

LEEUBRUG GATEWAY

an exhibition and convention centre

The world is currently experiencing an economical and environmental crisis. Innovative thinkers are now more than ever our hope for a brighter future.

The goal of this study is to establish an Exhibition and Conference Centre in Pretoria. The centre should educate its users about the potential opportunities of creative and innovative thinking.

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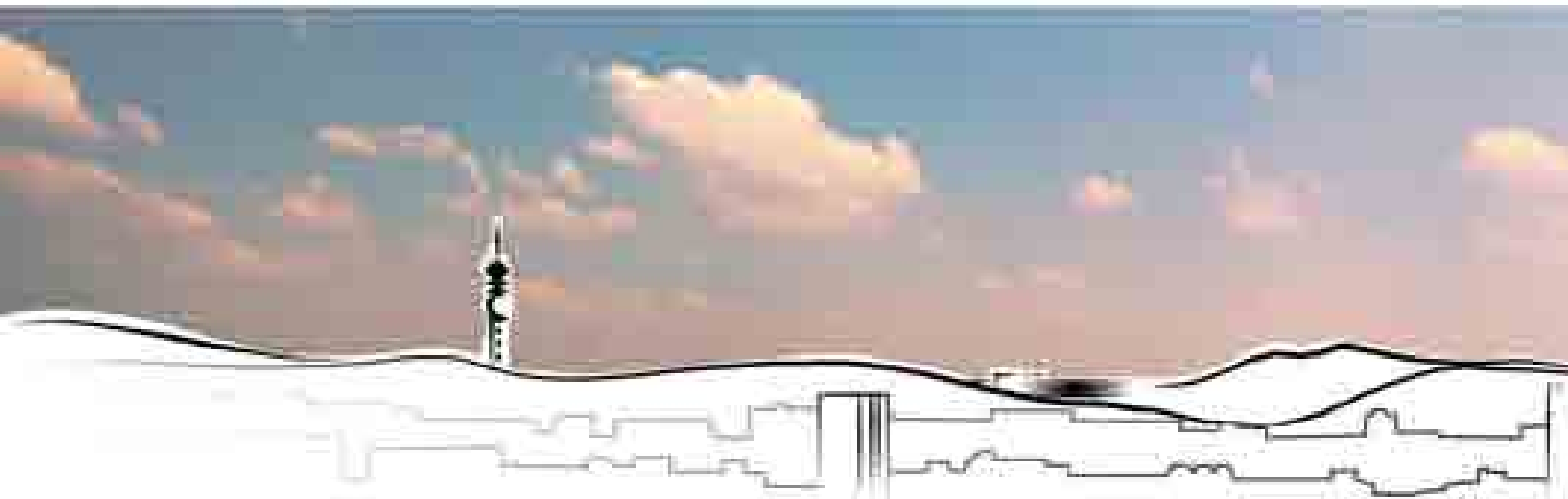
Course Co-ordinator: Jacques Laubscher

Submitted in partial fulfilment of the requirements for the degree Magister in Architecture (Professional) in the Faculty of Engineering, Built Environment and Information Technology, University of Pretoria, 2009

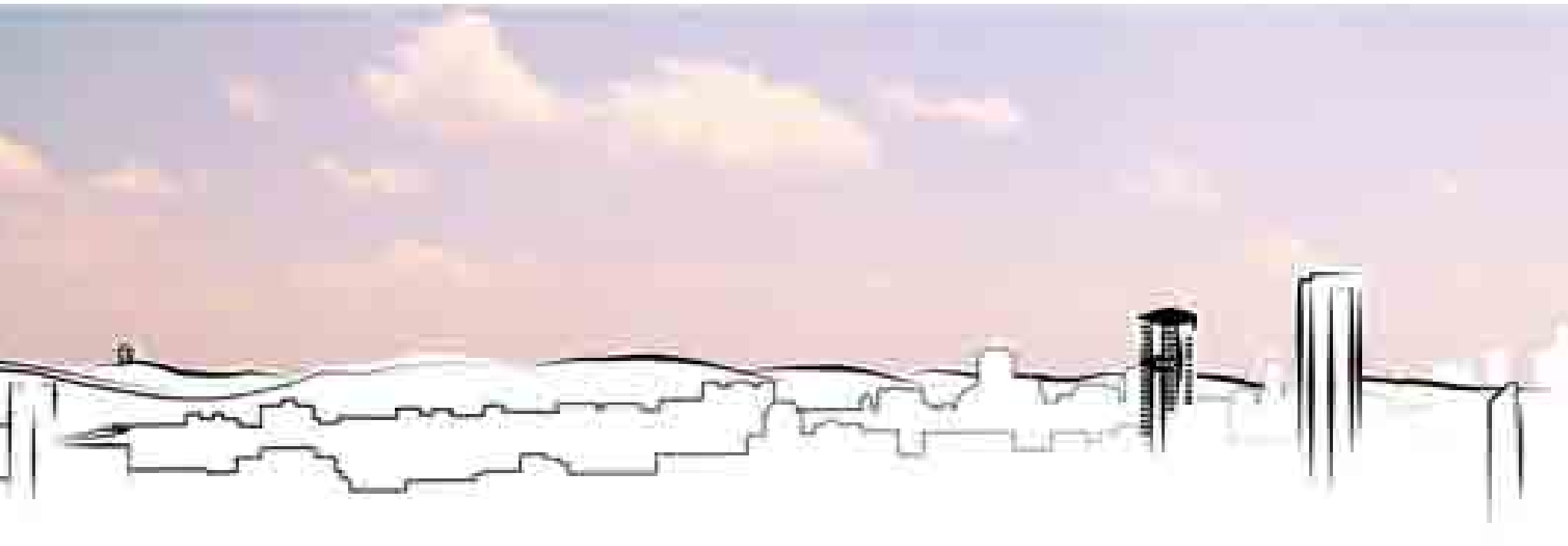
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The Proposed Tshwane Exhibition and Conference Centre is situated on the c/o Nelson Mandela Boulevard and Church Street, Arcadia, Pretoria, and falls under the research field of Housing and Urban Environments

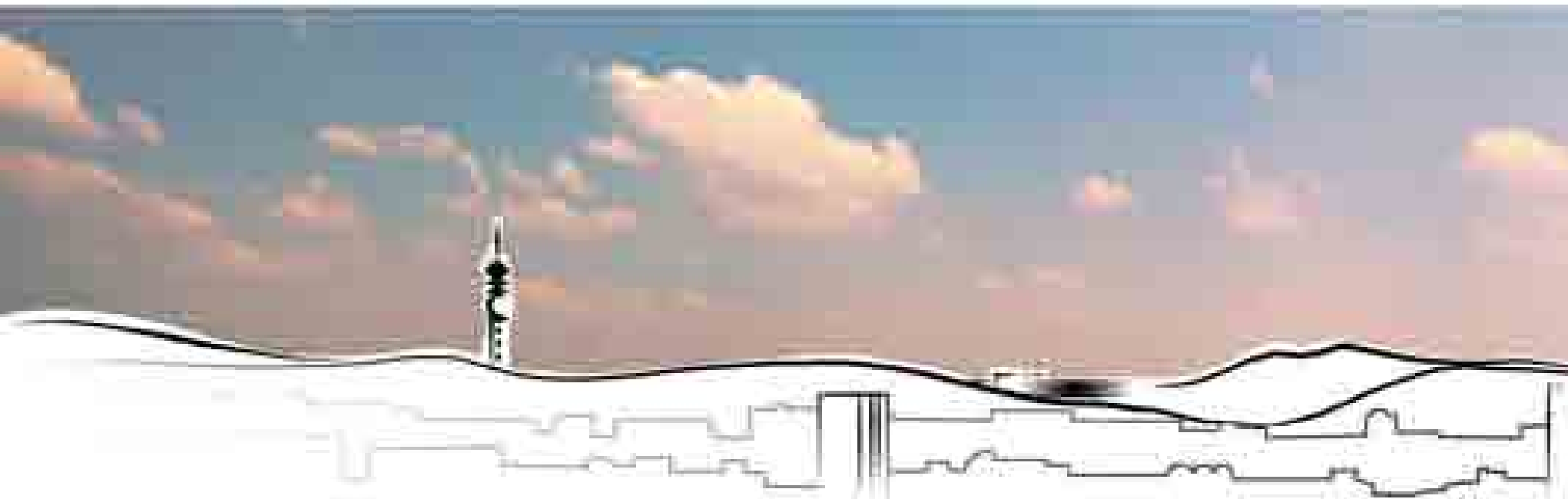


Contents

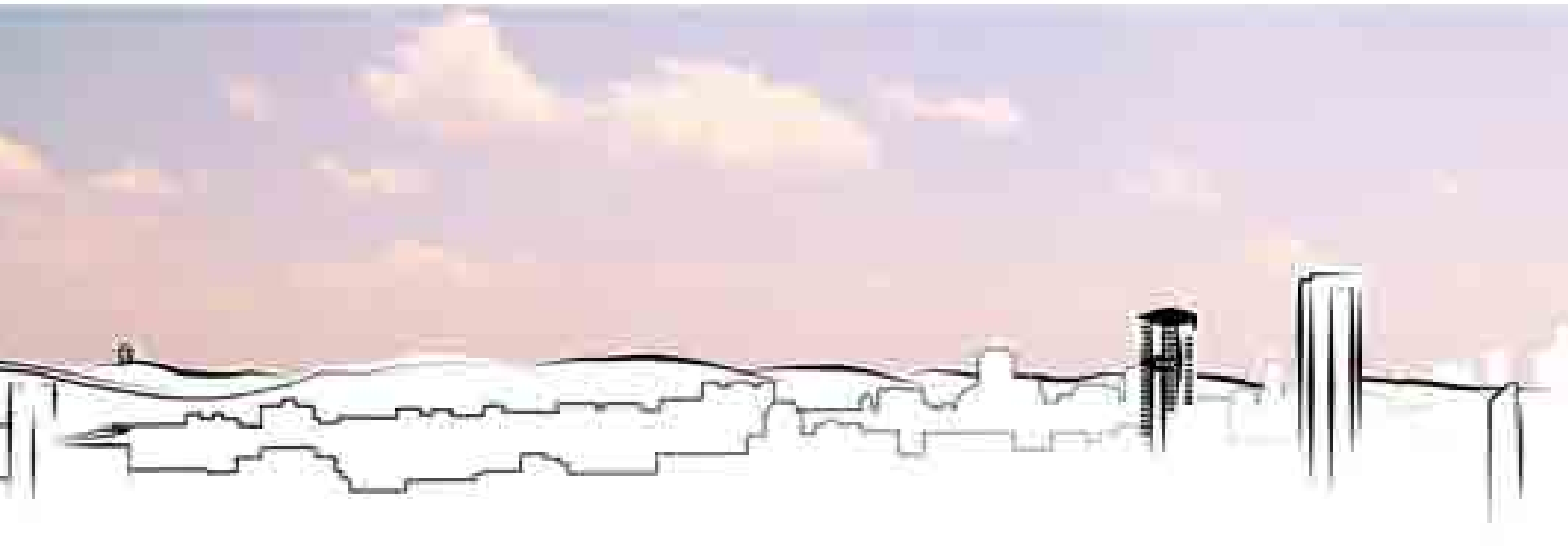


| | | |
|--------------------------------|---------------------|-------|
| List of figures | | pg xi |
| Introduction and background | | pg 1 |
| Project proposal and rationale | _Problem statement | pg 5 |
| | _Opportunities | |
| | _Client profile | |
| | _User profile | |
| | _Project proposal | |
| Context and the site | _Analysis theory | pg 13 |
| | _Precedents | |
| | _Group framework | |
| | _Site proposal | |
| | _Site analysis | |
| | _Historical context | |

| | | |
|--------------------------------|----------------------------|--------|
| Design concept and development | _Design theory | pg 43 |
| | _Precedents | |
| | _Design development | |
| | _Sketch proposal | |
| Technical development | _Stereotomic investigation | pg 133 |
| | _Tectonic investigation | |
| | _Materials | |
| Conclusion | | pg 143 |
| Bibliography | | pg 147 |
| Addendum | | pg 153 |



List of figures



| | |
|---|----|
| Fig. 1 mossy stones by dadimax from www.flickr.com | 3 |
| Fig. 2 image by author | 6 |
| Fig. 3 collage by author | 9 |
| Fig. 4 business man by slipper buddha from www.flickr.com | 9 |
| Fig. 5 image by author | 10 |
| Fig. 6 image by author | 14 |
| Fig. 9 image by author | 14 |
| Fig. 7 image by author | 14 |
| Fig. 8 image by author | 14 |
| Fig. 10 image by author | 15 |
| Fig. 11 image by author | 15 |
| Fig. 12 image by author | 16 |
| Fig. 13 image by author | 16 |
| Fig. 14 image by author | 17 |
| Fig. 15 image by author | 17 |
| Fig. 16 image by author | 17 |
| Fig. 17 image by author | 18 |
| Fig. 18 image by author | 18 |
| Fig. 19 image by author | 18 |
| Fig. 20 image by author | 19 |

| | |
|---|----|
| Fig. 21 image by author | 19 |
| Fig. 22 image by author | 19 |
| Fig. 23 image by lize gerneke from group1 framework | 20 |
| Fig. 24 image by author | 21 |
| Fig. 25 image by author | 22 |
| Fig. 26 image by author | 23 |
| Fig. 27 image by chris sparks from group1 framework | 23 |
| Fig. 28 image by author | 23 |
| Fig. 30 sketch by tobias mahne from group1 framework | 24 |
| Fig. 31 sketch by tobias mahne from group1 framework | 24 |
| Fig. 29 sketch by tobias mahne from group1 framework | 24 |
| Fig. 32 image by urban solution architects and urban planners from mandela development corridor urban development framework | 25 |
| Fig. 33 image by urban solution architects and urban planners from mandela development corridor urban development framework | 25 |
| Fig. 34 sketch by tobias mahne from group1 framework | 26 |
| Fig. 35 sketch by tobias mahne from group1 framework | 26 |
| Fig. 36 image by author | 27 |
| Fig. 43 image by author | 28 |
| Fig. 44 image by author | 28 |
| Fig. 45 image by author | 28 |
| Fig. 38 image by author | 28 |

| | |
|---------------------------|----|
| Fig. 39 image by author | 28 |
| Fig. 41 image by author | 28 |
| Fig. 42 image by author | 28 |
| Fig. 37 image by author | 28 |
| Fig. 40 image by author | 28 |
| Fig. 46 image by author | 29 |
| Fig. 47 image by author | 30 |
| Fig. 48 image by author | 31 |
| Fig. 49 collage by author | 32 |
| Fig. 50 collage by author | 34 |
| Fig. 51 collage by author | 36 |
| Fig. 52 collage by author | 38 |
| Fig. 55 image by author | 40 |
| Fig. 53 image by author | 40 |
| Fig. 54 image by author | 40 |

Fig. 56 collage by author_tango II bygrace3737_dancing house prague by edgar barany_calatrava lisboa oriente station by jaimé silva_forest by ben_federationsquare by its rowdy_ water molecules by vitroid_ tern in flight by sebastian kennerknecht_calatrava milwaukee by crazyegg 95 from www.flickr.com 44

Fig. 57 collage by author_norman foster tower by trey wheeler_pine cone by phil clements_staircase by ly wylde_shell golden section by doug_paul klee by numstead_mountains by jessica2819 from www.flickr.com 46

- Fig. 58 collage by author_images by franci du toit_images by pieter goosen_images by anel van schalkwyk from 10 years + 100 buildings_la avenida de los baobabs by bit ramone from www.flickr.com 48
- Fig. 59 collage by author_images by david braun_images by anton comrie_images by christoph hoffmann_sketches by activate architects from 10 years + 100 buildings_homini hotel from www.forumhomini.com_ 50
- Fig. 60 collage by author_images by van der merwe miszewski_plans by van der merwe miszewski architects from 10 years + 100 buildings 52
- Fig. 61 collage by author_sketch by sarah calburn architects_images by hugh fraser_images by richard stretton from 10 years + 100 buildings 54
- Fig. 62 collage by author_kenyeang by maimuska_vertical urbanism by its daniel from www.flickr.com_images from www.trhamzahyeang.com 56
- Fig. 63 collage by author_federation square paving by daniel demich_sunset in federation square by violetas_gr_federation square melbourne by dean-melbourne_federation square melbourne by andrewwantcoffee_federation square by this bath is too hot_ from www.flickr.com 58
- Fig. 64 sketches by author 60
- Fig. 65 sketches by author 62
- Fig. 66 sketches by author 64
- Fig. 67 sketches by author 66
- Fig. 68 sketches by author 68
- Fig. 69 sketches by author 70
- Fig. 70 sketches by author 72
- Fig. 71 sketches by author 74
- Fig. 72 sketches by author 76
- Fig. 73 sketches by author 78

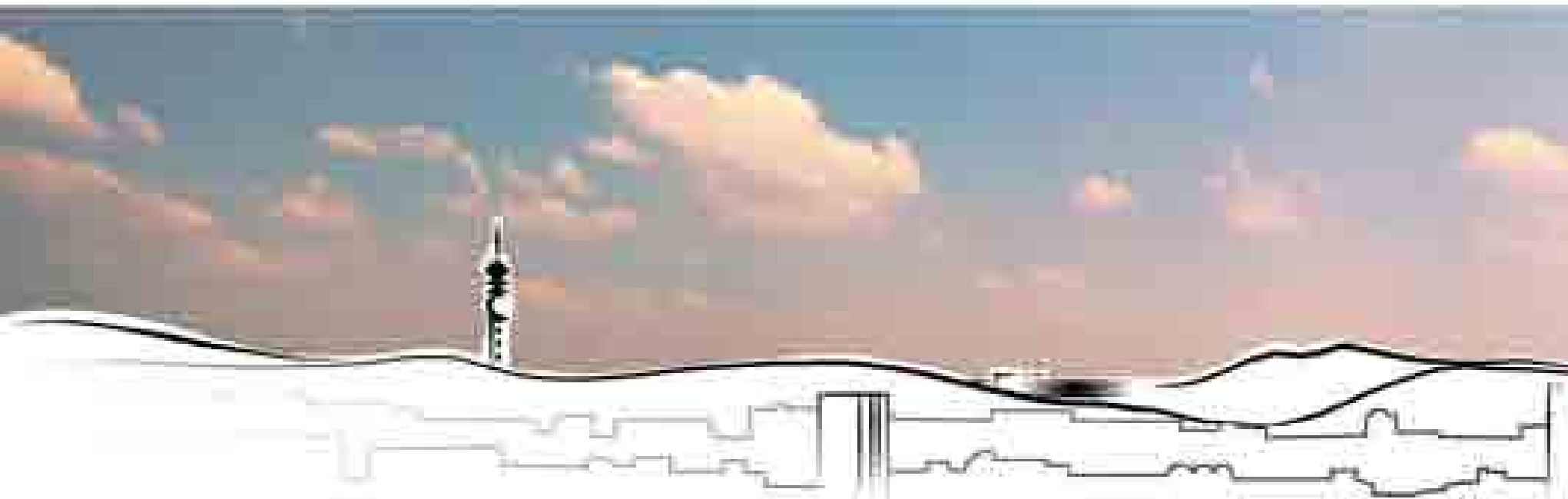
| | |
|----------------------------|-----|
| Fig. 74 images by author | 80 |
| Fig. 75 images by author | 82 |
| Fig. 76 images by author | 84 |
| Fig. 77 images by author | 86 |
| Fig. 78 images by author | 88 |
| Fig. 79 images by author | 90 |
| Fig. 80 sketches by author | 92 |
| Fig. 81 images by author | 94 |
| Fig. 82 images by author | 96 |
| Fig. 83 images by author | 98 |
| Fig. 84 images by author | 100 |
| Fig. 85 images by author | 101 |
| Fig. 86 images by author | 102 |
| Fig. 87 images by author | 103 |
| Fig. 88 images by author | 104 |
| Fig. 89 images by author | 106 |
| Fig. 90 images by author | 108 |
| Fig. 91 images by author | 110 |
| Fig. 92 images by author | 112 |
| Fig. 93 images by author | 114 |

| | |
|--|-----|
| Fig. 94 images by author | 116 |
| Fig. 95 images by author | 118 |
| Fig. 96 images by author | 120 |
| Fig. 97 images by author | 122 |
| Fig. 98 images by author | 124 |
| Fig. 99 images by author | 126 |
| Fig. 100 images by author | 128 |
| Fig. 101 images by author | 130 |
| Fig. 102 images by author | 134 |
| Fig. 103 images by author | 134 |
| Fig. 104 images by author | 135 |
| Fig. 105 images by author | 136 |
| Fig. 106 collage by author_patrick blanc by grebert_ branly window by author_branly by unexpected bacon_green wall in madrid by i-dave_green wall detail by paikan1449 | 137 |
| Fig. 108 images by author | 138 |
| Fig. 109 images by author | 138 |
| Fig. 107 images by author | 138 |
| Fig. 110 collage by author_images by pitta joffe from creative gardening withindigenous plants: a south african guide | 139 |
| Fig. 111 images by author | 140 |
| Fig. 112 images by author | 142 |

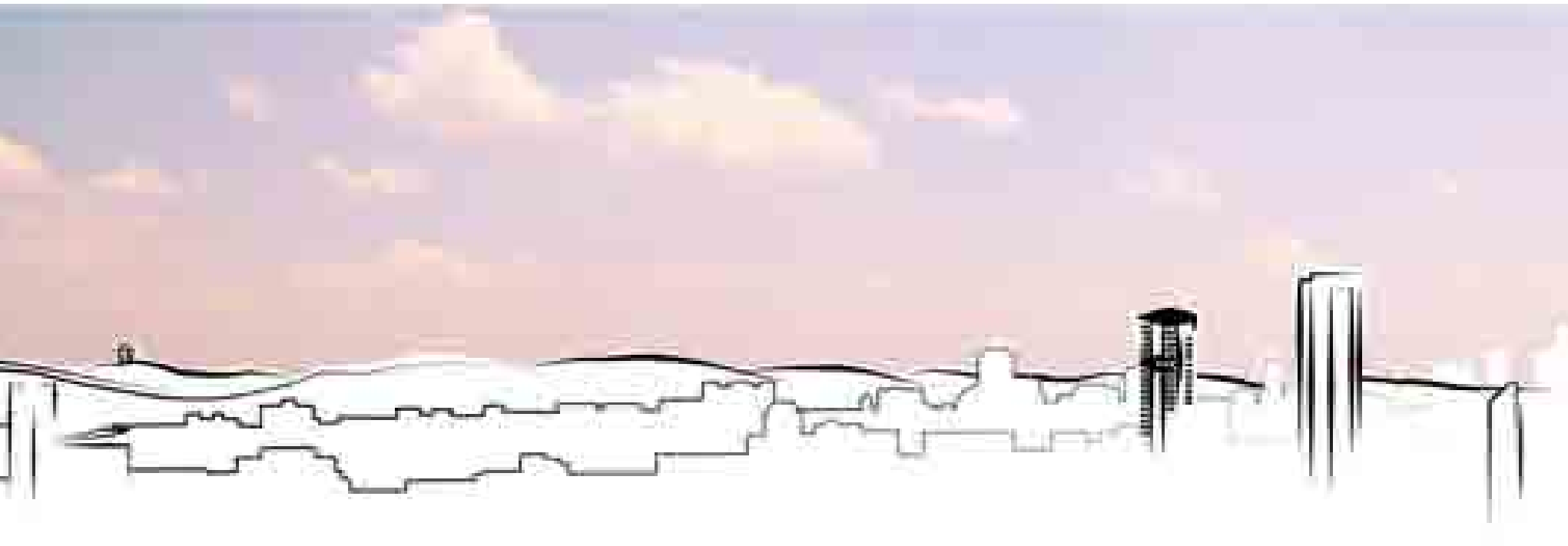
| | |
|---------------------------|-----|
| Fig. 113 images by author | 142 |
| Fig. 114 images by author | 143 |
| Fig. 115 images by author | 143 |
| Fig. 116 images by author | 144 |
| Fig. 117 images by author | 144 |
| Fig. 118 images by author | 144 |
| Fig. 119 images by author | 145 |
| Fig. 120 images by author | 145 |
| Fig. 121 images by author | 146 |
| Fig. 122 images by author | 146 |
| Fig. 123 images by author | 147 |
| Fig. 124 images by author | 147 |
| Fig. 125 images by author | 148 |
| Fig. 126 images by author | 148 |
| Fig. 127 images by author | 148 |
| Fig. 128 images by author | 149 |
| Fig. 129 images by author | 149 |
| Fig. 130 images by author | 149 |
| Fig. 131 images by author | 149 |
| Fig. 132 images by author | 150 |

| | |
|---------------------------|-----|
| Fig. 133 images by author | 150 |
| Fig. 134 images by author | 150 |
| Fig. 135 images by author | 151 |
| Fig. 136 images by author | 151 |
| Fig. 137 images by author | 152 |
| Fig. 138 images by author | 152 |
| Fig. 139 images by author | 153 |
| Fig. 140 images by author | 153 |
| Fig. 141 images by author | 154 |
| Fig. 142 images by author | 154 |
| Fig. 143 images by author | 155 |
| Fig. 144 images by author | 155 |
| Fig. 145 images by author | 156 |
| Fig. 146 image by author | 160 |
| Fig. 147 images by author | 171 |
| Fig. 148 images by author | 171 |
| Fig. 149 images by author | 171 |
| Fig. 150 images by author | 171 |
| Fig. 151 images by author | 172 |
| Fig. 152 images by author | 173 |

| | |
|---------------------------|-----|
| Fig. 153 images by author | 174 |
| Fig. 154 images by author | 175 |
| Fig. 155 images by author | 176 |
| Fig. 156 images by author | 177 |
| Fig. 157 images by author | 178 |
| Fig. 158 images by author | 180 |
| Fig. 159 images by author | 182 |
| Fig. 160 images by author | 184 |
| Fig. 161 images by author | 186 |
| Fig. 162 images by author | 188 |
| Fig. 163 images by author | 190 |



Introduction





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A
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I
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E

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U
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Fig. 1 mossy stones

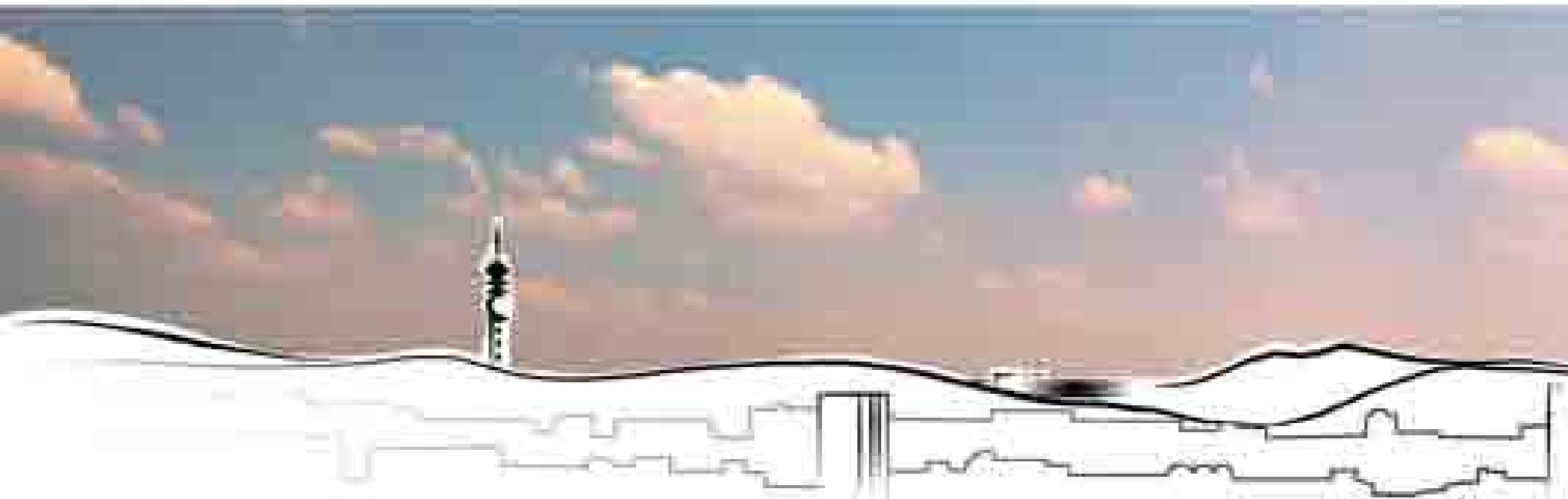
Innovate/v. to change something established by introducing new methods, ideas, or products. origins from Latin *innovare* meaning 'renew, or alter.' [Soanes,2008]

Innovation represents one of man's tools to ensure a brighter future. A rolling stone gathers no moss, thus we must strive to consciously pursue developmental and technical progress.

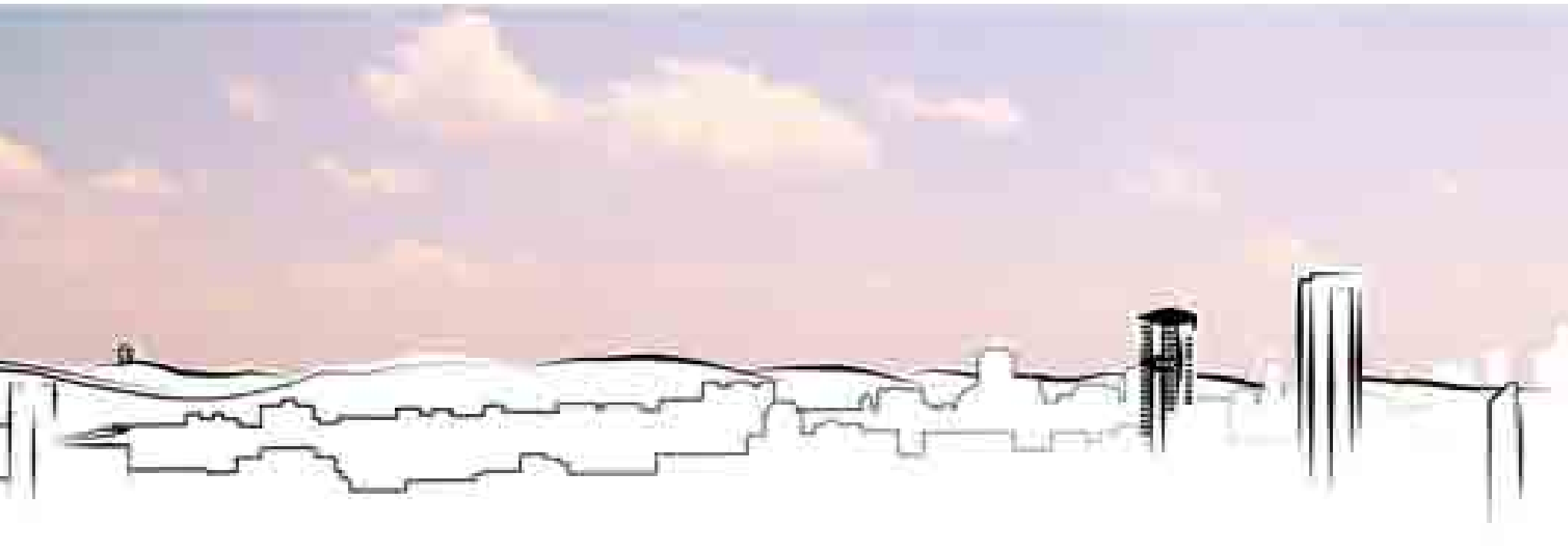
Innovation in South Africa is at an all time high, thanks to institutions such as the CSIR and the SABS, along with private initiatives such as the African Carbon Trust. The Design Indaba held annually in Cape Town inspires young and old with new ideas in a time of economic and environmental crisis.

