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“talkspace

among infill and void

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Submitted in fulfilment of the requirements for the
Degree of Magister in Architecture (Professional)
in the Faculty of Engineering,
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Study Leader: Prof. Karel Bakker

to my loved ones

abstract

The following dissertation will consider the contemporary education of natural languages and explore its influences on designed space in an urban environment. The concept of weaving cultures together by using languages will be investigated in order to produce an architectural intervention of amalgamated infill and voids.

The structure of natural languages and methods of learning a new language will be used as a departure point to propose a public facility on the University of Pretoria's main campus. This facility will fit into a network of public gathering spaces proposed in the area, and will be in the form of an interactive learning and information space that will provide the users with an opportunity to engage in intercultural cross pollination in various languages. The architecture of the language learning centre will encourage individuality, freedom of thought and expression, and exposure to creative ideas.

The site was selected for its ability to enable the opportunity for social interaction and design exploration, and it is significantly located at a point where two major urban grid patterns touch each other.

The proposed design celebrates this concept of convergence in which voids between cultures are filled with understanding. The success of the proposed project will depend on the ability of the language learning centre to integrate with the urban fabric and most importantly, facilitate the education of language, communication and cultural interaction.

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prologue

"To be free is not merely
to cast off one's chains
but to live in a way that respects
and enhances the freedom of others." (1)

Nelson Rolihlahla Mandela a leader

On a visit to the Apartheid Museum in Johannesburg in early November 2007, the author read the quotation on the wall that welcomes the visitor into the compound of the museum. A desolate space that does not really 'welcome' the visitor, but rather an emotional reflecting space, where the words of Mandela echo through the voids and among the five principles of the constitution.

Moving through the space the author questions what lies between these voids, what exists within these grey desolate spaces? Perhaps it is only the memory of the past. But with that distant memory, valuable knowledge has been gained and now the opportunity presents itself for the nation to rebuild itself and look to the future.

0.03

Still, the existence of a void between the informed and the ignorant hinders the progression of unity within the population. This void can be identified as a communication void between individuals in society: If South Africa has 11 official languages, but only 23.8% (2) of the population speaks the mostly spoken language which is isiZulu, there is by no doubt an existence of this communication void.

Perhaps the void then between ignorant and informed needs to be filled by the learning of different cultural languages. So, in order to fill these social voids, there is a universal paradigm needed to bridge the past and design the future. Only then there would be what Mr Mandela talks about – living a lifestyle, in which democracy, reconciliation, equality, diversity and responsibility are celebrated, and people have respect for one another, only then one would truly be free…

0.02

Resources: (1) Mandela,N. 2000. *Long Walk to Freedom.* p.632.
(2) Census 2001. www.statssa.gov.za

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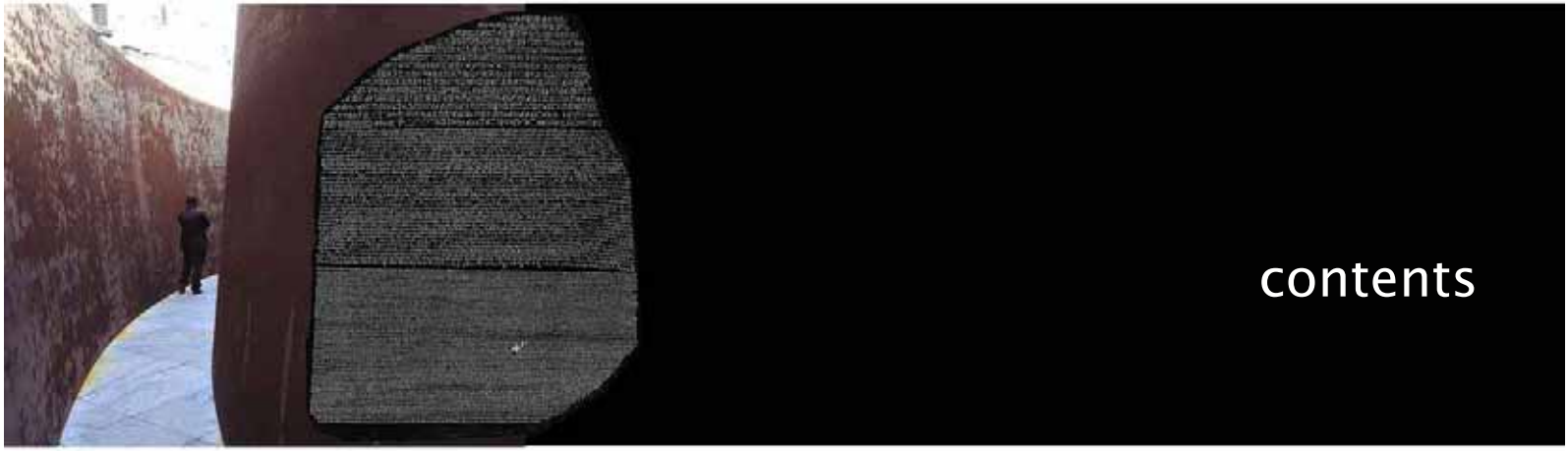

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All illustrations by author unless otherwise specified.

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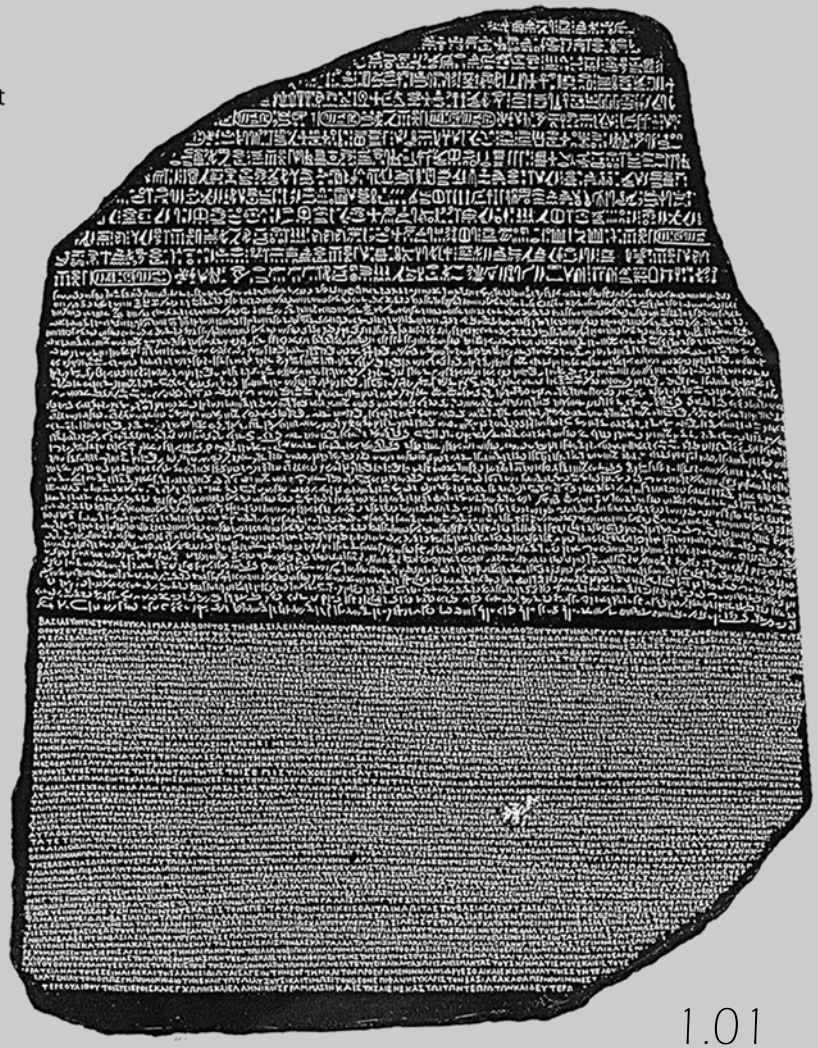
01 introduction

Historical Background

'The Rosetta Stone is an Ancient Egyptian artefact which was instrumental in advancing modern understanding of hieroglyphic writing.
The stone is a Ptolemaic era stele with carved text made up of three translations of a single passage: two in Egyptian language scripts (Hieroglyphic and Demotic) and one in classical Greek. It was created in 196 BC, discovered by the French in 1799 at Rashid (a harbour on the Mediterranean coast in Egypt which the French referred to as Rosetta during Napoleon Bonaparte's campaign in Egypt) and contributed greatly to the decipherment of the principles of hieroglyphic writing in 1822 by the British scientist Thomas Young and the French scholar Jean-François Champollion.
Comparative translation of the stone provided the key in understanding many previously undecipherable examples of the ancient Egyptian language, and also assisted in unlocking the Egyptian culture.
It was the multicultural nature of Egyptian society that led to the stone being inscribed in two different languages.
The stone is actually a decree issued by the priests of Egypt in favour of the Greek born King of Egypt Ptolemy and among other things details rather mundane tax concessions.
The stone has been on public display at The British Museum since 1802.'

(*Rosetta Stone* on www.wikipedia.org)



1.01
The Rosetta Stone

01 introduction

"About 100 000 years ago there was a dramatic jump in the quality of stone tools. This may also have been the moment when gasps, grunts and groans flowered into language. A time when man began to communicate thoughts and ideas."

(Fletcher, 2001: p.391)

This statement indicates that language, consisting of different sounds and body movements, gives humans the ability to express themselves in such a way that their development as a species is dramatically altered. The existence of language and communication is therefore considered a highly valuable tool for the continued existence of the human race.

The image on the adjacent page (fig. 1.01) serves to introduce the intentions of this dissertation. As a metaphor cast in stone, the Rosetta Stone symbolises a celebration of cultures coming together and people learning one another's language, and therefore creating a platform for the sharing of knowledge.

This dissertation attempts to address the paradigm of willingness to be educated in other natural languages; by being an instrument for cultural convergence. A tool that forms a formal language of architectural space, attempting to fill the communication void within a certain social framework, whilst celebrating this important idea of cultural convergence and knowledge gain.

The theoretical investigation of this dissertation therefore reacts to the concept of integration, and is therefore weaved into the development of an architectural conclusion.

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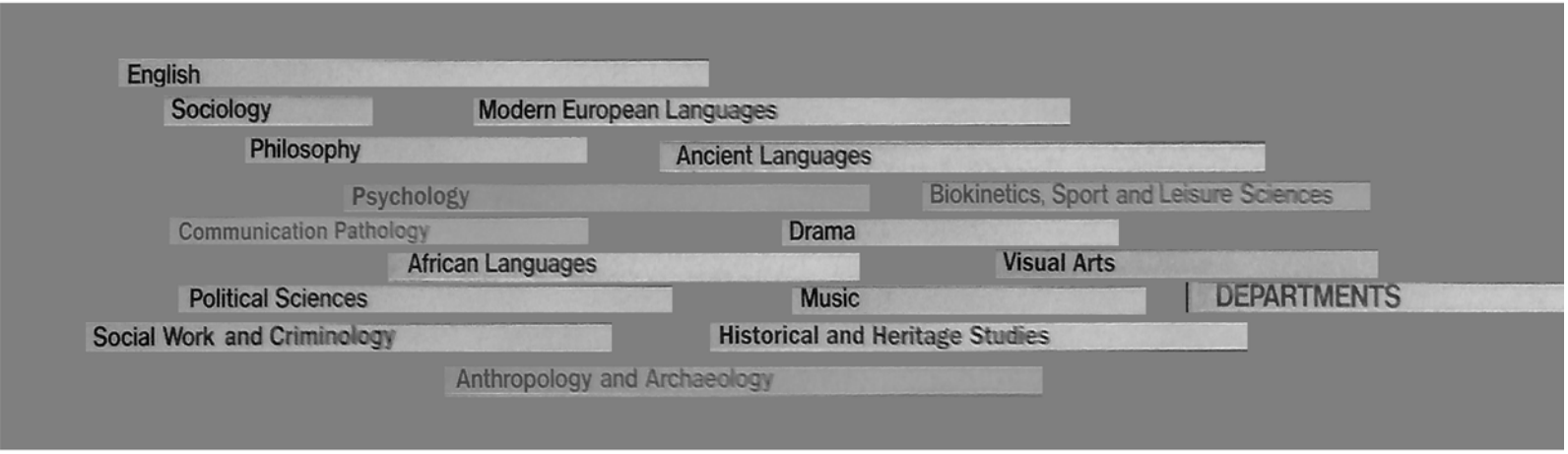

02 problem statement

- introduction
- client profile
- brief
- goal statement
- theoretical premise


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2.01

02 problem statement

Introduction

As the idea of convergence of cultures is laid down, the client is introduced. This sets the scene for the brief of the project to express the client's needs, and translate a theoretical premise, all in order to state a goal for the development of the dissertation.

2.02

Client Profile

The client to be considered for this dissertation is the University of Pretoria. The Faculty of Humanities' various Language departments are the main interested parties that are considered for the development of the architectural conclusion.

2.03

A hundred years ago the Pretoria branch of the Transvaal University College commenced with 32 students attending classes in a house in 270 Skinner Street in the centre of Pretoria called Kya Rosa. Courses were presented in Dutch and other Modern Languages, English Language and Literature, Classics (which included Philosophy, Latin and Hebrew), as well as Natural Sciences.


2.04

"Today more than 50 000 students study in the nine faculties and two business schools for the 371 undergraduate and 1522 post-graduate study programmes on offer."

(*Univ. of Pretoria Centenary, 2008:* www.up.ac.za)

2.01 Aerial photo of the University of Pretoria (1967)
2.02 University of Pretoria Centenary logo
2.03 Photo of Kya Rosa in its original location
2.04 Photo of Kya Rosa in its current location

2.05

Photo of the Humanities Building.

Despite being one of the oldest faculties on campus, the Faculty of Humanities only found a permanent residence in 1977, where it is located to this day. Located on the main campus the building forms a point of reference, a historical landmark within the continuously developing precinct. The faculty consists of a variety of departments which include: Sociology; Philosophy; Psychology; Communication Pathology; Political Sciences; Social Work and Criminology; Biokinetics, Sport and Leisure Sciences; Drama; Visual Arts; Music; Historical and Heritage Studies; Anthropology and Archaeology; and Language Departments.

The Language Departments include: English; Afrikaans; Modern European Languages; Ancient Languages; and African Languages.

The image with sketch overlay indicates that each floor of the building is dedicated to a specific department, and consists mainly of offices with a meeting room at the end of each hallway. These horizontal spaces are vertically connected with the elevator core.

The University of Pretoria is celebrating its Centenary in 2008 and is appropriately themed: *A Century in the Service of Knowledge*. It is within this milieu of knowledge and achievement that the proposed project will function.

2.06

Photo with sketch overlay indicating the building's spatial function.

Photo collage of facial expressions suggesting cultural difference.

Brief

The image above serves as a visual reminder of the different cultural layers that exist in society. The social problem identified earlier in the dissertation states that the existence of a void between ignorant and informed needs to be filled by the learning of different cultural languages. It is this concept of infill and void that resonates with the requirements of the Faculty of Humanities. The Language Departments require space on main campus where students can freely express themselves in their various languages. This should not only function as a space of expression, but mainly the new location for the Departments' practical language learning centre: a space that will provide the students with an opportunity to engage in critical thinking and talking sessions, brainstorming, and where they can network with one another, and ultimately cause intercultural cross pollination in various languages. The new building should fit in well within its urban precinct, and at the same time be accentuated as a remembrance of the university's centenary celebrations.

Photo collage of facial expressions suggesting cultural difference.

Goal Statement

The challenge now is to translate exiting spaces into sensory stimulating social spaces that would provide the freedom of choice and expression, evoke intercultural chance encounters, and ultimately enhance the quality of life. *The goal is therefore to design an urban responsive language learning centre that would be a linking tool which enables the user to learn through interactive intercultural contact sessions.*

1. How does the learning centre facilitate interaction between cultures, encourage individuality, the freedom of thought and expression, and exposure to creative ideas?
2. How does the facility fit into the urban environment?
   a) Who will benefit from the facility within the urban context?
   b) What will the facility 'fix' in the urban context?
3. How does the learning centre influence the education of languages?
   a) How will the learning process be channelled to enable maximum information gain?

Theoretical Premise

The theoretical stance which this dissertation investigates is:

Language as an architectural translator.

The purpose of this investigation is to establish whether the pedagogy of *natural languages* can influence the translation of unutilized, left-over spaces in an urban environment into an *architectural language* of form and image with sensory stimulating social spaces and real cross-cultural dialogue.

Natural languages are the richest symbolic system to which human beings has access to, enabling people to communicate with others. "Language-using is itself a form of social practice as such it is implicated in the reproduction of the beliefs, relationships, attitudes and values that exist in a given society." (Markus, 2002: p.3.)

When language is personified as a translator or mediator, it acts as a catalyst within a complex development of an architectural conclusion. "The purpose of language is then to convey ideas and information from one head to another. Not so easy when English/American one drives on a parkway and parks in a driveway, plays at a recital and recites in a play." (Fletcher, 2001: p.391) It seems that language can also somehow be lost within the translation.

To what extent then, does the interaction of language and image affect the perception and evaluation of design?

As stated earlier, the existence of language and communication is considered a highly valuable tool for the continued existence of the human race. This fact is further emphasized with the statement that "linguistic and cultural competence will be the mark of the well-educated citizen of the 21st century." (Genesee & Cloud, 1998: p65)

It has been recorded in history that Cuneiform script tablets were the first recorded written form of language expression. This indicates that image and language work together as multimodal texts, informing the user of the substance while stimulating the senses. "Oddly enough, for a function so basic to being human, research into exactly how language works, and how it is acquired, is full of theories, some more plausible than others, and very few facts indeed." (Barter, 1994: p.35)

Having said that, linguistic academics state that language develops in three areas, namely grammatical development (language form), expansion of concepts (language content), and appropriateness of communication in particular context (language use). (Nelson, 1998: p.288)

2.09

Background image indicates Cuneiform symbols.

In order to fully comprehend the process of language acquisition, the range of chrestomathy[1], and the instruments required to learn a new language, the author sets out to learn a new language himself. From the 112 recognized world languages available to learn, the process started off as being rather a daunting task. After a couple of elimination rounds and prerequisite criteria, a language was chosen to get the process started.

The utilization of computer software as an instrument to commence the process of understanding a language makes it rather an accessible development. These software programs utilizes a combination of images, text, and sound, with difficulty levels increasing as the learner progresses, in order to teach various vocabulary terms and grammatical functions intuitively, without drills or translation. The process consists of the teaching of pronunciation, basic expressions, and the three main components which include: grammatical development, expansion of concepts, and appropriateness of communication in particular context.

The author is in total agreement with Collier's statement of mastering a language: "in order to become linguistically proficient and competent in any language requires time and input. Language acquisition occurs over a number of years and requires stimulation and feedback in the target language from communication partners." (Collier, 1989: p.510) It is therefore appropriate to conclude that social interaction is central to language learning, and that spaces that are designed for this action, be design with social interaction as part of the conceptualization of the architectural conclusion. The analysis of language is therefore a useful tool for understanding buildings as social objects.

Where spoken language is a system of visual, auditory, and situational constraints 'providing users with multiple ways of representing the same object, state, event or process' (Markus, 2002: p.3.), then architecture is public art speaking in images that are 'constructed by combining a set of formal elements according to a set of formal rules.' (Markus, 2002: p.4.)

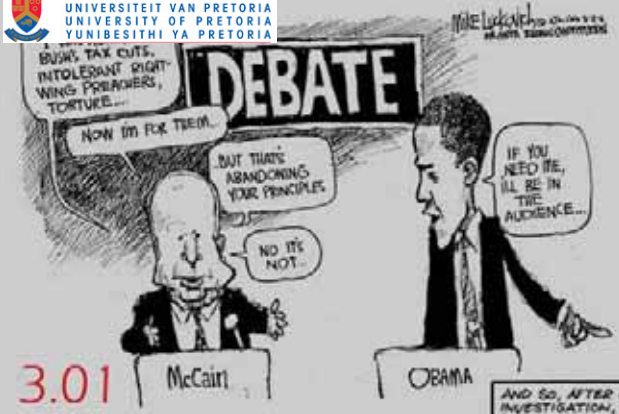
Verbal language plays a vital part in the process of designing a building. It is a collaborative process which involves continual dialogue with clients, colleagues, and other professionals. The language used to speak and write about the built environment plays a significant role in shaping that environment. One such aspect is the technical vocabulary of architecture. The vocabulary is not merely "a convenient shorthand, it is a system for thinking with, and provides the classificatory scheme which enable architects to 'see' as they do." (Markus, 2002: p.3.)

The section to follow will place the stated problem into its context, by investigating the social and urban environment in which the site is located.

*1. **Chrestomathy** (from the Greek words khrestos, useful, and mathein, to know) is an anthology (collection) of choice literary passages compiled especially as an aid for those engaged in learning a foreign language.*

03 context analysis

- introduction
- social
- urban
- site description
- climate data
- site elements
- development



3.01

3.02

3.03

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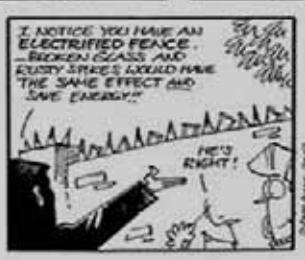
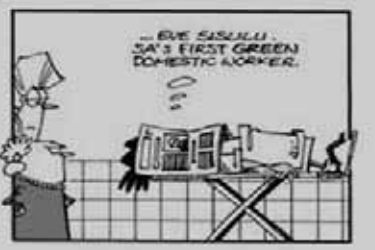




03 context analysis

Introduction

The investigation into the context in which unutilized, left-over space in an urban environment will be translated into sensory stimulating social spaces will present useful indicators in order to develop the architectural language of the building.As a point of departure for this process to commence, levels of scale will be introduced to produce an understanding for the milieu in which the building will be designed.

"My world it moves so fast today
The past it seems so far away
And I squeeze it so tight, I can't breathe
And every time I try to be
What someone has thought of me
So caught up, I wasn't able to achieve
But deep in my heart the answer it was in me
And I made up my mind to find my own destiny

I look at my environment
And wonder where the fire went
What happened to everything we used to be
I hear so many cry for help
Searching outside of themselves
Now I know His strength is within me
And deep in my heart the answer it was in me
And I made up my mind to find my own destiny

And deep in my heart the answer it was in me
And I made up my mind to find my own destiny"

Lauryn Hill musician

3.06

Macro scale - Cultural context
Social convergence

"The concept of culture leapt fully armed from the head of Johann Gottfried Herder in the mid-eighteenth century, and has been embroiled in battles ever since. *Kultur*, for Herder, is the life-blood of a people, the flow of moral energy that holds society intact, *Zivilisation*, by contrast, is the veneer of manners, law and technical know-how. Nations may share a civilization; but they will always be distinct in their culture, since culture defines what they are."
Roger Scruton (Fletcher, 2001: p.14)

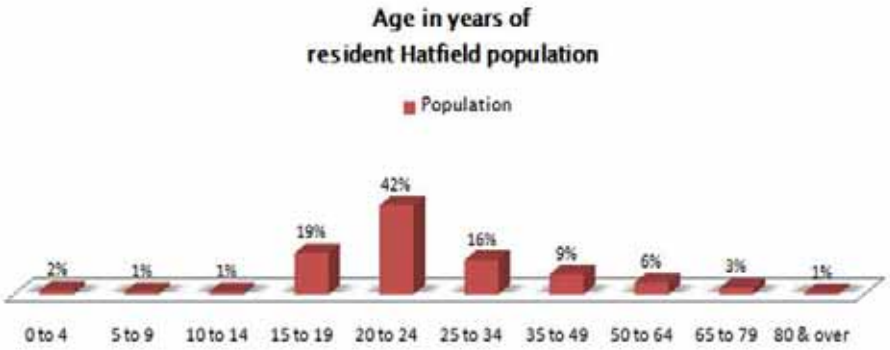
Societies around the world are concerned with pressing issues like global warming, environmental conservation, airport security, international financial markets, political rivalry, Skype, Facebook and off course what celebrities are getting up to. Because South Africa forms part of this global village, societies within the country share the concern for the above aspects as well. South Africa is the host nation for the 2010 Soccer World Cup. This brings additional issues to the table including: the Gautrain Project, economic growth, electricity load shedding, unemployment statistics, and off course bribery and corruption.

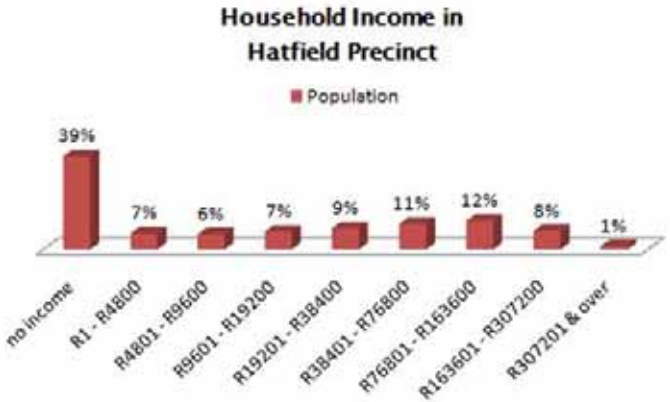
3.01 Comic strip of a debate between McCain and Obama by Mike Luckovich.
3.02 Social commentary comic strip of the Gautrain project as in Madame & Eve.
3.03 Comic strip of airport security by Mark Parisi.
3.04 Social commentary comic strip of bribery and corruption as in Madame & Eve.
3.05 Social commentary comic strip of global warming as in Madame & Eve.
3.06 Lyrics form the album *The Miseducation Of Lauryn Hill*, 1998 by Lauryn Hill.

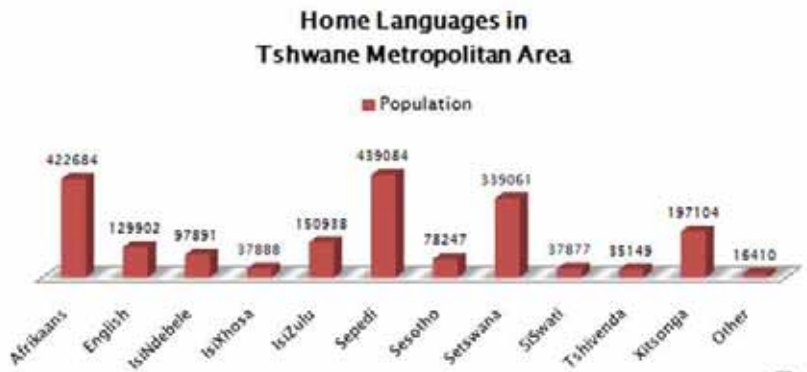
Social

Problems identified in social context:

- High unemployment rate
- Expensive healthcare
- Lack of housing delivery
- Insufficient security
- Lack of intellectual interaction
- Lack of social spaces
- No 'platform' for self expression
- Segregated public and private spaces
- Lack of cultural expression
- Communication Void







3.07

The South African Census of 2001 indicates that the majority of the resident population in the study area which include Hatfield, Arcadia, and Hillcrest precincts is between 20 and 24 years of *age*. This is due to the amount of students living in the areas that are studying at the university. Due to the amount of secondary schools in the area, the second largest resident population is aged between 15 and 19 years.

The majority of the resident population within the Hatfield Business District has no household *income*. This is again due to the amount of students living in the areas that are studying at the university and at secondary schools.

Sepedi is the most commonly spoken *home language* in the Tshwane Metropolitan Area (22%), followed by Afrikaans (21%) and Setswana (17%). (*Census 2001* on www.statssa.gov.za)

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Urban

Micro scale - Local

University's main campus & Hatfield precinct

3.08

"Surveyor WR Lanham laid out the suburb of Hatfield on the farm Koedoespoort for the Wesleyan (Methodist) Society in 1905. The suburb was named after Hatfield House in Hatfield, Hertfordshire, England, the residence of William Waldegrave Palmer, second Earl of Selborne (1859-1942), who became Governor of the Transvaal (1905) and High Commissioner in 1909. The name Hatfield has its origin from Old English heap field, meaning "heather-covered field". The Hatfield township was incorporated into the Pretoria municipality in 1916. Most of the residential houses remaining in the Hatfield - Hillcrest area date back to the early 1900's." (www.tshwane.gov.za)

The *University of Pretoria* was re-located in September 1911 from the residence in Skinner Street to the Hatfield precinct where it is currently situated.
As a *landmark* within this precinct the main campus functions as a research and education hub, from which the surrounding precincts benefit.

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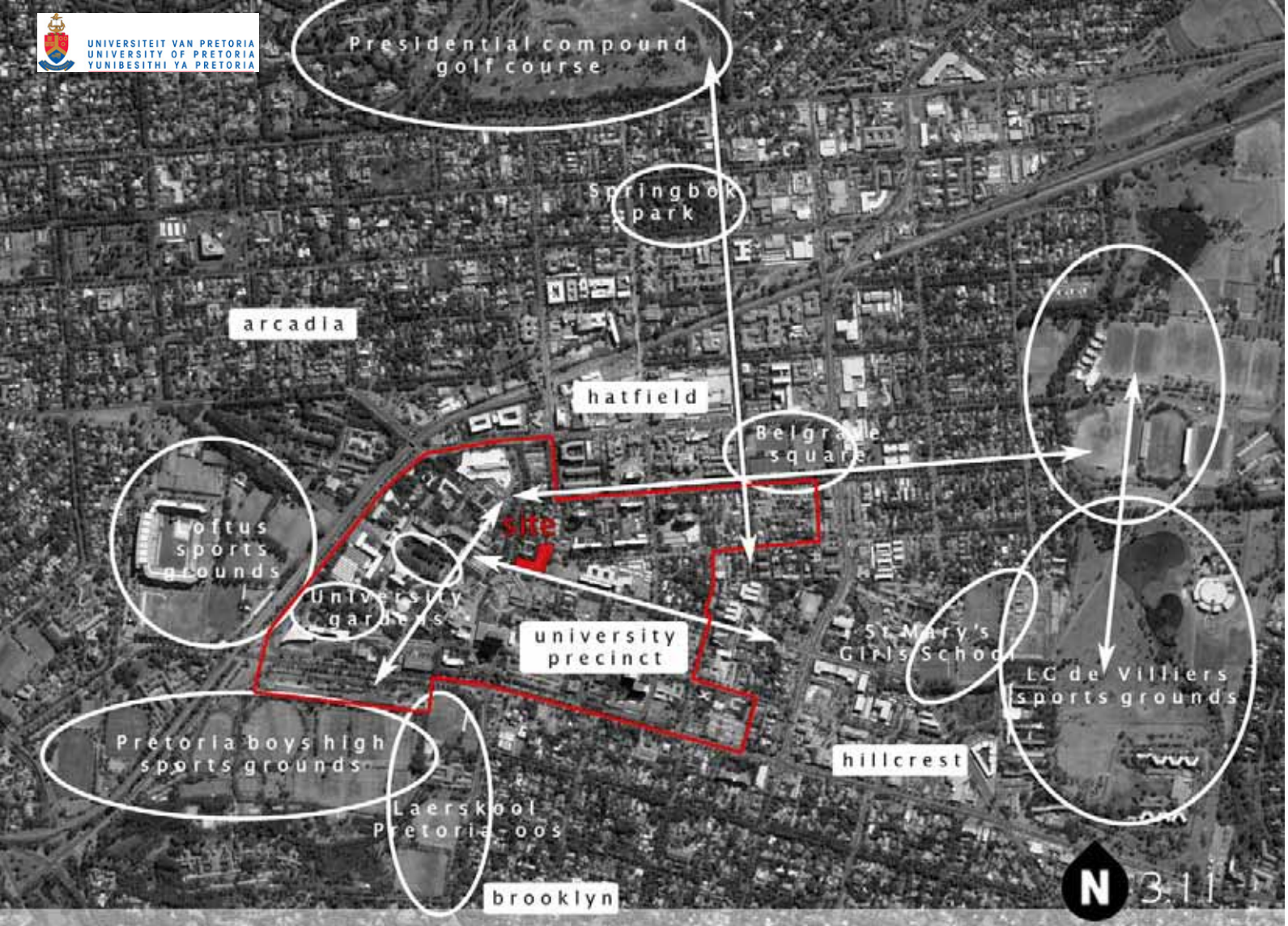
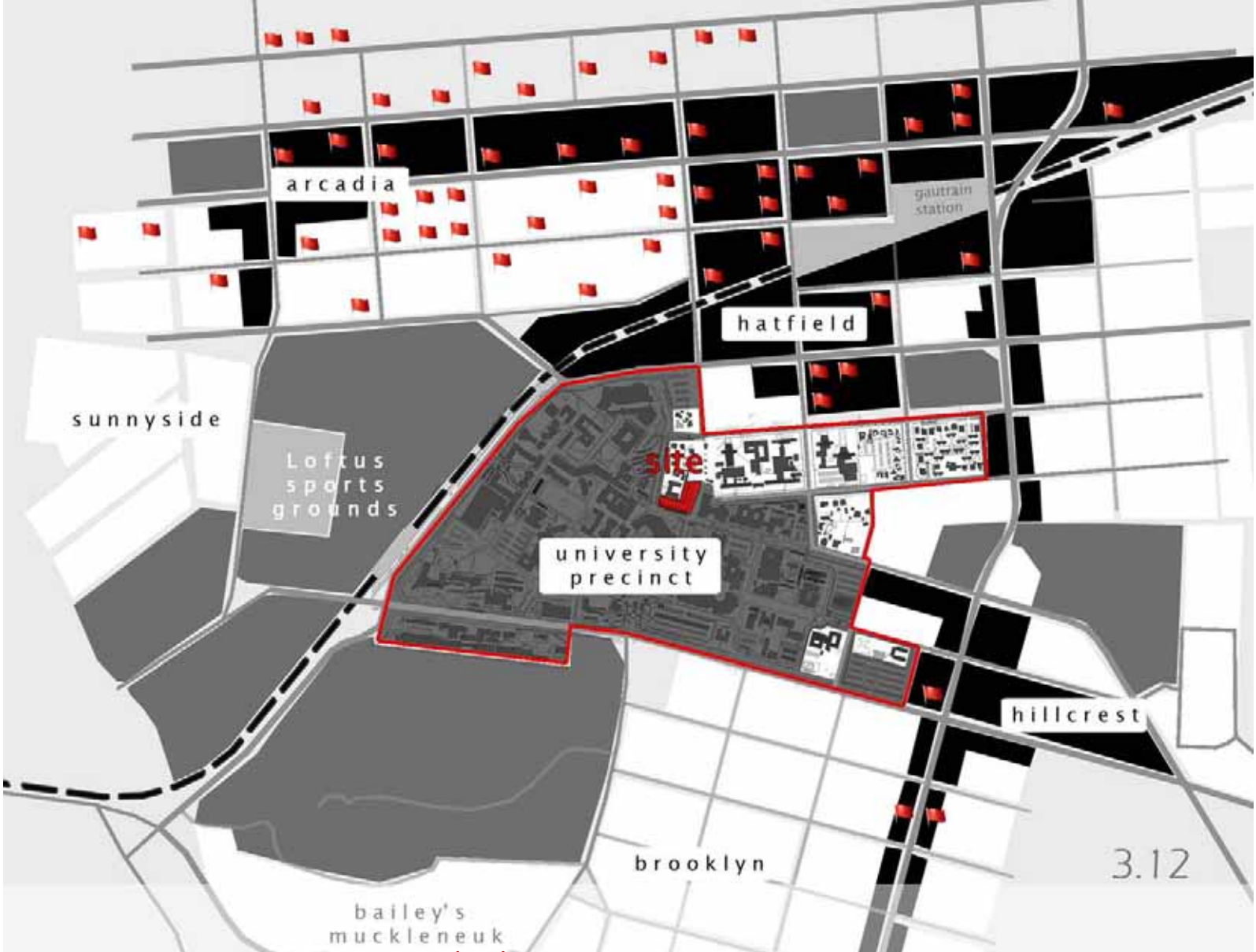
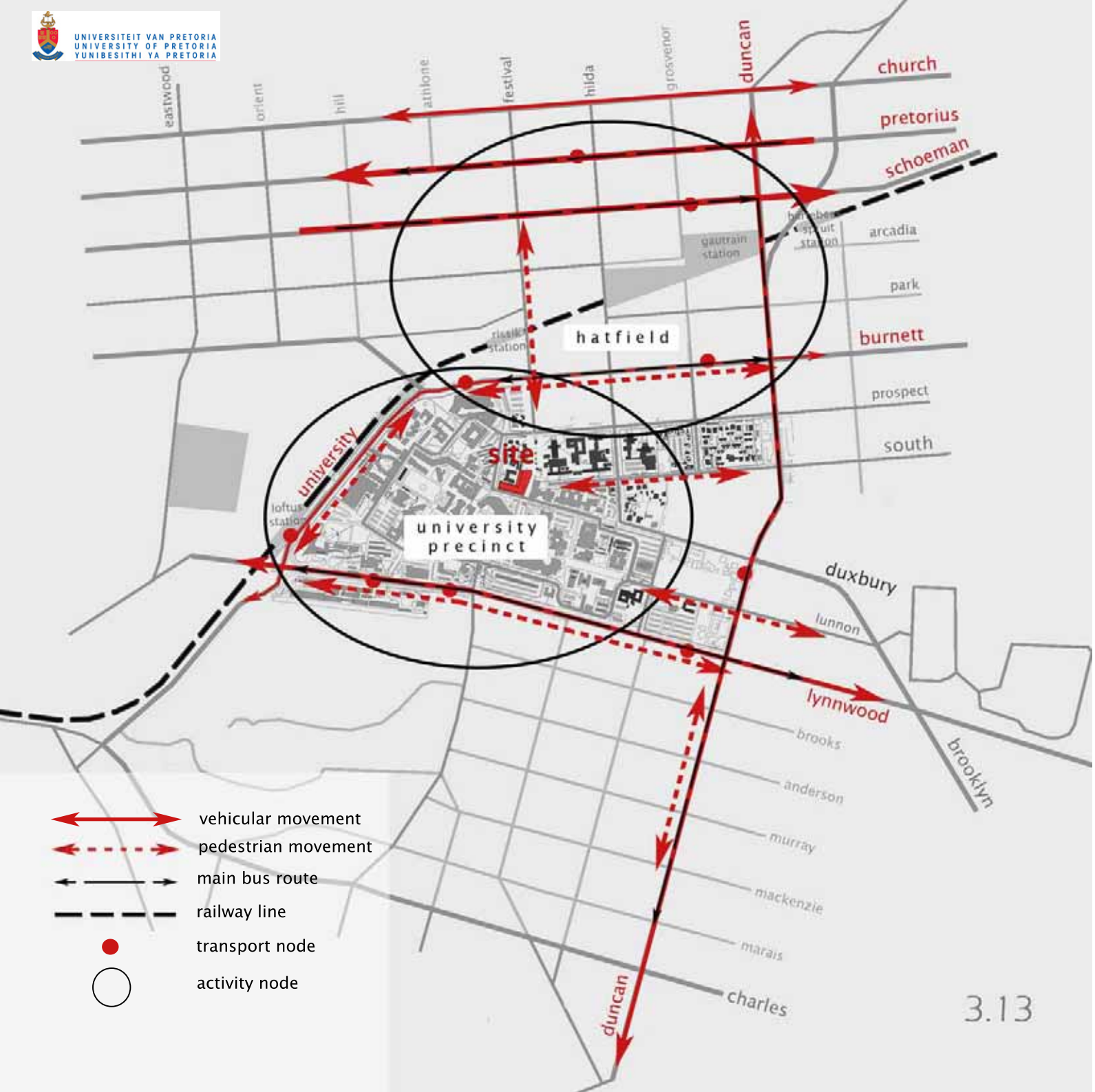


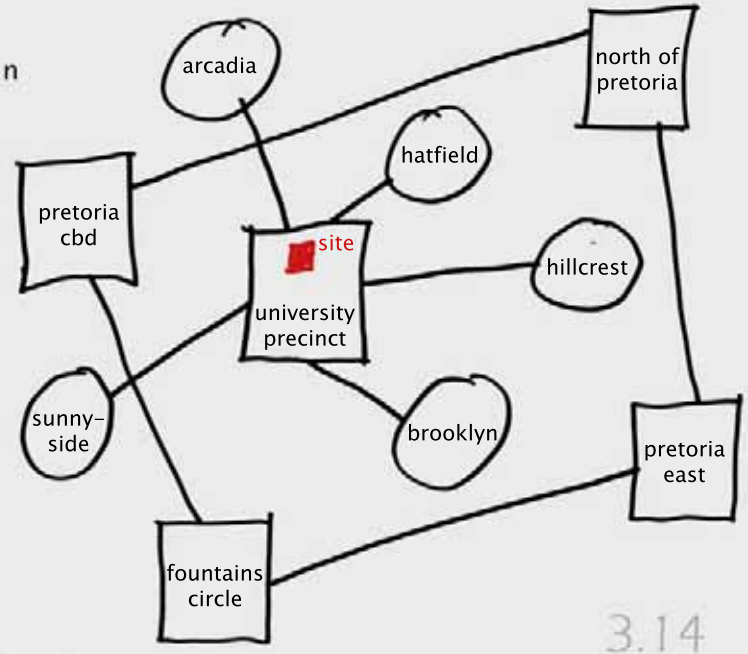
Surrounding the precinct are *green open spaces*, consisting of private sports grounds, a public park, and the private presidential compound and golf course. Most of these green spaces are inaccessible for the public. Inside the precinct are semi-private gardens scattered throughout with connected green pedestrian routes. A number of green open spaces in the study area are *connected with green corridors*, but the green spaces are far apart and the corridors are along fast-moving vehicular routes, making it dangerous for pedestrians to use.



When considering the study area, the *land uses* surrounding the precinct to the south are predominantly low density *residential* and high density residential to the east. *Educational* zones with sports grounds are present to the west and south-west. To the north of the precinct are *commercial* zones, with a large number of international *embassies* scattered throughout. As a result of roads with heavy vehicular movement and the position of the railway line, the zones to the north, west, and south are cut off from the campus, causing the campus to become an isolated island. Furthermore, the institutional land-use of the campus creates a barrier for movement from the Hatfield precinct to the south and vice versa.


eastwood
orient
hill
athlone
festival
hilda
grosvenor
duncan
church
pretorius
schoeman
arcadia
park
burnett
prospect
south
gautrain station
hatfield
site
university
university precinct
duxbury
lunnon
lynnwood
brooks
anderson
murray
mackenzie
marais
charles
brooklyn
duncan
vehicular movement
pedestrian movement
main bus route
railway line
transport node
activity node

The Hatfield precinct being largely a mixed use commercial hub is an important *activity node* within the city. It will be the last station on the Gautrain route to the north, and will provide the community with a variety of entrepreneurial opportunities. The precinct is currently functioning separately from the university campus, which generates the problem of public and private spaces not being integrated. Urban place-making is needed in order to fill these voids between the different realms. There is a need for a safe formalized *public transport system* with facilities that will integrate different transport modes, linking regional activity nodes together.



3.14

Linking the activity nodes within the area, are primarily by enhancing the flow of pedestrian and vehicular *movement patterns*. When considering the study area, primary vehicular movement occurs in Schoeman - and Pretorius Street. Both these streets are four-lane one-way streets; one leading traffic out of the city, and the other bringing traffic from the N4 highway into the city. Church Street also provides east-west access into the city. Secondary movement occurs in Duncan Street which connects suburbs in a north-south direction, and Lynnwood Road which is an east-west connector. Both these streets form part of the primary bus route, but have little pedestrian activity on the side-walk, due to the faster vehicular movement. The tertiary *vehicular route* is Burnett Street to the north of the precinct, and University Road to the west. Both streets are single-lane streets with slower vehicular traffic and higher levels of pedestrian movement with some side-walk activities.

Public pedestrian movement through the campus is discouraged by security access into the compound, while the *pedestrian paths* along the streets can generate *linear urban edges*, but are not utilized to its maximum commercial potential. These urban edges are not designed and therefore prohibit the development of day - and night time activities along the side-walks. If implemented correctly these activities will ensure *passive surveillance* within the area, and will contribute to the general safety within the precinct.

Climate Data

Zone

Pretoria falls into the Northern Transvaal climatic zone, which is characterized by distinct rainy and dry seasons, with large daily temperature variations and strong solar radiation, and moderate humidity levels.

