UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

EQUI SCAPE

An Architecture, landscape architecture and infrastructure for humans and their equestrian companions in the urban environment

Philip Slabbert
2013

© University of Pretoria

Thank you Nico for loving what you do, for understanding when not even I did, for your passion, enthusiasm and insight. For encouraging dreams. Thank you for creating the space I required to stay true to myself.

Thank you Arthur for always having time, for your guidance when I felt lost, keeping me on course.

To my dad, thank you for always taking an interest in my work; allowing it to become a common interest between us.

To my mom, thank you for loving and understanding the designer in me.

Thank you Louis for knowing and helping me see. Eleonore for having faith.

Thank you Tuliza for asking why.

Thank you Kathleen, Graig, Siphiwe, Lindy, Kithue, Lungile and Margaret for your unfathomable generosity, help and support.

Thank you Tialise and Riki for always making me feel welcome.

Classmates of 2013 thank you

thank you

© University of Pretoria

Philip Slabbert
University of Pretoria
Department of Architecture
2013

Programs
Mounted Units, Equestrian Therapy

Site Description
Department of Public Works Workshops

Site Location
On the western edge of the Museum Precinct, on the edge of the Central Business District (CBD)

Project address
116 Minnaar Street _ Museum Park _ Pretoria

GPS Coordinates
25° 45' 17.55" S + 28° 11' 4.65" E

Research Field
Human Settlement

Property Owner
Department of Public Works

Client(s)
City Council of Tshwane

Keywords
Mounted Units, Equestrian Therapy, adaptive reuse, regenerative design, human animal interaction, intersection of infrastructure, architecture and landscape architecture

Thesis Drivers
Site + Program

Study Mentor
Nico Botes

Studio Mentor
Dr. Arthur Barker

Submitted in partial fulfilment of the requirements for the degree Magister in Architecture (Professional) in the faculty of Engineering, the Built Environment and Infromation Technology.

© University of Pretoria

ABSTRACT

This dissertation explores the interface between people, horses and architecture as an edge, which allows it the opportunity to facilitate relationships and accommodate multiple users.

City edges currently present themselves as fences and walls. This dissertation aims to engage with and reinterpret these edges, while simultaneously shifting the boundaries between people and animals.

The Public Works Department ground in Museum Park is an appropriate place to investigate edges as it currently has segregating boundaries, yet lends itself to the reintroduction of a historical function into the city.

By considering life other than human life, architecture's anthropocentric tendencies are subverted, and the segregating nature of the existing site's barriers reinterpreted, through the exploration of physical and mental edges.

© University of Pretoria

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

CONTENTS

ABSTRACT
LIST OF FIGURES

01 INTRODUCTION

1.1 LOCATION 2
1.2 PROBLEM 3
1.3 THESIS STATEMENT 4
1.4 THE HORSE AND HUMAN PERCEPTION 5
1.5 PROGRAMS 6
1.6 SITE REQUIREMENTS 7
1.7 INTENTIONS FOR AN ARCHITECTURAL EDGE 8
1.8 RESEARCH METHODOLOGY 9

02 CONTEXT

2.1 MACRO SCALE 14
2.2 MESO SCALE 34
2.3 MICRO SCALE 35

03 VISION

3.1 PREVIOUS FRAMEWORKS 53
3.2 MUSEUM PARK VISION 55
3.3 SITE VISION 59

04 PROGRAM

4.1 HISTORY OF HORSES AND CIVILISATION 71
4.2 EQUESTRIAN CENTRED PROGRAMS 72
4.3 MOUNTED UNIT 73
4.4 THE EQUESTRIAN THERAPY AND RIDING SCHOOL 80
4.5 PROGRAMS ON MUSEUM PARK EDGE 81
4.6 PROGRAMS ON THE URBAN EDGE 81
4.7 EQUI SCAPE DESIGN CONSIDERATIONS 82
4.8 BARAGAN'S EQUESTRIAN TRILOGY 85
4.9 EQUINE ERGONOMICS 86
4.10 EQUI SCAPE'S PROGRAMMATIC REQUIREMENTS 88

05 THEORY

5.1 LANDSCAPE ECOLOGY 94
5.2 THOUGHTS ON EDGE 96
5.3 MENTAL EDGES 97
5.4 HETEROTOPIA 98
5.5 HUMAN-NATURE HYBRIDS 99
5.6 SCAPE 100
5.7 THE NICHE 101

© University of Pretoria

06 PRECEDENT

6.1 ENRIC MIRALLES 104
6.2 KENGO KUMA 107

07 DESIGN SYNTHESIS AND DEVELOPMENT

7.1 EXPLORATION OF BARRIERS WITH PROSPECT 111
7.2 EQUI SCAPE INFORMANTS 113
7.3 CONCEPT MODEL 114
7.4 DESIGN EXPLORATION 118
7.5 AN EQUINE NICHE IN THE URBAN LANDSCAPE 122
7.6 RAMP AS RELATIONSHIP MEDIATOR 123
7.7 EDGES AS SEGREGATING BARRIERS VERSUS A BARRIER ESTABLISHED THROUGH LEVEL CHANGES 124
7.8 EDGES [ZOOMING IN] 127
7.9 URBAN - EQUI SCAPE INTERFACE 128
7.10 RAMP 131
7.11 RUGGED AND SMOOTH EDGES 135
7.12 EQUI SCAPE EQUINE DESIGN 138
7.13 DESIGN PLANS 142
7.14 DESIGN SECTIONS 149

08 TECHNICAL DEVELOPMENT

8.1 TERRAFORM 162
8.2 PRIMARY STRUCTURE 165
8.3 MAKING INFRASTRUCTURE HABITABLE 166
8.4 SECONDARY STRUCTURE 174
8.5 ACCESSORIES 176
8.6 WASTE 184
8.7 GREY WATER REUSE 185
8.8 EQUINE WATER DETAIL 186
8.9 SECTION C_C 190
8.10 SECTION A_A 192
8.11 SECTION B_B 200

09 CONCLUSION

APPENDIX A

APPENDIX B

REFERENCES

© University of Pretoria

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

LIST OF FIGURES

Chapter 01

Fig 1.1 Site Location in Museum Park, Pretoria. (Author's collection, 2013)

Fig 1.2 View across the PWD grounds towards Museum Park (Author's collection, 2013)

Fig 1.3 Relationship between macro + micro. Author's collection, 2013 (Author's collection, 2013)

Fig 1.4 PWD grounds western boundary wall (Author's collection, 2013)

Fig 1.5 PWD grounds southern boundary wall (Author's collection, 2013)

Fig 1.6 Dissertation site within its context (Author's collection, 2013)

Fig 1.7 Introducing the horse to the city (Author's collection, 2013)

Chapter 02

Fig 2.1 Africa. Author's collection, 2013.

Fig 2.2 South Africa (Author's collection, 2013)

Fig 2.3 Gauteng (Author's collection, 2013)

Fig 2.4 City of Tshwane (Author's collection, 2013)

Fig 2.5 Pretoria CBD (Author's collection, 2013)

Fig 2.6 Site Location within Museum Park (Author's collection, 2013)

Fig 2.7 Site location and building in and around Museum Park (Author's collection, 2013)

Fig 2.8 Dissertation site selection (Author's collection, 2013)

Fig 2.9 Pedestrian activity around the Public Works Department (Author's collection, 2013)

Fig 2.10 Heritage buildings around the site (Author's collection, 2013)

Fig 2.11 Historical areal photograph of Burgers Park looking North West 1930's (Sammy Marks library, photo collection)

Fig 2.12 Historical areal photograph of Museum Park looking West 1939 (Sammy Marks library, photo collection)

Fig 2.13 Site in context, Museum Park condition and connecting Minnaar Street (Author's collection, 2010)

Fig 2.14.1 PWD grounds and buildings which define Museum Park and Minnaar Street (Author's collection, 2013)

Fig 2.14.2 PWD grounds in its context of significant spaces and buildings (Author's collection, 2013)

Fig 2.14.3 PWD grounds in relation to green spaces in Museum Park (Author's collection, 2013)

Fig 2.15.1 Ditsong National Museum of Cultural History (Author's collection, 2013)

Fig 2.15.2 Old Fire Station (Sindi 2013)

Fig 2.15.3 City Hall (Author's collection, 2013)

Fig 2.15.4 Pretorius Park (Sindi 2013)

Fig 2.15.5 Burgers Park (Author's collection, 2013)

Fig 2.15.6 Melrose House (Author's collection, 2013)

Fig 2.15.7 Pretoria Station (Author's collection, 2013)

Fig 2.15.8 The National Museum of Natural History (Author's collection, 2013)

Fig 2.16 Map of the southern part of Pretoria CBD (Author's collection, 2013)

Fig 2.17.1 Pretoria Station Square (Author's collection, 2013)

Fig 2.17.2 Sectional diagram showing the edges and voids of Pretoria Station Square (Author's collection, 2013)

Fig 2.17.3 Landscape in front of Pretoria station (Author's collection, 2010)

Fig 2.18.1 Pretorius Square (Author's collection, 2013)

Fig 2.18.2 Sectional diagram showing the edges and voids of Pretorius Square (Author's collection, 2013)

Fig 2.18.3 View across Pretorius Park (Sindi 2013)

Fig 2.19.1 Station Square Mall diagram (Author's collection, 2013)

Fig 2.19.2 Mall edge to Jacob Mare Street (Author's collection, 2013)

Fig 2.20.1 Burgers Park diagram (Author's collection, 2013)

Fig 2.20.2 View of Burgers Park (Sindi 2013)

Fig 2.21.1 Tram Market diagram (Author's collection, 2013)

Fig 2.21.2 Sectional diagram showing the various edges of the Tram Shed (Author's collection, 2013)

Fig 2.21.3 Tram market entrance (Author's collection, 2013)

Fig 2.22.1 Hussein Masjid Mosque (Author's collection, 2013)

Fig 2.22.2 Diagrams illustrating the appropriation over a five year period (Author's collection, 2013)

Fig 2.24 The shoe doctor (Author's collection, 2013)

Fig 2.25 Diagram of various edges (Author's collection, 2013)

Fig 2.26 Maria's Shisanyama (Author's collection, 2013)

Fig 2.27 Diagram of various edges (Author's collection, 2013)

Fig 2.28 Image showing space created by vendors (Author's collection, 2013)

Fig 2.29 Diagram of various edges (Author's collection, 2013)

Fig 2.30 The music man's stall (Author's collection, 2013)

Fig 2.31 Site in context, Museum Park and Urban condition (Author's collection, 2013)

© University of Pretoria

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Fig 2.32 Site in context, Museum Park and Urban condition (Vision collection 2013)

Fig 2.33 Site in context, Museum Park and Urban condition (Vision collection 2013)

Fig 2.34 Map showing the PWD Transport in 1932 (Van der Waal collection)

Fig 2.35 Expansion and contraction of the PWD site [1913-2013] (Author's collection, 2013)

Fig 2.36 Current Functions on PWD grounds (Author's collection, 2013)

Fig 2.37 Underutilized space (Author's collection, 2013)

Fig 2.38 Site Character (Author's collection, 2013)

Fig 2.39 Minnaar Street entrance (Author's collection, 2013)

Fig 2.40 Minnaar Street looking West (Author's collection, 2013)

Fig 2.41 Carpentry Workshop (Author's collection, 2013)

Fig 2.42 Administration (Author's collection, 2013)

Fig 2.43 Crest removed from the Union Building (Author's collection, 2013)

Fig 2.44 Storage (Author's collection, 2013)

Fig 2.45 View to urban site edge (Author's collection, 2013)

Fig 2.46 Electrical Workshop (Author's collection, 2013)

Fig 2.47 Plumbing Workshop (Author's collection, 2013)

Fig 2.48 Veiw across site (Author's collection, 2013)

Fig 2.49 Existing Thoroughfare towards the West (Author's collection, 2013)

Fig 2.50 Urban Edge (Author's collection, 2013)

Fig 2.51 Heritage buildings (Author's collection, 2013)

Fig 2.52 Heritage Buildings and significant elements (Author's collection, 2013)

Fig 2.53 (a) Sketch of the storage buildings East facade (Author's collection, 2013)
(b) Store Room East facade (Author's collection, 2013)
(c) Store Room Interior (Author's collection, 2013)

Fig 2.5.4 (a) North + East facades Carpentry Workshop _ later additions to be stripped back (Author's collection, 2013)
(b) South + East facades Carpentry Workshop _ later additions to be stripped back (Author's collection, 2013)
(c) Carpentry Workshop (Author's collection, 2013)

Fig 2.55.1 Original House (Author's collection, 2013)

Fig 2.55.2 Out House (Author's collection, 2013)

Fig 2.55.3 Plant Store (Author's collection, 2013)

Fig 2.55.4 Electrical Store (Author's collection, 2013)

Chapter 03

Fig 3.1 Use and Zoning (Group vision collection, 2013)

Fig 3.2 Museum Mall Proposal (Group vision collection, 2013)

Fig 3.3 Museum Park Proposal (Group vision collection, 2013)

Fig 3.4 Museum Park Implemented (Group vision collection, 2013)

Fig 3.5 Edges and Boundary conditions: resulting city block characters (Group vision collection, 2013)

Fig 3.6 Museum Park Vision Overlay (Group vision collection, 2013)

Fig 3.7 Existing and new paddock space as edge to thoroughfare (Author's collection, 2013)

Fig 3.8 Larger Framework Vision: Exploding the acupunctural points within the expanded Museum Park (Group vision collection, 2013)

Fig 3.9 Illustration of Buildings which are to undergo a change in function and buildings to be added (Group vision collection, 2013)

Fig 3.10 Vision approach (Group vision collection, 2013)

Fig 3.11 Vision Development (Group vision collection, 2013)

Fig 3.12 Vision Diagram (Group vision collection, 2013)

Fig 3.13 Programmatic Relationship Diagram (Group vision collection, 2013)

Fig 3.14 Heritage Buildings as an introduction to Museum Park (Group vision collection, 2013)

Fig 3.15 Barriers and detracting elements (Author's collection, 2013)

Fig 3.16 To be demolished (Author's collection, 2013)

Fig 3.17 PWD site showing buildings to be retained (Author's collection, 2013)

Fig 3.18 Opportunities (Author's collection, 2013)

Fig 3.19 Buildings retained (Group vision collection, 2013)

Fig 3.20 Vision [april] (Group vision collection, 2013)

Fig 3.21 Existing typology and access respectively (Group vision collection, 2013)

Fig 3.22 Exploring the possibilities of the existing in relation to the new thoroughfare (Group vision collection, 2013)

Fig 3.23 Existing, widened thoroughfare (Author's collection, 2013)

Fig 3.24 New thoroughfare (Author's collection, 2013)

Fig 3.25 Stable courtyard (Author's collection, 2013)

Fig 3.26 Stable courtyards and existing buildings (Author's collection, 2013)

Fig 3.27 Plinth Approach (Author's collection, 2013)

© University of Pretoria

Fig 3.28 Past additions need replacing and adaptation (Author's collection, 2013)

Fig 3.29 Adaptations (Author's collection, 2013)

Fig 3.30 Materiality _ Existing and new (Author's collection, 2013)

Fig 3.31 Previous additions need replacing and adaptation (Author's collection, 2013)

Fig 3.32 Giving rise to an opportunity for reinterpretation (Author's collection, 2013)

Fig 3.33 Site's current approach to slope (Author's collection, 2013)

Fig 3.34 Plinth as an approach to heritage buildings in relation to the courtyards (Author's collection, 2013)

Fig 3.35 Previous additions need replacing and adaptation (Author's collection, 2013)

Fig 3.36 Ramp as reinterpretation and edge to courtyards (Author's collection, 2013)

Chapter 04

Fig 4.1 Expulsion of the horse (Author's collection, 2013)

Fig 4.2 Re-introduction of the horse (Author's collection, 2013)

Fig 4.3 Past + present view of horse human relationship (Author's collection, 2013)

Fig 4.4 Present + encouraged future view of horse human relationship (Author's collection, 2013)

Fig 4.5 Mounted units in wedge formation (Burns 2010)

Fig 4.6.1 SAPS horses in their paddock (Author's collection, 2013)

Fig 4.6.2 SAPS horse grazing (Author's collection, 2013)

Fig 4.6.3 Current SAPS Stables (Author's collection, 2013)

Fig 4.6.4 SAPS Stables interior view (Author's collection, 2013)

Fig 4.8 Ramp and balustrade of the equestrian ramp at the Scotland yard stables(von Schmidt 2010)

Fig 4.9 Closed off stables with mechanical ventilation systems (von Schmidt 2010)

Fig 4.10 Equestrian ramp at Scotland yard's stables (Langrish 2012)

Fig 4.11 Horse training grounds (Author's collection, 2013)

Fig 4.12 Horses box for training (Author's collection, 2013)

Fig 4.13 Foot soaker at farrier workshops (Author's collection, 2013)

Fig 4.14 Horse training lunge ring (Author's collection, 2013)

Fig 4.15 Pharmacy (Author's collection, 2013)

Fig 4.16 Food store (Author's collection, 2013)

Fig 4.17 Stable (Author's collection, 2013)

Fig 4.18 Lunge ring for a training a horse(Author's collection, 2013)

Fig 4.19 Location of the current SAPS mounted unit in Pretoria West as well as the proposed site (Google Earth image adapted by author)

Fig 4.20 Horse and carriage (Niqui Mansfield 2012)

Fig 4.21 Shop entrance onto Scheiding Street in Pretoria (Author's collection, 2013)

Fig 4.22 Paddock-space landscape elements (Author's collection, 2013)

Fig 4.23 Horse in stable courtyard on site with other horses
Fig 4.24 Horse in Lunge ring - training
Fig 4.25 Horse in Arena - training
Fig 4.26.1 Horse on site paddock spaces + ramp as - first introduction to the city
Fig 4.26.2
Fig 4.26.3 Horse in Museum Park- second progression into the city
Fig 4.26.4 Horses introduction from the Rural environment to the urban environment, with the site as mediator (Author's collection, 2013)

Fig 4.26.5 Relationship between various scales to be considered in the design (Author's collection, 2013)

Fig 4.26.6 Colours visible to horses (Author's collection, 2013)

Fig 4.27 Herd animals: safety and comfort in numbers (Author's collection, 2013)

Fig 4.28 Desired development of human-horse relationships after several encounters (Author's collection, 2013)

Fig 4.29 Water and the processional (Ambasz 1976:61)

Fig 4.30 Frieze (Ambasz 1976:73)

Fig 4.31 Wall scale (Ambasz 1976:91)

Fig 4.32 Horse dimensions and weight (Adapted from Littlefield 2008)

Fig 4.33 Horse dimensions (Adapted from Littlefield 2008)

Fig 4.34 Mounted horse dimensions (Adapted from Littlefield 2008)

Fig 4.35 Stable slope for drainage (Adapted from Littlefield 2008)

Fig 4.36 Stable head height (Adapted from Wheeler & Zajaczkowski 2009)

Fig 4.37 Stable door scale (Adapted fromWheeler & Zajaczkowski 2009)

Fig 4.38 Stable layout (Adapted from Littlefield 2008)

Fig 4.39 Stable door scale (Adapted fromWheeler & Zajaczkowski 2009)

Fig 4.40 Stable enclosure and exposure

Fig 4.41 Manger Height and size (Adapted from Littlefield 2008)

Fig 4.42 Typical stable layout

Fig 4.43 Stable door scale

© University of Pretoria

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Fig 4.44 Hay net Height (Adapted fromWheeler & Zajaczkowski 2009)

Fig 4.45 Hay above manger to catch wasted food (Adapted from-Wheeler & Zajaczkowski 2009)

Fig 4.46 Fence height (Adapted fromWheeler & Zajaczkowski 2009

Fig 4.47 Wash bay dimensions (Adapted from Potchefstroom SAPS academy)

Fig 4.48 Horse box dimensions (Adapted from Littlefield 2008)

Fig 4.49 Indoor arena edge (Adapted from Littlefield 2008)

Fig 4.50 Outdoor arena edge (Adapted from Littlefield 2008)

Fig 4.51 Lunge ring edge (Adapted from Potchefstroom SAPS academy)

Fig 4.52 Equipment needed for mucking out stable stalls (Vogel 2011)

Fig 4.53 Illustrating the process of changing a horses shoe, which is put on display for the visitors of the Equi Scape (Vogel 2011)

Chapter 05

Fig 5.1 Ecotone (Author's collection, 2013)

Fig 5.2 Elements for creating a scape edge (Author's collection, 2013)

Fig 5.3 Introducing the horse to the city and creating a niche for the horse from which to be reintroduced to the city. (Author's collection, 2013)

Fig 5.4 Scape components (Author's collection, 2013)

Fig 5.5 Scape created through mimicing urban and rural elements (Author's collection, 2013)

Chapter 06

Fig 6.1 Roof Plan (Curtis 2005)

Fig 6.2 Shows a layering of space form material and edges (Curtis 2005)

Fig 6.3 Use of a precast concrete facade element (Curtis 2005)

Fig 6.4 Precast vault (Curtis 2005)

Fig 6.5 Design Drawings of the competition building (Curtis 2005)

Fig 6.6 Illustrates the layering of form, materials and functions which end at different points as it extends into the landscape, softening the edge. (Curtis 2005)

Fig 6.7 Exterior view of the rhythm created by the louvers (Kuma 2010)

Fig 6.8 Light filtering through the layers revealing the structure (Kuma 2010)

Fig 6.9 Section illustrating the layering of the roof (Kuma 2010)

Chapter 07

Fig 7.1 Diagram illustrating a change in the creating of barriers (Author's collection, 2013)

Fig 7.2 Current PWD ground's barrier which segregates (Adapted from Dee 2010)

Fig 7.3 Proposed ramp edge which creates an interface (Adapted from Dee 2010)

Fig 7.4 Exploring edges from barriers to mental mediators of people and horses (Author's collection, 2013)

Fig 7.5 Ramp as edge which captures and releases energy allowing for spontaneous engagements between people and horses (Author's collection, 2013)

Fig 7.6 Possible physical barriers (Author's collection, 2013)

Fig 7.7 Users (Adapted from Dee 2010)

Fig 7.8 Equi Scape informants (Author's collection, 2013)

Fig 7.9 Diagrams illustrating the approach to the current site's courtyard typology (Author's collection, 2013)

Fig 7.10 Concept model: illustrating the ramp as edge, as connector, as boundary, landscape and mediator (Author's collection, 2013)

Fig 7.11 Parti Diagram for the Equi Scape (Author's collection, 2013)

Fig 7.12 Initial investigation of the design of the landscape (Author's collection, 2013)

Fig 7.13 Exploration of the Equi Scape landscape in its context (Author's collection, 2013)

Fig 7.14.1 Investigation of circulation on site (Author's collection, 2013)

Fig 7.14.2 Initial planning exercise, placement of arena, courtyards and edges (Author's collection, 2013)

Fig 7.14.3 Initial sunken stable courtyard with edged with stables (Author's collection, 2013)

Fig 7.14.4 Exploration of the Ramp which contrasts its context through form (Author's collection, 2013)

Fig 7.14.5 Exploration of the ramp which both contrasts and relates to the existing (Author's collection, 2013)

Fig 7.14.6 Exploration of the ramp which both contrasts and relates to the existing (Author's collection, 2013)

Fig 7.15 Initial drawing showing an intuitive design response to the site and its context (Author's collection, 2013)

Fig 7.16.1 Noise generators (Author's collection, 2013)

Fig 7.16.2 Implemented noise barriers (Author's collection, 2013)

Fig 7.16.3 The various courtyards are programmed with various equestrian activities held together by the ramp (Author's collection, 2013)

Fig 7.17.1 Equine space which has restricted physical public engagement (Author's collection, 2013)

© University of Pretoria

LIST OF FIGURES

Fig 7.17.2 Relationship between these private spaces and the public edge. (Author's collection, 2013)

Fig 7.17.3 Relationship between public, private(horse) and the mediating spaces between them (Author's collection, 2013)

Fig 7.18 Section showing the ramp as a mediating spaces (Author's collection, 2013)

Fig 7.19 Diagram showing the existing in brown, blue as public, yellow as horse-human interaction space and orange as the start of the ramp (Author's collection, 2013)

Fig 7.20 Model exploration of the site levels and connecting ramps (Author's collection, 2013)

Fig 7.21 Model showing the elevated ramp on the southern urban edge (Author's collection, 2013)

Fig 7.22.1 Model showing the elevated ramp on the southern urban edge (Author's collection, 2013)

Fig 7.22.2 Model showing two new ramps in black (Author's collection, 2013)

Fig 7.23 The scape becomes an edge which complements Burgers Park to the East

Fig 7.24 The site creates a transitional space between the urban transport precinct and Museum Park, as well as between human and horse space.