"He that will not apply new remedies must expect new evils; for time is the greatest innovator."
Francis Bacon, 1625 [en.wikiquote.org]

Francis Bacon's words still ring true to this day. It is our responsibility as designers to develop new methods, ideas, and products that will assure that we will continue to prosper many years into the future.



Project proposal and rationale



Problem statement The last months of 2008 has seen the global economy collapse in what has been described as the worst recession since the Great Depression of the 1930's. This is accompanied with Global warming.

These two phenomenon represent a great crisis. But, as John F. Kennedy said in his speech in Indianapolis, 12 April 1959:

"The Chinese use two brush strokes to write the word "crisis". One brush stroke stands for danger; the other for opportunity."

How can innovation turn this crisis into an opportunity?

Fig. 2 pretoria panorama



Opportunities Exposing the public to new innovations and designs should generate greater awareness. This allows for the opportunity to educate the public in economic and environmentally viable designs, through lectures, workshops, and exhibitions. Since "now is the time to reinvigorate the debate on how to make things better... to spark fresh thinking and rekindle optimism, even against this backdrop. After all there's never been a bad time for a good idea."
[Ravi Naidoo,2009 - www.designindaba.com]



Client profile According to the *Tshwane Inner City Development and Regeneration Strategy of 2005 - TICDRS 2005*, the Municipality needs to establish an independent Investment and Development Promotion Agency. This Agency will be accountable to the Municipality, although it will act as an independent business unit.

The purpose of the Agency will be to attract and facilitate investment, to liaise with important role players such as the relative Government Departments, the CSIR, and SABS - and to establish Public-Private relationships.

Investment will be generated from national and international companies. The African Carbon Trust is a local initiative, established in 2008. The trust's founding partners are Interactive Africa, KPMG and Bowman Gilfillan. The trust is associated with the international web-based company called Innocentive Inc. - a web community for open innovation, enabling scientists, engineers, professionals and entrepreneurs to collaborate to produce breakthrough solutions for innovative research and development driven organisations, such as Avery Dennison, and Procter & Gamble to name a few.



CITY OF TSHWANE

"we are the same"



User profile In Jan Gehl's publication *Life between Buildings*, three types of outdoor activities are identified that take place in a city environment.

- Necessary activities - are compulsory activities such as shopping and working.
- Optional activities - occur under favourable exterior conditions, these include mostly recreational activities
- Social activities - results in conjunction with the other two activities, they occur spontaneously as a direct consequence of using the same space.

Three types of users can be identified within a city context.

- Familiar users work, live in, or frequently make use of the city's facilities, e.g. the students and scholars surrounding the study area.
- Unfamiliar users are the potential users of the city, who do not use the city frequently for security, locality or discomfort reasons.

- Sporadic users are temporary visitors such as tourists.

Assuming that the Tshwane Kopanong development, a proposed major tourist attraction, mentioned in the *TICDRS 2005* will be realised. The programme of the study could incorporate all three types of activities and accommodate both the familiar and sporadic users of the city.



Fig. 3 client logo collage

Fig. 4 business man

Project proposal The proposed architectural component of the study is to establish an Exhibition and Conference Centre on the North Eastern corner of Nelson Mandela Boulevard and Church Street.

The proposal should accommodate the before mentioned clients as well as:

- A large green open space along the Apies River
- Adaptable exhibition halls
- An auditorium
- Information kiosk
- Research facilities
- A library
- Internet access
- A cafeteria and retail outlets

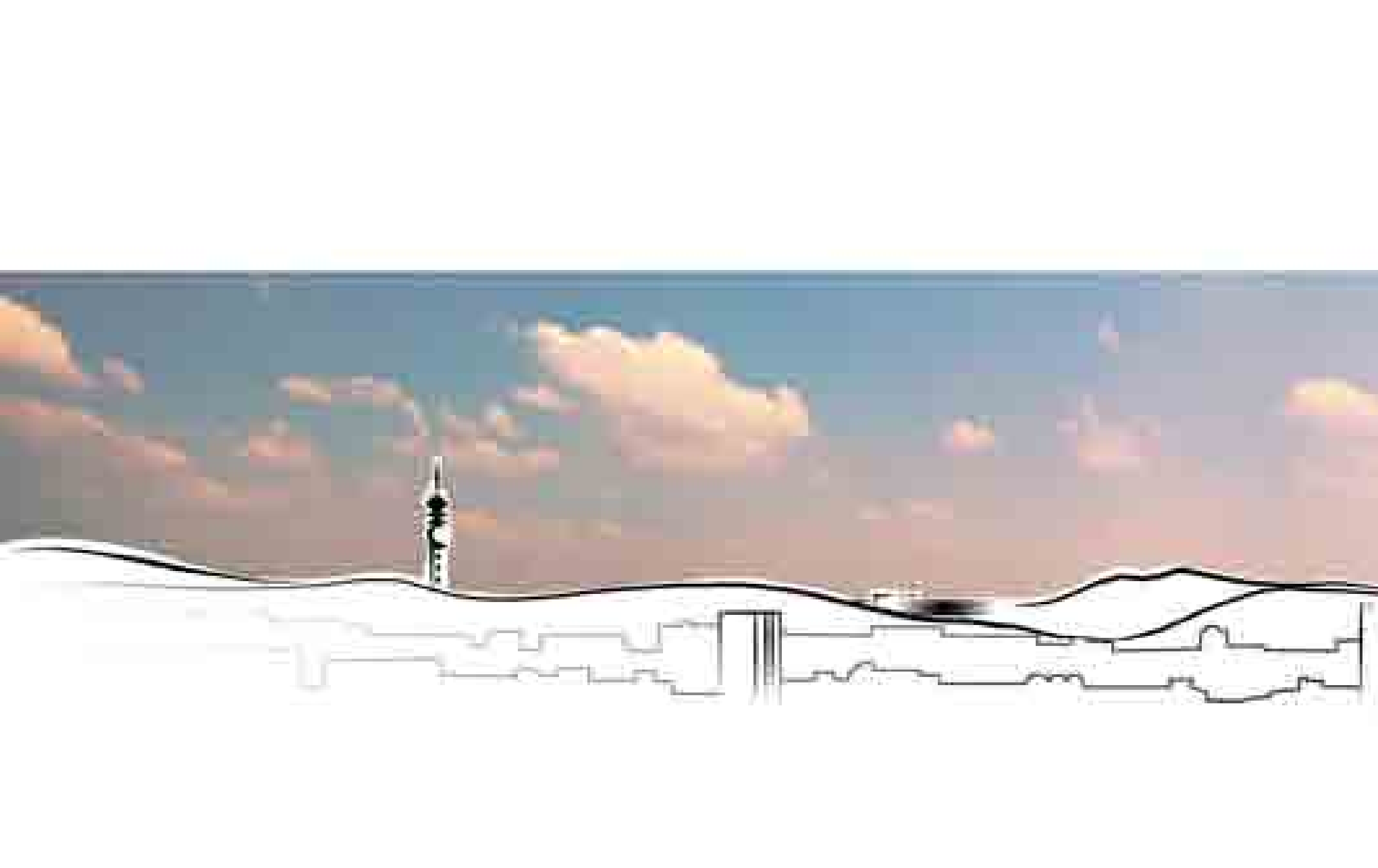
The design should be of such a nature that it could have the capability to adapt to the future needs of the users, increasing the end product's overall life span.

The Centre should simultaneously act as an Eastern gateway to the city, re-establishing the historical Leeubrug as an area of repose along Church Street.

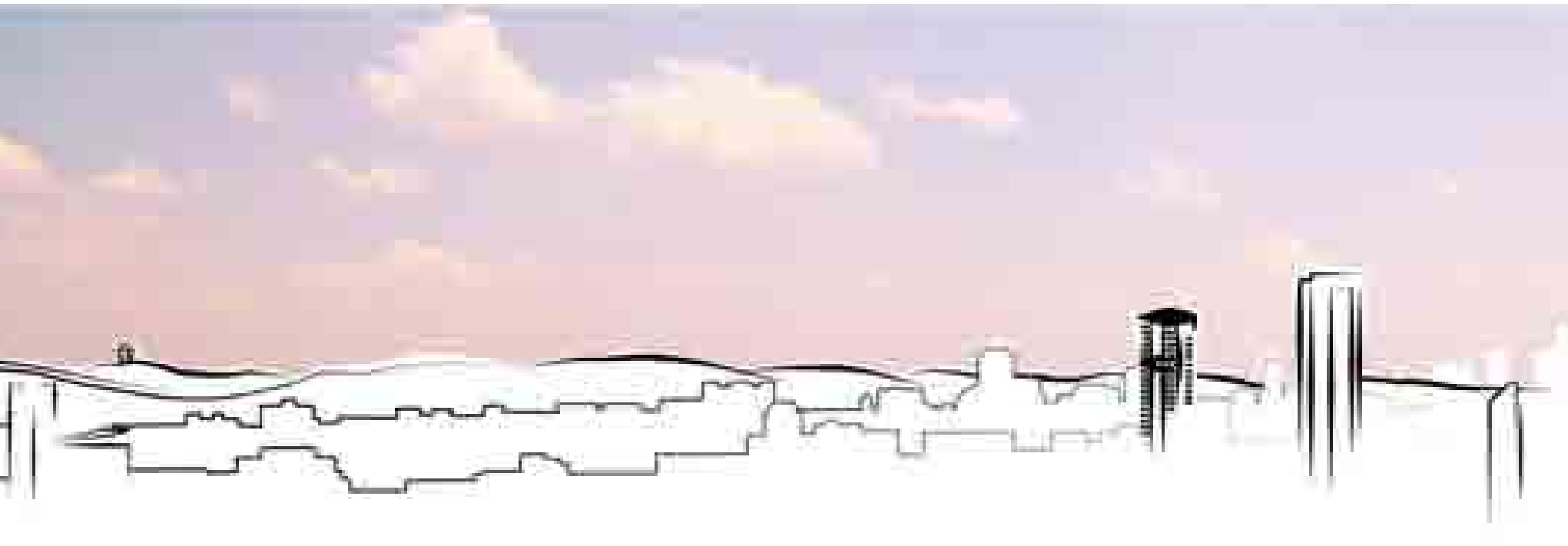
The study will be guided and informed by a compilation of qualitative and quantitative research methodologies. These methods will include precedent studies, black box theory and mapping.

Fig. 5 cliffs of green





Context and the site



Analysis theory_

Semiotics/n. the study of signs and symbols and their use or interpretation. origin from Greek *sémeiotikos* meaning 'of signs.' [Soanes,2008:1309]

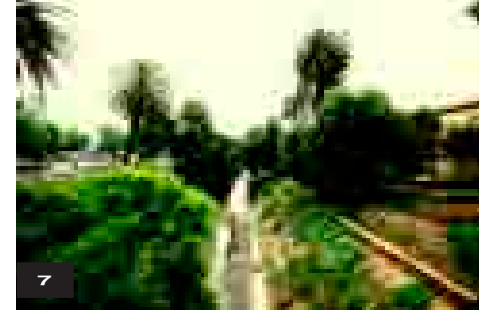
Semiotics studies signs relating to the recognition of the social and natural environment of an individual and their internal world. These signs constitute the denotative languages and connotative codes of culture.

- Denotative semiotics are the physical elements that the user encounters directly; the signifiers.
- Connotative semiotics are the connotations the user makes when associating with the physical elements of the city; the signifieds.

The theoretical discourse of this study will be split into two chapters. In the first section the denotative and connotative urban semiotics in the context of the proposed study area will be discussed. The second section will deal with the relationship of semiotics with architecture and nature as part of the design development of the study.

Urban semiotics look at material objects as vehicles of signification. Thus the symbolic act experienced by the user will always involve a physical object, for example, streets, squares, buildings, etc. Lynch's theory in the *The Image of the City* identifies five physical semiotic features:

- · Paths - are the channels along which the user moves. They may be street, walkways, transit lines, etc. The user reads the city while moving along these paths.
- · Edges - are linear elements that are not used or considered as paths by the user. Edges form the boundaries between two distinct areas; they are the linear breaks in continuity, for example rivers and shorelines.
- · Districts - are the larger sections of the city which have an identifiable character. These districts have a two-dimensional quality that the user enters mentally.
- · Nodes - are strategic points within a city into which the user can enter. These nodes are the destinations to and from which the user travels, such as train stations, public squares, etc.





10

- Landmarks - are similar to nodes in that they also are points of reference but the user does not enter into them. These are usually physical objects like a building, mountain, sign, etc.

Fig. 6 nelson mandela blvd and kotzte str crossing

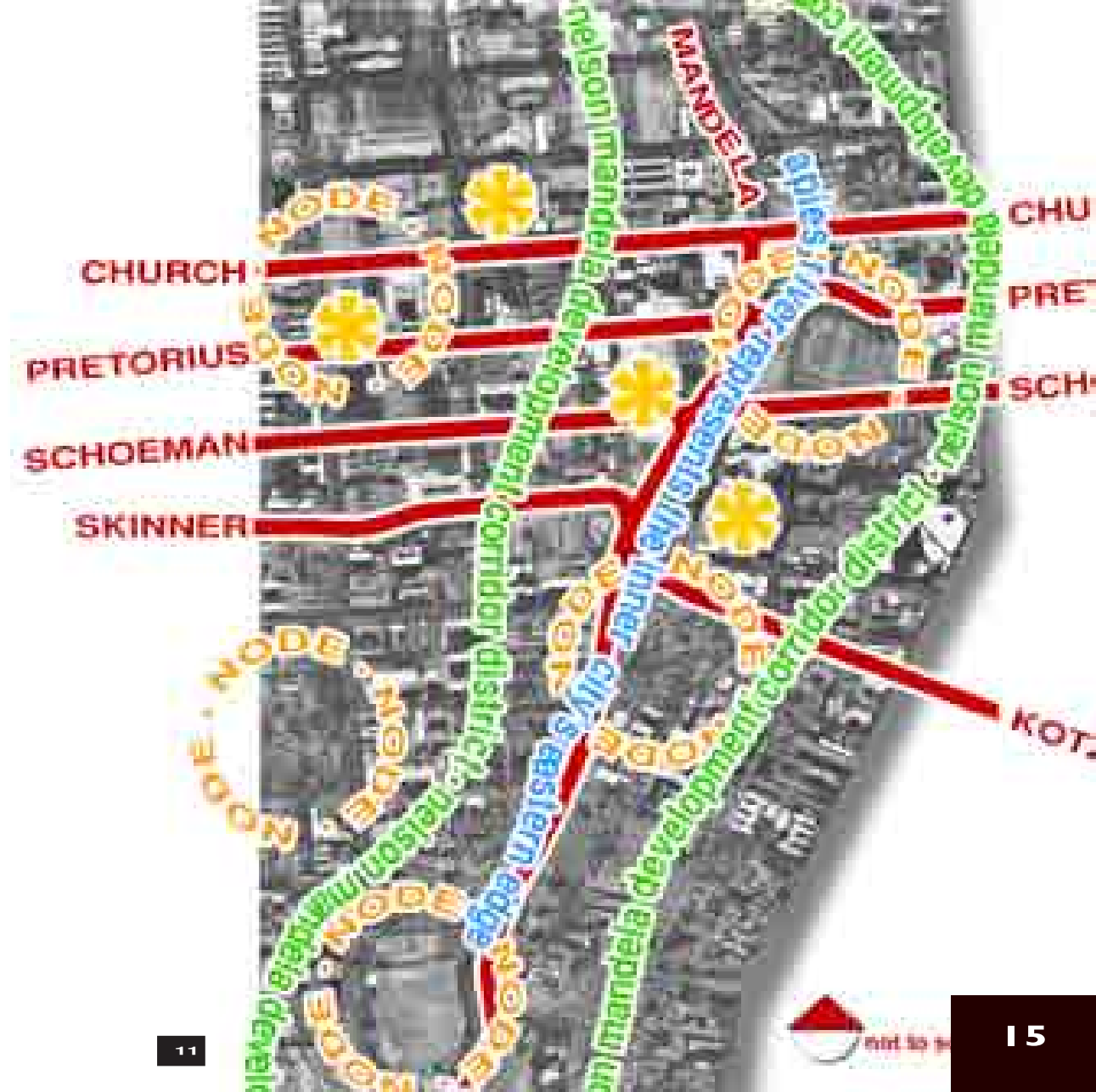
Fig. 7 apies river

Fig. 8 city hall piazza

Fig. 9 church square

Fig. 10 federal reserve bank and church

Fig. 11 lynch's analysis theory



11



15

Lynch however reduces the semiotic study to the activity of movement and orientation. Ledrut on the other hand, searches for the symbolic, connotative level of the urban image. Gottdiener and Lagopoulos claim that "urban structures act as stimuli because they have become symbols and not because they support behaviour by facilitating movement." [Gottdiener,1986:8]

A semiotic approach to analysis is by no account objective, as every individual reads the discourse of the city differently. The city speaks to us differently due to our "values, lifestyle and culture." [Moore,1983:36] Thus a connotative vision of the city is fundamentally tied to a society's culture and history.

Ledrut poses the question: "How does the city speak to us?" which he answers: "As a work of art, which means as an object charged with meaning by the production and the use men make of it. The only way to learn what the city tells us, is to examine the field of the urban experience, the 'lived' city." [Gottdiener,1986:120]



Fig. 12 union buildings



Fig. 13 telkom tower



14



15



16

Fig. 14 sammy marks arcade

Fig. 15 jacaranda lined street

Fig. 16 off-ramp overhead nelson mandela blvd



Fig. 17 general motors dealership



Fig. 19 lion bridge apartments



20

Fig. 20 paul kruger statue



21

Fig. 21 cafe riche



22

Fig. 22 applause

Precedents *The Tshwane Inner City Development and Regeneration Strategy of 2005* and the 2006 abridged version state that -

- The stretch of the Nelson Mandela Boulevard leading up to Church Street is suitable for high quality commercial and upmarket residential development.
- The rest of the corridor North of Church Street needs to be redeveloped as a recreation and

entertainment district for residents and tourists.

- The Nelson Mandela Boulevard and Church Street crossing should be celebrated with high profile landmark buildings. The New Caledonian Sports Grounds is the perfect location for a development of the scale proposed, the Tshwane Kopanong. However the sports grounds needs to be relocated.

The TICDRS along with numerous reports on the Apies River argues that the river needs to be rehabilitated and a green open space system needs to be introduced along the river. The crossing over the river should be easily identifiable and celebrated.

The *Nelson Mandela Corridor Urban Development Framework* by Urban Solutions propose that four nodal clusters are created along Neslon Mandela Boulevard.

- an automotive and commercial cluster
- a sports and recreation cluster
- a business and government cluster and,
- a arts and culture cluster

The group framework of this study derived its strategy from a conglomerate of the above mentioned precedents.

legend







-  high quality commercial and upmarket residential development
-  recreation and entertainment district for residents and tourists
-  tshwane kopanong development
-  nelson mandela boulevard and church street crossing
-  apies river green development
-  proposed nodal clusters along nelson mandela boulevard



Fig. 23 nelson mandela blvd city scape

Fig. 24 framework precedent diagram

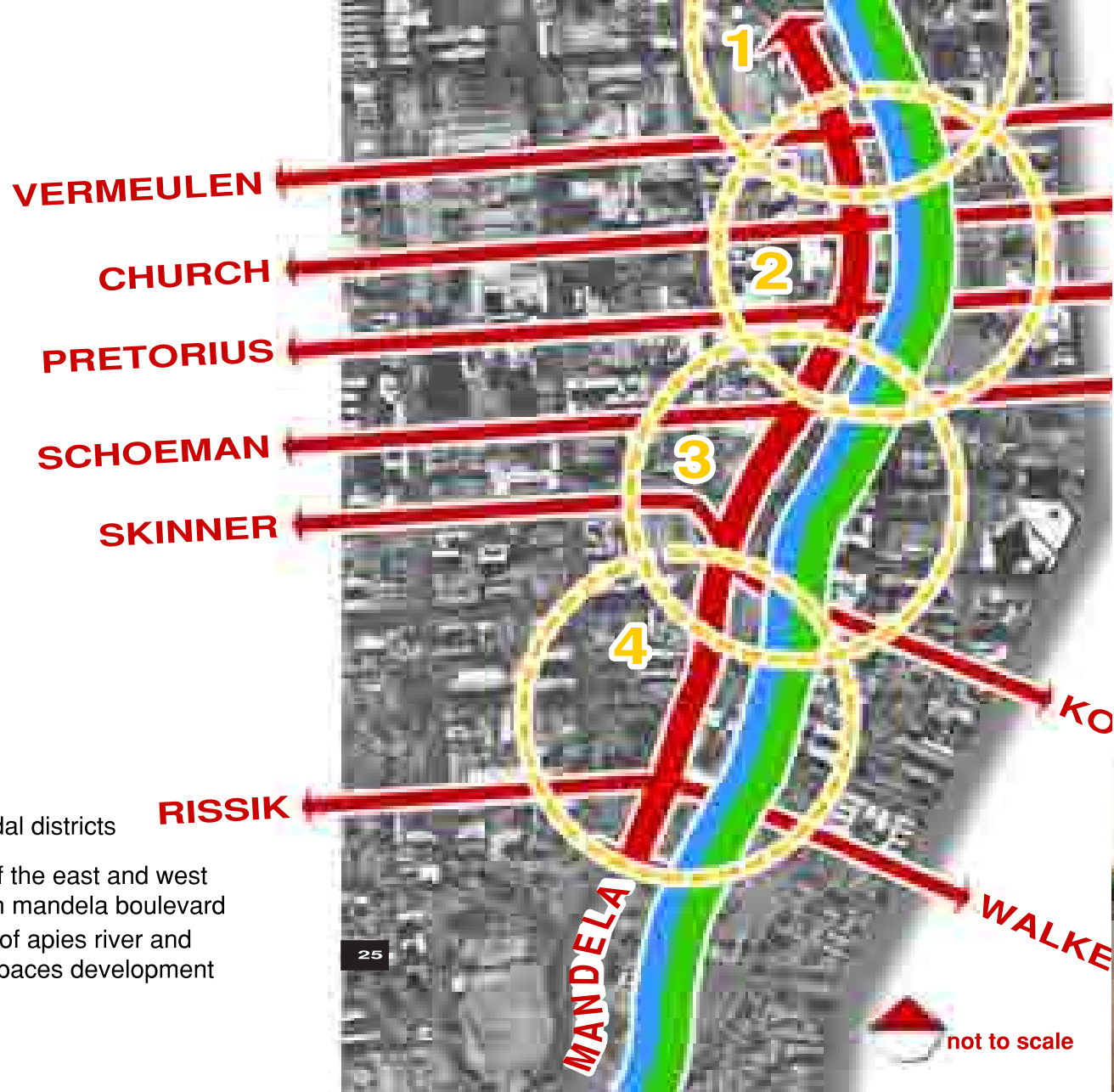
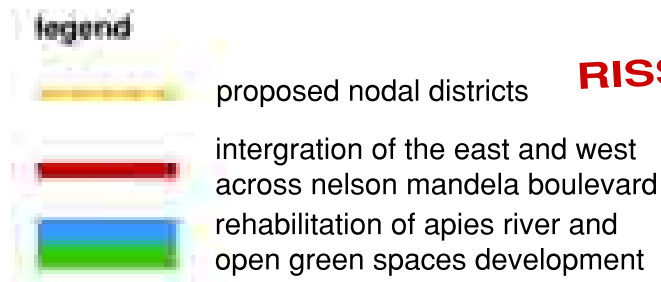
24

not to scale

Group framework_

Introduction_The study area in question is the Nelson Mandela Corridor, the gateway into the city from the South. A very important spine running along the Apies River feeding the city's East/West orientated streets. It is the opinion of this group that Nelson Mandela Avenue represents a rip in the urban fabric of the city and this group proposes that this rip be repaired by adding buttons, or nodes along the affected area, thus 'buttoning up' the urban fabric but still providing enough play for the corridor to develop through a natural process. Four nodes are proposed, namely; Cultural; Business; active Recreational and passive Recreational nodes - placed on strategic crossings along Nelson Mandela Avenue.

Fig. 25 group1 framework diagram



Problem statement_ The Nelson Mandela Corridor is currently seen as an urban wasteland, a defragmenting agent between the East and the West, acting as a physical buffer between the city's two halves. The links and connections between the city and its surrounding neighbourhoods are very poor and needs addressing. Pedestrian integration along Nelson Mandela Avenue is also in a state of neglect - sidewalks are used as refuse depots, street furniture needs upgrading, shade is in short supply, etc. The natural features along the river are unmaintained. There is no informal economy, the buildings are all monofunctional. In short the Nelson Mandela Corridor is lacking an identity.

Fig. 26 neglected sidewalk

Fig. 27 lack of informal economy

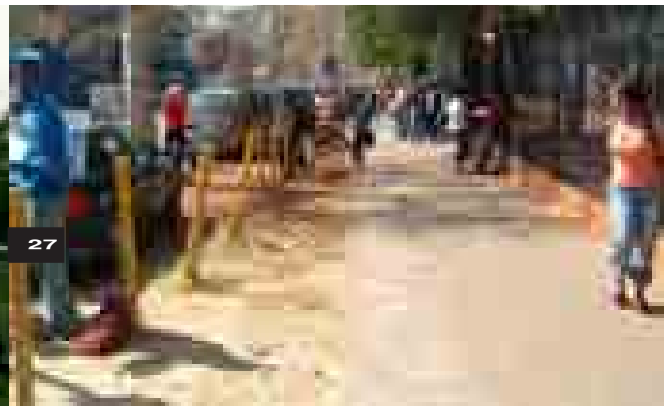
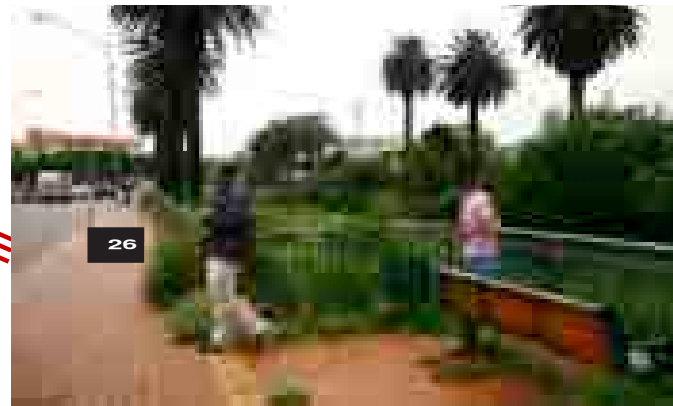
Fig. 28 unkept green spaces

Aims_ The identified nodes are to act as catalysts which will promote positive, future developments. This catalytic development is aimed to progress in a East/ West direction. The aim is to allow for the integration of the CBD towards the Eastern residential area which at the moment lack social development. This will be achieved through creating precinctal nodes which will promote the social/cultural, environmental and economic elements of the area.

- Social - the integration of the East with the West. Providing environments for activities which promote social integration.
- Environmental - the upgrading of the Apies river which will act as a spine for the creation of parks and public spaces into a social gathering and recreational hot spot. The emphasis will be on the historical and cultural heritage of the area and the

biodiversity, which includes water quality and quantity of the river will also play an important factor in the development.

- Economic - the transformation of current land banking hot spot into a social and economic use. Currently many potential spaces have been lost due to the accommodation of garages for the automotive industry, which does not promote the social or economic well-being of the area. Job creation through potential hot spots via the social integration and gathering of people. As more people will occupy the area, naturally this will create more potential business opportunities which will be needed to cater for the increase of people.



Opportunities_Many opportunities exist along the Nelson Mandela Boulevard Corridor, such as;

- Wide Road Servitude - there is great potential in the wide road servitudes to create vibrant interactive spaces which links the different zones and hot spots together.
- Gateways and Landmarks into the city
- Creating a local identity which adheres to that specific area and creating a sense of place.
- Apies river and green pockets - the river is in a upset state and recreational areas along it has not been looked after or put to good use. Ideal opportunity to uplift the current state and introduce new interventions to promote the area into a positive and socially populated space.
- Social and Cultural heritage - a vast amount of social and cultural heritage exists in the area and these aspects must be brought out and form part of the whole identity of the area.

- Pedestrian lines - pedestrian access must connect to different spaces, the East/ West connections across Nelson Mandela Boulevard are the main concerns of this framework.

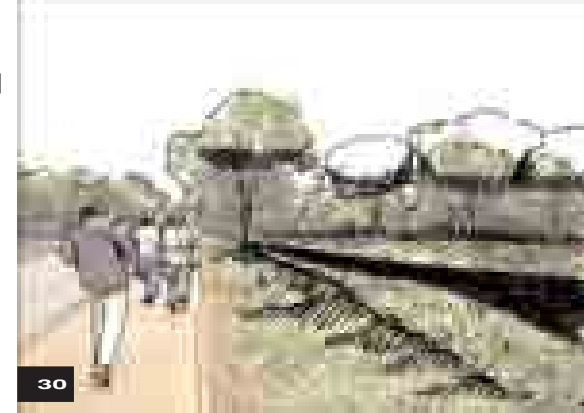
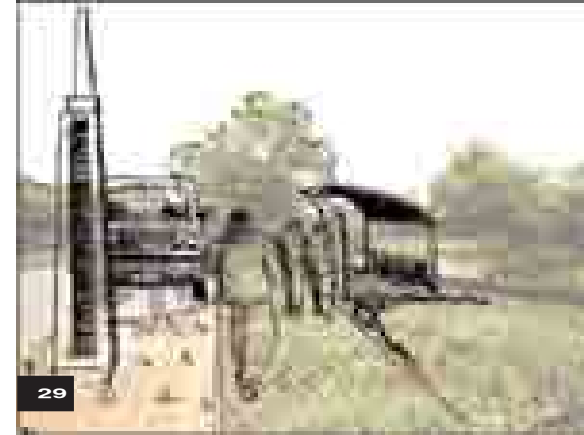
Fig. 29 landmarks legible public transport interchanges

Fig. 30 widen apies river

Fig. 31 increased informal trading along nelson mandela blvd

Fig. 32 urban intergration

Fig. 33 pedestrian movement network



Spatial framework_

Promote and celebrate regional connections;

- Johannesburg to the South
- Soutpansberg to the North

Upgrade and create local area connections;

- Promote the East/West connections
- Promote urban integration

Promote and celebrate prominent public spaces;

- Create new public spaces within the new nodal districts

Rejuvenate and upgrade existing public spaces;

- The Overzicht Village and the banks of the Apies River are of top priority in this framework

Integrate a movement network;

- Connecting the important nodes of the

city with a reliable public transport system

- Promote pedestrian routes

Celebrate the built fabric and promote the identity of the proposed nodal districts.

