

Above | Below | Between

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A thesis
submitted in partial fulfillment
of the requirements for the degree of

Master of Architecture

University of Washington
2016

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Louisa Iarocci

Program Authorized to Offer Degree:
Architecture

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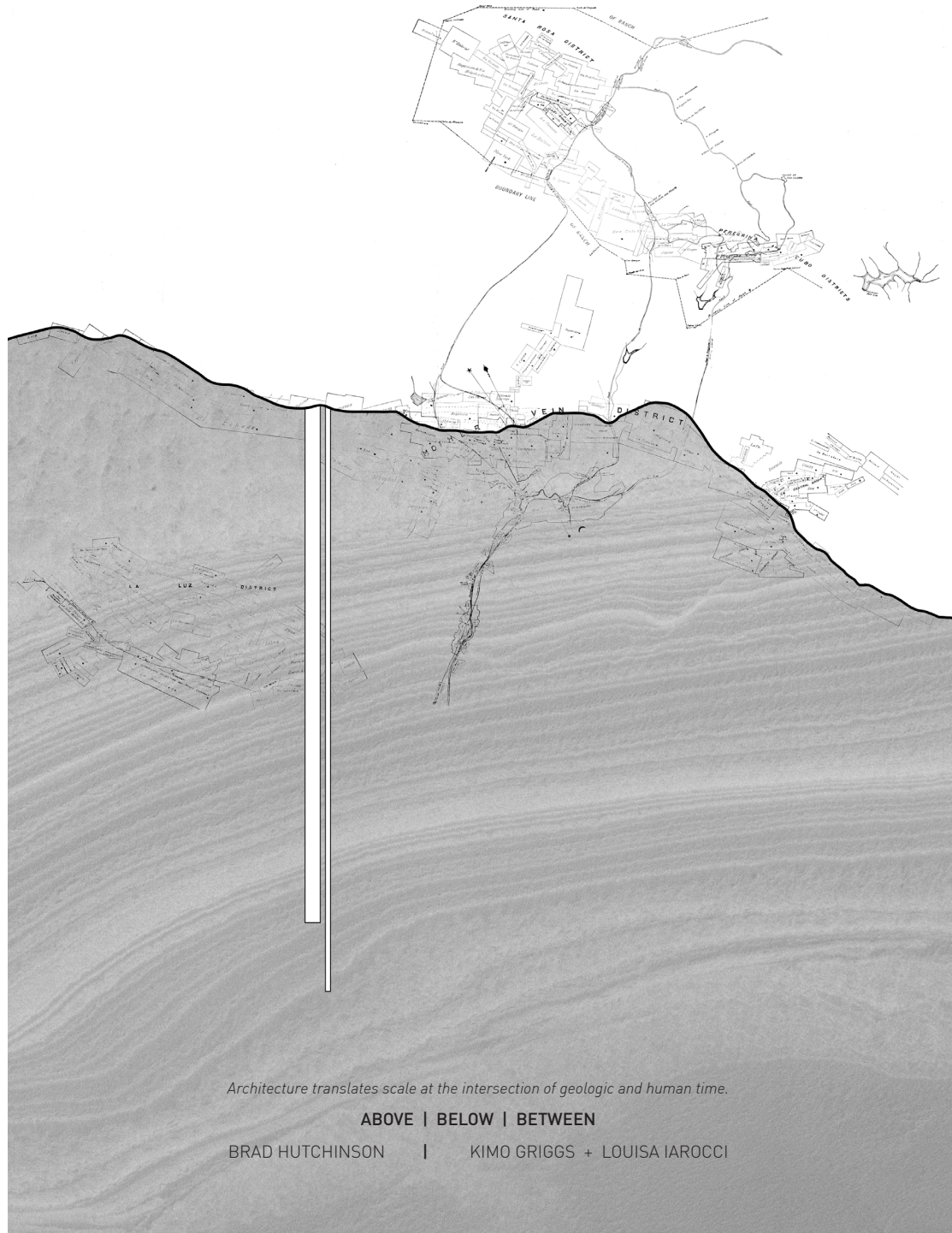
A. Looking East over Guanajuato



ABSTRACT

Architecture transforms time and space at the intersection of the geologic and the human. Human existence in the natural environment constitutes such a small swath of both space and time that our very presence amounts to an insignificant interruption in the history of the universe. As such, the ways in which we connect with our environment are attempts to mediate this gap between the scale of the human and natural domains. In manipulating the space around us, we are testing hypotheses and understandings of the world around us. Architecture, in this manner, can be seen as a tool used to cross the boundary between ourselves and the external. Our built works are a method of translating between our inner consciousness and the exterior environment, between the infinitely small and vast.

This thesis begins with the acknowledgement that the built environment exists as a mediation between man and nature. Every built object is a direct result of a continuing effort to connect and simultaneously exploit the land for own own use. When human constructs at all scales exceed their utilitarian lifetimes, they are often discarded. But instead, they can be seen as containing an embedded wealth of both scientific and cultural knowledge that documents intricacies of past times, places, and spaces. These obsolete artifacts of an industrial past and a post-industrial present are often sited in landscapes that shaped and were shaped by their presence. These latent structures remain a major unrealized asset in our society today, ripe for re-invention, re-interpretation, and rehabilitation. This project proposes that architecture can act as a sort of intermediary between man and the environment, bridging the interval between anthropic and cosmic time.



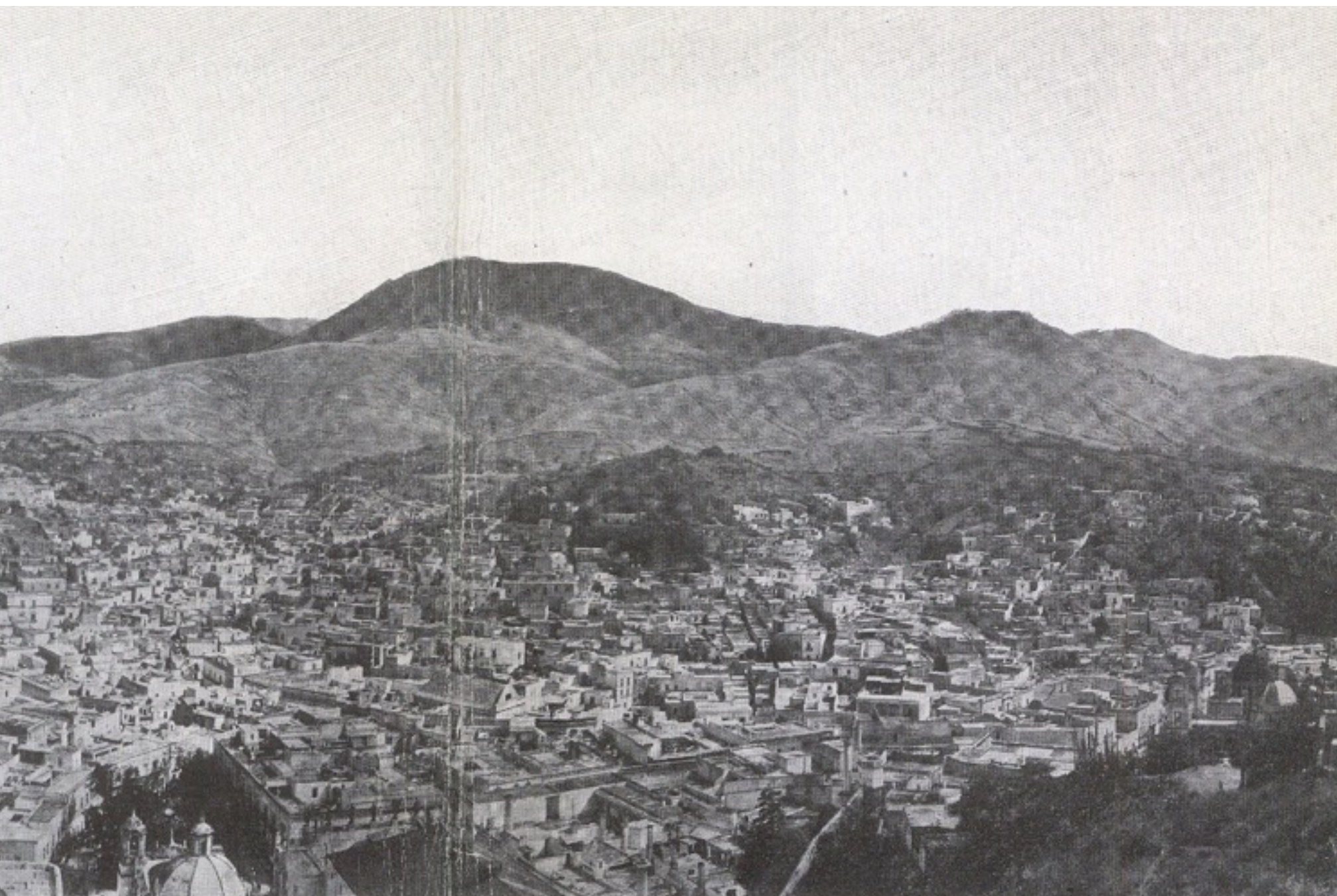
Architecture translates scale at the intersection of geologic and human time.

ABOVE | BELOW | BETWEEN

BRAD HUTCHINSON | KIMO GRIGGS + LOUISA IAROCCHI

Thank you to all who have helped along the way.

B. Looking East over Guanajuato



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PERSONA

“If you free yourself from the conventional reaction to a quantity like a million years, you free yourself a bit from the boundaries of human time. And then in a way you do not live at all, but in another way you live forever.”

John McPhee, Basin and Range¹

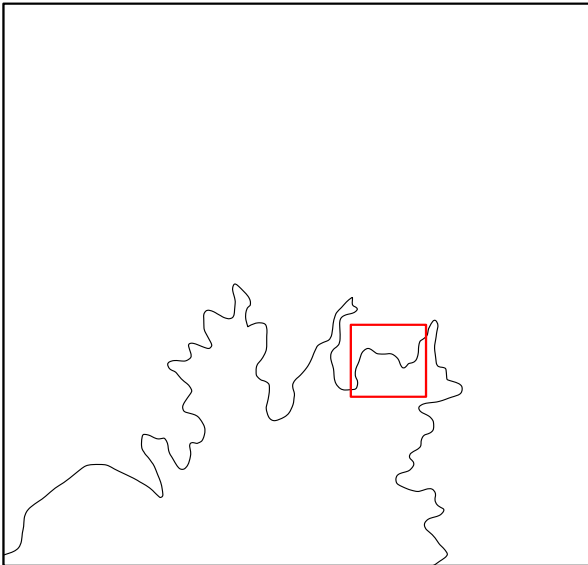
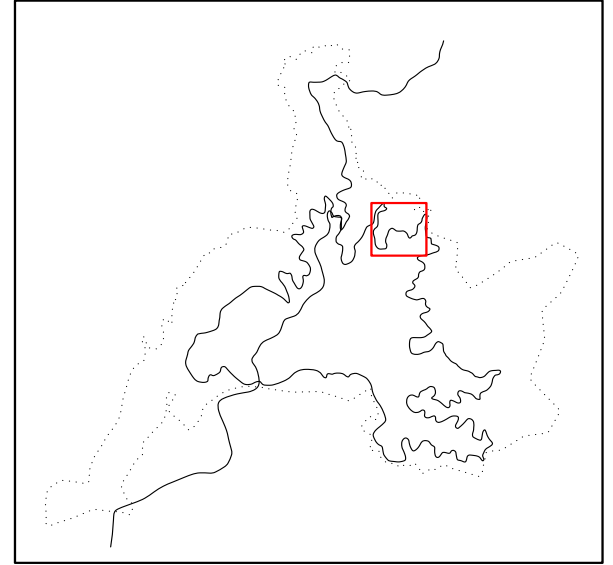
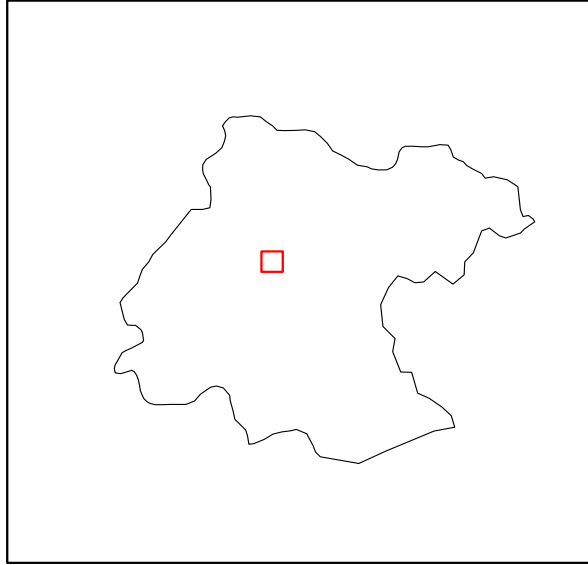
Introduction

This thesis investigation begins and ends with site. The land on which we have built over the reaches of time has both been changed by human efforts and yet remained unchanged, subject to our designs and stable despite them. As John McPhee states, an understanding of the vastness of geologic time makes us more aware of the relatively infinitesimal amount of time that the human species has spent in our current state. But at the same time, human activity has left indelible marks on the landscape over the past several millennia in the form of both unintentional ruin and willful scarring from the processes of exploring and exploiting our natural environment. McPhee further argues that this recognition of culpability provides essential perspective for considering the consequences of our constructions.²

Further, industrial progress has relied throughout history on the creation of societal systems to enable this consumption of natural resources to complete depletion. When the rock, earth, and vegetation we cull from the ground is inevitably exhausted over the course of hours, weeks, years, or centuries, these manufacturing processes leave skeletons and voids that persist beyond the departure of activity. These relics exist in practice and concept in a state of in-betweenness, outside the scale of human time yet fully within societal consciousness. As Etienne Turpin argues, these sites are ripe for reinterpretation and reinvention, yet are most often seen as the useless detritus of an unsavory

C. Vicinity Map





yesteryear.³ It is important to view these disrupted landscapes as an opportunity to rediscover the latencies in our built environment and re-conceptualize the industrial ruin as a rich cultural resource, full of potential and ripe for a new epoch of reactivation.