Fig 7.25 The ramp acts as a series of horizontal edge planes which accommodate both people and horses

Fig 7.26 The edges of these horizontal planes respond directly to its specific human or horse users.

Fig 7.27 Balustrade as edge that responds both to the horse and its rider

Fig 7.28 Sectional explorations of the ramp as edge May 2013: Layering of the architectural edge (Author's collection, 2013)

Fig 7.29 Roof plan (Author's collection, 2013)

Fig 7.30 N-S Section through ramp looking east (Author's collection, 2013)

Fig 7.31 N-S Section through entire site looking east (Author's collection, 2013)

Fig 7.32 Development of ground floor plan (Author's collection, 2013)

Fig 7.33 N-S Section through ramp looking West (Author's collection, 2013)

Fig 7.34 3D sketch of the ramp where various materials join (Author's collection, 2013)

Fig 7.35 N-S Section through ramp looking East (Author's collection, 2013)

Fig 7.36 3D sketch of the ramp at the start of the thoroughfare (Author's collection, 2013)

Fig 7.37 Section showing the tunnel submerged underneath the surface (Author's collection, 2013)

Fig 7.37 Section through ramp looking West, exploration of edges, light, level changes and prospects (Author's collection, 2013)

Fig 7.38 3D sketch of the ramp where various materials join (Author's collection, 2013)

Fig 7.39 Urban (south) facade concept sketch (Author's collection, 2013)

Fig 7.40 Urban (south) facade possibilities (Author's collection, 2013)

Fig 7.41 Diagrammatic plan showing the smooth edges (Author's collection, 2013)

Fig 7.42 Diagrammatic plan showing the rugged edges (Author's collection, 2013)

Fig 7.43 Diagrammatic plan showing the interaction between smooth and rugged edges (Author's collection, 2013)

Fig 7.44 Exploration of the urban and thoroughfare edges, development of rugged edges with several sub-spaces (Author's collection, 2013)

Fig 7.45.1 Minimum turn for a fast moving horse (Neufert 1980)

Fig 7.45.2 Large diameter circle (Author's collection, 2013)

Fig 7.45.3 Equi Scape Arena (Author's collection, 2013)

Fig 7.46 Rounded Corners for paddock spaces to allow a bullied horse to escape (Adapted from Wheeler and Zajaczkowski 2003

Fig 7.47 Design considerations for a platform raised above the ground (Author's collection, 2013)

Fig 7.48 Site plan (Author's collection, 2013)

Fig 7.49 Plan of the Equi Scape stable layout (Author's collection, 2013)

Fig 7.50 qui Scape stable door design allowing ventilation at all heights (Author's collection, 2013)

Fig 7.51 An impression of the thoroughfare looking towards the arena seating (Author's collection, 2013)

Fig 7.52 Three dimensional view looking N_W (Author's collection, 2013)

Fig 7.53 Basement plan

Fig 7.54 Ground floor plan

Fig 7.55 Roof plan

Fig 7.56 Key plan

Fig 7.57 Key sections

Fig 7.58 Ramp and sub-space (Author's collection, 2013)

Fig 7.59 Ramp mediating between the urban and horse courtyard scale (Author's collection, 2013)

© University of Pretoria

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Fig 7.60 Section cuts through the ventilation and lighting shaft (Author's collection, 2013)

Fig 7.61 Grounding concrete structures, supporting steel ramp above (Author's collection, 2013)

Fig 7.62 Section through timber section of the ramp (Author's collection, 2013)

Fig 7.63 Section showing the tunnel submerged underneath the surface (Author's collection, 2013)

Fig 7.64 An impression of Jacob Mare street with the ramp as a new edge (Author's collection, 2013)

Chapter 09

Fig 8.1 Technical concept diagram (Author's collection 2013)

Fig 8.2 Technical development diagrams (Author's collection 2013)

Fig 8.3 Exploded axo showing the ramp, its structure and landscape (Author's collection 2013)

Fig 8.4 Desired concrete texture, created by the shuttering (Author's collection 2013)

Fig 8.5 Courtyards and public squares (Author's collection 2013)

Fig 8.6 Store room trusses (Author's collection 2013)

Fig 8.7 Existing site: Material palette (Author's collection 2013)

Fig 8.8 3D showing the structural system (Author's collection 2013)

Fig 8.9 Desired concrete texture, created by the shuttering (Author's collection 2013)

Fig 8.10 Section illustrating day lighting into the infrastructural sub-spaces (Author's collection 2013)

Fig 8.11 Column core as ventilation duct (Author's collection 2013)

Fig 8.12 Stable door design to optimise ventilation across the entire height of the stable (Author's collection 2013)

Fig 8.13 DC 12V fan (SC Origin 2007)

Fig 8.14 PV cells imbedded in 3.2 tempered safety glass (Artsolar 2013)

Fig 8.15 Illustration of Euro Co polycarbonate horizontal louver roof ventilation system (Colt 2012)

Fig 8.16 Section illustrating the separate ventilation systems for human and horse infrastructural sub-spaces (Author's collection 2013)

Fig 8.17 Ramp Surface drainage pattern (Author's collection 2013)

Fig 8.18 Ramp drainage down the core (Author's collection 2013)

Fig 8.19 Section A_A exploration of technology (Author's collection 2013)

Fig 8.20 Sketches: exploring the duct core cap (Author's collection 2013)

Fig 8.21 Precast concrete Echo Slabs for floors supporting people (Echo 2008)

Fig 8.22 Precast concrete Echo Slabs for floors supporting horses (Echo 2008)

Fig 8.23 Precast concrete top floor Echo Slabs for making vertical concrete screens (Echo 2008)

Fig 8.24 Exploration of concrete channel edge (Author's collection 2013)

Fig 8.25 Exploration of concrete channel balustrade (Author's collection 2013)

Fig 8.26 Due to the lever the concrete channel will have to be designed to withstand such forces (Author's collection 2013)

Fig 8.27 Exploration fixings to of channel edge (Author's collection 2013)

Fig 8.28 Exploration of a variety of balustrades and their relationship to the channel (Author's collection 2013)

Fig 8.29 Exploded assembly of the balustrade detail (Author's collection 2013)

Fig 8.30 Assembly detail with assigned materials (Author's collection 2013)

Fig 8.31 Surfaces to be painted colours which are visible to horses (Author's collection 2013)

Fig 8.32 Sketches illustrating examples of timber and steel products that have the potential to be made from reused material (Author's collection 2013)

Fig 8.33 Texture created by a precast concrete screen (Author's collection 2013)

Fig 8.34 Section A_A exploration of technology (Author's collection 2013)

Fig 8.35 Stable design with rubber mats (Warco 2010)

Fig 8.36 Compost heap (Fairfax county 2011)

Fig 8.37 Grey and black water system (Adapted from Bainbridge & Haggard 2011)

Fig 8.38 Arena drainage (Andalusian World 2013)

Fig 8.39 Drainage of surfaces that may contain horse manure to a wetland for nutrient removal (Author's collection 2013)

Fig 8.40 Sub-surface flow wetland (Bainbridge & Haggard 2011)

Fig 8.41 Surface flow Wetland (Bainbridge & Haggard 2011)

Fig 8.42 Diagram illustrating the black water system (Author's collection 2013)

Fig 8.43 Diagram illustrating the septic tank process (Plummers 2013)

Fig 8.44 Section A_A through the Equi Scape Landscape showing the fall of the site from the stables to the wetlands (Author's collection 2013)

© University of Pretoria

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Fig 8. 45 Diagram illustrating the black water system (Adapted)

Fig 8. 46 Section C_C through Equi Scape arena seating (Author's collection 2013)

Fig 8. 47 Section C_C (Author's collection 2013)

Fig 8. 48 Roof plan showing section lines (Author's collection 2013)

Fig 8. 49 Section A_A (Author's collection 2013)

Fig 8. 50 Section A_A through the Equi Scape Landscape and ramp edge (Author's collection 2013)

Fig 8. 51 Three dimensional section A_A render (Author's collection 2013)

Fig 8. 52 Assembly drawing of the ramp's top from Section A_A (Author's collection 2013)

Fig 8. 53 Balustrade edge accessory for the channel (Author's collection 2013)

Fig 8. 54 Side elevation of the Baluster (Author's collection 2013)

Fig 8. 55 Front elevation of the Baluster (Author's collection 2013)

Fig 8. 56 Front elevation of the Balustrade (Author's collection 2013)

Fig 8. 57 Roof plan showing section lines (Author's collection 2013)

Fig 8. 58 Section B_B (Author's collection 2013)

Fig 8. 59 Section B_B [1] showing the ramp with ablutions below and thoroughfare between ramp and post office to the left (Author's collection 2013)

Fig 8. 60 Section B_B [2] through Equi Scape ramp edge (Author's collection 2013)

Fig 8. 61 Section B_B [3] Through Equi Scape Tunnel (Author's collection 2013)

© University of Pretoria

SUMMARY

This dissertation explores the interface between people, horses and architecture as an edge, which allows it the opportunity to facilitate relationships and accommodate multiple users.

The scene for this exploration is set by the ongoing relationship between people and animals within an urban environment, specifically horses, with whom our evolution has aligned for thousands of years. The possibility of an Equi Scape is investigated: a platform for people and horses to commune and continue our social-coevolution.

The Equi Scape is located within Pretoria's Museum Park on an underutilised Department of Public Works site, segregated from its civic 'park' context by barriers. Within South Africa a practice of erecting barriers as a solution to social problems has developed, based on conventions of segregation. These principles have created the current segregated character of the site and Museum Park. Consequently these boundaries create an antisocial, stagnant urban environment.

When considering the site's environment as part of natural systems a need to allow change to form part of our way of living arises. By approaching city edges as an ecotone of an environment, they can play a vital role in allowing and stimulating change, as they are dynamic places where various physical and functional differences come together. Edges are places in our cities which allow for spontaneous interactions.

By considering life other than human life, architecture's anthropocentric tendencies are subverted, and the segregating nature of the existing site's barriers reinterpreted, through the exploration of physical and mental edges. A dialogue about edges is initiated, from which the edges of the Equi Scape emerge through the articulation of its architecture. These architectural edges create niches in the city from which horses can slowly be initiated into the urban environment, facilitating the alignment of ourselves with our equine companions in the urban future.

The Equi Scape edge is designed to be responsive to people, nature and place, making it an ideal place for a horse-culture to be grounded. The Equi Scape houses the SAPS Mounted Unit, equestrian therapy and riding school stables. The Urban edge programs include: public amenities, a food court, shops and a police office. This edge responds to everyday users of the taxi rank and the Pretoria station precinct towards the south. The Museum Park edge programs include a museum, restaurant and carriage rides.

The Equi Scape's architectural edge takes the form of a ramp which weaves through the existing fabric of the site and its context accommodating these programs. The ramp is designed as both introverted and extroverted, based on internal courtyards and contextual stimuli, thus creating and allowing different edge conditions to flow into one another, accommodating both horses and humans, in a constantly developing relationship, as well as the urban and Museum Park environments.

The Equi Scape design manifests the presence of horses within the urban environment. Simultaneously it mediates people's interactions with these large companion animals. This allows for people from different walks of life to interact with one another, as the horse becomes a communal interest.

© University of Pretoria

I am the animal you created
forcefully bred to do your bidding.
Bred to be calm and controlled
not wild
not free

we once roamed
now we stand and wait for you
to enforce your will
upon us

yet despite your attempt to break us
we are animal, wild, instinctual

As our hooves gallop on the ground it trembles
I am aware of you upon me
allowing you the predator to ride
do I share your perception?
Are you in fact in control
or have we become one

When you fight me do you not fight yourself?
When you beat me do you not beat yourself?
When we race across the open field
are we not the wind blowing in our hair.
our lungs fill with the same air

I am so acutely aware of you.
Why then are you not aware of me?

by P Slabbert 2013

© University of Pretoria

INTRODUCTION

[EQUI]

refers to equestrian - "Depicting or representing a person on horseback."
(Oxford English dictionary)

[SCAPE]

"Koolhaas reads the city as simply "SCAPE" - a condition in which architecture, infrastructure, and landscape are undifferentiated and subject to the same forces."
(Weller 2006)



01

© University of Pretoria

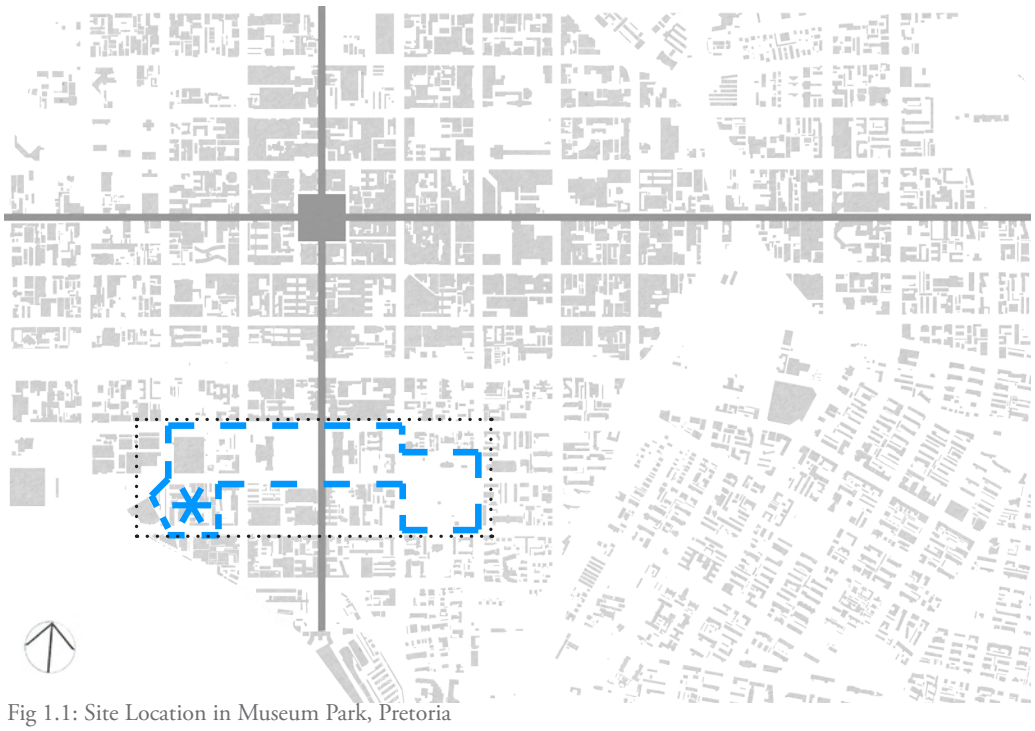


Fig 1.1: Site Location in Museum Park, Pretoria

1.1 LOCATION

The site under investigation is the Public Works Department (PWD) grounds situated between Museum Park on the western end of Minnaar Street and the Pretoria Station Transport Precinct, on the southern edge of Pretoria's Central Business District (CBD).

Currently the PWD grounds house artisan's workshops to maintain government buildings in Pretoria. These functions are however becoming redundant as the PWD workshop functions are out sourced to private companies (De Wit: 2013). Creating an opportunity for the redevelopment of the site in its context.



Fig 1.2: View across the PWD grounds towards Museum Park

© University of Pretoria

1.2 PROBLEM

The site has a courtyard typology created by buildings with no windows or openings that allow for engagement. The site is therefore segregated from its civic 'park' and urban context by barriers.

Within South Africa a practice of erecting barriers as a solution to social problems has developed, based on conventions of segregation. These principles have created the current segregated character of the site and Museum Park. Consequently these boundaries create an antisocial, stagnant urban environment.

Problems of segregation are evident both at a micro and macro scale within the context.

1.3 THESIS STATEMENT

Through design, edges can be created that do not create barriers which segregate, but barriers which become an interface between people and other animals.



Fig 1.5: PWD grounds southern boundary wall



Fig 1.4: PWD grounds western boundary wall

© University of Pretoria

1.4 THE HORSE AND HUMAN PERCEPTION

Historically the site was used by the Department of Public Works Transport. In an interview with De Wit (2013) the manager of the PWD workshops, it was explained that horses were previously stabled on the grounds.

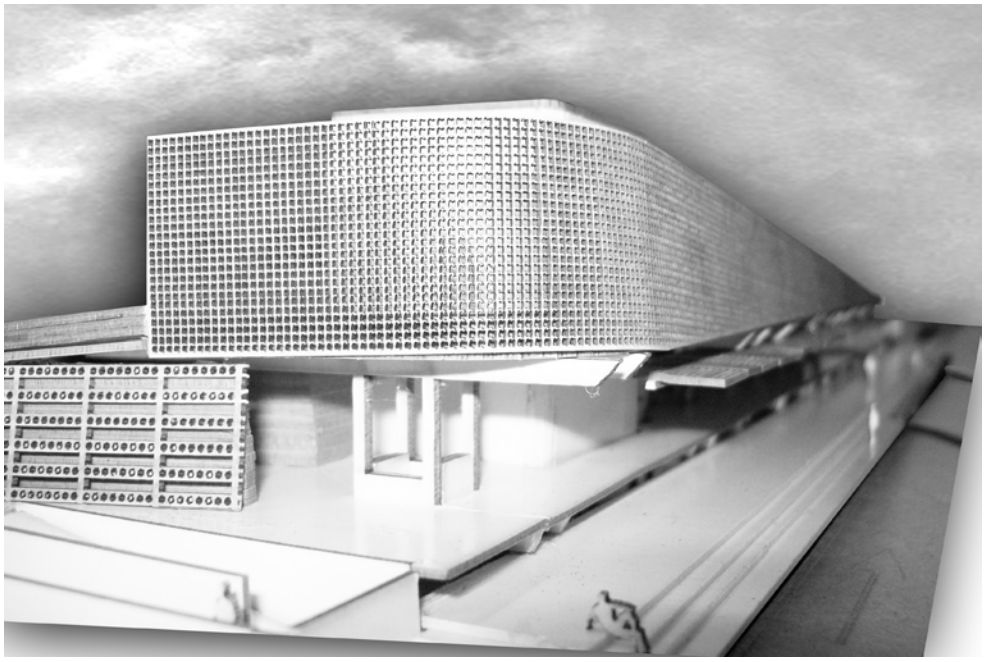
Giving rise to the idea of reintroducing horses onto the site and into the city, through the design of the Equi Scape.

The thesis statement is therefore investigated by reintroducing equestrianism into the urban environment.

The scene for this exploration is set by the ongoing relationship between people and animals within an urban environment, specifically horses, with whom our evolution has aligned for thousands of years. The possibility of an Equi Scape is investigated: a platform for people and horses to commune and continue our social-coevolution.
Horses have been worshipped, sacrificed, consumed and mounted in war. They inspired literature, art and entertained us for centuries. As a technology, they pulled carts and powered engines, fulfilling many of our everyday needs (Hyams 1979:42). This was the predominant role the horse fulfilled in Pretoria until the arrival of the automobile and electric tram, which reduced horses to a redundant technology, easily expelled from the urban environment. Over thousands of years this relationship has developed and today horses have also become a human companion.

The relationship between humans and horses was predominantly based on peoples' perceived domination over the horse. A dramatic shift in this perception has occurred as this relationship developed, to the point where horses are our companions, instead of subservient to us.

Horses need to be reintroduced into Pretoria's CBD. Not solely as a sustainable service animal, but also in a reciprocal capacity they will add great value to people's lives. The architectural scheme establishes an urban niche in which people can interact with these large communal companion animals as well as with one another.



© University of Pretoria

1.5 PROGRAMS

The Equi Scape edge is designed to be responsive to people, nature and place; making it an ideal place for a horse-culture to be grounded. The Equi Scape houses the SAPS Mounted Unit, equestrian therapy and riding school stables.

Equestrian therapy is used to help victims of violence as well as people with disabilities or autism. Horses become tools that aid the integration patients back into society, by building relationships and social confidence.

The riding school gives city dwellers the opportunity to learn basic horse care and riding skills. Mounted unit cadets and their horses can also receive refresher training courses here. These activities foster and develop reciprocal relationships between people and horses. Making people aware of our dependence on other animals.

The Mounted Unit in Museum Park is a satellite of the main stables in Pretoria West, which acts as a display unit, aimed at improving and encouraging the interaction between citizens and the police with the horse as a mediator. This is essential to South Africans who have lost their faith in the police due to high crime rates and police brutality.

Horses completely transform the urban environment for the mounted officer. The horse can move across various edges, such as streets, sidewalks and city blocks unlike any other mode of transport available to the police. The horse also elevates the officer above cars, walls and pedestrians allowing the rider better views, but also asserting their presence and authority.

Other programs include the reintroduction of horses and carriages, which along with the Mounted Unit create a brand for Museum Park.

Through branding, the Museum Park and its facilities will become a more attractive destination.

The Urban edge programs include: public amenities, a food court, shops and a police office. This edge responds to everyday users of the taxi rank and the Pretoria station precinct towards the south.

The Museum Park edge programs include an equine museum and restaurant.

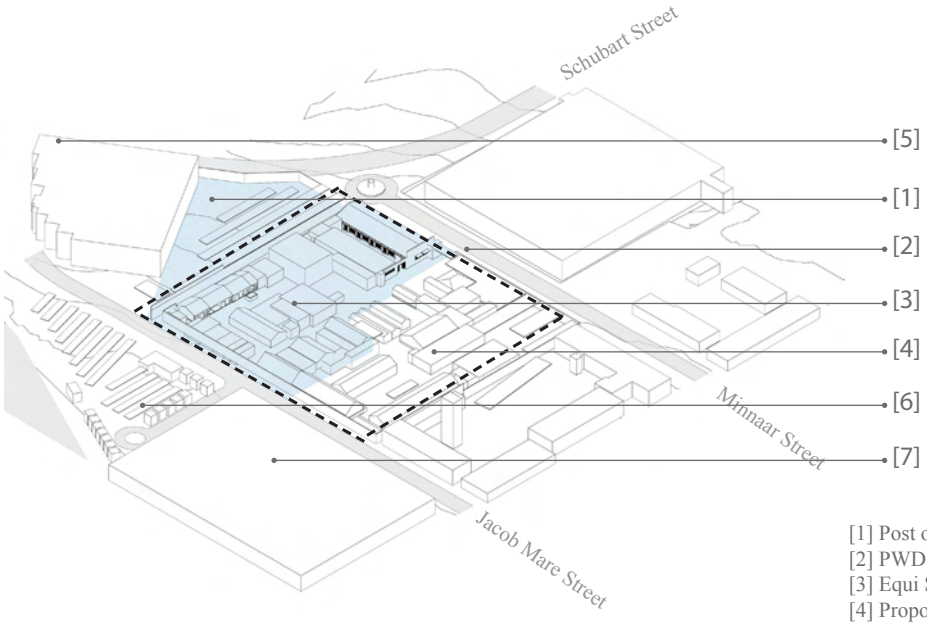


© University of Pretoria

1.6 SITE REQUIREMENTS

In cities like Vienna and London where horses are accommodated, they are mainly required to adapt to an environment designed for people.

Hausberger (in Martine et al. 2008:11) emphasizes the importance of a horse's site in determining its personality. Describing it as "a multi-dimensional factor", referring specifically to the condition of the environment as well as the relationships it allows with people. The design will therefore focus on the articulation of the edge where landscape and architecture / horses and people overlap.



[1] Post office parking area
[2] PWD site
[3] Equi Scape (hatched blue)
[4] Proposed Urban school
[5] Post office
[6] Taxi Rank
[7] Station Square Mall

Fig 1.6: Dissertation site within its context

© University of Pretoria

Horses become a catalyst for assimilation within a segregated urban environment. By using a seemingly 'elitist' program and making it accessible to all, allows a common interest to guide the place making and culture forming processes.

1.7 INTENTIONS FOR AN ARCHITECTURAL EDGE

When considering the site's environment as part of natural systems, a need to allow change to form part of our way of living arises. By approaching city edges as an ecotone of an environment, they can play a vital role in allowing and stimulating change, as they are dynamic places where various physical and functional differences come together. Edges are places in our cities which allow for spontaneous interactions.

Physical and metaphysical edges, and the relationship between them, is the focus of this dissertation. The context provided the initial vocabulary of edges, from thresholds to barriers of segregation. Such as the PWD's current site condition. Segregating barriers, becomes the problem against which the dissertation reacts.

The context, program and theory together becomes the tools with which edges are challenged and rearranged, to discover the possibilities of edge and more importantly of edge's as barriers. The existing site edge-condition informed the design. It is, however not seen as a fixed barrier in the landscape. It permits the street to become an extension of the site; and the site an extension of Museum Park.

