PREFIGURATIVE MOBILE LEARNING
in rosario

CONTEXTUAL DESIGN DRIVERS

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CENTRIPETAL ZONING

ROSARIO 1930-1980's

Between the 1930's and the 1980's the inhabitants of Rosario began to settle in centripetal circles segregated according to class. This orderly although extreme zoning of the city lead to the rich occupying the centre, the middle class the middle ring and the urban poor being confined to the peripheral ring, with the incidence of enclaves of ectreme poverty, otherwose known as informal settlements. This latter category expanded and today it encompasses some 35.000 families in Rosario.

Present day settlements in Rosario

Informal popular settlements

Source: Rosario Habitat (2011)

3rd ring
the periphery
urban poor

2nd ring
the centre
middle class

1st ring
the centre
upper class

"The city which has been delineated by the current socialist government is not the city that the majority of Rosarians imagined. It is a city that continues to exclude those who were already excluded and continues to favour those who from the beginning enjoyed a high purchasing power."
TONI SALINAS, giros

COLONISING THE PERIPHERY

ROSARIO 1980's-2000's

THE FRAGMENTED CITY

From the 1980's, the urban fabric began to shift leading to a fragmentation of the traditional zonification into class segregated circles. The very rich began to move to the outer circle of the city, wanting the peace of a rural lifestyle while preserving the proximity to the cities amenities. Pockets of wealth began to progressively colonise the margins of Rosario through the spatial typology of gated communities. These *countries* as they are known in Argentina, are typically developed by private limited companies buying cheap public land from the Municipality. The problem is that said land is seldom uninhabited...

Pockets of wealth

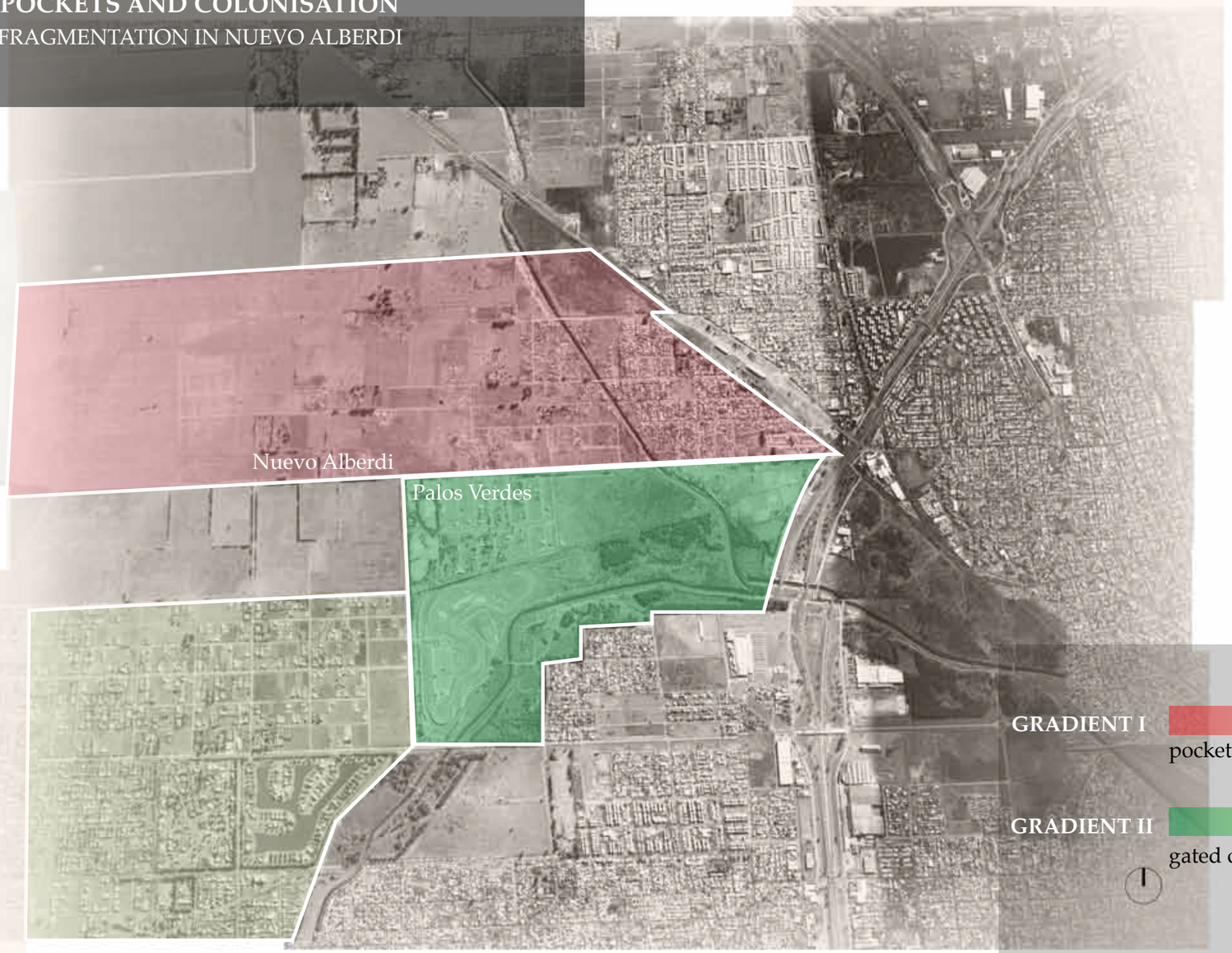
Pockets of poverty

"Underneath each gated community in Rosario there is a history of informality, of popular settlements"

TONI SALINAS, Giros

POCKETS AND COLONISATION

FRAGMENTATION IN NUEVO ALBERDI



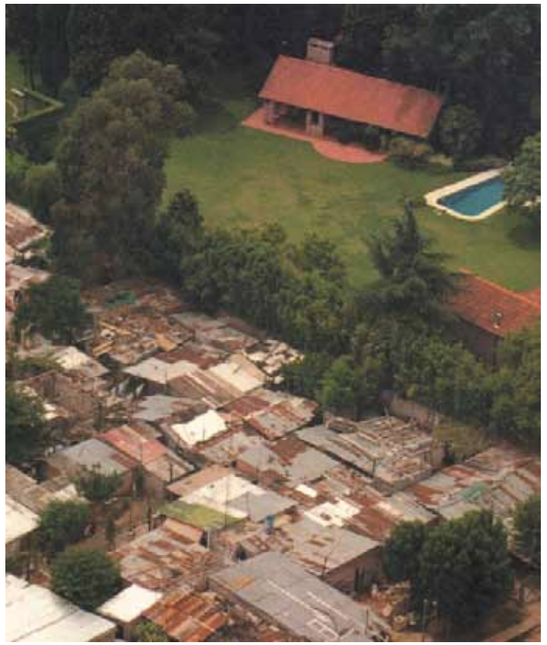


Image source: Giros (2007:5)