Our built infrastructure is an essential part of these landscapes, also inhabiting this state of in-betweenness, a mediation between man and space that is in a constant state of entropy. Wallace Stegner speculates on the nature of the landscape of the American West that “[.] some settlement that has managed against difficulty to make itself into a place and is likely to remain one....It is in places like these...that the West will realize itself, if it ever does.”⁴ He acknowledges the temporary nature of human-constructed institutions, no matter how seemingly permanent. In this way, even in its formative stages, every human construct can be considered a relic of a process, a possible solution for a complex problem. The very existence of a built work is both universal in scope and specific in execution; many systems are designed generically, but all products create a unique dialogue through use and site over time. A barn and a road, for example, are ideologically similar in different locations, as marks on the land but not of the land. They exist as evidence of society’s desire to transcend the natural and our simultaneous inability to harness it. It is in these collisions and collaborations, however, that we come to recognize that our buildings are reflections of ourselves and our relationship with our habitat. Throughout John McPhee’s numerous road trips across the West, he gradually realized that the rock formations his companion geologists travelled thousands of miles to see were novels in a different form. His layman’s inability to comprehend his surroundings wasn’t attributable to a lack of information. All he had to do was learn to parse the layers anew.⁵



E. Desert, realized
F. Of / Not Of

- G. Church on site
- H. Amphitheater on site
- I. Looking West to La Luz



J. Site plan

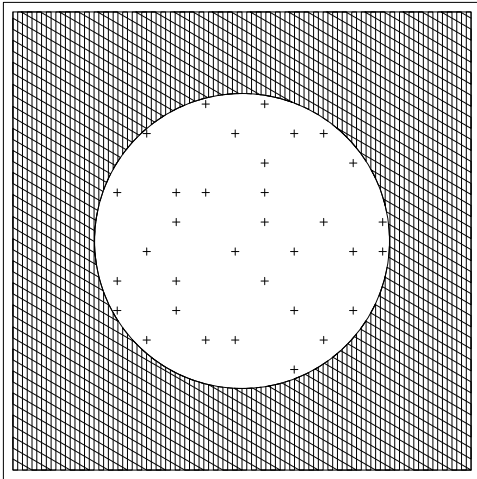


Proposal

This investigation thus reveals a system of layers that exist within abandoned sites of industry we can read in order to better understand their intricacies. The histories of human use and natural resource accretion calcify together over time, leaving behind traces of infrastructural residue that elucidate the past. The study of these striations reveals latent meaning and makes possible appropriate design responses that were previously unknown.⁶

K. Context

L. Existing conditions



The site for this thesis is a disused set of shafts within in a still-active silver mine complex in the state of Guanajuato in North Central Mexico. It is a unique place in terms of both space and time; it is at once both abandoned and active, functional and non-functional. Located above the urban sprawl of the city, the site is a remote and overlooked remnant of the mining industry. At the same time, it is located in close proximity to the major cultural epicenter of the city of Guanajuato, home to a national university and several major cultural festivals. This thesis proposes to experiment with designing within these unique circumstances, attempting to mediate between the conditions on the surface and beneath it. The examination of the utility and aesthetics of these conditions will engrain the site with new purpose, revealing the histories resident in its extant built infrastructure and geologic forms, restoring a depleted space for the benefit of both the scientific community and the residents of the region.



This project proposes a seismic observatory that occupies two vacant mine shafts and the surrounding surface plaza. Architecturally, this complex will include the scientific devices necessary for monitoring geologic and temporal shifts, an archive for past measurements, underground lookouts, workshops, and spaces for contemplation. The attendant circulation and mechanical spaces are designed to support these primary uses and create paths that reveal the idiosyncrasies of this landscape. The

proposed intervention is intended to be quite literally the frame through which these extant spaces will be experienced,⁷ acting as the very tool by which human and natural changes that will occur on the site can be measured. The recovery of this space will enable the infrastructure to serve as a new point of interest for the surrounding areas, drawing attention to the past century's void of activity amidst the general development of the proximate city and its systems. Thus, the project will investigate the nature of the site as a mined resource, as land art, and as built infrastructure, finding the overlaps in place and time that link the three inextricably.



CAUSA

“To them, just being out here is in no small measure what it’s all about.”

John McPhee, In Suspect Terrain⁸

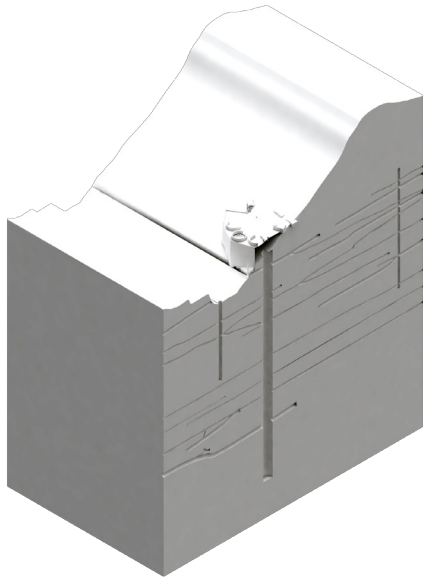
Mine

Whether for commercial gain or for geologic research, humans have been harvesting the natural environment for value since the very beginnings of time. What began as foraging for survival morphed into caching, protecting against an uncertain future via surplus.⁹ With the rise of trade, collection and specialization became a means for ensuring this same safety in a more diverse way. Direct trade yielded to the rise of currency as a proxy for goods and the divorce of the one-to-one relationship between goods . Monetary systems, and arguably the rise of industrialism, led to wide scale population growth and a shift in worldview from a system predicated on abundance to one typified by scarcity.¹⁰ Finite goods suddenly became an undeniably precious resource, and the quest to stockpile and exploit these supplies have fueled conflict since. Precious metals are a critical resource in this system, their value amplified due to their relative unavailability.¹¹

Silver has been a valued by civilizations for millennia as both a precious and an industrial metal. Found alloyed in the coins and tools of early civilizations, it is both delicate and durable as a metal. In the past and today, it has many diverse applications beyond coinage, used extensively in optics, jewelry, photography, ornaments, utensils, and medicine.¹² The earliest historic traces of silver usage date to the fourth millennium BCE in Asia Minor, where slag heaps indicating the processing of silver ore have been found amidst several settlements. Romans further perpetuated its use as a stable bank for value, with demand for both the process and product soaring throughout the duration of their empire.¹³ Especially pertinent to this thesis, however, are the methodologies by which silver has been obtained form the land. Found deep underground in veins, silver is an ore, its valuable product mixed

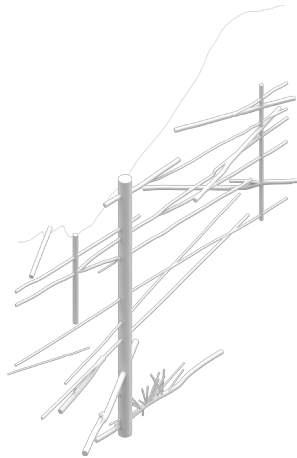
N. Ingot





with the types of hard rock most often found in seismically active areas. This precious metal is deeply embedded in the earth, with the extraction of tons of ore being necessary to yield only trace amounts of silver. Even with these repetitive large-scale, destructive processes, silver is extraordinarily difficult to find and even harder to obtain, making it extremely valuable for centuries.¹⁴

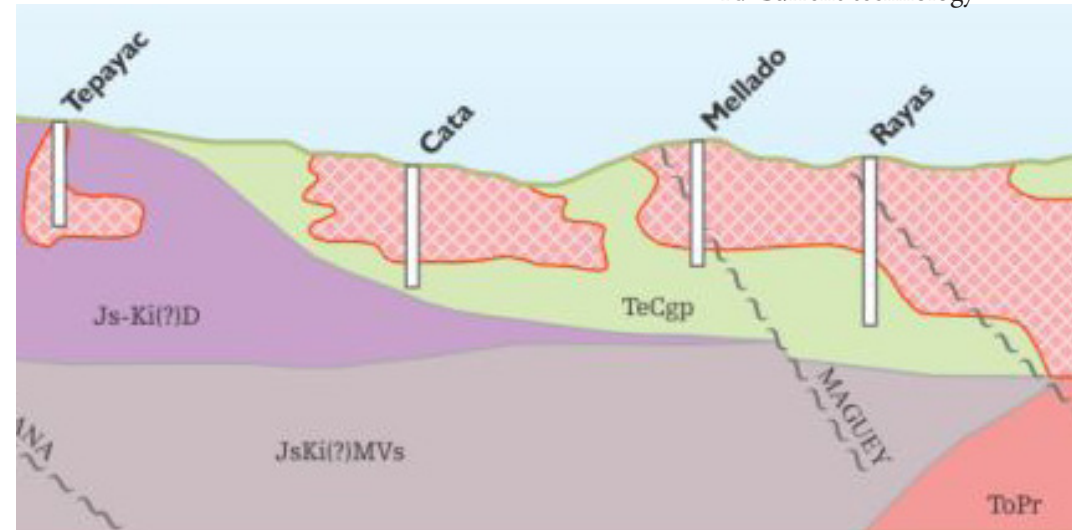
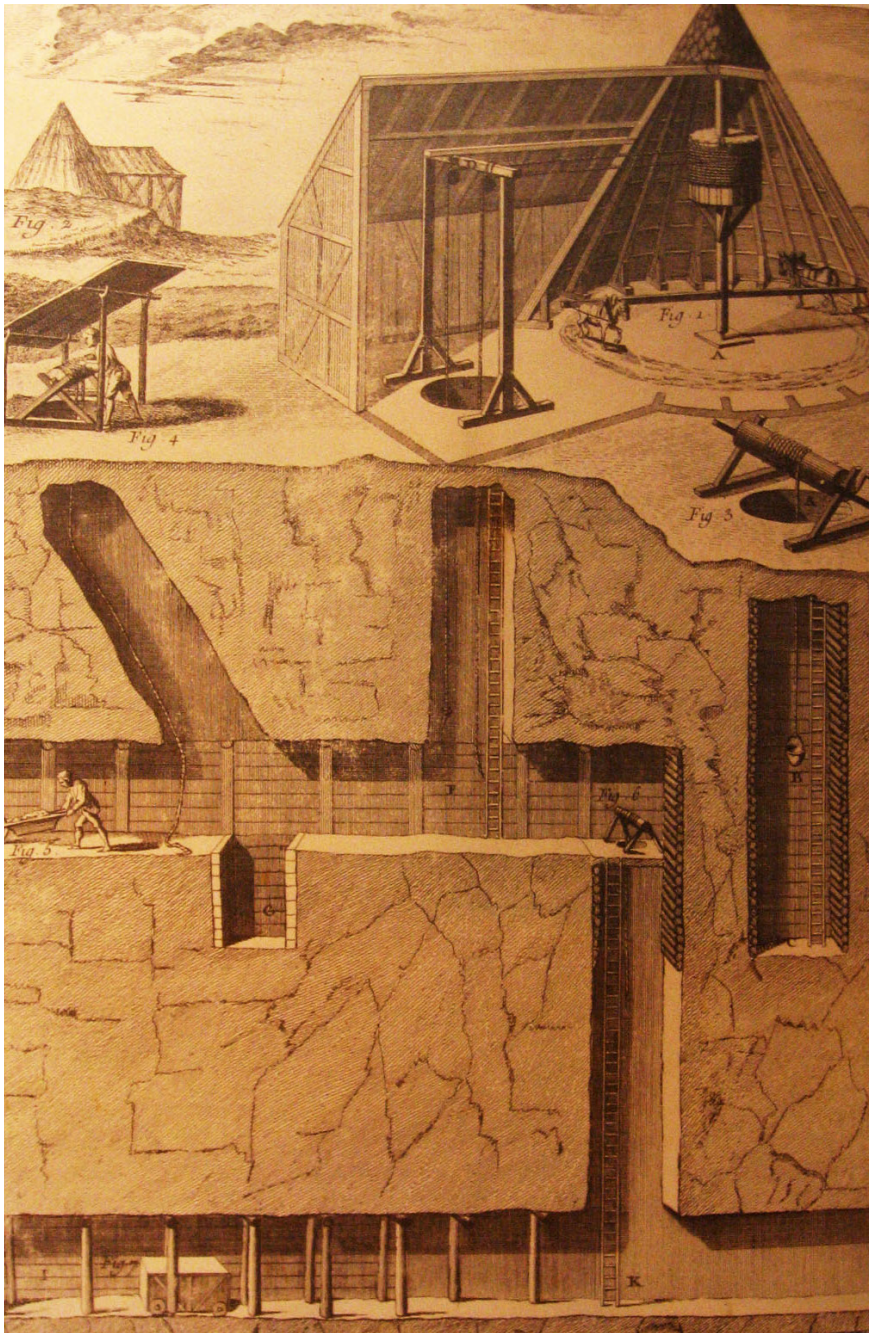
Due to the complexity of this process, a massive global extraction industry has surfaced around the sites where silver is known to exist. Although techniques for extraction have evolved over the centuries, it has continued to be an extraordinarily toxic process at almost every stage. Drilling and extracting rock within the earth releases long-buried elements into the atmosphere, refinement processes have used chemicals as toxic as arsenic and cyanide, and long, difficult hours of labor strain even the hardiest of workers and machines.¹⁵ As a result, tools and workers are fatigued, leaving traces of their work in social constructs as well as the physical landscape. The ramifications of these struggles are often visible in the ruins of buildings and the histories of the people who have wielded the tools, embedding anthropologic history even more deeply into the landscape.



The human traces of the industries involved in extracting these limited resources from the earth, can be read in the topography of the terrain and its histories of place. The time scales of the anthropocentric, or human-dominated, and geologic, or natural, are superimposed in these circumstances, creating points of confluence, departure, and discovery. Michael Benedikt observes that the instruments and contours that result from these explorations are rarely considered valuable in and of themselves; the products of these operations are most often considered to be the spoils yielded rather than the voids left behind.¹⁶ When forgotten by industry and society, these unique spaces do not disappear, but are often suppressed in society as unpleasant memories. However, the transformation of these landscapes from natural to manufactured uncovers the complex intersections between the forces acting on the site. It is important that these spaces be recaptured as a strategy for learning about our past and future by using that which remains to measure ourselves against time.

O. Void/Solid

P. Guanajuato Mines
Q. Current ventures
R. Current technology



S. Carved site



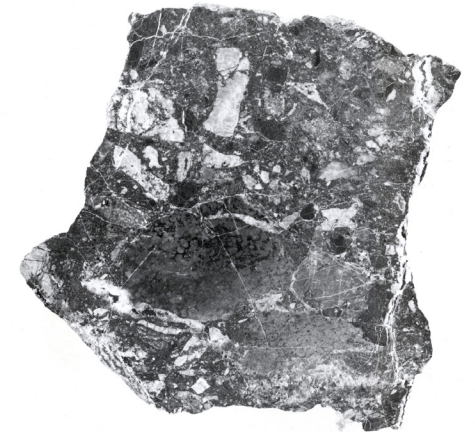
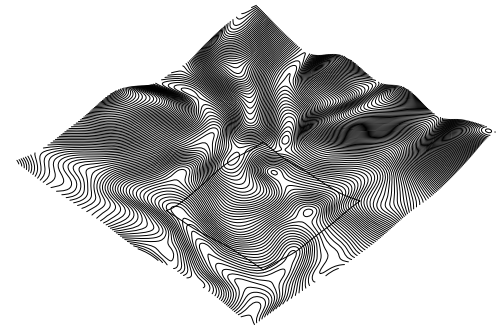
Map/Tool

Tools, or the devices used to apply change to a system, can be seen as interpreters between man and the spaces that surround us. Michael Benedikt observes that they are records of our curiosity and aspirational devices for that which we wish to accomplish. This is true at every proportion.¹⁷ Even though our implements sometimes exceed our own proportions, they are necessarily scaled to our hands and our ambition. In this way, the instruments we devise are like versions of ourselves, intervening in the space between ourselves and our surroundings.

