PALIMPSEST

Derelict Mines and an Architecture of Archeology One Hundred Years from Now

Tsitsi Isabel Gora
A.B. Visual and Environmental Studies
Harvard College, 2005

Submitted to the Department of Architecture in Partial Fulfillment of the Requirements for the Degree of Master of Architecture at the Massachusetts Institute of Technology.
February 2009

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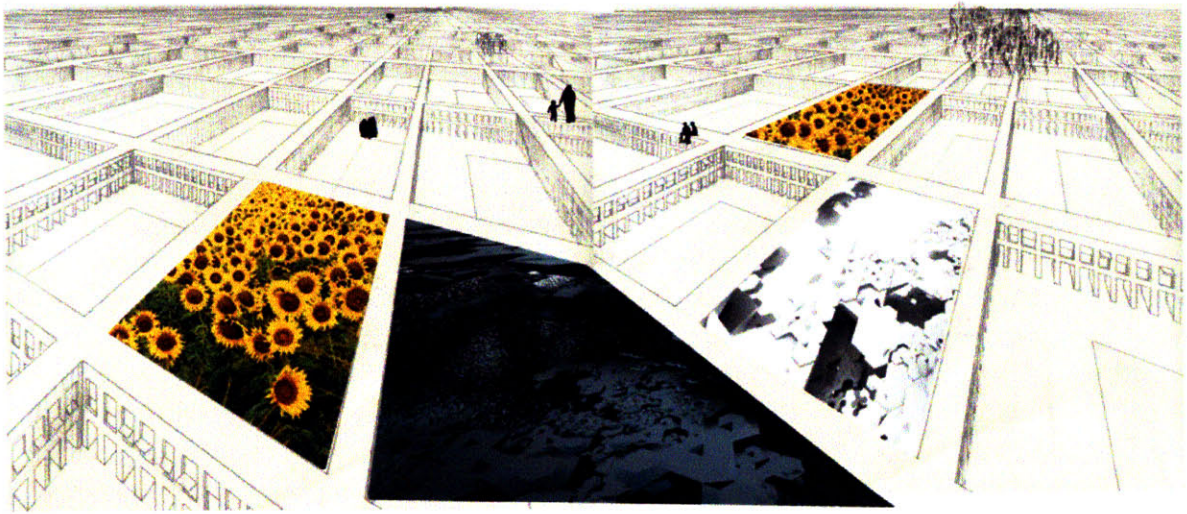
Abstract

The realities of the built past and the palimpsest-ic nature of activities on the African mining landscape is under critique. On a site where nature gives way to the man-made activity of platinum ore excavation and mineral extraction, the activity of mining essentially creates infrastructures of dust and filthy landscapes. Inserting a new architecture within this obliterated savannah landscape allows for a process of reclamation to take place.
This project uses an abandoned mine site in Southern Africa and focuses on the environmental mitigation and civic development of the site adjacent to the existing mining town of 40,000 inhabitants. The derelict mineshafts serve as infrastructure for a new civic space of scenic agrarian routes and programmed enclosures: auction floors, warehouses, residential short-stay rooms, water purification systems, mineral baths, crop rotational schemes, research labs and a museum space.

Thesis Supervisor: Adèle Naudé Santos
Title: Professor of Architecture and Urban Planning
Dean of the School of Architecture and Planning

You gave me courage to finish strong.



PALIMPSEST

Derelict Mines and an Architecture of Archeology One Hundred Years from Now

Contents

Acknowledgements

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Thank you for a tremendous year working on a project that was very meaningful to me. Thank you for your time, your vision and your imagination in helping make this work possible.

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Thank you for and awesome experience from the streets of Tokyo to the studios of MIT. Your interest and perceptiveness helped this thesis come a long way.

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Thank you for your rigor in helping me shape the design question

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Thank you for cultivating my insatiable appetite to do the things in life that really matter

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Thank you for your awesomeness and helping me get this thesis archived.

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Thank you for the incredible journey through design school at MIT. I look at this book and I see you.

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You were all so awesome at the final hour. I couldn't imagine arriving at this point without your awesome kindness.

Helen, Greg, Yehoda, Simi,
Thank you for your encouragement through architecture school

Kathleen Coleman,
Thank you for your unfailing support and belief in the important role design will play in my life

1902 - 1999

1999 -2049

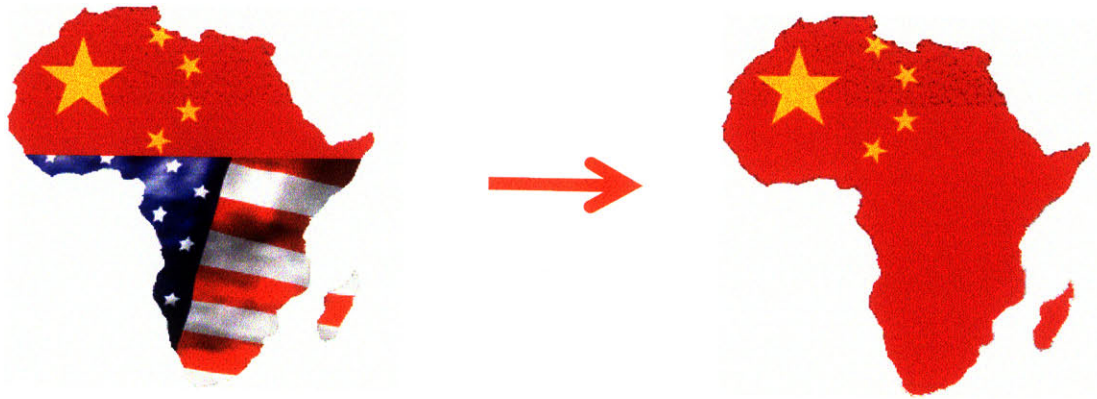
2050 - 2100

2101 - 2192

Cold War Politics

During the Cold War, China, like the Soviet Union, invested heavily in newly-independent African countries, building up infrastructure and providing aid in the hopes of counterbalancing Western influence on the continent. Citing shared experience with colonialism and Western imperialism, the Chinese regarded themselves as an older brother to the Third World.

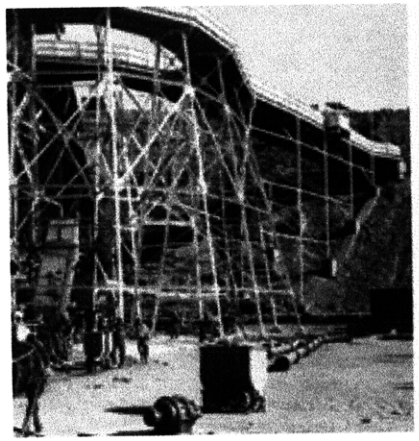
After the Cold War and China's opening up to the world economy, investment scaled back considerably.

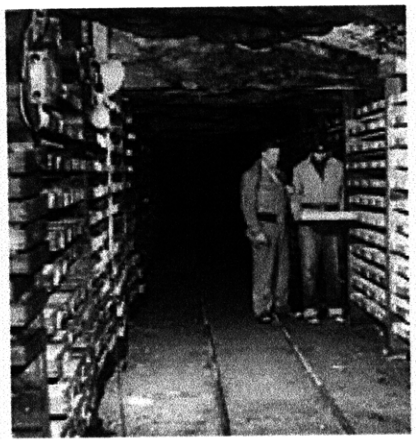


The criticism on working conditions in mines have been that the workers are systematically subjected to sub-humane standards where work, life, health and safety are constantly jeopardized by capitalistic impositions made by mining corporations on employee workforces. The stubborn denial and cynical ways that corporations have historically repressed the lived reality of conditions in mining compounds has been repeated and effective in allowing the clandestine and sub-humane planning strategies to remain incontestable.

Empirically, conditions experienced in mining compounds have been shown to be worse than those of people living in incarceration systems: a case in point is the comparison of working conditions at Tsumeb (a diamond mine in Namibia) with a totalitarian incarceration system at Robben Island where anti-apartheid political prisoners were incarcerated.

Labor shifts have fluctuated over the century between migrant labor and indigenous work-forces, and still the standards of most living and working conditions have remained indiscriminately sub-humane. Foreign illegal labor has been directed strictly to the unsafest mines. A tension has always existed between foreign labor and domestic labor recruitment.





1902 - 1999

CHINA

RSA
ZIM

platinum mining rights

the new panopticon

new company
mine compound

labor - capital relations

security / paternalism
v. the unionist debate

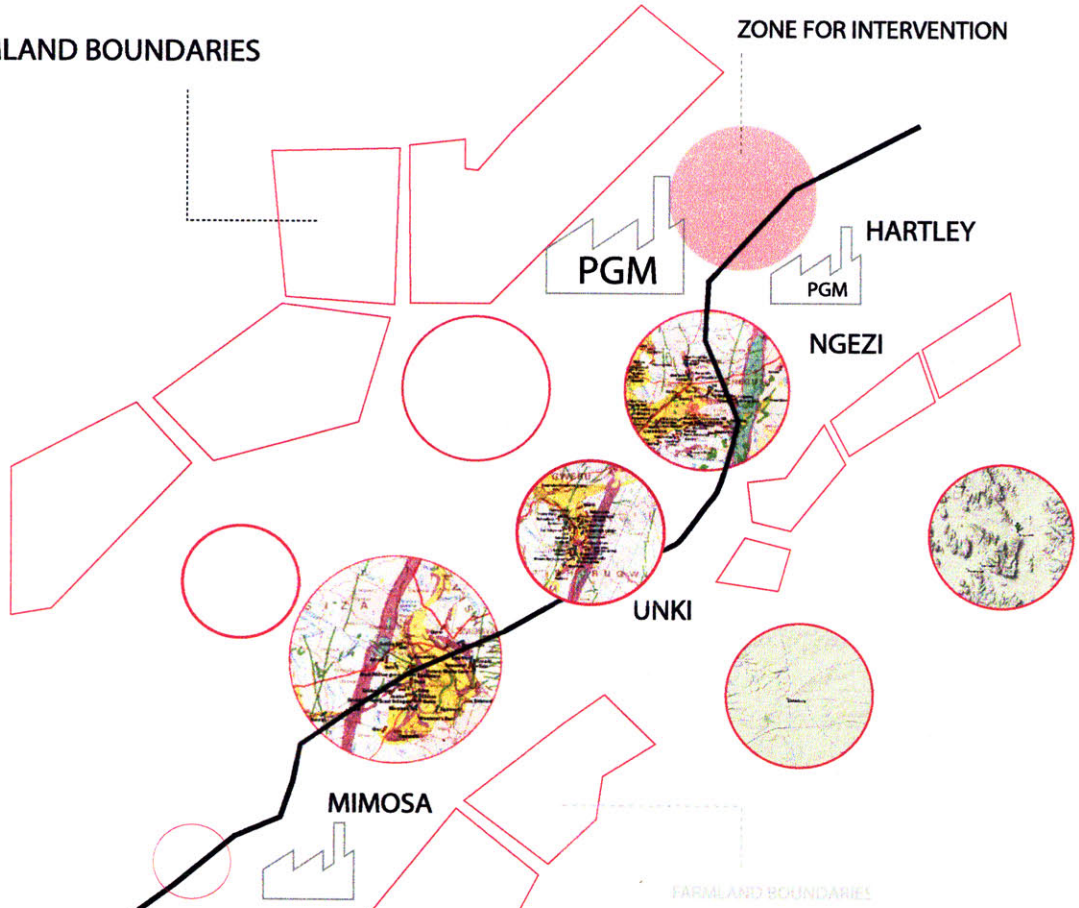
humanizing the
mining experience


ZIM
CHINA
RSA
platinum
catalytic convertors
automobile industry
history of indentured labor camps
company mining town / mining compound
architect as social engineer
labor-capital relationship
Post-Cold War Sino-Africa trade invesments
Early 80's Chinese policy under Deng Xiaoping:
SEZ development
e.g. Shenzhen
architectural criticism:
contextual v. non-contextual deveopment
'selling the image of a project'

1902 - 1999

The thesis site is a projected future post-industrial mining landscape in the Hartley Platinum mining town of Chegutu, situated in the savannah bushveld region of Zimbabwe. This project engages a critical aspect of a very particular socio-economic phenomenon. Rapid Chinese investment in infrastructural development across Africa gives the project an opportunity to propose ways to develop derelict mine shafts as an investment strategy in Zimbabwe's post-colonial and post-industrial future.

REGIONAL CONTEXT

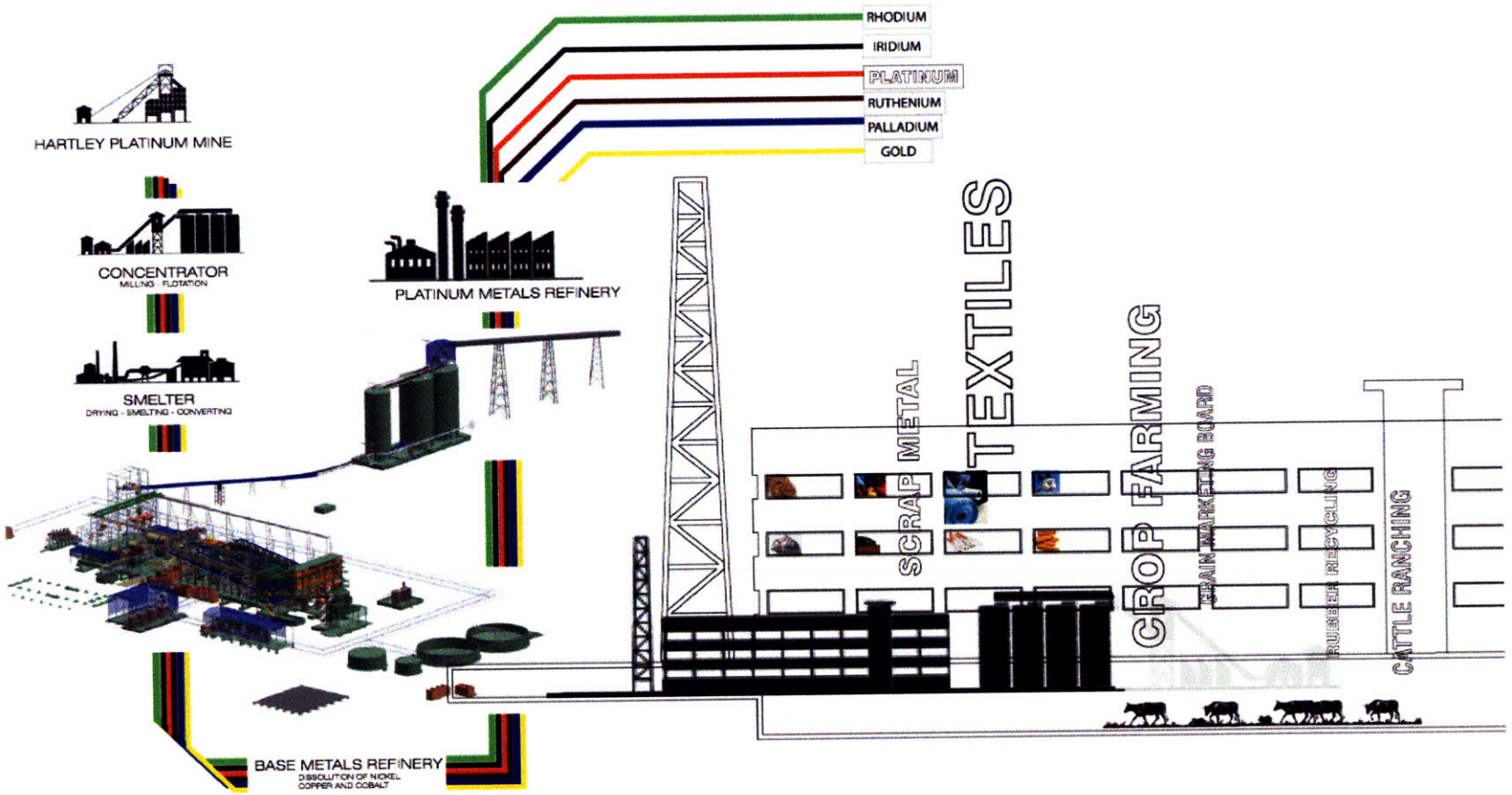


The proposal for this part of the project engages an 'architecture of archeology' and the 'mining landscape as artifact' where a new infrastructure is designed on top of the derelict mine-shaft landscape. A corollary part of the project deals with the history and legacy of migrant worker social dynamics and the paternalism of mining corporations that has traditionally tended towards the production and spectacle of panoptical company mine labor camps. The aim of the thesis is to subvert the organizational structures that exist through injecting new types of programming within this architecture of surveillance, archeology and power.

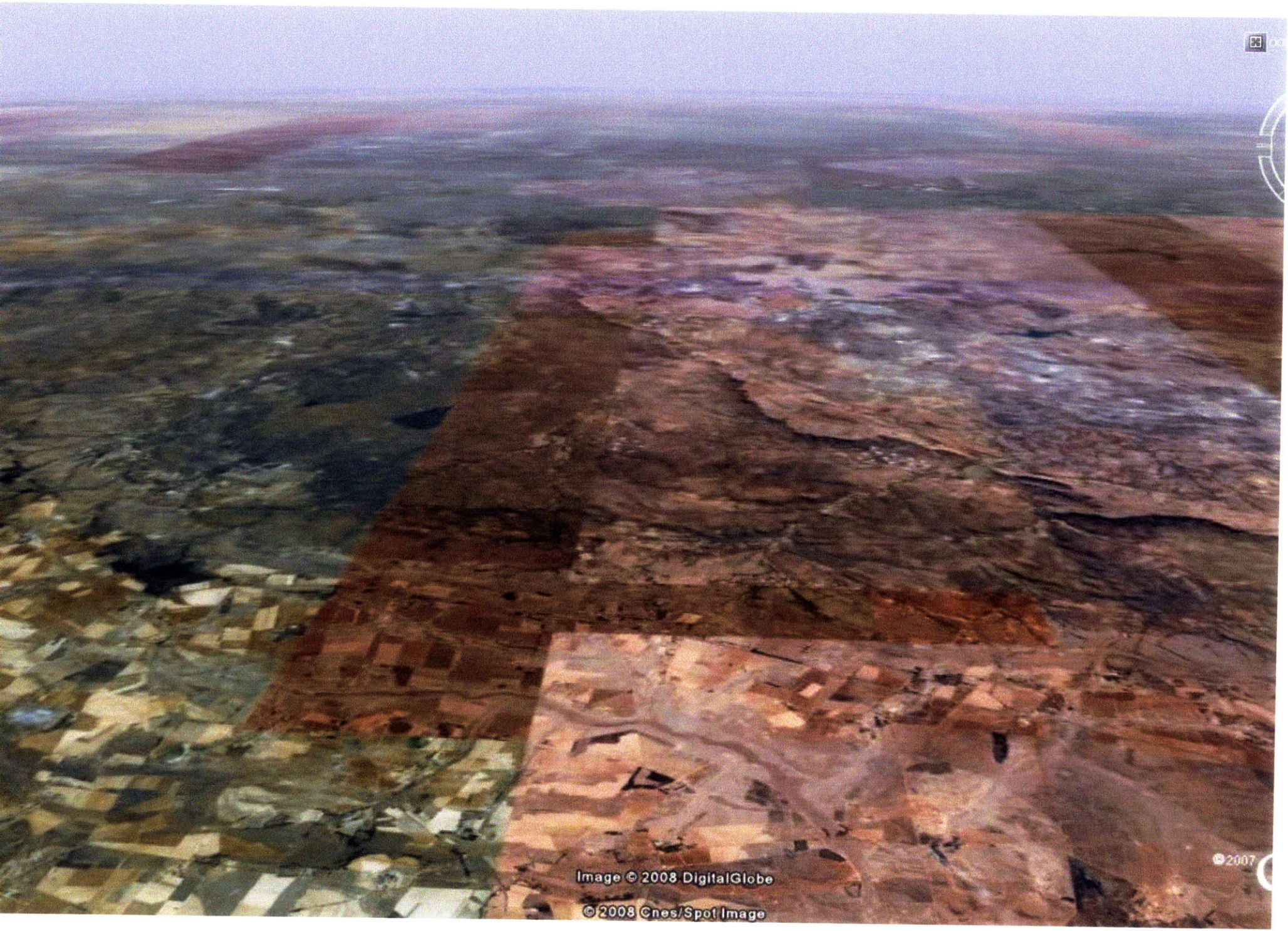
1902 - 1999

This thesis assumes that as China's automobile manufacturing industry increases production exponentially, the demand for platinum group metals will rise concurrently. Chinese manufacturer's use platinum in catalytic convertors and several SoE's have already started negotiations with the South African and Zimbabwean governments. These two countries collectively hold the largest mineral deposit reserves for platinum behind Russia. From a profitability standpoint, unlike the Russian platinum mining industry, the on-site infrastructure and rate of production in both South Africa and Zimbabwe could benefit from an aggressive strategy to upgrade tremendously. The thesis proposes an investment and infrastructural development timeline that would occur in the next 20 years. This timeline involves fine-print that states that in order to access the mineral resources in Southern Africa, a caveat for investment maintains that pre and post industrial development initiatives made by the Chinese is bound under certain building and infrastructural definitions and codes. This situates the project very much in the realm of architecture and urbanism. The project derives its impetus from the site of a platinum mining town as a contested space of migrant labor systems and paternalistic infrastructures.

