architecture & the commute

<< a railway station in mamelodi >>

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For influence, inspiration & guidance

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Nicholas Clarke . Piet Vosloo

>>>

For support

my husband . my parents . my pirates

ABSTRACT

This dissertation investigates architecture's potential role in improving the experience of the daily commute into and out of the city. It is proposed that an architectural intervention that takes into account the 'embodied' experience of the commuter as key informant could assist in such an improvement.

Various structural and infrastructural upgrades are being planned for the east-west Metrorail link between Pretoria Station and Mamelodi by the Tshwane Municipal Government and the Passenger Rail Agency of South Africa (PRASA). This link is selected to act as setting for the enquiry, with Mamelodi Gardens Metrorail Station as site for architectural intervention.

A conflict is identified between requirements of the public transport system to function optimally and efficiently and the experiential and everyday needs of the commuter who encounters it. The dissertation aims to relieve this apparent opposition through a design process of mediation.

Due partially to its functionally driven nature, public transport planning often leads to an environment of extremes which places the commuting experience under tension. Architecture's potential role in alleviating these extremes through impact or through the mediation of other environmental impacts is explored.

Phenomenological philosophy, as a study based in the ontological enquiry of conscious experience, is the theoretical stimulus to the experiential component of the study. This theoretical base is partnered with investigative and interpretive study in order to ascertain the various ways in which architecture could potentially impact on the embodied experience of the commuter.

Figure i-1 Impression of commute from Mamelodi into the city, by author (Feb 2012)

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01 introduction

Figure 01-1 Railway line near Pienaarspoort Station, by author (Feb 2012)

01 THE IDEA

The impetus to the dissertation is the notion that the most basic everyday encounters between the inhabitant and the city can be improved by urban and architectural design that takes into account the phenomenology of experience.

02 THE SETTING_ the commute

One of these encounters with the city takes place at the outset and close of each working day, when the inhabitants enter and leave the city environment. This 'in between' experience of the commute, which consists of both journey and wait, is of tremendous experiential and existential importance as it shapes a significant portion of the everyday life-experience of many city dwellers.

Due to urban sprawl caused by apartheid planning strategies, a large percentage of inhabitants that work in the city live in far removed and marginalized areas well outside the city borders and make use of public transport services such as bus, taxi and rail to access the city. From those inhabitants travelling from Mamelodi more than 30% make use of the Metrorail services and are known to generally represent the poorest of the poor (GAPP, 2010:13). These residents often spend hours every day on their way to, in and around the railway line and its stations.

This east-west commute via the Metrorail link between the township of Mamelodi and the Pretoria CBD has thus been selected as setting for the enquiry.

03 THE PROBLEM_ a need for enquiry

Within the proposed phenomenological context, the existing commuting environment of the Metrorail line is found to be inadequate. This is partly due to the fact that the functional and practical requirements demanded of public transport planning generally far outweigh the requirements for experientially appropriate environments. The investigation reveals that this often leads to an environment of extremes that places the commuting experience, which can last for extended times, under tension.

04 THE HYPOTHESIS

It is proposed that an architectural intervention that considers the embodied experience of the commuter as key informant could assist in the development of a more appropriate commuting environment if incorporated into the upgrades planned by the Tshwane Municipal Government and the Passenger Rail Agency of South Africa (PRASA).

More specifically the hypothesis of the dissertation is that architectural intervention, through impact or mediation of other environmental impacts, has the capacity to alleviate the environmental extremes shown to exist within the commuting environment.

05 THE TASK

The ultimate challenge of the design process will be to mediate between the scientific and determinate requirements of a rail station to function optimally and efficiently and the experiential needs of the commuter who encounters it.

02 theoretical background

01 INTRODUCTION

The portion of the investigation focussed on the commuter's experience is informed by a theoretical background of phenomenology, a philosophy which is rooted in the enquiry of conscious experience.

Phenomenological philosophy, through engaging with the concepts of perception and experience, illustrates for us the ultimate impact that architectural environments could potentially have on not only temporal experience, but also on the perception of the greater world and one's relation to it. This re-frames the responsibility of the architect, and necessitates a consideration of the experiential impact of architecture.

The philosophical concern of phenomenology is however dense in its theoretical content and requires in depth elaboration which lies beyond the means of this dissertation. It is therefore aimed to present a condensed introduction to it's subject matter in order to illustrate the manner in which it has informed and directed the investigation.

Two levels of philosophical thought are dealt with in this chapter. The first relates to the study of phenomenology itself, as brought to life by Edmund Husserl and developed by Martin Heidegger and Maurice Merleau-Ponty. The subsequent and second level of thought elaborated on relates to the manner in which architectural theory has translated phenomenological philosophy. The first level of study is required in support of the second as the architectural phenomenologists sourced are heavily influenced by the work of both Heidegger and Merleau-Ponty.

THE LEBENSWELT AND BODILY EXPERIENCE

> "Phenomenology would turn to the things themselves, toward the world as it is experienced in its felt immediacy" – David Abram on the roots of phenomenology (Abram, 1996:35)

Heidegger's phenomenology brought the difficult questions around the nature of human perception, thus far disregarded by scientific discourse as being fanciful, out of the dark and onto the table.

Figure 02-1 Impression of the city, author unknown (SSC, 2012)

Figure 02-2 'Touch', by James (SSC, 2010)

His famed notion of 'being in the world' is one of the defining notions of phenomenological philosophy and essentially relates to the primordial experience of the world and of phenomena prior to any logical abstraction of it. Husserl, before Heidegger, referred to this world of our immediately lived experience prior to all thought about it as the *lebenswelt* or 'life world' (Abram, 1996). According to Heidegger and many of his followers, the post-Greco scientific abstraction of that 'life world' into geometric space, measurable matter and engineered environment had to a great extent overrun the way in which man is built to intuitively 'be in' the world.

Merleau-Ponty, another one of the founding fathers of the philosophy, wrote at great length about the intricacies of the human perception of phenomena. He famously described the body as the centre of primordial perception and he criticized the Cartesian notion of a transcendental ego ultimately separable from the sensing body as the body "is our general medium for having a world" (Merleau-Ponty, 1945:169). He argued that, if without the body there would be no possibility of experience – then the body itself is the true subject of experience and all experience 'embodied experience'.

Figure 02-3 'A Mother's Duty' (1658-60), by Pieter de Hooch (Wikimedia, 2011)
An impression of domestic experience

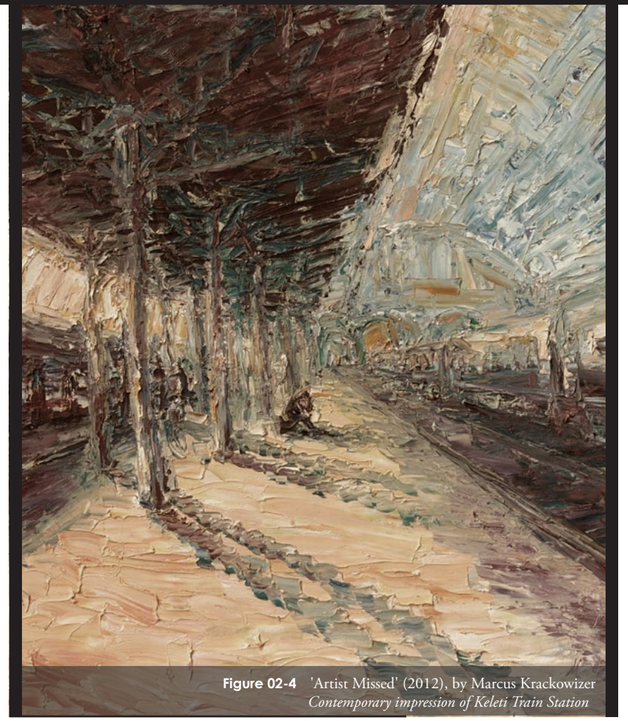


Figure 02-4 'Artist Missed' (2012), by Marcus Krackowizer
Contemporary impression of Keleti Train Station

Figures 02-01 and 02-03 to 02-05 depict impressions of various environments wihtin the artists' realities. In a sense they reveal the reciprocity between the environment and the self, as the landscapes and settings become an articulating part of the artists conscious internal awareness.

Figure 02-5 'Why Should I Stay Here' (2011), by Olaf Bisschoff (Author, 2012)
An impression of landscape experience

For Merleau-Ponty the body's engagements with phenomena were however never statically determinate as they ceaselessly adjust themselves to a world and a terrain that is continually shifting. The perceiving body is in constant reciprocal engagement with its environment. Abram, in his *The Spell of the Sensuous* colours this notion by describing the interaction of his perception with the perceived:

> "As I follow the raven with my eyes, I inevitably feel the stretch and flex of its wings with my own muscles... My various senses, converging as they do from a single, coherent body, coherently converge as well, in the perceived thing, just as the separate perspectives of my two eyes converge upon the raven and converge into a single focus." (Abram, 1996:62)

This convergence of the senses in, and almost *through* the perceived thing illuminates the reciprocal nature of experience. According to Heidegger man comes into being through this perceptual engagement with the phenomena that surrounds him. Beyond 'the thing' this is also man's relation to space and place and to the architecture that articulates it.

02 EXISTENTIAL SPACE

Norberg-Schulz translated the dialogue described by these thinkers into a way of understanding how man relates to his cities and to architecture. In *Existence, Space and Architecture* (1971:9) he introduces his theoretical premise by stating that "man's interest in space has existential roots" and he explains that it stems from a need for man to grasp vital relations in his environment. This 'world we live through' is what Norberg-Schulz terms as existential space. Essentially it is the perceptual field that makes up the *lebenswelt* or 'life-world'.

Dalibor Vesely (2004:40) similarly explains in his *Architecture in the Age of Divided Representation* that, because our existence is always spatial, the "nature of lived phenomenal space determines the topography, orientation, meaning, and the sanity of our existence".

In this theoretical setting it becomes apparent that there exists an intimate link between the act of architecture and the *lebenswelt* of those who inhabit it.

03 ARCHITECTURE AND THE LEBENSWELT

> "We shape our buildings, thereafter they shape us." - Winston Churchill

Juhani Pallasmaa, who has written extensively on the subject, explains that as we construct our self-made world, we construct projections and metaphors of our own mindscapes - "We dwell in the landscape and the landscape dwells in us" (2009:20). He makes a case against industrial culture and the impact of its progression on man's environment and therefore on man himself. He argues that it is reasonable to assume that prior to current industrial culture, situations in daily life and indeed in the *lebenswelt* provided a sensorally denser ground for human growth due to their direct interaction with the natural world and its "complex causalities".

Many urban and engineered environments have perhaps, in their requirement to be efficient, legible and productive, caused a 'monotonization' within this sensory experience. The situation in many of our cities often illustrates the cost of a purely functionalist, technological or programmatically driven architecture. The manner in which cities have morphed to adapt to the advent of the automobile provides a possible metaphor as to the influence of the technological era on the perceptual field of the *lebenswelt* where the pedestrian is often expelled to the tarmac edge of an environment now structured to carry the automobile.

04 THE ARCHITECTURAL RESPONSIBILITY

Based on the above insights it is concluded that essentially, architecture could be seen as the bringing together of or dispersing of material mass... the densification or dilution of phenomena. It has been determined that the perceptual field of the *lebenswelt* or 'life world' is made up of a sensory field. What architects perhaps then ultimately do, as augmenters of sensed phenomena, is to either speed up and densify sensory exposure to phenomena, or slow down and limit exposure. One could almost say the act of architectural design bears influence on the texture or the intensity of mans 'dwelling' in the *lebenswelt*.

What phenomenological theory ultimately suggests is that any architecture that excludes the whole sensing human body as its predominant recipient has most likely failed. The notion that existential space deeply affects the *lebenswelt* of our everyday experience indicates the potential consequence of such a failure. If architecture articulates the perceptual field that makes up this existential space, then the impact of architecture on the consciousness of the inhabitant is potentially profound. The implication is that the architect, planner, engineer and urban designer is responsible for much more than fulfilling programmatic spatial requirements.

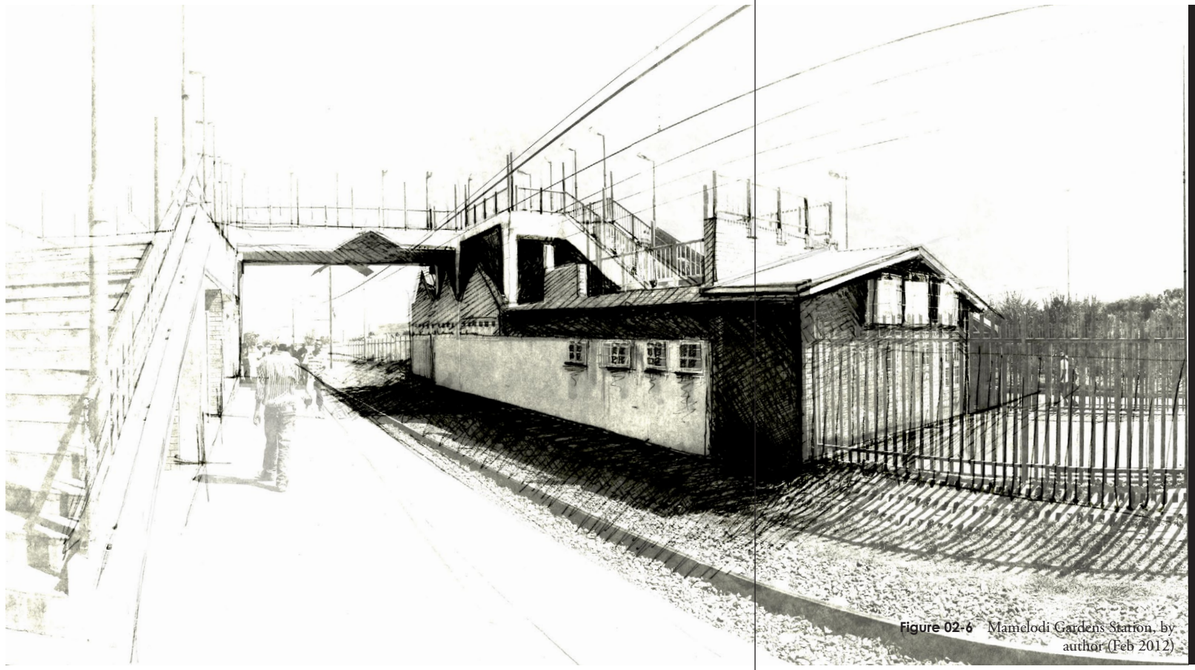


Figure 02-6 Mamelodi Gardens Station, by author (Feb 2012)

Figure 02-7 The Commute, author unknown

Figure 02-8 The Wait at Mamelodi Gardens, by author (Feb 2012)

05 IN CONCLUSION

The link between the physical city environment and the *lebenswelt* or 'life world' of the city dweller is apparent. Planners and designers, as authors, initiators and augmenters of this physical environment, therefore need to consider the 'embodied' experiences of those inhabitants who encounter them as key informant. Not only at places of event and destination, but also at those in between places that connect them, and that make a considerable part of the *lebenswelt* of everyday life.

03 setting_ the commute

Figure 03-1 Mamelodi Gardens Station Platform, by author (Feb 2012)
Commuters huddled together under limited shade

01 INTRODUCTION_ the commute as lebenswelt

The commute has been selected as setting for the study both due to its significance in the experience of the city as *lebenswelt* and its potential in accommodating a dense theoretical and practical investigation.

In the South African urban environment, shaped to great extent by its political past and ongoing financial and planning challenges, there is often little room left for the planning of a finer grain experience. Dewar and Uytenbogaardt extensively list the causes for what they describe as a "stultifying" environment in their primer, *Creating Vibrant Urban Places to Live* (1995:4), and conclude that we are left with a generally sterile and standardized public environment within our urban centres and settlements. Although this is a broad statement, certainly not pertaining to all of the urban environments in question, it does bring to mind many images of real-world spaces within the South African urban fabric that turn a cold shoulder to the inhabitants which most intimately traffic them. The level of generosity that the urban environment provides in terms of even the most basic comfort is called into question (Figure 03-1).

The deep impact of this essential disregard and consequent discomfort becomes apparent when considered in the phenomenological terms of the *lebenswelt*. In this light the environment accommodating the commute is of as much importance phenomenologically as the home, the place of work or public urban centres as it shapes a significant portion of everyday life-experience. It is a place with a nature of its own and a setting in its own right. Additionally it is the space within which the commuter is tangibly exposed to all the varying realities of the public environment before the onset of the usually constant activity of daily work.

02 THE SETTING_ mamelodi gardens metrorail station

The commute on the east-west Metrorail line between the township of Mamelodi and the Pretoria CBD has been selected as the subject of study. The focus of the study is the stations to the east of Eerste Fabrieke which are due significant expansion and upgrade. Mamelodi Gardens station has been selected as site for architectural intervention as it is in it's half-life phase and presents an interesting combination of needs (refer to figures on page opposite). These include a need for the upgrade of existing structure, the inclusion of new structure and better integration with the surrounding fabric (PRASA, 2007).

It should be noted that the encounter of the inhabitant with the station environment is part of a larger commuting experience. The stations are therefore seen as portions of an extended experience through time and are treated as such.

gure 03-2 Metrorail stations to east of Eerste Fabrieke, by author (March 2012)

Figure 03-3 Mamelodi Gardens Station, by author (March 2012)

Figure 03-4 Greenview Station, by author (March 2012)

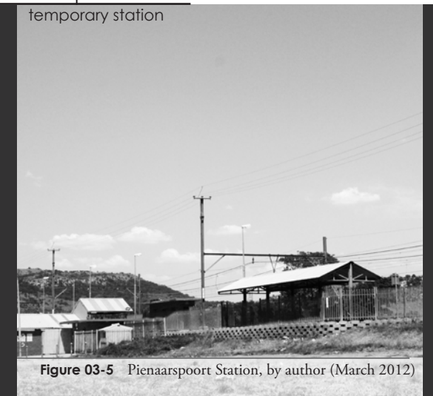


Figure 03-5 Pienaarspoort Station, by author (March 2012)

03 THE CLIENT_ prasa & tshwane

The Passenger Rail Agency of South Africa (PRASA) states in its Station Infrastructure Upgrade Report of 2007 that the continual expansion of the settlements to the east of Mamelodi has resulted in an increased and currently congested travel demand from this area towards the employment opportunities in the west. It subsequently indicates the need for the rail to act as "the backbone of the public transport system" in future (PRASA, 2007:8) and this need is reiterated by the Tshwane Metropolitan Municipality in its Regional Spatial Development Framework (Tshwane Metropolitan Municipality, 2011).

In order for this to be achieved line capacity and supporting structure and infrastructure need to be urgently increased (PRASA, 2007). PRASA's upgrade report goes on to state that the aim is also to develop the station nodes to the east of Eerste Fabrieke to act as focus points for the development of local commercial opportunity, increased access to services and higher density land use.

The upgrades and expansions indicated as urgent in this report have up to this date not been completed. The Tshwane Metropolitan Municipality, with PRASA its partner in development, is for this reason defined as the project client.

04 THE USER_ the commuter

In order for the station upgrade to result in an environment that addresses embodied experience it is necessary to first determine the user and his relationship with that environment.

In addition to the provision of access, rail stations manifest in many varied and often contrasting ways in regard to their relationship with the user. They are places of transit or transition, and of connection or separation. Existentially they may be places of welcoming or of farewell, of the everyday humdrum or scenes of personal event (Figure 03-6). Often they are places of business or tourism and in many cases they act as social and public space, as they do in Mamelodi.

Although rail stations generally consist of the same concrete components, which typically include controlled access points, ticket offices, managers' offices, platform areas and the like, the nature of the setting varies considerably depending on the user that occupies it (refer to illustrations on page opposite). This not only stresses the importance of the user in determining the nature of the environment, but also indicates the capacity of architecture and its tectonic to express and relate to phenomenological experience.

Figure 03-6 Scene at train station from 'Brief Encounter' (The Guardian, 2012)

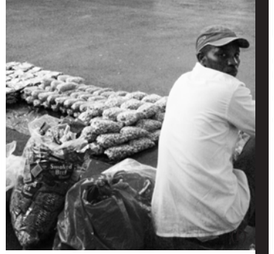
Figure 03-7 Gautrain interior, by author (March 2012)
The articulation of the train interior resembles an office environment suited to the businessman

Figure 03-9 Friends of the Rail train interior, by author (April 2010)
The articulation of the train interior resembles a restaurant space suited to a tourist

Figure 03-8 Office environment (Shutterstock, 2012)

Figure 03-10 Restaurant environment, by Petrichuk (2012)

Figure 03-11 (a) - (c) Rail stations, by author (March 2012)



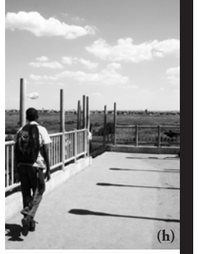


Figure 03-12 (a)-(h) Metrorail, by author (March 2012)

Figure 03-13 (a)-(f) User- Typologies, by author (March 2012)

In the case of the east-west Metrorail line servicing Mamelodi, the commuters are generally of low income background and are usually employed in low level positions in the city or industrial areas of Pretoria (GAPP, 2010). The Metrorail stations are therefore places of daily transit with the user most likely being a worker-user (Figures 03-12(a) & 03-12(b)).

The station environments in this area do however exhibit another layer, specific to Mamelodi and the South African context of informal settlement and informal trade. Due to the lack of private transport, the rail stations and other public transport nodes have, at differing scales, become centres of commerce, with the train stations often acting as nodes of intensive informal trade activity. This, combined with the lack of organized public and civic space within the settlement, has lead to these stations becoming defined social and interactive public spaces. In this regard the users are often buyers and sellers, consumers and producers, entertainers and audience. They are also often community members engaged in interaction with one another.

When not engaged in interaction, the 'in between' experience of the commute also becomes a place of wait and of reflection and rest whilst the daily transition into and out of the city takes place, often a delayed and lengthy experience (Figures 03-12(c) to 03-12(h)).

In this sense the rail stations and other public transport facilities in Mamelodi have become more than functional components linking far off destinations together. They are places of social, communal and personal significance, where hours are often spent in a state of wait.

In its physical manifestation the present station architecture does not respond to this significance. The economic, political and practical constraints surrounding the development of the Metrorail stations in Mamelodi have produced a very baseline setting, where the architectural articulation of the stations predominantly express a focus on security and durability. This has in many cases lead to an environment that imposes on the user rather than responding to him and it is this aspect of the rail stations in Mamelodi that the dissertation seeks to address.

04 strategy_ a process of mediation

The apparent opposition that exists between the functional, scientific requirements of the rail and the experiential needs of the commuter presents an interesting duality for the design process. The margin between the scientific context and the more interpretive experiential context is not static as it is difficult to make a distinction between the physical ordering of reality and the experience thereof. Vesely gives clarity to this problem:

> "In a spontaneous creative process it is difficult, even today, to separate completely the abstract geometrical definition of a building from its realization in a particular material and from the world of experience of the users." (Vesely, 2004:2)

He does however go on to state that the development of scientifically standardised production processes has lead to a tendency to judge architecture as one might any other technical achievement, founded on an existing universal knowledge base. This in a sense limits true creativity and true investigation and he states that "attempts to come to terms with this approach force architects to sacrifice all aspects of architecture that do not meet the standards of technical knowledge."

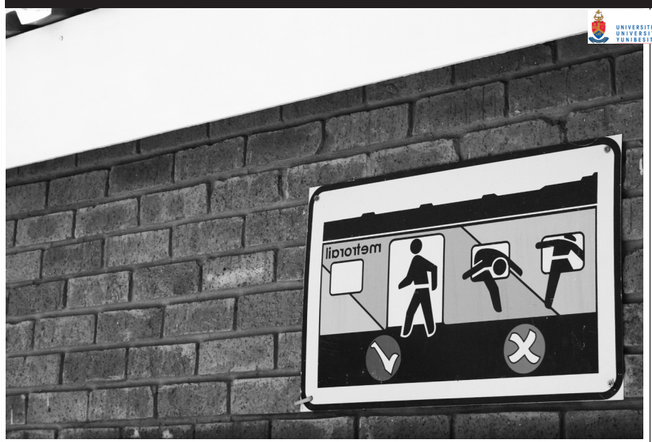


Figure 04-1 (a)-(b) Metrorail environment, by author (March 2012)

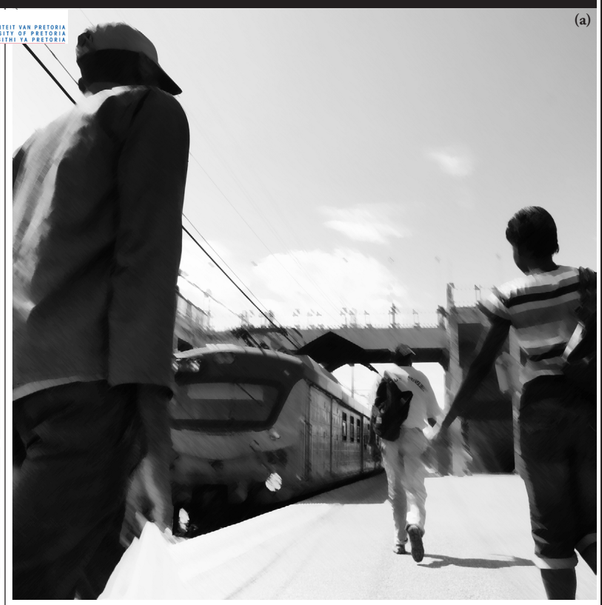


Figure 04-2 (a)-(b) Commuting environment, by author (March 2012)

Vesely makes a distinction here between two contexts that inform decision making during the design process of the architect. The first is based on a productive reality, which is informed by instrumental and scientific knowledge and seems to generally take preference in the development of our built environment. The second is based on the awareness of an experiential and creative reality and is very often neglected during the design process due to the difficulty in measuring its abstract and transient nature.

The distinction drawn between these two contexts is useful in regard to this study as they provide a framework that may give clarity to the investigation of this duality. The investigation is subsequently divided into three parts. The first part deals with what will be from this point onward referred to as the scientific instrumental context. This part utilizes means and methods of materializing architecture that are known and accepted within the profession. The second part then aims to deal with the more abstract experiential context of the user and is based on interpretive and exploratory study. Finally, part 3 poses the design development as a mediation between these contexts.

part 01 >>

the scientific instrumental context

As stated in the previous chapter, this section deals with the scientific instrumental context to the design problem and does so by utilizing accepted means and methods within the profession.

Specifically it presents the development of an urban framework which analyzes the urban structure of Mamelodi in order for the intervention to achieve value within context. Existing frameworks are also consulted and analyzed in order for the intervention to be aligned with government driven momentum. An area of architectural impact is identified within this larger scale and various objectives are set up to guide design decisions. At site scale the programmatic and operational requirements of the railway station are investigated and a list of accommodation is set up.

As mentioned before, the margin between this context and the experiential context is not static and experiential considerations do protrude many aspects of this section.

part 01
05 framework development

01 INTRODUCTION

As mentioned, he first part of the contextual investigation looks at Mamelodi and the Metrorail stations from a planning and strategic urban perspective. The study area is addressed at two scales. At the first scale Mamelodi is analyzed at large, with the focus on a portion within Mamelodi East. A broad framework was done at this scale through consultation of existing frameworks and was performed in collaboration with a framework group.

At the second scale the focus is on the area of impact of the proposed upgrade at Mamelodi Gardens station and the key aim here is to translate the framework objectives to site scale.

02 FRAMEWORK OBJECTIVES

Most of Mamelodi's structural planning problems arise from the issues surrounding the historical urban sprawl brought about by apartheid (GAPP, 2010).

Presently the majority of residents commute out of Mamelodi into the Pretoria CBD and surrounding area to access opportunity for income generation. Generally, this commute is expensive, congested and doesn't support local development.

The broad objectives of the framework study were therefore not only to establish better access to the city, but also to generate opportunity and improved support to residents within Mamelodi itself.

