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a mixed metals market for 21st mining





EXCHANGE

A Mixed Metals Market for 21st Century Mining

Jacques du Plessis

2012

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DECLARATION

I, Jacques du Plessis 0707129A, am a student registered for the course Master of Architecture [Professional] in the year 2012. I hereby declare the following:

I am aware that plagiarism [the use of someone else's work without permission and/or without acknowledging the original sources] is wrong. I confirm that the work submitted for assessment for the above course is my own unaided work except where I have stated explicitly otherwise. I have followed the required conventions in referencing thoughts, ideas, and visual materials of others. For this purpose, I have referred to the Graduate School of Engineering and the Built Environment style guide. I understand that the University of the Witwatersrand may take disciplinary action against me if there is a belief that this is not my unaided work or that I have failed to acknowledge the source of the ideas or words in my own work.

Jacques du Plessis
07 December 2012

This document is submitted in partial fulfilment for the degree:
Master of Architecture [Professional] at the University of the Witwatersrand, Johannesburg, South Africa, in the year 2012.

Note: All unreferenced material is the authors own.

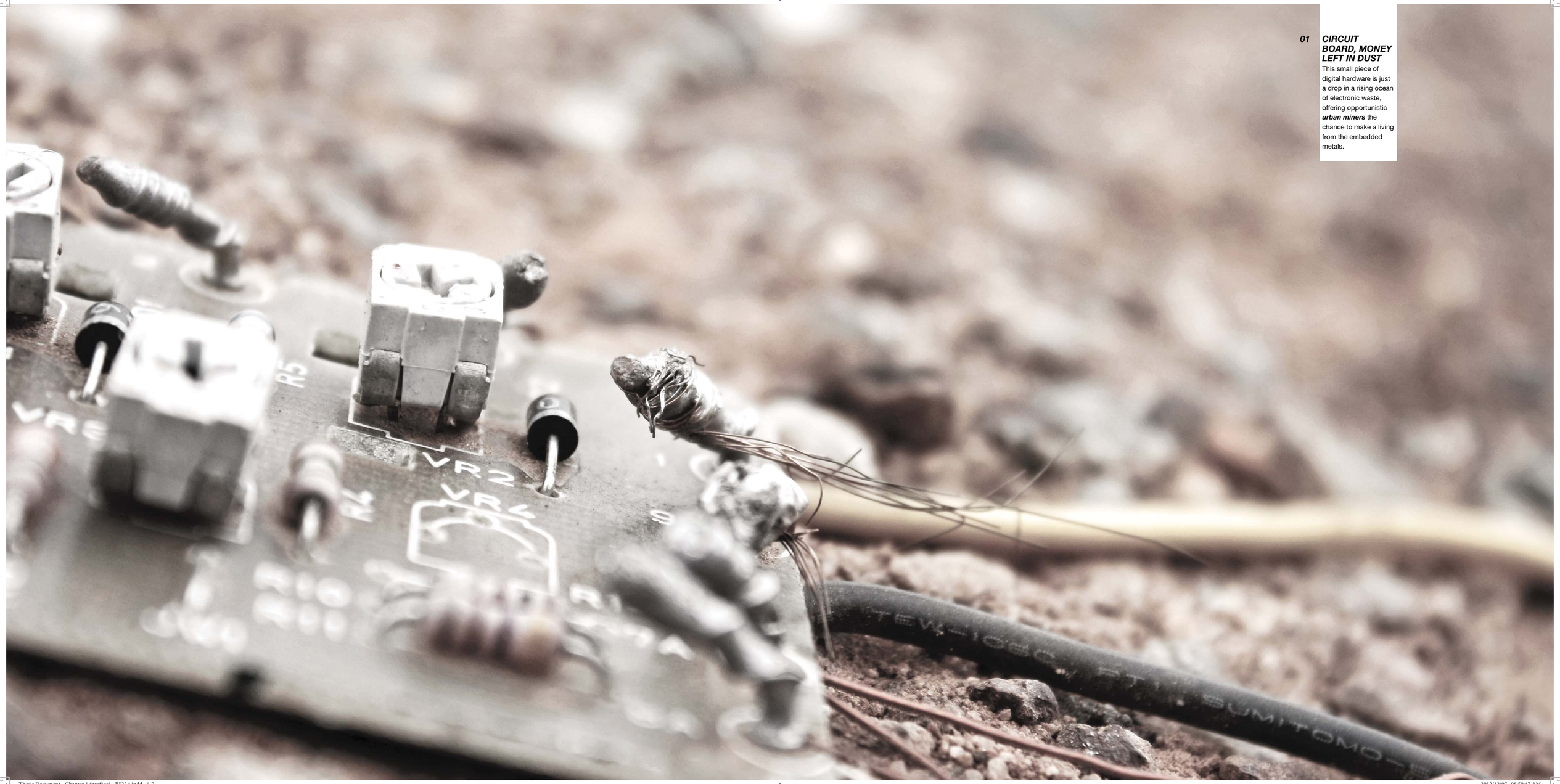
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The compilation of this paper has been the most significant academic challenge I have ever had to face. It is a great pleasure to give respect to those who have made this thesis possible. Without the support, patience, and guidance of the following people the efforts of the past year would not have been possible. It is to them that I owe my deepest gratitude and appreciation.

I owe my sincere thankfulness to my supervisor, Hilton Judin, whose passion for architecture and dedication to his academic profession inspired me to push myself further than ever before. You patiently followed me when I was chasing ideas, you gave me positive direction when I wandered, and you always offered your best input and thoughts – thank you for lighting that initial spark. Thank you once again for guiding me through this incredibly complex and difficult process. To my girlfriend, Michelle Belamant, who for the past two years has not only lifted my spirits and carried me through the thick of things, but also been the person with whom I have shared every idea. You always put things in perspective and have a way of making even the most impossible tasks seem manageable. Your dedication to your work and exuberance for life has been my benchmark. Thank you for all your love, friendship, and support. To my mother, father, and sister thank you for all your enduring love and support, and thank you for your tireless patience and rational understanding. I know the last two years have been tough on you as well. To JJJ, my friends Jacobus and James thank you for jumping in and helping me out when I needed you, but more importantly thanks for all the laughs and momentary breaks back into reality – your time is coming soon.

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01 ***CIRCUIT BOARD, MONEY LEFT IN DUST***

This small piece of digital hardware is just a drop in a rising ocean of electronic waste, offering opportunistic ***urban miners*** the chance to make a living from the embedded metals.

‘It is insufficient for architecture today to directly implement an existing building typology; it instead requires architects to carefully examine the whole area with new interventions and programmatic typologies.’

Zaha Hadid

‘Each new situation requires a new architecture.’

Jean Nouvel

‘Any work of architecture that has with it some discussion, some polemic, I think is good. It shows that people are interested, people are involved.’

Richard Meier

SPACE
TECTONICS
STRUCTURE
EXPERIENCE
EXPERIMENT

I believe architecture is a method of planned co-ordination. A process that continually challenges our fundamental understanding of tectonics, perceptions of space, and conception of type. By engaging with our everyday surroundings and imagining alternate possibilities we can create architecture that is functionally, contextually, and environmentally responsive, emotionally stimulating, spatially intriguing, and socially engaging. As the architects of our built environment, we have the ability to envisage new buildings, mould meaningful spaces, piece together social situations, and create lasting impressions through memorable interaction – we are the daydreamers that will always continue to dream bigger.



02

FADING SANDS

This small piece of digital hardware is just a drop in a rising ocean of electronic waste, offering opportunistic ***urban miners*** the chance to make a living from the embedded rare earth metals.

01
THEORY

Urban Places and Electronic Spaces: *The Spatial Tension between Globalising and Developing Worlds*

A **INTRODUCTION**

B **INFORMATION SPACES**

C **ELECTRONIC SPACES**

- *The Virtual*
- *Urban Networks*
- *Globalisation*
- *Re-configuring Architecture In Space*

D **DEVELOPING SPACES**

- *The Physical*
- *Global Urbanism And African Urbanity*
- *Africa's Network Society, People As Infrastructure*
- *Re-imagining Architecture In Place*

E **SOMEWHERE IN-BETWEEN**

- *The Urban Imaginary*

02
VISUAL

A **ANYTHING NEW TODAY**
The Markets We Already Know

P ***THE OPEN MARKET***

P ***THE TRADING PIT***

* **GOOD OLD TENDER**
The Rest of Money

P ***ELECTRONIC WASTE PROCESSING LABS***

B **THE BORDERLANDS**
Technological Infoscapes and Electronic Wastelands

P ***DIGITAL TRADING FLOOR***

C **GLOBAL ORE**
The World's Metal Market

P ***MIXED METALS REFINERY***

E **LOCAL PLACE**
The Meeting Grounds

P ***ADMINISTRATION WING***

P ***METAL ROUTE***

D **ELECTRONIC CADAVERS**
What Makes Them Re-tick

P ***ELECTRONIC ACADEMY***

03
DESIGN

- *Industrial epopee*
- *Programme breakdown*
- *Typology band*
- *Concept exploration*
- *Design Development*
- *Technical aspects*
- *Design presentation: Open Public Trade Forum*

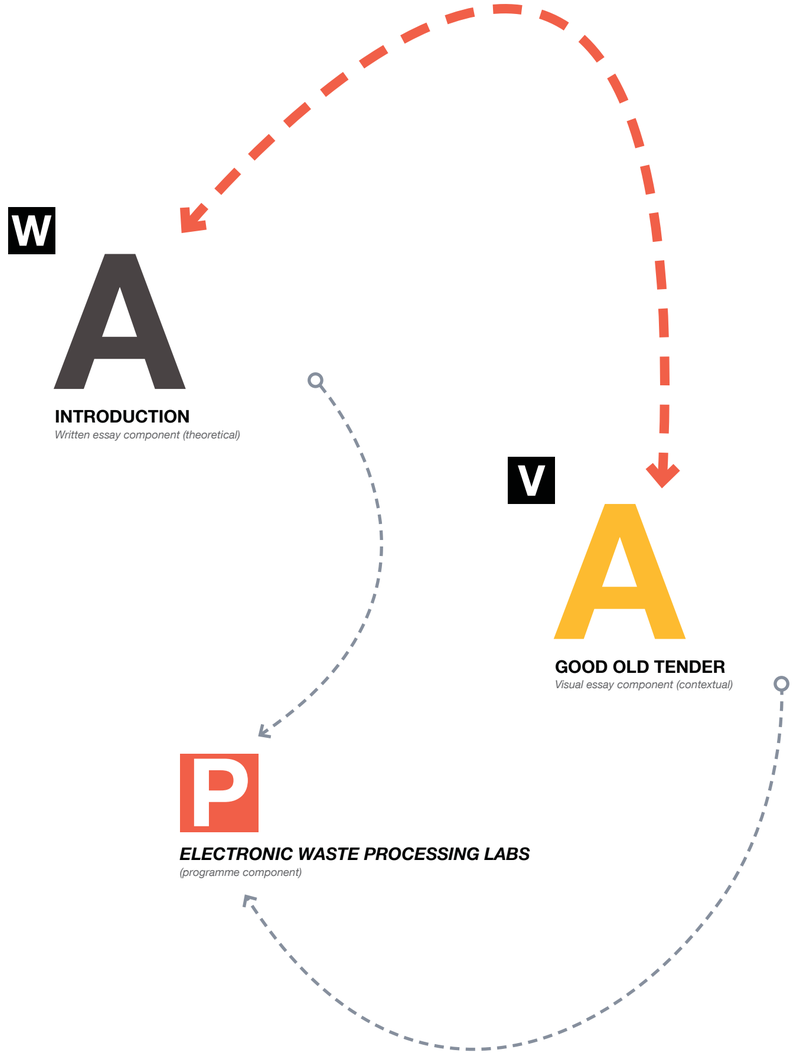
D ***CRAFTING A TYPOLOGY***

DOCUMENT STRUCTURE

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The thesis is as much about presenting an architectural intervention as it is a journey of discovery. The structure of this book is carefully arranged to present to you my encounter with electronic waste and the journey of urban mining.

The layered exploration begins by looking into the theoretical aspects of the *Information Age* which subsequently develops into the argument centred on digital or 'electronic spaces' being embedded in physical place. It is in much the same way that the virtual manifests itself in the physical I will attempt to ground my theoretical enquiries in a contextual exploration. It is my objective to present to the reader a number of themes throughout this book: where each essay chapter introduces a theoretical argument or 'informational component'; the visual sections following afterward compliment the theory by expanding on a particular 'physical' aspect coinciding with the theoretical argument; in concluding each section I will introduce a programmatic element that grounds both the written and visual essay sections to my thesis and its working context. This thesis ebbs and flows from information, set in transient space, to waste in physical place, and finally moves to an architectural intervention that embraces the entire journey of *urban mining* and electronic waste.



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ABSTRACT

Society is moving through the *Information Age*[1], a period summarised by advancing information technologies, a world economy, and a global culture, where an ephemeral network has expanded to stir and captivate our everyday lives. While the seemingly unimaginable nature and spatial qualities associated with this digital age continue to captivate our imaginations, one cannot ignore that electronic space has grounding in physical place; a consequence that sees minerals, energy, technology, and people coming together in real spaces to construct the backbone upon which today's global information networks are built.

In this instantaneous era, where spatial tensions are characteristic of widespread change, one need not stretch one's imagination to see that people and cities are increasingly pushed to find new ways to retain their grasp on and compete within the circuits of globalising space. The shifting nature of urban geographies everywhere materialise not only from the capacity of networks to disperse but also integrate increasingly complex components of productivity throughout specific regions of the world, while hollowing out spaces of marginality in others. Those cities located within developing contexts, which live so precariously along a cusp, become frontiers for unimagined resourcefulness and experimentation, where people as infrastructure assemble with remarkable reach and efficiency to oscillate between the universal and particular (Simone, 1998:173-178) . These trajectories shift our perception from city to borderland, where the urban imaginary converges on themes of exclusion and incorporation, marginality and experimentation. Our incessant lifestyles and fixations with technology, consumption, and obsolesce have reproduced volatile circumstances, where mountains of discarded electronic waste are dumped near marginal communities. These wastelands are far removed from the promises once held by this machinery – instead offering opportunities only to those willing to salvage precious metals in smouldering pits. By providing an interface that operates to alleviate the collision between these phenomena; the ***Open Public Trade Forum***, a hybrid market place where a liberalised trade in metal weaves in and out between actual and virtual space, informal and formal activities, local and global networks, could be the first to explore the intersection between these traditionally exclusive sectors. Through rethinking existing economic activities and socio-spatial environments the market is to become a lithe public realm – an arena for altering perceptions – where established notions of trade fuse with progressive concepts of exchange and production in an exploration of programmatic relations and typological inventions. This is a dynamic space to be used as much for commerce and industry as social collectives, where a myriad of citizens are brought together under the auspices of exchange: to trade in mixed metals, to visualise, debate, and shift their dreams of urban futures, to experience chance encounters and excite unique social interactions. And in so doing distinguish a new public architecture – a pioneering metal market embedded between Johannesburg's informal, informational and industrial landscapes.

1 *Information Age:* a period characterised by widespread electronic access to information through the use of computer technology.
(Encarta English Dictionary)

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OPEN PUBLIC TRADE FORUM

A Mixed Metals Market for 21st Mining



03 ***SITE CONTEXT***
The aerial photograph shows the distinct characteristics of the industrial, informal, and mining context. The blur represents the collision of these unique conditions at the chosen site.
(Image source: Google Earth)

01 *Written Component*

\+

02 *Visual Component*

\+

03 *Design*

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TITLE	PAGES	THEMES	OVERVIEW	OBJECTIVES	GRAPHIC	FORMAT	SECTION
Good Old Tender *The Rest of Money*	27-38	• Exchange • Financial transaction • Unconventional tender	***The Rest of Money*** is a metaphor for exchange and transaction, where the psychological relationship we share with money not only dictates its value but also allows us to imagination alternate forms of tender.	By discussing unconventional forms of tender I intend to construct the a narrative of making something out of nothing. Furthermore it introduces discarded electronic waste as viable source of unconventional tender.	 *04 MONEY*	• Visual essay	*
Introduction	15-18	• Information and society • Contemporary urban themes • Urban imaginary • The public realm	The introduction supports the argument on global connectivity, while emphasising the relevance of cities and urban spaces in the developing world.	By introducing the notion of the public realm as a dimension of societies collective urban imagination I hope to establish a narrative based on the exchange of everyday life through the expression of unfamiliar events and spaces.		• Written essay	A
Anything New Today *The Markets We Already Know*	19-30	• Established market places • Financial markets • Exchange • Public realm	***Anything New Today*** takes a broad look at some of the market places operating in and around Johannesburg. It also captures the essence of exchange networks through the global economic market.	By understanding an array of programmatic relationships, circulation and service requirements, user groups, and the reasons for locality I hope to build a thorough base in order to develop a pioneering metal market.		• Visual essay	A
Information Spaces	41-44	• Information and society • Communication networks • Public domain • Exchange	***Information Spaces*** introduces the relationship between information and society, while establishing the public realm as a generator for information spaces within our built environment.	The historical relationship shared between information and society supports the notion that the public realm too infuses a spatial relationship with information, thus it is my intention to express the market as a place that not only fosters the exchange of material goods but also information and ideas.		• Theory essay	B
The Border Lands *Technological Infoscapes and Obsolete Wastelands*	45-50	• Globalisation • Obsolescence • Marginalised communities • People as infrastructure • Unconventional markets	The ***Border Lands*** paints a harsh picture of the obsolesce surrounding waste in the developing world. The relationship between technological advancement and marginalised communities is taken beyond Johannesburg.	By contrasting the marvels of the *Information Age* with the spatial tensions imposed on the developing world I intend to establish the relationship between the universal and the particular, and furthermore explore the relationship between technology, networks, and marginalisation.	 *05 AGBOGBLOSHIE MARKET*	• Visual essay	B
Global Theme *The Virtual*	51-56	• Local and global dialogue • Contemporary urban themes • *Network Society*	The ***Global Theme*** begins to establish the dialogue between ***the local*** and ***the global*** by focusing on themes such as *The Network Society* and globalisation.	By discussing some of the key themes of the *Information Age* I hope to emphasise the relationship between information, space, society, and physical place.		• Theory essay	C
Global Ore *The World's Metal Market*	57-68	• Global metal production • Global metal consumption • Metals in electronic devices	***Global Ore*** sheds some light into aspects of production and consumption within the global metals industry.	By providing information on the global metals industry I hope to showcase the potential value electronic waste could provide a maginalised community, as well as the global metal market.		• Visual essay	C
Local Theme *The Physical*	69-74	• Developing spaces • Global urbanism + African urban practices • Africa's network society	The ***Local Theme*** develops a layered dialogue between ***the local*** and ***the global*** by focusing on the how the major themes of the *Information Age* manifest themselves is the physical places of the developing world context.	As the ***Global Theme*** pitched the relationship between information, space, and society, so the ***Local Theme*** aims to weave the argument on ***Information Spaces*** into the complex layers of Africa's existing urbanism.		• Theory essay	D
Electronic Cadavers *What Makes Them Re-tick*	75-84	• Electronic waste • Resource recovery • Waste to reward	***Electronic Cadavers*** dissects our everyday electronic gadgetry revealing the metals embedded in the circuit boards. These are some of the richest and most abundant sources currently available, and if mined correctly, electronic waste could be transformed into a thriving industry.	Using an exploded mapping process and supporting technical information, I intend to provide evidence of the potential value electronic waste has to offer Johannesburg's developing context not only as a viable source of revenue but also as a pioneering effort in industry.		• Visual essay	D
Somewhere In-between Theme *Johannesburg, The Collision*	85-90	• Local + global binary • Obsolescence • Marginalisation	***Somewhere In-between*** describes an outcome produced by the tensions of the ***local*** and the ***global*** – a binary between information and waste which manifests itself in Johannesburg's developing urban context.	This piece aims to conclude the written essay by contextually grounding my argument in the themes introduced in previous sections.		• Descriptive essay	E
Local Places *The Locale*	91-100	• Industrial context *(metal)* • Informal context • Mining context • Urban mining	***Local Places*** presents the setting of Germiston North by establishing the dialogue between the locales industrial, informal, and mining contexts.	The site and contextual study sets out to explore the various informal and formal activities happening in and around Germiston Nort. Furthermore it overlays these activities by grounding the theoretical arguments and visual sections previosuly introduced.		• Visual essay	E

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ESSAY

URBAN PLACES & ELEC-TRONIC SPACES

The Spatial Tension Between Globalising and Developing Worlds

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GOOD OLD TENDER

The Rest of Money:

Photographic essay

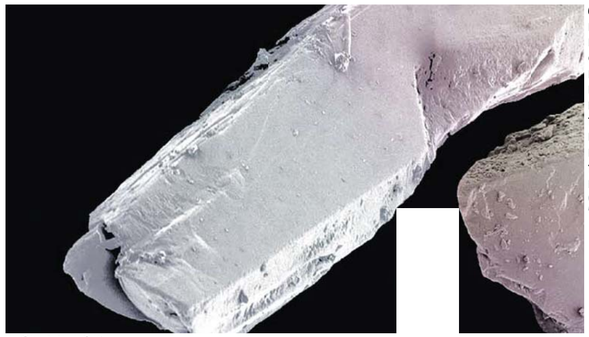
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Money is the paper that makes the world go round. This global form of tender embodies a psychological relationship with today's society; a relationship that moves between an object and a prescribed value.

Money is an object that not only feeds the world, but its value is determined by the actions of global society. This paper, which people handle on a daily basis, is a master illusion forged from the necessities of our daily lives. It takes the form of global currencies, which are just some the common forms of tender in circulation today. However the 'idea' of money can stretch beyond what we perceive to be ordinary.

The essence of money can thus be seen as a metaphor that allows one to conceive of new – unconventional – forms of payment, transaction and exchange. It is this re-interpretation of financial transaction and wealth, commonly occurring outside of major metropolitan areas which has caught my attention.

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06
IN PARTS OF COLUMBIA COCAINE CAN SUBSTITUTE FORMAL CURRENCY IN ALMOST EVERY FINANCIAL TRANSACTION FROM SHOPPING FOR FOOD TO MEDICAL EXAMINATIONS.
(image source: COLOURS Magazine, 2008)

A CURRENCY

The re-interpretation of money as a medium of exchange begins in Southern Columbia, where an energetic substance of fabled value grows naturally in the area. It appears everywhere – dominating the surrounding river basins.

For as long as the people of this area can remember, the towns have engaged solely in the production of the powdery substance, which is locally harvested, processed, and packed into bags of specific weight. The towns depend heavily on the seemingly endless taste for the white dust in the northern urbanised areas. The value of this tender becomes apparent when comparing the producing south to the consuming north. If one gram is worth 1 in the local villages, then the same one gram is worth 100 in the urban north.

Communities, which fall under the control of militias groups, use this charmed substance as a substitute for money, transforming the river basin into a place where cocaine drives all economic activity.
(COLOURS Magazine, 2008: 05-08)



08, 09
BAGHDAD IS ALWAYS BLEEDING, EVERYWHERE, CITIZENS FEEL LIKE THEY TREADING AN EMOTIONAL AND FINANCIAL KNIFE-EDGE.
(image source: COLOURS Magazine, 2008)



07 **THE EXCHANGE OF GOODS AND THE CYCLE OF SERVICES, ENTERTAINMENT AND HEALTH ARE BACKED BY POWDERED CURRENCY.**
(image source: COLOURS Magazine, 2008)



BLOOD BANK

Baghdad is bleeding all the time, and that is exactly how some people grow rich by exploiting others that are becoming impoverished. The blood of hundreds of citizens feed an unquenchable black market thirst. The frequency of bomb attacks and the unhygienic conditions at formal blood collection centres force people to find alternative sources; if they or their family require blood, they turn towards the black market supply.

In the veins of Baghdad, flows the dirty blood of junkies and drunks who are taken off the streets during emergencies. Without any health checks the addicts receive their bruises and loose change; the wounded receive bad blood; and the technicians, militias and Sheik leaders take the bounty – blood money. (
COLOURS Magazine, 2008: 14-16)



10
BANKS, THEY ARE JUST TOO MUCH OF A HASSLE FOR THOUSANDS OF KENYANS, BUT WITH M-PESA THEY CAN SEND MONEY THROUGH THE AIR.
(image source: COLOURS Magazine, 2008)

12 **SUBSCRIBERS USE THE SERVICE FOR A RANGE OF ALMOST INFINITE MICRO TRANSACTIONS FROM PAYING RENT TO BUYING FOOD, MEDICINE, BUILDING MATERIALS AND EVEN BAIL.**
(image source: COLOURS Magazine, 2008)

A VIRTUAL ATM

M-PESA is an ingenious service offered by a Kenyan mobile network. The virtual service is aimed at the 'unbanked' sector, and bypasses the entire formal system by offering tens of millions of poor Kenyan's with a simple, yet efficient financial service. The financial services that keep the rest of the world connected were previously unavailable to the majority of Kenyans.

M-PESA has turned nearly every cell phone into a mobile bank, and the country's abundant informal stores and kiosks are thriving as they effectively become human banking machines. The mobile networks have effectively created a new currency that has taken Kenya by storm.

In a world where money is viewed as anything that you can trade for something, a fluid notion of exchange in African societies means that the Cow, not cash, is king. Even though the money system is imaginary it becomes very real when at the end of the day something tangible is exchanged through a virtual transaction.
(COLOURS Magazine, 2008: 39-41)



11 **CAMBIO VERDE (GREEN EXCHANGE) PROVIDES AN OPPORTUNITY FOR IMPOVERISHED FAVELA DWELLERS TO EXCHANGE SEPARATED WASTE FOR SMALL VOUCHERS, WHICH IS EFFECTIVELY AN ALTERNATE FORM OF MONEY THAT CAN BE USED TO PURCHASE BUS TICKETS AND FOOD BOUGHT IN BULK BY THE CITY FROM LOCAL FARMERS.**
(image source: COLOURS Magazine, 2008)



13 **HARD WORK AND A COLOSSAL MASS OF JUNK ARE THE KEY TO ONES SUCCESS.**
(image source: COLOURS Magazine, 2008)

ORGANIC TRACES

The Brazilian city of Curitiba has slums, but these favelas are not ordinary slums. The city was gripped by a protracted and seemingly hopeless crisis, since the local municipality could not provide a service to deal with the massive mounds of rubbish barricading the streets. It was an almost impossible task for pedestrians, let alone for removal vehicles, to pass over the dirt strewn streets.

The favelas were a catastrophe, a health hazard waiting to happen. However, instead of bulldozing the slums, the City had a different idea; to tap collective human potential. They created a new currency, which provides incentive to contributing citizens, thereby averting a hygienic catastrophe. It has been so successful that two thirds of Curitiba's residents now receive a steady flow of income from sorting and packing their rubbish.
(COLOURS Magazine, 2008: 42-45)

THERE ARE MANY OTHER INTRIGUING FORMS OF TENDER. THESE INCLUDE, BUT ARE NOT LIMITED TO THE FOLLOWING: TRADING OIL FOR EYE SURGERY IN CUBA, STONES AND SOIL IN MICRONESIA, TIME IN ITHACA (NEW YORK), AND VIRTUAL MONEY ACROSS THE WORLD WIDE WEB. HOWEVER, THESE UNIQUE FORMS OF TENDER ARE JUST THE BEGINNING OF MY JOURNEY INTO SOME OF THE INGENIOUS FORMS OF TENDER BEING INVENTED AND EXPANDED UPON IN JOHANNESBURG.

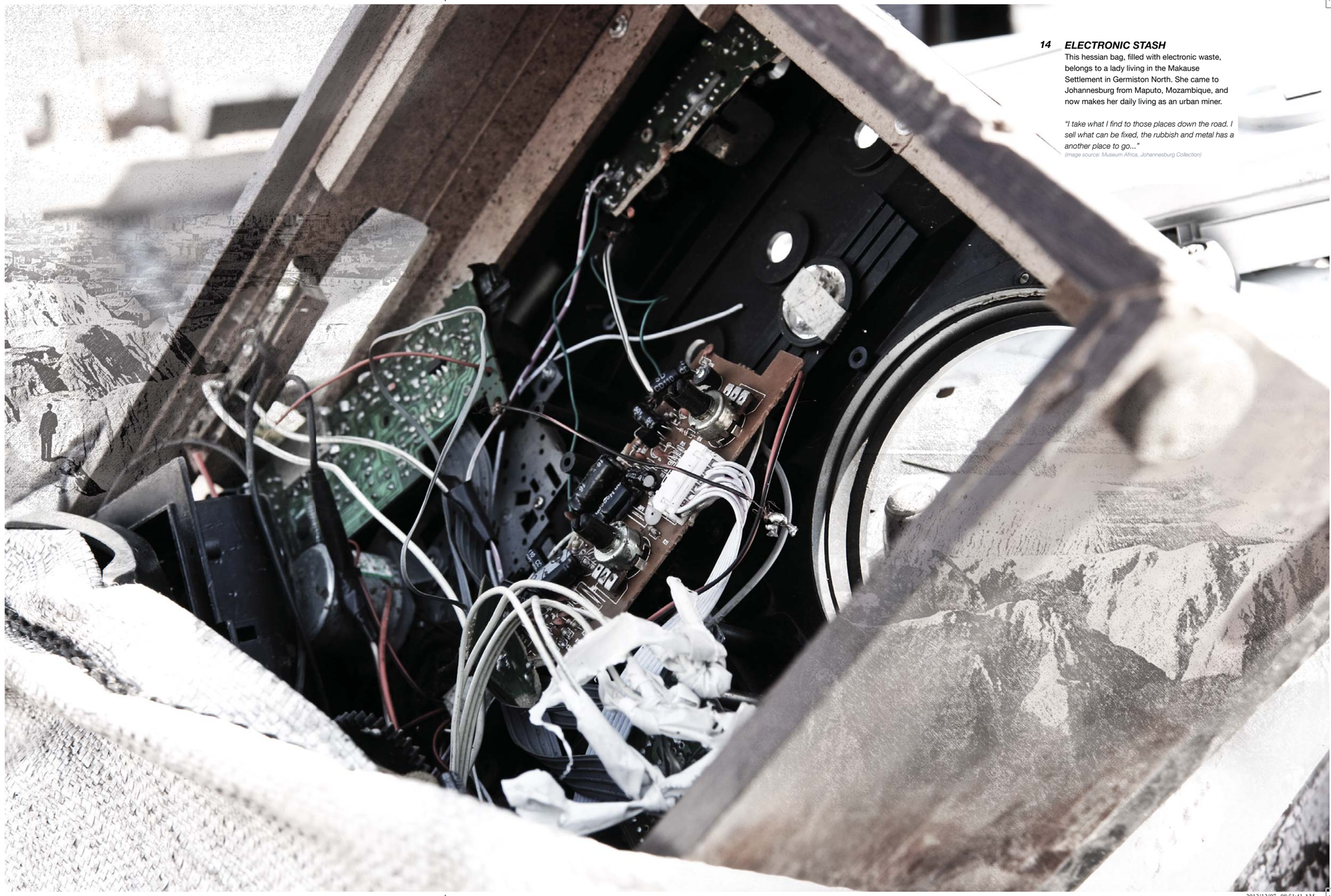
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A REOCCURRING HISTORY

The journey of reinterpreting money and economic transaction continues in Johannesburg, where the essence of mineral and mining activity responsible for the city's existence is being re-imagined and reprocessed in an energising manner. Just as the first alluvial gold was found in plain sight, so evidence of this new mineral can be found almost everywhere, and if one knows what they looking for these new veins are seemingly endless.

From the very beginning of Johannesburg's history, people have associated the city's existence with rich golden veins running beneath its rolling Highveld plains. The city emerged, despite it lacking an affectionate landscape, as a concrete formation set between rocky ridges, dusty fields, and golden grassland. The rapid and expansive growth associated with Johannesburg has not only secured the city's status as an international point of reference, but forever rooted Johannesburg in the African landscape (van der Waal 1987: x). The level of development was matched only by some of the biggest man-made structures of the 20th century; these monolithic mountains of gold, which grew alongside experimentations in modernity, once formed a continuous ridge along the city's reef line. However, today, as these historical structures slowly disappear and fade from our memories, a new activity looks set to continue a tradition deeply ingrained with mining heritage. This new formation set between industrial factories, informal settlements, and ghosting mountains is made not from concrete, but human infrastructure.

In Germiston, an industrial city to the east of Johannesburg, a group of people are constantly searching for new ways to carve a living form a landscape that offers them little beyond what others once promised. But here, somehow, they have found a means to survive by seeking opportunities where many others see none; they take what the majority of people regard as obsolete, as waste, and make something out of nothing. On a daily basis hessian bags and trollies, filled with electronic waste gathered from nearby dumping sites, are pulled across this conditioned landscape. At the end of a long day the dusty land is charred, toxins have been discharged, metals have been salvaged, and bags emptied. The urban miners of Germiston North make their living from refurbishing electronics or burning their haul to salvage precious metals – an era of mining is once again upon the city of gold.



14 ***ELECTRONIC STASH***

This hessian bag, filled with electronic waste, belongs to a lady living in the Makause Settlement in Germiston North. She came to Johannesburg from Maputo, Mozambique, and now makes her daily living as an urban miner.

"I take what I find to those places down the road. I sell what can be fixed, the rubbish and metal has a another place to go..."

(image source: Museum Africa, Johannesburg Collection)

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CANVAS Life

Saturday Star March 17 2012

Digging for gold in Jozi's dustbins

It's a street race against time – once Pikitup comes, income's gone

NONI MOKATI

IT'S 5.20AM and Mateboho Mothibeli jumps out of bed. It's another day of work and she hasn't time to waste. She dresses and applies home-made sunscreen to her face. It's a brown cream-like substance made out of mud.

"It protects me from the sun," she says and makes her way out of a makeshift cardboard room she calls



THIS IS HOME: Mateboho Mothibeli wears her home-made sunscreen of mud outside the dark, abandoned building where she lives.

who live with their families in a dilapidated and rat-infested factory in central Joburg, opposite the Kwa Mai-Mai market.

At 6am, a determined Mothibeli, and her friend, Julia Lijane, leave the decayed building.

The two work as recyclers, collecting anything from white paper, to plastic bottles and grocery packets.

It is a venture that Mothibeli began five months ago.

"I'm from Lesotho. I arrived in Joburg after my sister told me that she had found work for me. She told me to head to the house of a woman.

"But things later got out of hand and I couldn't work for her. Our personalities clashed all the time. I left and ended up here," she says.

She is wearing an old frock, a jersey wrapped around her waist.

"I take the jersey with me for the extra cold days. But it doesn't help much. I cough and sneeze all the time."

Soon Mothibeli picks up her trolley and dashes across the quiet road.

She has come to know the city's streets like the palm of her hand – this is clear in how she maps out her route.

"I'll first walk through Commissioner Street, then Marshall, Anderson and Market."

As the mother of three walks through the biting wind, the city eventually roars to life.

The early buses ferry passengers and taxis accelerate like Formula One cars, only they're competing to win the first client.

Pedestrians scurry up and down to their destinations. Mothibeli seems in tune with the ebb and flow of the urban jungle.

She and Lijane dig through rubbish bins lined up outside a flat. The stench is unbearable; they ignore it, and they dig, oblivious to the stares of bystanders.

"This job is like any other. There is no room for embarrassment in what I do.

I need to pay the bills and put food on the table," Mothibeli says,

She is collecting money to go home for Easter.

Her children and husband are back in Lesotho. However, none of her kids know what she does for a living.

"Imagine what it would do to them if they saw their mother scrabble through dirty bins. Unlike me, they wouldn't take it well. They'd be embarrassed," she says.

Mothibeli says recycling is survival of the fittest. Metro cops, motorists, residents – none seem sympathetic.

"The metro police sometimes harass us for dragging our trolleys on the road and not on the pavement. Then we have motorists who are inconsiderate and impatient. There have been a couple of instances where I was almost knocked over."

Mothibeli pauses and rushes to another set of dustbins.

Sweat breaks out on her forehead as she rifles through the bin. She puts more plastic bottles in her bags. She's racing against time – once the rubbish removal trucks arrive, it's too late.

"When the Pikitup guys get here, they don't ask questions. They just empty the bins.

"I suppose I can't tell them anything. They are also at work," she says and jokes that some of the bins smell better than others.

The trucks arrive to find Mothibeli hard at work. All that is left is for her to scrape up the bits of paper left on the ground and set off in search of another bin.

Her sack is full and she compares it with Lijane's. She says she is lucky.

The two rest on a pavement and begin to sort out the biodegradable products.

Plastic goes in one pack and bottles in the other.

Then comes the long walk to the factory she calls the "scrapyard", to get her money.

The sun is at its peak and Mothibeli pulls her mountainous sack. She hasn't eaten today.

"I only eat when I go back home. I use the little money I'm given to buy dinner," she says.

She says she doesn't work on rainy days.

At Motech Recycling in New Doornfontein, Mothibeli joins the other recyclers on Staib Street.

Most are men. But that doesn't intimidate her.

She approaches the gate and registers her name with a security guard. Her bag is weighed – she gets paid R70.

Tomorrow is another day.



BUSINESS IN LITTER: Kashif Khan is the owner of Motech recycling, a recycling business that has been running in Doornfontein, Johannesburg since 2010. They purchase plastic, paper, boxes and steel from 'Street Walkers'. PICTURE: REFILWE MODISE

JMPD's response:

STREET hawkers are not contravening bylaws by pulling their trolleys on the road.

JMPD chief superintendent Wayne Minnaar said hawkers driving large hand trolleys for recycling purposes did not require a licence.

"There is no law that stipulates this. Legally they have the right to pull trolleys on the road and not necessarily on the pavement. The only time we fight with them is when they obstruct traffic, especially at a narrow road. In those instances it is impossible for motorists to navigate on the street."

Minnaar said motorists also had the responsibility to look out for the hawkers and exercise their discretion when approaching or driving past them. Meanwhile, the metro police said hawkers found pulling their trolleys on highways would be fined, including those riding bicycles and animal carts.

OFF TO WORK: Every day at 6am, Mateboho Mothibeli and her friend Julia Lijane set out on their route through the Joburg city centre. Dustbins are their target – and the waste inside that can be recycled for cash. PICTURES: REFILWE MODISE

Recyclers go to heart of matter

NONI MOKATI

STREET recyclers are often ill-treated and barely recognised for the work they do, according to a recycling company owner.

Kashif Khan, of Motech Recycling in New Doornfontein, said government was unaware of the tremendous role played by the women and men who sort and collect waste to clean while clearing the environment.

"Do people know how much lifespan is created by these recyclers on landfill sites? Unlike trucks that dump things all at once, they go to the heart of the matter by sorting rubbish. Yes, they might be seen as a nuisance when they go through bins and drag their trolleys on the street, but the service they provide for the city is of great importance," Khan said. "Therefore they should not be judged."

The businessman launched his small recycling enterprise in March 2010.

Khan said that, before he obtained capital to start his business, he was already buying recycling material from street hawkers on the streets and in turn selling the products to bigger companies.

"I built myself up with a bakkie to get to where I am today. You can go anywhere in the north west and various landfill sites. People know me. That's the kind of relationship I've established with everyone involved in recycling," he said.

Khan described his business as a buy-back industry.

He explained that the process began with a street hawker bringing already-sorted biodegradable products for a weigh-in. These usually range from non-ferrous metals and plastics to cardboard. He takes nothing that contains copper.

"I used to accept copper, but stopped because of the copper theft in the country. It was very hard to ascertain where the copper was taken from."

Khan said that recyclers were required to register their names at the gate. Once registration is complete, the items are weighed and the hawkers are paid according to the mass of their collections. The junk is in turn thrown into groups and compressed by a small tractor.

He said Fridays and the weekend were the busiest days at the factory and that hawkers who were serious about recycling often earned thousands every month. On average he gets 250 hawkers a day and has created jobs for 25 people. He has also hired former street recyclers to help inside the factory.

Asked what challenges came with running a company of this nature, Khan replied: "The numerous complaints we receive from the Johannesburg Roads Agency (JRA) and the metro police."

Khan said the JMPD constantly had qualms about the hawkers contravening by-laws and obstructing traffic. He said queries from JRA, on the other hand, always involved hawkers degrading the roads and dirtying pavements.

Khan said that, in the past, he had noted some of the complaints and had built pavements for hawkers to stand on. "Unfortunately I later received a fine from JRA. They fined me for erecting the pavement. It's a confusing situation," he said.

He claimed that during the 2010 Fifa World Cup, government wanted him to close down the business in order to keep the city clean and the hawkers at bay but he refused.

Khan said his future plans included expanding his business and purchasing a building opposite his premises.

Apart from glass and paper, South Africa, unlike Europe, has a long way to go in the recycling sector, Khan said.

WASTE RACE

(image source: Saturday Star March 17, 2012)

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16 ***CASH FOR...***

At present Germiston North is home to a number of scrap metal shops which act as the only interface between urban miners and their daily haul of electronic waste. However, due to the discrete nature of the scrap shops, their methods of transaction, and the process of extracting the metals, the urban miners are being exploited. A large void needs to be filled in order to realise the full potential electronic waste has to offer as a resource.

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17 ***SMOULDERING HILLS***

An area close to the Simmer Jack landfill has become just one place where salvaged metals and electronic waste is burnt – a convenient workplace between the dump and the settlement. However, before the community chased this group of people away they worked inside the settlement.

At first one seems incapable of registering exactly what is happening here. However, on closer inspection the plumes of smoke, a set of basic tools, and a loosely arranged working arrangement define this place as something other than a dumping ground.

The morning stillness is quickly broken by the blazing heaps of waste which, by the end of the day, have slowly smelted into smouldering conglomerates of badly refined metal.





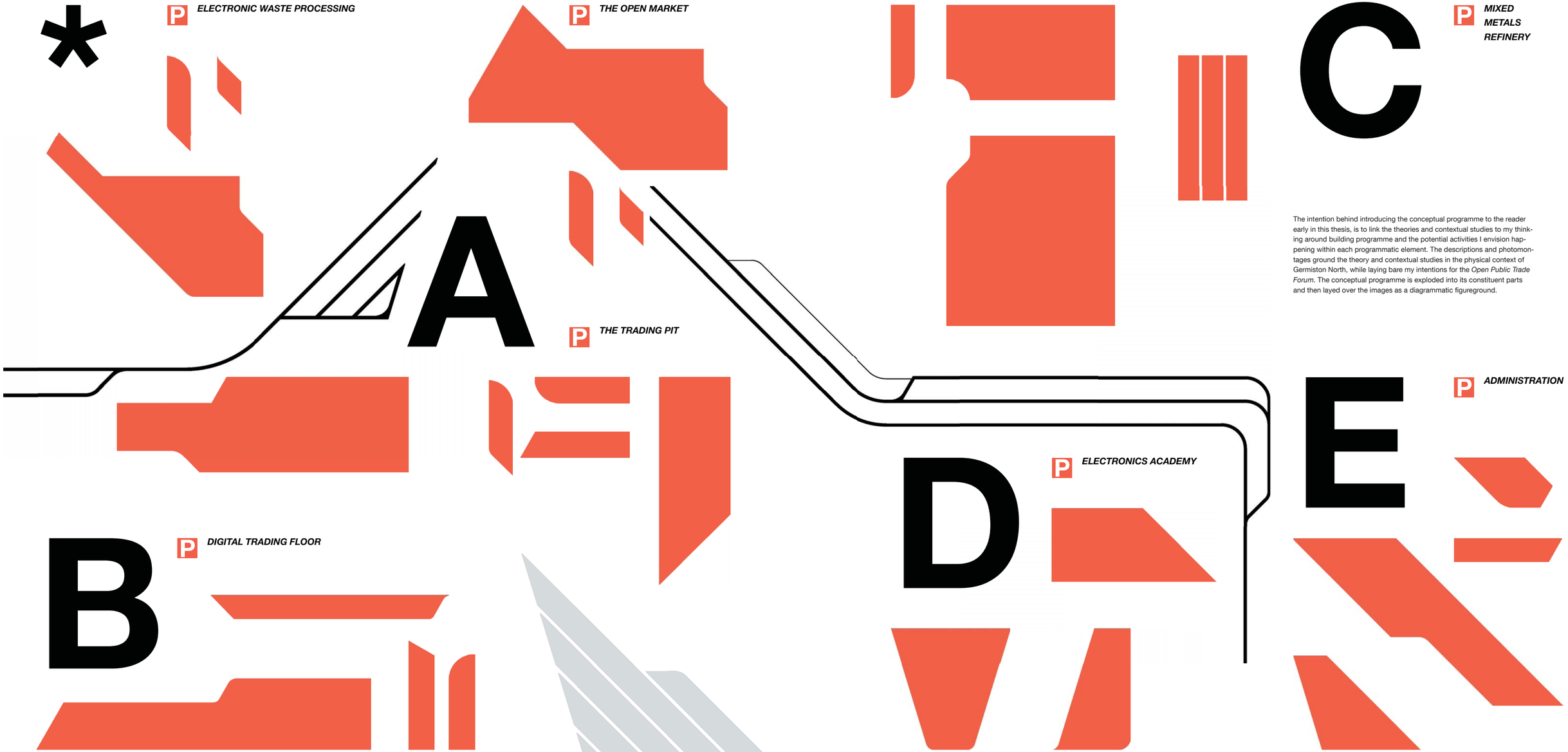
18 ***HARVEST TIME***

Its late afternoon, and Victoria gathers, inspects and sorts through her chunks of metal. While moving through the dirt and ash, carefully avoiding the toxic patches that have stained the earth, she takes momentary pauses to talk about her work as an *urban miner*.

"I come from Maputo looking for work, but there is nothing. Now I work here for that man."

"No, I don't like this work, but what can I do? I need money."

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The intention behind introducing the conceptual programme to the reader early in this thesis, is to link the theories and contextual studies to my thinking around building programme and the potential activities I envision happening within each programmatic element. The descriptions and photomontages ground the theory and contextual studies in the physical context of Germiston North, while laying bare my intentions for the *Open Public Trade Forum*. The conceptual programme is exploded into its constituent parts and then layed over the images as a diagrammatic figureground.

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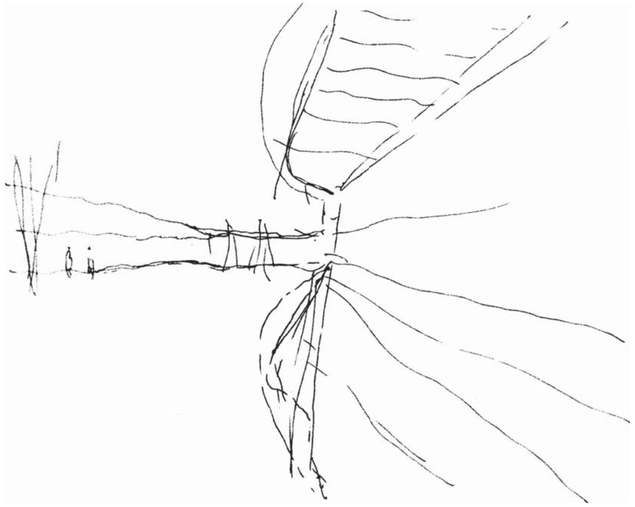


19 ***PROCESSING LABORATORY MONTAGE, processing floor***

The compilation of images represents the key ideas behind the electronic processing laboratory; the spacious white laboratory as the work space, the work benches and machinery for processing, the worker separating and organising the waste, the lab technician protected from the toxic fumes by his suit, and the visitor passing through this unique experience.

(image source: Lanoo, J; Lawsky, D; unknown)

A The captivating, yet deeply concerning, scenes surrounding urban mining in Germiston led me to believe that the Open Public Trade Forum should accommodate an electronic waste processing plant. This technical laboratory would separate the composite mixture of metal, plastic, and toxic chemicals in a controlled manner, thus avoiding the deadly threats to both people and the environment currently associated with open pit burning techniques. The processing laboratory would function as a primary component of the Open Public Trade Forum (OPTF) with its material constantly being fed not only by the local urban miners but also by commercial waste collection depots in the greater Johannesburg region.



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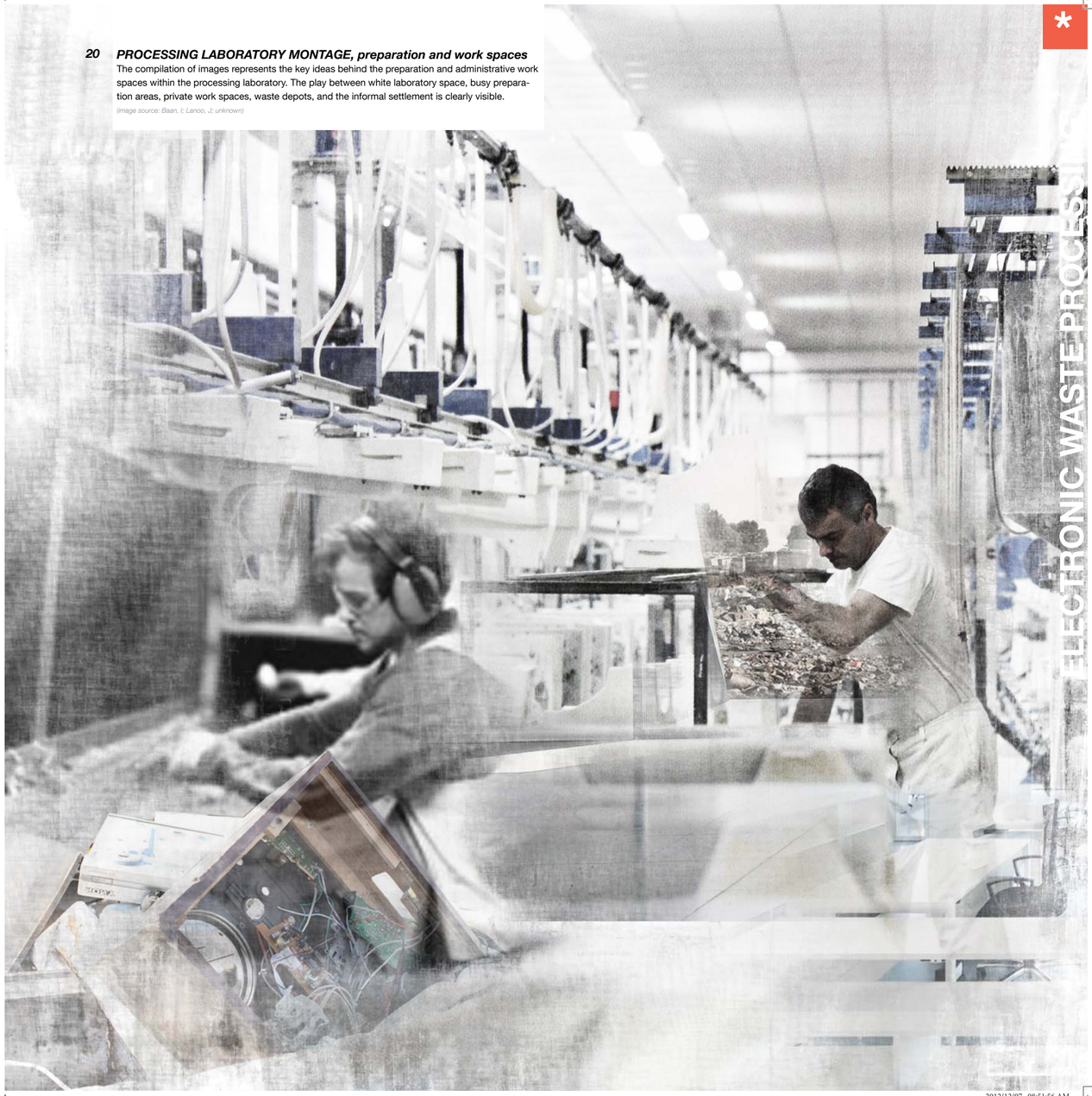
B The technical cycle starts its life as a relatively simple and seemingly crude process when large volumes of electronic waste are dumped in a holding depot. From there the waste will begin its transformation into something of discernible value. Laboratory technicians and sufficiently trained local community members, working in highly visible preparation rooms, will carefully separate and organise the electronic waste in preparation for processing. Once the waste has been sorted into highly reactive and non-reactive material it will be sent to one of two processing facilities within the laboratory; the first will employ a combination of professional technicians and locally trained urban miners who will feed the waste into efficient furnace chambers to extract the metals; the second will employ only highly trained technicians who will extract the embedded metals, from highly reactive material, using chemical agents to dissolve non-metal elements. The final part of this process will be the containment and removal of toxic sludge, and the packaging of purified mixtures of metal.

C Besides functioning as a crucial programmatic component towards the recycling of electronic waste, the processing laboratories will more importantly transform the otherwise incredibly dangerous task of salvaging metals through open pit fire burning into a far safer and more sustainable process. In addition to its machine like activities the laboratory will function as a space which is visible to other users within the building, while also inviting a public audience to engage with staff and experience a series of unique events happening within the walls of this component. The laboratory will draw from a wide range of logic: scientific minds experienced in metallurgy, engineering, and chemical processing; as well as dexterous hands practised intricate physical work. The intriguing mix of laboratory technicians, plant managers, and urban miners working with electronic waste in this exciting high-tech environment will be on display. The celebration of scientific process and the exhibition of a myriad people working is just one layer I wish to explore in the OPTF – a theme outlined by the intersection between informal practices and informational space.

PROCESSING LABORATORY MONTAGE, preparation and work spaces

The compilation of images represents the key ideas behind the preparation and administrative work spaces within the processing laboratory. The play between white laboratory space, busy preparation areas, private work spaces, waste depots, and the informal settlement is clearly visible.

(image source: Baan, I; Lanoo, J; unknown)



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INTRO-DUCTION

Urban Places And Electronic Spaces,
The Spatial Tensions Between Globalising And Developing Worlds:
Written essay

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Cities of the world today have mostly undergone key transformations in recent decades. The processes of *urbanisation*[2] and *globalisation*[3] have greatly accelerated across the world rendering these cities a series of interconnected nodes within a web of informational networks linking infrastructural, economic, social, cultural, and historical threads. In considering this, I look to the writings of Andreas Huyssen whose thoughts on the *urban imagination*, the way city dwellers perceive and imagine their urban environment, are of primary importance to my thinking; not only on the binary between the universal and particular but also on untold possibilities for the public realm.

Urban Places And Electronic Spaces,
The Spatial Tensions Between Globalising And Developing Worlds:

2 *Urbanisation:* is the physical growth of urban areas as a result of global change, and can be used to describe a specific condition at a set time, i.e. The proportion of total population or area in cities or towns, or it can describe the increase of this proportion over time.
(http://en.wikipedia.org/wiki/Urbanization)

3 *Globalisation:* is the spread and connectedness of production, communication, and technologies across the world. This spread has involved the interlacing of economic and cultural activity through improved technology and communications and the influence of large multinational corporations.
(http://www.inted.org/biblio/globalization.htm)

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The *urban imaginaries* of leading scholars in urban studies, architecture, and history are brought together under Andreas Huyssen's umbrella on globalisation. The stories told within delve into the imagination of city dwellers; where their daily lives and work, and the countless layers of experience and movement through their built environment point not only to the spatial tensions caused by the networks of globalisation, but also to the effects on urban life and city form. For Huyssen, these threads make up the everyday fabric in which we as a global society operate:

All cities are palimpsests of real and diverse experiences and memories (Huyssen, 2008:03).

Today's networks – interwoven through space, place, and time – produce world spectacles, events and shared consciousness, and are thus the matrix from which our daily relations are wound.

Globalisation as a process revolves as much around a contextual medium in which major cities are reproduced as an information generator revealing the manner in which emerging urban areas beyond the transatlantic develop (Huyssen, 2008:01). Huyssen (2008:01) maintains that these global networks, and their subsequent effects on the universal and particular, "[h]ave made 'other cities' part of the way we live and perceive the world", and by this he implies that cities and society are linked by a field of global consciousness where 'exchange' has become the ever reaching medium of everyday life. It is the exchange of everything real and intangible, simple and intricate, and the sharing of ideas both new and long standing which have led to the emergence of 'world cities' and continue to capture our imaginations.

Many of the complexities associated with cities of today emerge not only from the spatial practices of architecture and planning, but also simultaneously from layers of diverse experience, memory, and event. These transparent layers continuously overwrite the city through administration and business, labour and leisure, culture and politics, and the practices of everyday life (Huyssen, 2008:01-05). In some dimension all cities today are global cities in the sense that there no longer exists any pure locality, yet the essence of locale is continuously reproduced by our movements through the urban sphere, our appreciation for and negotiation of the built environment, and our myriad of interactions with urban life (Huyssen, 2008:01-05).

Huyssen (2008:03) speaks of an *'urban imaginary'* as first and foremost the way in which citizens imagine their own city as the place to practice everyday life, the location for inspiring traditions and continuities, the scene of diverse histories as well as the site for exciting new possibilities. He believes that urban space is always and inevitably social space:

An urban imaginary is the cognitive and somatic image which we carry within us of the places where we live, work, and play. It is an embodied material fact. Urban imaginaries are thus part of any city's reality, rather than being only figments of the imagination (Huyssen, 2008:03).