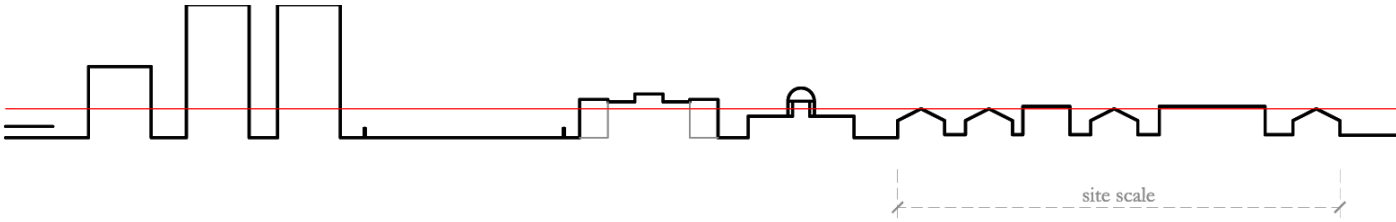
Barriers are challenged through the reintroduction of horses into Museum Park, on the edge of the CBD. The site is therefore ideal for initiating the return of horses into the urban environment.

Horses played an important role in shaping Pretoria, their reintroduction links to this historical social past. It also reestablishes a lost activity, opposed to simply memorialising the past as the majority of the park's museums do.

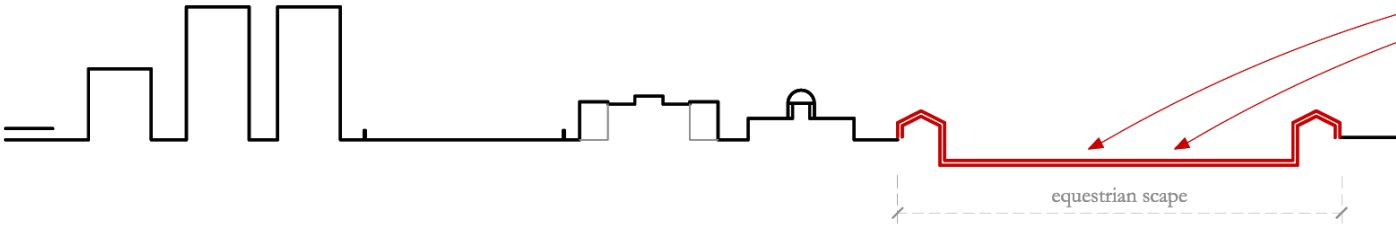
The Equi Scape design manifests the presence of horses within the urban environment. Simultaneously it mediates people's interactions with these large companion animals. This allows for people from different walks of life to interact with one another, as the horse becomes a communal interest.

By considering life other than human life, architecture's anthropocentric tendencies are subverted, and the segregating nature of the existing site's barriers reinterpreted, through the exploration of physical and mental edges. A dialogue about edges is initiated, from which the edges of the Equi Scape emerge through the articulation of its architecture. These architectural edges create niches in the city from which horses can slowly be initiated into the urban environment, facilitating the alignment of ourselves with our equine companions in the urban future.

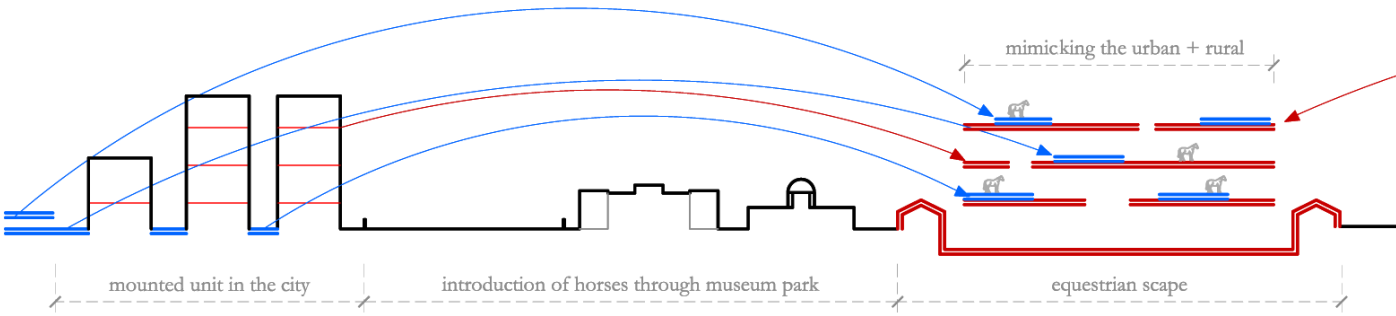
© University of Pretoria



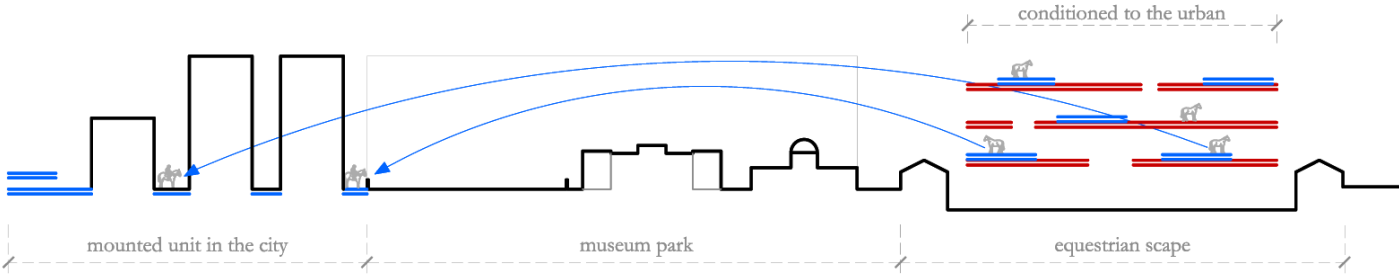
Relationship between SAPS site scale and proposed site scale



Creating of a niche in the urban which mimics the rural



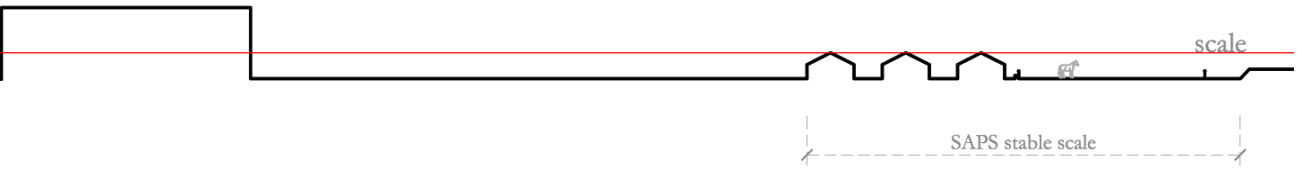
Scape created through mimicking Urban and Rural elements

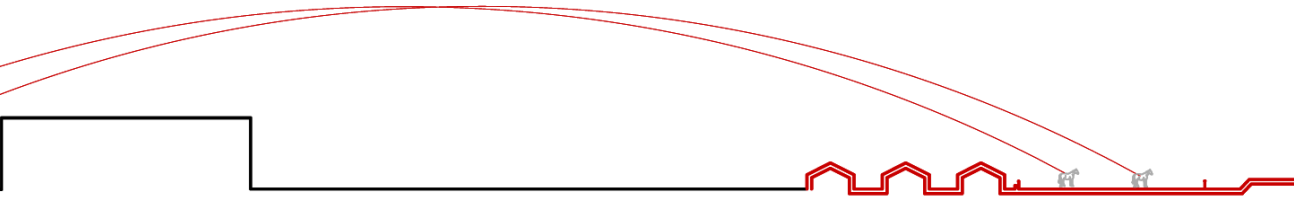


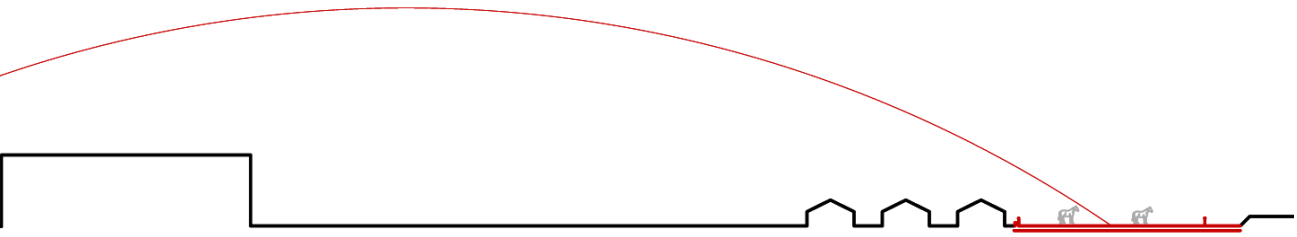
Introduction through Museum Park

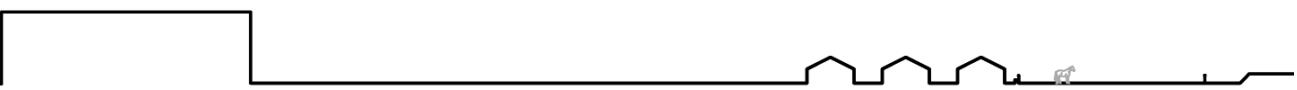
Fig 1.3: Introducing the horse to the city [creating a niche for the horse from which to be reintroduced to the city]

© University of Pretoria









© University of Pretoria

1.8 RESEARCH METHODOLOGY

The dissertation investigation will take the following form:

Chapter 1 Introduction
Outlines the context of the dissertation, highlighting the supposition, which is explored.

Chapter 2 Context
Gives a detailed analysis of contextual edges in and around Museum Park at various scales, from the macro scaling down to the micro condition.

Chapter 3 Vision
Gives an overview of past urban frameworks, which along with the context analysis sets the scene for the programmatic responses, and allows the framework to respond to the various scales of the context addressed within the dissertation.

Chapter 4 Program
Discusses the relationship between man and horse and how it has developed over time, it then highlights the services that horses can offer Pretoria in the 21st century and establishes requirements for an equestrian facility within Museum Park.

Chapter 5 Theory
Drawing from various concepts, namely landscape ecology, mental edges, heterotopias, human-nature hybrids and landscape urbanism and its relation to infrastructure, a theoretical design approach is established for the creation of a niche in Museum Park, to which a human-horse culture may be grounded.

Chapter 6 Precedents
Discusses the design approach of Enric Miralles, which starts to inform an approach to architecture, materiality and technology along with the work of Kengo Kuma which aided in informing an approach to materials and technology.

Chapter 7 Design synthesis and development initiates the process of renegotiating and reinterpreting the current site boundary walls, allowing a solution to emerge from the investigation into edges undergone up until this point.

Chapter 8 Technical Development
Clarifies how the architecture manifests its edges at a detail level in response to its users.

© University of Pretoria



© University of Pretoria

SOPHRONIA

In contemplating the invisible city Calvino describes the city of Sophronia, the city consists of two half cities.
The one half is characterised by folly and the potential for fun latent in the carnival. The other half of marble and stone contains the formal city of banks, factories and schools (Groak 1992:8).

One half is permanent, the other temporary when the two meet they momentarily form a whole. Then the one half city is uprooted and replanted on the waiting lots of another carnival half-city. In this moment the dependence of the carnival city on the ordered city is revealed, as it is left with nothing but un-realised potential (Groak 1992:8).

Pretoria has many similarities to Sophronia, with several half cities segregated and divided with many un-realised opportunities.

This chapter aims to reveal the latent potential of the past and present site, allowing for the elements of a future potential to be revealed.

There also exists, as with Sophronia, an essential relationship between the formal and informal. There is a tension at the point where they meet. Making it a dynamic place for emergence, engagement and spontaneity.

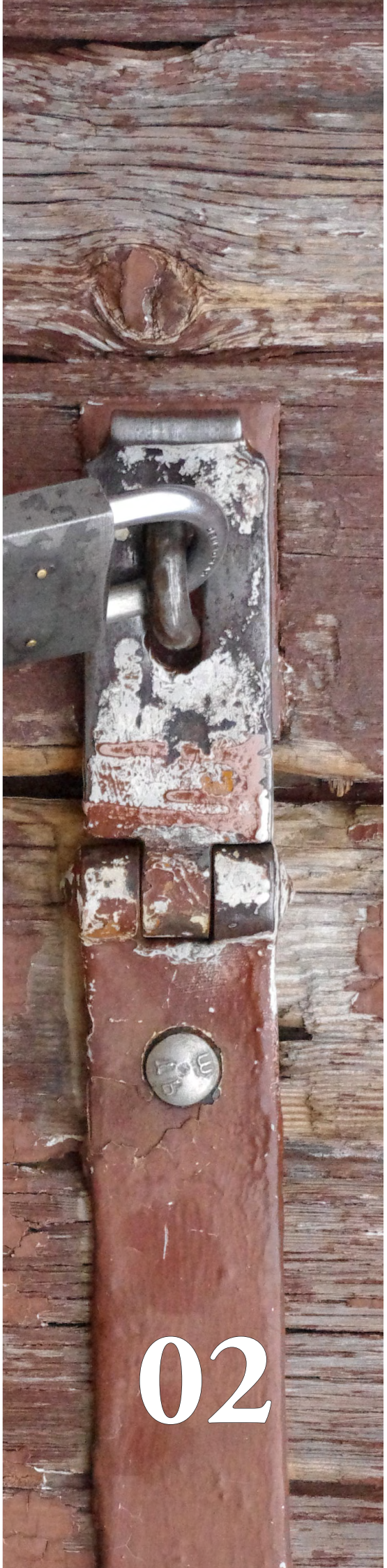
© University of Pretoria

CONTEXT

Chapter 2 is a detailed analysis of contextual edges at various scales, from the macro scaling down to the micro condition.

This chapter delves into the edge problems and opportunities present in the context. Gaining an understanding of the various scales and edges in which the project will establish itself.

A contextual edge analysis then gives an understanding of how edges manifest within the context. Thus establishing a contextual approach to the design of edges.



02

© University of Pretoria

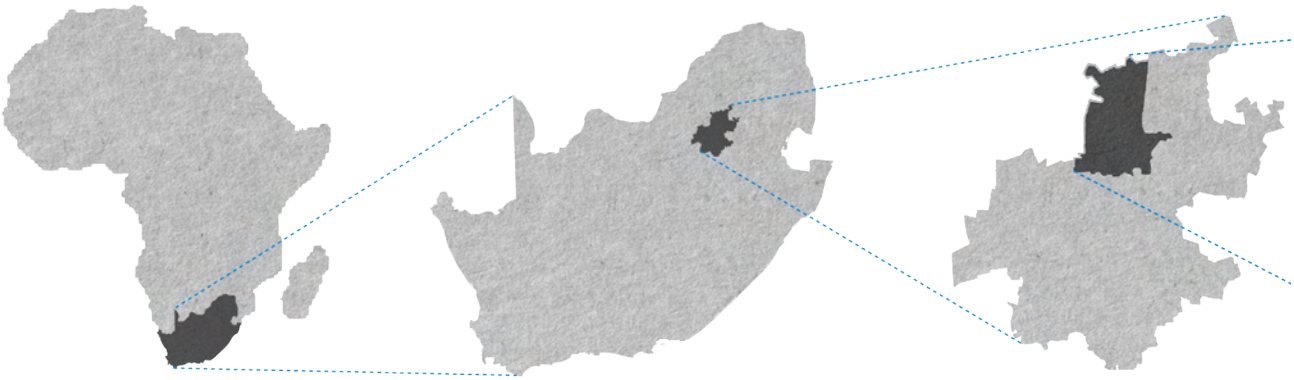


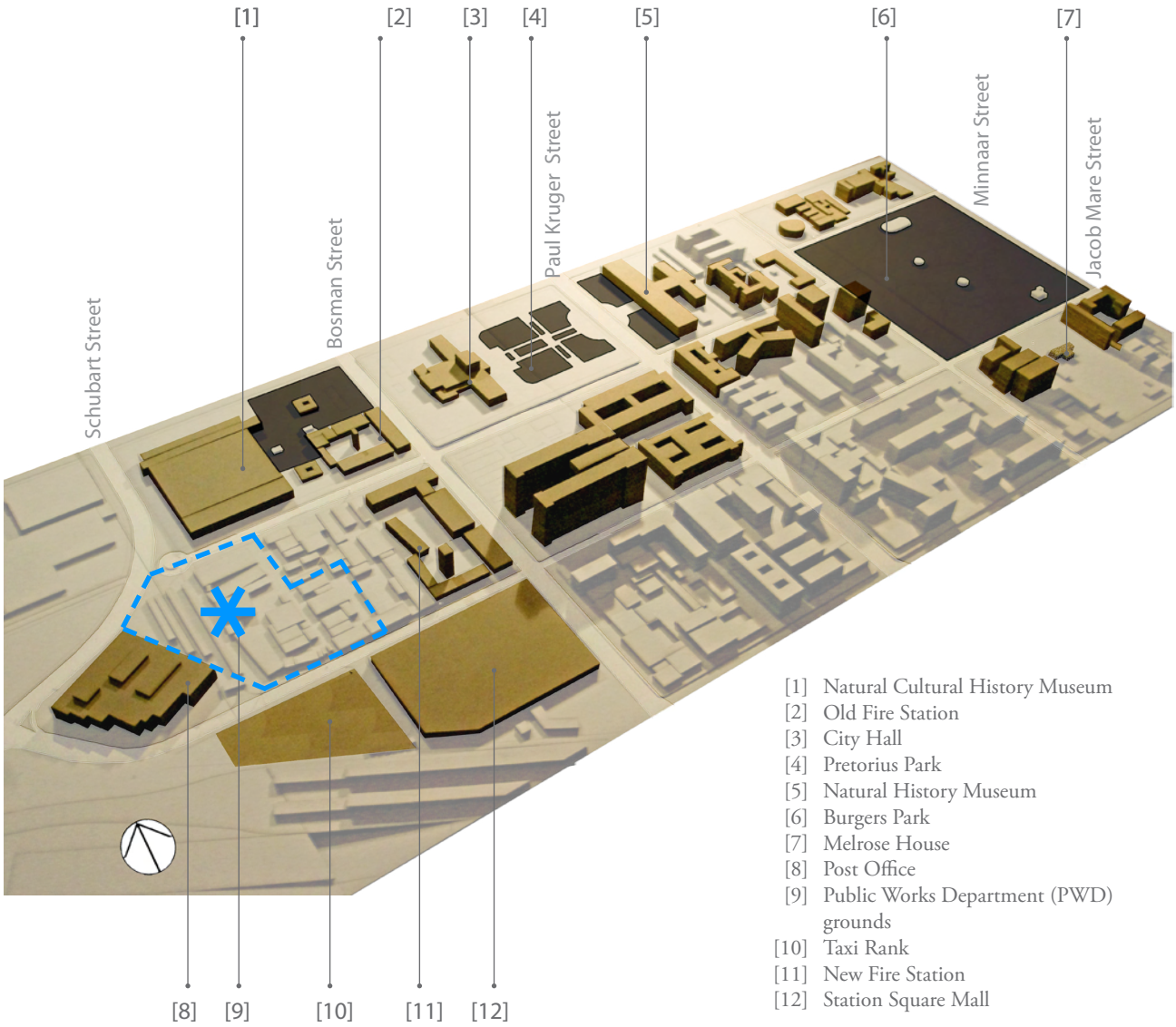
Fig 2.1 South Africa within Africa

Fig 2.2 Gauteng within South Africa

Fig 2.3 City of Tshwane within Gauteng

2.1 MACRO SCALE

2.1.1 PWD GROUNDS IN MUSEUM PARK, IN RELATION TO PRETORIA



[1] Natural Cultural History Museum
[2] Old Fire Station
[3] City Hall
[4] Pretorius Park
[5] Natural History Museum
[6] Burgers Park
[7] Melrose House
[8] Post Office
[9] Public Works Department (PWD) grounds
[10] Taxi Rank
[11] New Fire Station
[12] Station Square Mall

Fig 2.7: Site location and building in and around Museum Park

© University of Pretoria

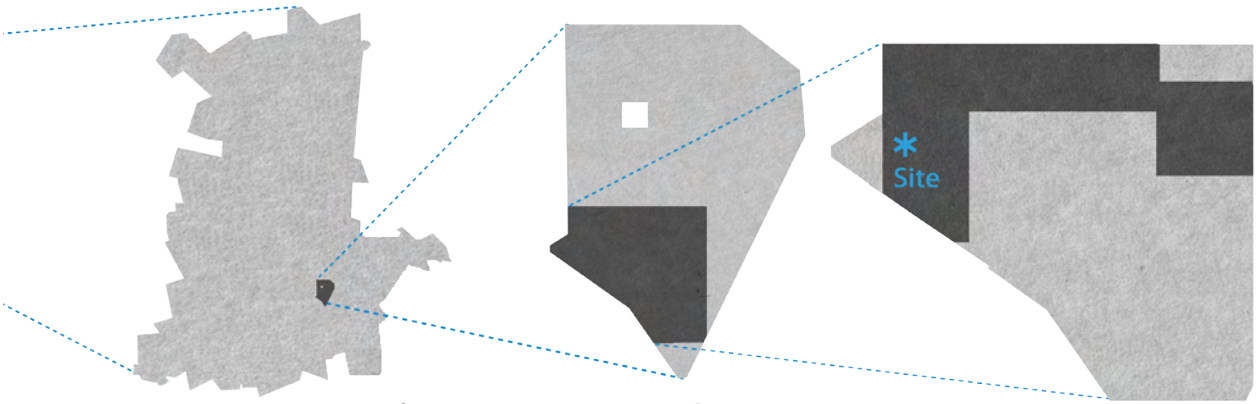
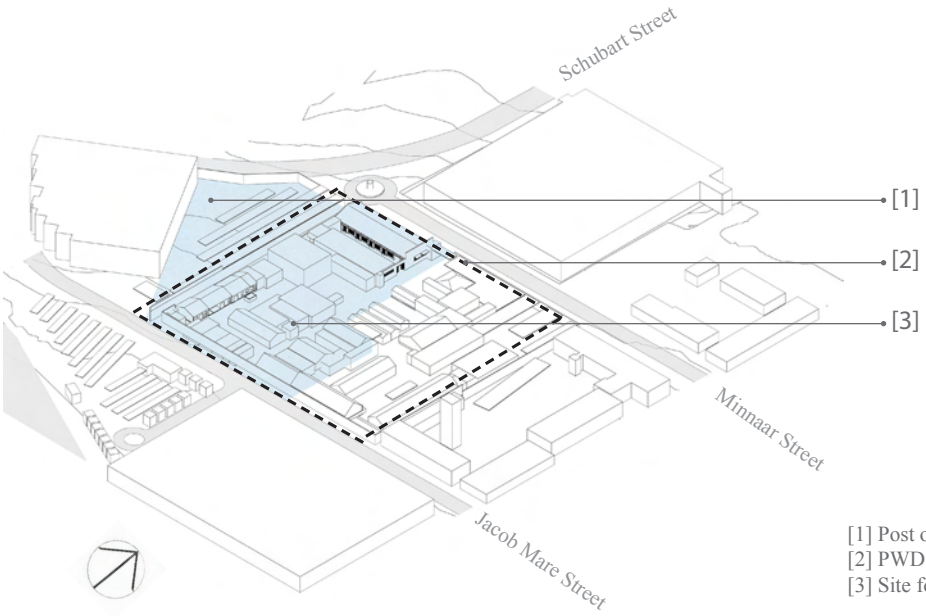


Fig 2.4 Central Buisness district in Central Business District

Fig 2.5 Pretoria CBD (transport interchange and Museum Park)

Fig 2.6 Site Location within Museum Park



[1] Post office parking area
[2] PWD grounds
[3] Site for the Dissertation (hatched blue)

Fig 2.8: Dissertation site selection

The site is located on the edge of the Pretoria Central Business District (CBD), between Minaar and Jacob Mare Street. Respectively these streets connect the site to the Museum Park to the north and the Pretoria Station modal-interchange to the south. The Pretoria Station modal-interchange is characterised by busses, taxis and trains which connect people locally, nationally and internationally. The recent addition of the Guatrain Station links Pretoria CBD to an international community.