Temperature

Temperate climate with:

average day temperature - summer 29°C
average night temperature - summer 17°C
average day temperature - winter 20°C
average night temperature - winter 5°C

Rainfall

380mm-700mm
Rainy season is from November - March, and peaks in January with late afternoon thunderstorms.

Wind

Summer: direction is predominantly east-north-easterly to east-south-easterly.
Winter: direction is predominantly south-westerly with occasional wind from the north-east.

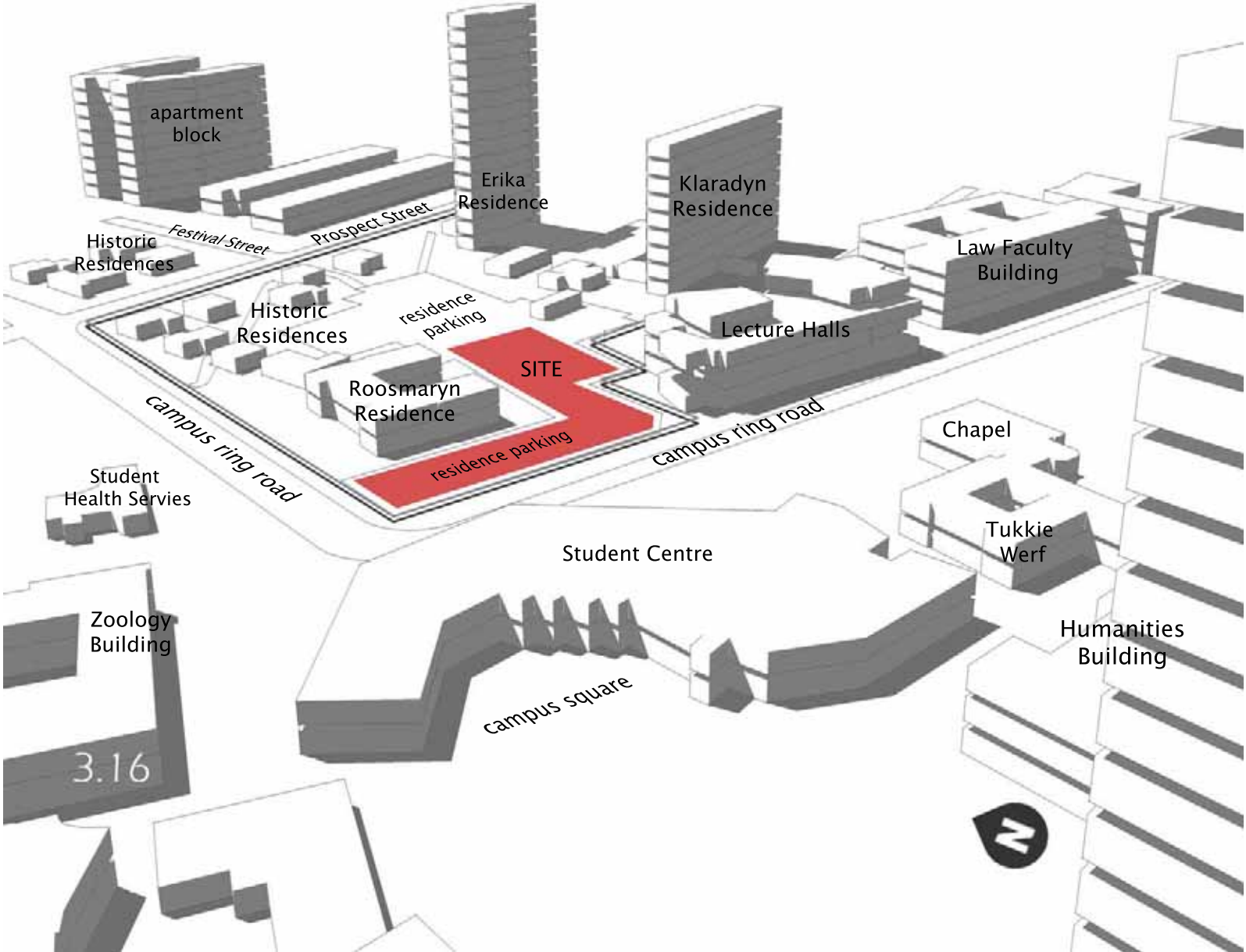
Altitude

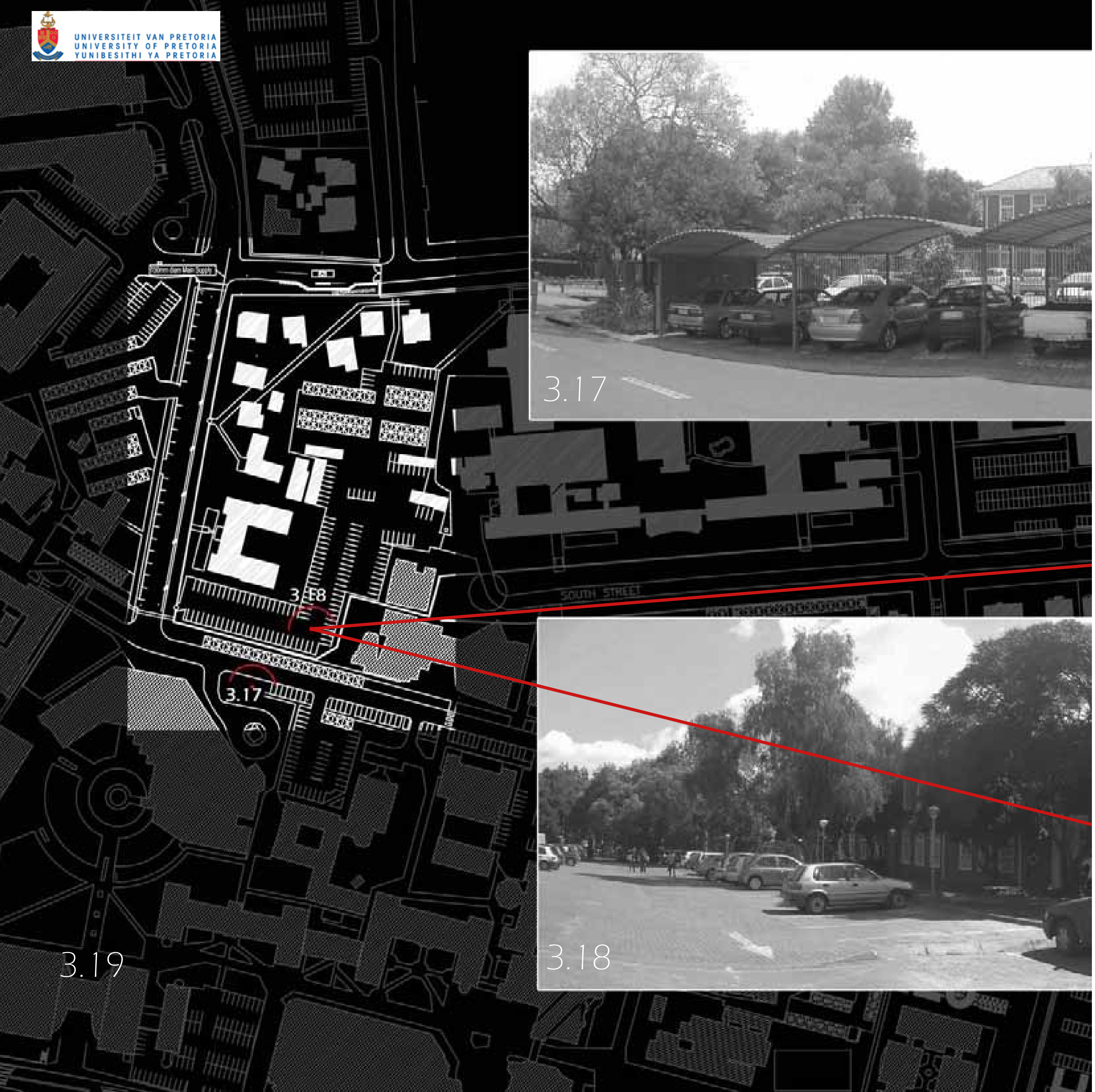
1372m above sea level

(Holm, 1996. p. 69)

Site description

The client made it possible to select an appropriate site for the language learning centre to be built on any of the properties owned by the university. Site *selection* needs to be considered on the main campus, due to easy accessibility for students and members of the public. The selected site needs to be easily integrated with the Hatfield Urban Development Framework, and will be considered for its ability to enable the opportunity for social interaction and design exploration.

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3.17
3.18
SOUTH STREET
3.18
3.17
3.19

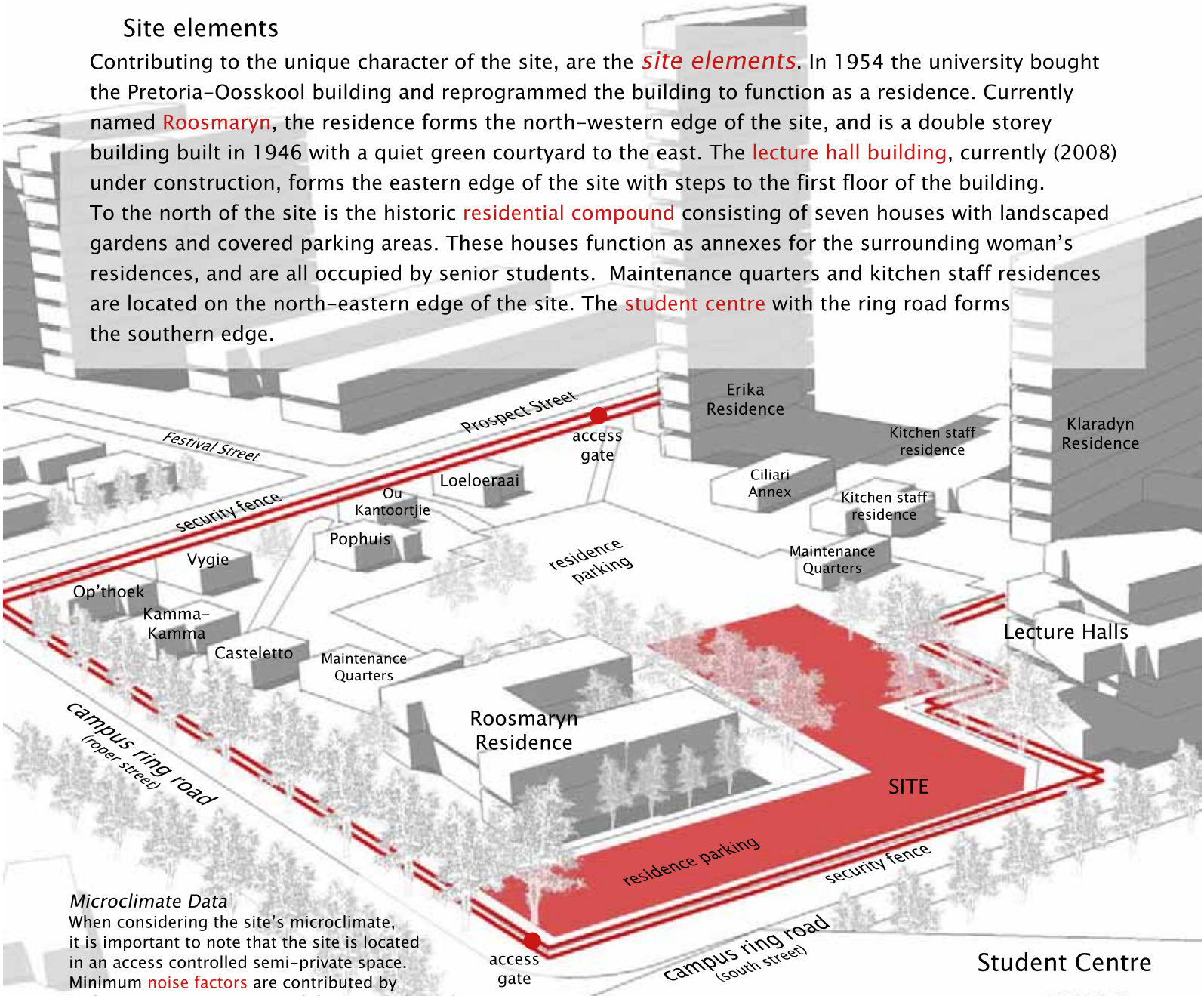
The site is therefore *located* on main campus, and significantly situated at a point where two major urban grid patterns meet. This convergence of the urban fabric enhances the concept of intercultural chance encounters and the celebration of converging cultures. Positioned between the Roosmaryn Residence and the newly constructed lecture halls, this fenced-off hard desolate space functions as a semi-paved parking area for the vivacious residents of the surrounding residences. A space that seems to be displaced somewhere between the private bustling of the main campus and the public hustling of commerce in the distance.

1. Roosmaryn Residence
2. Residential Compound
3. New Lecture Halls
4. Student Centre

3.20
Photos illustrating the surrounding site elements.

Site elements

Contributing to the unique character of the site, are the *site elements*. In 1954 the university bought the Pretoria-Oosskool building and reprogrammed the building to function as a residence. Currently named Roosmaryn, the residence forms the north-western edge of the site, and is a double storey building built in 1946 with a quiet green courtyard to the east. The lecture hall building, currently (2008) under construction, forms the eastern edge of the site with steps to the first floor of the building.
To the north of the site is the historic residential compound consisting of seven houses with landscaped gardens and covered parking areas. These houses function as annexes for the surrounding woman's residences, and are all occupied by senior students. Maintenance quarters and kitchen staff residences are located on the north-eastern edge of the site. The student centre with the ring road forms the southern edge.



Microclimate Data
When considering the site's microclimate, it is important to note that the site is located in an access controlled semi-private space. Minimum noise factors are contributed by pedestrians in conversation while moving through the site, and slow moving vehicles searching for parking places. The vegetation comprises of mature trees that are along the periphery of the Roosmaryn residence and between series of parking bays. These trees include: Jacaranda Mimosifolia; Platatus Occidentalis; Bauhinia; Celtis Africana; and Quercus Roburn. According to geological data for the area, the geology comprises of Ferruginous shale, Quartzite, and Andesite. (Tshwane Geological Data, Tshwane Municipality, 2008.)

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3.22

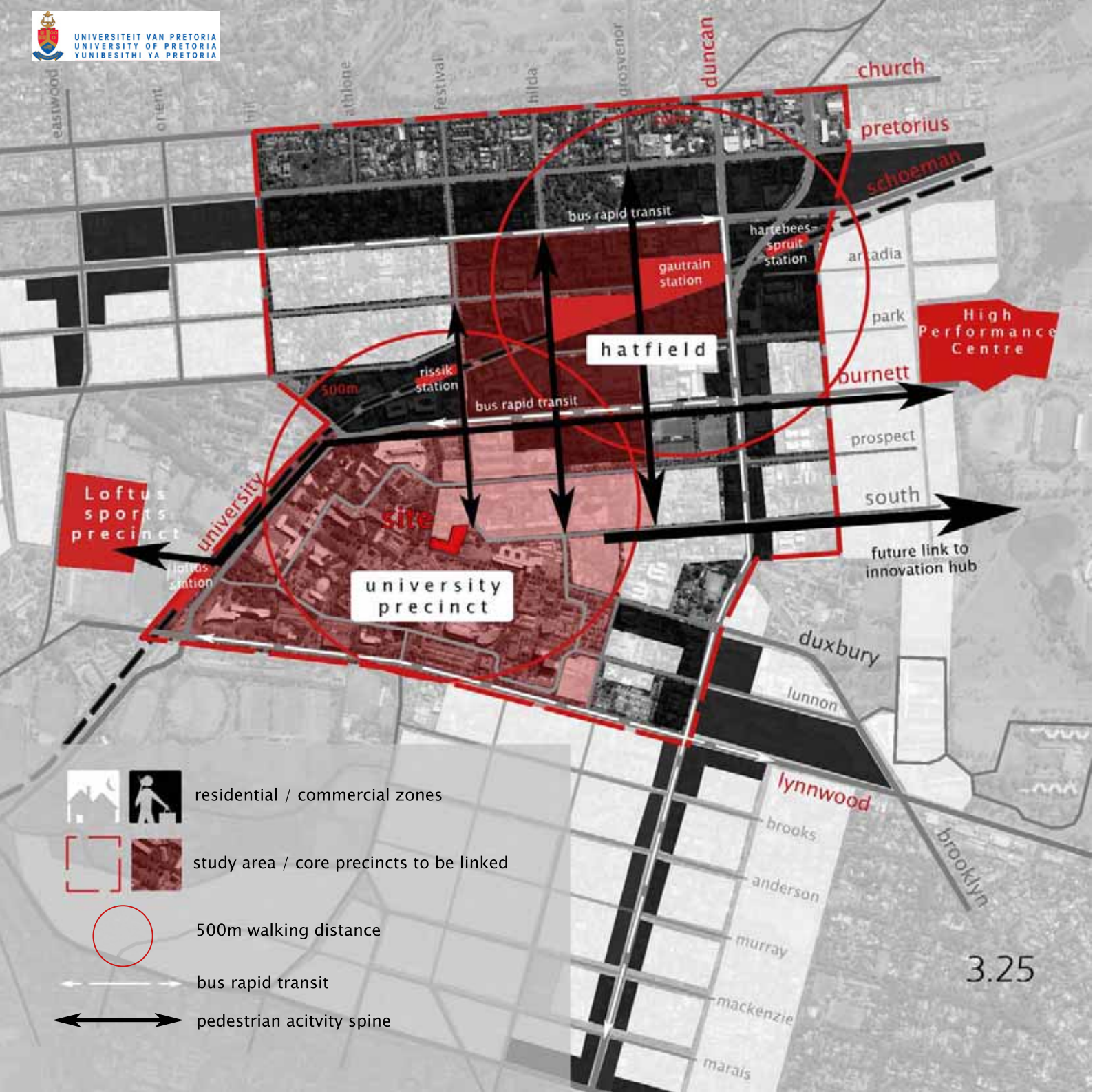
3.23

fenced-off site

pedestrian movement

3.24

Although situated on the university ring road, the site is fenced-off and only accessible with an access card through a rotating security gate. Pedestrian *movement* is diagonally across the site, originating from a rotating security gate in the fence in the south-west corner towards the residences to the north-east of the site. Vehicular movement occurs across the extent of the site, due to the space functioning as a parking area, with entrance from South Street.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athlone
festival
hilda
grosvenor
duncan
church
pretorius
schoeman
bus rapid transit
hartebees-spruit station
gautrain station
arcadia
park
High Performance Centre
burnett
hatfield
500m
rissik station
bus rapid transit
prospect
south
Loftus sports precinct
university
site
loftus station
university precinct
future link to innovation hub
duxbury
lunnon
lynnwood
brooks
anderson
murray
mackenzie
marais
brooklyn
residential / commercial zones
study area / core precincts to be linked
500m walking distance
bus rapid transit
pedestrian acitvity spine
3.25

Development

"Hatfield has been identified as one of six Metropolitan Cores in terms of the Tshwane Metropolitan Spatial Development Framework (MSDF). The MSDF contains specific guidelines as to how a Metropolitan Core should develop." (Hatfield MCUDF, 2007 on www.tshwane.gov.za)

Problems that have been identified of previous development frameworks were: does not address the precinct in its context; proposed before the Gautrain Development; no sufficient level of detail proposals to enable land use management.

Hatfield Metropolitan Core Urban Development Framework

Problems Identified

- Expensive Land Values
- Many conservation worthy buildings
- A large population of students that often have no significant source of income and vacate the area periodically and have no personal interest in the area.
- Lack of parking
- Congested roads
- Car dominated movement
- Lack of open spaces

The major driving forces behind the proposal are:

- Tshwane Metropolitan Spatial Development Framework
- Gautrain Station
- Proposed Bus Rapid Transit (BRT)
- University of Pretoria
- National Sports Facilities
- Movement Linkages
- Inner City and National Government

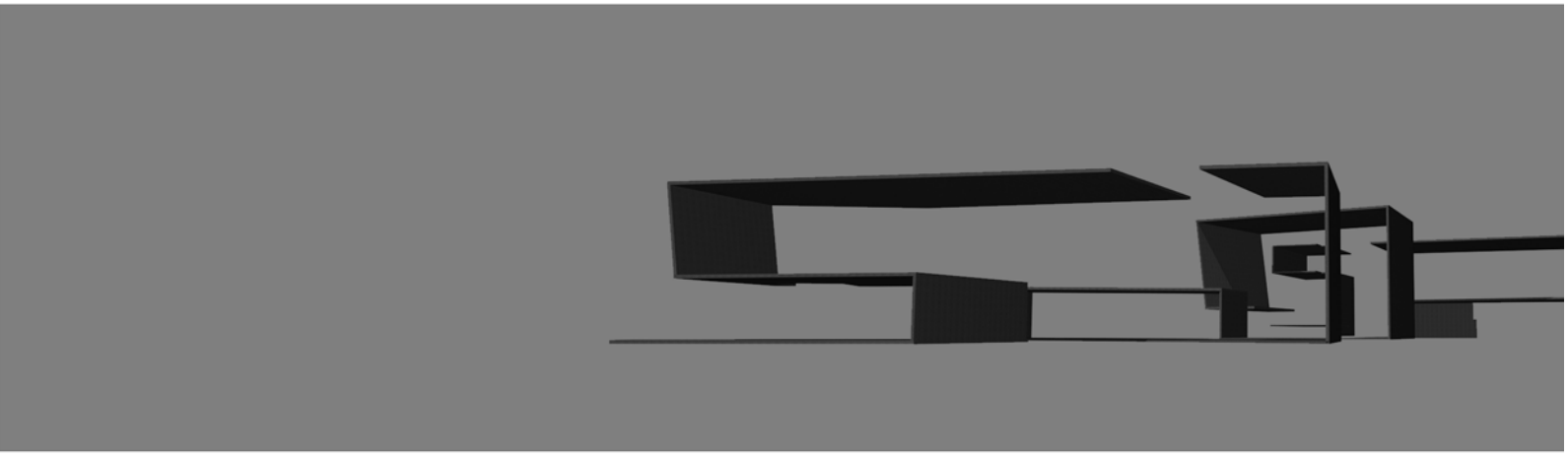
"Transit Oriented Development is the exciting new fast growing trend in creating vibrant, livable communities. Also known as Transit Oriented Design, or TOD, it is the creation of compact, walkable communities centred around high quality train systems. This makes it possible to live a higher quality life without complete dependence on a car for mobility and survival." (Hatfield MCUDF, 2007 on www.tshwane.gov.za)

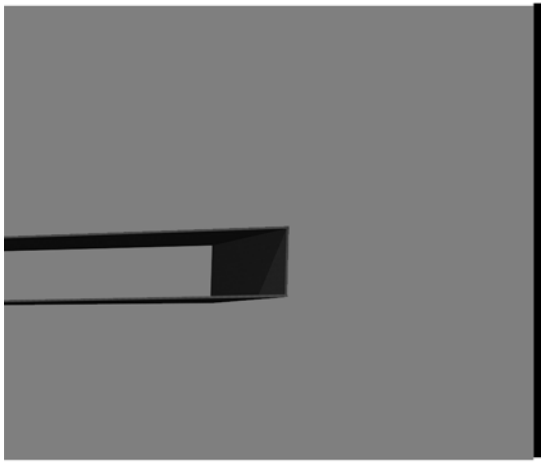
The components of Transit Oriented Design are:

- Walkable design with pedestrian as the highest priority
- Train station as prominent feature of town centre
- A regional node containing a mixture of uses in close proximity including office, residential, retail and civic uses
- High density, high-quality development within 10-minute walking radius surrounding train station
- Collector support transit systems including trolleys, streetcars, light rail and buses
- Designed to include the easy use of bicycles, scooters and walking as daily support transportation systems
- Reduced and managed parking inside 10-minute walking radius around town centre/train station

Critical Requirements

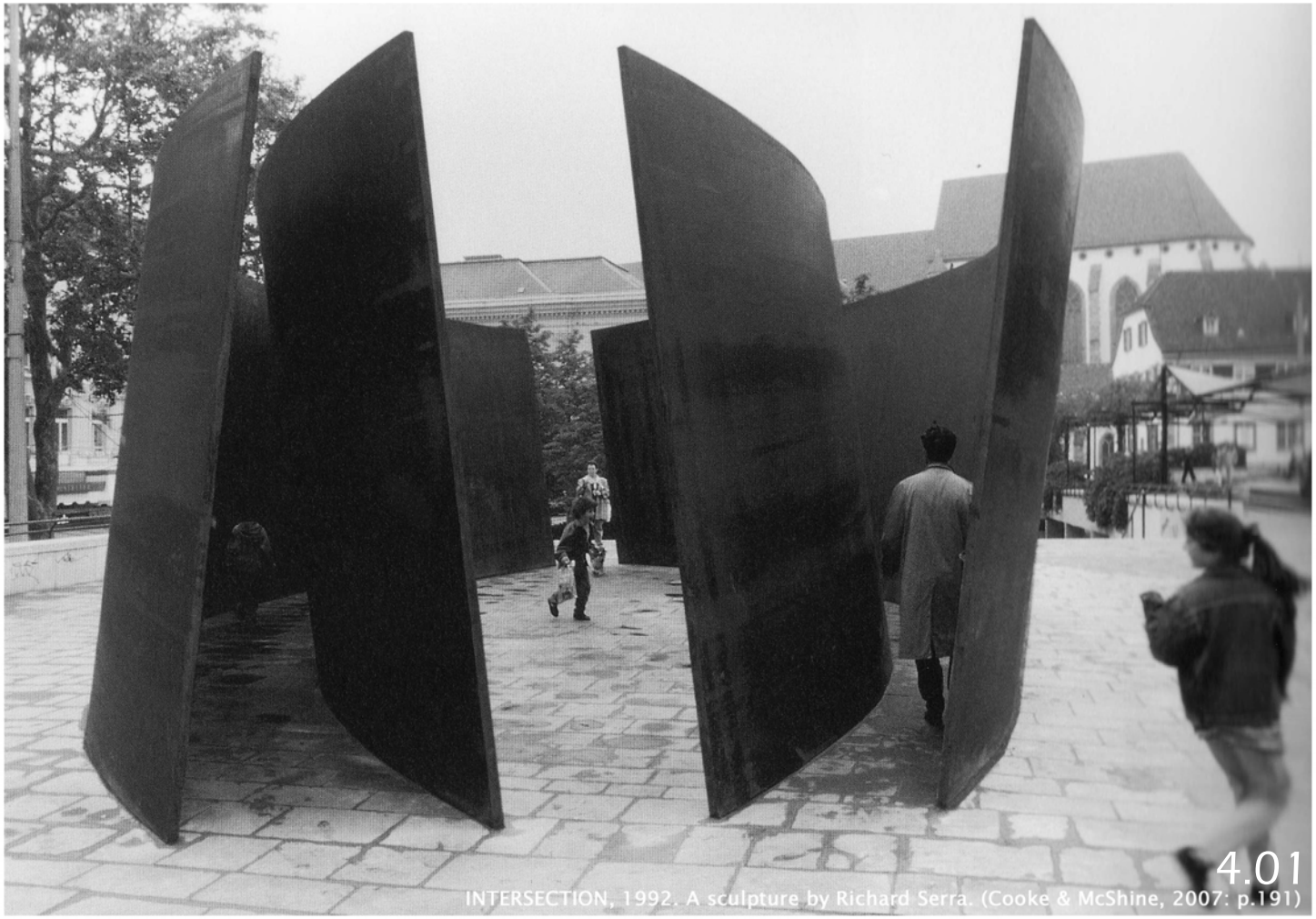
- A clear identity and image
- Intensification of development
- Mixed land use on site level
- Land use and transport integration
- Quality architecture
- The upgrading of the public domain and the integration of private developments with public space
- Linkages for non-motorised transport (pedestrians and cyclists)
- Sound Urban Management
- Service Infrastructure to support development





04 design development

- architecture and the voice
- urban design framework
- urban intervention
- site intervention
- design proposal



4.01
INTERSECTION, 1992. A sculpture by Richard Serra. (Cooke & McShine, 2007: p.191)

"The intelligibility of Serra's pieces is not given through any code or language of distinct pictorial or compositional elements. Instead, they are constructed diagrams of spatial disposition and movement. They cannot be read simply by looking at them, only by moving within them; rather than being grasped cognitively at a distance, or recalled as image, they must be experienced here and now." (McShine & Cooke, 2007: p.16.)

04 design development

"This is the architectural mosaic of our planet. The same buildings are erected in any capital of the world, regardless of how much of a specific setting's historical or cultural baggage they may be carrying. Our history and culture are now global, common, linked by necessity, and following the same path. At the same time, they are inseparable, as Adolf Loos stated when he said: "today is built on yesterday, just as yesterday was built on the day before. It has never been any other way, and never will be."
(Vidiella, 2007: p.13)

Architecture and the voice

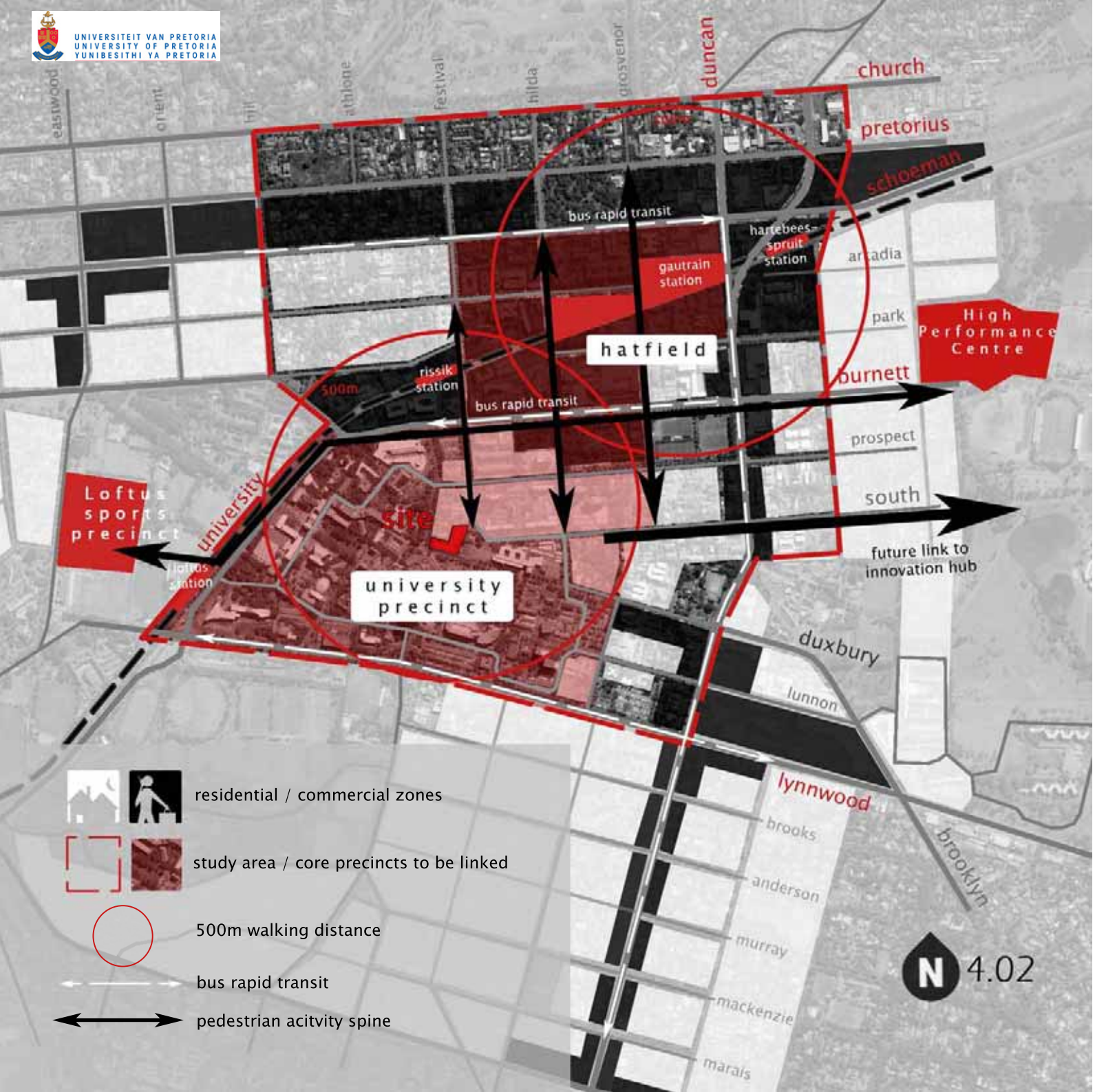
"Semiotics and structuralism propose language not as a metaphor for architecture, but rather that architecture is a language." (Markus, 2002: p.5)

When intercultural expressions are physically experienced within a space, the space acquires a certain aural dimension. An aspect ratio that brings cultures together, announcing man's presence of arriving, meeting, agreeing, and being together. So, when this space becomes a sentence within a poem, the poem forms the background fabric for human activity to flourish, with a beginning, middle, and an end.

"Instead of creating mere objects of visual seduction, architecture relates, mediates, and projects meanings. The ultimate meaning of any building is beyond architecture; it directs our consciousness back to the world and toward our own sense of self and being. Significant architecture makes us experience ourselves as complete embodied and spiritual beings. In fact, this is the great function of all meaningful art." (Pallasmaa, 2006: p.20)

The meaning of architectural space is only relevant when the whole context i.e. social, temporal, and spatial is taken into consideration. This idea is further emphasized with the fact that: "by focusing on form as the main determinant of what a building 'means' leaves out things which, in the real world, are fundamental to its meaning." (Markus, 2002: p.10.) The meaning of space is therefore partially generated by the users of that space, creating a social landscape which is formed by human behaviour.

This chapter will commence by investigating the 'poem' of which is spoken previously. The 'poem' suggests the urban framework in which an architectural space needs to function. A framework that weaves all the different ideologies together within a holistic whole.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pretorius
schoeman
bus rapid transit
hartebees-spruit station
gautrain station
arcadia
park
High Performance Centre
hatfield
burnett
500m
rissik station
bus rapid transit
prospect
south
Loftus sports precinct
university
site
future link to innovation hub
loftus station
university precinct
duxbury
lunnon
lynnwood
brooks
anderson
murray
mackenzie
marais
brooklyn
residential / commercial zones
study area / core precincts to be linked
500m walking distance
bus rapid transit
pedestrian acitvity spine
N
4.02

Urban Design Framework

The concept of *'infill and void'* will be the underlining thread that weaves the theoretical argument, the proposed urban framework, and the architectural conclusion together. In its broadest meaning, infill is material that fills in an otherwise unoccupied space, being the void. In urban planning and development, infill is the use of land within a built-up area for further construction, especially as part of a community redevelopment or growth management. It focuses on the reuse and repositioning of obsolete or underutilized buildings and sites. This type of development is essential to renewing blighted neighbourhoods and knitting them back together with more prosperous communities. On a theoretical level the concept of 'infill and void' suggests the learning of subject matter that has been previously misunderstood or not known at all – the gaining of knowledge.

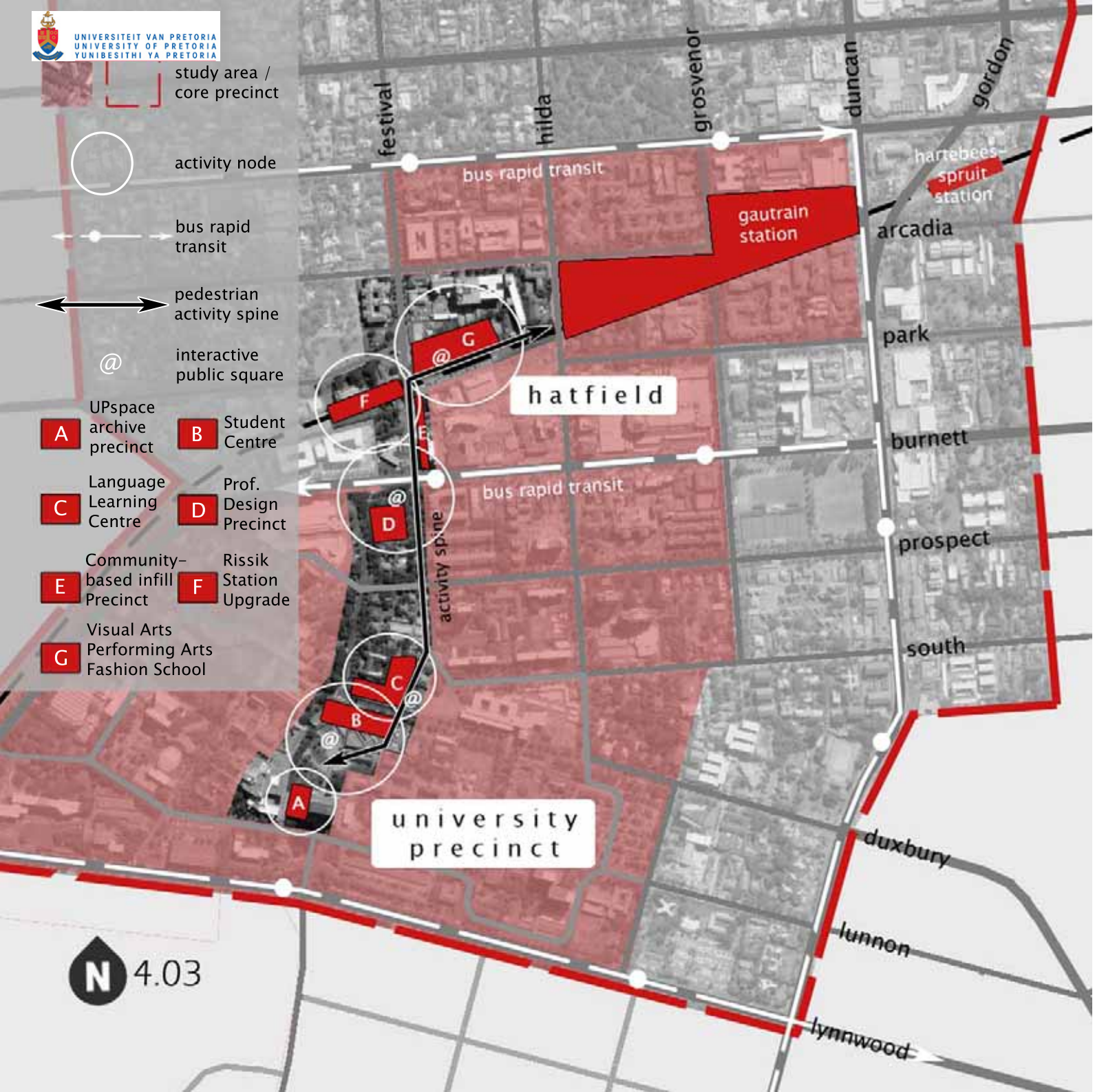
The proposed urban design framework for the project will utilize this concept of *'filling in the voids'* and will be integrated with the Hatfield Metropolitan Core Urban Development Framework, implemented by the local authority. The long term goal of the urban design framework is to remove the physical boundaries of the university compound and integrate the education precinct with the surrounding commercial, residential and other educational precincts. This long term goal of *integration* would occur with intermediate phases where different scaled projects clipping onto one another, forming a type of 'bricolage' (ad hoc patchwork of types and styles).

"In the urban, everything is calculable, quantifiable, programmable; everything, that is, except the drama that results from the co-presence and re-presentation of the elements calculated, quantified, and programmed."
(Lumby, 2006.)

Urban aspects:

- **Integration** – Connection and overlap with surrounding areas.
- **Functional efficiency** – So that individual elements (buildings, streets, open space etc) work together as part of an efficient whole.
- **Environmental harmony** – Creating development forms that are energy efficient and ecologically sensitive.
- **A sense of place** – Creating somewhere that is recognisably distinct but simultaneously strengthens local identity.
- **Commercial viability** – Responding to the realities of market influences on development assortment and delivery.

4.02
Diagram indicating the Hatfield Metropolitan Urban Core Development Framework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UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA
study area / core precinct
activity node
bus rapid transit
pedestrian activity spine
@ interactive public square
A UPspace archive precinct
B Student Centre
C Language Learning Centre
D Prof. Design Precinct
E Community-based infill Precinct
F Rissik Station Upgrade
G Visual Arts Performing Arts Fashion School
festival
hilda
grosvenor
duncan
gordon
bus rapid transit
gautrain station
hartebees-spruit station
arcadia
park
hatfield
burnett
bus rapid transit
activity spine
prospect
south
university precinct
duxbury
lunnon
lynnwood
N 4.03

The design of the streetscape, public spaces, public and private facilities will be an integrated framework of dignified human environments.

- The establishment of a clear spatial structure through an identifiable hierarchy of routes, visual connections to semi-private spaces and supporting building types increasing the legibility of the overall environment.

- The creation of transition zones from public (both commercial and institutional), to semi-private courtyard spaces and private residential spaces. This will enhance visual interest and foster street life along the pedestrian edges.

- Equitable access to all commercial opportunities and community facilities by ensuring that facilities are not embedded within the neighbourhoods but located along main routes. Facilities should be combined to promote multi-functional activity, so strengthening the civic spaces by intensifying their use.

- The making of a coherent streetscape through the design and building of active interfaces between the buildings and the street.

- Using defensible space and informal surveillance principles throughout to ensure that all streets, public open spaces and facilities are overlooked.

- Establishing a safe formalized public transport system with facilities that will integrate different transport modes, linking regional activity nodes together.

- In order to improve the green areas; certain parts of the private sports grounds will be consolidated and the remainder will be reprogrammed to function as public open spaces, with more pedestrian-friendly green corridors which connect and form a network of accessible green pockets.

4.03 Diagram indicating the Urban intervention within the Development Framework.

Urban intervention

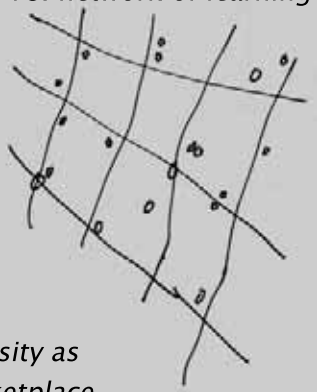
What does the urban fabric dictate?

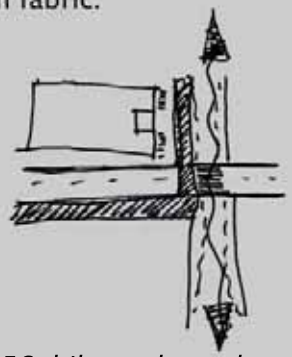
When the opportunities within the urban design framework and criteria of the levels of scales have been identified, an investigation into the urban fabric is done, by utilizing Christopher Alexander's 'A Pattern Language' as a baseline to generate 11 selective patterns for the urban fabric.