This assertion expands the notion that a series of interwoven spatial threads bind the citizen to the urban sphere, and ultimately the spaces we imagine and how we come to perceive them thus inform the manner in which we interact with them.

We have come to conceive of the wold as a single place bound by systematic properties whose primary subject is man himself. The world we know, typified by science, technology and machinery, the *commercialisation*[4] of knowledge, and the *aestheticisation*[5] of everyday life, attempts to conceptualise and validate human activity as contemporary culture (Smart, 1993:128-131). Although there is no singular unified global culture shared by all inhabitants across the world, and it would be misleading to assume so, the term 'global culture' asserts and maintains a dialectical tension between the universal and the particular. Huyssen (2008:05) further maintains that "[...] urban imaginaries are also the sites of encounters with other cities, mediated through travel and tourism, diasporas and labour migration, cinema, television, and the Internet. The global and local invariably mix, a fact captured with neologism glocalization." The emphasis lies on plurality, whereby spatial diffusion, translations, appropriations, transnational connections, and cross border travel are not new phenomenon, but rather these occurrences have accelerated and intensified in recent decades (Huyssen, 2008:03-06). The widespread circulation of digital and print media, seminal branding, cyberspace, and global popular music and film are subjects of the *Information Age* which connect, reproduce, and recycle world cities (Huyssen, 2008:03-06). This practice of *solipsism*[6] serves as a symbol to which today's society can associate cities, architecture, and spaces with themselves as certain objects of the contemporary world (Boyer, 1988:49-53).

Indeed, these are critical dimensions that, together with what is locally embedded, globally connected, and widely practiced by society form part of the urban imagination of today. This notion of collectiveness is the subject and expression of man's popular imagination reflected in the public realm, and made concrete by the built environment through its conception and construction of public space.

4 *Commercialisation:* to apply business principles to something or run it as a business. (Encarta English Dictionary)

5 *Aestheticisation:* to transform something into its best or most artistic form. (Encarta English Dictionary) For the purposes of this text, aestheticisation refers to beautifying spaces and objects of consumption or making mundane spaces or objects desirable to consumer society.

6 *Solipsism:* the belief that the only thing somebody can be sure of is that he or she exists, and that true knowledge of anything else is impossible. (Encarta English Dictionary)

For architects and city planners, the notion of public space as a dimension of the *urban imagination* is burdened with inherent function and meaning. Seen still today as a typology assumed to foster social interaction, recreation, communal organisation, and civic discourse the term public space has loosely been ascribed to any place that encourages mass habitation. A particular emphasis is placed on urban spaces which oscillate between the aesthetic and the social, commodification and consumption, private and commercial, universal and particular. These themes are intrinsically bound to a contemporary grand narrative, assembled around the discourse of globalisation; transforming the public realm into a universal subject that conceives and constructs space based on the interrelated connectivity of world cities (Smart, 1993:127-141).

Apart from the urban spaces we commonly associate with today's public realm, one must ask of spaces which exist beyond the narratives of our popular imagination? As we continue to embrace and maintain a dialectical connection between the universal and particular, so our *urban imaginaries*, wrought from the tensions between what is locally embedded and globally connected, evolve and open opportunities to envision an untold narrative born from the exchange of everyday life. Just as Huyssen assembles his thoughts on 'other cities' and 'other worlds', and his selection of writers outside Western Academia express their views on the importance of developing urban areas beyond the northern transatlantic, so I wish to emphasise the significance of urban spaces which exist outside the traditional urban realm – free from the burdens associated with today's public realm.

Through expressing the unfamiliar spaces and events associated with these borderlands, so blatantly excluded from yet so intrinsically connected to the development of 'other cities', the *urban imaginary* is to become a product of shared consciousness; a new kind of public realm assembled around untold narratives and urban experiences.

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It is my objective within this text to stitch together a series of themes interwoven through the *Information Age*; a ***global theme***, a ***local theme***, and a ***consequence somewhere in-between***. The preoccupation with these subjects lies in further developing the concepts introduced through reference to Huyssen's volume 'Other Cities Other Worlds'. In structuring a setting, which reflects the binary between the universal and particular, I hope to establish the grounds to explore an architectural response embedded in the medium of exchange; a conversation between these themes is arranged in order to challenge conventional notions of what it means to be public, while asking questions about the opportunities created in a world riddled by the uneven patterns of globalisation. This interwoven trilogy not only begins my enquiry into public space within Johannesburg's developing urban context, but also the grand narrative of exchange between advancing informational networks and existing informal networks – by tradition, two mutually exclusive realms.

The conversation throughout this thesis runs as a dialogue between the ***local*** and the ***global***, with the narrative centred on ***'Information Spaces'*** aiming to guide the subject through 'virtual' and 'physical' explorations. The ***global theme*** examines the context of the *Information Age* through a series of enquiries into the inherent spatial, social, and economic conditions associated with the dimensions of today's globally structured change. Manuel Castells' *Network Society* thus becomes a key component to the narrative on ***Information Spaces***. The ***local theme*** explores the changing contours of survival within the developing African context in response to the *Information Age*. For AbdouMaliq Simone, the capacity for many African residents to strategically engage in new forms of urbanism in response to advances in global economic, informational, communication and technological spheres serves to reinforce the notion of a local network society embedded in universal 'Information Space'. The ***consequence somewhere in-between*** concerns itself with the context of the greater Johannesburg region, and more specifically with the east lying city of Germiston where resultant conditions, born from the tension and collision between ***local*** and ***global*** phenomena, are explored through descriptive text.

As the dialogue through this thesis develops, an exploration unfolds into the functional role that architecture can play as an interface between the ***local*** and the ***global***, thus rethinking the programmatic possibilities, spatial forms, and everyday processes supported by the traditional public realm. In reaction to themes of the digital age, this spatial juncture develops as an *urban imaginary* where a myriad of individuals come together under the event of exchange. In this sense the market becomes more than just a place where citizens trade in salvaged metals, it becomes an environment that mediates between the ***local*** and the ***global***, the informal and informational. Here is a place in which high-tech laboratory processes meet low-tech informal practices in order to mine precious earth metals, and transform the compressed energy in electronic waste and bulk-metal scrap into an array of spatial implications. This place where global technological networks meet conventional local infrastructure is a locale where two worlds collide.

The Open Metals Mar- **develops as oping Jo- importantly, citizens liv- conditioned and more re- comes the for a future** ***Public Trade Forum, A Mixed ket for 21st Century Mining*****, thus a response not only to the devel- hannesburg context, but more by engaging with the myriad of ing and working in a landscape by decades of mining, industry, cently informal settlement, it be- conceptualisation and realisation public space.**

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ANY-THING NEW TO-DAY

The Markets We Already Know:

Visual essay

Analytical study

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The root of this historic artery, which stretches the length of the Witwatersrand, can be traced to the tracks of the Highveld pioneers, cut by their wagons, mail-coaches, and other transportations, when, in 1886, the discovery of continuous gold-fields across the Reef had been widely published (Smith, 1971: 312). Ten years after Johannesburg's origin representatives of the various mining companies gathered to discuss the question of making a road from the East Rand to the West Rand. It was emphasised that the route would follow the line of the Reef, as it was intended to serve the companies for the transportation of supplies to their mines (Smith, 1971: 312). Over a century ago this massive infrastructural undertaking, of linking Boksberg to Krugersdorp, was a sight to behold; it was reported in the Standard and Diggers' News that over 300 men had been tasked with building the 45km route (Smith, 1971: 312). The report continued to describe a scene of forty to fifty strong canvas tents erected at each of the six road sections, so that settlement operated independently and resembled a small mining camp (Smith, 1971: 312). Today, this historical road, which remains embedded in the Witwatersrand Reef, may have lost its grandeur and part of its identity to the city centre and surrounding industry, but the significance of this road can clearly be seen by the spread of countless factories and mine dumps which now dot the southern horizon.





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22 ***JOHANNESBURG'S REEF LINE***

Whether viewed from above, or when driving past, the reef line is a characteristic feature left behind by Johannesburg's early mining and industrial activity. It is along this historical band that I have based my study area, as the mixture between commercial activities, heavy industry, informal settlements, and fading mine dumps is of particular interest to me.

(image source: after Google Earth)



Many centuries have passed since the energetic bazaars, life giving agoras, and essential forums have supported the city and governed the daily lives of its people.
These grand markets and bold civic spaces, often found at the centre of towns, were the essential places where citizens would go not only to trade goods but exchange ideas, conversation, and fleeting moments in space and time (Gehl, 2005:530-539; Sitte, 2005:474-485).

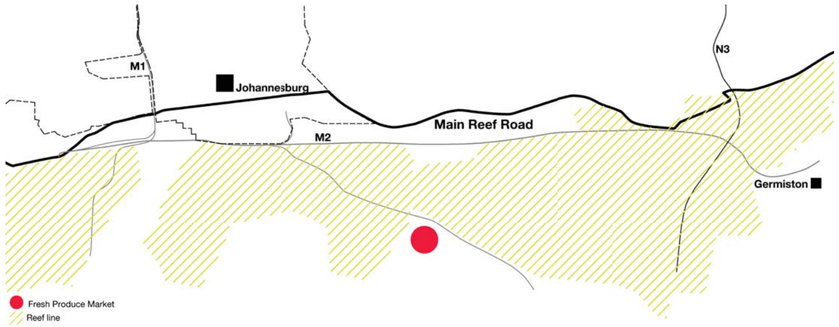
Today, however, those traditional markets have all but faded only to be replaced by a new market – a global market with alternate spatial dimensions. This new market not only serves a city and its people, but entire countries and continents. In fact, by virtue of its reach and flexibility this new market serves most of contemporary society. It belongs to a world found somewhere between the corporeal and ethereal, and still comprises stalls and traders, customers, and something for sale, yet the format of exchange is markedly different. It is the global economic market which now binds today's society, while governing our every action through emerging trade networks. These core market spaces are now everywhere and here at the same time leaving traditional market spaces, the ones where everyday goods are sold, as commercialised spaces that offer little more to society than the goods they provide.

However, it is the essence of the market place, whether physical or virtual, as a symbol of exchange that I wish to capture within this thesis. The market can be seen as a metaphor, open to many new interpretations, that can easily shift to meet the needs of a society and context in which it stands.



21 ***FARADAY MUTI MARKET***
Besides being known for its diverse mix of herbs, animal skins, traditional healing remedies, and spiritual charms, the Faraday Muti Market also has a number of stalls selling a range of everyday personal items. The Faraday Precinct is a multiuse zone, and apart from the market place, it is also a fully functioning transport interchange.

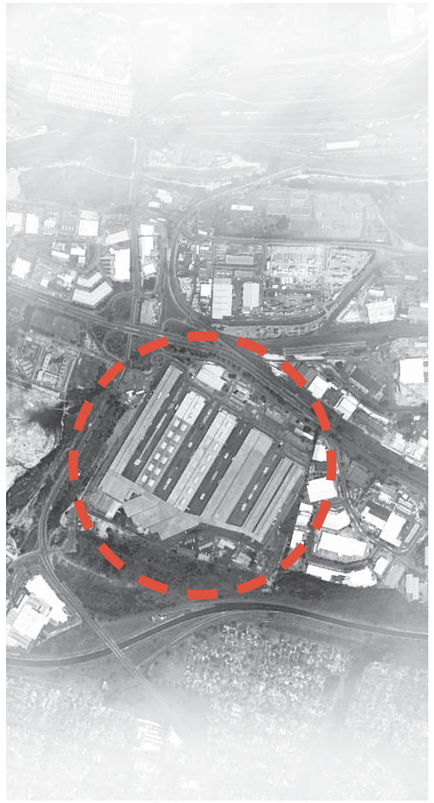
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23 *Johannesburg Reef Line Map (source: derived from Johannesburg Topographical Maps)*

LOCATION

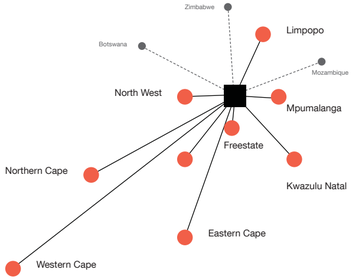
Situated along the reef line, just south of the inner city, the Johannesburg Fresh Produce Market feels right at home amongst the large factories and endless container stockpiles. In fact, the essence of this market is complimented by the surrounding context of City Deep, which is in fact the largest inland port in South Africa.



24 *Aerial photograph: Johannesburg Fresh Produce Market (source: after Google Earth)*

MARKET REACH

The sheer size of this market means that it attracts a wide clientele. Farmers deliver their produce from around the county, and regular deliveries even arrive from across our borders. Being such an expansive commercial enterprise, the largest of its kind in Gauteng and arguably one of the biggest in southern Africa, the produce sold here is exported both locally and internationally (Piet, 2012).

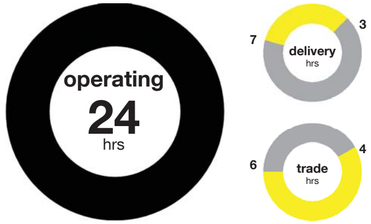


OPERATIONS

I spoke with Piet, an agent from *de Villiers (EDMS)*, who for the past 6 years has made this market his home:

"I begin my day here at 4am, by then most of my deliveries have been made. The big clients get here at about 5am, and by 7am most of my stock has already been sold (Piet, 2012).*"*

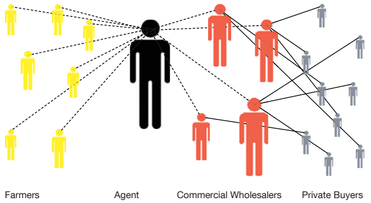
" I'm on my cellphone all day talking to other trading companies in the Gauteng area and nationally in order to determine competitive costs. I also check prices from other farmers (Piet, 2012).*"*



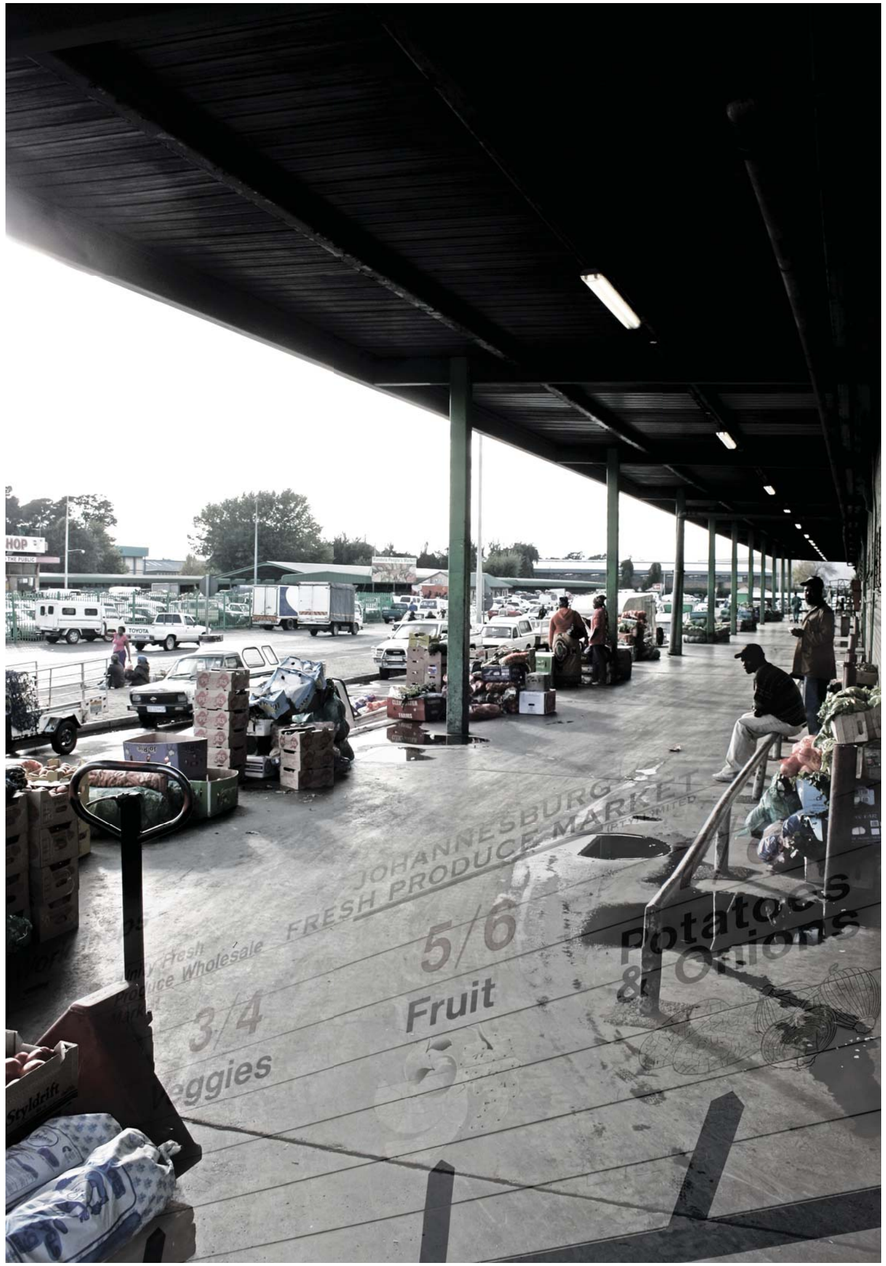
TRADING SYSTEM

At the Fresh Produce Market the agent companies act as the middle man. They buy and receive their produce directly from the farmers, and then sell to commercial buyers, private buyers, and even individuals.

" The price we fetch for our produce depends on market value, which is dictated by supply and demand. We like to have a general competitive price range amongst all trading companies (Piet, 2012).*"*



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FRESH PRODUCE MARKET

programme

Trading Halls
There are 9 trading halls, each one specialising in different produce. The halls are divided into pens, which are managed by trading agents.

Market & shops
Fresh produce is available to the everyday consumer at the Mandela Market. The traders operating here buy their fruit and vegetables from the trading halls.

Workshop & Loading Bays
Loading bays, surrounding the halls, provide enough space for everyman and his bakkie. Expansive service yards have ample space for the largest of tucks to manoeuvre with ease.

Restaurant
The restaurants provide convenient meals and take aways to agents, wholesalers, and staff.

Administration
From offices to boardrooms, this multistory office block provides enough administration space to manage this commercial giant.

25 ***COMMERCIAL PRODUCE***

This mixed programme commercial machine is divided into nine halls, each specialising in different produce. Some sell fruits, others sell vegetables.

The massive trading halls, which exude a sense of organisation and precise co-ordination, are strongly contrasted by the chaos that has taken over the packing areas and service yards. This apparent sense of contrast is present everywhere; with private consumers rubbing shoulders with wholesale giants.

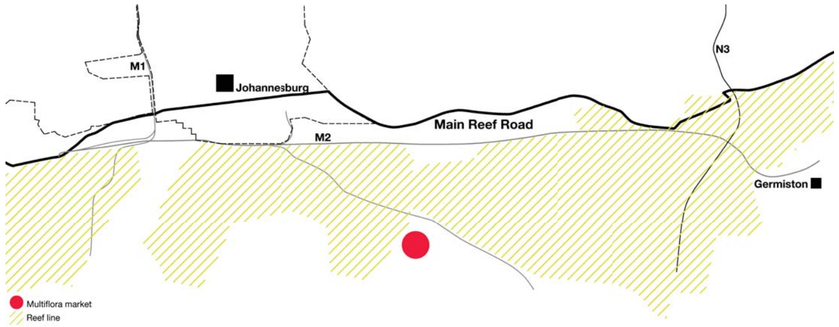
The mixture of so many different activities and people make this market a fascinating place to experience.

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26 ***RUSH HOUR***

As the sun climbs from its morning horizon all that is left behind by the big commercial buyers is quickly scooped up – at cheap rates – by small scale private buyers, informal traders, and the odd individual. It is 8am, and in this organised chaos nothing will be left to waste.



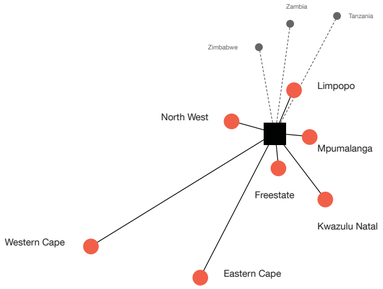
27 *Johannesburg Reef Line Map (source: derived from Johannesburg Topographical Maps)*

LOCATION

Also situated in City Deep, directly behind the Fresh Produce Market, the Multiflora flower market is also well connected to Johannesburg's commercial infrastructural networks.

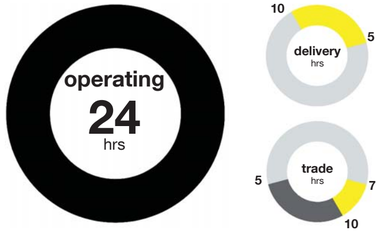


28 *Aerial photograph: Multiflora Flower Market (source: after Google Earth)*



MARKET REACH

Established in the early 1940's as a centralised flower market, Multiflora has become the core of South Africa's flower industry. Having the largest auction house in Africa means that the market attracts a large number of growers, auctioneers, wholesalers, and florists. The majority of the flowers on auction are grown in and just beyond Gauteng, but the markets reach also extends from the Cape to Natal and the eastern and northern regions of the country, as well as beyond our national borders. The wholesalers distribute the fresh flowers from Johannesburg to every corner of South Africa, and even export to other countries (Sue, 2012).

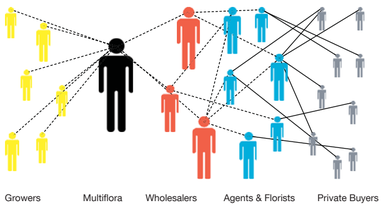


OPERATIONS

I spoke with Tsepo (an employee who working in the flower hall) who explained his responsibilities at the market:

"I work here in the flower hall. I am here early every morning to bring all the trollies from the freezer for the auction (Tsepo, 2012)*."*

"Some trucks deliver at night, but not the same growers everyday, maybe once or twice a week they deliver. We keep the flowers fresh in the big freezer. They can stay fresh for a week (Tsepo, 2012)*."*



TRADING SYSTEM

There are two trading areas: the first being the flower hall, where agents sell directly to the public, and the second is the auction house, where wholesalers and florists gather to bid on the flower lots.

"The auction house is frantic, with nearly 150 people gathering here everyday. The large clocks display detailed information about the flowers, and all the bidding is done through our computerised system". (Sue, 2012)



programme

Auction House
The auction house, essentially, is an auditorium used to hold daily auctions. This is where the flowers are sold using a computerised system.

Flower Hall
This large hall is a flexible space is used for the display and temporary storage of flowers, as well as a trading space for agents selling directly to the public.

Service & Loading Bays
Large loading bays and service yards surround the flower hall. This expansive space can accommodate large commercial vehicles and private delivery vans.

Retail
The retail component has a number of florists and garden stores which sell to the general public.

Restaurant
The restaurant is a convenient place to grab a cup of coffee and a meal after a busy mornings trade, or just a place to take some time out.

Education
The market has a floral academy which, apart from teaching budding florists, also provides flower arrangement courses for creative individuals.

29 ***CLOCK WORK***

The auction house is the meeting grounds between the growers and the wholesalers and buyers.

Four giant clocks provide an easy marker for all interested parties involved in the bidding process to follow. All essential information is displayed on this computerised system, which is not limited to: the grading of the flowers, the quantity of stems per bunch, number of containers available, buyers number, and the growers name.

Before the bidding commences the auctioneer will set the base price, which starts high and rotates lower. The clock only stops when a buyer, who presses his button first, stops the clock on the price which he intends to pay. All information is communicated electronically between the buyer and auctioneer through a computerised system.
(Sue, 2012)

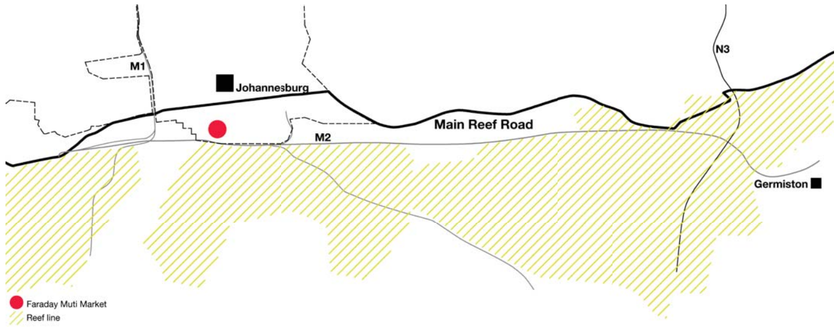


30

DEEP FREEZE

Flower containers and trolleys are safely stored in massive cold storage rooms. Before the daily auction commences the fresh flowers are moved into the hall where they will be on display to interested buyers and wholesalers.

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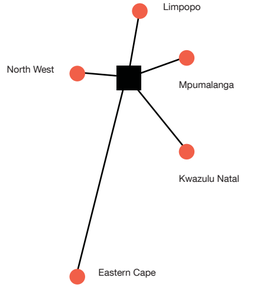
31 *Johannesburg Reef Line Map (source: derived from Johannesburg Topographical Maps)*

LOCATION

The Faraday Market and Taxi Rank is located in the southeastern part of Johannesburg's inner city. This precinct is boarded by high-rise city blocks to the north, the M2 highway to the south, and the historical backdrop of the mine dumps, which line the reef, just beyond. The market is well located, being anchored by the Faraday railway station, and has subsequently developed into a thriving transport interchange.

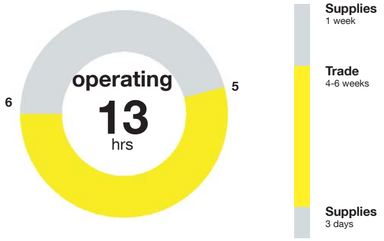


32 *Aerial photograph: Faraday Precinct (source: after Google Earth)*



MARKET REACH

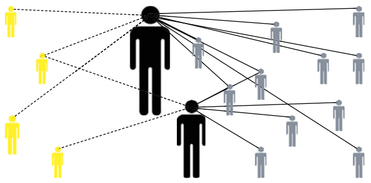
The Faraday Muti Market is abuzz with people during most hours of the day looking for herbs, traditional African medicines, and consultations with healers. This market place, in the heart of downtown Johannesburg, provides a place away from the rural homelands for people seeking traditional medicines to cure almost any aliment. The formalised presence of this traditional market, in combination with its location adjoining the taxi rank, means that it has attracted a wide client base. Just as Johannesburg has become an international point of reference, attracting a myriad of citizens, so Faraday attracts customers from all corners of South Africa.



OPERATIONS

When visiting the market I spoke with Lindiwe, a muti trader from Kwazulu Natal, who gave me a basic account of her job:

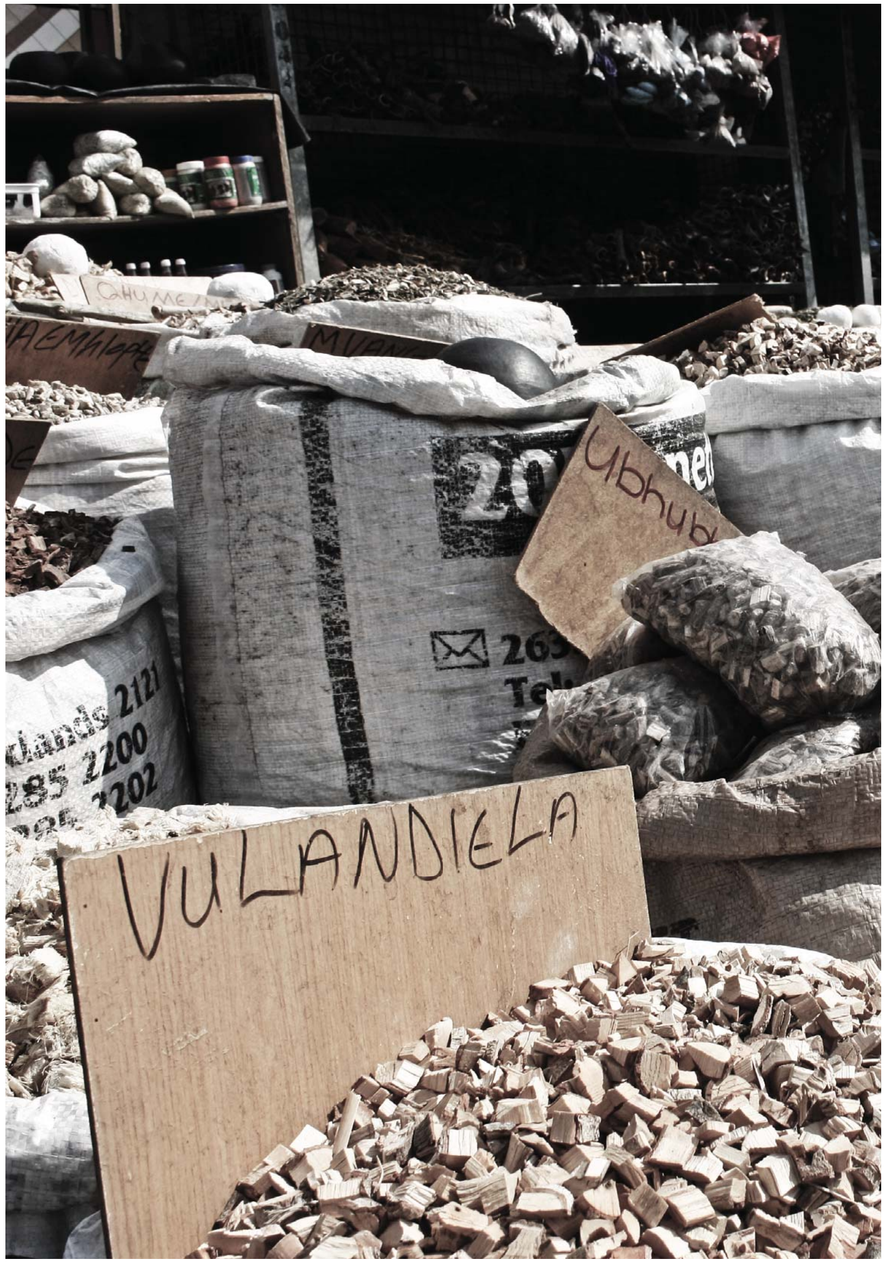
- Lindiwe sets up her stall every morning and at the end of a long day she packs away the entire contents which are then securely stored at the market.
- Every 6-8 weeks she returns home to source her own herbs and medicines which have been gathered by traditional healers.



TRADING SYSTEM

The Faraday Market can accommodate roughly 280 stalls with each one being manned by a muti trader, and in most cases each stall has something unique on offer. The formalised nature of the market place provides an open meeting ground for exchange and transaction; a process with takes place directly between the buyer and seller.

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programme

Market Place

Most of the informal stalls are accommodated in open air environments with walkways being transformed into a seamless display of African mythology and mysticism.

Produce Market

This small fresh produce market adds another dimension to the market place, and is also a welcome addition for people passing through this transport interchange.

Secure Storage

A large number of compact storage units offer secure storage to traders. Many of the units have a dual function, as they provide additional stall space.

Rest & Eating Places

Tables and chairs might be a rare site, but low walls, benches, and concrete sculptures provide ample space to rest and enjoy a meal amongst friends.

Cafes & Spaza Shops

A numbers of cafes and spaza shops provide meals, drinks, and snacks to any number of people working or moving through the market.

33 ***FROM THE EARTH***

A number of densely packed open-air stalls surround the prime property immediately adjacent to the taxi rank and train station. The traders operating here are hoping to catch the attention of thousands of people passing through the Faraday Precinct everyday.

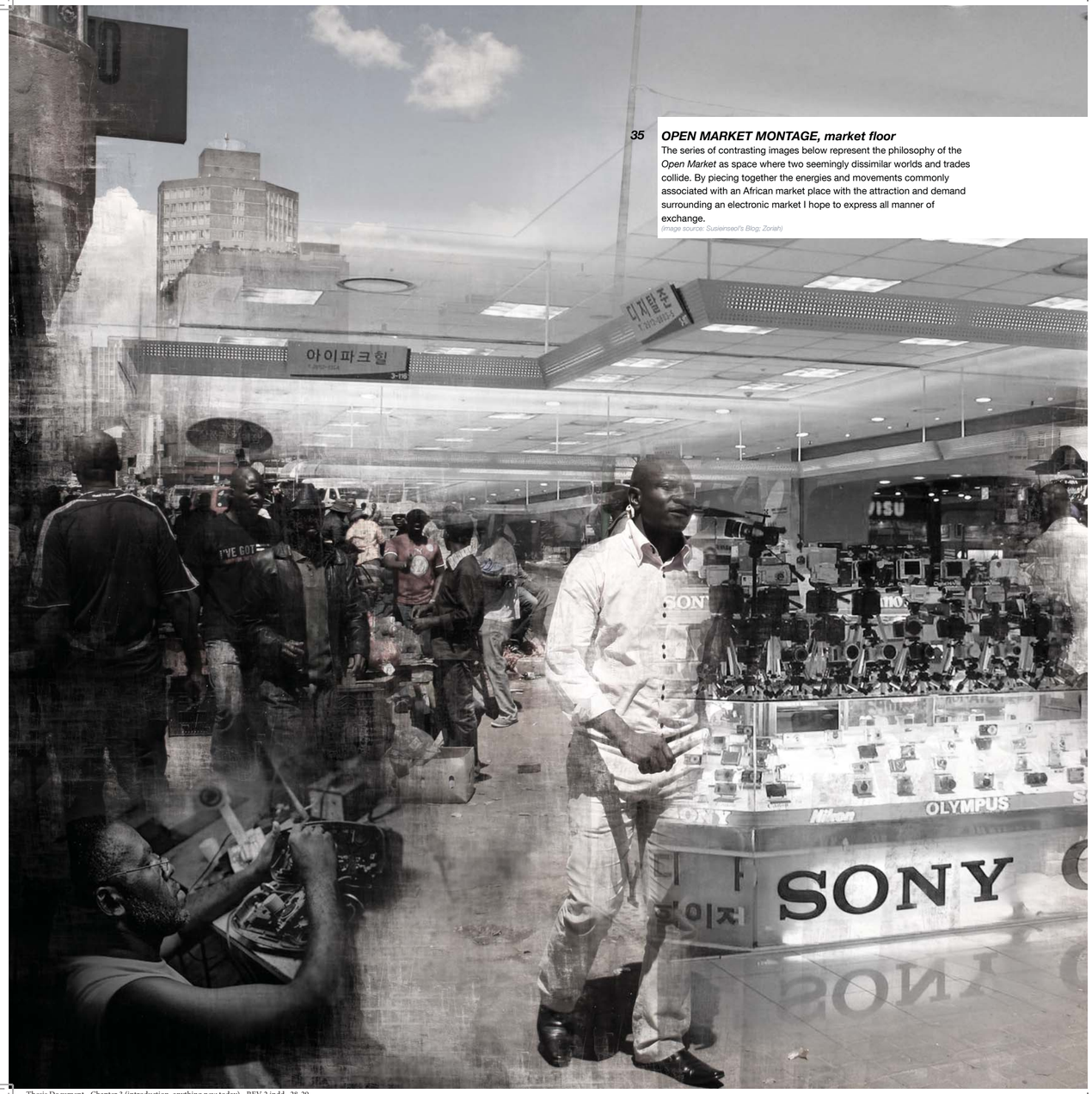
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34 ***TRADING SHED***

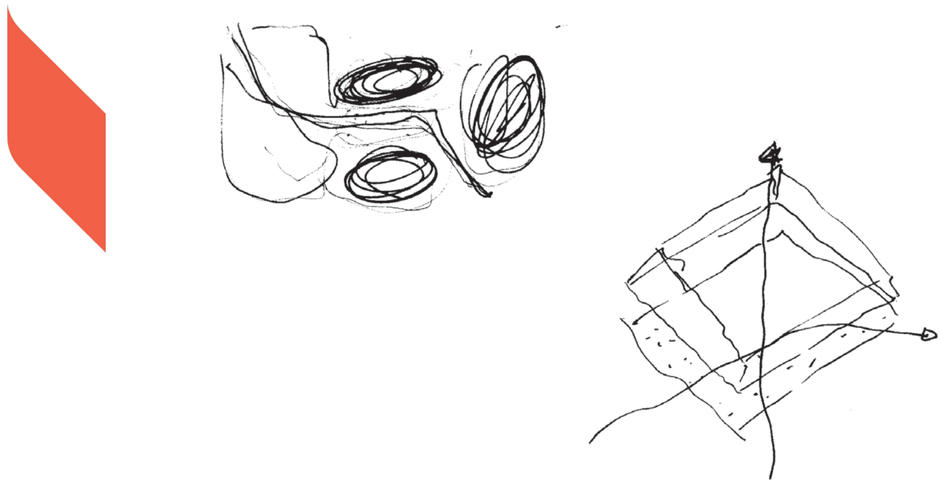
The high volumes, open facade envelopes, and industrial architecture of this trade shed don't feel out of place in this old industrial sector of Johannesburg. Furthermore, the Faraday Muti Market brings something more, something unique to this city; the contrast between the buzz of people moving through this interchange and the eccentricity of this ancient pastime are in some kind of harmony with the highs and lows of this bustling city.

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35 ***OPEN MARKET MONTAGE, market floor***
The series of contrasting images below represent the philosophy of the *Open Market* as space where two seemingly dissimilar worlds and trades collide. By piecing together the energies and movements commonly associated with an African market place with the attraction and demand surrounding an electronic market I hope to express all manner of exchange.
Image source: Susieinseol's Blog; Zoriah)

A At the burn site, the *urban miners* point to a small pile of organised electronic waste that is placed a short distance from the fires. For the *urban miners* this 'other' waste pile, which seems to be treated with greater care, given more attention, and receives further discussion, is not destined to be burnt – just yet. The pile contains items which are in better condition than most of the waste lying around, and therefore holds a different kind of value; a value which will most likely see the items being repaired by a friend at a second hand repair shop. Those items which cannot be repaired will be salvaged for working components, and from there the remainder hastily sent to an ashy gave. Apart from salvaging and processing metals, the ***Open Public Trade Forum (OPTF)*** could provide a space to serve the emerging market of refurbished electronics and scrap metal.



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B The *Open Market* would afford informal traders the opportunity to sell refurbished electronics, salvaged components, and re-worked scrap metal within a public open-air environment. In this space, technicians, specialising in electronic media and metal work, would exercise their craft in restoring value to what may seem to be no more than useless junk. The *Open Market* aims to interweave a myriad of people through a seamless public environment. Imagine a continuous fabric of trade that is bustling with energy, where a number of stall owners rub shoulders all vying for potential transactions; practitioners dealing in electronics and 'rough diamonds' so to speak, vendors re-working sheet metal that could be sold as building material, sculptors exhibiting and selling their metallic creations, and informal traders serving food and drink to passing customers.

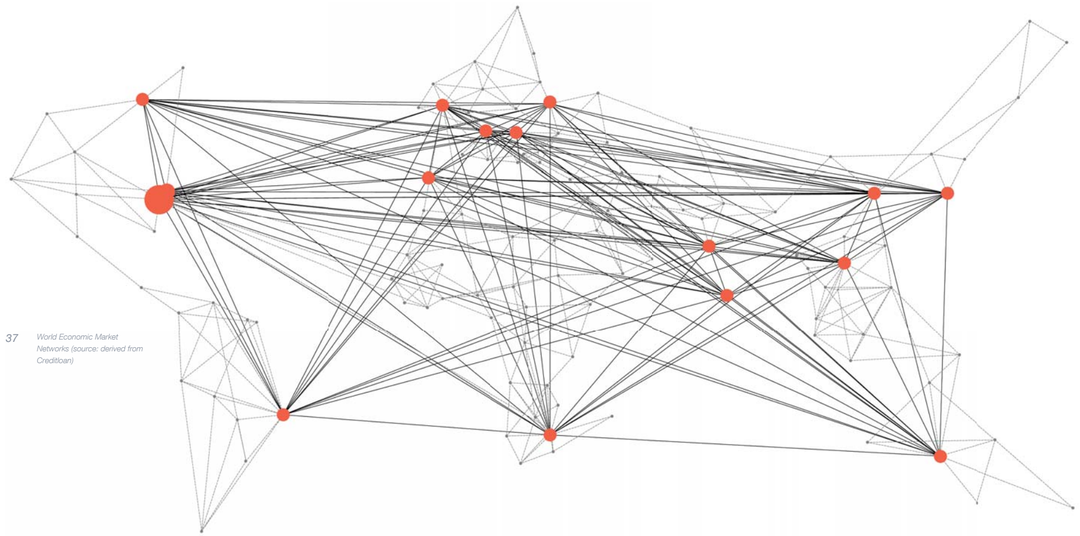
C Weaving in and out between enclosed building and outdoor space, the *Open Market* aims to provide a public strand that will not only take people along an experiential journey amid the array of activities housed in this metal market, but will also stitch together the components of public/private and landscape/architecture. Merging seamlessly with the street, open-air walk ways, and movement corridors, the outlooks and courtyards, and the enclosed programme, the *Open Market* paints a scene that passes between the narratives of a market place, Johannesburg's conditioned reef, and the hardships of a developing context. The collision between traditional and contemporary urban trade is one theme I wish to explore in the ***OPTF*** – an intersection expanded on by local informal practices and global informational dynamics.



OPEN MARKET MONTAGE, work space

The expression of exchange is the primary component of the *Open Market*, however another critical aspect is depicted by the composition below. In combination with the electronics market, which is inspired by the essence of an African market, there will be a number of work spaces adjoined to the trading floor. These animated work spaces will openly celebrate the transformation from cadaver to, once again, functioning device. The work spaces thus support the myriad of activities and people moving through the market place.

(image source: iFixit; Prakash, V)

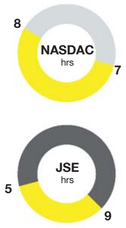


37 *World Economic Market Networks (source: derived from Creditloan)*

MARKET REACH

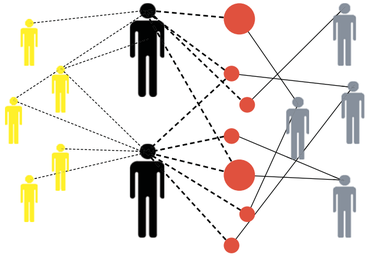
Today the idea of a 'stock exchange' has grown from something as simple as the historic London Stock Exchange, which started life in the coffee houses of 17th century London, into a global financial spectacle manifesting itself in the world economic market. The world economic market owns its explosive growth and expansion to the ubiquitous communication networks and rise of information technologies across the world. In this market place, which knows almost no boundaries, financial institutions exist in place which is not limited by distance, and space which is not constrained by time. In fact the world economic markets' only limitations are the electronic infrastructures and human interfaces upon which it is built. (London Stock Exchange, 2012)





OPERATIONS

Individual economies which were previously isolated from each other, are now increasingly influenced and affected by each others actions and situations within the world economic market. The world market economy means a place or virtual space where all the economies of the world merge and the exchange of commodities and services are carried out at an international level. The very nature of the global economic market means that its operations never cease; when the established markets of the west begin to set aftermarket trading rises alongside the emerging markets of the east – along the meridian we are caught somewhere in-between. (Economy Watch, 2012)

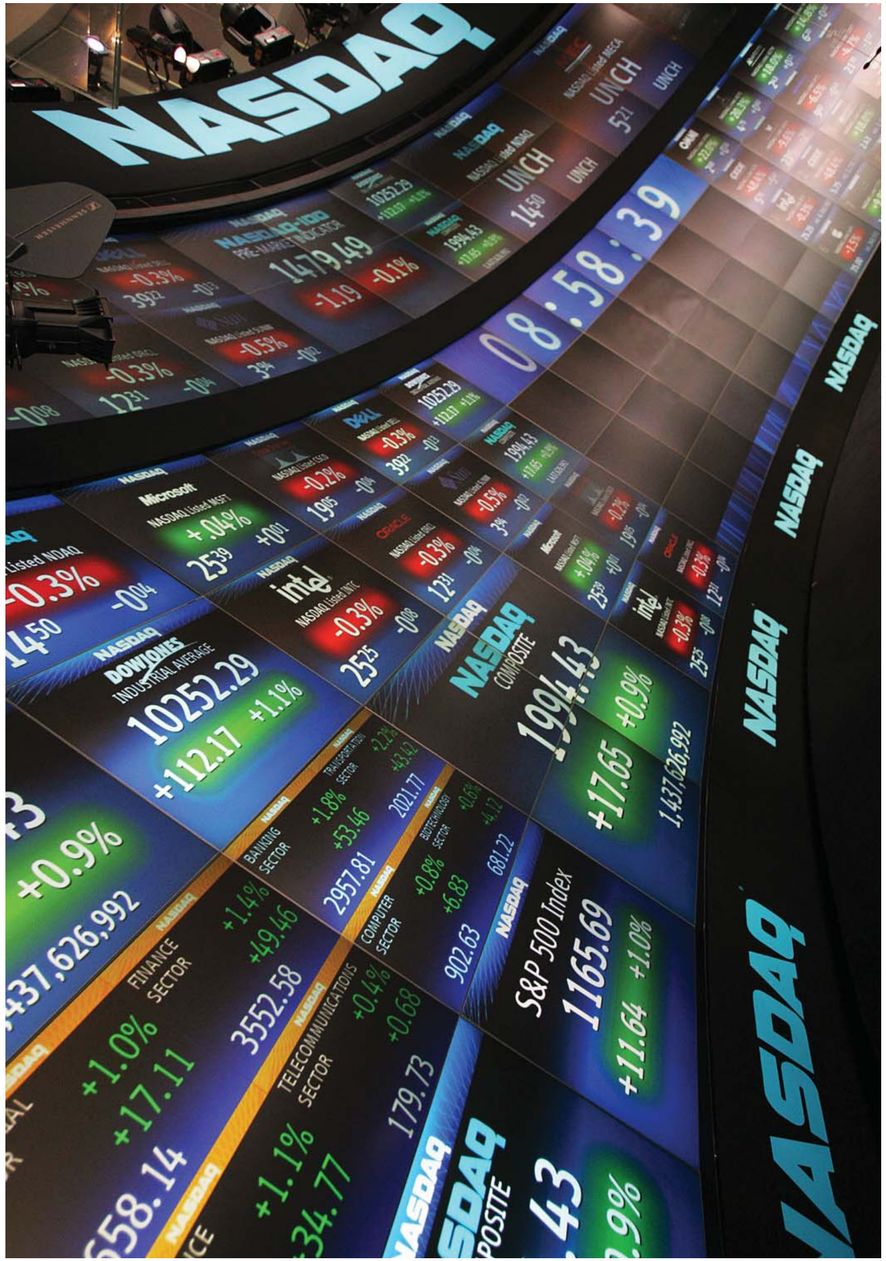


Investors Stock Brokers Listed Stocks Listed Companies

TRADING SYSTEM

The stock market is a forum where publicly held financial stock and financial instruments are traded. Stock trading works on a system of buying and selling shares, or quite literally a small share in the ownership of a company. Investors looking to grow their financial portfolio can engage in two methods of stock market trading. The traditional way occurs on a trading floor within a stock exchange, with modern day trading is done through electronic exchanges in 'real time'. Today large computer networks have also made private online stock trading an effective alternative to the bustling exchange floors. (Hope, 2012)

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programme

Digital Trade Floor

Large digital or electronic trading floors, packed with thousands of computers and massive bulletin boards, have replaced the analog trading pits of the first stock exchanges.

Server and Telecom-munications Room

The most advanced server and communication rooms provide the necessary infrastructure and support required to make large volume global trading possible. The success of stock market trading partly relies on instantaneous transactions.

MarketSite

The MarketSite Tower, located in the heart of New York's Times Square, serves as the epicentre for NASDAQ news and events. Each day the larger than life display host some of the most world's most prestigious business leaders to preside over the market opening.

Administration

The trading floor, MarketSite, and broadcast studio may be the most prominent compo-nents of the NASDAQ Stock Market, however, behind the scenes it is the administra-tion component which keeps this global exchange network operating smoothly.

38 ***GLOBAL BROADCAST***

The MarketSite Tower houses a cutting edge digital broadcast studio that continuously transmits up to 100 live market updates. This pano-ramic informational billboard, which is managed by a dedicated NASDAQ technical staff, provides instantane-ous market feedback and trading information 14 hours a day.

The Broadcast Studio also offers public groups the unique opportunity of attending the opening and closing bell ceremony. This not only allows members of the public to view this celebrated occasion, but also experi-ence some of the inner happenings of how this stock exchange giant is run (Nasdaq QMX, 2012).

(image source: Nasdaq QMX)

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39 ***WORLD STOCK EXCHANGES***

The series of contrasting images below represent the philosophy of the *Open Market* as space where two seemingly dissimilar worlds and trades collide. By piecing together the energies and movements commonly associated with an African market place with the attraction and demand surrounding an electronic market I hope to express all manner of exchange.

(source: after Creditloan)

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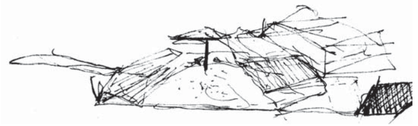
THE TRADING PIT MONTAGE, trading floor

The notion of exchange is continued within the walls of this tall volume. *The Trading Pit* could be seen as a mixture between an industrial work floor, a contemporary exhibition space, and an auction hall. The high level lighting, robust tectonics and stark aesthetics, the large open spaces, and mechanical gantry systems come together to create a stage where one can immerse themselves in electronic waste, the event of exchange and everything that is 21st century mining.

(image source: Alden, J; Roland, H; unknown)

A The root of this enquiry aims to not only question the notion of what it means to be public, but also challenge how people engage with space while responding to a unique set of activities happening in and around a particular urban context, in this case Germiston North. The intention here is not an attempt at providing the definitive public space, as public spaces are strongly associated to a particular time in history as well a number of contextual relations. Rather, it is my objective to provide an interpretation, for this unique context, as a celebration of the public realm and the industrial working environment; which when given adequate thought, could be considered public too.

B At the heart of the *OPTF* rests *The Trading Pit*, a large multi-volume auction arena where all manner of trade and exchange take place – trade which may be financial and exchange that could be social and informational. This mixed trading space exists definitively in the context of today's urban environment, yet it conjures up images of the distant past; the crowded trading floors and competitive auctions once held inside the walls of early financial houses are reproduced within this progressive realm. *The Trading Pit* is a working domain with its focus aiming to draw participants of both public and private interest, to pool together information of local and global proportion, and set them together within a central arena. This location draws together a myriad of practitioners under the event of exchange: where *urban miners* gather in workshops to strip electronic waste as a working display, and then trade in unrefined metals sourced from waste and scrap; it is a space where *pit traders* meet daily to gain valuable information, through passive and physical experience, before they bid; a realm where stock market traders and auctioneers, who rub shoulders with the *urban miners* and *pit traders*, spark unique social interactions; and it is also a place to discover the true value price.



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C *The Trading Pit* provides the spatial logic and architectural tectonic that supports the *OPTF*. This central arrangement is designed to configure traders in space, time and place, where a continuous field of mixed activity is reinforced. In the breakdown spaces *urban miners* sift through trolleys of raw electronic waste breaking, separating, and organising their bounty into precise items of value. Once sorted, the *urban miners* shift their metal to lot racks, where their bounty is put on panoramic display to a bidding audience. Field experts, using trained eyes and a vast pool of knowledge, scan the building facades assessing the potential investments on larger than life displays. These electronic experts provide the essential link between the electronic waste and their fellow *pit traders*, and once a measure of value has been determined they engage in an intense bidding process. The practitioners use their networks of friends and colleagues to gather information about the market, to find a profitable location within *The Pit* to work, and to complete exchanges with auctioneers, other traders, and *urban miners*. *The Trading Pit* thus institutes a measure of certainty; whereby traders, carefully listening to the rhythms of the bidding and analysing the changing numbers, are able to establish themselves within the pit arena.

D The domain of *The Pit* defines a space where relationships of obligation, trust, and reciprocity between traders are put to test, and where information about metal commodities are evaluated and solidified into price. The auction thus becomes most efficient and effective, to those who want to buy and sell valuable metals, when individuals can see and hear the various bids and offers from all the other participants. The fleeting temporal nature of the market makes physical presence in *The Trading Pit* even more essential – if a trader is out *The Pit*, he is out the market. The intersection and exchange between *urban miners*, *pit traders*, auctioneers and financial traders, and the public is the most important layer I wish to explore within this building.



41 ***THE TRADING PIT MONTAGE, trading floor***

The expression of exchange is once again captured in the following images. The trading pits of early stock exchanges were tightly packed and fiercely contested work spaces. Traders relied on their essential trade networks, effective communication skills, and a thorough understanding of the 'market' or stock they were trading. Today the stock exchange floors are dominated by computers and instantaneous digital networks, however without people, as the physical interface, these global digital markets would cease to exist. Both the trading pit and trading floor bring together a myriad of people all investing their efforts towards a common goal – the exchange of tender. In the *OPFT* the chosen tender is electronic waste, and it is the timeless quality of the old trading pits combined with the intensity of people engaging in all manner of exchange which I intend to capture.

(image source: unknown)

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INFOR-MATION SPACES

Written essay

There has been a long history shared between information and society; histories that overtime have and continue to impact our relationship with and perceptions of space. The inseparable bond maintained by information networks is not specific to human society; in fact everything cellular, atomic, or virtual relies on a communication system or some essential bond. It is this deep level organisational structure that ensures the inherent functionality and development of everything we have come to know. For Manuel Castells, this notion forms a leading aspect of his thoughts on Informationalism, Networks, and Society, where he maintains that: “[n]etworks [...] are not specific to twenty-first century societies or, for that matter, to human organisation. Networks constitute the fundamental pattern of life, of all kinds of life.” (Castells, 2004:04)

Thesis Document - Chapter 4 (information spaces, borderlands) - REV 2.indd 2-3
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For Manuel Castells (2004:04), this notion forms a leading aspect of his thoughts on *Informationalism*, Networks, and Society, where he maintains that: "[n]etworks [...] are not specific to twenty-first century societies or, for that matter, to human organisation. Networks constitute the fundamental pattern of life, of all kinds of life." The nature of the information and the manner in which it is communicated may vary, however the component of information itself remains vital to the survival, success, evolution and diversity of society. The methods of communication, the formal and informal networks, and the physical and digital paths along which information travels are born from the milieu of society itself, thus as society adapts to their chosen environment so information and communication shift to meet the advancing needs of that society and so forth:

Indeed, if we transfer the notion of globalisation to the geography of the ancient world, as determined by available transportation technologies, there was globalisation of a sort in antiquity, as societies depended on their livelihood, resources, and power on the connectivity of their main activities to networks transcending the limits of their locality (Castells, 2004:04).

Information and communication networks have always embedded themselves in the transformation of physical place, where a spatial relationship exists not only to reflect society but express it as a fundamental dimension of that society, inseparable from its overall organisation and change (Castells, 2005:574). However, one thread remains common to both networks and society; over time important functional locales have been used by society to ensure the effective exchange of information. These essential places, which I am referring to as information spaces, may have been as rudimentary as an open fire; used by cavemen to roast meat, to keep warm, to trade stories of the hunt and to ward off predators. Alternatively, they could have been as intense and socially complex as a Roman forum or Greek market place; used to hold public festivals and theatrical presentations, to conduct official ceremonies, to promulgate laws, and to support the daily needs of city life (Sitte, 2005:476-477).

Whether the locale in question was unassuming, or layered and complex is not critical, but rather that each facilitated a diverse range of programmed and impulsive activities.

Popular civic spaces and architectures have always infused a spatial relationship with information and communication. By tradition these ***information spaces*** have been the centre of activity and most often the origin of many cities; the principle hall so to speak (Castells, 2005:573-574). These core spaces where human traffic was most intense embodied diverse mixtures of activity, and in doing so encouraged social interaction. One such space was the *market place*[7], in which space served citizens as a resource for organisation and a significant code of communication – a dynamic environment used as much for trade as social collectives and chance encounters dependant on the presence of others (Seligmann, 2000:2-4). This public realm not only housed agitated movements and a collection of sounds, smells, and stinks, but was also accompanied by a diverse range of merchandise ranging from bread, vegetables and fruit, and meats of all variety, to items such as pots, exotic jewels, incense, and herbs.

These open-air markets were the business capitals of former times, where local farmers, wealthy merchants, and talented craftsmen gathered to shift their goods to throngs of people looking to fill their daily baskets. Citizens would meet to barter and participate in fleeting conversation, to broaden their connections and engage in communal activities, or to simply be among others – that is passive contact (Sitte, 2005:476-477).