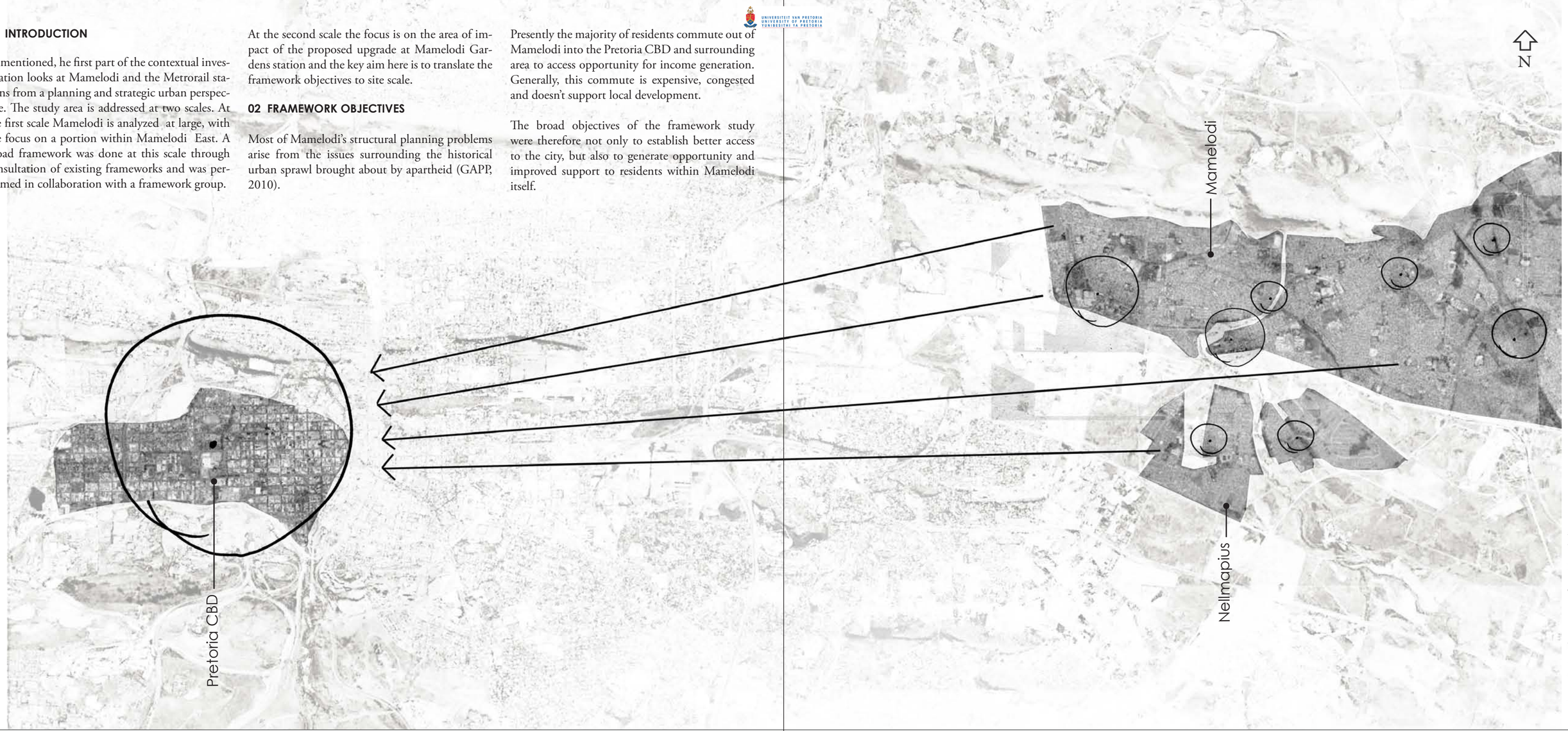


Figure 05-1 The commute from Mamelodi to the CBD, by author (Feb 2012)

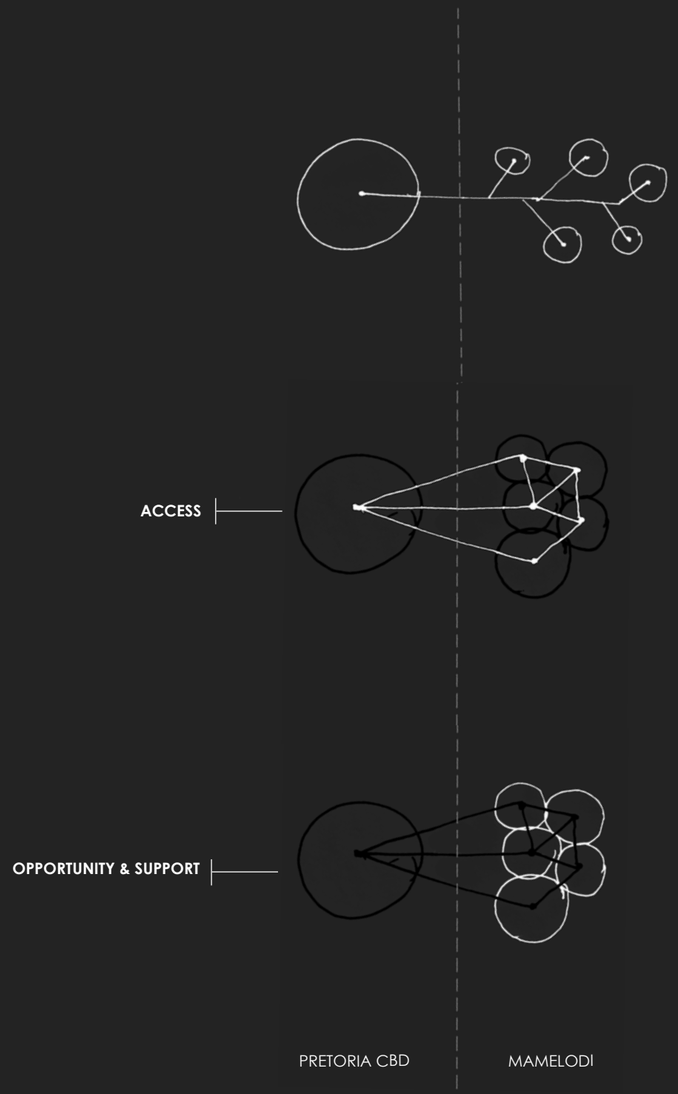


Figure 05-2 Representation of framework objectives, by author (March 2012)

Figure 05-3 Opportunity for informal trade in the Pretoria CBD (March 2012)

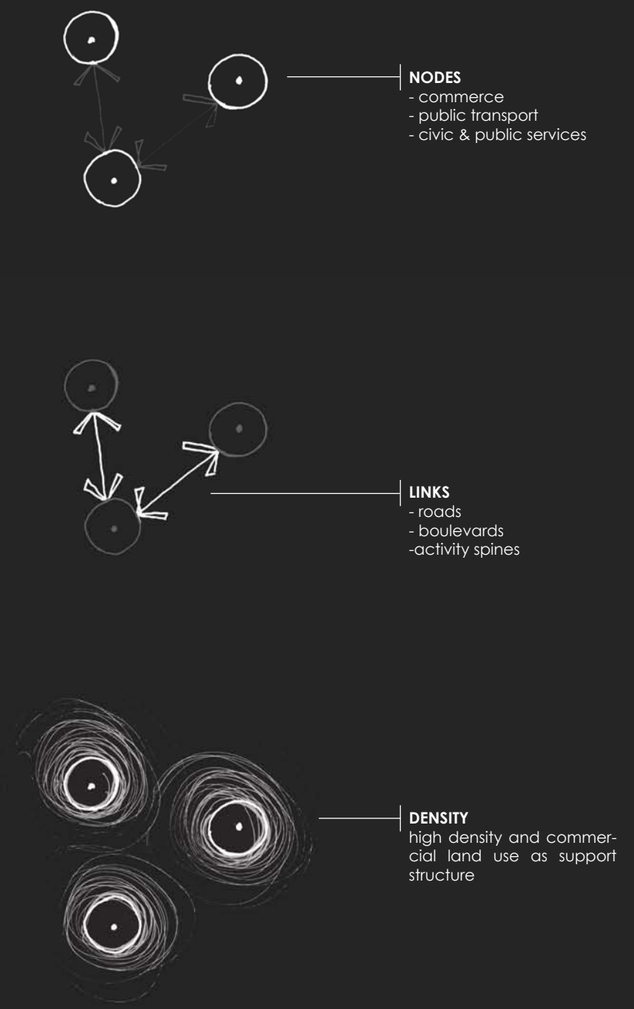


Figure 05-4 Ordering principles used by existing frameworks (March 2012)

03 EXISTING FRAMEWORKS

Various existing municipal frameworks were consulted in order to gain a better understanding of the major planning issues that exist as well as the direction that governmental structures aim to steer development in. The majority of frameworks consulted draw from the environmental ordering principals as defined by Lynch in *The Image of the City* (1960) and are based largely on the development of nodes or points of higher energy, which act as centres or loci, and the paths or routes that connect them. The frameworks essentially aim to re-structure the urban fabric in order to give development more momentum and directionality and to improve the legibility of the township fabric. The latter refers to what Lynch describes as the "ease with which its parts can be recognized and can be organized into a coherent pattern" (Lynch 1960:2). Within the frameworks the nodes are also planned to sustain services, commerce, public transport and other interactions and are planned to be supported by higher densities within the surrounding fabric (Figure 05-4).

_gapp framework

The well known and widely consulted Tsosoloso Programme set up by GAPP was the main source studied in order to gain an understanding of the longer term development strategy for Mamelodi. The programme is based on a 20 year planning horizon with its main focus on the development of local opportunity (GAPP, 2010).

Figure 05-5 Illustration of GAPP framework proposal, by author (March 2012)

Figure 05-6 Illustration of Tshwane Metropolitan Municipality and PRASA framework proposals, by author (March 2012)

The GAPP framework structure proposes to first establish connectivity through the development of existing and future roads. It goes on to illustrate where the main nodal points are planned to manifest, usually at the intersection of these main roads (Figure 05-5).

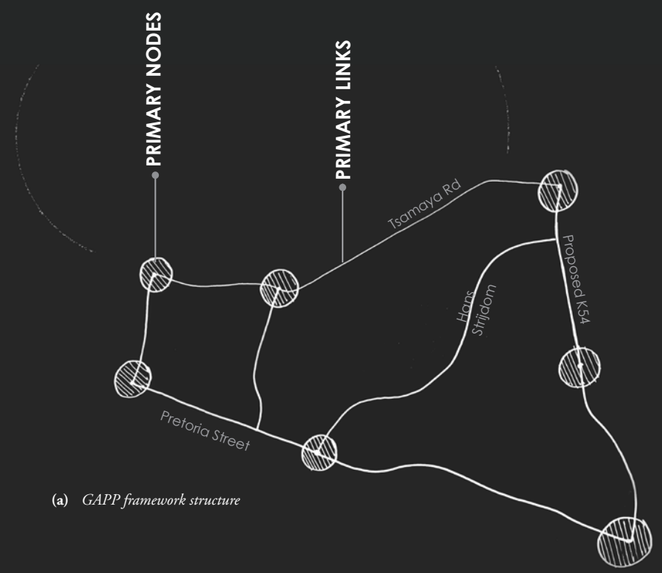
Some of the major nodes are however planned along a 20-year time line and at some of these locations current trends within the urban fabric do not support the development of the intersections into points of high energy concentrations. Furthermore, the nodes that currently do exist or have enough momentum to exist within the following 5 years do not push growth in the direction of the 20-year plan. A gap is therefore identified between the existing condition and the planned future condition.

_ tshwane & prasa frameworks

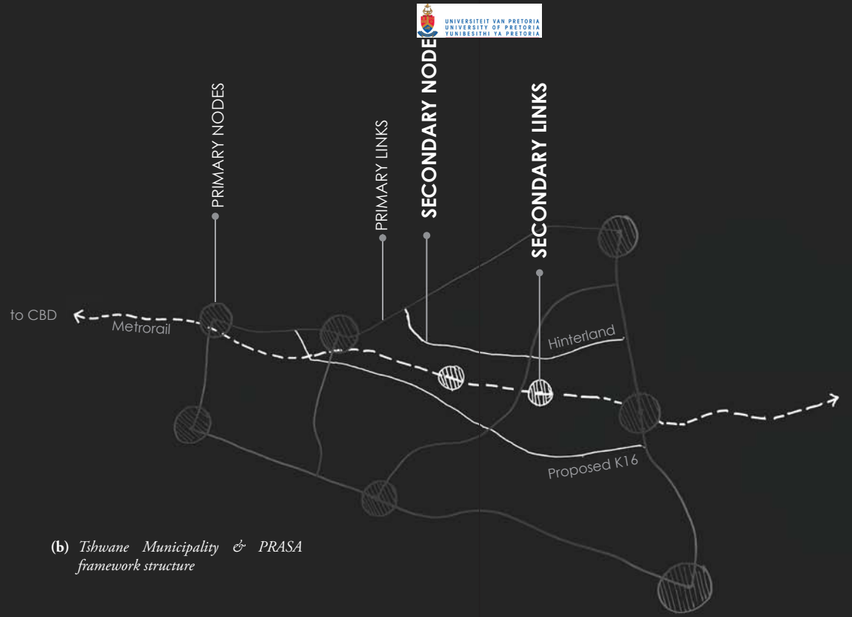
Other frameworks identified as relevant to the study were the Regional Spatial Development Framework (RSDF) and the Integrated Transport Plan 2006-2011 as set up by the Tshwane Metropolitan Municipality as well as the Eerste Fabrieke to Greenview Railway and Station Infrastructure Upgrade - Planning and Preliminary Design Report as compiled by in 2007 by the Passenger Rail Agency of South Africa (PRASA) - the then SARCC.

These frameworks place greater focus on shorter term development and propose a regeneration of the rail system to alleviate issues with access and congestion. The PRASA framework also proposes that these rail station sites be developed as nodes where small scale commercial activity and access to services may be facilitated.

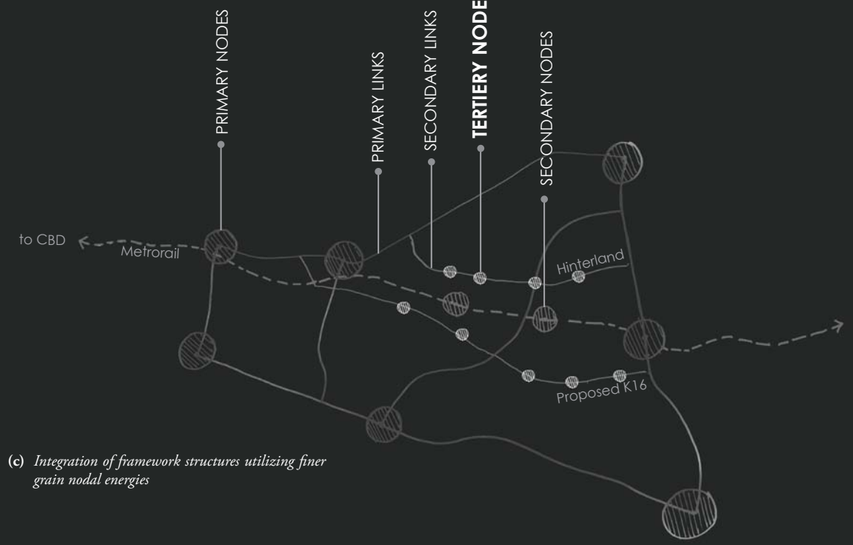
The nodal development proposed by these frameworks is however not synchronized with that of the 20-year horizon posed by the Tsosoloso programme.



(a) *GAPP framework structure*



(b) *Tshwane Municipality & PRASA framework structure*



(c) *Integration of framework structures utilizing finer grain nodal energies*

Figure 05-8 (a)-(c) Proposal to integrate the frameworks proposed by Tshwane, PRASA & GAPP, by author (March 2012)

04 FRAMEWORK PROPOSAL

The proposal is to merge the longer term strategy of the Tsosoloso framework with that of the short term strategies posed by the Tshwane Metropolitan & PRASA frameworks in order to achieve a more holistic strategy (Figure 05-8).

Furthermore, a finer grain system of informal commerce was identified throughout Mamelodi which drives opportunity for income as well as support in terms of product and service delivery (Figure 05-7). The framework therefore acknowledges this energy and proposes to harness and support the existing finer grain momentum strategically in order to drive future development at a larger scale. This concept will be illustrated in greater detail with the framework resolution at site scale.

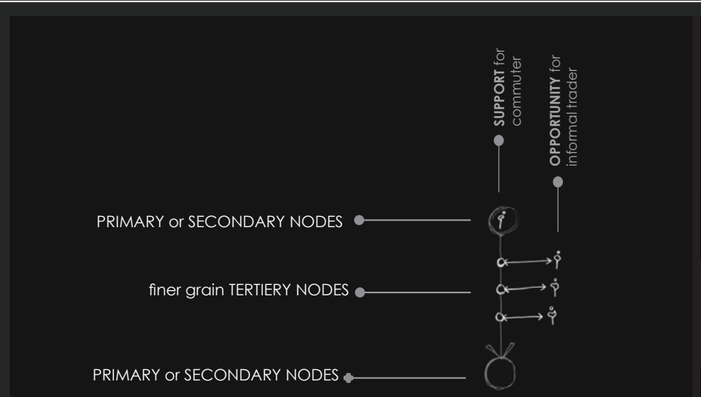


Figure 05-7 Finer grain energies, by author (March 2012)

Figure 05-9 (a)-(b) Finer grain energies, by author (March 2012)

Figure 05-10 Framework focus area, by author (March 2012)

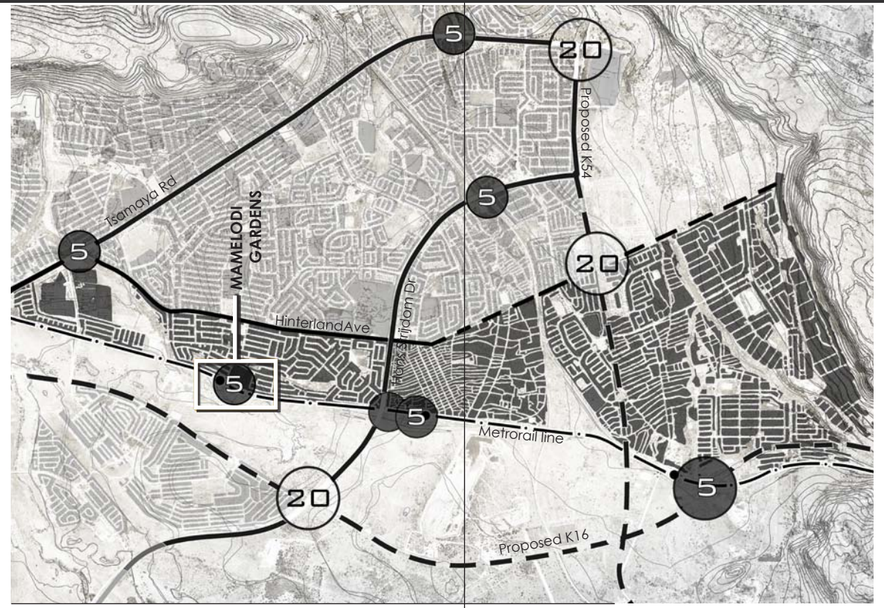


Figure 05-11 Proposal to integrate the frameworks proposed by Tshwane, PRASA & GAPP, by author (March 2012)

Figure 05-13 Existing fine grain energies on Hinterland Ave, by Author (March 2012)

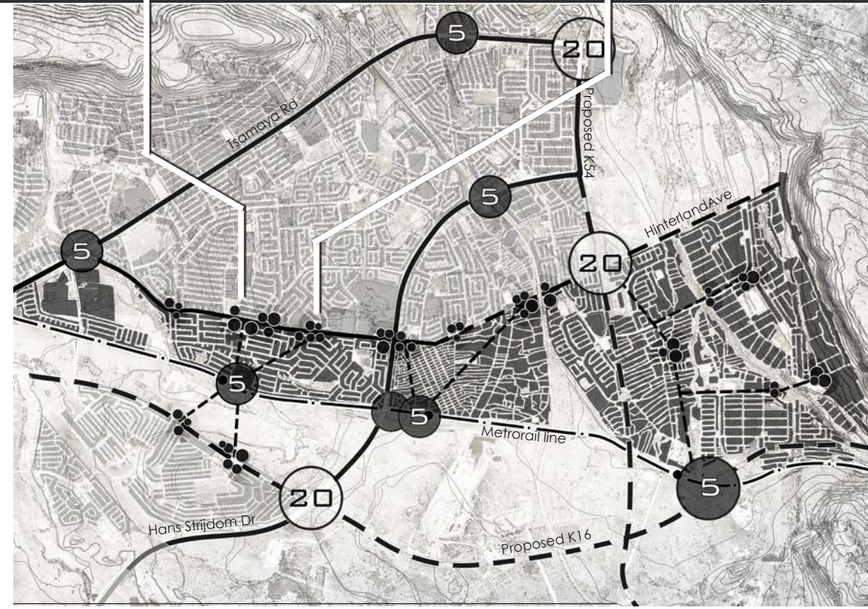


Figure 05-12 Harnessing of existing finer grain energies to support development along the 20 year horizon, by author (March 2012)
The diagram illustrates the potential in harnessing the existing finer grain energies along Hinterland in order to develop it as a link and to develop the intersections with access roads to the stations as tertiary nodes

MAMELODI GARDENS METRORAIL STATION

According to PRASA (2007) extensive upgrades are planned for the existing station, which is currently inadequate in terms of, among other things, its carrying capacity, passive security, climatic issues and it's integration within the urban fabric.

There is at present no direct link to Hinterland Avenue and the area to the north of the station is developed as medium density built up housing, with a school for the disabled directly north-east of the station. Some of the properties adjacent to the station have already been acquired by the Tshwane Metropolitan Municipality in order to obtain the space required for the station threshold to be better integrated with the surrounding fabric.

To the south is an open tract of land that separates Mamelodi from Nellmapius. An artery of the Pienaars river which runs through the space punctuates this separation. The planned land use for this area is high density housing with a focus on mixed use and services such as post offices or clinics in closer proximity to the station (GAPP, 2011). It is also proposed that this and other stations along the Metrorail line act as nodal pedestrian links between Mamelodi and Nellmapius.

Figure 05-14 Mamelodi Gardens Station, by author (April 2012)

Figure 05-15 Existing station at Mamelodi Gardens, by author (April 2012)

The northern and southern thresholds each pose unique challenges and strategies were set up that deal with both, with the main prerogative being to achieve the objectives set out by the group framework, namely, improved access, opportunity and support.

Additionally, it is aimed to extend the generosity of the station beyond the station threshold primarily through the incorporation of landscape features that address the comfort, security and orientation of the commuter travelling to and from the station.

06 AREA OF IMPACT

Figure 05-16 illustrates a mapping of the catchment area that the station serves. The strategy is to define an area of impact for the station, on which development can be focussed and which will benefit most dramatically from the station development. The 10 minute walking radius surrounding the station was therefore defined as the area of impact. The incorporation of the objectives set out above will therefore be focussed on this area. The area also intersects with Hinterland Avenue and reaches to the existing housing in Nellmapius, providing the opportunity to improve access from the main roads to the station.

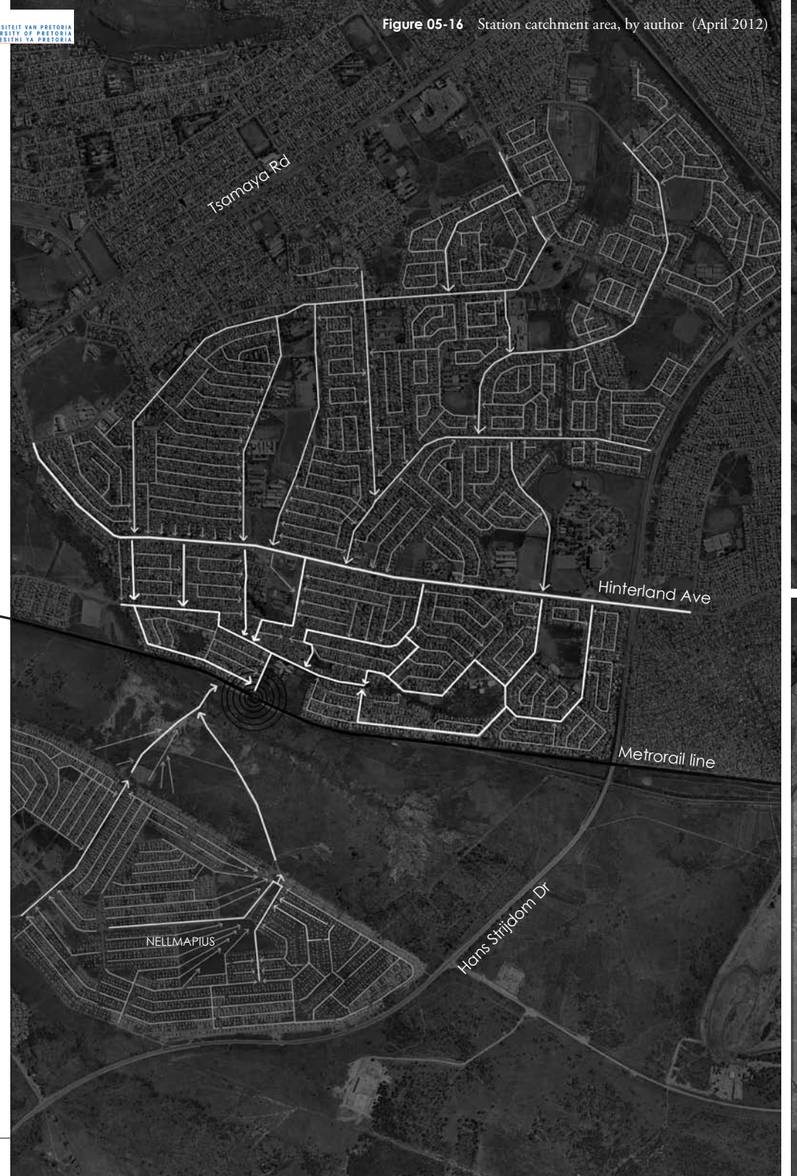


Figure 05-16 Station catchment area, by author (April 2012)

Figure 05-17 Pedestrian access, by author (April 2012)
600m walking radii

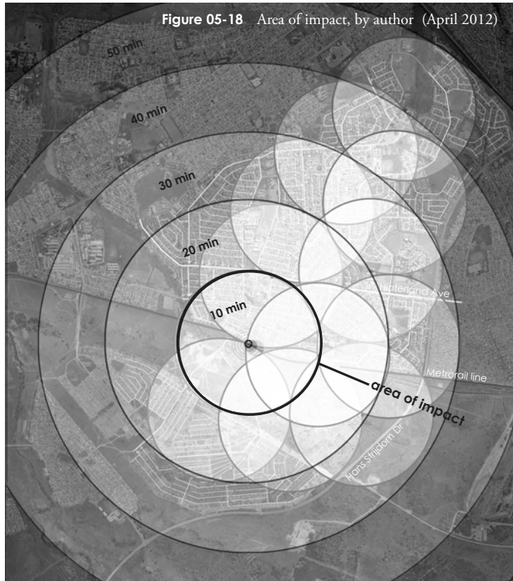


Figure 05-18 Area of impact, by author (April 2012)

07 STRATEGY TO NORTH_ adjusting flow

Figure 05-21 illustrates a mapping of the existing concentration of finer grain energies along Hinterland Ave and Netshibupfe Nkuna Street. These are points of small scale commerce and the informal trade along Netshibupfe Nkuna Street especially is associated with the pedestrian traffic to and from the station.

The existing access route is fragmented and there is no clear or legible access route to the station that provides a sense of direction or arrival. A restructuring of access routes to harness and focus the existing energy is therefore proposed. The aim is that these access routes will act to extend the generosity of the station and will strengthen the small scale commerce that provides opportunity for the informal trader and support to the commuter.

Figure 05-21 Existing finer grain energies, by author (April 2012)
Based on small scale commerce observed

Figure 05-19 Existing access from north, by author (April 2012)

Figure 05-20 Adjusted flow from north, by author (April 2012)

Figure 05-22 Existing finer grain energies , by author (April 2012)
Concentration of energies along Hinterland Ave and Netshibupfe Nkuna St

Figure 05-23 Proposal to north, by author (April 2012)
Re-structuring of access routes to harness & focus energies

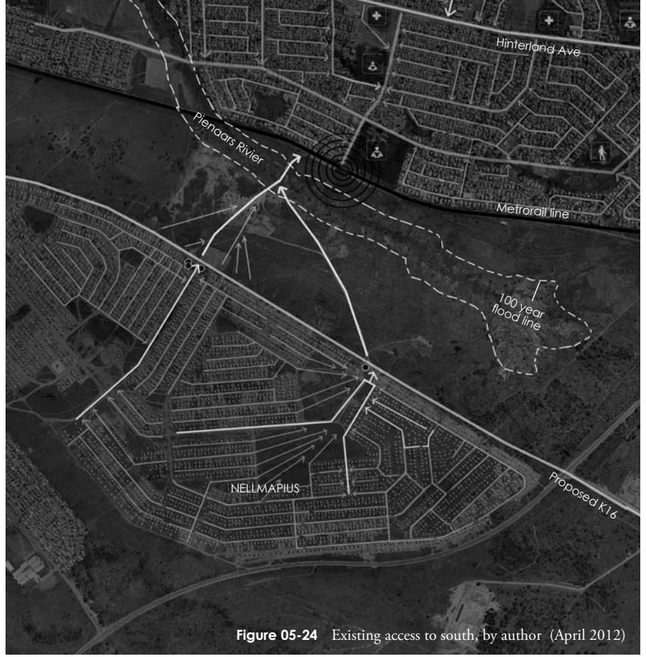


Figure 05-24 Existing access to south, by author (April 2012)

Figure 05-25 Proposed access, by author (April 2012)
Formalization of existing routes

Figure 05-26 Proposed supporting land use, by author (April 2012)

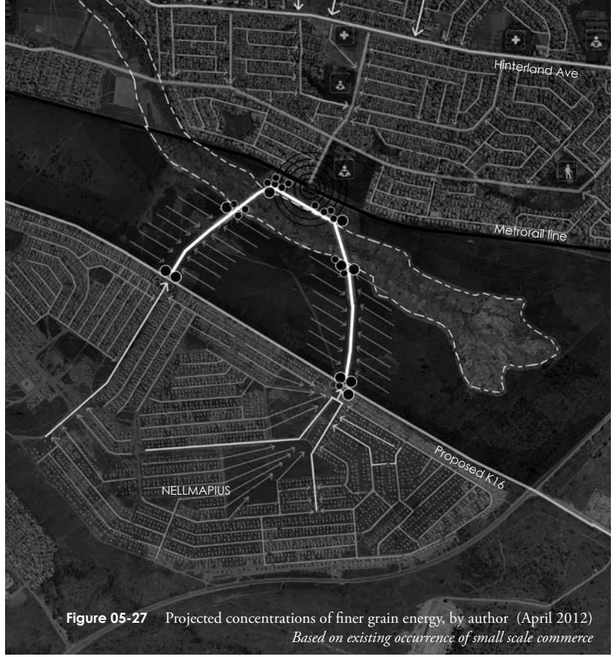


Figure 05-27 Projected concentrations of finer grain energy, by author (April 2012)
Based on existing occurrence of small scale commerce

08 STRATEGY TO SOUTH_ integration

The undeveloped tract of land to the south of Mamelodi Gardens Station provides opportunity for the development of mixed use and high density housing to be supported by the station as public transport node (GAPP, 2011). There is then also potential to utilize the flood line area as public open space, with higher densities then at its threshold in order to activate its edges as far as possible, and provide passive surveillance (Figure 05-26).

Access to the station from Nellmapius is currently from two main exit points, where a finer grain informal trade energy presently occurs. It is proposed for these access roads to be formalized (Figure 05-26), again with the aim being not only to establish clear and legible access but also to extend the generosity of the station into the surrounding fabric and to support the existing small scale commerce (Figure 05-27 - projected concentrations of energy).

These two access roads also intersect with the planned K16 road, which is proposed by GAPP (2011) and the Tshwane Metropolitan Municipality (2006) to become an important link in future, connecting some of the larger 20-year horizon nodes and accommodating higher densities on its edges. There is thus opportunity here to steer momentum in the direction of the GAPP vision by accommodating and strengthening the energies that already exist along this link (Figure 05-28) .

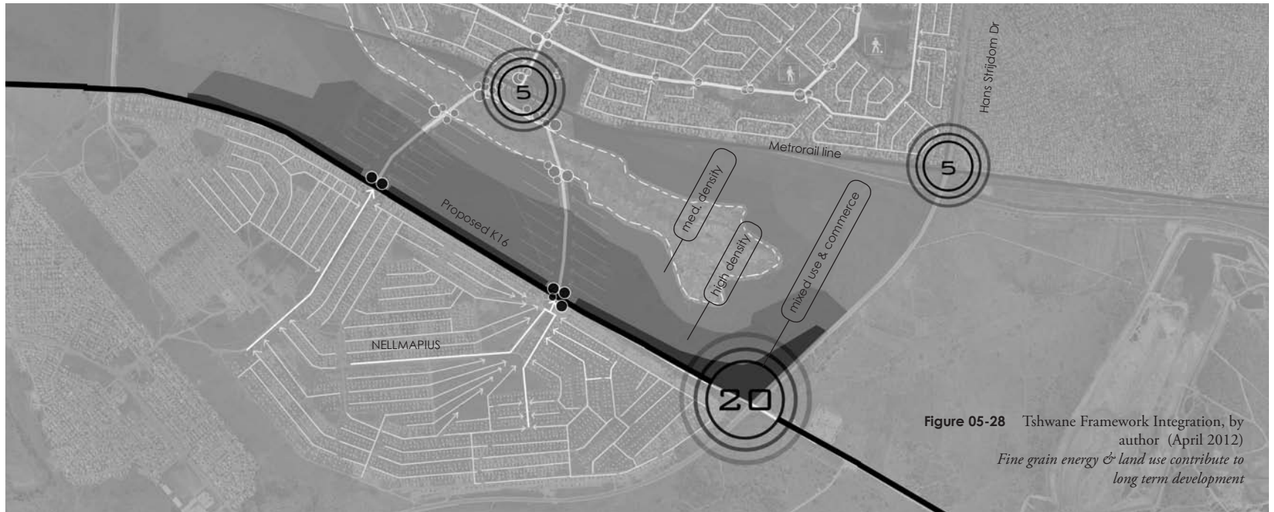


Figure 05-28 Tshwane Framework Integration, by author (April 2012)
Fine grain energy & land use contribute to long term development

part 01
06 programme & requirements

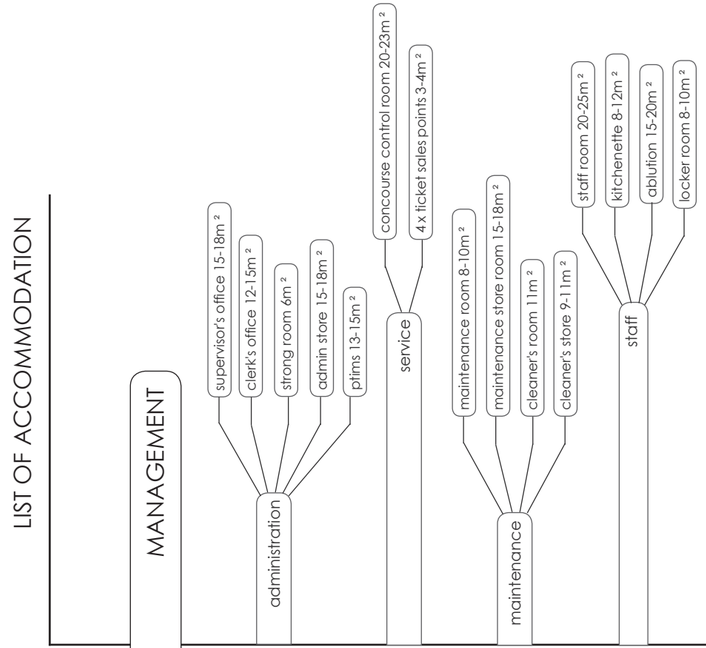
01 DESIGN REQUIREMENTS

Several documents were sourced in order to gain a broad understanding of the various design requirements that take priority with the design of rail stations. The UK Network Rail's Guide to Station Planning & Design (2011:13) gives a good universal list of design objectives and in combination with PRASA's planning and design reports for the stations east of Eerste Fabrieke (2007 & 2010) was used to compile a contextual list of design requirements to guide decision making throughout the design process.

Various meetings with Tshwane and PRASA representatives, as well as interactions with the locals, revealed the most prominent problematics to be accessibility and security, as there are frequent and widely publicized issues with crime such as vandalism and theft at the stations.

02 ACCOMMODATION

An accommodation list was compiled based on the requirements set out by PRASA's Detail Design Report for Mamelodi Gardens, Greenview & Pienaarspoort Stations (PRASA, 2010). The programmatic elements not included in the document are marked with an asterisk.