1902 - 1999



TOWN INDUSTRIES / PRODUCTION SCALES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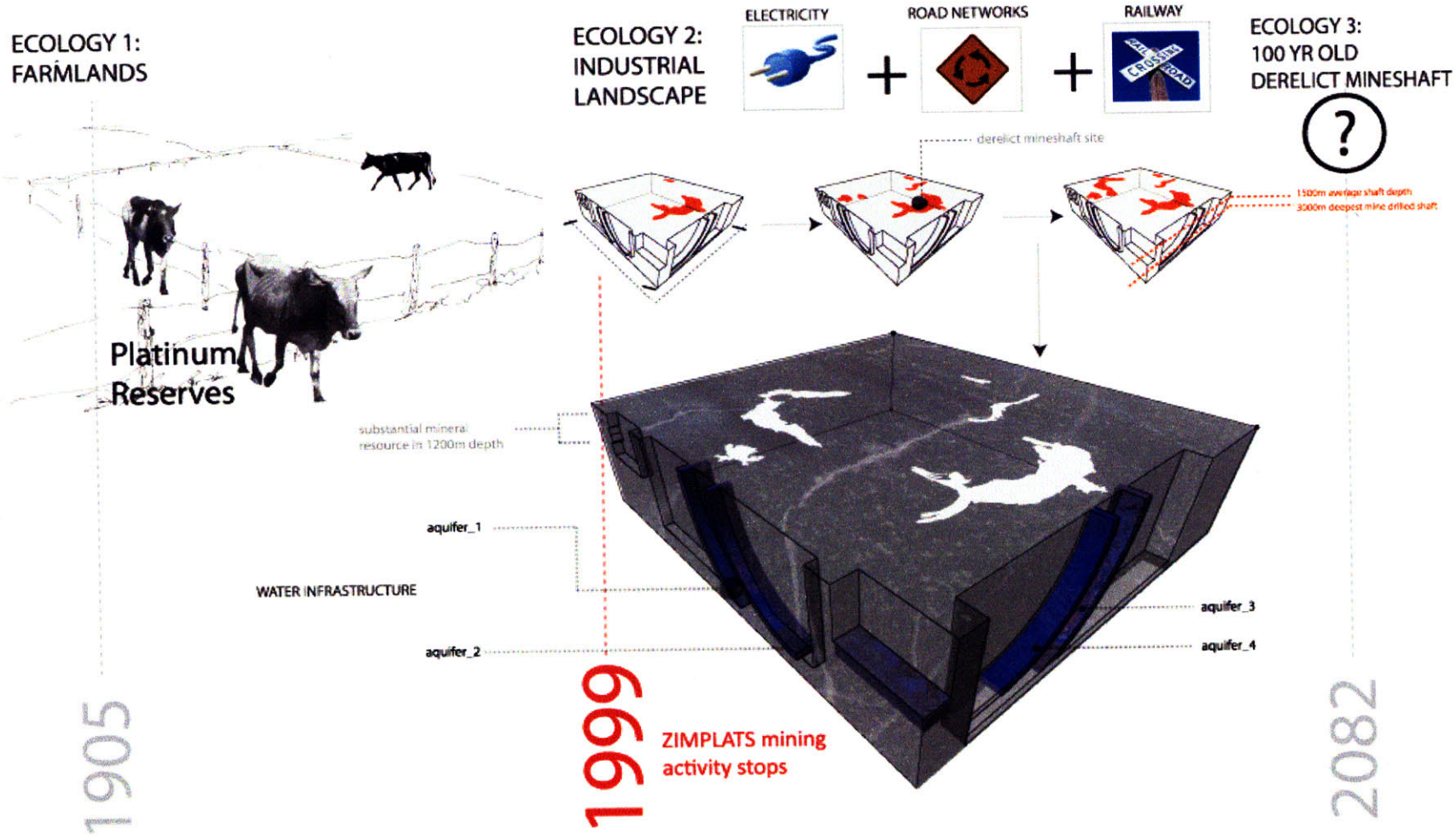
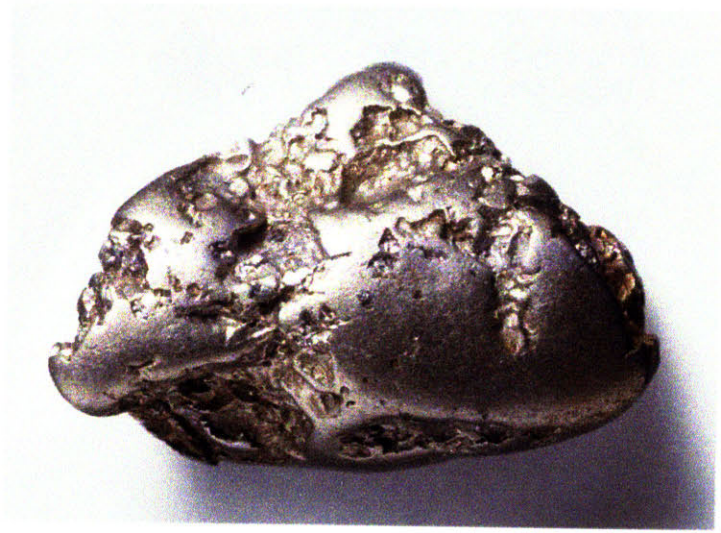
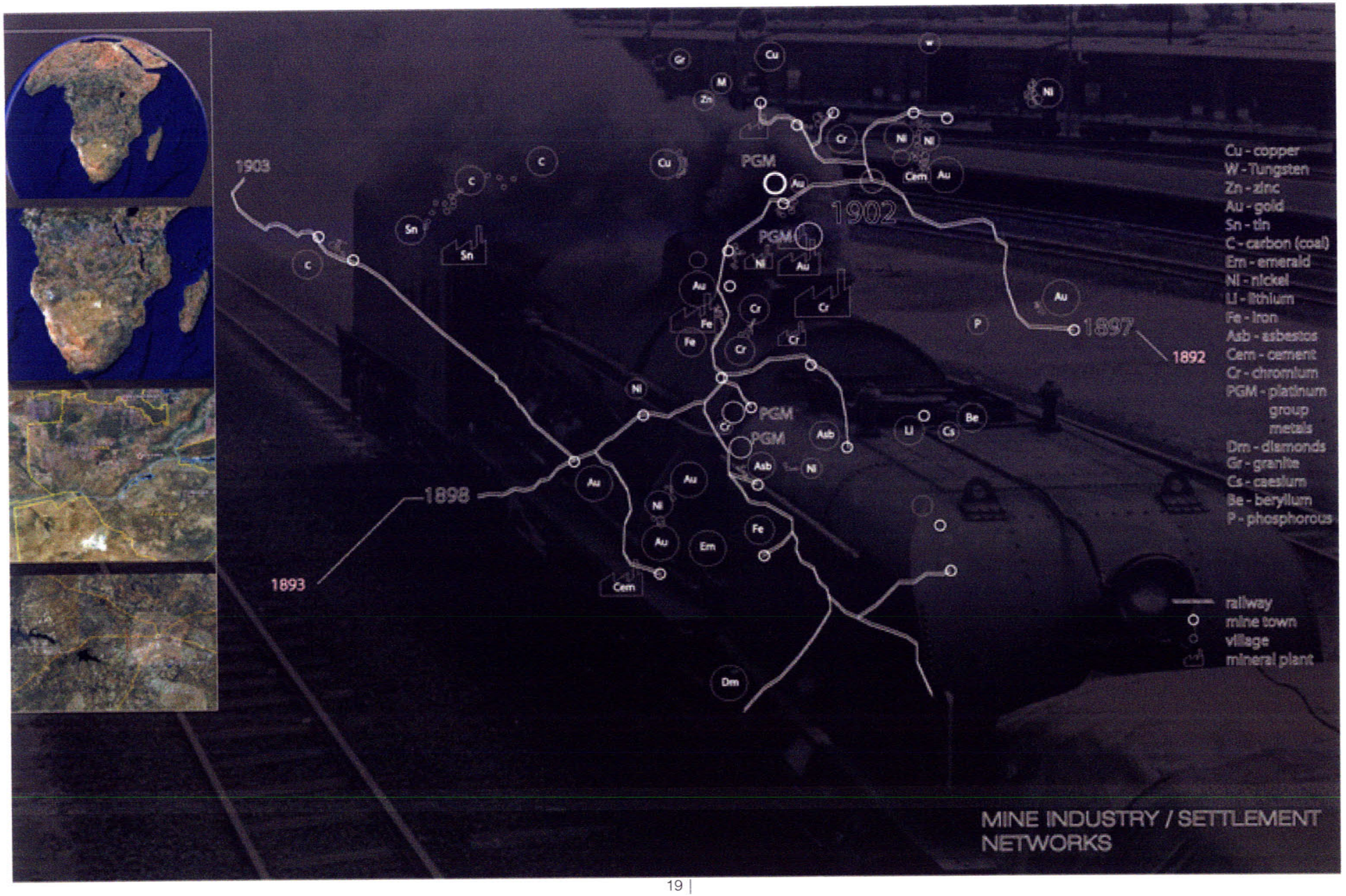


URBAN INFRASTRUCTURE LIFECYCLE 100 YR LIFETIME

1902 - 1999

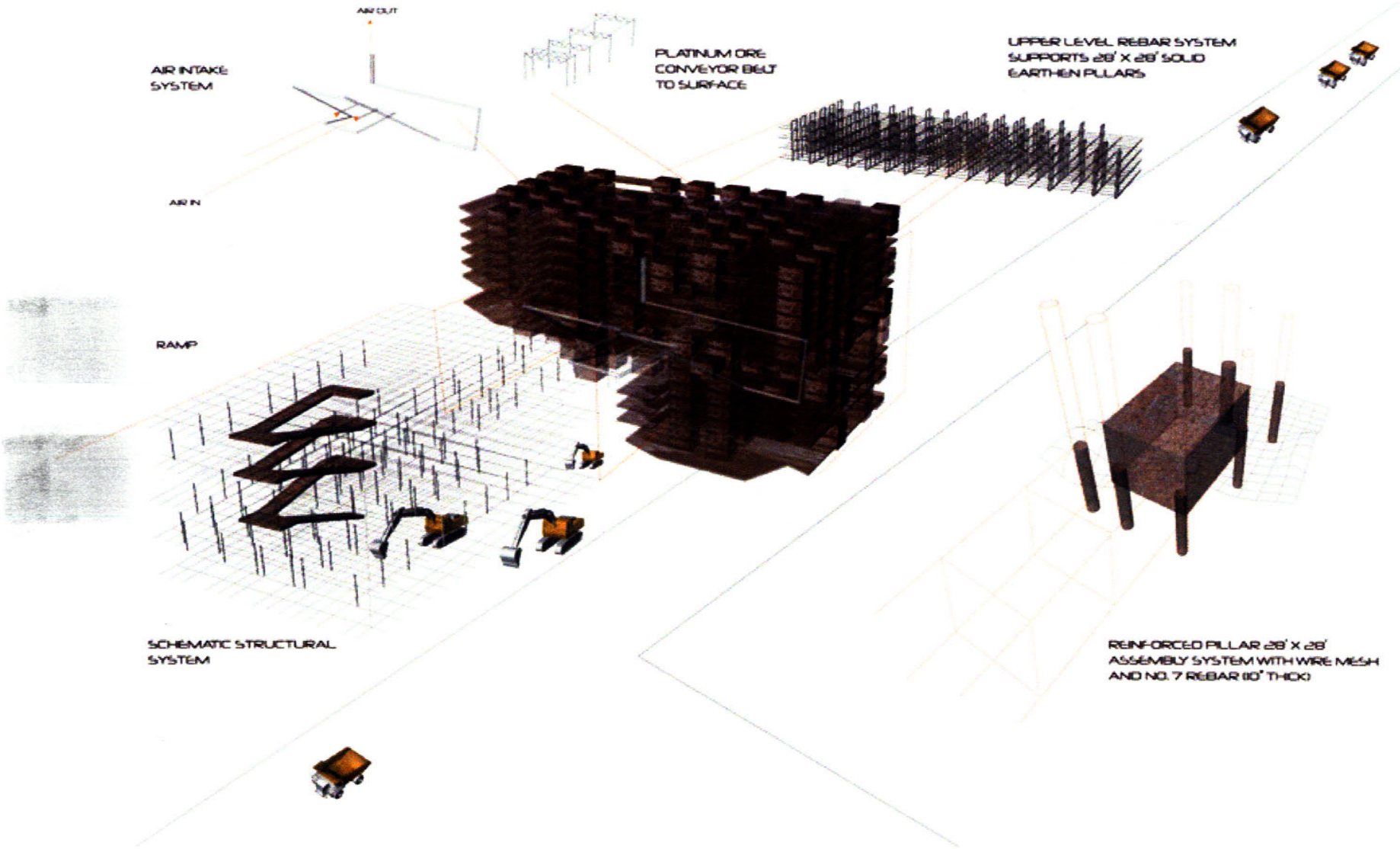


The labor-compound system emerged in the early years of the diamond and gold mining industries in the Southern African region and served as a prototype for the hostel system on the Rand (South Africa's gold mining reef where Johannesburg is built on top of) in subsequent years. The labor compound was quadrangular with military-like barracks and its perimeter was bound by a twelve-foot fence and a single large gate enclosing the living quarters. A few provisional stores ensured insularity and self-sufficiency. Mamdani writes that "with workers communally quartered in prisonlike barracks constructed on mine premises, this system spread so fast to other labor-intensive enterprises on the Rand and to mines in Rhodesia (now Zimbabwe)."


1903
1902
1897
1892
1898
1893
PGM
Cu - copper
W - Tungsten
Zn - zinc
Au - gold
Sn - tin
C - carbon (coal)
Em - emerald
Ni - nickel
Li - lithium
Fe - iron
Asb - asbestos
Cem - cement
Cr - chromium
PGM - platinum group metals
Dm - diamonds
Gr - granite
Cs - caesium
Be - beryllium
P - phosphorous
railway
mine town
village
mineral plant
MINE INDUSTRY / SETTLEMENT NETWORKS

1902 - 1999

Unpacking the density of uses on the Hartley Platinum site, its benign nature is seen in its legibility as a residential enclave. The larger scale reference to urbanity is clearly missing and so the problem of the project becomes the apparatus of the mining town. The challenge is how the project locates the functionality of a centuries old typology that has systematically exploited indentured labor systems through establishing a relatively high infrastructural investment in the beginning, but with a relatively low or non-existent projected civic-spatial function in its future. The programmatic ambitions of this project will be to define an architecture of archaeology that could exist on the site. The archaeological reference will be the residual infrastructure of the box and pillar excavation method used on platinum mines sites. The relationship of new building to archaeological remnants becomes an important one and a project to reference for this kind of conceptual strategy is Bernard Tschumi's New Acropolis Museum project in Athens where the building mediates a relationship between enclosure and ruin.


AIR OUT
AIR INTAKE SYSTEM
PLATINUM ORE CONVEYOR BELT TO SURFACE
UPPER LEVEL REBAR SYSTEM SUPPORTS 28' X 28' SOLID EARTHEN PILLARS
AIR IN
RAMP
SCHEMATIC STRUCTURAL SYSTEM
REINFORCED PILLAR 28' X 28' ASSEMBLY SYSTEM WITH WIRE MESH AND NO. 7 REBAR (10" THICK)

