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MULTI-NODAL TRANSPORT INTERCHANGE HUB

MARABASTAD

FIG A_Thesis intervention placed in the *Integrated Urban Design Framework* for Marabastad framework by Aziz Tayob

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MULTI-NODAL TRANSPORT INTERCHANGE HUB

MARABASTAD

"Transport interchanges have become the agora of the newly democratic state, the place of maximum commercial exchange and social interaction" (Deckler; 2006: 59).

_by Steven Crawford

_study leader: Gary White
_course coordinator: Jacques Laubscher

Submitted in fulfillment of part of the requirements of the degree Magister in Architecture [Professional] Department of Architecture in the Faculty of Engineering, Built Environment and Information Technology, University of Pretoria, South Africa. November 2009


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_ABSTRACT

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This thesis explores city making, specifically good public space. The city of Tshwane is envisaged “to become the leading international African capital city of excellence…” (TICDRS; 2005: 5). Public transport is identified as being one of the interventions for achieving this vision.
The Tshwane Spatial Development Strategy 2010 and beyond state that “the ability to travel from one place to another is a basic requirement of a successful metropolitan area.”

The inner city core and the Marabastad precinct represent the heart of the Inner City and its Capital City significance. The main feature defining Marabastad’s character today are the public transport systems contributing to the area as being an intermodal transport node (IUDFM; 2002: 253).

This thesis develops a multi-nodal transport interchange hub in Marabastad at the Belle Ombre train station. The program of the building is made up of three parts: Firstly the building defines a new public square in front of the Belle Ombre train station that is also the termination point for the green strip running through Marabastad, as planned in the Integrated Urban Design Framework for Marabastad. This square also provides a spill-out point for all the commutors of the various transport facilties surrounding the square. Secondly to provide formal facilities for the proposed new Bus Rapid Transit (BRT) and inner city distribution bus system, and thirdly to provide a connection for these new transit systems to the Belle Ombre train station. The building will have a mixed use character with programs such as informal market, offices and transitional housing units.
“Transport interchanges have become the agora of the newly democratic state, the place of maximum commercial exchange and social interaction” (Deckler; 2006: 59).

OPSOMMING

Hierdie verhandeling ondersoek goeie stedelike samestelling en daar word spesifiek gefokus op suksesvolle publieke ruimtes .

Die visie vir die Stad van Tshwane is “om in ‘n leidende Internasionale Kapitale stad van Afrika ontwikkel te word...” (TICDRS; 2005: 5). Publieke vervoer word geïdentifiseer as een van die hoof toevoegings om hierdie visie te bereik.

Die kern en die Marabastad omgewing van die middestad verteenwoordig die hart van die hoofstad en die stad se kapitale karakter. Die hoof kenmerk wat Marabastad se karakter huidiglik definieer is die publieke vervoerstelsel wat bydra tot die area as ‘n publieke vervoer node (IUDFM; 2002: 253)

Die verhandeling ontwikkel ‘n multi-nodale vervoerwisselings-punt in Marabastad by die Belle Ombre treinstasie. Die program van die gebou omvat drie hoof dele:
Eerstens, definieer die gebou die publieke plein voor die Belle Ombre treinstasie wat ook die terminasiepunt is vir die groenstrook wat deur Marabastad ontwikkel word as deel van die beplande geïntegreerde stedelike ontwerpsraamwerk vir Marabastad. Hierdie plein verskaf ook ‘n vergader plek vir al die pendelaars wat al die vervoestelsels gebruik om hierdie hierdie nuwe plein. Tweedens huisves dit die formele funksies en funksionele benodighede vir die voorgestelde nuwe “BRT” en nuwe bussisteem wat die middestad bedien. Laastens voorsien dit die konneksie tussen die verskeie funksies na die Belle Ombre treinstasie. Die gebou is ‘n tipiese gemengde gebruik gebou met programme soos ‘n informele mark, kantore en oorgangsbehuising.
“Vervoer verwisseling nodes het die agora geword van die nuwe demokratiese staat,’ n plek van maksimum kommersiële verhandelinge en sosiale interaksie.” (Deckler; 2006: 59).


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_THANKS

Spesiale dank aan my ouers, Mark & Charmaine Crawford wat in my glo en wat hierdie 5jaar avontuur moontlik gemaak het en aan oom Frans vir al sy ondersteuning en hulp deur die jare.


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1 INTRODUCTION

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TSHWANE

Pretoria, the inner city region of Tshwane, a place of great significance, was established in 1855 to house the government of the dispersed Afrikaner communities of the Transvaal (Lemon; 1991: 67). The city later became the capital city of South Africa and today it is envisaged as "to become the leading international African capital city of excellence that empowers the community to prosper in a safe and healthy environment" (TICDRS; 2005: 5).

EXISTING SPATIAL FORM

Unfortunately, the city is still in the process of achieving this vision, as it is a well-known fact that Pretoria, just as most other South African cities, has a spatial form that is highly inefficient, inequitable and unsustainable (CTSDS; 2007: 1).

The spatial form of Tshwane even today displays the typical characteristics of earlier urban planning policies which give the city a dual city status in which well-developed, affluent parts coexist with vast stretches of the poorly developed periphery, thus depriving the poorest people from any economic opportunities (CTSDS;2007: 1).

The more affluent parts of this dual city are characterised by

- Low density sprawl
- Fragmentation of development
- Separation of functions that causes great distances between various urban functions and facilities (CTSDS;2007: 1).

NATURE OF THE PROBLEM

The above-mentioned characteristics imply that a lot of time and money is spent commuting to and from the city. This activity directly aggravates poverty, as city living is dependant on the use of private vehicles that many people can't afford. All these vehicles cause traffic congestion and pollution. This results in city streets being predominantly designed for vehicles. In turn this results in a public environment that generates few economic opportunities for small scale traders (CTSDS; 2007: 2).

SOLUTION

In order to counteract this phenomenon and to achieve the vision of the city of Tshwane, numerous sets of legislation, policies and strategies from national to provincial level exist to address the spatial problems that characterise the city (CTSDS; 2007: 2).

If the goals set out in these documents can be met, a city would be created where

- the Public transport systems works and is supported by higher density development
- internal municipal processes are efficient and corruption free and create a good investment environment
- affordable housing in areas integrated with places of opportunity is available to people close to their jobs
- a balance is achieved between the environment, social needs and economic development. (CTSDS; 2007: 2).

From the above it is obvious that the importance of the inner city is once again understood. As Dewar (1991:114) states, people come to the city to experience economic, social, cultural and recreational opportunities.
Unfortunately the problems of the dual city will not vanish overnight. The poor will still struggle to survive on the edges of the city, commuting to the inner city on a daily basis to experience all of the opportunities presented by the city. This complex problem faced by the city can only be solved by implementing various solutions and interventions.

One of the main interventions is public transport. As stated in the *Tshwane Spatial Development Strategy 2010 and beyond*, "the ability to travel from one place to another is a basic requirement of a successful metropolitan area." It further states that all land use types cause the need to travel - from residents commuting between home and work to goods being distributed (CTSDS; 2007: 24).

One of Dewar's (1991: 114) concerncs is that there is little use in providing opportunities in cities if these are only accessible to a limited number of people (those who own private transport). Croeser (2005: 12) further remarks that there is a definite need in South Africa to upgrade the public transportation system.

The movement system of a metropolitan area is very important as it ensures that people have greater

accessibility to jobs and social and recreational opportunities, while all these opportunities are accessible at a lower cost, in shorter periods of time and with more convenience (CTSDS; 2007: 24). This movement system also contributes to the linkage of Tshwane with the rest of the Gauteng urban region, which will contribute to Tshwane's attractiveness as an investment destination (CTSDS; 2007: 28).

The present traffic situation in Tshwane is characterizes by extreme congestion. This is on the increase due to the peripheral urban growth that feeds the urban sprawl pattern. The insufficient public transport system diminishes the quality of the life of the urban citizen as time and money are wasted daily in travelling to and from places of opportunity (CTMMTDD; 2006: 1).

The *Integrated Development Framework of August 2007* states that the strengths of the existing system must be recognized and expanded. The existing system together with the proposed new Bus Rapid Transit system (BRT)will form the new inner city transport system (IDF; 2007: 77).

It is important to note that the new Bus Rapid Transit system won't replace the existing system, but supplement the systems already in place, thus ensuring the optimal use of existing and planned infrastructure (IDF; 2007: 77). The *BRT Planning Guide of June 2007* also mentions that the planning and implementation of a BRT system can't be done in isolation, and that the most effective BRT systems are integrated with all the other transport systems (BRTPG; 2007: 6). After the completion of a scoping study conducted in 2007 (BRTOP; 2008: 2), the City Council of Tshwane gave the go-ahead for the new proposed Bus Rapid Transit system project. A full operational plan for implementing a road based public transport system for Tshwane was developed by the companies appointed, with the emphasis on providing a Bus Rapid Transit (BRT) system for the Tshwane metropolitan area. The companies involved were Advanced Logistics Group, S.A. (ALG, the Consultant), Namela Projects (Pty) Ltd and Transports Metropolitans de Barcelona, S.A. (TMB).

BRT is a "a high-quality bus based transit system that delivers fast, comfortable, and cost-effective urban mobility through the provision of segregated right-of-way infrastructure, rapid and frequent operations, and excellence in marketing and customer service" (BRTPG; 2007: 11).

According to the City of Tshwane Metropolitan Municipality Transport Development Division, this BRT system will play the following role in the city
•"Support corridor development, which will lead to a more efficient city
• Improve the quality of life of citizens, as travel time will be significantly reduced
• Promote public transport in such a way that it becomes the preferred mode, even of people who do own a motor vehicle
•Provide a proper feeding system for Gautrain, and in such a way contribute towards efficient public transport within the Province
• Provide proper access to Loftus, one of the 2010 World Cup venues
•Provide proper public transport access to growth points such as Menlyn, Brooklyn, Hatfield, Sunnyside and the CBD
• Provide fast and efficient transport to residents living in the northern areas, the declared 'area of preference' of the city" (CTMMTDD; 2006: 1).

Apart from the proposed BRT system the city is planning an inner city distribution system to help serve the transport nodes at Pretoria railway station, Bello Ombre railway station and the Bloed/Boom Street taxi rank (TSPTPN Appendix B; 2006: 1).
The benefits from the project are
• proper linkage amongst the various transport termini located around the city
• reduced walking distances
• reduction of congestion
• increased accessibility of major land uses within the CBD (TSPTPN Appendix B; 2006: 1).

FIG 1.1_View of Tshwane inner city

STUDY AREA

The Tshwane Inner City Development and Regeneration Strategy of 2005 states that the inner city of Tshwane is made up of the following broad land-use districts where the inner core and Marabastad precinct represents the heart of the inner city and its capital city significance:

- An inner core of mainly office, retail, commercial and residential intensive development in a 2,5 km radius around Church Square
- Marabastad and its finely grained surroundings towards the north-western side of the inner city reminiscent of the city's historic African vibrancy and a zone of extensive urban decay
- The high density residential areas of Sunnyside and Arcadia on the eastern side
- A service industry zone of mostly smaller entrepreneurs towards the western side of the inner city (TICDRS; 2005: 2).

The *Tshwane Inner City Development and Regeneration Strategy* thus focuses its proposal on the inner city core and Marabastad as it is believed that the greatest impact can be achieved by concentrating efforts in these areas (TICDRS; 2005: 2).

FIG 1.2_View of western inner core district taken from city building roof top

FIG 1.3_View of Marabastad taken from Kruger Park building roof top

FIG 1.4_View of Sunnyside taken from top of engineering tower at University of Pretoria

FIG 1.5_broad land use districts
of the inner city region

The Tshwane Inner City Development and Regeneration Strategy of 2005 state that the inner city of Tshwane is made up of four broad land-use districts with the inner core and Marabastad precinct representing the heart of the Inner City and its Capital City significance.

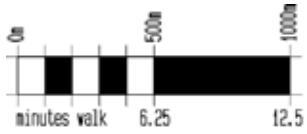
_INNER CITY REGION BOUNDARY

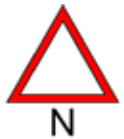
_INNER CORE DISTRICT

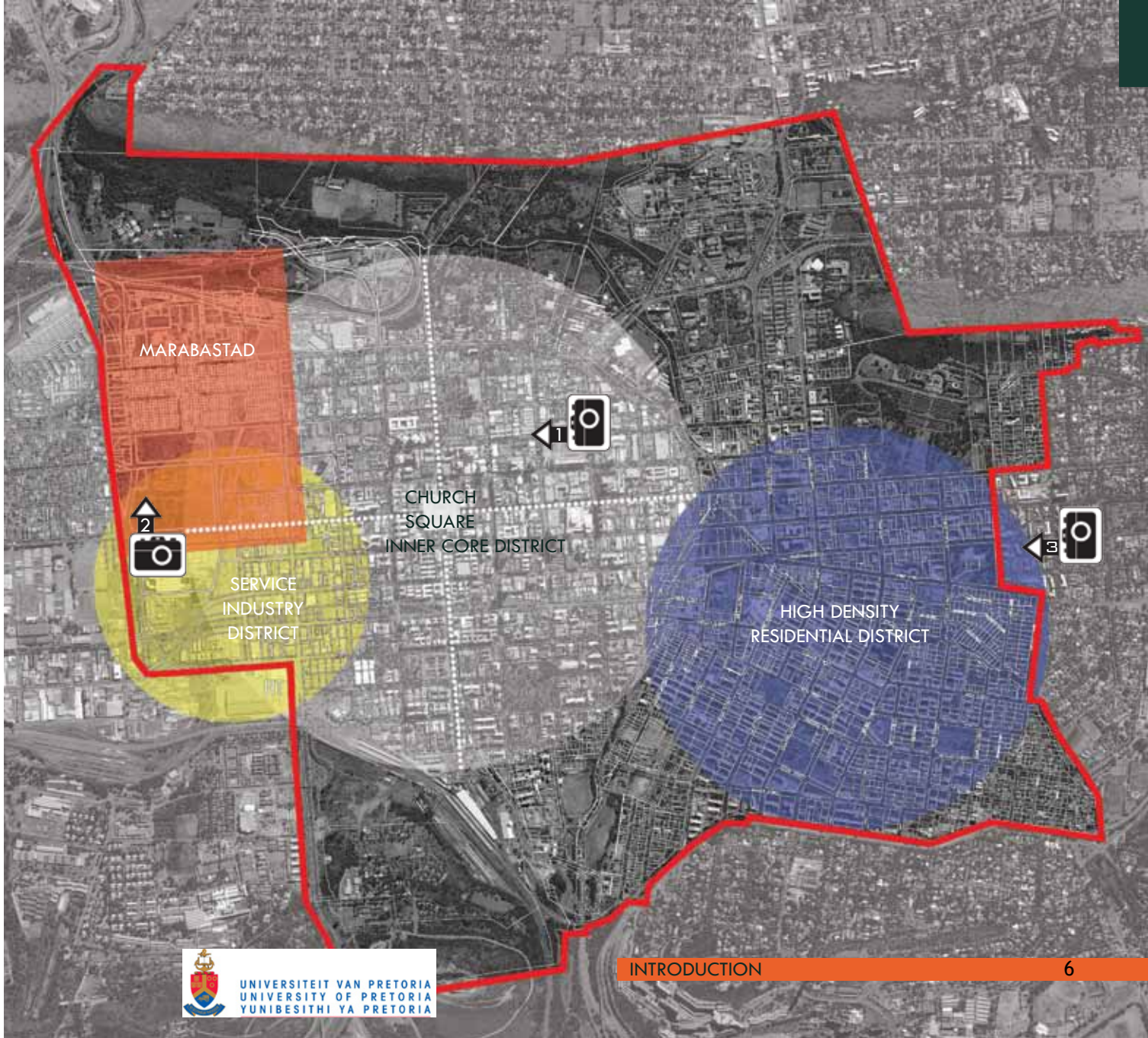
_HIGH DENSITY RESIDENTIAL DISTRICT

_SERVICE INDUSTRY DISTRICT

_MARABASTAD







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The *Tshwane Bus Rapid Transit (BRT) Operational Plan* presented by Advanced Logistics Group on 24 April 2004 states that they adopted a layered approach for planning the proposed new network. The existing rail system will be at the top of the hierarchy of modes, followed by the BRT system, then the enhanced corridor and finally the feeder services (BRT Operational Plan; 2008: 4). During the planning of the system a number of corridors have been examined for the new BRT system, and the system for phase one is as follows

• Line 1: Bus Rapid Transit route between Mabopane and Pretoria Station
• Line 2: Bus Rapid Transit route between Belle Ombre Station and Mamelodi
• Line 1: Enhanced bus corridor on Church Street between Atteridgeville and Hatfield
• Line 2: Enhanced bus corridor on Church Street between DF Malan and Mamelodi
• Feeder routes to provide access to the BRT services (BRT Operational Plan; 2008: 4).

BRT terminals for phase one are proposed at the following sites
• Line 1: Mabopane Station and Pretoria Station
• Line 2: Belle Ombre Station and Mamelodi
• Depot facilities will be provided at the end of lines 1 and 2 at Mabopane and Mamelodi respectively (BRT Operational Plan; 2008: 4).

Because of Marabastad's significance in Tshwane and of the new proposed BRT system with its line 2 terminals planned to be located at the Belle Ombre Station, a transport interchange at the Belle Ombre train station in Marabastad was chosen as the topic for this thesis project.

ADVANCED LOGISTICS GROUP

FIG 1.6_ Advanced Logistics Group logo

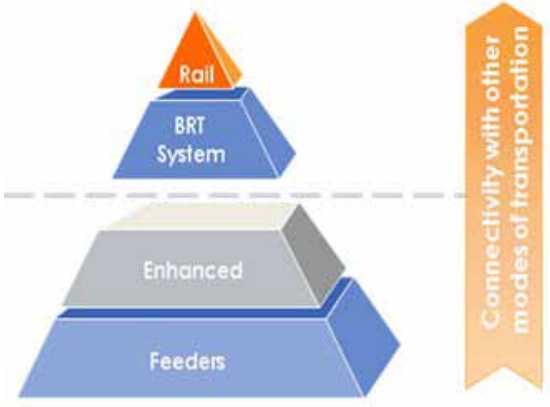

FIG 1.7_ Layered planning approach of BRT

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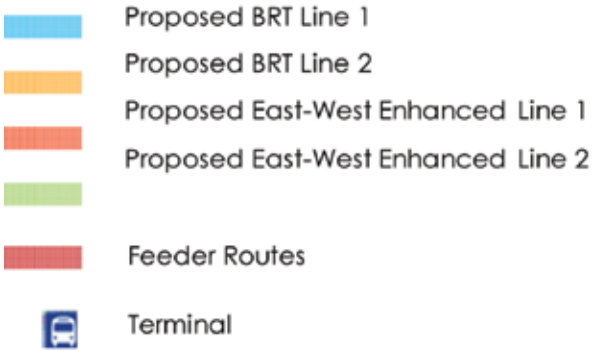
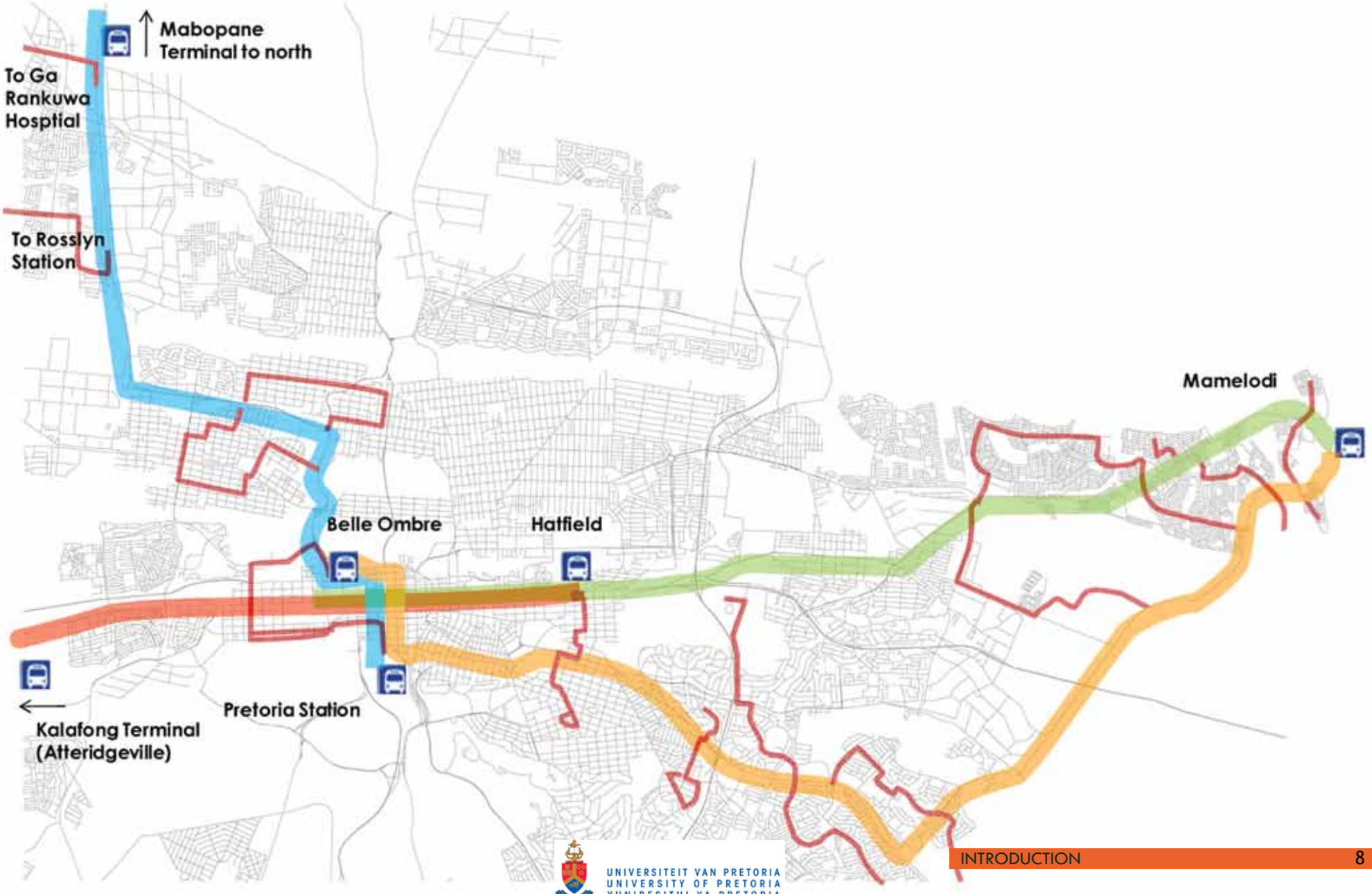
FIG 1.8_Proposed BRT routes for Tshwane

Key features of the proposed BRT corridors include:
• Links priority townships such as Soshanguve and Mabopane to the north and Mamelodi to the east to the city centre and other key centres such as Menlyn, Hatfield and Rosslyn.
• The two lines overlap between Belle Ombre Station and Pretoria Station to provide optimal service through the CDB area.
• Serves Loftus Stadium, a 2010 World Cup venue.
• Provides links to key rail stations and the Gautrain project.
• High demand throughout corridor, in particular along the R80 corridor.
• Transit mall stations in Church Square with reduced mixed traffic access and parking.
• Bus Rapid Transit to have priority in Paul Kruger corridor in alignment with ReKgabisa precinct planning between Boom Street and Pretoria Station with reduced mixed traffic lanes and access, reduced parking and improved pedestrian amenity (BRTOP; 2008: 5).




Mabopane
Terminal to north
To Ga
Rankuwa
Hosptial
To Rosslyn
Station
Belle Ombre
Hatfield
Mamelodi
Pretoria Station
Kalafong Terminal
(Atteridgeville)

Route Characteristics - BRT Line 2 Alternative 2

- Directly links CBD economic hub with Sunnyside, Menlyn Park and key population area of Mamedoli.
- Directly links CDB and 2010 World Cup venue at Loftus Stadium.
- Ease of construction through Skinner Street.
- Central route through Sunnyside.
- Existing public transport demand between CBD and Mamelodi: estimated at 6000 pph.
- Exclusive Right-of-Way lanes due to demand and to facilitate optimal journey times and allow for configuration of median bus-ways and median stations.
- Passing lanes to facilitate express and limited stop services.

FIG 1.9_BRT line 2 charactiristics

Pros	Cons
• Provides improved CDB access and links through Paul Kruger / Boom Street and Church Square "Capital Core Anchors" (IDF). • Aligns with Re Kgabisa with focus on full length of Paul Kruger corridor. • Direct links to Pretoria and Belle Ombre Stations. • Direct links to Gautrain Station at Pretoria Station. • Fewer lane kilometres of infrastructure required. • Allows for the two BRT lines to overlap between Belle Ombre Station and Pretoria Station along the length of Paul Kruger providing maximum service to this key corridor and maximum transfer points between the two lines.	• Not as conducive to accessing Hatfield node. • Physical constraint at railway bridge overpass on Walker Street. • Slightly higher potential difficulty to construct via Boom – Paul Kruger – Walker Street route than D.F. Malan – Skinner Street. • Less central route through Sunnyside.

FIG 1.10_BRT line 2 pro's and con's

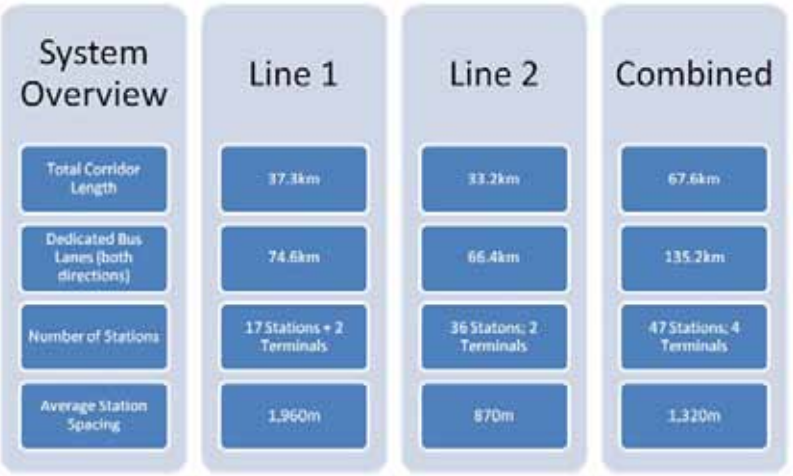


FIG 1.11_BRT system overview

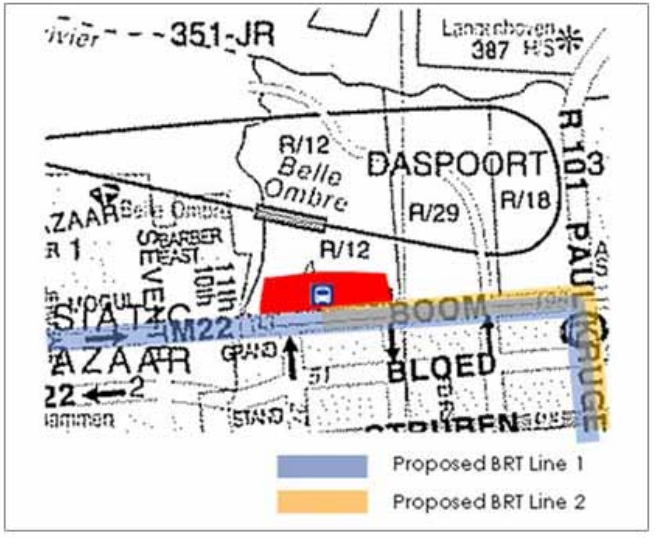


FIG 1.12_Terminal position of Line 2 identified by the BRT Operational guide

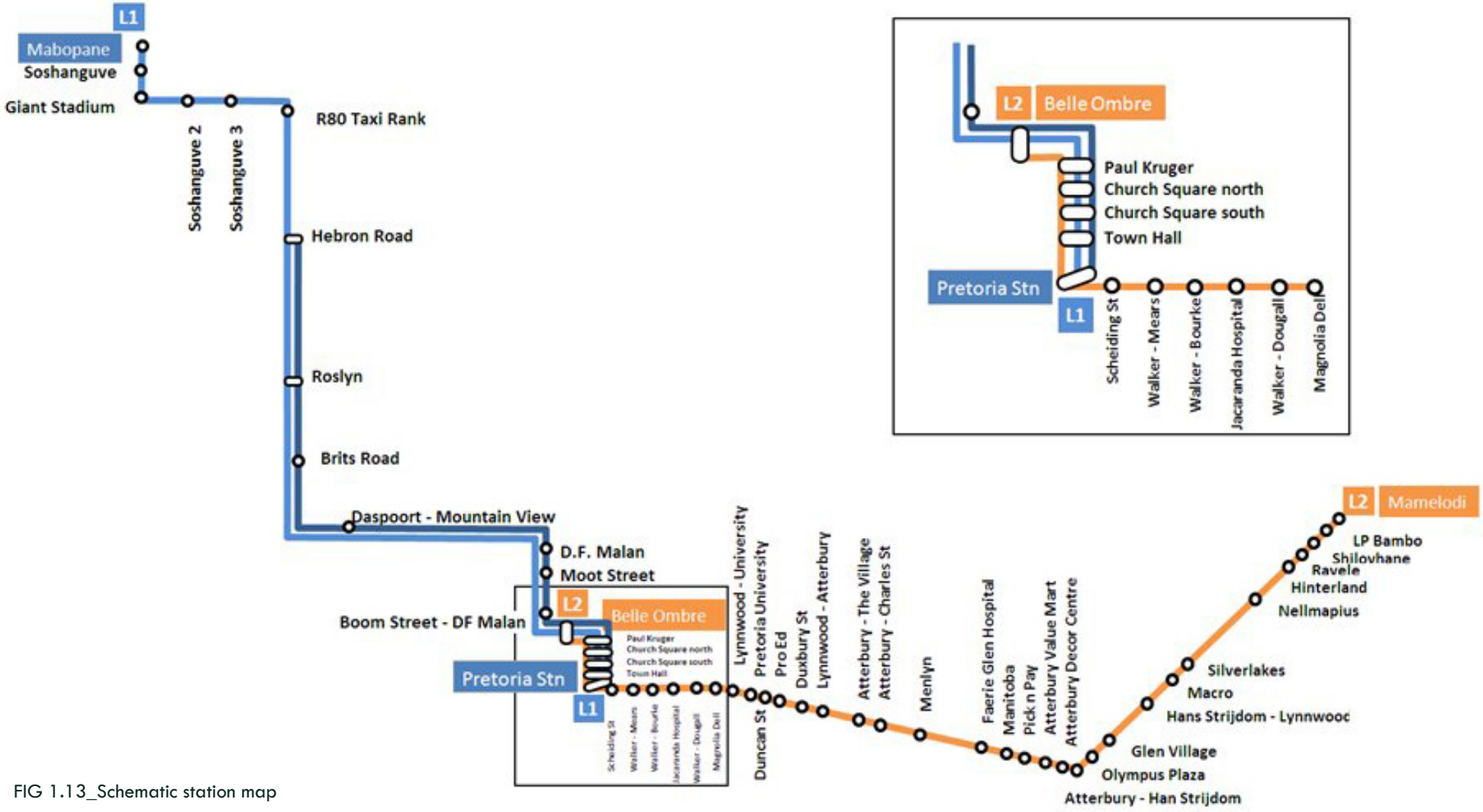


FIG 1.13_Schematic station map

CHAPTER:

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PROJECT JUSTIFICATION

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CONNECTING TSHWANE

As stated previously the *Tshwane Spatial Development Strategy 2010 and beyond* states that "the ability to travel from one place to another is a basic requirement of a successful metropolitan area." (CTSDS; 2007:24).
It is this movement that ensures accessibility to jobs, social and recreational opportunities. It is of great importance that all these opportunities can be accessed at a lower cost, in a shorter period of time and with more convenience (CTSDS; 2007: 24).

The strategy identifies 5 points that form the basis for an efficient metropolitan movement system that connects strategic areas in Tshwane (CTSDS; 2007: 24):

1_**Highways.** These form corridors for large-scale economic development. They also connect Tshwane to the rest of the Gauteng and the country.
2_**Public transport system.** Forming the basis for this system is the existing rail system and proposed Bus Rapid Transit system:
•The **existing rail system** should become the basis of public transport throughout Tshwane and should become the primary movement system over long distances.
• The proposed **new Rapid Bus Transit system** will deal with transport problems over short to medium distances and connect metropolitan activity nodes that fall outside the areas serviced by the rail network.

3_Completing the **concentric road network** that serves the multi-nodal structure of Tshwane.
4_The **Gautrain development** that links Tshwane to Johannesburg.
5_The development of **Wonderboom Airport.**

IMPACT AREA

As stated previously, the *Tshwane Inner City Development and Regeneration Strategy* focuses its proposal on the inner city core and Marabastad as it is believed that the greatest impact can be achieved by concentrating efforts in these areas (TICDRS; 2005: 2).

In 1999 the architectural firm of Aziz Tayob Partnership Architects Inc. compiled an *Integrated Urban Design Framework for Marabastad* for the City Council. They were re-appointed in 2002 to prepare an updated version of the document for the fast-changing realities of Marabastad. The framework states that its main aim is to ensure the reintegration of Marabastad within the grid of the inner city (IUDFM; 2002: 15).
This re-integration should occur in the physical urban environment and the socio-economic environment (IUDFM; 2002: 191).

The physical re-integration deals with:

- Interpenetrating of Urban Character
- Public Green Open Spaces
- Church Street west
- Zoning Overlaps
- Transport Links (IUDFM; 2002: 191).

The socio-economic deals with:

- Land ownership
- Social outreach programmes
- Cultural outreach programmes
- Economic support
- Publicity campaigns (IUDFM; 2002: 194).

The main feature defining Marabastad's character today is the public transport systems (railway station, two bus ranks and major taxi activity) contributing to the area as an intermodal transport node (IUDFM; 2002: 253). The *Inner City Development Framework* (in IUDFM; 2002: 194), however, describes modal integration of public transport in Marabastad as being poor, forcing modal competition rather than modal integration (IUDFM; 2002: 253).
It is envisaged that in the future Marabastad will be a major station for several modes of transport networks. Marabastad will act as one of the three major public transport nodes in the inner city, the others being the Pretoria Central Station and the taxi ranks at the zoological gardens (IUDFM; 2002: 253).
The transport facilities planned for Marabastad will be concentrated around Belle Ombre Railway Station (IUDFM; 2002: 253).
This is also the site proposed for the new BRT terminal for line 2 of phase one of the system (BRT Operational Plan; 2008: 4).

Trade in Marabastad is largely dependent on the movement of commuters, and this holds great potential for business opportunities around these transport facilities (IUDFM; 2002: 253).

One of the other dominant main features of Marabastad is the Steenhoven Spruit - despite it being canalized. The development plan for Marabastad allows for the redevelopment of the entire length of the spruit, from Princess Park in the south to Boom Street in the north. The vision for the spruit is to be developed into a public green belt to form part of the city's open green systems (IUDFM; 2002: 231).

FIG 2.1_Belle Ombre metro rail station

FIG 2.2_Belle Ombre metro bus rank

FIG 2.3_Taxi ranks at Belle Ombre Train station

FIG 2.4_The *Integrated Urban Design Framework* by Aziz Tayob Partnership Architects Inc.

The Architectural firm Aziz Tayob Partnership Architects Inc. compiled an *Integrated Urban Design Framework* for Marabastad in 1999 for the City council. They were re-appointed in 2002 to prepare an updated version of the document for the fast changing realities of Marabastad.

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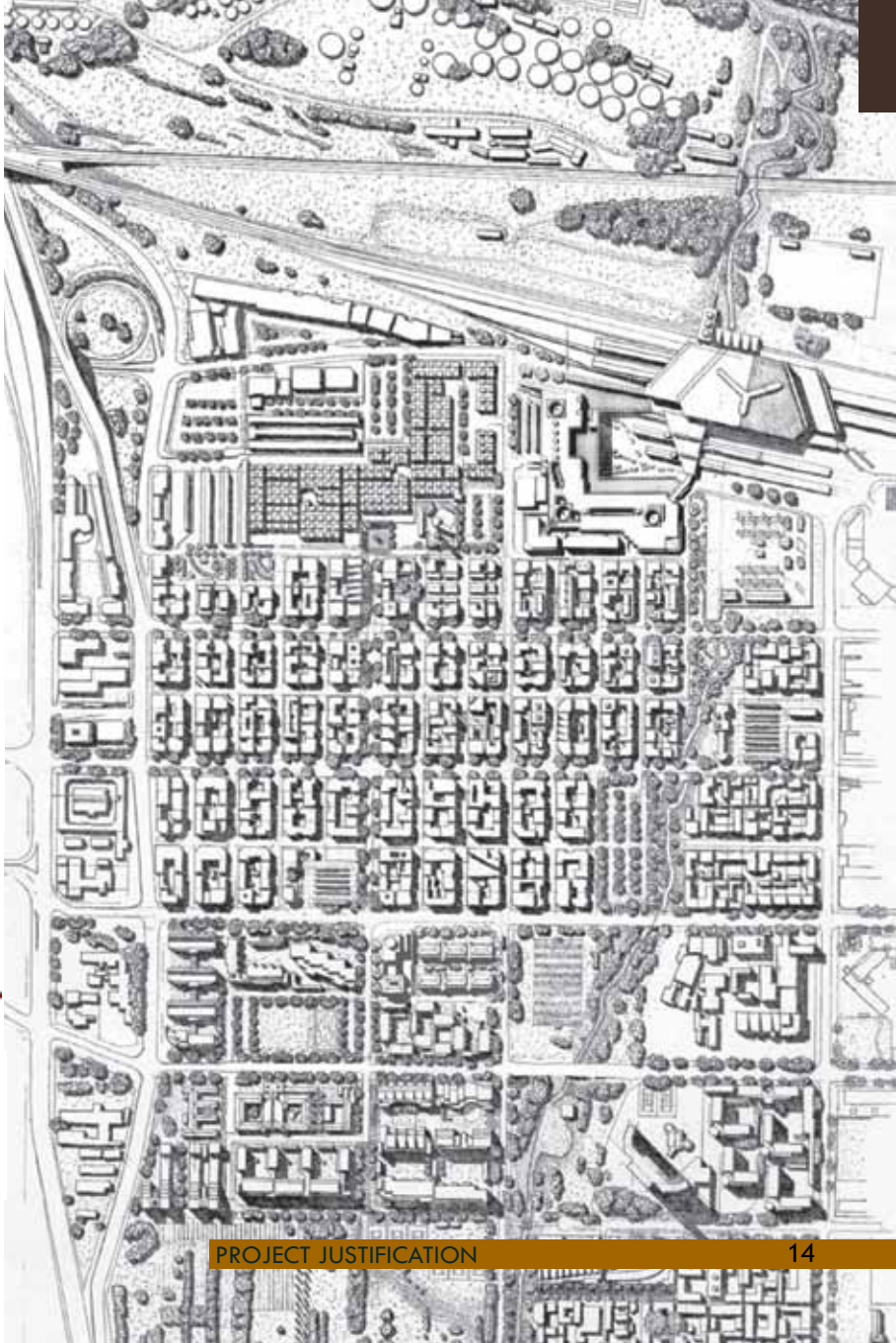

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INTERVENTION

To deal with the spatial problems in the City of Tshwane, the *Tshwane Inner City Development and Regeneration Strategy* defines eight building blocks to start with the restructuring process of the city (TICDRS; 2005: 11).

The eight building blocks are:

- Announcing the destination
- Cultural circle
- Capital precinct
- Mandela development corridor and Apies River precinct
- Tshwane crossing
- Zone of urban regeneration
- Movement
- Exceptional public environment

It is also important to note that in order for these building blocks to be sustainable, they must be supported by an economically and socially sound environment. Five socio-economic building blocks are defined to ensure this (TICDRS; 2005: 22):

- Safety and security
- Development facilitation
- Identity and branding
- People's place
- Informal trade

The building blocks that will be tapped into in this thesis will be:

- Zone of urban Regeneration
- Movement
- Exceptional public environment
- People's place
- Informal trade

_MAJOR NODES AND PLACES OF INTEREST

_NEW INTERCHANGE FROM BEN SCHOEMAN DIRECTLY INTO INNER CITY

_INNER CITY DISTRIBUTION BUS

_AMENDED ALLIGNMENT OF RAPID RAIL AND POSITIONING OF STATION

_CHANNEL

_PROPOSED SITE

_MARABASTAD URBAN VILLAGE

_CREATIVE INDUSTRIES

_URBAN PARK

_BUSINESS DEVELOPMENT

_RESIDENTIAL AMENTITIES INTEGRATED WITH RESIDENTIAL DEVELOPMENT

_INTEGRATION OF LINKAGES BETWEEN NATURAL ASSETS

_STREET BOULEVARDS

FIG 2.5_Building Blocks

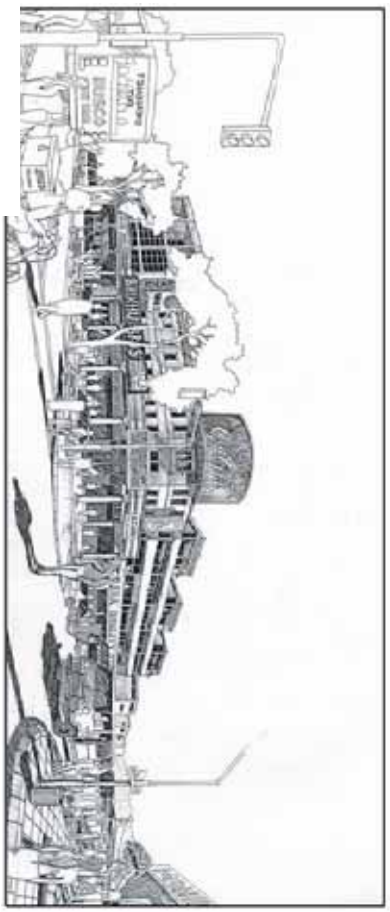

FIG 2.8_Gradual Development of Marabastad - Stage 2
(IUDFM; 2002: 263)

FIG 2.7_Gradual Development of Marabastad - Stage 1
(IUDFM; 2002: 263)

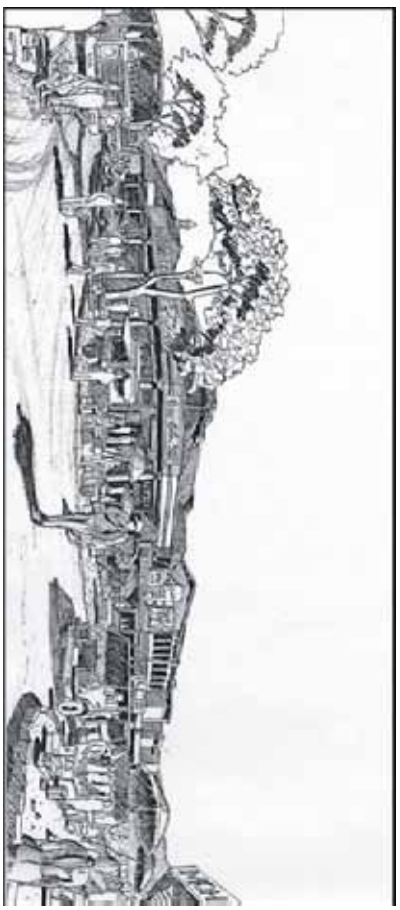

FIG 2.6_Gradual Development of Marabastad - Current condition
(IUDFM; 2002: 263)

CHAPTER:

3

SITE & CONTEXT

UNIVERSITEIT VAN PRETORIA
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YUNIBESITHI YA PRETORIA

FIG 3.1_World Map

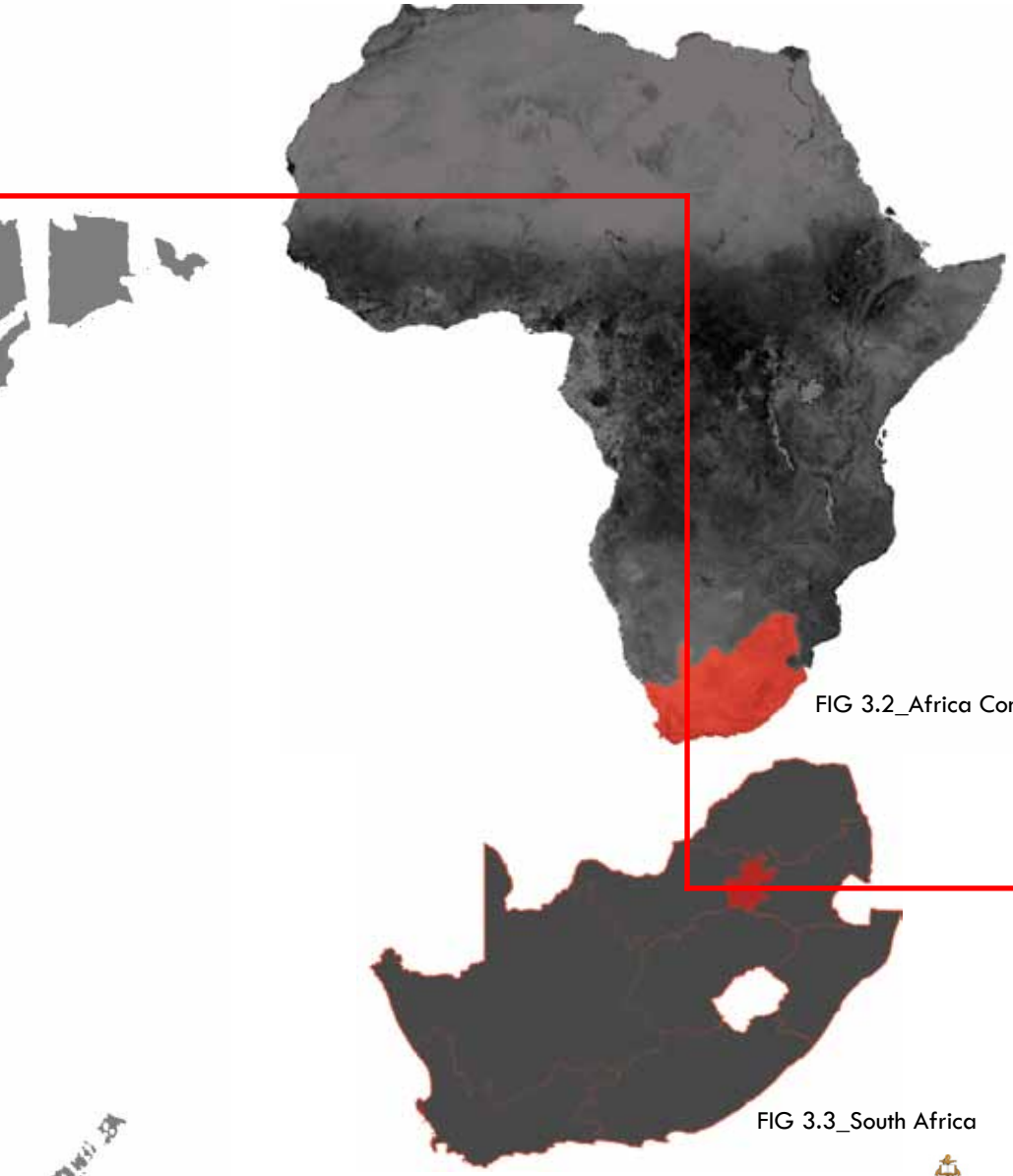


FIG 3.2_Africa Continent

FIG 3.3_South Africa

FIG 3.5_Location of Site within the inner city region

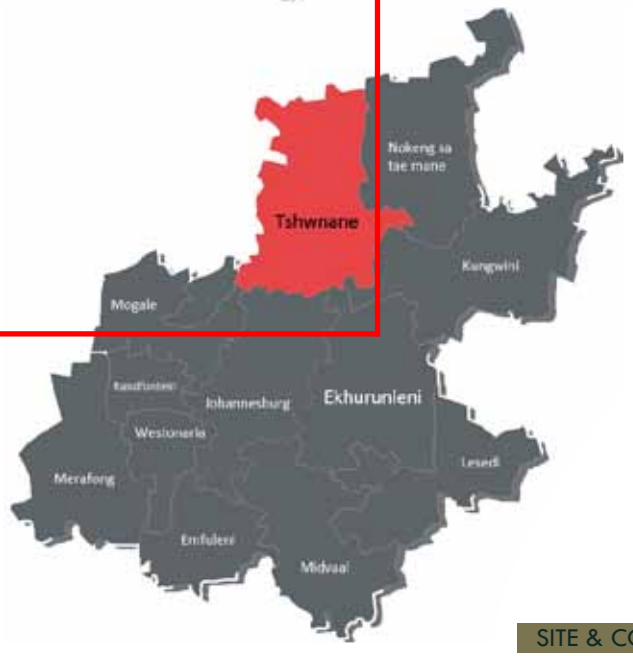


FIG 3.4_Gauteng Province

FIG 3.6_ Tshwane Inner City Region

The *Tshwane Inner City Development and Regeneration Strategy* focuses its proposal on the inner city core and Marabastad as it is believed that the greatest impact can be achieved by concentrating efforts in these areas (TICDRS; 2005: 2)..