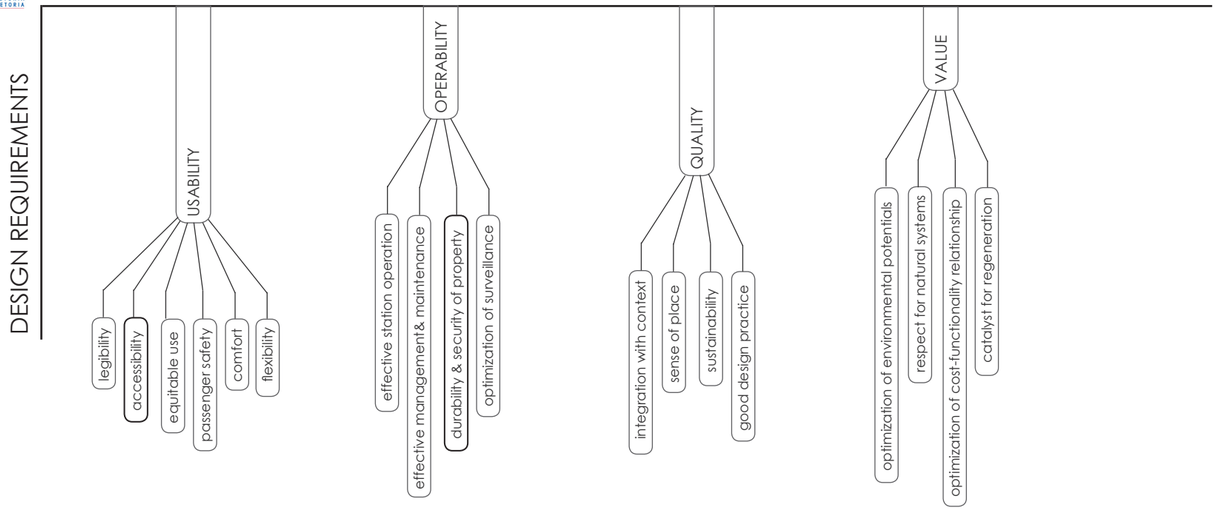
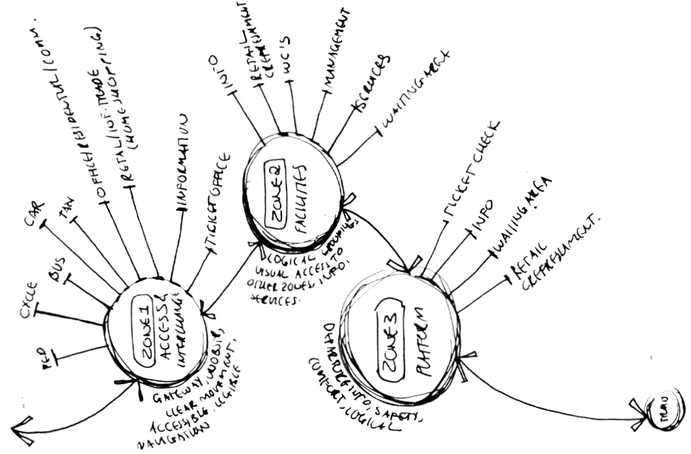


Figure 06-1 Exploration of spatial organization, by author (June 2012)



part 02 >>

the experiential context

The focus in this section is on the potential impact of architecture on the embodied experience of the commuter. The study is based on a background of architectural phenomenological theory, as introduced in the second chapter, and is developed by an exploratory study. As phenomenological philosophy deals with subjective experience the exploratory study is inevitably based, in part, on hermeneutic interpretation.

Based on these observations, the commute as setting is analyzed in regard to its experiential character and a line of commute from Mamelodi to the Pretoria CBD is identified for investigation. This is done not only in order to determine the problems that need to be addressed in regard to commuter experience, but also to provide a relative reference against which improvement may be measured.

Finally, the architectural means through which the impact of the environment on inhabitant may be mediated is investigated through the analysis of precedents.

part 02
07 mapping architectural impact

01 INTRODUCTION

The first portion of this section is informed by a research component based on a literature study of various architectural phenomenologists, whom offer their own interpretative input into the impact of architecture on experience. The second portion is based on an exploratory study. The main intent of the investigation is to directionally inform the tectonic development of the station at Mamelodi Gardens.

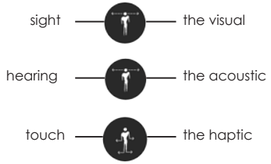
02 LITERATURE STUDY_architectural impact

Based on readings done of the work of authors such as Juhanni Pallasmaa, Kenneth Frampton and Steen Eiler Rasmussen, two channels through which the urban environment can affect the embodied experience of the commuter have been identified. These are namely direct sensory contact and environmental awareness, the latter being comparatively less measurable than the former.

The authors cited all explore the varied ways in which architecture impacts on the senses and on embodied experience. Rasmussen for example (1959) illustrates the wide and rich palette of impact that architecture has on the senses in terms of texture, light, colour, sound reflection and so forth. Pallasmaa (2005) continues this investigation by illustrating the impact of architecture and the urban environment on haptic, acoustic and multisensory experience as well as peripheral vision and the awareness of space. Frampton (1995) discusses the relationship between tectonic of architecture and embodied experience, examining for example the impact of tectonic and stereotomic architectural expression on the bodily perception of space. From these investigations it became clear that architecture not only impacts on the senses directly and individually ('I see a roof and walls around me'), but also contributes to a conscious awareness of the environment that perceiving body occupies ('I am enclosed'). It was subsequently decided to map architectural impact along these two channels.

_sensory contact

According to Shinzen-Young (2009), a researcher in meditative psychology, the senses that the environment most dramatically impact on can be categorized into three main types of sensory experience:

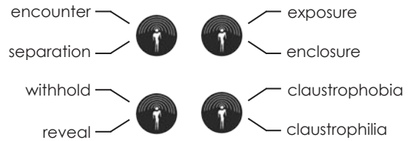


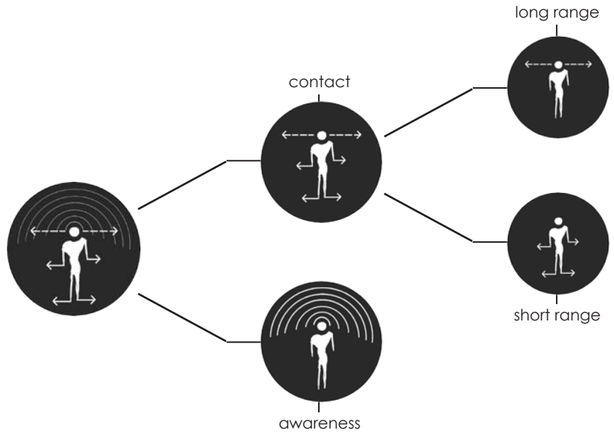
These three direct sensory experiences can be further categorized into long range and short range senses, where the visual and acoustic are perceived over distance but where touch, as it requires closer proximity, is a much more intimate experience. The long range senses of hearing and sight are the last to develop in infancy and interestingly often the first to be lost by the old. Sight and hearing impairments are also generally known to be the most common and disabling sensory impairments. The very young, very old and the disabled therefore generally have a disadvantage in regard to the long range senses and have a sensory realm dominated by the haptic.

The generosity of the built environment toward the commuter may followingly be measured in not only the level of accessibility and legibility as perceived by the long range senses, but also in the nature of its haptic expression toward the short range and intimate senses.

_environmental awareness

In addition to physical sensation most of the authors cited also penetrate and investigate the dialogue between architectural tectonic and the way the observer relates to his greater environment. Different blends of sensory contact, combined with higher faculties such as association, intuition and memory bring about certain states of environmental awareness. These are difficult to define specifically due to their subjective conscious construction. Some states of environmental awareness do however present themselves more obviously, and have been selected for investigation in the exploratory study.





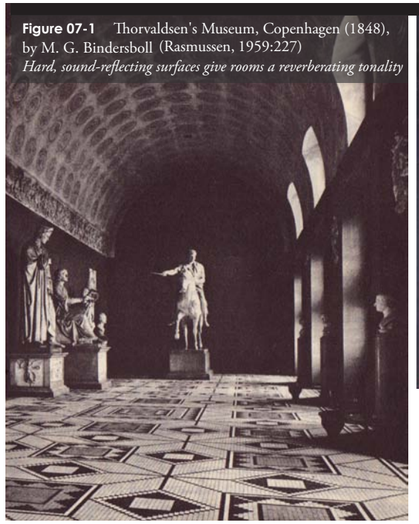


Figure 07-1 Thorvaldsen's Museum, Copenhagen (1848), by M. G. Bindersboll (Rasmussen, 1959:227)
Hard, sound-reflecting surfaces give rooms a reverberating tonality

Figure 07-2 'Flagellation of Christ' (1607), by Carvaggio (Museworthy, 2008)
Chiaroscuro - the impact of deep shadow on visual experience

Figure 07-3 Goldoni's House, Venice (Rasmussen, 1959:205)
Venetian use of light against walls impacts on visual awareness of architectural enclosure

Figure 07-4 Brion-Vega Cemetery, (1970-1972), by Carlo Scarpa (Architectcouture, 2011)
Scarpa's use of light fragments sensory exposure

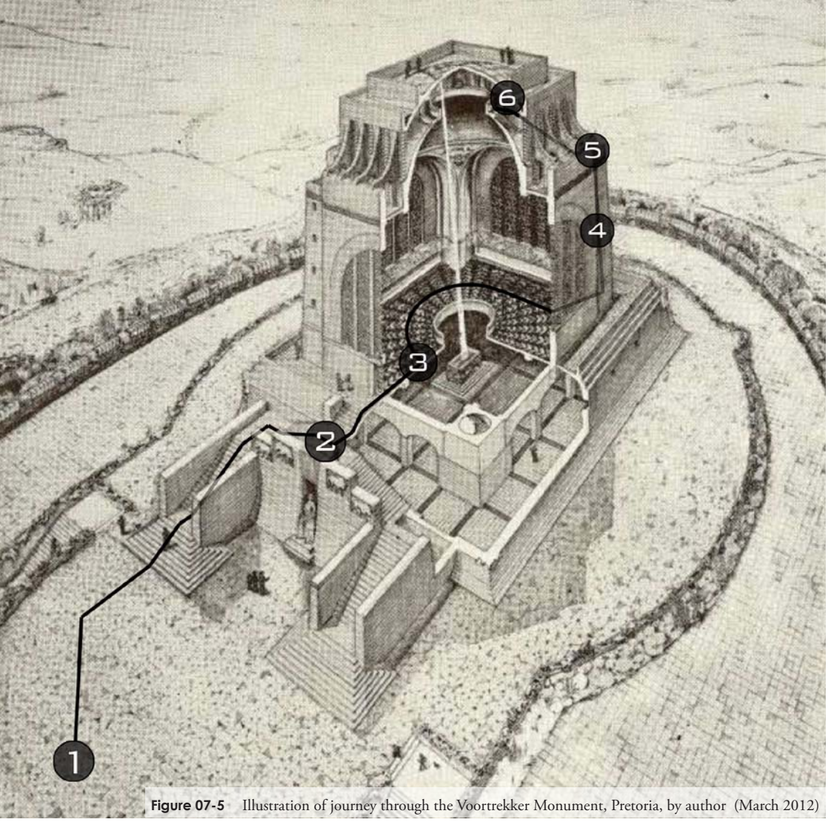
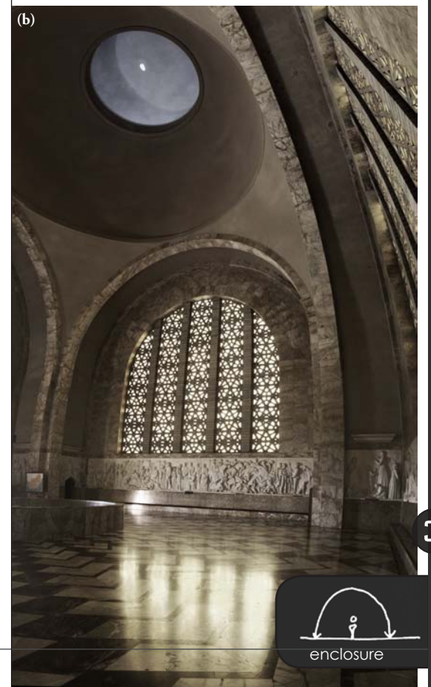
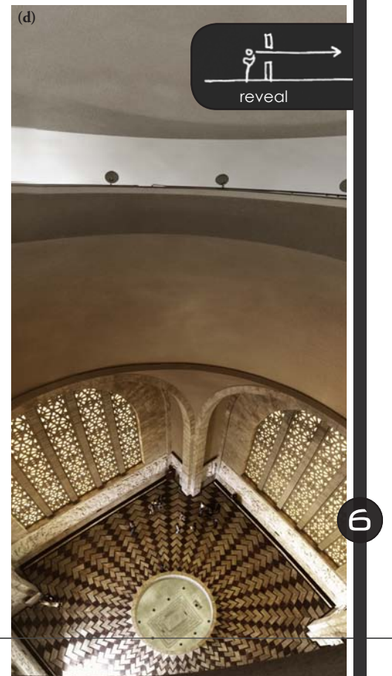


Figure 07-5 Illustration of journey through the Voortrekker Monument, Pretoria, by author (March 2012)

Figure 07-6 (a) - (f) Photographic accou of journey through the Voortrekker Monument, by author (March 2012)





03 EXPLORATORY STUDY _ the monument typology

An interpretive study was conducted in order to investigate the various experiential structures through which architecture could potentially impact on environmental awareness. In this regard the monument typology was found to be a suitable setting for investigation as the programmatic intention of the monument is to have direct impact on the conscious awareness of the visitor, and thus opens itself up for dissection.

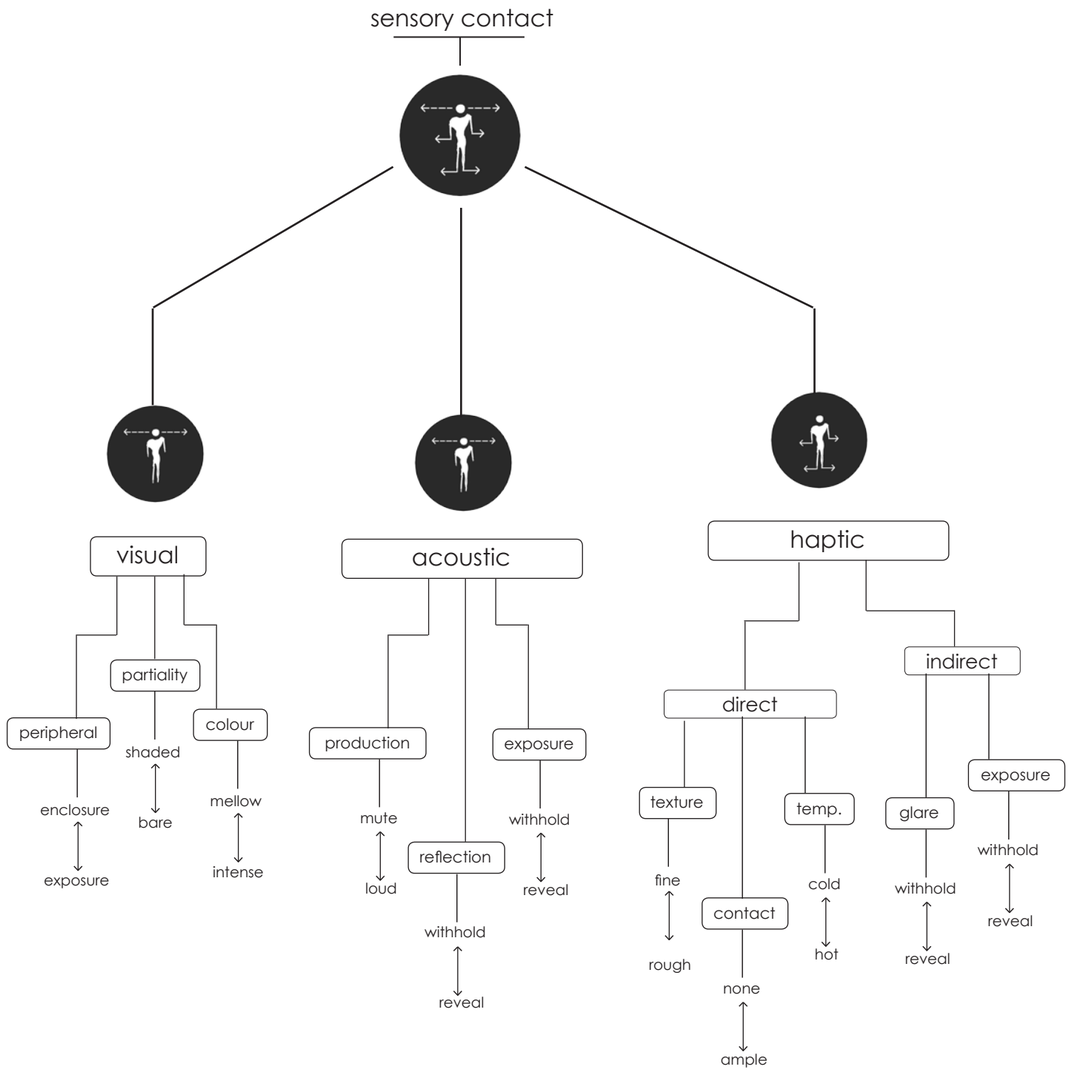
The study not only serves as a platform for investigation in terms of environmental experience but also reveals aspects of experience in general, which contributes to the manner in which the analysis and improvement of the commuting environment is resolved.

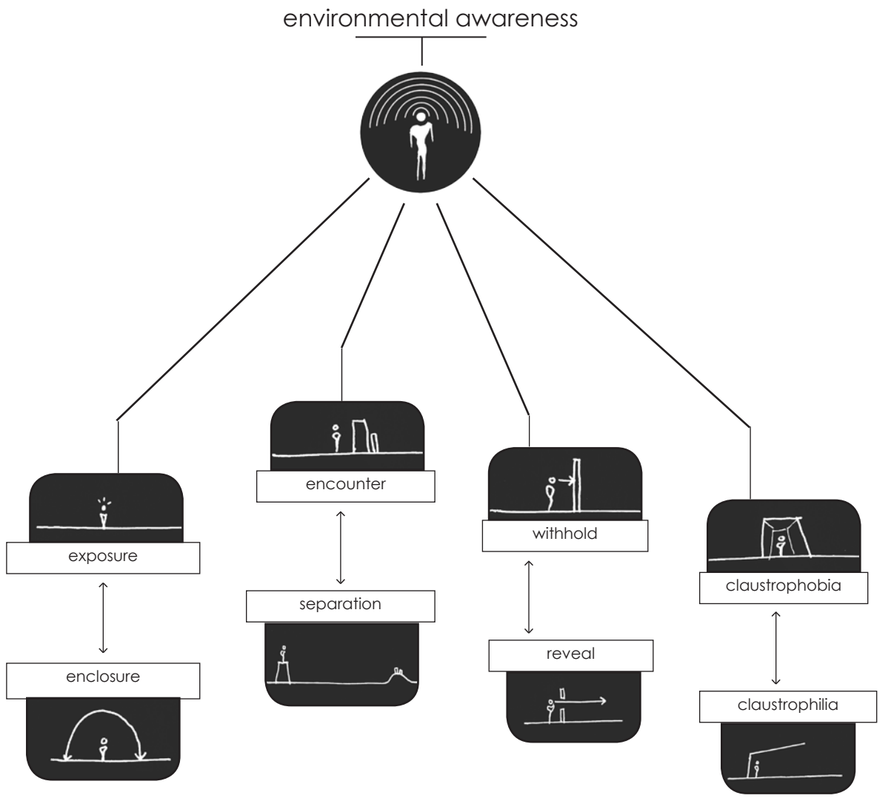
The historical Voortrekker Monument in Pretoria was selected as setting for investigation and the experiential impact of encounters with the various architectural features were mapped photographically in order to illustrate the findings (See photographic account on opposite page).

_findings: polarity & tension

The main finding of the study was that embodied experience occurs in terms of polarities of extremes. When experiencing the sensation of temperature for example the sensation is described as being somewhere between the two extremes of hot and cold. When describing the sensation of enclosure it is in reference to the opposite sensation of exposure. Moerdjik, the architect of the Voortrekker Monument, used polarity as a means to illicit moments of dramatic encounter. As an example, the experience of the stereotomic enclosure within the interior hall of the monument is preceded by the experience of absolute exposure on the vast pavement on the exterior before entry. This polarity causes a sort of tension in experience, dramatizing the moment of entry (Figure 07-6 a-b).

A second finding was therefore that when polarity in sensation manifests at an extreme, or changes abruptly through time, it causes tension in experience. This could possibly be confirmed if one considers the laws of physical science. When, for example, a material such as steel is subjected to high and low temperatures over time it places the material in tension. Similarly, once the environmental condition changes abruptly, the observer becomes aware of the sensation. This phenomenological impact is used on several occasions by Moerdijk as to tool by which to illicit response.

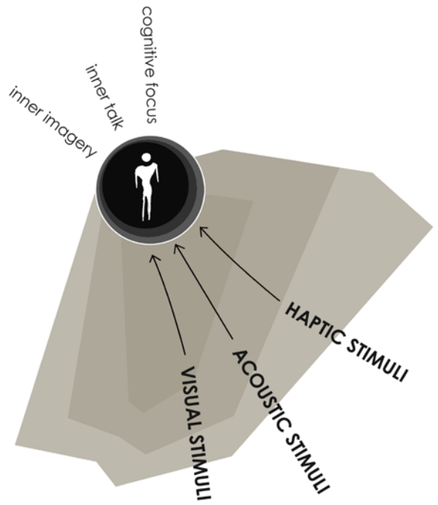




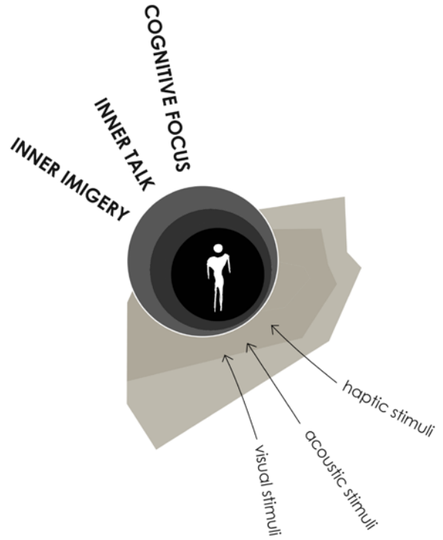
_conclusions

The moments of encounter at the Voortrekker Monument are driven by a positive tension as it is the purpose of the architecture in this case is to be communicative. Within the commuting environment however, the extremes presented are predominantly negative in nature, as will be illustrated in the following chapter. In this setting they influence the nature of the journey and the wait, during which the commuter often engages with internal processes or socializes and interacts with fellow commuters, activities which environmental extremities could potentially impact on negatively.

Architecture's potential role in this regard is then to aid in alleviating the extremes that impede on these experiences.



environmental impacts at extremes



mediated environmental impacts

Figure 07-7 (a) - (b) Illustrations indicating the impact of environmental stimuli on experiential focus , by author (March 2012)

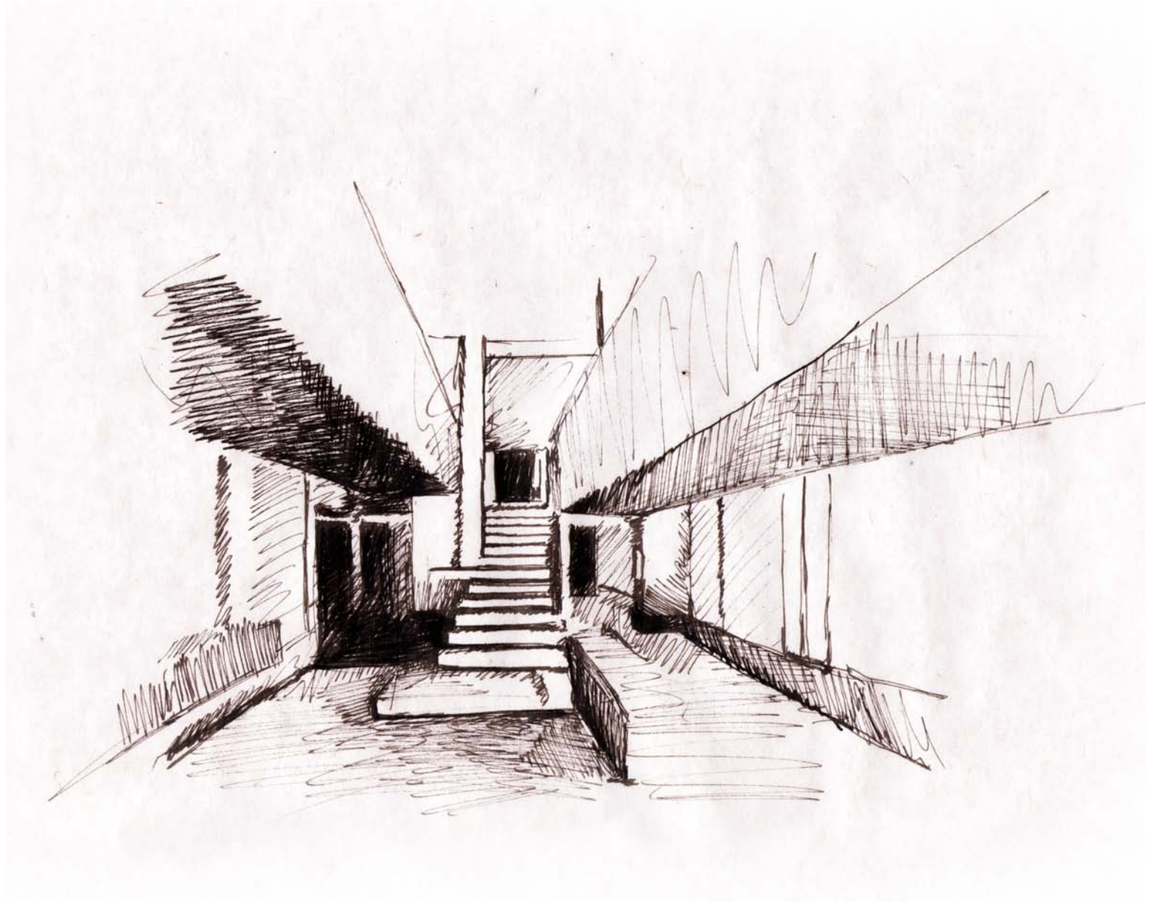


Figure 07-8 Impression of Carlo Scarpa's Olivetti Showroom , by author (March 2012)
Indication of the fragmentation of architectural volume and the impact of deep shadow on the experience of surface

04 EXPLORATORY STUDY _ architectural surface

An investigation was also conducted into what potential impact the articulation of architectural surface specifically could have on embodied experience.

_the significance of shadow

The investigation was prompted by Pallasmaa's commentary in his *The Eyes of the Skin* on the significance of shadow in the experience of the environment:

> "Deep shadows and darkness are essential, because they dim the sharpness of vision, make depth and distance ambiguous and invite unconscious peripheral vision and tactile fantasy." (Pallasmaa, 2005:46)

He elaborates on this statement by comparing the inviting street of an old town with its alternating levels of light and shadow with a street that one would likely find in a modern landscape of today, where homogenous lighting "wipes the sense of place" (Figures 07-9 & 07-10).

This aspect of spatial perception also bears on the experience of architectural surface. Various sites and precedents were followingly analyzed in terms of their surface quality in order to ascertain how shadow and surface intensity may influence experience and how it could subsequently be utilized as an architectural tool.

Figure 07-9 Photograph of market street in Venice, by author (Dec 2005)

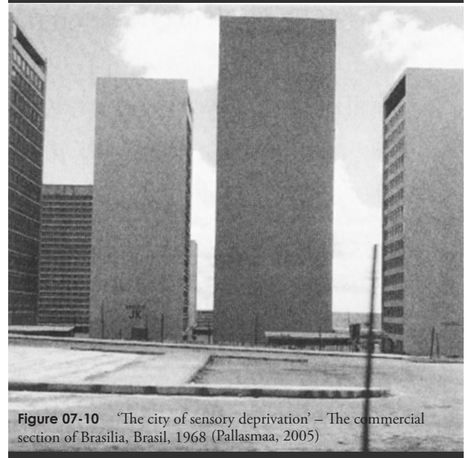
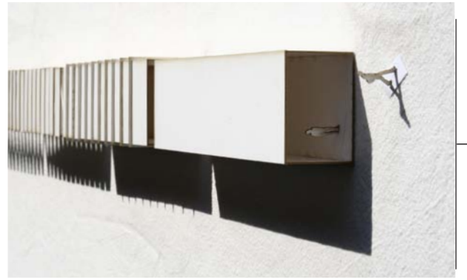
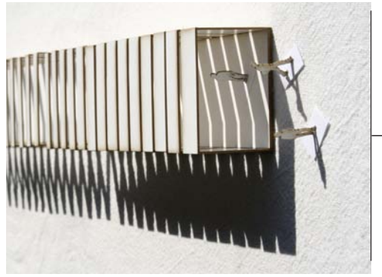


Figure 07-10 'The city of sensory deprivation' – The commercial section of Brasilia, Brasil, 1968 (Pallasmaa, 2005)





exposed surface

material fragmentation

volumetric fragmentation

fragmentation through shadow

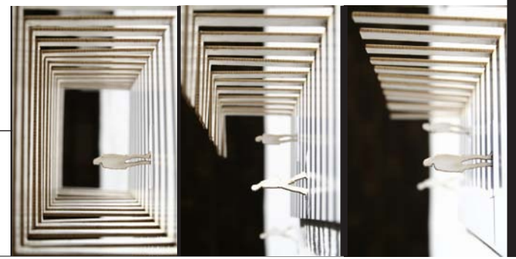


Figure 07-11 Photographs illustrating modelling of surface study, by author (April 2012)

Figure 07-12 Mamelodi Gardens Station, by Author (April 2012)
Figure 07-13 Eco Park, Centurion, by Author (March 2012)
Figure 07-14 Ning,bo Historic Museum (2008), by Wáng Shu (Ounodesign, 2009)

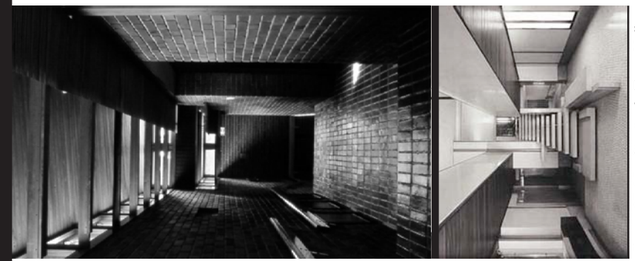


Figure 07-15 Säynätsalo Town Hall, Finland (1951), by Alvar Aalto (Payson, 2007)
Figure 07-16 Olivetti Showoom by Carlo Scarpa, Venice (1957-1958) (Studio Cleo, 2007)

Figure 07-17 Park Pobedy Station, Moscow (1987-2003), by Shurygina & Shumakov (Alekseev, 2009)
Figure 07-18 Mackie Street, Pretoria, by Author (March 2012)
Figure 07-19 Pretoria Station, by Author (March 2012)

Figure 07-20 Brion-Vega Cemetery, (1970-1972), by Carlo Scarpa (Architectcouture, 2011)
Figure 07-21 Coimbra Station, Portugal (Cornelius, 2007)

_findings: fragmentation

The level of surface exposure was found to be the predominant factor impacting on experience. At the other pole, surface exposure is softened through fragmentation which could potentially manifest, not only though the presence of shadow but also through material or volumetric fragmentation.

The polar extremity here is then between the unity in surface exposure to perception and the fragmentation of that unity. In order to achieve relative comparison, four differing levels or means of fragmentation were identified (see illustration of mapping opposite).

_conclusions

Within the commuting environment, the need for surveillance, security, durability and circulative flow often leads to environments of relatively homogenous lighting and surface exposure.

The development of an improved architectural surface tectonic should be managed in a manner which is informed by its impact on embodied experience. The management of light and its relationship to surface becomes important in this regard.

part 02
08 the experiential setting

01 INTRODUCTION

As mentioned previously, the encounter of the commuter with the station environment at Mamelodi Gardens forms part of an extended commuting experience through time, and can therefore not be measured in isolation. The extended commute between Mamelodi and Pretoria was for this reason measured and interpreted based on the findings of the previous chapter.