EXISTING CIVIC PROGRAM

MINE BARRACKS

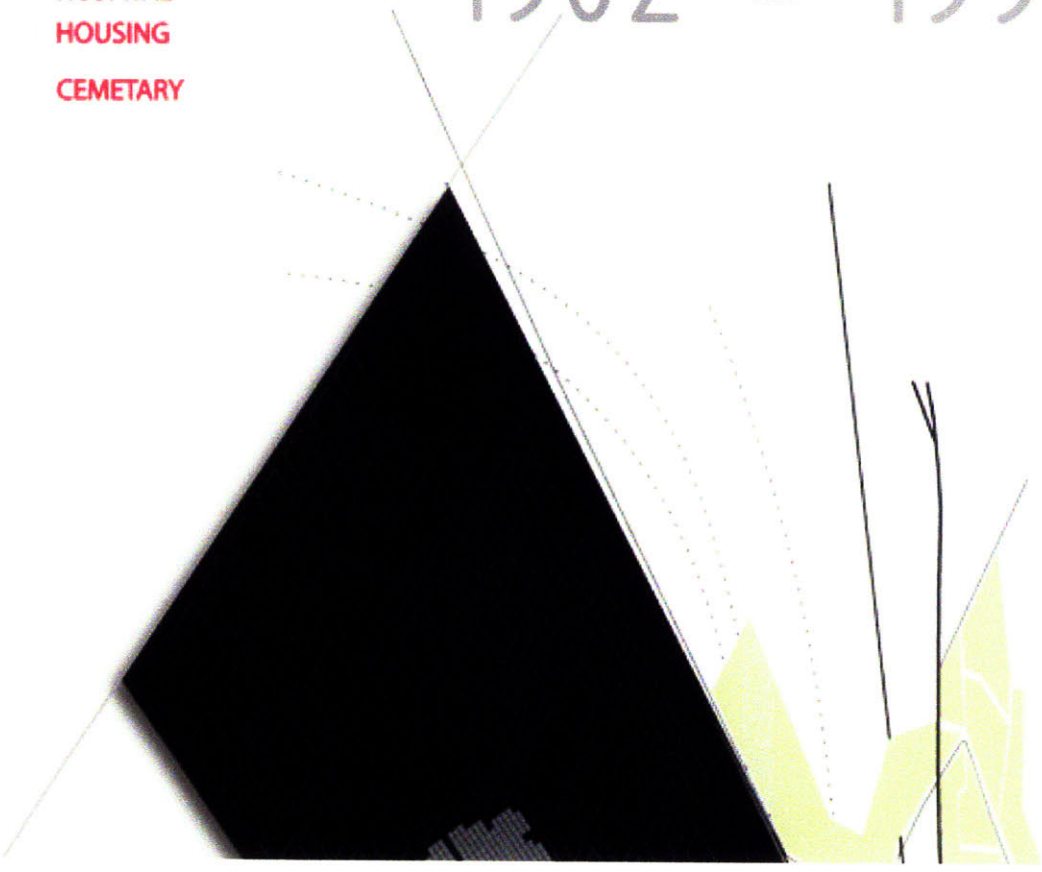
PROCESSING PLANT

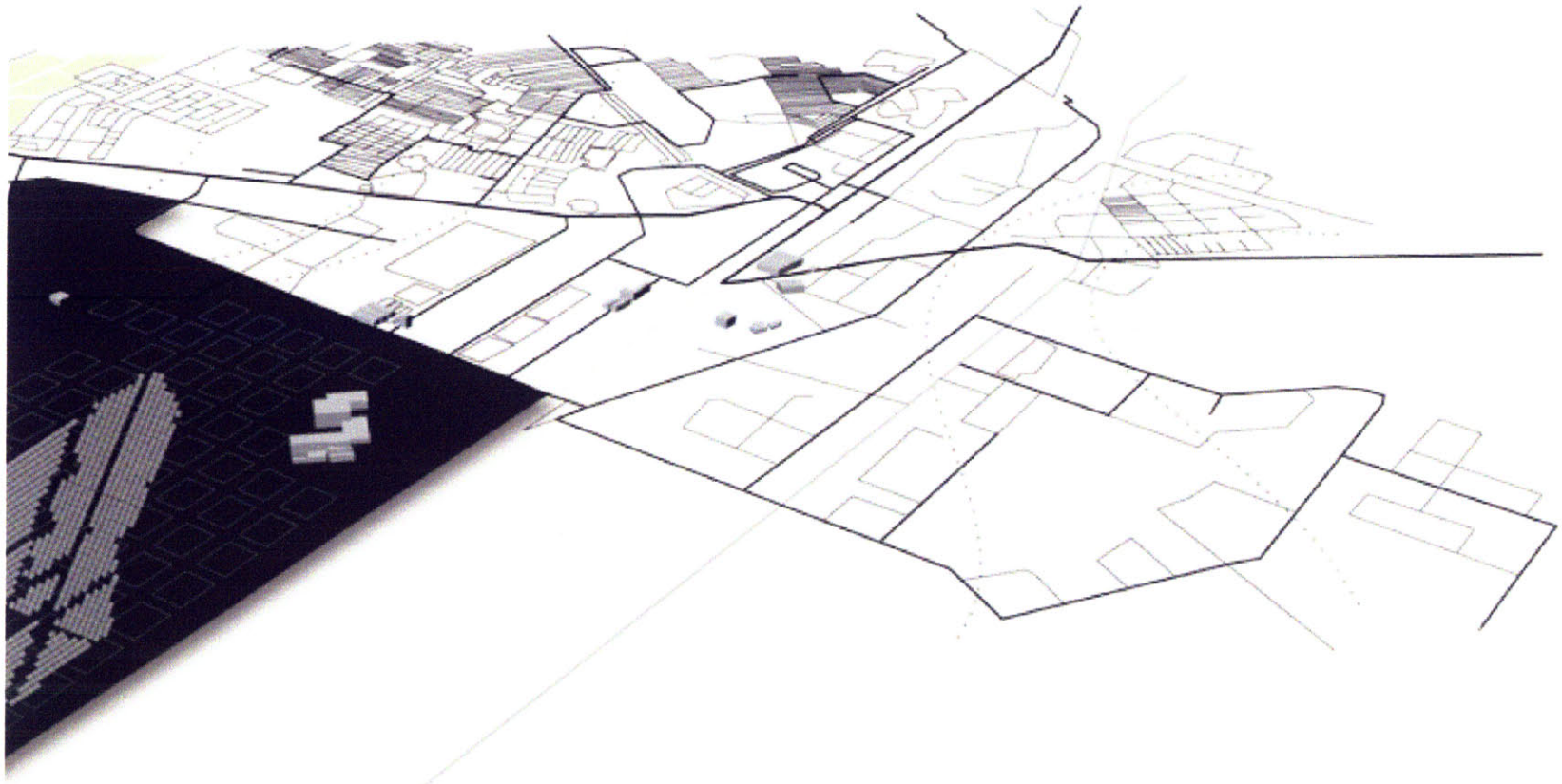
TEXTILE MILL

HOTEL MOTEL
SCHOOL
DISTRICT ATTORNEY
POLICE
POST OFFICE
HOSPITAL
HOUSING

CEMETARY

1902 - 1999

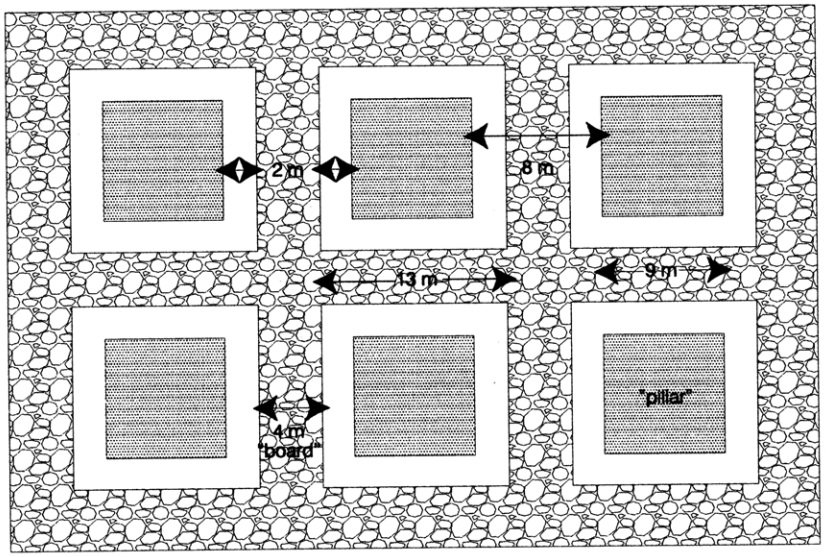




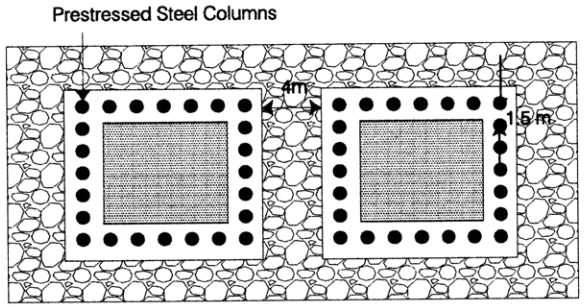
SITE FOOTPRINT = 3.8 KM x 1.78 KM

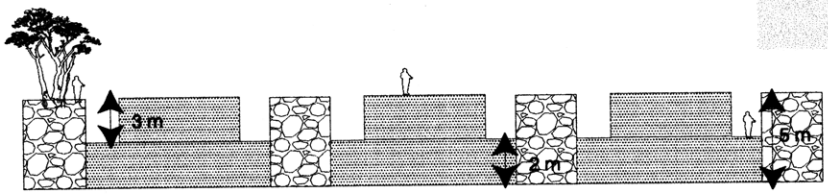
90 % UNCONTAMINATED
10 % CONTAMINATED

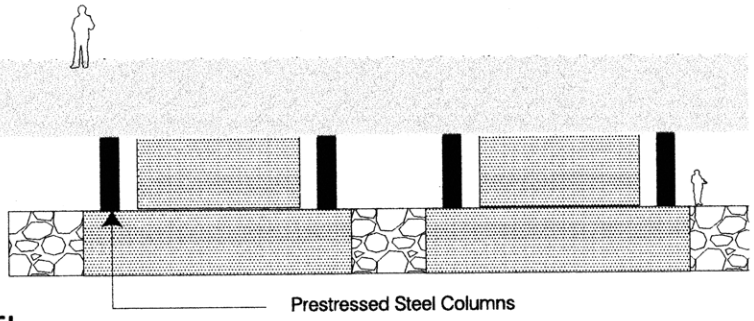
1902 – 1999



PLAN







GROUND LEVEL
SECTIONS

EXISTING SITE CONDITIONS

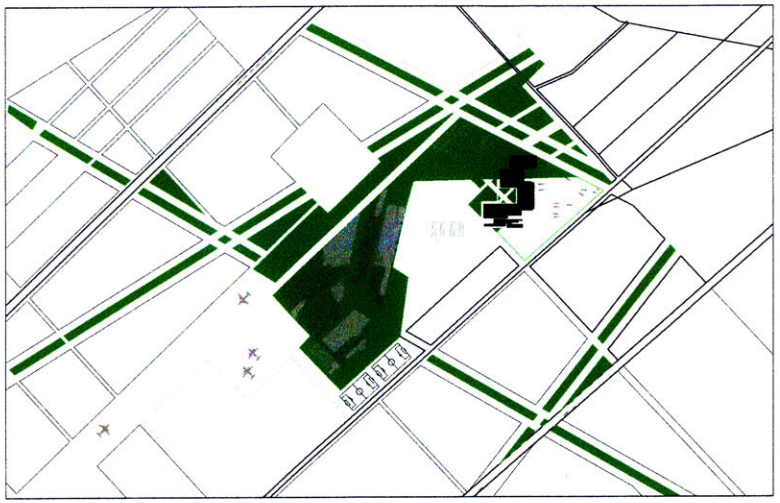
1902 - 1999

1999 -2049

2050 - 2100

2101 - 2192

1902 - 1999



SITE FOOTPRINT = 3.8 KM x 1.78 KM

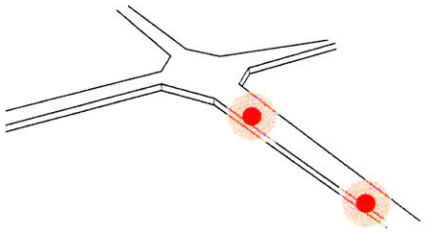
90 % UNCONTAMINATED
10 % CONTAMINATED

1999 - 2049

SITE FOOTPRINT = 3.8 KM x 1.78 KM

90 % UNCONTAMINATED
10 % CONTAMINATED

AIRSTRIP



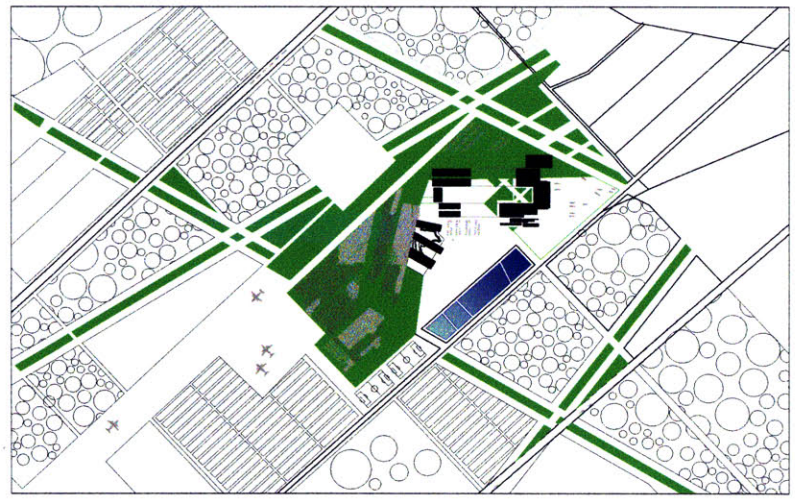
landscape cropping phase 1

water treatment

botanical mine shafts

buildings phase 1
- museum
- short-stay housing
- workshop studios

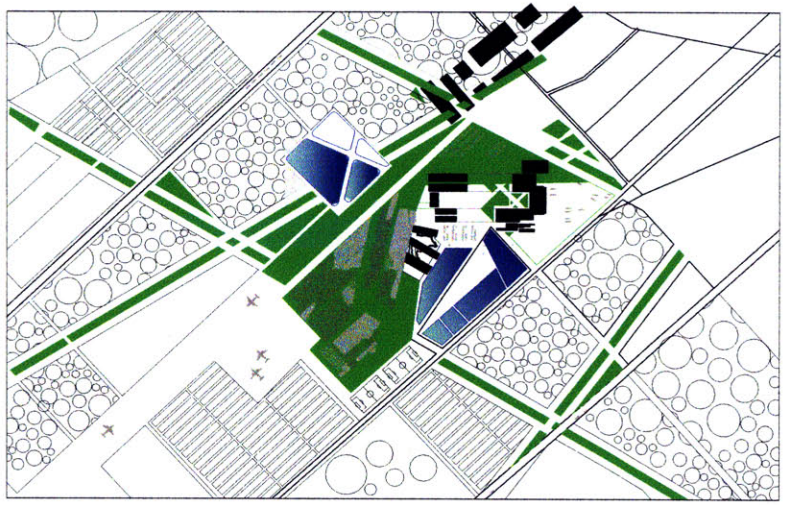
2050 - 2100



SITE FOOTPRINT = 3.8 KM x 1.78 KM

90 % UNCONTAMINATED
10 % CONTAMINATED

2101 - 2192



SITE FOOTPRINT = 3.8 KM x 1.78 KM

90 % UNCONTAMINATED
10 % CONTAMINATED

landscape cropping phase 2

dam

buildings phase 2

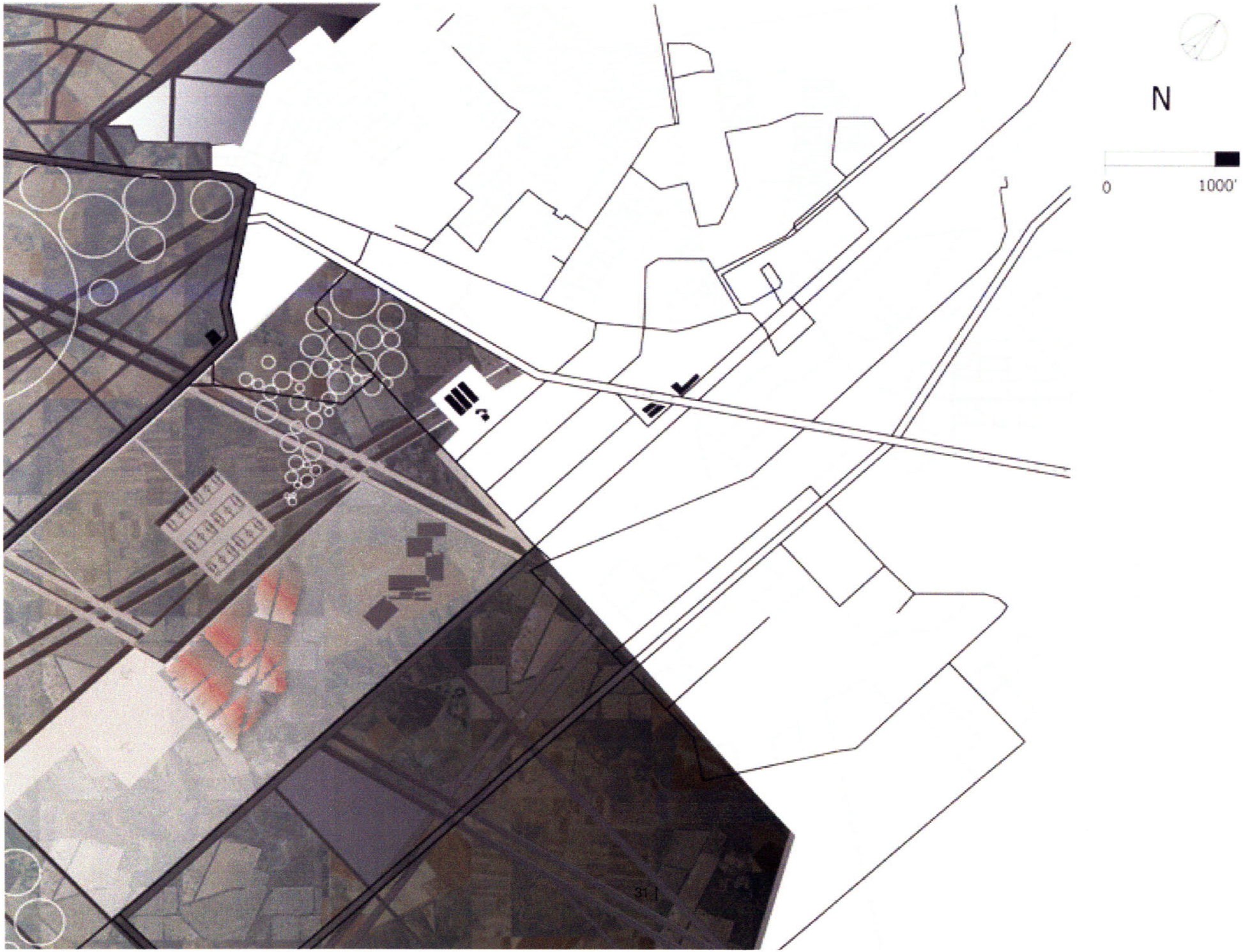
- warehouses
- open air markets
- closed markets
- research labs

buildings phase 3

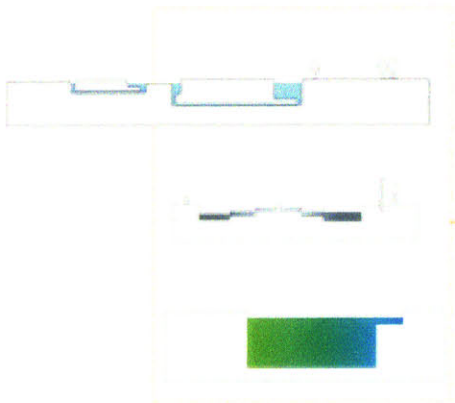
connection to existing mine town

multi-purpose units

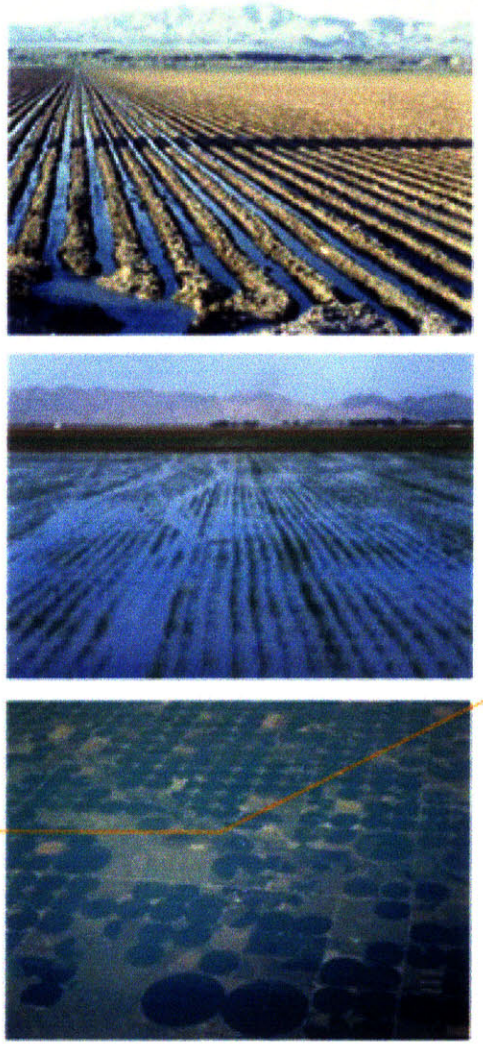
1999 -2049


N
0
1000'

1999 - 2049

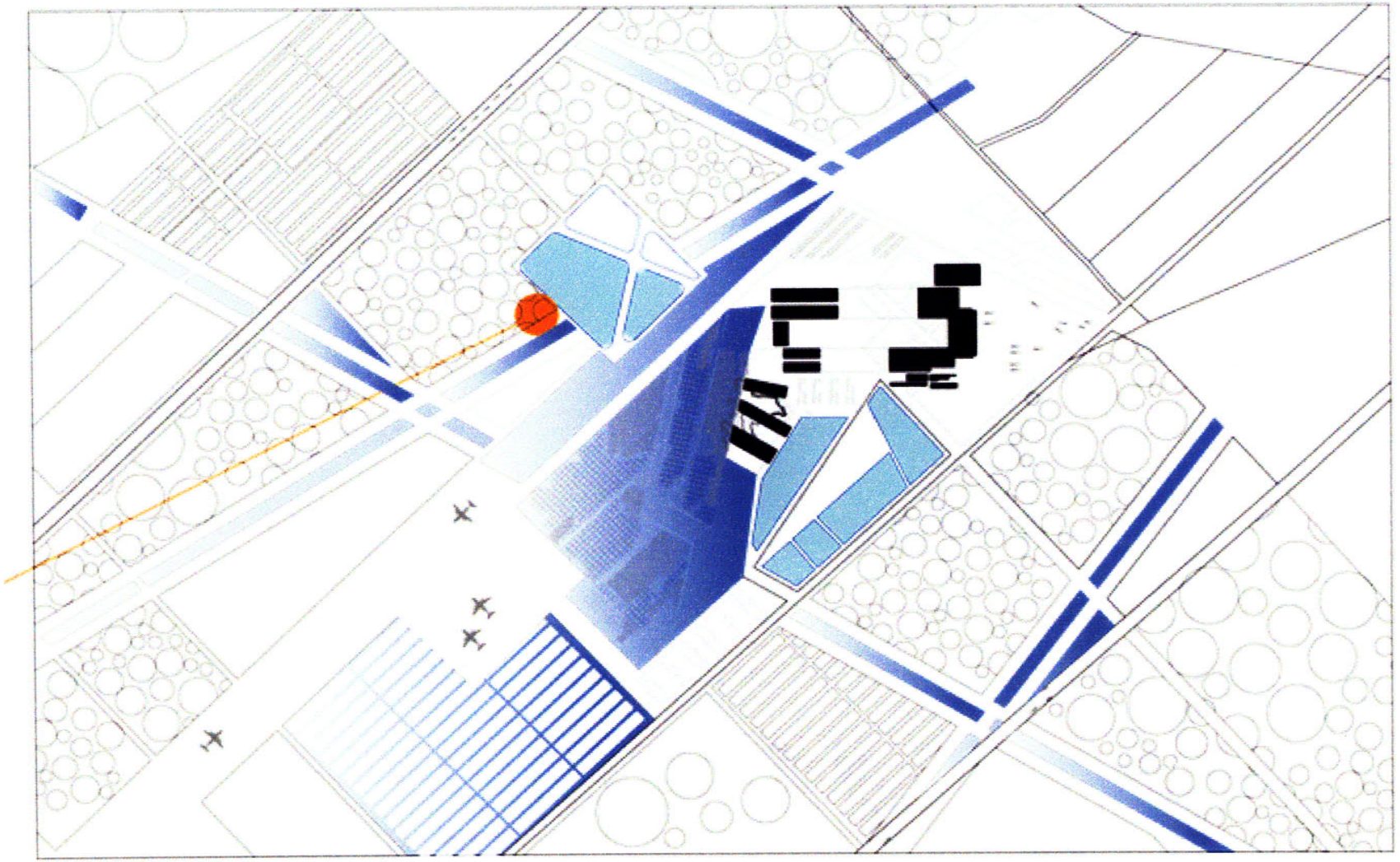


water treatment pools



irrigation systems

furrow
flood
center pivot
drip



underground water / irrigation channels

surface water

SITE FOOTPRINT = 3.8 KM x 1.78 KM

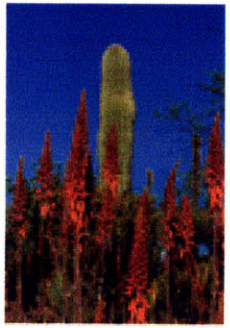
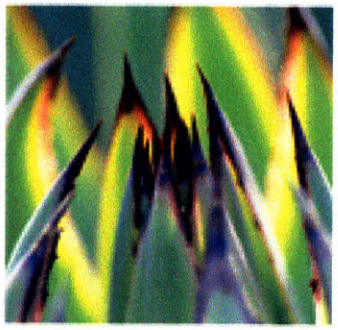
90 % UNCONTAMINATED
10 % CONTAMINATED

1999 - 2049

drip irrigation soils
intercropping system:
aloe
cotton

ALOES (A. VERA)
medicinal / cosmetics
biofuel




1999 - 2049

drip irrigation soils
intercropping system:
aloe
cotton




1999 - 2049

flood irrigation soils
intercropping system:
grasses and reeds

NATIVE REED / GRASS PRODUCTION
absords impurities from waste water

1999 - 2049

furrow irrigation soils
intercropping system:
sunflowers
jatropha

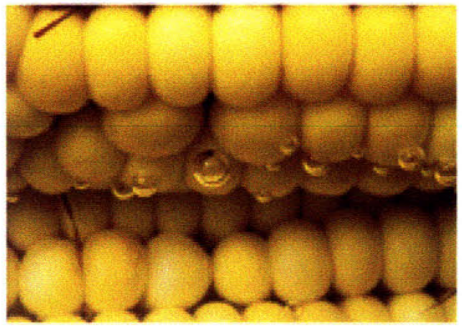
JATROPHA TREES

seeds for high quality biodiesel

needs processing plant for oil esterification

1999 - 2049

center pivot irrigation soils
intercropping system:
maize
pomegranates
oranges



1999 - 2049

center pivot irrigation soils

intercropping system:

maize

pomegranates

oranges

1999 - 2049

center pivot irrigation soils

intercropping system:

maize

pomegranates

oranges

POMEGRANATE

used for food / organic medicine / pharmaceuticals
grown on marginal sols
soils of tailings faciilities