7 *Market place:* is a space in which a market operates. The traditional market square is a city square where people gathered regularly to exchange goods and services. Overtime many of these once life giving market places have fallen out of favour due to processes of urbanisation. (http://en.wikipedia.org/wiki/Marketplace)

Resultant social activities emerged spontaneously from the everyday events embedded in the market place, sparking the development of a myriad of interconnections characterised by the context in which they occurred. It was precisely the presence of other people, activities, events, and the inspiration they sparked which comprised the essence of the market place (Gehl, 2005:532-534). The nodes where these intense social and commercial activities merged were fuelled by the traditional networks of information, commerce and mobility, however these principal architectural elements of cities have greatly changed in the centuries gone by:

Public squares (Forum, market, etc.) are used in our times not so much for great popular festivals or for the daily needs of our life. The sole reason for their existence is to provide more air and light, […]. It was quite different in ancient times. Public squares, or plazas, were then of prime necessity, for they were theatres for the principal scenes of public life, […] (Sitte, 2005:476-477).

The beginning of what is distinctively known as modern in our civilisation is marked by the growth of great cities. The rise of these cities in the modern world is certainly not independent from the advent of modern power-driven machine technology, mass production, consumption and commodification, capitalistic enterprise and the liberalisation of society at large (Wirth, 2005:97-100). Pioneering technological advances have at every major interval throughout human civilisation instituted, through dimensions of social structure, a change in the manner in which we perceive, conceive, and interact within our material world (Castells, 2004:08-13; Mills, 1997:53-66). This pattern has been continued with the focus on great cities now shifting towards 'other cities'. The rise of major sites of globalisation in the 21st century manifesting themselves in the emerging cities of the developing world is the result of a complex relation between technology, society, and information (Huyssen, 2008:14). The increasing rate of urbanisation in combination with technological innovation and advancing communication processes have piloted society through the industrial age, towards a prevailing change in social, economic, cultural, political and geographic space referred to as the *Information Age* (Castells, 2004:08-13; Sassen, 2005:556-557).

The formation of globalised networks of spatially concentrated human settlements and infrastructural configurations, in which major dimensions of human organisation are at once concentrated, reproduced and contested, are a result of the processes of globalisation (Brenner and Keil, 2005:600-601).

8 *Global technological skin:* is a digital matrix or interconnected technological fabric, which spans the globe, weaving in and between real and digital space whose ability to instantaneously connect global society has a profound effect on the everyday lifestyles of all people.

9 *E-space:* is a digital environment, boundless in form and materially detached, yet at the same time totally inseparable from the real world in which we reside. This digital world facilitates the participation of society in new global circuits of social, economic, political and cultural activities.

10 *New Market Space:* is the contemporary market place of the new world economy, which operates within E-space. It is supported by powerful multi-national corporations and influenced by the daily activities of global market players.

11 *Cyber-playground:* is an online medium of computer networks, in which society can engage in online communication and various social, economic and 'spatial' activities.

Change occurs at varying levels, some of it extensive and openly apparent, some of it difficult to gauge, while much change manifests itself in locally specific forms as a result of emerging global trends. However – everywhere – change is toward more urban forms of life embedded in formal and informal urban economies. New urban spatial relationships, and changes in contemporary living have much to do with technologies and information carriers that have become ever-present in the global circuits of this world; these are not limited to personal and collective mobility, and communications through telephones, cellular phones, the Internet and broadcast media (Read, 2005:3-5). The degree of instantaneity, in the space-time compression that processes of globalisation so depend on, promise to be eclipsed as technological networks become ever more dense and ever more integrated, ultimately perhaps becoming a *global technological skin*[8] which could offer, beside ubiquitous connectivity, the possibilities of instantaneous monitoring and feedback of economic, environmental and urban processes (Read, 2005:3-5).

The contemporary built environment has become a networked arena, a contested *E-space*[9] guided by globalising vectors. These paths, not limited to economic flows but also including new social, cultural, political, ecological, and media threads, aim to meet society's ambitions for advancement and competition (Brenner and Keil, 2005:604-605). As the lustre of the traditional market place as an information space continues to fade, densely integrated digital networks begin to generate technical infrastructures upon which a *New Market Space*[10] is built. This is the *cyber-playground*[11] for multi-national corporations, where the capitalist world and virtual flows of information and economy expand to dominate global society.

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Digital networks are boundless in form and dimension; a fluid matrix of conflicting and corresponding information colliding in transient space that when given sufficient attention are inseparable from the conventional world. The new urban world arises from within the formation process of the *Information Age*, and for the first time we see the possibility, indeed the necessity, for the development of technological processes towards understanding and managing new urban practices (Castells, 2005:573-574). However, in the developing world, where the shadow of information technology and development often renders local social, infrastructural and economic networks as limited, there is a chance to construct a place of opportunity. This flexible interface is where new urban processes mix seamlessly with global circuits of information and local networks of production resulting in new forms of exchange.

The fluidity, haste, and mation across infinitely our perception of space enquiry into new forms Within the walls of this new spatial relations will within a realm of collid- formal, where low-tech ing market place meets night meets day, where world and everything

advances in the exchange of infor- large and complex networks alter and time; begging us to make an of urban space and architecture. new architecture type, a series of exist where one can be immersed ing activities; where informal meets meets high-tech, where an emerg- the global economic market, where Johannesburg meets African, the in-between.

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THE BORDER LANDS

Technological Infoscapes and Obsolete Wastelands:

Visual essay

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There are sites scattered around the developing world which have become home to the most hellish recycling yards on earth. They are the places where our old electronics, appliances, and machinery have been tossed up by the hidden currents of today's consumerism and commerce, and have found strange resting places: lining the banks of the Odaw River, on the outskirts of Ghana's capital, Accra, lies a wetland turned wasteland littered with the remains of cast-off electronic machinery; spread along the shore of the Bay of Bengal, only a few kilometres from Bangladesh's second city, Chittagong, lies a stretch of beach home to the ghostly hulls of retired oceangoing vessels; and spoiling the rice fields of Guiyu, China, lie mountains of electronic waste blackening the city's water system (Pucket, 2011: 97; Graffiti, 2010; Walsh, 2009).

In these dark places machinery that could previously execute billions of processing instructions per second, or transport oil to every corner of the world, have found their end as metal and plastic skeletons amongst some of the world's most sorrowful and marginalised communities (Pucket, 2011: 97). These harsh landscapes have become the hunting grounds for teams of workers, armed with little more than their bare hands and rudimentary tools, to gather and recycle the relics of our *Technological Age* – waste is bludgeoned, cleaved, torched, and painstakingly broken down to scavenge the precious metal (Pucket, 2011: 97-98; Graffiti, 2010). The harvest reaped from the endless piles of electronic waste or gigantic wrecks, delivered from developed nations, provide a steady source of metal, tens of thousands of jobs, and are also a valuable source of revenue for a developing economy (Graffiti, 2010). So valuable in fact that the health risks, insurance protection, and environmental concerns laboured over by first world countries are totally overlooked, thus making it an economical, yet most unsustainable form of recycling (Graffiti, 2010). This is the other side of recycling, functioning in a periphery far removed from a culture of pleasant reuse; where recycling is not an ethical option but rather a means to survive. These waysides, where detritus from developed countries is put toward good use, are what I am referring to as ***The Borderlands***.

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42

THE DIGITAL AGE

In today's technologically driven and information rich society it is not uncommon for electronic media to play a major role in almost every aspect of our lives, so much so that children as young at two years old are being educated using an *Apple ipad* or an equivalent device. The rapidly changing development of computer technologies mean that within two years what was once cutting edge is now obsolete.

(image source: after Bareham, J; Wilson, A: unknown)

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43 ***THE OTHER SIDE***

The production and consumption of information technology has grown relentlessly in the past few decades. So much so, that in the United States (the largest e-waste contributor) computer use has increased from one per thousand in 1975 to an average of one per person in 2010. There are two factors at work here; hyper-consumption and hyper-obsolesces which conspire to satisfy our ego desires, our need for speed, and our competitive edge. Yet we don't think beyond the device held in our hand – our consumption of information technologies has real consequences where mountains of electronic waste are shifted around the world to some of the poorest communities (Pucket, 2011: 98).

(image source: after Blach 2010; Hugo, 2011)

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44 ***THE DIGITAL TRADING FLOOR, electronic place***

The series of images below capture the essence of the *Digital Trading Floor* as a place where financial traders operate to facilitate the exchange of metal commodities between world financial markets and the *OPTF*. It is within the boundaries of this trading arena that the world's electronic networks will be grounded in local physical place, and in so doing complete the medium of exchange between local, global, and everything in-between. This programmatic element will thus become the realisation of an electronic place born from a network of virtual electronic spaces.

(image source: after Bareham; and unknown)



B

THE DIGITAL TRADING FLOOR

A The Digital Trading Floor further develops the key ideas around trade and exchange that have been established by The Trading Pit. By staging a virtual market arena, a domain that merges the world economic market with this local metal market place, the notion of exchange is taken to levels previously unexplored. Although this space exists as a tangible entity, an interface inseparable from human interaction and decision making, the digital market is much more than a physical place; its operations belong to a context that is simultaneously local and global, while at the same time also existing in physical and virtual realities. The Digital Trading Floor completes the cycle of urban mining by establishing electronic trade networks with major metal markets around the globe, thereby orientating the OPTF within the global economy as an emerging market and pioneering market place.

B The instantaneous communicative and monitoring abilities made possible by advancing information technologies, combined with a commitment to 24-hour trading, make it possible for the OPTF to compete with the world's leading metal markets. The Digital Trading Floor is thus a place where physical and virtual realms overlap to create particular spatial and temporal conditions. In these continually variable working conditions time and space collide to open an opportunity for a new kind of trader to emerge; a trader who can operate between the harshness of The Trading Pit and the fast moving pace of the Digital Trading Floor. The programmatic explorations of the OPTF favour a trader – an urban actor – with abstract analytical skills who not only understands the world economic market but can also use his intimate knowledge of urban mining to operate within The Trading Pit.

C This form of electronic trading creates a fabric where participants share time, space and relationships. The boundaries of interaction between traders operating in this digital realm exist only in moments; where conversation is made up of changing numbers, and intentions are revealed through bold gestures. The Digital Trading Floor is the final frontier of the market component, and by weaving together the distinct threads of The Open Market and The Trading Pit it manufactures a collision between two traditionally exclusive sectors. This juncture continues to explore the intersection between the local informal and global informational within a new public domain.



45 THE DIGITAL TRADING FLOOR, information space

The compilation of images represent the *Digital Trading Floor* as an information space for the generation, exchange, and capturing of financial data. This component will act as the final frontier between the *OPTF*, competing metal markets, and the world economic market. The entire process of *urban mining*, which involves the efforts of the miners, pit traders, processing technicians, metals workers, and financial traders will be displayed in real time, for all to see, on larger than life trading boards.

(image source: after The Star, July 3 2012; and unknown)

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ELEC-
TRONIC
SPACES

The Virtual
Urban Networks
Globalisation
Re-configuring Architecture In Space

Written essay

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In order to respond to the dialogue set by this thesis, the binary between ***the local*** and ***the global***, an observation that explores the context of the *Information Age* is first required. Rationalising where and how architecture can slot into a realm somewhere in and out between actual and virtual space, and exploring the possibilities of what architecture can offer today's society means immersing oneself in the globalising conditions embedded in the contemporary world.

Electronic Spaces
TheVirtual:

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Today advancing technologies have not only moulded society through time but also shaped our greater urban environment, the intimate spaces we inhabit, and the manner in which we use them from day-to-day. The processes of globalisation in combination with the interaction between technology, society, and space generate new urban processes as the material basis of our lives in the *Information Age*, thus opening an opportunity to explore an unrecorded spatial dialogue between architecture and the virtual domain (Castells, 1989:06).

An exploration in which the tectonics of architecture become informational and the binary of information becomes spatial.

Social structures, like networks, are by design and requirement rooted in place. Even the origins of the most advanced virtual domains are an expression of circumstantial arrangements manifest in physical place, whereby a unique spatial dialogue exists between our world and a realm which is seemingly inconceivable. I turn to the postmodern theorist Manuel Castells whose thoughts rest on a particular conception of space and time in relation to advancing information networks, technologies, and society. The theory Castells (2005:572-582) constructs offers insight into contemporary issues of planning and architecture, in which he argues that urbanity, street life, and civic culture should be as important to modern day city planners as economic competitiveness. His theory emphasises the social importance of public spaces by reinforcing the established ideas of scholars such as Kevin Lynch *(The Image of The City)*, Jan Gehl *(Life Between Buildings: Using Public Space)*, and Camillo Sitte *(The Art of Building Cities)*, yet he recognises that today's urban world, mapped by networks and riddled with spatial tensions, requires a complete rethinking of ideas about cities and urban life (Castells, 2005:572-582). Considering Castells' thoughts on information, society, and space one can begin to conceptualise the new urban world as a product born from the processes shaping today's global society – the *network society* (Castells, 2005:573-574).

In the context of the Information Age, which is characterised by today's *Network Society*[12] and *Informational City*[13] , there exists a social structure that is seemingly global, however most human experience is definitively local in terms of spatial, material, economic, and cultural terms (Castells, 2005:572). This dual logic, which acts simultaneously through both inclusionary and exclusionary processes, underpins how some societies and cities find themselves beyond the circuits of globalisation (Castells, 2004:22-24). The course of globalisation tends to overshadow existing local practices forcing them to fold, and in so doing they conform to a set of ideals instilled by global dynamics. However, by virtue of this transformation, those used to the rhythms and regularities of old urban life may struggle to fit within the margins of globalisation, thus the local runs the risk of becoming just another inclusive node within an ever expanding stable of interrelated systems (Graeme & Marvin, 1996:48-49).

The pressure to compete and become intertwined within the matrix of globalisation creates spatial tensions which are precisely captured by this dual logic cycle.

12 *Network society:* the social structure that results from the interaction between social organisation, social change, and a technological paradigm constituted around digital information and communication technologies. (Castells, 2004:xvii) A network society is a society organised around a series of interconnected nodes woven through the fabrics of space and time, who's essential structure is one based on advancing electronic information and communication technologies. (Castells, 2004)

13 *Informational city:* defines an urban reality resulting from the interaction between the contemporary form of production and the contemporary development model which has generated new social and spatial forms. The main characteristics of this new urban environment are flexibility, social polarisation, and fragmentation. (http://www.atributosurbanos.es/en/terms/informational-city/)

Castells' principal thought, and the implication of his analysis on the built environment, is that cities should now be understood on metropolitan and global scales. His challenge to architects and planners is to conceptualise space that is not only meaningful to its local environment but also effective in its connectivity to globally associated urban nodes (Castells, 2005:572-582). At this point it is important to consider his conception of space as a fundamental dimension that expresses urban society, and that "[t]echnological change can only be understood in the context of the social structure within which it takes place. […]. We must be able to locate technology in the level and process of the social structure underlying the dynamics of any society (Castells, 1989:07)." To continue along these lines, it is necessary to introduce a theoretical concept in an attempt to place analysis on this technological change in relation to economic and social change, as this informs the argument around the effects of ***global electronic space*** on ***local urban place***. Castells' (1989:07) analytical focus lies on the emergence of a new mode of development which he brackets as the *'informational mode'*. His theoretical perspective suggests that societies are made of a matrix of human processes structured by historically determined relationships of production, experience, and power (Castells, 1989:07, 11), whereby:

Production is the action of humankind on matter to appropriate it and transform it for its benefit […] in accordance with socially determined goals. Experience is the action of human subjects on themselves within the various dimensions of their biological and cultural entity in the endless search for fulfilment of their needs and desires. Power is that relationship between human subjects which, on the basis of production and experience, imposes the will of some subjects upon others (Castells, 1989:08).

The point at which these processes of production, experience, and power converge, results in a paradigm shift in human organisation, therefore heralding a change in the relationship between society and its built environment. The spatial experience of this new urbanism can therefore be expressed through what Castells' calls the space of flows – the electronic networks of communication through which the majority of exchange within the new global economy is conducted – and through the space of places, that is; the built environment, shaped by objects, paths, edges and interrelated nodes within urban regions where people live out their daily existence (Castells, 2005:572-578).

Understanding that spatial transformation cannot be viewed independently from social transformation, allows one to comprehend that today's urban world arises from the advancing actions of a new society, the network society, characteristic of the *Information Age* (Castells, 2005:574). Castells (2004:01) maintains that "[c]communication networks are the patterns of contact that are created by flows of messages among communicators through time and space." The point of exchange between information and society thus becomes a moment in space and time captured in relation to the human subject and today's ever globalising urban life. However, it is important to note that the intrinsic relationships shared by the rise of new information technologies, intensifying global networks, and rapidly changing urban condition do not imply that cities will lose their traditional functions and yield physical place to virtual space (Huyssen, 2008:07-11).

Instead, I make the point of understanding the expansion of information networks and global flows in relation to the development of emerging urban space and the effects it has on urban life and global culture. I believe the changing experience of today's urban environment, and the tensions between globalising and developing urban spaces, is a direct product of the *Information Age* and digital technological change.

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There are few who would argue the notion that a technological revolution, of global proportions, is altering the fundamental dimensions of human life as we know, where "[t]he unfolding promise of information technology opens up unlimited horizons of creativity and communication, inviting us to the exploration of new domains of experience, from our inner selves to the outer universe, challenging our societies to engage in a process of structural change (Castells, 2004:01)." Castells' thoughts rest on the conception of information technology permeating the boundaries of human creativity and communication which ultimately leads to the sensation of space and time compression.

These dominant forces, which shape the structural and functional organisation of urban space, invite us to explore new domains of experience, from within ourselves to the outer universe, thus challenging society to engage in a process of structural change (Castells, 1989:01). The principle developments of spatial patterns and urban processes associated with these macro-structural changes, can be reproduced within the following spheres: machine-operated commercial processes and a global economy, which integrate productive networks throughout the world, resulting in an increasingly urban population; the uneven distribution of urbanisation, results in large territorial expanses that are functionally integrated yet socially differentiated around polynucleated urban systems; advancing technologies, such as telecommunications and modern transportation systems allow for synchronised spatial concentration and dispersal, while pioneering a new web of networks with concentrated urban nodes spread throughout the world; social relationships are characterised by *individuation*[14] and *communalism*[15] with virtual and physical communities acting through an array of communication systems and diverse spatial patterning to develop seamless interactions; and the rise of networked empires spur new economic activity through highly decentralised, yet coordinated work methods (Castells, 2005: 574; Sassen, 2005: 555-562).

Sassen (2005:561-562) maintains that at the intersection between actual and virtual space lies a new topography of unexplored activity. This topography, which weaves back and forth between actual and digital space, contains new possibilities for architecture and the built environment, where "[t]he space of the computer screen, which one might posit as one version of the intersection, will not do, or is at most a partial enactment of the intersection (Sassen, 2005:562)."

Rather this intersection needs to be explored through an architectural type, where a seamless dialogue between actual and virtual space responds to the everyday conditions produced by the contextual binary between globalising and developing spaces.

14 *Individuation:* the act or process of making somebody or something separate and distinct from others.(Encarta English Dictionary)

15 *Communalism:* the principles and practices of communal living or ownership, or support for a communal society. (Encarta English Dictionary)

In the context of the *Information Age*, already established notions and assumptions about the development, planning, and management of space are coming under question. Rapid transformations, associated with a shift in human organisation, have rendered time as seemingly instantaneous and space as a domain that belongs to both actual and virtual realms, thereby reducing accepted notions about the nature of time, space, distance, and the everyday practises of urban life to a fleeting moment.

(Castells, 1989 & 2004)

Electronic Spaces
Urban Networks:

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This transformation can be interpreted in relation to the urban sphere, where Graeme and Marvin (1996:02) speak openly about the fast shifting boundaries currently separating what is public and private. In their opinion, "[u]rban life seems more volatile and speeded up, more uncertain, more fragmented and more bewildering than at any time since the end of the last century (Graham & Marvin, 1996:02)." Much of today's urban change is central to remarkable advances in technology where the application of information and telecommunication infrastructures and services transcend spatial barriers instantaneously (Graham & Marvin, 1996:02-05). This micro-technology revolution, which connects widely separated points and places together in 'real time', is a part of material culture, central to today's social structure and its inherent change (Castells, 2004:03-42).

Technological innovation, in combination with the changing dimensions of human organisation not only allow us to re-imagine, re-produce, and select our urban environment but also regulate these spaces in relation to a globalising world.

I shall now move to consider Castells' theoretical blueprint on *Informationalism, networks, and the network society*. In his theory of the *Network Society*, he explains that "[a] network society is a society whose social structure is made of networks powered by microelectronics-base information and communication technologies (Castells, 2004:03)." Expanding on the notions of social structure, he means "[...] the organizational arrangements of humans in relations of production, consumption, reproduction, experience, and power expressed in meaningful communication code by culture (Castells, 2004:03)." Networks have the ability to instantaneously transmit new information flows, characterised by their flexibility, adaptability, and self-reconfiguring nature (Castells, 2004:05-06). This instantaneity combined with their ability to connect widely separated points and places has ultimately produced increasingly complex webs and nodes of interconnected human activity (Graham & Marvin, 1996:02-05). William Mitchell describes the historical evolution of information and communication technologies as a process of expansion and augmentation of the human body and mind (Castells, 2004:06). This process, which is occurring in today's network society, is characterised by an outburst of digital hand-held devices, across a global stage, which enables universal connectivity, instantaneous interaction, and wide spread computing and network capacity (Castells, 2004:06). These advancing digital technologies, which constitute the material basis of today's network society, have quickly superseded industrialism as the dominant technological paradigm (Castells, 2004:08-13). *Informationalism* , according to Castells (2004:08-13), is the new paradigm, of which information and communication form the quintessential components of human activity and organisation. Castells (2004:13) maintains that it was on the foundations of informationalism that the network society emerged as the new form of social organisation and human activity, where in his words:

Every new social structure has its own genesis, dependant on spatiotemporal context. Naturally, there is a relationship between the historical process of production of a given social structure and its characteristics (Castells, 2004:14).

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Digital networks are not confined to any boundaries in their capacity to re-configure and reproduce themselves within their domain, and their ubiquitous presence within present day material culture means, that at their core, they are global. Consequently, today's society whose organisation is structured around a system of digital networks can also be classified as global (Castells, 2004:22-43). Networks and digital technologies have the capacity to continuously self-expand their processing power due to their recurring, communicative ability. The flexibility of networks and new information and communication technologies allow for the distribution of processing power across a variety of contexts and applications, such as business enterprises, broadcasting media, and the public and private realms (Castells, 2004:08-10). Furthermore, Castells advances his hypothesis by stating that:

[T]here is something else, not only quantitative but qualitative: the capacity of these technologies to self-expand their processing power because of their recurrent, communicative ability. This is because of the continuous feedback effect on technological innovation produced by the knowledge generated with the help of these technologies. In other words, these technologies hold emergent properties; that is the ability to derive new, unforeseen processes of innovation by their endless re-configuration (Castells, 2004:10).

The self-expanding communicative ability, boundless re-configurations, and emergent properties of networks and technology is critical to my thinking; as the idea of advancing technologies in relation to social reorganisation and re-imagining human activity opens a door to explore new spatial possibilities within the urban realm.

Today's dominant social structure, through its inherent functioning, means that people everywhere are affected by the myriad of processes taking place across a globally intertwined urban fabric. This is because a set of core activities, which shape and control human life in every corner of the planet, are organised in globally intertwined networks (Castells, 2004:22-23). However, this does not imply that these processes are evenly distributed, as "[..] the network society diffuses selectively throughout the planet, working on the pre-existing sites, organizations, and institutions that still make up most of the material environment of people's lives (Castells, 2004:22)." Instantaneous informational flows, characterised by the *Network Society*, are exploding into our built environment, and it is through this action that networks now underpin and intersect all elements of urban life (Graham & Marvin, 1996:02-04). For Graeme and Marvin (1996:03), "[t]he corridors between cities, whether they be made up of land, ocean or space, are in turn developing to house giant lattices of advanced telecommunication links. These connect urban hubs together into global electronic grids".

As Informationalism continues to penetrate into ever widening contexts of the human environment; it is the matter of flexibility, more so than the density of its networking ability that will transcend static boundaries (Graham & Marvin, 1996:02-06). These are the traditional boundaries that separate public from private, local from global, physical from virtual. By creating continuous fields of presence, that may extend beyond private space, throughout buildings, outside walls and into the open realm where it can flow to far ends of the world, these associated phenomena will affect the nature, locations and spatial distributions of the network society (Castells, 2004:03-13). These spatial transformations are precisely captured by Castells' *Spaces of Flows and Spaces of Place*.

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The world that we know, both material and imaginary, is constructed by unseen rules imparted through the structures of human organisation. These structures, arranged around an interconnected web of human activity, are continuously altered by the convergence of historically determined relationships of knowledge, production, experience, and power.

(Castells, 1989:07-32)

Electronic Spaces
Globalisation:

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The knowledge we attain through the nature of our habits and normative social behaviour, our perceptions of day-to-day reality embedded in our subconscious, our networks of communication, and advancing technologies and processes of production are all constrained and shaped by discursive structures. The objects that exist, the dreams we imagine, and the events that occur, within the tangible and now virtual realms, are held and interpreted with discursive structures (Mills, 1997:53-66). We perceive and conceive of material objects such as art, architecture, and the fabric of our cities; we imagine processes of communication, finance, social behaviour; and we conjure up methods of travel through discourse and the guiding structures it imposes on society. The evolution of global discourse has led to wide spread changes in technological, spatial, social, economic, cultural, and political flows – these dimensions taking effect in present day are referred to as globalisation.

The globalisation of economics, social practices, transportation, and communication is making the world appear a smaller space. However, this shrinkage is an unevenly distributed process, which seeks to include and exclude players from the globalised sphere like weak members omitted from in a winning combination. The world economy remains divided between the wealthier, more developed countries (core), and the poorer developing countries (peripheral) (The Times Comprehensive Atlas of the World, 2007:48-49). Economic prosperity from one nation can often be at the expense of another; increasingly large and dominant transnational corporations are driving, and in turn, being driven by the process of globalisation. Some industrialised countries, mainly developing nations, are expanding at a rapid rate in an attempt to bridge the divide between periphery and core, while others, less fortunate, are left grasping at straws, a situation few would want to be a part of (The Times Comprehensive Atlas of the World, 2007:48-49).

Globalisation is a dimension of cross-national economic integration that runs deeper than the international exchange of goods and services and beyond direct foreign investment to include all phases of economic activity. Products and services may now be designed, manufactured, packaged, delivered, and sold in different parts of the globe (The Times Comprehensive Atlas of the World, 2007:48-49). Advancing technologies such as cars, aeroplanes, the internet, email, and mobile phones are becoming wide spread, thereby making the world a tighter knit web of interrelated activities. In tandem, the global financial market and communication flows have expanded beyond what the average person can comprehend. Through more integrated systems, heightened levels of speculation, the hyper-mobility of capital, and securitisation whereby almost everything – material or intellectual – has been transformed into a financial asset that can be bought, sold, exchanged, and speculated upon (The Times Comprehensive Atlas of the World, 2007:48-49).

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The increasing flexibility, density, and spread of global *virtualisation*[16] do not mean that existing urban environments, which hold so many of our distinctly human characteristics, will fall away. Instead, as we continue through the *Information Age*, digital networks will contribute to new kinds of interconnections between the local and the global, and the coincidences in space and time in relation to the network society will usher in new forms of spatial development and interaction.

(Castells, 2004, Sassen, 2005: 153-155)

Electronic Spaces
Re-configuring Architecture In Space:

16 *Virtualisation:* to hide or abstract the physical characteristics of a computing platform. Virtualisation is performed on a physical system to create a simulated environment. (http://en.wikipedia.org/wiki/Virtualization

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New opportunities will be opened for citizens to assert their own social, economic, and cultural perspectives towards transforming an existing local context. Therefore, architecture, as a spatial device in the *Information Age*, has a specific role to play; not only to bridge the gaps created by an urban world riddled by uneven patterns of globalisation, but also restore symbolic meaning to society (Castells, 2005:581). For Castells (2005:581), "[a]rchitecture holds the possibility of rescuing particular urban regions by marking places in the space of flows." He further maintains that:
"Recent trends in architecture signal its transformation from an intervention on the space of places to an intervention on the space of flows, the dominant space of the Information Age […] (Castells, 2005:581)*."*

I do not maintain that architecture – alone – offers the possibility of changing the meaning of, or transforming the core of an urban region. However, I do believe architectural moments, which act on spaces dedicated to public interaction, can provide meaning to society and a particular urban fabric. If conceived in relation to a specific urban environment, particularly one that is home to a marginalised people living in a context torn by uneven patterns of globalisation, then architecture holds many exciting possibilities. It is against the backdrop of these urban themes that we can begin to comprehend the effects of the *Information Age* on our built environment.

Fundamental changes also to space and time, as have altered the pattern one to conceive of new design now hold possi- ences and functional pro- rethink the application of think of architecture as digital space, where the the local overlap, bind, to a different kind of pub- of a new urban imagina- not only to human organisation but a result of advancing technologies, of human thinking, thereby allowing urban imaginaries. Architecture and bilities to explore new spatial experi- cesses, thus opening opportunities to architecture in the Information Age; an intersection between actual and contextual strands of the global and and permeate each other to give form lic space constructed in the context tion.

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GLOBAL ORE

The Worlds' Metal Market:

Visual and analytical essay

Thesis Document - Chapter 5 (electronic spaces, global ore) - REV 2.indd 16-17 2012/12/07 08:54:25 AM

When measured by its share of gross domestic product (GDP) worldwide, the metal industry is a significant contributor to the global economy.
The industry's sub-braches, which include primary metal production, non-electrical machinery, electrical machinery and transport equipment, employ over 70 million workers worldwide, who, excluding the informal industry sector, account for nearly half of all goods produced in the manufacturing sector and more than half the value of merchandise exported worldwide (International Metalworkers Federation). As a result, the metal industry is not only a powerful driving force of the world economic market but it also largely influenced by the extent of the overall economic climate (International Metalworkers Federation).

Following the stabilisation of the world's metals market between 2010 and 2011, after a steep decline due to the global financial crisis of 2008, the industry looks to rise to unprecedented levels (PRWeb, 2012). Prospects of the global metal market appear to be positive in the near future as factors not limited to increasing confidence among investors towards commodities market, rising consumption in developing world nations, and abundant inventory levels are poised to fuel market growth (PRWeb, 2012). The continued increase in metal consumption in developing nations including China, Brazil, and India is expected to help the Global Metals Market reach a yearly figure of US$872 billion by the year 2015 (PRWeb, 2012).

Yet for all the positives that growth in the Global Metals Market promises, research has shown that if demand continues to increase at projected rates, many of the world's precious metal resources will be depleted within the next decade. As population numbers continue to swell and technologies advance, the demand for precious metals will increase exponentially (Bertram, Gordon, Gradel, 2006). It has been determined that even if fully extracted from the earth's crust and recycled using current programmes, our finite metal resources may not meet future demand (PHYS.ORG, 2006).



46 **CASH SLIP ITEMISING METALS SALVAGED FROM ELECTRONIC WASTE**
(source: information adapted from www.lme.com; www.metalprices.com; www.metalpages.com.)
(image source: derived from COLOURS Magazine, 2008.)

Thesis Document - Chapter 5 (electronic spaces, global ore) - REV 2.indd 18-19

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Bangladeshi workers lives in shipbreaking

EU safety rules for recycling yards could save hundreds from l but pose dangers for south Asian economies

John Vidal in Chittagong
The Observer, Saturday 5 May 2012 13:25 BST



Everything is recycled as workers in the ship breaking industry dismantle oil tankers by hand, under dangerous conditions. Photograph: Andrew Holbrooke/Corbis

When the rusty, old supertanker Lara 1 reached Bangladesh two weeks ago, the captain stoked up its engines for the last time and rammed it as far up the beach at Chittagong as possible. The 70-metre tall, 400-metre long iron colossus now squats in the mud in the Rising Steel ship breaking yard, waiting to be picked over by an army of young men risking their lives for little more than £1 a day.

The Lara 1 is one of the largest corpses in the world's biggest graveyard of ships. A half-dismembered bulk carrier lies on one side, the remains of a European car ferry on the other.

Beyond it, stretched along 12 miles of what just a decade ago was a pristine sandy beach, ore carriers, container ships, gas tankers, cruise liners and cargo ships of every size and description are being dismantled by hand in 140 similar yards. Every year more than 250 redundant ships, many from Britain and Europe, come here to be broken up.

It will take gangs of oxyacetylene cutters nearly six months to dismember the 42,000-tonne Lara 1. In the first week, say its owners, oils, toxic sludges and other waste will be pumped out, parts of the bow and some bulkheads will be removed and the recycling will start. The cable, the steel, the generators, funnels, propellers, lifeboats, companionways, sinks, toilets, even the lightbulbs and every nut and bolt of the Lara 1 will be sold on the Bangladesh market, to be turned into construction materials, girders, metal sheets and furniture. The sheet metal will be used for riverboats and coastal craft.

"Every bit of this ship will be recycled, reused and resold. Nothing will go to waste. This ship will help build Bangladesh. We dismantle 2.5m tonnes of steel a year from Chittagong, but we need four million tonnes to keep growing," says Hefazatur Rahman, chairman of the Mostafa group of industries, which paid $20m to buy the Lara 1 for scrap, and could make $10m profit if world steel prices rise in the next year. Or, he says, he could lose everything if they fall, as they did in 2008.

But now, in a move that India, Bangladesh and other developing countries with major shipbreaking industries say could wreck local economies, the EU has proposed laws stating that ships registered in Europe should be broken up only in licensed yards meeting strict new environmental guidelines. It estimates that up to 1.3m tonnes of toxic materials on board end-of-life vessels are sent each year to Chittagong and other shipbreaking yards in south Asia from the EU alone, with "incalculable" risks to workers.

Under the system, outlined last month in Brussels, European ships will have to remove toxic wastes before they are exported, and ship recycling yards will have to meet strict environmental and safety requirements. European ships will be recycled only in the best yards.

Few yards in Bangladesh or India, the world's two largest centres of shipbreaking, can expect to pass the proposed standards without massive investment. Figures are hard to verify but, say local Chittagong watchdogs, in the past 10 years hundreds of men working in the 70 breaking yards have died or been maimed or poisoned. Many are from the poorest communities in the country.

"On average, one worker dies in the yards a week and every day a worker is injured. It seems like nobody really cares. Workers are easily replaceable to the yard owners: if one is lost they know another 10 are waiting to replace him. The government collects the taxes and turns a blind eye," says Muhammed Shahin, an officer with local watchdog group Young Power in Social Action.

"Explosions of leftover gas and fumes in the tanks are the prime cause of accidents in the yards," he says. Other accidents are caused by falls – because the men are not given safety harnesses – or workers being crushed by falling beams or plates, or electrocuted.

Last week the Exxon Valdez, the ship responsible in 1989 for one of the largest oil spills in US history, was sold for scrap and is expected to be broken up on a beach in India or Bangladesh.

"It is outrageous that this ship, which has already created one environmental catastrophe, is being allowed to kill and pollute yet again," said Jim Puckett, executive director of the Basel Action Network, which works to prevent the globalisation of the toxic chemical crisis. "The ship's owner must be held accountable for simply selling this toxic time- bomb and then walking away."

According to the YPSA, most workers wear no protective gear and many work barefoot. "There is hardly any testing system for the use of cranes, lifting machinery or a motorised pulley. The yards re-use ropes and chains recovered from the broken ships without testing their strength. Fires, gas explosions, falling steel plates, exposure to poisons from bunker oil, lubricants paints and cargo slop have left thousands with respiratory diseases," says Shahin.

But the breakers insist that safety conditions have improved. "We have changed. It is much safer now. It's quite different," says Nazmul Islam, secretary of the Bangladesh Ship Breaker Association. "We are installing modern equipment and are guided by international law. We have built a 150-bed hospital for workers. The supreme court in Bangladesh has given us new directives, and we have incinerators and separators. Compared with just three years ago, it's much better. We now have storage facilities for asbestos."

But the EU environment commissioner, Janez Potocnik, is not convinced. "Although the ship recycling sector has improved i practices, many facilities continue to operate under conditions that are dangerous and damaging. This proposal aims to ensure that our old ships are recycled in a way that respects the health of workers as well as the environment. It is a clear signal to invest urgently in upgrading recycling facilities," he says.

What is certain is that shipbreaking has become essential to Bangladesh's breakneck industrial growth. Apart from providi nearly half the steel the country of 160 million people uses a year, the government collects £70m in revenue from an indus try that employs more than 20,000 people directly and as ma indirectly.

LME, Commodities, Top Directors' Dealings, Petrol price

London Metals Exchange (LME)

Prices Quoted in US$ per metric ton on 24/8/2012

	CASH BID/ASK	3 MNTH BID/ASK	SETTLEMENT
Aluminium HG	1870.5/1871.5	1916.0/1919.5	1890.5
Aluminium Alloy	1755.0/1760.0	1800.0/1800.8	1784.3
Copper	7600.0/7600.5	7657.0/7663.0	7627.8
Lead	1941.0/1942.0	1969.0/1972.3	1963.3
Nickel	16425.0/16430.0	16489.0/16492.0	6422.0
Tin	20315.0/20320.0	20751.0/20799.0	0908.0
Zinc	1836.0/1836.5	1874.0/1875.0	1858.8

SOURCE: BLOOMBERG

Commodities

	LAST ($)	CHANGE
Gold (London pm, Friday)	1667.00	unch
Platinum (London pm, Friday)	1537.00	unch
Palladium (London pm, Friday)	643.00	unch
Silver (London pm, Friday)	30.37	unch
Brent	112.52	– 1.07
US Sweet Crude	95.03	– 1.12

REUTERS

Top directors' dealings

NAME	COMPANY	TYPE OF DEAL	VALUE
G Hayward	Massmart	sale	R28 970 620
C Hallowes	Rockstage	purchase	R6 034 720
N Bruton	RGT Smart	sale	R2 000 000
P de Vantier	RGT Smart	sale	R2 000 000
M Oliver	Rockstage	purchase	R1 673 860
A Calcun	RGT Smart	sale	R961 800

Petrol price

CENTRAL ENERGY FUND AT (011) 280-0300 Source: The Star, issue	PETROL 95 UNLEADED	DIESEL(*) 0.05%	DIESEL(*) 0.005%	PARAFFIN
Gauteng Pump Price as from 01/08/2012	1 104.000	1 025.590	1 031.990	761.028
Coastal Pump Price as from 01/08/2012	1 069.000	1 000.890	1 007.290	719.128
Single Maximum National Retail Price (applicable)				991.000
BASIC FUEL PRICE - 24/08/2012 (SA c/l)	720.187	749.497	756.197	739.627
PRESS RELEASE CONTRIBUTIONS TO BFP	608.950	647.630	654.030	636.128
UNIT OVER/(UNDER) RECOVERY (SA c/l) - 24/08/2012	(111.237)	(101.867)	(102.167)	(103.499)
AVERAGE BASIC FUEL PRICE 27/07/2012 - 24/08/2012	691.519	706.571	712.902	699.414
AVERAGE UNIT OVER/(UNDER) RECOVERY 27/07/12 - 24/08/12 (86.337)		(61.655)	(61.730)	(65.479)

Next price adjustment on 05/09/2012 to be based on the average unit over/(under) recovery for 27/07/2012 - 30/08/2012

SOURCE : DME

* The wholesale price of Diesel but not the retail price is regulated.

World markets

	LAST	% CHANGE	YTD		LAST	% CHANGE	YTD
Dow Jones (7pm)	13157.05	– 0.01	+ 7.69	Nikkei	9085.39	+ 0.16	+ 7.45
Nasdaq (7pm)	3077.90	+ 0.26	+ 18.15	CAC 40	3462.83	+ 0.86	+ 9.59
S&P 500 (7pm)	1414.76	+ 0.22	+ 12.46	Hang Seng	19798.67	– 0.41	+ 7.40
FTSE 100	5760	unch	unch	S&P 200	4343.70	– 0.12	+ 7.08
DAX	7[illegible]	[illegible]	[illegible]	Kospi 200	25162.80	– 0.44	+ 2.49

SOURCE: BLOOMBERG

Afghan factory melts Soviet-era tanks for steel

Reuters
Herat, Afghanistan

IN AN updated version of swords being beaten into ploughshares, caterpillar tracks belonging to abandoned Soviet-era tanks are being melted into steel bars and used in west Afghanistan's construction industry.

The tanks from Moscow's decade-long war in Afghanistan wait under baking sunshine to be smelted at one of its few steel mills, a stark reminder of the humiliating end met by the Soviet forces more than 20 years ago.

Soviet-produced tracks make up about 2 percent of steel production at the Wardak Atawla factory in Herat in western Afghanistan, about 100km east of the border with Iran.

"The Russians came here, ruined our country, and now their tanks sit in a scrap dump," mill manager Azim Khan says as he strokes away sand with his sandal-clad feet from the tracks, which are stamped with Cyrillic letters.

"They are made of really good iron. It's funny to see them sitting here now," he adds.

The tracks were taken off the tanks scattered around the Herat landscape by locals looking for cash.

They belong to forces from the former Soviet Union, who pulled out of Afghanistan in 1989 after defeat by mujahideen fighters, handing security over to a shaky government that was quickly beset by heavy fighting and civil war.

Comparisons are being frequently drawn to the current Nato-led war, and fears are surfacing among Afghans and analysts of a repeat.

When asked if he believes American armoured vehicles will end up in his scrapyard, Khan replies with a smirk: "Unfortunately we do not love peace in Afghanistan."

The mill went on stream two months ago, producing rebar from scrap to feed Herat's construction industry, which is enjoying a boom from better security and trade with neighbouring Iran.

Beating swords to ploughshares refers to turning weapons of war to peaceful purposes.

(image source: after The Observer, May 5 2012; The Star, July 3 2012)

Li Lithium
Na Sodium
K Potassium
Rb Rubidium
Cs Caesium
Fr Francium

Alkali Metals

Al Aluminium
Ga Gallium
In Indium
Sn Tin
Tl Thallium
Pb Lead
Bi Bismuth

Transition Metals

Sc Scandium
Ti Titanium
V Vanadium
Cr Chromium
Mn Manganese
Fe Iron
Co Cobalt
Ni Nickel
Cu Copper
Zn Zinc
Y Yttrium
Zr Zirconium
Nb Niobium
Mo Molybdenum
Tc Technetium
Ru Ruthenium
Rh Rhodium
Pd Palladium
Ag Silver
Cd Cadmium
La Lanthium
Hf Hafnium
Ta Tantalum
W Tungsten
Re Rhenium
Os Osmium
Ir Iridium
Pt Platinum
Au Gold
Hg Mercury

Post Transition Metals

Metalloids

B Boron
Si Silicon
Ge Germanium
As Arsenic
Sb Antimony
Te Tellurium
Po Polonium

Rare Earth Metals

La Lanthanum
Ce Cerium
Pr Praseodymium
Nd Neodymium
Sm Samarium
Eu Eurpoium
Gd Gadolinium
Tb Terbium
Dy Dysprosium
Er Erbium
U Uranium
Y Yttrium

Alkaline Earth Metals

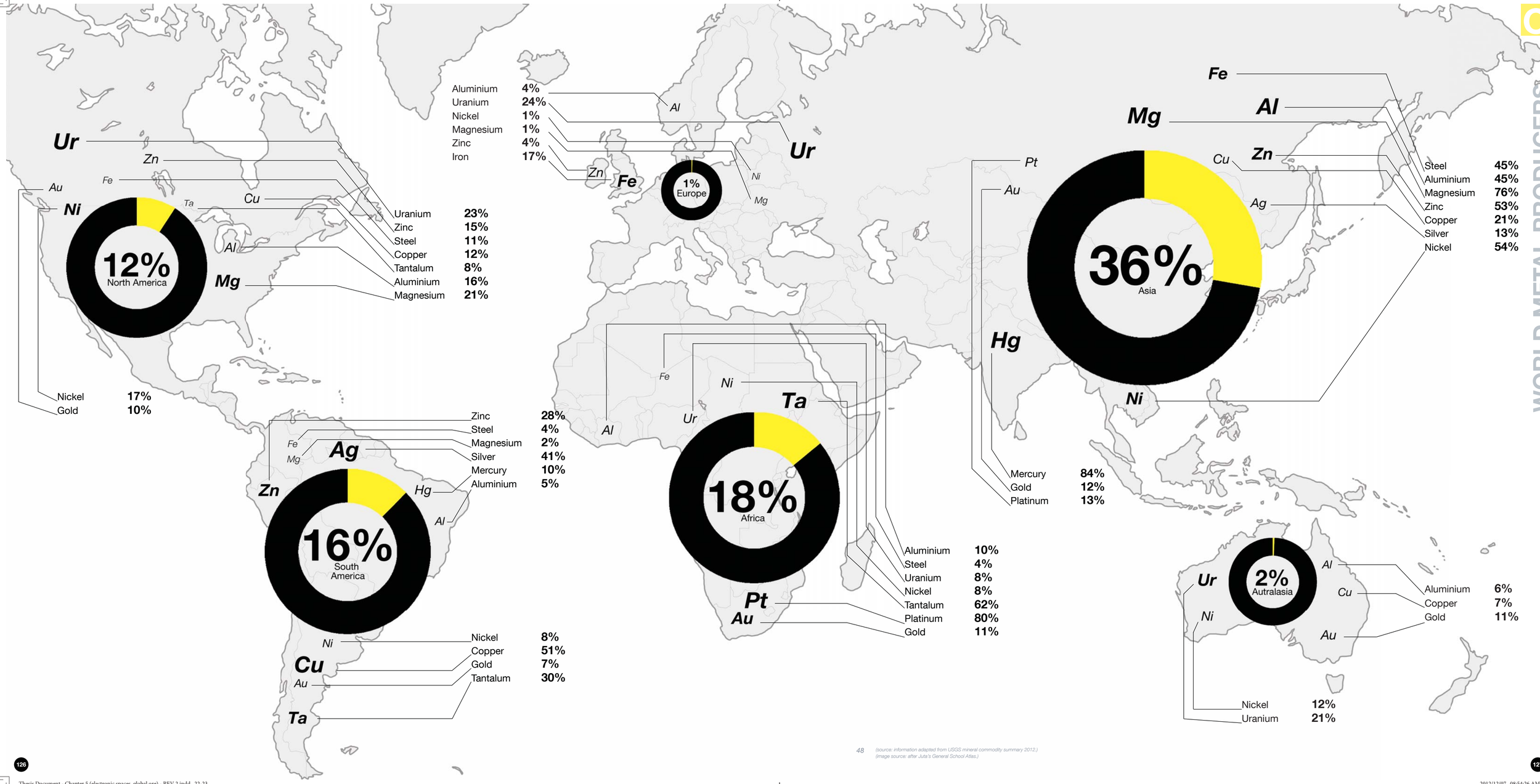
Be Beryllium
Mg Magnesium
Ca Calcium
Sr Strontium
Ba Barium
Ra Radium

Al Sb Ba Be Co
Cu Cr Ga Au Hf
In Pb Li Mg Mn
Hg Ni Pd Pt Ru
Ag Sr Ta Sn
Ti W Y Zn Zr

Metals In Electronic Waste

La Ce Pr Nd

(source: information adapted from Home of The Periodic Table, available at http://www.webelements.com/ [accessed 24 April 2012]; Periodic Table of Elements, available at: http://www.elementsdatabase.com/; http://www.metalprices.com/)



48 (source: information adapted from USGS mineral commodity summary 2012.)
(image source: after Juta's General School Atlas.)

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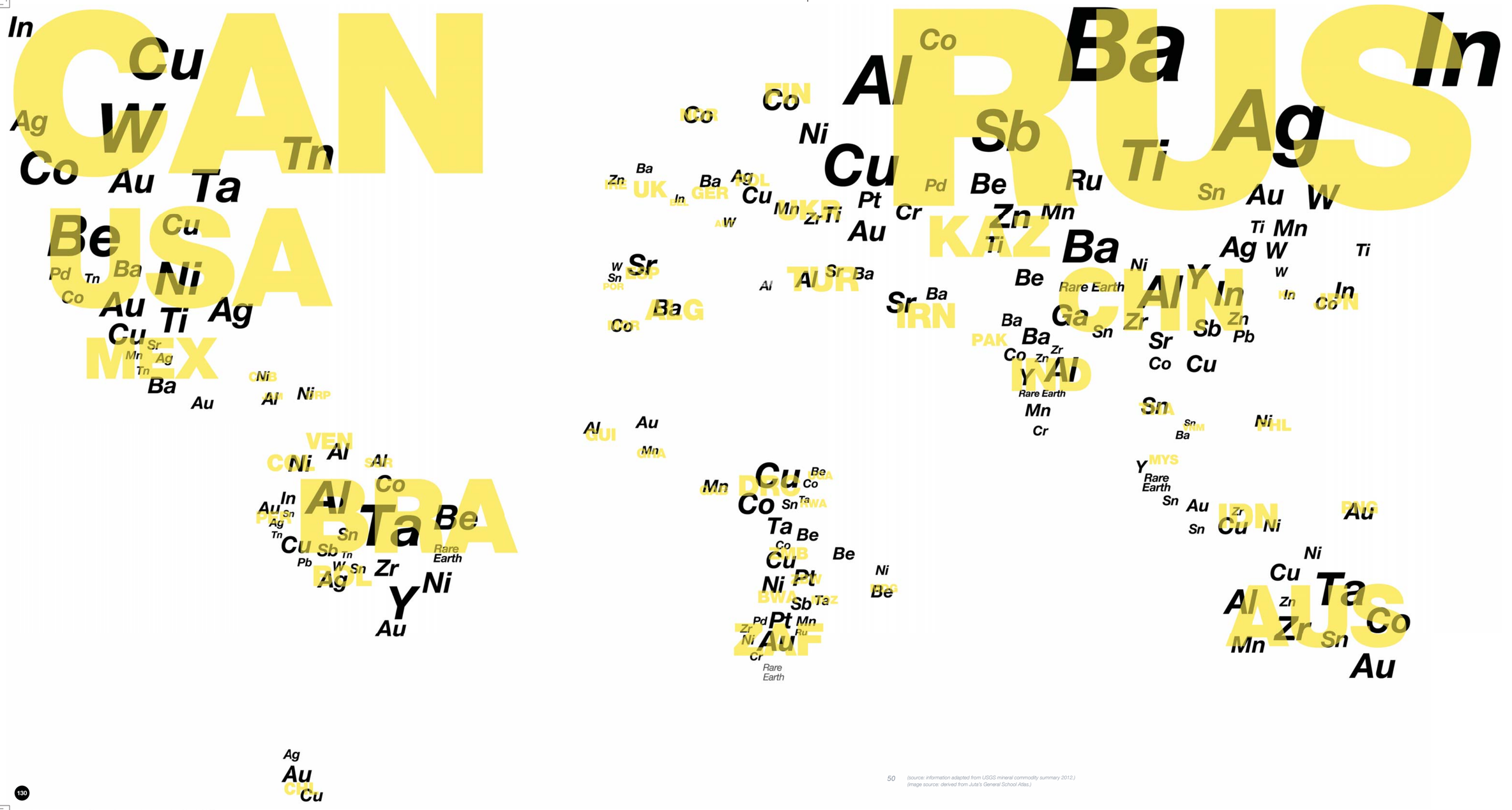
RARE EARTH METAL DISTRIBUTION

49 (source: information adapted from USGS mineral commodity summary 2012.)
(image source: after Juta's General School Atlas.)

Thesis Document - Chapter 5 (electronic spaces, global ore) - REV 2.indd 24-25

2012/12/07 08:54:29 AM

RARE EARTH METAL DISTRIBUTION

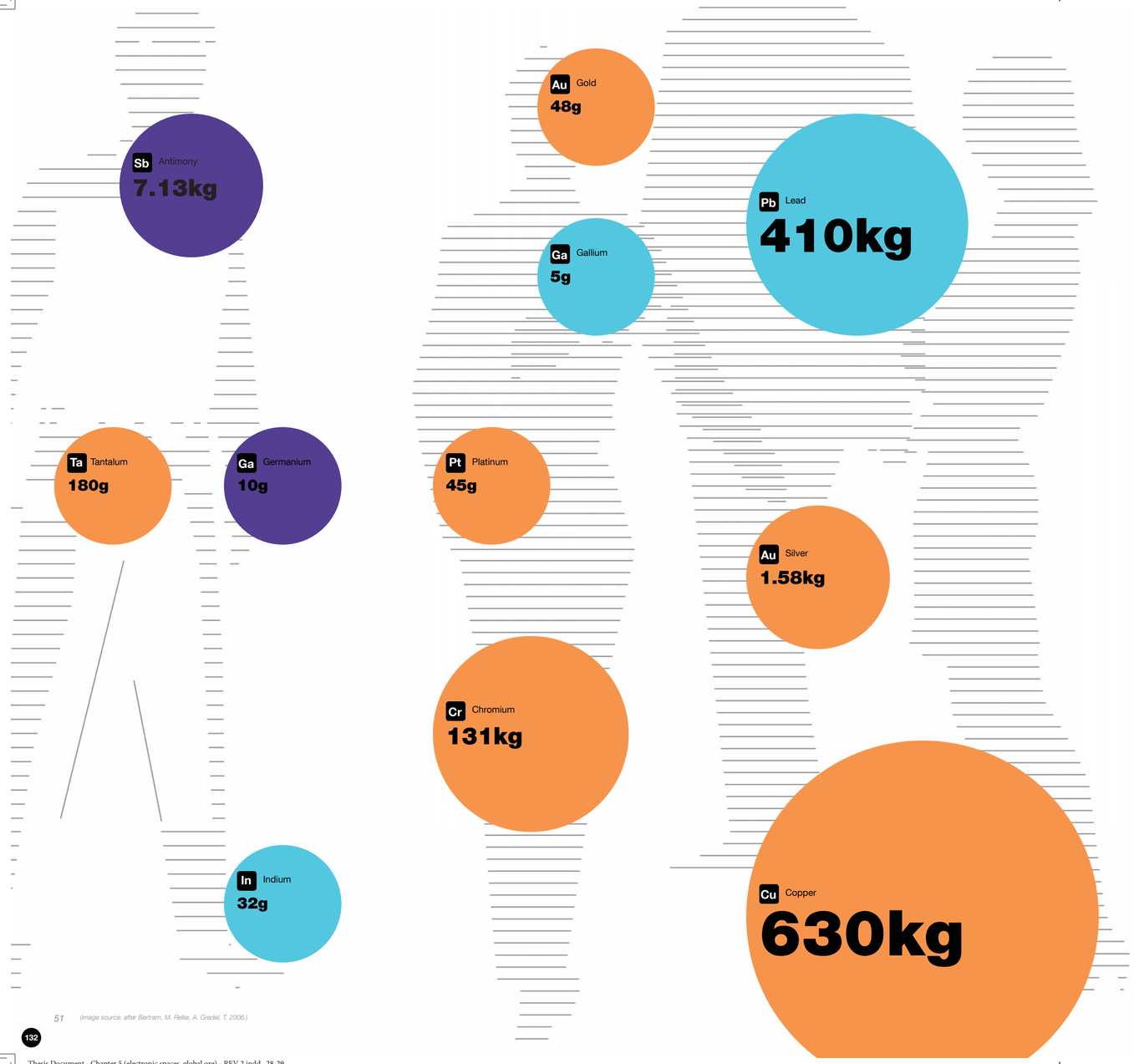


50 (source: information adapted from USGS mineral commodity summary 2012.)
(image source: derived from Juta's General School Atlas.)