8. mosaic of subcultures

13. subculture boundary

18. network of learning



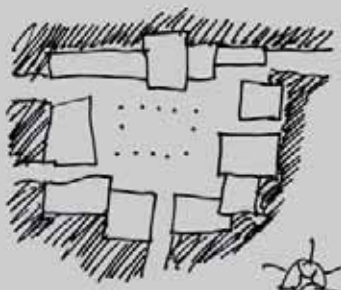


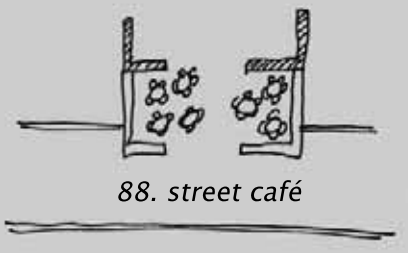
56. bike paths and racks

61. small public squares

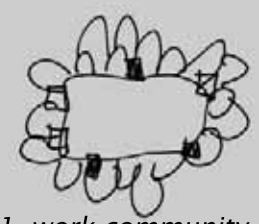
43. university as a marketplace

33. night life

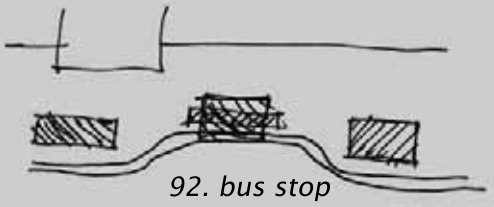




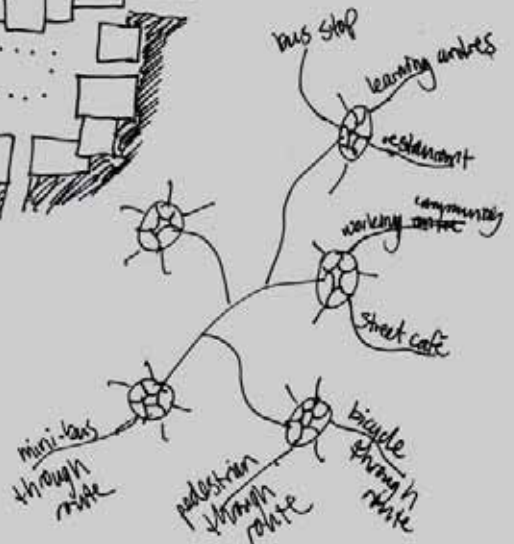
88. street café



41. work community



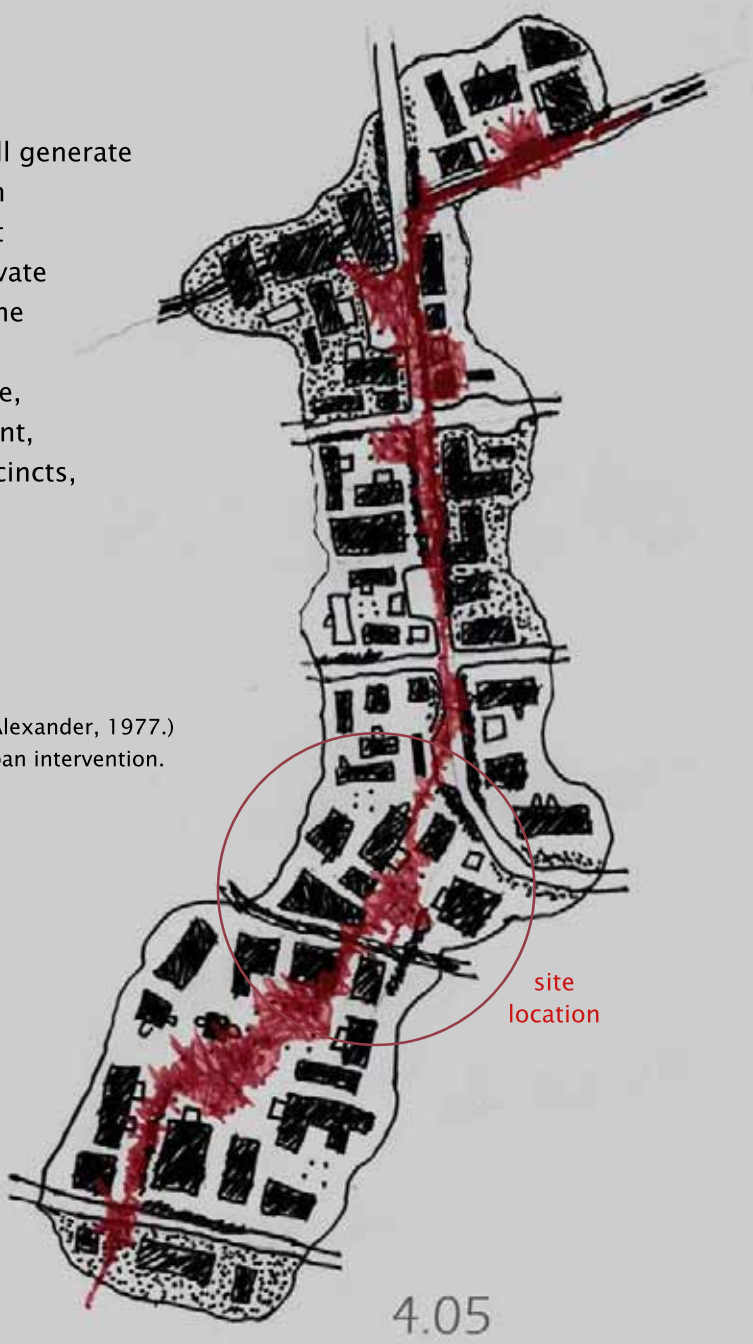
92. bus stop



20. mini-buses

By integrating these patterns, the result will generate an *urban intervention*. The proposed urban intervention will redirect pedestrian movement through previously inaccessible sites, and activate design opportunities along the urban spine. The framework includes developments like:
a fashion design school, performing arts centre, visual arts centre, Rissik station re-development, spatial network of community-based infill precincts, creative professional design precinct, the proposed language learning centre, new student centre and urban square, and UPspace archive precinct.

4.04 11 generative patterns for the urban intervention (Alexander, 1977.)
4.05 Sketch indicating the spatial composition of the urban intervention.

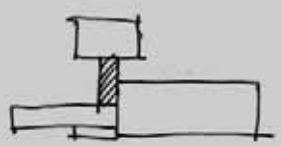


4.05

Site intervention

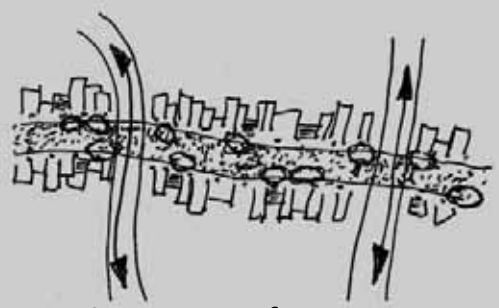
What does the site dictate?

Then, an investigation into the fabric of the site is done, by utilizing Christopher Alexander's 'A Pattern Language' as a baseline to generate 11 selective patterns for the site fabric.
When these patterns are integrated with one another, they will in-turn generate a site intervention:

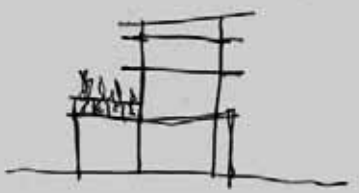


95. building complex

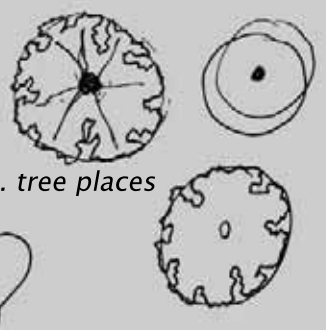
100. pedestrian street



142. sequence of sitting space

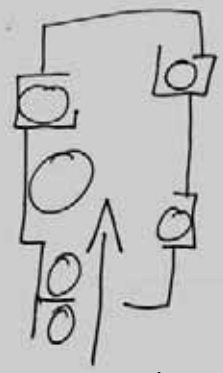


118. roof garden

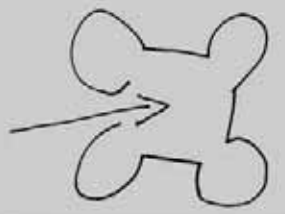


171. tree places

148. small workgroups



124. activity pockets



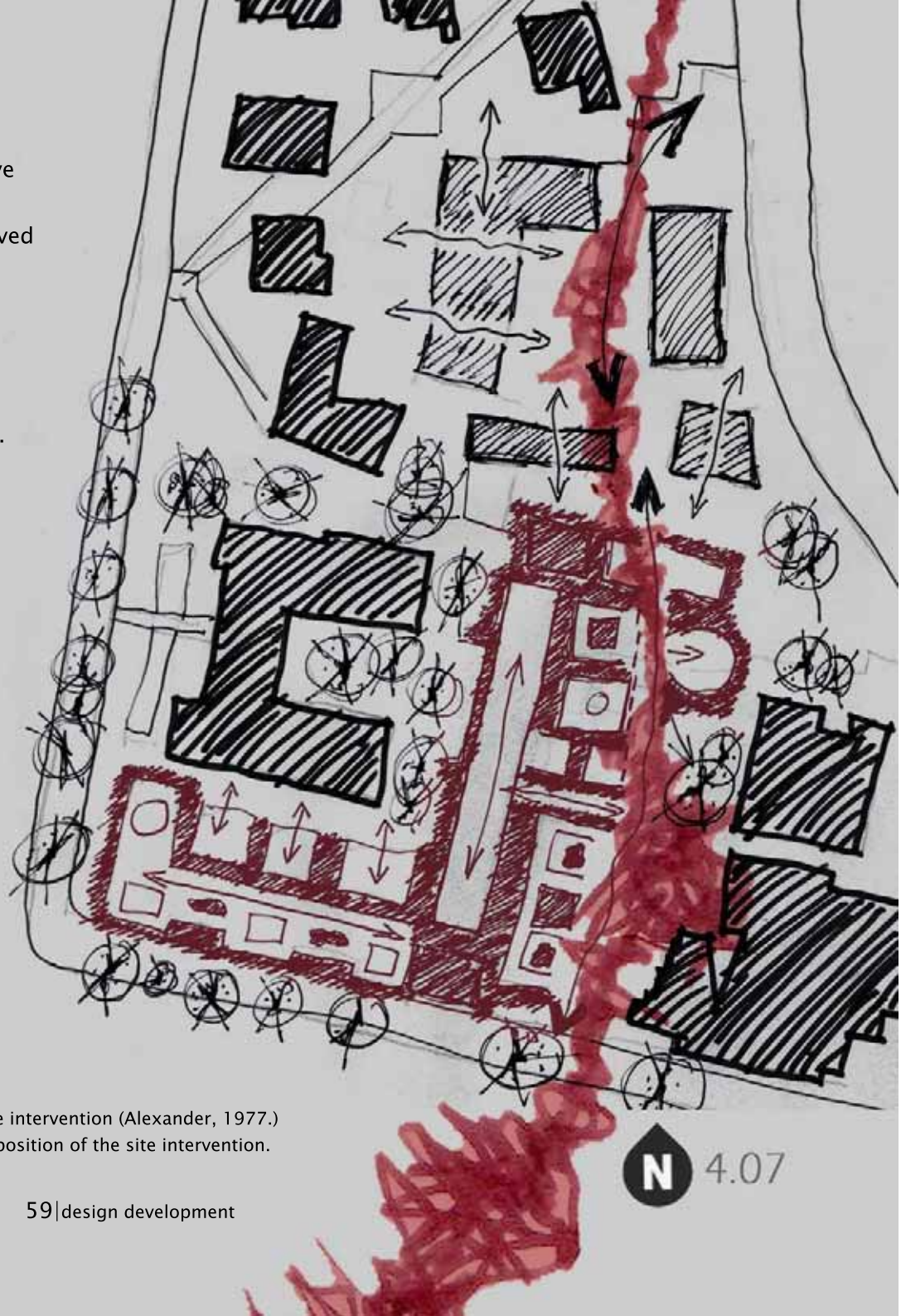
129. common areas at the heart

151. small meeting rooms

165. opening to the street

160. building edge

At the end of the generative intervention processes, the proposed development is weaved into the existing urban fabric. The integration of the urban intervention and the site intervention produces a *spatial layout* for the initiation of a design proposal. The proposal will develop the different programmed, semi-programmed, and unprogrammed spaces.



4.06 11 generative patterns for the site intervention (Alexander, 1977.)
4.07 Sketch indicating the spatial composition of the site intervention.

Design proposal

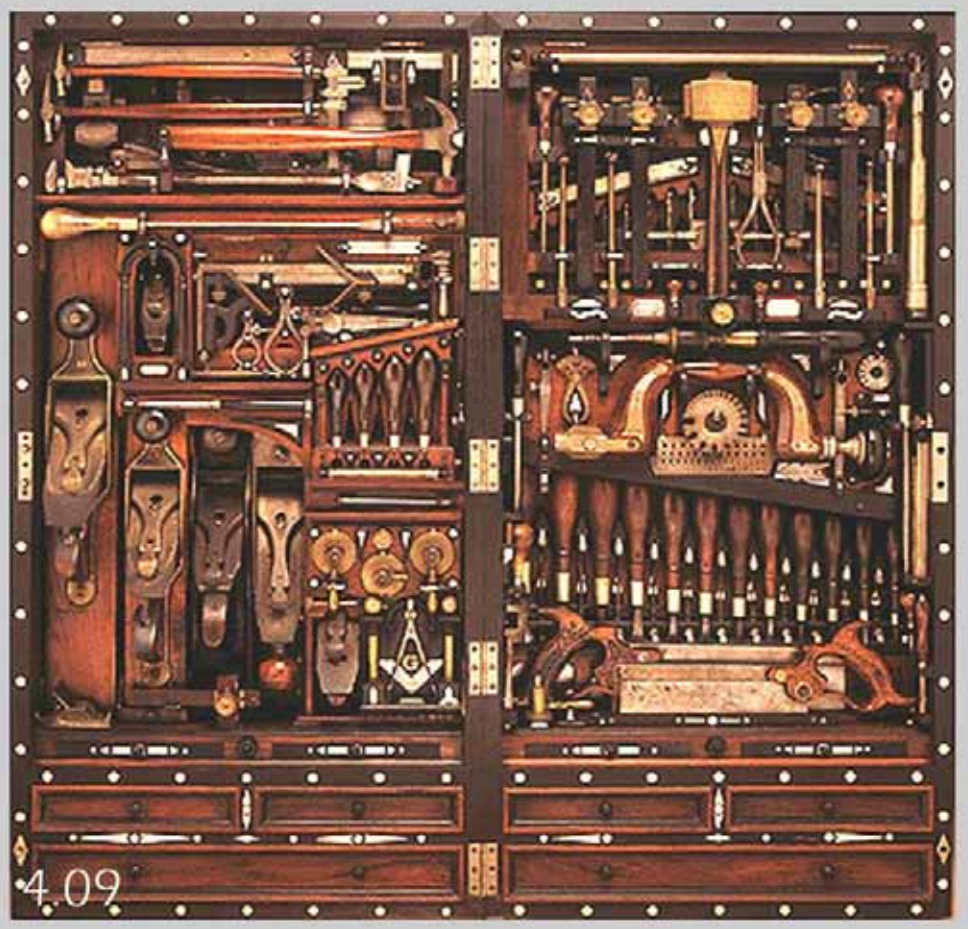
Concept Development

The images (figs. 4.08 & 4.09) serve to introduce the intentions of the concept.
As a conceptual entity, the building is somewhere between a 19th century Studley tool chest and a 18th century wunderkammern (a glass-fronted cabinet which displays ornaments):

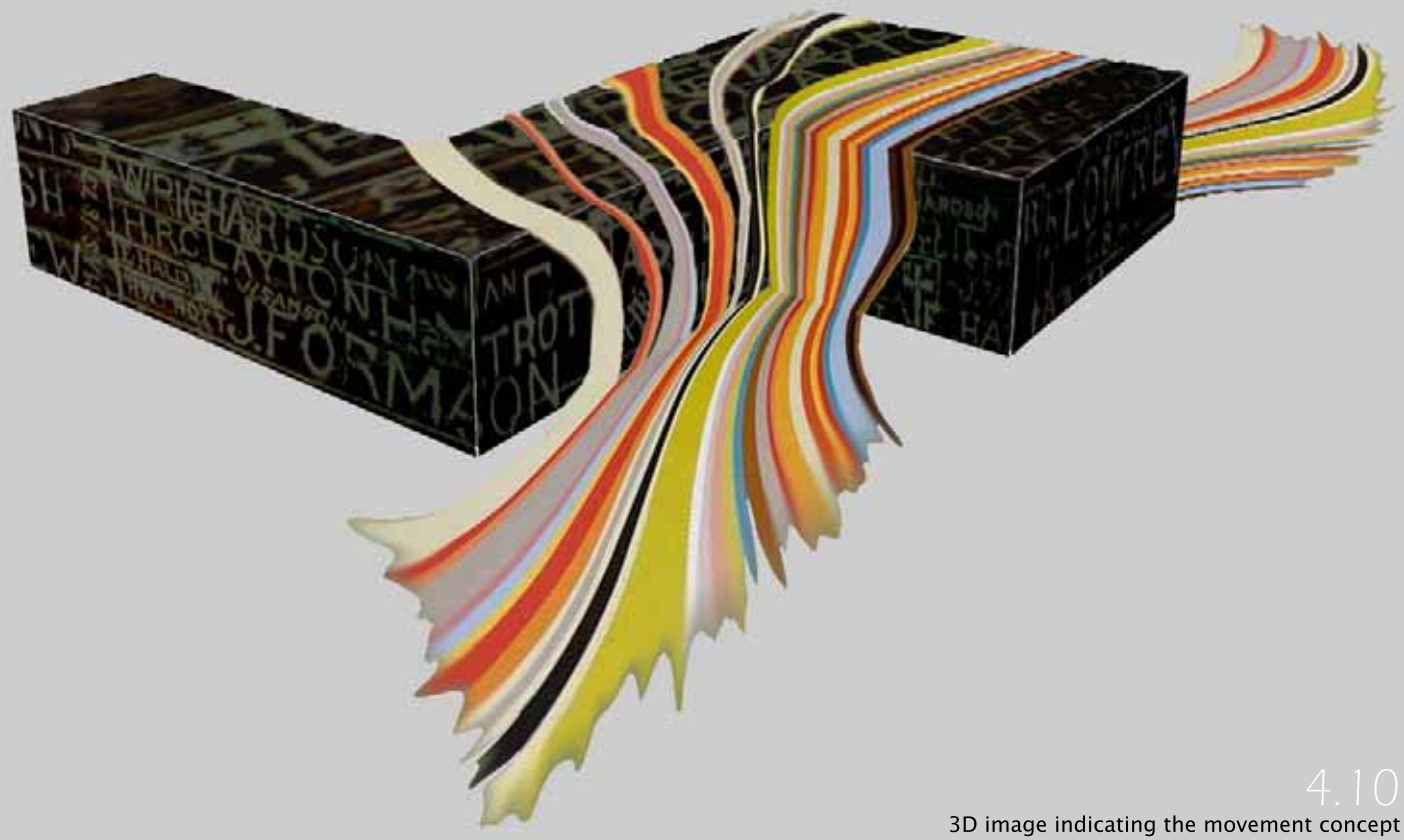
A container that functions as a platform for the collection of tools for shaping the tongue.

18th century wunderkammern

The aesthetics of tool chests can tell us much about workers and their workplaces. While its purpose is to organize, carry, and protect the tools, these chests also suggest what workers think of themselves and how society measures the value of their work. An architectural parallel, perhaps?



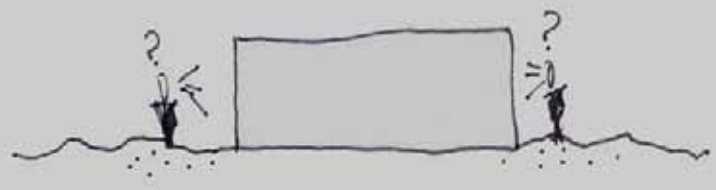
19th century Studley tool chest



4.10
3D image indicating the movement concept

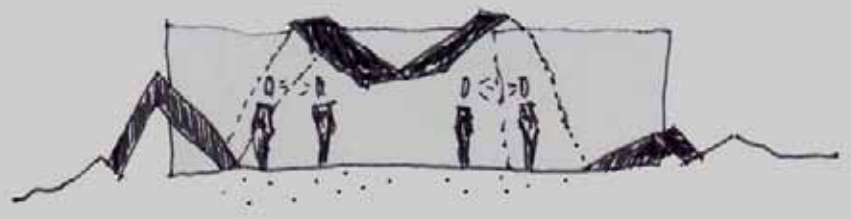
Inspired by the parallel colour arrangement of Paul Smith's corporate logo (British fashion designer);
a metaphor is derived to symbolise the movement of different cultures through the container.
As the pedestrians progress through the space, their movement is translated into a weaving process.
A process of combining spatial layout with programmed volumes.
A development of integrating education with commerce.
And most importantly an intertwining of different cultures, language groups, individuals, and ideas.

communicating void

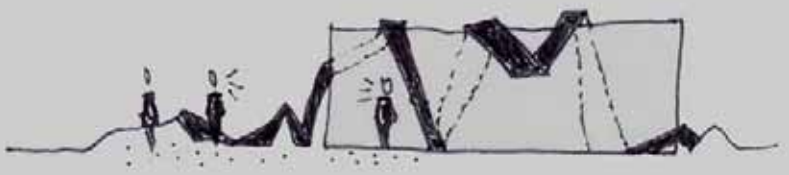


linking noise

container of understanding



weaving cultures together



applying knowledge

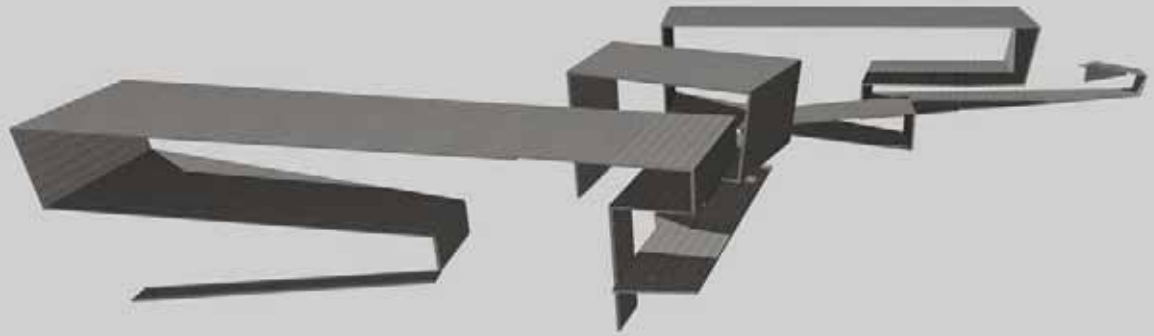
communicating wholeness

The images serves as a précis to illustrate the development of the concept from a communicating void to communicating wholeness.

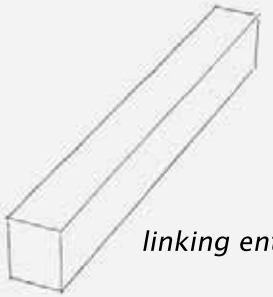
Human

a concrete ribbon weaving through the site
up and down, from left to right
crafting social spaces as it glides
creating, embracing, divides.

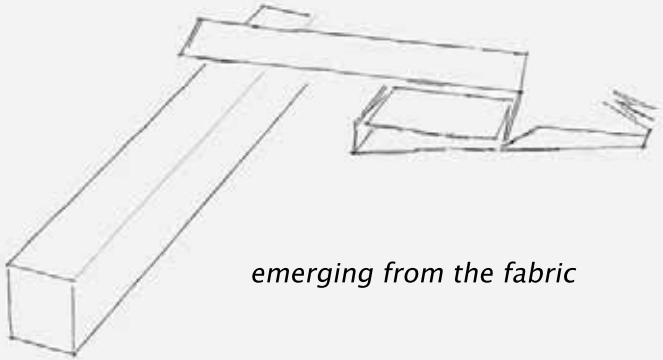
(The author, 2008.)



Formal Development



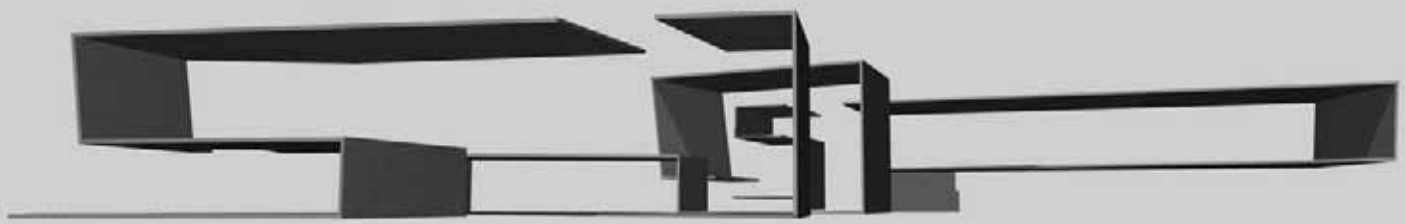
linking entities



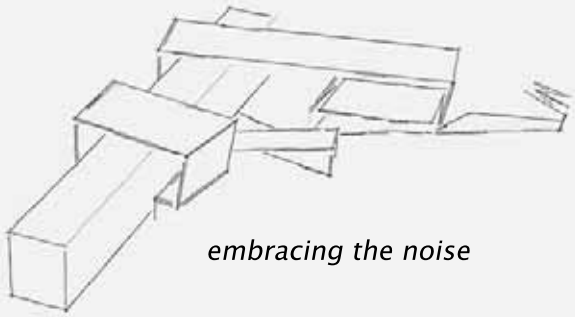
emerging from the fabric

4.12

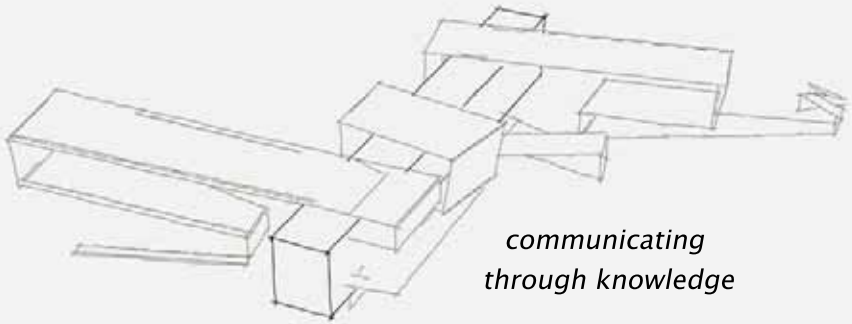
The series of images indicate the tangible weaving process.



The poem serves to introduce the progression of the idea of weaving into a more tangible entity. An entity with horizontal and vertical planes floating above the surface touching here and there, speaking with geometric vocabulary in a concrete tone of voice.



embracing the noise

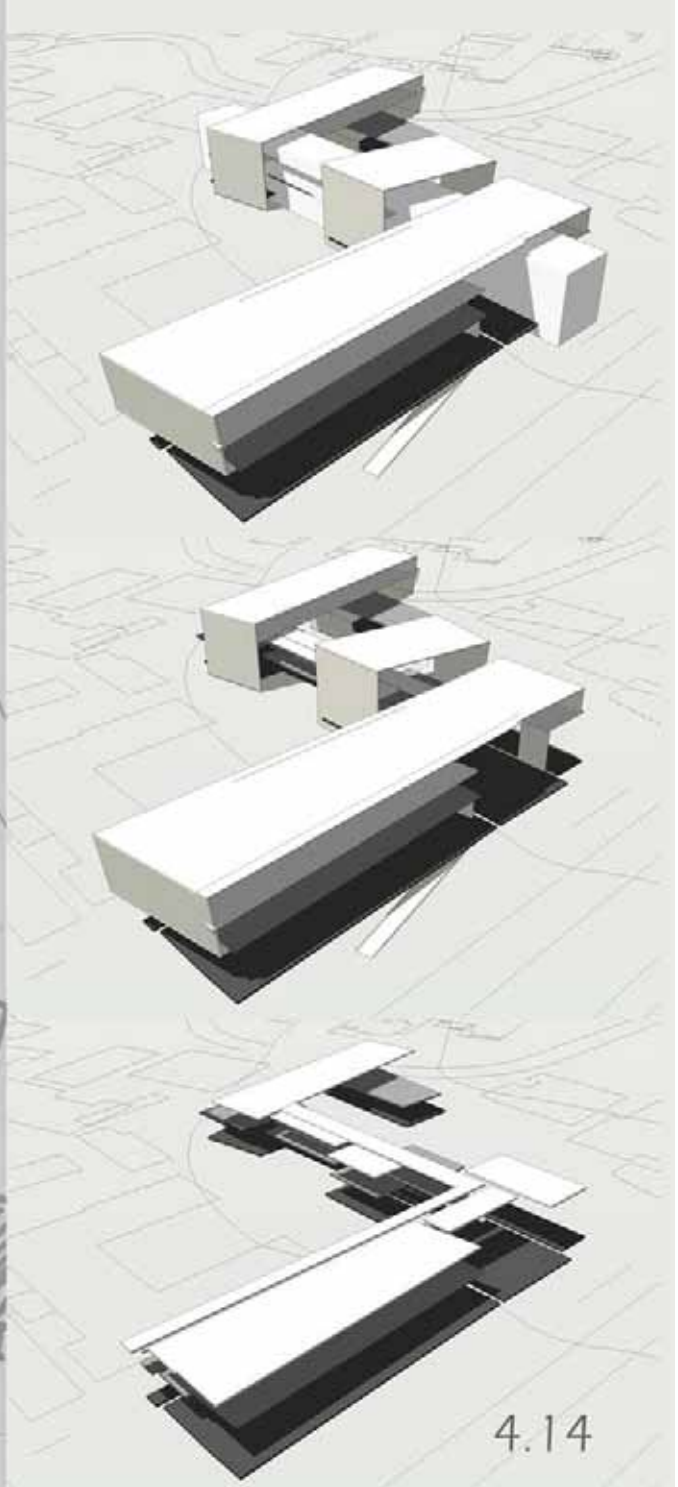


communicating through knowledge

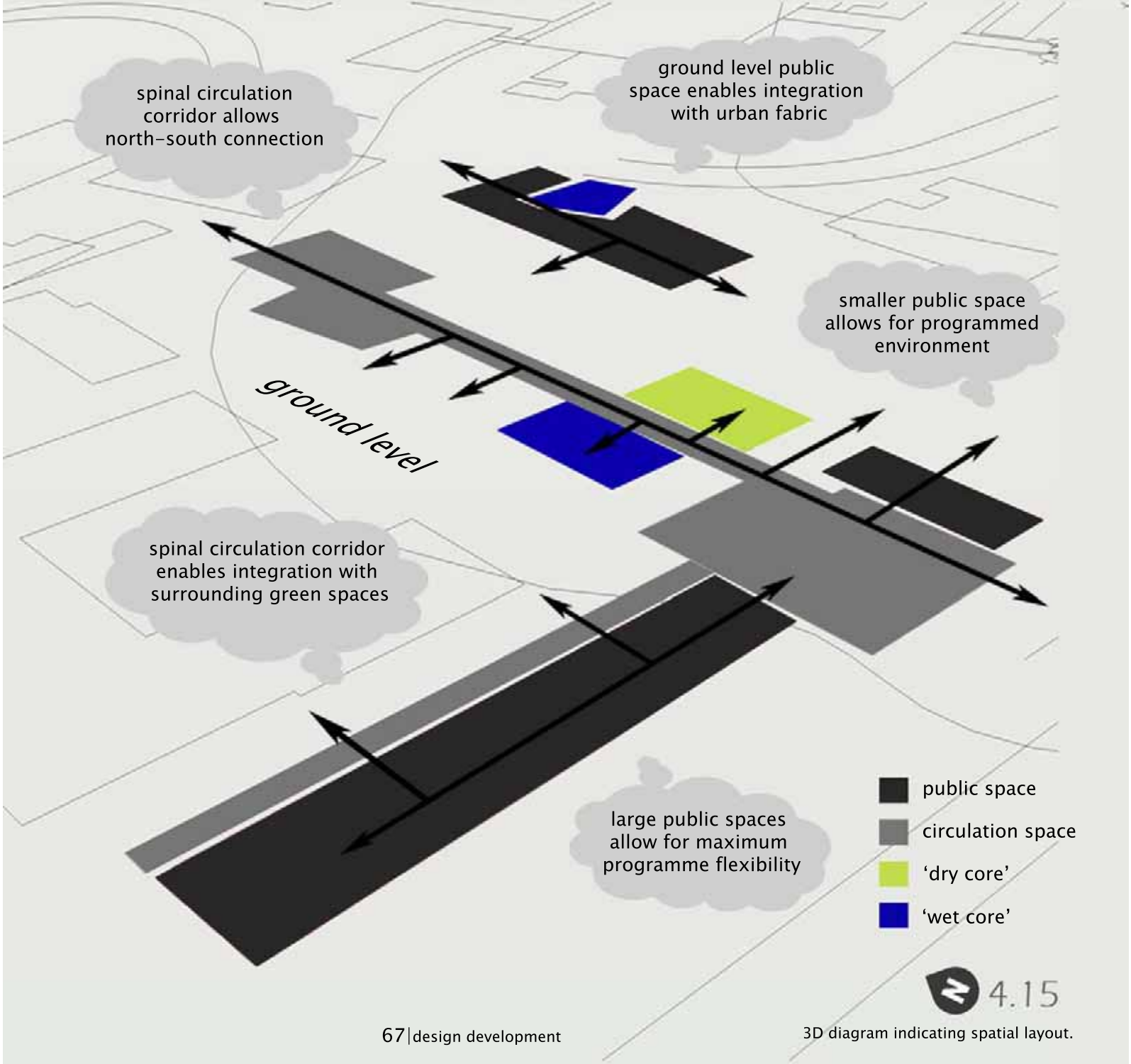
Spatial Development

The integration of the urban intervention and the site intervention produced the spatial layout, which will be integrated with the formal development in order to initiate the *spatial development*. The outcome will produce the different programmed, semi-programmed, and unprogrammed spaces of the building.

N 4.13

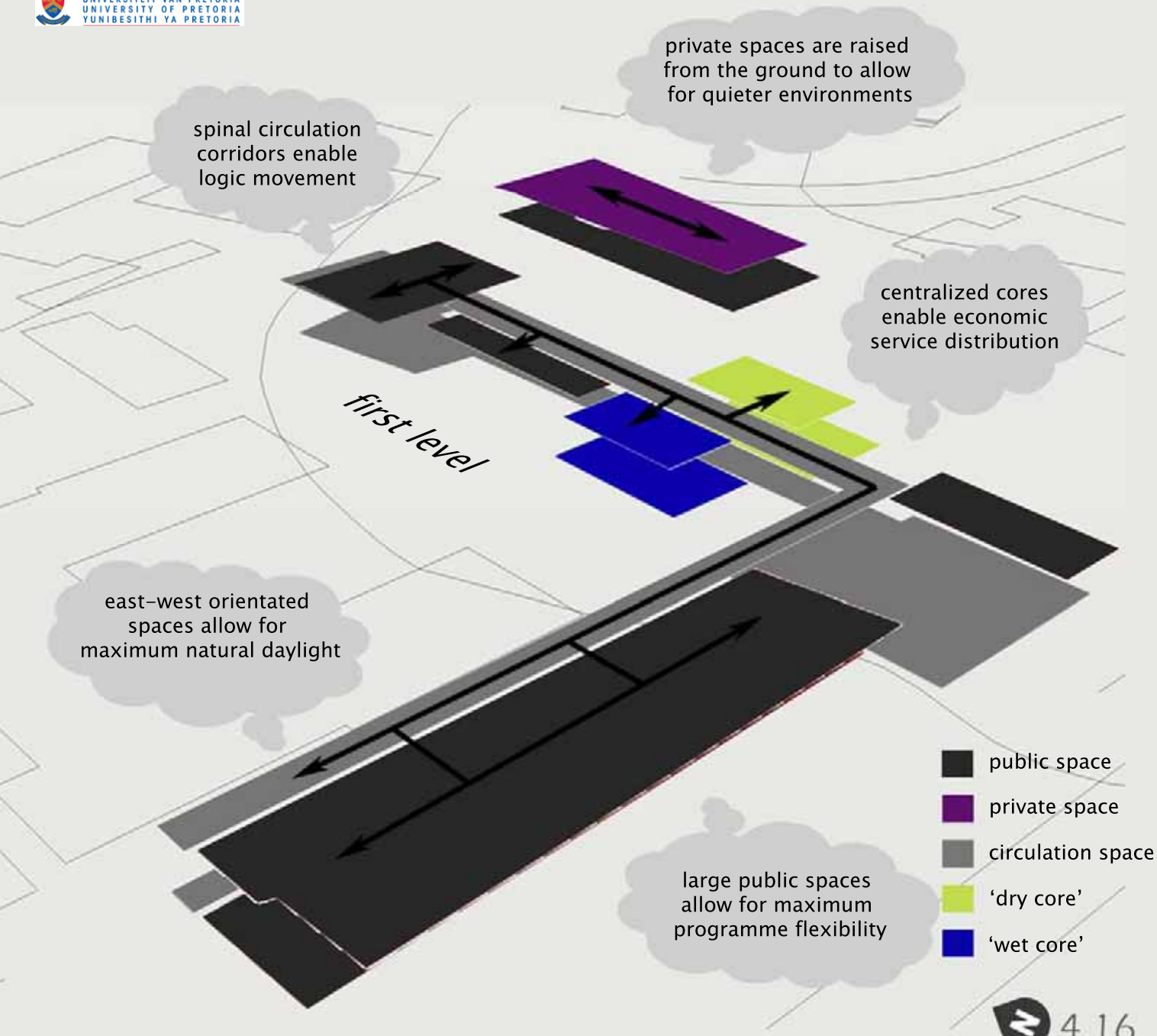


4.14



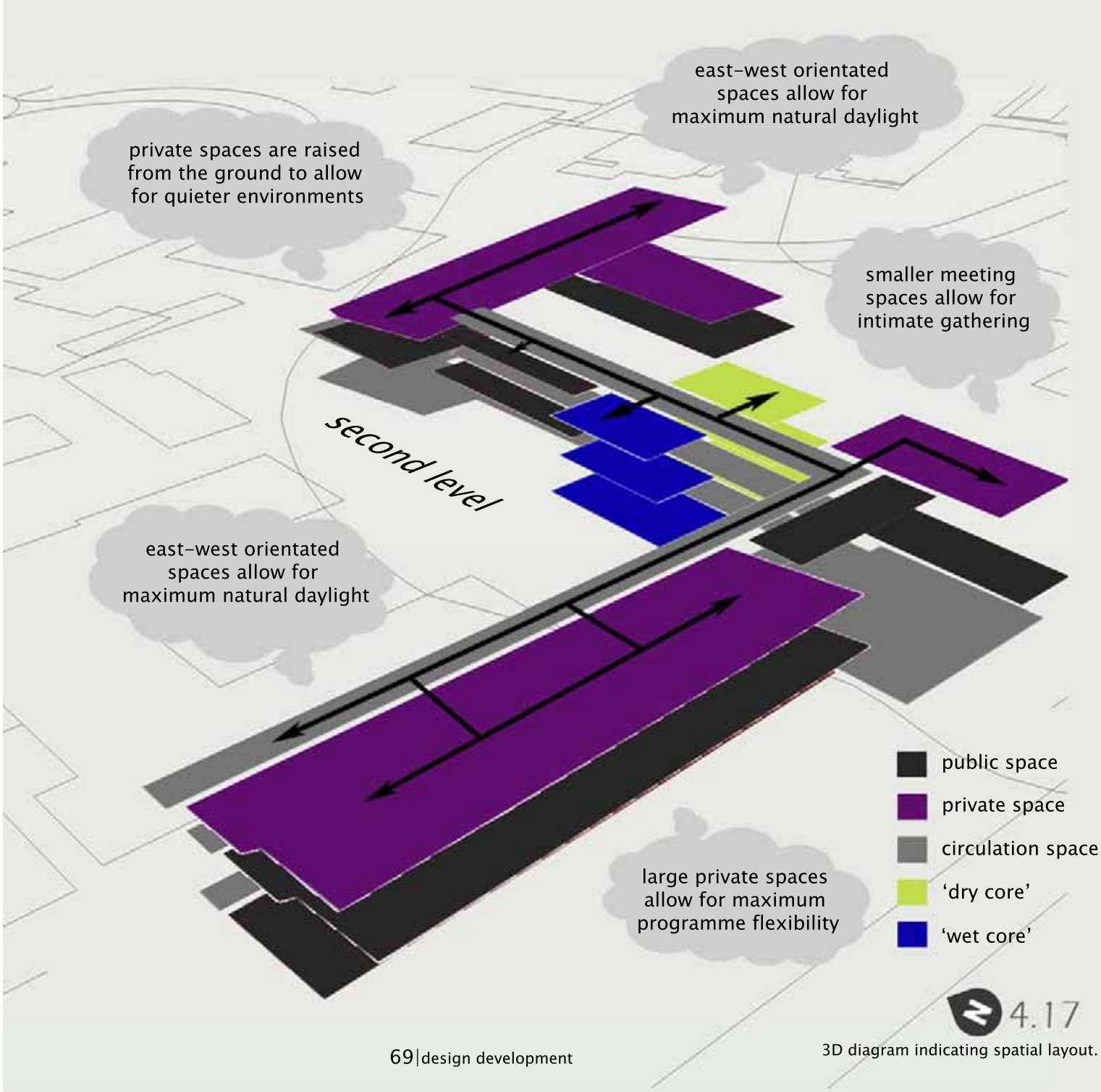
4.15

3D diagram indicating spatial layout.



4.16

3D diagram indicating spatial layout.



4.17
3D diagram indicating spatial layout.

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

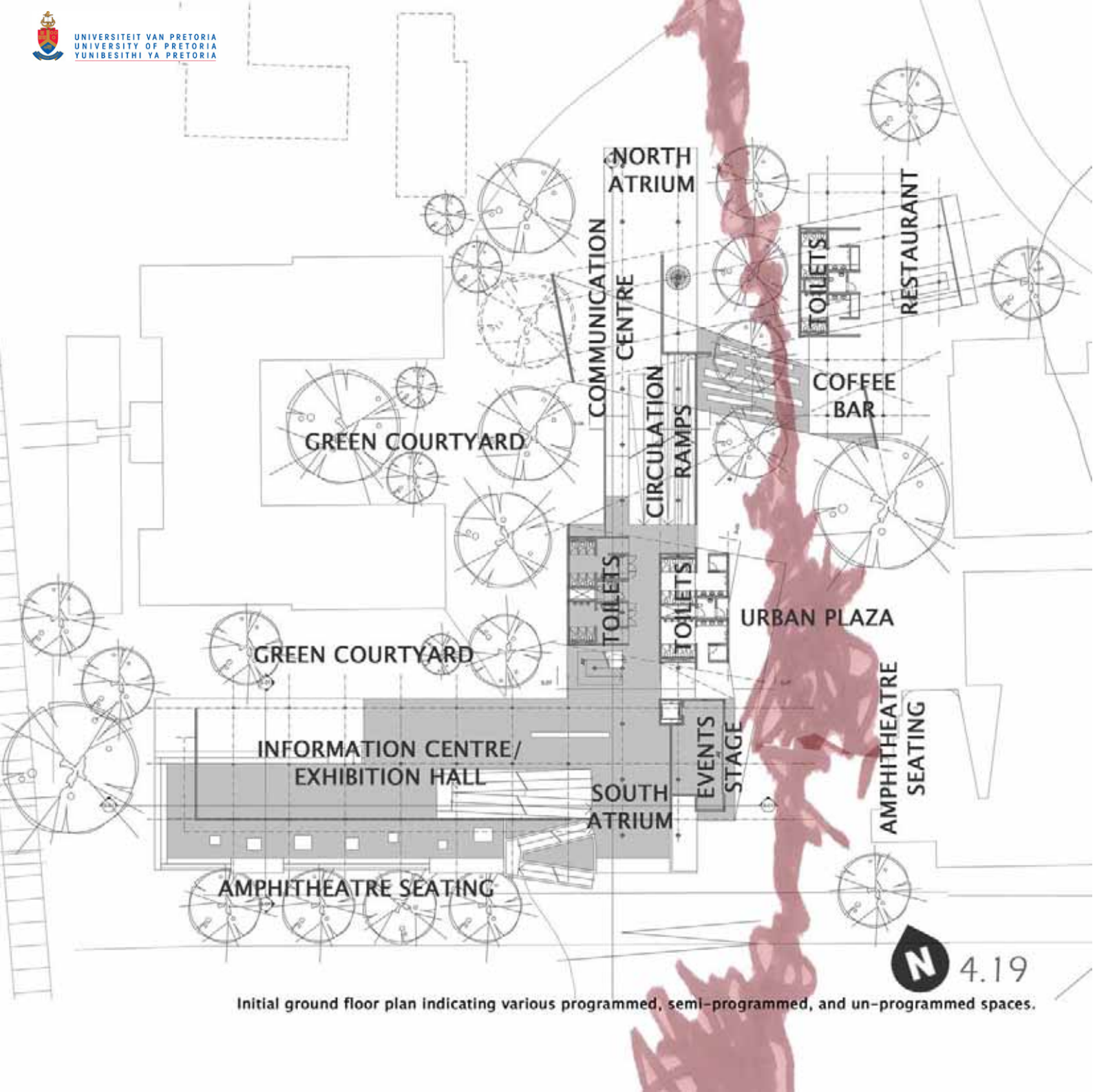
PROGRAMME

MEETING/COMMON ROOMS • MULTI-PURPOSE LOUNGES • ABLUTIONS • EDUCATION CINEMA
VISITOR INFORMATION CENTRE • EVENTS STAGE • STORAGE • EXHIBITION HALL

4.18

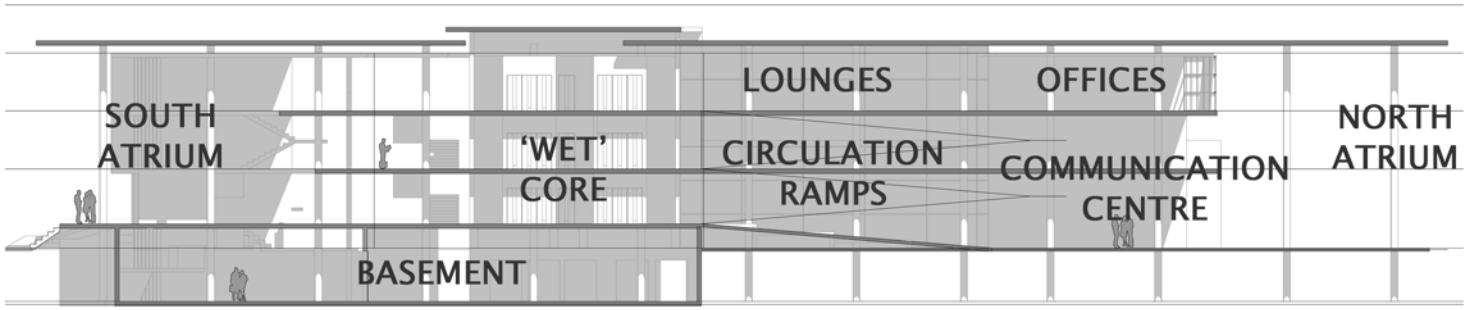
UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

COMMUNICATION CENTRE • ROOF TERRACE • COFFEE BAR • CONFERENCE CENTRE • BICYCLE STORAGE
OUTDOOR MEETING SPACE • LEARNING KITCHEN • PRIVATE OFFICES • LANGUAGE COMPUTER LAB

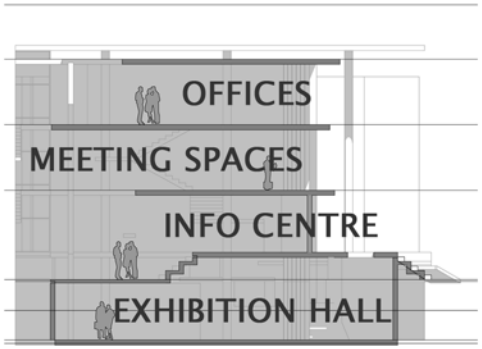


4.19

Initial ground floor plan indicating various programmed, semi-programmed, and un-programmed spaces.