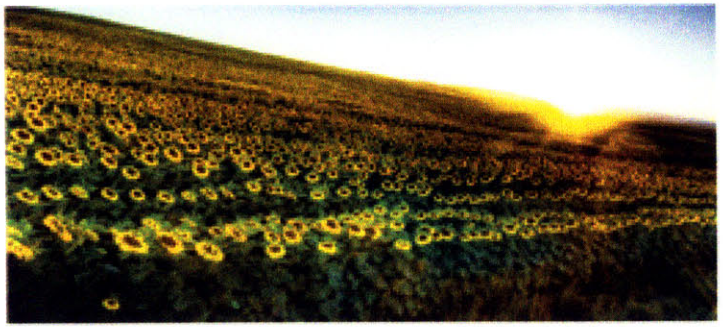




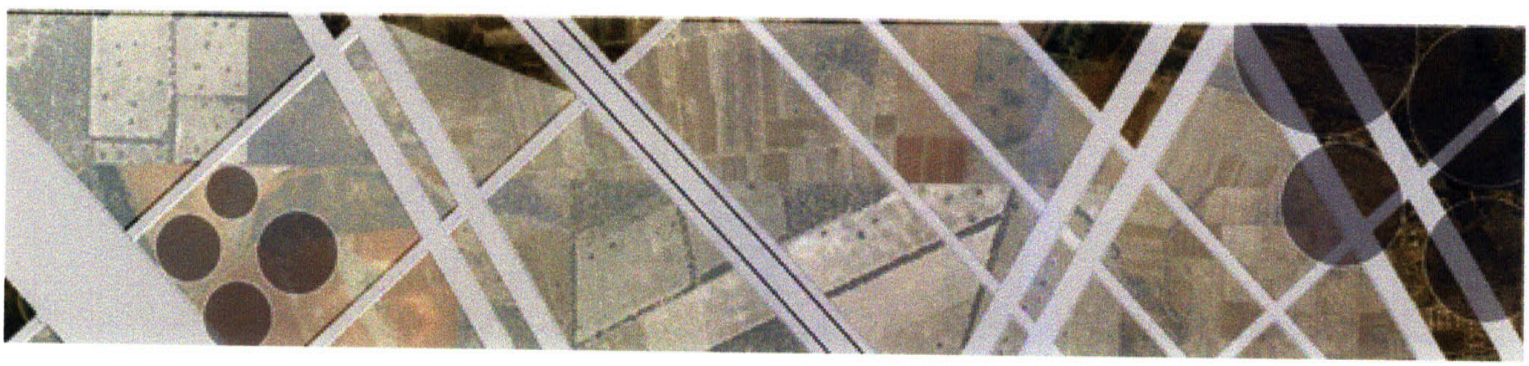
1999 -2049

furrow irrigation soils
intercropping system:
sunflowers
jatropha






1999 -2049



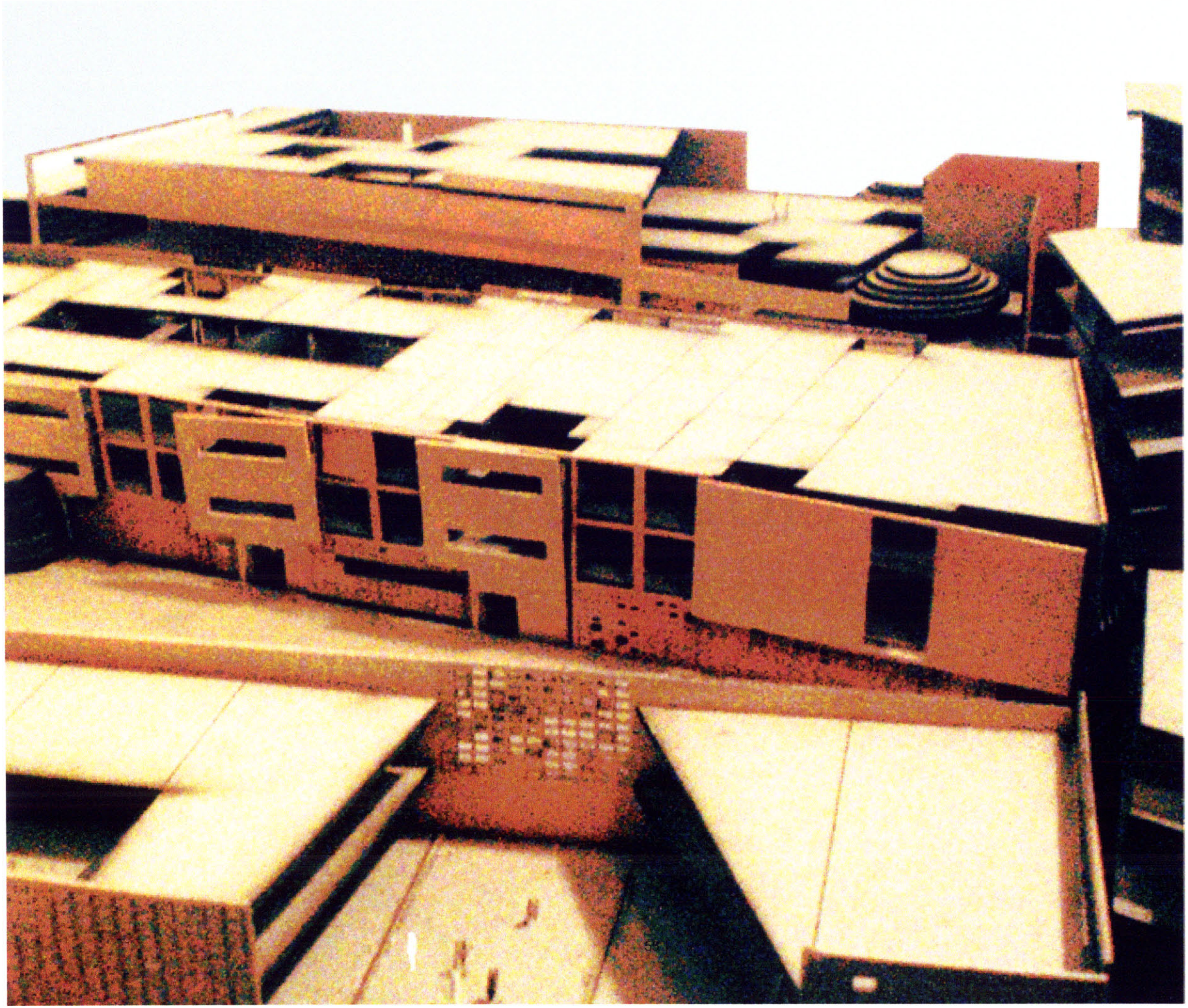
1902 - 1999

1999 -2049

2050 - 2100

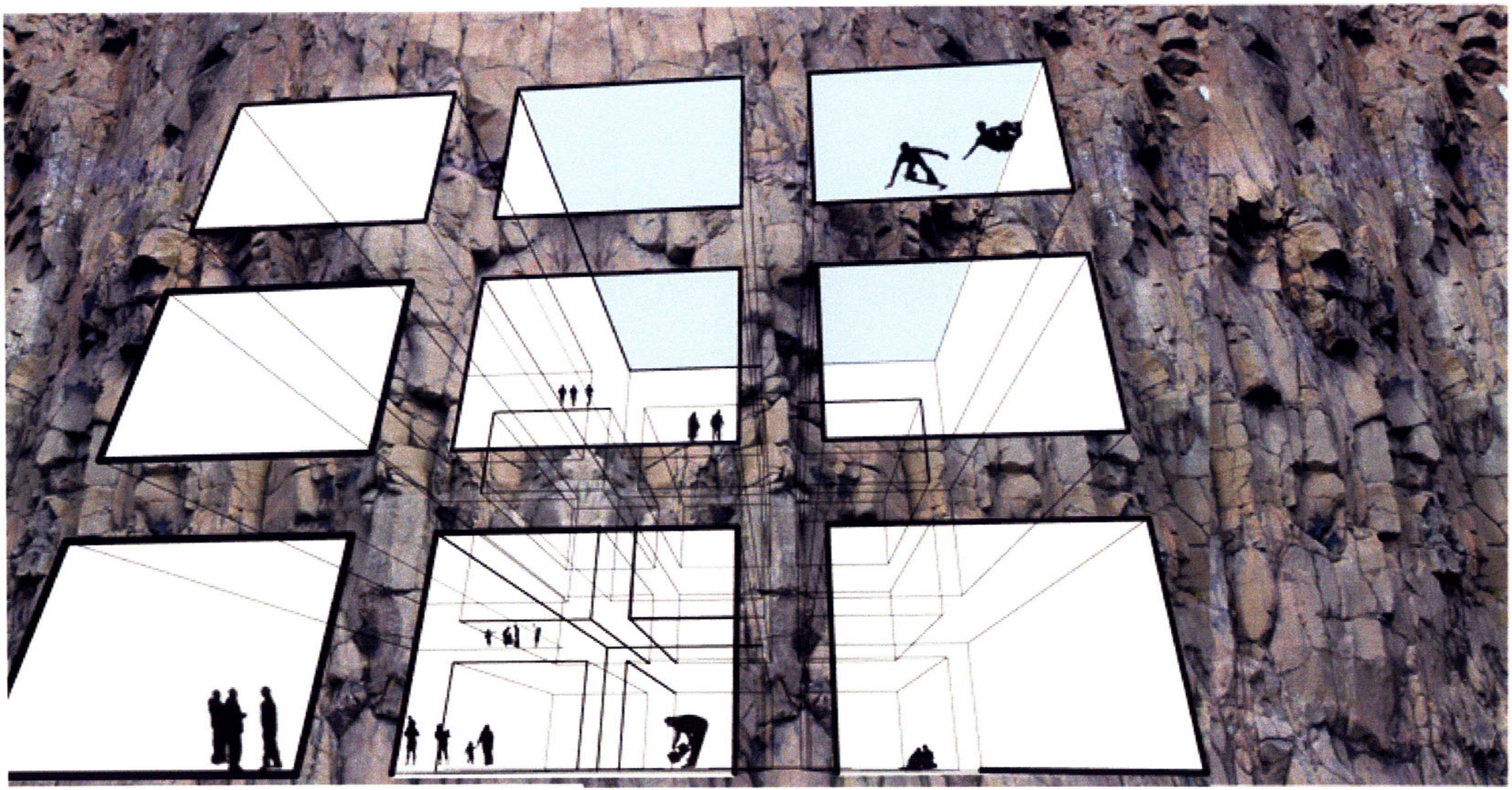
2101 - 2192

2050 - 2100

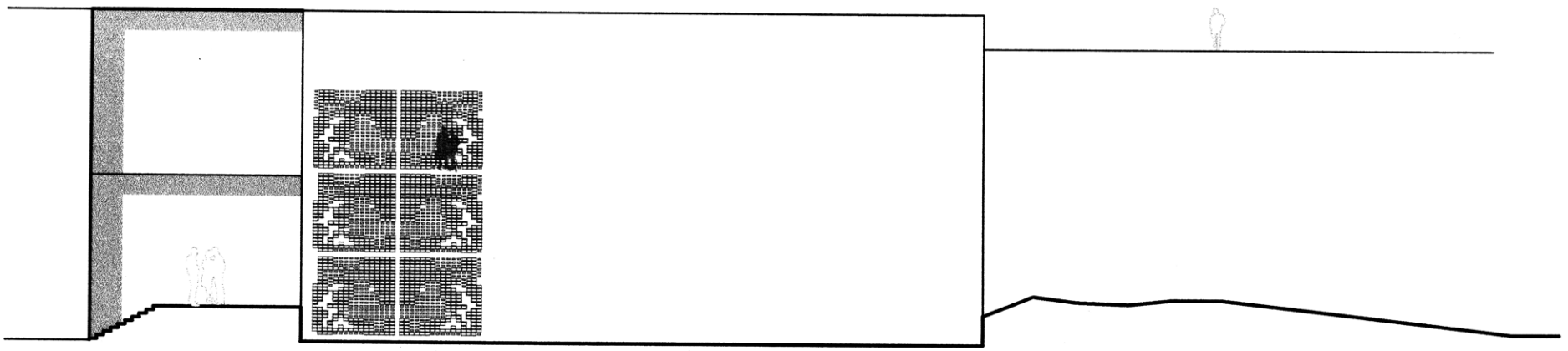


2050 - 2100

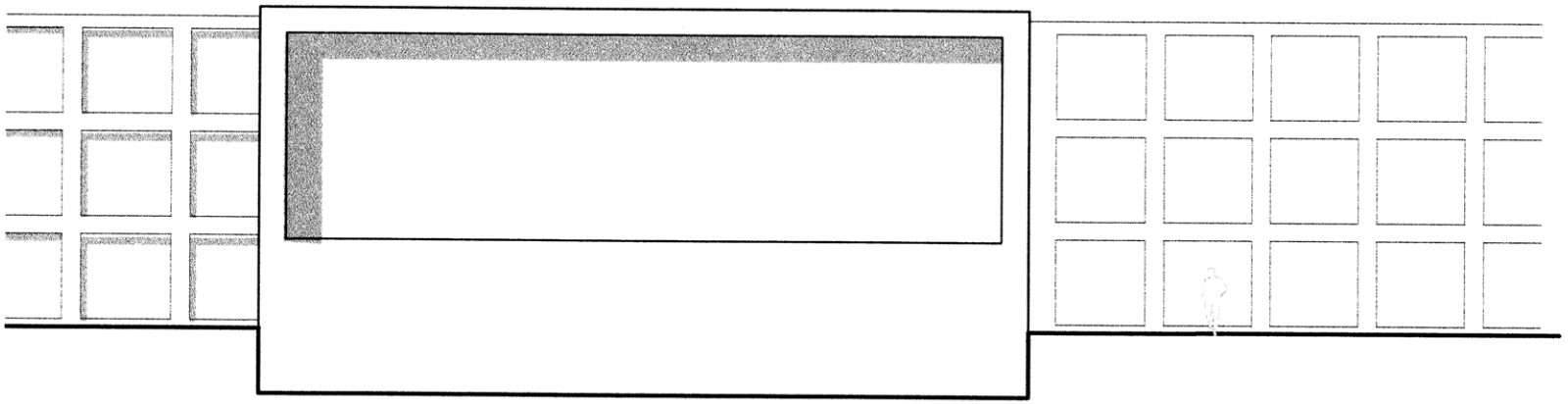
MUSEUM



2050 - 2100



MUSEUM EAST ELEVATION

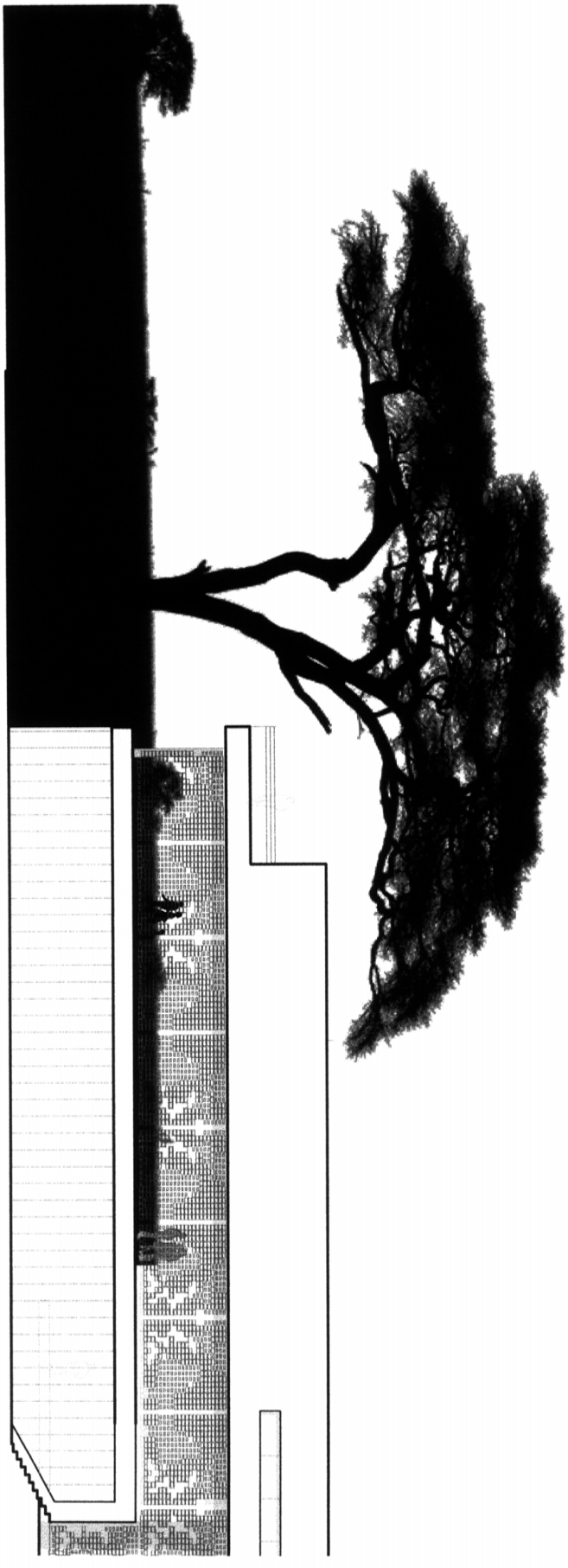


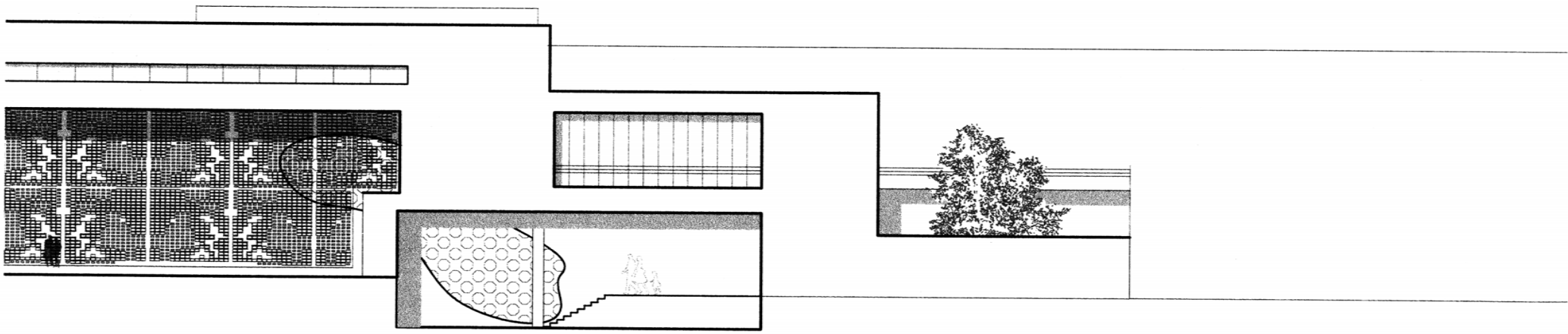
MUSEUM WEST ELEVATION

2050 - 2100

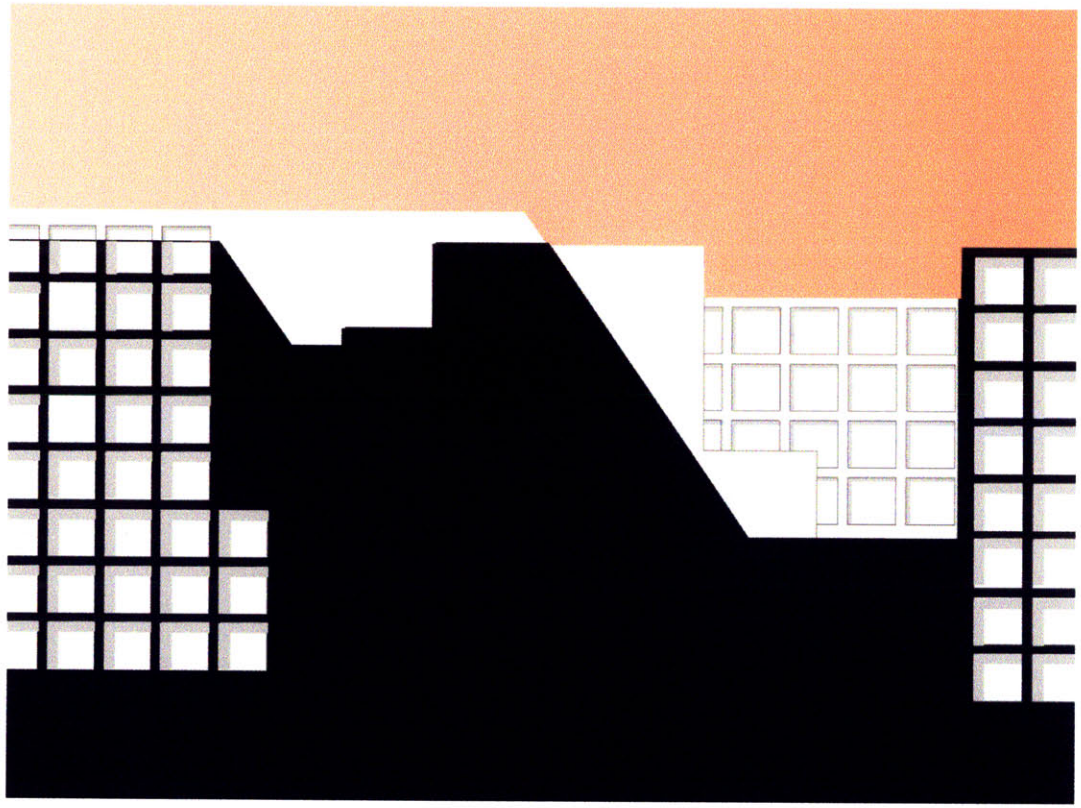
MUSEUM SOUTH ELEVATION

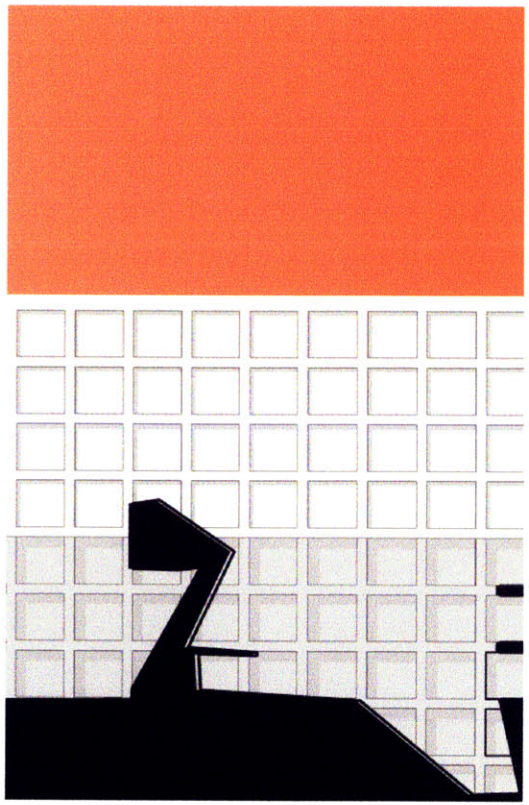
2050 - 2100

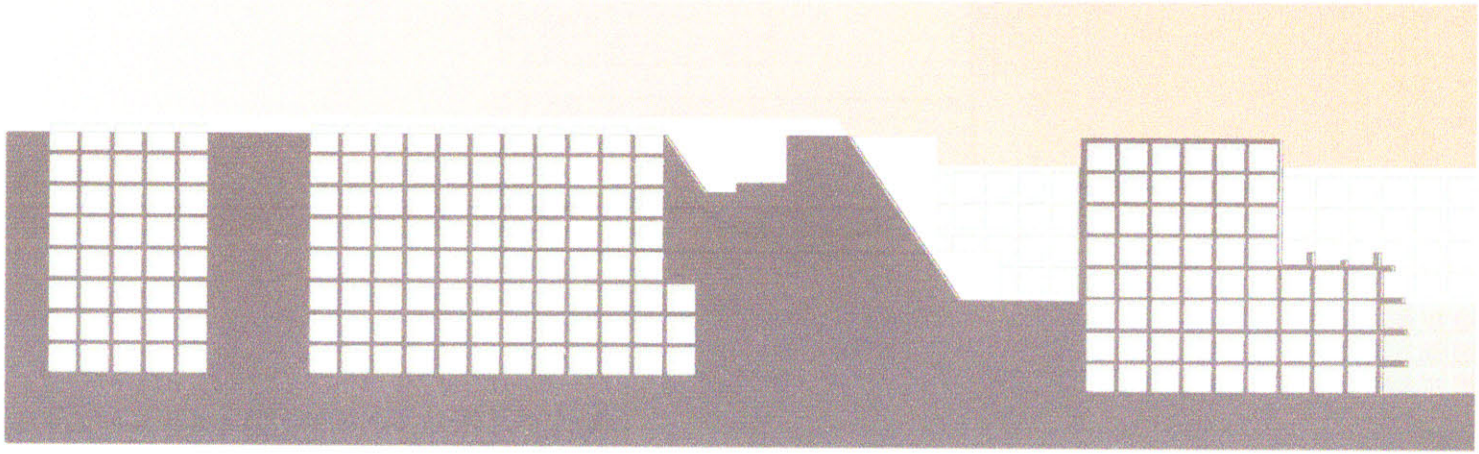