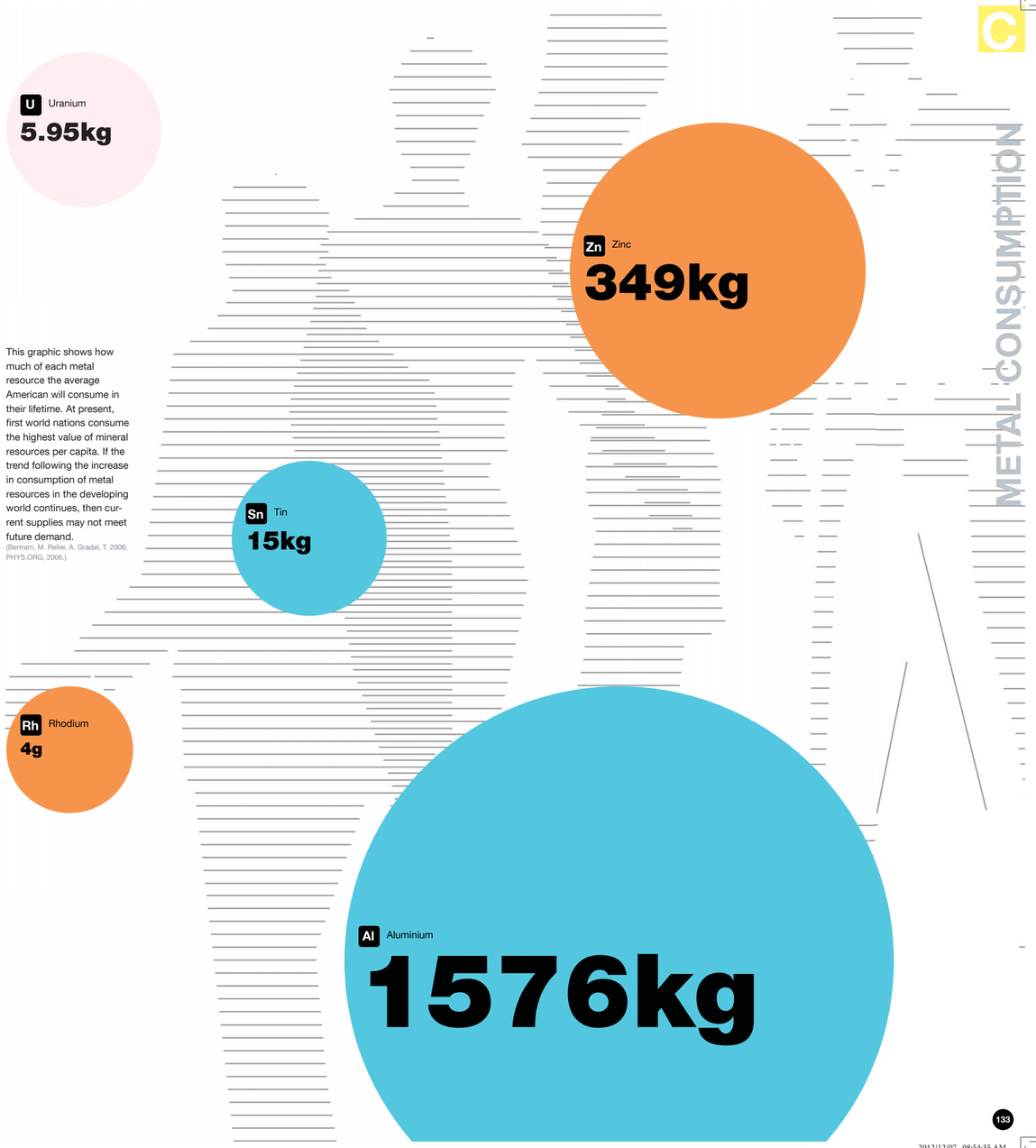
Thesis Document - Chapter 5 (electronic spaces, global ore) - REV 2.indd 26-27

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METAL CONSUMPTION

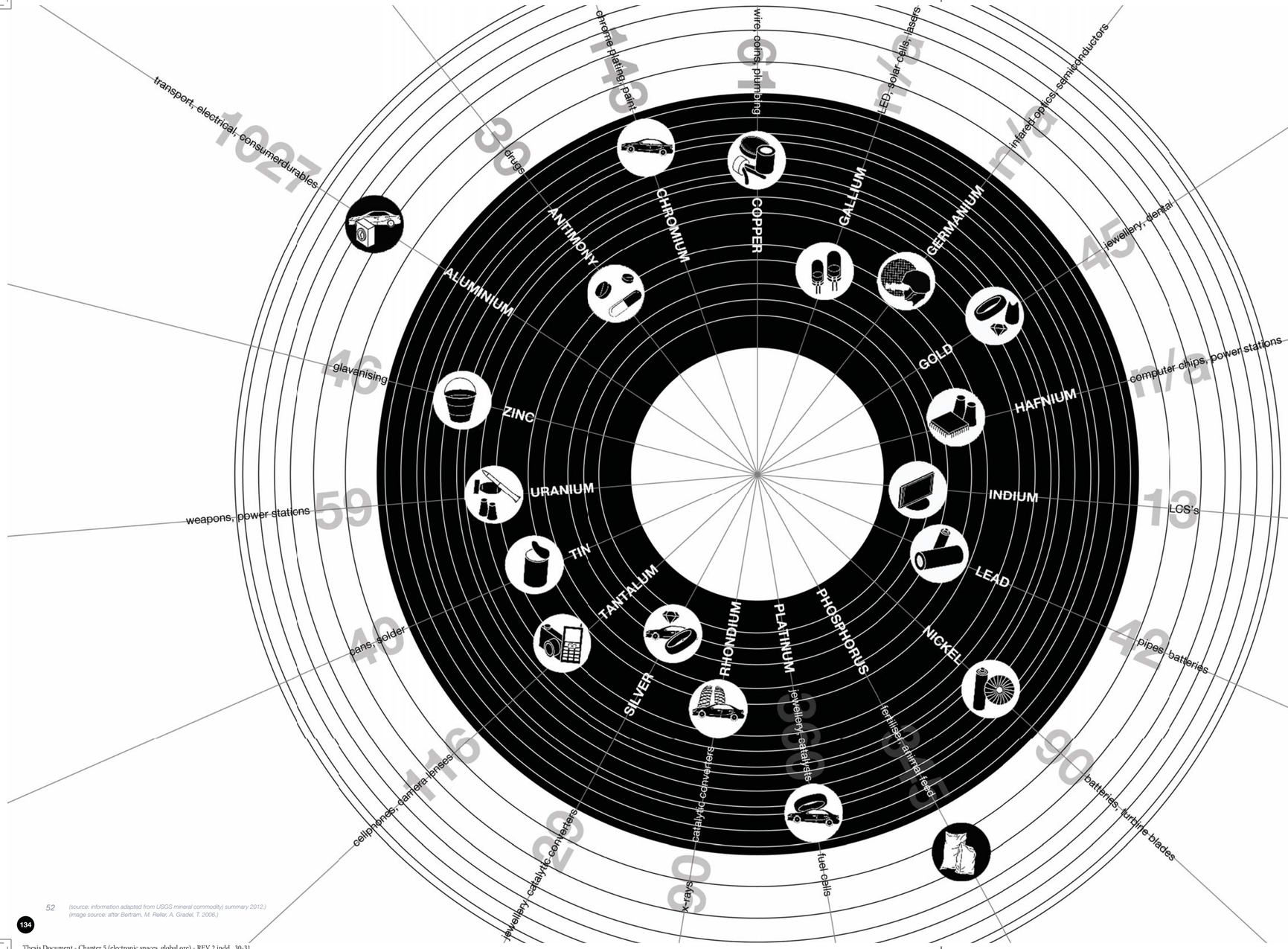


51 (image source: after Bertram, M. Reller, A. Gradel, T. 2006.)

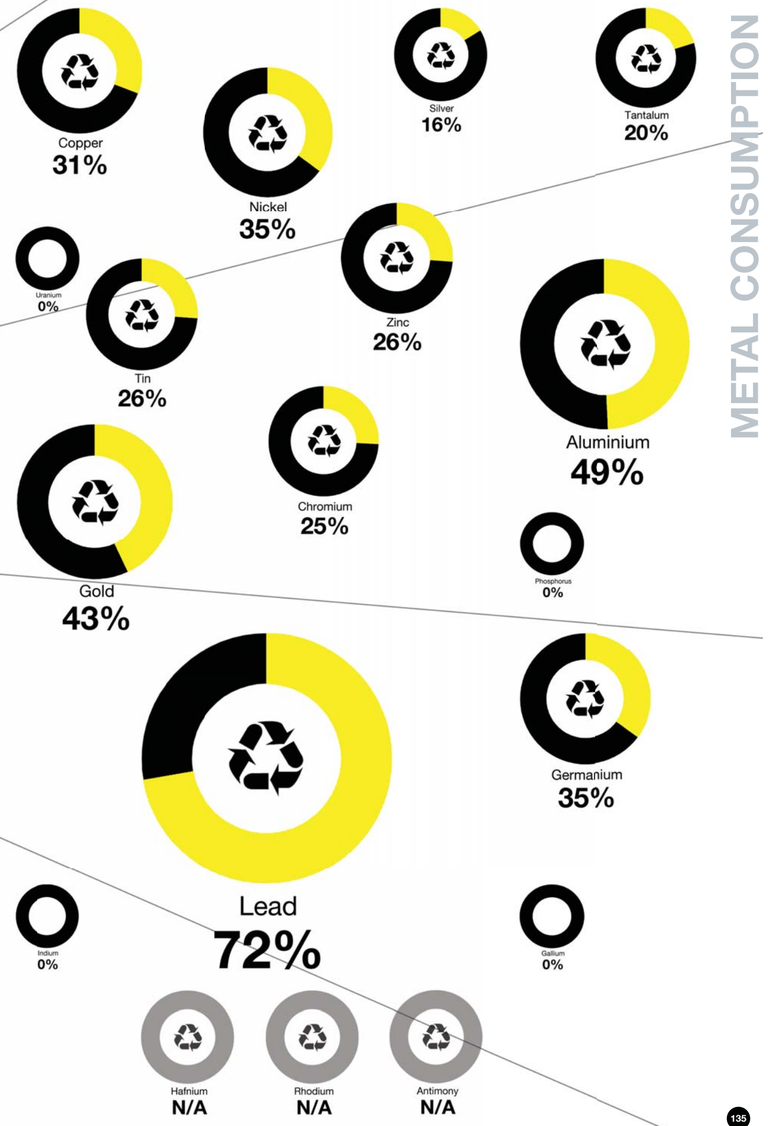


This graphic shows how much of each metal resource the average American will consume in their lifetime. At present, first world nations consume the highest value of mineral resources per capita. If the trend following the increase in consumption of metal resources in the developing world continues, then current supplies may not meet future demand.
(Bertram, M. Reller, A. Gradel, T. 2006; PHYS.ORG, 2006.)

Thesis Document - Chapter 5 (electronic spaces, global ore) - REV 2.indd 28-29
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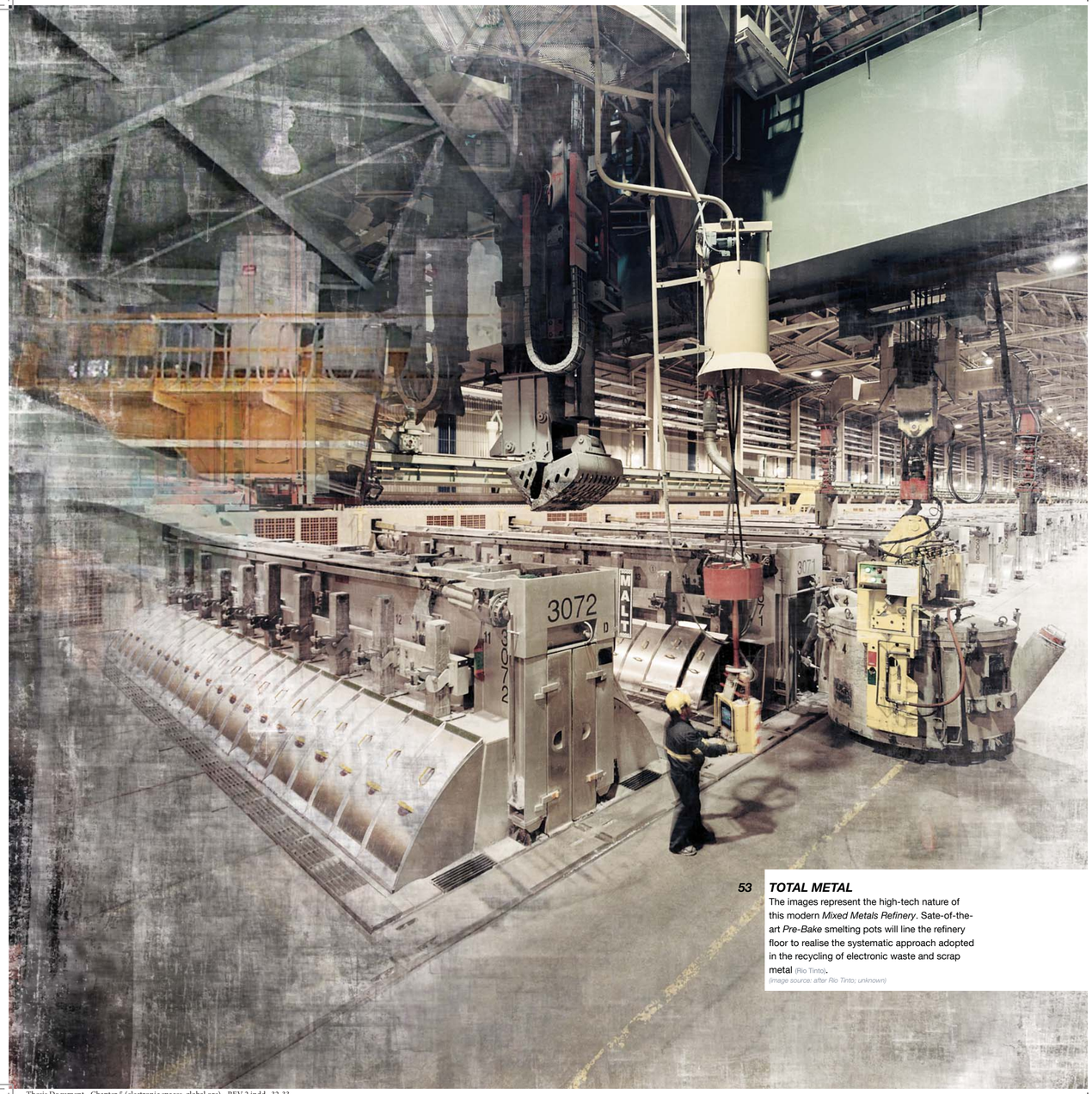


PROPORTION OF METAL CONSUMPTION WHICH IS RECYCLED



METAL CONSUMPTION

52 (source: information adapted from USGS mineral commodity) summary 2012.)
(image source: after Bertram, M. Reller, A. Gradel, T. 2006.)



53 ***TOTAL METAL***
The images represent the high-tech nature of this modern *Mixed Metals Refinery*. Sate-of-the-art *Pre-Bake* smelting pots will line the refinery floor to realise the systematic approach adopted in the recycling of electronic waste and scrap metal (Rio Tinto).
(image source: after Rio Tinto; unknown)

A The transformation of raw electronic waste into refined metal commodities may begin in the breakdown spaces of *The Trading Pit*, and from there progress to the acid baths and heating plates of the *Electronic Waste Processing Laboratories*, but the final stage of the process takes place in the baking pots of the *Mixed Metals Refinery*.

B Spanning the length of the potroom floor, the industrial core of the *OPTF*, lies an array of environmentally superior machinery used to bake salvaged metals like no other refinery that has come before. Armed with fire retarding suits, protective masks, and an overhead crane, a team of workers move meticulously between the rows of highly productive reduction cells. The metal from the *Processing Laboratory* – mixed clumps of copper, gold, silver, aluminium, platinum, and indium to name but a few – is quickly smelted and separated into a purified state ready for casting.

Thesis Document - Chapter 5 (electronic spaces, global ore) - REV 2.indd 32-33
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C This day lit technological workplace is in strong contrast to the rudimentary working landscape layered thick with acid fumes of burning electronic waste and scrap metal. The darker side of recycling will be transformed into a culture of industrious reuse and inspired repurposing – a reality that moves forward from the hellish pits of fire, billowing smoke, molten discharge, and the beating sun, towards a process of sustainable recovery. The very process of transforming unwanted detritus from the first world into desirable commodities, to be sold on the global economic market, completes the enquiry of exchange between ***the local*** and ***the global***.



C MIXED METALS REFINERY

54 ***GONE WITH THE HAZE***
The modern Mixed Metals Refinery will reduce the dangerous working conditions associated with rudimentary pit burning.
(image source: after Rio Tinto, unknown)

DEVEL-
OPING
PLACES

The Physical
Global Urbanism and African Urbanity
Africa's Network Society, People As Infrastructure
Re-imagining Architecture In Place

Written essay

Now that we have established an interpretation of the *Information Age* – its logic, application, and reach – a further exploration and observation into the binary between ***the local*** and ***the global*** can commence. In considering how themes of the *Information Age* begin to affect the developing world context I intend to open thinking towards the role of architecture not as material, structural, and physical entities, but rather as a spatial juncture interfacing the collision between global phenomena and everyday local practices. In a realm torn between what is locally embedded and globally connected; the realisation of an *urban imaginary*, set within a developing context, means immersing oneself in the orders and disorders of the contemporary African City. Thus the energies of everyday urban life, in combination with the notion of people as a collective infrastructure amid a series of interwoven networks, can be captured within the medium of an architectural exploration seeking to interface and alleviate the collision between local and global phenomena.

Thesis Document - Chapter 6 (developing places, electronic cadavers) - REV 2.indd 2-3
2012/12/07 08:55:41 AM

In developing the dialogue between ***the local*** and ***the global***, I intend to associate the connection between African urbanities and the larger urban world with previously established notions on the *Information Age*. We shall now move to consider the work of AbdouMaliq Simone, whose thinking and literature illustrate the complex and constantly shifting dynamics of contemporary African city making and survival. I wish to reflect on aspects of his work that not only capture the myriad ways citizens negotiate unique spatial practices, economic processes, and social relations that entangle place, identity and histories in urban sites, but also shed light on the rich complexity, ambivalence, and variety of African urban experiences (Simone, 2005).

For Simone, African urbanism is constantly being reworked by the movements and activities of everyday life that give way to unique urban formations and experiences. This is further shaped through the geographically uneven dynamics of globalisation and the technological advances of the *Information Age* – the articulation of which interacts with locally specific histories, social practices, economic contingencies, and spatial configurations (Simone, 2005).

The city is the conjunction of seemingly endless possibilities of remaking. […]. They are the products of specific spatial practices and complex interactions of variously located actors that reflect manoeuvres on the part of the city residents to continuously re-situate themselves in broader fields of action (Simone, 2004:09).

Simone emphasises the diversity of African urbanism and space making, captured through fluid and rapidly changing institutional structures, informal agreements, and the ability for citizens to find innovative ways of interweaving various sectors and actors in relation to wider fields of activity. I believe that when considering these attributes of African urbanism in relation to the *Information Age* and global urbanism the margins of one's urban imagination begin to shift.

The continuous reformation and fluid dynamics of African urbanism, which have become ubiquitous across its contemporary built environment, have made it an increasingly complex location in which to anticipate a future – a future which could be seen as a layered composition assembled across a series of networks and locales (Simone, 2008:99). With this in mind, one possible imaginary could see urban Africa progressively intersecting with a growing number of cities external to the region and with more diverse complexes of urban development, financial and labour markets and socio-spatial expression. For Simone (2008:99), "[t]his intersection is, of course, a means of extending urban Africa across new geographies, as it is an instrument that also informs, complicates, an contaminates conventional understandings of urban processes everywhere."

It is at this point where the extension of a developing African context across new geographies can be viewed in a somewhat different manner; where geographies could be understood as both physical and virtual domains, and where the extension across these domains could be realised through a spatial juncture which weaves together a series of unique social, economic, and spatial conditions.

Thesis Document - Chapter 6 (developing places, electronic cadavers) - REV 2.indd 4-5

It is estimated that in the year 1900 about 95 percent of Africa's inhabitants made a living from the land, meaning that an overwhelming majority lived in rural settings. In the early 1950's around 15 percent of Africa's population lived in cities, by the turn of the millennium that number had swelled to over 37 percent, and today that number is expected to exceed 45 percent (Simone, 2002:17; UN, 2002). Within this setting, some emphasise that Africa is becoming progressively urbanised, but to say that the rate at which urbanisation is taking place is accelerating is a gross an understatement; with some major cities, such as Lagos and Kinshasa, experiencing a sevenfold population explosion (Simone, 2002:17).

Developing Places
Global Urbanism and African Urbanity:

2012/12/07 08:55:41 AM

For Simone (2002:16), the dual acting processes of rapid urbanisation and industrialisation in the developing African context, which act primarily through their economies, have altered the fundamental principles of urban life. The intersection of urban Africa across new geographies, in combination with global technological development, an exploding urban context, and a sense of historical discontinuity compounded by a consequence of colonial legacies, may leave future urban dynamics in a precarious situation (Simone, 2002:17).

If the exploding urban context of the last fifty years has been predicated on the precarious – between chaos and sustainability – calling for the suture of dynamism and volatility, nowhere is the sense of precariousness more apparent than in the cities of the 'developing world'(Simone, 2002:16).

The notion of many African cities having precarious urban dynamics may be understood when they are viewed as an array of collision points between tradition and modernity, between African development and external pressures – as collisions between the local and the global (Simone, 2002:17). These incidents in time and space allow many African cities and their unique urban and spatial conditions to be re-imagined as "[…] new sites for the reformulation of old and new influences, and an opportunity for the symbolic production of postcolonial identities (Simone, 2002:17)."

What I am emphasising is that African urbanism is not merely a condition of multiple intersections, interwoven dynamics, and historical discontinuities, but rather that this syntax allows for a greater deal of experimentation in the conception and production of space within our built environment.

Urban environments in their present context are dynamic inventions, and as technologies advance and digital networks expand to connect and entwine the globe they circulate and readapt images of the modern city (Simone, 2002:18). These processes, by virtue of the myriad of new contacts and intensified movements through space, feed the urban imagination.

Within the contextual setting of global urbanism and African urbanity come the promises held by globalisation and the *Information Age*. However, these are rendered somewhat limited by a divide that splits developed and developing worlds along informational, social, economic, cultural, and infrastructural lines. The limits and realities placed on developing urban contexts mean that while the shape of the urban everywhere is changing, there are also severe geographies of control and inequality placed on marginalised societies (Simone, 1998:174; 2002:13-20). Although the processes of globalisation are unevenly distributed across cities, countries, and the world, they do however generate far reaching effects that are both positive and negative; where there is hardship there is also opportunity. This duality, which underpins a particular aspect of the African City, has become characteristic of city life, and can be seen through the movements, activities, and networks of citizens who tirelessly carve their pathways back and forth through the urban sphere seeking riches and making a living where passers-by see none (Simone, 1998:186). This notion surrounding the efforts of citizens to continuously seek unprecedented opportunities and extend their trajectories through urban space is precisely captured by Simone, who states that:

The resilience and inventiveness of urban dwellers have kept many cities functional. Everything is translated and reprocessed to fit new modalities of living. Urban life, far from being dystopic, is outlined by the apparent exuberance of the everyday, where forms of self-organizing, parallel and informal economies continue to produce new […] modes of transmitting their efficacy to the city polity at large (Simone, 2002:18).

It is precisely this interpretation of the inventiveness, exuberance, and reprocessing ability of the African urban dweller which brings me to imagining the urban as a place where multiple intensities, layers, and trajectories intersect – a location for the deliberate experimentation of extending and organising space, while engaging with possibilities of the unconventional and unrecorded.

Thesis Document - Chapter 6 (developing places, electronic cadavers) - REV 2.indd 6-7

Many of the spatial intensities and intersections associated with contemporary global urbanism can be coupled with the densification of information networks and rapidly advancing technological infrastructures. Although these associations are also central to contemporary African urbanism, it is more interesting to connect these intersections and intensities with an urban field interwoven by social infrastructures – a zone characterised by intense social and spatial interaction (Simone, 2002:1). Simone understands African society as being marked by a visible 'wholeness' acting as a point of reference – a means of establishing intersections in larger, more complex external systems (Simone, 1998:175). This brings me to conceive of African society as a 'network society' functioning seemingly independent from, yet, at the same time, in unison with the global *Network Society*.

Developing Places
Africa's Network Society, People As Infrastructure:

2012/12/07 08:55:41 AM

Africa's network society is an emergent form of social collaboration, which has an astute capacity to use thickening fields of social relations and intersections in order to manoeuvre through the city in general. The dynamic social support systems rooted in extended family connections, local reciprocity, and various configurations of mutual ties are relied upon to make urban life viable (Simone, 2005:1). As these local networks, or cross-community ties, seek to connect themselves to larger networks of production, consumption, and exchange, they naturally become involved in the competing demands and influences associated with globalisation. At this conjunction – between Africa's network society and the global Network Society – lies the ability of local participants to constantly piece together diverging trajectories, formal and informal opportunities, as well as momentary mechanisms for maintaining a sense of coherence (Simone, 2005:23-24).

This sense of coherence can be framed around the notion of people as infrastructure, where the exchange between participants is emphasised by those who collectively share in countless social, economic and spatial interconnections. Simone (2008:100) suggests a reality in which the capacity of urban Africa to produce trajectories of movement and economy, familiar to contemporary modes of urban formation and regulation, are linked to '[…] people as infrastructure and a reading of the city as if there were no difference between people and infrastructure.' This conception of people as infrastructure is expanded upon by Simone:

The implication is that the consolidation of individuals, institutions, sectors, or specializations is no longer a predominant urban operation and thus no longer an impediment to converting people to all kinds of uses. People from all walks of life can be assembled to have remarkable reach and efficiency (Simone, 2008:100).

The notion of collaborative human potential is further characterised by people's activities and intersections within the city, as well as their ability to engage in complex arrangements of objects, spaces, persons, and urban practices (Simone, 2004:407-408)**. These coincidences become an infrastructure as such – a platform for re-imagining and extending urban space.**

Thesis Document - Chapter 6 (developing places, electronic cadavers) - REV 2.indd 8-9

African cities, as part of a developing world context, can be seen as works in progress. With this in mind, it is not an exaggeration to say that they function along an edge of uncertainty, where things can happen quickly or seem not to happen at all (Simone, 2002:13). They tread a narrow line by virtue of the sheer efficiency at which information can be relayed through traditional network structures, and a workable sense of social co-operation and consensus pieced together to accomplish any given task (Simone, 1998:175). At other times, they seem to be left hanging in stasis – unresponsive to change, as anything beyond the conventional appears either persuasive or inappropriate (Simone, 1998:175). In this context there exists a critical balance between embracing the 'new', which stems from global pressures, and hanging onto what is existing – the tried and tested ways of life. It is this characteristic duality, underpinning the African city, which affects all levels of development; a tension grounded in the pushes and pulls of contemporary life sews lines of division between local functionality and global aspirations.

Developing Places
Re-imagining Architecture In Place:

2012/12/07 08:55:41 AM

Today, the mixture of global and local urbanism as technological and infrastructural instruments play a significant role in re-configuring and re-imagining space in contextualised urban place. This recomposition occurs through a networked geography of highly capacitated spaces, which include physical and virtual domains, thereby inducing cities and urban actors to extend their reach across new spatial, economic, and social frontiers (Simone, 2008:101-104). Simone (2008:116) believes that the potential for African citizens to negotiate new urban environments and frontiers may simply rest in the fact that a myriad of activities, modes of production, and institutional forms have intersected to provide unprecedented possibilities of how people may live and make things, how they manoeuvre through the urban realm and collaborate with one another. Although unrecorded intersections are constantly being negotiated, they do however depend on a particular set of histories, inclinations, understandings, and networks belonging to each actor involved (Simone, 2008:116). As these urban actors traverse recomposed urban space and engage in a wider set of activities, they become more adept at operating within a growing number of intersections – they adapt to an unpredictable range of scenarios (Simone, 2008:117). And as a result, '[r]egularities thus ensue from a process of incessant convertibility – turning commodities, found objects, resources, and bodies into uses previously unimaginable or constrained (Simone, 2008:116-117).'

In conclusion, I now focus more specifically on Johannesburg, where the approach to the urban imaginary I emphasise does not stay within the boundaries of the city, its sectors, institutions, physical places, or people, nor is it affixed to or influenced exclusively by any one form of urbanism.

From the intersection of the local and the global, a theme explored throughout this thesis, the urban imaginary finds ways to transcend the networks, pathways and routes along which a wide range of urban productivities, capacities, and potentials exist (Simone, 1998:186).

There is an incessant push and pull of these two kinds of urbanisms (or forms of city building), one engaged with making the most of repair, breakdowns, dereliction, and obsolescence, and the other with the wired and wireless universe, with cutting edge, high-speed, high-connectivity information transfer and continuous logistics (Simone, 2008:103).

The conjunction between intersecting urban practices, experiences and influences brings the category of informality to the fore; where the mode of interaction between two binaries, in this case two logics which structure space, reinforce the theme of the local and the global.

It is the convergence and divergence of normal institutionalised logic, represented by regulatory authorities, and informal logic, animated by urban actors, which constructs and structures the specificities of Johannesburg's contemporary urban context (Simone, 2005:357-358). Thus the relationships between local and global, formal and informal, physical and virtual form the engines of production that transform this urban landscape. I am in agreement with Simone when he states that perhaps our grasp of these relationships could begin in a very basic and obvious way: 'by uncovering the original functions of the majority of African cities – as points and organisers of entry and exit, as ports, railheads and crossroads (Simone, 1998:186).'

In Johannesburg there are real places of people and goods moving back and forth. Something unique is happening where spaces of opportunity are intersected and pieced together by people expanding their domains of operation; they are coming up with ingenious ways of earning a living, of making connections among themselves, and interacting with urban spaces folded across Johannesburg and the networks beyond. I call these people *urban miners*, and it is their inspiring sense of creativity and exuberance of day-to-day life which inspires my *urban imagination*.

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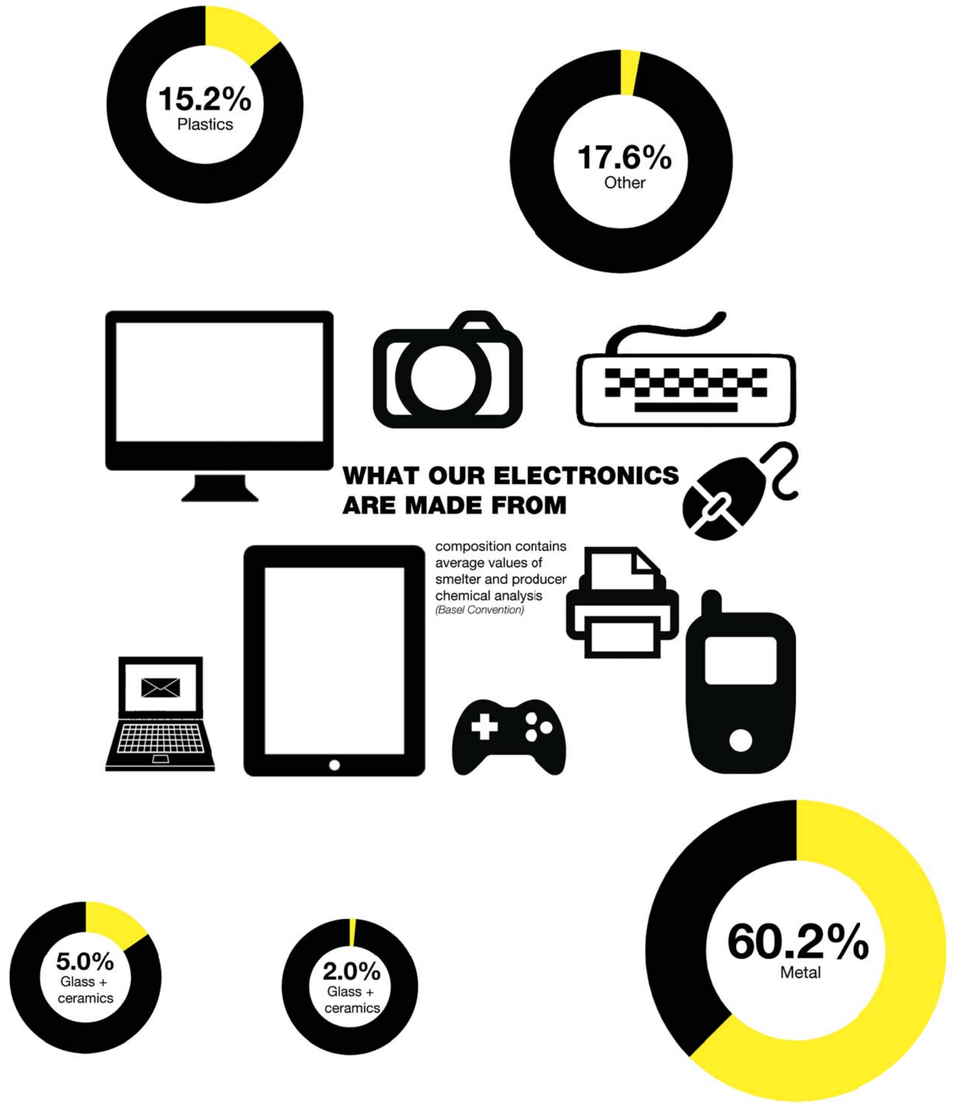
ELEC-TRONIC CADAV-ERS

What Makes Them Re-tick:

Visual essay

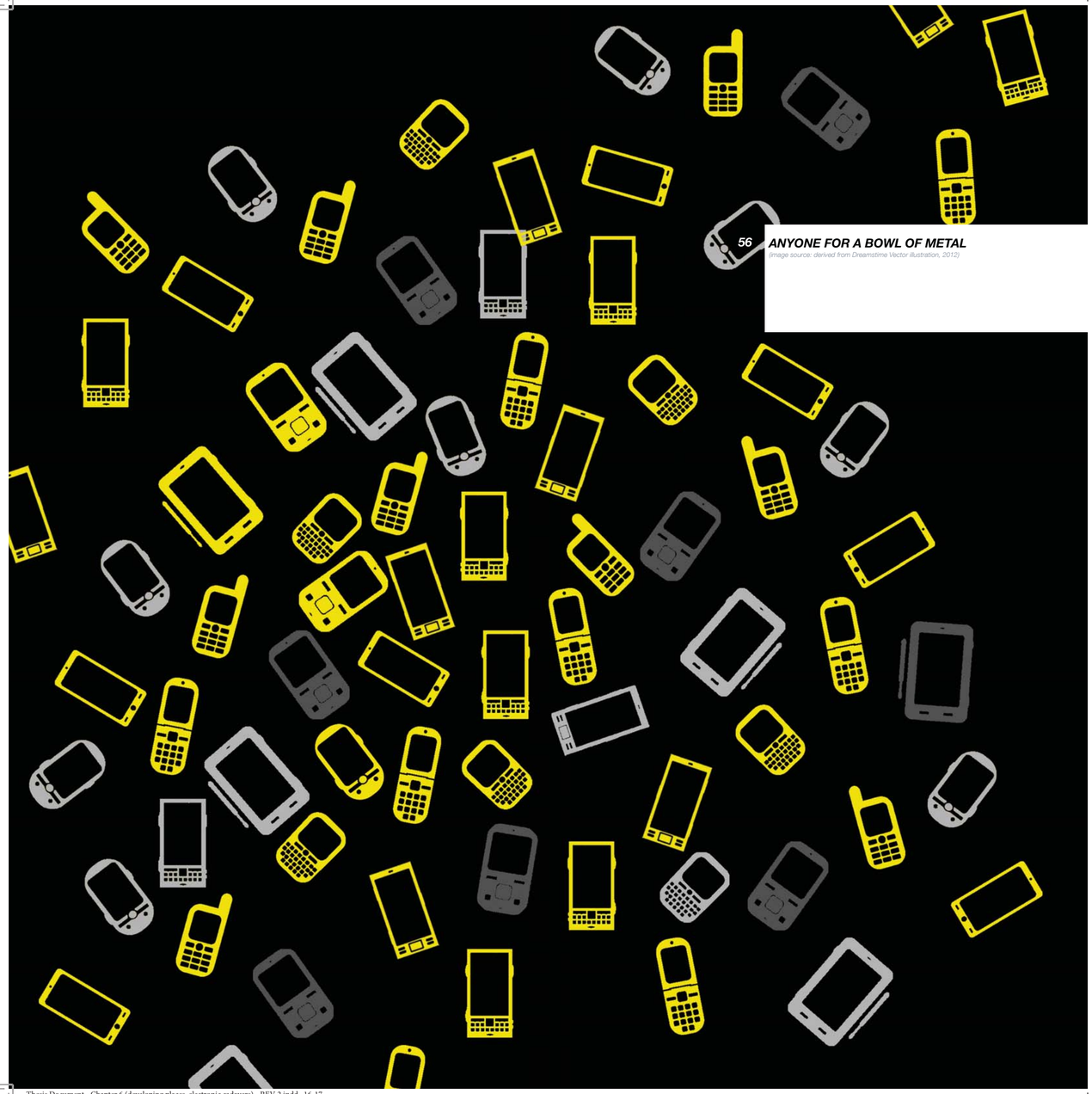
Thesis Document - Chapter 6 (developing places, electronic cadavers) - REV 2.indd 12-13 2012/12/07 08:55:41 AM

The story of electronic waste in the developing world is as much about emerging environmental and health issues, as it is about increasingly significant business opportunities. The production, consumption, and use of electronic devices have grown astronomically in recent decades. This rapid growth has also brought about a rise in the disposal of obsolete devices, the majority of which will find a way to landfill sites in the developing world – waste which is then bludgeoned and torched in some of the most horrific working conditions. Given the current volumes of e-waste being generated and the content of toxic and valuable metal minerals, as well as the rising lack of employment in the developing world, one cannot simply sit back and ignore the possibility of a better solution (Pucket, 2011: 98; Worldaboutweb, 2011).



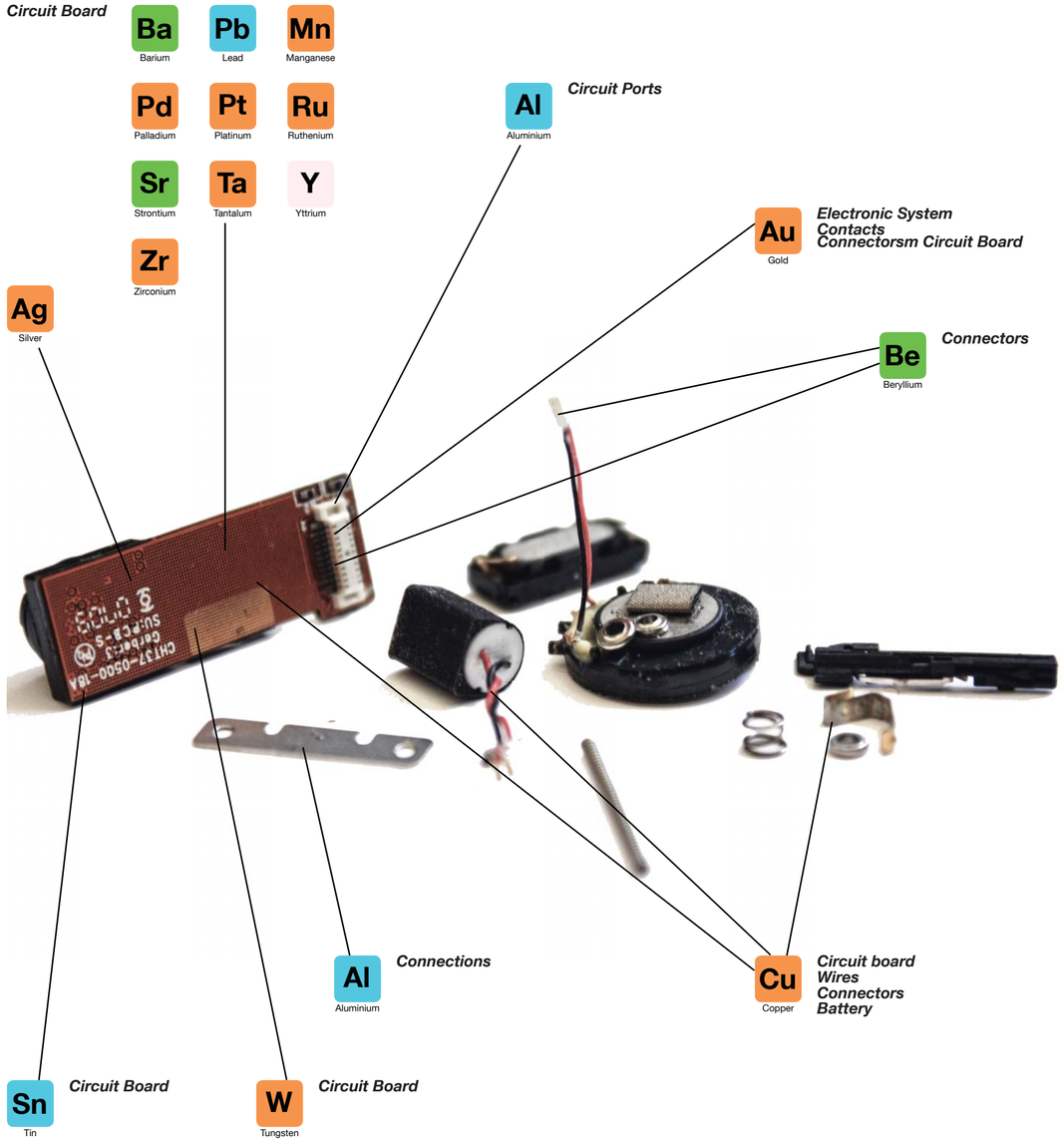
55 *(source: information adapted from Basel Convention on the Control of Transboundry Movements of Hazardous Wastes and their Disposal, Mobile Phone Partnership Initiative, USGS mineral commodity) summary 2012; Worldaboutweb's Blog, 2011.)*

Thesis Document - Chapter 6 (developing places, electronic cadavers) - REV 2.indd 14-15 2012/12/07 08:55:41 AM



56 **ANYONE FOR A BOWL OF METAL**

(image source: derived from Dreamstime Vector Illustration, 2012)



57 *(source: information adapted from Basel Convention on the Control of Transboundry Movements of Hazardous Wastes and their Disposal, Mobile Phone Partnership Initiative, USGS mineral commodity) summary 2012.)*

Thesis Document - Chapter 6 (developing places, electronic cadavers) - REV 2.indd 16-17

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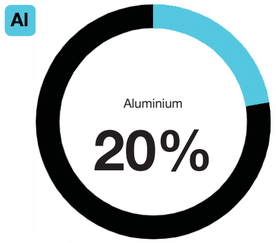






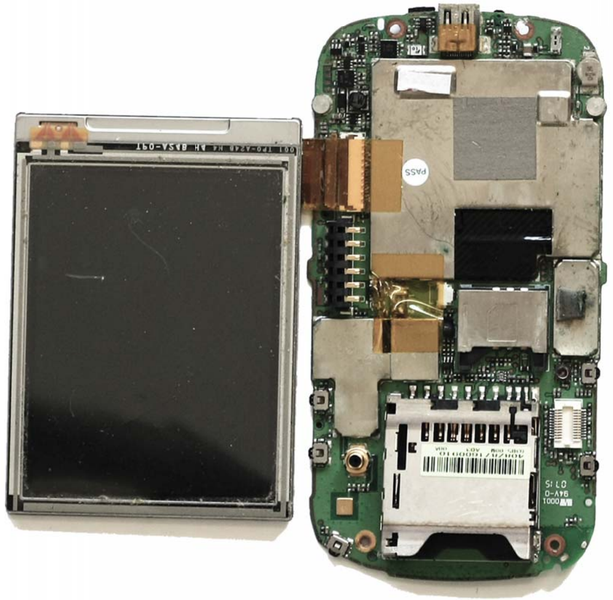


Al

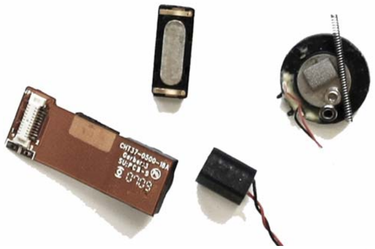


Covers, frames, battery, circuit board

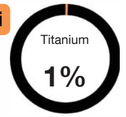
- **Weight** 30g
- **Market price** R15,60/kg
- **Value** R0.50







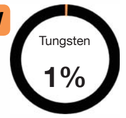
Ti



Case, frame

- **Weight** 1.5g
- **Market price** R230/kg
- **Value** R0.35

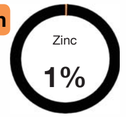
W



Circuit board

- **Weight** 1.5g
- **Market price** R544/kg
- **Value** R0.82

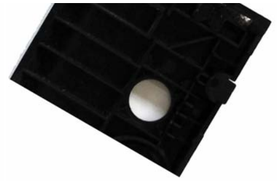
Zn



Circuit board

- **Weight** 1.5g
- **Market price** R16/kg
- **Value** R0.024

58 *(source: information adapted from Basel Convention (Nokia Report), 2006; USGS mineral commodity) summary 2012.)*





>1%

Sb Antimony *(case)*
- **Weight** 0.15g
- **Market price** R135/kg
- **Value** R0.026

Ba Barium *(circuit board)*
- **Weight** 0.15g
- **Market price** R16/kg
- **Value** R0.002

Be Beryllium *(connectors)*
- **Weight** 0.15g
- **Market price** R7 201/kg
- **Value** R1.08

Ga Gallium *(LED's)*
- **Weight** 0.15g
- **Market price** R7 864/kg
- **Value** R1.20

Au Gold *(electronic system, contacts, connectorsm circuit)*
- **Weight** 0.15g
- **Market price** R505 750/kg
- **Value** R76

In Indium *(screen)*
- **Weight** 0.15g
- **Market price** R6 418/kg
- **Value** R1

Pb Lead *(circuit board)*
- **Weight** 0.15g
- **Market price** R21.60/kg
- **Value** R0.003

Mn Manganese *(circuit board, case)*
- **Weight** 0.15g
- **Market price** R26/kg
- **Value** R0.004

Pd Palladium *(circuit board)*
- **Weight** 0.15g
- **Market price** R27 073/kg
- **Value** R41

Pt Platinum *(circuit board)*
- **Weight** 0.15g
- **Market price** R570 310/kg
- **Value** R86

Ru Ruthenium *(circuit board)*
- **Weight** 0.15g
- **Market price** R53 550/kg
- **Value** R8

R Rare Earths *(battery)*
- **Weight** 0.15g
- **Market price** R2194/kg
- **Value** R0.33

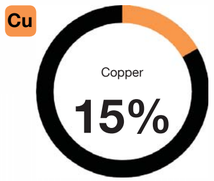
Sr Strontium *(circuit board)*
- **Weight** 0.15g
- **Market price** R2890/kg
- **Value** R0.43

Ta Tantalum *(circuit board)*
- **Weight** 0.15g
- **Market price** R2405/kg
- **Value** R0.33

Y Yttrium *(circuit board)*
- **Weight** 0.15g
- **Market price** R578/kg
- **Value** R0.87

Zr Zirconium *(circuit board)*
- **Weight** 0.15g
- **Market price** R37/kg
- **Value** R0.006

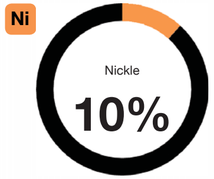
Cu



Wires

- **Weight** 22.5g
- **Market price** R70/kg
- **Value** R1.60

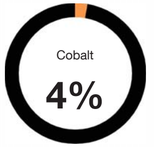
Ni



Battery

- **Weight** 15g
- **Market price** R9.4/kg
- **Value** R0.14

Co



Lithium-iron battery

- **Weight** 6g
- **Market price** R330/kg
- **Value** R1.98

Cr



Case, Frame

- **Weight** 1.5g
- **Market price** R107.5/kg
- **Value** R0.16

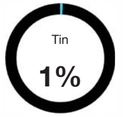
Ag



Circuit board, key pad

- **Weight** 1.5g
- **Market price** R44/kg
- **Value** R0.066

Sn



Circuit board

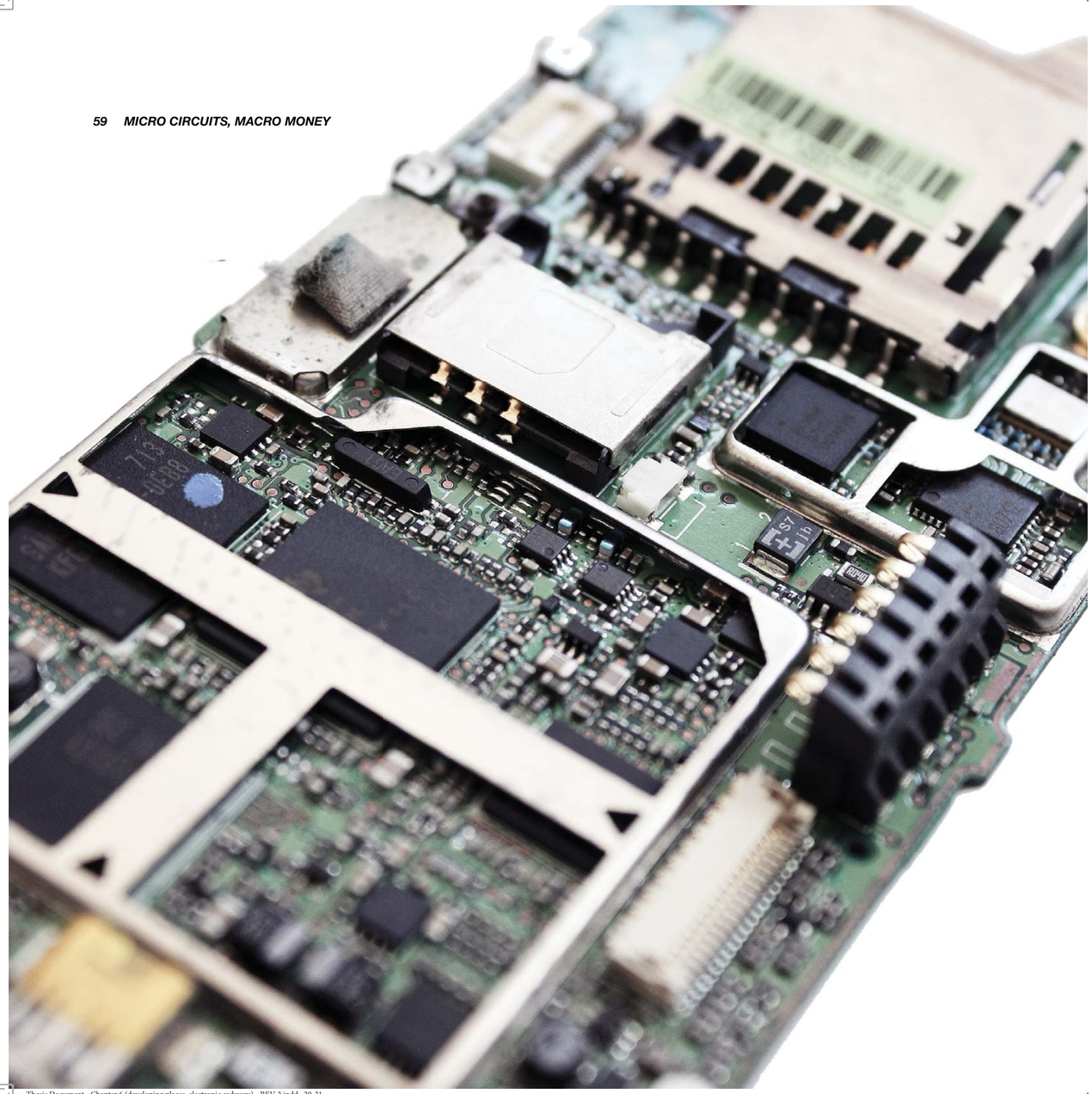
- **Weight** 1.5g
- **Market price** R269/kg
- **Value** R0.40





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HTC P3400, SMARTPHONE

- **Gross weight** 150g
- **Metal weight** 84.9g
- **Mixed metal weight** 4.25g
- **Net weight** 89.15g
- **Purchase value** R3200 (2007)
- **Second Hand value** R100 (2012)
- **Recycling value** ? (2012)

R222.32

NOTE:
- All calculations are based on metal prices averaged between 6th August 10th August 2012 *(www.lme.com; www.metalprices.com; www.metalpages.com.)*
- Prices have been converted from US$ to a Rand per kilogram value averaged between 6th August 10th August 2012 *(x-rates.com)*.
- All percentage values refer to an average composition value for each mineral resource *(Basel Convention Roteq Report) 2005)*.
- The above figures are based on a case study undertaken by myself and are therefore for representational purposes only.

Thesis Document - Chapter 6 (developing places, electronic cadavers) - REV 2.indd 20-21 2012/12/07 08:55:50 AM

GLOBAL ELECTRONIC WASTE FIGURES

50

Million metric tons of electronic waste disposed worldwide by the year 2010.

13.5%

Global percentage of the consumer electronic products generated into the municipal waste stream that were recovered for recycling in 2008.

05%

The **growth rate** of electronic waste per annum.

68%

Global percentage of consumers who stockpile used or unwanted electronic equipment in their homes.

366 million

Total **computer units sold** globally in 2010.

$245 billion

Global computer spending in 2010, up 12.2% from 2009.

(source: information adapted from Electronics TakeBack Coalition, 2010; EMPA, 2009.)

HAZARDOUS ELEMENTS LEFT BEHIND

Hg — **Mercury**

This toxic metal damages the central nervous system, endocrine system, and major organs. Exposure can result in brain damage and ultimately death.

Cd — **Cadmium**

Exposure to this toxic metal can lead to kidney failure.

As — **Arsenic**

Acute, symptoms may include diarrhoea, vomiting, bloody urine, muscle cramps, stomach pain, and convulsions. The final result of arsenic poisoning is coma to death.

Mg — **Magnesium**

In its metal form, this element induces neuro-chemical changes and has been identified a contributing factor to developing Alzheimer's.

Ni — **Nickel**

Large quantities of this metal are found in the batteries of most electronic devices. The metal has been shown to significantly increase the risk of caner.

Pb — **Lead**

Interferes with a variety of body processes and is toxic to many organs and tissues including the heart, bones, intestines, kidneys, and nervous system. It is particularly harmful to children as it permanently affects the development of the central nervous system, potentially causing learning and behaviour disorders.

Be — **Beryllium**

This metal is highly corrosive to human tissue, and exposure can also result in the chronic life-threatening allergic disease called berylliosis.

Sb — **Antimony**

This poisonous substance has very similar effects to arsenic poisoning.

Li — **Lithium**

This metal has a high instability which can create environmental issues. Exposure to water, which is present in most landfills, causes the metal to react, resulting in extreme underground fires.

Electronic products contain many metals, most of which are highly toxic, and if not dealt with properly they be deadly to both human beings and the environment.

LARGEST CONSUMER:

USA, *NORTH AMERICA*

INDUSTRY NOTE:

ELECTRONICS INDUSTRY

The global electronics industry is one of the largest and most important sectors of the economy in terms of employment, revenue, investment, and development all over the globe. However, current growth rates and increasing obsolescence mean that consumer electronics have a very short life span, which will only increase the current E-waste crisis.

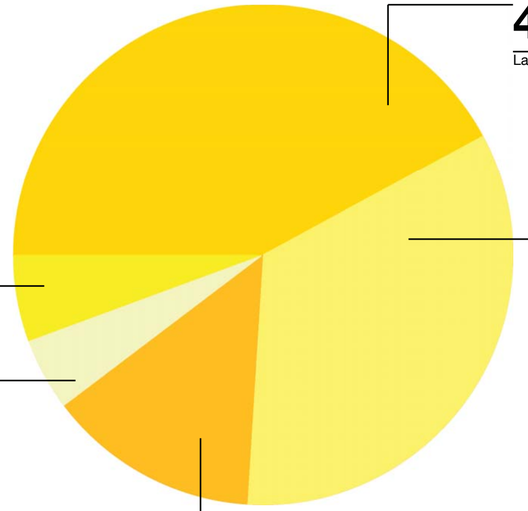
LARGEST EXPLOITATION:

GHANA, *AFRICA*

Thesis Document - Chapter 6 (developing places, electronic cadavers) - REV 2.indd 22-23

ORIGIN OF ELECTRONIC WASTE

Average percentile origin of electronic waste generated worldwide for the year 2010.



42.1% Large household appliances

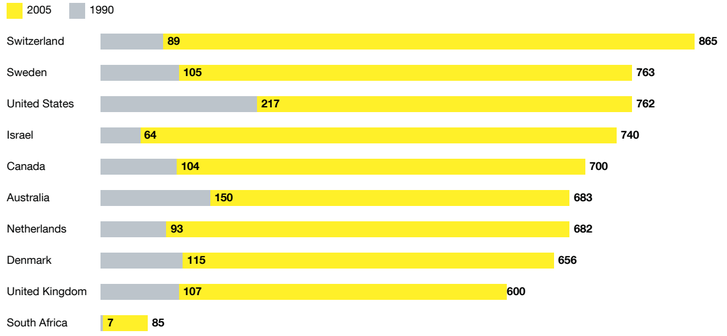
33.9% IT and Telecommunications equipment

13.7% Consumer equipment

4.7% Small household appliances

5.6% Other

AVERAGE NUMEBR OF COMPUTERS PER 1000 PEOPLE



45 million

Number of active cell phones out of population of 49 million. We are ranked in the top 5 globally.

LOCAL CONSUMER

SOUTH AFRICA

(source: information after NationMaster; Worldaboutweb's Blog, 2011; SAGoodNews, 2012.)

31st

Rank of internet users per 1000 population.

900

Number of cell phone users per 1000 population.

660

Number of television sets per 1000 population.

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ELECTRONIC WASTE TRASHED

26.9
Million television units per anum.

205.5
Million computer units per anum.

126.3
Million cell phone units per anum.

ELECTRONIC WASTE RECYCLED

6.3
Million television units per anum.

48.2
Million computer units per anum.

14.0
Million cell phone units per anum.

RECYCLING RATE

18%

18%

10%

ELECTRONIC WASTE PROJECTION

400 million
Average in million units of discarded electronic waste will be scrapped, not recycled per year.

(source: information adapted from Electronics TakeBack Coalition, 2010; EMPA, 2009)

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CELL PHONE SALES

1.21 billion
Number of cell phones sold globally in 2009.