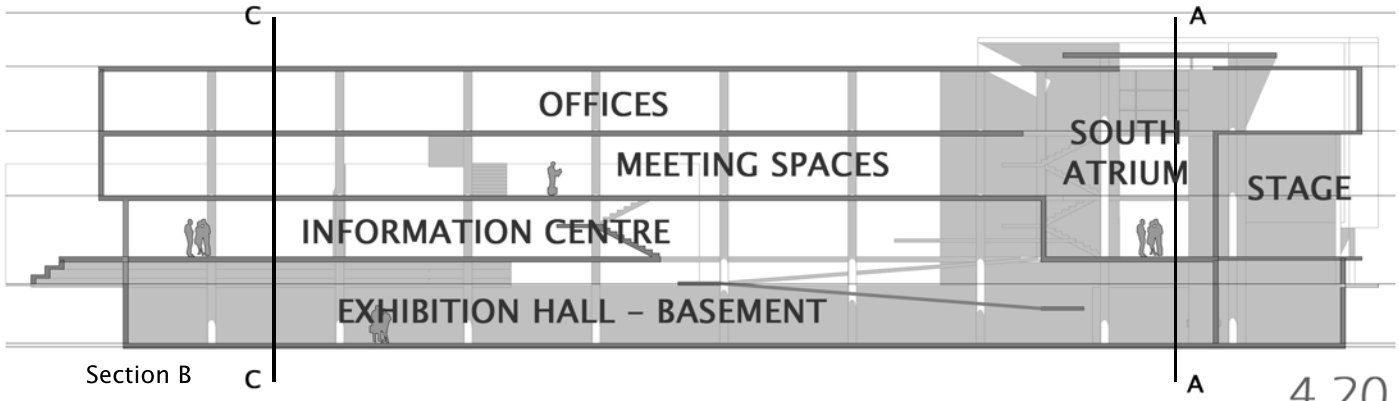


Section A

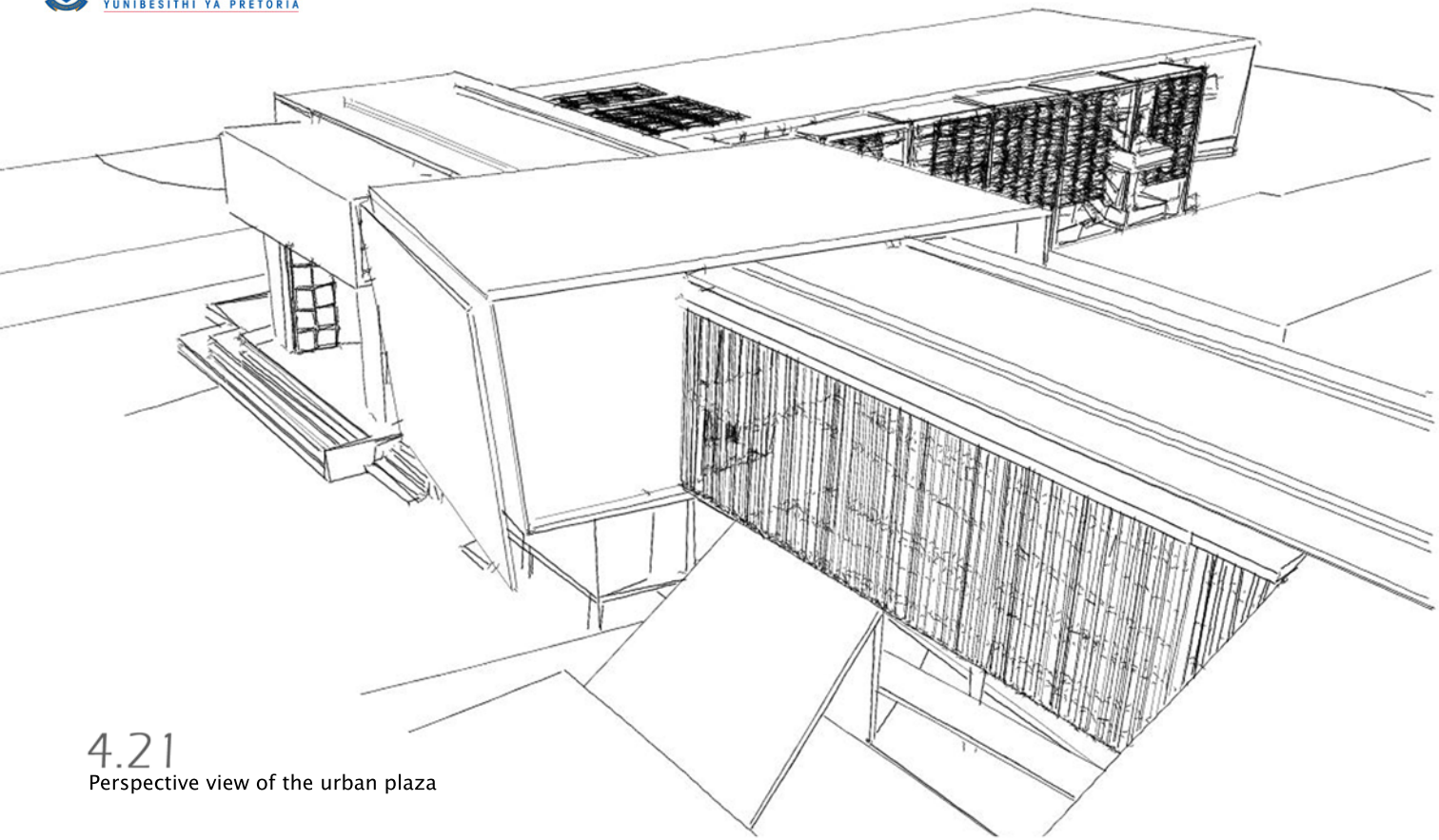


Section C

The floor plan on the adjacent page is the preliminary design footprint derived from the spatial development. The drawing indicates the relationship between existing buildings within the context and the proposed learning centre. It is also evident that the public spaces are designed around the pedestrian activity spine of the urban framework. The preliminary sections illustrate the relationships between the different sized volumes within the building, and how these volumes are connected by vertical and horizontal circulation.



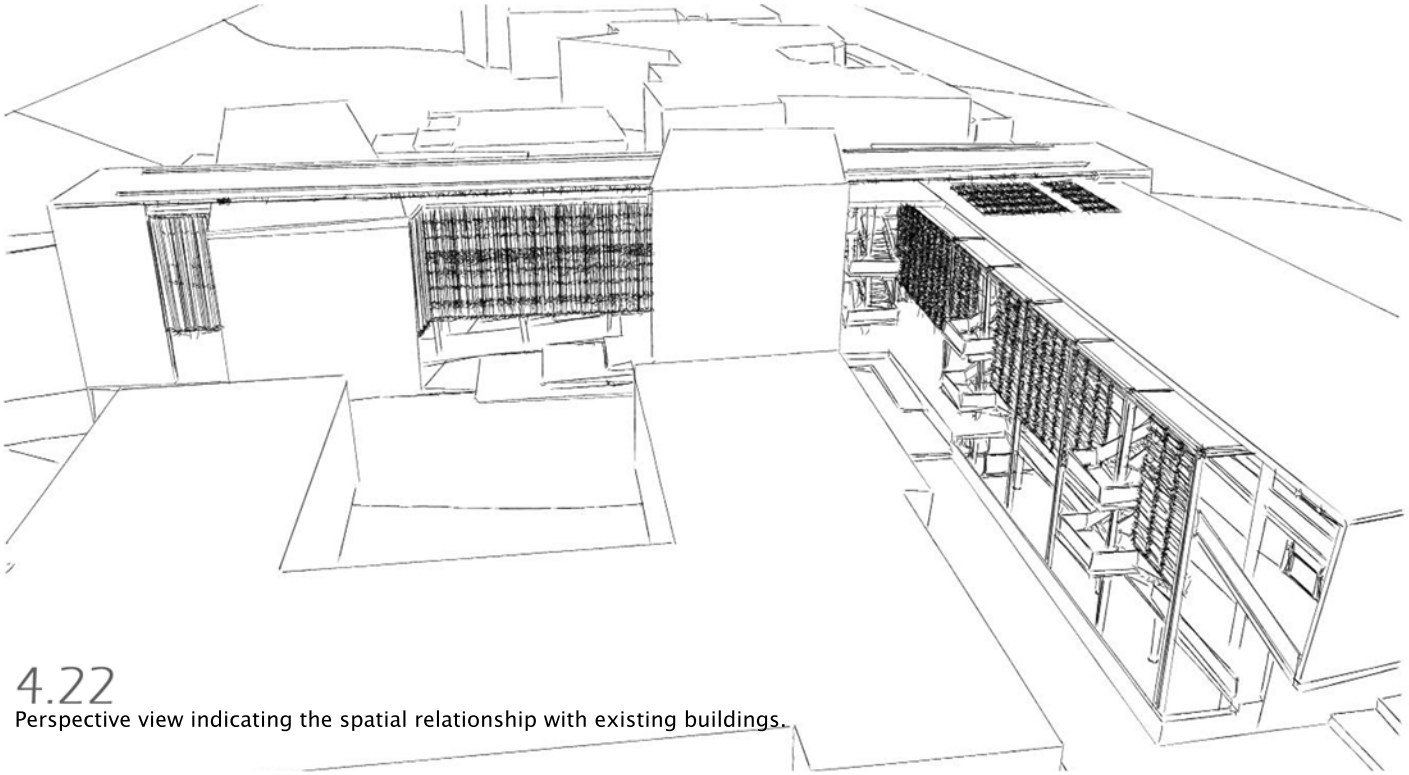
Section B



4.21
Perspective view of the urban plaza

Project Outcomes

The proposed building fits within the urban framework and becomes a container for interactive human activities in the landscape. This container provides the opportunity for intellectual interaction between the students on the university campus and will encourage them to engage in critical talking and networking sessions. These students will gather information from all senses, verbal and/or written expressions, reflection, observation, experience and reasoning.
Here follows a list of different outcomes which the proposed project will strive to achieve:

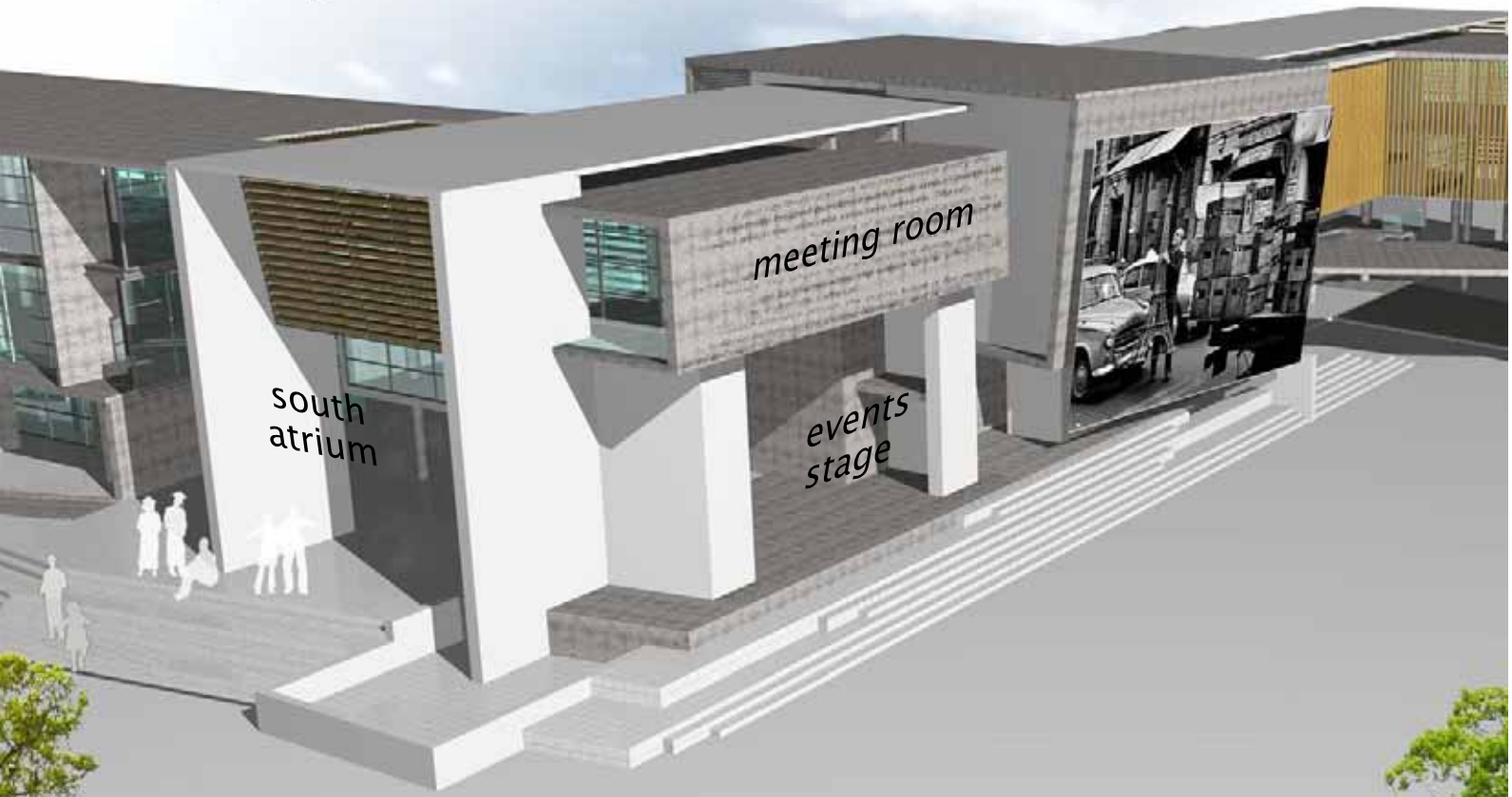


4.22
Perspective view indicating the spatial relationship with existing buildings.

- learning a new language
- teaching communication skills to the community and to students
- the pedagogy of the contained educational environment
- interactive learning experience
- nodal information point for language training
- providing a platform for public forums
- intellectual interaction between students
- variety of social spaces
- space for intercultural chance encounters
- integrating the campus with the commercial precinct and beyond

- awareness of urban green architecture
- versatility and recyclability of concrete
- building element that provides a sustainable solution to real-world environmental challenges
- recycled building materials and energy conservation
- electricity generation and water treatment
- natural ventilation and daylighting
- views from all workstations

The Storytelling Meander



The distinctive northerly and southerly atriums are respectively entry markers to both the building and the urban plaza. The centrally located buildings with their strong north-south axes form the main focal point around which the concrete structure weaves. These buildings with different proportions provide the spaces where the functions of language education would be performed.

The surface of the concrete ribbon adds to the educational experiences of the building. The eastern digital media façade acts as an information billboard as well as a surface for screening local or foreign movies. The screen not only functions during the day, but also at night which provides a dual function by illuminating the urban space, which is an integral part of the night time animation of the university campus.

Located adjacent to the south entrance atrium, the events stage is for incidental daily events, casual performances or ticketed performances during festivals, and is also acoustically tuned to provide a space suitable for small to medium sized music and theatre ensembles.

The proposed urban plaza will lie in the centre of the project. 'Apparently the informal activities of shops and cafes contribute as much to the growth of students, as the more formal education activities.' (Alexander, 1977: p.438) The space will not only functions as an urban plaza, but ultimately as an urban design research analysis precinct. This dynamic square enables a platform for built environment students and professionals to analyse the elements within the square in order to predict various human behaviour in and around the plaza. By documenting the urban space, the researchers have the opportunity to achieve the optimum results, and therefore produce design principals to be used as guidelines when creating public spaces.

The surface meandering through the urban plaza is constructed with salvaged, crushed concrete elements from demolished buildings, and re-used as aggregates in order to cast the concrete blocks forming the surface. Like the engravings on the Rosetta stone, stone blocks which are inlaid on stairs and seating surfaces are inscribed with layers of typographically scaled and interwoven texts of various natural languages.

The video communication pods are fully flexible and adaptable, and therefore can easily be enlarged or moved for when the demand for video communication increases.

Vertical circulation is primarily by means of the gradual incline or decline of a series of ramps located in the centre of the building and also to the exhibition hall located in the basement. The walking surfaces of the ramps are inscribed with numbers and text from different languages enabling the user to move from one level to another while learning to count in these different languages.

Bridges and ramps throughout the building enhance the metaphor for linking languages and essentially weaving cultures together. The broad proportions of these elements enable the opportunity for pausing, thus a space for chance encounters to take place, and for the user to inscribe their own experiences of sharing, through shifting view lines and cross connections to spaces beyond.

The multi-purpose lounges are located adjacent to the series of ramps on each floor, where interaction; encounters; and shared teamwork takes place. On the first floor the lounge connects the language computer lab and the education cinema. The small 56 seat education cinema allows students or visitors to engage in local or foreign movies with subtitles as part of the language learning process.

The exhibition hall is located is the basement to allow for a more enclosed, calmer and darker space. Natural daylighting within the space is achieved by a series of scattered skylights punched through the plinth of the building, allowing light to filter onto the collections exhibited. The northern side of the hall is partially open to the sky in order to create an exterior exhibition space, and thus provides sufficient lighting for the interior spaces.

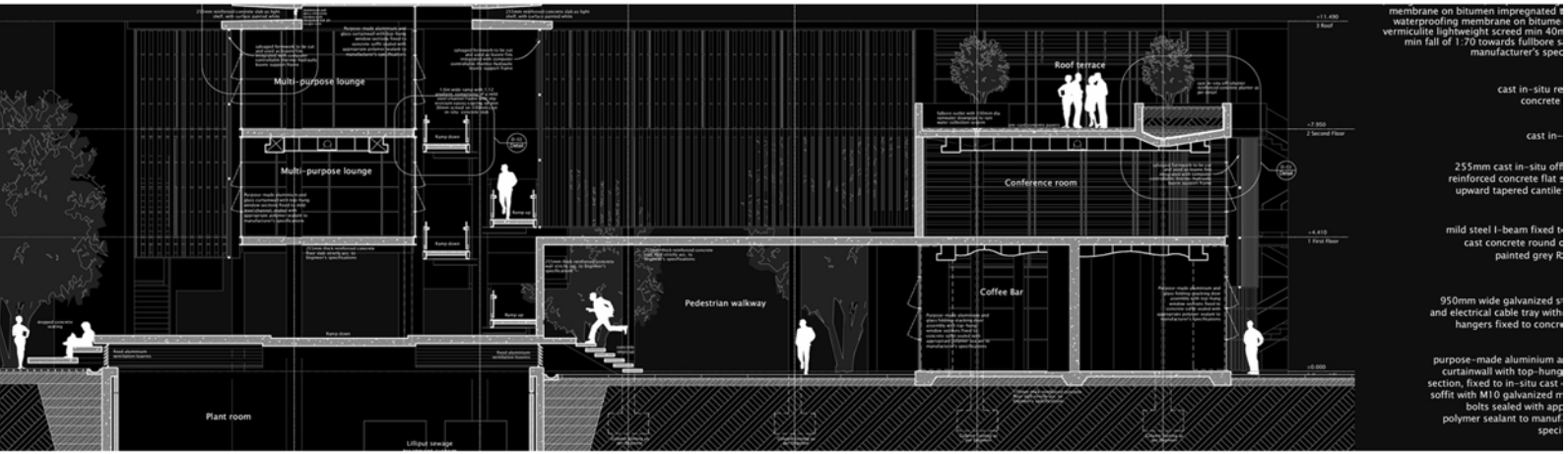
The majority of the floor area of the proposed building is semi-programmed flexible office and meeting spaces, enabling the user to choose the desired layout. These semi-programmed spaces are key to the successful development of language learning.

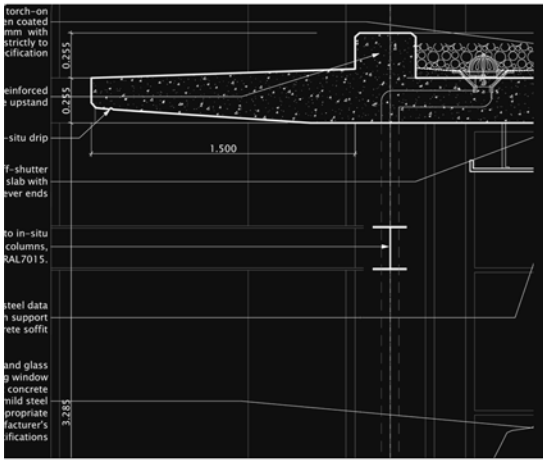
Quick access to upper and lower floors is enabled by exposed reinforced concrete staircases with reusable formwork redeployed as balustrades. The exposed staircases encourage users to go to the upper or lower floors of the building, a key element in orientating the user in the space.

The video communication pods are fully flexible and adaptable, and therefore can easily be enlarged or moved for when the demand for video communication increases. The building accommodates an adaptable data and electrical skeleton, running separate but parallel to one another in metal trays fixed to the concrete soffit of the structure.

Located adjacent to the south entrance atrium, the visitor's information centre enables visitors and regular users to easily access the space in order to make an enquiry. The glazed southern façade of the centre functions as a plinth of graffiti for public expression, bringing a kaleidoscope of colours into the interior of the visitor's information centre. The centre also provides a secure entrance to the exhibition hall below.

The building with surrounding social spaces is in essence multiple zones functioning as one spatial figure: a geometric array of configurations and arrangements, from small to medium scale public gathering to one-on-one engagement to intimate contemplation and relaxation. A space designed for the vocal human.


Multi-purpose lounge
Multi-purpose lounge
Roof terrace
Conference room
Pedestrian walkway
Coffee Bar
Plant room
Lilliput sewage
+11.490
3 Roof
+7.950
2 Second Floor
+4.410
1 First Floor
±0.000



05 technical investigation

- sustainable design
- concrete as a building material
- structure - skin - infill envelope
- integrated building systems
- landscape

5.01 A photo collage of various images to illustrate the complex nature of Sustainable Design.

05 technical investigation

Sustainable Design

Sustainable design is a movement in contemporary architecture, which among others aims to create environmentally friendly, energy-efficient buildings and developments by effectively managing natural resources. This holistic approach to the design of buildings places a high priority on human health, economic viability, and environmental and resource conservation performance over the building's lifecycle. A baseline study which indicates the performance of the building, is located in the addendum section of this dessertation.

Principles

- *Connecting with nature*

Whether the design is a building in the inner city or a landscape in a natural setting, connecting with nature brings the designed environment back to life. Effective design helps inform human beings' place within nature.

- *Understanding natural processes*

In a natural system waste does not exist: the by-product of one organism becomes the food for another, therefore creating a closed system. Working within these natural cycles enables the opportunity to engage in processes that regenerate rather than deplete natural resources.

- *Understanding Environmental Impact*

By understanding the impact of the design an informed decision will be made by evaluating the site, embodied energy, toxicity of the materials, and the energy efficiency of the design, materials and construction techniques.

- *Embracing co-creative design processes*

Designers of sustainable environments are finding it important to collaborate with systems consultants, engineers and other experts in the beginning stages of the design processes, rather than at construction phase.

- *Understanding place*

Understanding place helps determine design practices such as solar orientation of a building on the site, preservation of the natural environment, and access to public transportation.

- *Understanding people*

Design must take into consideration the wide range of cultures, races, religions and habits of the users inhabiting the built environment. This requires sensitivity and empathy for the needs of the people and the community.

(Sustainable Architecture and Building Design, 2007, www.arch.hku.hk.)

The challenge now is to find harmony between environmental considerations, economic constraints, and the needs of the community.

Concrete as a building material

"Concrete is more than an essential material. It is, in terms of its constituents, and wide-ranging properties and applications, one of the most environmentally friendly of all building materials. In an era of increased emphasis on sustainable development and the environmental impact of construction, concrete has much to offer."
(Sustainable Design, 2008, www.greenbuilding.co.za.)

Concrete is an environmentally friendly material for building projects and has long been an indispensable component of the economic and social growth of countries. With this construction material's economic versatile qualities it makes concrete the designer's material of choice.
It offers excellent sound and fire protection as well as high thermal mass, and eco-designers believe that "the way to sustainable building lies in the long-life, adaptability, and low-energy design of concrete, because the earth's resources are best conserved if the service life of the building is prolonged, therefore the durability and longevity of concrete makes it an ideal choice."
(Sustainable Design, 2008, www.greenbuilding.co.za.)

5.03
A photo of a concrete surface.

	Continuous flat slab		Cantilever slab	
	Required	Provided	Required	Provided
• Max. span (L)	between 6 -7.5m	between 6-7m	between 2-3m	between 1.6-2.8m
• Min. depth (d)	between L/25 - L/30	255mm	L/10	255mm
	between 200 - 300mm		between 200 - 300mm	

Reference: Smit, J.E. 2005. *Simplified structural design*. Pretoria: Univ. of Pretoria.

	Round column		Retaining wall		Concrete wall	
	Required	Provided	Required	Provided	Required	Provided
Height	2-4m	3-4m	2-6m	4.8m	2-4m	3-4m
Slenderness ratio (h/d)	6 to 15	7	10 to 12	12	18 to 25	18

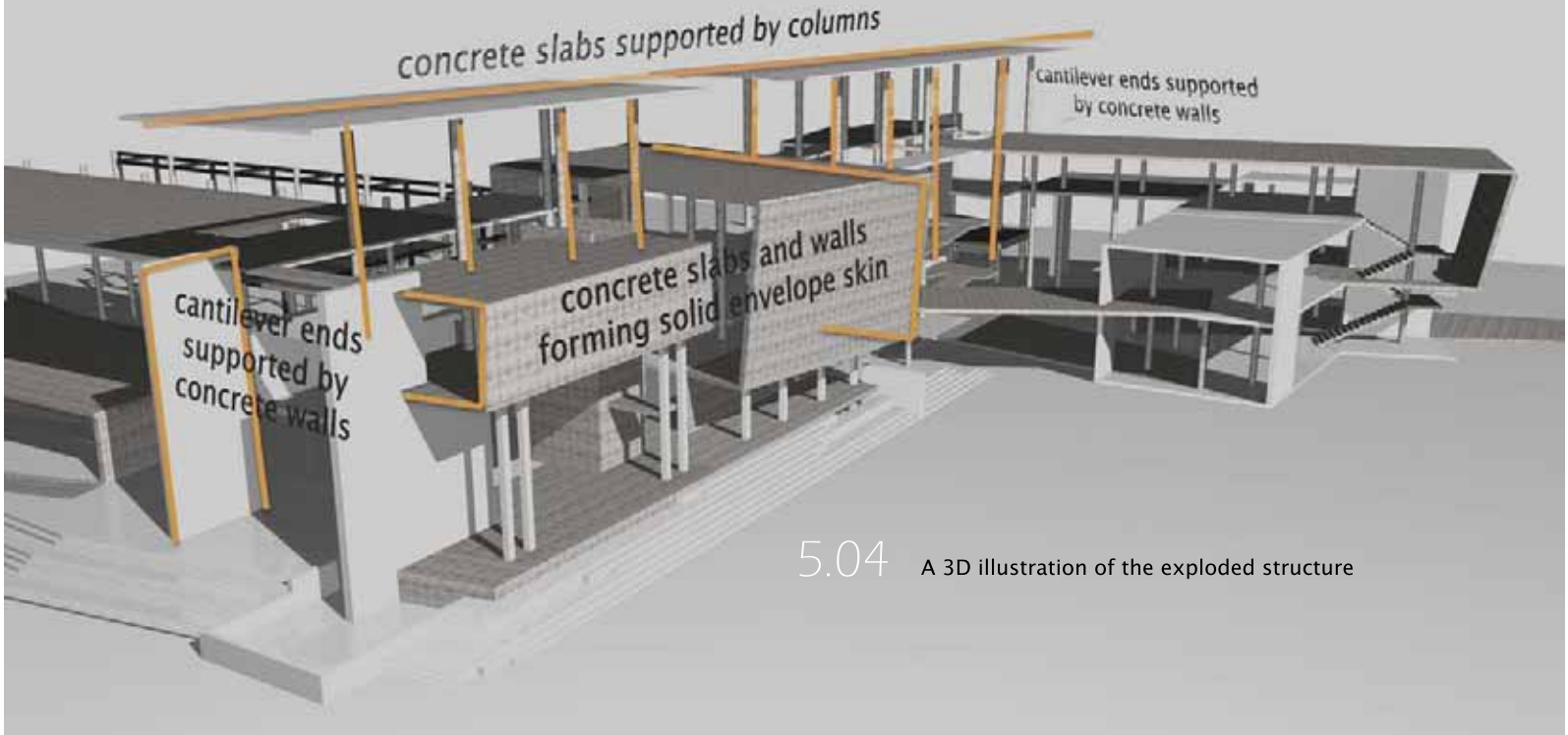
Structure - Skin - Infill envelope

The structure of the building is designed to act as a kind of 'exoskeleton', therefore the structure becomes 'the skin' of the building. This idea of exposing the structure emphasises the honest architecture of the building and has its roots in the Modern Movement: *"the paradoxical change that the architect, who shortly before had kept the engineer carefully hidden behind the scenes, now chased him out on the stage to entertain the public with his art."* (Ford, 2003: p.57)

The recyclability, durability, energy efficiency and versatility of concrete, makes it an ideal building material for sustainable design. The structure of the building thus comprises out of reinforced concrete elements. Crushed recycled concrete has been re-used as aggregates for the reinforced concrete structure. This decreases the reprocessing of construction materials, thus retaining some of the expended and embodied energy.

Roof, floor and column construction

The reinforced concrete flat slabs are, as indicated with image 5.04, are supported by round reinforced concrete columns, and the flat slab ends are supported by reinforced concrete walls. In order to maximize floor area the structure has to occupy the minimum area. Like modernist architecture, the building's constructional language has a more dramatic demonstration of the play of static forces.
The main North-South orientated building has a roof construction which helps to slow down the flow of stormwater allowing more of the water to evaporate through the foliage. The green roof serves as an insulation layer on top of the concrete slab, and provides UV-protection to the waterproofing membrane.

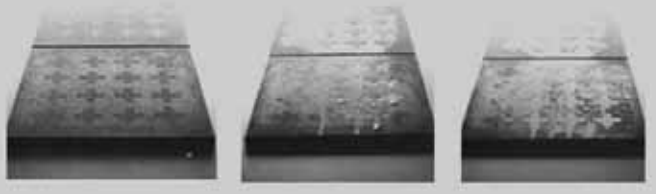


5.04 A 3D illustration of the exploded structure

Concrete wall construction

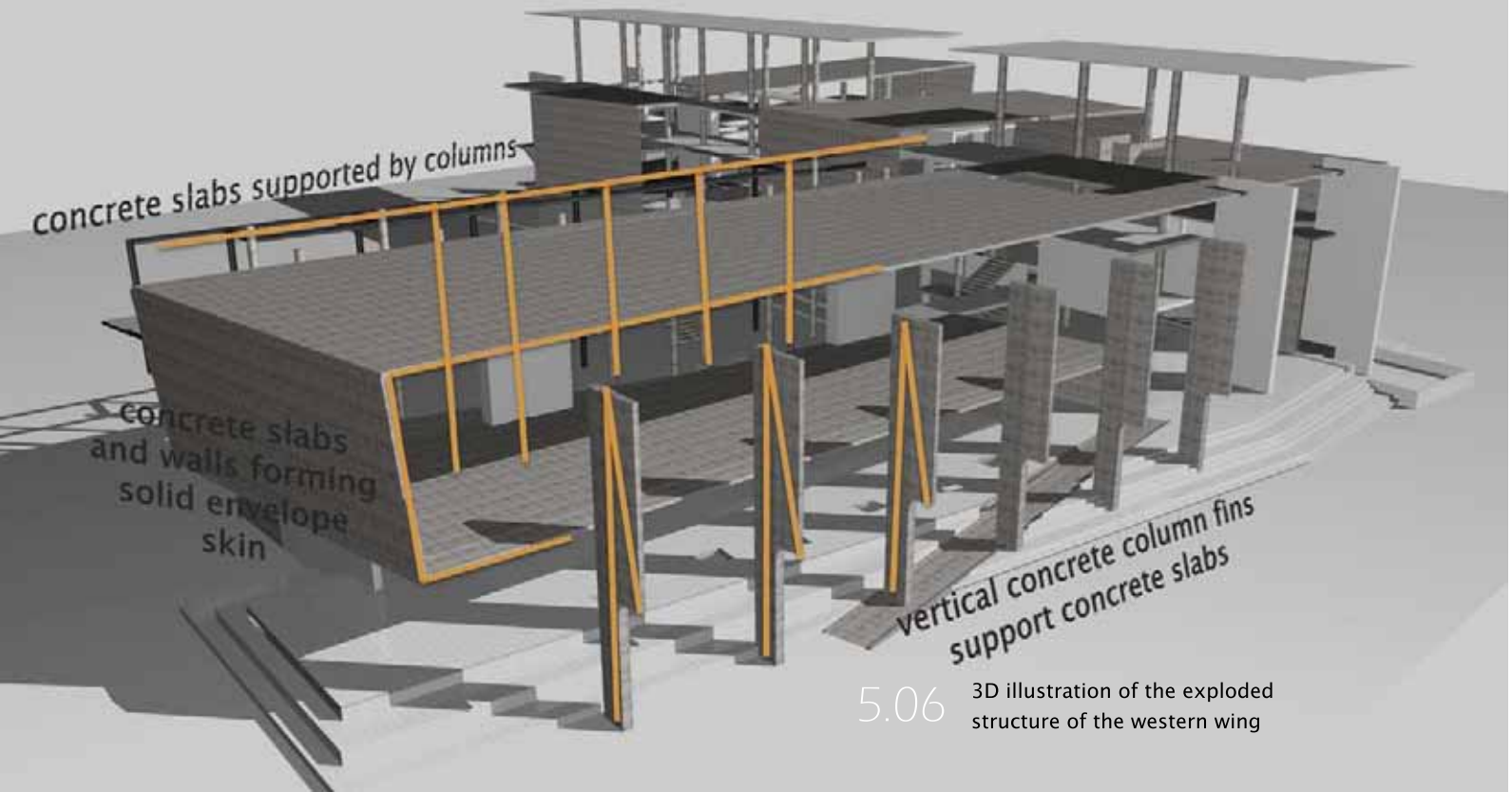
The high performance reinforced concrete used for the wall construction, contains waterproofing and anti-corrosive admixture which provide superior waterproofing to membrane systems.

The vertical reinforced concrete elements of the building are prepared with a non-toxic liquid, silicone-based, transparent dampproofing agent applied to the surfaces as text to form random words and phrases from various world languages. This layer of moisture-sensitive damp-proofing reveals the above mentioned text when water is introduced to the surface. With this low-tech technology a dynamic façade is created which responds directly to different weather conditions, producing the desired contrasting light-dark effect as indicated with the images.



5.05 Photos illustrating the effect of water on dampproofing agent on concrete.

The exposed off-shutter concrete and masonry walls reduce the need for additional exterior and interior wall finishes, therefore reducing material use and improving indoor air quality.
The concrete wall brings the roof and the floor together in a unified geometry, linking to the concept of cultural integration with the tectonics of the building.



5.06 3D illustration of the exploded structure of the western wing

Curtain wall construction

The wall has to stand free in front of the columns, which maximizes the structural capacity of concrete by cantilevering the edge of the slab and makes it possible to have a free façade, unhindered by column arrangements.

The vertical glass curtain walls are constructed with partially recycled powder coated aluminium members with fixed and operable double glazed sections. The curtain walls have been designed not to take the operability of the building out of the hands of the user, but rather to encourage users to interaction with the building elements. The thickness of the window assembly is kept to the minimum in order to keep the weight of the curtain wall to the minimum. The curtain walls are fixed to mild steel channel profiles, which are in turn fixed to the concrete structure, giving the façade both technical and aesthetic unity. The floor-to-ceiling height curtain walls provided sufficient lighting conditions for the internal spaces, which mean less use of artificial lighting and a significant saving on utility bills.

The western wing of the building has a large aluminium and glass curtain wall to the south, which enables the internal office and meeting spaces to have sufficient daylighting. This façade has large reinforced concrete vertical fins which support the floor slabs and also provide shading from the early morning and late afternoon summer sun.

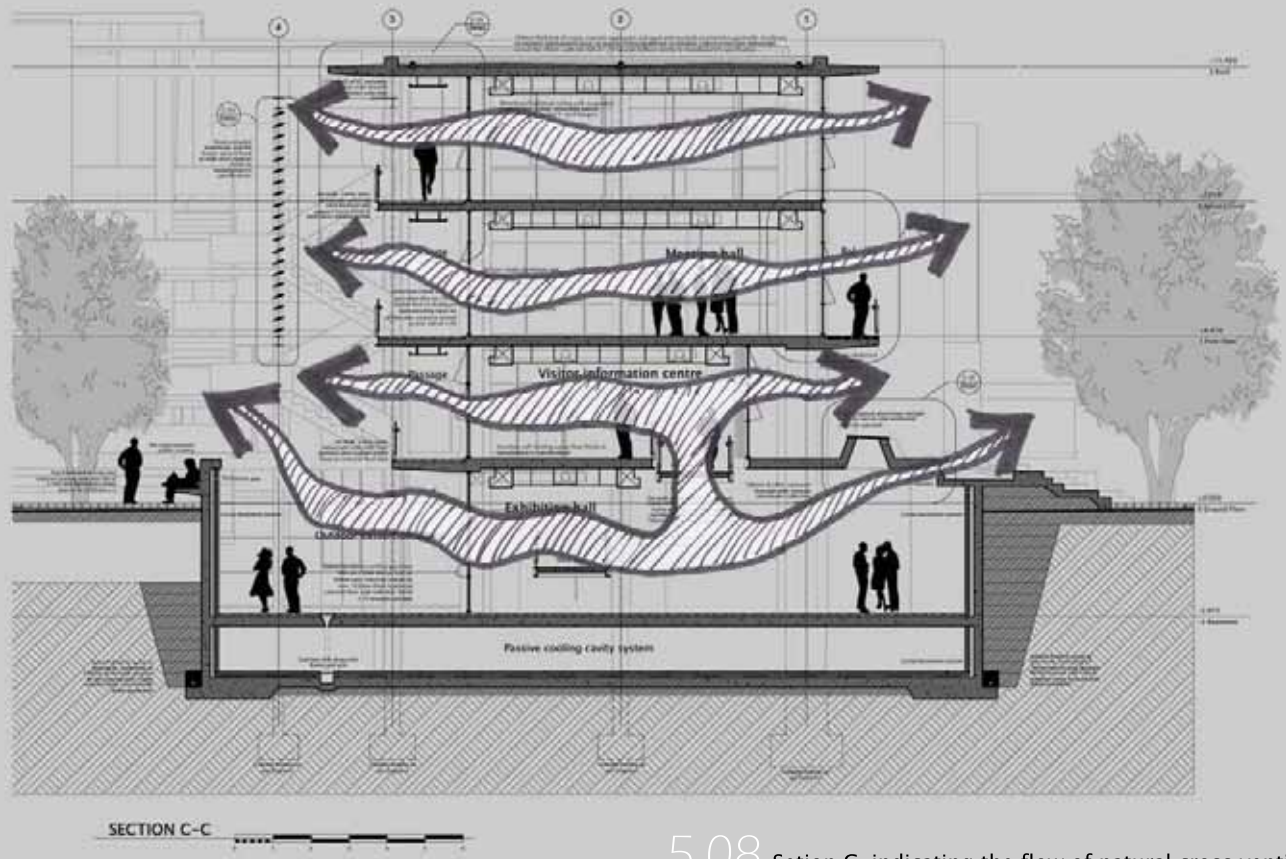
5.07 3D illustration indicationg the curtain wall

Integrated building systems

In order to comply with sustainable design protocol, the building utilizes a highly innovative system of structural, mechanical and electrical systems integrated to promote environmental sustainability while minimizing operating costs. Heating, cooling, and electricity load reductions are made possible by double glazed curtain wall assembly; double skin concrete wall insulation; concrete roof insulation; efficient lighting; and natural daylighting, allowing for smaller and less expensive HVAC equipment and electrical systems.