If we extend this concept of tools as mediator to include anything that we create, architecture can also be seen as a translational device. Peter Zumthor states that our buildings are thus extensions of ourselves and our memories as well, meant to provide things for us that we cannot achieve on our own.¹⁸ Art, similarly, is meant as a machine for relation. Its very creation is meant to elicit understanding from the world, drawing inspiration from the mysteries of the time and space that surround us. Arguably, the medium poised between these two is the abstract mapping, or stereography, of three-dimensional spaces.¹⁹ Rendering three-dimensional forms into two dimensions takes something concrete and abstracts it, fundamentally separating its inherent physicality from its image. This Platonic ideas of form as representations of the same thing divided into the material and transcendent realms accumulate over time. Just as the strata in a rock formation show the localized aggregation of space-time in form, so too do a series of maps show the layers of information that reveal the development of knowledge over time.

In the same way that a space can be understood by studying a current map, we can gain an understanding of a place's history by studying progressions of maps of the same place. Time becomes a reanimated third dimension when applied to successive maps. Just as a z-axis in a model gives us

T. Patched site
U. Breccia



V. Guanajuato, 1809
W. Rayas, 1740
X. Topography, 2015



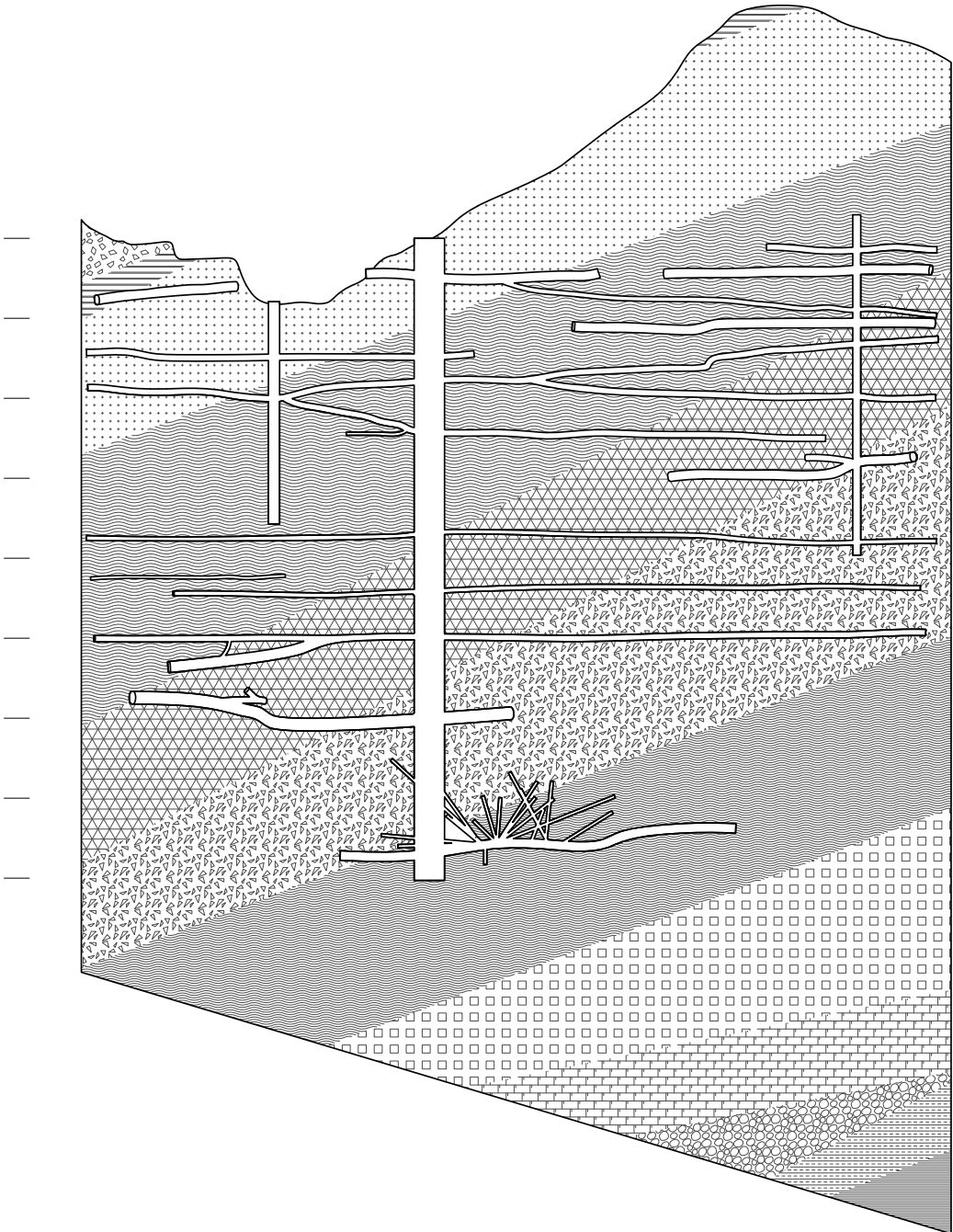
information invisible within a two dimensional snapshot, so too can the evolution of information enhance our understanding of a condition. In viewing, for example, the series of these projections of Guanajuato, we learn about the discoveries and uses of the land over the centuries, helping us reanimate its development and decay. These mapped histories are records of space-time similar to how geologic formations reveal otherwise invisible pasts. Discovering the history of actions and the land are both processes of excavation that can only be advanced through the record of these dormant realities.



Thus the studying and making maps of the site became an early focal point of the thesis process, revealing the dynamic forces that shaped the site. Diagrams and cartograms like the ones pictured at right that map this additional time variable conveyed the importance of the edges of the site as transition points from one condition to the other.²⁰ These thresholds influenced the modes through which the design interventions developed in relation to the existing conditions, how spaces transitioned from one state to another, and the role of the new in making plain elements of the hidden. This project brought to light the fact that edges are where the essence of things is often exposed. The boundaries of systems are where pieces organize into and operate within larger systems, showing something intrinsic to themselves that is impossible to decipher from their interiors. A space the Japanese call “ma”—essentially “a place between two attributes”—exists in this fertile in-between.²¹ Black tells us much about white, silence about sound, and solid about void. The points of tension between two polar conditions vibrates and the interval becomes something entirely separate from either.



Y. Existing





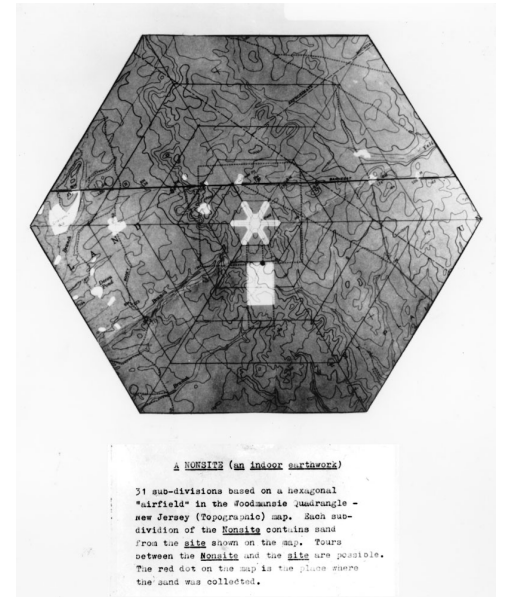
Precedent

In the Western United States during the 1960s, a series of land artists began exploring the effects of space and place in a landscape similar to the Mexican Plateau, where this thesis site is located. Robert Smithson and Michael Heizer, among numerous American artists, used the land as a canvas to directly challenge the tradition and boundaries of gallery art and to capture the American fascination with the unexplored. Smithson, especially, also advanced these ideas through writing about his art. His pieces were almost always multimedia presentations of an idea, and very rarely even about the act of creating space at all.²² By merging sculpture, architecture, photography, and sound, he laid bare intricate social ideas about the role of the land in modern society and the mysteries of terra incognita. Smithson expressed outward disdain for singular media in art, declaring in 1966 “Painting, sculpture, and architecture are finished, but the art habit continues.”²³ This minimalistic approach to representation reiterated that image is the main vehicle for categorizing and sharing knowledge, and that art, as a mode for transcription, can help raise societal issues that often resist characterization or definition. Ron Graziani observes that by appending the suffix -work to every artistic pursuit, Smithson and his contemporaries acknowledged the temporal nature of their work as part of a continuum, implying the labor involved in their creation.²⁴

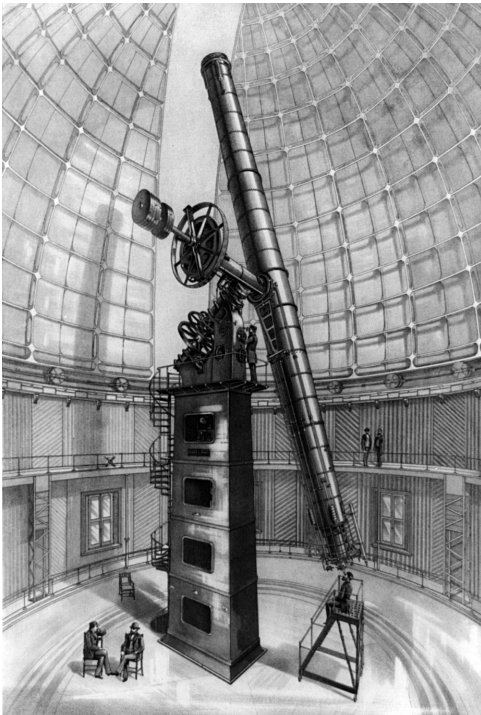
Smithson further addressed these issues by operating in disrupted landscapes for much of his later career. Fascinated by the marks left by industry, he was interested in exploring the link between the entropic irreversibility of the mining operations and the people who perpetuated them. Smithson produced a series of works, including *Double Nonsite* (1968), *Mirror Displacements 1-9* (1969), *Spiral Jetty* (1970), and *Broken Circle/Spiral Hill* (1971) to explore issues about anthropic industrial change within the natural landscape.²⁵ Walter De Maria similarly experimented in rigorous interventions like *Desert Cross* (1969) and *Lightning Field* (1977). His work similarly asserts that the artistic forces

AA. *Double Non-Site*

BB. *Desert Cross*



CC. ALMA Array
DD. Royal Observatory



superimpose on the landscape a personal and cultural narrative to something that already bore the marks of intervention.²⁶ The work of both artists shows the power of the right move at the right time and the timeline innate in the history of the landscape.

Despite Smithson's objections, architecture is also an important method for marking the passage of both space and time. Zumthor observes how it does this in several ways, including the thoughtful use of material, respect for weathering and decay, and the designing of space for the passage of natural light.²⁷ It can also do so by making clear the qualities most inherent in a utilitarian structure, be it a mining shack or a factory. Another building type that evokes this recording of time is the astral observatory, which houses the ever-changing equipment used to survey unknown spaces beyond this planet. The observatory has taken many forms over time, from Tycho Brahe's first tower at Uraniborg in the Øresund (1580) to the current dish arrays in the Atacama Desert of Chile (2011). Since the development of the telescope in 1608 by a trio of Dutch lens grinders,²⁸ these spaces for viewing celestial events in detail have extended the architecture of the ground plane upwards, changing conceptions of what and how to map our surroundings in the process.

The Royal Observatory at Greenwich, England is widely considered to be the first great observatory of the modern era. Commissioned by Charles II in 1675, Sir Christopher Wren was responsible for the main design of an stone octagonal tower to house equipment for scientifically cataloging the night sky. As technology has changed, the original building was swallowed by additional support annexes, and eventually observational efforts were moved elsewhere.²⁹ This, however, belies the structure's main contemporary use: from the time of Ptolemy until 1884, maps were nonstandard in their treatment of longitude. While latitude, as an angular distance from the equator, is easily calculable (among other ancient methods) using the rise and fall of stars on the horizon, there was no line of origin from which to measure longitude. Techniques including sea clocks had been invented to measure the relativity of position, but the lines themselves wavered depending on the cartographer and the time

and place in which they were drawing. When the International Meridian Conference convened to standardize the line, Greenwich was chosen to embody this centering point.³⁰ Today, the observatory is a museum and an artifact cataloging this zero, with both landscape and built interventions evoking this concretization of site lines. It is a literal x on the map, as arbitrary in its location as De Maria's Desert Cross from 1966. The land is a canvas, and site is where we decide it is.

If concepts of place are malleable, then site is merely an opportunity for reinterpreting one's surroundings. Gordon Matta-Clark, a New York artist contemporaneous with Smithson et al, realized the power of subtraction. He often spoke about the power of "making space without building it," of finding the innate essences of things without adding to them.³¹ His projects mostly considered decay urban conditions, but many other projects by other architects and artists pick up on this sense of "undoing."³²

A spirit of improvisation is especially evident in the landscape remediations at Duisburg Nord in Germany. Once a hundred five hundred and seventy acre steel plant, the terrain surrounding the Duisburg was heavily contaminated prior to abandonment in the early 1980s. Peter Latz, a local landscape architect, proposed a clean-up effort for the site called phytoremediation, first pioneered by Richard Haag twenty years earlier at Gas Works Park in Seattle. Both firms successfully sequestered contaminated soils in bunkers below grade and treated the surface site using plants, reestablishing the land as an inhabitable, public space with minimal cleanup³³.

The resulting landscape is lightly edited from its origins—massive concrete piers and hulking, perilous steel towers are open to the public, who clamber over and around them. There is a deep sense of cultural memory embedded here, addressing not only a direct preservation for preservation's sake, but also a re-interpretation of a site, showing the depths of program that are universally possible given a lack of constraint. Walkways at a myriad of levels connecting spaces at different elevations allows

EE. *Conical Intersect 2*
FF. Duisburg-Nord



individuals to create their own narrative path and associate with the hulking elevations on a personal scale. Continuously open to the public since, the plant is an industrial-scale playground, edited minimally.³⁴ It is a testament to the intrigue and power of post-industrial spaces that people continue to revisit it, and further testament to Matta's commentary on framing, editing, and clarity.

