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experiential ground

jacques pansegrouw

2013

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experiential ground

a fibre processing plant that adresses existing
industrial heritage and attempts to re-establish a close relationsip between man and his
'first nature'

Jacques Pansegrouw

study mentor: Gary White
course coordinator: Arthur Barker

Submitted in partial fulfilment of the requirements of the degree
Master of Architecture (Professional)
in the Faculty of Engineering, Built Environment and Information Technology
at the University of Pretoria

Pretoria, South Africa
2013

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project summary

Fibre Processing Plant and Textile mill
Old ERA Brick Works, Brick factory
Erf R/171, 254, 306 Derdepoort 326-JR
Cnr St. Joseph & Filander Ave.
Eersterust. Silverton.
Pretoria.
South Africa
S25°42'49.12". E28°18'12.48"

Environmental Potential & Heritage and Cultural Landscapes

CSIR & SABS

Man and nature // Adaptive reuse // Industrial heritage // Haptic architecture

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a special thanks to...

- Gary White for his enduring guidance and support throughout the year
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- Fi Smit and Elize Venter for editing this document
- And to my dear friends Gary and Rainer for the support and assistance

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to my parents Margaret and Eugene

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pallasmaa

> "It is tragic, indeed, that at the time in which our technologies offer a multidimensional perception of the world and ourselves, we should throw our consciousness and capacities back to a Euclidian world. I do not wish to dwell on nostalgic images of an Arcadian past, or to represent a constructive view of cultural development. I just want to remind myself as well as my readers of the very evident blind spots in our established understanding of our own historicity as biological and cultural beings." **(Pallasmaa, 2009:13)**

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ludvi'k vaculi'k

"In antiquity, commanding the forces of Nature and bringing discipline to human nature were two sides of the same coin. In neither area did the interveners need to fear that they would succeed completely. The power of Nature was overwhelming. It took care of itself. Humans had to battle to acquire the bare necessities. Nature's order and equilibrium was unshakeable. Man was, and considered himself, a parasite on an eternal life system. The metropolis was a hard won corner, a fortified camp under threat from earthquakes, storms, drought and wild animals. The metropolis did not pose a threat to Nature, but was itself an exposed form of life... In such a perspective, technology was ethically neutral. Morality comes into play only when one can cause damage, in relation to someone or something that is weaker or equally strong. Therefore, the consequences of human actions for non-human objects lie beyond the horizon of moral issues." **(Ludvi'k Vaculi'k, in Berge, 2009: xiv)**

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abstract

In humanity's current condition, the advantages of organic material sources are supplanted by the qualities of synthetics that allow for rapid growth and altered capabilities, whilst man becomes further removed from his natural existence as a being that once possessed the aptitude to understand and work with these materials.

Prior to our industrial, mechanised and materialist consumer culture, the direct interaction with the natural world provided humanity with more comprehensive and experiential ground for growth and learning. As we are connected to the world through our senses, space becomes the primary enabler of such a platform.

Relying on the haptic qualities of materials and the body's ability to experience and embody its immediate surroundings, architecture's role in the integration between man, nature, and industry is explored.

As a natural industry with a significant public interface, architecture acts as a mediator between man's "constructed nature" and his "first nature" – referring to man's estrangement from his environment.

This dissertation investigates the adaptation of industrial buildings to accommodate public interaction whilst responding to the environmental impact that the production of building materials has on the environment. Alternatives to commonly used materials such as glass, steel and carbon fibres were researched, and so hemp, flax and bamboo became the primary elements used in the making of the architecture.

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samevatting

In die mensdom se huidige omstandighede word die voordele van organiese materiale oorskadu deur die kenmerke van sintetetiese bronne wat spoedige groei aanhelp, maar sodoende word die mensdom verder verwyderd van sy natuurlike bestaan as ‘n wese wat eens hierdie materiale verstaan het en kon verwerk.

Voor die bestaande industriële, gemeganiseerde en materialistiese verbruikerskultuur het die direkte interaksie met die natuurlike omgewing die mensdom voorsien van ‘n meer omvattende ervaring wat bygedra het tot ervaringsleer en groei. Ons is gekoppel aan die wêreld deur ons sintuie, en daarom word die ruimte waarin ons beweeg die primêre element wat hierdie ervaring moontlik maak.

Deur staat te maak op die haptiese kwaliteite van materiale en die liggaam se vermoë om sy onmiddellike omgewing te ervaar word die rol van arkitektuur in die integrasie van die mens, natuur en industrie ondersoek.

As ‘n natuurlike industrie met beduidende publieke interaksie word argitektuur ‘n tussenganger vir die mens se “gekonstrueerde natuur” en “eerste natuur”, met verwysing na die mensdom se vervreemding van sy omgewing.

Hierdie dissertasie ondersoek die aanpassing van industriële geboue om publieke interaksie te akkommodeer terwyl die omgewingsimpak van die produksie van boumateriaal in ag geneem word. Alternatiewe vir die algemeen gebruikte materiale soos glas, staal en koolstofvesels is nagevors, en daarom is hemp, flas en bamboes die primêre elemente wat gebruik is om argitektuur te maak.

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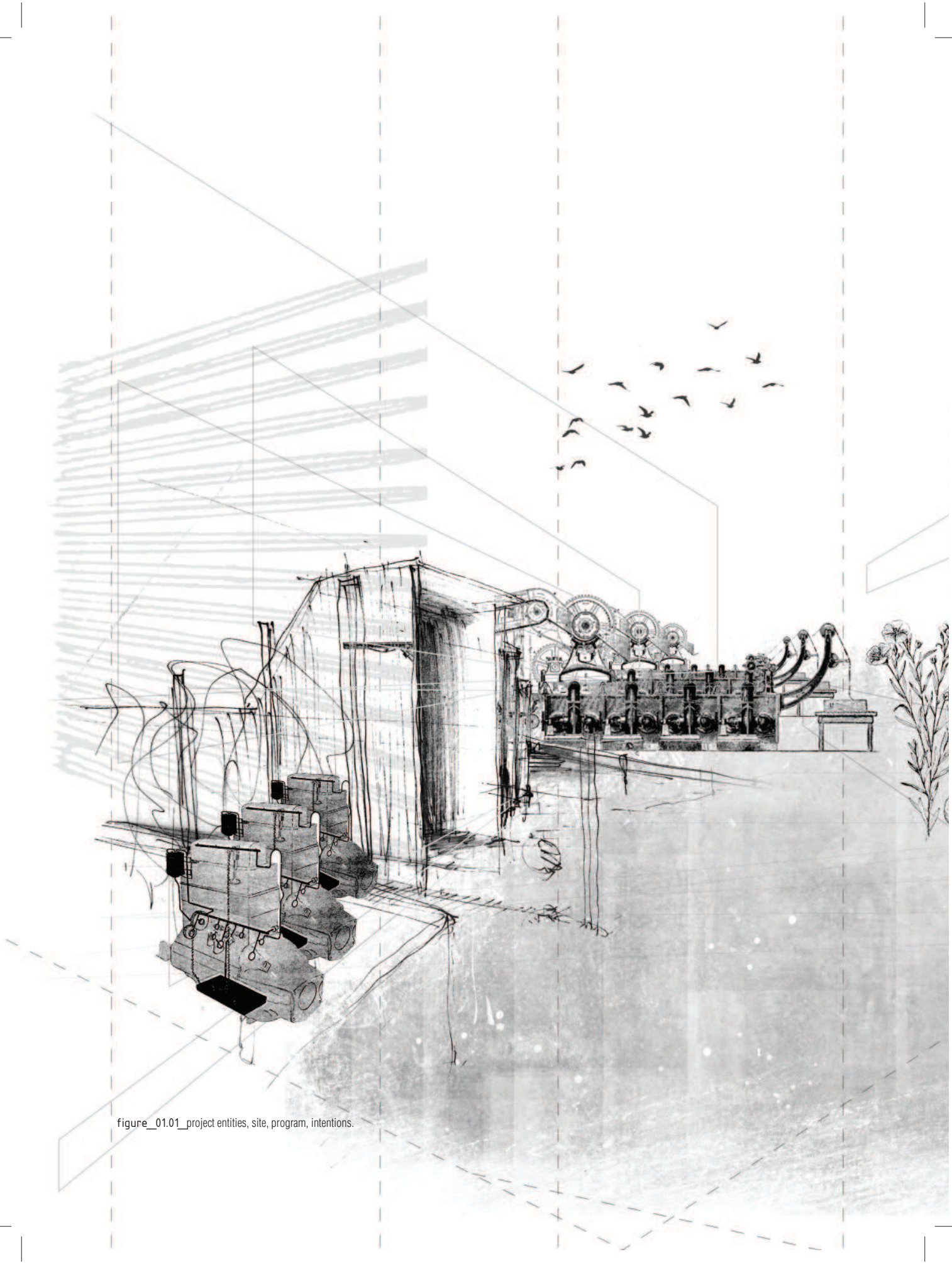

figure_01.01_project entities, site, program, intentions.

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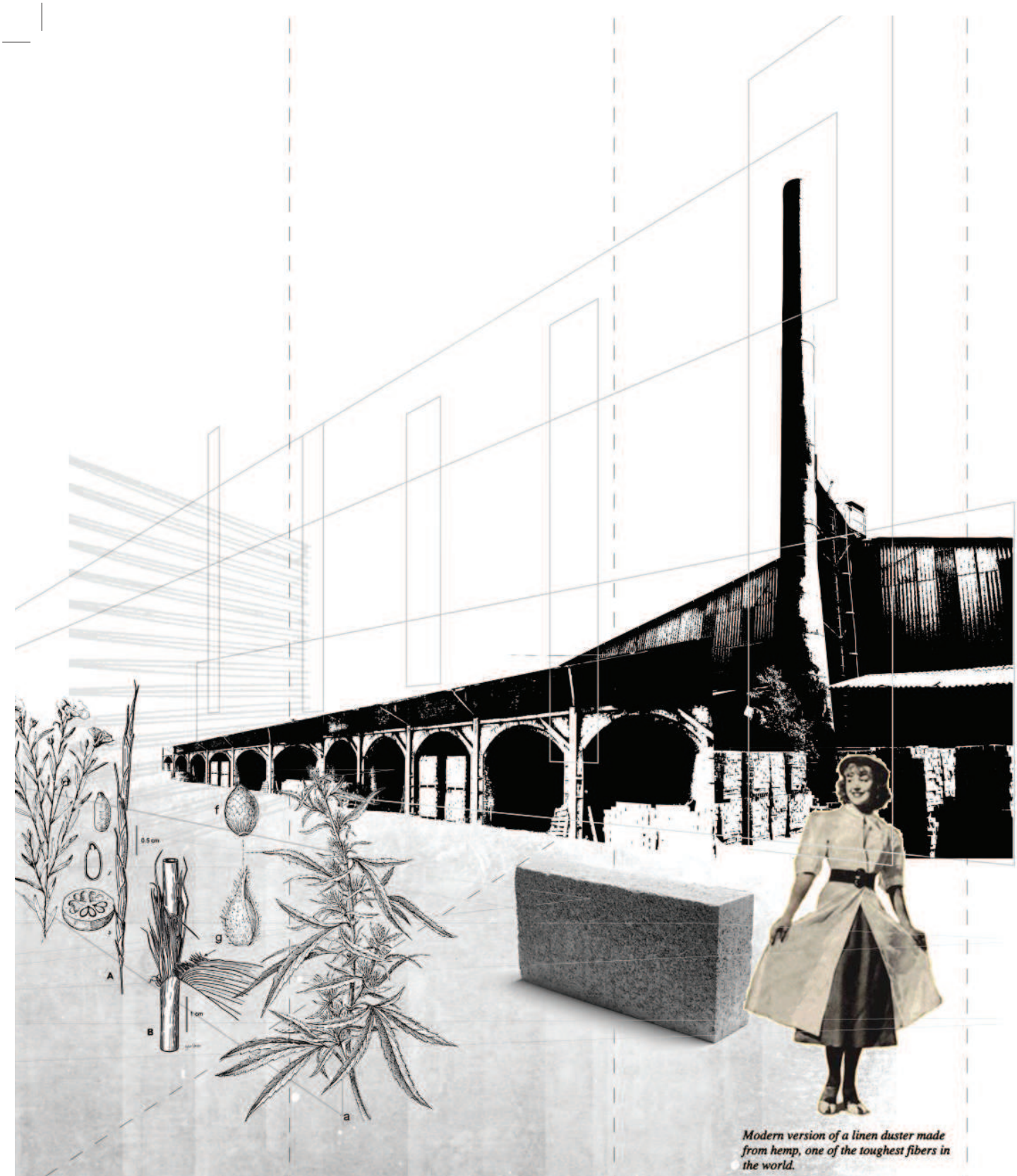

Modern version of a linen duster made from hemp, one of the toughest fibers in the world.

01_introduction

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01_introduction

01.01_background

"Architecture had no place in the first industrial revolution. The design of factory buildings was considered to be beneath the dignity of the architect, unless they were masked by a façade of masonry or brickwork." (Munce, 1960:1)

Since the industrial revolution when manufacturing processes on a grand scale promised a better future, exponential growth in economy, employment and prosperous futures for civilisations across the globe, architecture enveloped a new typology in terms of factory building (Munce,1960:1). Large shed-like structures occupied the skyline of many peri-urban landscapes. These structures often embody an industrial characteristic that is visible in the materials, form and spatial qualities. Munce (1960:1) further explains how the Architect, only after a great deal of time, learned the importance of design pertaining to industrial structures; over the years, new problems continued to present themselves in the industrial field, and the Architect gained the necessary knowledge and experience (and prerogative) to transform industrial typologies of factory building. Winter (1970:7) also mentions that since this enlightenment (when industrial architecture moved away from what is amusingly termed the "dark satanic mill" typology), factories were seen as fresh new products.

Still, many industrial buildings and sites tend to be ill-designed and neglect two entities that play a major part in industrial ecology. As there is very little written about the relationship between man and nature as it applies to industrial architecture, it can be assumed that the well-being of each in isolation and in reference to the other was not of importance throughout the design, construction, management and maintenance of factories and industrial typologies.

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figure_01.02_images of man and pollution in the Industrial Revolution.

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figure__01.03__The Chimney House in Sheffield, a factory converted into a function venue.

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However, many of these structures become dilapidated once the function for which they were conceived has become unviable or been discontinued due to economic and technological reasons – testament to the industrial design imperative of yesteryear: notoriously poorly integrated and serving only as a means to a single end. For many years and many more to come, architects will continue to **revive the structure** and integrity of these empty factories, celebrating the perverted beauty of heavy industrial after effects on the building, landscape, and machinery and expressing the effects of time whilst capturing the memory of a lost tradition or process.

Alfrey and Putnam (1992:1-3), question and attempt to summarise the entirety of Industrial Heritage as follows:
- Putting pieces of lost industry together in an attempt to understand the functioning of that industry.
- Conservation of factory buildings, sites and machinery for their aesthetic, historic or technological value.
- Restoring redundant machinery and adapting their use.
- Learning and experiencing from earlier industrial populations.
- And finally—usually the most common—to learn how past generations lived and worked.

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figure_01.04_sale.

figure_01.05_I Shop.

Pallasmaa (2009:12-15), explains that as cultural and biological beings humanity grows and learns; together, or individually, we strive to gain a sense of belonging, and that through memory or study of our past we find our way into our future. The above attempts to express that humanity in its most integral character will always be connected to, and continue to long for the expression of that connection to our past, including the methods and ways of living of our predecessors.

It is no longer possible to deny the current global environmental crisis and the neglect the human race has shown toward our natural existence and resources in the course of our duties as stewards of the earth. This is an existence that continues without comprehension, consciousness or sensitivity to the detrimental effects our modern ways of living continue to have on our planet. Living as an **"industrial, mechanised and materialist consumer culture"** (Pallasmaa, 2009:13) further removes us psychologically and subconsciously from a direct interaction with nature, expanding the gap between that which we long for—a sense of belonging through memory of our past and our context—and that which we perceive as a mindful way of living.

figure_01.06_television consumer culture.

figure_01.07_Banksy.

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01.02_a first nature

An article on Karl Marx's theory of alienation, focusing on nature, explains the estrangement of man from nature. Wolfe (March 2013) summarises the basic argument of Karl Marx's Economic and Philosophical Manuscripts of 1844, stating that Marx was concerned not only about man's relationship with nature, but with man as the worker specifically.

"It was part of the worker's fourfold alienation under capitalist modernity: his estrangement from nature, from the products of his labour, from other people, and from himself" Wolfe, 2013.

Marx explains that man as the worker cannot create anything without nature and "the sensuous external world" (Marx, 1992:29). He gives credit to the material with which man creates, and says that man's labour is realised in and through the material.

However, as the products of the worker's labour are expropriated, nature becomes reduced to only an idea and form of existence, an artless source of survival, causing nature to seem subordinate to man and deviating from the inherent harmony between two facets of the same entity. Nature is then perceived to be a source that feeds a mediator and eventually the needs of man. Marx (1992:325) then states that man now only lives off of these natural products in numerous forms—such as shelter and clothing—and that nature no longer forms part of the human body.

The concept that these are separate entities has, over centuries, allowed for the concepts of "man" and "nature" to stray further apart in popular culture. Through the processing of the natural materials, nature presents itself only in a mediated form, encouraging man's estrangement from the source. This has resulted in the misconception that nature has lost its proximity, and that man is alienated from the natural world.

As time has passed, this estrangement has continued to evolve in the subconscious of humanity, and has manifested in our propensity to disregard the natural world as the most important and precious source, whilst man finds that he does not understand nature anymore despite an extensive factual database of global information. However, in our current social context, the importance of our environment and focus on the global crisis has awoken a primal gene in our society. Although still focused on the exchange of commodities and western ideals, man has awakened to – and begins to respond to – the longing for that elemental relationship with nature.

Today, the people around us have maintained the perception of nature that Marx explained: they buy organic products and promote cautious and sustainable living, yet still interact fundamentally with nature not directly, but through mediation (processed products, imported or manufactured without them having knowledge about the material, how it was made etc.).

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figure_01.08_"first" and "constructed" nature.

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figure_01.09_Darwin's dinner guests.[1]

"Every self-estrangement of man, from himself and from nature, appears in the relation in which he places himself and nature to men other than and differentiated from himself" Marx, 1992:33.

Man now exists in a nature that he has constructed for himself. Set up by carefully chosen values (religious, westernised or commoditised), man operates within this "constructed nature" and is merely pretending to be in harmony with his "first nature".

Debord (1994:22) states that even though man strives toward the future and embraces technology, he is a negative being that is solely to the extent that he suppresses being, but still remains connected to time. Man knows that within time and in nature lies the definition of his being. Man retains the knowledge that one cannot live without nature, for within it and with it, man can retain memory and gain knowledge, as well as sustain a mutually beneficial relationship between industry, nature and himself.

[1]Darwin's dinner Guests. Charles Darwin owned a collection of photographs by French physiologist, Benjamin Amand Duchenne, showing a man having his face contorted via electrical shock treatment into a range of grimaces. So, sometime between dessert and a final drink in Darwin's home in 1868, Darwin would confront his dinner guests with the images and ask them to describe the man's expressions in their own words. Darwin's big aim was to determine whether 'universal core emotions' exist, and whether they are modified through-out history and by language or culture. The University of Cambridge's Darwin Correspondence Project is repeating the experiment - the same questions have been answered by 18,000 people to attempt to respond to the following: 'Is the expression of emotion innate? Or is it culturally modified? How do we equate different words to describe emotion (even in one language, let alone across different languages)?'

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01.03_the building industry

"I object! I do not agree that the Earth and everything that exists on her shall be defined by the law as man's living environment. The Earth and all that is hers, is a special being which is older, larger and stronger than us. Let us therefore give her equal rights and write that down in the constitution and in all other laws that will come. . . A new legal and moral status is needed where Nature herself can veto us through her own delegates. . . One must constitute the right of all things to be themselves; to be an equal with Nature, that is totally unarmed; do well out of it in a human way and only in accordance with their own nature." Ludvi'k Vaculi'k, in Berge, 2009:xiii.

Vaculi'k in Berge (2009) further explains the positive consequences that such a law, a law that defends mother earth, can have on our existential world. He denotes that undeveloped land will be left undeveloped, that no economic decisions will be made to harm the conditions that man and other living beings live in. He says that man will then again be responsible for his own things and finally mentions that production would have to revert to its beginnings, or that we need to find new ways to produce without having detrimental effects on the natural world.

For many years and for many years to come, it has been and remains imperative to adopt an ecological world view so as not to be the cause of our own extinction, not to exhaust our natural resources, but exist holistically as natural beings. Berge (2009:xiv) uses the house as metaphor for our common ground, earth, and states that we have been managing too much whilst not understanding enough.

It is evident in the global catastrophes such as melting polar ice caps, biodiversities that cease to exist, even the mental, physical, and psychological ills that exist within industrialised civilisations, that man hasn't even fully comprehended the nature of himself. Berge (2009) then finally furthers Vaculi'k's argument and claims that production, especially production pertaining to the building industry is one of the main contributors that threaten mother earth.

"The building industry is, after food production, the largest consumer of raw materials in the world today. A broadly accepted goal for a sustainable future is a drastic reduction in the use of raw materials. This is most important for the scarce non-renewable resources…" Berge, 2009:6.

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figure_01.10_Baltimore.

figure_01.11_looking north over the Merrimack river.

figure_01.12_container terminal, Singapore.

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His book, The Ecology of Building Materials, focuses on the building industry and the production of building materials. However, he only briefly mentions and names alternatives such as organic plant material used in biocomposites such as concrete, ceiling boards and many other products. In certain climates, certain materials are unviable while being both economically and environmentally unconscious; the programmatic investigation of this dissertation therefore lies within the smaller scale materials that can have a positive effect on the impact the building industry has on production and subsequently our environment.

Biocomposite materials come in various forms, cementitious, ceramic based, resin based and naturally bonded. Weinberger (1996:1-5) mentions that in many of these materials glass, steel and other synthetic fibrous materials (such as plastics) are used for their aesthetic value, material properties, and ability to be modified and manipulated according to specifications. However, these are among some of the **most intensive materials to harvest and manufacture**. Above all, they are moulded from non-renewable sources such as sand, petroleum and iron ore.

At a time when man operated within his “first nature”, the equivalent of steel, glass and plastic fibres was accessible in a form that nature has so abundantly made available, called plant fibres. For many years, many different fibres with a vast range of qualities were used to make shelters, bricks, floors, clothing and accessories to accommodate man in his environment. The greatest advantage of this material source is that it is renewable. So in agreement with Vaculi’k’s argument about reverting to older means of production, plant fibres are a viable substitute in the production of building materials, textiles, oils and other organic products.

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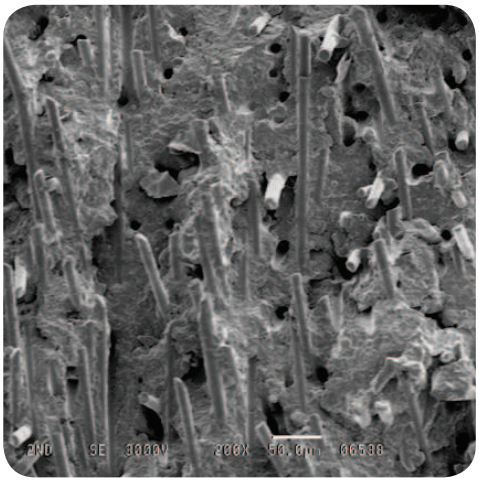

figure_01.13_micrograph - plastic.

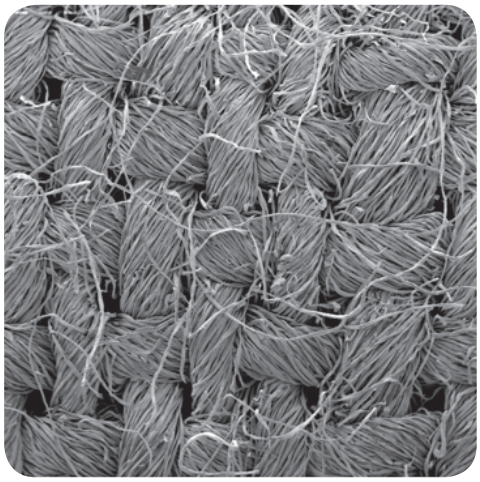

figure_01.14_micrograph - flax.

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figure_01.15_Paradise: Wrestling, Zhu Zhiwei.

Zhu Zhiwei's paintings dwell on the incredible scale of China's industrialization, and the relationship between modern city dwellers and the man-made environment that they inhabit.The entire composition is saturated by monotonous gray hues, with the sole exception of the neon-orange figures that dot the painting. These small figures further amplify the scene's enormous scale, and appear engulfed by their industrial surroundings. Images of child-like figures living an ordinary life in giant factories epitomize the incongruities and absurdities of contemporary life. With steel and concrete structures as homes, in an increasingly industrialized landscape, the whole world has become distorted beyond recognition.

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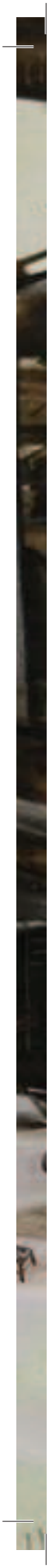

01.04_problem – thesis - intent

For many years, the Era Brick factory has been a landmark for the communities of Eersterust, Jan Niemand Park and the Silverton area in Pretoria, South Africa. Now that the factory is on the brink of being decommissioned, what is to happen to the intangible heritage of the factory?

The building industry will continue to manufacture building materials, but at what cost? The exhaustion of natural resources is the asking price.

It is safe to assume that man will continue to long for explanations of his existence, his nature and his connection to an existential world. Man has thus far constructed his own nature and set up standards, chosen values, and survives with the aid of certain commodities – this has become a part of not only the very fabric of our society, but also the basis of operation for the majority of the world's population. In reality, it is doubtful that man can revert back to an Arcadian mode of living - at least not entirely.

The dissertation that follows attempts to place Architecture in the middle of this question. It tests whether it is possible for the architect to understand the particularities involved in this issue, and their independent necessities, whilst celebrating their common interests. Using a natural industry, man, and an industrial site with both compromised and thriving ecology, the aim is to mediate between that which exists (the existing infrastructure), that which is affected by the industry (nature), and that which has caused the current condition (man), to find an experiential ground where each entity can thrive, individually and in relation to one another.

In an attempt to establish a closer relationship with his "first nature", man, being a "cultural and biological" being is placed within different spatial conditions to embody the knowledge and immediacy of a natural industry. Architecture is then questioned in terms of its ability to act as a facilitator.

The dissertation aims to prove that within an industrial setting, man and nature, together with industry can operate in harmony and that architecture can facilitate the spatial requirements of the particularities involved.

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figure_02.01_locality of site.

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The proposed site is a working brick factory, situated between Eersterust, Silverton and Jan Niemand Park south of the Derdepoort poort of the Magalies Mountain Range. The site and factory buildings are currently in the process of being decommissioned. This dissertation forms part of a three-part scheme that intends for the factory and clay quarry site to become a regional park.

02_context

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02_context

02.01_silverton

In 1893 the first steam train entered Pretoria. The railway ran from the east along an existing trade route to Maputo. It was called the Easterline. By that time, Pretorians had been enjoying whiskey produced in Eerste Fabriken, and had had electricity provided to the town for three years. Pretoria was known as a hub for the trade of ivory, tobacco and snuff (Naudè & Naudè, 2007:46).

Postal and trade coaches travelled along carefully mapped trade routes, supporting inns at as much as a 10km radius around Pretoria, so people could stop and freshen up before entering town. One such route was the Soutpansbergweg. To access this route from Pretoria, one had to travel through the Wonderboompoort, just north of Church Square. Because the Apies River regularly flooded this poort, an alternative route was established through Derdepoort, 10 km east of Pretoria.

Around the same time, silver was discovered on a farm called Koedoespoort, 11km east of Pretoria. This discovery caused a brief migration of prospectors to the farm. This rush was short-lived as silver reserves proved to be insubstantial. However, it left a legacy of trade and industry, and a small town called Silverton was established (Jansen, February 2013).

The idea of opportunity and prosperity accompanied travels to Silverton: the land was relatively cheap, labour forces were available, and existing trade routes connected the budding town to big centres like Lorenzo Marques and Nelspruit. Industries such as the Silverton Tannery, established in 1915, paved the way for other smaller industries like a timberworks and meat board. In 1949, an engineering and motor works facility was founded (Naudè & Naudè, 2007).

Today Silverton is still known for its trade and industry, and provides the capital with many of its light industrial services. It is well populated by diverse production industries, and lies close to several suburban areas like Eersterust, Meyerspark and Mamelodi.

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figure_02.02_Eeste fabrieken est. 1866.

figure_02.03_Silverton tannery est.1915.

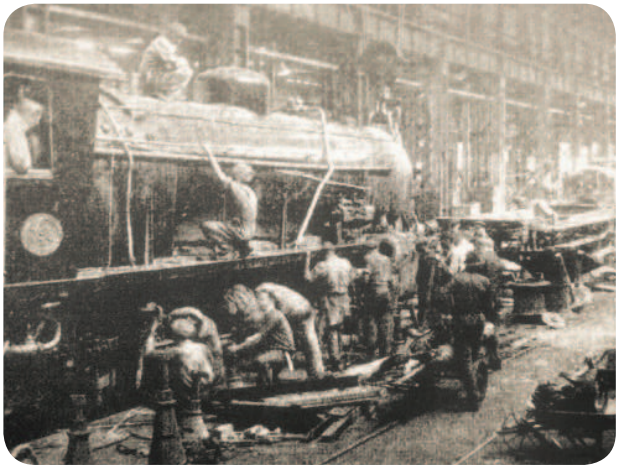

figure_02.04_building a locomotive, Koedoespoort shunting yards.

figure_02.05_preparing hides, Silverton tannery.

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02.02_era brick works

About sixty years ago the owner of Derdepoort, a maize farmer situated 11km east of Pretoria, started producing handmade clay bricks from clay found on his farm. The farm was conveniently located between the Moreleta River and Rietspruit, and had an abundance of quality clay (Van Dijkhorst, 2013).

The nearby Silverton provided the Derdepoort brickworks with a client base and became well established and profitable. In 1980, the works was sold to the company Rosema & Klaver, who founded Era Bricks. Today the coal-driven Hoffman kilns at Era bricks have become very costly to maintain and upgrade and the owners have applied for a decommissioning certificate due to the unsustainable nature of production.

Decommissioned industrial sites like Era bricks are generally perceived to have little fertility and value but are in fact sites of transition, and can be rearranged into a new way of being. It offers specific potentials in the form of access, cheap and available land, and connection to existing business sectors. The brick factory has been a landmark to the residents of Eersterust (Blaetler, Hough & vd Westhuizen, s.a.) since the 1950's when the factory was built.

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figure_02.06_Era brick works 1991.

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02.03_era regional park

02.03.01_introduction

The Era Regional Park is a proposal for the decommissioned brickworks and quarry site. Social and ecological value is introduced within an industrial heritage context, and becomes integral in a holistic rehabilitation process. This allows for industrial, ecological and social functions to co-exist and makes these relationships apparent.

figure_02.07_photos of factory.
figure_02.08_locality.

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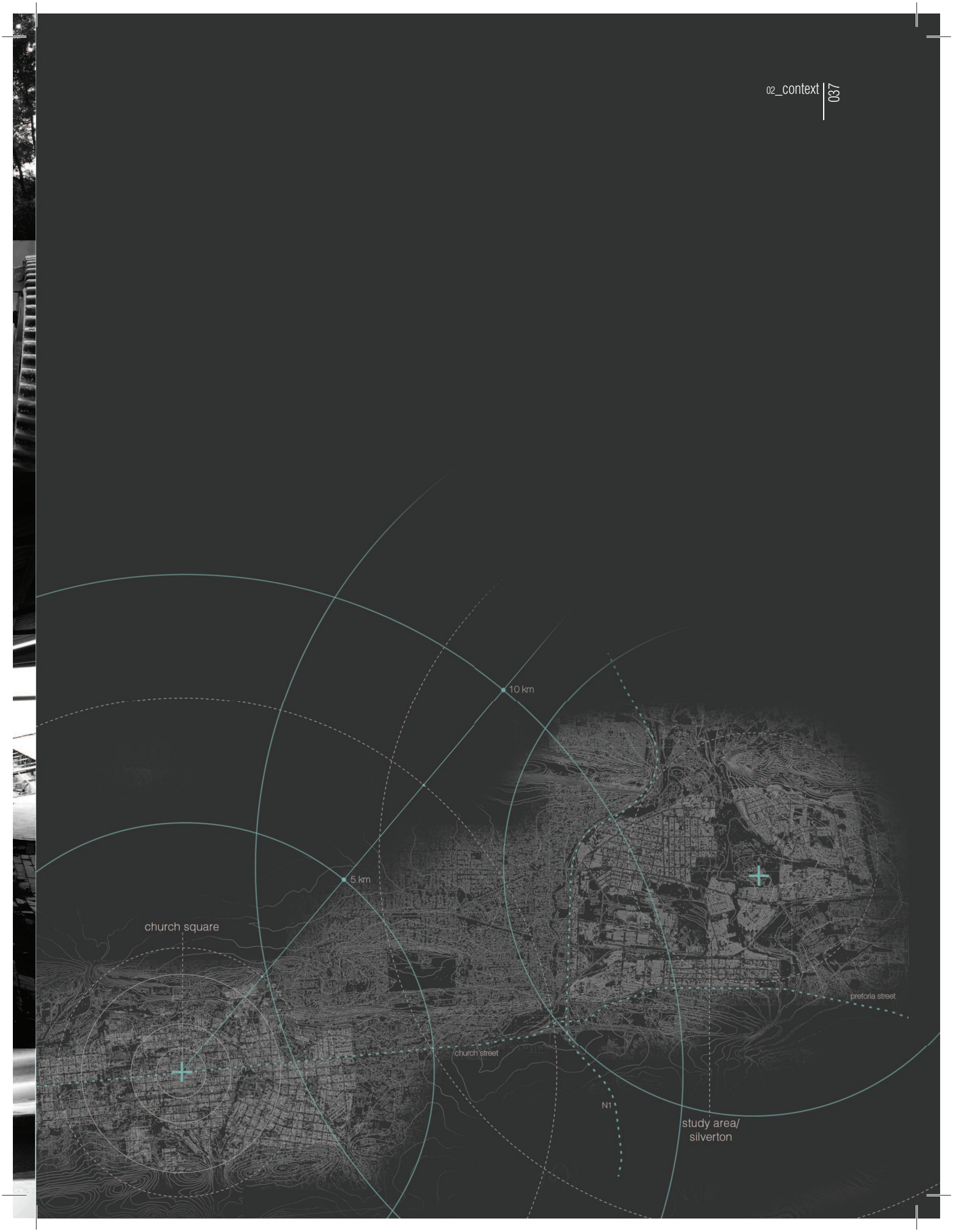

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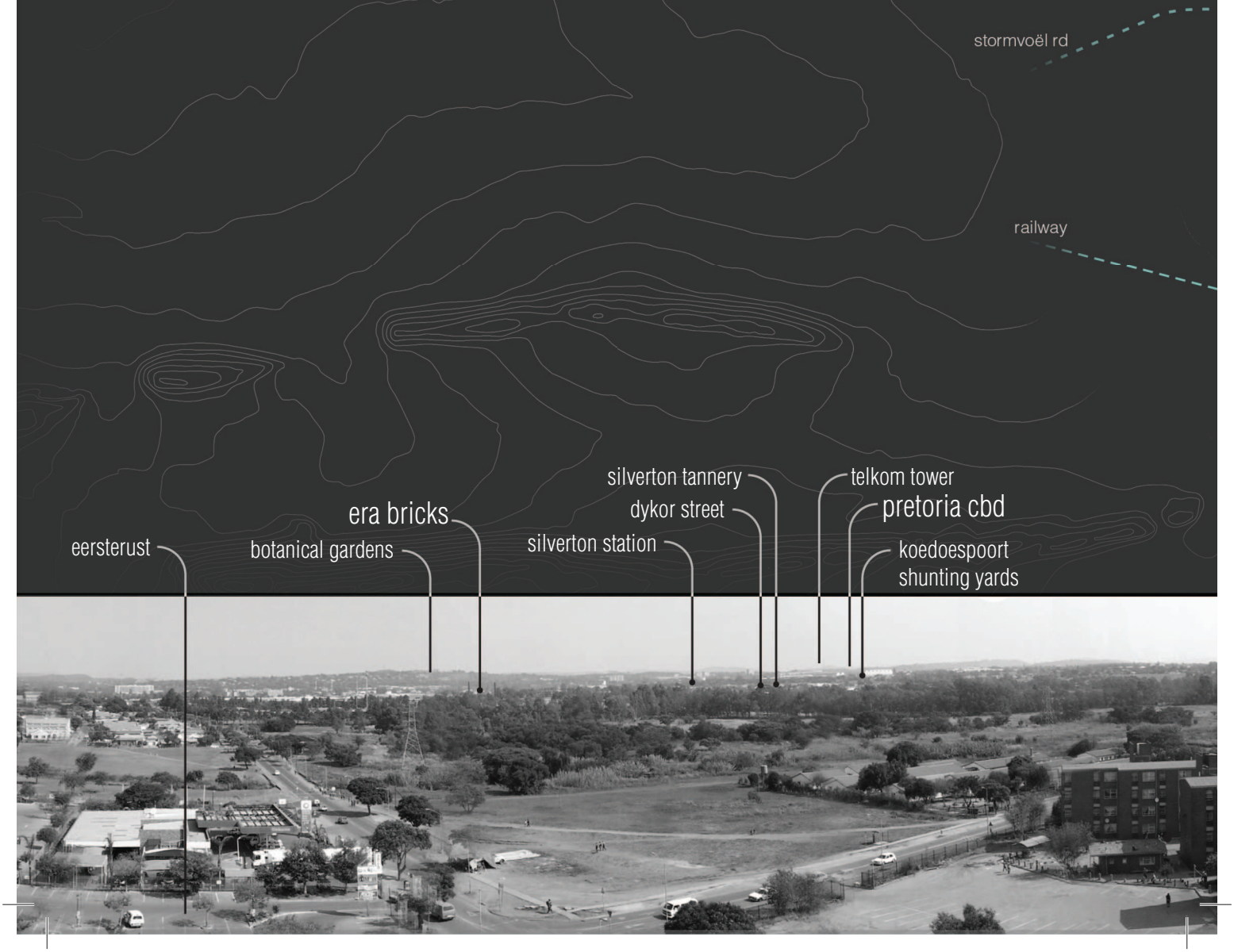
02.03.02_contextual frame

ERA Brick Works
Cnr St. Joseph & Filander Ave.
Eersterust. Silverton.
Erf R/171, 254, 306 Derdepoort 326-JR
Pretoria. South Africa
S25^{0}42'49.12". E28^{0}18'12.48"



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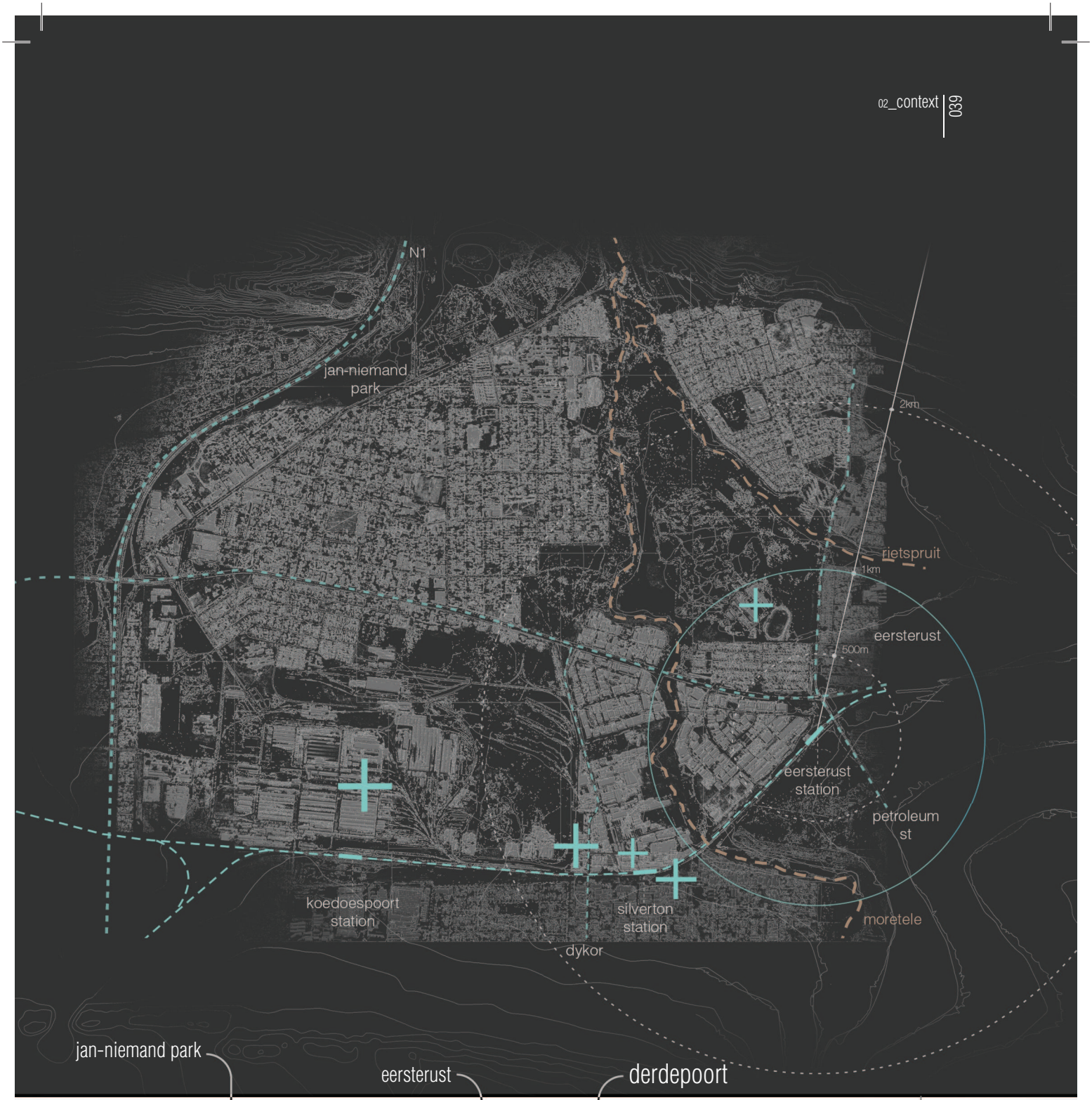

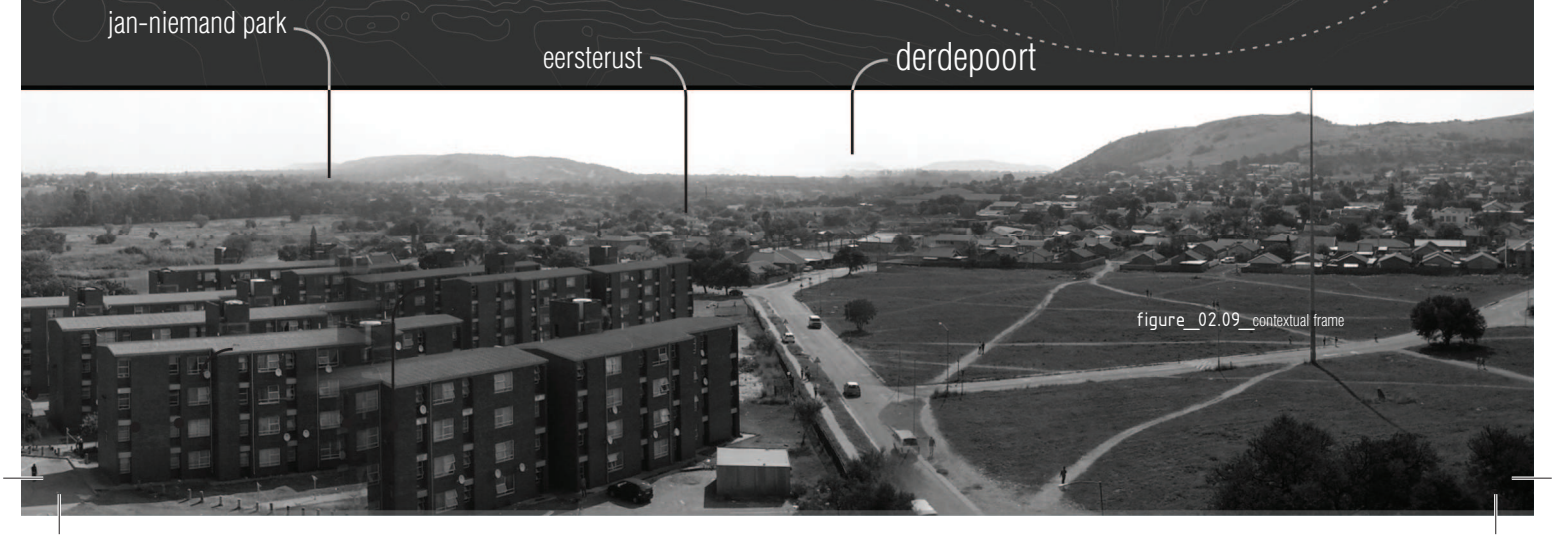

figure_02.09_contextual frame

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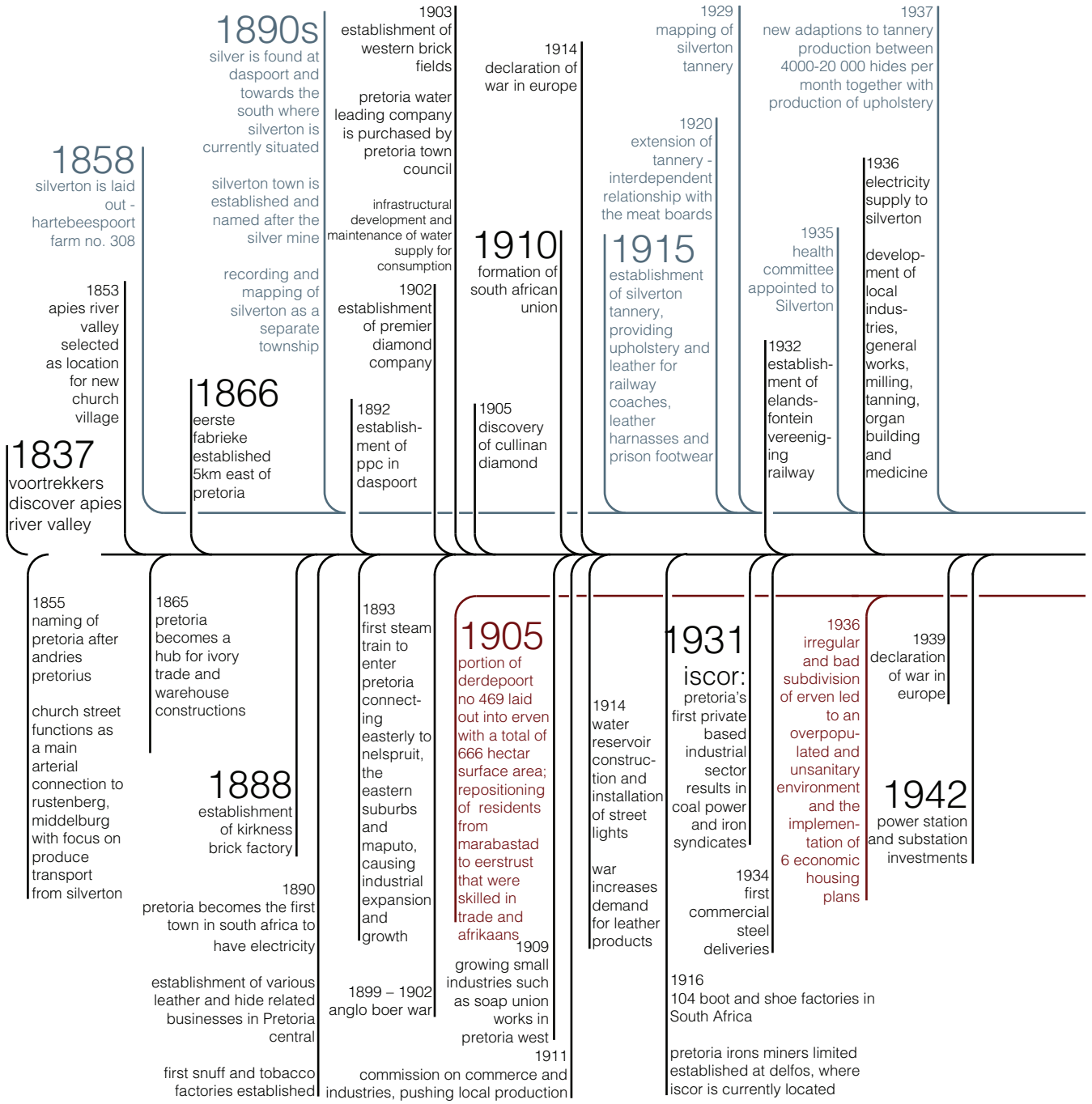

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industrial development

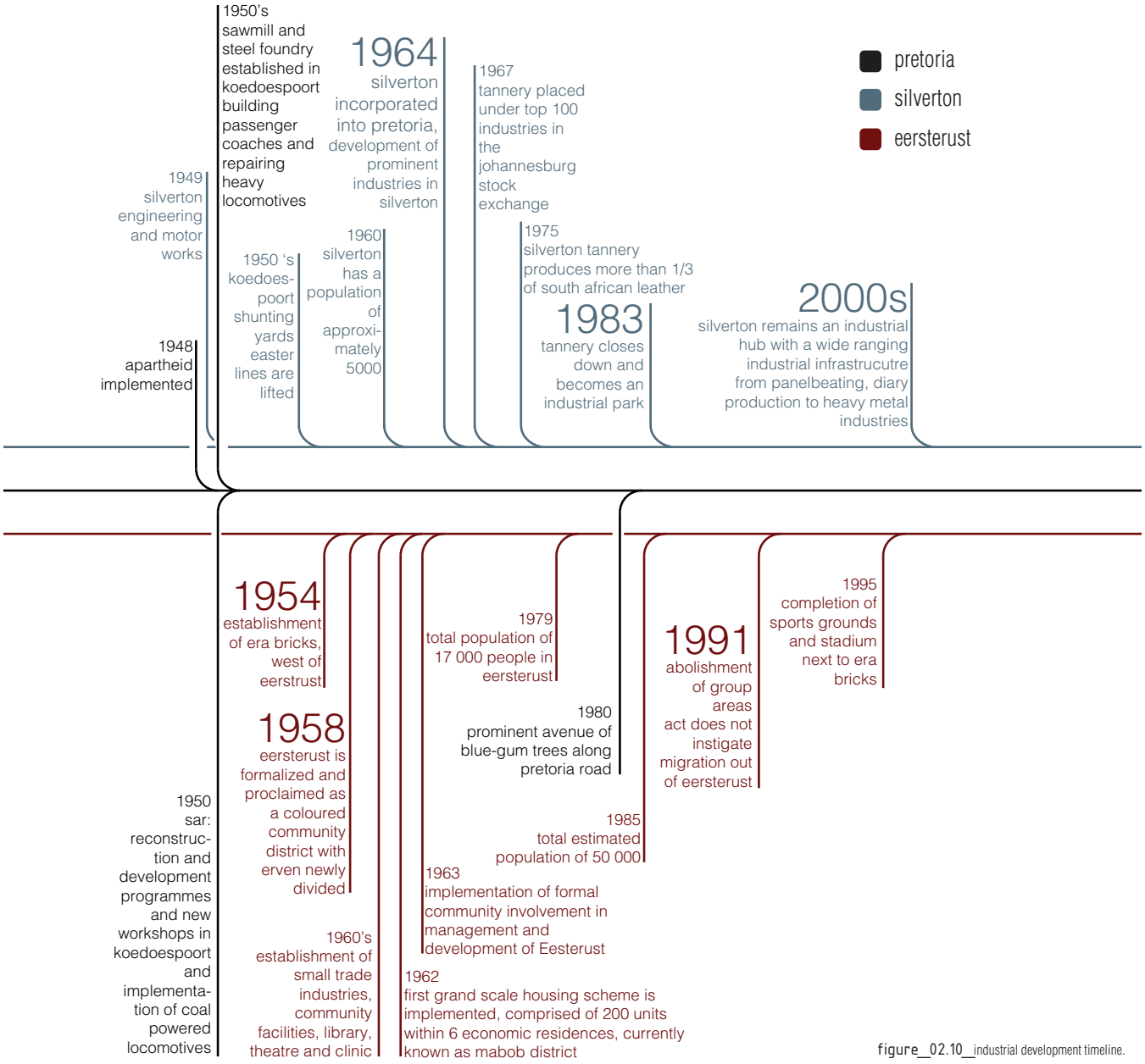

figure_02.10_industrial development timeline.