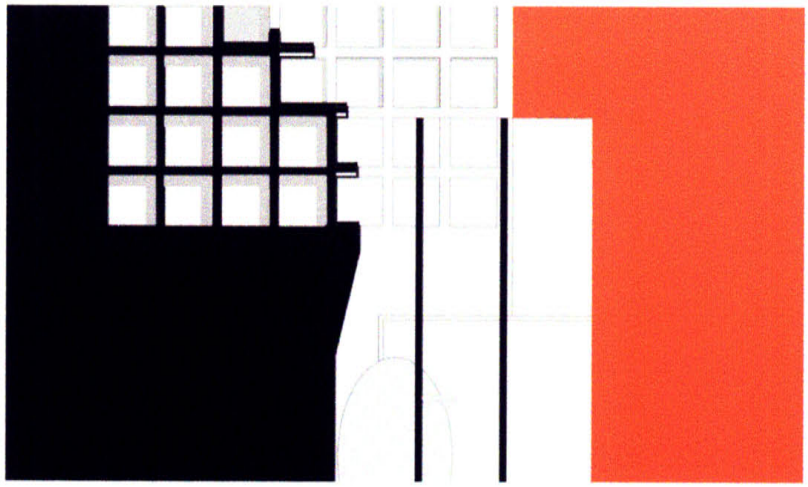


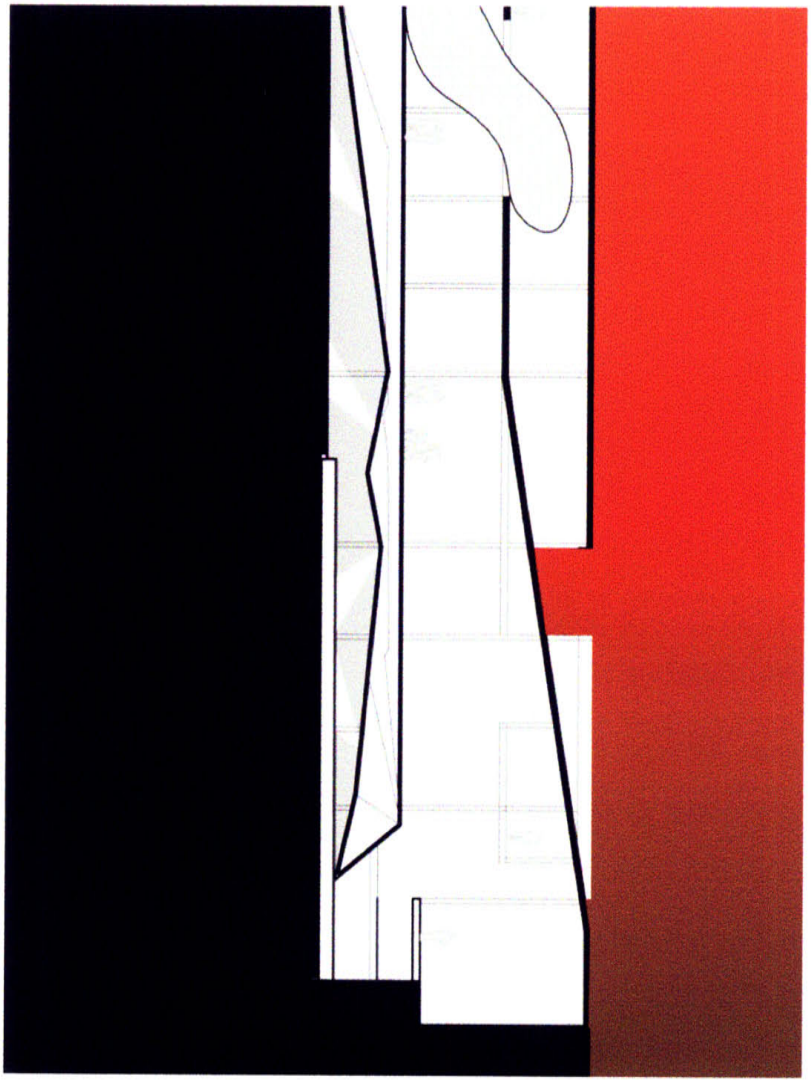
MUSEUM NORTH ELEVATION







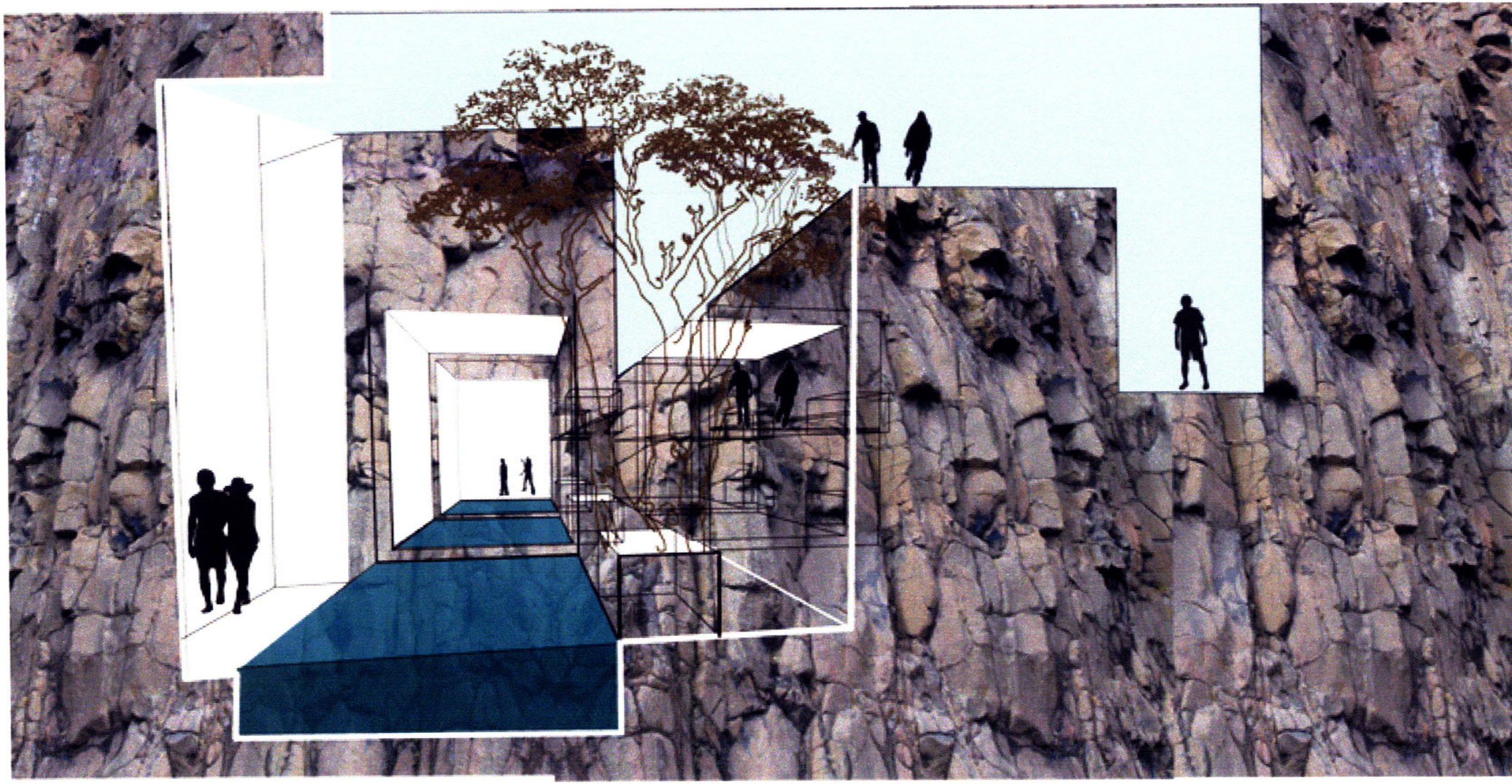




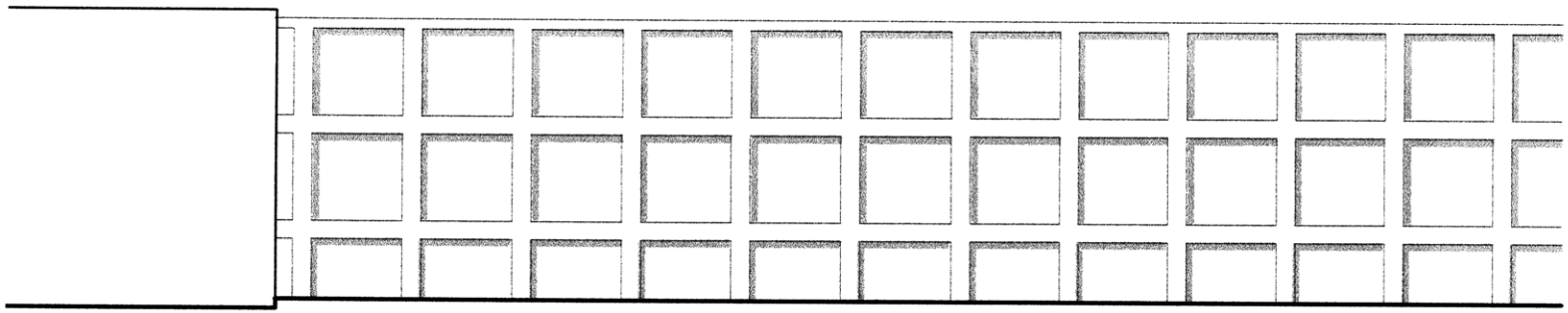
SECTION VIGNETTES

2050 - 2100

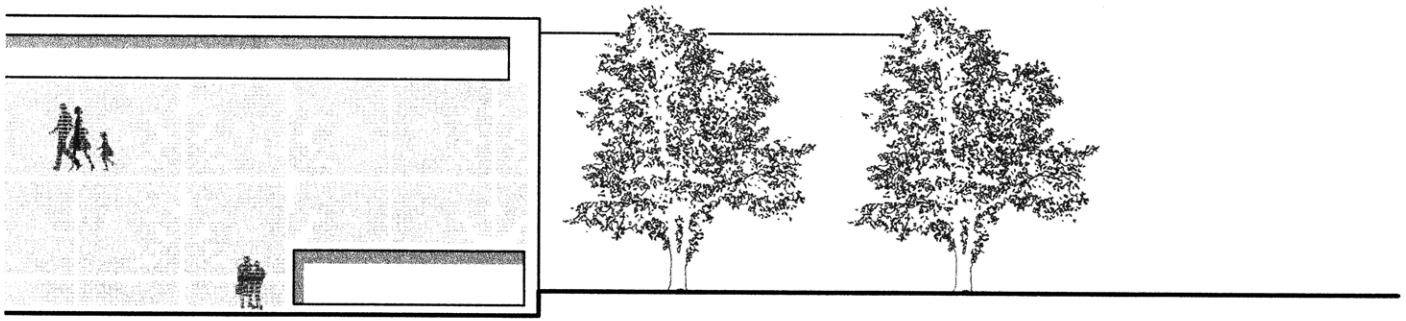
SHORT-STAY HOUSING



2050 - 2100

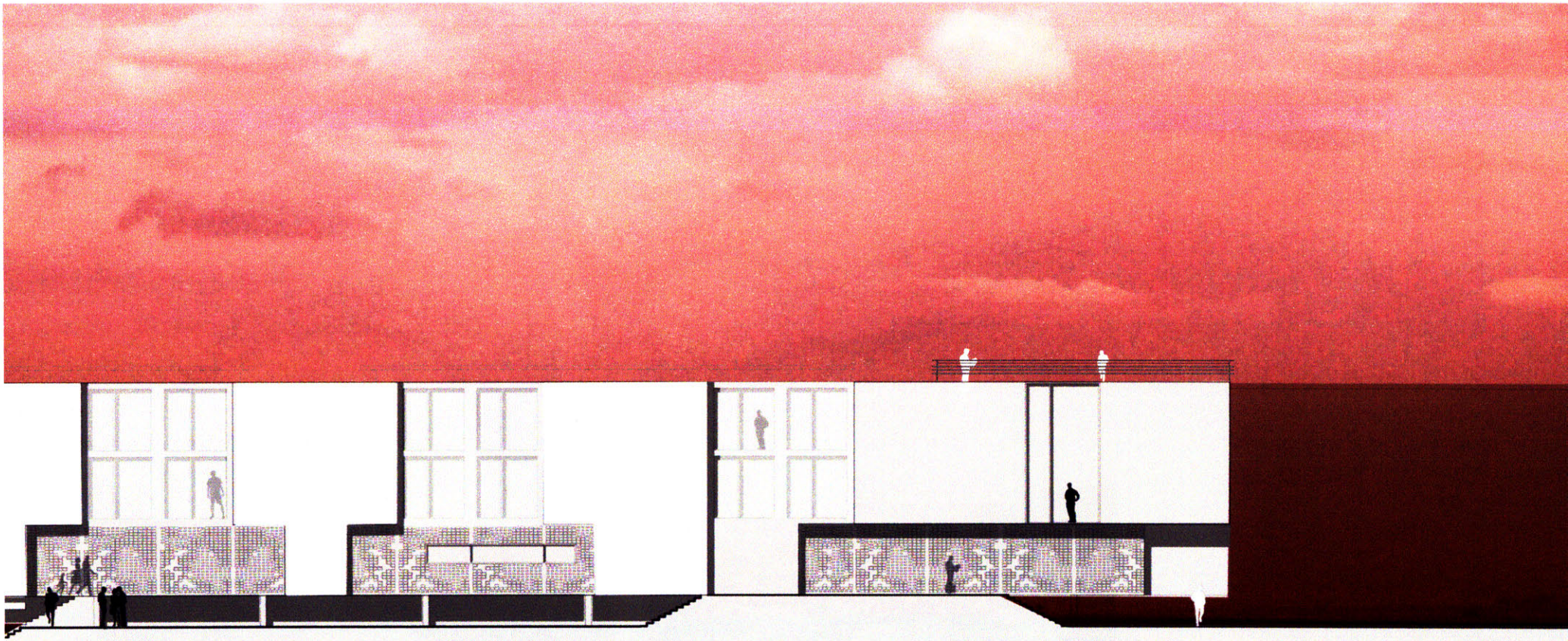


SHORT-STAY WEST ELEVATION



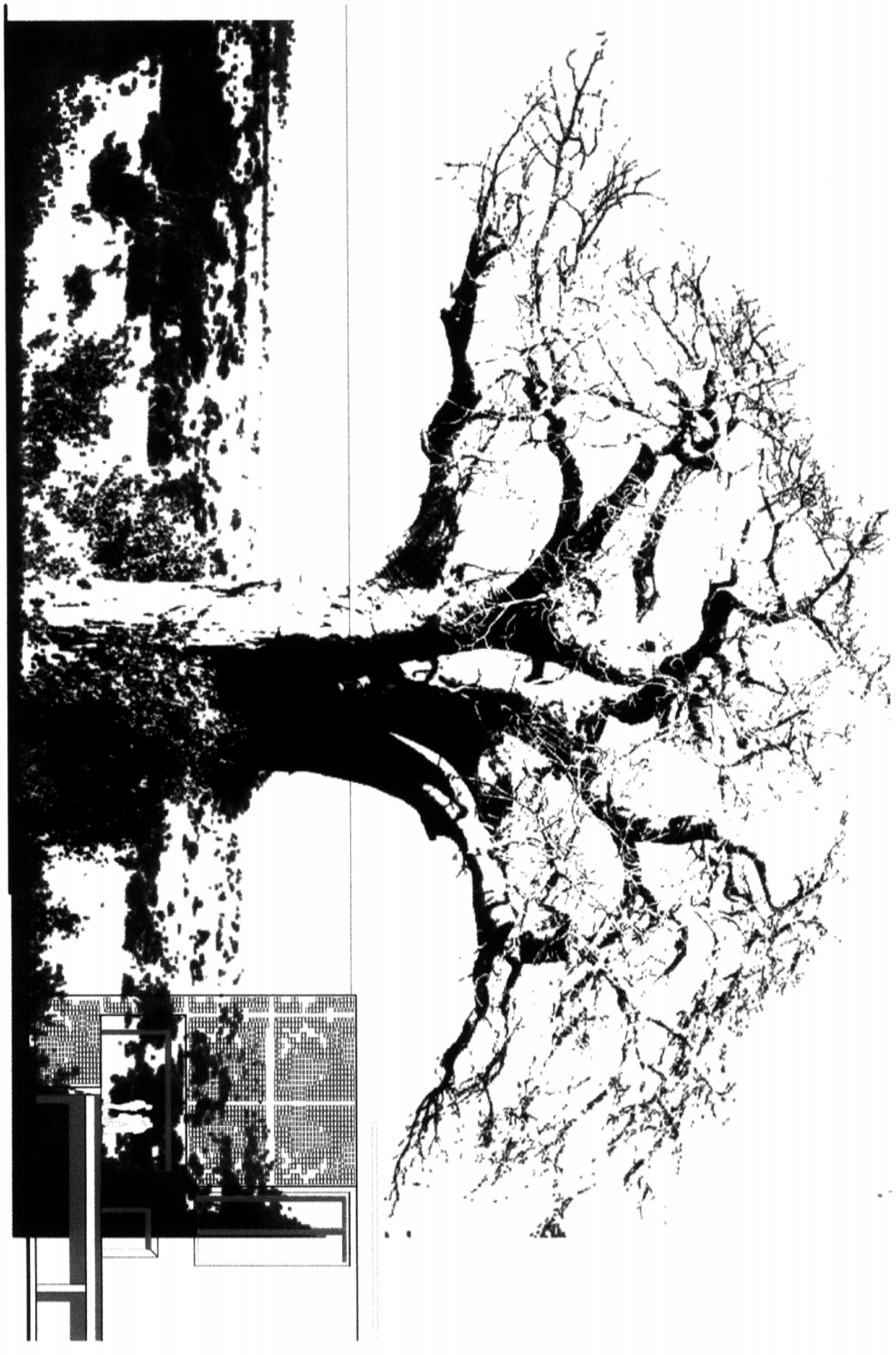
SHORT-STAY EAST ELEVATION

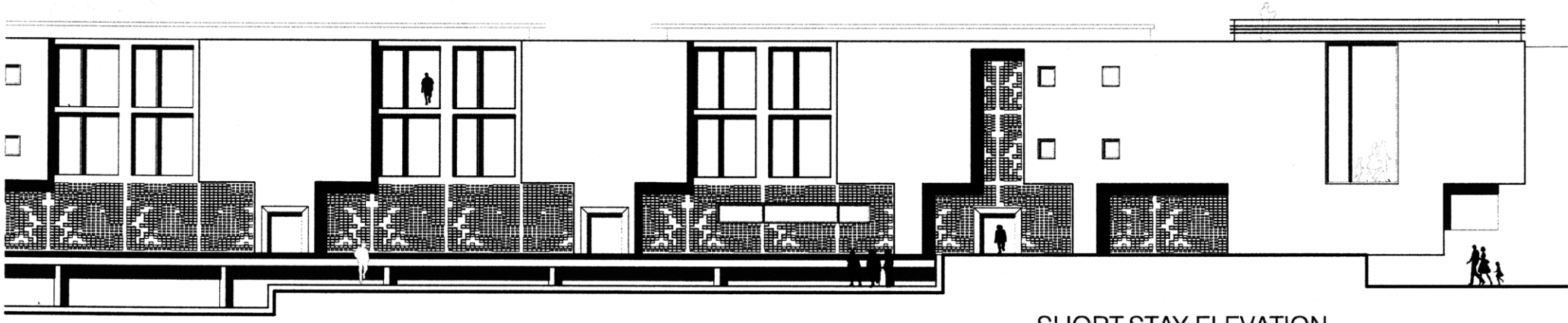
2050 - 2100



SHORT-STAY NORTH ELEVATION

2050 - 2100





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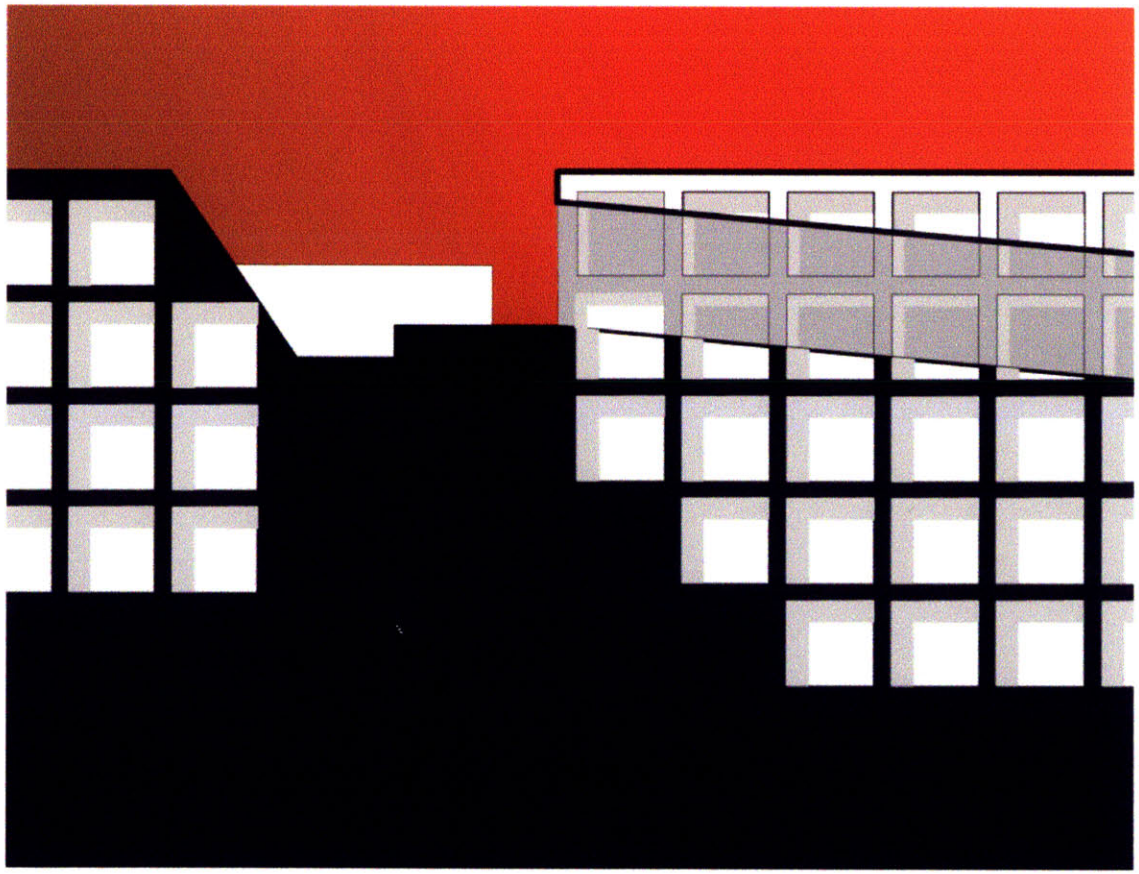
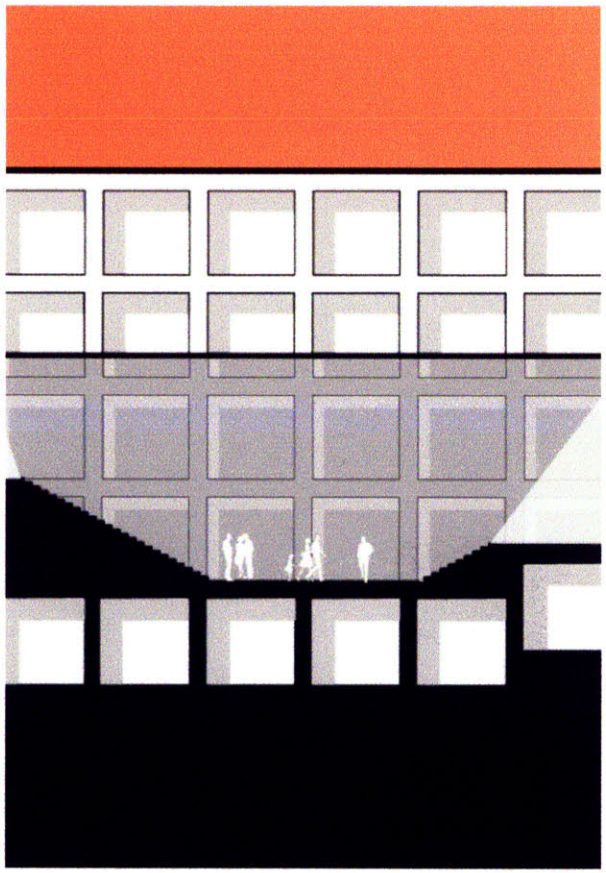
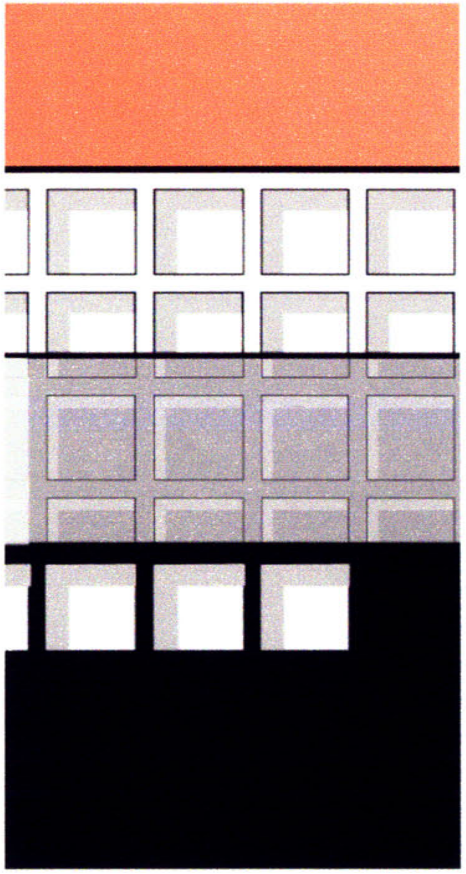
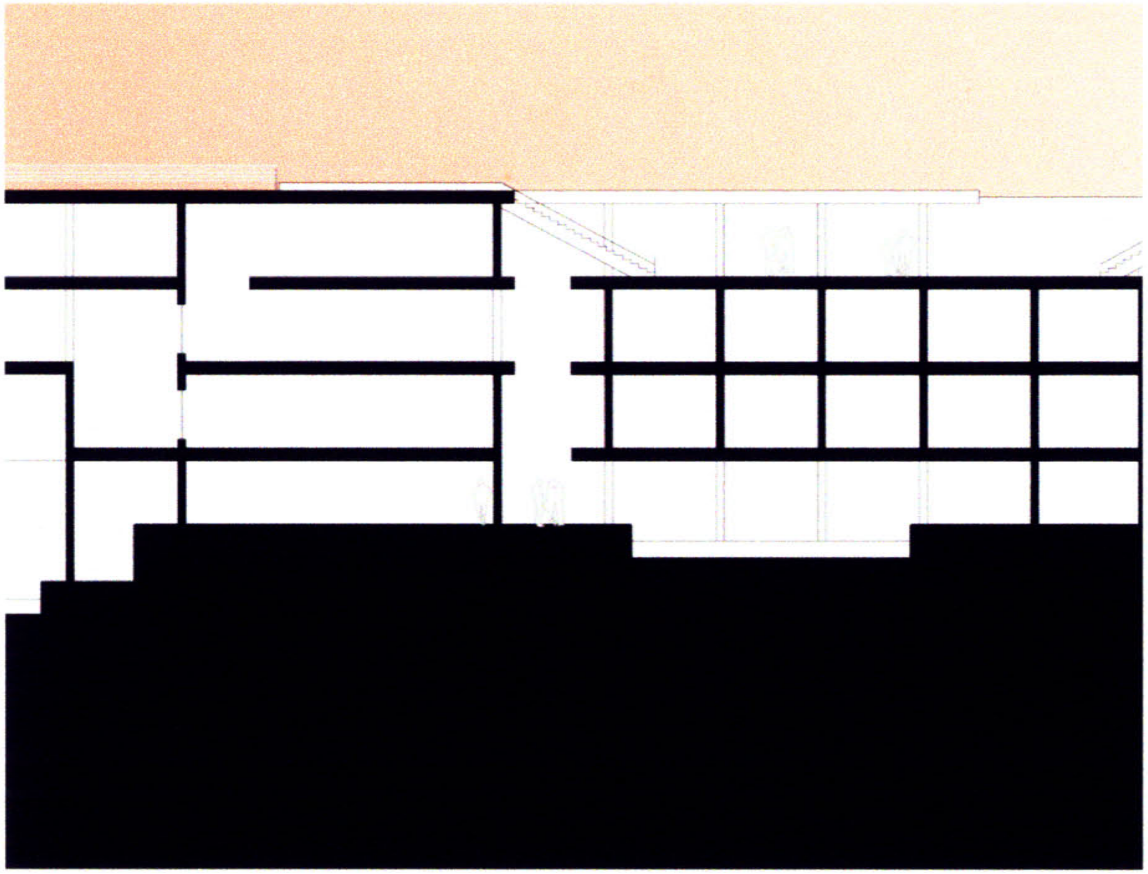