© University of Pretoria

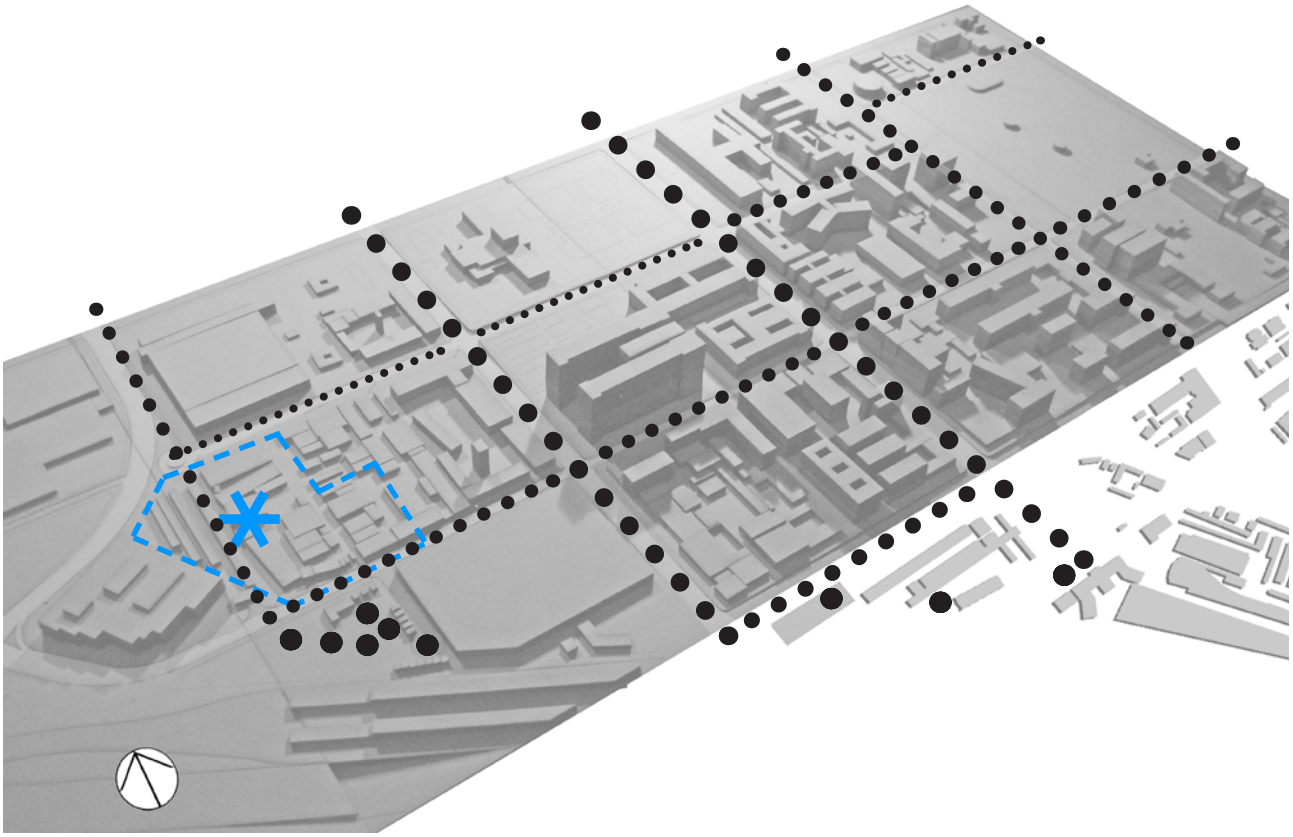


Fig 2.9: Pedestrian activity around the Public Works Department grounds and Museum Park

This has started affecting the design of public spaces and facilities outside the station, developments include coffee shop, ice-cream kiosk and a fast food outlet. The most significant development in the area is the erection of a new mall directly south of the chosen site. It is ordered around an arcade, that links Bosman Station to the taxi rank directly across from the site. Although the mall responds to its context through peoples desire lines, it signifies a change in the nature of public space within the area, as the commercial aspect overrides any attempt at creating public space and isolates itself from the street.

Figure 2.9 illustrates the pedestrian activity in the area. Revealing opportunities for the site to engage with city dwellers. The site's proximity to the transport precinct as well as the recent developments in the area, allows for developments in Museum Park aimed at both tourists and local communities.

© University of Pretoria

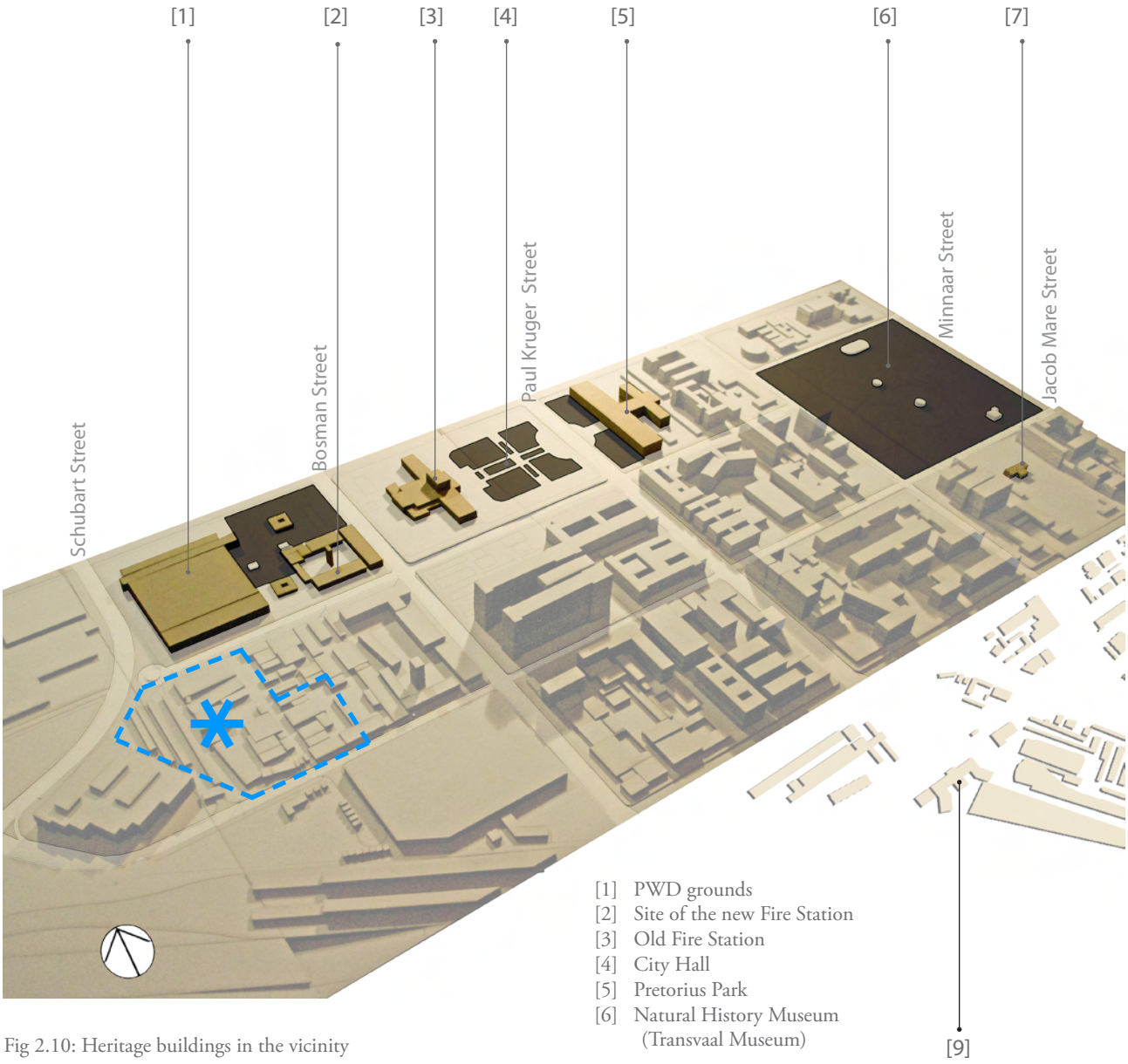


Fig 2.10: Heritage buildings in the vicinity

2.2.1 MUSEUM PARK

An initiative started by the City Council of Pretoria as a grouping of cultural facilities; designed by Holm Jordaan Architects and Urban designers. The intention was to strengthen the symbolic structure of the city through cultural and historical buildings while at the same time facilitating education and tourism (Van Dyk 2000:14).

2.2.1.1 BURGERS PARK

The Museum Park's most eastern edge is created by Burgers Park established in 1890. Today the park is the most actively used space in the precinct, figure 2.10 shows the park in the 1930's.

The park's spatial quality is created by the dense residential buildings which define its urban edges. The residents use it as a multifunctional leisure and recreational space. Due to its accessibility and good maintenance there is a sense of ownership.

Local resident's using Burger's Park for recreational purposes displayed their sense of ownership by confronting unsuspecting cyclists (unfamiliar to the neighbourhood) by pointing out the 'no-motorcycle' policy signs at the entrance. Their view was that if motorcycles are prohibited, bicycles were equally unsuitable. This display of ownership and responsibility indicates that the community is proud of their communal spaces.

© University of Pretoria



[1] Natural History Museum (Transvaal Museum)
[2] Burgers Park
[3] Gardeners Cottage
[4] Restaurant

Fig 2.11: Historical aerial photograph of Burgers Park looking North West 1930's

© University of Pretoria



Fig 2.12: Historical aerial photograph of Museum Park looking West 1939

© University of Pretoria

2.2.1.2 MINNAAR STREET AS MUSEUM PARK CORRIDOR

Minnaar Street connects the various Museums and facilitating spaces.

The collection of images in figure 12.14 highlights the buildings and facilities in the 'park'.

Figure 2.13 below shows a panorama of Museum Park, highlighting Minnaar Street, as well as various elements of the landscape, including the PWD site in its context.

The street has been designed for people, evident in its wide sidewalks which provide trees for shade, lamps for lighting at night and seats for moments of rest.

Where Minnaar intersects Burgers Park there is a richness created by, the chime of an ice-cream cart, the smell of food and the constant flow of people.

As one moves along Minnaar, Pretorius Square is a tangent to Minnaar towards the west, and is edged by the City Hall (west) and the Museum of Natural History (east).

The aerial photograph, figure 2.11 shows the layout of this part of Museum Park.

Newly erected boundary fences now segregate these places from their users. One hardly notices the massive skeletons which adorn the entrance to the museum.

The Old fire station and National Museum of Cultural History are hidden behind City Hall. Due to the fences Minnaar Street fails as a connector west of Paul Kruger Street, as not even the National Cultural History Museum is still accessible from Minnaar Street.

Museums and facilitates are few and far between, this problem becomes amplified by the fences which create boundaries and decrease accessibility.



Fig 2.13: Site in context: Museum Park condition and connecting Minnaar Street

© University of Pretoria

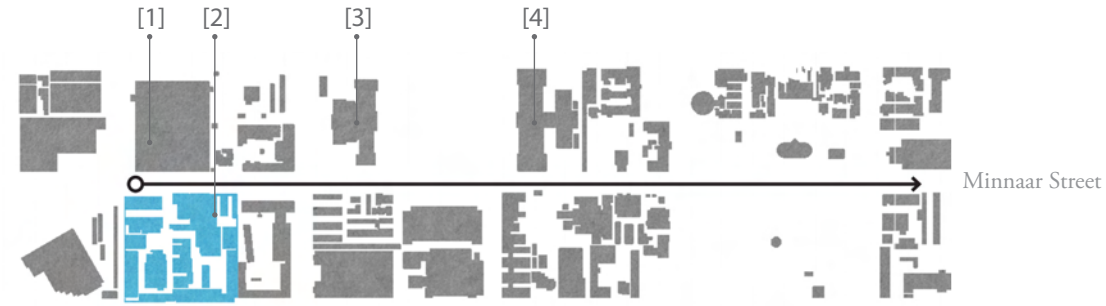


Fig 2.14.1: PWD grounds and buildings which define Museum Park and Minnaar Street

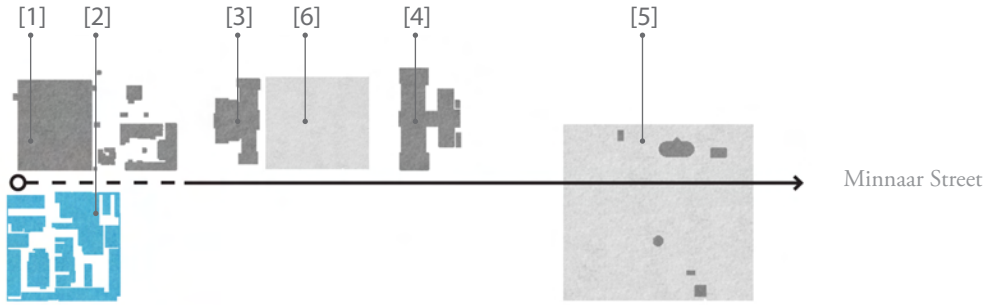


Fig 2.14.2: PWD grounds in its context of significant spaces and buildings

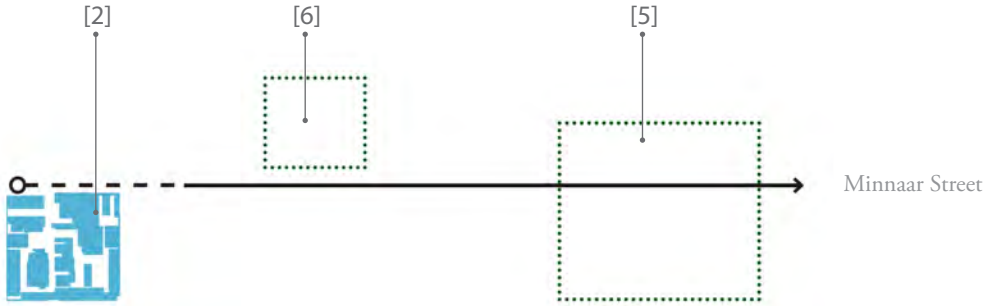


Fig 2.14.3: PWD grounds in relation to green spaces in Museum Park

[1] PWD Grounds
[2] Site of the new Fire Station
[3] Old Fire Station
[4] City Hall
[5] Pretorius Park
[6] Natural History Museum (Transvaal Museum)



© University of Pretoria

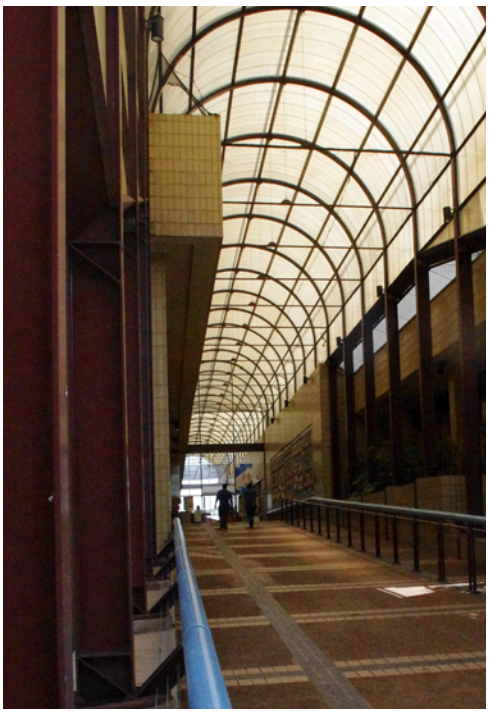


Fig 2.15.1: **DITSONG NATIONAL MUSEUM OF CULTURAL HISTORY**
1995
KWP Architects:
Adaptive reuse of the old mint. Displays two million years of South African Cultural heritage and aims to explore the rich cultural diversity of our country (Ditsong 2010a).



Fig 2.15.2: **OLD FIRE STATION**



Fig 2.15.3: **CITY HALL**
1935
L.S. Cleland Architects
Neo-classical building



Fig 2.15.4: **PRETORIUS PARK**

© University of Pretoria



Fig 2.15.5: **BURGERS PARK**
1890
Sytze Wierda Architects (Van Dyk 2000:14)
One of the best examples of: a Victorian age garden (Kusel 1993:3)



Fig 2.15.6: **MELROSE HOUSE**
1886
Vale Architects
Victorian/Edwardian house pre-manufactured in England (Ablewiki 2010b)



Fig 2.15.7: **PRETORIA STATION**
1910
Sir Herbert Baker
(Ablewiki 2010a)



Fig 2.15.8: **NATIONAL MUSEUM OF NATURAL HISTORY**
1913 (Previously: Transvaal Museum founded 1892)
J.S. Cleland Architects
Neo-classical landmark building; the principle custodian and centre for recording South Africa's natural environment. On display are original fossils and collections, usually denied to the public (Ditsong 2010b).

© University of Pretoria

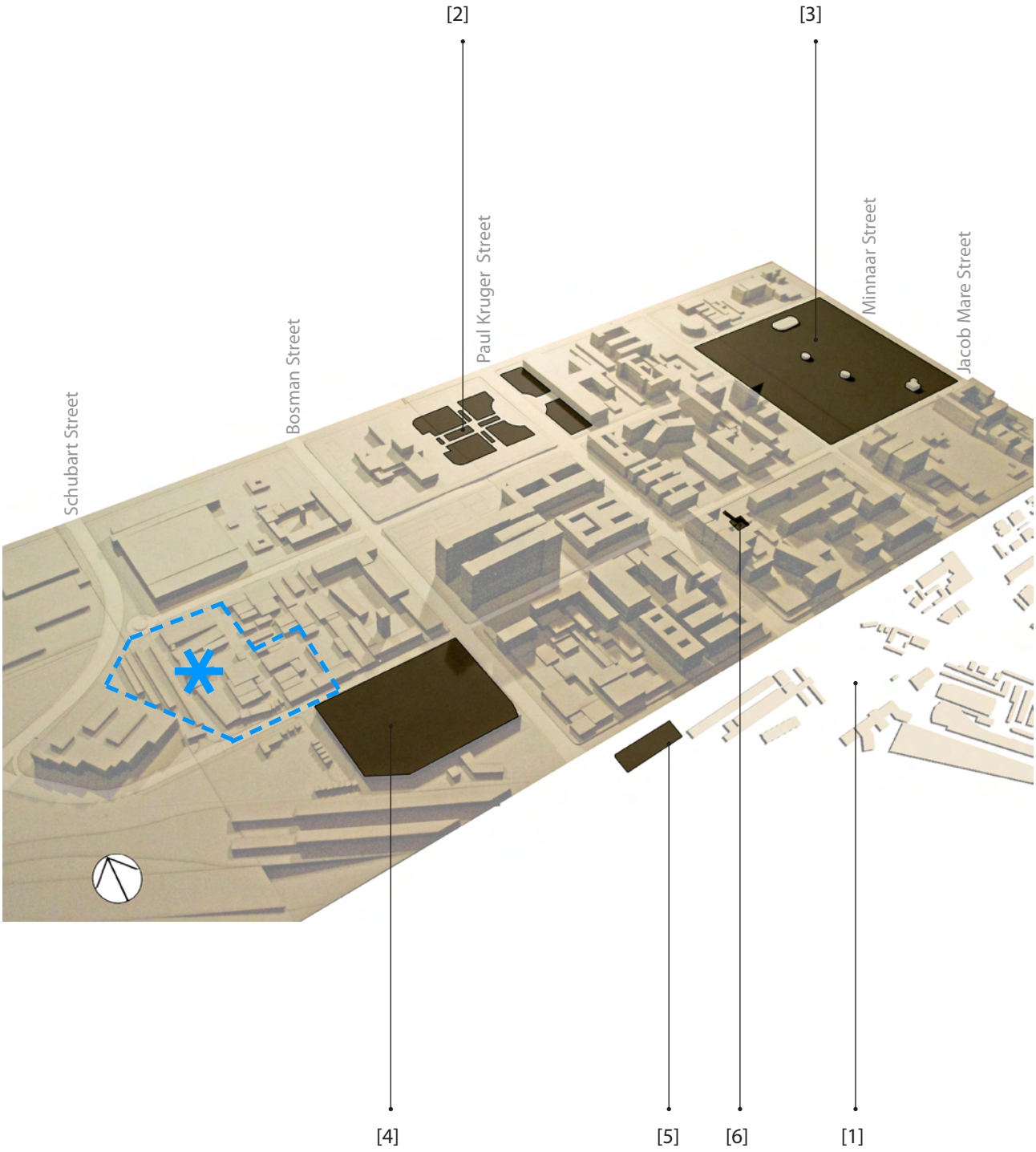


Fig 2.16: Map of the southern part of Pretoria CBD, showing the location of significant urban rooms

2.2.2 URBAN ROOMS

This section investigates elements which contribute to or detract from a urban room's sense of place. Giving specific attention to the role that edges play in this place making. This investigation will establish a better understanding of the local context and establish an approach to place making through the design of edges.

© University of Pretoria

[1] PRETORIA STATION SQUARE

Paul Kruger Street

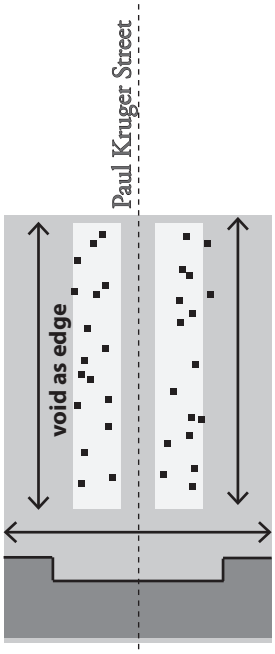


Fig 2.17.1: **Pretoria Station Square**

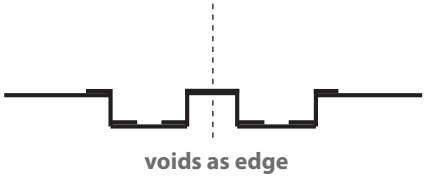
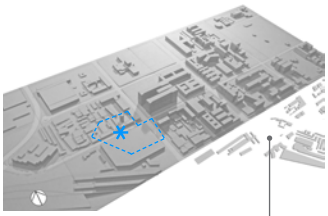


Fig 2.17.2: Sectional diagram showing the edges and voids of **Pretoria Station Square**



[1]

Urban Room as:
- Void

Edges:
- Buildings
- Circulation space around voids

Function:
- Pause space between modes of transport

Contributing to place making:
- Trees
- Sunken landscape with seating
- Activity
- Seating



Fig 2.17.3: Landscape in front of Pretoria station

© University of Pretoria

2.2.2 [2] PRETORIUS SQUARE
Corner of Minnaar and Paul Kruger Street

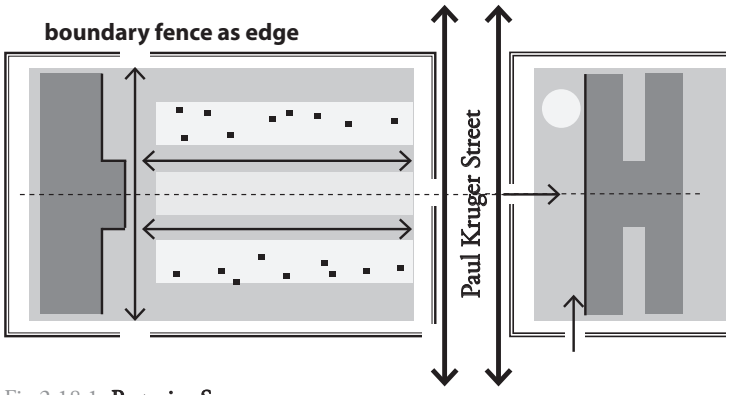
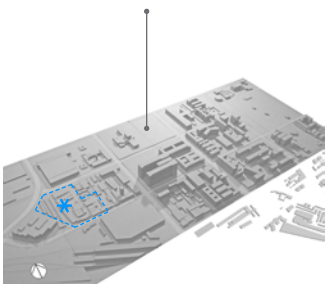


Fig 2.18.1: **Pretorius Square**

[2]



Urban Room as
- Park

Edges:
- Buildings
- Fences

Contributing to place making:
- Trees
- Water
- Axis
- Seating

Detracting from place making:
- Fences have become the quick fix to any social problems from vandalism and crime to homeless occupation.