FIG 3.7_Proposed Marbastad integration into inner city region

_HIGH DENSITY HOUSING

_RAILWAY CONNECTIONS

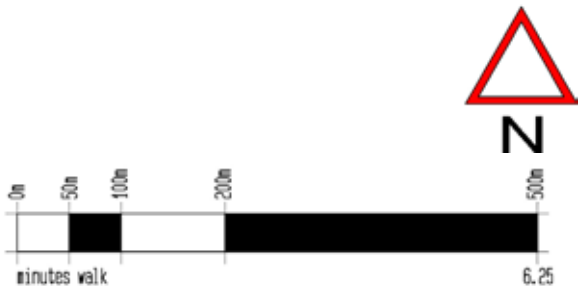
_MAIN ROADS FOR GREATER METROPOLITAN CONNECTIONS

_HISTORICAL TOURIST ROUTE

_FEEDER AND OFF-FEEDER ROADS THROUGH URBAN TRAFFIC

_CHURCH STREET WEST UPGRADE TO ATTRACTIVE URBAN SPINE

LEGEND



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YUNIBESITHI YA PRETORIA

FIG 3.8_ PROPOSED TRAFFIC CONFIGURATION

LEGEND

_MAJOR ONE-WAY ROAD SYSTEMS

_PARKING AREAS

_PROPOSED GREEN AREAS

_HIGH VOLUME ACTIVITY STREETS

_PREDOMINANT PEDESTRIAN ROUTES

_ROAD TO BE REALIGNED

_TAXI HOLDING AREA

_RAILWAY STATIONS

_BUS TERMINAL

_FULLY PEDESTRIANISED STREETS

_TAXI STOPS

FIG 3.9_Proposed Marbastad green areas

LEGEND

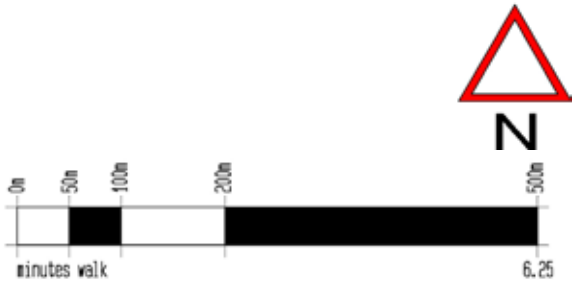
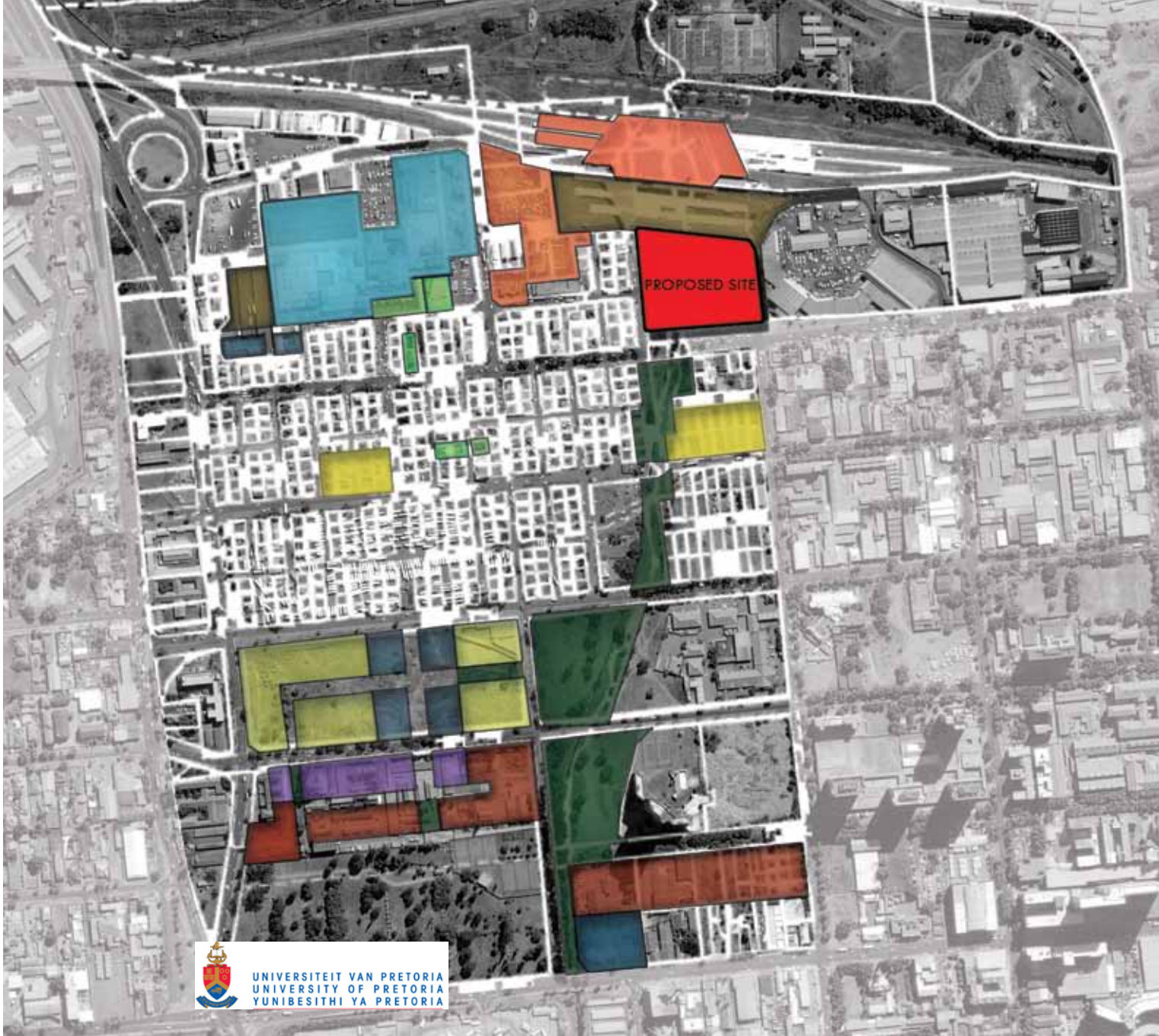


FIG 3.10_Proposed Marbastad specific land use



_MARABA SHOPPING CENTRE

_MEDIUM DENSITY RESIDENTIAL (3 STOREY)

_HI DENSITY RESIDENTIAL (6 STOREY)

_MIXED USE

_PARKS & OPEN SPACES

_BUSINESS & TRANSPORTATION DEVELOPMENT IDEALY DEVELOPED FOR LOCAL INVESTMENTS.

_BUS TERMINUS

_RAILWAY PURPOSES

_EDUCATIONAL

_RELIGIOUS

_TAXI TERMINUS

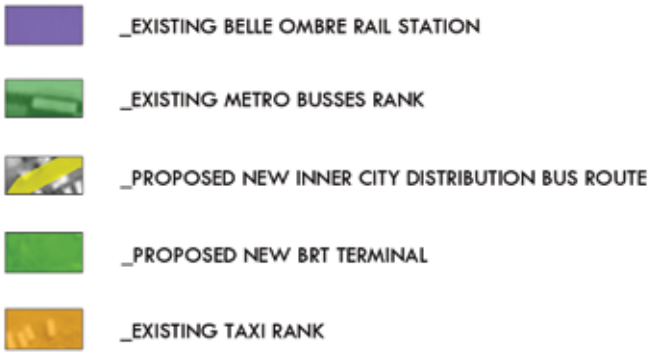
LEGEND

N

0m 50m 100m 200m 500m

minutes walk 6.25

FIG 3.11_Existing Transport Node of Marbastad



LEGEND

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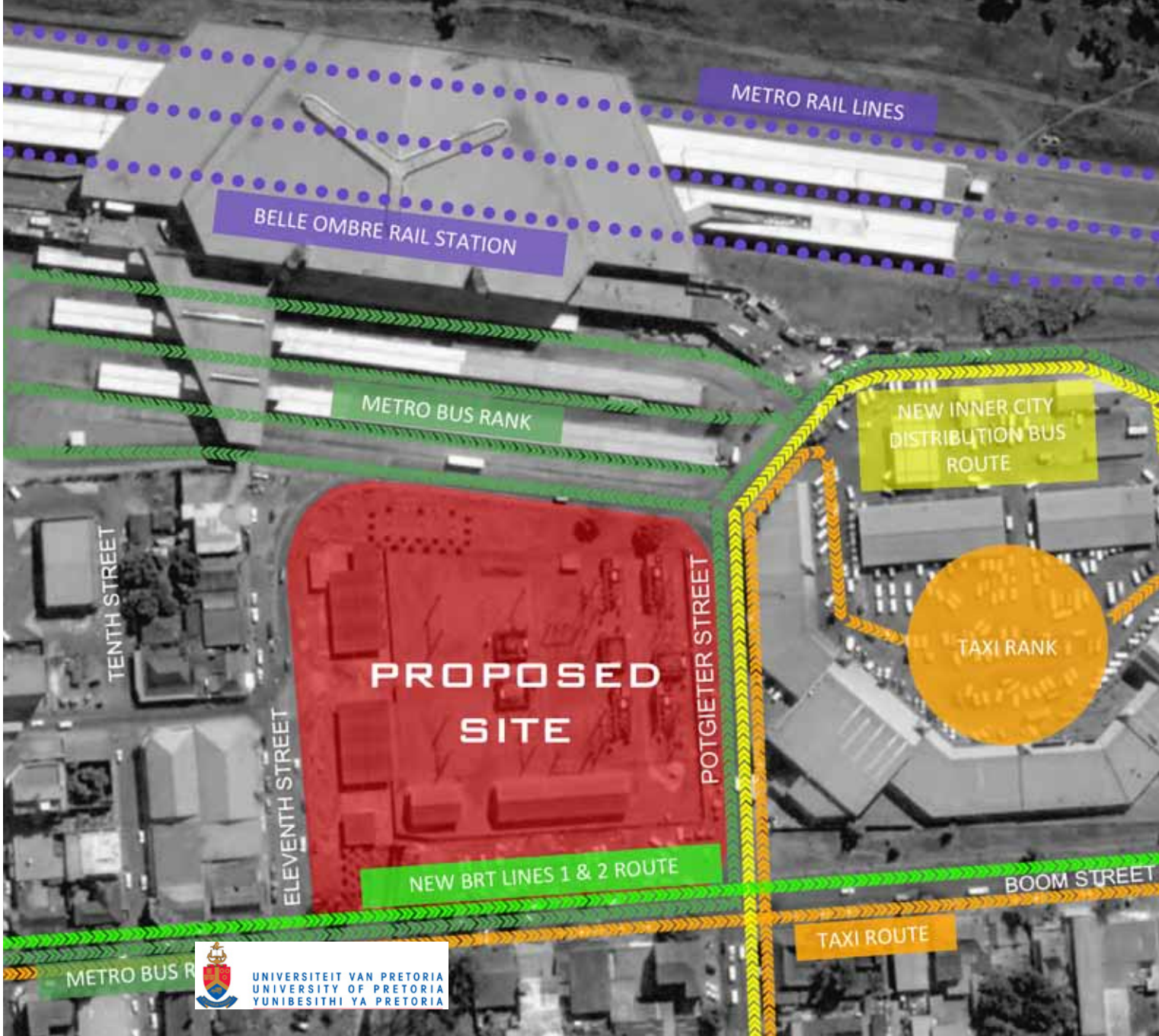
FIG 3.12_Access and circulation by various transport modes



LEGEND

_PROPOSED SITE

_METRO RAIL LINES

_EXISTING METRO BUS

_NEW INNER CITY DISTRIBUTION BUS ROUTE

_NEW BRT ROUTE

_EXISTING TAXI ROUTES

0m 50m 100m

N

FIG 3.13_Existing municipal information

_PROPOSED SITE

_BOUNDARY LINES

R/668 _ERF NUMBERS

_SEWER LINES AND CONNECTION POINTS

LEGEND

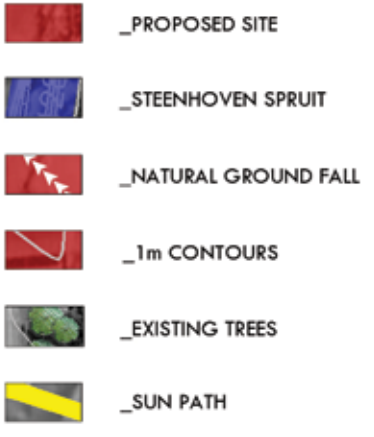
FIG 3.14_Steenhoven Spruit during rainfall

FIG 3.15_Steenhoven Spruit during rainfall

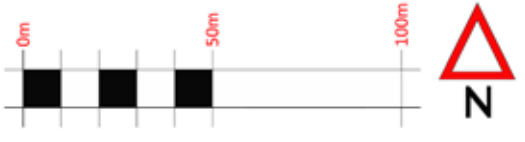
FIG 3.16_Current condition of Steenhoven spruit

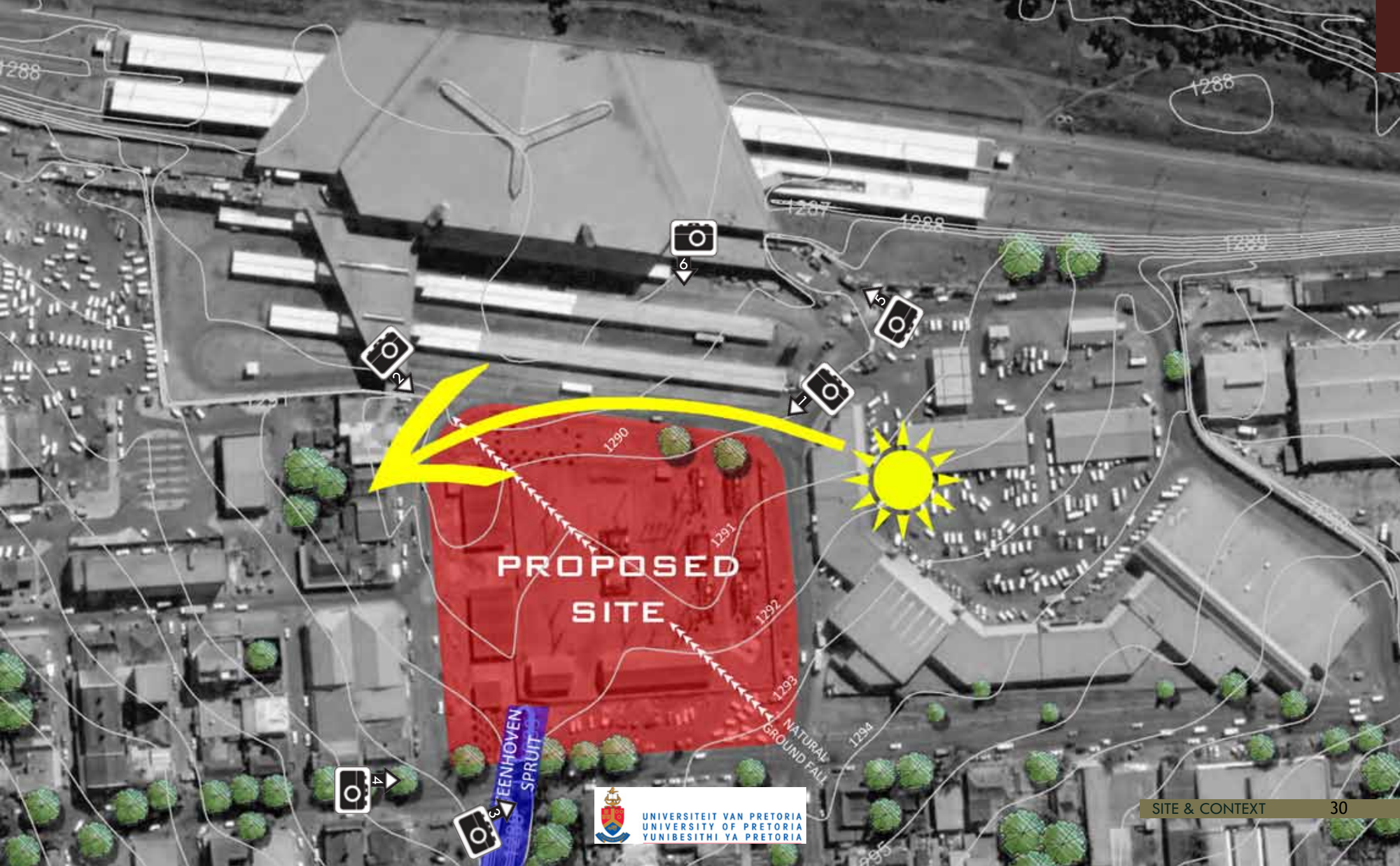
FIG 3.17_Natural conditions on site

The Steenhoven Spruit will form a green strip that runs through the Marabastad area that pulls all the various new developments together planned for the area. The channel cross section will also be reconfigured to make it more human friendly. The intended green strip will terminate in the new public square planned at the Belle Ombre train station, forming a spill out point for all the commutors using the various transport modes surrounding the new public transport hub.



LEGEND




1288
1287
1288
1289
1290
1291
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1293
1294
1295
PROPOSED
SITE
TEENHOVEN
SPRUIT
NATURAL
GROUND FALL
1
2
3
4
5
6
UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

FIG 3.18_North Eastern view of site

FIG 3.19_North western view of site

FIG 3.20_Existing site conditions
on southern side of site

FIG 3.21_South Western view o

FIG 3.22_View of Eastern Main entrance to the Belle Ombre train station

FIG 3.23_Northern view of site

CHAPTER:

4

URBAN DESIGN

GOOD URBAN FORM

Many authors have written about various goals that urban planners, urban designers and architects should strive towards and promote for the achievement of good urban environments. These authors include urban theorists such as Kevin Lynch; Ian Bentley; Appleyard and Jacobs and Dewar and Uytenbogaardt.
In there writings they discuss goals such as: vitality, sense, fit, access, control, liveability, identity and control, Authenticity and meaning, efficient use of recourses, opportunity generation, convenience, choice, quality of place and sustainability.

4.1_ GOALS

The following chapter is dedicated to briefly discuss these goals for good urban environments.

The author combined the various authors' goals and grouped them to form several goals that cover all the various goals set out by the urban theorists mentioned previously.

These groups of goals are:
Vitality/Liveability;
Choice/ opportunity generation/ Diversity;
Access/ permeability;
Sense/ Identity/ Legibility/Authenticity and meaning;
Scale/Fit and Sustainability.

4.1.1_Vitality/ Liveability

"The degree to which the form of the settlement supports the vital functions, the biological requirements and the capability of human beings- above all, how it protects the survival of the species" (Lynch; 1984:118).

"A city should be a place where everyone can live in relative comfort" (Appleyard & Jacobs; 1987:495).

There are a number of performance dimensions for city form that group themselves under vitality (Lynch; 1984:121).

4.1.2_Opportunity generation/ Diversity/ Choice

"Settlements which perform well are multi-faceted places. They offer a diversity and thus choice, of places, life-styles, activities and interaction opportunities" (Dewar, Uytenbogaardt & Todeschini: 4).

People come to cities to experience economic, social, cultural and recreational opportunities and facilities that can be generated through the physical collection of large numbers of people. The places of greatest interaction in cities are the places of greatest opportunity (Dewar & Uytenbogaardt 1991:17).
With great opportunity, variety is increased which increases choice (Bentley; 1995:27).
An important part of generation is allowing people sufficient freedom and choice to maneuver, in order to find opportunities to express their own ingenuity and creativity (Dewar & Uytenbogaardt 1991:16). When people are offered rich choices and freedom to make those choices, true participation is promoted, therefore, urban environments should promote the maximum positive freedom for individuals to act, and in so doing creating a diverse and complex environment as stated in the next quote:

"Appropriately, the creation of urban structure should be so judged as to release the energies and talents of many people in the making of environments. Only in this way can truly stimulating, diverse and complex environments emerge" (Dewar & Uytenbogaardt 1991:19).

People have a choice of living in intense, vibrant environments, or in quieter, more private areas. Places vary from person to person and over the life-cycle of households (Bentley; 1995:27).
On the one hand, positively performing settlements offer opportunities for human contact and interaction. They also provide opportunities where people can live on their own but not be alone. People also have the choice concerning the extend they want to engage in social activity (Dewar, Uytenbogaardt & Todeschini: 4).
On the other hand people also want places that are private, mainly in the sense of knowing who lives in an area and who the strangers are (Dewar, Uytenbogaardt & Todeschini: 4). Dewar, Uytenbogaardt & Todeschini then states: "The challenge is to encourage environments that provide a diversity of choice, so that people don't have 'either-or' choices, but rather choices which relate to relative degrees of privacy or exposure"
The key in achieving this lies in the hierarchies of movement, public spaces and social institutions, and the design of living areas (Dewar, Uytenbogaardt & Todeschini: 4).

In developing countries, where rates of urban growth are very quick and there are high levels of poverty and unemployment is the need to generate opportunities for small scale, self generated economic activity. The formal economy is incapable to absorb new entrants into the job market that leads to these people creating self-generated employment, usually in the informal sector. These people

have to find places to manufacture trade or provide services at no or very little overheads within the urban system in order to survive (Dewar & Uytenbogaardt; 1991:16).

4.1.3_Access/ Permeability

The ideal city is imagined by some as being a great center where one has easy access to an enormous variety of goods, services and other people (Lynch; 1984:186). Dewar and Uytenbogaardt (1991:16) states that all inhabitants should enjoy relatively easy and equitable access to urban opportunities. They also state that it is little use generating opportunities if access to these is limited to a very limited number of people. Bentley (1995) says that only places that people can access can offer them choice. Lynch (1984:1920) says that a good environment is a place that affords obvious and easy access to a moderate variety of people, goods, and settings.

Access may be classified according to the features to which access is given and to whom it is afforded.
Most basic is access to other people: to kin, friends, and mates and to a variety of more casual acquaintances. Humans are social beings and regularly contact is essential to their well being.
Next in importance is access to certain human activities. The key activity for adults may be work, but other important services are financial, medical, recreational, educational and religious. These activities either represent opportunities for the person to do something or they supply a valued service.
Access is also acquired to certain material recourses like food, water, energy and various other goods.
People also want access to places- to shelters, open spaces, centers, symbolic places and natural environments (Lynch 1984:188).

4.1.4_Sense/ Identity/ Legibility/ Authenticity and meaning

Kevin Lynch (1984) describes the sense of place as the "clarity with which it can be perceived and identified, and the ease with which its elements can be linked with other events and places in a coherent mental representation of time and space and that representation can be connected with non spatial concepts and values".
Sense depends on spatial form and quality, but also on culture, temperament, status, experience and current purpose of the observer. The sense of a place will vary for different observers (Lynch; 1984:131).

There are three elements of sense, Identity, Formal structure and those qualities which help us to connect settlement form with other features of our lives.

☐ Identity:" Identity is the extent to which a person can recognize or recall a place as being distinct from other places- as having a vivid, or unique, or at least a particular character of its own" (Lynch; 1984:131).

☐ Formal structure: Which at a scale of a small places, the sense of how its parts fit together, and in a large settlement the sense of orientation (Lynch; 1984:134).
The practical significance of orientation is clear enough: poor orientation means lost time and wasted effort. Good orientation also enhances access and so enlarges opportunity (Lynch; 1984:134).

☐ next come the qualities that help to connect settlement form with other features of people's lives.
The first level is called congruence: the purely formal match of environment structure to non spatial structure.
Transparency is a component of sense. That is the "degree to which one can directly perceive the operation of the various technical functions, activities and social and natural processes that are occurring within the settlement" (Lynch; 1984:139).

Congruence, transparency and legibility are components of sense, which describe explicit connection of settlement form to non spatial concepts and values (Lynch; 1984:139).

Another component of sense is legibility. Legibility is the way people orientate and navigate themselves within a city (Carmona; 2003:88).
Before the twentieth century traditional cities worked well in terms of legibility. The places that looked important were in fact important and public spaces could easily be identified (Bentley; 1995:42).

The biggest open spaces were related to the most important public facilities. Figure illustrates this (Bentley; 1995:42).

The buildings with the greatest public relevance stood out from the rest, for example churches (Bentley; 1995:42).

The buildings that needed privacy and security allowed the passer-by to see the activities inside, for example the black smith in the picture billow (Bentley; 1995:42).

The modern cities are also legible but only in a curtain sense. In the modern city the biggest buildings are the big financial institutions and occupy the key centre position

of the city. These big buildings overwhelm the publicly-relevant places and facilities, confusing important activities and buildings (Bentley; 1995:42).

The confusion people experience is made worse because the important public buildings and publicly-relevant buildings often look the same (Bentley; 1995:42).

"People should be able to understand their city, its basic layout, public functions and institutions, they should be aware of their opportunities. An authentic city is one where the origins of things and places are clear" (Appleyard & Jacobs; 1987:496).
This above quote from Appleyard and Jacobs (1987) mean that an urban environment should reveal its important meaning, it should not be dominated by one type of group, and neither should the public places be hidden.

4.1.5_Scale/ Fit

"The fit of a settlement refers to how well its spatial and temporal pattern matches the customary behaviour of its inhabitants" (Lynch; 1984:151).

Fit is linked to characteristics of the human body and of physical systems in general. This perspective is general, but since fit is the match between place and whole patterns of behaviour, it is dependent on culture: on expectations, norms, and customary ways of doing things (Lynch; 1984:151).
Places are modified to fit ways of behaviour, and behaviour is changed to fit a given place (Lynch; 1984:151).
The term fit is loosely associated to such words as comfort, satisfaction and efficiency.

4.1.6_Sustainability

Sustainability has two main dimensions, the one relates to the built environment and the natural landscape and the other is the degree to which the settlement reflects, 'timeless' qualities (Uytenbogaardt et al;1997: 5).

Settlements that exist are depended on recourses drawn from a much larger area and adapted to fit the landscape it exists on. There are two central issues to achieve environmental sustainability. The first is to work with the natural landscape in such a way that the natural system is not broken down.
The second issue is to recycle wastes to the greatest extend (Uytenbogaardt et al;1997: 5).
The second element of sustainability is the level to which the settlement reflects, in its structure and form, 'timeless' qualities (Uytenbogaardt et al;1997: 5).
Sustainable settlements can handle growth and change well, and are in turn enriched by processes of change. These sustainable settlements have three primary characteristics, namely: they are scaled to the pedestrian, they reflect a structural order and they have a strongly spatial feel, with defined and generously made public spaces that are not made for the immediate development need, but made with the acknowledgment that public space is important in its own right (Uytenbogaardt et al;1997: 5).

4.2_HOW TO ACHIEVE GOALS FOR GOOD SETTLEMENTS

4.2.1_Public Space

Carmona (2003) defines public space as the "sites and settings of public life". He also states that the public realm ideally functions as a forum for political action and representation; as a neutral ground for social interaction, intermingling, and communication; and as a stage for social learning, personal development and information exchange (Carmona; 2003:109).

Many people have observed that the public realm, has declined, recognized in part to the reduced availability of public space and public life. They observed that the traditional public space have transferred to private realms for example leisure activities, entertainment, gaining information and consumption all are undertaken at home through television and the internet. Activities that traditionally could only be available in collective public forms have increasingly become available in private forms, while the use of public space has been challenged by lots of different developments, such as increased private mobility. Private cars facilitate an essential private control over public space. The decreases in public space are consequences of the trend towards privatisation. Some factors that lead to privatisation are: Social, political and economic factors (Carmona; 2003:110).

4.2.3_Qualities of good Urban Space

A good public space has got curtain qualities to be successful. They are enclosed by buildings, are part of activity system, have expressed building facades, and the spaces themselves are well treated.

4.2.3.1_Space enclosed/ Defined by building

A good open space will be defined or enclosed. Buildings serve this function; they must be adjacent to one another and flush with the street or space. There facades form the walls of the open space, the y convey the buildings

identity and character (Carmona; 2003:68).

4.2.3.2_Part of activity system

A good space must be part of the activity system, which means that it must be a place were people want to go to use it. If there were no activities then there wouldn't be any reason to visit that specific open space.

4.2.3.3_Building facades

As stated before the building facades form the walls of the open space which defines it and conveys the buildings identity and character.

4.2.3.4_Well treated space

Any good open space that people would want to visit will be well looked after. It will be neat, clean. The surface also makes a difference for example if an open space had grass or a paved floor.

4.3_THE ELEMENTS OF THE CITY

Mental maps of places are central to studies of environmental perception in urban design and the key work in the field is Kevin Lynch's The Image of the City (1960) based on mental mapping techniques and interviews with people from Boston, Jersey City and Los Angeles (Carmona ;2003:88).
He was originally interested in legibility and argued that "the ease with which we mentally organise the environment into a coherent pattern or 'image' relates to our ability to navigate through it" (Carmona; 2003:89). Through his research, he found that the minor theme of orientation grew into the major theme of the city's mental image, and observation of cities with districts, landmarks and pathways that were easily identified led to the definition 'imageability', "that quality in a physical object which gives it a high probability of evoking a strong image in any given observer" (Carmona; 2003: 89).
Through mental mapping exercises Lynch (in Carmona; 2003:89) aimed to identify aspects of the environment that left a strong image in the people's minds and from his research he derived five key physical elements, namely: Paths, edges, districts, nodes and landmarks.

Paths: Paths are the channels along which the observer moves and were often the predominant elements in people's maps with other elements arranged around them. Paths can be important in images for a few reasons, including regular use, special uses, characteristic spatial qualities and visual proximity (Carmona; 2003:89).

Edges: Edges are linear elements that are not seen or used as paths and often form boundaries between areas. Shores, railroads, edges of development and walls are just some examples of edges. Edges can be barriers (that can be penetrable) that enclose regions and can act like an organising element because of its ability to hold areas together (Carmona; 2003:90).

Districts: "Districts are the medium-to-large sections of the city, conceived of as having two dimensional extent, which the observer mentally enters 'inside of', and which are recognisable as having some common, identifying character." (Lynch; 1960:47).
Districts may have definite boundaries or soft uncertain ones (Carmona; 2003:90).

Nodes: Nodes are points in the city the observer can physically enter, and which are the intensive foci to and from one is travelling. Nodes may be primarily junctions, places of a break in transportation, or a crossing of paths. Nodes can also be a concentration of curtain places on street corners or a type of a public square. Nodal points are almost found in every image and are sometimes the dominant feature (Lynch; 1960:48).

Landmarks: Landmarks are point references that the observer cannot enter. They are usually simple defined physical objects like a building, sign or mountain. Some landmarks are distant ones seen from many angles and distances where other landmarks are primarily local, being only visible from curtain approaches (Lynch; 1960:48).

CHAPTER:

5

_PRECEDENTS

Many people have observed that the public realm has declined, partly due to the reduced availability of public space and public life. They observed that the traditional public space have transferred to private realms for example leisure activities, entertainment, gaining information and consumption all are undertaken at home through television and the internet. Activities that traditionally could only be available in collective public forms have increasingly become available in private forms, while the use of public space has been challenged by lots of different developments, such as increased private mobility (Carmona; 2003:110).

Keeping this in mind and reviewing writings of urban theorists, it is easy to come to the conclusion that the public-transport interchanges in the context of South African cities have the ability to exhibit the desirable qualities for good urban places and spaces.
"*Transport interchanges have become the agora of the newly democratic state, the place of maximum commercial exchange and social interaction*" (Deckler; 2006: 59).

The last few years have shown a tremendous increase in providing formal facilities for the taxi industry. Transport interchanges with a variety of supporting functions for example the Baragwanath Public Transport interchange and traders market, the Faraday market and Transport Interchange, and the Claremont Public Transport Interchange all show innovative thinking for these important nodes in the city landscape.

Although this thesis project focusses more on the new proposed BRT system for Pretoria, the local precedents for transport interchanges are mostly for the taxi and local bus services. The public nature of these facilities are of great value in understanding the working of public faciliteis where vehicles and pedestrians meet.

According to the Bus Rapid Transit Planning Guide of June 2007 there exists only two truly "full BRT" systems in the worldnamely Bogota in Columbia and Curitiba in Brazil (BRTPG; 2007: 14).
Most new BRT sytems today are based on the systems of these two cities (BRTPG; 2007: 25).

For the typological investication international precedents the "TransMilenio" of Bogota and the BRT of Curitiba will be looked at and locally the new Rea Veya BRT system of Johannesburg.
The investigation of the Reya Veya system is of great value due to the fact that it is the first BRT system implemented in South Africa.

The aim of precedent study is to gain a greater understanding of the working of these BRT systems with their supporting facilities. The investigation will focus mostly on the design and working of the stations themselves as this is of great importance for designing the station facilites for the intended transport interchange for the thesis project.
The investigation into the local transport interchanges will also contribute to gaining valuble insight in the working of these transport facilites in the public environment of South Africa.


FIG 5.1_Rea Veya BRT Johannesburg

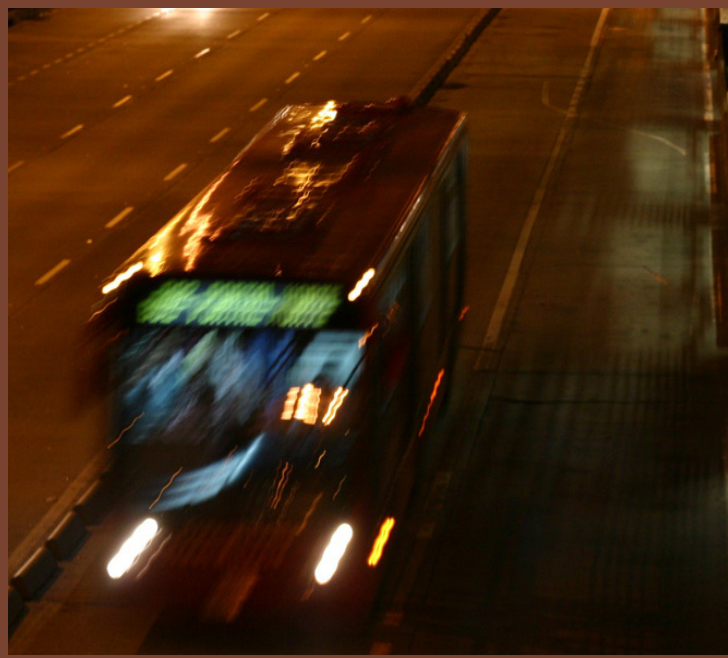

FIG 5.3_ View of Traders Market at the Baragwanath Public Transport Interchange and Traders Market

FIG 5.4_ View of Traders Market at the Baragwanath Public Transport Interchange and Traders Market

FIG 5.6_TransMilenio Bogota

FIG 5.2_TransMilenio Bogota

FIG 5.5_BRT Station Tube in Curitiba

FIG 5.7_ Informal traders at Baragwanath Public Transport Interchange and Traders Market

INTERNATIONAL PRECEDENTS

This is until the "TranMilenio" BRT system in Bogota radically transformed the perception of BRT around the world. Today the system is serving over 1.2million passanger-trips per day. It is estimated that by 2015 when the entire system is completed an estimated 5million passanger-trips per day (BRTPG; 2007:25).
The success of the system can be linked to various key elements that increase the efficiency of the system.
Curitiba's BRT system also implements the same elements that contribute to the success of the system. These elements will briefly be looked at in the next section.

FARE COLEECTION SYSTEM

The method the fare collection will have a great impact on the operational efficiency of the system (BRTPG; 2007: 441). An effiecient fare collection system can have an impact on boarding and alighting time, time queuing for tickets and clearing turn stiles.
The two systems that can be implemented are: Off-board fare collection and on-board fare collection. From the investigation it was found that off board fare collection is the better option for an effiecient BRT system, as it reduces long delays that generally accompany on-board fare collection, it eliminates the risk of the bus being robbed for the fare money.
It is important to note that if such a collection system is chosen a closed station construction is needed. There must exist a physical seperation between the customers who paid and those who have not. Other benefits that a closed sation provides is protection from the elements and increases safety for the commuters (BRTPG; 2007: 442).

TURNSTILE OPTIONS

The closed station design with off baord fare collection requires access control in the form of turnstiles. The TransMilenio makes use of a rotating arm turnstile for its protection against fare evasion and safety when passing through together with a drop-arm turnstile to allow people with special needs to easily gain access to the station platform (BRTPG; 2007: 453).

PLATFORM

Most BRT systems have introduced 'platform level boarding'. This means the platform is the same height as the vehicle floor, that allows for faster boarding and alighting, and also provides easy access for persons in wheelchairs, parents with strollers, young children and the elderly (BRTPG; 2007:259).

PHYSICAL ENVIRONMENT

Pedestrians prefer at-grade crossings due to the directness of access these crossings provide. Stairs and ramps cause inconvenience and can cause the physical disabled to loose access to the facility (BRTPG; 2007: 485).

BICYCLE FACILITIES

The area of the BRT catchment area can significantly by integrated it with bicycle usage. If secure bicycle parking facilities are provided customers will be confident to leave the bicycle at the station or terminal during the day (BRTPG; 2007: 7).

FIG 5.8_Curitiba BRT StationTube


FIG 5.9_At-grade crossing at TransMilenio

FIG 5.10_Access controll atTransMilenio

FIG 5.12_At-grade crossing at TransMilenio

FIG 5.14_level boarding at Trans Milenio

FIG 5.11_Access for people with special needs

FIG 5.13_Bicycle facilities at TransMilenio stations

REA VEYA BRT STATION JOHANNESBURG

The Rea Veya BRT station in Johannesburg provides a great opportunity to study a BRT station in its built form, as this is the first BRT station in South Africa, based on well known international precedents such as the BRT of Curitiba & TransMilenio Bogota.

1) PASSANGER AMENITIES
(Combined busstop design)
- a) Shelter
  - i) Protection against weather
  - ii) Rain
  - iii) Sun
  - iv) Wind
  - v) Cold
  - vi) heat
- b) Information
  - i) Transit Route details
  - ii) Advertising
  - iii) Schedule and delay info
  - iv) Signage (facilitate passenger convenience)
  - -Electronic display of expected bus arrival
  - -Entry for disable
  - v) Audio systems for visually challenged people
- c) Furniture
  - i) seating
  - ii) Leaning rails
  - iii) dustbins

2) SAFETY AND SECURITY
(Combined busstop design)

i) visibility – commuters should be able to see the surrounding areas and be seen from outside the stations
ii) adequate illumination
iii) closed circuit television

3) BARRIER FREE DESIGN
(Combined busstop design)
i) accessibility for the physically challenged
ii) station to facilitate easy circulation
iii) access via ramps for stations with raised platform

4) BRT PLATFORM DESIGN CHARACTIRISTICS
(Combined busstop design)

-commuters should be able to clear the platform before the arrival of the subsequent bus.
-platform vehicle interface influence boarding and alighting speeds.
-high platform level boarding obtained through precision docking
-platform size – enough space for waiting commuters, commuters flowing in and out.

5) CLIMATIC PROTECTION
(Combined busstop design)

i) Passive solar design and natural cooling techniques
ii) Energy demand / source

6) FARE COLLECTION
(Combined busstop design)
i) off board fare collection reduces bus dwell time and enables rapid boarding
ii) station divided into paid areas and free areas

FIG 5.15_Automatic sliding doors at Rea Veya

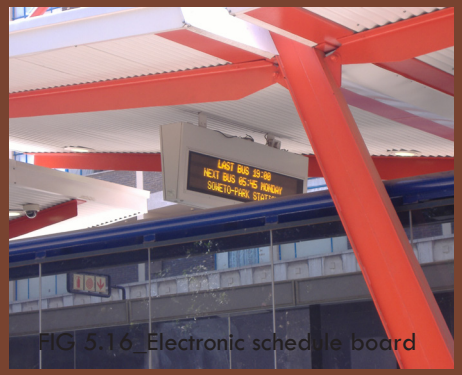

FIG 5.16_Electronic schedule board

FIG 5.19_ Protruding platform for easy docking of BRT bus

FIG 5.21_At-grade crossings

FIG 5.17_Clear signage

FIG 5.20_Ticket sales inside station

FIG 5.18_Safety - fire hose

FIG 5.22_Platform raised for level boarding

FIG 5.23_Turnstiles for fare collection & access controll

CHAPTER:


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DESIGN _DEVELOPMENT

The design intention of the original design brief written for this thesis document was only concerned designing a BRT terminal on the site at the Belle Ombre rail station identified by the BRT operational guide as discussed previously in this document.

