

# interaction

a built environment staging centre

# project summary

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**Site Location:** Erf R/332, Hatfield

**Address:** c/o Lynnwood Road and University Road, Hatfield, Pretoria,  
South Africa

**GPS Coordinates:** 25°45'23.50"S, 28°13'43.79"E

**Programme:** Built Environment Staging Centre

**Site:** The University of Pretoria – linking Main Campus and South Campus

**Client:** Department Facilities Management at the University of Pretoria

**Users:** Students and facilitators of the Department of the Built Environment,  
the built environment industry and the general public

**Architectural Theoretical Premise:** The relationship between theory  
and practice

**Architectural Approach:** Developing a new inhabited bridge between  
Main Campus and South Campus at the  
University of Pretoria

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I further state that no part of my dissertation has already been, or is currently being, submitted for any such degree, diploma or other qualification.

I further declare that this dissertation is substantially my own work. Where reference is made to the works of others, the extent to which that work has been used is indicated and fully acknowledged in the text and list of references.

The dissertation is 22 087 words long (excluding the scanned items).

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# abstract

## keywords:

staging, interaction, transition process, architectural education, theory, practice, relationships

This dissertation investigates the relationship between architectural education and practice. The nature of the relationship between these two phases in architecture is continuously debated and discussed. The debate generally revolves around the responsibilities of educational institutions to produce architects that can easily adapt in the work environment and the industry's responsibility to assist graduates in the transition process. The debate is discussed and analysed in depth and a programme is developed to assist in facilitating this capricious relationship. A more collaborative relationship between architectural theory and

practice can benefit both the quality of architectural education and the architectural industry.

The architectural building type that will be investigated is an inhabited bridge. The structure will act as a unifying space between architectural education and practice, Main Campus and South Campus, as well as the different departments in the Built Environment at the University of Pretoria. The facility will act as a platform for the students to interact with members of the different departments in the Built Environment, the built environment industry and the public.

The architectural exploration aims to create an environment where the relationship between theory and practice can successfully sustain itself. This is achieved through the development of three types of relationships: social, intellectual and practical. These relationships are developed in order to inform and support one another in the attempt to create a more stable and interdependent relationship between architectural theory and practice. An additional relationship that is addressed is the University's interface and relationship with its local community and society at large.

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# list of terms & abbreviations

**Architecture** (when referring to the students or the study of architecture)  
– A collective term used to describe architecture, landscape architecture and interior architecture.

**BRT** - Bus Rapid Transport

**Built Environment** – The School for the Built Environment at the University of Pretoria. The school covers all the programmes within the Built Environment, divided into three departments, namely: Architecture, Construction Economics and Town and Regional Planning.

**CAA** – Commonwealth Association of Architects

**CBD** – Central Business District

**CID** – City Improvement District

**Construction Industry** – Includes all entities involved in the construction process, amongst others engineers, suppliers, builders, developers, etc.

**CoT** – City of Tshwane. This term specifically refers to the greater Tshwane area or the area covered by the City of Tshwane Metropolitan Municipality or the City of Tshwane Metropolitan Municipality itself. Not to be confused with 'Pretoria' as this refers to the original city, before the amalgamation of the various local governments, including areas such as Centurion, Hammanskraal, Akasia, Mabopane, Soshanguve, Pretoria, etc (<http://www.ananzi.co.za/advertising/>

[tshwane/index.htm](http://www.ananzi.co.za/advertising/tshwane/index.htm)).

**Graduate Staging Centre** – This dissertation introduces a new typology of Staging Centres. These are buildings that are designed with the main aim of showcasing the work that is being produced at an academic institution. The Staging Centres are discipline-specific and should act as a foyer between the academic institution and its local environment.

**HEQF** - Higher Education Qualification Framework

**HoD** - Head of Department

**HMCDF** – Hatfield Metropolitan Core Development Framework.

**Incubation Centre** – According to Dr Mark Yates an influential figure in global business, a business incubator is a facility set up by a university to assist graduates in establishing and managing their own businesses. Financial and business support is provided for up to three years for graduates who are starting their own business; in turn, they, as members of the business incubator, give a percentage of their earnings back to the centre (Yates, 2009).

However, in this dissertation the term will be used differently, as it does not aim to be an incubation centre in terms of its management, but will provide a forum for the interaction between the students of the Built Environment and the members of the built environment, assisting students in the transition process between education and industry. It will not be managed as an incubation

centre in terms of business, but only act as an incubation facility.

**Industry** – Refers in a broad sense to all people involved in the industry of the built environment, including people from the architecture, construction, construction management, town and regional planning, and quantity surveying professions.

**ITP** – Integrated Transport Plan

**NVABES** – New Visual Arts Building and Exhibition Spaces. This abbreviation refers to a new project at the University of Pretoria (UP) currently underway. It entails the extension and refurbishment of the Visual Arts Building and a new exhibition space for the University of Pretoria's permanent collection (see Permanent Collection Building). The new exhibition space for the permanent collection should not be mistaken for the exhibition space proposed as part of this dissertation. The two spaces are separate and should only relate to each other, but it is not one space (see Fig 1.3).

**NQF** - National Qualification Framework

**Permanent Collection Building (PCB)** (also see NVABES) – This building forms part of the NVABES development. Its footprint and relationship to its environment forms part of this dissertation. The PCB will house the University's permanent collection with an estimated value of R400 million, currently not on display.

**RIBA** – Royal Institute of British Architects

**SACAP** – South African Council for the Architectural Profession

**SAIA** – The South African Institute of Architects

**SPTN** – Strategic Public Transport Network

**TMSDF** – Tshwane Metropolitan Spatial Development Framework

**TOD** – Transit Oriented Development

**Transition Process** – The term refers directly to the interface between architectural education and the architectural industry; the phase between the completion of a specific degree and actually working at a firm or as a practicing architect.

**UCT** – The University of Cape Town

**UP** – The University of Pretoria

Pretoria in my [h(e)]art!

# thank you

Arthur Barker

Jacques Laubscher

My entire family and all my friends

Cornè

In my heart I will always know that this was a good year -  
thanks to you!



# chapterone

Introduction



## Background and context

The relationship between architectural education and industry forms the basis of this dissertation. The lack of synergy between these two phases in architecture causes a problematic transition from education to practice, as the gap between these two phases in an architect's career is too vast (Noero, 2000: 100). The proposed project is an attempt to narrow this gap by proposing a new building typology that can facilitate the relationship in a more acceptable and productive manner in order to benefit both the theory and practice of architecture.

Very little interaction occurs between the different departments in the Built Environment at the University of Pretoria (UP). Currently the only formal interaction is a four day workshop that is completed as part of post-graduate studies. A lack of interest and

management is causing the isolation of the different departments and as a consequence the students are not aware of the potential and abilities of each others' professions (Bakker, 2011).

Lynnwood Road separates South Campus and Main Campus. A pedestrian bridge was built in 1995 after a student was killed while crossing the road (Ad Destinatum, 1995: 203). However, it is not a successful link between the two campuses as it acts as an isolated entity that links two sides of Lynnwood road and does not create an integrated campus. This causes South Campus to be experienced as a separate, isolated space.

Interaction with the public has been identified as a priority in future developments at UP according to

the Strategic Plan for 2007-2011 (The University of Pretoria, 2011). UP has identified its interface with society as problematic, because the University is experienced as an isolated island that is not accessible to the public. A space is needed where interaction between the university and the public can take place to demonstrate some of the pioneering works that are being done at UP.

This dissertation proposes to unify segregated entities and some problems of integration, through the creation of an inhabited bridge over Lynnwood Road. The long-term legacy of the project is to create a forum for the interaction between students and the industry in order to simplify the transition process between the two stages in an architect's career.

## Project location

The City of Tshwane (CoT) Metropolitan Municipality defines the central northern part of the Gauteng province in South Africa. Formerly known as Pretoria, the Municipality was created on 5 December 2000 and is an amalgamation of 13 former city and town councils. Just over 2.2 million people currently live in CoT with an area of 3 200km<sup>2</sup> (City of Tshwane, 2009).

UP is situated on the corners of Lynnwood Road and University Road, Hatfield, south east of the Central Business District (CBD) of Pretoria. South Campus is situated south of Lynnwood Road and Main Campus is north of Lynnwood Road (Fig 1.6). The site is located in the north eastern quadrant of South Campus as well as west of the Boukunde building on Main Campus. An pedestrian bridge currently links the two sites.

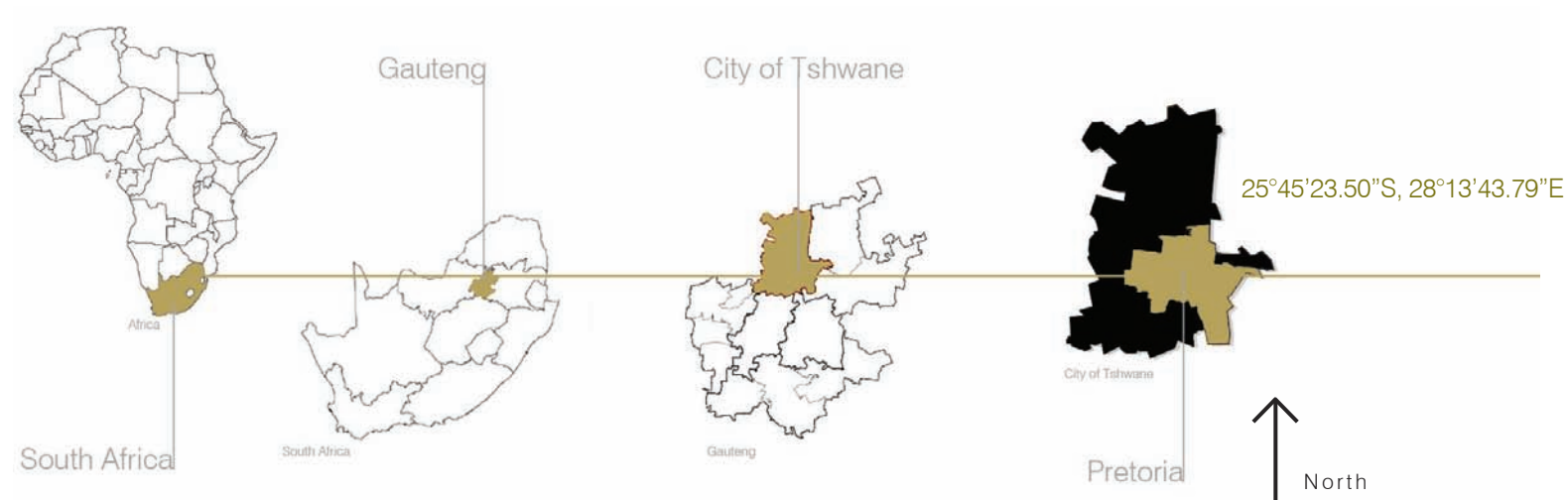


Figure 1.1 Locality in an international context

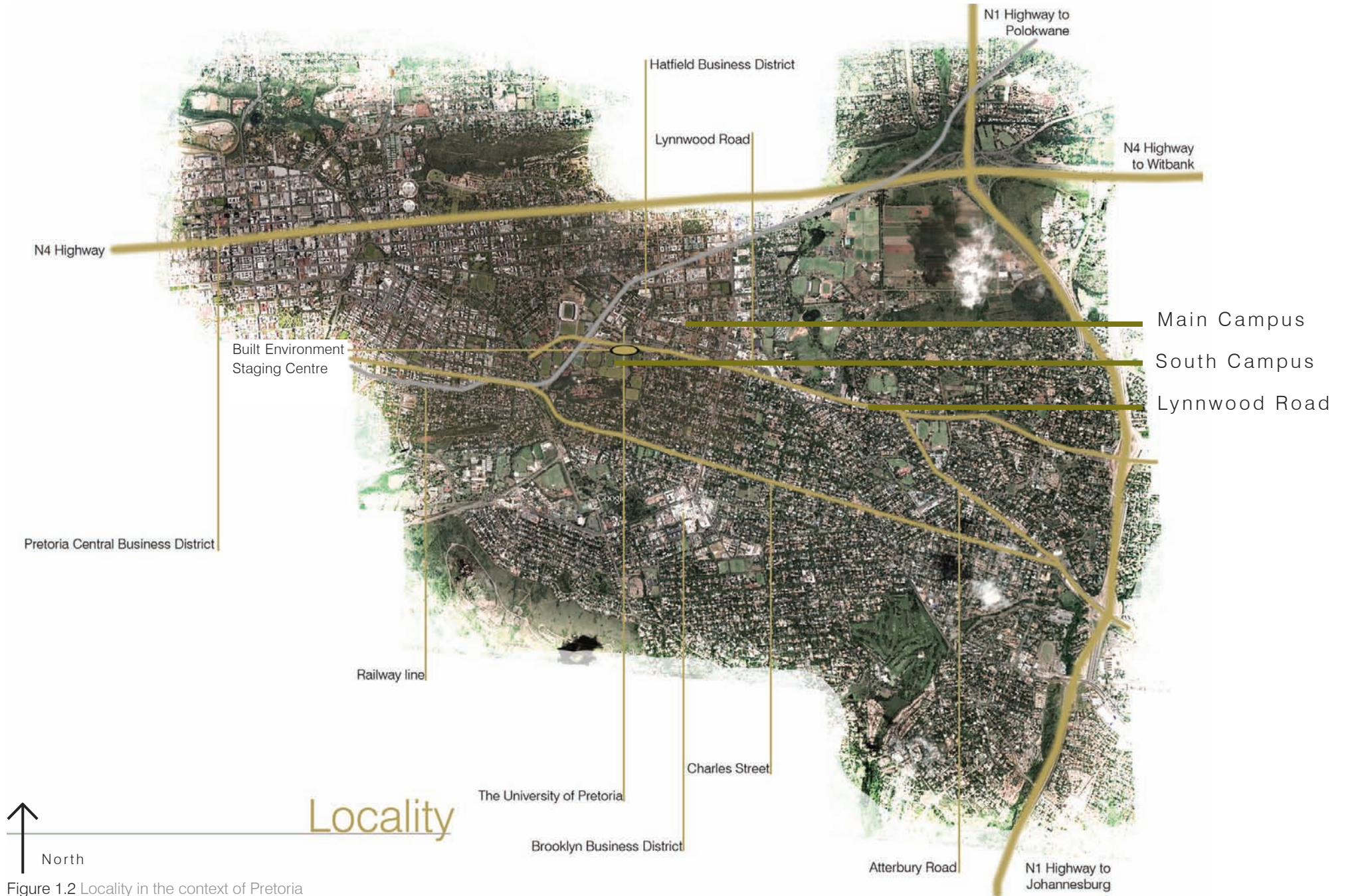


Figure 1.2 Locality in the context of Pretoria



## Establishment of the University of Pretoria

The University was established in 1908 as the Pretoria campus of the Transvaal University College (TUC), situated in Johannesburg. The University has grown from its humble beginnings with 32 students, housed in one building, to almost 40 000 students in 2010, divided into 140 departments on seven

campuses (The University of Pretoria, 2011). In 1930, in terms of the Private Act on the University of Pretoria (Act 13 of 1930), the University gained its independence and 10 October 1930 is the official date of establishment of the University of Pretoria.

## Current facilities on South Campus

South Campus is a rectangular site with its long axis stretching east-west. The site currently facilitates Town and Regional Planning, Construction Management, Drama, Fine Arts, Chemical Engineering's division for water utilisation and Biotechnology. Other facilities on the campus include the Kiosk, Centre for Electromagnetism, UP Press, store rooms and a security administration building (Fig 1.5).

## New developments

The University of Pretoria is planning to build a new facility for the Visual Arts Department (Vosloo, 2011) as well as additional exhibition space (NVABES). The new development is situated between Boukunde and the current Visual Arts building. The new facility will include an exhibition space that will house the University's permanent collection.

This dissertation will respond to the brief of the proposed new development as the two projects complement each other. The location and footprint for the new Permanent Collection Building (PCB) is proposed in this dissertation in order to create an integrated and cohesive new interface between the university and the public.

Figure 1.3 indicates the relationship between the NVABES project and the Built Environment Staging Centre, proposed in this dissertation.

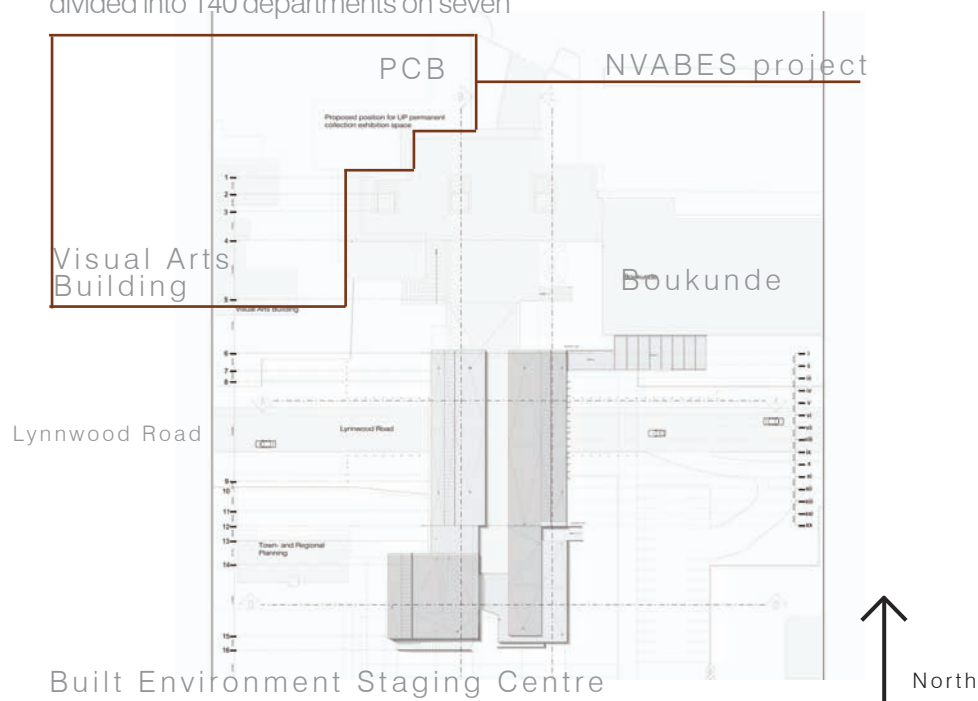


Figure 1.3 Relationship between NVABES project and Built Environment Staging Centre

## The University of Pretoria Strategic Plan

UP's strategic plan is a comprehensive, publically available document that specifies the outcomes and strategies of UP (The University of Pretoria, 2011). One of the main strategies is to have a sustainable and influential impact on the local community. The aims that correlate with this dissertation are to:

- have a significant local impact through better engagement with the community;
- be an economic driver and competitor in the area;
- be a force for social change;
- be more influential on a national scale, producing pioneer work that can benefit the people of Southern Africa.

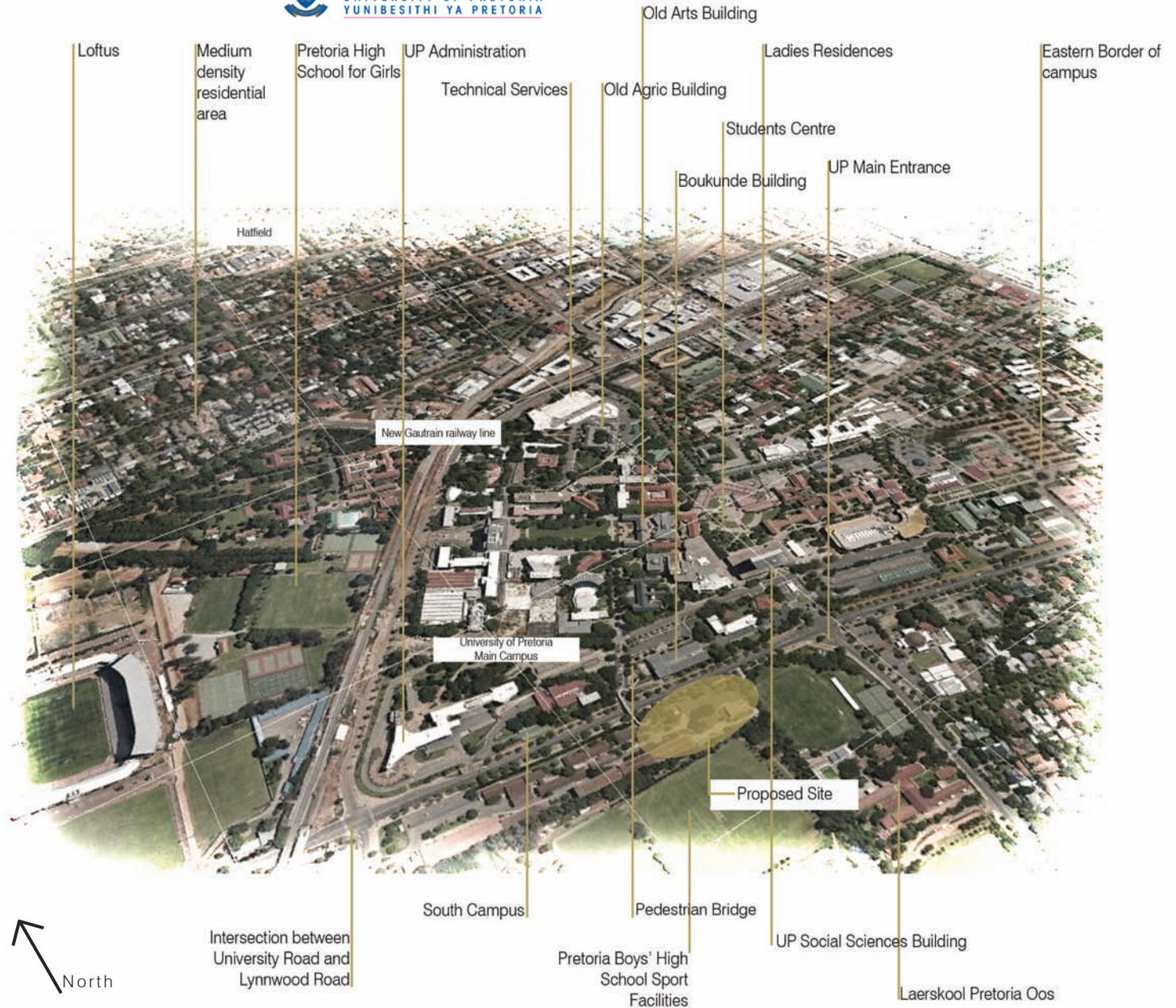


Figure 1.4 Identification of important areas around the site





- |  |  |
|--|--|
| 1. Entrance  | 12. Construction Economics               |
| 2. Exit  | 13. Art History                          |
| 3. Pump Room                                       | 14. Drama Practice Rooms                 |
| 4. South Campus Administration                     | 15. U.P. Press                           |
| 5. Sculpture Studios                               | 16. Town and Regional Planning           |
| 6. Geology Storage Rooms                           | 17. Pedestrian Access Gate               |
| 7. Department Electrical Engineering Storage Rooms | 18. Pedestrian Bridge over Lynnwood Road |
| 8. Drama Storage Rooms                             | 19. Cafeteria                            |
| 9. Drama Practice Rooms                            | 20. Undercover Parking                   |
| 10. Chemical Engineering (Water Utilisation)       | 21. Centre of Electromagnetism           |
| 11. U.P. Press                                     | 22. Storm water channel                  |

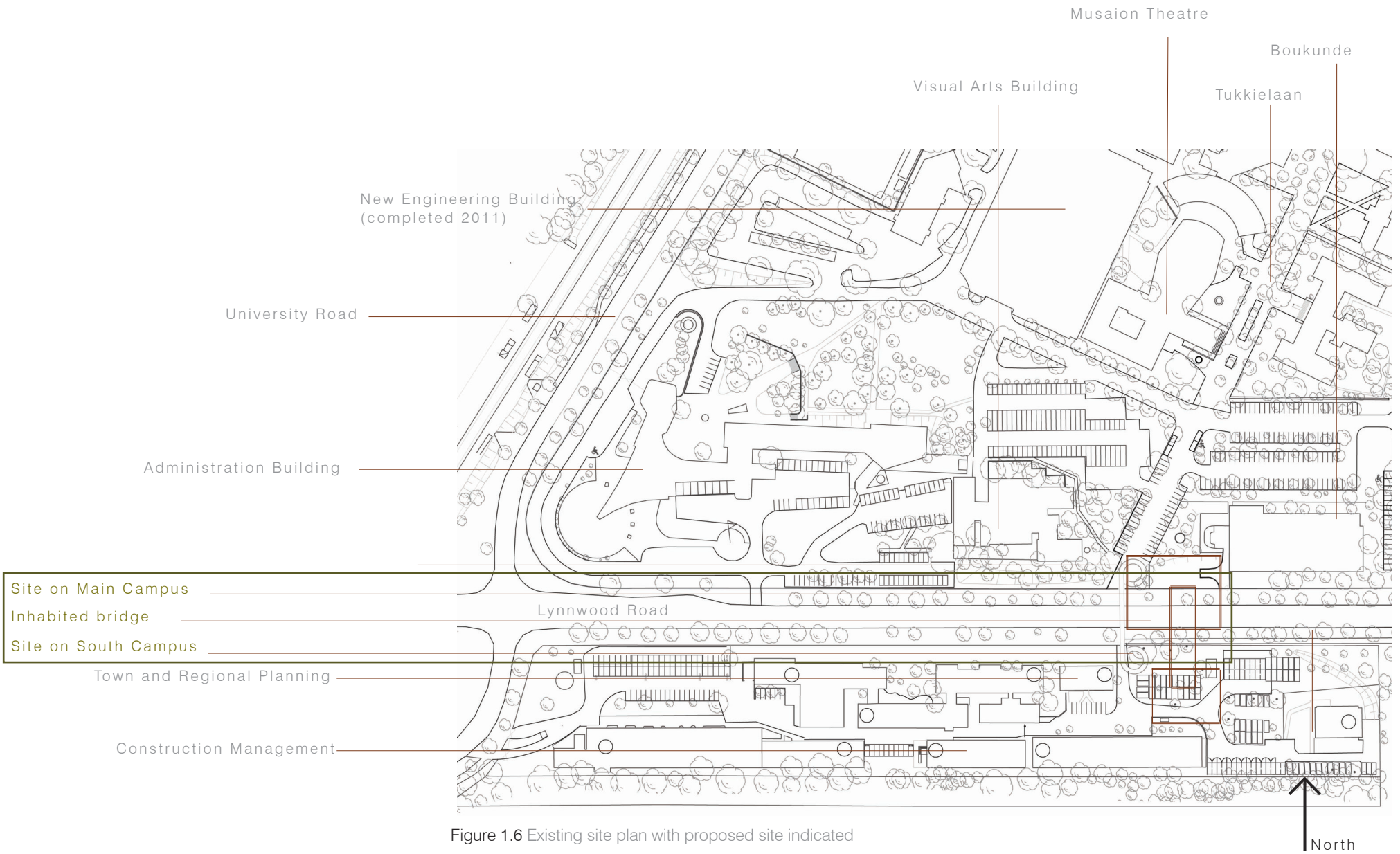


Figure 1.6 Existing site plan with proposed site indicated

# Aims

The aims of this dissertation are to:

- Establish a platform for the development of a better relationship between architectural theory and practice;
- Expose the work of the students at UP to as many relevant people as possible in order to narrow the gap between education and the industry;
- Encourage interaction between the disciplines in the Department of the Built Environment;
- Create a sustainable and viable link between South Campus and Main Campus;
- Create a public interface that communicates achievements and educational development at UP to enable UP to become an influential entity within the society;

design intent  
creating spaces that link:

architectural theory      architectural practice

the different educational departments at the university

south campus      main campus

the university of pretoria      the public

by creating  
intellectual, social and practical interaction spaces

Figure 1.7 Summary of aims of the dissertation

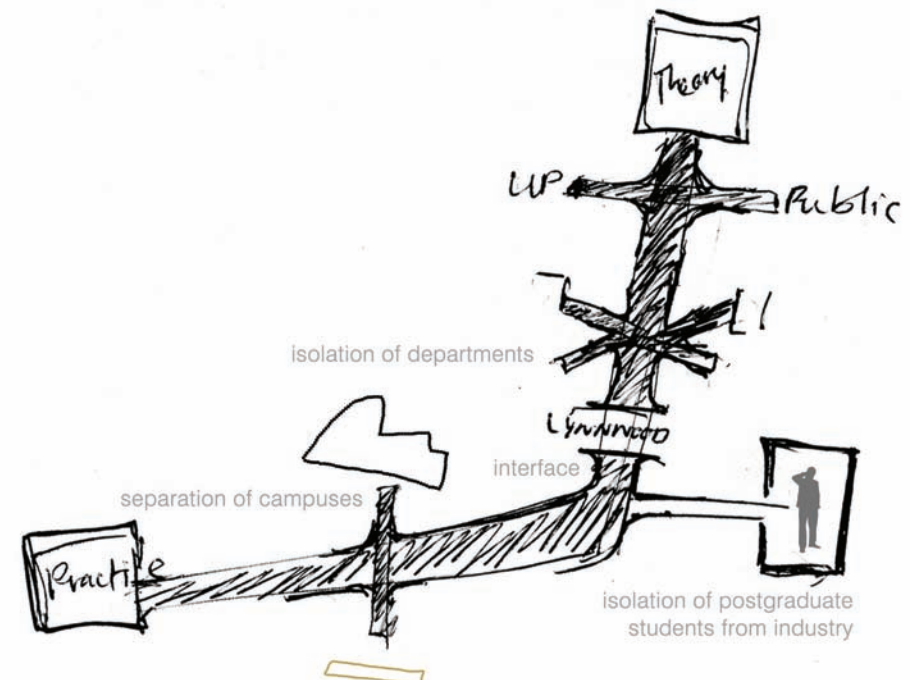


Figure 1.8 Graphic illustration of aims



# Programme

A Graduate Staging Centre (GSC) is a new typology that is created to facilitate better transition between students and their future professions. The facilities are designed to constantly showcase the work that is produced at that specific academic institution and puts it in the public realm for scrutiny and evaluation.

Staging (or stage) has many different meanings in many different disciplines. The most applicable meanings for the purpose of this study are:

1. A stage – refers to a level, phase or period as a continuous process or as part of a process with a specific goal.

In this dissertation it refers to the time before the completion of the student's studies, yet close to the time when the student will be moving into the industry and start working.

2. Theatre staging – putting something on display and in the public realm, in order to showcase or demonstrate.

In this dissertation it refers to putting the work or projects on display, to showcase work that is produced to fellow students, members of the industry and the general public.

3. Data Staging – the last phase of data editing and manipulation before the production of a software product.

In this dissertation it refers to the educational aspect that is still present. The students are still in an academic environment and need additional skills and experience before they can become practicing professionals.

This dissertation proposes a Built Environment Staging Centre. This is a GSC for the students, members and interested parties of the built environment.

The Programme is discussed in detail in Chapter three of this dissertation.

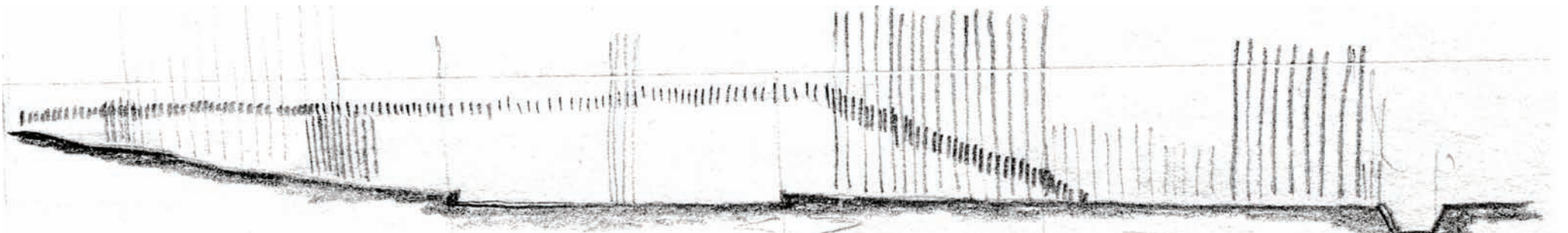


Figure 1.9 Conceptual section depicting activity intensity

# Importance of the project

The transition from education to practice is inevitable for most students. The long-term legacy for the project is to become an established incubator for students, which facilitates regular interaction between students and the industry. This process empowers both students and the industry as it creates a controlled environment where the members of the industry are exposed to students' work and can therefore make more informed decisions when recruiting.

The interaction between the different disciplines enables students to

develop relationships with their peers within the Built Environment. This leads to a more comprehensive understanding of the dynamics of the built environment and further simplifies the transition into the industry as students are already well connected.

In addition, members of the public, who are ultimately the clients when referring to building commissions, are exposed to the academic development within the built environment, thereby resulting in better and more informed design briefs and projects.

# Client

The building will be commissioned by the Department Facilities Management of UP, in collaboration with the NVABES commission.

The project will partially sustain itself through the provision of incubation offices, exhibition spaces and retail facilities. According to the Strategic Plan, Innovation Generation: Creating

the Future, 2007-2011 (The University of Pretoria, 2011), it is intended that the University investigates the exploitation of commercial activity through its developments. A commercial aspect to generate funds through private initiatives is therefore included in the design.

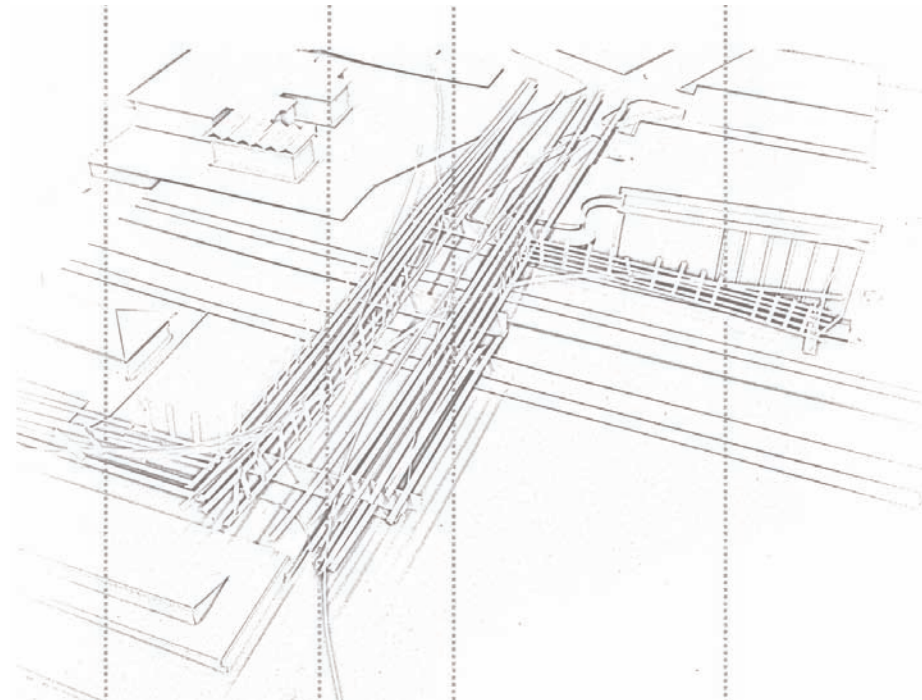


Figure 1.10 Picture of conceptual model - investigating the linearity of the structure

# Approach

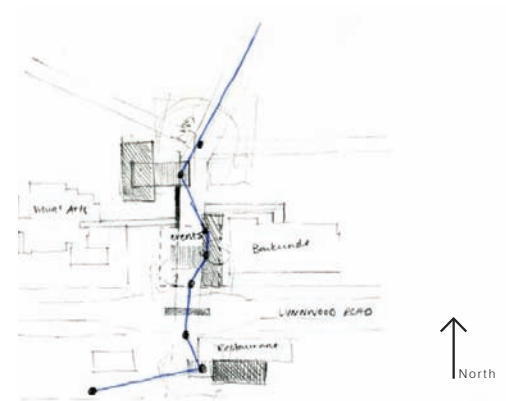
A sustainable relationship between two entities that have been segregated is difficult to develop and enforce; the academic study revolves around how this can be achieved. It is clear that new relationships need to be identified and developed to establish successful interaction between segregated entities. Therefore, in order to create a space that can foster interaction between theory and practice, three types of relationships were established, namely: social, intellectual and practical: social relationships are established through regular, uncontrolled interaction; intellectual relationships arise from interaction on an intellectual level, where skills are transferred, communicated and taught; and practical relationships

are based on formal relationships that develop within the academic and industry frameworks, where students and member of the built environment interact through projects and formal meetings. The amalgamation of these relationships can possibly lead to a sustainable relationship between theory and practice.

Activities and events are used to attract the public and members of the industry to the GSC, leading to the development of social relationships. These will then act as the forum for the development of intellectual relationships. Intellectual relationships are formed when informal and semi-formal relationships start to develop between the students and the members of the industry. This in turn

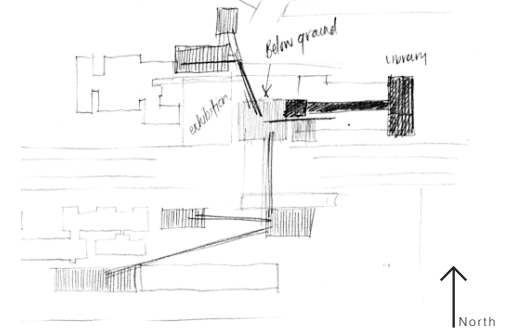
can lead to the establishment of formal practical relationships. All three these relationships are necessary to develop a sustainable relationship between theory and practice; one relationship will not function successfully without the other two relationships. If one relationship exists without the other, it will then lead to an imbalance in the relationship between theory and practice.

The type of relationships which are encouraged through the design and programming of the GSC are explained in Chapter three. These basic relationships will inevitably lead to more, and more diverse, relationships.



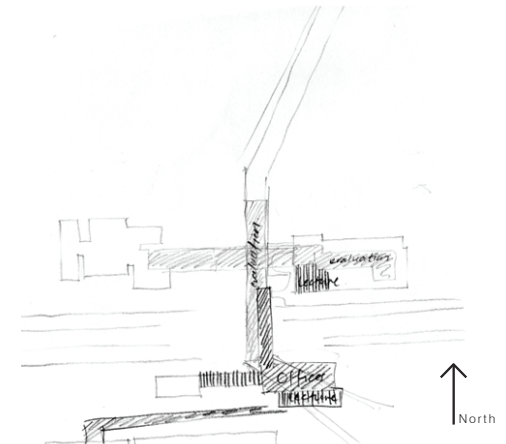
**Social relationships and interaction**

Figure 1.11 Identification of social areas



**Intellectual relationships and interaction**

Figure 1.12 Identification of intellectual areas



**Practical relationships and interaction**

Figure 1.13 Identification of practical areas

Figure 1.11 - 1.13 are diagrams indicating the process that was followed to establish a programme that can facilitate the interaction between the different types of relationships that were identified.

## Research Questions

How does one create an interface that accommodates the interaction between:

- Education and the industry?
- Students of the respective disciplines in the Built Environment?
- The University and the public?
- Seperated campuses?

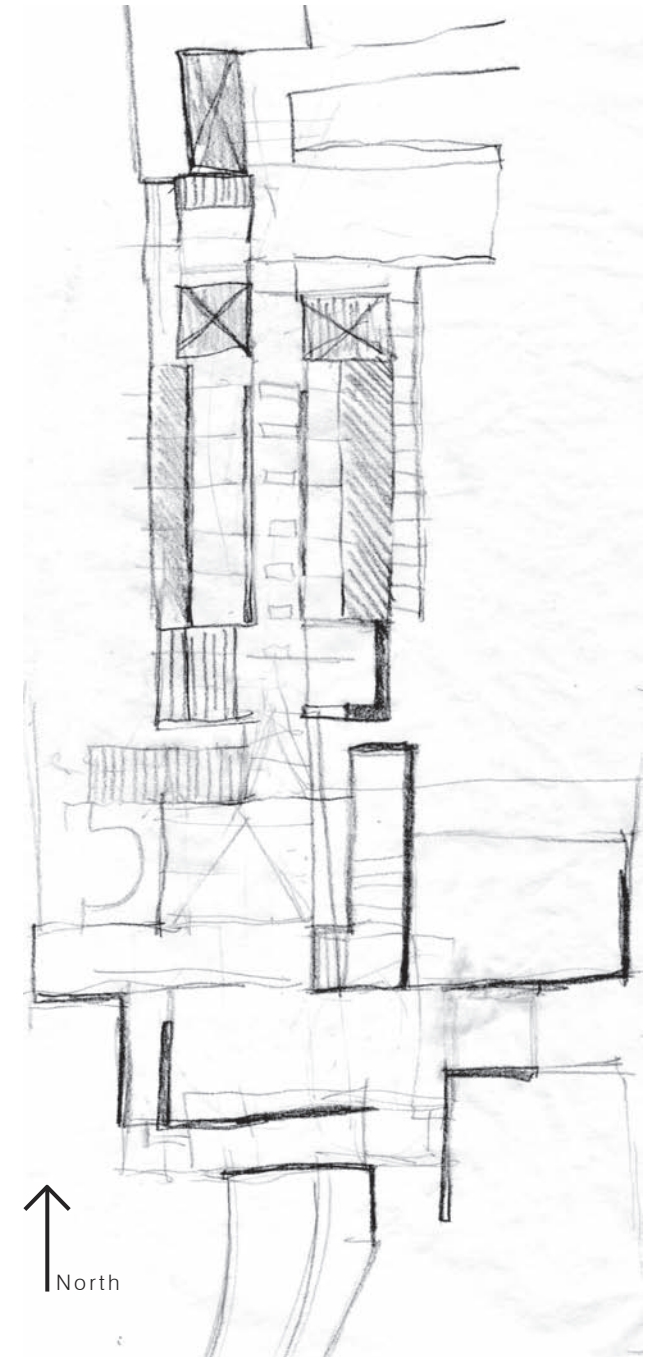


Figure 1.14 Conceptual sketch exploring the linearity of the plan in relation to the proposed programmes

# Research methodology

The debate regarding the current relationship between architectural theory and practice is analysed and discussed. Current relationships are identified and then the possibilities of how to achieve a better relationship and proposals are investigated.

Both qualitative and quantitative research methodologies will be used:

## Qualitative research

- Debating architectural education – The role of architectural education and the relationship between architectural education and the industry are investigated through a literature review and a series of interviews.
- Precedent studies – The Bauhaus, as a successful educational and design facility that remained influential over a large period of time, is analysed in depth. This study assisted in the development of a programme as well as architectural principles have been identified from the design of the Bauhaus building in Dessau, Germany. Further precedent studies were done during the design process.
- The history of the education of architecture, both locally and internationally, is discussed in order to develop a new stance for the creation of a more successful relationship between theory and practice.

## Quantitative research

- The history of the buildings in the vicinity of the proposed building is considered in terms of the history of the establishment of UP as a university, in order to react to the context appropriately. UP boasts a rich heritage and history of more than 100 years.
- Personal interviews with HoD's from the different architectural schools in the Pretoria vicinity, as well as practicing architects in the area, assisted in the identification of the detailed programme - discussed in Chapter three.
- A context analysis is done through an analysis of photographic documentation, academic research of the history, data obtained from CoT and previously developed frameworks for the Hatfield area.

Figure 1.15 graphically depicts the research methodology. Even though the process is depicted as a linear process the reality is that the sequence and methodology constantly changes as it is questioned and re-examined.

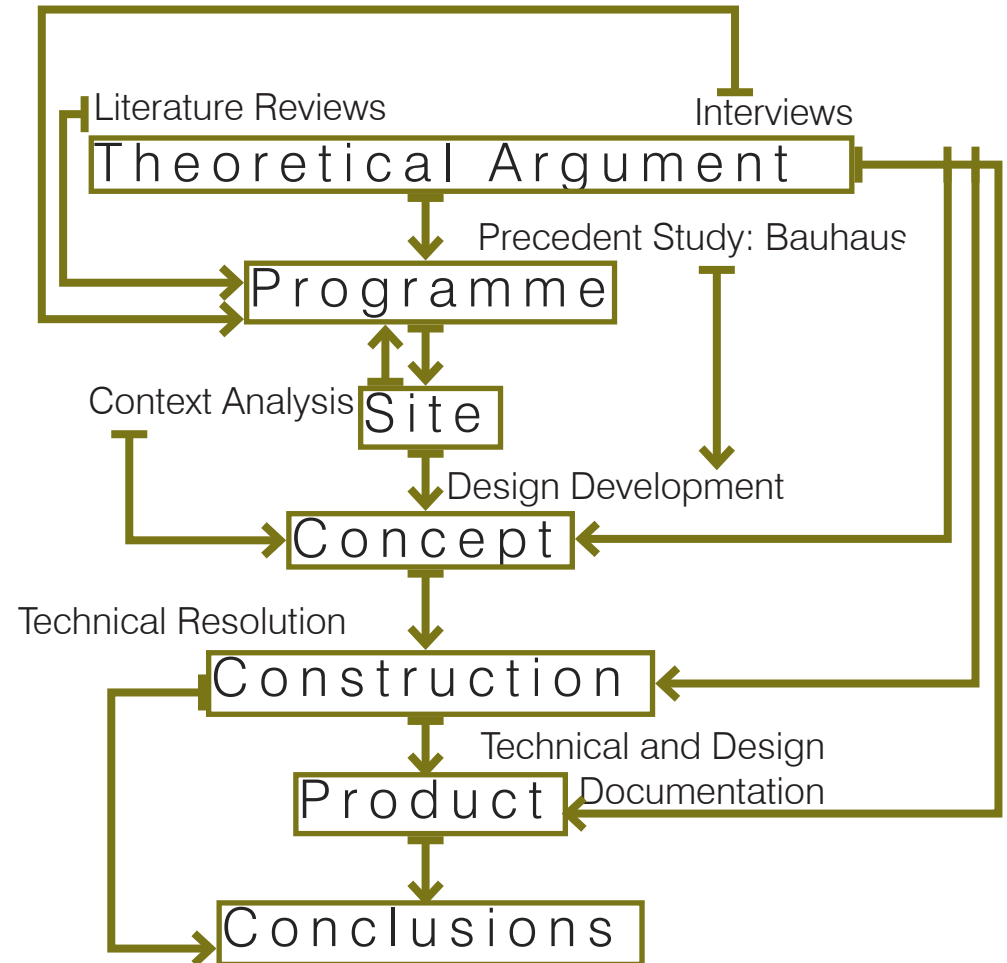


Figure 1.15 Research methodology



## Design brief

An inhabited bridge structure that can facilitate the relationship between architectural education and the industry will be developed. The main element of the structure will consist of exhibition spaces. The programme will also include functions that will aid in the development of social, intellectual and practical relationships between students and members of the built environment industry. These will include workshop studios, a restaurant, public spaces, lecture facilities, library, architectural offices and studios. In general the structure will be able to facilitate many different sizes and types of events.

The link between South Campus and Main Campus as well as the University's interface with the public

will form an integral part of the design. All the spaces will be adaptable and subject to change as the requirements and nature of the relationship between theory and practice develops and changes.

New foyers will be created in the open spaces or squares around the site to facilitate social, intellectual or practical interaction between the users of the spaces. The interaction between these foyers, the building and the spaces around it will lead to a contextualised and well-rounded intervention between the two campuses.

A parking structure is zoned on the far eastern corner of South Campus (Fig 1.16), but there are currently no formal plans to start with construction.

The space is currently a well-shaded lawn that will be utilised by temporary programmes derived from the design, but the presence of the parking structure in the future will be considered and recognised.

Rentable space will be included in the design to create a partly financially independent building. The exhibition spaces will be able to host private exhibitions of different scales and natures.

The brief is to create a landmark structure in Lynnwood Road that will act as a foyer between the University and the public that also communicates the competence and quality of education received by the students at UP.

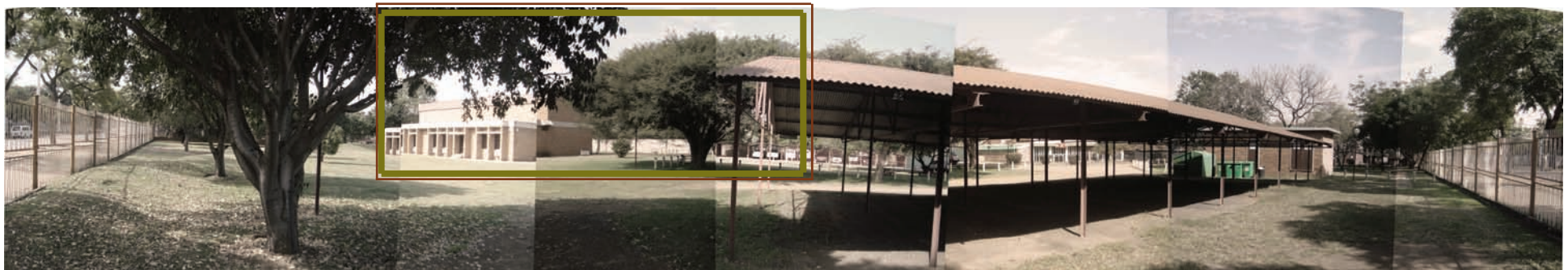


Figure 1.16 Panorama view of South Campus with position of future parking structure

## Design approach

Figure 1.17 demonstrates the main design generators. Firstly the context, with a natural northern slope and Lynnwood Road as arterial road in Pretoria are to be utilised to achieve the requirements as set out in the design brief.

The spaces on the northern and southern side of Lynnwood Road become urban foyers, moving away from the University's isolated identity.

The two urban foyers are then linked with a bridge structure spanning over Lynnwood Road. The bridge is programmed and becomes an urban foyer on its own, linking the other two urban foyers.

The direct context, identity and function of the surrounding buildings are complimented and integrated into the design.

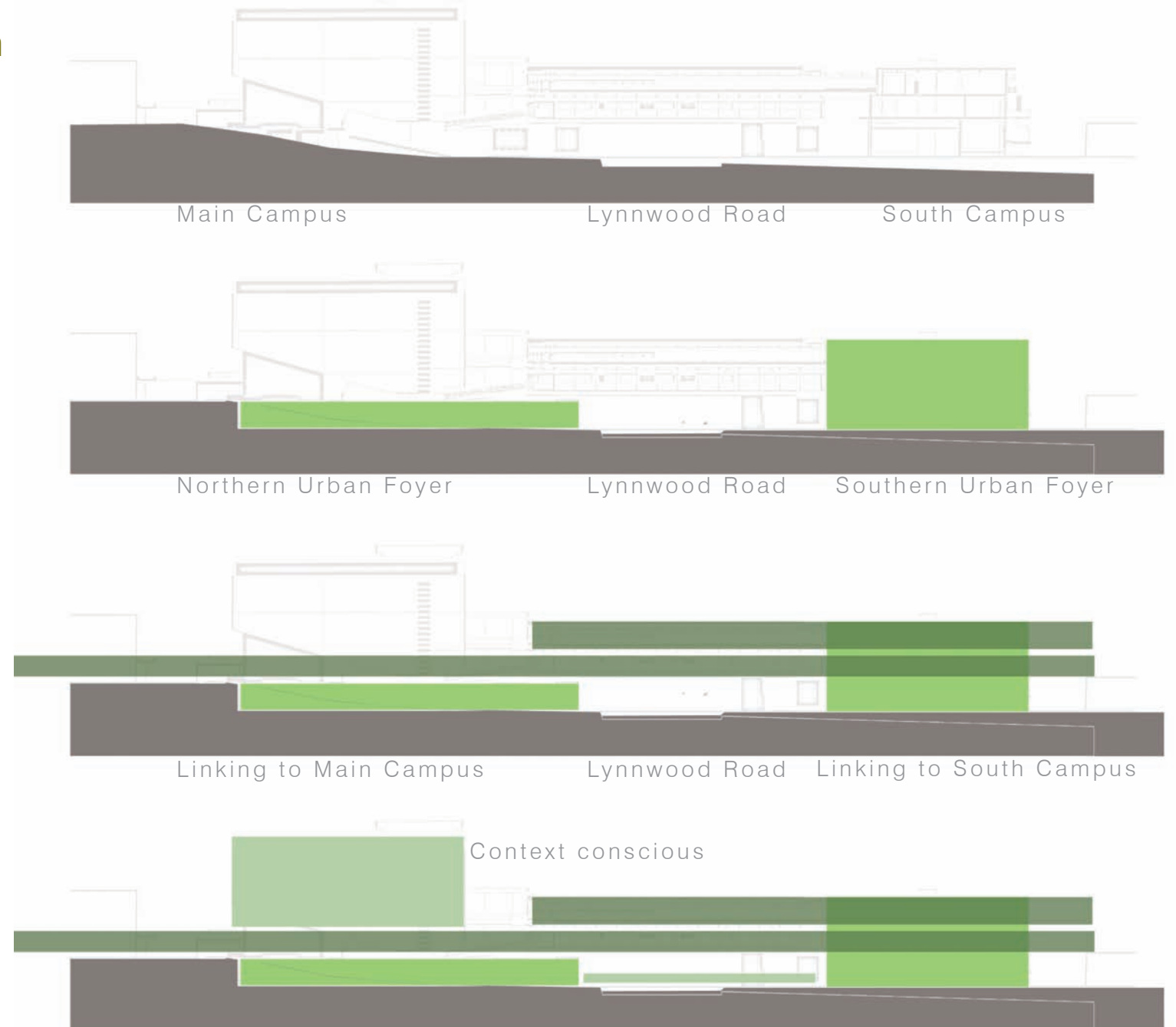


Figure 1.17 Design approach diagrams

## Assumptions and delimitations

It is assumed that the additions and alterations to the existing Visual Arts Building will not enlarge the building's footprint and the entrance will remain in the same position. Also, the new exhibition space for the permanent collection does not need to be directly on the street, though still needs direct public access. Furthermore it is assumed that both projects can be funded and constructed simultaneously.

This dissertation develops a possible stance regarding the debate around what the relationship between architectural theory and practice should be. It is important to keep in mind that the nature of the relationship between architectural theory and

practice is constantly debated and every individual has a personal opinion of what the relationship is suppose to be. Even though the study was done as thoroughly as possible, it is inevitable that not all opinions have been included.

It is assumed that the University will be able to obtain the right zoning to construct an inhabited bridge over Lynnwood Road.

Additions are proposed to the current Boukunde building. The new structure will be independent, but new openings and alterations are proposed on the southern facade and on the ground floor. It is assumed that this will be possible.



## Structure of the study

Chapter one acts as an introduction to the dissertation. The background and context together with the location is given in Chapter one. The aims are identified and reasoned through an introduction to the programme, importance of the project and the identification of the problems. The research questions and methodology are then discussed followed by the design brief and approach as well as the assumptions and delimitations.

In Chapter two the debate surrounding the relationship between architectural education and the industry is discussed. The history of the relationship between architectural theory and practice is established followed by a discussion on the opinions of influential individuals on the subject matter. To complete the discussion, possible solutions that have worked in the past are discussed as well as the current structure of the relationship between architectural theory and practice in South Africa.

The programme and its development are discussed in detail in Chapter three. The three types of relationships (social, intellectual and practical) are explained and translated into a programme. The areas between the formal spaces are explained and discussed as these areas define many of the most important spaces in the design. Chapter three also relates to Appendix A, a precedent study that was performed as part of the process to determine a programme for the building.

Chapter four deals with the urban framework. Existing frameworks for the Hatfield area are discussed and combined to create one comprehensive framework for the University as part of the Hatfield precinct. The University's role in society is enhanced through the incorporation of a number of urban foyers in the form of GSCs.

The physical properties and characteristics of the site are discussed in Chapter five. The influence the new BESC structure will have on its context as well as how the context informed the design is explained. The concept was derived from a contextual background. The relationship between the context and concept and how the context influenced the concept development is explained.

Chapter six deals with the design development and the process that inform the building design. The design reasoning and logic is discussed in relation to the process that was followed.

The structural, services and environmental systems are explained and demonstrated in Chapter seven. The integration of the various services and systems, and how these changed the design and aesthetic of the building is focused on.

Technical detailing and resolution are documented in Chapter eight. Detailing and building functionality form the basis of this chapter.

Conclusions are drawn in Chapter nine. The project is synthesised and projections are made into the future.

# chaptertwo

Theory



## Introduction

Marco Frascari, Associate Director of the PhD programme in Architecture at the University of Pennsylvania, states that the arduous relationship between architectural theory and practice has been with us since the earliest times of philosophy (1988: 15). The education of architects is often criticised by members of the industry (Noero, 2009: 102); this complicates the transition from education to practice as the aims of the universities and the needs of industry do not often coincide. In this chapter, architectural education and the relationship between architectural education and practice are discussed in an attempt to identify what the possibilities are in dealing with the transition between the two phases in an architect's career.

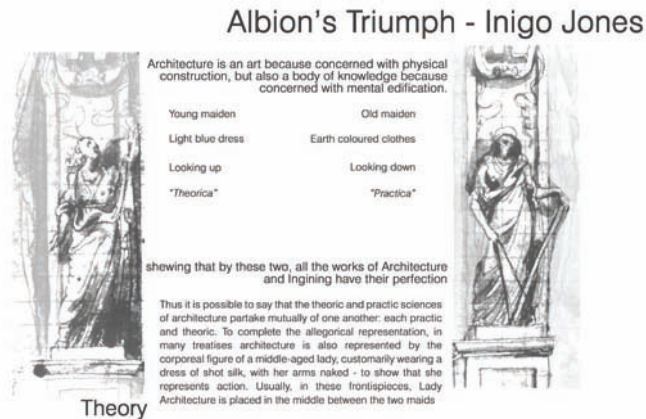


Figure 2.1 Details from Albion's Triumph by Inigo Jones depicting the maiden's Theory and Practice



Figure 2.2 The origin of the relationship between theory and practice in Greek mythology

## Historic relationship between architectural theory and practice

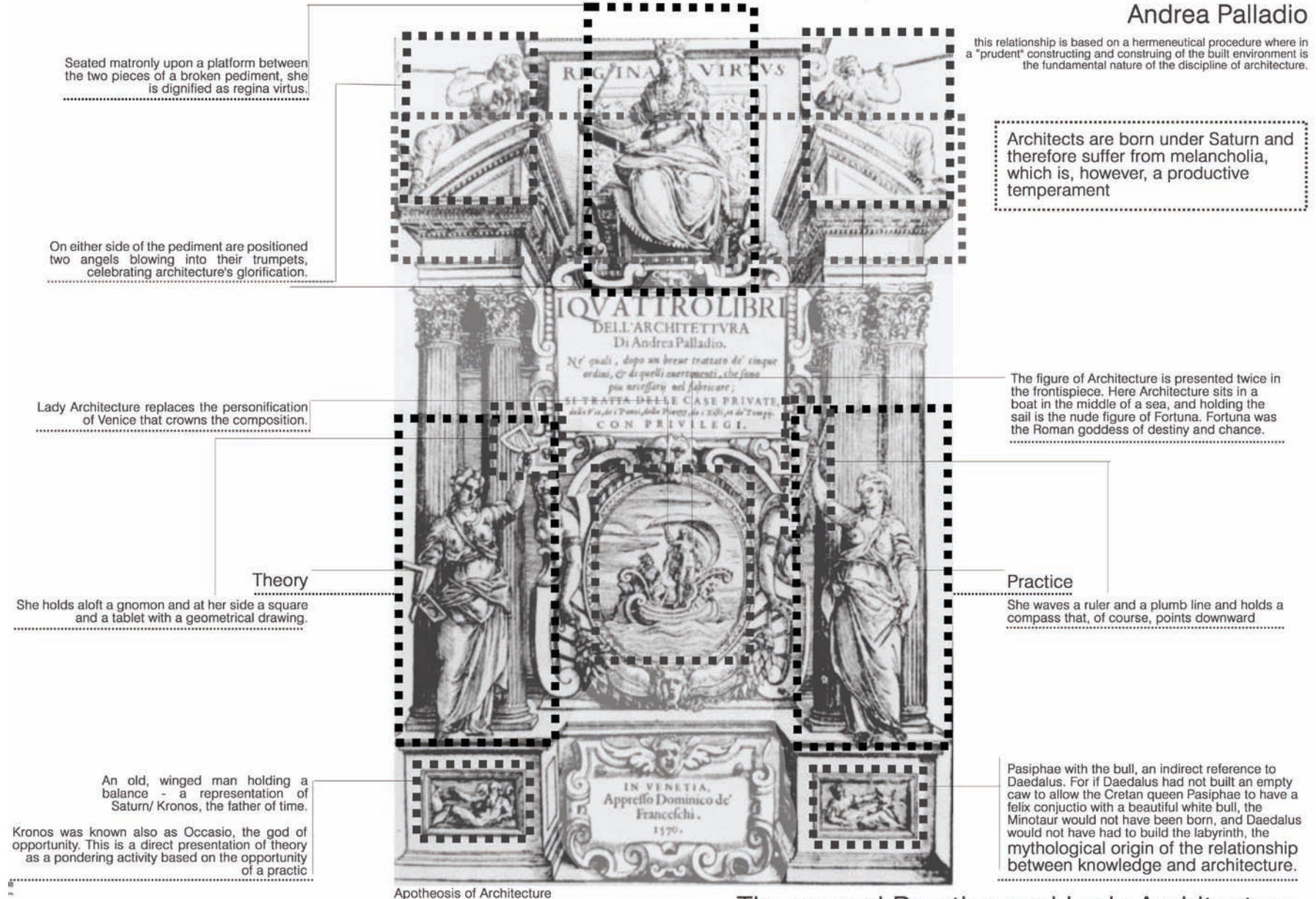
Depicted in Figure 2.1 - Figure 2.3 is a summary of Frascari's paper on the relationship between architectural theory and practice: "Maidans 'Theory' and 'Practice' at the sides of Lady Architecture" (1988). The paper explores the origins of the relationship within the Greek mythology and then demonstrates how influential architects

such as Inigo Jones and Andrea Palladio depicted this relationship on building façade designs.

Theory and practice are viewed as the two entities, both equally important, that act as the supporting "infrastructure" that sustains architecture. Each has its own individual character and

responsibilities and can only function fully if the other is in full function – and only if both are fully functional can architecture sustain itself. Theory and practice are in equilibrium, the two sides are interdependent and the one requires the other in order to exist.

## Frontispieces of Quattro libri dell'architettura - Andrea Palladio



## Theory and Practice and Lady Architecture

Figure 2.3 Frontispieces of Quattro libri dell'architettura by Andreas Palladio - summary of the meaning of the facade detail



## A brief history of architectural education

The Sophists were the first to introduce the concept of Liberal Arts in the 5th century BC (Graceworks, 2003). The intent of the Liberal Arts was to be a standard prelude of general studies to act as a platform for students before specialising in a profession, according to Rowland and Howe, in the foreword of the 2001 publication of Vitruvius' Ten books of architecture (7). The Liberal Arts (Fig 2.4) lost its status by the first and second century AD as the parents were not concerned about the substance of the education obtained by their child, but rather the "rapid professional enhancement" (ibid: 8) of the student.

Throughout Medieval times and well into the 19th century architecture was taught in two ways, namely: an apprenticeship type education where the student traded his labour services for instruction and education from the master builder; and articulated pupils,

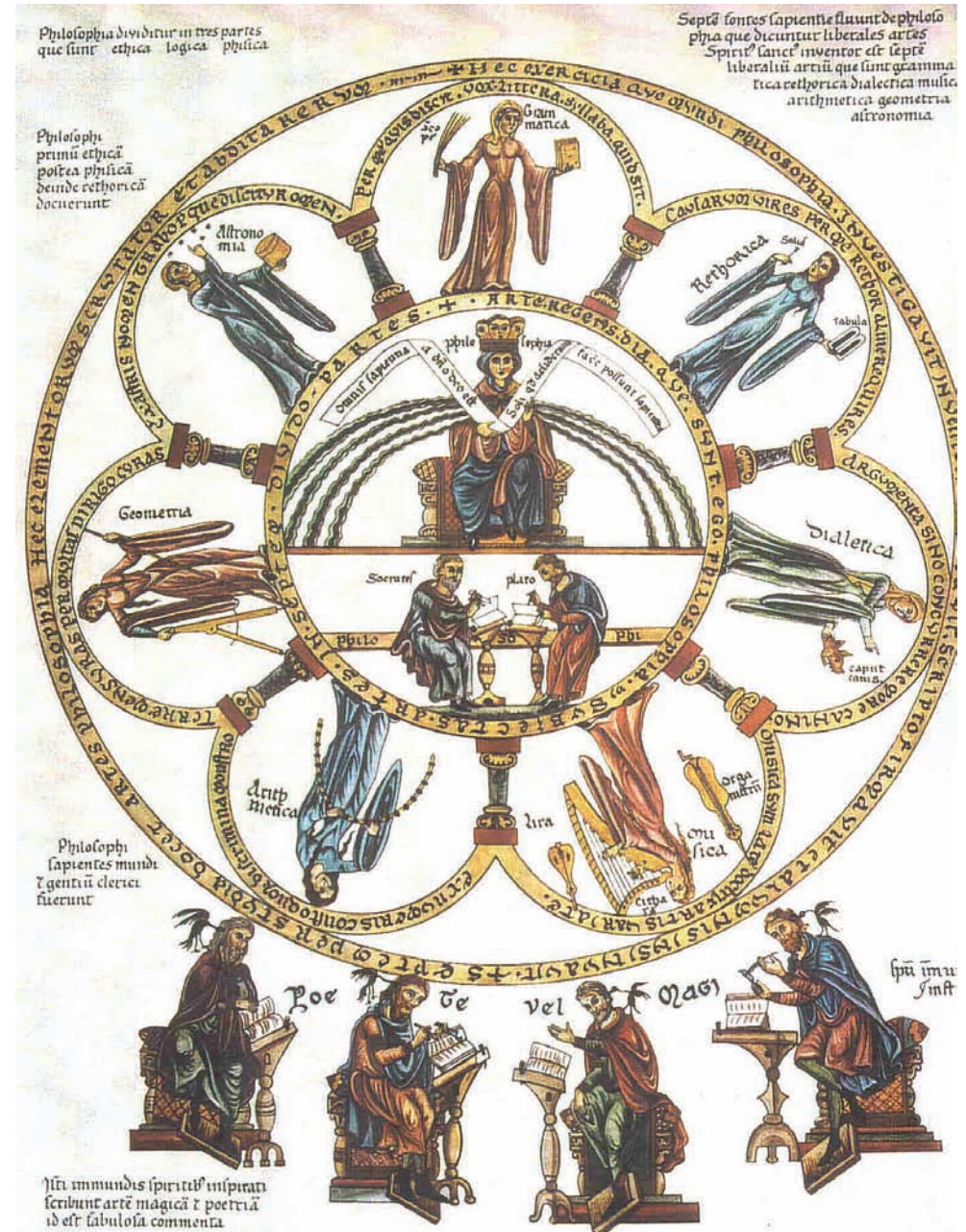
who paid to get taught. These training methods lasted between five and six years and attendance at a local Arts School as well as travelling was encouraged (Stevens, 2010). The first school of architecture was opened in France in the early 19th century and was called *École des Beaux Arts* (ibid).

John Dewey (1859-1952), an early 20th century philosopher on pragmatism, made a large contribution to educational systems as we know them today. He was the first to introduce hands-on-learning and experimental education (Neill, 2005). Dewey was the first to state that education should not consist of a single educator standing in front of a class teaching the content of a pre-described syllabus, but rather an interactive conversation on the subject matter. Dewey argues that education is a social process and therefore social reform can take place within a school.

*Archi-Mundus* is a collaborative project between 17 European and 12 American Schools of Architecture (Spiridonidis; 2011). Their main aim is to establish an international forum for further development and the implementation of competence-based architectural quality - according to this project the most appropriate learning environment. The focus of this project is to educate students in an appropriate manner to successfully prepare them for the increasing demand for mobility, transparency, communication and quality.

The Bauhaus' approach to design education as a hands-on skill development process is another approach to enhancing the quality of architectural education. The educational methodologies and approaches of the Bauhaus are analysed in depth in Appendix A.

Jo Noero stated that architectural education is in a predicament today in that architecture is still being taught according to the old Beaux Arts model (2009: 104), which took students off site and instigated the education of architecture on an academic basis. This led to the isolation of the profession and a loss of integration between theory and practice. Due to the structure of academic institutions and technological development, architecture has become a highly specialised, isolated profession. As depicted in Figure 2.5, a large gap has developed between architectural theory and practice. Jo Noero believes that the future of architecture lies in the collaboration of architecture with the other professions in the built environment and that the inter-dependency between theory and practice is therefore in desperate need of restoration



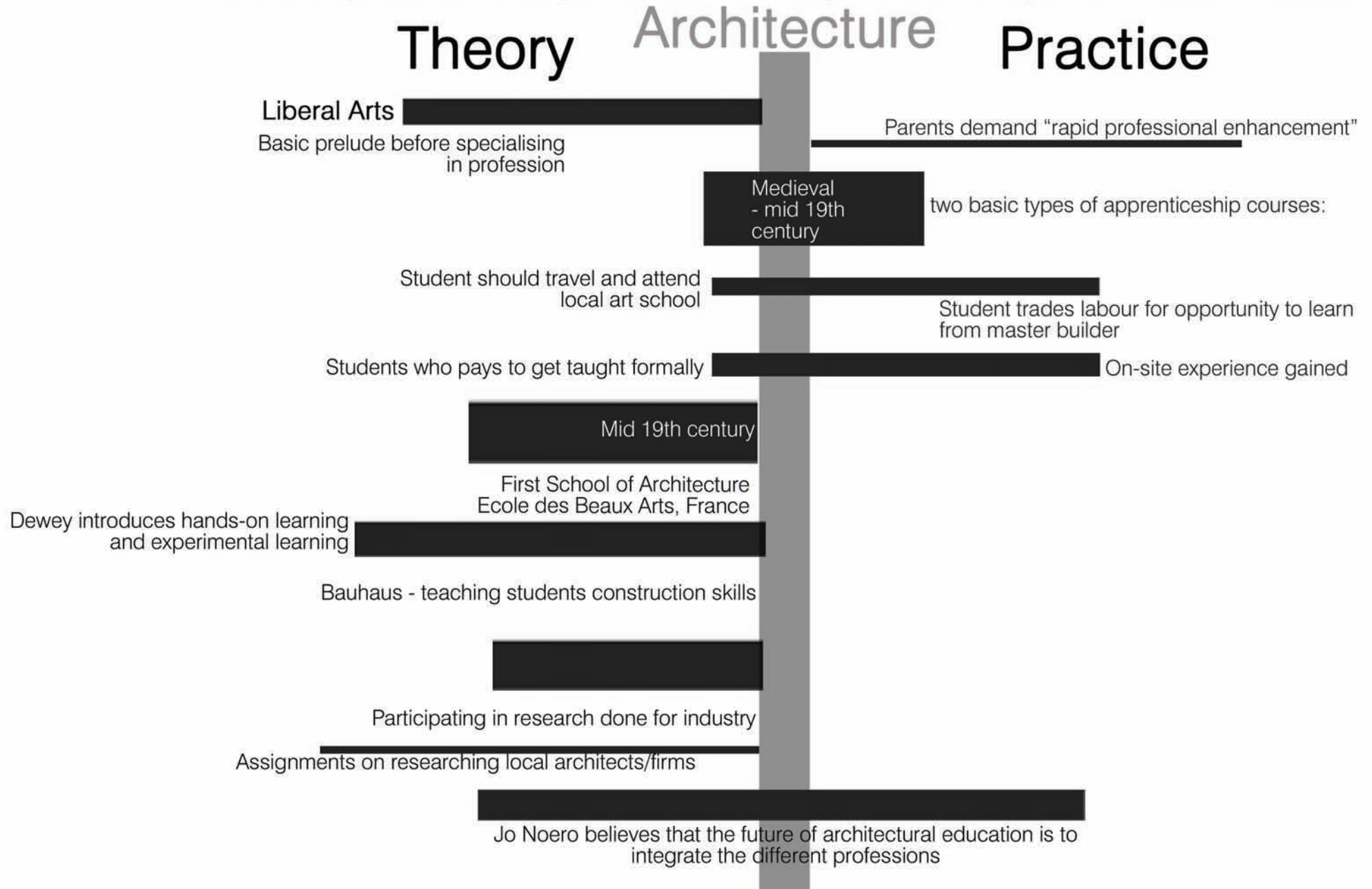
“The value of an education in a liberal arts college is not the learning of many facts but the training of the mind to think something that cannot be learned from textbooks.”