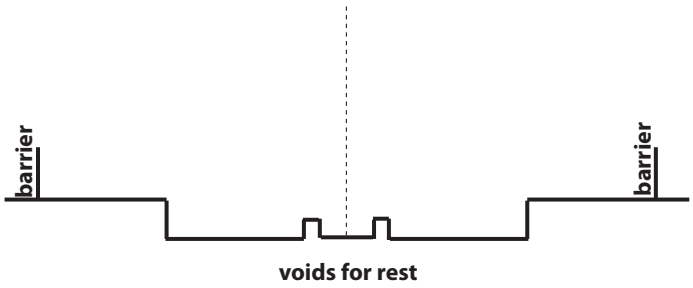


Fig 2.18.2: Sectional diagram showing the edges and voids of **Pretorius Square**



Fig 2.18.3: **View across Pretorius Park**

© University of Pretoria

2.2.2 [4] STATION SQUARE MALL

Corner of Bosman and Jacob Mare Street

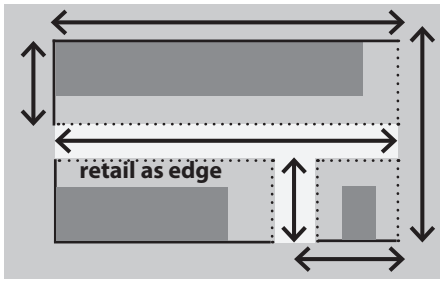
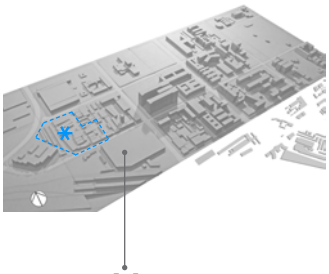


Fig 2.19.1: Station Square Mall diagram



Urban Room as
- Mall
- Route

Edges:
- Retail as edge as well as hard edges

Function:
- Commercial
- Arcade with a mall constructed around it

Contributing to place making:
- Shops as interior edges
- Constant flow of activity

Detracting from place making:
- It creates no public spaces free of a commercial intention.
- Impermeable edges have been created on three edges.
- Spikes line all sidewalk seating.

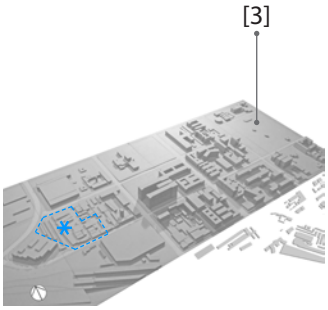


Fig 2.19.2: Mall edge to Jacob Mare Street

© University of Pretoria

2.2.2 [3] BURGERS PARK

Minnaar Street, Museum Park



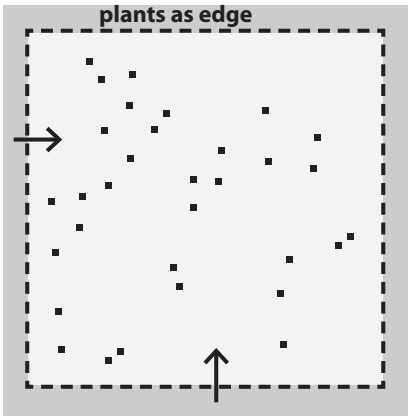


Fig 2.20.1: Burgers Park diagram

Urban Room as
- Park

Edges:
- Plants + low fence

Function:
- Leisure + Recreation

Contributing to place making:
- Trees
- Water
- Residential Edge
- Sense of ownership

Detracting from place making:
- Only two entrances are still used.

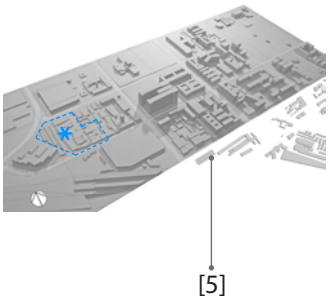


Fig 2.20.2: View of Burgers Park

© University of Pretoria

2.2.2 [5] TRAM MARKET

Scheiding Street



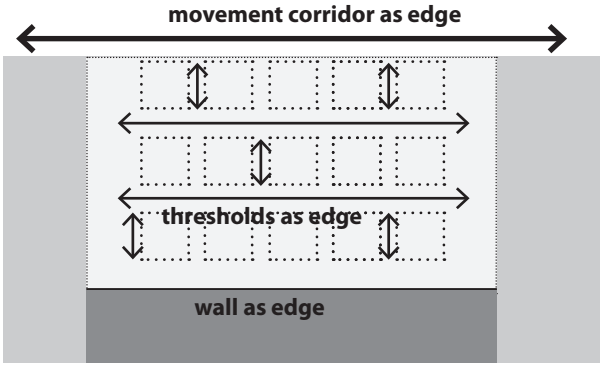


Fig 2.21.1: Tram Market diagram

Urban Room as
- Void
- Route

Edges:
- Permeable layering of market and public space
- Multiple Thresholds

Function:
- Informal vending + storage

Contributing to place making:
- Pedestrians movement
- Protected from busy street
- Sense of ownership
- Sounds + smells
- Amenities
- Seating

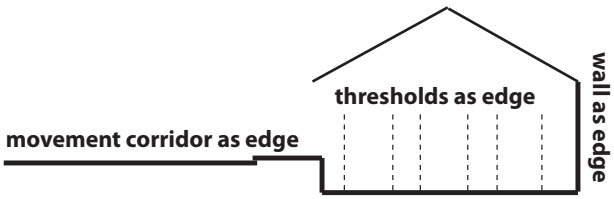


Fig 2.21.2: Sectional diagram showing the various edges of the Tram Shed



Fig 2.21.3: Tram market entrance

© University of Pretoria

2.2.3 HUSSEIN MASJID MOSQUE

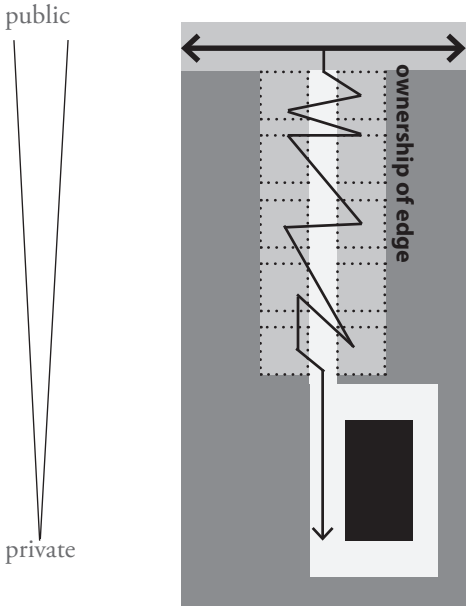
Jacob Mare Street
Pretoria

Through the investigation of the context, the most notable characteristic about the area was the opportunities in lost space. Made apparent by the Hussenien Masjid Mosque located in the centre of a city block surrounded by residential high rise buildings.

The community associated with the mosque actively displays their ability to appropriate through ornament and in-fill, establishing a place of belonging for a community.

The mosque is accessed through an alley between two existing buildings. What is fascinating about the mosque is the manner in which it has grown through the appropriation of surfaces though adornment. The alley is now an extension of the mosque, the mosque is metabolising and thus constantly changing in scale and meaning. There is also an exciting sense of the outside becoming the inside, yet remaining outside. Claiming portions of several buildings as it grows.

Lost space is being claimed, yet opposed to closing it off, it opens up to invite the public in, providing services and retail en route to the mosque, thus establishing an economic system which grows from and enriches the social system. Several thresholds from public to private are established, however from the moment you enter off the street there is a sense of ownership.



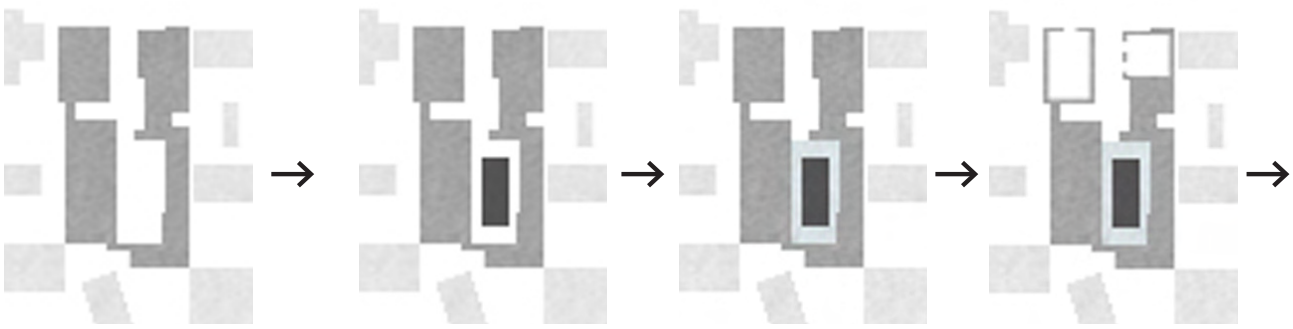
Urban Room as
- Destination
- Appropriated alley

Edges:
- Appropriated buildings edges

Function:
- Mosque + mixed use

Contributing to place making:
- Ownership of edges
- Community formed around the Mosque
- Mixed use
- Both private and public

Fig 22.1: Hussein Masjid Mosque diagram



Alley leading to residential area

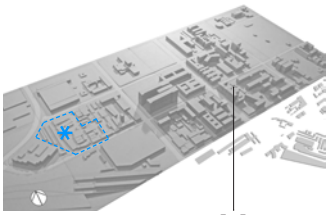
1998 mosque is built in the courtyard

Residents started tiling the courtyard

Street facing stores are opened

Fig 2.22.2: Diagrams illustrating the appropriation over a five year period

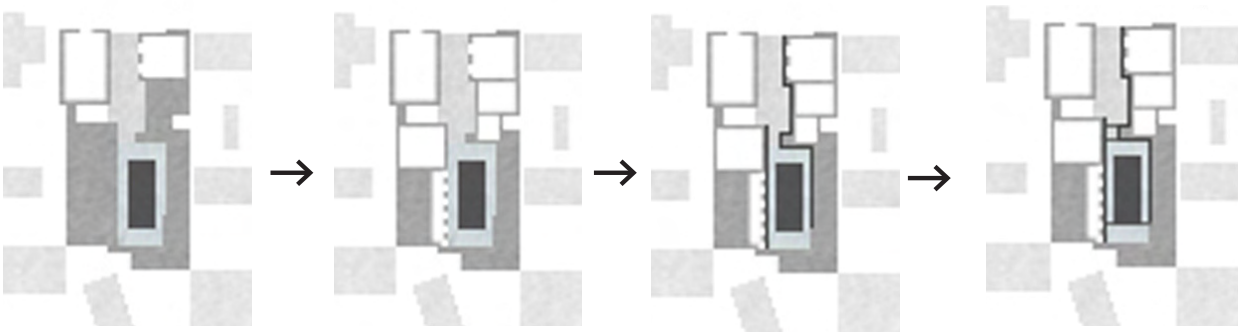
© University of Pretoria



[6]



Fig 2.23: Image of the alley appropriation over the last five years



The area up to the street becomes tiled

The mosque becomes a destination creates opportunity for shops

The mosque continually grows through the appropriation of the alley

Arches are built + slowly the boundaries between the inside + outside become blurred

© University of Pretoria

2.2.3 APPROPRIATED EDGES AND THEIR SPACES

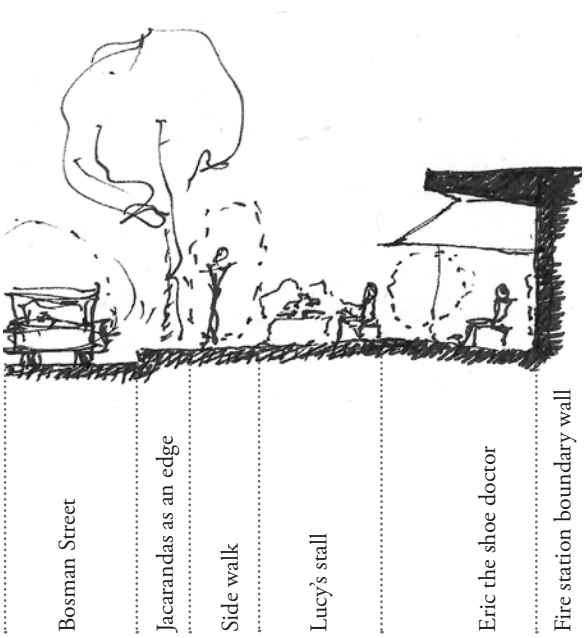


Fig 2.25: Diagram of various edges (formal and informal)



Fig 2.24: The shoe doctor

'THE SHOE DOCTOR'
c/o Bosman and Jacob Mare Streets

The movement of vehicular and pedestrian traffic is constant here, where Jacaranda's provide shade and some comfort from harsh urban edges.

Here Luci and Eric have established their own niches against the new fire station edge which creates a space through protruding beams which extend into the public realm. This has created an opportunity for Eric to set up his business of making African shoes as well as repairing broken shoes. He is from Ghana but has been working at his corner for 11 years.

Just in front of his workspace Lucy sells fruits, vegetables and snacks. Together they create a new street edge, with niches and sub-spaces.

© University of Pretoria



Fig 2.26: Maria's Shisanyama

SHISA NYAMA (Zulu for a Braai)
Jacob Mare along the PWD Edge

Through appropriation these ladies have created their own edges from gas cookers and umbrellas. The shisanyamas face the busy street and pedestrian sidewalk where they make taste buds water. While creating an active edge, behind which customers sit and eat sheltered from the bustle of the city.



Fig 2.27: Diagram of various edges (formal and informal)



Fig 2.28: Image showing space created by vendors

BOSMAN STATION ENTRANCE
Along Bosman Street

Once more intense pedestrian activity has encouraged vendors to create stall edges. Reggie and Keketso sell food as well as provide public phones, charging 90c a minute, this stall and others like it, creates dynamic edges for interaction.



Fig 2.29: Diagram of various edges (formal and informal)



Fig 2.30: The music man's stall

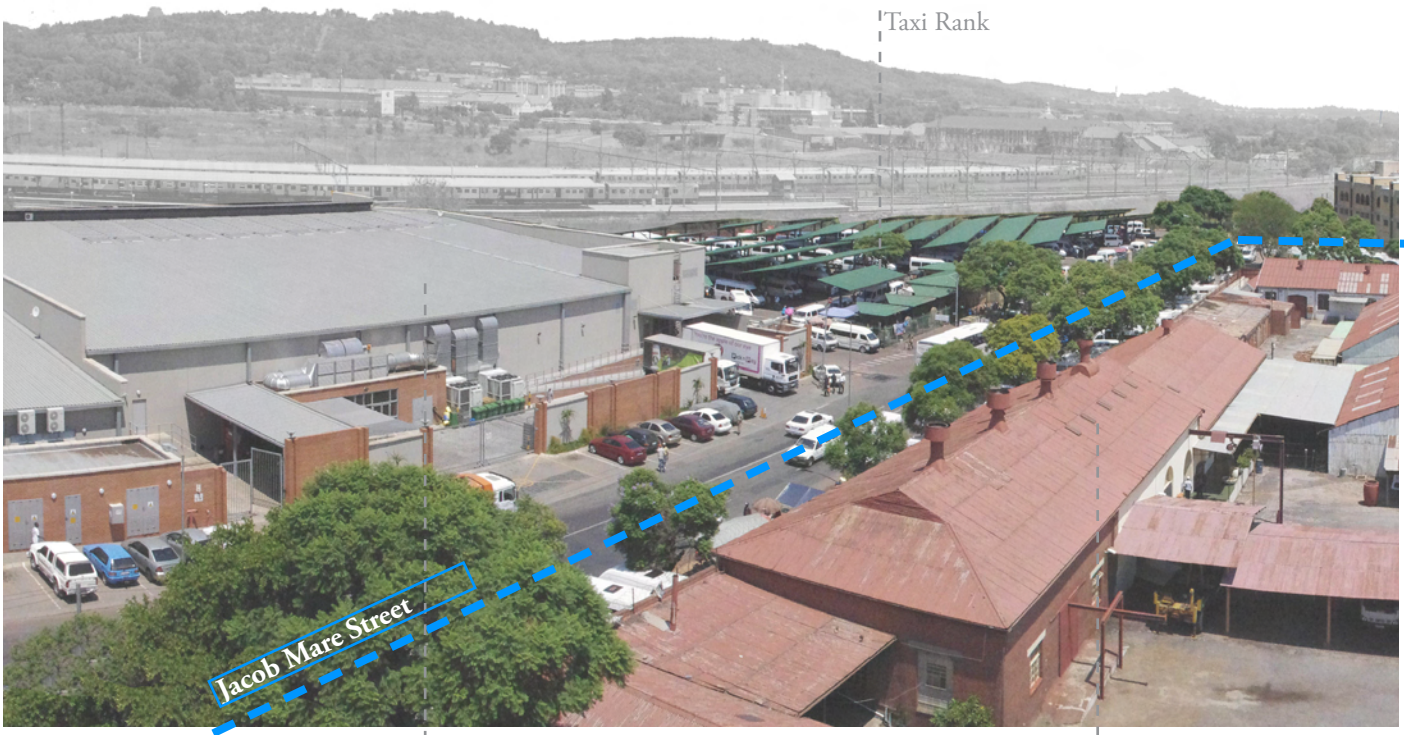
'THE MUSIC MAN'
Old Tram shed

Andries owns a music stall in the old tram shed. Five stalls from he's, there is another vendor selling CDs. These two vendors compete for clients through the volume of the music they play

© University of Pretoria

2.3 MESO

The site's location is on the western edge of Museum Park and is surrounded by large buildings which occupy entire city blocks. Figure 2.14 and 15 illustrate the scale of the PWD grounds in its context, as viewed from the new fire station tower. The site is located opposite a vibrant taxi rank which encourages a consistent flow of people. As evident in the photograph the mall has a hard edge facing Jacob Mare Street to its north, the post office and National Cultural History Museum both create hard edges which fail to respond to the urban life around them.



© University of Pretoria

2.4 MICRO

The PWD site within its context of monolithic structures lays hidden behind unfriendly isolating brick walls, adorned with razor wire and surveillance cameras. Behind this mask of security there is an enclave to be discovered, of small scaled buildings which together create the feeling of a small town in a big city. This initial experience transports one back in time. A feeling that is strengthened by the character of the red face brick buildings which, upon entering, reveals a layering of time, as parts of Pretoria's face brick tradition is revealed.

Due to the light industrial functioning of the site it has become scattered with buildings of both a permanent and temporary nature. Steel structures clad with corrugated sheets, became the quick fix to any space requirements, today every nook of usable space has been filled with stores and parking structures. Time and need, has been captured within this patchwork of temporary building types, which today are mostly vacant.



Fig 2.31: Site in context, Museum Park and Urban condition

© University of Pretoria

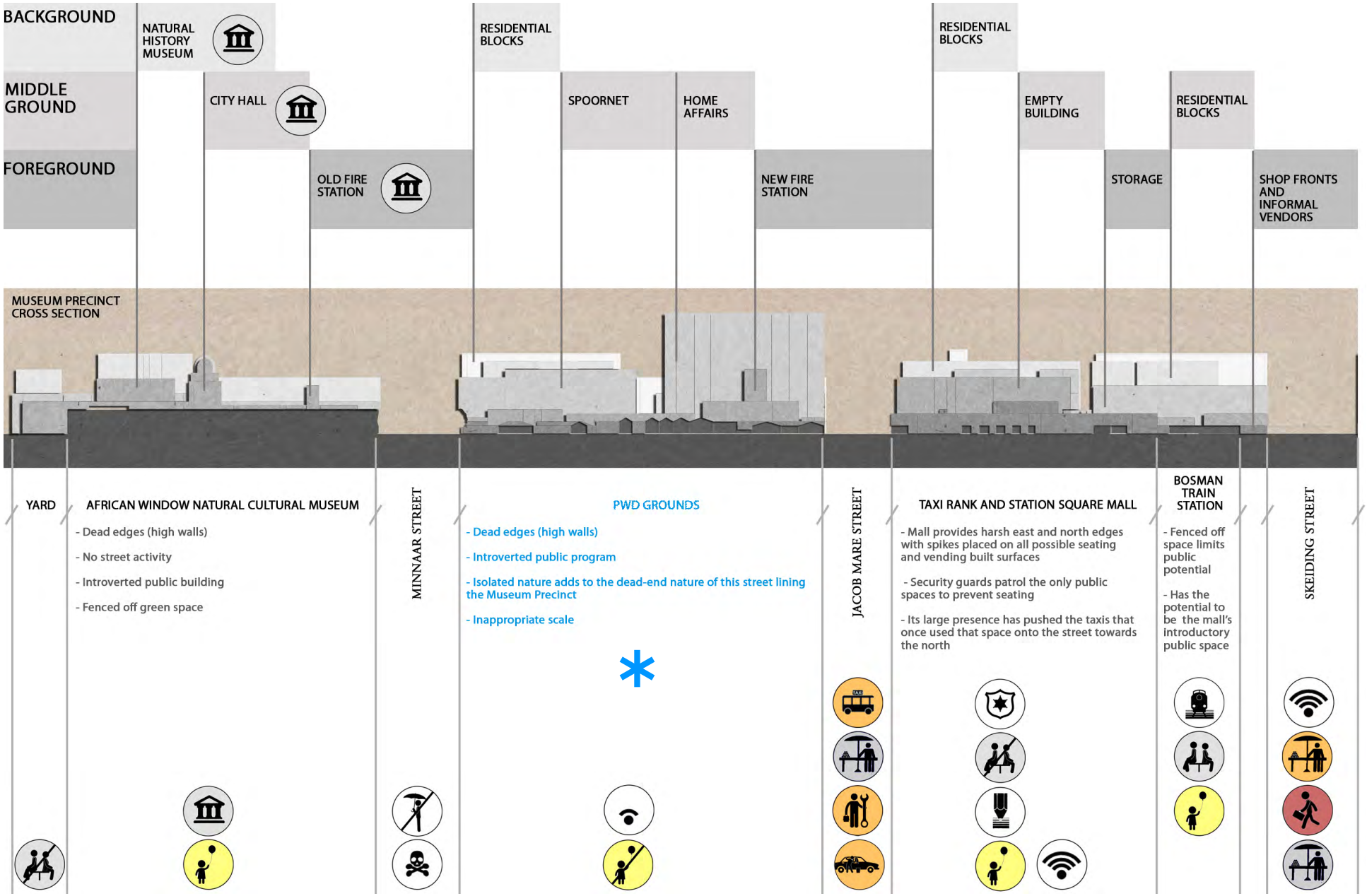


Fig 2.32: Site in context, Museum Park and Urban condition

© University of Pretoria

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

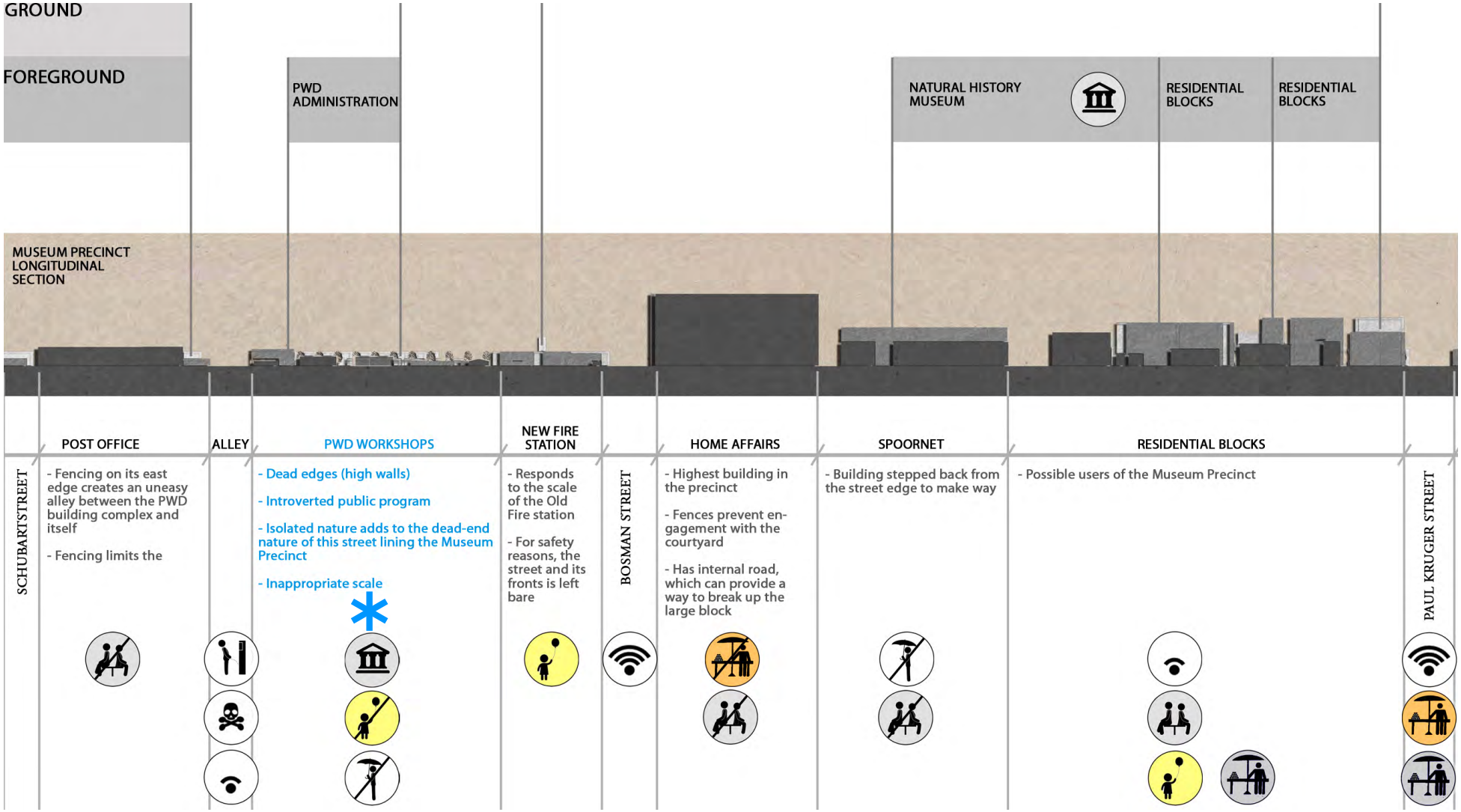


Fig 2.33: Site in context, Museum Park and Urban condition

© University of Pretoria

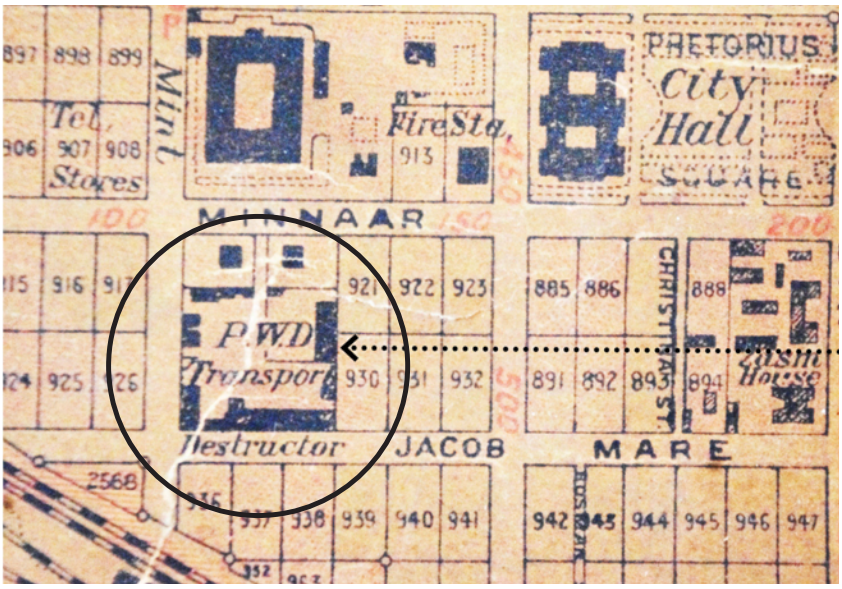


Fig 2.34: Map showing the PWD Transport in 1932



Fig 2.35:
Expansion and contraction of the PWD grounds(1913-2013)