GRADIENT I — **POVERTY SCALE**

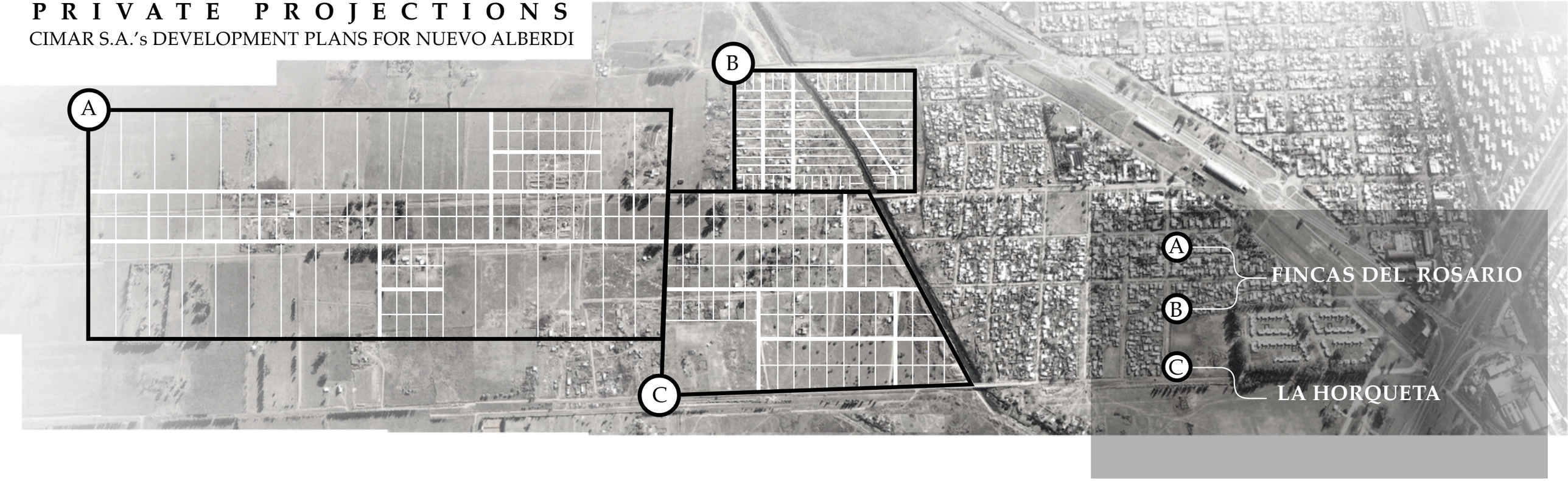
pockets of extreme poverty to working class settlements

GRADIENT II — **WEALTH SCALE**

gated communities to upper middle class settlements

PRIVATE PROJECTIONS

CIMAR S.A.'s DEVELOPMENT PLANS FOR NUEVO ALBERDI



PRIVATE PROJECTIONS
EVICTION STRATEGIES BY CIMAR SA

Source: Giros (2008/2: 4)

GHOST INFRASTRUCTURE

THE THREAT OF A FUTURE OF EXCLUSION

"Space is not, contrary to what others may think, a reflection of society but one of society's funda- mental material dimensions and to consider it in- dependently from social relationships (...) is to destroy the first principle of any social science: that matter and consciousness are interrelated, and that this fusion is the essence of history and science."

Castells (1983:311)

Gas cabinets in Nuevo Alberdi

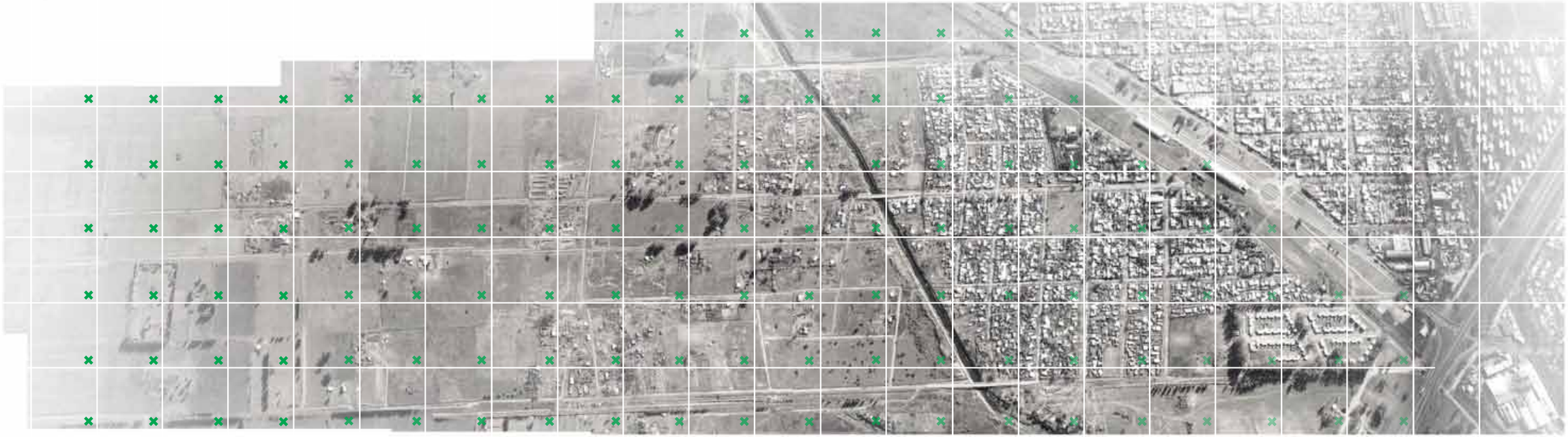
Gas cabinets in Palos Verdes

LAND TENURE CONFLICT INTENSITY

The diagram illustrates where the conflicts pertainingland tenure are strongest in in terms of advancement from the private developers in the territory of Nuevo Alberdi. For this purpose the map of the neighbourhood has been divided by a grid of the approximate dimension of a standard city block, 150mx150m. The intensity of the × indicates the severity of the conflict in that particular square.

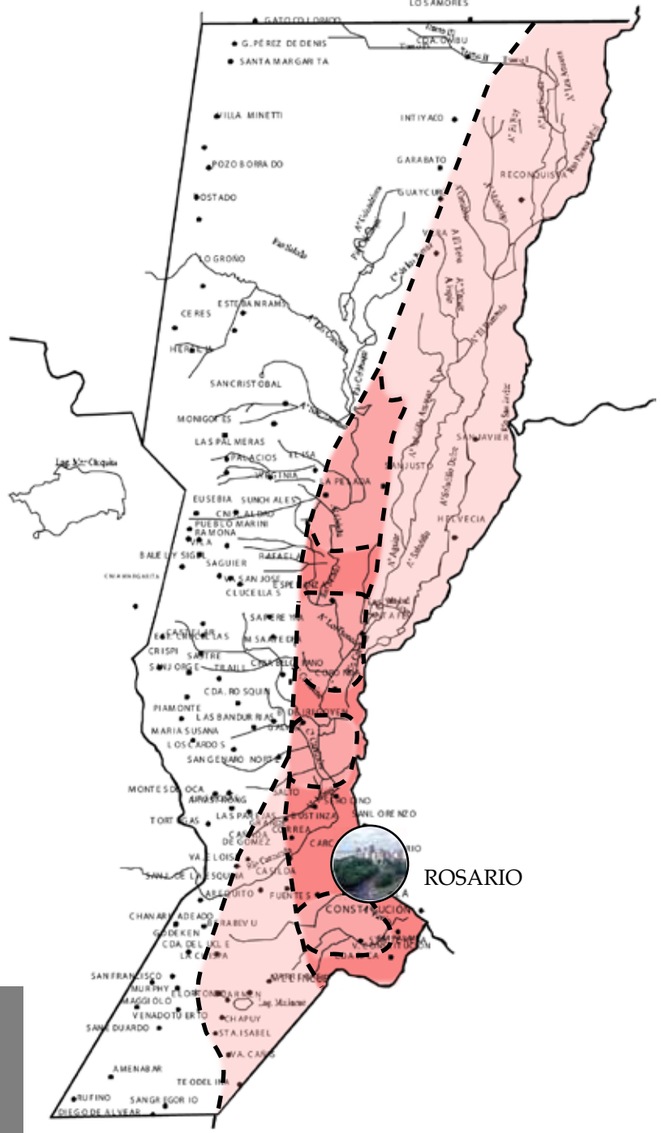
strong advances from CIMAR S.A. ×

some advances from CIMAR S.A. ×



POTABLE WATER SOURCES
IN THE PROVINCE OF SANTA FE

While a large portion of the Provice of Santa Fe suffers from very poor access to potable water sources, Rosario is located in an area which has an abundant supply of water suitable for drinking. This is mainly due to the city sitting on the coast of the Paraná River, the second longest river in Latin America.



no direct sources of drinking water
limited sources of drinking water
some sources of drinking water
abundant sources of drinking water

Source: Aguas Santafesinas

A WATER ACCESS IN ROSARIO
A PROBLEM OF DISTRIBUTION

While Rosario has ample access to sources of potable water, the conflict in the city lies in the distribution system of the same, particularly to the precarious pockets of poverty already highlighted in the previous section.