LOCUS

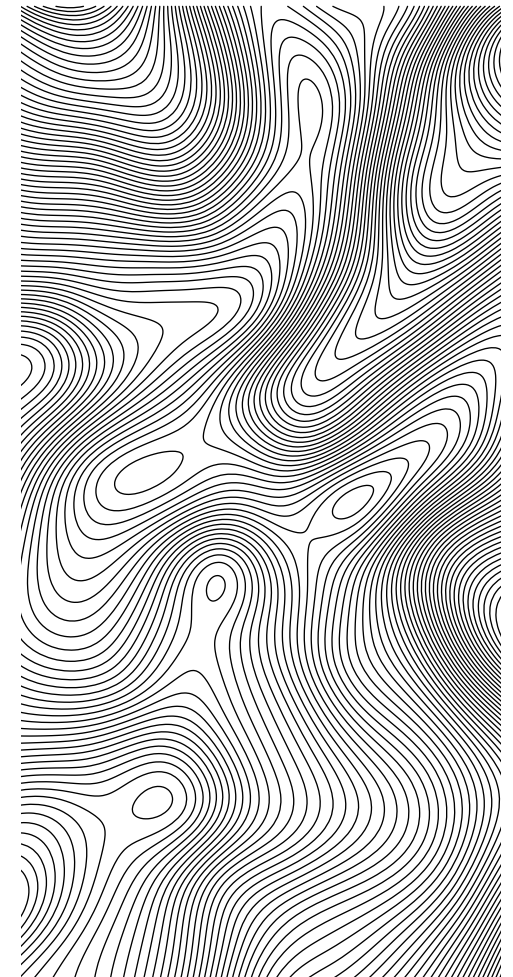
“In geologists’ own lives, the least effect of time is that they think in two languages, function on two different scales.” John McPhee, Rising from the Plains³⁵

Natural

This thesis surveys the role of architecture as a means of translation in the present through a design proposal for a seismic observatory in a disused mine in Guanajuato, Mexico. In order to fully appreciate the motivations for this new infrastructure on the site, it is necessary to unearth and catalog the histories of this place. This more targeted probe will focus on how the site has both embraced and resisted change, and how the different eras of its anthropic use have accreted and metamorphosed over time.

The city of Guanajuato sits in the high plains of the Central Mexican Plateau, nestled in a crook of the Sierra Madre Oriental range. This area of the Sierras is highly seismic; the Trans-Mexican volcanic belt spans the entirety of this swath of Latin America from the Pacific Ocean to the Gulf of Mexico, subsuming portions of three mountain ranges across several Mexican states. This all occurs at the confluence of the North American, Riviera, and Cocos tectonic plates underneath the crust. In most similarly seismic zones, the path of volcanos follows closely the trench between the plates, but the Mexican belt is atypical; here, instead, the peaks are obliquely sited to the arc, setting up unique geologic relationships still not fully understood by scientists. According to scientists, the geology is rare even for its surroundings— the fault breccia sometimes appears unexpectedly amidst different formation.³⁶ The rock in this region is, resultingly, an amalgamation of several different eras.³⁷ It is largely breccia—rock composed of different types of minerals fused together with a fine igneous

GG. Topography



matrix. Literally “loose gravel” in its original Italian meaning, breccia can typically have several different origins.³⁸ In Guanajuato, it is mostly a mix of fault breccia—the product of two plates sliding past one another—and a volcanic subfamily resulting directly from laval accumulation. At Rayas, these two types alternate sporadically. The volcanic breccia, however, is also called ore breccia, and only ore breccia holds silver here. Thus detailed maps of the ore breccia deposits in the region exist, dating to the mid-sixteenth century.³⁹

The climate at Rayas is relatively temperate, due to a combination of the latitude and altitude. At nearly 2200 meters above sea level, the heat of the Central Mexican Plateau is mitigated, with the annual average temperature hovering near 20°C. The direct sunlight has a pure, blanching quality, and two thirds of the half-meter of annual rain happen during the summer months. Winds are mild but constant in the east-west direction, resulting in hardy, high-desert flora, few fauna, and poor agricultural land.⁴⁰ The land is at once hospitable and austere, desirably clement for habitation.

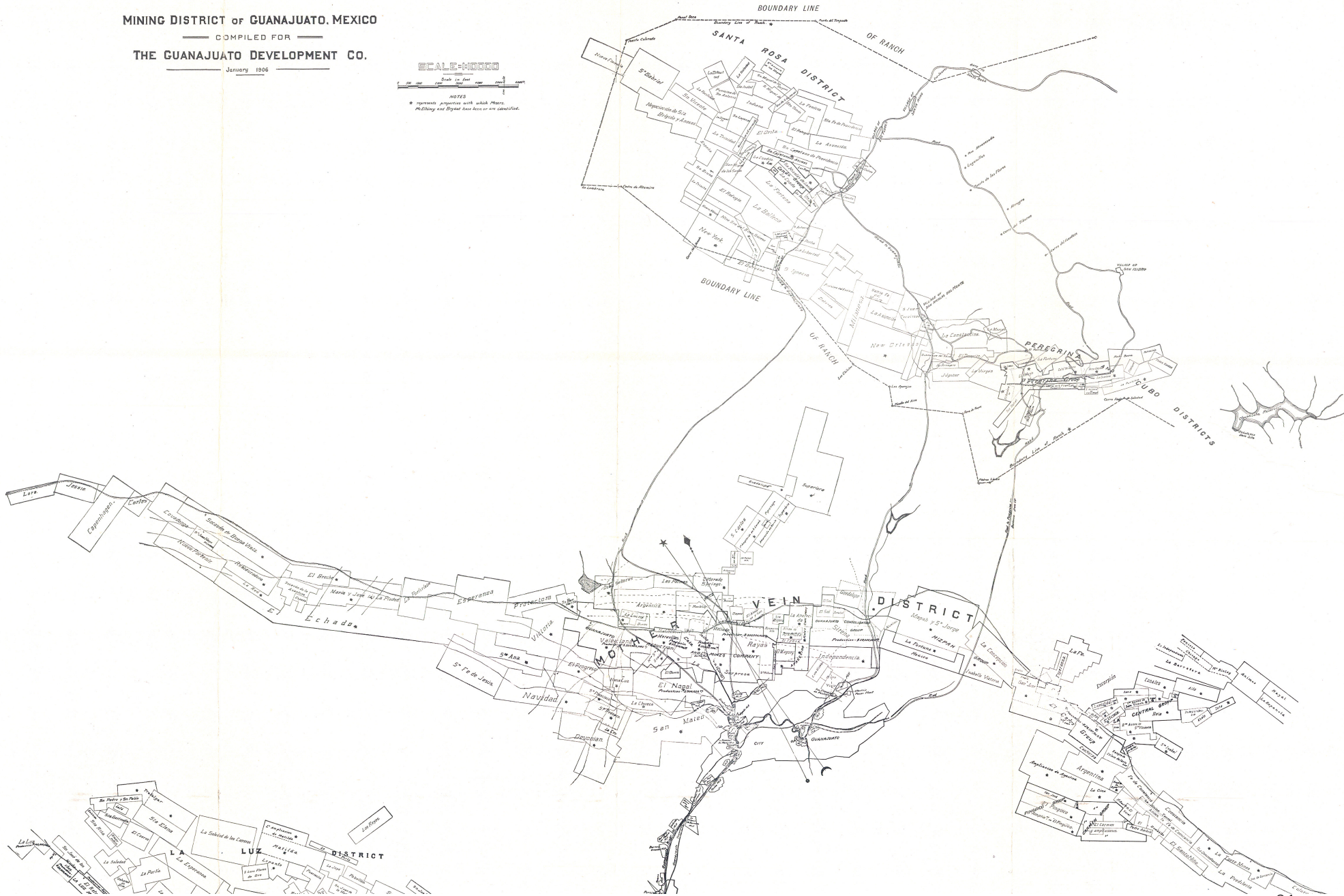
HH. Mining claims

MINING DISTRICT OF GUANAJUATO, MEXICO

COMPILED FOR
THE GUANAJUATO DEVELOPMENT CO.
 January 1906



NOTES
 * represents properties with valid Patents.
 ** Mining and Beyond have been or are considered.



II. Mining claims



Man

Guanajuato state in Mexico was first settled about 800 BCE by tribes seeking arable land. Despite its aridity, the valleys surrounding the present-day city of Guanajuato have fertile land and more surface water than its immediate vicinity. Presumably due to prolonged drought, the area was abandoned in the 10th century and sparsely populated by native populations for hundreds of years thereafter. The arrival of Cortes in the New World, however, marked a new beginning for the region. Spanish expeditions from present-day Mexico City reached Guanajuato in 1522, with silver and mineral discoveries quickly driving major population growth and expansion of both the extraction economy and the mines as a locus for exportation.⁴¹

Spanish ore discoveries quickly mounted in the region and by the end of the seventeenth century, the process of extracting and exporting silver had fueled a since-unprecedented boom in the region. New experts and workers mapped the Veta Madre, or “Mother Vein,” in hopes of striking even more riches, and were frequently rewarded. By the year 1750, the mines were producing nearly two-thirds of global silver output, with the claims at Rayas and the proximate La Valenciana the most prolific.⁴² Silver riches fueled development in the valley as the mines reached outward, and Guanajuato developed both organically and according to strict planning. The city itself is laid out similarly to European cities from the same era, with typical low-rise residential fabric, towering cathedrals, and winding, pedestrian-scale streets that conform to the topography. Alleys lead nowhere, seeming dead-ends bend into open fora, and vibrantly-painted houses differentiate the city quarter by quarter. Tunnels penetrate both the hillsides and the city; developed to deal with both the heavy transportational demands on the city and periodic surges of groundwater, the tunnels today serve as the main corridors into and within the city. Atop these underground tunnels on the outskirts of the city, informal neighborhoods crowd the shafts, providing worker housing and the services necessary to support such a separated population.⁴³

JJ. Housing
KK. Tunnel
LL. Cathedral



The city continued to grow in step with the mines throughout the 17th and 18th centuries, booming with people and currency when discoveries were especially abundant. Silver mining, however, is an infamously inefficient practice; small amounts of silver are categorized by the tonnage of ore mined to yield them, and even the richest veins sometimes come up completely empty. Further, the practice is entirely subject to the technology of extraction tooling so that when these tools exhaust their capability, mines shut until technology improves. This happened several times over the centuries—documented in 1642, 1794, and 1810.⁴⁴ During one of these 18th century closures, however, the Marquis de Rayas capped the shafts on the site, improved the town, and built a cathedral amidst the scattered industrial fabric. When new extractive processes emerged, the town atop Rayas was considered too valuable to disrupt with mining activity.⁴⁵ New vertical shafts were bored for access and mining continued far beneath the town, but the main downcasts in the town remained shuttered for centuries.

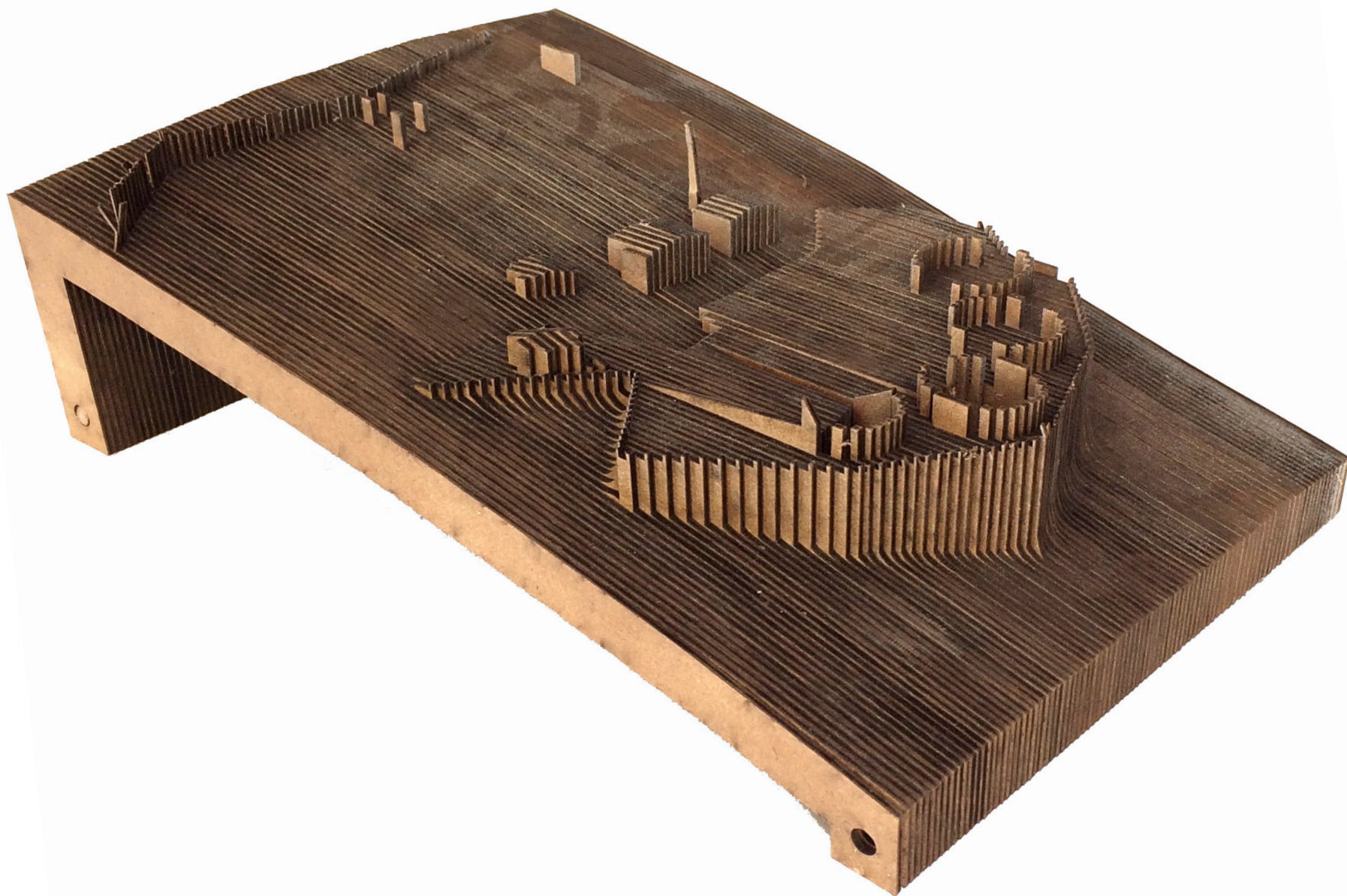
Today mining continues to be a major source of income for the region, with shifting ownership and concern fluctuating with gains below the surface. The current owners are Great Panther Mining, a multinational company with principally Canadian ownership that bought the mine around fifteen years ago. This firm now owns nearly 6500 acres of the Central Plateau surface, last year pulling 310,000 tons of ore to the surface. This amounted to about 1.7 million ounces of pure refined silver—a return of about 150 grams per ton mined, but also about 0.01% efficiency by weight.⁴⁶ Despite newly high rates of silver recovery, the present low price of precious metals means that the company is currently in “discovery” mode, mapping the claims they own and annexing new ones for the future. This will continue until prices once again inevitably surge, at which point Great Panther will redouble their interest in extraction.

