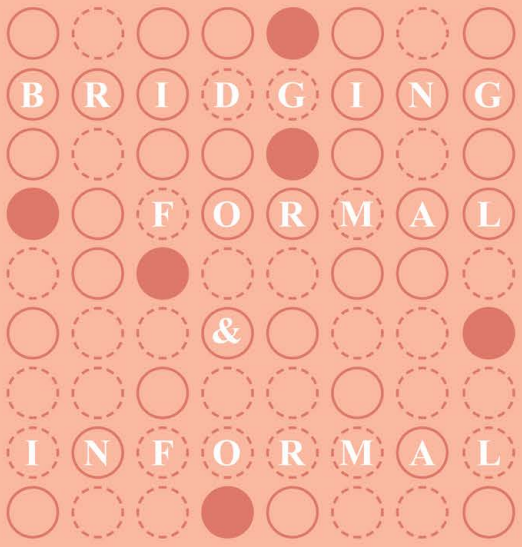

Masters in Architecture Thesis Program 2020

Chiayin Hsu 180115
Architecture and Extreme Environments
The Royal Danish Academy of Fine Arts

Bridging
Formal & Informal

Architecture Master Thesis Program 2020

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formal
noun

1. belonging to or constituting the form or essence of a thing

2. relating to or involving the outward form, structure, relationships, or arrangement of elements rather than content

3. following or according with established form, custom, or rule

informal
noun

1. marked by the absence of formality or ceremony

2. characteristic of or appropriate to ordinary, casual, or familiar use

bridge
noun

1. a structure carrying a pathway or roadway over a depression or obstacle (such as a river)

2. a time, place, or means of connection or transition

Table of Contents

The pink pages, like this one, contain the information fundamental to this thesis program. They act as an aid for time-limited readers, enabling a quick, basic understanding of the project.

The Preface

This preface can be read as the entry point into an understanding of the thesis thematics; an overview of *What? Where? Why?* and *How?*

What?
The program addresses the multi-dimensionality of poverty in Antofagasta through a social housing functioning as an infrastructure bridging the formal and informal settlement.

Where?
The program is situated in Antofagasta, one of the wealthiest and most expensive cities in Chile as a result of mining activities. The region serves the Escondida mine, the largest copper mine in the world, whilst also responsible for 35% of global lithium extraction. Many people, both nationally and internationally, rushed to the city in search of a better life; as a result, the cost of housing has risen exponentially.

Why?
The region is suffering a crisis with an increasing population living in informal settlements; places where people self-build their homes on illegal plots with found and recycled materials. Over the past six years, the population in these informal settlements has increased by 70% with many seeing it as a replacement for social housing. Inequality is an immense issue here: some people can be on the waiting list for social housing for eight years and, as such, there is a high demand for housing that is affordable.

How?
In collaboration with TECHO Chile, this project will use the language of architecture at different scales, informed by the concept of the active form in the work of Keller Easterling, to bridge informality and formality. The investigation will then split into the following inquiries:

Celebrating Informality: Social inquiry
How can the language of architecture create common ground for the community and be inclusive and supportive? How do we let people value informality and understand the necessity of it?

Optimizing density: Technology inquiry
How can architecture provide a healthy environment for human beings in a saturated urban context?

Urban Disposition Protocol: Urban inquiry
Considering the project as an infrastructure to connect people, can it provide a framework that gives a boundary to the informality? Rather than perceiving the agency of infrastructure as a static arrangement, can we see it as a growing protocol providing software that regulates an urban disposition?

Academic Framework

This master thesis program has been prepared to inform an architectural project to be undertaken during Spring 2020 and developed within the Architecture and Extreme Environments program at the Royal Danish Academy of Fine Arts in Copenhagen, Denmark.

The program explores relationships between architecture, technology, and arts through a site- specific design approach; in this case initially explored during the previous semester with on-site fieldwork in Antofagasta Chile. The studio aims to respond to the present and future global challenges through an active expedition in which a 1:1 architectural prototype is put to the test to inform an innovative design. Specifically, my device discusses the privatized resources and social aspects explicitly within the informal settlements in the region.

Through the expedition work; experiencing, engaging and interacting with first-hand knowledge, the investigation has furthermore informed the basis for this architectural building program.

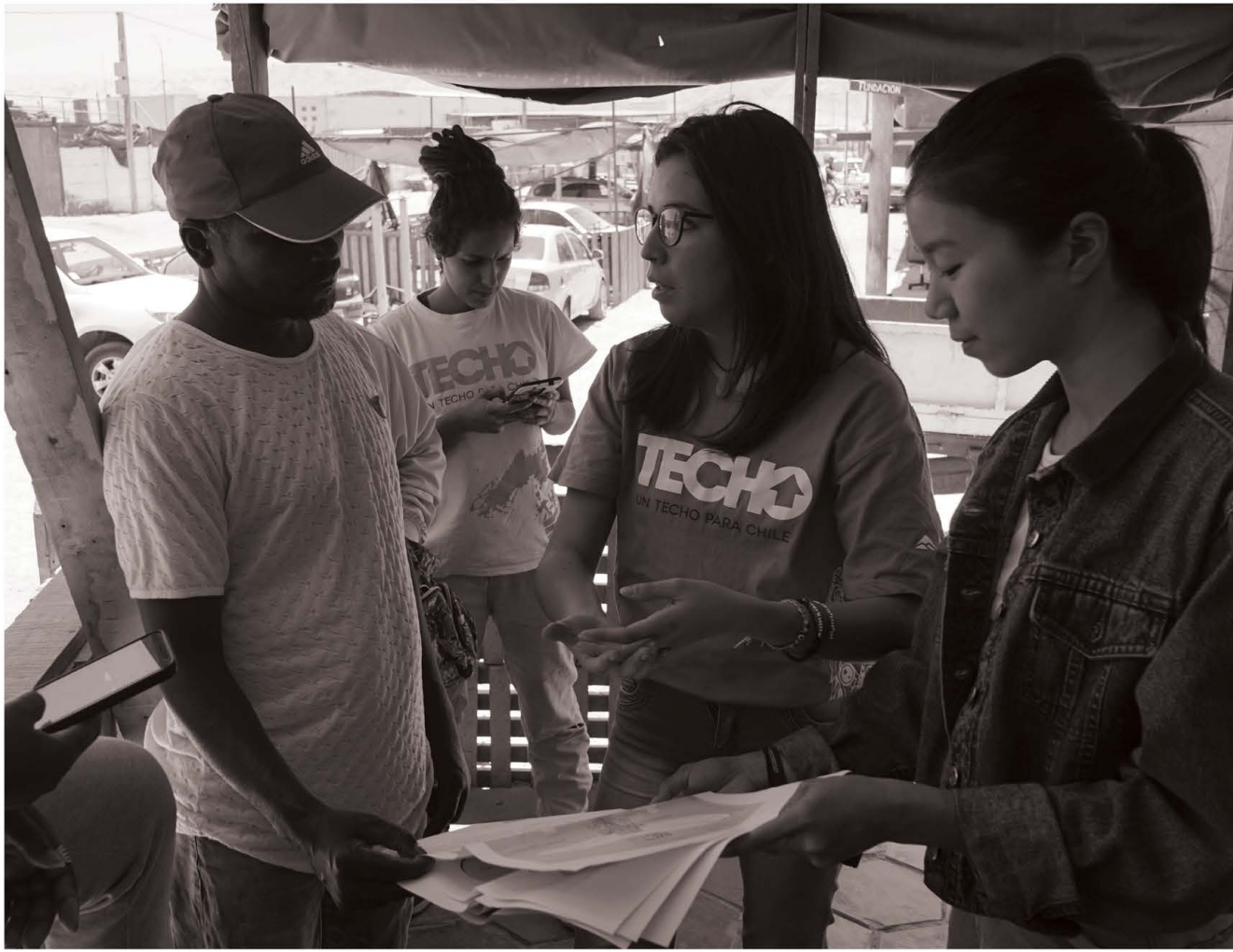
On-Site Research

During the on-site research conducted in the previous semester, I was fortunate to develop a close relationship with TECHO Chile which informed a constructive collaboration.

TECHO is a non-governmental organization working in informal settlements throughout South America. Their work seeks to provide communities with different tools so they are able to access essential services. One of their key aims is to empower communities through collaboration with skills training and connectivity so they gain autonomy and can sustain themselves.

With the help of TECHO, I am fortunate to have had the experience to work on a 1:1 prototype within an informal settlement in the region, Mejillones, and to have established a close relationship with the community. The result was a gradual process of discussions and considerations involving the different people and users of the prototype.

The materials presented in this program are principally empirical; first-hand data collected by the author through interviews, interactions with the people, and personal experiences.



Field work in the Informal Settlement, Mejillones *Fig I*

The Campamento

An informal settlement, which in Latin America is called a 'campamento', is described as such when eight or more families have built illegal dwellings on public or private plots, of which they do not have ownership. Most of the time, they have constructed their houses in precarious locations, and many lack at least one essential urban service such as sanitation, water, or electricity. These settlements tend to be urban areas that experience spontaneous growth, usually characterized by organic physical patterns that are built gradually over time as they respond to the need of communities. The situation of the 'campamento' has become a fact of life in the urban context of, not only Latin America, but also other developing countries.

Informality has many origins; low income, a lack of affordable dwellings in the formal city, unrealistic building regulations, city planning, a shortage of social housing, and dysfunctional legal systems. Residents in the 'campamento' risk many costs such as discrimination, lack of public services, environmental hazards, insecurity of building plots, and unequal civil rights. Additionally, local governments also face social costs, for instance, criminal violence, public health.

A massive relocation of 'campamentos' is unrealistic and financially impossible. For many years, the most significant challenges for the metropolitan areas in the Latin American nations had been, instead, improving the living conditions of the 'campamentos' and integrating them into the formal cities in situ.

Based on research figures from 2012, 24% of the urban population in Latin America is estimated to be living in a 'campamento', equating to millions of people living in informal cities, and it has become perhaps the most significant urban issue for architects nowadays. However, we should consider it an issue that should be thought about, not as a problem, as we are discussing citizens that live in risky and vulnerable conditions which require government services.

quote
Dr Ariel C. Armony
2014

24% of the urban population in Latin America is estimated to be living in a 'campamento'

Formality or Informality?

How do we understand the formal and informal settlements? What can we learn from one another?

During the fieldwork conducted in Antofagasta, an intermediate city located in the north of Chile, I observed a strong character of self-build and creativity in dwellings throughout the city, both in the formal and informal settlements. We can see self-built concrete block houses on legal plots, artistically painted walls in the formal city, and self-initiated green space in the public areas and on the sidewalk. The city is full of liveliness because of these autonomous creations by the citizens.

The autonomy of the informal settlements allows for flexibility and adaptability in reacting to the various community needs where, in many cases, the government is too slow in recognizing and solving these challenges and/or regulating the issue. For instance, when facing an emergency such as a fire disaster in the settlement, the network of sharing information between the informal settlements seems more efficient than the government authorities. Flexibility also appears when residents require transportation; they have a spontaneous transportation network that provides services for grocery shopping for the community living outside of public transport.

Houses in the formal city Antofagasta *Fig2*

Social Housing done by Elemental *Fig3*

Houses in the informal Settlements *Fig4*

Formality in Informality

We get a glimpse of the desire to formalize the informality in the campamento by looking at the autonomous street signage and naming within the community.

