



UNIVERSITEIT VAN PRETORIA  
UNIVERSITY OF PRETORIA  
YUNIBESITHI YA PRETORIA





## CONTEXT

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STUDY AREA 2.1

HISTORIC CAMPUS DEVELOPMENT 2.2

SITE SELECTION 2.3

SITE ANALYSIS 2.4

RESEARCH CONTEXT 2.5

## 2.1 Study Area

The area that this study covers on a local scale includes the Universities properties west of the N1 highway and east of the railway in Hatfield. In a broader context, the universities location and functions within a metropolitan context and with regards to other institutions of note is also studied.

### 2.1.1 Location

The university is strategically located in relation to both the national N1 and N4 highway routes; these routes provide good access to the campus at national, provincial and local scales.

On a metropolitan scale the university is located approximately 4 kilometres east of the historic core of the city of Tshwane. The University is also located within the important activity nodes of Hatfield/Arcadia and Brooklyn. This positions the University favourably in terms of being located centrally in an 'activity triangle'. The university is located close the

CSIR, Innovation Hub and Human Sciences Council on the metropolitan scale and close to University Of Johannesburg and the Tshwane University of Technology of note on a regional scale. This fortuitous positioning, opens great possibilities to the University in terms of research collaborations and commercial partnerships.

Figure 2.1: Regional scale location diagram

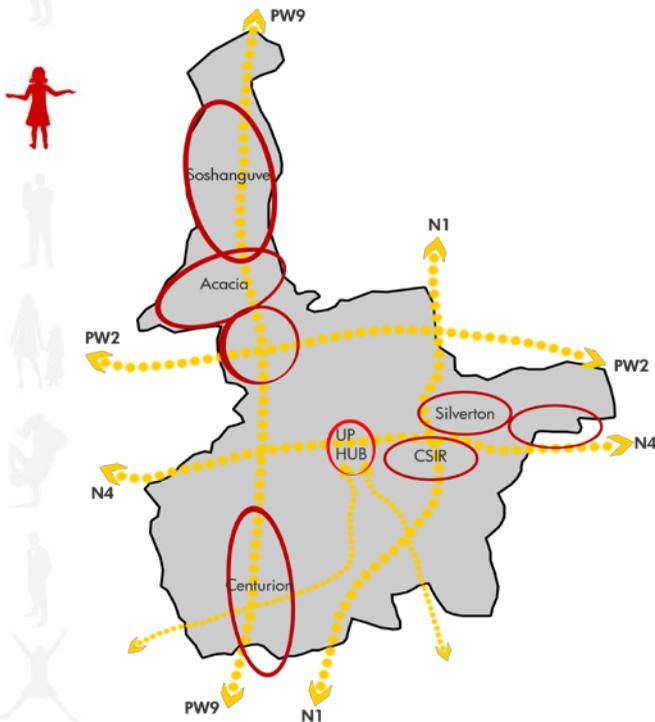


Figure 2.2: Regional scale aerial photograph



Figure 2.3: Metropolitan scale aerial photograph



Figure 2.4: Precinct scale aerial scale photograph



## Local (Hatfield)

At precinct scale, the University is located in an area that has undergone tremendous character shift and development in the recent past. Commercial pressure has changed the character of the Hatfield area from a calm student village to a vibrant busy mixed use business zone.

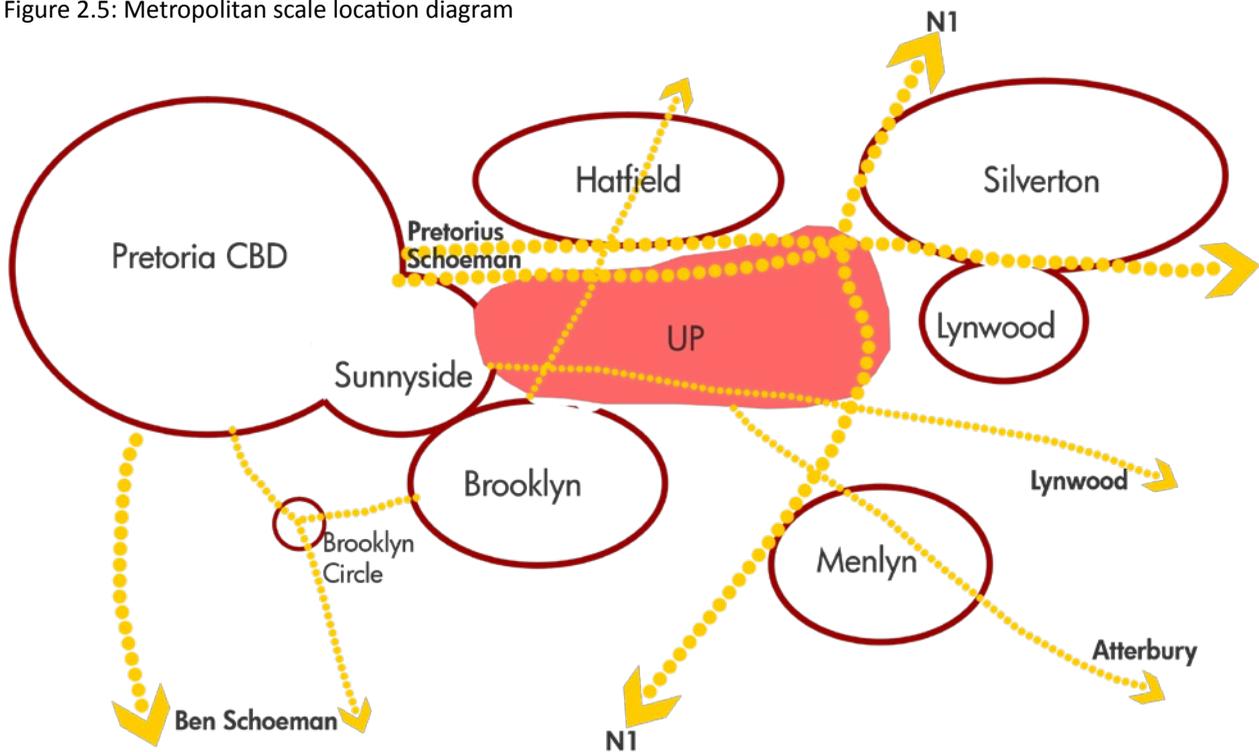
cadia and Sunnyside by the railway line that passes next to the western boundary of the campus. There is thus potential to integrated pedestrians flow from the west to the main campus, making these areas more accessible.