As shown by the diagrams, the case of Nuevo Alberdi is no exception, and the settlement currently is neither connected to the cities water distribution system nor to the sewage system. So how do the neighbours of Nuevo Alberdi access their water...?

Rosario water distribution system

Rosario sewage system

existing water mains
proposed water mains
proposed water treatment plant
existing water treatment plant

source: Aguas Santafesinas
diagrams by Carmelia Paramasivan

INFRASTRUCTURE, EXCLUSION AND GAS CARAFES

"94% of the land plots (of Rosario's 110 informal settlements) are hooked up unreliably to the electrical network, in 74% black water is eliminated through tanks with no sceptic membrane and in 75,3% of the cases the plots are connected informally to the water network. 98%, in turn, use delivered gas carafes for cooking."

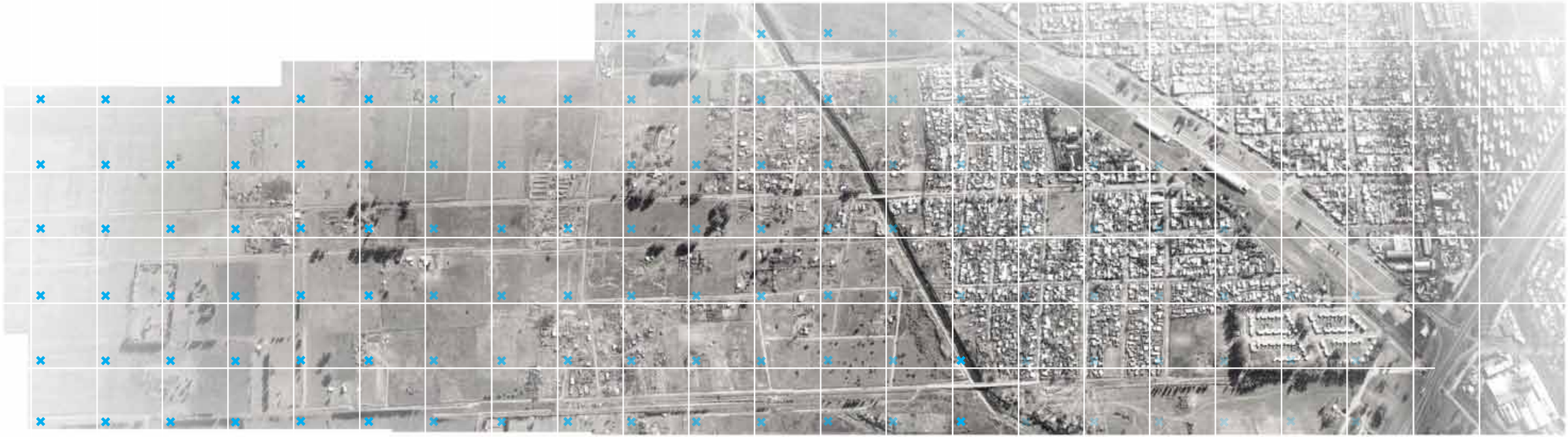
Clariín, 18 November 2013

WATER CONFLICT INTENSITY

The diagram illustrates where the conflicts pertaining distribution of potable water are strongest in the territory of Nuevo Alberdi. For this purpose the map of the neighbourhood has been divided by a grid of the approximate dimension of a standard city block, 150mx150m. The intensity of the × indicates the severity of the conflict in that particular square.

no access to water distribution network

some water distribution network

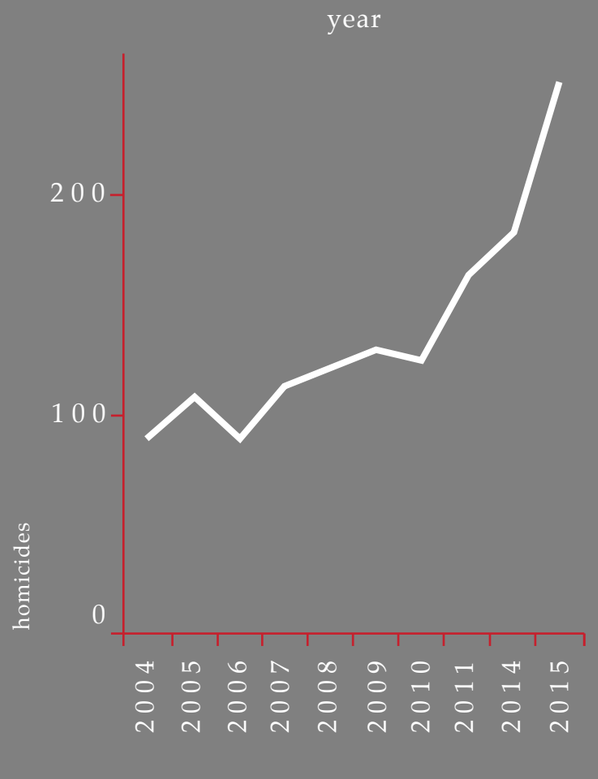


NARCOTICS AND VIOLENCE
DRUG RELATED HOMICIDES 2012-2013

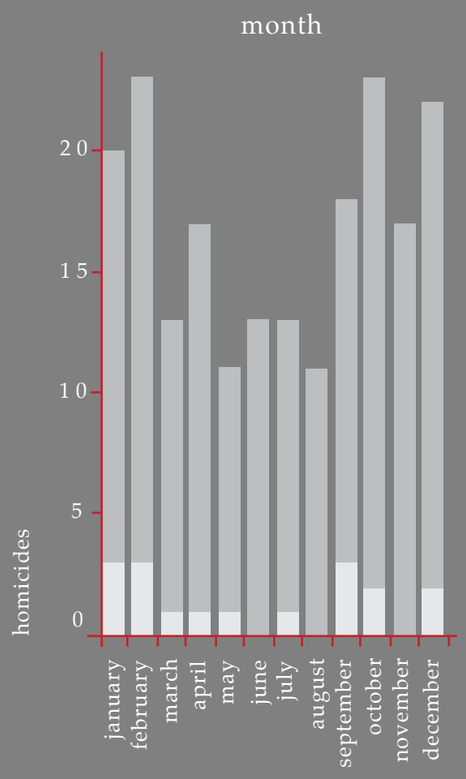
Source: Calles Perdidas: el avance del narcotráfico en Rosario