Subsequent to interviews with local commuters, a representative portion of the everyday commute was identified for investigation. The route, including extended periods on foot, stretches from the residence of Bongani Skosana at Madolo Close in Mamelodi East via the Metrorail to Church Square in the Pretoria CBD.

Various environmental impacts were considered and they present themselves in terms of both scientifically measured data, such as temperature & acoustic stimuli, as well as interpretive findings, such as the presence of an awareness of enclosure.

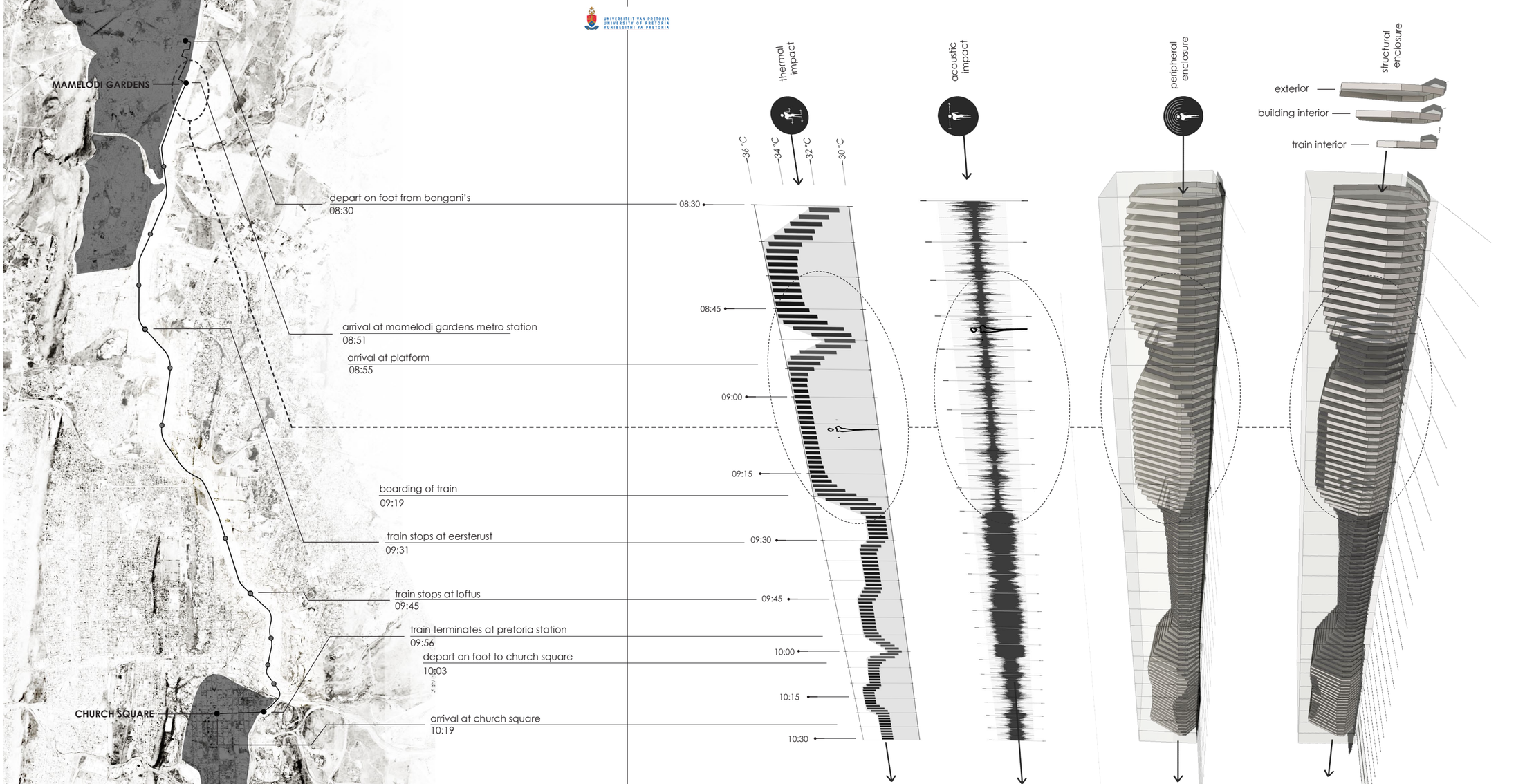


Figure 08-1 Mapping of commute between Mamelodi & Pretoria, by author (March 2012)

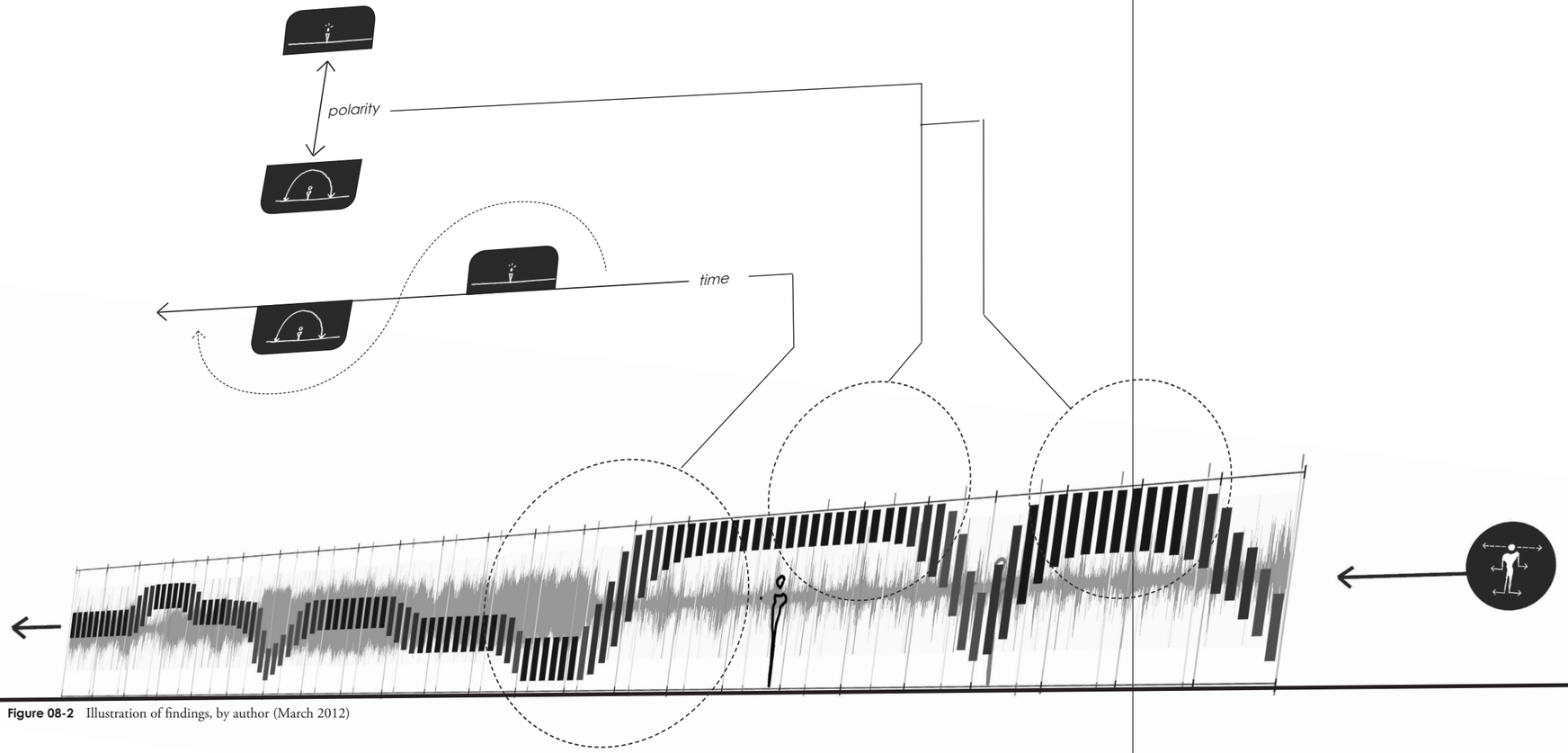


Figure 08-2 Illustration of findings, by author (March 2012)

02 FINDINGS

What the findings predominantly indicate is that the environmental impacts within the line of experience fluctuate quite dramatically and present themselves in extremes. Through observation this is attributed to not only the nature of the commute, which occurs across varying terrain, but also to a lack of generosity toward the commuter for whom inadequate support and protection is provided during the varying stages of the journey.

The built environment which accommodates the commute was also found to be relatively homogenous in its articulation, which is geared primarily toward the operational and institutional characteristics of the station.

Figure 08-3 Mamelodi Gardens Station, by author (March 2012)

part 02
09 precedent study_ architectural means

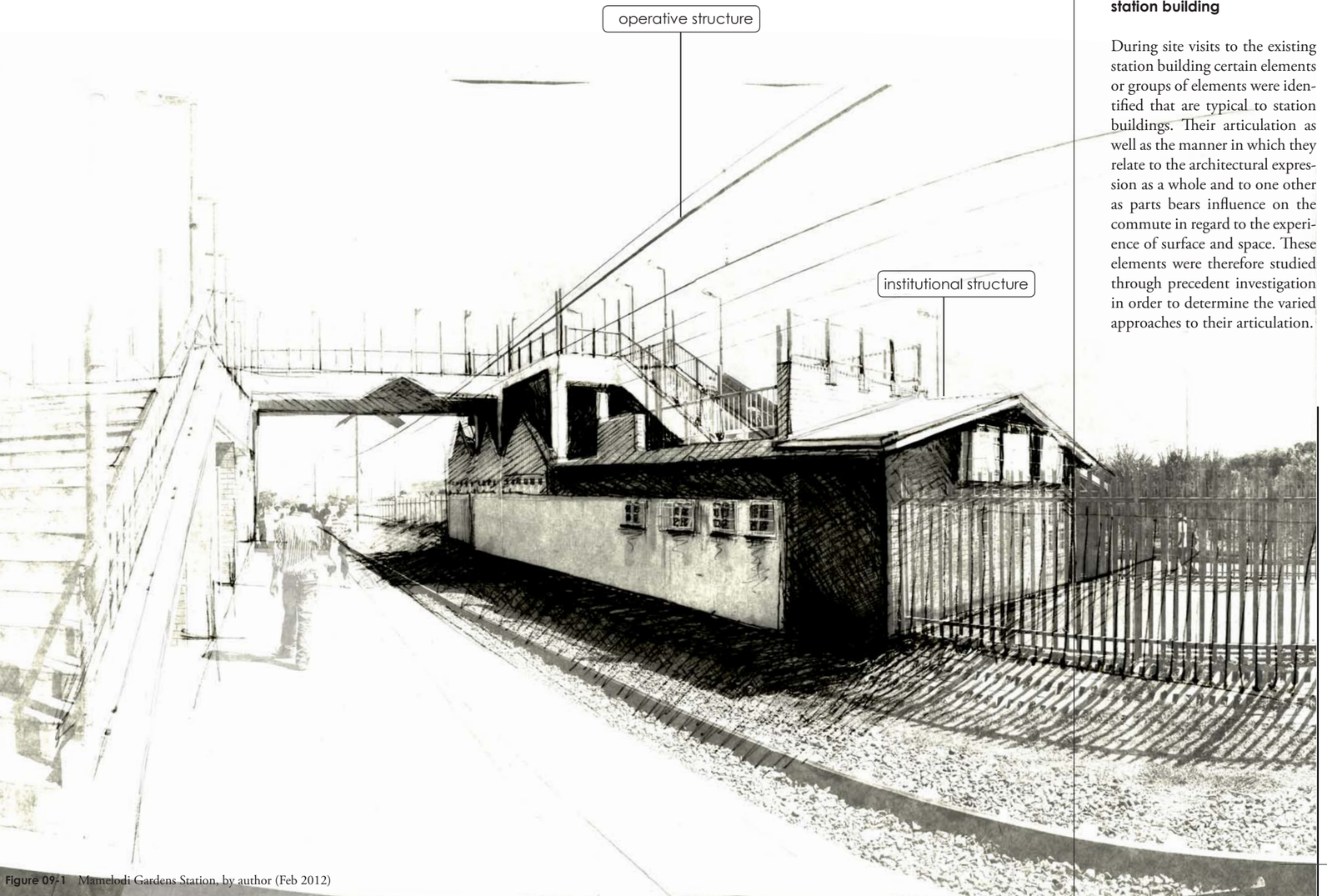


Figure 09-1 Mamelodi Gardens Station, by author (Feb 2012)

01 INTRODUCTION_ existing station building

During site visits to the existing station building certain elements or groups of elements were identified that are typical to station buildings. Their articulation as well as the manner in which they relate to the architectural expression as a whole and to one other as parts bears influence on the commute in regard to the experience of surface and space. These elements were therefore studied through precedent investigation in order to determine the varied approaches to their articulation.

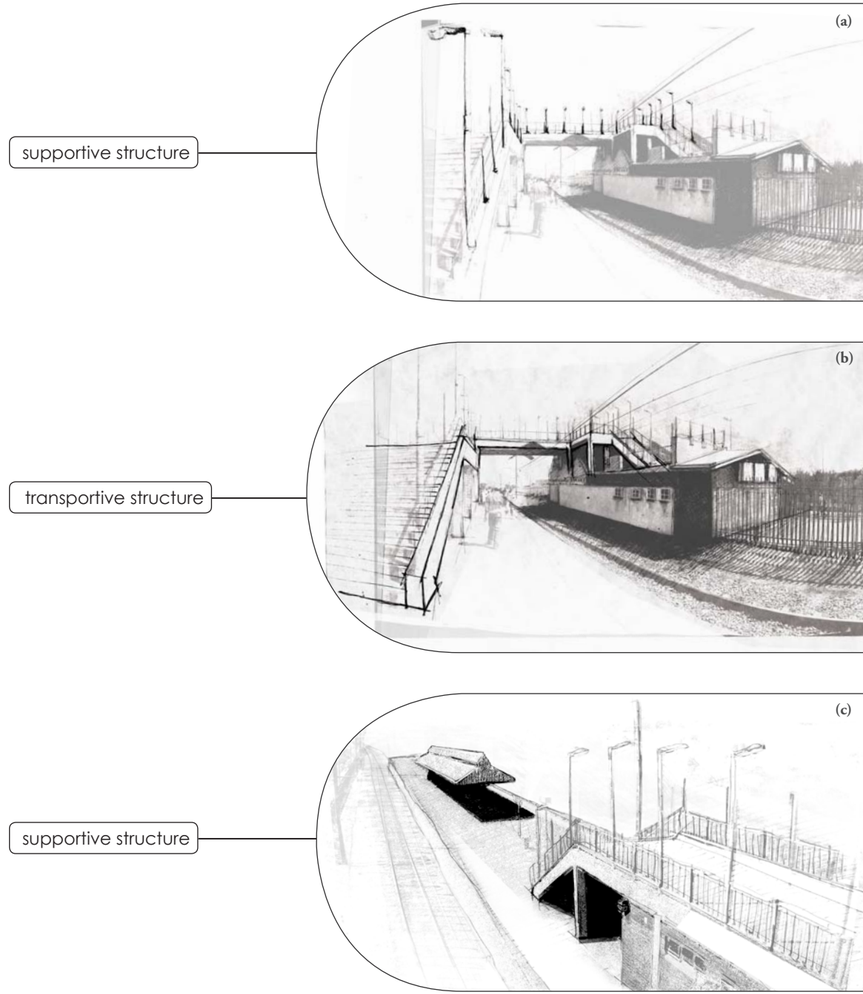


Figure 09-2 (a)-(c) Investigative sketches, by author (Feb 2012)

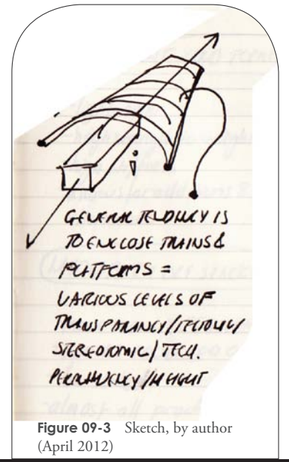


Figure 09-3 Sketch, by author (April 2012)

At rail station buildings the exterior as well as interior spatial experience is typically articulated by the presence of platform (transportive surface) and encasement (enclosing structure). These elements were therefore focussed on specifically during the precedent investigation in order to directionally inform the tectonic development.

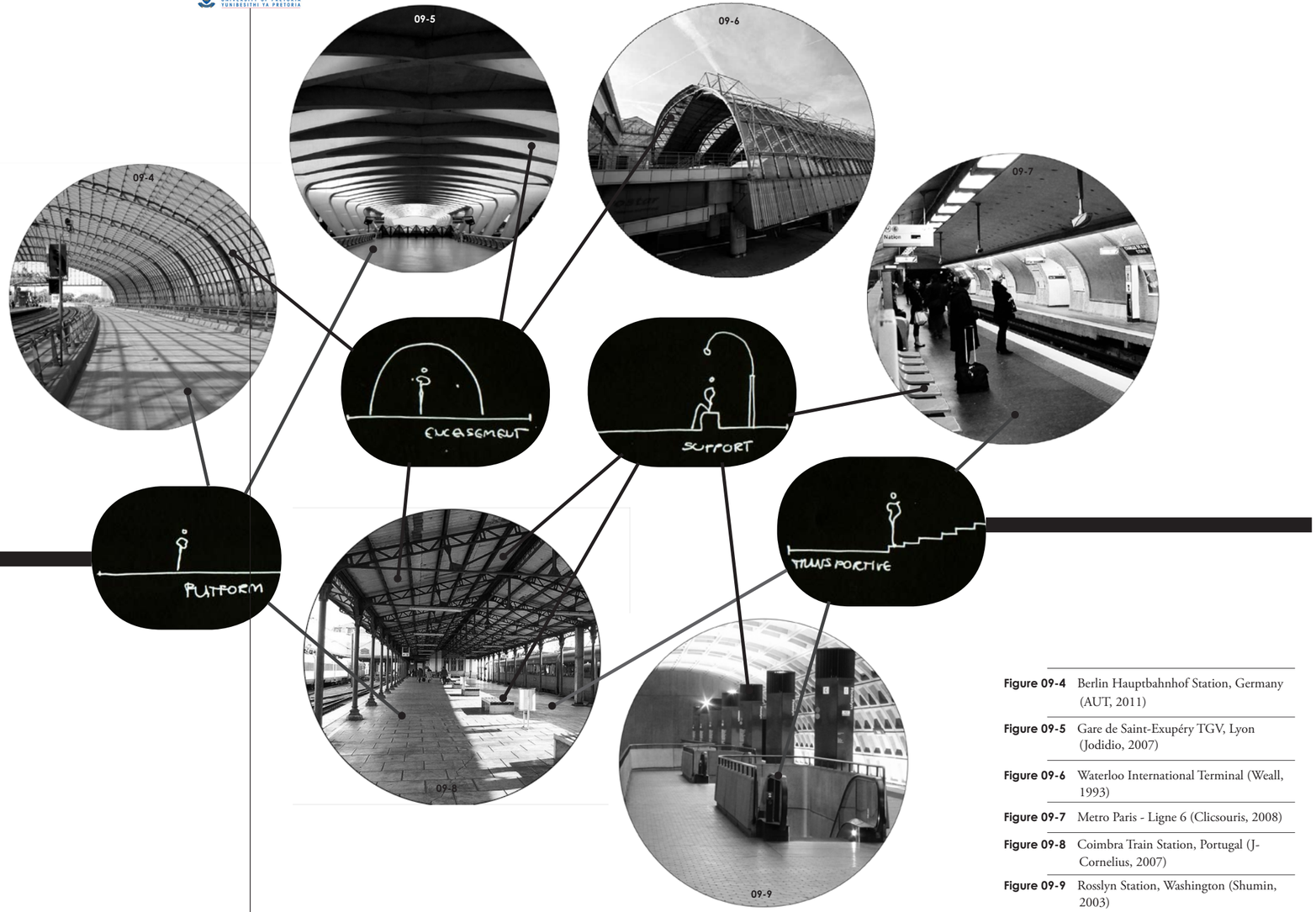


Figure 09-4 Berlin Hauptbahnhof Station, Germany (AUT, 2011)

Figure 09-5 Gare de Saint-Exupéry TGV, Lyon (Jodidio, 2007)

Figure 09-6 Waterloo International Terminal (Weall, 1993)

Figure 09-7 Metro Paris - Ligne 6 (Clicsouris, 2008)

Figure 09-8 Coimbra Train Station, Portugal (J-Cornelius, 2007)

Figure 09-9 Rosslyn Station, Washington (Shumin, 2003)

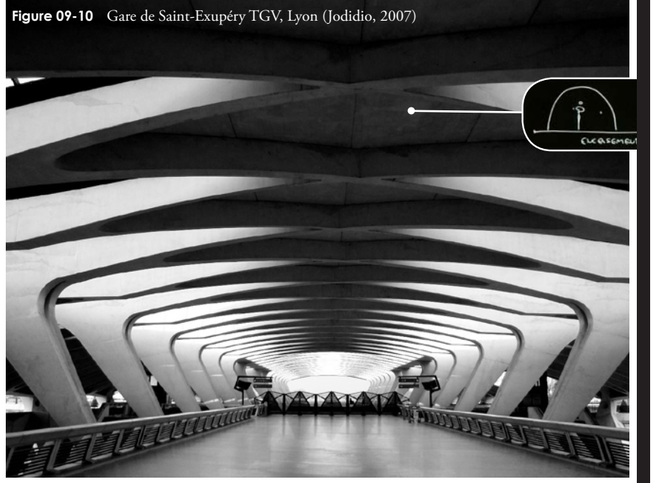


Figure 09-10 Gare de Saint-Exupéry TGV, Lyon (Jodidio, 2007)

Figure 09-11 Aerial view of Saint-Exupéry, by author (August 2012)

Figure 09-12 Saint-Exupéry TGV, Lyon, (ECOMANTA, 2009)

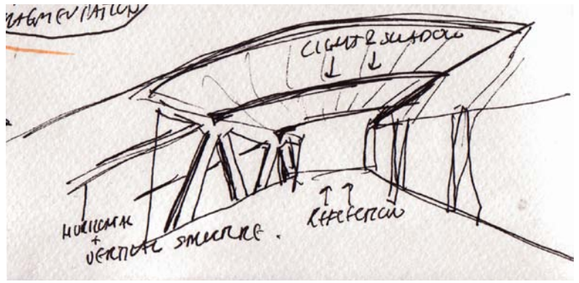


Figure 09-13 Investigative sketch, by author (April 2012)

02 GARE DE SAINT-EXUPÉRY TGV, LYON
_Santiago Calatrava

At Santiago Calatrava's TGV station in Lyon, as at many of his other station and airport buildings, the relationship of platform and encasement are expressed dramatically. The exoskeletal structure acts to fragment the encasing surface, which pointedly frames the transportive surface below. All of the station parts also act to achieve a compositional whole, which is geared toward the nature of the building as a train station as well as the experience of the commuter as central audience.

The station itself is also part of a greater urban composition and its integration into the experience of the surrounding landscape appears to be calculated and intentional. As the station itself forms a bridge, the transportive surfaces express themselves as part of the extended journey.

Figure 09-14 Centurion Gautrain Station Platform, by author (March 2012)

Figure 09-15 Centurion Gautrain Station, by author (March 2012)

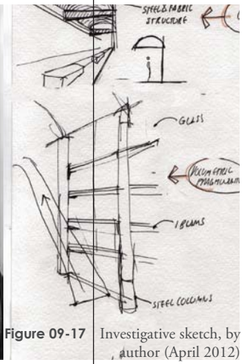


Figure 09-17 Investigative sketch, by author (April 2012)

Figure 09-16 Hatfield Gautrain Station, by author (March 2012)

03 GAUTRAIN STATIONS, CENTURION & HATFIELD
_Gautrain Architects Joint Venture (GAJV)

According to the Gautrain Management Agency (GMA, 2012) the conceptual focus behind the design of the Gautrain stations was symbolic, with encasement structures representative of Acacia trees in the African landscape. The focus here is therefore seemingly more on the elemental expression of the station parts than the goal to achieve a conceptual whole.

The buildings subsequently architecturally express their internal function in regard to the rail more dramatically than any relationship to the surrounding landscape and do not clearly acknowledge themselves as part of an extended journey. This may also in part be attributed to limited pedestrian entry to the stations from the surrounding urban fabric, with the main access being via bus or private car.

Fragmentation of the encasing surfaces also occurs in a less conscious manner at these stations if compared to the intentional surface fragmentation at the Calatrava Station in Lyon.

Figure 09-18 Park Pobedy Station, Moscow (Alekseev, 2009)

Figure 09-19 Investigative sketch, by author (April 2012)

Figure 09-20 (a)-(b) Park Pobedy Station, Moscow (Stephens, 2010)

Figure 09-21 Park Pobedy Escalators, Moscow (PROJECT DENNIS, 2012)

04 PARK POBEDY, MOSCOW
_ Shurygina & Shumakov

As one of the deepest stations in the world, Park Pobedy Metro Station's architecture represents a tunnel typology.

The articulation of the interior expresses the setting below ground through stereotomic mass. Similarly, platform and encasement also express the nature of the station and are formalistically equal counterparts of the tunnel experience as a whole.

The architects defined the thresholds from concourse to platform by volumetrically fragmenting the tunnel encasement. The two separate platforms of the cross-platform complex are of identical design but are of inverse material execution, indicating their programmatic relationship. The surfaces are further fragmented and softened through reflection and material complexity, providing alternating levels of light and surface intensity to an environment that may otherwise have been experienced as cold and harsh given the tunnel setting.

part 03 >>

mediation

The design process aims to mediate the duality that exists between the contexts presented in Part 1 and 2. It manifests in a process of bracketing, where a continual shift occurs between an indeterminate interpretive process, addressing the experiential context, and a more determinate scientific development. The two processes overlap continually and the chapter is therefore not segregated in its illustration of either process. What the observations however do reveal, is that the most evident conflict existing between the two contexts is the station's need to be defensive of its property and its responsibility to also be generous toward its user.

The various operational aspects of the station, including the requirements in regard to staff, security and services are developed to be optimized. In parallel, the needs of the commuter and the quality of his embodied commuting experience act as key generators to the design development. It is aimed for the relationship between these two contexts to be reflected in the development of not only the layout, but also the structural, tectonic and detail approach to the design problem. In this manner the investigative process becomes an informant for tectonic resolution.

part 03
10 design development

Figure 10-1 Map illustrating station catchment and area of impact, by author (April 2012)

01 LAYOUT DEVELOPMENT _threshold

The aim in regard to the station's orientation is for the northern and southern thresholds to address the surrounding landscape and approach, acting as the arms through which generosity toward the commuter is extended into the surrounding landscape.

As stated in the framework chapter, the station thresholds also need to integrate with the surrounding fabric by acting as platforms for interaction and informal commerce. Small scale public spaces are therefore proposed which serve to accommodate rest and meeting spaces, access to the station, informal trade and storage space, small scale formal commerce in the form of a kiosk as well as a security outpost.

Figure 10-3 Conceptualization of station threshold, by author (May 2012)

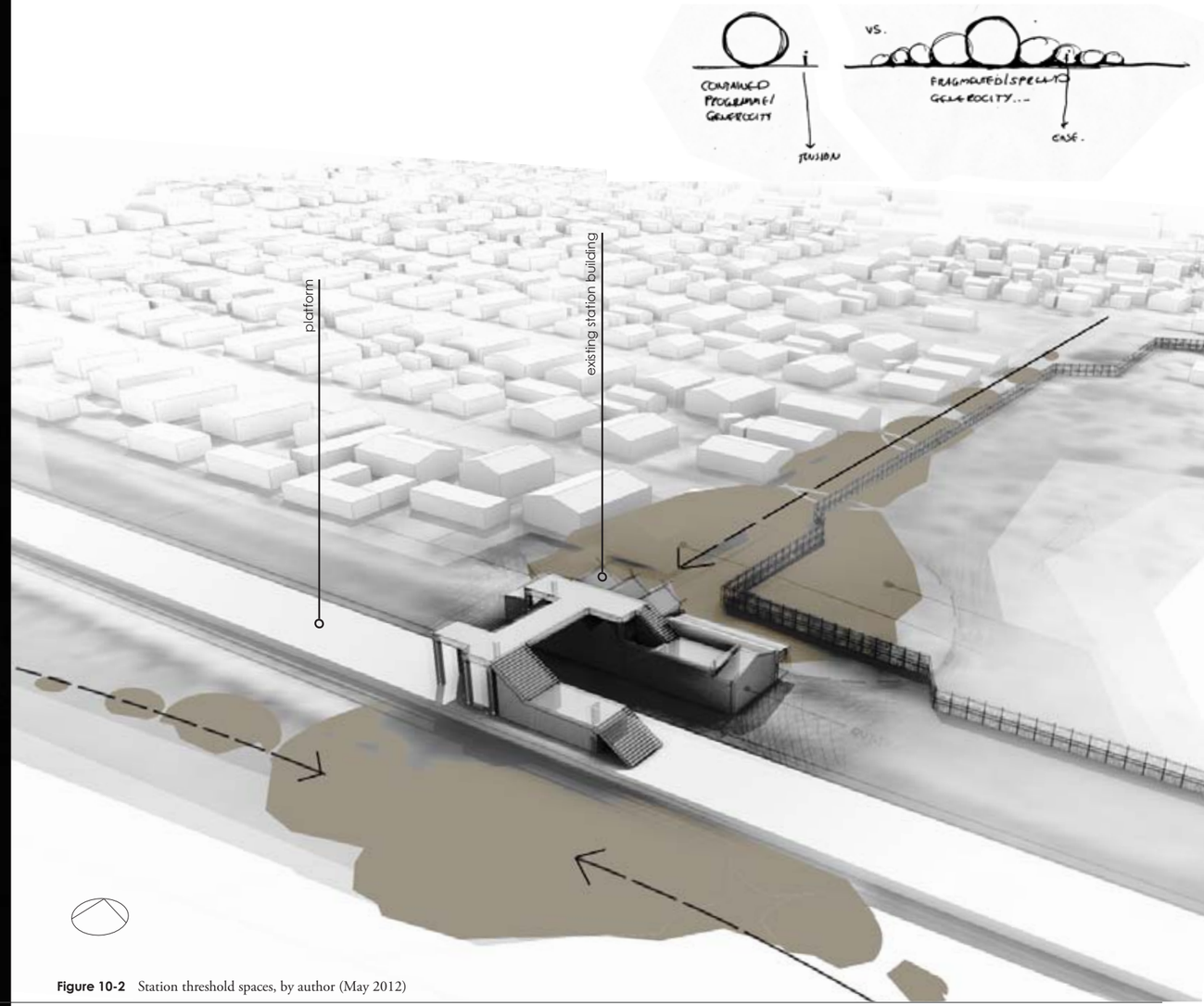


Figure 10-2 Station threshold spaces, by author (May 2012)

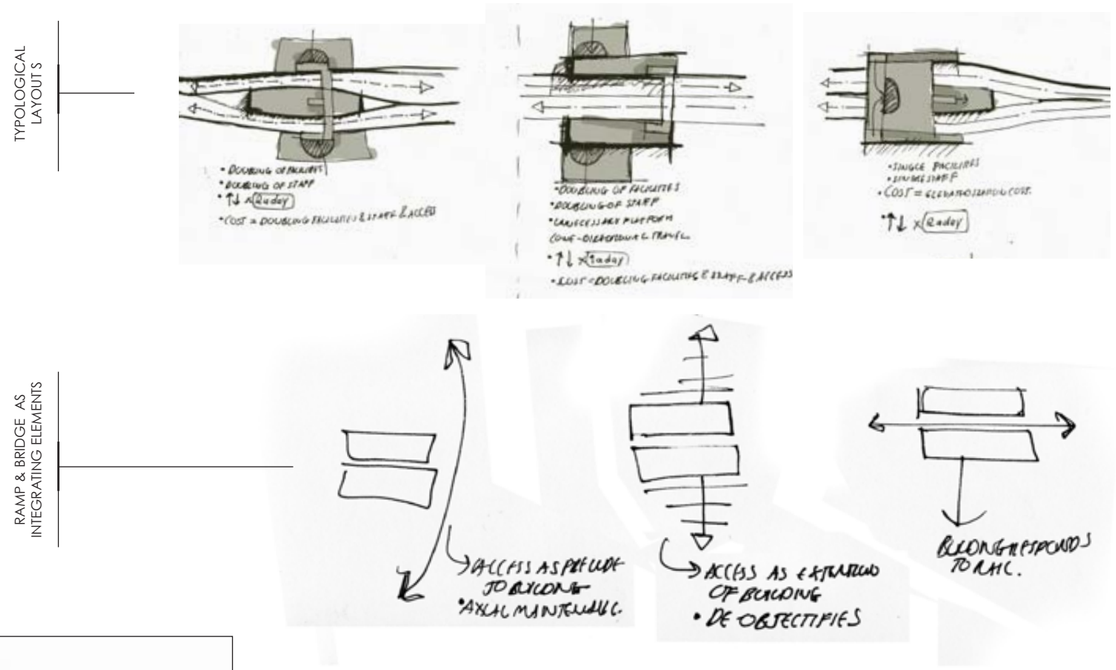


Figure 10-4 Exploration of station typology, by author (May 2012)

Figure 10-5 Exploration of relation of access to building, by author (May 2012)

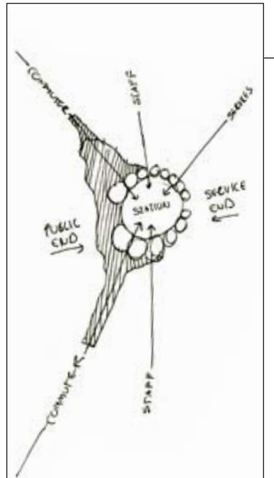


Figure 10-6 Conceptualization of access, by author (May 2012)

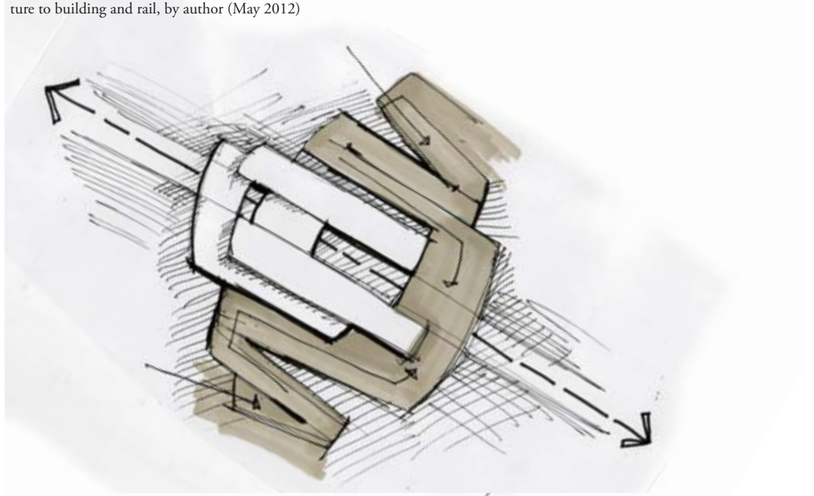
02 LAYOUT DEVELOPMENT _station typology

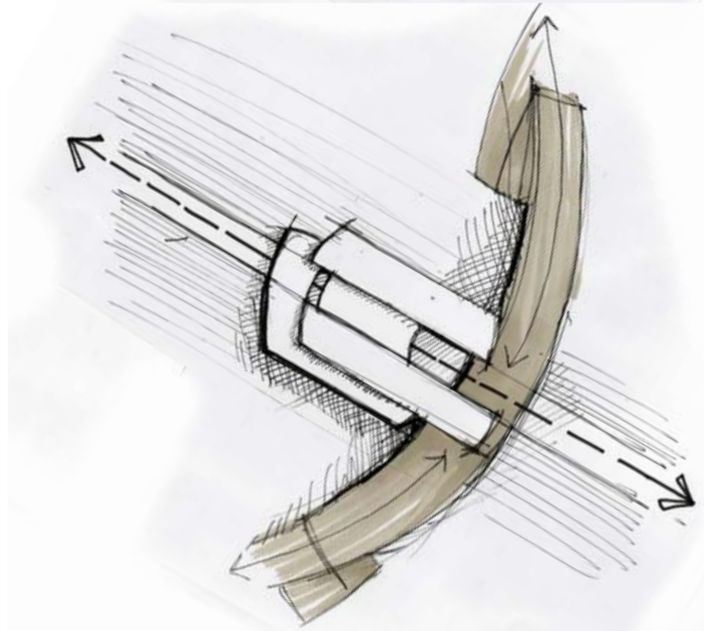
The raised concourse station typology is identified as most suitable following an exploration of various typological possibilities. The main factors driving the selection are cost, access and the optimization of station facilities together with the fact that there is an existing track and platform that are to be maintained. The predominant aims are to avoid the doubling of facilities to the north and the south, pointed out as a priority by PRASA's Planning & Preliminary Design Report (2007), as well as to keep the movement of the commuter between levels to a minimum and thus minimize physical strain.