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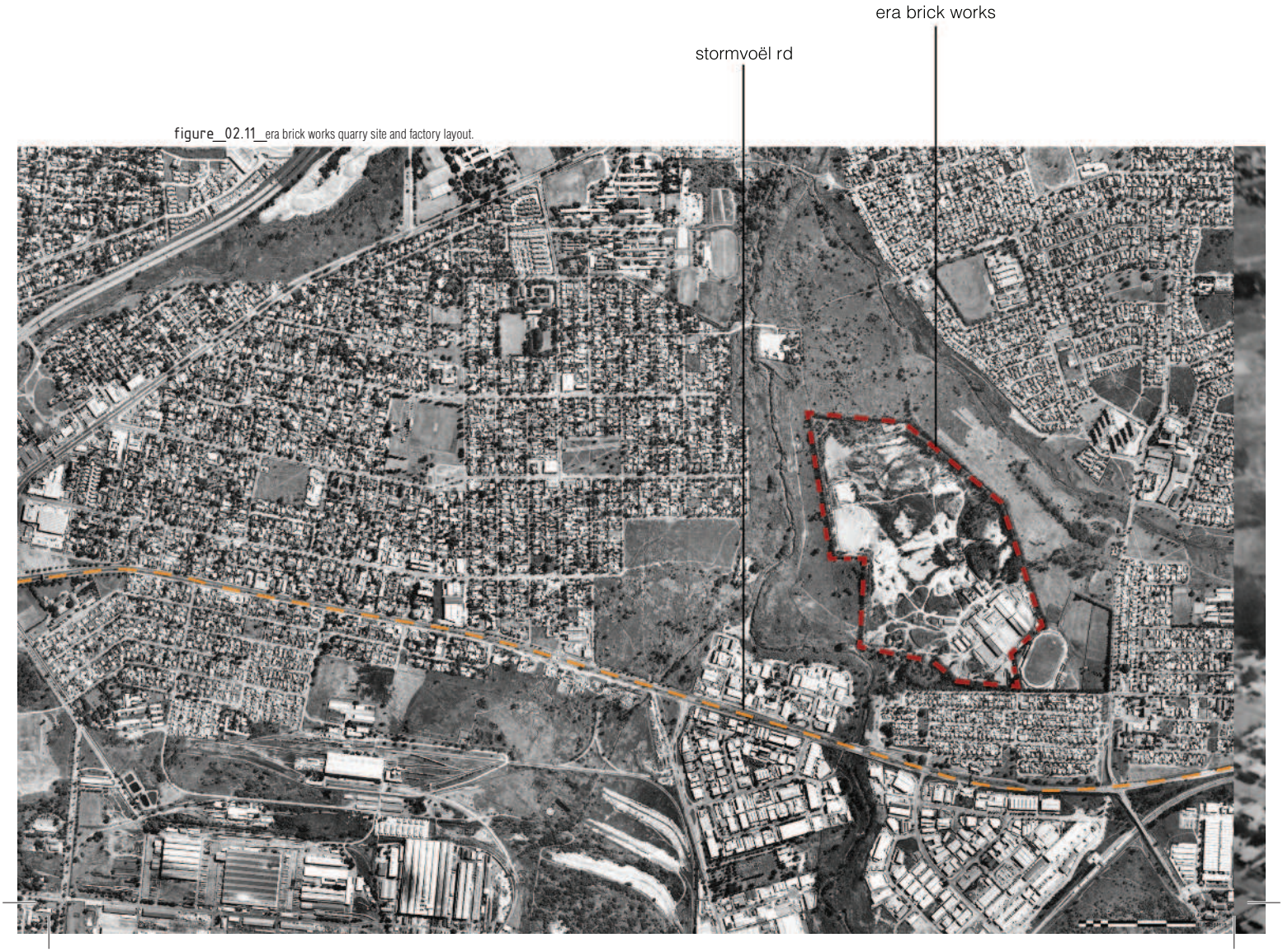
figure_02.11_era brick works quarry site and factory layout.



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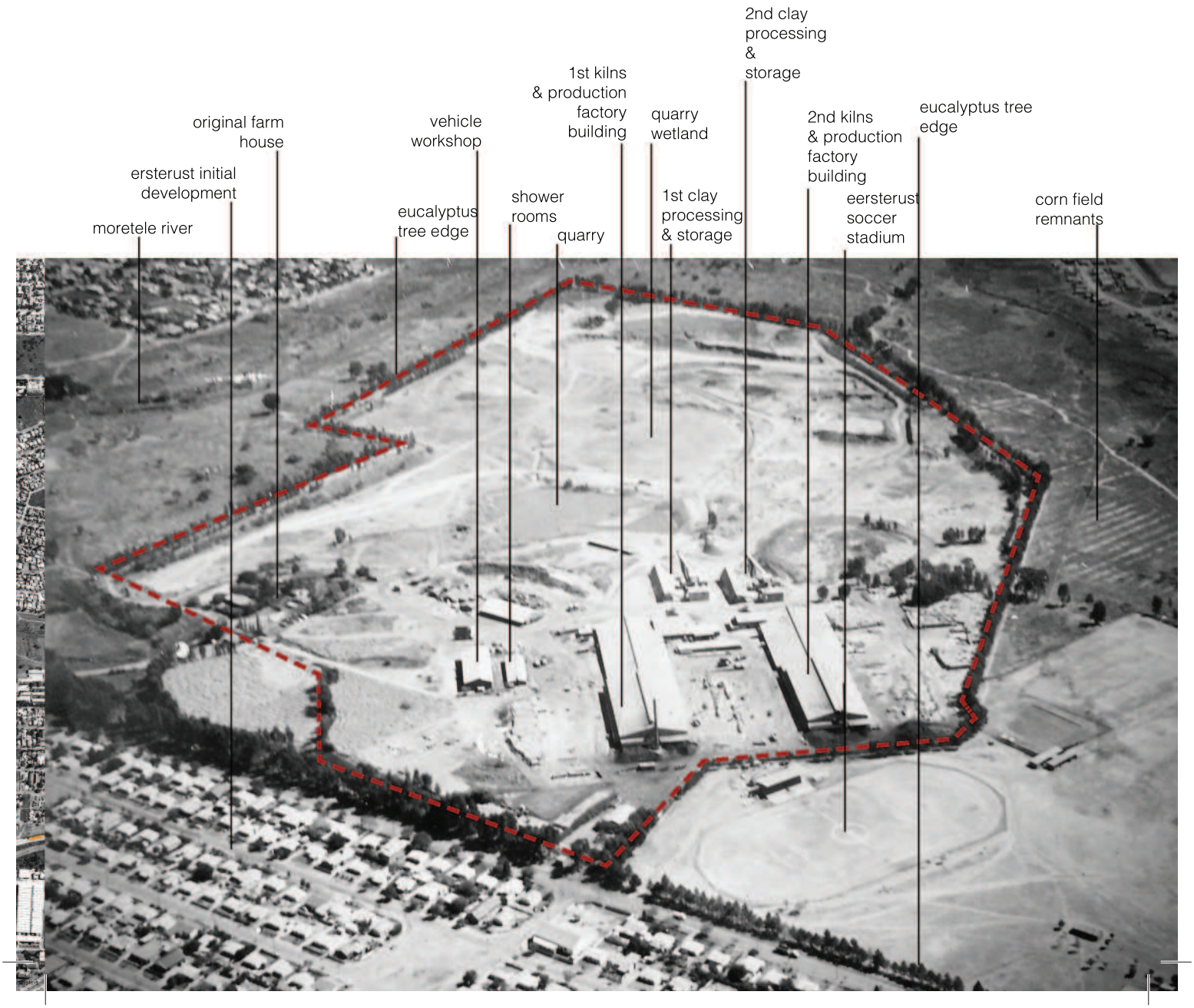

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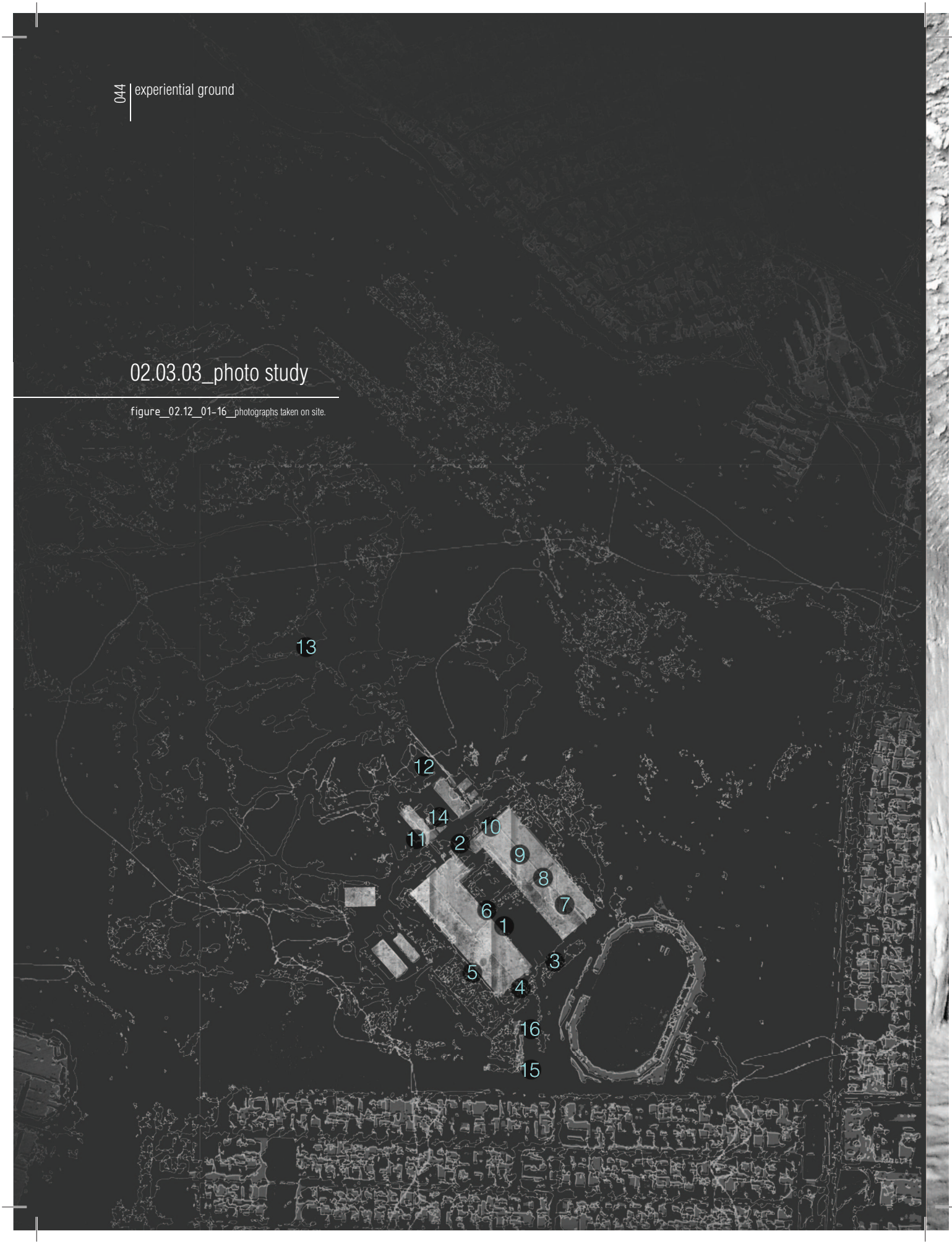
02.03.03_photo study

figure_02.12_01-16_photographs taken on site.



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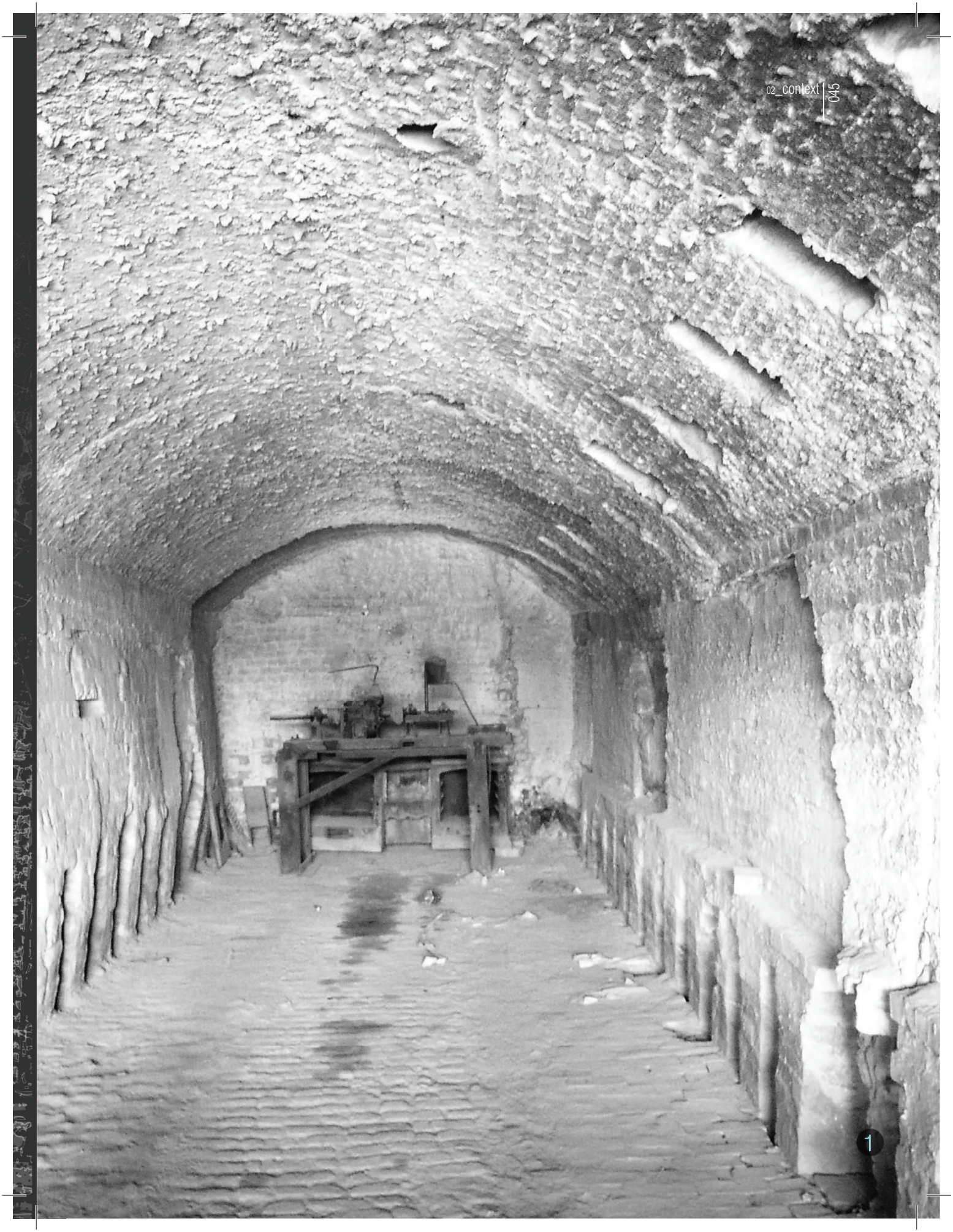

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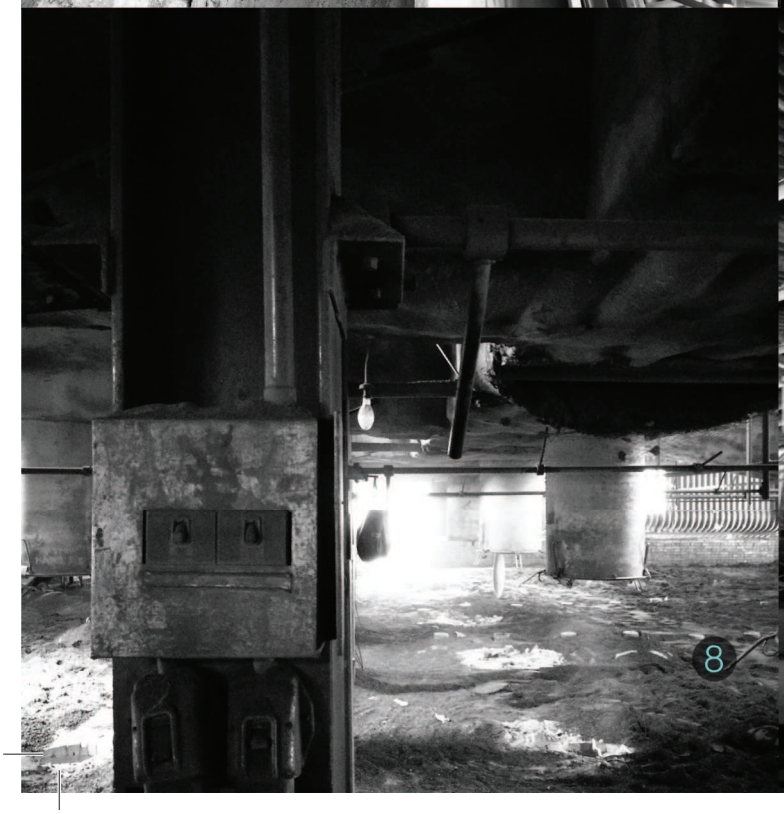
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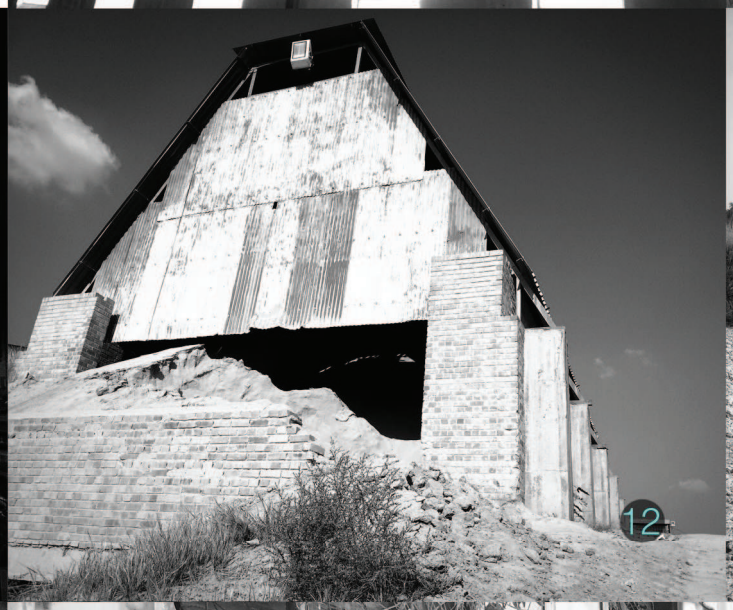
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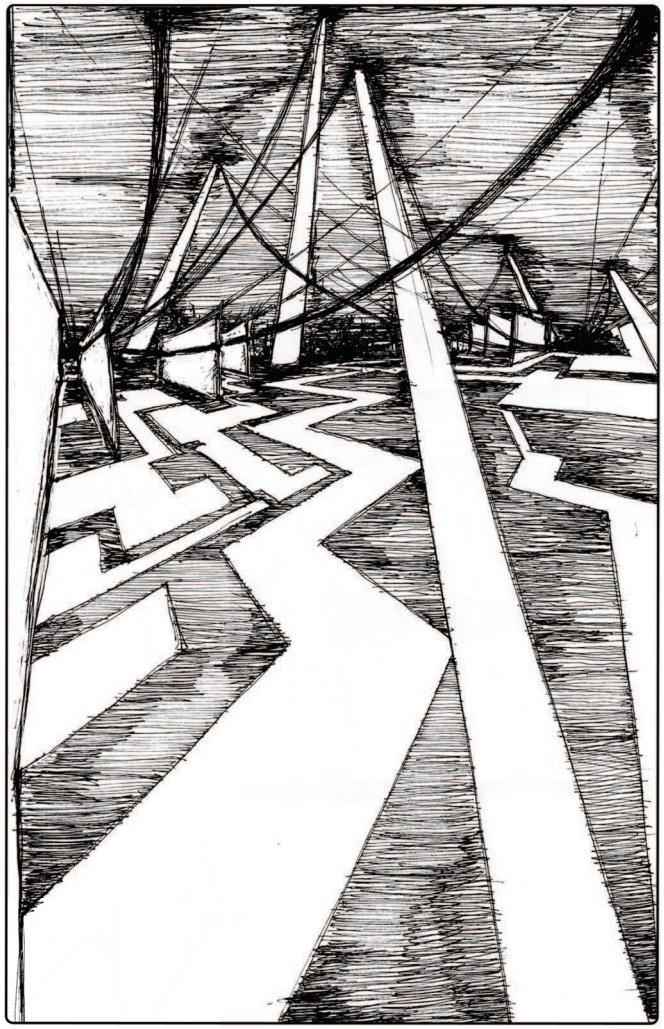

currency (n.)

1650s, ‘condition of flowing’, from Latin currens, present participle of currere ‘to run’ (see current (adj.)); the sense of a flow or course extended 1699 (by John Locke) to circulation of money

figure_02.13_currency.

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02.03.04_site approach

The site and its context are approached in terms of its currencies. Currencies are not only monetary, but broadly seen as avenues of flow. Currencies in the context of Silverton and Eersterust were found to be either apparent, such as the flow of labour and raw material, or non-apparent such as human capital and natural systems. After decommission, apparent currencies tend to be destroyed or forgotten instead of acting as informants for new interventions. Non-apparent currencies like ecological and social exchanges tend to be disregarded and forgotten during and after industrial activities. This results in spatial and social voids.

The site is seen as an isolated element wedged between social, industrial and ecological functions. It also has a historical core with legacies that spread into the landscape. The existing sporting facilities functions as a social core that concentrates community events near the old factory buildings.

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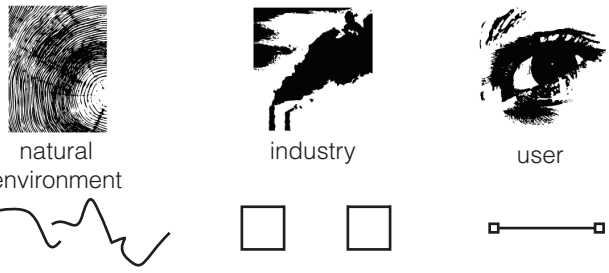
apparent / non apparent relationships



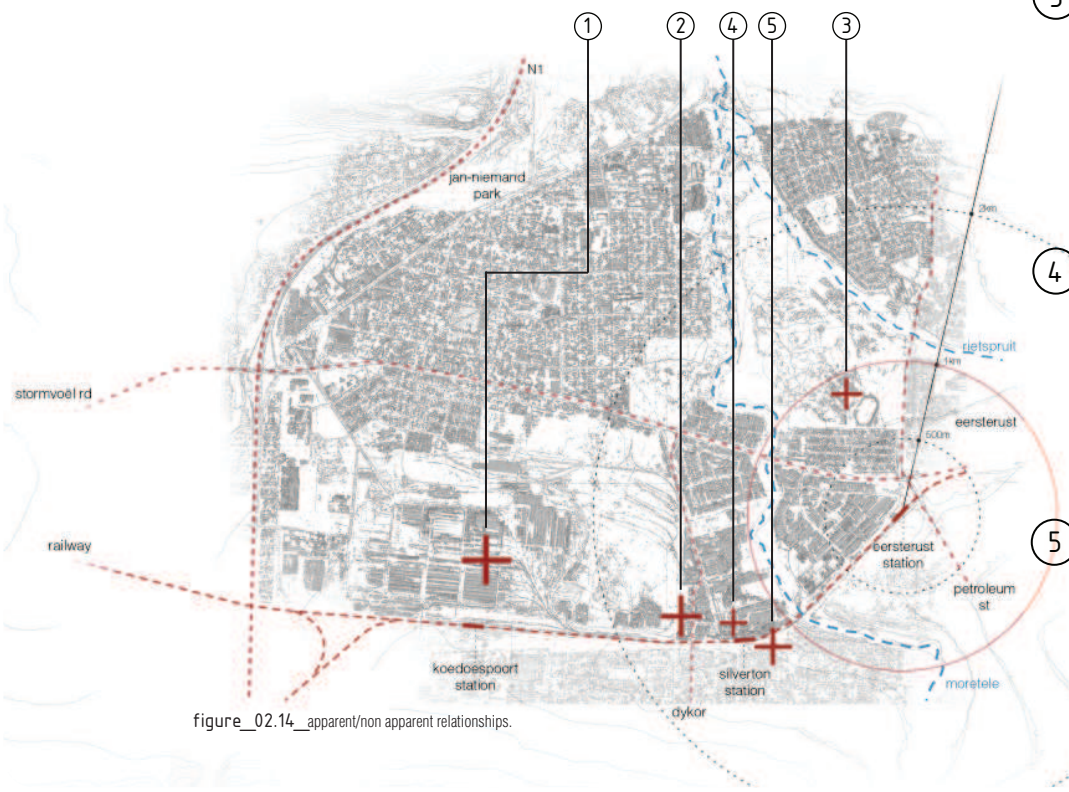


figure_02.14_apparent/non apparent relationships.

site / study area

1 koedoespoort shunting yards

2 dykor street

3 era bricks

4 silverton tannery

5 silverton station / moreleta street

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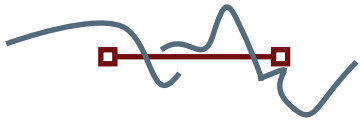
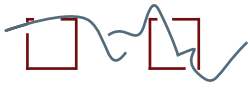
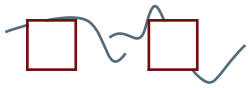
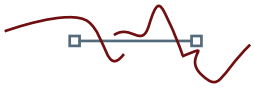
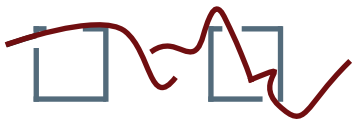
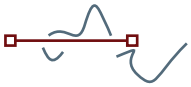
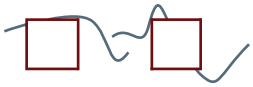
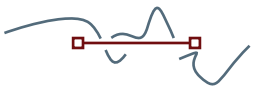
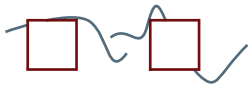
	user + industry	natural environment + user	industry + natural environment
	 isolated	 necessitated (expansive exploitation of ecology)	 exploited
	 conditional (changes to user environment)	 apathetic	 disregarded
	 integrated	 interwoven	 contextual (industrial reliance on ecology)
	 isolated (removal from user environment)	 apathetic	 disregarded
	 reciprocal (skill and industrial interchanges)	 apathetic	 disregarded

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capital:
small perceived value

capital:
high perceived value

industry as
converter

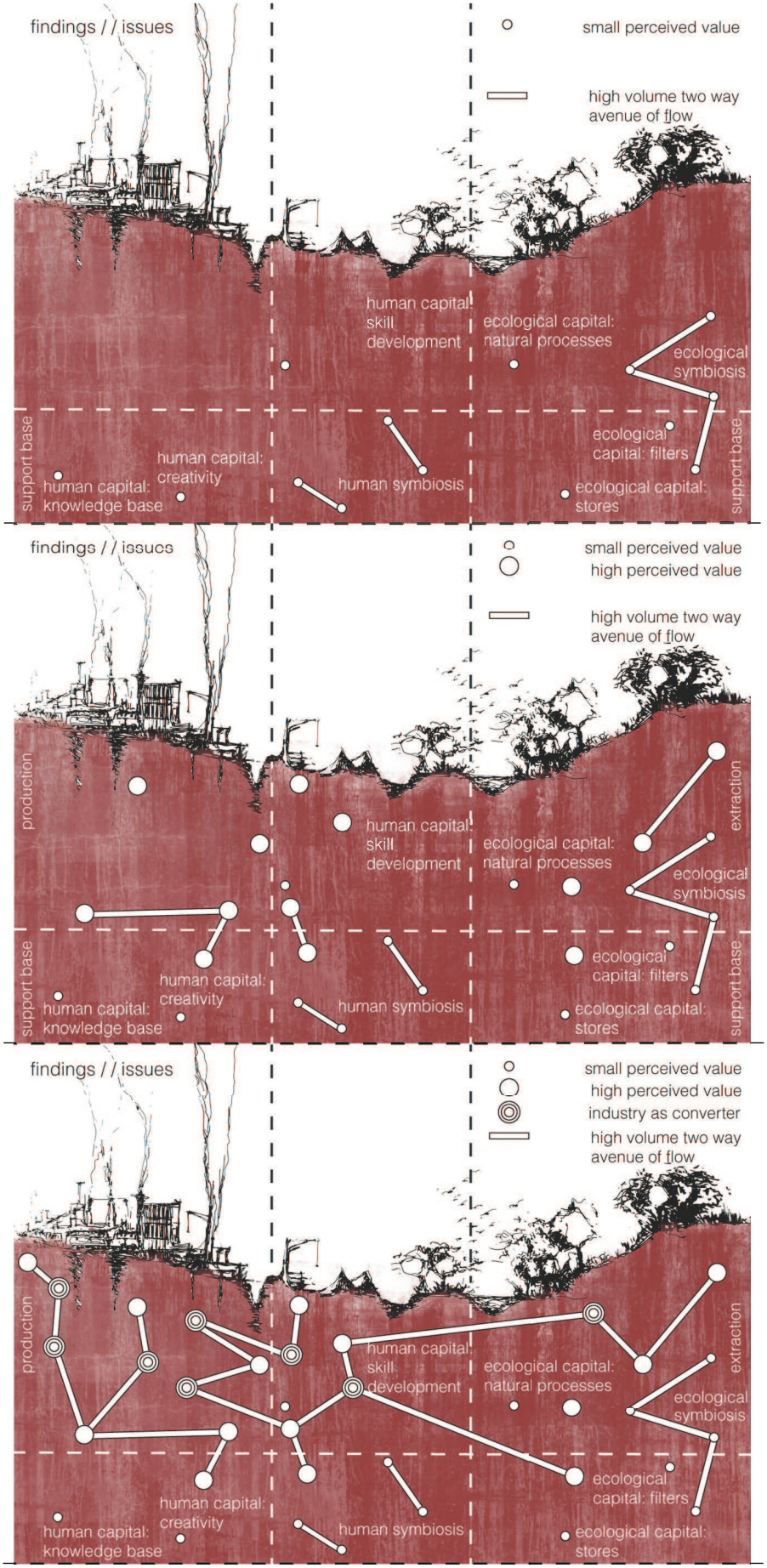

figure_02.15_avenues of flow.

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non apparent currencies (two way avenues of flow)

ecological capital: natural processes/ resources, ecological symbiosis, filters, stores

human capital: creativity, knowledge base, human symbiosis, skill development

apparent currencies (two way avenues of flow)

$ £ € ¥ ¢ ™ © ®

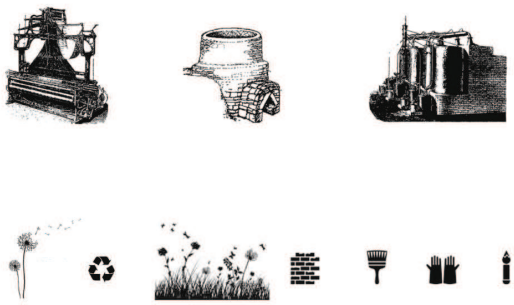
ecological capital: value defined, product based

human capital: necessity based & replacaeble

apparent industry (one way avenue of flow)

expendable resources

non apparent industry (two way avenues of flow)



replenishable resources

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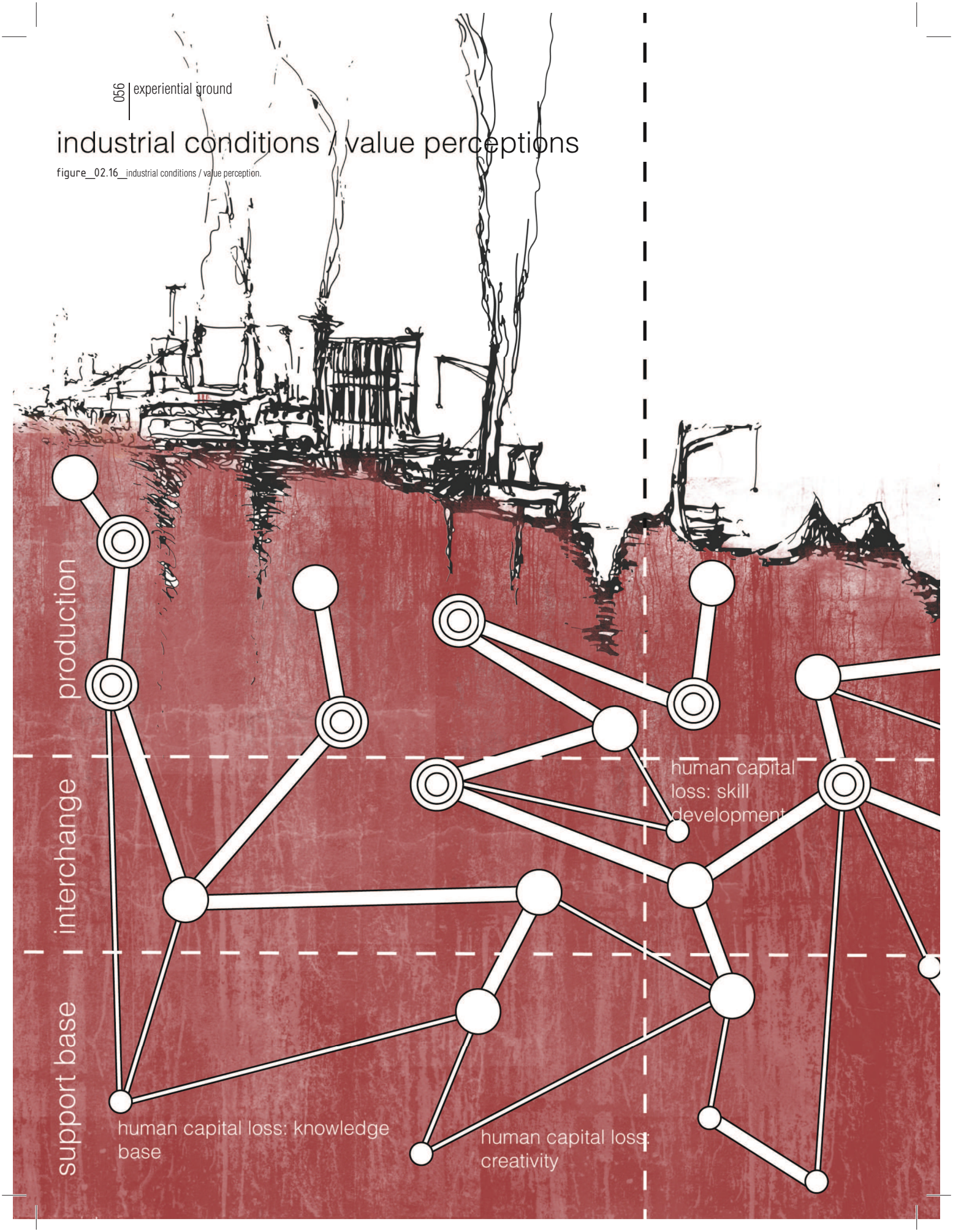
industrial conditions / value perceptions

figure_02.16_industrial conditions / value perception.



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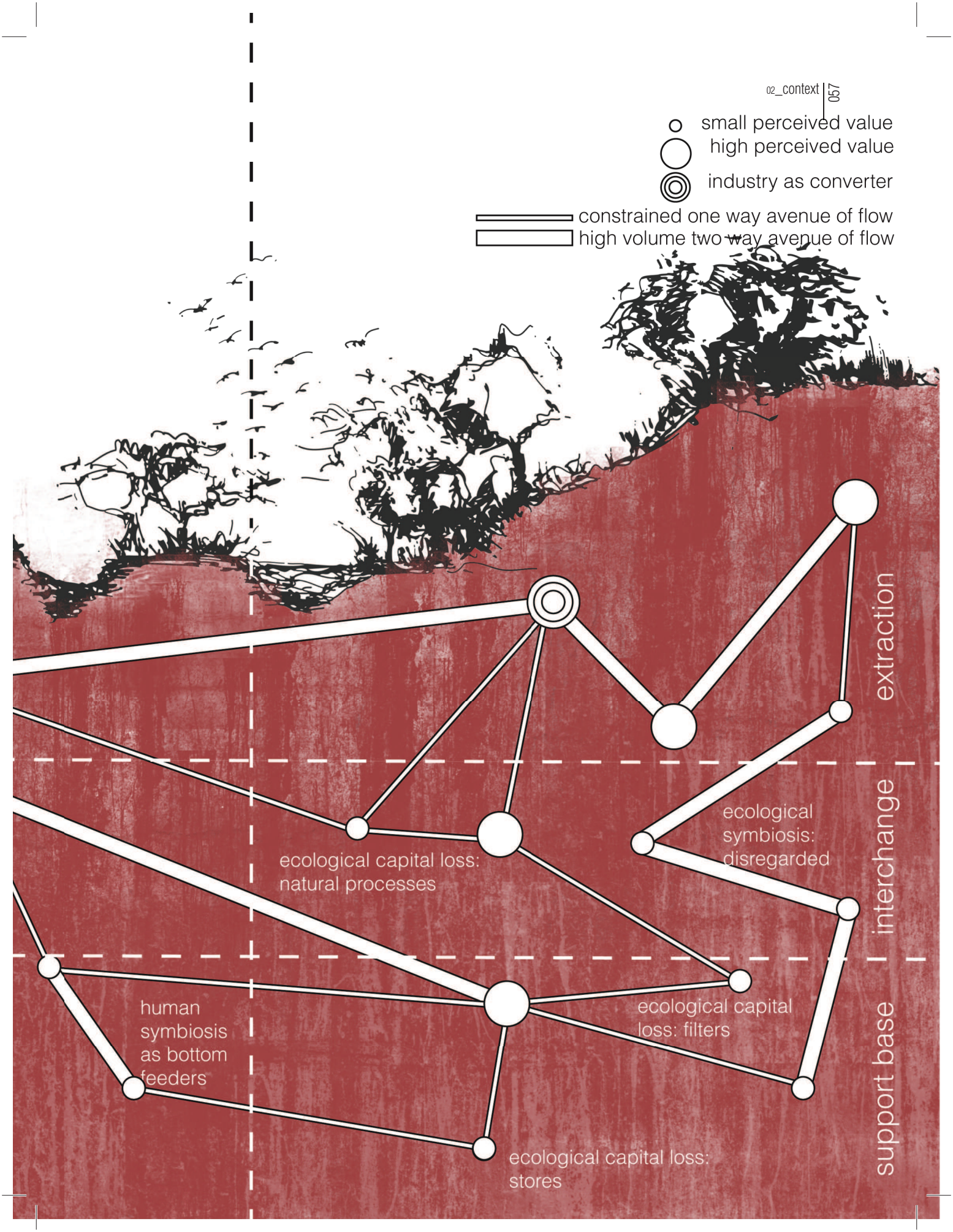

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02.03.05_precedents

1. Tempelhofer Freiheit, Berlin: how to deal with the site in terms of the scale and the vastness of the site.

figure_02.17_site development strategy, Tempelhofer Freiheit, Berlin.

figure_02.18_conceptual perspective, Tempelhofer Freiheit, Berlin.

figure_02.19_competition entry, Tempelhofer Freiheit, Berlin.

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2. Evergreen Brick Works, Toronto: the social integration, small footprint and the connection to the heritage of the tradition of brick making.

figure_02.20_site development, Evergreen Brick works, Toronto.

figure_02.21_interior space of converted shed, Evergreen Brick works, Toronto.

figure_02.22_landscape routes, Evergreen Brick works, Toronto.

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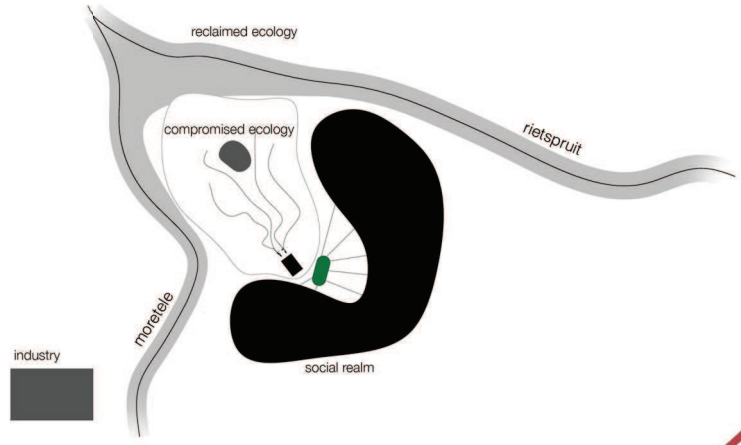
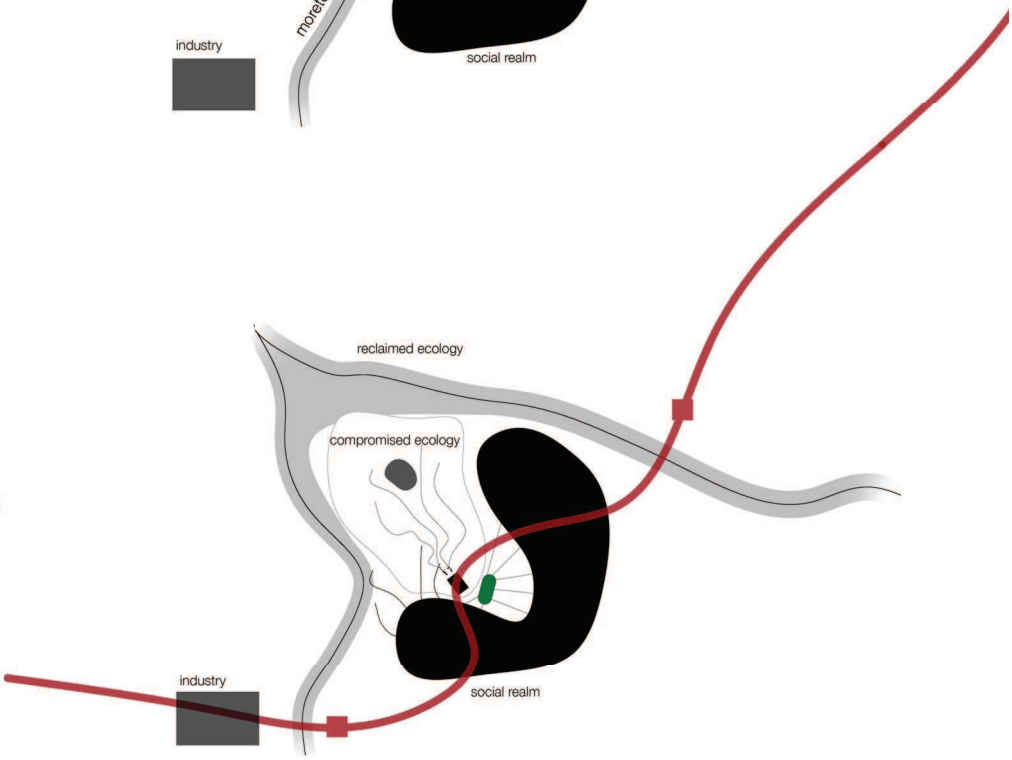
1. Current condition

The site is an isolated element wedged between social, industrial and ecological functions. A historical spread core legacies into the landscape. The existing sporting facilities functions as a social core, that concentrates community events near the old factory buildings.



2. Reconnect with anchors

A proposed connection enables conditions for all the functions of the site to thrive. This includes historical, ecological, industrial and social. The areas of overlapping and weaving of the different functions becomes important sites of reconciliation.



3. Conditions of overlap

The connection route enables conditions for existence of all the site functions and is imagined to grow around the historical core and existing stadium.

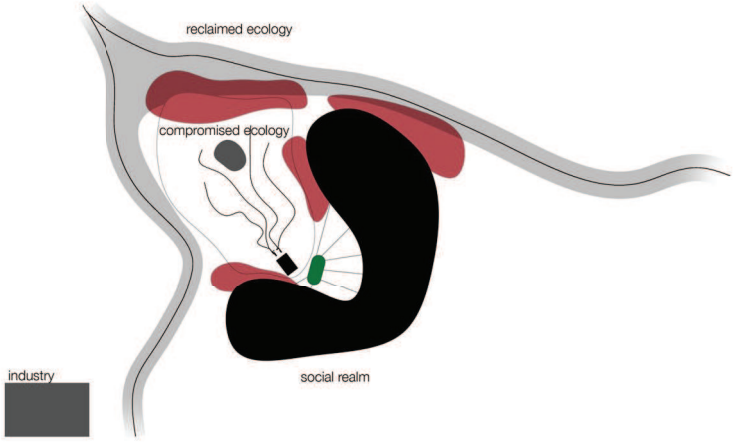


figure_02.23_Era Regional Park site approach/ strategy.

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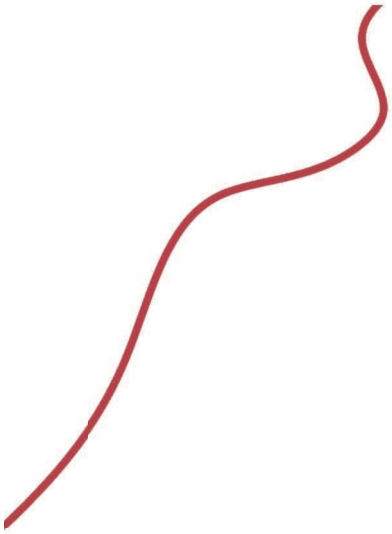
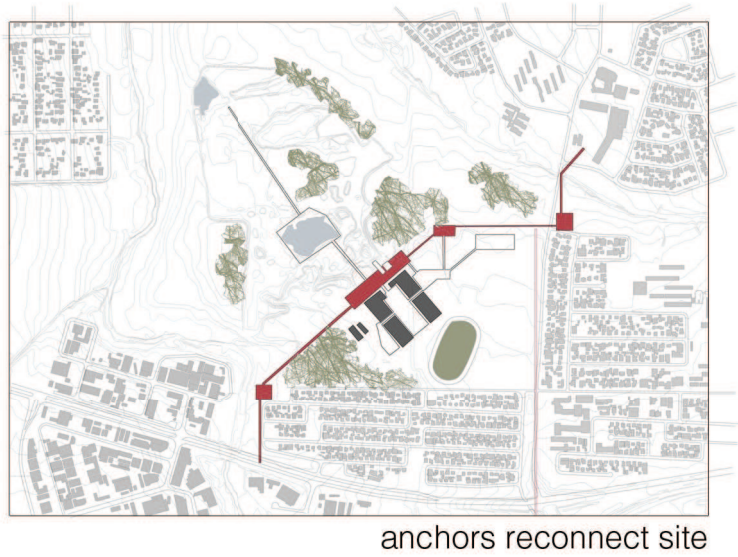
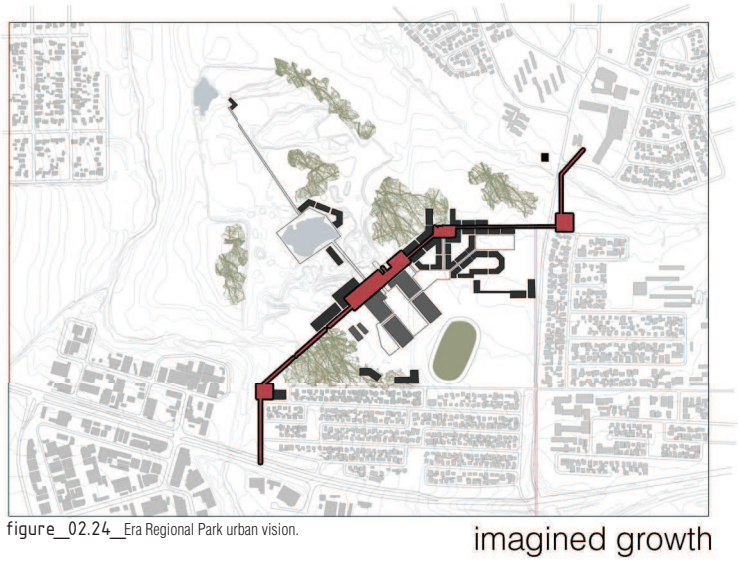


current site plan



anchors reconnect site



imagined growth

figure_02.24_Era Regional Park urban vision.

A connection is proposed, that enables conditions for all the functions of the site to thrive. This includes historical, ecological, industrial and social activities. The areas that overlap and interlace become important sites of reconciliation.

The specific project interventions are based within this context.

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02.03.06_industrial ecology

The programmatic collaboration of the Era Regional Park urban vision projects.

1. A natural fibre processing plant that acts as a facilitator and creates spaces of interaction with old, new and natural industries, enhancing the significance of each whilst establishing a closer relationship between man and his first nature – J. Pansegrouw.

2. An incubator for ceramic-based industries becomes an architectural solvent for natural, industrial and cultural endeavours - C. Taljaard.

3. An apiary and honey-processing facility becomes a transitional exploration from enclosure to opening, revealing the totality of the post-industrial terrain - C. Von Geyso.

These three programs form part of an interdependent cycle that allows for constant adaption and evolution of the site. The three individual projects are located within a similar context; however, the immediate contexts of the different sites offer various opportunities as well as problem areas.

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figure_02.25_macro collaboration of programmes.

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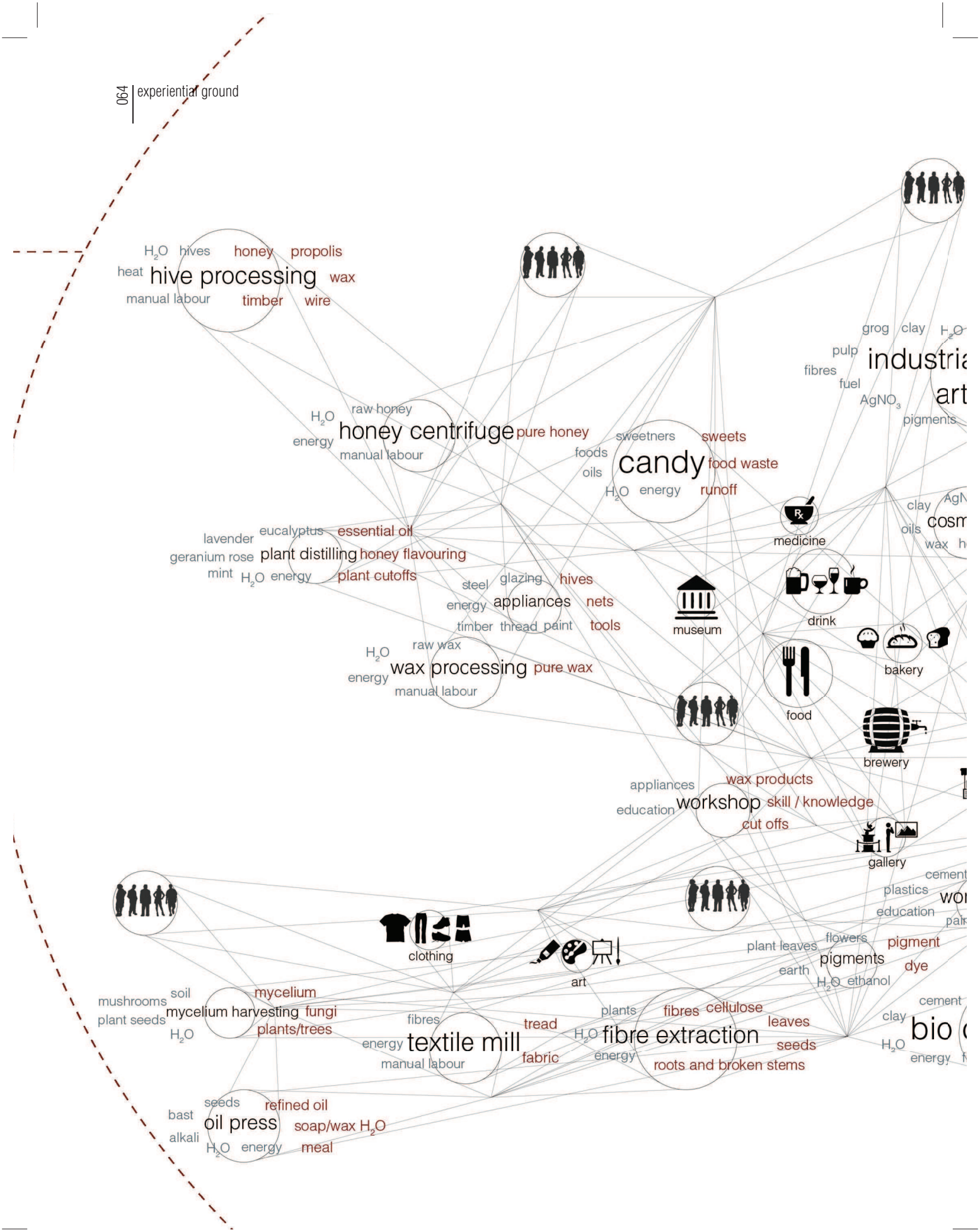

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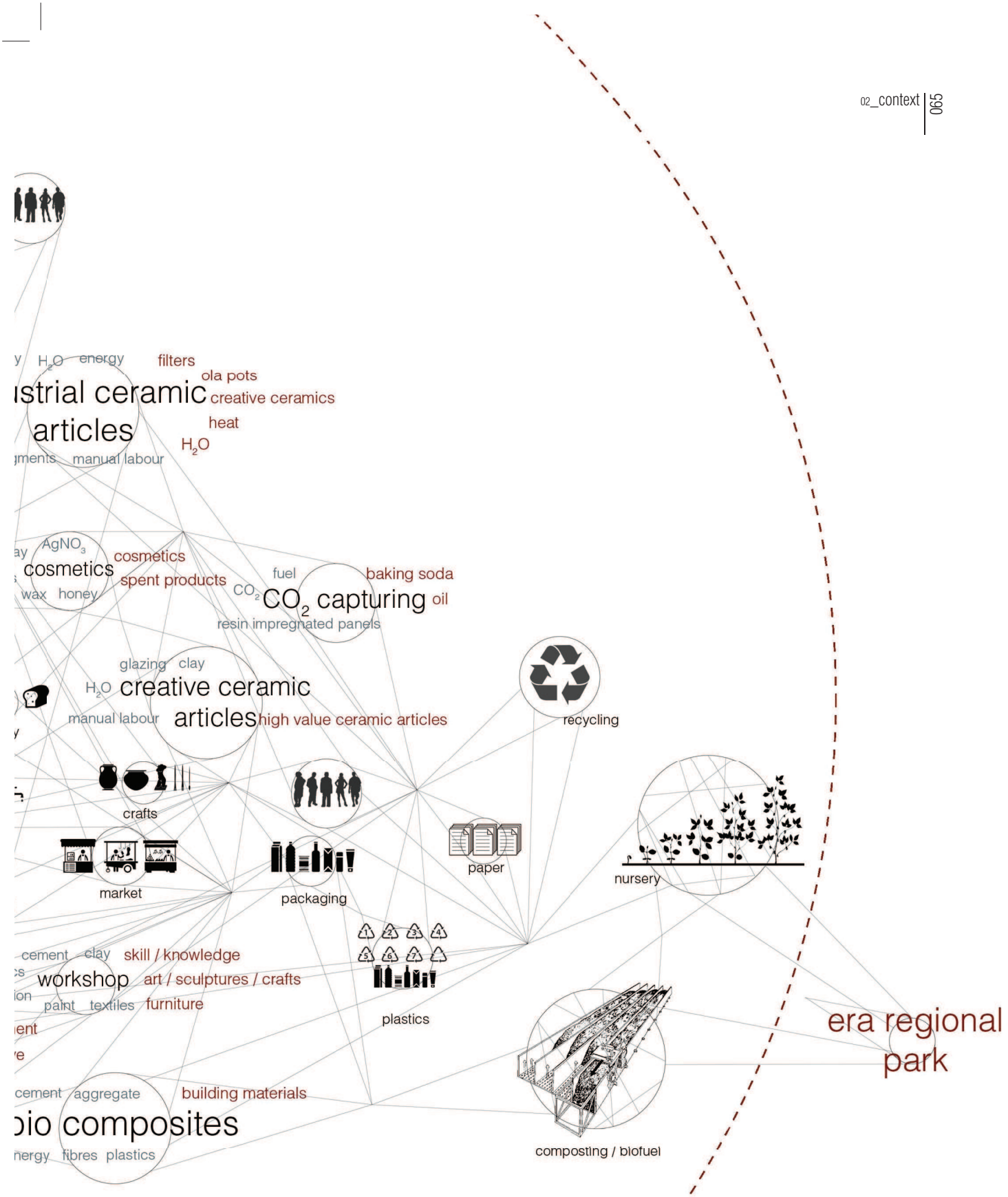

figure__02.26__industrial ecology including support programmes.