The university is bordered on the northern side by Burnett Street, which is arguably the main activity street of Hatfield, this in its self presents the university with many options in terms of access to the campus and integration with the Hatfield urban fabric.

To the South of the University lies the residential areas of Brooklyn, Menlo Park and Lynnwood, these areas consist mostly of good quality residential stock with big plots and well developed gardens, it is also interspersed with small business mixed in along main routes through the above areas.

To the west of the main campus the university is isolated from the higher density residential areas of Ar-

Figure 2.5: Metropolitan scale location diagram





## 2.2 Historic Campus Development

“From humble beginnings in 1908 when 32 students enrolled for courses at the Pretoria branch of the Transvaal University College, the forerunner of the present University of Pretoria, the institution has grown into a leader in tertiary education. Today more than 50 000 students study in the nine faculties and a business school for the 371 undergraduate and 1 522 postgraduate study programmes on offer.” (<http://web.up.ac.za/default.asp?ipkCategoryID=5035>, 26/09/08)

2000: 18-19)

### Tower Blocks

This building typology is very similar in terms of function to office blocks, there were however only three of them built on the campus, and this is due to the inflexible nature of this building typology. (G.P Greef and associates, 2000: 18-19)

### 2.2.1 Building Typologies

The campus building structure is defined by a number of building typologies that represent most buildings on the campus. These building typologies include: (G.P Greef and associates, 2000: 18-19)

#### Courtyard Buildings

This building type occurs on the older western part of the campus and is between two to three stories high and positioned around a central courtyard and is designed for natural lighting and ventilation. The building uses vary from laboratories, offices and lecture halls. (G.P Greef and associates, 2000: 18-19)

#### Lecture Halls

These building types occur dispersed across the campus and are typically two to three stories high, they are usually designed with a single function in mind. The buildings are mostly withdrawn in relation to their site positioning, except for their entrances. (G.P Greef and associates, 2000: 18-19)

#### Office Blocks

Office blocks appear on campus as three to six story high rectangular buildings. They include the academic functions of small lecture halls, academic supportive and administrative. (G.P Greef and associates,

Figure 2.6: 1921 Campus Development

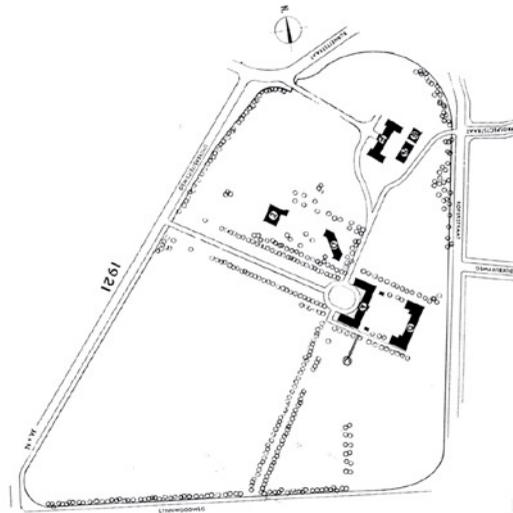
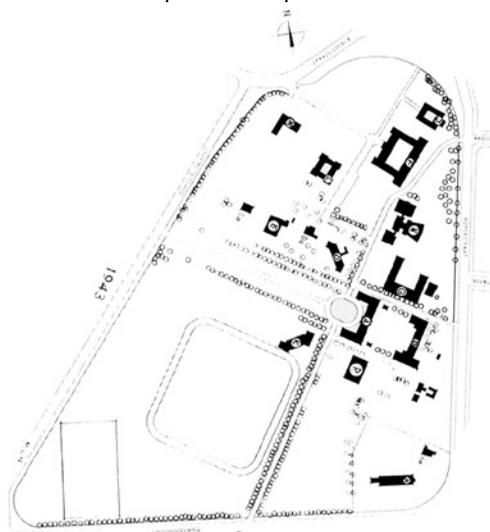


Figure 2.7: 1943 Campus Development





UNIVERSITEIT VAN PRETORIA  
GEBOUW — 1960



### Workshops and Labs

Are mostly positioned on the periphery of the universities boundaries, they are typically between two to four stories and have great potential for refurbishment due to the robust nature of their structures and well dispersed services.

### Special Structures

These include the Library, cafeteria, study areas, Aula that are required for the effective functioning of the campus. Due to their specific functions, they require specific structures that are costly to maintain and change.

Figure 2.8: 1960 Campus Development

UNIVERSITEIT VAN PRETORIA  
GEBOUW — 1970

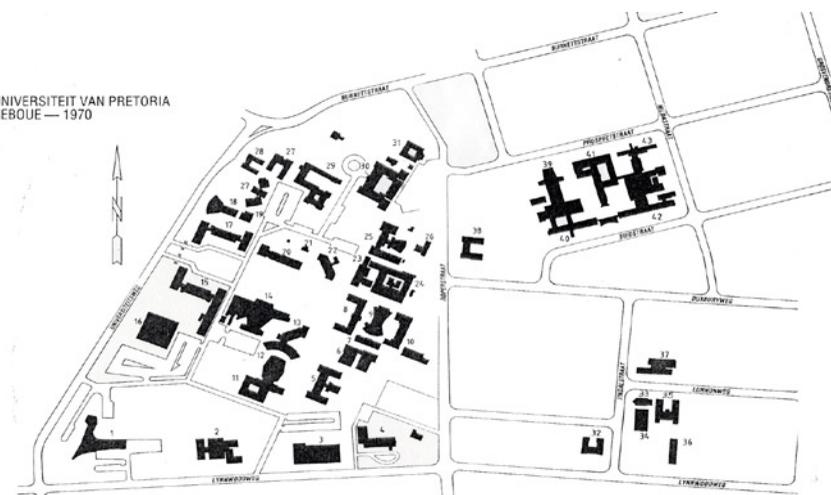
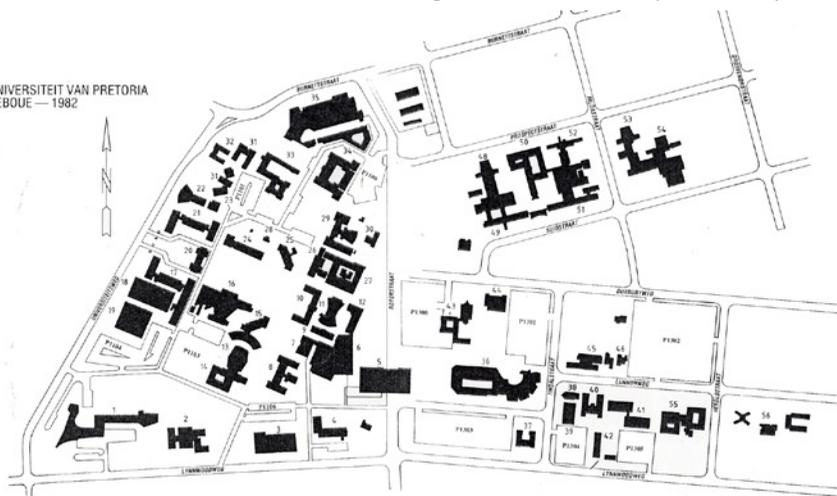