4 billion
Number of cell phones users worldwide by 2008.

RESOURCES USED IN ELECTRONICS MANUFACTURE

81%
Percentage of a desktop computers life time energy use is in the manufacturing process.

90%
Amount of energy saved to recover 10 kilograms of aluminium from recycled material.

1 ton R127 500
One metric ton (6000 units) of used cell phones contains on average 3.5 kilograms of silver, 340 grams of gold, 140 grams of palladium, 130 kilograms of copper.

RESOURCE RECOVERY

1 V **17** +850%
One metric tone of electronic waste yields more gold than 17 tons of ore.

RESOURCES USED IN ELECTRONICS MANUFACTURE

TO MAKE ONE PC MONITOR?

240 kg
Fossil fuels

22 kg
Chemicals agents

1.5 tons
Water

AFRICA'S ENVIRONMENTAL CHALLENGES

The exponential growth of electronic waste means that Africa's environmental challenges are growing by the day. It is now time for Africa to take action on addressing health and environmental problems as a result from today's wasteful habits. If we consider the potential value of these materials, then this represents and important opportunity to take advantage of the present situation by using tomorrows recycling processes. Waiting on the horizon is another resource beckoning to be mined, thereby creating new jobs and business opportunities.

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A Working hand-in-hand with the *Waste Processing Laboratories*, the *Electronic Academy*, a practically orientated educational component, is geared toward the training of professional *urban miners*. The aims of this educational centre align with the overall goals of the *OPTF* in the sense that it again echoes the notion of exchange between ***the local*** and ***the global***, and informal and informational. The goal is to not only provide specialised training to current practitioners, the established *urban miners* operating in and around Germiston North, but also a practical education to new learners from the neighbouring Makause Informal Settlement and greater Johannesburg region.





B In the sense that the former programmatic components work together, through a series of exchange situations, towards the transformation of electronic waste into refined metal commodities, so the *Electronic Academy*, through its unique exchange environment, facilitates a transfer of knowledge. By bridging the gap between the rudimentary methods currently adopted by *urban miners* and the machine technologies operating within the *OPTF*, I hope to realise the transformation of *urban mining* from an undesirable routine into a rewarding profession.



C Apart from the essential objective of bringing learners and community members up to speed with the safest and most efficient methods of processing electronic waste, the *Academy* will also direct its efforts towards training a number of practitioners who are dedicated to working in the *OPTF*. The extended education programme will prepare learners either for a career operating as a bidder in *The Trading Pit*, an occupation working as a stock trader on the *Digital Trading Floor*, or alternatively a job employed as a technician in the *Electronic Waste Processing Laboratory*. The very nature of training a number of people in the profession of *urban mining* and its affiliated branches is altogether a method of exchange that celebrates the notion of people as an infrastructure.

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SOME-WHERE IN-BE-TWEEN

The Collision

Descriptive essay

When millions of computers and electronic devices can no longer compute or satisfy the requirements of our day-to-day existence, they are sent ‘away’ to places often half way around the world (Pucket, 2011:97-103).

In these global borderlands out-dated electronic waste, tossed up by the underlying currents of today’s obsolesce, consumerism, and commerce, have found strange resting places. Machines that could previously process billions of instructions per second, send messages instantaneously around the world, or hold a wealth of information in a device no bigger than one’s hand, have found their end as metallic carcasses in some of the world’s poorest communities. Today, these borderlands tend to exist in developing countries, on the outskirts of major cities – but the location is just a factor driven by systems of poverty, desperate labour, and unregulated environmental control. (Pucket, 2011:97-103)

Somewhere In-Between
The Collision:

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Along a southern ridge, an expansive belt constructed and continuously altered by man, there exists a rich landscape conditioned by over a century of mining – a setting as old as the cityscape which grew alongside it. Johannesburg, the mining town, owes its existence and layered histories to the rich golden veins running beneath its rolling highveld pains (van der Waal, 1987:x). The reef line, which extends in an arc from east to west, has over time been developed into a field of industrial and commercial enterprise, but more recently, towards Germiston, the reef has become home to a number of informal settlements dotted between the ghosting mountains and rising landfills.

As strange as it may first appear, one seems unable to comprehend what these images of Germiston present to us; one perceives a measure of stillness when standing in the blowing sands, amongst rusting headgears, and between the myriad of opaque factory facades. With the presence of international mining houses having long left this area there is no longer a rush to harvest the earth beneath this highveld plane, only scattered pockets of infrequent human activity remain; there are no working shafts descending to unstable depths, today broken road edges serve as the only infrastructure to carry their haul; there are no mining houses to return to after a long day's work, only an informal settlement which adds layers of dirt to bodies already tarnished by ash and toxic plumes. Yet, after all these years the earth is still being mined for precious metals, but no ore has been excavated. In its place lies a barren landscape that besides the odd patch of dry yellow grass is void of colour; a landscape which has been burnt to residue, bled upon by chemical discharge, and poisoned in ways yet to be fully understood.

In this working landscape, there is something seemingly mythological in the sight of a group of men and woman working amidst the debris of devices they have disassembled. These urban miners first make their living by salvaging electronic waste, then their mounds of waste are dismantled by hand, tool, and finally flame. If refined to an acceptable level of purity, the chucks of mixed metal are sold to scrap shops and may eventually find their way around the world – normally China (Simmonds, K: 2012).

It is ironic that this group of people are surviving – barely – on the leftovers of a wealthy world that has sent its waste elsewhere, waste which is then 're-cycled', reprocessed, and will eventually finds its way back to the very same group of people.

On closer inspection, one is suddenly able to read between the lines and register the dangers affixed to this rudimentary process of mining. In Makause, the informal settlement in which these urban miners reside, waste is fed to a blaze which not only rips through the air but also pops and explodes when reactive metals come into contact with a naked flame, or are expose to a combination of water and air. In a clearing, where children used to play, waste is now burnt - metals are excreted, molten plastics ooze into the ground, and a suffocating smoke billows into the air.

In this raw and displaced landscape of rare metals, forming toxic pockets that leach through the earth and out across into nearby communities, a place is quickly being marked by a profound sense of inhumanity.

Yet, even after comprehending this dire situation, one is still captivated by the raw processes happening in an around this setting. One is enticed by the urban miners and their gestures; the manner in which they move carefully through the dirt and ash making sure to avoid the searing heat and toxic patches staining the earth, the casual gaze in their children's eyes who are oblivious to the deadly threats awaiting them around every corner, as well as the insightful and disarming resilience shown by this group of metal gatherers. These urban miners, who have come together as an infrastructure, stand in a symbolic space where everything may seem futile, where their hardships and struggles with everyday life go unnoticed, where notions of progress and obsolesce collide, where memories and information stored in countless electronic devices become nothing more than a clump of metal. Yet there is something more on offer here, beyond the metal and burning, something of real value.

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Such scenes lead me to wonder what might happen if the waste wasn't burnt within the settlement, if people and the environment weren't being poisoned, and if the metals were not sold to scrap shops – if urban mining and its associated practices were instead brought together within the walls of architecture. What if the waste were to be hauled into a large trading pit – a typology mixed between a factory, museum, and market place – where processes of disassembling are celebrated through public display, where trading materialises in the form of a daily auction and not behind closed doors, and where processing occurring under controlled conditions could be considered recycling, then the architecture offers something beyond the metal?

The architecture then holds further possibilities of extending its reach across a global sphere, where local resources and labour would collide with an informational world specialising in trade across international financial markets. Imaging this architecture as a public industrial trade complex will not only provide symbolism to the greater Germiston area, but more importantly it will celebrate the actions of urban mining in the context of Johannesburg – the city of gold.

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LOCAL PLACE

Germiston, The Chosen Locale:

Site Analysis

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From makeshift gold mining camp to an industrial powerhouse of Southern Africa – such is the layered history of Germiston. More than a century ago, Germiston lay amid vast undulating grasslands abounding with game. It was one of many mining camps that had sprung up through the promise of discovering a second network of golden ore.
(de Freitas, n.d.: 07)

Towards the turn of the 19th century, Germiston, the mining town, grew out of the Reef as a collection of wood and iron clad shacks arranged around the old 'Rand Tramline' railway junction. This location was some 16km from the newly discovered Johannesburg mines (de Freitas, n.d.: 09-10). On September 20th, 1886, President Paul Kruger signed a proclamation to declare the farms Driefontein and Elandsfontein, which made up Germiston, as public digging sites (de Freitas, n.d.: 09). Almost immediately gold mining companies were established in the area, and the town quickly developed into a mining centre. August Simmer and John Jack, two businessmen from the Orange Freestate, purchased a half-interest in the Elandsfontein Farm, and about a kilometre from their mine they laid out the township of Germiston (de Freitas, n.d.: 09). Although it was the discovery of gold that gave Germiston its initial spark, the mines required equipment and thus the manufacturing industry was born – an industry which has followed a course of dynamic and diversified expansion (de Freitas, n.d.: 09).

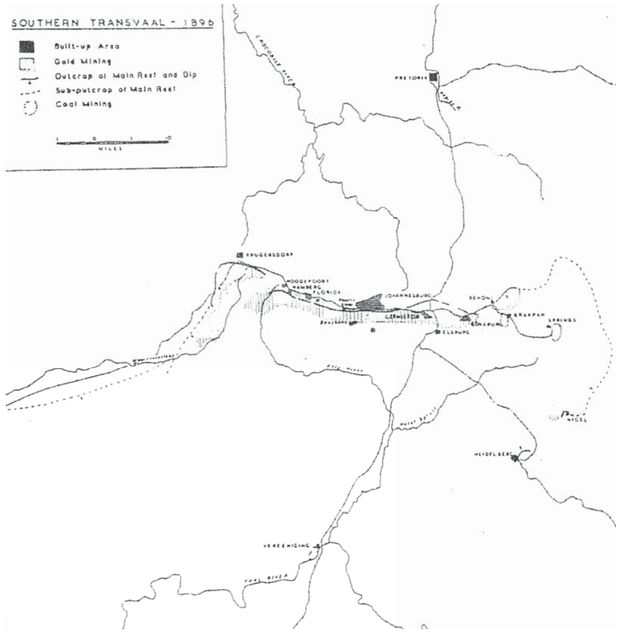
Germiston owes its phenomenal industrial growth to a handful of advantages available to industries in the East Rand Area. Its location not far from the centre of the most densely populated region in South Africa means that all the important markets and sources of labour are easily accessible. Raw materials are easily obtained, and the close proximity of steel and coal suppliers are factors of great economic value to the industrial region (de Freitas, n.d.: 09). Furthermore, the exceptionally developed transport infrastructure is another important advantage. As the most important railway junction in South Africa, Germiston has direct rail links to all the other interior and coastal industrial centres. Adding to its well-developed railway systems, Germiston is also the focal point of the country's road and air transportation networks (de Freitas, n.d.: 09).



60 ***GERMISTON RAIL***
The railway mechanical workshops at Germiston are nestled amongst some of the largest man-made structures in the country. The monolithic mine dumps fill the horizon from kilometres away.
(image source: de Freitas, n.d.: 73.)

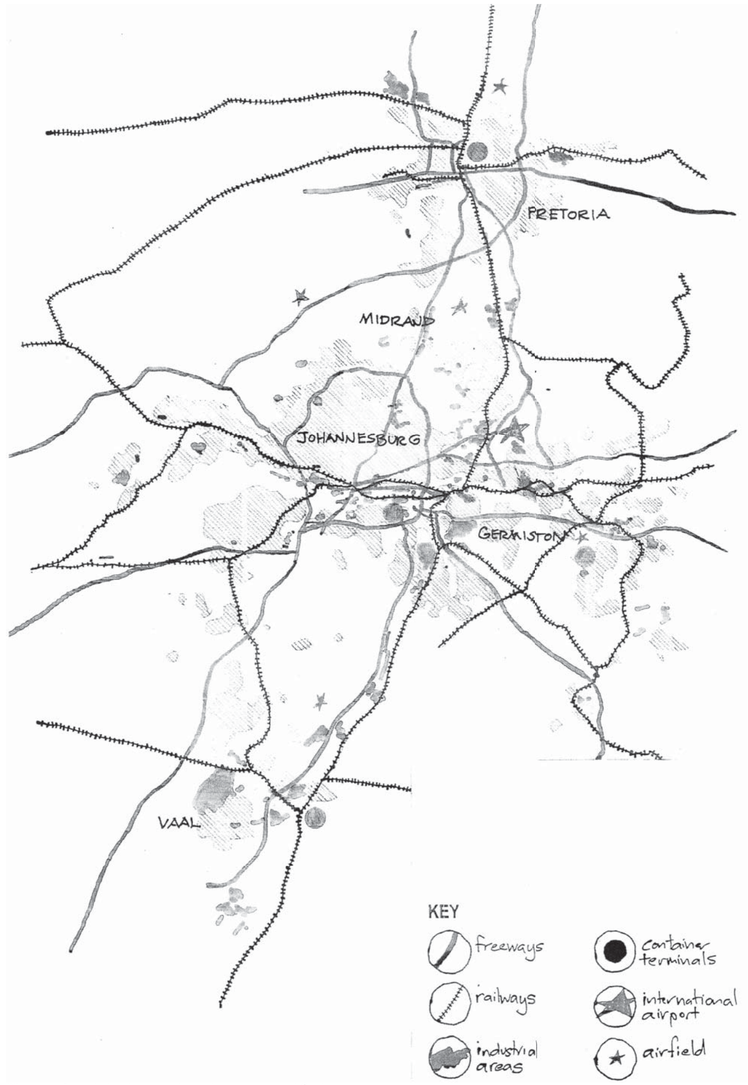
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The East Rand is one of five principal manufacturing regions in South Africa, and forms the core of the country's manufacturing economy. The East Rand has developed into a specialised metropolitan area marked by its own value systems, socio-economic conditions, industrial activity, and demographic forces. However, what really defines this region is its industrial activity – the East Rand has become South Africa's workshop (Bloch, 1997:05). Most of the job opportunities lie in manufacturing, particularly in the production and working of metals; so much so that it can be described as a metalworking cluster geographically bound to a collection of specialised companies that fall within the same or complimentary sectors, and are linked together by shared infrastructure, services, and labour markets (Bloch, 1997:05).



61 Map 1: by 1896 the essential cruciform geometry had already been established (Fair and Mallows, 1959: 128).

In addition, the East Rand, together with Pretoria, Johannesburg, and Vereeniging, combined to create an industrial geography or continuous fabric of urban development that is roughly cruciform in shape (Silverman, 1999:05). The east-west axis of this cruciform followed the Reef outcropping and consisted of numerous small gold mining towns that lay to the north and south of the Reef, which included Germiston to the east and Johannesburg at the centre. This major axis was consolidated by the construction of Main Reef road in 1896 and more importantly of an east-west rail link in 1891 (Silverman, 1999:05; Smith, 1971:312). Gold production may have been centred in and around Johannesburg, but from 1916 onwards the East Rand steadily developed into the more powerful wing of this east-west axis. This dominance was supported by numerous reasons; among them were its largely flat topography, which was more suitable for large industrial plants than the West Rand; the convergence of railway lines at Germiston from Mozambique and Durban, and from the steelworks at Pretoria and Vereeniging; its relative proximity to the coalfields of Witbank and the Mpumalanga; and the growth of deep level gold which was later reinforced by rapid industrial growth (Bloch, 1997:10; Silverman, 1999:05).



62 Map 2: illustrating the current industrial geography of Gauteng (Silverman, 1999)

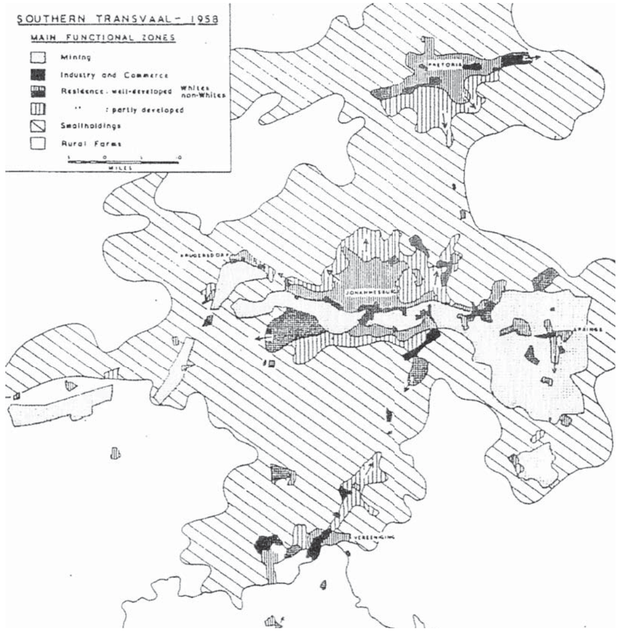
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The East Rand has steadily moved from an era of mining to its present place in manufacturing where it plays a key role in the Pretoria Witwatersrand Vereeniging (PWV) complex. Basic steel may be produced in Pretoria and Vereeniging, but the majority of that steel is processed on the Witwatersrand, particularly the East Rand (Bloch, 1997:11). Analysts believe the metals geography grew most on the East Rand because of its vast supply of flat land, which has meant that it could accommodate the outwards movement of the Johannesburg-base manufacturing firms. In addition to the geographical landscape, road infrastructures and services have been significantly improved upon, while water and electricity rates were negotiated at preferential rates for incoming factories (Bloch, 1997:11).

Plants of all sizes and forms of ownership, covering the entire metals production and processing chain, have thrived in the industrial atmosphere this region came to provide, so much so that it became the heartland of South Africa's mass production. The East Rand supplied much of the materials and components for the output of vehicles, telecommunications equipment, and consumer electronics. In addition, the area also manufactured or modified much of the machinery that produced these goods, while assembling a large portion of the final outputs themselves (Bloch, 1997:11).

However, in recent years, manufacturing in the East Rand has stagnated, while its population continues to grow. This issue is compounded by a number of diverging factors; among them is a sharp rise in unemployment rates; a surge in the development of informal settlements and marginalised communities; and the undercurrents of a thriving informal metal sector that looks set to take its place (Bloch, 1997:03).

The crucial challenge facing the region is to find new ways of generating economic growth and creating jobs to provide for a growing population. This is a challenge that needs to be considered in relation to a broader context: the emergence of a global economy. Cities and urban regions have become the stage for new global economic activity, competition, and growth, and by developing concepts which will enable the region to become more globally competitive, the East Rand will more readily discover the means to cope with its developmental challenges.(Bloch, 1997:03)



63 Map 3: by 1958 many of Gauteng's functional zones had been established (Fair and Mallows, 1959: 128).



64 Map 4: illustrates municipal boundaries and industrial areas in the Gauteng region. (Silverman, 1999)

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INDUSTRIAL INFORMAL

context

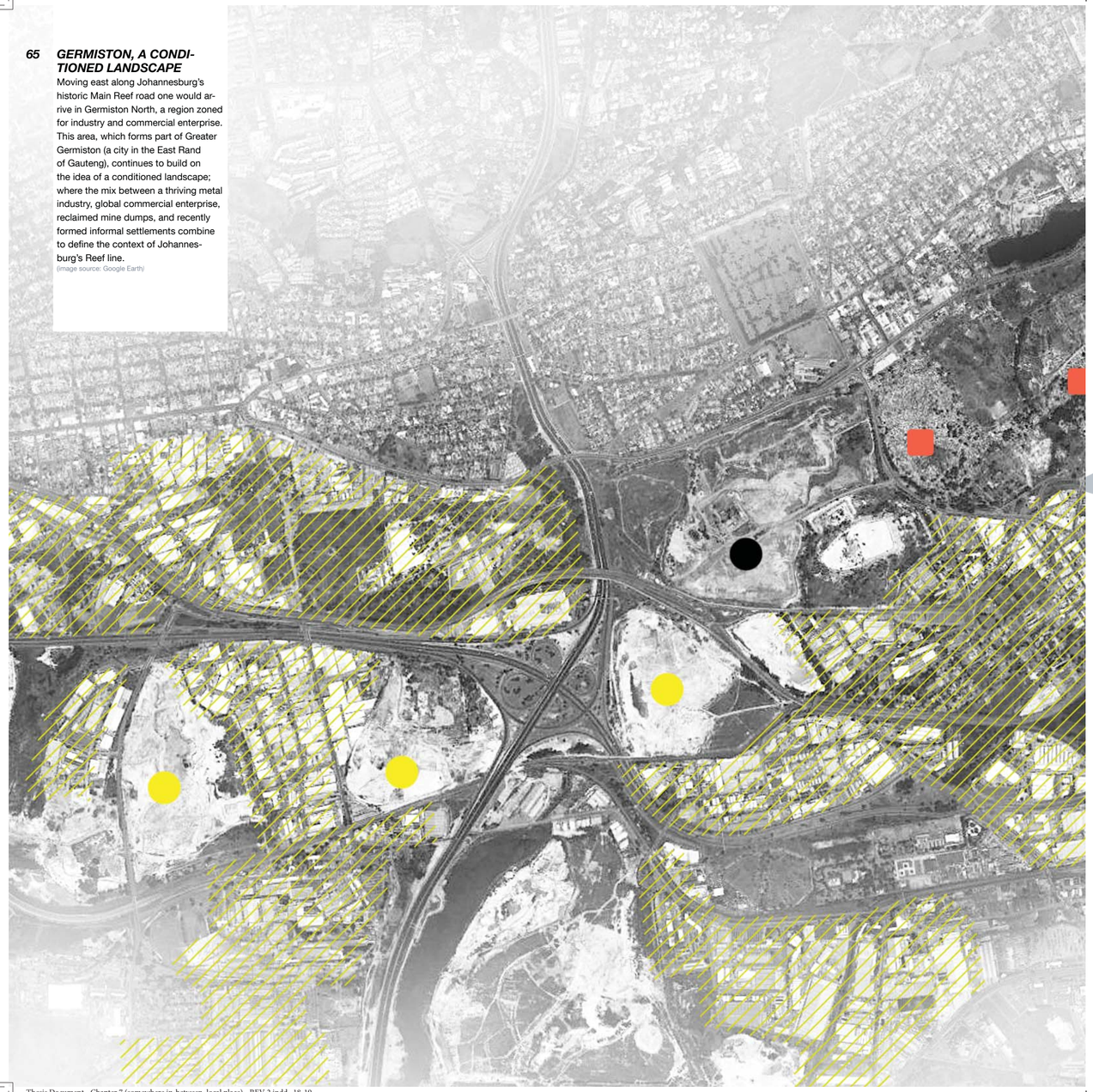
MINING

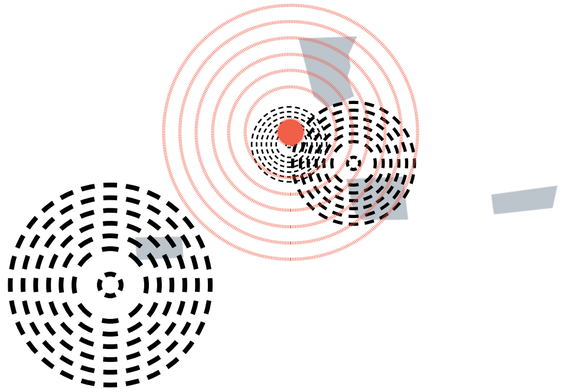
landscape

65 ***GERMISTON, A CONDITIONED LANDSCAPE***

Moving east along Johannesburg's historic Main Reef road one would arrive in Germiston North, a region zoned for industry and commercial enterprise. This area, which forms part of Greater Germiston (a city in the East Rand of Gauteng), continues to build on the idea of a conditioned landscape; where the mix between a thriving metal industry, global commercial enterprise, reclaimed mine dumps, and recently formed informal settlements combine to define the context of Johannesburg's Reef line.

(image source: Google Earth)

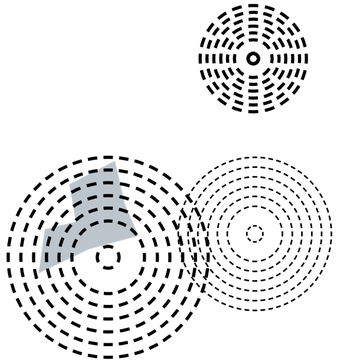


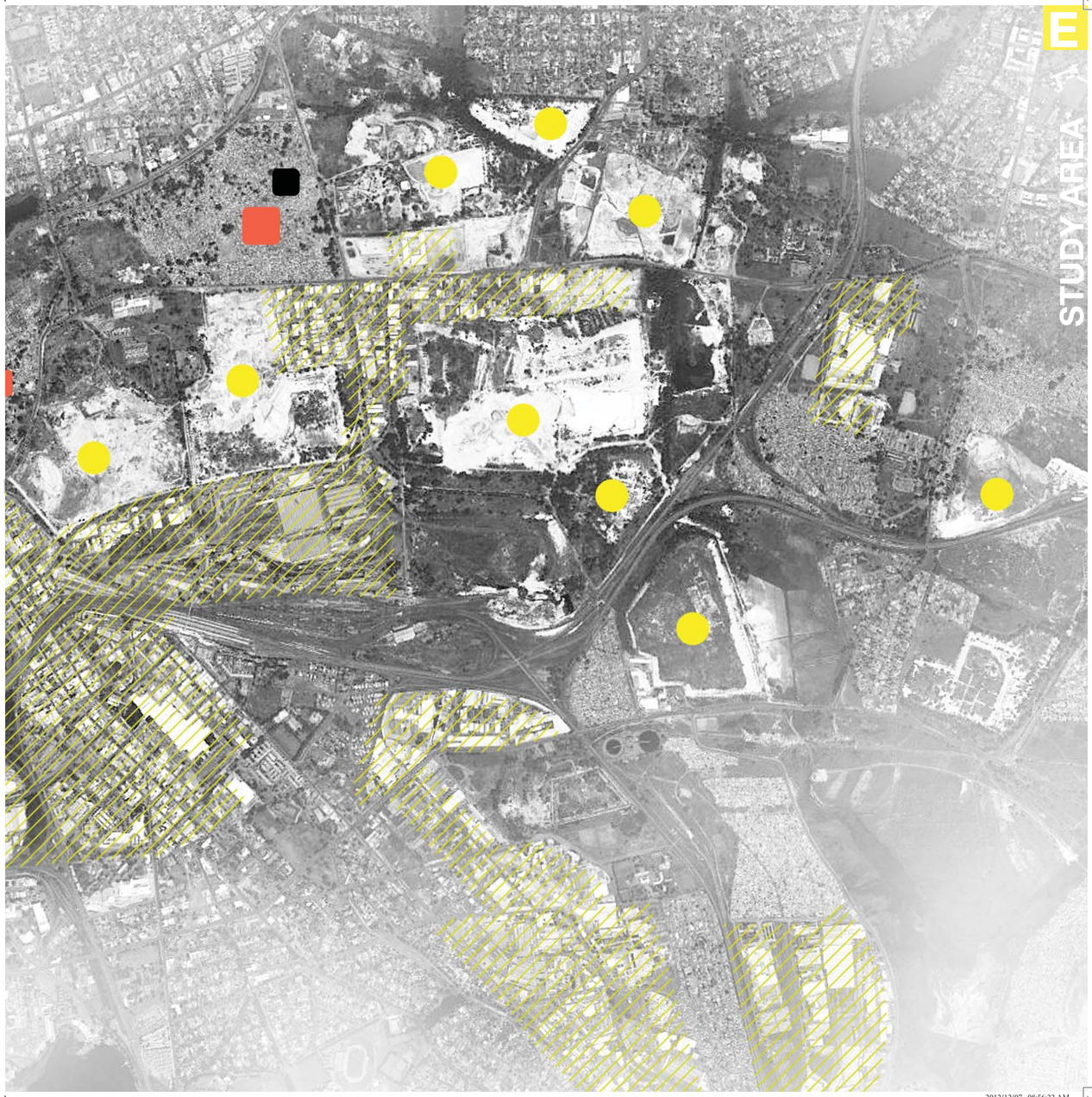


- Mine dumps
- Informal settlements
- Dumping site in Makause
- Jack & Simmer Mine (dump)
- Open pit burning sites
- Informal waste depot
- Site choices
- Industrial & commercial zone

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E
STUDY AREA



66, 67

CORROSION, CAPTIVATING, PATINA

Many of the older factories and warehouses have been turned into makeshift metal scrap yards. Their transformation from manufacturing to salvaging is captivating. In some places time seems lost to me, with the worn down facades telling the story of a different metal industry.





68 ***METAL MASTERS***
Even though the area has seen a decline in manufacturing, Germiston North is still home to a wide variety of metal manufacturers. These workshops are scattered in-between cash-for-scrap yards, and together they make up much of the urban fabric.





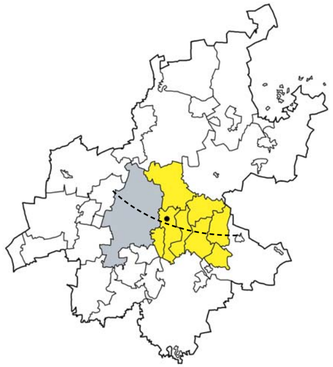
69, 70 ***SUM OF DIVISION***

The decline in the local manufacturing industry and growth of the Makause Informal Settlement have occurred simultaneously. Physically they are separated by Main Reef road, symbolically they are separated by contrasting histories.

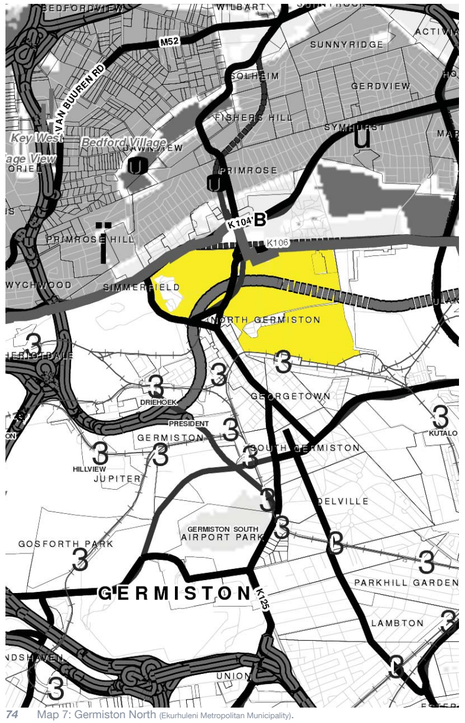


THIS IS MINESCAPE

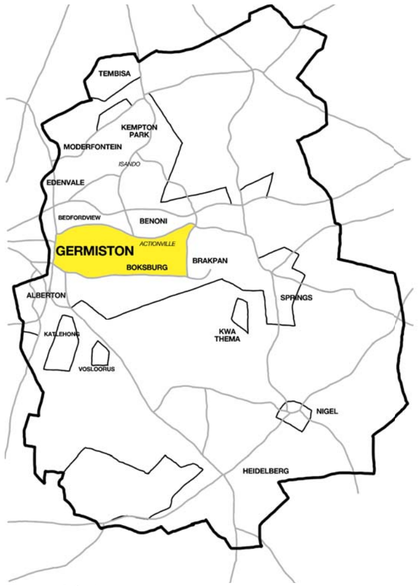
In this ghosting landscape, once built to elevated levels by the hands and machinery of an early pioneering mining industry and now quickly being reduced to stratified craters, one could be forgiven for thinking they were experiencing another time and place. Well over a hundred years have passed since the first veins of gold were chased, and with remnants such as the headgears standing frozen in time it seems an obvious indication that there are no longer any mineral sources left to be mined. This observation may hold true beneath the surface, but above the surface a different kind of mining is taking place; the *urban miners* of Germiston North feed off the surrounding metal industry, and their daily movements not only reinterpret but also retrace those of the early pioneers. Today Germiston is still living and breathing mining, yet it is happening in an altogether different way.



72 Map 5: Johannesburg and Ekurhuleni municipal boundaries (After Bloch, 1997: 07).

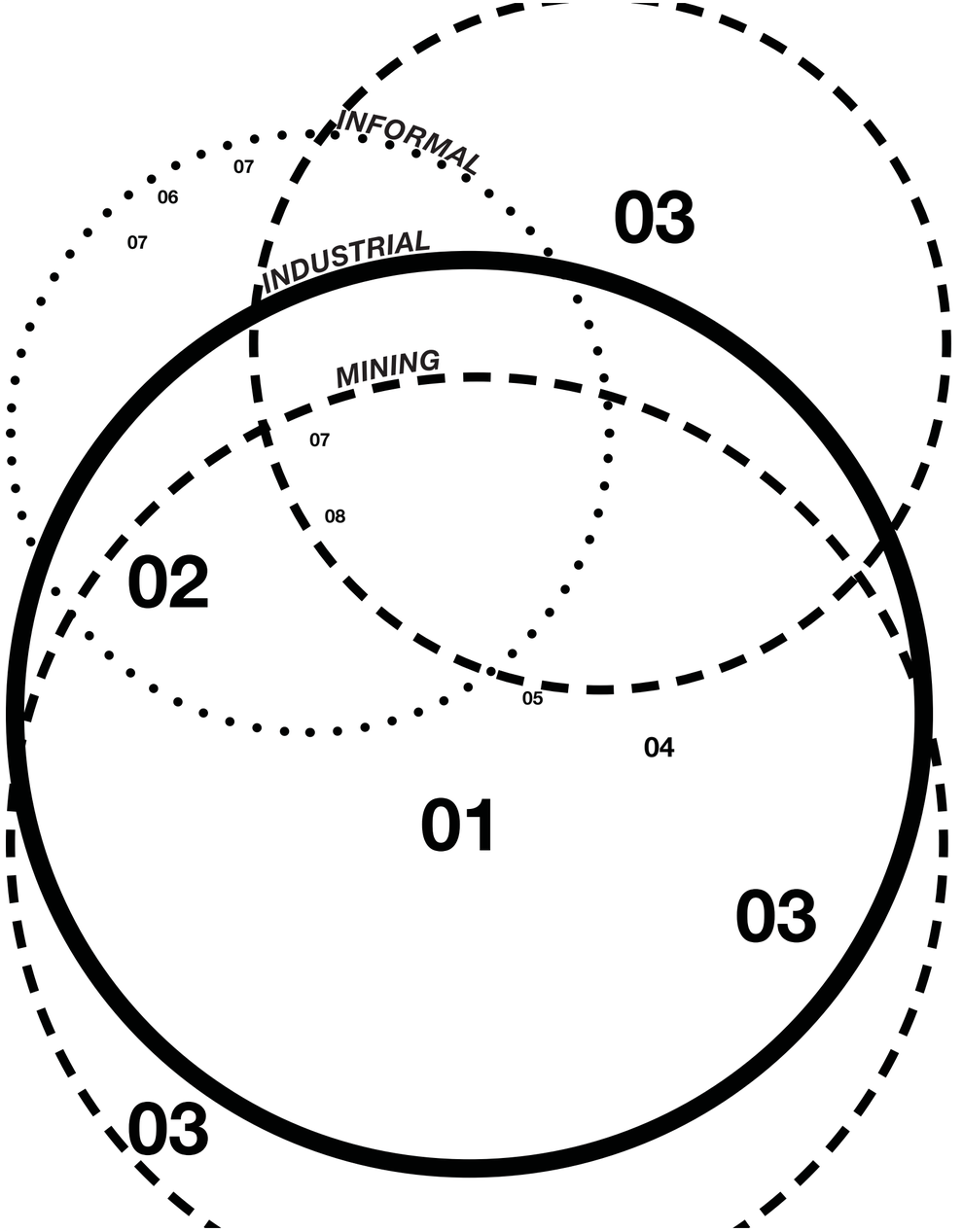


74 Map 7: Germiston North (Ekurhuleni Metropolitan Municipality).



73 Map 6: Gauteng's municipal boundaries (After Bloch, 1997: 07).

Apart from Germiston North being situated within Johannesburg's primary manufacturing belt, commonly referred to as the Reef line, the site was chosen for a number of more specific reasons; among them were the large number of *urban miners,* operating in the area, who currently make a living from salvaging scrap metal and recyclable waste; Germiston's layered history as a mining town and important manufacturing node; the infrastructural significance associated with the east-west railway line and Main Reef roads, both of which converge at the border of Germiston and Germiston North; the ability to plug into the existing metal industry and access the surrounding labour markets; but most importantly the site was chosen for its proximity to the industrial, informal, and mining contexts of the area. The relationship shared by this contextual trilogy provides the ideal platform to stage my enquiry into a future public space – a pioneering metal market embedded between a glorious past, an unpredictable future, and a prospective future.



E

SITE SELECTION

01 INDUSTRIAL CONTEXT
The manufacturing sector in Germiston North has defined the area as metals workshop. This continuous industrial field, broken only by the mine dumps, follows Main Reef road along an east-west axis, and is one of the largest in South Africa (Bloch, 1997).

02 INFORMAL CONTEXT
Bordering the industrial belt is the Makause Informal Settlement. There are other smaller settlements scattered around Germiston North, nearly all of them have sprung up next to large factories and manufacturing zones.

03 MINING LANDSCAPE
The historic reef outcropping, which spanned from Boksburg to Krugersdorp, has, over the past 120 years, been developed into Johannesburg's Reef Line. The mixture of undulating landscape, manufacturing industries, and mine dumps is a primary feature of Johannesburg.

04 METAL INDUSTRY
Since the decline of gold mining in the area, Germiston North has been largely supported by its manufacturing sector. This sector specialised in metal production and processing. The greater area is also home to The Rand Refinery, which was once the world's largest gold refinery.

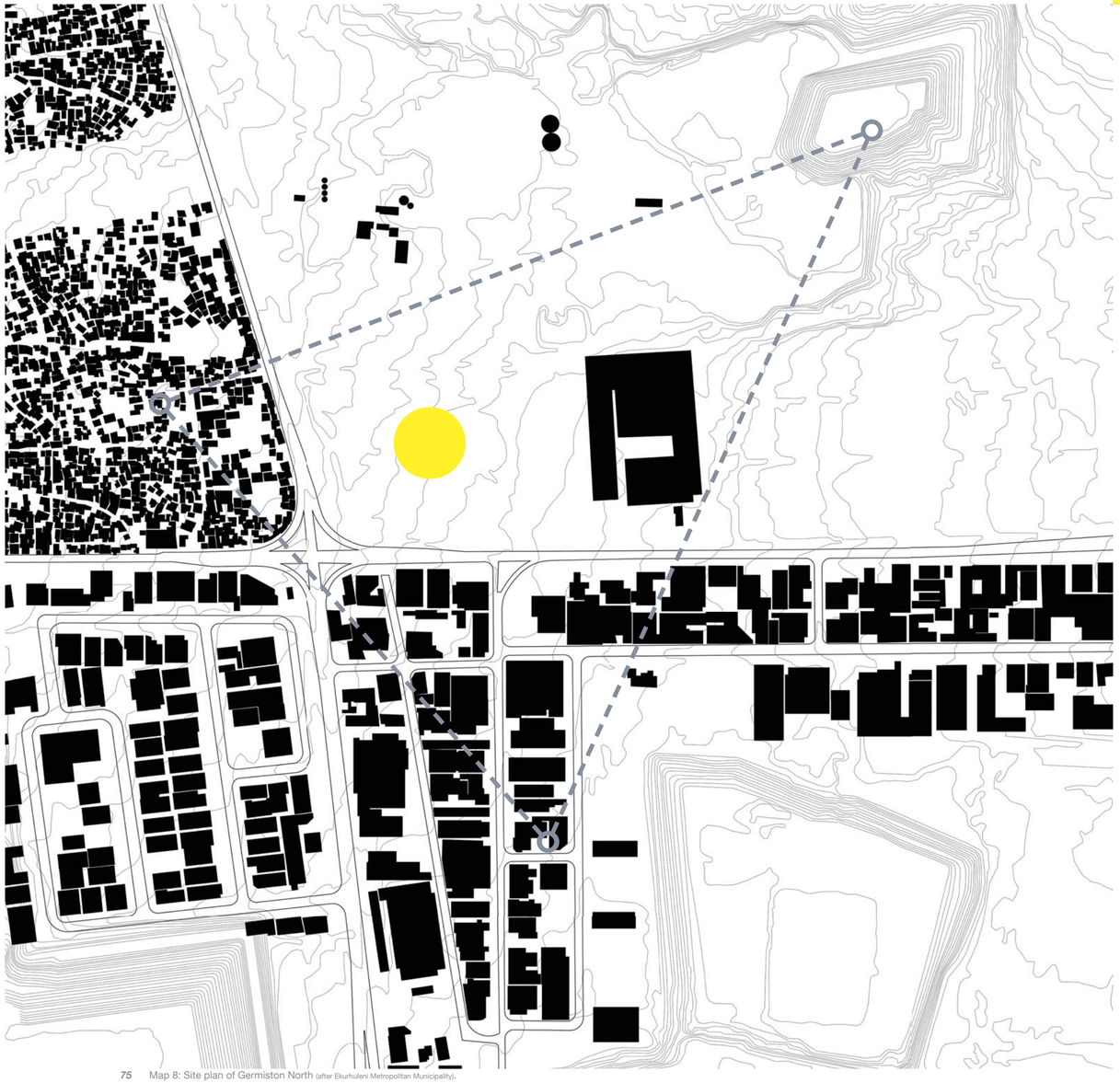
05 RECYCLING YARDS
In addition to the metal industry, a number of cash for scrap shops and plastic recyclers have opened shop in the area.

06 WASTE DEPOT
What was once a park, used daily by the children of Makause, is now a vast waste depot. Hundreds of heavy duty bags and trollies, filled to the brim with waste, are arranged and lie waiting for delivery.

07 BURN SITE
Adding to the frenzy of the waste depot are a number of pit burning sites used to salvage scrap metal.

08 TROLLEY ROUTES
Both Main Reef and Stanley roads are used as primary thoroughfares by the *urban miners* to deliver their daily hauls. The cruciform is delivering a new kind of metal to surrounding industries.

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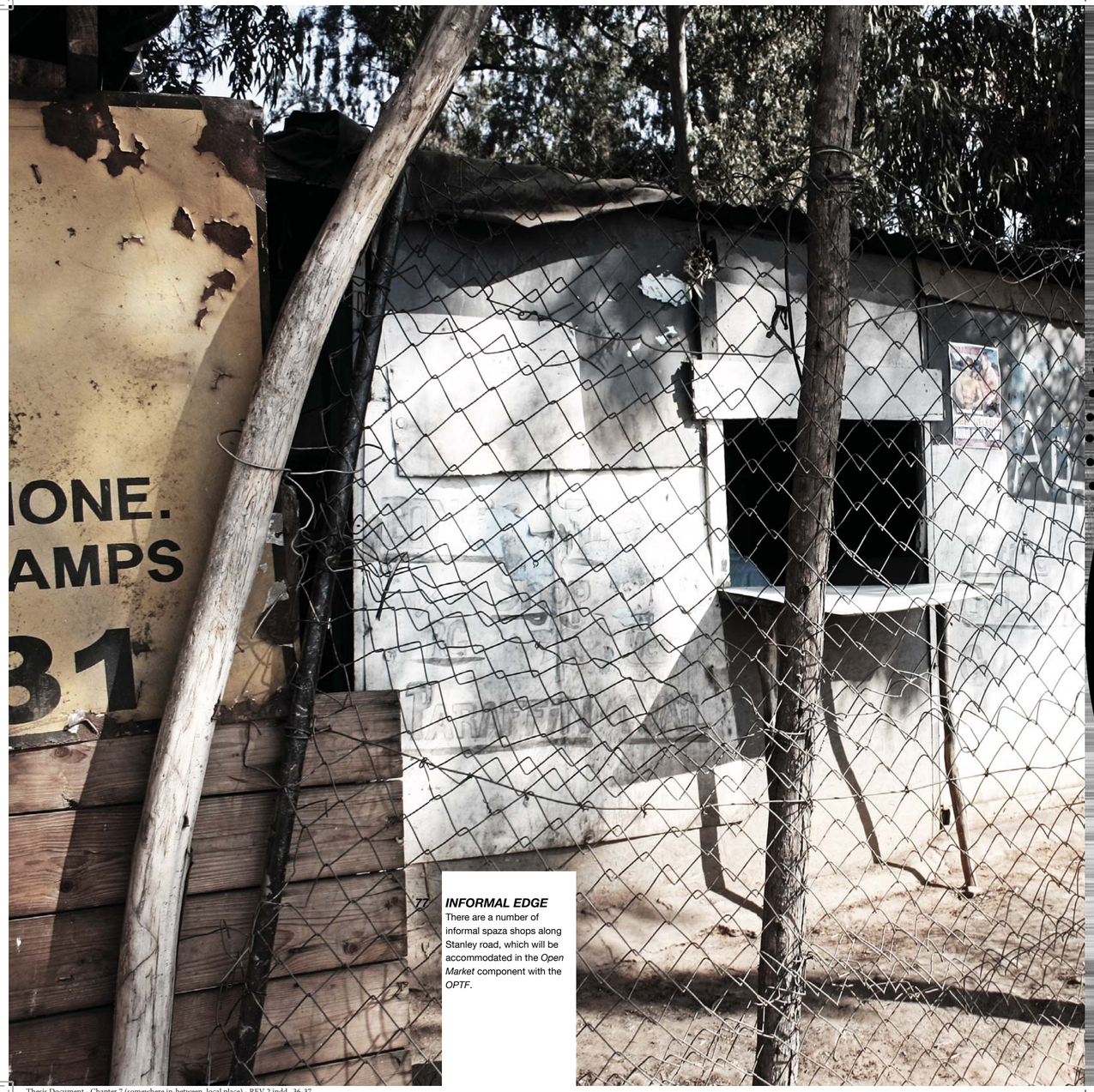
75 Map 8: Site plan of Germiston North (after Ekurhuleni Metropolitan Municipality).

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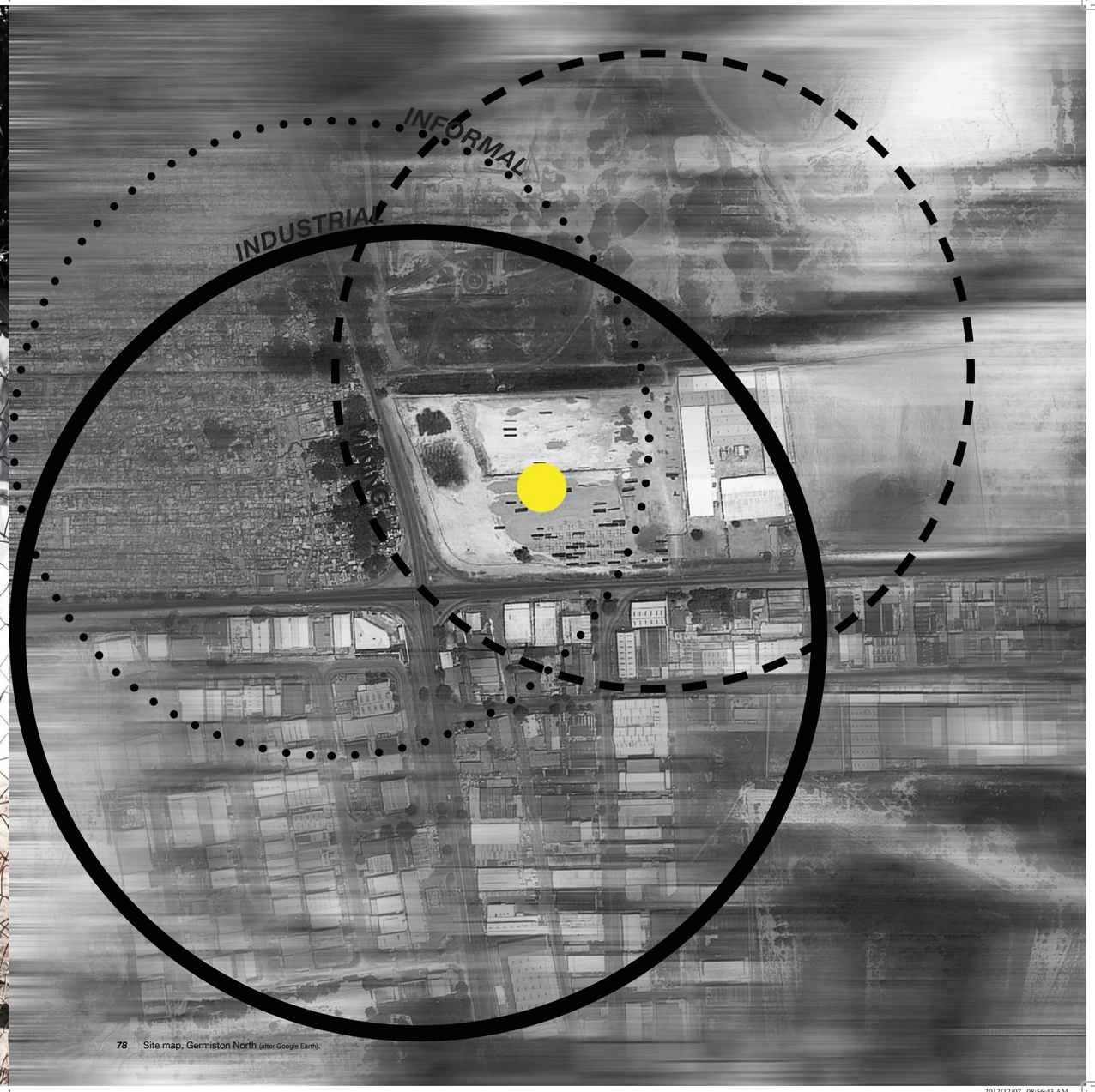
76 ***THE LOCALE***
The site, which borders on Main Reef and Stanley roads, is nestled between a massive factory, a densely built informal settlement, and historic mine dumps.



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77 ***INFORMAL EDGE***
There are a number of informal spaza shops along Stanley road, which will be accommodated in the *Open Market* component with the *OPTF*.



78 Site map, Germiston North (after Google Earth).

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BEHIND CLOSED INDUSTRY

Germiston North is layered with contrasting contextual strands. Here the densely built informal settlement, Makause, which is located along the busy edge of Main Reef and Stanley roads, is in strong contrast with the industrial footprint of Garsin Engineering.

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80

MAIN EDGE

The manufacturing industry lining Main Reef road in made up predominantly of metal producing and processing industries. The most common types being steel works, and motor vehicle related sub-industries.

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RIDING TO WORK

Urban miners use Stanley and Main Reef roads as primary thoroughfares in their search for waste. In this photograph a man riding his trolly, travelling along Stanley road, has sourced his daily haul from Primrose. He will now stop at the informal waste depot in Makause; where a group of urban miners will separate his waste into plastics, metals, and repairable items. From there he will travel into Germiston North to exchange his waste.

INFORMAL DEPOT

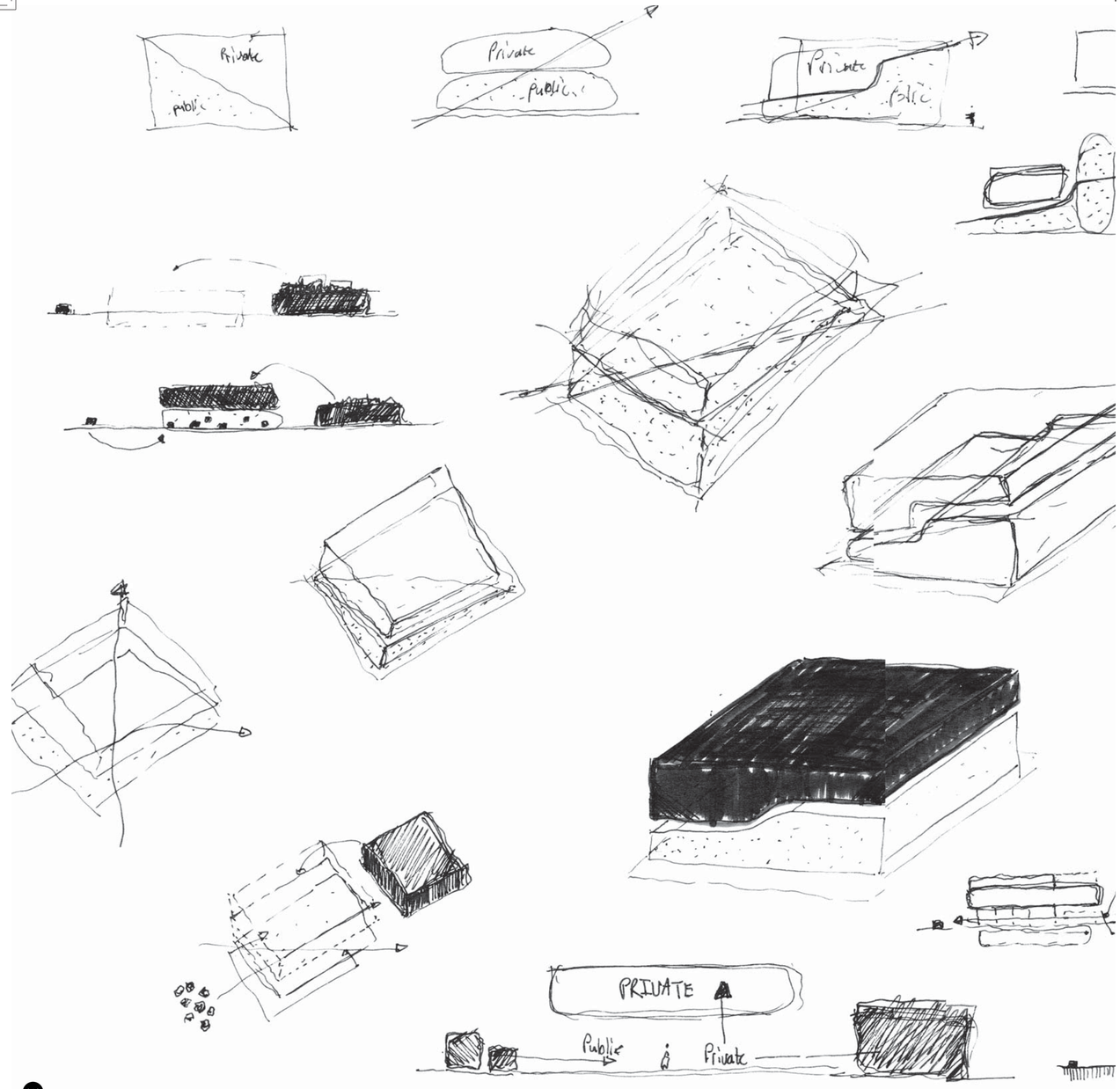
The large clearing in the Makause Informal Settlement was once a park where children played soccer, now it is a dangerous exchange depot used to sort, pack, and burn waste. On the edge of the settlement, a number of informal trading stalls have been established to exchange scrap and precious metals.



83 ***WORKING THE FOOTHILLS***

The clearings, where the mine dumps once stood, have either become places of business for a few informal traders, or they have become dumping site for all manner of waste.





01

01 The initial gestures were towards developing a principle concept for ordering public and private space. The major parti arrangement had to deal with the adjacent private industries and the informal context. In addition, consideration had to be given to the busy Main Reef and Stanley roads which border the site.

02 The diagrammatic separation of public and private programme was then explored through section. The focus of the public zone was to address the issue of the passing urban miners and the busy commercial street edge. Still represented in these diagrams as two separate masses, the final concept in dealing with public and private will see the two components woven together. This seamless blend will allow for the collision of different user groups, and ultimately mix the informational and informal themes of this thesis.

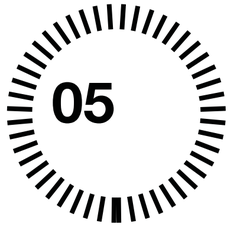
02, 03

03 One of the key aspects of this thesis is challenging traditional forms of public space, and the site was specifically chosen because of its relationship to mixed urban uses. Instinctively, the street and informal settlement edge was viewed as a tool to order the public programme, while the adjacent factory edge could be used to order the private programme.

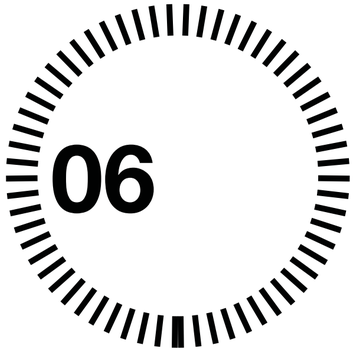
04

04 The public and private ordering was explored by arranging the major programmatic components in a triangular relationship or configuration. This simple parti arrangement, although initially conceived here in plan would pave the wave for a more complex spatial arrangement across three dimensions – a layered matrix of public and private space centred around the heart of the building.