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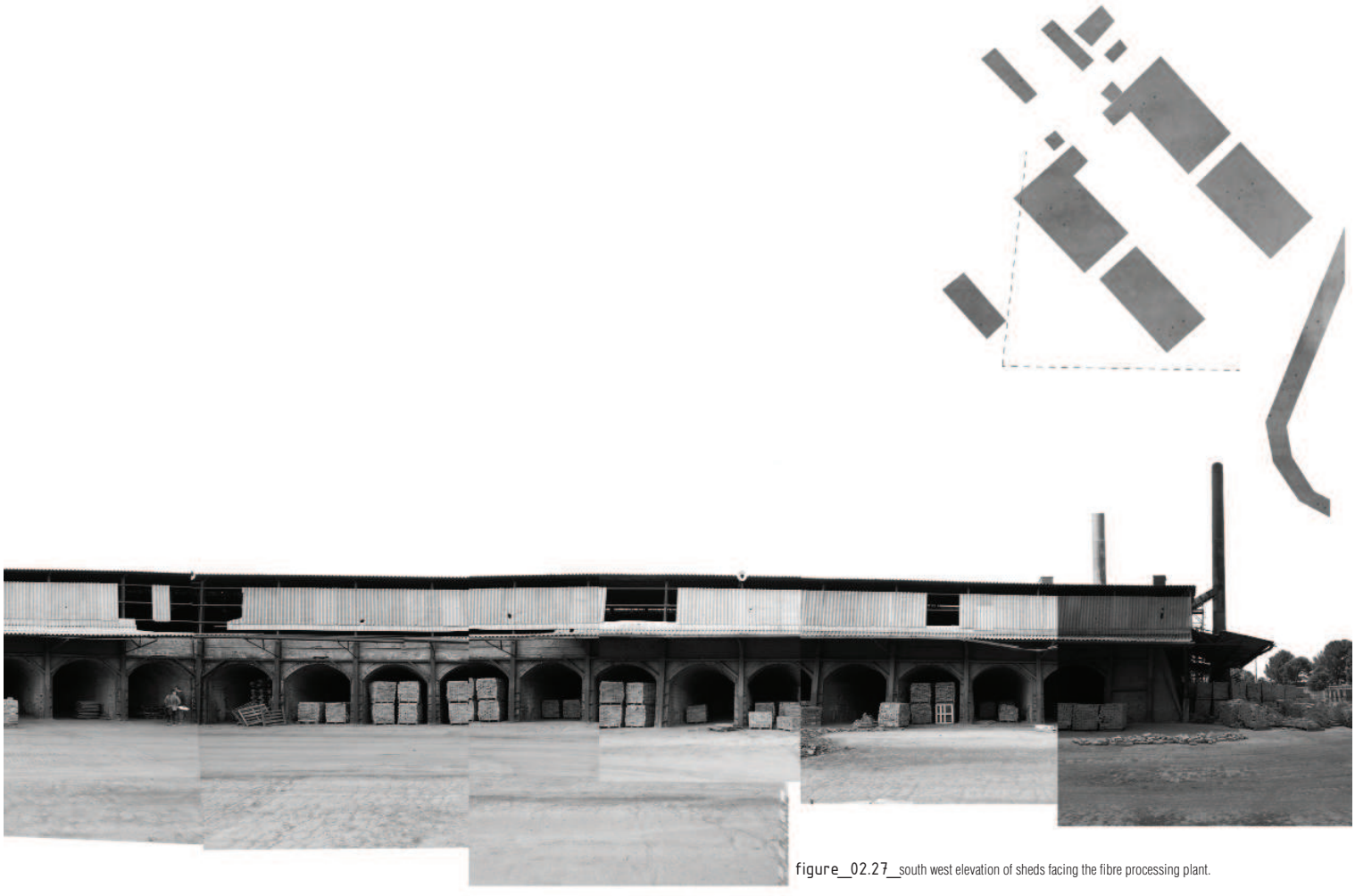

figure_02.27_south west elevation of sheds facing the fibre processing plant.

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figure_03.01_variety of plants that has fibrous structures.

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kakiebos [*tagetes minuta*]


hemp [*canabis sativa*]


melkbos [*asclepias fruticosa*]


lantana [*lantana camara*]

The proposed building program consists of a natural fibre processing plant that cultivates, imports and extracts organic plant fibres primarily from hemp, but also from flax, bamboo and other plant species. The focus of the facility is to incorporate and test organic fibres in the production of composite building materials. To ensure the fullest use of the different plants and a balanced industrial ecology, an artisanal textile mill and dyeing facility, along with an oil press and a pigment extraction facility is introduced to the site. As a response to the issues raised around public interface with the vision for the Park, workshops and artist studios are included to manipulate the public perception of the industry as well as attempt to foster the relationship between man and his “first nature”. Pilot crop fields form part of the research facility, processing plant and the experiential aspect of the design intervention.

03_programme

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03_programme

03.01_a natural industry

The University of California (UC) has conducted extensive research on the use of plant fibres including their advantages and disadvantages. According to their research and other writings, plant fibres, their cultivation and usefulness to humans date back to the Stone Age in Europe. For a very long time, aside from their use as a food source, plant fibres were used for many things including clothing and shelter, and proved to be a useful material in the furthering of human civilisation (UC, 2011).

Despite the fact that animal products have also been available throughout the ages, it's been noted by the UC (2011) that it was much easier to harvest fibres from plant material as they were available in the roots, stems and leaves of plants.

Due to the great diversity of plants that exist in our natural habitats, it is almost impossible to calculate the amount of plants that have useful fibres in the building and clothing industry. However, according to the UC (2011), only a relatively small amount of plant fibres are used for commercial purposes. This despite the observation that the durability of these species of fibres such as hemp and sisal, do at times exceed the capabilities of synthetically produced fibres.

The fibres that are still used today in the production of building materials and textiles have withstood the test of time (Xu, 2010). Another example is flax, the use of which also dates back to antiquity, cultivated not only for the plant's fibres, but for the flax seed too that has provided civilisations with the highly versatile linseed oil for many years (UC, 2011).

The classification of natural fibres places these materials into three categories; Plant fibres, Animal fibres and Mineral fibres. The most important category is Plant fibres (Saxena et al, s.a.:122). The most common among the plant fibres that are still used today are cotton, flax, jute, sisal, ramie and hemp. The final classification divides the plant species into categories according to the location of the fibres: seed, leaf, bast/ stem, fruit and stalk fibres. (Saxena *et al*, S.A: 123).

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figure_03.02_flax farmers early 1900's.

figure_03.03_sorting of hemp fibres early 1900's.

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BILLION-DOLLAR CROP

petition with coolie-produced foreign fiber while paying farmers fifteen dollars a ton for hemp as it comes from the field.

From the farmers' point of view, hemp is an easy crop to grow and will yield from three to six tons per acre on any land that will grow corn, wheat, or oats. It has a short growing season, so that it can be planted after other crops are in. It can be grown in any state of the union. The long roots penetrate and break the soil to leave it in perfect condition for the next year's crop. The dense shock of leaves, eight to twelve feet above the ground, chokes out weeds. Two successive crops are enough to reclaim land that has been abandoned because of Canadian thistles or quack grass.

Under old methods, hemp

(Continued to page 144A)

Top, modern version of linen duster made from hemp. Bottom, harvesting hemp with a grain binder. Hemp grows luxuriously in Texas

figure_03.04_The Billion Dollar Crop advertisement.

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03.02_the billion dollar crop

Hemp (a species within the Cannabis plant family) is commonly used for its fibres around the globe and its use can be dated back to 8000 B.C. when it was first applied for medicinal use, as textile and some forms of shelter in Asia (HoH, 2013). It can be assumed that hemp is the most versatile plant when it comes to the uses of the plant's material as almost every part of the plant can be used in the production of oils, textiles, ropes, clothing, paper and biofuel (Hemporium, 2013).

Hemp grows in lengths varying from 1500mm to 5000mm in height and produces fibres 900mm to 4000mm. The fibres have a similar quality as that of flax fibres, durable and great in strength, but lack the flexibility thereof (UC, 2011). According to the University of California, a crop of 4000m^2 produces 2 – 3 tons of hemp stems, of which almost a third is usable fibrous material.

Hemp is currently a controversial subject matter when it comes to the cultivation thereof. Commonly referred to as "weed", the female Cannabis sativa L. Marijuana plant contains high tetrahydrocannabinol (THC) levels that many use for recreational and medicinal purposes. According to Leitch (2009:1), hemp refers to the male of the species that contains less than 1% THC and is used for industrial purposes, indicating that it has none of the side effects that present when consuming the cannabis plant.

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According to Yurchey (2010), hemp has been the wonder of all crops for a very long period before it was banned in America in 1937. After thorough research, Yurchey was able to list the following facts:

- “George Washington, Thomas Jefferson and other founding fathers grew hemp. (Washington and Jefferson Diaries. Jefferson smuggled hemp seeds from China to France then to America.)”

- “Benjamin Franklin owned one of the first paper mills in America, and it processed hemp. Also, the War of 1812 was fought over hemp. Napoleon wanted to cut off Moscow’s export to England. (Jack Herer. Emperor Wears No Clothes.)”

- “80% of all textiles, fabrics, clothes, linen, drapes, bed sheets, etc. were made from hemp until the 1820s, with the introduction of the cotton gin.”

- “Henry Ford’s first Model-T was built to run on hemp gasoline and the car itself was constructed from hemp! On his large estate, Ford was photographed among his hemp fields. The car, ‘grown from the soil’, had hemp plastic panels whose impact strength was 10 times stronger than steel. (Popular Mechanics, 1941.)” Yurchey (2010).
The list of facts continues and includes that Bibles were printed on hemp, paints and oils were produced from the plant and that hemp acquired the alias: “The Billion Dollar Crop”.

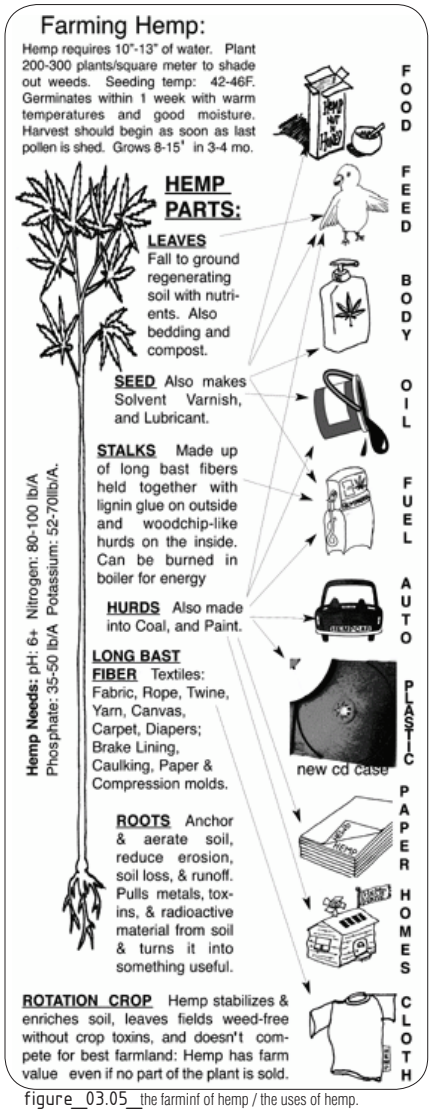

figure_03.05_the farminf of hemp / the uses of hemp.

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Yurchey (2010) explains why the cultivation of hemp was banned in 1937; William Randolph Hearst and the Hearst Paper Manufacturing Division of Kimberly Clark were the main suppliers of paper at the time. Another billionaire, Du Pont started a synthetic manufacturing company, producing plastics from oil and coal. The hemp industry would have destroyed these companies, taking up to 80% of their "respectable" companies' profits. After discussion and planning, it was understood that hemp had to be removed from the industry so that their companies could thrive. Using a Mexican slang word, "Marijuana", America was about to change their perceptions about the Plant Wonder, hemp. Using media propaganda, hemp ("marijuana") was named the culprit of the menace and havoc (such as car accidents, violent riots and murder) that stirred among the nation.

In 1937, hemp was finally banned, whilst according to the Department of Agriculture, Forestry and Fisheries (2011), it was already declared illegal in South Africa since 1903 when the Dagga prohibition was passed.

figure_03.06_hemp propaganda 1937. "Devil's Harvest".

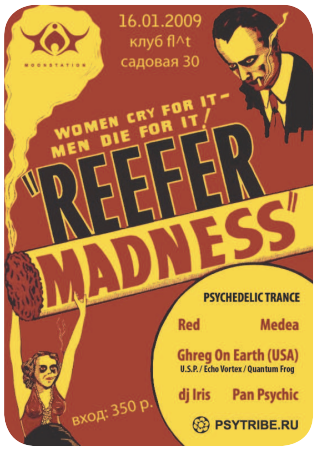

figure_03.07_hemp propaganda 1937. "Reefer Madness".

figure_03.08_hemp propaganda 1937. "Marihuana".

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Until recently, it has remained a controversial and the technologies of hemp could not have been developed as hoped for. In a time where environmental issues require industries to have a sustainable and ecological development plan, the word "green production" has gained the attention of increasingly more companies (Xu, 2010:2). Hemp fibres, being one of the most versatile and important fibres, are believed to be the substitute for many synthetic fibres employed in the manufacturing of composites (Xu, 2010:2), and that it is re-emerging as a substitute in the construction industry (HoH, 2013). Cape Town is currently the home of the first "Hemp House" that is entirely made of hemp and hemp composite materials in South Africa. Located in Noordhoek, Cape Town, the Hemp House, according to Magen (July 2011), the walls are made using hempcrete, hemp insulation panels and hemp plaster, while all the carpets, lamp shades, painting canvases, duvets, ceiling panels and almost all the furniture is made from the hemp plant.

"…the hemp used to build this home was grown in under a year, and the construction of the house itself took only eight months from start to finish. Thus, the hemp house is a standing example of the viability of replacing traditional building materials with hemp…" Magen, 13 July 2011.

Magen further states that this material has benefits that, with extensive integration into man's personal life and our society, can change the way we live and perceive our vulnerable environment.

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figure_03.09_wall construction of hempcrete wall, The Hemp House, Noordhoek, Cape Town.

figure_03.10_Hemp Eye, exposure of hempcrete wall, The Hemp House, Noordhoek, Cape Town.

figure_03.11_construction of The Hemp House, Noordhoek, Cape Town.

figure_03.12_western veiw of The Hemp House, Noordhoek, Cape Town.

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03.03_tributary plant fibres

As an extension to the hemp research facility, flax and bamboo are introduced and tested for their possible contributions to the building industry. In conjunction with the upgrading of the site's biodiversity, invasive plant species such as lantana and kakiebos will be extracted and tested for their fibrous properties and viability in building materials. Imported plants such as sisal and jute will be processed and tested together with other plant species and materials.

03.03.01_ flax

Flax is a common and favourable plant that has been used since 3000 B.C. (UC, 2011). The plant is an annual herb that flowers blue or white petals with very small leaves that grow between the height of 300mm and 1200mm. The fibres are essentially tough string-like strands that vary in length from 100mm to 900mm.

According to the UC (2011), these fibres are known for their great tensile strength, fine quality and durable attributes. Flax fibres are commonly used in the production of linen cloth and thread, canvas, strong twine, carpets, cigarette paper, writing paper and insulating materials. Although the fibres that are present in the stalks of the plant are not as fine and long as the core fibres, their use is more promising in composites manufacturing as they resemble the same characteristics of the hemp stalk fibres used in hempcrete (UC, 2011).

Introduced in America by the pilgrims, flax cultivation was producing sufficient material for domestic use until the cotton industry took over in the early 1900's. The flax plant is also grown and popular for its seeds; the seeds are used in the production of linseed oils (UC, 2011).

figure_03.13_manual picking of flax.

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03.03.02_ bamboo

With a tensile strength comparable to that of steel, bamboo is widely recognised as the world's fastest growing plant. Compared to the rate it takes an 18m tree that has been cut down to be replaced (60 years), the equivalent amount of growth for bamboo takes only 59 days (Bamboo warehouse, 2013).

Found and used in China, more than 5000 years ago (Bambooki, 2011), bamboo has been used as an alternative building material long before the global environmental crisis. Along with its structural capabilities, bamboo has a very wide diversity of uses. Bamboo fibres have been used for the production of rope and textiles for many years, but it is also edible and used in many Asian food dishes. Furniture, musical instruments, weapons and non-structural building materials are also common products manufactured from bamboo (Bamboo Grove, 2013).

The strong cellulose fibres that exist closer to the outside of the bamboo culm, is what makes the extraction of the fibres easier and at the same time contributes to the bamboo's structural capabilities (Janssen, 2000). Janssen (2000:10) describes that the bamboo plant grows either from seeds or in rhizomes. The rhizomes are referred to here as the foundation of the bamboo plant as the plant is hollow and does not have a central trunk. The rhizomes are either clumped together (sympodial rhizomes) or tend to spread across the soil (leptomorphous rhizomes).

Not only can a bamboo grove or forest be used for the cultivation of building materials, the grove/plantation can also, according to Janssen (2000:13), be a haven for other plant forms such as flowers, herbs and mushrooms.

figure_03.14_Chinese art of the bamboo plant.

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03.04_extraction

The extraction of natural fibres can be achieved through one of two processes: retting or decortication, both of which have been used throughout history in different technological forms.

Retting is a method that extracts fibres from the stem or bast fibre plants such as flax, sisal and jute. Water is the main functional component in the retting process and forms the traditional basis of the method (Saxena *et al*, s.a.:126-127). The process is also known as a biodegradation process involving microbial decomposition where the chemical bonds that merge the fibres with the pith or pectins are broken. Fermentation through means of anaerobic bacteria degrades the piths or pectins as well as any other binders in the plants that unite the fibres and stems/basts together (Saxena *et al*, s.a.: 126-127).

The retting process is achieved by soaking bundles of plant stems in ponds of water, or submerged under slow running water for a period of 15 to 20 days depending on the robustness of the stems. After the stems and fibres have separated or loosened, the stems are further broken using rollers and the fibres are removed using needle like extractors. The fibres are then washed and dried (Saxena *et al*, s.a.:126-127). Fibres can then be spun or balled depending on the destination and end-use of the raw material.

figure_03.15_retting in a shallow pond.

figure_03.16_retting in a slow flowing river.

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Decortication is a process that detaches fibres from the plant core and can be divided into two popular processes; Hammering and Crushing. Hammering involves the stem being hammered continuously along its length to crush the exterior of the plant. This process is used when short fibres are required. For the extraction of longer fibres, the stems are crushed when fed through rollers. The roller crushers are less destructive and ensures better quality when longer fibres are required (Xu, 2010:1-2).

figure_03.17_early decortication machine.

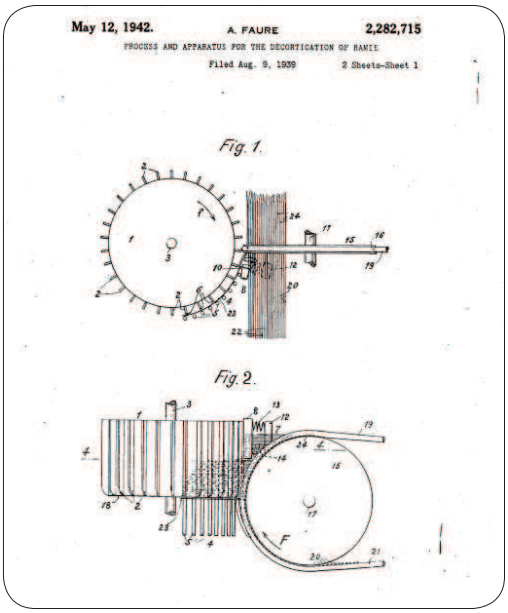

figure_03.18_ramie decortication figure.

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03.05_biocomposites

Saxena *et al* (s.a.:121) define composite materials as a combination of two or more materials where one of the materials is in a reinforcing phase whilst the other material is in a matrix phase. The reinforcing material is fibrous, in sheet form or small particles; the matrix material is ceramic or cementitious based - a polymer or a metal.

Matoke, Owido & Nyaanga (2012:208) state that fibre reinforced composites are a very important class of materials in the engineering field due to the fact that they are easy to manufacture, have significant mechanical properties and are flexible and adaptable in terms of design. However, the nature of the synthetic fibres used most commonly (glass, carbon, steel and other synthetic fibres) -their origin, extraction, manufacturing, high density, hazard to health risk status and non-recyclability - makes composite materials where the fibres are of a natural, renewable origin more attractive in the composite industry.

Saxena *et al* (s.a.:121), further mention that today many different natural plant fibres have been used in the manufacturing of biocomposite materials such as “flax, hemp, jute, straw, wood, rice husk, wheat, barley, oats, rye, cane (sugar and bamboo), grass, reeds, kenaf, ramie, palm oil, sisal, coir, water hyacinth, pennywort, kapok, paper mulberry, banana-,pineapple leaf fibre and papyrus.”(Saxena *et al*, s.a.:121-122).

Biocomposites, in comparison with cementitious, ceramic, polymer or steel composites, contain natural bio-degradable and renewable fibres that have been used for many years (mud, straw and dung composites and buildings such as those in Timbuktu, are some examples), before the synthetic industry proved more lucrative at the turn of the century. This synthetics industry remains, according to Xu (2010), a large contributor to the ecological crisis we face today.

The proposed Research and Development centre, mainly for occupation by the CSIR and SABS initially, will not only test the use of the primary plant fibres - hemp, flax and bamboo - in biocomposites, but will also import and grow other plant species to test their viability in the building industry.

figure_03.19_hemp brick.

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figure_03.20_products made from maize.

figure_03.21_hemp insulation.

figure_03.22_house built with hemp and earth.

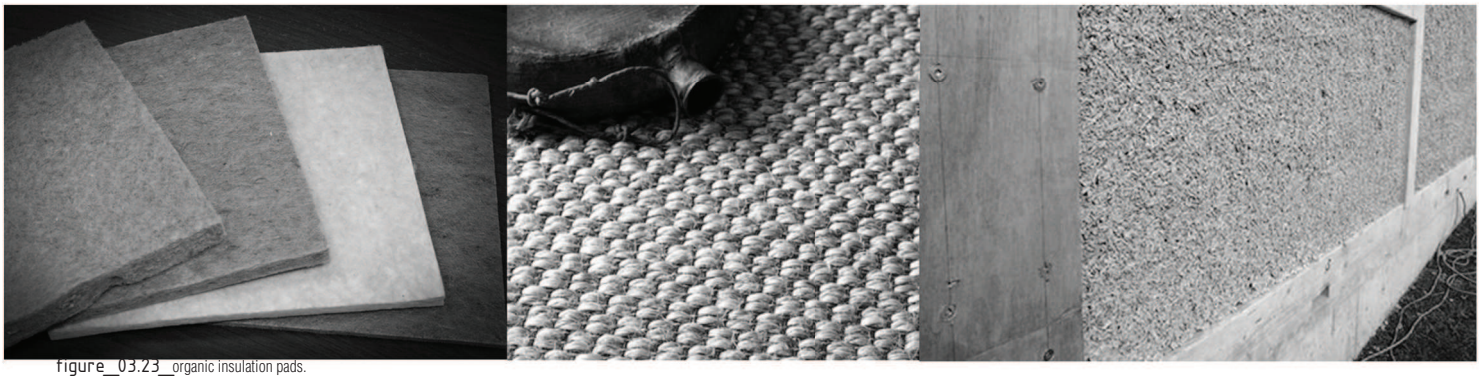

figure_03.23_organic insulation pads.

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figure_03.24_textile weaving.

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03.06_artisan textiles & augmented programmes

"According to the Columbia History of the World, the earliest known woven fabric was apparently of hemp, which began to be worked in the eighth millennium (8000-7000 B.C.)" Hemporium, 2013.

Kortenhoeven (2005:34), states that since the domestication of animals, wool was the first fibrous material used in textile production. Despite the uncertainty of the exact origin of textiles and woven fabrics, the craft is undoubtedly one that has been around for centuries and has evolved throughout time but has never really lost its significance as an art form, until the industrial revolution mechanised the industry and the machine took over man's role in the making of fabrics (ibid.). Before synthetic fibres became the status quo in the textile industry, hemp, flax, jute, sisal and bamboo were some of the most popular plant fibres used in the making of textiles.

Before the machine, man utilised natural materials and understood their compositions in order to make useful products. Textiles are merely one expression of an artisanal craft that has nurtured the bond between man and nature. Since the expropriation of the product from man-and-nature, man started losing that ability to understand and create from nature (Marx 1992:325).

Not only did man use the fibres to make his own product, man extracted the fibres as well using similar methods at a smaller scale as mentioned in the extraction process. After the fibres have been extracted, left to dry and/or balled, the fibres are spun to form thin threads. Threads also known as yarn, depending on the required thickness and specifications, are either spun together to make thicker thread or are taken to be woven. Using a weaving loom, fabrics can be made to vary in size, thickness, texture and quality depending on the plant fibres used, methods, speed and thickness of threads (Kortenhoeven, 2005:34). The dyeing process used on textiles depends again on the type of fibres used in the fabric.

After the fabric has been removed from the loom, they are referred to as grey goods. These fabrics can then be bleached to obtain a white colour (this is not recommended as it destroys the integrity of the plant fibres [HoH, 2013]). Submerging the fabric into baths containing water mixed with pigment, either hot or cold, is referred to as the dyeing process. The fibres absorb the water and when they are left to dry, the water evaporates and the pigment particles remain in the fibres.

As the craft of textile manufacturing may serve as a bridge between man and his "first nature", so plants offer other artisanal crafts that represent similar immediacies with nature such as seed oil pressing and organic plant pigment extraction.

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03.06.01_the oil press and pigments

In the days when flax and hemp were grown for their fibres, the flax and hemp seeds were by-products and secondarily used to produce oils (Penn State University, s.a.). Penn State University explains how the seeds were processed from their natural form into oil and meal products in the 17th and 18th century.

The seeds were spread out in the loft of the mill to rid them of dampness and then washed to cleanse the seeds of dust and other dirt, that may have accumulated from cultivation to the spreading on the floor, as well as other impurities and excess plant material. The seeds are crushed in a hammer mill and some of the oil is released. Seeds are crushed until they resemble an oily meal form.

After the crushing, the oily meal is taken to roasting pans that heat the seeds before a final press in a wedge press; this allows further rupturing of oil cells in the seeds. When seeds are cold pressed, a lighter coloured oil is obtained, but at a lower yield than extraction by the hot press method.

As a by-product of oil production, the meal of linseed and hemp can be used in dietary supplements for animals and are edible and safe for consumption by humans as they are high in proteins, essential fatty acids (Omega 3 and 6), fibre and other beneficial vitamins (Roussell, 2013).

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The extraction of natural pigments dates back to more than 15 000 years ago (Winsor & Newton, 2011) when cavemen decorated their cave walls. Earth pigments were used to make paint, with yellow and red earth the most commonly used colours along with white chalk and black pigment (soot combined with animal fats). From 8000 B.C. through the Fourth Dynasty of Egypt, up until the Industrial Revolution, pigments were extracted from plant roots, stems, leaves and flowers. Stone, earth, and minerals, including insects and bones were used to make pigments (de la Montana, 2008).

Dr Michael Eastmen (2010) explains that the extraction of pigments from natural materials involves the separation of at least one compound within a mixture. Plant material is usually boiled in a water and alcohol mixture so as to separate the colour from the material's biological structure. After the material is boiled, solids are removed and the mixture is left to evaporate, leaving the pigment particles, usually in powder form, to be applied in dyeing fabrics, staining surfaces and making paints with linseed or hemp oils.

Although technology has provided faster and more advanced equipment for the extraction of oil from plant seeds and pigments from plant based materials, the craft, skill and knowledge based trades of the oil press and pigment extraction offers a greater opportunity in the experiential temperament of a natural industry.
As Pallasmaa (2009) refers to the experiential ground of immediate interaction as a fundamental key in the activation of imagination and memory, the proposed oil and pigment extraction facilities will follow the nature of traditional means of extraction.

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03.06.02_a public interface

As a programmatic response to the issues surrounding to the relationship between man and industry (the industry here is focused on a natural industry) and the spatial neglect for man within industrial sites, the need for a public interface is introduced.

As an industry that relies on traditional methods of production and extraction, the programme extends its functions in the form of studios and workshops for artists and the public to interact with nature and means of production. This arrangement aims to transfer knowledge and skill based trades of an artisanal origin. It is here that the “experiential ground” becomes the platform on which the programme (industry), the material (nature) and the artist (man) interact programmatically and spatially. This “experiential ground” becomes the departing point for further investigation, theoretically, conceptually and technically.

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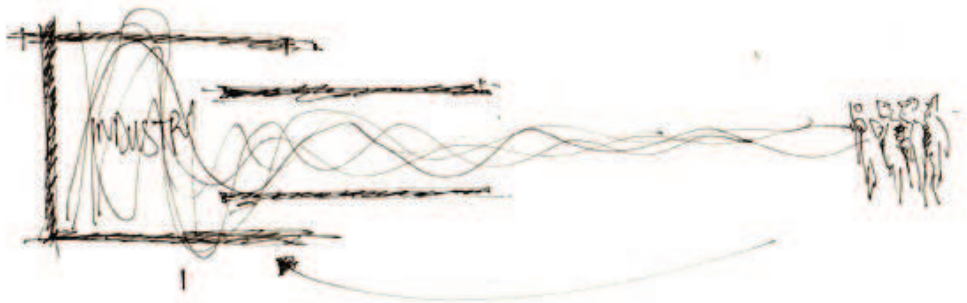

figure_03.25_a public interface to industry.

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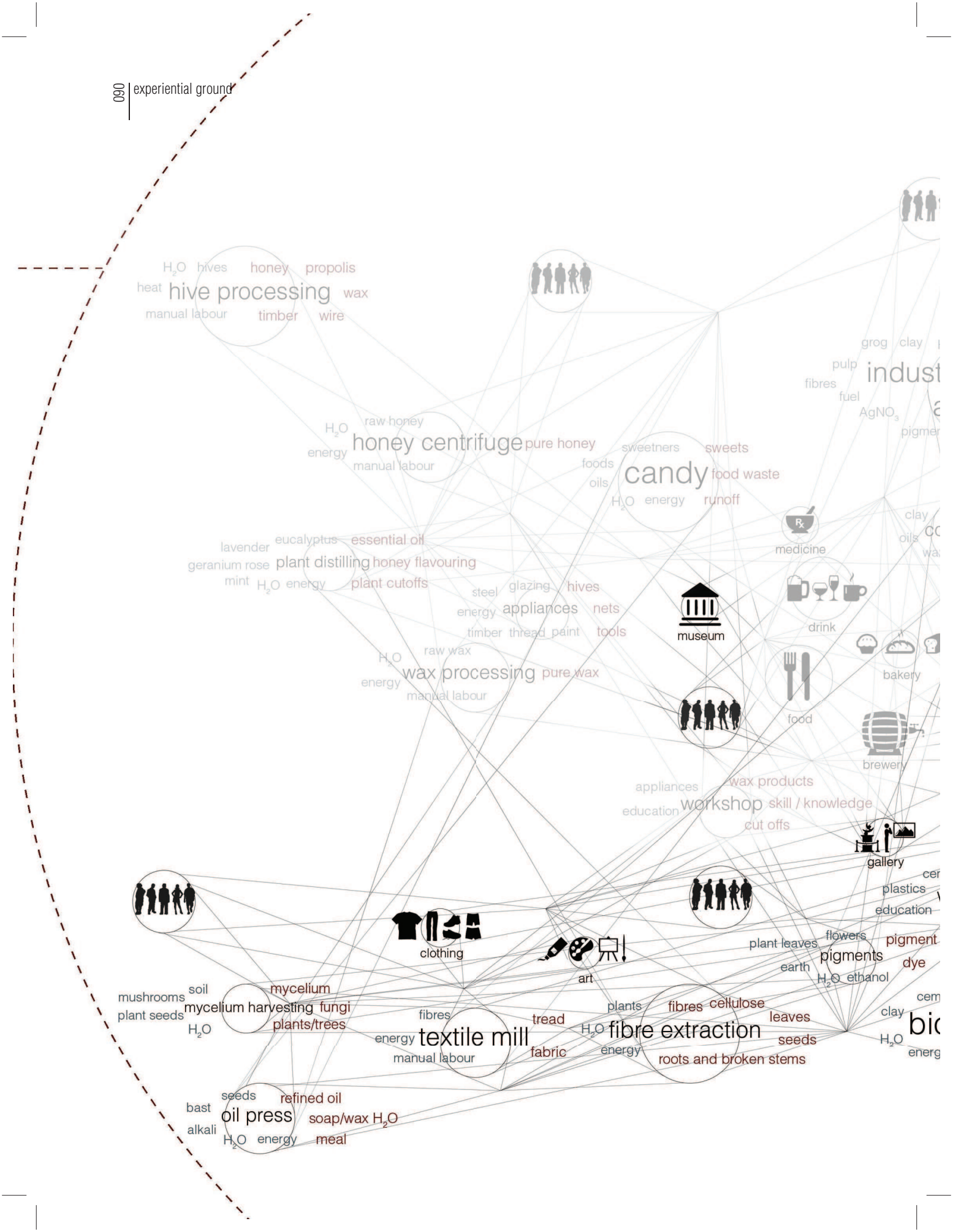

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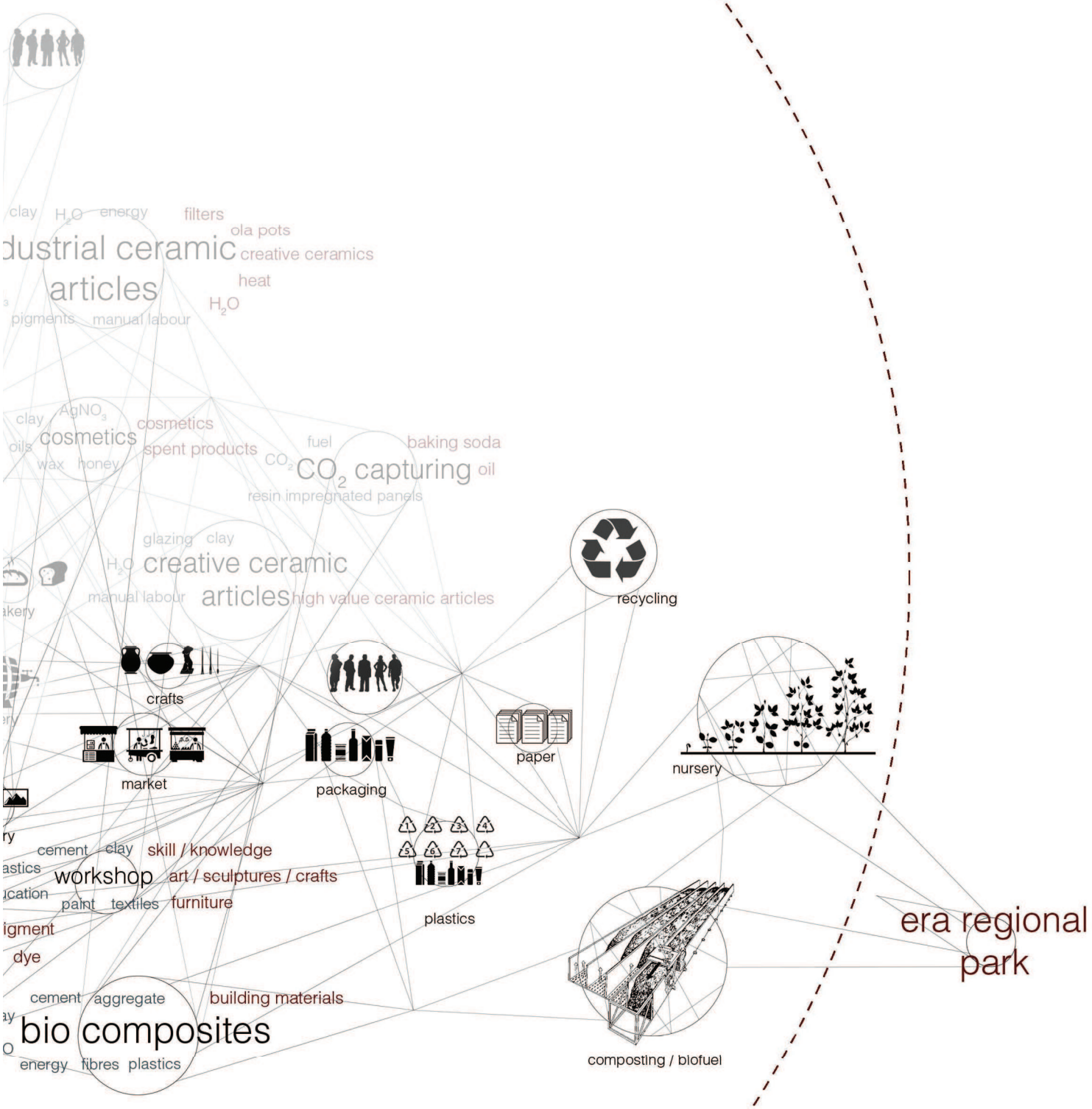

figure_03.26_programme diagram.

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figure_04.01_seven senses.

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The Era Brick works factory is a landmark of intangible significance, it's visual connection to the surrounding communities is significant. Within its walls, the brick making practice is a poem of processes. As the genesis of the raw material to finished product is described, one begins to understand that significance lies in the consequence of the process itself - it connects the place and structure to memory. The sensuous quality of the architecture paves the way for the theoretical argument of haptic space making.

Architecture is art that must confront the realities of three-dimensional space – space that a highly complex humanity not only observes, but experiences. Our senses connect us to the world around us; the ear, nose, mouth, skin and skeleton embody experience in a web of simultaneous sensory interpretation.

04_theoretical discourse

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04_theoretical discourse

04.01_the industrial heritage

According to Blaetler, Hough & vd Westhuizen (s.a.), the Era Brick Works factory has been a landmark for the surrounding communities of Eersterust, Jan Niemand Park and Silverton since the factory was opened some 50 years ago. Although the public had no interaction with the factory, but merely a visual connection to the 30 meter high chimneys blowing smoke into the air, it can still be deduced that these dark and heavy structures remained in their peripheral views and had to have gained an intangible significance.

According to Alfrey and Putnam (1992:1), the industrial heritage of a factory building can be declared as significant when there is interest in the aesthetic (pleasing or not) of technical, historical and functional elements such as the chimneys of Era Brick Works.

figure_04.02_the grit of Globeville.

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04.01.01_Existing buildings and processes

The brick factory is comprised of two identical production lines. These production processes are linear and consist of:
- The quarried clay that is extracted from the site and stored in heaps around the site.
- The heaped clay is transported via a conveyor belt to where it is crushed and filtered through large tumbling sifts.
- The fine clay is conveyed to a storage shed north-west of the factory buildings. From here the clay is conveyed once again to the mixing room.
- The clay is mixed with water to form the desired consistency and is then pressed into long rectangular segments.
- Using a wired cutting machine, brick shapes are cut from the segments and then placed on pallets before they are moved to the adjacent shed used for drying the bricks.

Here the bricks are still moist and wait to be rolled (on tracks laid in the floor) into the oven. The oven uses hot air that rises from the kilns to dry the brick to a certain moisture content level. When they are removed from the dryer, they are left to cool to allow any excess moisture to evaporate slowly from the bricks.

The bricks are then moved into 34 separate Hoffman kilns (17 on either side of the second shed south-east from the drying shed). The bricks are fired for approximately 24 hours and left for another 24 hours to cool down before removing them. The kilns are coal-fired and rely on a mechanical system to drop a teaspoon full of coal into the 15 meter deep kiln every 20 seconds. The fire moves through the kilns in a clockwise direction through vaults in the bottom of the kiln walls.

The vaults are constructed using thin bricks and depend on compacted earth to maintain the integrity of the structures. Smoke and heat are extracted using a duct system that is connected to the 30 meter tall chimney at the south-eastern end of the factory building.

1 - processing and storing raw clay. 2 - mixing and forming of bricks. 3 - hot air drying. 4 - brick firing. 5 - extraction chimney.

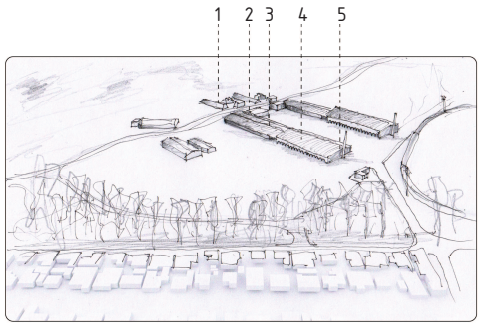

figure_04.03_existing processes.

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The first production line was constructed more than 40 years ago and has been out of commission for the last 15 years due to mechanical system failure. The cost of upgrading the factory did not prove viable and the structures were allowed to fall into disrepair. Since the retirement of the first production line, the second line has been operational for 10 years and is currently still in working condition. However, the line has very few lucrative years left and the owners of the factory have made the decision to decommission the facility as the time is fast approaching that it will no longer be an economically viable venture.

Vestiges of the years of production processes that activated the site are visible within the landscape and in the buildings. Machinery, tools, permanent structures and parts of the mechanical systems are found scattered throughout site. Bricks of different sizes and colours complete the tapestry of the landscape. While moving through these structures and artefacts, one can almost feel the bricks breathing, as a tangible presence that has borne witness to the passing of years within this once dynamic space.

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figure__04.04__a memory captured in time at an industrial site.

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figure__04.05__a patina of building and bricks.

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04.01.02_statement of significance

As the buildings are not older than 60 years, there is no prohibition against the demolition of the structures. However, the author feels that there is significance in the consequences of the process itself. The dated manner in which the bricks were made, gave form to the structure which ultimately produced more of their kind; the kilns and the machinery that form part of the industrial landscape - the arches of the kilns and the layout of the buildings - gain significance. Alfrey & Putnam (1992:52-71) refers to this as the cultural potential of the industrial heritage as it depicts a time of a specific tradition of a near-lost craft (nowadays brick works are streamlined with bricks mass-produced and the production line often focuses on profitability rather than the product and service).

The brick product connects the place and structure to a memory - a memory that serves as an explanation of not just the existing structures on the site and the means of production, but one that tells the story of a universal, modular structural unit – the brick: an ancient building material that has been an inspiration to many architects and builders over the centuries. The Era Brick Works factory is built for the brick, and despite the stagnancy of the buildings, just walking about the site one has a sense of the process of the natural material being formed and fired into a product that will have a long lifespan itself. The corporeal quality of the architecture and its materiality, entirely apart from the layers of meaning that have weathered the industrial surfaces, pave the way for the theoretical argument of haptic space making.

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04.02_"architecture for the senses"

"Architecture is the thoughtful making of space." Louis Kahn in Frederick, 2007:25

Bruno Zevi (1957:22) acknowledges that architecture is a form of art that is the preoccupation with space. Although many art forms, such as sculpting, share the ability of working in three dimensions, architecture differs from any other form of art as it grapples with a three dimensional vocabulary that includes the most intimate accommodation of an endlessly complex element: man. Man does not observe the three dimensions, man experiences it.

We are, as Pallasmaa (2009:13) states, connected with our surroundings through all of our senses. The body is "a knowing entity". He continues to say that our "**entire being in the world is a sensuous and embodied mode of being**…" and it is this fact, this ability of the human body to experience, that forms the foundation of our existential knowledge.

The body can perceive, interpret, structure and store existential knowledge in its muscles. In Hapticity and Time (2000), Pallasmaa mentions that every experience of Architecture is experienced by more than one sense, and always simultaneously. He states that it is not just the eye that experiences scale of buildings, spatial expressions and aesthetic qualities, but that the ear, nose, mouth, skin and even the skeleton embodies that experience in experience thereof.

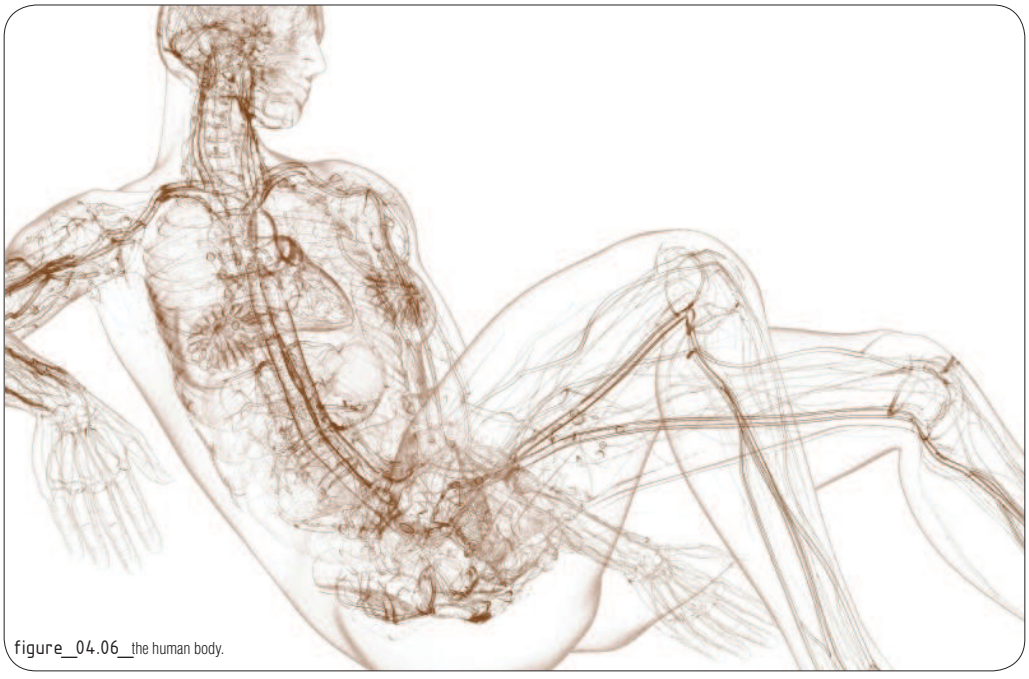

figure_04.06_the human body.

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"All the senses including vision, are extensions of the sense of touch: the senses are specializations of the skin, and all sensory experiences are related to tactility"
Pallasmaa, 2000.

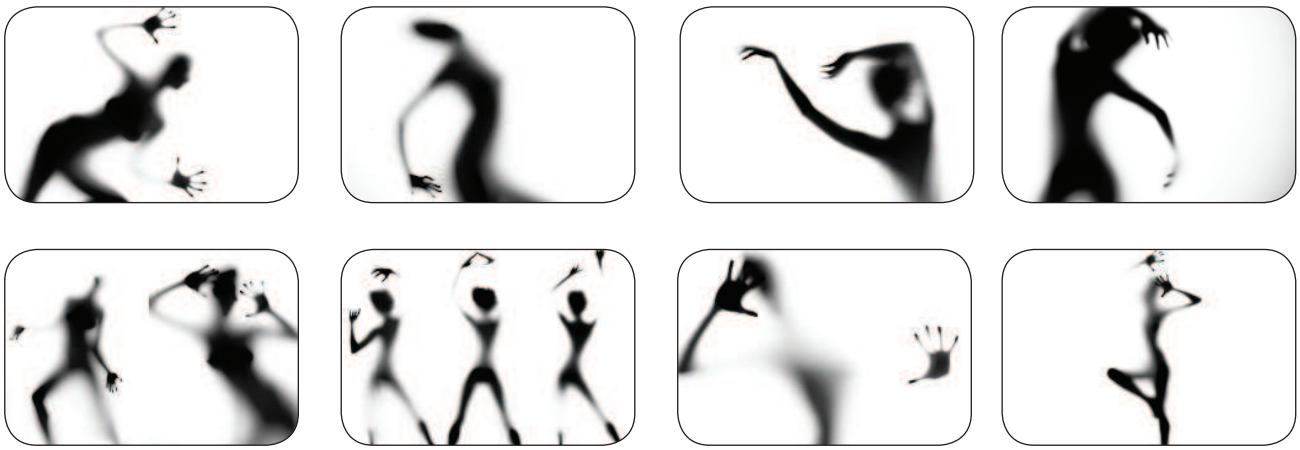

figure_04.07_series of spatial tactility.[3]

[3]The Jes Dance series by Michael Dare is a visual extension of Pallasmaa's statement (2009:13) that we are connected with our surroundings chiefly through all of our senses and that the body is "a knowing entity". With the mantra in mind that all sensory experiences are related to tactility, as he advocates, the images above serve to illustrate how an anonymous figure, driven by some intangible stimuli, can put their bodies through a series of movements that interact with, express the physical experience of, and explore all the other senses through the manipulation of the physical body – articulating its own tactility, in relation to itself as well as to the air and space and material around it. As the centre of gravity, the attitude toward negative space, the light quality over the skin (as witnessed by the onlooker) is observed – one is given a taste of the experience by voyeuristic means, and can better understand the concept of abstract, heightened tactility.

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Zumthor (2006) stated that architecture should aim to be sensuous and transmit the hapticity of materials. Space should therefore be constructed around an intention of creating poeticism about the materials, and how the architect intends for man to experience that space and tactile qualities. Although theories tend to abstract the architectural idea of space making, the author believes that it is essential for architects to bear in mind during the design process that architecture is never perceived as theoretically intended. In support of Zumthor's (2006) statement, architecture is a concrete matter - not abstract - and that experience of space is influenced by innumerable factors, not the least of these being **light, tactility and volume**.

Zumthor (2006:59) suggests that it is our inner, intangible and sensuous image of our architectural experiences that helps us not to get lost in the theories of space. Zumthor (1999) also suggests that the making of space is not arbitrary, that it is the architect's way of recollecting spatial experiences that are embodied within the architect's self. He also refers to the ability of architects to use these recollections to imagine what else could be made from this raw experiential material.

As the architect possesses the ability to recollect holistic haptic memories of spatial experiences, the question of "space making" turns to the ability of man without architectural knowledge about the influence that architecture has on space, to embody and recollect spatial experiences in the same way or as intended by the architect when first experienced.

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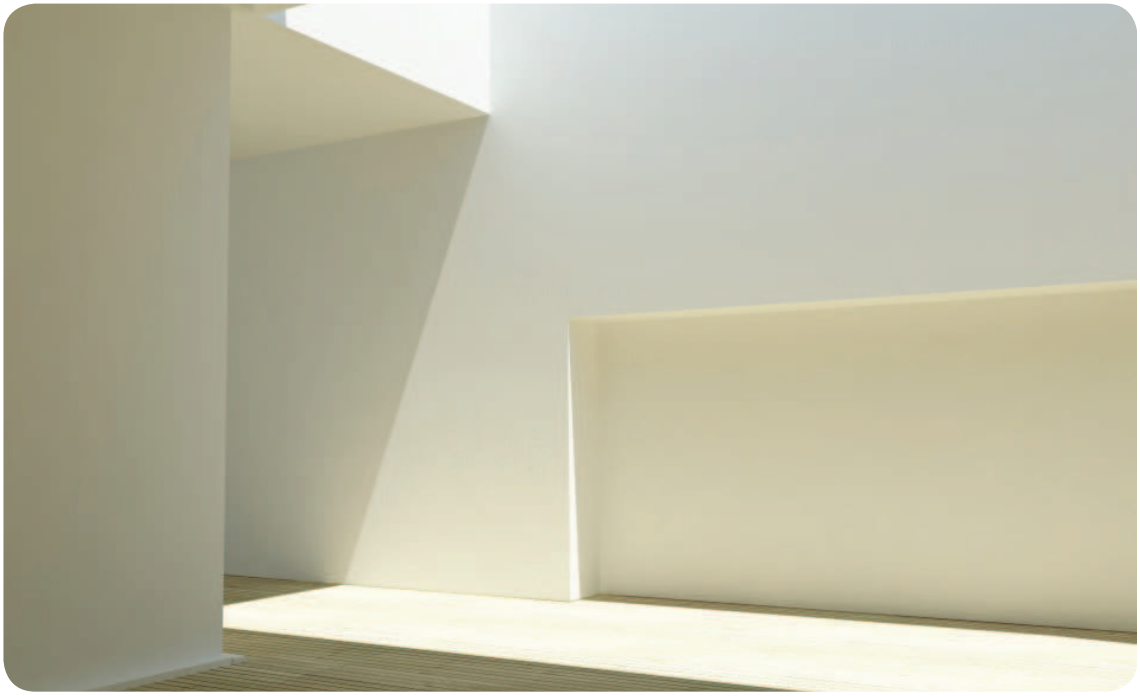

figure_04.08_white architecture.[4]

[4]The image above serves to illustrate that the experience of space is influenced by light, hapticity and volume – and that inevitably complex factor – man's experiential understanding of three dimensions. The user enters a space such as the above with his own plethora of associations, assumptions, biases and human conditions – a filter through which he sees, feels, smells, touches and senses. However the architect intended the space to be experienced, will physically be felt – but then interpreted within the unique reality of each individual user.

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The author supports Zumthor's concept, but combines it with the earlier statement that architecture is never perceived as theoretically intended. Man has his own and much individualised recollections of time and experiences, based on the nature, reality and associative world he has constructed for himself. Man is and experiences what he surrounds himself with. However, Holl et al (2006) define an architectural experience as one that eliminates all of the surrounding noise and coherently removes us from the present, allowing man to experience and understand some isolated aspect of tradition, time and history. According to them, all experiences imply an "**act of recollection, remembering and comparing**".

Subsequently, it becomes evident that the expression of hapticity of materials and how they inform space making and architecture is an essential aspect that cannot be ignored in the conception of "space making".

Pallasmaa (2000) suggests that Architecture is all about how the experience of space can be manipulated to fulfil a simple task or architectural goal; and that is to make the following concept clear, visible and tactile to man: "**how the world touches us**".