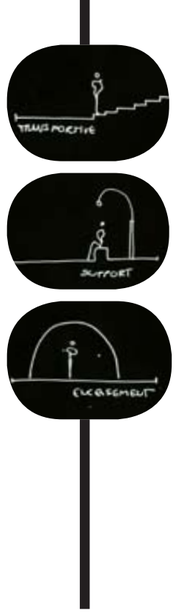
03 LAYOUT DEVELOPMENT _transportive elements

The requirement of universal access together with the condition of existing on grade railway tracks that are to be maintained has lead to planning problems for many of the Metrorail stations upgrades as large scale ramps subsequently need to be included in the station programmes.

Figure 10-7 Exploration of relation of transportive structure to building and rail, by author (May 2012)







It is therefore proposed that the ramps be utilized as integrating thresholds that will act to connect the north with the south. In this manner they will become extensions of the surrounding landscape, and their structure will act to house some of the programmatic elements listed for the station thresholds.

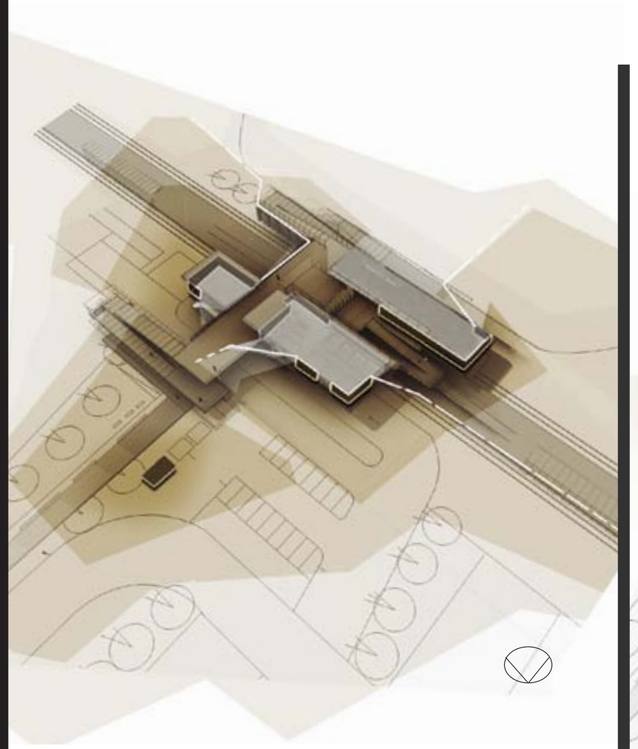


Figure 10-8 Optimization of surveillance, by author (June 2012)

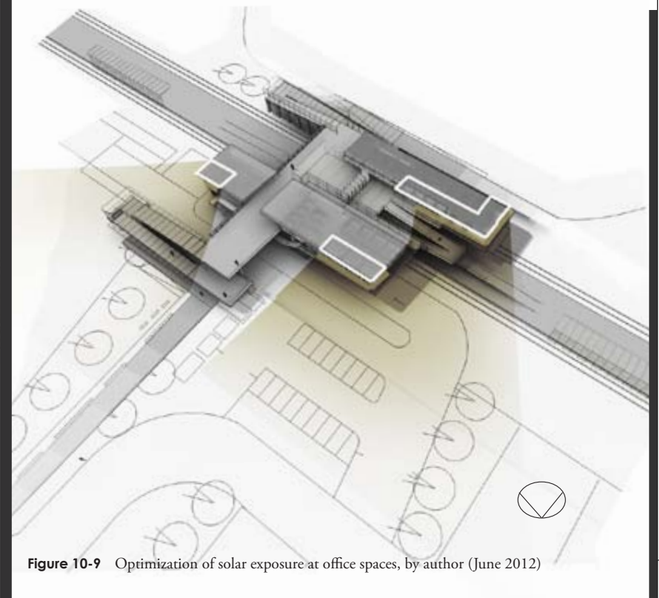


Figure 10-9 Optimization of solar exposure at office spaces, by author (June 2012)

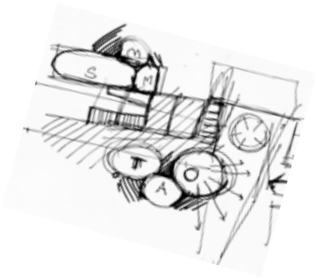
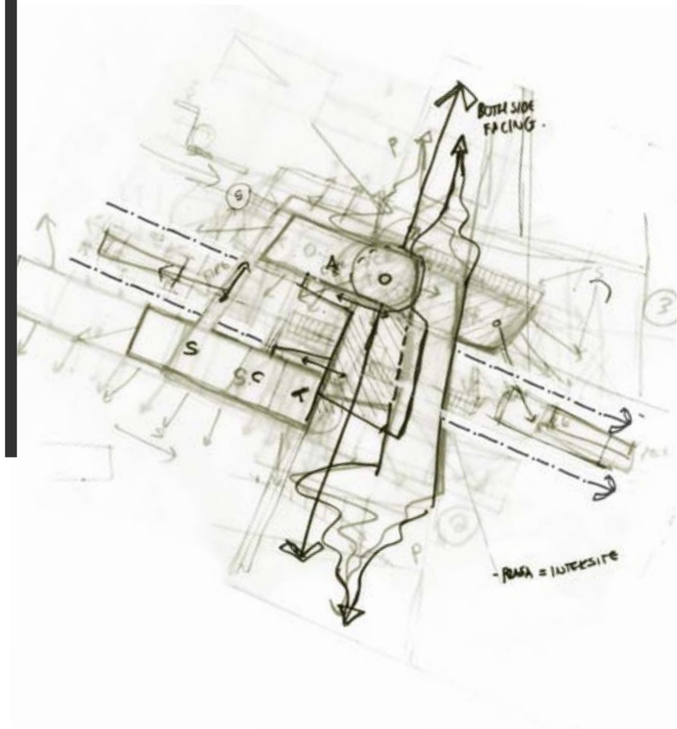


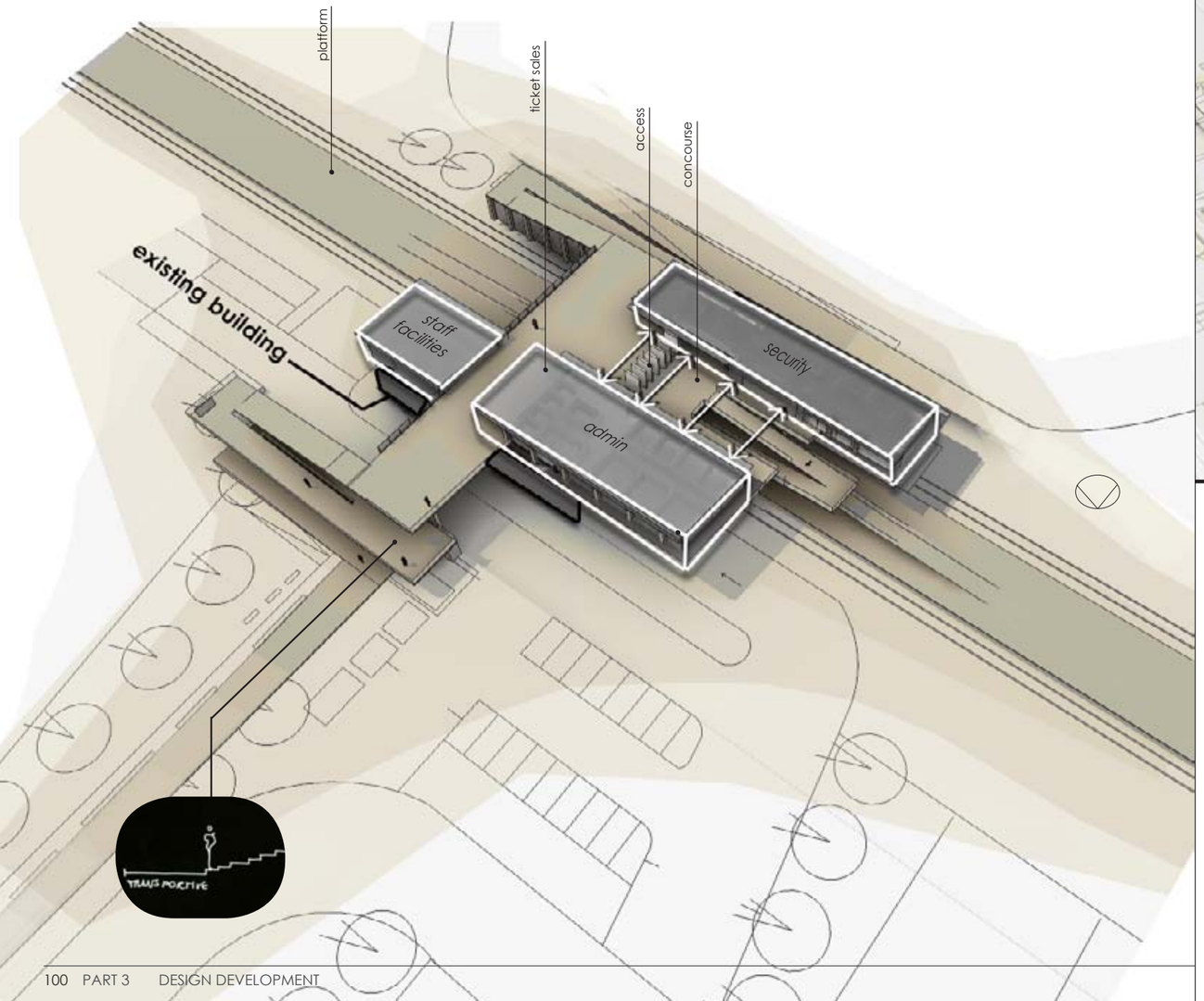
Figure 10-10 Development of Layout, by author (June 2012)



04 LAYOUT DEVELOPMENT _massing

Among other factors such as solar gain and circulation, the layout is developed with a focus to optimize surveillance and security access. In regard to station operation, there is a programmatic split between administration and security. The building mass is therefore split to accommodate both programmes separately and optimize solar access at the office edges, surveillance over the grounds and access to the concourse, with commuter facilities and contact points then accommodated along the edge where building mass meets concourse and bridge.

Figure 10-11 Massing & programmatic split, by author (June 2012)



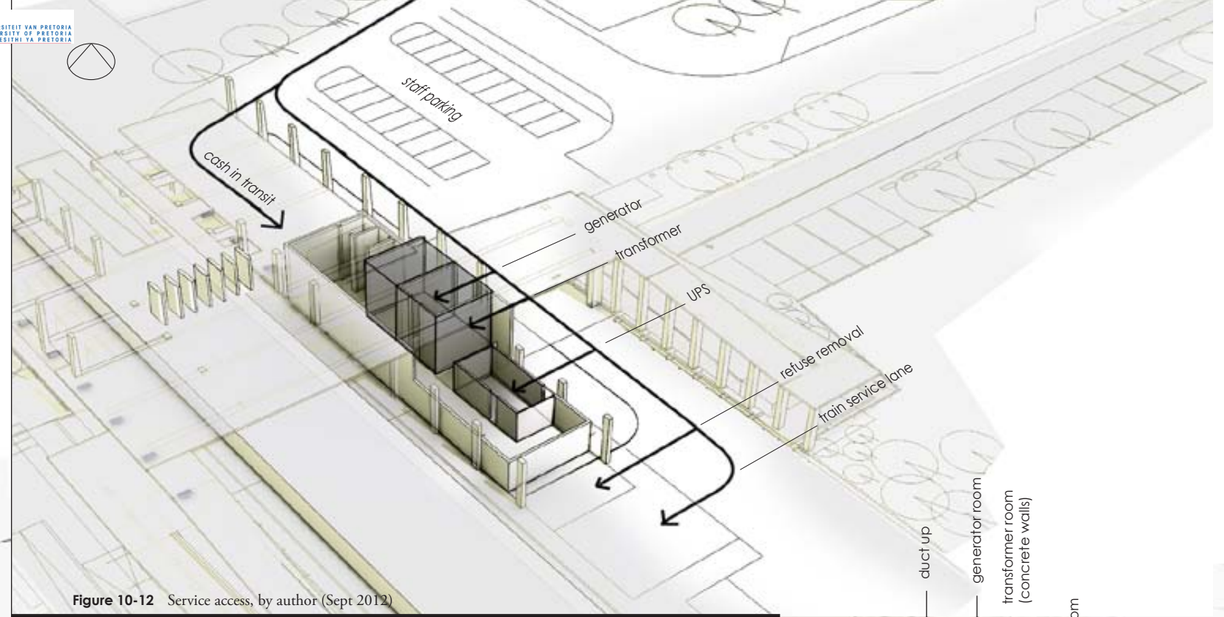


Figure 10-12 Service access, by author (Sept 2012)

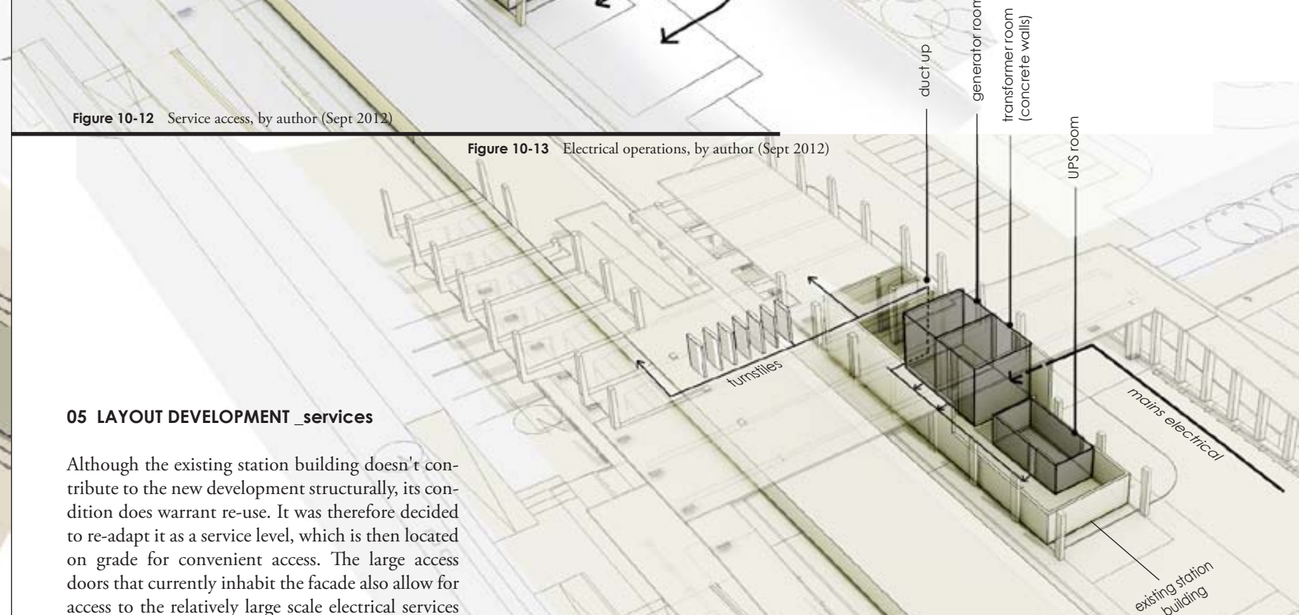


Figure 10-13 Electrical operations, by author (Sept 2012)

05 LAYOUT DEVELOPMENT _services

Although the existing station building doesn't contribute to the new development structurally, its condition does warrant re-use. It was therefore decided to re-adapt it as a service level, which is then located on grade for convenient access. The large access doors that currently inhabit the facade also allow for access to the relatively large scale electrical services that are to be housed on this level.

Figure 10-14 Ground floor circulation, by author (Sept 2012)

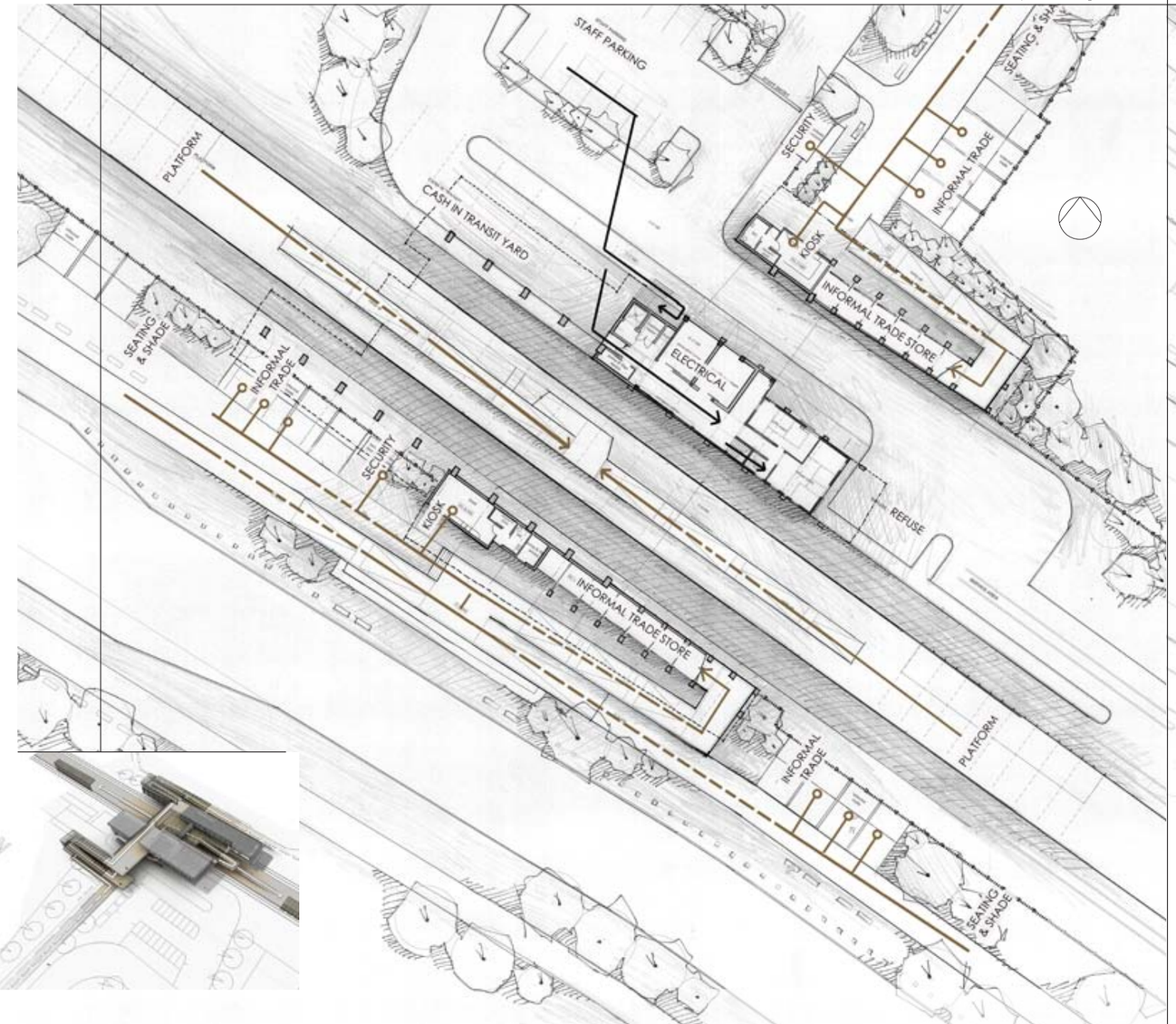
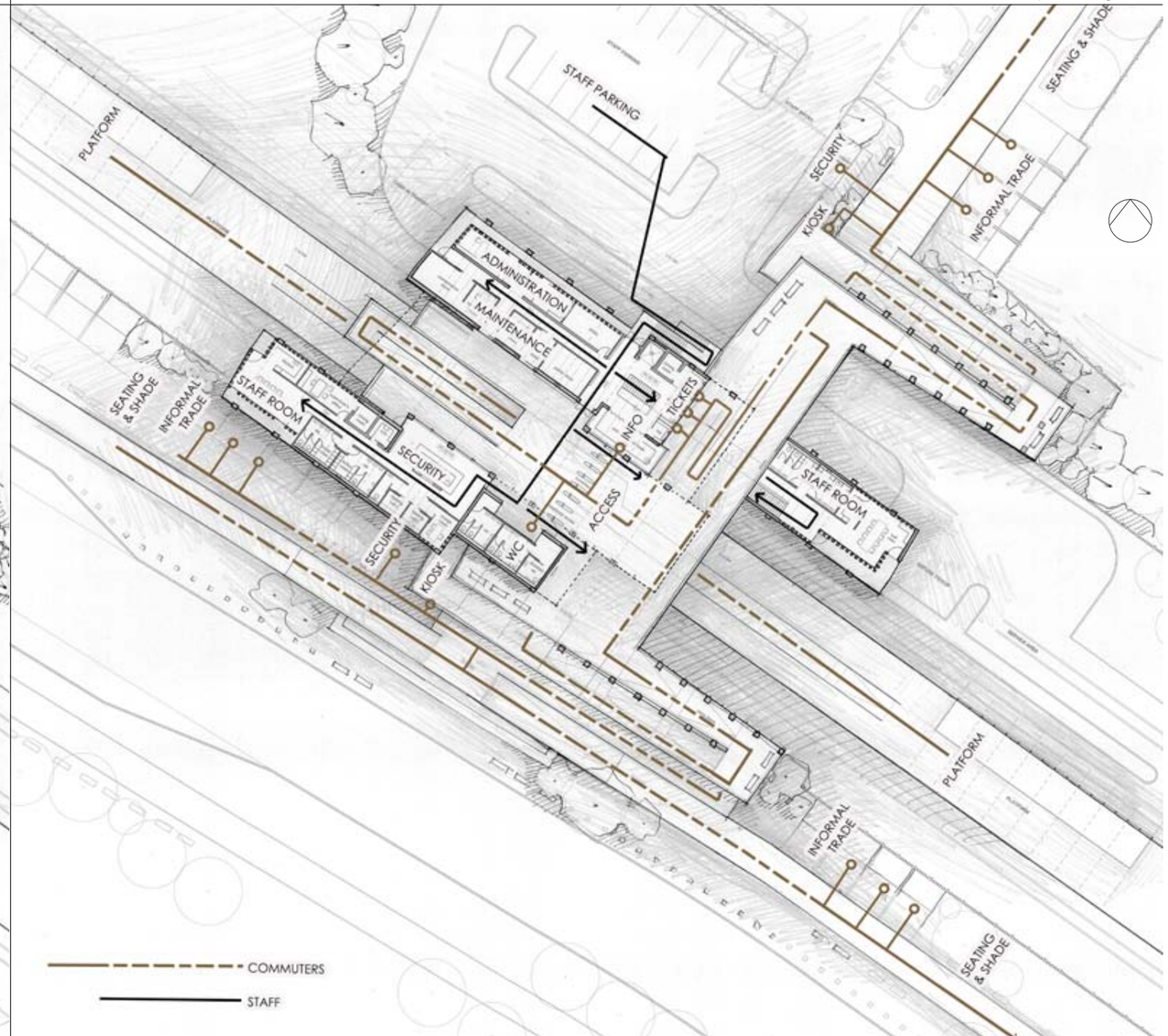


Figure 10-15 First floor circulation, by author (Sept 2012)



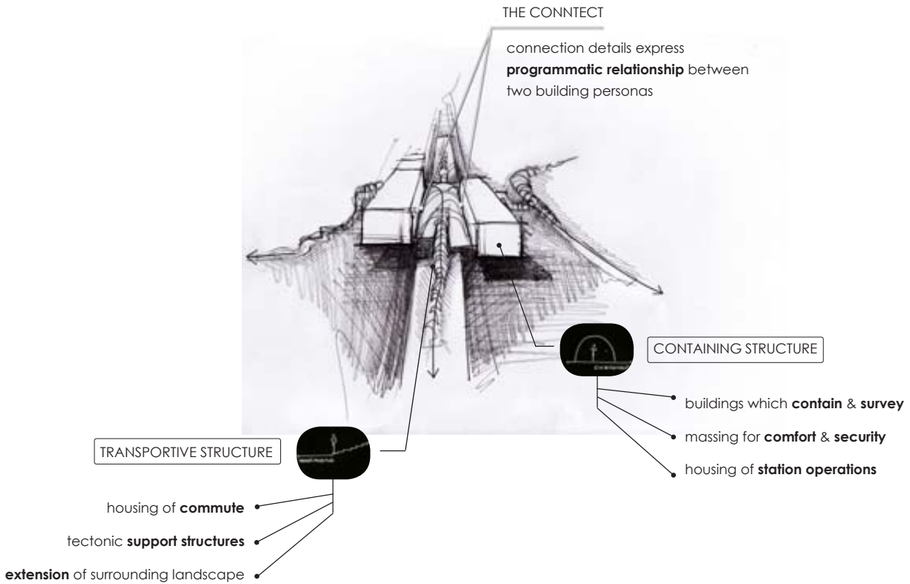


Figure 10-16 Illustration of tectonic concept, by author (Sept 2012)

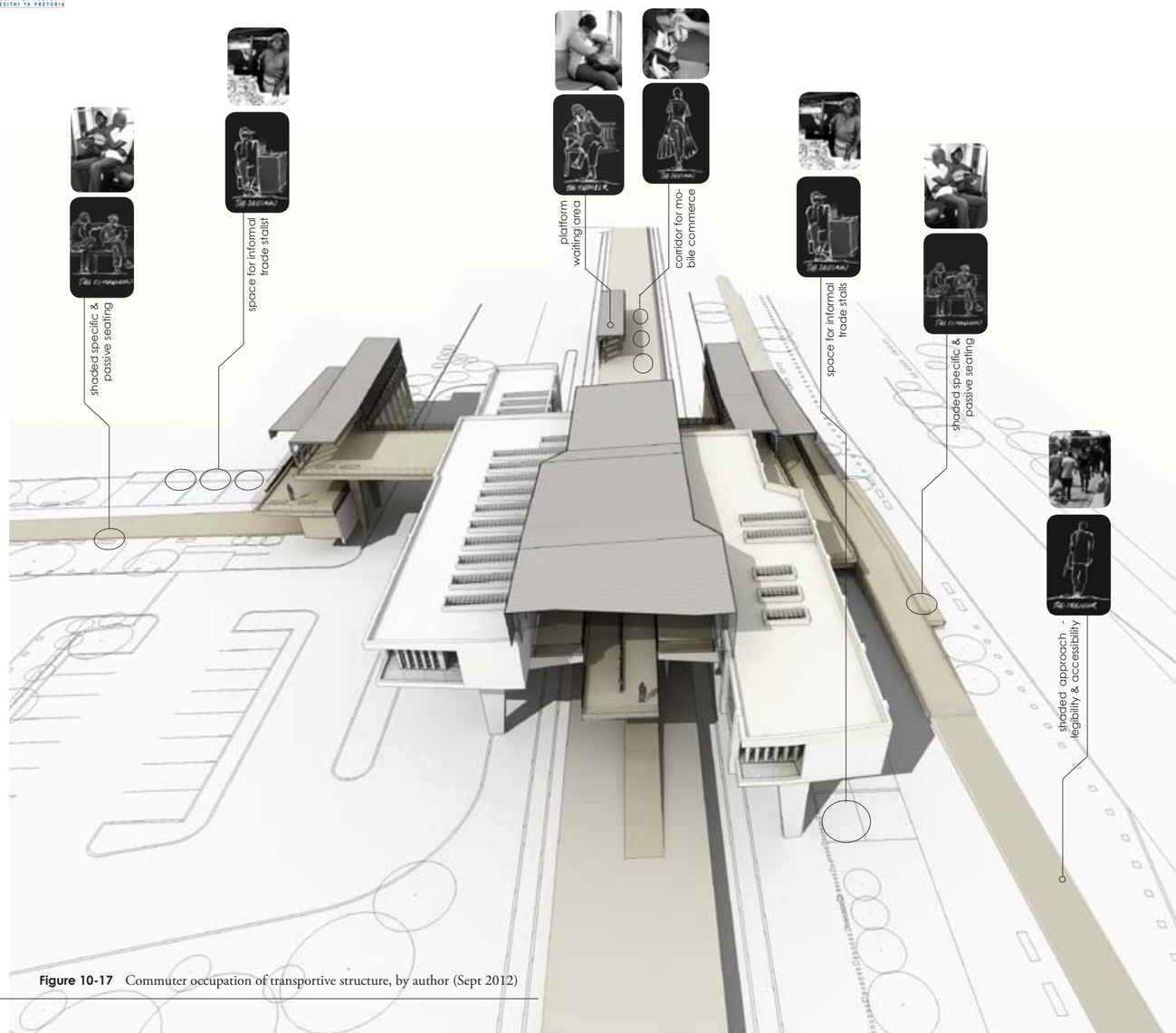


Figure 10-17 Commuter occupation of transportive structure, by author (Sept 2012)

Figure 10-18 Illustration of space where concourse meets platform, by author (Oct 2012)
Transportive structure lowers to meet platform

The tectonic development expresses the duality that exists between the requirements of the station and the needs of the commuter through two building personas.