Figure 2.9: 1970 Campus Development

Figure 2.10: 1982 Campus Development

UNIVERSITEIT VAN PRETORIA  
GEBOUW — 1982



## 2.2.2 Open Space Structure

The University of Pretoria's main campus is characterised by a good open space structure that is pedestrian oriented. The open space structure on campus can be divided into three categories, Soft Open space, and Hard Open Spaces, axis and circulation spaces. (G.P Greef and associates, 2000: 21)

### Soft Open Spaces

Soft open spaces on the campus can be defined in three purposeful categories; Functional Social Spaces, Educational Spaces and Landscape buffer zones.

Functional social open spaces (Figure 2.12) refer to large scale open spaces which contribute greatly to the structure and functioning of the campus. These spaces have a strong social character and function as the heart of the campus as well orientation spaces. The major spaces identified as such include the lawns in front of the Aula, Merenski Library and the student centre.

Educational soft open spaces (Figure 2.11) also occur on the campus; they are located on the western border of the campus and occur as spaces between buildings with an intimate scale. These spaces are the botanical gardens surrounding the botany faculty.

Buffer Landscape zones (Figure 2.13) occur all over the campus and are space that have no specific function, however they serve as buffer zones between buildings, roads and structures and form part of the greater campus open space structure.

### Hard Open Spaces

The hard open space structure (Figure 2.14) of the campus is a complex network of pedestrian activity spaces, circulation routes, parking areas and service areas.

## 2.2.3 Axis and Circulation:

The campus has traditionally evolved around certain visual and circulation axis. These historic axis play an important role in the design and development of the Campus, as well as the functioning of it. G.P Greef and associates, 2000: 22)

The axis provides structure and form to the Campus and integrates various components with each other. Essentially it forms the movement framework that connects all Campus facilities and makes building and facilities accessible.

The main axis identified on campus include; The North-South axis from the Lynnwood pedestrian entrance to the Burnett street pedestrian entrance, The West-East axis from the Universityds weg entrance

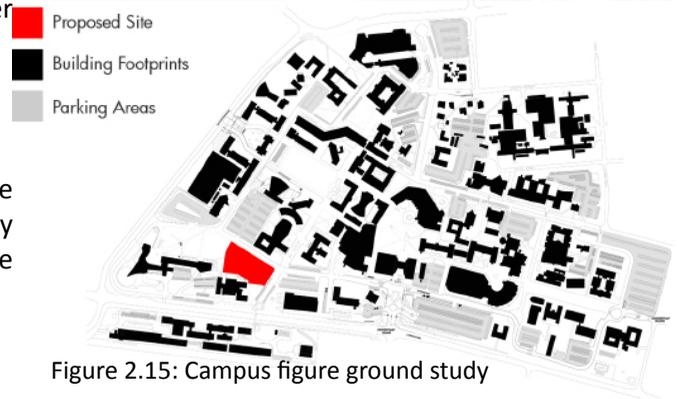


Figure 2.15: Campus figure ground study

past the lawns in front of the Aula to the student centre and the East-West axis from ..... road entrance to the Library

### 2.2.4 Constrains and Problems:

Figure 2.16: Campus soft open space structure



Figure 2.17: Campus building use study

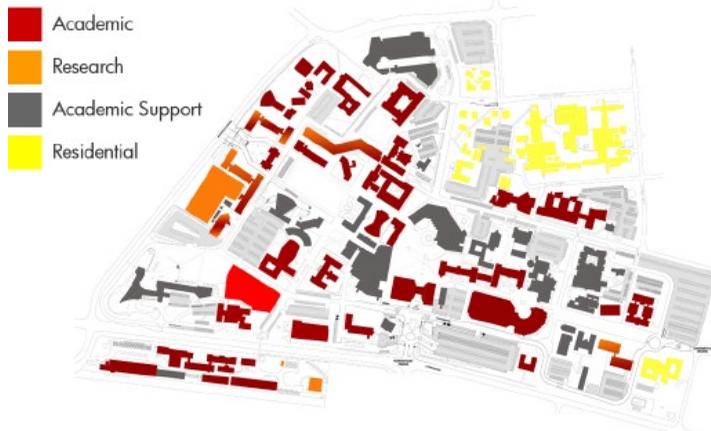


Figure 2.18: Campus possible development sites



The campus has a number of historic problems that can be clearly identified and contribute to the overall Campus spatial structure problems, they are:

1.The large amount of traffic routes through and around the campus, which contribute to a pedestrian environment that is dangerous and uninviting.

2.The perimeter security fencing creates an environment that has restricted access and uncomfortable movement patterns.

3.Access to the main Campus has poorly defined gateways, which contribute to a negative pedestrian environment and campus image.

4.Historic movement axis are terminated inappropriately and are poorly defined

5.Parking facilities on campus are placed insensitively to the campus landscape and inefficiently use valuable campus land.

6.There are many under utilised spaces on the Campus that require higher development densities to reach their full potential.

7.The traditional Hart of the Campus has shifted from the Lawn in front of the Aula to the Lawn in front of the Student Centre has lead to this space losing

Figure 2.19: Campus circulation and axis study



## 2.3 Site Selection

Choosing a site for the development of a new research facility for the University of Pretoria was a difficult task due to the numerous performance criteria the site had to adhere to. The performance criteria were implemented to choose and develop a site that would be the most appropriate for the chosen function of the facility and its intended urban effect.

### 2.3.1 Performance criteria

**A. Accessibility & Legibility** - The site has to be located in a area that is easily accessible by pedestrians and vehicles, preferably on main axis. Further the site has to be located in a area that has good access to public transport facilities. The site also has to be located where it can be come a recognised icon on the campus, to act as the flagship unit for research on the University's campus, to give research prominence and identity

**B. Size** - A rather big site is required in campus terms to accommodate a facility that would require a large footprint area to function properly.