Holl et al (2006) further explain that natural materials allow for the experience of man to penetrate the materials and comprehend the authenticity thereof; the ability for natural materials to express time and tell a story enhances spatial experiences. In light of the issues raised in this dissertation, materiality and expression of man's relationship to the natural world becomes a substantial driver for both design and technical resolution.

These design imperatives will be applied to the resolution of the proposed buildings, as well as the approach to and resolution of the industrial heritage aspects of the project.

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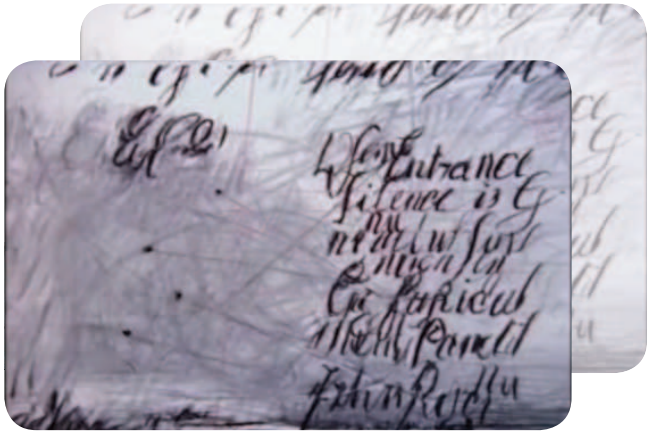

figure_04.09_press image by William Kentridge.[5]

[5]Zumthor (1999) suggests that the making of space is the architect's way of recollecting spatial experiences that are embodied within the architect's self. He also refers to the ability of using that recollection to express an idea as an extension of our experiences as architects. William Kentrige's work makes reference to that residue of experience – spatial and otherwise. As his charcoal drawings move as animations over a white two dimensional plane, creating his characters from the formation of words and descriptions captured in language, the animation titled Automatic writing expresses the idea that Man is and experiences what he surrounds himself with. His past experiences, like the residue of the charcoal that informs every frame from that point on as a tangible mark, inform his current reality.

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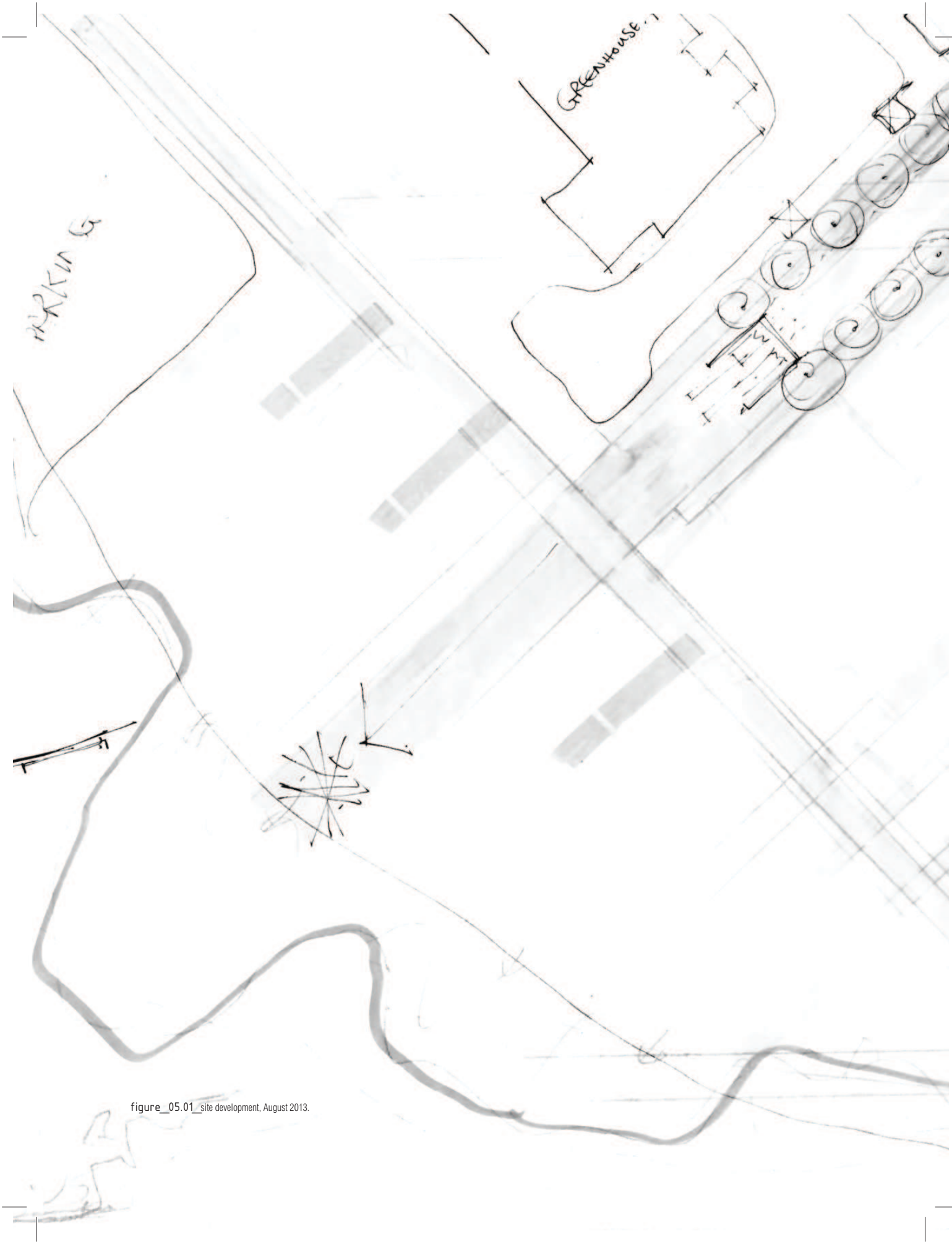

figure_05.01_site development, August 2013.

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05_design development

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Figure 05.02 south west view of brick factory

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05_design development

05.01_the site

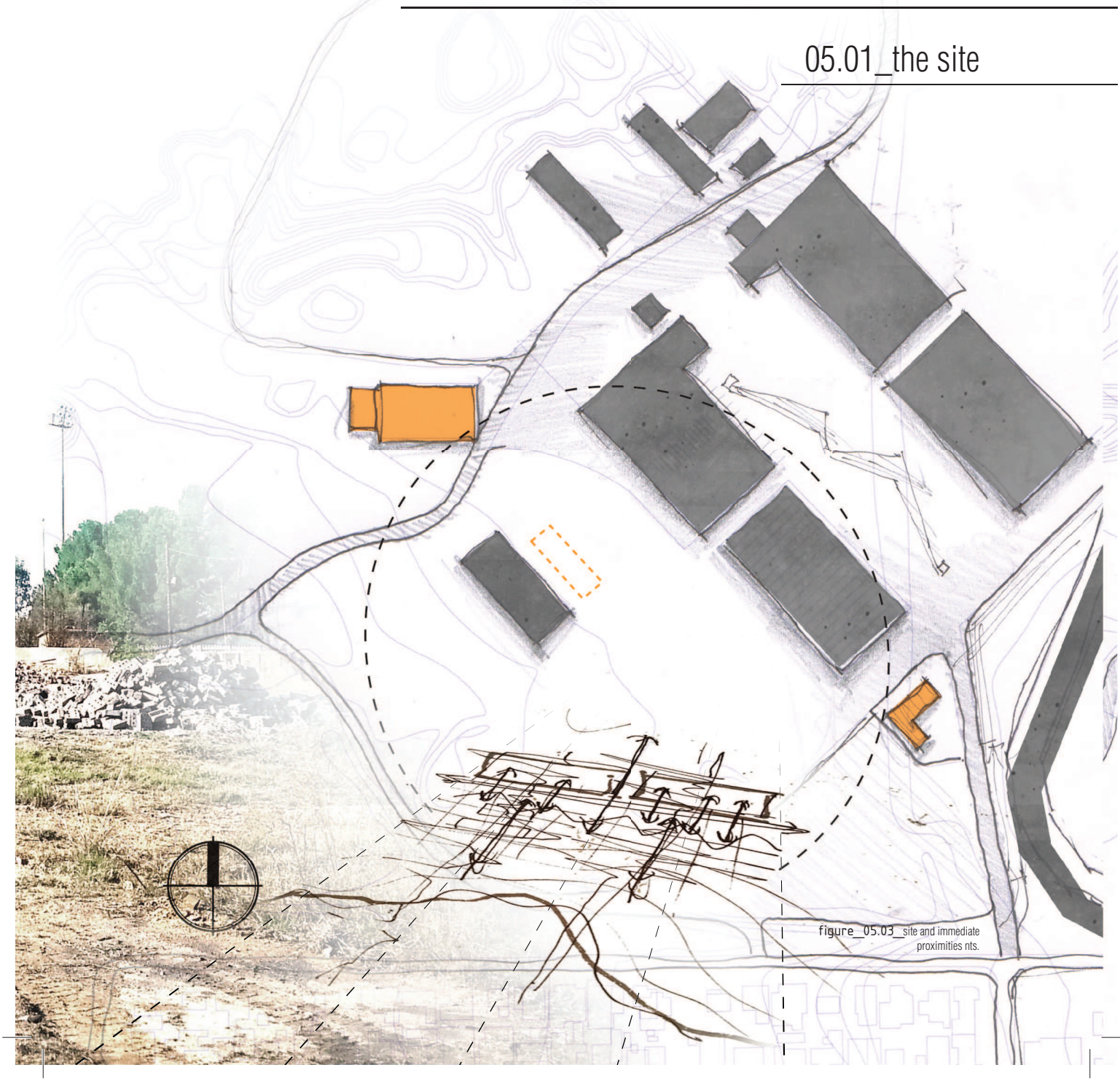

figure_05.03_site and immediate proximities nts.

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05.02_site informants

Contextually responsive design is ensured through the understanding of immediate proximities. The qualitative, programmatic and spatial contributions of surrounding architecture, landscapes and functions inform the design process and are expressed in the resolution thereof. Fisher and Clarke (2012) suggest that design should be generated through investigating the responses to diverse problems that are informative independently so that one can reach an optimal resolution.

"It must be borne in mind that the inherent qualities of each facet are but a subsystem of the emergent design that needs to be tested as a whole." Fisher and Clarke, 2012:75.

The programmatic organisation of the processes extant within the design informs the placement of the proposed facilities in terms of the conceptual approach as it applies to each phase. These phases include the processing of raw material – fibre extraction, manipulation of natural form, bio composites and the intermediate state – to public interface, the finalising of a product – the textile mill, and exhale. These are the expression of process.

1 - clay extraction facilities. 2 - brick forming and drying. 3 - hoffman firing kilns. 4 - second production line. 5 - storage sheds. 6 - sports stadium. 7 - shed proposed to be converted into a stream driven power plant. 8 - new proposed information and bicyle store for era park.

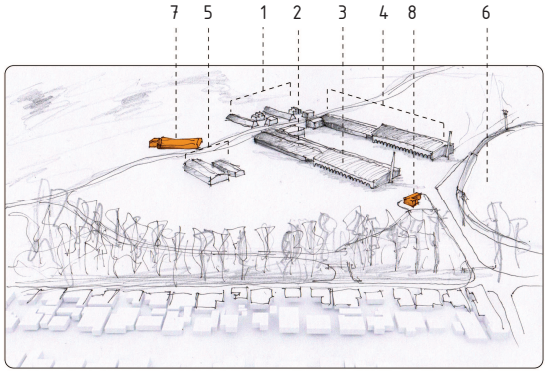

figure_05.04_existing building/programs and proposed programmatic insertions.

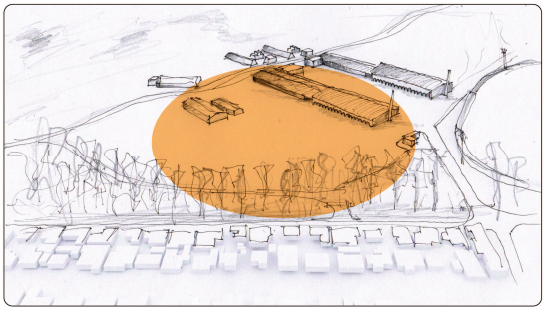

figure_05.05_site and immediate proximities.

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1 - processing of raw material. 2 - manipulation of natural form.
3 - intermediate state. 4 - finalising a product. 5 - exhale.

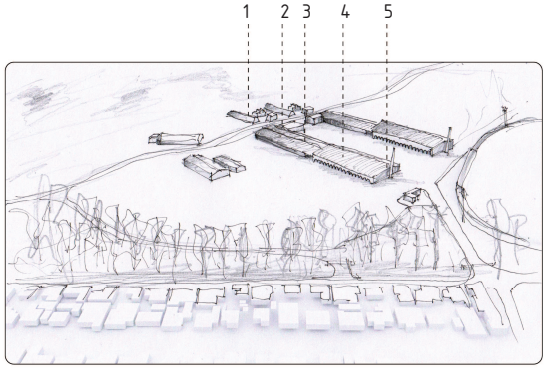

figure_05.06_programmatic organisation of existing processes.

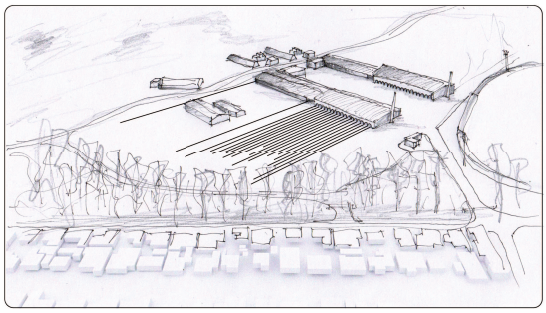

figure_05.07_grid organisation of kilns and shed.

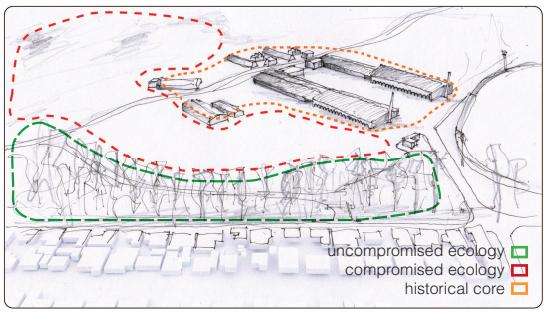

figure_05.08_immediate conditions.

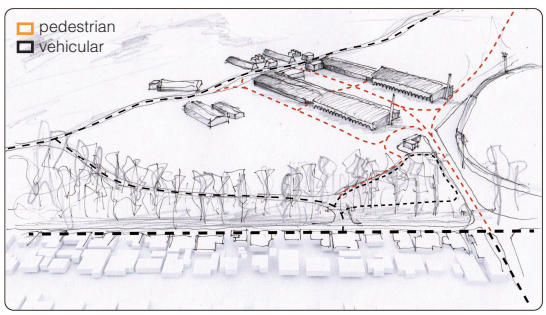

figure_05.09_site circulation.

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05.03_experiential proximity

Due to the scale of the existing structures and the size of the site, the placement of the proposed fibre processing plant is investigated thoroughly. Through the exploration of perception of scale and experience of spaces – as referred to specifically in the chapter on theoretical discourse – the fibre processing plant's presence in the landscape is considered in terms of the intervention's proximity to the existing. An observable proximity is achieved through allowing the two architectures to belong to their immediacies yet remain integrated in a larger, and observable, framework for the observer to experience as either a singular or separated space.

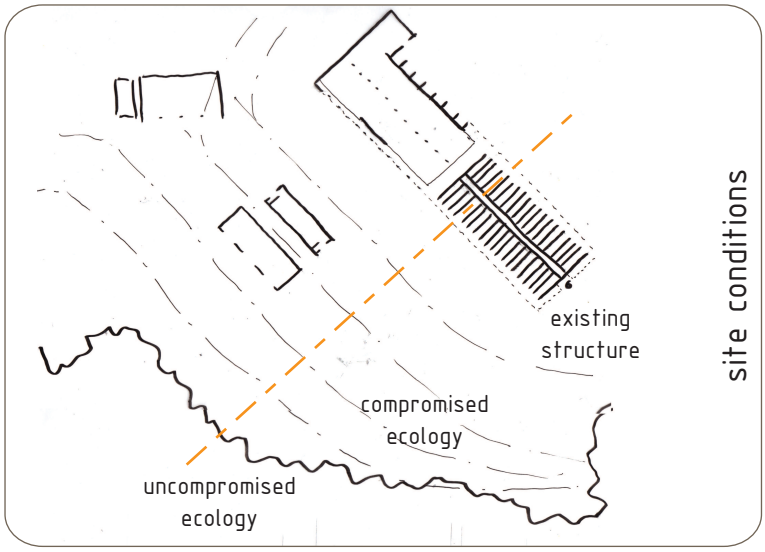

figure_05.10_site condtions and section location.

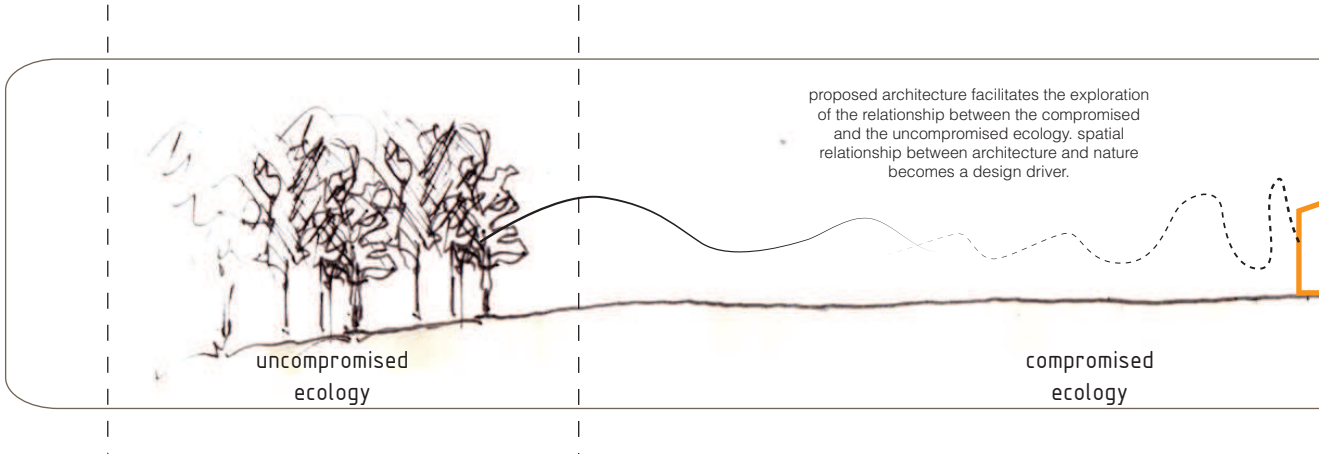

figure_05.11_experienced proximity.

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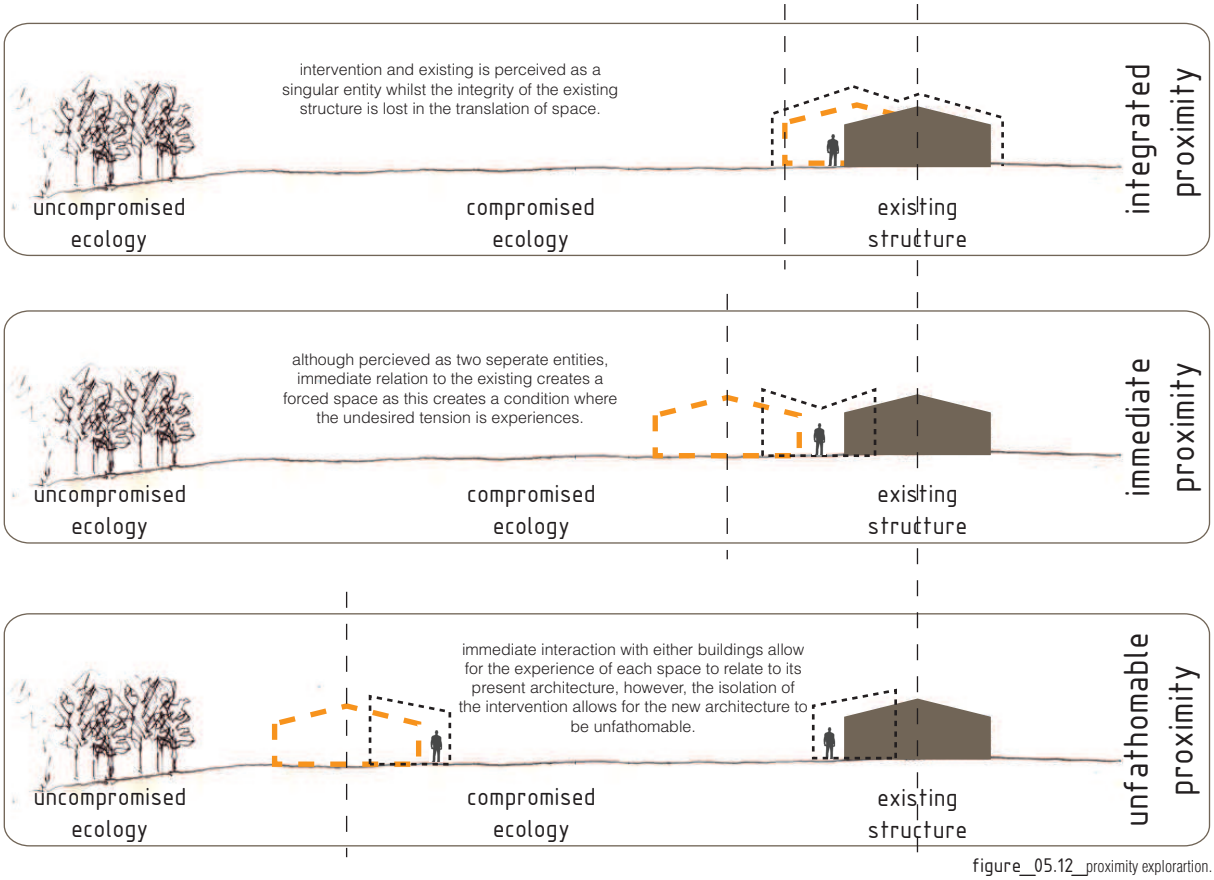
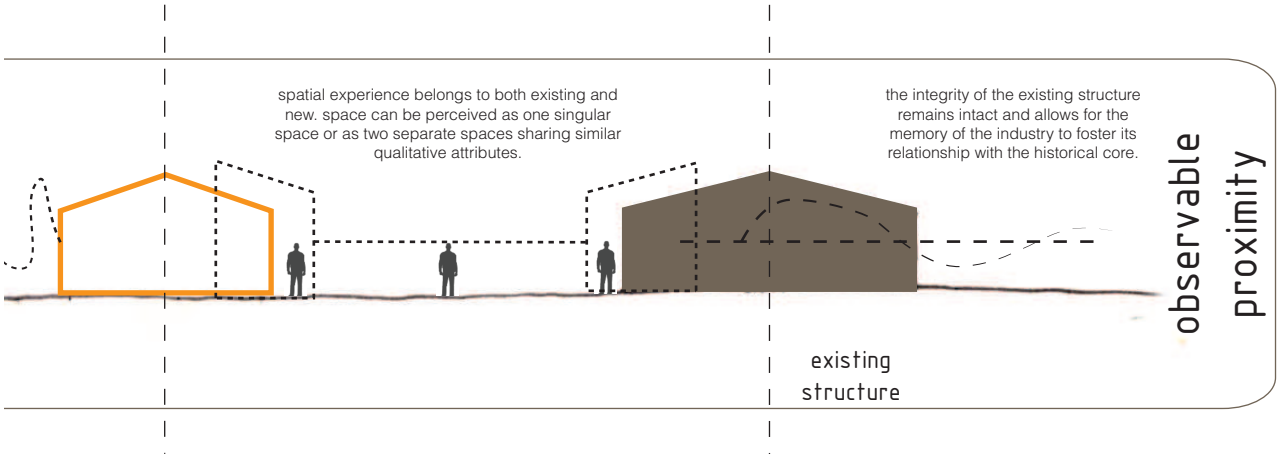


figure_05.12_proximity explorartion.



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05.04_heritage approach

The existing kilns have a stereotomic presence that is grounded heavily within the context and the landscape.Their presence therein is tangible, while the human perception thereof is malleable. The burn marks, cracks and blemishes on the brick arches communicate the age of the structure while beautifully enhancing the character of the site. Cues are taken from the existing aesthetic of the site in envisioning the spaces that will articulate the intervention. For instance, the gallery and restaurant spaces will celebrate the patina of the kilns by contrasting these heavy elements with lighter tectonics. The designer intends that the kilns will become objects of art, newly conceived of, as the new architecture will frame the brickwork and poetics of the aged materials.

Castelvecchio Museum, Verona Italy. 1956-78, Carlo Scarpa.

figure_05.13_Castelvecchio museum, Carlo Scarpa.

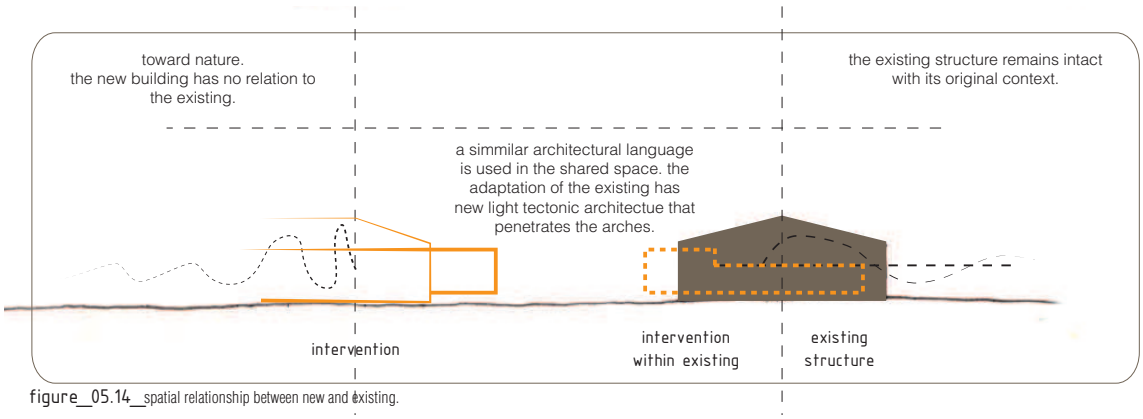

figure_05.14_spatial relationship between new and existing.

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"Time is the most mysterious dimension of both the physical reality and human consciousness... Our common everyday understanding of time seems to fall apart under the scrutiny of science..." McCarter & Pallasmaa, 2012:45.

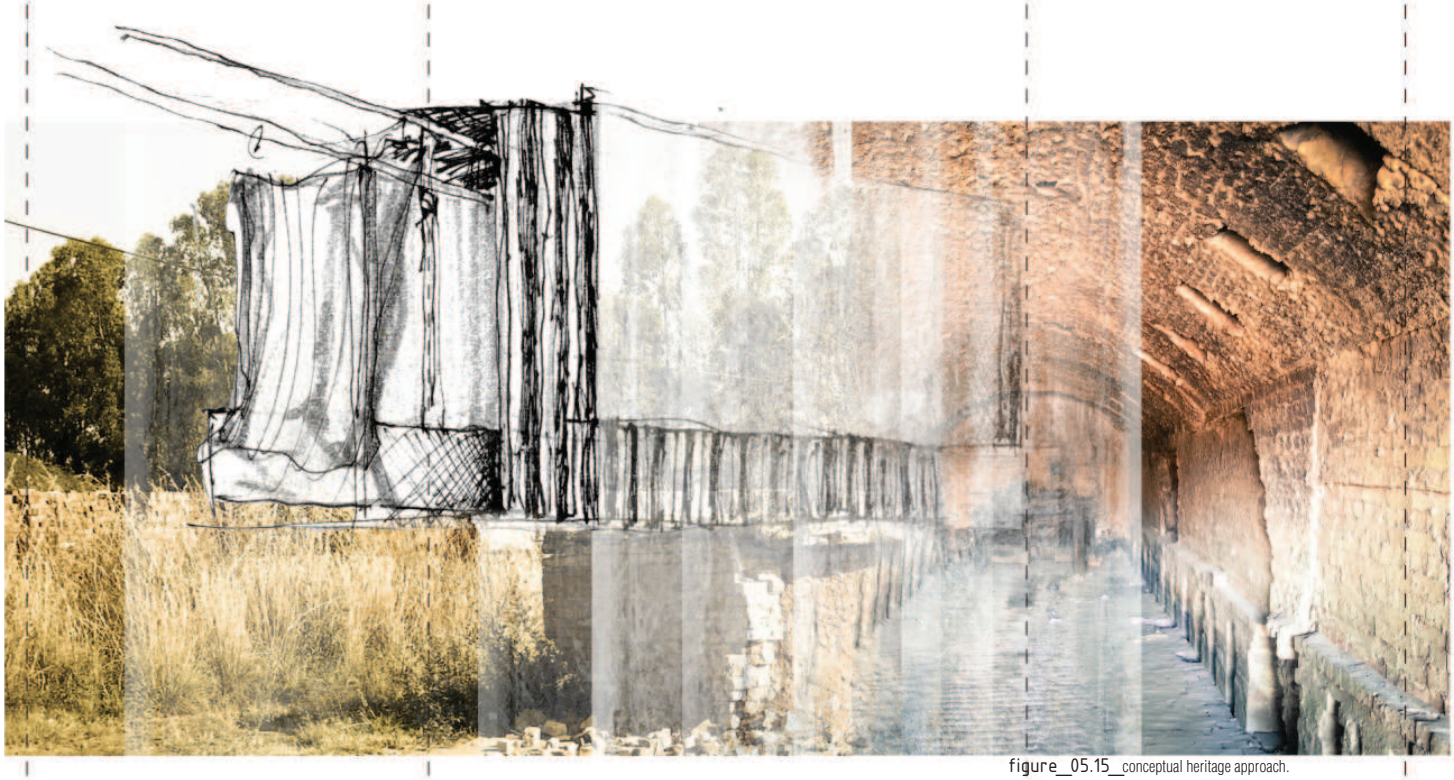

figure_05.15_conceptual heritage approach.

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05.05_ethereal vestige

Derived from the significance the factory's chimneys embody as a landmark, and the notion that one attaches a certain experiential value to objects that one has no immediate interaction with, the term 'Ethereal Vestige' is used to define the structures. 'Ethereal Vestige' is explained as an intangible/ unattainable yet visible remnant of a building, a process or a landmark that has significance, to both the viewer and to the non-witnessing landscape.

The conceptual approach to the design resolution is formulated around the idea of enhancing the significance of these structures through establishing a more quantifiable relationship between man and the existing structures. To add value to the experience of the spaces - old and new - certain relationships are to be established based on the tactile attributes of industry, nature and architecture. Tactility refers to the notion that each part of, and the sum total of our physical senses are merely extensions of our tactile sense, and that all sensory information is related to the experience of touch.

Relationships are thus established through engaging with this ethereal vestige, which is subsequently based on the nature of the entities involved.

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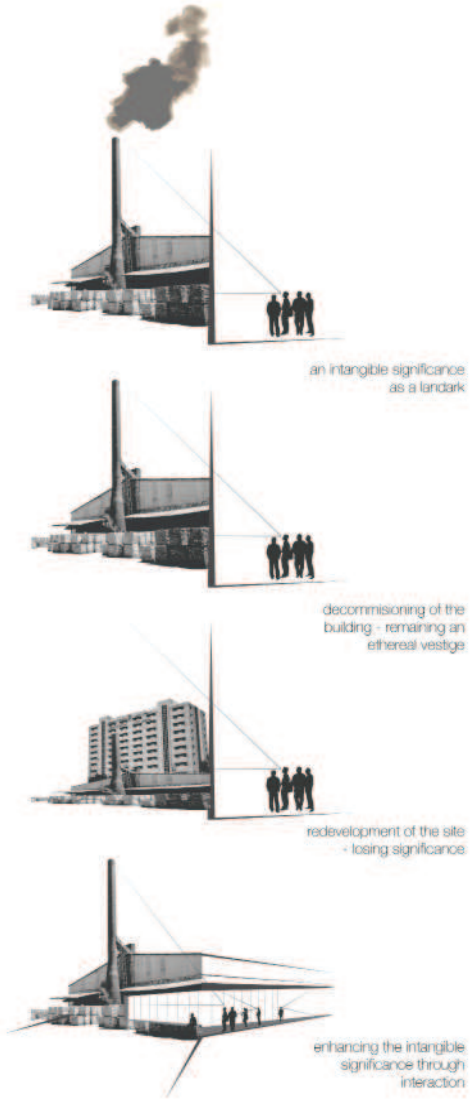

figure_05.16_enhancing significance, ethereal vestige.

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figure_05.17_conceptual notion of ethereal vestige, man and his 1st nature.

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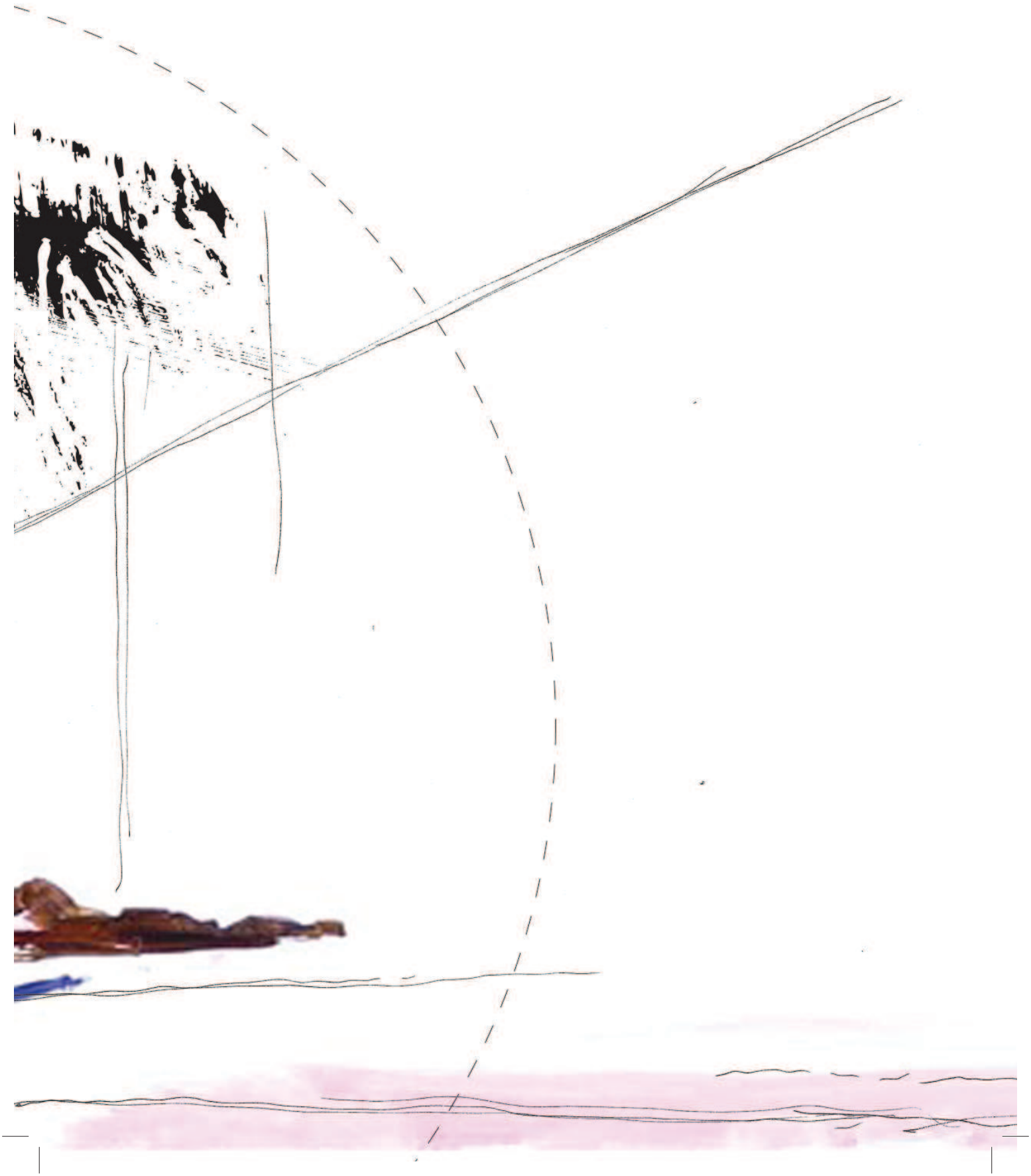

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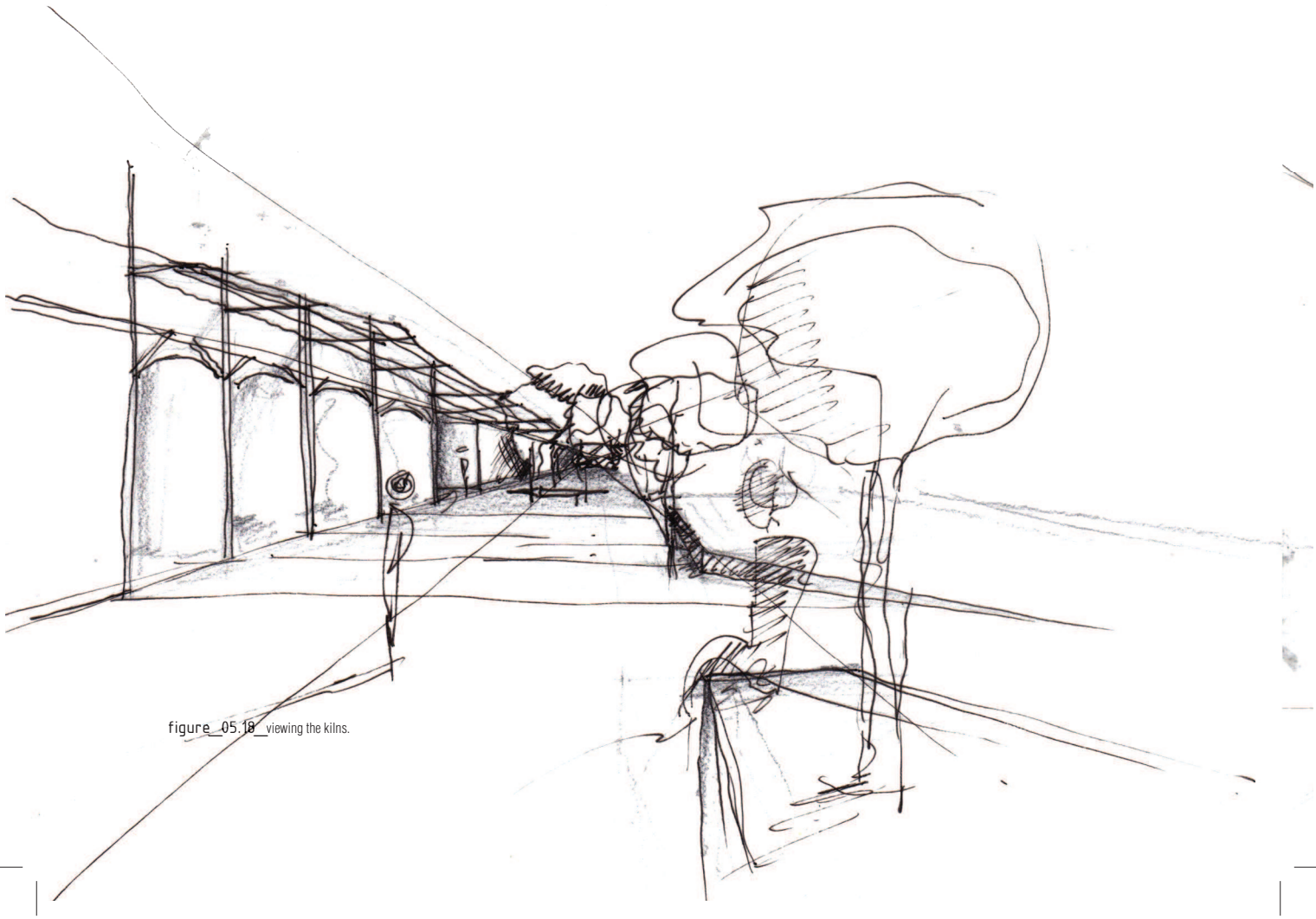

figure__05.18__viewing the kilns.

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"…the usual design process proceeds from a guiding conceptual image down to the detail, this architecture develop from real experiential situations towards an architectural form. As drawings, in fact, these buildings might sometimes appear vague, fragmentary or incomplete, as the design aims solely at qualities arising in the lived experiential situation." Pallasmaa, Hapticity and Time, 2000.

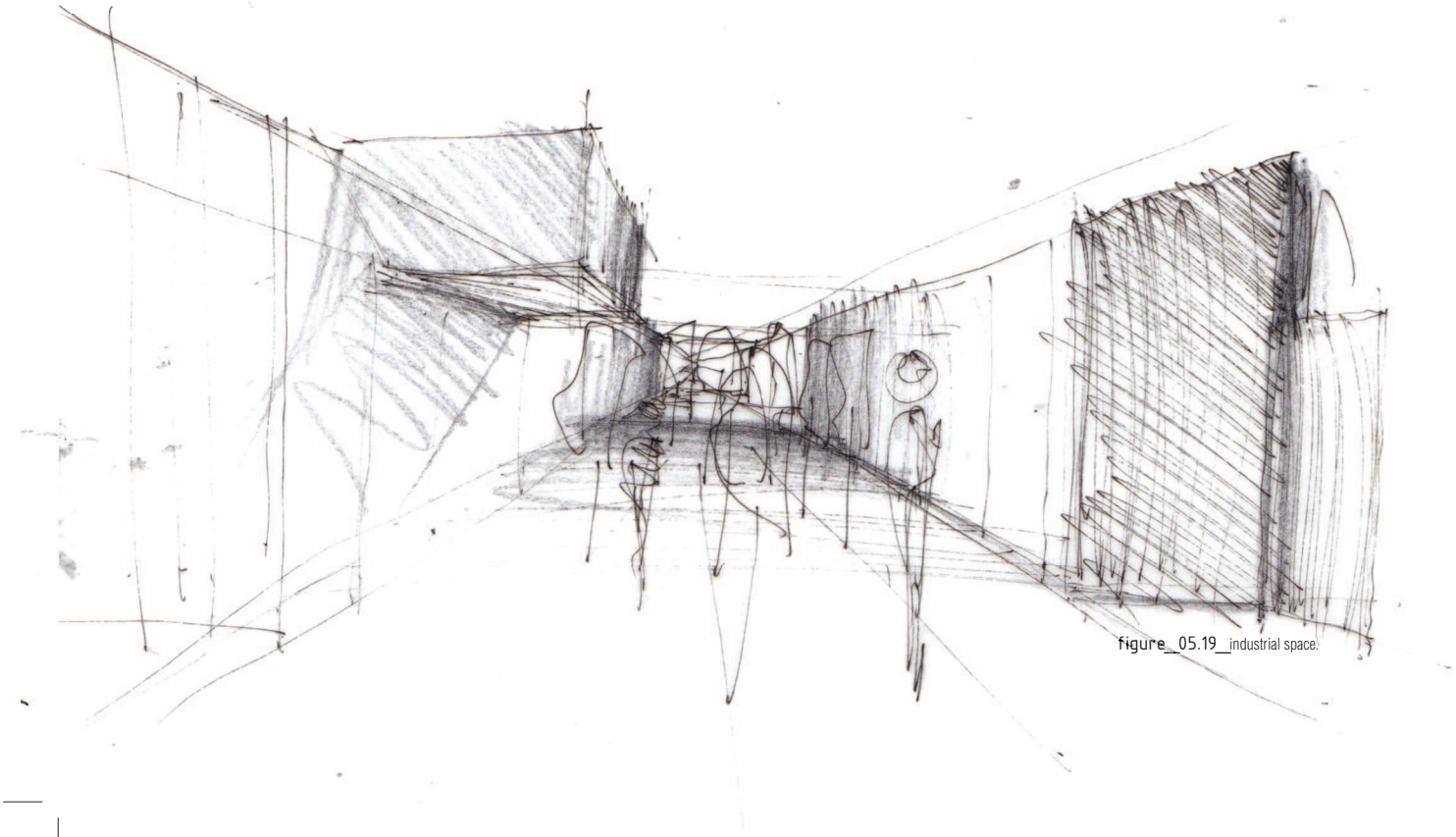

figure_05.19_industrial space.

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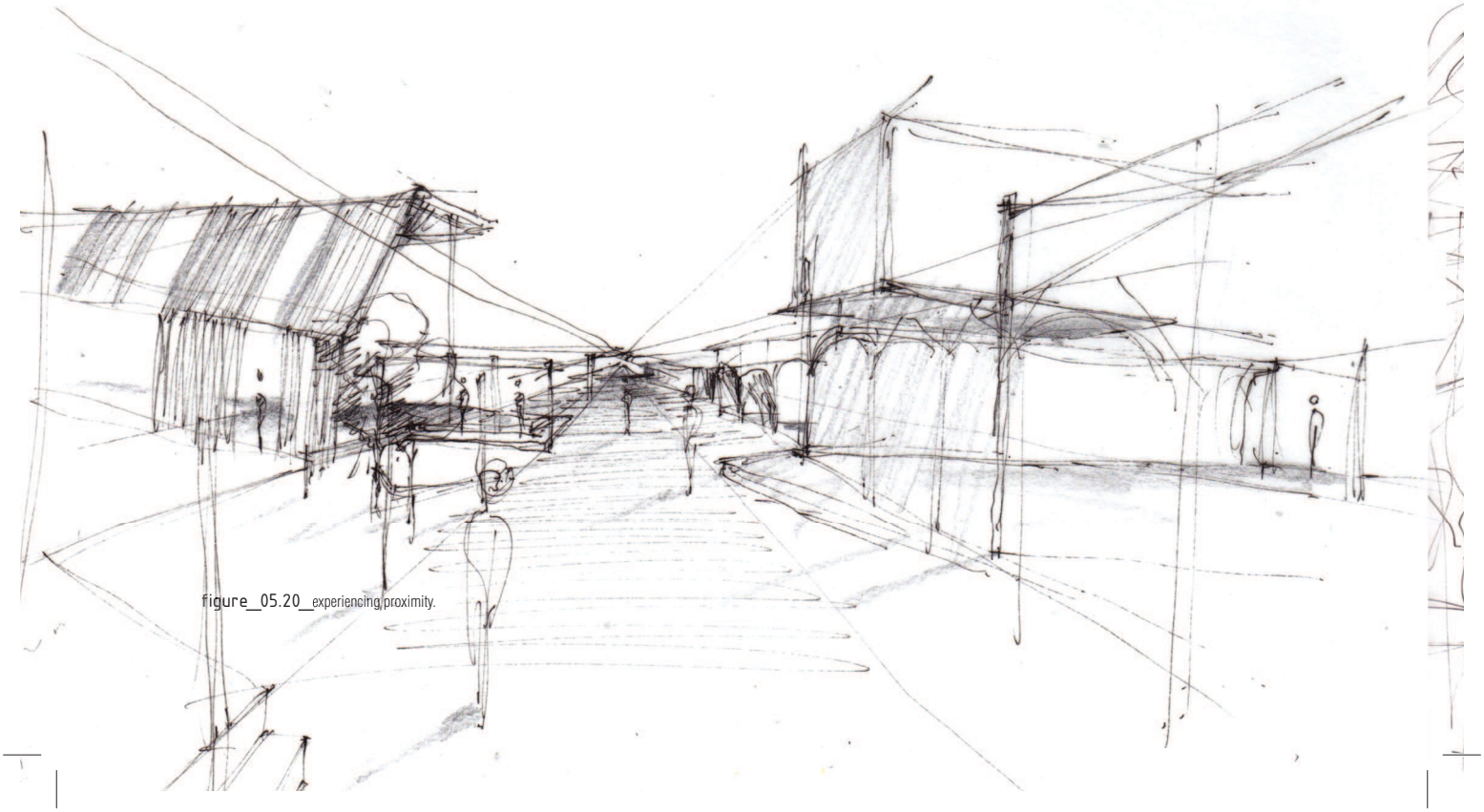

figure_05.20_experiencing proximity.

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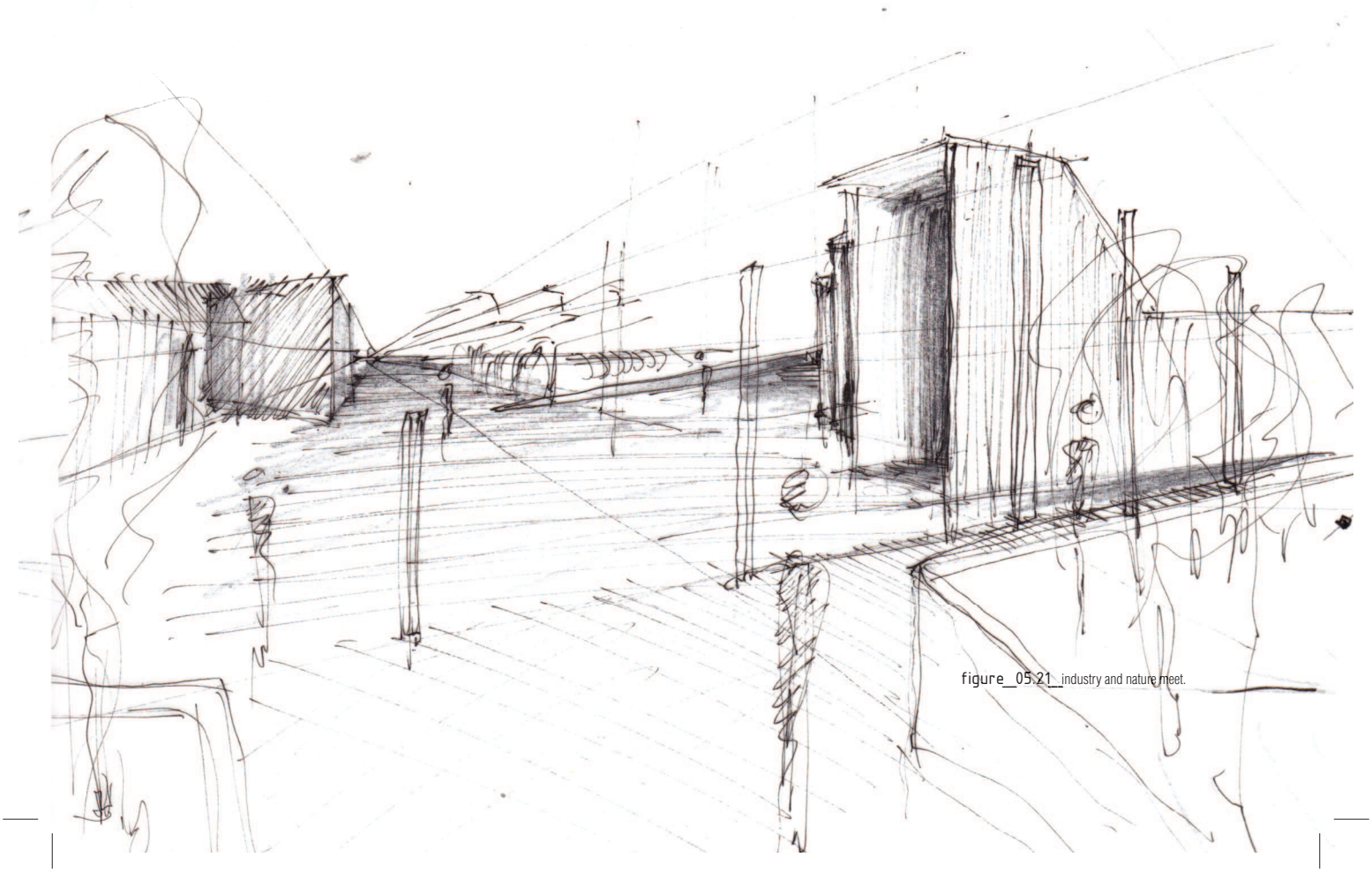

figure__05.21__industry and nature meet.

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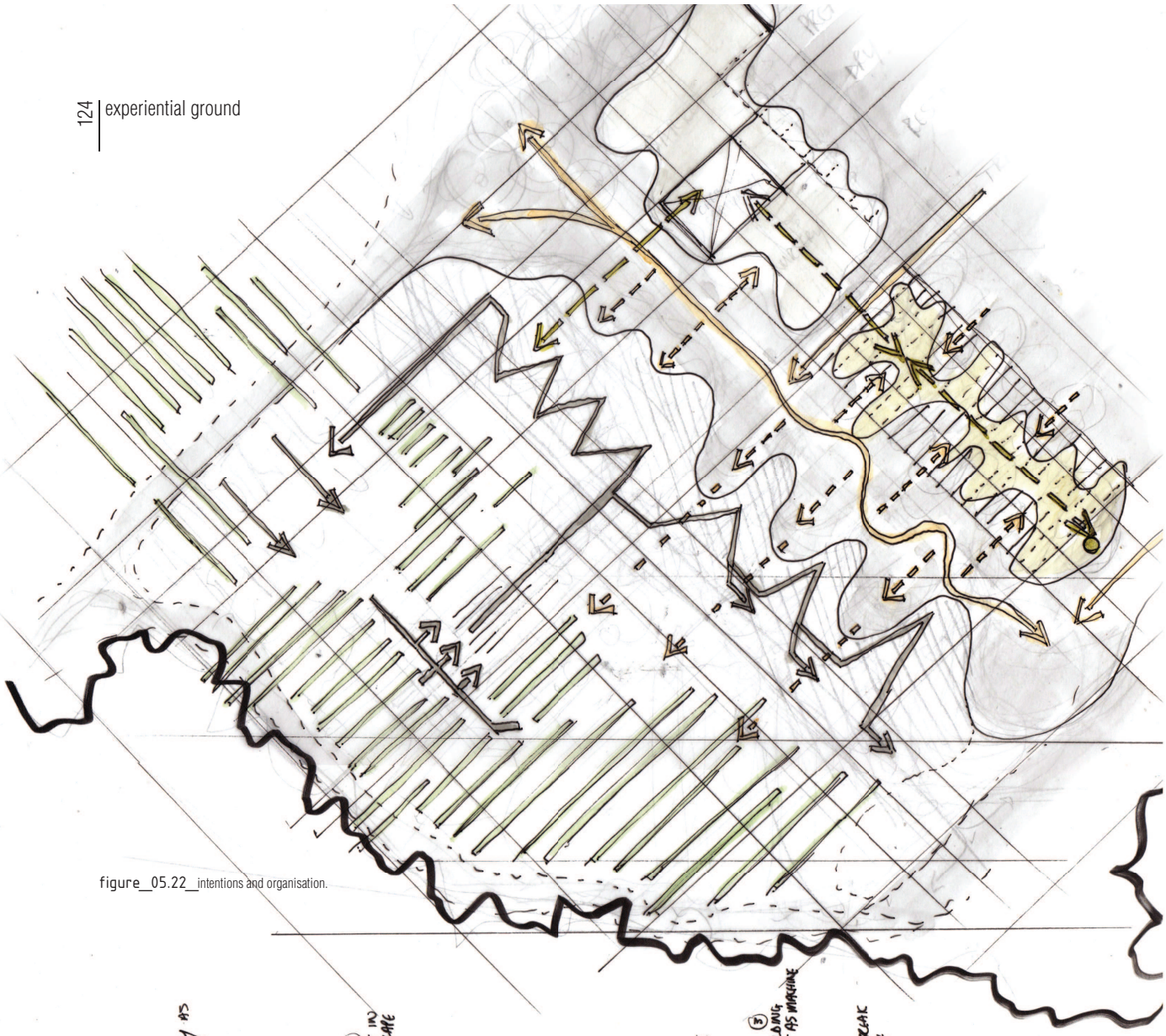

figure__05.22__intentions and organisation.