Air

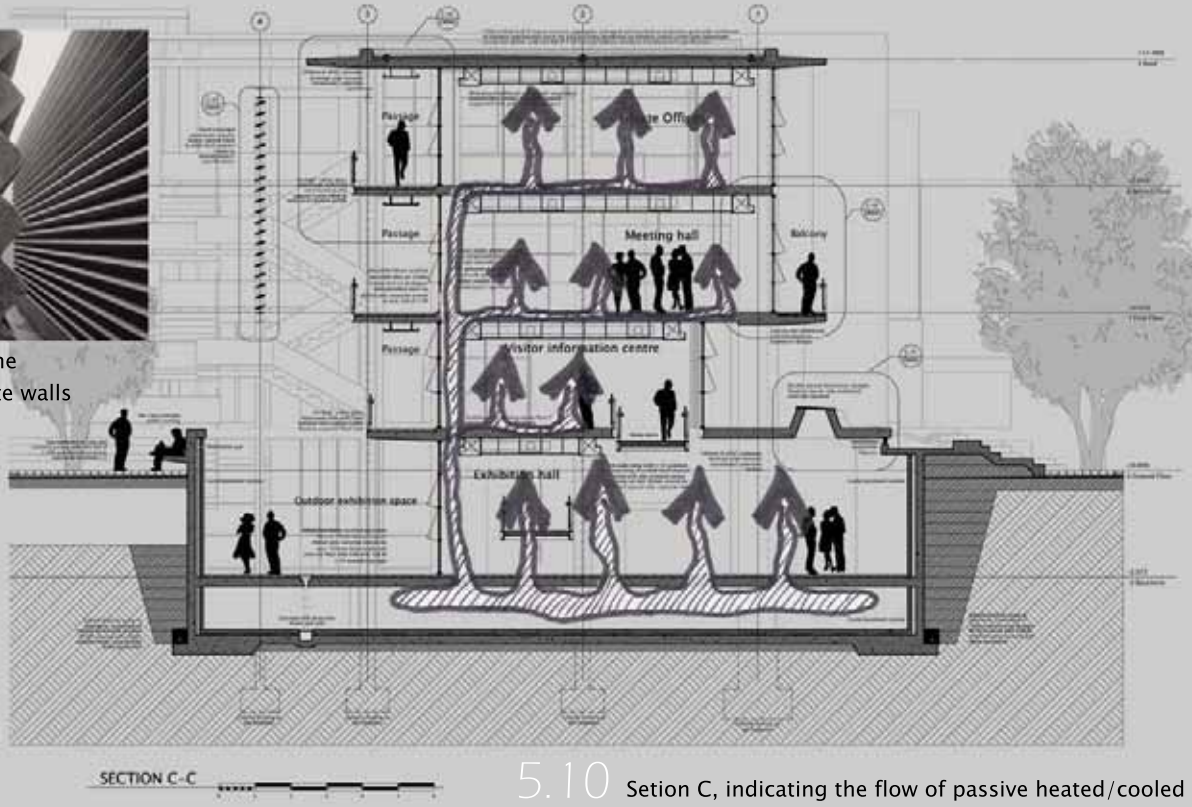
The building has been designed so that 94% of the total area of the building has the capability to be naturally ventilated. The image indicates how *natural cross-ventilation* is obtained through the glass curtain walls to the internal spaces. Ventilation is also accomplished using a displacement system.



5.08 Setion C, indicating the flow of natural cross ventilation

The building has an innovative *passive heating and cooling system* positioned beneath the exhibition hall spanning the entire length of the space. The 100% fresh air intake duct is positioned at the south entrance atrium, where fresh cool air is drawn in through the louvers over the water feature, and down to the air handling plant located in the basement. A maze of corrugated concrete walls (fig.6.xx) is used to provide environmental climate control (cooling and heating) for the western block of the building containing the exhibition hall, information centre, meeting halls and offices. The system comprises of precast concrete walls of 1.2m in height spaced at approximately 1500mm centres, simultaneously providing support for the exhibition hall floor slab. Utilising the specific climatic qualities of Pretoria, with high diurnal temperature variation, cool air is pumped through the maze cavity at night, which in turn cools the concrete walls. During the day, air is again pumped through the cavity, this time being cooled by the concrete. During the winter months the structure's thermal mass maintains an inherent warming potential, which will be supplemented as required. The system directs air to the required spaces, introduced at floor level, dispersed by use of a low-velocity displacement system. As the spaces heat up due to heat gain from occupants and electrical equipment, the air rises, flushing contaminants upward where it is then captured and re-used to supplement the thermo-active slab heating system. In peak summer conditions, the system would be able to reduce the air temperature well below the external ambient temperature, equivalent to conventional air conditioning but using one tenth of the energy consumption and generating less than one tenth of the CO2 emissions.

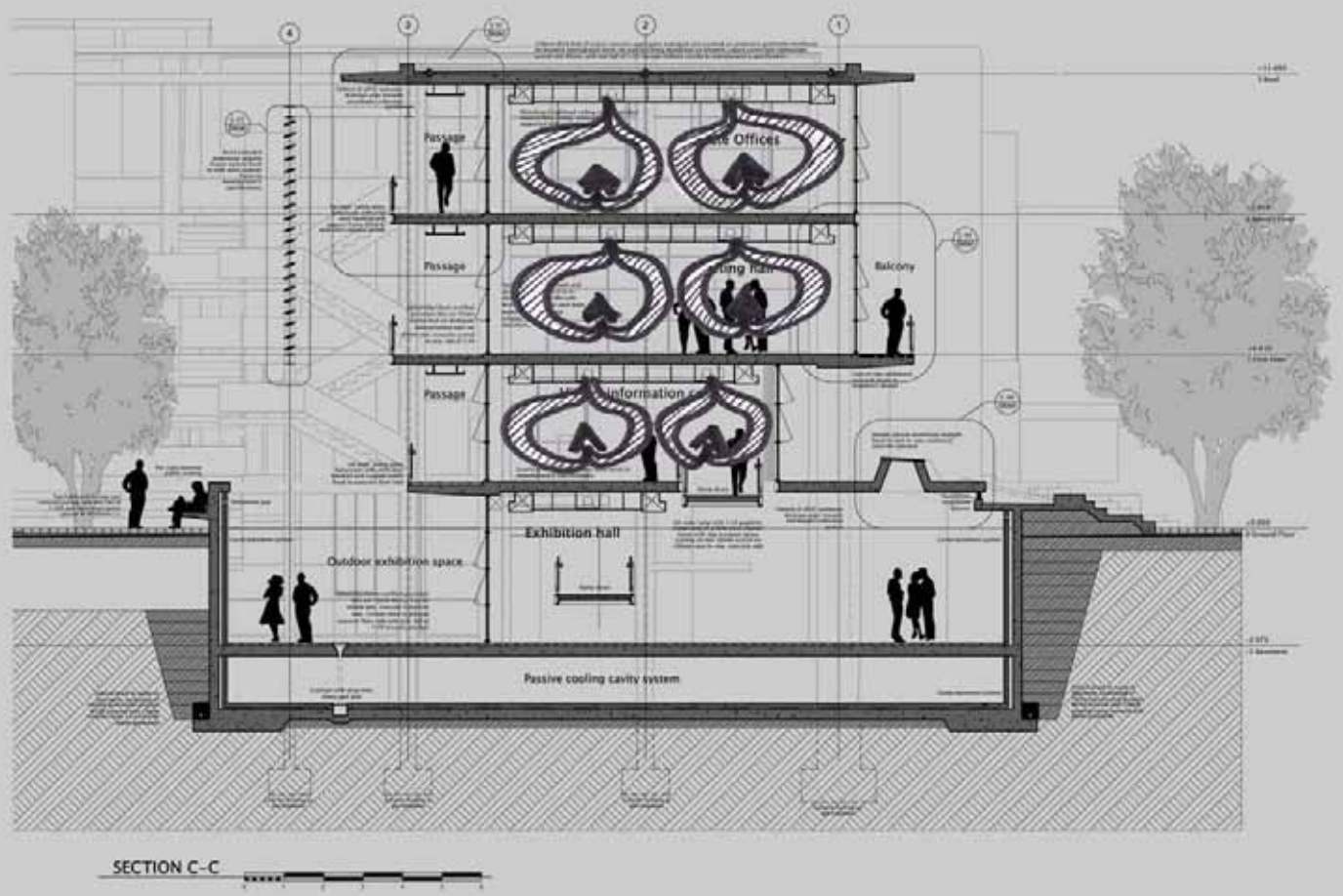
5.09 Image indicating the corrugated concrete walls as per Section B.



5.10 Setion C, indicating the flow of passive heated/cooled air.

The passive heating and cooling system is supplemented by a HVAC system, and can also be utilize as a pre-cooling system for the spaces during summer months when the *HVAC system* is at its full capacity, thereby helping to significantly reduce the overall energy consumption on the site. The building comprises of two separate HVAC air handling plants. One is located underneath the events stage servicing the western block and the other is located in the plant room servicing the eastern block of the building. Conditioned air is distributed through flexible horizontal ducts located within the ceiling voids, and vertical concrete ducts between the different floor levels.

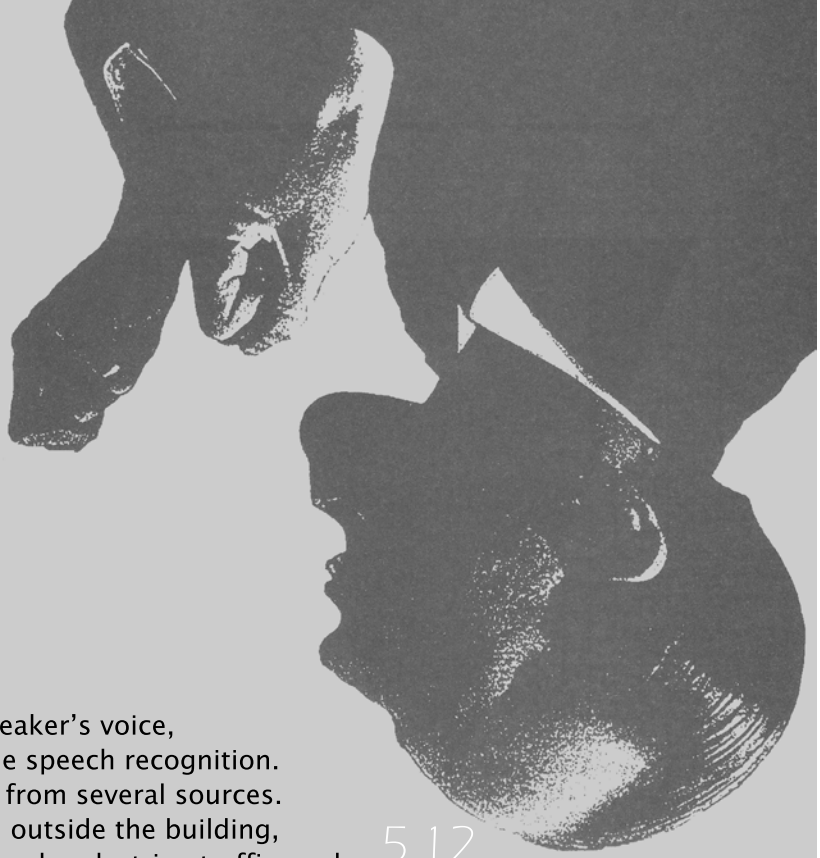
The *thermal mass* of the concrete and masonry structure absorbs the heat created by people, computers, lighting, equipment and solar gain, thereby reducing daytime temperatures and also a reduction of the overall energy consumption.



5.11 Setion C, indicating the flow of air-conditioned air.

Sound

"For optimal speech recognition to occur in a room, the speaker's voice must be heard clearly above the individual listener's threshold of audibility and the background noise level of the enclosure. The human voice has relatively limited acoustic power. The average sound pressure level that is produced by a speaker (at 1m) during quiet, normal, and loud speech is 45dB, 65dB, and 85dB, respectively."



5.12 Image of Dadaist John Heartfield. (Fletcher, 2001: p.389)

Valente states that in addition to the power of the speaker's voice, *background noise* in a room may also compromise speech recognition. Background noise according to Valente can originate from several sources. These sources include external noise generated from outside the building, such as airplane traffic, local construction, vehicular and pedestrian traffic; and internal noise that originates from within the building, such as cafeterias, lecture rooms, media rooms, and busy hallways. (Valente, 2000: p.602)

In order to provide the building with acoustically sound functioning spaces, the horizontal surfaces of the building are designed as absorptive surfaces in order to decrease the reverberant characteristics of the hard, smooth concrete interior spaces. The double glazed *curtain wall construction* serves to obstruct background noise from external and internal sources, therefore supplementing the absorptive surfaces for effective acoustic insulation. The *floor surfaces* of interior spaces comprise of a rubber tile flooring system. This flame and slip resistant system is built up of 90% recycled rubber studded floor tiles, with patented interlocking units featuring a unique hidden joining and sealing method. These reusable tiles are easily installed, and can be removed and re-laid in another area where required without the use of toxic adhesives. The thermal, acoustic, and aesthetic characteristics of the product make it an ideal sustainable flooring system. The *ceiling surfaces* of the interior spaces comprise of Gyproc flush plastered RhinoCeiling with removable mineral fibre acoustic ceiling panels, suspended from the concrete soffit with patent T-steel hangers. This composite ceiling system reduces reverberation time and provides the interior spaces with sufficient sound absorption.

5.13 Images of the ceiling panels and rubber floor tiles.

Light

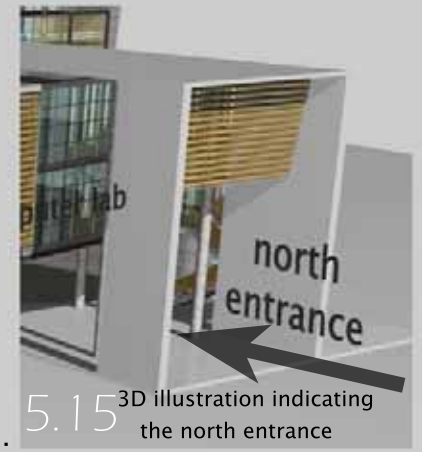
The façades of the building that are exposed to harsh western and eastern sunlight have been designed to accommodate vertical solar shading. Due to the sun angles during the summer months, controllable *solar shading devices* are required in order to protect the internal spaces from excessive solar glare and solar heat gain. Controllable fins, forming part of the *dynamic intelligent building envelope*, are mounted vertically to optimise solar shading and visibility. These fins are controlled by computer software to follow the path of the sun, which reduces the likelihood of 'overshading' or 'undershading' caused by fixed solar shading and will result in the optimum shading angle.

On days when the weather is overcast, light sensors engage the fins to fully open in order to allow the occupants maximum *natural daylight*, reducing the costs of artificial lighting and increasing visibility to the outside at all times. Additional benefits are that, when closed, the fins provide substantial security and can help reduce heat loss during the winter months. The computer software enables the solar system to function in a variety of operating modes including weekend programming, storm shut down and even a cleaning position. A thermo-hydraulic control system is used which is self-powered by the sun using the heat generated to expand or contract fluid within a hydraulic cylinder. This system requires no external power, and detects the position of the sun and forces the hydraulic cylinder to open or close the fins.

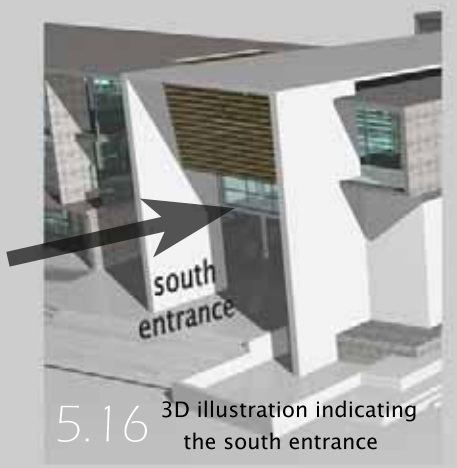
The north-orientated glazed façades of the building have been designed to accommodate horizontal solar shading. Due to the sun angle reaching a maximum of 64.2° during the summer solstice, fixed solar shading devices are required. The fixed fins are mounted horizontally to optimise solar shading and visibility. The challenge is to maximise daylight entry into the office and meeting spaces whilst protecting these internal spaces from excessive solar glare and minimising solar heat gain. The fins and rafters of the shading systems are manufactured from extruded partially recycled aluminium alloy with brushed stainless steel fixings.

5.14 3D illustration indicating the solar shading devices.

Located respectively in the north and south atriums of the building, are custom-made solar devices manufactured from standard extruded aluminium solar system frame and fitted with re-usable formwork that has been redeployed as louvers. These custom-made *louvre systems* provide shading and glare protection to the atriums. The systems also provide a certain sculptural quality to the high open spaces, and serves as an entrance marker directing pedestrians to the entrance of the building.



5.15 3D illustration indicating the north entrance



5.16 3D illustration indicating the south entrance

Water

"Approximately 90% of South Africa has been classified as arid, semi-arid, or sub-humid. 65% of the country receives less than 500mm annual rainfall, generally regarded as the absolute minimum for successful dry land farming. A country in which draught, desertification, and naturally limited water resources are a rapidly growing problem, water conservation has become a necessity."
(The South African Weather Bureau, 2008.)

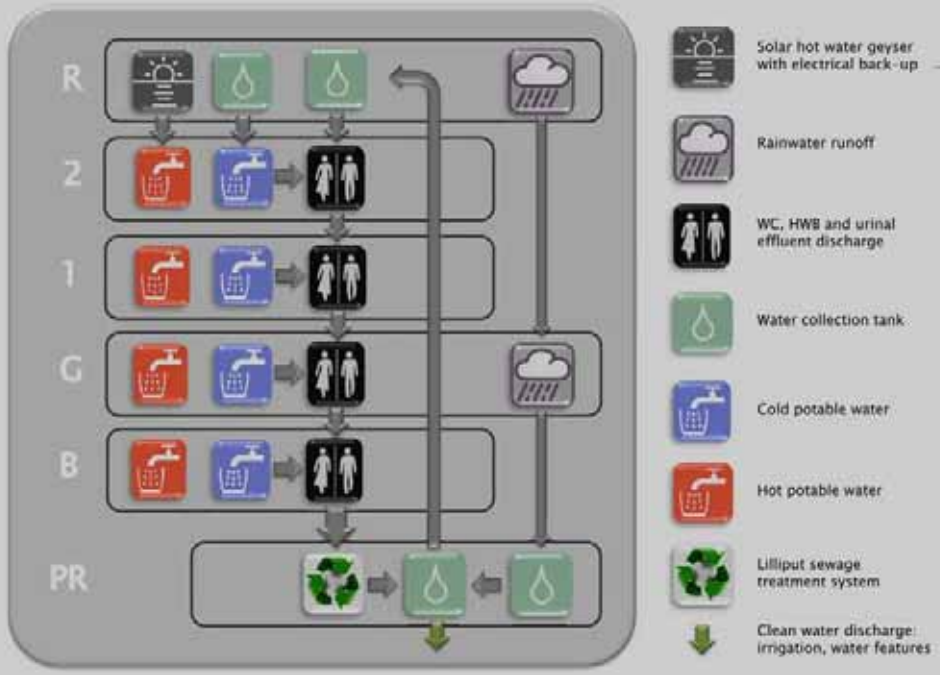
Located in the plant room is the *Lilliput® sewage treatment system*. This compact, versatile and highly efficient sewage treatment plant comprises of an unlimited expansion modular design that has the capability of rendering toxic waste water into 100% reusable water which:

- *Exceeds minimum standards for discharge back into the environment;*
- *Is almost entirely biologically processed, minimizing the need for chemicals;*
- *Is 100% odourless and pathogen free;*
- *Is suitable for a wide range of applications, such as recirculation into irrigation systems, water features, and used for the flushing of water closets.*

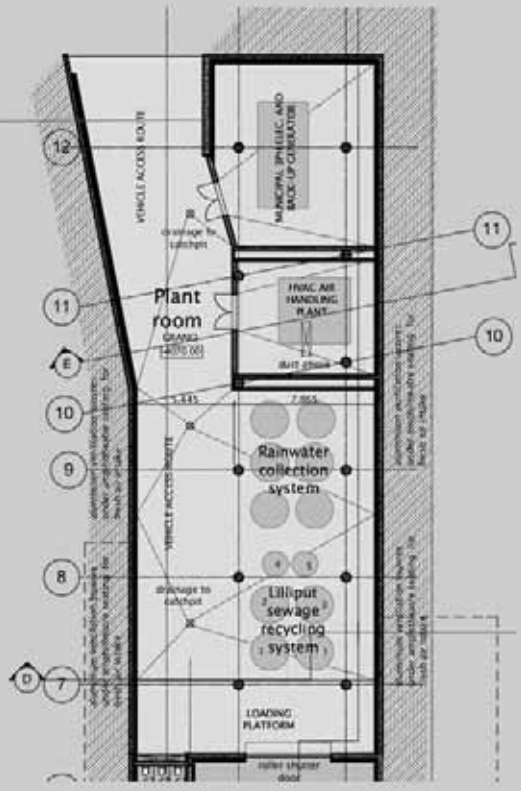
(Lilliput sewage treatment plants, 2007, www.lilliput.co.za.)

The sewage treatment system functions as a circular system within the building. Black and grey water effluent flows from the wet core into the predigestion chambers, then to the balancing, bio-reactor, and clarifier tanks. The last stage is the disinfection tank after which the water is then 100% odourless and pathogen free. Clean water is then available for irrigation purposes and to replenish the water feature. The majority of the clean water is pumped to the roof tanks, where the water is used to fill the cisterns of the building. By implementing the Lilliput water treatment plant water consumption is reduced by approx. 40%, therefore contributing to the conservation of water and energy resources. This contribution to water conservation plays a large role within the urban development framework in which the building functions. Due to the future densification of the precinct proposed by the framework, the demand for water supply will increase by approx. 20% within the next six years. (HCUDF, 2007, www.tshwane.gov.za.)

Located in the plant room is the *stormwater collection system* which consists of six vertical water tanks each with a water capacity of 5500l. The system is connected to various catchment areas located throughout the site. These catchment areas include: the semi-permeable hard surfaces consisting of the urban plaza, the green gathering space, and the green courtyard; and the roof surfaces consisting of terraces, the concrete aggregate roof, and the green roof. The stormwater collection system introduces fresh water into the circular water system which in-turns supplements the roof tanks, where the water is used to fill the cisterns. Potable water is obtained from a municipal water connection, which is pumped to a potable water tank located on the roof. The building utilizes *solar water heating* technology in order to heat the potable water. After the water is used, the grey water is then introduced into the system and the cycle start over again. As mentioned earlier in this chapter, the building contains a thermo-active slab heating system.



5.17 Diagram of the building's wet core indicating the circular water system



5.18 Segment of the basment floorplan indicating the water systems.

During the winter months heating is provided to the exhibition hall (located in the basement) by a *thermo-active slab heating* system. Supplementing the passive climate system, it consists of water piping embedded within the concrete floor structure. Heated water is pumped from the plant room through a network of piping, allowing the floor area to act as a radiant surface heating the interior of the exhibition hall, reducing the overall heating load of the building.

1. PREDIDESTION	Max. power consumption: 0.9kWh
2. BALANCING	Avg. power consumption: 0.3kWh
3. BIO-REACTOR	Chlorine consumption
4. CLARIFIER	Sodium Hypochlorite @ 0.05mg/l
5. DISINFECTION	Calcium Hypochlorite @ 6mg/l
	Trichloroisocyanuric acid @ 6mg/l

Sewage treatment system

Required effluent capasity

Accomodation	Population *	Sewage flow *	Effluent
	(Max. no.)	(L/person/day)	max. (L/day)
Exhibition hall	98	9	882
Urban plaza	570	9	5130
Visitor information centre	13	9	117
Communication centre	33	9	297
Street café	90	20	1800
Education theatre	63	9	567
Meeting hall	26	9	234
Language labs	32	9	288
Conference Centre	24	20	480
Private offices	51	90	4590
Total			14385

* Reference: SABS 0400 - 1990

Lilliput sewage treatment systems **

MODEL	L/day	L/hour	L/min	L/sec
SBC1000	1000	41.667	0.694	0.012
SBC2000	2000	83.333	1.389	0.023
SBC4000	4000	166.667	2.778	0.046
SBC6000	6000	250	4.167	0.069
SBC12000	12000	500	8.333	0.139
SBC24000	24000	1000	16.667	0.278
SBC36000	36000	1500	25	0.417
SBC48000	48000	2000	33.333	0.556
SBC72000	72000	3000	50	0.833
SBC100000	100000	4166.667	69.444	1.157

Technical Specification	BLOWERS				TRANSFER PUMP		DISCHARGE PUMP		PEAK	AVG
MODEL	QTY	WATTS	TOT W	DUTY	WATTS	DUTY	WATTS	DUTY	LOAD (kW)	LOAD (kW)
SBC 24000	2	125	250	100%	370	60%	250	20%	0.87	0.52

** Reference: Information brochure; Lilliput domestic sewage treatment plants. Tel: 011 880 2800

Rainwater collection system

Annual rainfall of Pretoria: 380-700mm
Average: 540mm

Roof areas:

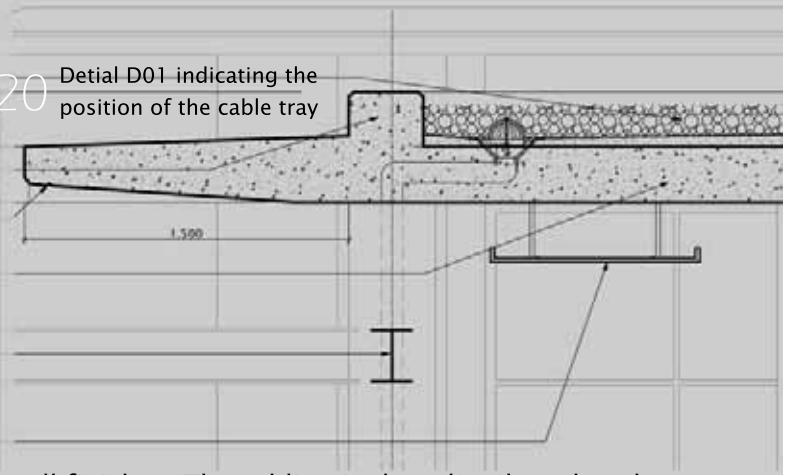
Green roof	370	m²
Concrete aggregate roof	1077	m²
Roof terraces	195	m²
	1642	m²
Semi-permeable hard surface runoff:	3500	m²
Total	5142	m²

Max. capacity collectable rain water : 2.77mil m³ per annum
7590 m³ per day

Amount of 5500l water tanks required: 2
Amount of 5500l water tanks provided: 6

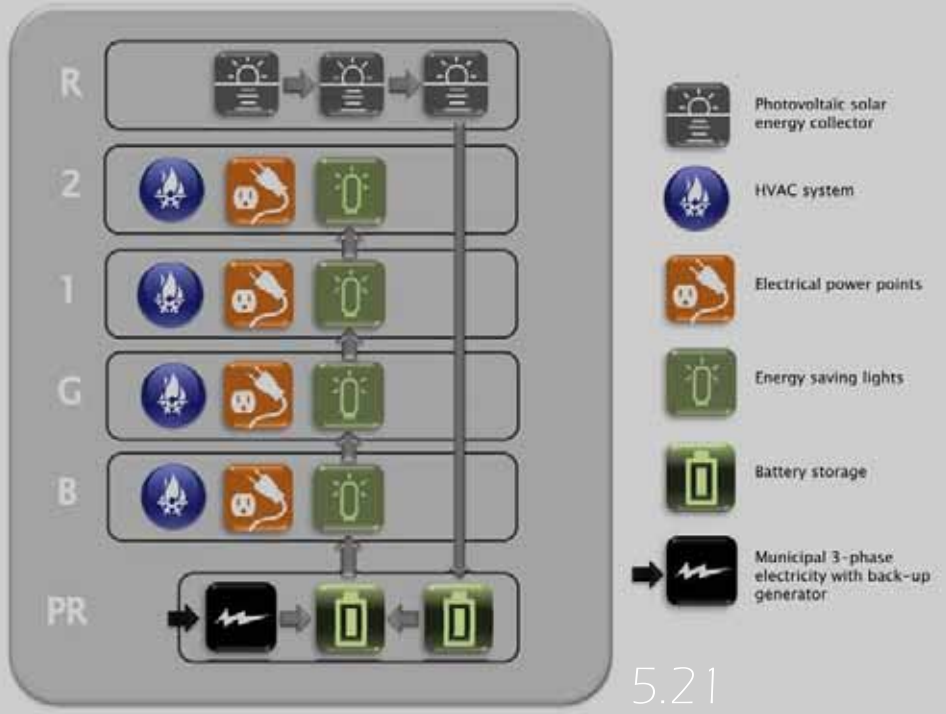
Downpipe size:
100mm²/m² - all rainfall regions
minimum Ø75mm
Calculation: 100 mm² x 33 = 3300 mm² = 57mm
Downpipe diameter required: 57 mm
Downpipe diameter provided : 100 mm

Data and Electrical system

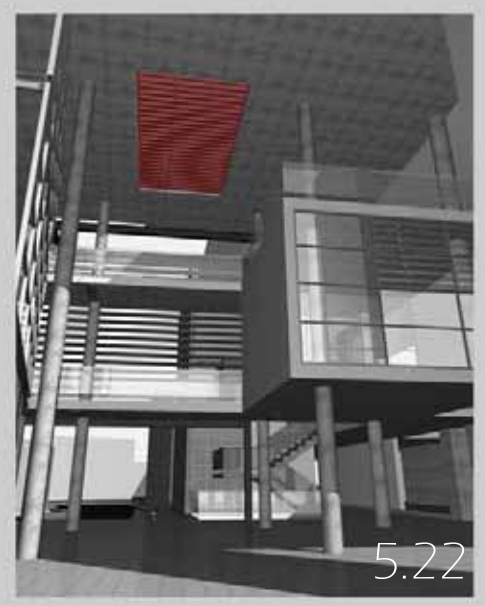


5.20 Detial D01 indicating the position of the cable tray

Three phase electricity is obtained from the municipality and backup generator located in the plant room. The *data and electrical cabling system* is contained within the 950mm wide exposed galvanized steel cable trays with support hangers fixed to the concrete soffit. These steel cable trays can be moved or adjusted as desired, making the system extremely flexible for when the demand for extra cabling is increased. Therefore the system can be retrofitted at any time of the building's life cycle, without damaging the building's structure or wall finishes. The cabling is then distributed to the different distribution boards located on each floor within the electrical ducts provided. From here the cabling is distributed to power points embedded within the concrete floors, and to various power points within the plinth of the aluminium office partitioning walls. The building utilises *photovoltaics* which are located on the roof and connected to battery storage components located in the plant room. This green energy system supplements the electrical system which operates the *energy saving artificial lighting* of the building during the day and night. The *photovoltaic solar shading system* located in the roof of the south entrance atrium, not only allows shards of sunlight to enter into the atrium space, but also supplements energy to the building, due to its innovative photovoltaic louvre panels.



5.21 Diagram indicating the electrical system



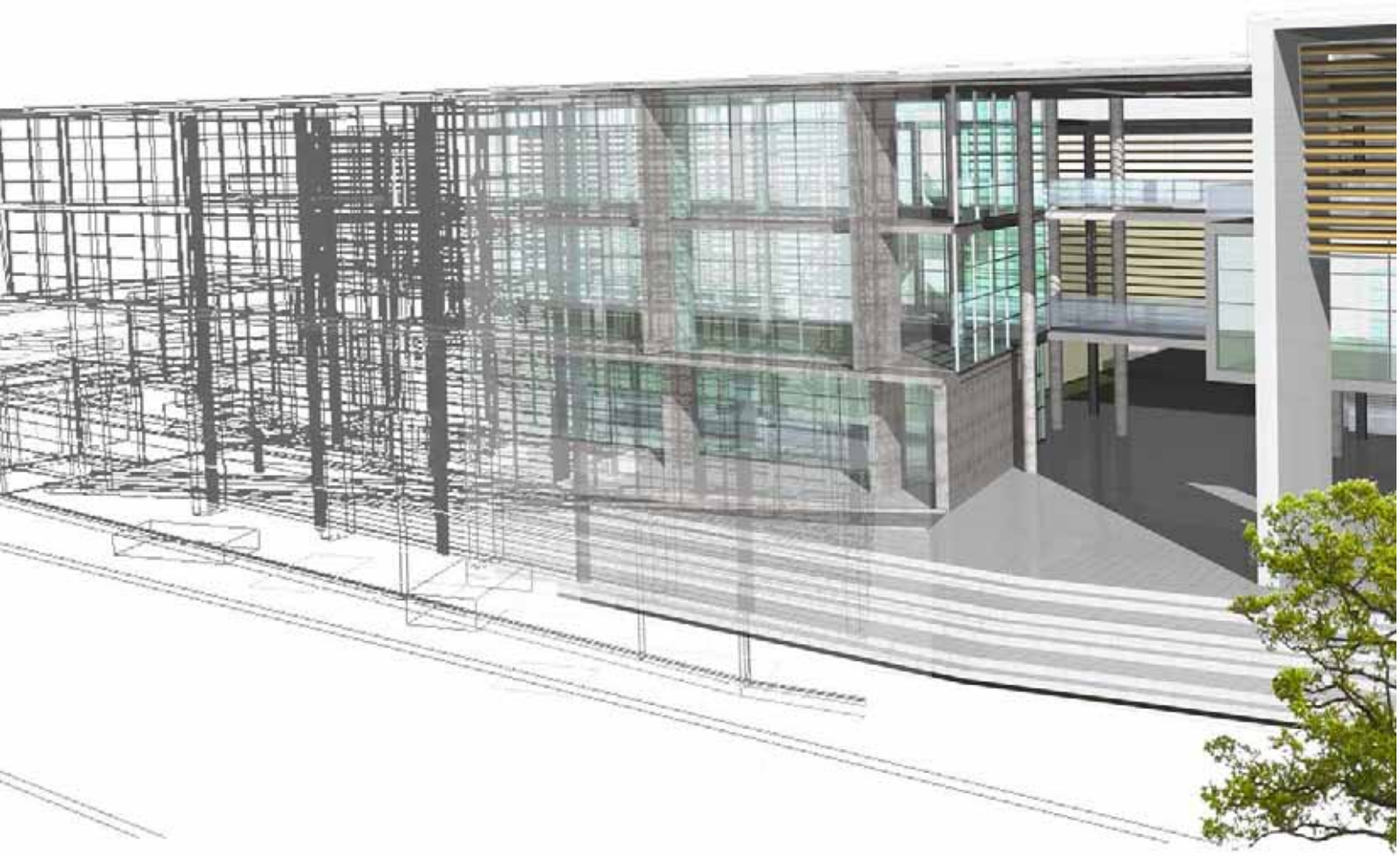
5.22 3D Images of the photovoltaic shading system

Positioned on the exterior wall of the education theatre, situated on the eastern elevation is the *digital media façade*. The rapid technological development of light emitting diodes (LED) has now cleared the way for the displaying of large-scale media content on building façades. “As a holistic, visionary lighting solution, LED combine high luminosity with longer service life, smaller component size and the possibility of controlling them easily via Internet from any PC. A conventional light bulb produces 3 lm/W; a halogen lamp 20 lm/W; an LED 60 lm/W. So an LED is twenty times more efficient than a light bulb. The smaller the distances between image dots, or pixels, the greater the resolution and the better the image quality. Apart from projection and back-projection – both of them techniques that only work at night, which require the creation of special projection surfaces and the deployment of extremely expensive projectors at precisely determined positions – billboards are the conventional procedure for the ‘medialization’ of façades.”
(ag4 Media Mesh catalogue, 2008, www.mediafacade.com.)
These weather resistant stainless steel wire mesh with interwoven LED profiles provides a permanent, integrated and intelligent ‘medialization’ of architecture. “The power consumption for the 100m2 media façade will average 3 to 5 kW/h, and maintenance is also simple within the patented construction of the mesh where individual LED profiles or control units can be easily replaced if necessary.” (ag4 Media Mesh catalogue, 2008, www.mediafacade.com.)

5.23 3D image indicating the Media facade

5.24 Media facade on the T-Moblie Headquarters in Bonn, Germany.

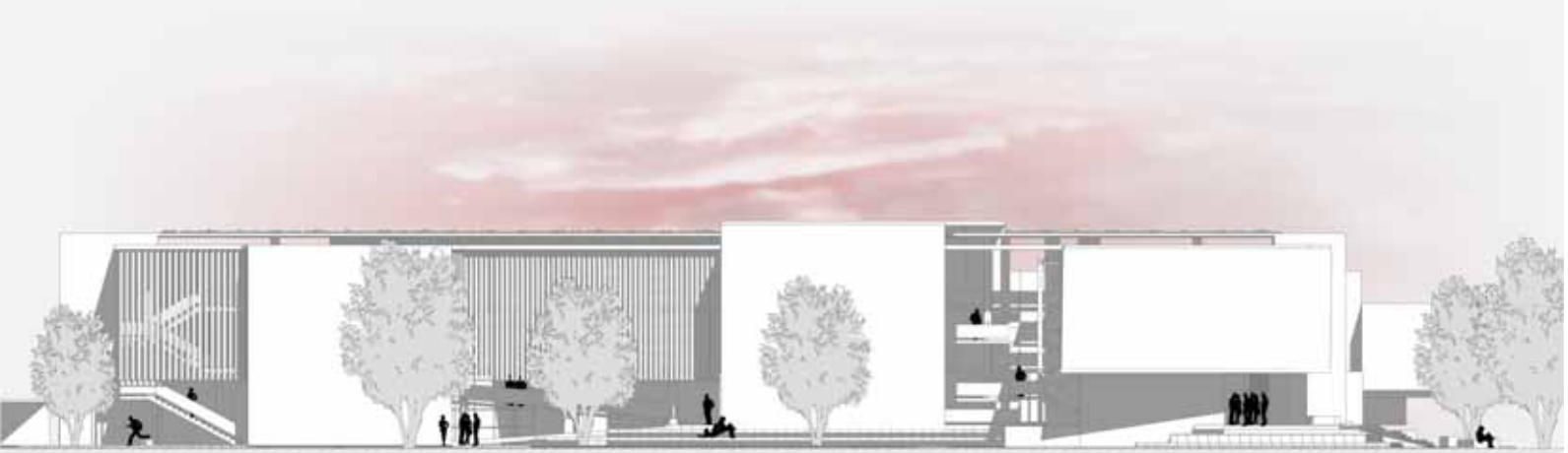
5.25 LED woven MediaMesh



Landscape

The surfaces meandering through the urban plaza and around the footprint of the building are constructed with insitu-cast concrete blocks. These blocks are made from concrete aggregates which have been crushed and salvaged from demolished concrete structures and sourced from various construction industries. Utilizing these by-products from the industries enable the reduction of landfill use and embodied energy of concrete. Scattered throughout the landscape are permeable green patches where the earth punches through the hard surfaces. These green patches allow rainwater to filter through, reducing rainwater runoff whilst creating soft relaxing spaces around the building's periphery. Additional indigenous trees are planted in these spaces which include species like Celtis Africana, Acacia xanthophloea, and Vepris lanceolata.
Pre-cast concrete blocks are laid on the tread surfaces of stairs and on the amphitheatre seating surfaces. These surfaces are inscribed with layers of typographically scaled and interwoven texts of various natural languages mimicking the engravings found on the Rosetta stone.

5.26 3D rendering of the urban plaza with concrete surfaces.



6.01

Western Elevation

06 conclusion

The goal of this dissertation was to design an urban responsive *language learning centre* that is a linking tool between the user and foreign languages, enabled through interactive intercultural contact sessions to gain knowledge of something unfamiliar.

The concept of *'infill and void'* is the key thread that links the proposed urban framework, the designed building, and the user together. When intercultural expressions are physically experienced within a space, the space acquires a certain aural dimension. An aspect ratio that brings cultures together, announcing man's presence of arriving, meeting, agreeing, and being together.

Through exposing the structure and celebrating internal transparency the building suggests its *honest architecture*. A modernist idea of transparency where there is an intimate connection between outside and inside, dissolving the boundaries, and as Ford states, that the building is "... not to enclose itself as an architecturally defined and independent entity, but to open itself up to the sun, nature, human life, and movement." (Ford, 2003: p.55)

It is clear from the dissertation that the attempt was to address the education of different *cultural languages*, in such a way that the convergence of different cultural groups will form a unity within the population. Unity that will radiate "the quality of similarity, shared identity, and a logical connection between separate entities" within a certain social framework. (Fleming, 1995: p700)

It is therefore not a building, but rather an architectural expression of formal *unity* to embrace a kaleidoscope of happy people and recognisable sounds.

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7

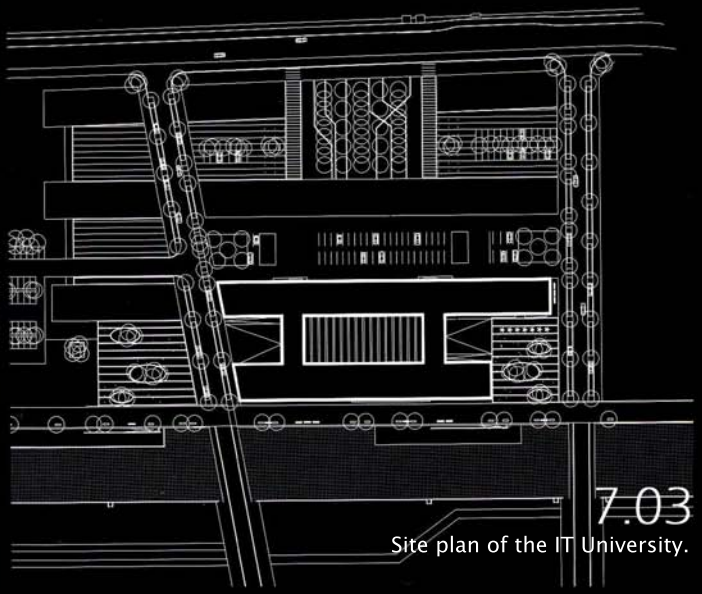
Precedent Studies

IT University in Copenhagen
Ørestad, Copenhagen, Denmark.
Henning Larsens Tegnestue A/S.
Completed 2004.

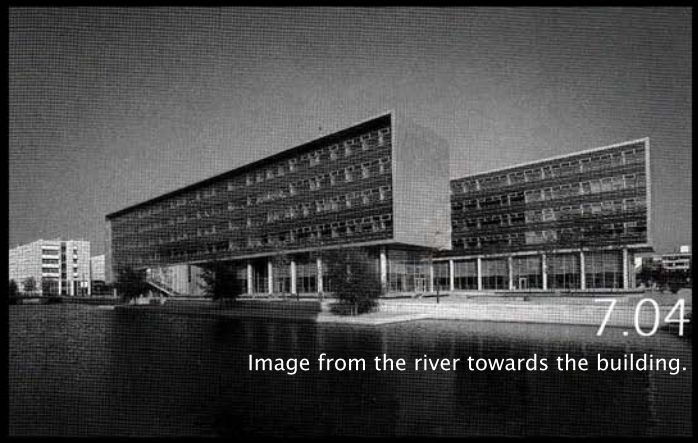
The building is located along the canal in the northern part of Ørestad within a new district of Copenhagen. The district is described as “an urban vision created upon a bare field outside the historical city’s diversity of blended functions and visual patina.” It is within this urban vision that the building intensifies the urban dynamic by “pushing its extroverted functions like café, restaurant and library forward into the urban scene so that the building shares its inner pulsing life with the city around it.” The building comprises of a large centre atrium (60m x 20m x 25m high), unfolding into plazas on the north and south, entering into a spatial dialogue with the site and surrounding district.

7.01
Image indicating the 'drawer-like' meeting rooms within the central atrium of the building.

7.02
Location plan of the university precinct.



7.03
Site plan of the IT University.

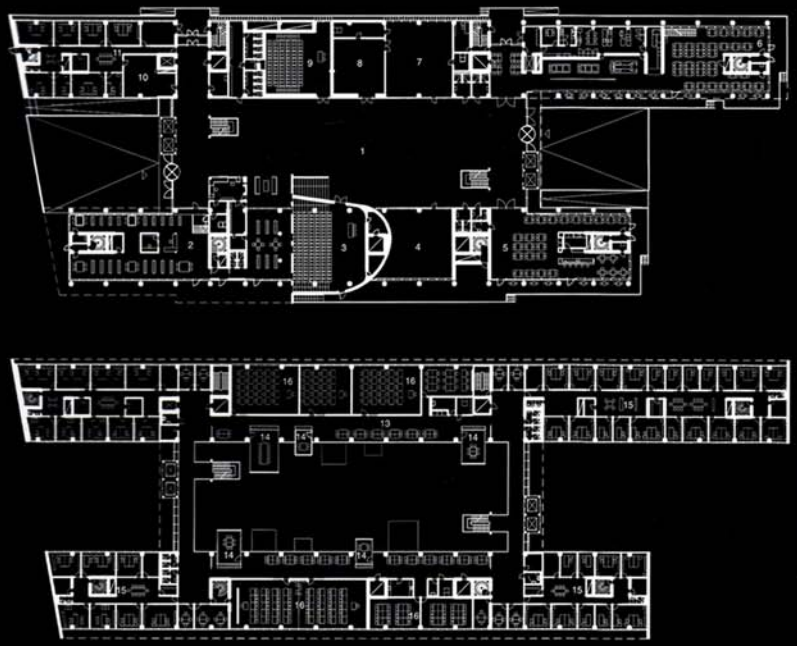


7.04
Image from the river towards the building.

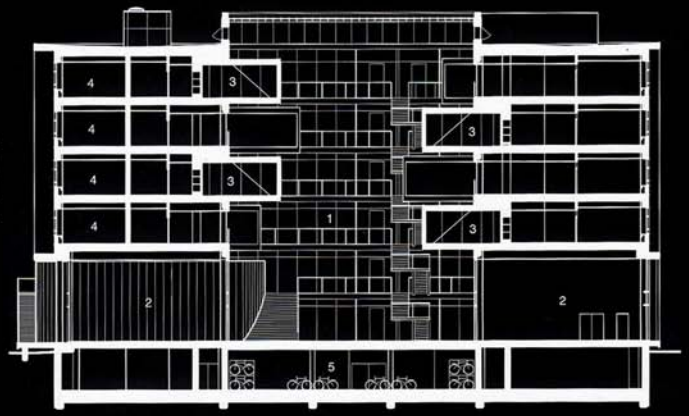
Image indicating the tranparent entrance of the eastern facade, showing the meeting rooms within the central atrium of the building.