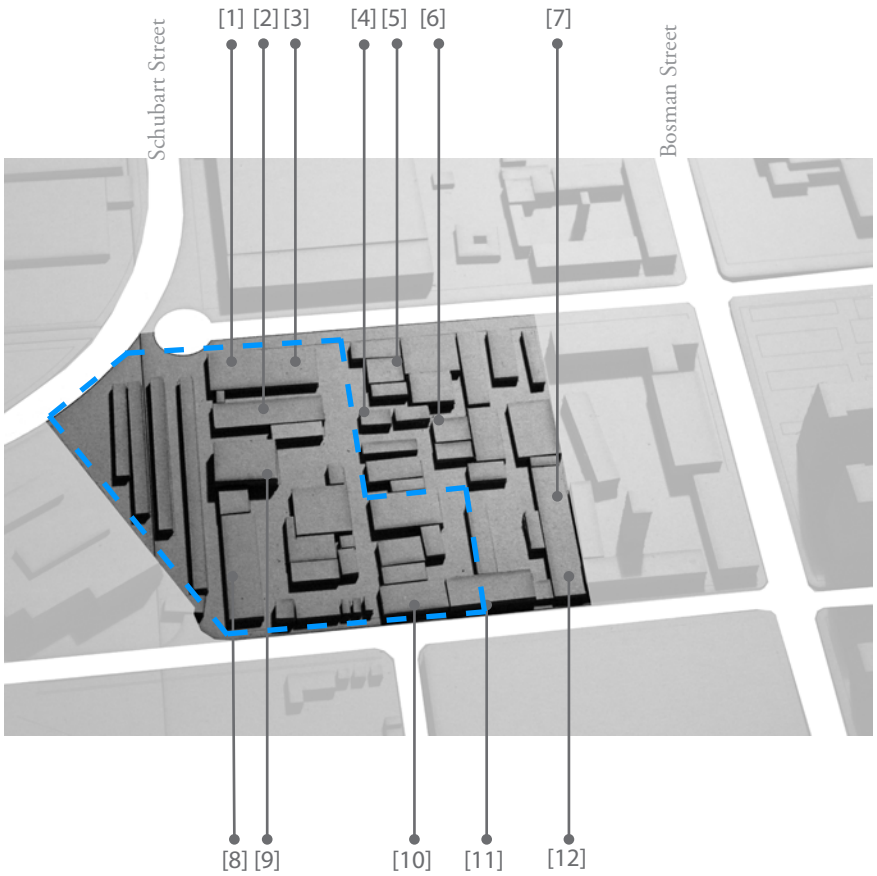
2.4.1 PAST, PRESENT FUNCTION

As fig 2.34 illustrates this site has been the grounds for the PWD since at least 1932. At this time it was the PWD transport, later converted to workshop spaces.

The Department of Public Works (PWD) maintains government buildings and services in South Africa. Workshop spaces become the central point of these functions. Figure 2.37 points out the various functions and their location on site, which include; Carpentry, Steel work, Mechanical, Electrical, Sewing and Plumbing. As these programs no longer requires all the available space, several buildings have become un-used or underutilised. Through its mono-functionality the site has become stagnant in time, detached from its context, and due to its isolation, became meaningless to its immediate context.

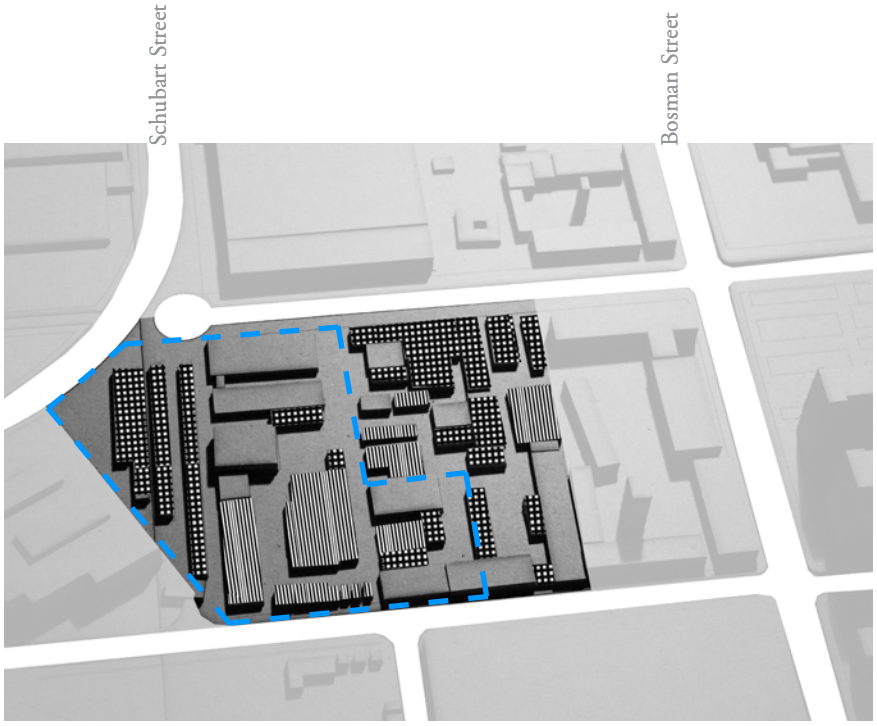
The current functioning of the PWD is likely to become obsolete as its functions become delegated to private companies. The site therefore becomes available for a change in function which allows it to respond differently to its context.

© University of Pretoria



[1] Carpentry workshop
[2] Steel workshop
[3] Security offices
[4] Sewing
[5] Offices
[6] Plumbing workshop
[7] Electrical workshop
[8] Storage
[9] Administration
[10] Empty
[11] Plumbing storage
[12] Welding

Fig 2.36: Current Functions on Site



Parking structures

Temporary Storage buildings

Fig 2.37: Underutilised parking and storage space

© University of Pretoria



Fig 2.38: Site Character



Fig 2.39: Minnaar Street Entrance

© University of Pretoria



Fig 2.40: Minnaar Street looking West



© University of Pretoria



Fig 2.41: Carpentry Workshop



Fig 2.42: Administration



Fig 2.43: Crest removed from the Union Building

© University of Pretoria



Fig 2.44: Storage



Fig 2.45: View to urban site edge [potential thoroughfare start]

© University of Pretoria



Fig 2.46: Electrical Workshop



Fig 2.47: Plumbing Workshop



Fig 2.48: Veiw across site [potential thoroughfare]

© University of Pretoria



Fig 2.49: Existing Thoroughfare towards the West



[7]

Fig 2.50: Urban Edge

© University of Pretoria

2.4.2 SIGNIFICANT BUILDINGS

When applying a filter of heritage significance, several of the red face brick buildings stand out. As they are older than 60 years and therefore protected by section 34 of the National Heritage resources act of 1999.

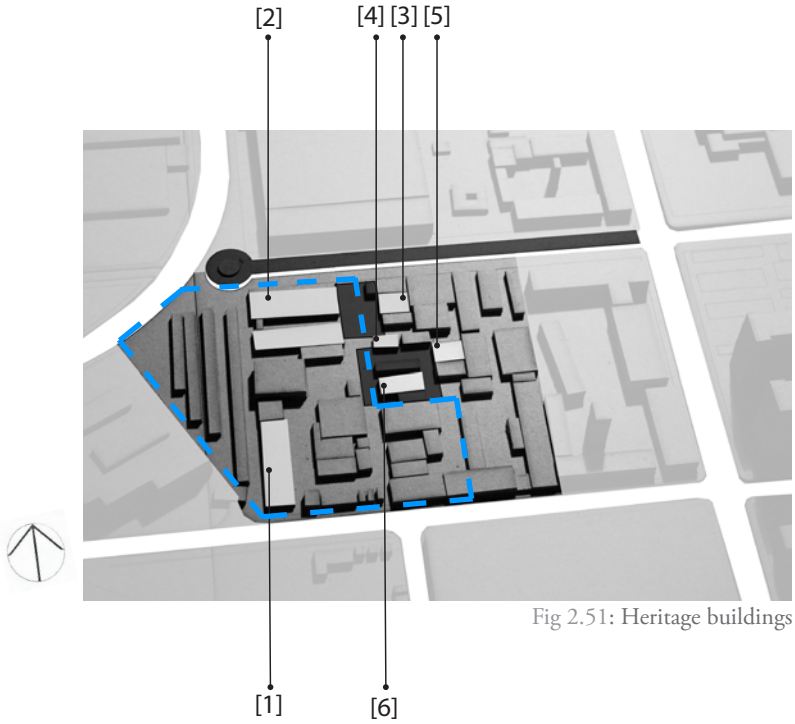


Fig 2.51: Heritage buildings

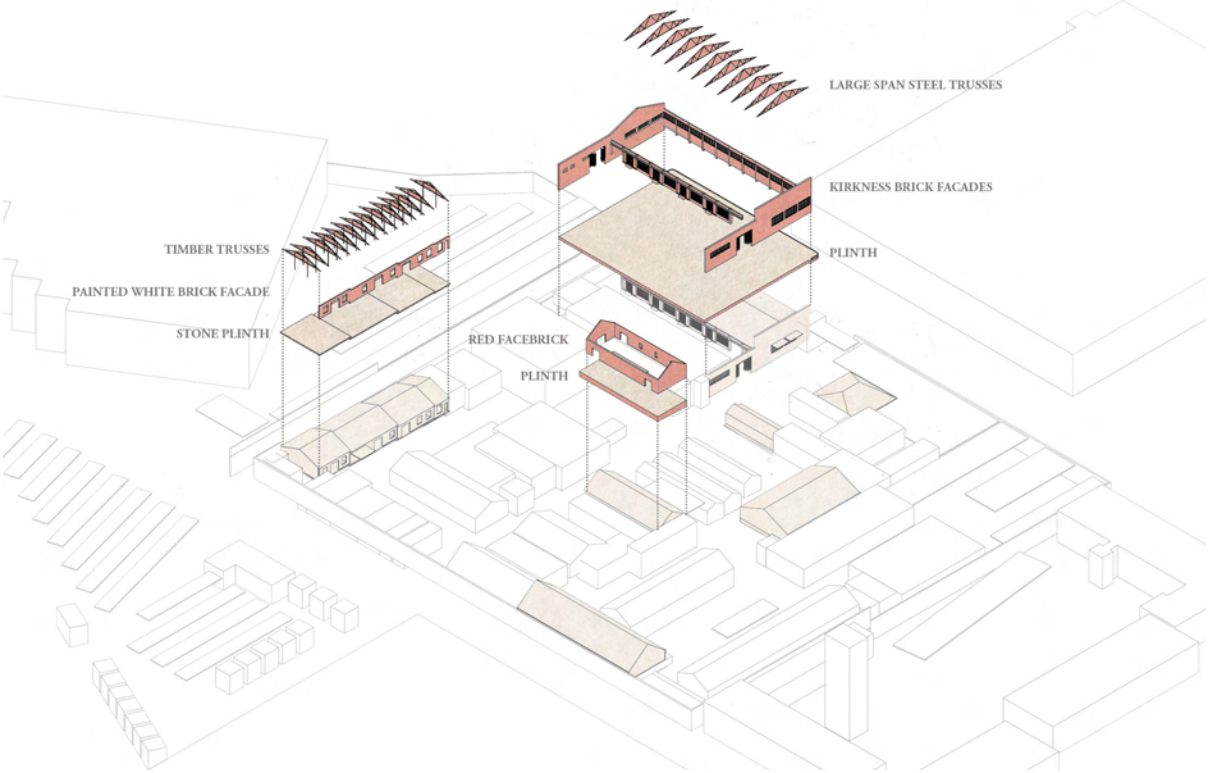


Fig 2.52: Heritage Buildings and significant elements

© University of Pretoria

[1] THE STORAGE BUILDING

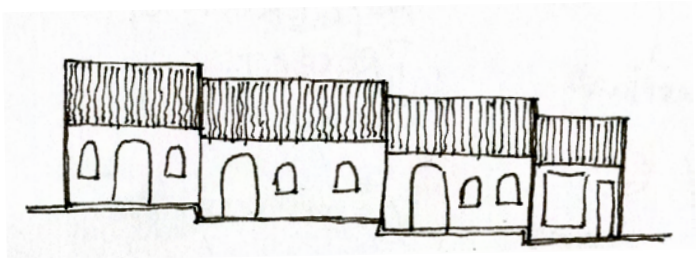


Fig 2.53.1(a) Sketch of the storage buildings East facade

The Storage Building in the south western corner, is the oldest building on site, built on a stone plinth and constructed with red bricks. From an analysis of the technology the store was built between 1890 and 1905 (Clarke: 2013).

The building consists of four sections which step with the fall of the site. The western facade creates a boundary which allows for little to no interaction with the building or the PWD site. It also aids in the creation of an unpleasant canal-like pedestrian thoroughfare which detracts from the urban experience.

The eastern facade is painted white and has several openings engaging with the internal courtyard. Internally the building has a pleasant atmosphere created by timber roof structure through which pools of light flood down.



Fig 2.53.1(b) Store Room East facade



Fig 2.53.1(c) Store Room Interior

© University of Pretoria

[2] THE CARPENTRY WORKSHOP

The Carpentry Workshop is the most prominent building when approaching the site; a light industrial Art Deco building from the 1940's (Clarke: 2013). The red face brick building captures the Art Deco style of the period in its western and eastern end walls constructed from Kirkness bricks. The internal courtyard space creates a significant link between these two walls. Additions made to the building are to be stripped back where it detracts from the buildings integrity.

These buildings will be retained as their style and construction are significant. In terms of use, the buildings have no significant contribution to make to the meaning of the place, especially due to the closed off presence of the site. The buildings will therefore have to be adapted to accommodate functions that allow people to experience the spaces they create, individually as well as collectively.

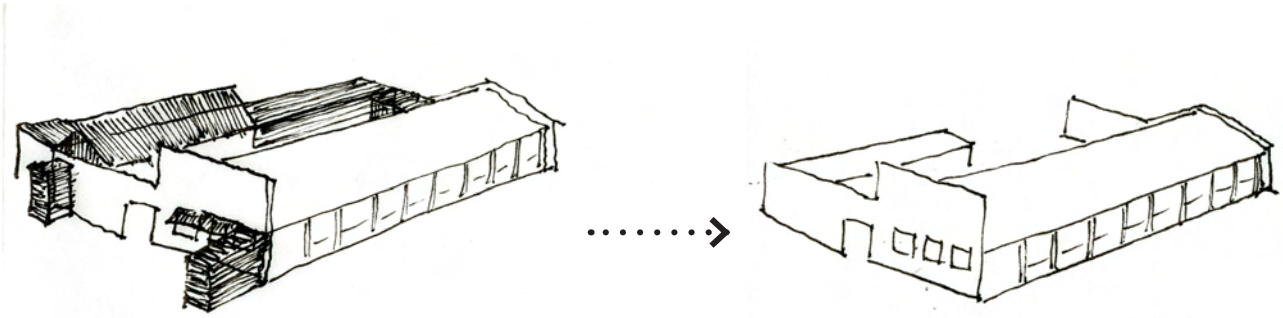


Fig 2.54.2(a) North + East facades Carpentry Workshop _ later additions to be stripped back

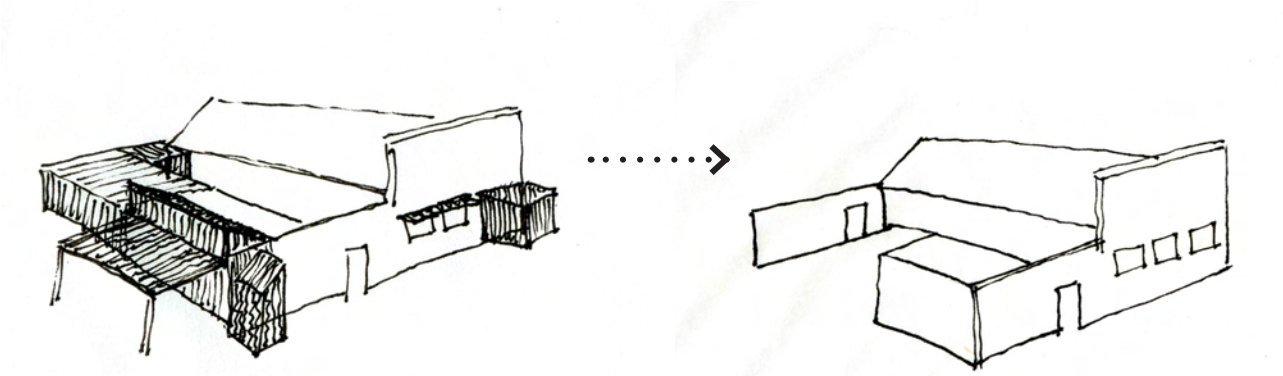


Fig 2.54.2(b) South + East facades Carpentry Workshop _ later additions to be stripped back



Fig 2.54.2(c) Carpentry Workshop

© University of Pretoria



Fig 2.55 **[3]** ORIGINAL HOUSE
[Situated across from the workshop]

Technology British
Age Built circa 1905 (Clarke: 2013)
Construction: Red face brick building ,constructed on a stone plinth
Past use House (Existed before the PWD occupied this part of the site.)
Current use Office space for the PWD

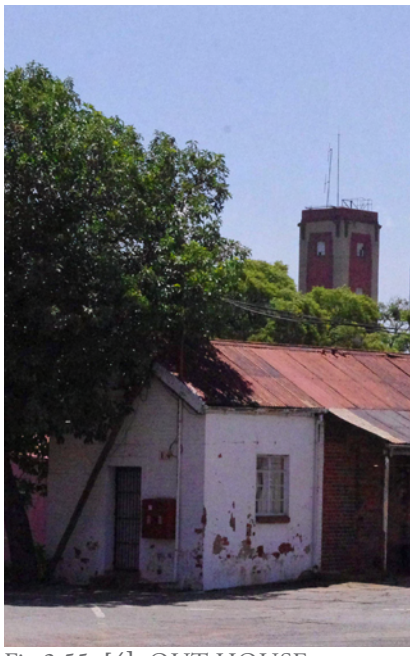


Fig 2.55 **[4]** OUT HOUSE

British Technology
Built circa: 1905 (Clarke: 2013) Age
Red face brick building, partially painted white, constructed on a stone plinth Construction
Servants' Quarters Past use
Office space and sewing room Current use



Fig 2.55 **[5]** PLANT STORE

Technology British
Age Built circa: 1910 (Clarke: 2013)
Construction Red face brick building, now painted white, constructed on a stone plinth
Past use Plant store
Current use Plumbing workshop

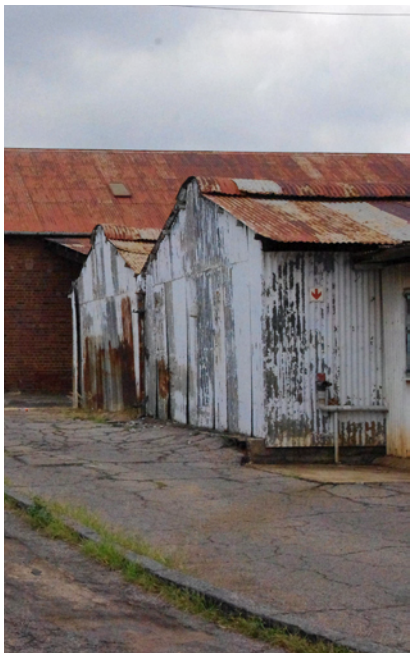


Fig 2.55 **[6]** ELECTRICAL STORE

British Technology
Built circa: 1910 (Clarke: 2013) Age
Steel Frame Clad in corrigated steel Construction
Electrical Store Past use
Demolished in 2013 Current use

© University of Pretoria

VISION

In chapter 3 past implemented urban frameworks are briefly discussed. These frameworks and the context analysis sets the scene for the programmatic responses, and allows the framework to respond to the various scales of context addressed within the dissertation.

The vision emerges from a context of urban 'greenspaces' and transport networks. The Museum Park vision develops from these contextual informants and aims to provide city users with environmental, recreational, educational and cultural stimulation.