Create a sense of arrival into the city;

- Nelson Mandela Development Corridor must be a gateway into the city

Celebrate and connect existing and proposed landmarks in the Nelson Mandela Corridor.



Green framework_ The Apies River must be developed as a green spine running through the city. All green spaces must conform to the following criteria:

- Accessible to the public
- Safe and create a sense of security
- Low maintenance
- Vibrant catalysts for social interaction
- Create a pedestrian friendly link through the city
- The river becomes a spine, linking all the green spaces
- The green spaces and Apies River upgrade should link all the nodes and public spaces
- Focus on interaction and blurred lines between the buildings, public spaces and open green spaces

Fig. 36 apies river channel

Fig. 34 apies river meander

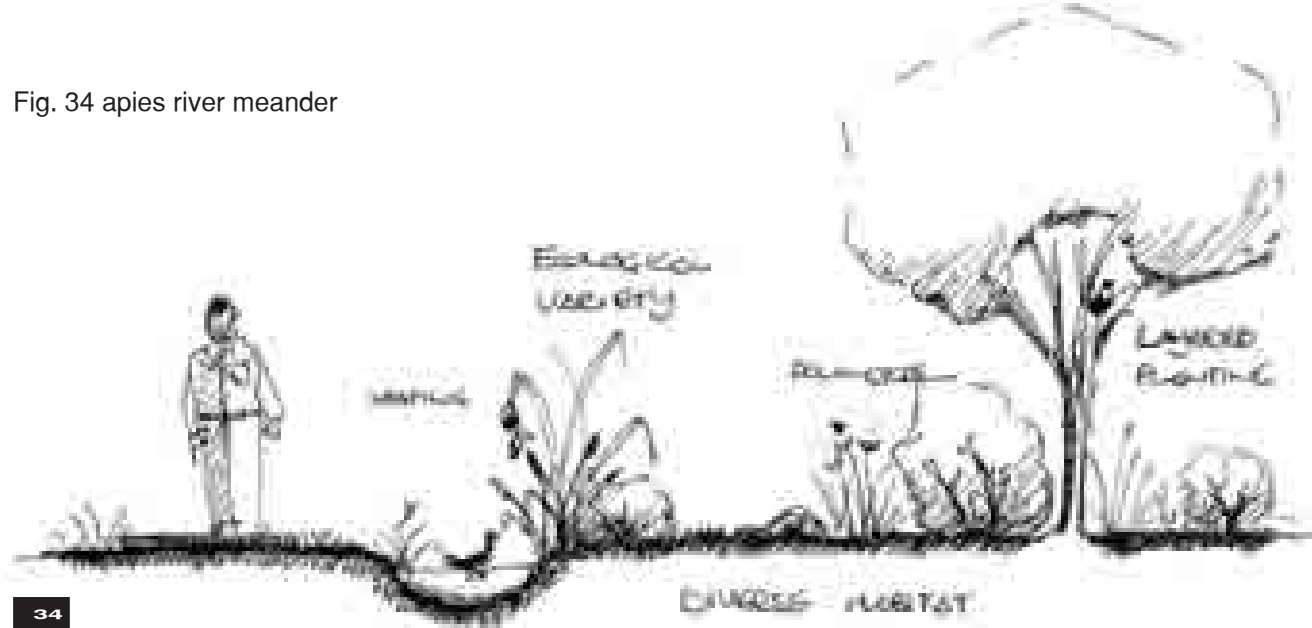
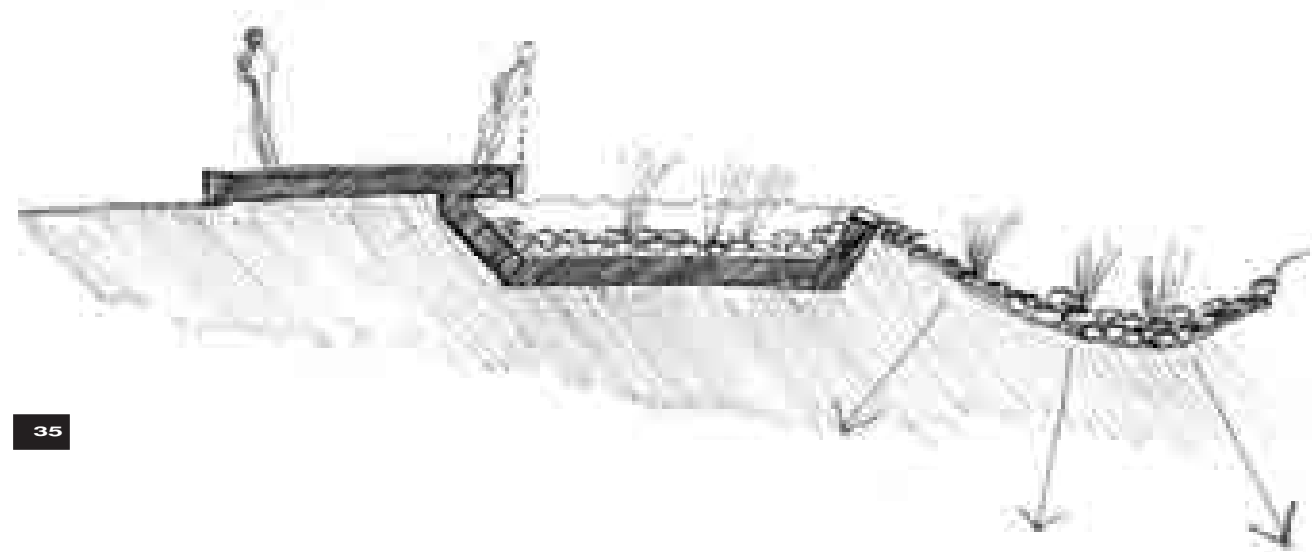


Fig. 35 apies river with ground water recharge





Site proposal The proposed site is located on the North Eastern corner the Nelson Mandela Boulevard and Church Street crossing. Situated among a plethora of motor dealerships, related retail outlets and educational institutions. The latter make up a large portion of the proposed users of the final product.

Fig. 37 abandoned structure

Fig. 38 technical university of tshwane science campus

Fig. 39 general motors dealership

Fig. 40 audi dealership

Fig. 41 bmw bavaria dealership

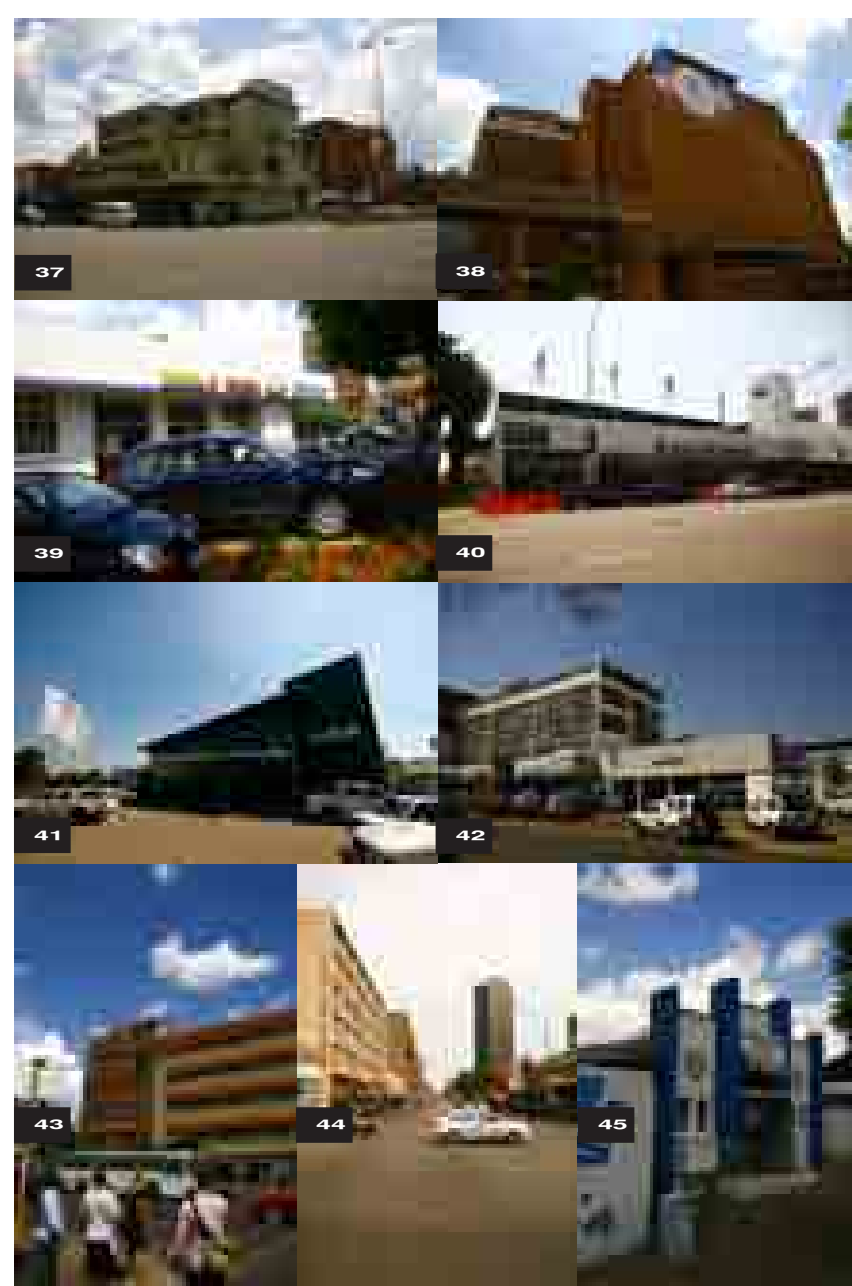
Fig. 42 toyota dealership

Fig. 43 leo's apartments

Fig. 44 lion bridge apartments

Fig. 45 carburator shop

Fig. 46 site proposal



VERMEULEN

CHURCH

PRETORIUS

Metro
Complex

Northern
College

Beres Park
High School

NELSON MANDELA

APIES RIVER

JURIES RIVER

Bavaria
BMW

McCarthy

Car Wash
Toyota

Carburetor
Workshop

GM

Audi VW

Barchel
Computers

Auto
Stops

Master
Cars



not to scale

Site analysis The SWOT analysis revealed seven major influences associated with the proposed site.

Strengths - the location of the site is on the most important crossing in Tshwane making it a prime choice for a high priority development

Weaknesses - predominant East/West orientated site, fast moving traffic and noise generated by the traffic poses possible design problems

Opportunities - the Apies River, as mentioned previously, is a prime development opportunity. The historical significance and integration of Leeu Brug adds to the site's potential

Threats - the Apies river represents a threat as well. Prone to flash floods a great amount of design consideration should be taken in developing the river

Fig. 47 friendly neighbourhood construction workers

Fig. 48 swot analysis diagram



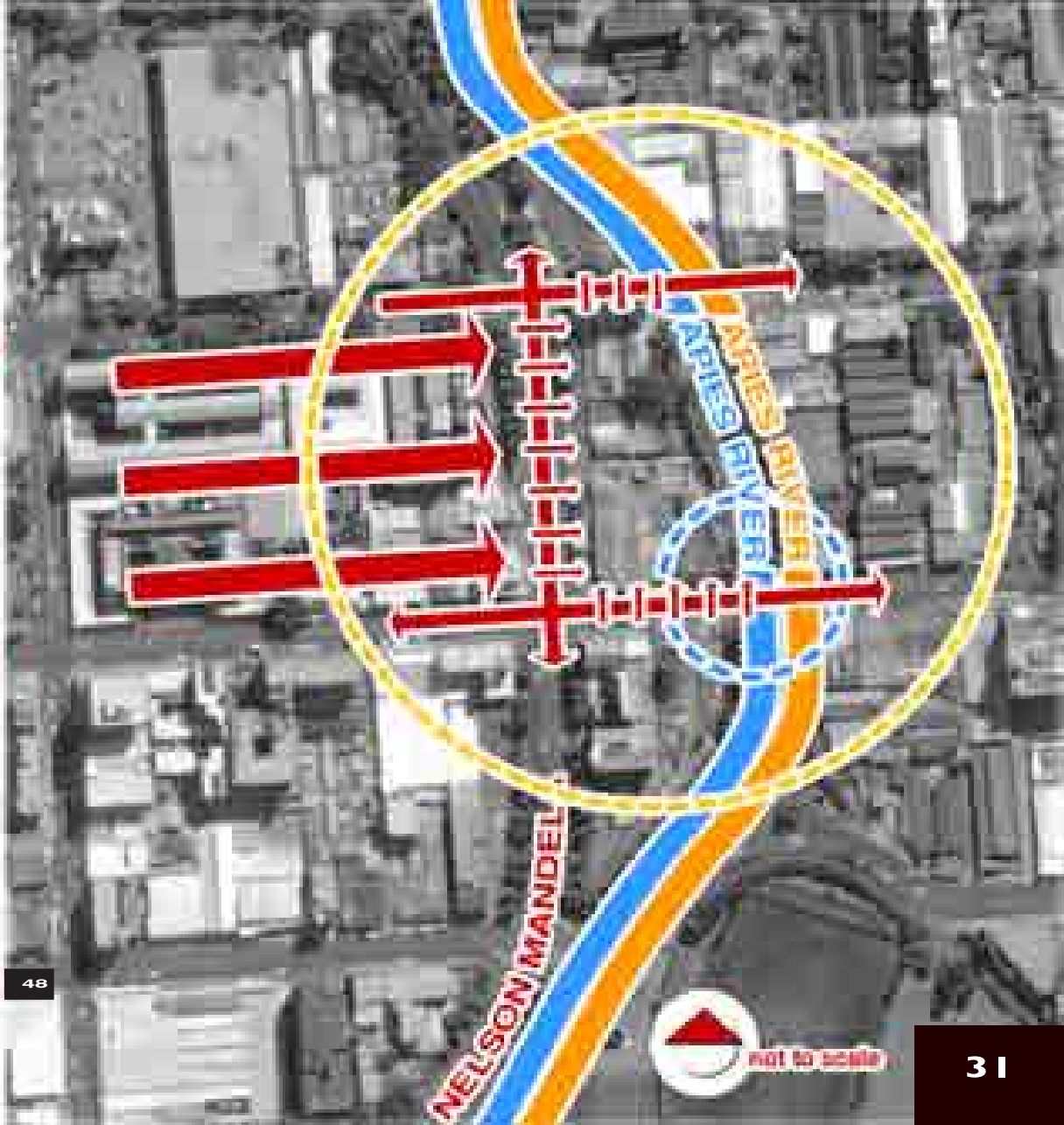


VERMEULEN

CHURCH

PRETORIUS

48



NELSON MANDEL



not to scale

Fig. 49 northern panoramic collage of site





Fig. 50 southern panoramic collage of site





Fig. 51 eastern panoramic collage of site



51



Fig. 52 western panoramic collage of site







53



54



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Historical context_

Lion Bridge's name originates from the lions that roamed Arcadia Drift, the crossing point across the Apies River.

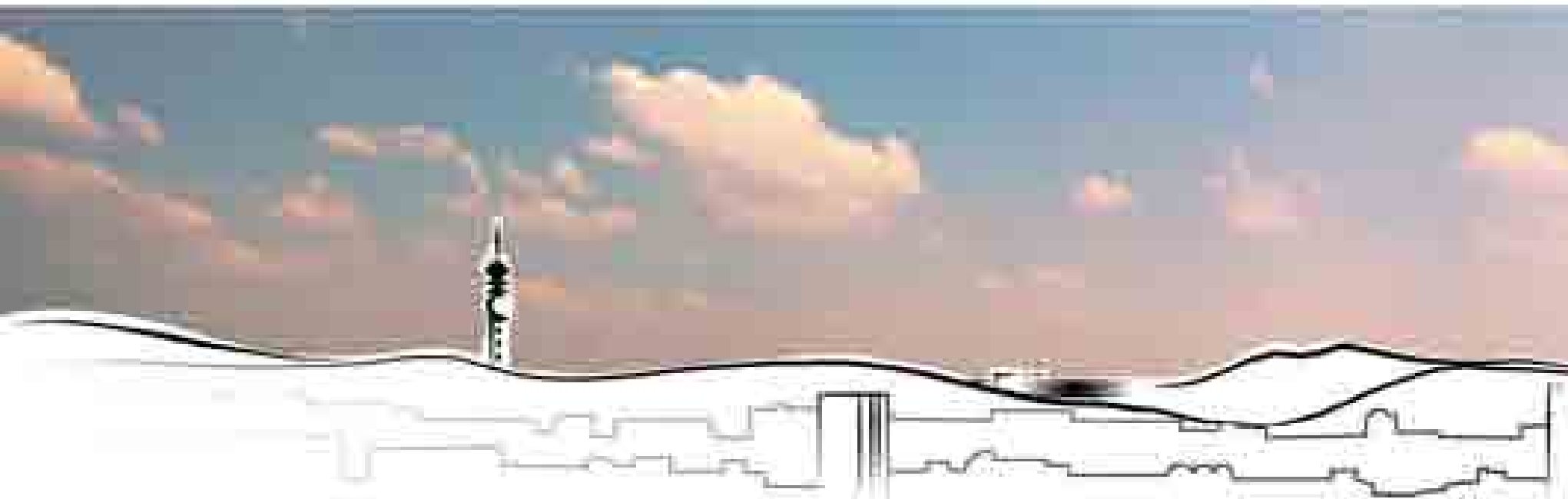
It was the gateway to the East of Southern Africa. The government engineer and architect, Sytze Wierda, designed a bridge for the Church Street crossing. The bridge suffered a lot of damage during heavy summer floods and had to be rebuilt a number of times.

Lion Bridge was opened by President Paul Kruger in June 1849. In 1981 Lion Bridge was proclaimed a national monument.

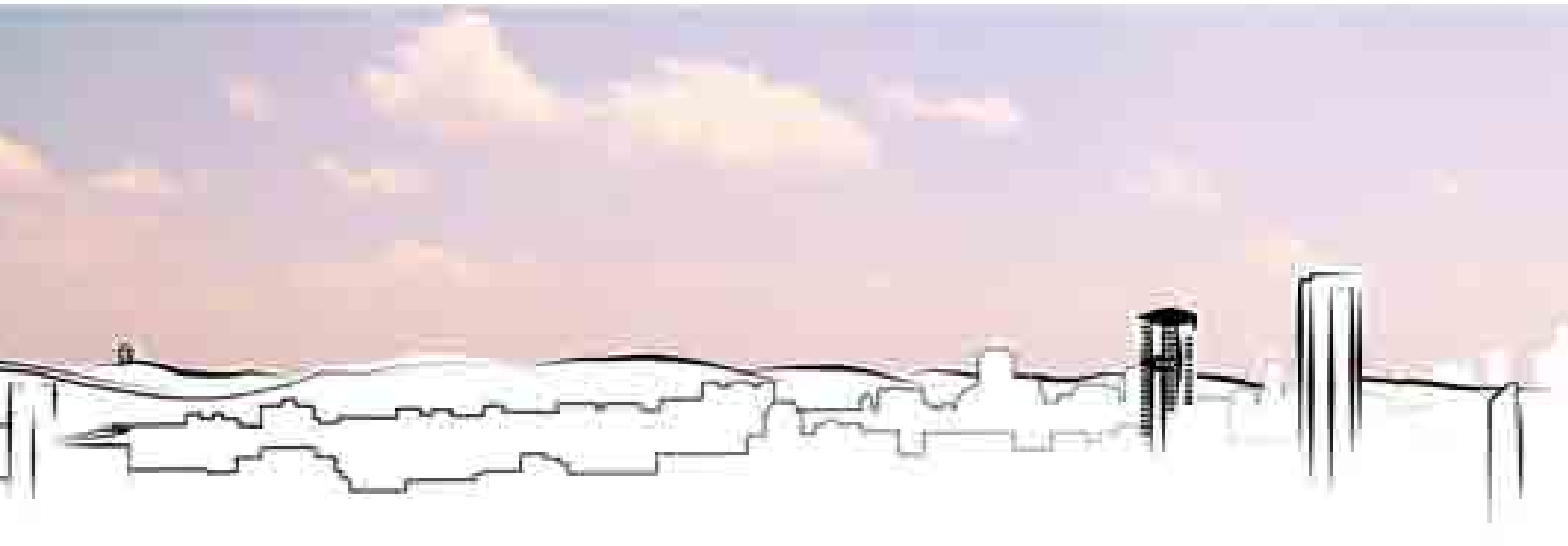
Fig. 53 looking east across lion bridge

Fig. 54 balustrade detail

Fig. 55 looking west across lion bridge



Design concept and development



Design theory The main function of semiotics is to communicate. This makes it particularly difficult to integrate into architecture, "because most architectural objects do not communicate, but function." Umberto Eco, 1968 [Gottdiener, 1986:57]

This is only partially true as a courthouse, for example, does communicate on a symbolic level, symbolising justice, fairness, etc. The process by which we as the readers make these connotations is quite complex. Eco explains this process by using a hypothetical example of prehistoric man and the cave.

The stone age man seeks shelter from the rain and cold, and enters the cave. Upon his entering he starts to examine the cave, noting an understanding that the cave walls and ceiling is the limit of the outside and the beginning of the inside. This may create a nostalgic longing for the womb, imbuing him with feelings of protection. On exiting the cave he looks at the entrance and he recalls the image of the inside, and the idea of the cave takes shape. This allows him to identify the same possibility of shelter in another cave. After a few visits to different caves, the idea of the cave becomes a model.

This model functions so well that the stone age man is now able to recognise another's cave or a cave he does not intend to use from a distance. The model is codified in his mind. He communicates this model to other men using graphic signs. The model ultimately becomes iconic and becomes an object of communicative intercourse. The image of the cave communicates a possible function, even when it is not fulfilled nor an existing need to fulfil it.

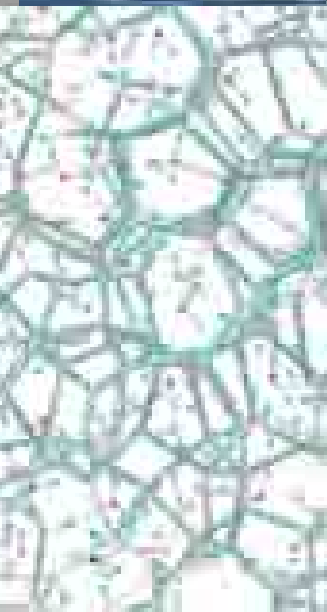
With Eco's connotation of the womb as symbol denoting the cave, primitive man has acquired mental models and images of dwelling in nature which he could apply as referent to his mode of communication.

The roots of the origin of the most primitive of architecture, namely the hut, are embedded in nature, for example:

- the tree
- the cave

Fig. 56 architecture vs nature i





· the nest; all archetypal images of the womb.

Portoghesi states that all archetypes of architecture have been drawn from nature. The Ancient Greeks were one of the first advanced civilisations that developed the notion of nature as an aesthetic standard. Reducing the laws of nature into mathematical formulas. "As with other arts, so with building, the Greeks sought it in, and drew it out from the very bosom of Nature." Alberti [Van Eck,1996:25]

In book IX of Alberti's *On the Art of Architecture* he defined architectural beauty as *concinnitas*. A term "used by Cicero

to characterise a style that is 'closely knit,' 'elegantly joined' or 'skilfully put together.'" [Van Eck,1996:24] Alberti states that buildings are like living organisms, and that architecture should imitate the methods of nature, for example in the way the human body is put together.

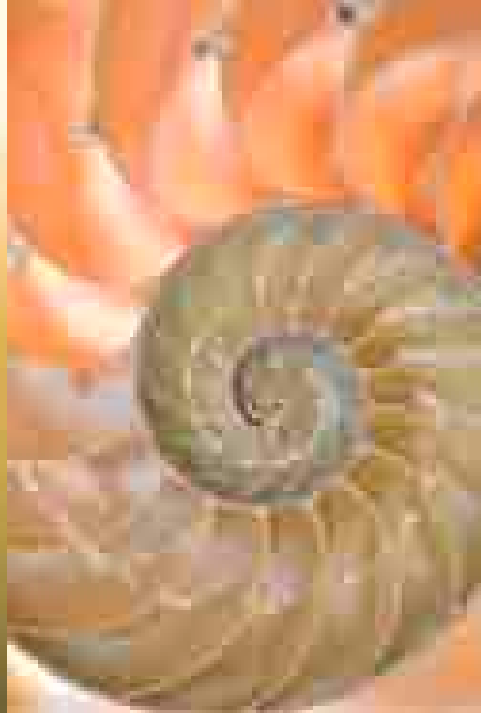
Through the Ages man has left his mark on nature. Portoghesi calls it a resistant sediment of objects and signs. And of this sediment, architecture is the most resilient of all its components. Man will continue to erect "his buildings onto nature assuming the role of continuator of Creation." [Portoghesi,2000:14]

"Architecture is a product of the transformation

of the earth's crust; it becomes a part of nature," [Portoghesi,2000:26] like the coral reefs, beaver dams, and sociable weaver nests etc. Man and nature have always engaged in a complex relationship, and somehow this relationship has been undermined and forgotten.

Fig. 57 architecture vs nature ii







Precedents_Baobab Toll Plaza (2004)

Mathews and Associates Architects

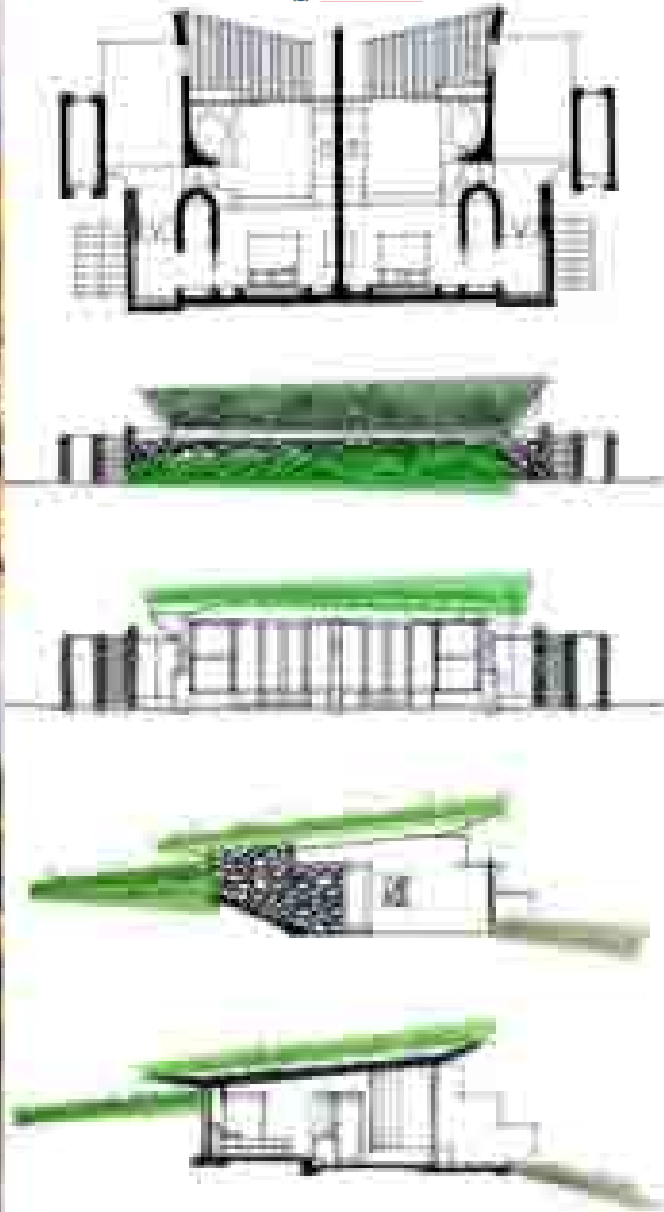
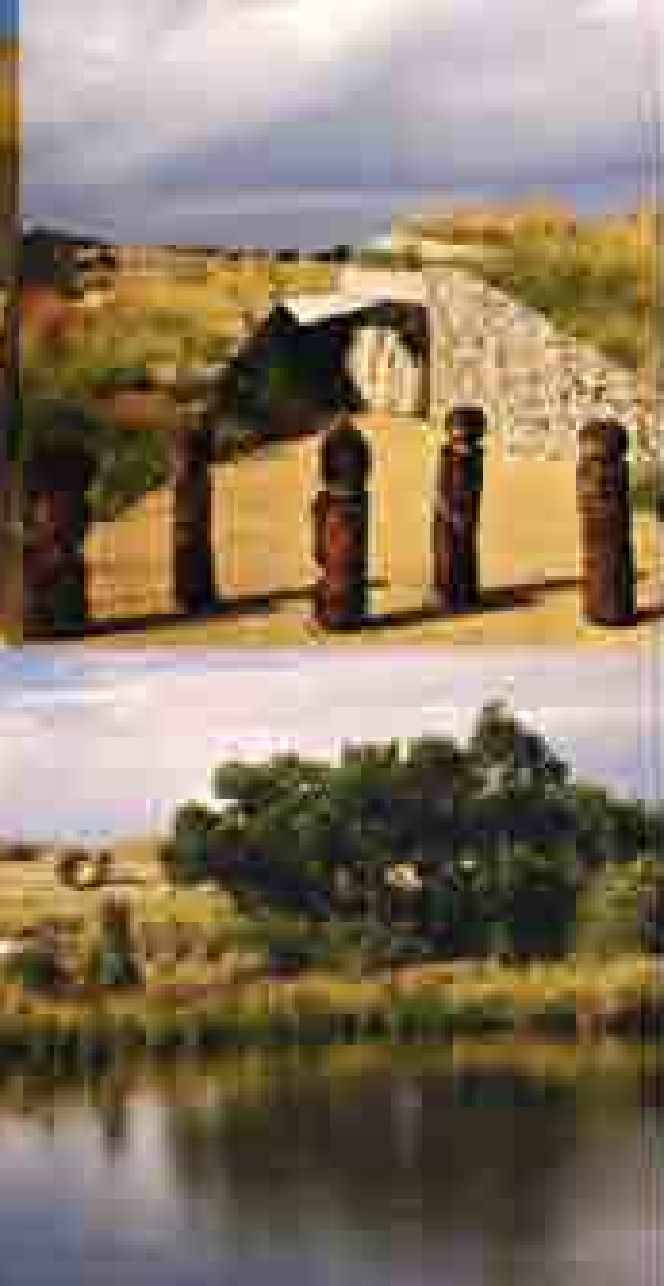
N1 Highway, Limpopo Province, South Africa

The toll plaza acts as the gateway of the North of South Africa. The architectural typology is an interpretation of the Baobab tree, indigenous to the Limpopo Province. The architecture illustrates how a project can take a semiotic approach where the final product can find a harmonic balance somewhere between the abstract and the literal.