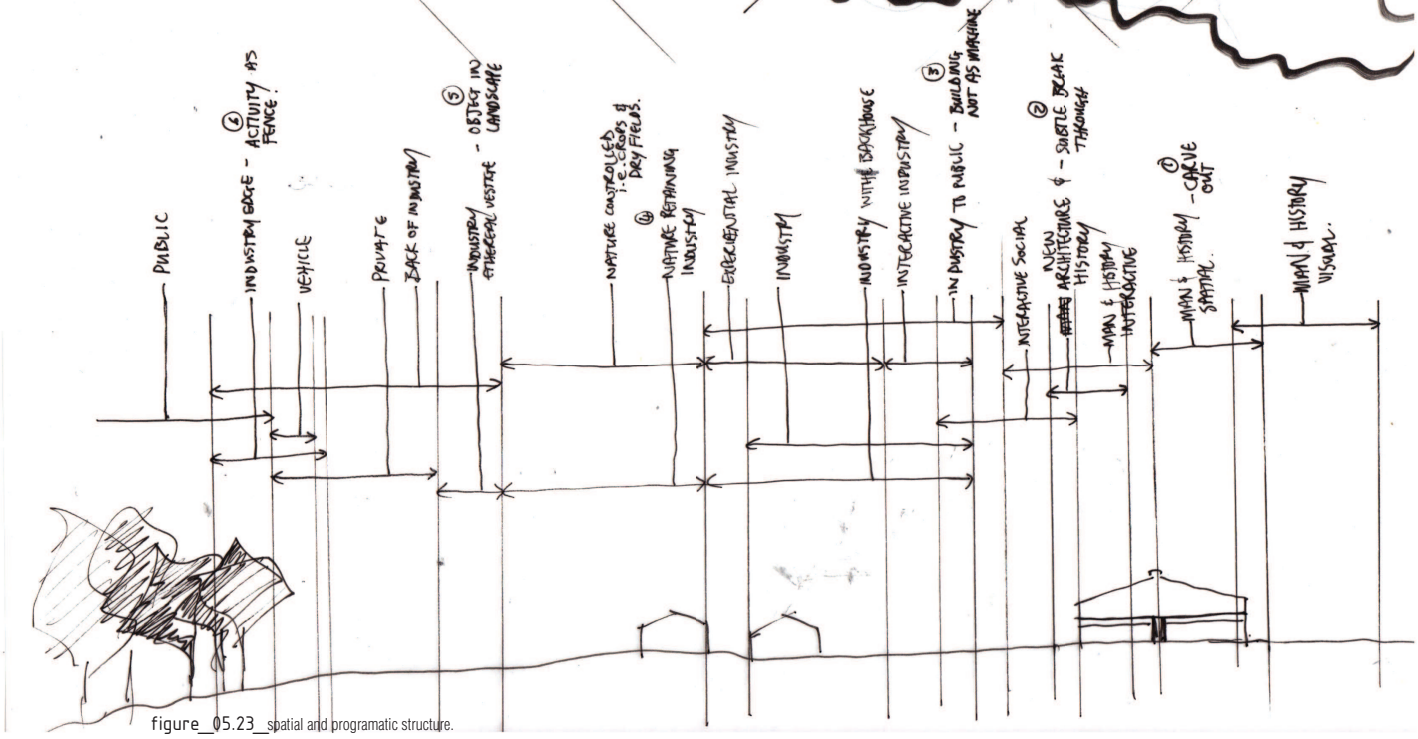

figure__05.23__spatial and programatic structure.

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05.06_site development

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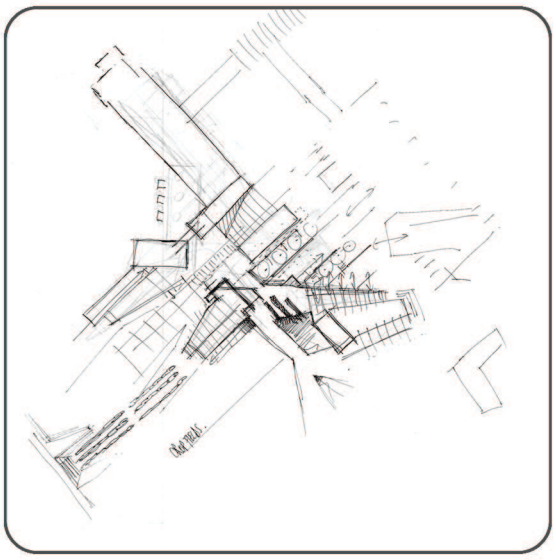
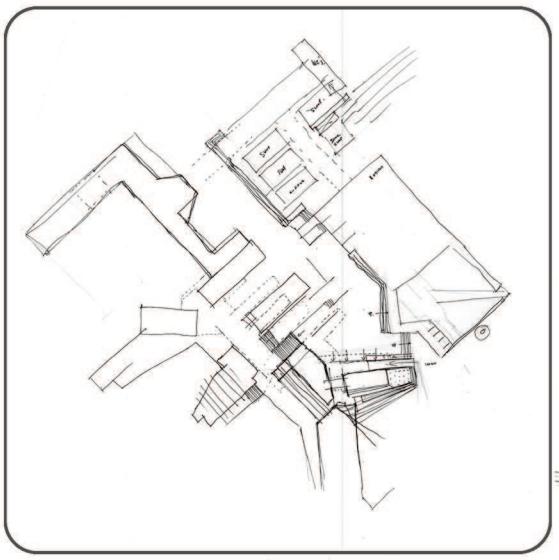


figure_05.24_site plan development nts.



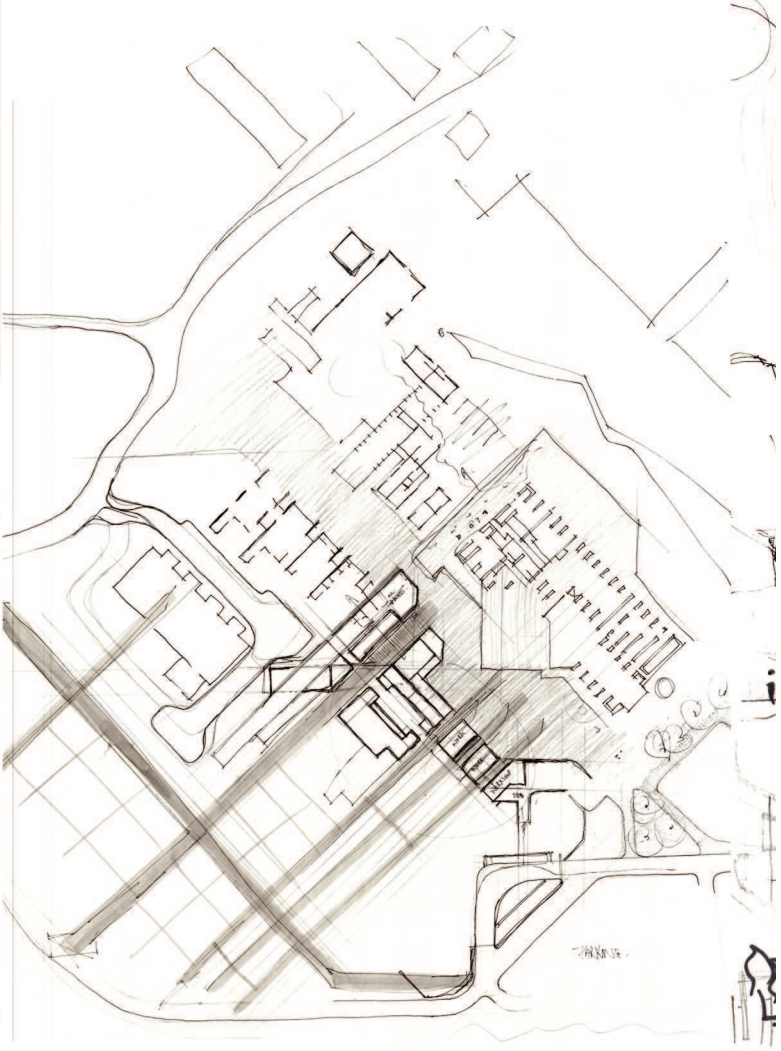


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figure_05.25_conceptual site plan.
figure_05.26_conceptual section exploration through site.

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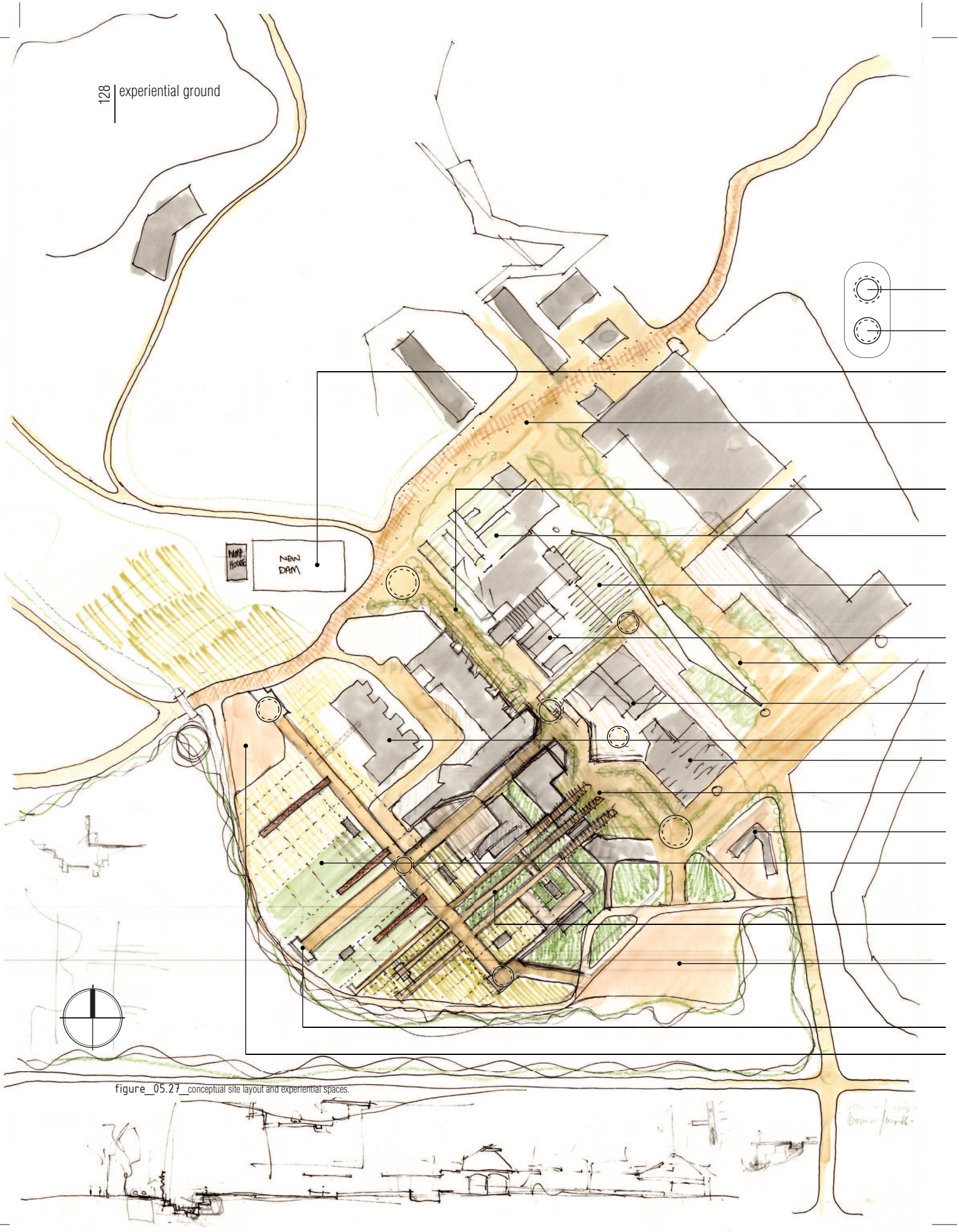

figure_05.27_conceptual site layout and experiential spaces.

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node

point of arrival

steam power plant

vehicular assessable square

outdoor market

indoor market

nursery

craft based retail

era square (social core)

social programme in existing

shed converted into a greenhouse

gallery and building exhibition

experiential sculptor's yard

information and bicycle store for regional park

large pilot crop fields

public pilot crop fields

graveled parking

contemplation space

graveled parking

public pilot crop fields

figure_05.28_Rooftop Haven for Urban Agriculture, Chicago USA.

large pilot crop fields

figure_05.29_Tokachi Millennium Forest, Shimizu Japan.

bamboo crop field

figure_05.30_The Floating Gardens, Yongning River Park China.

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figure_05.31_plan development.

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05.07_plan development

The plan has been developed around the experiential spaces where man is introduced to the existing structures, products (market and retail), sculptors' yard (exterior exhibition spaces of organic sculptures and arts), the crafts section (workshops and studios), the industry area (processes of extraction to final products) and the natural elements (crop fields and experiential landscape). The plan responds to the rigidity of the existing structure yet allows for interpretive movement through the different experiential entities. The initial design – being of the industrial typology - lacked many of the nuances of designed space, not the least of these being flexibility and poetics.

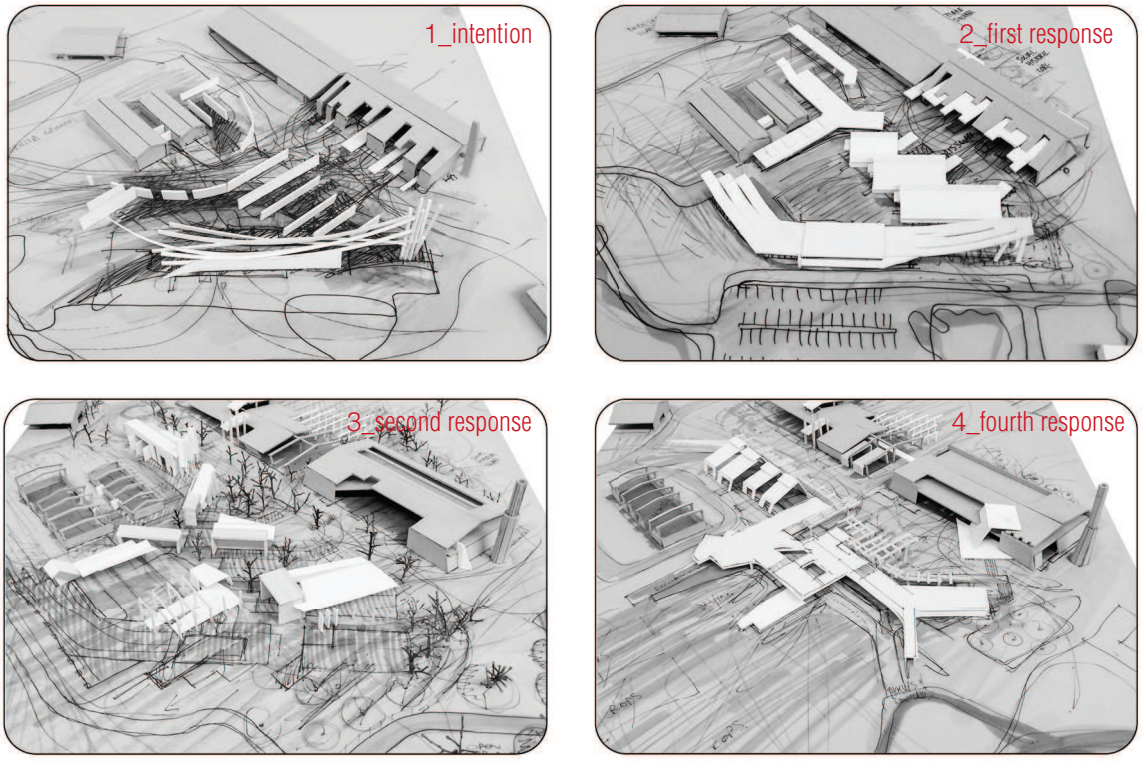

figure_05.32_model development.

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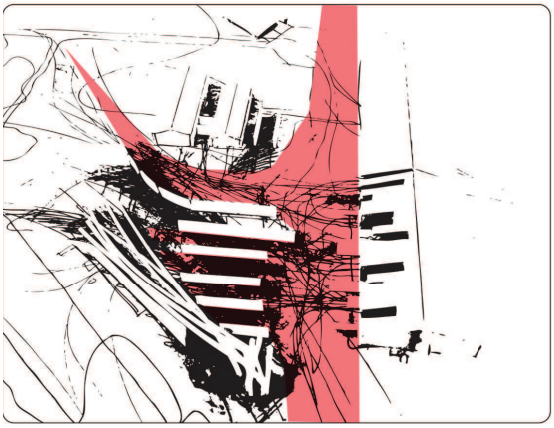
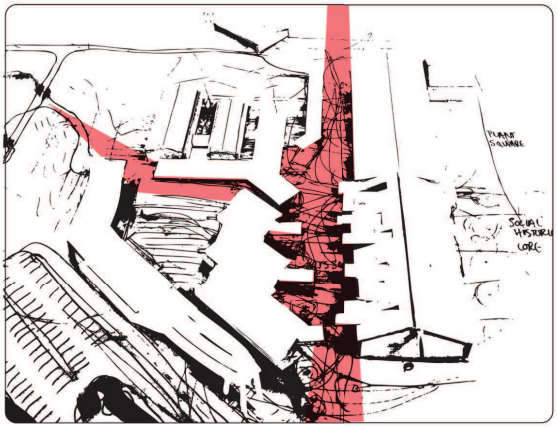
05.08_spatial analysis

1_intention



2_first response



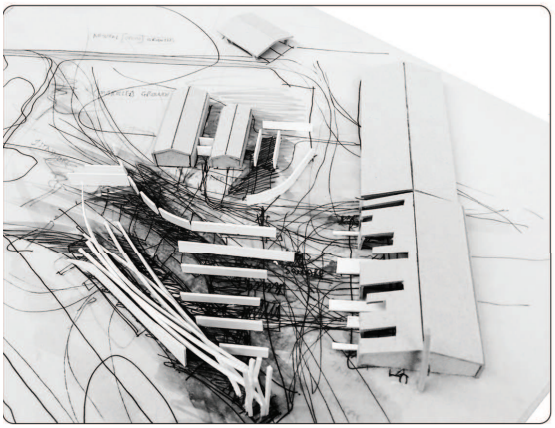


figure_05.33_intention model spatial analysis.

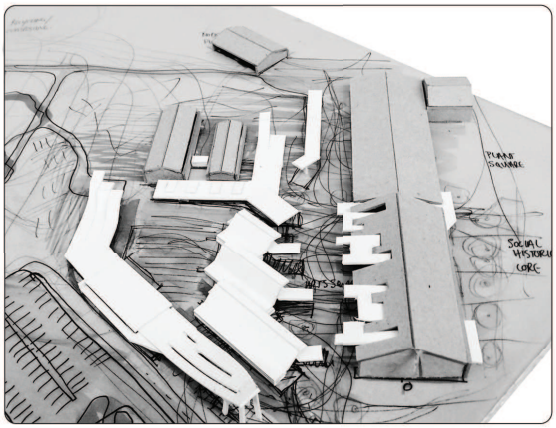


figure_05.34_first response spatial analysis.

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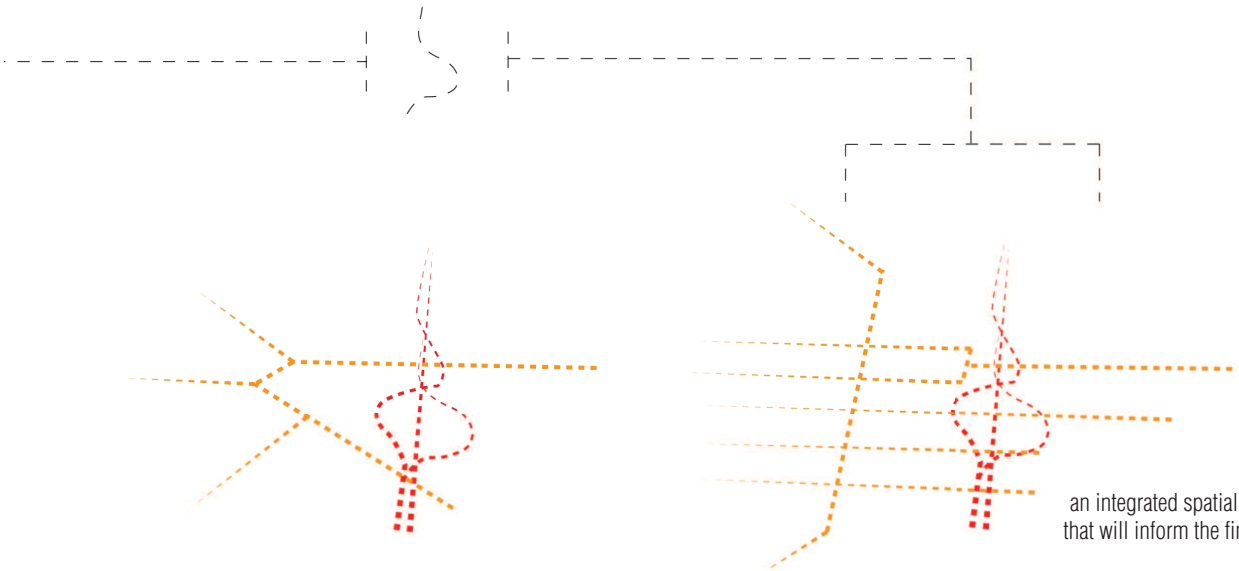
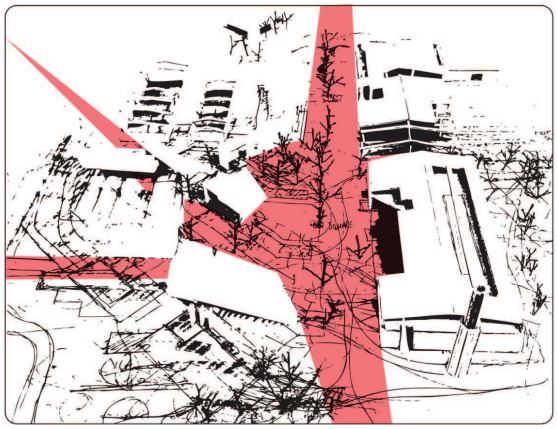
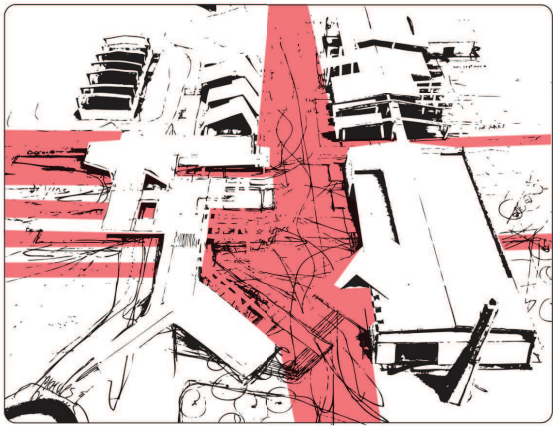


an integrated spatial resolution
that will inform the final design.

3_second response



4_fourth response



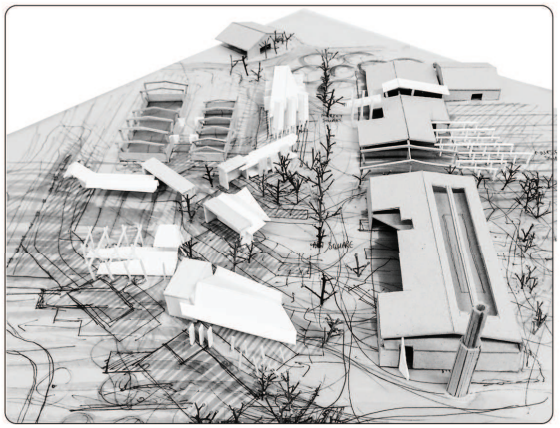


figure_05.35_third respone spatial analysis.

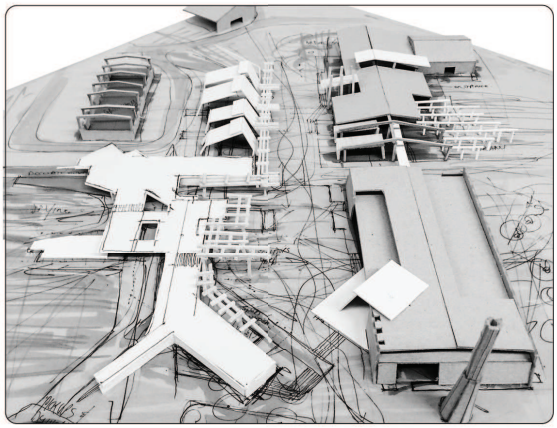


figure_05.36_fourth respone spatial analysis.

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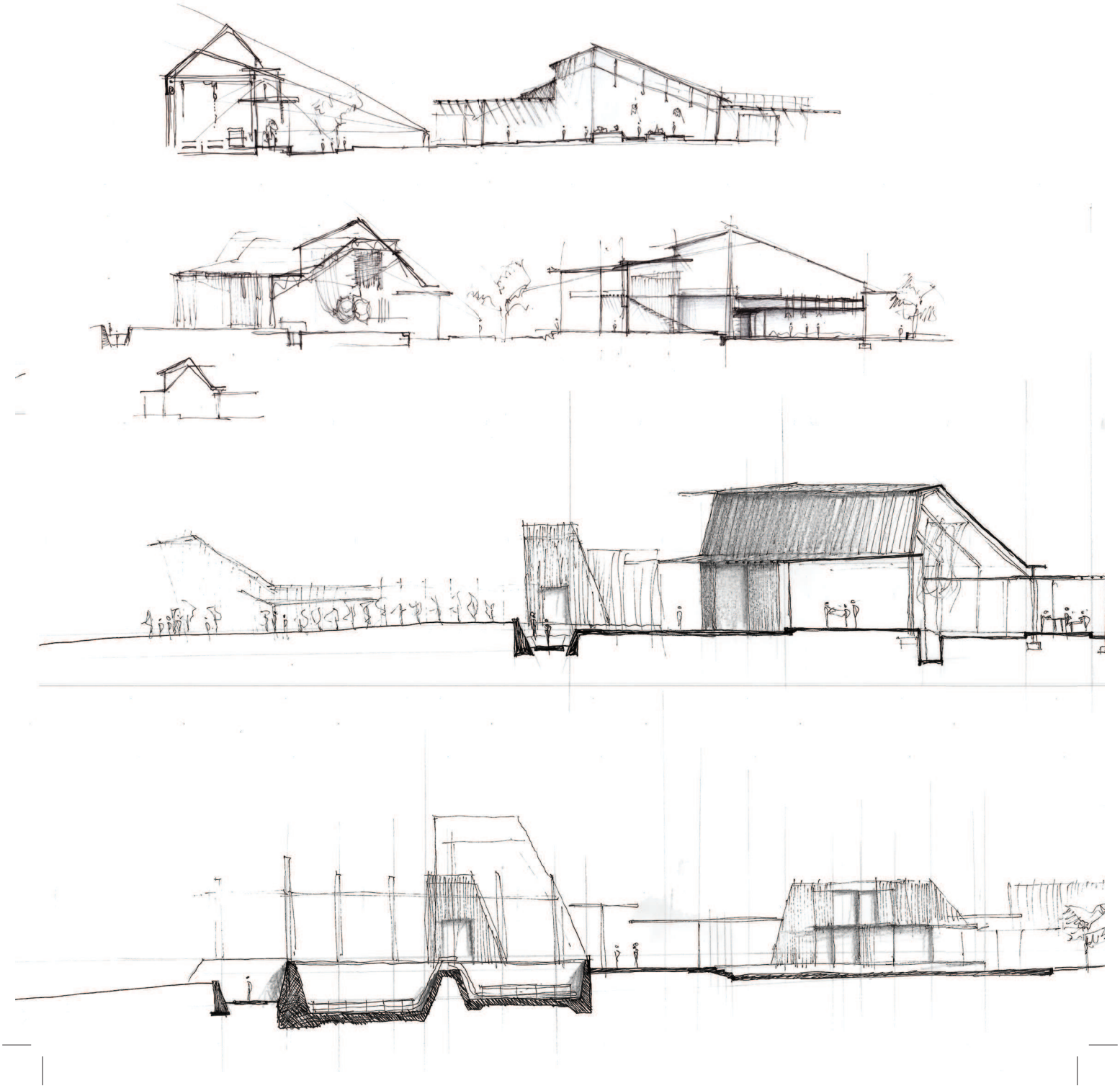
05.09_section exploration



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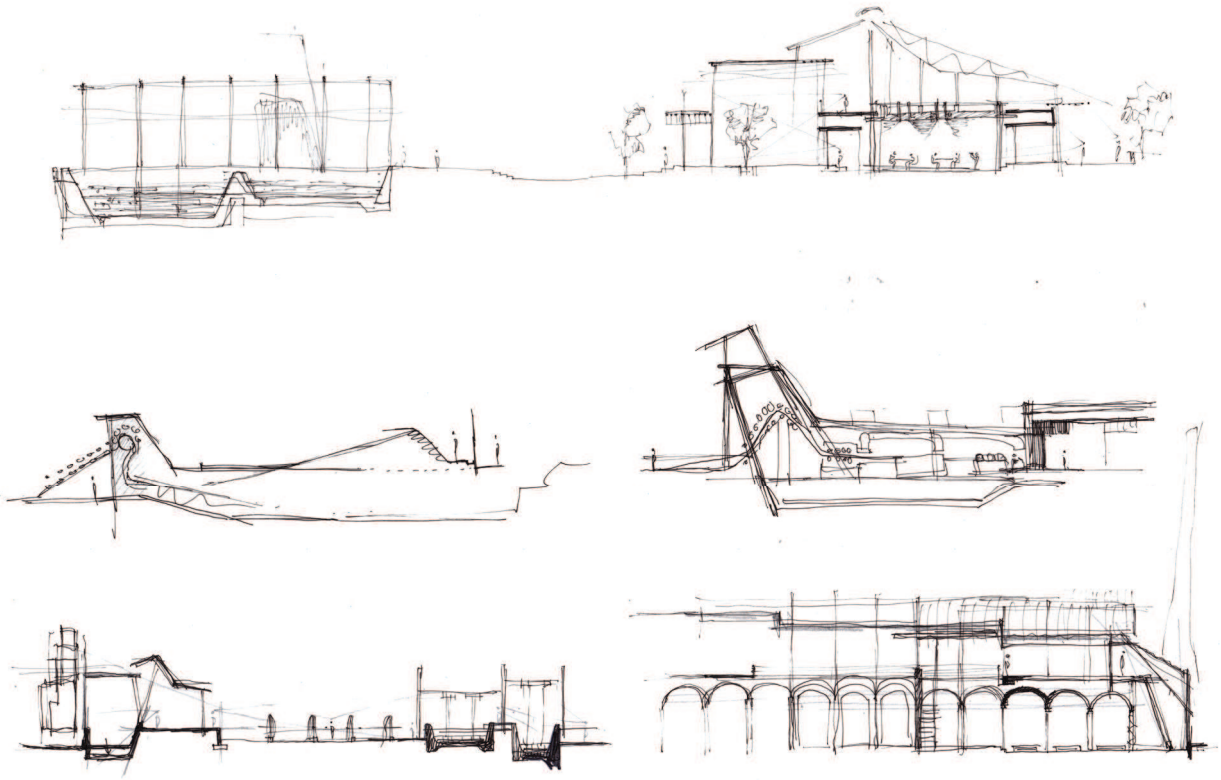

figure_05.37_sectional exploration of existing and new. June 2013.

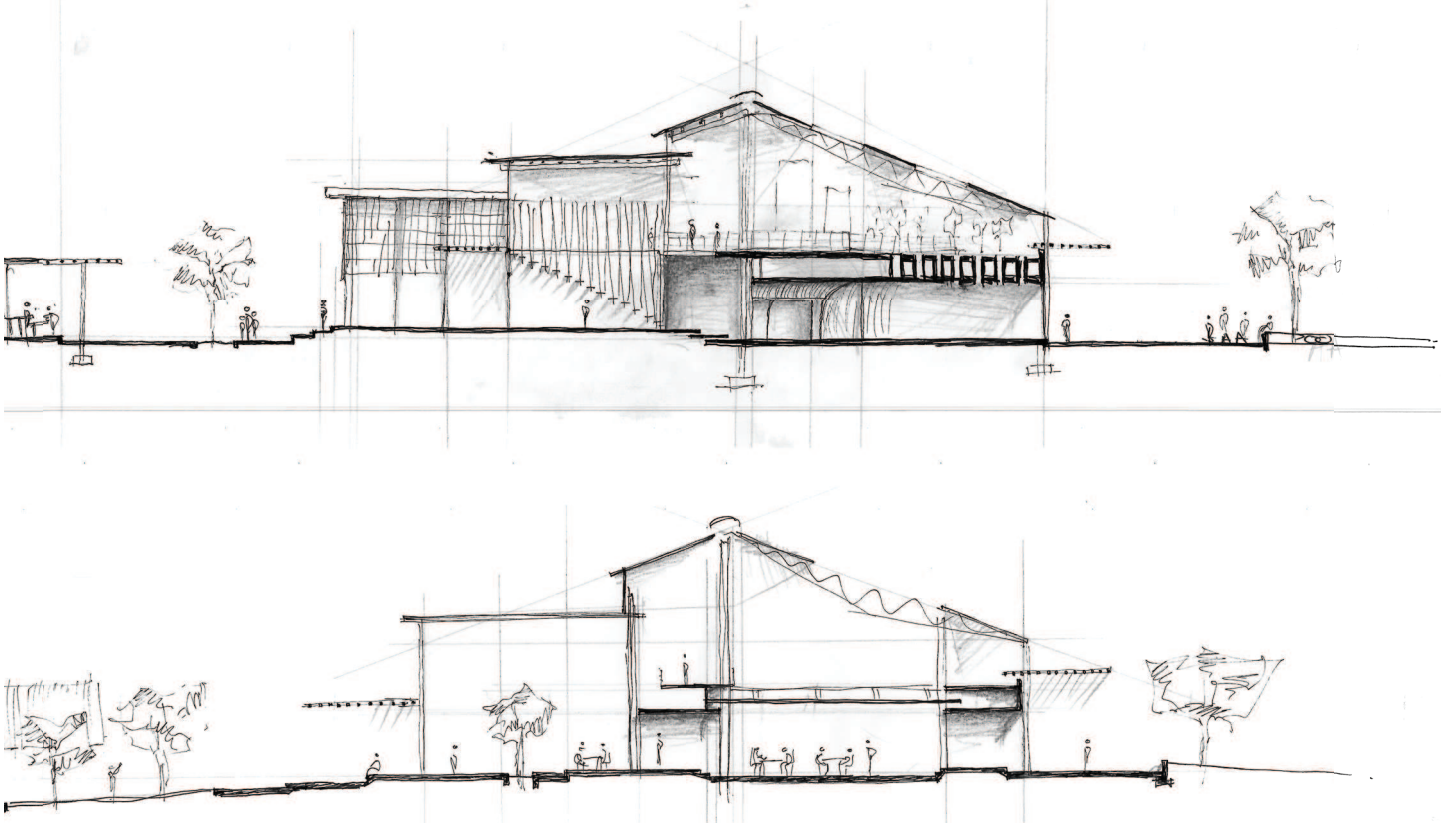

figure_05.38_sectional exploration of existing and new. July 2013.

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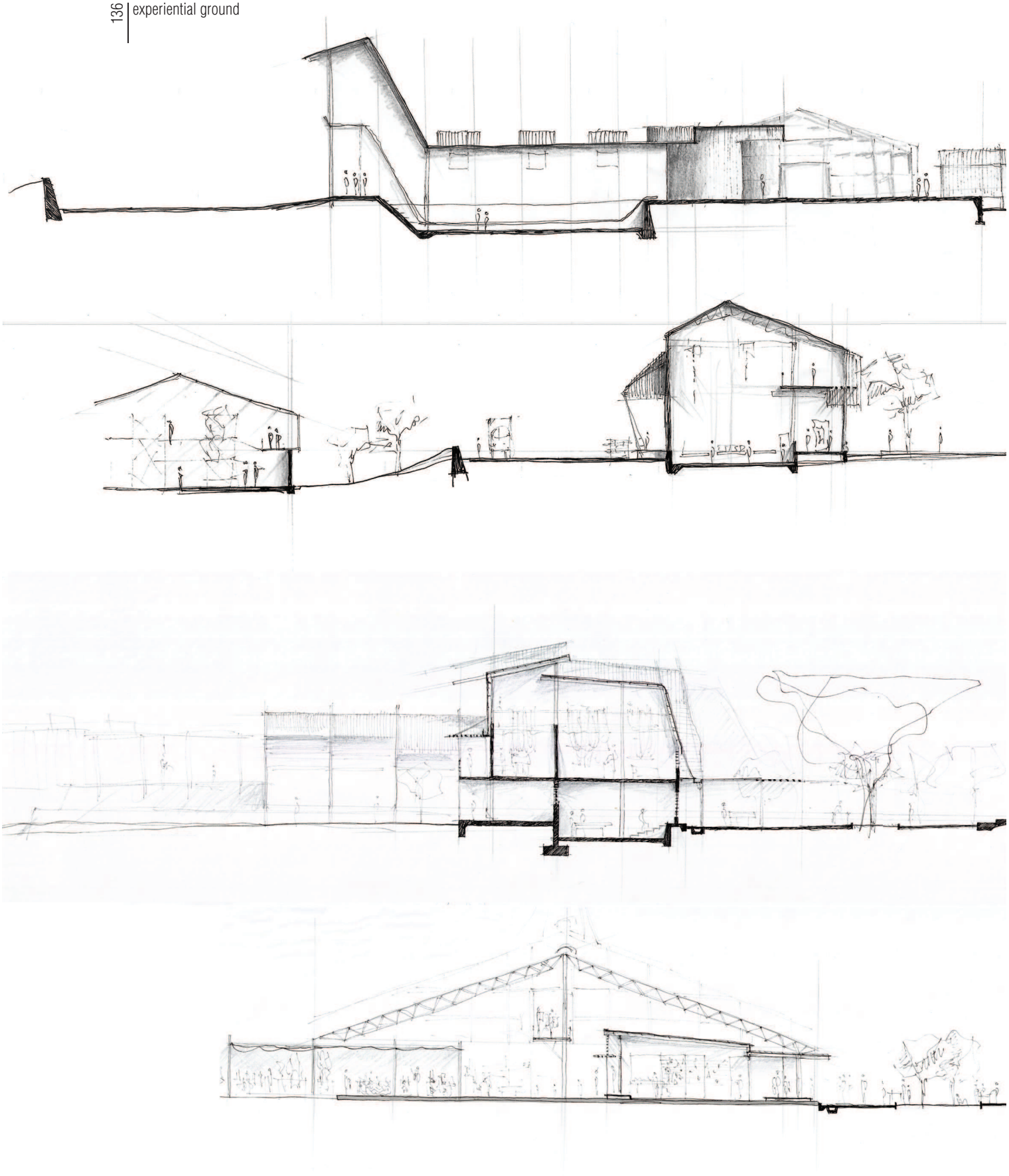

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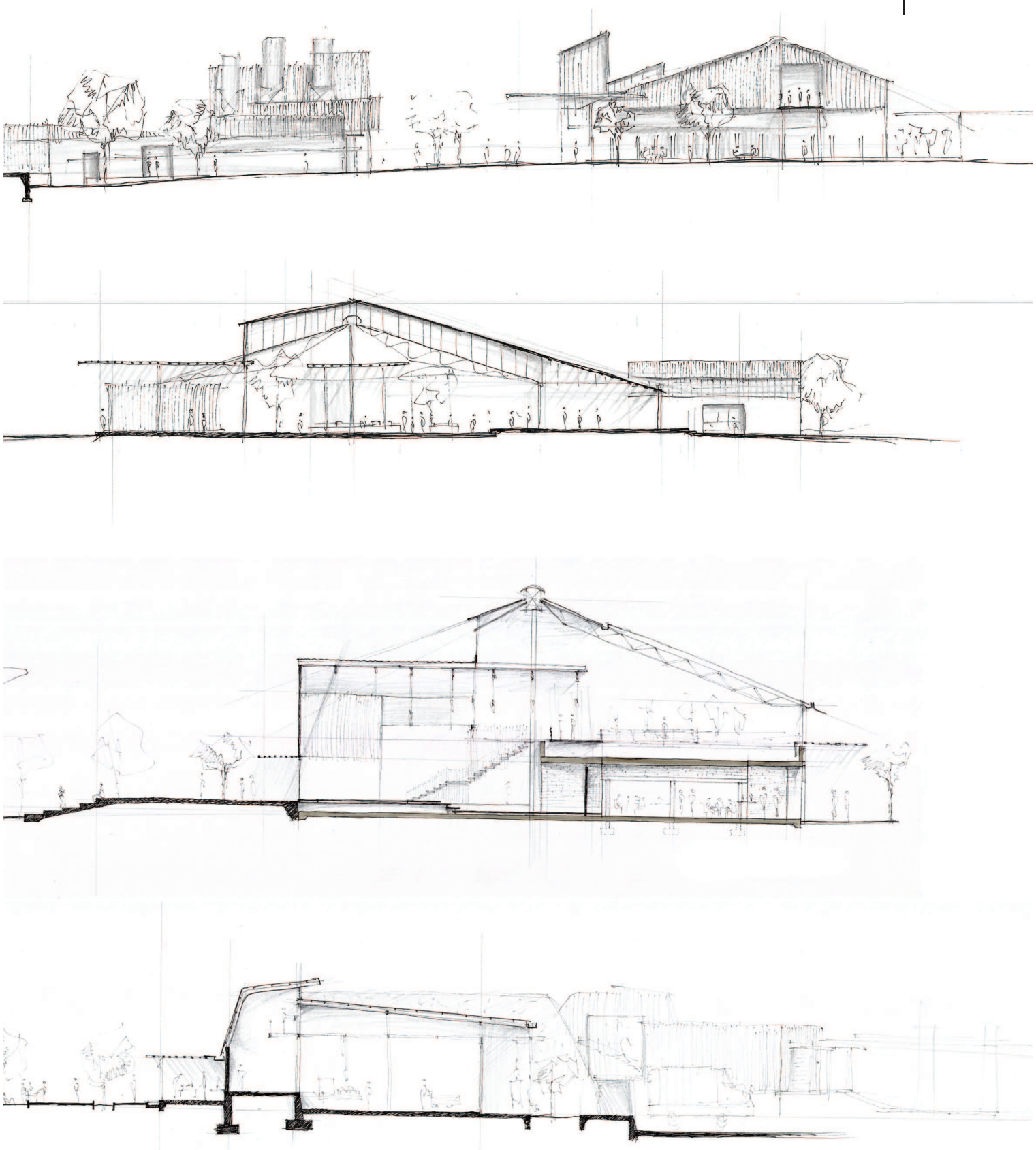

figure_05.39_further sectional development. August - September 2013.

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05.10_programmatic organisation

1- fibre gallery
2- coffee shops
3- restaurants
4- greenhouse / restaurant extension
5- nursery
6- retail
7- market
8- greenhouse

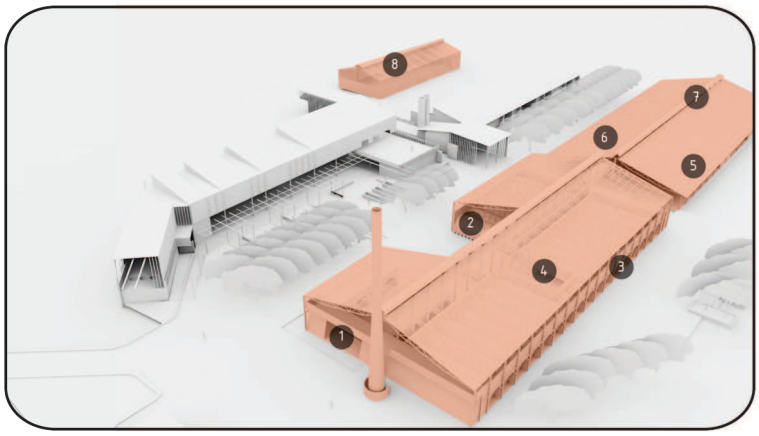

figure_05.40_existing building programmattic adaptation.

1- decortication
2- oil press
3- biocomposites
4- spinning
5- weaving
6- dyeing
7- sculptor studio
8- artist studio

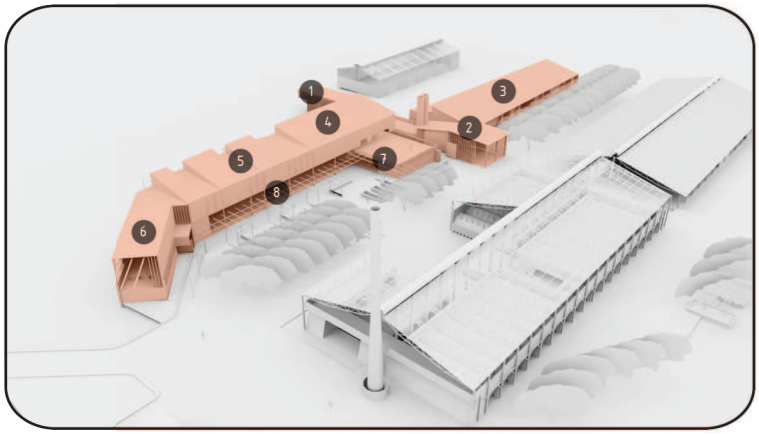

figure_05.41_intervention proggrammatic organisation.

1- primary
2- secondary
3- tertiary
4- semi private

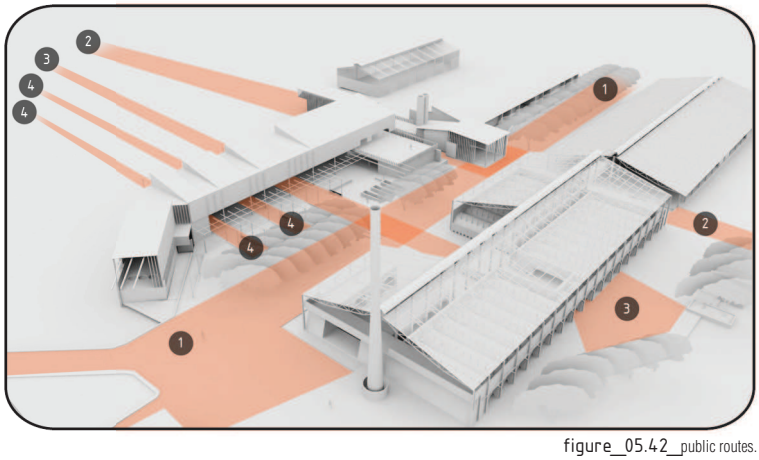

figure_05.42_public routes.

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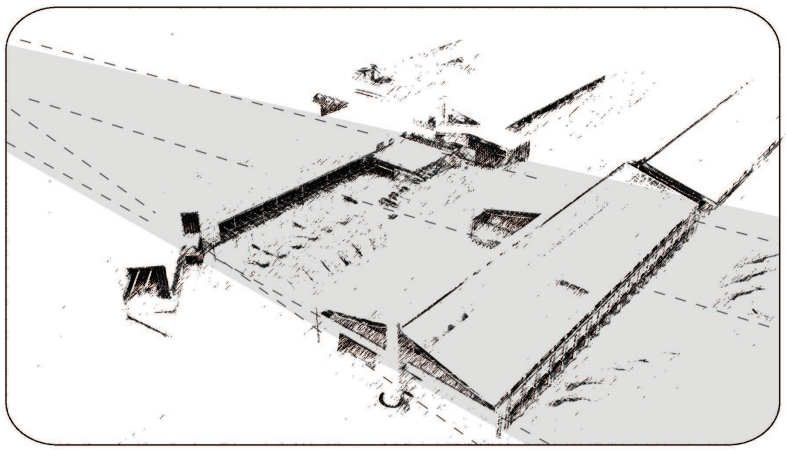

figure_05.43_experiential ground.

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05.11_experiential ground

With a concept of scale, spatial organisation and exploration defined, the design can now be furthered toward its resolution. The author now focuses on the design challenges at hand. The chosen investigation area (see Figure 05.41) is referred to as the “experiential ground” as it implicates all of the entities mentioned within the problem statement; these being theoretical discourse, contextual framework and programme organisation.

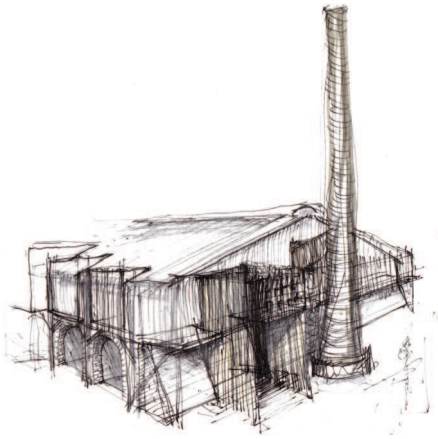

figure_05.46_galery extention.

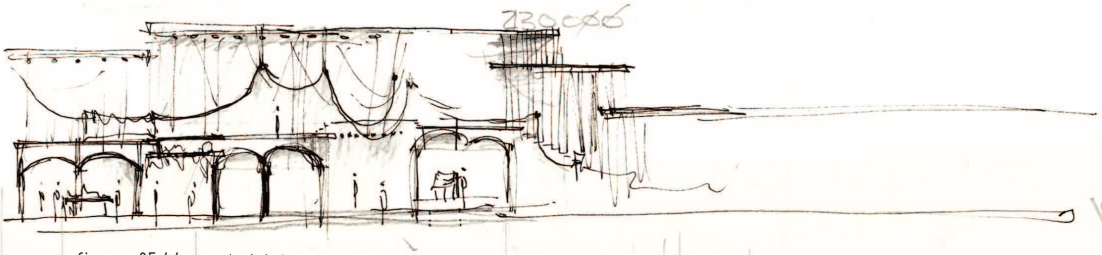

figure_05.44_exposing industry.

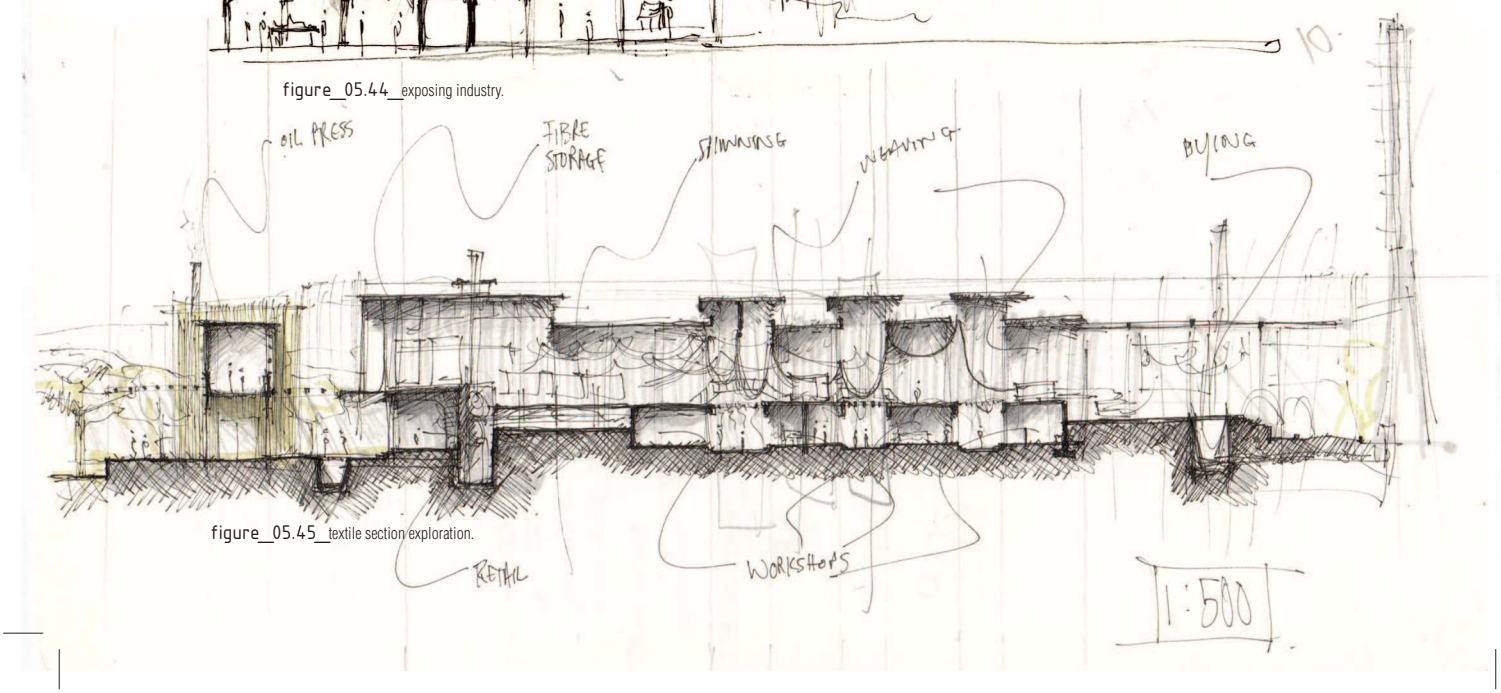

figure_05.45_textile section exploration.