Albert Einstein (1879-1955)

Figure 2.4 The seven Liberal Arts: Grammar, Logic, Rhetoric, Arithmetic, Geometry, Music and Astrology -derived from classical thought



Relationship between theory and practice throughout the history of architectural education



## Debating architectural education

### Identification of shortcomings (The problems)

Theory and practice are both equally responsible for inducing a sustainable relationship which will lead to a healthier architectural condition. Only after understanding the historic relationship between theory and practice and in what way architecture is reliant on the stability of this relationship, can conclusions be drawn as to how to improve this relationship.

The three main issues that continuously occur when the relationship between architectural theory and practice is debated in intellectual circles, in no specific order, are:

- Universities do not produce students that are prepared for practice (Hawley, 2004:8);
- Research performed at universities does not coincide with relevant issues experienced by the industry (Westfall, 2010: 165);
- The industry does not effectively influence the educational syllabus (Stevens: 2010).

These issues are caused by many factors and many repercussions spiral from these fundamental shortcomings, resulting in architects losing their status and value within the public realm. This dissertation aims to identify the reasons for the shortcomings as well as possible solutions in order to restore the relationship between architectural theory and practice.

## The University (Theory)

Dalibor Vesely of the University of Cambridge's School of Architecture states: "The first thing that usually comes to mind when hearing about architectural education is its ambiguous nature and uncertain place on the current architectural scene..." (2004: 63).

Christine Hawley of the Bartlett School of Architecture states that the criticism schools in architecture receive from members of the industry is that students are not necessarily prepared for practice once they leave the university. The conflict of interest lies between the university's aims of producing academic scholars and the industry's requirement of receiving competent, useful architects that can produce architecture (2004: 8). She continues by stating that newly trained architects are often exploited and used for their skills and not necessarily encouraged to expand their knowledge base. She

suggests that this is a managerial problem within the profession (Ibid: 11).

Due to the lack of experience students often accept inappropriate employment opportunities out of desperation. The result is often that the architecture produced by the student in the industry and the architecture the student did at university are very different. The student's design abilities are not stimulated and developed, but rather suppressed into creating the same architecture the respective firms have been producing for many years. The university is often criticised for not preparing students for the industry, but often the student is not granted the opportunity to demonstrate and communicate the skills obtained at university. Students' design abilities are often not managed effectively when they start working, and once the students are qualified to design their own buildings, their ideas are either old or the students have lost interest

in doing ground breaking work and just continue to produce mediocre architecture.

"Graduates are an asset to the profession precisely because they can detour away from traditional assumptions of the profession", says Mark Wigley, Dean of the Graduate School of Architecture, Planning and Preservation, Columbia University (2004: 16-17). Students that have recently left the university should therefore be seen as an asset that can add value to a firm. He continues and states that academicism of architecture is one of the most crucial parts of the profession as it acts as the platform for innovation and dreaming in architecture. He calls it: "...a space for exploration and redefinition" (Ibid: 16).

Tom Henegan, a lecturer at the AA from mid-1960s to mid-1980's is of the opinion that it is not the responsibility of the university to create a good

architect. He believes that a university can only put the student in the position of becoming an architect, there is no responsibility involved. Henegan argues his point by saying that many students focus on being employable, whereas others are not really interested in the quality of work that they produce on university level, as they know that it will not influence their ability or chances of getting a job (Ibid: 36). This is a problematic characteristic of the entire architectural profession. As a possible solution to this problem, Leon van Schaik (Henegan, 2004: 37) argues that students should work and study simultaneously – where one will have the opportunity to apply theory as it is taught and not try to apply all of it at once after one has finally left university. This solution can be linked to Christine Hawley's comment that: "... practitioners need to be involved far more in architectural education," (Hawley, 2004: 9).

## The role of research (The relationship)

“Making research relevant to the design disciplines is of crucial importance to those involved in architectural education, as one of our fundamental roles is to generate and sustain a search for new knowledge that will improve the built environment for the people of various cultures and societies, as well as enriching the role of the architect and the state of the profession” (Westfall, 2010: 165).

Marvin Malencha believes that “the connection between research and practice is a matter of culture” (Ibid: 152). The mutual dependency between the two is currently fuelled by globalisation, economic crisis,

technological change and changing social values. The way architecture is taught should change as social values change because these are contingent.

Benyamin Schwarz, in his paper “The place of architectural research”, argues that research topics should be closely aligned with the agenda of the profession and the practitioners in order for the knowledge to be effective (2010: 159). Communicating this new knowledge and research to practitioners is of utmost importance, otherwise it becomes irrelevant to the profession. The link between academia and the profession should therefore be apparent and powerful.

The new knowledge should then in turn be communicated to the public by the practitioners.

There are two types of research: scientific research and applied research. Scientific research has strict boundaries, is done through experimentation and all knowledge consists of facts. Applied research is more a technique or method, where knowledge is obtained through experience, reflection and observation. Ultimately both types of research provide new knowledge. “Accordingly we can infer that a mutual dependency exists between the role of academia (education and research) and practice

(applied knowledge) for our discipline to address the problems we face today” (Boza: 159).

In a personal interview Randall Bird, Head of the Department of Architecture at the University of the Witwatersrand, criticised schools of architecture in South Africa because of their inability to make research available to the industry and the public. The communication between educational facilities and the profession has no formal or informal platform that successfully informs the one entity of the development and growth of the other.

## The Industry (Practice)

Stevens states that the university grants qualifications with the idea that the industry will regulate the quality of the syllabus. He summarises architectural education by stating that architecture only exists through the reproduction of itself and this is formally located within a university structure. The other major contributing factor is that the academics produce research that informs their teaching and in this way the profession can grow (Stevens: 2010). The industry should therefore pressure the university to produce a better suited candidate that can meet all the requirements of being a professional, yet still be able to add value to the industry through research and further studies.

Architectural education is primarily based on information obtained from intellectual theory and literature. The

authors of such text are often not qualified architects (Ibid) and if they are, they spend most of their time writing about architecture and not doing architecture. Therefore the industry seldom has any input into how students are educated.

## The effect on architecture (Architecture)

The aim of architecture has shifted from its role as creator of socially cohesive spaces, which serves a larger population of the public, to an architecture preoccupied with the needs of the developer in terms of aesthetics and finances as well as technological delimitations for a single building (Wigley, 2004: 13 & 15). The architect is not acting as the creator of public spaces and is therefore experienced by the public as a negligible participant in the social realm. The architectural profession is not succeeding in its communication of better concepts to the public, because the developer has the final say (Schneekloth & Shibley, 2006: 131).

Wigley acknowledges the fact that architecture cannot dictate all social and political issues (Wigley, 2004:

14), but that architects should still attempt to create new and innovative spaces that create environments with the potential to lead the user to question the possibilities in architecture and space. He views buildings as publications that reflect one's perception of architecture and other buildings, thus communicating a state of mind. His conclusion is that those who design buildings or objects that cannot yet be built, are the main generators behind architectural evolution or development (Ibid: 14-16). It is therefore evident that the student, the education of architectural design and the communication of these new concepts and ideas are essential for the development of architecture.

Figure 2.6 is a summary of the different arguments in the debate.



Debating the relationship between architectural theory and practice currently

Theory Architecture Practice

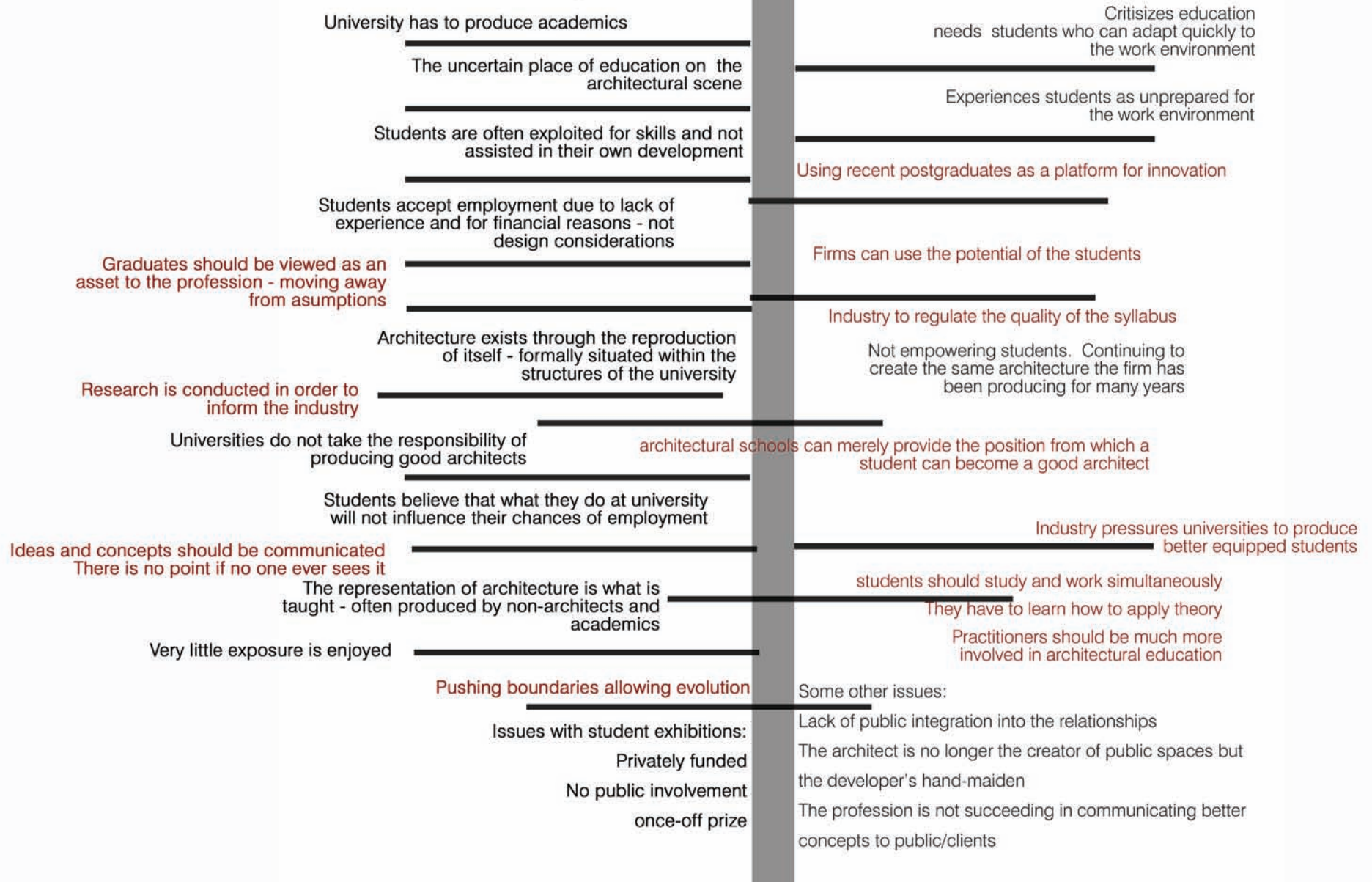


Figure 2.6 Summary of the current debate between architectural theory and practice



## Restoring the relationship (Possible Solutions)

### Moving away from “expert culture”

Schneekloth and Shibley, in “Emplacing architecture into the practice of place making” (2006: 130) argue that architecture needs to move away from its image as an “expert culture” and place itself more firmly within the everyday environments of the users; moving away from the exclusivity of architecture, but not taking away any of the value of the expert knowledge or status. “The expert appropriation of place making denies the potential for people to take control over events and circumstances that ‘take place’ in their lives...if we acknowledge the real complexities and contradictions inherent in each site of intervention, seeing differences and similarities, we would be required to continually negotiate meaning and position – including where we as ‘experts’ are located.” These new

spaces that encourage the above are called “border territories”. In these spaces knowledge is exchanged; knowledge and experiences that are constituents of place, expert artistic talents, expert historical knowledge and expert scientific knowledge are shared and debated. With these exchanges come reciprocal learning, the power to act and the potential of populations to take control over the circumstances of place in their lives.

The paper further argues that architecture should be placed within the public realm. “A class of experts is inevitably removed from common interests as to become a class with private interests and private knowledge, which in social matters is not knowledge at all” (Ibid: 131).

### “Spontaneous schooling”

At the London Festival of Architecture 2010 the concept of “spontaneous schooling” was introduced (Woolford, 2010: 159). This is a process where workshops that facilitate the latest design work and research are presented. The results of the workshops are then publically displayed through installations, drawings, models and electronic media as well as scale 1:1 objects and components (Fig 2.8). The curator of the event, Malissa Woolford, states the following: “Successful workshops are not over thought or have predetermined outcomes”. She continues by criticising the notion that failure is not allowed in architectural workshops, because schools are too high-stake orientated. She believes that not only the product, but the methodology acquired and the decisions made in workshops are what is important.

After the completion of these workshops a survey was done to establish where the success of these workshops lies. The participants agreed that the intensity, creativity and brevity (time constraints) are the factors that contribute to the success of the workshops. Furthermore, it was felt that the end result should be some type of object or model that can be displayed and scrutinised, otherwise too much will be lost if it is never exhibited.

“Beholden as most design education is to accreditation and assessment, there is little room for spontaneity in contemporary schooling which is exactly why ‘spontaneous schooling’ [was] so valuable” (Antwood, 2010:161).

Possible solutions for a more balanced relationship between architectural theory and practice

Theory Architecture Practice



Figure 2.7 Summary of possible solutions for a more sustainable relationship between theory and practice

## Architectural education conclusion

The lack of synergy and interaction between the educational facilities and the architectural industry is evident. The need for a sustainable, stable relationship between architectural theory and practice is established and it is evident that the poor condition of this relationship has a spiralling effect on the architectural condition. Even though there are many examples of attempts that were made to address this lack of synergy, the diversity of the solutions is evident.

The restoration of the relationship between theory and practice will therefore not be a simple, once-off intervention that will address all the issues simultaneously, but rather a process. This process is bound to change and develop as the arduous relationship between theory and practice is re-established and this should form an integral part of the design.

The proposed structure must therefore be able to accommodate very different scenarios and circumstances in order to be a successful platform for the development of this relationship.

### “The medium is the message” exhibition

Students at the Polytechnic University in San Luis Obispo were given the assignment to install land art in order to map or understand the impact of design in public spaces. The approach was to encourage the students to produce work that will attract public participation. It is argued that spaces that are readable, orderly and controlled are often experienced as dead in contemporary society. Michael Sorkin’s premise is that public space should be utilised by higher education in order to create engagement with contemporary social issues within the public realm. This will enable the public to have a deeper understanding of academic knowledge and “...opens up potential for its future application, unveiling public space as the critical stage upon which positions of identity are established and negotiated” (Diamond, 2010: 102).

Barber (1984: 178-79) realised the importance of an active interface between the public and academia in 1984 when he stated that: “... we need communicative interaction to help ourselves think publically about the power we exercise and the decisions made”.

The “Medium is the Message” exhibition (Fig 2.9) demonstrates to future designers that the public sphere can be a forum for ideas rather than simply a market place for consumer goods. This implies that public spaces should more often be integrated with exhibitions, creating debate regarding the subject matter within the public realm.



Figure 2.8 “Spontaneous Schooling” exhibition - products from workshops



Figure 2.9 The “Medium is the Message” exhibition - example of controversial issues placed within the public realm

## Architectural education in South Africa

The South African Council for the Architectural Profession (SACAP) is responsible for the accreditation of architectural qualifications. In South Africa, one can obtain an undergraduate qualification at one of the six universities (The University of Pretoria, The University of the Witwatersrand, The University of Cape Town, The University of the Free State, The University of KwaZulu Natal and Nelson Mandela Metropolitan University) followed by a two year professional qualification, which includes a Honours Degree in Architecture and a Professional Master's Degree in Architecture. Alternatively one can study through an accredited university of technology, obtaining a MTech Architecture: Professional Degree. This degree is obtained in a minimum of six years, including six months practical experience (<http://www.sacapsa.com/>).

### The structure of architectural education in South Africa

The structure of architectural education in South Africa has drastically changed over the past 10 years (Steyn:2010). The promulgation of the Architectural Profession Act (Act 44 of 2000) is the main reason for this change as it prescribes that practitioners should be registered in one of four categories - those of Professional Architect, Professional Senior Architectural Technologist, Professional Architectural Technologist and Professional Architectural Draughtsperson. These categories signify a specific focus in the practitioner's work and by implication

the level of training. SACAP obtained management power through the promulgation of the Act as it made the accreditation of academic institutions possible. After SACAP was admitted to rejoin the Royal Institute of British Architects (RIBA) and the Commonwealth Association of Architects (CAA) – the main international accreditation bodies – the structure of architectural education changed to coincide with international standards (Henderson, 2000:16). What was always a five year Bachelor of Architecture degree is now a three year degree and thereafter an

honours- and masters degree that can all be completed within five years (at a university). The new categorisation of practicing architects forced schools to become more industry orientated and students are trained according to the requirements as set out by the Joint SACAP/RIBA/CAA Validation Agreement.

Programme contents throughout South African architectural education have undergone an examination process to comply with the National Qualification Framework (NQF) as well as the international bodies. The

new Higher Education Qualification Framework (HEQF), published in the Government Gazette of 5 Oct 2007, introduced a new standardisation of requirements for the obtaining of any qualification. A credit value system has been developed where every point represents 10 hours of learning; for a Master's Degree in Architecture 660 credits need to be accumulated during the education process. Steyn states that this is only a hypothetical indication when referring to architectural education in particular, "as design problems take much more time!" (Steyn, 2010).

Figure 2.10 is a summary of the structure of South African architectural education as well as suggestions made with regards to how the gap between theory and practice can be breached by influential role players in the education of architecture.

## Architectural education currently in South Africa

Prof Jo Noero argues that architectural education is at a crossroads in South Africa and that it “needs redefinition if it is to be able to provide the kind of understanding that graduates need if they are to become effective professionals in the design of the built environment” (2000: 169).

In a personal interview with Prof Gerald Steyn of the Tshwane University of Technology, he stated that the university has a responsibility to prepare students for industry. He believes that the basics in architecture first need to be taught before further exploration and daring projects can be attempted (Steyn,

2011). At the University of Pretoria the aim is not to teach technical detail and specifications, but to guide the student into the exploration of possibilities and then aiding them in detailing and specifications (Van Rensburg, 2008).

The six-month mandatory work experience that is required by universities of technology is an attempt to prepare students for the realities of practice once they have completed their studies. This is a useful process, however, the management and control over the quality of experience is lacking. As stated earlier by Christine Hawley, such students are often

exploited and not necessarily aided in the educational process, but rather misused by the industry.

Every university has a different focus and different approaches due to the nature of the education of architecture. Even though the accreditation of the programmes are regulated and controlled on a national as well as international level, the university’s individual relationships with their direct architectural industry cannot be managed in this way.



## Architectural education in South Africa's relationship between theory and practice

# Theory Architecture Practice

The structure of South African architectural education changed due to the Architectural Profession Act (Act 44 of 2000)

Academic Institute Accreditation

Giving the profession the medium to control education and syllabis

Education levels coincide with international standards

Three years Bachelors  
Two years postgraduate studies

The New Higher Education Qualification Framework (HEQF) (2007) - the standardization of degrees in South Africa

Professionals must be registered as:

1. Professional architect
2. Professional senior architectural technologist
3. Professional architectural technologist
4. Professional architectural draughts person

RIBA, CAA, SACAP Validation Agreement

Practice orientated education

The Department of Architecture at the University of Pretoria is in need of a new research facility  
Karel Bakker - The University of Pretoria

To allow for better university based projects - involving students in real projects

Physical construction skills and the art of building should be taught at school  
Braam de Villiers - Practicing architect

Empowering the student to be more capable of working in the industry - understanding the art of building. Learning from those in the field.

Popularisation of architectural research  
Making archives more accessible  
Combination of Schools in the Built Environment  
Randall Bird - University of the Witwatersrand

Enabling research done at the university to reach the industry more effectively.  
More comprehensive and realistic research

The university has the responsibility to equip the student to become an architect - the school should teach the theory and specifically focus on the technical  
Gerald Steyn - Tshwane University of Technology

Producing architects that are ready to adapt quickly in a working environment

All educators of architecture should actively be involved in practice  
Jo Noero - The University of Cape Town

Enabling the educators to be more informed about practice and teach students accordingly

Figure 2.10 Architectural education in South Africa's relationship between theory and practice



## Conclusion

Noero (2009: 100) propagates that all educators of architecture should actively be involved in practice, but this is often problematic as it is very difficult to manage a productive practice and simultaneously educate successfully. Adele Naude Santos, who was honoured with the 2009 Topaz Medallion for Excellence in Architectural Education, also believes that it is important for educators in architecture to be actively involved in practice. She believes that it improves her ability to aid students successfully in becoming well balanced and informed professionals (Naude Santos, 2010). However, it is not always possible

for educators to be fully focused on education and practice. The personal experience of educators can therefore not be the only mechanism that prepares students for industry – a more active relationship is required between education and practice.

Even though the accreditation bodies and governing entities are doing everything in their power to integrate education and practice, it is the responsibility of the individual educational facilities to establish an active platform for the interaction between education and practice. The accreditation processes can

only be performed over a large period of time, but the realities of the interaction required in order to create a sustainable relationship between theory and practice on an active and individual level, is almost daily.

The relationship between architectural theory and practice should therefore be addressed on a smaller scale and should be community, industry and educational facility specific. This will allow the relationships to develop over time and become a sustainable mechanism for the interaction between theory and practice.

## Theory conclusion

Architecture is dependent upon both theory and practice and the relationship between the two. This relationship needs restoration after the nature of architectural education has developed into an academic-based education. The relationship needs to be re-established and developed because society has changed since the segregation of theory and practice.

New types of relationships between theory and practice should be identified and systems that will encourage these relationships to exist need to be developed within

current societies. The dependency and integration between architecture, theory and practice should have a platform from which it can function and exist.

The South African context and the way architects are educated in South Africa forms an integral part of this relationship that will allow architecture to be restored as an influential role player within South African society at large.

The relationship between architectural education and the industry creates the

potential for continuous development in architecture. A once-off intervention will not result in a sustainable relationship that will benefit all the related parties. A system should be devised to create a forum for the interaction of the different members of the built environment in order to establish and build a relationship that can be sustained.

An attractive, yet functional building, that can adapt to reflect technological development in architecture within the South African context, creates the platform for the interaction between

many different entities and individuals. The Built Environment Staging Centre (BESC) will act as a meeting place between theory and practice. It is clear that many individuals have different opinions and suggestions on how to address the lack of synergy. The BESC should therefore merely be a facility that encourages interaction, but does not necessarily regulate the interaction. The adaptability of the continuously changing spaces can be manipulated to fill the current needs on a daily basis.

# chapterthree

Programme: The Built Environment Staging Centre

## Introduction

In the previous chapter it was established that new types of relationships and interaction are needed to restore the segregated relationship between theory and practice. The proposal is to design a Graduate Staging Centre (GSC) for the Built Environment (Built Environment Staging Centre -BESC). The programme's main functions are to facilitate relationships between:

- Theory and practice within the built environment;
- The different departments within the Built Environment at UP;
- UP Main Campus and South Campus; and
- UP and the public.

Stage [steɪj] Stag-ing [stay-jɪŋ]

-noun, verb, staged, stag-ing

A single step or degree in a process; a particular phase, period, position, etc., in a process development, or series.

A raised platform or floor, as for speakers, performers, etc.

The scene of any action.

A place of rest on a journey; a regular stopping place.

The distance between two places of rest on a journey; each of the portions of a journey.

To present, produce, or exhibit on or as if on a stage.

To plan, organize, or carry out (an activity), especially for dramatic or public effect.

(<http://dictionary.reference.com/browse/staging>).

## Existing relationships between theory and practice

In Figure 3.1 existing relationships between theory and practice are listed. The graphic also demonstrates an imbalance in the current relationships, tending towards the industry's inactive role in education.

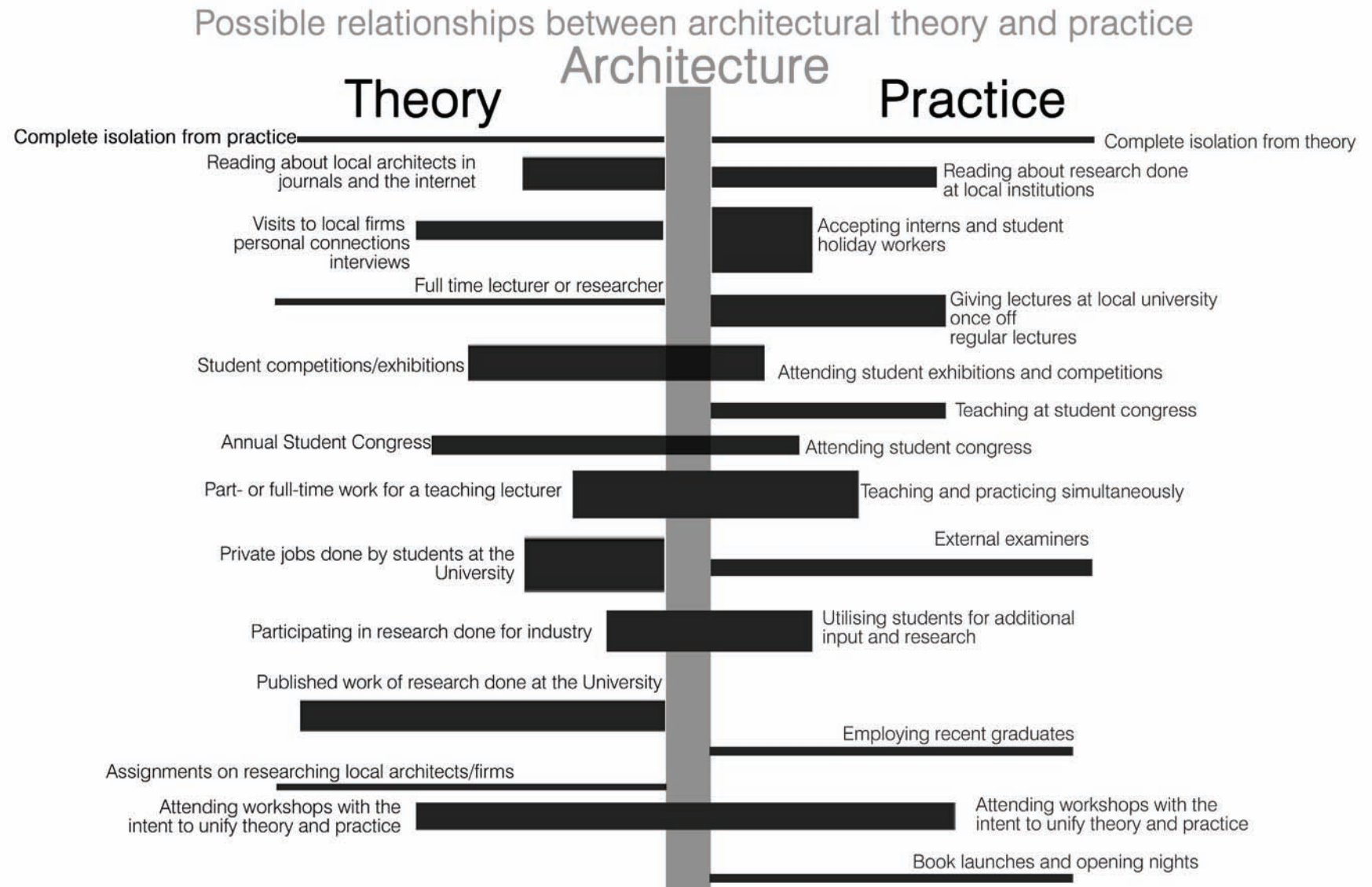


Figure 3.1 Possible relationships between theory and practice



## New sustainable relationships between theory and practice

The new types of relationships that need to be established have to develop from the current relationship between theory and practice. Currently, there is very little interaction between students and members of the industry on a formal as well as an informal basis. Therefore, both formal and informal relationships need a platform for development that can later lead to more integrated relationships.

The Bauhaus building in Dessau, Germany, was identified as a building and series of events that has made a long-term impact on the nature of

architecture as we know it today. The Bauhaus succeeded in effectively merging theory and practice.

There are more examples of schools or programmes that attempted to merge theory and practice, for instance, Rural Studios (Fig 3.2 - Fig 3.3) at Auburn University in Alabama (<http://www.cadc.auburn.edu/rural-studio/>) and Frank Lloyd Wright's Taliesin West (Fig 3.4 - Fig 3.5), intended as a camp for architectural students (<http://www.global-writes.com/chronological/?-Token.article>). Even though there is much to be learnt from these

programmes, there is no school or system as influential and revolutionary as the Bauhaus.

The Bauhaus has been analysed and opportunities have been identified in order to establish a system from which a sustainable relationship between theory and practice can be developed (see Appendix A).

Three types of relationships have been identified from the possible solutions discussed in Chapter two and the Bauhaus precedent study. These are: social, intellectual and practical

relationships. Social or informal interaction can be used to initiate more formal interaction between theory and practice and vice versa. The one type of relationship is used to aid the development of the next.

Figure 3.6 indicates how these relationships were identified. The opportunities identified were reduced and condensed and certain programmatic functions were assigned to each relationship. The programme was then developed to accommodate the identified relationships.



Figure 3.2 Project by Rural Studios



Figure 3.3 Students of Rural Studios



Figure 3.4 Exterior view of Taliesin West



Figure 3.5 Interior view of Taliesin West

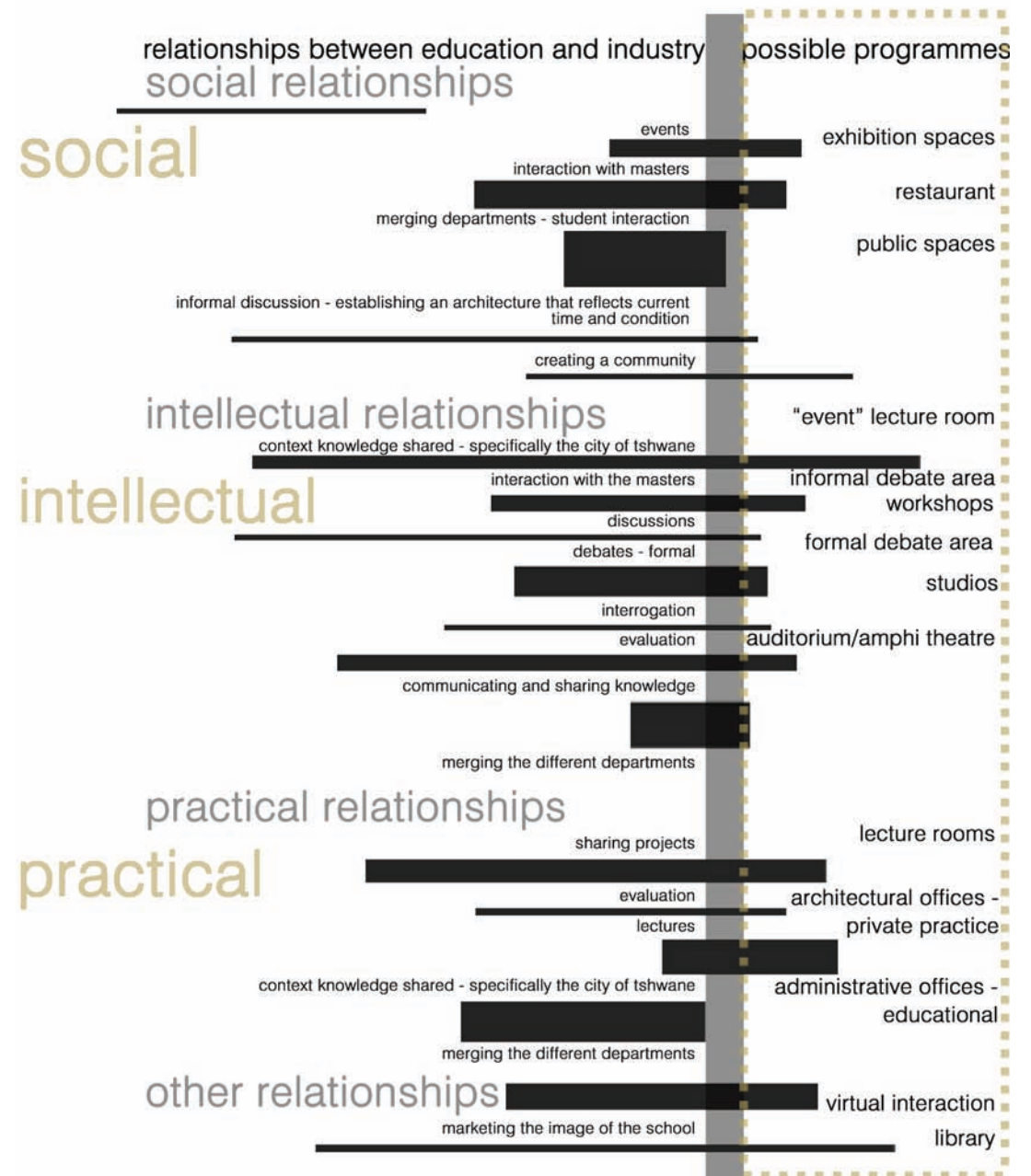


Figure 3.6 Programme establishment

## Graduate Staging Centre – Built Environment Staging Centre

### Graduate Staging Centres (GSCs)

The capricious relationship between architectural education and the industry is not an isolated occurrence as many other professionals, such as artists, engineers and lawyers, experience the same lack of integration between the education and the practice of the profession. The proposal is to create GSCs that can showcase the work that is produced by the students in order to inform the industry and the general public of the nature of their education as well as putting the syllabus and educational quality within the public domain; this will allow the industry to assist in the quality control and structure of the education of the students. These centres will act as urban foyers that facilitate the possible relationships between education and the industry of the respective professions.

The GSCs are proposed to be on the periphery of UP in order to create a better interface between the university and the public. The nature of the relationships that exist between academia and industry cannot be pre-determined or stipulated. Accessibility and inclusivity of the GSCs are therefore important in facilitating the desired relationships.

Each GSC will have its own requirements and the nature of the possible relationships between the industry and the educational facility will be different at all GSCs. The location of the GSC, the type of industry, the nature of the existing relationship between an industry and an educational facility, etc. will be amongst the factors that need to be identified before a GSC is constructed.

### Aims of GSCs

The main aim of the GSCs is to establish better, sustainable relationships between the theory and the practice of the respective fields. Further aims are to:

- Link the relevant departments within the vicinity – Architecture, Construction Economics and Town and Regional Planning (also Visual Arts and the Music Departments are included);
- Include the community into the GSCs through the incorporation of relevant programmes that encourage the direct community to use the spaces;
- Design pedestrian-friendly buildings;
- Be public transport orientated.

This dissertation proposes a GSC for the Built Environment specifically. The programme of the building is determined by the requirements of social, intellectual and practical relationships.

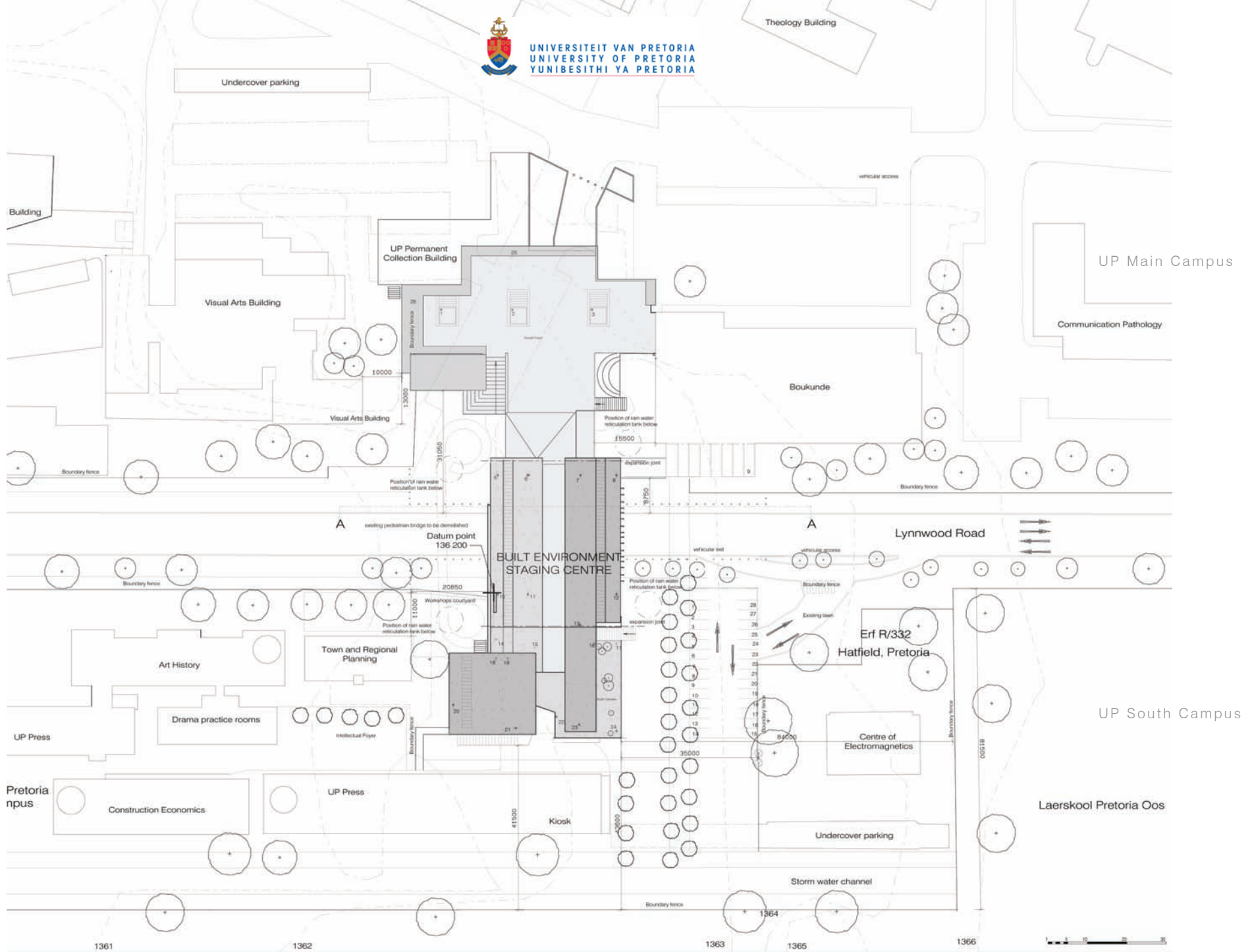


Figure 3.7 Site Plan



## Social relationships

Social relationships are defined by interaction that takes place on an informal, spontaneous level. These relationships can be viewed as friendships between students, members of the industry and the public.

The most important part of the design consists of exhibition spaces that can facilitate social relationships. The exhibition spaces are complemented by the inclusion of public spaces and a restaurant.

Exhibitions will form the main attraction element in the design. The main exhibition space is situated on the Bridge Level, framed by workshops and studios. The spaces that support and define the main exhibition space are versatile and can become part of the main exhibition corridor. The space thus has the ability to be anything from a narrow linear exhibition on a walkway to a broad, large exhibition space that can manipulate the viewer into many spaces as part of the journey across Lynnwood Road (Fig 3.8 - Fig 3.11).

On ground level the threshold into campus is enlarged and softened to turn the space into an urban foyer. Figure 3.8 indicates how public space is extended into the University's grounds in order to make the University more accessible and permeable, without jeopardising the integrity of the University's security systems.

On the northern side of Lynnwood Road a formal exhibition space is situated on street level; this is a formal foyer into the University, showcasing some of the work that is produced by students at UP. This exhibition space on street level then also acts as a prelude to the new exhibition building that is proposed on the corner of Tukkielaan and the Ring Road, next to the Visual Arts Building (NVABES). This building will house the University's permanent collection; therefore it should also be a publically accessible building.

A restaurant is proposed on the southern side of Lynnwood Road. The restaurant socially links the public street

UP Main Campus

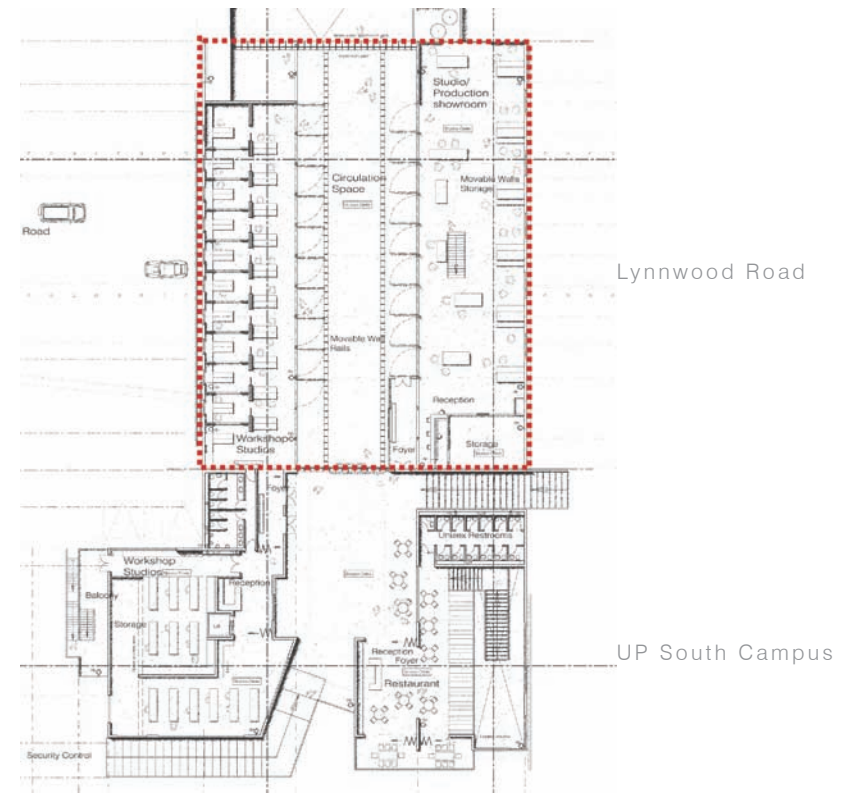
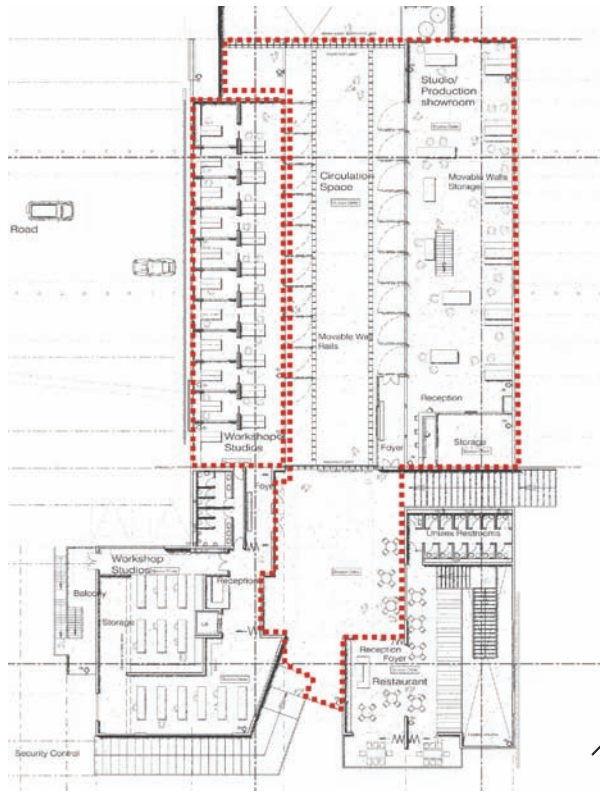


Figure 3.8 The bridge structure used as one space

level with the main exhibition space on the bridge. Public accessibility and inclusivity is enhanced through the incorporation of a restaurant (Fig 3.12). The restaurant can then be used to cater for events, whether the events are social, intellectual or practical.

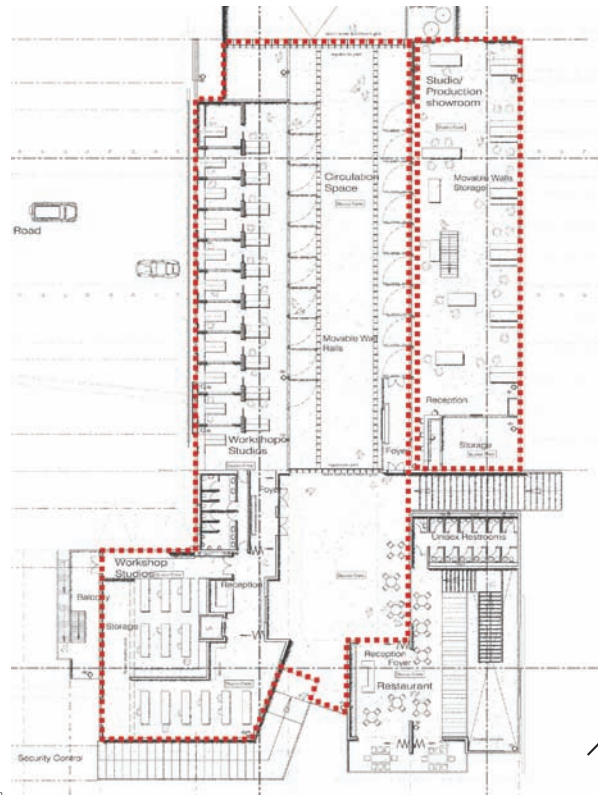
Social relationships can be anything from a quick conversation while passing a fellow student to a late night dinner with practicing professionals. These relationships are not regulated or manipulated, but encouraged through the design.





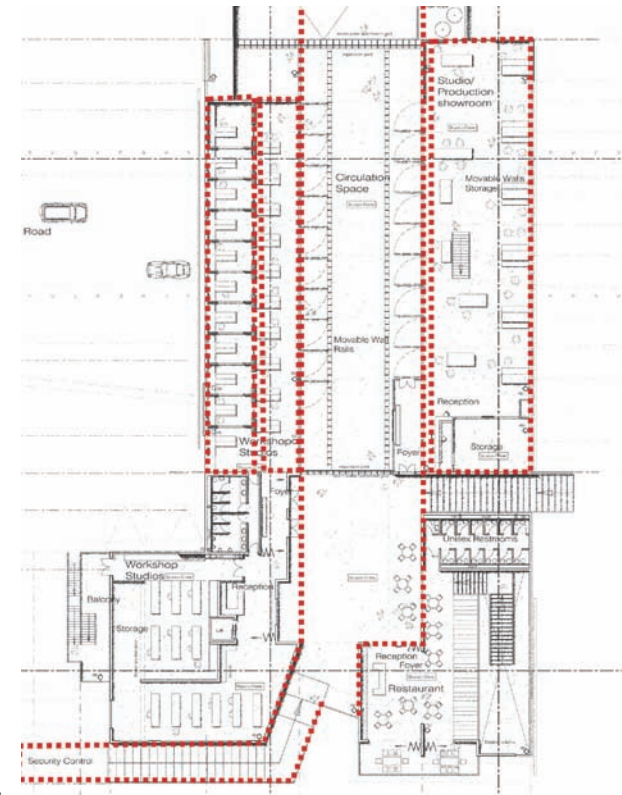
↑ North

Figure 3.9 Combining the main circulation space and Production Studios



↑ North

Figure 3.10 Combination of Workshop Studios and main circulation space



↑ North

Figure 3.11 All spaces used separately

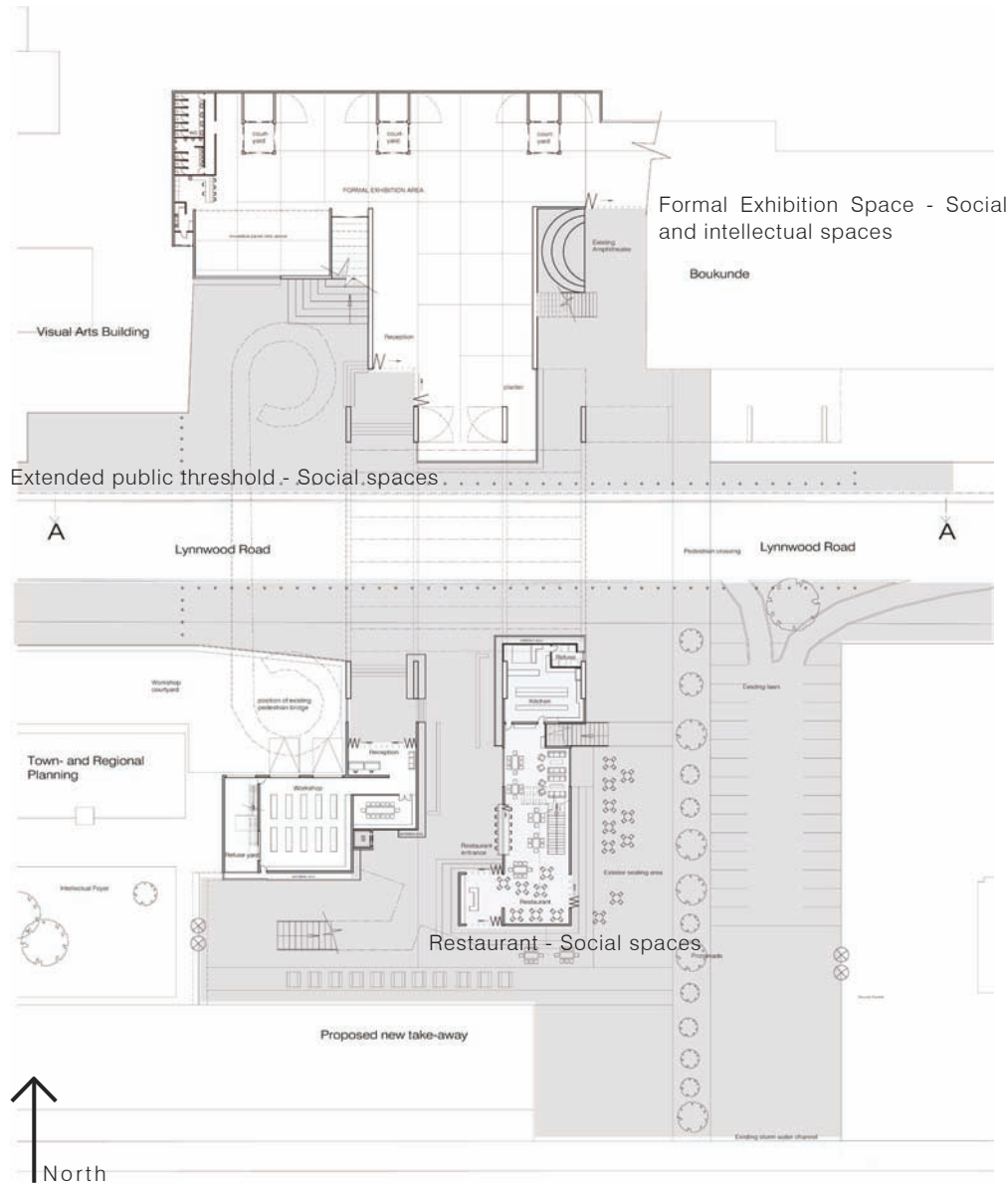


Figure 3.12 Ground Level - diagram depicting extended thresholds

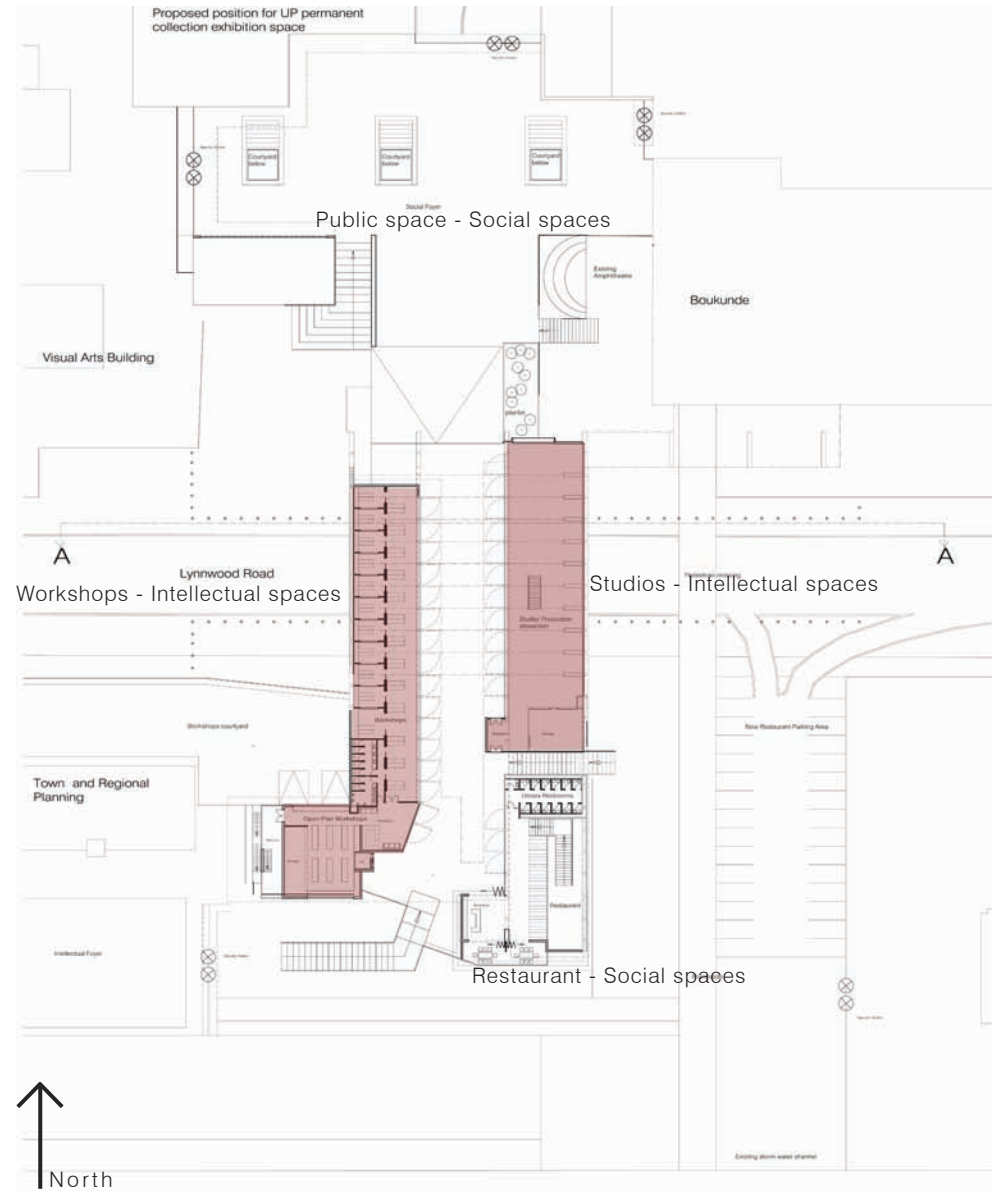


Figure 3.13 Bridge Level - diagram of spaces defining the main exhibition space

## Intellectual relationships

Intellectual relationships are defined by student interactions amongst each other and the industry where skills are transferred and conversations are experience- or academically orientated. These relationships are semi-formal but not as regulated or structured as completely professional relationships.

An 'event' lecture space together with seminar rooms, design studios, informal debating areas, workshop studios and seminar rooms are designed to accommodate this type of relationship

The design studio and workshop studios (Fig 3.13) are housed in the structures that define the main exhibition space. These spaces can also be called "production centres".

The design studio is similar to the existing studios inside Boukunde, but the space is designed to showcase the production process of architecture. Ample storage space in the studios allows for furniture to be temporarily stored while the spaces are used for exhibition. The accessibility both physically and visually stimulates intellectual interaction.

The workshop studios are spaces where members of the industry - whether industry representatives, architects, artists, contractors, etc. - are appointed to present workshops to the students. This type of education is important to allow the industry to be able to manipulate the type of knowledge that is obtained at a university and to present the latest technologies and skills. The spaces need to be adaptable

to facilitate many different types of presentations and practical workshops. The ideal is to present workshops in such a way that the students have to complete practical tasks, or do physical projects, that can be exhibited in order to encourage intellectual relationships.

The Formal Exhibition Space, on ground level towards the north of Lynnwood Road, also provides smaller seminar rooms for private discussions and interaction between students and members of the industry. Smaller workshops and lectures can also be held in these spaces. The private seminar rooms can be manipulated to form part of the formal exhibition space and will only be closed when in use.

West of the existing Boukunde building an existing amphitheatre, that can

seat at least fifty people, is currently neglected and under-used. This space will be revamped to form an integral part of the design. This is an exterior space that can easily be used for small events such as movie evenings and informal debates. The amphitheatre acts as a link between the new inhabited bridge and Boukunde on street level.

An "event" lecture room for more formal events is required. However, the type of events that will be hosted will mostly take place after hours. Boukunde has many lecture facilities that can be used for such events. The ideal venue would be Room 1-10, situated on the south western corner of Boukunde, on street level. An exterior door, not currently in use, can be used for access to Room 1-10. Another "event" lecture room would therefore be unnecessary.



Design/ Production Studio

Pedestrian Walkway

Workshop Studios

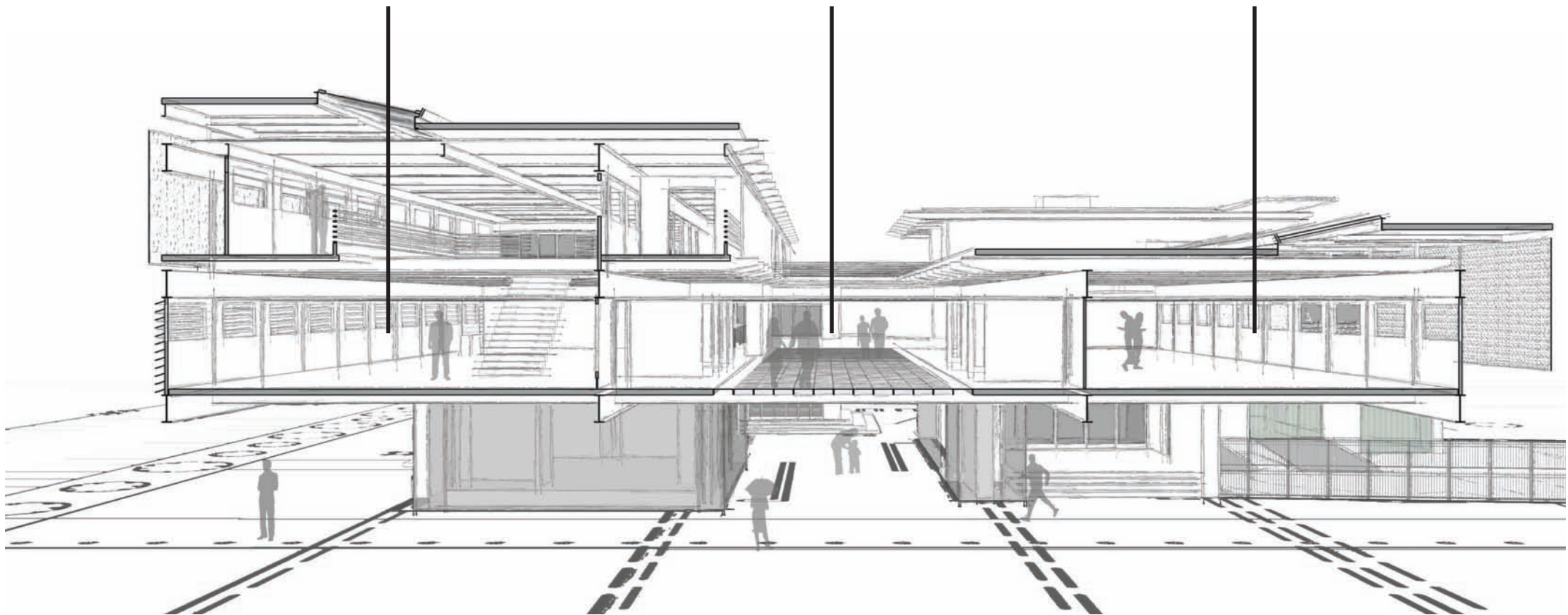


Figure 3.14 3D section explaining the interaction between the studios and the public walkway

## Practical relationships

A practical relationship is where a formal, regulated relationship is established between students and or members of the industry. This is currently done through the weekly “School Lectures” held at Boukunde: members of the industry present their work in order to expose the students to architectural practice.

The proposal is to establish an office where students and members of the industry can simultaneously engage in projects (Fig 3.15). This will enable members of the industry to utilise the innovation and manpower of the students. This will empower the students to work on projects that will actually be executed. Through this arrangement students obtain experience, members of the industry

are given the opportunity to share their experience and the revenue obtained through these projects can be reinvested into architectural education, making the building partly financially independent.

These incubation offices aid students in the transition process between education and practice. The offices can be visited by any member of the public, giving them access to current developments in architecture.

Other practical relationships can also be established through more regular and scheduled sessions with members of the industry, where skills and experiences are transferred to better prepare students for the work environment.

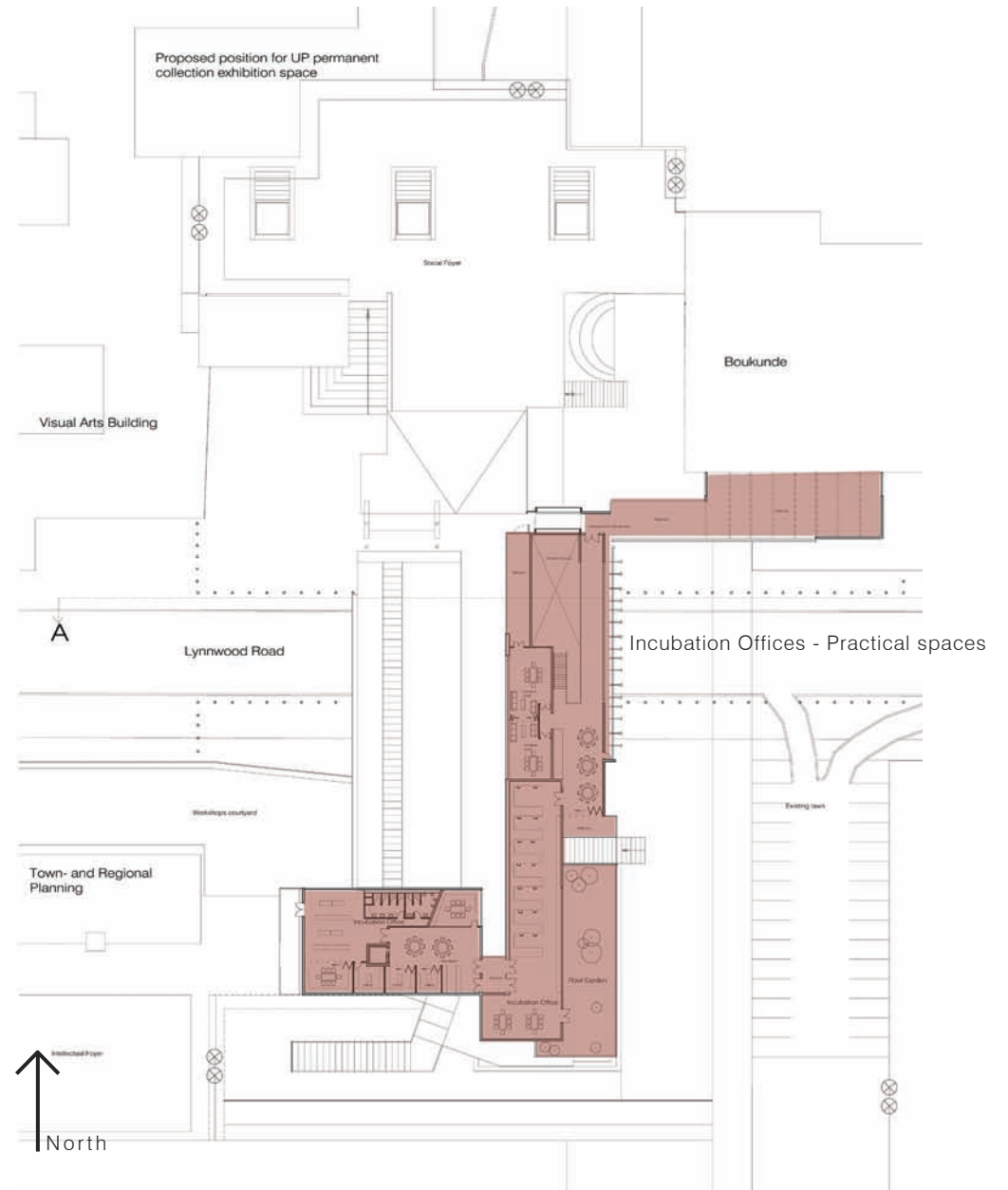


Figure 3.15 Top level plan - diagram indicating connection to Boukunde



## Relationship between Main Campus and South Campus at UP

The proposed pedestrian walkway links South and Main Campuses as it becomes an inhabited bridge over Lynnwood Road (Fig 3.16). The programming is organised so that most of the activity will happen on South Campus: the restaurant as well as the entrances to the design studio and workshop studios are situated towards the south. Furthermore the structure becomes a much more inclusive, contextualised, pedestrian walkway than the current pedestrian bridge over Lynnwood Road.

## Relationship between the University and the public

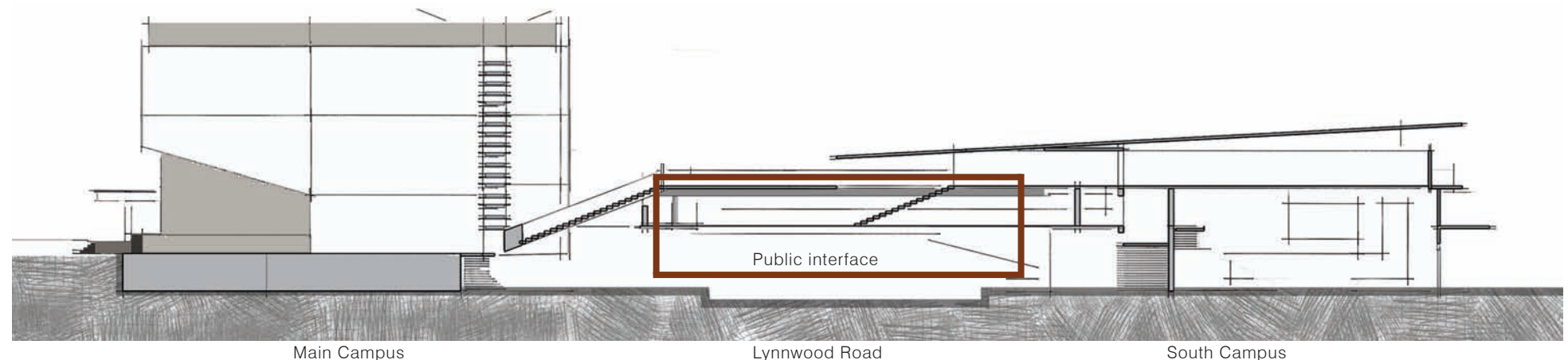
As stated previously, the University has identified its interface with the public as problematic. The university is experienced as an inaccessible, isolated island due to the security fencing. An interface that communicates events and achievements at UP is needed to reconnect the University with its local community. The location of the building, being a bridge over Lynnwood Road, is the ideal opportunity to create a better interface between the University and the public.

## The relationship between the relationships

The eastern and western sides, or in this case facades of the bridge, will communicate to the fast travelling vehicular traffic through billboards that act as communicative devices and sunscreens, protecting the interior exhibition spaces and offices from direct sunlight.

Public accessibility and events will allow members of the community to physically interact with students and work that is produced at UP.

The spaces where the interaction between the segregated entities overlaps are called foyers. The foyers all have different characteristics ranging from formal foyers where users are introduced into a space to more informal, urban foyers and public spaces. The concept of foyers is discussed in Chapter six of this dissertation.



## Conclusion

The proposed programme, a Built Environment Staging Centre, is one that will currently serve the relationship between theory and practice best. However, it is important that the designed spaces can be manipulated and changed as the requirements of the relationship between theory and practice change.

The hierarchy and area of the exhibition spaces will probably change over time as the relationships become more stable and working relationships between education and the industry improve.

The programme should therefore not be seen as a stagnant intervention, but as the first layer or stage of programming. Over the years the programme will undergo many stages and change and development is inevitable.

# chapterfour



Urban Framework

## Aim of urban framework

The vision of the framework is to create a series of spaces to facilitate the interaction between the University – as an academic institution – and the community, in order to become an influential entity within society. The main aims are to:

- Penetrate the physical and psychological barriers that separate the University from its environment;
- Generate a system where the integration between students and the public can create a space for social, intellectual and practical cohesion and interaction;
- Create an opportunity where skills, experiences, cultures and innovation can be shared and transferred to empower more people.

## Framework structure

As summarised in Fig 4.1 the proposed urban framework for this dissertation is influenced by frameworks previously designed. These include the Hatfield Metropolitan Core Development Framework (HMCDF), University-City framework, the Transit Oriented Development (TOD) concept, Rejuvenation of Lynnwood Road, Holm Jordaan's Urban Development Framework for UP and UP's development policies as stipulated by Facilities Management at UP.

The frameworks are evaluated and additional proposals are added to create a cohesive framework that will enable the University to become an influential entity in society.



The Hatfield East Spatial  
Development Framework, 2003

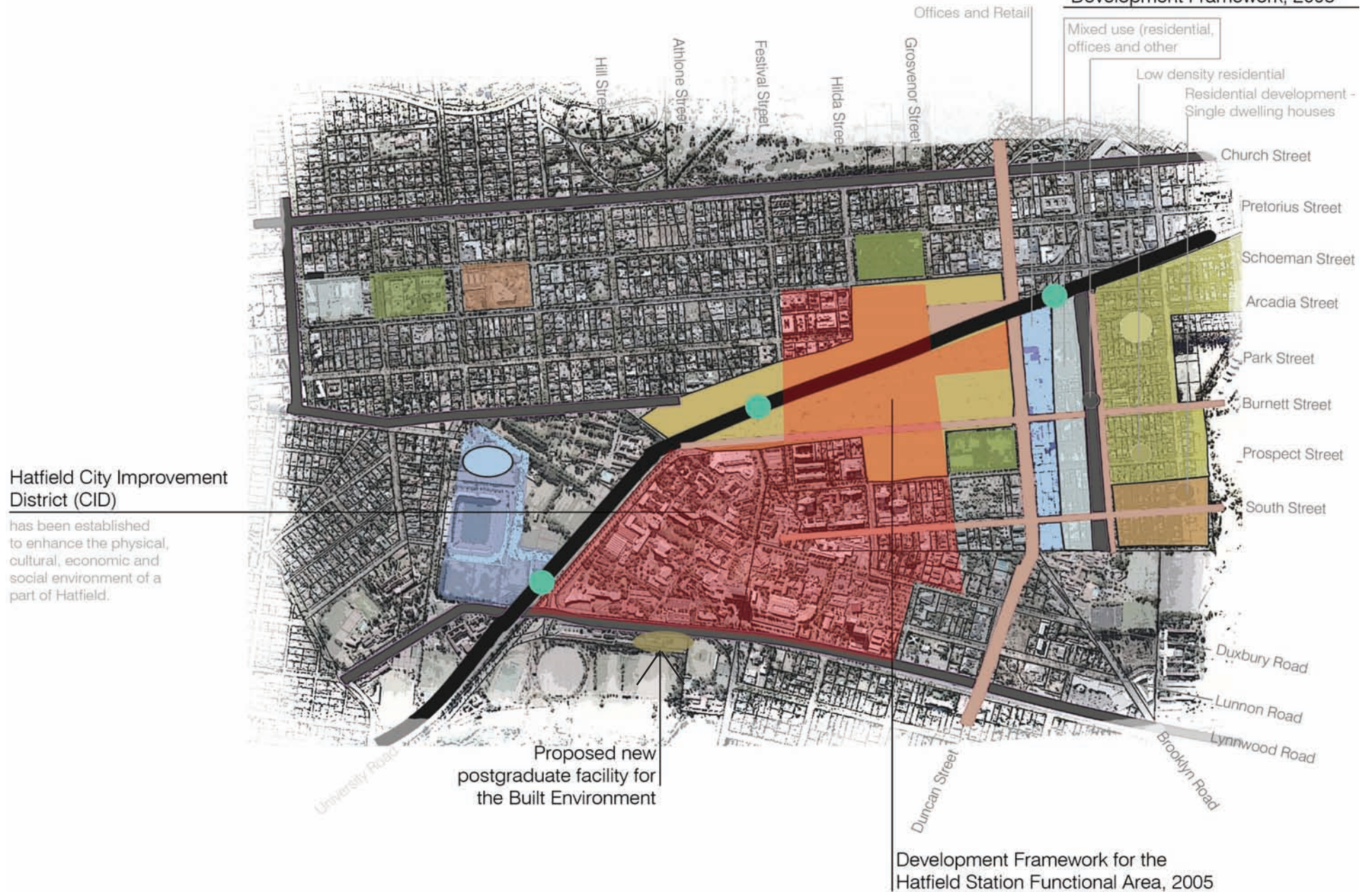


Figure 4.1 Summary of existing urban frameworks in the Hatfield area



## Hatfield Metropolitan Core Development Framework (HMCDF)

The HMCDF has been developed as a result of Hatfield being identified as one of the six metropolitan core areas according to the Tshwane Metropolitan Spatial Development Framework (TMSDF). The framework must ensure that land uses are integrated with transport and social needs, private and public domains are integrated and Green Building Codes are integrated into all new developments.