Fig. 58 baobab toll plaza collage





Precedents_ Forum Homini
Boutique Hotel (2005)

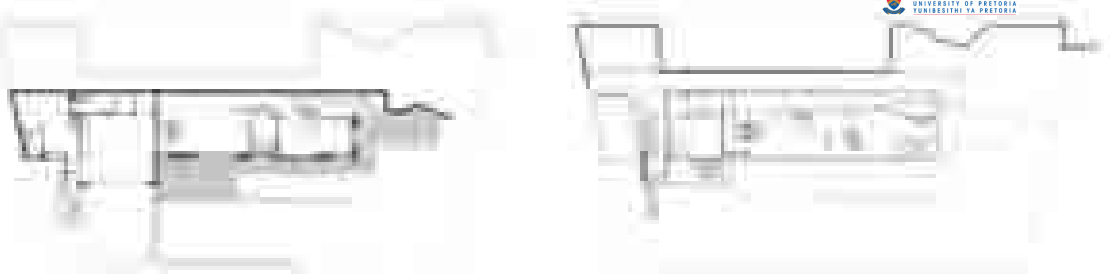
Activate Architects

Cradle of Humankind, Gauteng, South Africa

The Forum Homini Boutique Hotel is a delicate blend of heavy and light architecture with the surrounding context informing and guiding the design process towards a final product. The concrete cave-like mass of the complex is countered by the delicate timber structure and decking. The character of the architecture plays with accents of stone cladding, complementing the rocky outcrops and the grass covered roofs seamlessly blending in with the savannah grassland.

Fig. 59 forum homini boutique hotel collage





Precedents_Tree House (1997)

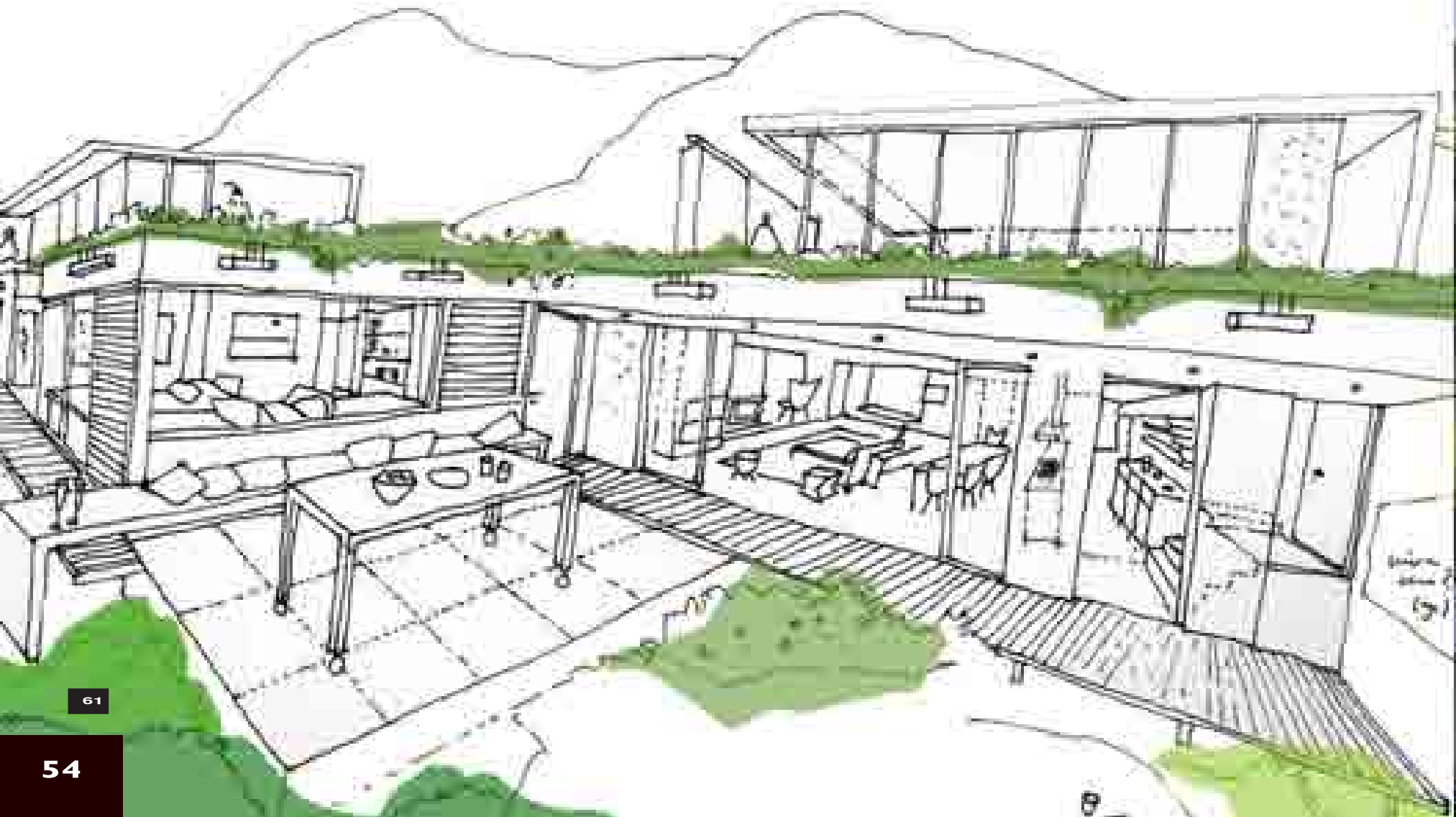
Van der Merwe Miszewski Architects

Cape Town, Western Cape, South Africa

It is apparent the nature was a major source of inspiration for the Tree House's design. The cultivated Stone Pines at the foot of Table Mountain served as the concept for the house's structural elements. The flowing walls and balustrades further enhance the allusion to nature. The architects broke away from what was expected and produced an extraordinary building that "is distinctly contextual, rooted - literally and figuratively - to its location." Dr Nic Coetzer [Joubert,2009:308]



Fig. 60 tree house collage



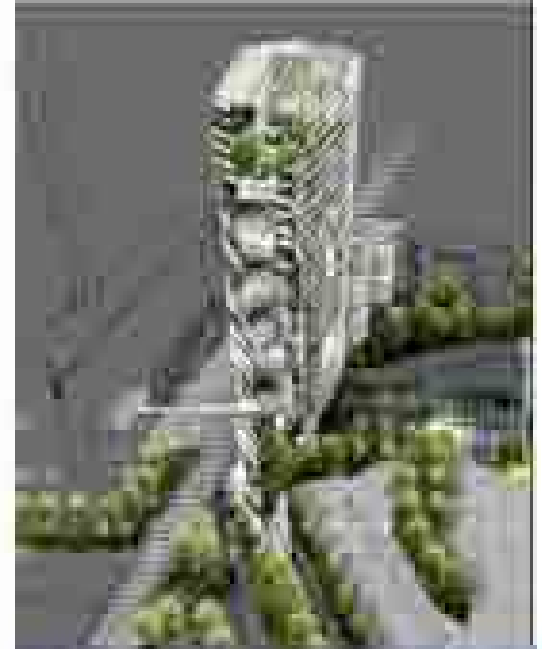
Precedents_Fynbos House (2005)

Sarah Calburn Architects

Betty's Bay, Western Cape, South Africa

The Fynbos House stands out from the majority of the holiday homes in Betty's Bay. It draws its inspiration from the bay's sand dunes, resulting in slanting embankments and fynbos covered roofs. Two glass boxes punch through the vegetation alluding to the mountain range in the distance. The Fynbos House questions the relationship between architecture and its landscape by having the landscape become the architecture.

Fig. 61 fynbos house collage





Precedents_Ken Yeang

Architect

Ken Yeang is the co-founder of Hamzah & Yeang which was established in 1975 in Kuala Lumpur. Best known for his low energy high-rise architecture or as he calls it, bioclimatic skyscrapers. Yeang has compared the high-rise architecture to the Boeing 747, stating that it is an "international piece of technology," Yeang,1995 [Matheou,1995:18] but it needs to respond to its setting and relate to its particular microclimate.

"Ecological design is my final agenda, my life's mission."

Yeang,1995 [Matheou,1995:19]

His work throughout his career reflect this principle through-and-through and Ken Yeang will always be at the cutting edge of innovation.

Fig. 62 ken yeang collage







Precedents_Federation Square (2002)

Lab Architecture Studio

Melbourne, Victoria, Australia

Federation Square has become the new heart in the Melbourne metropolis. Spanning across the city's central railway tracks, it bridges the void that previously split the city into two. Drawing inspiration from the relatively new domain of fractal dynamics the architects created a distinct and unique architectural character, giving the city of Melbourne a new cultural centre and civic identity.

Fig. 63 federation square collage

Sketch proposal_

Fig. 84 ground floor not too scale

84

Fig. 85 first floor not too scale

Fig. 86 second floor not too scale

86

Fig. 87 third floor not too scale



88

Fig. 88 north elevation not too scale

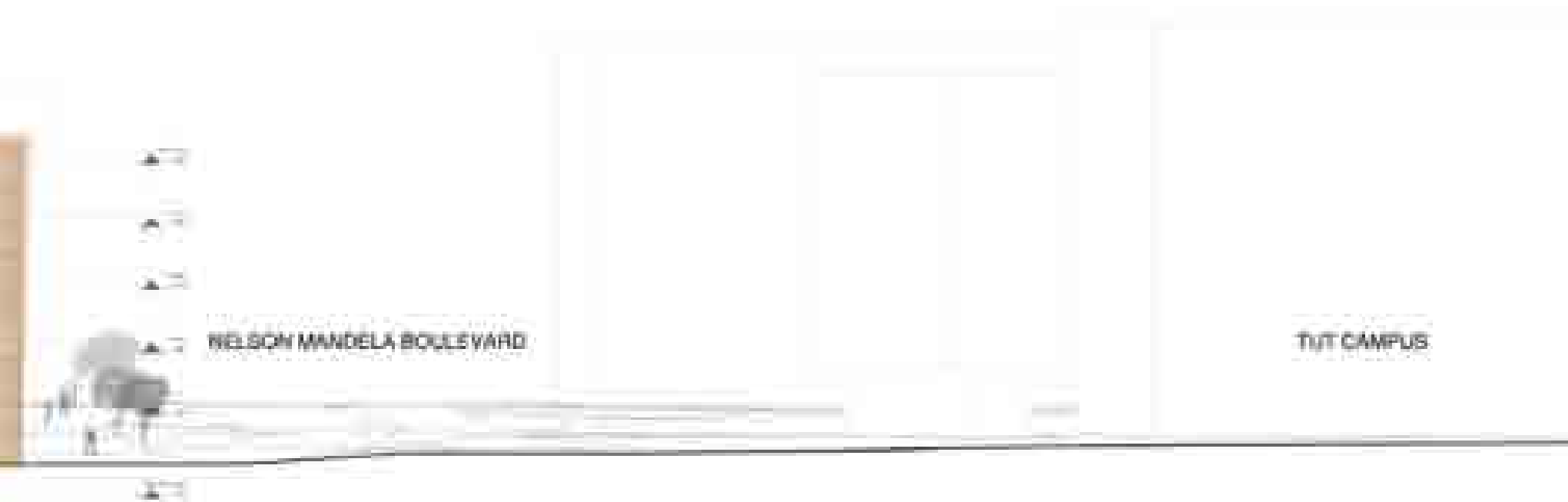
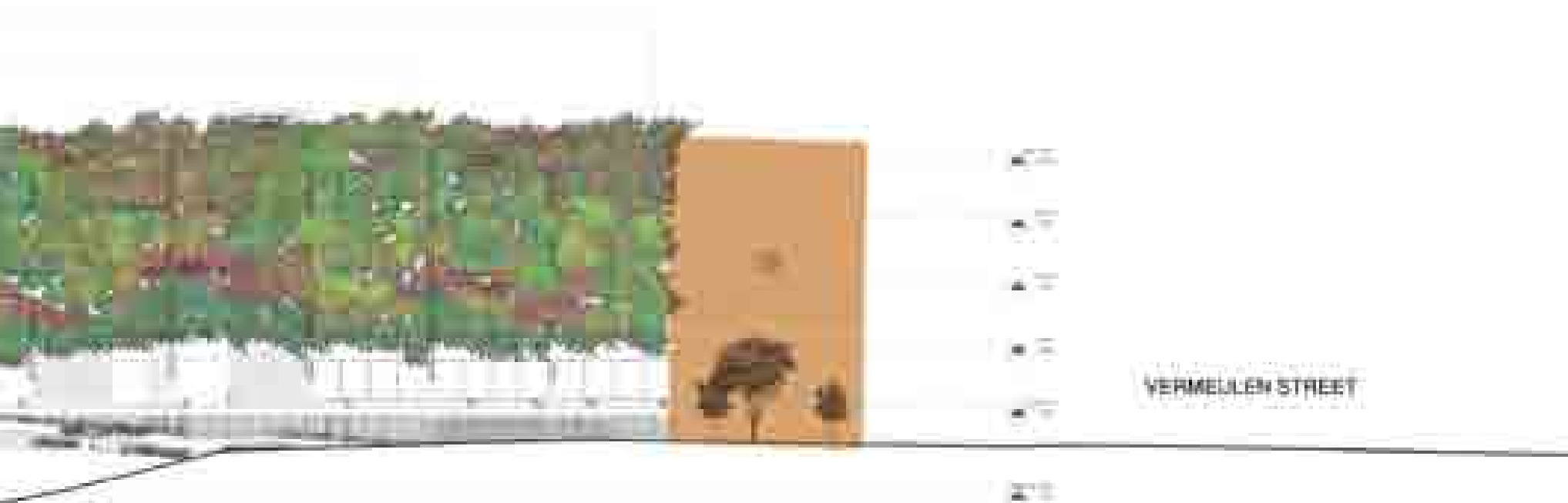
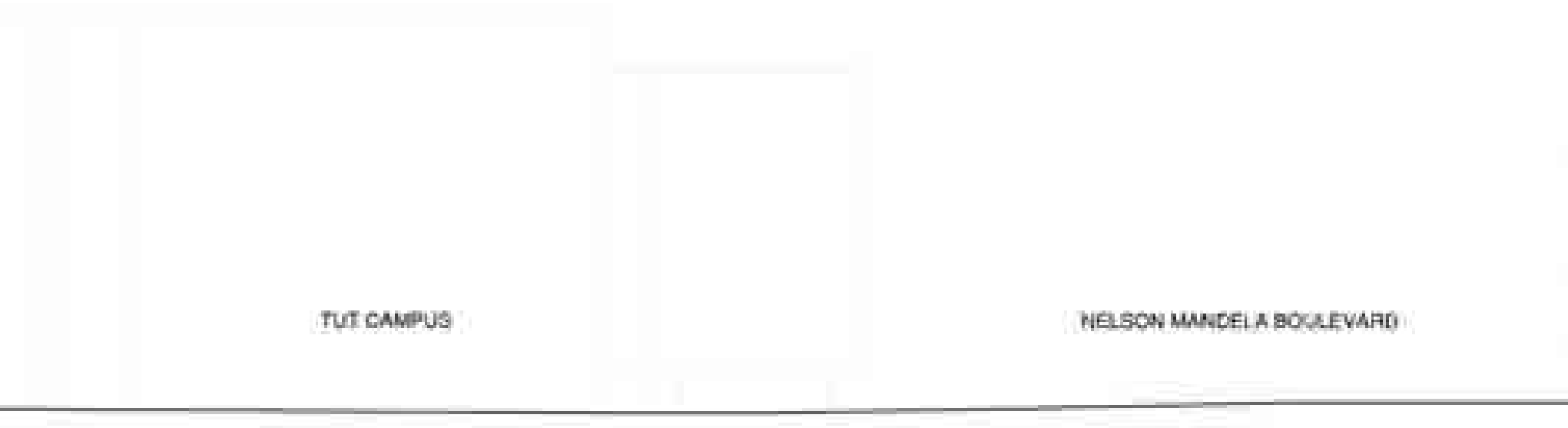




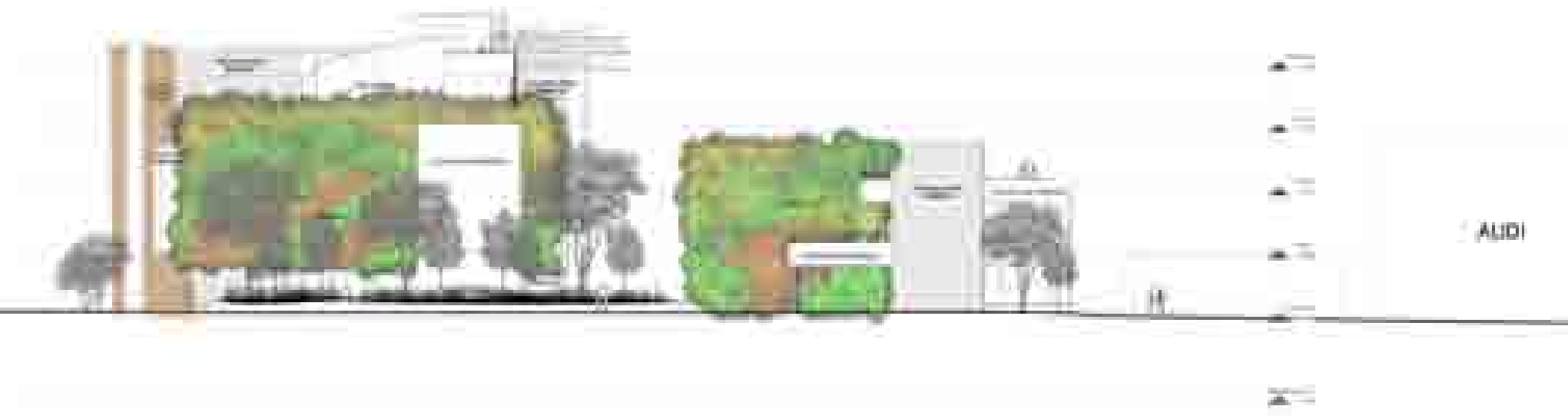
Fig. 89 east elevation not too scale

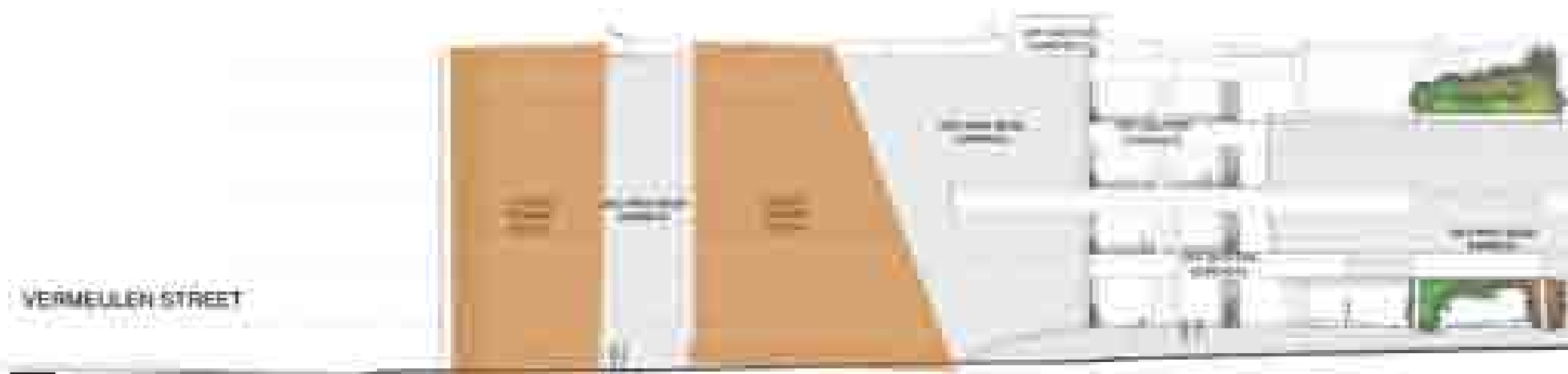




90

Fig. 90 south elevation not too scale





91

Fig. 91 west elevation not too scale



Fig. 92 north elevation and context not too scale

92





Fig. 93 east elevation and context not too scale

93





Fig. 94 south elevation and context not too scale

94





Fig. 95 west elevation and context not too scale

95





Fig. 96 section through the green tower not too scale

96





Fig. 97 section through the green auditorium not too scale

97



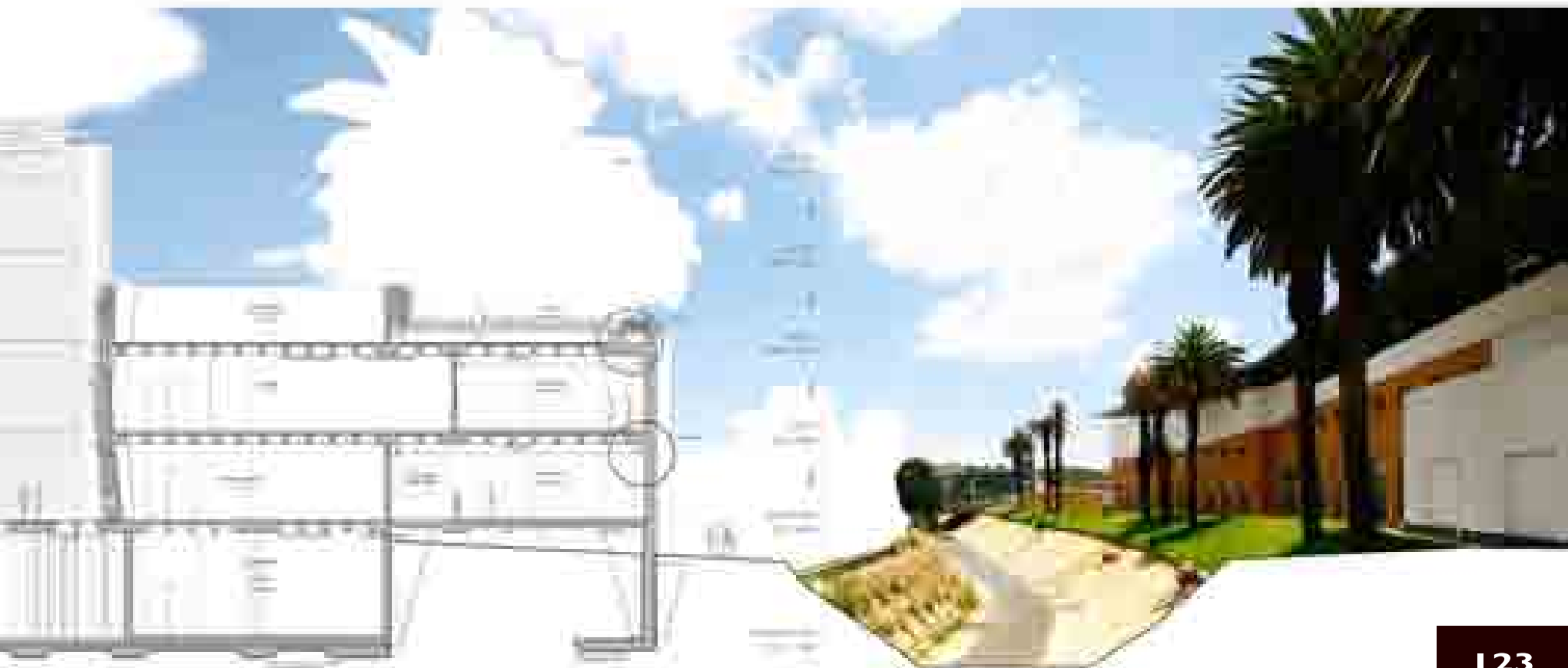


Fig. 98 south west perspective and context

98





Fig. 99 north west perspective and context

99





Fig. 100 south perspective and context

100

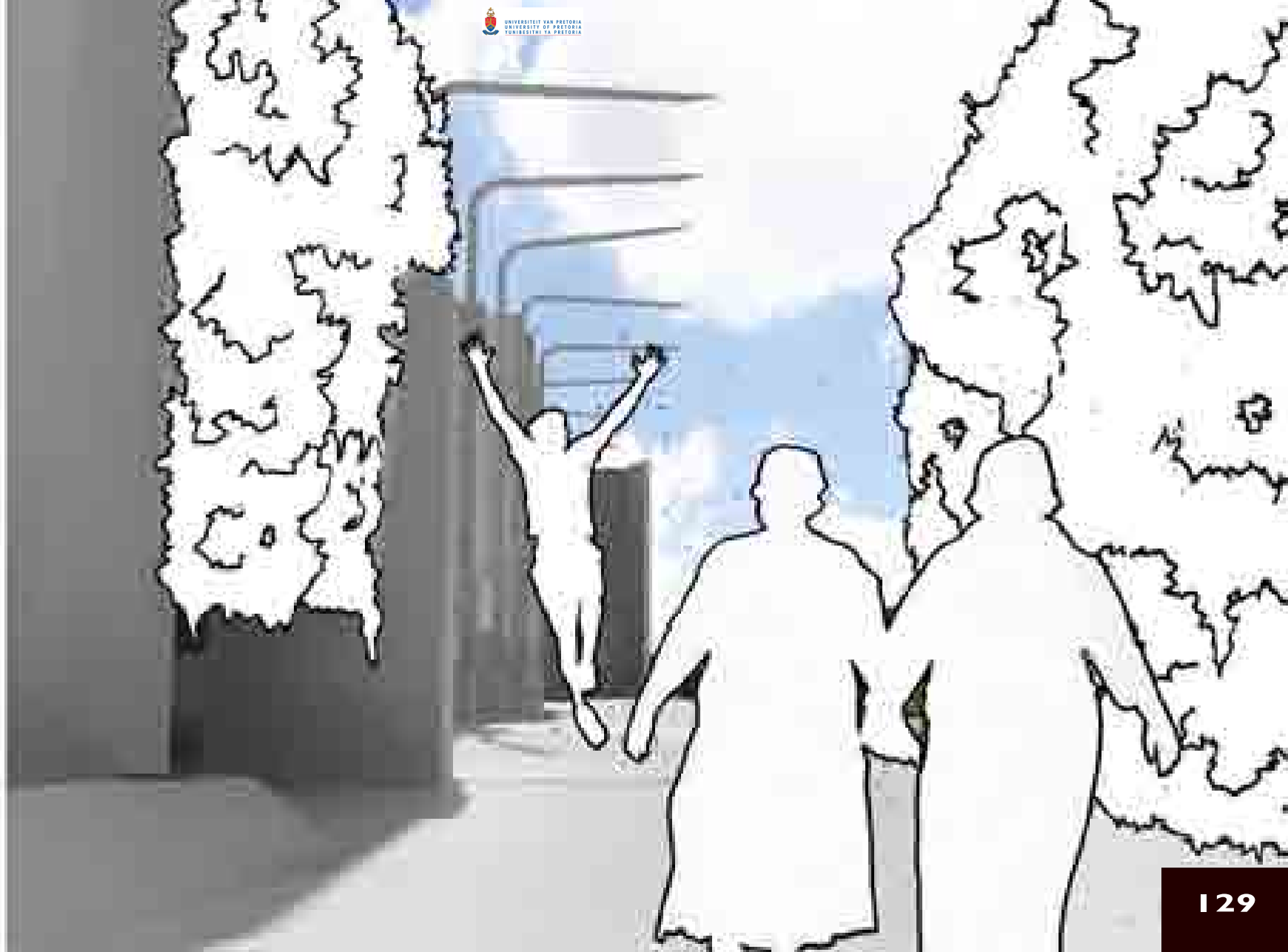
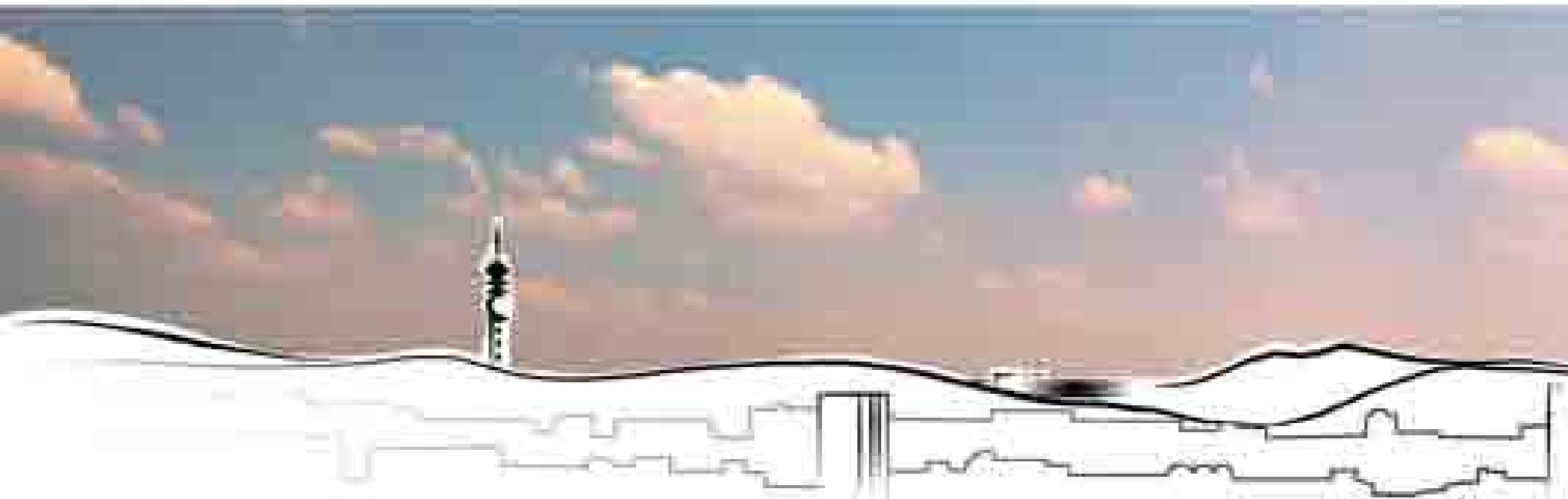


Fig. 101 north perspective and context

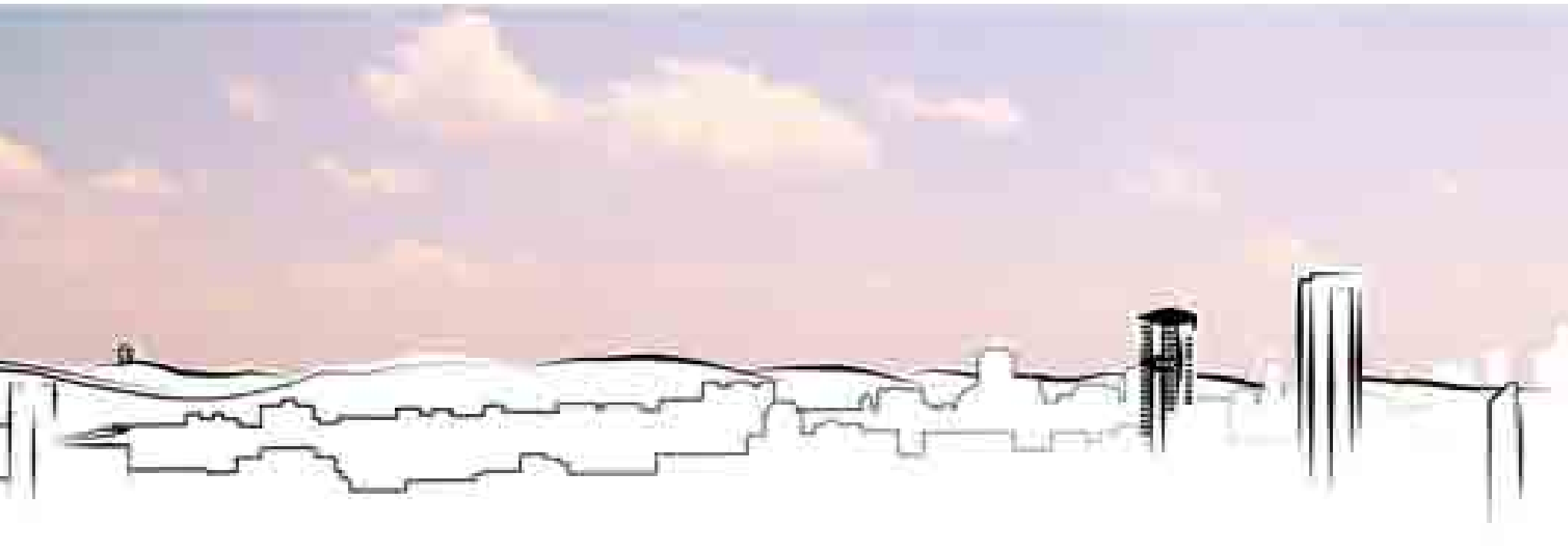
101







Technical investigation



According to Gottfried Semper the building crafts can be classified into two fundamental procedures; namely "the stereotomics of the earthwork, the repetitions piling up of massive elements to compose volume; and the tectonics of the frame, lightweight components composed to define a spatial matrix."
[Frampton,1996:5] These two forms play a strong metaphorical role in the relationship between architecture and nature. "The tectonic or frame component has an affinity to the sky, where as the stereotomic has an affinity to the earth, dissolving there in." [Frampton,1996:7]

Both components are further discussed in the technical investigation, with the primary focus on the tectonic component as defining character of the project.