The building is described as “absorbing the adjacent city space as a direct part of its inner spatial quality, so that the life in these spaces and activities inside the building are melted into a cohesive whole.” It is this concept of connection, integration, and association with others, that resonates within the theoretical position of this dissertation, and the importance of the programme of the building creating a spatial dialogue with one another.
The majority of the functions inside the building are centred on group work and group projects, offering interactivity between student, and between students and the researchers. The goal of the project was to create a dynamic study and research environment within open study areas which provide possibilities for informal and spontaneous encounters. “The space appears as a geometric installation consisting of precisely formed group and meeting rooms that are placed in a complex composition, where their differing size and placement read like open drawers in the tall atrium.”
(Yoshida, 2005: p.44)

7.06
Image indicating the meeting spaces wihin the atrium.



7.07
Floor plans indicating the ground and first level of the buidling.



7.08
Section through the central atrium of the building.

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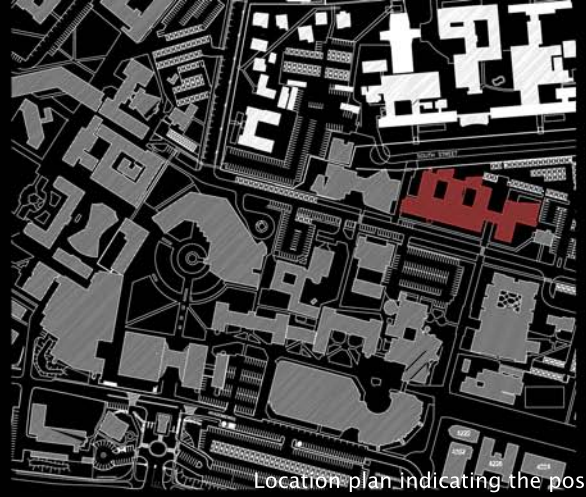
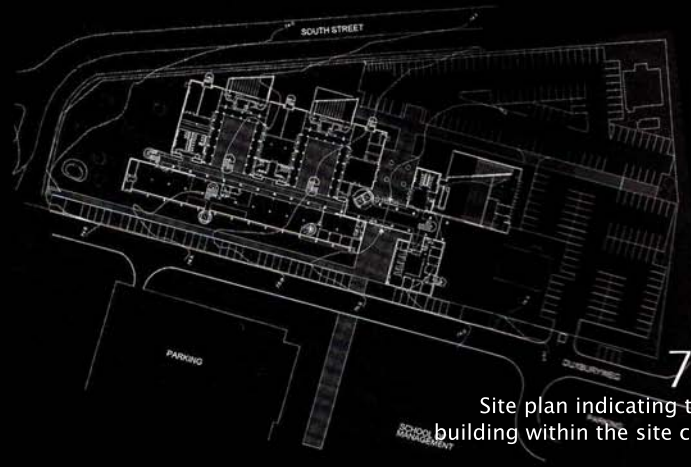
Law Faculty, University of Pretoria
Pretoria, South Africa.
Kruger Roos Architects.
Completed 2003.

The building is located on the main campus of the University of Pretoria, on a site that was previously occupied by small residential buildings and used as an annex by the students from adjacent residences. Due to the location of the current ring road of the campus and the security fence around the semi-private precinct, the site of the law building has not been integrated with the commercial precinct to the north. Yet, it is stated that the building is “a happy merging of a site and a building that echo the same concern for the environment: direct, unpretentious, legible and strong.”

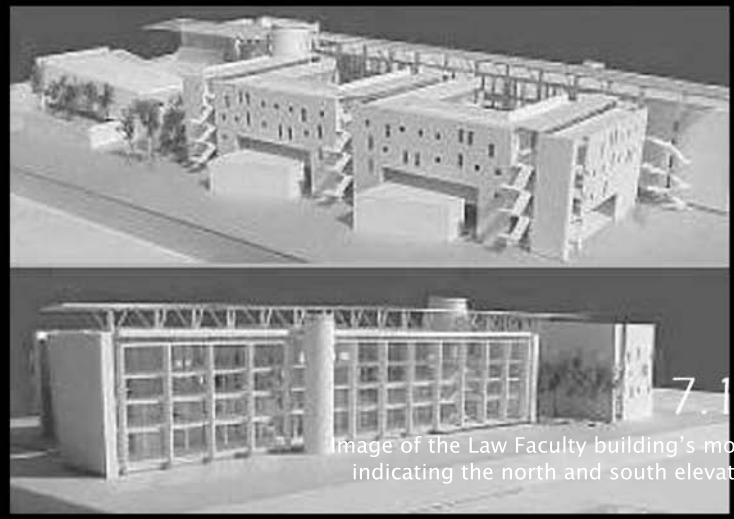
7.09
Image of the southern elevation of the Law building's administration block.



7.10
Location plan indicating the position of the building within the University precinct.



7.11
Site plan indicating the the building within the site context.

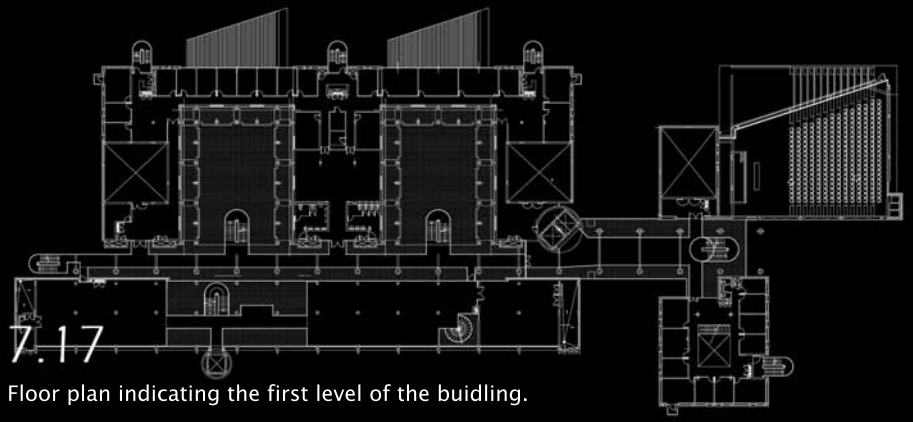


7.12
Image of the Law Faculty building's model indicating the north and south elevation.

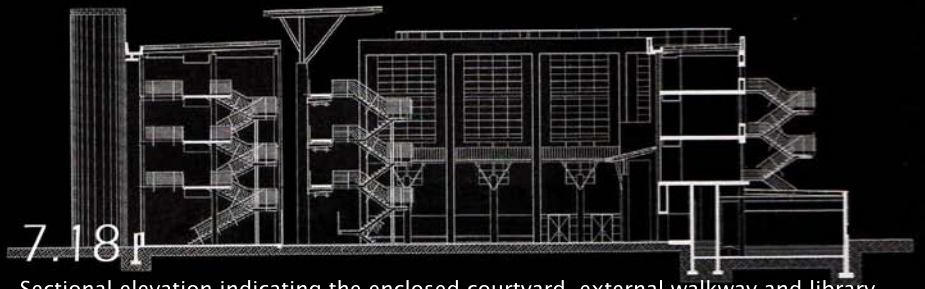
7.13 Image indicating the library, south entrance, and administration block of the buidling.

Images of the external and internal spaces.

The lack of integration with the urban fabric only means that the building does not contain functions like cafés and restaurants, opening up to the street. Instead, the building is internalised and functions as "a small campus inside the larger one and this concept has been evident since the first sketch plans: solid blocks of lecture halls, meeting rooms and private offices envelope planted courtyards and are connected with the library, large auditorium and administrative offices by four levels of interior 'streets'." Therefore the building enables the opportunity for students to meet and interact with one another within these 'streets' and interior open spaces, while watching campus life through the large windows of the library. "People can walk through the building easily and freely, but are also displayed and etched against the light. Their voices fill the big open spaces. They complete the building. It becomes a building only if there are people to fill its spaces." It is this concept of the user completing the spatial quality functioning as a campus within a campus, which resonates within the theoretical position of this dissertation. (Le Roux & Botes, 2005: p.37)



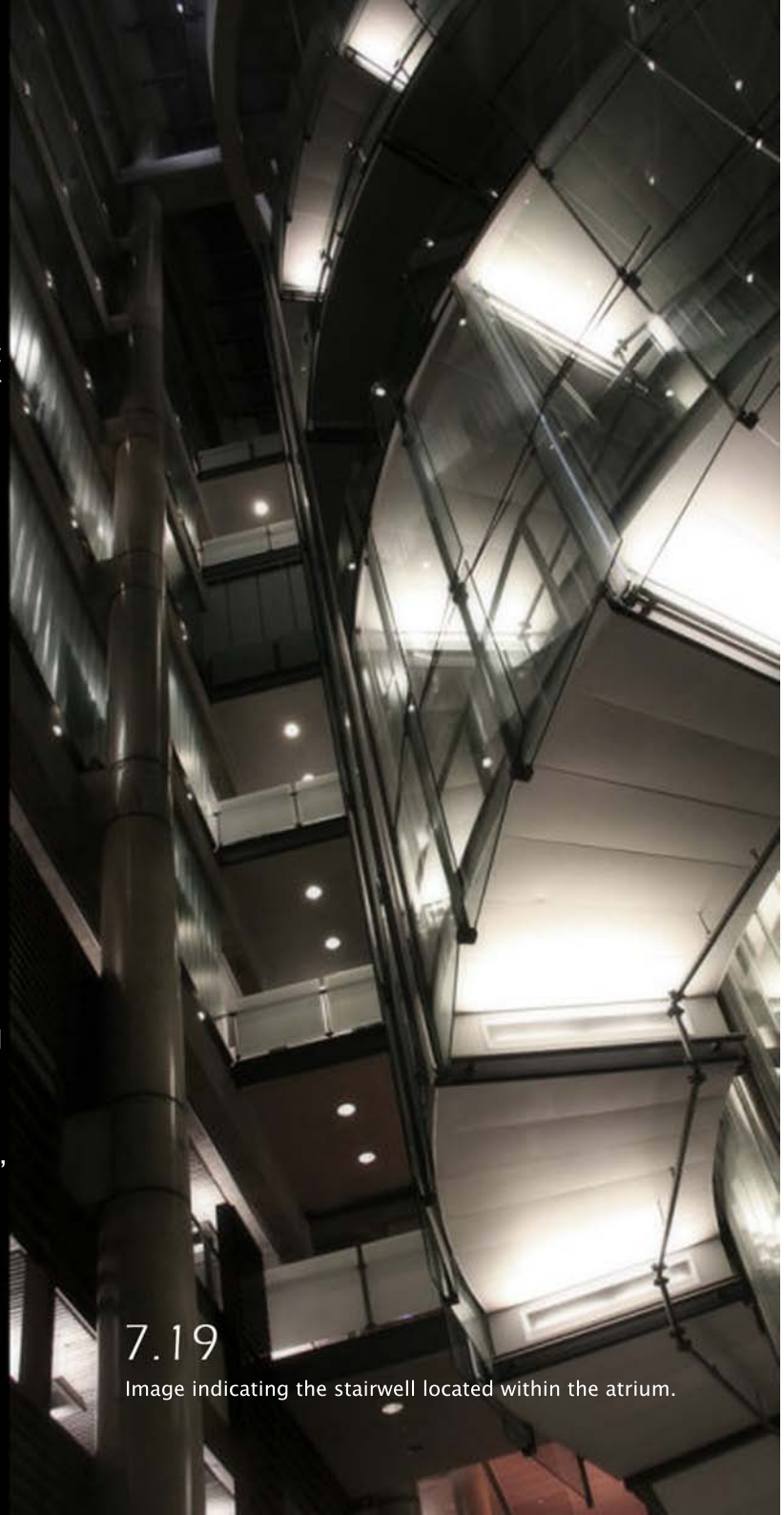
Floor plan indicating the first level of the buidling.



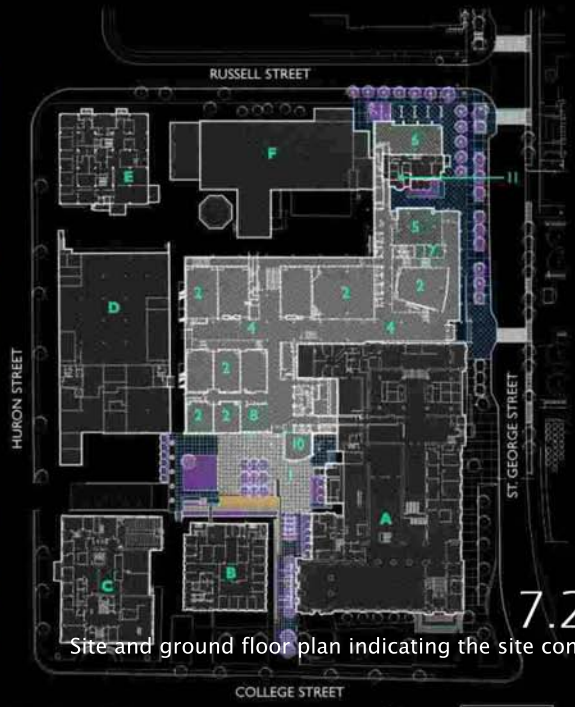
Sectional elevation indicating the enclosed courtyard, external walkway and library.

Bahen Centre for Information Technology,
University of Toronto,Toronto, Ontario.
Diamond & Schmitt Architects.
Completed 2002.

The building is located in a dense urban environment surrounded by six existing buildings, forming part of the University of Toronto's downtown St. George campus. Considered as an infill project the Bahen Centre is nestled among an eclectic collection of smaller existing buildings, where the construction involved the demolition of Victorian houses; public opposition resulted in the retention of the most historically significant of these, incorporating the building within the complex. The building also replaces an asphalt-paved parking lot and service yard with usable space and three distinct landscaped courtyards. "The Bahen Centre for Information Technology is designed to accommodate spaces that are adaptable, flexible and shaped on the understanding that the essence of education lies in connection." (Schmitt, 2008: p.01) Education in the twenty first century is more than just the presenting and passing on of knowledge, it is the expansion and development of thinking. Schmitt notes that the ideal environment in which to facilitate this enlightenment allows for interaction, congregation and convergence, not only of people but of ideas.



7.19
Image indicating the stairwell located within the atrium.



7.21
Site and ground floor plan indicating the site context.

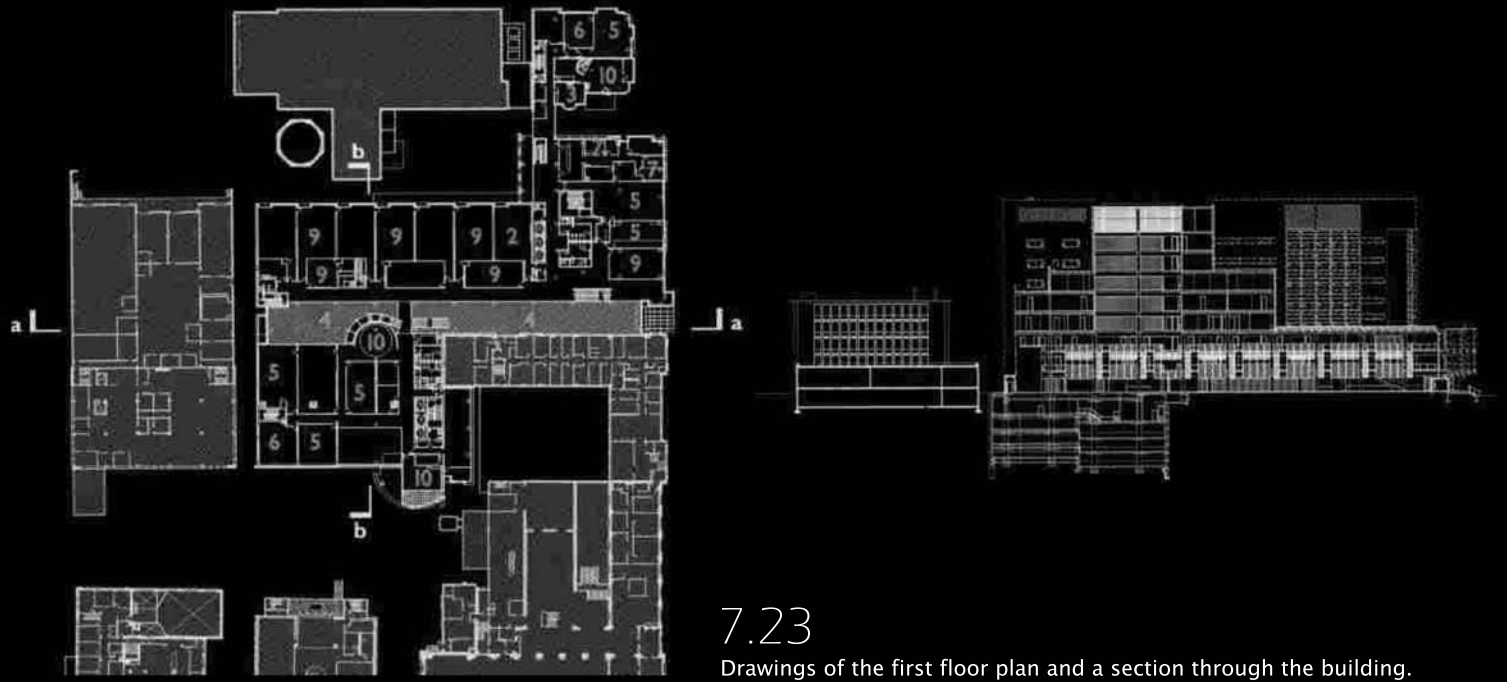
Site/ground floor

A Koffler Centre for Student Services
B Fields Institute
C Faculty of Architecture, Landscape and Design
D university offices
E F. Norman Hughes Pharmacy Building
F steam plant

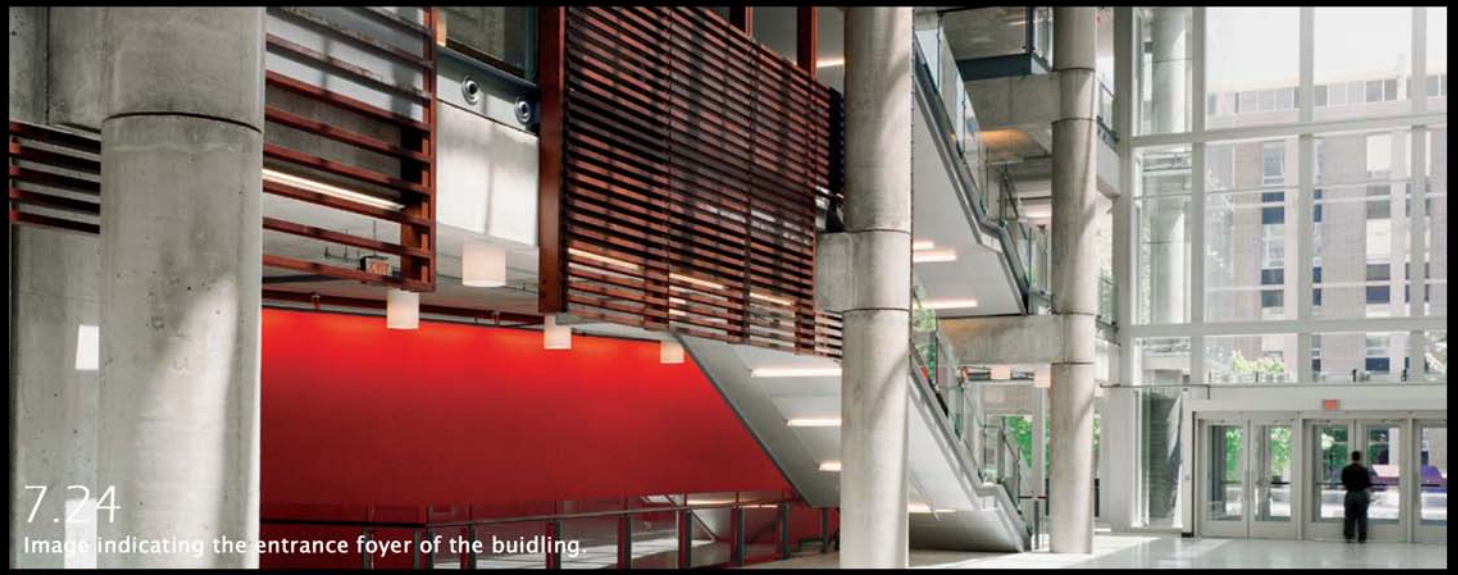
1. courtyard
2. lecture theatres
3. meeting rooms
4. atrium
5. computer laboratory
6. study hall
7. offices
8. café
9. tutorial rooms
10. lounge
11. PEY program office (Victorian house)

7.20
Images of the external views of the building.

7.22 Aerial image of the eastern elevation indicating the urban context and 'infill' character..



7.23
Drawings of the first floor plan and a section through the building.

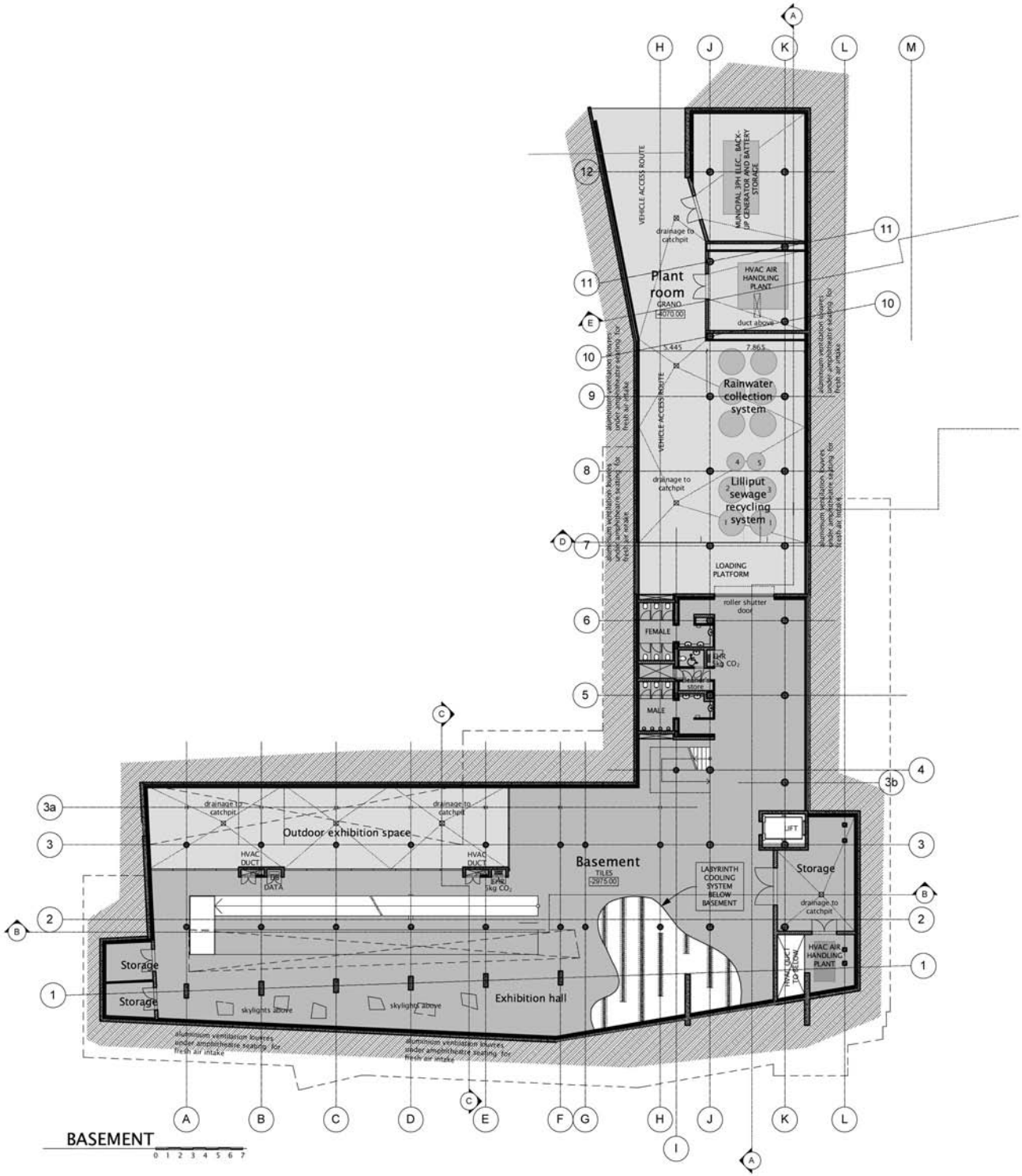


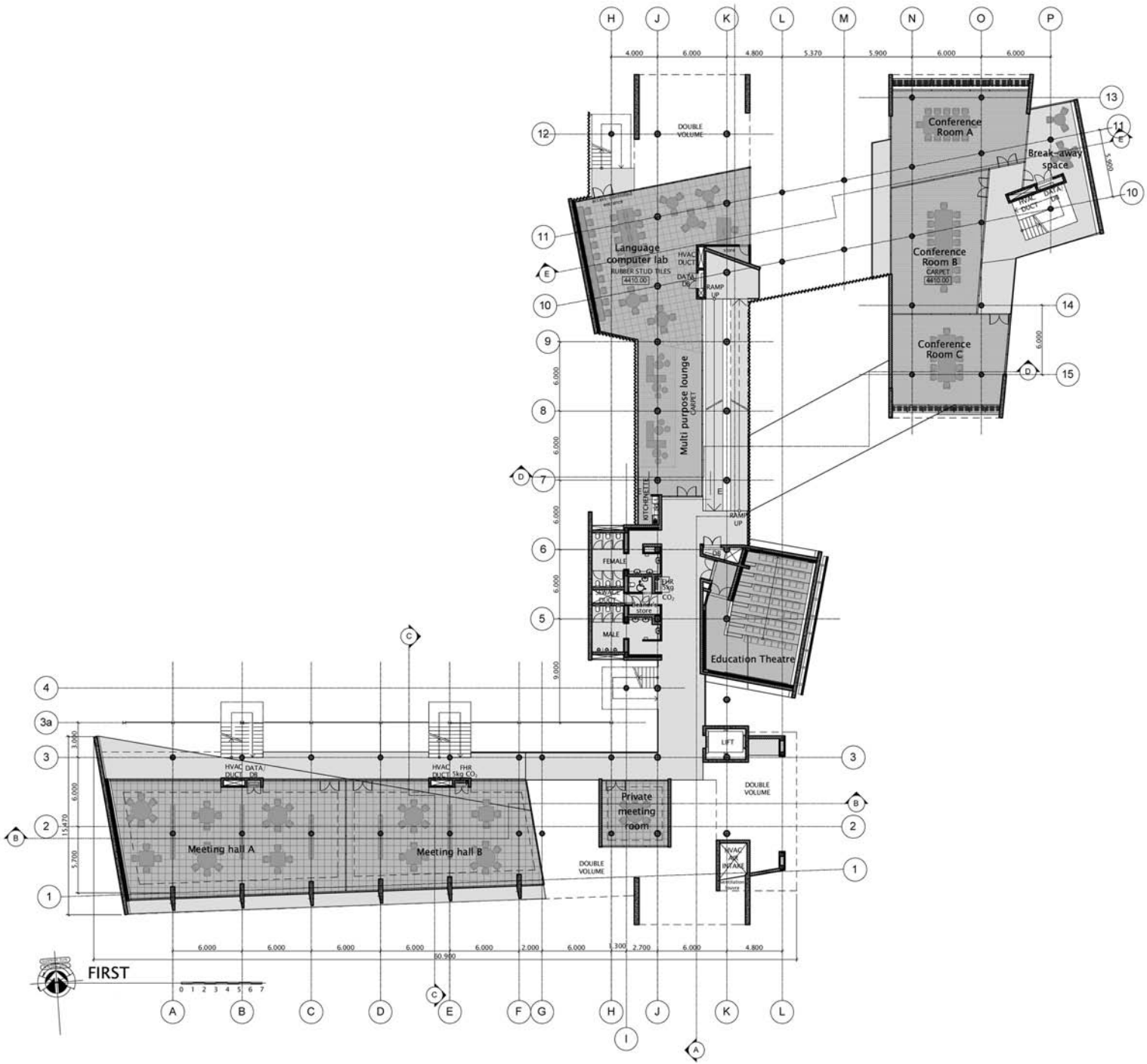
7.24
Image indicating the entrance foyer of the buidling.

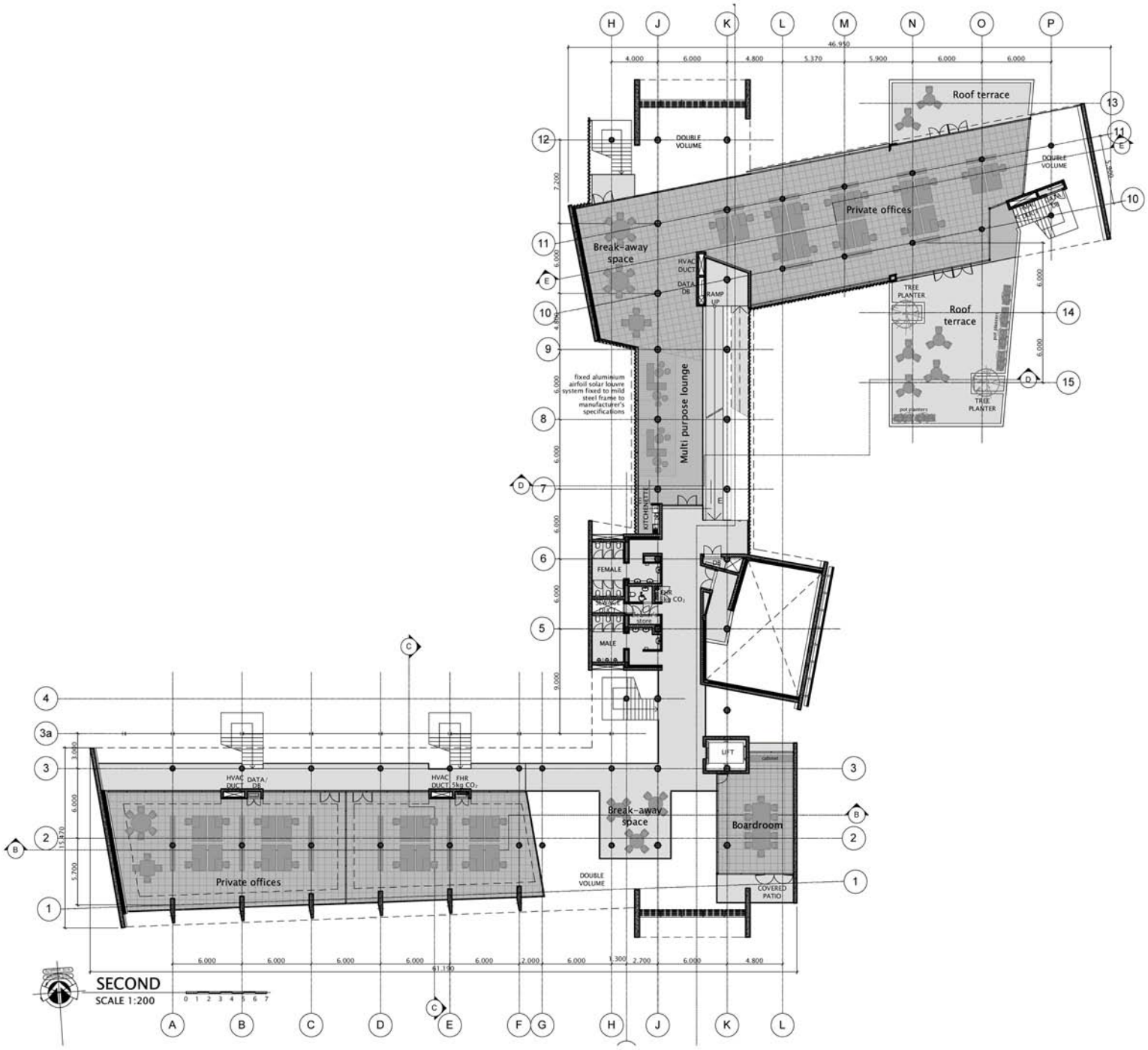
7.25
Image of the internal atrium space.

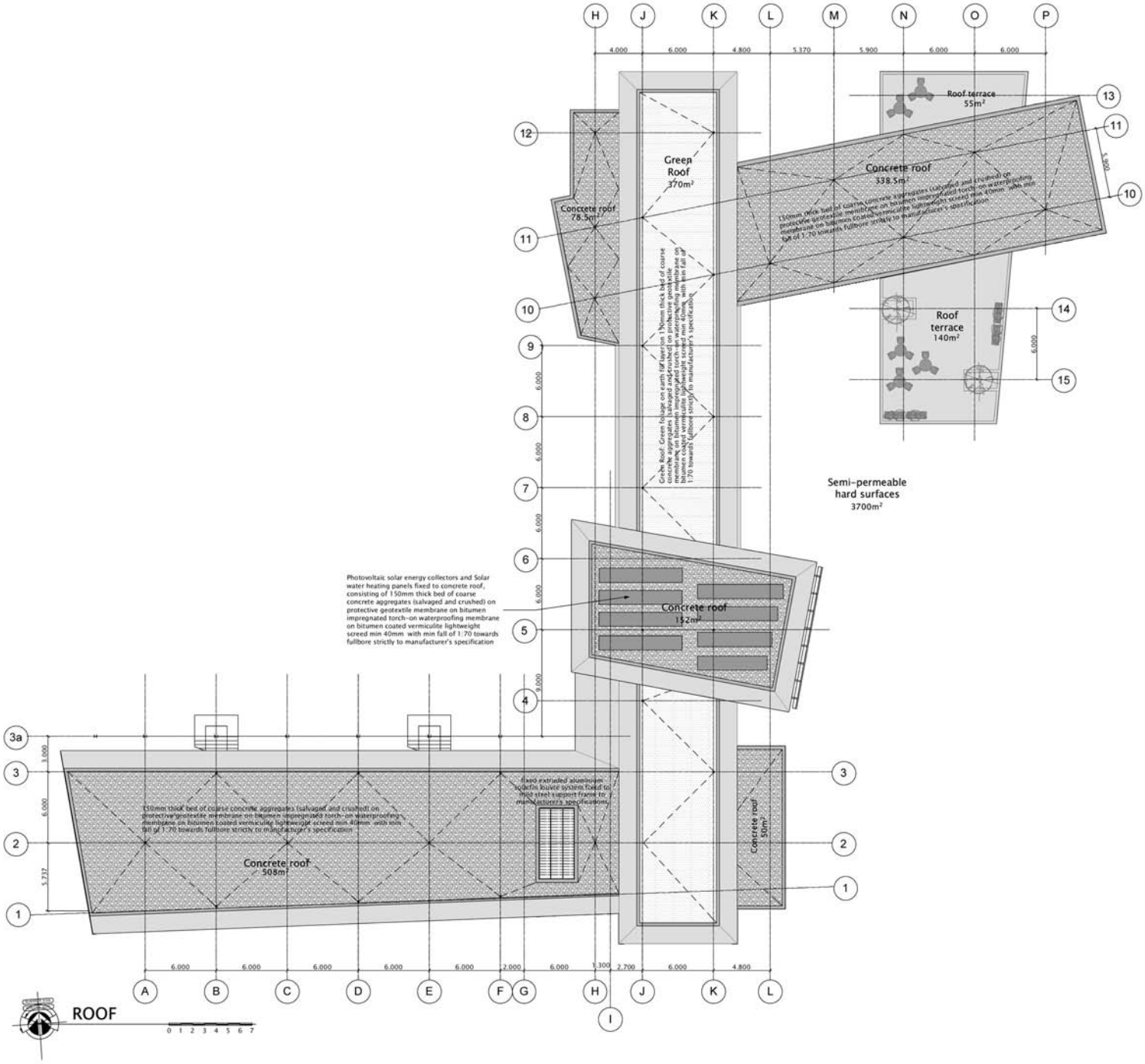
It is within this complex interweaving of urbanity, public space and sustainability, that the Bahen Centre shares with this dissertation the theoretical position of merging cultures, and of combining environments. “Fundamentally, the Bahen Centre is a reflection of the belief that education requires people to connect with each other, with ideas and with their environment.” The emphasis lies with the connection of the building and its student to the outside environment and campus. It is stated that the naturally-lit atrium and stairwell with its “sense of expansiveness and merging pathways is fundamental in promoting convergence and interaction.” The building includes a variety of spaces that can be used as informal meeting spaces. The building contains both passive and active systems, including the provision of daylight to minimize the need for artificial lighting, natural ventilation including the use of the atrium as a thermal chimney, sun shading devices to reduce the cooling load, and careful zoning of building to maximize the benefits of various orientations. “The project’s most significant contribution to sustainable design has more to do with its relationship to site and its attitude toward the city and traditions of high density urbanism.” (Polo, 2003: p.20)

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA


Plant room
GRANO
+2070.00
HVAC AIR HANDLING PLANT
duct above
MUNICIPAL 3PH ELEC. BACK-UP GENERATOR AND BATTERY STORAGE
VEHICLE ACCESS ROUTE
drainage to catchpit
Rainwater collection system
Lilliput sewage recycling system
LOADING PLATFORM
roller shutter door
FEMALE
MALE
Cleaner's store
LIFT
Outdoor exhibition space
HVAC DUCT
DB DATA
Basement
TILES
-2975.00
LABYRINTH COOLING SYSTEM BELOW BASEMENT
Storage
Storage
Storage
Exhibition hall
skylights above
HVAC AIR HANDLING PLANT
aluminium ventilation louvres under amphitheatre seating for fresh air intake
BASEMENT
0 1 2 3 4 5 6 7

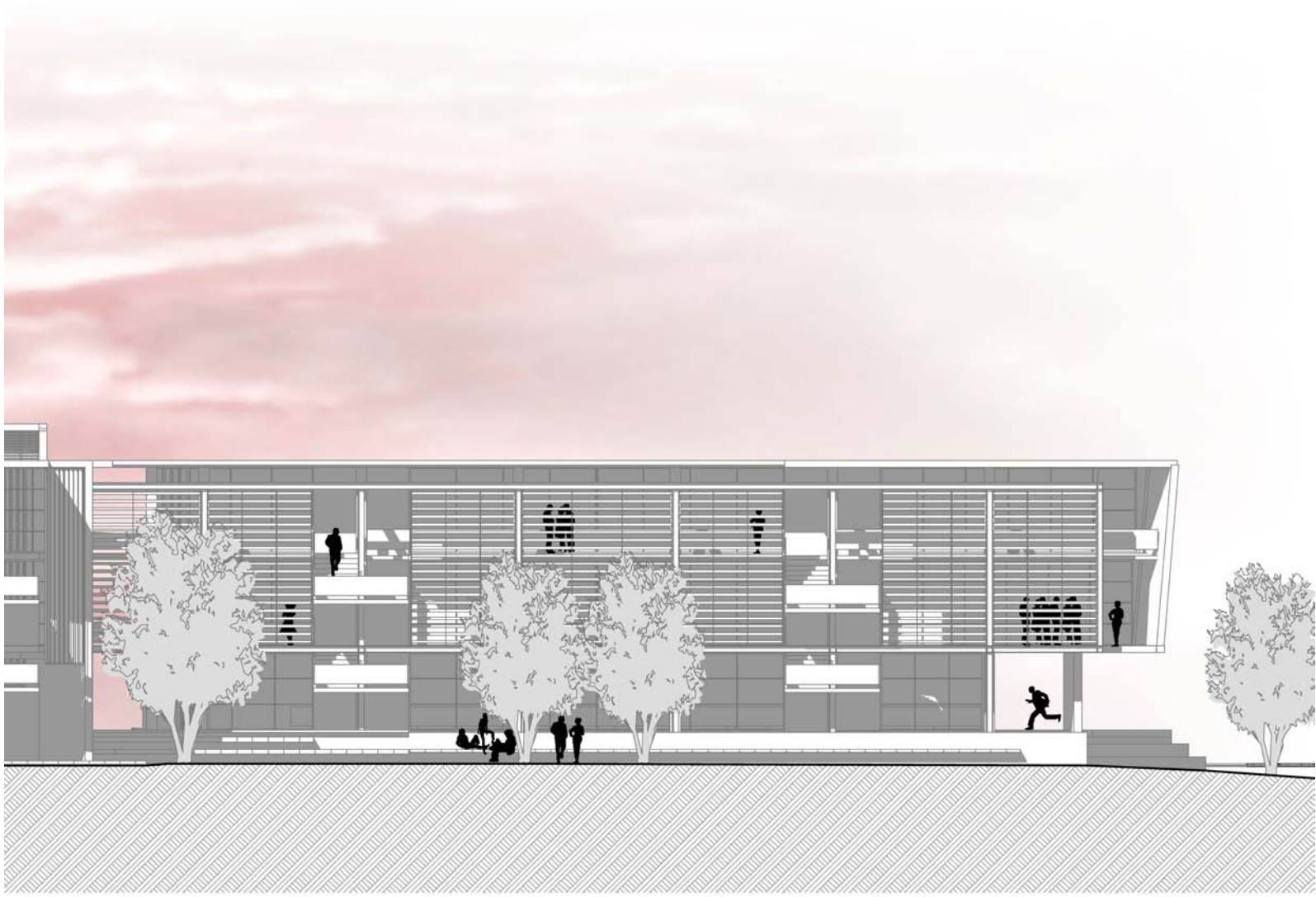

Conference Room A
Break-away space
Conference Room B
CARPET
4410.00
Conference Room C
Language computer lab
RUBBER STUD TILES
4410.00
Multi purpose lounge
CARPET
Education Theatre
Private meeting room
Meeting hall A
Meeting hall B
DOUBLE VOLUME
KITCHENETTE
FEMALE
MALE
STORE
LIFT
RAMP UP
HVAC DUCT
DATA DB
FHR 5kg CO2
HVAC AIR INTAKE
FIRST