The communities often name the streets after the nationalities of residents.

The informal settlements have a denominated street system because, when seeking to participate in the labor market, a proper address can mean a better chance of getting a job. The fact of living in a ‘ campamento’ or in unofficial conditions is seen as undesirable to employers.

In the event of an emergency such as a fire, including the community in the formal system can make it easier for the authority to dispatch rescue and resettlement measures.

Street Names/ Sign in the Informal Settlement *Fig5*

“Welcome to the North Union Community”

“Welcome to High Sun Community”

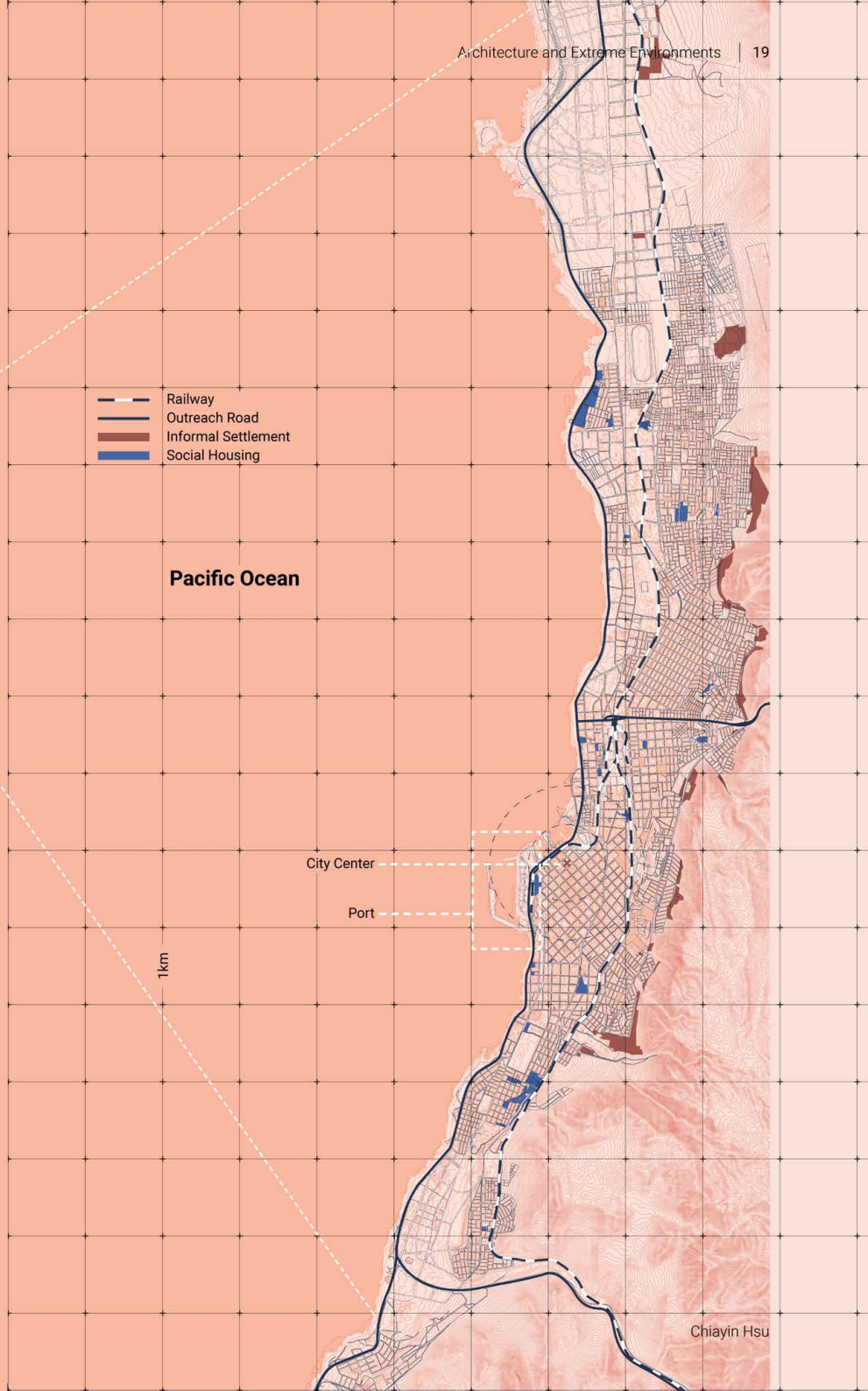
This is Antofagasta

23°38'47"S 70°23'53"W

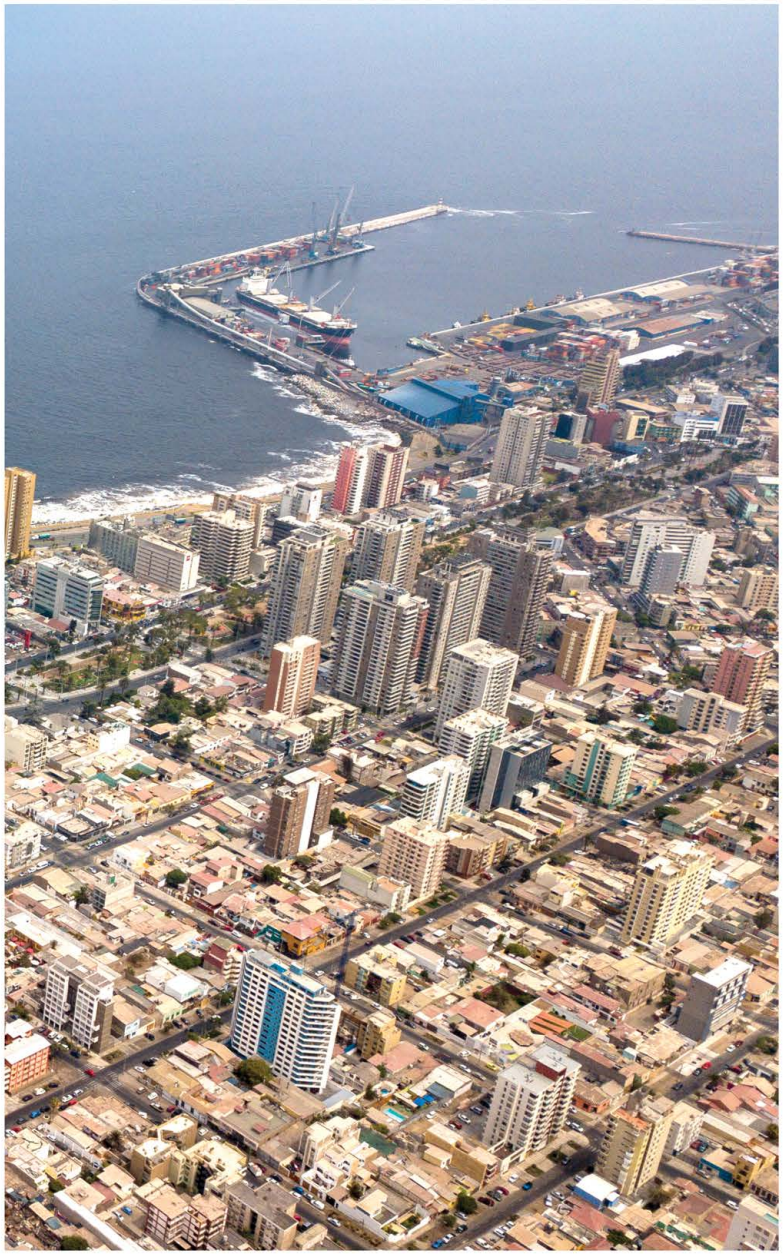
Area: 30,718.1 km^2
Population: 402,669 (2015)
Average Yearly Precipitation: 2.5mm
Average Yearly High Temperature: 20°C
Average Yearly Low Temperature: 14.3°C

The city of Antofagasta is a port city in northern Chile, bordered on one side by the pacific ocean, and on the other by the Chilean Coastal Range. It is a medium-sized city with more than half (66%) of the economic activity in the region devoted to the mining industry. Antofagasta is approximately 200km away from the mines and is experiencing rapid population growth, which puts much pressure on the urban system economically, socially, culturally, and physically.

The geographical conditions of this city are very narrow and long, 30 kilometers long from north to south, and 3 kilometers wide from east to west — Antofagasta is located in one of the most arid areas on earth, the Atacama Desert.



Antofagasta a Hilly City *Fig6*



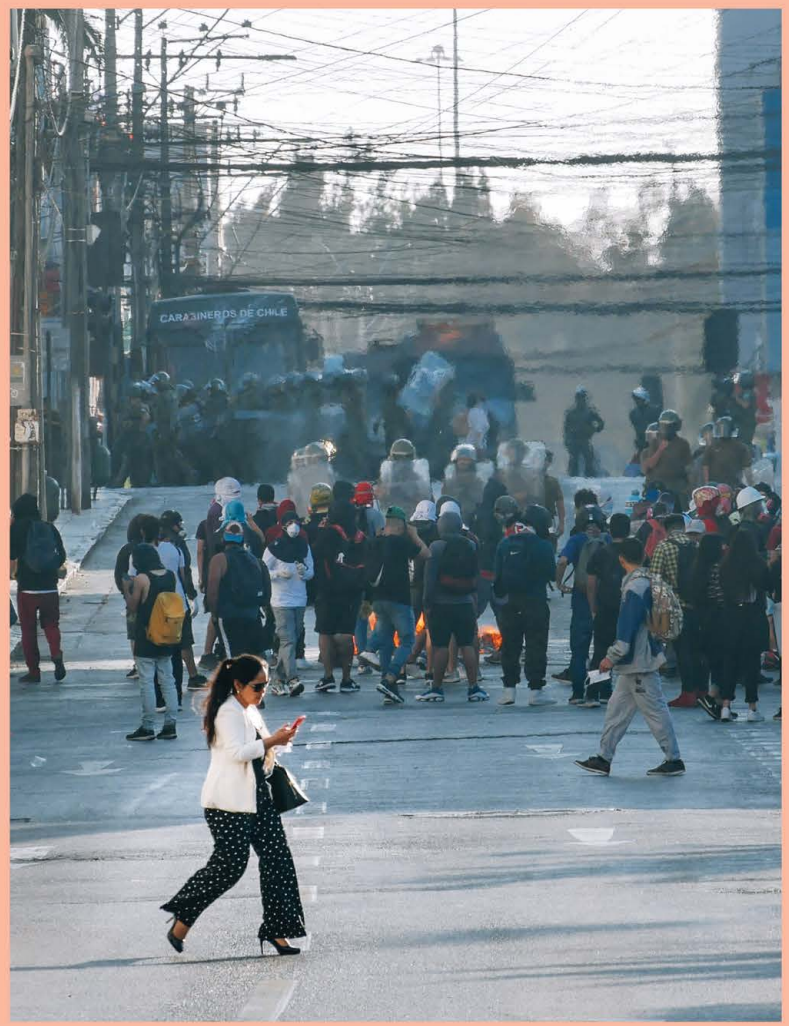
Antofagasta a Port City *Fig7*

Multi-dimensional Poverty

We often measure poverty by income, but poverty is complicated and cannot be captured simply with a single indicator. Multi-dimensional poverty encompasses the various deprivations poverty can engender, such as unaffordable health care, education, dis-empowerment, unemployment, threats of violence, feeling unsafe, low living standards and living in environmentally hazardous areas .