03

© University of Pretoria

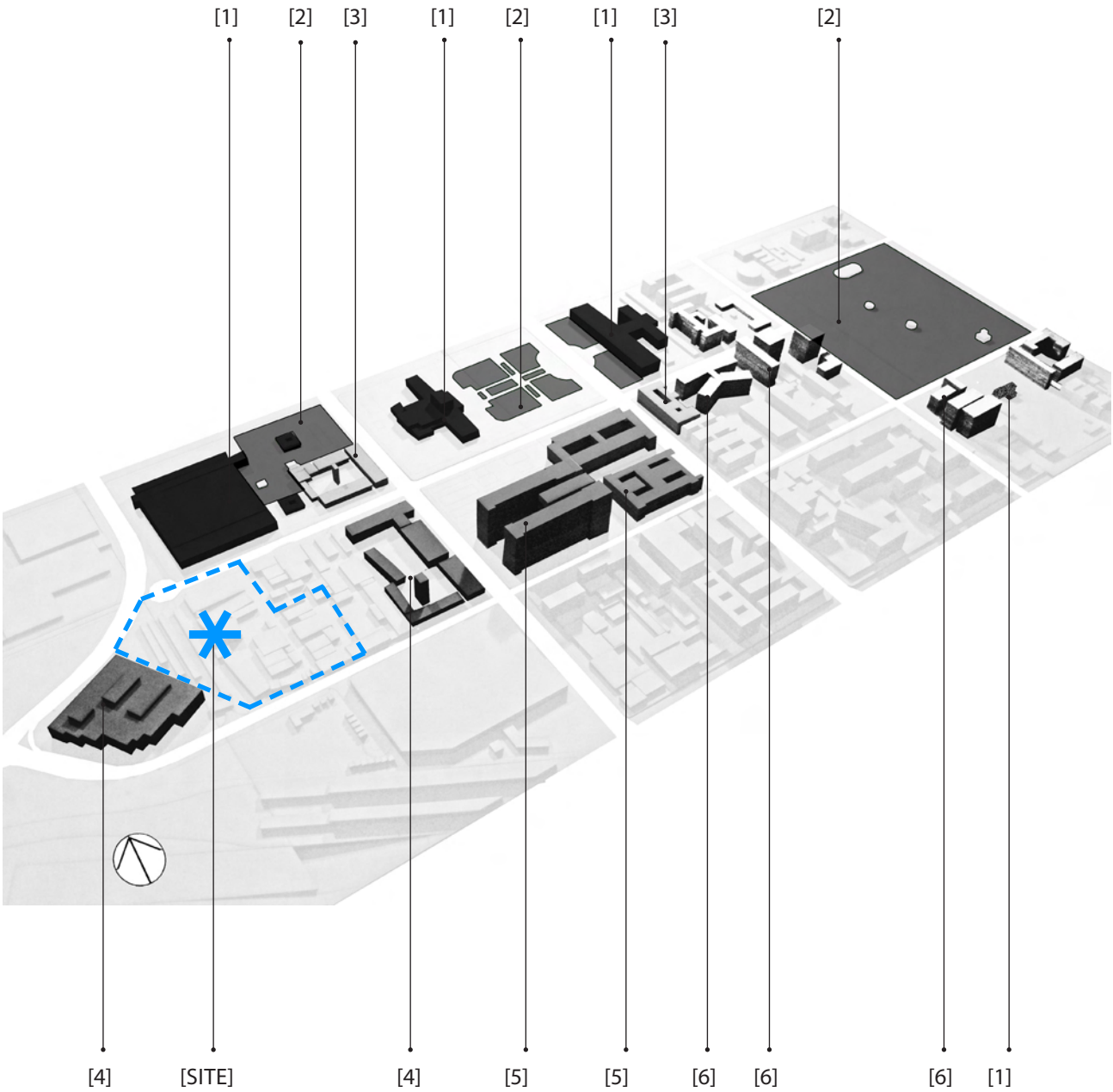


Figure 3.1: Use and Zoning of Museum Park

[1] Museum Park Facilities
[2] Recreational spaces
[3] Mixed Use
[4] Municipal
[5] Governmental
[6] Residential

© University of Pretoria

3.1 PREVIOUS MUSEUM PARK FRAMEWORKS

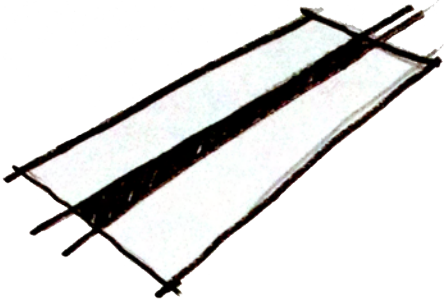


Figure 3.2: Museum Mall Proposal

3.1.1 MUSEUM MALL PROPOSAL 1992

Minnaar street was seen as the main avenue (City Planning Department 1992). The concept of a mall was introduced and the vehicular street was partially converted to celebrate the pedestrian.

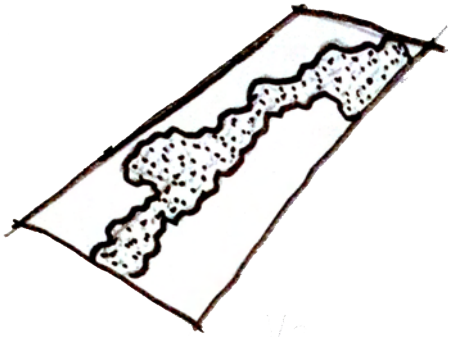


Figure 3.3: Museum Park Proposal

3.1.2 MUSEUM PARK PROPOSAL 1993

The intention was to develop a park which would link the various Museums and their facilities, with Minnaar Street still acting as the main connector (Kusel 1993). Only sections of the park framework were developed with the majority of the attention still focused on Minnaar Street.

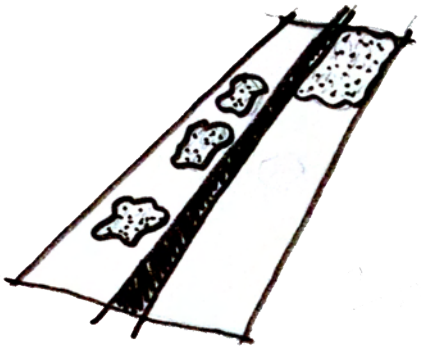


Figure 3.4: Museum Park Implemented

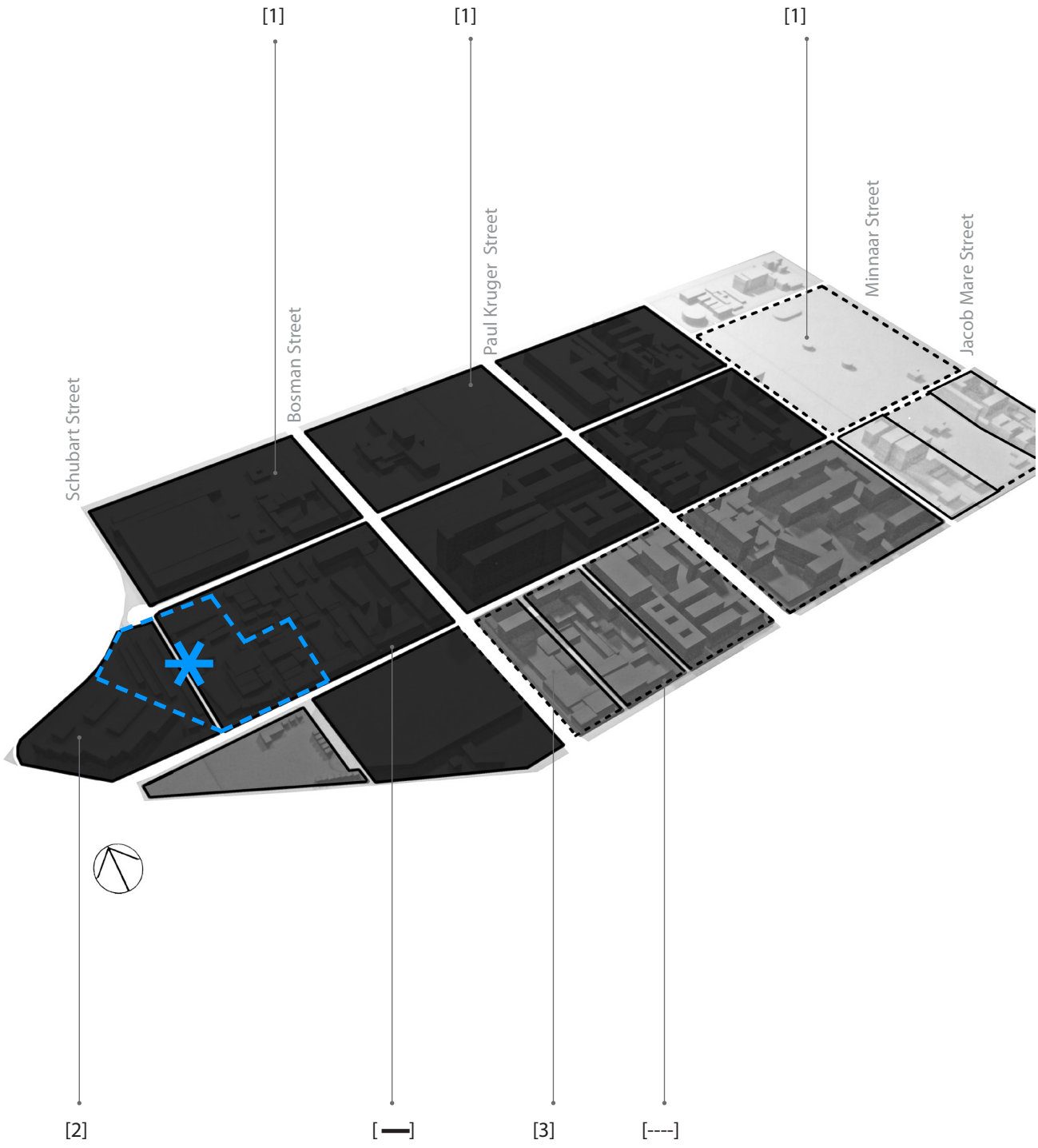
3.1.3 MUSEUM PARK 1999

Museum Park as implemented by Holm Jordaan Architects and Urban designers (Van Dyk 2000:14).

3.1.3 FENCING OFF MUSEUM PARK Currently

Due to the misuse and vandalism of public spaces provided in or throughout the Museum Park, attempts have been made to protect these spaces by fencing them off. This has in some instances made these spaces inaccessible and unfriendly, detracting from the Museum Park's sense of place.

© University of Pretoria



Permeable street edge

Buildings as engaging edges

Impermeable edges

1 Green Spaces
2 Fenced Off
— Impermeable Edges
3 Partially Fenced Off
--- Permeable

Figure 3.5: Edges and boundary conditions; creating a segregated Museum Park

© University of Pretoria

3.2 MUSEUM PARK VISION

The PWD grounds and its current use is not likely to continue in the future as the department is outsourcing these functions to the private sector.

An Urban School and Equi Scape become the starting point for the vision of the site in its context into the future.

The Urban School designed by Tuliza Sindi occupies one half the site and responds to the educational aspect of the Museum Park.

3.2.1 EQUINE REINTRODUCTION

Through an interview with Mr De Wit (2013), the manager of the PWD workshops, the inspiration arose for the reintroduction of horses onto the site, as he spoke about the site's history of stabling horses.

Horses played an essential part in the establishment of Pretoria and the development of South Africa, the Groot Trek and Anglo Boer War to mention two major events. The horse is an amazing creature which can continue to contribute to the development of Pretoria into the future as we face ever bigger social as well as environmental issues.

In this proposal the western edge of Museum Park is transformed into an Equi Scape, from here horse and rider ritualistically reintroduce themselves to the city. Minnaar Street acts as the platform for these events. This emphasises Minaar Street's role as the main connecting corridor of the park.

Museum Park becomes filled with horse and carriage rides as well as Mounted Unit processionals. The Equi Scape becomes a catalyst, establishing a new identity for Pretoria's Museum Park. This allows Museum Park to reconnect with its users which starts off the process of regeneration.

A mixture of active and passive surveillance is established as Museum Park becomes used for equestrian activities. This attracts people and eventually encourages the development of the Museum Park's edges and the removal of recently established boundaries.

Due to the establishment of safer streets and edges that engage the public/passer-by the Urban School also starts to spill out and use the culturally orientated public spaces as classrooms.

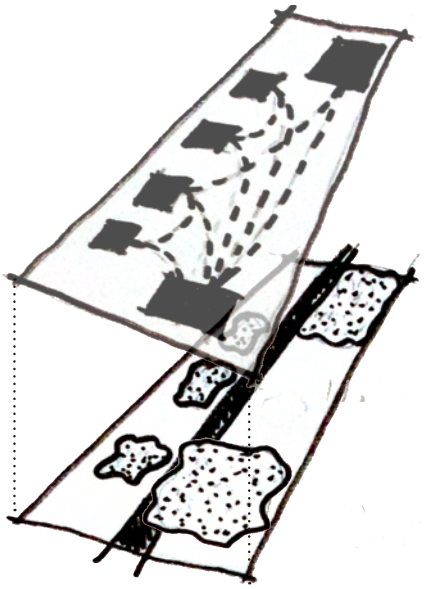


Fig 3.6: Museum Park Vision Overlay

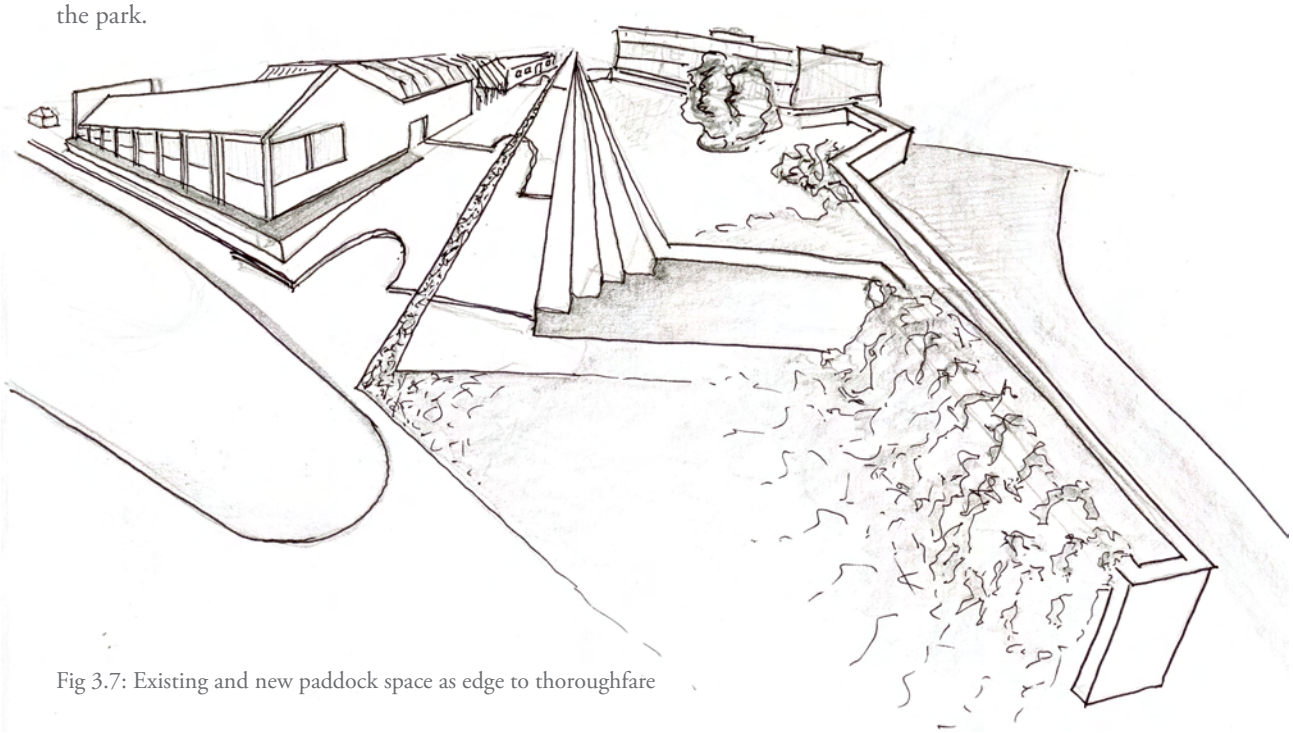


Fig 3.7: Existing and new paddock space as edge to thoroughfare

© University of Pretoria

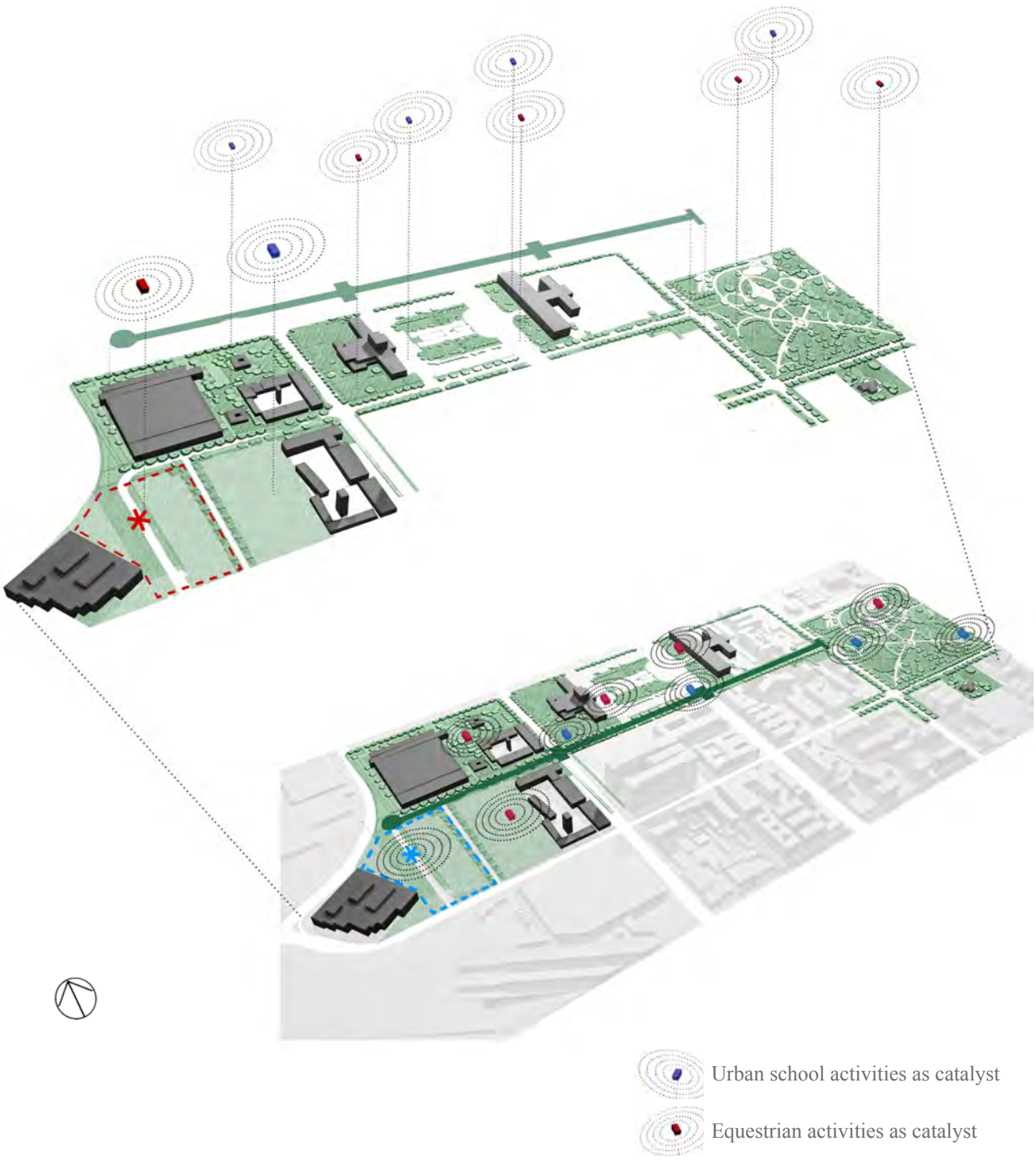


Fig 3.8: Larger Framework Vision: Exploding the acupunctural points within the expanded Museum Park

The vision proposes the spilling out of the various programs into the Museum Park, creating points of activation throughout the park. Allowing for human-horse interactions along the entire framework area.

© University of Pretoria

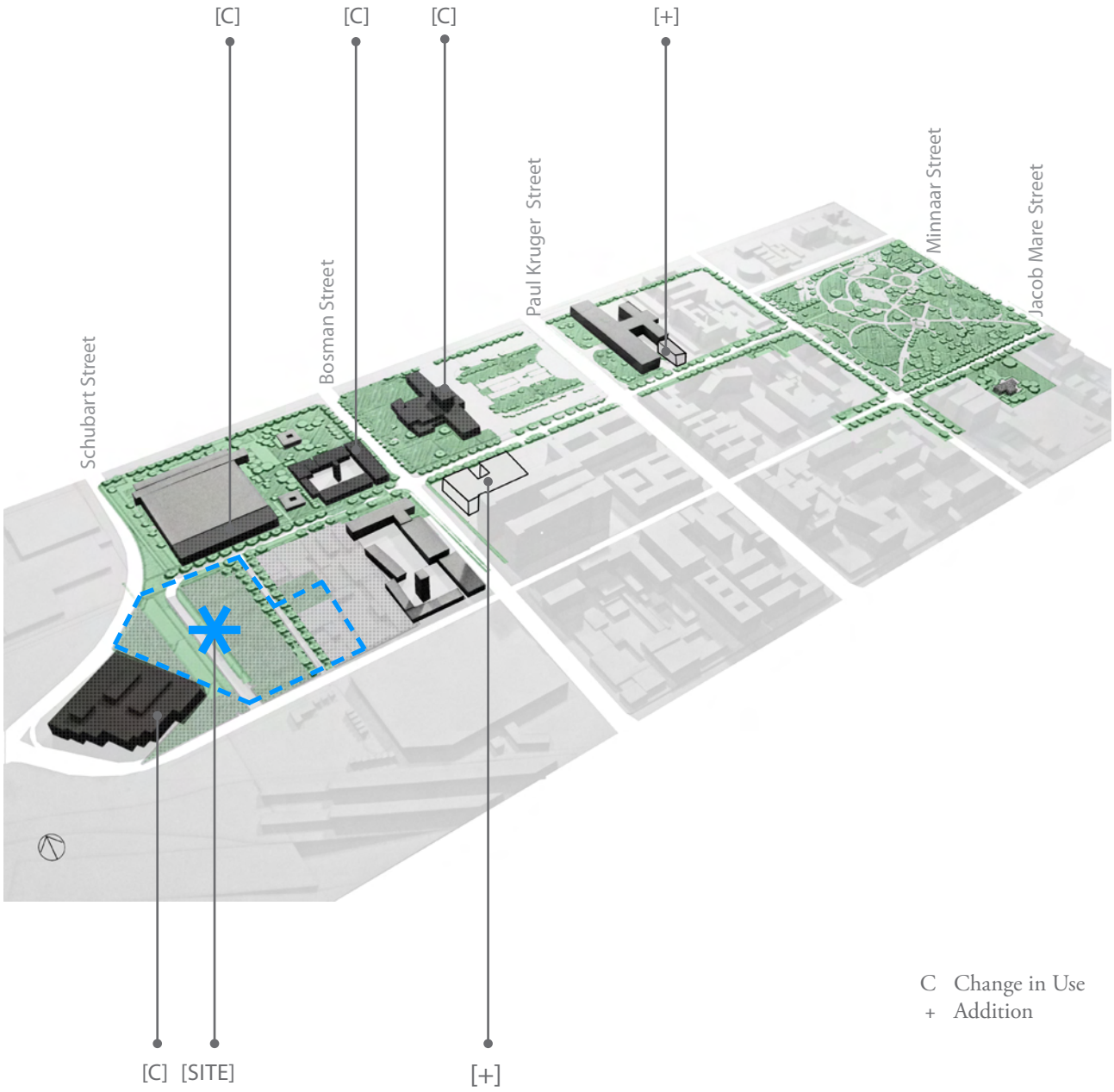


Fig 3.9: Illustration of existing buildings which are to undergo a change in function and buildings to be added

The edges of the Museeum Park becomes more active through changes in use; while new buildings create engaging edges where there were previously no engagement. Passive surveillance is increased.

© University of Pretoria

3.2.2 VISION APPROACH

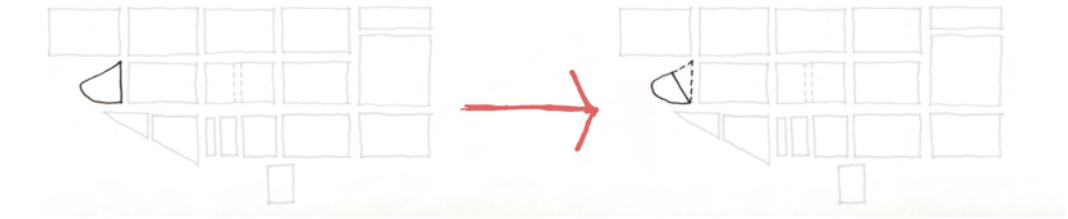


Vehicularised minaar street

A pedestrianised avenue



Reinstatement of closed off christina street

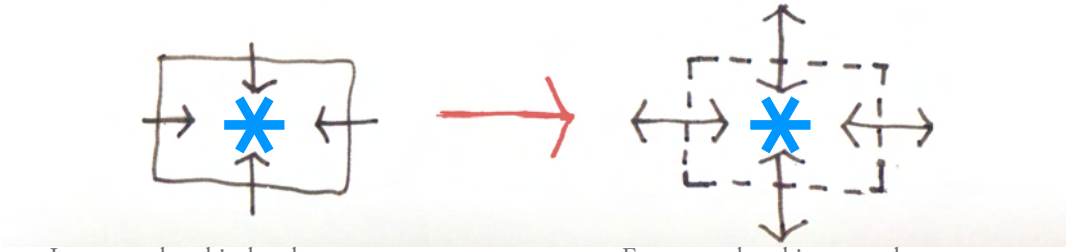


Removal of the wall + parking - creating a public space



Hard edged PWD grounds

An engaging, activated edge



Introverted and isolated

Extroverted and integrated

Fig 3.10: Vision approach

© University of Pretoria

3.3 SITE VISION

3.3.1 ESTABLISHMENT A NEW THOROUGHFARE

The framework-intention at the grid scale is to create disturbances of the city blocks where appropriate, in order to alter the character and accessibility of Museum Park, making the grain finer, thereby increasing the edges as well as network connectivity to the transport interchange.