NARCOTICS AND VIOLENCE
GROWING HOMICIDE RATES IN ROSARIO

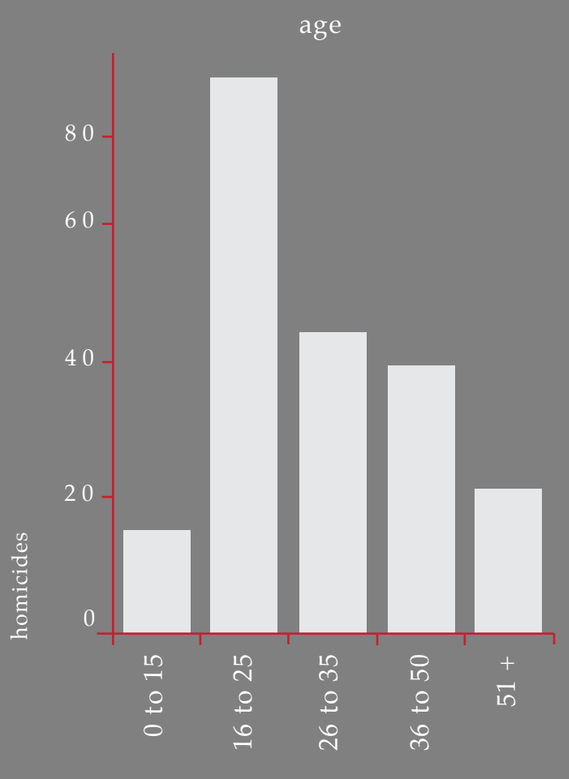
The below charts illuminate the exponential increase in cases of fatal violence in Rosario, directly correlated, according to the group Calles Perdidas from the University of Rosario, with the growth of the narcotics industry in the city. The demographic most affected -16-25 year-old males- are, likewise, the group most likely to be recruited as *soldaditos*, the gun-bearing frontmen of the druglords, typically payed 300 pesos/day for enforcing the narcotics law.



Total homicides per year in Rosario from 2004 to 2013



Homicides according to gender in Rosario from January to December 2013



Homicides according to age group in Rosario from January to December 2013

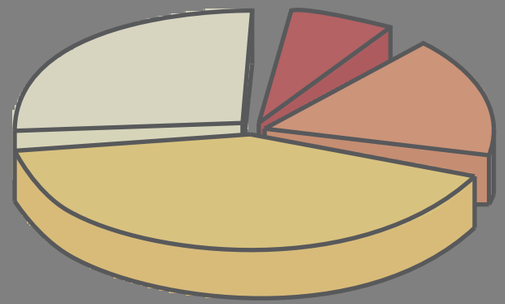
Source: Calles Perdidas: el avance del narcotráfico en Rosario

MATERIAL RESISTANCE OF HOMES

CALMAT INDEX IN NUEVO ALBERDI

There is an increased incidence of narcotics related violence in Rosario, a hightened risk of stray bullets and a low material resistance to such ballistic antics in the peripheral settlements where the narcotics violence tends to occur. The resonance of resistance to the onslaught of drug violence in this social housing typology will then propose to increase the CALMAT index of the dwellings and protect the neighbours from further tragedy in a non-confrontational way.

CALMAT index :
An index which defines and categorises housing in Argentina in accordance to the quality of the building materials of its structural components.



CALMAT I 9/113 homes 7.7%
The dwelling presents solid and resistant materials in all its structural components (floors, walls and roofing) and encompasses all the necessary insulation and finishing.

CALMAT II 21/113 homes 18%
The dwelling presents solid and resistant materials in all its structural components but lacks appropriate insulation and/or finishing.

CALMAT III 51/113 homes 45%
The dwelling presents solid and resistant materials in all its structural components but lacks appropriate insulation and finishing in all aspects. Walls and/or roofing constructed of metal sheeting or asbestos cement or with no ceiling.

CALMAT IV 32/113 homes 28%
The dwelling presents non-resistant materials with marked lack of solitdity or waste-materials in at least one of the structural components.

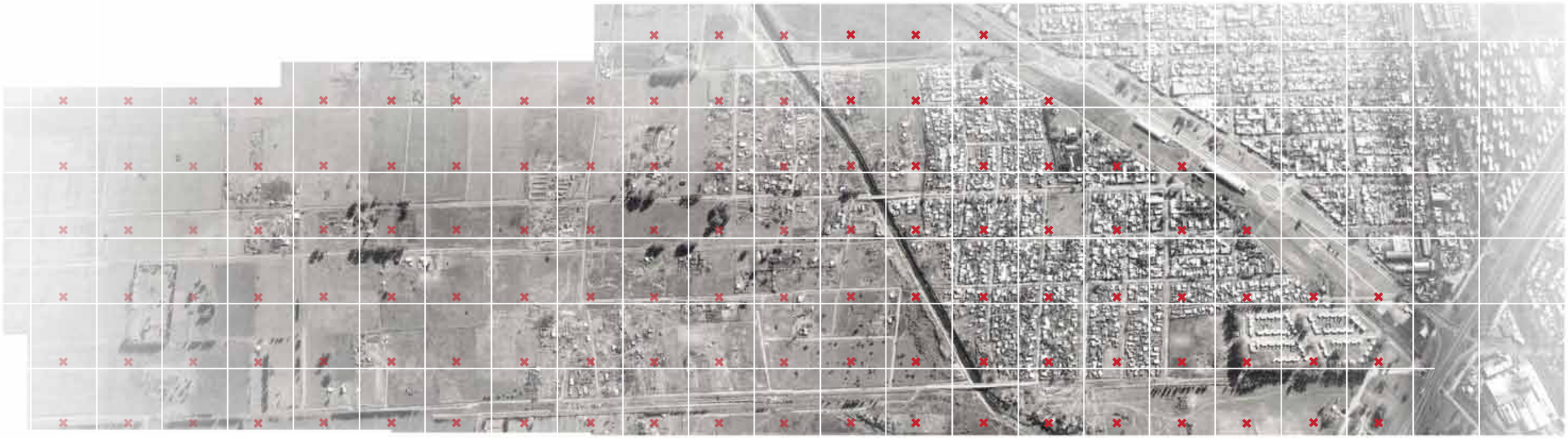
Sources: The World Bank (2010: 19) & Giros (2008)

NARCOTICS CONFLICT INTENSITY

The diagram illustrates where the conflicts pertaining narcotics, and hence threats of firearm violence, are strongest in the territory of Nuevo Alberdi. For this purpose the map of the neighbourhood has been divided by a grid of the approximate dimension of a standard city block, 150mx150m. The intensity of the × indicates the severity of the conflict in that particular square.