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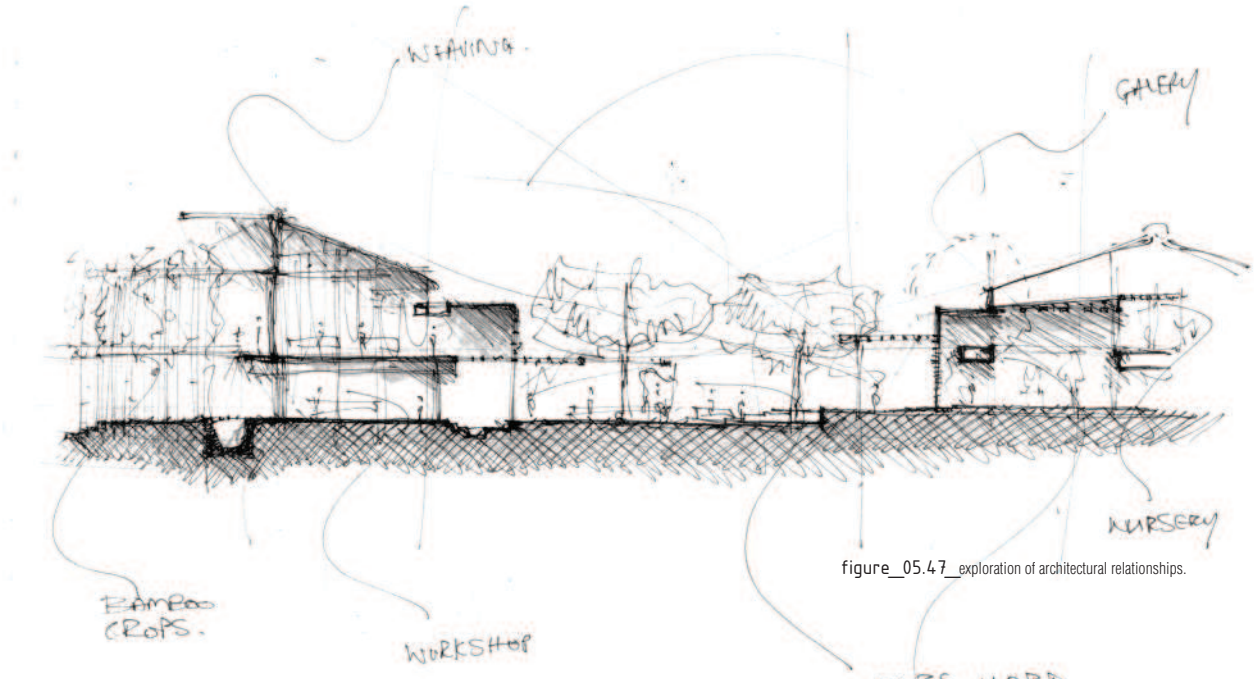

figure_05.47_exploration of architectural relationships.

The design now begins to explore the spatial relationships demanded of the scheme on a technical scale. The hapticity of materials and the impact that these elements have on space will inform the making of architecture.

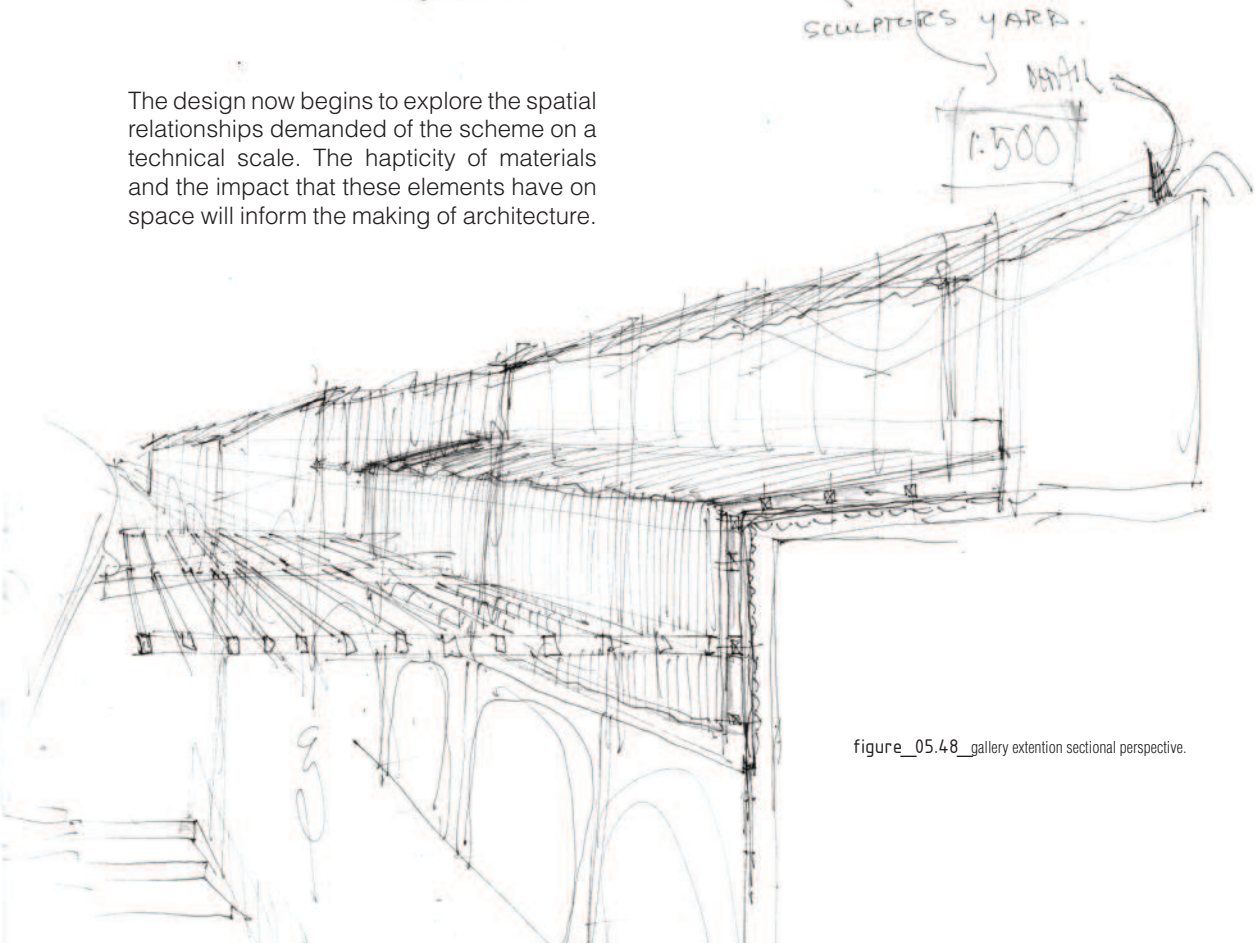

figure_05.48_gallery extention sectional perspective.

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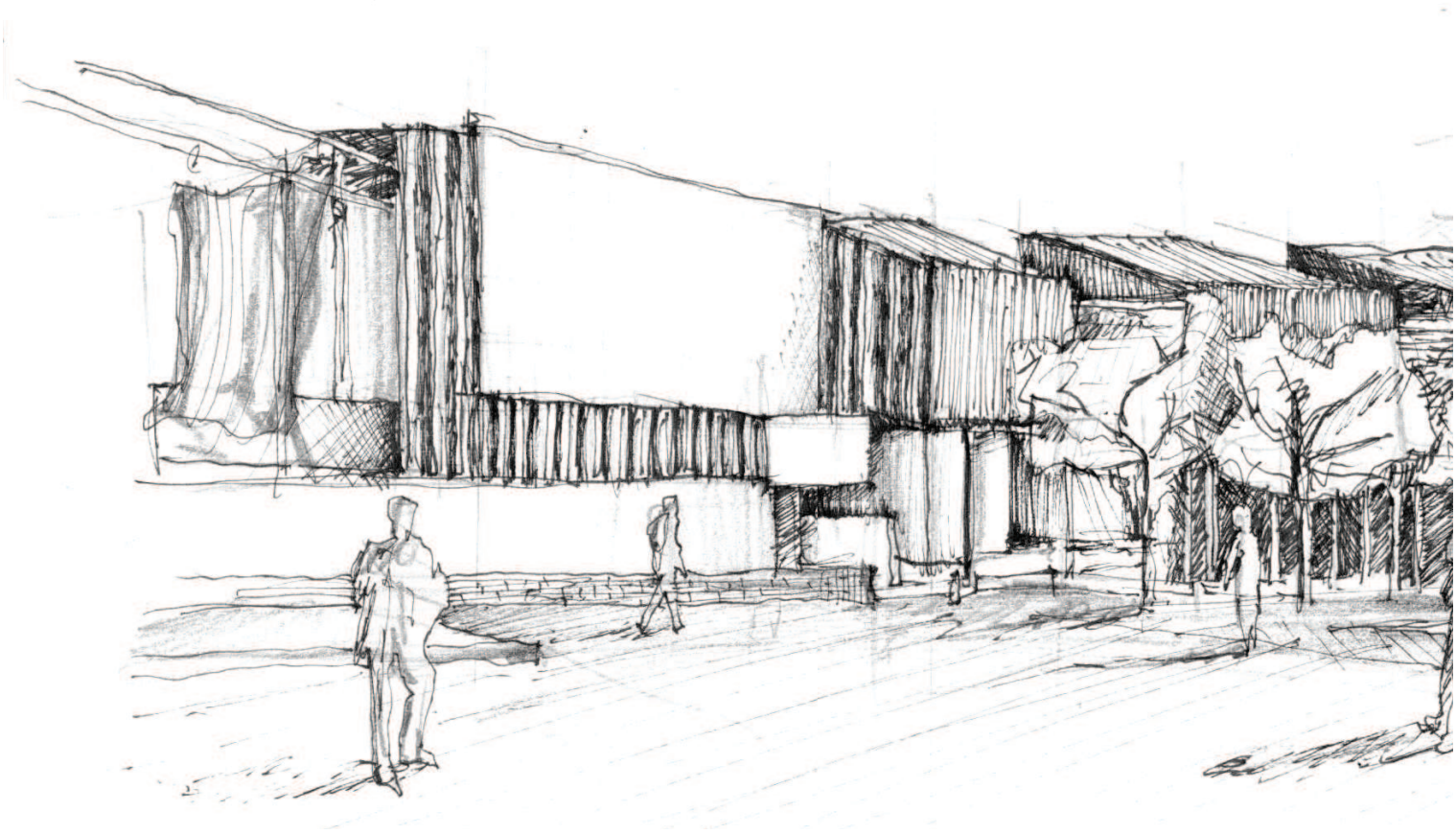

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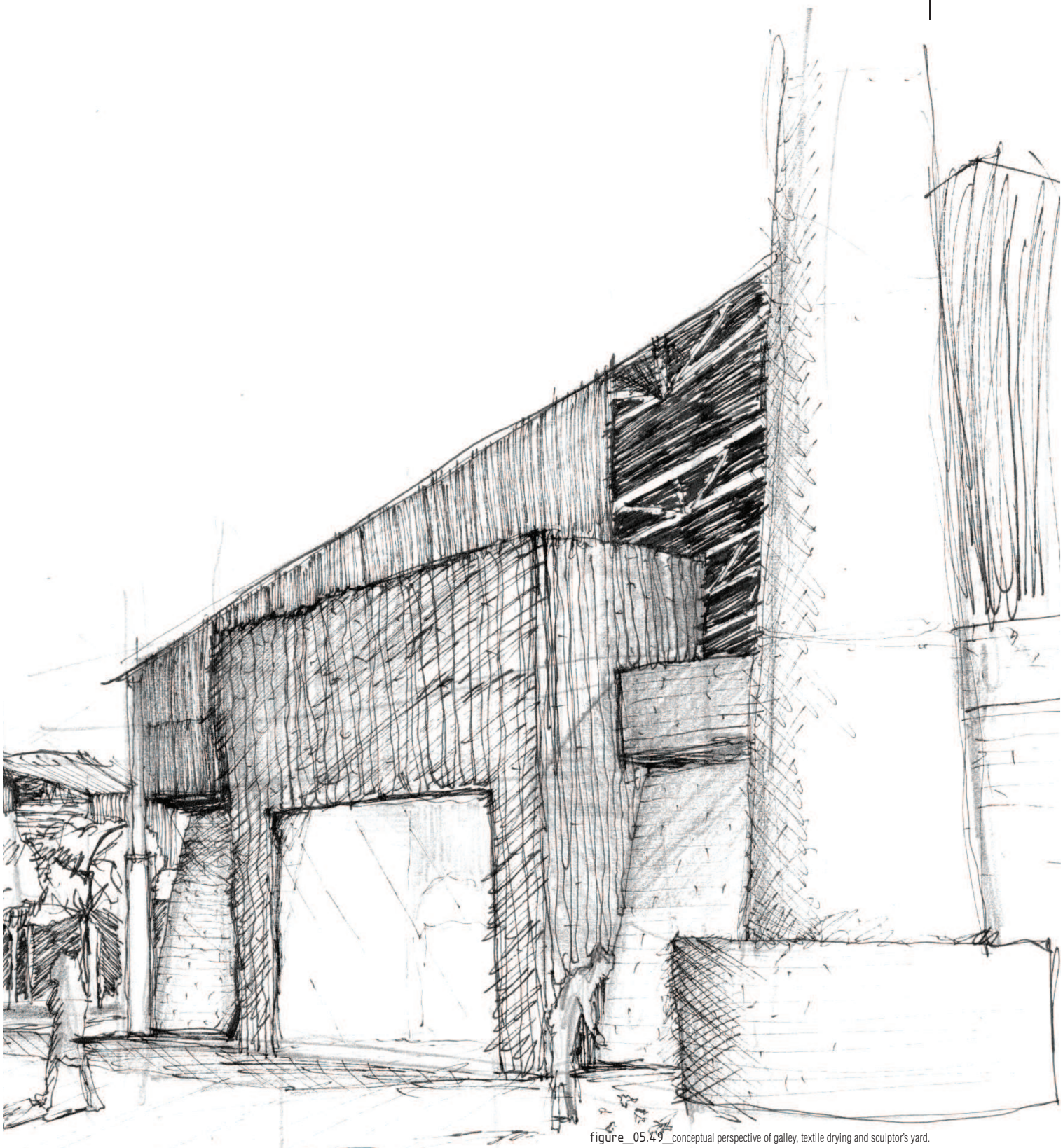

figure_05.49_conceptual perspective of galley, textile drying and sculptor's yard.

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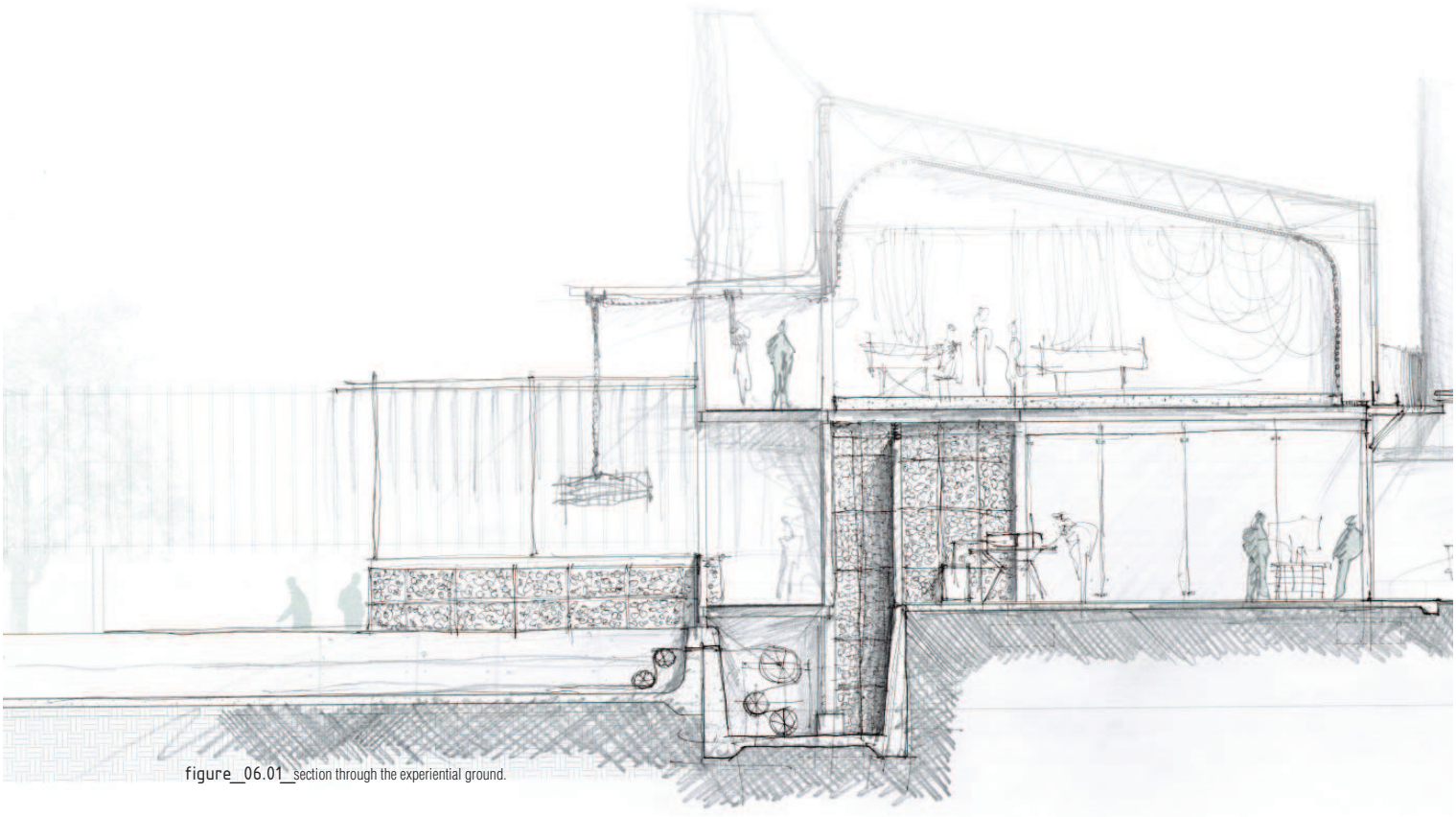

figure__06.01_section through the experiential ground.

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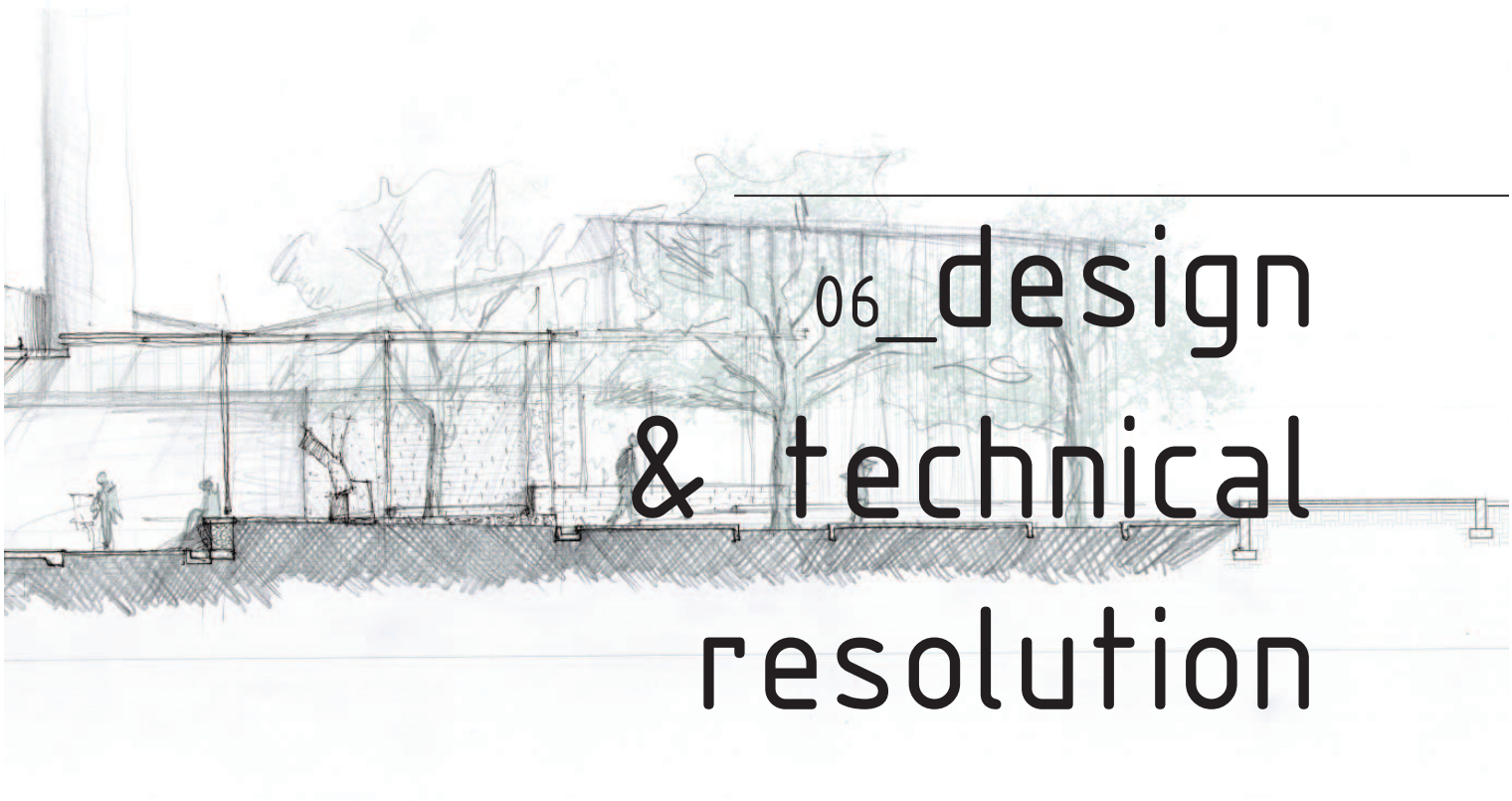

06_design & technical resolution

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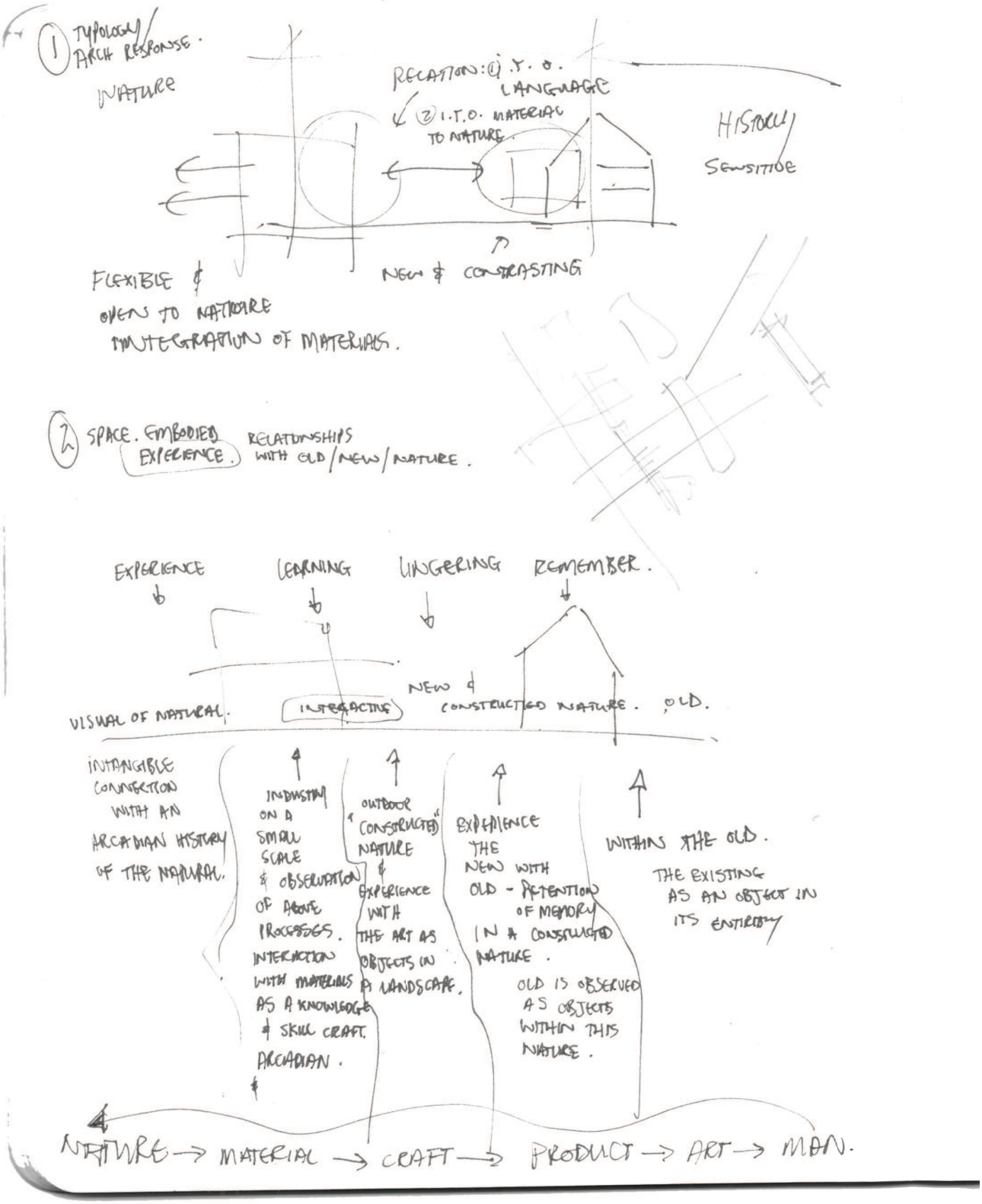

figure_06.02_journal notes on spatial experiences and typology.

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06_design and technical resolution

06.01_concept

The architectural elements, ground, wall and roof, are used as facilitators in the resolution of the design. Using these elements as they are intended, combined with the expression of various materials, the conceptual approach to the technical aspect of this dissertation explores the combination of both theoretical and physical implications of materials and planes. The combination of the aforementioned assists the ethereal vestiges created by the design, and completes the relationships that are established.

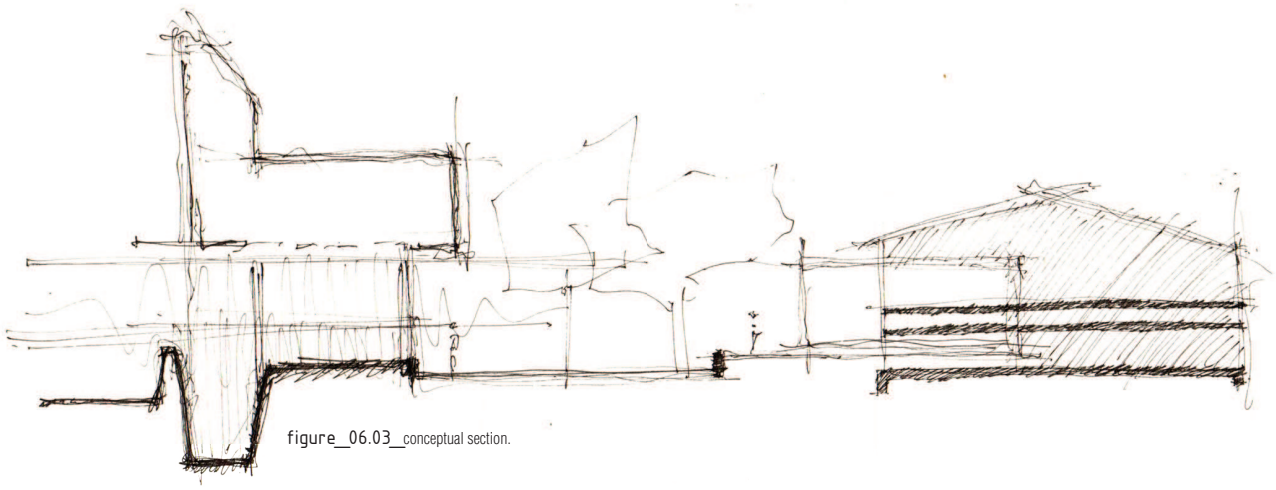

figure_06.03_conceptual section.

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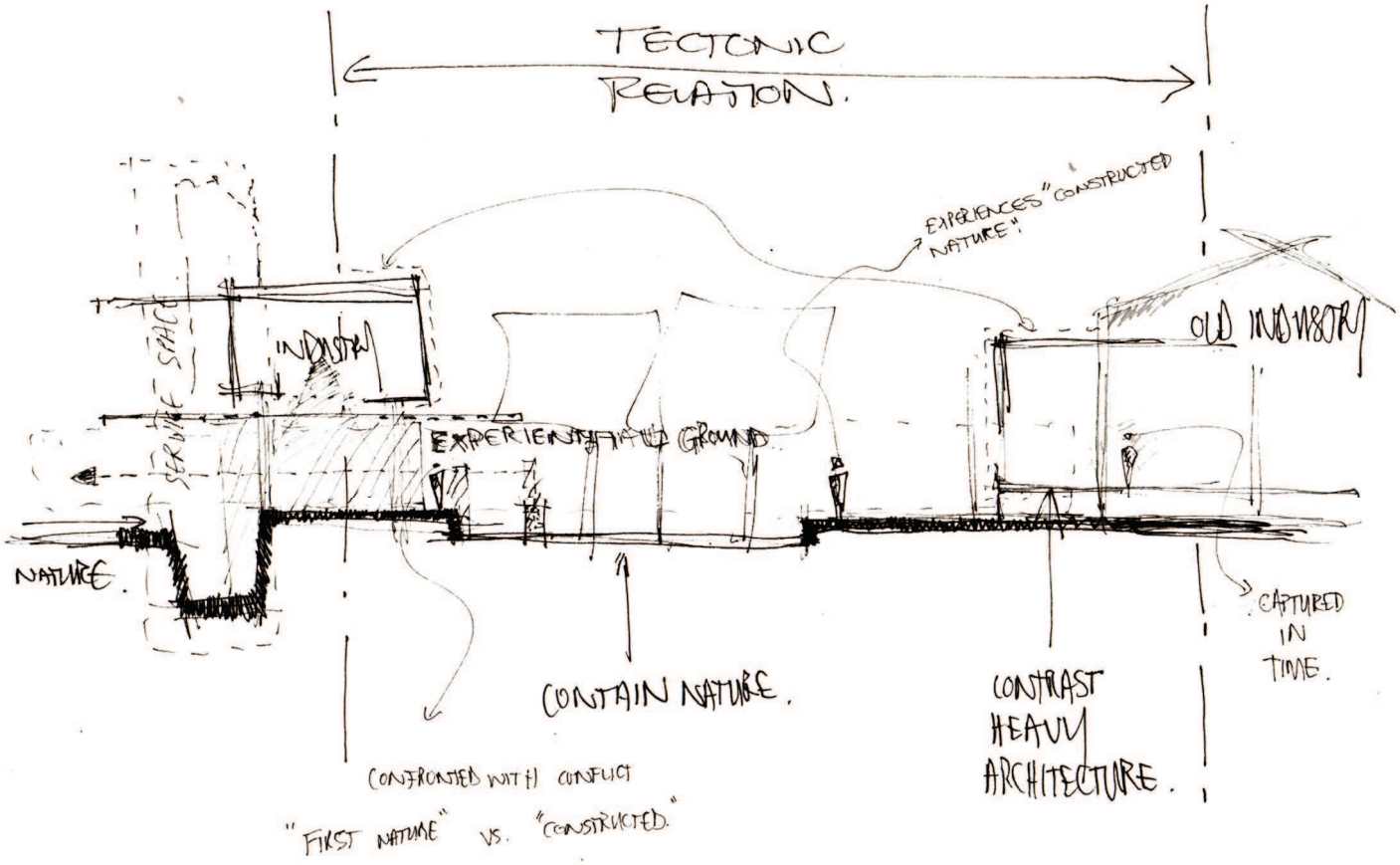

figure_06.04_conditions and aproach.

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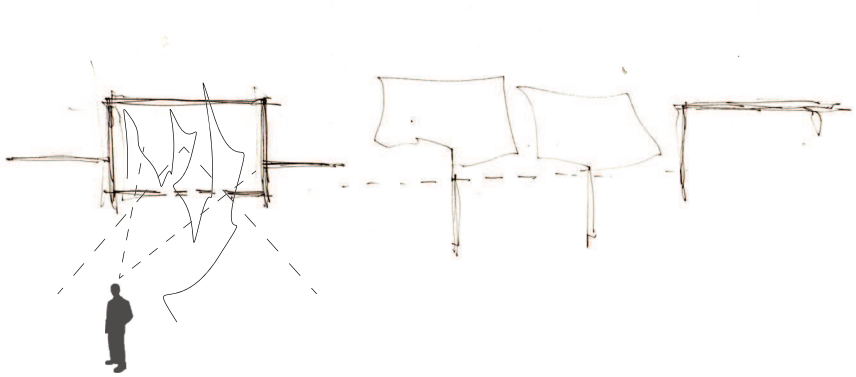
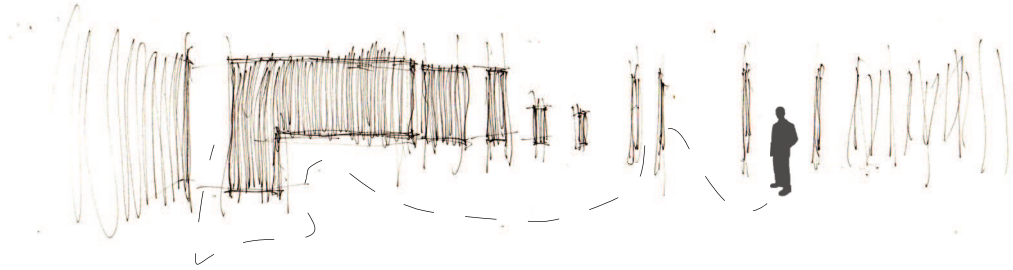
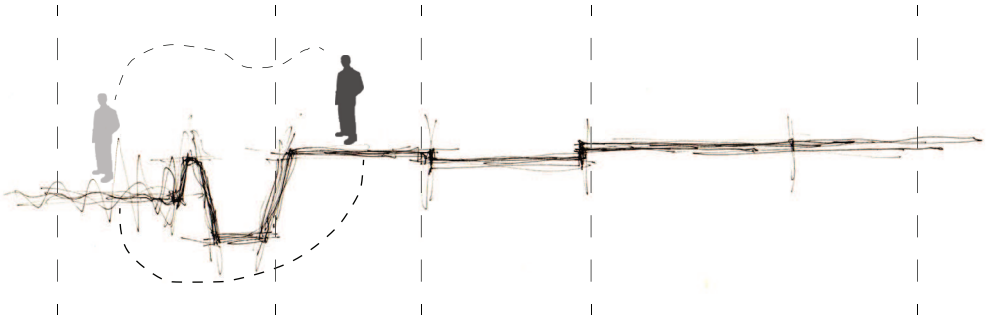


roof - visual event of space



wall - active guidance of space



floor - physical foundation of space

figure_06.05_the facilitators.

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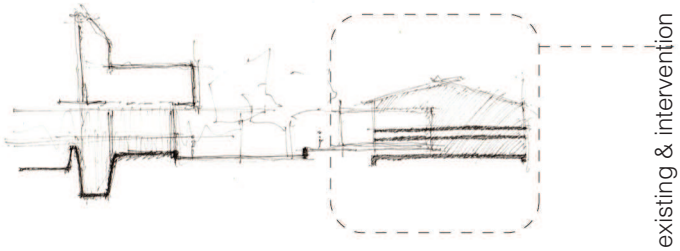
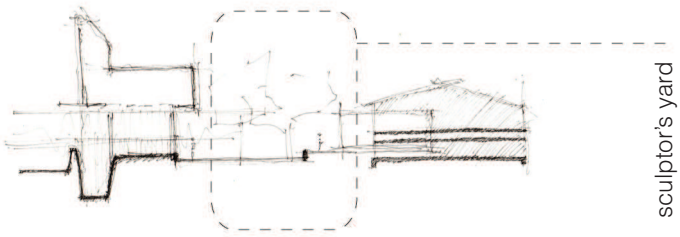
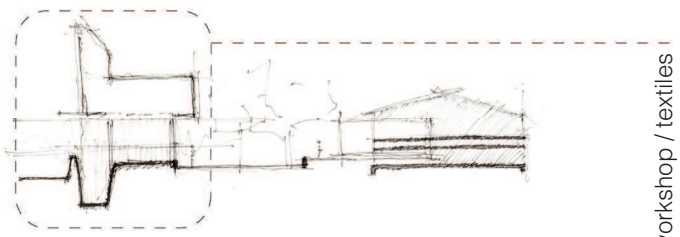
06.02_materiality



existing & intervention materials



sculptor's yard



workshop / textiles

figure_06.06_materiality

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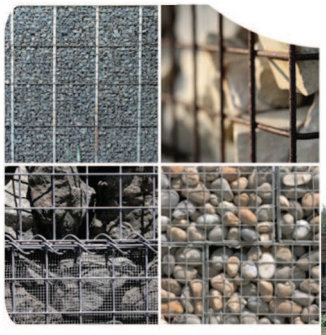

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06.03_plan

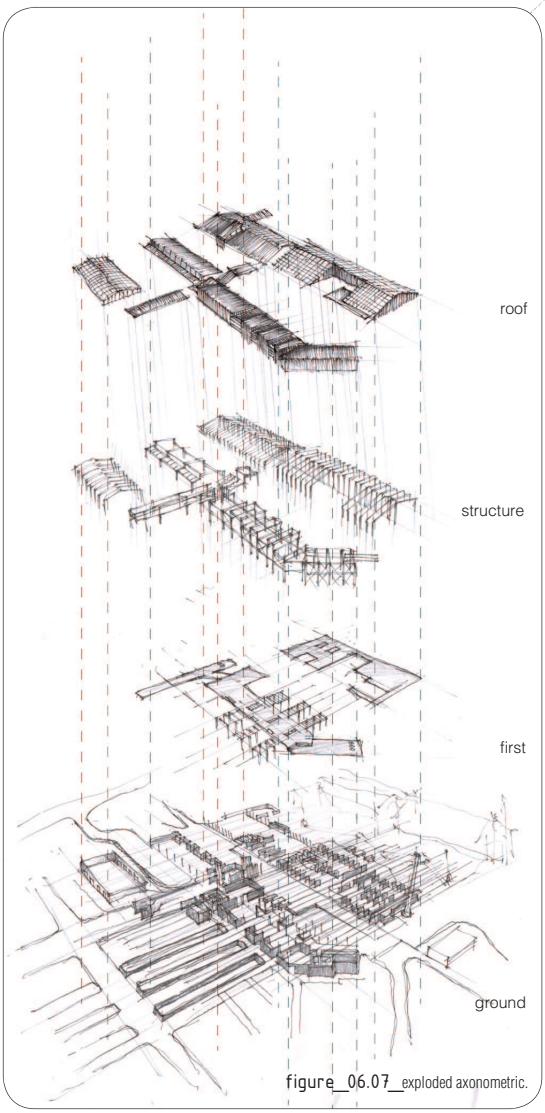

figure_06.07_exploded axonometric.

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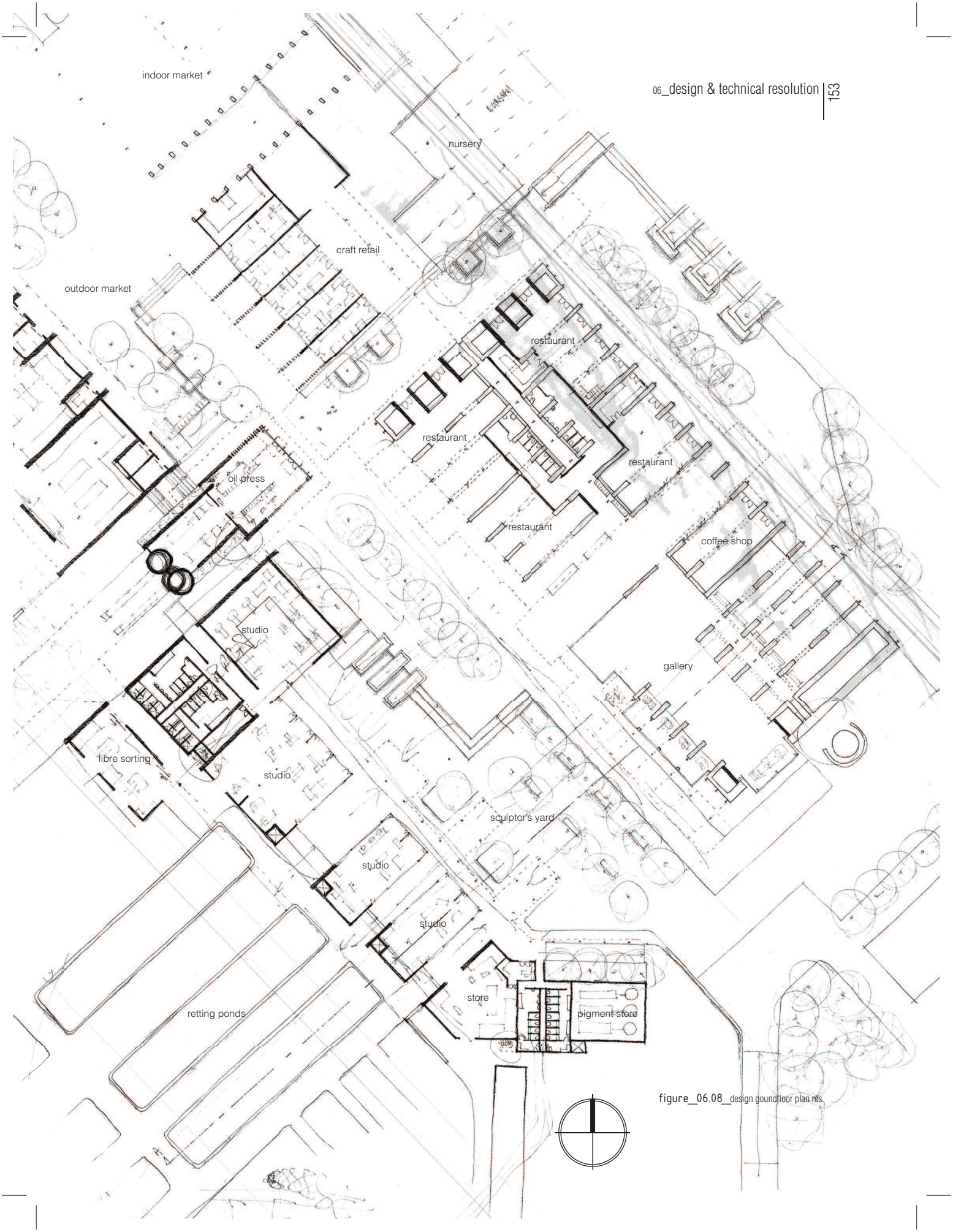

figure_06.08_design goundfloor plan nts

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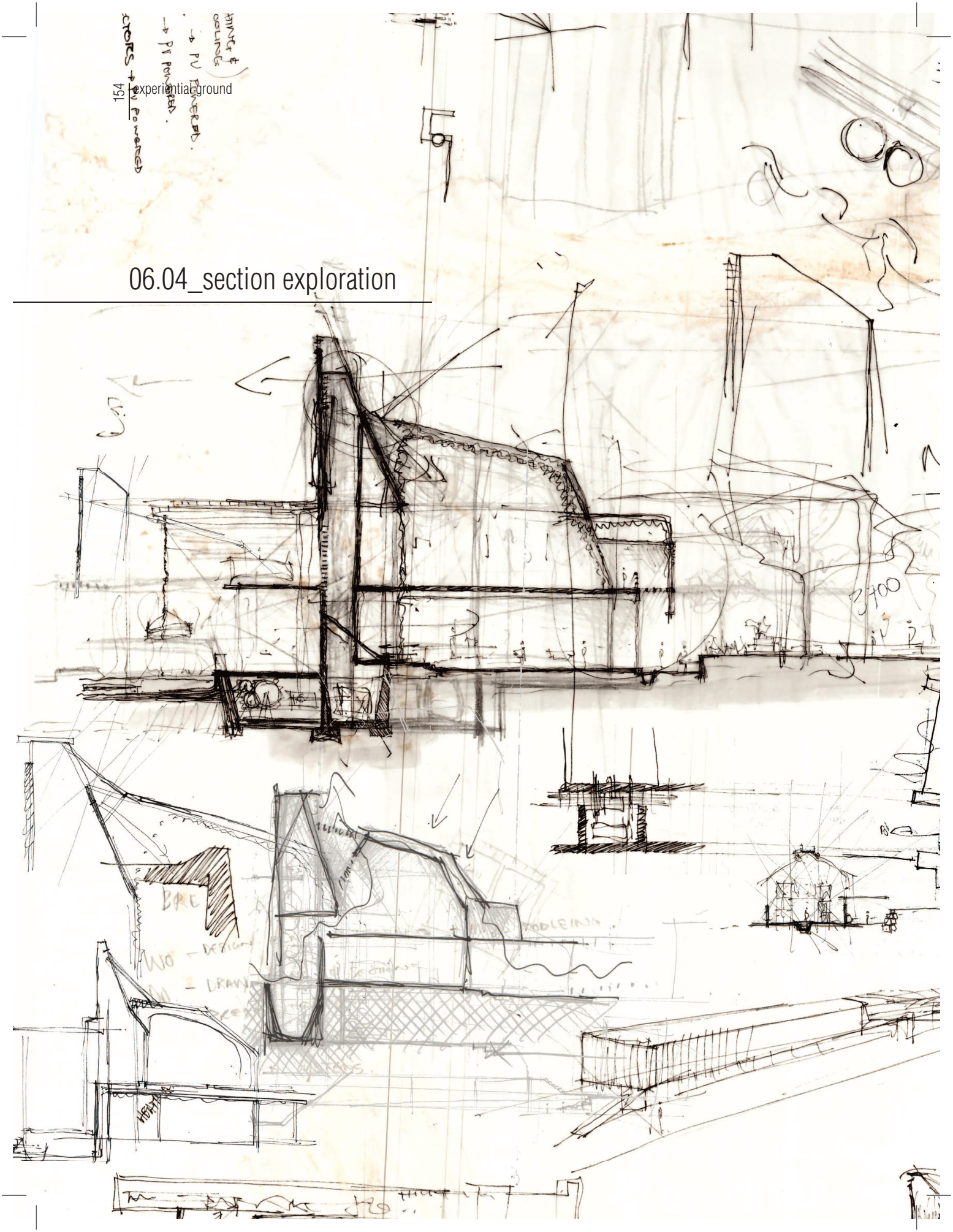
06.04_section exploration



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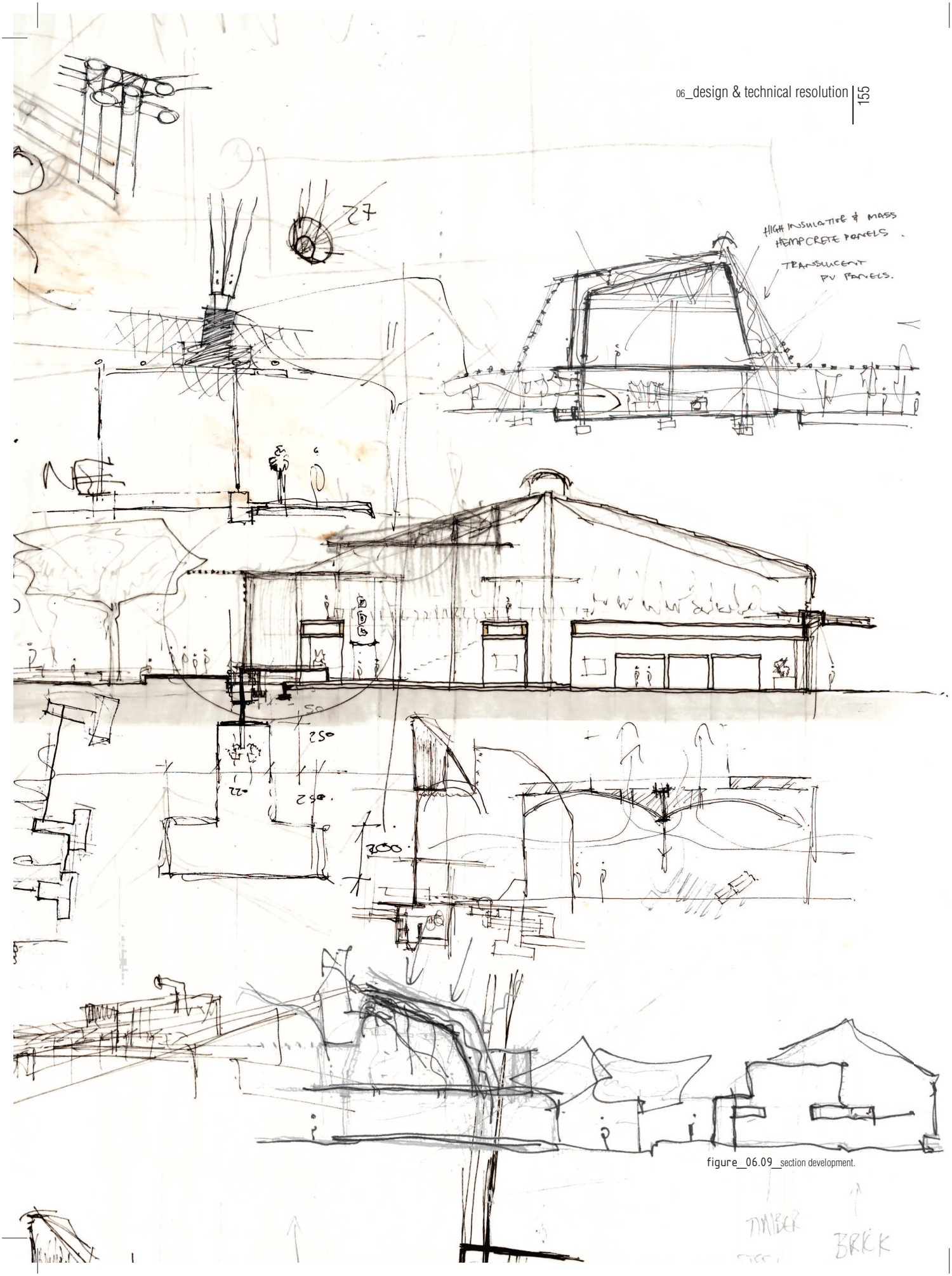

figure_06.09_section development.