Fig. 102 cardboard concept model

Fig. 103 mass concrete structure

Stereotomic_

A mass concrete structure was chosen as the load bearing component of the project. Concrete is a regionally recognised material and the raw beauty of the unfinished material makes it a very expressive architectural component. The dense mass of concrete allows for a passive climate control within the building minimising energy requirements in that respect. The structure forms a skeleton framework , within which a non-load bearing internal layout can be erected as spatial requirements stipulate. The internal spaces are made more accommodating by incorporating



102



103

access floors and suspended ceilings.

The building's structural component originates from the basement. The basement provides vehicular parking and houses the building's plant room and respected service rooms.

The basement employs a combination tanked and infiltration system against horizontal and vertical ground water pressure. [see detail] The infiltrated water is drained to mechanical sumps, placed at selected points, and pumped into water catchment tanks to be used in irrigation. The Northern third of the basement is naturally ventilated through the perforated

Fig. 104 basement plan not too scale



Western and Eastern façades. Strategically placed extraction fan system installed along the Southern retaining wall draws fresh air from the Northern third of the basement. Water infiltration from the public square is managed via a system of drip trays, ultimately draining the water to water catchment tanks. Planters on the ground level are placed strategically above columns to carry extra load as well as allow for natural migration tendencies of the public square users. The basement is designed to have a floor-to-ceiling height of 5,1m allowing for services to run overhead leaving a clearance height of 4,5m to admit service and emergency vehicles into the basement, as it provides facilities for deliveries and waste removal.

The entrance to the basement is on the Northern boundary of the site from Vermeulen Street. Access is governed



by security booms at the entrance to the basement. Access to the building are provided by lift and stair shafts that continue through to the various levels above.

The column grid was influenced by the interplay between the rigid grid of the city and the natural grid of the Apies River. A primary grid spacing of 8,4m x 5m x 7,5m is chosen to provide space for an economical parking layout. A 230mm x 460mm reinforced concrete column is recommended by Carl von Geyso [structural engineer, during interview with the author], as the column size meets load bearing requirements but still creates the feeling of a light connection. The reinforced two-way coffer slab has a depth of 510mm, the deeper slab is favoured to reduce the amount of steel reinforcing required.

The exhibition building being raised from the ground floor level led to the metaphorical use of a 'forest' floor with tree trunks punching through the ground carrying the canopy above. Reinforced concrete columns with a 300mm diameter is chosen for the 'concrete forest'.

The flat roof construction allows for future vertical expansion, hopefully increasing the

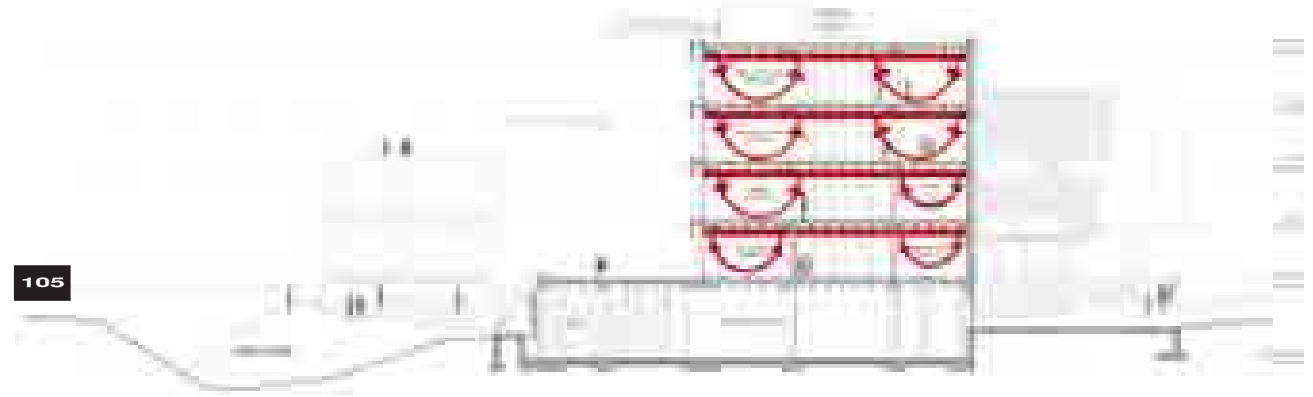
building's overall life span. It also allows for a roof garden on the third level with a tower element punching through the floor. The large expanse of the flat roof accommodate even more water harvesting for irrigation.

Each component of the building has a dedicated service shaft with the major part of the services running within the suspended ceiling void. Passive ventilation alone in such a large building cannot create a comfortable environment for its users thus a sealed system consists of double glazed windows sealing the interior workspace with an ice pack chiller system cooling incoming fresh air. Each floor has two sub chillers one dedicated to the East half of the workspace and the other to the West. The ventilation system used for

the toilets can be reversed at night to draw cold night air into the buildings ceiling voids through the use of timer controlled vents, cooling the buildings structure throughout. Reducing the amount of energy required to climatise the building during the day.

Fig. 105 diagrammatic section not too scale

Fig. 106 patrick blanc collage



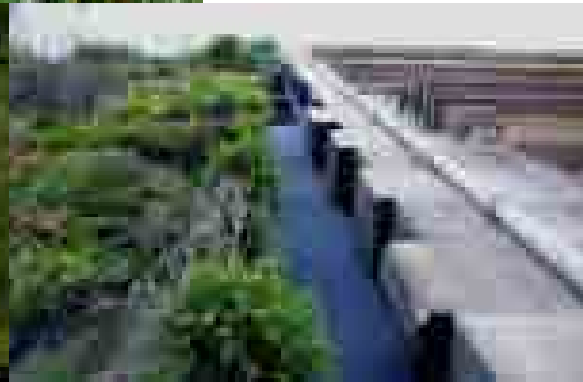
Tectonic_

The primary focus of the tectonic investigation is the vegetated walls of the auditorium, exhibition tower and kitchen. The 'Vegetal Wall' patented by French Botanist, Patrick Blanc is investigated and an adaption of his system for our climate is proposed. The plant selection for these vegetated walls is also included in the investigation. These vegetated walls defines the projects character and is the literal interpretation of the relationship between architecture and nature.

Patrick Blanc has worked with many prominent architects; Jean Nouvel, Herzog & de Meuron to name a couple. His work can be found all over the globe. He says that plants does not soil to grow, it is purely a mechanical support. Plants only need water and the minerals that are dissolved therein, coupled with light and carbon dioxide to conduct photosynthesis.

The system Blanc employs is very simplistic in its composition. A metal frame is fixed to

a structural wall, followed by a 10mm thick sheet PVC riveted to the metal frame to make the system rigid and act as the waterproofing. Two layers of rot proof nylon felt is stapled to the PVC layer. The capillary qualities of the felt allows water to travel effectively throughout the installation. The water is supplied from the top of the installation via a drip system. A carefully calculated amount of minerals and nutrients is injected into the water supply at regular intervals. The excess water drains into a trough and is pumped back to the top. Blanc places plants that are more drought hardy at the top of his installations while placing pants that enjoy more shade and moisture at the bottom. If the plant selection is done properly Blanc says that maintenance only needs to be done every two months. The cost of the installation runs at approximately R 1450.00 p/m² excluding plant selection and labour.



The proposed adaptation of Blanc's 'Vegetal Wall' has the following additions:

- The PVC sheet is reduced to a 5mm thickness, effectively halving the cost and weight of the installation
- A coarse weave nylon shade netting is sandwiched in between the two nylon felt layers to accommodate a thicker rooted plant selection

These proposed additions to Blanc's system should make habitation for the plant selection in the South African climate more manageable.

Fig. 107 top detail of green wall not too scale

Fig. 108 bottom detail of green wall not too scale

Fig. 109 prototype and exploded axo of green wall system layers

Fig. 110 plant selection for green walls: (top l to r)

south facing and interior walls_
 adiantum capillus-veneris_maidenhair fern
 pteris vittata, banded fern_clivia miniata, clivia
 impatiens hochstetteri subsp. hochstetteri_wild impatiens
 zantedeschia aethiopica_white arum lily
 plectranthus fruticosus_forest spurflower

north, east and west facing walls_
 dimorphotheca cuneata_bride's bouquet
 lampranthus coccineus_red vygie
 helichrysum splendidum_cape gold
 drosanthemum speciosum_red ice-plant
 archtotheca calendula_cape marigold
 carpobrotus edulis_sour fig
 asparagus densiflorus 'sprengeri'_emerald fern

107

108

109



The plant selection for the vegetated walls need to be made carefully, taking into consideration the orientation, water and sunlight requirements. Only indigenous plants have been considered for the plant selection. The following plants are recommended by De Wet Louw [landscape architect, during interview with the author];

The North and East facing walls need plants with a tolerance for direct sunlight and that require little to moderate watering are selected

The West facing walls need plants that can survive the harsh heat of the afternoon sun

The South facing and interior walls are ideal for plants that require more water and less sunlight

110



Materials_

The material choices for the project are influenced by the colours and textures of the site as well as the need for the materials to be hard wearing and require low maintenance.

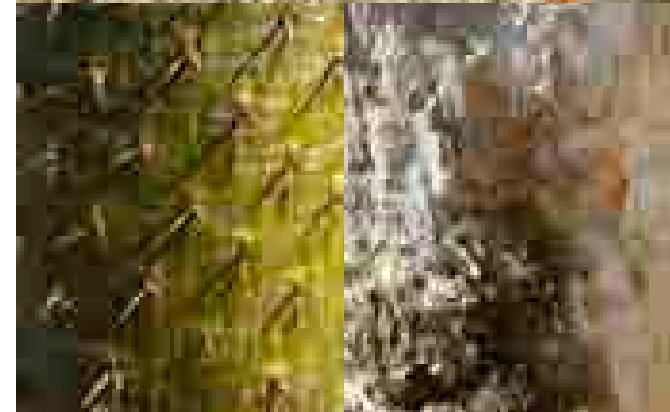
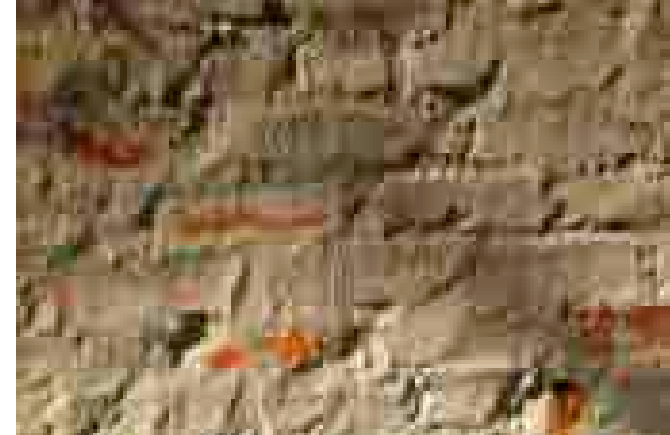
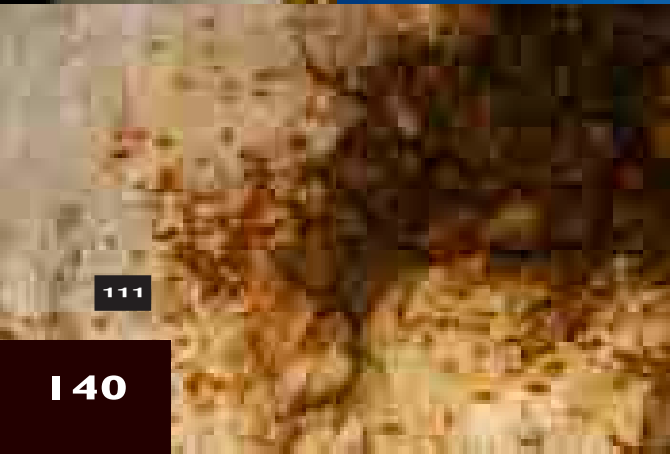
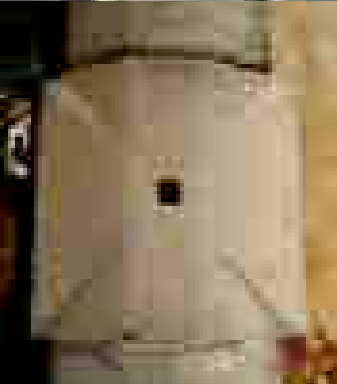
Concrete

Concrete denotes permanence. An unfinished off-shutter finish allows the material to manifest in a natural, raw state. This heavy, dense material forms a strong metaphorical bond with the earth, anchoring the building firmly to the ground.

ECOwood

ECOwood is a wood composite material and is manufactured from a recycled polymer, such as PVC and scrap wood shavings. The end product looks like wood but it lasts longer and needs no maintenance. The product can be bent on site, considering the radius is not too small, by heating the planks with a gas oven to 80°C.

Fig. 111 colours and textures of the site

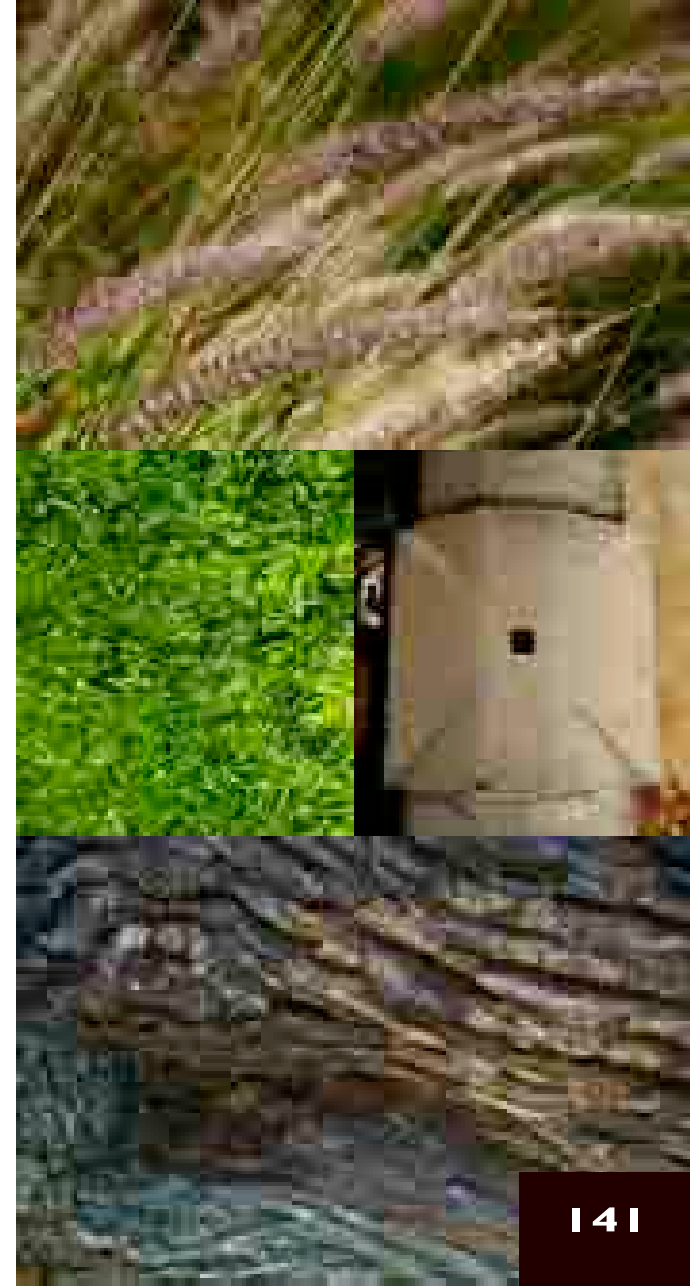
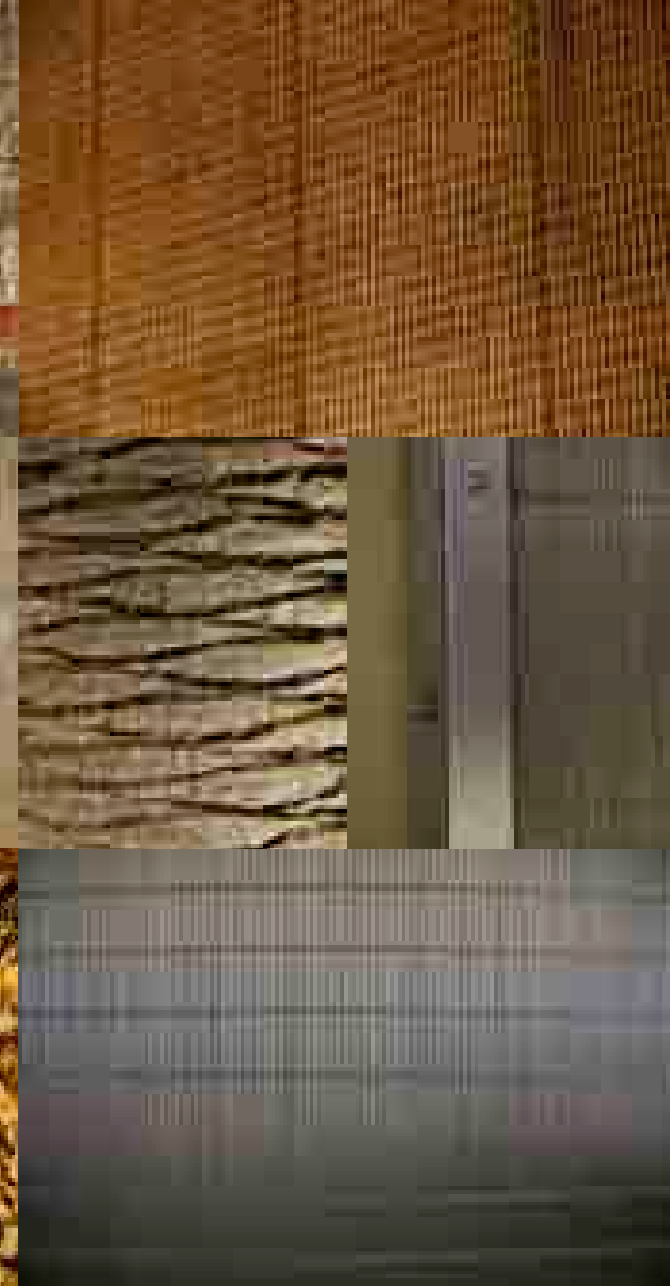


Glazed ceramic blocks

The purpose made glazed ceramic block façade pays homage to Norman Eaton, mirroring his perforated brick façade of The Technical University of Tshwane's science campus. The glazing on the faces of the blocks creates an impermeable surface, making the blocks hard wearing requiring little maintenance and adding an attractive sheen to the block's base colour.

Stainless steel mesh

Stainless steel mesh manufactured by the GKD group is used as an attractive solar screen on the Northern and Western façades. The mesh has a 40% opening ratio adding to the solid appeal of the building during the day and illuminating the exterior at night.



Technical documentation_

Fig. 112 basement parking not too scale

112

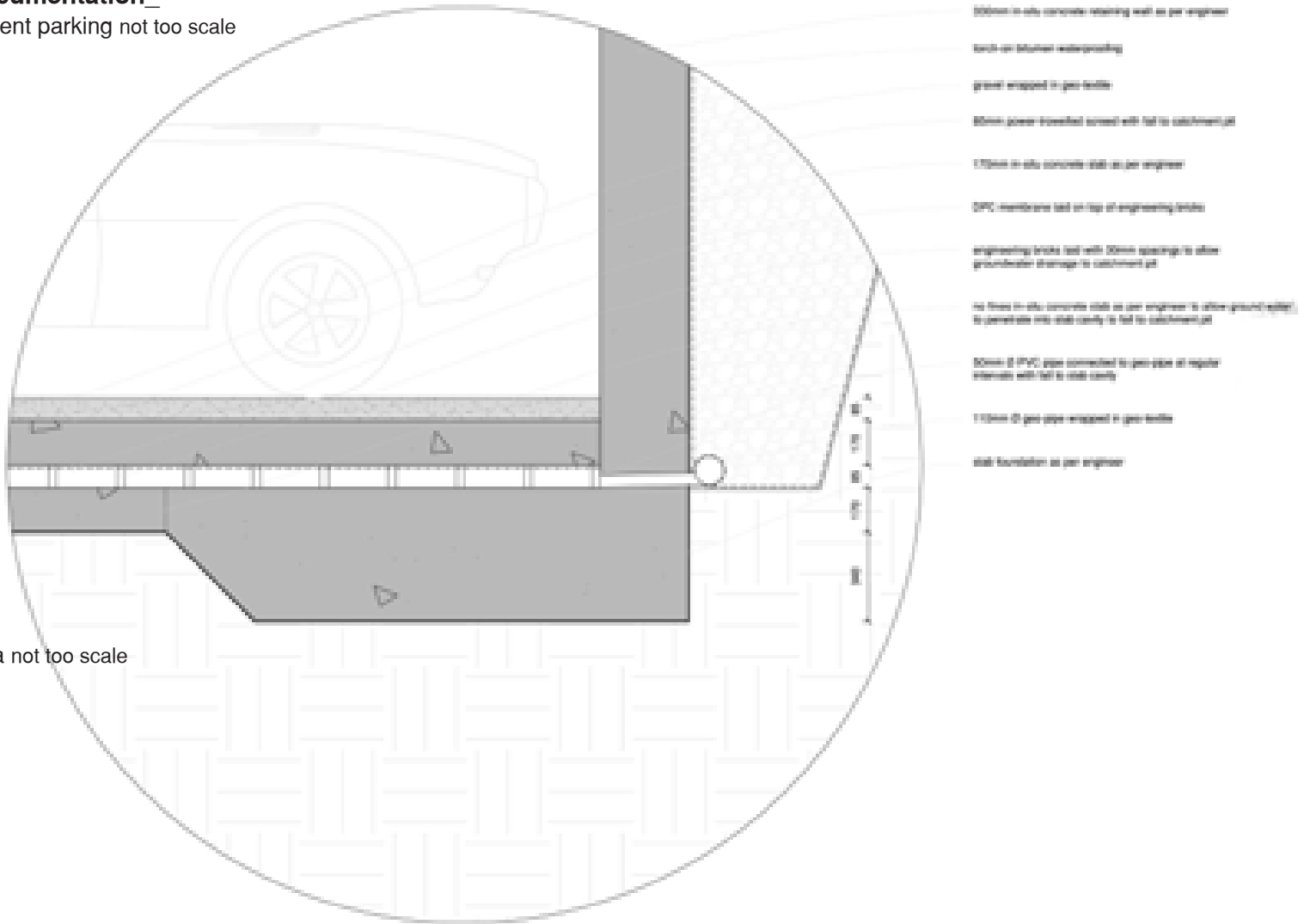
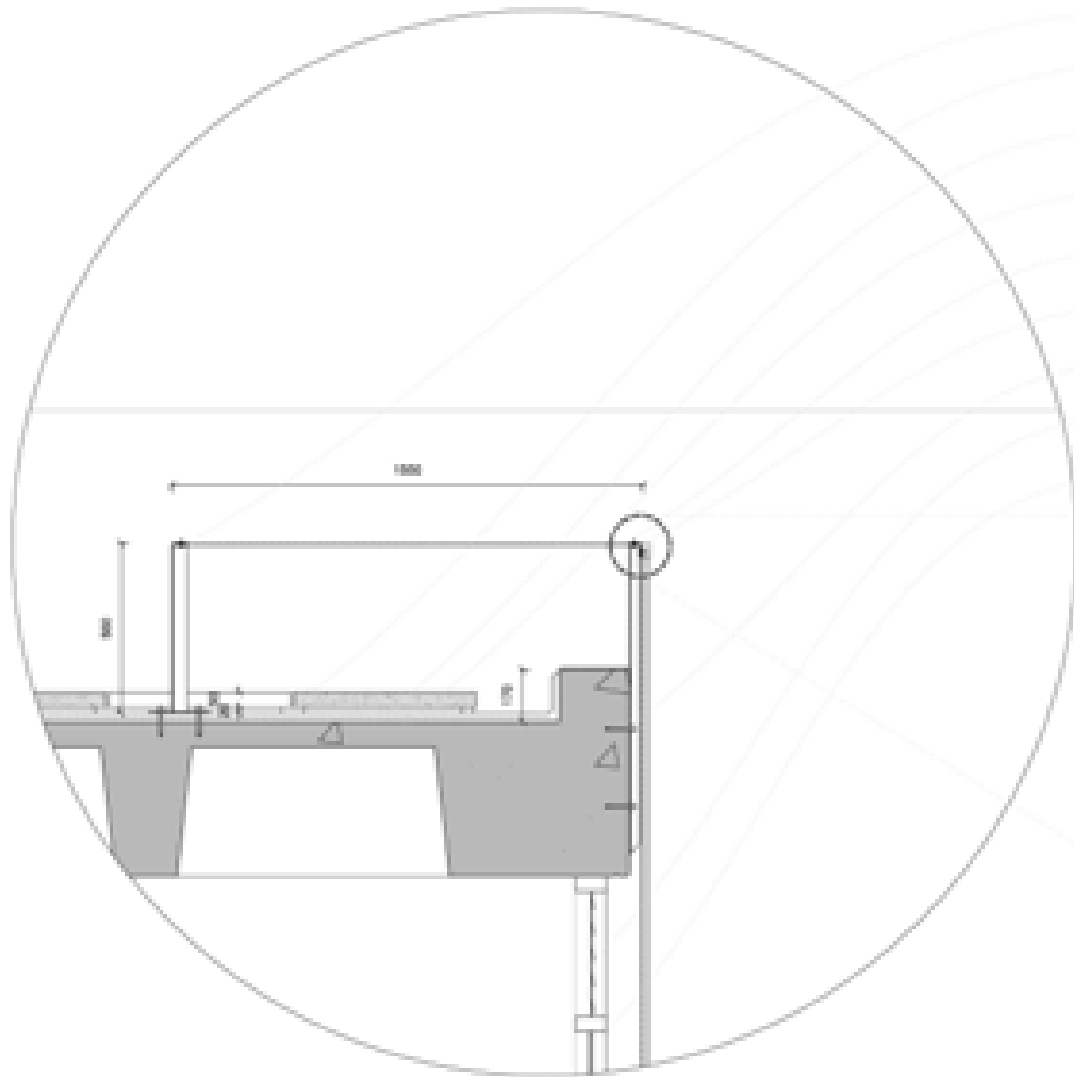


Fig. 113 detail a not too scale

113



- purpose made stainless steel supported to concrete slab
- 600 x 100mm pre-cast concrete block placed on 10mm thick rubber sheet
- min 20mm screen with 100 waterproofing or any other approved waterproofing, full to fullness
- 170mm in situ concrete offer slab as per engineer
- 200 stainless steel screen fixed to stainless steel angle
- stainless steel angle fixed to stainless steel support
- stainless steel support bolted to concrete slab
- aluminium slotted panel for ventilation
- double glazed curtain wall