Despite this continued expansion, the remnants of the old nineteenth century production continue to remain dormant at Rayas. Four twenty-two meter diameter shafts, once the principal access

and mining shafts, remain capped at the center of the town, alongside a well that is twelve meters in diameter that reaches even further into the earth. These are accessible; at the surface, visitors can walk onto these capped spaces, bordered by surrounding five meter tall walls. One has an amphitheater that is infrequently used, two hold random plantings and are closed with a chain, and one is half destroyed, open to the plaza. In close proximity to these spaces are the ruins of the church built by the Marquis de Rayas in the 1770s, an intact smelting chimney, and several one-story twentieth century industrial structures. The site is empty at its center, with the population mostly bypassing the remains of its mining past.

This thesis project intends to reveal the past of this site, not to replace it. The built and excavated infrastructures here endures despite the uncertainties of environment and industry. It feels both like a curiosity and a sacred space, a landscape that has evaded certain destruction to emerge as a place of wonder. By drawing out suppressed narratives from the spaces that already exist, it can become a utilitarian and aesthetic space. The forces that shaped the spaces beneath the surface of the earth have also weathered the structures on the surface. In connecting above, below, and between at several different scales, the intent is to connect to the histories now resident in the site. This proposed intervention, poised between the geologic and the anthropic, the inner and the outer, evokes this state of betweenness, and activates a journey through time.

MM. Site model

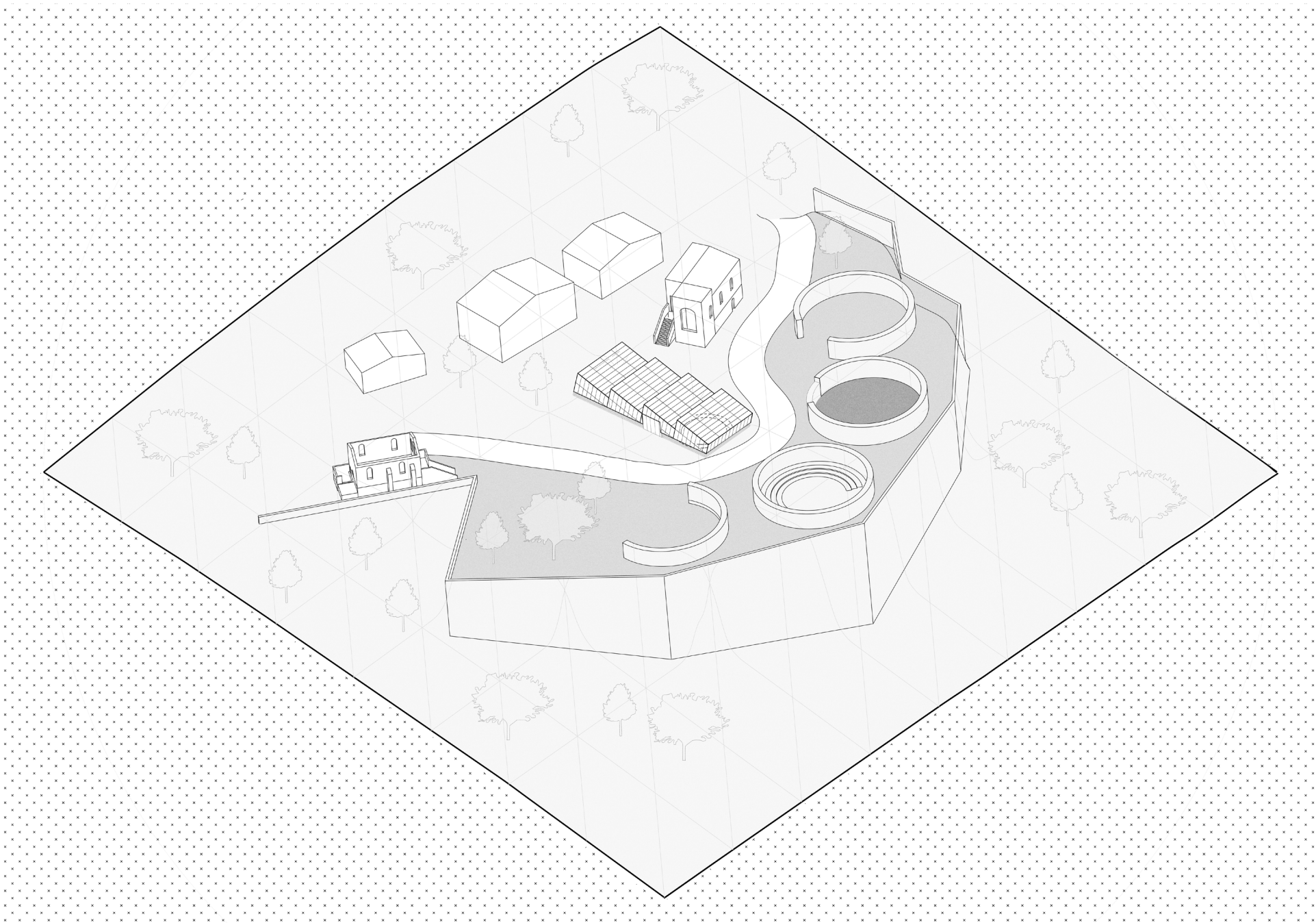


Today

The approach into the Rayas complex today is nothing short of breathtaking. Taking the Carretera Panoramica out of Guanajuato, one climbs quickly, ringing the city along the walls of the valley to the north. The visitor quickly begins encountering artifacts of the silver mines, some currently active, some silent, and all dating to the sixteenth century. The road twists and turns to maintain elevation, snaking through roadcuts, crossing bridges over depressions, occasionally emerging into wide meadows. The operational portions of the silver mine and the related neighborhood of Cata is encountered first, grouped around a small Baroque square. Continuing westward along Panoramica, a narrow footpath runs alongside the one lane road, curving along the foothills. The approach from the northwest leads directly into the small town plaza of Rayas, full of small houses, a somewhat overgrown open marketplace, and an abandoned stone church. Continuing fifty meters past the church, the road cuts back one more time into a central plaza, where the four shafts of the old mine come to the surface. Capped since the 18th century and surrounded by the ruins of the mining concern, the plaza is a void on the surface, hiding the some 425 meters of emptiness below.⁴⁷ Surrounding the mine shafts are the remains of the mining industry, a few shuttered buildings, sitting silent in the sun. The plaza is small. Upon exiting it, the road continues to hug the walls of the valley before dropping back into the city, completing the loop.



NN. Smelter
OO. Church



FACTUM

“If you are going to have an industrial society you must have places that will look terrible. Other places you set aside—to say, ‘This is the way it was.’”

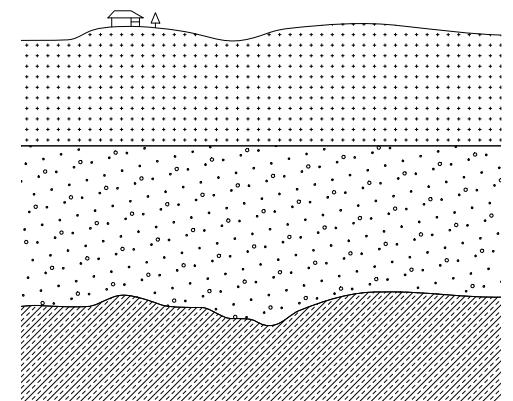
John McPhee, Assembling California⁴⁸

Program

Culling from this understanding of the site and its past, this thesis sets out a methodology for intervention in an extreme site. The architecture proposed here—formally, materially, spatially—is developed as a mechanism that best employs the current state of the site. As such, the program serves as merely a frame for showcasing the characteristic elements that define the site on its surface and below—its light, texture, or form. As a type of infrastructural intervention, the project offers a temporarily appropriate response, a sort of case study in the present. The seismic observatory is envisioned as being subject to decay through use and disuse, and as such is not upheld as an end or ideal use for the space. Rather it is an attempt to repurpose the unique structures and spatial conditions in a way that makes them newly relevant without destroying the embodied qualities that define them. The architectural approach is more often about stripping away and revealing what is already inherent in a site than creating something new.⁴⁹

With these ideas in mind, many different programmatic strategies were considered for optimizing this particular site. Large spaces for potential storage led to explorations of libraries, seed banks, and data repositories. Museums and interpretative centers were considered for their public outreach and ability to decode histories not immediately evident. Æolic batteries, hydroponic farms, and heat sinks were considered as so-called greening exercises. Ultimately, the extant spaces in place demanded

QQ. Translation



less programming, not more, and the utilitarian spaces for scientific observation and measurement became a more appropriate response to the current site conditions.

The spaces, as designed, were broken down into the following categories:

ABOVE

- + workshop
- + lecture
- + lookout

EDUCATION + OUTLOOK

BELOW

- + seismometer array
- + strainmeter
- + gradiometer
- + archive

MEASURE + HOLDING

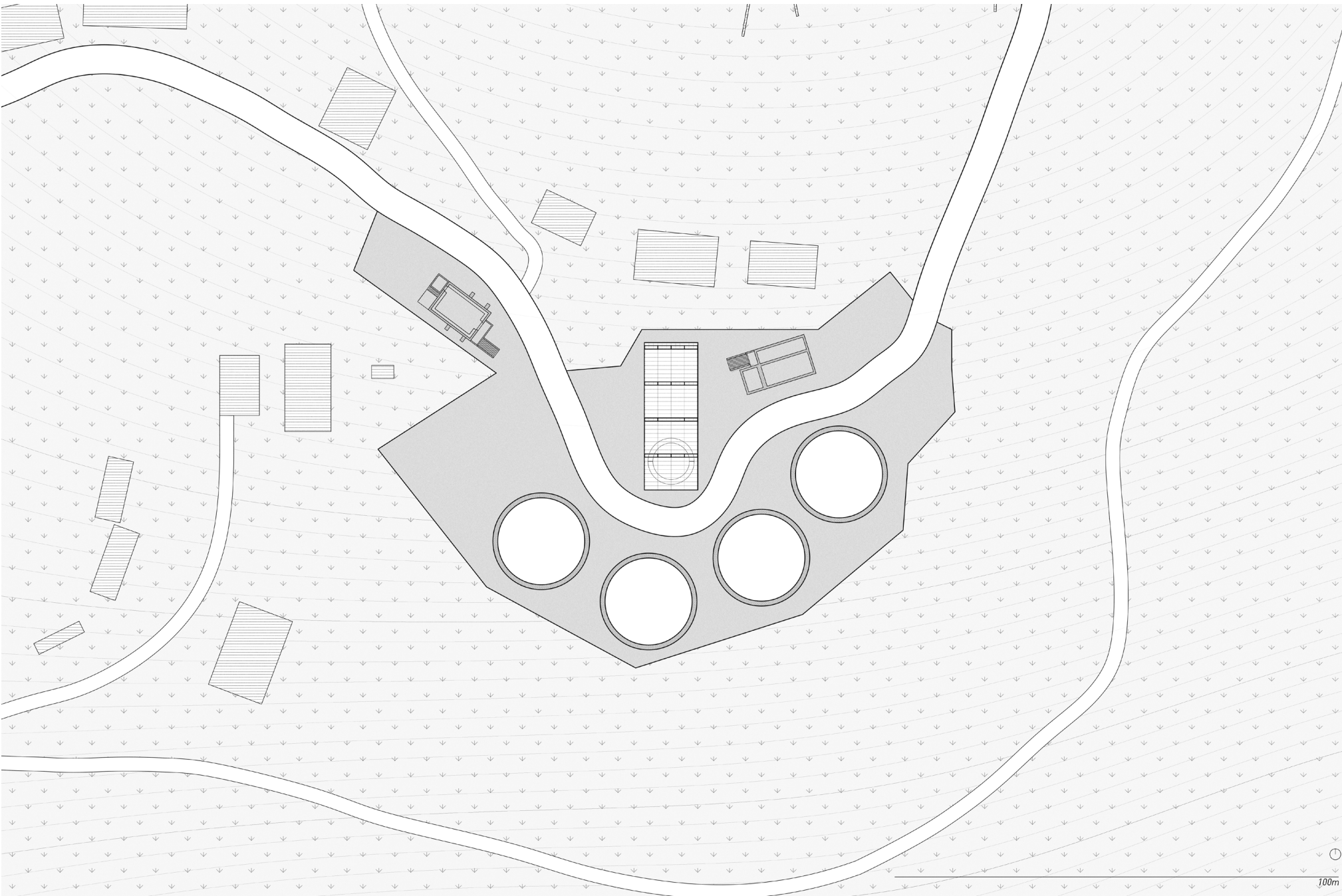
BETWEEN

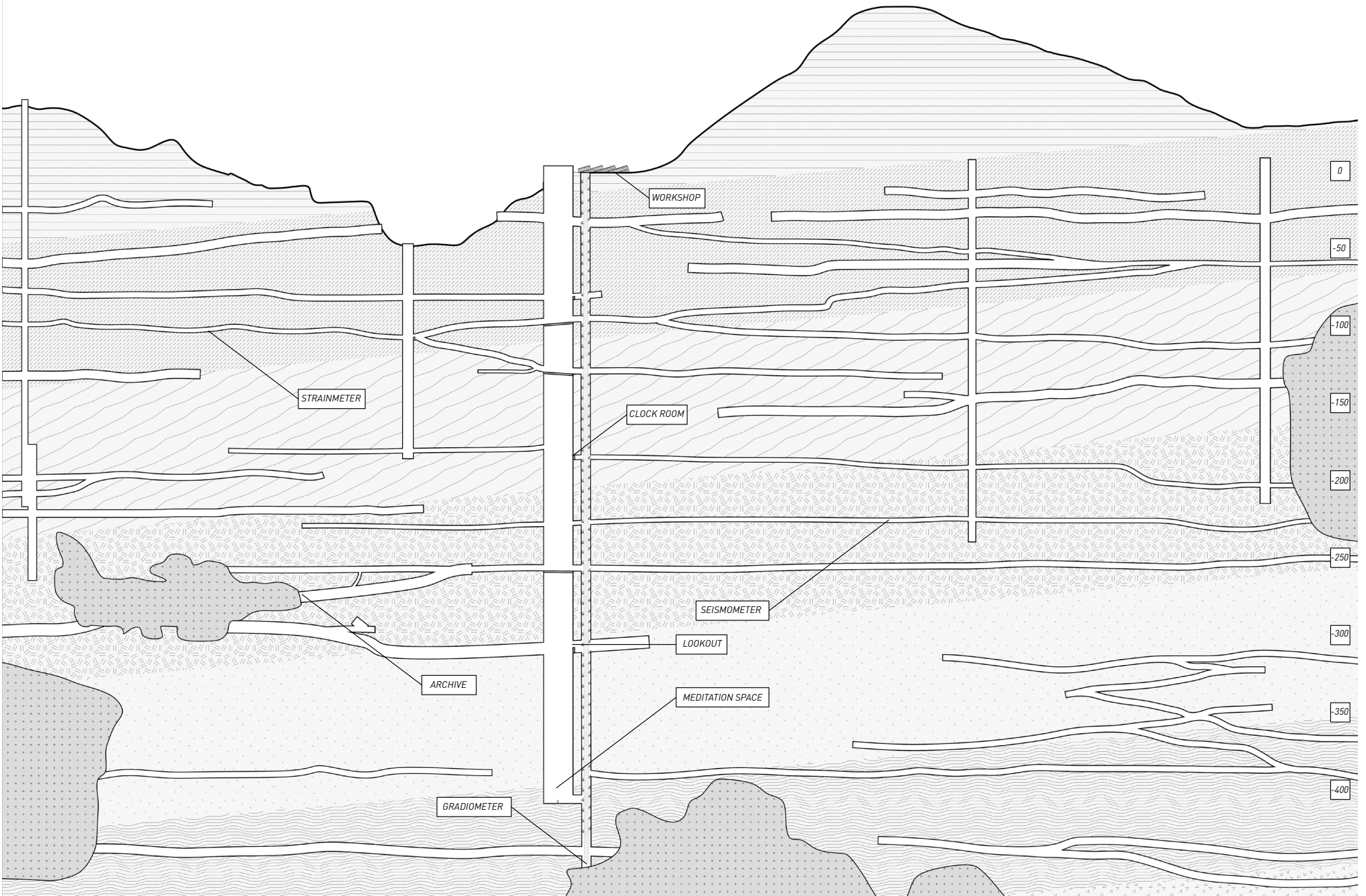
- + meditation space
- + vertical circulation
- + clock room
- + mechanical

REFLECTION + MOVING

Programs were then placed in situ according to several different criteria. Foremost were their relationships to the existing site conditions, both above and below the surface of the earth. Certain spaces or needs were evident; for example, the strainmeter and seismometer needed to be buried within undisturbed rock, whereas workshop spaces tied to the necessary surface sunlight and air circulation. The natural and historical flows on site further dictated the ways in which people,

RR. Site map





material, and information moved around the site. The cues culled from the landscape, both natural and manufactured, served as a scaffolding for all of the design interventions within. They are meant to complement and make evident the pieces that were already at hand. The mix between public and private spaces further dictated separations and differentiations, creating a clear boundary for how each set of users are intended to use the proposal.

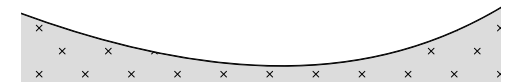
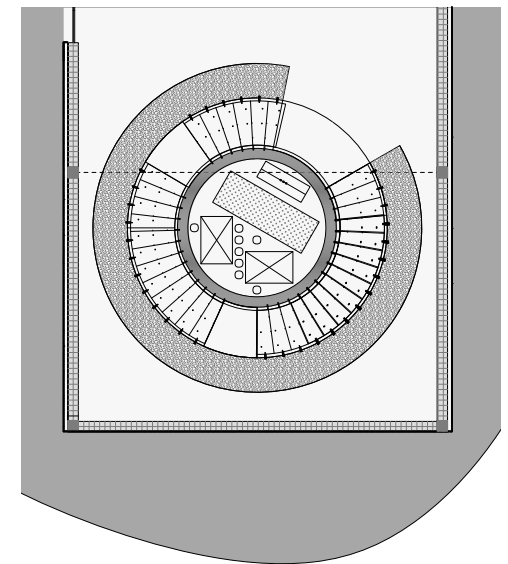
This project consists of three separate interventions investigating the conditions of above, below, and between on this site:

- + Building a scientific workshop and controlling subterranean access over the well
- + Insertion of a mechanical core/stair into the wellshaft and benches into the church
- + Extraction of the cap over a main mineshaft and the rafters over the church

These proposals amount to a series of gestures on three sites: the first is a self-contained construction, the second an insertion into the existing infrastructural framework, and the third a stripping away to reveal something essential about the site. Each is a separate architectural inquiry, yet they are conceptually linked through the historicity of the landscape. Each reveals the strata that have accumulated on site over time as a result of the processes at work. The composition, thickness, and wear of these material artifacts reflect the amalgamation of different lodes: the built/natural and the human/infrastructural, which continues to passively mediate between the two.

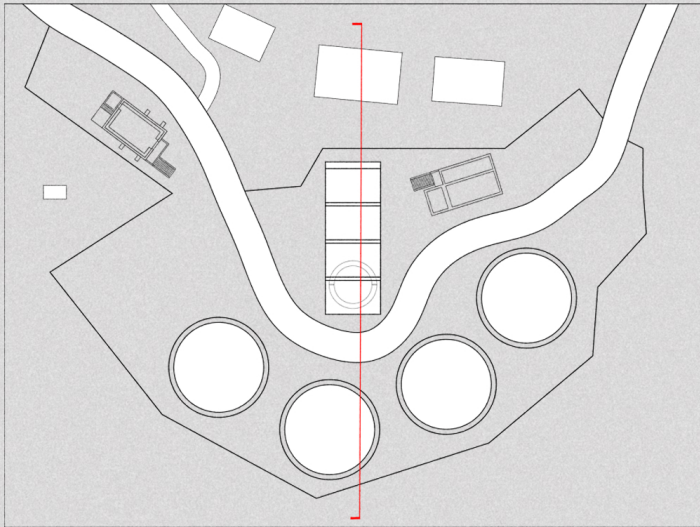
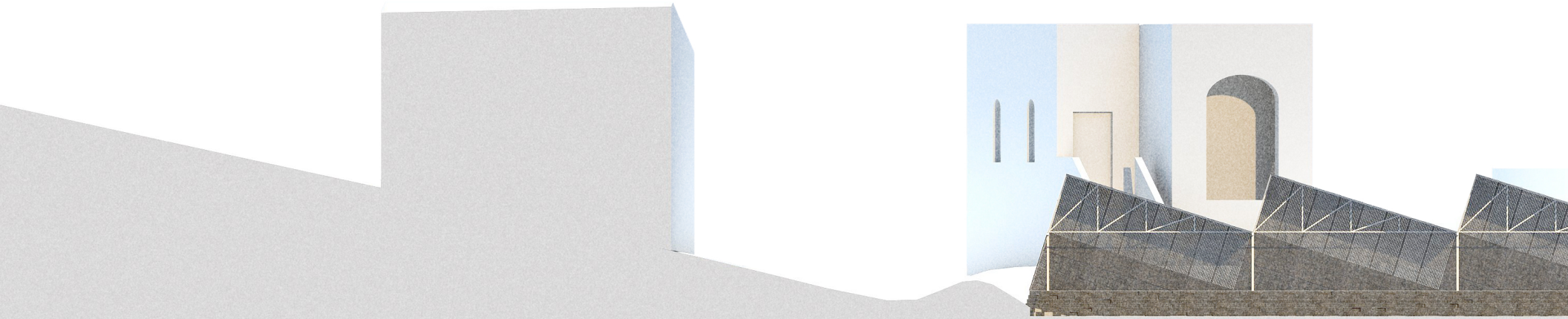
Several factors determine the specific layout of this program. Foremost are the relationships between the shafts, both horizontally and vertically, but also included are references to the surface of the earth, depth, and the depths of the existing mine. Placing structures both above and below allows the surface to be a threshold between different programmatic typologies. It represents a boundary between the communal and the individual; spaces below the surface are scaled and lit for individual interpretation, while the ones above are tailored to the collective, engaged with the community.

TT. Site diagram
UU. Shaft plan

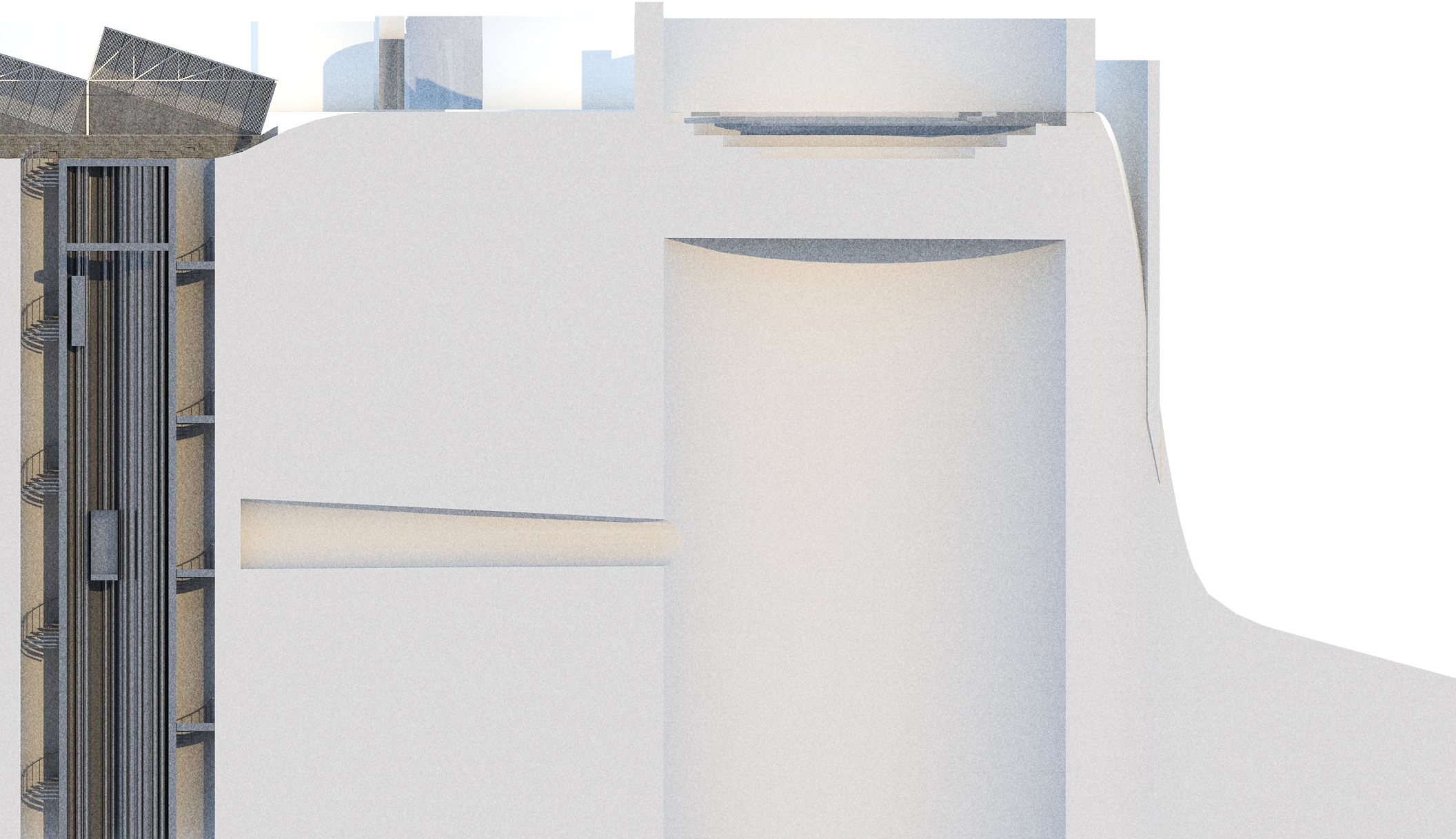


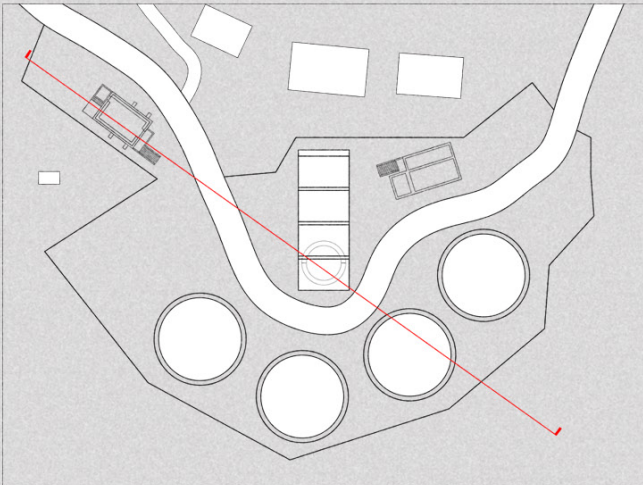


Through this series of interventions, the concept of architecture as a superimposition on, in, and below the landscape will be explored. Issues of place will be considered through a process of reactivating the latent histories on site and reclaiming that which was previously useful. The thesis is intended to be as much of a question as an answer, leaving open a discussion of the potentiality of design in conditions that are as typified by decay as by growth.