The building mass, which houses the station operations, acts to contain and survey. The mass is geared towards creating a comfortable internal environment and securing itself and its contents. It then defragments at its edges in order to survey the surrounding landscape and connect with the concourse and bridge.

The transportive structure houses the commute and accommodates encasing structures as well as other elements which provide support for the commuter.

The manner in which these building persona's then connect with one another reflects the programmatic relationship between them.

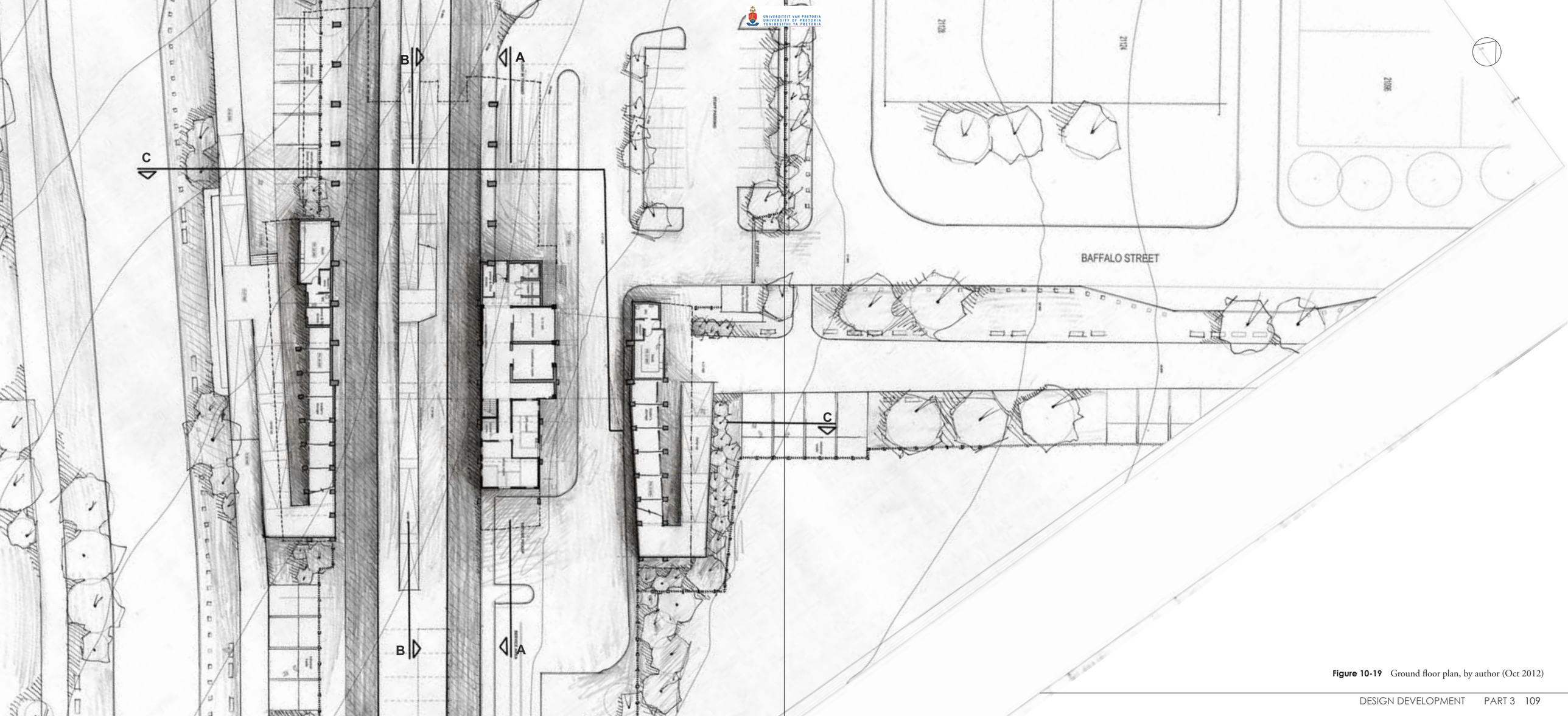


Figure 10-19 Ground floor plan, by author (Oct 2012)

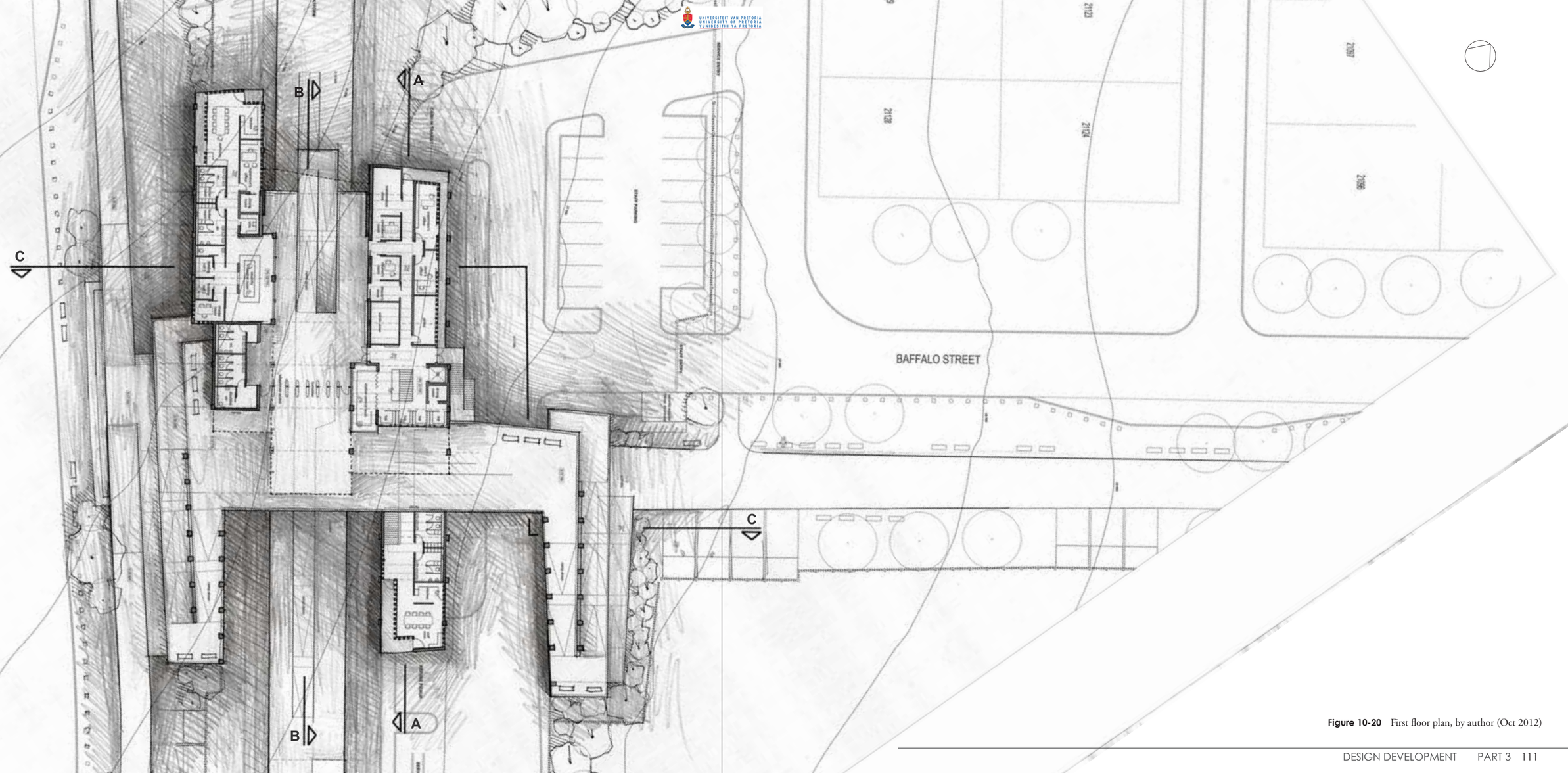


Figure 10-20 First floor plan, by author (Oct 2012)

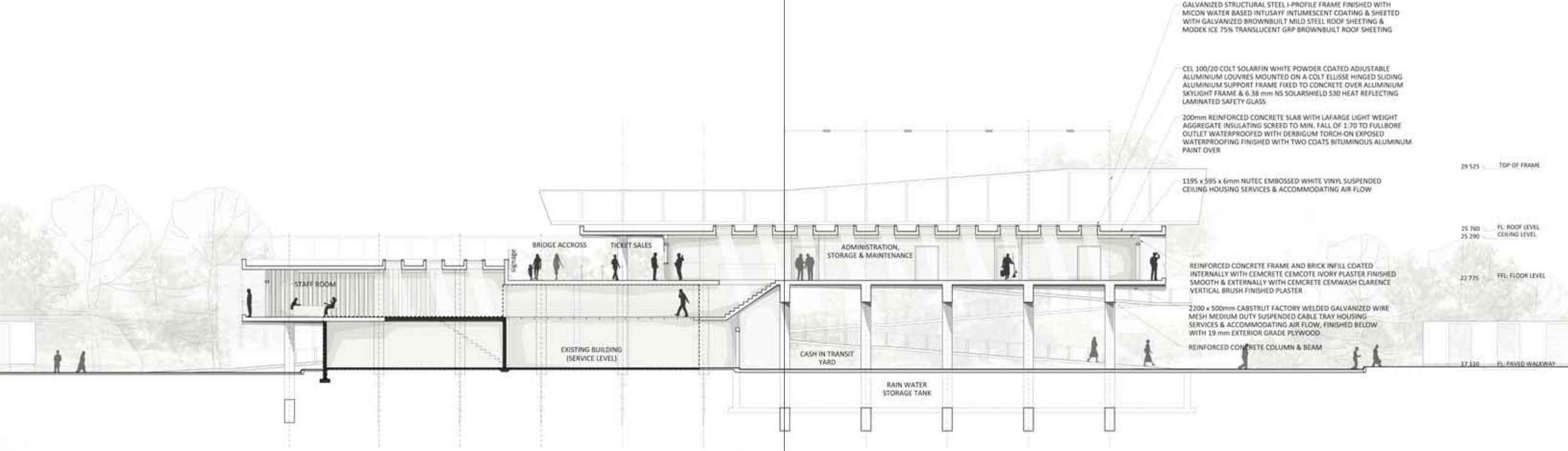


Figure 10-21 Section A-A, by author (Oct 2012)

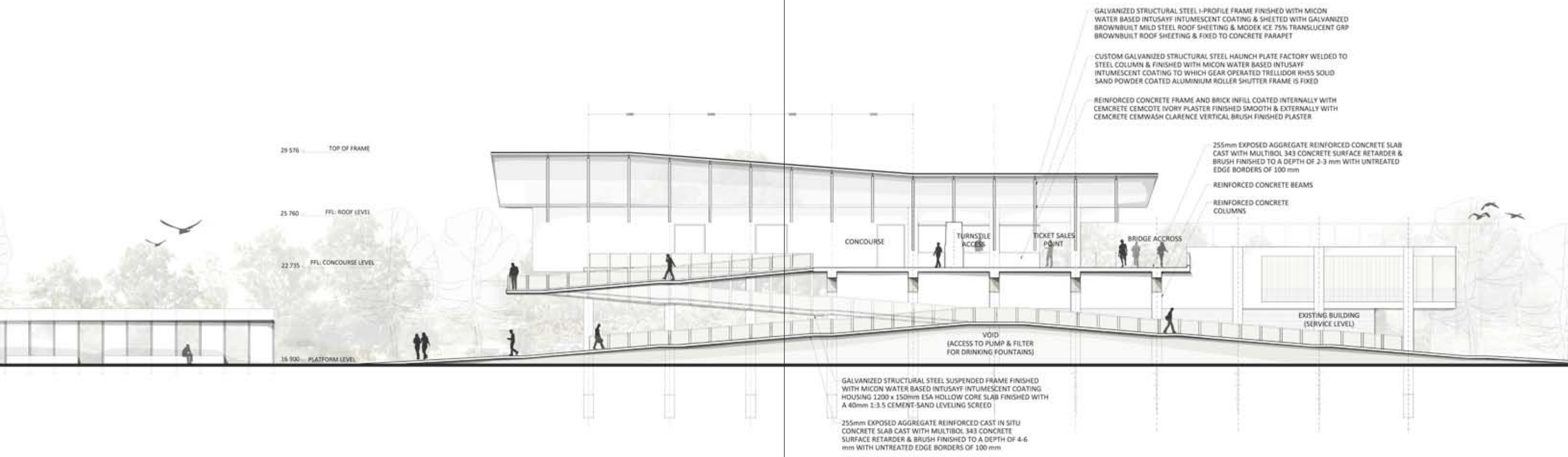


Figure 10-22 Section B-B, by author (Oct 2012)

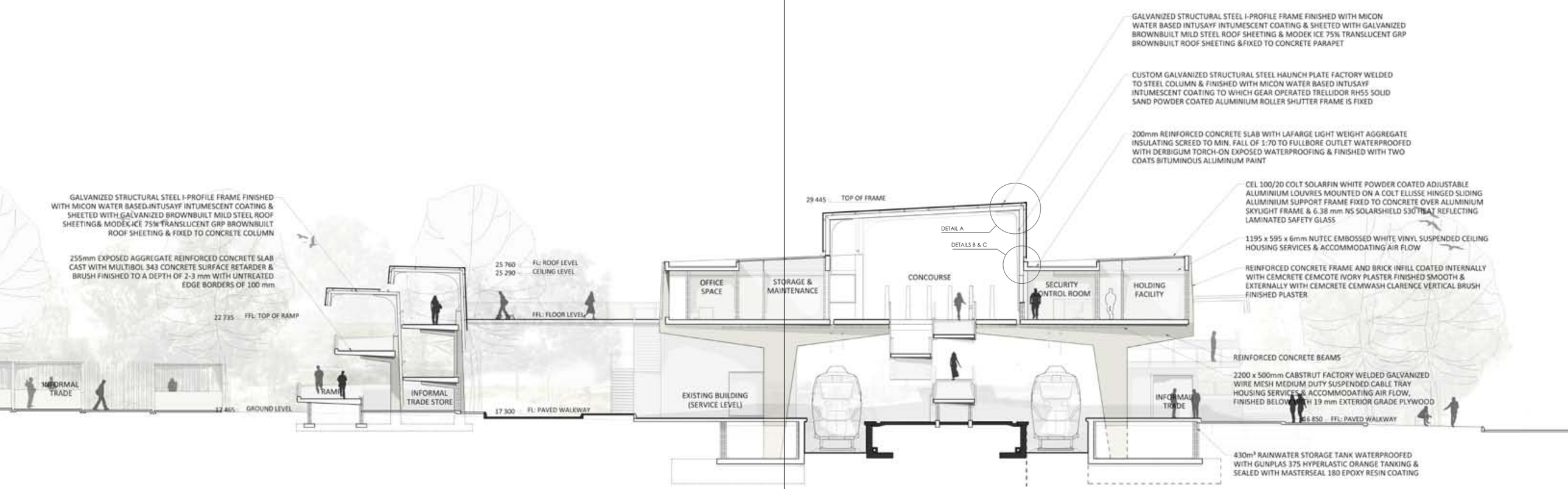


Figure 10-23 Section C-C, by author (Oct 2012)

Figure 10-24 Ground floor layout of service level & facilities in northern ramp @ 1:200 , by author (Oct 2012)

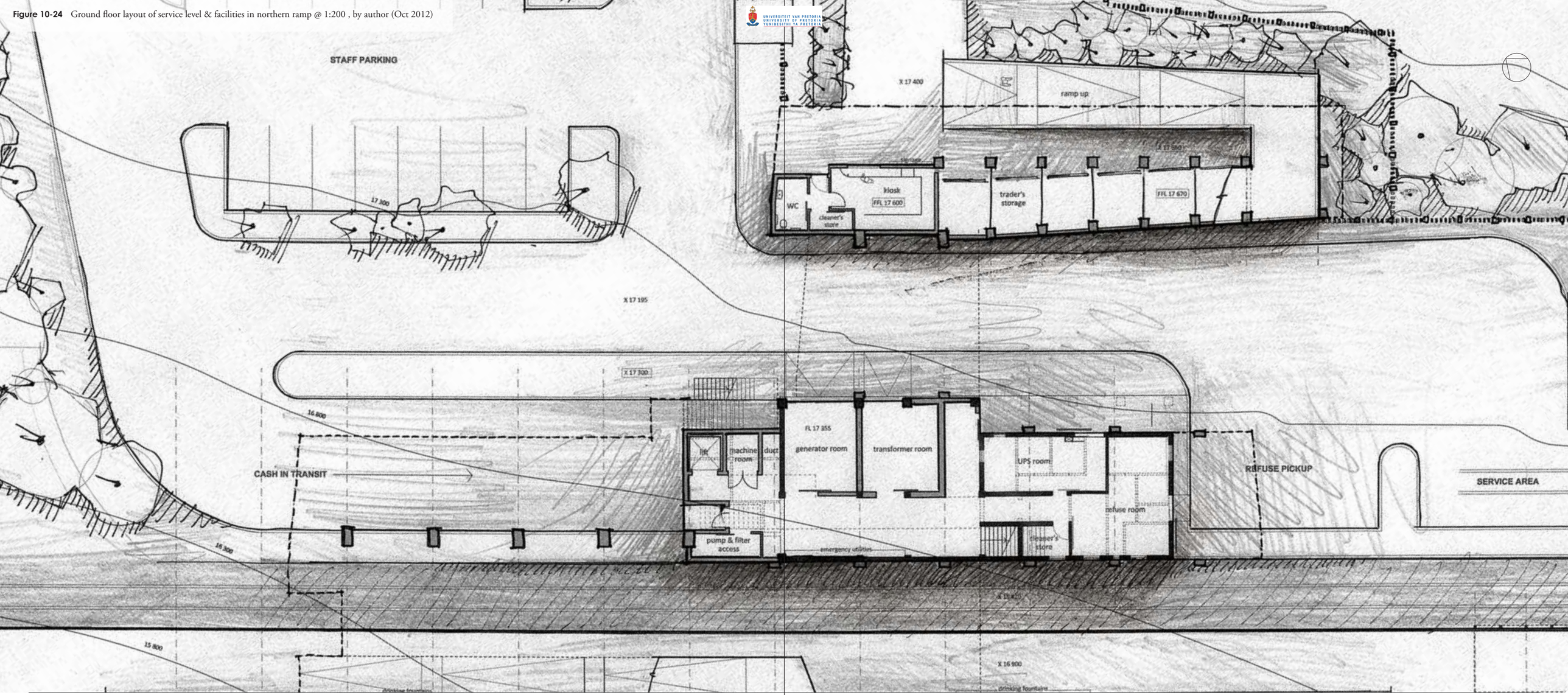


Figure 10-25 First floor layout of administrative & security blocks & concourse @ 1:200 , by author (Oct 2012)

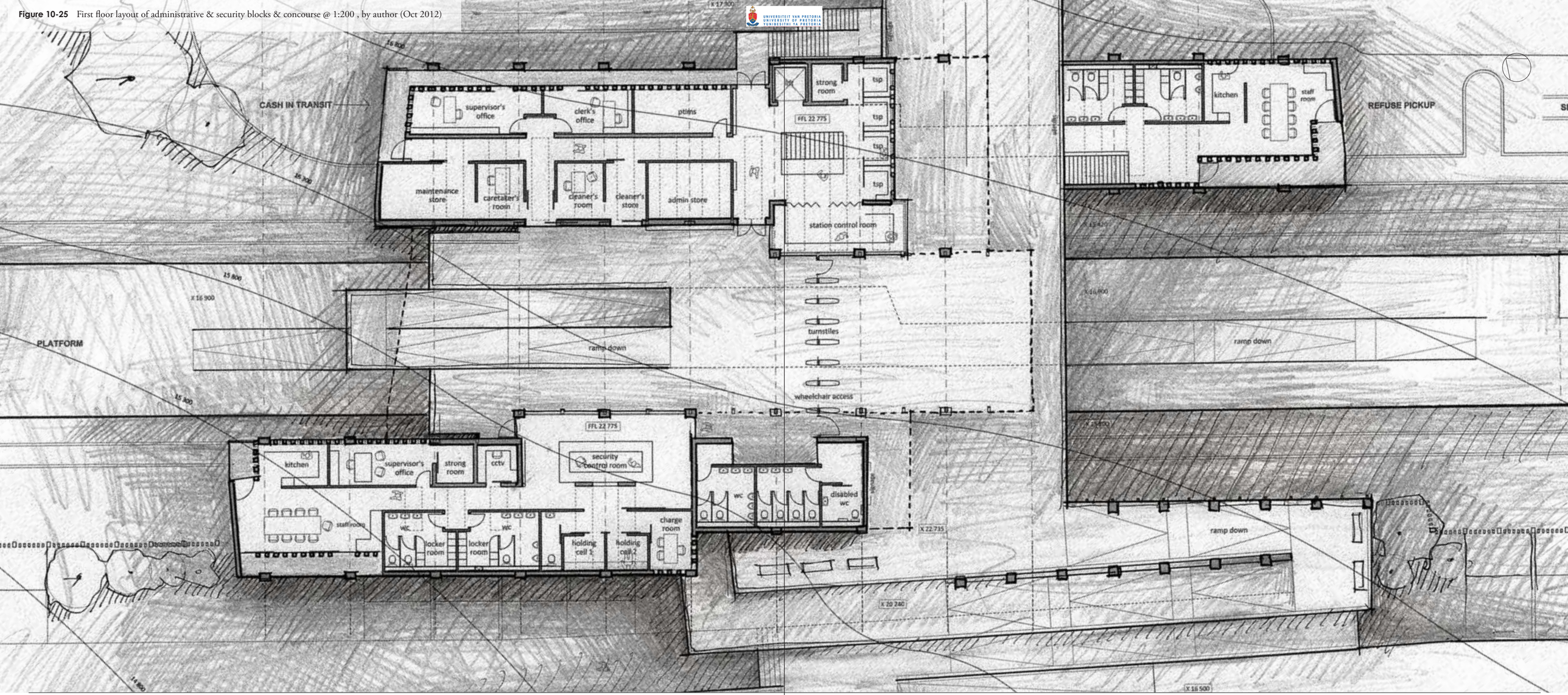
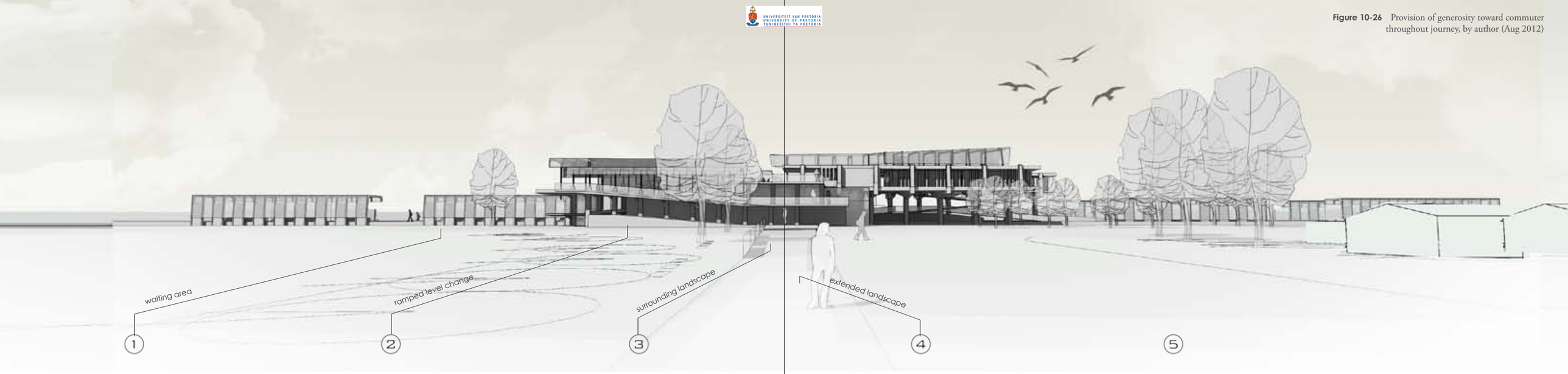
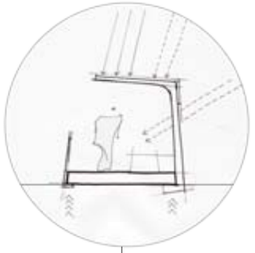


Figure 10-26 Provision of generosity toward commuter throughout journey, by author (Aug 2012)



DEFENSIVE
- high level of surveillance
- good access by security
- within control zone
-removables
- difficult access to remove

GENEROUS
- seating
- support
- heating/cooling
- cover:
(rain)
(sun)
(wind)

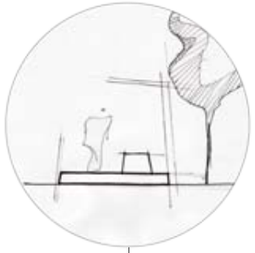


DEFENSIVE
- high level of surveillance
- good access by security
-removables
- difficult access to remove

GENEROUS
- seating
- support
- cover:
(rain)
(sun)

DEFENSIVE
- high level of surveillance
- good access by security
-removables
- difficult access to remove

GENEROUS
- seating
- support
- cover:
(passive shade)



DEFENSIVE
- moderate level of surveillance
- less access by security
-no removables

GENEROUS
- seating
- cover:
(passive shade)

DEFENSIVE
- low level of surveillance
- poor access by security
-no removables

GENEROUS
- cover:
(passive shade)

08 STRATEGIC GENEROSITY

As mentioned previously, the layout is developed with a focus to optimize security and surveillance across the grounds. The various station elements that provide generosity to the commuter, including protection from the weather, temperature control, seating and support for the disabled, then defragment into the surrounding fabric as far as the optimized surveillance and security allow.

The height of generosity is then provided at the station platform, where the wait takes place. The greatest support is also provided at points within the journey where the commuter is placed under strain, such as level change, or where pause and wait could potentially occur.

Figure 10-27 Illustration of public space at northern ramp, by author (Oct 2012)

09 JOURNEY SPECIFIC GENEROSITY

The key intention is for the intervention to alleviate the environmental extremes shown to exist within the commuting environment. In order to achieve this, the architectural response is conditional to the different parts of the journey, as the event of commute occurs through time and space. In other words, the architectural support as well as the nature of its haptic expression toward the commuter is relative to the stage of the journey at which it is occurring.

In this regard for example, ramp inclines or shading strategies are not planned in a uniform manner, but are responsive to the strain needing to be mediated at any one point. In the example indicated in Figure 10-30 the shade structures are designed to provide conditional shade, relative to the amount of strain experienced at different stages of the upward journey. The material selection and detail resolution of support structures are also developed toward this end.

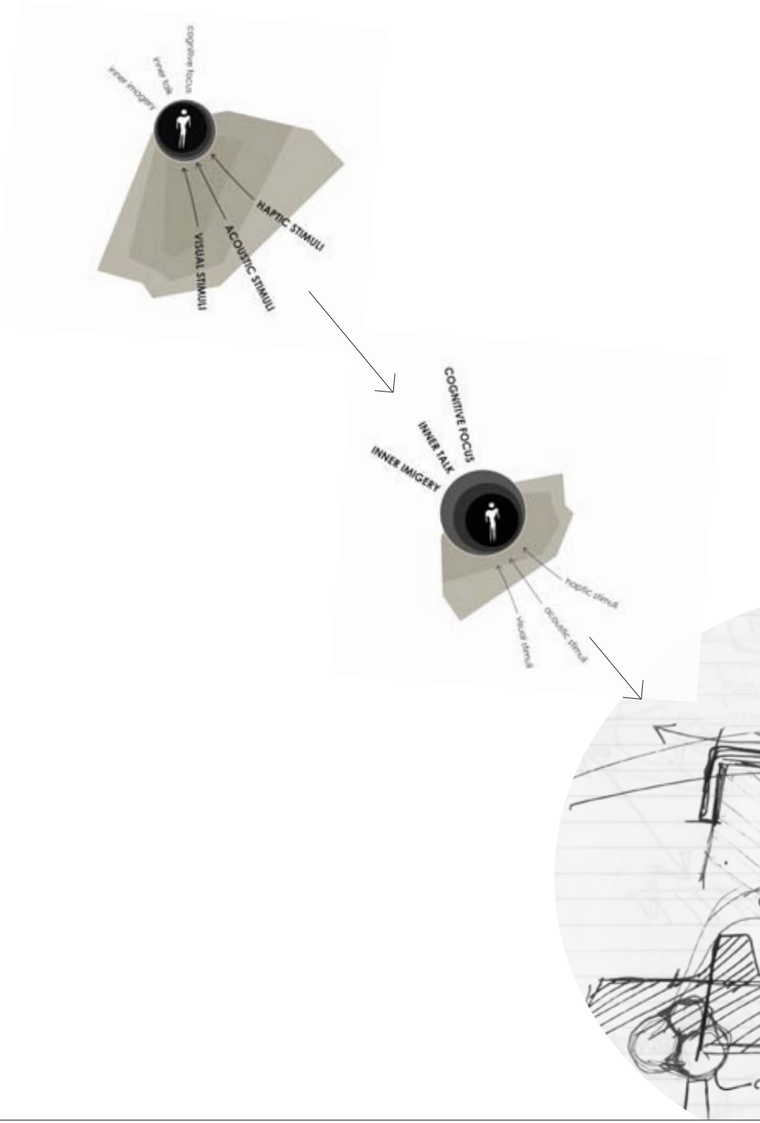


Figure 10-28 Developmental sketch of commuter needs, by author (April 2012)

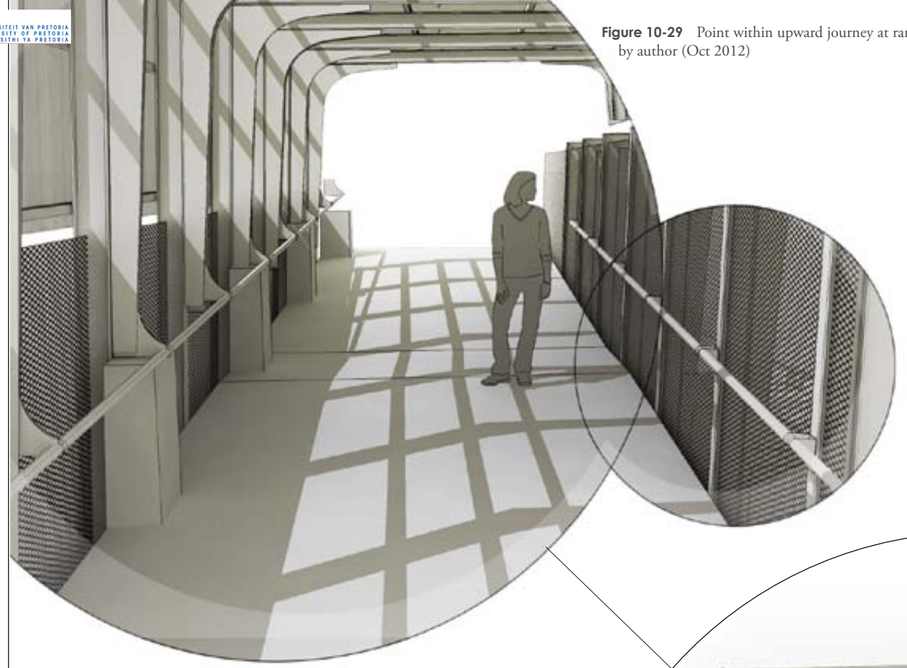


Figure 10-29 Point within upward journey at ramp, by author (Oct 2012)

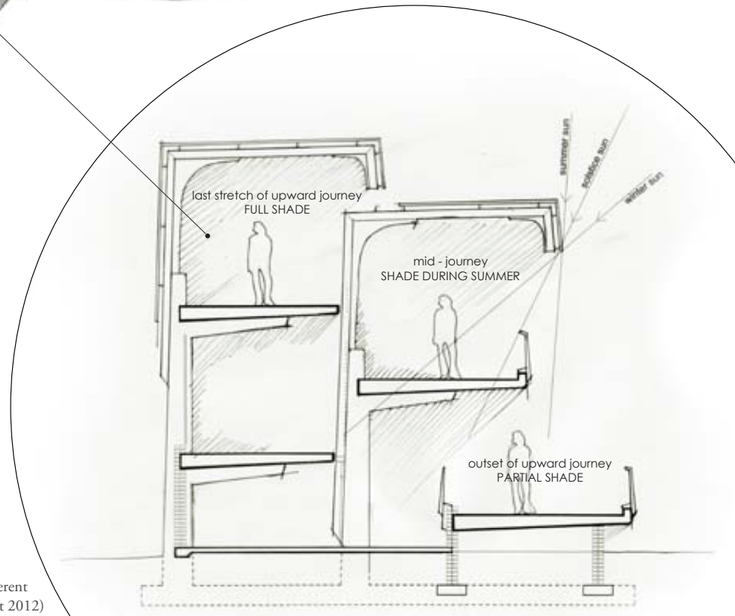


Figure 10-30 Anticipated solar access to different stages of journey, by author (Sept 2012)

Figure 10-31 Illustration of public space at southern ramp, by author (Oct 2012)

10 LEVEL CHANGE

As mentioned, accessibility is an issue inherent to railway upgrades in South Africa. The existing rail lines to the east of Eerste Fabrieke are on grade, requiring raised points of crossing as well as raised access to the stations themselves. As lifts are not always plausible, due to requirements in terms of security, maintenance and issues with financing, this condition often leads to the incorporation of ramped level changes.