It is important and highly relevant to view the complexity of poverty through this lens in Chile, the wealthiest country in Latin America, where people still suffer with many of these struggles in their lives.

Importantly, not all individuals who have low-income are multi-dimensionally poor, and not all multi-dimensionally poor individuals are income poor. In fact, a survey by TECHO Chile illustrated there is a high percentage of labor participation among residents in the campamentos in Antofagasta and the city is reliant upon the labor market from the informal settlements, particularly in the service sector. Furthermore, the children almost all have access to school since the informal settlements are mostly close to the public schools in the city. However, a more general problem in Chile is the education provided is of a lousy quality.



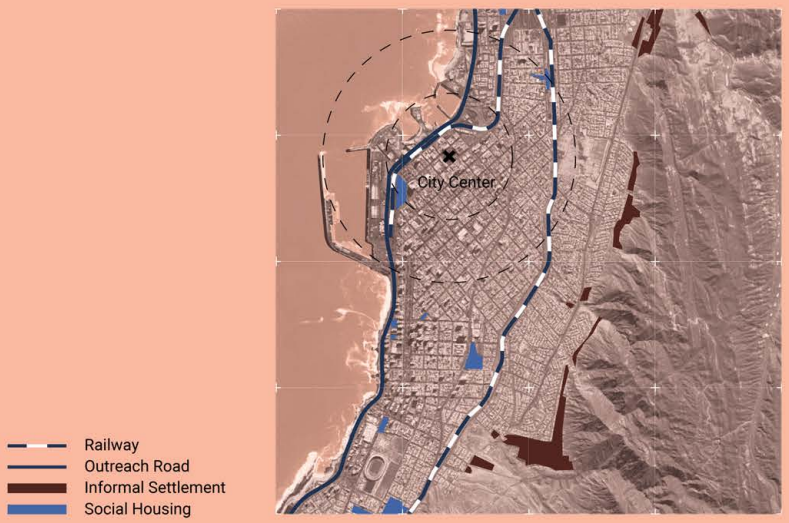
Protest in Antofagasta *Fig8*

Reading Antofagasta

Antofagasta is very narrow geographically. Looking at the city from above, it is evident the railway cuts the texture of the city in half; on the ocean side the rich, on the mountainside the poor. We can even extrapolate this feature of Antofagasta as a miniature of Chile: long and narrow geographically, and with polarized social classes.

To analyse the phenomenon, the railway seems to be a good starting point to understand the city. The port of Antofagasta is one of the terminals of the railway and is where Chile exports precious mineral resources from the Atacama Desert. Since the mining activities are the origin of the city, the railway is the reference point when building the urban texture.

From the southern and oceanside to the northern and mountainside, there is a gradient change to the social stages. As we travel along the railway from the south towards the north, we see the city landscape change from high-rise housing to more dense and crowded living conditions with the mountainside geologically sandy and at risk of landslides.



quote
Felipe Rojas Rios
2019

The railway cuts the texture of the city in half; on the ocean side the rich, on the mountainside the poor.

Antofagasta Railway

The railway in Antofagasta is called “Ferrocarril de Antofagasta a Bolivia”. It is a private railway operating in the northern provinces of Chile, dating back to 1873 and exclusively for the mining industry, with no passenger transportation. The city was built and expanded along with the railway - both having been constructed almost at the same time (1868).

The owner of the railway is Antofagasta PLC; one of the most critical Chilean corporations, it operates in various sectors of the economy, including Antofagasta Mineral, railway, and other exploratory joint ventures in different parts of the world.

The building and operation of the railway from Antofagasta, a port on the Pacific Coast, to La Paz, the capital of Bolivia, in order to transport mining goods across the Andes mountain was, in fact, the reason for the incorporation of Antofagasta PLC. Luksic Group now operates the company after acquiring controlling interests.

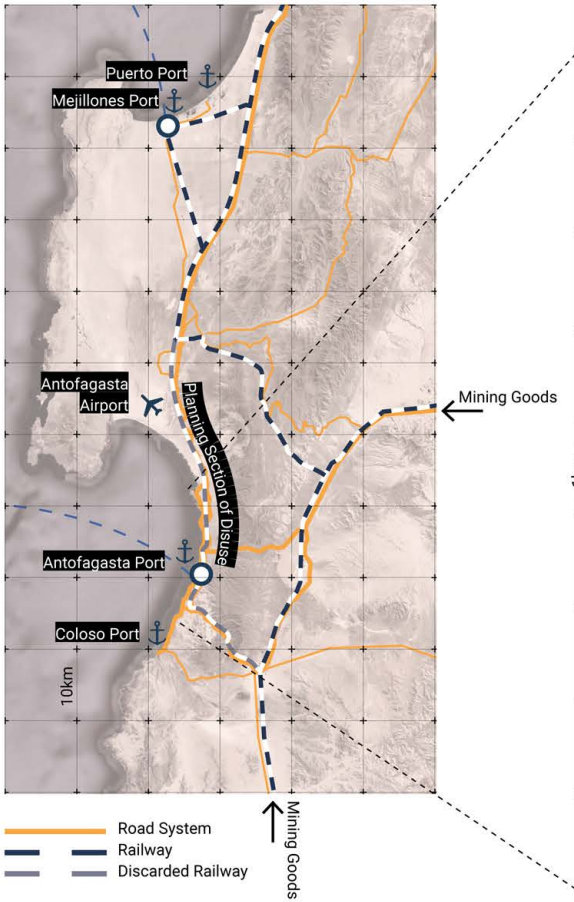
Antofagasta Railway *Fig9*

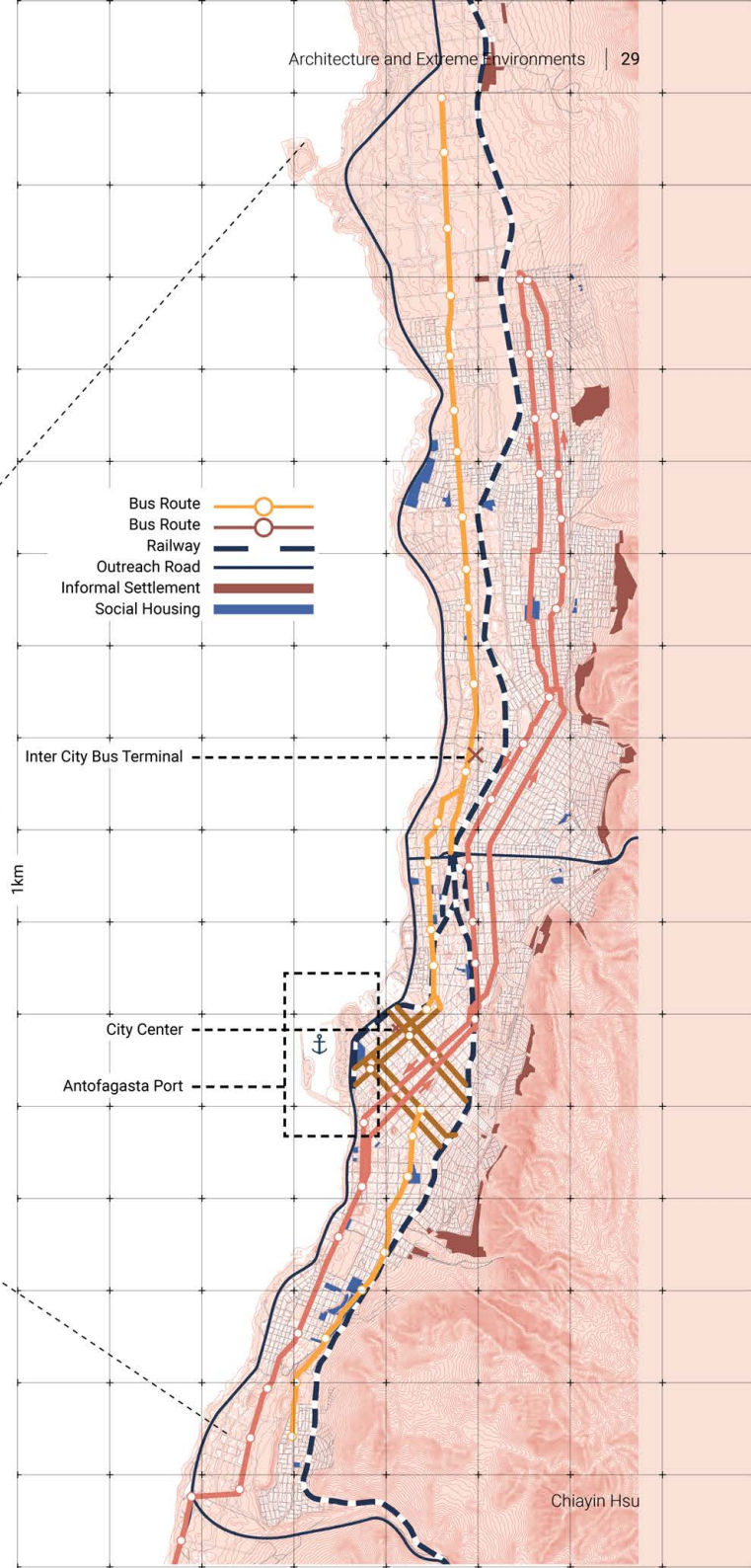
Antofagasta Transportation

The mining goods from the Atacama are currently transported to Antofagasta Port, and Mejillones Port, via the railway with Antofagasta being the main exporting port for the mining goods in the region. However, the port has brought with it pollution and created a serious health problem for the residents. As a result, the city is planning to move the primary port to Mejillones to minimize the impact of pollution in the city center and subsequently discard the railway currently running through the city. The future usage of the private railway is still confidential.

Therefore the project intends to utilize this discarded railway as a potential site.

The TransAntofagasta is a public transportation provider that operates bus routes. The TransAntofagasta has 17 bus routes in Antofagasta, with 433 bus stops transporting passengers from the north to the south, which is now the primary means for the citizen to commute. However, the price of the bus is 590 Chilean peso for a single trip - about 9% of the lowest average monthly salary if commuting with a bus every month. (Copenhagen is 4%). Moreover, the route does not cover the most needed community in the campamento.