After the investigation into the site and its context, together with the urban design theory, it was obvious that a larger intervention was needed to ensure that the building will become a public space catering for the various needs of the urban dwellers.
With the investigation of the site in its context, together with the study of urban design theory the accommodation list grew to accommodate the BRT, the inner city distribution bus, park and ride facilities (basement for parking ones car and using the BRT system), bicycle parking facilities, accommodating the informal traders on site together with the new small scale trading opportunities that will arise from the construction of such a system. Also let able space will be available for small businesses and transitional housing for people seeking short term housing.

The building thus evolved from being a mono-functional facility to being a structure that is multi-functional in its nature, defining space, creating a link between the various public transport systems and becoming a good public space for the urban dwellers.

The next section is to enable the reader to see the maturing of the design, from being a building that is very expressive in its nature to one that only seeks to ensure the basic need of shelter. Finally a balance was struck between the two original concept designs and the final product reflects the combination of the two, being a building that uplifts the area and caters for the needs of the people.

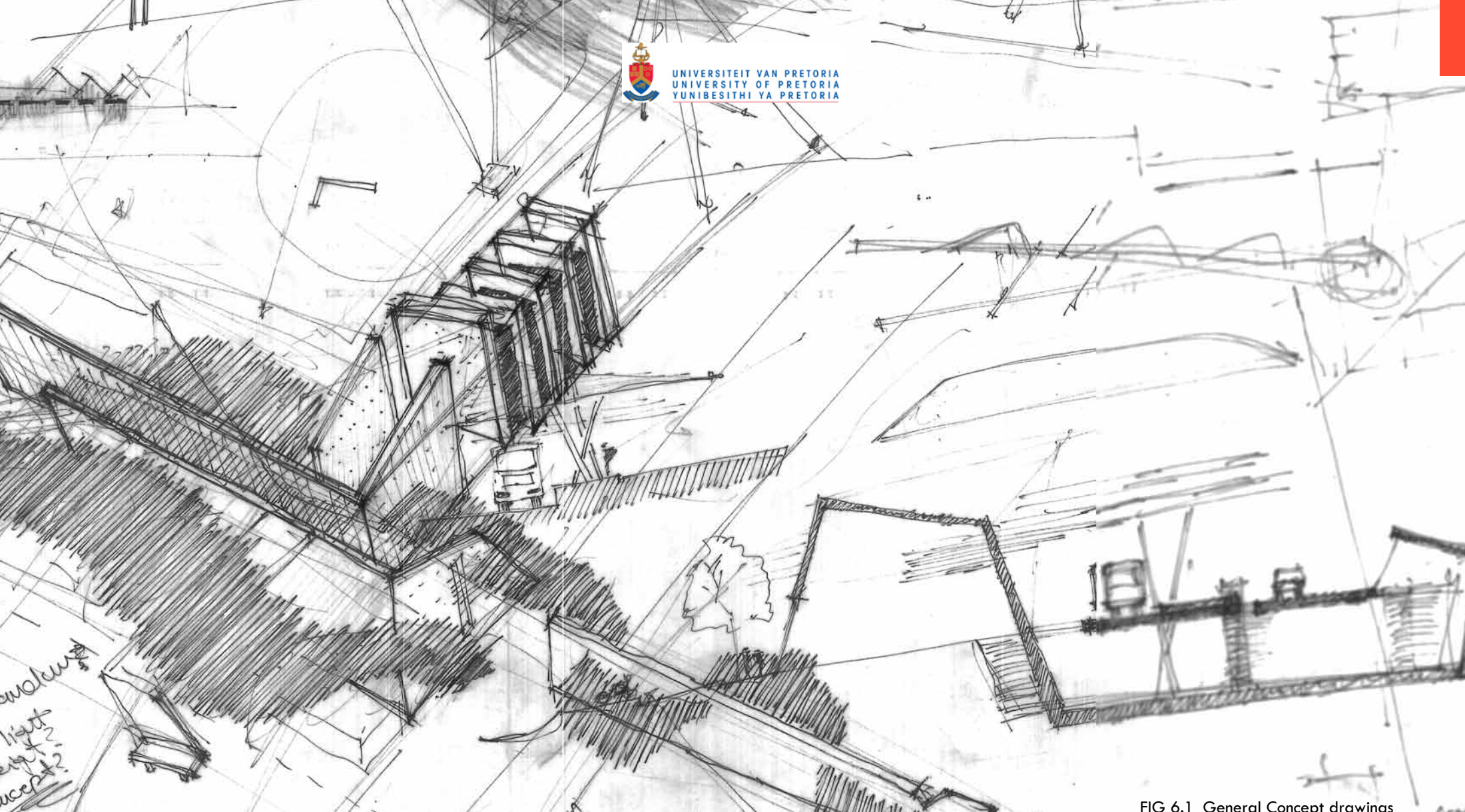


FIG 6.1_General Concept drawings

CONCEPT 1

The first attempt to solve the design problem quickly evolved into a structure that was concerned with the movement of commuters to and from the BRT platforms.

As the busses are expected to arrive every 90 seconds in peak time, sky bridges and tunnels were created in order to ensure the safe passage of the people. This idea was soon scrapped as bridges and tunnels are very unaffected ways of moving to and from a destination, as it adds a great distance to the route. Also it creates dangerous pockets of spaces that are unsafe and due to its lack of visibility of the public eye.

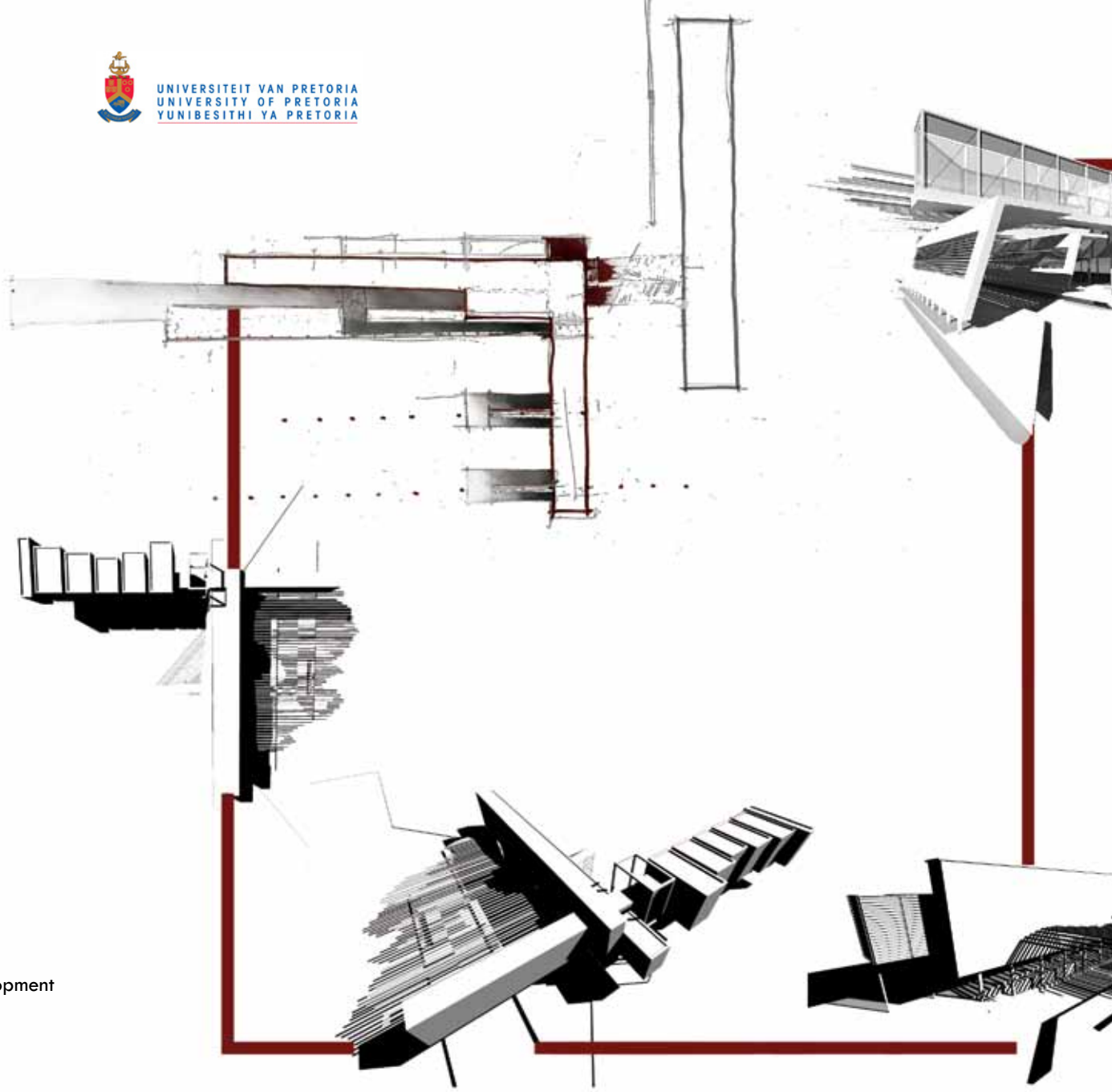
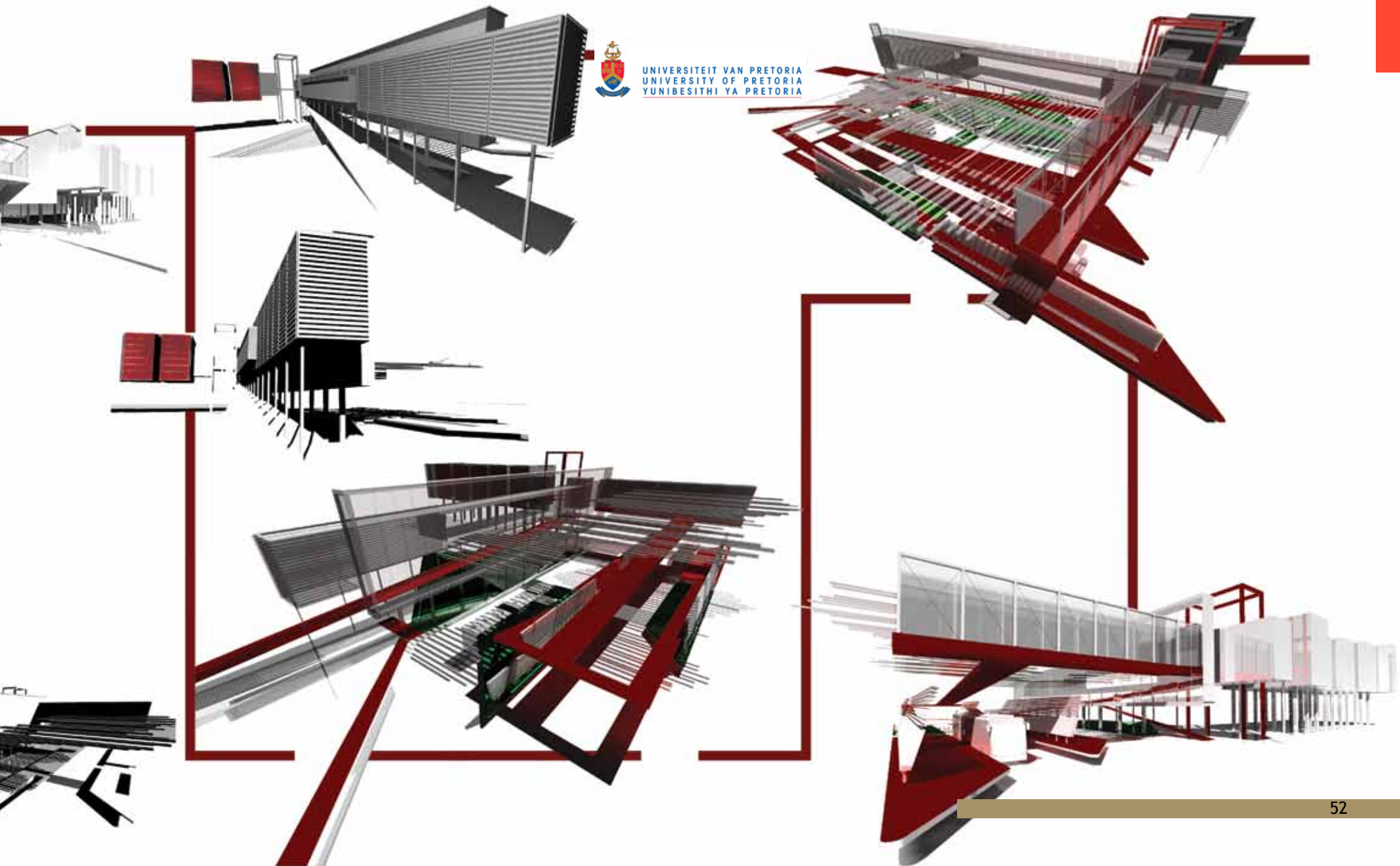


FIG 6.2_Concept 1 development



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CONCEPT 2

The aim of this design concept was to simplify the problem, and to solve the urban design issues of the site and to fall into the urban design framework for Marabastad. The building defined the public square that is situated at the end of the green strip that follows the Steenhoven Spruit that runs through the Marbastad area. Also all public movement and activities where moved to the ground level the reduce the formation of unsafe spaces caused by ramps and tunnels. The design was still very much concerned with only the BRT side of the building.
The connection of the building to the site was from this point forward looked at.

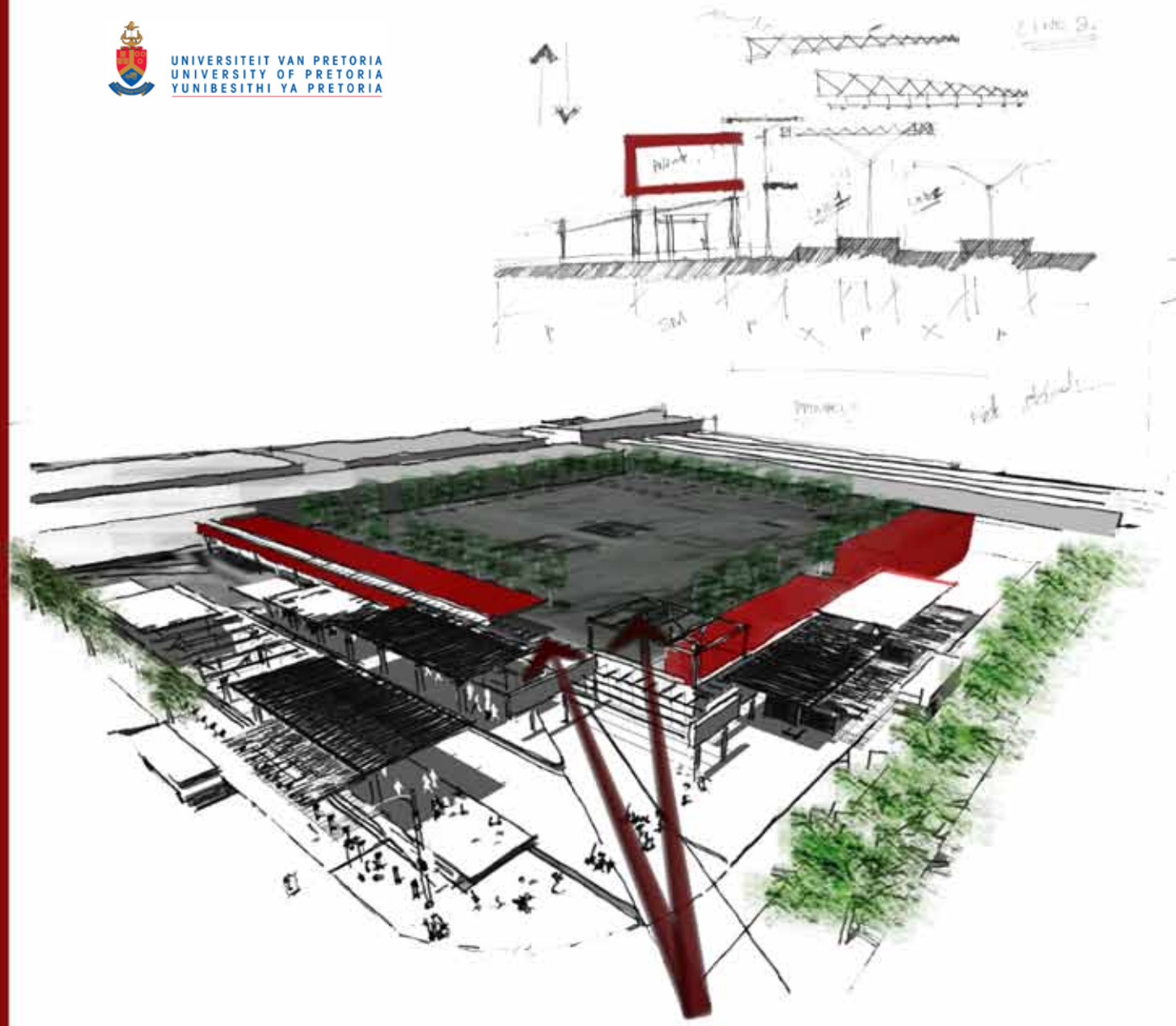
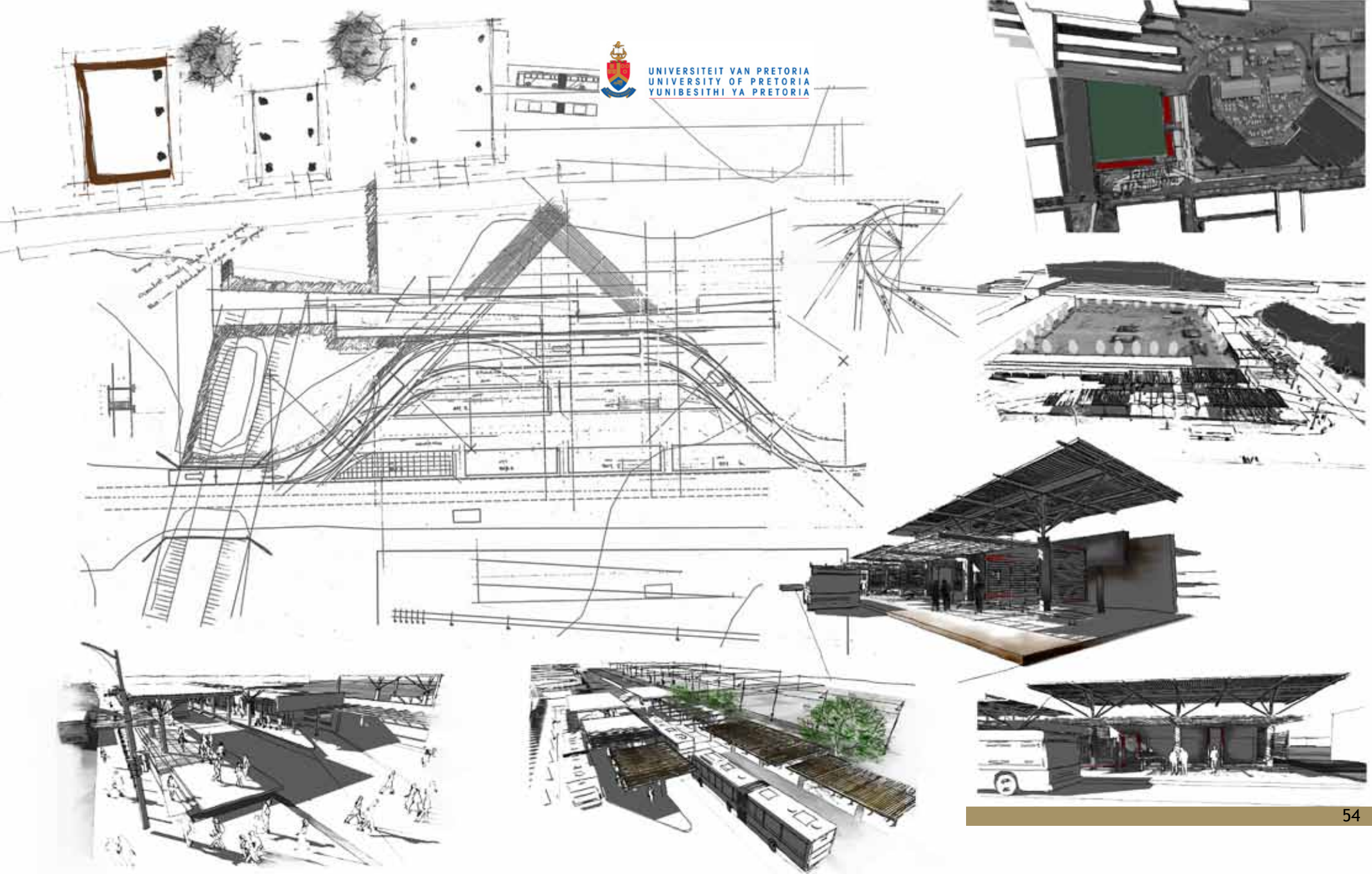


FIG 6.3_Concept 2 development



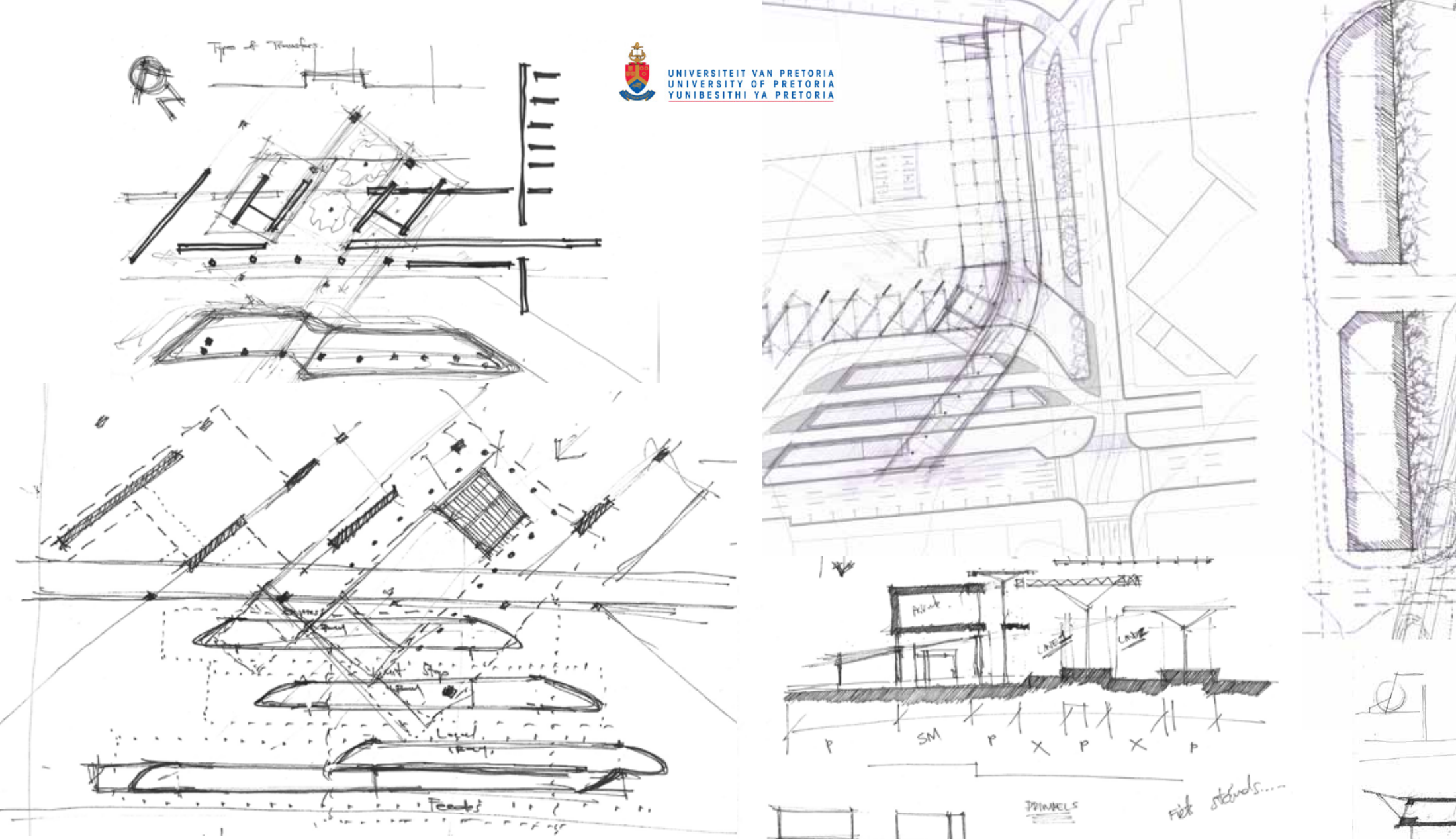
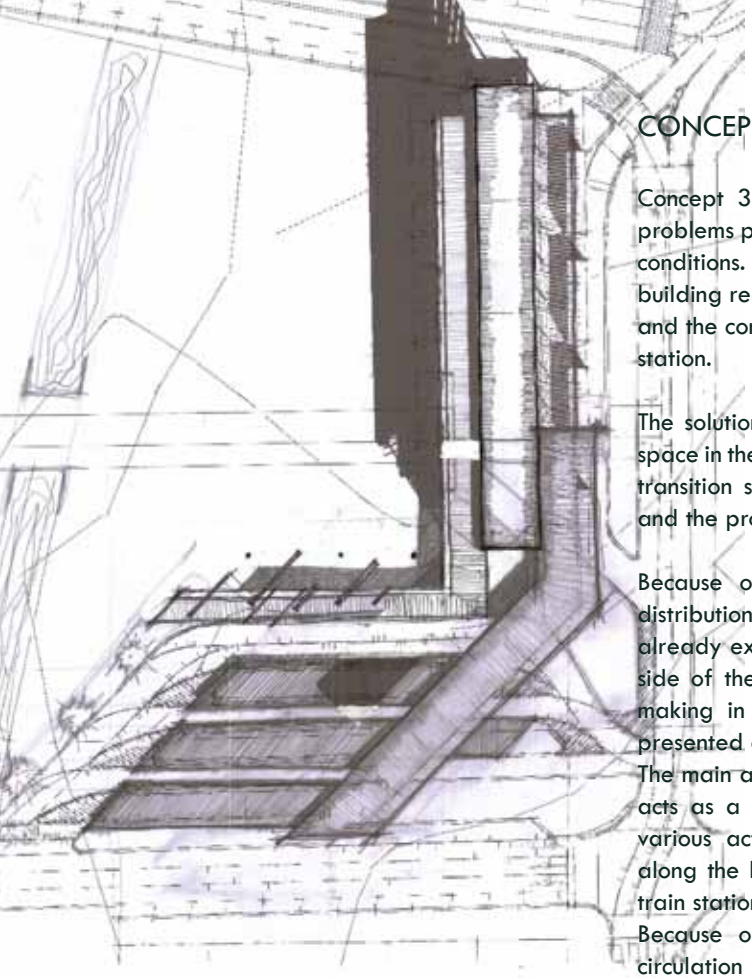
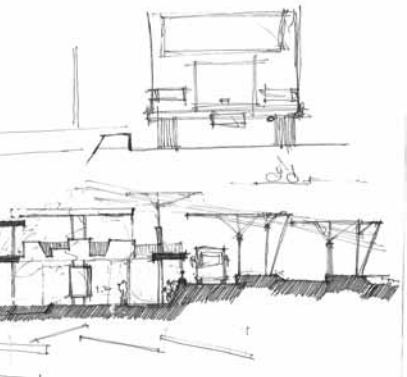


FIG 6.4_Concept 3 development





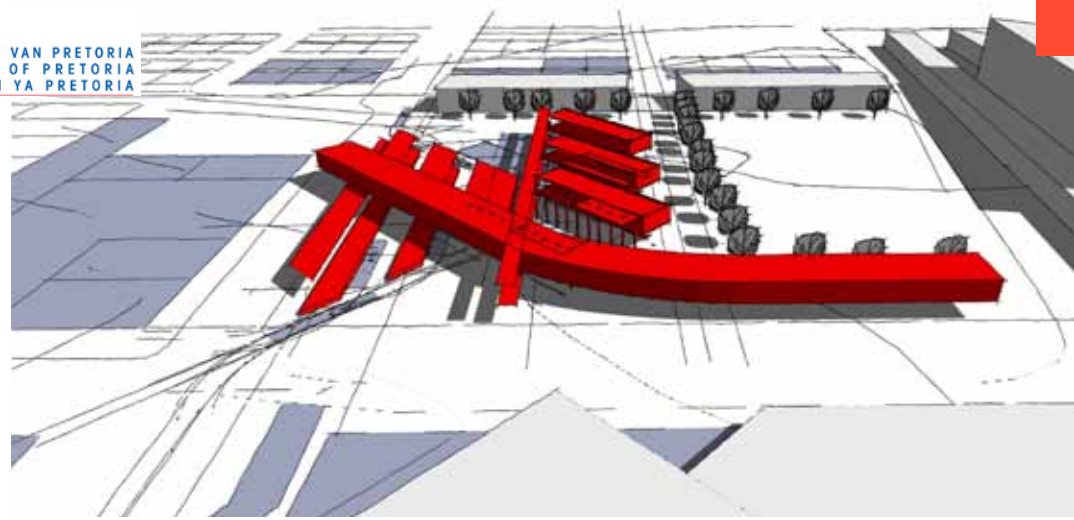
CONCEPT 3

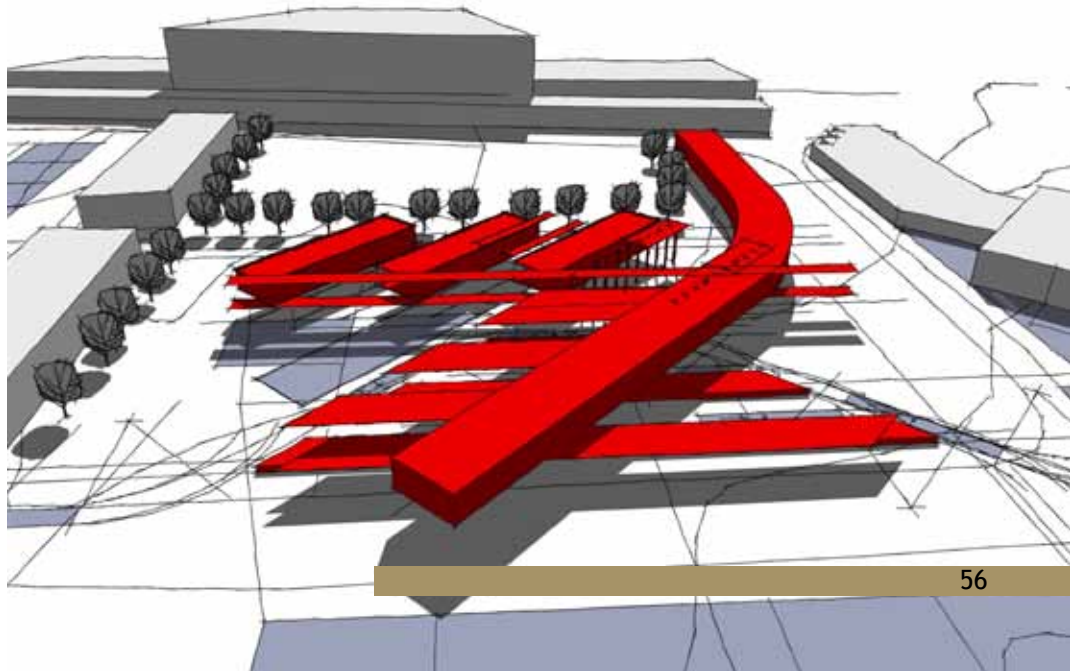
Concept 3 started to critically address the problems presented by the site and its specific conditions. The question of how does the building react to this new public square arose, and the connection of the building to the train station.

The solution was to create pockets of public space in the form of courtyards that acts as the transition spaces between the public square and the programs of the intended building.

Because of the position of the inner city distribution bus stop and the fact that there already exist a main entrance on the eastern side of the train station guided the decision making in the direction seen in the figures presented on this page.
The main access route to the train station also acts as a circulation spine that pulls all the various activities together that takes place along the length of the building towards the train station.
Because of the flow of people down this circulation spine it will be a great place to position informal traders that are already located on site.

The BRT system was also further investigated thus the provision of three bus bays, one for the local bus route, another for the limited stop service and lastly the express route was provided.





GENERAL SECTION DEVELOPMENT

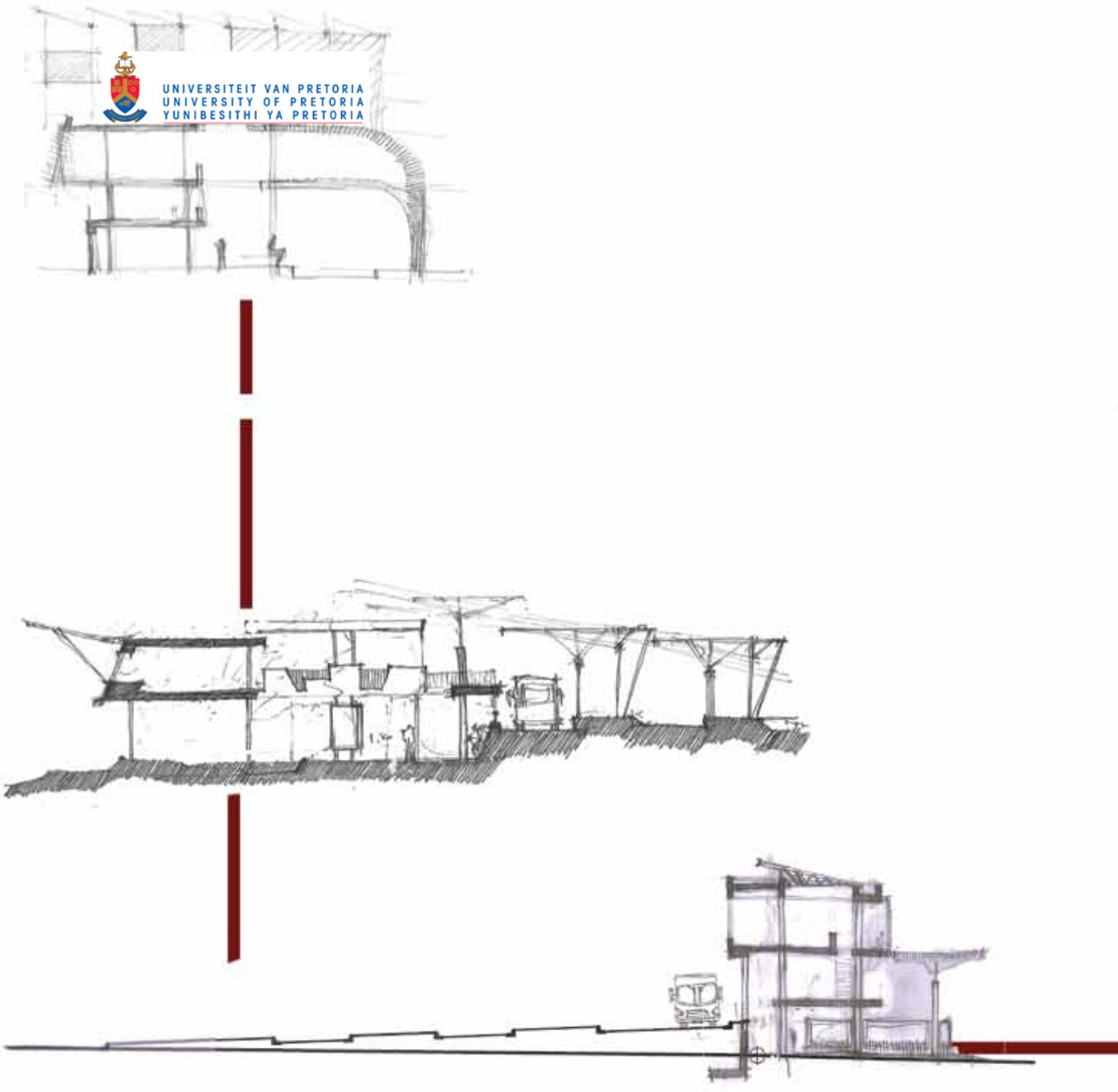
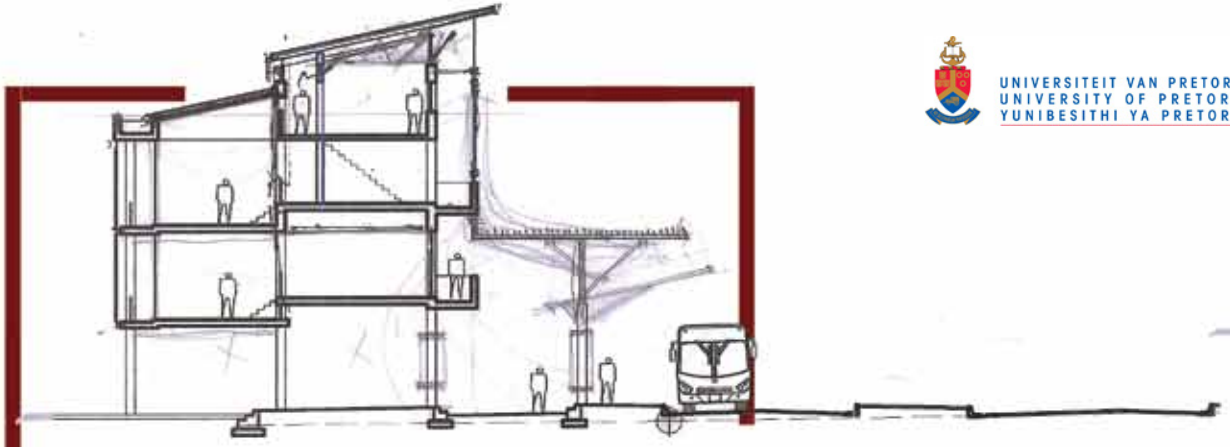
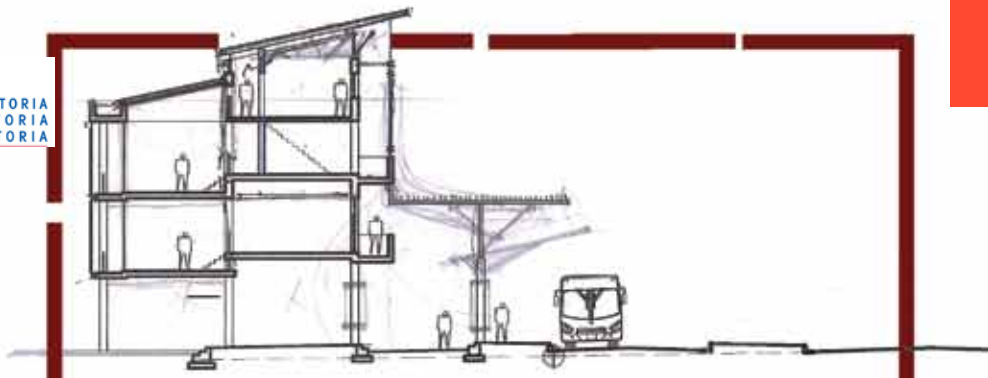
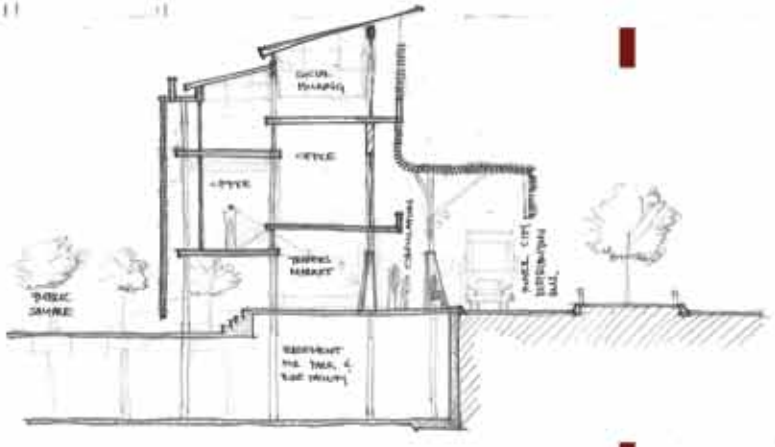
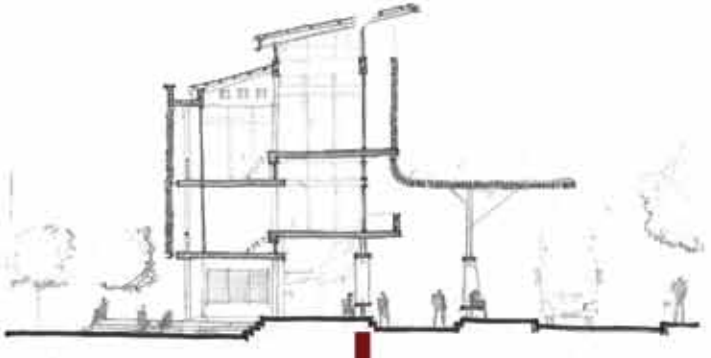


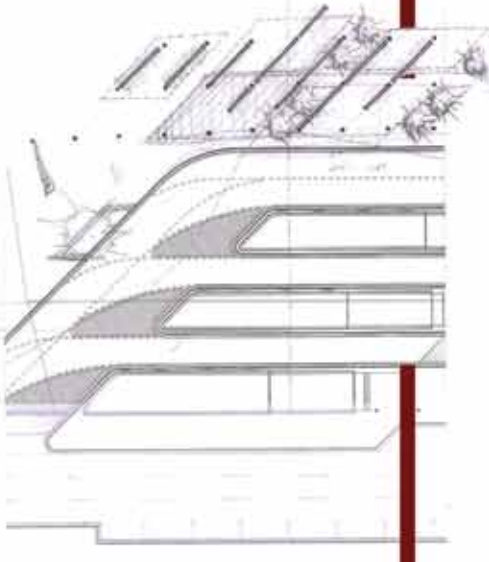
FIG 6.5_Concept 3 general section development