Fig. 114 ground floor not too scale

114

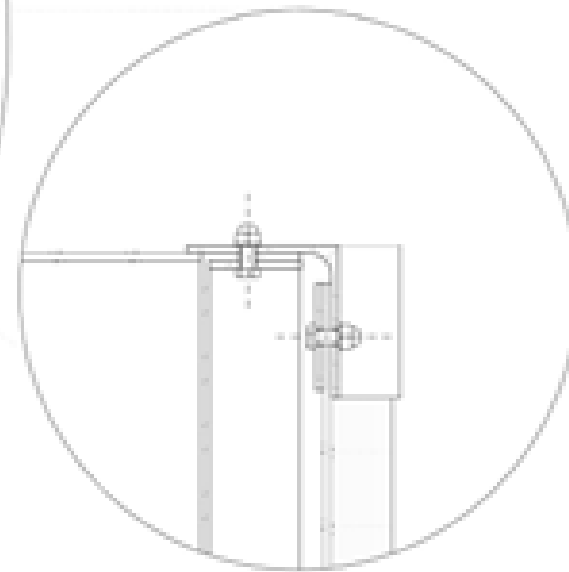


Fig. 115 detail b not too scale

115

Fig. 116 first floor not too scale

116

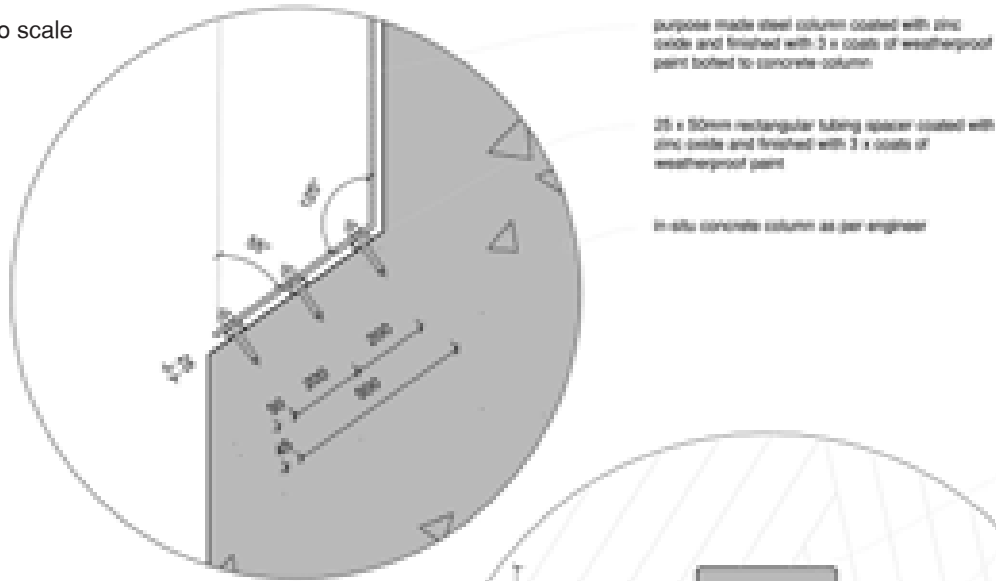
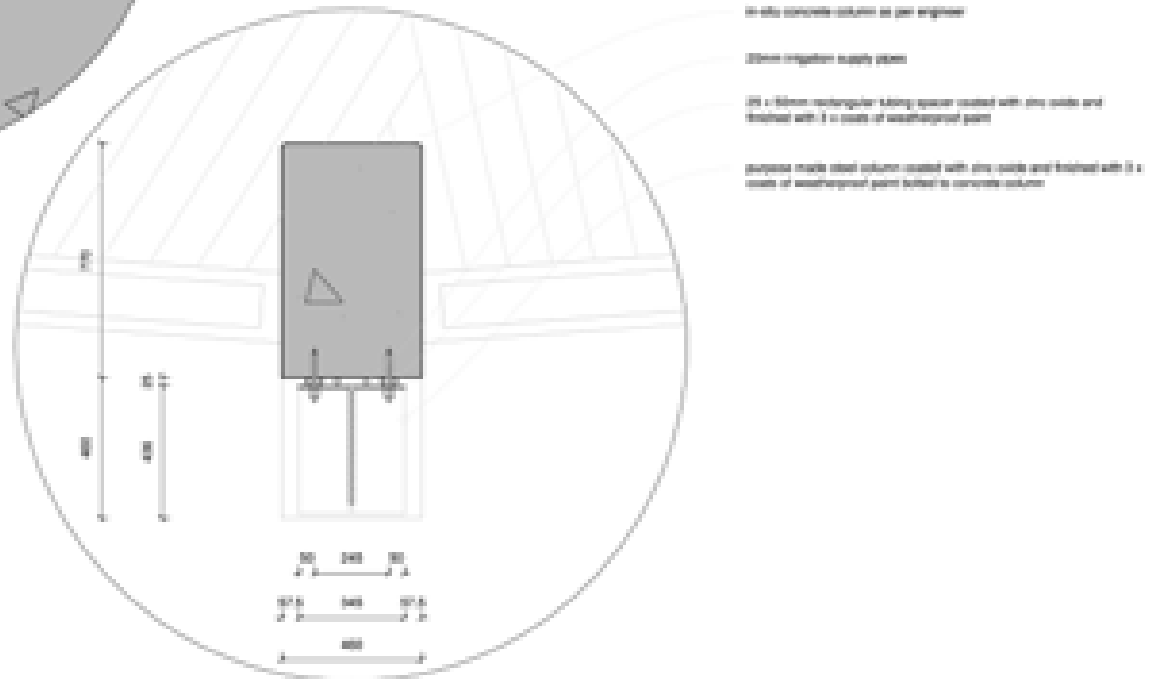


Fig. 117 detail c not too scale

Fig. 118 detail d not too scale

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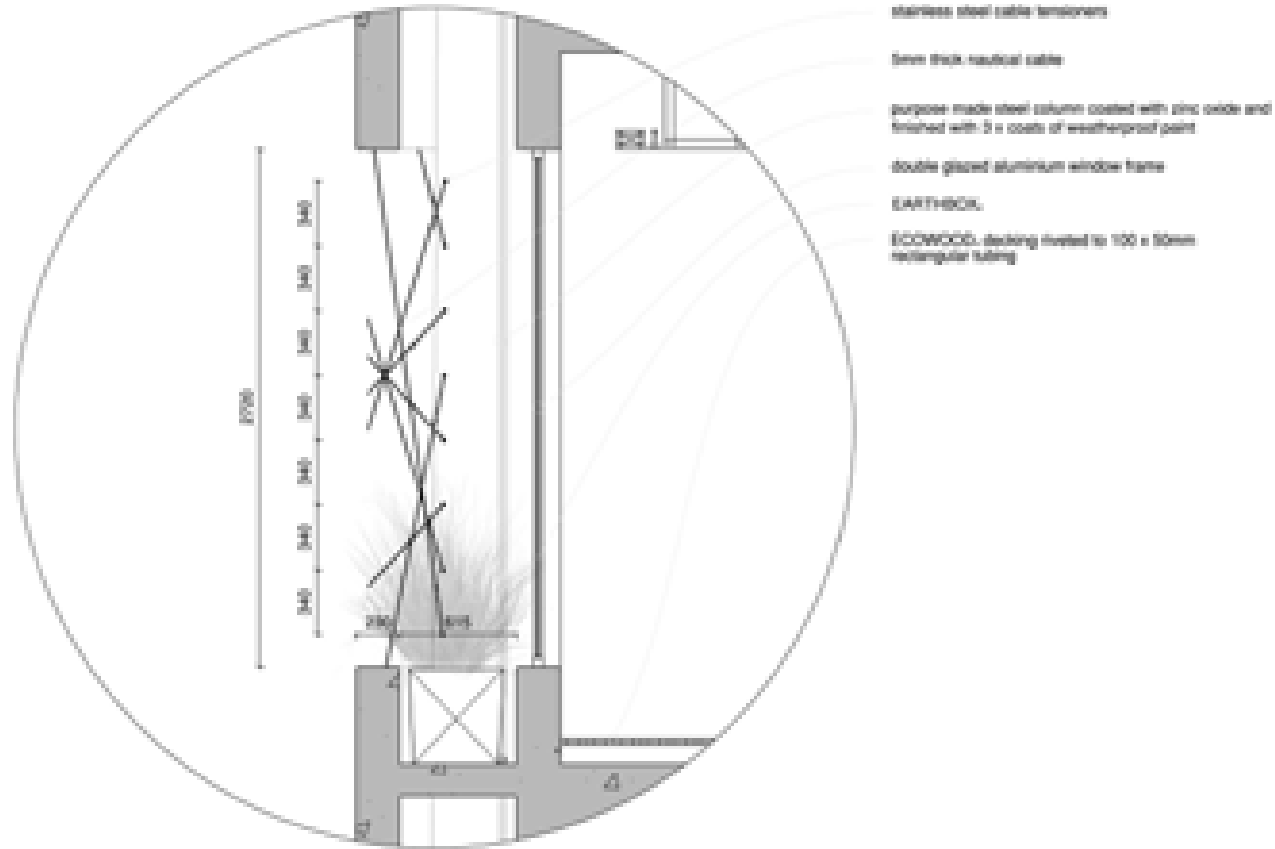


Fig. 119 second floor not too scale

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Fig. 120 detail e not too scale

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Fig. 121 third floor not too scale

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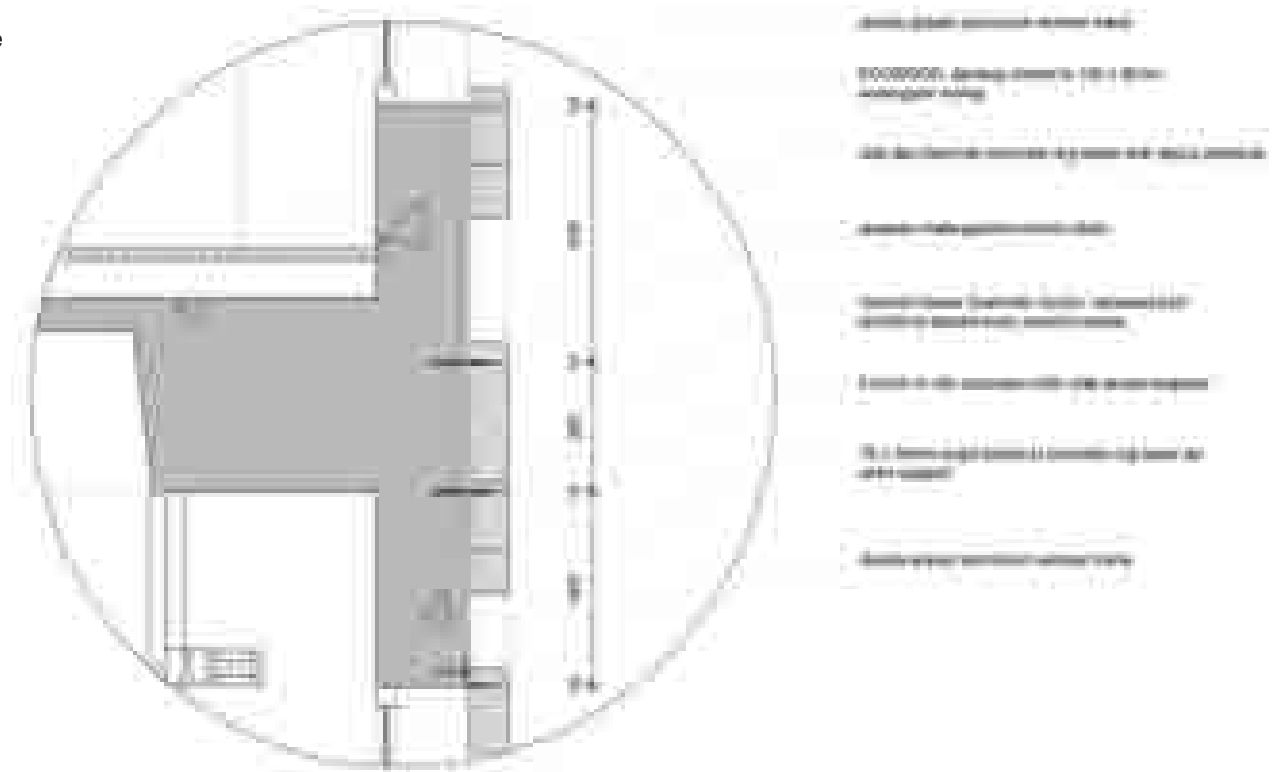


Fig. 122 detail f not too scale

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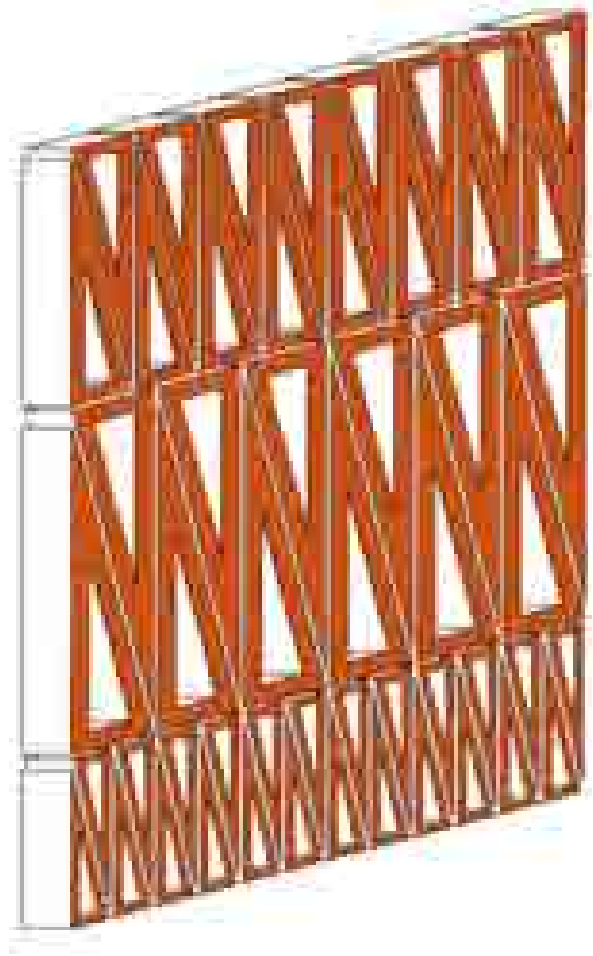
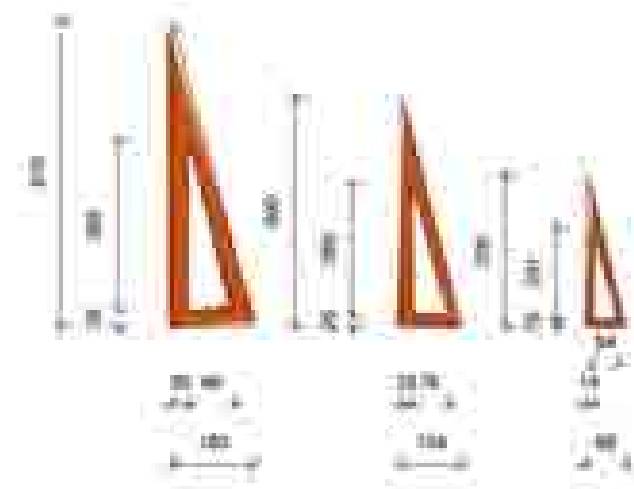


Fig. 123 roof plan not too scale

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Fig. 124 axonometric of ceramic blocks not too scale



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Fig. 125 north & south elevations not too scale

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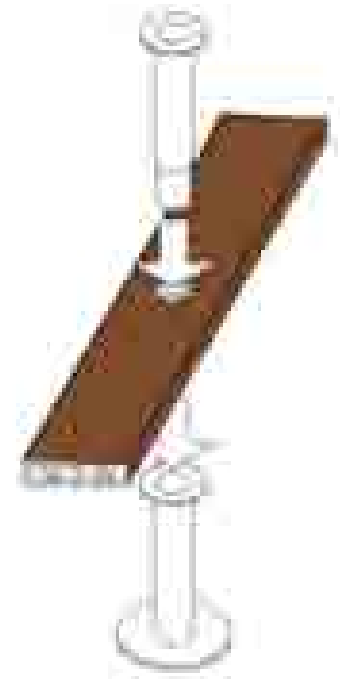
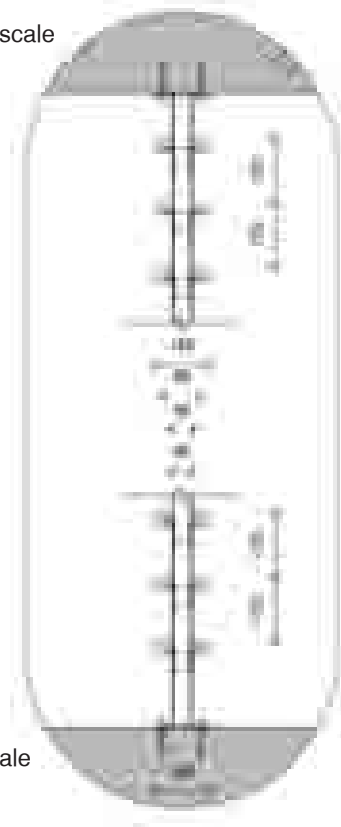


Fig. 126 detail g not too scale

Fig. 127 axonometric of screen not too scale

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127



Fig. 128 east elevation not too scale

Fig. 128 west elevation not too scale

Fig. 129 detail h not too scale

Fig. 130 detail i not too scale

Fig. 131 detail j not too scale

Fig. 129 detail h not too scale

Fig. 130 detail i not too scale

Fig. 131 detail j not too scale

Fig. 129 detail h not too scale

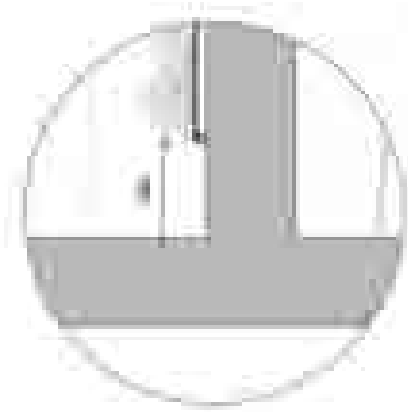
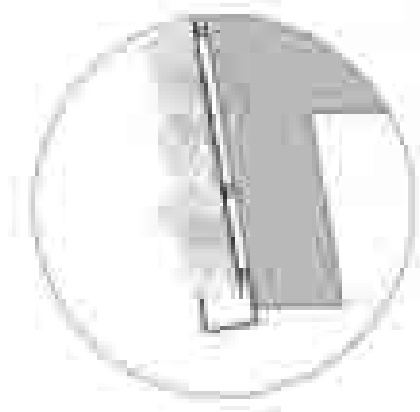


Fig. 128 east elevation not too scale

Fig. 128 west elevation not too scale

Fig. 129 detail h not too scale

Fig. 130 detail i not too scale

Fig. 131 detail j not too scale

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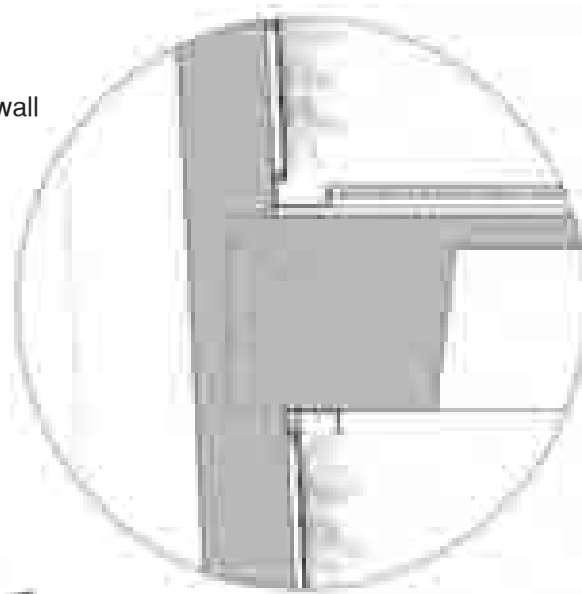
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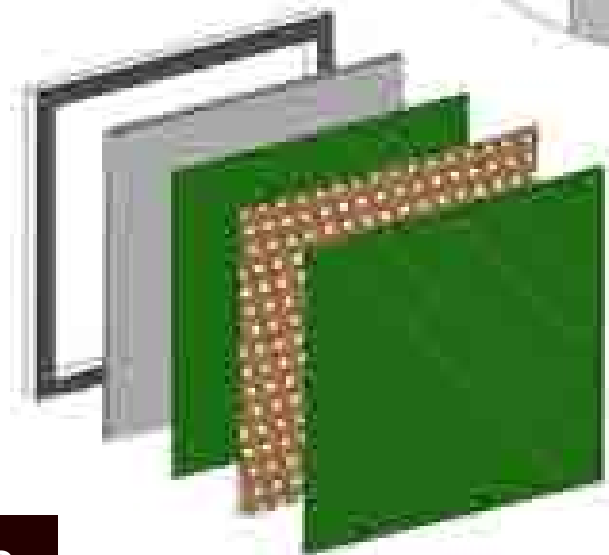
Fig. 129 detail h not too scale
Fig. 130 detail i not too scale
Fig. 131 detail j not too scale

Fig. 132 section aa not too scale
 Fig. 133 detail k not too scale
 Fig. 134 axonometric of vegetal wall
 not too scale

132
 133
 134



- 132 (a) Section aa not too scale
- 133 (b) Detail k not too scale
- 134 (c) Axonometric of vegetal wall not too scale



- 132 (a) Section aa not too scale
- 133 (b) Detail k not too scale
- 134 (c) Axonometric of vegetal wall not too scale



1. Roof
2. Wall
3. Floor
4. Column
5. Foundation
6. Ground level
7. Section line

Fig. 135 section bb not too scale

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Fig. 136 detail I not too scale

136

Fig. 137 section cc not too scale

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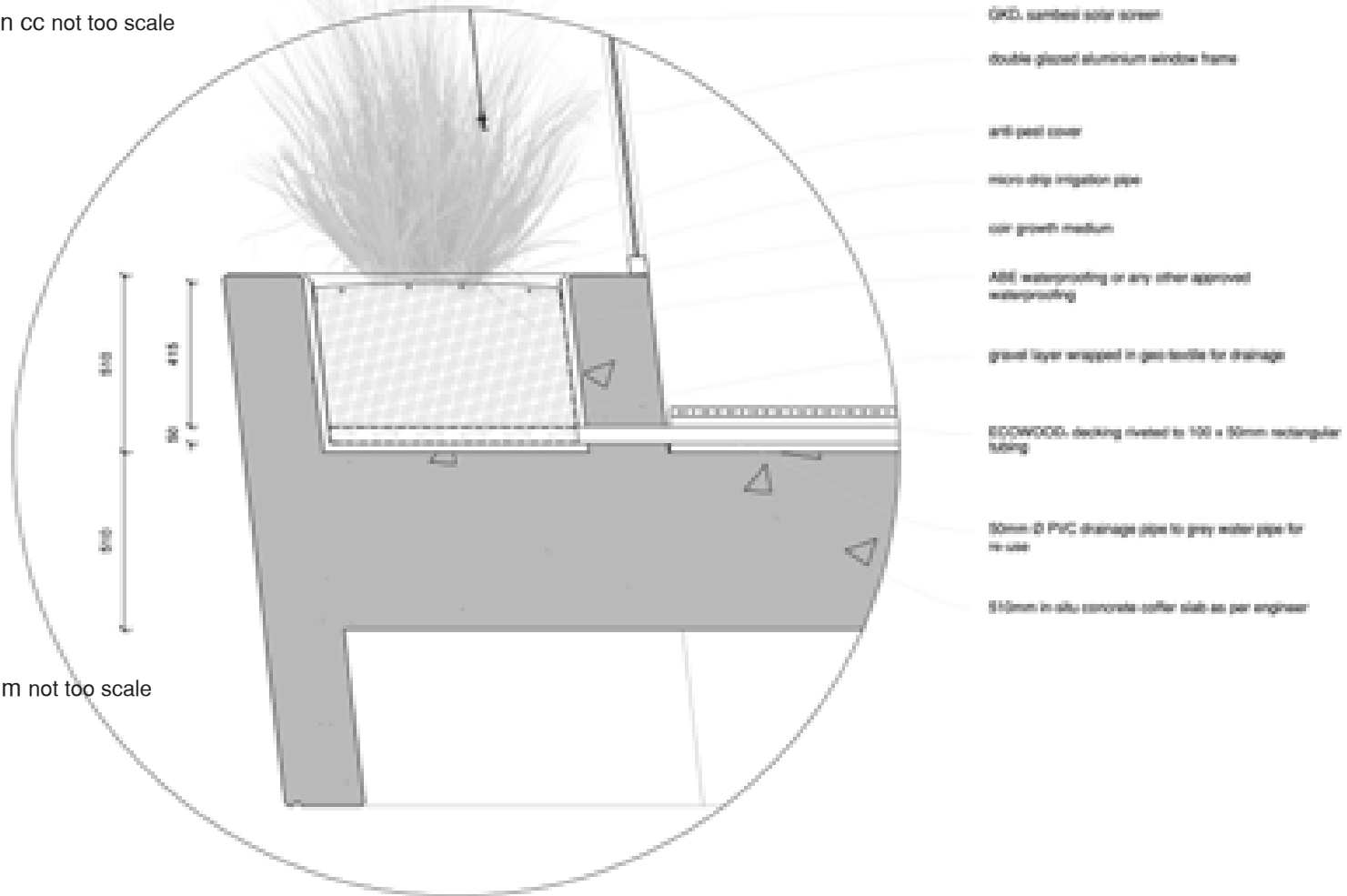
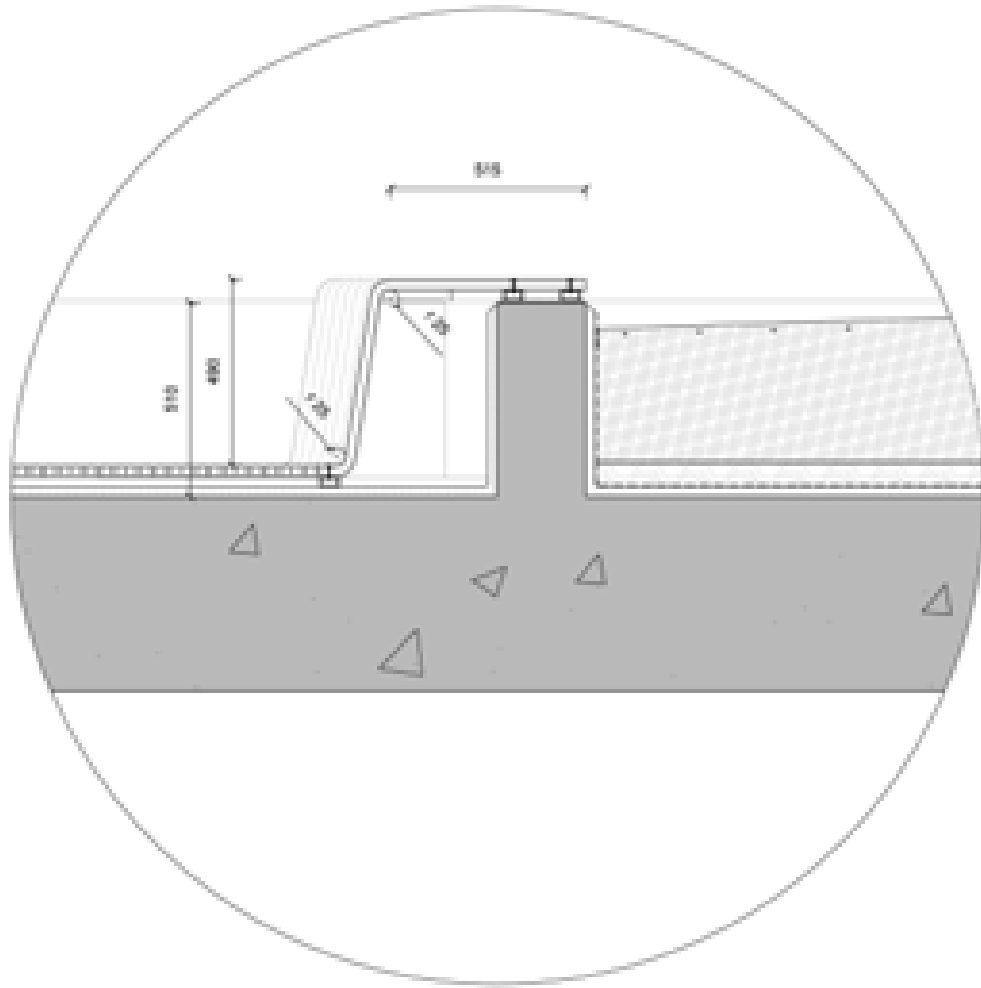


Fig. 138 detail m not too scale

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ECCOWOOD, tubing inverted to 25 x 50mm rectangular tubing

Fig. 139 section dd not too scale

anti-pest cover

micro-drip irrigation pipe

soil growth medium

ABE waterproofing or any other approved waterproofing

139

gravel layer wrapped in geo-textile for drainage

510mm in situ concrete coffer slab as per engineer

Fig. 140 detail n not too scale

140

Fig. 141 section ee not too scale

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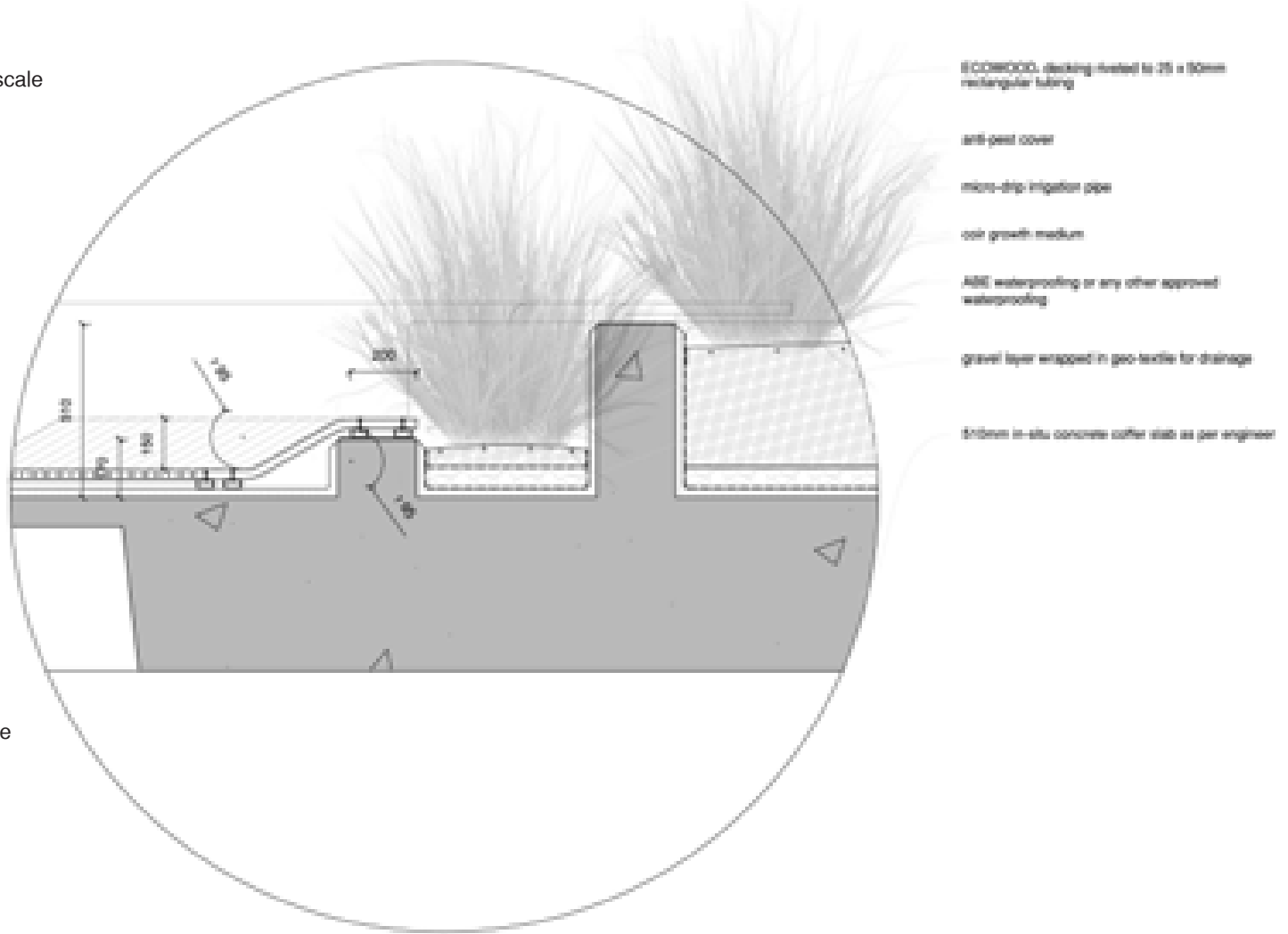
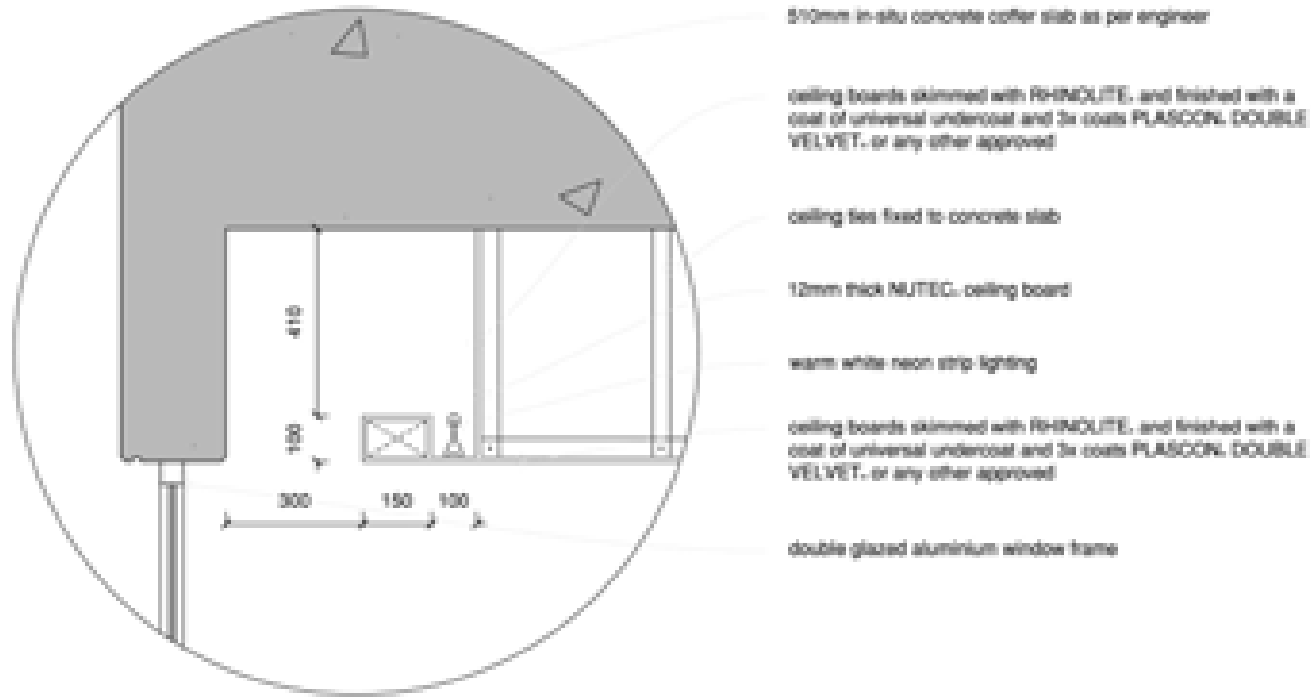