Hatfield is managed by the Hatfield City Improvement District (CID). This managing body has a close relationship with CoT, but they are also responsible for security, cleanliness and trade in the Hatfield area. As

illustrated in Fig 4.1 this does not include all of Hatfield, and yet again South Campus is completely ignored.

Hatfield has also been identified as a Concentration Zone by the TMSDF. This implies that it needs to develop into a vibrant, high-density, mixed-use area. The area should create a sense of concentrated urbanity, known for its high level of activities and public environment. The integration of the private and public transport systems is dominant in the creation of such a Concentration Zone.

## Transit Oriented Development (TOD)

The concept of Transit Oriented Development is an international notion that has the main aim of integrating public transport with urban development. Due to the new Gautrain Station situated in the northern part of Hatfield, this concept is an important mechanism that can assist in the efficient design of facilities and developments in the area. The defining elements of TOD are to: enhance mobility; be more pedestrian friendly; create an integrated working and living environment; revitalise the neighbourhood; and ensure public safety.

In January 2007 the CoT approved the City Integrated Transport Plan (ITP) and the Strategic Public Transport Network (SPTN). These transport planning documents propose the implementation of the Bus Rapid Transport (BRT) system. As illustrated in Figure 4.2, line 2 of phase 1 of the implementation of the BRT system will run from the Pretoria CBD to Mamelodi via Hatfield.

Save public pedestrian accessibility and the impact the BECS will have on the local community reacts directly to these approved schemes within the city.

## Bus Rapid Transport (BRT) systems in CoT

Line 2 of phase 1 of the new BRT system will be 33.2km long with two main terminals, one in the CBD and one in Mamelodi. It will consist of 36 stations (Fig 4.2) at an average of 920m apart. Each station must have minimum dimensions of 20m x 3m. It is planned that a station will only be empty for up to ninety seconds during peak hours. These are the regulations as set out in the SPTN and ITP.

This dissertation proposes a BRT bus stop in Lynnwood Road, as close as possible to the intersection with University Road. The proposed position is indicated in Figure 4.3.

## Department Facilities Management at UP

This Department is responsible for the coordination of the UP estate - on a strategic, tactical and operational level - to serve the entire University community (The University of Pretoria: 2011). The Department assists the University in being people orientated and producing top class academics and students by managing and facilitating all developments, maintenance and operations of the UP estate.

As part of the Department's mission statement it is stated that the aim is to provide customised buildings that satisfy the needs of students, facilitators and visitors. Furthermore, renting out excess spaces for additional income is part of its responsibility.

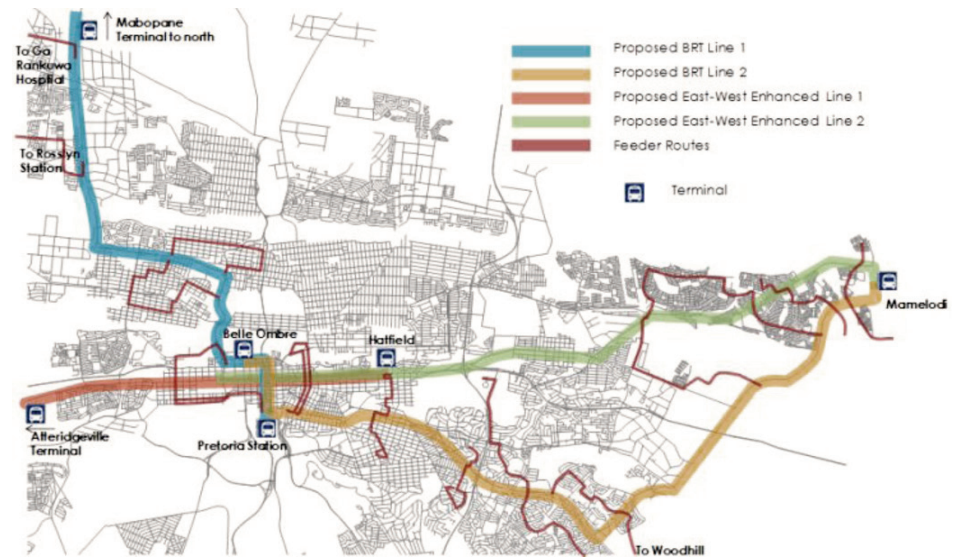


Figure 4.2 Approved BRT routes in Pretoria

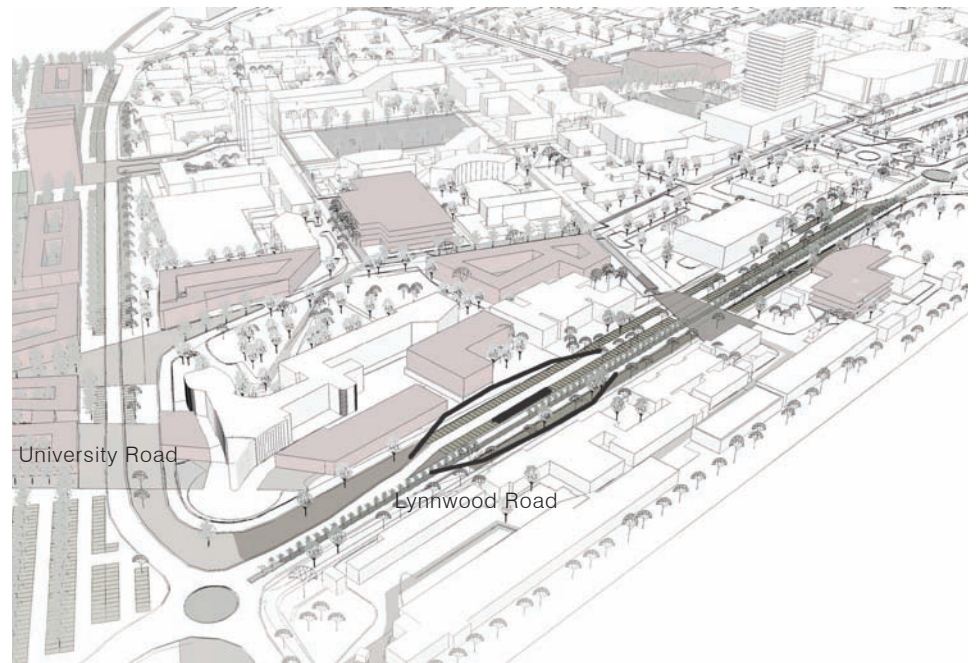


Figure 4.3 Proposed position of BRT bus stop at UP, Lynnwood Road

## Previous frameworks for UP

### Rejuvenation of Lynnwood Road

In his final year dissertation, Ryno Dreyer proposes that Lynnwood Road can be re-imagined to create a better interface between the University and the public (2008: 6.1). Lynnwood Road forms a direct link between Pretoria CBD to the west and the N1 national highway to the east of the University. This road is a four lane road separating the University from its neighbours to the south (Fig 4.4) due to daily excessive vehicular movement. Dreyer proposes that the amount of private vehicles and the speed at which they travel should be reduced drastically.

The implementation of mixed-use residential development on the southern side of Lynnwood Road is a viable argument, as this can become the threshold space between the University and the suburbs to the south. The creation of a vibrant student city can also add to the University's aim of improving its public interface, breaking down the psychological barrier that is currently created by Lynnwood Road.

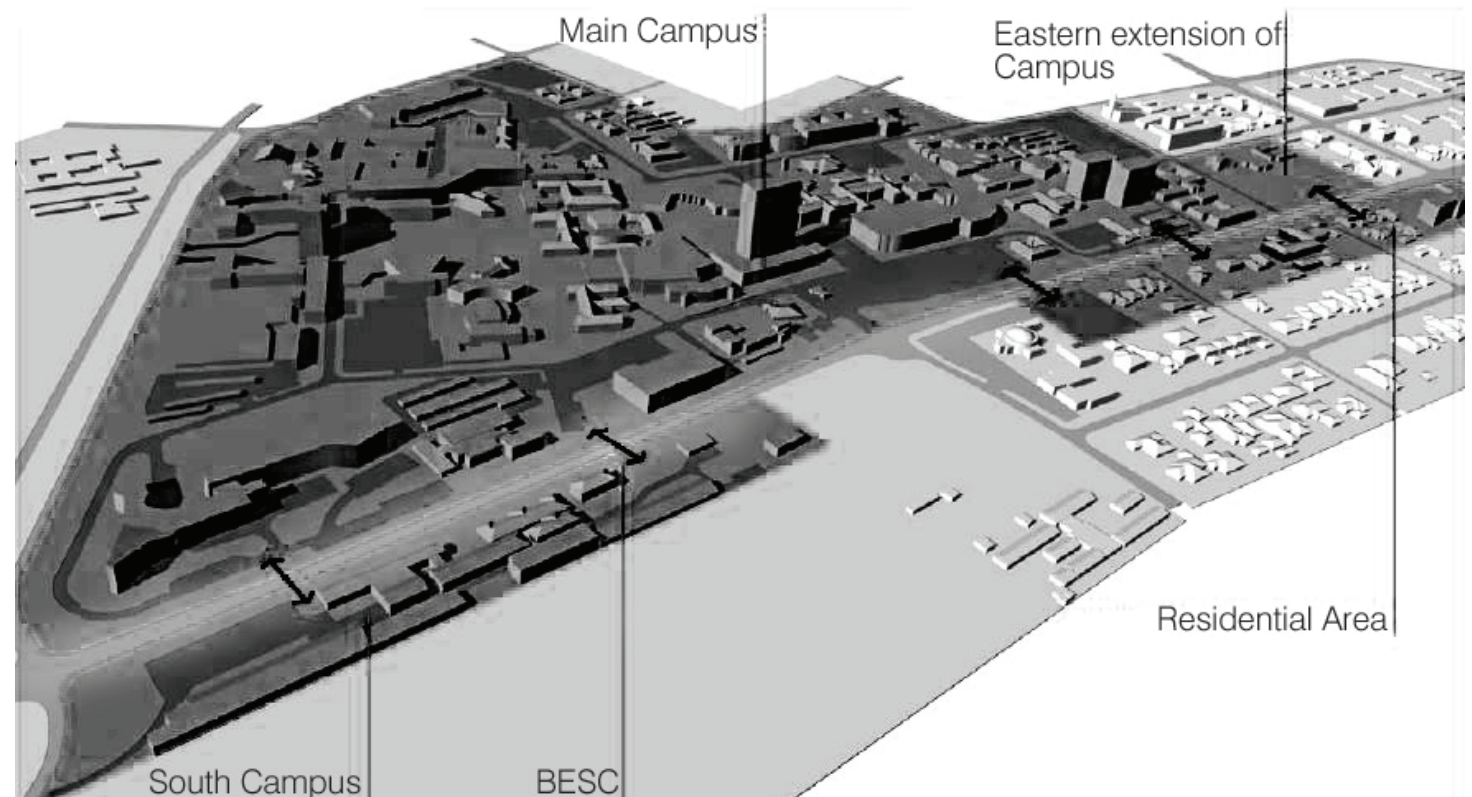


Figure 4.4 Rejuvenation of Lynnwood Road, stitching the University back into the urban fabric

## Holm Jordaan UP urban framework

Holm Jordaan Architects and Urban Designers was appointed by UP to design a ten-year development plan in order to provide the University with guidelines for development and growth. The aim was to develop a framework that would allow the University to create facilities that can relate to its context and result in more integrated spaces and facilities on campus. The Holm Jordaan Group referred to the UP Strategic Plan 2006-2011 and translated it into a framework after analysing all aspects of the UP campus, for example the physical context, economic context, urban form, public amenities, circulation and movement. Strategic commercial opportunities were identified as well as the obtaining of strategic properties that are market related in terms of the University's development strategies.

Some goals that were identified in relation to the Vision of UP were: densification of campus; significant open spaces; place making; spatial structuring; growth strategies and phasing. With these goals in mind detailed guidelines were developed for the creation of boulevards, gateways and links between functional units on campus. It is important to note that this framework is not fixed, but rather a proposal that is continuously adapted by UP.

Figure 4.5 shows where negative open spaces currently are and Figure 4.6 shows where the positive open spaces are situated on campus. Furthermore, Figure 4.7 shows which parts of campus can be viewed as part of the bigger urban context.

For the densification of campus, the Holm Jordaan Group proposes many new buildings. Their proposal suggests the rejuvenation of the north-south axis with the extension of Roper Street to a green boulevard, as illustrated in Figure 4.9. Furthermore, the south eastern quadrant (including South Campus) should, according to their proposal, develop into a more dynamic gateway into the University. Further extensions towards the east are also proposed as this correlates with the University's intension of extending towards L.C. de Villiers Sport Facilities, east of Main Campus.

The Holm Jordaan Framework is evaluated in the following figures - both positive and negative aspects of the framework are identified and criticised.



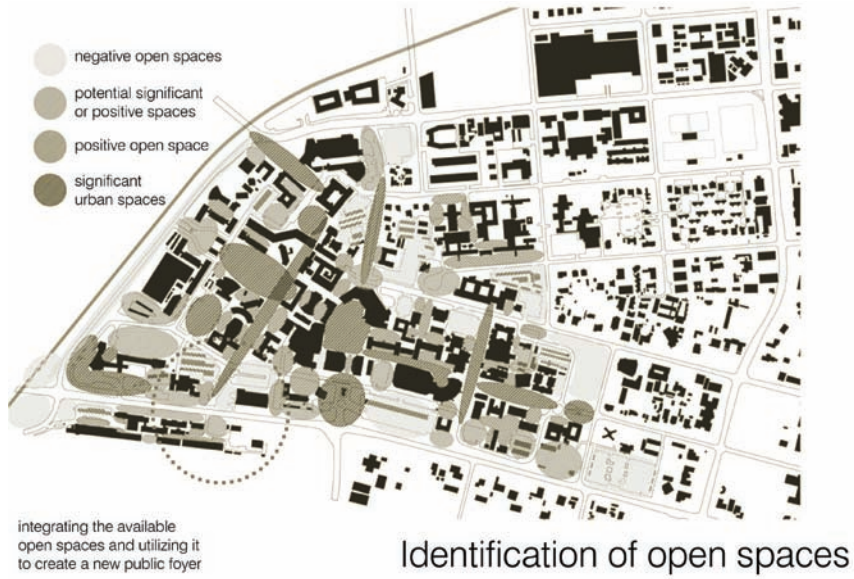


Figure 4.5 Identification of open spaces

- linking the university with Loftus over University Road on the west
- manipulating building shape to manipulate exterior spaces and pedestrian movement
- new large crossing over Lynnwood Road - not on street level

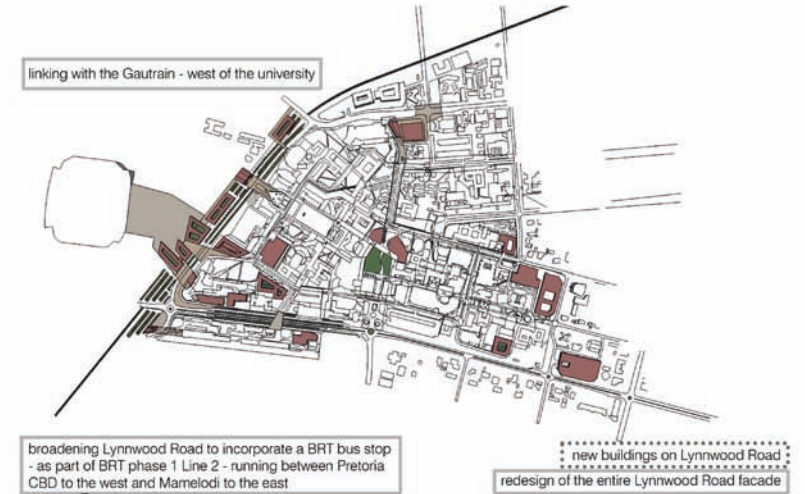
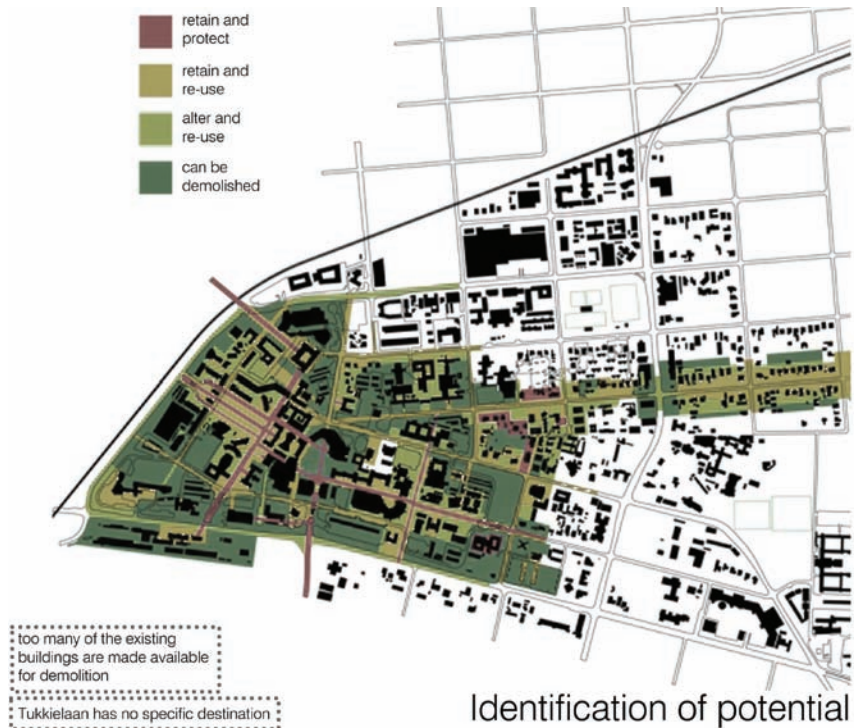


Figure 4.7 Possible links between UP and its direct context



64 Figure 4.6 Identification of potential



new destination building on northern border of UP main campus

new entrance on University Road

broadening Lynnwood Road - but not for parking

closing the Admin Building should be avoided

articulation of the corner remains

proposed new structure on the eastern side of south campus

using what is there and working with it - no demolitions  
circles on the main corners is not feasible

redesign of the piazza as central urban foyer at the University of Pretoria

increasing density on the eastern side of main campus

creating an "activity street" in Lynnwood Road

20 year plan is to move east towards existing LC de Villiers Sports Facilities

the framework proposes to densify the existing campus - more sustainable approach

linking the university with the community around it - part of the university's strategic plan

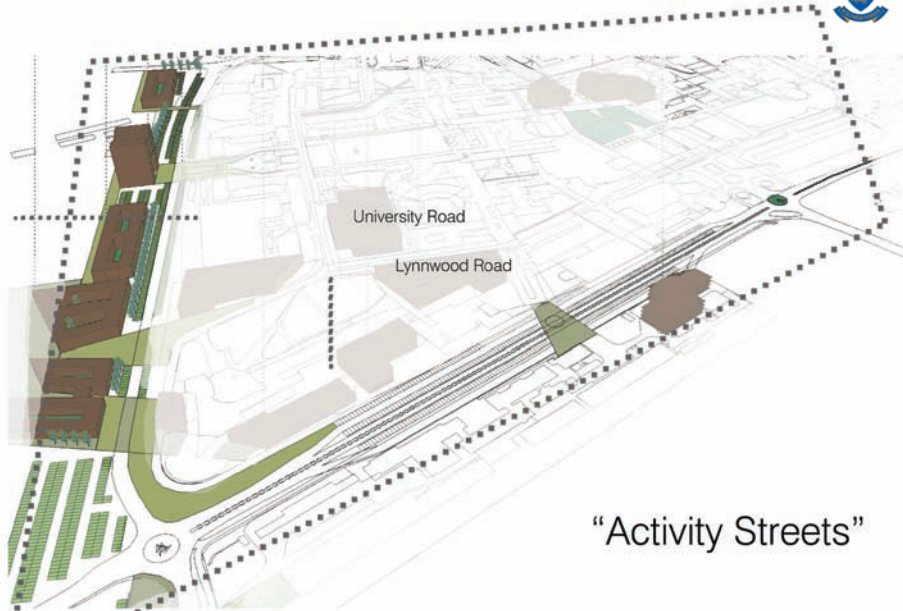
specifically focussing on the link between the university and the suburbs towards the south on the opposite side of Lynnwood Road



### Proposed intervention

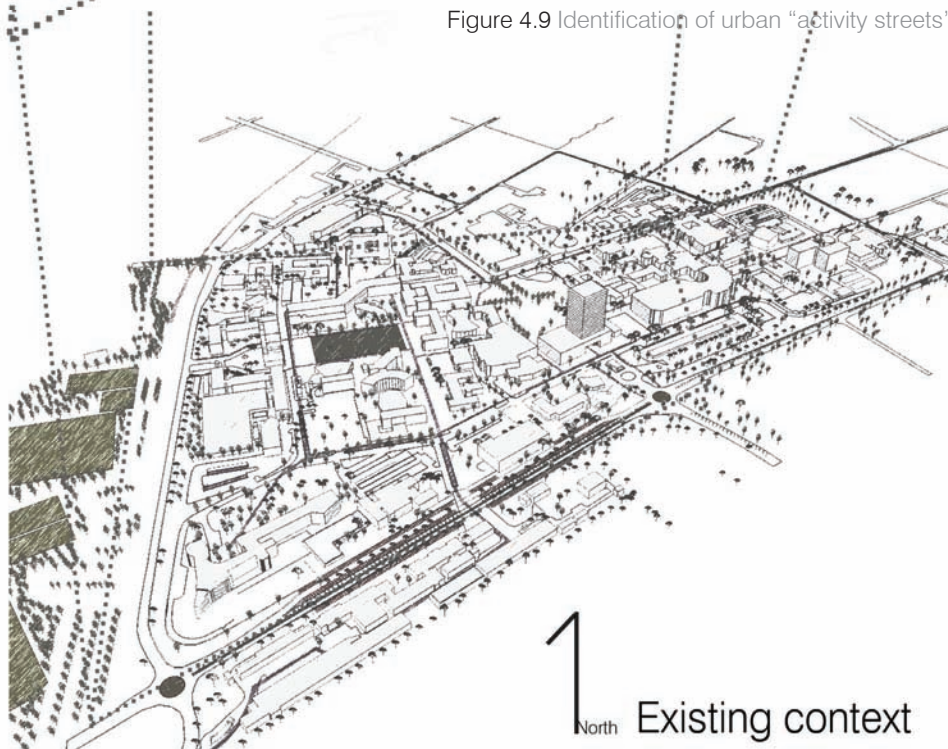
Figure 4.8 Evaluation of proposed Holm Jordaan Framework for UP





“Activity Streets”

Figure 4.9 Identification of urban “activity streets”



66 Figure 4.10 Graphic depiction of the existing context

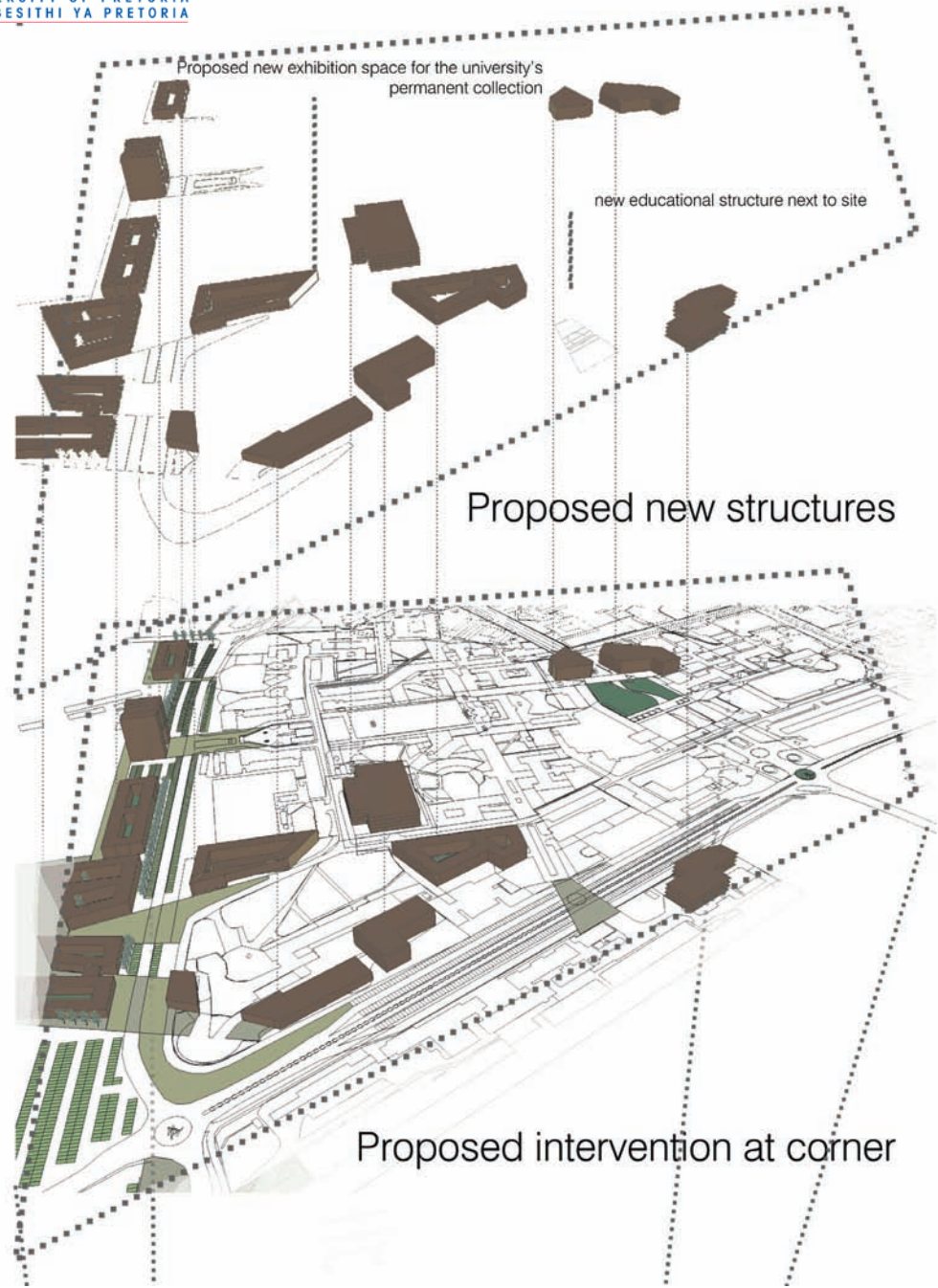


Figure 4.11 Evaluation of Holm Jordaan Framework at the corners of Lynnwood Road and the University

# Proposed framework

## Introduction

The proposed urban framework is an amalgamation and extension of the previously discussed frameworks.

## Urban problems

The main urban problems are identified and it is the aim of the framework to address these problems:

- The physical interface between UP and the surrounding community is problematic as the University is experienced as an isolated island;
- UP is experienced as an isolated island due to security measures, such as fencing and access card control;
- South Campus is completely segregated from Main Campus, apart from an un-integrated pedestrian bridge;
- Some of the current public spaces at UP are experienced as being unsafe;
- Transport and parking do not yet make out an integrated part of the University's urban design framework.

## Key indicators

Some key indicators have been identified and need to be addressed as requirements when designing all future developments in and around campus:

- Adaptability – all developments must be flexible and should be adaptable as requirements and needs are constantly changing;
- Connections – all new developments should cohesively link with the existing infrastructure of the University as well as add to the quality of the connections between spaces and functions;
- Multifunctional – all new public as well as facility-specific spaces should be multifunctional in order to encourage interaction between different groups of people as well as adding variety;
- People orientated spaces – interaction between all people should be encouraged;
- Adding quality to existing context – the University has a rich heritage and this should be respected; however value should be added through the incorporation of safe, comfortable and attractive public spaces.



## Built Environment Staging Centre

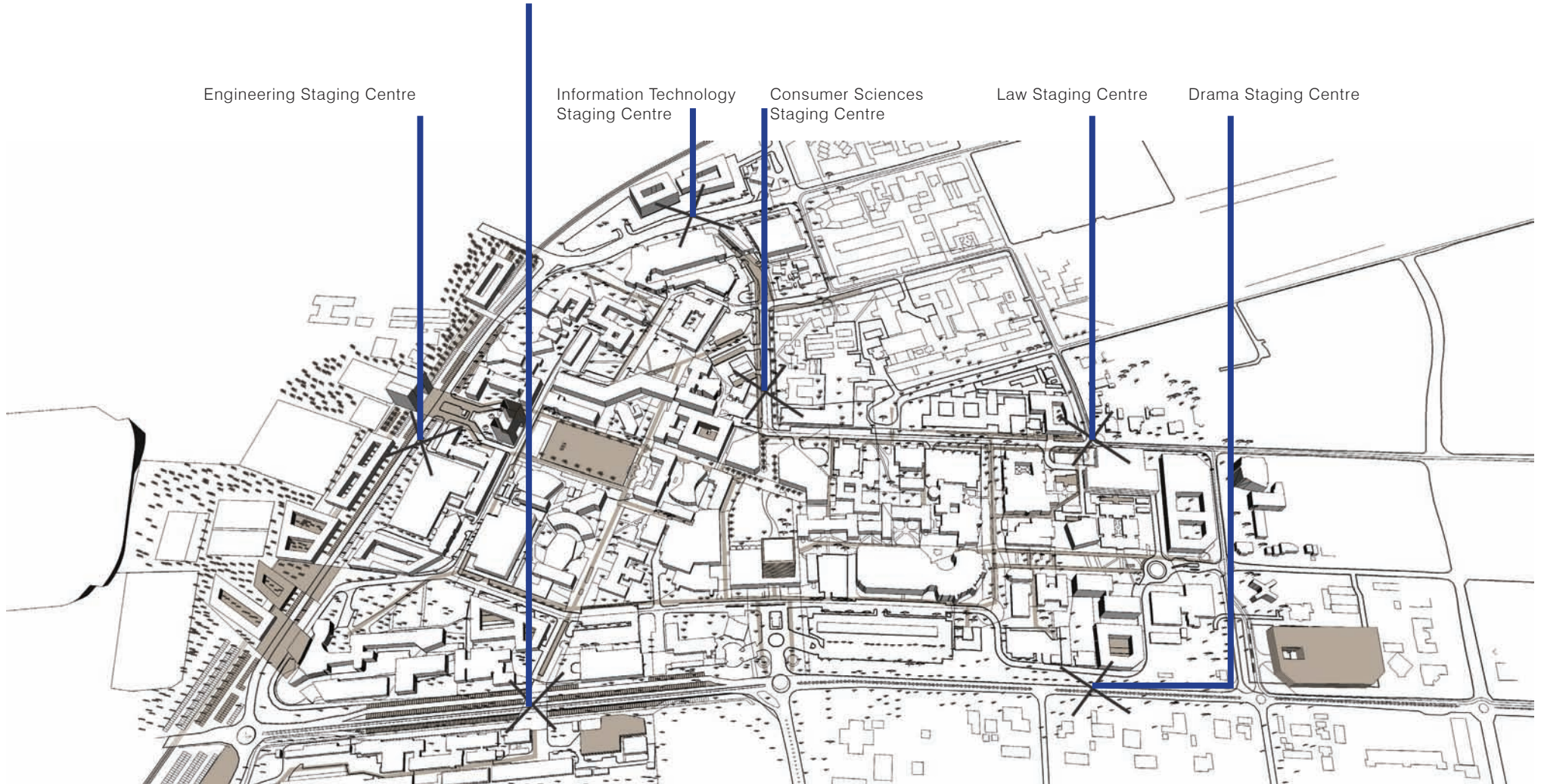


Figure 4.12 Proposed positions for GSCs

The proposal is to accept the Holm Jordaan Framework, with the exception of the previously mentioned aspects. In addition GSCs are proposed around the Main Campus periphery. The GSCs act as urban foyers that allow the public access to the academic environment. The characteristics of GSCs were discussed in detail in Chapter three.



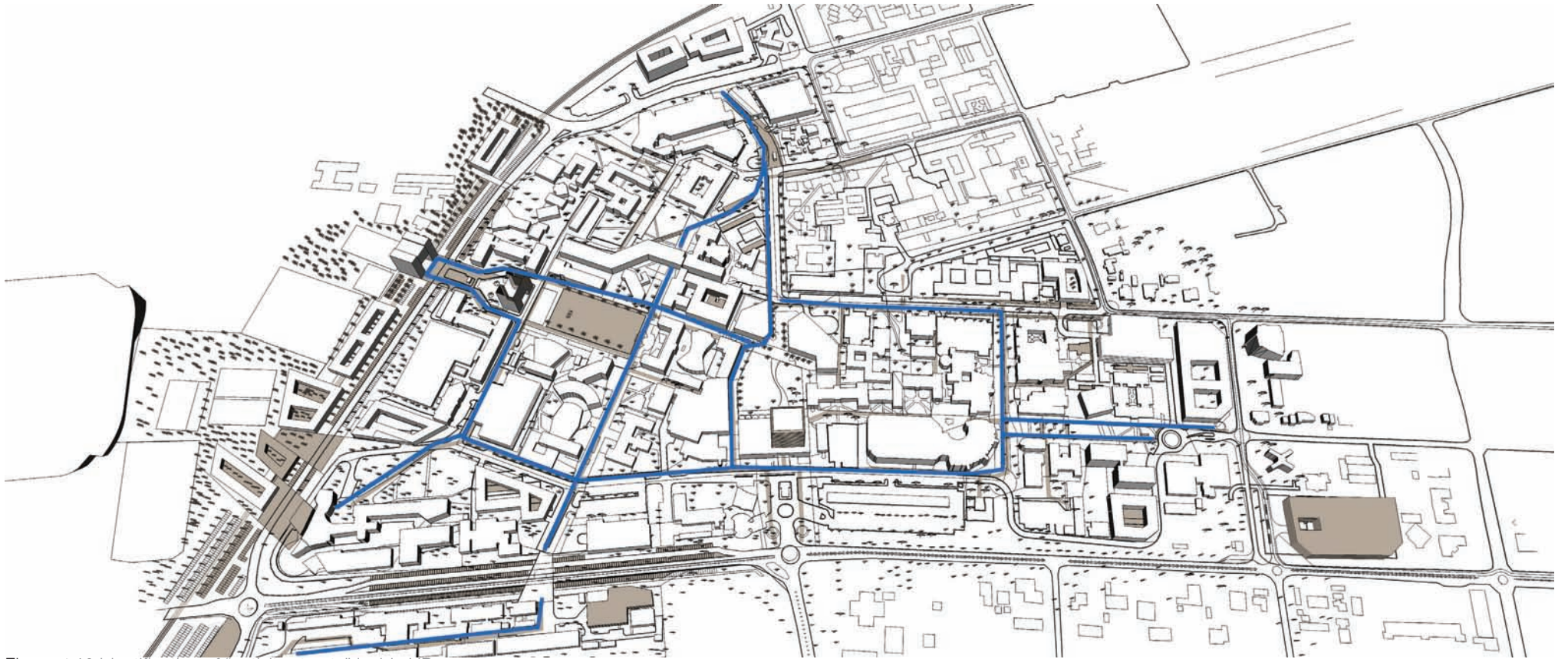


Figure 4.13 Identification of "activity streets" inside UP



## Activity streets

Activity streets have been identified as illustrated in Figure 4.13; they are broad corridors that encourage public interaction. Retail activity is encouraged in these streets and parking areas are not regarded as part of these avenues. These streets are to be well lit and well within the public eye, with ample public seating provided. They are situated around existing movement patterns to encourage social exchange.

Buildings defining the edges of activity streets are to be built up to the building line to create a corridor that defines the public domain. Commercial activity is encouraged on ground level.

These streets are both inside and around the periphery of UP, this is done in order to reconnect the University with its context and community.

## Architectural standards

The National Building Regulations are applicable in all cases. The following are encouraged:

- Each building should read as a separate entity;
- The interaction between buildings and the thresholds between buildings should be well designed and planned;
- The use of new materials that reflects the technology of the time
- Compliance with Green Star Accreditation System;
- The use of SANS 204 is compulsory.

## Build-to lines

All buildings should be built up to the Build-To line to better define public spaces and to create safer streets and public walkways by providing eyes on the street.

## Cooperative design approach

All new buildings are to be built on the cooperative design approach. This implies that buildings can share facilities such as a canteen, recreational facilities or service alleys. The main aim is to avoid underutilised dark alleys – this can also improve safety in the area.

## Landscaping

All landscaping should contribute to the public value of the space in terms of functionality, aesthetics and security. Planting should be used to soften the landscape as well as provide ample shading for the public; however, only indigenous plants are to be used. Where alien plant matter already

exists its influence on the surrounding landscape should be evaluated and then it should either be removed and replaced with indigenous species or kept until it dies naturally.

Xeriscaping should be used where possible to keep water consumption of the landscape as low as possible. The landscaped areas should assist the rainwater drainage to avoid storm water volumes increasing due to the introduction of many more hard surfaces.

## Parking design and development standards

New parking structures are zoned in and around campus. These structures are all to be multifunctional as it should be integrated with an educational programme similar to the new engineering building recently completed at UP.

Where parking is not part of a structure, it should comply with Table G of the

Tshwane Town-Planning Scheme, 2008 (City of Tshwane, 2008: 59). These include general requirements including minimum dimensions of 2,5m x 5m as well as 7,5m manoeuvring space. At least 10% of the total area of a parking area is to be landscaped with a minimum of one tree for every five parking bays.

It is encouraged to obtain the relevant consent to lower the required number of parking bays, as the implementation of the new public transport systems will lower the use of and need for private vehicles.

## Sidewalk design

All sidewalks are to be re-used and upgraded to create an urban character. Trees, lighting, seating, dustbins, planters and removable façade furniture are to be part of the sidewalks. All sidewalks are to be accessible to everyone, including disabled people and cyclists.

Where possible, a separate bicycle lane should be part of the sidewalk, encouraging the use of lower energy transportation.

## Storm water management

Grass bricks are introduced in order to assist in storm water management. Storm water management should be a part of each individual design with a zero run-off policy throughout.

## Street furniture

- All street furniture to be low cost, low maintenance and vandal proof;
- Street furniture to be integrated into the building fabric;
- Seating and refuse bins should be provided on 100m intervals on alternate sides of the boulevards and synchronised with street lamp spacing.

## Conclusion

The University can play an influential role in its direct community as well as in society at large. Creating spaces and facilities that make the University's image and iconic status more permeable will aid in the development of the influence the University has on society. Better accessibility and more inclusive design will enable the University to communicate better to the public as well as enhance its status in intellectual circles.

The opportunities around UP are endless, especially with the newly completed Gautrain Station, linking Hatfield to Johannesburg (Sandton) and the rest of the world (O.R. Tambo International Airport). The University should latch into this link and connection, allowing the University's influence within society to be more accessible to a much wider range of people in South Africa and around the world.

# chapterfive

## Contextual Response

## Site

### Climate

Temperature – Average maximum temperature: 24.3 degrees Celsius

- Average minimum temperature: 10.3 degrees Celsius

Solstice

- Summer: 41 degrees

- Winter: 88 degrees

- Equinox: 64.5 degrees

Rainfall

- an average of 720mm precipitation per year

(information obtained from: <http://www.climatetemp.info/south-africa/pretoria.html>)

### Access

The site can currently be accessed by students from both the northern and the southern boundaries, but no public access is possible from either side. From the north, one has to travel through the Main Campus main gate in Lynnwood Road and access the site from the parking area adjacent to Boukunde (Fig 5.1). From the south, access is only possible from the entrance into South Campus, situated in University Road, west of the site. Pedestrian access from Lynnwood Road is possible for students with valid student cards.

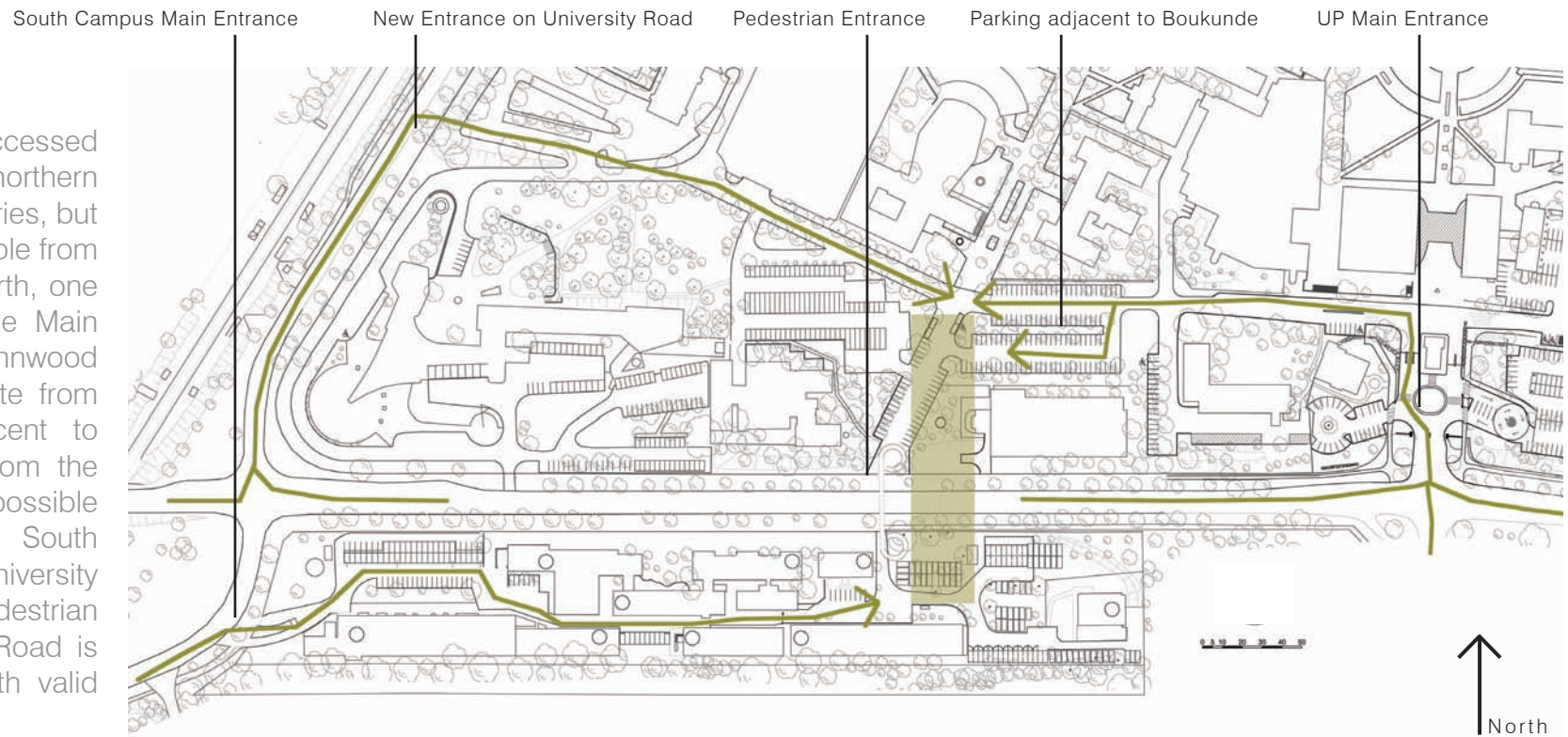


Figure 5.1 Existing site plan and access



## Parking

Over the years parking has become an increasingly serious problem at UP. Formal and informal parking areas are indicated in Figure 5.2. The University recently completed a New Engineering Building, combined with a 4 level parking structure. In the framework by Holm Jordaan a new parking structure is recommended on the eastern end of South Campus.

The new parking structure is not yet in the planning phase, but this dissertation respects the possibility that a new parking structure could be constructed within the next 10 years. In the meantime the lawn that is currently in its position will be used as a recreational and social space.

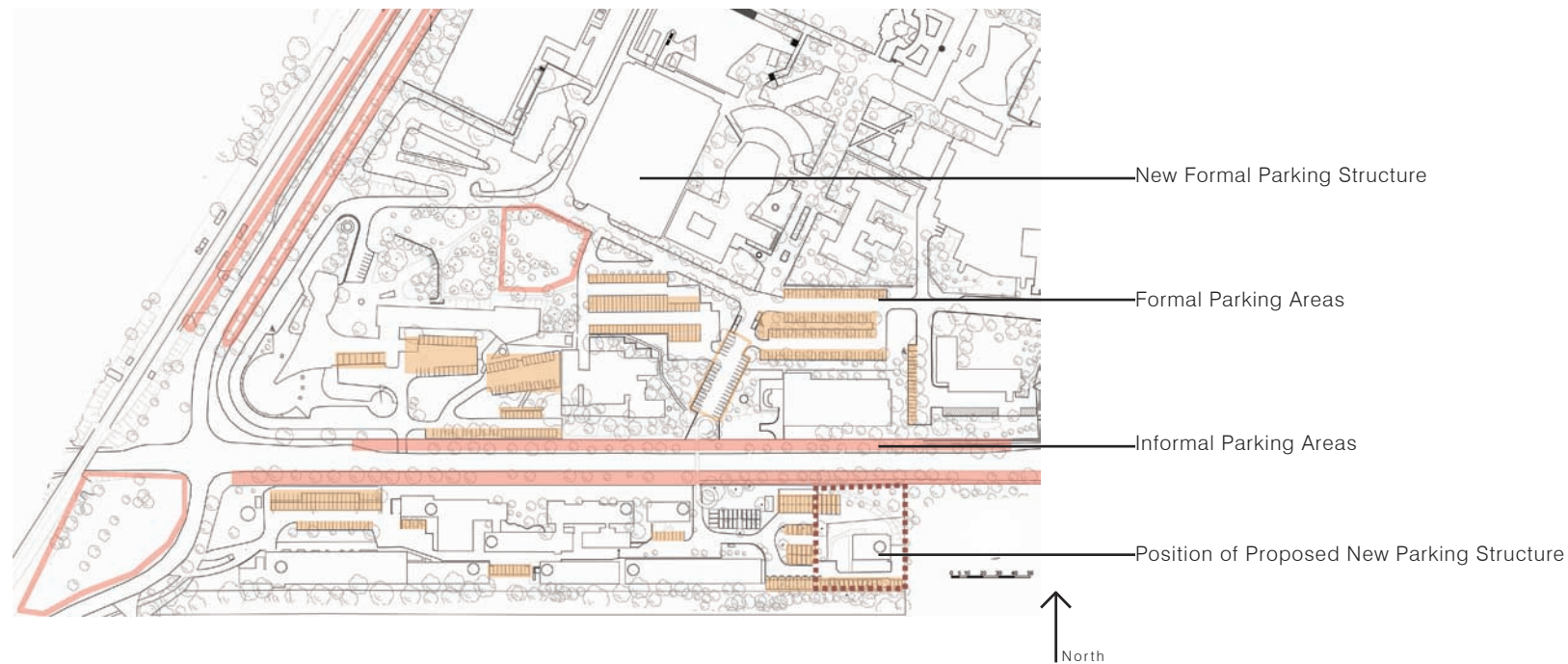


Figure 5.2 Parking at UP

## Buildings

This chapter deals with the influence the BESC and its context have on each other and how this leads to a concept. The history of each building is mentioned and then the contextual response to the building is described. When a building is discussed the spaces around the building, entrances, aesthetics and its relationship to other existing structures are also implied. The buildings and spaces that influence the BESC most and that are most influenced by the BESC are: Boukunde, the Visual Arts Building, the Town and Regional Planning Building and the proposed new PCB (Fig 5.4). Each of the three existing buildings in its own right consist of architectural significance, therefore it is important to respect and respond to these structures in a non-intrusive way.

The conceptual approach is discussed in relation to the context as these are interdependent in this dissertation. The concept assists in the unification of the different buildings on the site, the two segregated campuses, the different departments in the Built Environment and, over all, theory and practice.

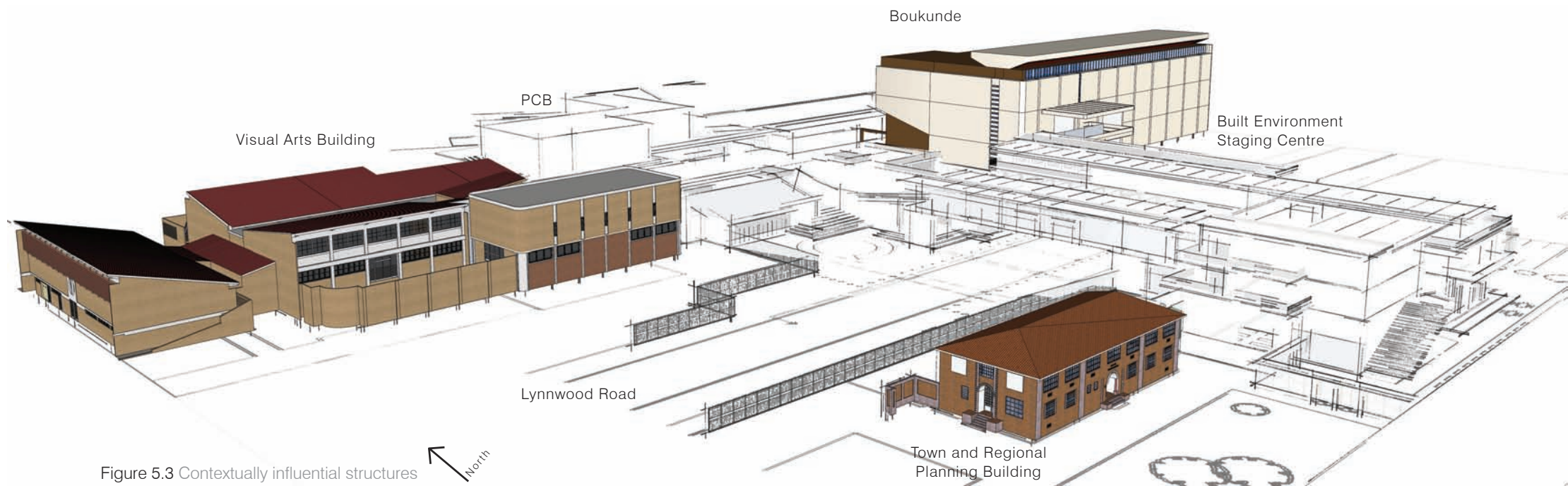


Figure 5.3 Contextually influential structures

Highlighted in Figure 5.4 are the buildings and elements that influence the architectural response on the existing site plan.

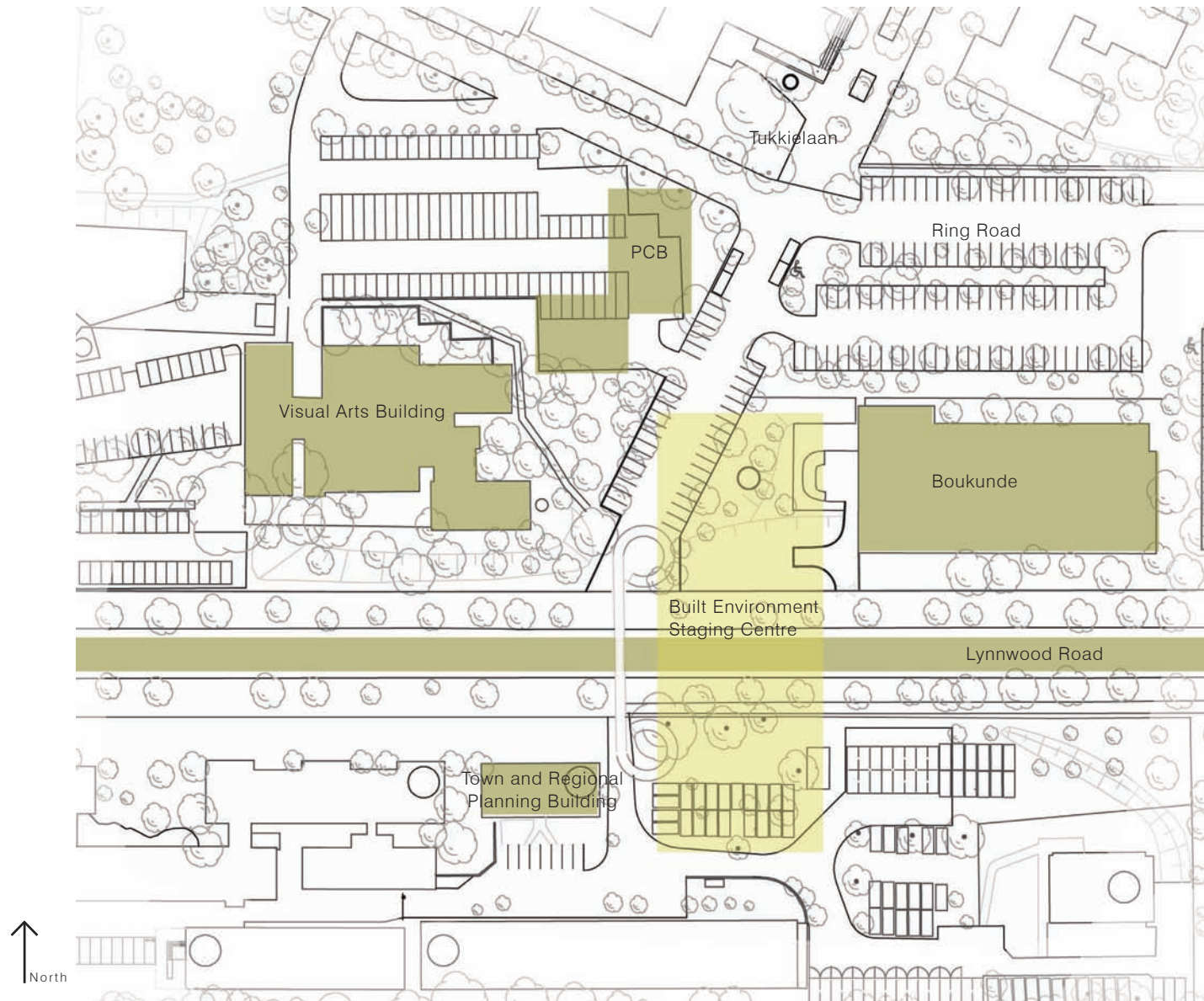


Figure 5.4 Important contextual design generators on existing site plan



## Background

In 1929 the faculty of the Built Environment, then known as the University of Pretoria Architects and Quantity Surveyors Association (UPAQA), was established. 31 years later the department was in desperate need of their own facility at UP. After completion of the Boukunde building in 1960, UPAQA moved in. By the 1960s the Building Industry Foundation of South Africa (BIFSA) established a new course in Construction Management that fell under the same department as Quantity Surveying. Both of these courses were moved out of the Boukunde building because there was not enough space for both departments. In 1973 the Boukunde building was expanded to accommodate more students and the facilities were upgraded to be more suitable for the education of architecture (Gardiner, 2008: 12).

The separation of the students in the built profession had an effect that reverberated into the industry. Due to the nature of the building industry, good relationships between different members of the industry are crucial. An architect, quantity surveyor or construction manager cannot work alone, as the different professions are reliant on each other for success. The

interaction between these professions should be stimulated and encouraged at university level in order to create better relationships in the industry (Meiring, 1961: 10). When all the professionals in the built environment fully understand what the roles and importance of the other professionals are, it could, arguably, result in better projects.



Figure 5.5 Boukunde building view from the north east, 1960.



## Boukunde

The Boukunde building (Fig 5.6), that currently houses the Department of Architecture at UP, was designed and constructed in 1960 (Ad Destinatum, 1960: 67). The building is a modern iconic building that sits as an object in the landscape. The singularity of Boukunde should be respected.

The original Boukunde building was mainly a concrete structure with glass curtain walls (Fig 5.5). Increased vehicular activity on Lynnwood Road caused the studio spaces to be too noisy and the building was altered and changed into the structure it is today.

Originally the building had a southern entrance, on Lynnwood Road, with a public lecture room and kitchen. The intention was that this would become a space where

members of the built environment could interact (Meiring, 1961: 13).

For security reasons the University was fenced off and the southern entrance lost its functionality. The exterior spaces on ground floor are therefore currently under-utilised and neglected.

The connection between Boukunde and the BESC should therefore be designed to revitalise these spaces and in this way not take away any of the architectural significance of Boukunde, but rather re-establishing its original functions.

The Department of Architecture's projections are to have 140 first year students, 130 second year students, 100 third year students, 80 fourth year students and 60 fifth year students by 2015 (Gardiner,

2008: 16). That implies that the facility that currently houses approximately 400 students must be able to deal with 100 more students as well as the necessary staff within the next five years. The current facility is saturated and expansion is inevitable.

A building designed and located close to Boukunde should be

sensitive to its original identity. Un-intrusive connections into Boukunde are only possible in the middle of the facades, not affecting the corners, the ground floor or the roof line of the existing structure. In this way Boukunde can be connected to the BESC structure without affecting the modern identity of Boukunde.

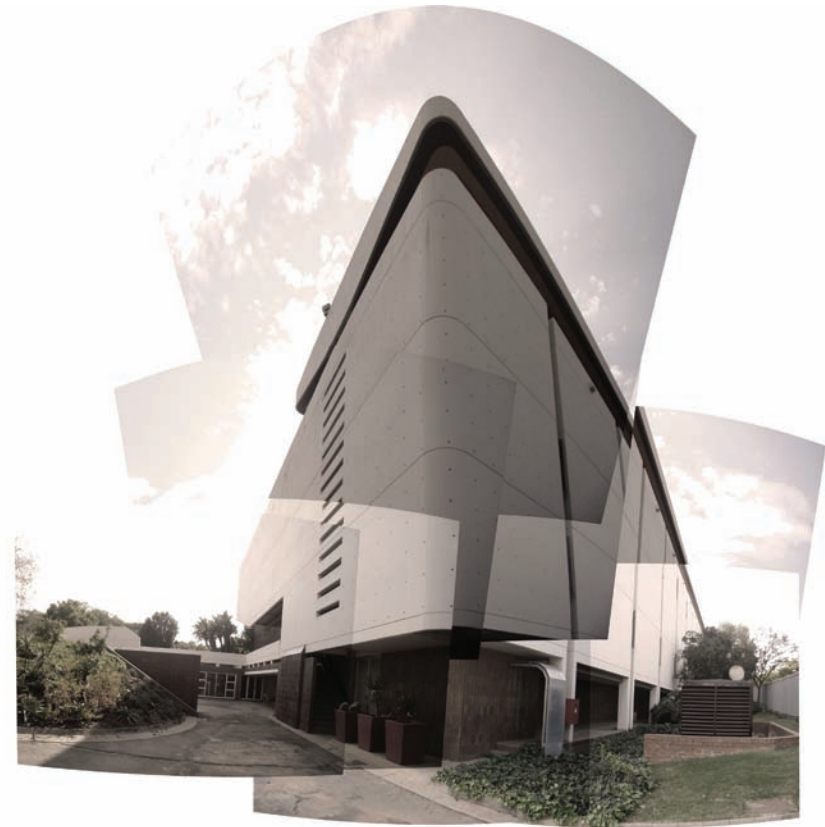


Figure 5.6 Western corner of Boukunde building, 2011

## The Visual Arts Building

The Visual Arts Department has been described by the University as an “embarrassment” (Vosloo: 2011). This department has proven itself to be amongst the most influential art departments in the country, but its facilities reflect the opposite. The University of Pretoria is currently planning on re-developing the facility and adding an exhibition space that will not only serve the Visual Arts Department, but also host the University’s permanent art collection. The collection has an estimated value of R400 million, yet it is not easily accessible (The University of Pretoria, 2011). The new building is planned to be situated on the eastern side of the current Visual Arts Building. The client in this brief is the UP Facilities Management Department.

In a paper ‘Designing the University of the Future’ Rifca Hashimshony and Jacov Hain argue that “universities will undergo major organizational and physical changes as they adapt their activities to meet present and future needs” (2006: 5). The organisation of the integration of the members of the Built Environment, the Visual Arts Department and the public will result in a new building typology, not only at UP, but also in the country.



Figure 5.8 Existing entrance to Visual Arts Building

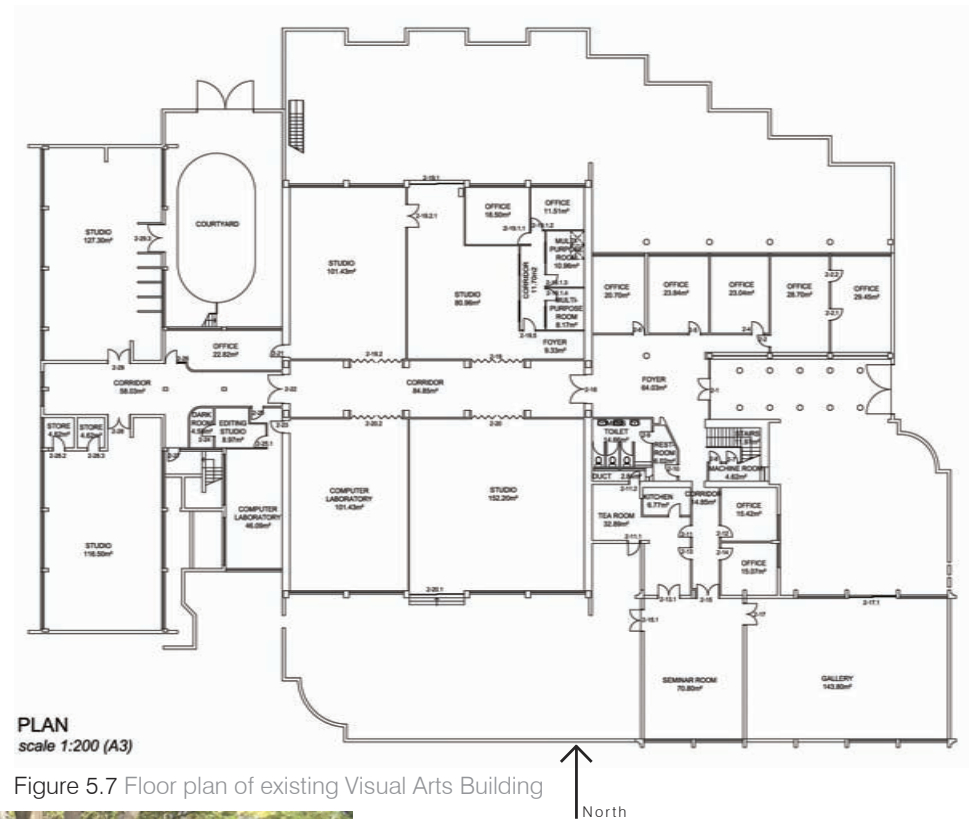


Figure 5.7 Floor plan of existing Visual Arts Building

## Connection between Boukunde and Visual Arts Building

The connection between Boukunde and the Visual Arts Building is currently divided by the southern end of Tukkielaan, a pedestrian walkway. Furthermore cars are also currently parking in this area, resulting in a very poor connection between the two facilities. The walkway towards the entrance of the Visual Arts Building is shown in Figure 5.9. The proposal is to establish a public space that encourages interaction between the architecture and art students, connecting the two facilities through social activity.

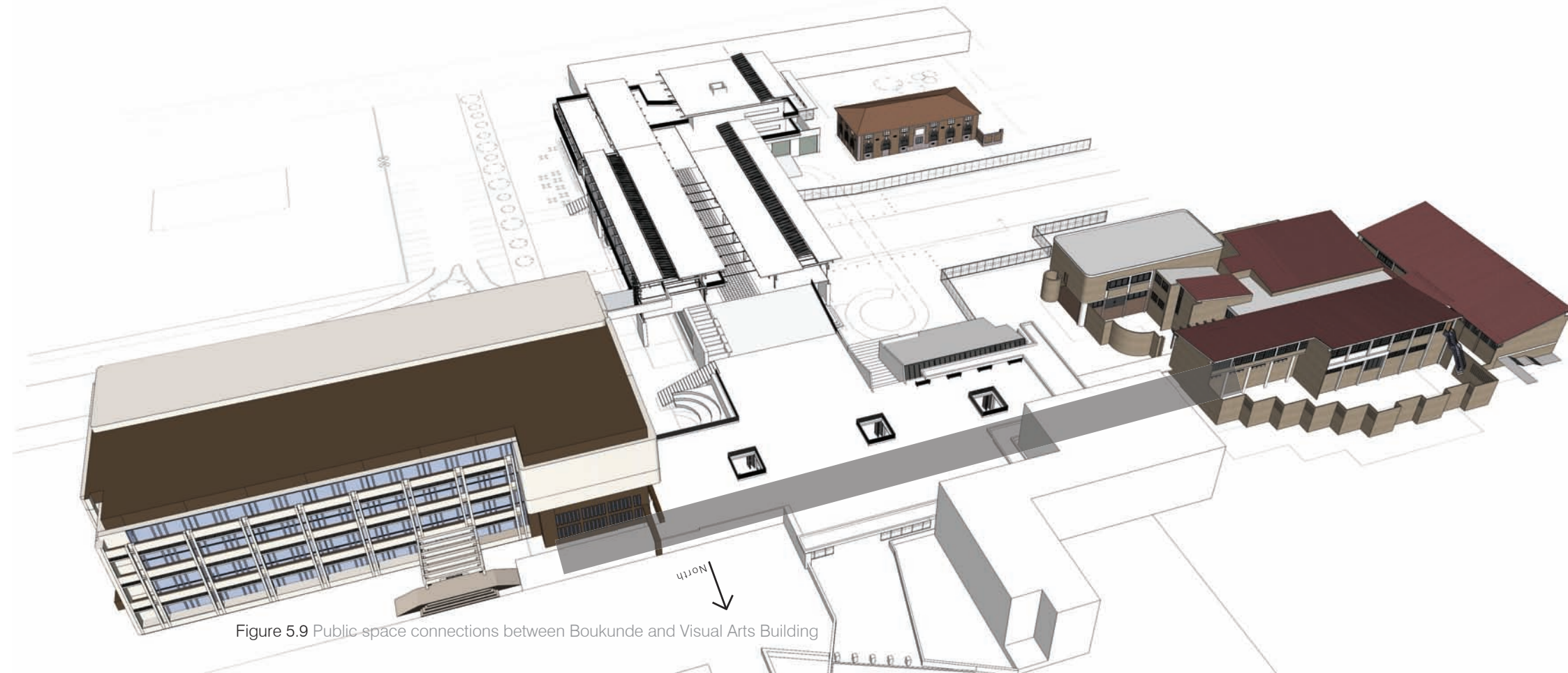


Figure 5.9 Public space connections between Boukunde and Visual Arts Building



## Lynnwood Road

Elandspoor farm was obtained by James Mears in 1875. The farm was located between the current Burnett Street to the north, Rupert Street to the east, Pretoria Boys' High School to the south and University Road to the west (Fig 5.11). Originally the now known Lynnwood Road was an ox-wagon trail dividing the farm, Elandspoor, into two parts (University of Pretoria, 1960: 264). Today, UP Main Campus is on the northern side and South Campus on the southern side of this historic thoroughway.

The original ox-wagon trail divided the site in the early 1900s and its effects are still evident today. The trail developed into a four lane vehicular street that separates South Campus from Main Campus. In order to address this separation it is important to respect the current activities happening on Lynnwood

Road and use them to the benefit of the project. The energy, i.e. the amount of vehicular and pedestrian movement generated by Lynnwood Road - will be embraced and the design will be structured around it to enhance the quality of the spaces and the area through the creation of a link between the two campuses.

Lynnwood Road is an arterial road connecting the N1 national highway with Pretoria CBD. Traffic intensity can reach a high of 3000 cars per hour (Lotz, 2008: 45).

Lynnwood Road has been identified as an Activity Street in the urban framework. The implementation of the adapted TOD and BRT systems are applied in Lynnwood Road, in order to make the BESC a pedestrian friendly and accessible building.

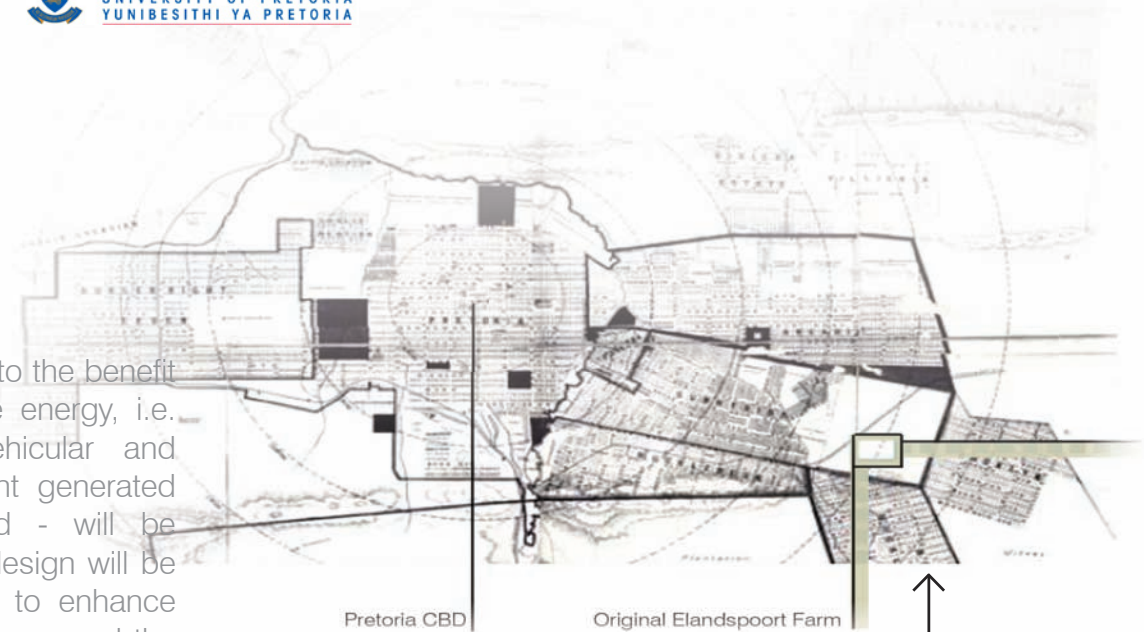


Figure 5.10 Location of Elandspoor Farm in relation to Pretoria CBD

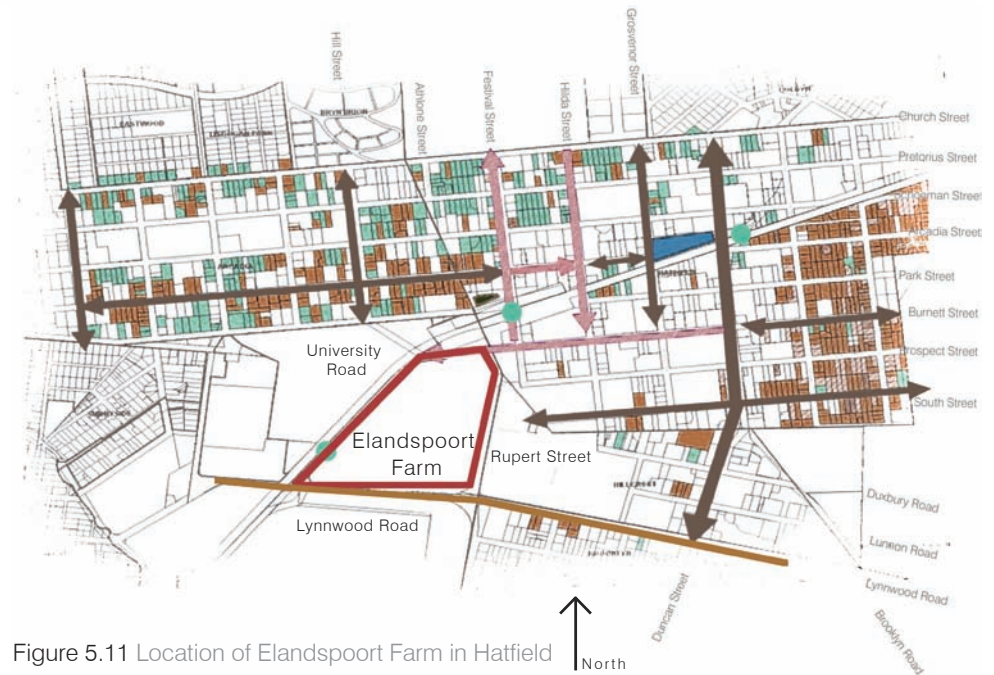


Figure 5.11 Location of Elandspoor Farm in Hatfield



## Town and Regional Planning Building

The first buildings along Lynnwood Road were constructed in 1933; these were facilities for the Fuel Research Institute. Continuous development took place until 1980 when the Council for Scientific and Industrial Research (CSIR) obtained control over the area now known as South Campus, even though the grounds and the buildings were government property. In 1990 UP obtained ownership of the area under the conditions that it is used for educational facilities and the University was responsible for the moving of all CSIR property. The facilities were

renovated to accommodate numerous functions (University of Pretoria, 1996: 501).