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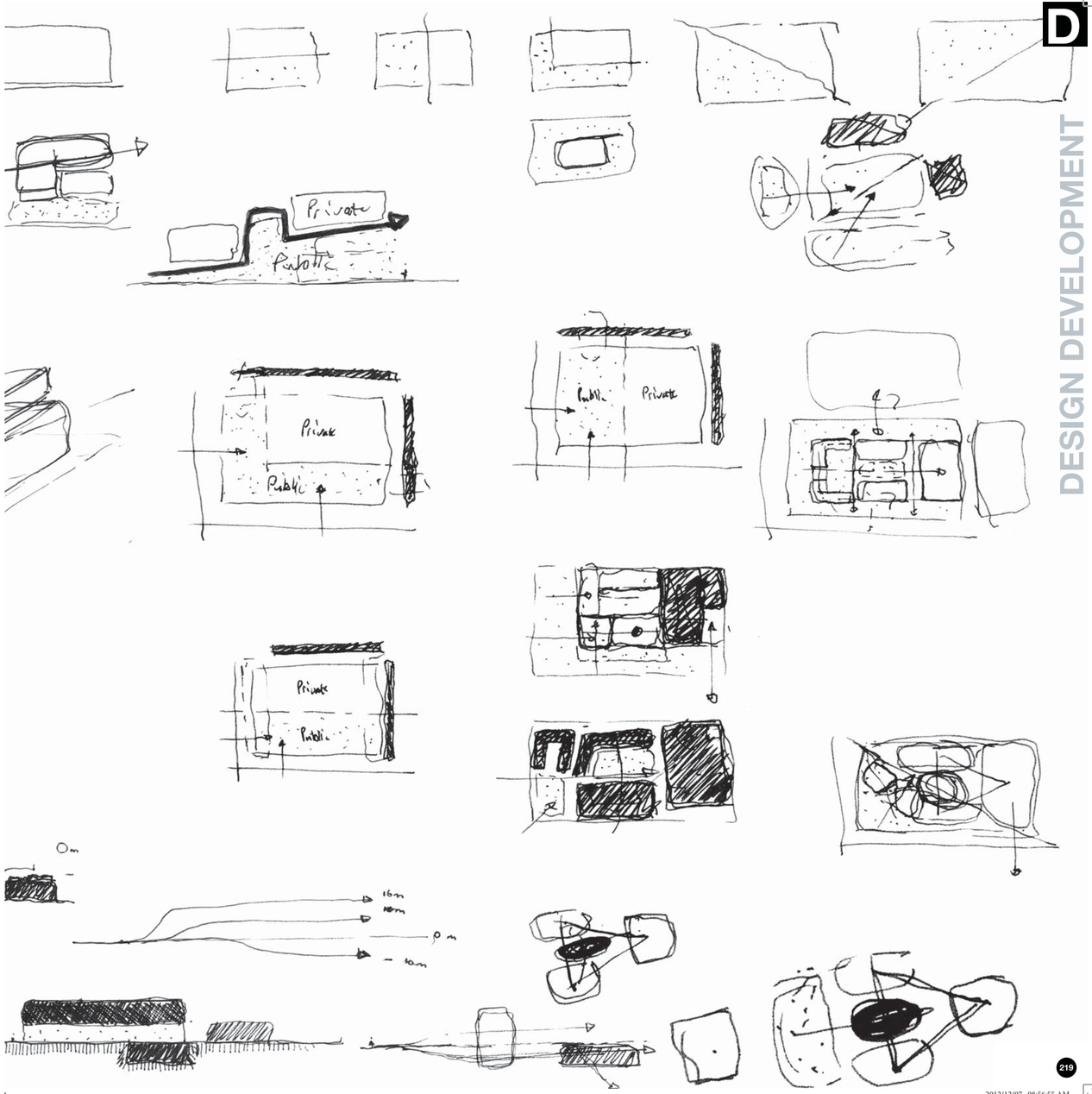
05 The natural instinct to divide the site along a diagonal, which symbolically separates public and private programme, came from the movement of urban miners from the informal settlement to the adjacent scrap metal yards in the industrial area. This dividing line would essentially serve as the first mark upon the site – a path which would later become a active route blurring the lines of public and private division.



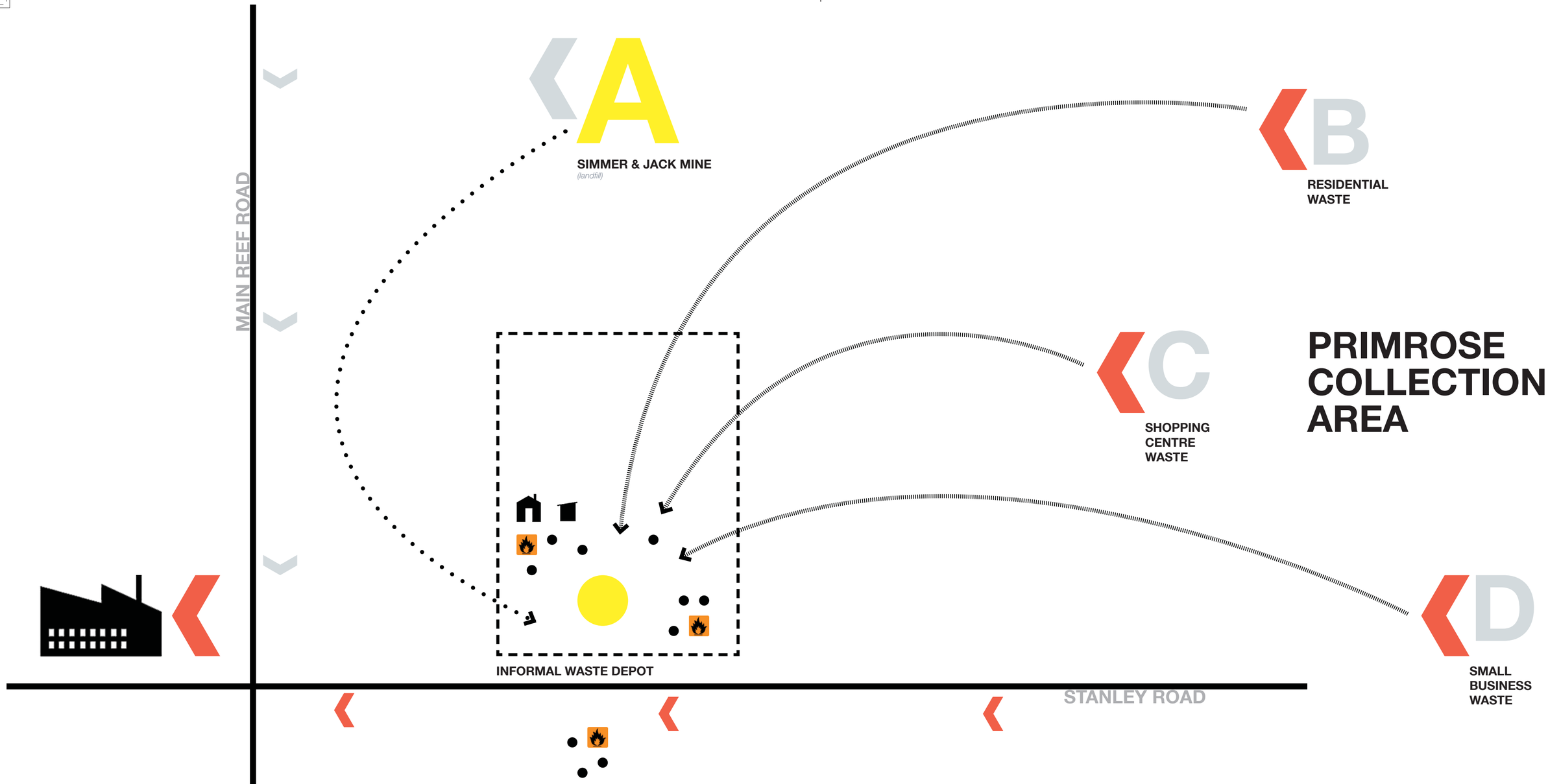
06 The shear size and sectional volume of the heavy industrial factories, in comparison to the seemingly flat scale of the dense informal settlement, required a unique approach. The sectional diagram for the public private spatial division was built upon, whereby the private industrial programme would be pulled from the ground and lifted above the surrounding industrial context. This allows for a voluminous public ground level across the site, which seamlessly integrates the informal activities of the urban miners with *The Open Market* and surrounding metal industry.



07 The large spatial requirements of the *Waste Process Laboratories*, financial and administration components, and *Mixed Metals Refinery* plant can be easily accommodated above the site as a private layer. This vertical shift allows the ground plane to be conceived as public field – a multi-dimensional realm – that accommodates major circulation, dense market activity, and the mixing of formal, informal and digital trade.



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PRIMROSE COLLECTION AREA

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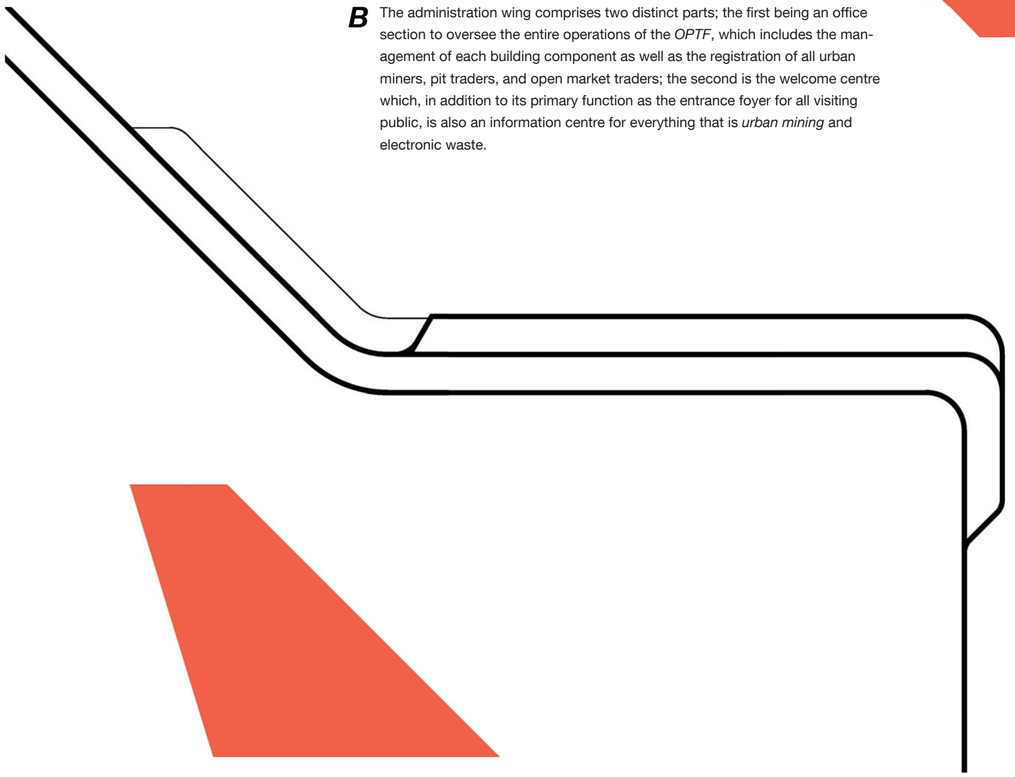
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84 ***URBAN MINERS***
A group of woman are responsible for packing and sorting a large portion of the waste that moves through the *informal waste depot*.



A The administration wing and *Metal Route* are the components that stitch together the individual programmatic elements of the *OPTF*. Practically the administration wing functions as any other administration office would, and the *Metal Route* is essentially a concourse reinvented, packaged, and exhibited as an industrial track. However, their positions within this mixed-metals market complex are far more significant than what is plainly suggested.

B The administration wing comprises two distinct parts; the first being an office section to oversee the entire operations of the *OPTF*, which includes the management of each building component as well as the registration of all urban miners, pit traders, and open market traders; the second is the welcome centre which, in addition to its primary function as the entrance foyer for all visiting public, is also an information centre for everything that is *urban mining* and electronic waste.



C The *Metal Route* is an industrial band, much like the east-west geometry of Johannesburg's Reef, in the sense that it connects a myriad of activities, events, and components through its organisational structures. Moreover, it can be understood as a metaphor for street and rail; where the current informal metal activities happening in and around Germiston North now have a definite place and prescribed role inside the building. If the Reef outcrop and Johannesburg's mining sector were consolidated through the developments of the east-west rail route and Main Reef road, and Germiston's success was built on the convergence of infrastructures along the cruciform geometry, then the operations of the *OPTF*, united through the circulation routes, working spaces, and gantry systems of the *Metal Route*, come together in *The Trading Pit*. This final programmatic component, which completes the *OPTF*, harks back to an era of mining and associated metal industry by retracing the tracks of early highveld pioneers through a process of 21st century mining.

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DESIGN DEVELOPMENT

OPEN PUBLIC TRADE FORUM

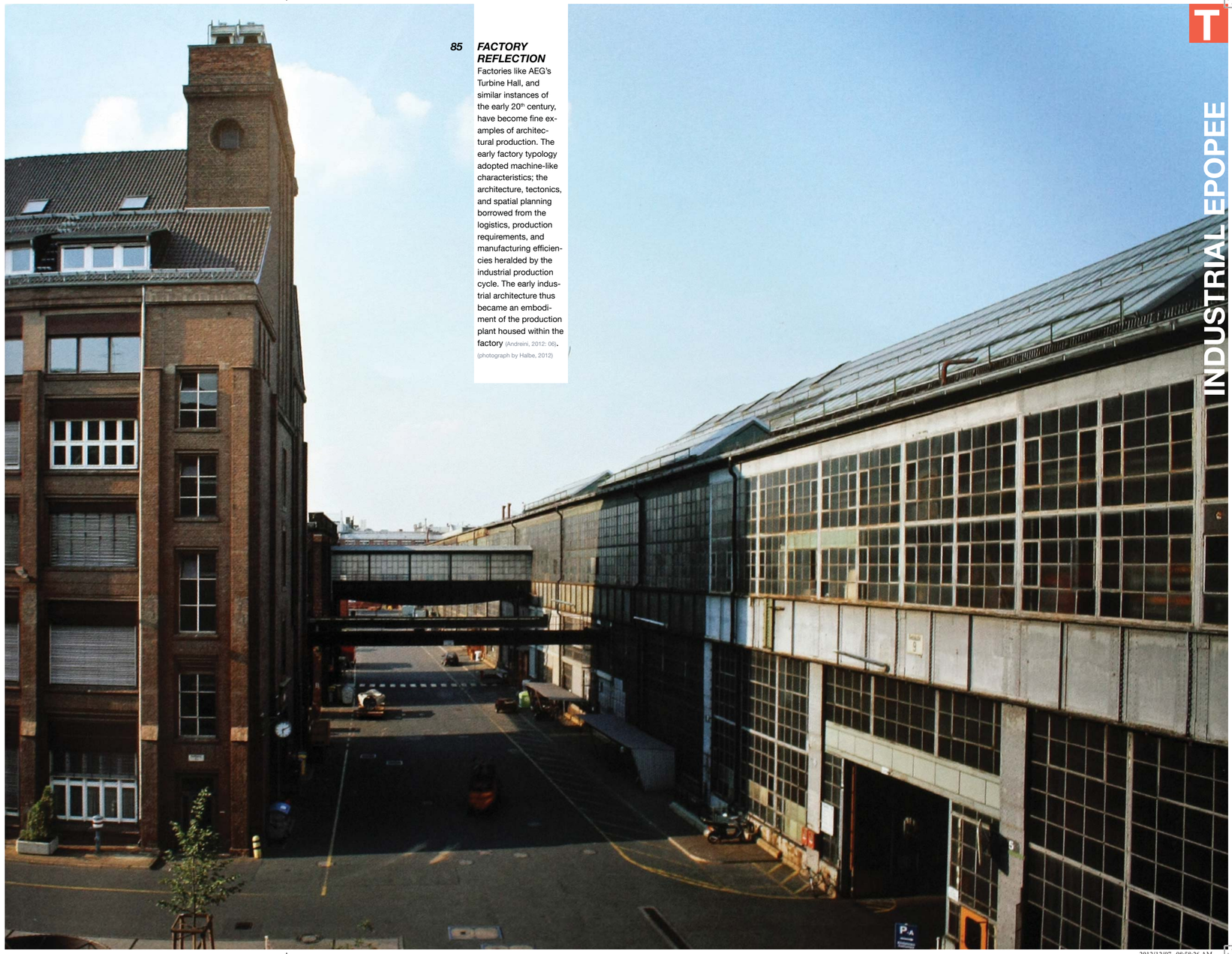
A Mixed Metals Market For 21st Century Mining

CRAFTING A TYPOLOGY

Market
Factory
Museum
Landscape

By virtue of its nature the industrial building is considered an essential part of the production cycle; in fact this relationship is one of only a few where the building type can be measured more in terms of instrumental assents than of real estate value (Casamonti, 2012:02). According to Paolo Portoghesi's Encyclopaedic Dictionary of architecture and town planning, the term industrial architecture is used to indicate '[...] the architectural typology of buildings intended to "contain" a production plant [...]' (Andreini, 2012:04). Simply put, the industrial typology is typically seen a matter of structures assembled around a series of works spaces, and whose design is therefore determined by logistics and production requirements, while the themes of habitable working space and the relationship between environmental conditions and the workers is unfortunately seldom a chief priority in the architectural design, which is usually conditioned by the requirements of machines (Andreini, 2012:04). After all, it is to allow the latter to function that any industrial building has been erected in the first place.

Analogously, the industrial building type – apart from a few worthy exceptions – appears impervious to the landscape and context around which it is sited and seems, despite the freedom provided by the often gigantic dimensions of its own volumetric structure, incapable of building new ones (Andreini, 2012:04). Moreover, large industrial complexes usually distinguish themselves by their absolute anonymity, which establishes a sense of disillusionment and exclusion to the surroundings in the best case, while they often present a threat due to the emissions and waste of natural resources in the worst (Andreini, 2012:04). It must however be mentioned that, as compared to other typologies, the factory can count on a relatively recent history and tradition; constructions of the industrial building type have been developed for little more than three centuries in the most advanced nations, and more recently as of last century in countries of the developing world (Andreini, 2012:04). An attentive reflection and evolution on the idea of the factory has yet to be brought to accomplishment in the developing world, and this would arguably – if the extent of its interaction with the landscape and working population were to be appreciated – produce extremely interesting effects in relation to the context surrounding it.



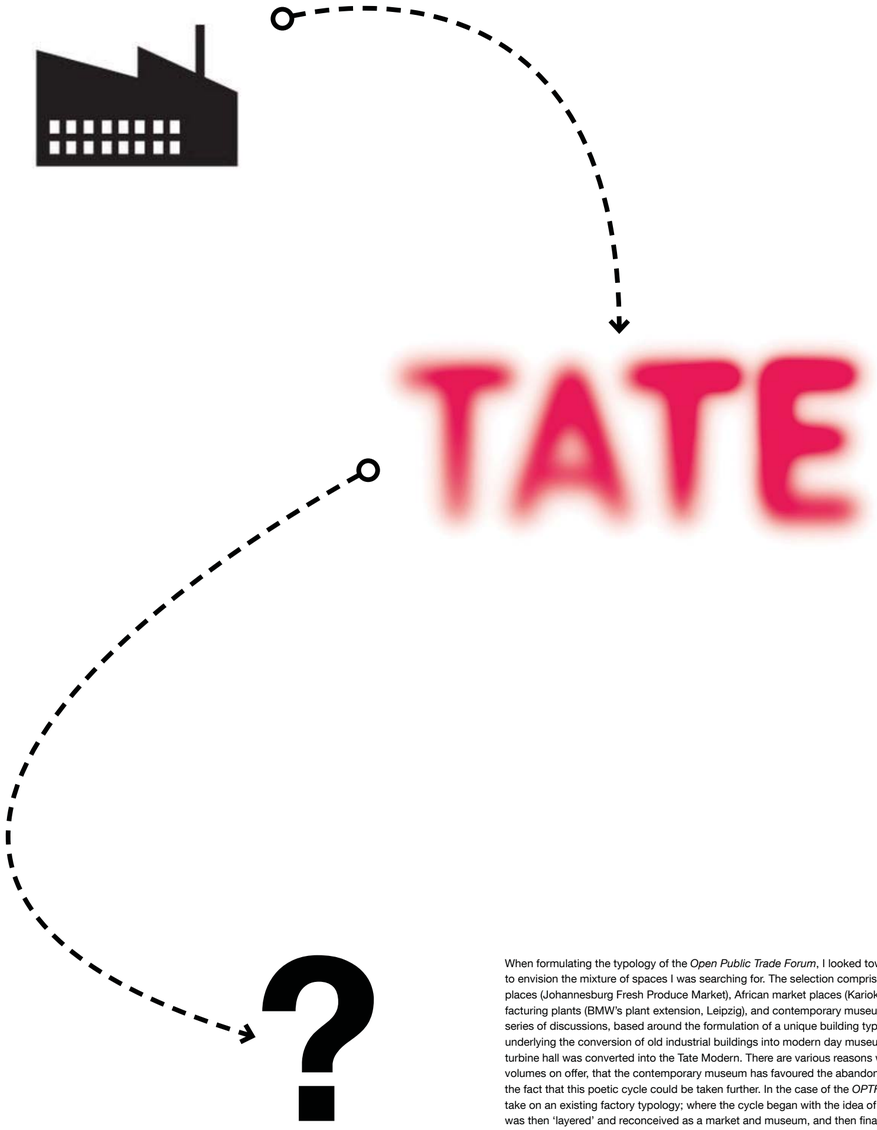
85 FACTORY REFLECTION
Factories like AEG's Turbine Hall, and similar instances of the early 20th century, have become fine examples of architectural production. The early factory typology adopted machine-like characteristics; the architecture, tectonics, and spatial planning borrowed from the logistics, production requirements, and manufacturing efficiencies heralded by the industrial production cycle. The early industrial architecture thus became an embodiment of the production plant housed within the factory (Andreini, 2012: 06).
(photograph by Halbe, 2012)

Thesis Document - Chapter 8 (forming typology, programme breakdown, concept development, design development) - REV 2.indd 2-3
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An interesting comparison can be drawn between traditional notions surrounding the construction of large industrial buildings, which are based on logistic, distributive, and volumetric requirements determined by production, and the destiny and role of architecture today, which is directly linked to the value and product itself as perceived by the market (Casamonti, 2012:02). In fact, it is a trend that seems to be shifting the meaning of the industrial building shell, as well as the manner in which the factory interacts with its context; by following the necessary demands of global competition a particular association is given to a product or the commercial culture whereby the building now represents a transmissible added value (Casamonti, 2012:02). In addition, since communication has become far more important than in the past when it comes to sealing the success of a consumer commodity, the places, spaces, and methods of production have become entwined with design and aesthetics (Casamonti, 2012:02). Due to this shift in thinking, a new importance has been attached, quite beyond the physical and qualitative consistency of the product to the entire manufacturing philosophy; where the respect for workers and their working conditions; the safeguarding of the environment and consumption of resources; the production of polluting emissions; and the origin of raw materials now form part of the overall image of a company (Casamonti, 2012:02).

In his conception of *'Architecture for Industry'*, Marco Casamonti (2012:02) believes that '[i]n this scenario the term "factory" appears too simplistic and not sufficiently exhaustive with respect to the complexity of the contemporary processes and industrial realities'. Today, the term producing means to design, engineer, assemble, advertise, exhibit and market a certain product (Casamonti, 2012:02).

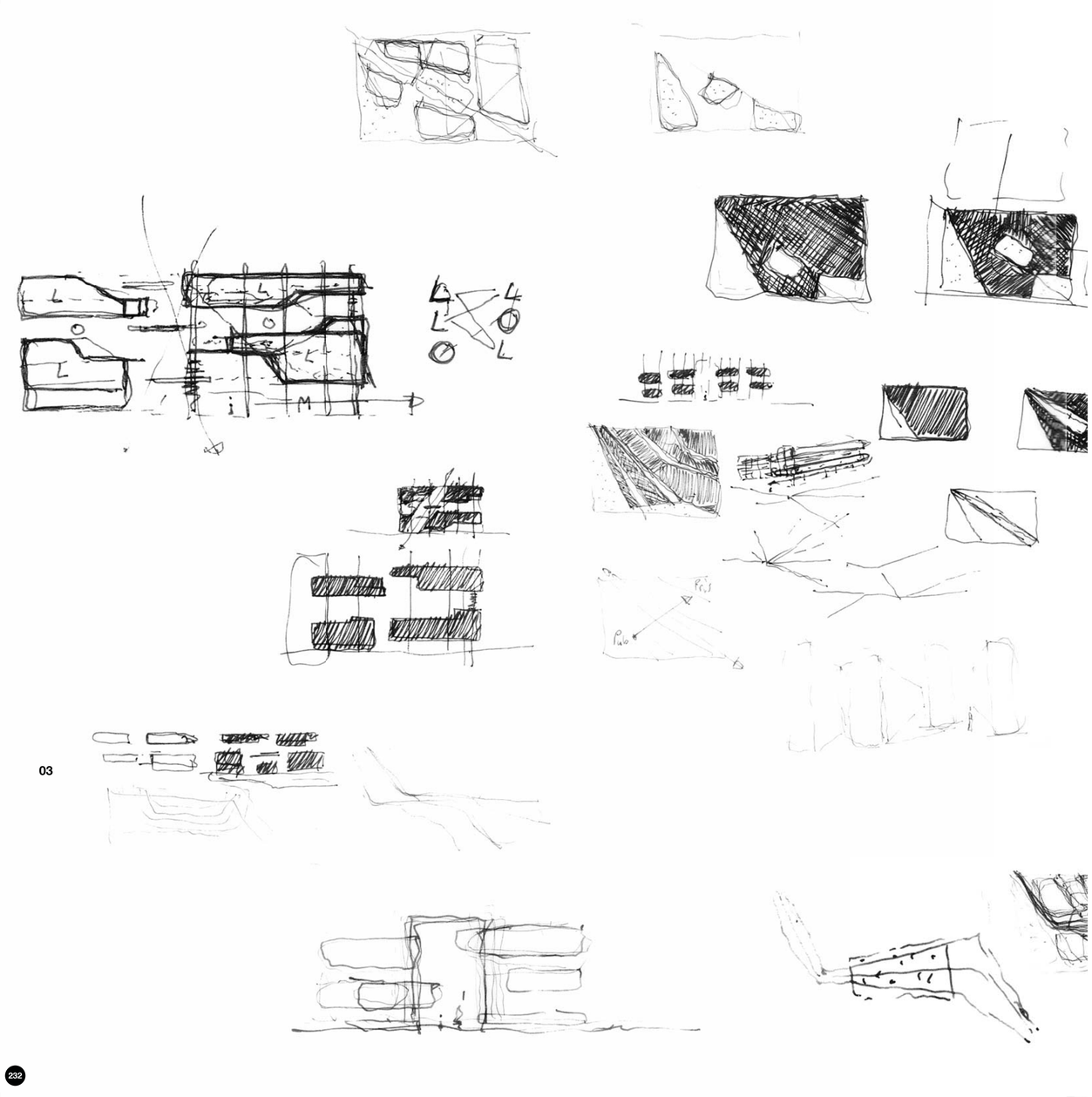
It would thus feel more appropriate to refer to the contemporary factory typology as an industrial complex made of multifunctional spaces that represent the essence and substance of raw material, finished product, and company. By reimaging the industrial typology as something more – a system of interrelated architectural components that converse with the landscape and surrounding territory – a possibility presents itself to remove the anonymity currently clouding many existing industrial buildings.



When formulating the typology of the *Open Public Trade Forum*, I looked toward a number of existing types in order to envision the mixture of spaces I was searching for. The selection comprised the following: commercial market places (Johannesburg Fresh Produce Market), African market places (Kariokor Market, Nairobi), factories or manufacturing plants (BMW's plant extension, Leipzig), and contemporary museums (Tate Modern, London). During a series of discussions, based around the formulation of a unique building type, what became apparent was the poetry underlying the conversion of old industrial buildings into modern day museums – as was the case when London's old turbine hall was converted into the Tate Modern. There are various reasons why, besides the flexible spaces and tall volumes on offer, that the contemporary museum has favoured the abandoned factory, but what is more critical was the fact that this poetic cycle could be taken further. In the case of the *OPTF*, the typology was conceived as a fresh take on an existing factory typology; where the cycle began with the idea of an 'old' factory serving at the base, this was then 'layered' and reconceived as a market and museum, and then finally the poem was completed when the new public environment was made into a factory once again.

Thesis Document - Chapter 8 (forming typology, programme breakdown, concept development, design development) - REV 2.indd 4-5

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03

01

01 After engaging with an experimental process of disassembling electronic waste and sorting its constituent components, the idea of a vector became clear to me. The flow of information and current moving through the embedded paths of gold and copper could be viewed as an extended metaphor for carrying the myriad of connections and activities passing through the building (this metaphor would be layered upon by the tracks of early mining pioneers, and the idea of bringing an industrial street through the building. The parti was conceptualised as a three dimensional route whereby the various programme and users could be connected across a field of interconnected paths. Spatially conceived as a linear and vertical mass – a metaphorical and structural spine that supports the entire building – its purpose would serve to stitch the various public and private programme not only across the site, but more importantly through space.

Thesis Document - Chapter 8 (forming typology, programme breakdown, concept development, design development) - REV 2.indd 6-7

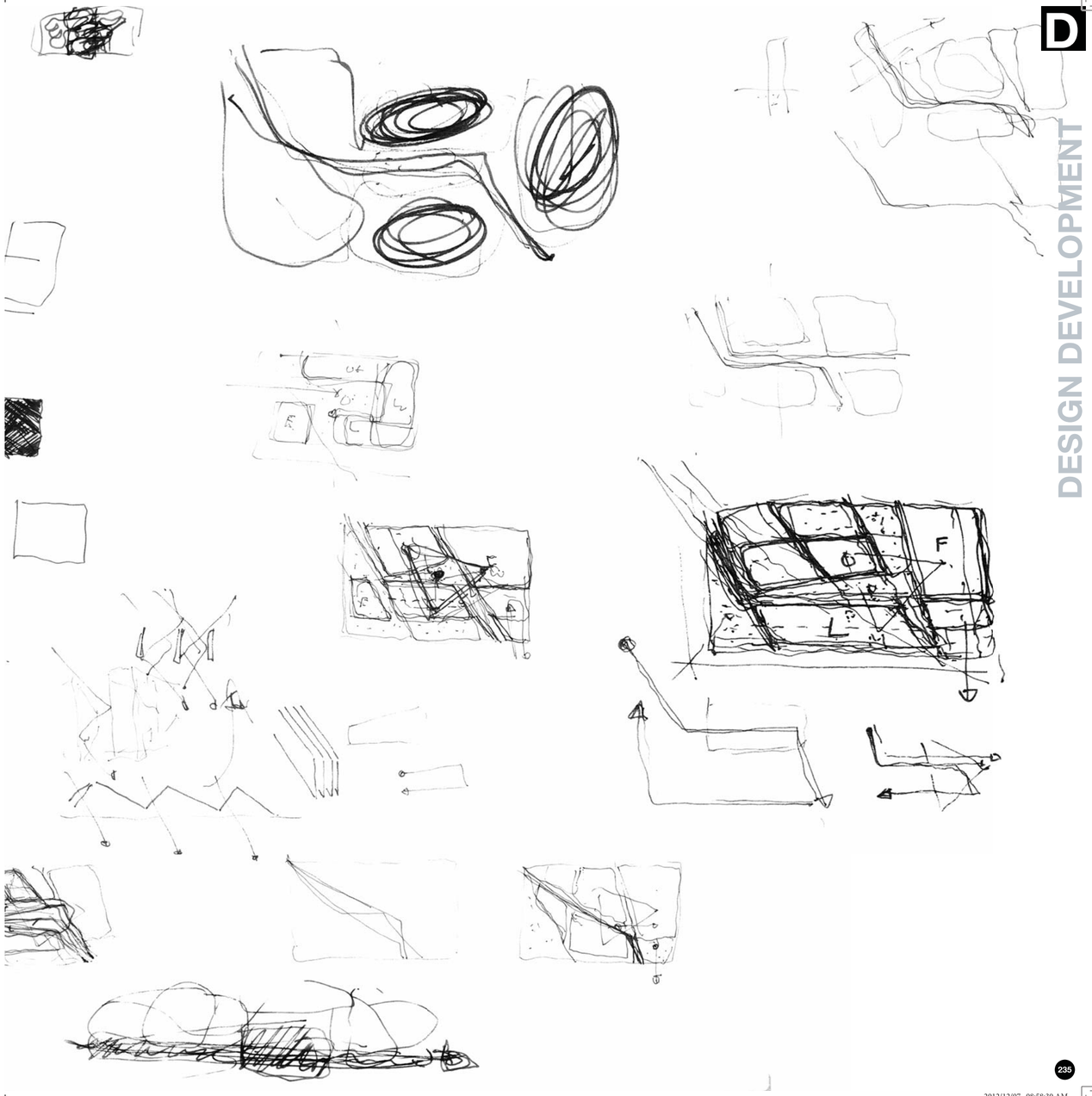
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03

03 The abstract patterning of the electronic circuits provided an early diagram for positive and negative space within the building. In this instance, the conceptualisation of sectional space was explored through a relationship diagram, whereby positive space was conceived as a solid mass, which would house a contained programme, and the remaining negative space conceived as open programme and multivolume circulation space. The sculpted sectional forms, although abstracted at this stage, allowed for the contained programme to expand and achieve a higher volume where necessary. This diagram, where a layered programme is essentially stacked between solid and void, takes the user on a journey woven through space.

02

02 Early parti ideas were focused around a fragmented programme with pockets of open space. This idea borrowed heavily from traditional public squares enclosed by buildings, and in this case by the various programmatic components of the market place. However, borrowing traditional public typologies and mimicking conventional responses to the urban user did not feel appropriate, because at its core, this thesis seeks to challenge our conception and perceptions of the public realm. To challenge the very essence of what a public space could offer an informal and industrial context required a fresh response that was in conversation with the everyday processes affixed to the area. *Urban mining* and electronic waste, the abstract nature of digital communication, and the surrounding metal industry provided the inspiration and platform to begin conceptualising the spatial arrangement of the building.



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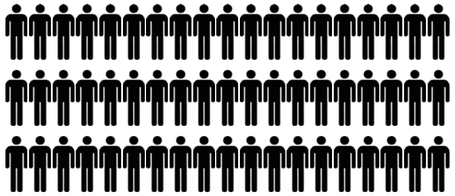
1 ton = 4000 units

R150 000
at current metal values

Average number of mixed electronic units found in one ton of electronic waste.



1 urban miner = 5kg/20 units of per day.



400 urban miners = 2000kg/8000 units per day.

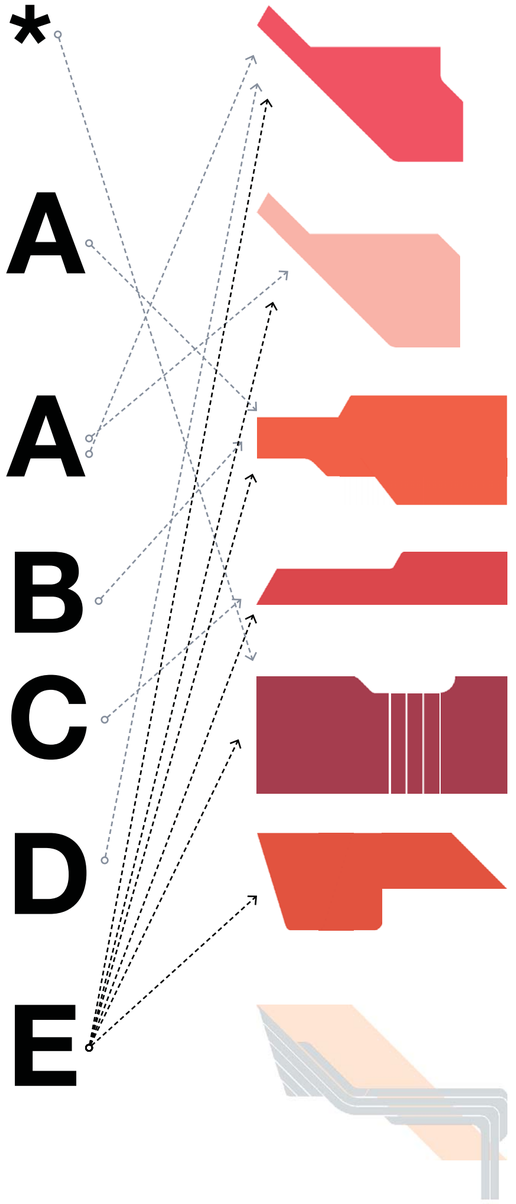
730 tons

Potential amount of mixed electronic waste processed each year.

(source: information adapted from Electronics TakeBack Coalition, 2010; EMPA, 2009.)

QUANTIFYING PROGRAMME

With the explanation of each programmatic component broadly introduced and defined in the previous chapters, it will be my intention to quantify and accurately define the building programme within the section to follow. From my research and analysis I have used the potential output of a single *urban miner* as the basis for the generation of the programmatic values. The idea of people as a collective infrastructure has thus been used to quantify the amount of electronic waste that could potentially be processed by the *OPTF*; this value has specifically determined the dimensions of *The Trading Pit*, *Electronic Waste Processing Labs*, and the *Mixed Metals Refinery*.



ELECTRONIC WASTE PROCESSING LAB

The piles of electronic waste auctioned in *The Trading Pit* are sent to the *Waste Processing Lab* where they will be processed into unrefined mixed metals. The bulk metal product produced within this controlled working environment will then be sent to the *Mixed Metals Refinery* for final processing and refinement.

THE OPEN MARKET

Refurbished electronics and small metal parts, or rough diamonds so to speak, are sold to the public and interested buyers in an open market environment. A number of metal craft and food stalls are also accommodated within this mixed trading space.

THE TRADING PIT

In the breakdown spaces a large quantity of electronic waste is disassembled, by teams of *urban miners*, into its constituent metal components. This unrefined bulk metal waste is then auctioned in *The Trading Pit* to a highly competitive group of *pit traders*, agents, and local electronic practitioners.

DIGITAL TRADING FLOOR

The *Digital Trading Floor*, or financial exchange, is where the refined metal commodities, produced within the *OPTF*, are traded on the global economic market.

MIXED METALS REFINERY

This state-of-the-art refinery processes the bulk metal product from the *Electronic Waste Processing Lab*. This industrial realm is responsible for the transformation of the mixed metal product into a fine metal commodity ready for local and global trading. The refinery also accommodates a warehouse facility for the packing, storing, and distribution of the new metal commodities.

ELECTRONIC ACADEMY

This education component affords community members, of the Makause Informal Settlement, as well as external learners the opportunity to gain key knowledge centred around the processing of electronic waste; essentially preparing community members and established *urban miners* for a career working in and around the *OPTF*. The facilities of *Electronic Academy* are not limited to a practical studio based environment; where in addition to its function as a lecture venue, the auditorium can also be used by the Makause Community to hold regular meetings.

ADMINISTRATION AND METAL ROUTE

The *Administration Wing* and *Metal Route* stitch together the components of the *OPTF*. Practically the *Administration Wing* functions as any other management office would, and the *Metal Route* is essentially a concourse reinvented, packaged, and exhibited as an industrial track.

1 PROCESS-ING LABS 1980 sqm
2 AMENITIES 330 sqm
3 RESEARCH DIVISION 270 sqm
4 ADMINIS-TRATION 270 sqm

* *WASTE PROCESSING LABS*
2850 sqm

A *THE OPEN MARKET*
980 sqm

1 MARKET FLOOR 850 sqm
2 AMENITIES 130 sqm

A *THE TRADING PIT*
7550 sqm

1 AUCTION ARENA 2100 sqm
2 BREAKDOWN SPACES 1600 sqm
3 CANTEEN 1550 sqm
4 SERVICE YARD 2000 sqm
5 AMENITIES 300 sqm

1 DIGITAL TRADING FLOOR 1100 sqm
2 SERVICE AND MAINTENANCE 100 sqm
3 AMENITIES 300 sqm

B *DIGITAL TRADING FLOOR*
1500 sqm

E *METALS ROUTE*
3000 sqm

C *MIXED METALS REFINERY*
4500 sqm

1 REFINERY FLOOR 2500 sqm
2 WAREHOUSE FLOOR 1500 sqm
3 STORAGE AND MAIN-TENANCE 300 sqm
4 WAREHOUSE ADMIN 200 sqm

1 AUDITORIUM 500 sqm
2 STUDIO'S AND WORK ROOMS 300 sqm
3 EXHIBITION 200 sqm
4 AMENITIES 200 sqm

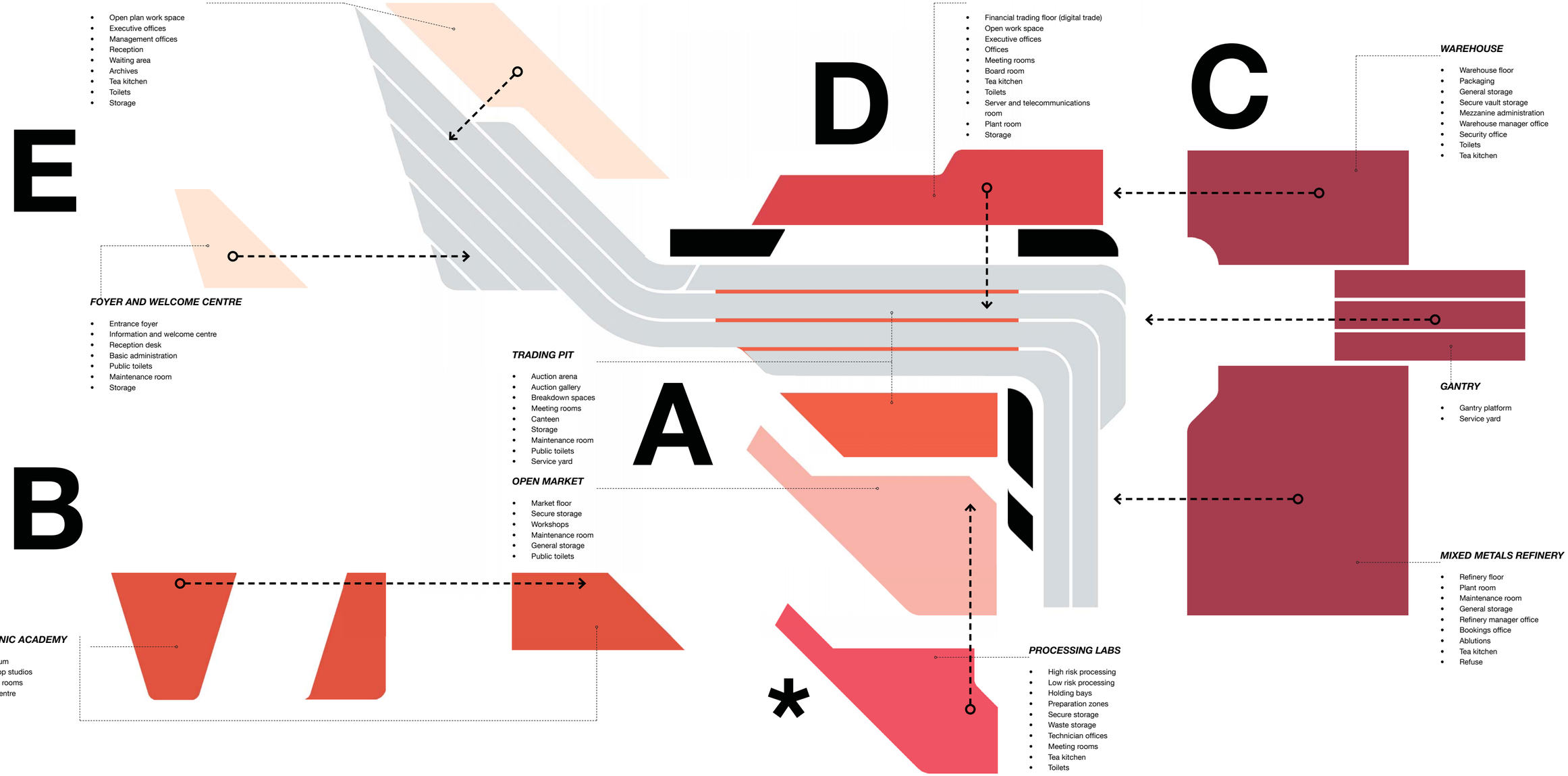
D *ELECTRONIC ACADEMY*
1200 sqm

1 ADMINISTRATION OFFICES 800 sqm
2 FOYER AND WELCOME CENTRE 600 sqm
3 RECEPTION 100 sqm
4 AMENITIES 100 sqm

E *ADMINISTRATION WING*
1600 sqm

SPATIAL QUANTITIES

Thesis Document - Chapter 8 (forming typology, programme breakdown, concept development, design development) - REV 2.indd 12-13
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ADMINISTRATION WING

- Open plan work space
- Executive offices
- Management offices
- Reception
- Waiting area
- Archives
- Tea kitchen
- Toilets
- Storage

FOYER AND WELCOME CENTRE

- Entrance foyer
- Information and welcome centre
- Reception desk
- Basic administration
- Public toilets
- Maintenance room
- Storage

TRADING PIT

- Auction arena
- Auction gallery
- Breakdown spaces
- Meeting rooms
- Canteen
- Storage
- Maintenance room
- Public toilets
- Service yard

OPEN MARKET

- Market floor
- Secure storage
- Workshops
- Maintenance room
- General storage
- Public toilets

ELECTRONIC ACADEMY

- Auditorium
- Workshop studios
- Seminar rooms
- Media centre
- Offices
- Toilets
- Storage

DIGITAL TRADING FLOOR

- Financial trading floor (digital trade)
- Open work space
- Executive offices
- Offices
- Meeting rooms
- Board room
- Tea kitchen
- Toilets
- Server and telecommunications room
- Plant room
- Storage

PROCESSING LABS

- High risk processing
- Low risk processing
- Holding bays
- Preparation zones
- Secure storage
- Waste storage
- Technician offices
- Meeting rooms
- Tea kitchen
- Toilets

WAREHOUSE

- Warehouse floor
- Packaging
- General storage
- Secure vault storage
- Mezzanine administration
- Warehouse manager office
- Security office
- Toilets
- Tea kitchen

GANTRY

- Gantry platform
- Service yard

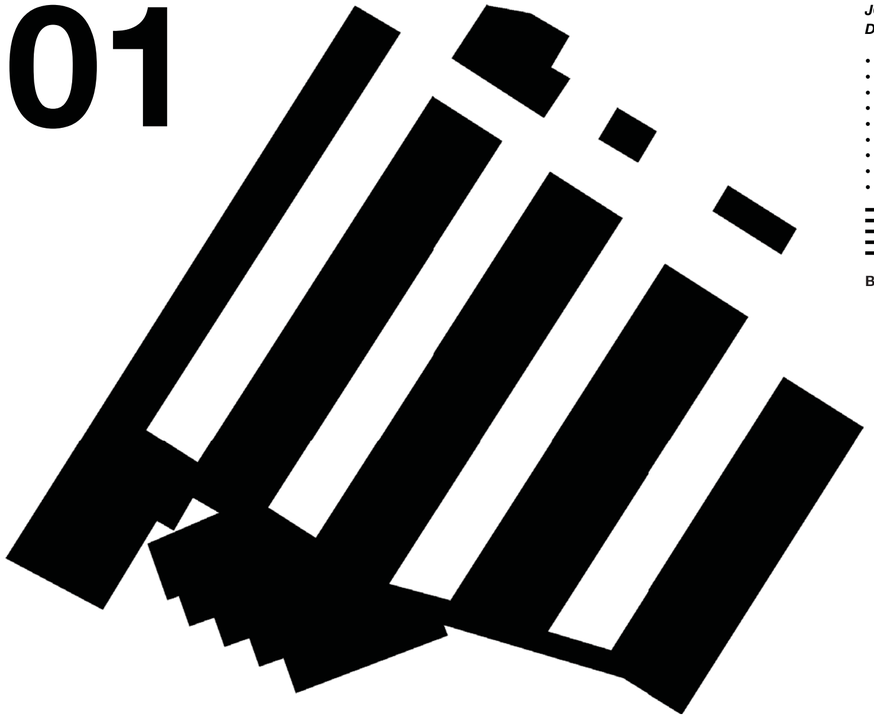
MIXED METALS REFINERY

- Refinery floor
- Plant room
- Maintenance room
- General storage
- Refinery manager office
- Bookings office
- Ablutions
- Tea kitchen
- Refuse

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01

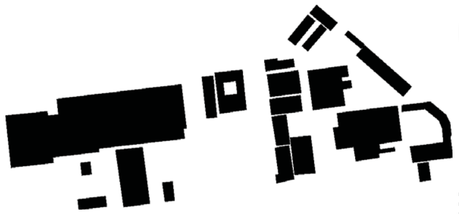


JOHANNESBURG FRESH PRODUCE MARKET (Johannesburg)

- Trading Halls
- Distributions zone
- Loading bays
- Packing and crate zone
- Restaurants
- Open Parking
- Informal market
- Service yard
- Administration offices

Building height: +- 10m

03



RAND REFINERY (Germiston)

- Refinery
- Administration
- Service yards

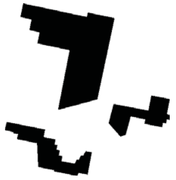
Building height: +- 12m

Building height: +- 12m

RED LOCATION MUSEUM (Port Elizabeth)

- Outside entrance foyer
- Internal entrance foyer
- Reception
- Museum exhibition
- Auditorium
- Conference hall
- Conference gallery
- Administration offices
- Art gallery
- Library
- Open parking

08



05



OPEN PUBLIC TRADE FORUM
(Germiston North)

- Open market
- Trading pit
- Digital trading floor
- Mixed metals refinery
- Electronic academy
- Administration
- Entrance foyer
- Metal route

Building height: 8-15m

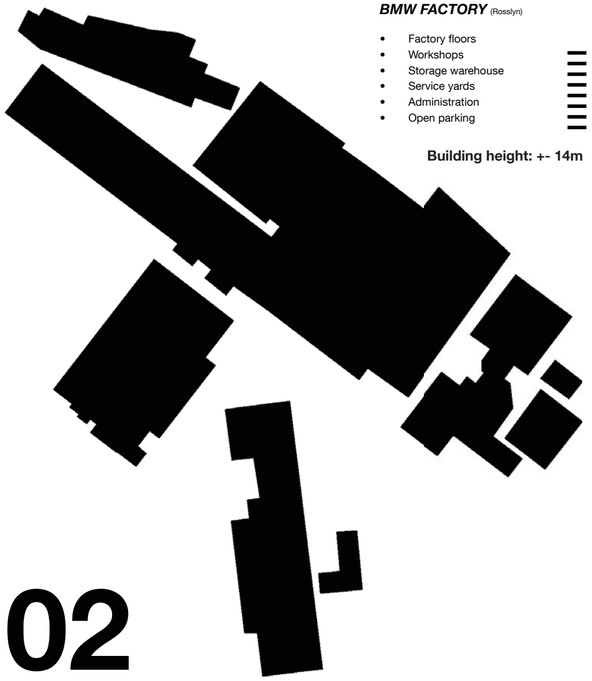
04



MULTFLORA FLOWER MARKET (Johannesburg)

- Auction house
- Flower hall
- Service yard
- Loading bays
- Retail
- Restaurant
- Flower academy

Building height: +- 12m



BMW FACTORY (Rosslyn)

- Factory floors
- Workshops
- Storage warehouse
- Service yards
- Administration
- Open parking

Building height: +- 14m

02

06



TATE MODERN (London)

- Concourse
- Information and tickets
- Book shop
- Restaurant
- Education area
- Public circulation areas
- Services zones

Building height: +- 40m

07



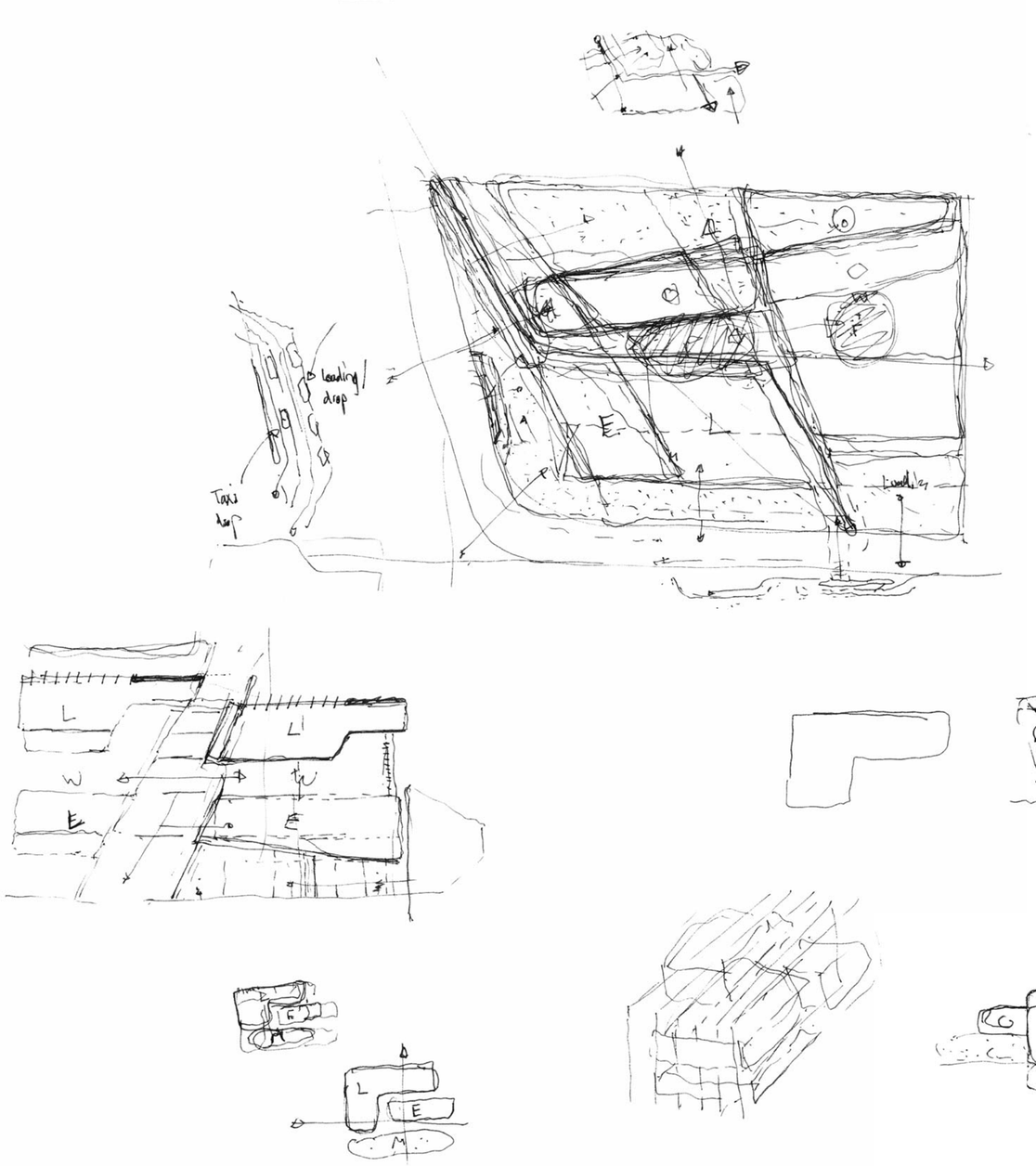
FARADAY PRECINCT (Johannesburg)

- Muti market
- Fresh produce market
- Secure storage
- Resting and eating places
- Cafes and spaza shops
- Taxi rank
- Train station

Building height: 6-10m

Thesis Document - Chapter 8 (forming typology, programme breakdown, concept development, design development) - REV 2.indd 16-17

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01

01 Early on the idea was to use a route through the site as a way of binding the various programmatic components together. The route would be accessed through a number of entrances, which one used would depend on the reason for visiting the building. In addition connecting the various programmes, the route would also facilitate the movement of people towards *The Trading Pit* – the heart of the building.