Fig. 142 detail p not too scale

142



510mm in-situ concrete coffer slab as per engineer

ceiling boards skimmed with RHINOULITE, and finished with a coat of universal undercoat and 2x coats PLASCON DOUBLE VELVET, or any other approved

ceiling ties fixed to concrete slab

12mm thick NUTEC ceiling board

warm white neon strip lighting

ceiling boards skimmed with RHINOULITE, and finished with a coat of universal undercoat and 2x coats PLASCON DOUBLE VELVET, or any other approved

double glazed aluminium window frame

Fig. 143 section ff not too scale

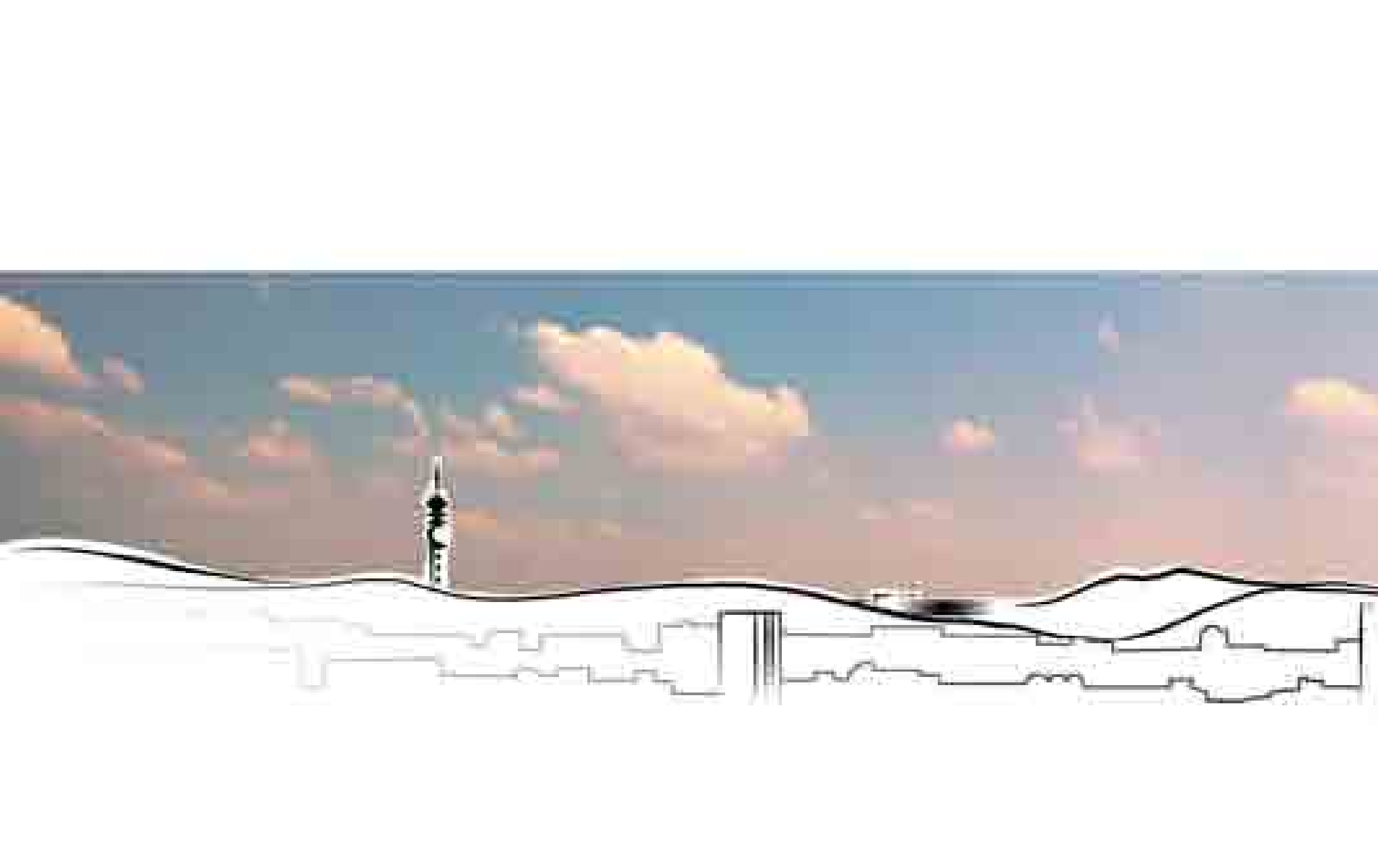
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Fig. 144 detail q not too scale

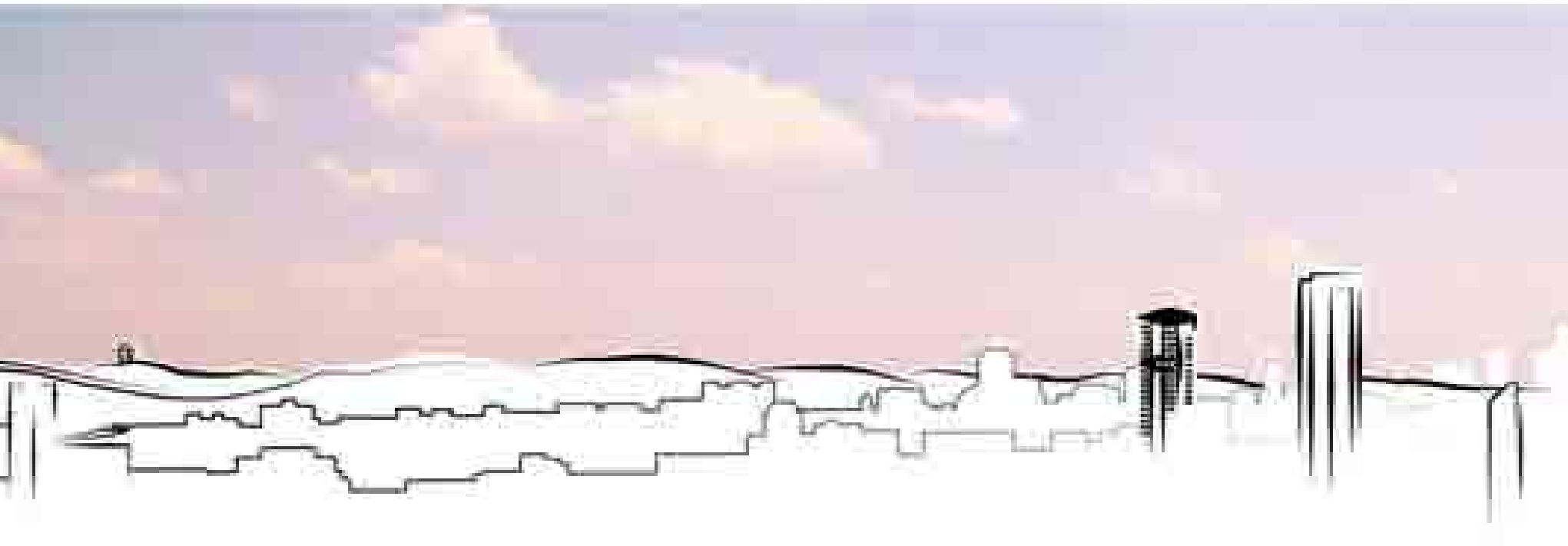
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Fig. 145 section gg not too scale

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Conclusion





The world is constantly changing, presenting us with ever more complex challenges that need to be addressed. Going forward simply thinking sustainably is not good enough anymore. We have to start acting sustainably in order to preserve this treasure that is the Earth. Man and nature have always engaged in a complex relationship, and somehow this relationship has been undermined and forgotten.

We have to re-engage with nature, since we are a vital and integral part of it.

"Each one of us is committed to supervising and guarding the proper arrangement of the earthly landscape, each with his own spirit and hands, in the portion for which he is responsible, so as to avoid passing down to our children a lesser treasure than that left to us by our fathers." William Morris, 1881 [Portogeshi, 1999:15]

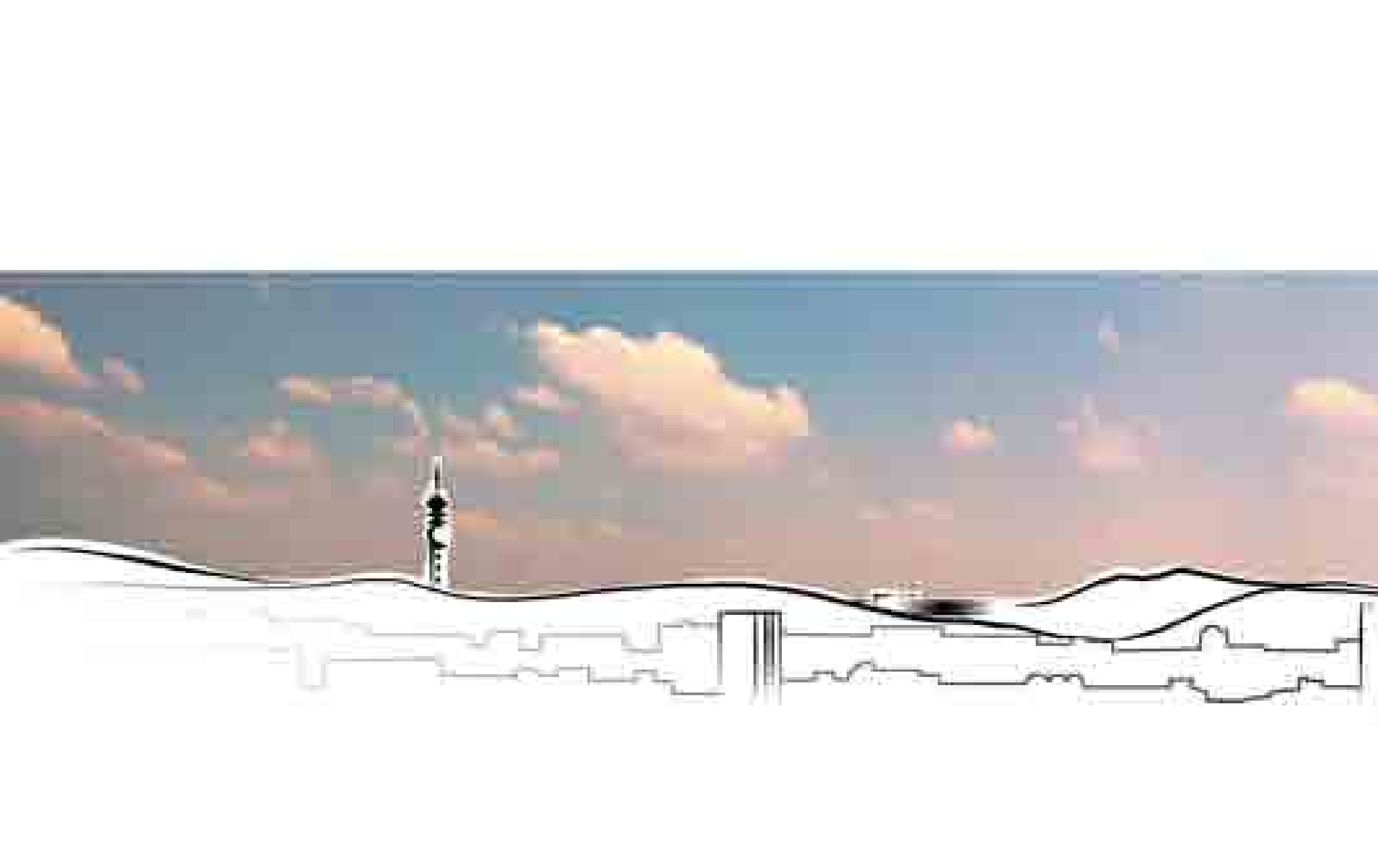
Fig. 146 cliffs of green

The world is constantly changing, presenting us with ever more complex challenges that need to be addressed. Going forward simply thinking sustainably is not good enough anymore. We have to start acting sustainably in order to preserve this treasure that is the Earth. Man and nature have always engaged in a complex relationship, and somehow this relationship has been undermined and forgotten.

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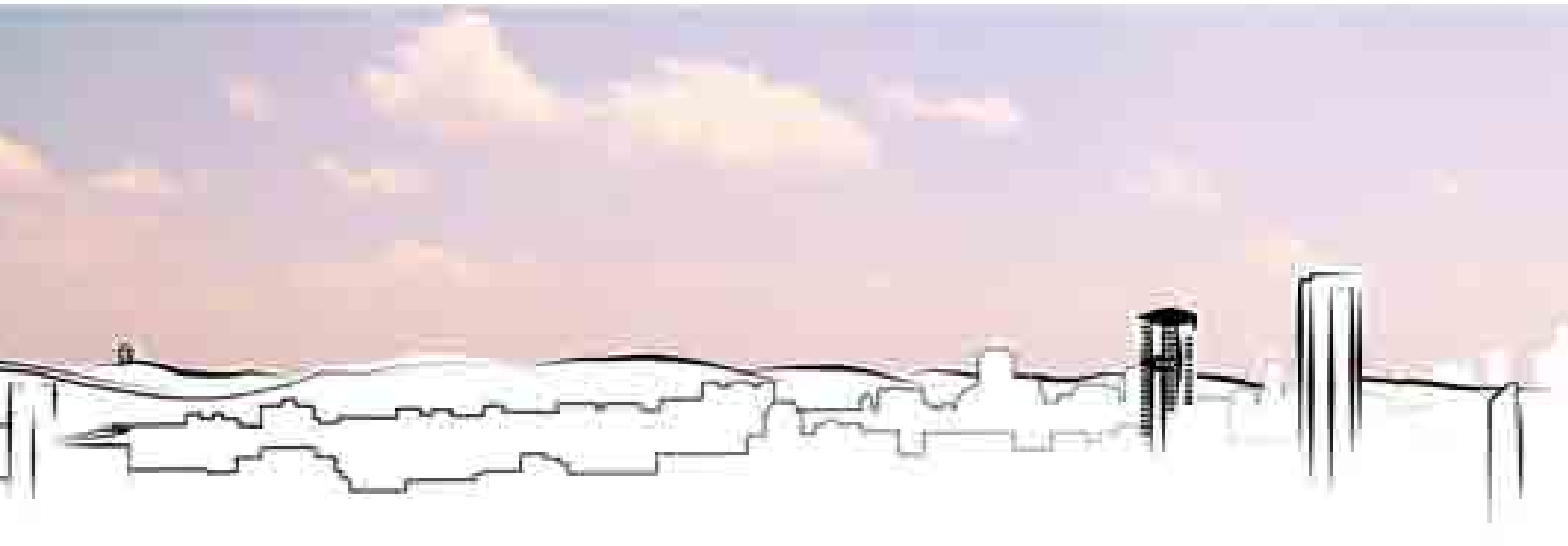
"Each one of us is committed to supervising and guarding the proper arrangement of the earthly landscape, each with his own spirit and hands, in the portion for which he is responsible, so as to avoid passing down to our children a lesser treasure than that left to us by our fathers." William Morris, 1881 [Portogeshi, 1999:15]

Fig. 146 cliffs of green



My sincere thanks to all who inspired, guided, motivated, scolded, assisted and prayed throughout the year

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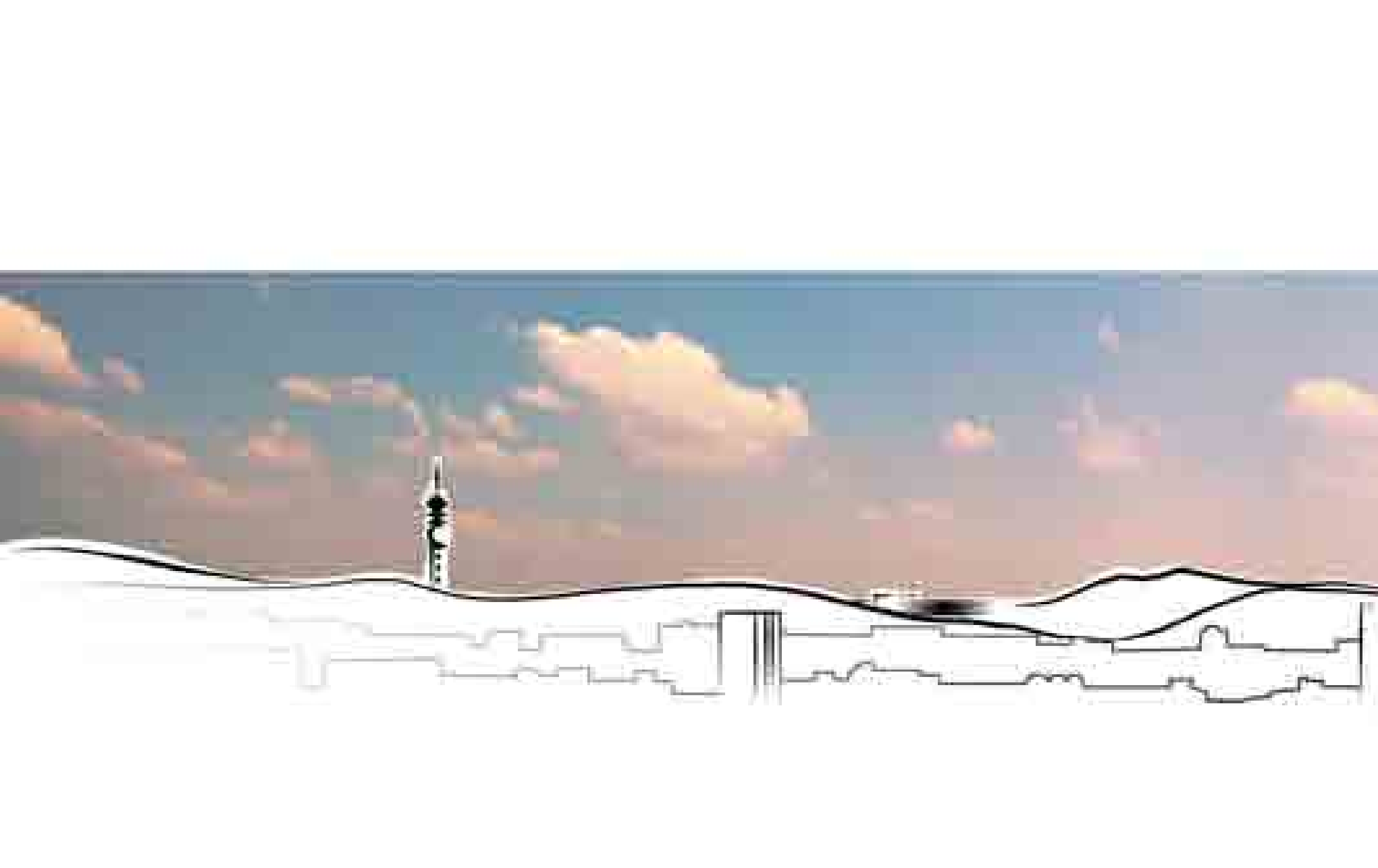
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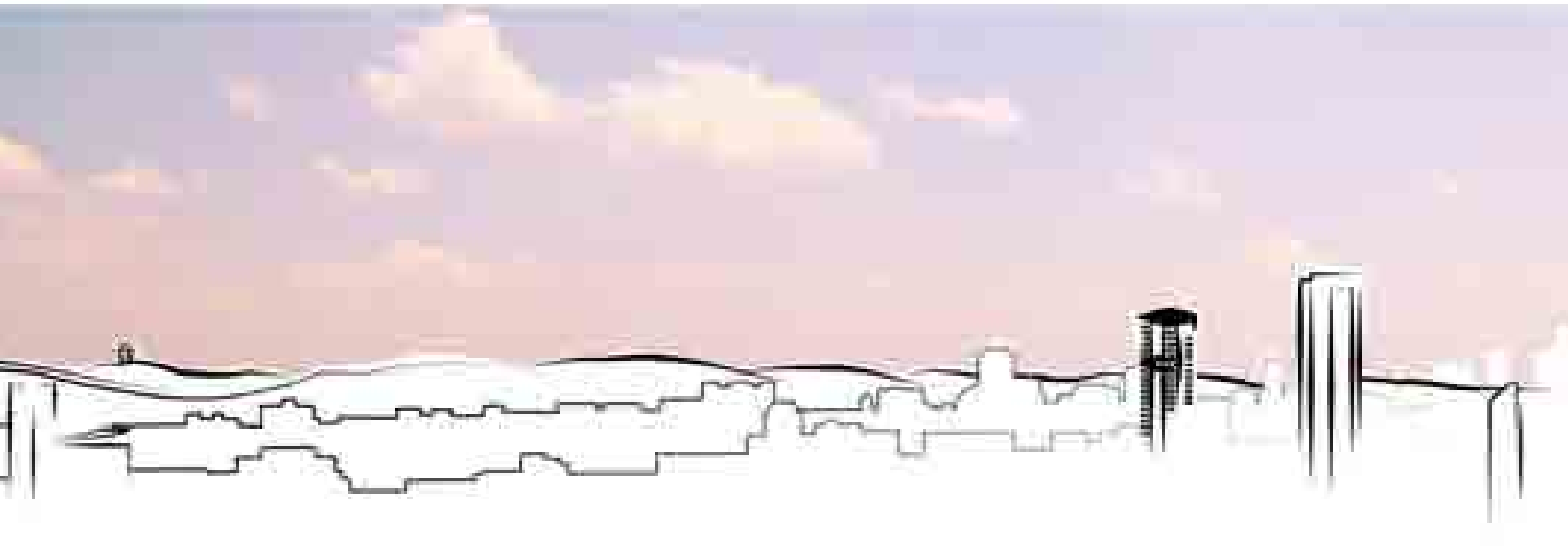
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Addendum



Introduction_

The following lessons learnt after re-evaluating the previous design have been addressed in this addendum:

- The building needs to function as a public building - where as the previous design was mostly inaccessible. The revision has been 'opened' to the public with more access points.
- The building must relate to its surrounding and this has been approached by including balconies and specific view points throughout the design.
- Densification of the building is also addressed by adding more floors while compacting the floors as the levels rise, thus increasing the value of an already valuable property.

The basement layout was re-approached and a mezzanine parking level has been added allowing for 50 extra parking bays. The new layout also caters for delivery, emergency and municipal services while allowing ample space for storage.

The elevations have been re-interpreted by articulating volumes, making the building more legible to the user. The material choices further enhance the articulation of the façades by placing emphasis on the textures, colours and appearance/densities of the materials.

In section, services are re-evaluated:

- By including light wells into the design the amount of natural daylight is allowed deeper into the building
- The large flat roofs allow for rain water harvesting that is used in irrigation of the vegetal walls and landscaping. By replacing potable water with grey water and harvested water in the use of water closets and urinals the potable water can be used in more appropriate ways.

The circulation of a public building was a very important aspect that needed to be addressed. The end result was a layering of different elements:

- The faster routes versus the meandering routes
- The placement of the transitional

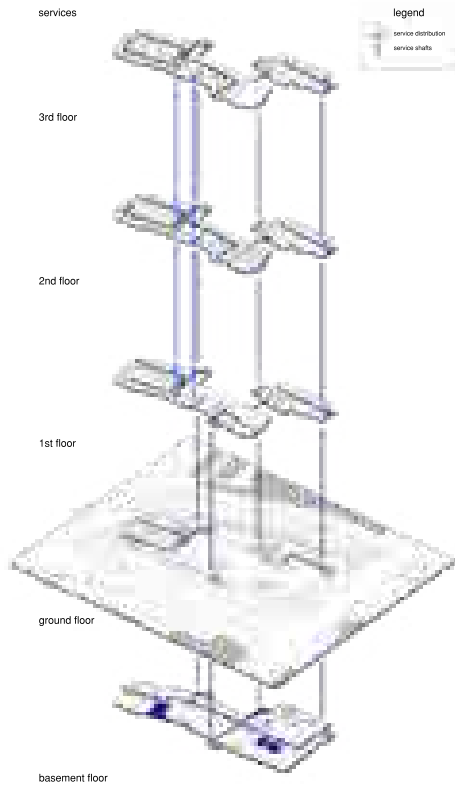
and intermediate spaces

- The transition from public to private

The programme is ultimately the summary of the revised design:

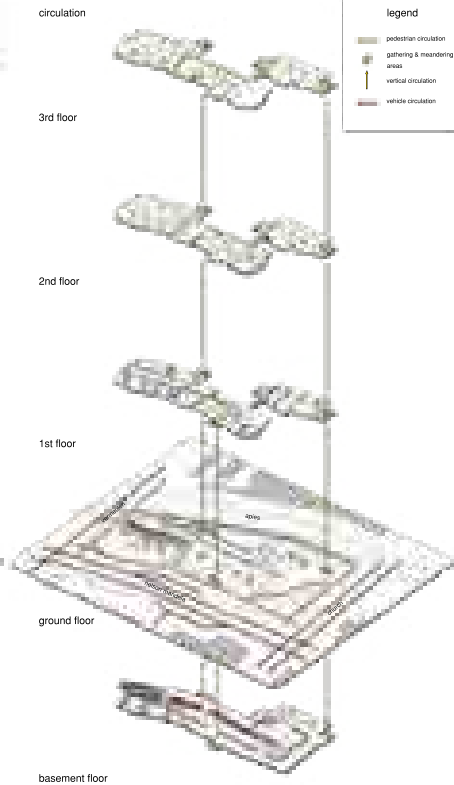
- The basement and mezzanine parking levels have been designed to be more economical and accessible
- The ground floor is a designated public level, housing open and indoor exhibition spaces, a public square and a coffee shop
- The first floor has been allocated conference facilities and a restaurant making the transition from public space to semi public space
- The second and third floors both accommodate office space, allowing for up to 8 different clients at a time.

This completes the transition from semi public space to private space.



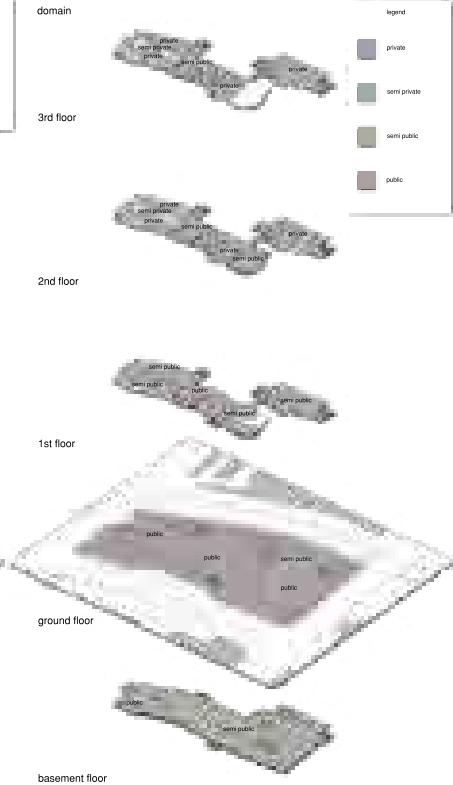
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Fig. 147 services isometric



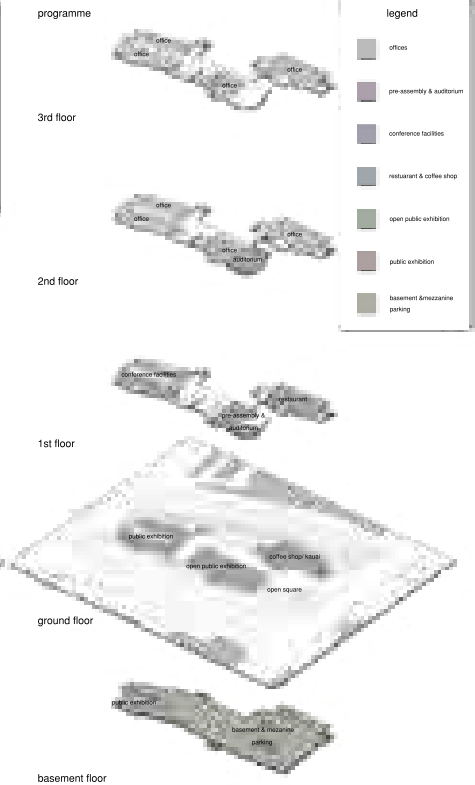
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Fig. 148 circulation isometric



149

Fig. 149 domain isometric



150

Fig. 150 programme isometric

Fig. 151 basement parking not too scale

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Fig. 152 mezzanine parking not too scale

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Fig. 153 ground floor not too scale

153

Fig. 154 first floor not too scale

154

Fig. 155 second floor not too scale

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Fig. 156 third floor not too scale

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Fig. 157 north elevation not too scale

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Architectural rendering of a modern building.