Constructed in 1933, the Town and Regional Planning Building was one of the first buildings on South Campus. The building is therefore protected by the Heritage Resources Act of 1997 and any additions or alterations to the building are subject to legislative approval.

Instead of physically linking the BESC with the Town and Regional

Planning Building, a link could be established with the exterior spaces around the buildings. These exterior spaces are currently under-used and could be re-used; to allow the building to be experienced from all sides, recognising its heritage and architectural significance.



Figure 5.12 Northern facade of Town and Regional Planning Building

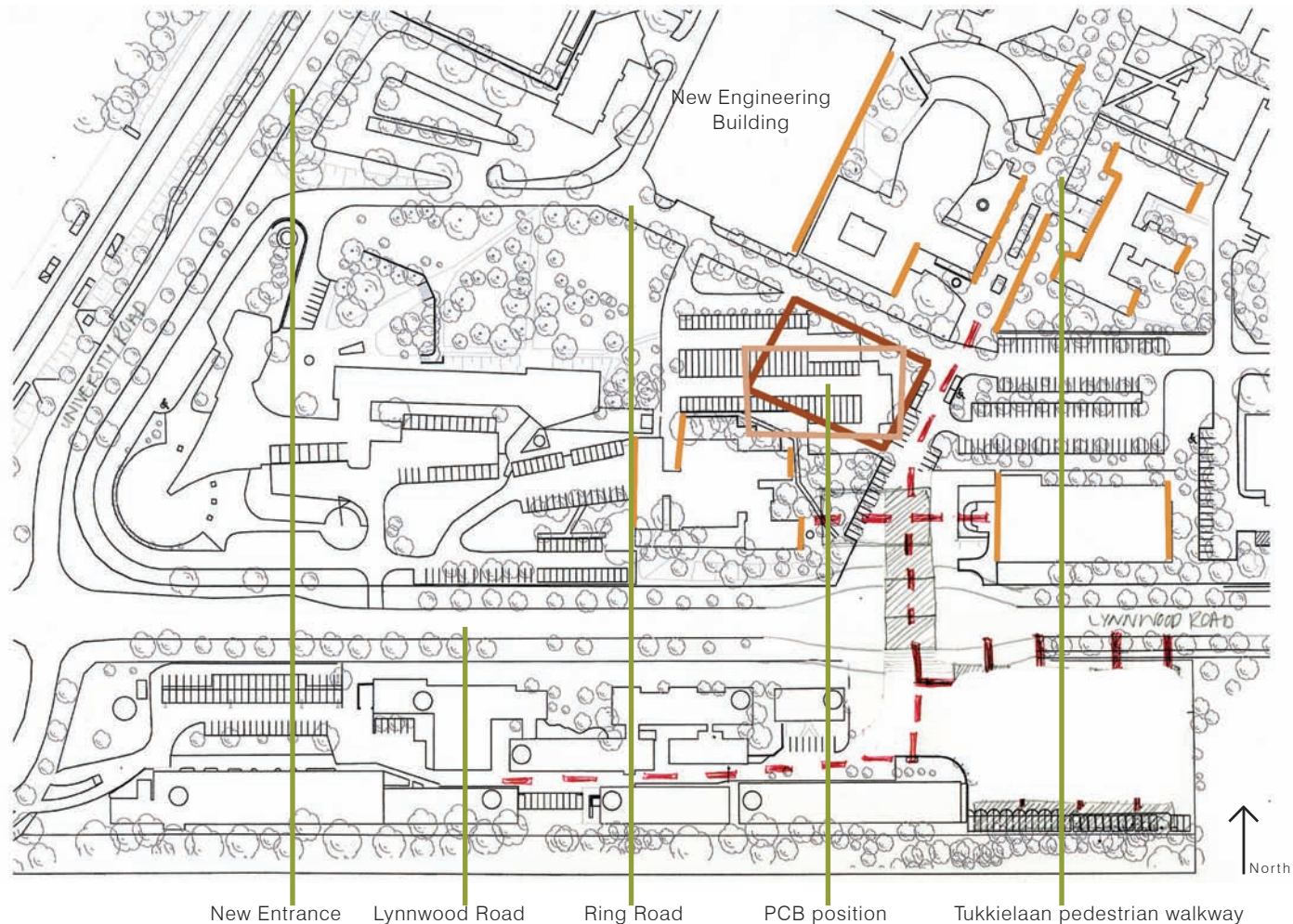


Figure 5.13 Spatial relationship between BESC and Town and Regional Planning Building

## The proposed new Permanent collection Building (PCB)

This building forms part of the NVABES project. This dissertation suggests a footprint of the building as indicated in Figure 5.4. Access to the building is important from the inside of Main Campus as well as the outside. Therefore, the location of this new development is on the corner of the Ring Road and Tukkielaan (Fig 5.14), allowing access to the students from inside campus and to the public from outside campus, on Lynnwood Road. The design of the PCB does not form part of this dissertation.

The PCB frames the entrance to the BESC from the northern side. A change in axis happens at this exact point: the change from the Tukkielaan axis to the Lynnwood Road axis. This building should also relate to the new entrance into UP from University Road (Fig 5.14) and the new Engineering building, both completed in 2011.





## Tukkielaan

Tukkielaan, as mentioned previously, is a pedestrian walkway that runs from north to south through Main Campus (Fig 5.15). Before the expansion of campus, Tukkielaan was a vehicular route with an entrance into Boukunde. After the University was fenced off, this entrance became only a pedestrian entrance for students. The current pedestrian bridge linking South Campus to Main Campus is situated at the southern end of Tukkielaan.

In terms of its heritage, Tukkielaan should be respected and rejuvenated. The current pedestrian entrance linking Tukkielaan and Lynnwood Road is not successful.

In this dissertation the proposal is to give Tukkielaan a destination; by changing the axis and extending the pedestrian walkway over to South Campus.

## Storm water channel

A storm water channel is situated south of South Campus (Fig 5.15), separating South Campus from Pretoria Boys' High School. The water in this channel is an accumulation of the run-off from the neighbourhoods in the vicinity. The channel is part of the network that transport run-off into the Apies River, west of the University.

This open space is neglected and under-utilised. Many trees and grass around the channel present the opportunity to use the adjoining space as a recreational area.

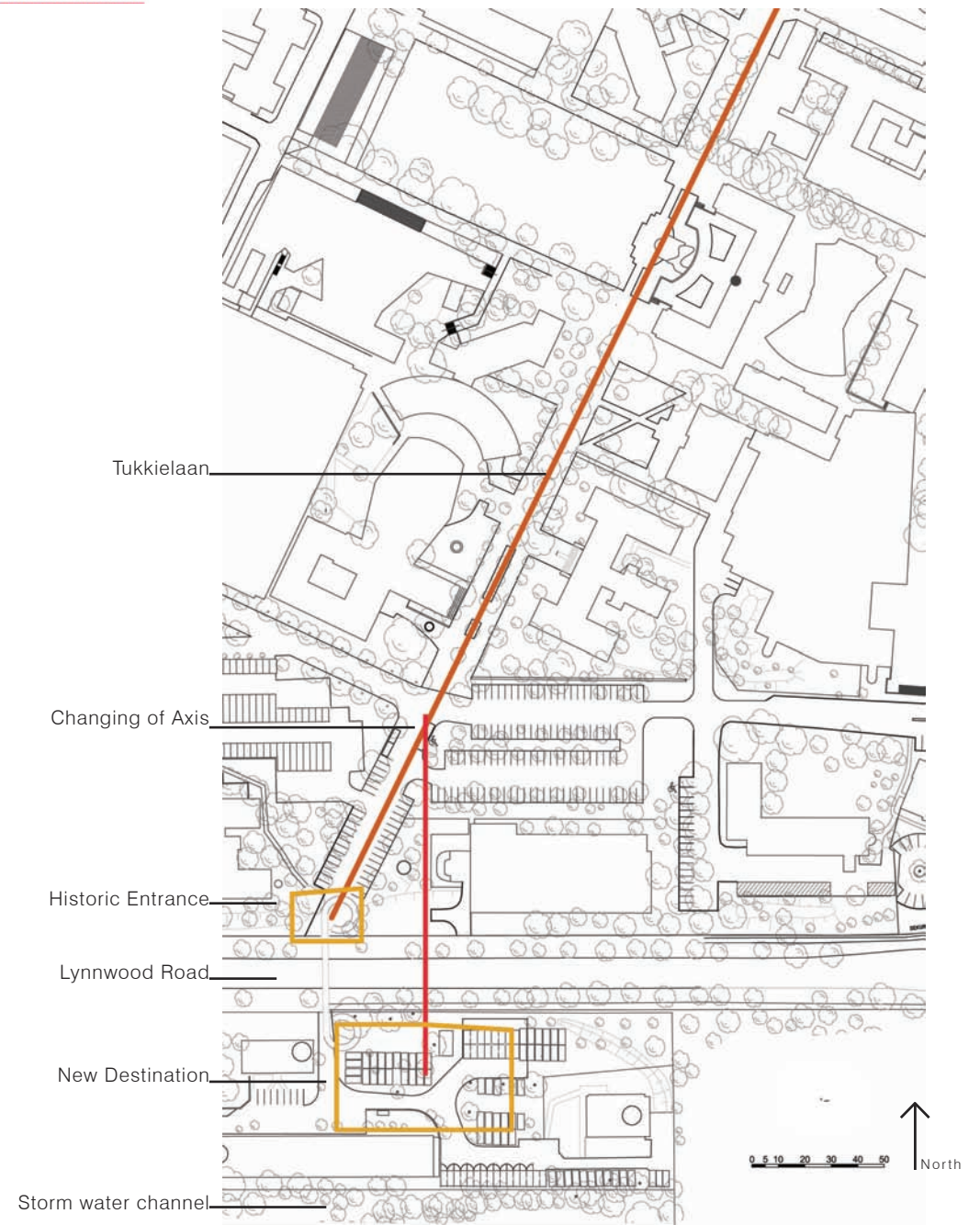


Figure 5.15 Tukkielaan and storm water channel

## Concept development in context

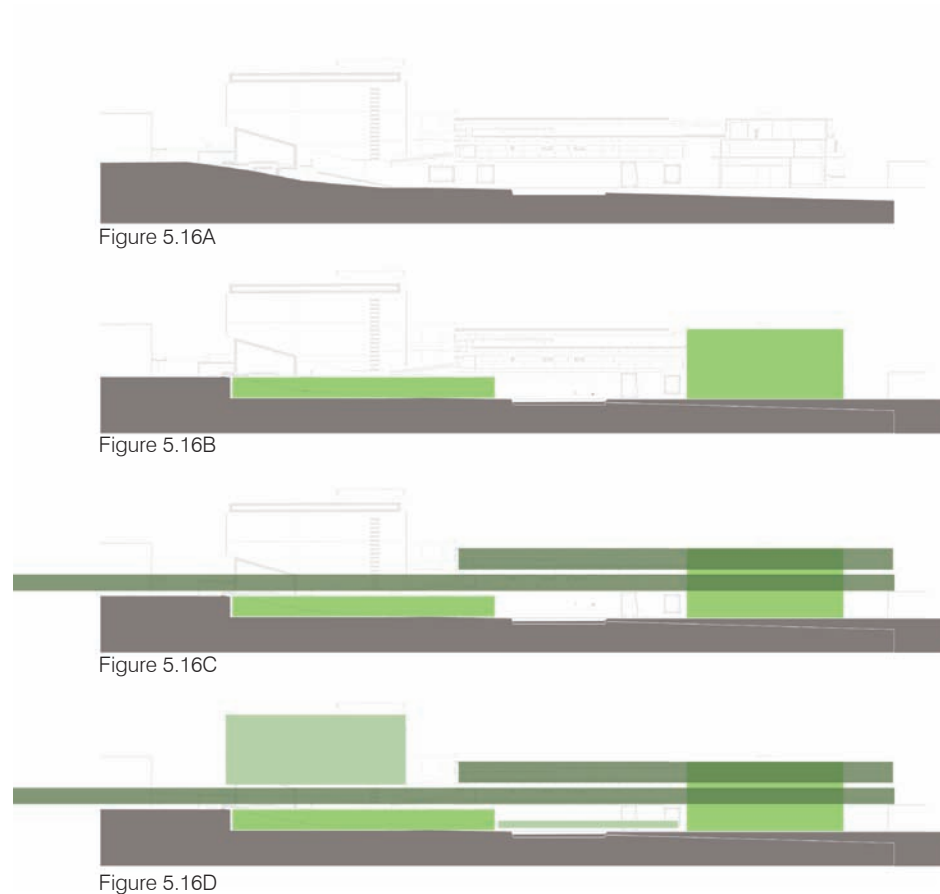


Figure 5.16 Diagrams explaining the concept: linking

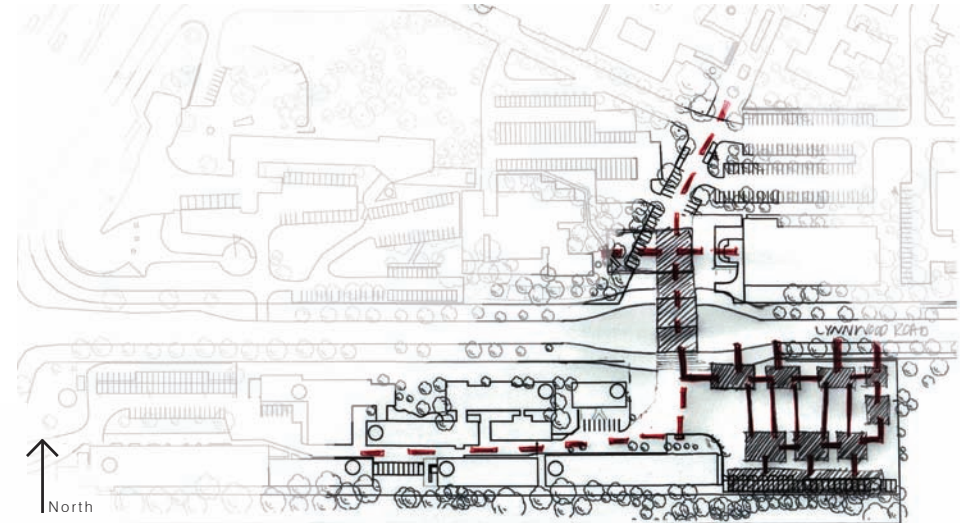


Figure 5.17 First concept drawing: linking

The primary concept is to establish a link between architectural theory and practice, South Campus and Main Campus, the different departments of the Built Environment and the University and the public. The concept was developed as a result of the research questions. The concept is to unite many different segregated entities through the creation of one facility spanning over Lynnwood Road.

In Figure 5.16 the concept of linking is explained: The context plays an integral role in the

establishment of the concept; the elevation of pedestrians, due to the natural slope (Fig 5.16A), is used to create a better pedestrian link between Main Campus and South Campus, over Lynnwood Road. The pedestrian bridge is used to link programmes that are situated on either side of Lynnwood Road (Fig 5.16B). The facade of the structure is then used as a further link between Up and its community, through a new interface (Fig 5.16C). The linking of the facilities around the bridge gives the concept context and relevance (Fig 5.16D).



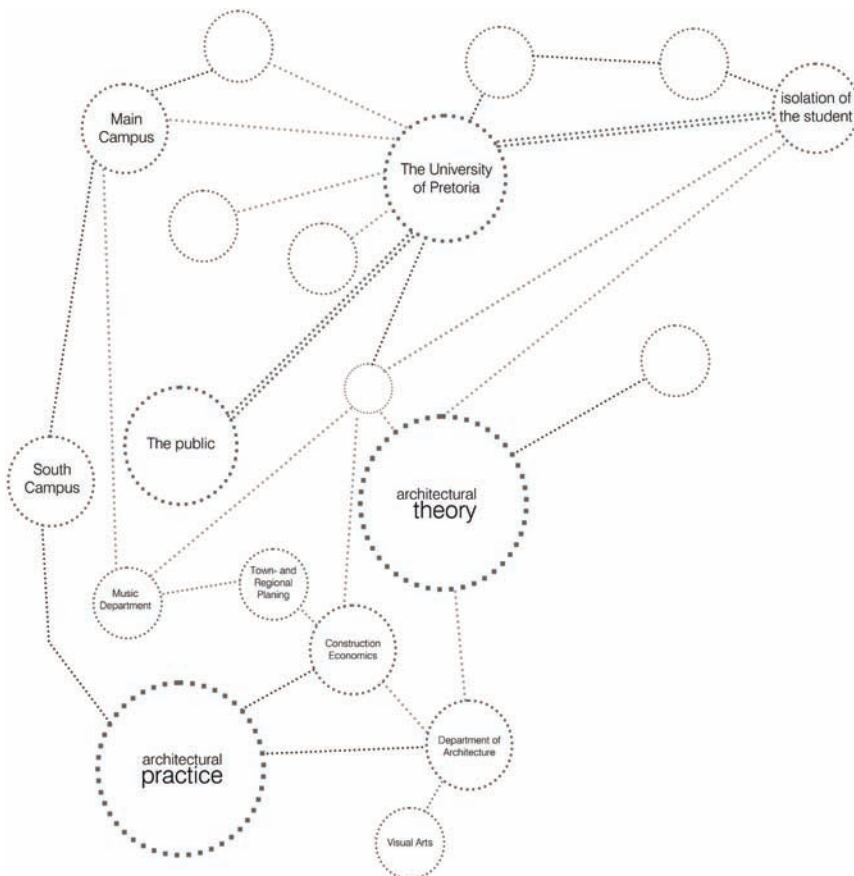
## Concept: Foyers

Foyer [foi-er]  
-noun

A hall, lobby or anteroom, used for reception and as a meeting place, as in a hotel, theatre, cinema, etc.

A centre providing accommodation and employment training, etc. for homeless young people (<http://dictionary.reference.com/browse/foyer>).

A space that links spaces with similar intentions but different functions (author)



The concept is to develop a series of foyers that act as the linking elements between the previously mentioned segregated entities (Fig 5.18). The concept of foyers is comprehensive in its inclusion of all scales.

A foyer is a place of social gathering, an introduction, a preparation and threshold into another space; it is a space where different functions meet and interact.

Foyers can have many different characteristics on many different

scales. The scale of the foyers can range from an entire street edge to a change in pavement pattern, introducing another space. The whole BESS can be seen as an urban foyer, acting as a threshold between the University and the public.

The establishment of the foyers on an urban level is indicated in Figure 5.19. Two large urban foyers, one on each side of Lynnwood Road, were defined and the programme development and design was structured around these.

Figure 5.18 Diagrammatic demonstration of unification of segregated entities

The new urban foyers are situated between Boukunde and the Visual Arts Building, north of Lynnwood Road and on the lawn next to the Town and Regional Planning Building, south of Lynnwood Road. The link between the two foyers becomes another foyer, adding the second layer of foyers to the concept.

intervention would have on the direct environment forms an integral part of the concept development.

Through the development of the site framework many layers of foyers are identified. The interaction, dependency and connections between these foyers are so integrated that they can no longer be separated.

The unification of the foyers assists in the unification of the segregated entities as indicated in Figure 5.18.

In Figure 5.20 pedestrian movement is indicated and a conceptual framework is developed for the site. The context and the influence the

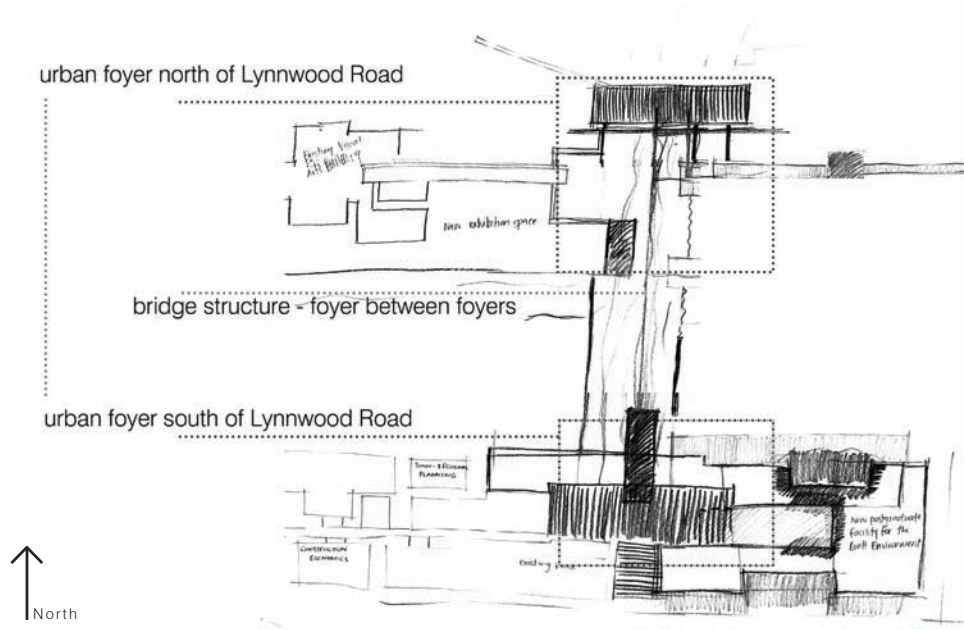
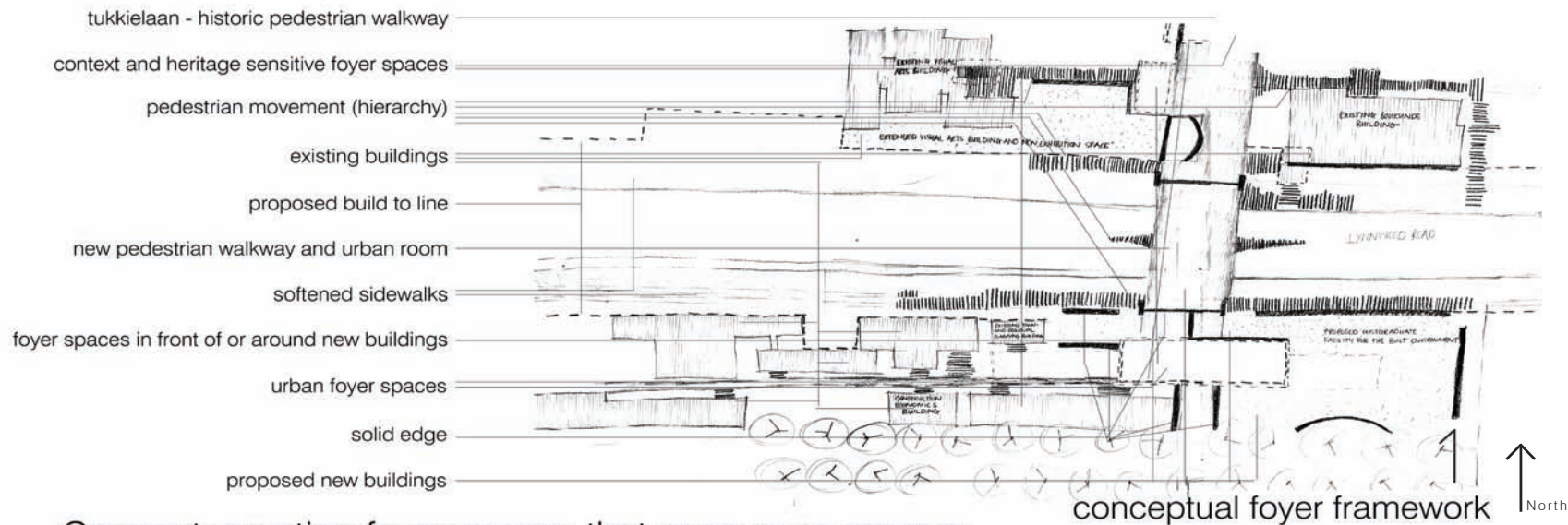


Figure 5.19 Initial urban foyer identification



Concept: creating foyer spaces that encourage synergy

Figure 5.20 Diagram summarising the concept of foyers, within context

All the spaces in the final design can be divided into different foyer spaces. These spaces are defined by the type of interaction that will predominantly take place in them and not necessarily by its physical attributes. The type of interaction is divided into social, intellectual and practical interaction.

Figure 5.21 illustrated how the various foyers interact and link up with each other. Even though the foyers seem defined and predetermined, the interaction between the users will change the reality of the foyers on a daily basis.

The various programmes of the building aid in the definition of the various foyers. The synergy between the foyers and its dependency upon the existence of the other create another series of foyers, at a larger scale. This process of grouping the various foyers into larger foyers can continue until the whole BESC can ultimately be seen as a social, intellectual and practical foyer into the University.

foyer interaction social, intellectual and practical

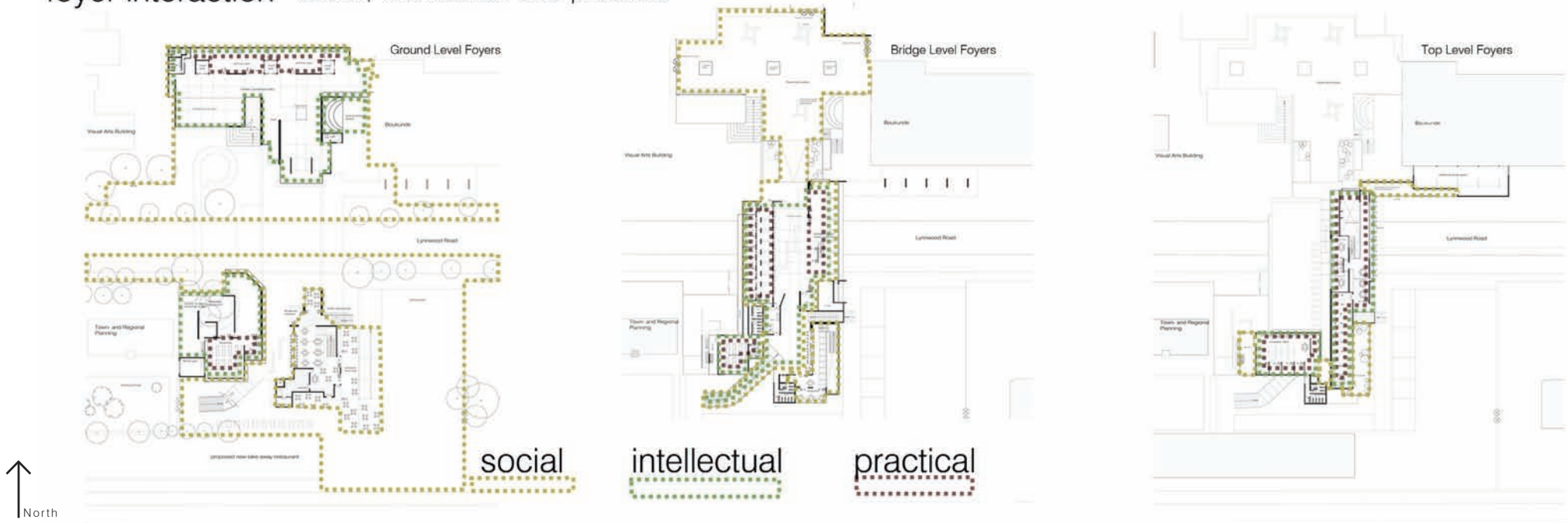


Figure 5.21 Diagram illustrating the synergy between the foyers



## Architectural intent

The architectural intent is to develop an inhabited bridge that can accommodate many functions, such as exhibitions, a restaurant, lecture rooms and public spaces, to enable segregated entities to interact and unite in a sustainable manner.

The inhabited bridge should read as a light-weight, non-intrusive element that complements its context and adds value to it. The horizontality of the structure will communicate its function as a linking, urban foyer that acts as the new interface between UP and the public.

After the contextual analysis and establishment of the programme a diagrammatic exploration was done to evaluate what the priorities are in the design of the BESC. The following images are a summary of the design principles that were identified and implemented in the design.

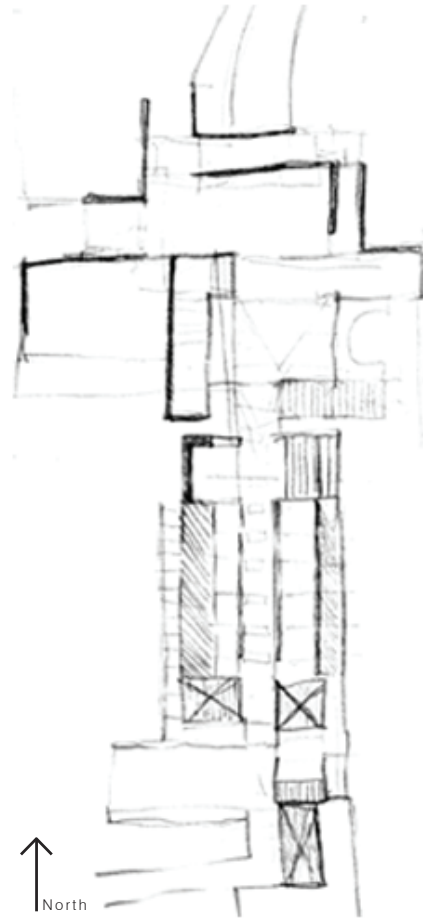


Figure 5.22 Conceptual diagram exploring the linear logic of the bridge level plan

Key:

————— identified opportunities  
 ..... rejected considerations

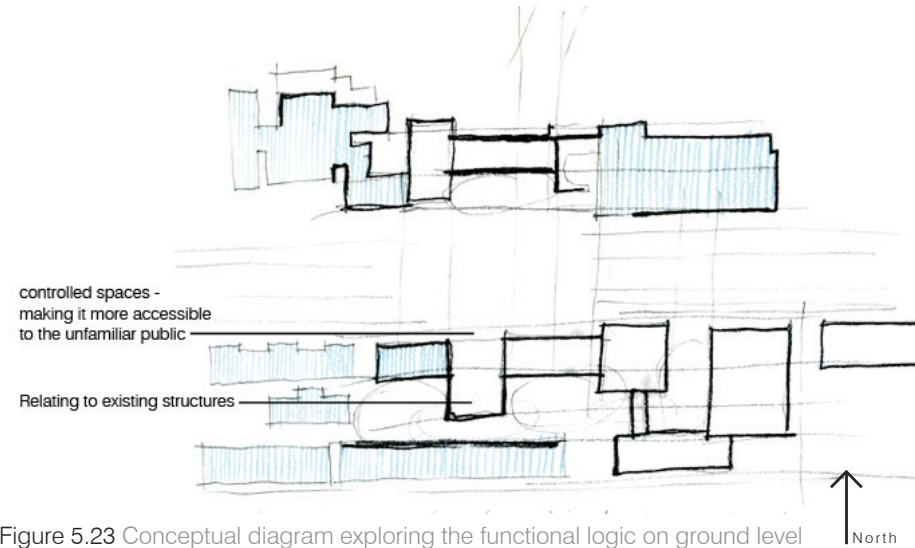


Figure 5.23 Conceptual diagram exploring the functional logic on ground level

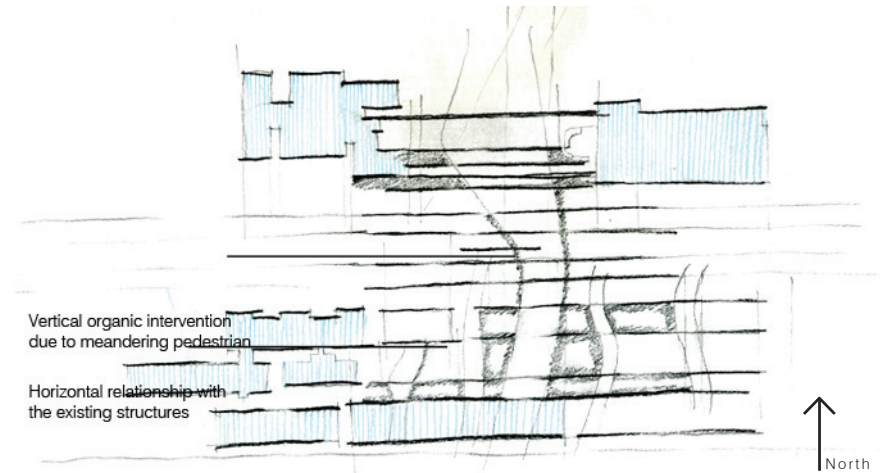


Figure 5.24 Conceptual diagram exploring horizontal order versus vertical organic lines



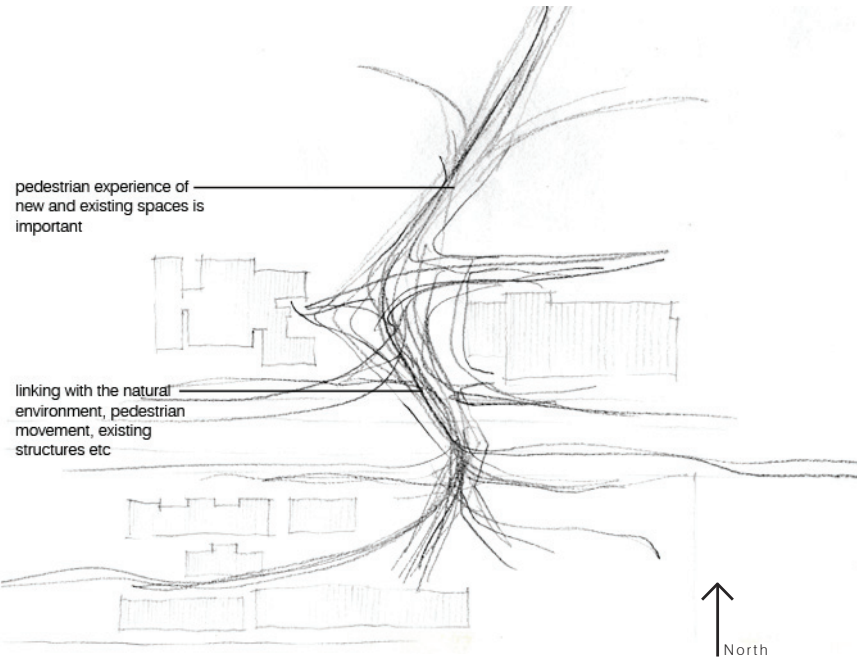


Figure 5.25 Conceptual diagram exploring less rigid movement pattern

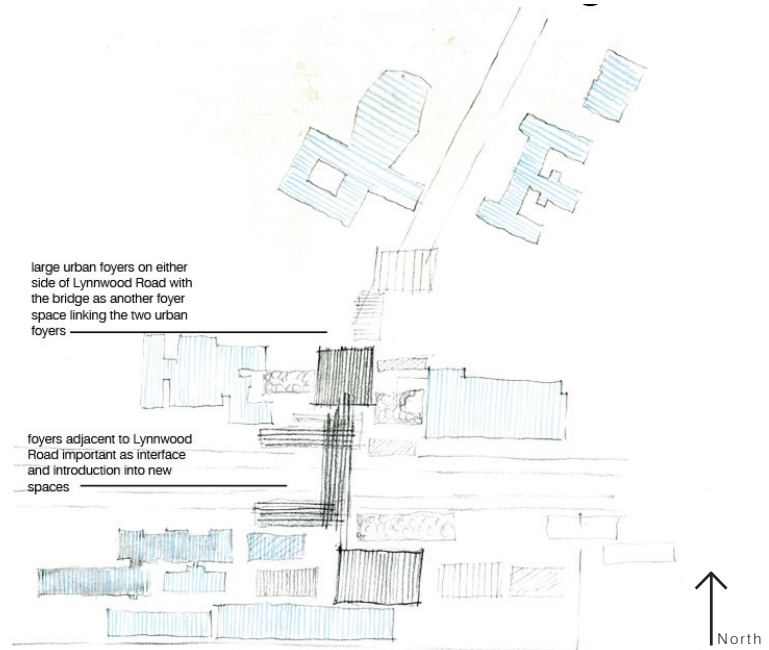


Figure 5.27 Conceptual diagram exploring the hierarchy of the urban foyers

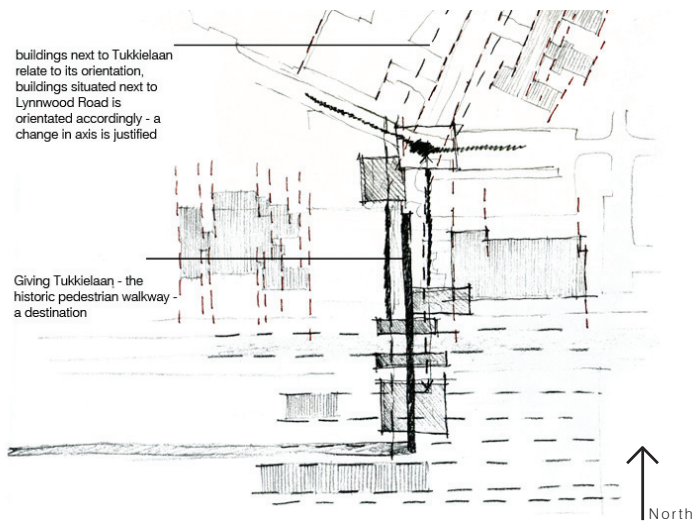


Figure 5.26 Conceptual diagram exploring the changing of existing axis

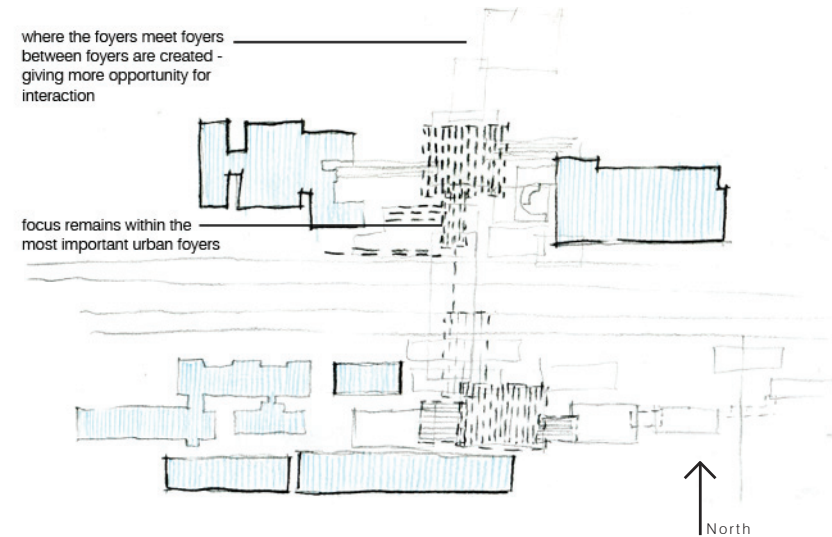


Figure 5.28 Conceptual diagram exploring the hierarchy of the foyers between the foyers

# chapter six

Design Development

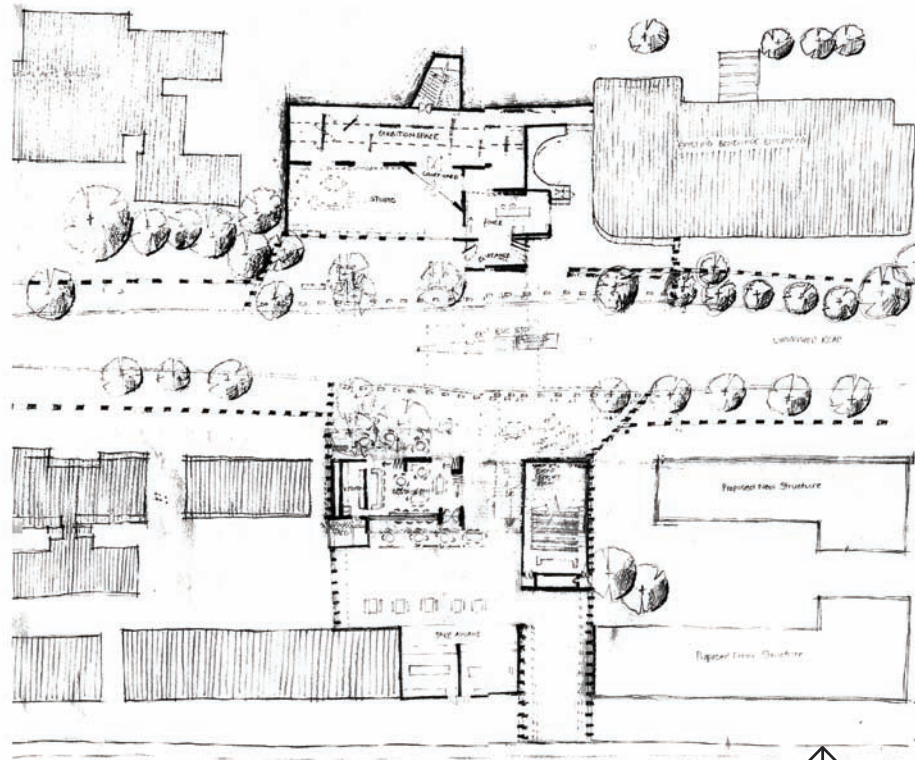


Figure 6.1 Ground level spatial organisation exercise

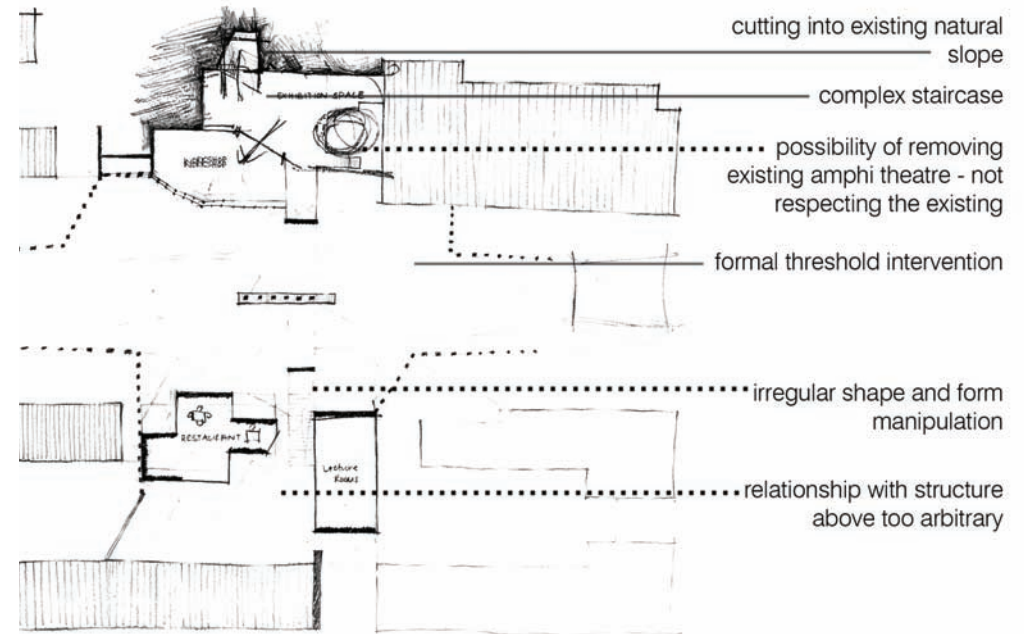


Figure 6.2 Ground level exploration of threshold extension

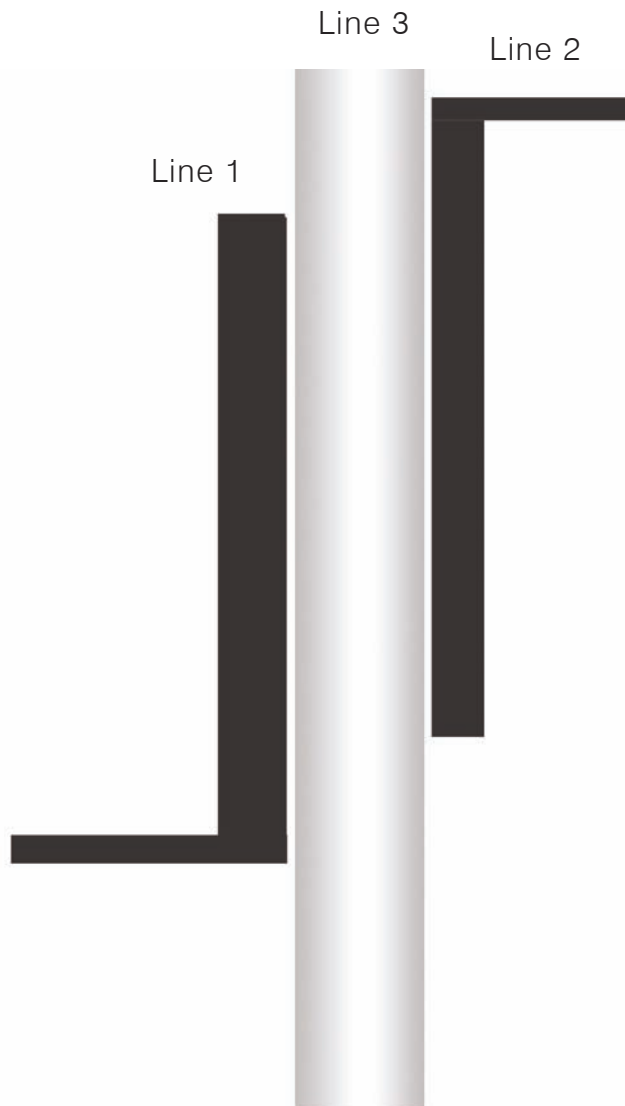


## Introduction

This chapter is a summary of the design process. Design is not a linear process and this should not be regarded as a chronological representation of the design progress. As the theory, context and requirements for the design developed, the planning was re-examined and evaluated. This chapter aims to communicate the this approach.

Both positive and negative aspects were identified in all plans and diagrams and then new plans were developed from the knowledge acquired from the previous sketches. Free-hand sketches, precedents, physical models and computer generated models were used in the development of the design.

## Parti diagram



The parti diagram (Fig 6.3) is a simple line sketch that summarises the design. As a whole the parti refers to the linearity of the design and the layering of the various systems to create an integrated structure that relates to its context.

**Line 1** refers to the western facade of the building and the space created on South Campus as well as implying the main movement pattern to South Campus.

**Line 2** refers to the eastern facade and the direct link to Boukunde. The link with the context is therefore implied.

**Line 3** suggests the spaces between the actual built fabric. It refers to the the interaction, activity and function of the structure as a whole.

The similarity of the outer lines suggests the equality of the entities linked in the design, with the inner line suggesting the actual linking of segregated entities.

The rigidity of the overall parti refers to the logical structure and how the structure is utilised to contain various systems.

Figure 6.3 Parti diagram



## Free-hand sketches and diagrams

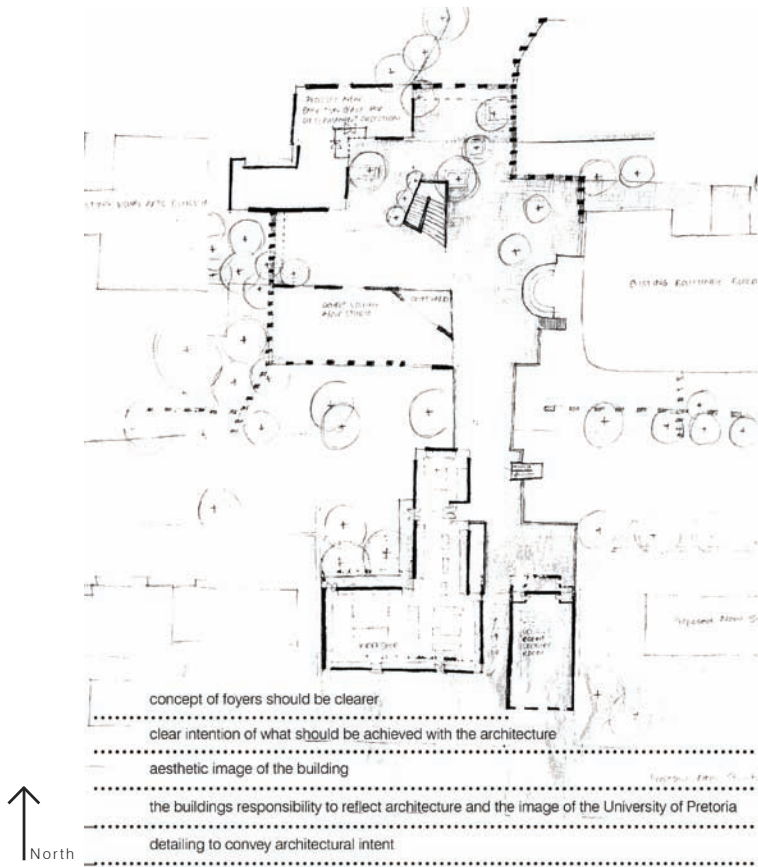


Figure 6.4 Bridge level organisational exercise

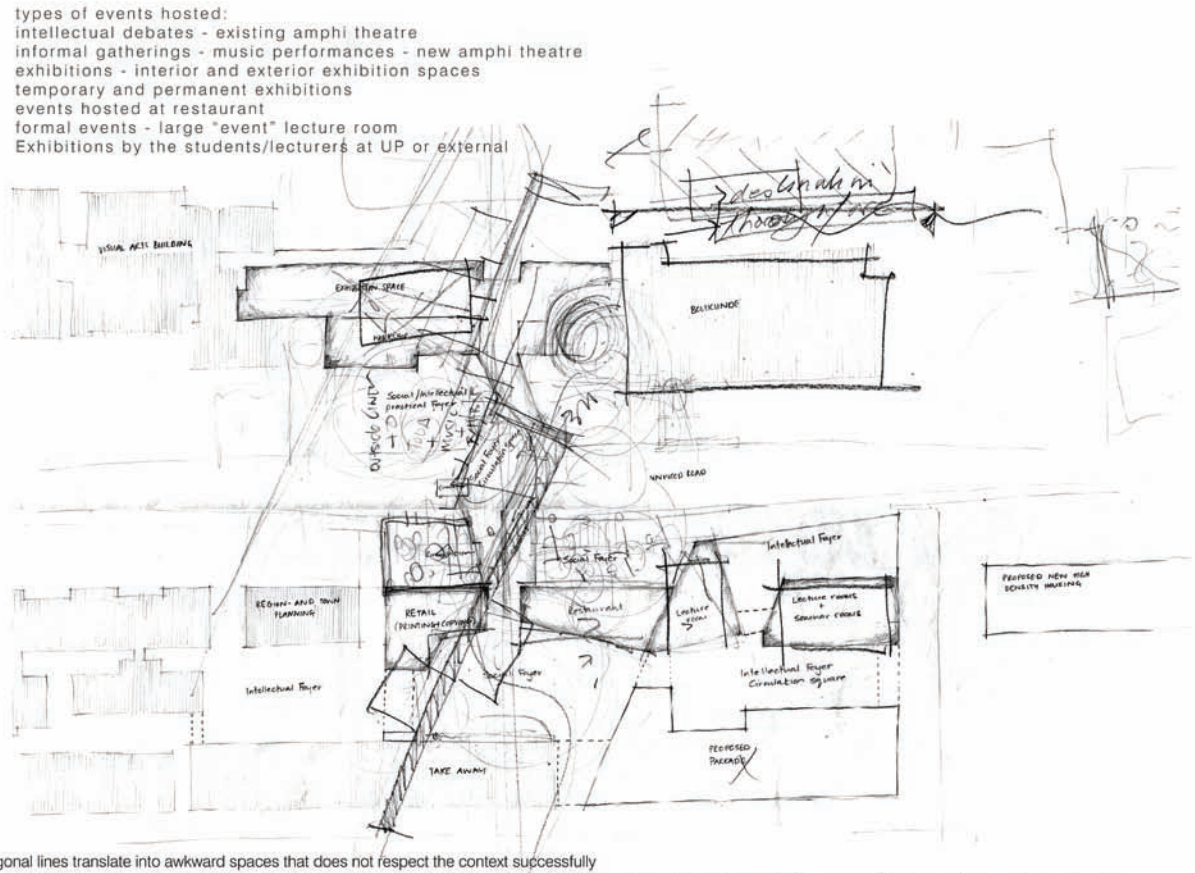


Figure 6.5 Bridge level exploration of existing axis on site

Most of the planning and design development happened through free hand sketches on the existing site plan. As the programme developed, the design requirements changed and the building needed to adapt. The two sides of Lynnwood Road and the unifying link between the two remained throughout the design process. Geometric investigations in terms of what the possibilities are on site continuously changed the shape of the structure.

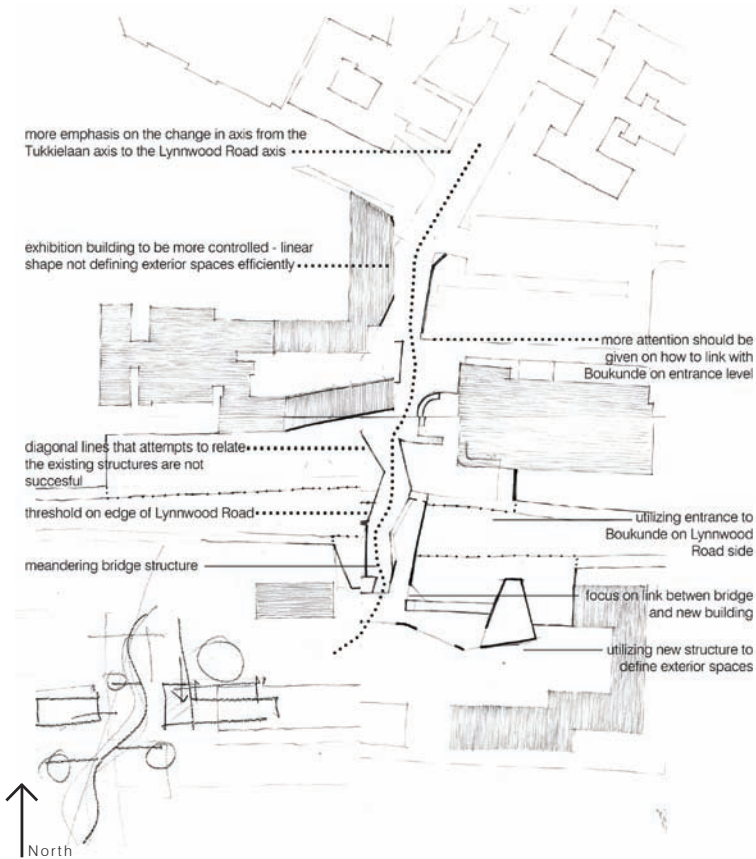


Figure 6.6 Bridge level possibilities of pedestrian movement patterns

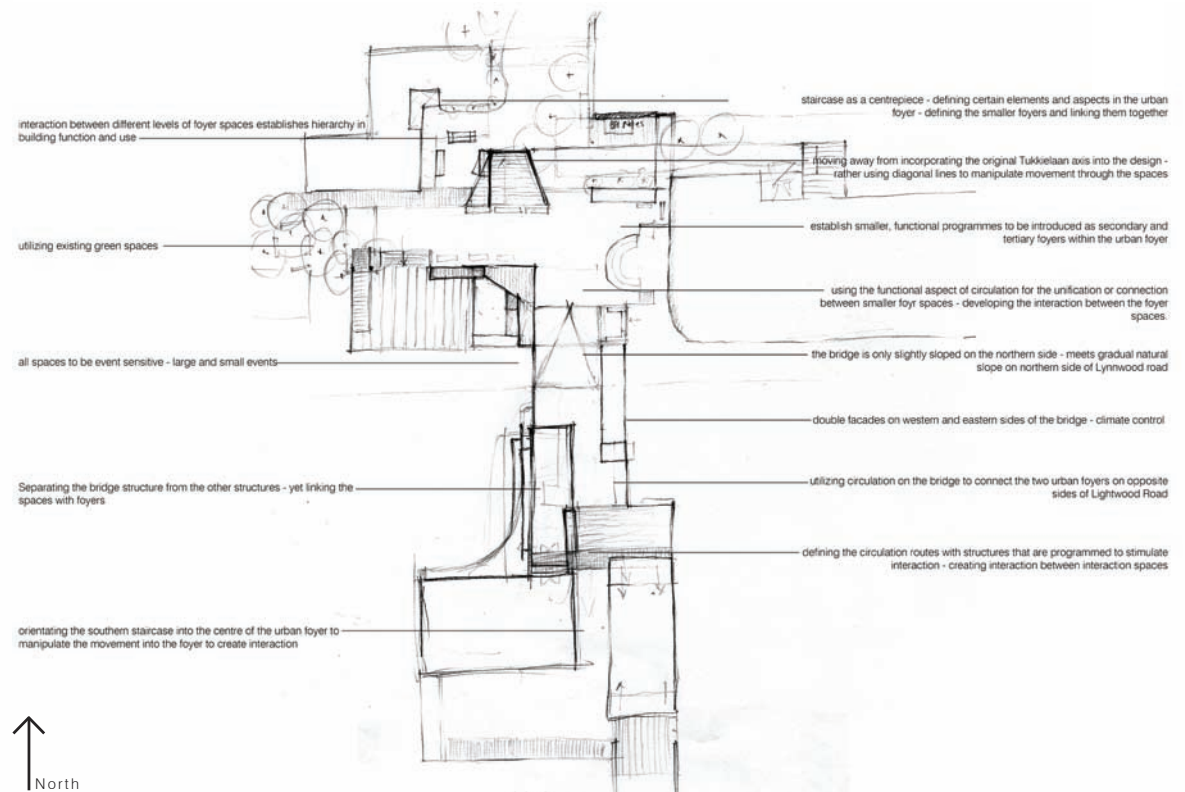


Figure 6.7 Bridge level diagram - order and logic

The interaction between the levels and pedestrian movement (determined by existing pedestrian movement patterns) and programmes of the surrounding buildings were some of the main planning generators.

## Linear plan development

The linearity of the plan provided many opportunities and limitations in terms of planning. Pedestrian movement and the pedestrian's experience of the spaces as well as functionality of the interaction between the programmes were organised and designed to support the linearity of the plan and not obstruct it in any way.



Figure 6.8 Creating spaces in a linear plan

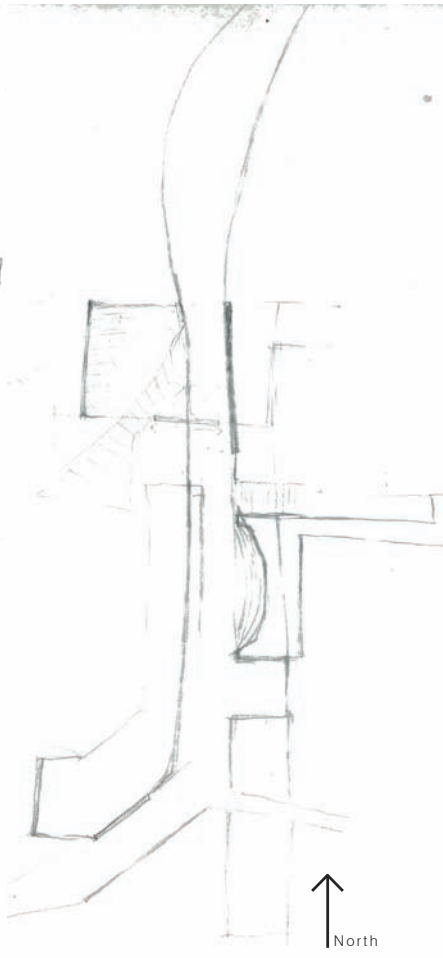


Figure 6.9 Simplification of the plan

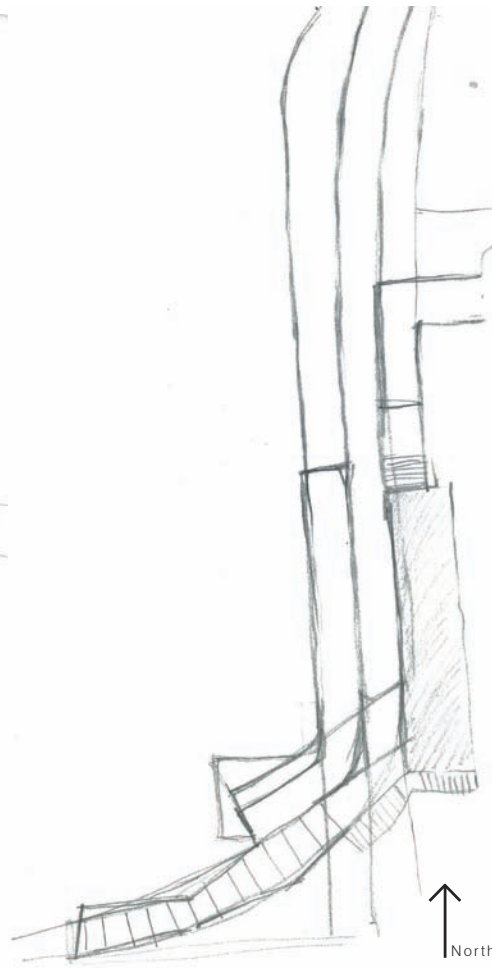


Figure 6.10 Extension into the landscape

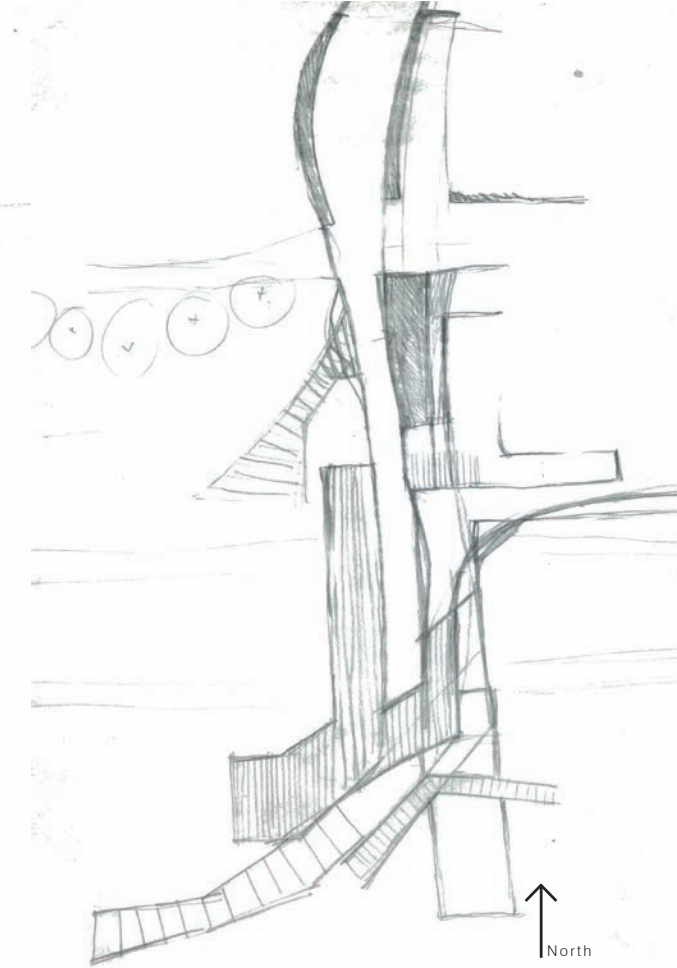


Figure 6.11 Programming a linear plan



## Models

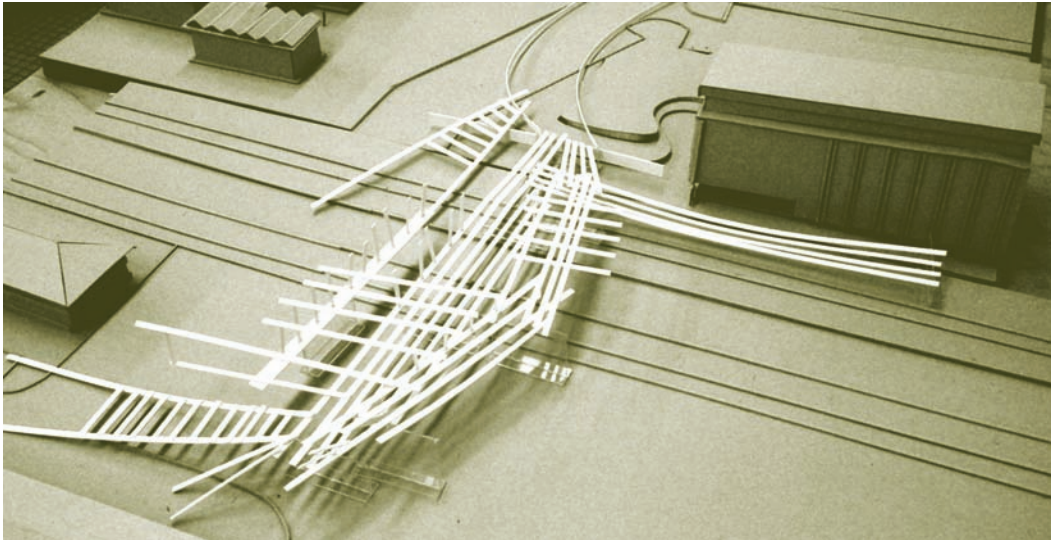


Figure 6.12 Conceptual model: Multi leveled bridge structure over Lynnwood Road

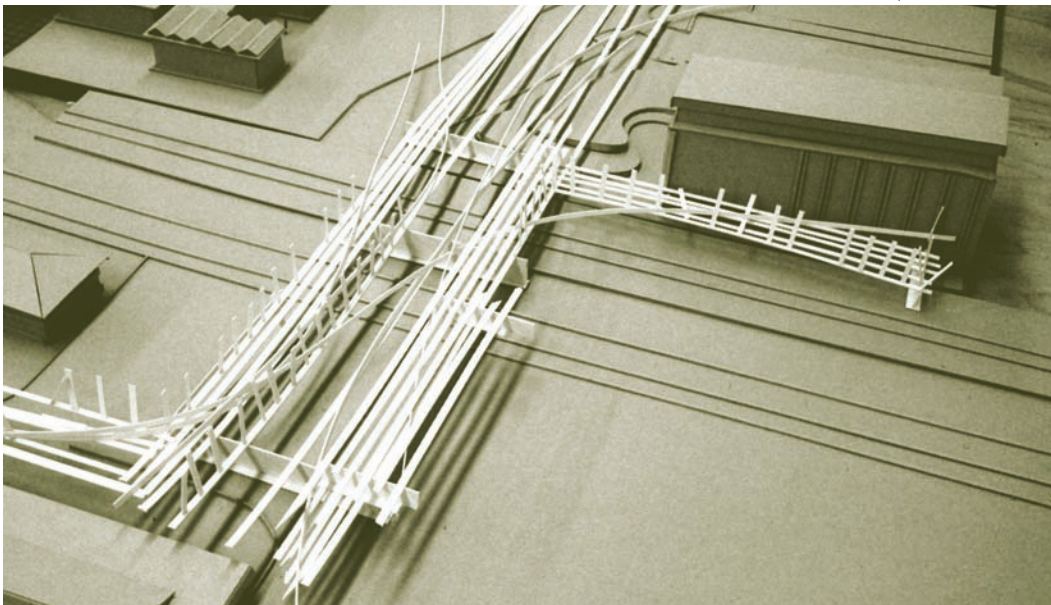


Figure 6.13 Conceptual model: Parti diagram



The models determined large parts of the design as they were done for the purpose of exploring the geometric and spatial possibilities within the context. The conceptual models are all built on the same context model, but can be removed in order to examine the possibilities successfully.

Boukunde, as a modern structure, influences the design decisions on all scales. The geometric exploration with the models enabled the design to develop in constant awareness of what influence the new BESC would have on its environment, in particular Boukunde.

The exercise also allowed for 3D exploration in terms of the different levels of the structure and what the possibilities of linking

the design into the Boukunde building are on an elevated level. The spaces that were created below the bridge presented new opportunities for the extension of the public threshold into UP.

The white strips made the models permeable and less rigid, allowing the design to develop naturally through a model building exercise. The extensions of the strips aided in the development of the spaces around the BESC as it is designed to sit within its landscape and not as an object on it.