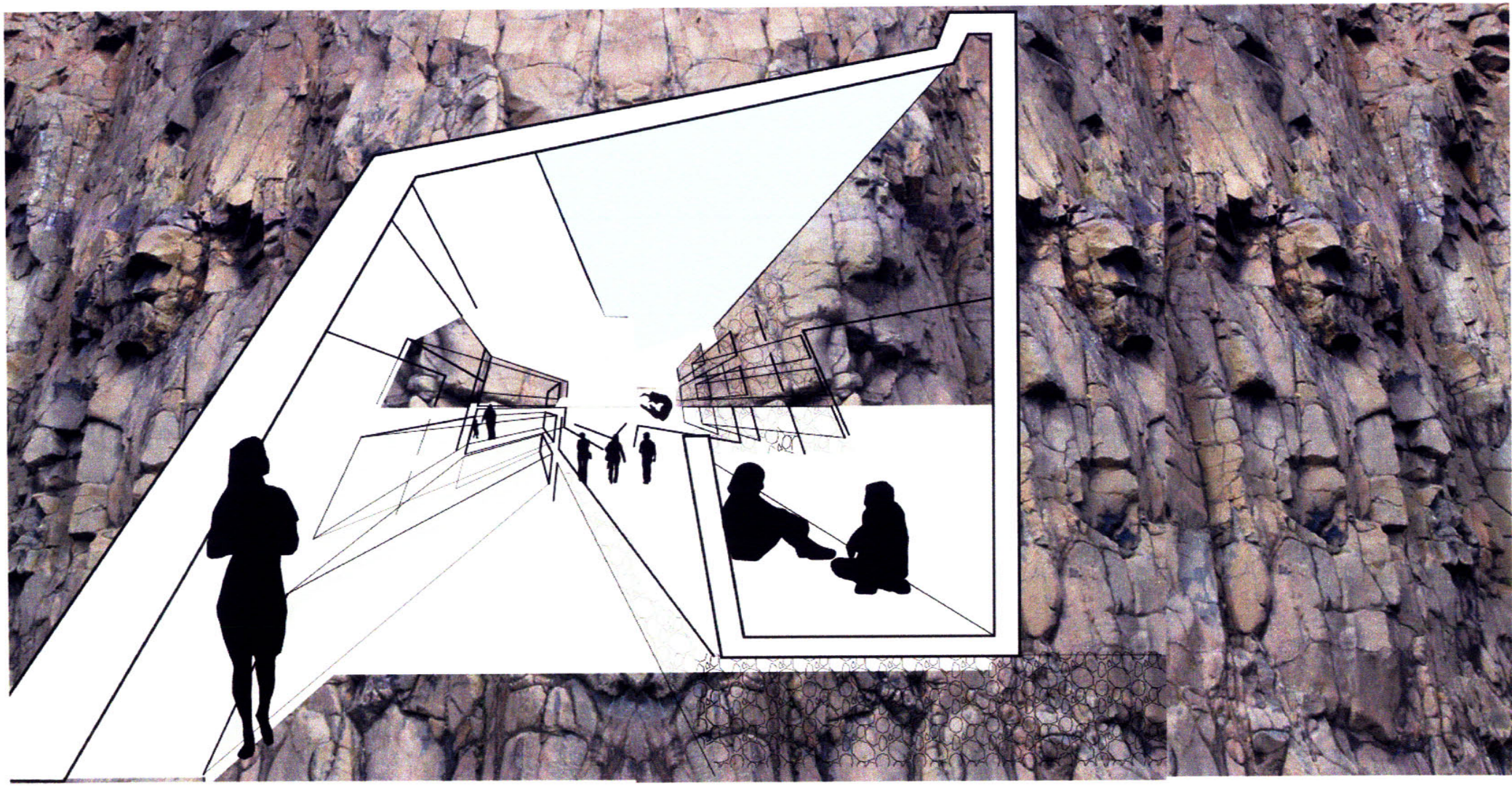




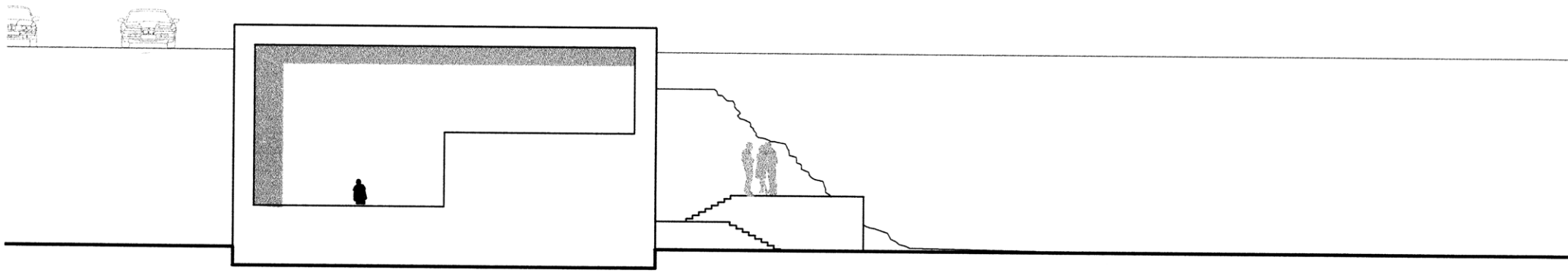
SECTION VIGNETTES

2050 - 2100

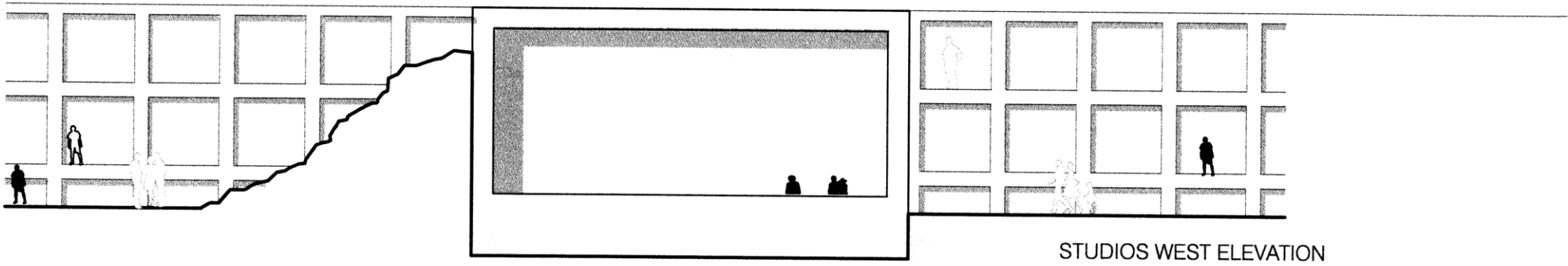
STUDIOS / WORKSHOPS



2050 - 2100

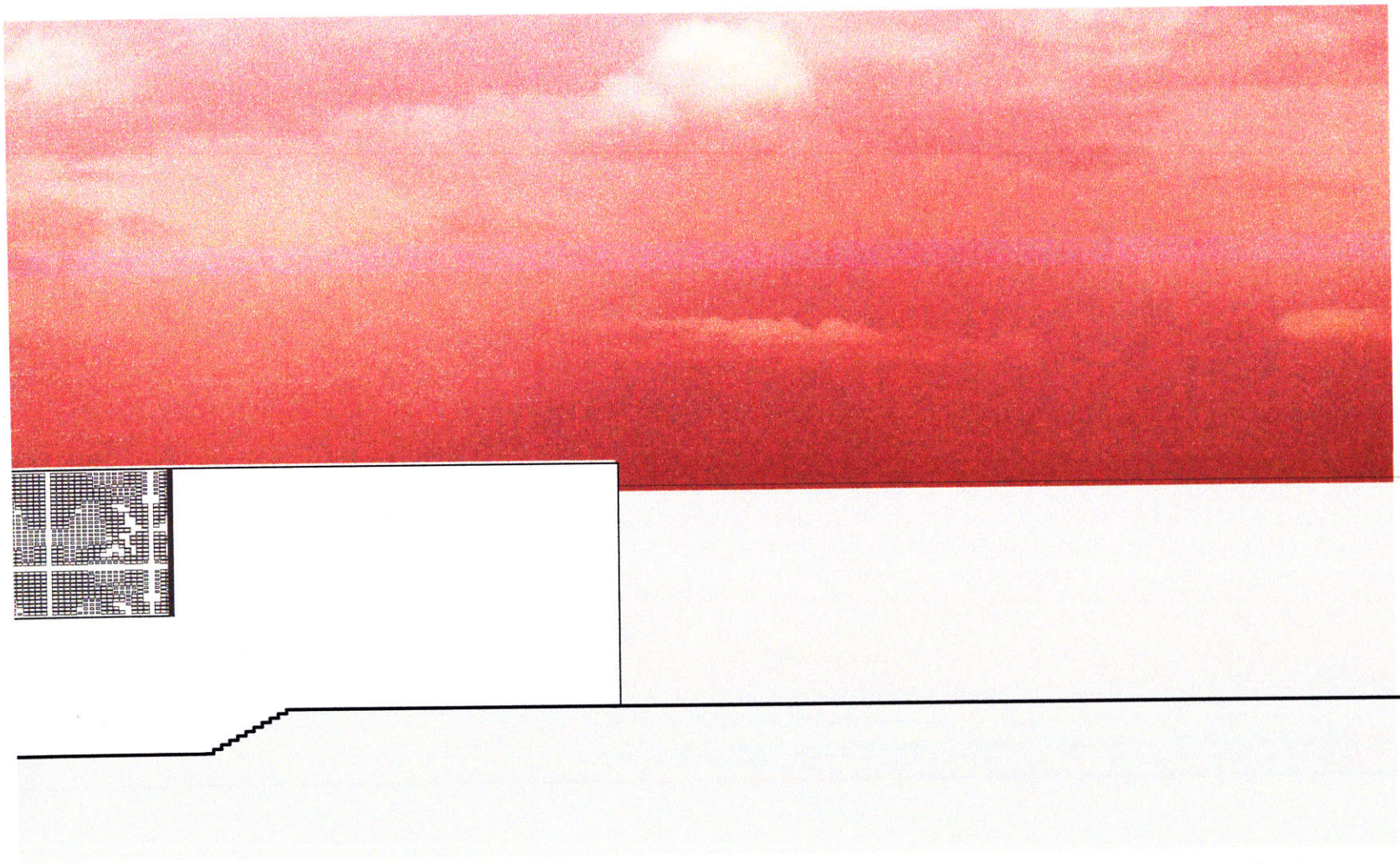


STUDIOS EAST ELEVATION



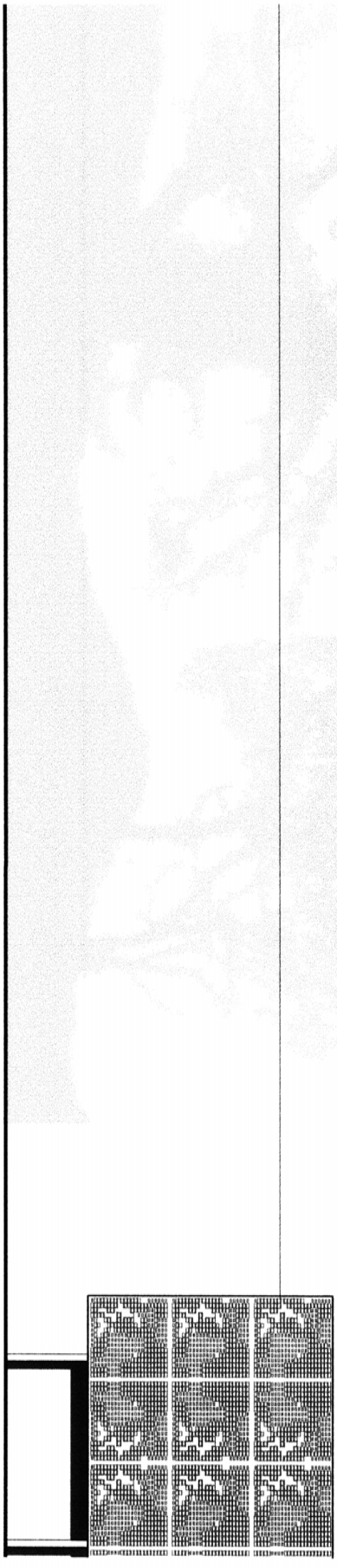
STUDIOS WEST ELEVATION

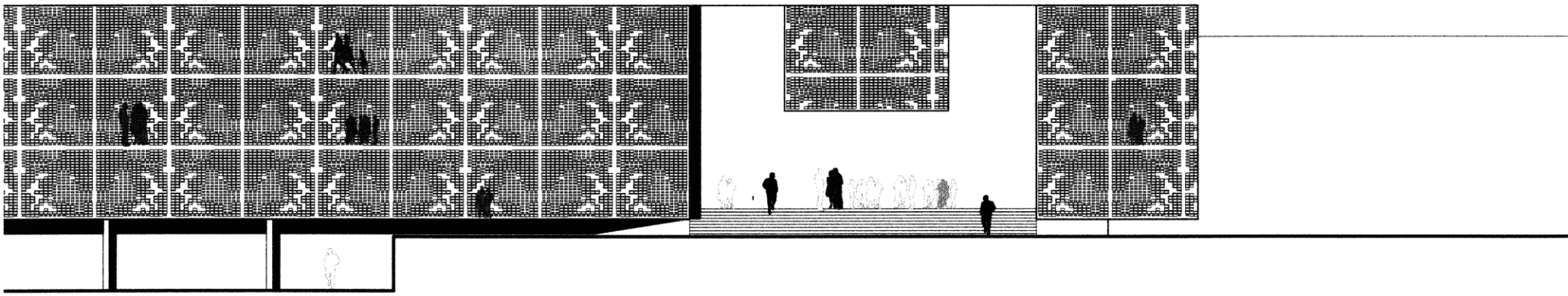
2050 - 2100



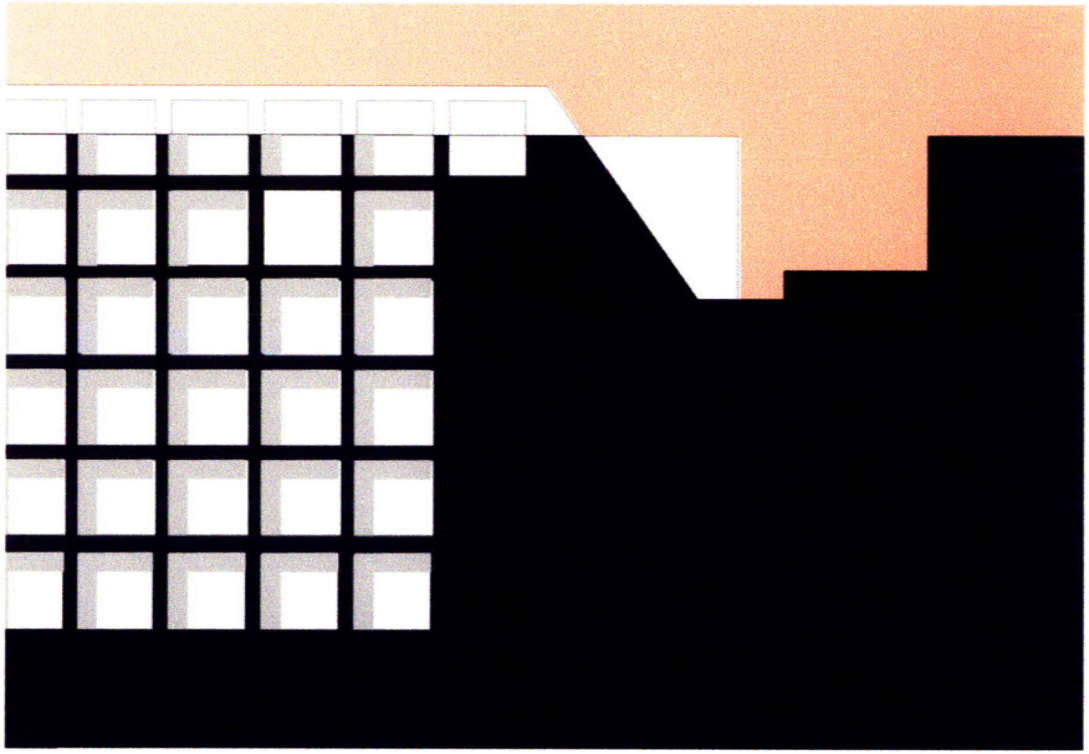
STUDIOS SOUTH ELEVATION

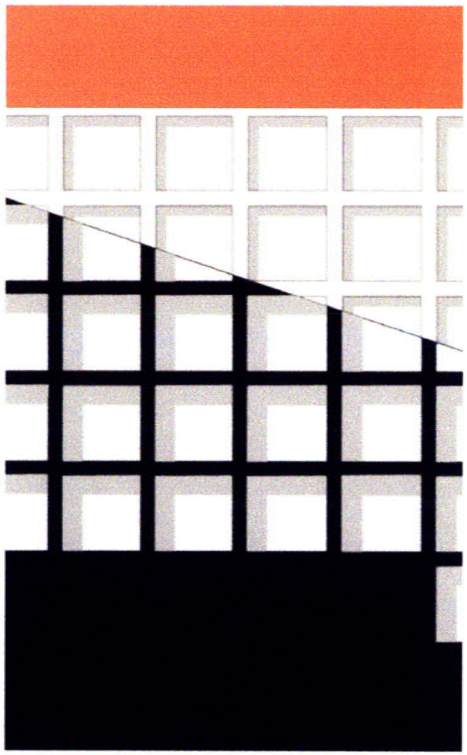
2050 - 2100



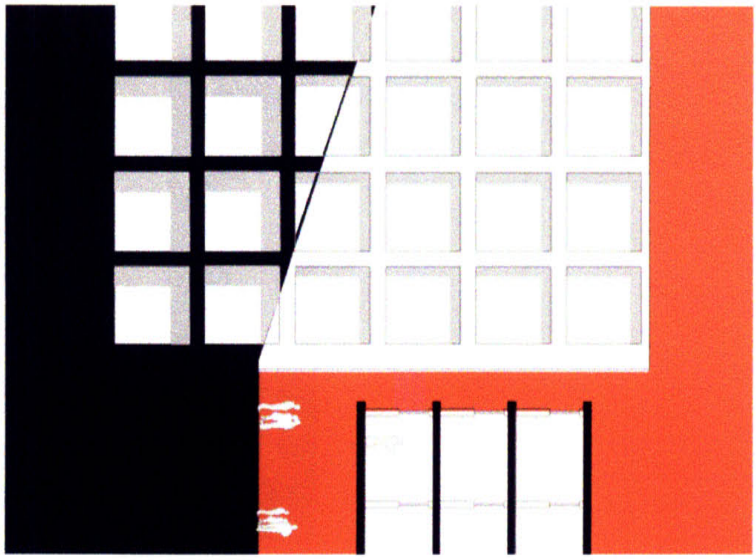


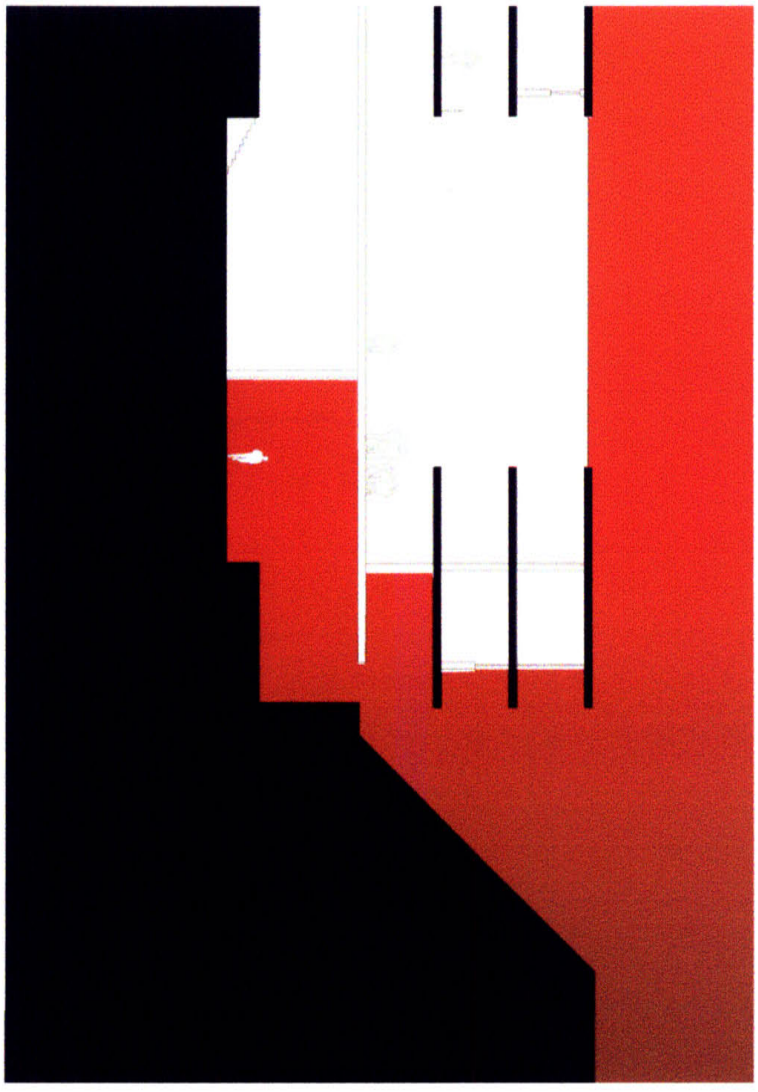
STUDIOS NORTH ELEVATION





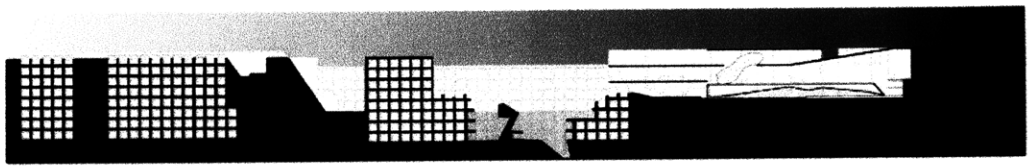
SECTION VIGNETTES



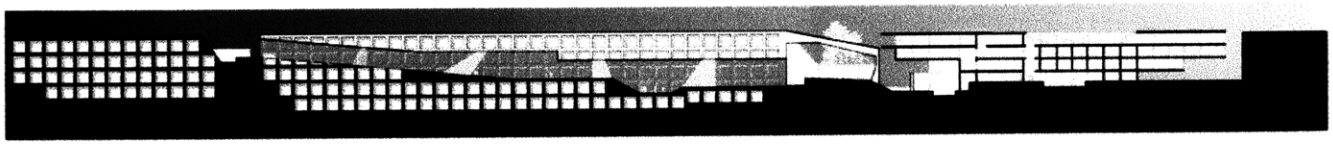


2050 – 2100

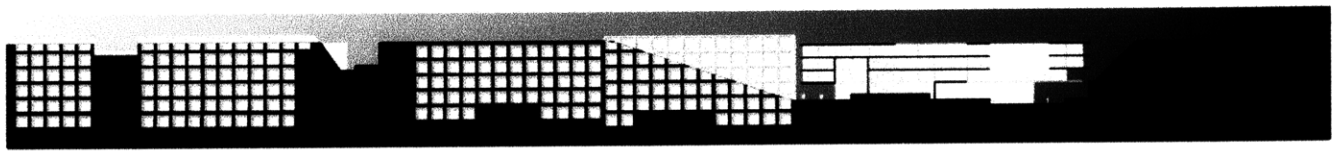
MUSEUM A - B

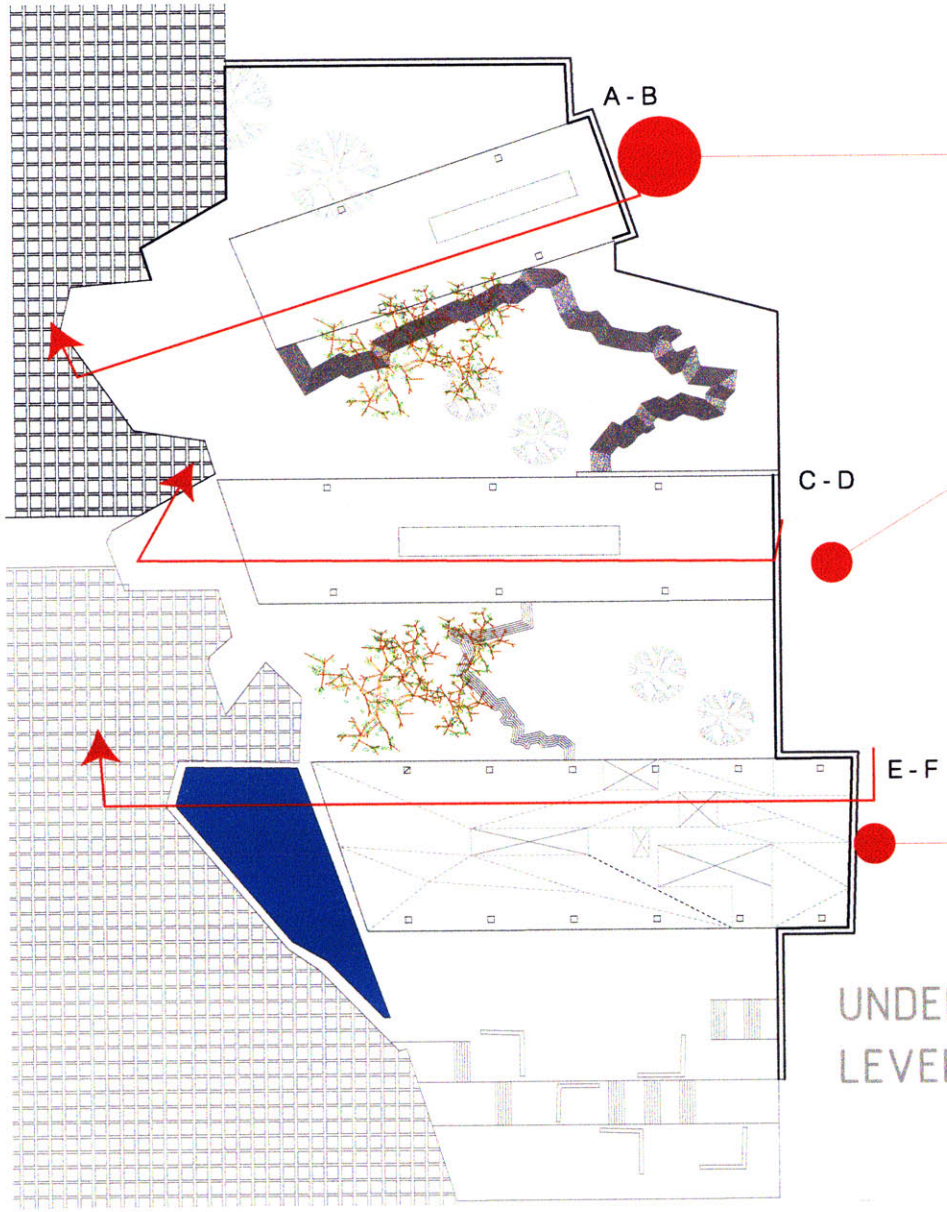


SHORT-STAY HOUSING C - D



STUDIOS / WORKSHOPS E - F





STUDIOS

sewing studio
textile studio
tapestry studio
dyeing studio

HEALTH BAR

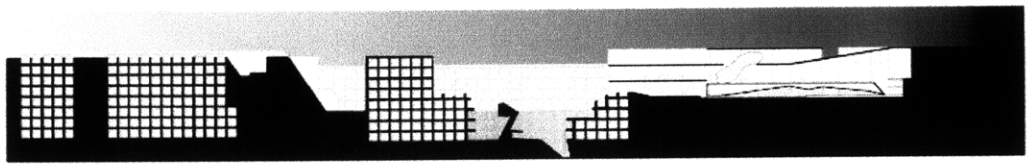
1 bedroom appartments
communal lounges

MINE MUSEUM

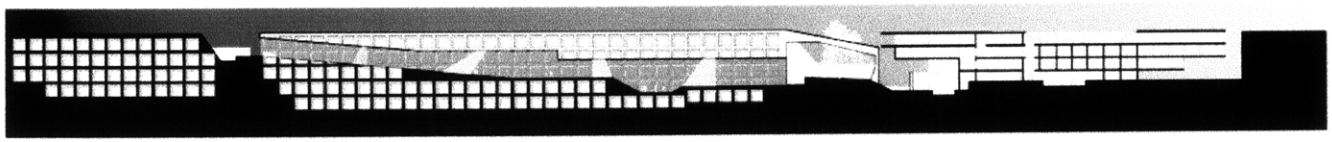
gallery 3
gallery 4
mine artifacts

2050 - 2100

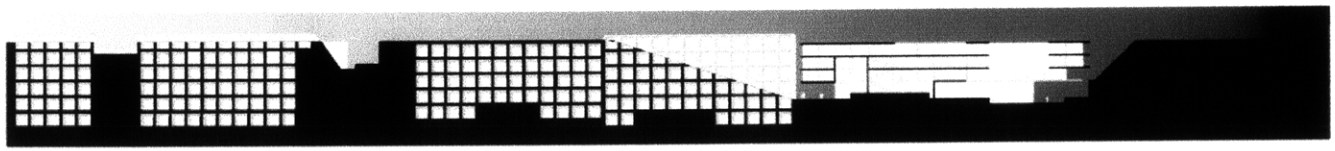
MUSEUM A - B

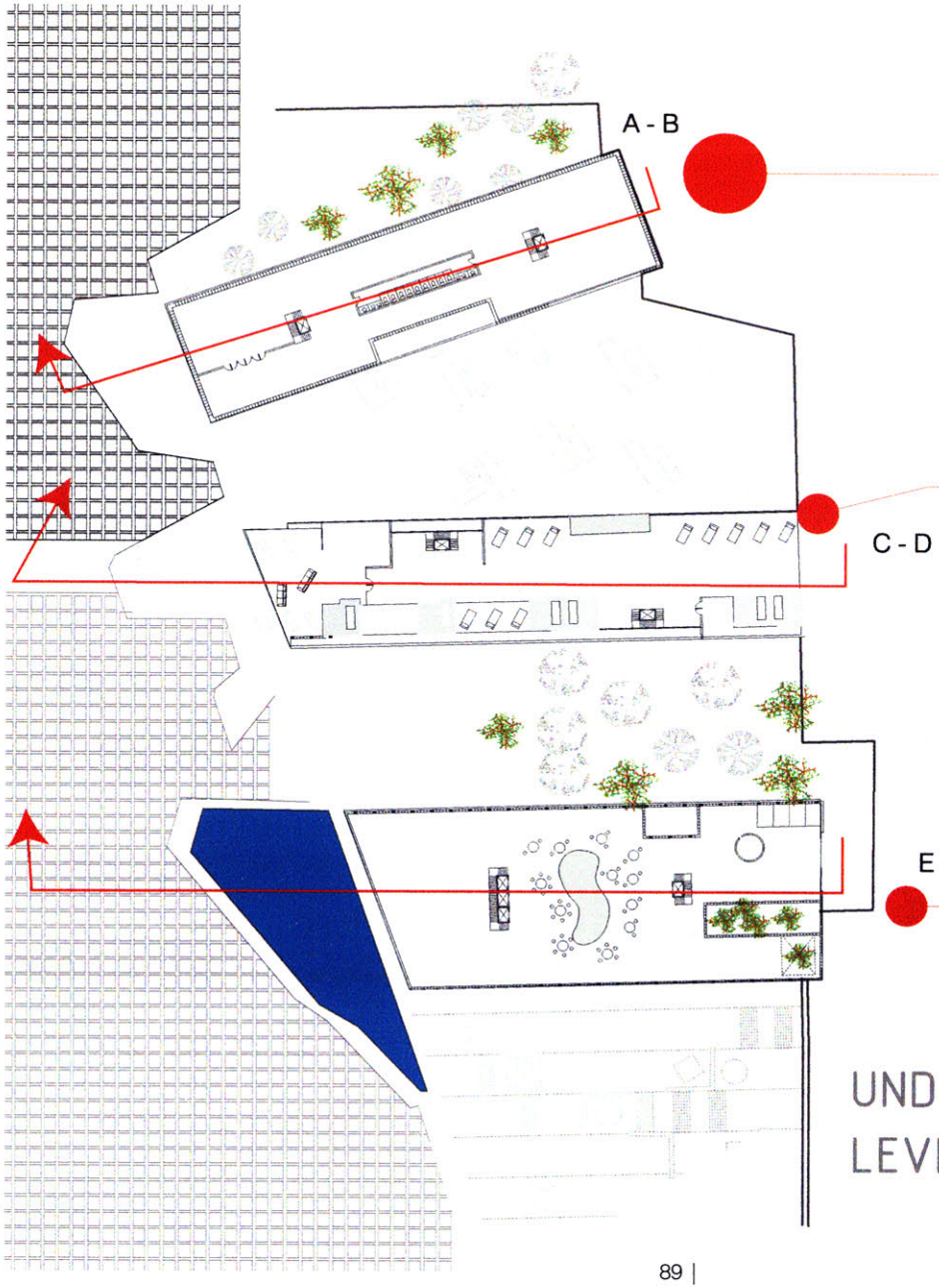


SHORT-STAY HOUSING C - D



STUDIOS / WORKSHOPS E - F





STUDIOS

fablabs

fab gallery spaces

HEALTH BAR

thermal baths

mineral baths

change rooms

massage stations

wellness center

MINE MUSEUM

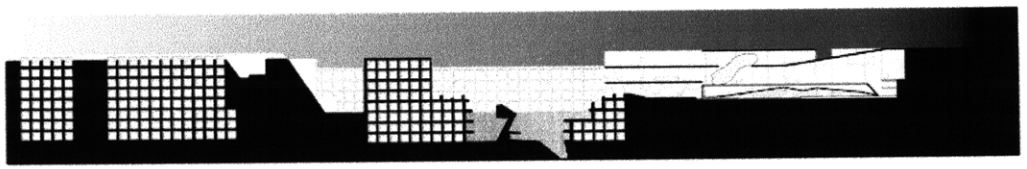
restaurant / cafe / bar

ramp to garden level

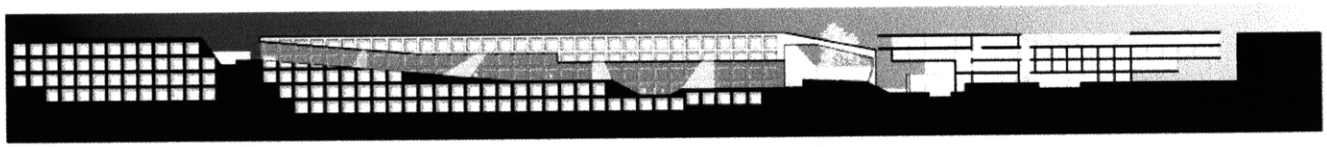
boardwalk to derelict shafts

2050 - 2100

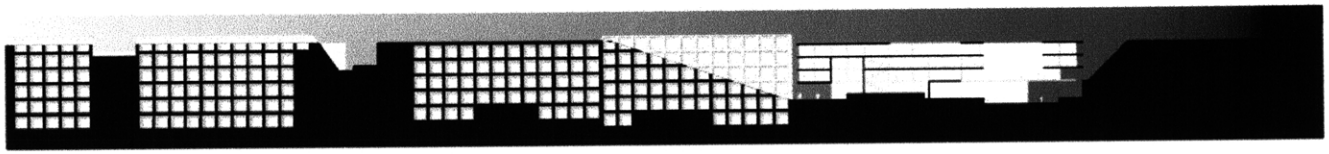
MUSEUM A - B

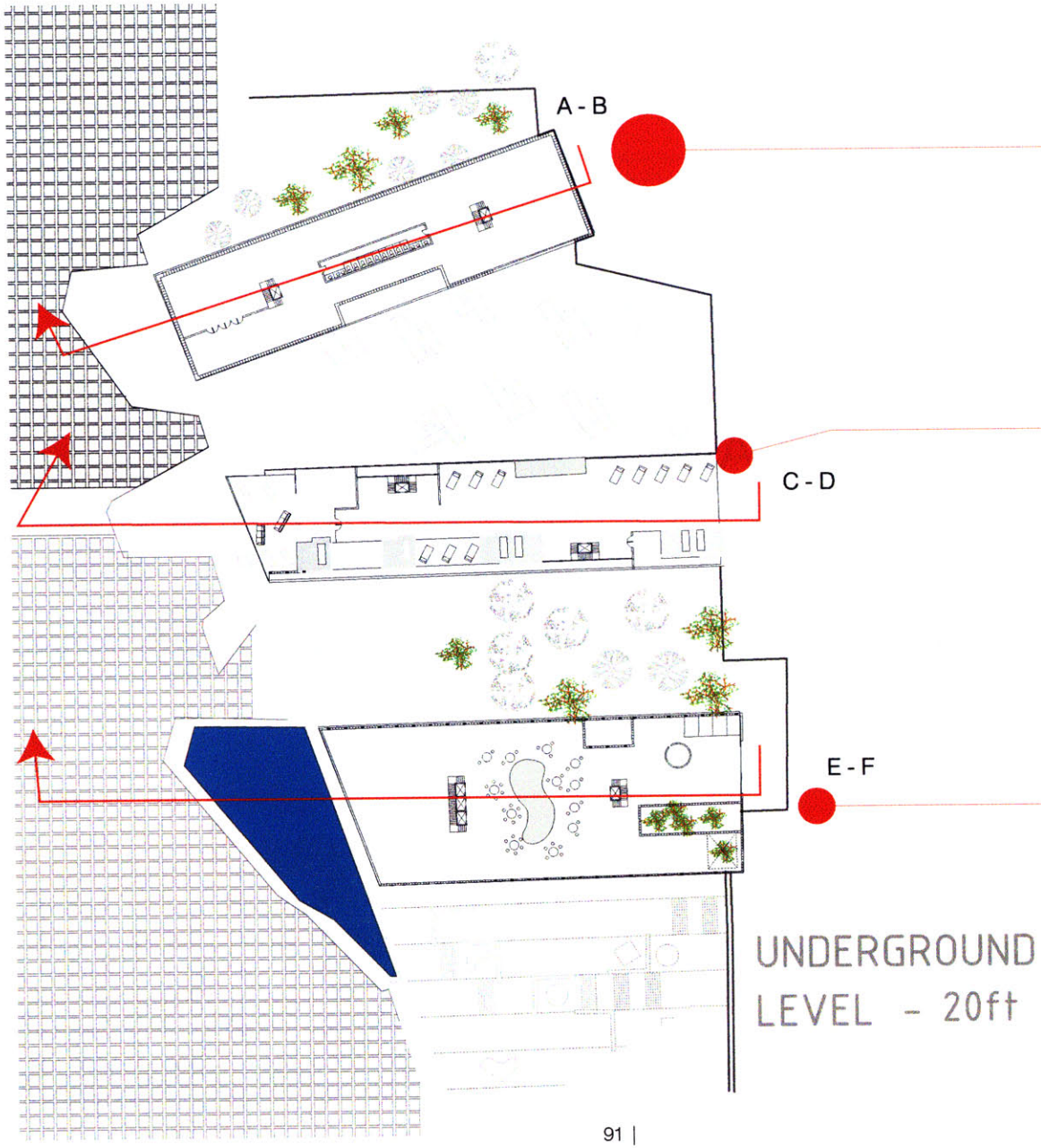


SHORT-STAY HOUSING C - D



STUDIOS / WORKSHOPS E - F