intense threat of violence ×

some threat of violence ×

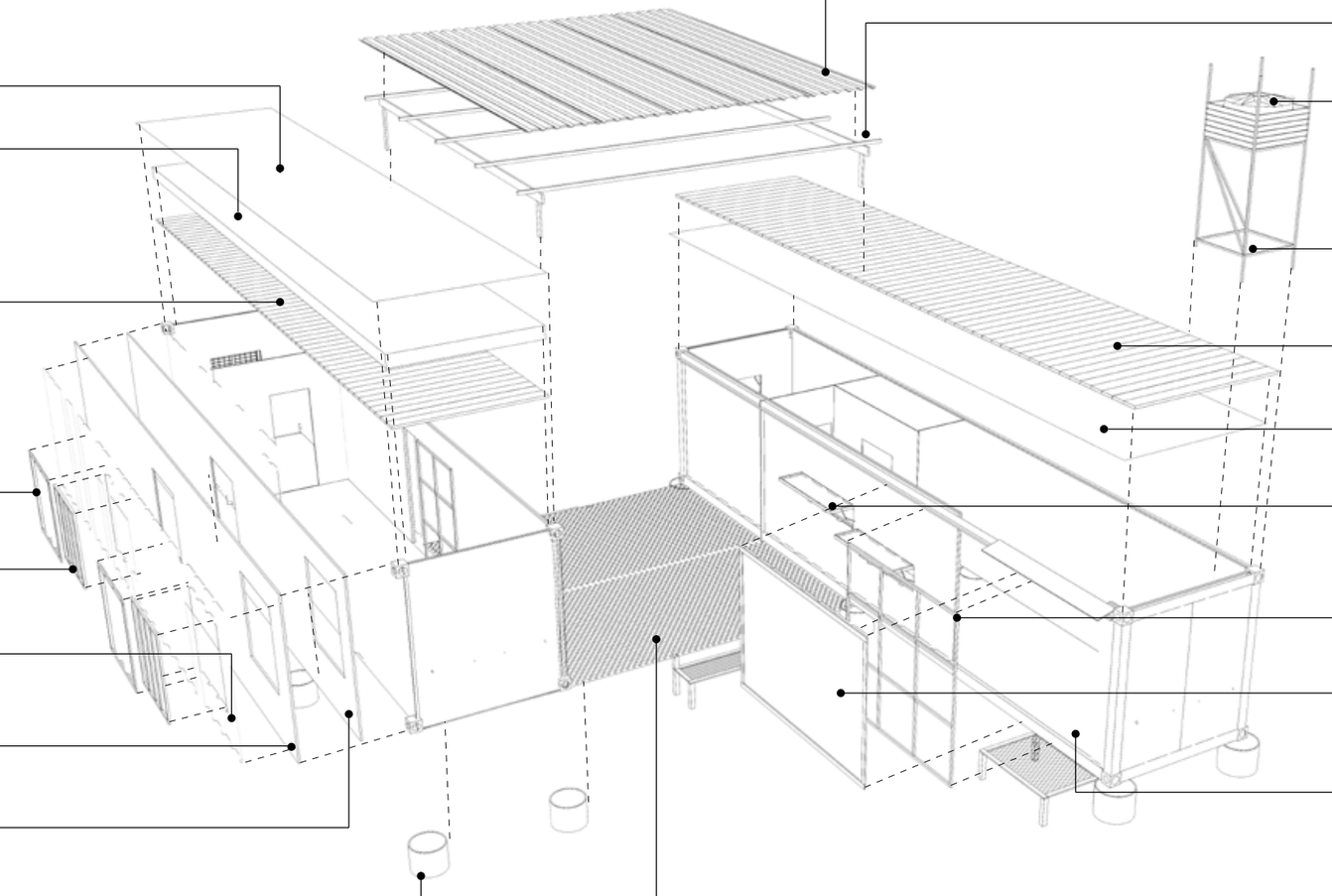


PRECEDENT ANALYSIS

GIROS CONTAINER PROTOTYPES

PRECEDENT ANALYSIS

GIROS CONTAINER PROTOTYPES
EXTERIOR ARTICULATION



upper container wall
2mm corrugated steel

inner roof insulation
30mm fibreglass

inner roof insulation
palette wood planks

sliding shutters
2mm container wall cut-outs

windows
glass and steel mullions

container side wall
2mm corrugated steel

wall insulation
30mm styrofoam (20 kg/m^3)

inner wall cladding
20mm corrugated PVC

foundations
6x halved 200 l. oil drums
filled with concrete

patio roof.
1 mm corrugated steel

patio roof structure.
50 mm soldered steel beams

water storage tank
PVC, 60 litres

tank tower.
palette wood + steel pipes

outer roof inuslation
palette wood planks

upper container wall (roof)
2mm corrugated steel

tip-up windows
2mm container wall cut-out

inner door
glass + lacquered steel mullions

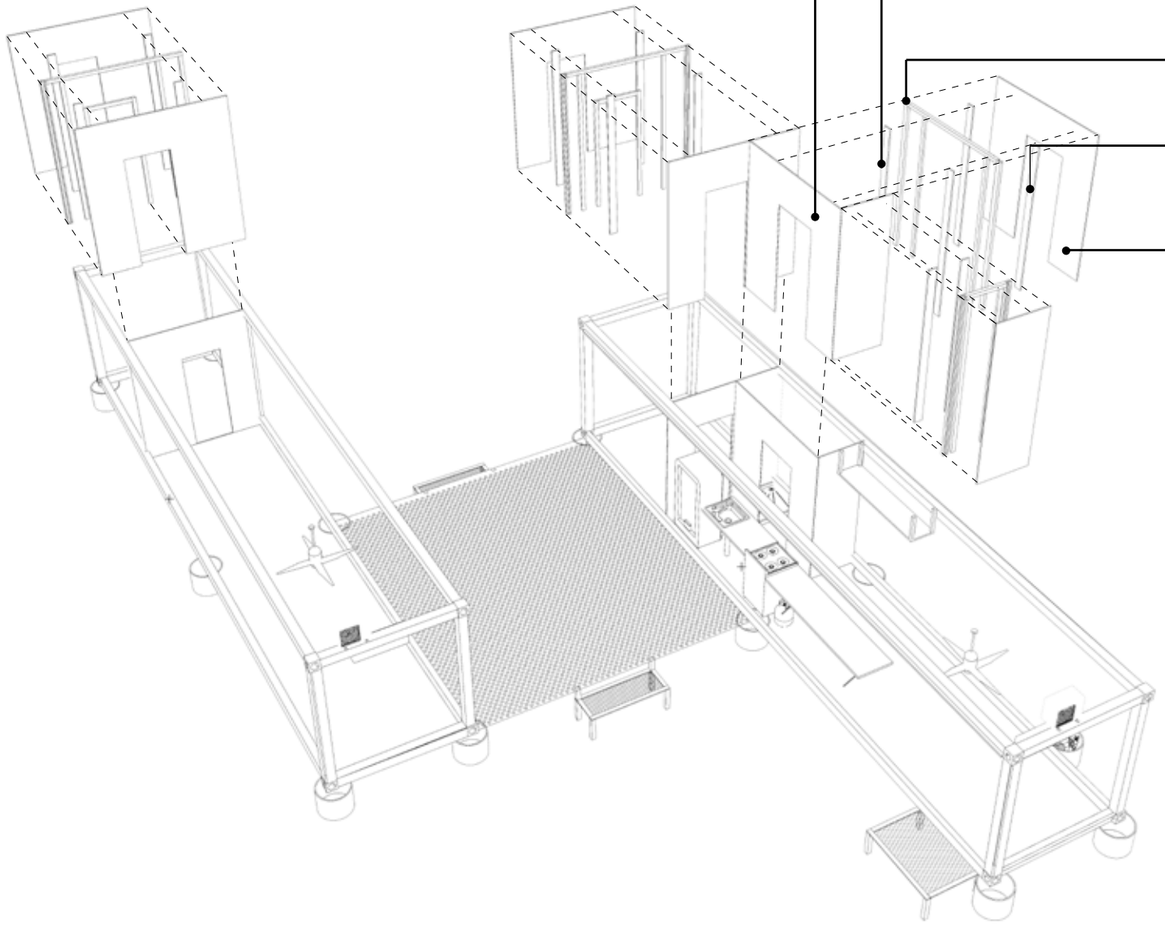
sliding outer door
2mm cutout from container wall
mounted (hanging) on steel runner

inner floor
plywood
preexisting container floors

elevated patio floor
soldered perforated metal sheeting

PRECEDENT ANALYSIS

GIROS CONTAINER PROTOTYPES
INTERIOR WALL ARTICULATION



wall cover
10mm precast plaster

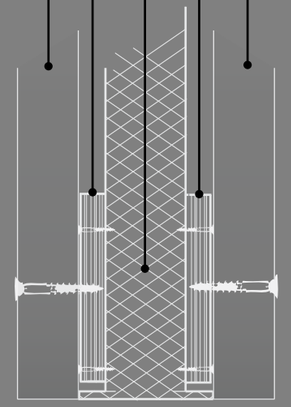
joists
4mm plywood

frame
10 mm aluminium

joists
4mm plywood

wall cover
10mm precast plaster

Detail of panels
1:1



PRECEDENT ANALYSIS

POST-OCCUPANCY EVALUATION

In conversation with the previous and current occupants of the dwelling container prototypes, as well as with the workers who helped build them, something akin to a post occupancy evaluation began to take form, which will be illustrated on the following pages.