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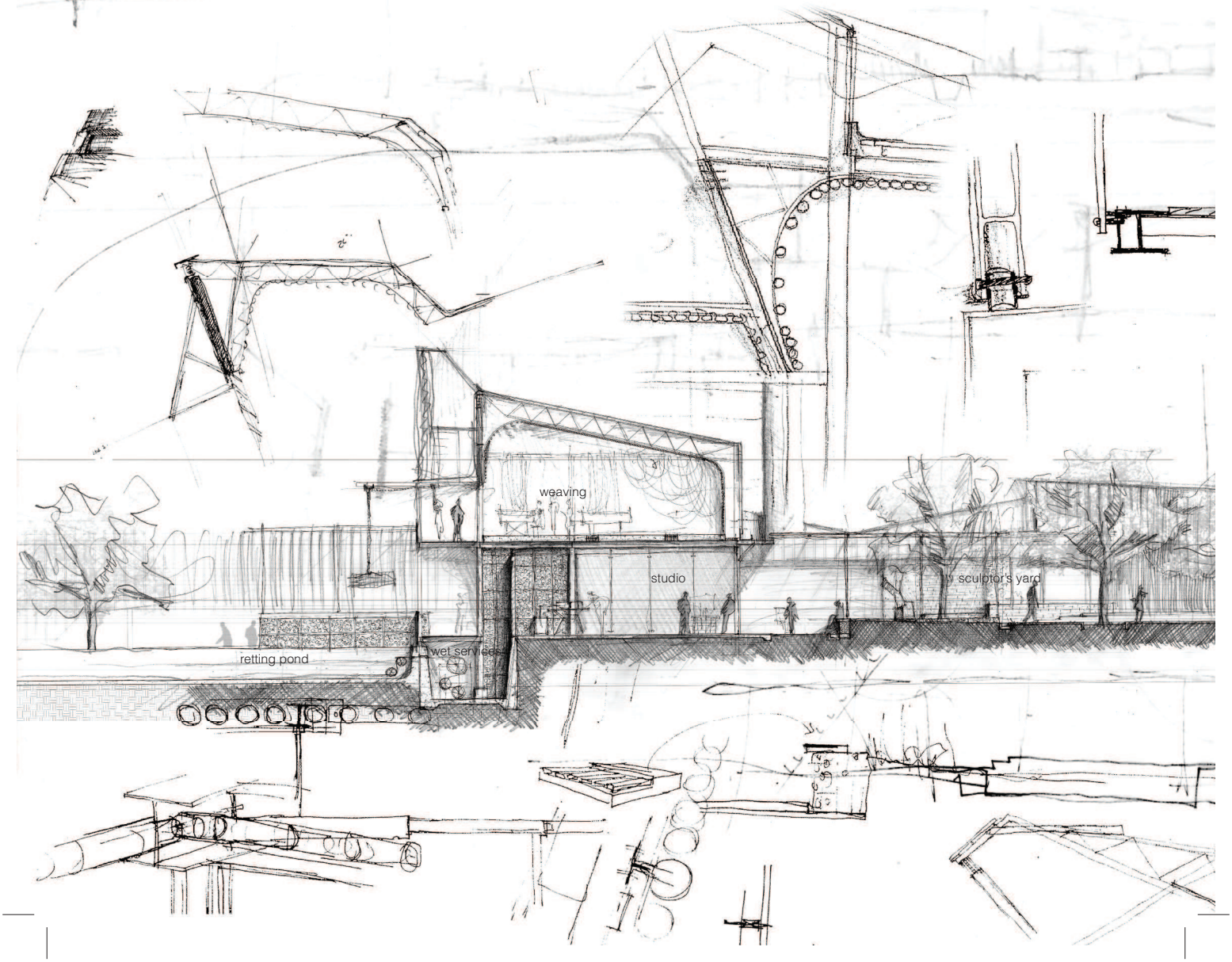
06.05_detail investigation



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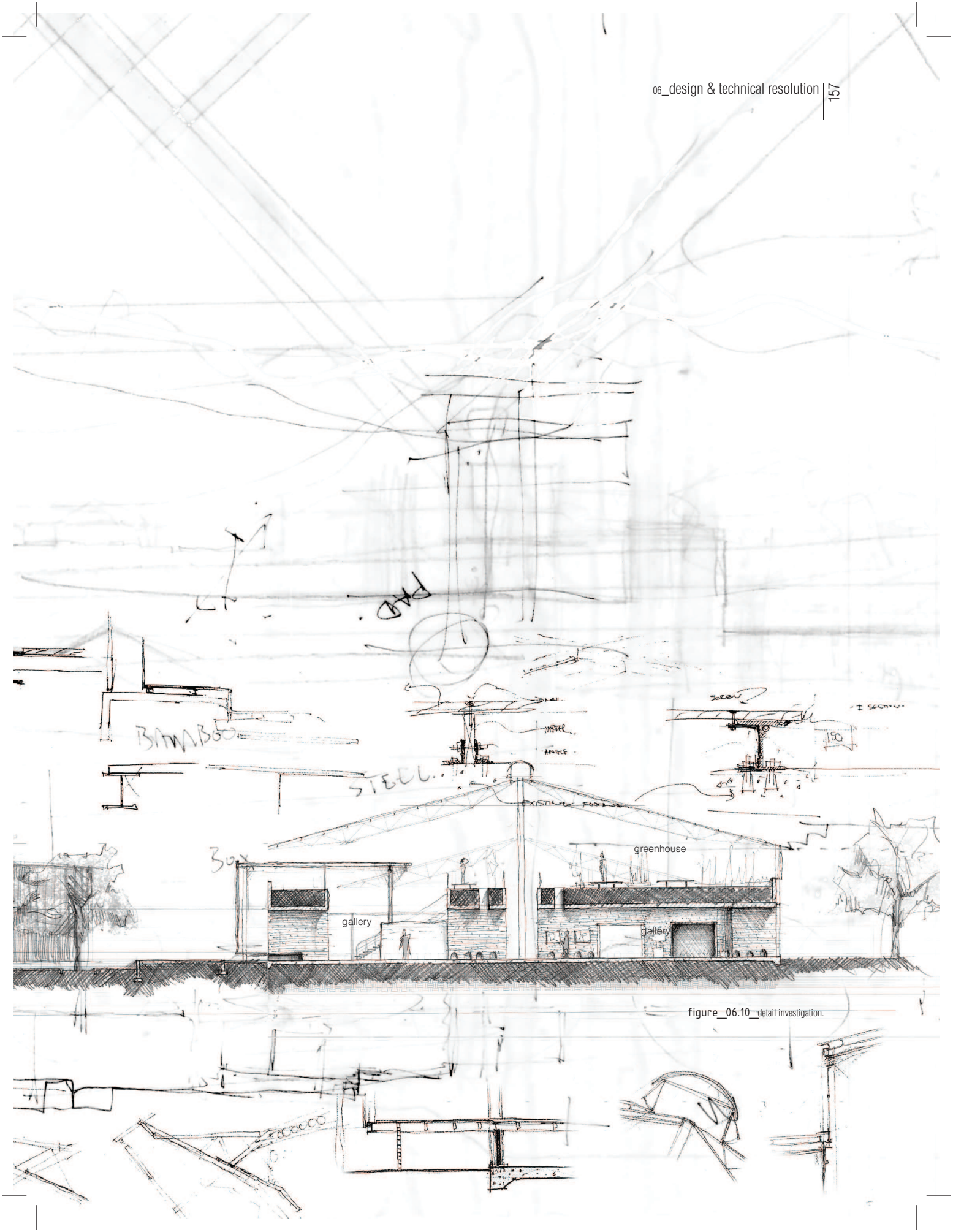

figure_06.10_detail investigation.

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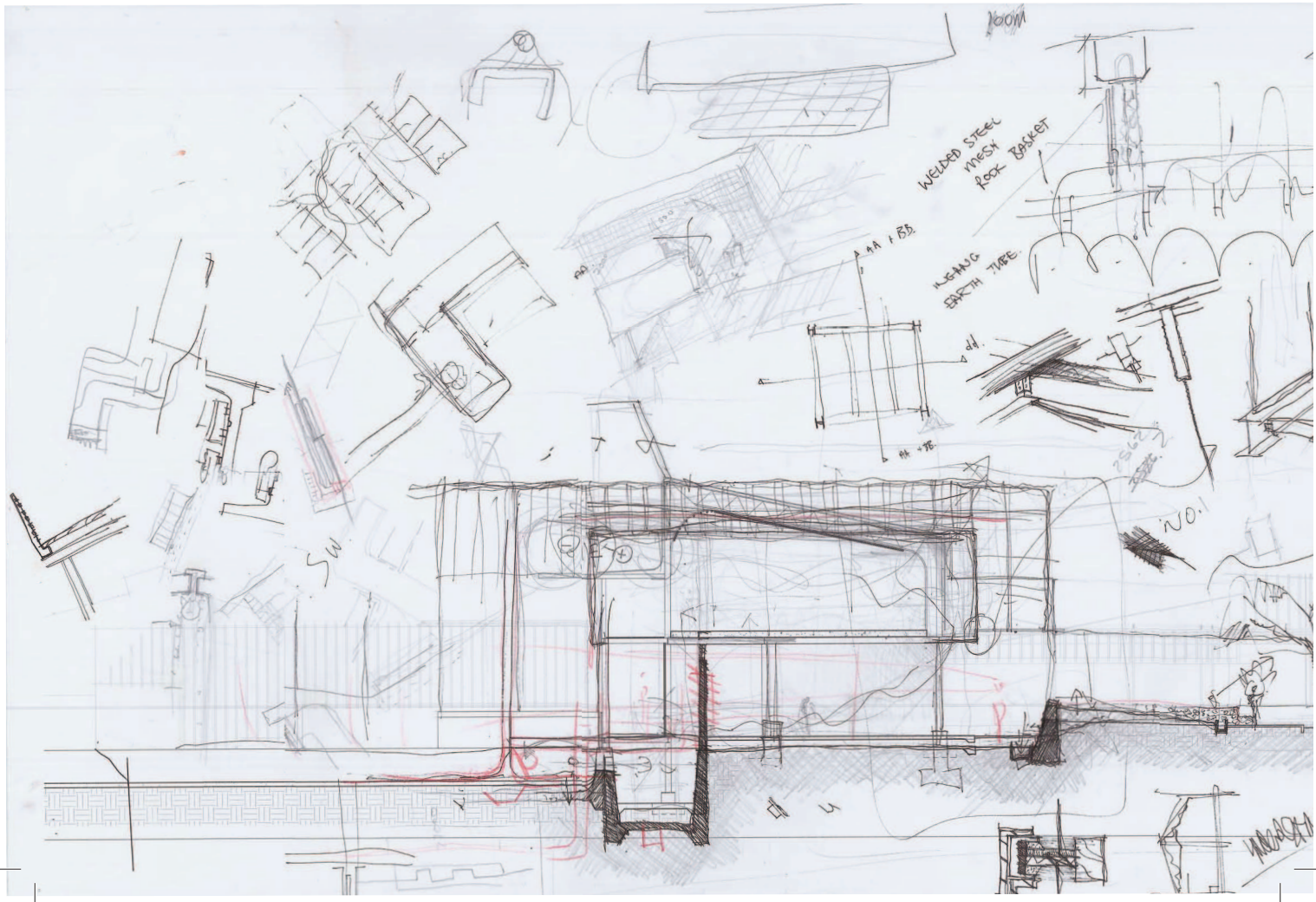

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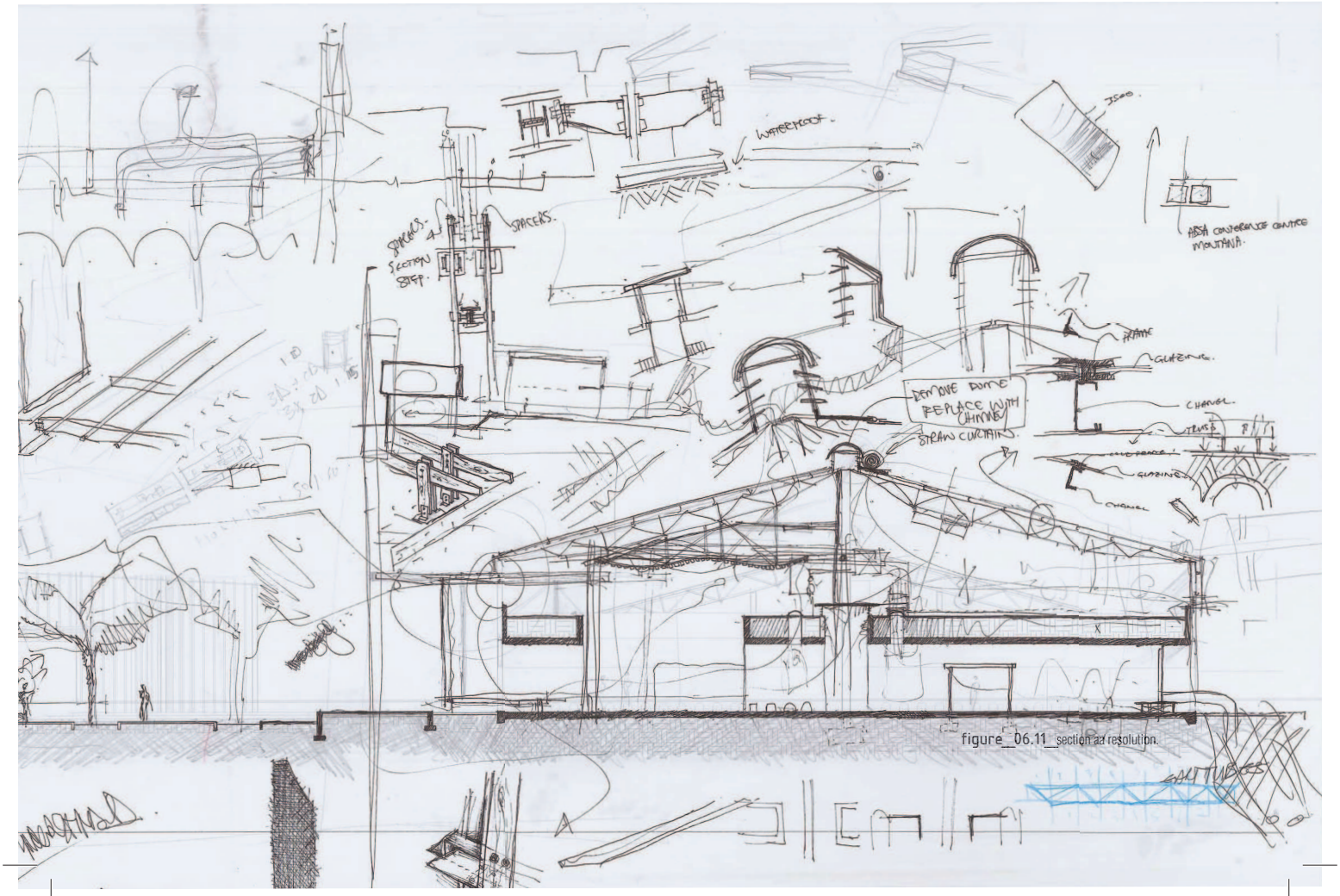

figure_06.11_section aa resolution.

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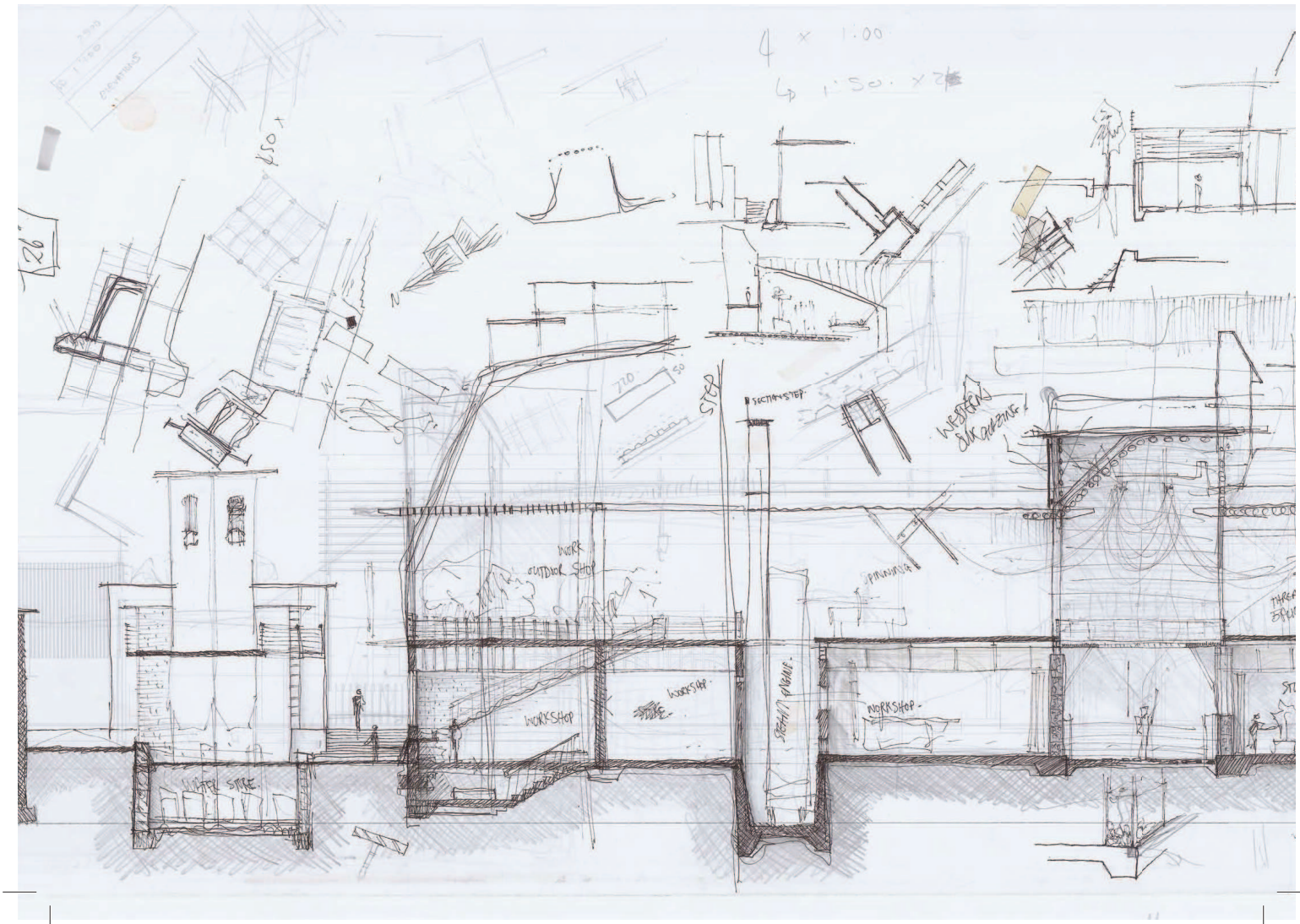

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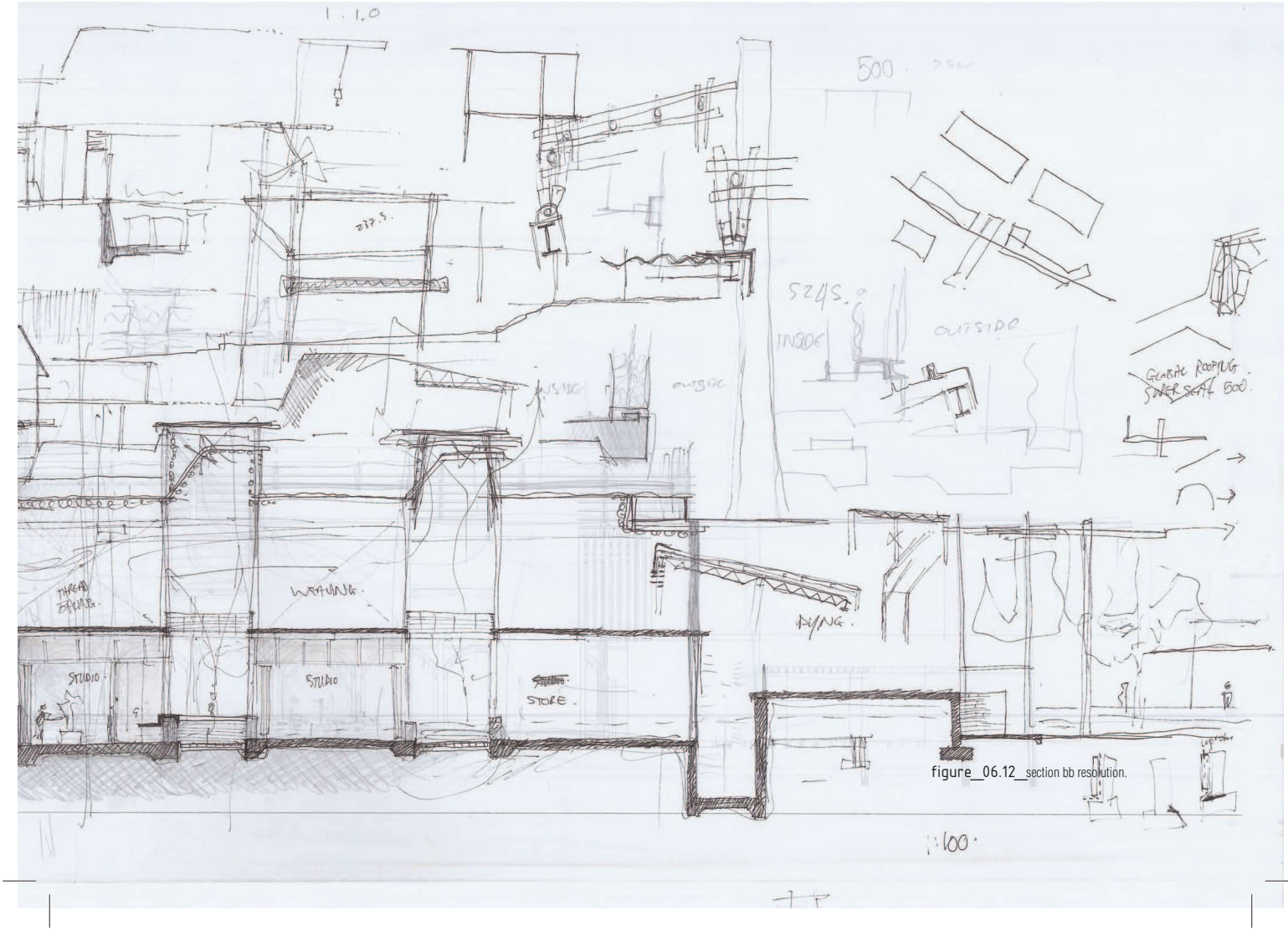

figure_06.12_section bb resolution.

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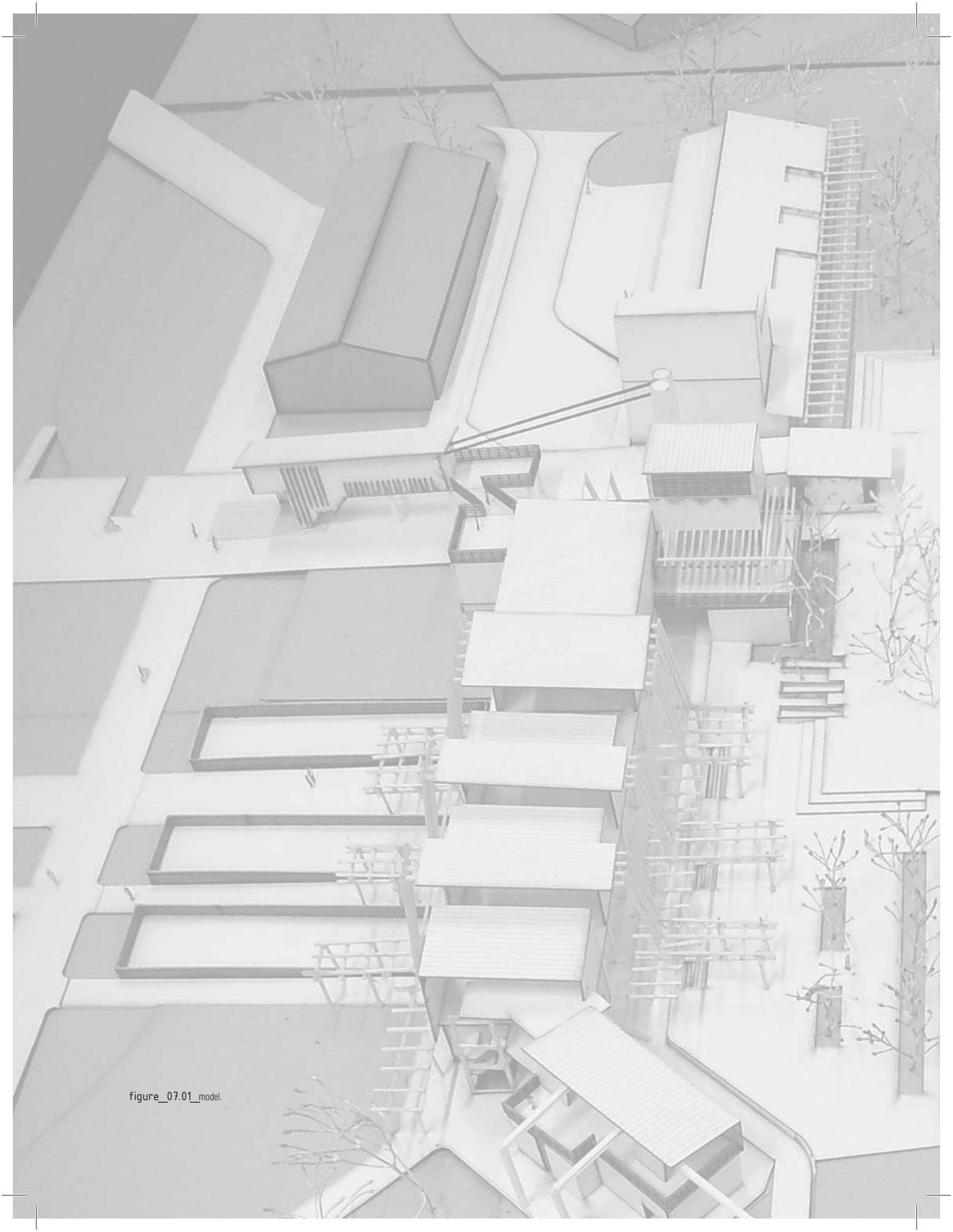

figure__07.01__model.

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07_conclusion

The architectural question has developed from the idea of an integrated space that caters for the particular requirements of industry, man and nature. Rather than questioning the feasibility of such an integration, the dissertation has provided exhaustive information that proves the relativity and feasibility of such an integration and the question focuses on the architecture.

How does one create space for the particularities to thrive and coexist within a single condition?

Experiential ground becomes the space that expresses, introduces and enables the attributes of industry man and nature to regulate through the simple organisation of the spaces that enhance the significance of each entity involved. Creating ethereal vestiges by means of adapting the roof, wall and floor, one is constantly aware of each particular. The roof exposes the industry and turns it into an event that playfully cast shadows on pedestrian walkways. The walls ground themselves in its origin and expresses history, construction and the biocomposite elements whilst the ground is constantly reminding one of the heritage of the site.

Enticed by the industry and it's moving threads, gaining knowledge of a new technology in building and standing on reused bricks of the Hoffman kilns, the space is programmatically with attention to the haptic, organised to enhance significance of an organic product and establish a relationship between man and his first nature.

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final drawings & model

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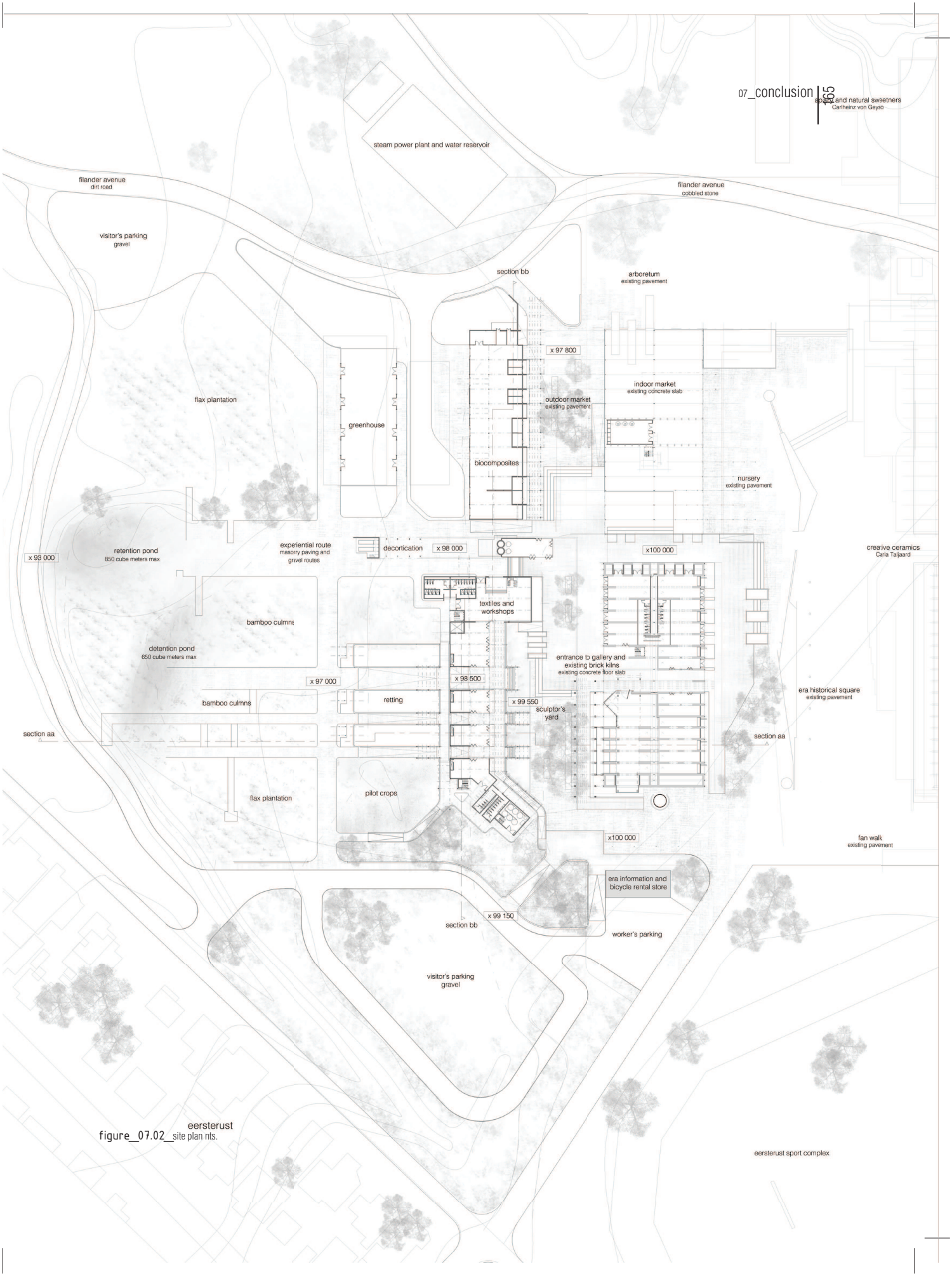

eersterust
figure_07.02_site plan nts.

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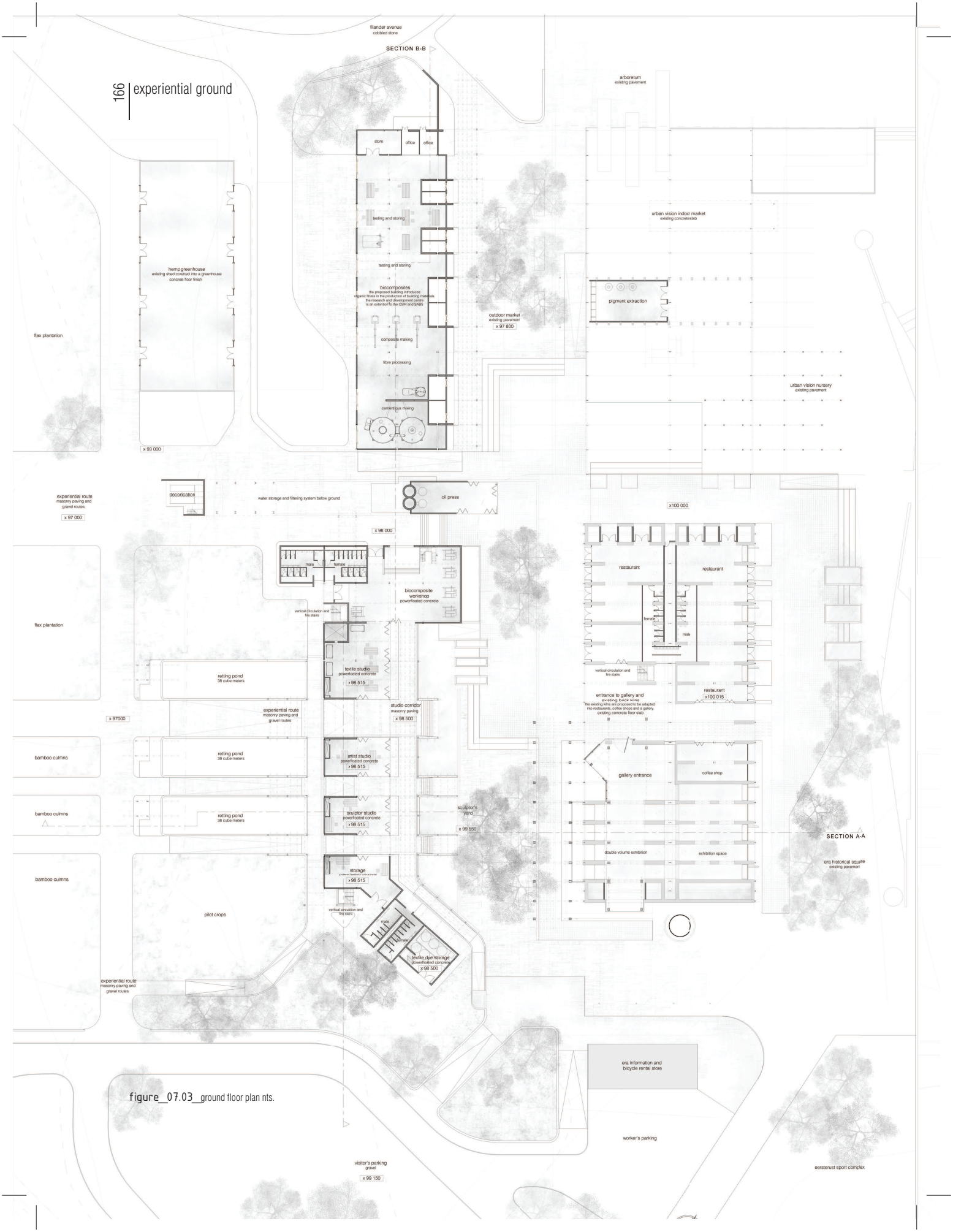

figure_07.03_ground floor plan nts.

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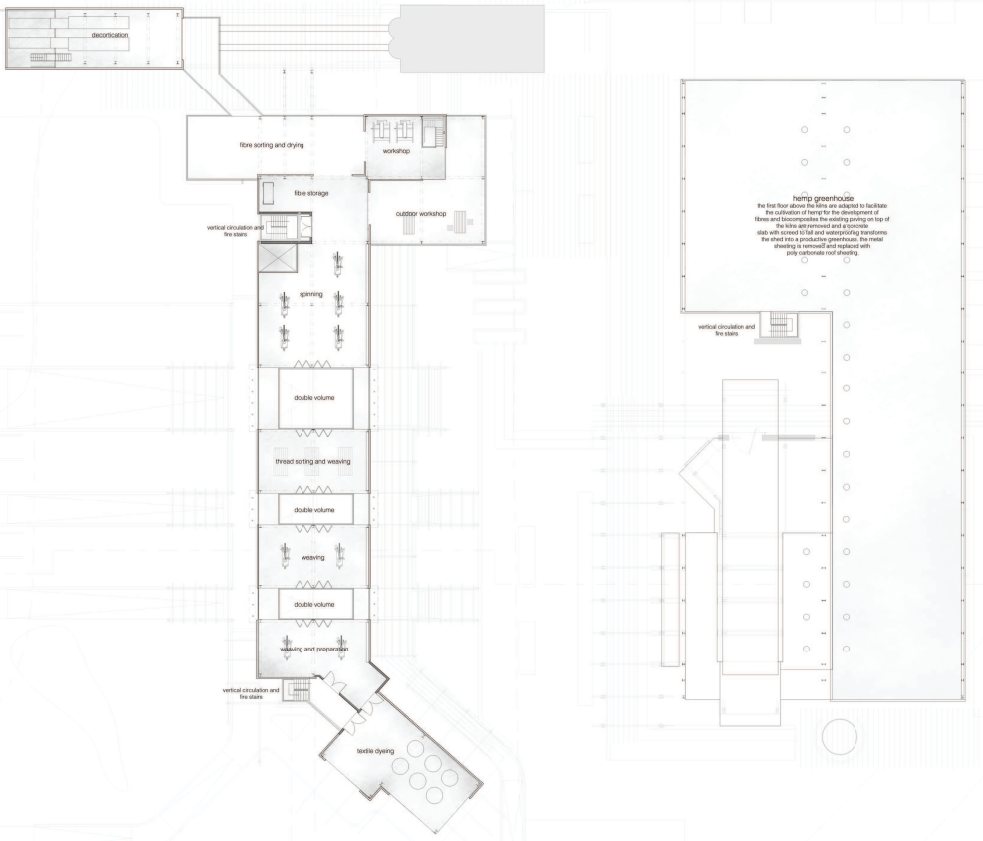

figure_07.04_first floor plan nts.

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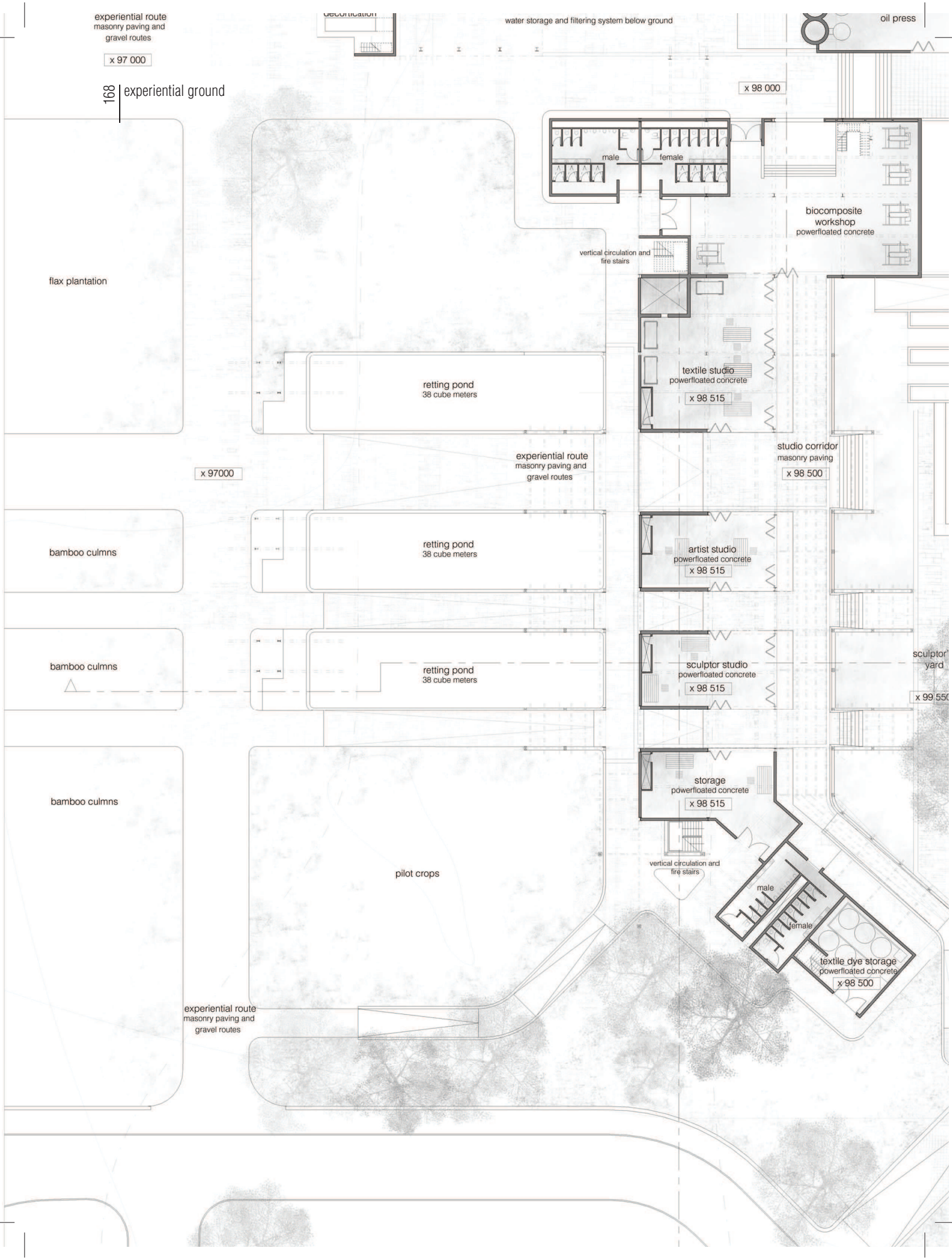

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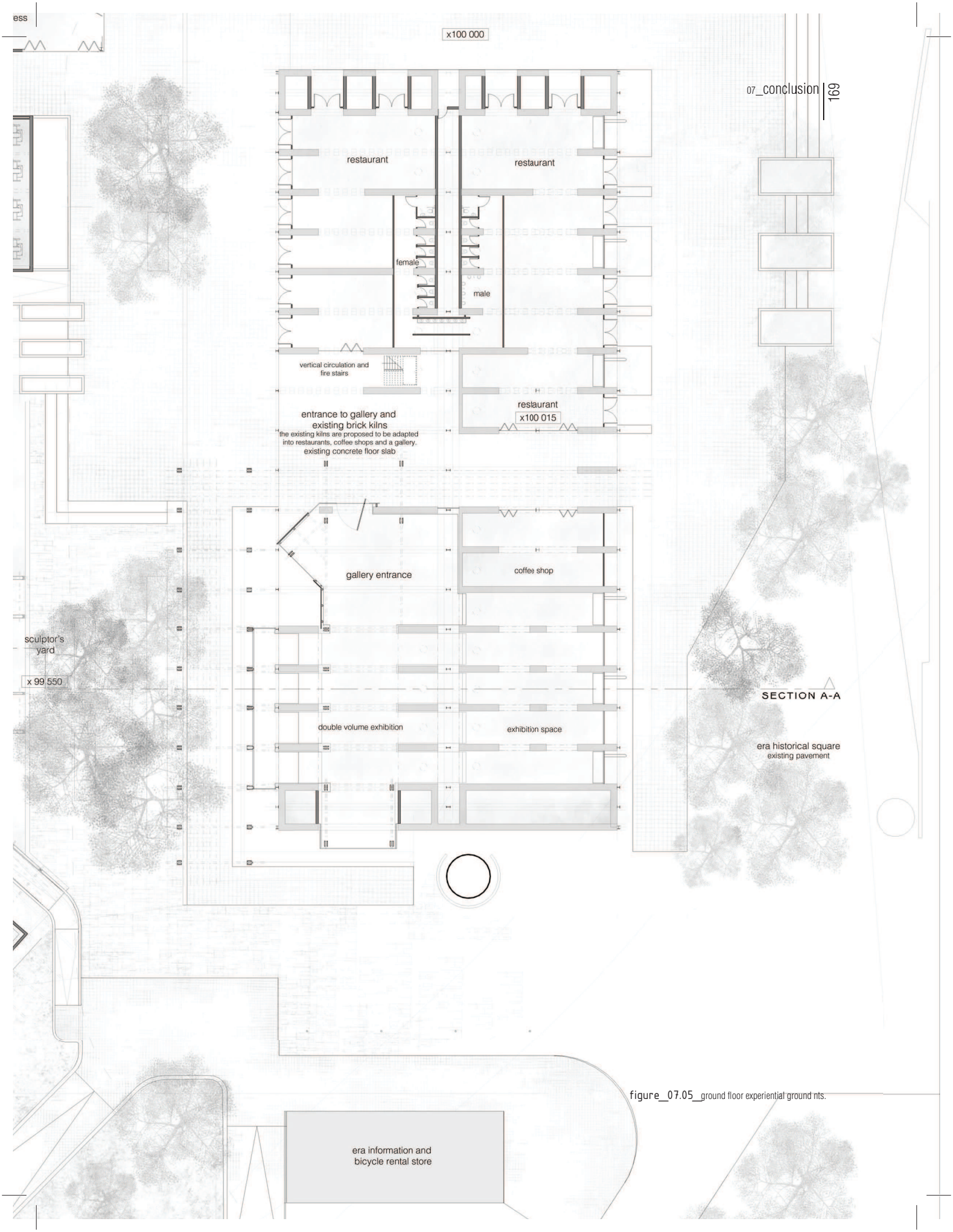

figure_07.05_ground floor experiential ground nts.

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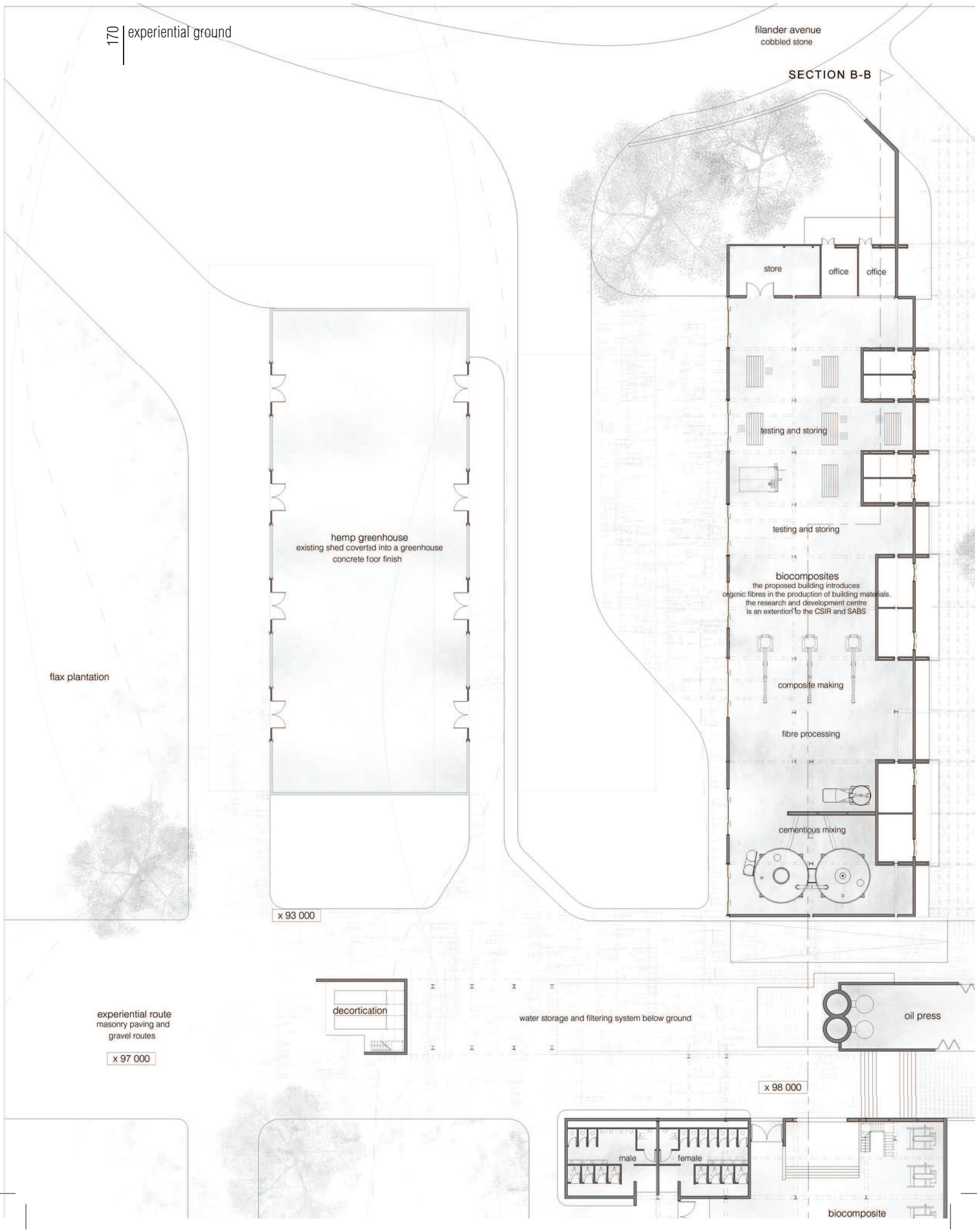

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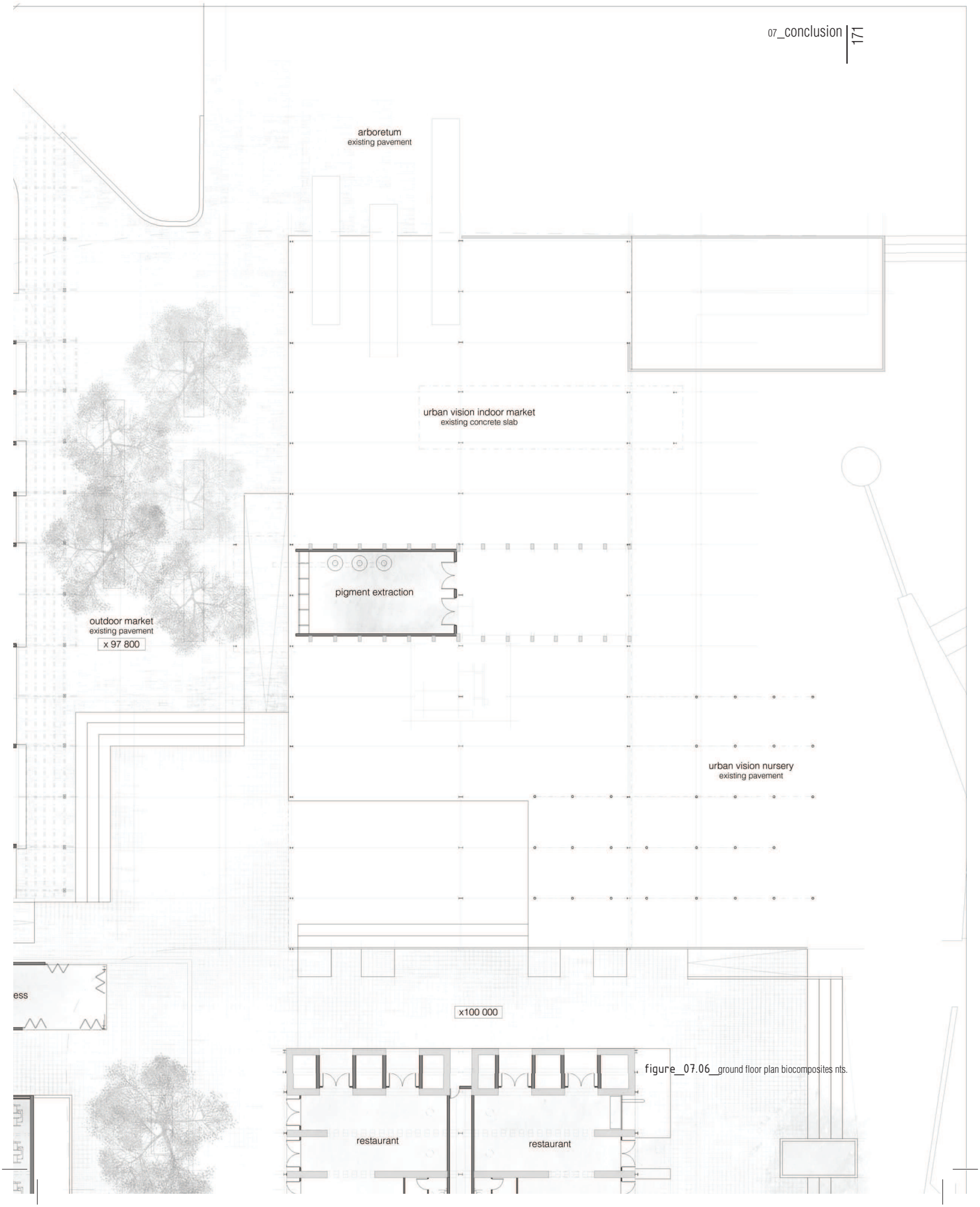

figure_07.06_ground floor plan biocomposites nts.

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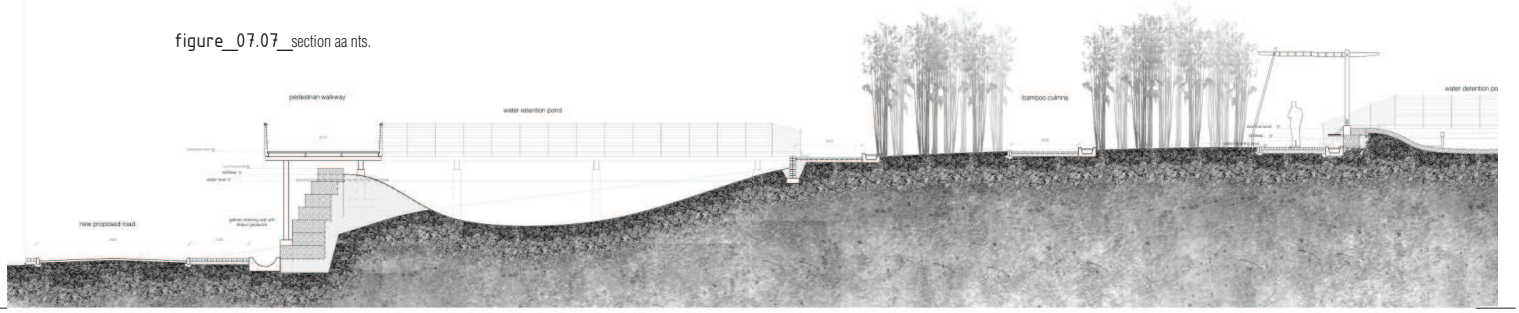
figure_07.07_section aa nts.