Fig. 158 east elevation not too scale

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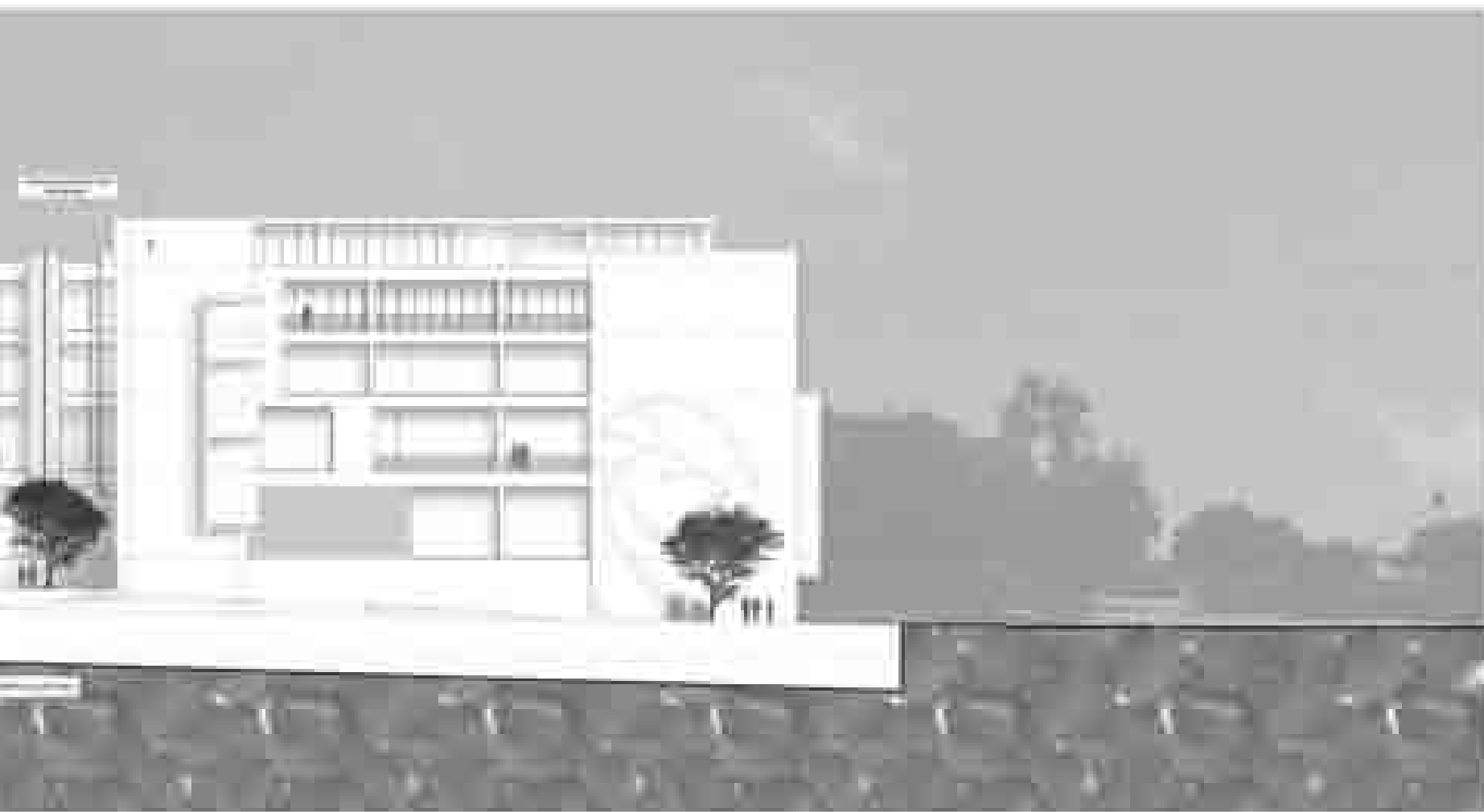
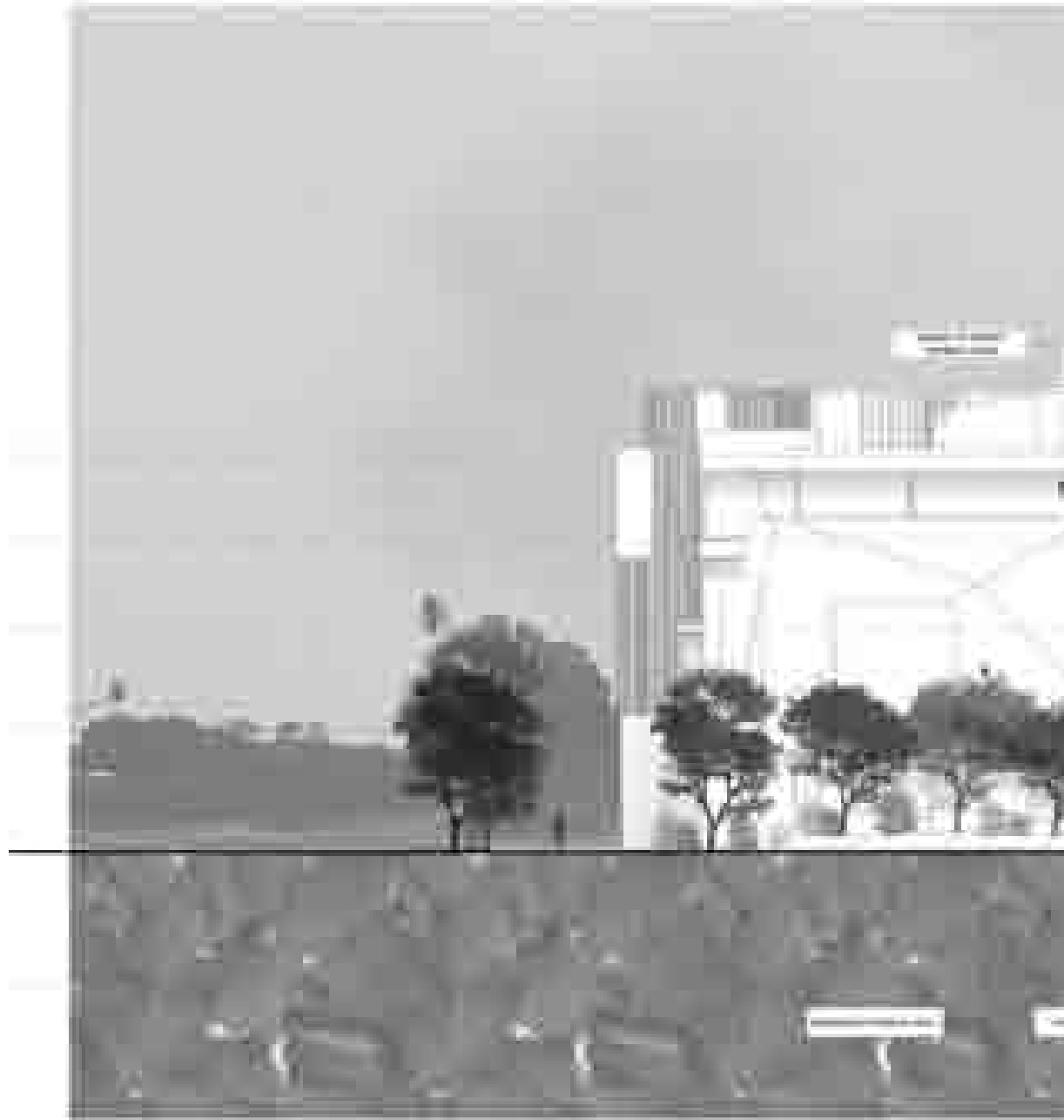
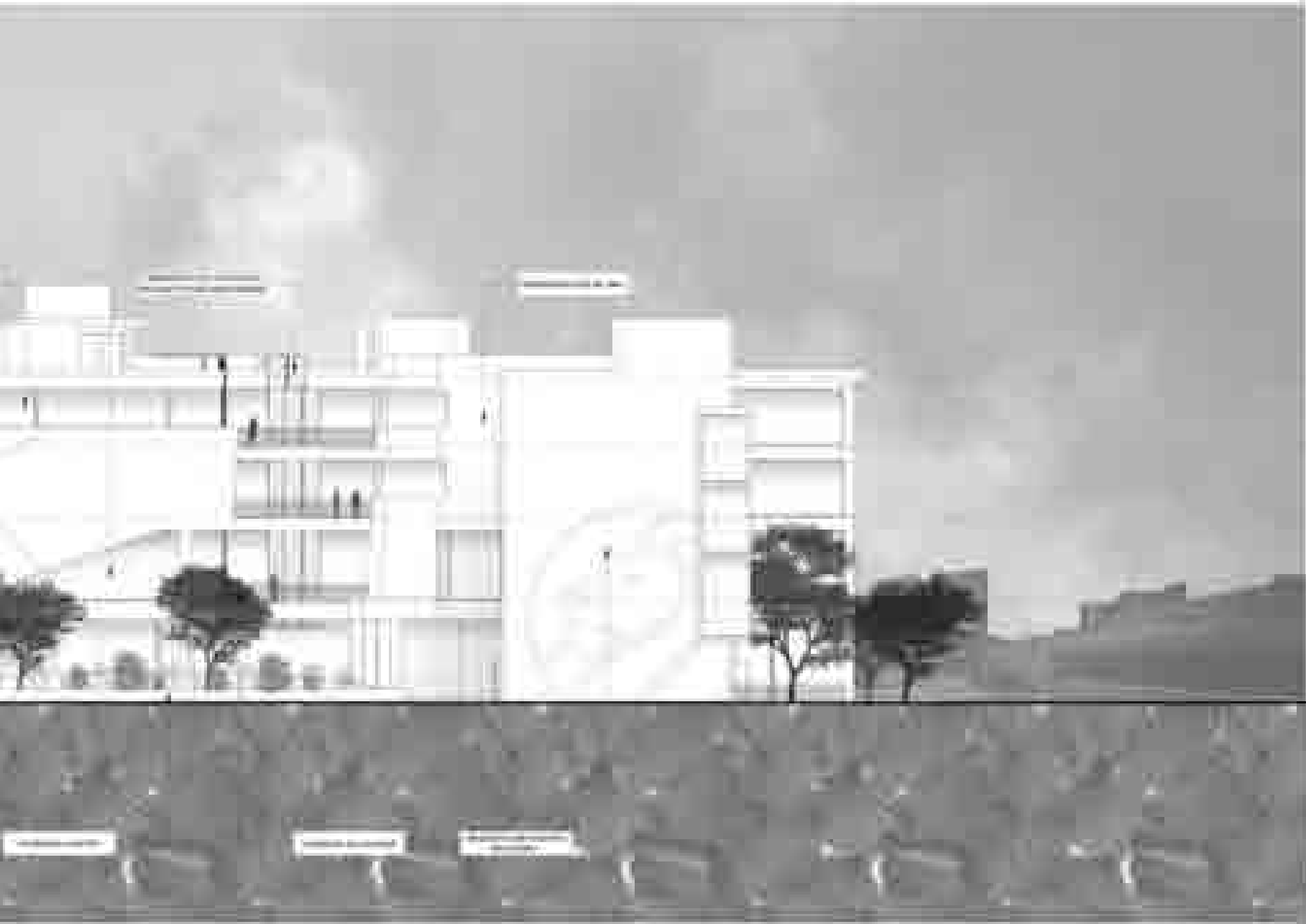


Fig. 159 south elevation not too scale

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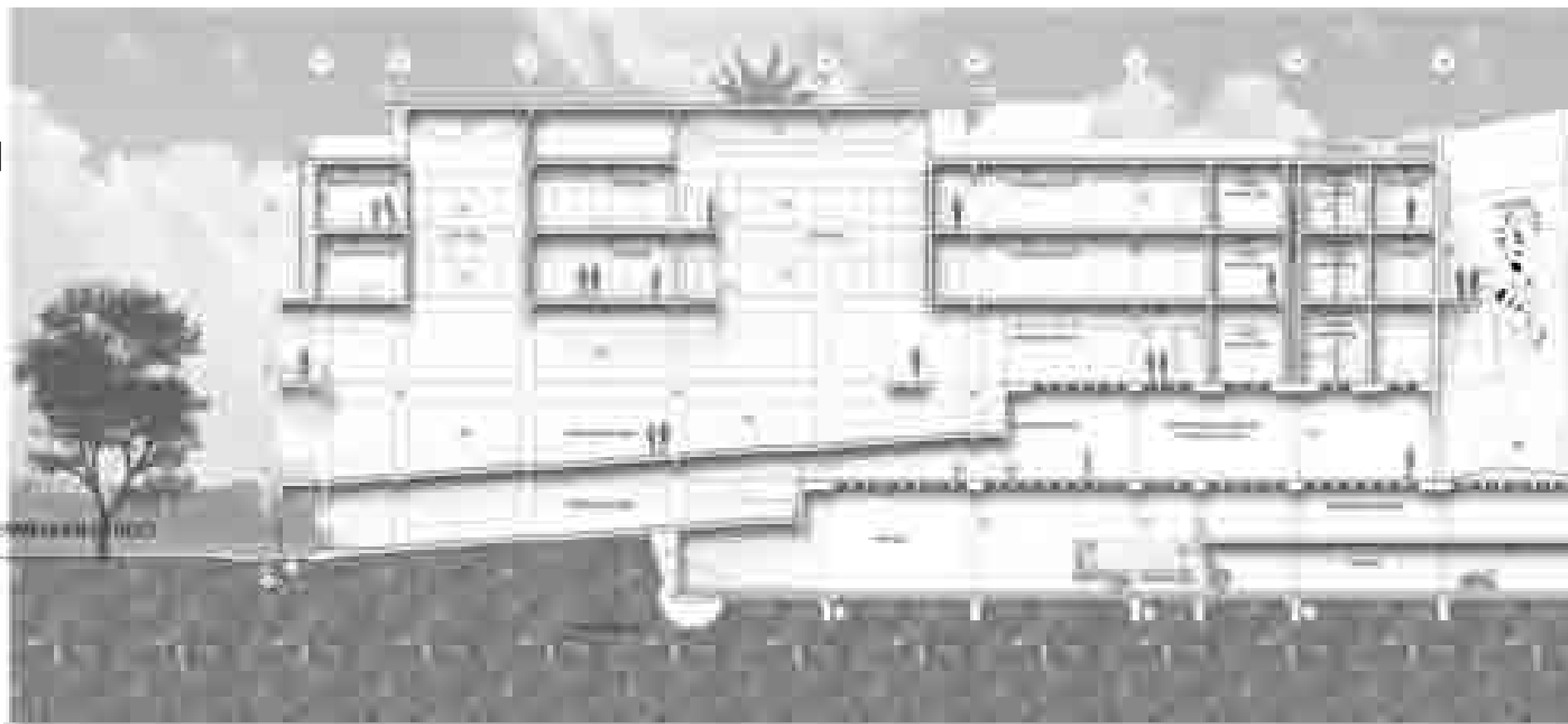
Fig. 160 west elevation not too scale





Fig. 161 longitudinal section not too scale

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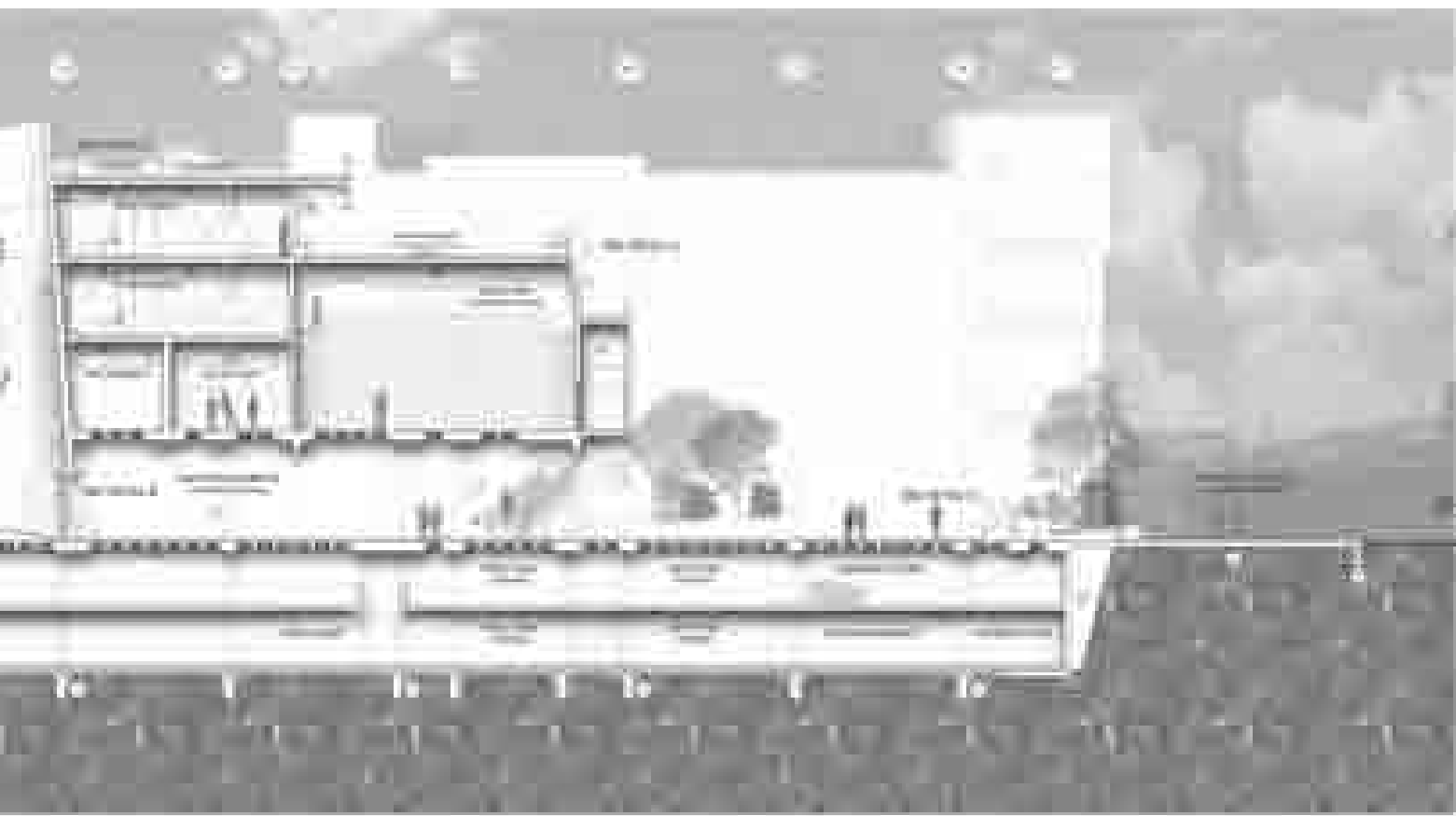


Fig. 162 section through lightwell not too scale

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NELSON MANIHELE
BOULEVARD



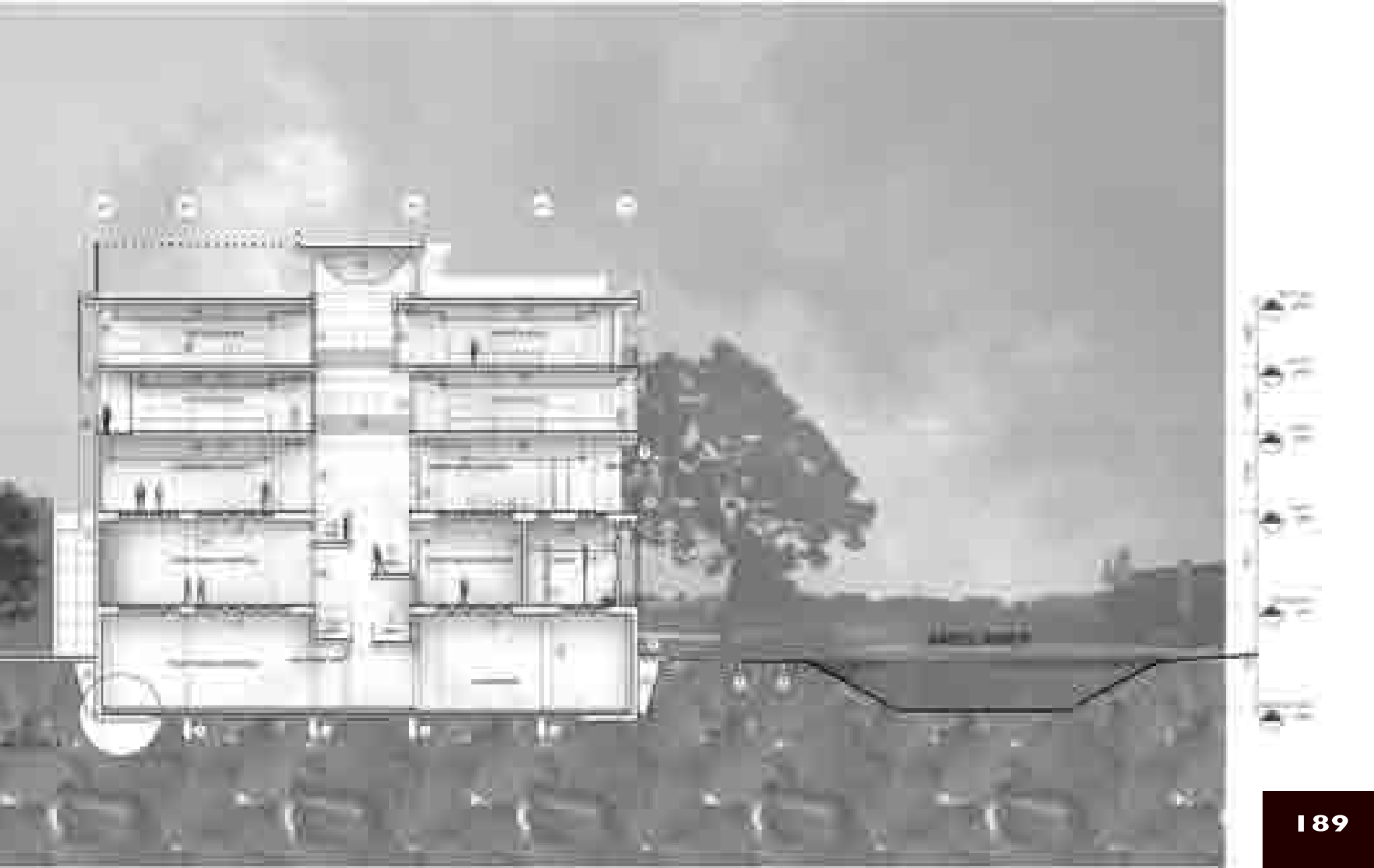
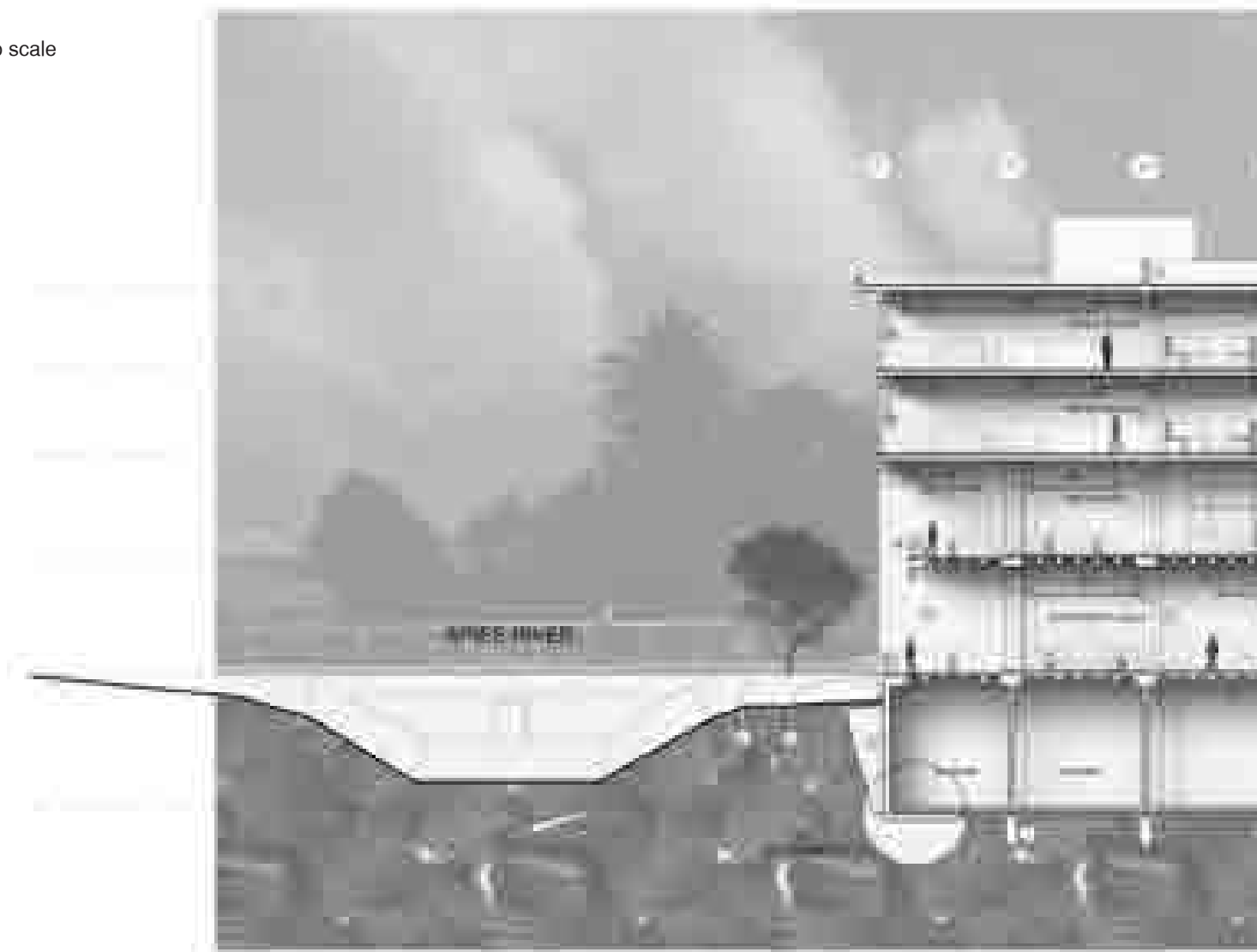
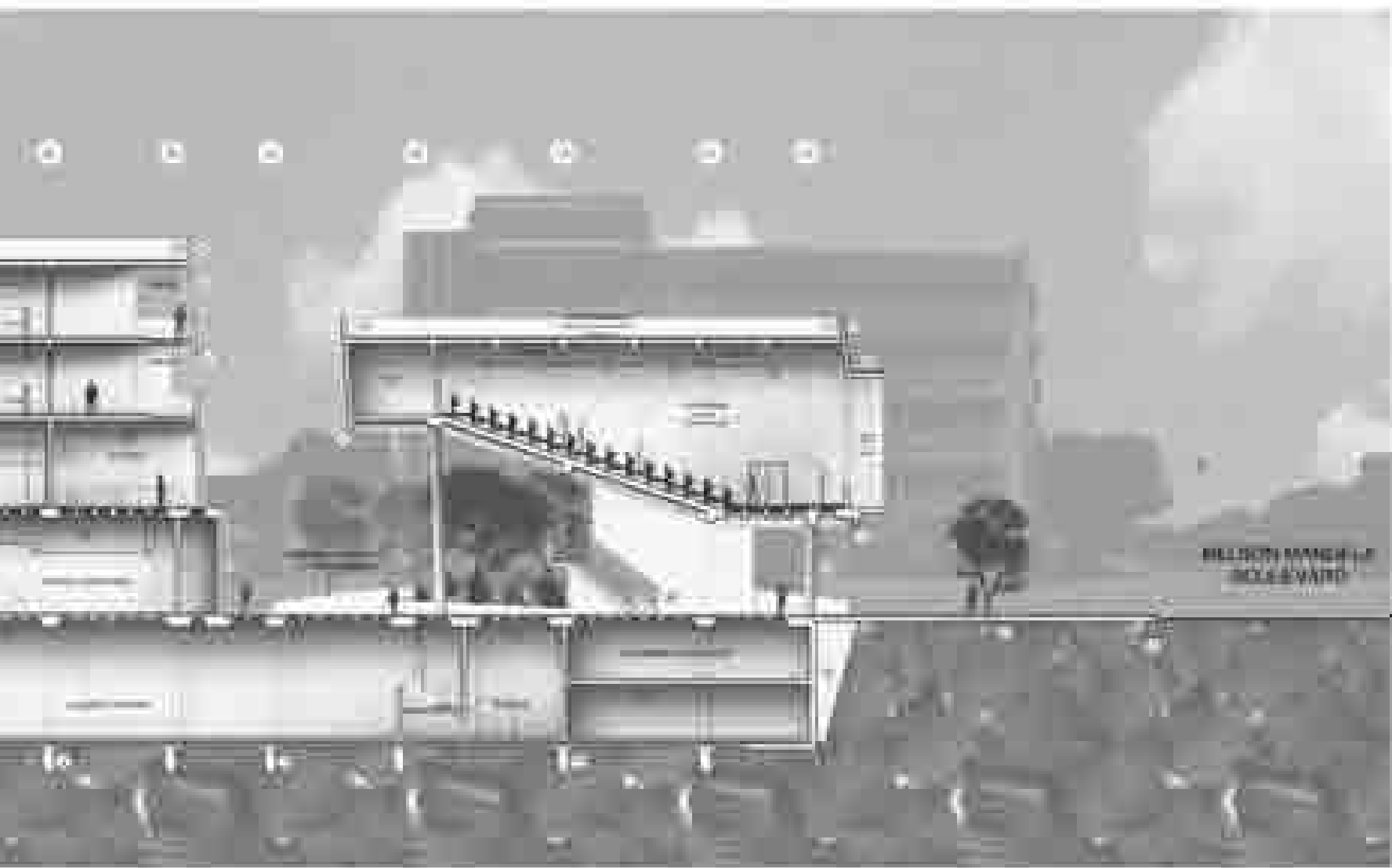


Fig. 163 section trough auditorium not too scale

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SECTION THROUGH
BUILDING