STUDIOS

fablabs

fab gallery spaces

HEALTH BAR

thermal baths

mineral baths

change rooms

massage stations

wellness center

MINE MUSEUM

restaurant / cafe / bar

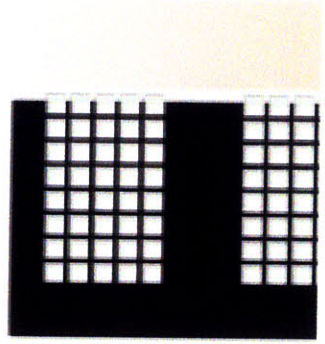
ramp to garden level

boardwalk to derelict shafts

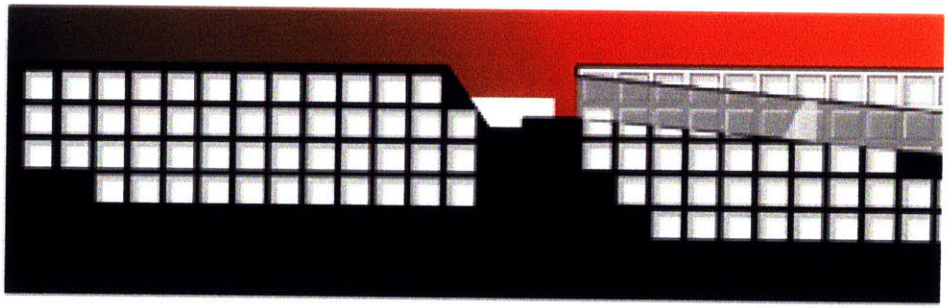
2050 - 2100

LONGITUDINAL SECTION CUTS

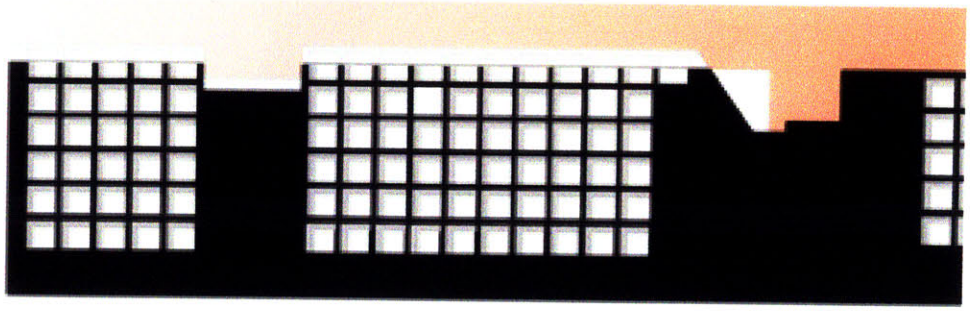
MUSEUM

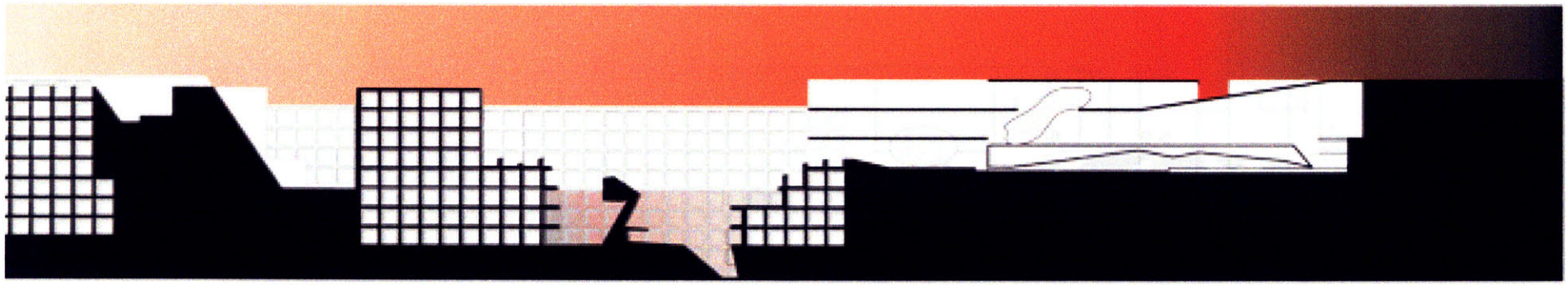


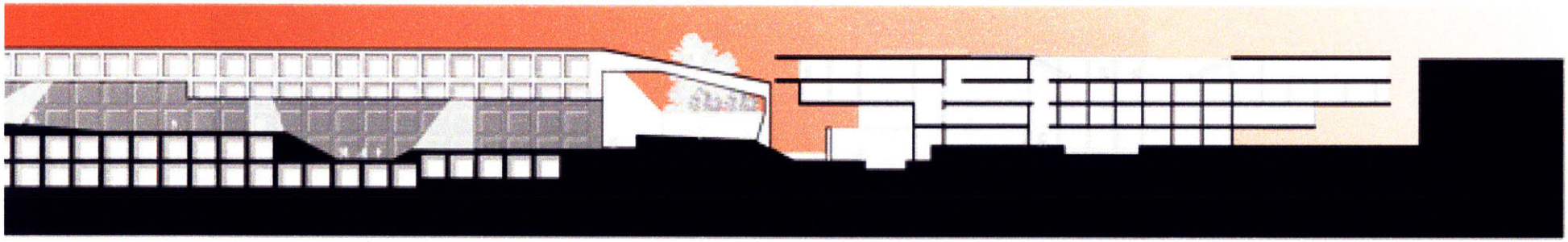
SHORT-STAY
HOUSING

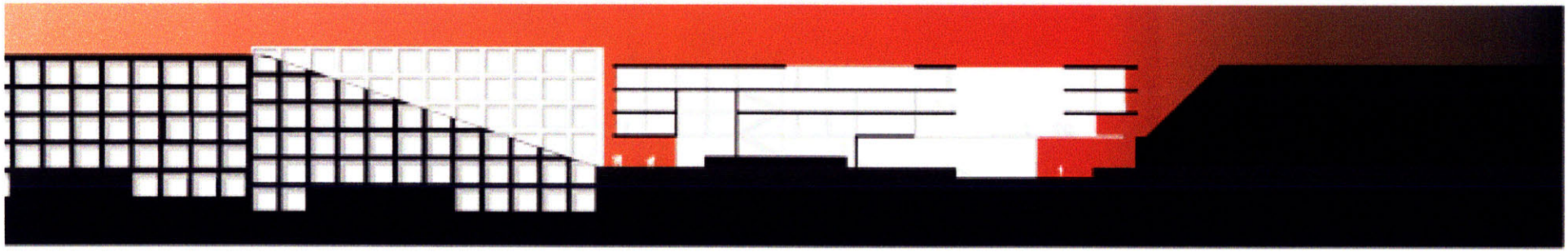


STUDIOS /
WORKSHOPS

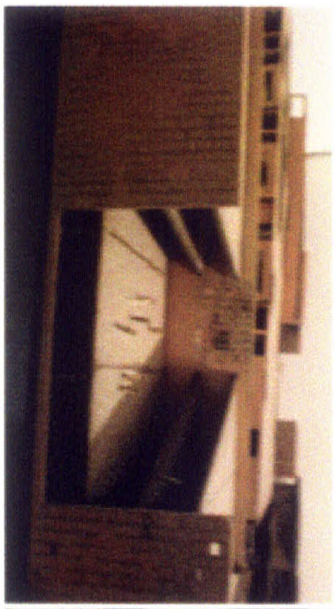


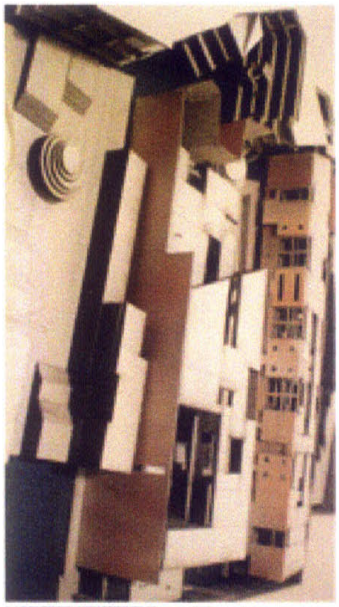


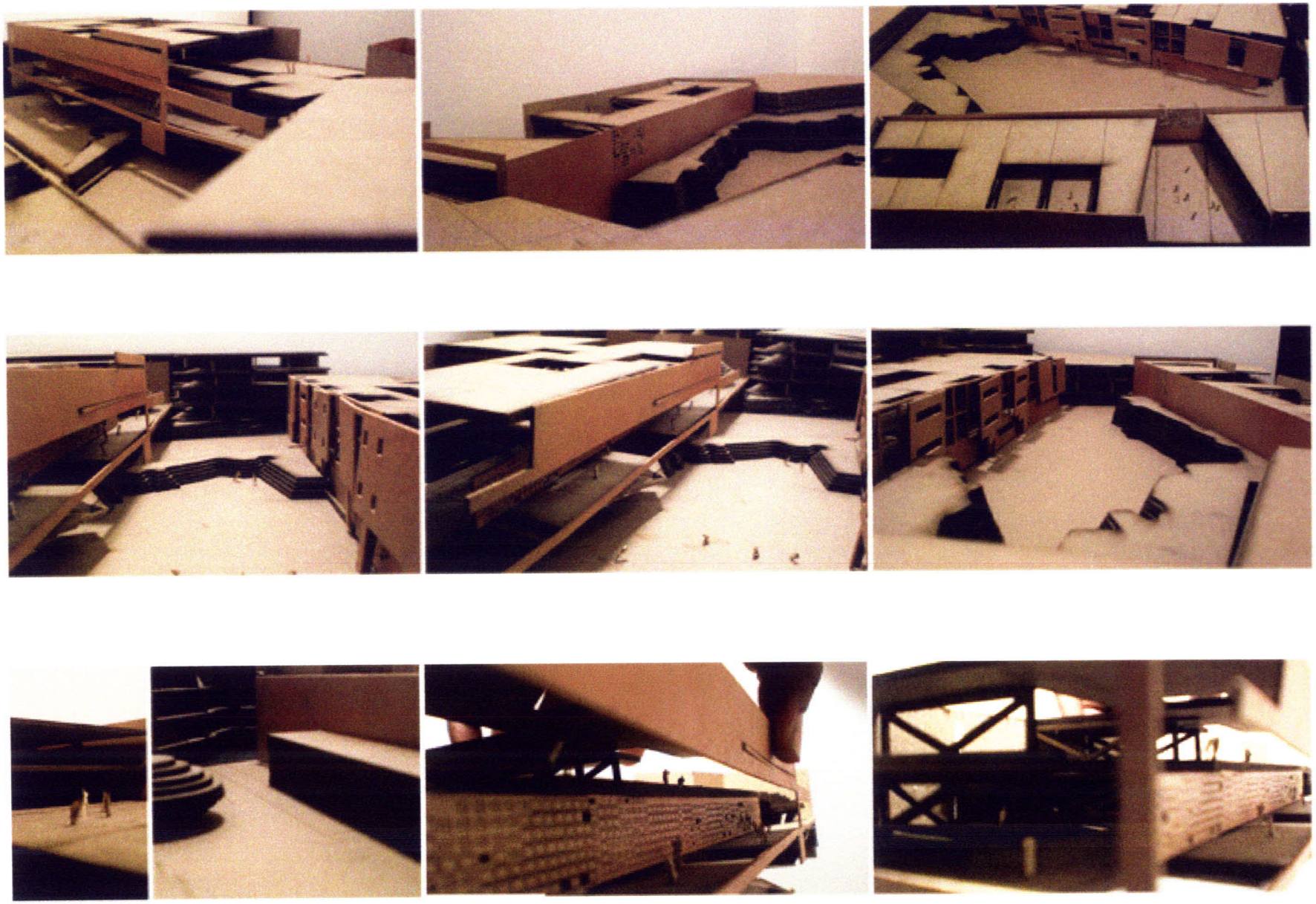




2050 - 2100







1902 - 1999

1999 -2049

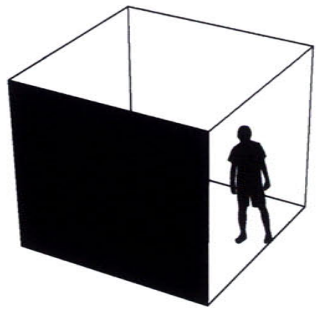
2050 - 2100

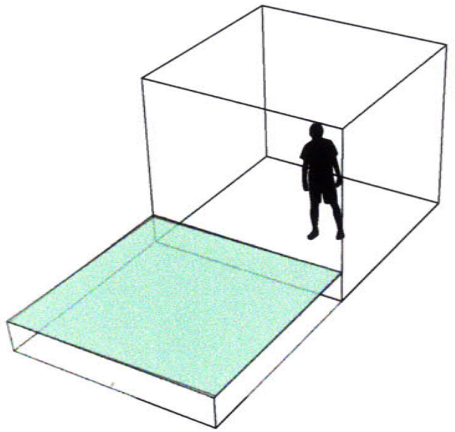
2101 - 2192

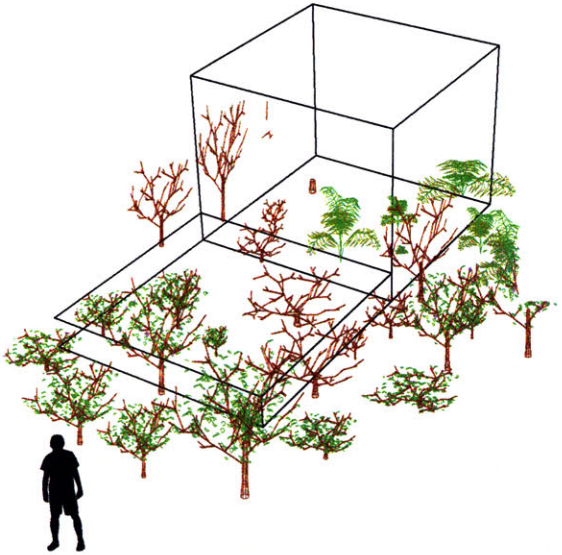
97 |

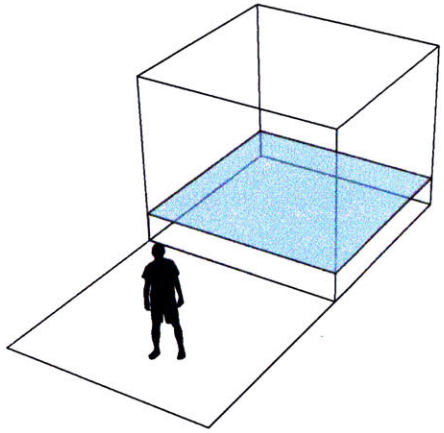
2101 - 2192

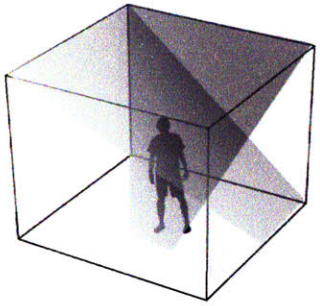
conclusion

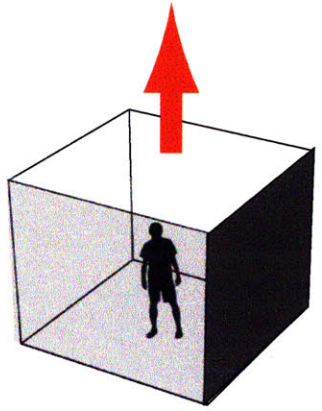






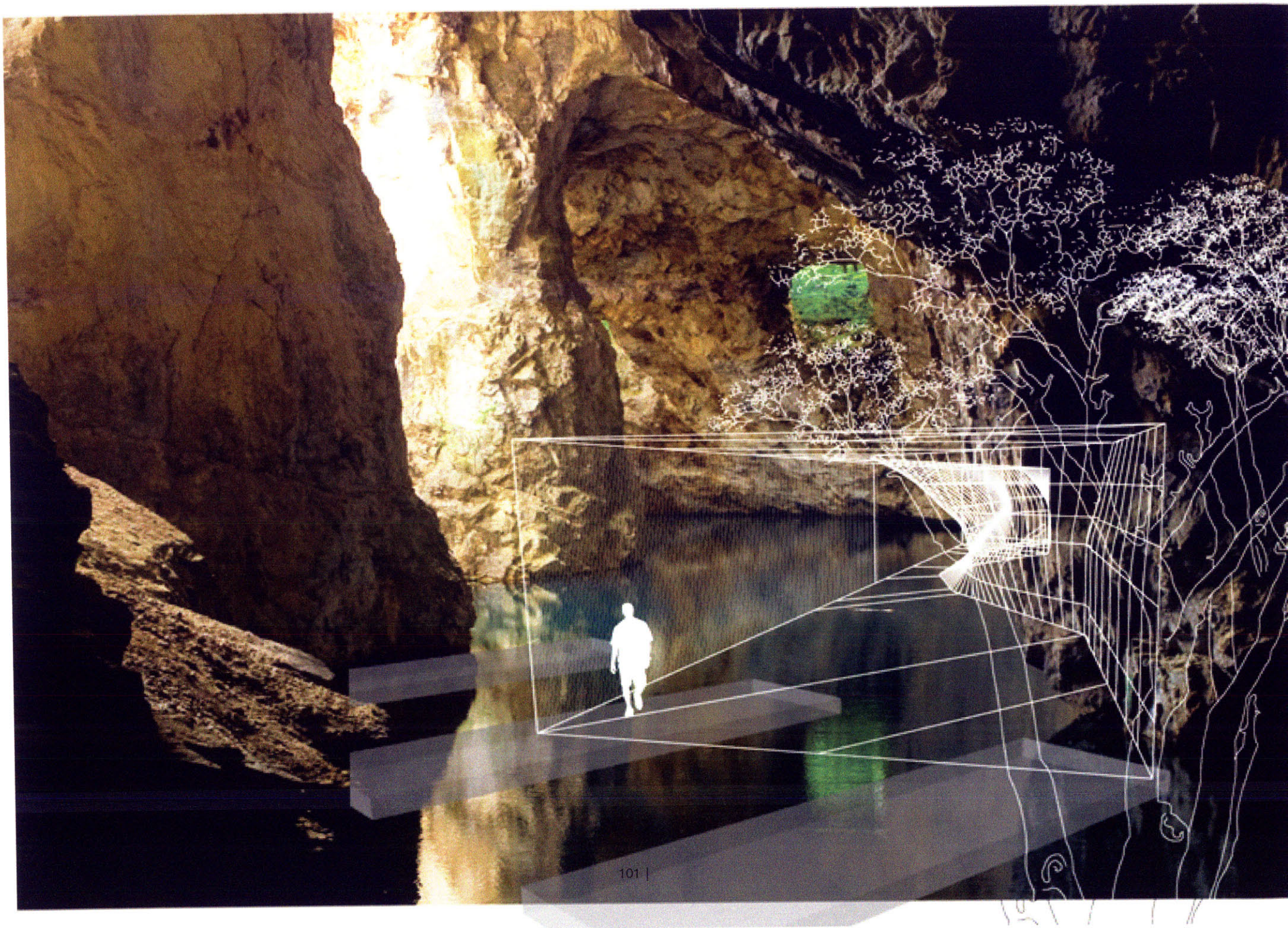






2101 – 2192

BOTANICAL SHAFTS



2101 - 2192

This thesis grapples with a regional phenomenon of the post-industrial derelict mine along the Southern African platinum mining industrial artery.

The proposal takes into account the progression of the landscape from an agraran state, to an industrial state, to an abandoned and toxic state. The project initiates a discourse on what could be, and how governments should think about rehabilitating and reclaiming these barren landscapes.

The architecture has, in this case, function as a post-production palimpsest of sorts that addresses what becomes of the company mining "town center" as a programmed artifact of the future. This artifact exists as a botanical garden of mineshafts and a series of public and civic spaces.