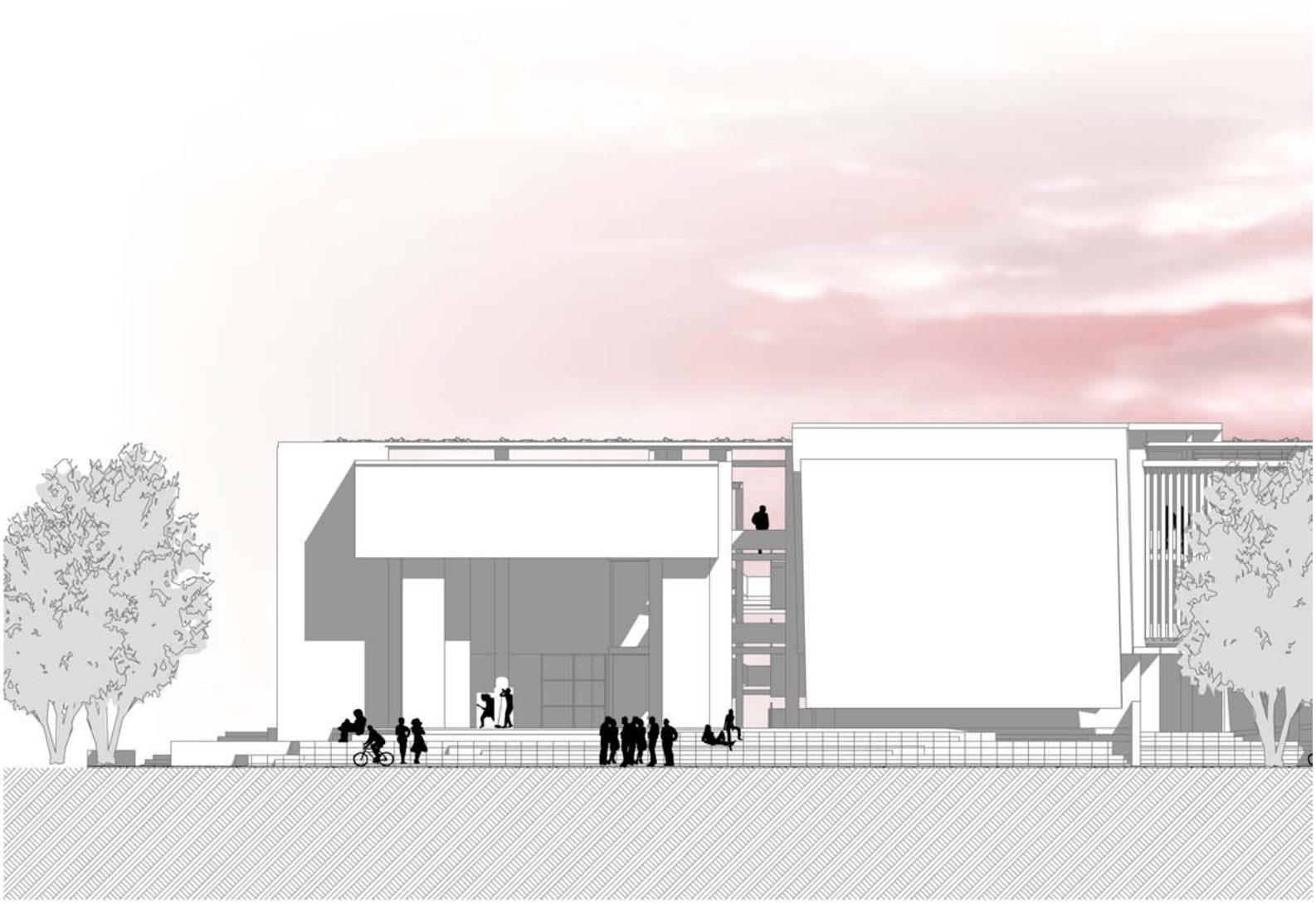

Roof terrace
Private offices
Break-away space
Multi purpose lounge
Roof terrace
fixed aluminium airfoil solar louvre system fixed to mild steel frame to manufacturer's specifications
KITCHENETTE
FEMALE
MALE
store
LIFT
Break-away space
Boardroom
Private offices
DOUBLE VOLUME
COVERED PATIO
TREE PLANTER
pot planters
SECOND
SCALE 1:200


Green Roof 370m²
Concrete roof 78.5m²
Roof terrace 55m²
Concrete roof 338.5m²
150mm thick bed of coarse concrete aggregates (salvaged and crushed) on protective geotextile membrane on bitumen impregnated torch-on waterproofing membrane on bitumen coated vermiculite lightweight screed min 40mm with min fall of 1:70 towards fullbore strictly to manufacturer's specification
Roof terrace 140m²
Semi-permeable hard surfaces 3700m²
Photovoltaic solar energy collectors and Solar water heating panels fixed to concrete roof, consisting of 150mm thick bed of coarse concrete aggregates (salvaged and crushed) on protective geotextile membrane on bitumen impregnated torch-on waterproofing membrane on bitumen coated vermiculite lightweight screed min 40mm with min fall of 1:70 towards fullbore strictly to manufacturer's specification
Concrete roof 152m²
Concrete roof 508m²
Concrete roof 50m²
fixed extruded aluminium louvrim louvre system fixed to mild steel support frame to manufacturer's specifications
ROOF
0 1 2 3 4 5 6 7

NORTH

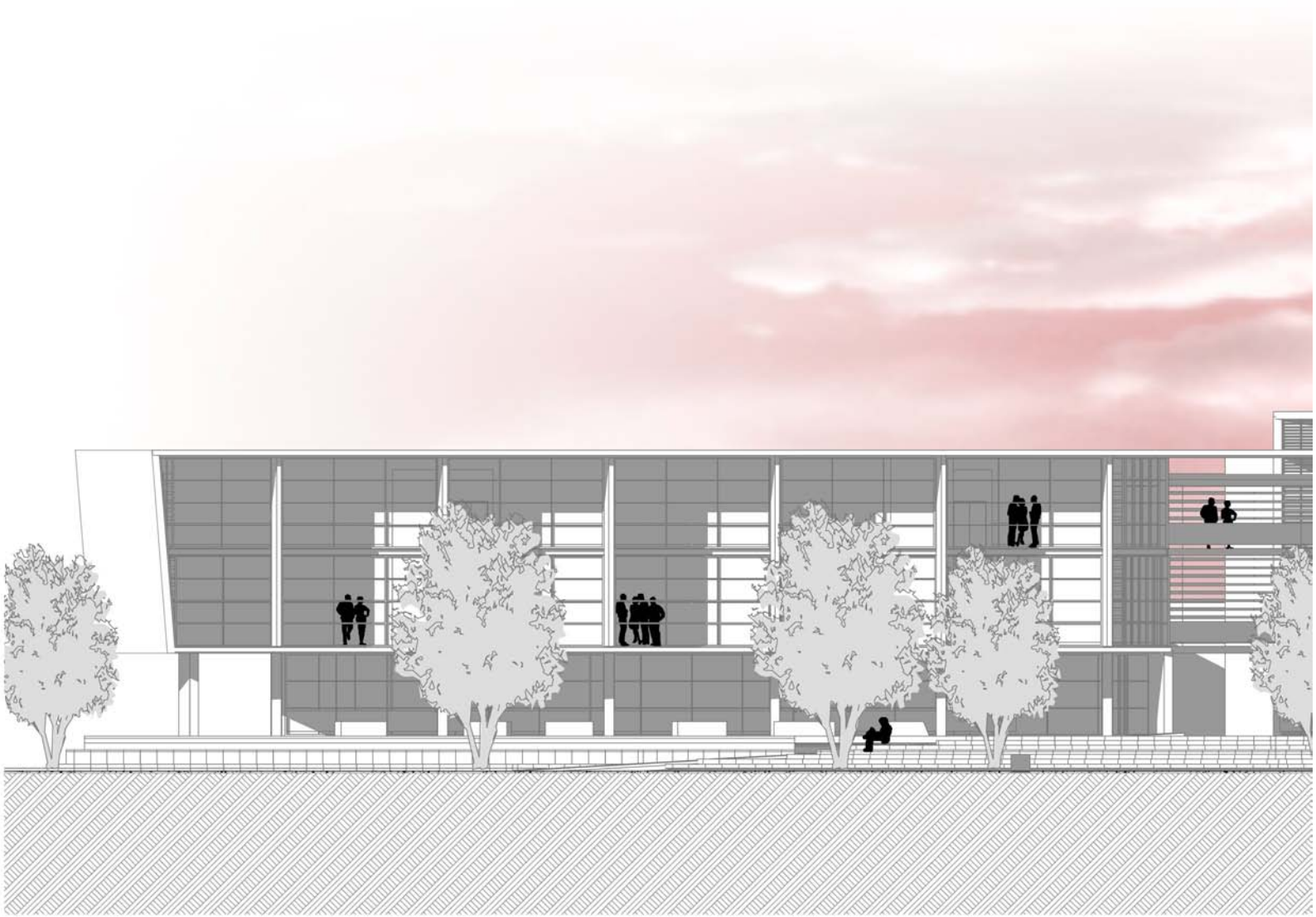
0 1 2 3 4 5 6





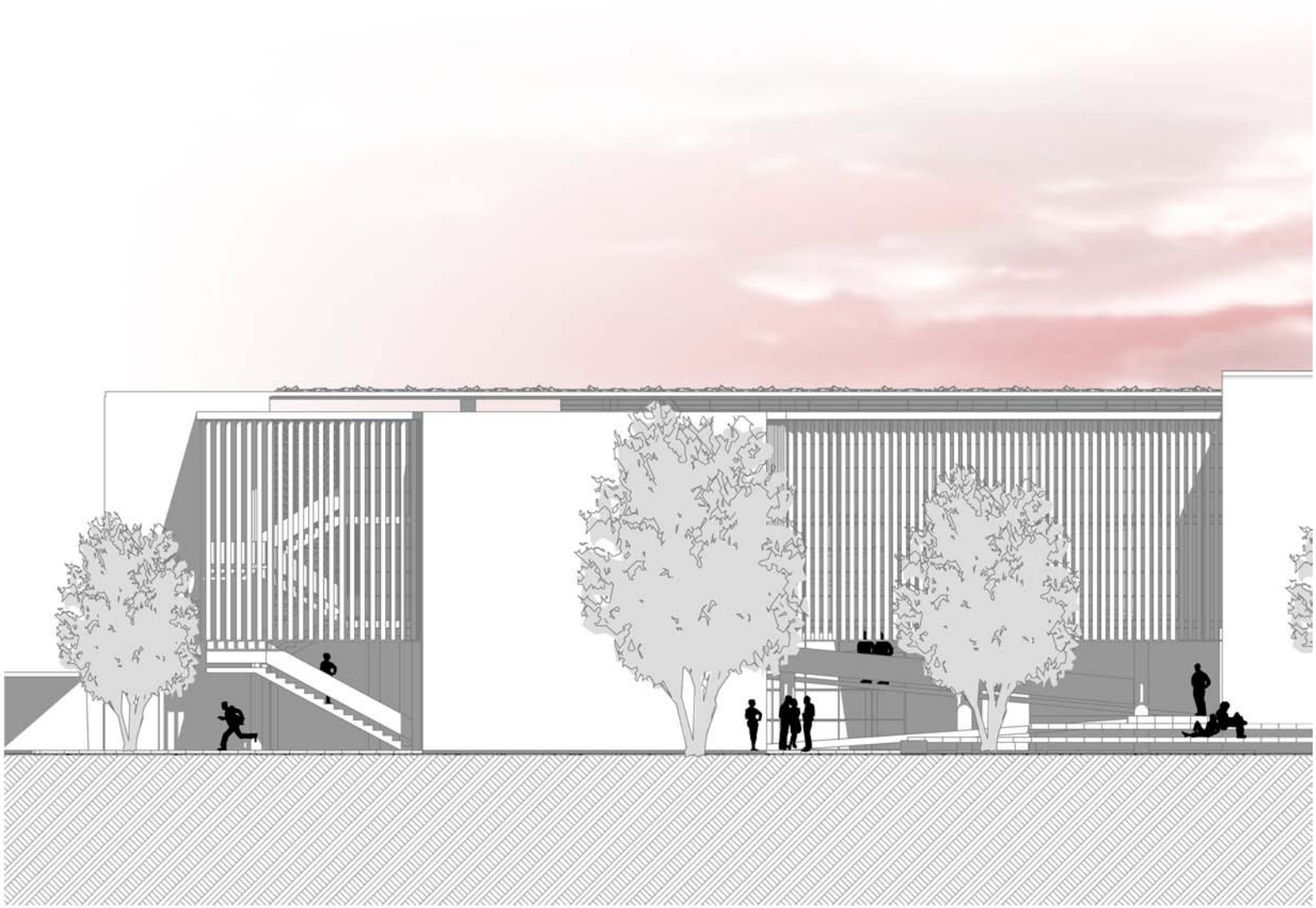
EAST

0 1 2 3 4 5 6



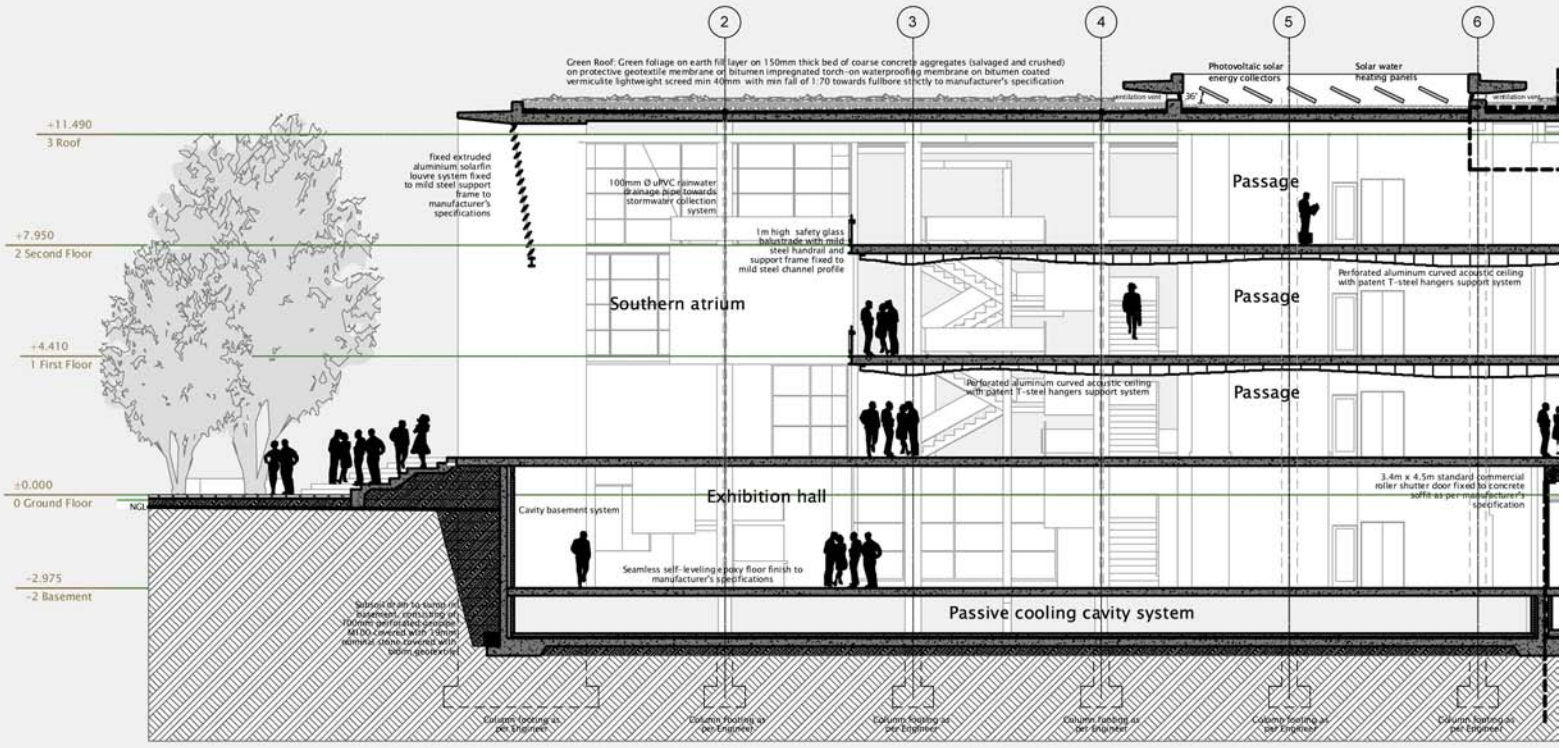
SOUTH

0 1 2 3 4 5 6



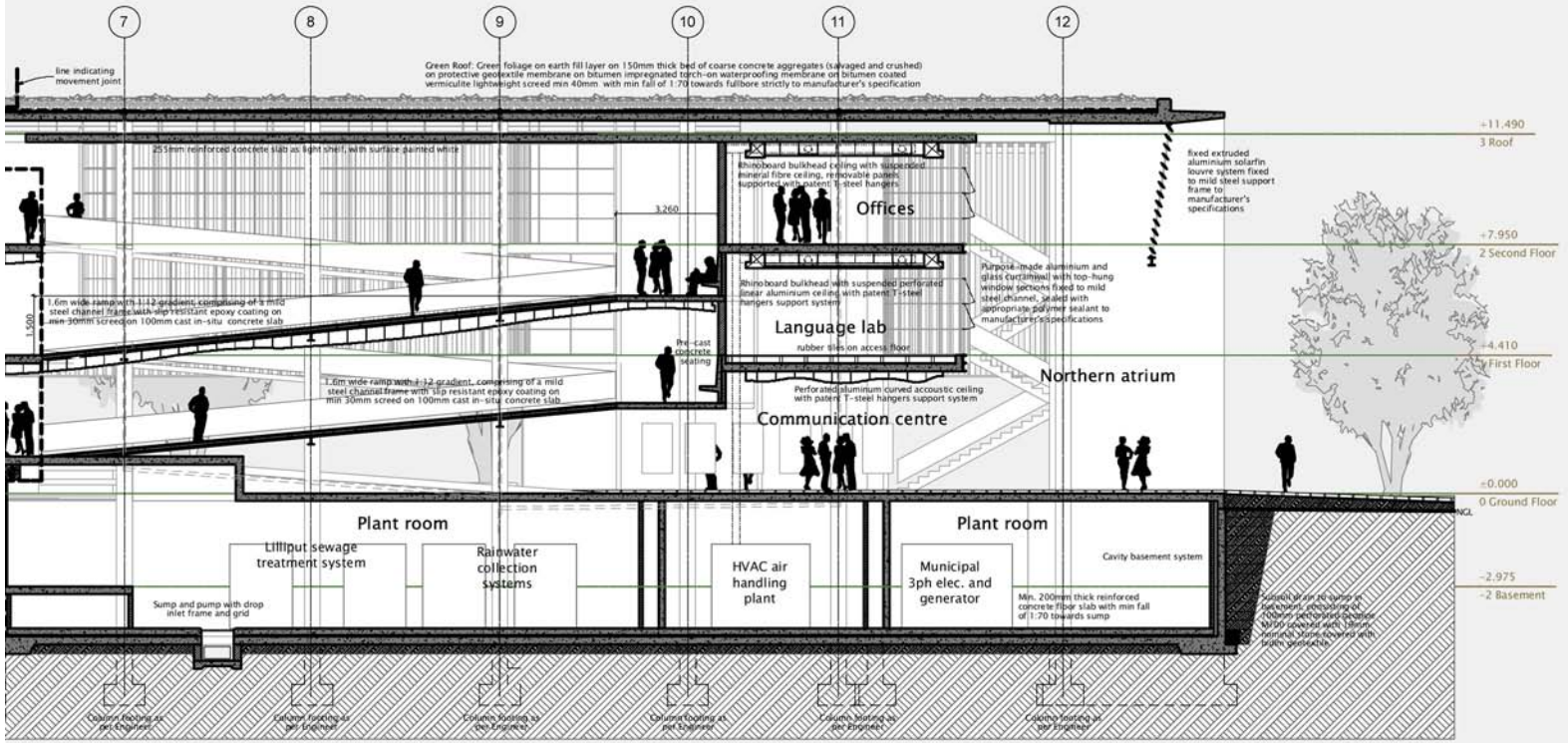
WEST

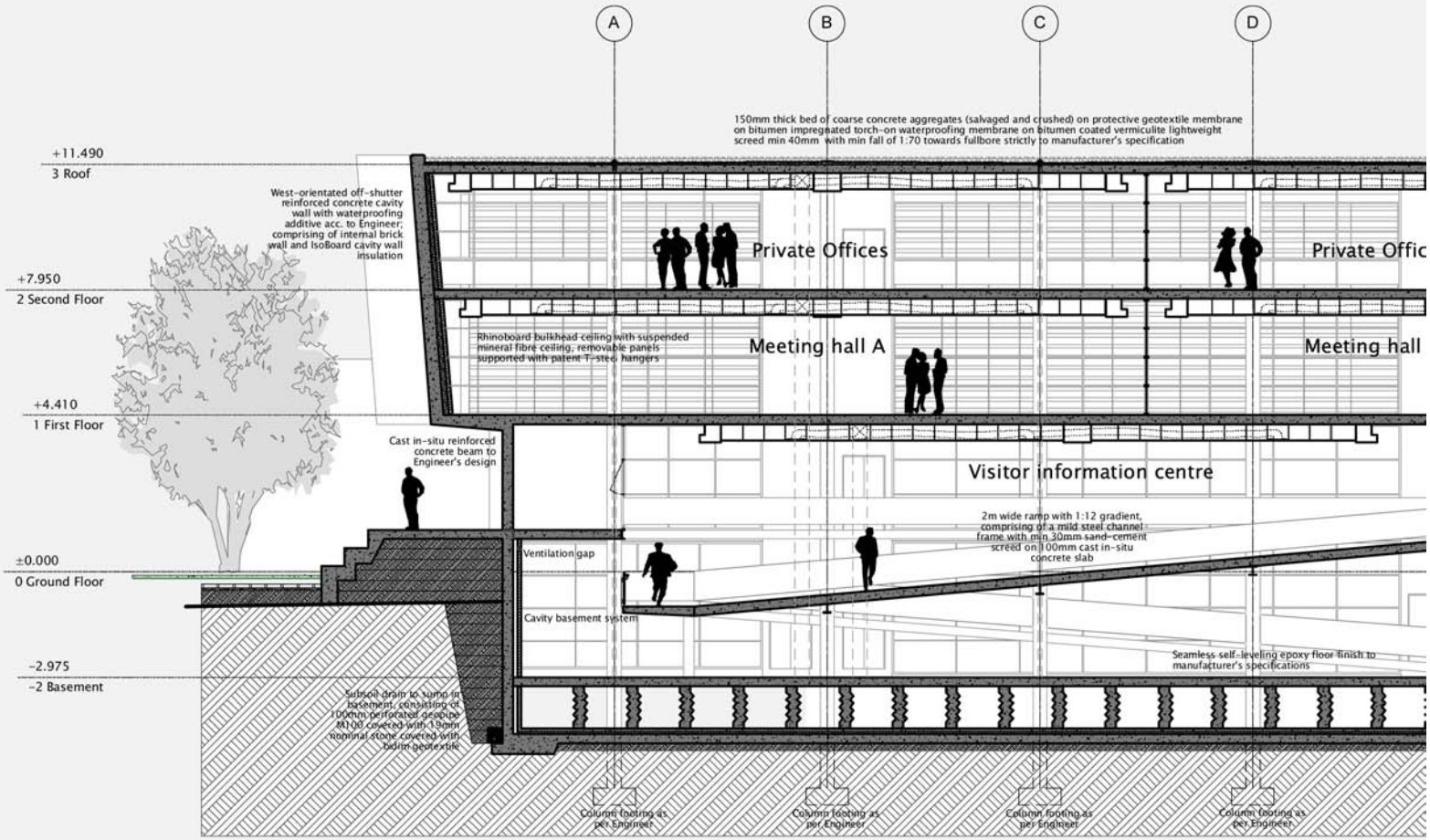
0 1 2 3 4 5 6



SECTION A-A

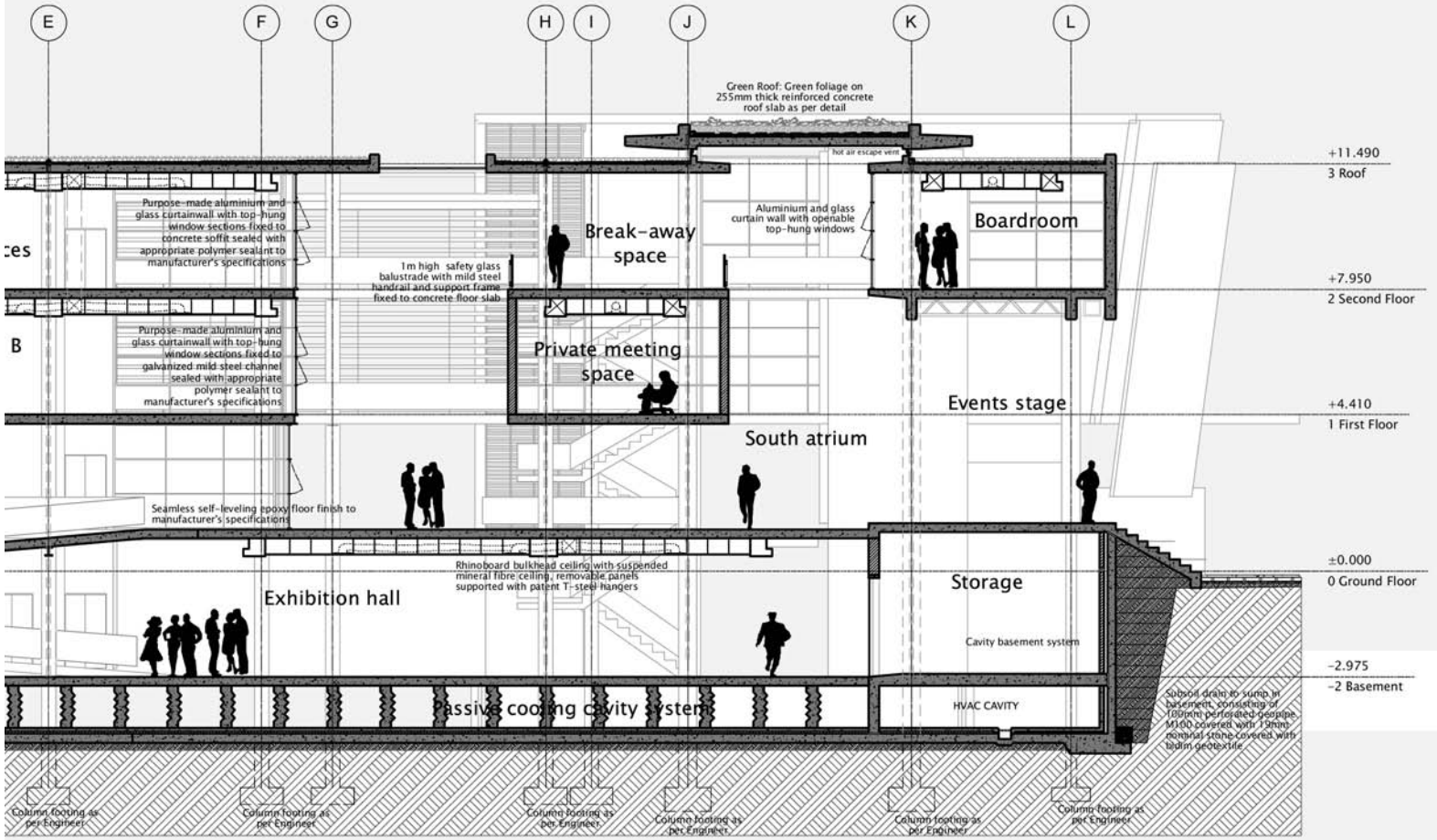
0 1 2 3 4 5 6

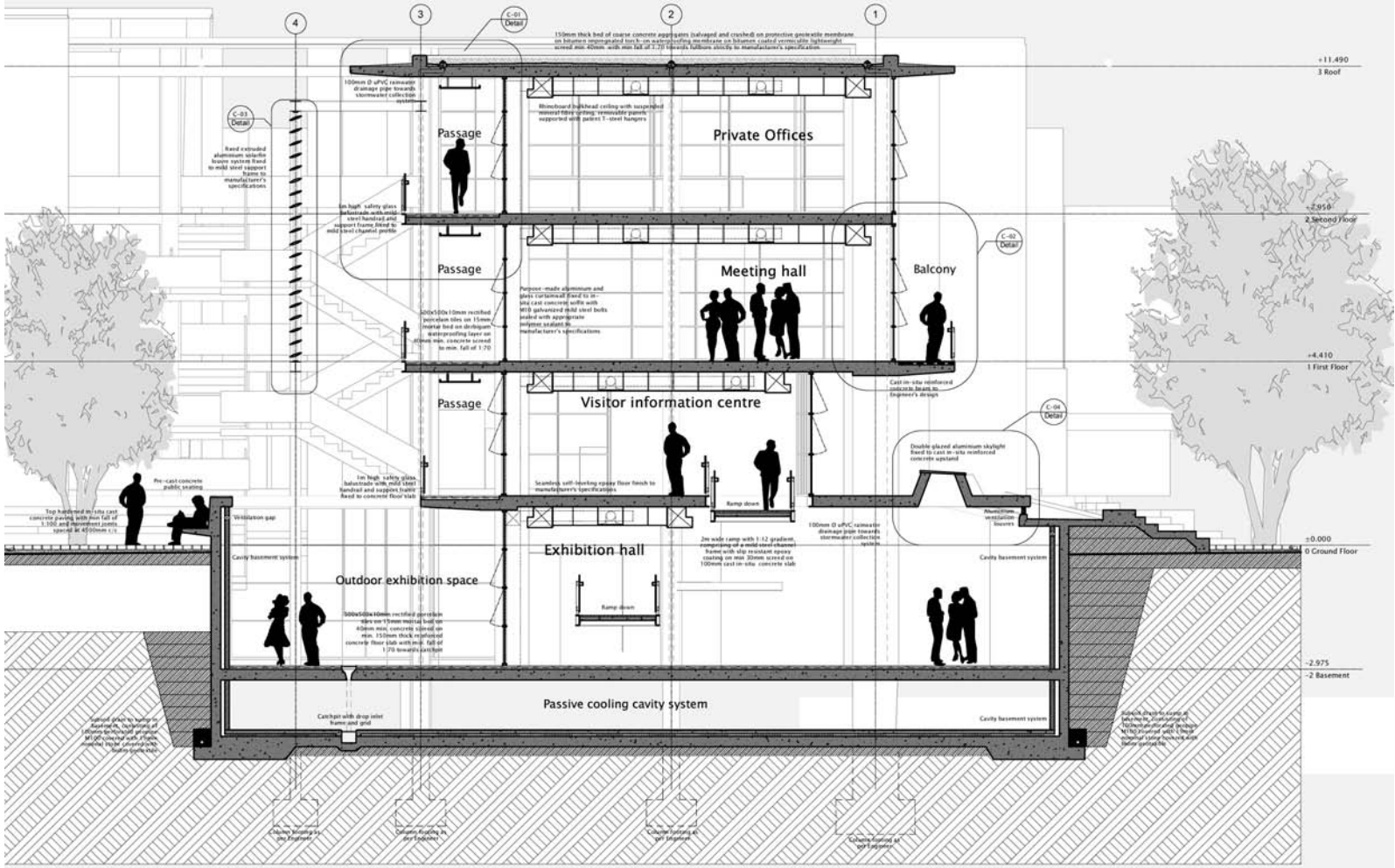

7
8
9
10
11
12
line indicating movement joint
Green Roof: Green foliage on earth fill layer on 150mm thick bed of coarse concrete aggregates (salvaged and crushed) on protective geotextile membrane on bitumen impregnated torch-on waterproofing membrane on bitumen coated vermiculite lightweight screed min 40mm with min fall of 1:70 towards fullbore strictly to manufacturer's specification
255mm reinforced concrete slab as light shell, with surface painted white
Rhinoboard bulkhead ceiling with suspended mineral fibre ceiling, removable panels supported with patent T-steel hangers
Offices
3,260
fixed extruded aluminium solarfin louvre system fixed to mild steel support frame to manufacturer's specifications
+11.490
3 Roof
+7.950
2 Second Floor
Purpose-made aluminium and glass curtainwall with top-hung window sections fixed to mild steel channel, sealed with appropriate polymer sealant to manufacturer's specifications
Rhinoboard bulkhead with suspended perforated linear aluminium ceiling with patent T-steel hangers support system
Language lab
rubber tiles on access floor
+4.410
1 First Floor
1.6m wide ramp with 1:12 gradient, comprising of a mild steel channel frame with slip resistant epoxy coating on min 30mm screed on 100mm cast in-situ concrete slab
1,500
Pre-cast concrete seating
Northern atrium
Perforated aluminium curved accoustic ceiling with patent T-steel hangers support system
Communication centre
±0.000
0 Ground Floor
NGL
Plant room
Lilliput sewage treatment system
Rainwater collection systems
Sump and pump with drop inlet frame and grid
HVAC air handling plant
Plant room
Municipal 3ph elec. and generator
Cavity basement system
Min. 200mm thick reinforced concrete floor slab with min fall of 1:70 towards sump
-2.975
-2 Basement
Column footing as per Engineer



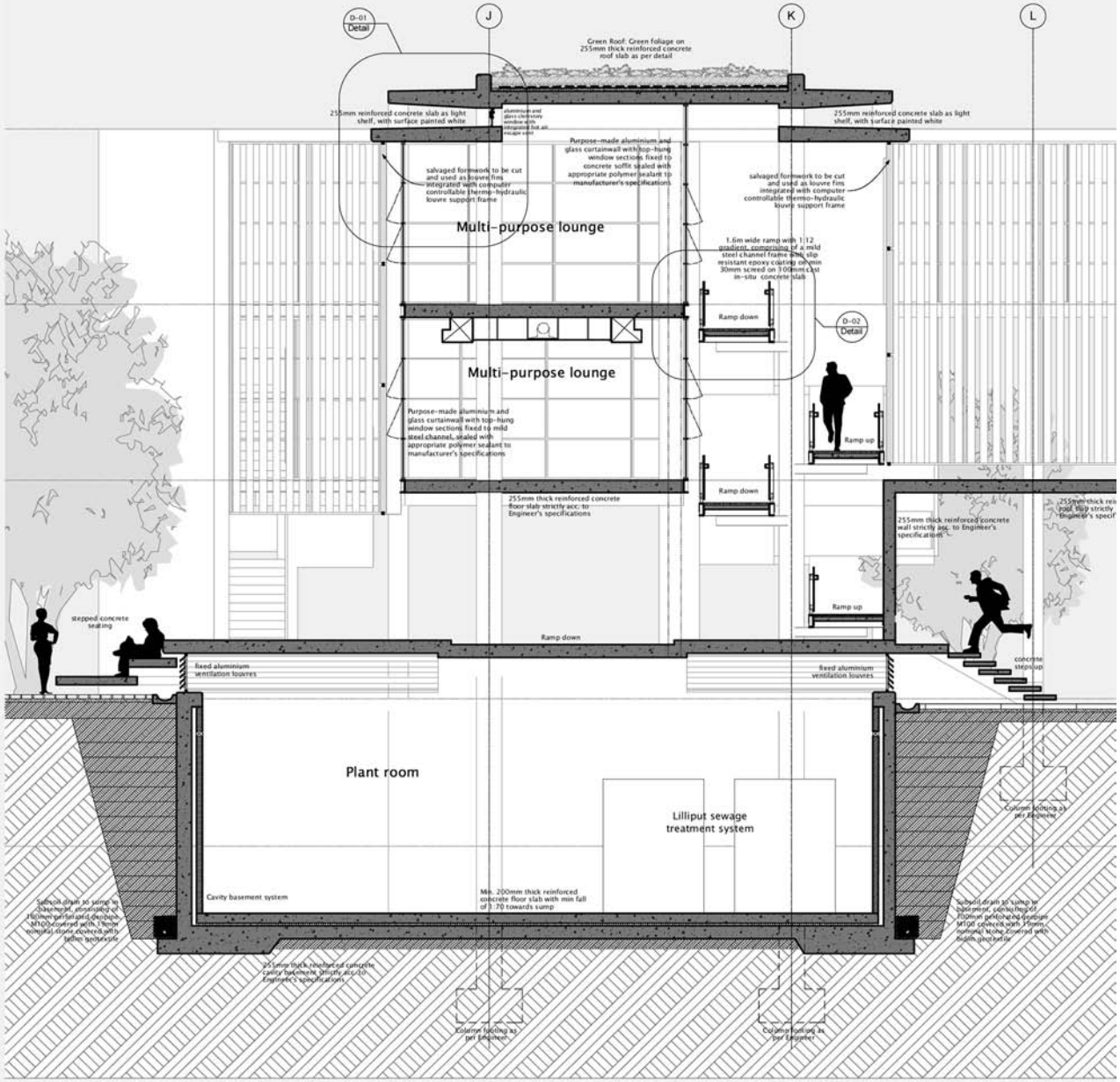
SECTION B-B

0 1 2 3 4 5 6


E
F
G
H
I
J
K
L
Green Roof: Green foliage on 255mm thick reinforced concrete roof slab as per detail
hot air escape vent
+11.490
3 Roof
Purpose-made aluminium and glass curtainwall with top-hung window sections fixed to concrete soffit sealed with appropriate polymer sealant to manufacturer's specifications
Break-away space
Aluminium and glass curtain wall with openable top-hung windows
Boardroom
1m high safety glass balustrade with mild steel handrail and support frame fixed to concrete floor slab
+7.950
2 Second Floor
Purpose-made aluminium and glass curtainwall with top-hung window sections fixed to galvanized mild steel channel sealed with appropriate polymer sealant to manufacturer's specifications
Private meeting space
Events stage
+4.410
1 First Floor
South atrium
Seamless self-leveling epoxy floor finish to manufacturer's specifications
Rhinoboard bulkhead ceiling with suspended mineral fibre ceiling, removable panels supported with patent T-steel hangers
±0.000
0 Ground Floor
Exhibition hall
Storage
Cavity basement system
-2.975
-2 Basement
HVAC CAVITY
Passive cooling cavity system
Subsoil drain to sump in basement, consisting of 100mm perforated pipe M100 covered with 19mm nominal stone covered with 160m geotextile
Column footing as per Engineer
Column footing as per Engineer
Column footing as per Engineer
Column footing as per Engineer
Column footing as per Engineer
Column footing as per Engineer

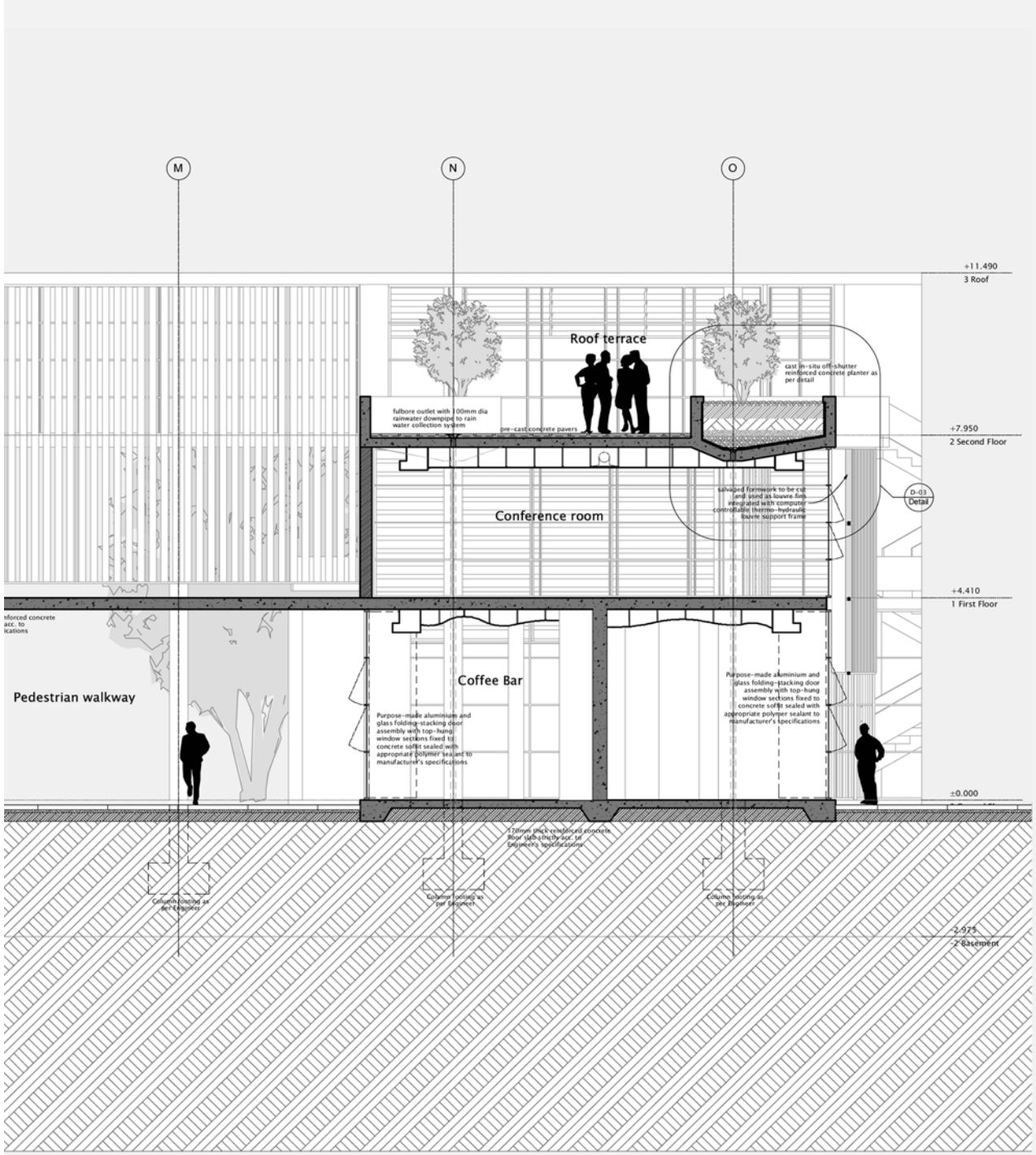

4
3
2
1
C-01 Detail
C-02 Detail
C-03 Detail
C-04 Detail
150mm thick bed of coarse concrete aggregates (salvaged and crushed) on protective geotextile membrane on bitumen impregnated torch-on waterproofing membrane on bitumen coated vermiculite lightweight screed min 40mm with min fall of 1:70 towards gutters strictly to manufacturer's specification
100mm Ø uPVC rainwater drainage pipe towards stormwater collection system
Rhinoboard bulkhead ceiling with suspended mineral fibre ceiling, removable panels supported with patent T-steel hangers
Passage
Private Offices
Rand extruded aluminium solarflo louvre system fixed to mild steel support frame to manufacturer's specifications
1m high safety glass balustrade with mild steel handrail and support frame fixed to mild steel channel profile
Passage
Meeting hall
Balcony
Purpose-made aluminium and glass curtainwall fixed to in-situ cast concrete soffit with M10 galvanized mild steel bolts sealed with appropriate polymer sealant to manufacturer's specifications
500x500x10mm rectified porcelain tiles on 15mm mortar bed on dribloam waterproofing layer on 40mm min. concrete screed to min. fall of 1:70
Cast in-situ reinforced concrete beam to Engineer's design
Passage
Visitor information centre
Double glazed aluminium skylight fixed to cast in-situ reinforced concrete upstand
Pre-cast concrete public seating
1m high safety glass balustrade with mild steel handrail and support frame fixed to concrete floor slab
Seamless self-leveling epoxy floor finish to manufacturer's specifications
Ramp down
Aluminium ventilation louvers
Top hardened in-situ cast concrete paving with min fall of 1:100 and movement joints spaced at 4500mm c/c
Weldmesh gate
Cavity basement system
Exhibition hall
2m wide ramp with 1:12 gradient, comprising of a mild steel channel frame with slip resistant epoxy coating on max 30mm screed on 100mm cast in-situ concrete slab
100mm Ø uPVC rainwater drainage pipe towards stormwater collection system
Cavity basement system
Outdoor exhibition space
500x500x10mm rectified porcelain tiles on 15mm mortar bed on 40mm min. concrete screed on min. 150mm thick reinforced concrete floor slab with min. fall of 1:70 towards catchpit
Ramp down
Passive cooling cavity system
Catchpit with drop inlet frame and grid
Cavity basement system
Column footing as per Engineer
Column footing as per Engineer
Column footing as per Engineer
Column footing as per Engineer
+11.490
3 Roof
+7.950
2 Second Floor
+4.410
1 First Floor
±0.000
0 Ground Floor
-2.975
-2 Basement