CONTAINER I

construction time: 5 weeks

Because this project was not only the first prototype of a dwelling container but the first time Giros had engaged in a construction project from scratch, the post-occupancy evaluation will also show a considerable number of negative comments concerning it.

CONTAINER II

construction time: 2 weeks

The second container shows a number of constructive improvevments over the first, as the post-occupancy evaluation will show. It is worth noting, however, that it houses neither bathroom nor kitchen, and is thus releived of the technical burden of gas and water installations, which can be problematic in any architectural project.

PRECEDENT ANALYSIS

POST-OCCUPANCY EVALUATION
EXTERIOR ARTICULATION

CONTAINER II

insulation

+ more efficient as insulation
+ aesthetically pleasing

windows

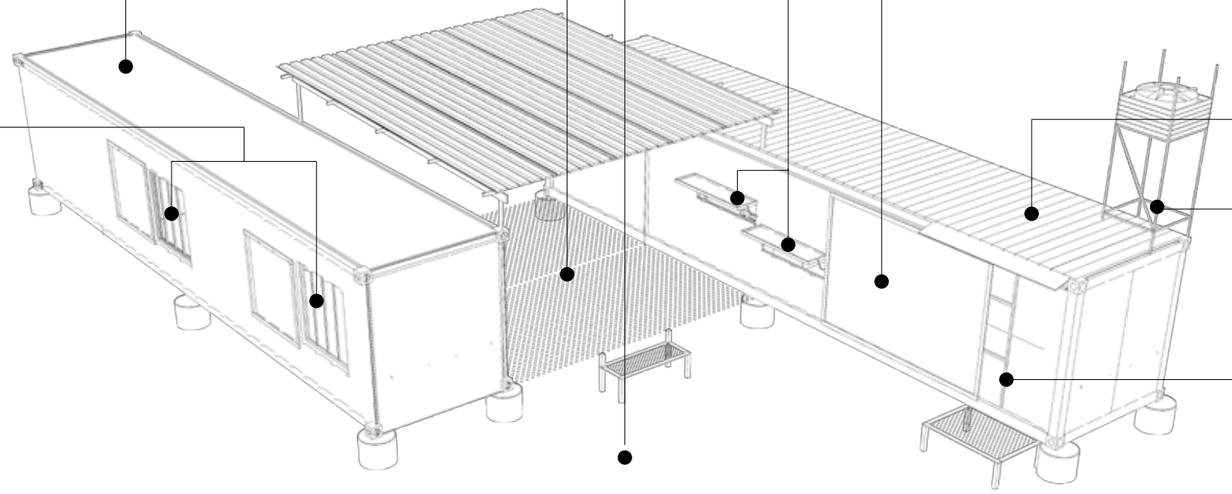
+ larger gives more light
+ window placement opposite door = cross ventilation

outdoor circulation area

− no ground cover = gets very muddy with rain

covered patio

+ perforated mesh = cooling draft in summer
+ most used space



CONTAINER I

windows

− too small = dark
− too small = no ventilation

sliding door

− cut too near top beam = compromises structural integrity of roof
− too large = heavy

insulation

− unsuccessfull. partially destroyed in storm

water tank

− placed above door = overflows = water gets inside

inner glass door

+ good view while sheltering from the elements

PRECEDENT ANALYSIS

POST-OCCUPANCY EVALUATION
INTERIOR ARTICULATION

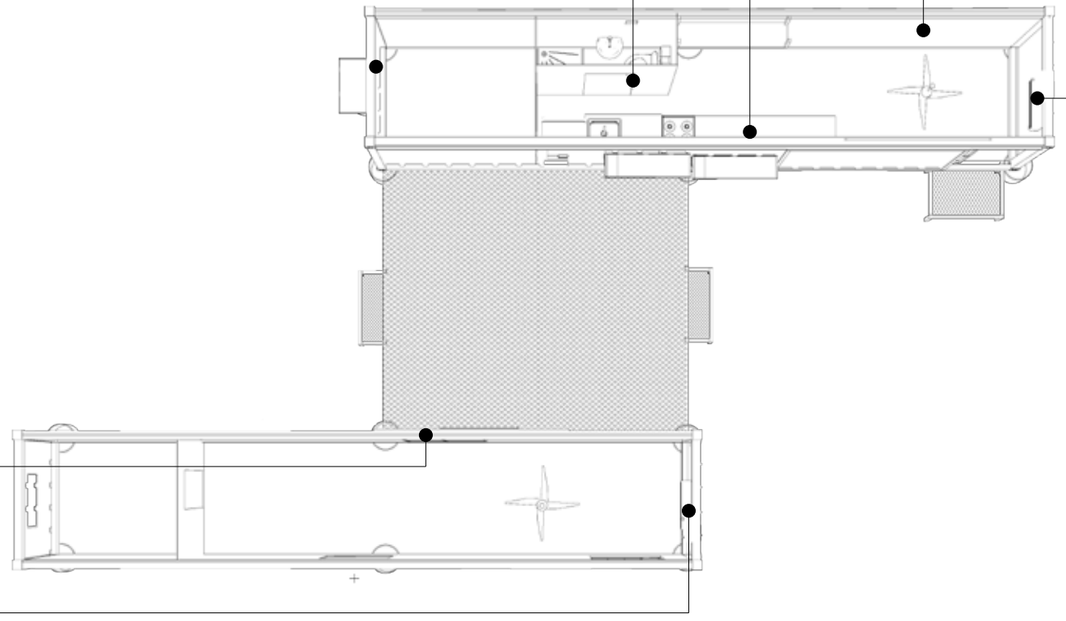
CONTAINER I

bathroom
- mouldy walls from shower
- too small

kitchen
- no storage

PVC wall cladding
- falls off/breaks
- looks ugly

AirCon
- doesn't turn on due to electricity glitches



CONTAINER II

sliding door
- appropriate dimensions +
- aids cross-ventilation +

AirCon
- doesn't turn on due to electricity glitches -

NOTE

The evaluation here stated are the opinions of the occupants, neighbours and activists associated with the containers, not the author.