02

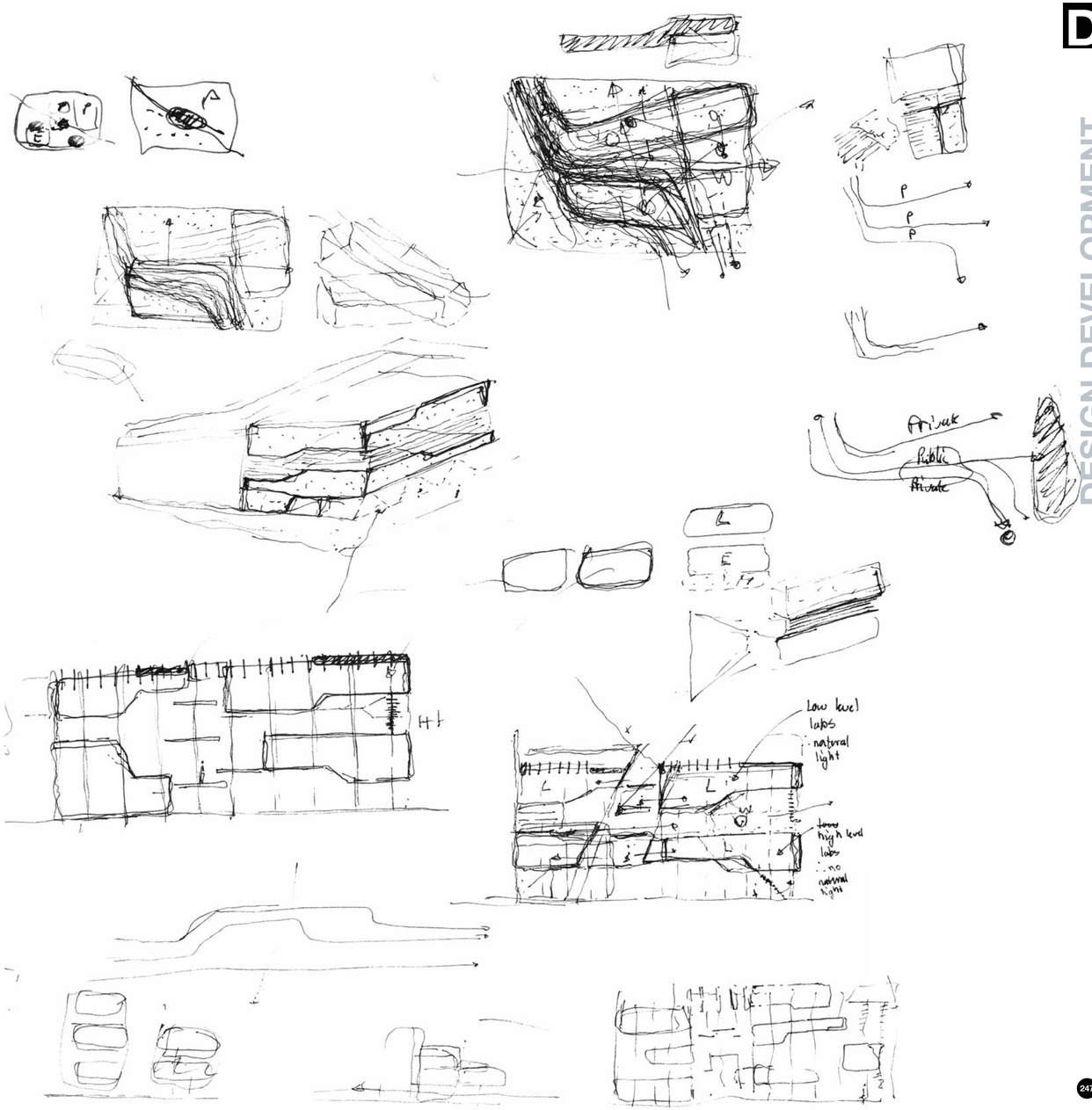
02 Early sectional ideas were centred around large open volumes complimenting smaller contained spaces. Splitting the programme in two sectional halves, a left and right hand band, meant that a large day lit space could be created. This would serve as the Metal Route housing primary circulation and the gantry system.

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03

03 Efforts were focused on developing a parti idea that would allow for a seamless mixture between indoor and outdoor spaces, as well as open and closed spaces, thus embedding the OPTF in the landscape.

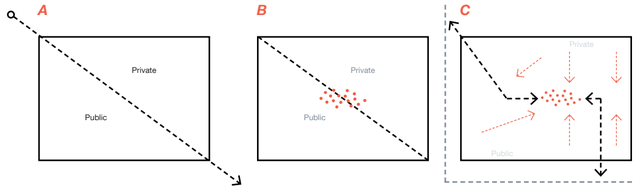


Thesis Document - Chapter 8 (forming typology, programme breakdown, concept development, design development) - REV 2.indd 20-21
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86 ***WASTEWAY***

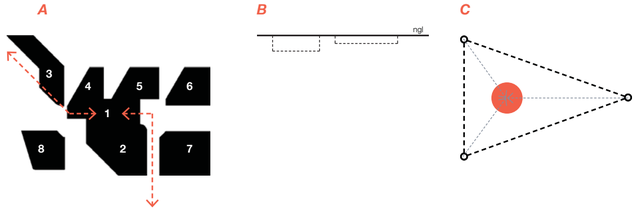
The daily movement of *urban miners* from Primrose, to the *Informal Depot*, and onwards to the industrial area of Germiston North provided inspiration for my initial gesture of bringing the 'street' into the building. Inside the *OPTF* the *Metal Route* becomes and expression and manipulation of the street.





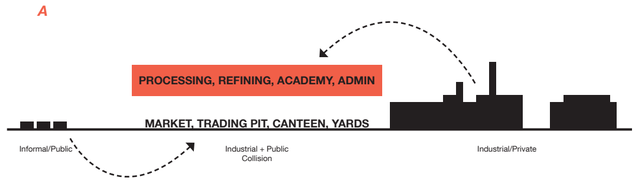
01 *ROUTE*

The initial gesture was to divide the site along a strong diagonal vector. This was based on an initial observation of southward movement from Makause to the industrial area of Germiston North. The idea of splitting the site is based on establishing a necessary public/private relationship; the notion of route can thus be seen as a tool to both structure and blur the boundary between public and private domains. The *Metal Route*, or 'street' functions as an industrial track that feeds the *Trading Pit*, using a gantry system, with electronic waste, bulk metal, and a population of *urban miners* and visitors.



02 *CUT*

The first of three principal spatial gestures was to craft architecture from the landscape – a poetic notion that resonates with an era of strong mining presence. This has been achieved through a series of cuts that have been made into the ground plane. Their purpose, besides aiding in lowering the building to a more modest height, is to provide large service yards for the market and a variety of vehicles delivering electronic waste, bulk metal, and decommissioned machinery. The cuts are arranged in a triangular formation around the *Trading Pit* – the heart of the *OPTF*.



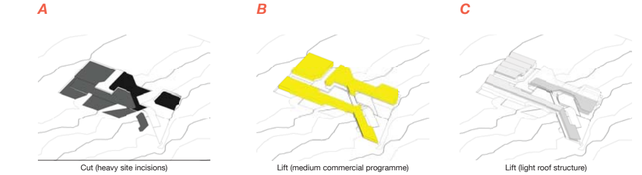
03 *LIFT*

The second principal spatial gesture was to raise the commercial, private, and enclosed programmes above the ground plane. In other words, the traditional industrial and commercial programme (refinery, processing, academy, and administration) is lifted and in its place the public programme (trading pit, market, canteen) is spread along the ground place as well as within the cut away landscape.



04 *SPLIT*

The third spatial gesture looked at the figure ground of the surrounding industrial, informal, and mining context. The positive figure imprinted by the built environment suggests function, programme, people, product, while the negative space left over in the landscape suggests movement, raw material, and history. It is with this in mind that each individual programmatic component of the *OPTF* is assembled around the *Metal Route* in such a manner that when combined resemble one building, but at the same time their organisation, broken by landscape, route, and open space, marks each building element as unique.



05 *LAYER*

In addition to the initial gestures, the *OPTF* has been conceived as three planes, which include the following; the ground or cut plane, which is a heavy service element comprising a series of site incisions arranged around the *Trading Pit* and *Metals Route*; the lifted plane made up of the enclosed programme, which can be seen as robust layer anchored above the ground plane; and the final layer is the light weight roof that makes reference to traditional industrial tectonics. The three layers combine to create a visible gradient that further highlights the significance of specific building elements.

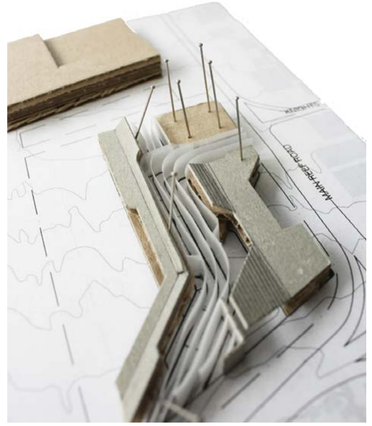
DESIGN DEVEL-OPMENT

Open Public Trade Forum, A Mixed Metals Market For 21st Century Mining

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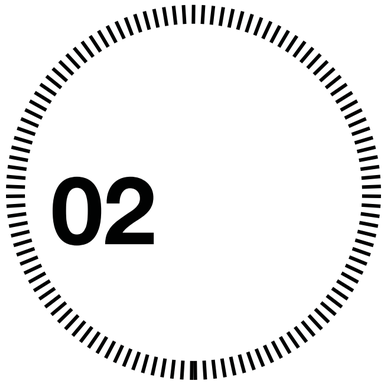


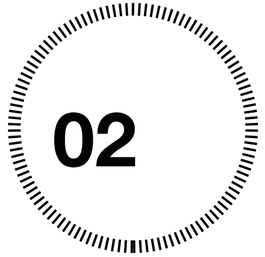


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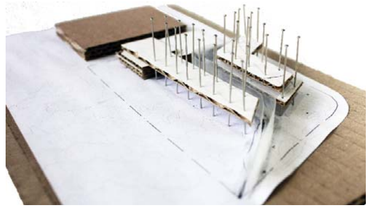
01 Early sketch models were developed simultaneously with sketch drawings and conceptual ideas. The process of switching between the two sketch mediums allowed me to quickly develop and test a series of spatial ideas. The first sketch models clearly illustrate the individual programmatic bands surrounding the *Trading Pit* and *Metal Route*, while showcasing the primary conceptual gesture of lifting the 'closed' programme above the ground plane.





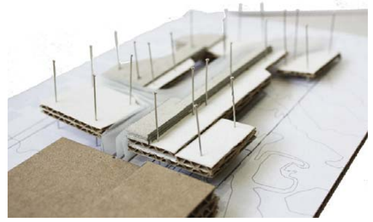
02 The following models further illustrate the sketch development phase. The conceptual gestures of ***Route***, ***Lift***, and ***Split*** (discussed in the previous chapter) were explored through a number of evolutionary models that began to take the slope of the site into account. Once the programme and areas had been loosely defined the primary objective was to keep the *Metals Route* and *Trading Pit* as core design elements. These key programmatic components received only subtle revisions to form and scale throughout the sketch design phase, thus shifting a greater degree of freedom towards developing the surrounding programme. The latter models began to resolve issues pertaining to building height and floor levels, while more accurately defining the massing form of the *OPTF*. The biggest breakthrough of the early design phase was moving the auditorium from the educational band to the corner of the site. The corner position, with frontage to Main Reef and Stanley roads, allowed the auditorium to function as a standalone building to be used by both the *OPTF* and the surrounding community.

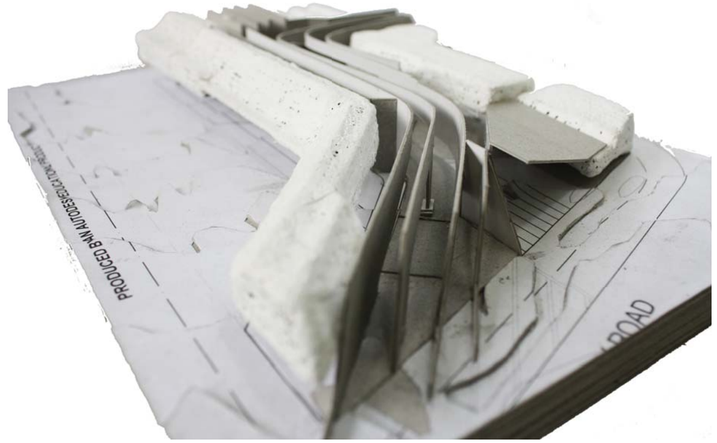
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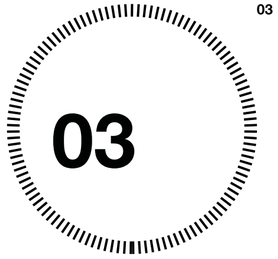






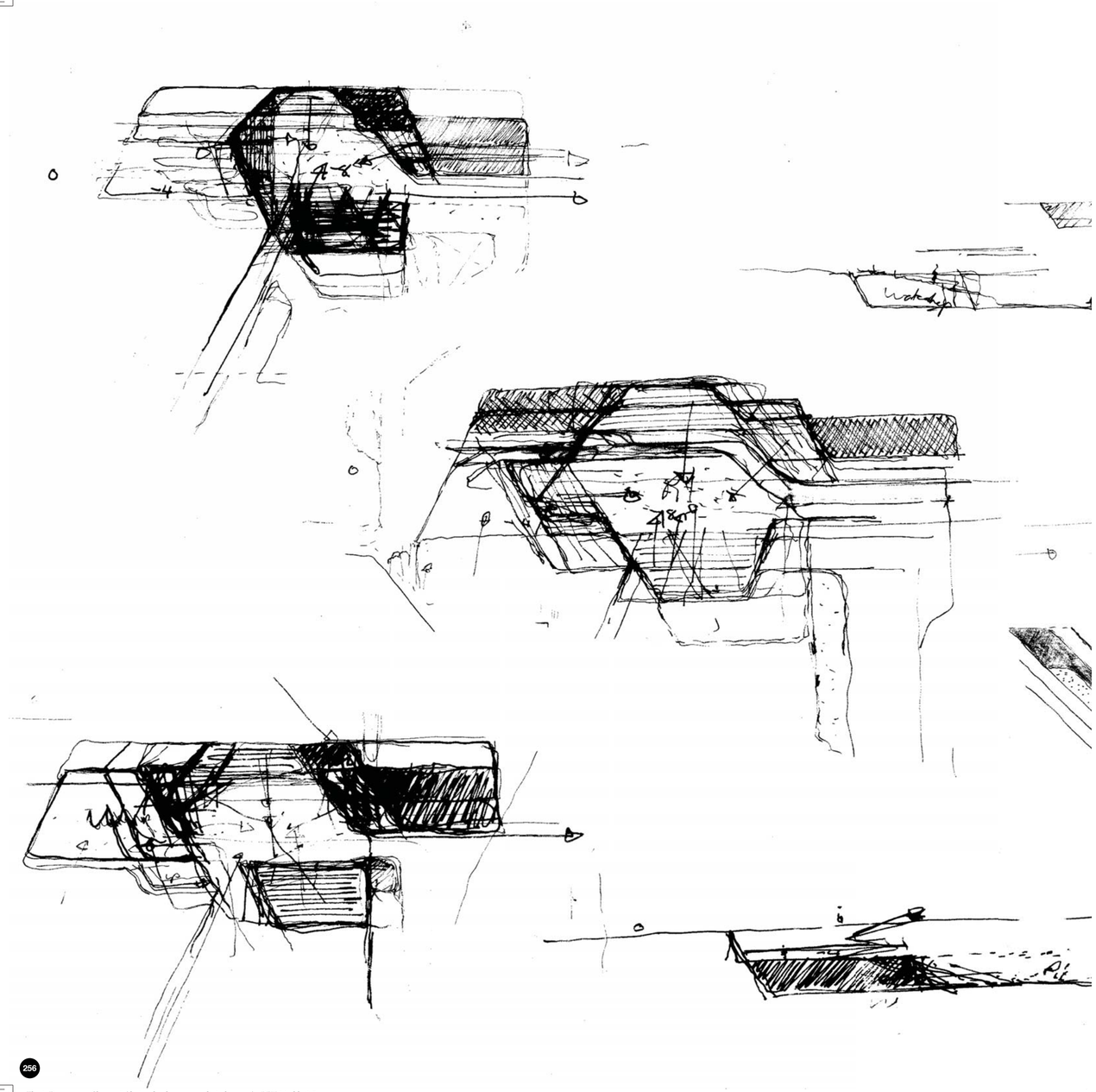
04 The final series of sketch models dealt with refining form as well as reducing the scale of the building in both plan and elevation height. The was achieved through a number of models which were carefully revised and reduced so as to maintain the proportions of the sketch design or building parti. At this stage the building was also moved further away from both street edges in order to create larger open areas around the building. These areas would act as external foyers and outdoor social spaces.





03 Later sketch models began to explore the conceptual gesture of ***Layer*** (discussed in the previous chapter). The models began to more accurately articulate the building form, roof elements, structure, and the gantry system running the length of the *Metals Route*.

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01

01 The following sectional sketches explore the idea of positive and negative space as closed and open programme respectively. The early form took inspiration from the exploratory process phase with electronic waste and circuit boards. The abstract form was later adapted and developed to create a sketch sectional that reflected my goals toward creating open or negative space from solid enclosed space. Furthermore, it was my objective to move beyond designing with traditional floor slabs and levels and move toward creating folding slabs and staggered levels. In so doing I intended to create a range of volumes that would in essence help to structure a series of spatial and privacy gradients throughout the building. The sectional form would ultimately act as a tool to define and loosely separate public and private space.

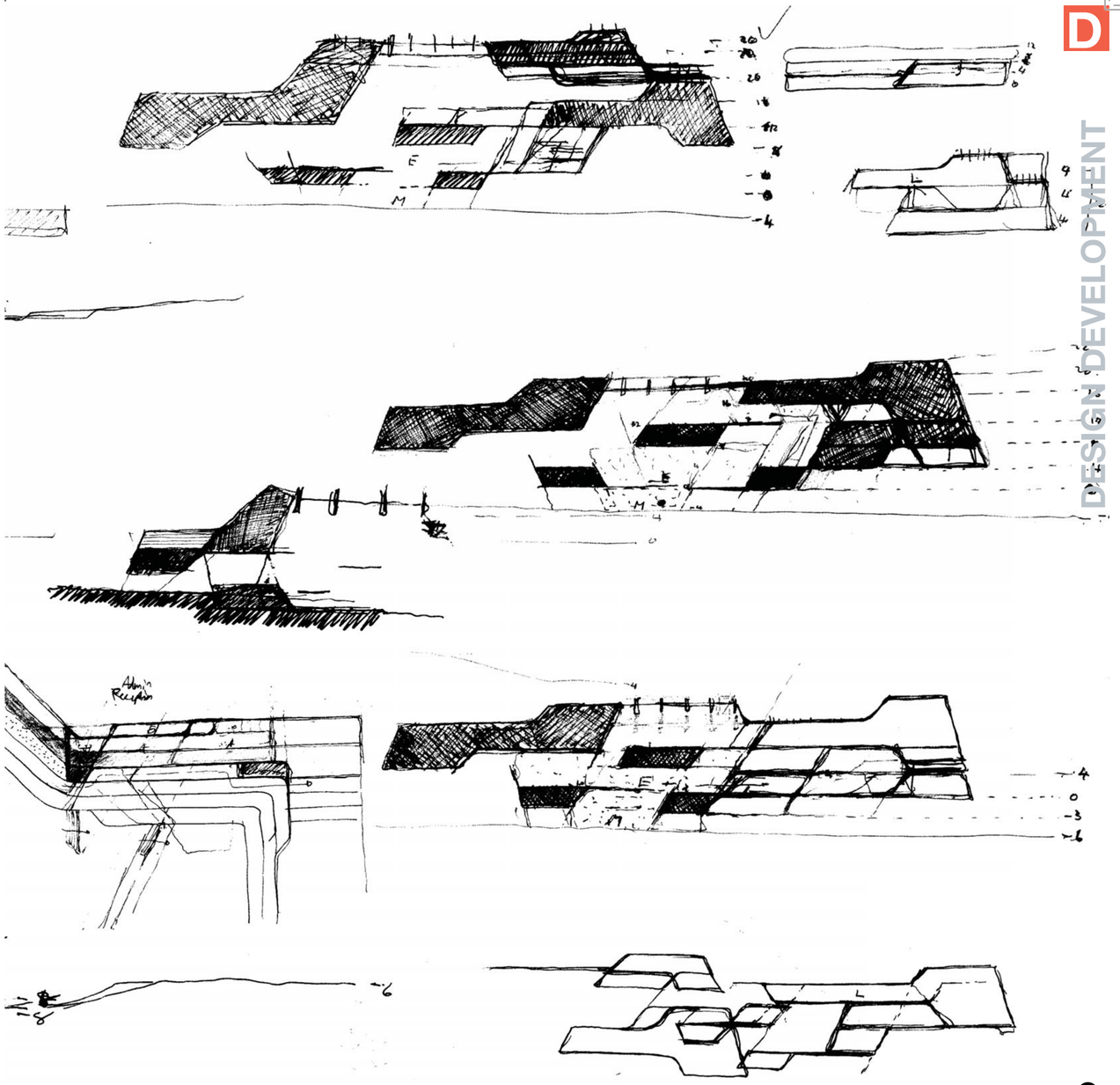
02

02 The early sketch sections did not yet explore the conceptual gesture of cutting into the site. From these sections it is clear to see the large sectional heights, which would be significantly reduce throughout the sketch design process. The reduction in building height was a critical design concern, as the *OPTF* needed to mediate between a range of contextual scales; from mine dump, to factory, to shack. The commercial nature of the building was also the primary objective, so cutting into the site gave the advantage of a greater internal volume, while significantly reducing the external elevation height.

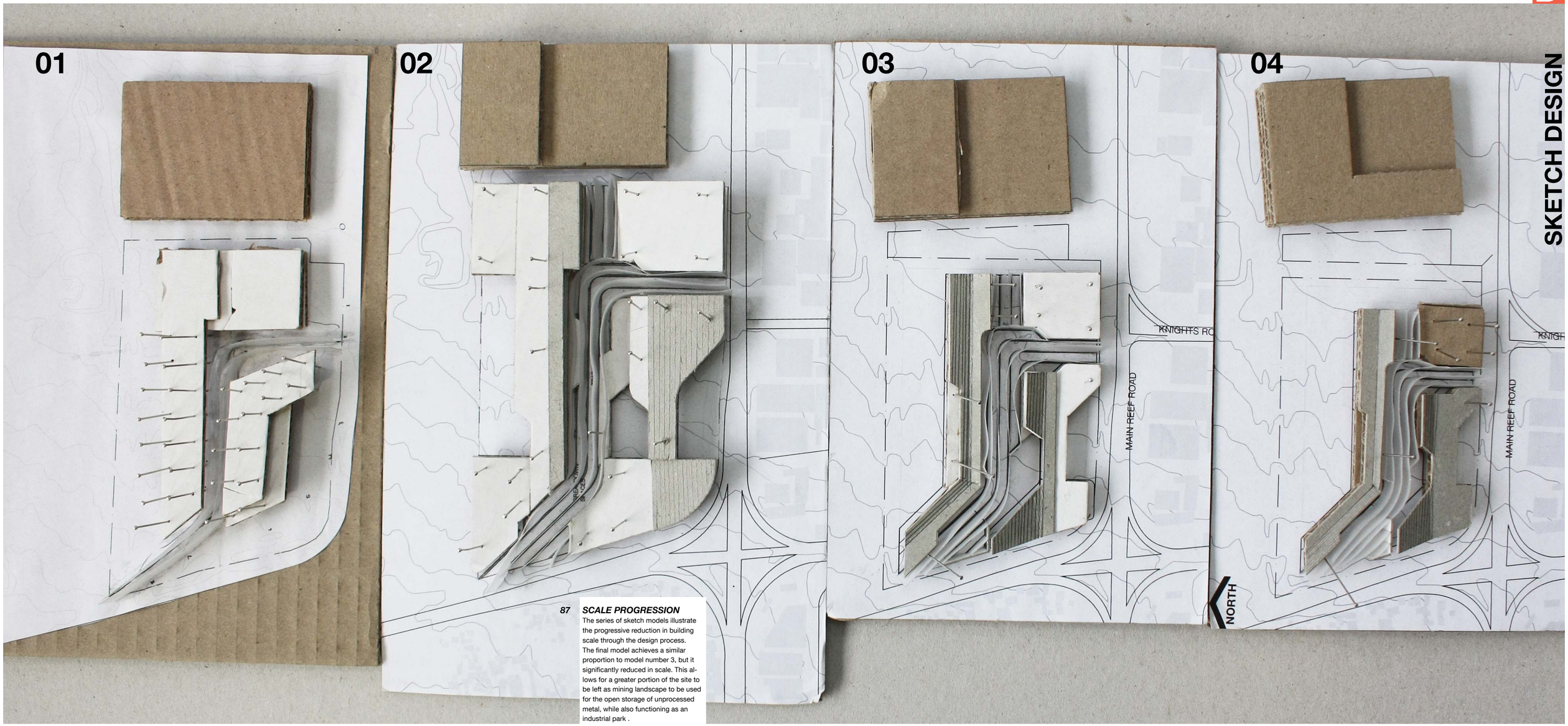
03

03

03 The conception of the Trading Pit borrowed from the large halls and trading pits of the early financial houses. Furthermore, the *Trading Pit* would also borrow from the open working environments currently used by the urban miners. The large volume, robust materials, day lit interior, and cross ventilated working environment attempts to bring an external feel to the internal realm of the *Trading Pit*. These early sketches show a large open work space surrounded by stadium rake bidding areas. This arrangement is in fact an enlarged version of a single financial trading pit, however in this instance the *Pit* itself functions as a much larger space that house a myriad of exchange and production activities.



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87 ***SCALE PROGRESSION***

The series of sketch models illustrate the progressive reduction in building scale through the design process. The final model achieves a similar proportion to model number 3, but it significantly reduced in scale. This allows for a greater portion of the site to be left as mining landscape to be used for the open storage of unprocessed metal, while also functioning as an industrial park .

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01
FUNCTIONAL ISSUES

A VISUAL COMFORT
One of the key principles of the industrial typology is to make use of natural day lighting. It is therefore a primary objective to give natural lighting to every habitable space, especially the public and factory domains.

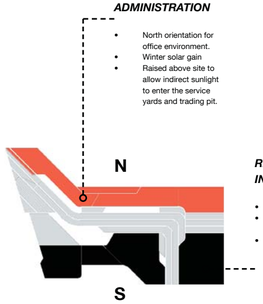
B AIR QUALITY
Fresh air is desirable, however a large amount of dust is blown from the mine dumps in the area, specially from the north. Therefore, natural ventilation systems will be minimized to the north and maximised to specific areas on the south, as the building will funnel and accelerate the wind around its edges. It would be undesirable to draw unnecessary mine dust into the building.

C MATERIAL
The very nature of the building deals with the notion of exchange within an experimental market place, however the *OPTF* also deals with another important issue, that of recycling and renewal. It is thus my objective to include recyclable building materials as a key component of the construction philosophy, which would include: recycled steel for structural work and shading elements; building rubble, recycled glass, and slag for the concrete mixture; and the use of soil from the site excavations for fill areas.

02
BIO-PHYSICAL

A CLIMATE (orientation)





ADMINISTRATION

- North orientation for office environment.
- Winter solar gain
- Raised above site to allow indirect sunlight to enter the service yards and trading pit.

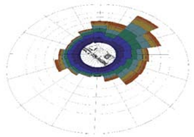
REFINERY, PROCESSING, ACADEMY

- South orientation.
- Working conditions require south lighting.
- Raised above site to allow reduce direct noise from the *Open Market* and Main Reef road.

B CLIMATE (wind)

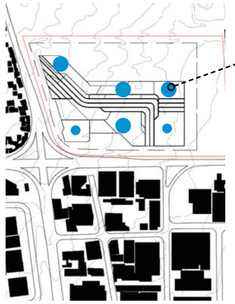
WIND ROSE

- Predominant northerly wind direction.
- Blowing from the mine dumps to the north.
- Sand from the dumps is a concern.



02
BIO-PHYSICAL

D WATER RESOURCE



WATER COLLECTION

- The refinery and processing components require large amounts of water to cool the machinery.
- Water will be collected using the large roof surface areas, and store in tanks buried in the ground.
- The heat absorbed by the water will be used to heat the building in winter using a reticulation system.

E BIODIVERSITY

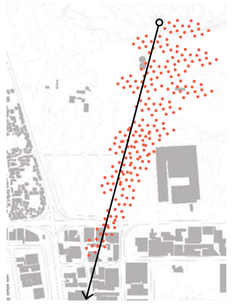
VEGETATION

- The natural grasses found growing in the area will be planted to re-establish the biodiversity of the site, which was destroyed through many years of mining.

03
SOCIO-ECONOMIC SOCIO-CULTURAL

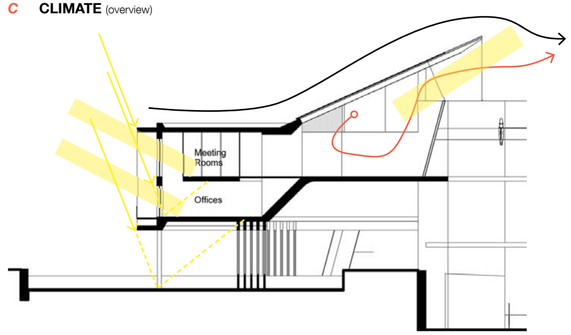
A EXCHANGE

- One of the long term goals is to ensure the mutual exchange between the OPTF and the surrounding community and metal industry.
- Long term job creation and the uplifting of the community is another primary goal.



MINE DUST
The north orientation of the service yards is further supported by the predominant wind direction. The public domain south of the service yards is therefore protected from the wind.

C CLIMATE (overview)

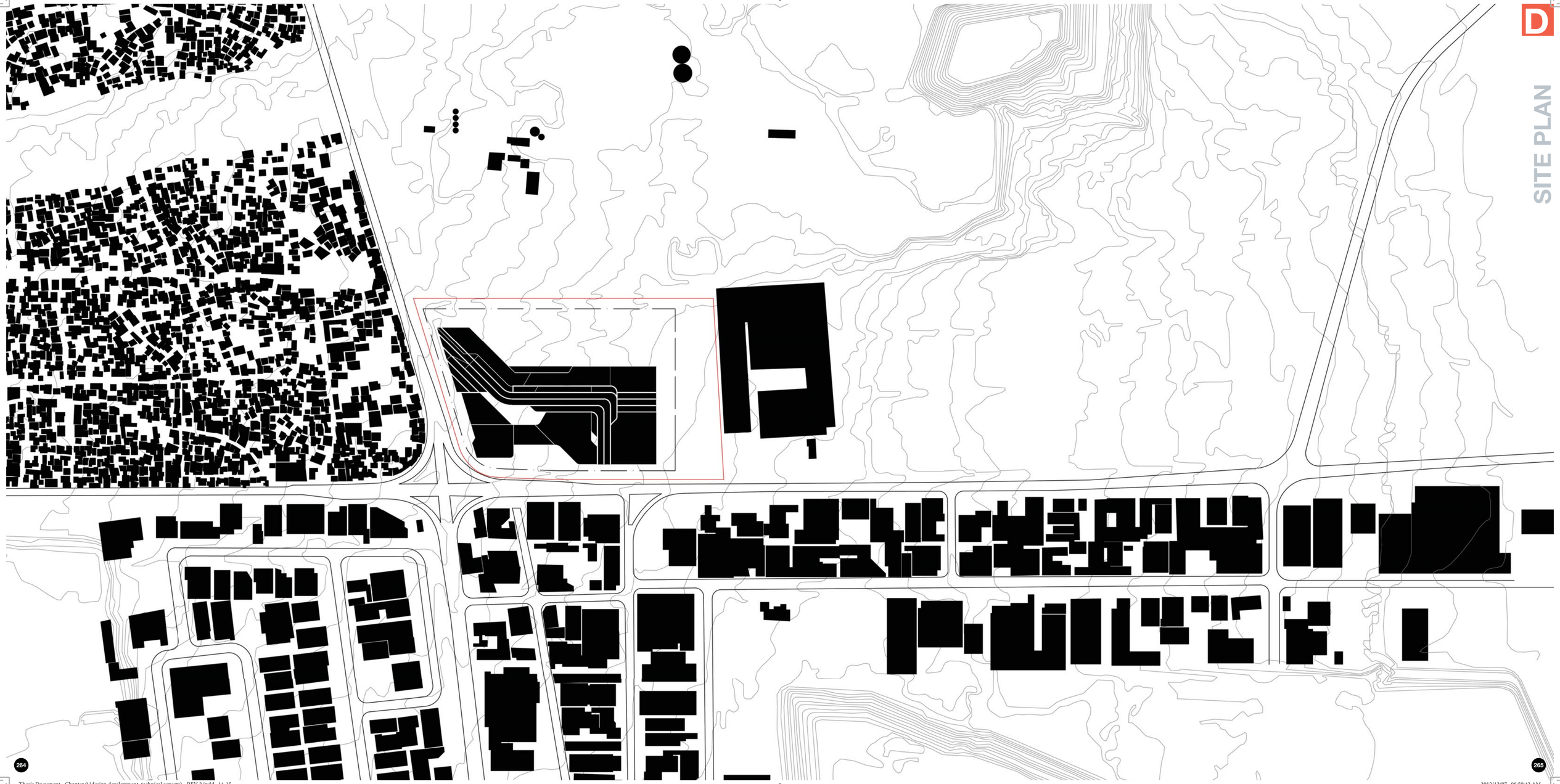


HIGH LEVEL LIGHTING AND VENTILATION

- The high level south windows provide good light for office conditions.
- Suction of the leeward side of the roof light by prevailing winds.

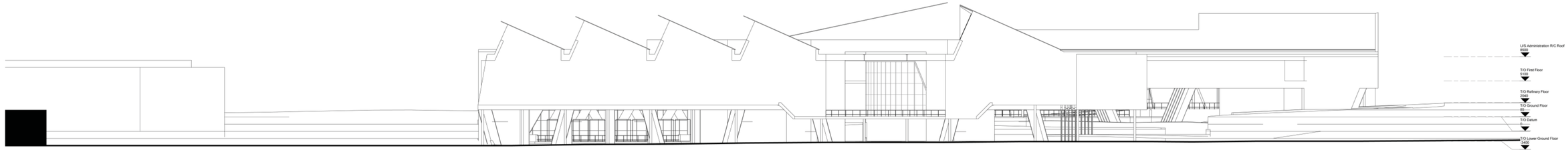
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SITE PLAN

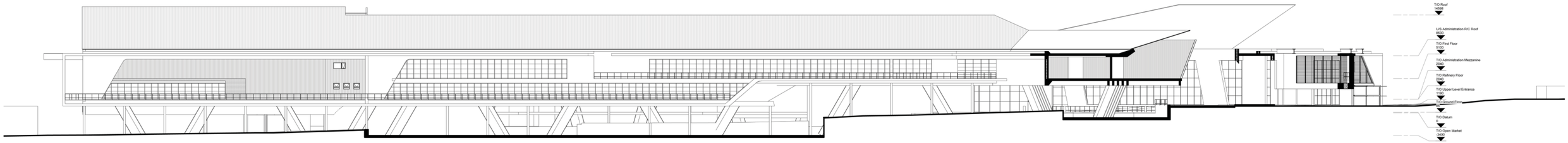


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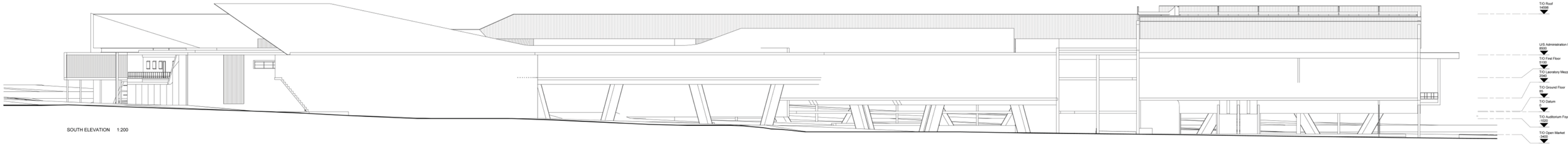
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EAST ELEVATION 1:200



NORTH ELEVATION 1:200



SOUTH ELEVATION 1:200

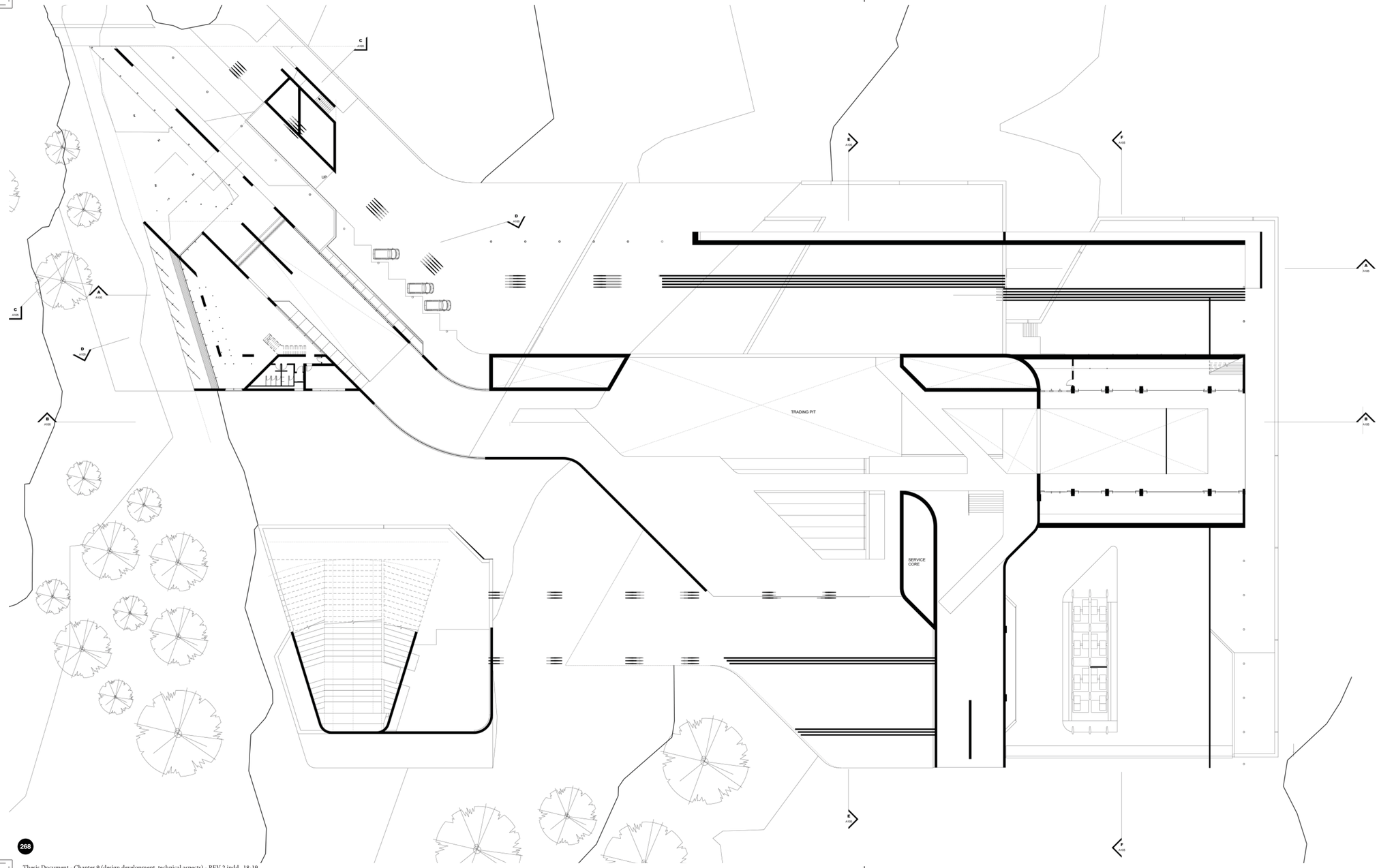


WEST ELEVATION 1:200

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GROUND FLOOR PLAN



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02

01

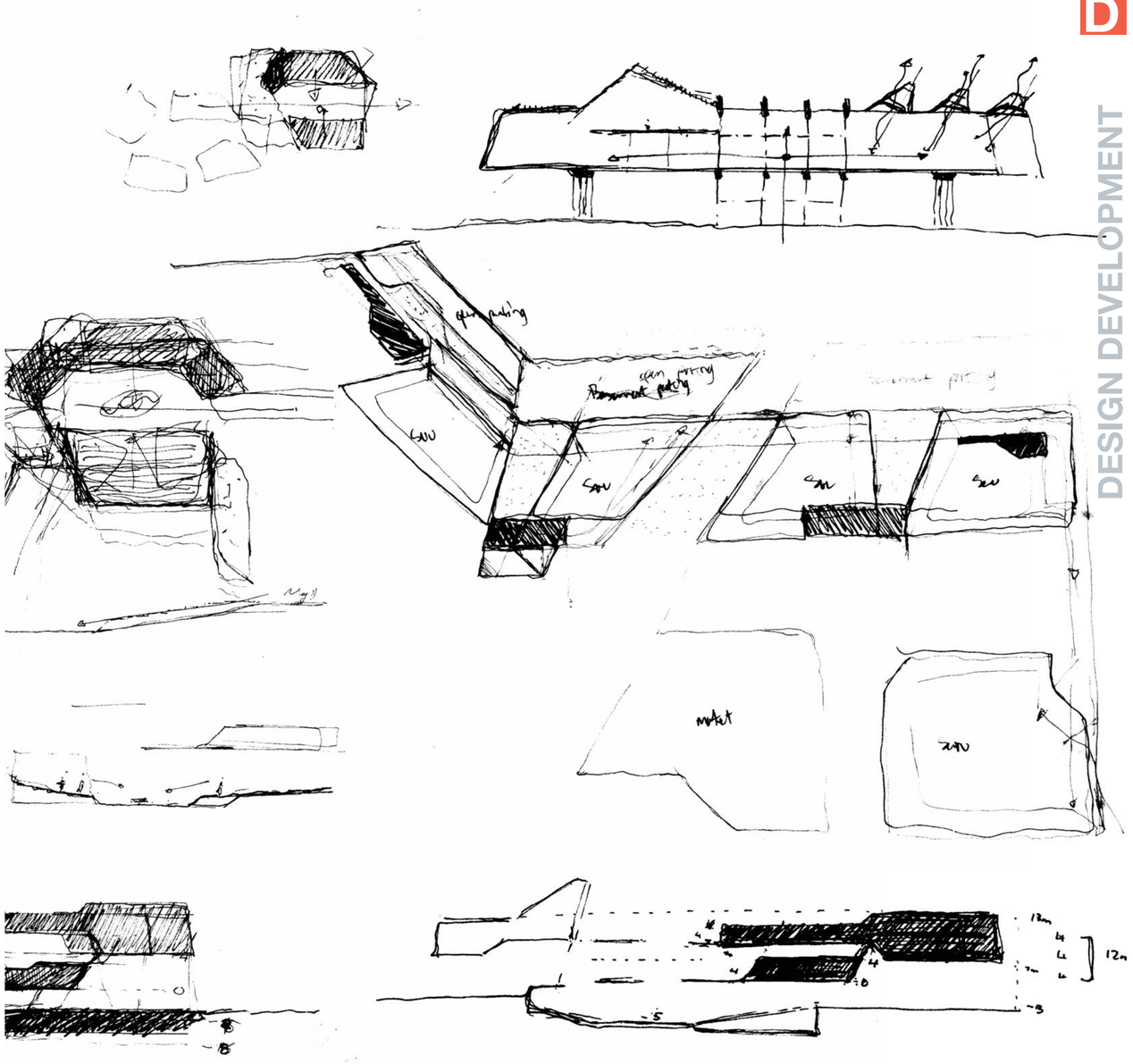
01-04 The following sketches illustrate the development of the *Trading Pit* and the *Mixed Metals Refinery*. The continuous development process has resulted in a building that has remained true to the initial conceptual gestures, but now shows a far greater level of refinement towards spatial planning, scale awareness, and form. This is particularly evident in the sectional development where the building form hints to the historical mine dumps and vast open nature of the surrounding landscape.

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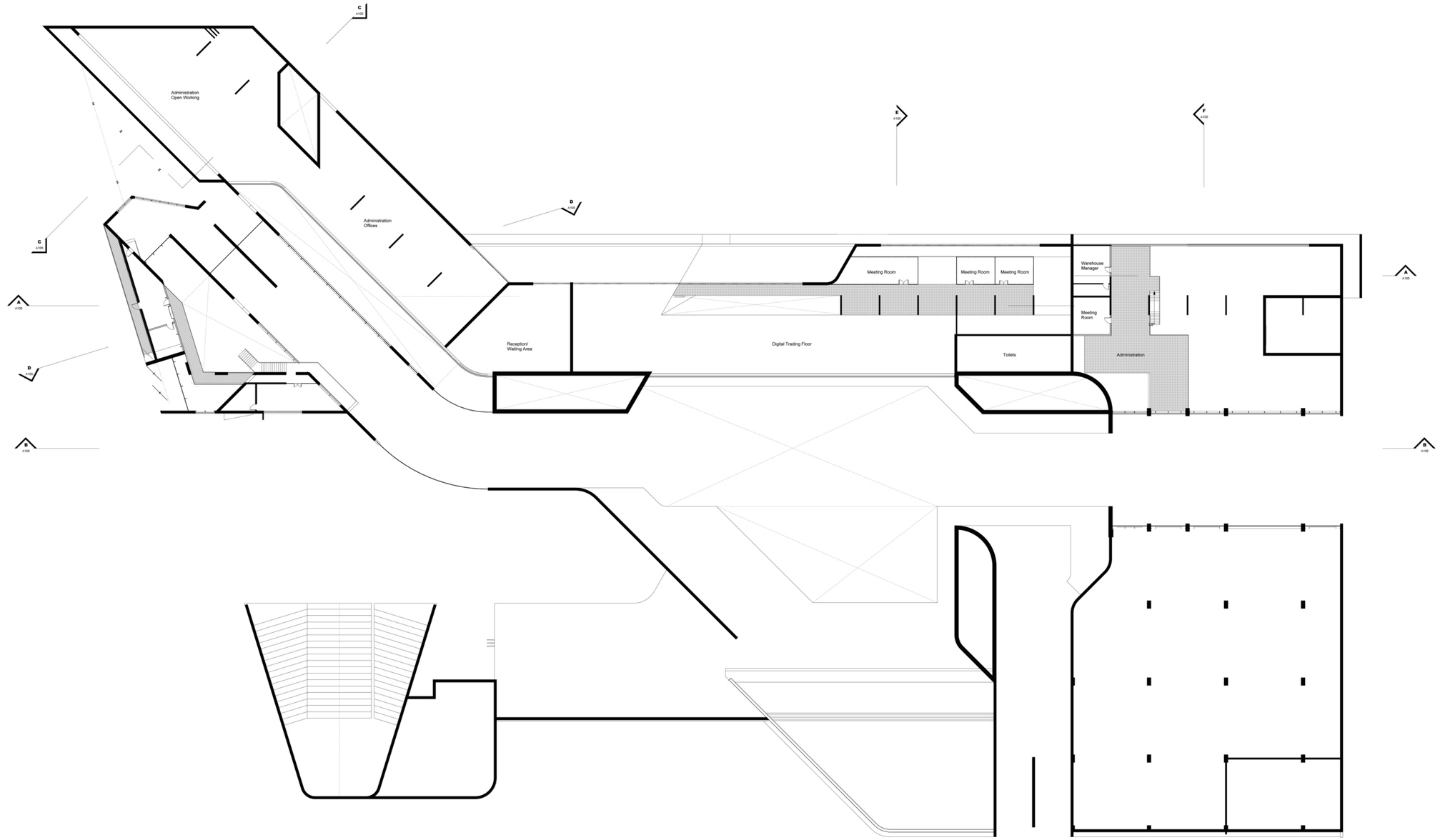
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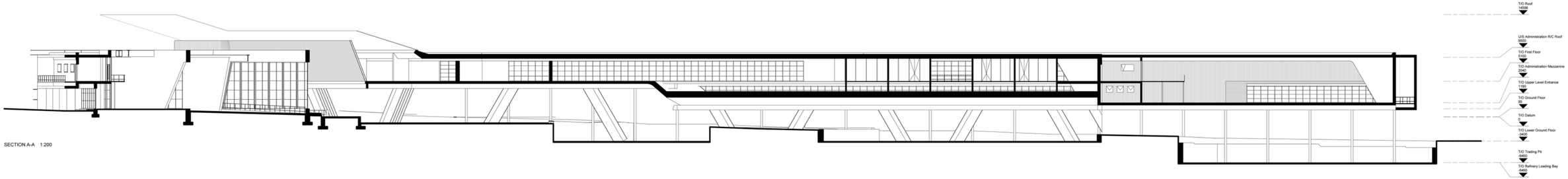
04



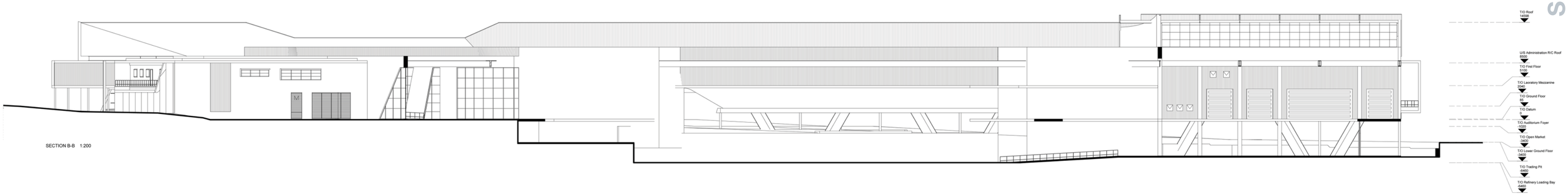
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FIRST FLOOR PLAN

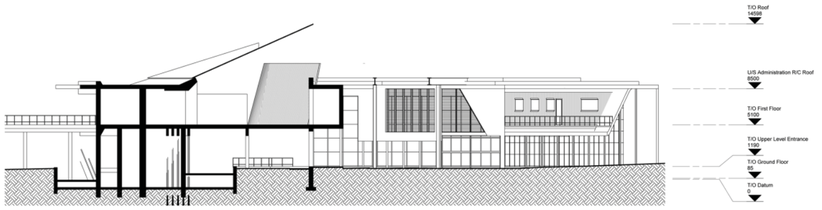




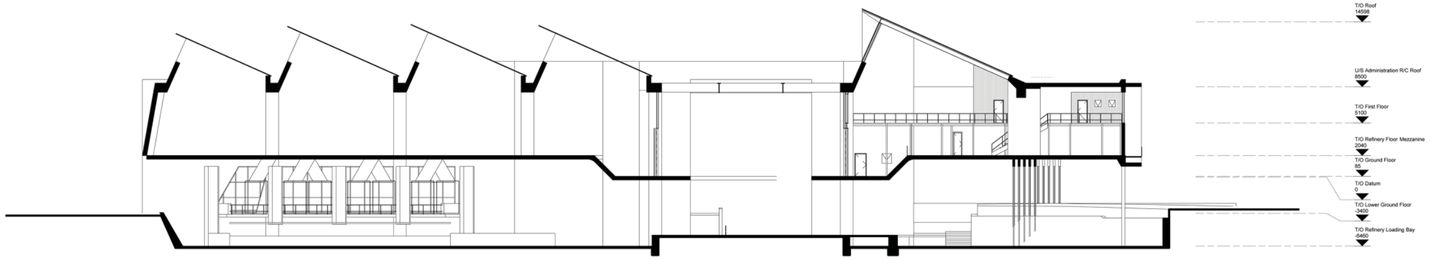
SECTION A-A 1:200



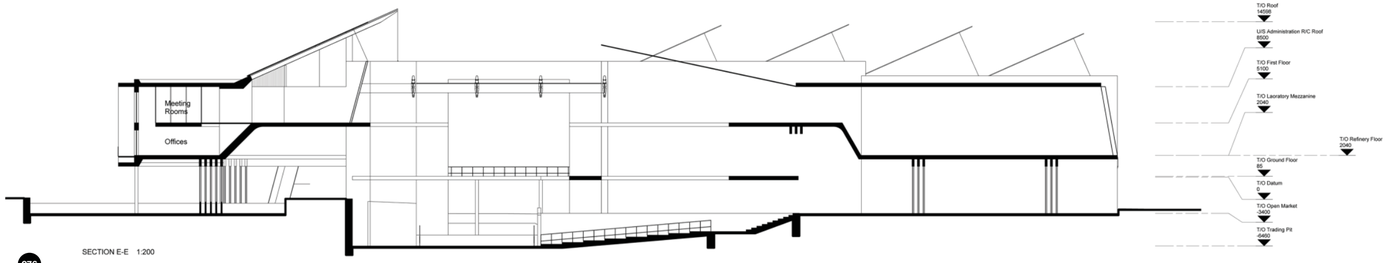
SECTION B-B 1:200



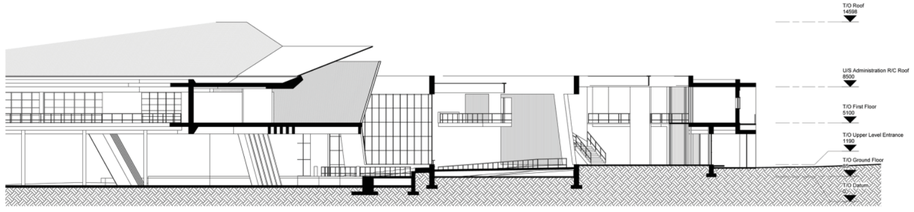
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SECTION F-F 1:200

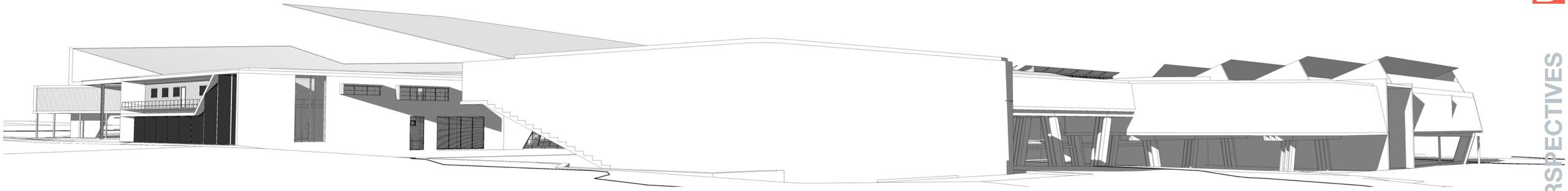


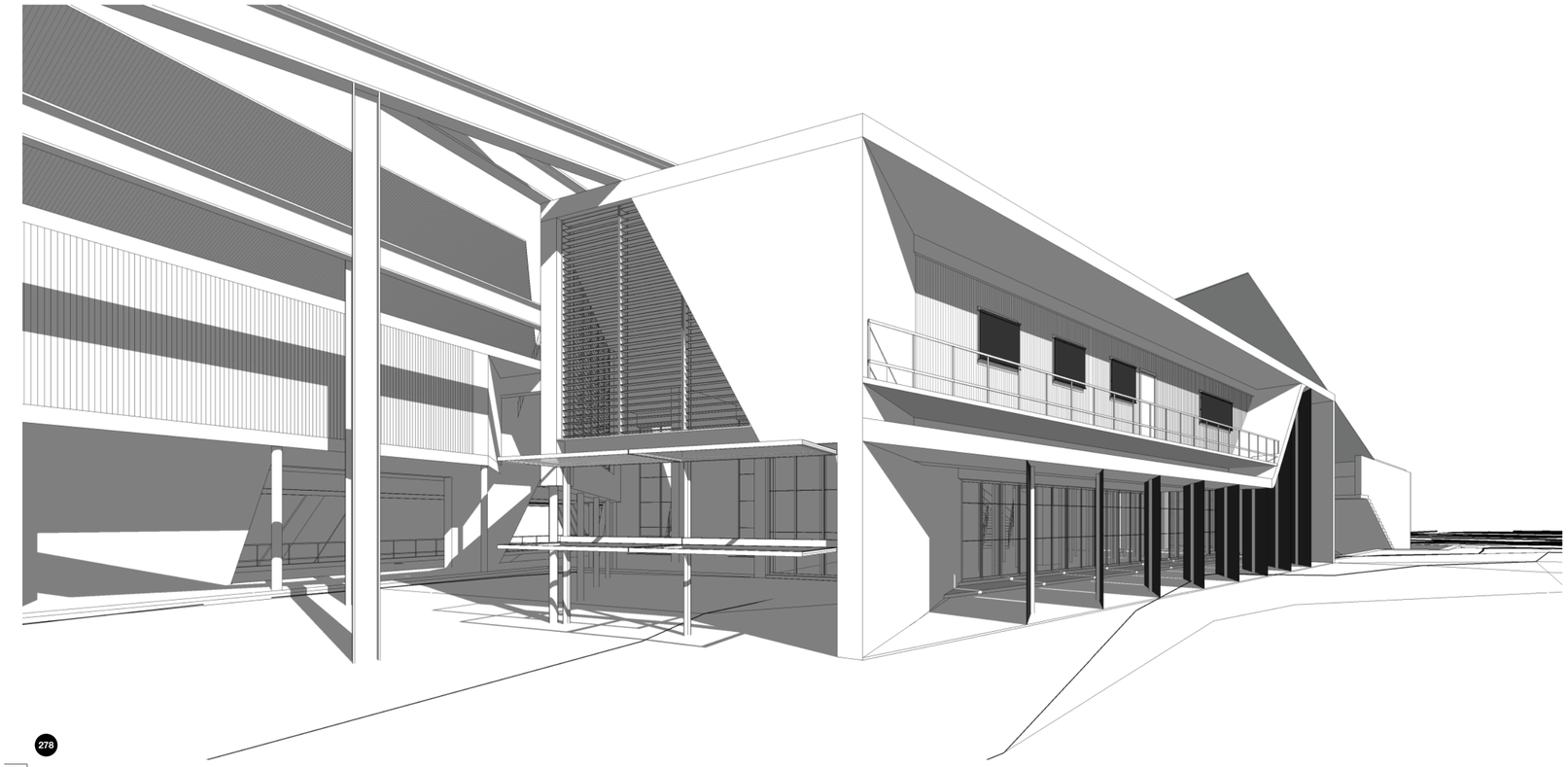
SECTION E-E 1:200

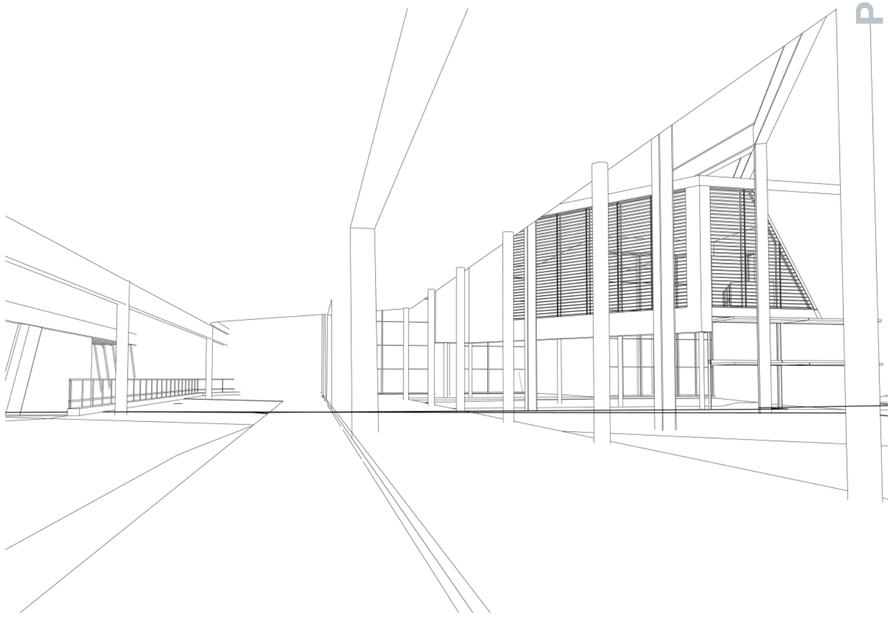


SECTION D-D 1:200

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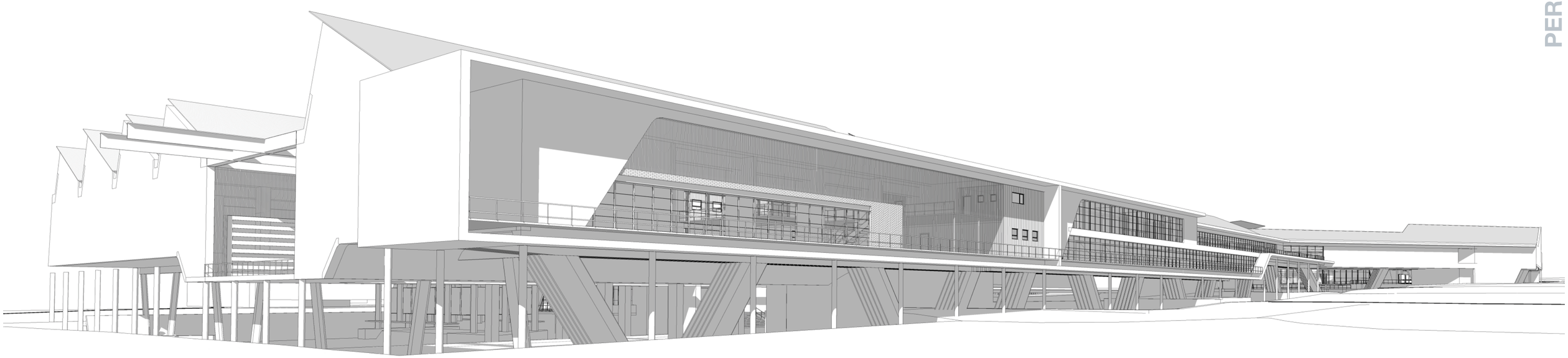