Taking into account the new SABS 10400 regulations (SABS, 2011) as well as the key intention for the proposed intervention to improve the commuter experience of a diverse scope of users, an investigation was undertaken into what the most suitable application of regulation would be.

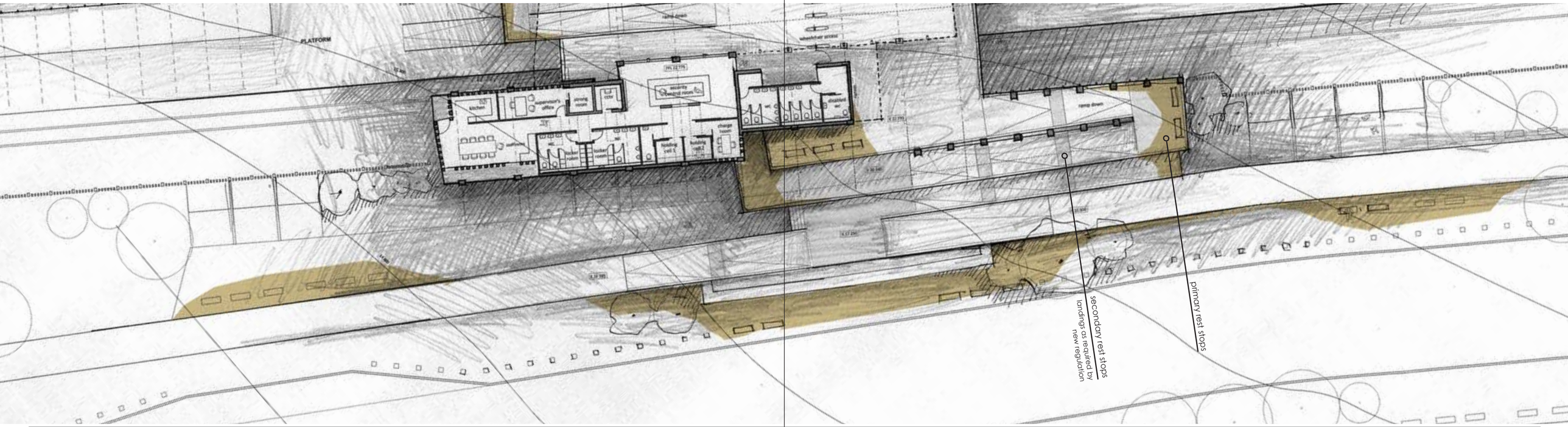
A conditional evaluation that tests the new regulation against the old and against international regulation was predicted to be of value considering the mixed opinions within the profession regarding the new regulation (follows on next page).

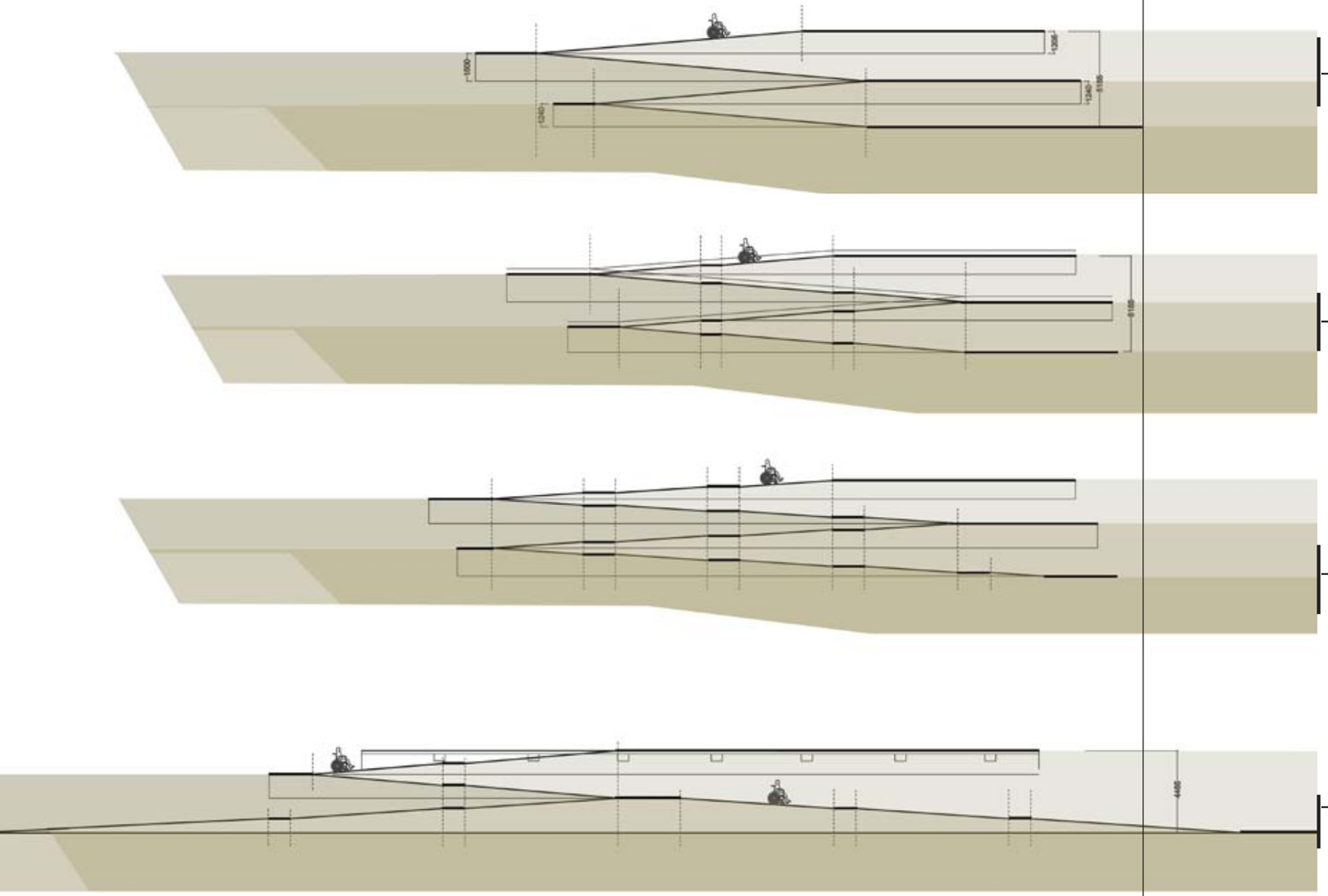
Overall, the new regulation was seen to result in much more comfortable inclines which are interrupted by rest stops (landings) more frequently, without invalidating the ramp as a means to achieve level change. The UK regulation (HMG, 2010), which is even more stringent, does not appear to fit the South African context as it would not be plausible to incorporate such low inclines at such a great level change.

Within the conditional approach presented here however, steeper inclines, which are more economical in length, are at certain points within the journey determined to be more appropriate. For example, in some cases it was determined that it would perhaps be more appropriate to limit the distance travelled on the actual ramp than lessen the strain while travelling.

The most evident practical implication that the new regulation brings about is the increase in the number of landings required. What these effectively provide are rests stops and this notion was expanded on by extending the ramps at their edges at every change in direction in order to offer a more primary space of rest. These spaces are offset from the main traffic flow, are provided with seating and additionally act as lookout points useful for orientation.

Figure 10-32 Illustration of 'rest stops', by author (Oct 2012)





OLD REGULATION @ 1:12 — (SABS 0400-1990:152)

- max. distance travelled on ramped surface without break: **18 060**
- total ramp length: **62 424**
- total travelled distance: **66 023**

NEW REGULATION @ 1:12 — (SABS 10400-S2011:17)

- max. distance travelled on ramped surface without break: **6 020**
- total ramp length: **63 092**
- total travelled distance: **75 092**
- comments:
  -increase in travelled distance doesn't invalidate use of ramp or render journey time unreasonable
  - improves generosity by providing rest stops

UK REGULATION @ 1:15 — (HMG, 2010:41)

- max. distance travelled on ramped surface without break: **5 011**
- total ramp length: **83 035**
- total travelled distance: **108 235**
- comments:
  -inclines steeper than 1:15 are not plausible for such a big level change as landings would be required at every 2m
  -there is a prominent increase in travelling distance

APPLICATION

- condition @ ramp connecting concourse with platform
- max. distance travelled on ramped surface without break: **8 000**
- comments: somewhat greater distances between rest stops but for shorter period of time - the ramps @ bridge occur at points after probable extended journey whereas the internal ramp occurs after rest or in downward direction - the height traversed is also less

Figure 10-33 Conditional evaluation that tests new regulation against the old and against international regulation, by author (July 2012)

11 DETAIL DEVELOPMENT

As stated, the detail resolution is developed to reflect the programmatic relationship between the two building personas that occur at the station. The tectonic structures 'inhabit' the stereotomic station structure with the level of integration between personas varying according to the condition (See example opposite).

Figure 10-34 Concourse detail, by author (Oct 2012)

The illustration depicts the edge where the security control room overlooks the concourse. Here, where programmes connect, the steel overlaps the concrete structure and acts to house the roller shutter door and frame.

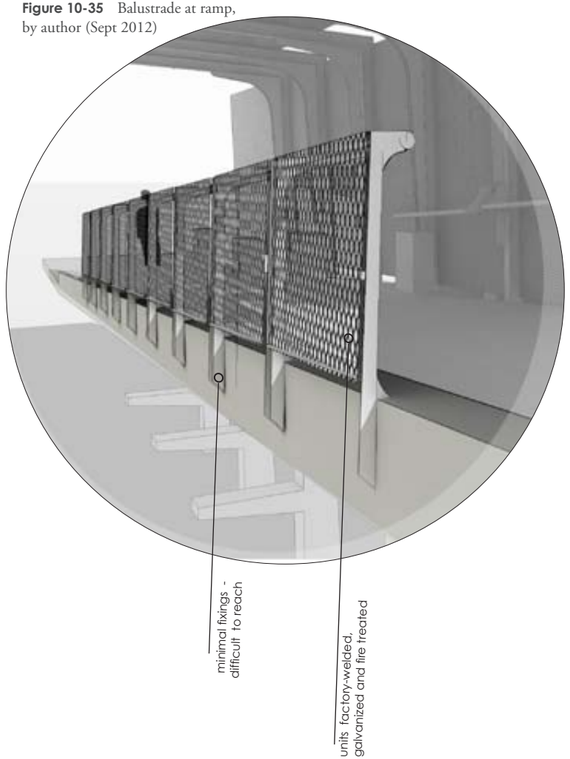


Figure 10-35 Balustrade at ramp, by author (Sept 2012)

12 DETAIL DEVELOPMENT _practical scientific

The prominent practical factors informing detail development are security, defensibility and constructability. The station building mass is developed to minimize exposure of its weak points, such as windows, through which vandals have been known to access or cause damage to station interiors. The tectonic steel structures that populate the transportive surfaces are for the greater part modular units which are pre-fabricated to the largest extent in order to maximize the efficiency of galvanizing and fire protection of surfaces and to minimize fixings which could potentially be removed by vandals. Generally the heavier, more permanent construction is developed with more freedom, whereas removables such as balustrades and shade structures of a smaller scale, like those occurring at the ramped access points, are designed with a higher level of defensibility.

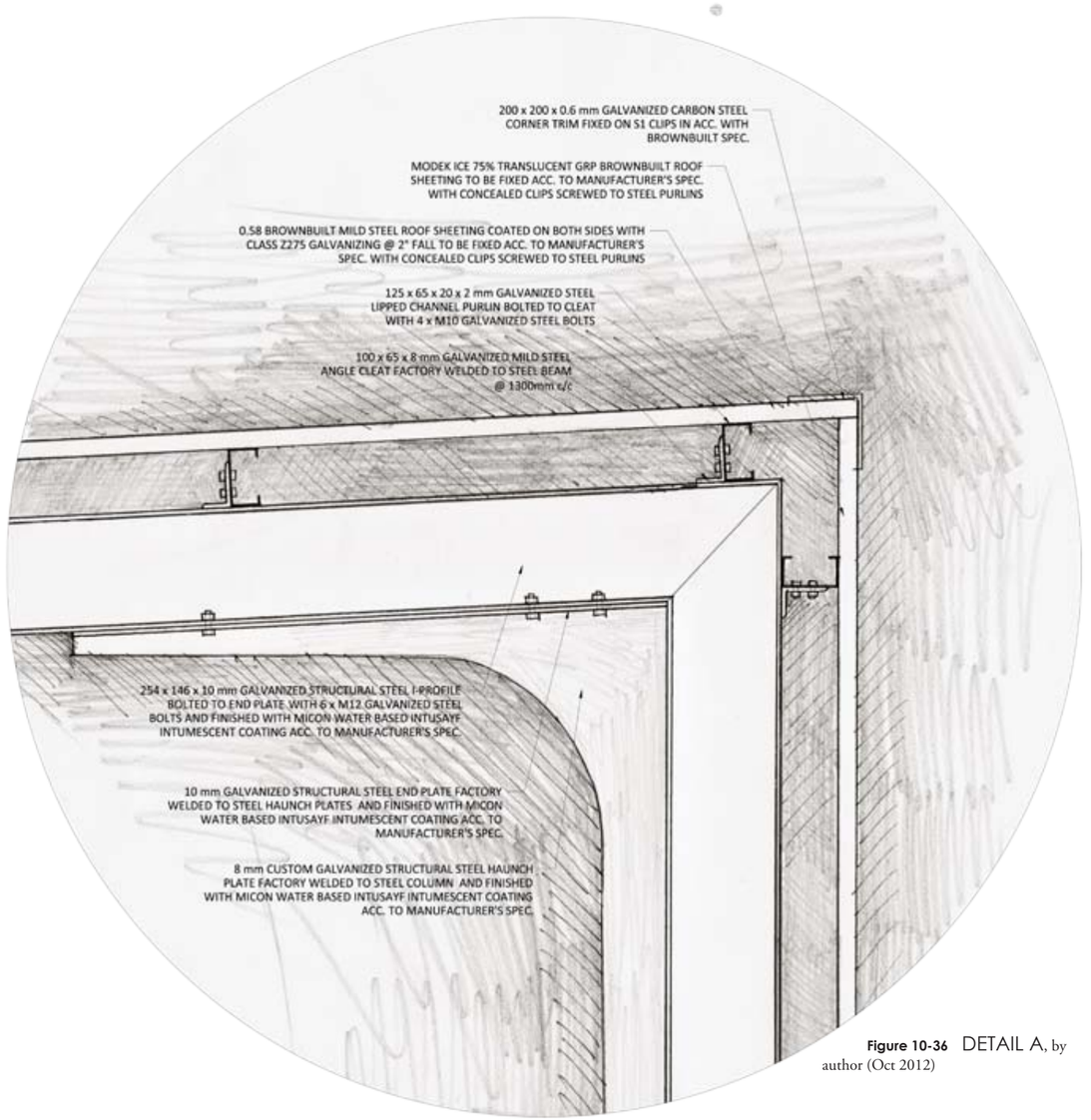


Figure 10-36 DETAIL A, by author (Oct 2012)

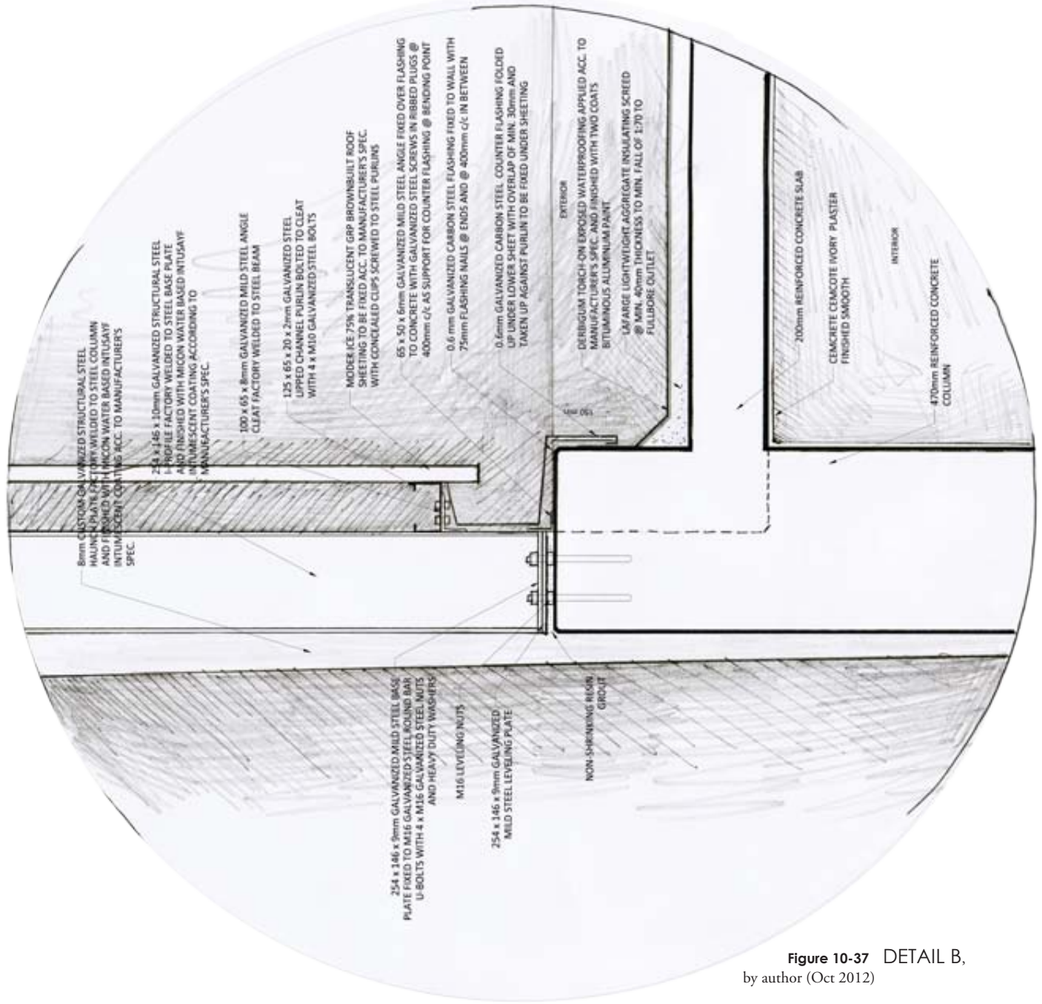


Figure 10-37 DETAIL B,
by author (Oct 2012)

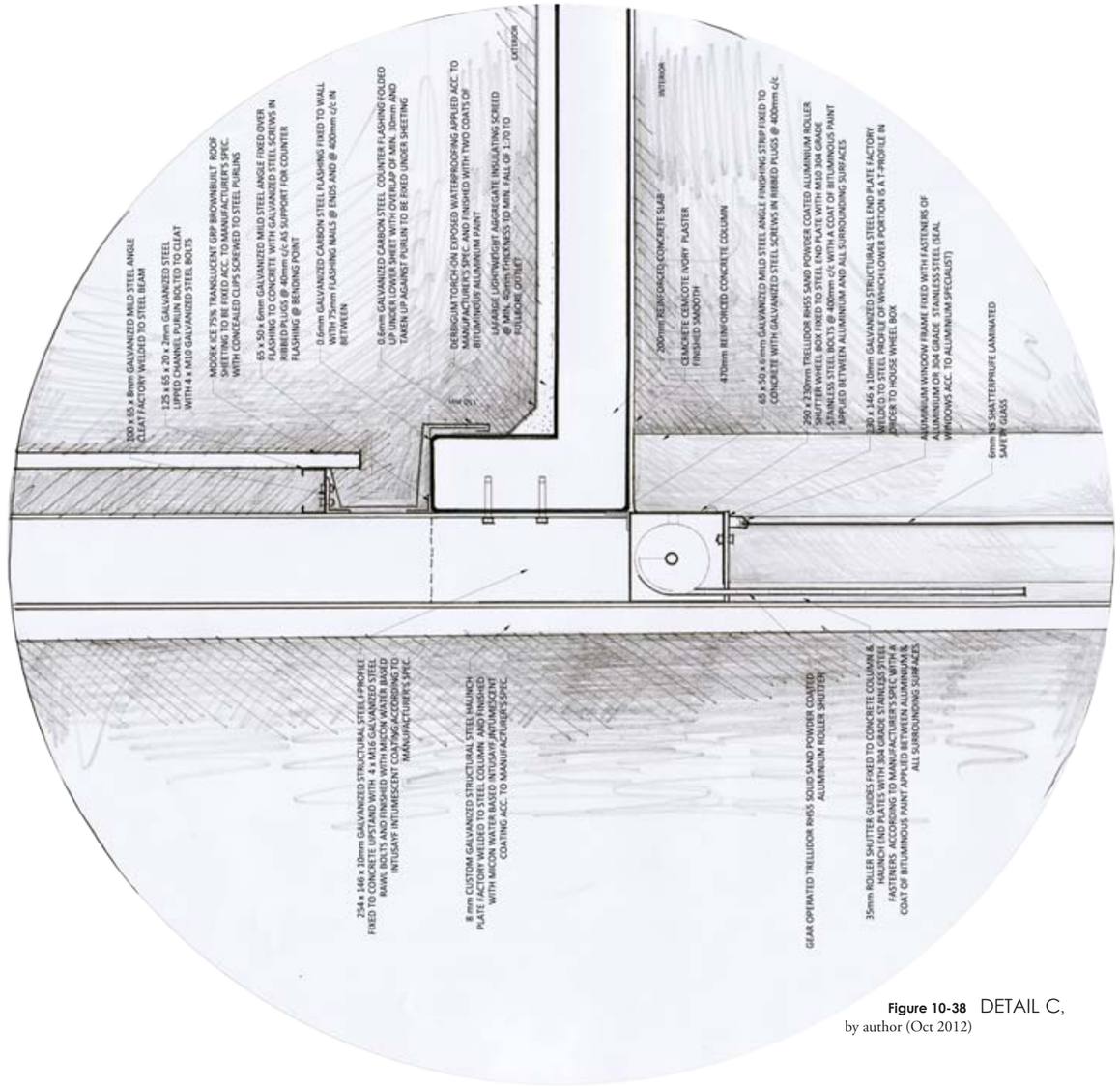


Figure 10-38 DETAIL C,
by author (Oct 2012)

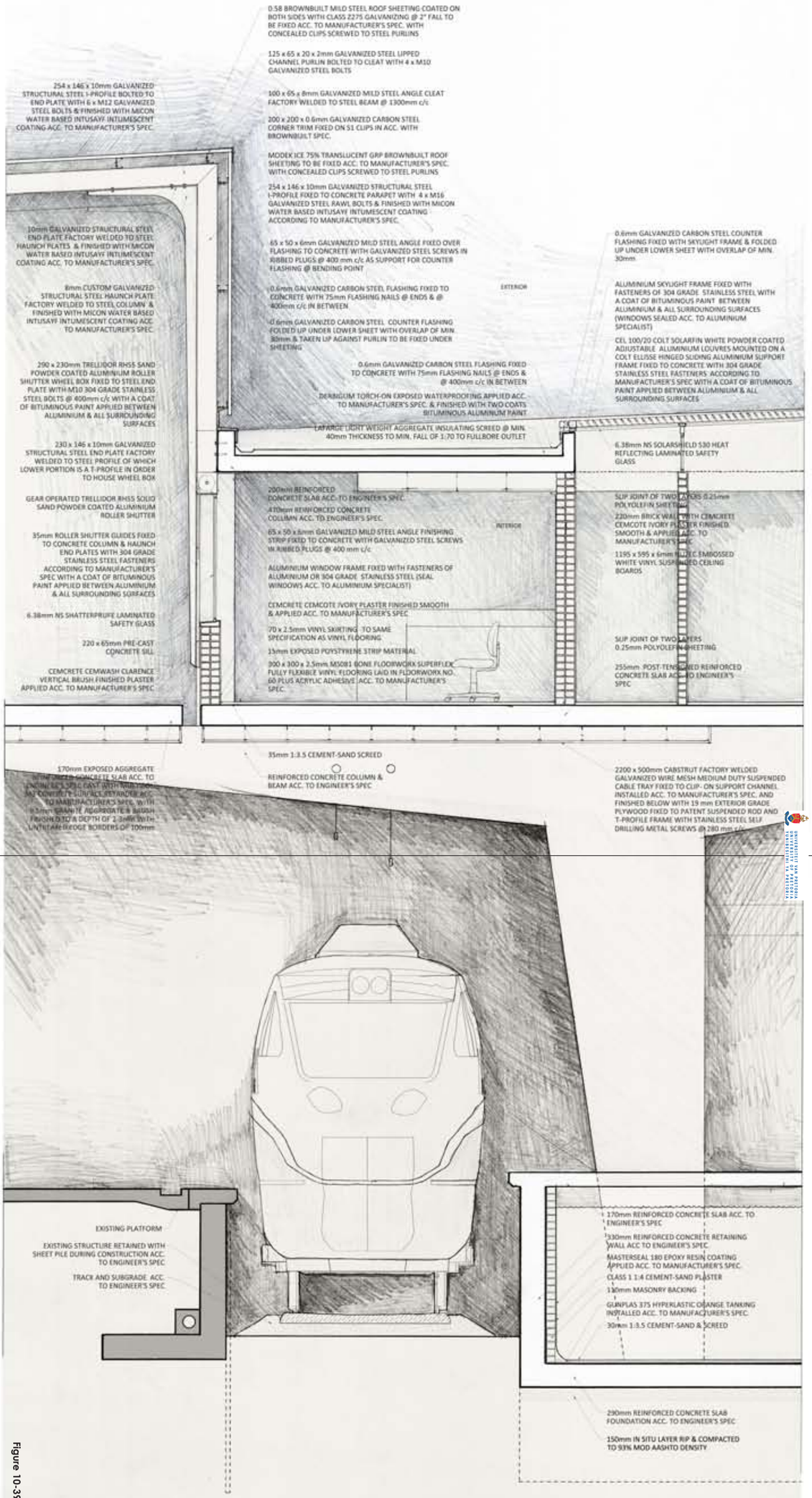


Figure 10-39 DETAIL SECTION D, by author (Oct 2012)

13 DETAIL DEVELOPMENT _experiential quality

At the other pole, key informants relating to the experiential context are visual, acoustic and audial quality. These categories are based on the investigations in part 2 and inform considerations of especially material quality and the manner in which it impacts on or augments commuter experience. Again, different factors take priority depending on the point in the journey the intervention is addressing and spatial typologies are therefore developed which inform material selection.

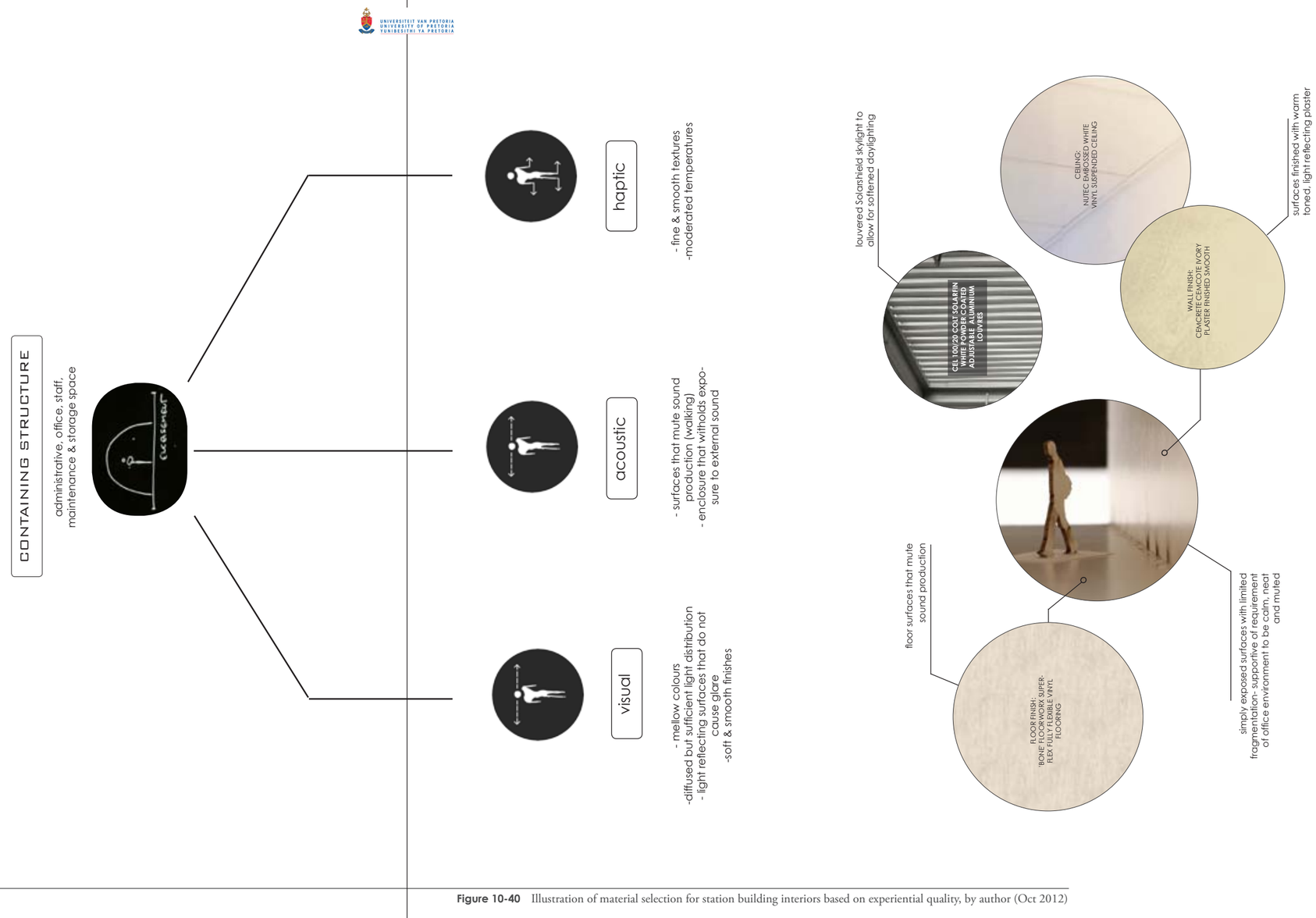


Figure 10-40 Illustration of material selection for station building interiors based on experiential quality, by author (Oct 2012)

TRANSPORTIVE STRUCTURE

access paths, ramps, concourse, waiting areas & platform accommodating commute

visual

acoustic

haptic

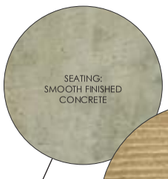
waiting/stationary

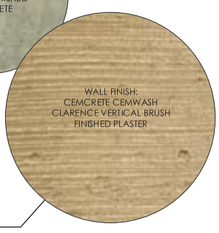
- vista/view/peripheral freedom
-mellow colours
- fragmented lighting condition
- surfaces that do not cause glare
-finer finishes

- surfaces that allow sound production (walking)

- finer textures
-heat/coolth emanating surfaces
-moderated temperatures

existing vista





seating surfaces receive solar radiation during winter months and shade during summer

semi-translucent sheeting to allow for soft dappling of light

station building exterior surfaces (encountered at ticket office and concourse) finished with warm toned, brush finished glare reducing plaster

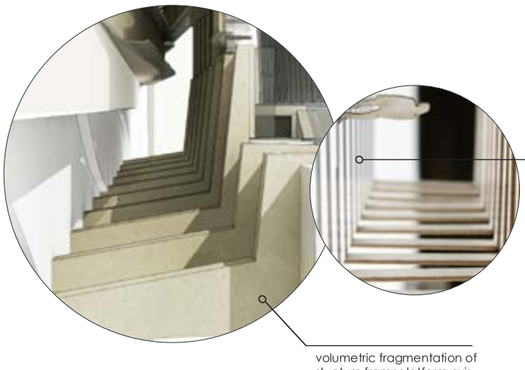
waiting/stationary

in motion

- visual access to route
-mellow colours
- semi-fragmented lighting condition
- surfaces that do not cause glare

- surfaces that allow sound production (walking)

- responsive/aiding textures
- moderately rough surface (grip)
-moderated temperatures



volumetric fragmentation of stucture frames latform axis rhythmically

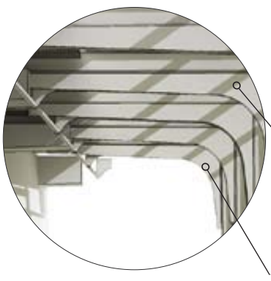
in motion

in motion under strain

- visual access to route
-mellow colours
- less fragmented lighting condition
- surfaces that do not cause glare

- surfaces that allow sound production (walking)

- responsive/aiding textures
- rough surface (grip)
-moderated temperatures



vague dappling of light :
- animation of surface
- not to extent that it causes issues with legibility

exoskeletal structure - material fragmentation frames route rhythmically

in motion under strain

Figure 10-41 Illustration of material selection for commuting environment based on experiential quality, by author (Oct 2012)

14 SUSTAINABLE STRATEGIES

Due to problems in regard to the financing and maintenance of technology at the stations, it was determined that a low tech solution with potential of future upgrade would be most beneficial. The implication is that the most basic environmental resources available need to be utilized optimally. In Pretoria, the major resources available are rainwater and especially solar energy. Although wind energy doesn't provide a major potential it is still incorporated into the scheme as the existing station and track structure is already orientated in the direction of the prevailing winds.