GENERAL SECTION DEVELOPMENT

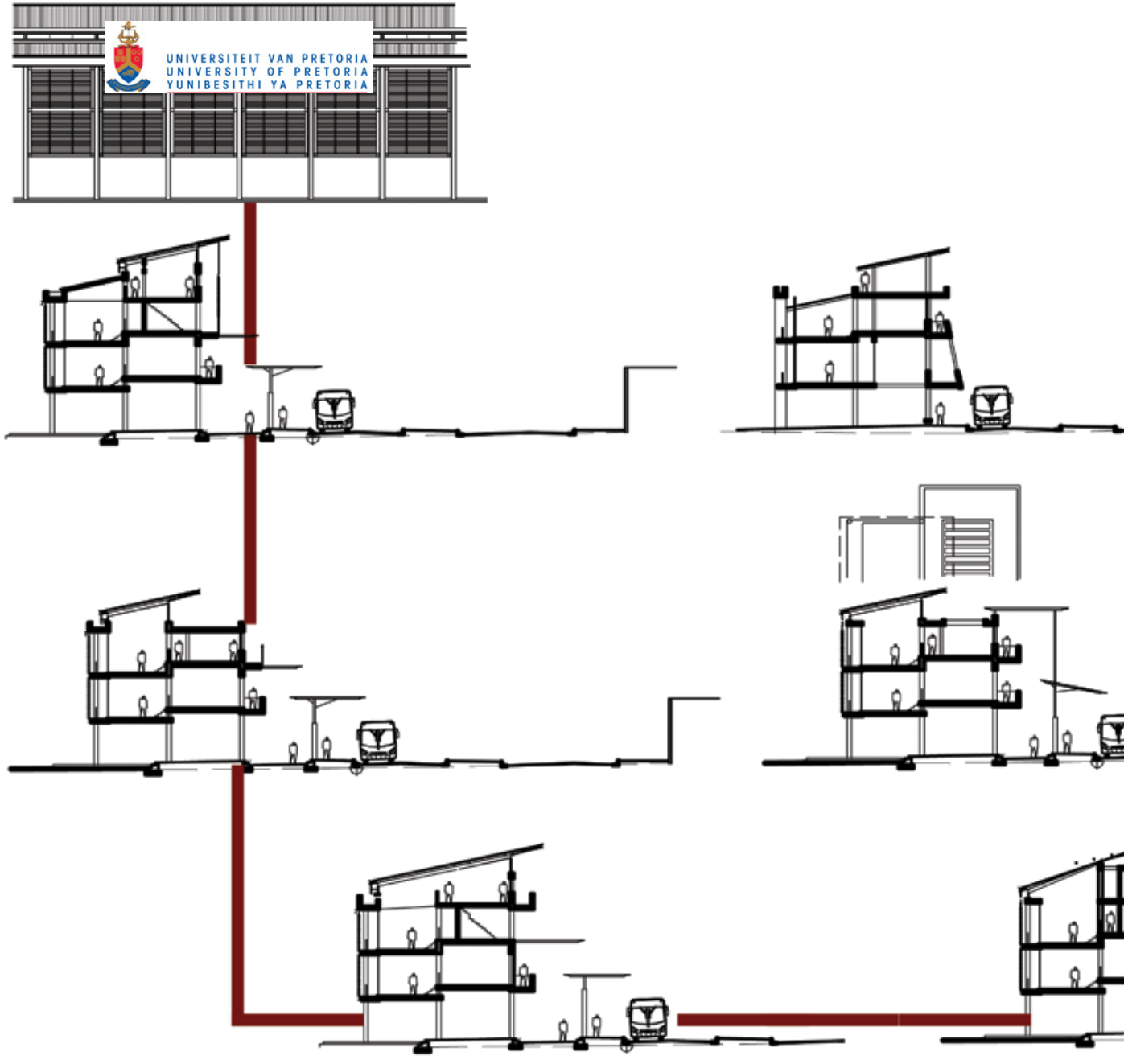
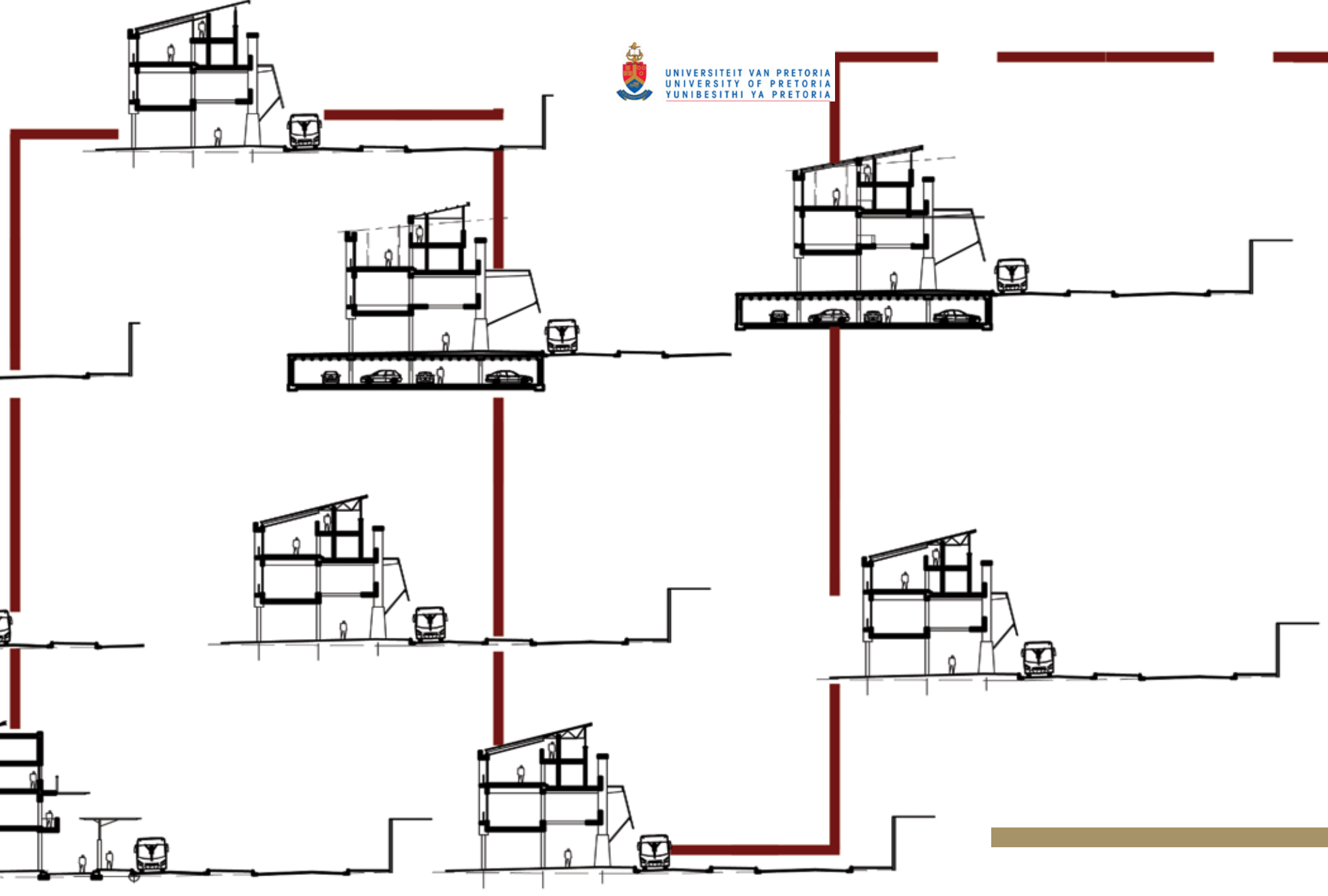


FIG 6.6_Concept 3 general section development



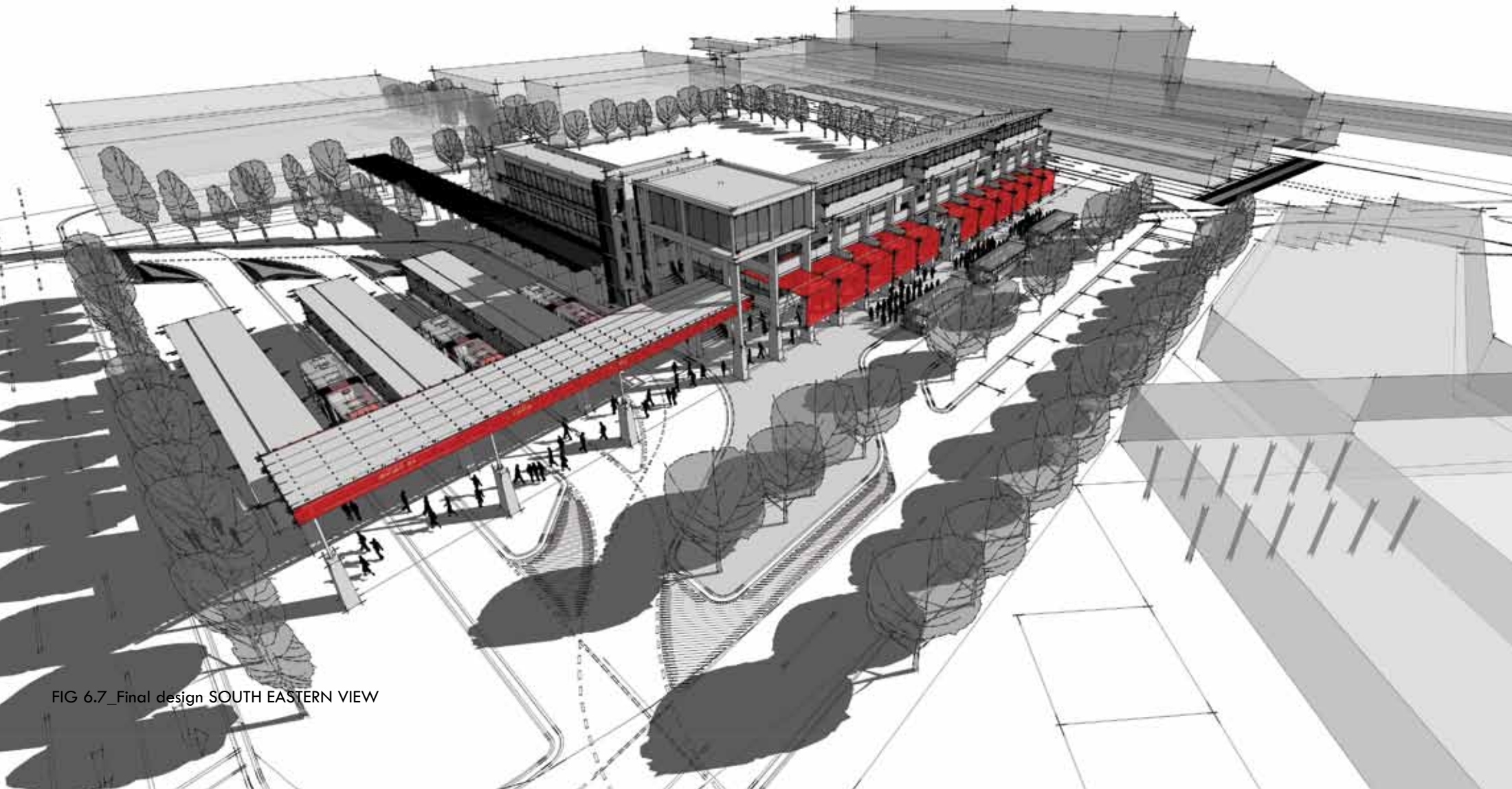


FIG 6.7_Final design SOUTH EASTERN VIEW

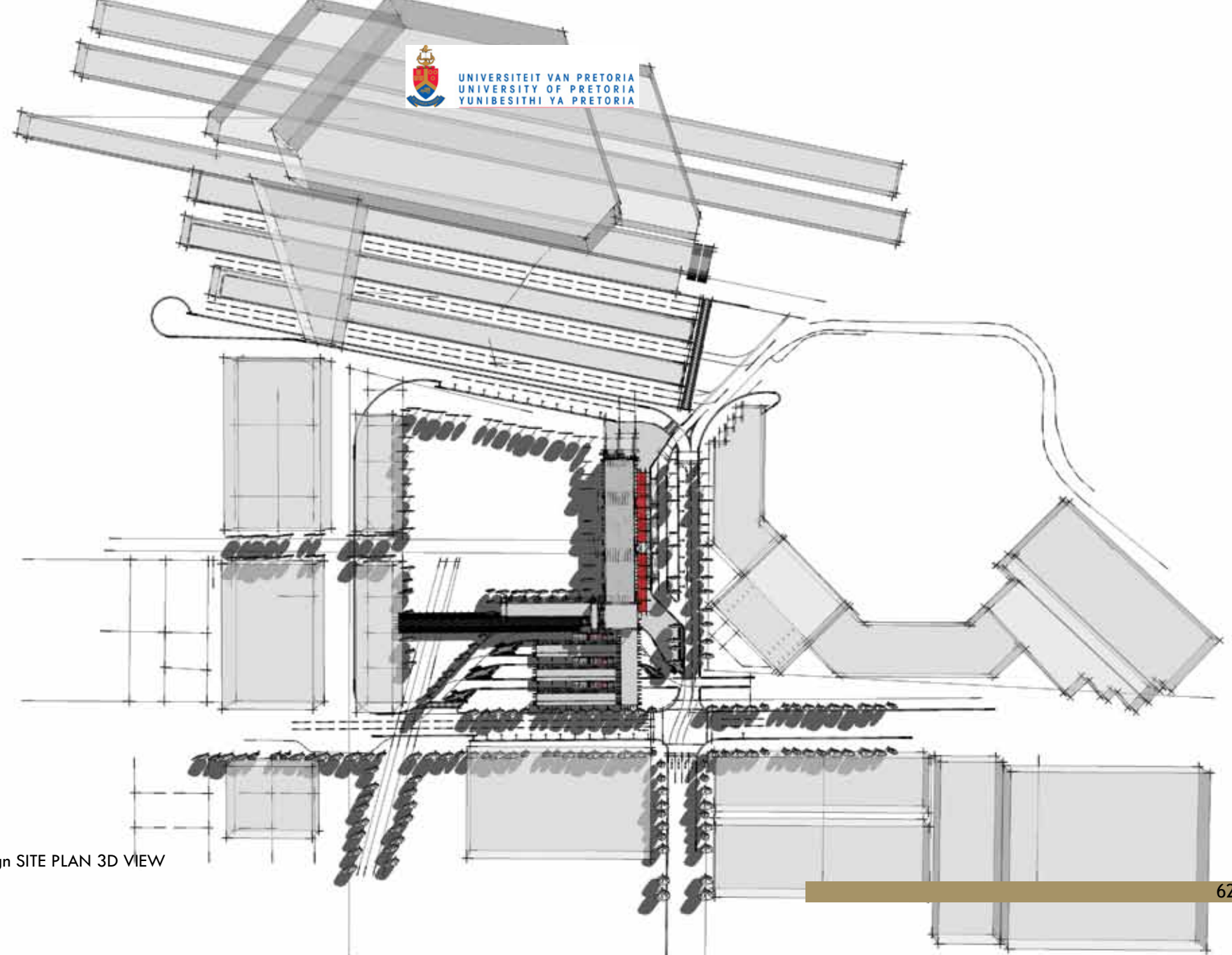


FIG 6.8_Final design SITE PLAN 3D VIEW

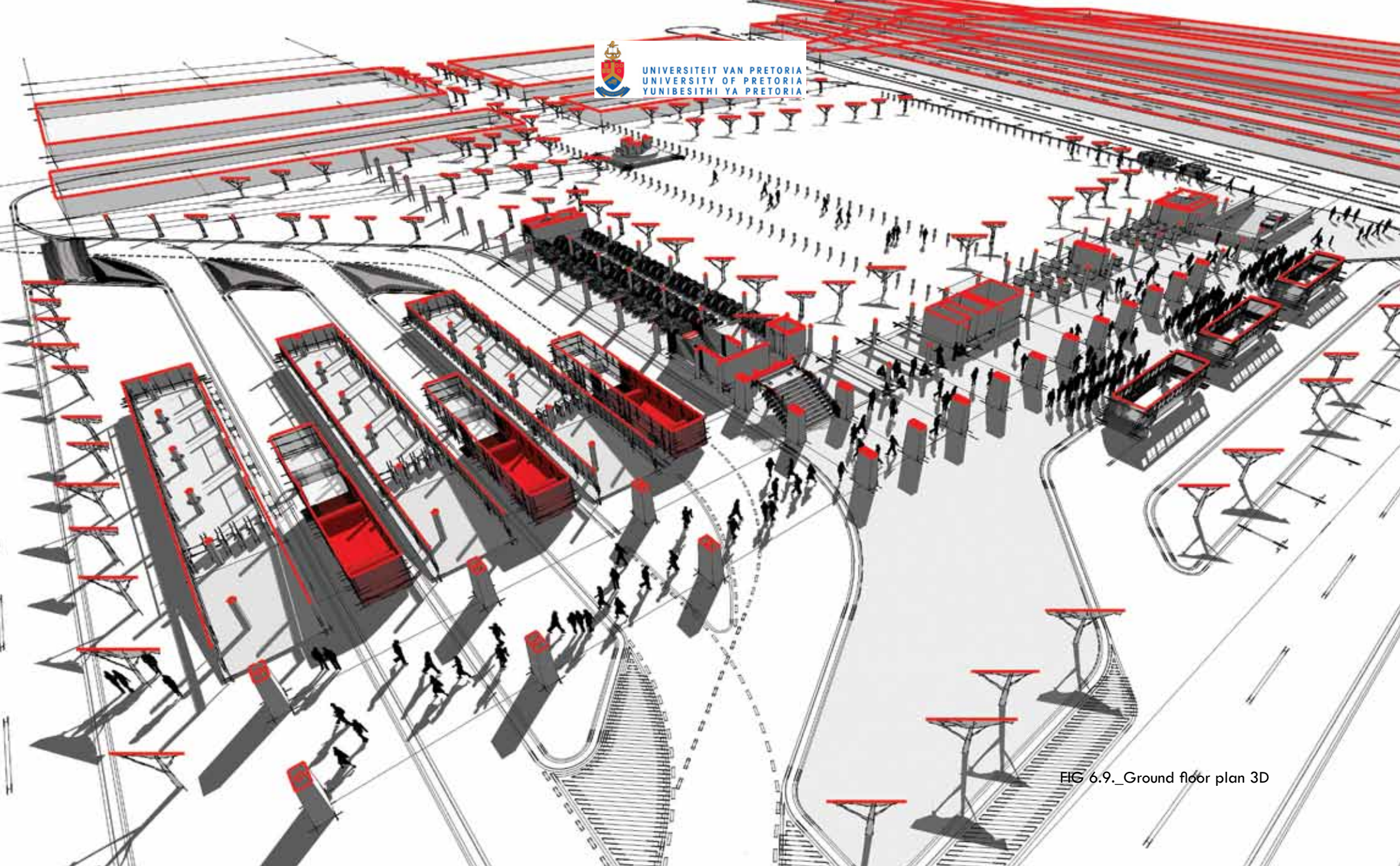


FIG 6.9._Ground floor plan 3D

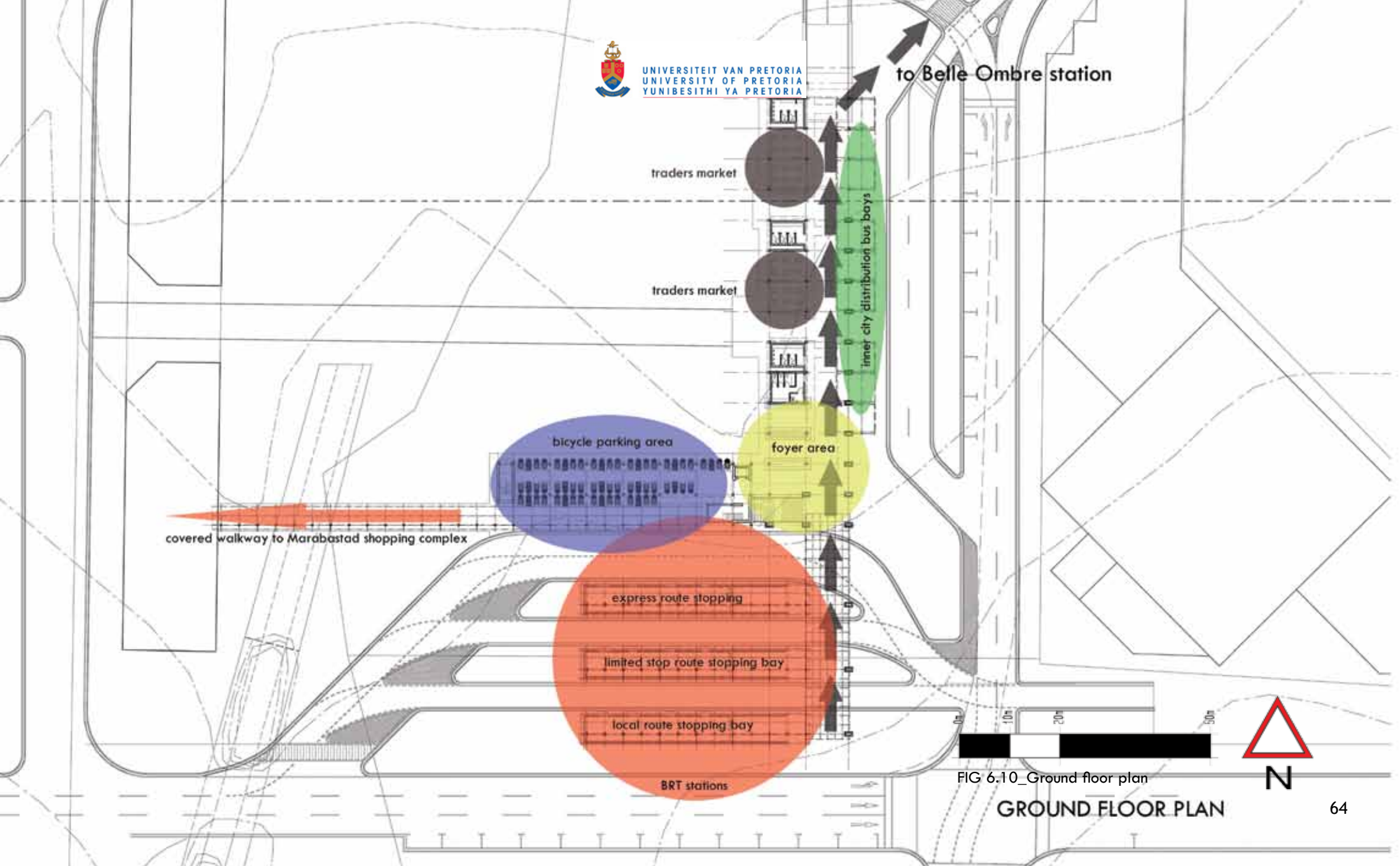


FIG 6.10_Ground floor plan

GROUND FLOOR PLAN

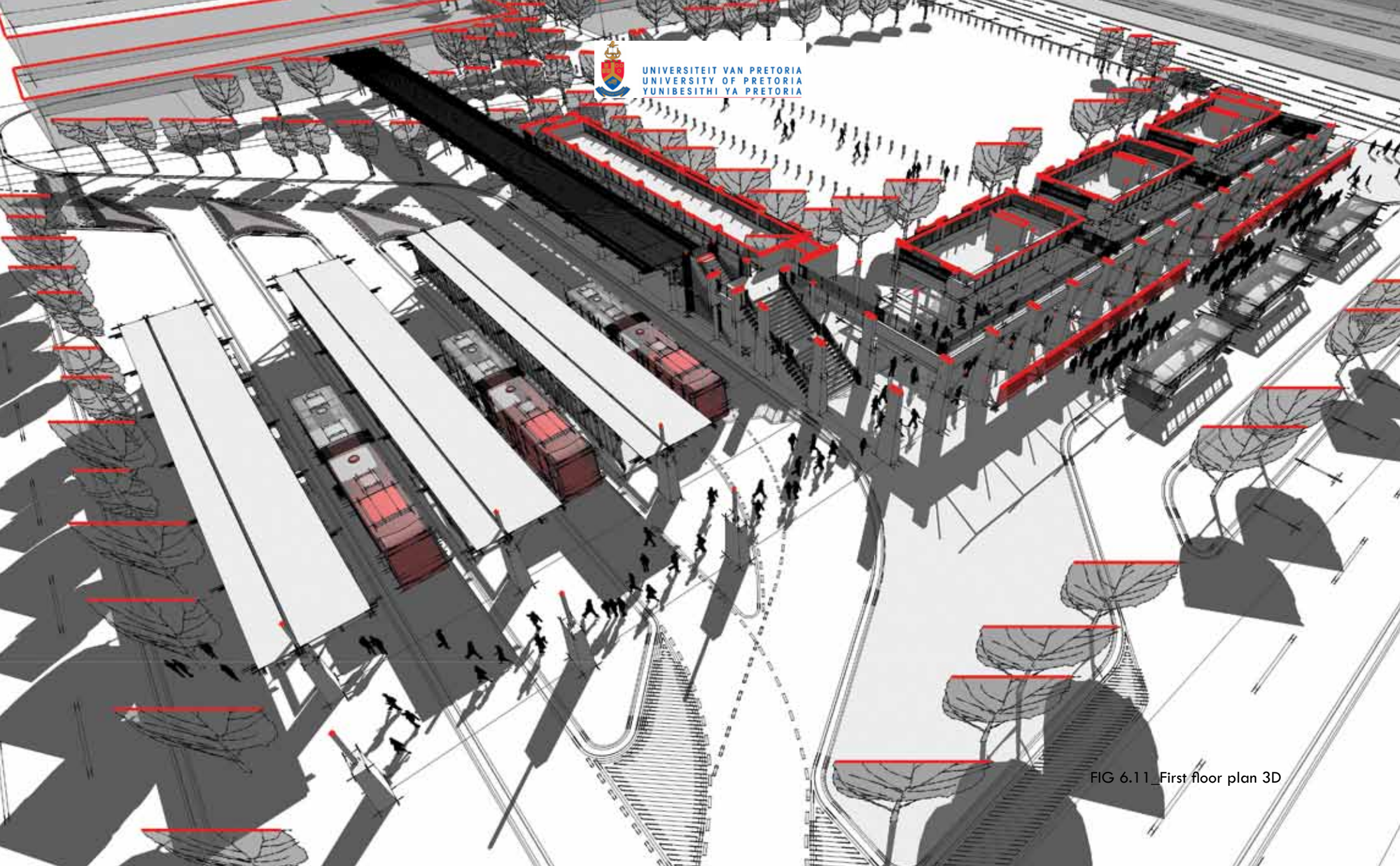


FIG 6.11_First floor plan 3D

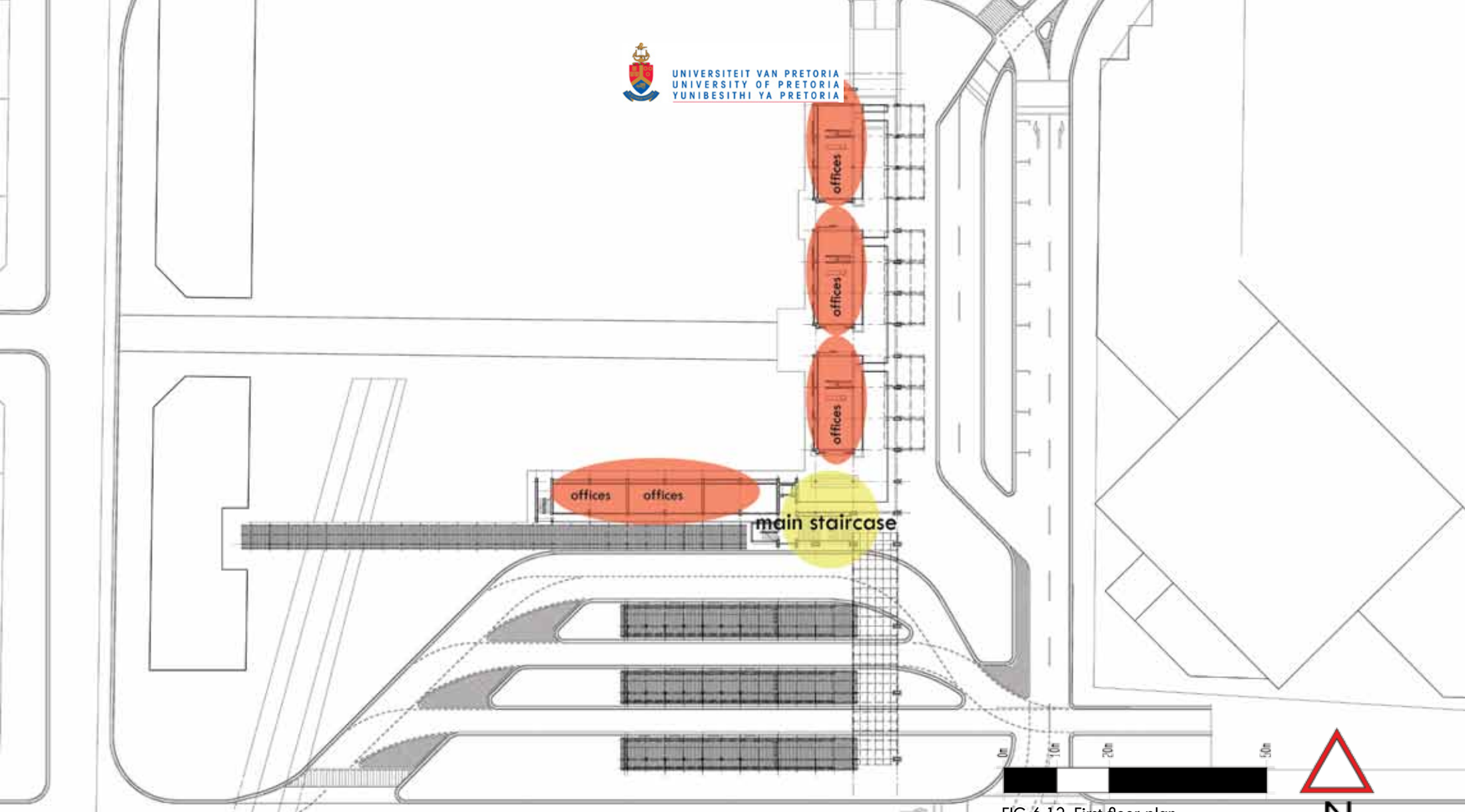


FIG 6.12_First floor plan

FIRST FLOOR PLAN

FIG 6.13_Second floor plan 3D

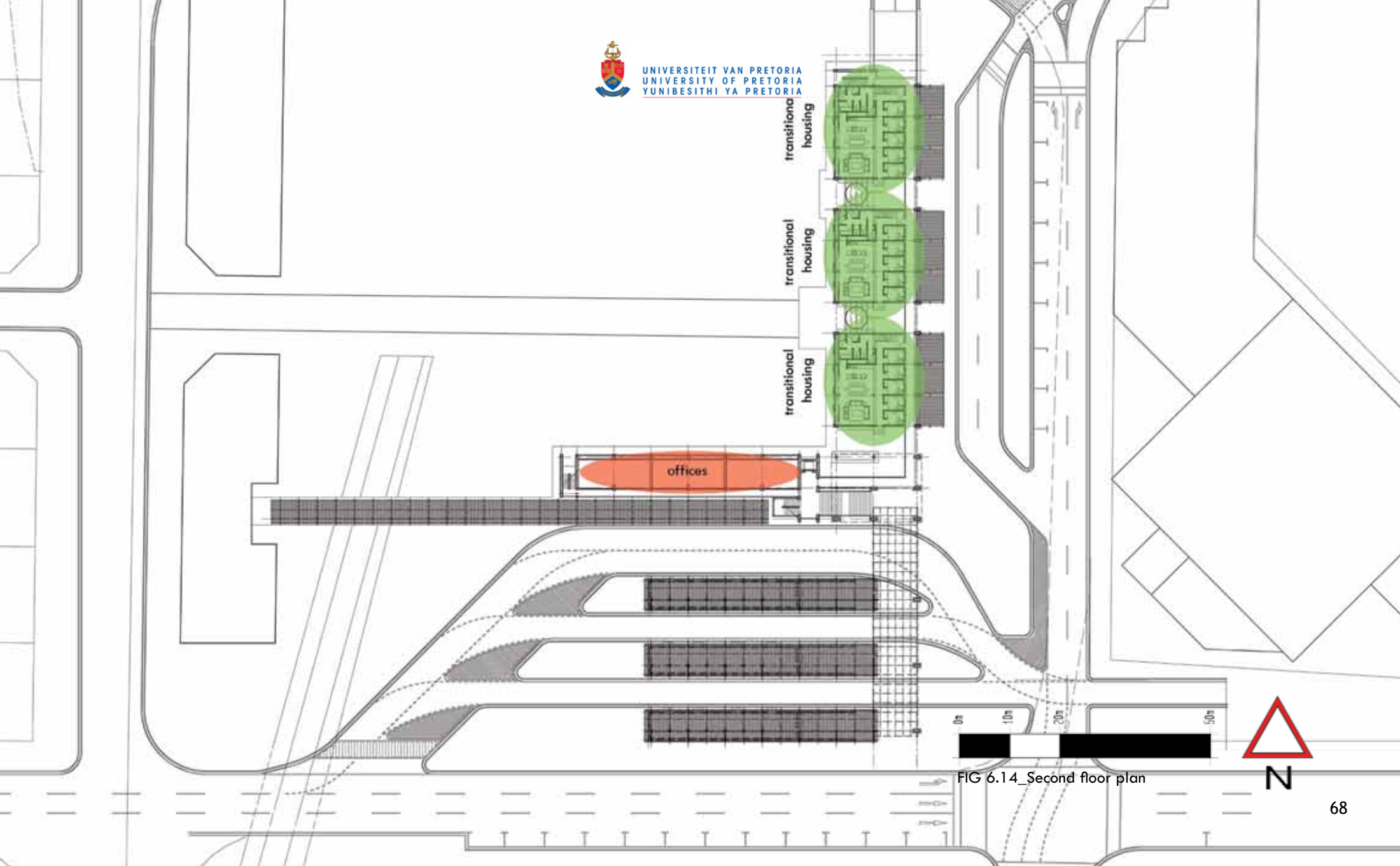


FIG 6.14_Second floor plan

FIG 6.15_Third floor plan 3D

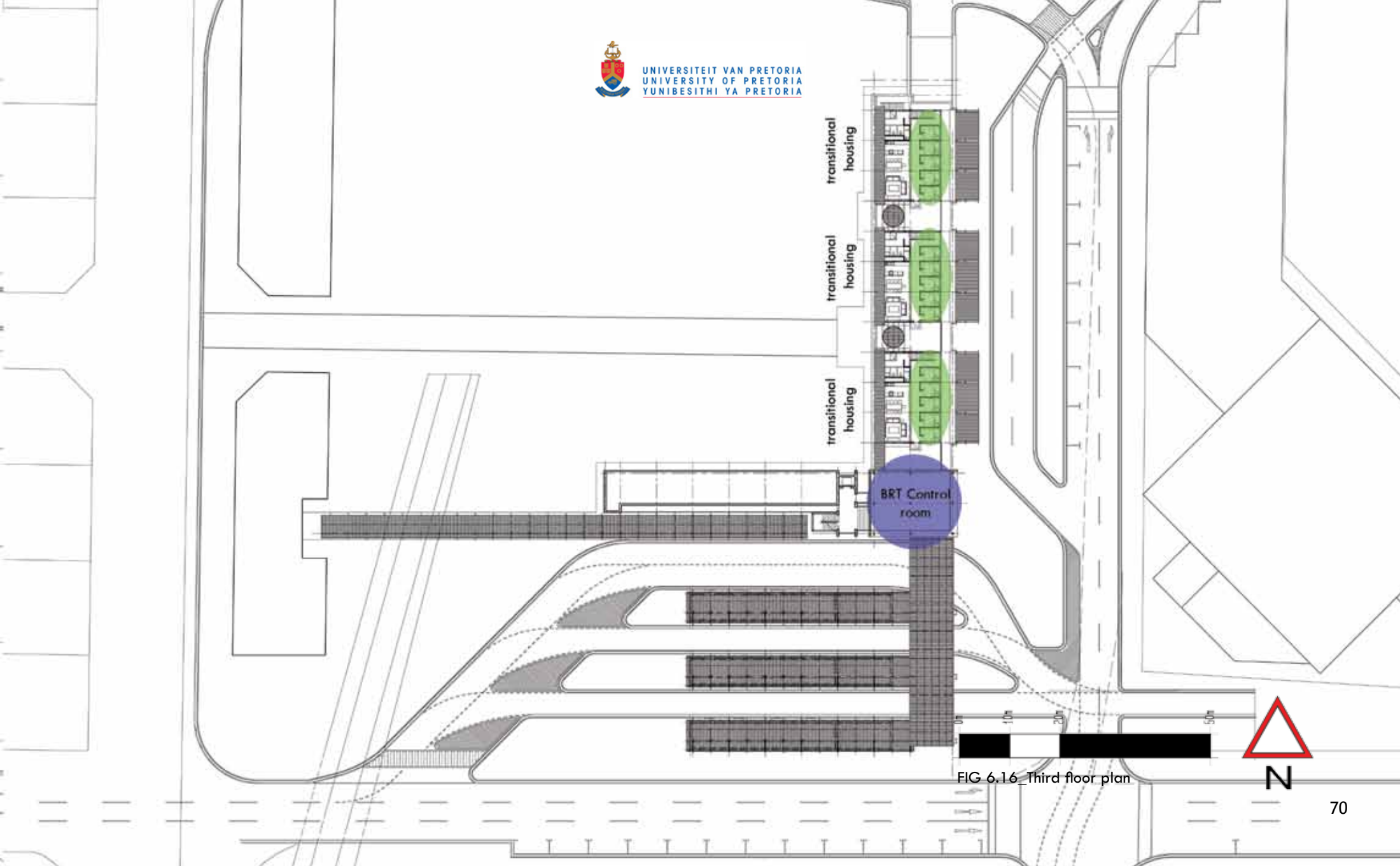


FIG 6.16_Third floor plan

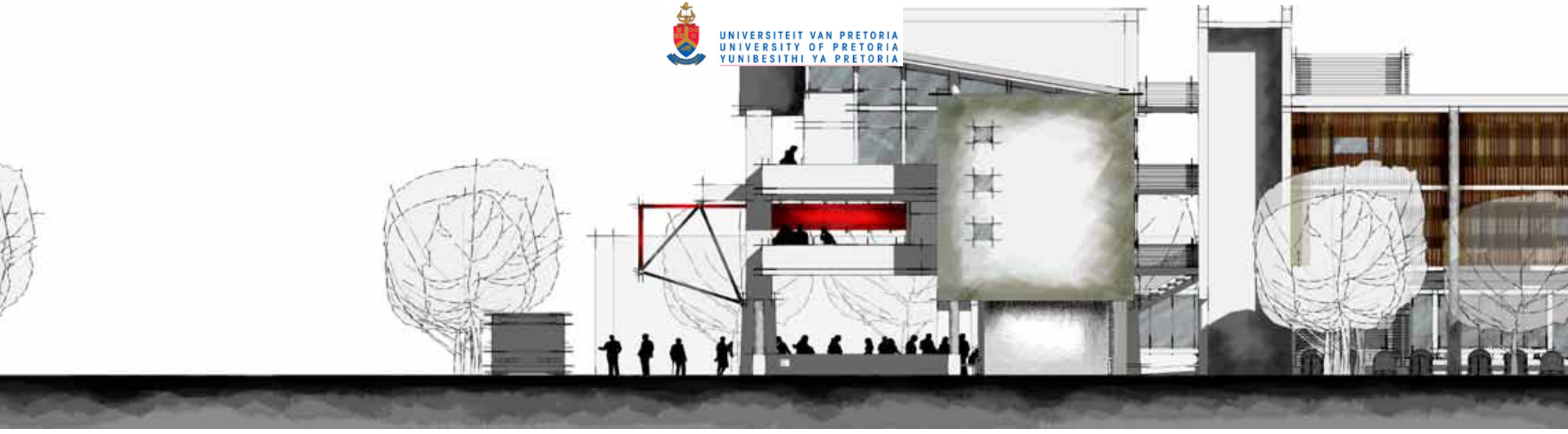


FIG 6.17_Final design north elevation

FIG 6.18_Final design northern view

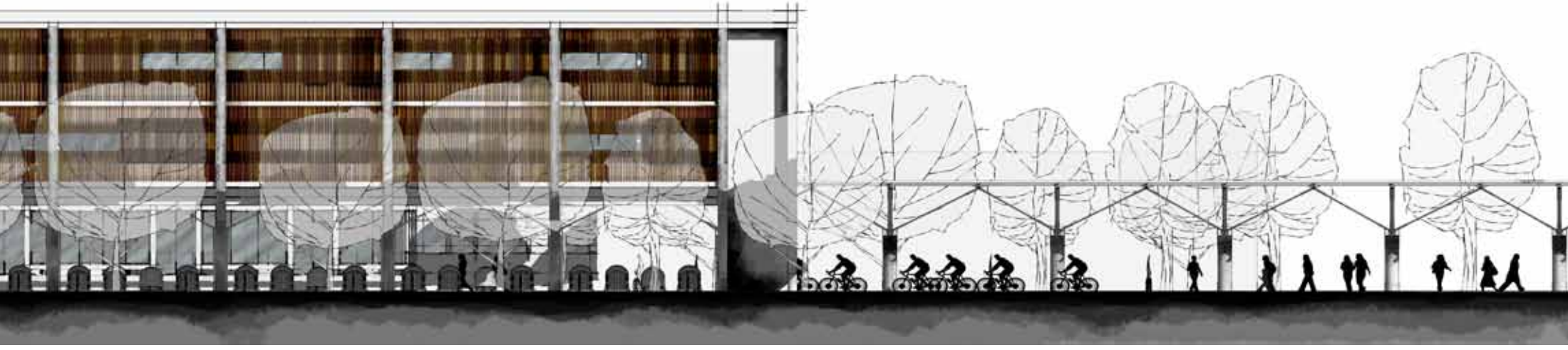


FIG 6.19_Final design south elevation

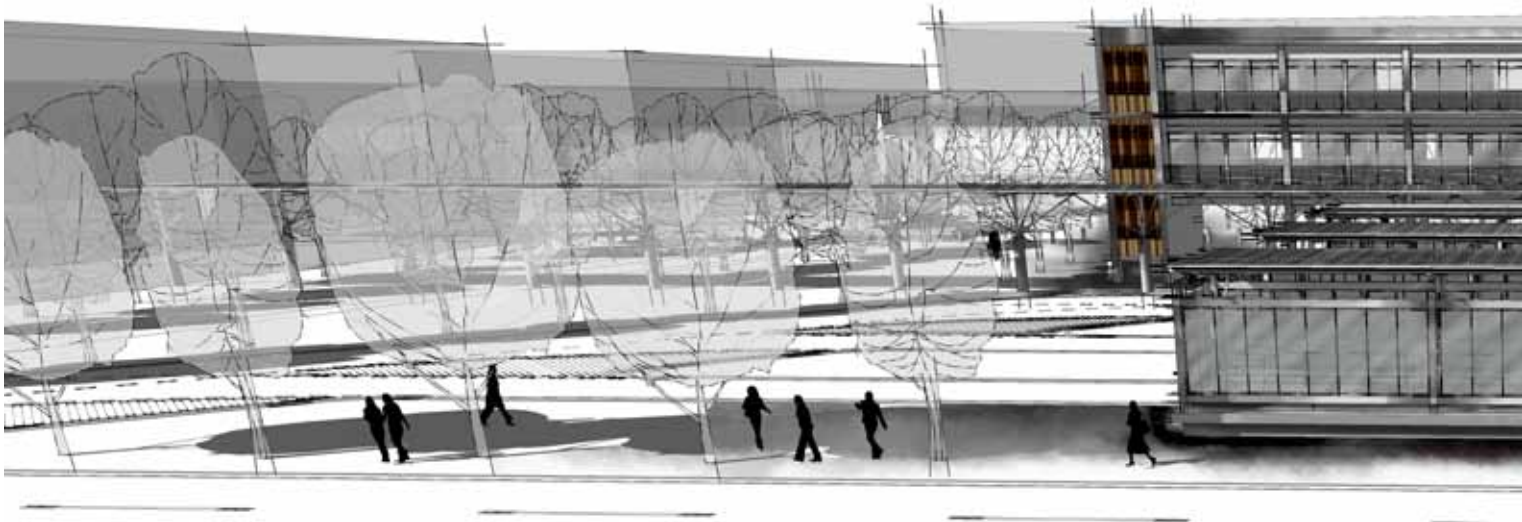


FIG 6.20_Final design southern view

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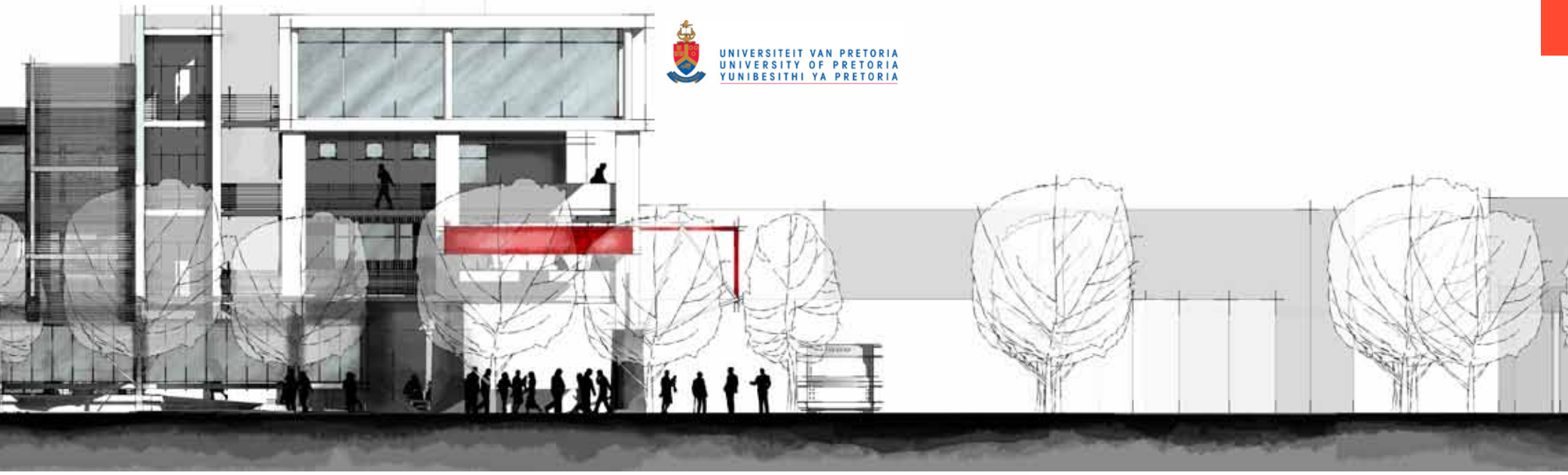