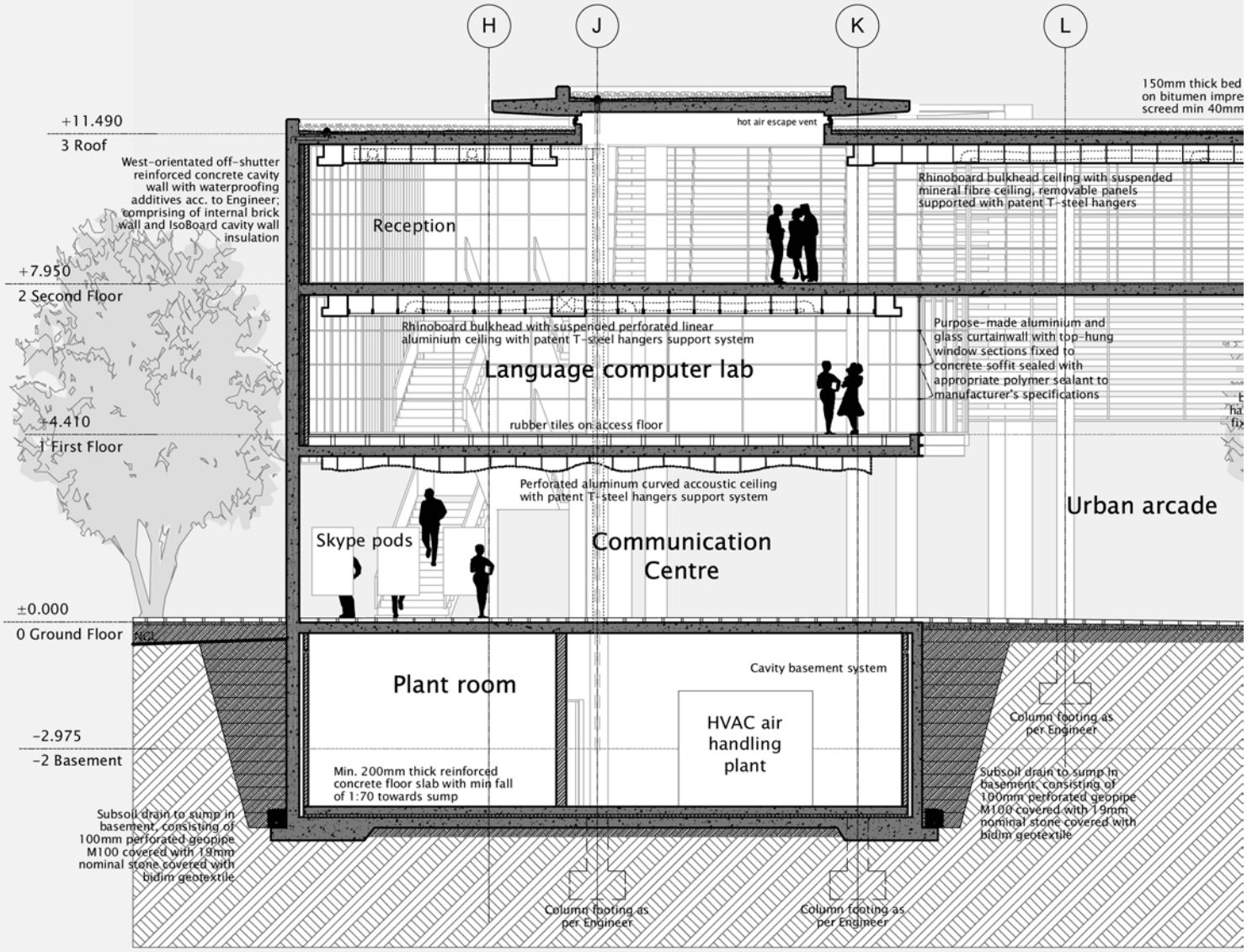
SECTION C-C



SECTION D-D

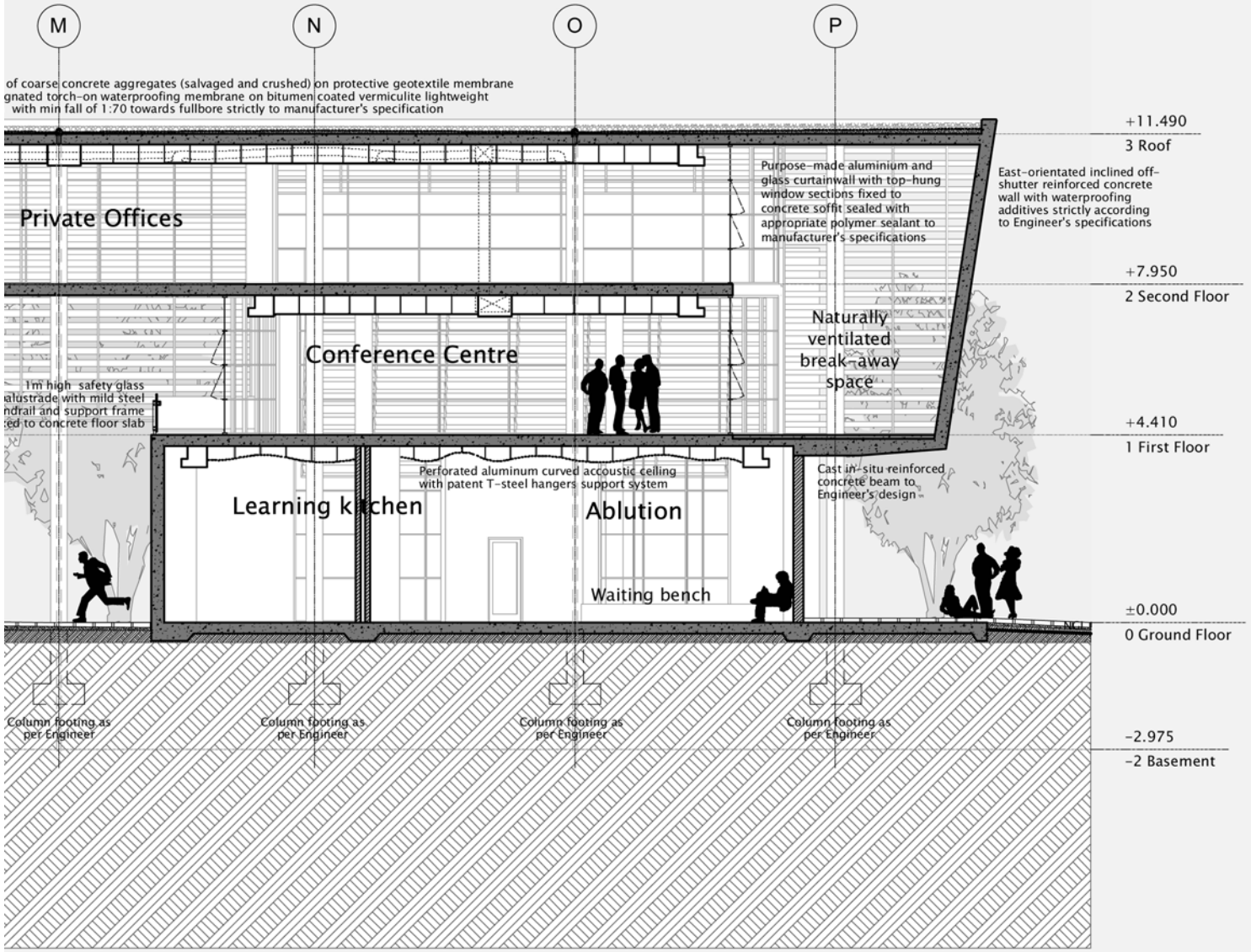
0 1 2 3 4 5 6

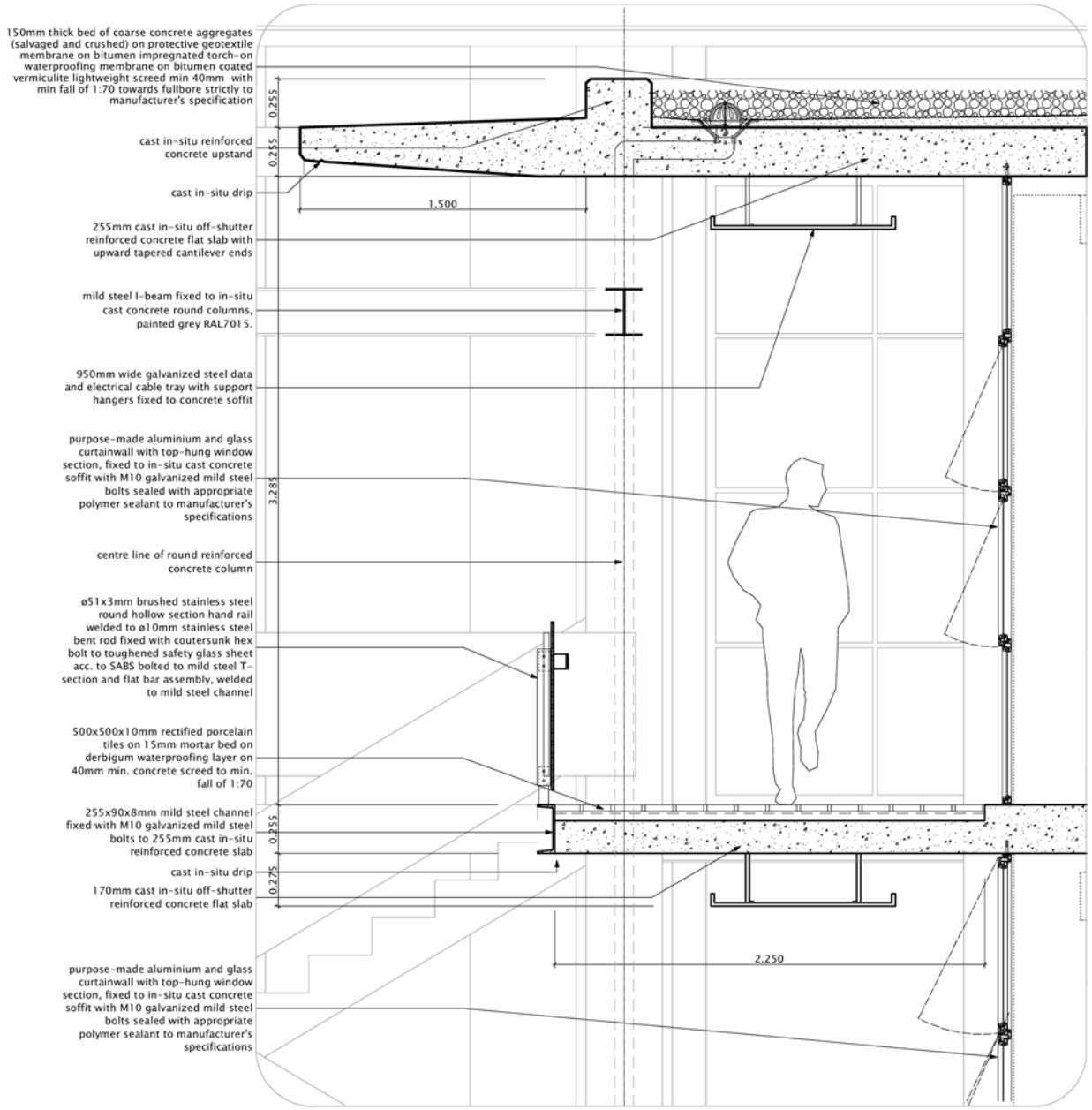

M
N
O
+11.490
3 Roof
Roof terrace
cast in-situ off-shutter reinforced concrete planter as per detail
fulbore outlet with 100mm dia rainwater downpipe to rain water collection system
pre-cast concrete pavers
+7.950
2 Second Floor
salvaged formwork to be cut and used as louvre fins integrated with computer controllable thermo-hydraulic louvre support frame
D-03
Detail
Conference room
+4.410
1 First Floor
Pedestrian walkway
Coffee Bar
Purpose-made aluminium and glass folding-stacking door assembly with top-hung window sections fixed to concrete soffit sealed with appropriate polymer sealant to manufacturer's specifications
Purpose-made aluminium and glass folding-stacking door assembly with top-hung window sections fixed to concrete soffit sealed with appropriate polymer sealant to manufacturer's specifications
±0.000
-2.975
2 Basement



SECTION E-E

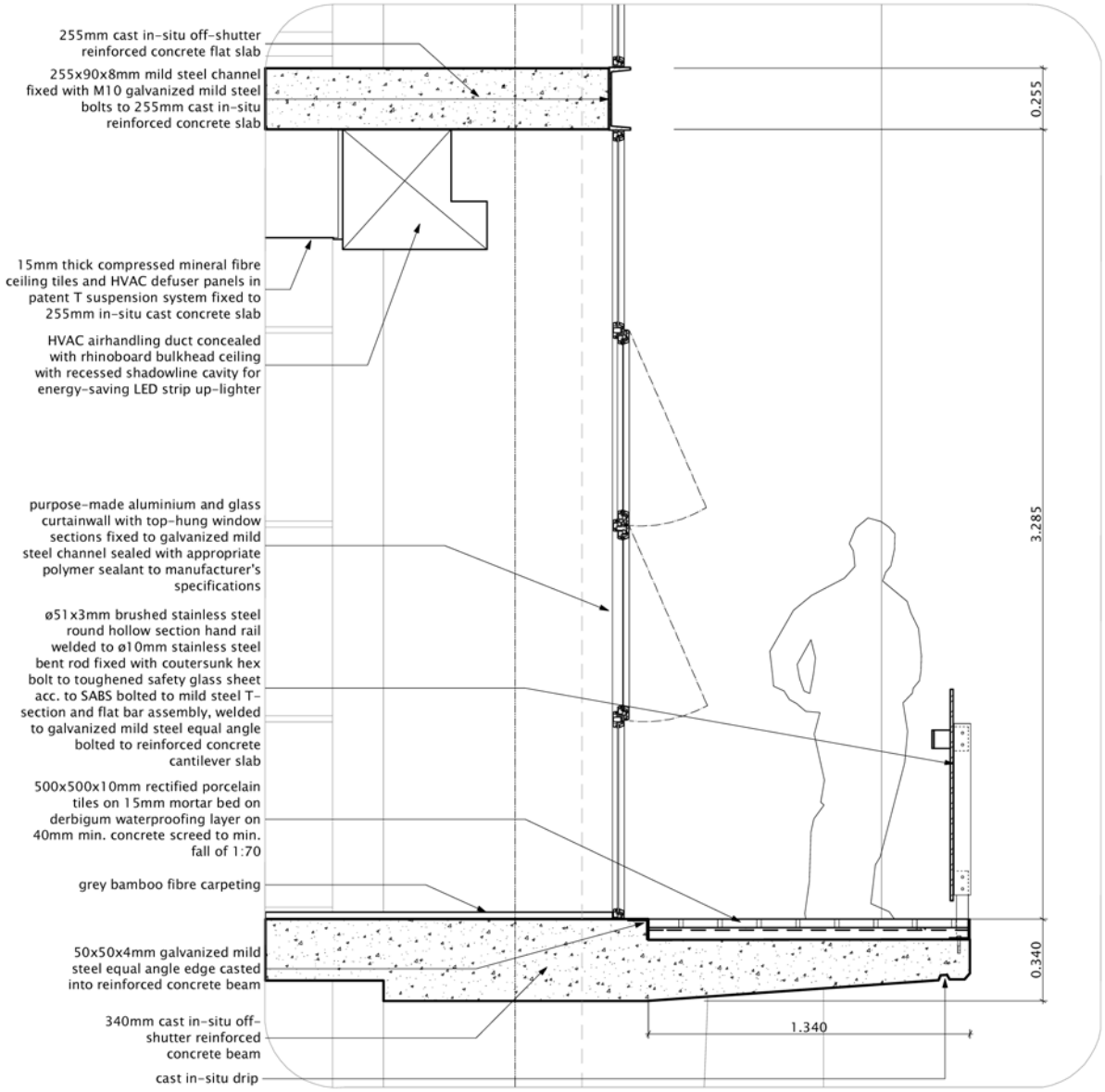
0 1 2 3 4 5 6





Detail C-01

SCALE 1:20



Detail C-02

SCALE 1:20

28mm double glazed aluminium skylight comprising of 6mm clear toughened outer pane, 16mm airspace with black spacer and 6mm clear 'low E' toughened inner pane, with factory applied silicone weather seal. Centre pane U-value achieved = 1.7W/m k

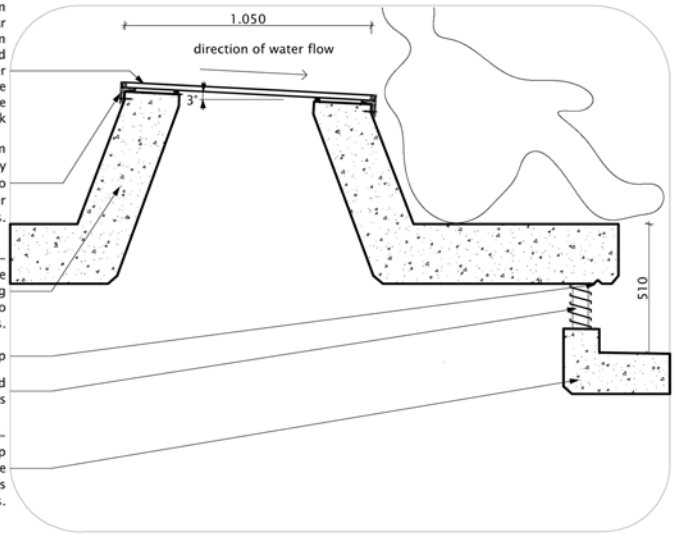
Polyester powder coated aluminium frame. Standard colour (grey RAL7015) in matt finish. Fixed to concrete upstand as per manufacturer's specifications.

200mm thick cast in-situ off-shutter reinforced concrete upstand with waterproofing additive strictly acc. to Engineer's specifications.

cast in-situ drip

100mm powder coated aluminium ventilation louvres

200mm thick cast in-situ off-shutter reinforced concrete ramp with waterproofing additive strictly acc. to Engineer's specifications.



Detail C-04

SCALE 1:10

Green Roof: Green foliage layer on 150mm thick earth fill layer on 150mm thick bed of coarse to medium concrete aggregates (salvaged and crushed) on protective geotextile membrane on bitumen impregnated torch-on waterproofing membrane on bitumen coated vermiculite lightweight screed min 40mm with min fall of 1:70 towards fullbore strictly to manufacturer's specification

cast in-situ reinforced concrete upstand

340mm cast in-situ off-shutter reinforced concrete beam with soffit painted white strictly acc. to Engineer's specifications

cast in-situ drip

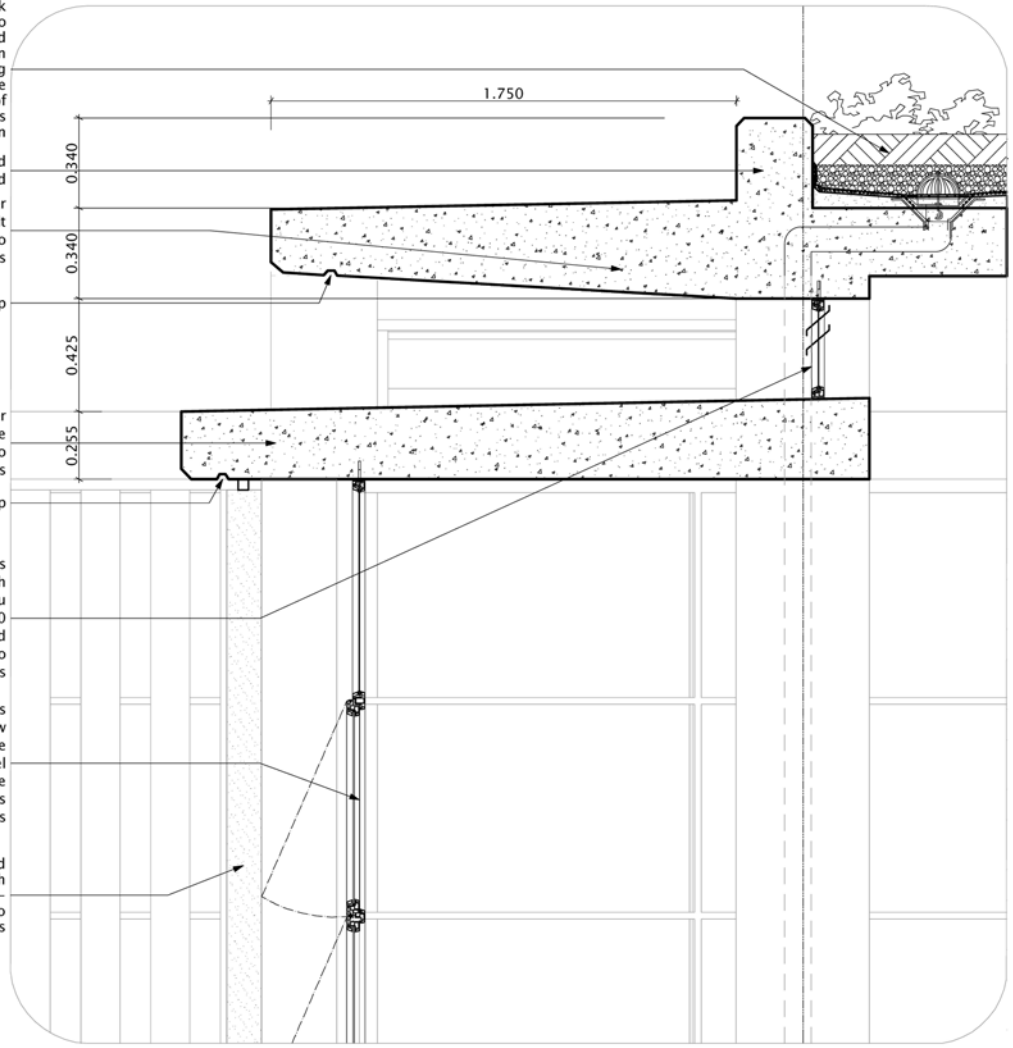
255mm cast in-situ off-shutter reinforced concrete slab with surface painted white strictly acc. to Engineer's specifications

cast in-situ drip

purpose-made aluminium and glass fixed clerestory window with ventilation louvres, fixed to in-situ cast concrete soffit with M10 galvanized mild steel bolts sealed with appropriate polymer sealant to manufacturer's specifications

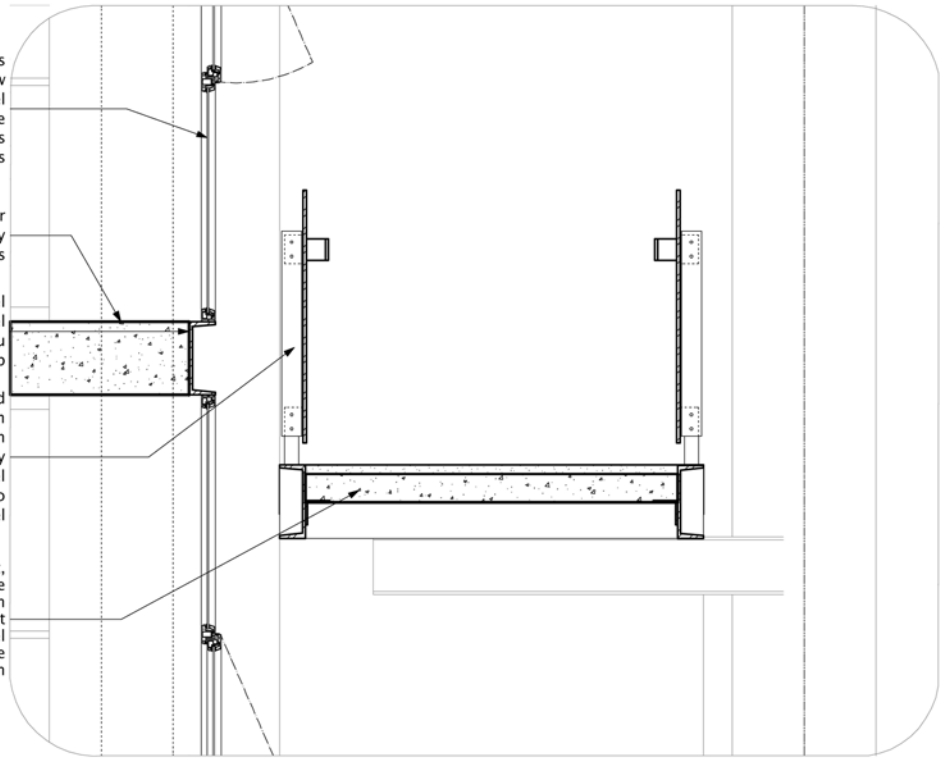
purpose-made aluminium and glass curtainwall with top-hung window section, fixed to in-situ cast concrete soffit with M10 galvanized mild steel bolts sealed with appropriate polymer sealant to manufacturer's specifications

salvaged formwork to be cut and used as louvre fins integrated with computer controllable thermo-hydraulic louvre support frame to manufacturer's specifications



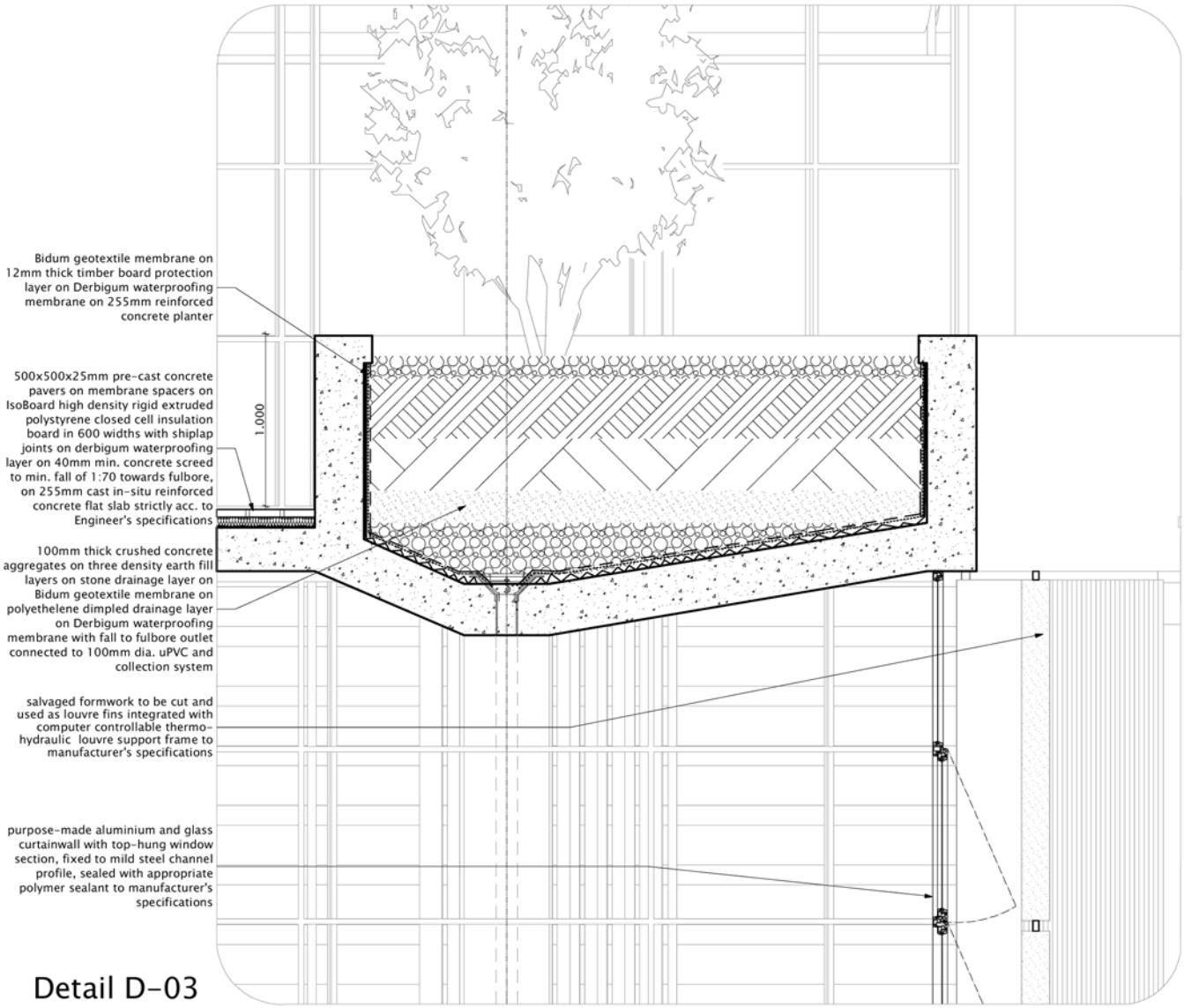
Detail D-01

SCALE 1:20



Detail D-02

SCALE 1:20



Detail D-03

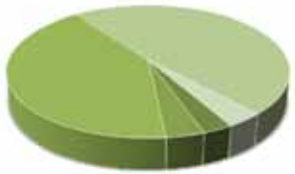
SCALE 1:20

Addendum B – Accommodation Schedule

Space required	Occupancy			Size (m²)	Ventilation Method	Light (lux)
	Class *	Population *				
		Required	Provided			
BASEMENT						BASEMENT
Exhibition hall	C1	1 person/10m²	98	975	Natural / Mechanical	300
Storage	J3	1 person/50m²	2	88	Mechanical	150
Plant room	D4	n/a	n/a	552	Natural	300
Ablutions	C1	Male: 1 WC, 1 U, 1 HWB	Male: 3 WC, 4 U, 3 HWB	67	Mechanical	150
		Female: 2 WC, 1 HWB	Female: 6 WC, 3 HWB			
Total area				1682		
GROUND FLOOR						GROUND FLOOR
South atrium	n/a	n/a	n/a	278	Natural	150
Events Stage	C1	1 person/10m²	6	63	Natural	300
Visitor information centre	C1	1 person/10m²	13	130	Natural / Mechanical	300
Systems control room	J3	1 person/50m²	1	72	Natural / Mechanical	500
Communication centre	A3	1 person/5m²	33	165	Natural	300
North atrium	n/a	n/a	n/a	78	Natural	150
Coffee Bar	A1	no. of seats	64	240	Natural / Outdoors	300
Learing kitchen	D3	1 person/15m²	4	63	Natural / Mechanical	500
Circulation	n/a	n/a	n/a	555	Natural	300
Ablutions (Main)	A1;A3;C1	Male: 3 WC, 3 U, 3 HWB	Male: 3 WC, 4 U, 3 HWB	67	Natural	150
		Female: 6 WC, 3 HWB	Female: 6 WC, 3 HWB			
Ablutions (Café)	A1;G1	Male: 2 WC, 1 U, 2 HWB	Unisex: 6 WC, 6 HWB	37	Natural	150
		Female: 3 WC, 2 HWB				
Total area				1748		
Urban plaza	A1	1 person/m²	570	570	Outdoors	
FIRST FLOOR						FIRST FLOOR
Meeting hall	G1	1 person/15m²	26	393	Natural / Mechanical	500
Private meeting room	G1	1 person/15m²	2	32	Natural / Mechanical	500
Education theatre	A2	no. of fixed seats	63	80	Mechanical	300
Multi-purpose lounge	G1	1 person/15m²	3	46	Natural / Mechanical	300
Language labs	A3	1 person/5m²	32	160	Natural / Mechanical	300
Conference Centre	G1	1 person/15m²	24	367	Natural / Mechanical	500
Circulation	n/a	n/a	n/a	412	Natural	300
Ablutions	A2;A3;G1	Male: 3 WC, 3 U, 3 HWB	Male: 3 WC, 4 U, 3 HWB	67	Natural	150
		Female: 6 WC, 3 HWB	Female: 6 WC, 3 HWB			
Total area				1557		
SECOND FLOOR						SECOND FLOOR
Private offices	G1	1 person/15m²	51	766	Natural / Mechanical	500
Break space	G1	1 person/15m²	2	32	Natural	300
Boardroom	G1	1 person/15m²	5	76	Natural / Mechanical	500
Multi-purpose lounge	G1	1 person/15m²	3	46	Natural / Mechanical	300
Roof Terrace	n/a	1 person/5m²	38	190	Outdoors	-
Circulation	n/a	n/a	n/a	327	Natural	300
Ablutions	G1	Male: 2 WC, 3 U, 2 HWB	Male: 3 WC, 4 U, 3 HWB	67	Natural	150
		Female: 5 WC, 3 HWB	Female: 6 WC, 3 HWB			
Total area				1504		
Total building area				6491		

* Reference: SABS 0400 - 1990

7.26

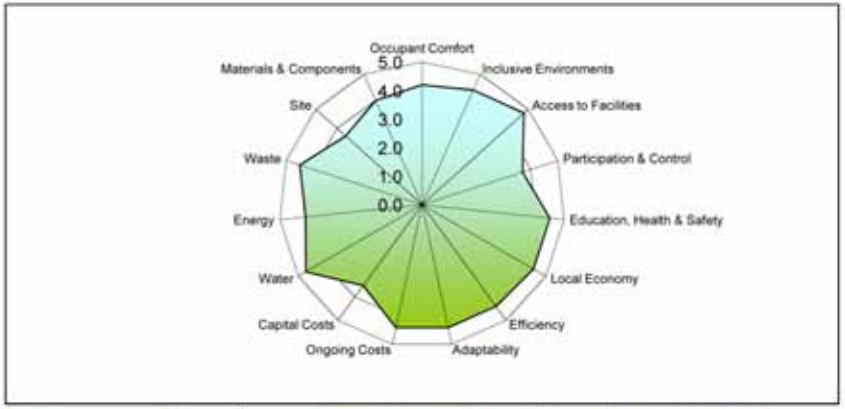


Building area (m²)	Ventilation method	% of total m³
190	Outdoors	3%
240	Natural / Outdoors	4%
2700	Natural	42%
3126	Natural / Mechanical	48%
235	Mechanical	4%

Addendum C – Baseline Study

SBAT – sustainable building assessment tool

The objective of the tool is to provide an indication of the performance of a building or the design of a building in terms of sustainability. (SBAT, Jeremy Gibberd, CSIR, 2007.)



7.27

Social	4.3	Economic	4.2	Environmental	4.2

Overall	4.2

Building Performance - Social

	Criteria	Indicative performance measure	Measured	Points
SO 1	**Occupant Comfort**		Explanatory notes	4.2
SO 1.1	Daylighting	% of occupied spaces that are within distance 2H from window, where H is the height of the window or where there is good daylight from skylights	80	0.9
SO 1.2	Ventilation	% of occupied spaces have equivalent of opening window area equivalent to 10% of floor area or adequate mechanical system, with unpolluted air source	80	0.8
SO 1.3	Noise	% of occupied spaces where external/internal/reverberation noise does not impinge on normal conversation (50dbA)	70	0.7
SO 1.5	Thermal comfort	Temperature of occupied space does not exceed 28 or go below 19oC for less than 5 days per year (100%)	90	0.9
SO 1.5	Views	% of occupied space that is 6m from an external window (not a skylight) with a view	90	0.9
SO 2	**Inclusive Environments**		Explanatory notes	4.4
SO 2.1	Public Transport	% of building (s) within 400m of disabled accessible (20%) and affordable (80%) public transport	70	0.7
SO 2.2	Information	Comprehensive signage provided (50%). Signage high contrast, clear print signage in appropriate locations and language(s) / use of understandable symbols / manned reception at all entrances (50%)	80	0.8
SO 2.3	Space	% of occupied spaces that are accessible to ambulant disabled / wheelchair users	90	0.9
SO 2.4	Toilets	% of occupied space with fully accessible toilets within 50m along easily accessible route	100	1.0
SO 2.5	Fittings & Furniture	% of commonly used furniture and fittings (reception desk, kitchenette, auditorium) fully accessible	100	1.0
SO 3	**Access to Facilities**		Explanatory notes	4.8
SO 3.1	Children	All users can walk (100%) / use public transport (50%) to get to their childrens' schools and creches	80	0.8
SO 3.2	Banking	All users can walk (100%) / use public transport (50%) to get to banking facilities	100	1.0
SO 3.3	Retail	All users can walk (100%) / use public transport (50%) to get to food retail	100	1.0
SO 3.4	Communication	All users can walk (100%) / use public transport (50%) to get to communication facilities (post/telephone/internet)	100	1.0
SO 3.5	Exercise	All users can walk (100%) / use public transport (50%) to get to recreation/excercise facilities	100	1.0
SO 4	**Participation & Control**		Explanatory notes	3.7
SO 4.1	Environmental control	% of occupied space able to control their thermal environment (adjacent to openable windows/thermal controls)	70	0.7
SO 4.2	Lighting control	% of occupied space able to control their light (adjacent to controllable blinds etc/local lighting control)	80	0.8
SO 4.3	Social spaces	Social informal meeting spaces (parks / staff canteens / cafes) provided locally (within 400m) (100%)	100	1.0
SO 4.4	Sharing facilties	5% or more of facilities shared with other users / organisations on a weekly basis (100%)	70	0.7
SO 4.5	User group	Users actively involved in the design process (50%) / Active and representative management user group (50%)	50	0.5
SO 5	**Education, Health & Safety**		Explanatory notes	4.5
SO 5.1	Education	Two percent or more space/facilities available for education (seminar rooms / reading / libraries) per occupied space (75%). Construction training provided on site (25%)	80	0.8
SO 5.2	Safety	All well used routes in and around building well lit (25%), all routes in and around buildings visually supervised (25%), secure perimeter and access control (50%). No crime (100%)	90	0.9
SO 5.3	Awareness	% of users who can access information on health & safety issues (ie HIV/AIDS), training and employment opportunities easily (posters/personnel/intranet site)	80	0.8
SO 5.4	Materials	All materials/components used have no negative effects on indoor air quality (100%)	100	1.0
SO 5.5	Accidents	Process in place for recording all occupational accidents and diseases and addressing these	100	1.0

Building Performance - Economic

	Criteria	Indicative performance measure	Measured	Points
EC 1	**Local economy**	Explanatory notes		4.5
EC 1.1	Local contractors	% value of the building constructed by local (within 50km) small (employees<20) contractors	70	0.7
EC 1.2	Local materials	% of materials (sand, bricks, blocks, roofing material) sourced from within 50km	80	0.8
EC 1.3	Local components	% of components (windows, doors etc) made locally (in the country)	100	1.0
EC 1.4	Local furniture/fittings	% of furniture and fittings made locally (in the country)	100	1.0
EC 1.5	Maintenance	% of maintenance and repairs by value that can, and are undertaken, by local contractors (within 50km)	100	1.0
EC 2	**Efficiency**	Explanatory notes		4.4
EC 2.1	Capacity	% capacity of building used on a daily basis (actual number of users / number of users at full capacity*100)	90	0.9
EC 2.2	Occupancy	% of time building is occupied and used (actual average number of hours used / all potential hours building could be used (24) *100)	80	0.8
EC 2.3	Space per occupant	Space provision per user not more than 10% above national average for building type (100%)	80	0.8
EC 2.4	Communication	Site/building has access to internet and telephone (100%), telephone only (50%)	100	1.0
EC 2.5	Material & Components	Building design coordinated with material / component sizes in order to minimise wastage. Walls (50%), Roof and floors (50%)	90	0.9
EC 3	**Adaptability**	Explanatory notes		4.7
EC 3.1	Vertical heights	% of spaces that have a floor to ceiling height of 3000mm or more	100	1.0
EC 3.2	External space	Design facilitates flexible external space use (100%)	80	0.8
EC 3.3	Internal partition	Non loadbearing internal partitions that can be easily adapted (loose partioning (100%), studwall (50%), masonary (25%)	90	0.9
EC 3.4	Modular planning	Building with modular stucture, envelope (fenestration) & services allowing easly internal adaptaptation (100%)	100	1.0
EC 3.5	Furniture	Modular, limited variety furniture - can be easily configured for different uses (100%)	100	1.0
EC 4	**Ongoing costs**	Explanatory notes		4.4
EC 4.1	Induction	All new users receive induction training on building systems (50%), Detailed building user manual (50%	70	0.7
EC4.2	Consumption & waste	% of users exposed on a monthly basis to building performance figures (water (25%), electricity (25%), waste (25%), accidents (25%)	80	0.8
EC 4.2	Metering	Easily monitored localised metering system for water (50%) and energy (50%)	100	1.0
EC4.3	Maintenance & Cleaning	% of building that can be cleaned and maintained easily and safely using simple equipment and local non-hazardous materials	100	1.0
SO 4.5	Procurement	% of value of all materials/equipment used in the building on a daily basis supplied by local (within the country) manufacturers	90	0.9
EC 5	**Capital Costs**	Explanatory notes		3.5
EC 5.1	Local need	Five percent capital cost allocated to address urgent local issues (employment, training etc) during construction process (100%)	60	0.8
EC5.2	Procurement	Tender / construction packaged to ensure involvement of small local contractors/manufacturers (100%)	60	0.8
EC 5.3	Building costs	Capital cost not more than fifteen % above national average building costs for the building type (100%)	70	0.7
EC5.4	Technology	3% or more of capital costs allocated to new sustainable/indigenous technology (100%)	90	0.9
EC 5.5	Existing Buildings	Existing buildings reused (100%)	30	0.3

Building Performance - Environmental

	Criteria	Indicative performance measure	Measured	Points
EN 1	**Water**	Explanatory notes		4.7
EN 1.1	Rainwater	% of water consumed sourced from rainwater harvested on site	90	0.9
EN 1.2	Water use	% of equipment (taps, washing machines, urinals showerheads) that are water efficient	100	1.0
EN 1.3	Runoff	% of carparking, paths, roads and roofs that have absorbant/semi absorbant/permeable surfaces (grassed/thatched/looselaid paving/ absorbant materials)	80	0.8
EN 1.4	Greywater	% of water from washing/relatively clean processes recycled and reused	100	1.0
EN 1.5	Planting	% of planting (other than food gardens) on site with low / appropriate water requirements	100	1.0
EN 2	**Energy**	Explanatory notes		4.1
EN 2.1	Location	% of users who walk / cycle / use public transport to commute to the building	80	0.8
EN 2.2	Ventilation	% of building ventilation requirements met through natural / passive ventilation	90	0.9
EN 2.3	Heating & Cooling	% of occupied space which relies solely on passive environmental control (no or minimal energy consumption)	70	0.7
EN 2.4	Appliances & fittings	% of appliances / lighting fixtures that are classed as highly energy efficient (ie energy star rating)	100	1.0
EN 2.5	Renewable energy	% of building energy requirements met from renewable sources	70	0.7
EN 3	**Waste**	Explanatory notes		4.5
EN 3.1	Toxic waste	% of toxic waste (batteries, ink cartridges, flourescent lamps) recycled	100	1.0
EN 3.2	Organic waste	% of organic waste recycled	80	0.8
EN 3.3	Inorganic waste	% of inorganic waste recycled.	80	0.8
EN 3.4	Sewerage	% of sewerage recycled on site	100	1.0
EN 3.5	Construction waste	% of damaged building materials / waste developed in construction recycled on site	90	0.9
EN 4	**Site**	Explanatory notes		3.6
EN 4.1	Brownfield site	% of proposed site already disturbed / brownfield (previously developed)	100	1.0
EN 4.2	Neighbouring buildings	No neighbouring buildings negatively affected (access to sunlight, daylight, ventilation) (100%)	100	1.0
EN 4.3	Vegetation	% of area of area covered in vegetation (include green roofs, internal planting) relative to whole site	60	0.6
EN 4.4	Food gardens	Food gardens on site (100%)	0	0.0
EN 4.5	Landscape inputs	% of landscape that does not require mechanical equipment (ie lawn cutting) and or artificial inputs such as weed killers and pesticides	100	1.0
EN 5	**Materials & Components**	Explanatory notes		4.0
EN 5.1	Embodied energy	Materials with high embodied energy (aluminium,plastics) make up less than 1% of weight of building (100%)	80	0.8
EN 5.2	Material sources	% of materials and components by volume from grown sources (animal/plant)	50	0.5
EN 5.3	Ozone depletion	No materials and components used requiring ozone depleting processes (100%)	100	1.0
EN 5.4	Recyled / reuse	% of materials and components (by weight) reused / from recycled sources	80	0.8
EN 5.5	Construction process	Volume / area of site disturbed during construction less than 2X volume/area of new building (100%)	90	0.9

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"I think of my proposals, for example, as a blueprint, not an edifice. But I have tried to make my argument clear, and I should be very interested to know what are its refutations; for that is how conversation begins. Perhaps we do not require a new 'movement' after all. Only a good conversation."
(Postman, 1979: p.42)

ROALD MEYER
November 2008

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UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

talkspace"

among infill and void