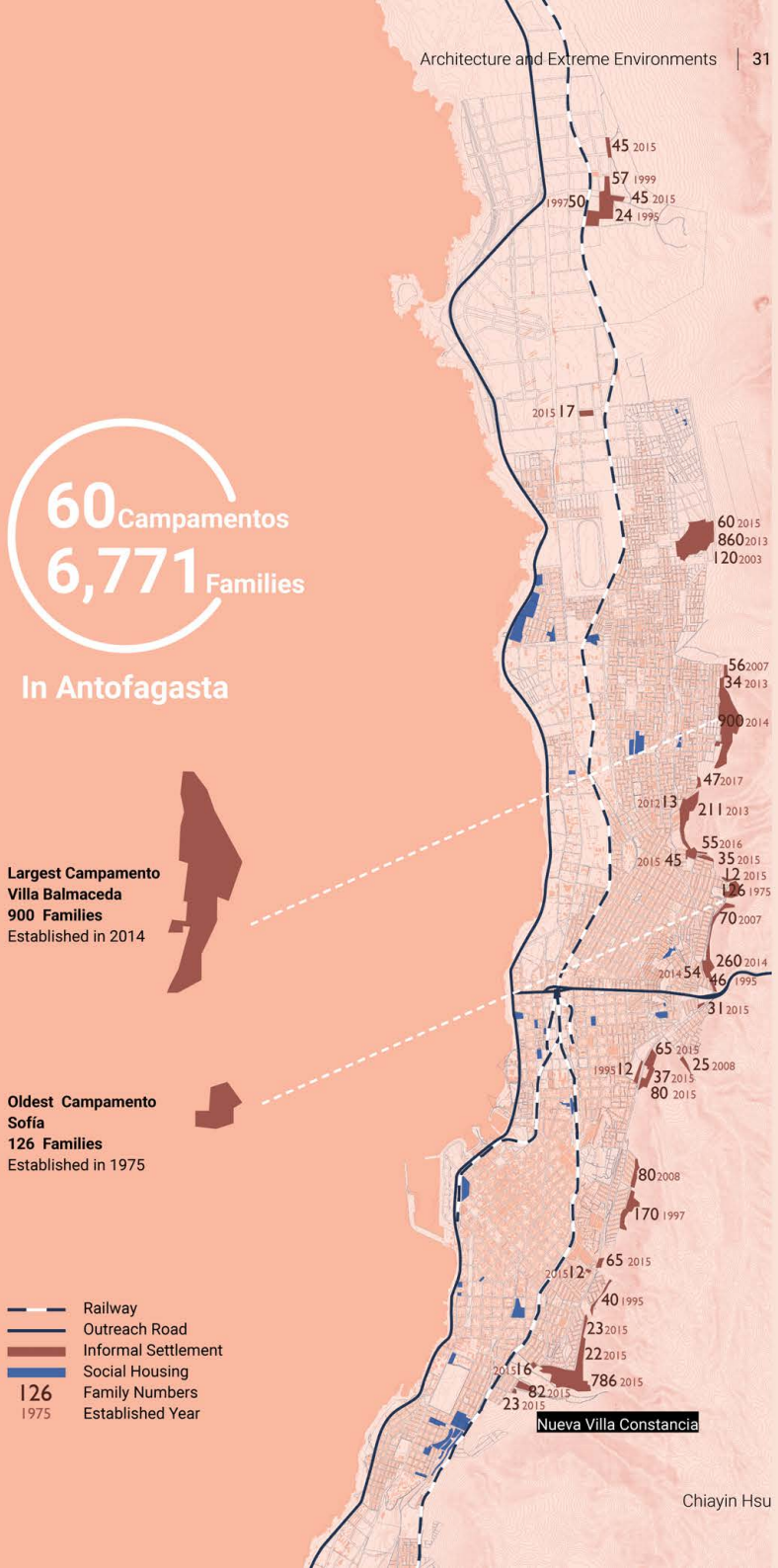
Campamento in Antofagasta

The population in the campamento has increased by 70% over the past ten years in Antofagasta. As a result of the city already being overcrowded, they are mostly located at the gap between the formal city and the mountain on the west side of the town.

As mentioned before, Antofagasta has the highest living cost compared to the other 15 Chilean cities, and land here is particularly costly. Almost all campamento here have access to electricity and water supply - they have methods to connect to the system under the unofficial agreements between their neighbors and the water supplier, Agua Antofagasta.

Villa Balmaceda *Fig10*

To have a sense of the population growth in the campamento, ten families move in every day, but only one leaves.



Campamento Nueva Villa Constancia *Fig I I*

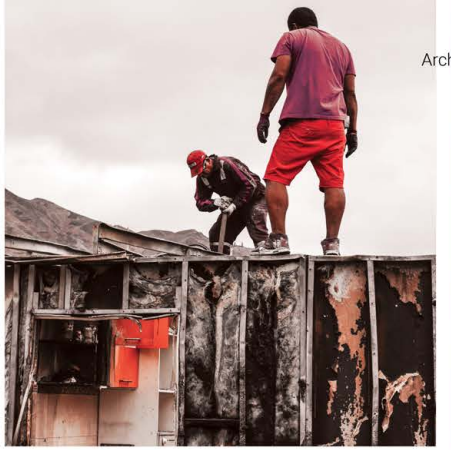
Challenges in the Campamento...

A fire broke out in one of the campamento during our on-site research period due to a poor connection to the electricity system. Since the houses were made of wood and the crowded spacing between houses, 12 families were affected as the fire went out of control.

For families that lost their houses in the campamento, the first option is for them to stay with their neighbors or relatives; if not, TECHO helps them arrange temporary shelters in the nearby school or community center, depending on the location and if the authority allows.

From this incident, it was obvious the community required better urban planning for the prevention of fire and a better arrangement between houses for the firefighter to enter. Besides this, the community is also in need of more public space for gathering and education purposes.

quote
Irene Planchuelo Gómez
2019



Campamento after Fire Accident *Fig I 2*

Rebuilding Campamento after Fire *Fig I 3*

For families that lost their houses in the campamento, TECHO helps them arrange temporary shelters in the nearby school or community center, depending on the location and if the authority allows.

... but also Potentials?

Even though they have problems in the campamento, according to interviews conducted with residents, there are some good things about living there if we look at the situation from another perspective.

Due to the tough and crowded living conditions everyone experiences, people tend to help each other more than in the formal city. There are strong social networks and a closely connected culture within the settlements, resulting in collaborations in building new houses, transportation, handling emergencies like a fire, sharing of resources, and information. There is more freedom to customize their living environment, and cheaper electricity and water supply because they are out of the formal control.

It's a bonding community compared to the formal city because they help each other.

Campamento Nueva Villa Constancia II, Antofagasta *Fig I 4*

Form of Public Space in the Campamento

In general, the campamento in Antofagasta lacks shared public space; the closest thing to a so-called public space would be the children's playground, mostly realized through collaborations with TECHO and/or other NGOs with the community. However, there are some less formal social spaces created by the residents: a piece of furniture in front of the doorway, a bench with plants, a table in the shade providing people with a respite from the intense sun.

I see these autonomous ways of creating sociable space as a statement from the residents, that they have the power to create the kind of environment they want to live in, and, as the creators of the space, they are more willing to maintain the area to retain these qualities.

They have the power to create the kind of environment they want to live in.

Campamento Nueva Villa Constancia II, Antofagasta *Fig I 6*

Fieldwork Prototype: Agua Para Todos

The entry-point into this thesis investigation began with the testing of an architecture; prototype, Agua Para Todos (Water for Everyone), which I brought on-site to Antofagasta. It is a water cleaning tea station using local material as a media for filtration. The project aimed to address an issue in the informal settlement where they were facing unreliable and polluted water sources alongside a lack of public space for the community. It is a form of a tea/coffee serving station that provides open space for the community in collaboration with TECHO Chile and the residents of the settlement.

The tea house structure also functions as an open platform for stimulating connections within the community whereby residents from different nationalities, who may not always get along well, can come together and create awareness, through conversation, of water rights as well as cultural exchange.

For more information, please refer to the appendices.

Agua Para Todos *Fig I 7*

Chiayin Hsu

Diversity in the Campamento

Generally, in Chile, most of the people who live in the campamentos are Chilean. However, in Antofagasta they have a very particular situation whereby 60% of the residents in the campamento are foreign nationalities; Bolivia (37%) Columbia (27.6%), Peru (24.9%), and Venezuela. Many come from neighboring counties with their children in search of a better life and initially choose to stay in this living situation as a temporary option. However, because of the social crisis in Chile, many end up staying for over ten years.

In terms of culture, informal settlements are essential for social innovation due to the diverse combination of residents from different cultures. However, there are often rivalries between campamento residents from different nations, and these competitions present challenges when working with these communities.

From the experience I gained through the fieldwork, I learned one of the keys to bind the community is the children; children don't care about others' nationality, even if the communities don't talk to each other. When there is space for children, they will gather together, no matter what.

Children in the Mejillones Campamento *Fig I 8*

Children don't care about others' nationality, even if the communities don't talk to each other. When there is space for children, they will gather together, no matter what.

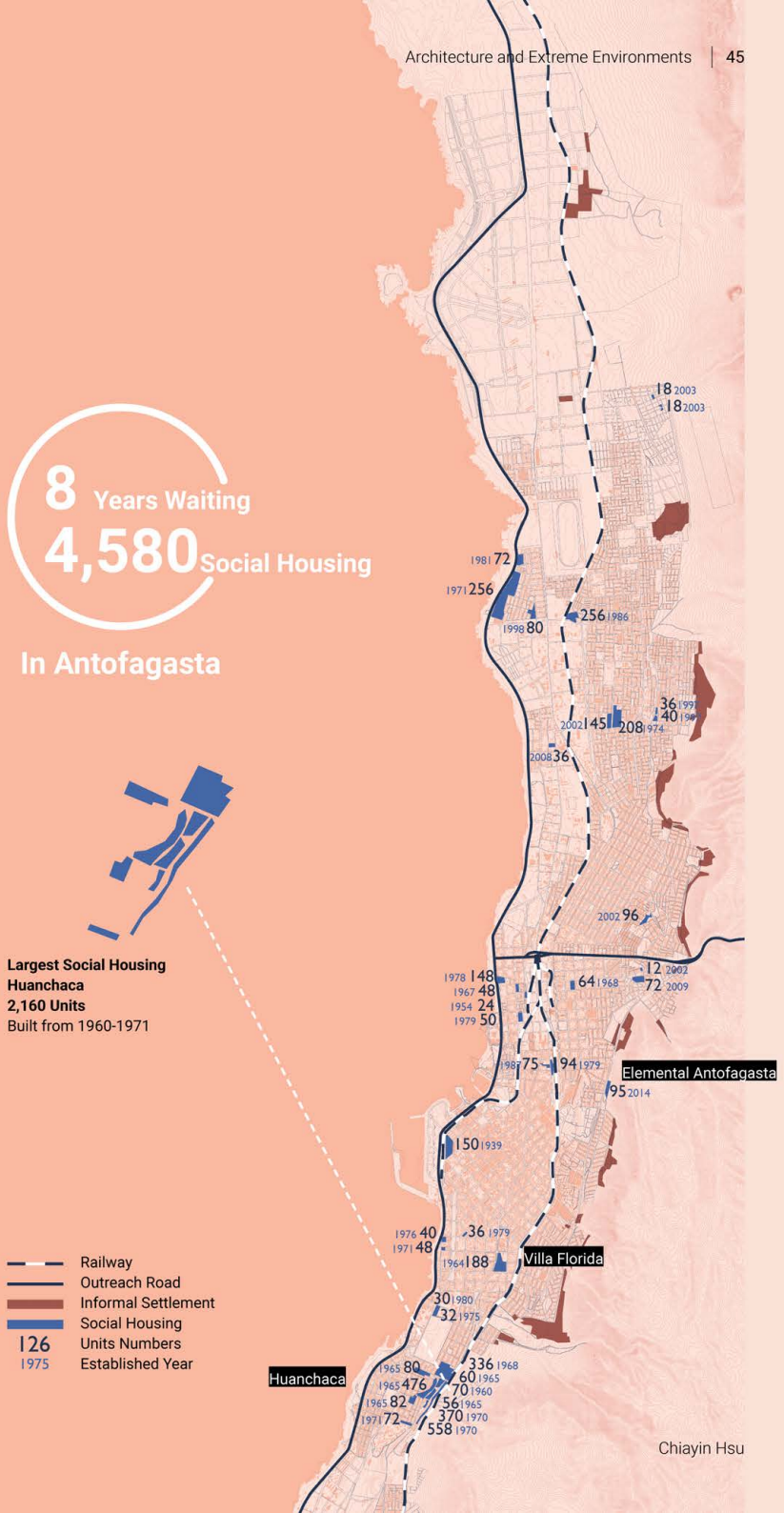
Housing in Antofagasta

There is some social housing situated around the city, mostly built in the 1960-1970 period before the dictatorship and when Chile had an economic boom. These projects set examples of the ideal living in the city of Antofagasta, according to several interviews the author had with the local citizens. They were adequately designed, with space and proper orientation for ventilation and shading. Situated in the city center, they have good access to public transportation.