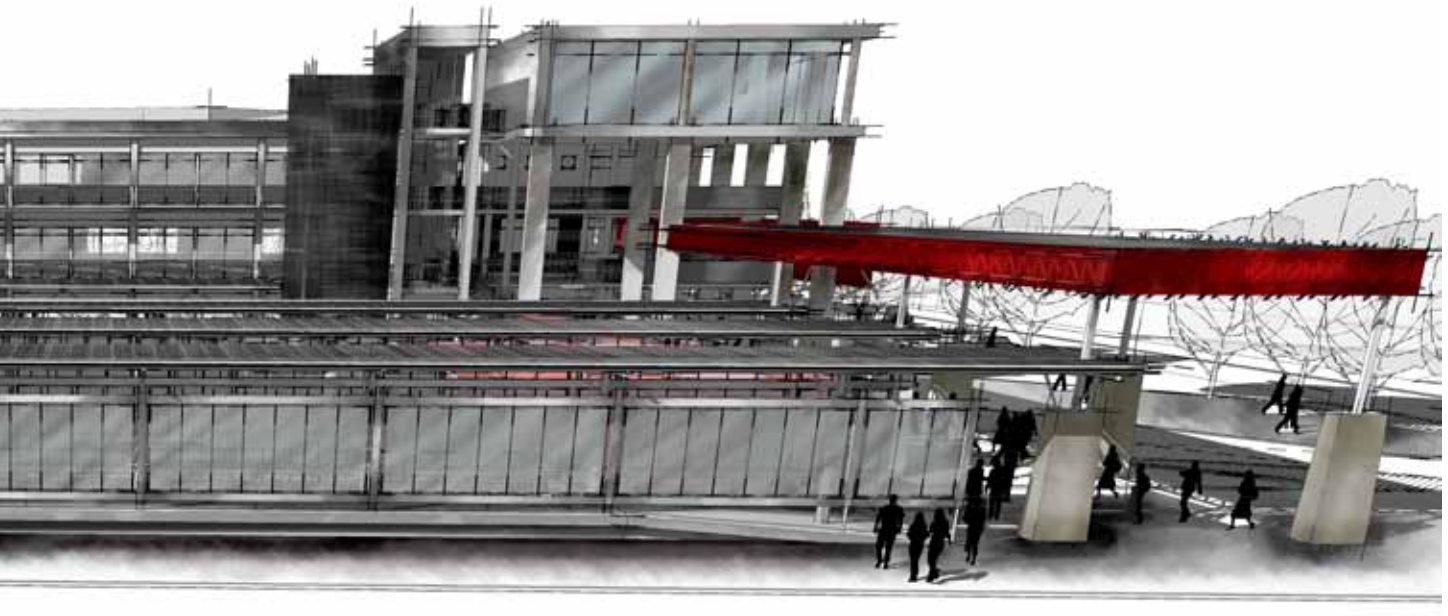

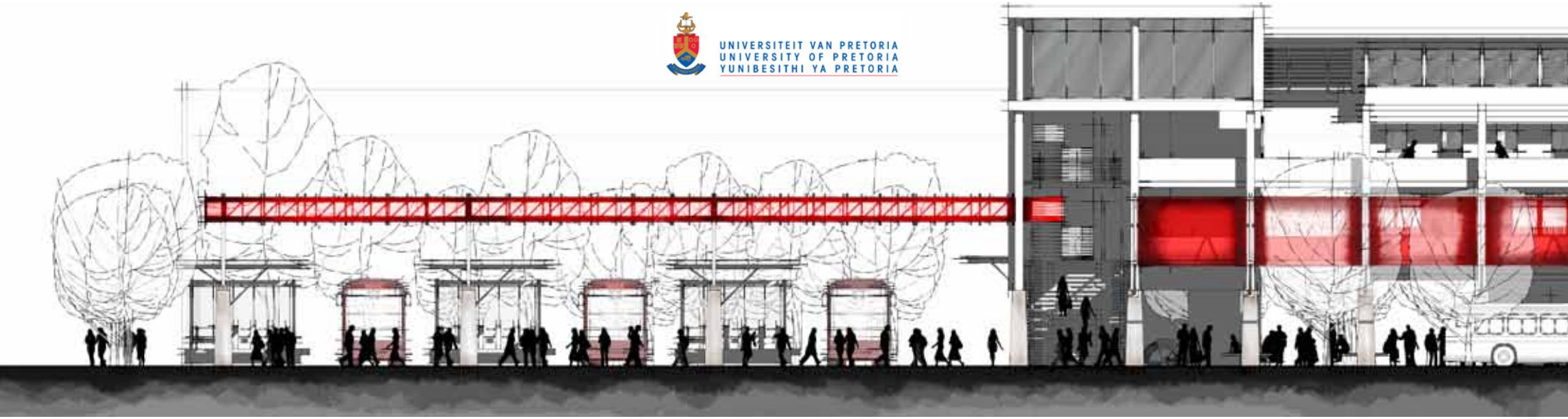

FIG 6.21_Final design east elevation

FIG 6.22_Final design eastern view

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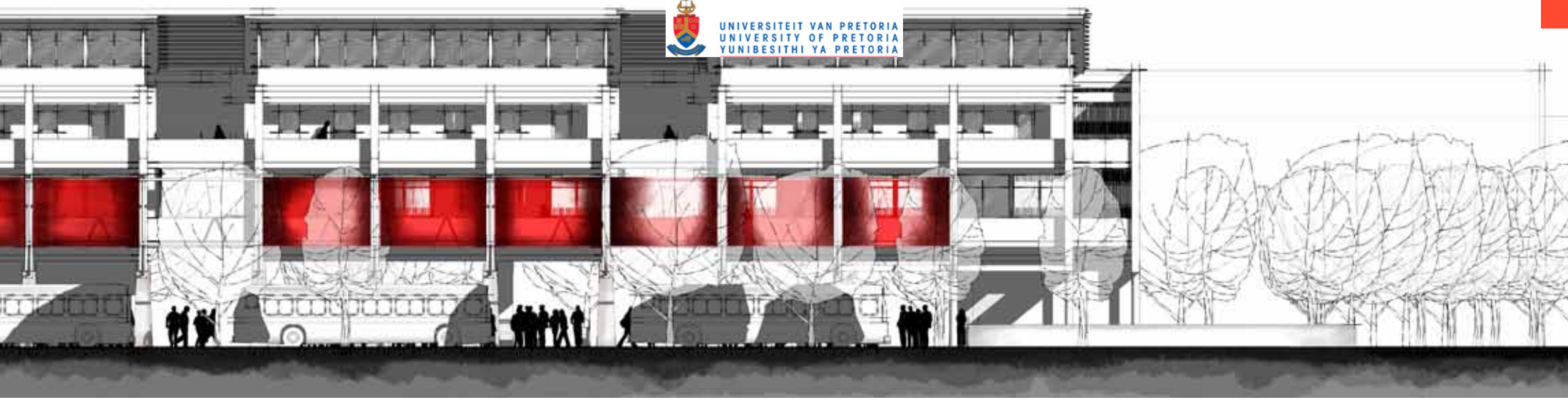

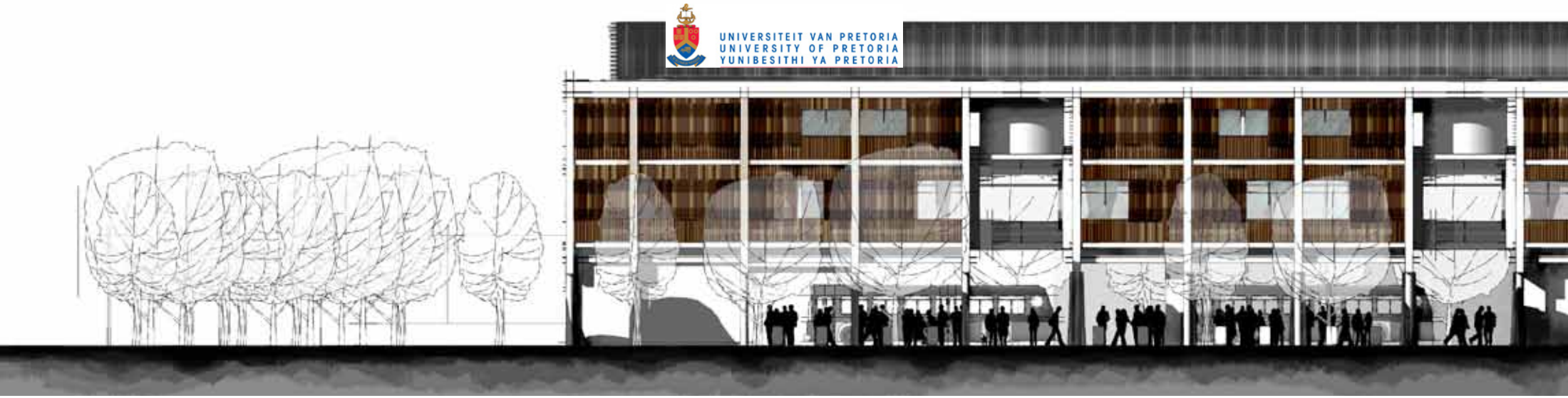

FIG 6.23_Final design west elevation

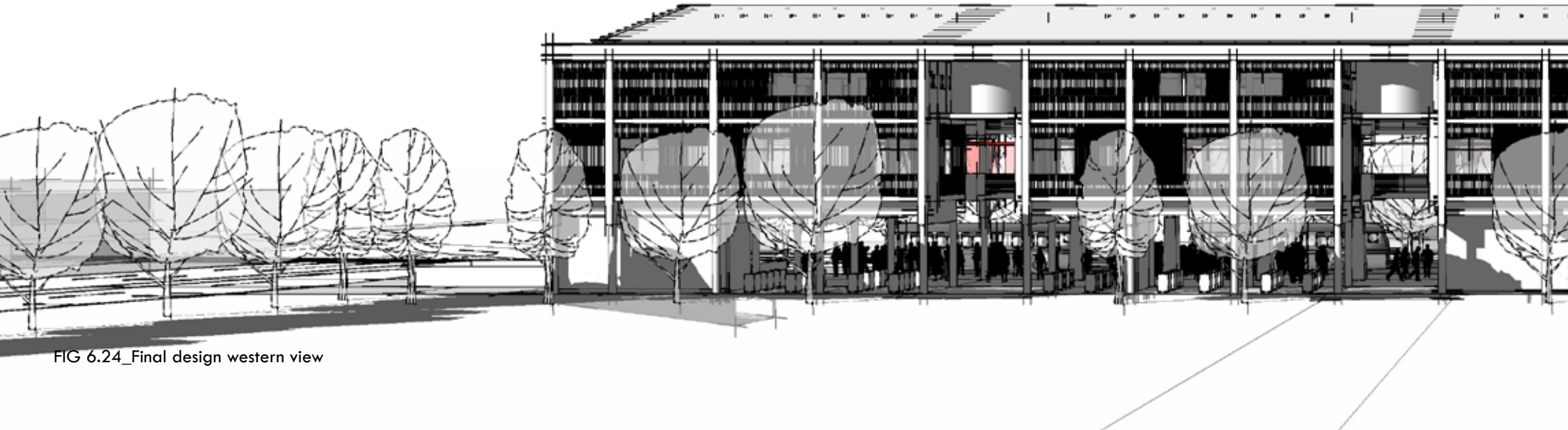

FIG 6.24_Final design western view


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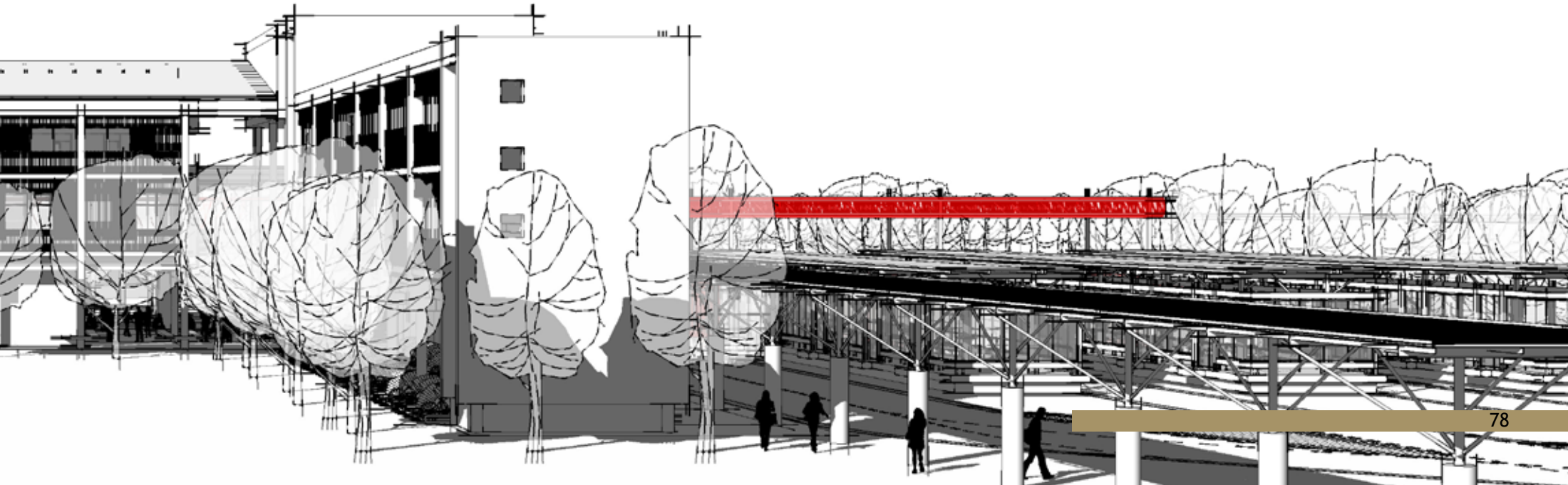

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CHAPTER:

7

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TECHNICAL _REPORT

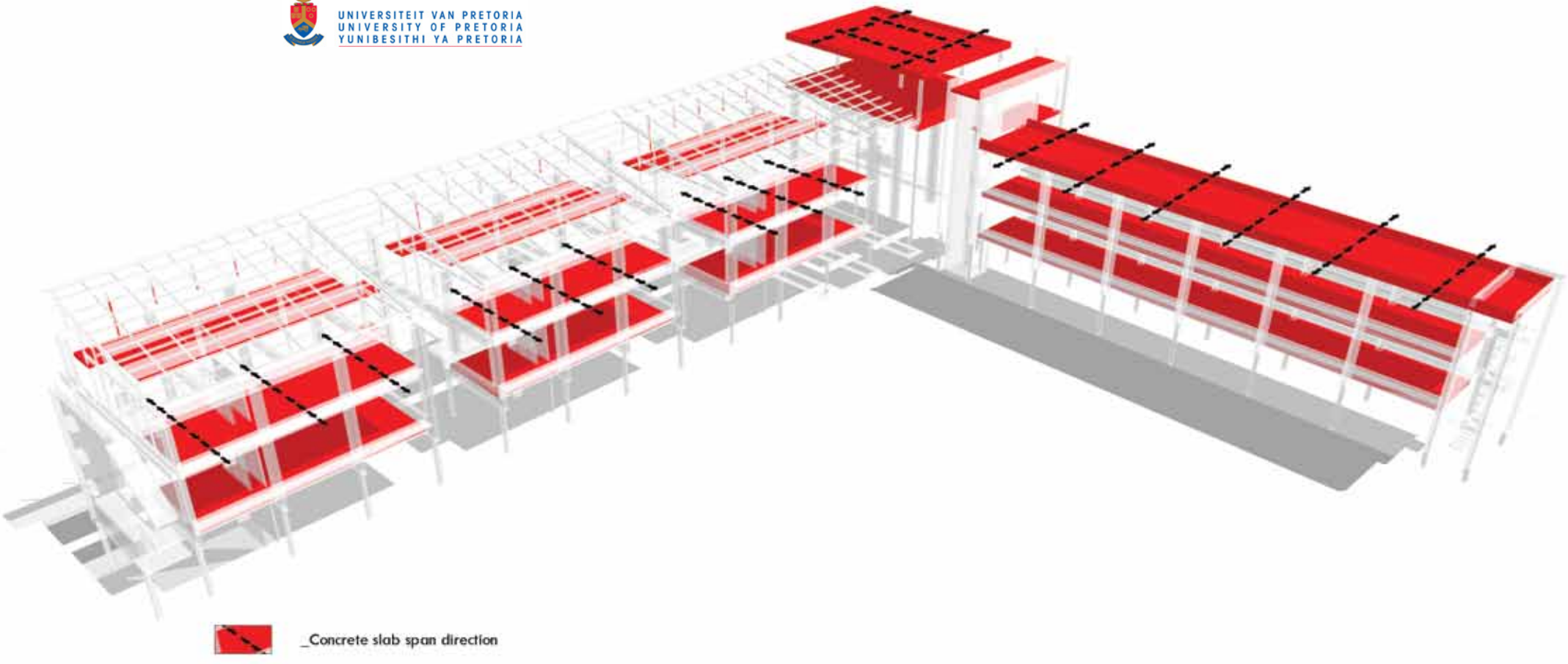
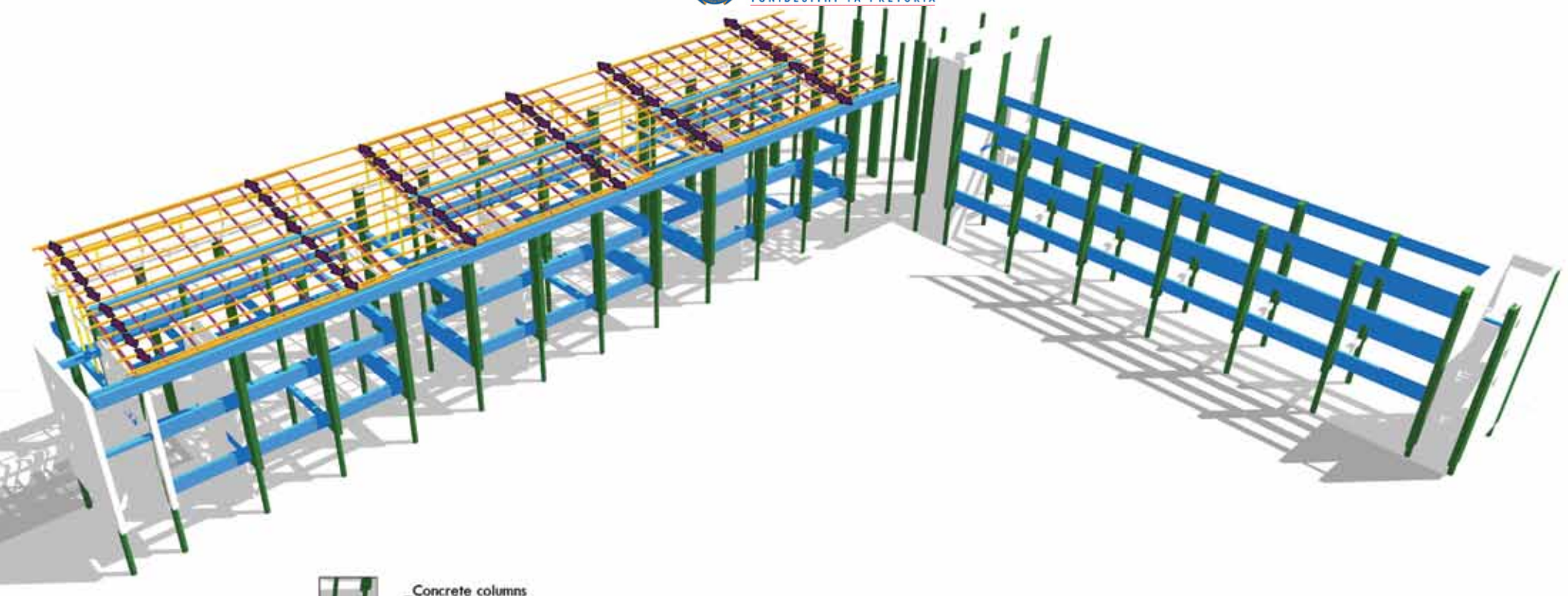


FIG 7.2_Concrete slab systems



_Concrete columns

_Concrete Beams

_Steel I-section rafters

_Steel I-section roof beam span direction

_Steel lipped-channel purlins

STRUCTURAL SYSTEM - beam & column

FIG 7.1_Concrete Column & beam system

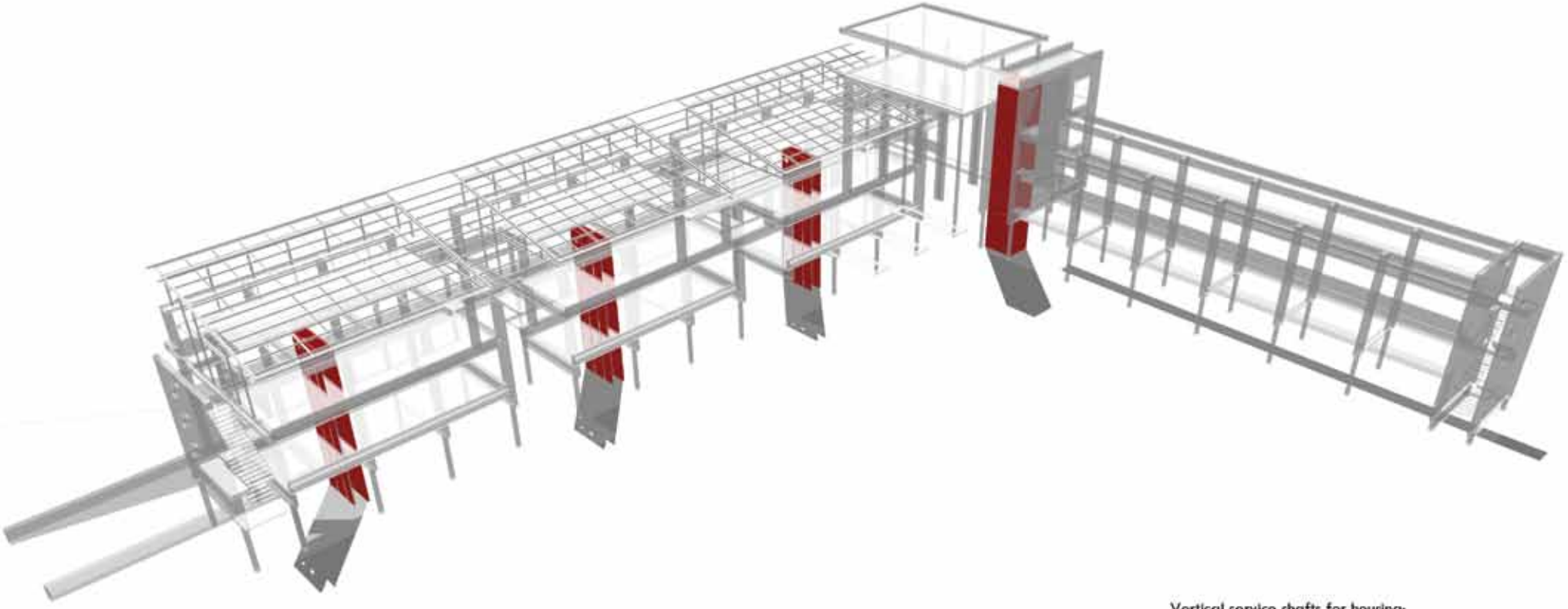


FIG 7.3_Vertical service shafts

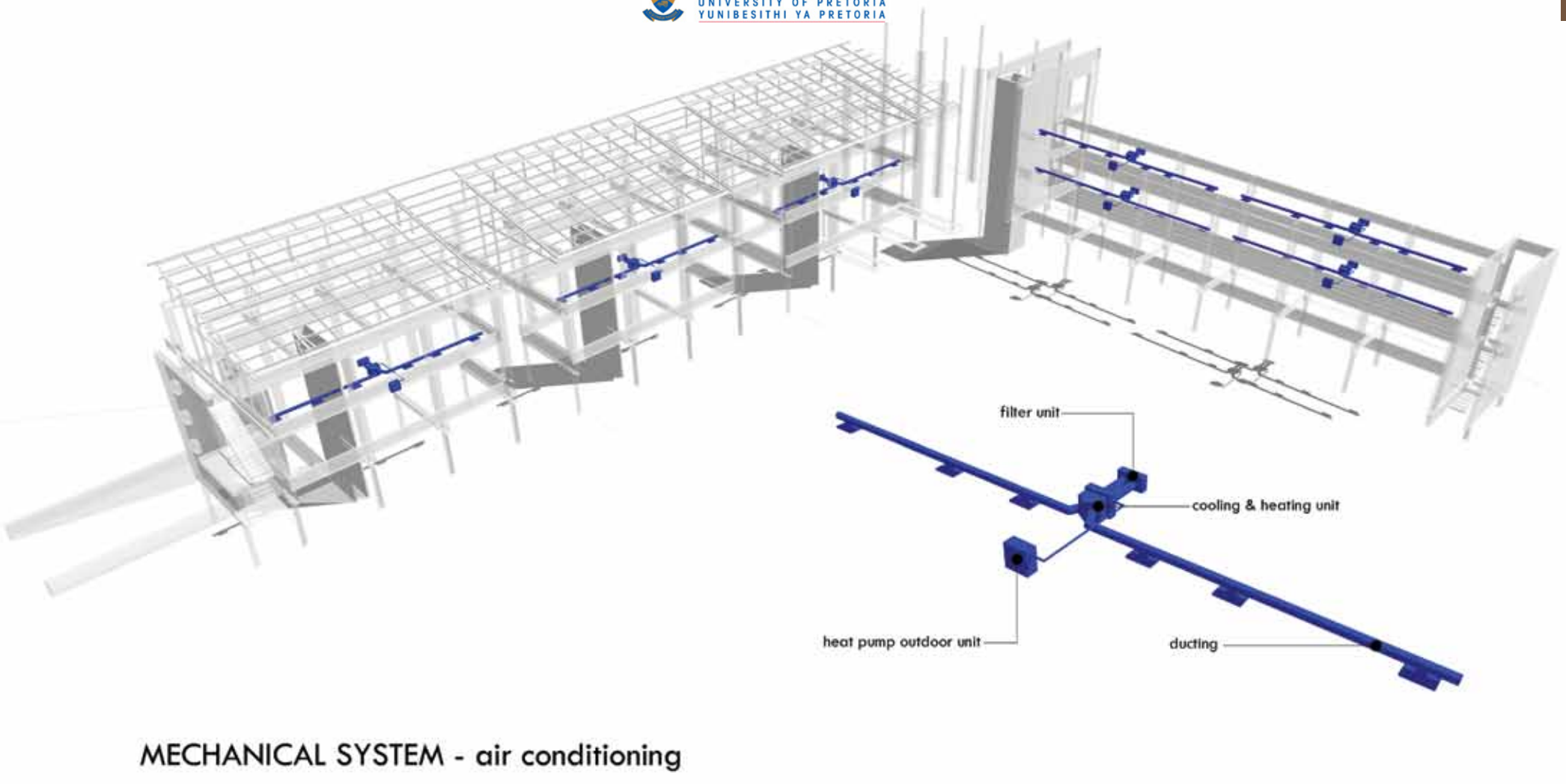


FIG 7.4_Air conditioning system

SITE PLAN

FIG 7.6_SITE Plan

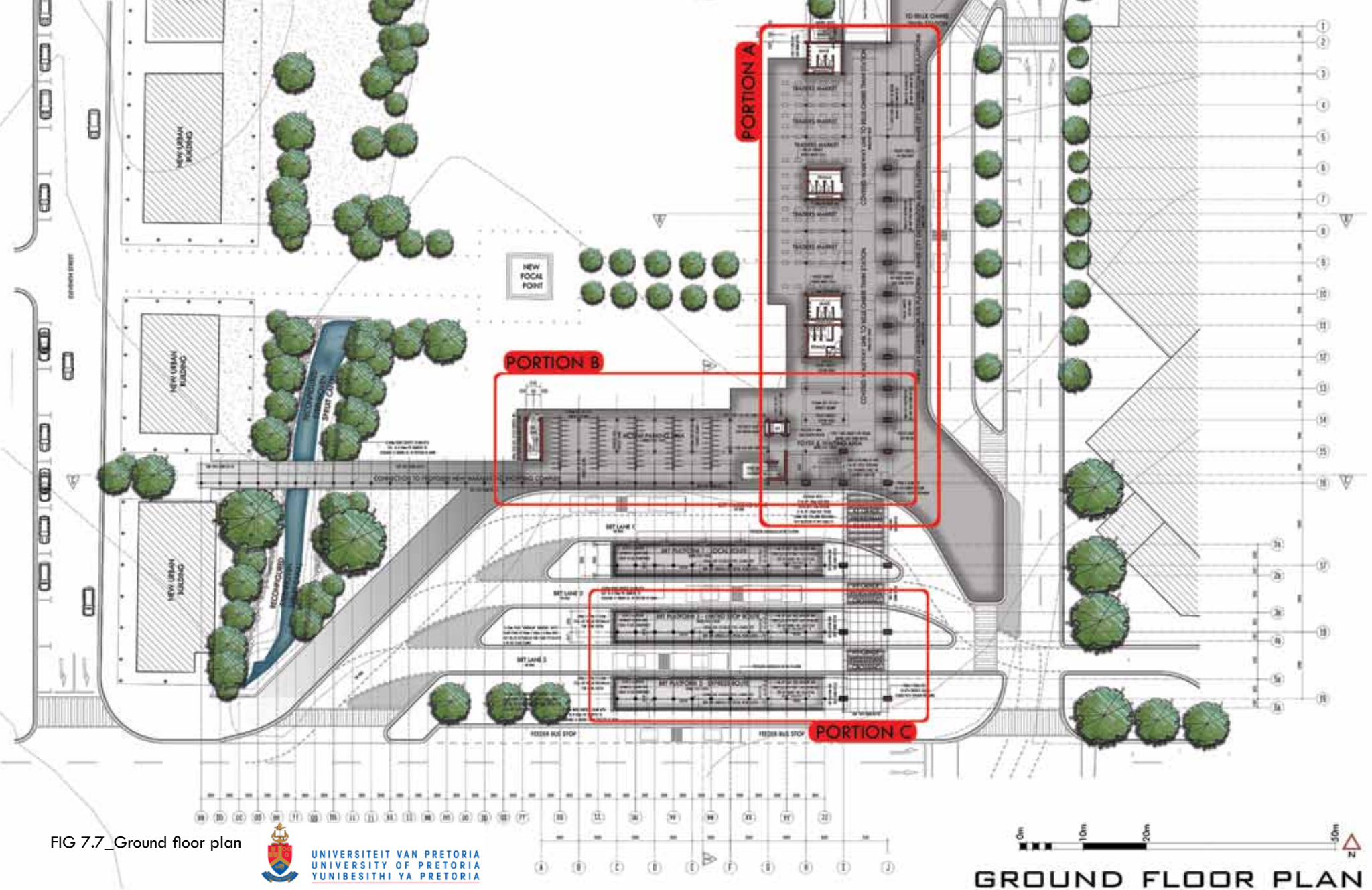


FIG 7.7_Ground floor plan

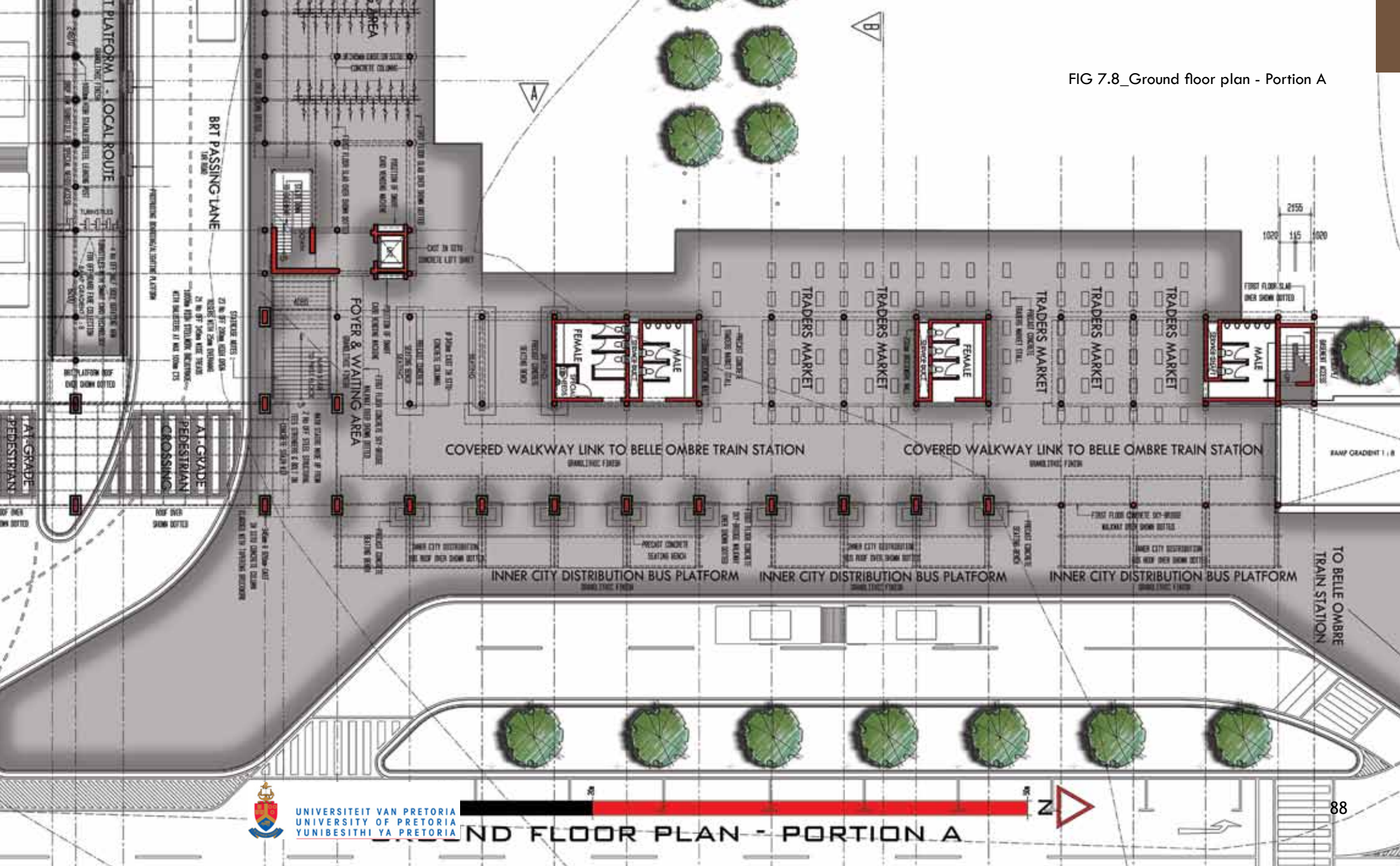


FIG 7.8_Ground floor plan - Portion A

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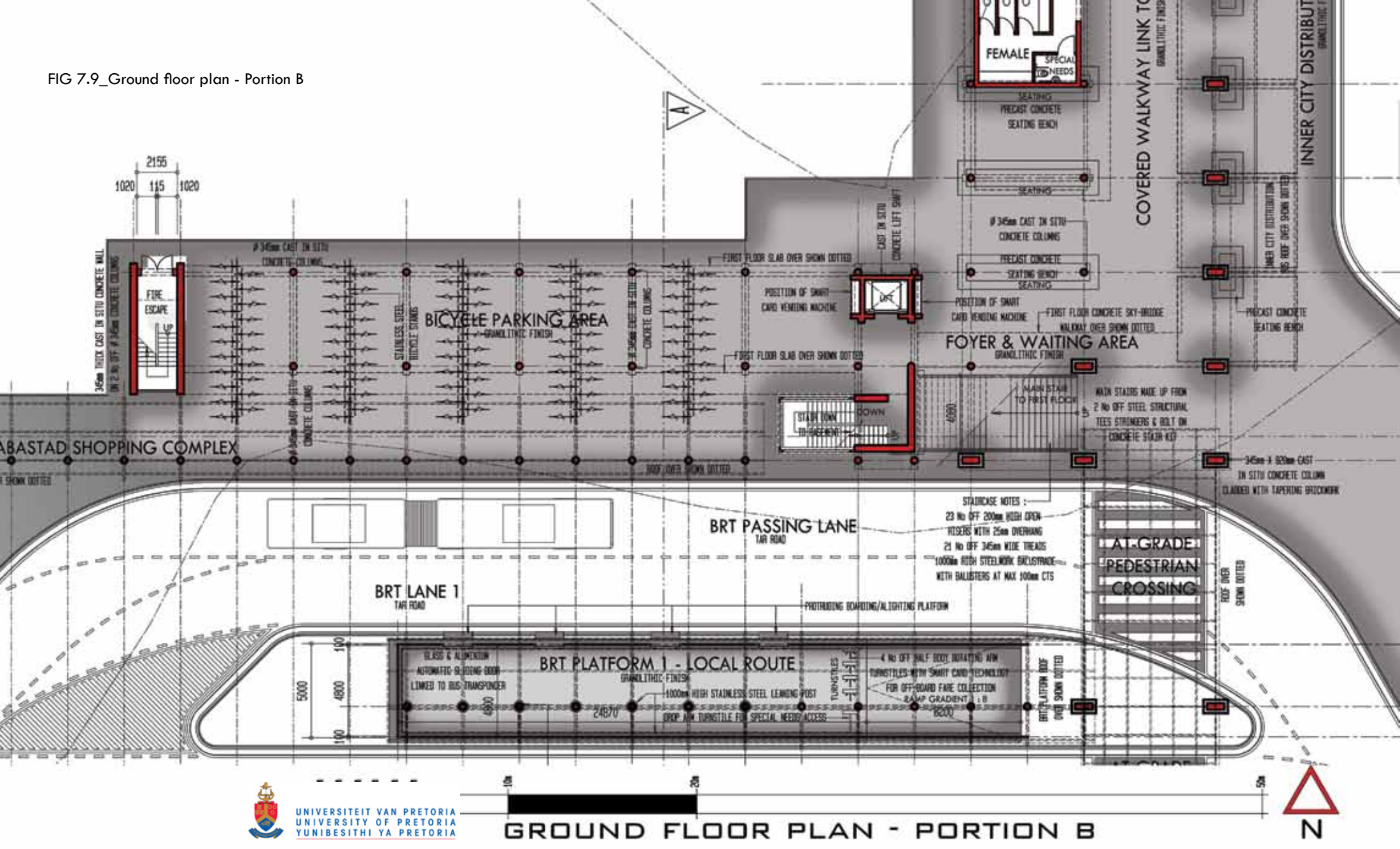
ND FLOOR PLAN - PORTION A

FIG 7.9_Ground floor plan - Portion B



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GROUND FLOOR PLAN - PORTION B