BIBLIOGRAPHY

Allen, Victor Leonard. The History of Black Mineworkers in South Africa . The Merlin Press Ltd, 2005.

Carstens, Peter. In the Company of Diamonds : De Beers, Kleinzee, and the Control of a Town. The Ohio University Press, 2001.

Crush, Jonathan S. et. al. South Africa's Labor Empire : A History of Black Migrancy to the Gold Mines. Westview Press, 1991.

Flynn, Laurie. Studded with Diamonds and Paved with Gold : Miners, Mining Companies and Human Rights in Southern Africa . 1992 .

James, Wilmot G. Our Precious Metal : African Labour in South Africa's Gold Industry, 1970-1990. Indiana University Press, 1992.

Mamdani, Mahmood. The Rural in the Urban; Migrant Workers in South Africa. In Citizen and Subject: Contemporary Africa and the Legacy of Late Colonialism. Princeton: Princeton University Press, 1996.

Mayer, Philip. Black Villagers in an Industrial Society : Anthropological Perspectives on Labour Migration in South Africa. Oxford University Press, 1981.

Moodie, T. Dunbar with Vivienne Ndatshe. Going for Gold : Men, Mines, and Migration . (Perspectives on Southern Africa, 51). London: University of California Press, 1994.

Ramphele,Mamphela. A bed called home : life in the migrant labour hostels of Cape Town . Claremont: David Philips Publishers, 1993.

Richardson, Peter. Chinese Mine Labour in the Transvaal . Palgrave MacMillan, 1982.

Schlapobersky, Paul Harry. Hardness in motion : retrieving Johannesburg after Apartheid. In Thresholds 24: "Reproduction and Production" / ed. Aliki Hasiotis, Janna Israel. MIT 2002

Turrell, Robert Vicat. Capital and Labour on the Kimberley Diamond Fields, 1871-1890. Press Syndicate of the University of Cambridge, 1987.