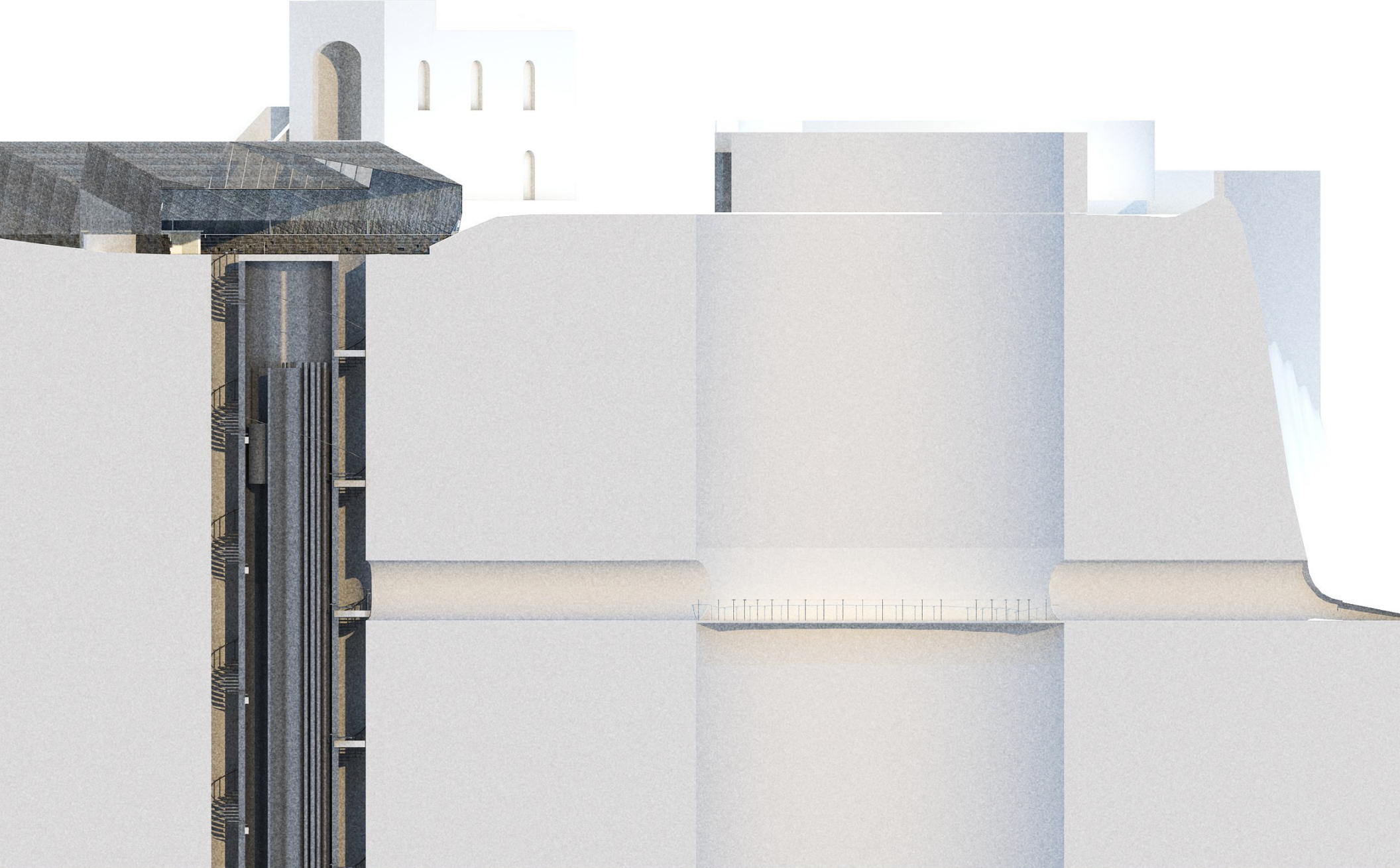


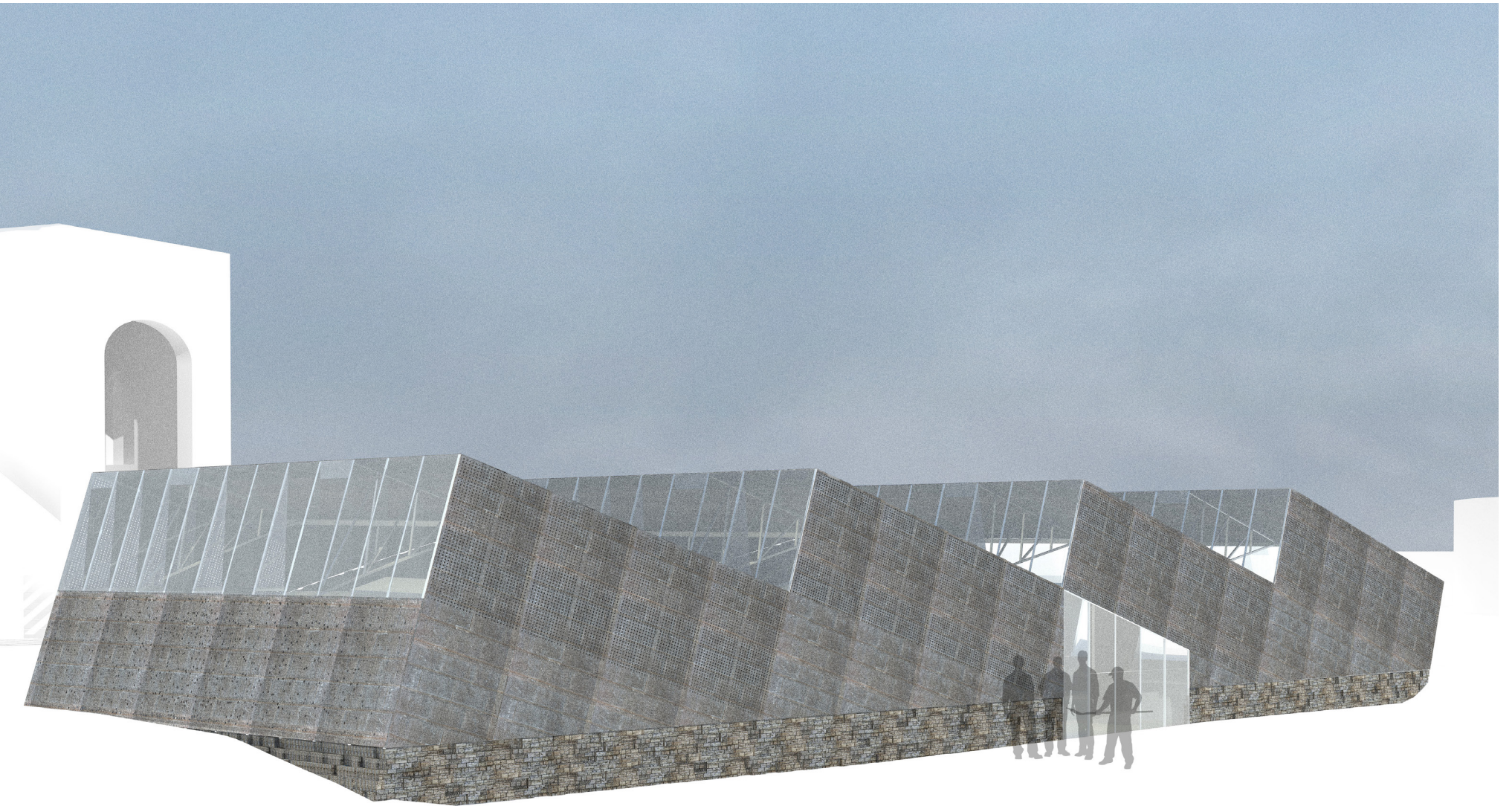
WW. Transverse section





XX. Lateral section





Narrative

The synthesis of these factors points us towards a few defining elements for outlining the design. It asks how a state of betweenness can provide prospect, but also protection. It also seeks how the transitions, edges, and borders come to best typify objects and ideas. But perhaps most essentially it asks how concrete projects of our own, ones based wholly in the realities of site and earth, can transcend their confines, connect to the ephemeral, and teach us about ourselves.

The road bends into the site from both east and west, approaching the plaza along a flat contour at grade. A new building at the center is aligned to both the plaza and the cardinal directions, capping the larger infrastructural interventions underneath. An oblique axis between the existing, radial shafts and the church is acknowledged, but negated, setting the new apart and alongside the old. Sectionally, the structure is set in a shallow depression to differentiate its height from the existing. The new building is meant to reveal rather than replace, using the experience of moving between the spaces as a methodology for unifying the new and the old, the human and the natural. The workshop is designed to be both contextual and set apart, open and closed to its surroundings.

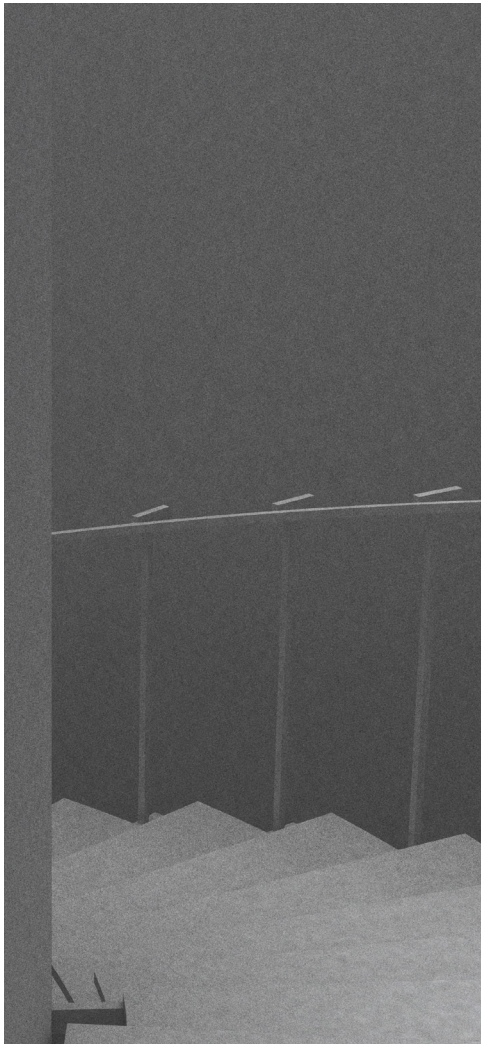
One enters the workshop from the west. Its orientation and envelope are both an homage to the industrial past and a direct response to geography, allowing northern light to fully infiltrate the space over the course of the day. It is built from materials reminiscent of the previous site, using corrugated, punched metal to control light and protect the interior, glass to permit visible and physical entry, and a stacked stone base fabricated from mine tailings currently piled on site. Workspaces are arranged for layout, conversation, and flexibility; the space is meant to be tailored over the course of time to the needs of both the scientists and community, providing a valuable indoor space not currently available to either. The interior space also serves as a control point for access to the mines below. The well

ZZ. Concept model



shaft, eight meters in diameter, has been completely filled with the program necessary to activate the uncapped shaft fifteen meters away. It holds all of the service spaces, with a spiraling stair encircling a mechanical core. This core, with thick concrete walls punctuated by openings at each landing, holds all of the systems necessary for fully inhabiting the previously inaccessible subterranean spaces: a material hoist, an elevator, dewatering piping, air handling, a gradiometer, and electrical systems.

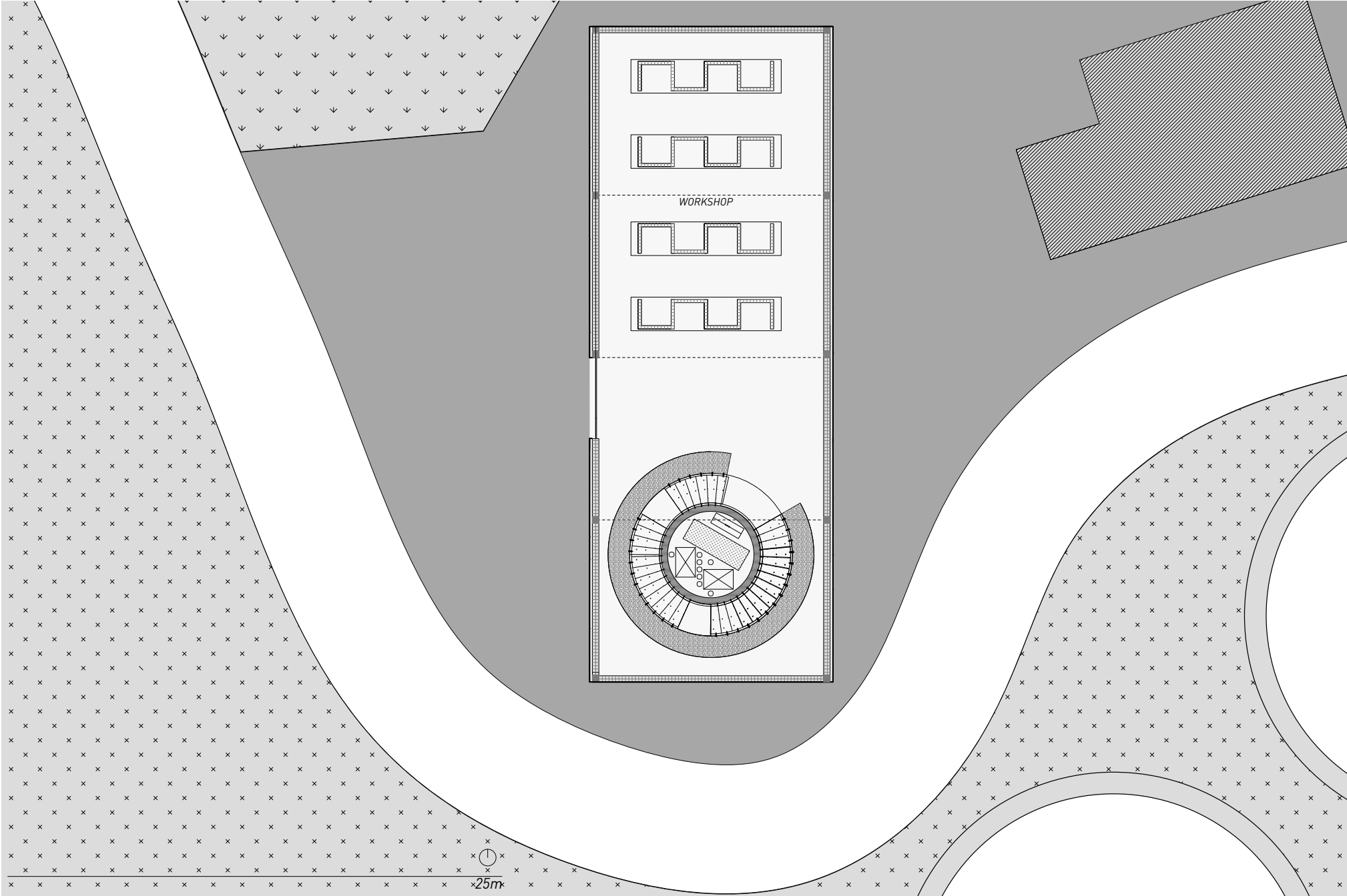
AAA. Downward



By employing the smaller well shaft for the majority of our new infrastructure, the larger void can remain devoid of program and open to the sky. Where horizontal paths tunnels intersect both vertical volumes, new paths radiate from the perimeter, connecting the programmed spaces in the tunnels without violating the airspace of the main chasm. The stair leads relentlessly downward; each landing, separated by twelve stairs from its predecessor, is hidden from view by the core itself. In this way, each new tunnel is an unanticipated surprise. The volumes are connected by the stair, but separate from it. When one finds a horizontal tunnel while descending, its presence is noted by a change in light conditions, but its function is not revealed. Consequently, one either needs to have an operational knowledge of the space through experience to know its use, or to explore blindly in order to discover what lies ahead. Shown in section, the spaces are organized to provide a variety of experiences for the explorer, positioning them above, below, and between their environments alternately. This disorientation presents itself anew each time, making the user consider the space both individually and as part of a series.