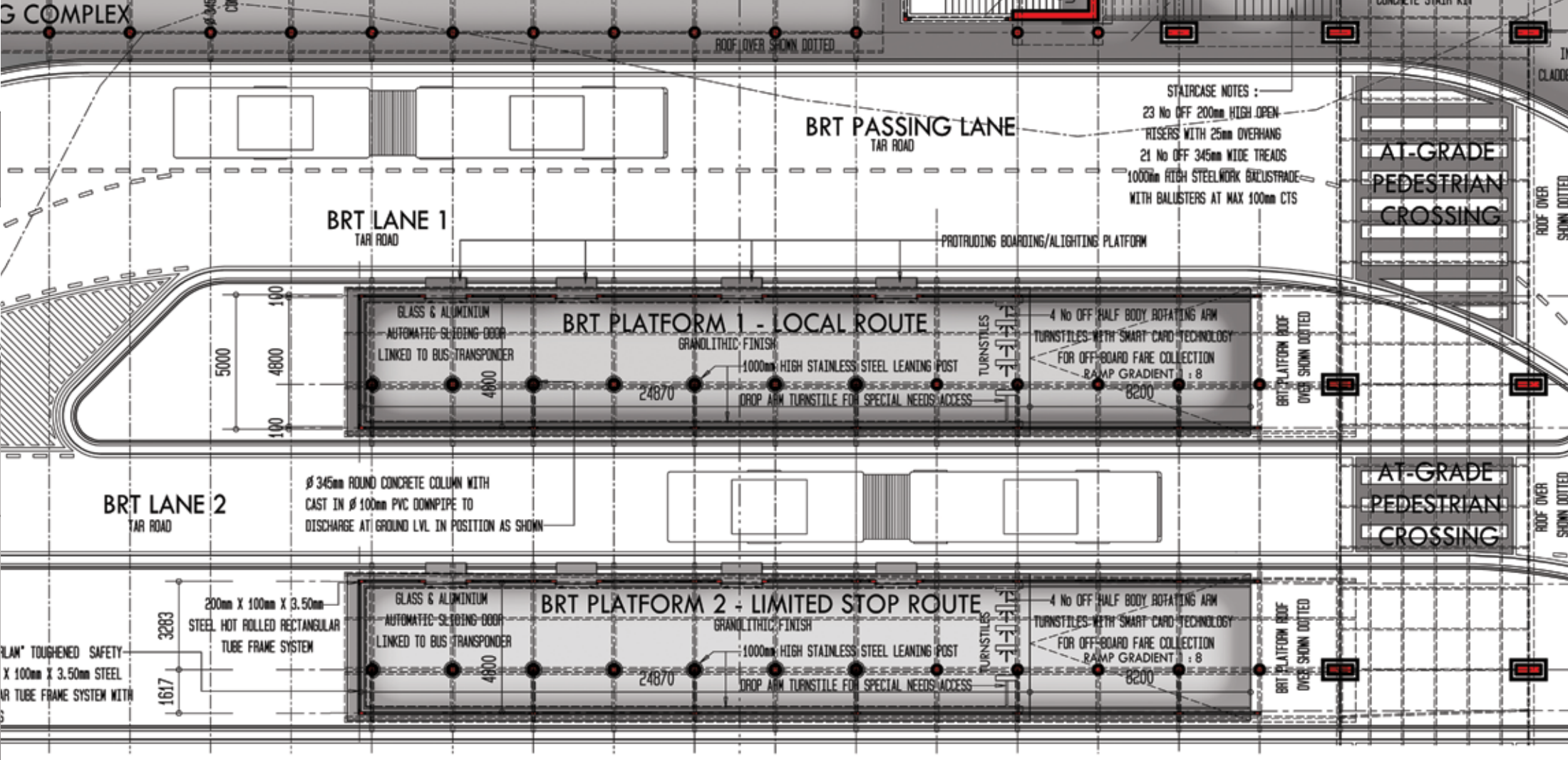


FIG 7.10_Ground floor plan - Portion C

GROUND FLOOR PLAN - PORTION C

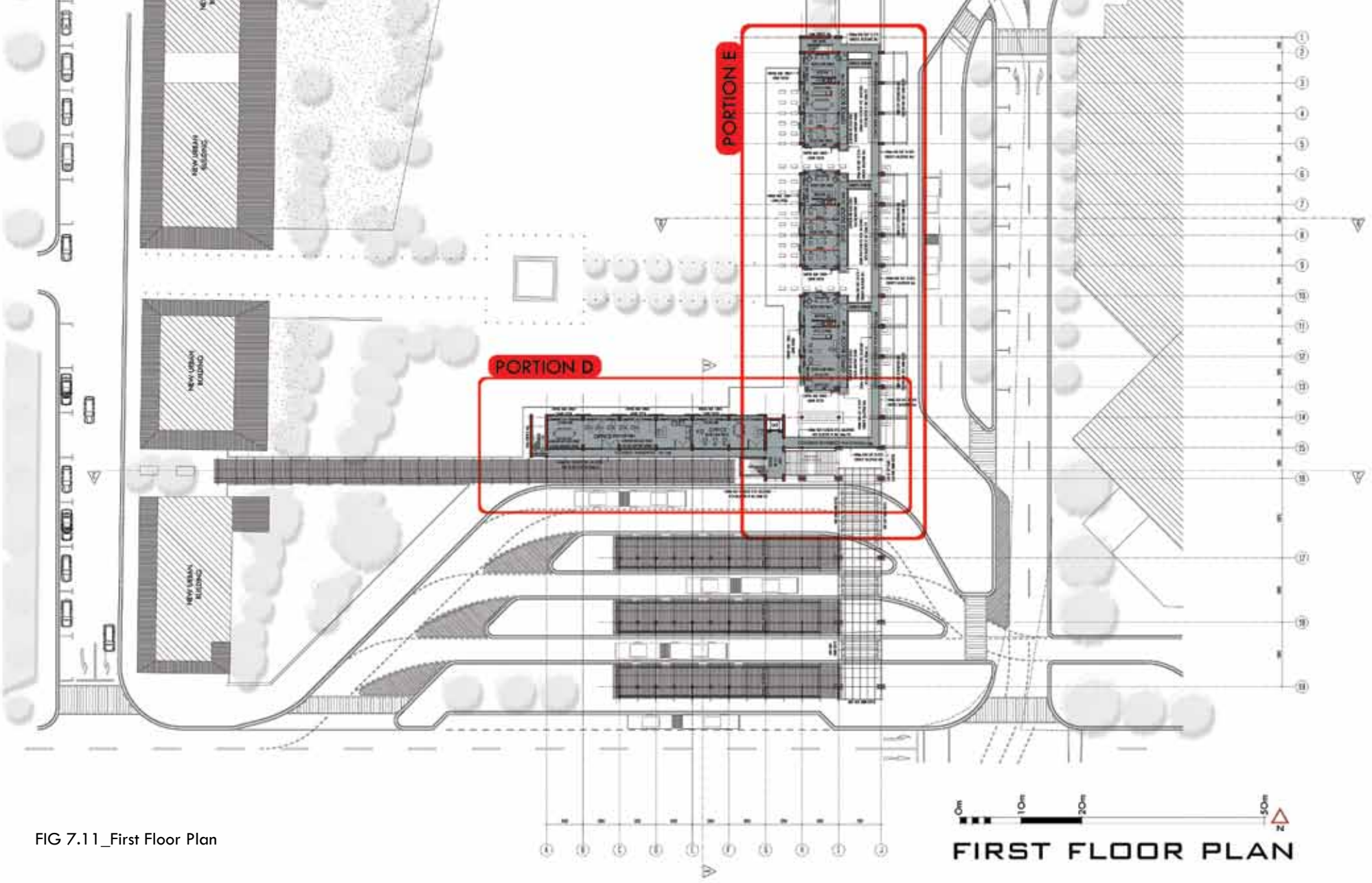


FIG 7.11_First Floor Plan

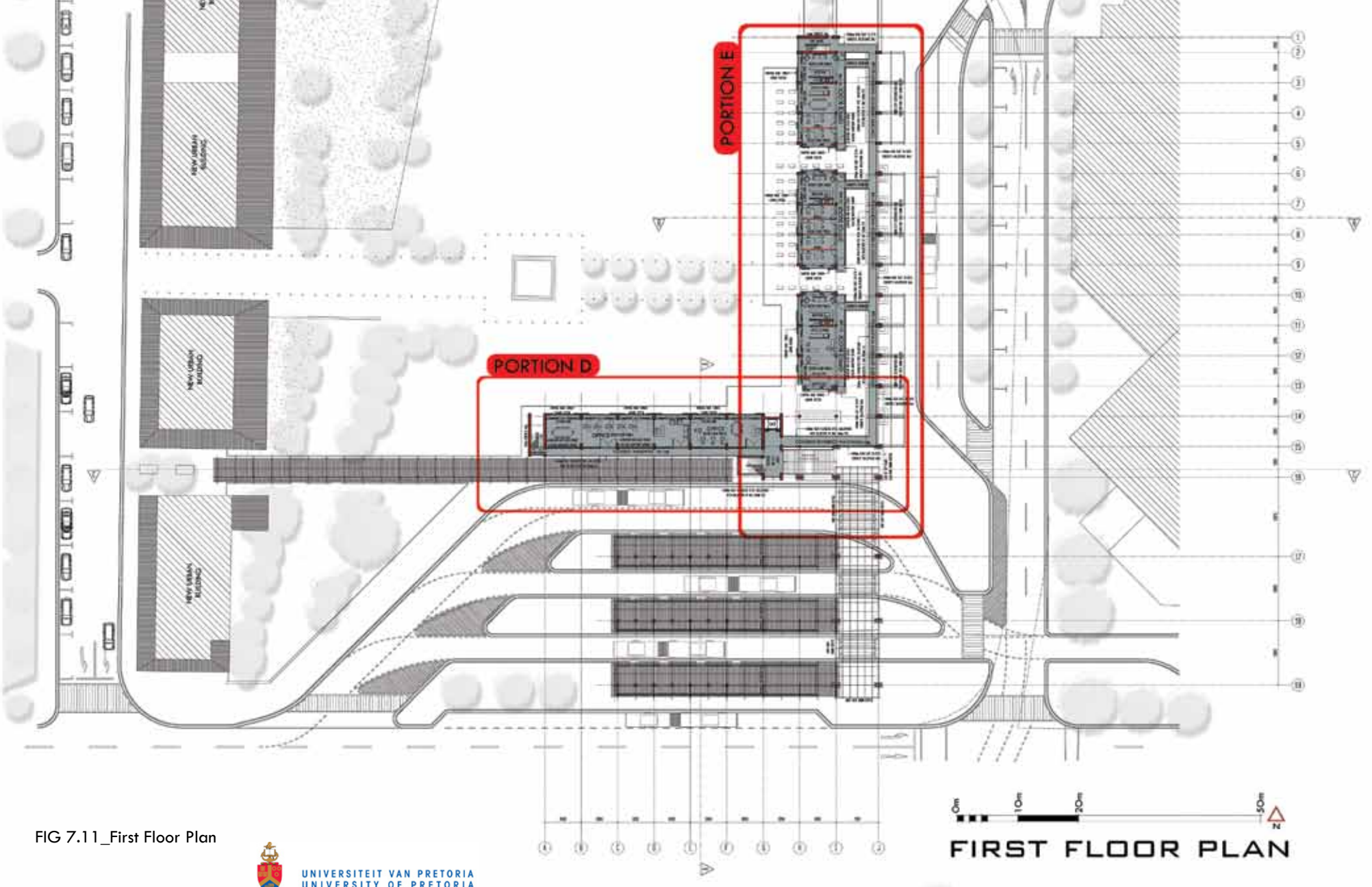


FIG 7.11_First Floor Plan

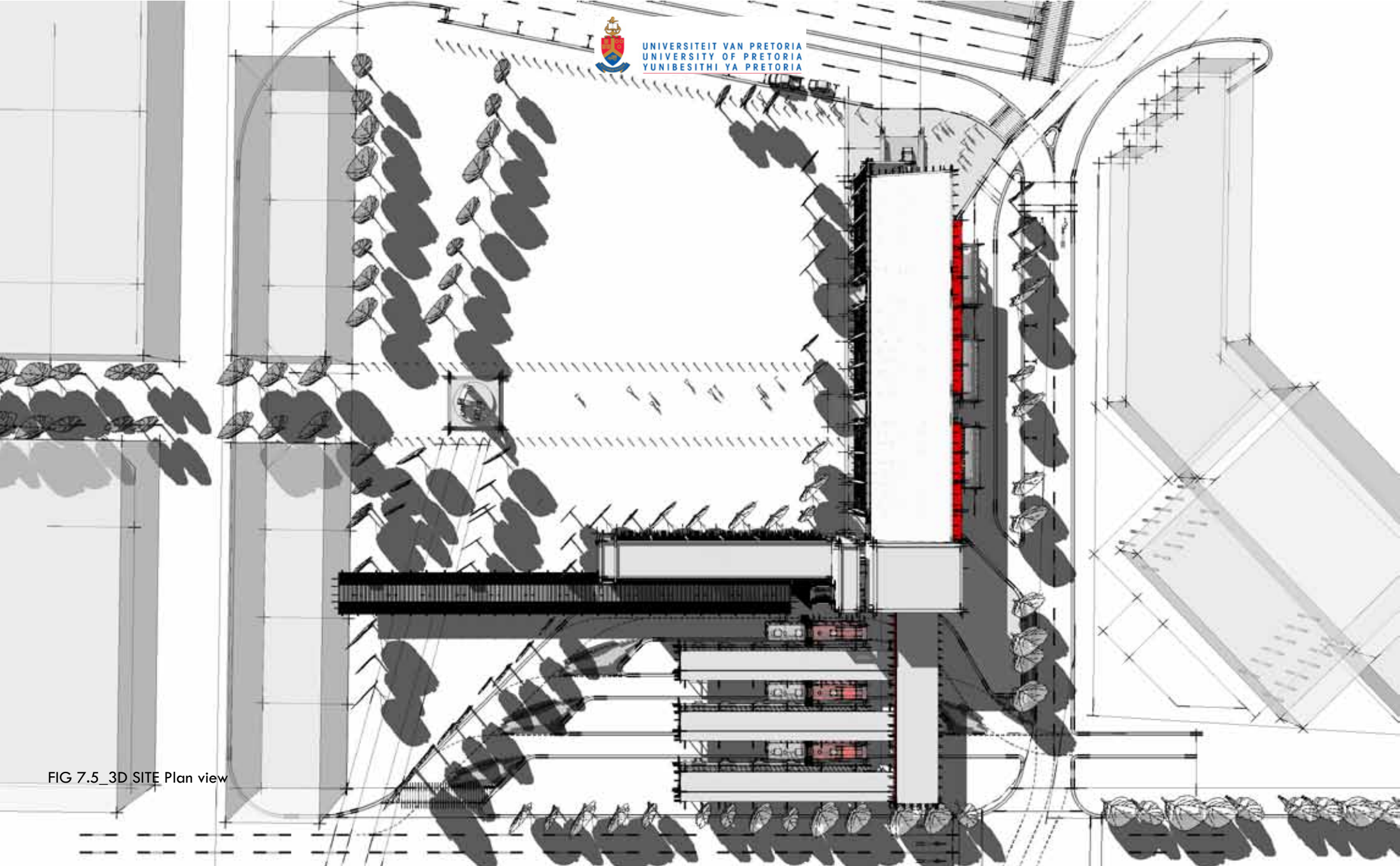
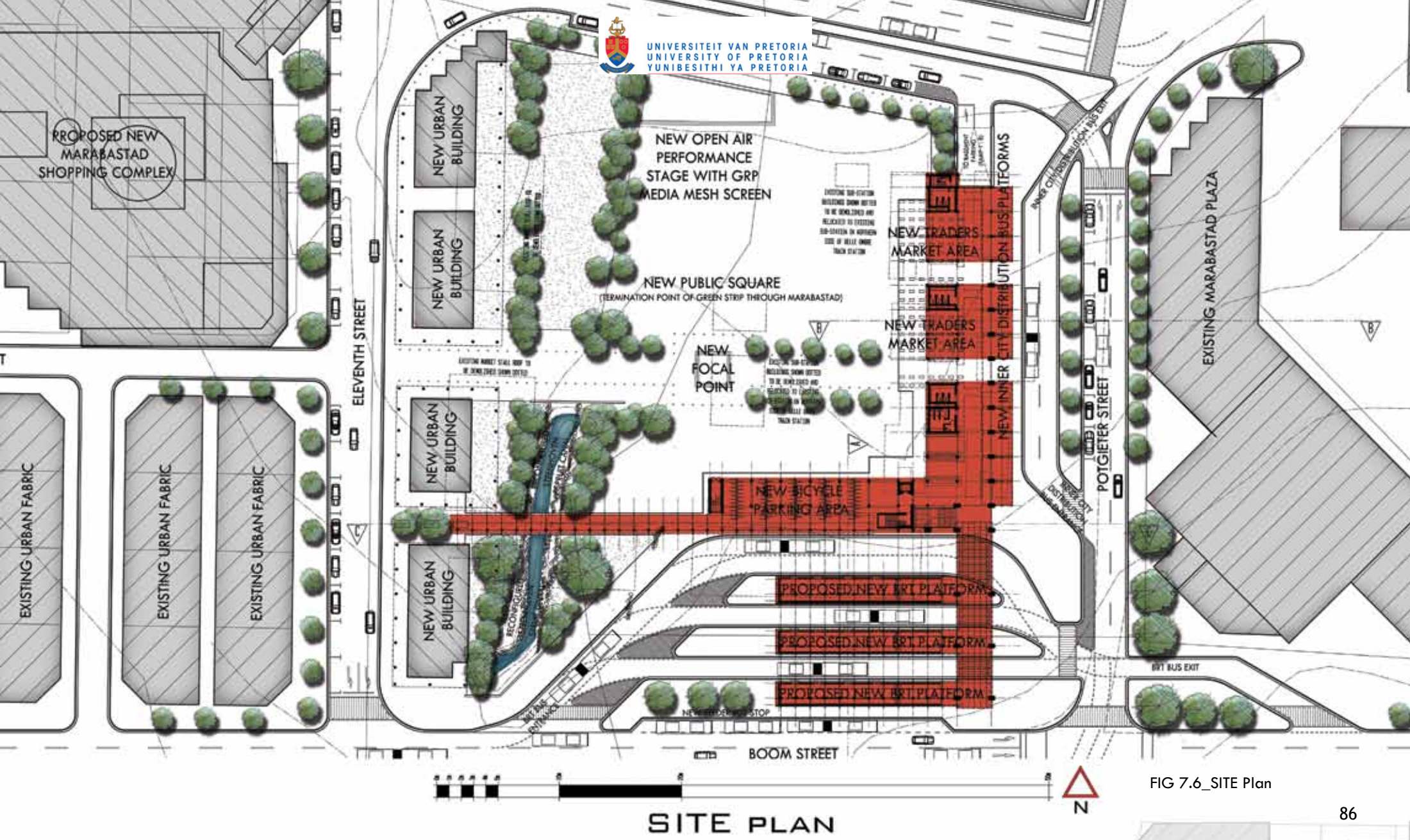


FIG 7.5_3D SITE Plan view



SITE PLAN

FIG 7.6_SITE Plan

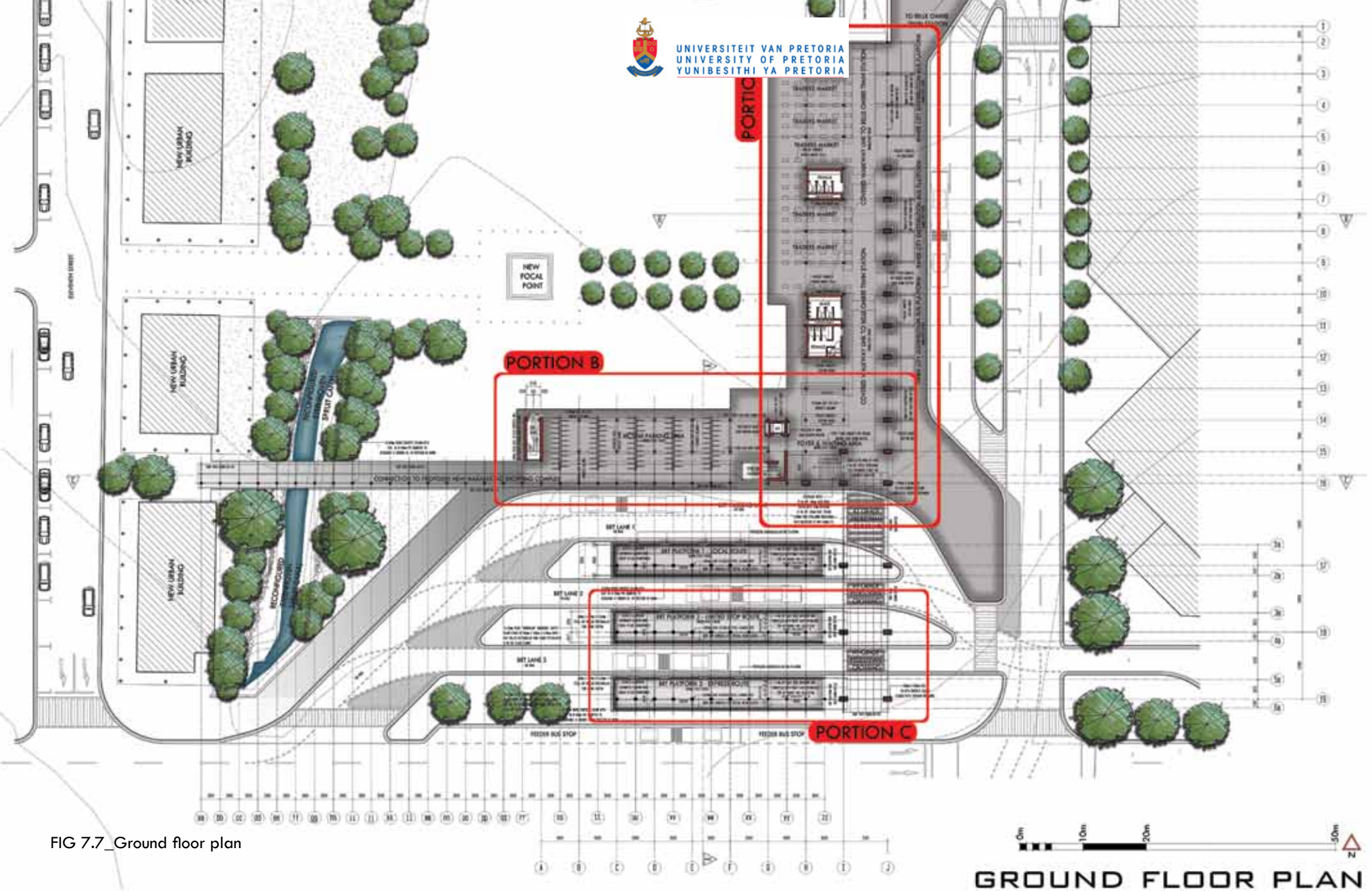


FIG 7.7_Ground floor plan

FIG 7.8_Ground floor plan - Portion A

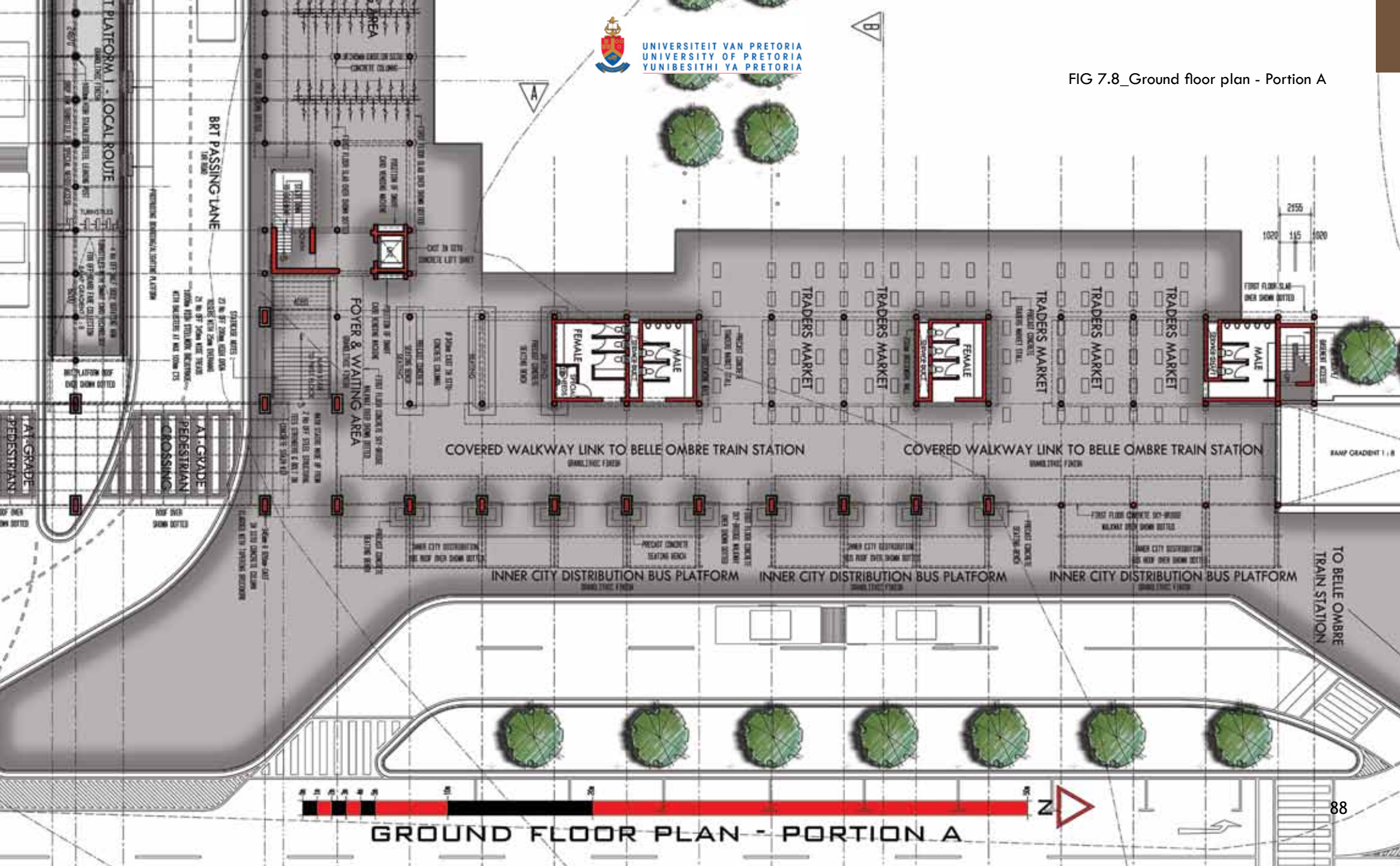
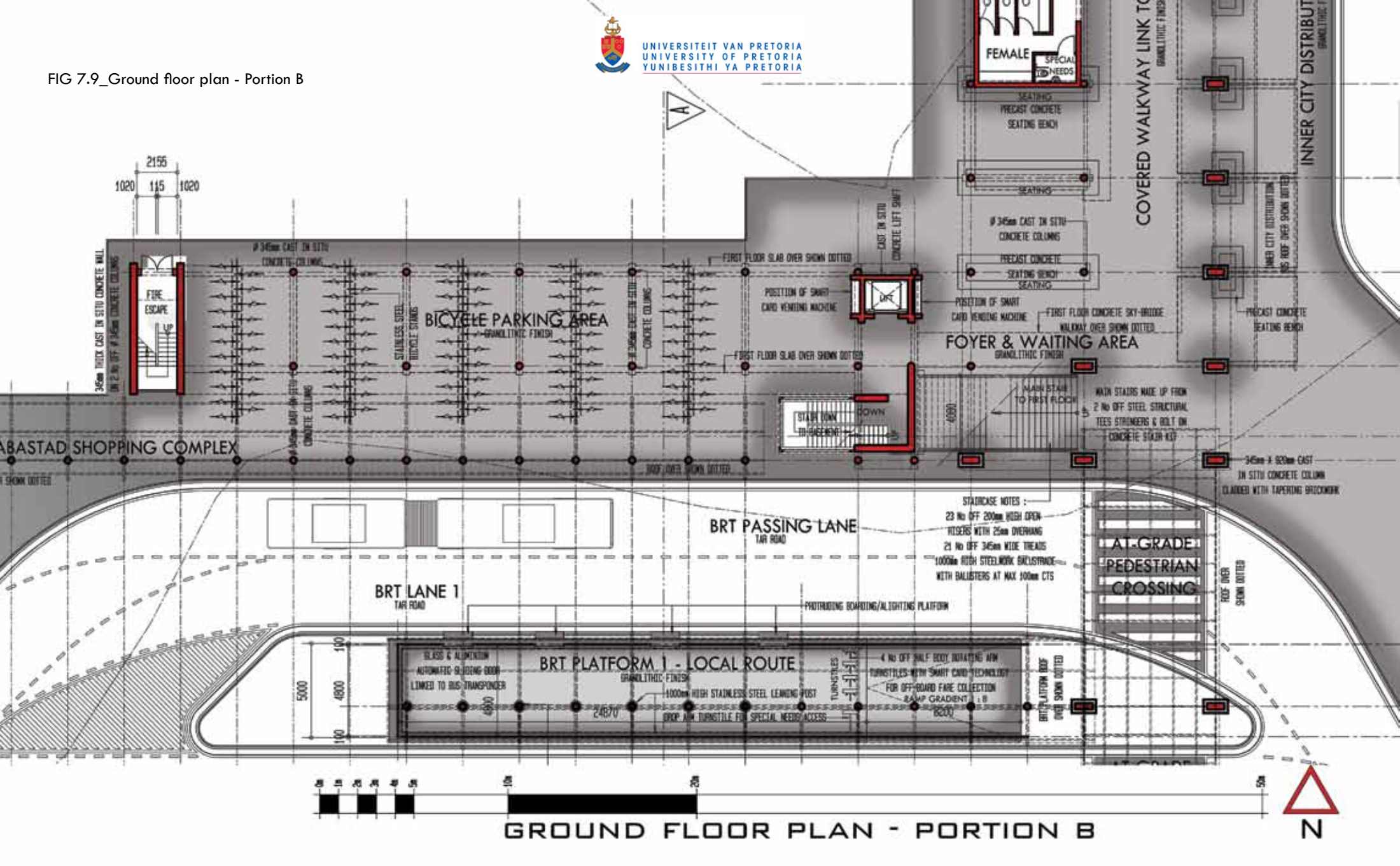


FIG 7.9_Ground floor plan - Portion B



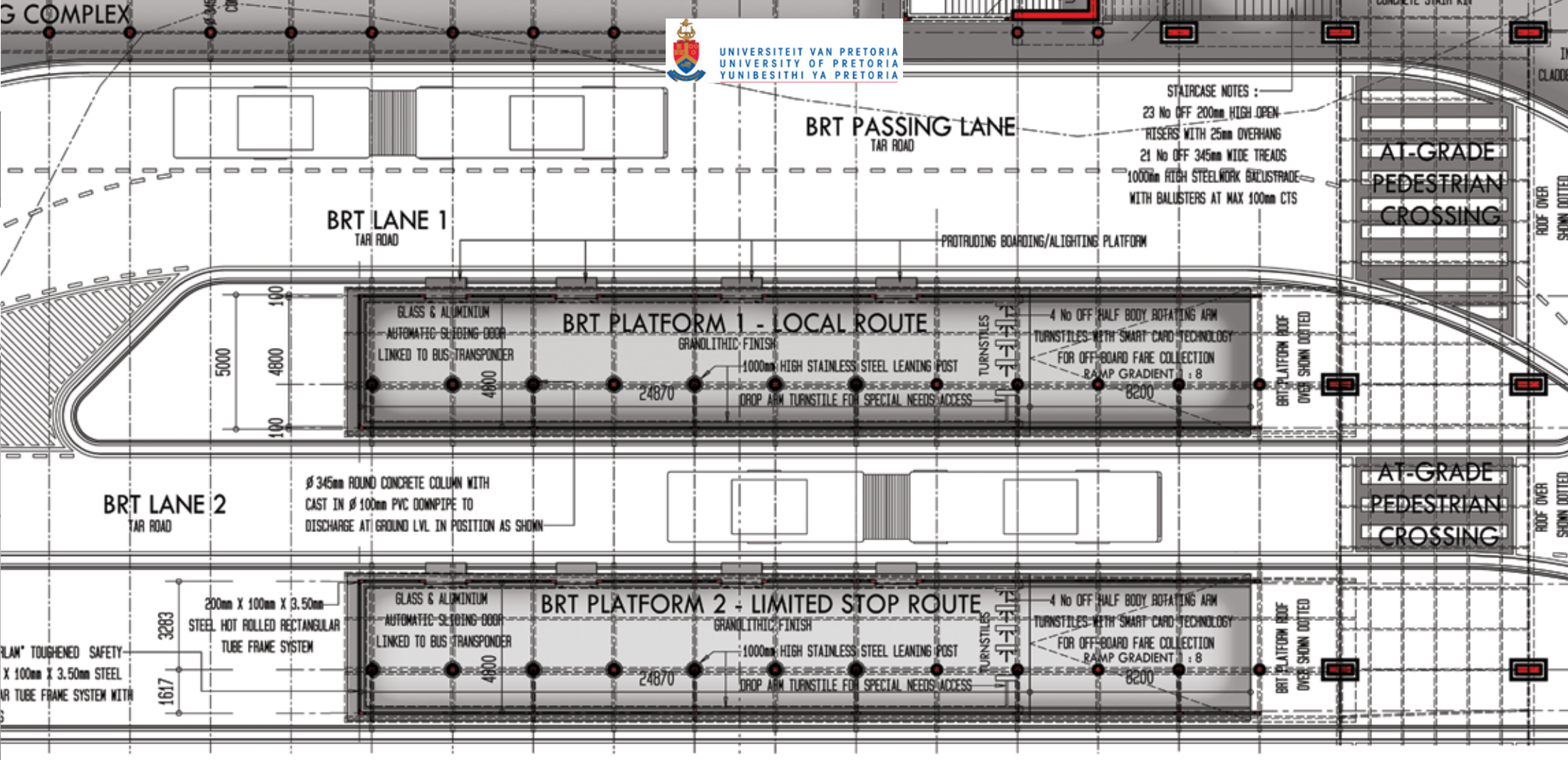
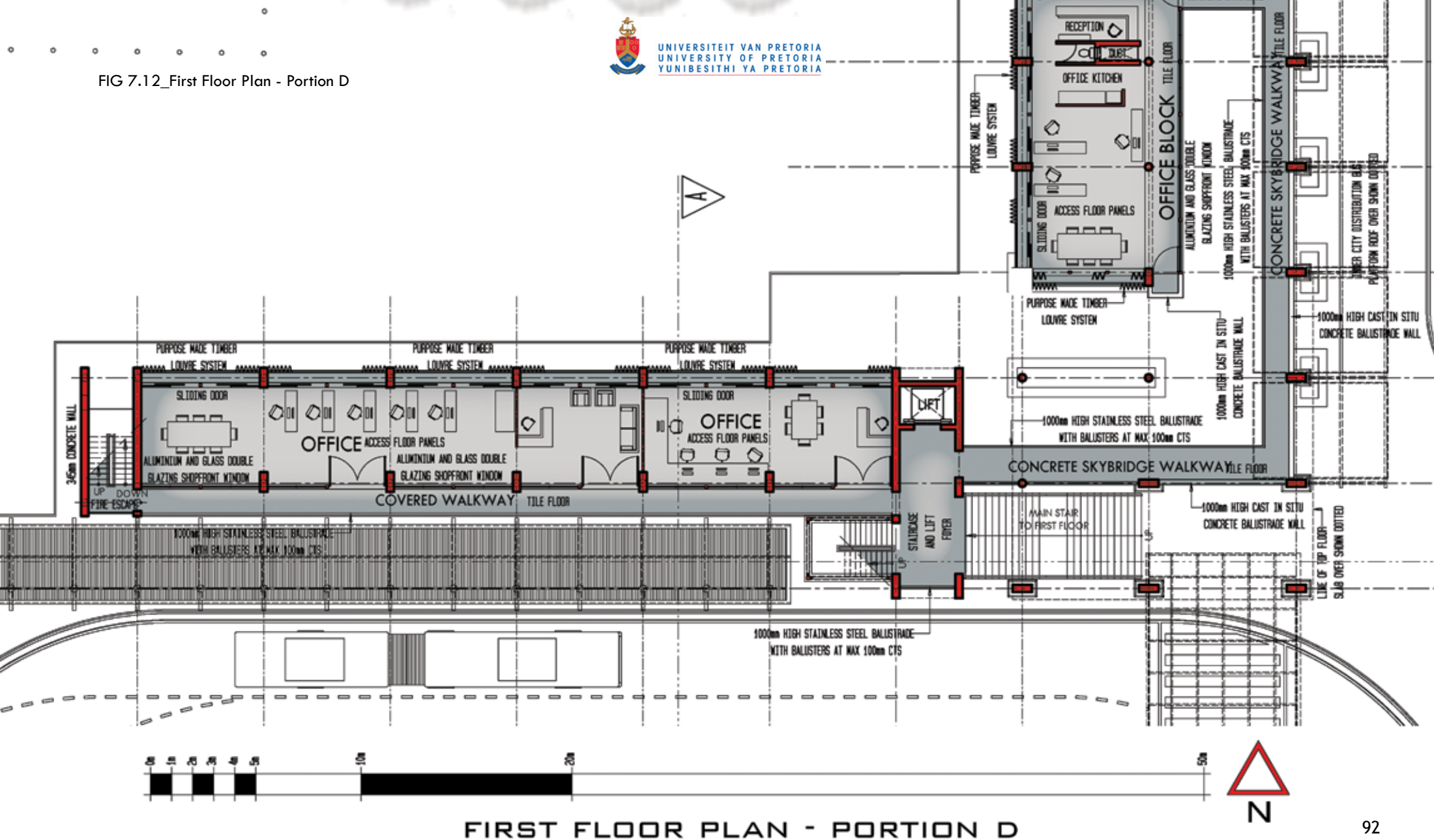


FIG 7.10_Ground floor plan - Portion C

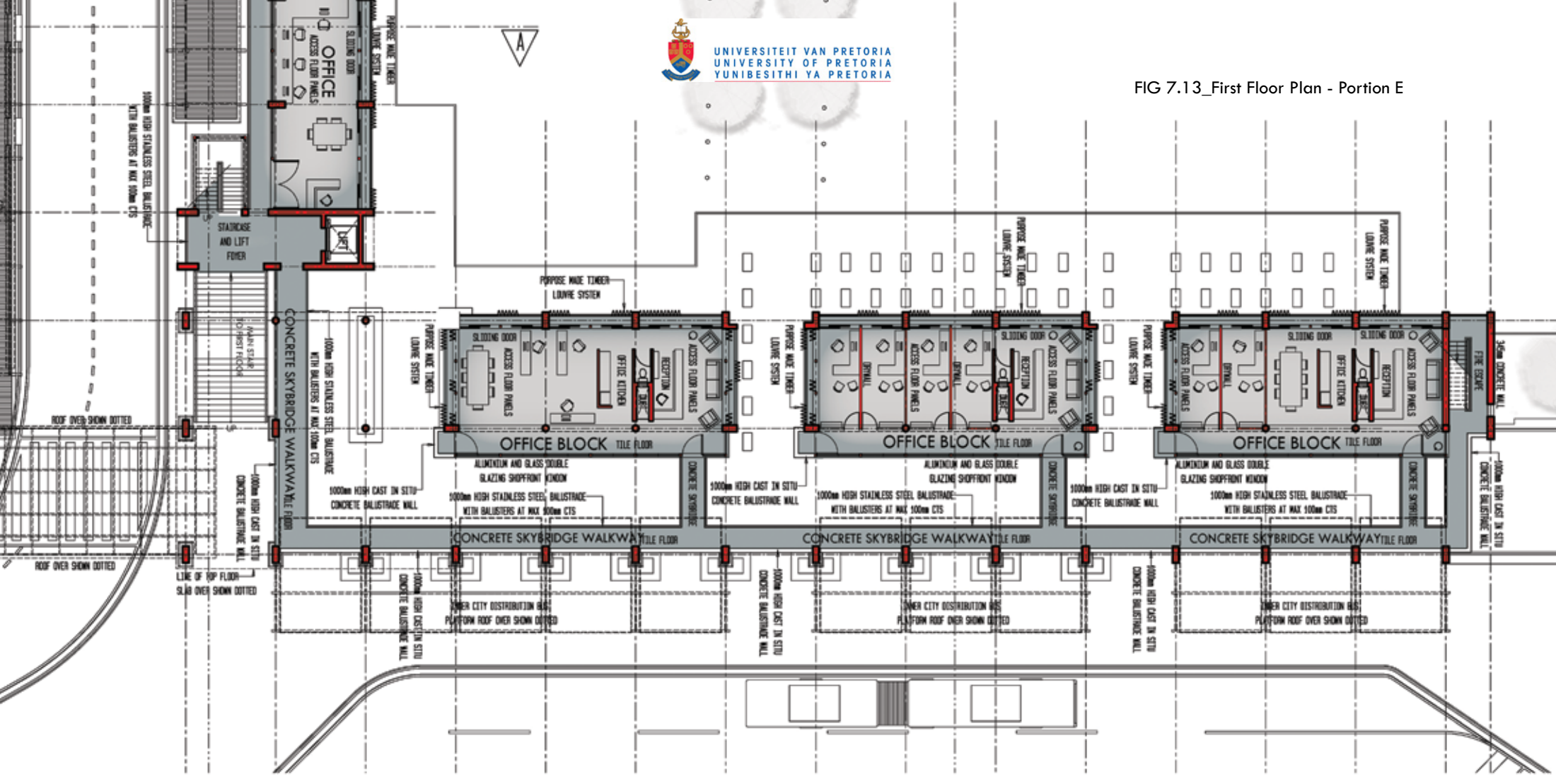
GROUND FLOOR PLAN - PORTION C

FIG 7.12_First Floor Plan - Portion D



FIRST FLOOR PLAN - PORTION D

FIG 7.13_First Floor Plan - Portion E



FIRST FLOOR PLAN - PORTION E

FIG 7.14_Second Floor plan

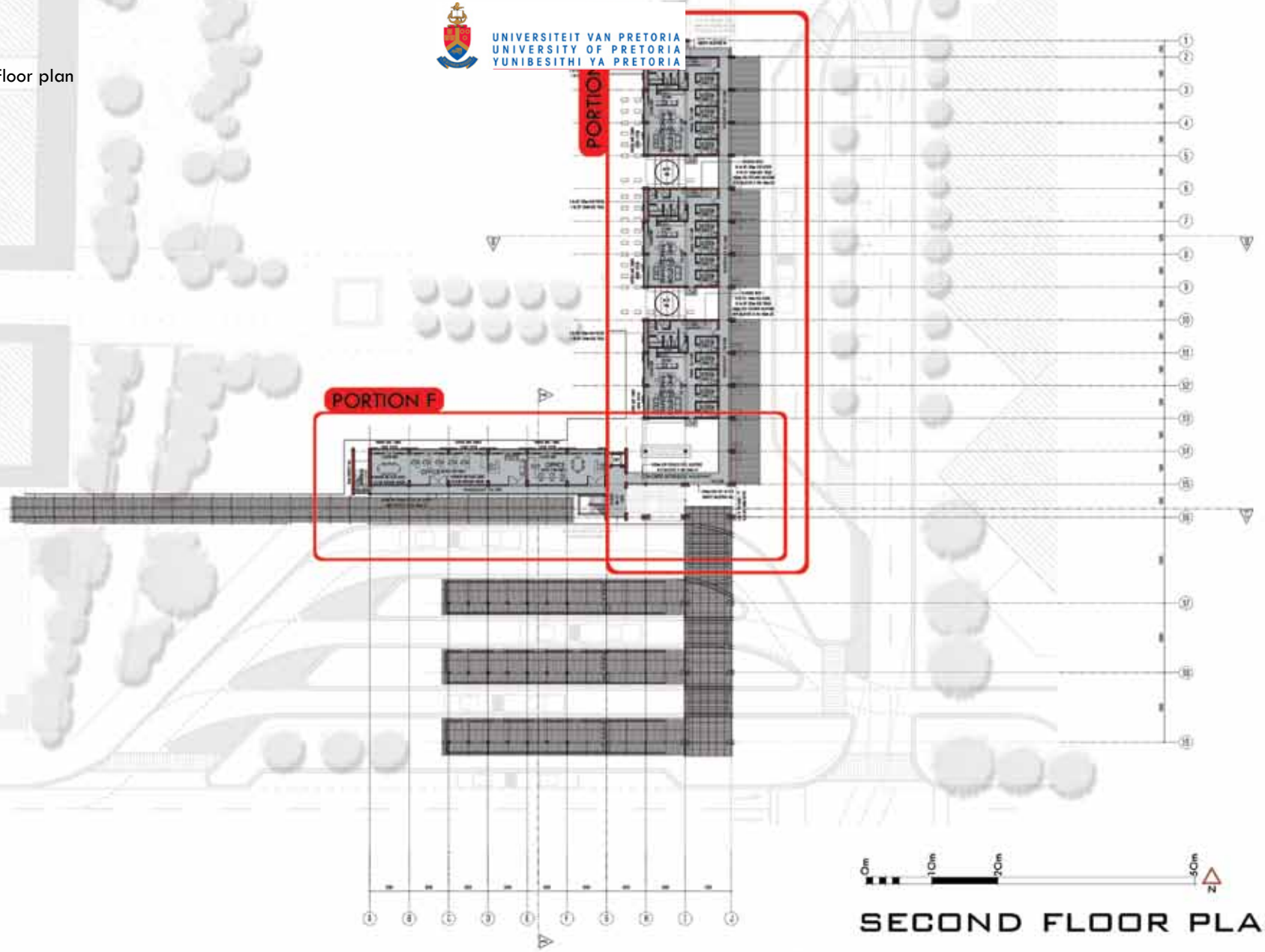
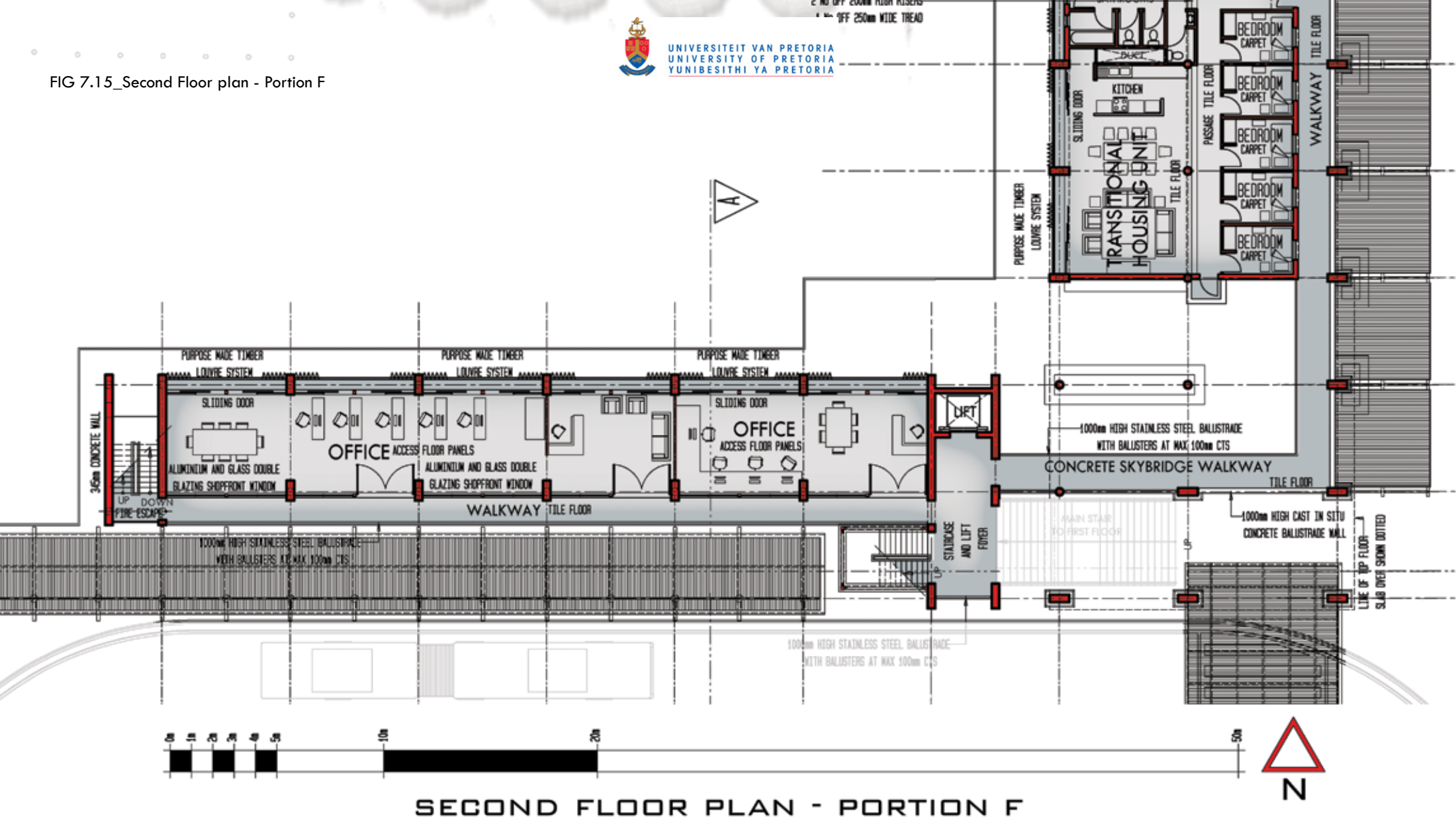
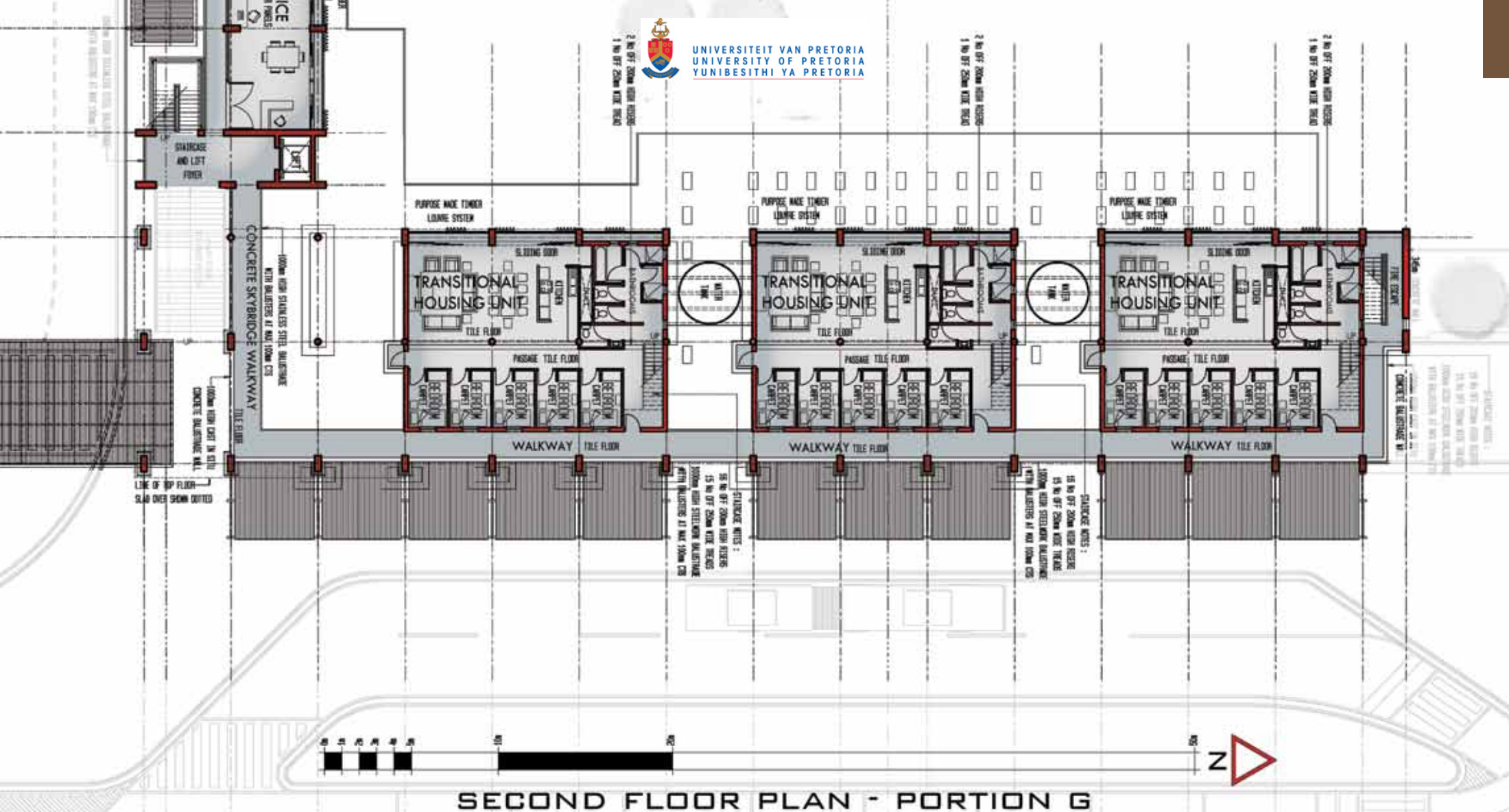