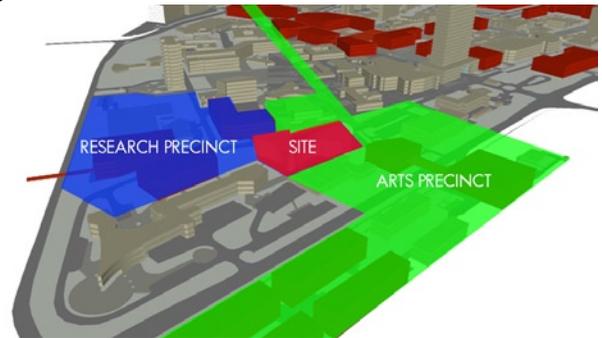
**C. Research Location** - As the facility is being developed to develop all research on campus it focuses on the top three research field at the university, agriculture, engineering and natural sciences. The optimal site solution would be located centrally between these 3 research facilities.

Figure 2.20: Site location diagram



**D. Urban Location** - As part of the project development an urban design strategy will be developed to facilitate the creation of a research precinct on the campus. Further to this the site has to be located in an area that has surrounding potential for further research developments. Part of the urban strategy will mandate that the site be located as close to the current arts precinct as established on campus to facilitate interdisciplinary research to take place.

Figure 2.21: Site and Precinct location



**E. Densification** - The selection of a site that is currently used for low density development or is under developed is of critical importance. It is also of critical importance to avoid greenfield sites. This is due to the diminishing scale of green open space, and to preserve the communit(village) atmosphere of the campus.

### 2.3.2 Chosen Site

The site that is deemed most appropriate and satisfies the performance criteria best is the current parking area located at the northern boundary of the visual arts department and southern boundary of the music department.

With reference to the performance criteria the site was chosen for the following reasons.

**A. Accessibility & Legibility** - The campus internal ring road and Tukkie laan pedestrian entrance form the eastern boundary to the site, these are to main cir-

culuation axis on the campus. It is also a site with great visibility from the main Roper street entrance to the campus and is visible from various vantage points off campus.

B. Size - The site is deemed to be big enough to facilitate any developmental need that the research facility would require.

Figure 2.22: Site surround development potential



C. Research Location - The site is almost triangulated with the top three research facilities and fields on the campus.

D. Urban Location - Open space is for future development is abundant around the site, the open space available consists of buffer green spaces and low intensity parking areas. Secondly the site is sandwiched between two of the prominent facilities in the art precinct, thus providing a vital precinct connection.

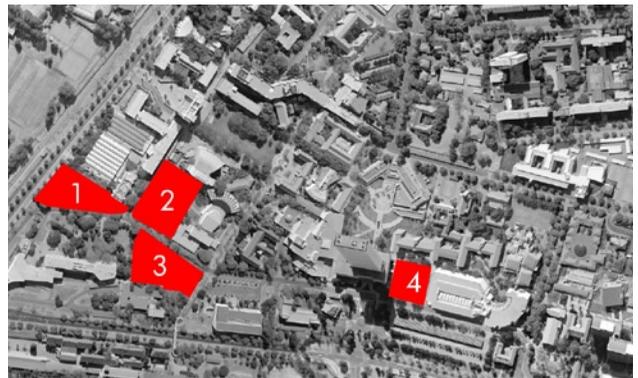
Figure 2.23: Current site use aerial photograph



A number of possible sites were evaluated before the final site selection was made. Figure \* illustrates the four possible sites.

No1. is a low density parking lot located next to the Nano-Electronics facility. Its location was good, however its shape and size were considered unfavourable.

Figure 2.24: Site surround development potential



No2. As with site 1, site and all the other sites considered are low density parking areas. Site number two was not considered for the development due to the fact that it was already selected for another thesis project.

No.3 Is the final project site.

No.4 Was investigated however it did not meet any of the performance criteria, hence it was also not deemed suitable.



Figure 2.25: Public transport surrounding campus

## 2.4 Site Analysis

### 2.4.1 Geographical Data

Pretoria is situated at 1370m above sea level at 25°45`S, 28°12`E. (Napier, A.2000: 9.8)

#### Macro Climate

Pretoria is located in the Northern Steppe Climatic zone. (Napier, A.2000: 9.8)

#### Meso Climate

Pretoria has a diurnal temperature range in the summer from 28.8° to 12,2°C in the summer and 25,7° to 2,6°C in the winter. Extreme heat in the summer and frost in the winter is not uncommon. The average monthly humidity is 59%. (Napier, A.2000: 9.8)

#### Rainfall

The mean annual rainfall of Pretoria is 700mm of which 88% falls in the summer months. (Napier, A.2000: 9.8)

#### Wind

In the summer 41% of the days receive light breezes to no wind, this amount increases to 60% during the winter. Summer wind direction is east-north-east, winter wind directions are north-west and north east. (Napier, A.2000: 9.8)

#### Sun Angles

Solar incidence in Pretoria is high with a maximum of 80% sunshine in the summer and a minimum of 67% in the winter. The percentages translate into solar radiation energy of 8W/hr/m<sup>2</sup>/day in the summer and 4.5W/hr/m<sup>2</sup>/day in winter.

Summer Solstice is on 21 March and 23 September at 64.24°, winter solstice is on 22 June at 40.73°. (Napier, A.2000: 9.8)

### Geology

The area surrounding the site consists of three distinct layers:

1. 0-5.5m Locally eroded andesitic lava containing agglomerate.
2. 5.5-6.1m Blue-green Andesitic lava enmeshed with thermally altered sediments
3. 6.1-120m Solid Andesitic lava, containing agglomerate.

The water table is located at approximately 18m deep during summer months. The soil has high bearing capacity with negligible swelling capacity.

All of the previously listed geographical and climate data play an important roll in the design and technical development of the facility. In chapters five and six the design response to these parameters will be investigated.