TECHNOPOPULAR KNOWLEDGES
CONSTRUCTION PRACTICES

CARPENTRY

ELECTRICAL SAWS

BRICK MASONRY

WELDING

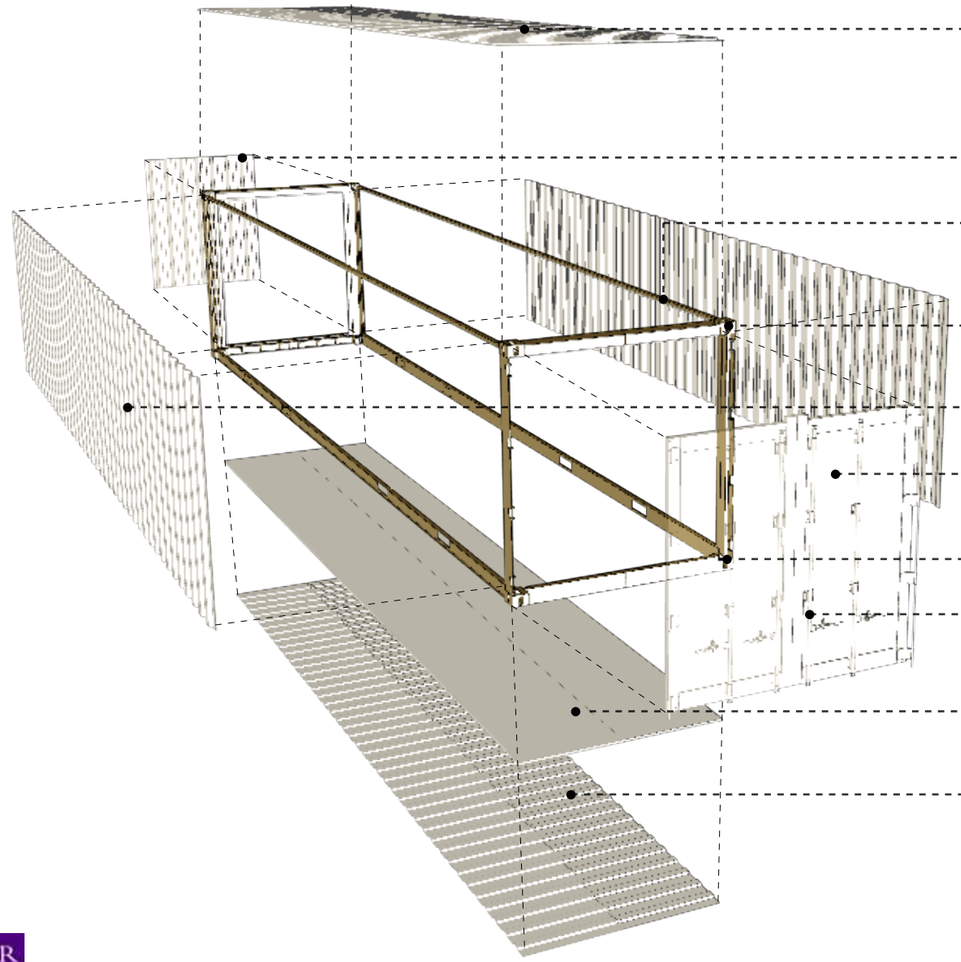
MINOR ELECTRICAL TOOLS

MATERIAL EVALUATION
SHIPPING CONTAINERS

"Here in Nuevo Alberdi all weather conditions are exaggerated. The wind is exaggerated. The heat is exaggerated. The cold is exaggerated. Everything is at the mercy of the elements. Things break. Deteriorate. That is why the containers are so good. They resist the climate."

MARIA LLERA
G I R O S

MATERIAL EVALUATION
SHIPPING CONTAINER COMPONENTS



As the diagram shows, the bearing structure of the container is entirely in the internal structural frame, giving the material a constructive and formal flexibility

top wall

back wall

structural frame

corner casting

side wall

door leaf

forklift pockets

door locking bar

wooden floor

bottom wall

CONTAINER DIMENSIONS

2.45 m x 12 m x 2.6 m = 76.4 m^3

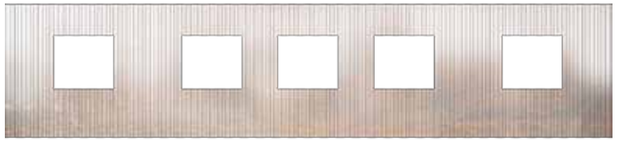
2.45 m x 12 m = 29.4 m^2

STRUCTURE AND WALL ELEMENTS
SECURITY AND FLEXIBILITY

The strucutural nature of the shipping container's iron frame makes the module a means of erecting the basic structure of a dwelling quickly in response to -for instace- accute need or land tenure conflict.

This same trait in the frame component lends the walls of the container a high degree of versatility in terms of form, allowing for perforations and removals of whole sections of wall without affecting the structural integrity of the building as a whole.

Hence, the shipping container as abuilding material for social housing offers both a degree of security and flexibility in the context of the reviewed conflicts.

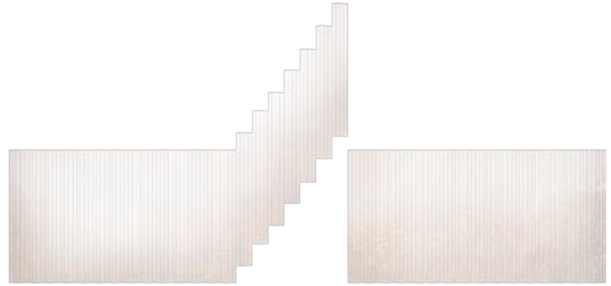


Thermal conductivity

50.000 W/mk

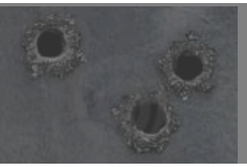
Specific heat capacity

480 J/kgK



Density

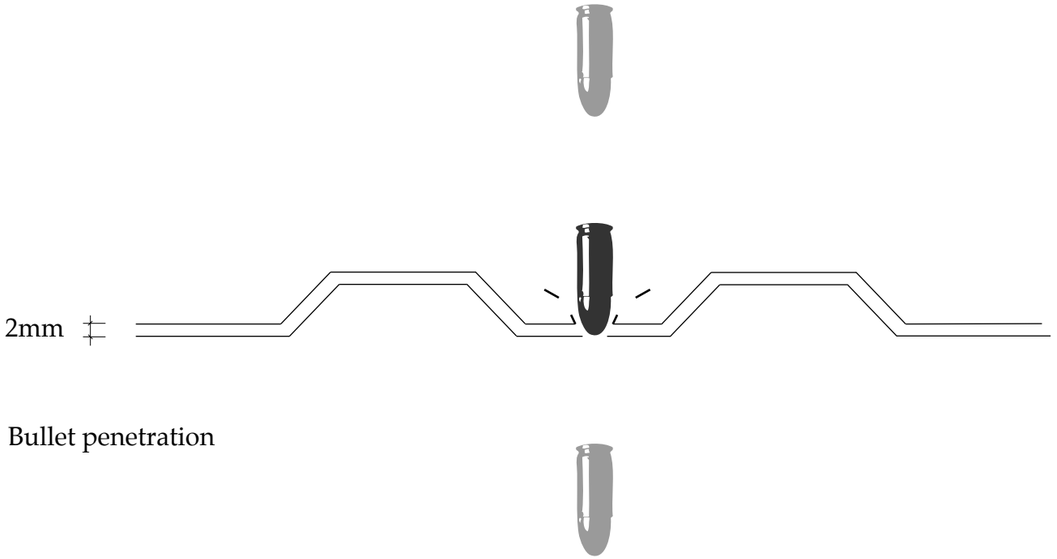
7800 kg/m^3



MATERIAL EVALUATION
CONTAINERS GONE BALLISTIC

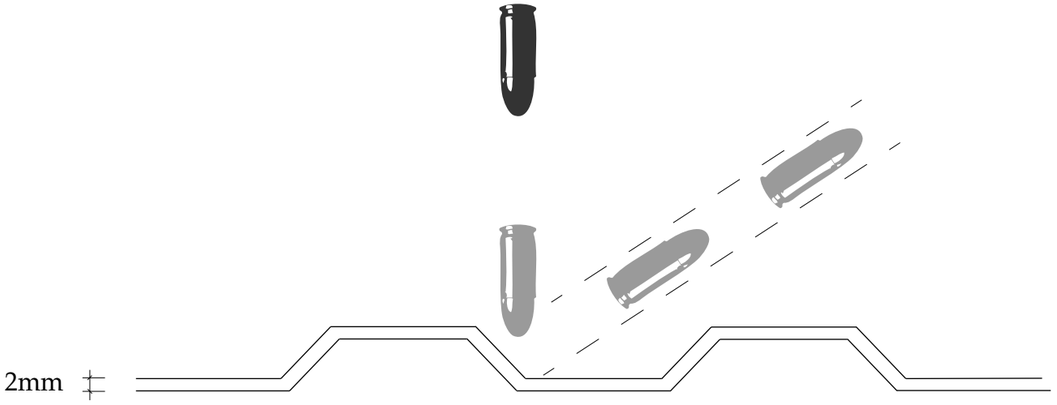
Due to the risk implied by stray bullets in the neighbourhood and the subsequent need for bullet-proof social housing, the shipping containers' resistance to ballistic impact becomes relevant.