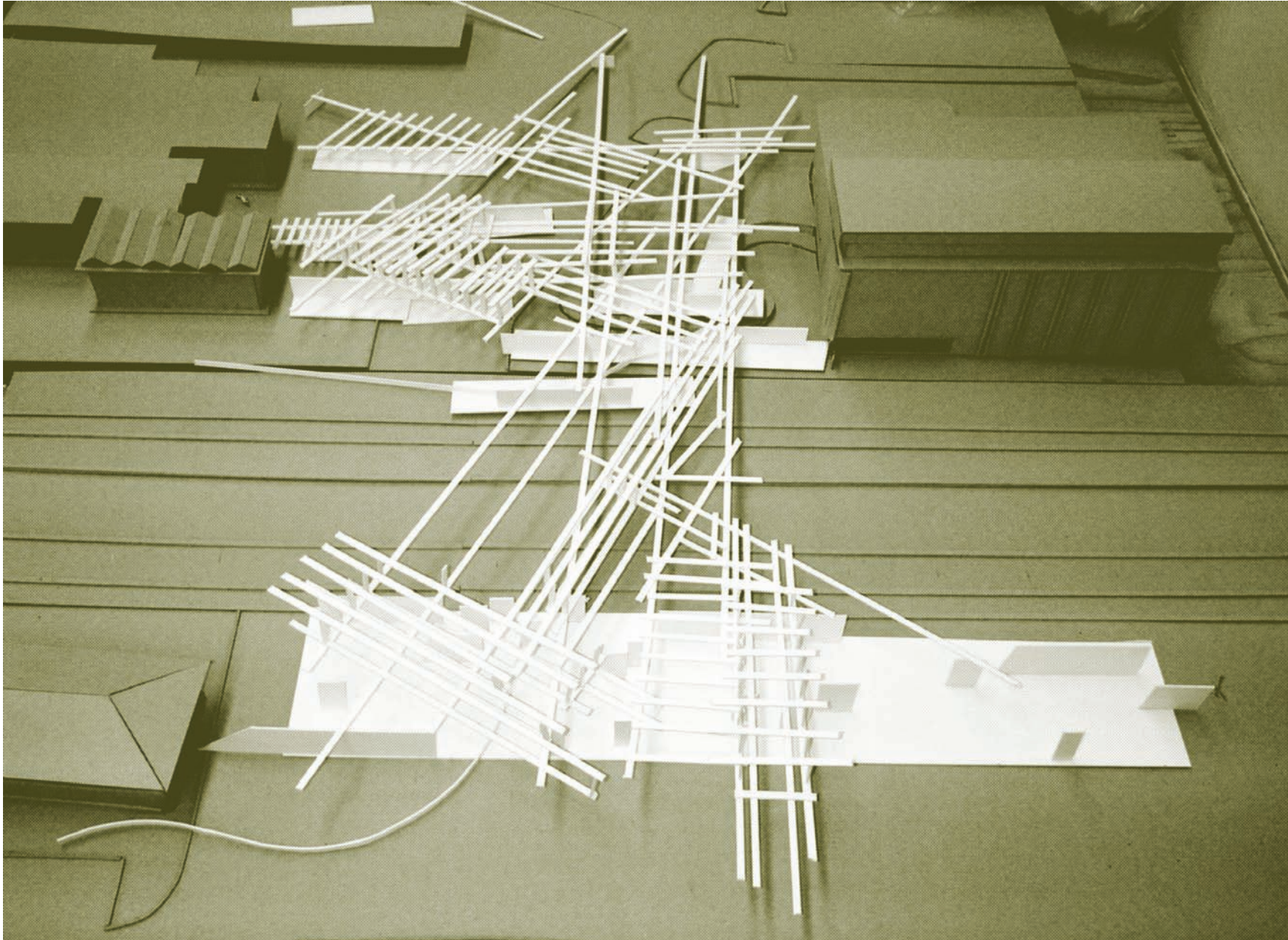
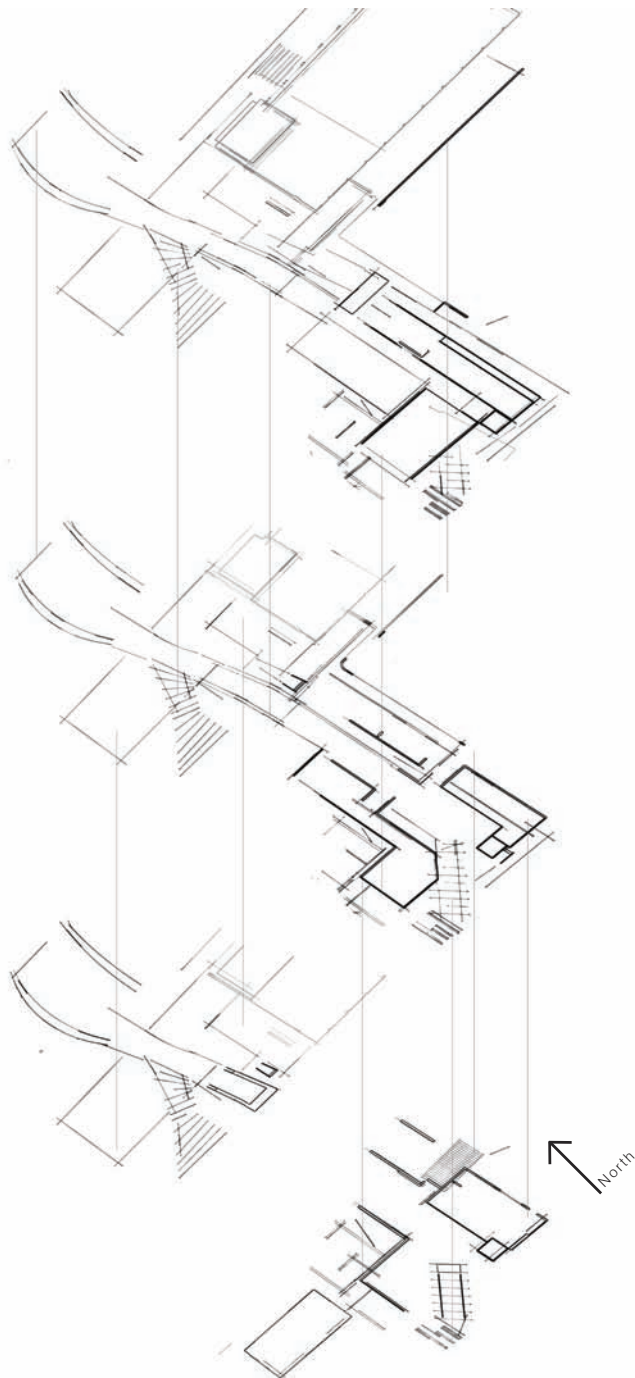


Figure 6.14 Conceptual model: Dealing with existing axis (interaction and change)





100 Figure 6.15 Diagrammatic exploration of interaction between levels

## Computer models

The relationships between the different levels, circulation, services and aesthetic resolution were mainly done in 3D, computer generated, models.

It was found that in order for the BESC structure to become a successful intervention that is not too intrusive on its context, the structure should read as a light weight bridge structure.

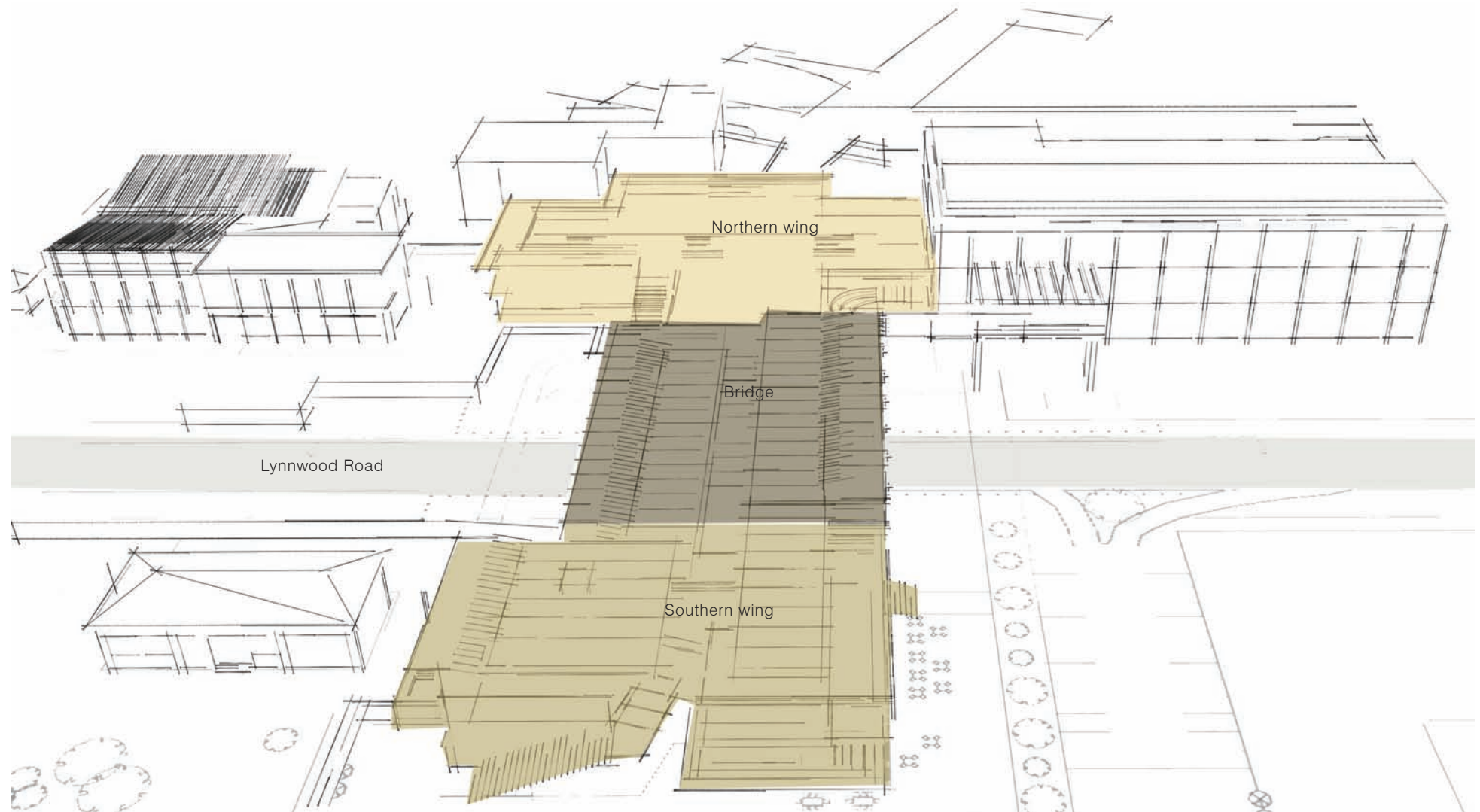
It was discovered that the horizontality of the design will enable the structure to read as a lighter element in the landscape.

In Chapter seven it is illustrated how the construction methods and processes together with the technical detailing, are primarily focussed on the horizontality of the structure - for it to be experienced as a light weight structure.



## Design clarification

The proposed intervention can be divided into three separate parts: the northern wing (1), the bridge (2) and the southern wing(3). The northern wing is a masonry structure, that relate to Boukundu; the bridge is a separate steel structure that spans almost 30 metres and the southern wing is a three storey masonry structure.



North Figure 6.16 The three main structural components of the BES

## Northern wing

### Formal Exhibition Space

The northern wing consists of a Formal Exhibition Space (FES) and a public square on top of it. The FES is sunken into the natural embankment to create a threshold, on street level into Main Campus

The main function of the FES is to showcase the work that is produced by students at UP. The versatility and adaptability of the space is achieved through the incorporation of operable wall panels in the interior spaces.

Natural light and interaction between interior and exterior spaces are achieved through large windows on the southern facade of the FES as well as a northern roof window, allowing visual interaction between the public square and the exhibition below (Fig 6.17).

The FES will link to Boukunde, on Ground Floor, through a currently neglected exhibition hall, north of the existing amphitheatre. Only controlled access will be allowed into Boukunde, so as not to jeopardise the integrity of the existing security systems.

The FES is seen as both a social and intellectual foyer. The interaction inside the space will constantly change as exhibitions and events change. The northern edge of the FES is designed to be able to close down, creating temporary, private seminar rooms for intellectual

interaction. The Coffee-bar is included to attract visitors and to encourage social interaction under intellectual circumstances.

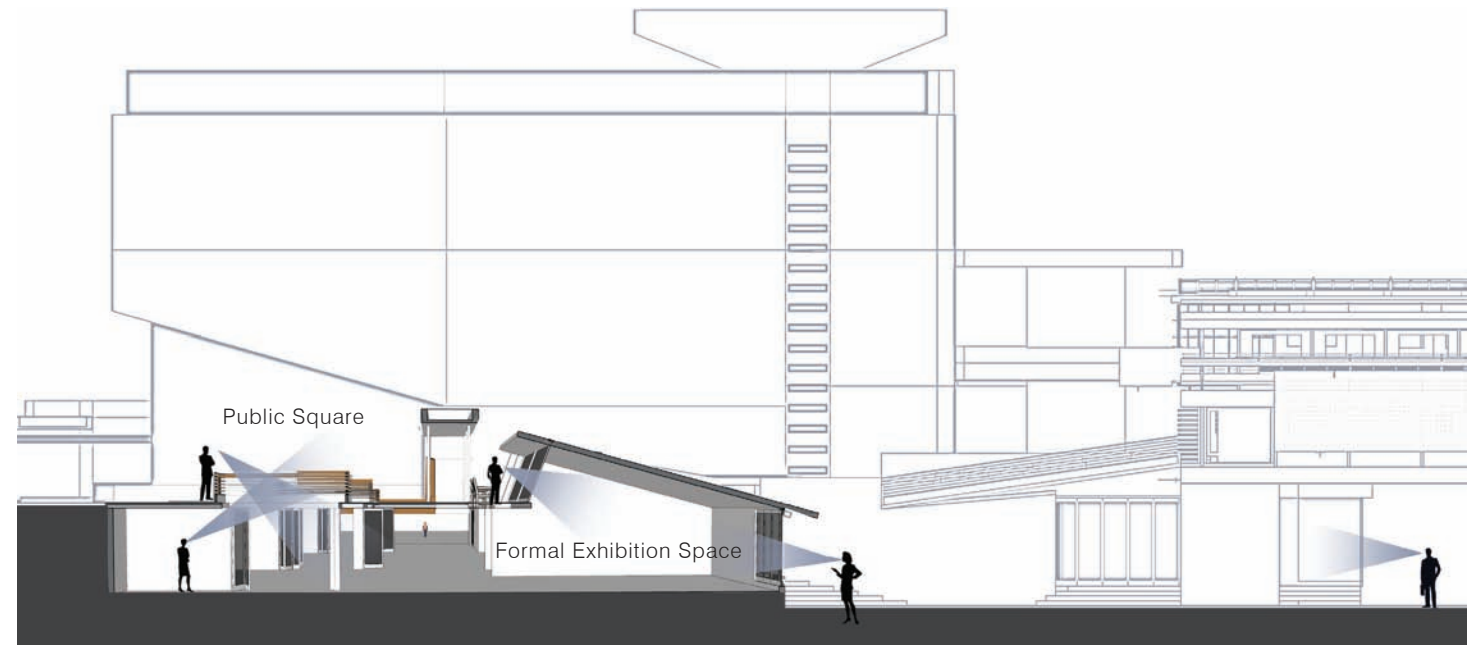


Figure 6.17 Interaction between interior and exterior spaces of the Formal Exhibition Space as well as natural light penetration



## Public square

The public square is situated above the FES, but on the same level as the existing entrances to Boukunde and the Visual Arts Building. The Public Exhibition Building (PEB) is proposed on the north-eastern edge of the public space, this allows the public to access the PEB without having to go through security control first.

A security barrier and card access control to the north, east and west maintains the integrity of the security systems at UP.

The space is designed as a foyer into UP, the PEB, Boukunde, the Visual Arts Building and the bridge, usually hosting exhibitions.

Interaction between the students from Boukunde, the Visual Arts Building, the Music Department

and students en-route to and from South Campus is encouraged through the incorporation of seating in shaded areas.

The space will also be used for public exhibitions and other events. Attendees will gather in the public space while the presentation happens from the top of the ramp leading to the bridge. The type of interaction in this space will therefore vary from social to intellectual.

The unprogrammed public square provides the spaces it serves with a relieving space, where one programme changes into another. Circulation routes intersect on the public square and are extended into the existing landscape causing the structure to relate to its context successfully.

The public square also acts as a foyer into the BESC from the side of Main Campus. It introduces the bridge, not only as a circulation route, but also as an exhibition and event space.

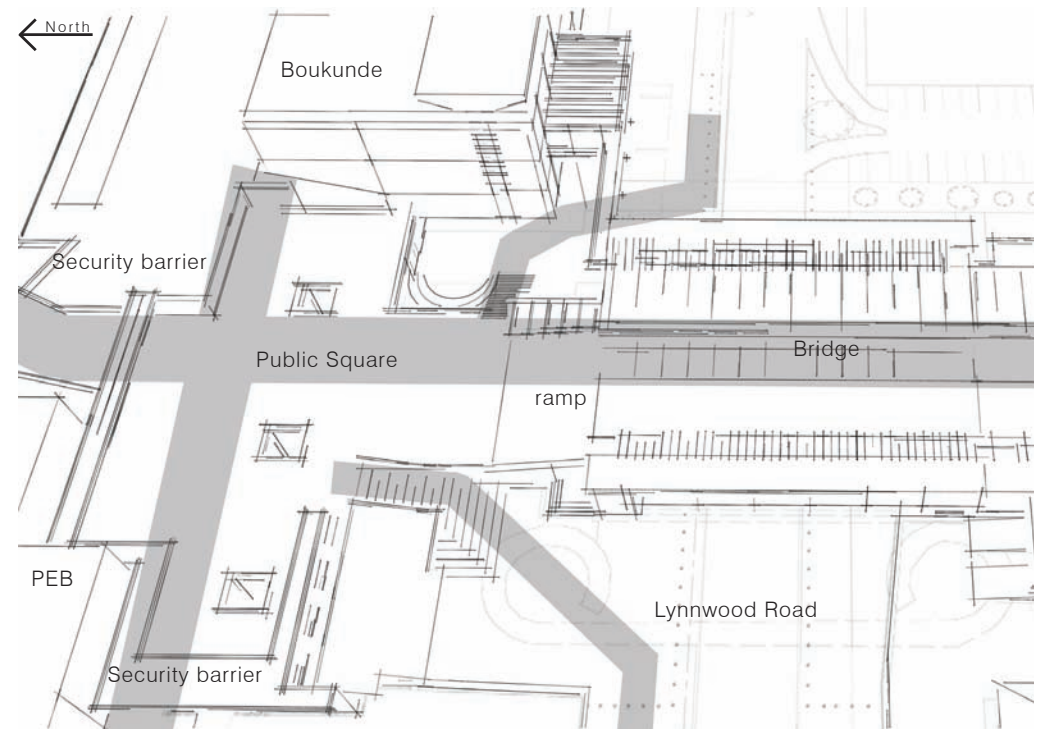


Figure 6.18 Functions of the Public Square within context

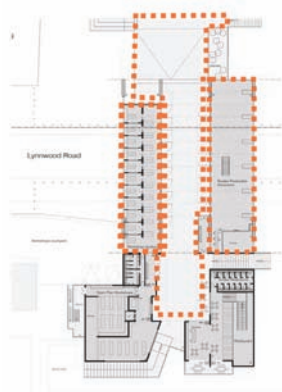


Figure 6.19 The bridge as three separate spaces

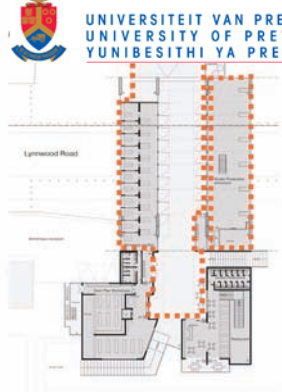


Figure 6.20 Circulation and Workshop Studios as one space

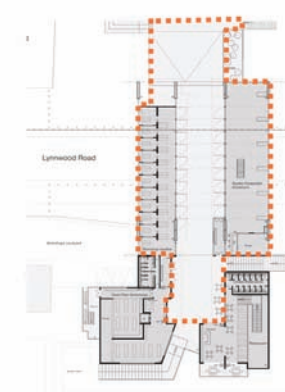


Figure 6.21 All spaces as one exhibition space

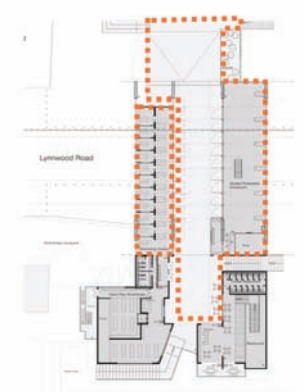


Figure 6.22 Circulation and Studio as one exhibition space

## Bridge

The bridge is divided into 4 different programmes:

Circulation route;  
Design Studio;  
Workshop Studios and  
Incubation Offices.

The bridge is primarily a **circulation route** (Fig 6.19-22) between Main Campus and South Campus. Students attending classes on both campuses can safely circulate between classes without any obstructions.

On the eastern side of the circulation route a **Design Studio** is proposed. This space provides additional studio space to the students of Boukunde. A large storage space allows the space to be transformed into an exhibition space without having to remove furniture from the building. Visitors who pass by the Design Studio can easily interact with the students working in the

studios, showcasing the production process of architecture. The eastern facade of the Design Studio is also the eastern facade of the bridge, people travelling in their vehicles on Lynnwood Road can see into the Design Studio (Fig 6.19-22) through double glazed windows, showcasing architectural education to the public.

A **Workshop Studio (WS)** is a space where members of the industry and lecturers at UP give short, practical workshops, where students have to produce some type of a product that can be exhibited.

On the bridge the WSs are divided into smaller compartments, to allow privacy for students working on long term projects. These smaller workshops can be closed down and locked, for students using the workshops on a permanent basis, or the roller-shutter

doors between the workshops can be opened and the space can become one large space.

Top hung operable walls can be maneuvered and moved between the Design Studio and the Studio Workshops on the bridge (Fig 6.28). The walls hang from hollow core mild steel square tubing, spanning between the eastern and western facades. The facades and structural system are designed in such a way that the operable walls can move through the facades into the interior spaces.

The operable walls are used as exhibition panels, making it possible to manipulate the spaces into many different sizes for many types of exhibitions. Both the facade of the Design Studio and the Workshop Studios can completely open up, making it possible for the circulation

route to become a part of the exhibition spaces. Figures 6.23 - 6.26 demonstrate what the possibilities are in terms of incorporating the circulation route into the exhibition spaces and how the whole bridge can read as one space.

An **incubation office** is directly linked to the Design Studio with an internal staircase. The link between the incubation office and the Design Studios is enhanced through the double volume spaces (Fig 6.28) and the direct link between the incubation office and Level 3 of the Boukunde building.

Billboards will be a part of the eastern and western facades of the bridge. The billboards are designed to act as permanent communication devices to the public. The type of communication will depend on the type of exhibitions

or events planned at the BESC and the rest of Uthe University The billboards also act as solar shading devices on both sides, protecting the interior spaces from direct sunlight.

The bridge structure is separated from the masonry structures with expansion joints to allow the different structures to move without affecting the other structures. The expansion joints will also act as thresholds introducing one structure while leaving the other.

Acoustics (Fig 6.29) are handled through the incorporation of a double floor system. A light weight concrete floor on top, a cavity and a acoustic treated hanging roof will act as the acoustic barrier between the vehicular generated noise and the bridge. Double glazing and solid core Formica exterior paneling will prevent noise from entering the bridge spaces.

The bridge is the central part of the design, all other spaces around the BESC are designed to complement and feed the bridge, because it is the main space where social, intellectual and practical interaction will take place.

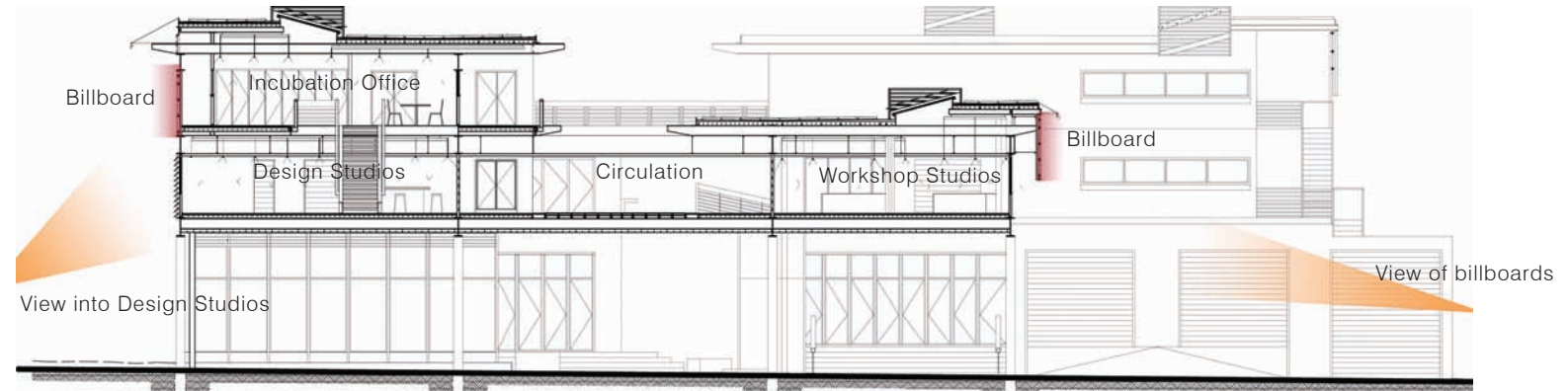


Figure 6.23 View from outside and billboards

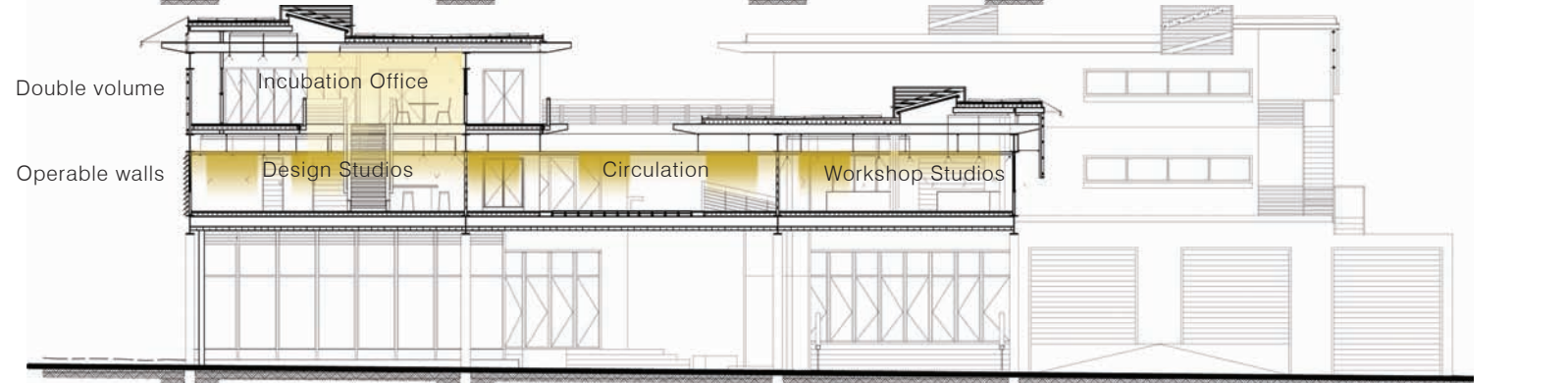


Figure 6.24 Operable walls and double volume

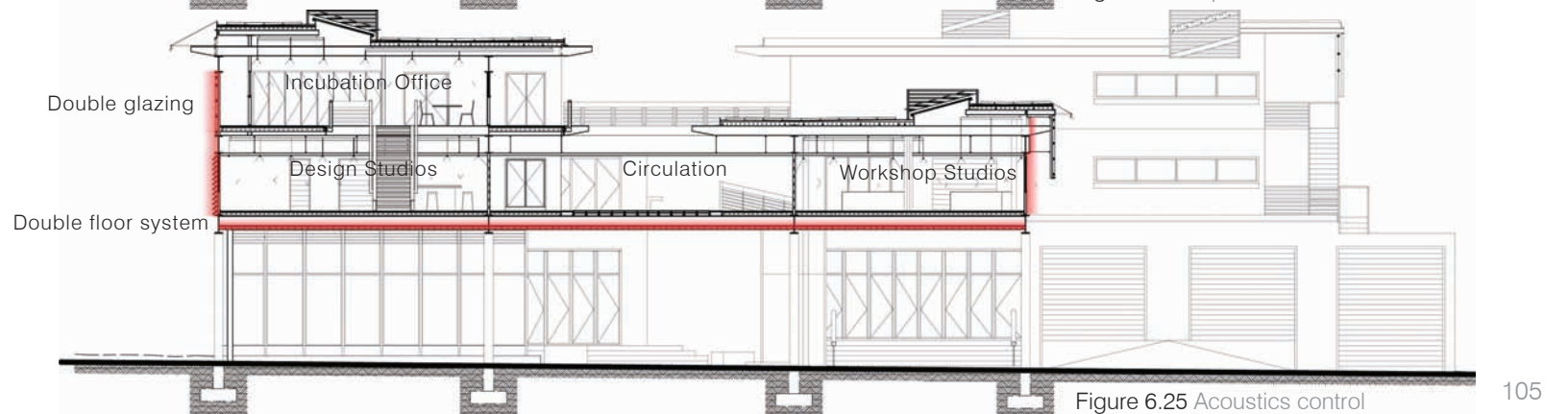


Figure 6.25 Acoustics control

## Southern Wing

The southern wing is a three storey masonry structure that defines the southern edge of the design.

### Ground Level

#### Workshop Studios

The entrance to the WS is directly opposite the entrance to the Formal Exhibition Space, connected with a raised pedestrian crossing. The spaces leading up to the entrance can be utilised as exhibition spaces because they are covered.

The space can be divided into two, determined by the size of the class presented. The southern room has a separate entrance and can be used as additional exhibition space when it is not a WS. To the north two large roller-shutter doors can open and lead into a courtyard shared with the Town and Regional Planning Building. This courtyard can be seen from Lynnwood

Road, showcasing the production processes of the WSs.

To the west an enclosed refuse yard is situated with another roller-shutter door to provide easy access from Lynnwood Road for refuse removal. The fire escape of the building also terminates here.

Higher ceilings, due to the height of the bridge, allow for suspended ceilings to be installed, covering the mechanical ventilation system and artificial lighting.

The **restaurant** is situated on Ground Level, south of Lynnwood Road. The main aim is to create a social space where people can meet and interact informally.

Due to high noise levels and lack of sunlight the kitchen is situated next to Lynnwood Road, under the bridge. The refuse yard forms part

of the kitchen in order not to effect pedestrian movement and social activity on Lynnwood Road, but still be accessible to the municipal refuse removers.

The entrance to the restaurant is situated on the southern edge, to attract visitors and customers into the South Campus space, exposing them to more students and informal student exhibitions. The restaurant continues on the Bridge Level, connecting users with the main exhibition spaces on Bridge Level.

The finishing and branding of the restaurant should be done by a specialist to achieve the optimum client base, ambiance and image for the BESC.

A new take-away restaurant is proposed in the building south of the BESC. The exterior spaces

of the take-away and the formal restaurant should overlap and become one exterior, social space.

### Bridge Level

The bridge level exhibition space expands onto the masonry structure, with foyers to the WSs and Design Studios on either side of the circulation route. When the facades are not open for an exhibition, the entrances to the spaces will be through the formal foyers.

The restaurant has a separate entrance on the Bridge Level, situated right above the Ground Level entrance.

Two flights of stairs make it possible for pedestrians to either go east or west down the bridge. A lift, circulating between all three levels is designed to aid disabled people,



move exhibition objects and for circulation convenience.

### Top Level

The incubation offices continue on the top floor. The offices are divided into two separate spaces, allowing more students to take part in a variety of projects.

A roof garden defines the northern border of the incubation office, providing a recreational area for its occupants.

A battery room is provided on the southern edge of the incubation office. These batteries provide electrical energy to the offices from photovoltaic panels situated on the roofs of the incubation offices.

A fire escape is situated on the western facade of the building.



Figure 6.26 Ground Level Plan - Southern Wing

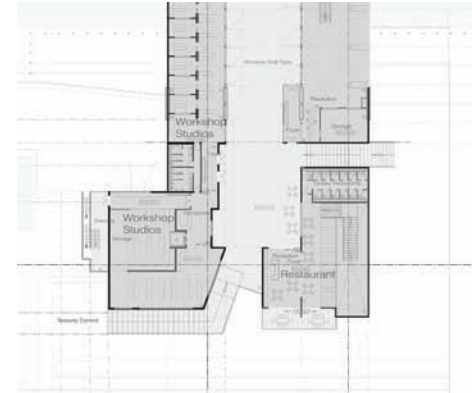


Figure 6.27 Bridge Level Plan - Southern Wing

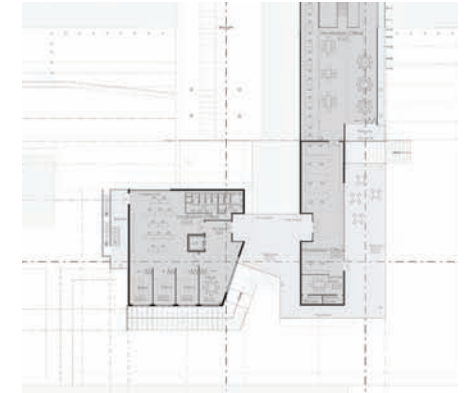


Figure 6.28 Top Level Plan - Southern Wing

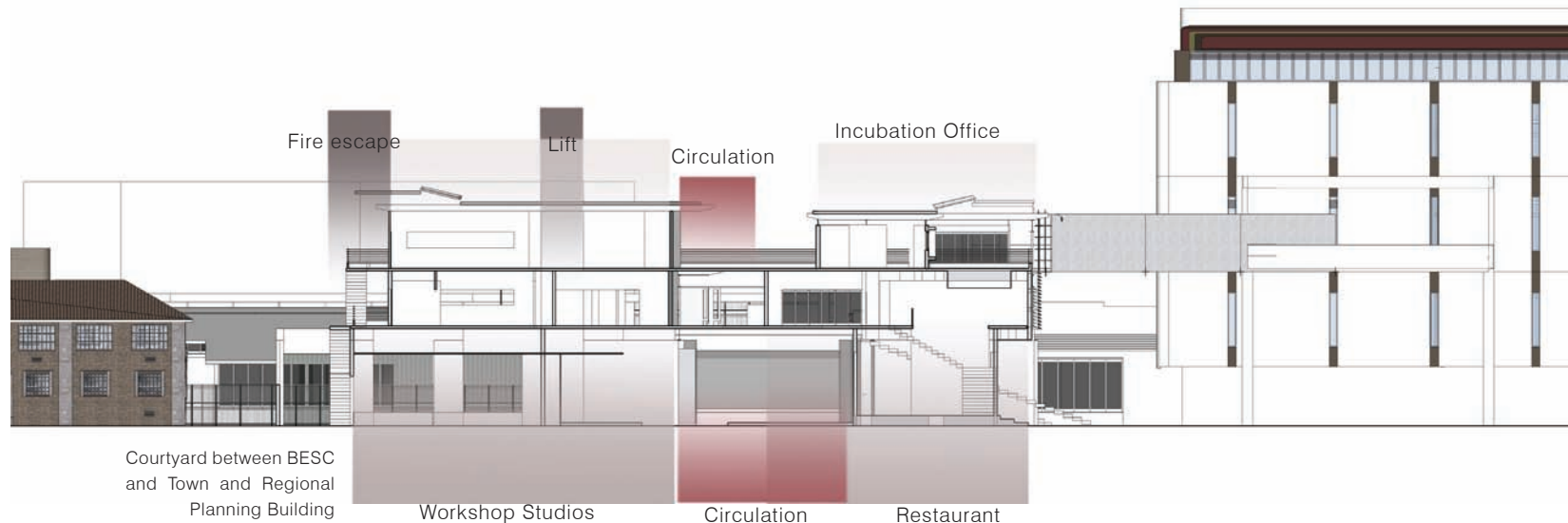


Figure 6.29 Southern wing spatial relationships

## Circulation

The circulation of all the different users of the BESC form an integral part of the design.

As illustrated in Figures 6.30 - 6.33 the circulation of the various users cannot be separated. All circulation routes overflow and the same spaces are used for several circulation routes as well as other functions.

There is no one route from one point to another, choice is always part of the journey, but the underlying linearity of the design continuously suggests movement, mobility and interaction.

The interaction between the different users of the separate spaces create another layer of foyers, where many functions with the same underlying intentions meet.

It is where the different users interact with different or similar intentions that the social, intellectual and practical relationships between the users develop.



Figure 6.30 Circulation diagrams: Key

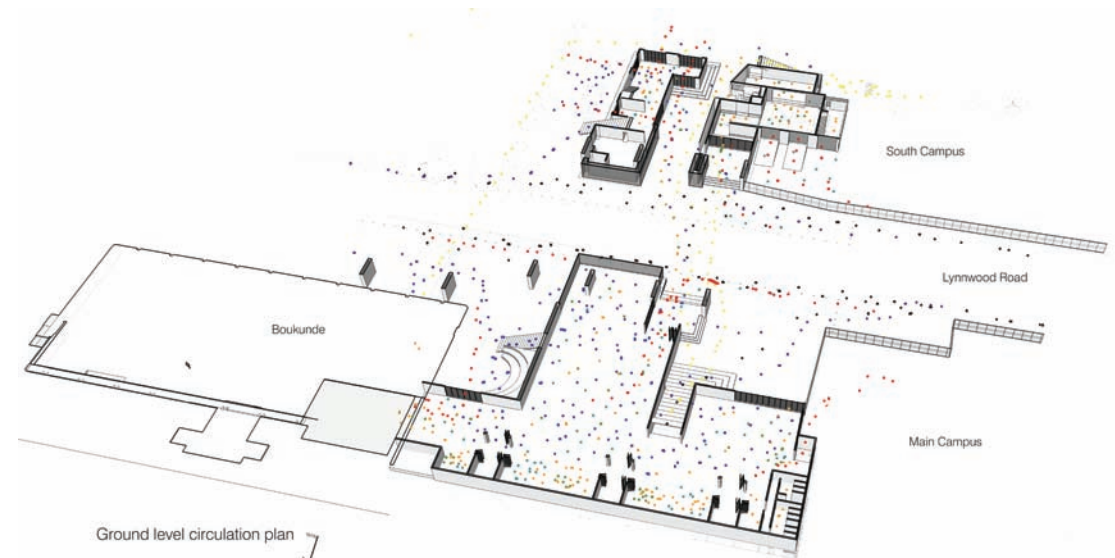
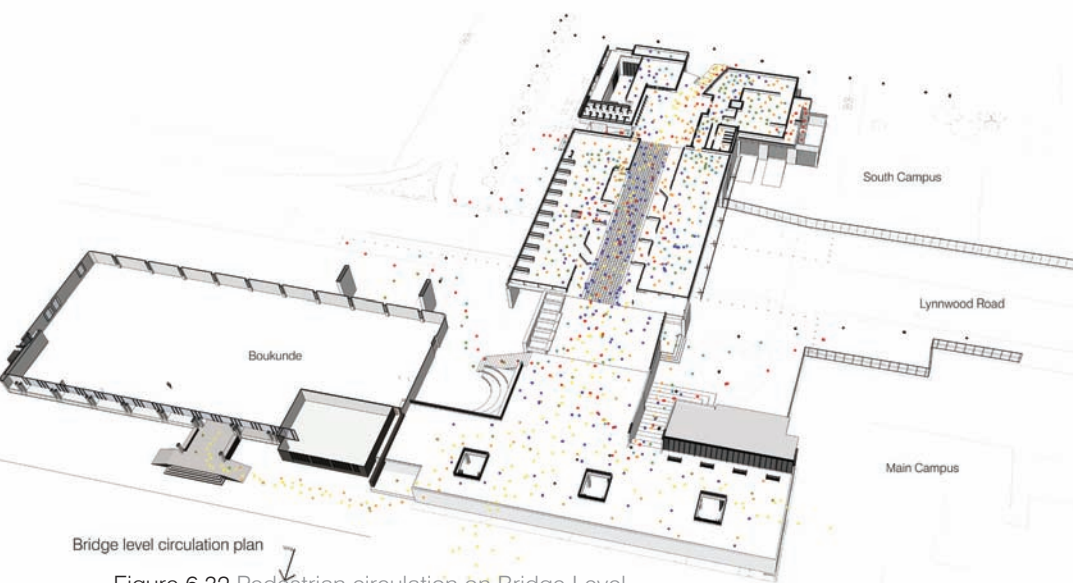
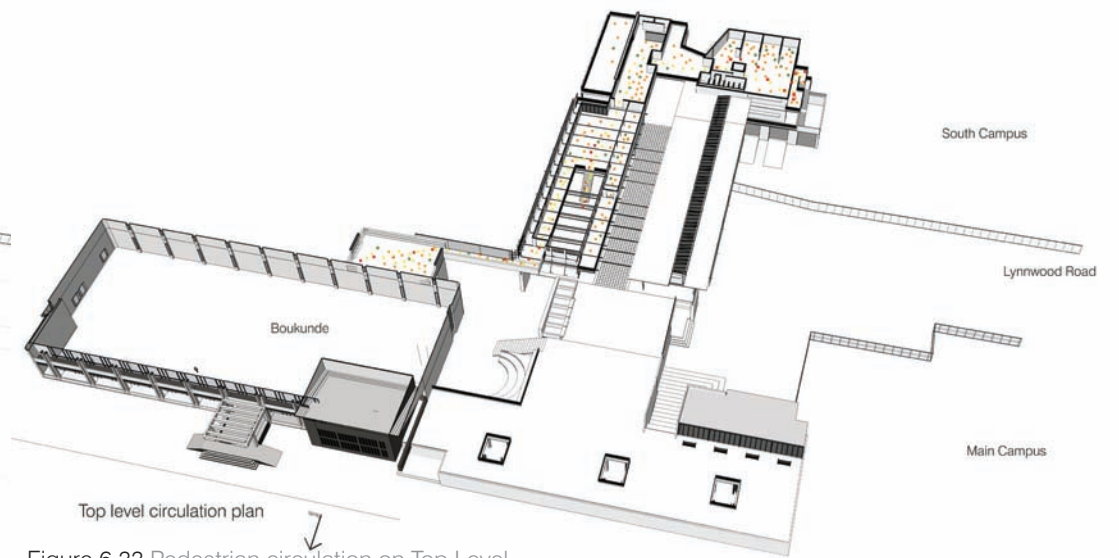


Figure 6.31 Pedestrian circulation on Ground Level



Bridge level circulation plan

Figure 6.32 Pedestrian circulation on Bridge Level



Top level circulation plan

Figure 6.33 Pedestrian circulation on Top Level

## Exterior spaces

Pedestrian crossings are designed over Lynnwood Road as indicated in Figure 6.30. The eastern crossing is situated in front of the existing southern entrance into Boukunde, linking with a promenade that runs up to the storm water channel on the southern side of South Campus. The promenade also separates the exterior seating area of the restaurant from the visitors parking area east of the restaurant. The western pedestrian crossing links the entrances of the Formal Exhibition Space and the Workshop Studios.

The public spaces below the bridge are made pedestrian friendly by the implementation of bollards, preventing cars from parking under the bridge and obstructing pedestrian activity.

These public spaces are paved, with seating, refuse bins, lighting and shade provided.

On the northern side of Lynnwood Road pedestrians have views into the Formal Exhibition Space. Direct access onto the bridge is available via two flights of stairs on either side of the Formal Exhibition Space. The existing amphitheatre west of Boukunde is re-used through the pedestrian activity around it created by the new circulation routes and the re-activation of Boukunde's southern entrance.

On the southern side, the public space underneath the bridge is used for circulation. This space becomes an exterior exhibition space with glass boxes protecting the projects.

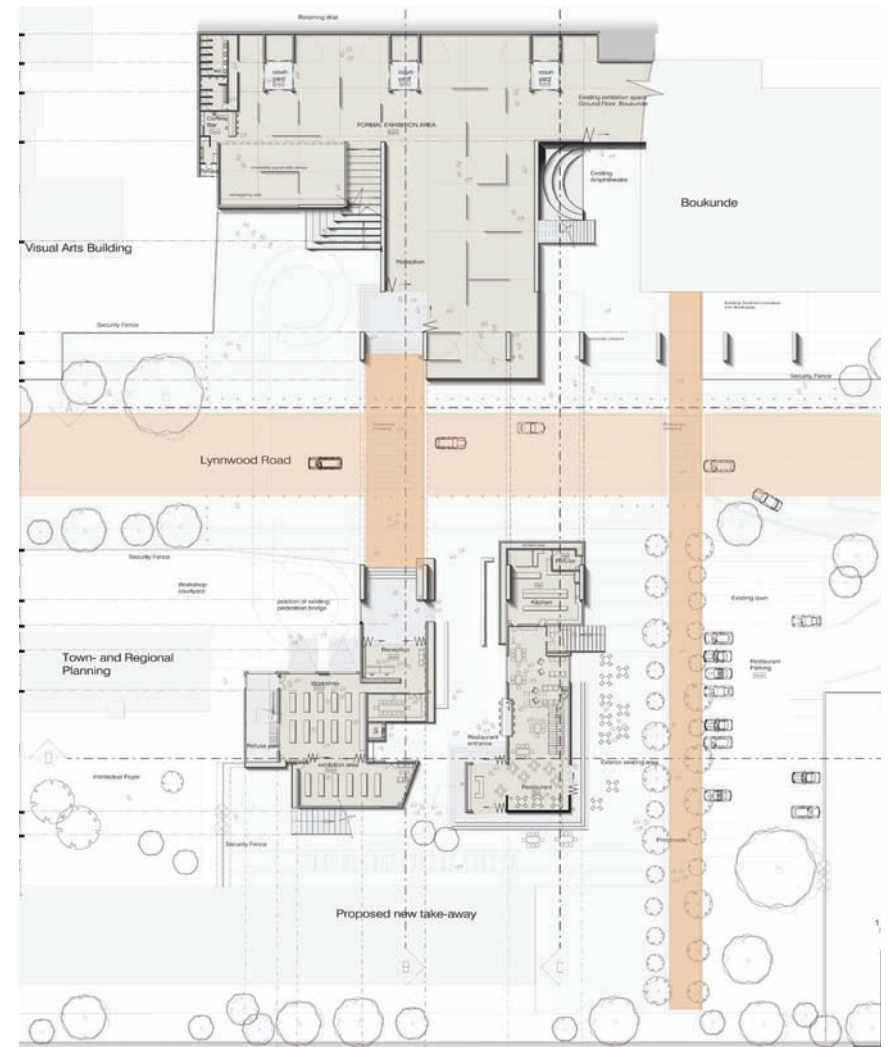


Figure 6.34 New raised pedestrian crossings



## Conclusion

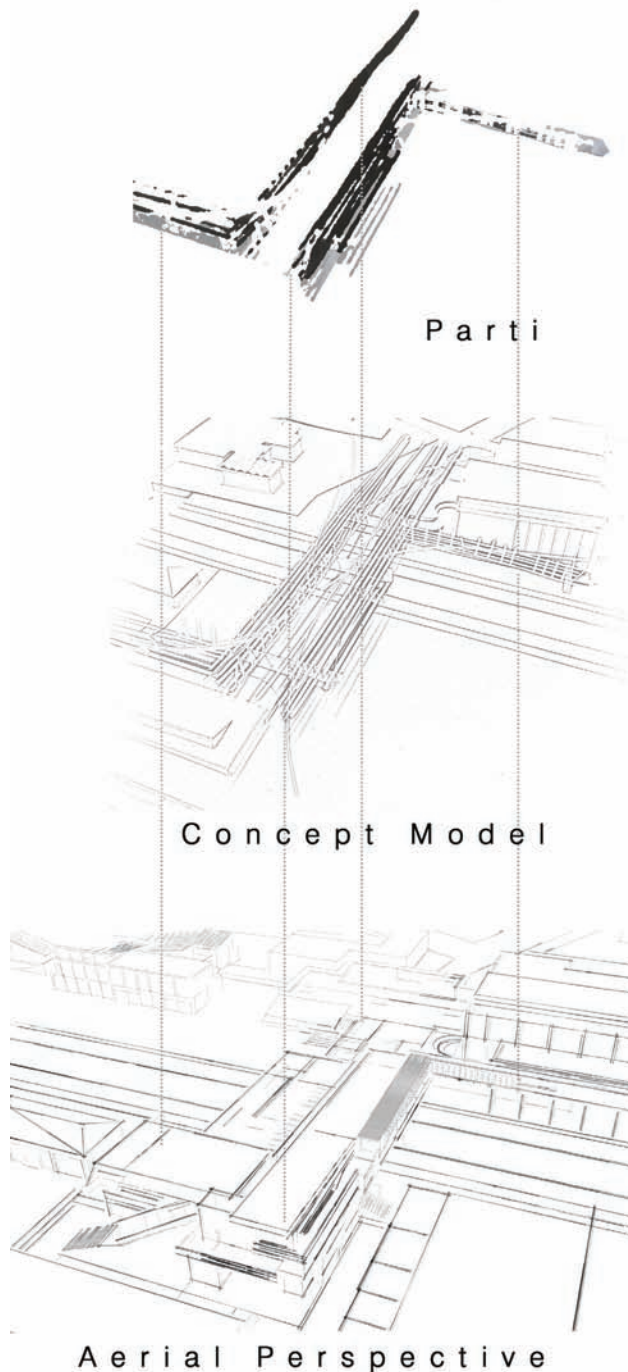


Figure 6.35 Relationship between all design development methodologies

The design intention is to create a facility that will link many segregated entities. The parti was developed as a result of many design considerations and influences.

The design process was one of exploration, trial and error and redesign. All processes ran parallel and the results of one design process was used to inform the next. The processes were layered, in order to successfully develop the functionality, aesthetic and overall design of the BESC.

As illustrated in Figure 6.31 the parti continued to stay one of the main design regulators throughout the design development.

All design decisions were evaluated according to the parti diagram, resulting in a concise, linear structure, that respects its environment and the other buildings in its vicinity, while successfully addressing the lack of synergy between a series of segregated entities.

# chapterseven

Technical Investigation

## Introduction

This chapter conveys the technical investigation that was done for the dissertation. Precedents will be discussed, followed by the development of the structural systems, materiality, services and other systems. The main challenge of the technical investigation is the integration of many systems on a double storey inhabited bridge that spans just short of 30 meters.

The approach is to develop a structure that expresses the structural properties of the various elements. In order to compliment the main programme of the building, being architectural exhibition, the structure becomes an exhibition of architecture itself. Connections are expressed and act as elements that assist in the definition of the various spaces, this happens at all scales.

Aesthetically, the main aim is to use the horizontality of the design to keep it as un-obtrusive in its context as possible. The various structural elements, systems and services are all designed to complement the horizontality as far as possible. The integration of the structural, environmental and functional systems are kept as simple as possible, to avoid any interference with the linearity of the design.

In order to achieve this, the building consists of a series of layers, also linking up with the concept of foyers and the integration of various layers of spaces. A hierarchy of the systems developed as the design process developed. The structural system houses the other systems and is therefore the most important. The environmental systems, including amongst others, the water reticulation system, solar control, natural ventilation and natural daylighting are manipulated and designed to fit into the structural system.

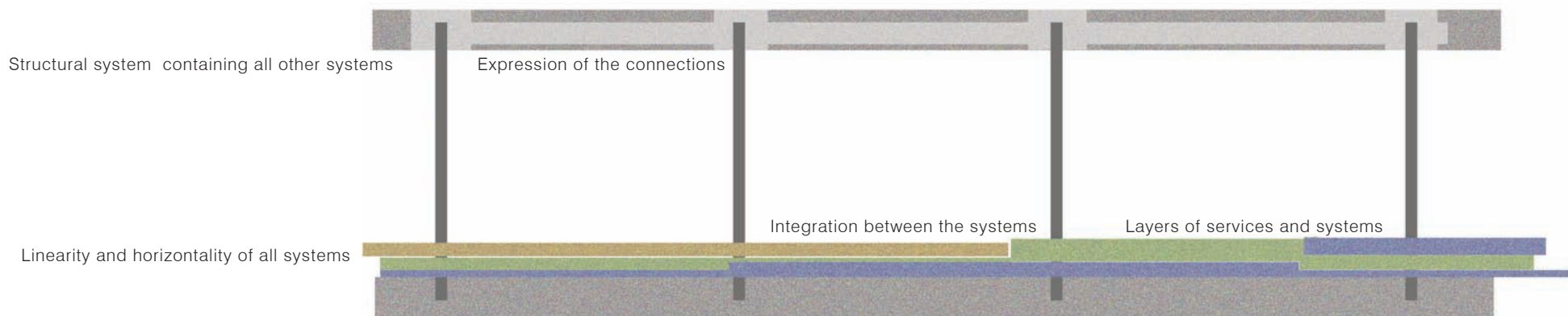


Figure 7.1 Conceptual idea for the tectonic of the building

## Precedent: Land Formation One

Architect: Zaha Hadid

Programme: Exhibition spaces, restaurant, offices

Size: 845m<sup>2</sup>

Client: City of Weil am Rhein, Garden Festival 1999

Formation One is an exhibition space that sits in a park, but it does not sit as an object in the landscape. The shape of the building was derived from existing pedestrian movement patterns on the site. These movement patterns were manipulated, elevated and curved to create the exterior and interior geometry of the building.

The building can be approached from any side and the walkways allow the pedestrian to experience the building from more than one level, allowing views into the interior from the exterior.

The main exhibition space is predominantly double volume. It allows natural sunlight in, but no

direct sunlight that can damage the exhibitions.

The linearity of the plan makes it possible for secondary and service spaces to be hidden as one does not experience them, but rather the linearity as one moves through the spaces.

The use of materials is manipulated; softer materials are used where there are openings in the facade. Protrusions from the facade further introduce entrances and openings on the facade.

The edges of the building are designed to unify with its context and environment. Thresholds are accentuated as part of the edge

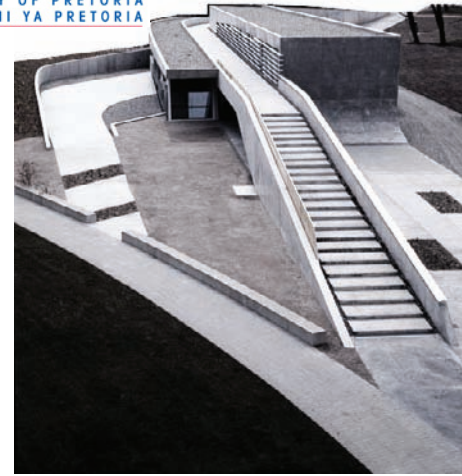


Figure 7.2 Elevated walkways



Figure 7.3 Naturally lit interior spaces



Figure 7.4 Exterior edges of the building

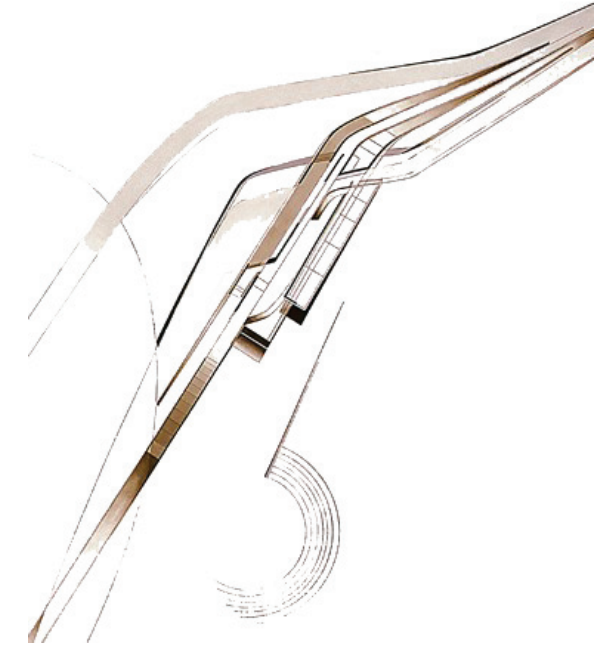


Figure 7.5 Linear plan extending into the landscape



Figure 7.6 Pedestrian experience of the building



## Precedent: Ponte Vecchio

Architect: Neri da Fioravante (rebuilt)

Programme: Inhabited bridge

Location: Florence, Italy

Client: Cosimo I de' Medici (1565 corridor commission)

The Ponte Vecchio is one of Florence's most iconic landmarks. The inhabited bridge with its stone columns and planks was probably constructed in the Roman times (www.italyguides.it/us/florence).

The specific programmes of the spaces on the bridge change continuously, but the bridge's function as a public space remained throughout the centuries.

In the 1900's the bust of Benvenuto Cellini, the ingenious Florentine goldsmith and sculptor, was placed on the bridge. The celebration of designers within the public realm is used as precedent in this case.

The linking element of the bridge, linking the inner city of Florence to its eastern outskirts, contributes to the practical functionality of the structure.

The Ponte Vecchio is an appropriate precedent in this case as it is an inhabited bridge, that continuously adapts in terms of programme, links two urban spaces, is a truly public space and a landmark in the urban landscape.



Figure 7.7 The Ponte Vecchio inhabited bridge, Florence, Italy



Figure 7.8 Southern view of the Ponte Vecchio

## Precedent: The Bauhaus

Architects: Walter Gropius, Carl Fieger and Ernst Neufert

Programme: “School of Building”, design school

Location: Dessau, Germany

Client: City of Dessau



Figure 7.9 Inhabited Bridge at Bauhaus

The Bauhaus building in Dessau was completed in 1919. The design refines Walter Gropius’s architectonic ideas that he first put into practice before WW1.

The different parts of the building are separated and each designed differently. The building can only be fully appreciated if the observer moves around the entire building as there is no central view point.



Figure 7.10 Transparent facade

The construction of the building is celebrated through the exposed connections and the edges that are accentuated where the glass surfaces overlap the edges.

Both the interior and exterior surfaces are painted in a light pallet, which contrasts vividly with the dark, continuous strip windows that define the facades. The large curtain wall facades allow for the building to appear transparent, especially at night time, as well as allowing ample natural light into the interior spaces during the day.



Figure 7.11 Interaction with street



Figure 7.12 Horizontality of facade



Figure 7.13 Natural lighting through roof

The accessibility of the structure, the way it is integrated with its context, compliments the simplicity of the final product.

The principles identified from the physical Bauhaus building have all played an integral part in the design of the BESC. Some of the most important design generators were to create an environment where architectural education and production can be showcased, as well as a structure that is accessible to all and can be approached from many sides.



Figure 7.14 Interaction with inhabited bridge



Figure 7.15 Events hosted at facility

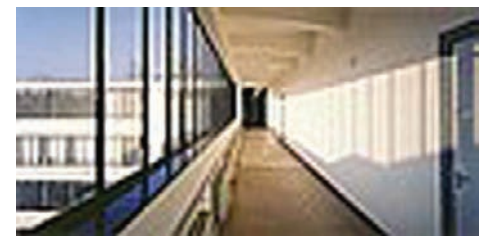


Figure 7.16 Treatment of direct sunlight

The principles identified through this analysis assisted in the programme development as well as the physical attributes of the designed structure.



precedent study:

## principles from the physical bauhaus building

showcasing architecture - transparency as principle

emphasis through composition and material use

individual design of different parts

hierarchy of spaces - functional separation of programmes

building can be approached and experienced from all sides

limited amount of defining elements on facade - accessible to all

inhabited bridge as part of the design

connection/foyer spaces

event spaces

colour pallet - light interiors and contrasts on facade

Quality of interior spaces



Figure 7.17 Approach from many sides



Figure 7.18 Interaction encouraged



Figure 7.19 An object in the landscape



Figure 7.20 Detailing of services



Figure 7.21 Protruding balcony



Figure 7.22 Experience on ground level



Figure 7.23 Quality of interior spaces

## Precedent: Transportation Hub, New World Trade Centre

Architect: Santiago Calatrava

Programme: Transportation Hub

Location: New York, USA

Client: Port Authority of New York and New Jersey

In the design of the new Transportation Hub, as part of the New World Trade Centre, Ground Zero in New York, Santiago Calatrava envisions a luminous, cavernous design, that offers the commuter a sense of flight.

The functional heart of the transportation hub is a mezzanine level, below ground, that links the main arrival hall and PATH terminals. The space is designed to be a open space without any columns obstructing the commuters. A large Vierendeel truss, spanning over 30 meters, is used to create the required span.

Arthur Vierendeel developed a method to calculate the strength of a truss without diagonal bracing,

but only vertical bracing with rigid connections, in 1896 (<http://users.telenet.be/karel.roose/vierendeel/vierendeel.html>). The Vierendeel truss's connections are factory welded connections, to achieve the rigidity required to be able to resist the bending forces.

The Vierendeel truss used in the Transportation Hub is referred to as its spine. The first two segments of the spine was constructed on 8 March 2011. The design and construction process of a Vierendeel truss are so complex that Mr. Billy De Pasquale, main field operator of the World Trade Centre Construction, stated: "you don't get many days like this," on the day the first two segments were erected.



Figure 7.24 Architectural presentation of Transportation Hub, NY



## Services and Systems

The structure is divided into three parts: the northern wing is a masonry structure, recessed into the natural embankment on the northern side of Lynnwood Road; the bridge, a steel structure, mainly supported by four Vierendeel trusses; and the southern wing, a three storey masonry structure. Each part will now be discussed individually, with main challenges highlighted.

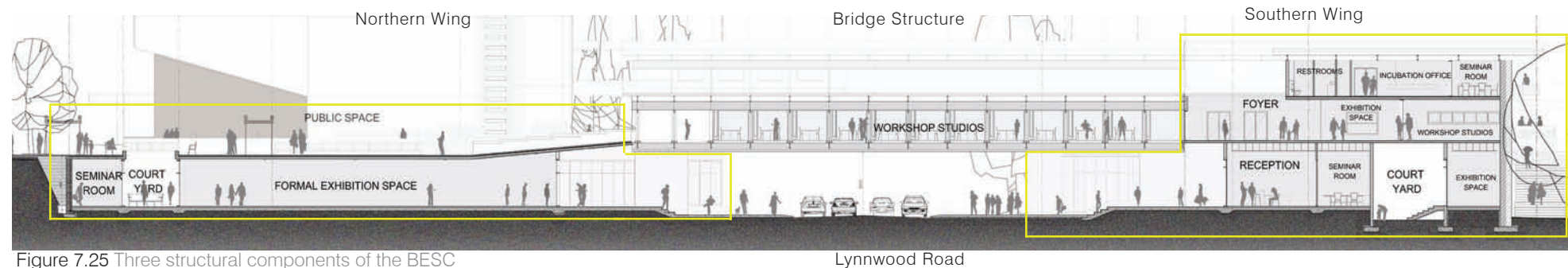


Figure 7.25 Three structural components of the BESC

The horizontality of the design is achieved through a flat public square that links a natural embankment on the northern edge with the bridge over Lynnwood Road. The space below the public square is excavated and the FES is designed to be below it. The northern wing is a regular masonry structure, with a retaining northern wall (Fig 7.26) and large glass facades on the southern edge that invite observers into the FES as they pass, as well as allowing natural southern light into the exhibition spaces. All wet work of the northern wing will be completed before construction starts on the bridge structure.

The link between the northern wing and bridge structure is a 150mm concrete sloped pedestrian walkway, separated from the steel structure with a 40mm minimum expansion joint. The ramp should only be constructed once the steel structure has been erected and settled, this will allow for a seamless transition between the spaces.

The foundations of the northern wing are regular strip foundations. The roof of the FES, also the floor of the public square, is in-situ cast concrete, with pavers and storm water is managed through sloped screeds, as per the storm water plans.

Three courtyards (Fig 7.26) are designed to allow ample natural light into the FES. Due to the level difference between the public square and the FES, balustrades protect the pedestrians in the

public square. The courtyards also allow for interaction between the different levels of the northern wing.

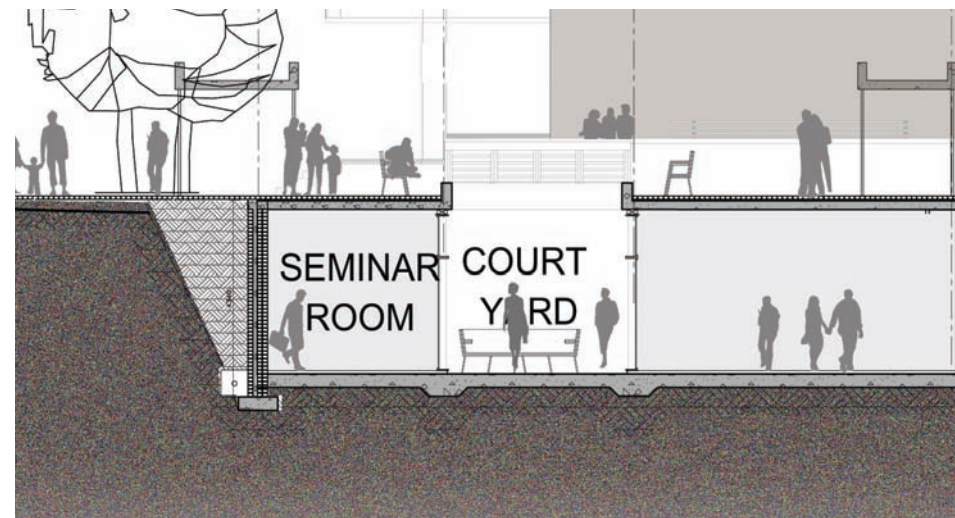


Figure 7.26 Section through northern retaining wall

Vierendeel truss:

an open-web truss with vertical members, but without diagonals and with rigid joints. (<http://www.merriam-webster.com/vierendeel%20truss>)

## Bridge

The bridge consists of a steel structure with infill panels. The main structural elements are the four Vierendeel trusses that also act as the facades of the bridge.

The bridge is the main element in the design. Technically, the bridge is the main structural challenge and the approach is to resolve the different challenges through many different layers, coordinating the different layers to integrate into one functional unit.

The horizontality of the design is achieved through the linearity and the absence of protruding elements on the facades and roofs, resulting in a simple horizontal aesthetic on the exterior facades.

The most important layer or system of the bridge is its structure. Eight concrete columns are designed to support four Vierendeel trusses. The properties of the Vierendeel truss are discussed in detail, to clarify the specific structural choice and what implications it has on the design of the BESC.

### Vierendeel Truss

The Vierendeel frame or truss, as it is more commonly referred to, consists of a top and bottom chord with rigid vertical bracing (Wickersheimer, 1987: 54), creating a series of rectangular frames (Fig 7.26). The shear force in a Vierendeel frame is transferred through bending moment in the joints and the vertical members,

resulting in all members being combined stress members, with axial, shear and bending stresses.

The Vierendeel gains rigidity with increased depth (Ibid: 59). It is, however, heavier than regular cross braced trusses that can handle the same load, due to higher cross sectional areas of the members, in order to resist the bending moments through the rigid connections.

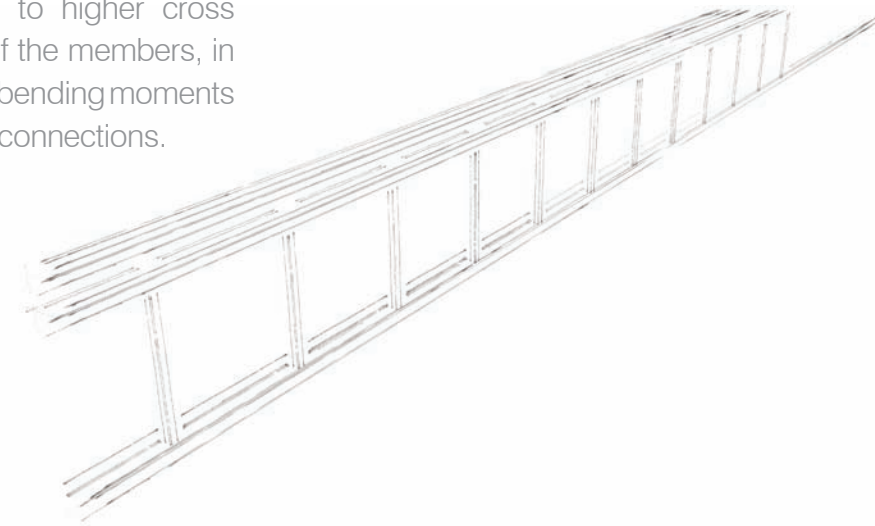


Figure 7.27 Vierendeel truss with horizontal chords and vertical, rigid supports

## Design requirements

- The structure is to have long span capabilities (almost 30 meters);
- The structure should be economically viable;
- Speed of erection is important, not to effect vehicular activity in Lynnwood Road.

## Opportunities

- The full expression of the entire structural system;
- Floor-to-floor structural depth;
- One truss can carry two floors;
- No additional materials required to resist torsion;
- The economy in transportation of materials.

## Design considerations of the Vierendeel truss

Physical – transportation and modularity

Max height of truss: 3 200mm

Max length of component: 12 000mm

Maximum weight of component to be considered by engineer.

Structural – Optimal cross sectional area in top and bottom chord

Rigidity of connections is essential – it has been proven that a hybrid between rigid and pinned connections can be achieved and should be considered by the engineer for material economy.

The connections between Vierendeel Truss and concrete columns bearing the load should be bolted to allow for movement of the truss, due to live load, creep, shrinkage and temperature changes.

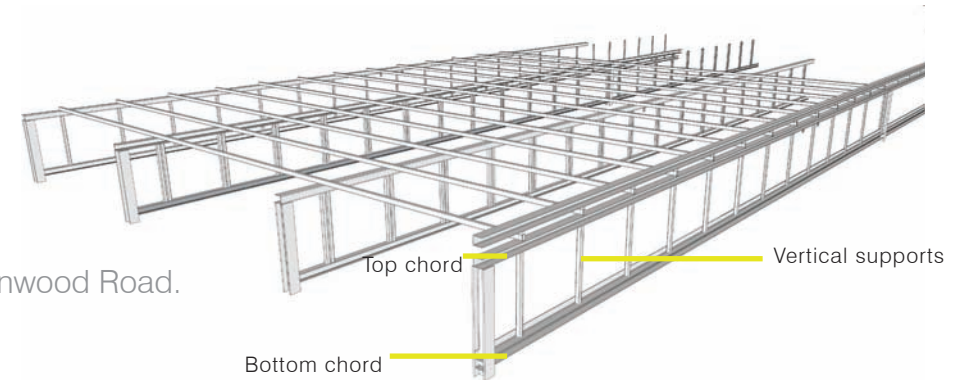


Figure 7.28 Four Vierendeel trusses, laterally braced to form one steel structure

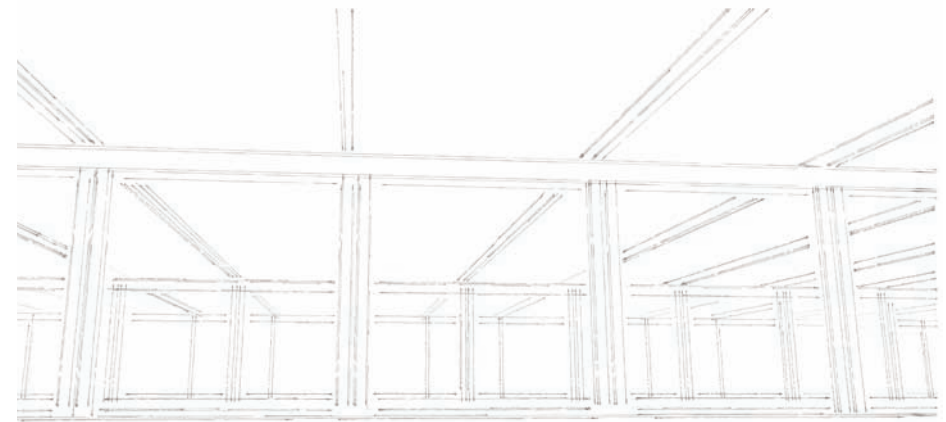


Figure 7.29 Rectangular openings in Vierendeel truss

## Height of Lynnwood Road bridge

The maximum height of the truss is determined by the legal height of a truck carrying a load, in order to get the truss to the site successfully. According to the South African Road Ordinance, the maximum height of a truck load is 4291mm. The truck required to transport the factory assembled Vierendeel truss segment is 1400mm high, leaving 2891mm for the height of the load. According to the South African National Road Agency Limited (SANRAL), a special permit can be issued, allowing total heights of up to 5000mm. The trusses are designed to have a total height of 3550mm, making it possible for the factory assembled segments to get to site.

## Advantages of the Vierendeel truss

- The facade is not ornamental;
- The structural elements do not have to be covered;
- It makes the structure lighter and cheaper;
- “The structure can become architecture”;
- Unification of aesthetic expression, function and economy;
- No cross members, allowing rectangular openings for access (Fig 2.29).

## Secondary structure

Additional lateral supports are required to connect the Vierendeel trusses, creating one integrated steel structure. The secondary structure consists of a series of I beams spanning between the Vierendeel trusses. The secondary structure is discussed as part of the Construction Process, in order to successfully communicate the relation between the primary (Vierendeel) and secondary structures.

## Infill

The infill is added to the structural layer. The infill can also be divided into several groups, the main groups being the Formica Solid Core wall panels and the Slimdek floor and roof systems.

Due to the different thermal capacities of the different materials, most panels are separated from the structural steel with spacers that allow for movement, without damaging other elements. The spacers between the materials act as another ‘layer’ added to the design; and it facilitates the integration of the different materials.

The infill components inside the steel structure should only be installed after the steel structure has settled, to avoid unnecessary cracking of the members.

The services and systems on the bridge are designed to integrate with the infill panels.

The aim of the infill layer is to create the desired aesthetic and practical functionality as well as complimenting the horizontality and linearity of the design.