With a particular emphasis on the disadvantaged social and financial class, people could sign up for a waiting list for this social housing. However, the city government is simply not providing enough to meet the needs of the people.

quote
Felipe Rojas Rios
2019

In Antofagasta, people could wait on the list for eight years to get a place of social housing.



Edificio Huanchaca

A group of low-density housing, commercial, apartment block, and an iconic tower located in the southern part of the city that was gradually built between 1960 to 1972. The most significant feature of the complex is the serpentine and large linear shape formed along the west side of the railway, together with collective public spaces and pedestrian connections linking different buildings.

The Huanchaca building, composed of a broad base volume and three buildings with gaps between them, has an essential urban articulating role. The concavity of the low-density housing to the west receives the flow of the city and embraces the city fabric. Internal routes between blocks, such as passage, stairs, and sharing terraces, allow the residents to move around within the complex whilst simultaneously being included in the urban context.

When walking around, you are never entirely inside or outside. Its open form towards the city, together with its scale, generates a dialogue of transversality between a common space of semi-internal public use and the city itself.

Location: Av.argentina / Carlos Pezoa Véliz

Architect: Ricardo Pulgar, Germán Cartagena and Sergio Gaete

Year of Construction: 1954-1978

Area: 276,560 m^2

Number of Family: 2,160

1. Huanchaca Building *Fig19*
2. Huanchaca Building *Fig20*
3. Site Plan *Fig21*
4. A photograph taken from one of the public terraces of Huanchaca *Fig22*

Villa Florida

The housing contains four building blocks located in the central area of the town. The east-west orientation, as well as the thin shape of the blocks, allows natural ventilation and protection from the intense north sun. On the north front of each block, there are horizontal openings and balconies with an alternating rhythm, creating a sun-breaking facade and protecting the interior of the apartments. On the southern front, the facades of each block are set back at three equidistant points to integrate the high access ramps that come from the inner street.

This condition enables a connection between the roofs of some units and the public walkways. In this way, the work is presented as an open and permeable composition with a magnificent mixture of scales and voids for public use and private residents; the transition from public to private became a continuous journey.

Location: Av.argentina / Antonino Toro

Architect: Guillermo Geisse Grove And Francisco Hurtado

Construction Company: Housing Corporation (CORVI)

Client: State of Chile

Year Of Construction: 1963-1964

Area: 23,868 m^2

Number of Family: 188

1. Villa Florida_South Facade *Fig23*
2. Terraces *Fig24*
3. Villa Florida Planning *Fig25*
4. North Facade *Fig26*

Elemental Antofagasta

The social housing designed by the Chilean architecture firm, Elemental, in Antofagasta, implanted the office's ideal of housing - that the house is considered as an on-going project. The design extends the concept for Villa Verde whereby half of the homes are identical, and the other halves are unique, customized, and built by the residents themselves according to their needs and budget. All the facilities that residents would have a difficult time installing themselves, such as plumbing, electricity, and foundations are already in place. The city government will finance sewage, roads, drainage, waste collection, public transportation, and other essential infrastructure required for a well functioning community. Family members have to spend their time, labor and extra materials for extending the other halves. A building workshop was held for the residents to be part of the designing process, and every house has a manual covering potential ways to expand and customise the base to their needs with materials easy to source.

The vision is that the family will have a much more pleasant living environment based on what they need rather than something generic built with state funding.

Location: Av. Padre Alberto Hurtado/ Alfonso Meléndez

Architect: Elemental - Alejandro Aravena

Year Of Construction: 2014

Area: 23,868 m^2

Number of Family: 95

Elemental - Alejandro Aravena_Antofagasta *Fig27*

Social Housing Reference_ Housing Research and Practical Experimentation Laboratory

An innovative community development in Hidalgo, Mexico designed by Tatiana Bilbao and 32 other architects and studios. This small community is the result of a project led by a federal company that develops workers' housing called Mexico's National Workers' Housing Fund. The idea was to create new construction techniques, water-saving systems, and sustainable energy sources without surging the cost of the homes.

This is an example of a community designed with the participation of the user and to an urban scale.

Experimental Mexican community contains social housing *Fig28*

Social Integration

Chile has had a tendency to maintain social segregation in recent decades, which has prevented the construction of a society with higher levels of urban integration. The segregation trend can be understood by a set of social, economic, institutional, and cultural mechanisms.

To deliver proposals for the design of a public policy that promotes social integration in cities, TECHO Chile formed a commission of experts in urban public policies to provide a guideline for designing a comprehensive policy on the subject. Their work aims to address social inclusion in all its dimensions.

Urban integration was positioned as a public and political agenda, allowing discussion of the subject at the national level. Thus, in line with the indicators proposed by the National Urban Development Council, Standard 20/60 has been adopted, which suggests, as a precondition of social integration, that all urban neighborhoods of Chile should have between 20% to 60% integration of vulnerable households.

Proposals For a Public Policy of Social Integration *Fig29*

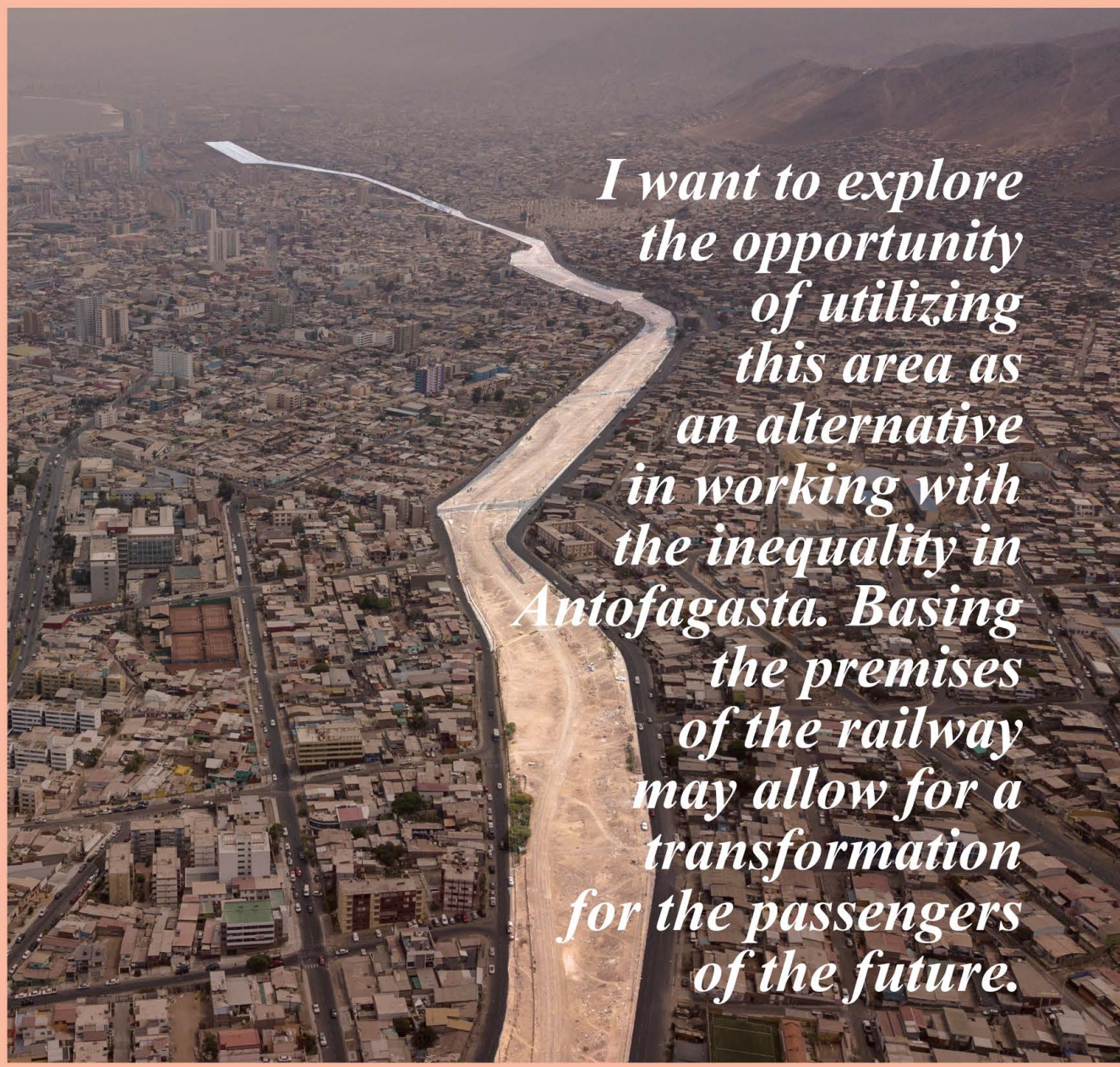
Proposals For a Public Policy of Social Integration
2018

All urban neighborhoods of Chile should have between 20% to 60% integration of vulnerable households.

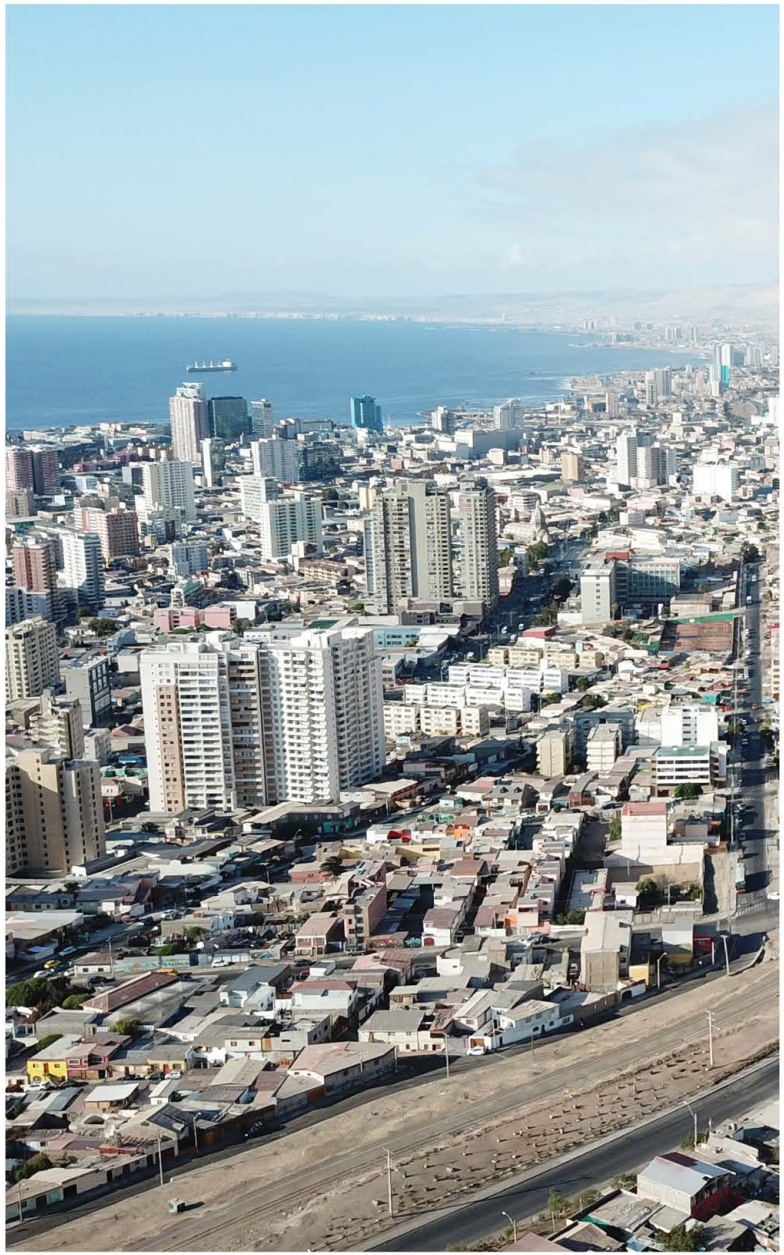
A Linear Opportunity

Antofagasta is overcrowded, in part due to its geological resources. Though the government is working to bridge the inequality gap through social housing projects, they can only find plots at the margin that are far away from the city center. As we know, socially disadvantaged people are the demographic who most rely on public transportation. Very often when working on replacement projects for the families in the campamento, they would rather stay in the original campamento closer to the city center rather than the formal buildings at the margin. The convenience of city amenities is a crucial factor when considering successful social housing projects.