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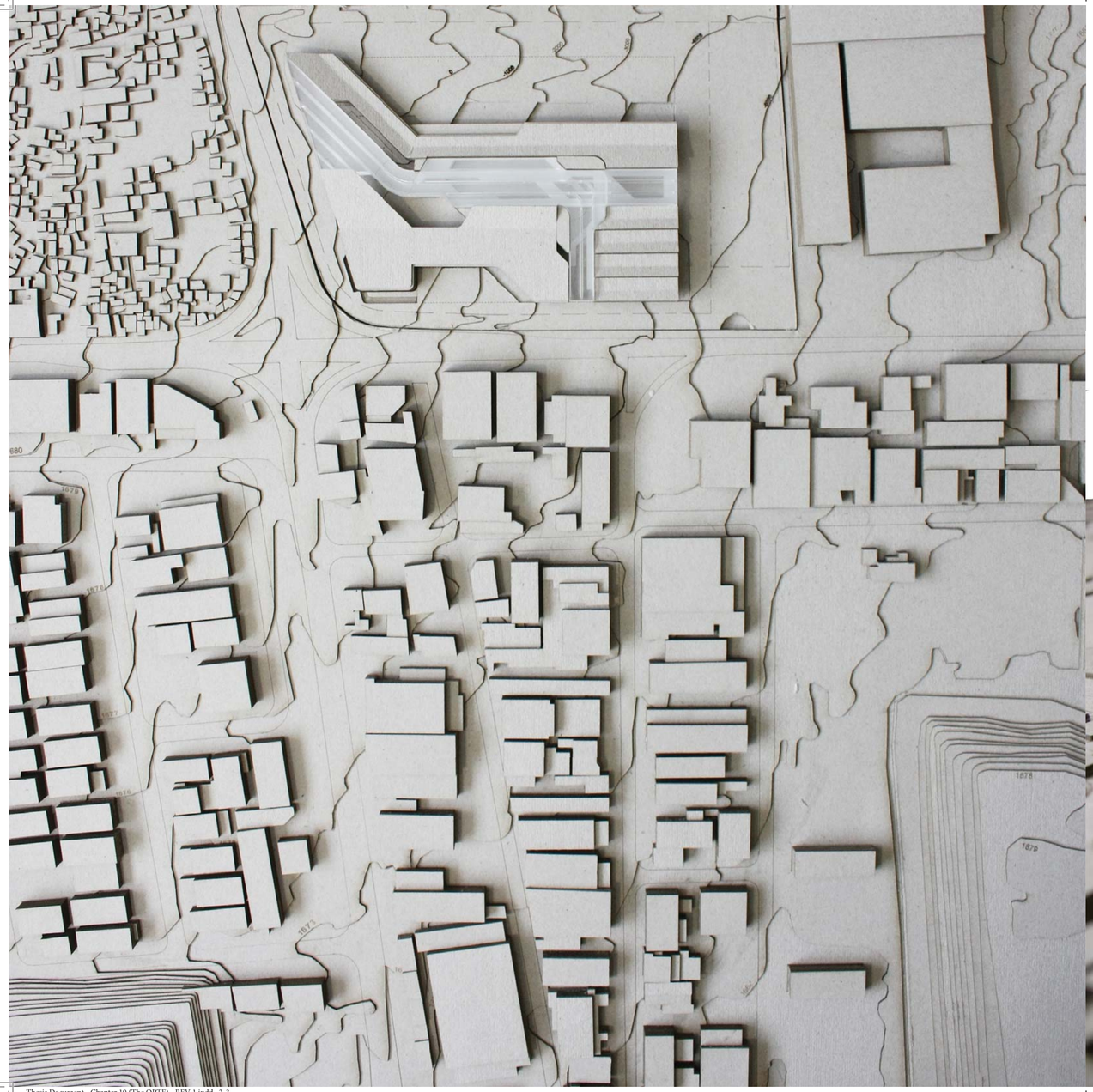
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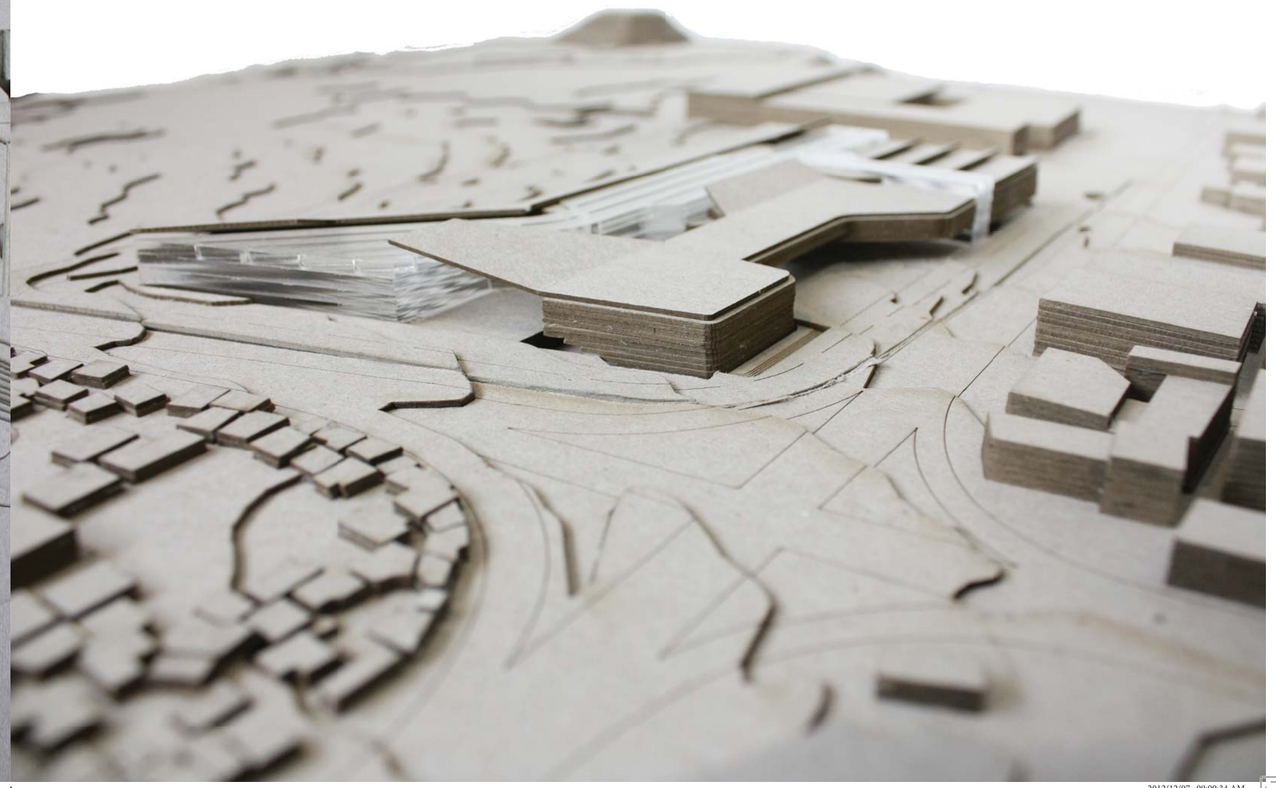
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OPEN PUBLIC TRADE FORUM

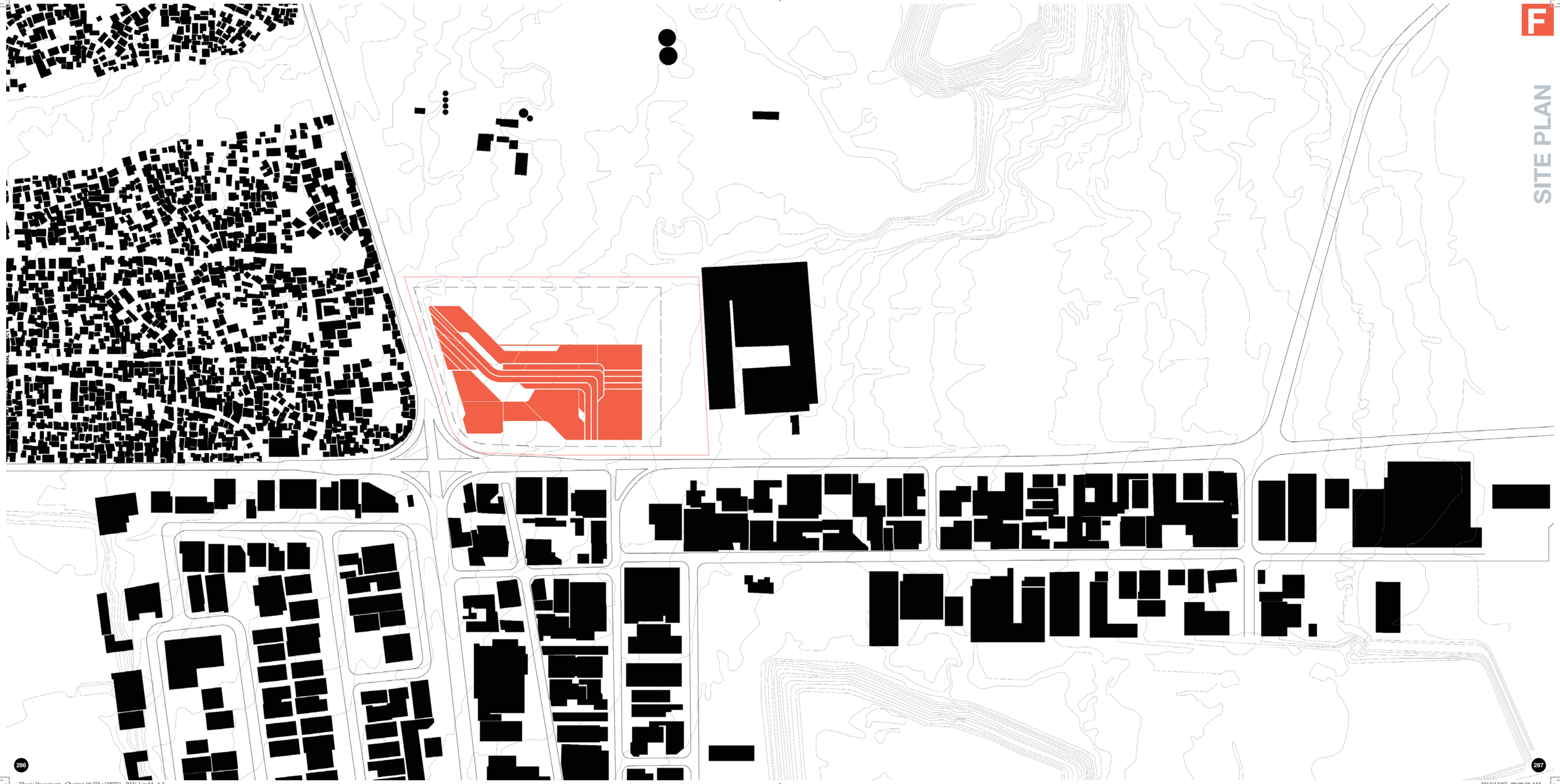
A Mixed Metals Market For 21st Century Mining

CONTEXT MODEL





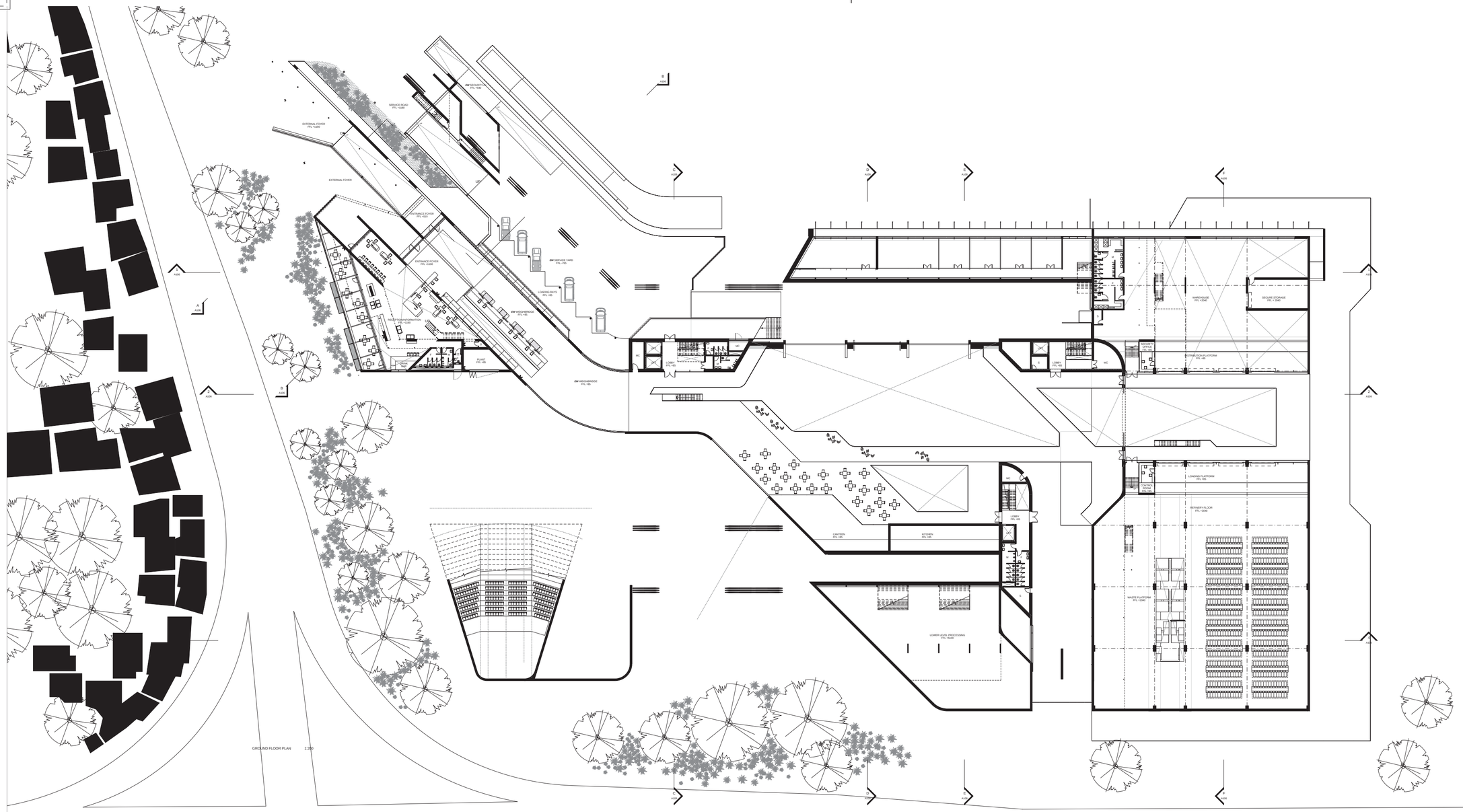
SITE PLAN



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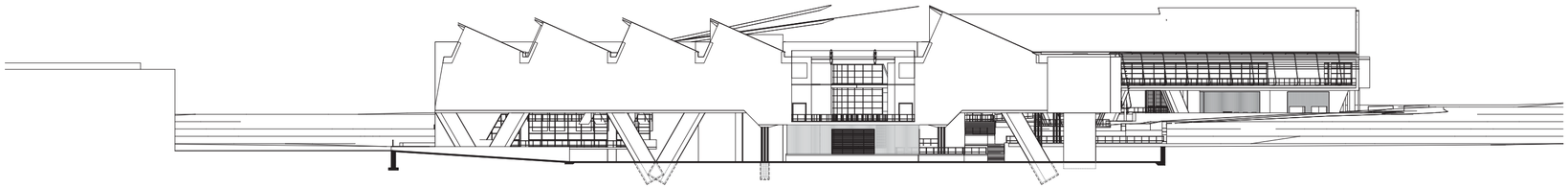
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GROUND FLOOR PLAN

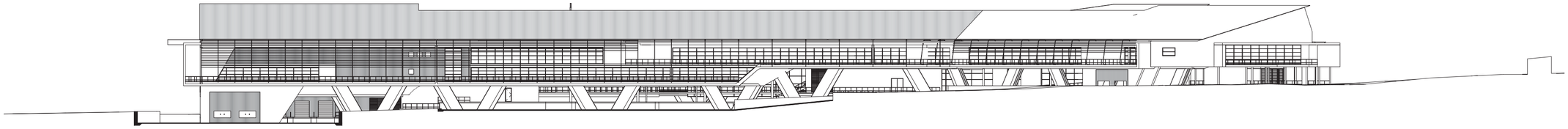


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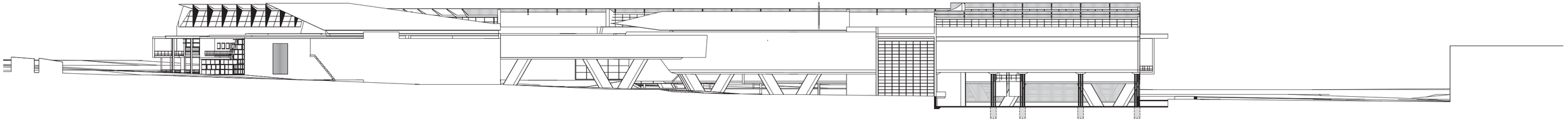
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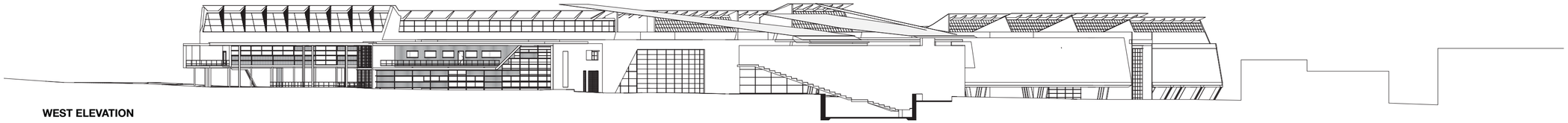
EAST ELEVATION



NORTH ELEVATION



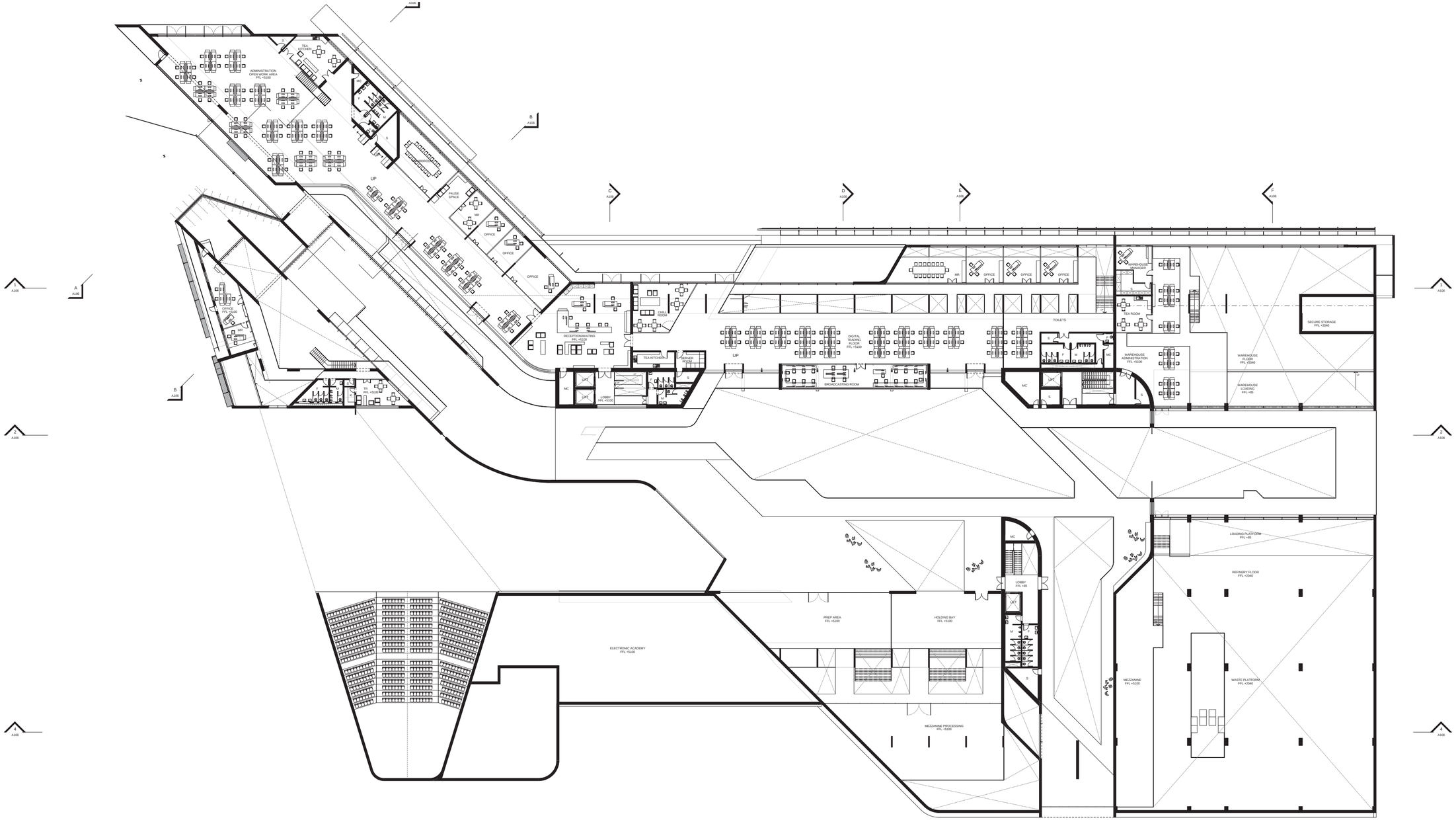
SOUTH ELEVATION

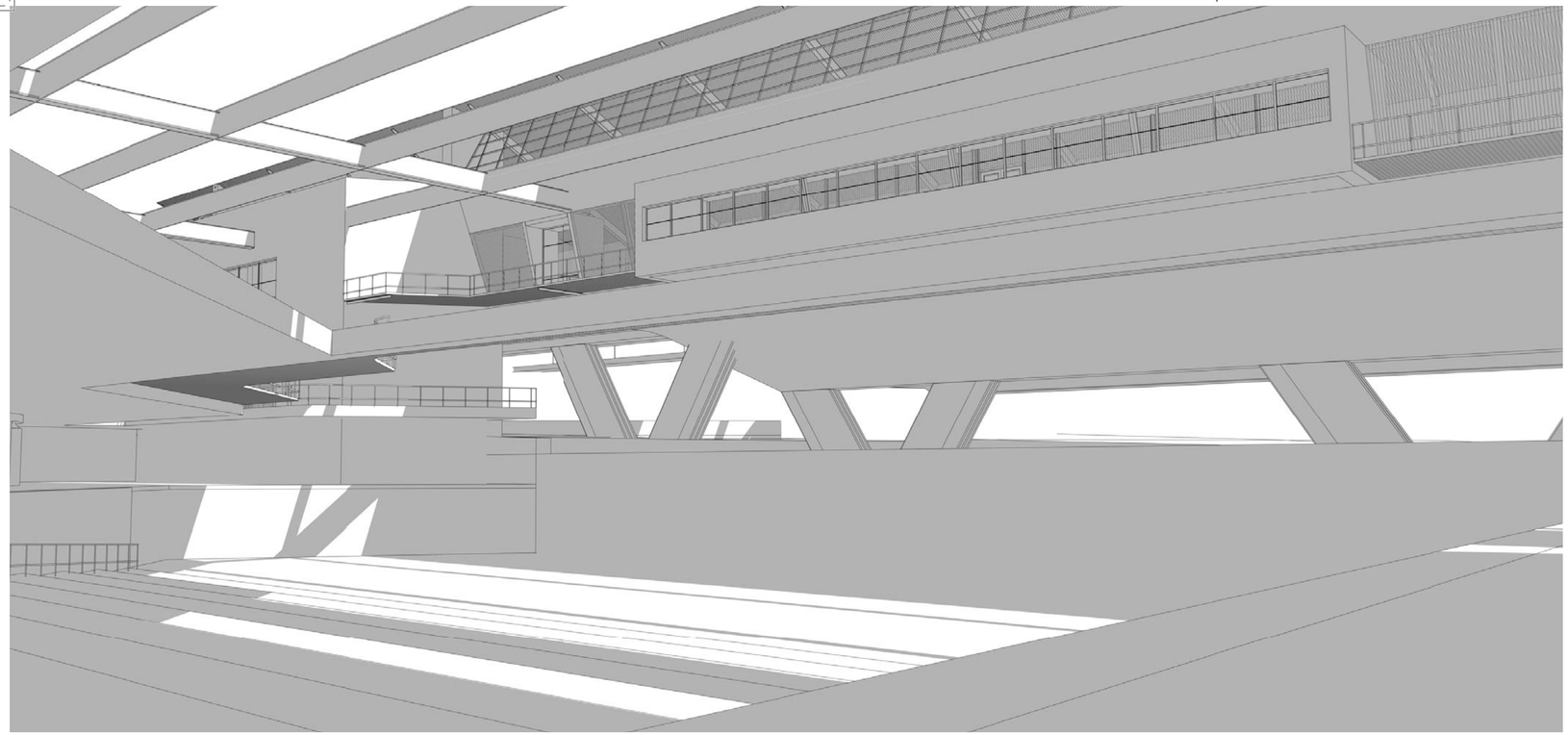


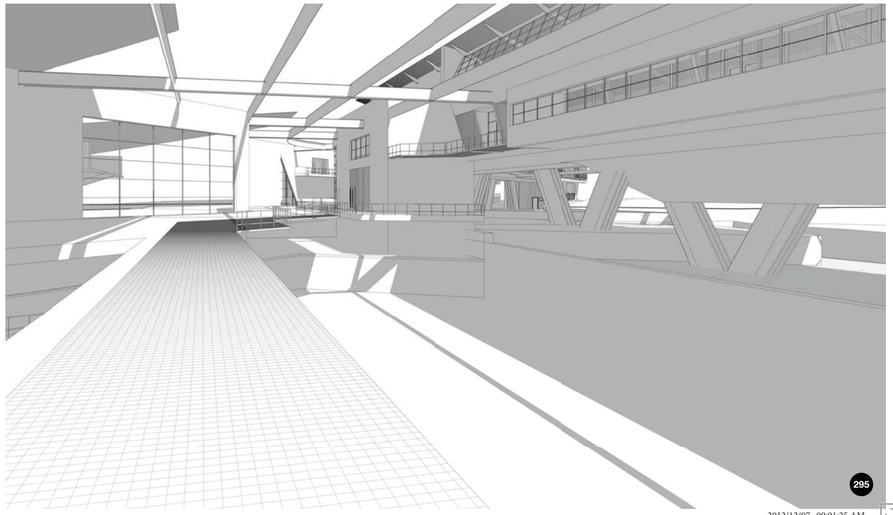
WEST ELEVATION

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ADMINISTRATION OPEN WORK AREA FFL +5100
MEN
WOMEN
PAUSE SPACE
MR
OFFICE
OFFICE
OFFICE
UP
OFFICE FFL +5100
MR
TEA KITCHEN
TEA FFL +5100
RECEPTION/WAITING FFL +5100
CHILL ROOM
SERVER ROOM
LOBBY FFL +5100
TEA KITCHEN
UP
DIGITAL TRADING FLOOR FFL +5100
BROADCASTING ROOM
MR
OFFICE
OFFICE
OFFICE
TOILETS
WAREHOUSE MANAGER
TEA ROOM
WAREHOUSE ADMINISTRATION FFL +5100
SECURE STORAGE FFL +2040
WAREHOUSE FLOOR FFL +2040
WAREHOUSE LOADING FFL +85
LOADING PLATFORM FFL +85
REFINERY FLOOR FFL +2040
LOBBY FFL +85
PREP AREA FFL +5100
HOLDING BAY FFL +5100
ELECTRONIC ACADEMY FFL +5100
MEZZANINE PROCESSING FFL +5100
MEZZANINE FFL +5100
WASTE PLATFORM FFL +2040

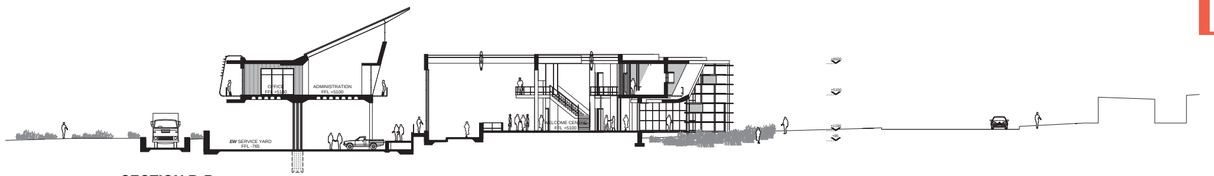




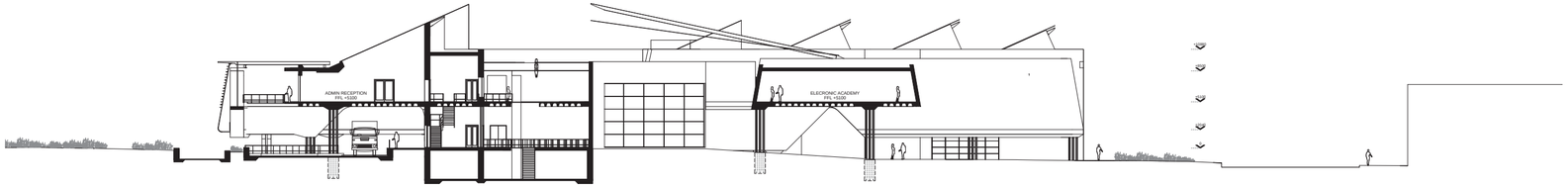
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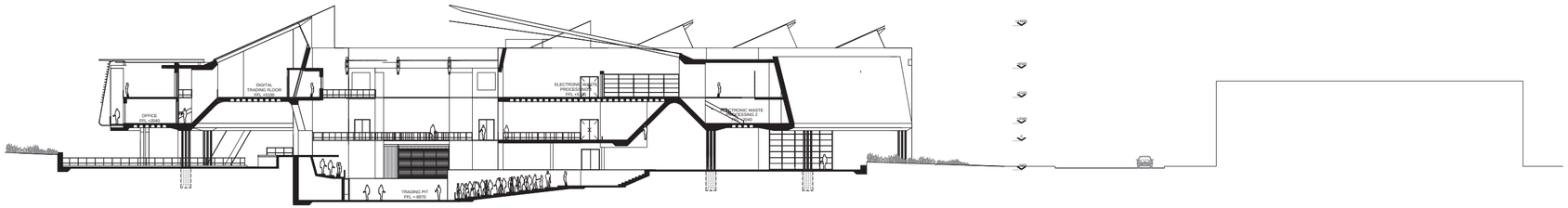
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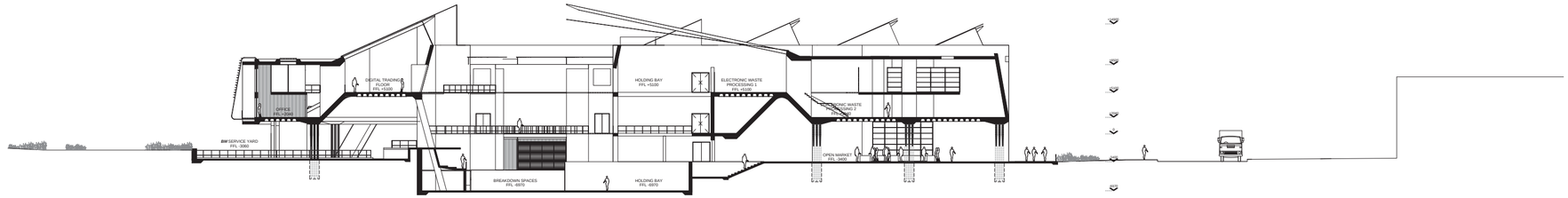
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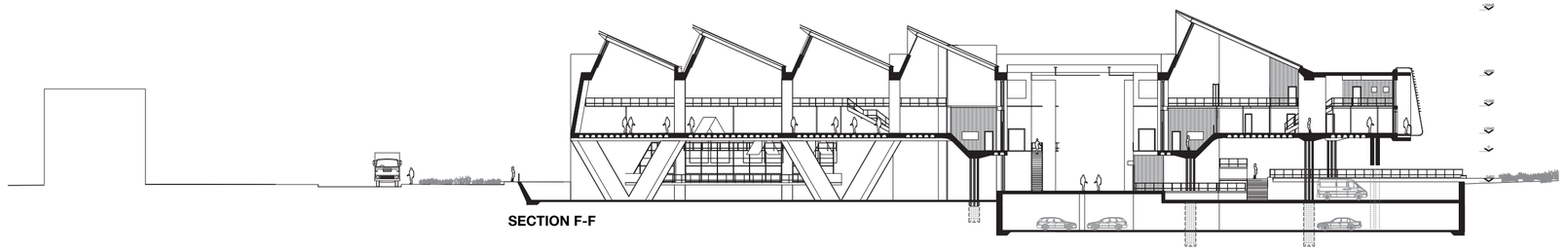
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SECTION D-D



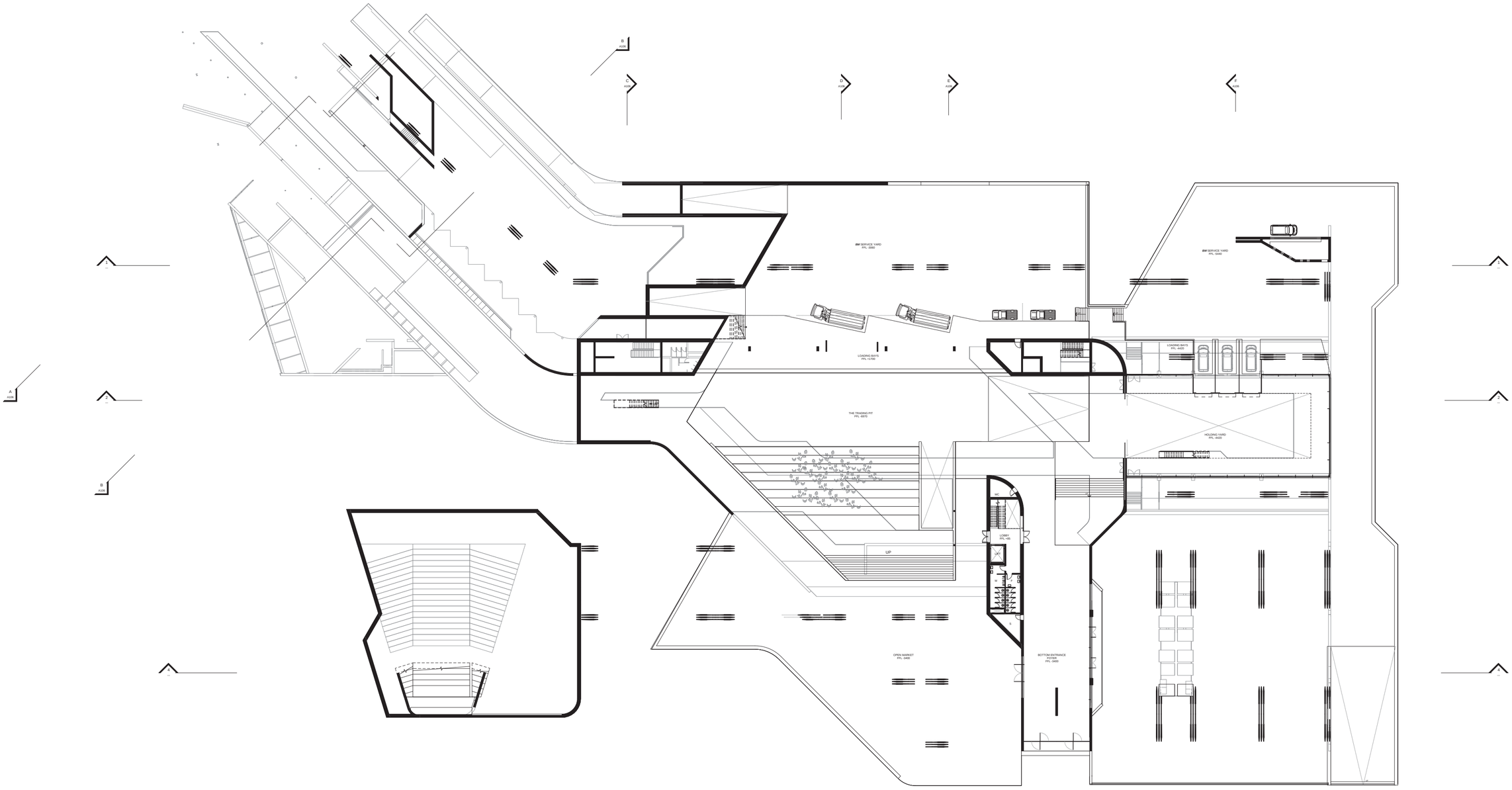
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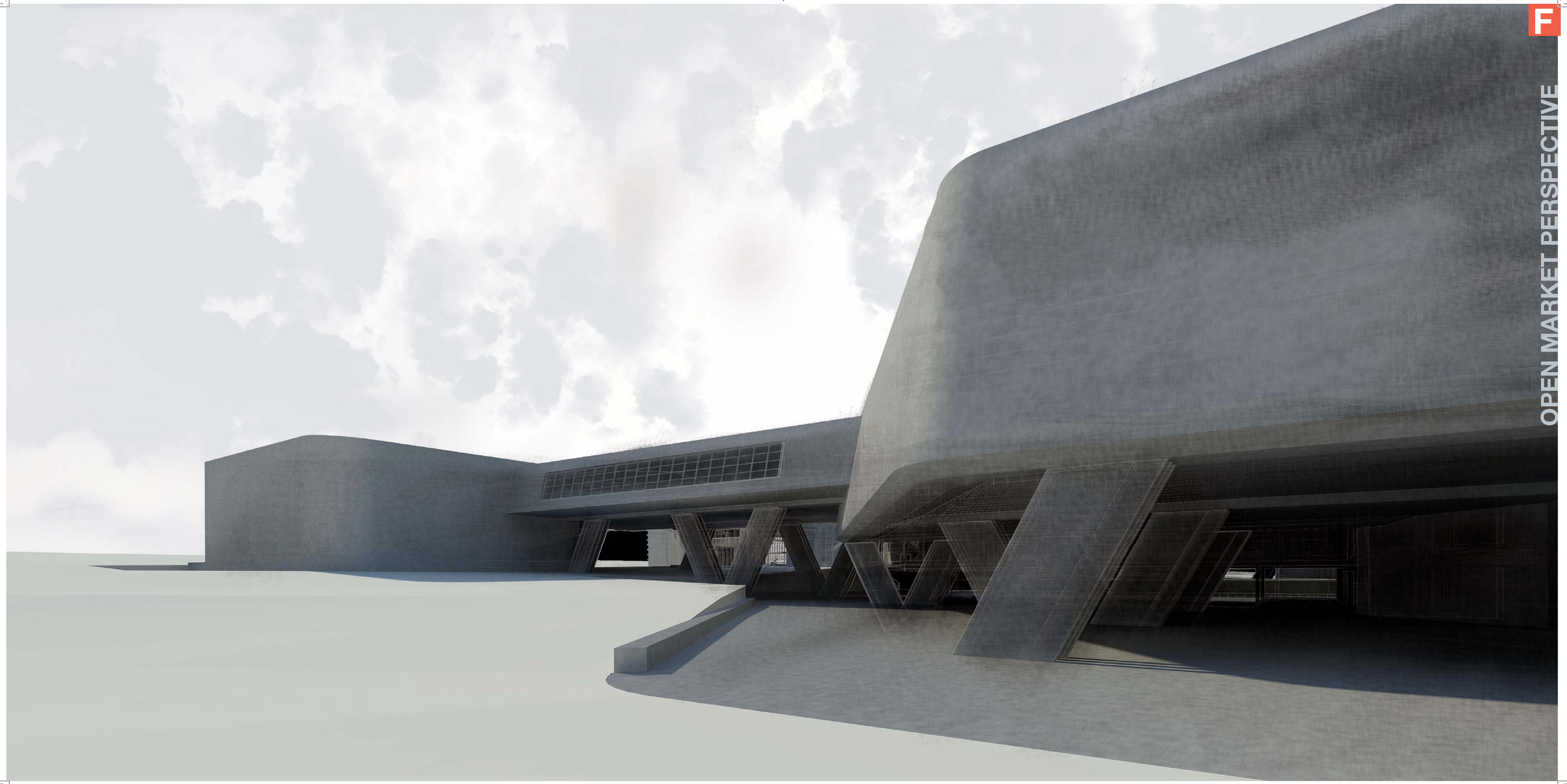
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LOWER GROUND FLOOR PLAN



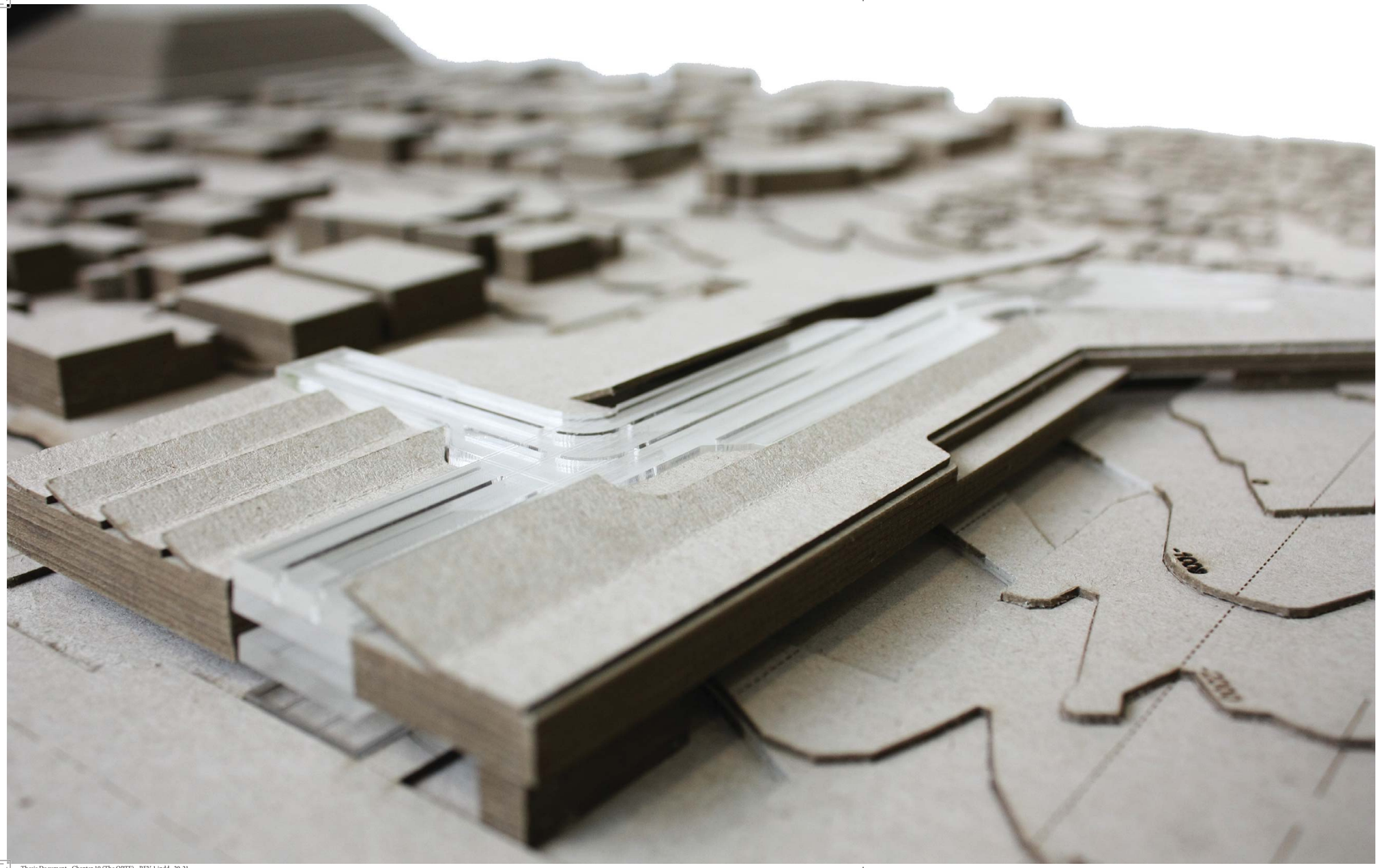
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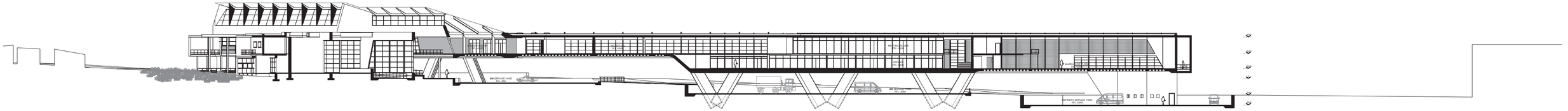


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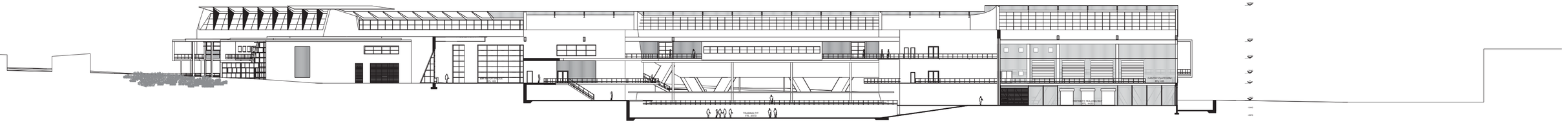
OPEN MARKET PERSPECTIVE



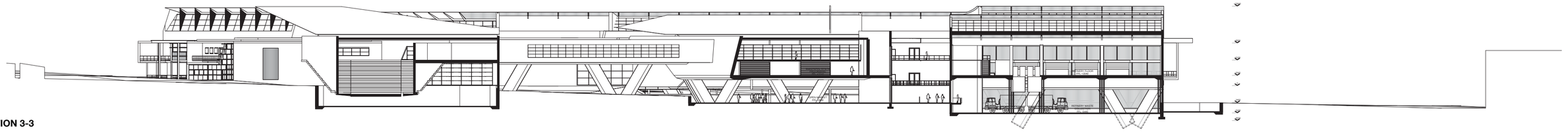
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SECTION 1-1



SECTION 2-2



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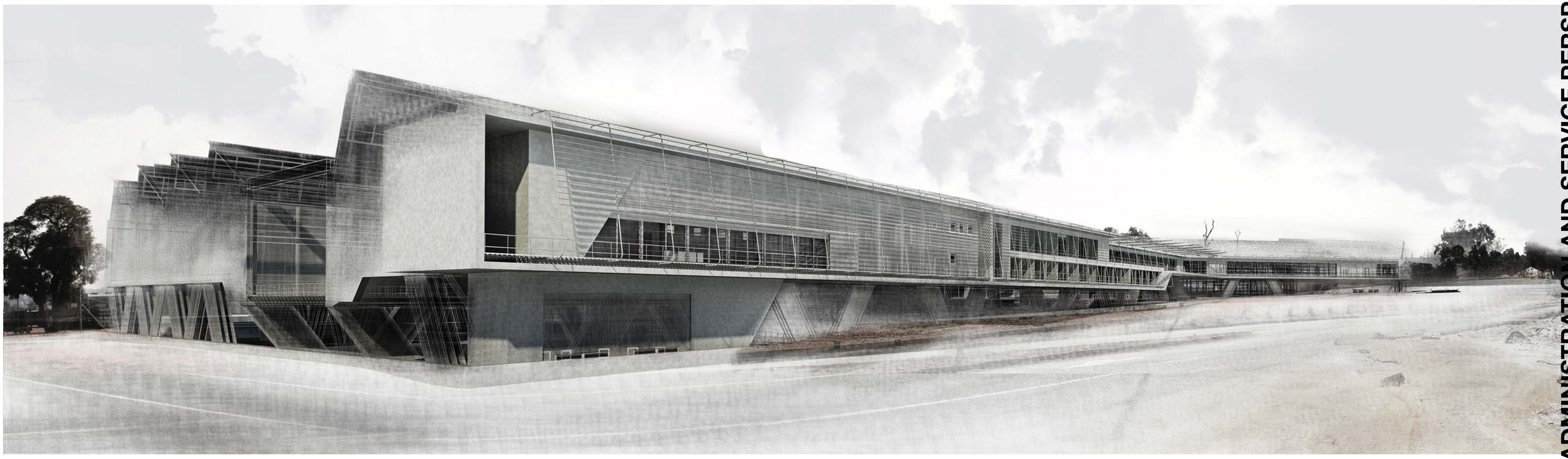
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ENTRANCE PERSPECTIVE



ADMINISTRATION AND SERVICE PERSPECTIVE

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64 ***MAP 4*** (pg 182)

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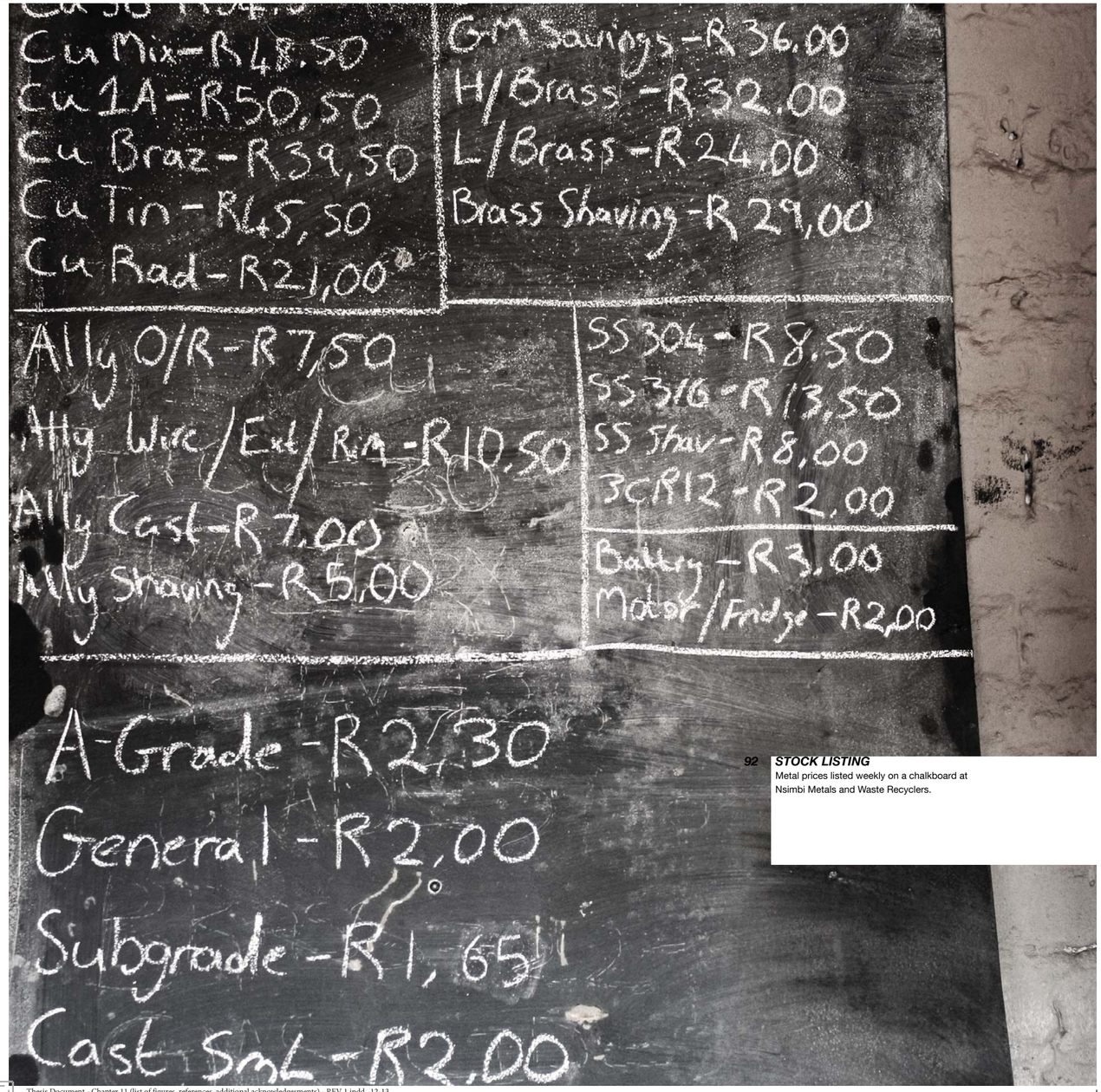
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APPENDIX

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92 ***STOCK LISTING***
Metal prices listed weekly on a chalkboard at Nsimbi Metals and Waste Recyclers.

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