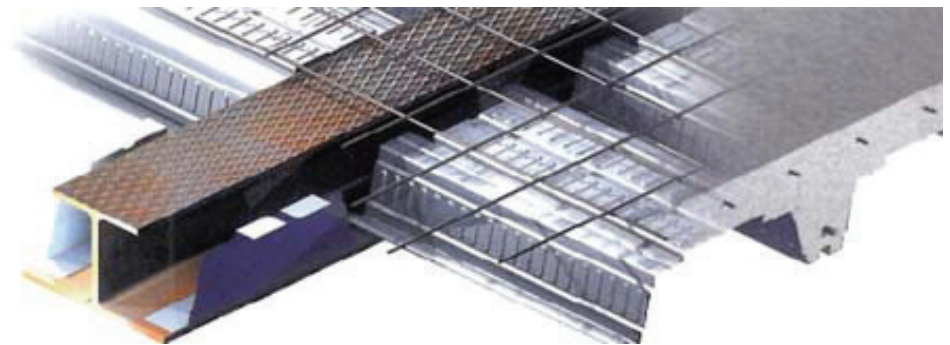


Figure 7.30 Composite light weight concrete flooring and roofing system



## Slimdek floor and roof systems

Slimdek (Fig 7.30) is an engineered floor and roof solution, designed to offer minimal depth light weight concrete slabs for use in multi storey steel structures. The system is designed to be integrated with the services of a structure, making it more cost effective. The Slimdek systems can handle grids of up to 11 x 11 meters.

The Slimdek is used as both floor and roof structures in the design. It consist of G275 spelter galvanized steel roof sheeting, and light weight concrete. The 75mm deep light weight concrete slab is cast after sheeting and service conduiting is in position. Units shall butt joint on the centre line of the supporting steel beam and be fixed to the beam by means of 20mm hammer drive galvanized steel screws, according to the structural engineer and manufacturer's specifications.

Slimdek total depth of 150mm minimum is covered by minimum 40mm screed (Fig 7.31), to slope at minimum 1:80 to full bore or similar water outlets. The final finish of the flooring systems is polished, self leveling, epoxy resin, cast in blocks of no larger than 1500mm x 1500mm and sealed with elastic waterproof clear silicon, to absorb the movement of the steel structure.

According to Andrew Orton's The way we build (1987, 22-34), cold formed steel decking with composite concrete topping has a typical depth of 100 - 150mm, typical span of 2-4m and typical L/d ratio of 25 - 30. For fire protection, concrete needs to be thicker than 40mm. In this system the dimensions are: Length = 3000mm, depth = 150mm and the ratio L/d = 20. This is well under the recommended ratios. The Slimdek system has a two hour fire rating.

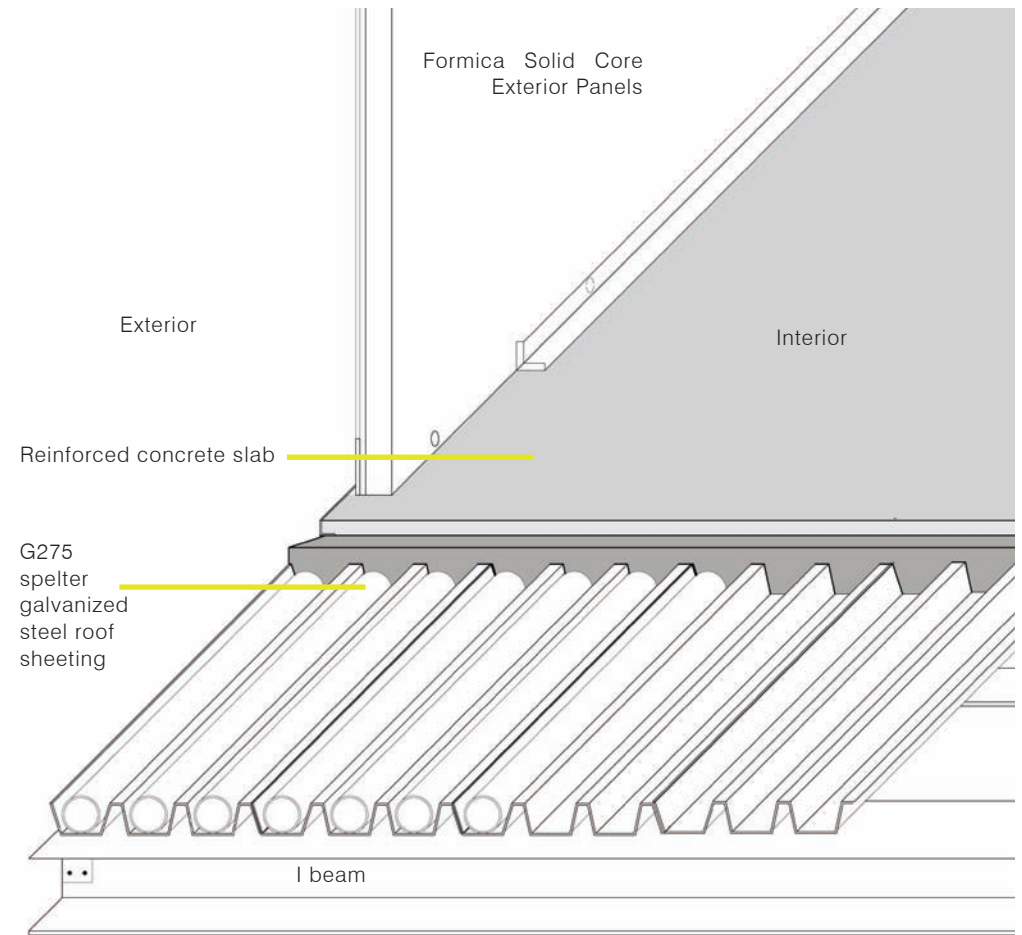


Figure 7.31 Slimdek detail

## Formica Solid Core Exterior Grade Paneling

PG Bison Formica exterior grade Solid Core panels are specified as the infill paneling. It is a self-supporting, water resistant, prefinished decorative product, with high resistance to mechanical, chemical, heat and environmental damage. The exterior grade is specifically used where ultra-violet lighting and environmental damage is critical.

The exterior side of the panel has an acrylic sheet overlay for UV protection and acoustic sheeting under the acrylic layer. All the cutting should be done with carbide tipped tools only, as specified by PG Bison. Chipping should be avoided by using a scoring blade. The panels are to be glued to the steel structure with polyurethane based adhesives, according to the manufacturer's specifications.

The polyurethane adhesives are flexible and will allow the Formica boards to move with the steel structure, in order to avoid cracking of the panels. All sides are to have polypropylene seals, to insulate the interior spaces, but allow the structure to be able to absorb the movement of the steel structure.

On the two inner facades of the bridge structure, on the Bridge

Level, the Formica Solid Core Panels are purpose made panels that can open (Fig 7.32). The panels are supported by heavy duty hinges, factory welded to the 100 x 100 x 10mm square tubing that act as the vertical support of the Vierendeel truss. The panels run on galvanized swivel gate wheels over the Slimdek floor finish, see DETAIL 3 (see page 164-165).



Figure 7.32 Perspective indicating openable Formica panels on inner facades of Bridge Level structure



Figure 7.33 PG Bison Solid Core Formica Panels

## Operable wall systems

Advanced Equipment, Type 5MS operable walls are designed to be stored in PG Bison Formica Solid Core Containers, situated on the eastern side of the Production Studio.

The walls are top supported by 148 x 89 x 11mm pre-painted mild steel hollow core square tubing, welded to the underside of Vierendeel horizontal chords. The square tubing acts as guide-rails for the movable wall panels, as specified by the manufacturer.

The maximum height difference between the finished floor level and the underside of the guide rail is 2150mm.

Each panel is individually suspended and operated manually, to allow maximum

flexibility of the system. The inner facades of the bridge structure are designed to allow the operable panels to penetrate the facade, into the circulation space as well as the Workshop Studio spaces on the western side (Fig 7.33).

The panels are designed to accommodate exhibitions, making it possible to redesign the space as often as required. This system, together with the operable facades of the two spaces, define the bridge circulation space and create the opportunity to turn the entire bridge structure into one urban exhibition room. The movement of the observer as well as the experience can be manipulated through the positioning of the different panels.

No tracks are required on the floor, as each panel is equipped with two trolleys, making it more versatile without jeopardising the linearity of the overall design.

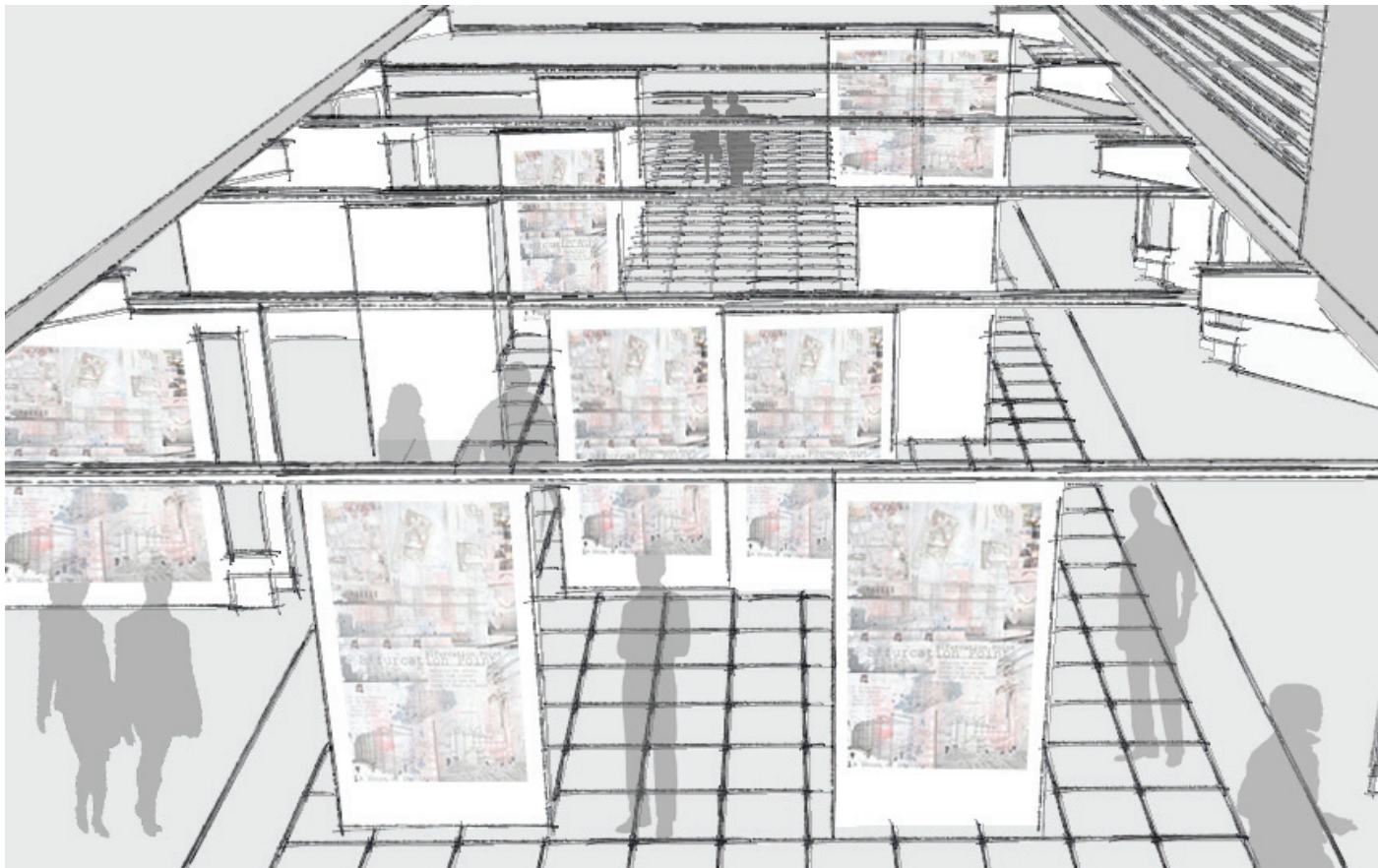


Figure 7.34 Operable wall panels moved into circulation space for public exhibition



## Acoustics

The main reason why Boukunde was drastically altered in 1973, is because the noise generated by Lynnwood Road penetrated the glass curtain wall southern facades of the original building, making the studio spaces too noisy. In order to maintain an acceptable noise level, the bridge structure needs an acoustic system.

As part of the floor structure of the bridge, a second layer is added in

the form of a hanging roof. The roof consists of 1500 x 1550 x 50; 0.8mm thick galvanized steel pre-painted Superseal 500 roof sheets, with double interlocking clips that are fixed to the underside of the Vierendeel trusses between the flanges, according to the manufacturer's instructions. Instead of creating thermal mass to control the acoustics, a double floor system, with acoustic sheeting and a cavity is used to control the noise levels.

The acoustic sheeting is a three layered acoustic sheet that is torched onto the Superseal 500 roof sheeting. The installation process will be discussed later.

Furthermore, all the Formica Solid Core Exterior Panels have acoustic sheets as part of the material composite. All glass windows and panels are double glazed and consist of tempered safety glass, double coated with low-E,

are dual-sealed and injected with Argon gas. The double glazing does not only keep out the noise, but also protects the work that is exhibited from excessive solar radiation.

The interaction between the different systems is detailed in DETAIL 2 (see page 162-163).

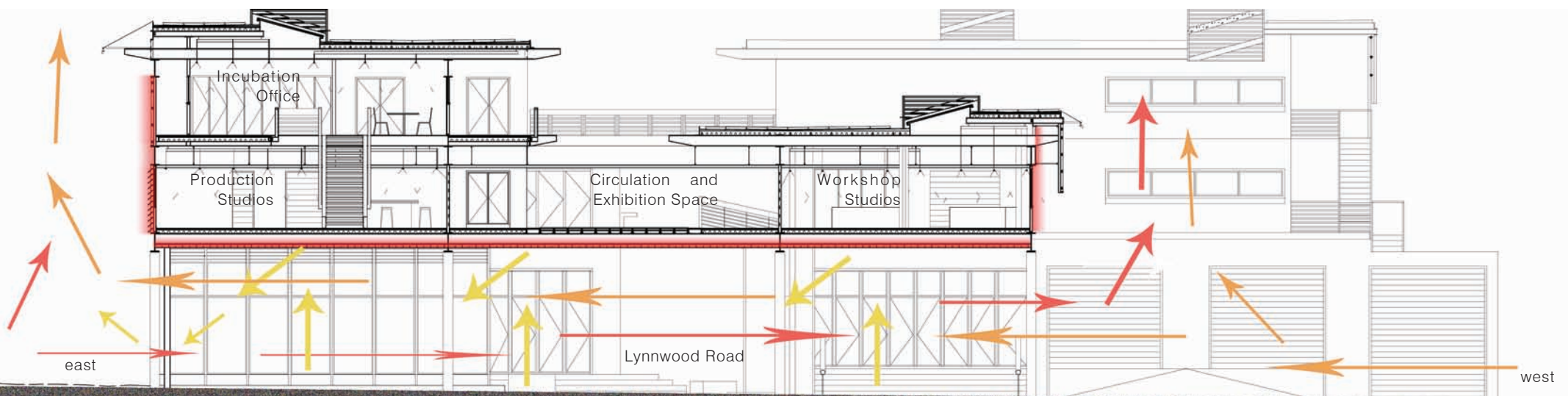


Figure 7.35 Diagram indicating the structure's ability to deal with excessive noise levels



## Southern Wing

The southern wing is a three storey masonry structure that defines the southern edge of the design intervention. The linearity on ground level is achieved through the incorporation of two pedestrian walkways linking the northern and southern wings. On the bridge level the pedestrian walkway continues into the masonry structure with two flights of steel staircases connecting the pedestrian with the ground level.

Construction of ground level can continue while the steel structure

is being erected, but the floor of the bridge level can only be cast when the exact height of the steel structure floor is determined. A minimum 40mm expansion joint is required between the steel structure and the masonry structure, according to the structural engineer Mr. Carl von Geyso. The expansion joint between the bridge and the southern wing will act as the threshold into the new space, this is merely a line, there is no level difference between the two spaces. The roof of the southern wing is exactly the same as the steel

structure's roof, only the expansion joints separate the two. As stated earlier, the roof is a Slimdek composite light weight concrete roof. The concrete roof is then used to house PV flat solar panels.

The structure consists of 230mm masonry brickwork with Slimdek being the horizontal elements. Slimdek has a maximum span of 11meters x 11meters, making it the most economic and feasible option to use as flooring and roofing structure.

The two incubation offices on the Top Level are linked with a bridge structure, this allows for interaction between the bridge level and the top level. This link also assists in defining the foyer space below it. This space acts as a combined foyer into the Restaurant, Workshop Studios, Production Studios and South Campus as a whole.

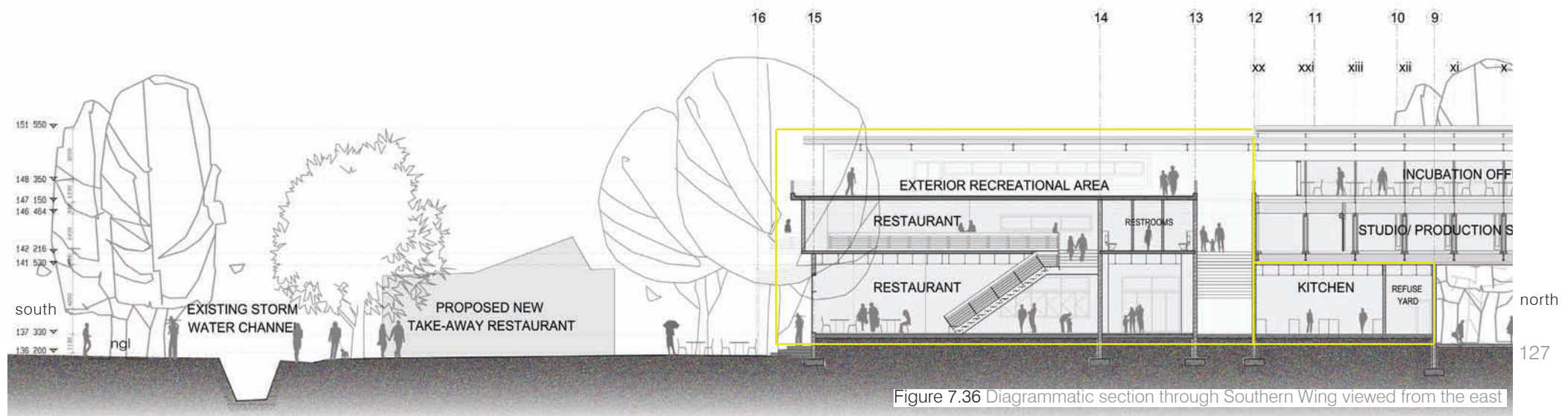


Figure 7.36 Diagrammatic section through Southern Wing viewed from the east



The storm water is collected on all hard surfaces, and then taken to the nearest storm water reticulation tank. For aesthetic and functional purposes, 200mm diameter exposed galvanized downpipes have been used. It was established that the largest area that can be served by one downpipe is just over 220mm<sup>2</sup>. The screed layouts, as indicated on the Roof Plan, are designed accordingly.

Storm water management		Min downpipe dimensions	
Total Footprint Area		5307m <sup>2</sup>	
		Area required	Radius (min)
1	52m <sup>2</sup>	7280mm <sup>2</sup>	48mm
2	52m <sup>2</sup>	7280mm <sup>2</sup>	48mm
3	52m <sup>2</sup>	7280mm <sup>2</sup>	48mm
4	204m <sup>2</sup>	28560mm <sup>2</sup>	95mm
5	64m <sup>2</sup>	8960mm <sup>2</sup>	53mm
6	145m <sup>2</sup>	20300mm <sup>2</sup>	80mm
7	224m <sup>2</sup>	31360mm <sup>2</sup>	99mm
8	90m <sup>2</sup>	12600mm <sup>2</sup>	63mm
9	218m <sup>2</sup>	30520mm <sup>2</sup>	98mm
10	77m <sup>2</sup>	10780mm <sup>2</sup>	59mm
11	213m <sup>2</sup>	29820mm <sup>2</sup>	97mm
12	90m <sup>2</sup>	12600mm <sup>2</sup>	63mm
13	213m <sup>2</sup>	29820mm <sup>2</sup>	97mm
14	65m <sup>2</sup>	9100mm <sup>2</sup>	54mm
15	57m <sup>2</sup>	7980mm <sup>2</sup>	50mm
16	113m <sup>2</sup>	15820mm <sup>2</sup>	71mm
17	73m <sup>2</sup>	10220mm <sup>2</sup>	57mm
18	111m <sup>2</sup>	15540mm <sup>2</sup>	70mm
19	111m <sup>2</sup>	15540mm <sup>2</sup>	70mm
20	67m <sup>2</sup>	9380mm <sup>2</sup>	55mm
21	78m <sup>2</sup>	10920mm <sup>2</sup>	59mm
22	86m <sup>2</sup>	12040mm <sup>2</sup>	62mm
23	96m <sup>2</sup>	13440mm <sup>2</sup>	65mm
24	96m <sup>2</sup>	13440mm <sup>2</sup>	65mm
25	1356m <sup>2</sup>	189840mm <sup>2</sup>	245mm
26	365m <sup>2</sup>	51100mm <sup>2</sup>	128mm

Figure 7.39 Rain water accumulation areas, for downpipe sizing

Storm water management calculations:

Downpipe sizing calculations:

$$\text{Area} \times 140 = x$$

$$x = (\text{Pi}) \times r^2$$

$$x/(\text{Pi}) = r^2$$

example -

$$213 \times 140 = 29820\text{mm}^2$$

$$29820/3.14 = r^2$$

$$r = 97\text{mm}$$

All downpipes to be 200 mm diameter galvanized steel, draining into subsurface gutters sloped at min 1:80 to the rain water reticulation tanks, for irrigation.

## Gutters and downpipes specifications

Gutter and downpipe sizes determined by roof area per downpipe, Pretoria's summer rainfall statistics (max. 132mm in wet months) according to SANS 10400-R.

### GUTTERS

1,0mm galvanised steel gutters according to SANS 357/4998. All gutters according to rain water management schedule. All gutters to have angles, stopped ends and outlet nozzles where required, according to manufacturer's specifications.

### GUTTER BRACKETS

40 x 6,0mm thick steel brackets to be hot-dipped galvanized after manufacture.

### INSTALLATION:

Lay gutters in galvanized mild steel brackets to min. fall 1:80 to outlets, screwed to steel structure at min. 1000mm centres.

Fix downpipes to vertical elements of steel structure or walls of masonry structure (positions as indicated on plans), 200 mm away from finished wall surface, seam towards wall when relevant, with 200 x 1.6 mm galvanized mild steel clamps, bolted around pipe in two halves, and with 6 mm diameter galvanized steel spiral nail driven into wall at least twice per downpipe length and max. 2 m centres.



## Storm water reticulation on Bridge

The rain water that falls on the Bridge Level pedestrian walkway is one of the main storm water challenges, as the surface should be 100% level to accommodate the operable walls.

The Slimdek flooring ends three meters from the Vierendeel Truss on either side of the pedestrian walkway (Fig 7.40). A 500 x 45 x 6 mm mild steel removable grating with easy clean solids traps separates the Slimdek from the 500 x 500 x 50mm stucco creed concrete pavers. The pavers are placed on T-sections that span between the lateral supports I beams of the steel

structure. The pavers are placed on spacers to allow water to seep through. The water is then collected on the hanging roof structure with the acoustic sheeting on. The hanging roof is sloped at an angle of minimum one degree to allow the water to flow from the middle of the bridge, towards the sides where it is collected in a gutter and then taken to the reticulation tanks.

An overflow is designed where the hanging roof meets the Vierendeel truss; this is done to avoid any water ever pushing up into the interior space of the Bridge Level.

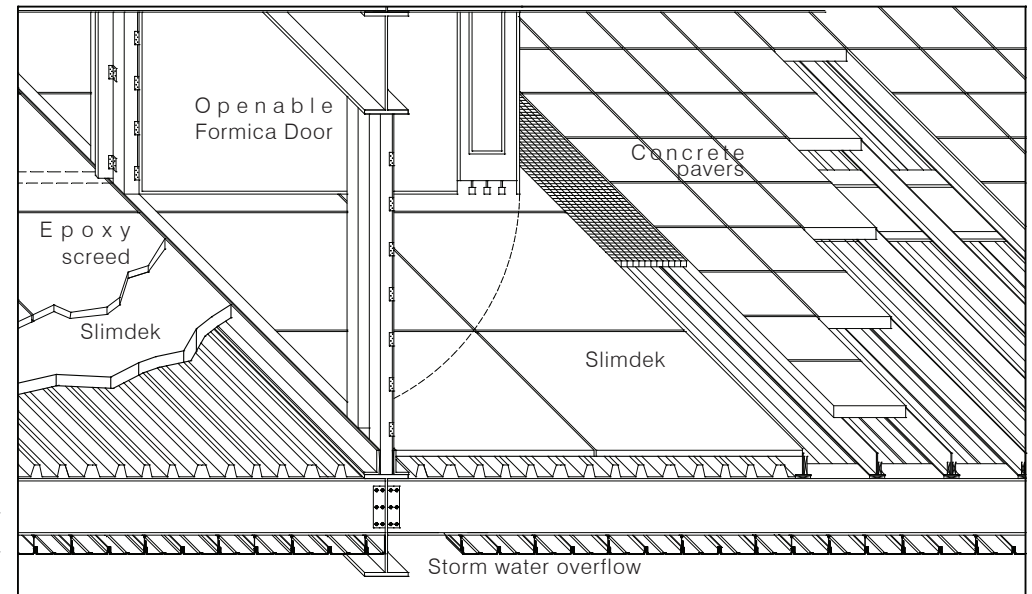


Figure 7.40 Detail indicating the different flooring systems

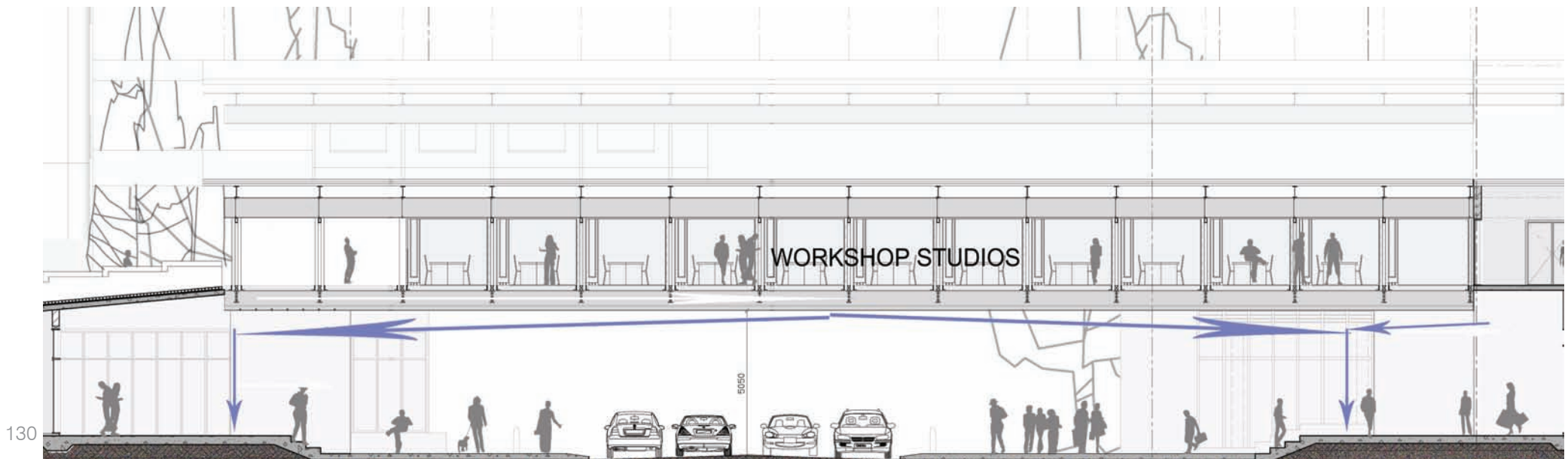


Figure 7.41 Diagrammatic presentation of water management from bridge to reticulation tanks



## Electrical services

To keep the horizontality and simplicity of the facade, flat photovoltaic collectors are placed on the Slimdek roof structure. A total area of 1500m<sup>2</sup> will be covered in photovoltaic panels. A battery storage room is designed on the southern end of the incubation office. Large louvres on the southern facade allow for natural ventilation in the battery storage room, and the roof will keep the batteries dry.

The accumulated energy will then be used to sustain the artificial lighting that is required in the

Workshop Studios, Production Studios and Incubation Offices. The electrical services are distributed through PVC conduiting that is placed into position as part of the Slimdek systems. The conduiting is placed in position before the light weight concrete is cast.

The electrical services therefore run inside the floors and no additional suspended ceilings or floors are required to hide the services.

In some areas, where there are suspended ceilings, the fluorescent

lighting is recessed into the ceilings in order to keep the spaces as light and clear as possible.

Fluorescent lighting casts very little direct shadows, resulting in defused, continuous lighting, ideal for work areas. Down lighters are used in specific areas where continuous exhibition will take place.

The photovoltaic panels will be used as much as possible, but the municiple connection will act as a backup.

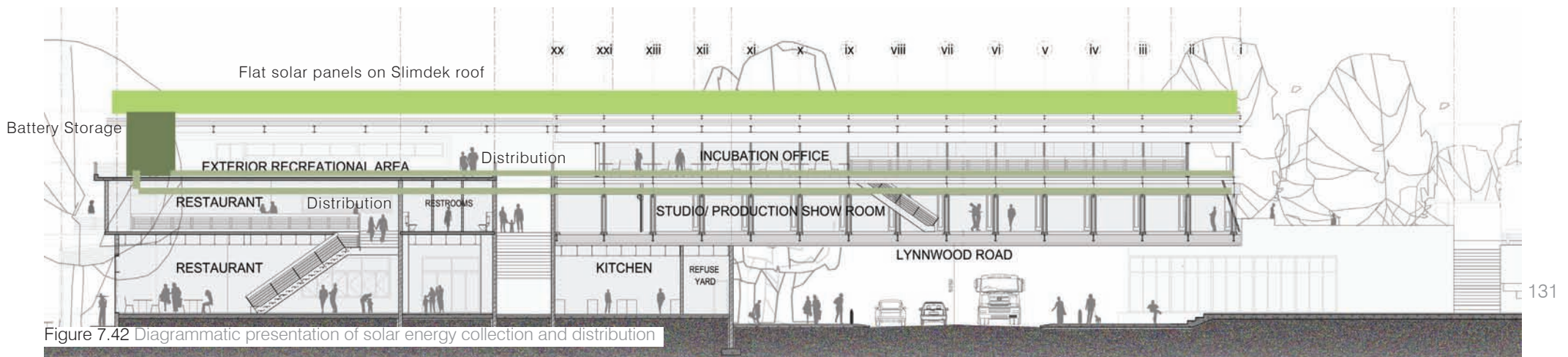


Figure 7.42 Diagrammatic presentation of solar energy collection and distribution

## Passive systems

### Orientation

The building, as a linear structure, is orientated with its shorter elevations north and south and the longer elevations east and west.

### Solar control and natural lighting

The spaces are designed to have as much as possible natural sunlight with as little as possible direct sunlight. On the eastern and western facades large billboards are provided to create a double facades that block unwanted direct sunlight (Fig 7.43), yet allows reflected light into the interior spaces. The inner skin of both facades have large, not openable, double glazed windows. The windows are openings in the facade that allow in natural daylight, but keep out the noise generated by the vehicular traffic on Lynnwood Road, through double glazing, and cannot be opened to avoid any unhealthy gasses entering the interior spaces.

In the FES a roof window is designed to allow in natural defused northern

light. The windows are openable to allow hot air to escape through the roof. On the southern facade of the FES, large double glazed windows allow in natural southern light, create curiosity in the passerby and keep out all unwanted noise generated under the bridge.

Natural light also enters the Production Studios and Workshop Studios from the main circulation space.

Intelligent roof lights are designed on the roofs. SolaQuad is an intelligent skylight system that provides controlled day lighting and a very high level of insulation. The double glazed windows have an opaque face that is rotated to the sun to control the amount of sunlight and solar heat gain transmitted through the panels. The skylight is openable to allow hot air to escape through the roof.

The solar control and natural lighting systems are passive systems implemented to keep the running cost of the building as low as possible, as well as lower its carbon footprint.

### Ventilation

Natural ventilation is achieved through the many openings and operability of the different elements in the design.

In the Workshop Studio on Ground Level some of the workshops that are presented might involve working with heavy machinery and by implication the gasses and dust produced when working with such equipment. Due to the required height of the bridge, the interior spaces on Ground Level, south

of Lynnwood Road exceeds 3800mm. A mechanical ventilation system, that will only be used when necessary is hidden with a suspended ceiling.

The success of a restaurant is influenced by thermal comfort. A heating, ventilation and air conditioning system is therefore designed into the Restaurant. Another suspended ceiling on Ground Level of the Restaurant is therefore required.

All other ventilation happens naturally through openings on the facades.

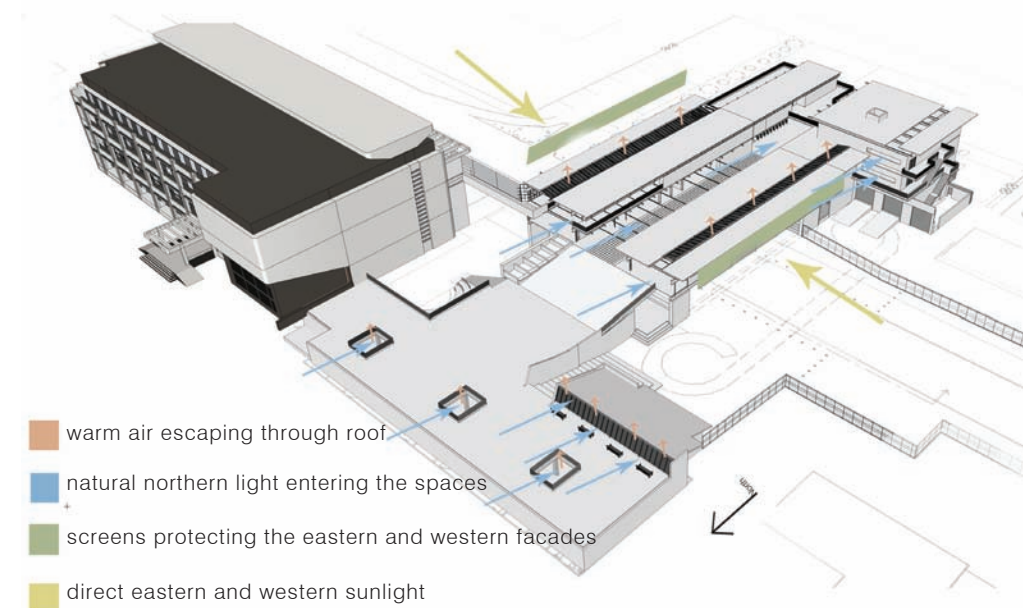


Figure 7.43 Summary of passive systems

## Construction process

The different layers of the technical aspect of the design have now been established. The integration of the layers and how they function to create a unified structure is discussed in terms of the construction process. In order for the different systems to function successfully, the construction process should be integrated.

Four storm water reticulation tanks are incorporated into the design to collect rainwater for irrigation on both campuses. All construction on storm water reticulation tanks to be completed before construction on the structure above ground commences.

The wet work on Ground Level should commence, starting with the northern retaining wall.

The concrete columns (Fig 7.43) as indicated on the plans are to be completed and leveled before delivery of the Vierendeel Structural System.

Concrete columns sizing calculation:

typical  $h/d = 20-25$

for buckling:  $h/d > 14$

$h/d = 4287/450$

$= 12.25$

The concrete columns are to be designed by a structural engineer, and should have a minimum width dimension of 350mm.

The height of the column is determined by the minimum height

to the underside of bridge, as discussed earlier. Adler's "Metric handbook" confirms that 5000mm is the minimum height of a bridge. The column heights are determined by these regulations.

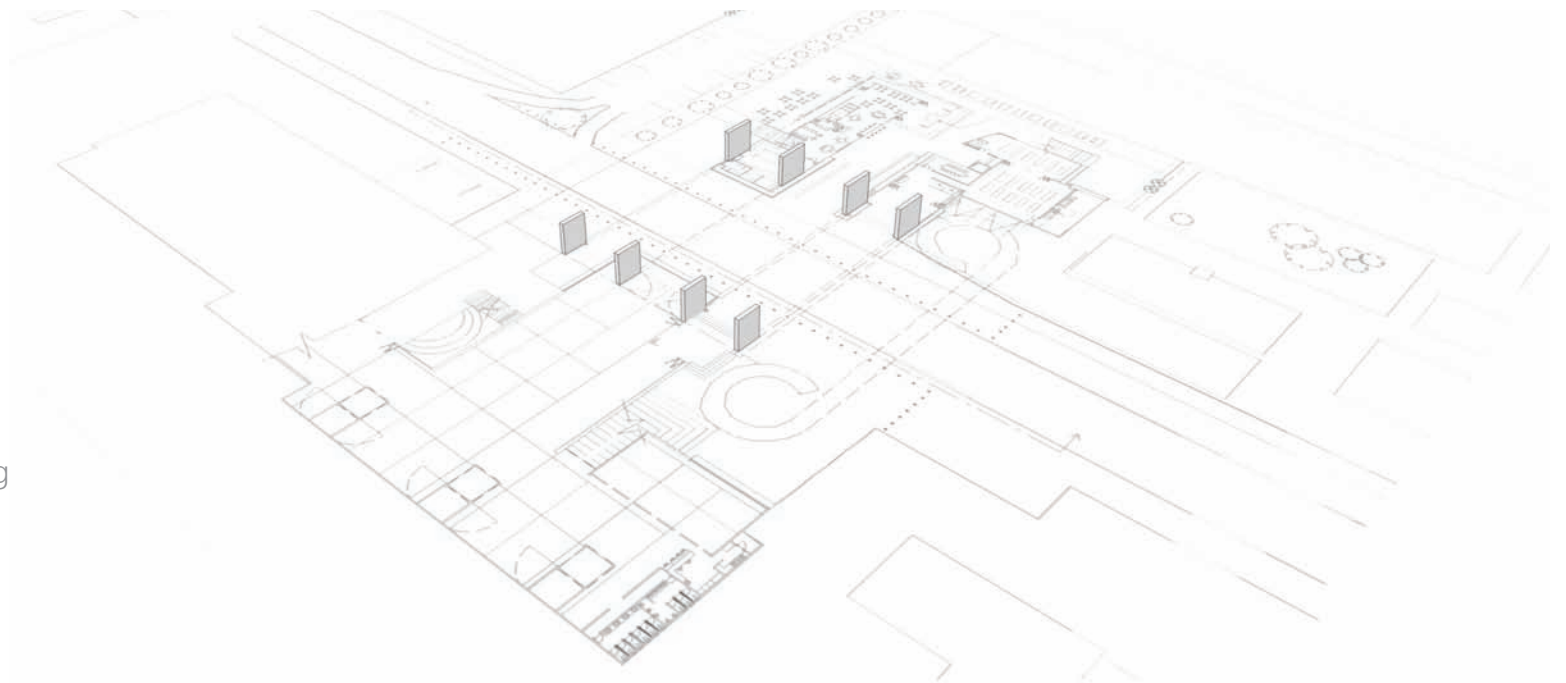


Figure 7.44 Position of concrete columns on Ground Level Plan



The two centre Vierendeel Trusses to be erected first (Fig 7.44), and then the two exterior trusses.

Pre-manufactured component with max dimensions of 12000 x 3200mm arrive on site and is placed on the first 100% level column by crane. The component is initially kept in position with temporary scaffolding until bolted connections are according to engineer specifications. The next segment is also placed on temporary scaffolding and lifted by crane into position until a 100% penetration weld is achieved (can take up to 24 hours). This process is repeated until the truss is fully supported by the concrete columns.

Vierendeel Girder:  
 typical depth = 1000 - 3000mm  
 typical span = 6-18m  
 typical L/d = 4-12  
 Rigidity obtained with depth increase  
 L = 29 435mm  
 d = 3200mm  
 L/d = 9.19

I beam as shear support of Vierendeel:  
 typical depth = 120 - 300mm  
 typical span = 3 - 12m  
 typical L/d = 25-35  
 Bolted to flanges on Vierendeel  
 L = 11915  
 d = 381  
 L/d = 31.27

Bottom chord I beam as shear support of Vierendeel:  
 typical depth = 120 - 300mm  
 typical span = 3 - 12m  
 typical L/d = 25-35  
 Bolted on top of concrete columns  
 L = 29 435mm  
 d = 686mm  
 L/d = 42.9

Even though the L/d is higher than the typical ratio, according to the engineer, Mr Carl von Geiso, it is still well within the safety limits and the capability of cold formed mild steel to carry itself over such a distance.

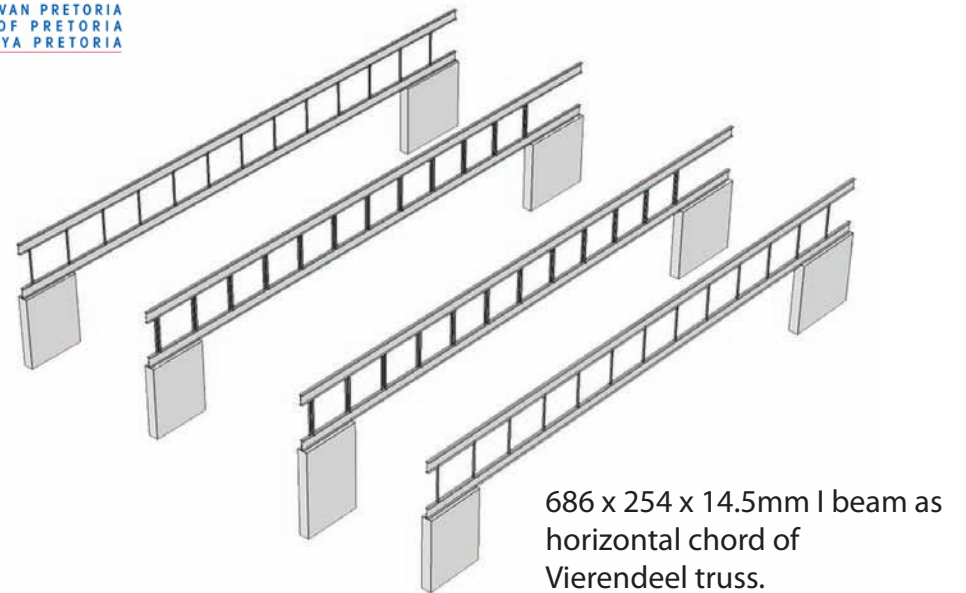


Figure 7.45 Four Vierendeel Trusses in position on concrete columns

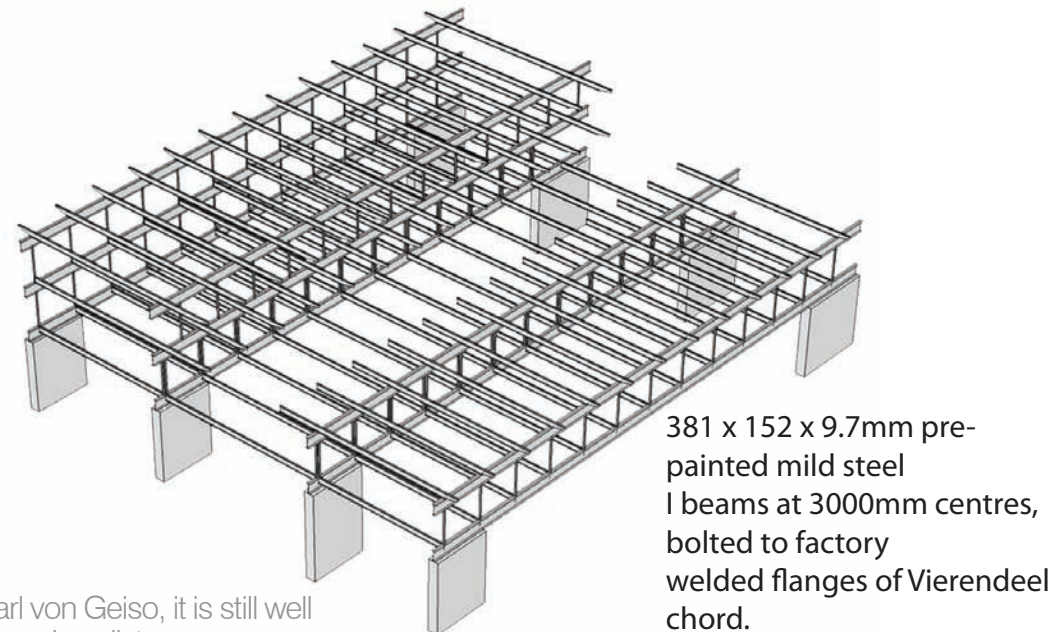


Figure 7.46 I beams bolted to Vierendeel Trusses for lateral support



Vertical Bracing of Vierendeel: hollow  
core square tubing:  
typical height = 2 - 8m  
typical h/d = 20-35  
For buckling: h/d > 20  
d = 100  
h = 2428  
h/d = 24.28

148 x 89 x 11mm pre-painted mild steel hollow core square tubing welded to underside of Vierendeel horizontal chord, as recommended by the structural engineers. Square tubing to act as guide-rail form movable wall panels.

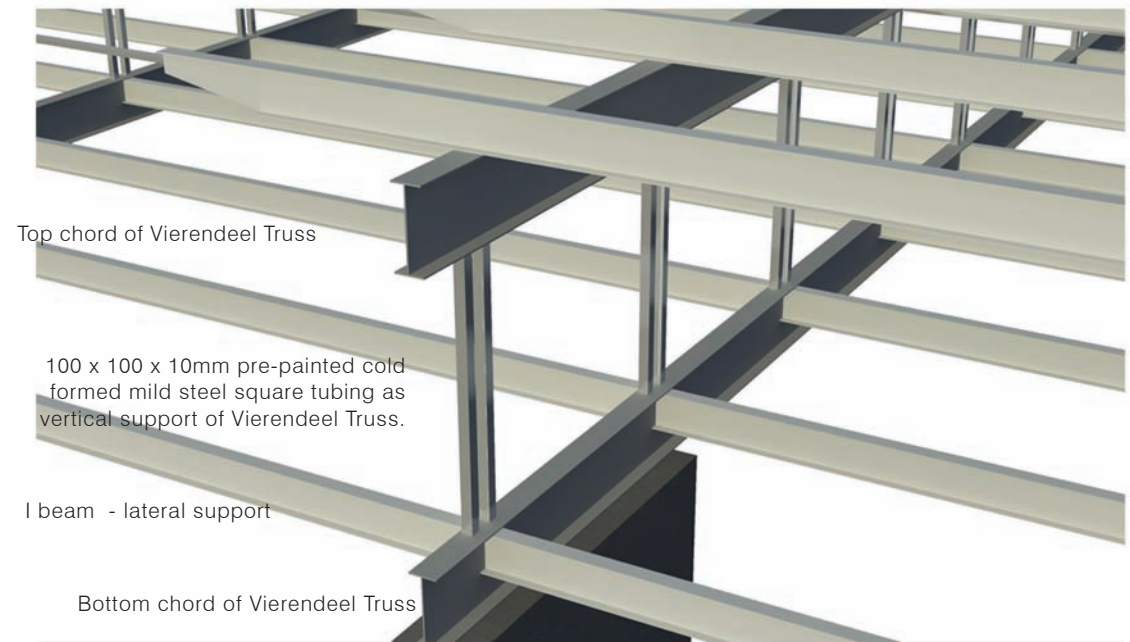


Figure 7.47 Steel structure detail

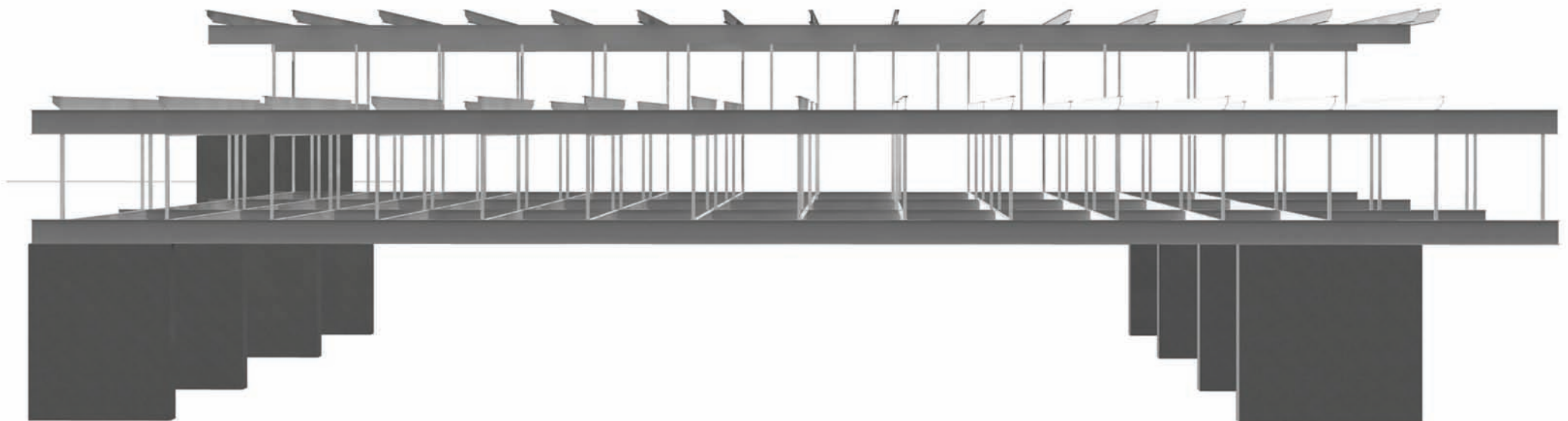


Figure 7.48 Western view of structural steel system

After the steel structure has settled, the infill can be erected and the wet work can continue on the northern and southern wings.

The three structural components are separated with two minimum 40mm expansion joints, sealed with polyurethane seals to accommodate the movement of the separate structures.

#### BRIDGE FLOOR CONSTRUCTION:

After the main steel structure is completed the hanging roof should be bolted to the underside of the lateral support I beams of the structure. The AcoustiPack acoustic sheets are then torched onto the hanging roof. The Slimdek roof sheeting is then fixed to the lateral support I beams, followed by the conduiting and the reinforcing placed into position after which the concrete is cast. The concrete tiles that complete the walkway is only placed on top of the spacers and T-sections, so it can easily be removed for cleaning purposes.

After the structure is completed the steel staircases and billboards are installed. The steel staircases are separate structures, custom made, according to DETAIL 8 and DETAIL 9. The structures are mechanically bond to the masonry structures and bolted into position where it connects to the steel structure.

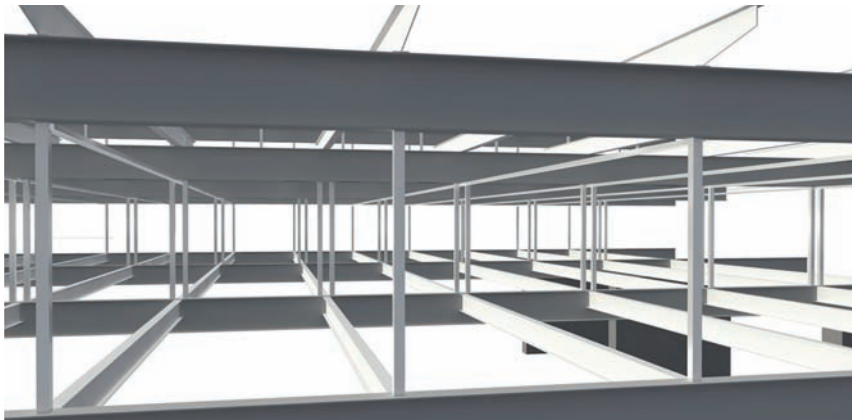


Figure 7.49 Edge of the structural steel system, before infill is installed

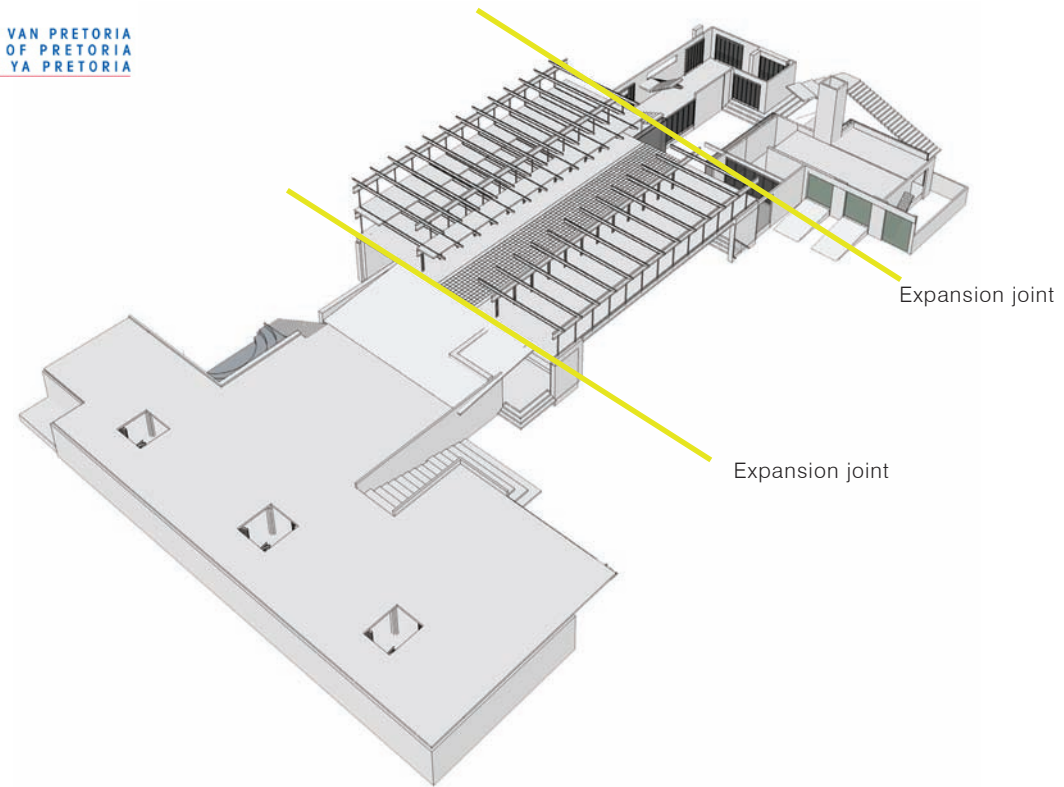


Figure 7.50 Wet work on northern and southern wings after steel structure is in place

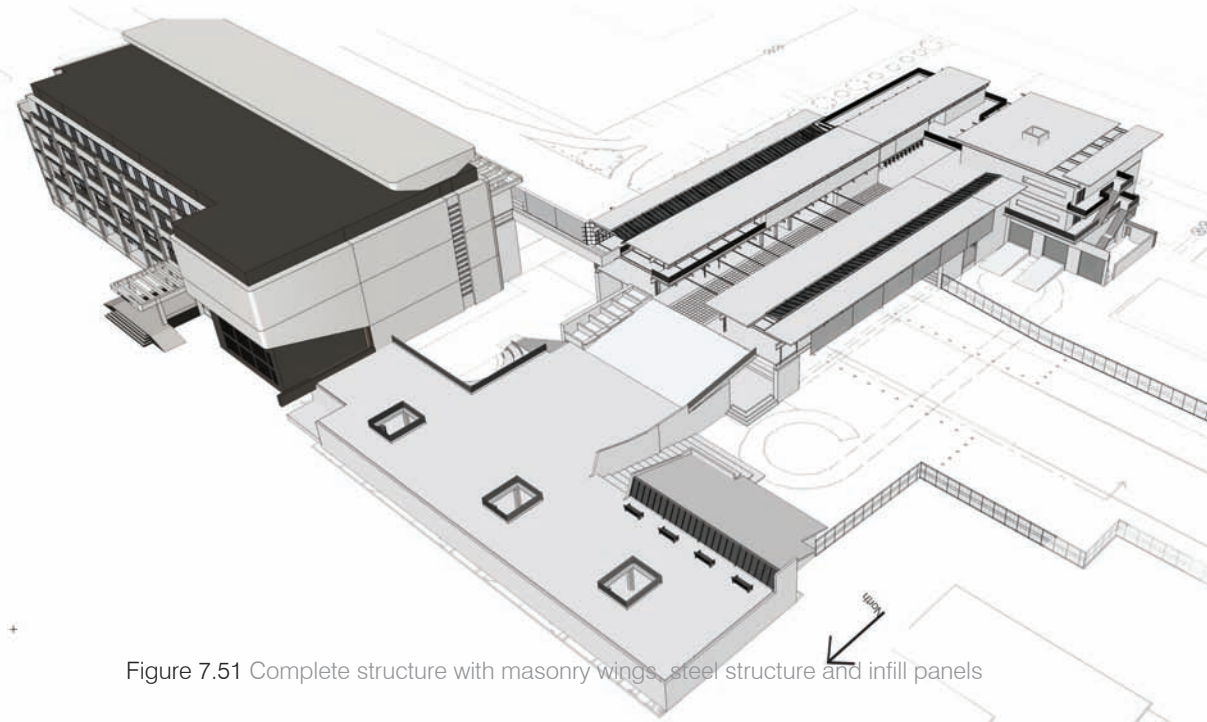


Figure 7.51 Complete structure with masonry wings, steel structure and infill panels

## Connection between BESC and Boukunde

The Top Level of the BESC has a walkway that links directly with Boukunde. As stated previously, the identity of Boukunde as a modern icon in the landscape should be respected.

The proposed intervention is a foyer into Boukunde similar to the existing foyer on the northern facade. The new and existing foyers are similar in proportion, dimensions, function and aesthetic.

The new foyer is designed to be structurally independent, standing on four large columns, with an expansion joint separating it from the existing Boukunde structure.

The structure consists of in-situ cast painted concrete, the aesthetic should match that of Boukunde completely.

The eastern billboard continues up to the foyer, acting as a balustrade and allows the

connection between the BESC and the new foyer to be unintrusive to the identity of Boukunde.

Two aluminium framed glass door panels, that match the front door of Boukunde, are to be installed, connecting the second floor studios directly with the incubation offices on the Top Level of the BESC.

The connection to Boukunde is designed to be able to accommodate change. The extension of the Boukunde building is inevitable and the foyer suggests where the extension could take place; the foyer can be extended to the eastern corner (not effecting the corner though) and closed down to provide more studio spaces. This can be done on all levels, allowing Boukunde to keep its identity and provide ample space for the growing number of students.

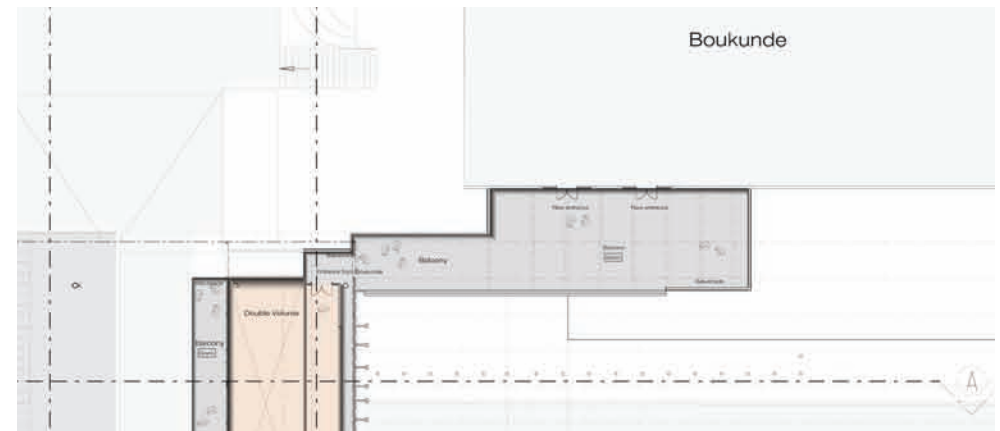


Figure 7.52 New openings on southern facade of existing Boukunde building

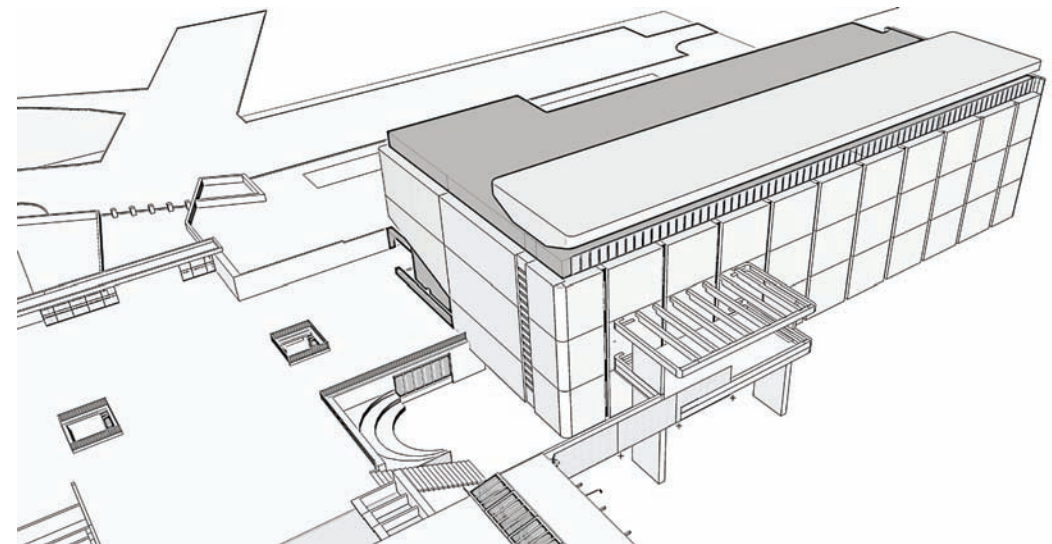


Figure 7.53 Connections between BESC and Boukunde

## Conclusion

All the technical aspects of the services and systems had to be separated in order to explain them systematically. But in reality the integration of the different layers of systems and services was never separated during the design process.

The simplicity of the facades and the linearity of the design enables the structure to read as an object. The expression of the connections, services and systems is done in such a way that it compliments the iconic image of the design.

The interdependency of the various services and systems creates a unified structure that functions as one system. Implying that one system does not come to its full potential without the others. This can be related back to architecture's dependency on both theory and practice for existence.

The layered tectonic resolution can therefore be traced back to the concept of foyers, linking different entities with similar intentions.