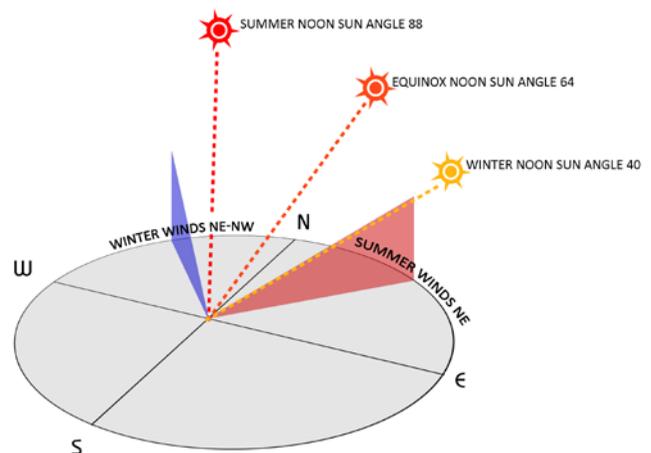


Figure 2.26: Site climate analysis diagram



Figure 2.27: Panorama of Southern neighbour (Visual Arts)



Figure 2.28: Panorama of eastern neighbour (Boukunde)



Figure 2.29: Panorama of Northern neighbour (Music Department)

### 2.4.2 Existing Site Features

The chosen site is located on one of the many Parking lots that are strewn across the University grounds; it is a low density usage for such a valuable piece of land. The Site is located at the junctions of the inner ring road transport system and the Lynwood road pedestrian entrance, thus it is a prominent site. The site is surrounded by trees and vegetation making it a sensitive site to work on. The site is bordered on its northern side by Fever trees, the ring road and the Music Department. Boukunde and the Tukkies Lane pedestrian axis dominate the eastern border, on the southern side it is linked directly with the Visual Arts Building and the western border is occupied by a buffer green open space and the main administration building.



Figure 2.31: Panorama of Fever tree lane

### 2.4.3 Neighbouring Features

The four buildings that border the site are all important buildings in their own right both in terms of architectural quality and in terms of campus function. Boukunde and the Administration building are iconic buildings with the Visual Arts and Music department buildings being more understated. These four buildings accommodate a range of functions from academic, performance to administration.

Boukunde, Visual Arts and the Musaeon are all part of the greater arts faculty and form the cornerstone of the arts precinct on campus.