All of the subterranean interventions are composed from a system of parts. These have been designed carefully to differentiate themselves from the existing experience through issues of structure and form. Small feet composed of structural tube steel touch the walls of the boreholes lightly, with paths and stairs poised lightly at these periodic moments. The paths underfoot are constructed of a tight galvanized metal grating, bolted to plates extending from the tube. These surfaces permit light and sound to echo, maintaining the unity of the overall space while allowing the path to branch off

BBB. Detailed plan





into spaces and rejoin seamlessly. Rails are attached through the path with stringers that rise to hand height continuously from the footers, connecting the body to the surrounding rock surfaces. The round handrail that winds continuously throughout the spaces is fabricated from silver. Cold to the touch and ceaselessly curving throughout the experience, it grabs the little available light, providing a glimmer ahead and leaving a memory behind.

Descending from the surface, one first encounters a lookout at 70 meters below the surface. It provides a vista across and upwards, orienting the user to the fact that the distance that they have already traveled is a fraction of the overall depth of the mine. This is the first contextual viewpoint of several, places at which the user can orient themselves for the path ahead. The next path, only one landing below, takes the user across the main shaft, hugging the wall along the radial path to skirt the unimpeded center void. Down the path is a strainmeter, bored four hundred meters laterally into the rock. Essentially a giant water level, it senses minute disturbances in the tectonic motion of the earth, sometimes initially mistaking mining operations kilometers away for seismic action. The path returns across the main shaft and continues downward in the well forty meters before encountering a clock room. This monitors slight fluctuations in time by linking an atomic clock with a sidereal one on the surface. Tying together these two spaces computationally allows the scientists on site to measure slight fluctuations in time, which are also subject to the gravitational reaches of the universe. Doubling back from this dark room, the path continues downward.

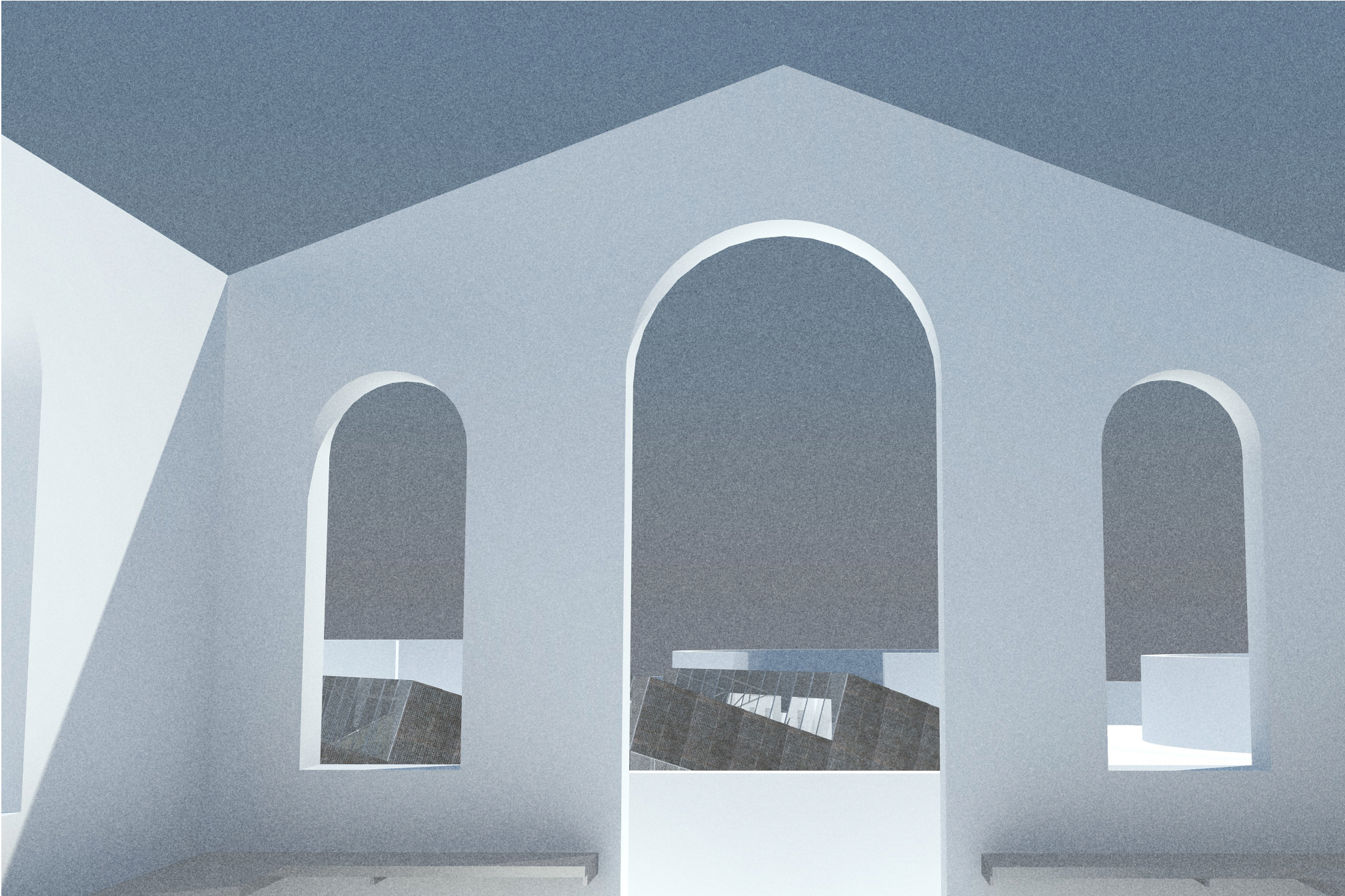
Now two hundred and twenty five meters below the surface, scientists begin measuring the vertical movements of the rock around them. The seismic shaking of the earth is monitored here via seismometer that reaches obliquely into the dark space. Visible only as a small dial on the surface of the rock, it is constantly measuring and documenting the conditions of the surrounding earth. Paper tape accumulates in a small niche carved from the rock, waiting for collection. The path continues onward and several landings downward, recrosses the main shaft. On the other side is an archive,

with shelves embedded in the rock of a vast cavern. Here the records of monitoring are held. Past mining maps, measurements, and equipment are held in stasis two hundred and fifty meters below the surface. They are latent resources, waiting to be called upon for future use. Further down the well is another lookout, three hundred meters below the first. It provides one more peek downwards, but is primarily oriented to the distance thus travelled. Light filters downward through to the vista, glinting off the metal infrastructure interposed above, but dimming greatly over the distance travelled. Once more, the path returns to the stair, terminating in the final space.

At the very bottom of the mineshaft is a single seat. The vast space, some one hundred and fifty thousand cubic meters of air, lies above the viewer, placing them in a wholly unique interposition. It is fit for solo meditation, a space so wholly set apart from humanity, but posed uniquely between intervention and non-intervention, lost and found. It is, however, not the end of the journey, but yet another point of prospect. After a time, the user reconnects with the railing encircling the space, which loops back to the surface.

Once in the plaza back on the surface, the user discovers the last intervention. The roof of the abandoned church has been removed and benches, using the same language as the path and stair in the well below, line the perimeter of the space. This “narthex” is an outdoor space for gathering, suited for lectures, events, or collective enjoyment. An interstitial space between the built and unbuilt, it provides a visual and axial connection between the interventions as proposed. It seeks to translate the site’s history by showing the levels and layers that have resulted from the fluctuations of time and weather. Connecting above, below, and between, this space acts as a key, linking the inwardness of the schemes to the greater context of the city, history, and land.

DDD. Church view







TEMPUS

“There would be more to tell you if you could sense what you can’t see.”

John McPhee, Crossing the Craton⁵⁰

Conclusion

The Rayas mine complex is a unique site, but there are many lessons to learn from its past, history, and current state. It sits at the nexus of the human and the natural, its state of betweenness commenting on the impacts of each on the other. The existence of this manufactured landscape speaks to an incontrovertible human desire to understand our surroundings and a latent curiosity for the unexplored. While some may mourn the permanence of these changes to the environment, this thesis attempts to take a neutral stance by making use of the localized tools to better understand its eccentricities. Industry will always be a factor in how we understand our world, and the modes through which we interact with the forces around us can be interpreted quite plainly as extensions of our very selves.

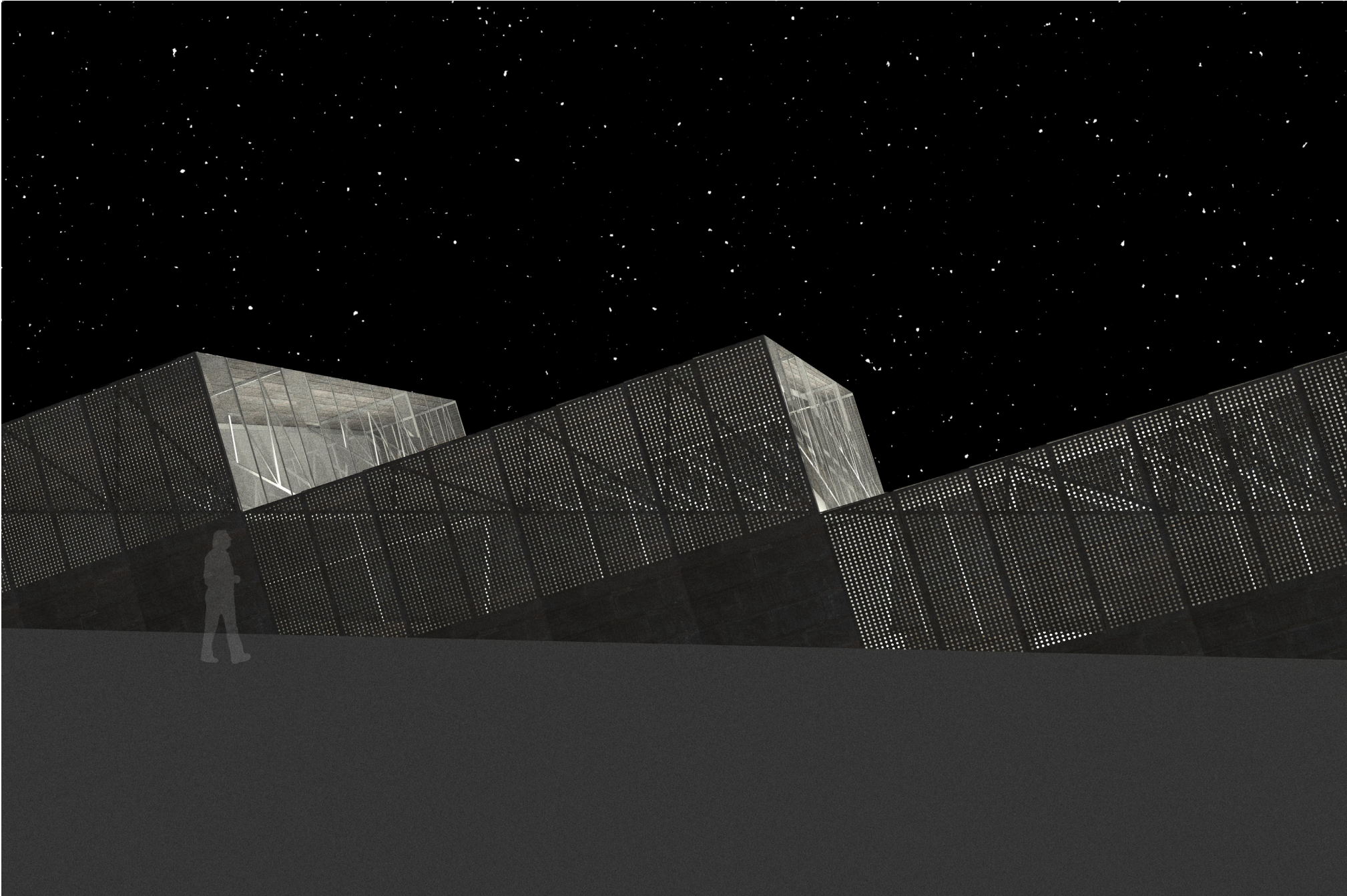
It is important to think of design as a tool in this way. Just as a map or a chisel is an interpreter between man and the environment, architecture guides our understanding of our surroundings. It is a method of scaling ourselves to something larger; we judge everything in relation to our bodies and use our hands and eyes to connect to the world, but this relationship is always relational. We can understand that everything we design and make, including our built projects, as tools meant to interpret between ourselves and the landscape. We can further say that our understanding of our environment is a direct product of the tools we make to examine it. Thus, our anthropocentric industry can be seen as a machine that we use to consider the world around us, and the marks that we leave on the land are intimately tied to human curiosity and learning.

GGG. Section model



By choosing such a complex site, this thesis attempts to address issues that both broadly and specifically addressed ideas inherent in modern design. It was a struggle to scale these ideas appropriately; difficulties arose in scoping the methodologies for addressing these ideas definitively, but limiting the major interventions to the two mines allowed the efforts to coherently address the context through intervention. The deep geologic and anthropogenic history of the site enriches the design interventions on this site, while the architecture itself aims to re-present its elements in a new way, enriching that which was already in situ. Engaging with these moments of wonder became central to the architecture put in place, with the project aiming to use the strengths inherent in this place as major design elements.

The arc of this proposal was to investigate the methods through which architecture can act as a sort of intermediary between man and the environment, through anthropic and cosmic time. The resultant proposal provides a minimal strategy for intervention, a sort of treatise on how to use the essence of something to simply mediate between forces. Materials, light, time and space all combine to form something greater than the sum of their collective parts. I believe that architecture is always a conversation between opposites—light and dark, vertical and horizontal, open and closed, and individual and communal. By cataloging these ideas and reacting towards and away from them, we measure ourselves against the march of time and create works that seek to evade it.



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- X. Topography, author, 2015.
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- CC. ALMA Array, Flickr, 2015.
- DD. Royal Observatory, Marian Donnelly, 1888.
- EE. Conical Intersect 2, Gordon Matta-Clark, 1975.
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Endnotes

- 1 McPhee, John. *Annals of the Former World*. New York: Farrar, Straus and Giroux, 1998. Print, 24.
- 2 McPhee, *Annals of the Former World*, 57.
- 3 Turpin, Etienne. *Architecture in the Anthropocene: Encounters among Design, Deep Time, Science and Philosophy*. Ann Arbor: Open Humanities, 2013, 213.
- 4 Stegner, Wallace. *Where the Bluebird Sings to the Lemonade Springs: Living and Writing in the West*. New York: Random House, 1992. Print, 8.
- 5 McPhee, *Annals of the Former World*, 124.
- 6 Foxley, Alice. *Distance & Engagement: Walking, Thinking and Making Landscape*. Baden, Switzerland: Lars Müller, 2010, 334.
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