# chaptereight

Technical Documentation

# Site Plan

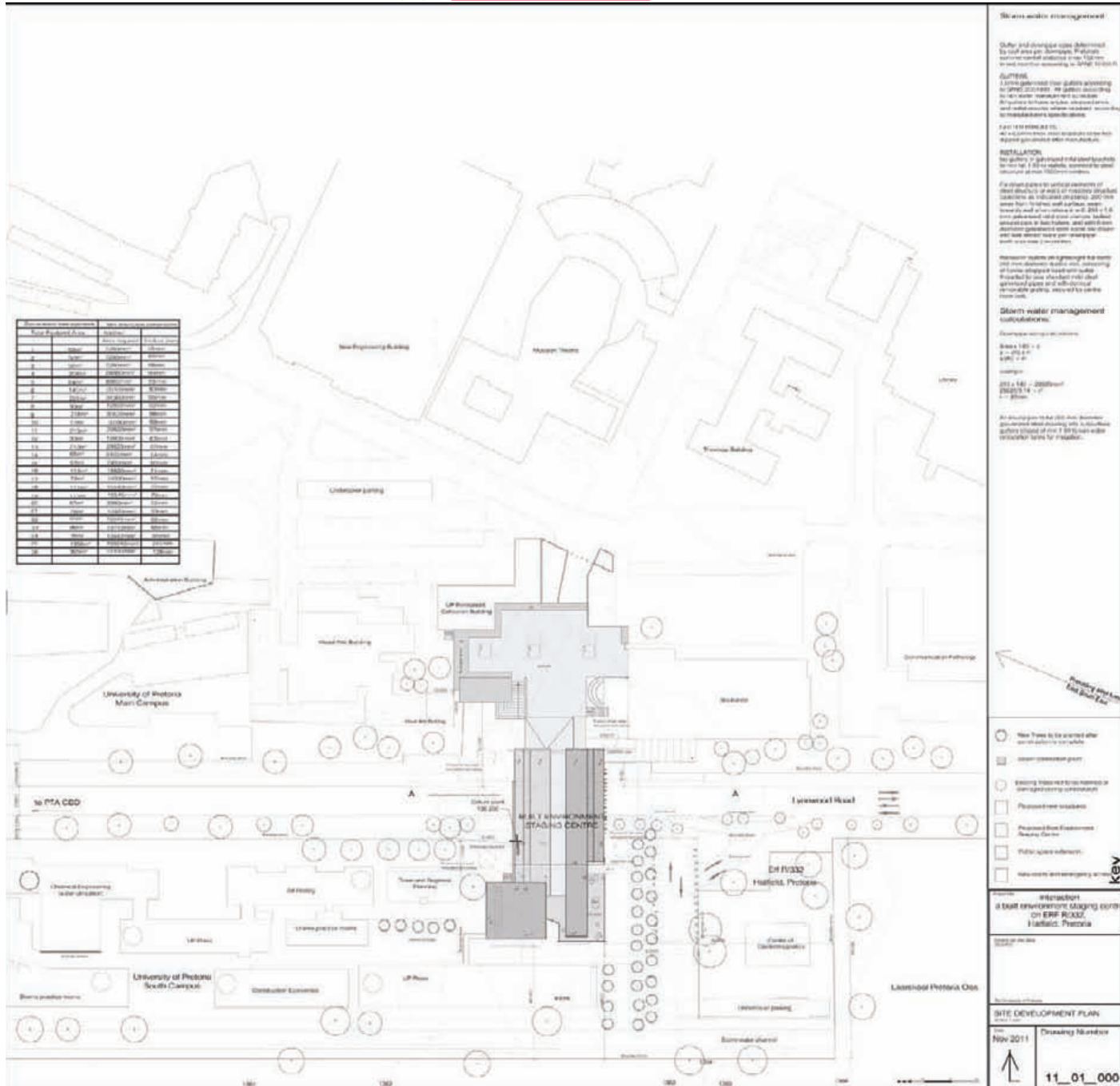


Figure 8.1 Site Plan

# Ground Level Plan

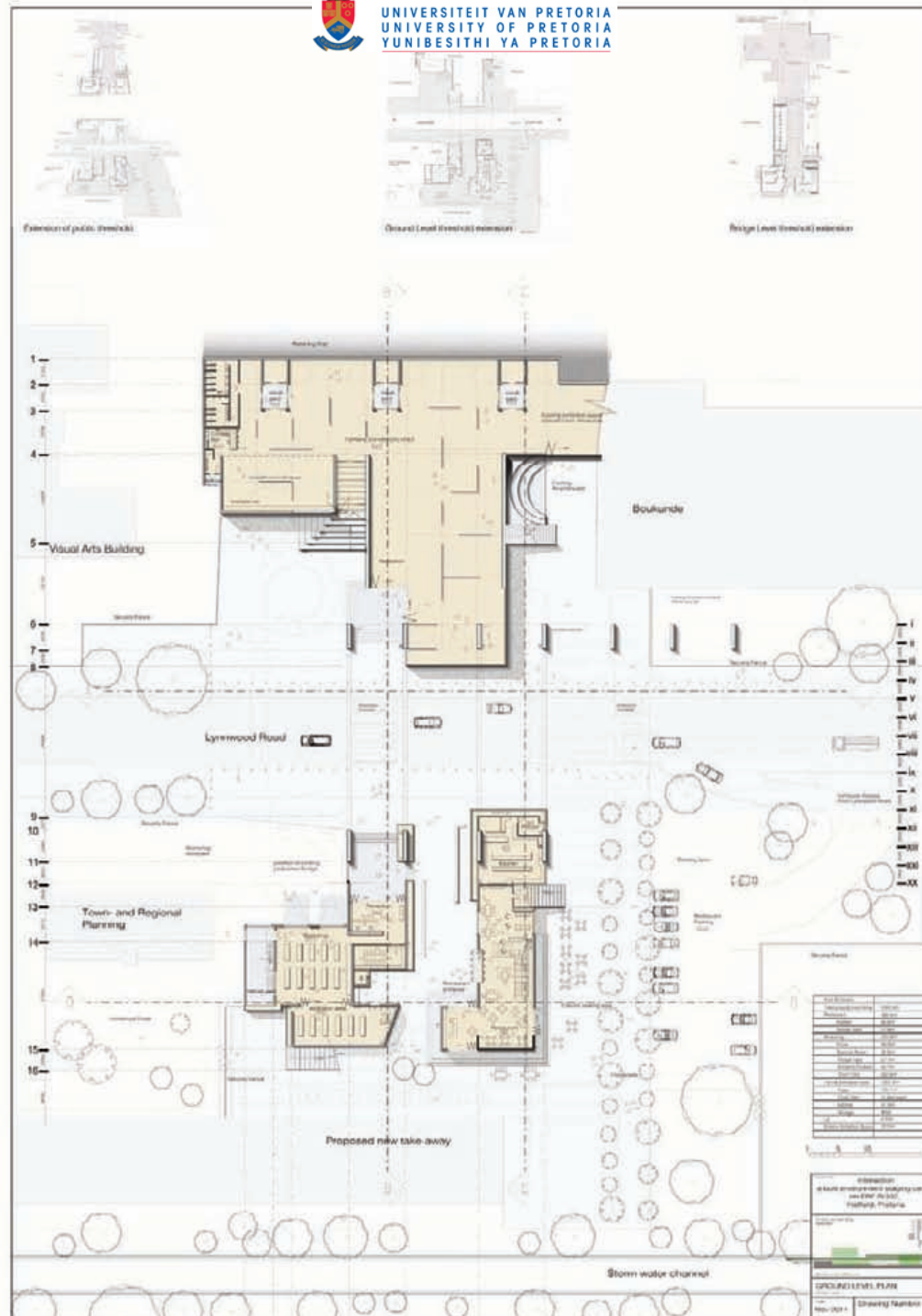
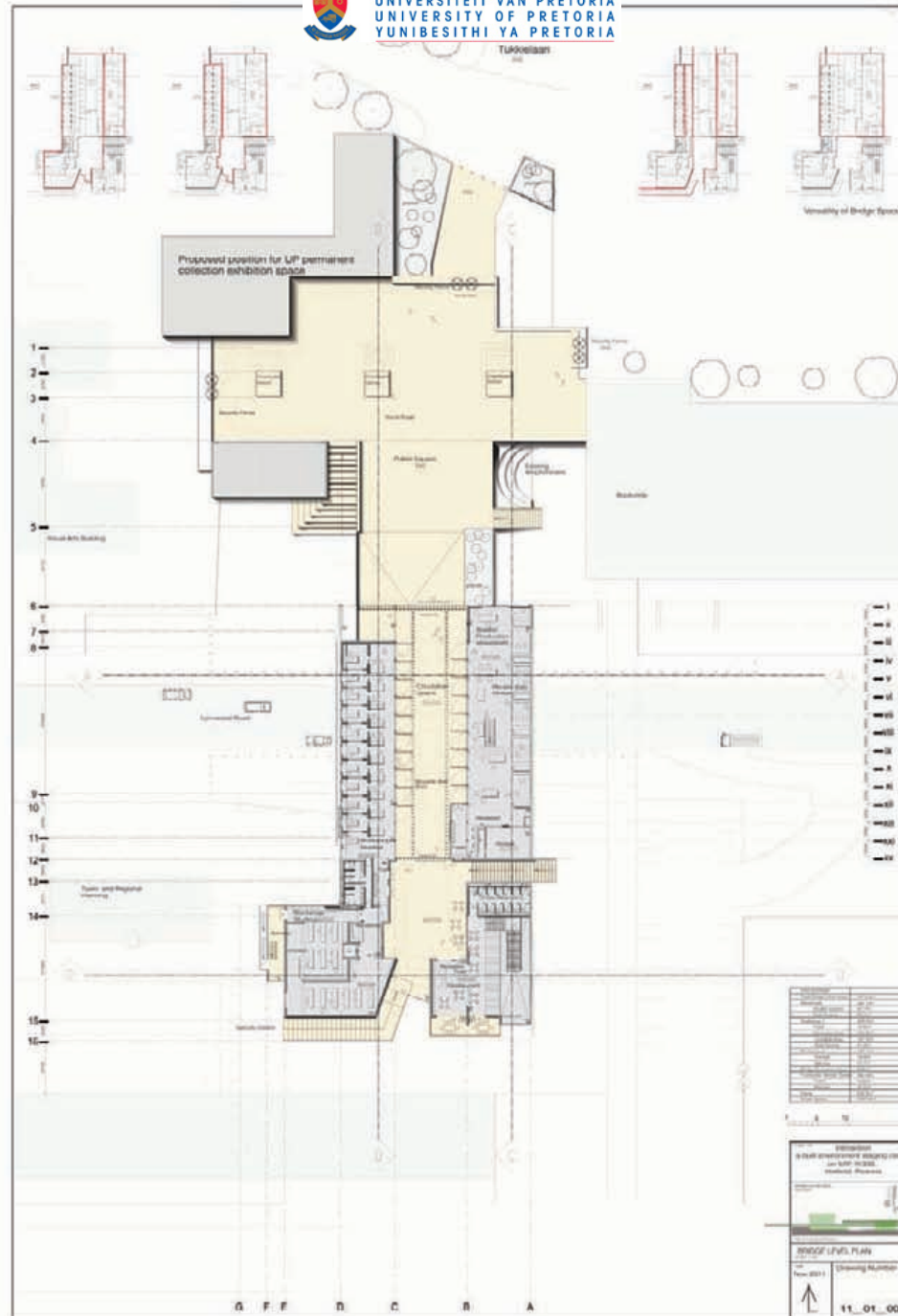


Figure 8.2 Ground Level Plan

# Bridge Level Plan

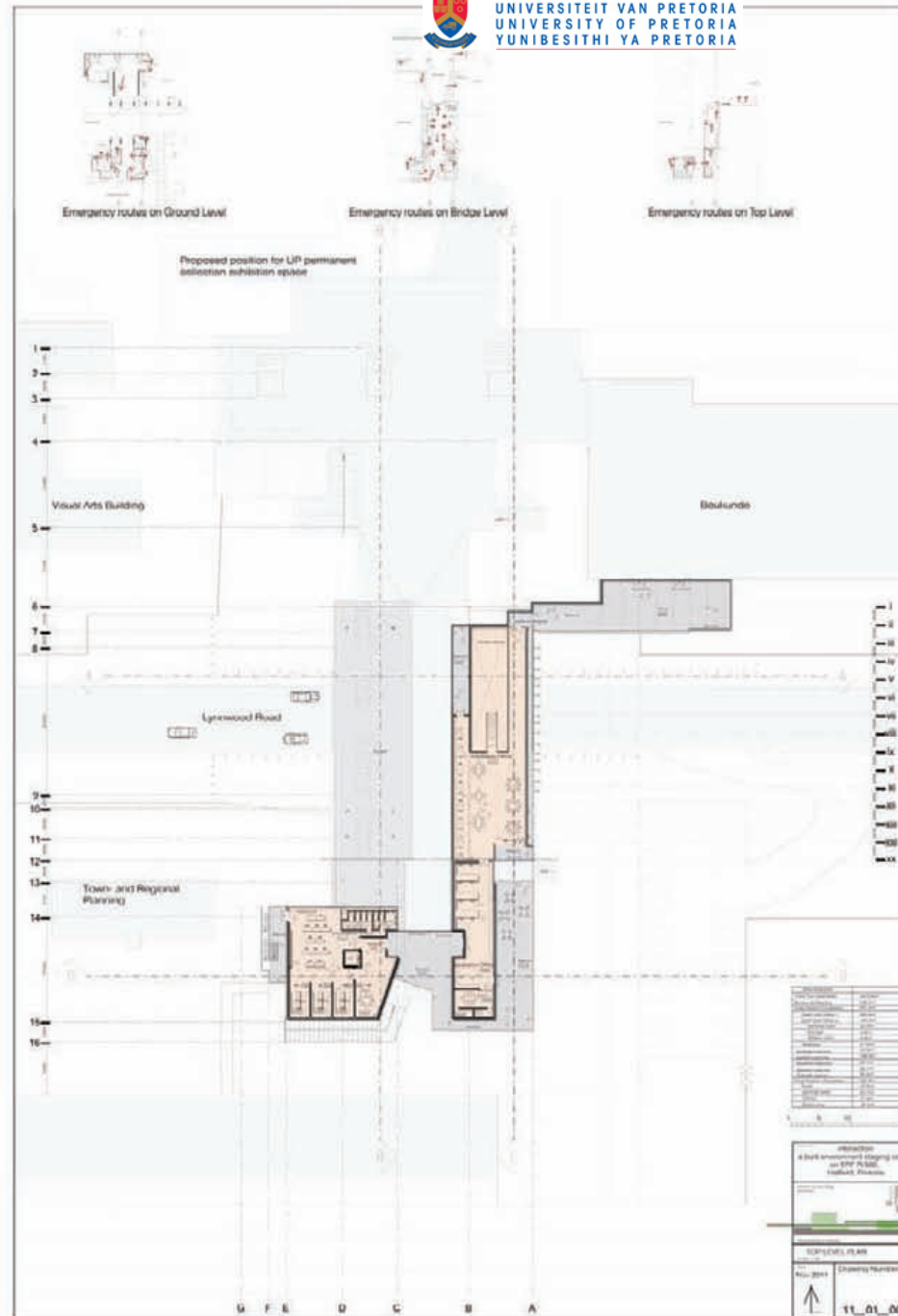


Area Schedule	
Total ground Level Area	2565.9m <sup>2</sup>
Restaurant	386.5m <sup>2</sup>
Kitchen	95.8m <sup>2</sup>
Refuse Yard	11.6m <sup>2</sup>
Workshop Studios	250.4m <sup>2</sup>
Foyer	34.2m <sup>2</sup>
Seminar Room	38.6m <sup>2</sup>
Refuse Yard	57.1m <sup>2</sup>
Entrance Podium	95.7m <sup>2</sup>
Court Yard	350.6m <sup>2</sup>
Formal Exhibition Area	1857.9m <sup>2</sup>
Foyer	135.1m <sup>2</sup>
Court Yard	31.6m <sup>2</sup> each
Kitchen	37.3m <sup>2</sup>
Storage	40m <sup>2</sup>
Lift	5.7m <sup>2</sup>
Exterior Exhibition Spaces	52.2m <sup>2</sup>

Figure 8.3 Bridge Level Plan



# Top Level Plan



Area Schedule	
Total Top Level Area	1653.6m <sup>2</sup>
Boukunde Balcony	249.3m <sup>2</sup>
Total Eastern Incubation Office	441.4m <sup>2</sup>
Open plan office 1	280.6m <sup>2</sup>
Open plan office 2	164.5m <sup>2</sup>
Seminar room	20.4m <sup>2</sup>
Storage	4.6m <sup>2</sup>
Battery room	4.6m <sup>2</sup>
Walkway	57.5m <sup>2</sup>
Northern balcony	40.9m <sup>2</sup>
Eastern balcony	186.9m <sup>2</sup>
Southern balcony	99.1m <sup>2</sup>
Western balcony	36.7m <sup>2</sup>
Catwalk balcony	55.5m <sup>2</sup>
Total Western Incubation Office	301.8m <sup>2</sup>
Foyer	37.5m <sup>2</sup>
Seminar room	23.1m <sup>2</sup>
Offices	21.8m <sup>2</sup>
Bathrooms	32.5m <sup>2</sup>

Figure 8.4 Top Level Plan

# Roof Plan

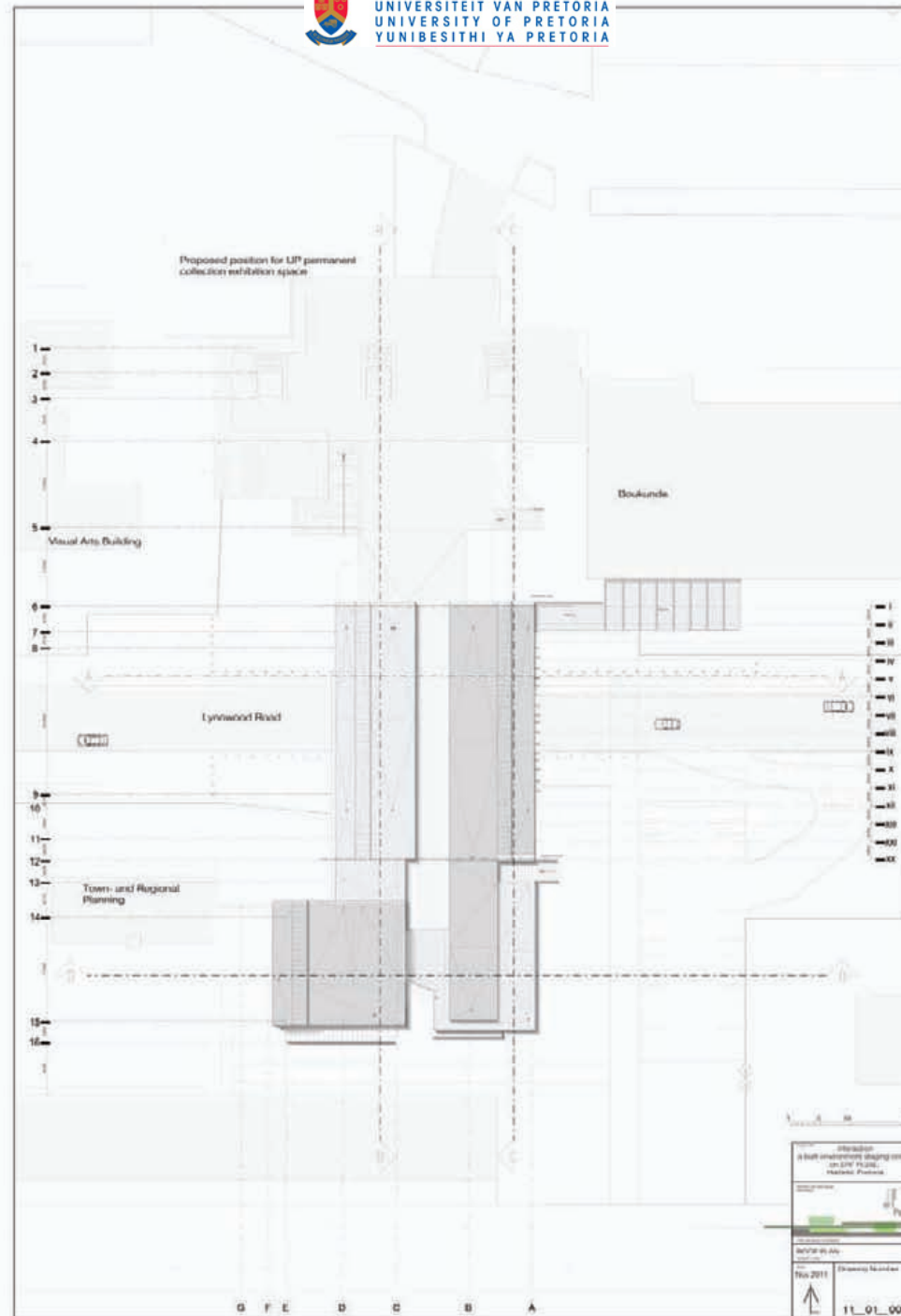


Figure 8.5 Roof Plan

# Eastern Elevation

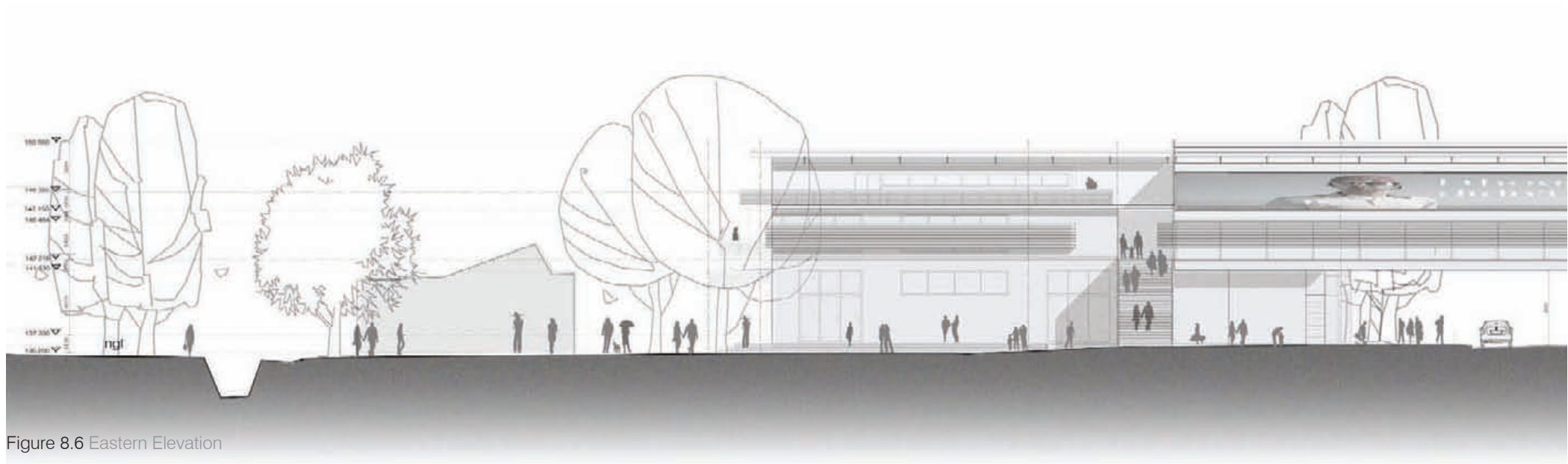
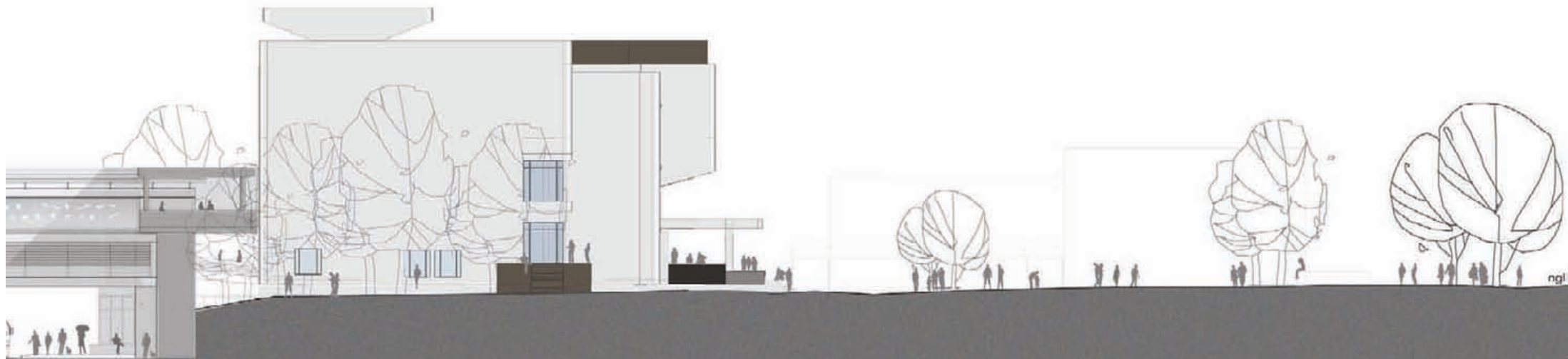


Figure 8.6 Eastern Elevation



EASTERN ELEVATION  
Scale 1:100



# Southern Elevation

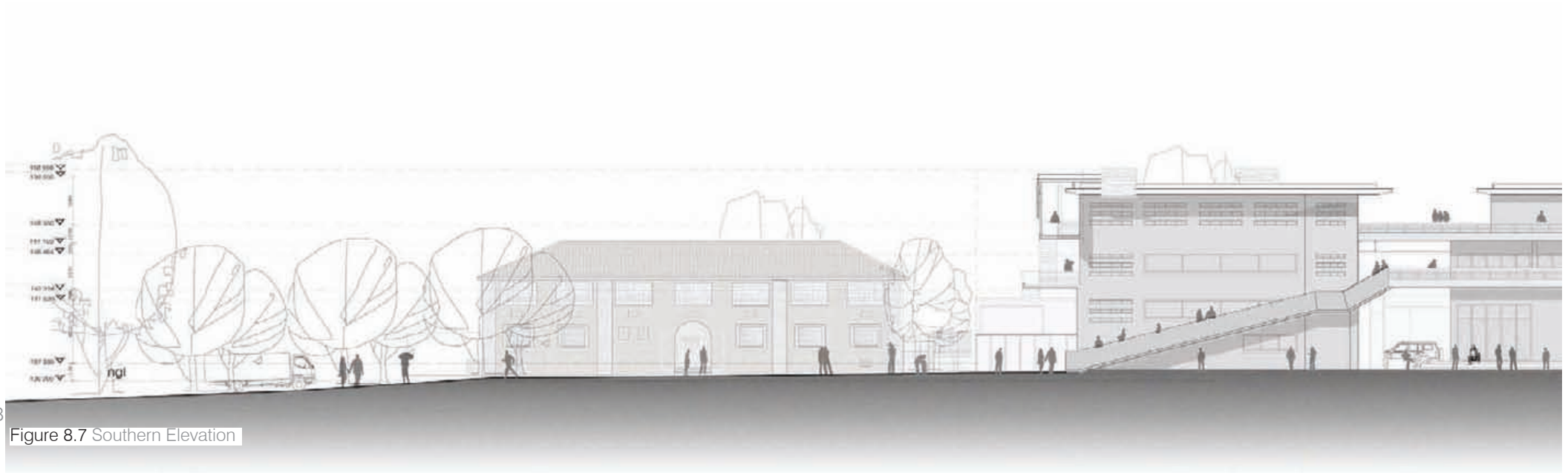
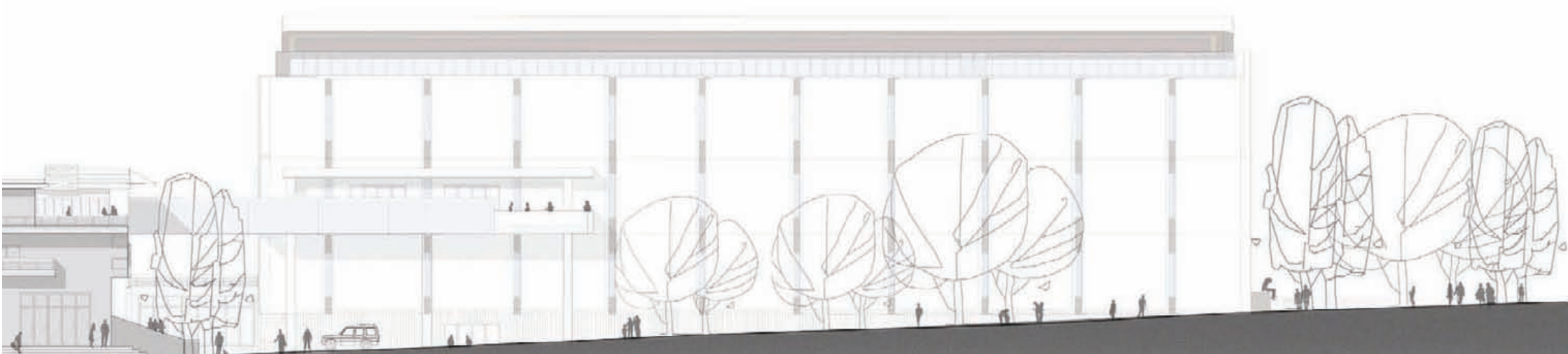


Figure 8.7 Southern Elevation



SOUTHERN ELEVATION

Scale 1:100

# Western Elevation

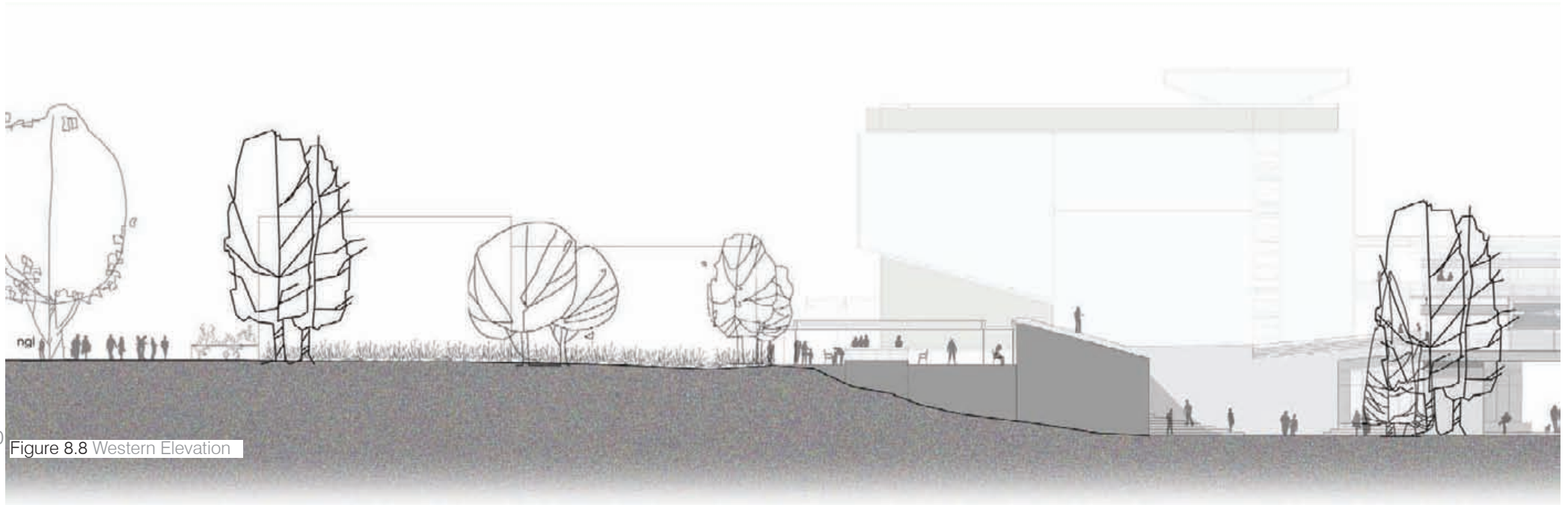
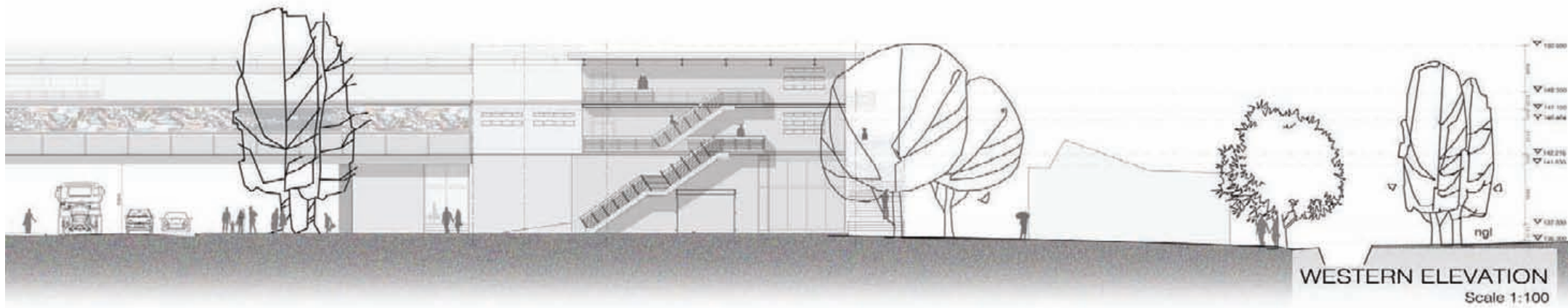
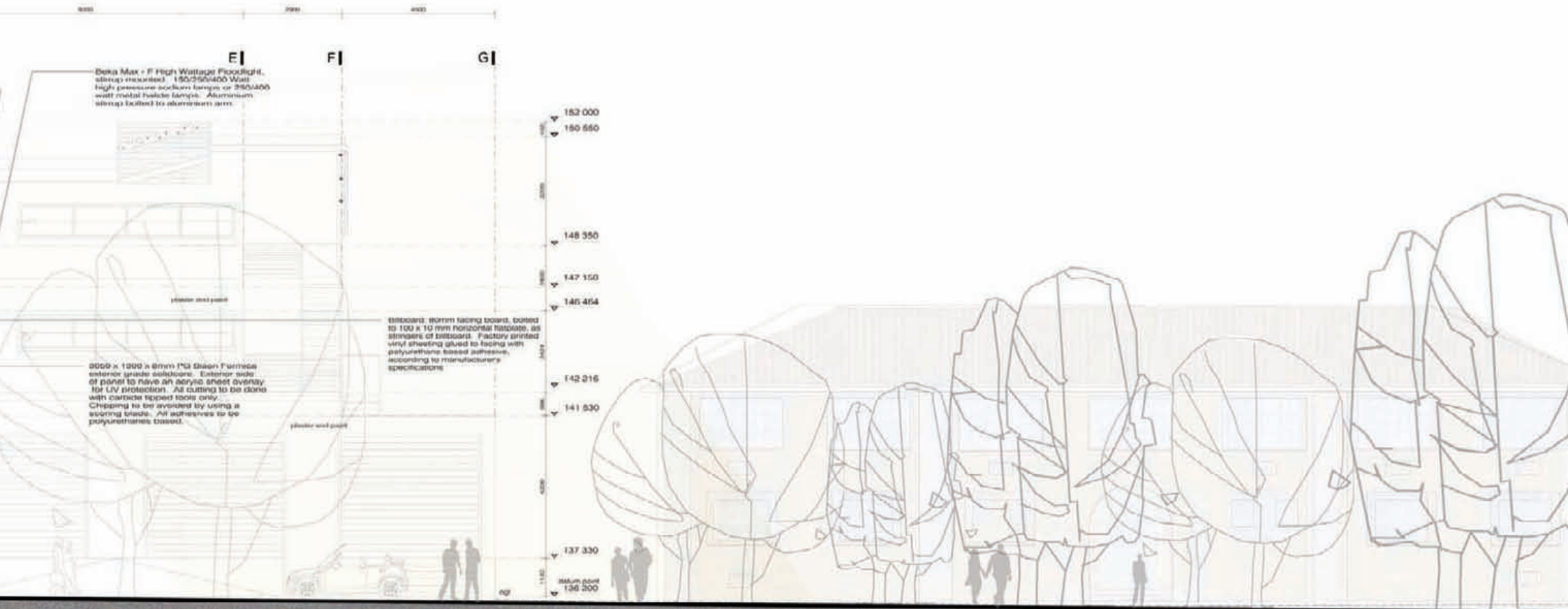


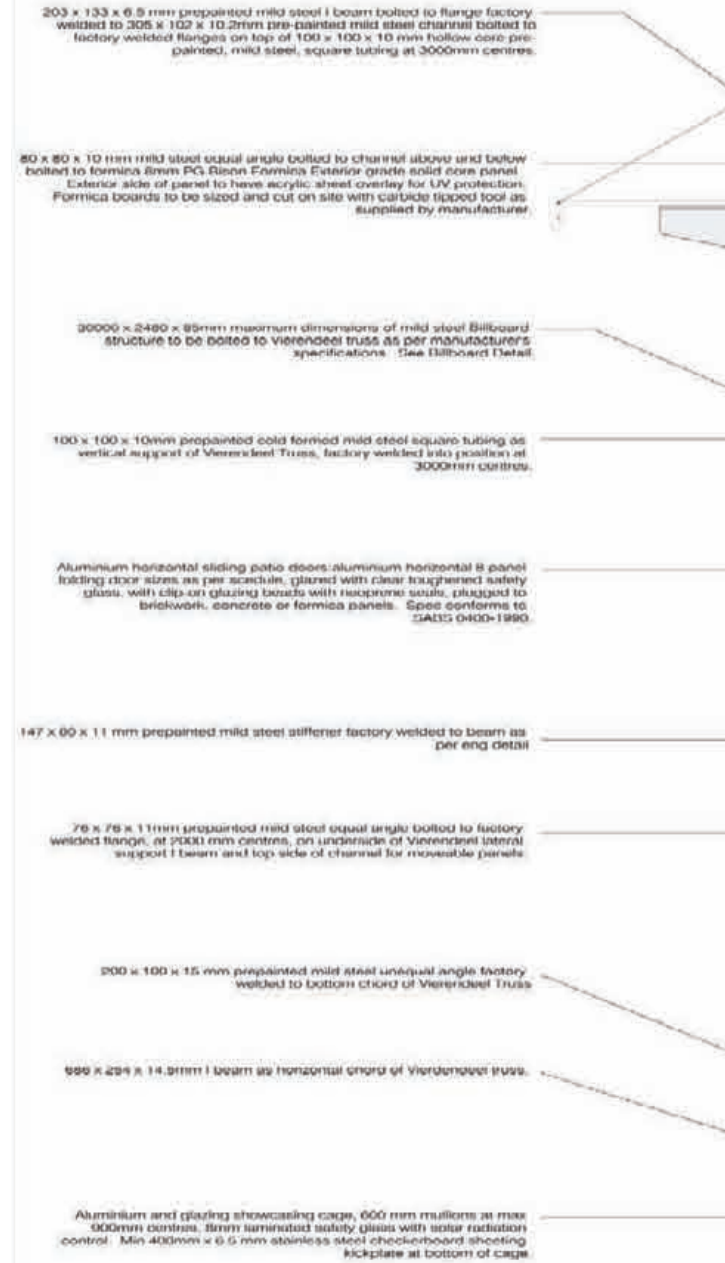
Figure 8.8 Western Elevation











**DETAIL SECTION AA**

**EAST-WEST SECTION**

**Scale 1:20**

Figure 8.10 Detail Section AA



AI



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BI

SoluCased II with high insulation and automatic daylighting control. Double glazed, opaque min 8mm safety glass. Skylight to be automatically openable.

Min 40 mm screed to min slope 1:80 to 200mm diameter fullbore outlets. Screed cast on top of 1500 x 600 x 75 x 1.2mm Q275 spelter galvanized steel as part of Q Lock floor units type Q.L. 21. 75mm deep light weight concrete slab to be cast after sheeting is in position. Sheetting as permanent shuttering on top of I beams.

3000 X 1300 X 8mm PC4 Elson Formica exterior grade solidcore. Exterior side of panel to have an acrylic sheet overlay for UV protection. All cutting to be done with carbide tipped tools only. Chipping to be avoided by using a scoring blade. All adhesives to be polyurethanes based.

381 x 152 x 9.7mm I beams at 3000mm centres, bolted to factory welded flanges of Viereckel bottom chord.

8mm AcoustiPac acoustic sheets bolted on top of Superseal 500 roof sheeting.

1500 x 600 x 75 x 1.2mm Q275 spelter galvanized steel as part of Q Lock floor units type Q.L. 21. 75mm deep light weight concrete slab to be cast after sheeting is in position. Units shall butt joint on the centre line of the supporting steel beam and be fixed to the beam by means of 20mm hammer drive galvanized steel screws, according to engineer's specifications.

1500 x 1500 x 50, 0.8mm thick galvanized steel pre-painted Superseal 500 roofsheet, or equal approved, with double interlocking clips fixed to Viereckel truss between flanges, according to manufacturer's instructions.



# Section BB

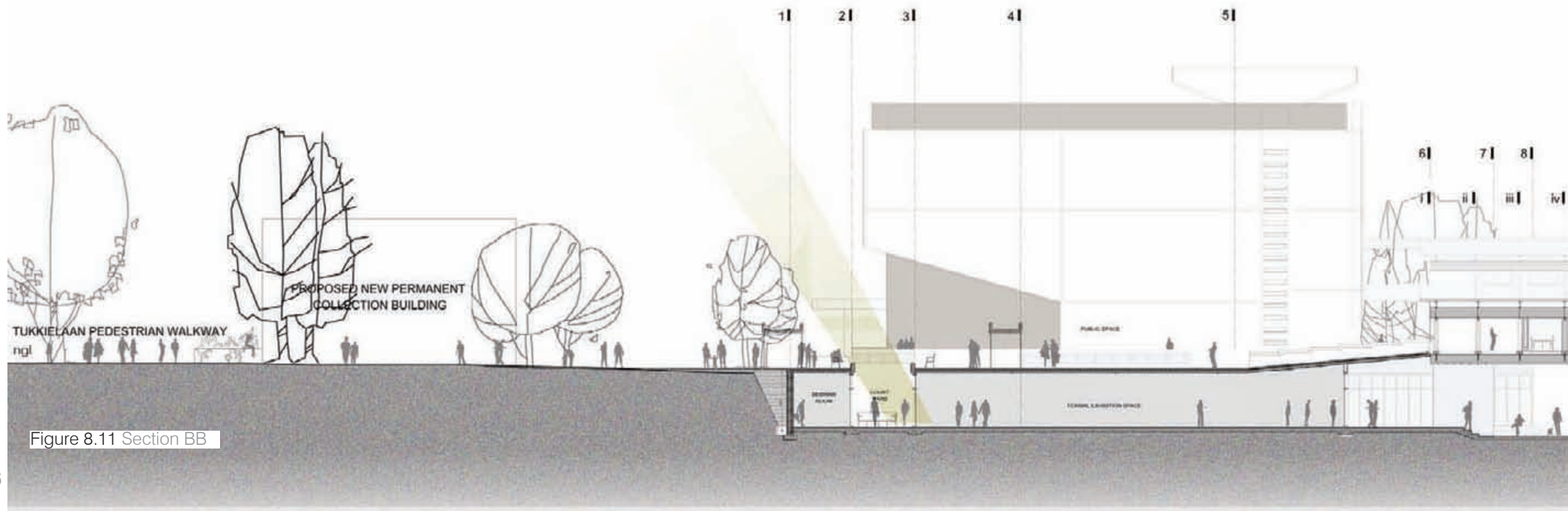


Figure 8.11 Section BB



# Section CC

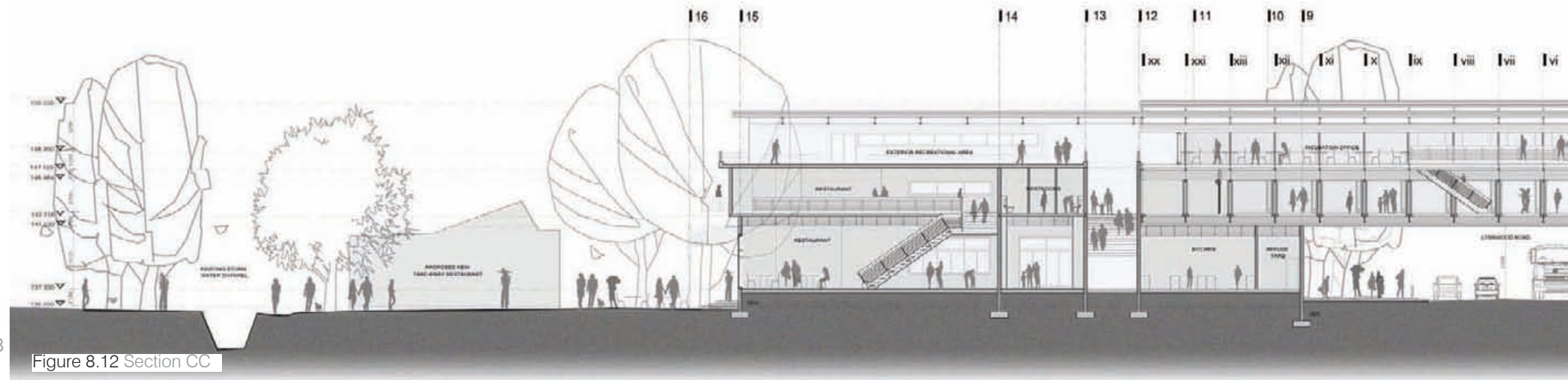


Figure 8.12 Section CC



SECTION CC  
NORTH-SOUTH SECTION



# Section DD



Figure 8.13 Section DD



SECTION DD  
EAST - WEST SECTION



40 mm insulating screed to min slope 1:80  
to 200mm diameter full bore outlets.

Polymer modified bituminous waterproofing  
membrane torched onto screed up to an if  
possible over steel members at edges of roof.  
Waterproofing protected by min 20mm course  
gravel up to edge of roof.

381 x 152 x 9.7mm pre-painted mild steel  
I beams at 3000mm centres, bolted to factory  
welded flanges of Vierendeel horizontal chord.

**BILLBOARD:**

80mm timber facing board, bolted to  
horizontal pre-painted, mild steel, flat  
plates, as stringers of billboard. Factory  
printed vinyl sheeting glued to facing with  
polyurethane based adhesive, according  
to manufacturer's specifications

2940 x 100 x 8.5 mm pre-painted mild  
steel flat plates bolted to factory  
welded flanges on vertical support  
square tubing of Vierendeel Truss.

100 x 100 x 10mm pre-painted cold  
formed mild steel square tubing as  
vertical support of Vierendeel Truss,  
factory welded into position at  
3000mm centres.

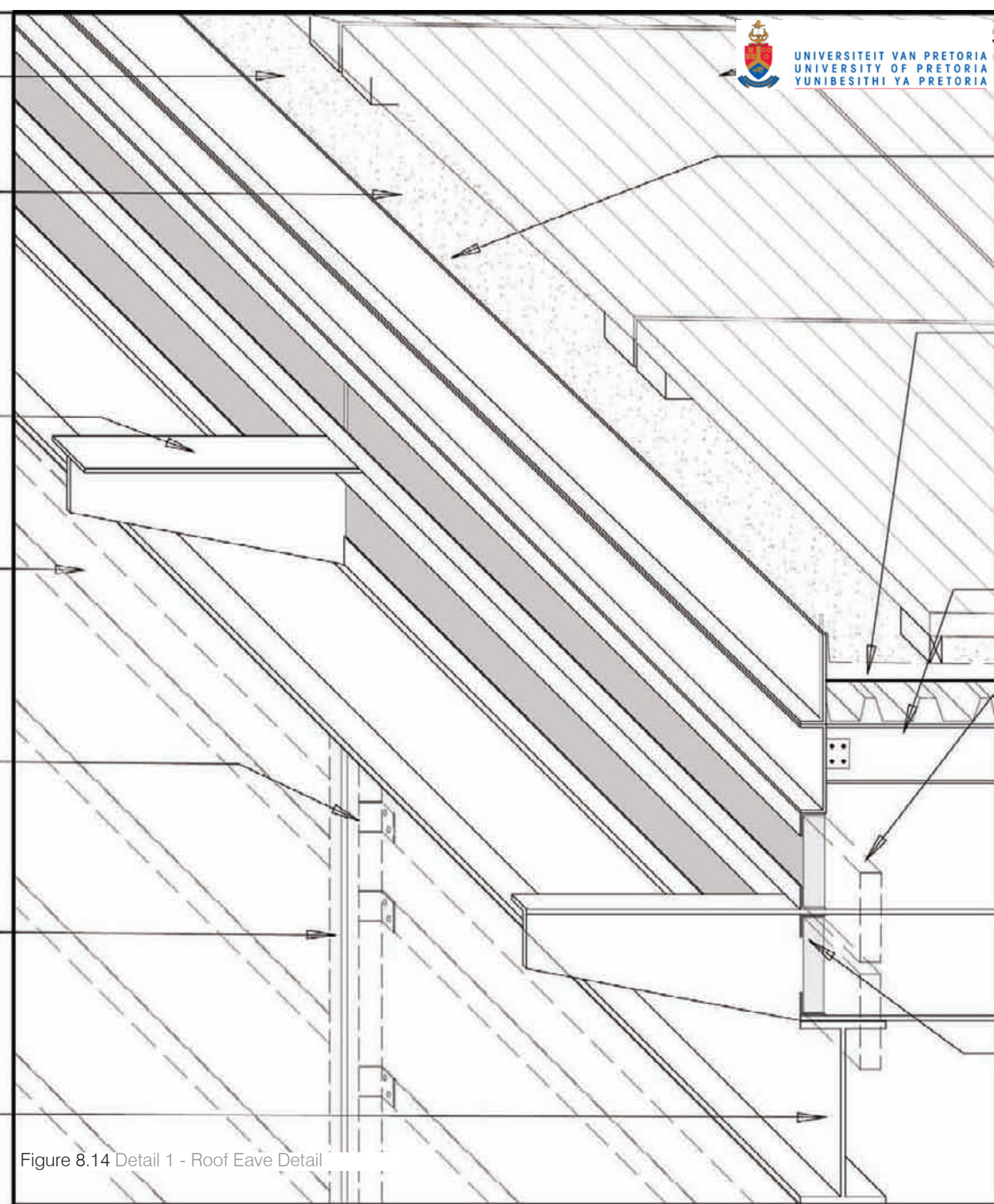
686 x 254 x 14.5mm pre-painted mild steel  
I beam as horizontal chord of Vierendeel Truss.

# DETAIL 1

Roof Eave Detail

Scale 1:20





1000 x 740 x 50mm 10 MW horizontal solar PV tiles, installation by specialist, according to manufacturer's specifications.

305 x 89 x 10.2 mm pre-painted unequal mild steel angle welded to top of 305 x 89 x 10.2 mm channel. Top side of angle to be lower than underside of skylight window, as storm water management emergency overflow.

1500 x 600 x 75 x 1.2mm G275 spelter galvanized steel as part of Q-Lock roof units type Q.L. 21. 75mm deep light weight concrete slab to be cast after sheeting is in position. Units shall butt joint on the centre line of the supporting steel beam and be fixed to the beam by means of 20mm hammer drive galvanized steel screws, according to engineer's specifications.

203 x 133 x 6.5 mm pre-painted mild steel I beam bolted to factory welded flange on 305 x 89 x 10.2 mm channel

Custom cut PG Bison Formica exterior grade solid core (dimensions to be measured on site after steel structure is installed). Exterior side of panel to have an acrylic sheet overlay for UV protection. All cutting to be done with carbide tipped tools only. Chipping to be avoided by using a scoring blade. Formica panels to be fixed to steel structure with polyurethane based adhesives according to manufacturer's specifications. All edges to be sealed with water resistant, heat resistant, flexible, clear silicone.

80 x 80 x 10 mm pre-painted mild steel equal angle bolted to channel above and below glued to Formica 8mm PG Bison Formica Exterior grade solid core panel.

Figure 8.14 Detail 1 - Roof Eave Detail



300 mm fabricated steel acoustic louvre factory assembled with 225mm pitch, 1.2 x 300 mm blades, mechanically fixed to 1.2 mm galvanized steel frame. Louvre system supplied as assembled unit to be bolted to T-sections welded to vertical support of Vierendeel truss.

3050 x 1300 x 8mm PG Bison Formica exterior grade solid core. No UV sheeting required. Formica walling system to be glued (polyurethane based) onto steel structure above and screwed into concrete light weight slab, according to manufacturer's specifications.

4500 x 600mm reinforced concrete column, levelled at top, off-shutter finished. Column according to eng detail.

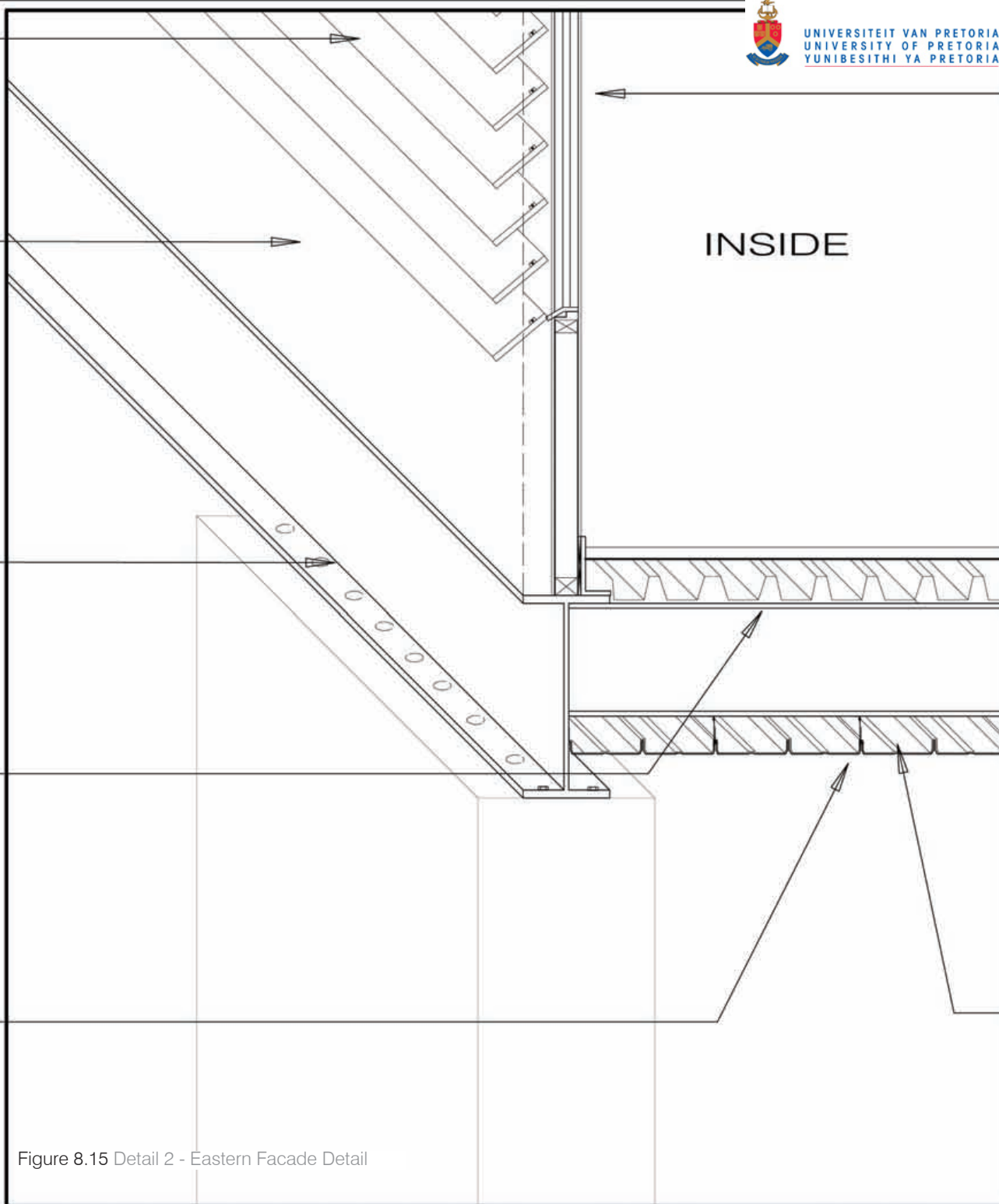
686 x 254 x 14.5mm pre-painted mild steel I beam as horizontal chord of Vierendeel Truss, bolted to top side of concrete column with min 50mm diameter expansion bolts at min 300mm depth, as per eng spec.

1500 x 600 x 75 x 1.2mm G275 spelter galvanized steel as part of Q-Lock floor units type Q.L. 21. 75mm deep light weight concrete slab to be cast after sheeting is in position. Units shall butt joint on the centre line of the supporting steel beam and be fixed to the beam by means of 20mm hammer drive galvanized steel screws, according to engineer's specifications.

## DETAIL 2

Eastern Facade Detail  
Scale 1:20

1500 x 1550 x 50, 0.8mm thick galvanized steel pre-painted Superseal 500 roof sheets, or equal approved, with double interlocking clips fixed to Vierendeel trusses between flanges, according to manufacturer's instructions.



2200 x 1200 x 8mm Climaplust Acoustic double glazing (manufactured by Saint Gobain) in aluminium frame inside formica solid core exterior panel.

INSIDE

**CONSTRUCTION PROCEDURE:**  
After Vierendeel truss, with lateral supports are erected and in position, the Superseal 500 roof sheeting are installed with manufacturer supplied clips, bolted to underside of mild steel I beams. AcoustiPack is then torched onto Superseal 500 sheets before the Q-Lock floor units are installed, followed by the light weight concrete being cast.

7mm Acoustipack EXTRA sheet (APExtS) 3 layered acoustic sheets torched onto top side of Superseal 500 roof sheets. See Construction Procedure.

Figure 8.15 Detail 2 - Eastern Facade Detail





min 40 mm Stucco Granno self-levelling screed, premixed and poured onto Q-Lock floor. Granno to be cast in max 1500 x 1500 mm blocks, separated before casting with polypropylene spacers. Openings to be filled with polyurethane sealant.

2280 x 100 x 40 mm SA Pine, timber door screwed to mild steel hinge, factory welded to vertical support of Vierendeel Truss. Door to open for manoeuvrability of operable walls and ventilation control of interior spaces.

2 x 100 x 100 x 10mm pre-painted cold formed mild steel square tubing as vertical support of Vierendeel Truss. min 105 mm opening between vertical supports for operable wall manoeuvrability. Vertical supports factory welded into position at 3000mm centres.

1500 x 600 x 75 x 1.2mm G275 spelter galvanized steel as part of Q-Lock floor units type Q.L. 21. 75mm deep light weight concrete slab to be cast after sheeting is in position. Units shall butt joint on the centre line of the supporting steel beam and be fixed to the beam by means of 20mm hammer drive galvanized steel screws, according to engineer's specifications.

381 x 152 x 9.7mm pre-painted mild steel I beams at 3000mm centres, bolted to factory welded flanges of Vierendeel bottom chord.

1500 x 1550 x 50, 0.8mm thick galvanized steel pre-painted Superseal 500 roof sheets, or equal approved, with double interlocking clips fixed to Vierendeel trusses between flanges, according to manufacturer's instructions.

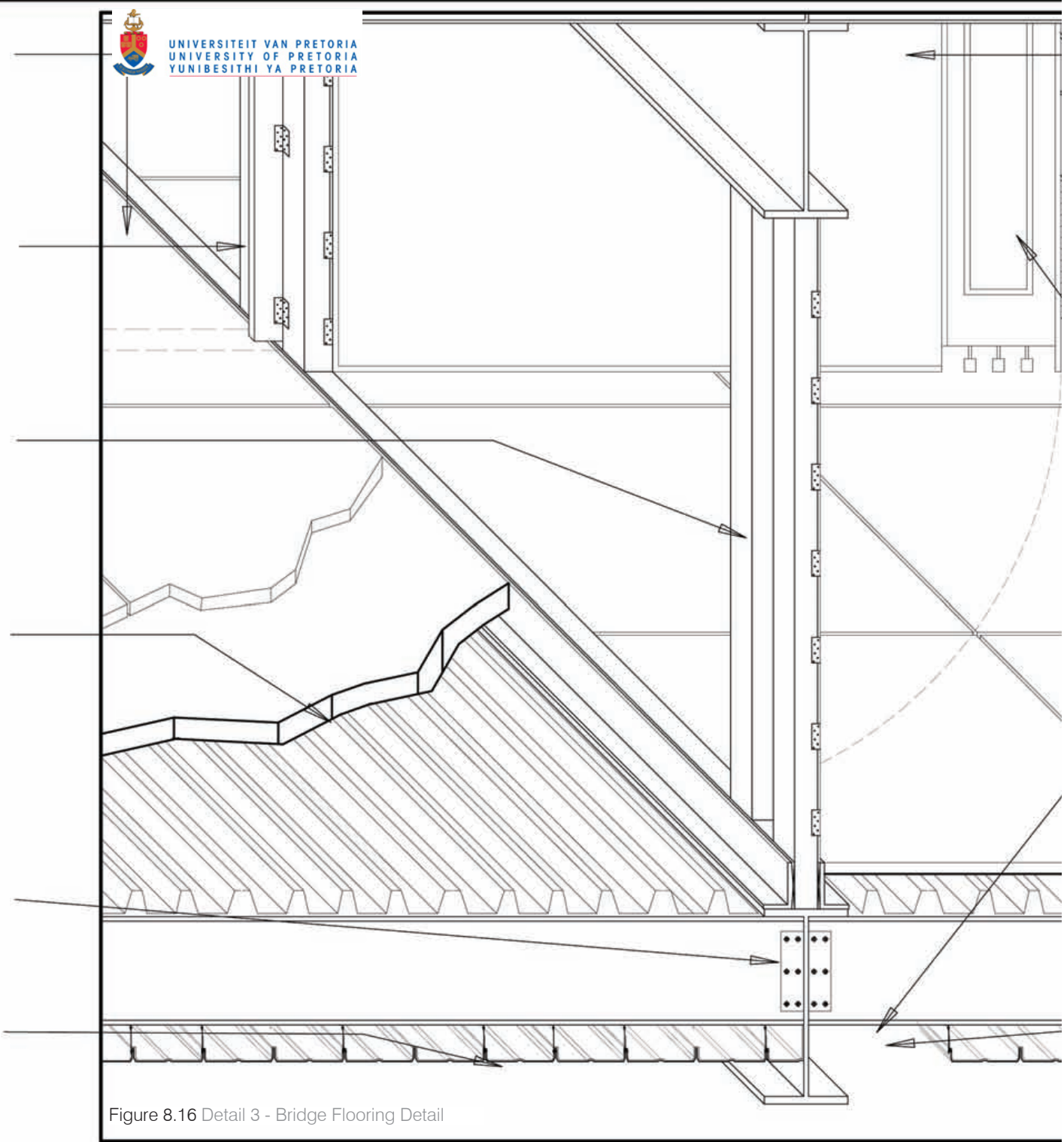
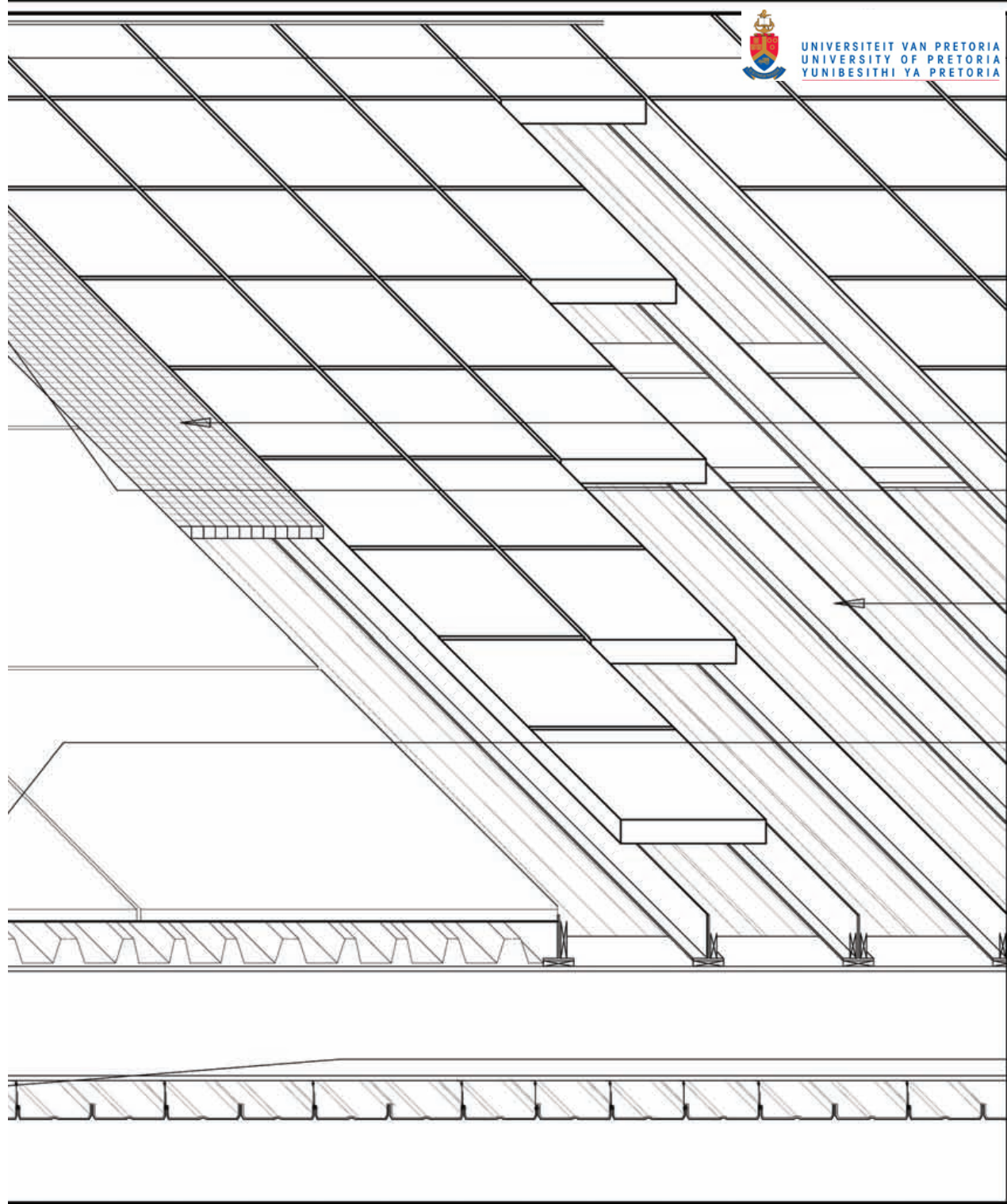


Figure 8.16 Detail 3 - Bridge Flooring Detail





2250 x 2850 mm PG Bison Formica exterior grade solid core (dimensions to be measured on site after steel structure is installed) doors. Both sides of doors to have an acrylic sheet overlay for UV protection. All cutting to be done with carbide tipped tools only. All doors are to be custom cut on site. Chipping to be avoided by using a scoring blade. Formica panels to be fixed to steel structure with heavy duty hinges. Min 20mm openings between steel structure and Formica door, sealed with a polypropylene rubber seal, glued to edge of door with polyurethane based adhesive. heat resistant, flexible, clear silicone.

500 x 45 x 6 mm mild steel removable grating with easy clean solids traps

6mm laminated safety glass with solar radiation control inside aluminium powder coated window frame as part of purpose made Formica door with wheels, as per specialist.

152 x 191 x 9.7mm pre-painted mild steel T-sections bolted to pre-painted mild steel I beams at 500mm centres for supporting removable concrete tiles with polypropylene spacers between tile and steel structure.

Min 400mm opening between Super-seal 500 roofsheets and bottom chord of Vierendeel Truss as storm water overflow, when down pipes or reticulation tanks are faulty water cannot penetrate the interior spaces of the bridge.

## DETAIL 3

Bridge Flooring Detail

Scale 1:20





- 381 x 152 x 9.7mm pre-painted mild steel I beams at 3000mm centres, bolted to factory welded flanges of Vierendeel bottom chord.
- 2 x 100 x 100 x 10mm pre-painted cold formed mild steel square tubing as vertical support of Vierendeel Truss. min 105 mm opening between vertical supports for operable wall manoeuvrability. Vertical supports factory welded into position at 3000mm centres.
- 1800 x 900mm Climaplust Acoustic double glazing (manufactured by Saint Gobain) in aluminium frame inside formica solid core exterior panel.
- 3050 x 1300 x 8mm PG Bison Formica exterior grade solid core. No UV sheeting required. Formica walling system to be glued onto steel structure above and screwed into concrete light weight slab, according to manufacturer's specifications.
- 1500 x 600 x 75 x 1.2mm G275 spelter galvanized steel as part of Q-Lock floor units type Q.L. 21. 75mm deep light weight concrete slab to be cast after sheeting is in position. Units shall butt joint on the centre line of the supporting steel beam and be fixed to the beam by means of 20mm hammer drive galvanized steel screws, according to engineer's specifications.
- 1500 x 1550 x 50, 0.8mm thick galvanized steel pre-painted Superseal 500 roofsheets, or equal approved, with double interlocking clips fixed to Vierendeel trusses between flanges, according to manufacturer's instructions.

# DETAIL 4

Facade Detail

Scale 1:20

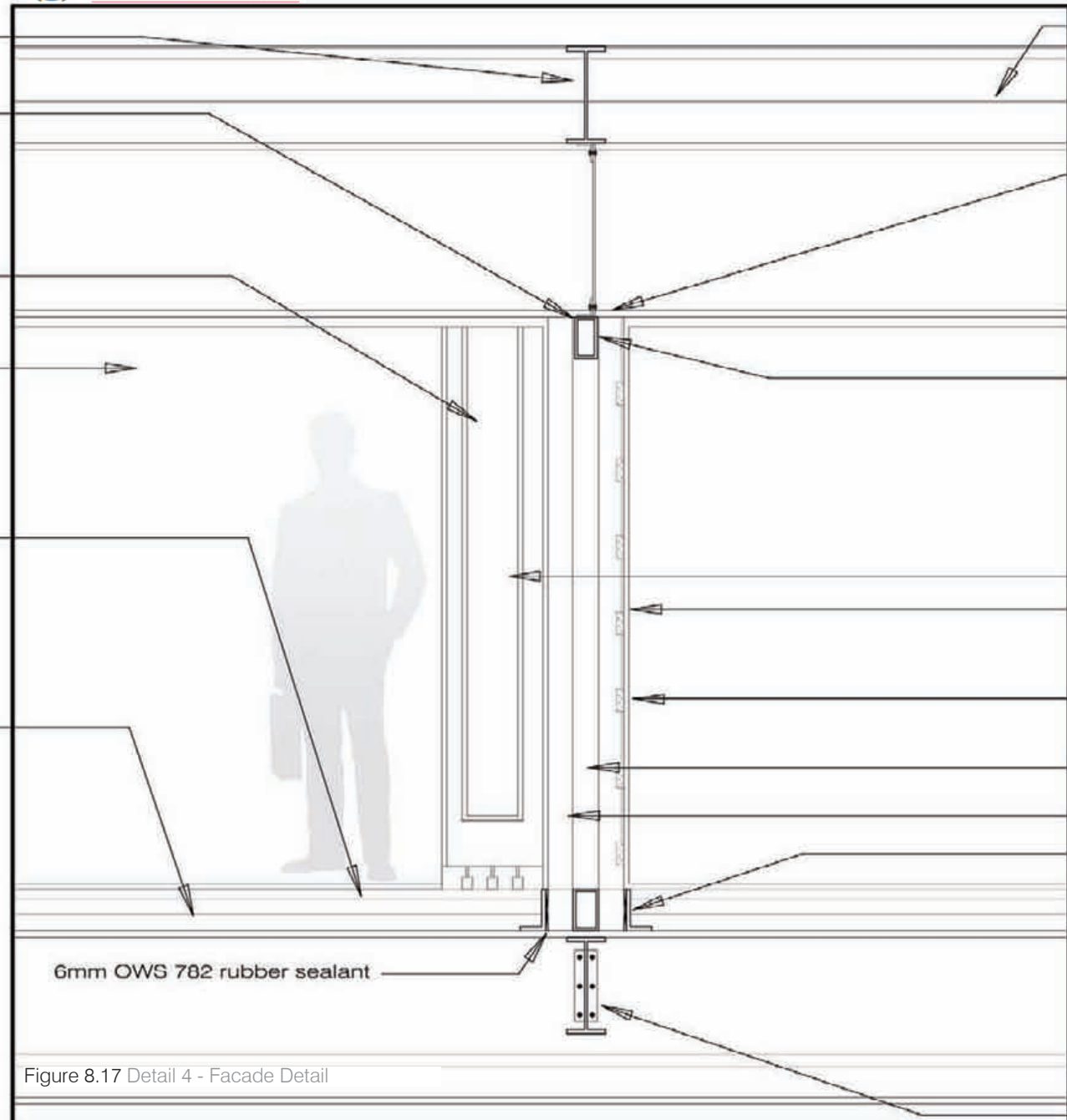


Figure 8.17 Detail 4 - Facade Detail



80 x 80 x 6 mm pre-painted mild steel equal angle welded to top side of square tubing at max 2000mm centres, bolted to 80 x 6mm flat plate

80 x 80 x 10 mm mild steel equal angle bolted to channel above and below bolted to formica 8mm PG Bison Formica Exterior grade solid core panel. Exterior side of panel to have acrylic sheet overlay for UV protection. Formica boards to be sized and cut on site with carbide tipped tool as supplied by manufacturer.

148 x 89 x 11mm pre-painted mild steel hollow core square tubing welded to underside of Vierendeel horizontal chord. Square tubing to act as guide-rail form movable wall panels as per manufacturer's specifications. Maximim finished floor level to underside of tubing: 2150mm.

6mm laminated safety glass with solar radiation control inside aluminium powder coated window frame as part of purpose made Formica door with wheels, as per specialist.

Min 20mm SCS 287 rubber sealant glued (polyurethane based) to all edges of Formica Solid Core Panels.

Extra Heavy Duty T Hinge With Bushing

100mm cavity in facade for movable wall panels to penetrate facade.

148 x 89 x 11 mm pre-painted mild steel hollow core square tubing welded to top side of Vierendeel truss horizontal chord as spacer between vertical supports of Vierendeel truss.

76 x 76 x 11 mm prepainted mild steel equal angle bolted to factory welded flange, at 2000 mm centres, on underside of Vierendeel lateral support I beam and top side of channel for moveable panels.

280 x 40 x 11 mm prepainted mild steel flanges factory welded to bottom chord of Vierendeel trusses at 3000mm centres, with pre-drilled holes for fixings, as per eng specs.

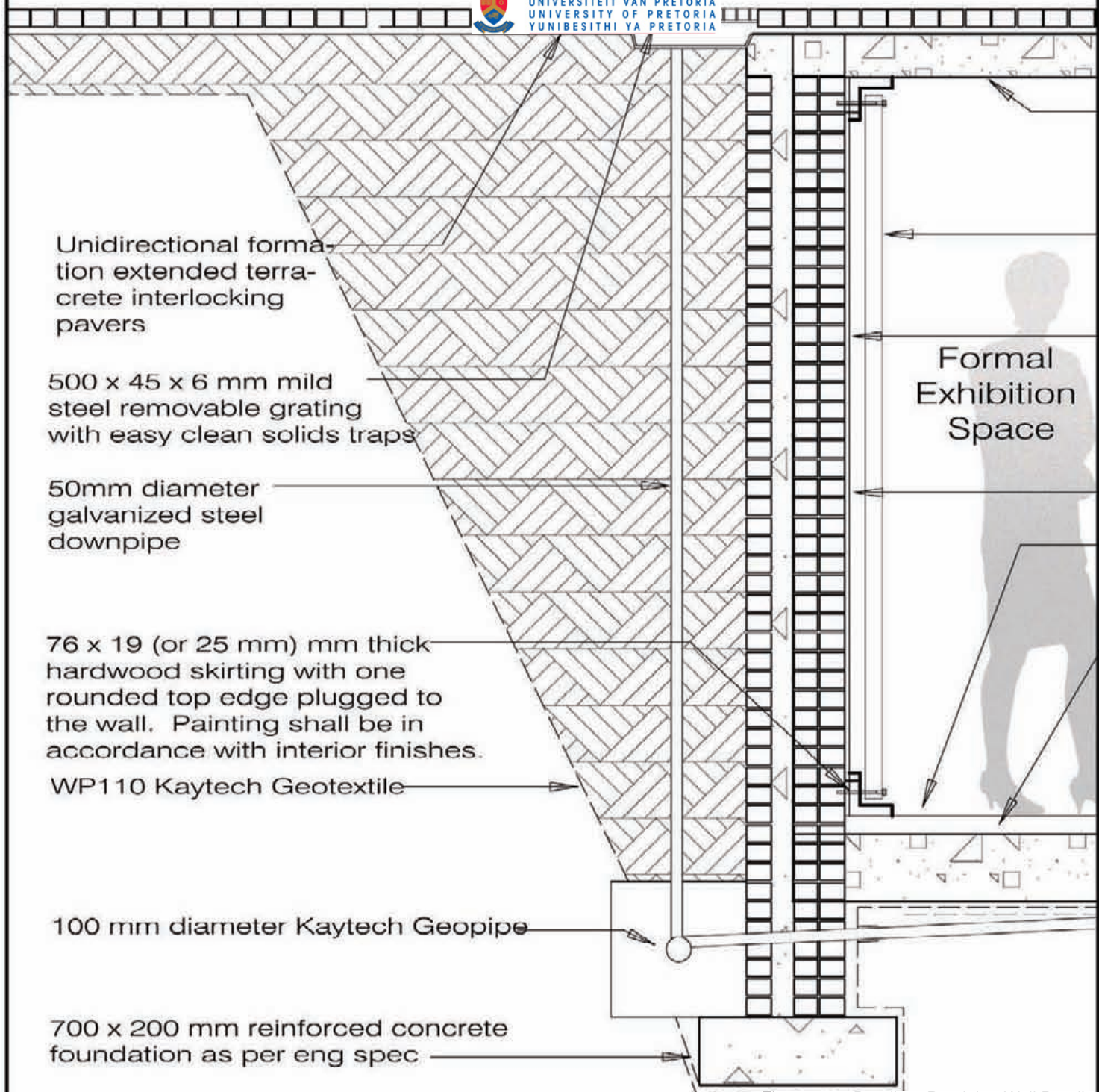


Figure 8.18 Detail 5 - Retaining Wall Detail



min 40mm insulated screed laid  
to min fall 1:100

170mm off-shutter reinforced self  
compacting concrete roof slab,  
cast on timber plank shuttering.

PEG MDF Soft wood timber exhibition  
boards fixed to timber skirtings and  
cornices -colour to match interior

RETAINING WALL:  
980mm concrete and masonry composite  
retaining wall, consisting of single brick  
course, in-situ cast concrete and double  
course masonry, as per eng specs.

Plaster and paint

Epoxy resin flooring applied onto screed

FLOOR CONSTRUCTION:  
min 40mm cement screed on  
150mm reinforced concrete floor  
on 0.25mm micron polyolefin damp  
proof membrane on approved  
compacted fill in max 150mm  
layers to 90% MOD AASHTO.