FIG 7.15_Second Floor plan - Portion F



SECOND FLOOR PLAN - PORTION F



SECOND FLOOR PLAN - PORTION G

FIG 7.16_Second Floor plan - Portion G

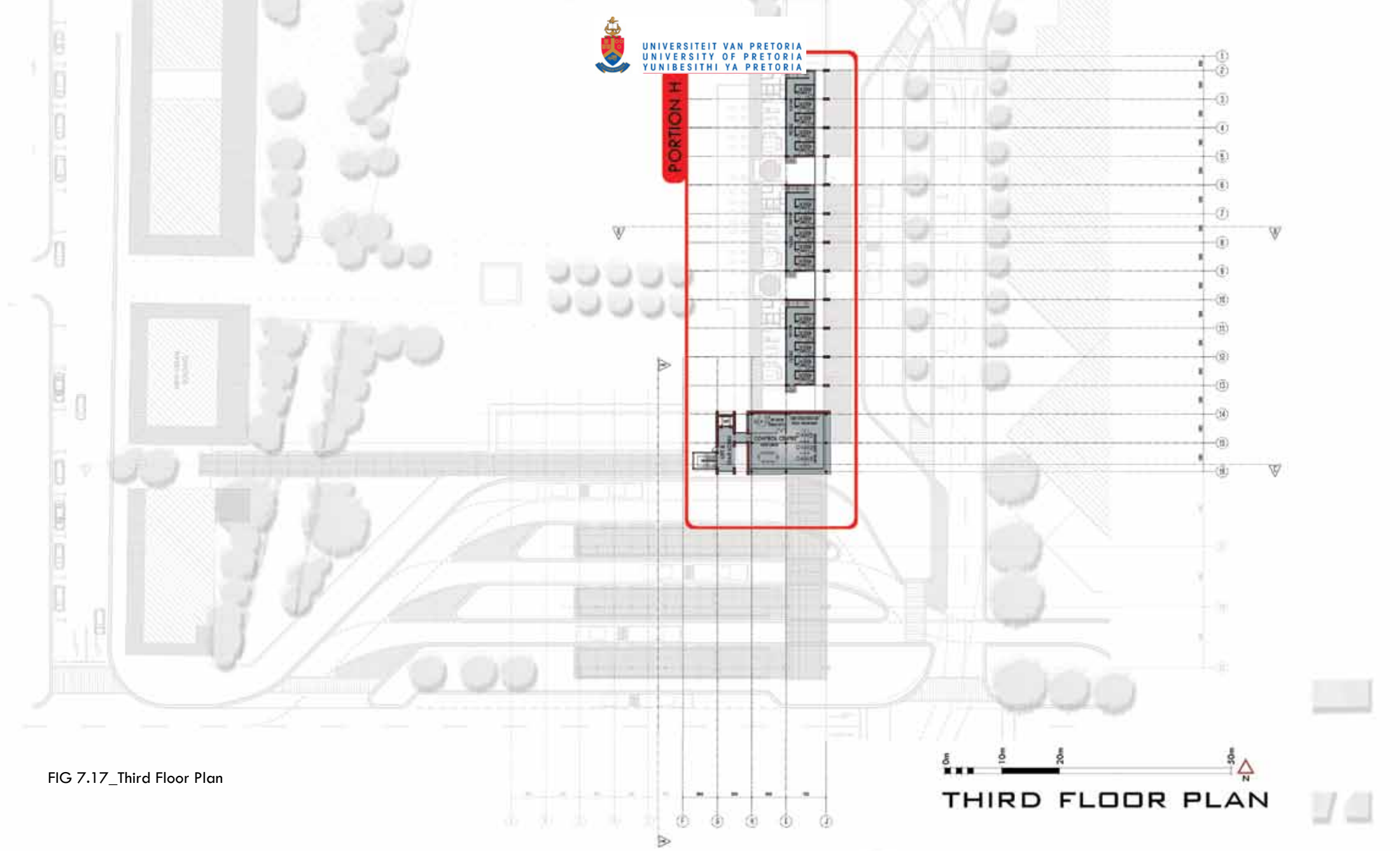
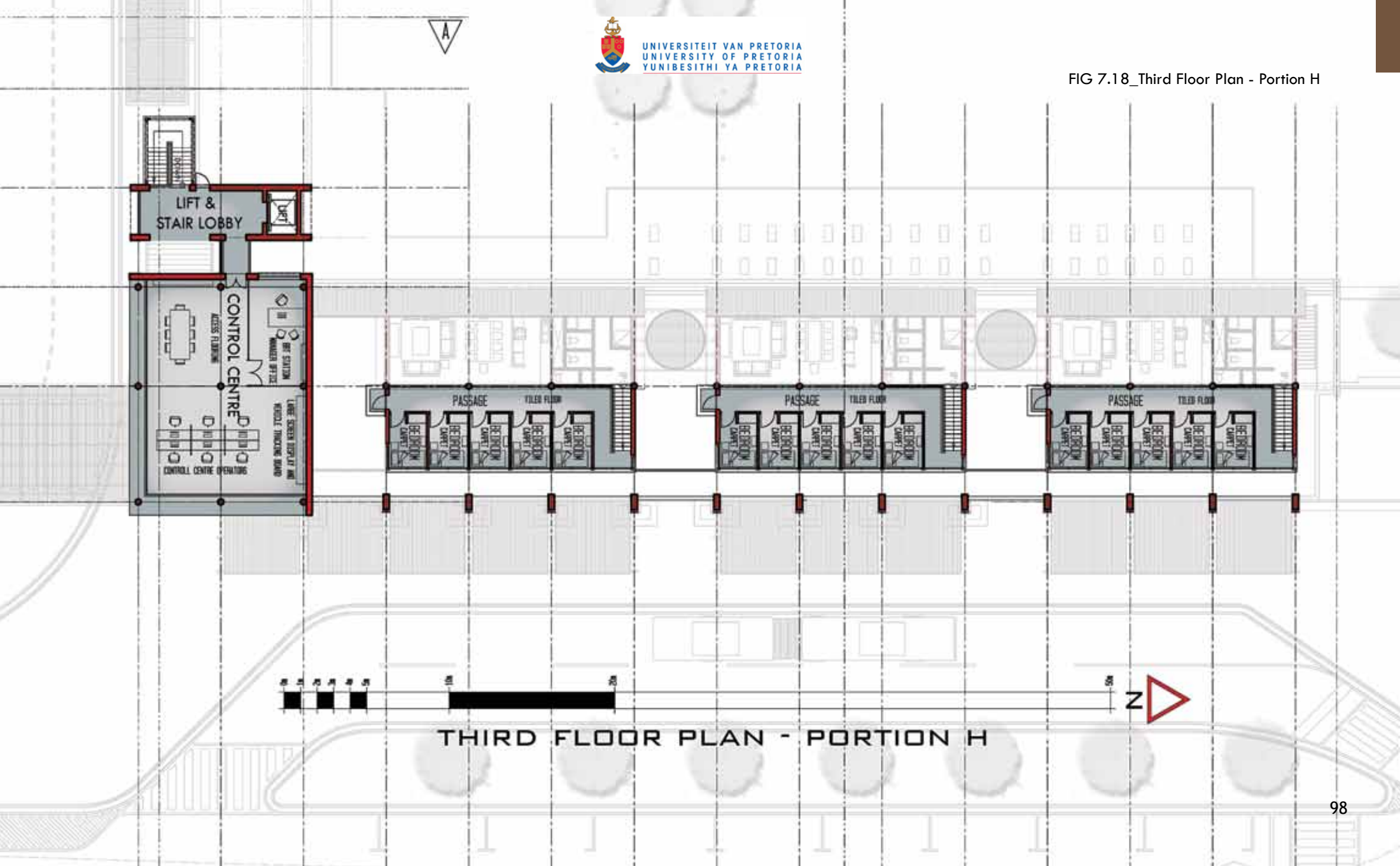


FIG 7.17_Third Floor Plan

FIG 7.18_Third Floor Plan - Portion H



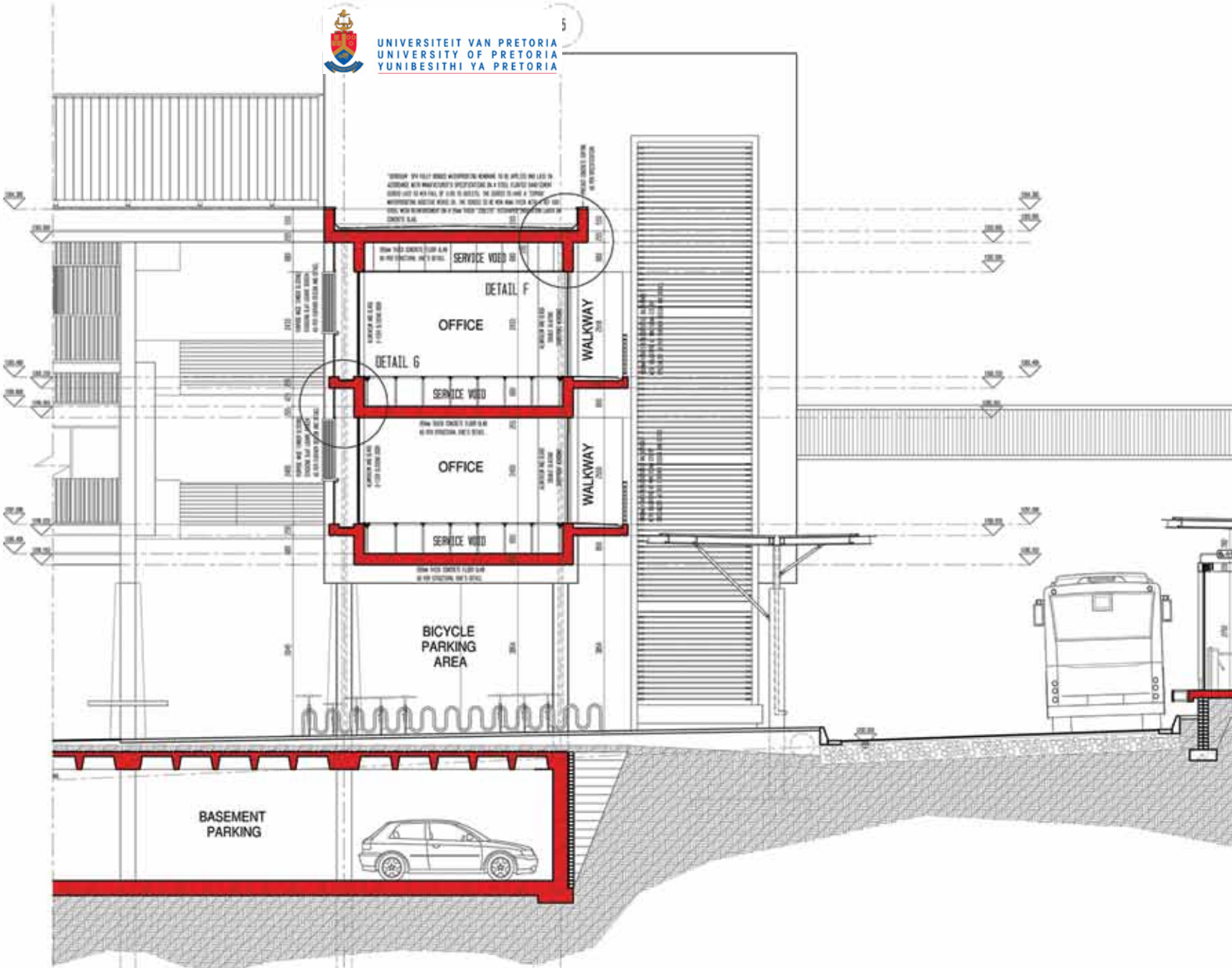
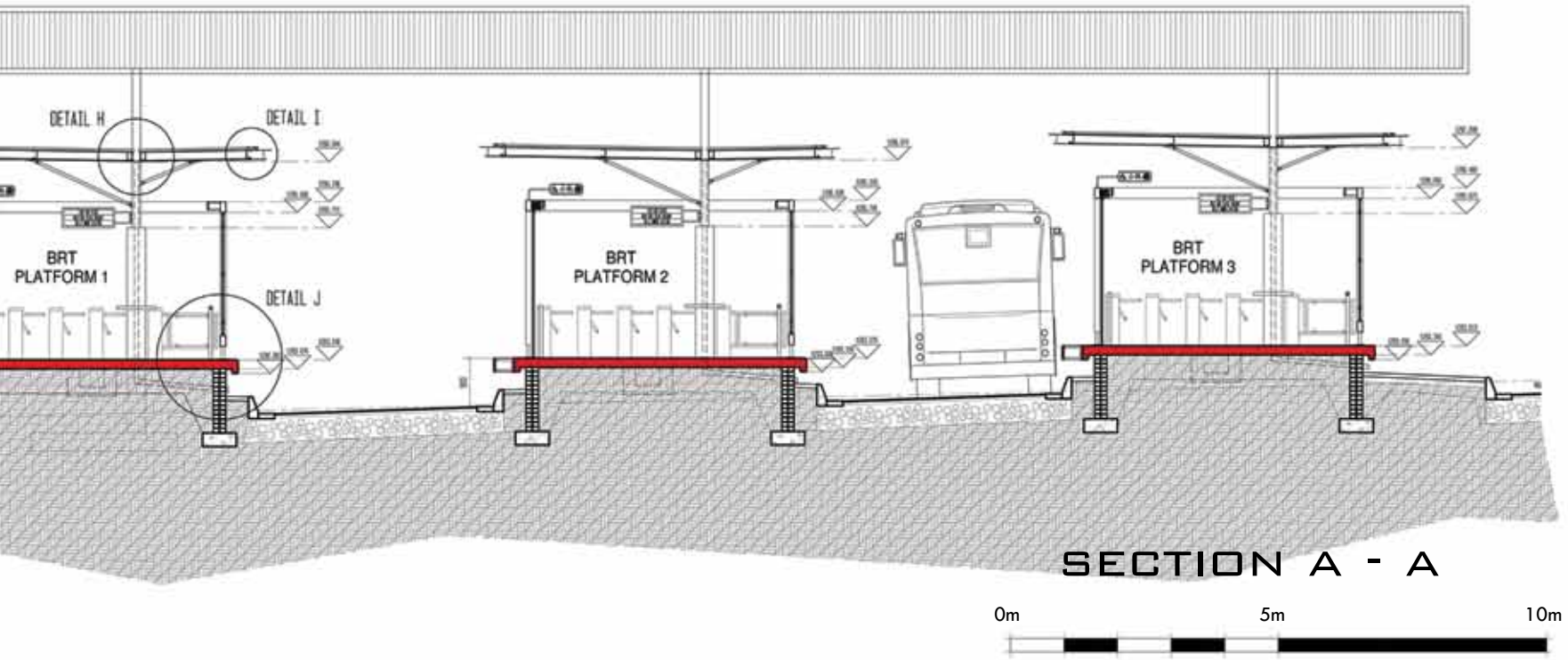

SERVICE VOID
DETAIL F
OFFICE
WALKWAY
DETAIL G
SERVICE VOID
OFFICE
WALKWAY
SERVICE VOID
BICYCLE
PARKING
AREA
BASEMENT
PARKING

FIG 7.19_Section A - A



SECTION A - A

0m 5m 10m

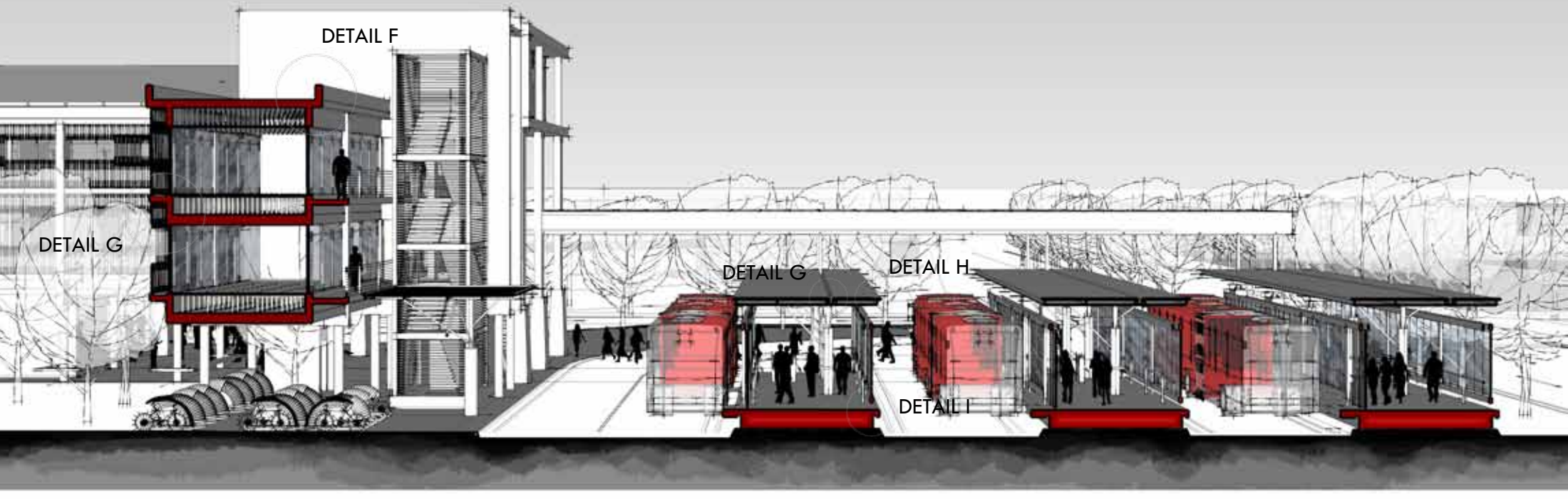
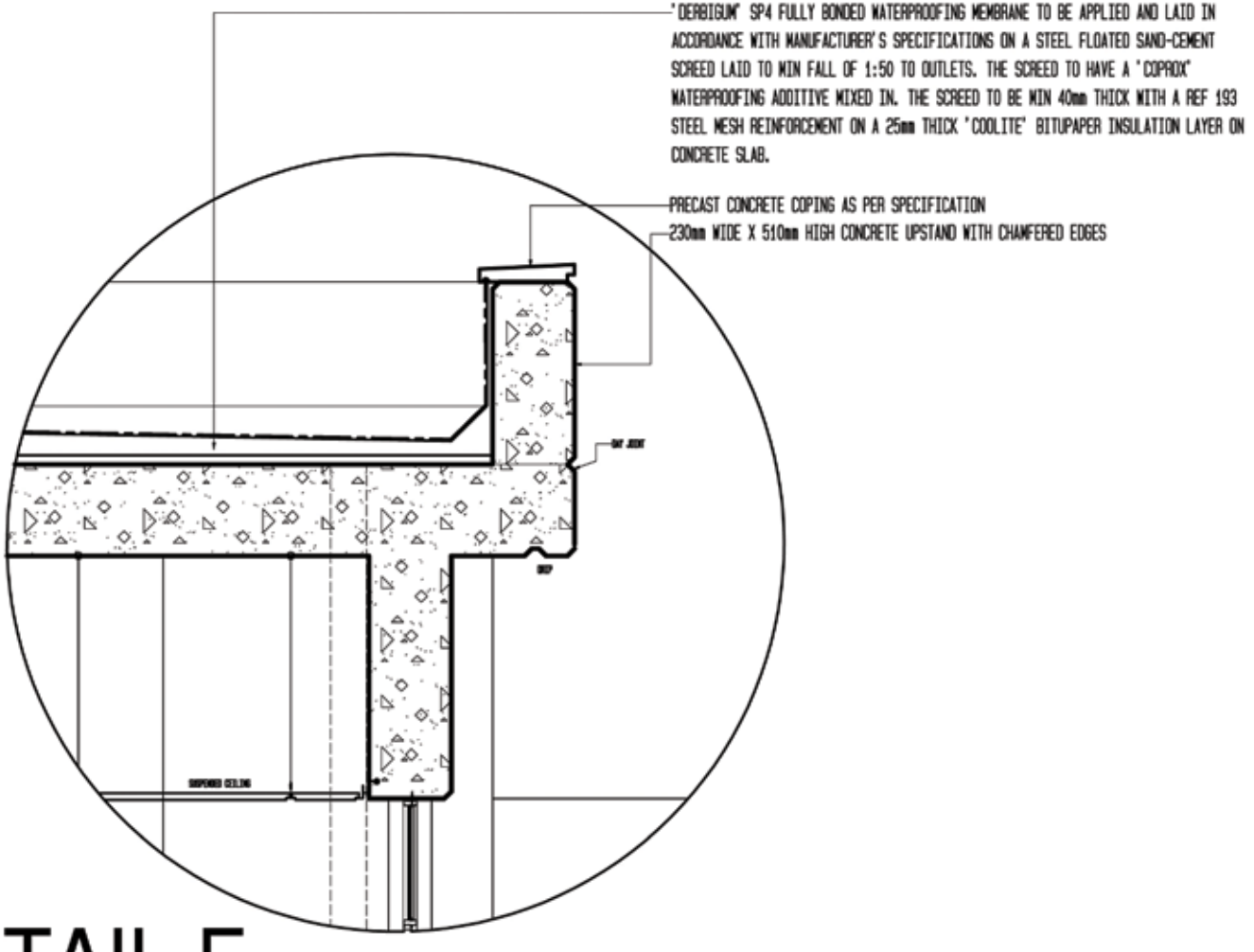


FIG 7.20_Section A - A 3D View

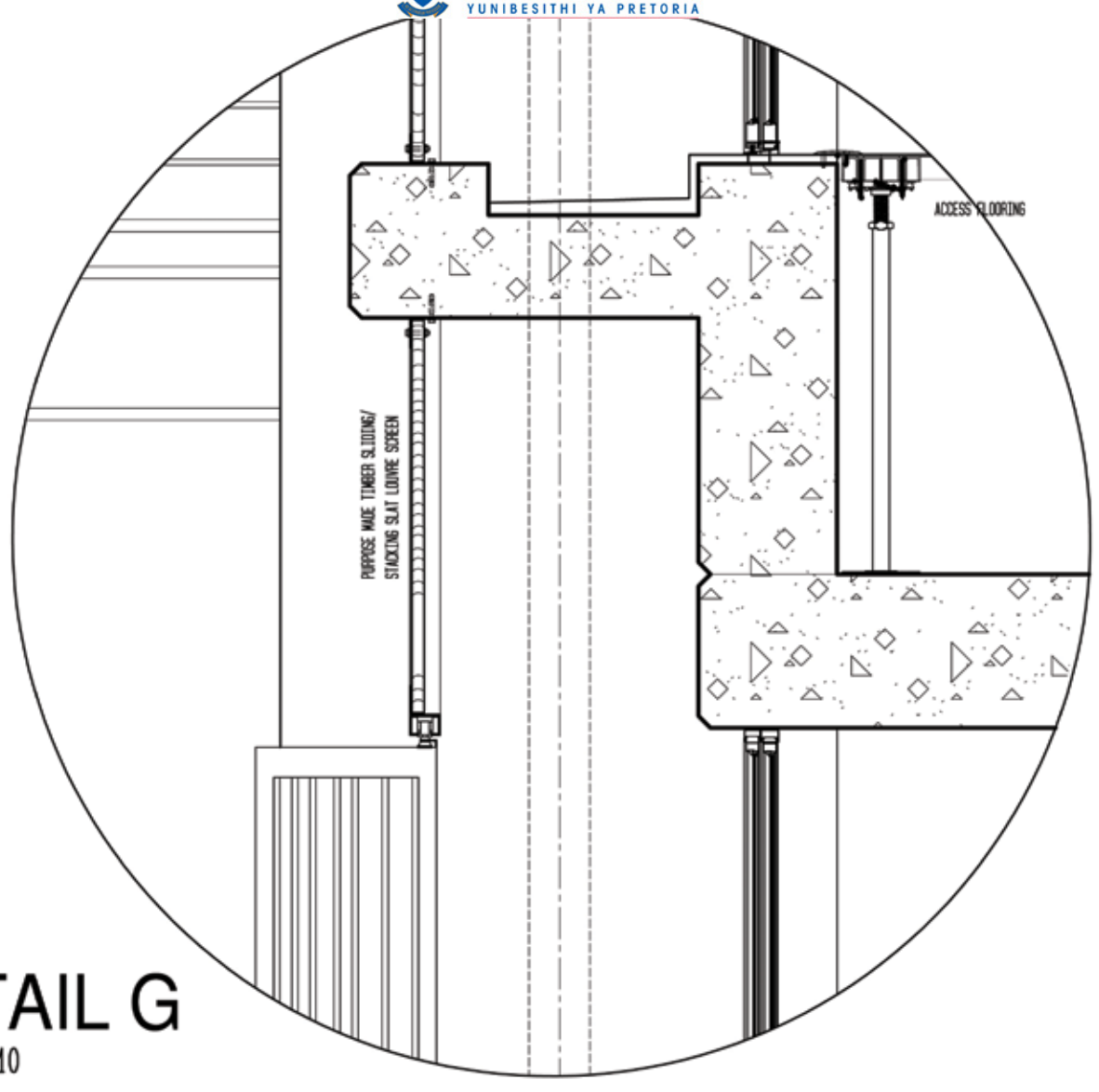


DETAIL F

SCALE 1 : 20

FIG 7.21_Detail F

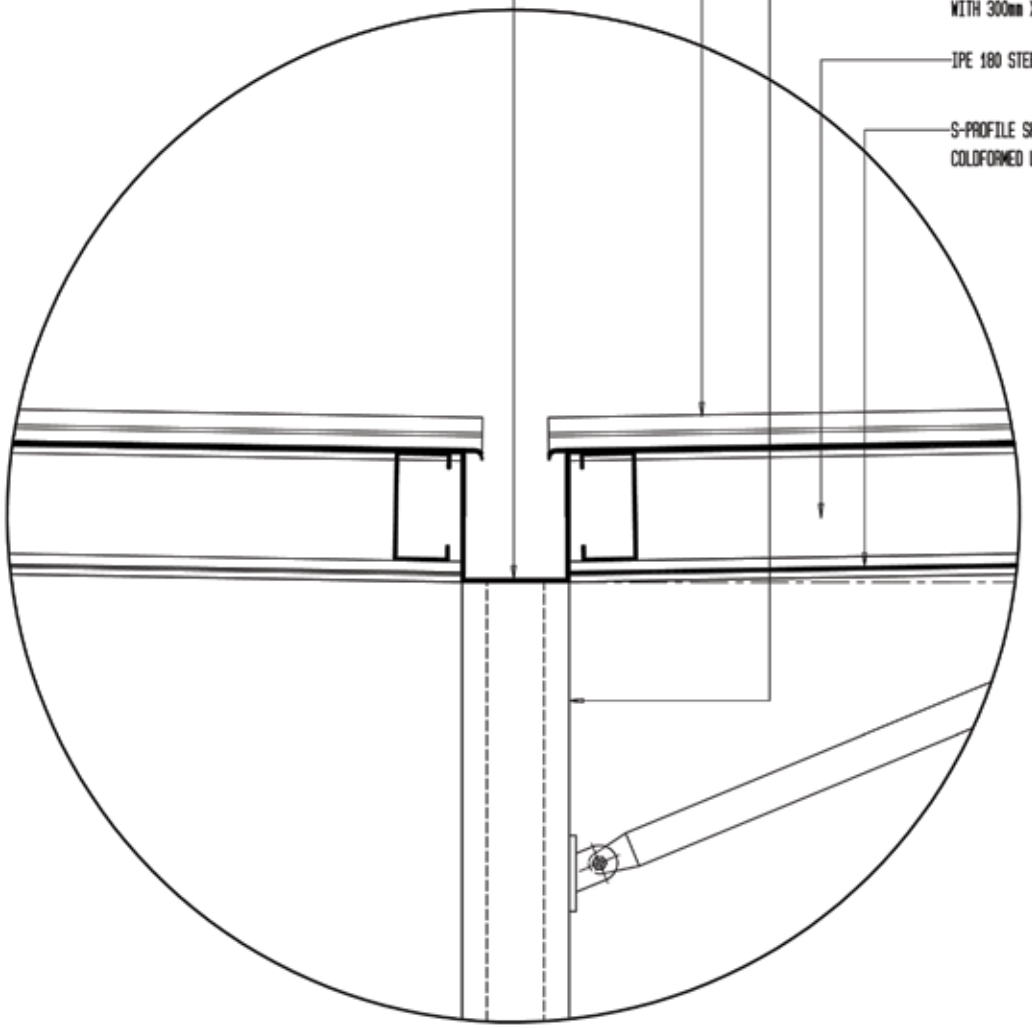
FIG 7.22_Detail G



DETAIL G

SCALE 1 : 10

FIG 7.23_Detail H



IGH X 150mm WIDE PURPOSE MADE STEEL GUTTER BEAM MADE UP OF 4mm THICK STEEL
TO 150mm X 150mm X 4mm STEEL SQUARE HOLLOW TUBE COLUMN

ROOF NOTE :
0,58mm THICK 'BROWNBUILT' GALVANISED ROOF SHEETING AT 1 deg PITCH WITH GLOBALCOAT FINISH,
COLOUR : DOVE GREY ON 100 X 50 X 20 X 2.0mm COLDFORMED LIPPED CHANNEL PURLINS AT MAXIMUM 1000mm CTS FIXED TO
IPE 180 STEEL ROOF BEAMS ALL AS PER STRUCTURAL ENG DESIGN AND DETAIL

150mm X 150mm X 4mm SQUARE HOLLOW TUBE COLUMN FIXED TO CONCRETE COLUMN
WITH 300mm X 300mm X 5mm STEEL FIXING PLATE AS PER STRUCTURAL ENG