The Antofagasta railway is a central divider of the city, but at the same time, it occupies a massive amount of unused plots in the city center and acts as a segregation wall in the town. I want to explore the opportunity of utilizing this area as an alternative in working with the inequality in Antofagasta. Basing the premises of the railway may allow for a transformation for the passengers of the future.



Antofagasta Railway *Fig30*



Antofagasta Ocean Side *Fig31*

Antofagasta Mountainside *Fig32*

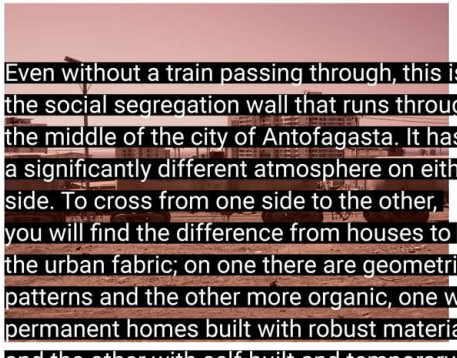
A Linear Opportunity

Even without a train passing through, this is the social segregation wall that runs through the middle of the city of Antofagasta. It has a significantly different atmosphere on either side. To cross from one side to the other, you will find the difference from houses to the urban fabric; on one there are geometric patterns and the other more organic, one with permanent homes built with robust materials and the other with self-built and temporary elements.

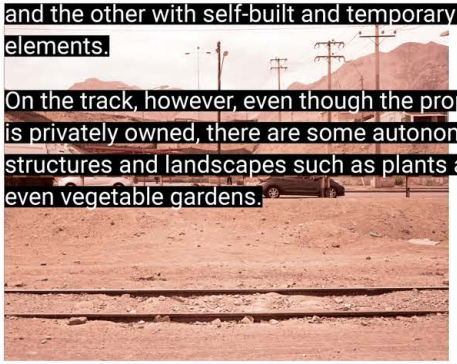
On the track, however, even though the property is privately owned, there are some autonomous structures and landscapes such as plants and even vegetable gardens.
















The Antofagasta Railway in the City *Fig33*

Way of Crossing

Currently, the track is built on the ground level with pedestrians and vehicles all crossing the railway at grade. Due to the elevation variation in the city, there are multiple opportunities of passing, bridges, ramps, staircases, etc.

Could the way of crossing the railway also be a way of crossing the social segregation?

Could the way of crossing the railway also be a way of crossing the social segregation?

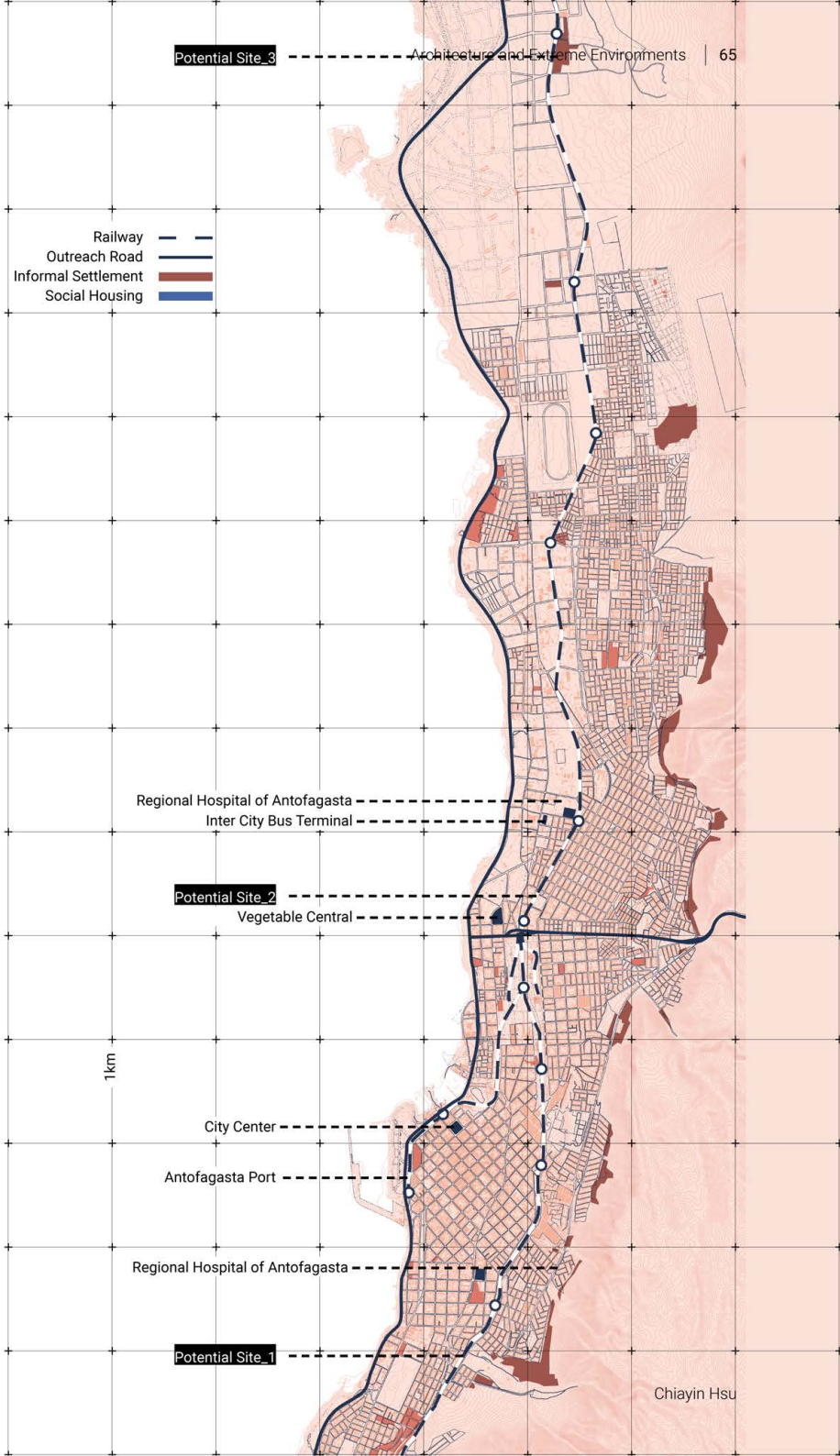
The Antofagasta Railway in the City *Fig34*

Connectivity of Urban Amenity

The project explores the potential of utilizing the railway site for social housing and providing infrastructure for citizens who need affordable housing in Antofagasta. The project will start with the masterplanning and transformation of the railway site as a means of transport for the citizens to connect to essential urban amenities such as markets, schools, hospitals, and public space.

I am setting out the transportation nodes along the railway, where citizens could have easier access to urban amenities and infrastructure. Social housing is to be integrated with these transportation nodes and is intended to create a meeting hub for passengers and the residents.

Social housing is integrating with the transportation nods and creates the meeting hub for passengers and the residents.



Potential Site

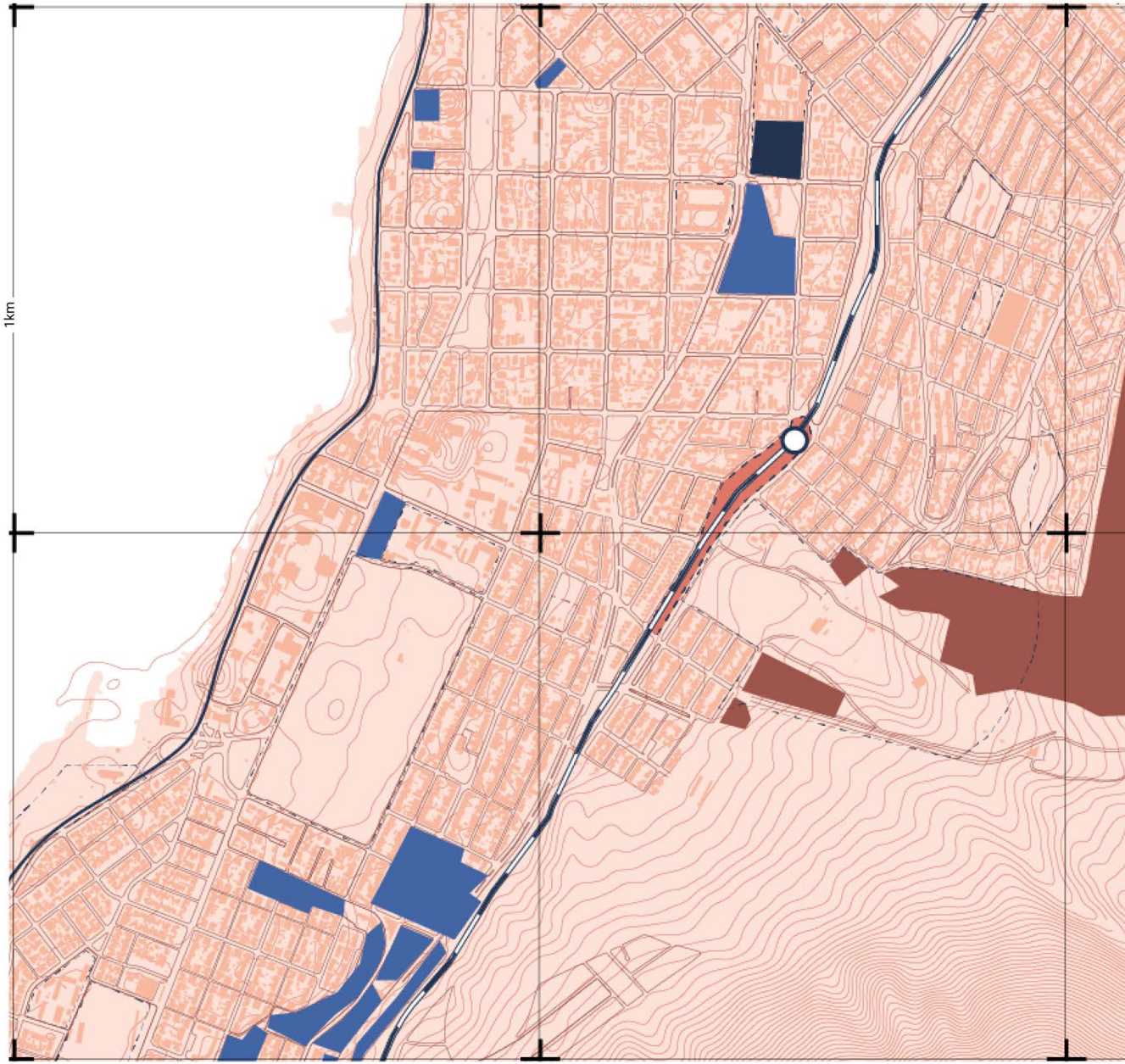
Area: 18,187 m^2

Design Level: Architectural Scale, Human Scale

Program:

- Transportation Station
- Housing 120 units
- Public Open Space
- Community Center
- Emergency Shelter
- Children daycare

The site is located next to the campamento called Nueva Villa Constancia, which has a population of about 900 families. It is 1.5 km away from the city center, consists of a very dense urban fabric and there is lack of greenery and public space in general.



to Nueva Villa Constancia

to Nueva Villa Constancia


Av. Andrés Sabella Gálvez
SITE
Av. Argentina


Nueva Villa Constancia
SITE

The Investigation

Following an understanding of the context laid out in the previous chapter, I will now address phenomena arising from the high urbanization in a contemporary context: the campamento. This project aims to take a bottom-up approach, to find out a way to include the voice of the social disadvantaged with social housing that mediates the formal and the informal. What kind of social housing should be offered to people, and, if willingly accessed, provide a potential route out of the campamento, but without losing the essence of creativity, autonomy, solidarity, and cooperation within the community.

How to reveal and argue for the virtue and creativity in informality and change people's perspective of it as a positive and desirable way of living?

Grounding and Positioning

The project positions itself as a local manifestation of a global issue. The positioning of the thesis project will be used to explore a hypothesis through social, spatial, and technological paradigms:

How can architecture be a celebration of equality of different social stages?

My initial position on informality is it is precious heritage rather than a chaos to be solved. The autonomous essence of the self-built character should be analyzed and transformed through a bottom-up architectural strategy to continue a sustainable, closely-bound, and resilient community. In collaboration with TECHO, whose goal is to leave the campamento after empowering the residents so they can manage things on their own, I will explore how architecture could collaborate with the user as well as in order to include their voices.

Architectural Inquiries

The investigations broadly seek to discover whether social housing as a way of bridging social segregation can not only create a shared place for one another but also provide a level ground to activate this bridge at different stages, shifting power and hierarchies.

The aim is to celebrate informal ways of living and integrate the idea of the responsive and flexible into the formal city. When considering the architectural inquiries to this aim, I will focus on some guiding principles discussed in the following pages.

Methodology

In collaboration with TECHO Chile, this project will use the language of architecture at different scales, informed the concept of the active form by the theory of Keller Easterling, to bridge informality and formality.

The correspondence methodology to achieve the inquiries will be presented on the following right page.

How can architecture create a level ground and activate interruption and intervention at different social stages?

Social Inquiry

Celebrating Informality

The regulative process of formality can barely adapt to, and catch up with, the speed of urbanization, and informality as a dynamic system appears to have more flexibility, economy, and responsiveness, especially when facing the extreme cases of massive growth in the population.

How do we understand this informality as a beneficial way of building, rather than thinking of it as chaos; a problem to be eliminated?

How do we translate the value of creativity and capability in the informal and make it recognizable as valuable to others - empowering people to see informality as a way of speaking for themselves?

Methodology

Nan Luo Gu Xiang By Drawing Architecture Studio *Fig35*

Technology Inquiry

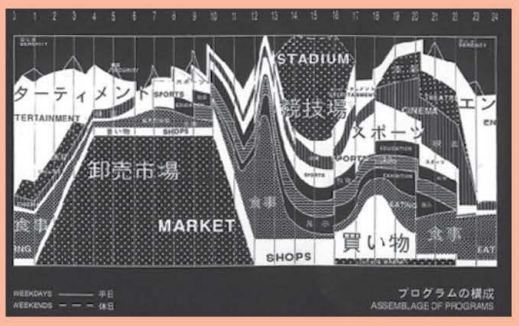
Optimizing Density

This thesis takes the view that density is how to address the overcrowded urban condition in Antofagasta.

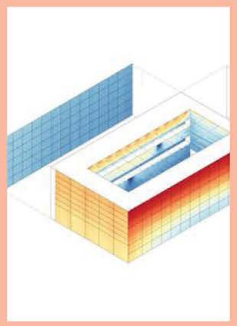
How can architecture maximise density and inhabit the maximum number of families without sacrificing living quality or the amount of open space?

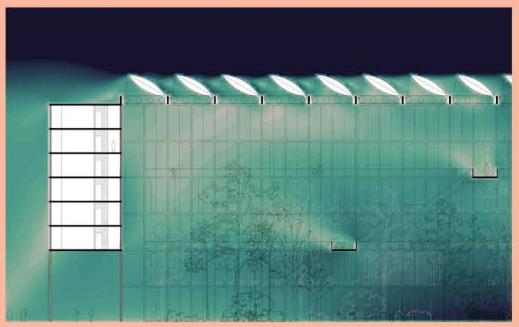
The inquiry will be based on an understanding of the physical environment through the use of digital simulation tools, setting out criteria of adequate public spaces, urban texture, micro-climate, and circulation. Moreover, it will explore program hybridity and use through time.

Methodology



OMA, Mixed program in use of time *Fig37*



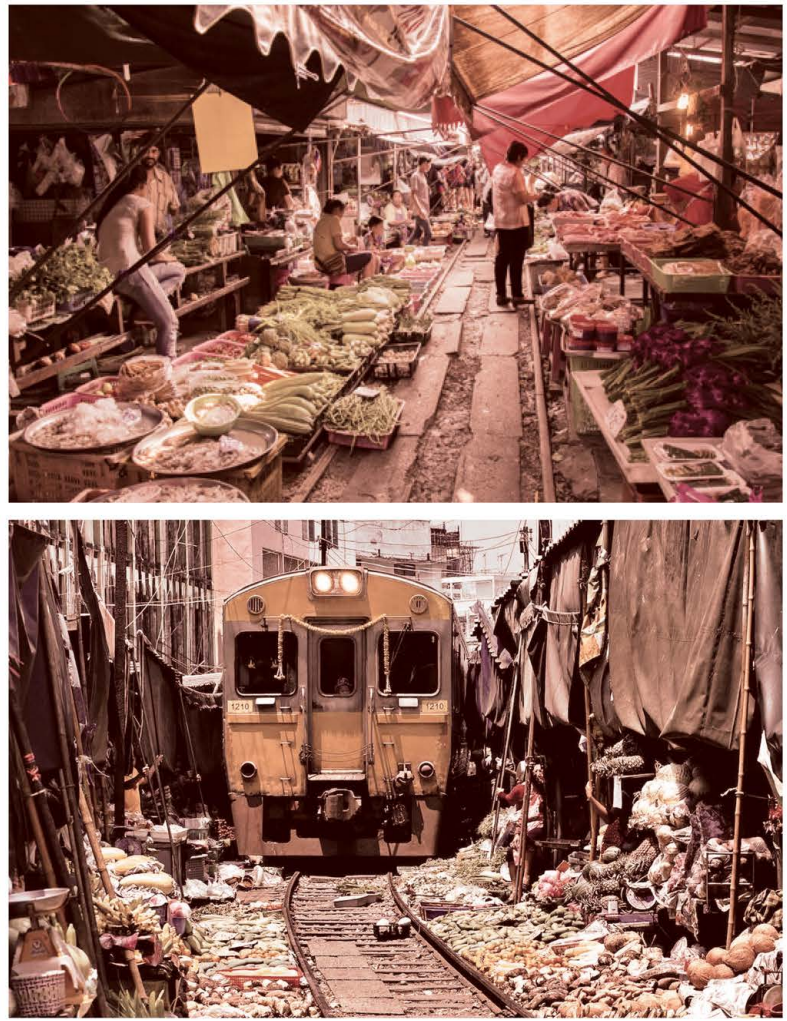


Stimulation Tools *Fig36*

Buildings with Railway Reference_ The Maeklong Railway Market

The Maeklong Railway Market in Thailand is an interesting example of utilizing space highly efficiently. The market has a train running through the middle of it several times a day and is even close enough to touch the vendors.

A warning bell will ring over the broadcast system a few minutes before the train comes, and vendors will pull back the adjustable awning as a response to allow the train to pass through. The market has a nickname among the locals: the Talat Rom Hoop, which means “Market Umbrella Close.”



Maeklong Railway Market *Fig38*

Urban Inquiry

Urban Disposition Protocol

In terms of bridging the formal and informal, the project will utilise existing infrastructure, the railway network, which has become a social division in the city, as a way to redress social segregation. I am considering the project as an infrastructure to connect people, but instead of perceiving the agency of infrastructure as a static arrangement, I see it as a growing protocol providing software that regulates an urban disposition, a concept of “active form”, according to Keller Easterling’s theory.

The inquiry aims to provide a site for people from different social groups to exchange, but with a boundary that gives a framework for informalities to grow. The example Keller Easterling brought forth in her description of the “active form” is the scheme for Savannah city by James Oglethorpe in 1773. Instead of designing a masterplan of a complete set of blocks, he introduced an approach that established the relationships between various designations of urban space -such as the percentage of greenery and the sequence of plots around it. The approach was an expression of interdependency where elements are in a dynamic balance to each other. How can an architectural language provide an infrastructure that allows the creation, and future customisation, of space to allow the residents to speak for themselves?

Methodology

“Disposition is immanent, not in the moving parts, but in the relationships between the components.”

quote
Keller Easterling
2016

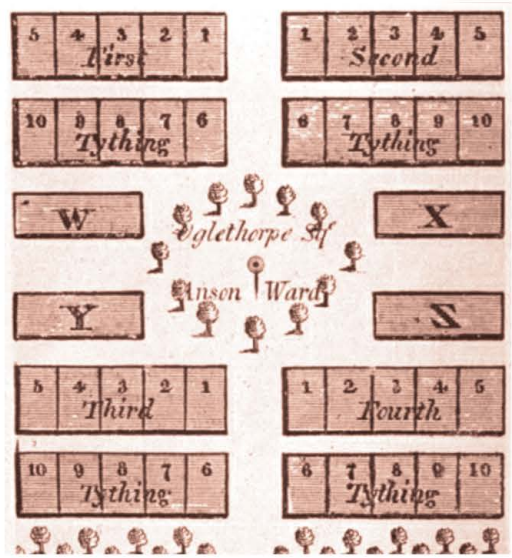
Extrastatecraft: The Power of Infrastructure Space
by Keller Easterling *Fig39*

Theoretical Reference_ Active Form by Keller Easterling

Designers naturally rely on what they are being trained to create. With pictures, drawings, and photographs, we create a formal object in which we control the form, using the single crafted envelope to represent a dynamic process. We do not treat the space as if the components are the actors, but collections of objects or volumes. The idea of the active form is different from the object form like buildings; it resembles code in the software that organizes architecture. The distinction of them is the object form is "knowing that," and the active form is "knowing how."