Figure 2.32: Diagram showing neighbouring site features

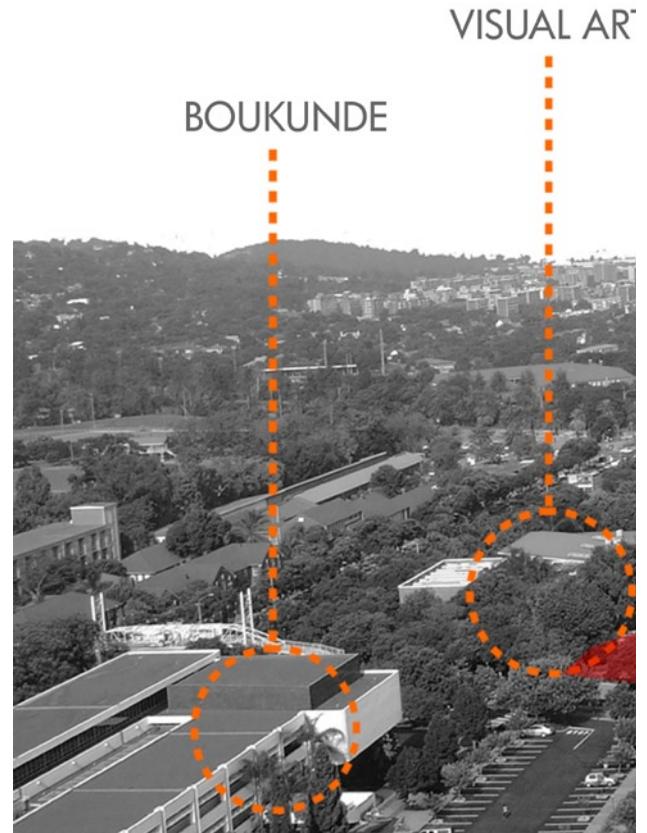


Figure 30: Site location

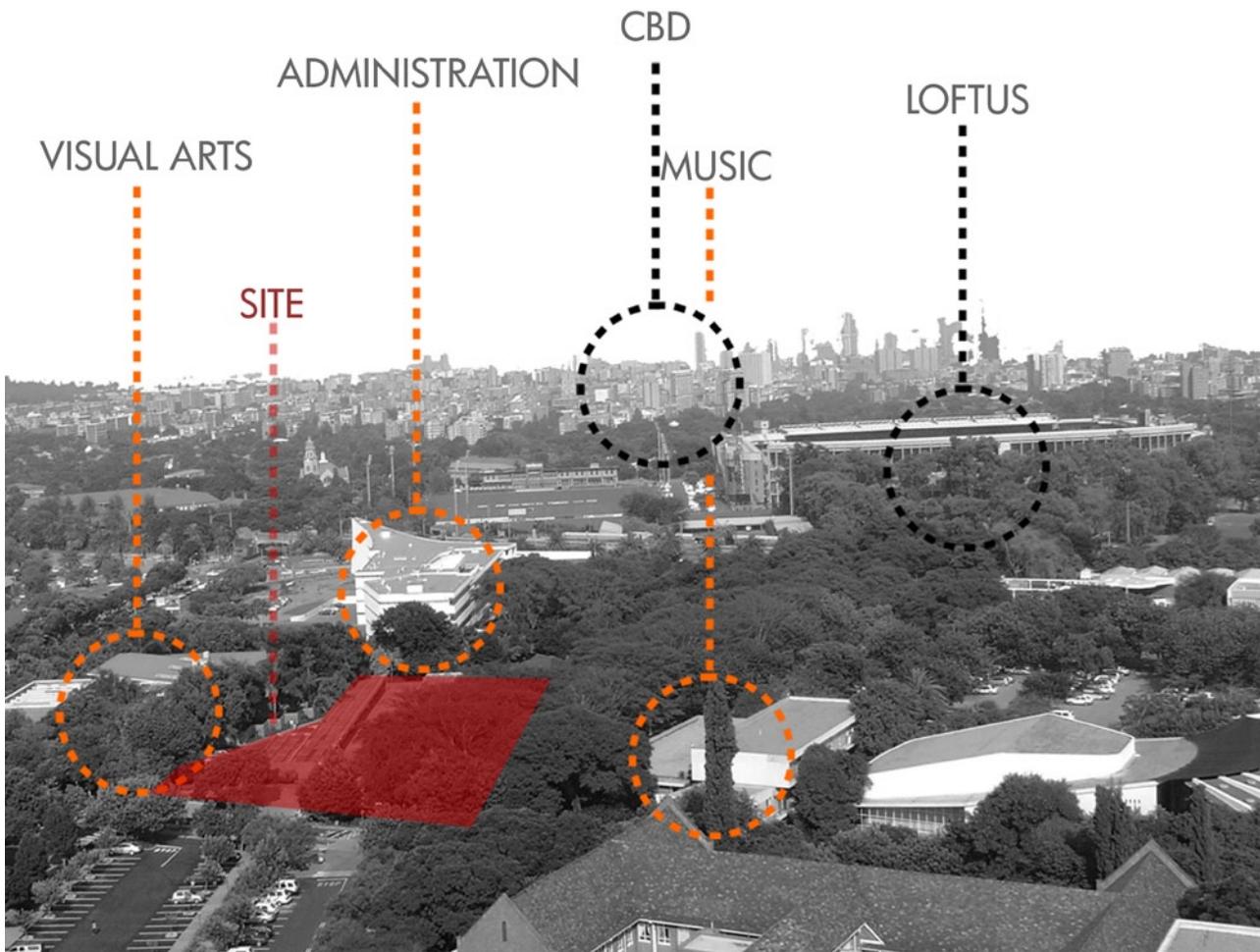




Figure 2.33: Photograph of Boukunde's Western facade



Figure 2.35: Boukunde location diagram

## Boukunde

### *Architect*

The original building was design by the resident lecturers of the time.

### *Date*

The building was opened in 1960

### *Style*

The building was designed in a formalist modern style

### *Importance*

The building is representative of period architecture on campus and represents the heart of architecture and construction on campus. It is a striking iconic fair faced concrete building.



Figure 2.34: Photograph of Boukunde's Northern facade





Figure 2.36: Visual arts location diagram

## Visual Arts

### *Architect*

Meiring and Naude, Burg & Lodge and Burg

### *Date*

8 October 1948

### *Style*

The building was designed in very reserved modernist style as result of the materials restrictions enforced during WWII

### *Importance*

The building was originally design as teachers life sciences training facility, later it was adapted to house the Visual Arts department, which to this day functions as the Anchor of the arts on campus.

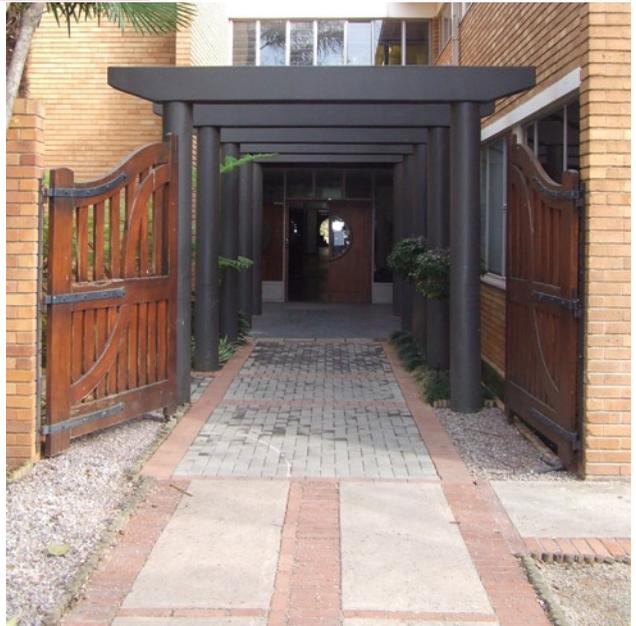


Figure 2.37: Photograph of Visual Arts main entrance

Figure 2.38: Photograph of Visual Arts` NE corner

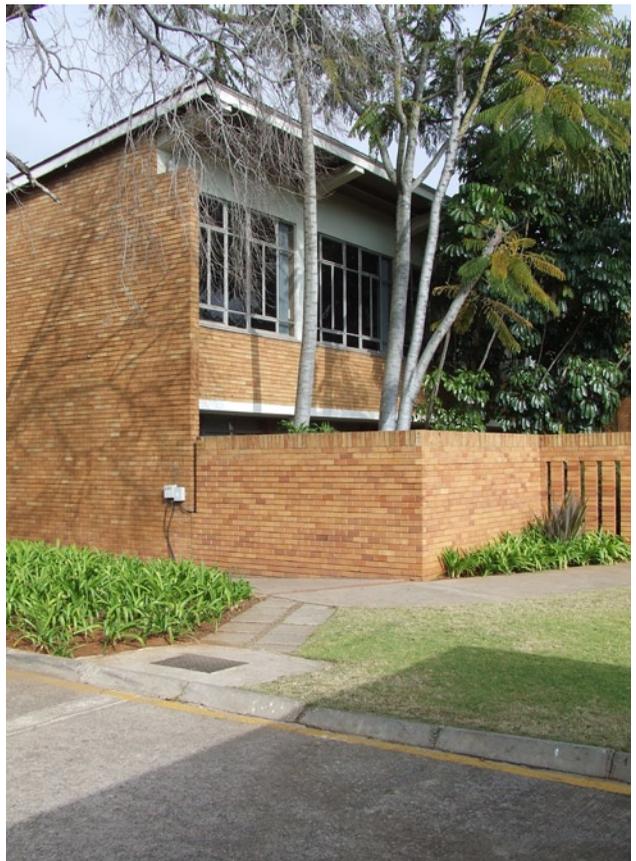




Figure 2.39: Photograph of Administration Northern fa-



Figure 2.41: Administration location diagram

## Administration

### Architect

Brian Sandrock

### Date

The building was opened in 1969

### Style

The building was designed in the `new Brutalist Style`

### Importance

The building is an iconic part of the campus history, it is closely associated with the University and lends identity to the campus, it also forms part of the Brian Sandrock Brutalist stock on the campus grounds



Figure 2.40: Aerial photograph of the Administration





Figure 2.42: Musaion location diagram

## Musaion

*Architect*  
Brian Sandrock

*Date*  
1964

*Style*

The building was designed in very reserved modernist style as result of the materials restrictions enforced during WWII

*Importance*

The building forms part of the Brian Sandrock Brutalist stock on the campus grounds, it was and is also the first formal home for the Music department on the campus and has served the University and its students well for education and performance purposes.



Figure 2.43: Photograph of Musaion main entrance

Figure 2.44: Photograph of Musaion Western facade



## 2.4.4 Views

At ground floor level the site is bisected by numerous views of neighbouring sites and axis. These will become important formal determining factors as can be seen in the design development chapter. There are two major axial views bordering the site on its eastern and northern borders with the pedestrian dominated Tukkies Lane and the vehicle dominated ring road.