As mentioned, there is a programmatic split between administration and security. The building mass is therefore split to accommodate the programmes separately and to optimize ventilation and solar access at the office edges, which at both buildings face north. The store, maintenance and holding rooms are then located at the southern edges and receive light through the roof via louvered skylights.

What this arrangement of raised building mass essentially allows for is solar exposure on the northern facades above and the maintenance of coolth on the shade side of the mass to the south (See sketches opposite) .

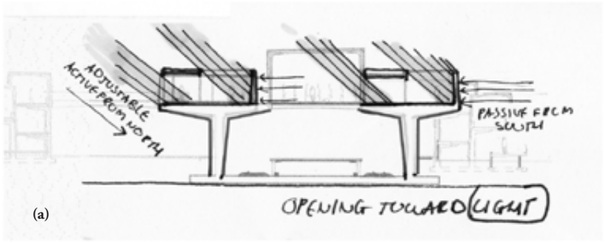
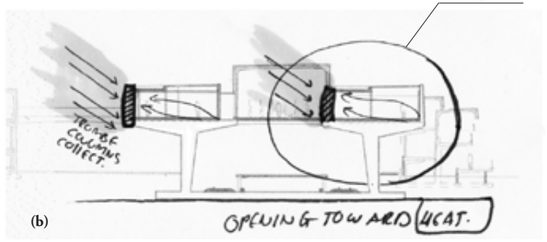


FIGURE 10-45



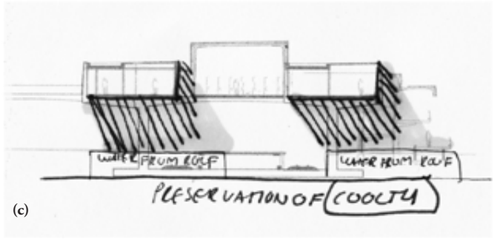


Figure 10-42 (a) - (c) Climatic strategies incorporated, by author (Aug 2012)

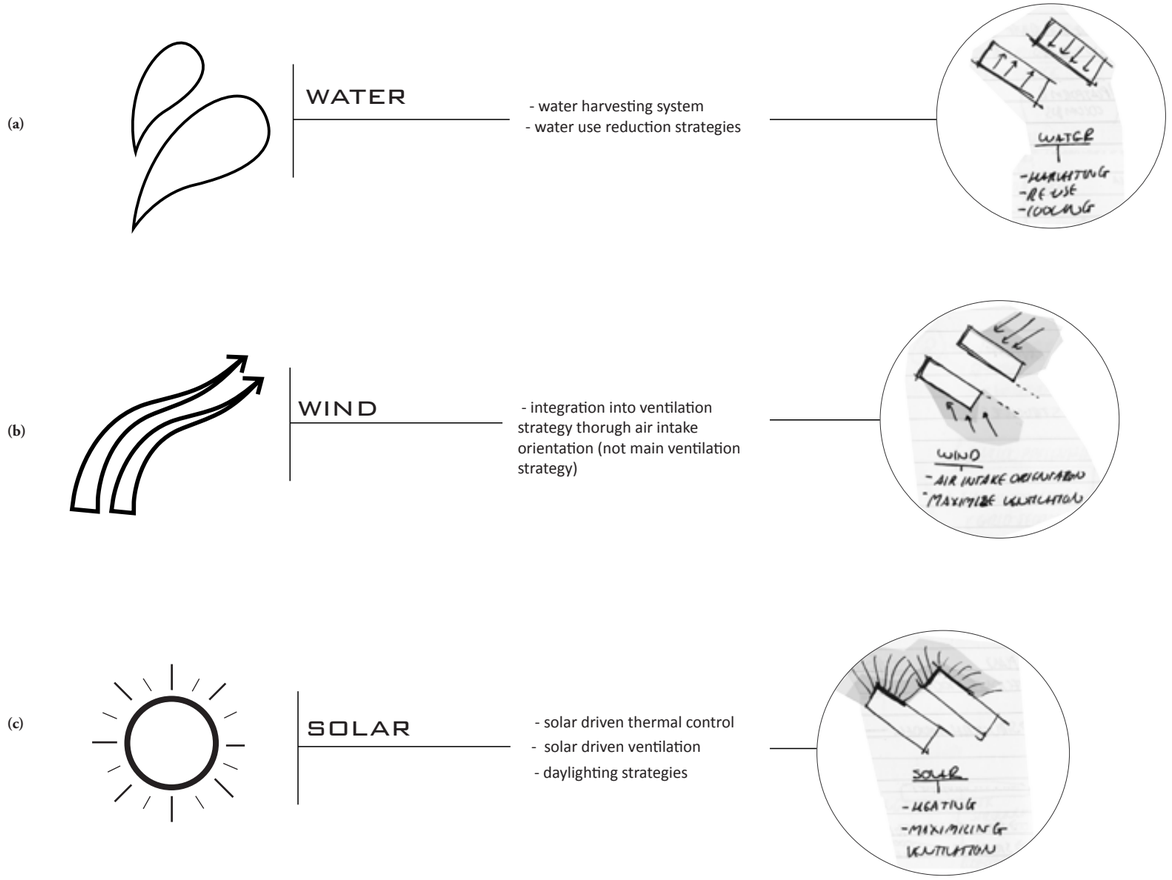


Figure 10-43 (a) - (c) Environmental potentials & sketches done at developmental stage, by author (April - Aug 2012)

15 SUSTAINABLE STRATEGIES _water

There is considerable roof area from which to catch rainwater and the need in this case is chosen to fit the supply. Following an evaluation of the various needs and the treatment, storage and circulation required for each it is determined that the supply available would be best utilized for drinking water which would be supplied to commuters via drinking fountains on the platform.

In regard to experiential requirements this is also found to be most suited in regard to the needs of the commuter as arrival at the platform is often subsequent to lengthy travel time, either on the train with no access to water or on foot to the station.

Water tanks that store roof run-off are located on the shade side of the massing from where it is supplied to the drinking fountains. These will however still be linked to the mains if for some reason there is no water available, or if the water has become contaminated. To prevent this however, a primary filter is used to direct the first runoff from the roof away from the tank. A control station with secondary filter also intercepts the water between tank and destination.

_fixtures

- Basin taps specified to have flow rates lower than 6L/min

- Toilets specified to have half (4.5L) & full (9L) flush options

_irrigation

- All excess run-off and grey water used to feed irrigation supply

- Planting specified to require little to no irrigation

_rainwater harvesting

NEED

total - 668 800 L/year

commuters

9200 daily at present
15 200 daily @ horizon year of 2028 (PRASA, 2007:21)

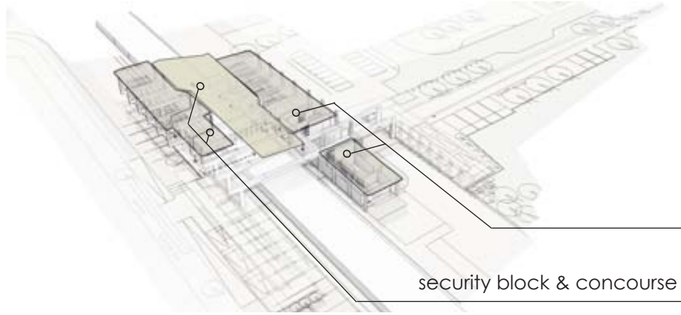
demand

15 200 (daily commuters)
x 250ml (per refreshment)
x 22 (week days)
x 8 (warmest months)

SUPPLY

total - 683 813 L/year

able to catch and store enough water to supply demand during the busiest days of the warmest months



administration block roof

concrete roof:

429m³ (roof area)
x 647 (annual rainfall)
x 0.9 (derbigum run-off coefficient)

249 806 L/year

security block & concourse roofs

concrete roof:

340m³ (roof area)
x 647 (annual rainfall)
x 0.9 (derbigum run-off coefficient)

197 982 L/year

steel roof:

384m³ (roof area)
x 647 (annual rainfall)
x 0.95 (metal run-off coefficient)

236 025 L/year

430m³ tank

240m³ tank

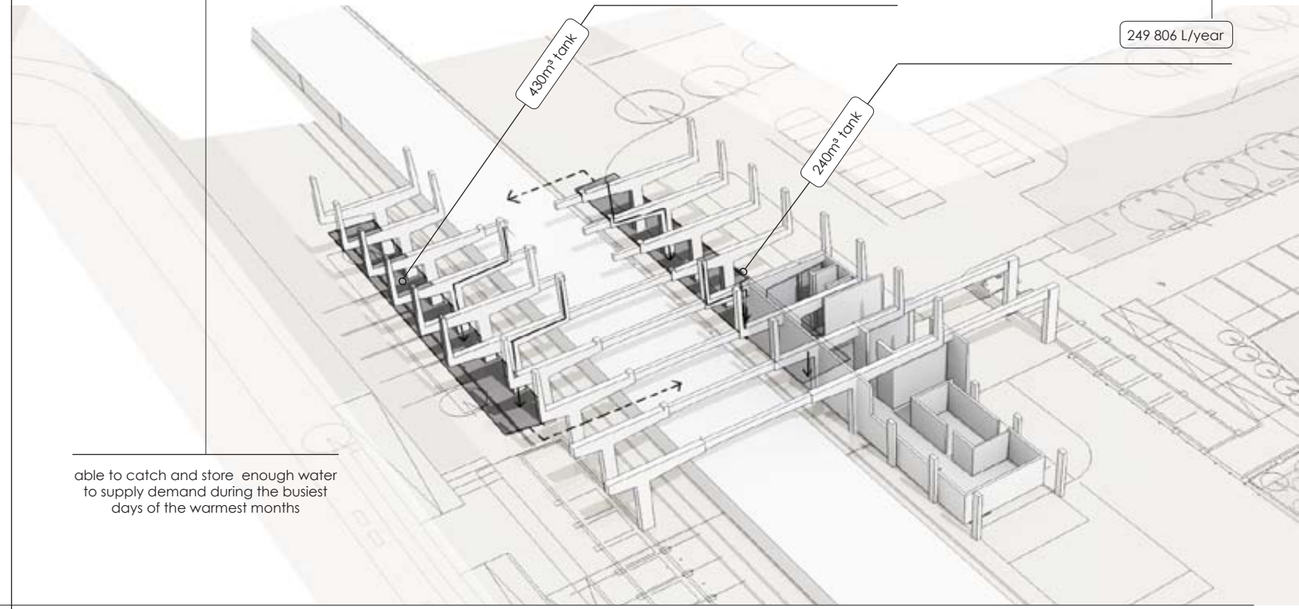


Figure 10-44 (a) - (c) Illustration of rainwater harvesting strategy, by author (April - Aug 2012)

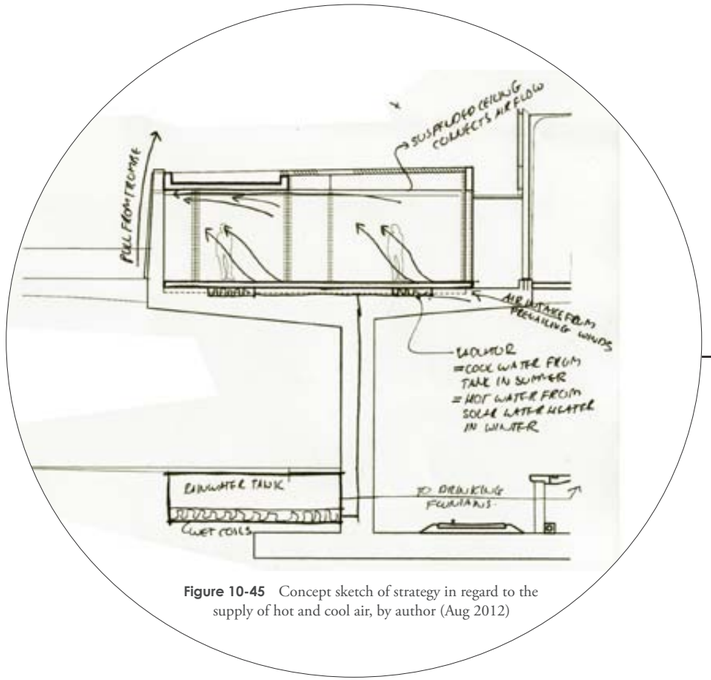


Figure 10-45 Concept sketch of strategy in regard to the supply of hot and cool air, by author (Aug 2012)

16 SUSTAINABLE STRATEGIES _comfort

The strategy is to maximise gains from solar energy as this is the greatest engine available for energy in Pretoria. 'Trombe' columns and solar chimneys are incorporated on exposed northern facades in order to create a negative pressure on the interior (through a suspended ceiling) which will aid in drawing air in from the sub-floor below.

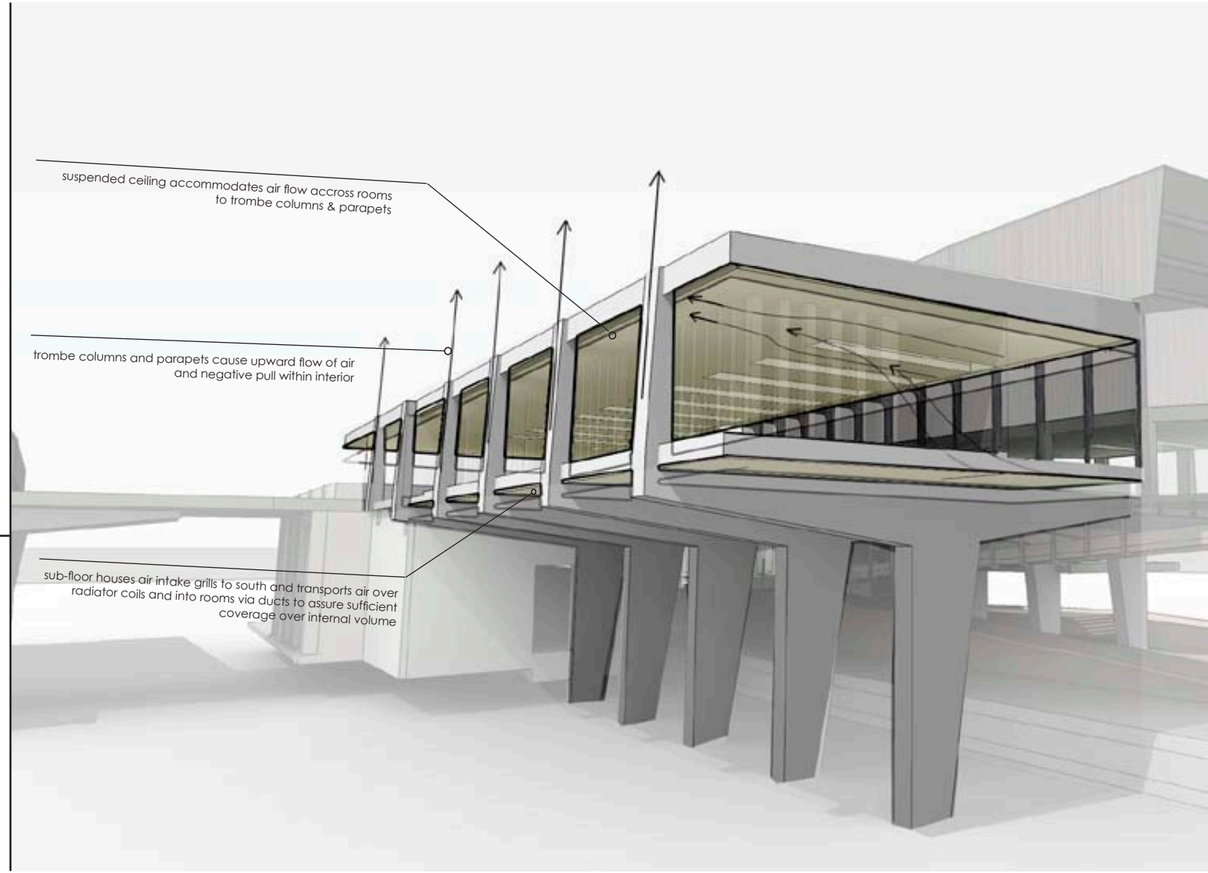
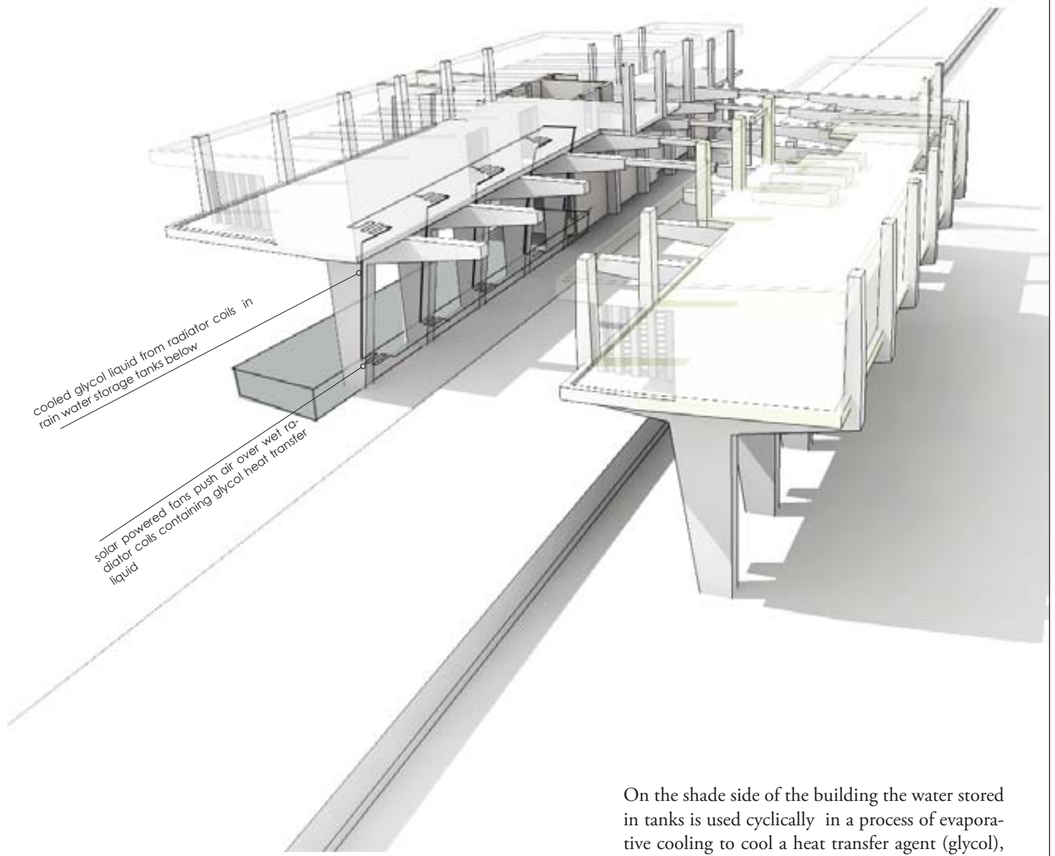
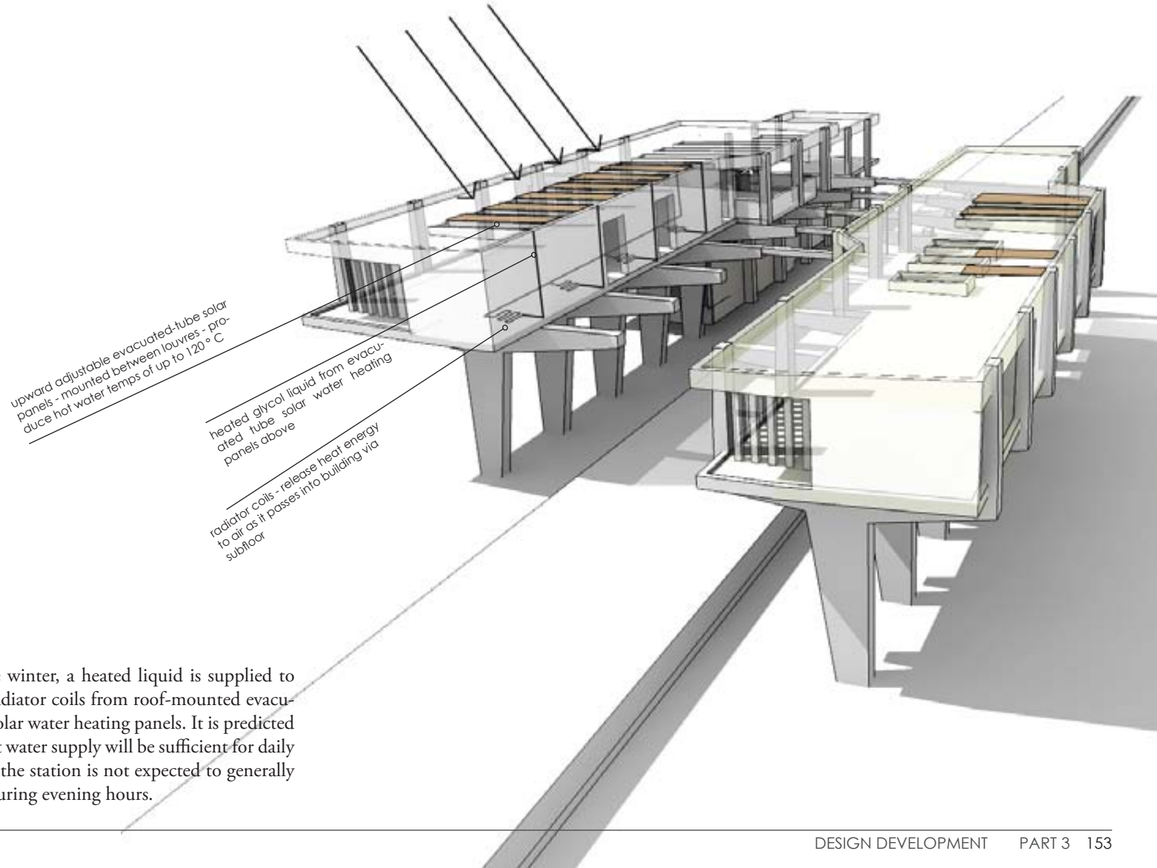


Figure 10-46 Illustration of cooling during summer, by author (Oct 2012)



On the shade side of the building the water stored in tanks is used cyclically in a process of evaporative cooling to cool a heat transfer agent (glycol), which is subsequently supplied to radiators in the sub-floor. Here the incoming air passes over the cooled coils before entering the room.

Figure 10-47 Illustration of heating during winter, by author (Oct 2012)



During the winter, a heated liquid is supplied to the same radiator coils from roof-mounted evacuated tube solar water heating panels. It is predicted that the hot water supply will be sufficient for daily demand as the station is not expected to generally be in use during evening hours.

A mapping was performed in order to determine the optimal louvre spacing for the office spaces that are located on the northern facades. Optimal spacing would be where solar access is optimized during winter months but restricted during summer months. Louvered walls are fitted with adjustable shade louvres internally to provide control of solar access during winter months.

Figure 10-48 Mapping of solar access though louvers at 310 mm spacing, by author (Oct 2012)

11 project presentation

Figure 11-1 Presentation of work, by Arthur Barker (Nov 2012)

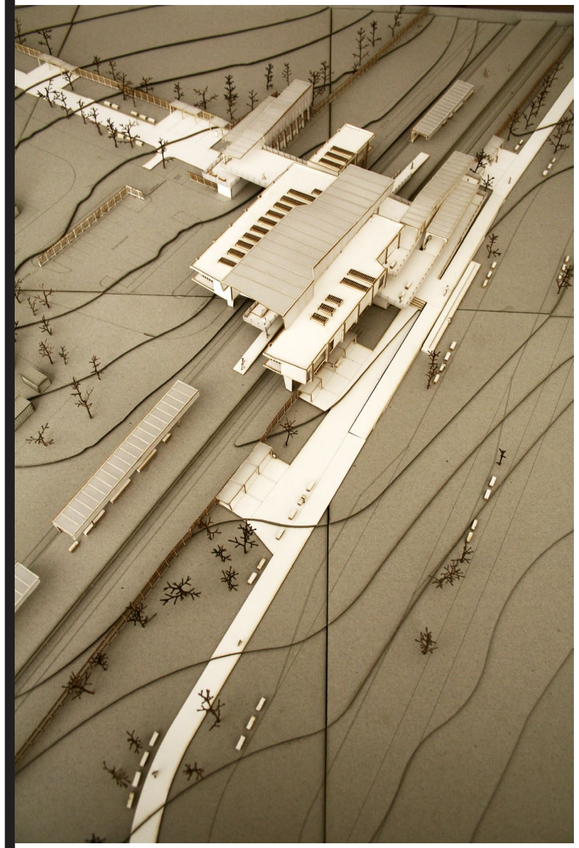


Figure 11-2 (a) - (c) Presentation of work, by author (Nov 2012)

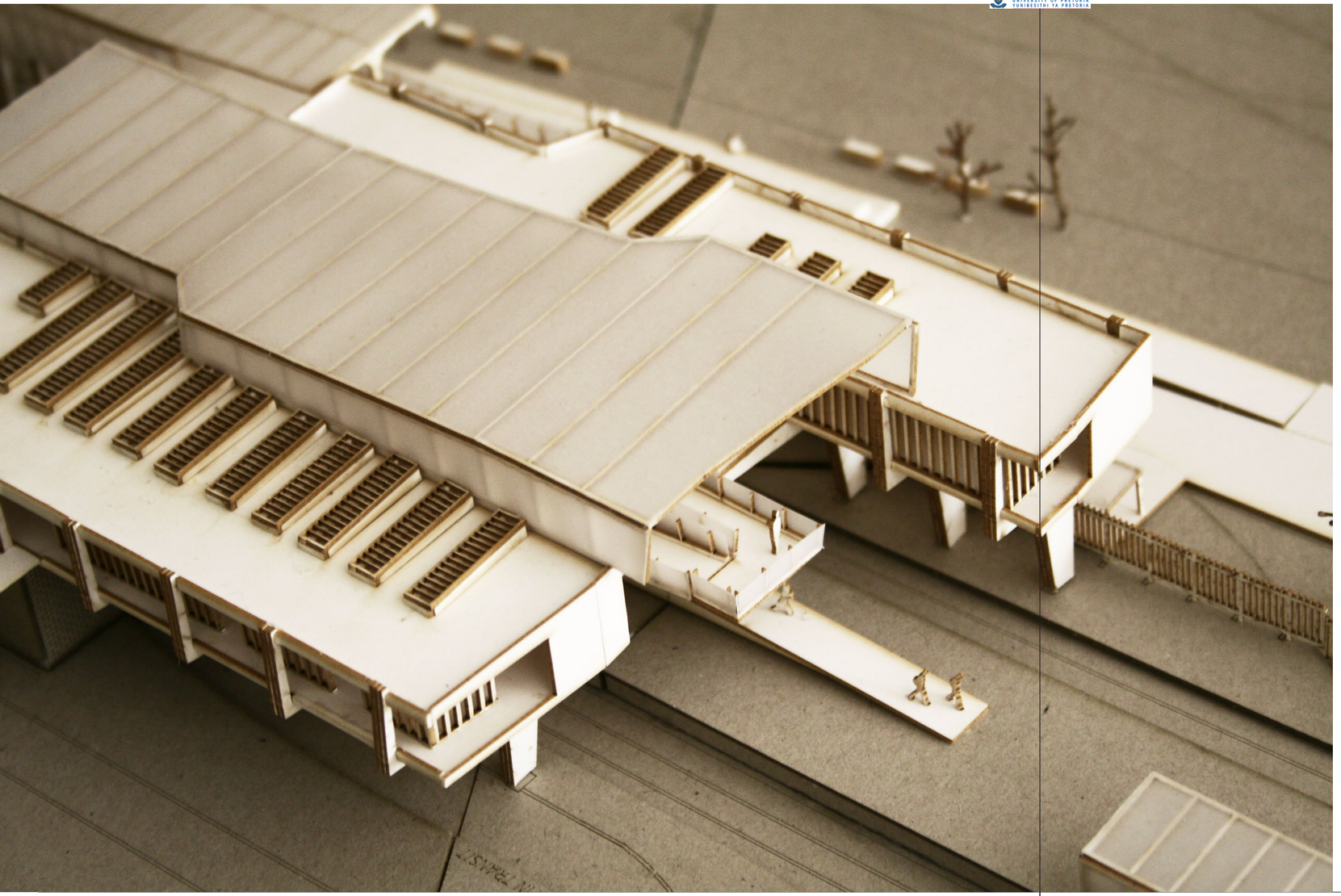


Figure 11-3 (a) - (b) Project model, by author (Nov 2012)

Figure 11-4 (a) - (d) Project model, by author (Nov 2012)

conclusion

This dissertation set out to investigate architecture's potential role in improving the experience of the daily commute into and out of the city. The commute is a non-static experience occurring through time and space. Generating architecture for such an experience subsequently necessitated the development of a non-static process.

The topic brings about an inevitable apprehension due to the limits in regard to the measurability of human experience. In this regard, phenomenological philosophy, although providing the theoretical justification for the exploration, was not able to provide precedent for its practical manifestation. Through investigation of the existing condition, paired with the intuitive and interpretive investigation of various precedents and environmental phenomena, the design process was able to bridge the gap.

The architecture which followed was the result of a conditional decision making process which integrated journey as a formal informant. Furthermore it was the result of a constant mediation between an optimization of security and resources and the environmental, visual, haptic and acoustic human experience it would articulate.

The process revealed that there exists a duality within the profession, and within similar professions, between the scientific instrumental world and the world of experience. Both in the contexts needing to be addressed and within the mind of the designer addressing them.

By allowing for the design process to be a mediator between these worlds the designer is more likely to bring about an architecture that has both contexts at the core of its becoming and hopefully also at the core of its eventual manifestation in lived space.

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