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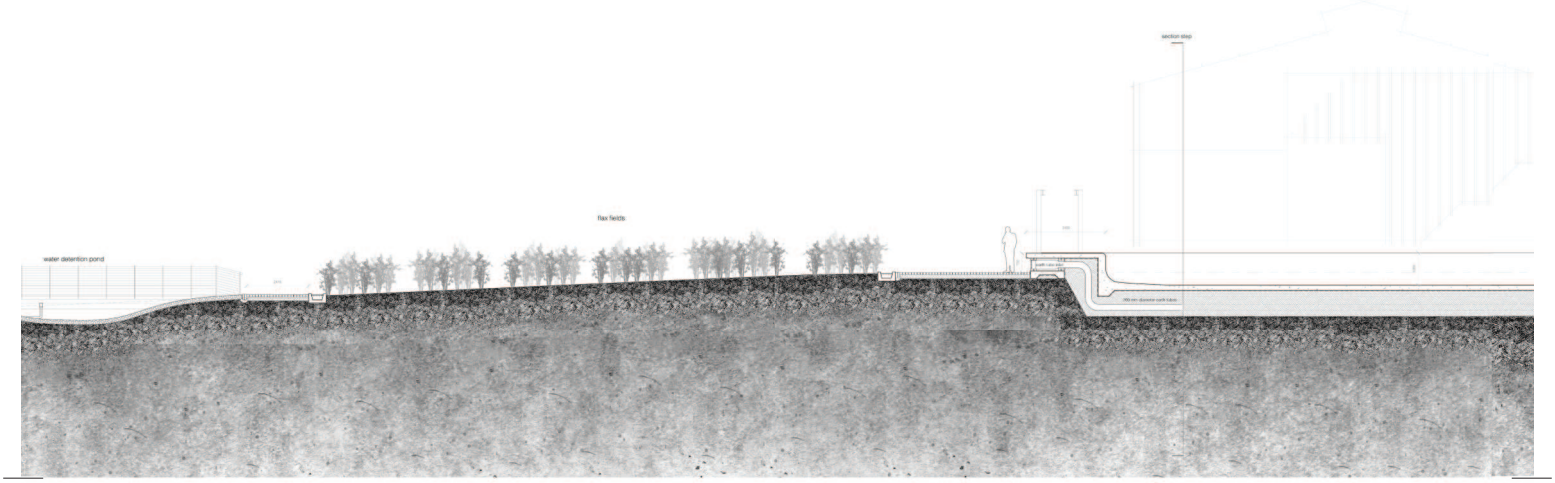

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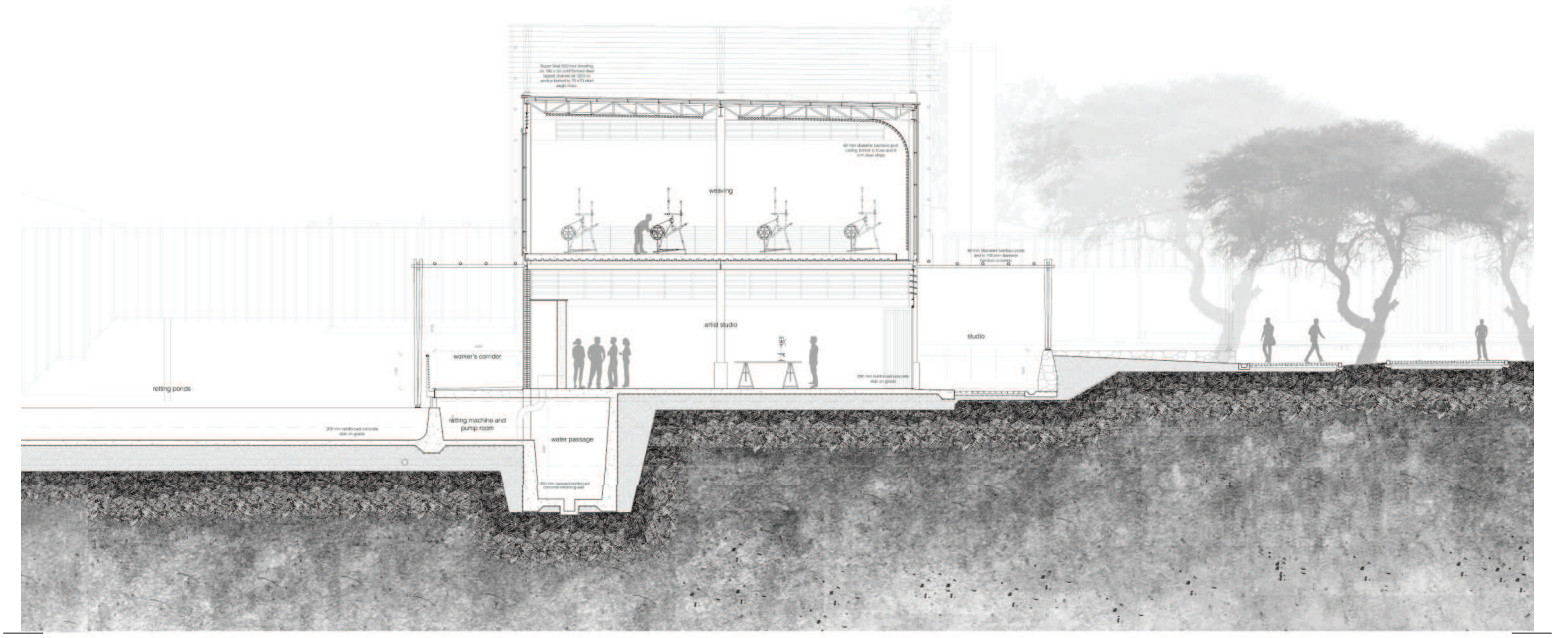

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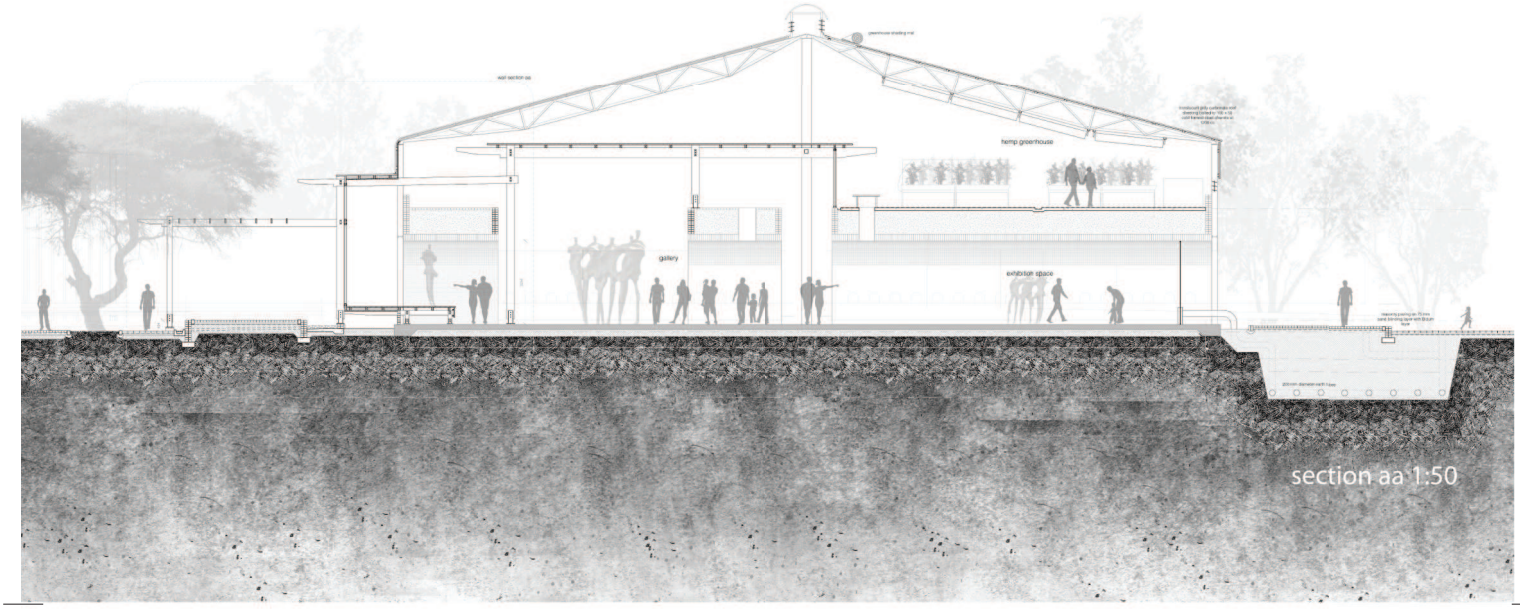

section aa 1:50

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figure_07.08_wall section aa nts.

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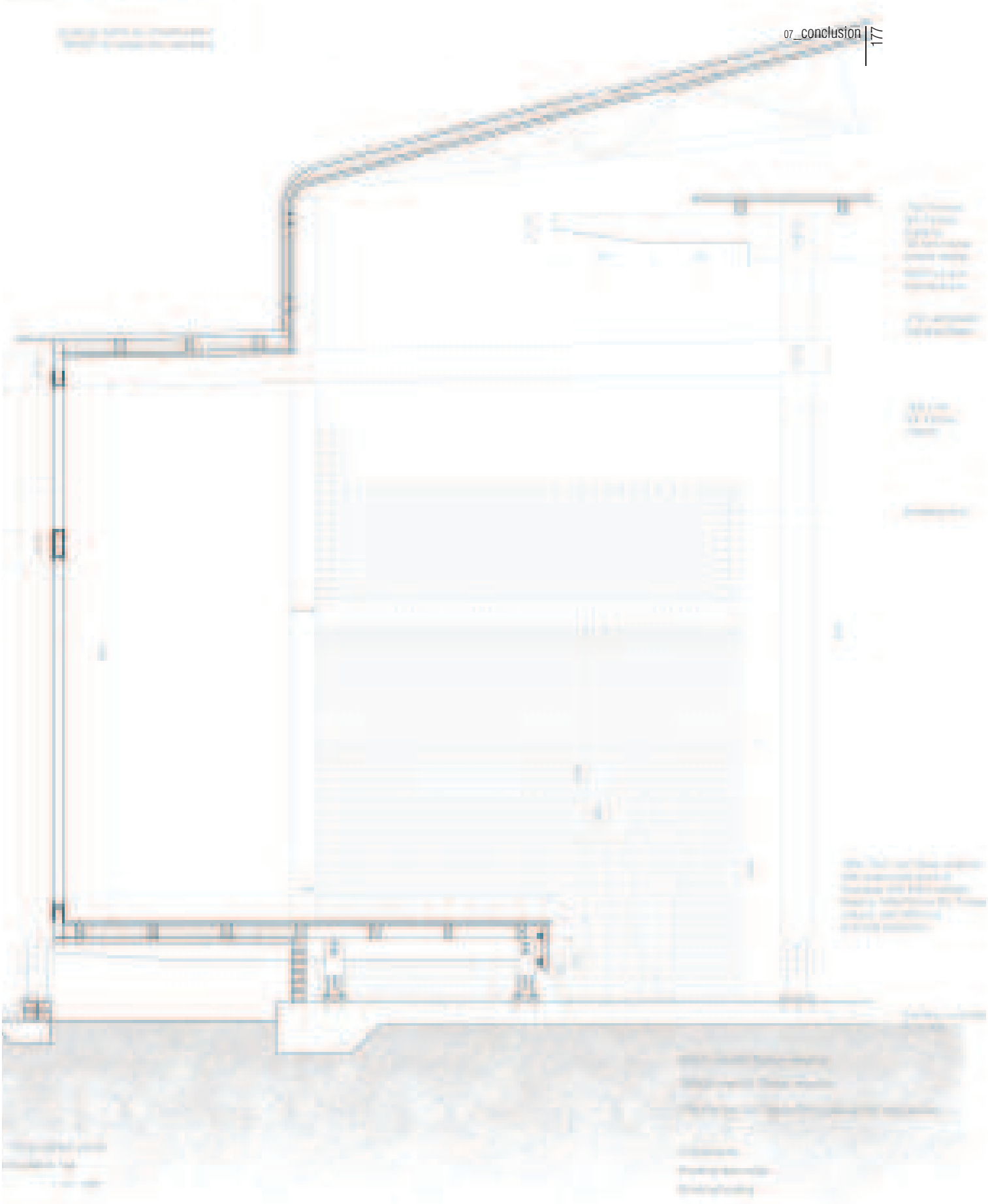

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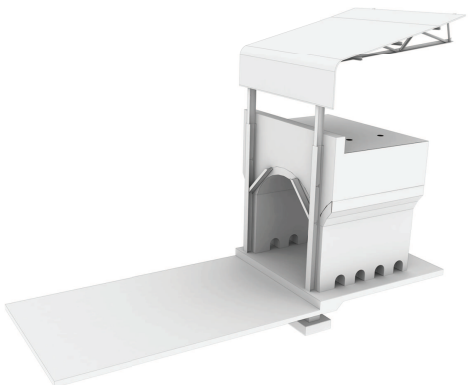

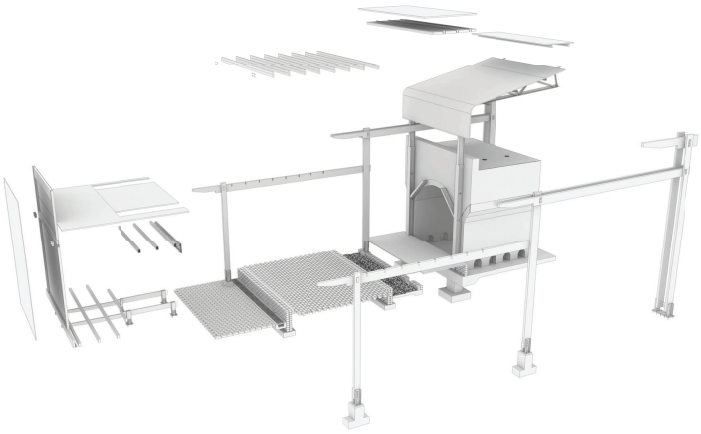

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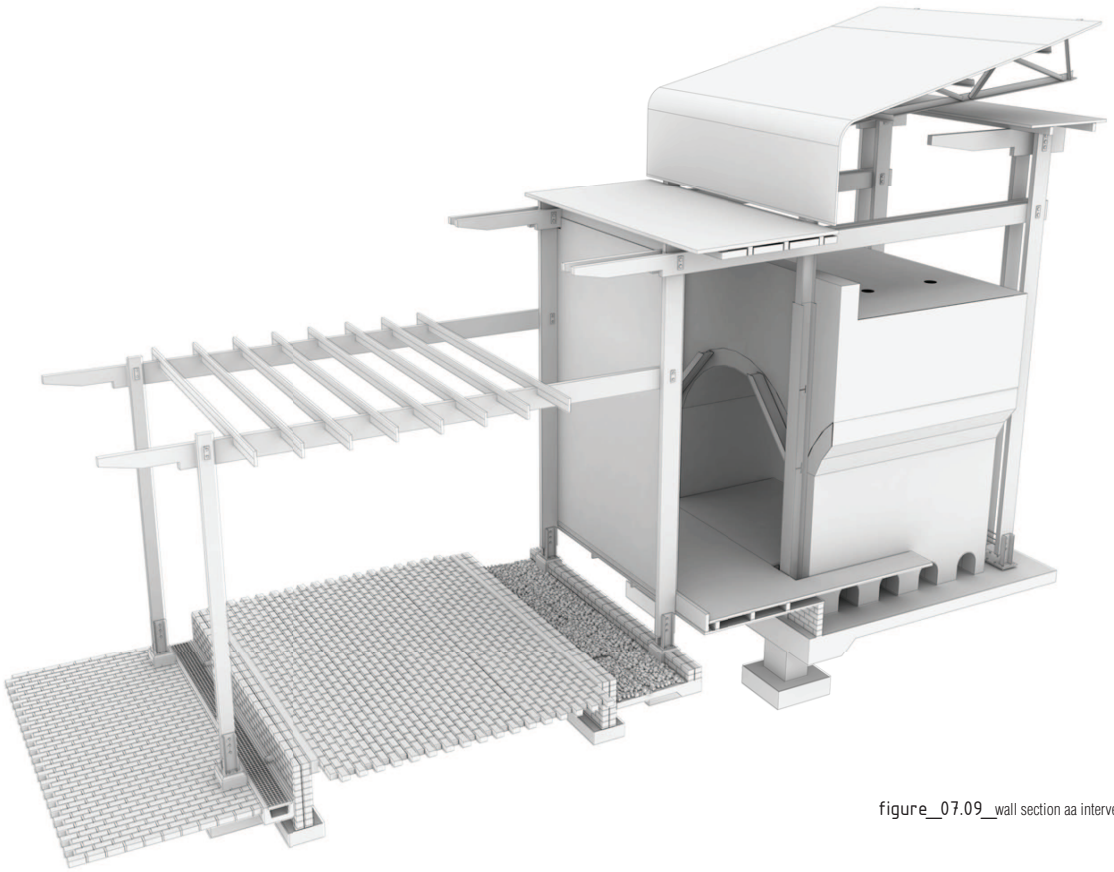

figure_07.09_wall section aa intervention 3d.

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figure__07.10__section bb nts.

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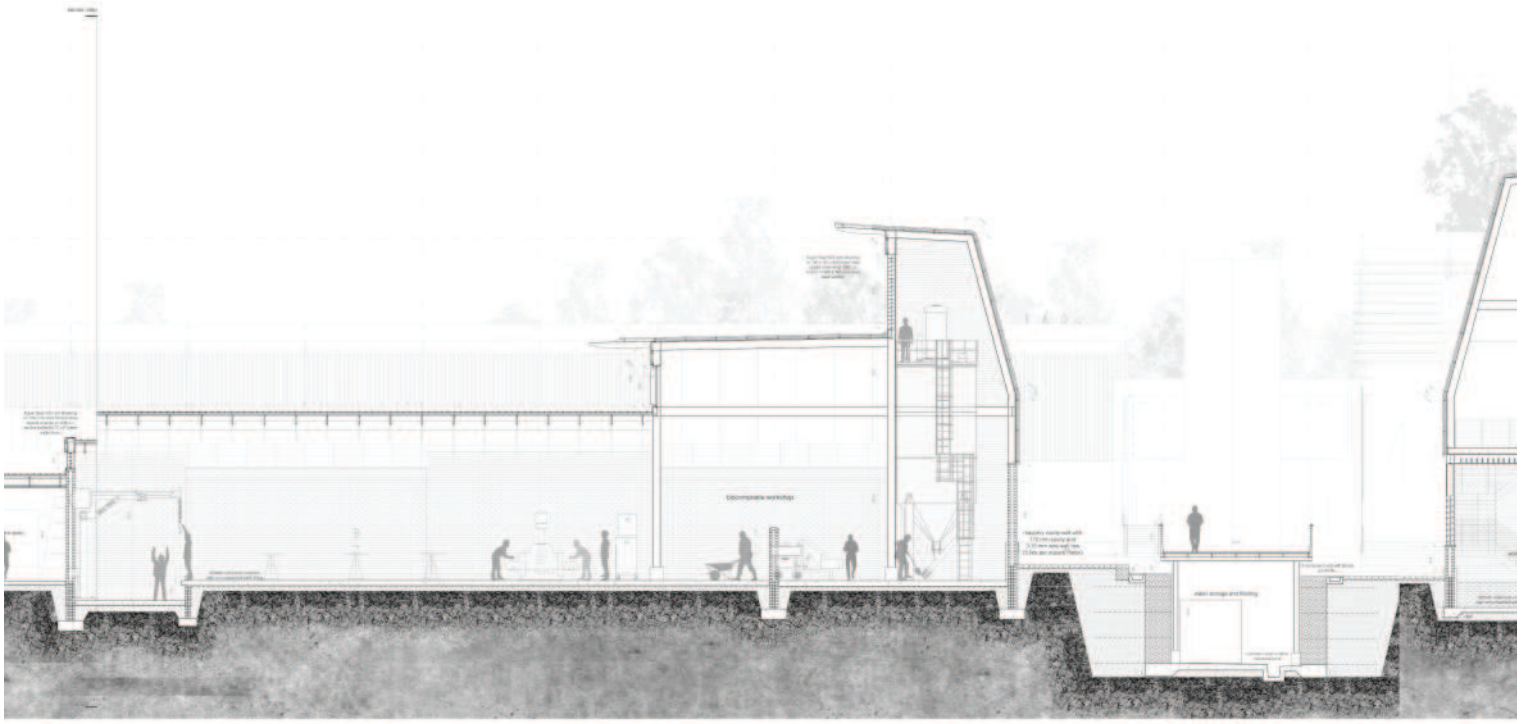

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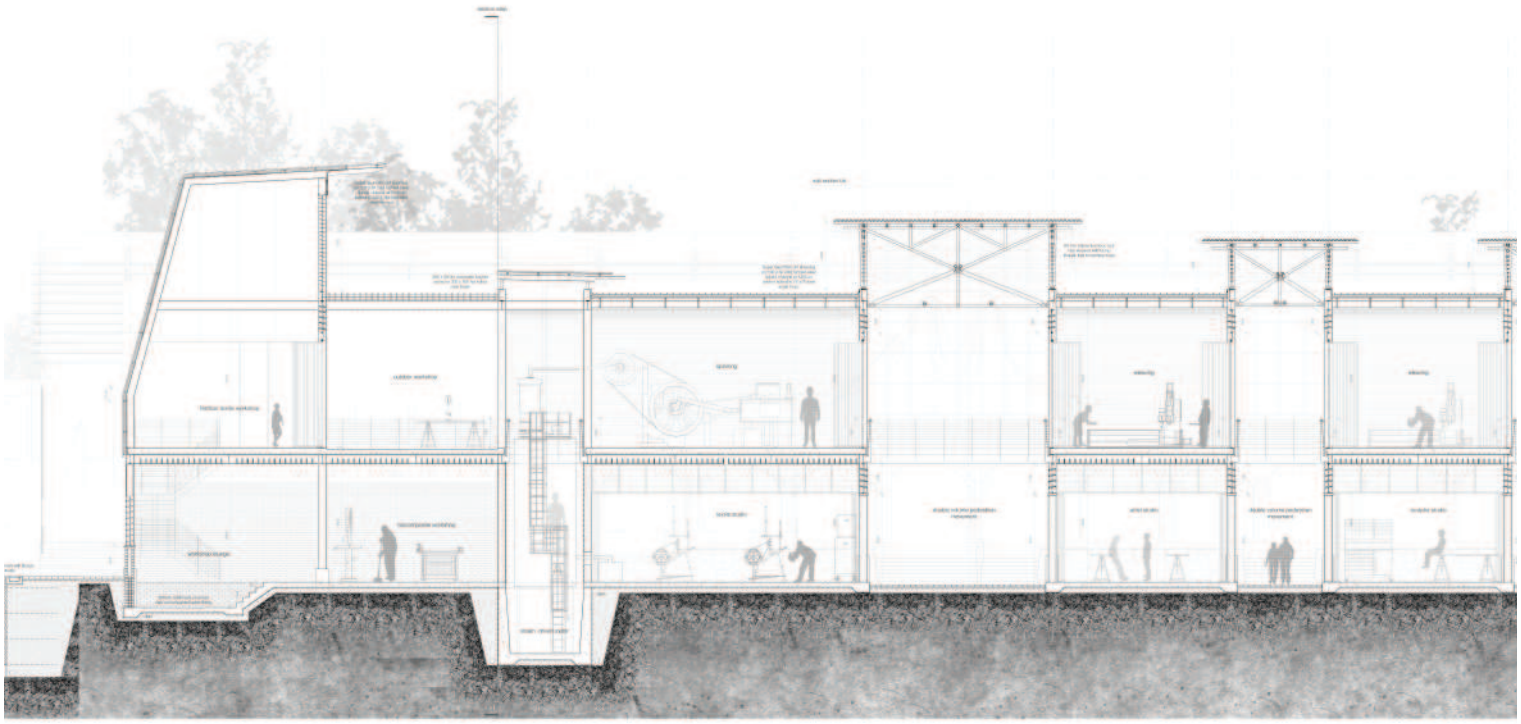

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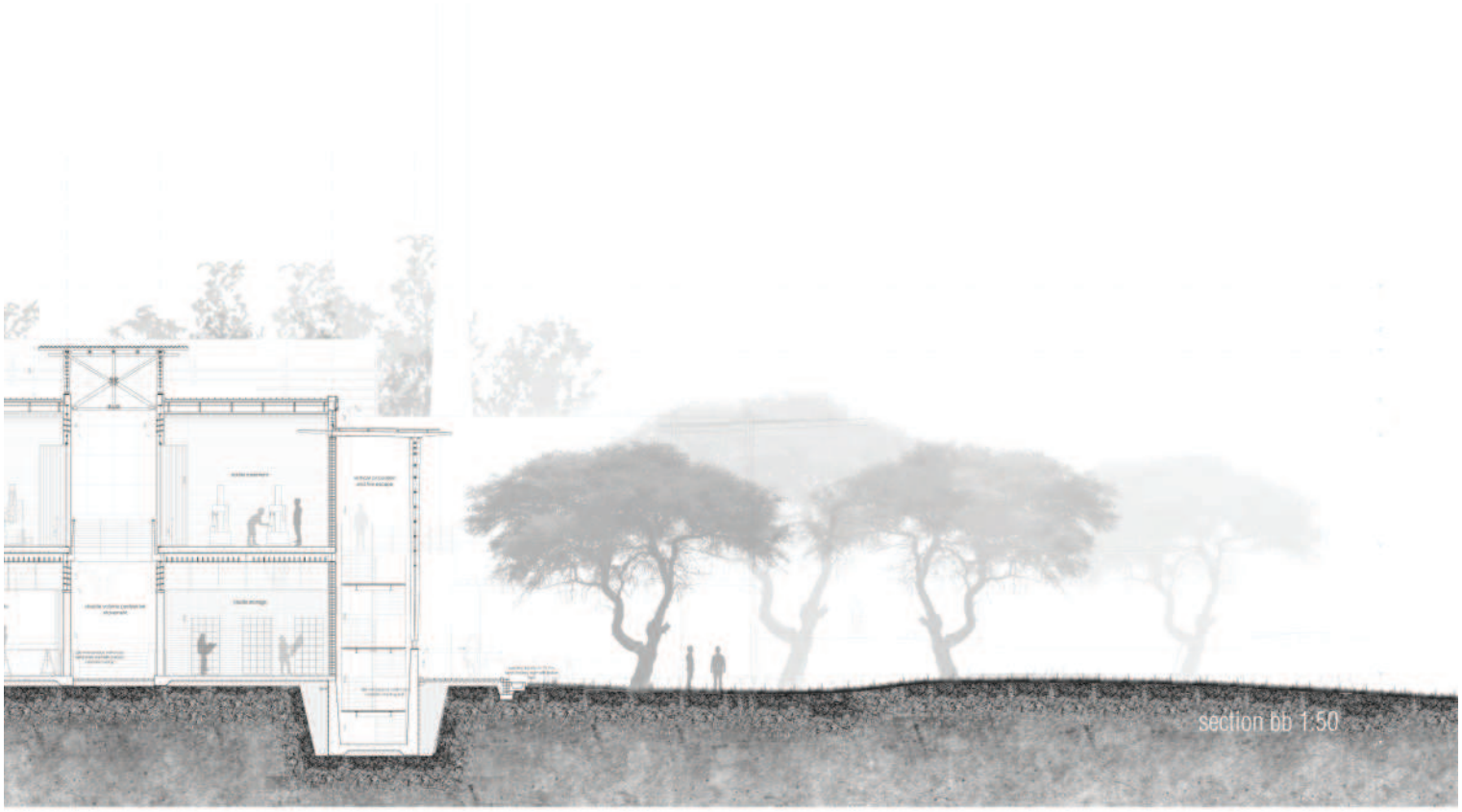

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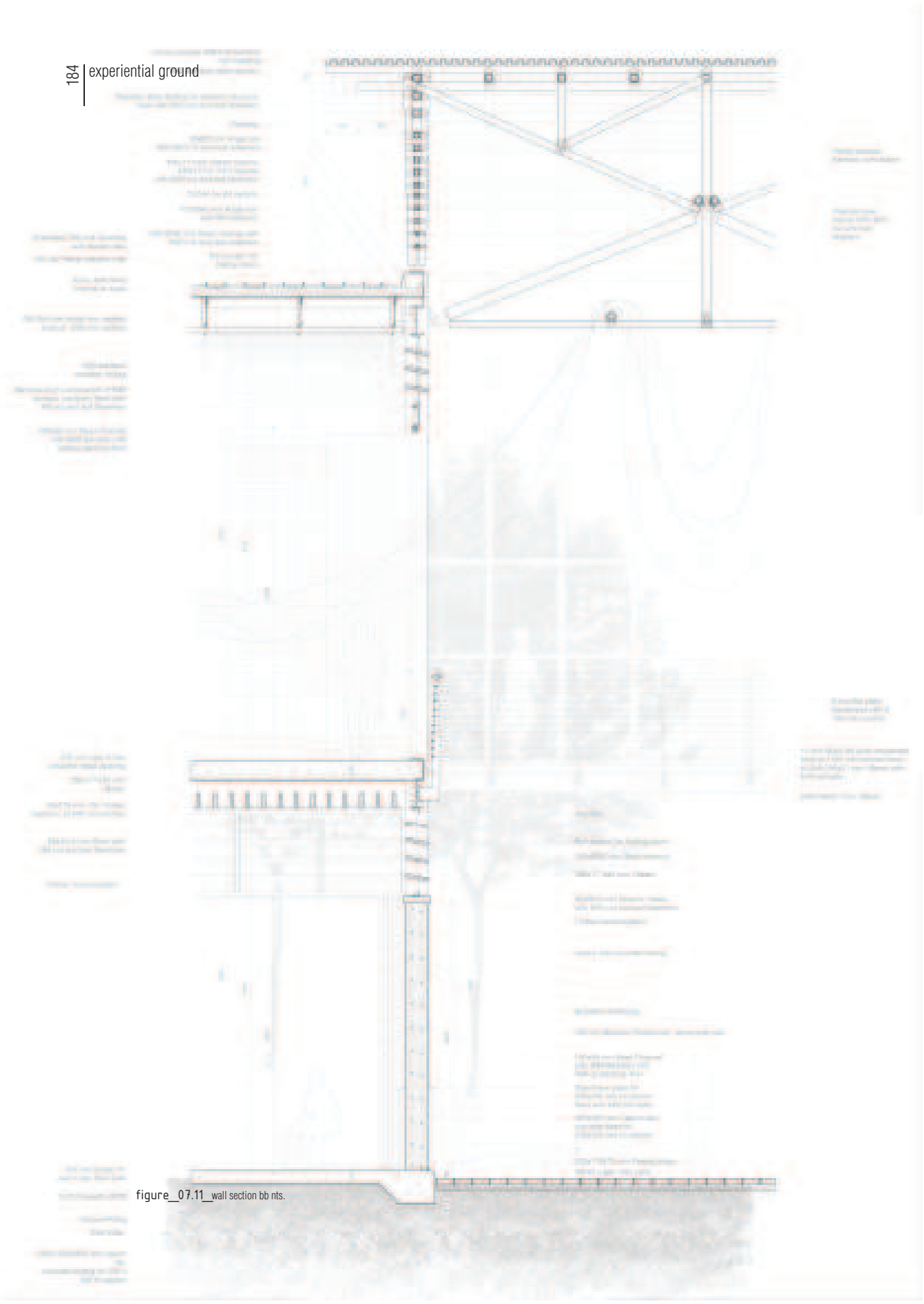

figure_07.11_wall section bb nts.

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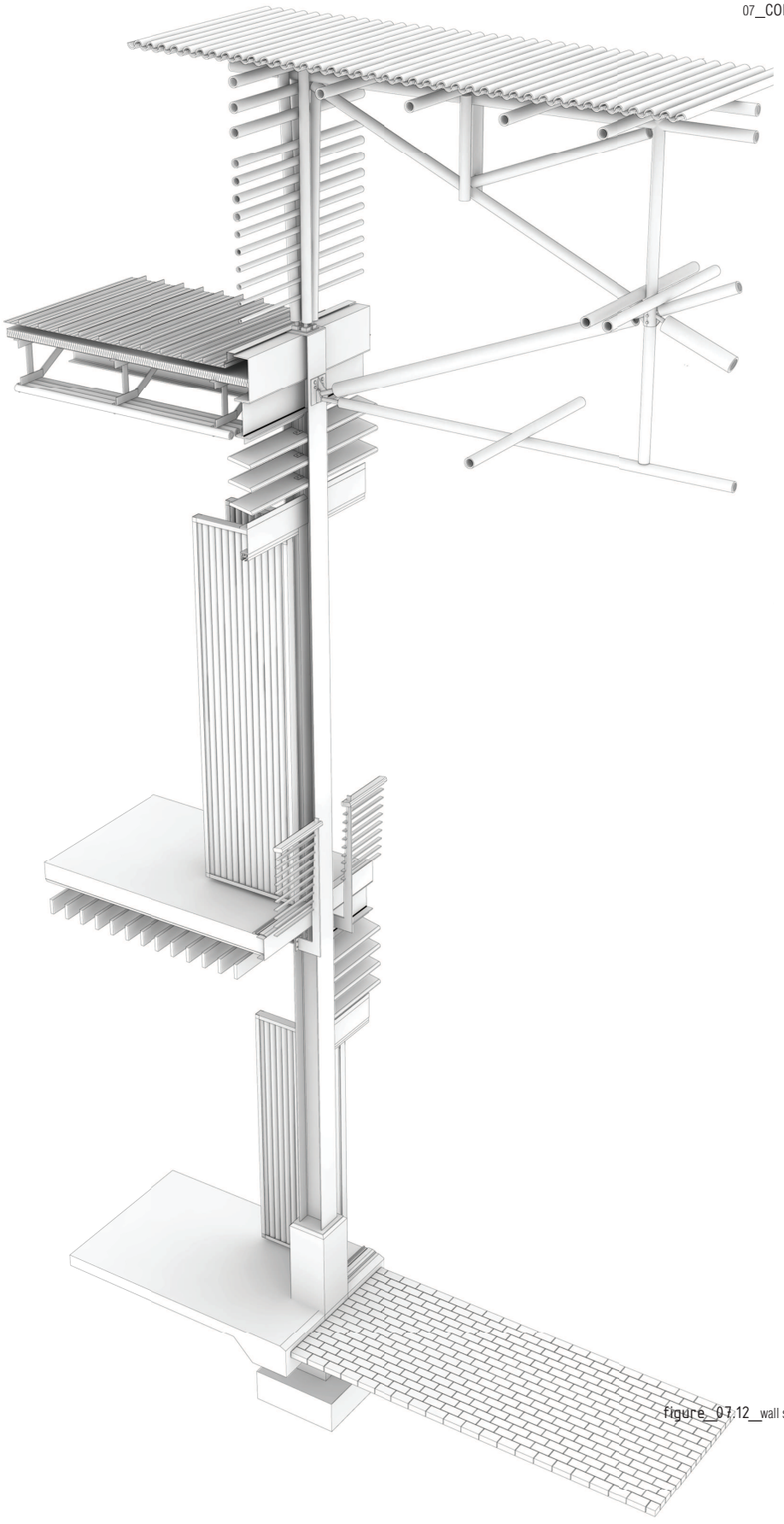

figure_07.12_wall section bb 3d.

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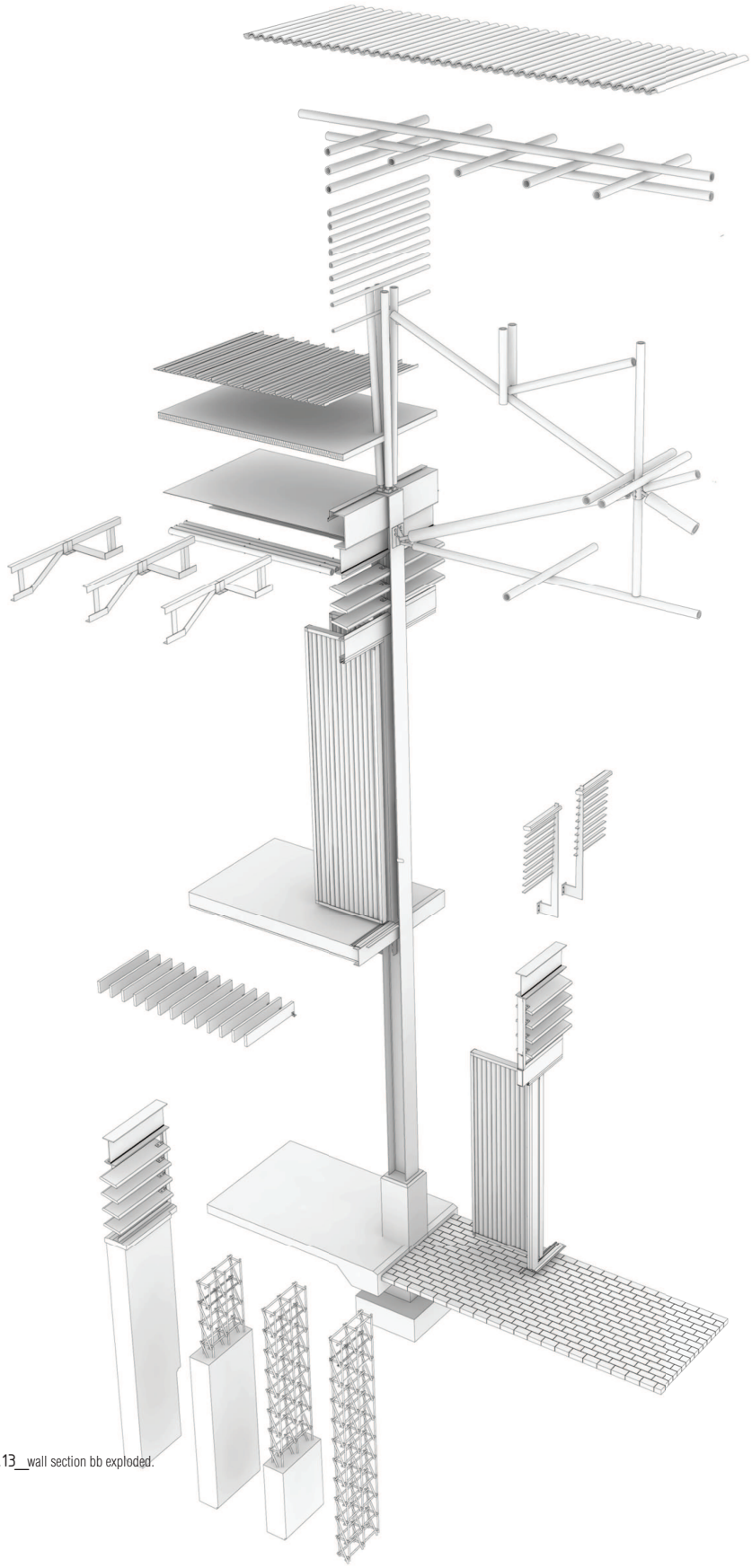

figure__07.13__wall section bb exploded.

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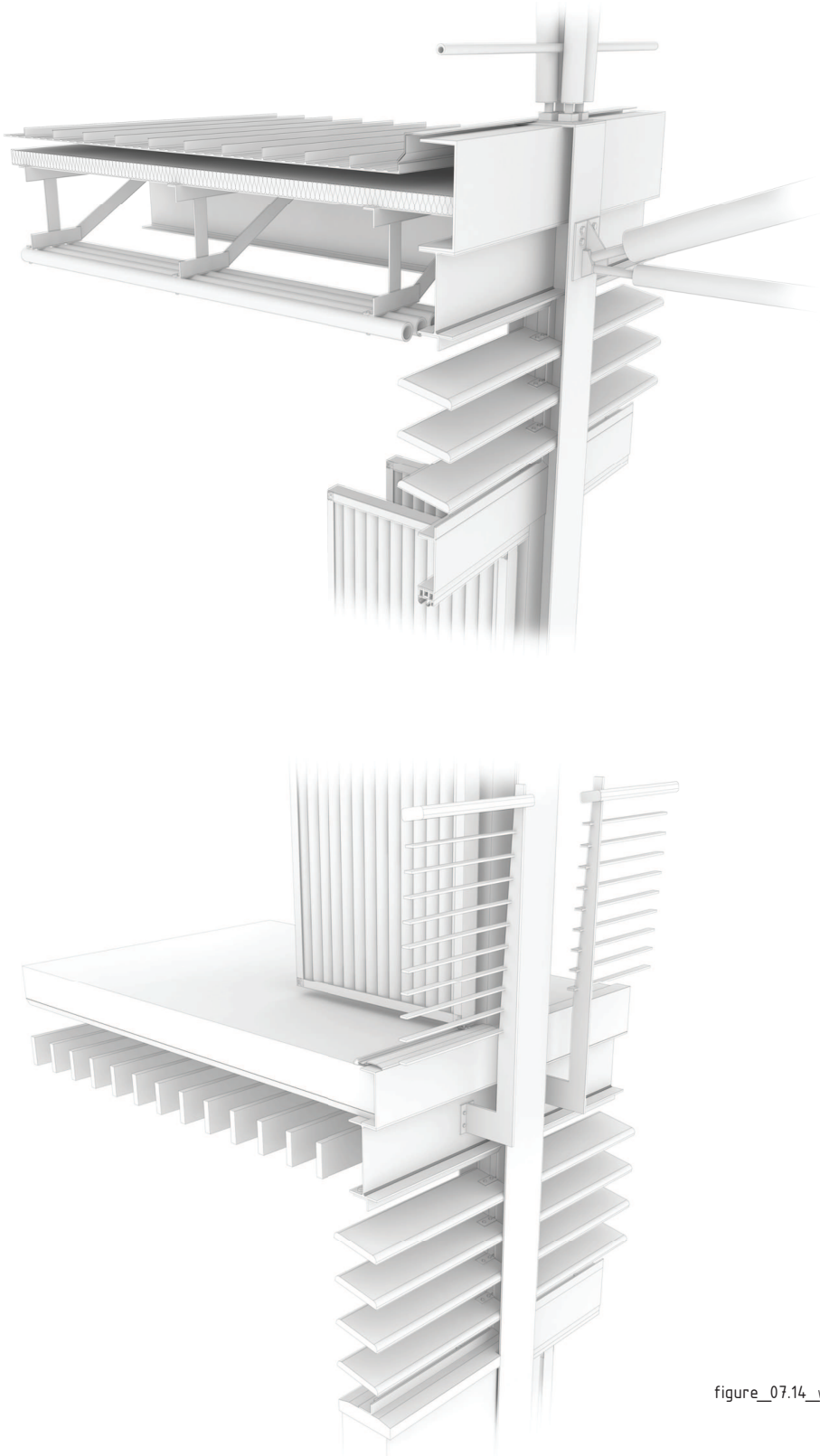

figure_07.14_wall section bb detail 3ds.

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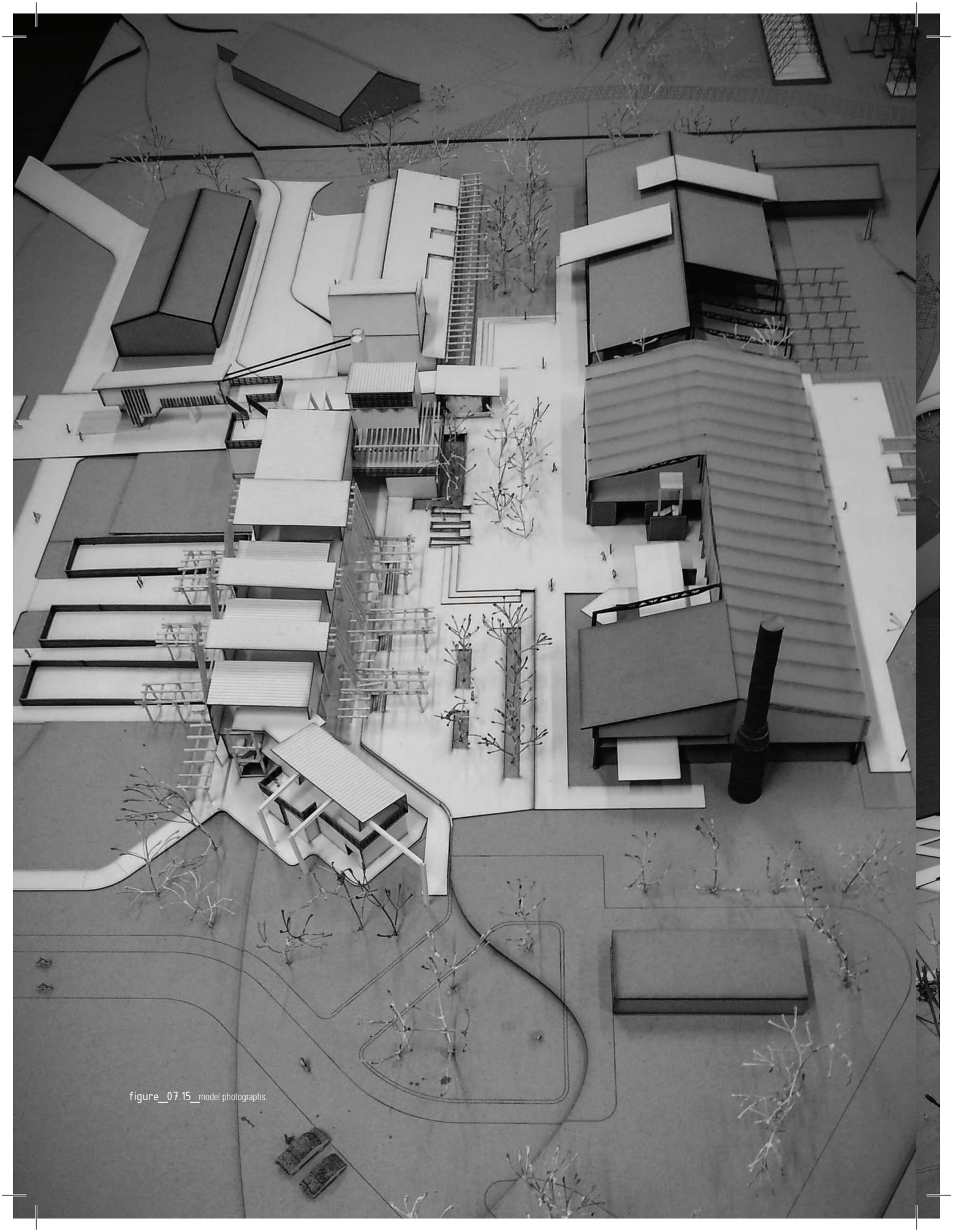

figure_07.15_model photographs.

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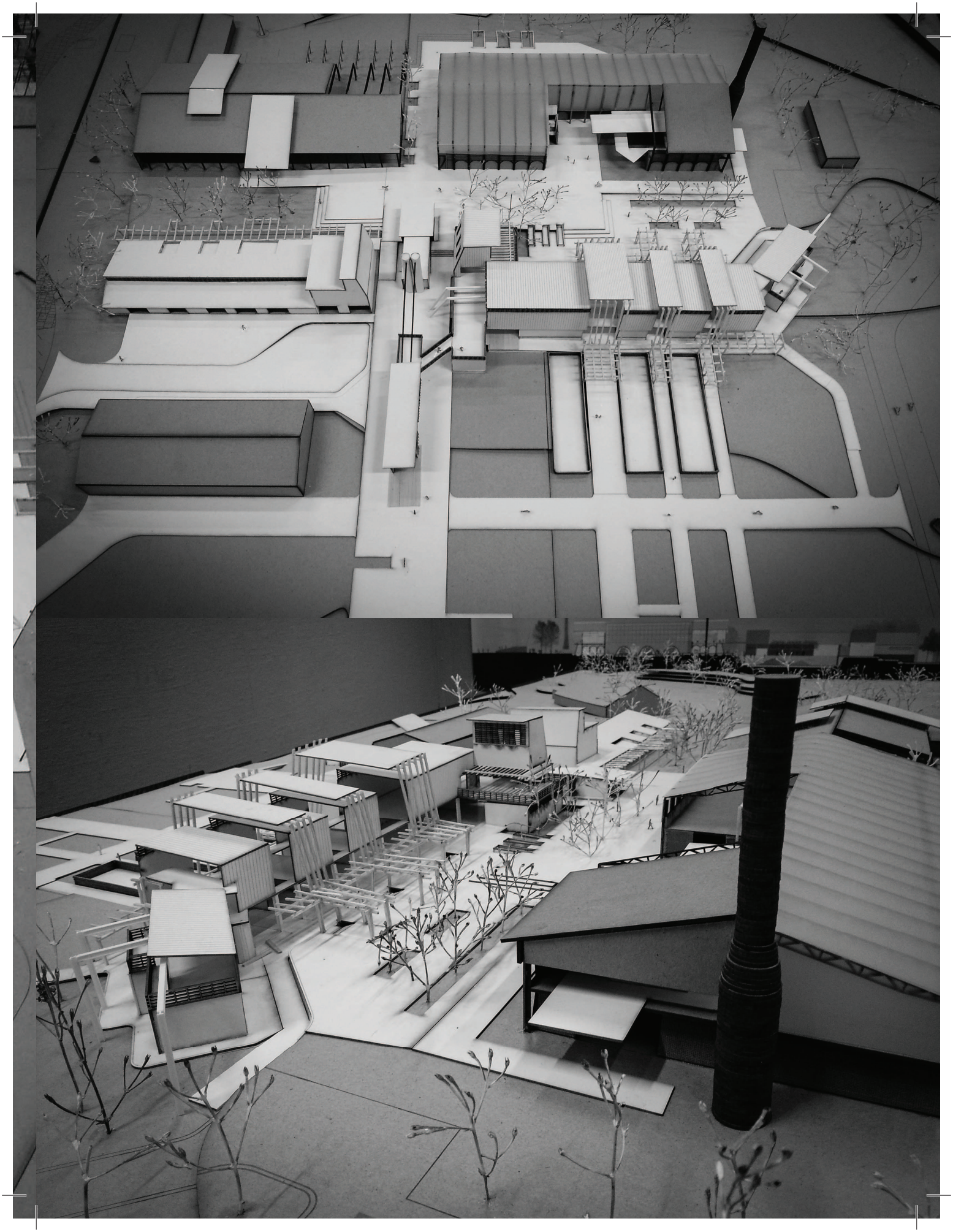

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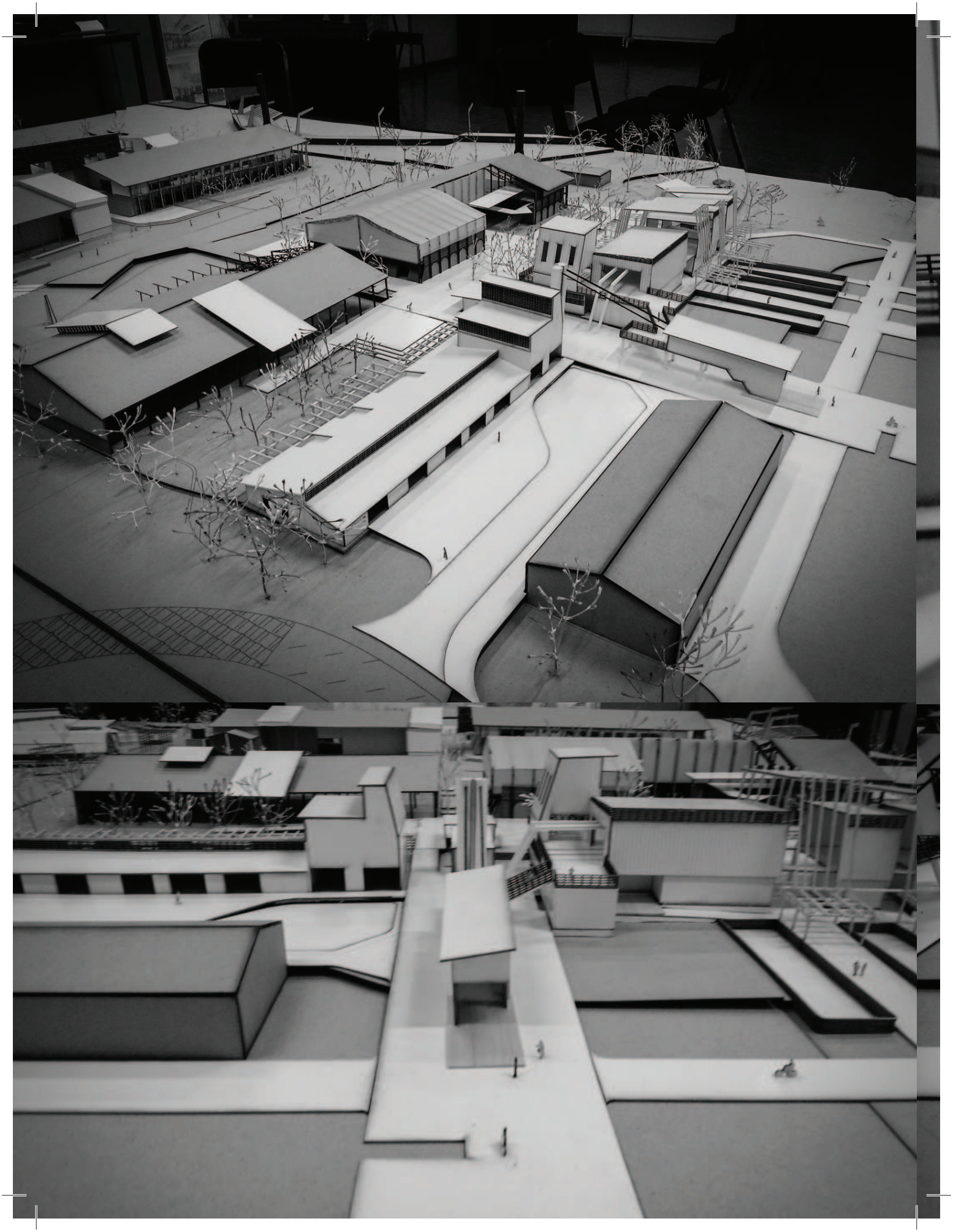

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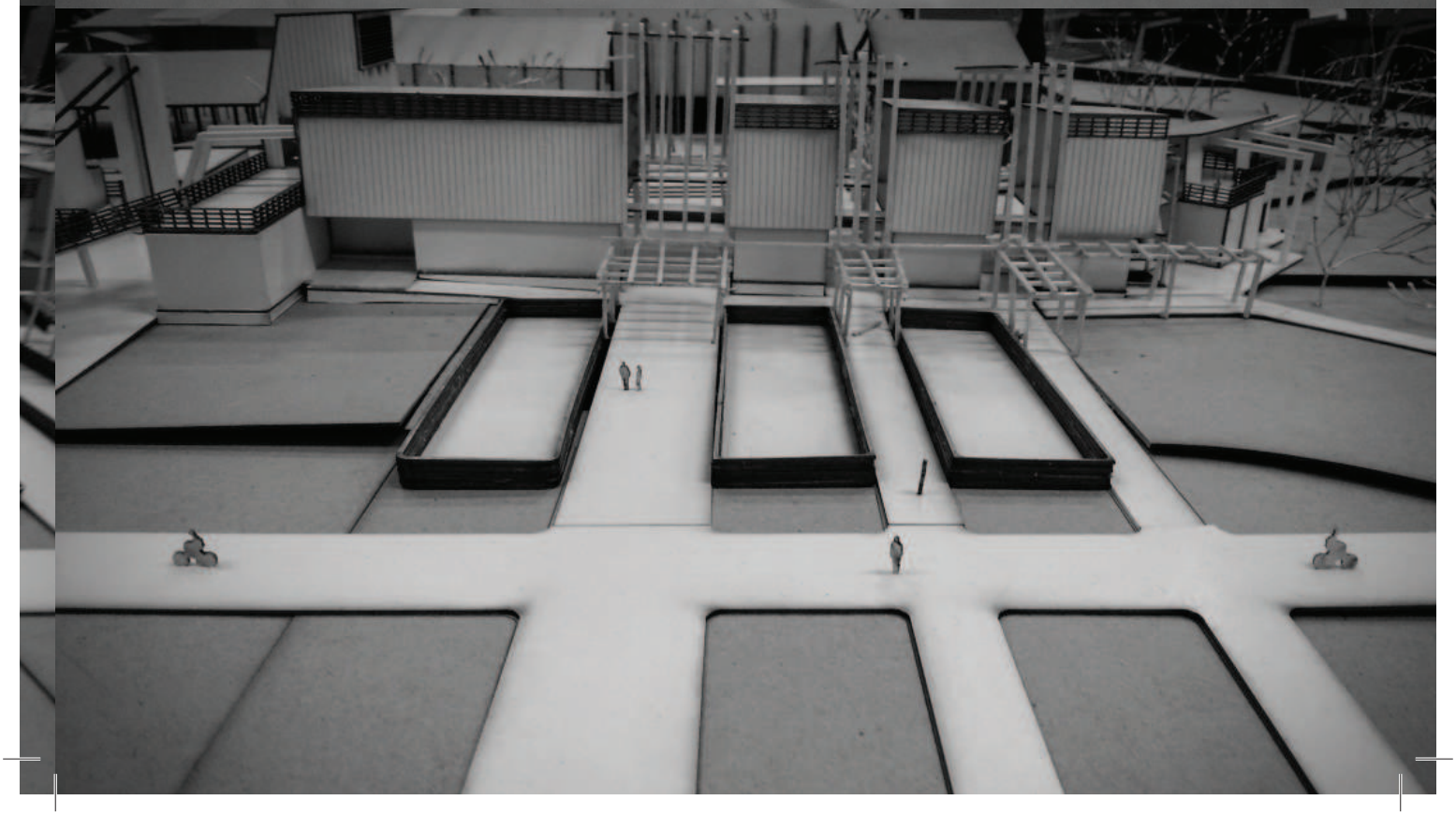

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