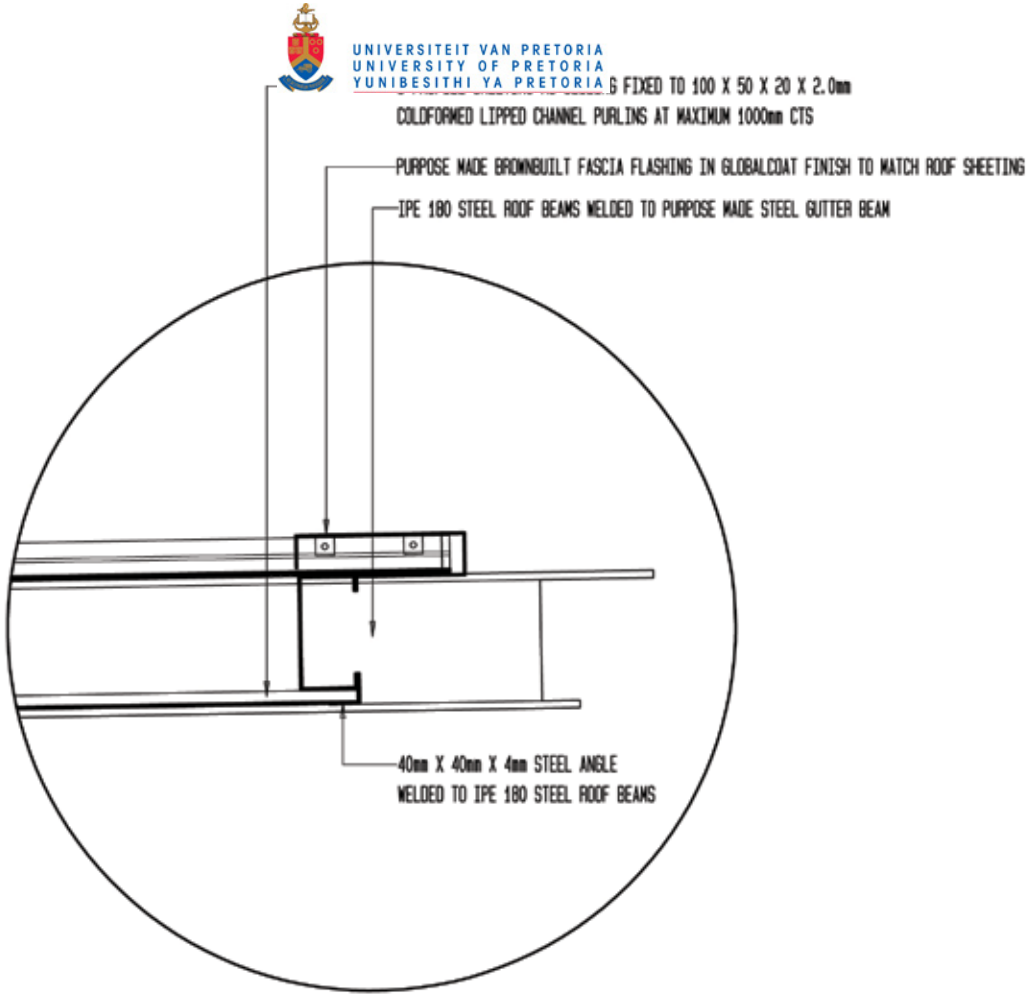
IPE 180 STEEL ROOF BEAMS WELDED TO PURPOSE MADE STEEL GUTTER BEAM

S-PROFILE SHEETING AS CEILING FIXED TO 100 X 50 X 20 X 2.0mm
COLDFORMED LIPPED CHANNEL PURLINS AT MAXIMUM 1000mm CTS

DETAIL H

SCALE 1 : 10

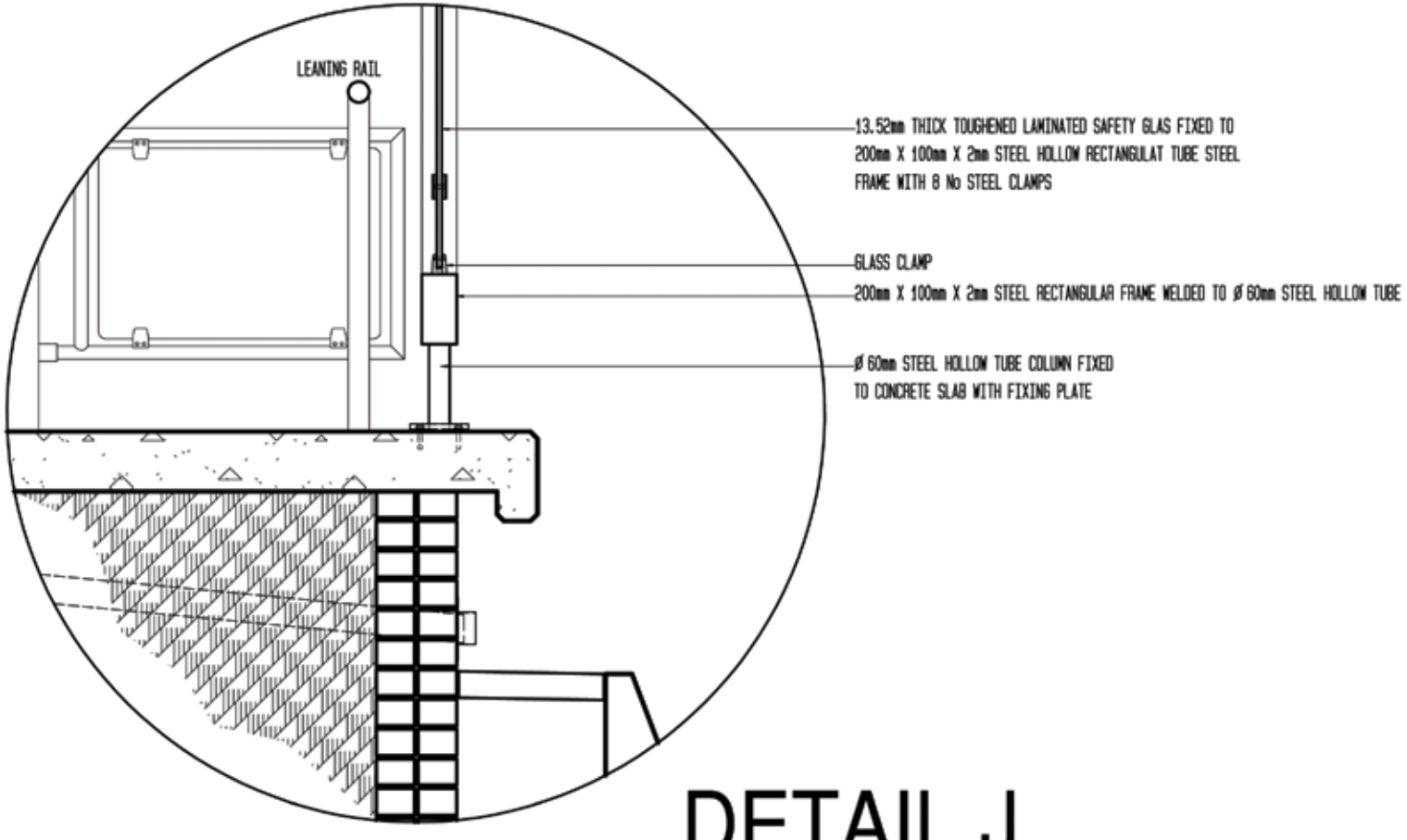
FIG 7.24_Detail I



DETAIL I

SCALE 1 : 10

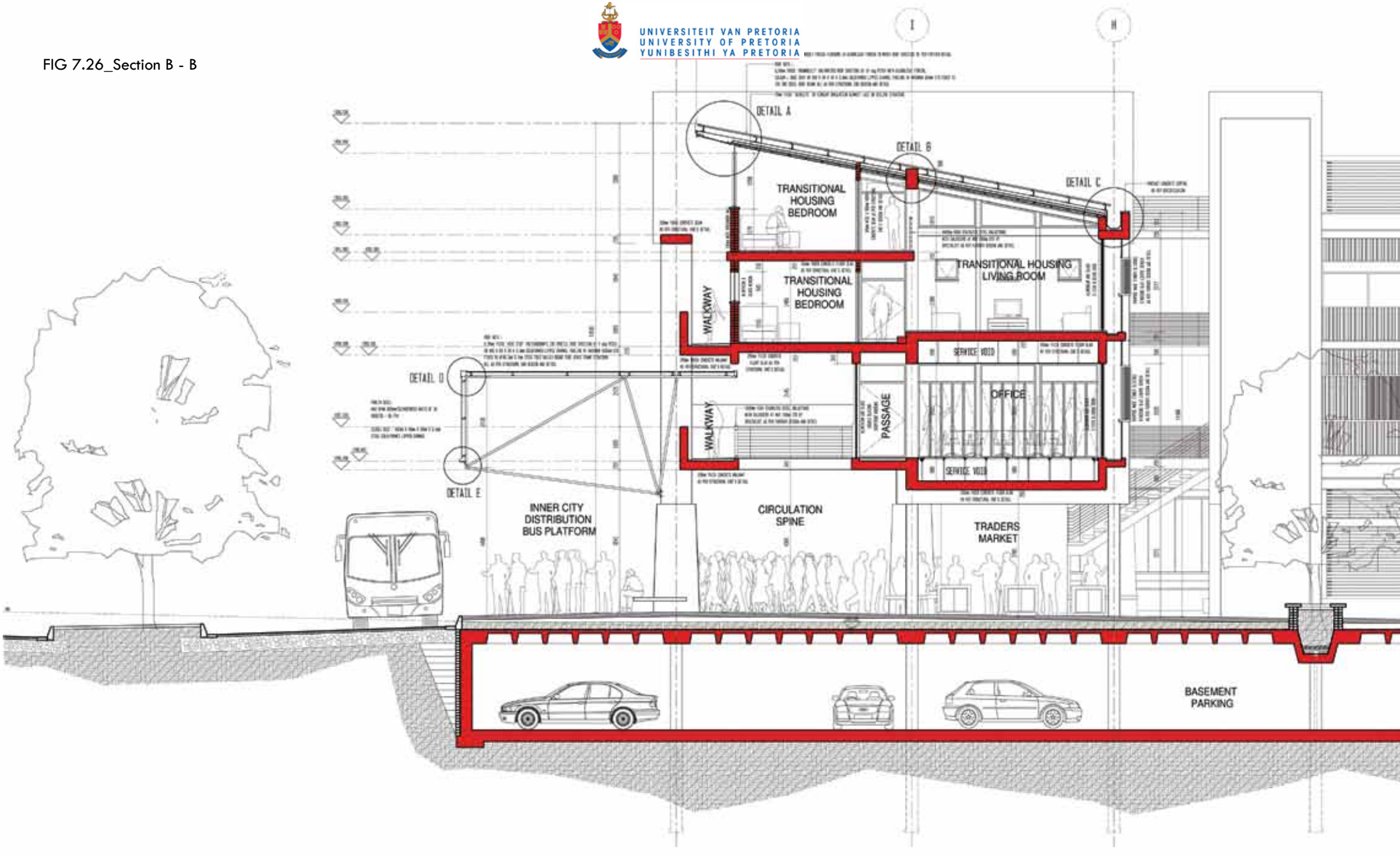
FIG 7.25_Detail J

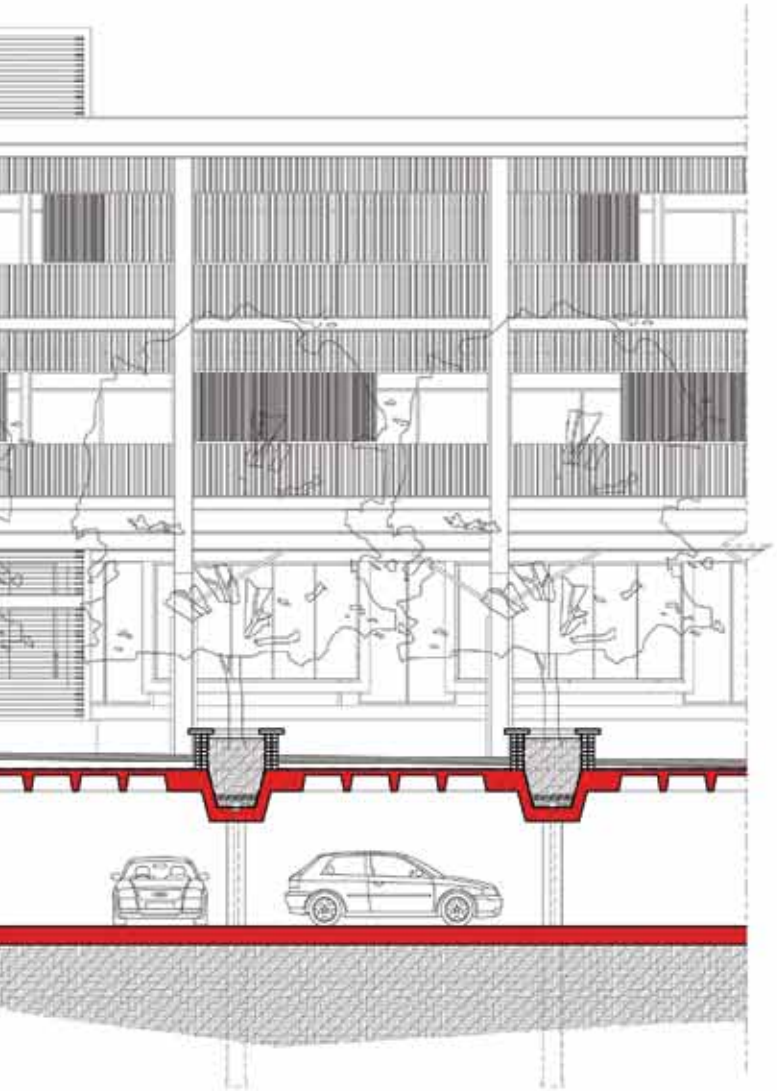


DETAIL J

SCALE 1 : 10

FIG 7.26_Section B - B

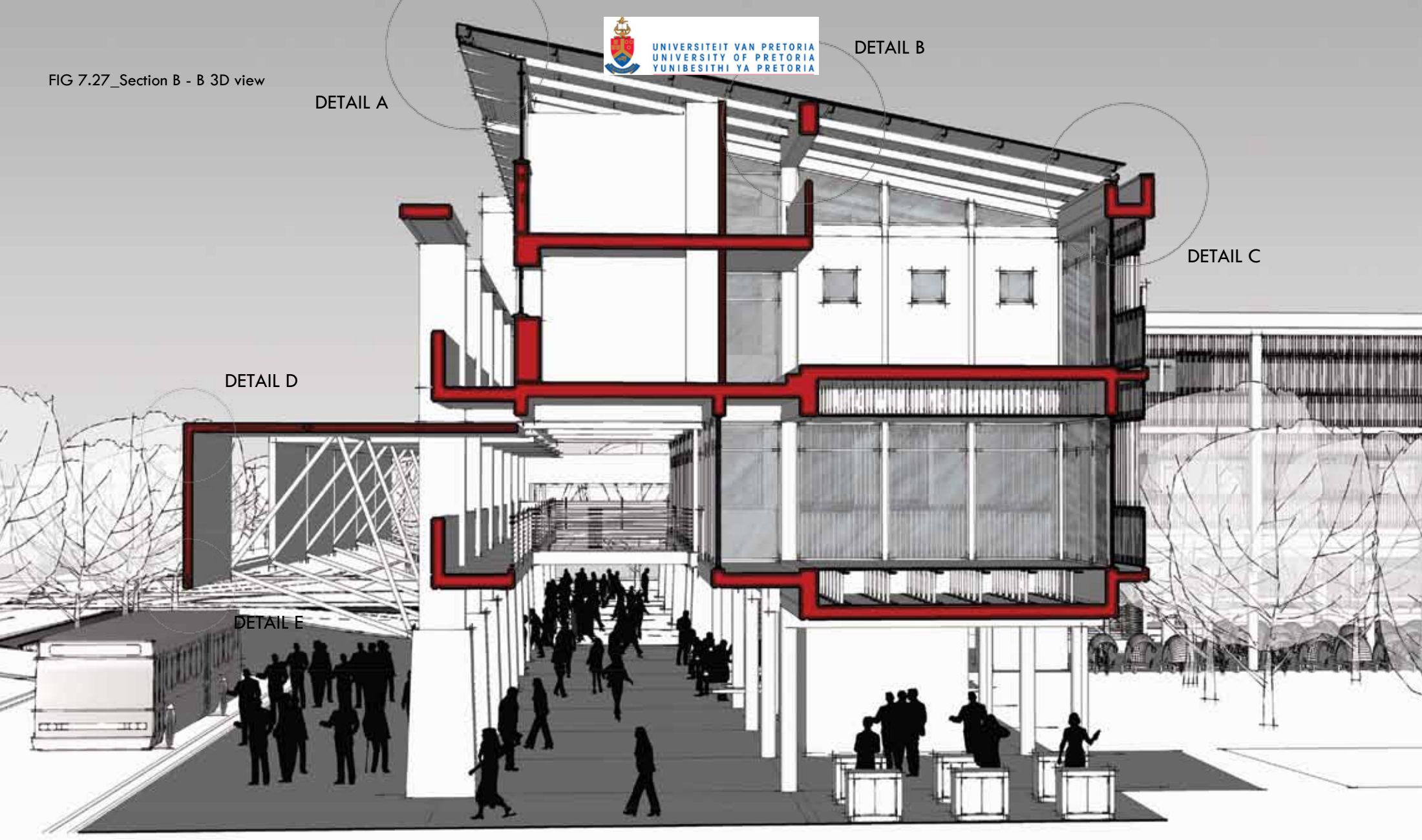


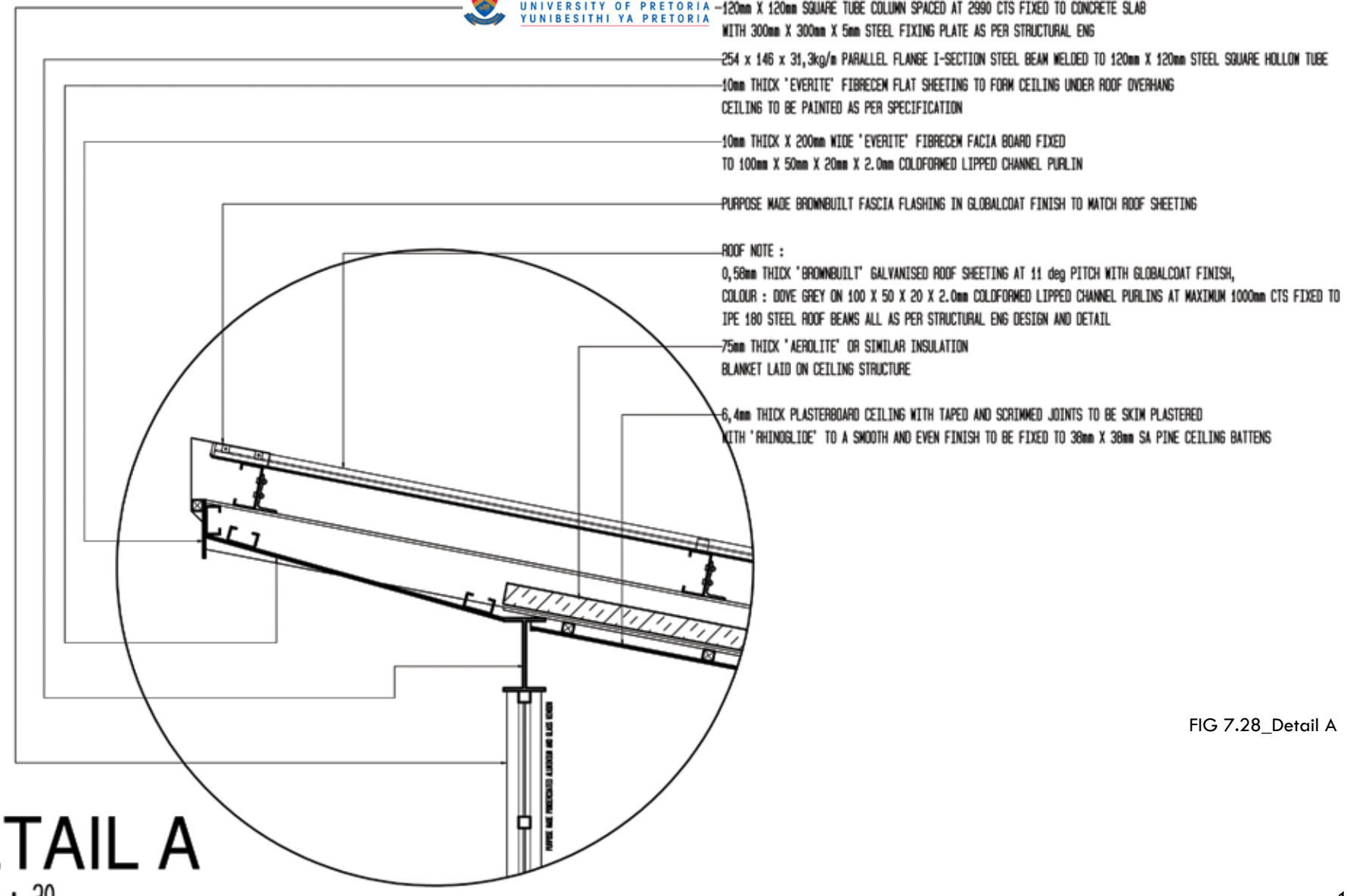


SECTION B - B

0m 5m 10m

FIG 7.27_Section B - B 3D view



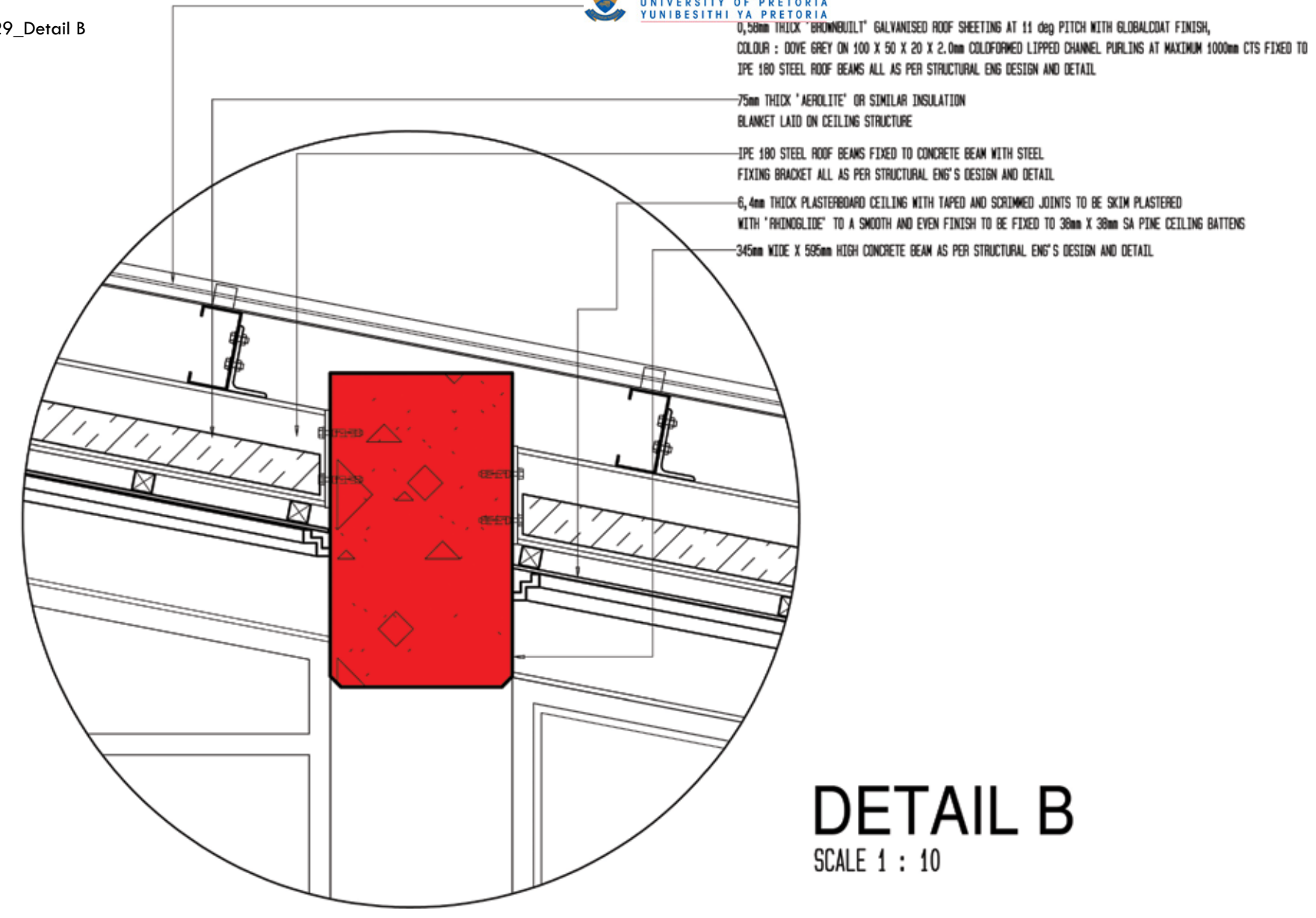


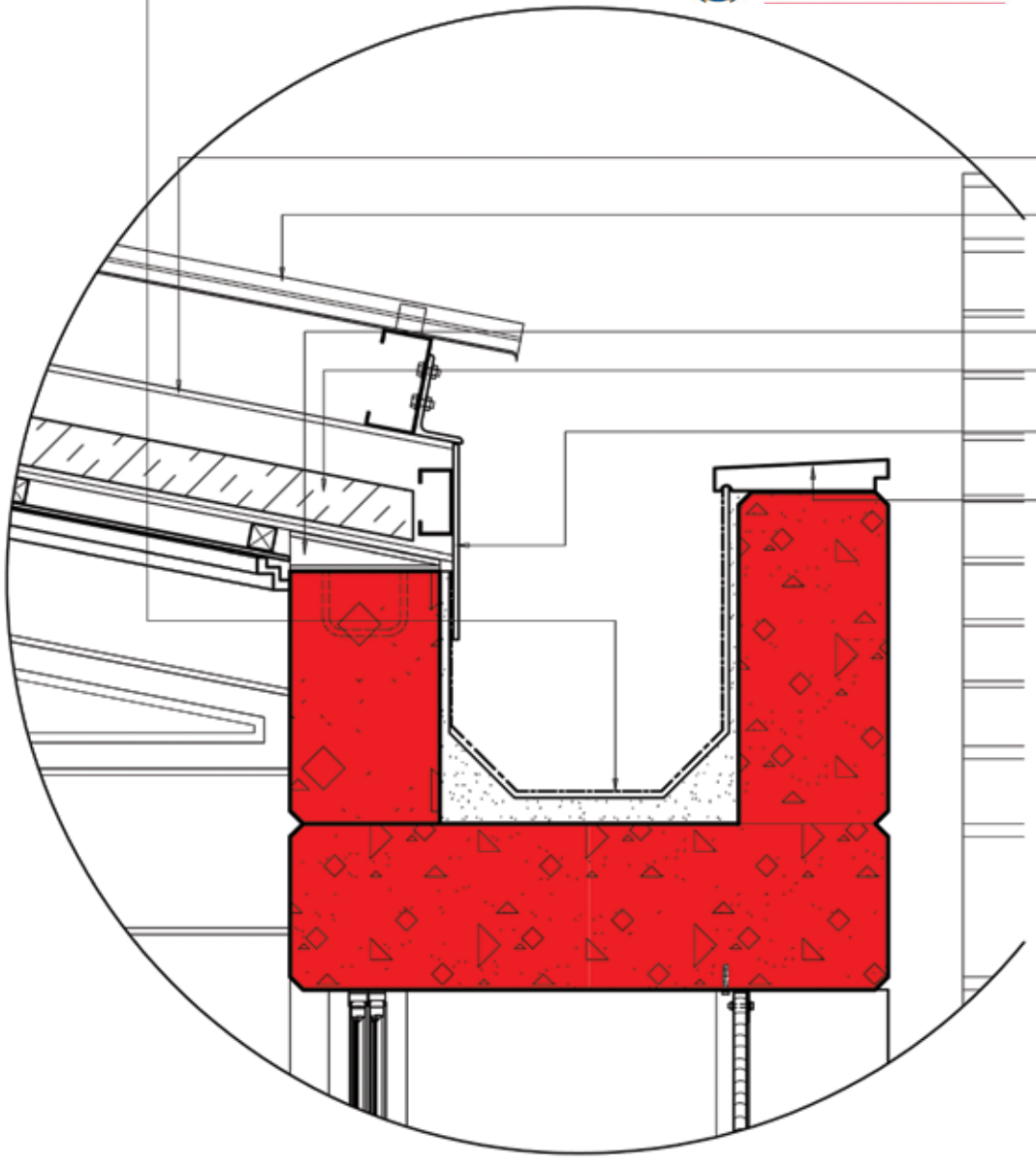
DETAIL A

SCALE 1 : 20

FIG 7.28_Detail A

FIG 7.29_Detail B





'DERBIGUM' SP4 FULLY BONDED WATERPROOFING MEMBRANE TO BE APPLIED AND LAID IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS ON A STEEL FLOATED SAND-CEMENT SCREED LAID TO MIN FALL OF 1:50 TO OUTLETS. THE SCREED TO HAVE A 'COPROX' WATERPROOFING ADDITIVE MIXED IN. THE SCREED TO BE MIN 40mm THICK WITH A REF 193 STEEL MESH REINFORCEMENT

IPE 180 STEEL ROOF BEAMS FIXED TO CONCRETE BEAM WITH STEEL FIXING BRACKET ALL AS PER STRUCTURAL ENG'S DESIGN AND DETAIL

ROOF NOTE :
0,58mm THICK 'BROWNBUILT' GALVANISED ROOF SHEETING AT 11 deg PITCH WITH GLOBALCOAT FINISH, ON 100 X 50 X 20 X 2.0mm COLDFORMED LIPPED CHANNEL PURLINS AT MAXIMUM 1000mm CTS FIXED TO IPE 180 STEEL ROOF BEAMS ALL AS PER STRUCTURAL ENG DESIGN AND DETAIL

PURPOSE MADE STEEL BRACKET FIXED TO CONCRETE BEAM WITH 4 No OFF EXPANSION BOLTS

75mm THICK 'AEROLITE' OR SIMILAR INSULATION BLANKET LAID ON CEILING STRUCTURE

10mm THICK X 300mm WIDE 'EVERITE' FIBRECEM FACIA BOARD FIXED TO 100mm X 50mm X 20mm X 2.0mm COLDFORMED LIPPED CHANNEL PURLIN

PRECAST CONCRETE COPING AS PER SPECIFICATION

DETAIL C

SCALE 1 : 10

FIG 7.30_Detail C

FIG 7.31_Detail D

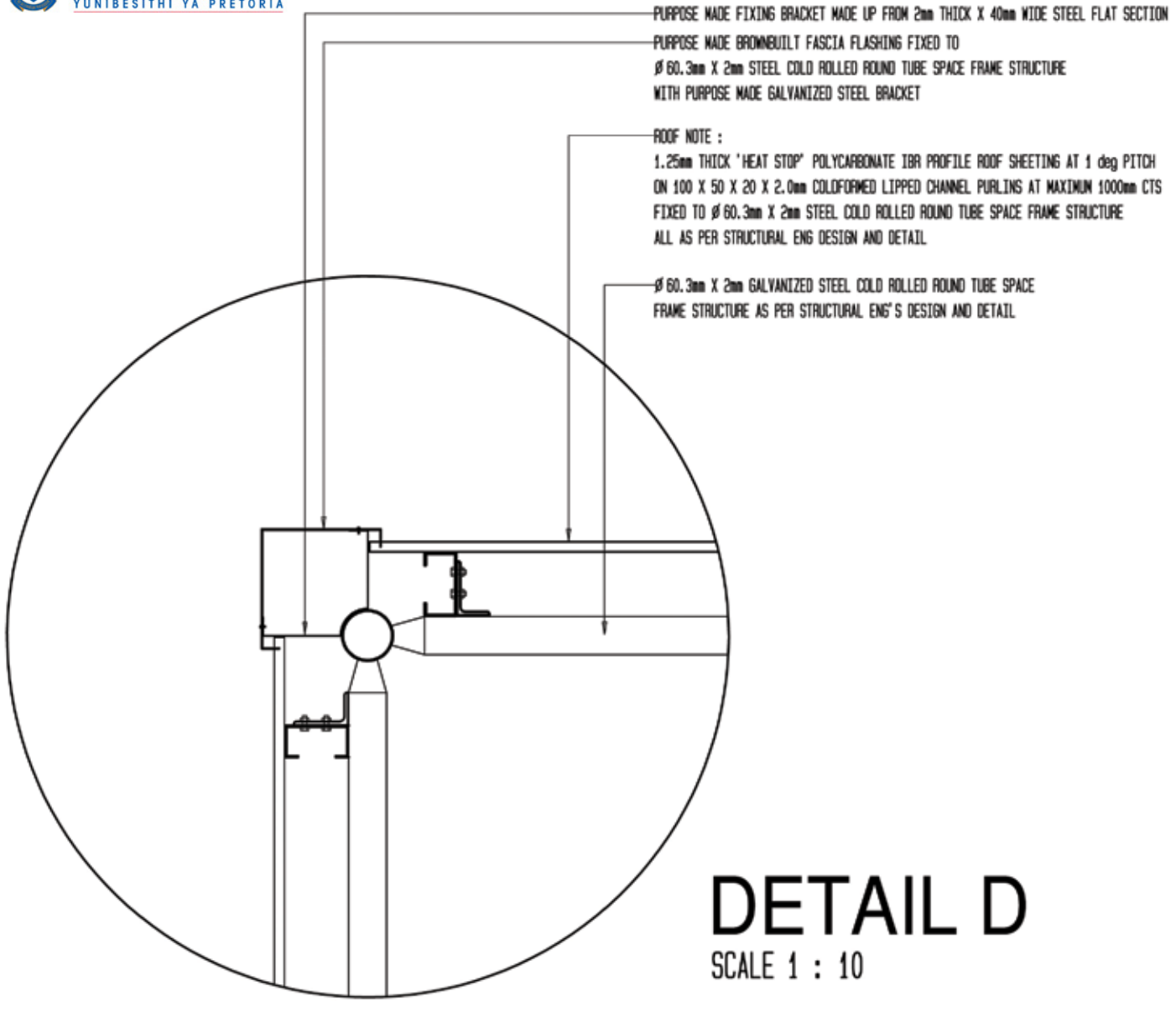
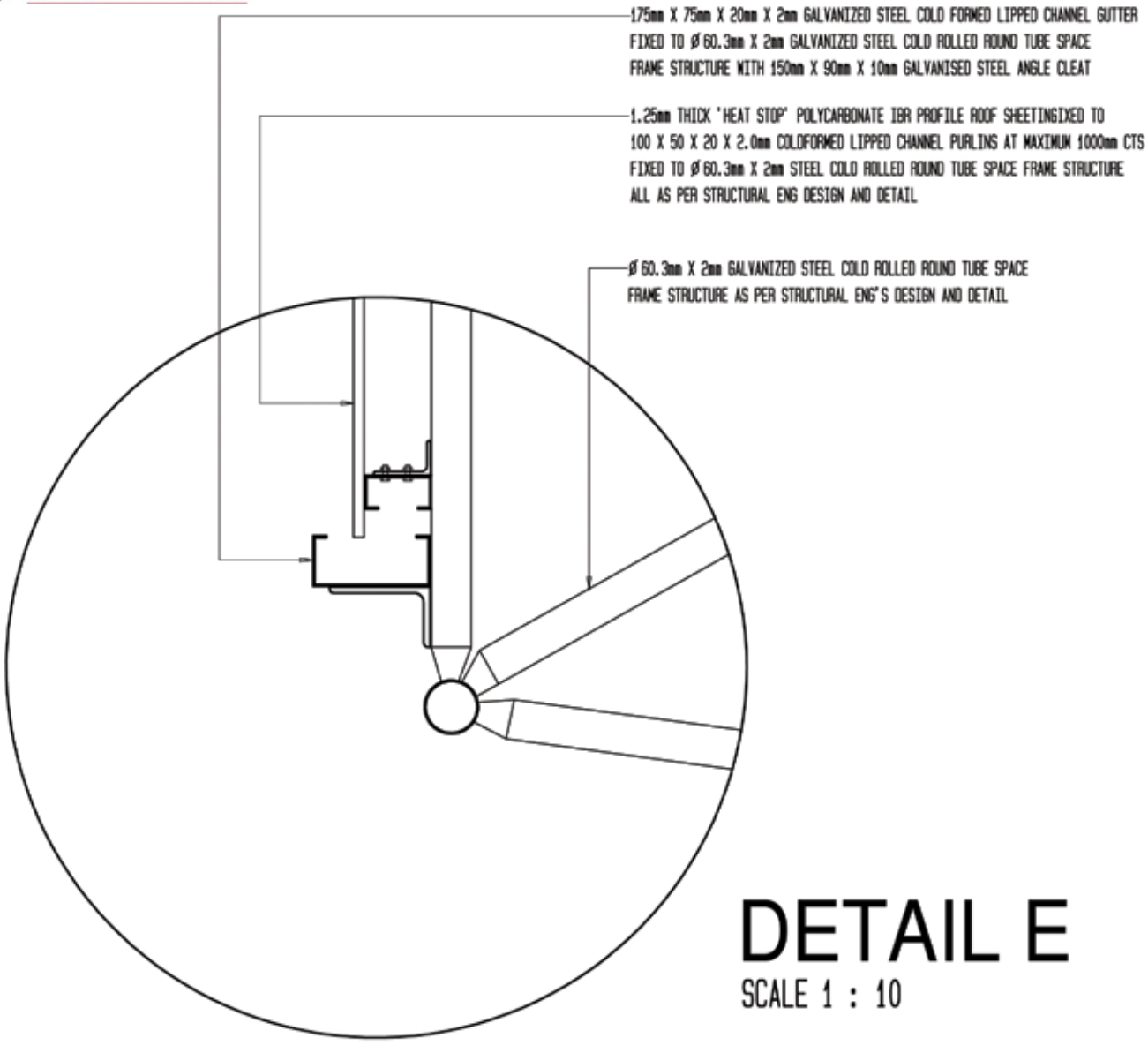


FIG 7.32_Detail E



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☐ TSHWANE STRATEGIC PUBLIC TRANSPORT PLAN AND NETWORK, November 2006.

☐ City of Tshwane Spatial Development Strategy 2010 and beyond, April 2007.

☐ Integrated Development Framework Final draft report, August 2007

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☐ Uytenbogaardt, R, Dewar, D and Todeschini, F (1997). A philosophic approach to settlement-making. Unpublished report prepared for the CSIR, Pretoria.

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BRTPG - see Bus Rapid Transit Planning Guide June 2007
IUDFM - INTEGRATED URBAN DESIGN FRAMEWORK FOR MARABASTAD. 2002.

CTMMTDD – see City of Tshwane Metropolitan Municipality Transport Development Division

IDF - Integrated Development Framework

IUDFM - INTEGRATED URBAN DESIGN FRAMEWORK FOR MARABASTAD

TICDRS – see Tshwane Inner City Development and Regeneration Strategy.

TSPTPN - see TSHWANE STRATEGIC PUBLIC TRANSPORT PLAN AND NETWORK

CTSDS – see Tshwane Spatial Development Strategy 2010 and beyond

Main entry under full name above.

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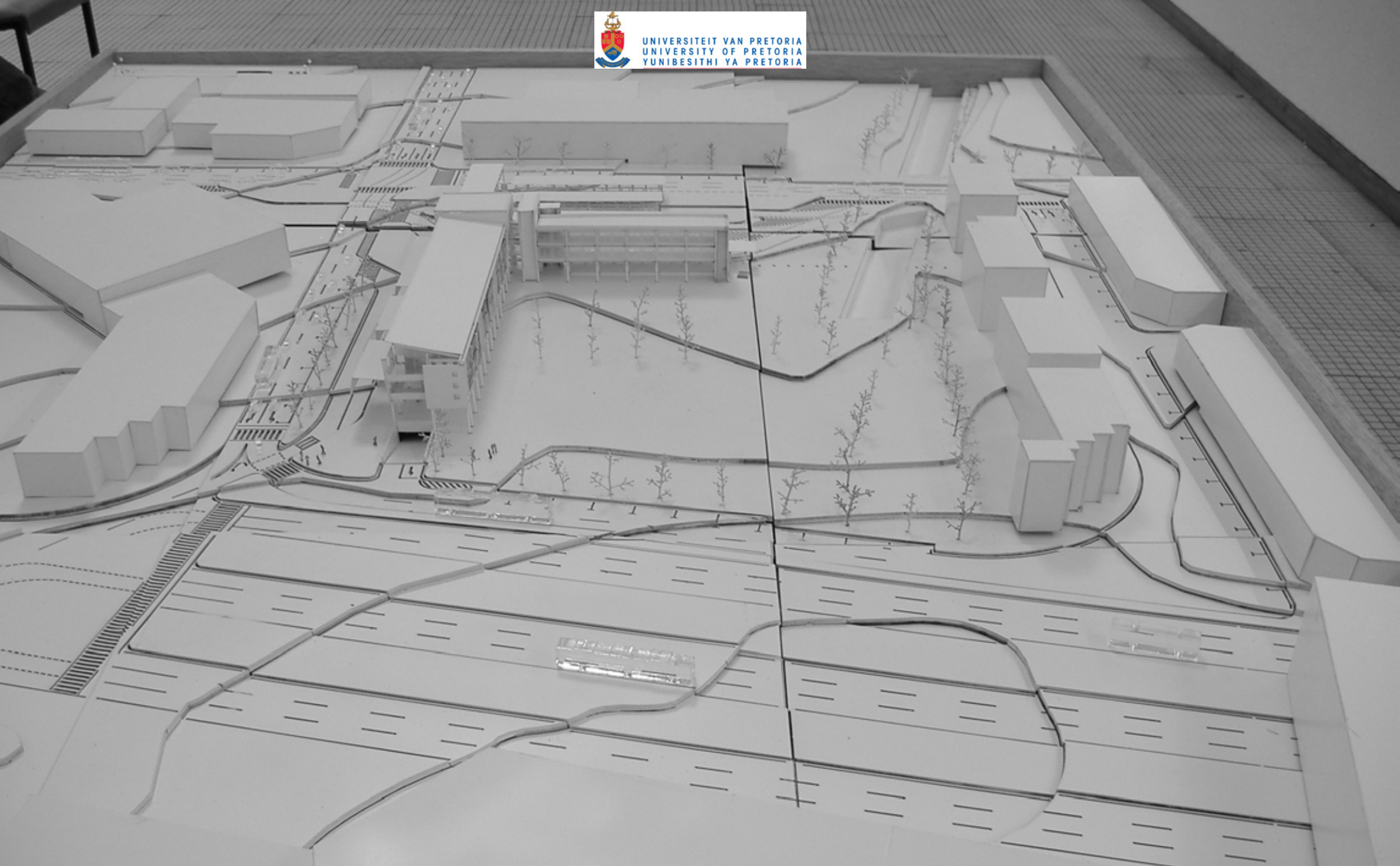
YUNIBESITHI YA PRETORIA

ANNEXURE A

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

_MODEL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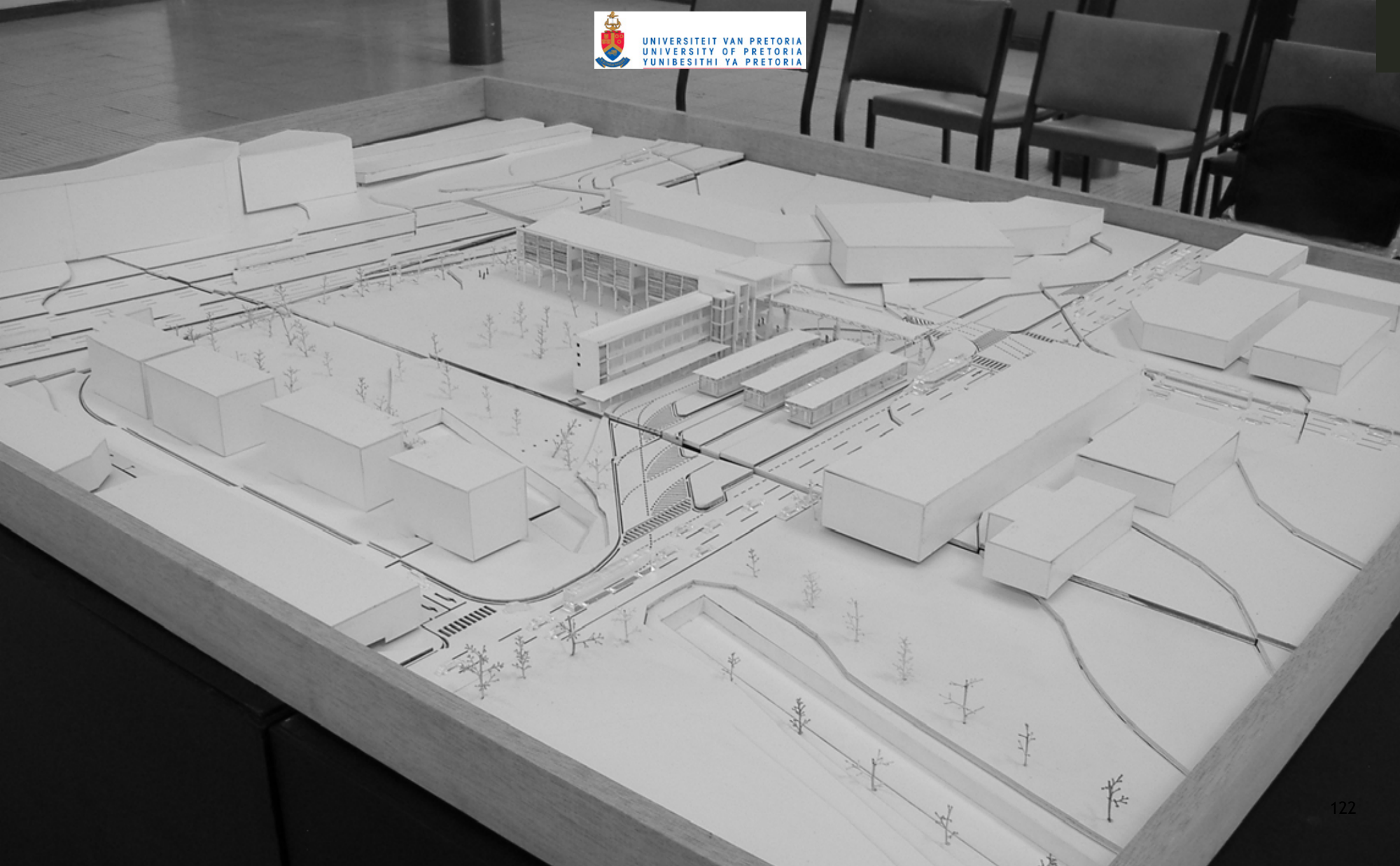
YUNIBESITHI YA PRETORIA

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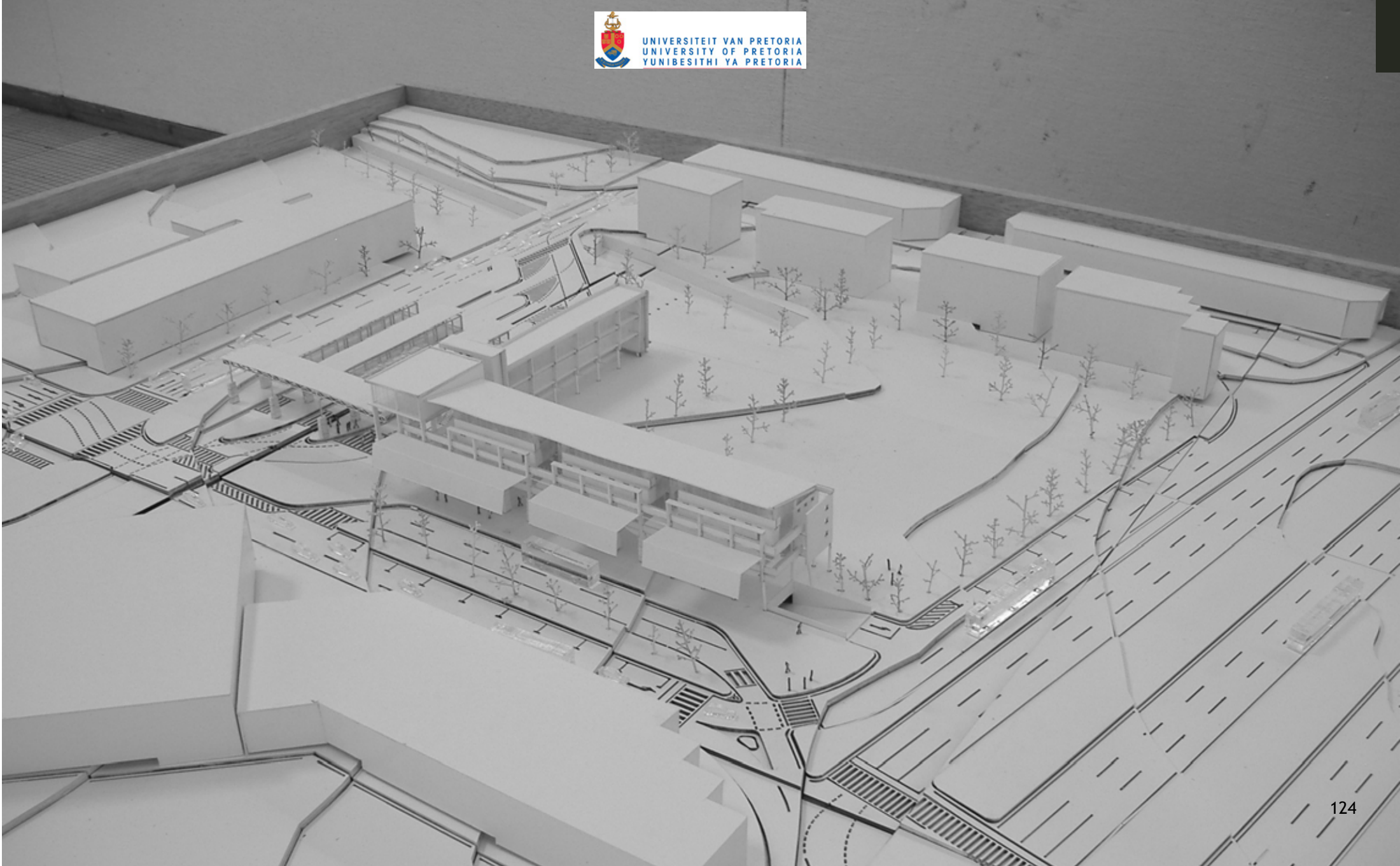

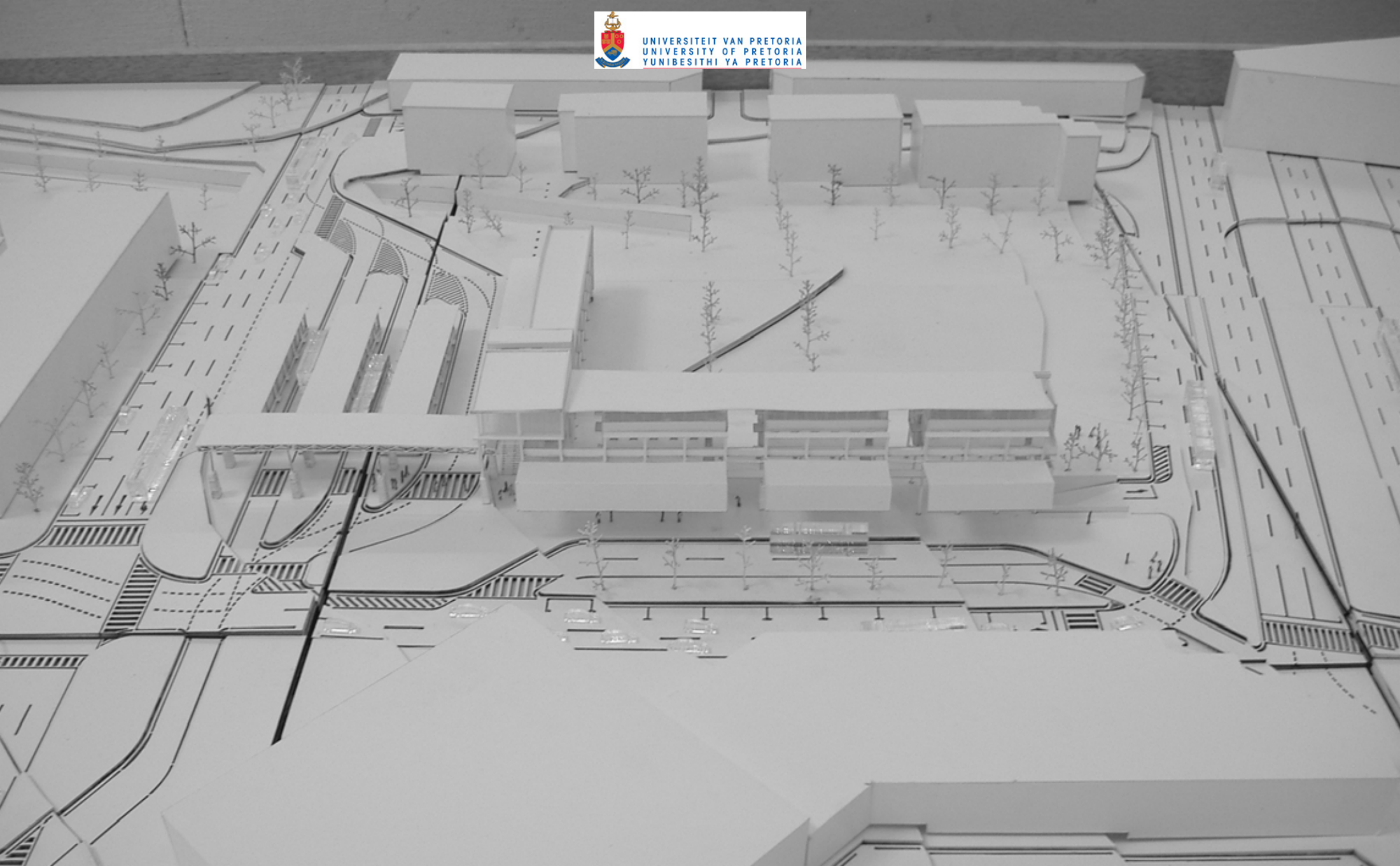
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YUNIBESITHI YA PRETORIA