0.25mm polyolefin damp proof membrane

50mm diameter Kaytech Geopipe from  
courtyard - storm water management

## DETAIL 5

Retaining Wall Detail  
Scale 1:50



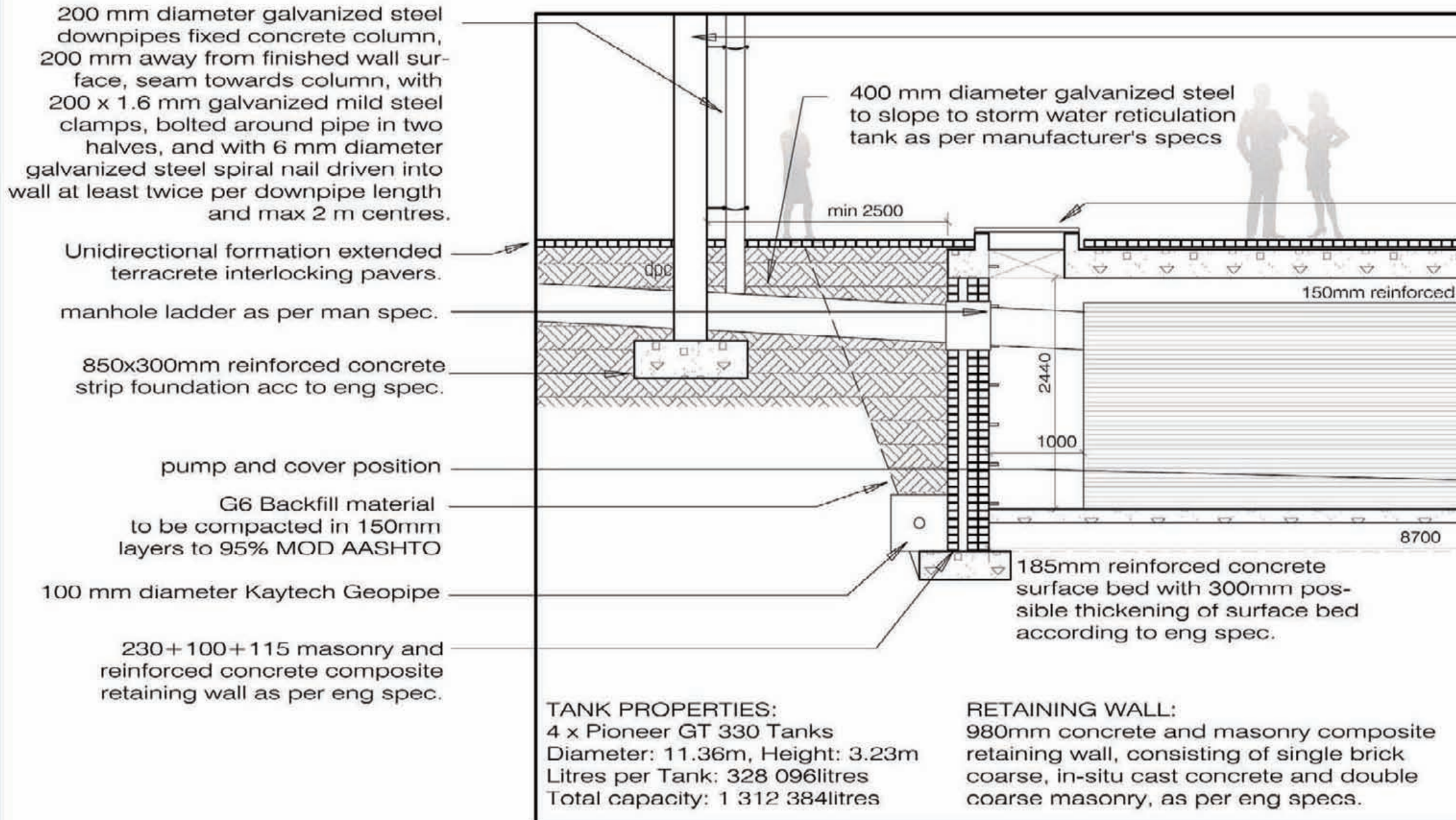
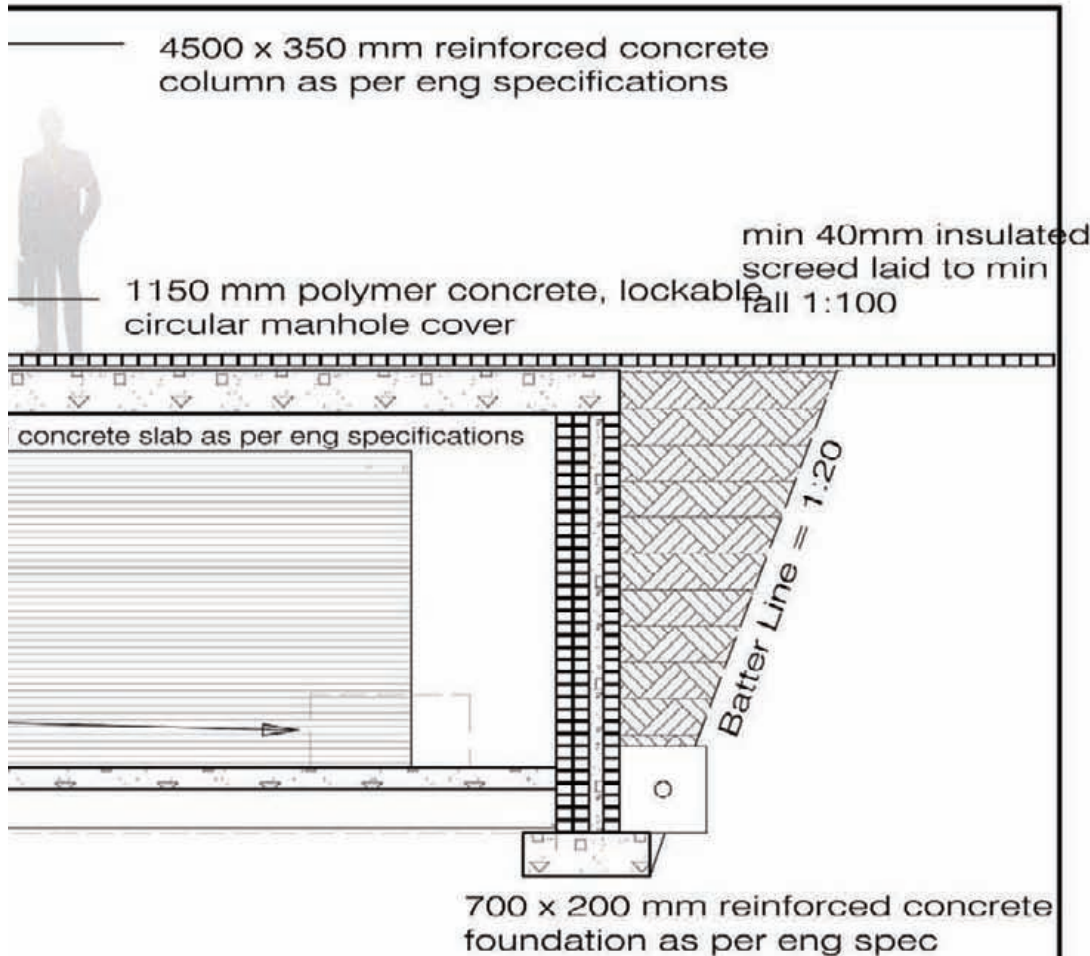


Figure 8.19 Detail 6 - Rain Water Reticulation Tank Detail



## DETAIL 6

Rain Water Reticulation Tank Detail

Scale 1:50

### SPECIFICATION WATER TANKS

#### PIONEER WATER TANKS

Site Preparation prior to tank installation:

Concrete slab must be level and stable prior to construction. Base to be 1000mm wider than tank on all sides.

Inside Tank:

Aqualiner created by hot melt laminating the 5 material layers under pressure.

- Layer 1: Clear Polyethylene Film
- Layer 2: Green advanced Polyolefin coating
- Layer 3: Weave: High tenacity multifilament polypropylene
- Layer 4: Green advanced polyolefin coating
- Layer 5: Black Polyethylene film

Steel Dome Roof:  
Heavy duty hot dipped galv steel roof trusses and roof sheeting.

#### PUMP

Davey H560/08T with 8 litres Pressure cell (supplied by PIONEER). Backup generator to manufacturer's spec. Pump mounted next to Tank on Basement 2 with pump cover.



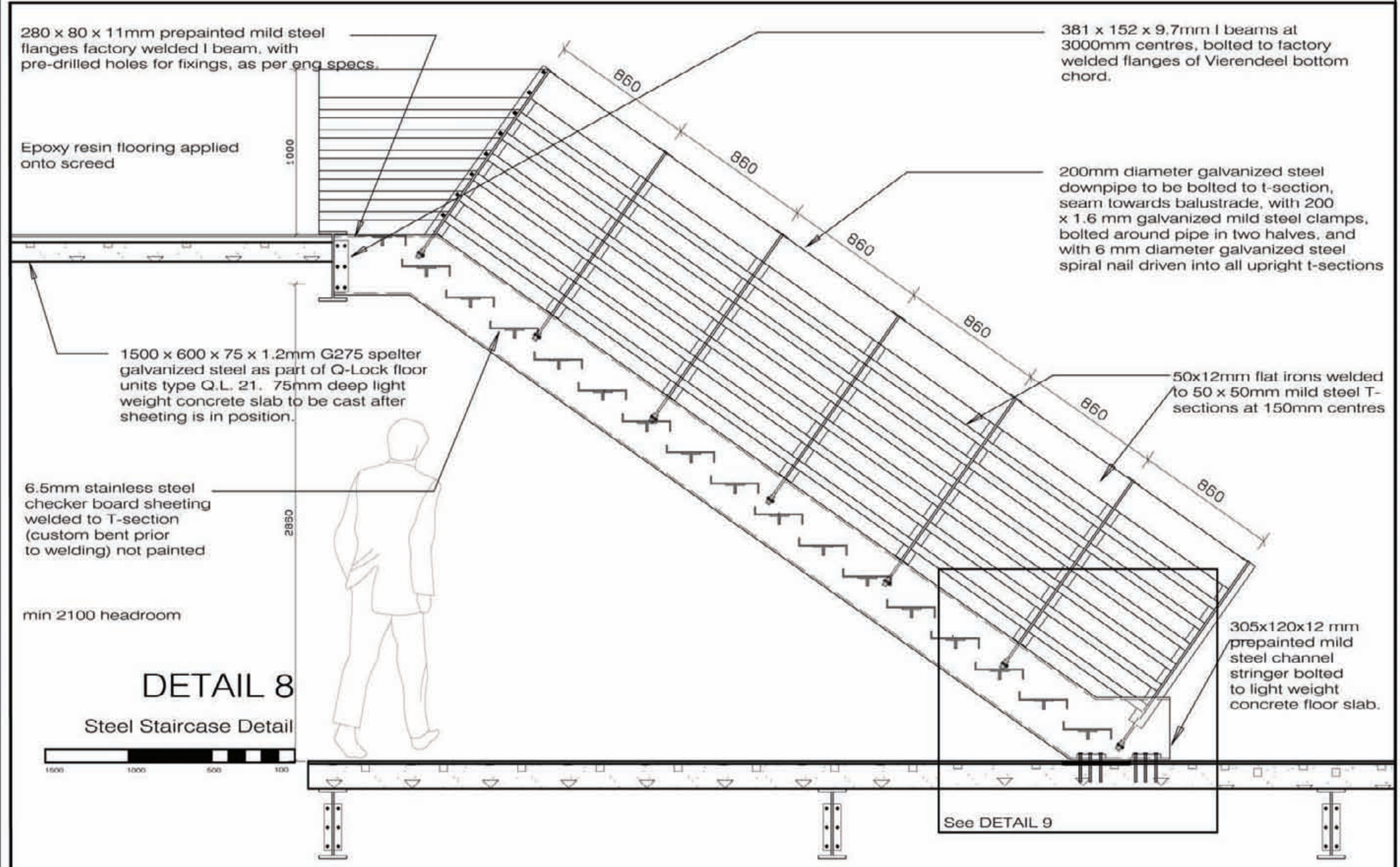


Figure 8.20 Detail 8 - Steel Staircase Detail

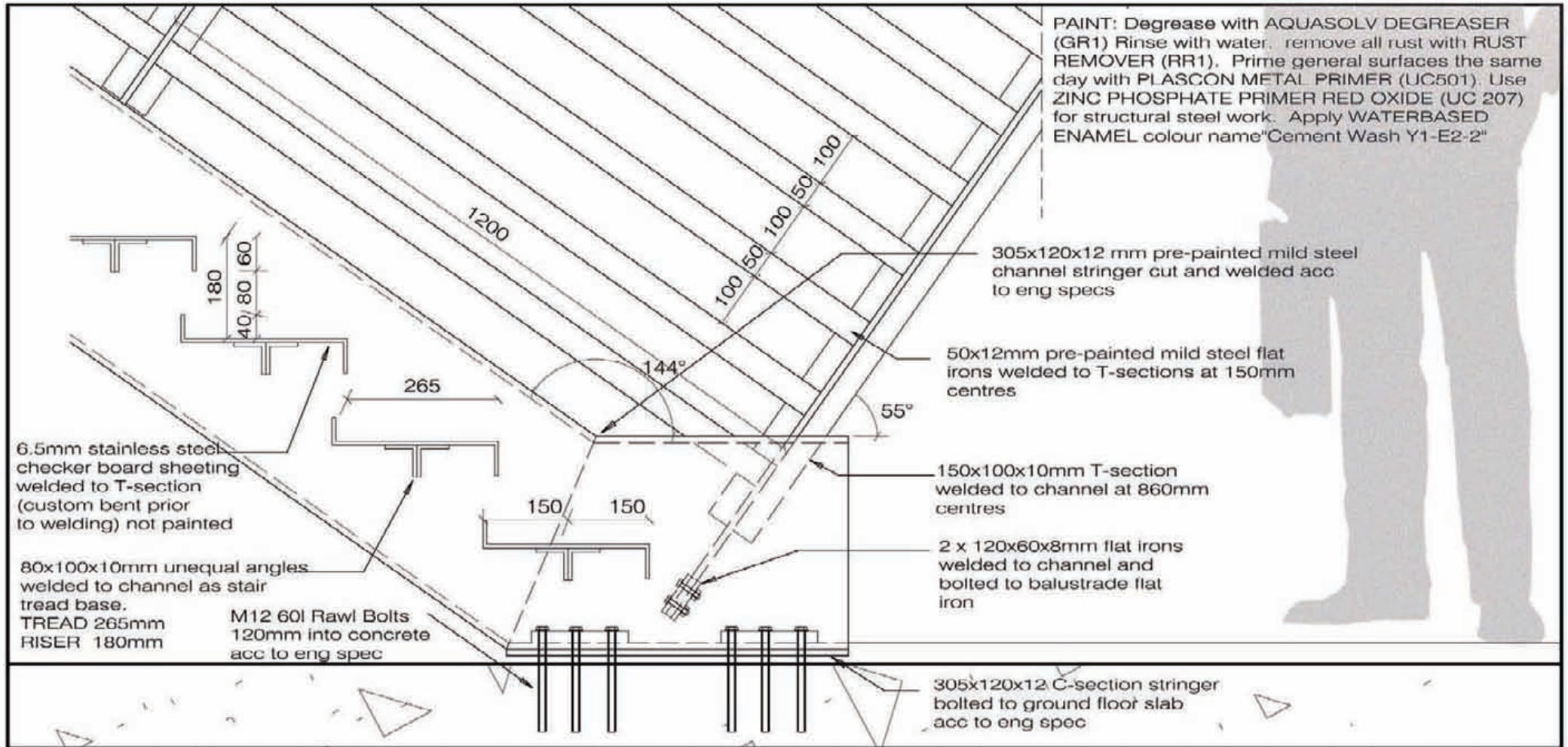


Figure 8.21 Detail 9 - Steel Staircase Detail

# DETAIL 9

Steel Staircase Detail

Scale 1:10



30000 x 2480 x 85mm maximum dimensions of mild steel Billboard structure, expansion bolted to in-situ cast concrete wall as per manufacturer's specifications.

min 40 mm Stucco Granno self-levelling screed, premixed and poured onto Q-Lock floor. Granno to be cast in max 1500 x 1500 mm blocks, separated before casting with polypropylene spacers. Openings to be filled with polyurethane sealant.

**BILLBOARD:**  
80mm timber facing board, bolted to horizontal pre-painted, mild steel, flat plates, as stringers of billboard. Factory printed vinyl sheeting glued to facing with polyurethane based adhesive, according to manufacturer's specifications

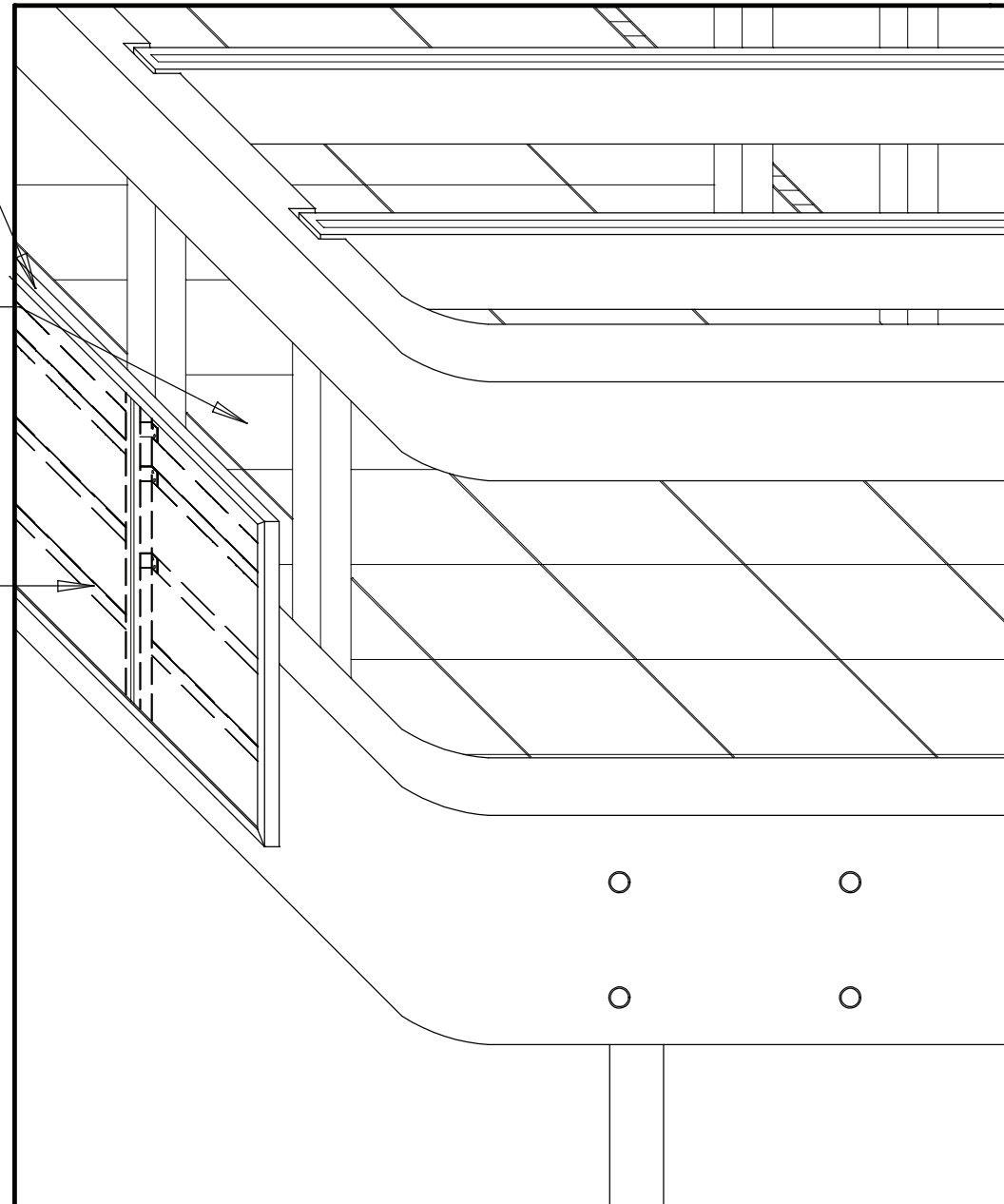
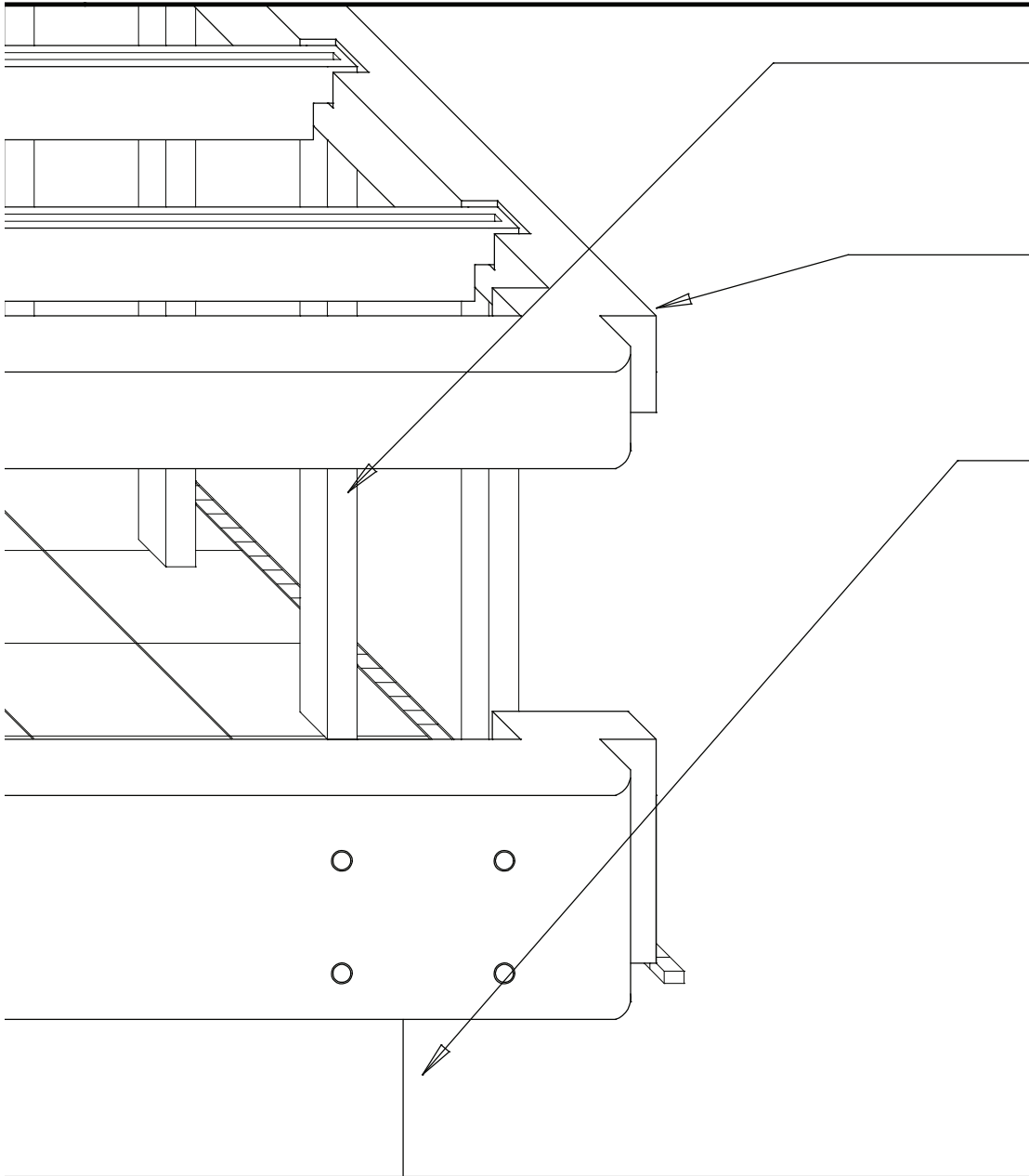


Figure 8.22 Detail 10 - Connection to Boukunde



100 x 100 x 10mm pre-painted cold formed mild steel square tubing as columns supporting concrete beam above. Tubing to match vertical support of Vierendeel truss.

280 x 200 reinforced concrete beam, shutter finish to match Boukunde aesthetic. Shuttering to be 500mm timber shuttering, paint to match existing Boukunde colour, according to specialist.

4500 x 600 mm reinforced concrete column as per eng specifications

## DETAIL 10

Connection to Boukunde  
Scale 1:20

# chapternine

Conclusion

The relationship between architectural theory and practice is a widely debated and intricate subject, with many viable arguments and managerial challenges. This dissertation aimed to discover what the possibilities are in addressing the matter through the design of a facility that would accommodate the development of a sustainable relationship between the two aspects of architecture.

The main reasons for the problematic relationship between theory and practice are that the industry believes that universities are not producing students ready for practice; research performed at the university does not coincide with the relevant issues experienced in practice; and the industry does not effectively influence the educational

system. The author is of the opinion that the current relationship between theory and practice is in dire need of an intervention that will improve the relationship between the two entities, to create an environment that is beneficial to the education and practice of architecture.

The architectural concept focused on the development of a series of foyers that can facilitate a series of spatial and functional relationships.

The different relationships are in reality inseparable, but in order to create interdependency between theory and practice the ideal circumstances had to be identified. This knowledge, regarding the ideal circumstances, is used to create right environment for all aspects of a mutually beneficial relationship to develop.

As illustrated in Figures 9.1 - 9.9 the foyers can be divided into a series of layers, but as they overlap new foyers are created, until ultimately the entire structure becomes one large urban foyer consisting of many smaller foyers. Each of these foyers are designed to serve a different aspect, social intellectual or practical, of a more interdependent relationship between theory and practice.

The specific site was chosen due to the fact that it has similar segregation issues that also need to be addressed. The segregation of the two campuses is addressed through the design of an inviting and accessible inhabited, pedestrian bridge, also allowing the local community into both campuses. The specific programme of the

building, including workshop spaces, studios, a restaurant and exhibition spaces, aids in the re-establishment of the relationship between the different departments within the Built Environment. The public open spaces around the structure serve the programmatic function, aiding in the development of social, intellectual and practical relationships.

The large billboards on the eastern and western facades assisted in the development of the University's new interface to the public and the community, establishing better relationships between segregated entities.

The architectural language of the building succeeds in being a landmark building within the urban



context, while still respecting its direct context, adding value to the spaces around it.

The project is not designed as one finished intervention, but rather as the first step in a series of events and interventions. The influence the BESC has in architectural circles and the rest of the community should be re-evaluated as often as possible, and additions and alterations to the structure should be made as relationships require it.

The desired legacy of the project is to create a platform for interaction between members of the industry and students, in order to make the transition from theory to practice easier and more effective.

“If the next generation of architects cannot define some new relationship between the public and the process of building, they will lose that special sense of identity which the profession has treasured for so long... it is in this context that the most significant changes in methods of getting work are to be found” (Golzen: 1984, 9).

# Foyer Interaction: Key

■ Social 
 ■ Intellectual 
 ■ Practical

■ Entrances

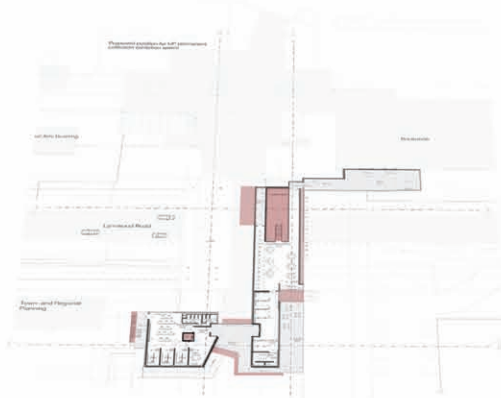


Figure 9.1 Top level interaction with lower levels

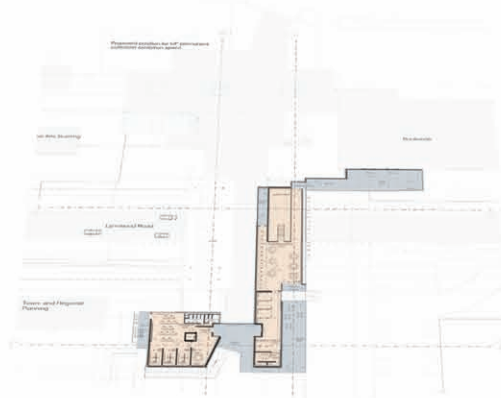


Figure 9.4 Top level - social, practical and intellectual foyers

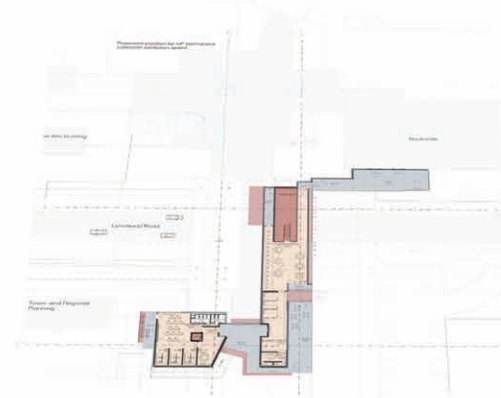


Figure 9.7 Top level - all foyers

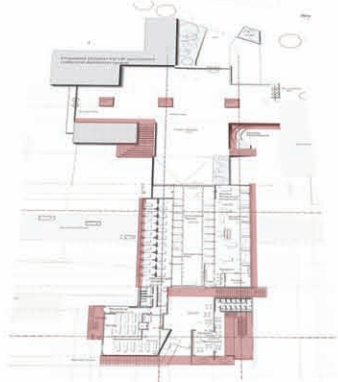


Figure 9.2 Bridge level interaction with other levels

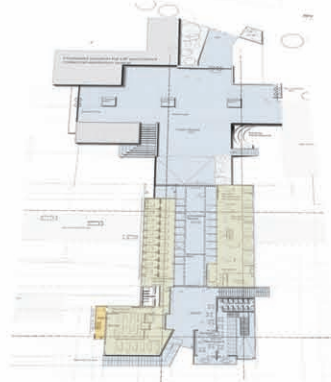


Figure 9.5 Bridge level - social, practical and intellectual foyers

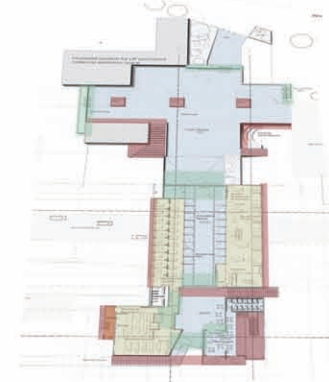


Figure 9.8 Bridge level - all foyers



Figure 9.3 Ground level interaction with other levels

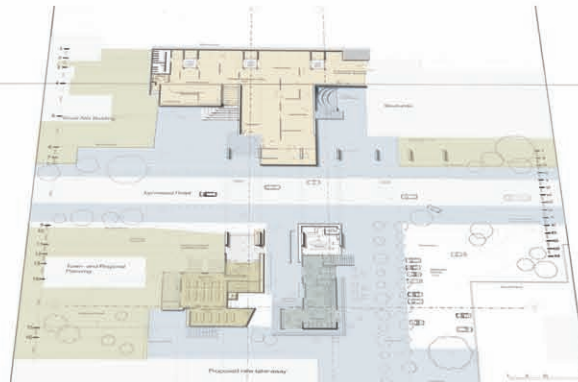


Figure 9.6 Ground level - social, practical and intellectual foyers

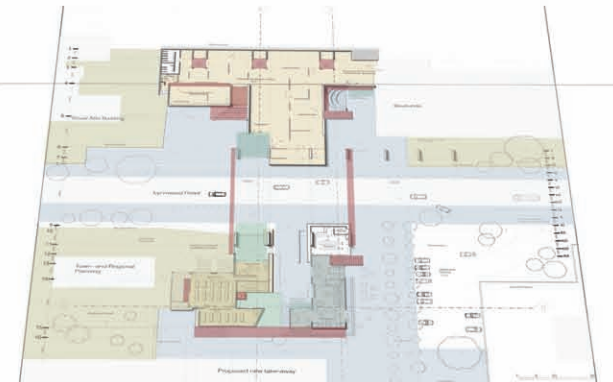


Figure 9.9 Ground level - all foyers

# ■ appendix a

Bauhaus, Dessau, Germany

## Introduction

The way the Bauhaus approached and publicised design changed the world's perception regarding design and architecture. The school's structure and methods of education created a revolution in architecture that has not yet been equalled.

This precedent study aims to identify what it was that made the Bauhaus so influential and timeless. The events that occurred at the Bauhaus have been summarised and opportunities (in terms of events,

management and practical organisation) have been identified in order to establish a well-rounded programme for the proposed BESC.

The practical principles that were applied at the Bauhaus, in terms of organisation and management, have been identified in order to structure the programme for the BESC around these principles. These principles are not necessarily architectural principles, but will determine the architectural

solution or approach to a building that aims to restore the relationship between theory and practice.

The physical Bauhaus building in Dessau, Germany, is evaluated to establish how the building, that facilitated the identified principles, serves its functions. The study is concluded with the identification of principles that would ideally be implemented in a building that serves architectural education.





# bauhaus

## opportunities

## timeline of events at the bauhaus

The events that took place at the Bauhaus are listed in chronological order on the right hand side and the opportunities that have been identified from these events on the left. The opportunities identified range from managerial logistical arrangements, such as the creation of a constitution, to more practical opportunities like workshops and guest lecturing.

dream of a new facility	1915	develops a view to set up an artistic advice centre for industry, crafts and manual trades
restructuring of educational structures	1919	walter gropius replaces henry van de velde as headmaster of school of arts and crafts weimar, germany - restructures it into bauhaus school of design
establish a manifesto unity between departments		the bauhaus manifesto commits it to forging all forms of art into a single whole, to bringing back together all artistic disciplines – sculpture, painting, arts and crafts, and manual trades – and making them integral components of a new art of building
workshops		the bauhaus brings together workshops and classes in stone sculpture, painting, graphics and printing, drawing, anatomy, bookbinding and weaving. also a gold, silver and coppersmith's workshop
events organised by school	1920	first bauhaus evenings for a short while the bauhaus has its own department of architecture
physical skill development	1921	woodcarving and bookbinding departments started
establish a constitution for the school		the weimar bauhaus publishes its constitution. the teachers are called masters, the students apprentices and journeymen
workshops		the bauhaus now incorporates workshops in stone sculpture, woodcarving, furniture, pottery, gold, silver and coppersmithery, mural painting and stained-glass painting, weaving, graphic printing, bookbinding
debating the value of accepting private commissions		the conflict between gropius – who believes the bauhaus should accept outside commissions – and itten – who is opposed to this on principle – comes to a head.
developing a community at the school - social	1922	institution of the bauhaus housing cooperative, designed to forge a single community of everyone at the bauhaus. exhibition of works by bauhaus apprentices and journeymen
exhibitions held at school - social, intellectual, practical relationship development		architecture exhibition at the bauhaus, with works by walter gropius and adolf meyer (and architecture office). gropius's architecture office enters the chicago tribune competition. their design marks a break with the expressionist phase and wins acclaim from the proponents of "neues bauen", who see it as a transition to objectivity
the reality of politics at school		a group of bauhaus students join together to form kuri (german acronym for constructive, utilitarian, rational and international)
public presentation of papers - making research done more accessible to the industry	1923	walter gropius delivers a paper on the unity of art, technology and science in hanover
taking work done at the institute to be exhibited elsewhere		bauhaus exhibition in weimar with several displays (including international architecture, with works by le corbusier, ludwig mies van der rohe, j. j. p. oud and others), publications and special events. walter gropius opens the exhibition with a paper entitled "art and technology – a new unity"
managing the school as a company	1924	plans to establish a bauhaus limited company with the involvement of the state of thuringia are discussed at the ministry of education
formation of a supporting group opportunity for industry to give back to the school		hendrik p. berlage, peter behrens, marc chagall, albert einstein, oskar kokoschka, arnold schönberg and others join together to form the society of friends of the bauhaus

# bauhaus

## opportunities

## timeline of events at the bauhaus

1925	<p>teachers and students address a joint letter to the thuringian government, declaring their intent to leave the bauhaus together</p> <p>official start of classes in dessau. all masters of form, except marcks, move to dessau, while former students, now junior masters, take over the workshops, abolishing the subdivision of the teaching staff into masters of craft and masters of form</p>
former students becoming junior masters	
classes held at another venue while waiting for the completion of the new facilities	classes are held at the municipal school of arts, crafts and manual trades pending completion of the bauhaus building, while the workshops are based in storerooms at a mail order firm
books published by the school	<p>the first of a series of bauhaus books appears</p> <p>the bauhaus in dessau switches to lower case in all its writings</p>
products made and sold	bauhaus ltd. is incorporated to market the products developed by the bauhaus
constant change in programme content - revised	1926
hosting events - increasing the school's social stature	<p>walter gropius criticises shortcomings in the workshops, which he attributes among other things to limited consideration for industrial mass production. the workshops are subdivided into teaching and productive sections</p> <p>topping-out ceremony for the bauhaus building, followed by celebration (festival in white) at the community and youth centre</p>
practical experimentation with the main aim of educating the designers of the future	the workshops move to the bauhaus building and the new constitution is issued. the government of anhalt recognises the bauhaus's new title of "hochschule für gestaltung" (institute of design). study courses lead to the bauhaus diploma. the bauhaus is an institute for design. its purpose is to shape the intellectual, crafts and technical abilities of creatively talented human beings to equip them for design work, particularly construction, and to perform practical experiments, notably in housing construction and interiors, and to develop models for industry and the manual trades
hosting events - increasing the school's social stature	<p>the bauhaus building is inaugurated in the presence of more than 1,000 guests from home and abroad, arousing major international interest. the first issue of the magazine "bauhaus" appears, and the first buildings completed on the törten estate are presented to the public.</p>
magazine produced by school	
1927	<p>the architecture department opens under the guidance of hannes meyer. the bauhaus magazine presents his latest projects</p> <p>béla bartók gives a concert in the hall, organised by the society of friends of the bauhaus. institution of free painting classes</p>
temporary free education	
hosting events - increasing the school's social stature	1928
interaction with other schools with the same or similar intent	<p>walter gropius asks to be relieved of his duties. beard-nose-heart festival at the bauhaus</p> <p>walter gropius's farewell party. a group of bauhaus members go to moscow where they visit the higher art and technical workshops (vkhutemas).</p> <p>hannes meyer criticises formalist tendencies at the bauhaus and gears it towards scientific principles and the needs of the common people rather than luxuries</p>
exhibitions of work done at school for public viewing - events	the bauhaus exhibits photos by its members. ernst kallai becomes editor of the magazine "bauhaus"
hosting constant debates	bauhaus members debate modern architecture, the bauhaus and vkhutein



# bauhaus

## opportunities

accepting private commissions to be done by teachers and students

travelling exhibitions of work produced at school  
festivals - events - exhibitions

touring exhibitions

money made through projects are paid out to students

products made at school sold for financial independence

the reality of politics at school

focus on architecture - connection between the technology of building and aesthetic issues

revised constitution - no politics

merging workshops

events

exhibition of outsiders hosted at school

other schools follow their example

events

## timeline of events at the bauhaus

1929	<p>hannes meyer started as head of department of the bauhaus school. the school received two of its most significant building commissions - schools first profit</p> <p>an exhibition of young bauhaus painters goes on tour</p> <p>festival of metal</p> <p>bauhaus touring exhibition at the basle museum of trades and crafts</p> <p>the students become politically more extreme, the kpd (communist party) members among them join together to form kostufra - communist students group. 32,000 reichsmark in license revenues are paid out to the students through the bauhaus ltd</p>
1930	<p>developed in 1929, the bauhaus wallpaper is now available retail and becomes the school's most successful product. eduard heiberg teaches architecture at the bauhaus</p> <p>bauhaus carnival with political protests by students, bauhaus attacked in the right-wing press. a group of students start a study on the dessau housing master plan, which three bauhaus members continue after graduating</p> <p>hannes meyer is called to account for the growing politicisation of the bauhaus and dismissed by the city of dessau because of communist-oriented students step up their activities</p> <p>ludwig mies van der rohe is appointed new bauhaus director. he streamlines study courses and focuses more on architecture, notably the connection between the technology of building and aesthetic issues. workshop activities are slashed. mies van der rohe seeks to keep the bauhaus out of all political conflicts and expels the communist-oriented students</p> <p>the bauhaus gets a new constitution which forbids all political student activities</p>
1931	<p>the workshops and architecture department are merged to become the building and interior decoration department</p> <p>bauhaus concert</p>
1932	<p>oskar schlemmer paintings exhibited at the bauhaus</p> <p>initiated a motion for the closure of the bauhaus. the students petition newspapers and the president of the Reich.</p> <p>the bauhaus in berlin is ludwig mies van der rohe's private school</p> <p>architecture and design: the international style exhibition in new york, frank lloyd wright sets up the taliesin fellowship.</p>
1933	<p>almost 700 people throughout the building join in the bauhaus festival. each one of the masters design a department of their own.</p> <p>ludwig mies van der rohe dissolves the bauhaus at the start of the summer semester with the masters' consent.</p>

governing principles:

to guide the design process of a successful integrating facility

## practical principles to be implemented

Students trained to integrate industry and education

Students participate in the actual construction of buildings

Utilizing the facility as a type of incubation centre for students just leaving the university

Moving away from "expert culture" - including the public:

public space

exhibition space

public debates

restaurant

events

virtual access to knowledge

Developing a new lifestyle through architecture

Constant reinvention of the curriculum

Encouraging "vertical brigades" between the different years

A postgraduate facility

Unification of the different departments

The opportunities identified are re-evaluated and examined to understand how the Bauhaus achieved such success.



## principles from bauhaus management

- have the dream for a more integrated facility
- set up a manifesto - unity between departments
- events organised by school
- physical skill development at school
- establish a constitution for the school
- encourage and administrate constant debates - both formal and informal
- accept private commissions - executed by lecturers and students
- develop a community within the faculty
- exhibitions of work produced at the school
- public presentations of research done at the school - making research more accessible to the industry
- work produced at school in exhibitions at other locations
- manage the school as a company
- formation of an alumni group/support structure - opportunity for the industry to give back to the school
- former students became junior masters
- books published by school
- products made at school are sold
- constant revision of programme content
- hosting social events
- practical experimentation
- regular interaction with other schools with similar intentions and goals
- host festivals as events
- money made from private commissions invested back into school
- revise constitution
- merging workshops
- exhibitions by others hosted by school
- assist other schools that follow the example

# bauhaus

## opportunities

## what happened at the bauhaus

practical: course structure	students had to take a 6 month preliminary course at the bauhaus
practical: course content	course involved painting and form experimentation
workshops	3 years of workshop training by 2 masters: an artist and a craftsman
actual construction of buildings	studies in architectural theory and practice - working with the actual construction of buildings
social and intellectual interaction	day-to-day contact with some of the most important practicing artists of the time
marketing and image of the school	the school was masterfully marketed in germany, acquired reputation and an influence out of proportion to its physical reality.
events - social interaction	the school came to be known for its grand masked balls and kite processions, experimental light and music evenings, and "triadic" abstract ballets.
events - social interaction	these events unified many students from different ages and nationalities into a community - propagating an alternative way of life
intellectual interaction	gropius created a laboratory to teach and expand the existing "deutsche werkbund" theories of design
focus on the direct context - pretoria as canvas	what was new about the school was its attempt to integrate the artist and the craftsman, to bridge the gap between art and industry
actual construction of buildings	bauhaus was the antithesis of the arts and crafts movement - no more romance of hand made art in the countryside: its emphasis was urban and technological, and it embraced the 20th century machine culture
actual construction of buildings	the bauhaus manifesto proclaimed that the ultimate aim of all creative activity is "the building"
actual construction of buildings	students participated right from the start in building projects
social, intellectual and practical relationships	a modern glass, concrete and steel building was erected. gropius designed classrooms, dormitories and faculty housing that were grouped in a complete artistic community
merging the departments	in response to past criticism of the school's curriculum gropius emphasised the merger of the arts and industry - studios that produce home appliances, textiles, accessories and furniture
architecture that reflects the time and condition	end of ww1, beginning of a new era - wanted to create an architecture that reflects the time and condition

# bauhaus

## opportunities

## what happened at the bauhaus

linking students to the industry through training	the school's philosophy was based on the idea that students must be trained to work with the industry
linking students to the industry through training	realization that the way architects, craftsmen and artists were educated would have to change to incorporate the integration between industry and education
actual construction of buildings	the bauhaus accepted commissions and produced buildings
actual construction of buildings - financial independence	an architectural school that was financially self sustainable
no specific programme social distinction abolished a concept	"the bauhaus was not an institution with a clear program. it was an idea. it was the first college in visual arts in which the social distinctions between the traditionally academic and non-academic disciplines were abolished and all categories of visual art had equal value in a complete whole. what happened was not so much the development of a style but the development of an artistic, social and educational concept."
achieved through social and intellectual interaction	some new methods based on specific types and standardization were employed not only to produce new architecture but to anticipate a new lifestyle through this architecture
practical: course content	a curriculum was established which included all relevant subjects such as planning, design, draftmanship, construction and town planning - the "design of life's processes"
established and determined through social and intellectual interaction	the concrete conditions in society and the factors determining architecture and its use formed the starting point for all planning and design
better interaction between students	students from various years worked together in "vertical brigades" on the design and erection of buildings
a postgraduate school	the majority of the new student intake at the bauhaus had already completed a course of studies and the bauhaus became a "postgraduate school"
practical: course content	"the studies of essentials" or the "collective satisfaction of the people's needs" changed to "the spatial implementation of intellectual decisions" in an aesthetically consummate fashion
workshops	practical work in the workshops was the core training element at the bauhaus
unification of the different disciplines	the students were called apprentices, journeymen and master craftsmen in accordance with artisan tradition
	crafts work was seen as an ideal unity of artistic design and material production

# bauhaus

## opportunities

## design of the bauhaus

no formal structure initially - opportunity for development

no architectural department until 8 years after establishment

workshops

the workshops were integrated with the building's interior design

transparent building - showcasing architecture

building: the glass curtain wall suspended in front of the load-bearing framework defines the exterior of the workshop wing and openly shows the constructive elements

emphasis through the right use of materials and composition

the glass surfaces overlap the corners - creating the impression of lightness

functional logic and individual design of different parts

all parts of the bauhaus was separated according to their function and individually designed

hierarchy of space and separation of programmes for functional purposes

the two wings are asymmetrically - today: bauhausstrasse and gropiusallee

building can be approached from all sides - not only one route or sequence of experiences

no central viewpoint of the building - observer must move around entire structure to fully experience it

limited amount of defining elements on the building - accessible to all

main elements of building: the glazed, 3 storey workshop wing the block for the vocational school (3 storeys) with honest rows of windows 5 storey studio building with projecting balconies

inhabited bridge as part of the design

2 storey bridge for administration and architectural offices links the workshop wing with the vocational school

connecting or foyer spaces

a single storey building with a hall, stage and canteen - festive area - connects workshop wing with the studio building

possibility of private accommodation facilities

the studio building housed 28 studio flats for students and junior masters - each 20m<sup>2</sup>

sensitive design of "event spaces"

the festive area is defined by portals between the foyer and the hall, a folding partition between the stage and the canteen, ceiling design, colour design - creating spatial coalescence

pallet and aesthetic design of building - contrasts

dark windows in contrast to the light pallet of the colour design

quality of interior spaces

the construction of the building is accentuated through the effective colour design on the interior

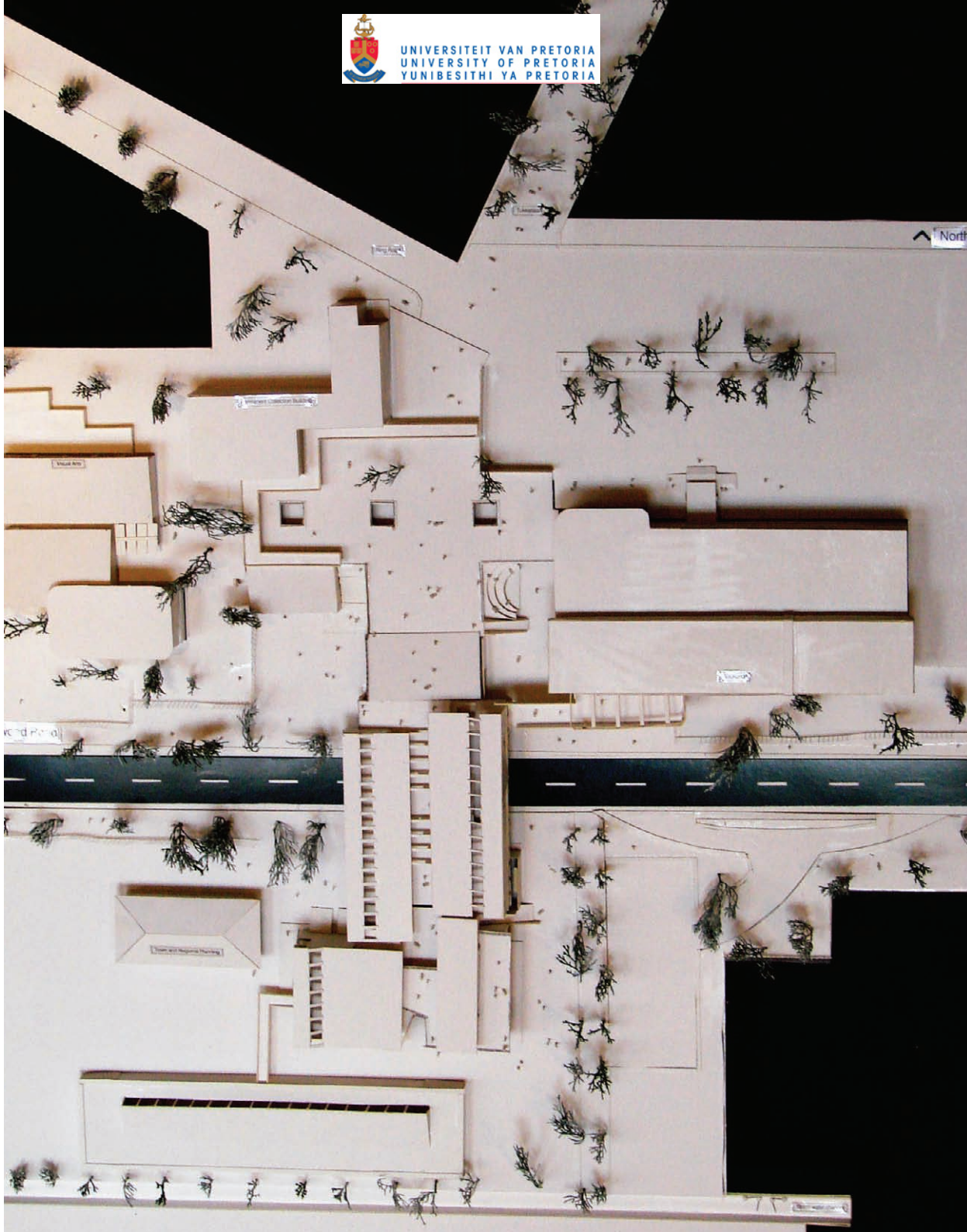
(The information in Appendix A was compiled from information obtained from a series of websites, as referenced (www.designhistory.org, www.froebelweb.org and www.bauhaus-dessau.de/). The analysis, opportunities identified and conclusions were reworked and the graphic presentations are done by the author.)



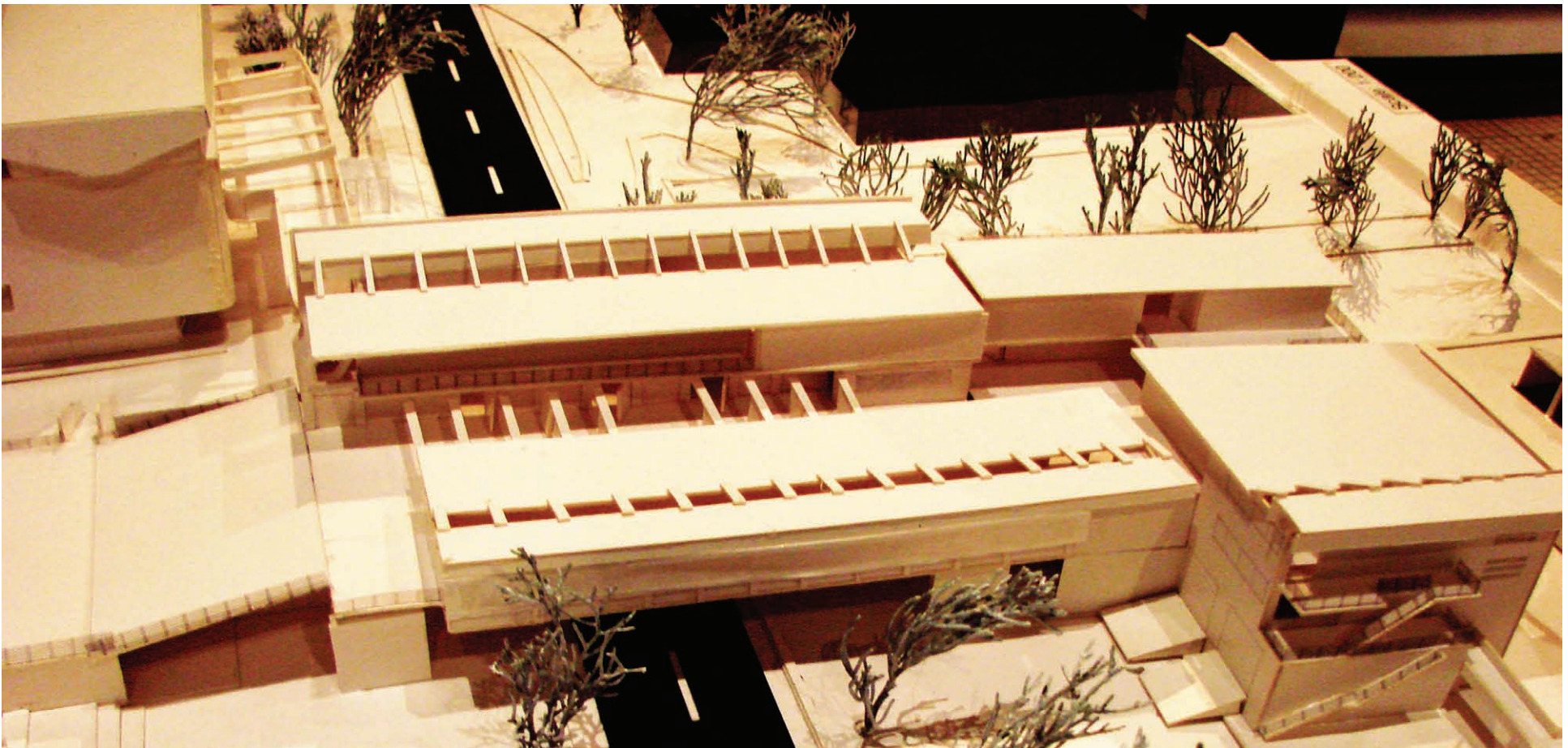
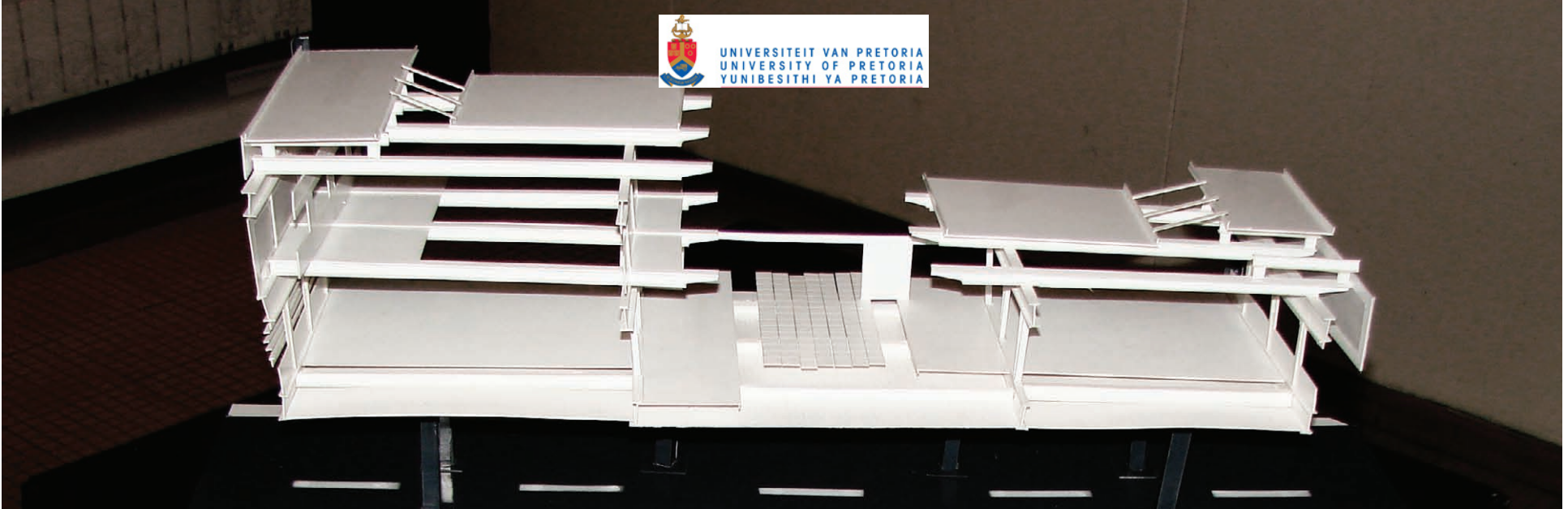


# appendix b

Exhibition Images



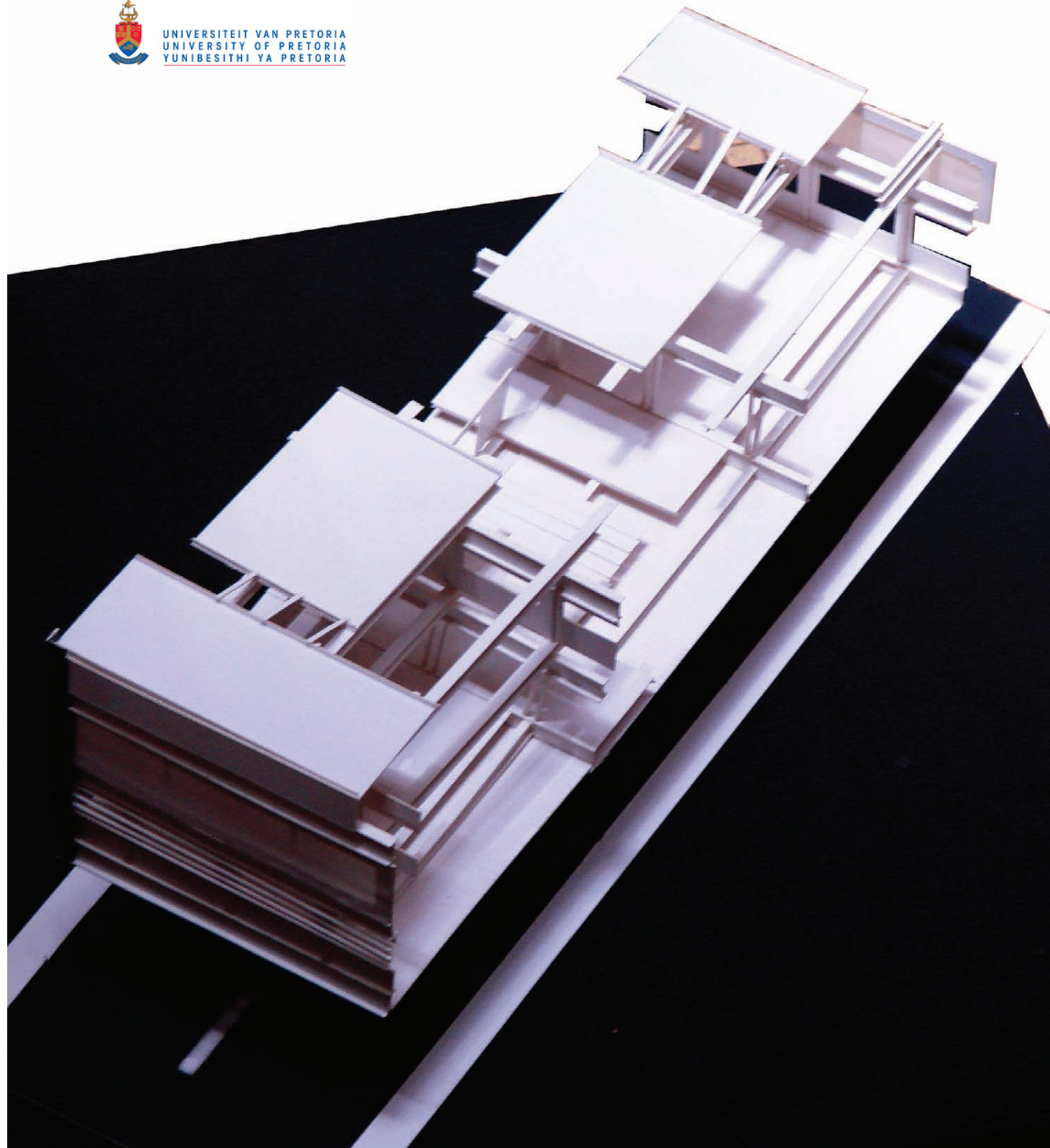




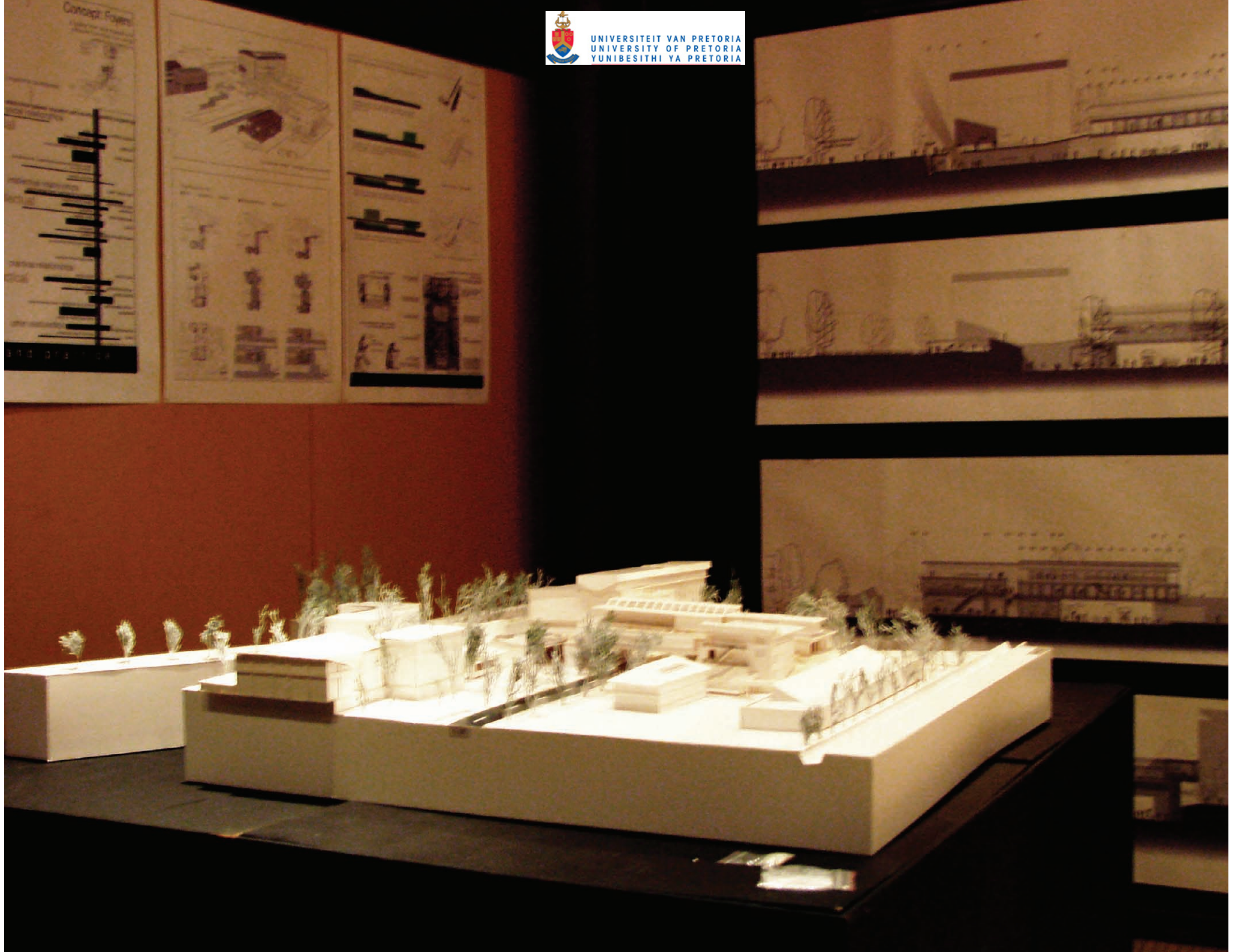




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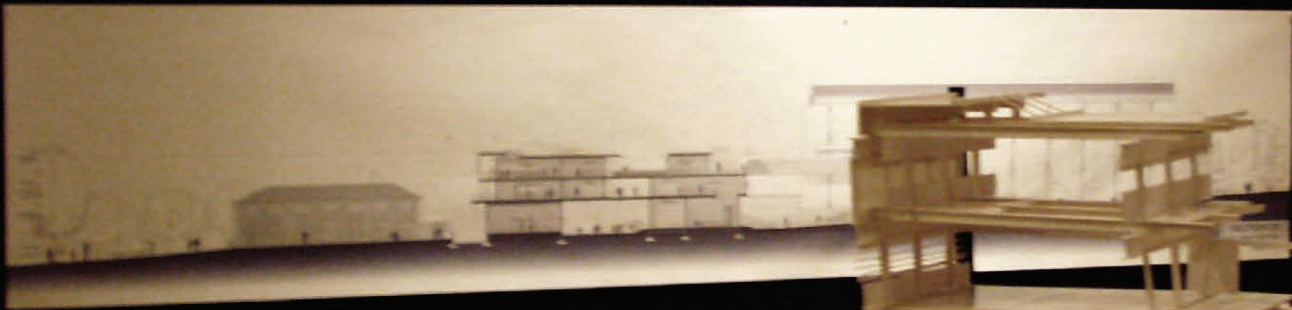








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View of northern street edge



View of circulation and exhibition space on bridge



View from new Boukunde extension



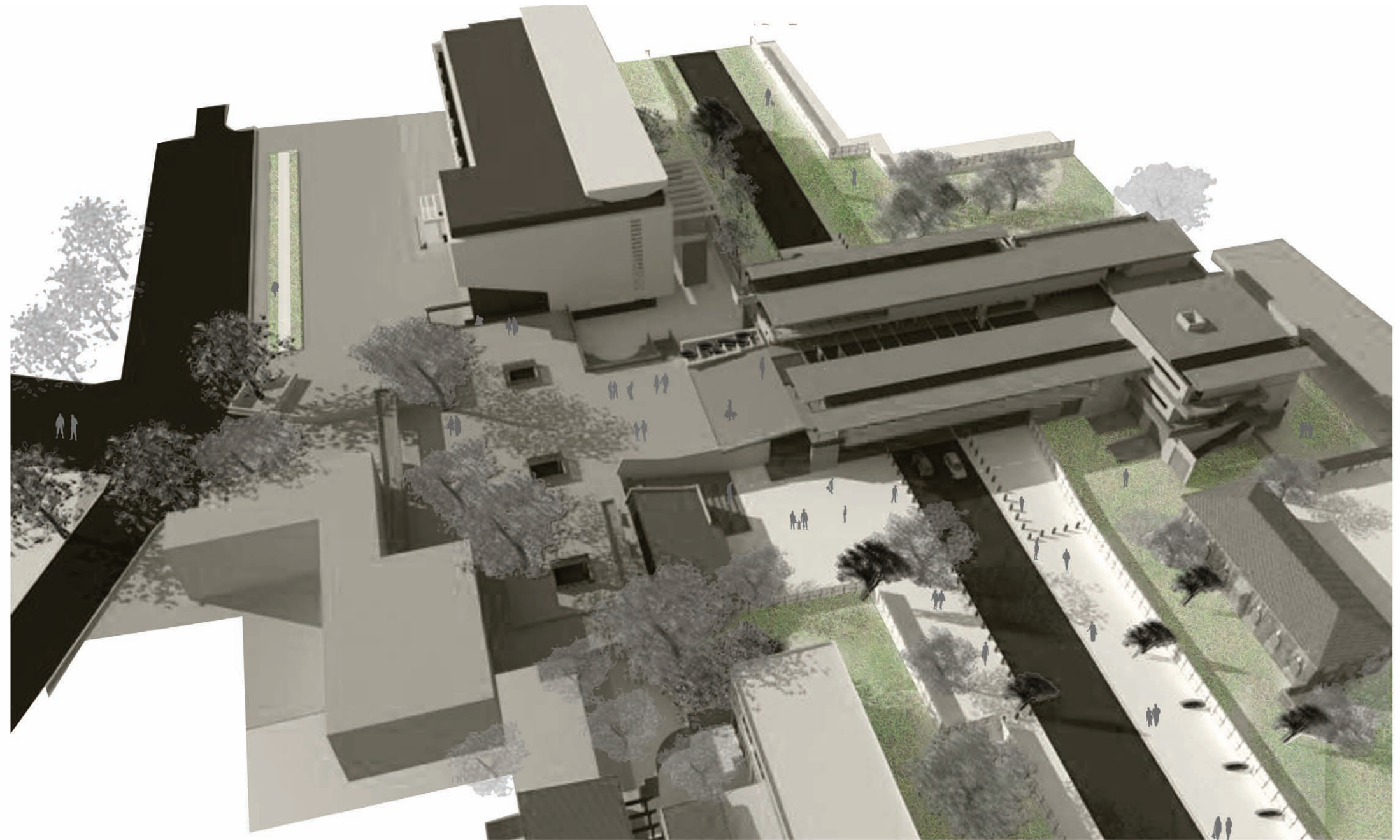
View of connection to Boukunde





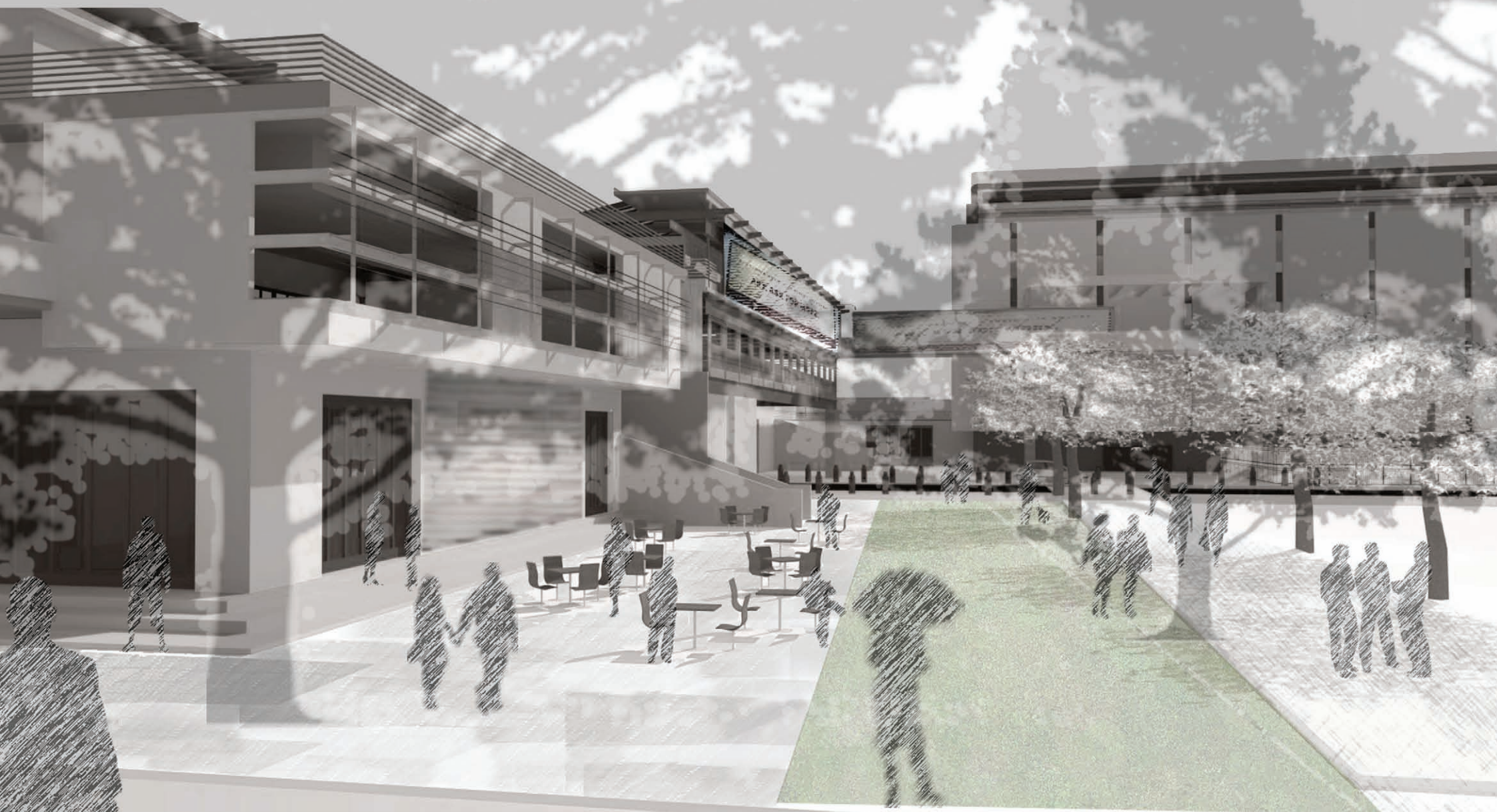
Western view





Aerial perspective





Eastern facade and connection to Boukunde

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