I will introduce this idea of active form into the design by providing a protocol of disposition within the framework of bridging formal and informal. To allow the customisation for residents with spatial references.

quote
Keller Easterling
2016



Typical ward, Savannah, Georgia *Fig40*

"Active forms are markers of disposition, and disposition is the character of an organization that results from the circulation of these active forms within it."

UN SDGs

Working under the framework of the UN sustainable development goals, this thesis is concerned with goal 10 and goal 11, namely Reduced Inequalities and Sustainable Cities and Communities.

The thesis is looking at the multi-dimensional poverty in Chile and aims to reduce the gap between people from different social groups obtaining housing in Antofagasta. By providing social housing as well as the equal ground to interrupt the segregation with an architectural language.

The investigation intends to celebrate the informal way of living and integrate the idea of responsiveness and flexibility to the formal city, being inclusive no matter what social status people have. The goal is to empower people and finally leave them to build a resilient and self-improving community.

10.1 By 2030, progressively achieve and sustain income growth of the bottom 40 per cent of the population at a rate higher than the national average

10.2 By 2030, empower and promote the social, economic and political inclusion of all, irrespective of age, sex, disability, race, ethnicity, origin, religion or economic or other status

10.3 Ensure equal opportunity and reduce inequalities of outcome, including by eliminating discriminatory laws, policies and practices and promoting appropriate legislation, policies and action in this regard

10.4 Adopt policies, especially fiscal, wage and social protection policies, and progressively achieve greater equality

10.7 Facilitate orderly, safe, regular and responsible migration and mobility of people, including through the implementation of planned and well-managed migration policies

11.1 By 2030, ensure access for all to adequate, safe and affordable housing and basic services and upgrade slums

11.2 By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons

11.3 By 2030, enhance inclusive and sustainable urbanization and capacity for participatory, integrated and sustainable human settlement planning and management in all countries

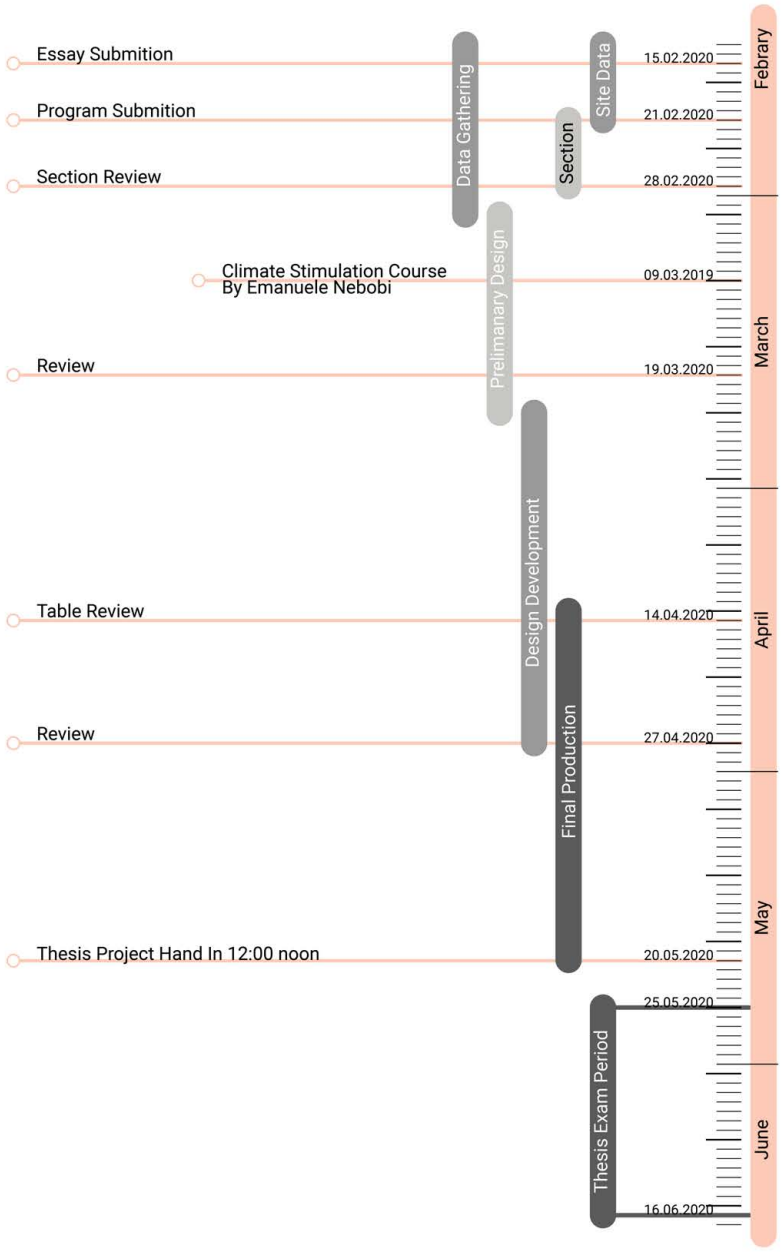
11.4 Strengthen efforts to protect and safeguard the world's cultural and natural heritage

11.C Support least developed countries, including through financial and technical assistance, in building sustainable and resilient buildings utilizing local materials

Scope of Deliverables

The scope of deliverables are as followed:

- Master planning of the Antofagasta Railway 1/20000
- Strategic Planning for each site 1/1000
- Architectural Plan 1/100
- Detail Drawings 1/10
- Isometric Drawing



The Appendices

Research Prototype

The research prototype was an investigation into using a local material, clay, as a medium for filtration to remove heavy metals from seawater for residents of informal settlements. It is a form of a tea/coffee serving station that intends to bring people together as well as provide a public space for the community in collaboration with TECHO Chile and the residents of the settlement.

In Chile, fresh water is 100% privately owned, mostly by the mining company who, through their mining activity and geological characteristics, pollute both the water and soil with heavy metals, especially around Antafogasta. People who live in the informal settlements in the region, in particular, have to cope with the most unreliable water access. In Mejillones, a port city 65km north of Antofagasta, people in informal settlements obtain water from the water trucks that come on an irregular basis. Since the vehicles are mainly for industrial purposes, the schedule is unreliable for the community, and when there is an instability in the supply, the residents take seawater for sanitary and cooking as substitution which is polluted with heavy metals.

This project explores a method of water treatment at the household level using the ceramic filters commonly used in developing countries. The research project aims to formulate the filter medium with local materials that can be quickly sourced in the region - coffee grounds, mate tea, and clay. The efficiency of heavy metal removal with the medium was tested, and the result shows the filter plays an active role in removing zinc and copper.

The tea house structure also functions as an open platform to promote connections and cohesion within the community where the residents are different nationalities and do not always get along well. It intends to create awareness and encourage conversation about water rights as well as stimulate a cultural exchange.

Agua Para Todos_Water for Everyone *Fig4 I*

Agua Para Todos_Water for Everyone *Fig42*

Agua Para Todos_Water for Everyone *Fig43*

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Acknowledgment

First of all, I would like to present thanks to my thesis tutor **Runa Johannessen** for her patience in guiding me through the program.

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Felipe Rojas Rios, 26 November 2019
Felipe Rojas Rios, Chiayin Hsu

Panama, 09 December 2019
Panama, Chiayin Hsu, Pablo Zapata Diaz

Fernanda Monserrat Santos Acuña, 03 December 2019
Fernanda Monserrat Santos Acuña, Chiayin Hsu, Henry Glogau

List of Figures

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Preposition Architecture | Taipei City, Taiwan — FEB. 2016 - JUL 2018
Architectrual Designer
Shiqiu 169 house renovation (Keelung, Taiwan) | concept design to construction document
Mizhan Horse Ranch (Hualien, Taiwan) | concept design to construction document
Hive Hotel facade renovation (Ilan, Taiwan) | concept design to construction document

Kris Yao Artech | Taipei, Taiwan — DEC. 2014 - FEB. 2016
Junior Designer
CHC Central Town (Taipei, Taiwan) | master planning
Dunnan Tower (Taipei, Taiwan) | master planning

Atelier Bow-Wow (アトリエ・ワン) | Tokyo, Japan — JEN.- JULY 2013
Study Job
Minagawa House, Saitama, Japan | concept, physical model
Nishi House, Karuizawa, Japan | concept, physical model
House in Antwerp, Belgium | render, material study, structural study

OASIStudio | Yilan, Taiwan — Summer 2011
Assistant Designer
-New Taipei City Museum of Art Conceptual Design International Competition
-Ruiyuan and Dongzhu Train Stations
-Huai Zhe Rehabilitation Home

Education

The Royal Danish Academy of Fine Arts — SEPT. 2018 - Present
Schools of Architecture, Design and Conservation | Denmark
Master of Arts in Architecture

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Graduate Institute of Architecture | Taiwan
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Adobe Photoshop/ Illustrator/ InDesign	Highly Proficient
Adobe AfterEffects/ Premiere/ Lightroom	Proficient
AutoCAD/ Rhino/	Highly Proficient
Grasshopper/ Vray	Proficient
Model making and graphic design	Highly Proficient
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English	Fluent, Written & Spoken

Exhibitions

Architecture & Extreme Environments_The Atacama — FEB. 2020
Exhibitor, KADK Campus | Copenhagen, Denmark
"Agua Para Todos_ Warer for Everyone"

On Site/ Off Site - X-Site 2019 — JUL. 2019
Exhibitor, Workstation JK | Taichung, Taiwan
"En Route to Resonance"

Architecture & Extreme Environments_Alaska — JAN. 2019
Co-curator/ Exhibitor, KADK Campus | Copenhagen, Denmark
"Thermal Dynamic in Alaska"

Re-habilitation — FEB. 2013
Exhibitor, NCTU Art Centre | Hsinchu, Taiwan
"Boundary of Perceive_ Keelung Harbour Terminal"

Archi-contellation — FEB. 2012
Exhibitor, NCTU Art Centre | Hsinchu, Taiwan
"Taiwan Architecture Centre Competition"

Archipelagic — JUN. 2011
Co-curator/ Exhibitor, Huashan Creative Park | Taipei, Taiwan
"Alley Coop."

Publications

Tectonics in Practice — 2017
Taiwan Architecture Magazine | Taiwan
"HIVE Hotel Facade Renovation" Vol.267 Dec.2017, p48-51

An Endless Labyrinth — 2012
Trans Art NCTU | Taiwan
"A Reverberant Labyrinth" ISBN: 978-986-03-8237-2

Honors and Awards

Final List, X-Site 2019 Competition — 2018
Taipei Fine Art Museum | Taipei, Taiwan
"En Route to Resonance"

Selected Awards, Hsinta Ecological Power Plant Construction Project Conceptual Design International Competition — 2017
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Judges includes Marcos Cruz, Charles Waldheim, Sungkyun Kim, Chinghwa Chang(張清華), Shuchang Kung(龔書章)

Student Representative, Mr. Cai Wanlin Memorial Scholarship — 2013
Cathay Foundation | Taiwan

Volunteer, Temple restoration — 2010
NIFC- New International Friendship Club Nepal | Pokhara, Nepal

Volunteer, Historical community restoration (Huazhai) — 2008
Foundation of Historic City Conservation & Regeneration | Wang-an Island, Taiwan