Moving up two a second story level, there are fine views to appreciate to the south and west, views that encompass parts of the residential areas of Brooklyn, Waterkloof and the CBD of Tswane.

## 2.4.5 Orientation

The site is irregularly shaped and its predominant edge runs roughly east to west; it has good northern sun exposure in the winter and also problematic western sun exposure in the summer.

## 2.4.6 Circulation

The site is bordered on its northern side by the main campus ring road transport system and on its eastern side by the main Pedestrian entrance from Lynwood road which connects to Tukkies Lane a major pedestrian artery on campus. These two factors combine to make the site very well placed and under utilized for its strategic location. The site also acts as a pedestrian gateway from the eastern and northern side to and from the administration building as well as to and from the music and engineering departments. However these two routes are informal and unstructured, they result in the termination of three pedestrian routes when they meet the borders of the site, and require urgent attention.

## 2.4.7 Site Constraints and Opportunities

The site as it is currently found has a number of constraints and opportunities. The following is a summary of the major influencing factors.

The site's main strengths include its accessibility and location in relation to main pedestrian and vehicular circulation routes, its location at the heart of the art precinct, its landscaping and natural setting and the possible views that are accessible from the site.

The site's main perceived weaknesses include its exposure to westerly sun in the summer, the isolation and noise generated by the internal campus ring road, possible lack of adequate natural ventilation in the summer and winter, and its undefined edges, low density and irregular shape.

Possible constraints on the site that might influence any development include, the Visual Arts Building that requires Northern winter sun that cannot be blocked, the pedestrian routes that have been established across the site and the amount of vegetation and trees around the site.

Figure 2.45: Site access and movement analysis diagram

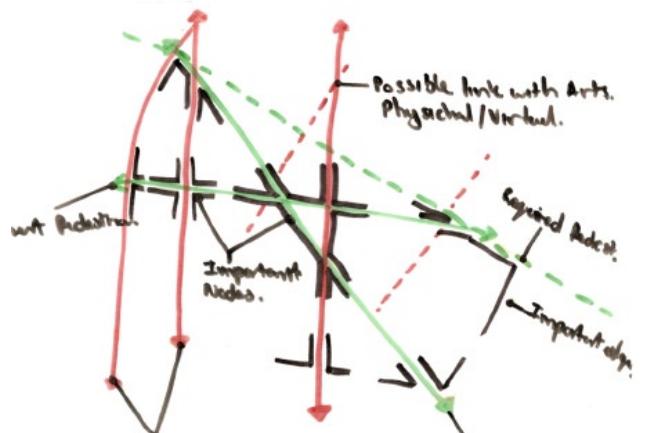




Figure 2.46: Site views diagram

Figure 2.47: Panorama of main Tukkies laan and ring road intersection



## 2.5 Research Context

“Being an internationally recognised South African teaching and research intensive university is central to the University of Pretoria’s new strategic plan.

Since its humble beginnings in 1908, the University has gone a long way to achieving this goal and is currently considered to be one of the leading institutions of higher education in the country.” (<http://web.up.ac.za/default.asp?ipkCategoryID=5035,26/09/2008>)

As stated on the research department web site, the University of Pretoria has made great advances towards achieving its goals. The following figures published in 2007 show the current standing of the university in the national and international context.

The University of Pretoria currently ranked the 4th best research university in South Africa, it is out ranked by the Universities of Stellenbosch, Rhodes and Cape Town. ([http://www.webometrics.info/rank\\_by\\_country.asp?country=za,07/03/2008](http://www.webometrics.info/rank_by_country.asp?country=za,07/03/2008)). Internationally the University of Pretoria is ranked as

no 686 of 1000 ranked world universities, the highest ranked occur in the Americas (1-8) Europe (10, 23,25) Asia (20,22,76) Australia (79). (Available: [http://www.webometrics.info/top1000\\_r&d.asp?offset=400,07/03/2008](http://www.webometrics.info/top1000_r&d.asp?offset=400,07/03/2008))

It is evident from these figures published in 2008, that the University of Pretoria requires drastic improvements to become an internationally recognised research university. Contemporary performance criteria are of vital importance to achieve this goal, these criteria will be discussed further in the Technical development chapter.