According to sources researched, the 2mm corrugated steel material which conforms the wall elements of the container cannot be trusted to withstand the impact of the 9mm bullets commonly used by the soldaditos narcos who operate in Rosaro's deprived neighbourhoods.



Bullet penetration

In the case of a frontal impact, it is likely that the bullet would penetrate the steel plate entirely. If the bullet were to impact the steel at an angle, hit a small dent in the metal or one of the angles of the corrugation in an awkward way, however, a piercing of the material would not occur. In this case, there is a high posibility that the bullet would ricochet, risking the wounding of people in the vicinity of the conflict.



Bullet ricochet

Sources: Steel Plate Penetration Testing (2013); The Firing Line (2002)

MATERIAL EVALUATION
HAND CUT ADOBE

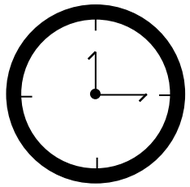
"That's the thing with brick pits: they provide work for people from here. *From this neighbourhood. Not everyone knows how to make brick, but Nuevo Alberdi was brought up on it."*

Oscar
Brick oven owner, Nuevo Alberdi

MATERIAL EVALUATION
HAND CUT ADOBE

There are approximately 80 brick ovens in the territory of Nuevo Alberdi, making it the main occupation of the settlement along with cattle-farming. While hand-cutting brick is not unique to the neighbourhood, the practices and knowledges involved in such artisanal work are by definition linked to local -popular- knowledges and practices which can only be disseminated by word of mouth.

LOCAL

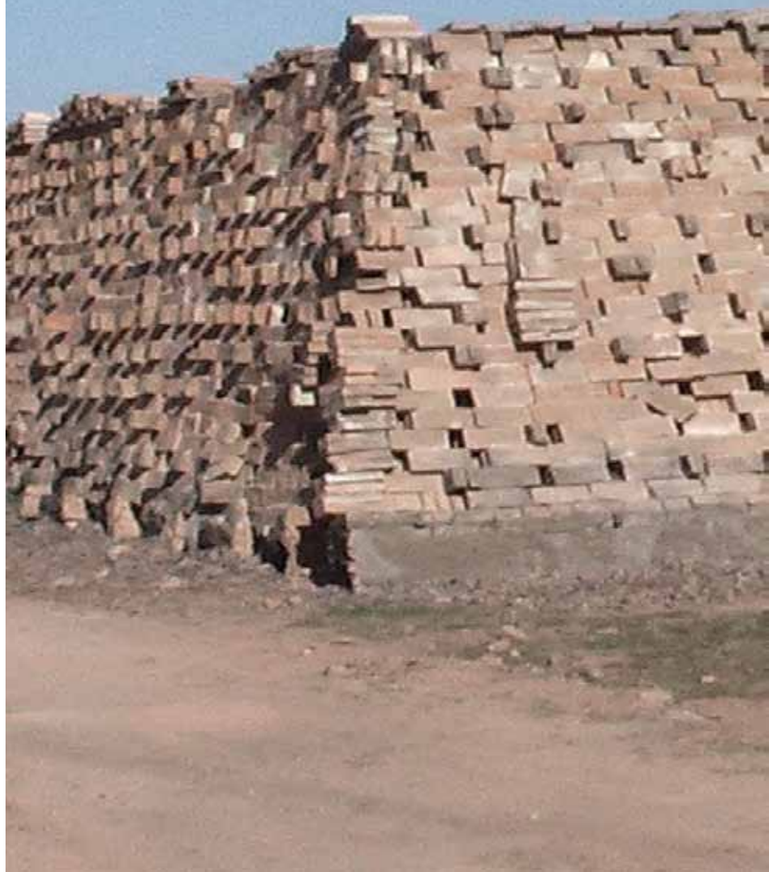


TIME CONSUMING

PRONE TO VANDALISM

So why not use local, hand cut brick instead of shipping containers?

The risk of vandalism (from CIMAR, soldaditos, rival settlers, movement opponents, etcetera). Building a structure with bricks takes a lot longer than converting a container into a suitable dwelling and it is easy for adversaries to come at night and knock down in half an hour what took a builder a day to achieve.



MATERIAL EVALUATION
POPULAR BRICK KOWLEDGE

NUEVO ALBERDI BRICK RECIPIE:
gives approximately 15.000 bricks

Ingredients

9 power shovels earth (black or red)

4 power shovels organic matter (horse or cow manure)

3 power shovels fine wood chips

Sunflower seeds to taste (for colour)

Water to cover

Instructions

1. Add ingredients to large pit *(pisadero)* in ground and cover with water pumped from a perforation.
2. Mix for a day using large mechanical wheel pulled by horse or tractor.
3. Allow to settle for one day or until mix reaches desired consistency.
4. Cut using a 250x120x50mm wooden mould, water as lubricant and expert workforce.
5. Place raw cut bricks in rows with largest surface area towards the ground to dry for 12 hours to 3 days, depending on weather conditions.
6. Once the bricks have acquired a paler colour, stack vertically in a diagonal formation with alternating angles -allowing air to circulate between the bricks- and allow to further dry for 7 to 20 days depending on weather conditions.
7. Once fully dry, use bricks to build an oven with grooves at the base to insert fire wood. Light fires under the bricks and bake for 9-10 hours at 900 ºC.

MATERIAL EVALUATION
POPULAR BRICK KOWLEDGE

There are certain wisdoms which can only be learned by talking to those who know. Who live and breathe the territory.

For instance, Rubén -who has lived in Nuevo Alberdi since he was born 67 years ago and worked in the construction industry his whole life- told me about soil types and binding agents...

There are two types of soild used in the adobe mix:

RED

Found 2 m down and of a sandier texture.
Best mixed with cow manure as binding agent. Horse manure in red earth leads the adobe to crumble.

BLACK

Surface soil. Clayier texture.
Best mixed with horse manure as binding agent. Cow manure in black earth leads the adobe to crumble.

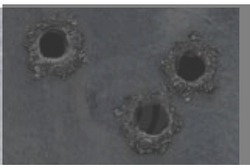
MATERIAL EVALUATION
FROM BRICK TO RAW ADOBE

While bricks are a readily accessible material in Nuevo Alberdi, they require a considerable amount of infrastructure resources and workforce to be produced and are hence not necessarily easily procured, as has been shown in the above recipie.

The ingredients for the bricks, however, happen to be the same as those required to produce raw adobe and cob, both notoriously resistant building materials with good thermal properties for insulation. The principle applied when using cob or raw adobe is the same as the technique used for rammed earth constructions, namely that of stomping the material to achieve a compact result, subesquently letting the element dry in the sun.

It is fundamental when using raw adobe, cob and rammed earch bulding techniques that the top and bottom of the element are capped to protect the material from rain. If this is done, there is, according to The Cob Builder's Handbook, little or nothing which will destroy the material.

Source: Bee (1997:4)



MATERIAL EVALUATION
ADOBE GONE BALLISTIC

HYPOTHESIS

The working hypothesis -arrived at through discussions with Rubén- is that weather cooked or raw, the adobe material would work to absorb the impact of stray bullets, leading them to lodge in the material, regardless of angle of entry -if the panel is thick enough.

The hypothesis will be tested further along as the project progresses by... well... shooting a panel of raw adobe with a 9mm bullet.