Figure 2.48: National Research context diagram

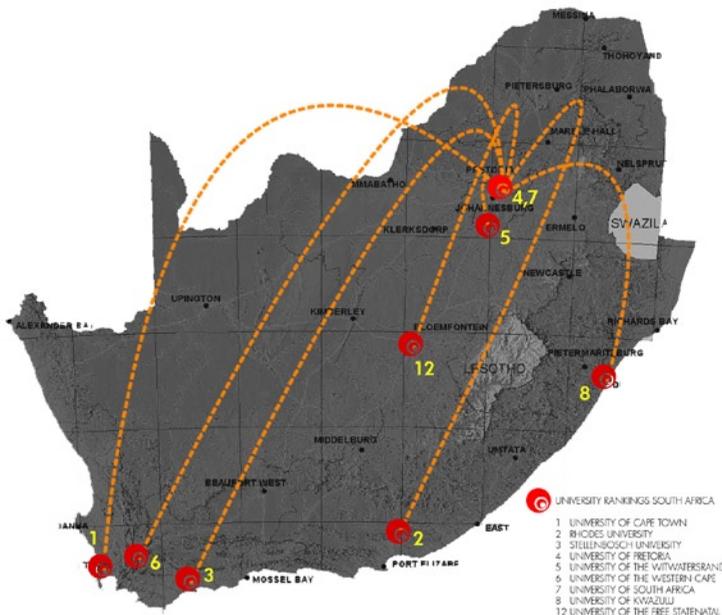


Figure 2.49: Regional Research context diagram

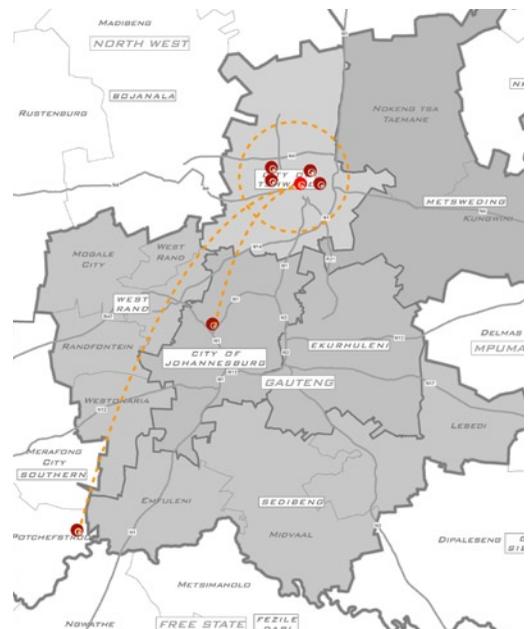
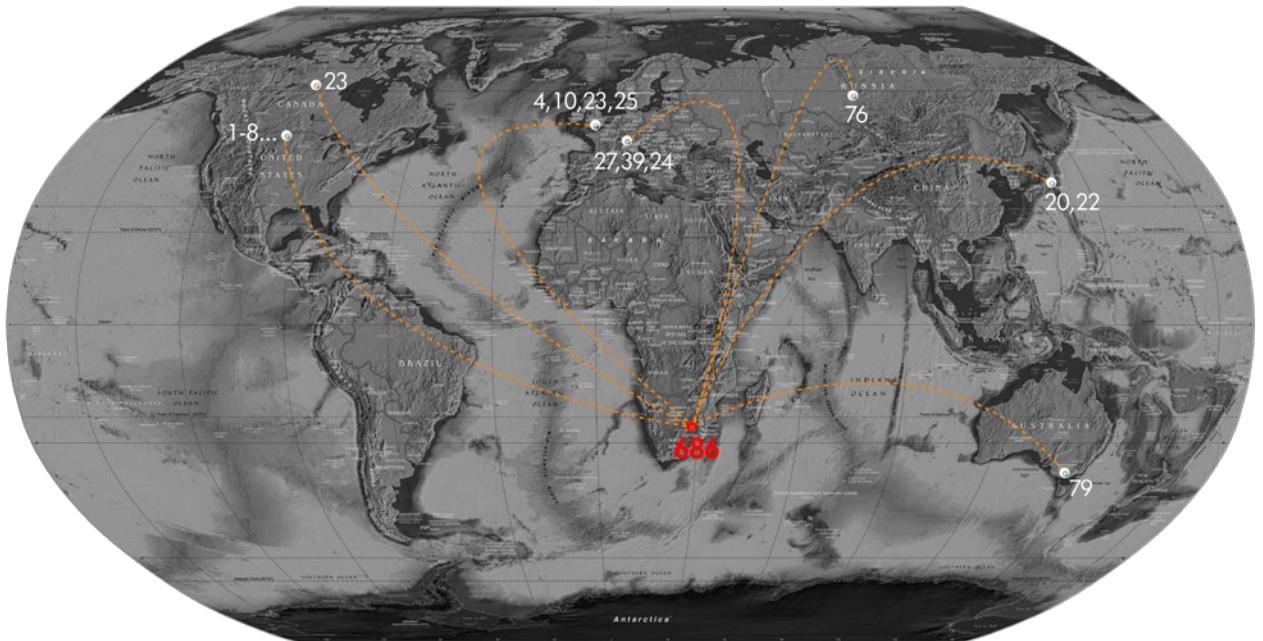


Figure 2.50: Internaltional Research context diagram



## 2.5.1 TUKS Research Environment

“In the post-war building boom of the 1950s and 1960s, American colleges, universities, and corporations built tens of millions of square feet of laboratory space for the sciences. Many of those buildings have proven inflexible in design, preventing their easy adaptation to evolving research needs and the accompanying expansion of building systems.” (Goldstein. R. N.2006, 243)

As stated above most of the research facilities on the University of Pretoria’s campus are old, inflexible and outdated. As can be seen in images 46-50 the research facilities are bound by the same constraints as most of the research stock of the same era.

Older buildings are designed on inflexible principles, the common problems among labs studied include:

1. Too Narrow (Floor Plan depth)
  2. Floor to ceiling height insufficient
  3. Structural bays to small
  4. To little space for services and utility shafts
  5. Not design for interaction (isolation)
- (Goldstein. R. N.2006, 243)



FABI (Forestry, Agriculture and Bio Industries) is the newest research facility on the campus, as shown in figure 48. Even this new research facility avoids away from the contemporary performance criteria for the development of successful slabs. It is an introverted building, isolating its self completely from the campus community, it also make no attempt to communicate or facilitate interaction. It also does not allow any room for future expansion and development due to its site use.

“If one accepts the premise that improved collaboration between researchers will more effectively lead to scientific breakthroughs and ultimately benefit humankind, then a logical implication would be that lab design should be optimised to enhance such collaboration.” (Goldstein. R. N.2006, 246)

The above quote reinforces the concepts to be employed in the development of a new research facility on campus, not to replace existing stock, rather to collaborate and support. To provide a new research base from where the university can launch its aspirations of becoming an internationally recognised research facility.

Figure 2.51: Agriculture research storage and wash area



Figure 2.52: Natural sciences research lab



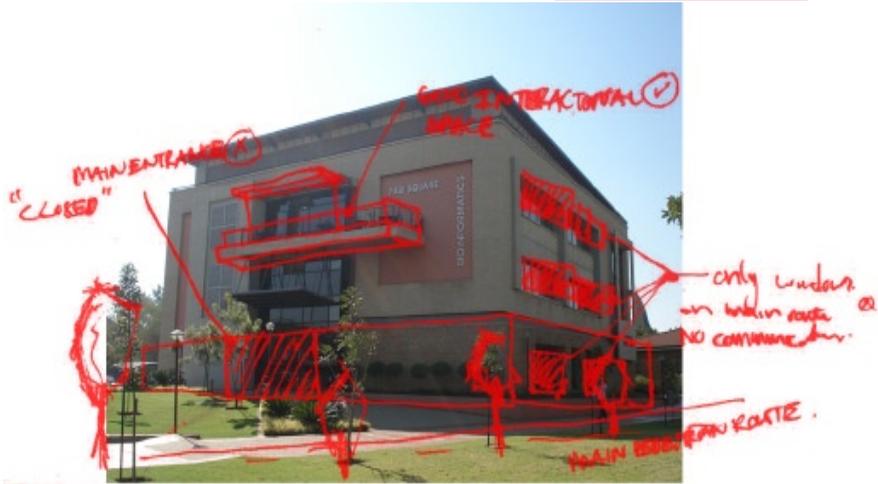


Figure 2.53: New Fabi research Lab



Figure 2.54: Engineering research lab write up area

Figure 2.55: Engineering research lab