Several heritage buildings are located on the northern edge of the site and along the proposed pedestrian thoroughfare, allowing these buildings to collectively become an introduction to the 'park'. The thoroughfare allows for views and pauses, moments in which the old and new character of the site can be explored. It also establishes an edge between the Equi Scape and Urban School.

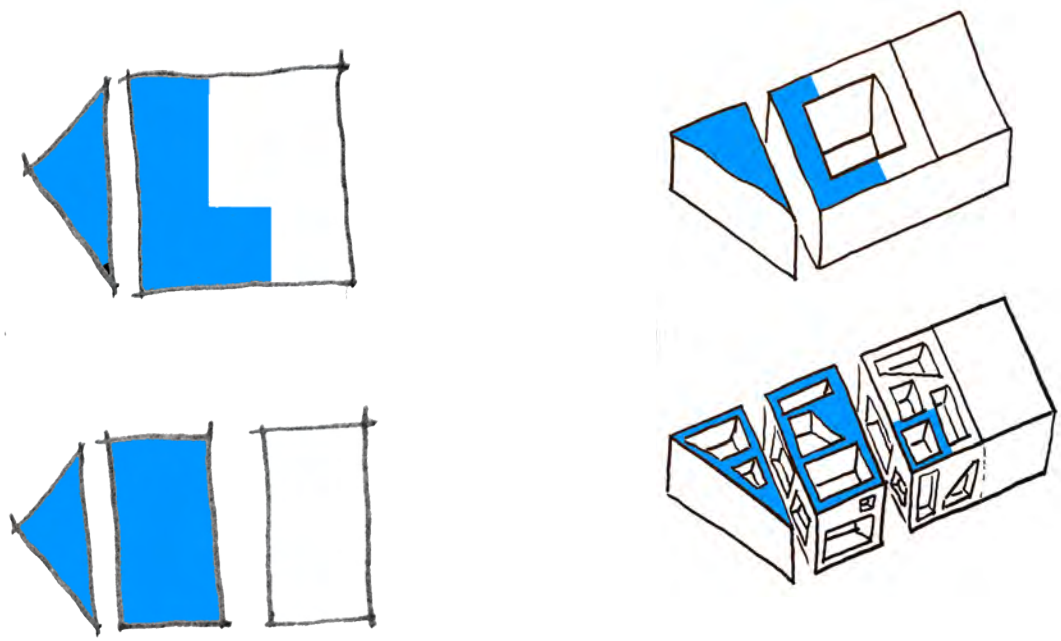


Fig 3.12: Vision Diagram

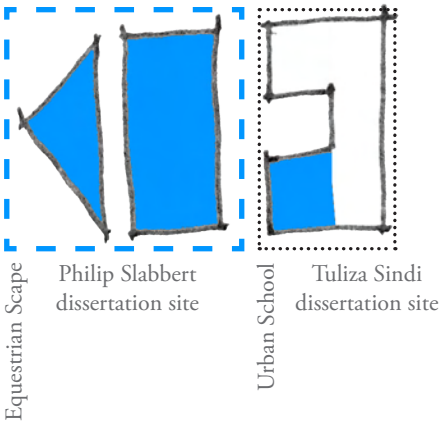


Fig 3.11.1: Vision Development

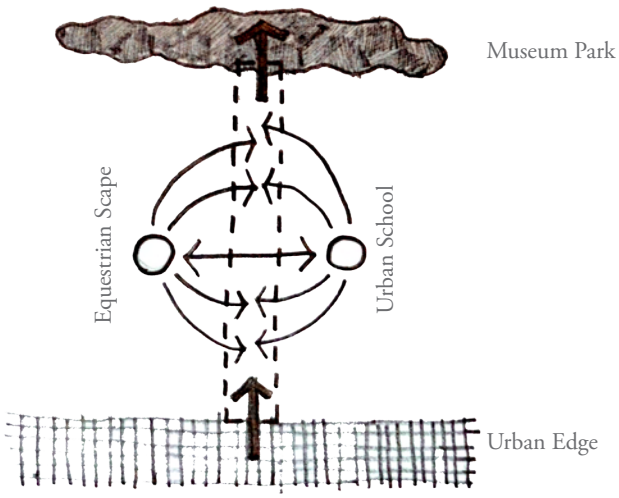


Fig 3.13: Programmatic Relationship Diagram

© University of Pretoria

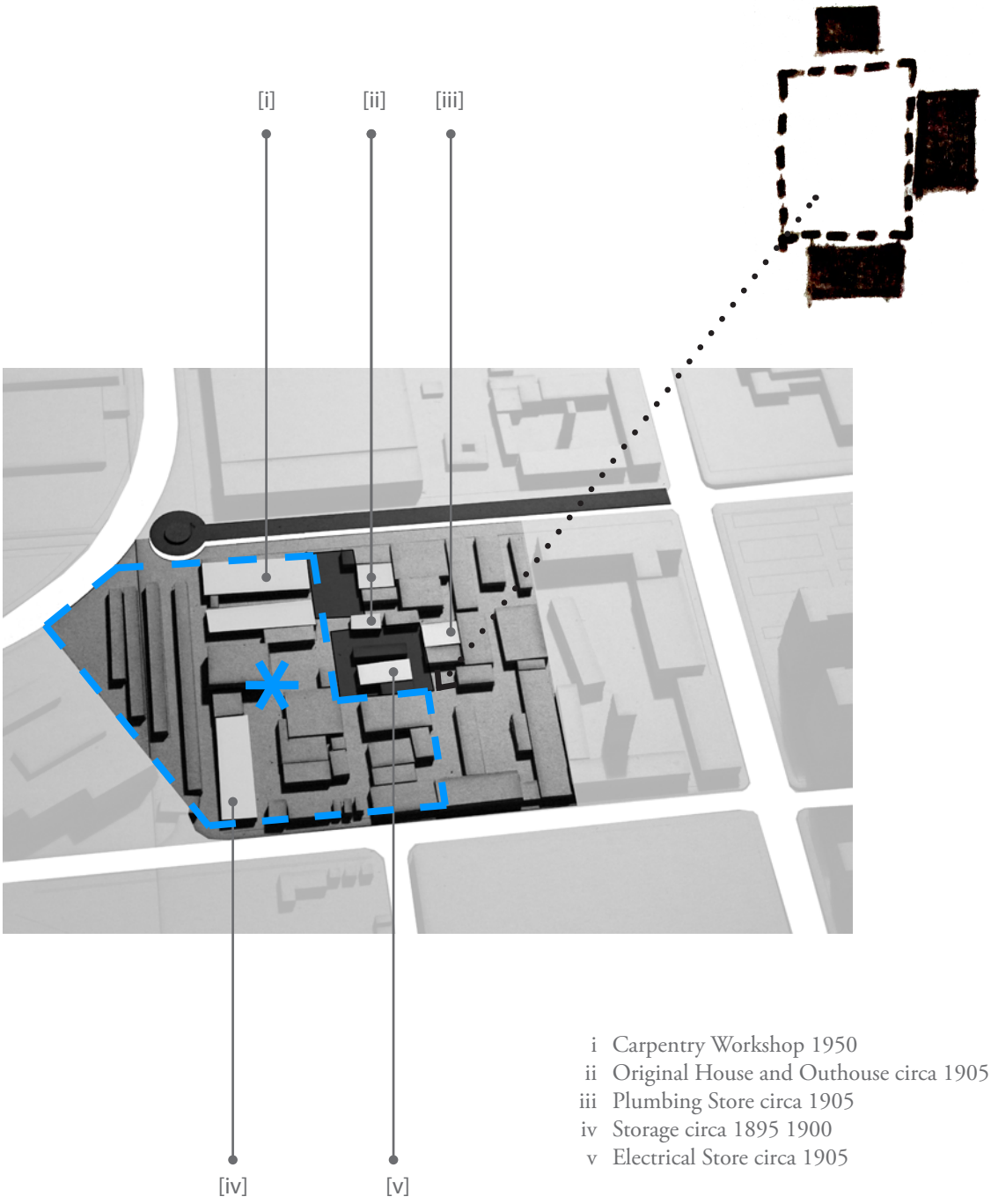


Fig 3.14: Heritage Buildings as threshold for pedestrians using the thoroughfare into Museum Park

© University of Pretoria

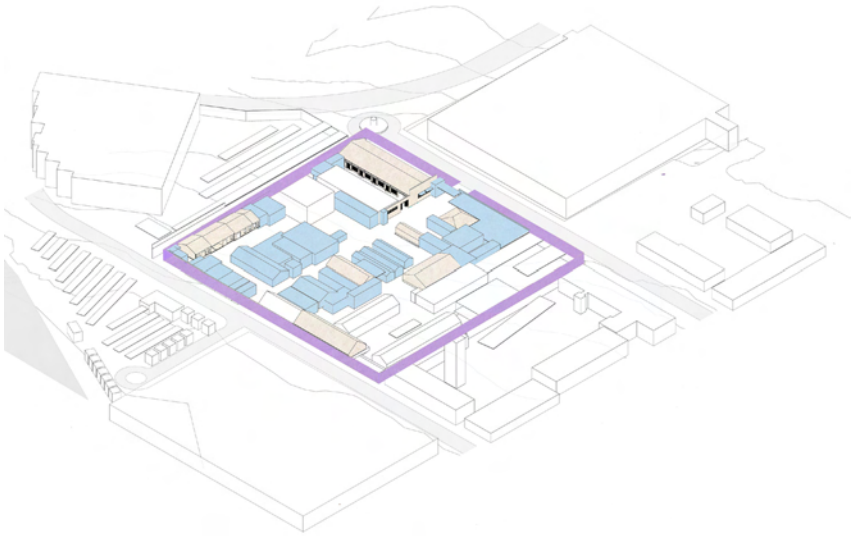


Fig 3.15: Barriers and detracting elements

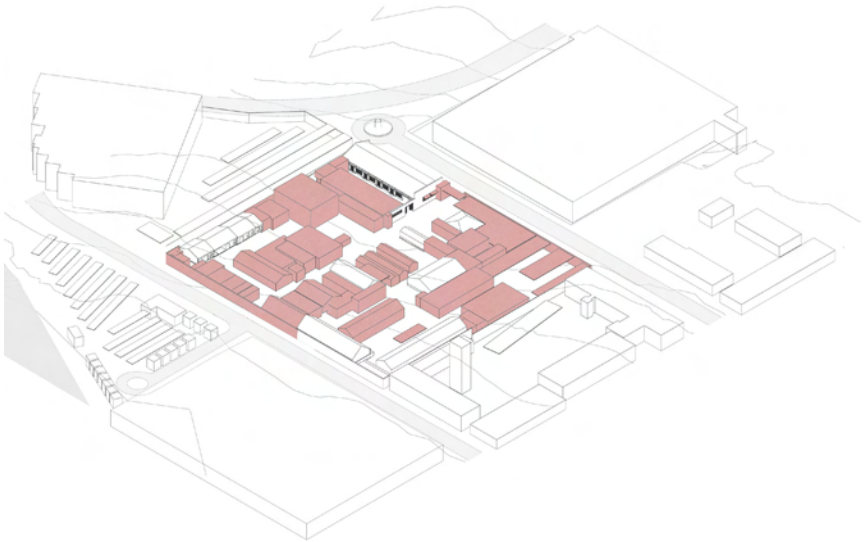


Fig 3.16: To be demolished

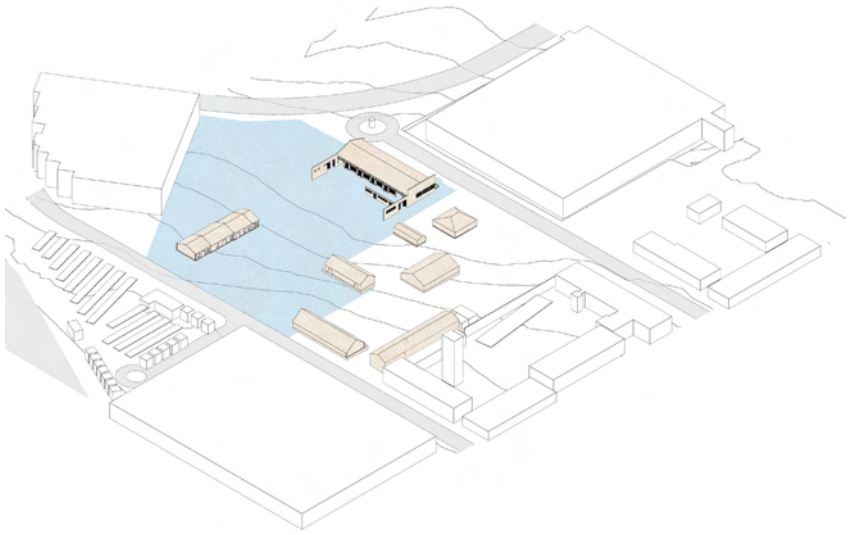


Fig 3.17: PWD grounds showing buildings to be retained as well as site selection

© University of Pretoria

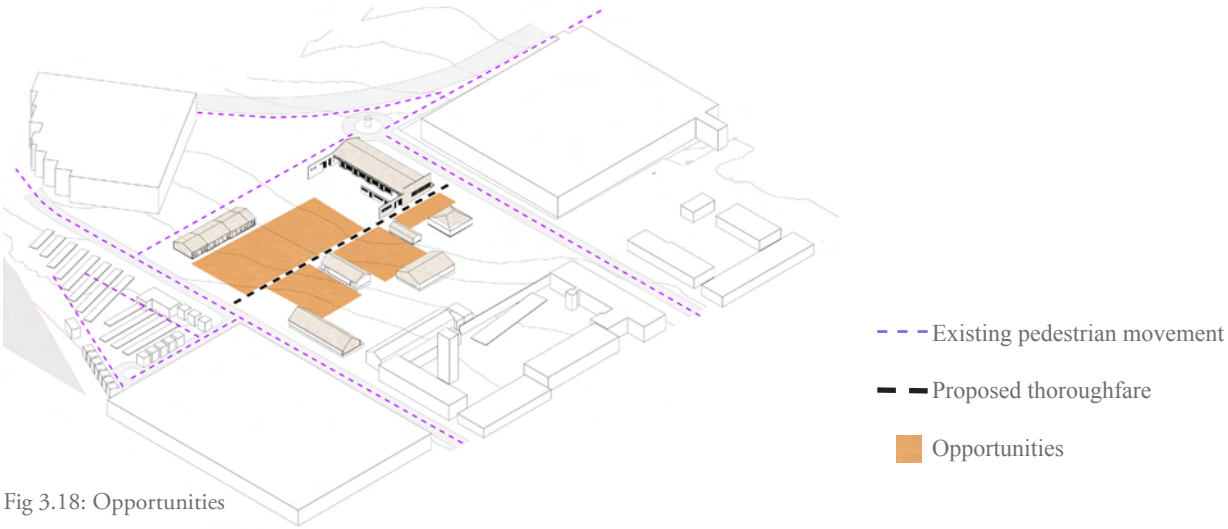


Fig 3.18: Opportunities

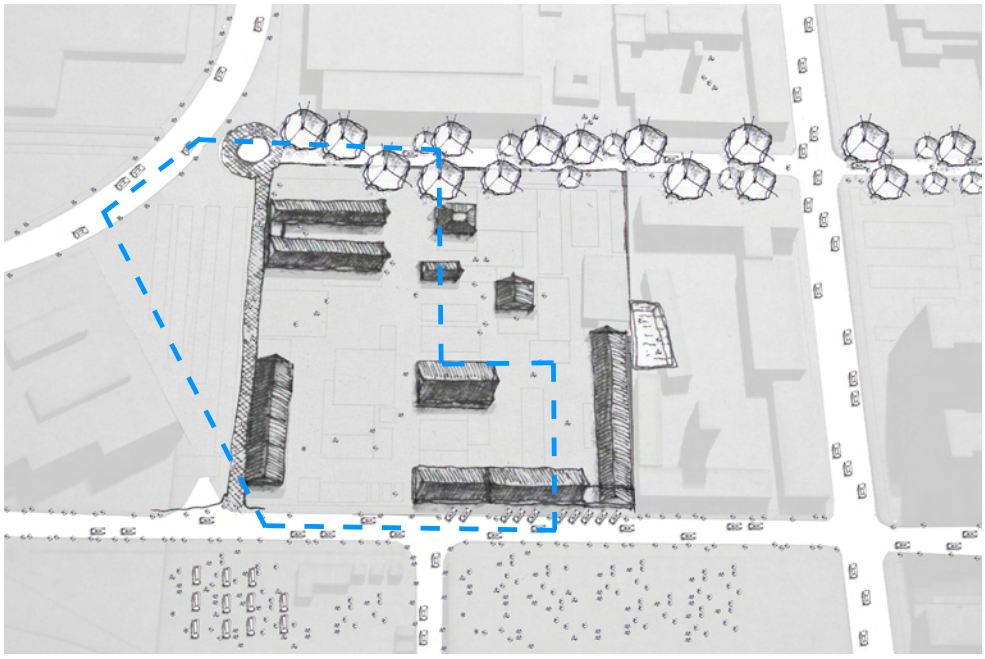


Fig 3.19: Buildings Retained



Fig 3.21: Existing typology and access respectively

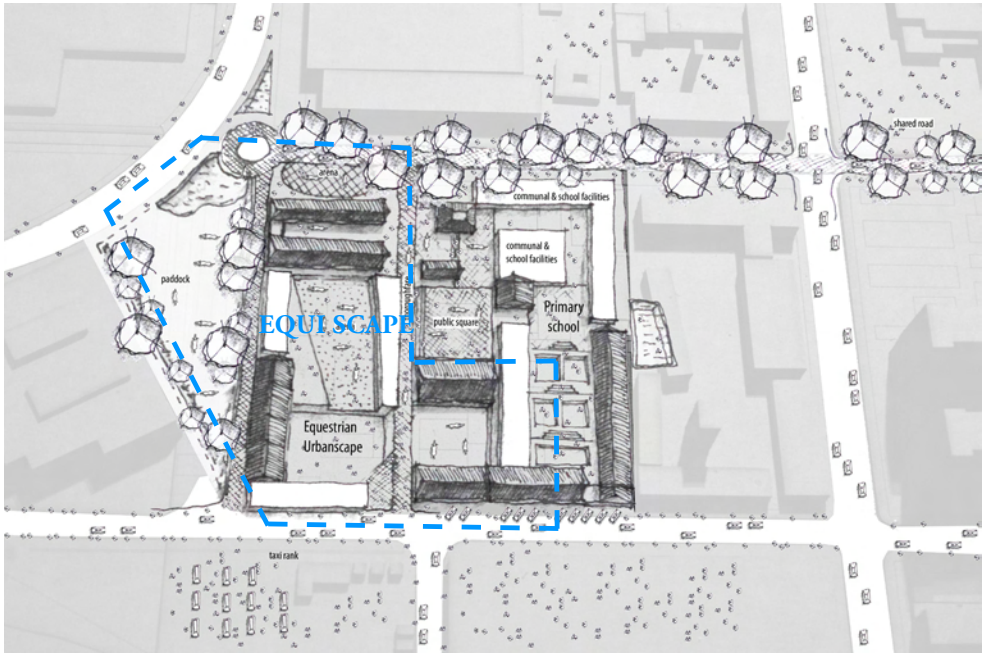


Fig 3.20: Vision for the Equi Scape and Urban School [April]



Fig 3.22: Exploring the possibilities of the existing in relation to the new thoroughfare

© University of Pretoria

3.3.2 VISION EQUI SCAPE

[The creation of a niche within the human habitat for an equine companion]

The function of an Equi Scape can be seen appropriate within the existing Museum Park. The existing density of the Museum Park is unlikely to increase (based on historical and previous urban design trends and proposals for this area.) The Equi Scape becomes the western complement to Burgers Park. Creating a continuity for Museum Park, allowing it to become an accessible civic space for people.

The site's edges are designed to create a niche for horses, between a bustling urban and quiet Museum Park edge. Its sense of place is established through the edge conditions, which accommodate both people and horses and mediates their interaction. A socially and culturally programmed public edges are established. Creating a place which draws the urban in and spills its equine programs into the Museum Park.

Introducing horses adjacent to the Urban School offers an unique opportunity for after-school activities usually only found at privileged private schools in South Africa.

The Mounted Unit display unit and riding school will also become an attraction for schools on educational visits to Museum Park. This introduces children to a friendly side of the SAPS thus altering the public's perception of the SAPS.

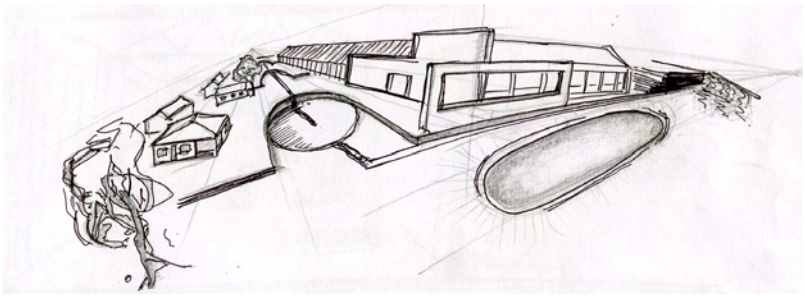


Fig 3.23: New thoroughfare

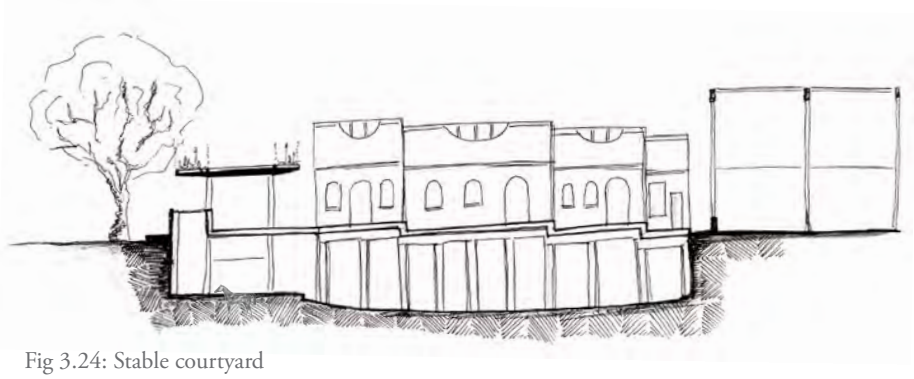


Fig 3.24: Stable courtyard

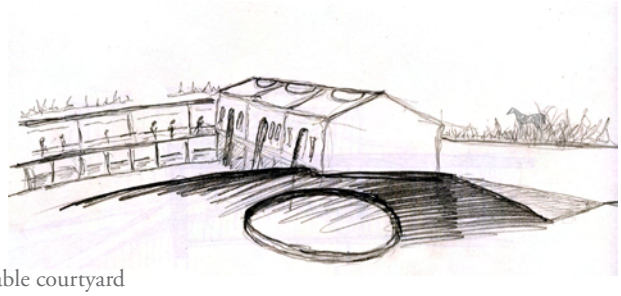


Fig 3.25: Stable courtyard

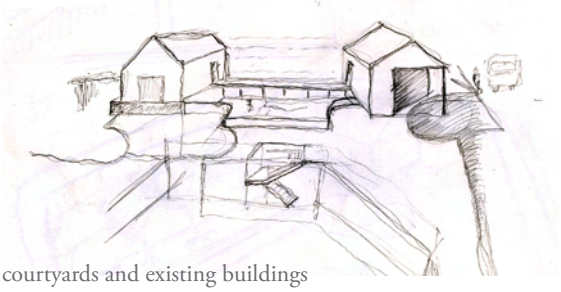


Fig 3.26: Stable courtyards and existing buildings

© University of Pretoria

3.3.3 SITE AND HERITAGE APPROACHES

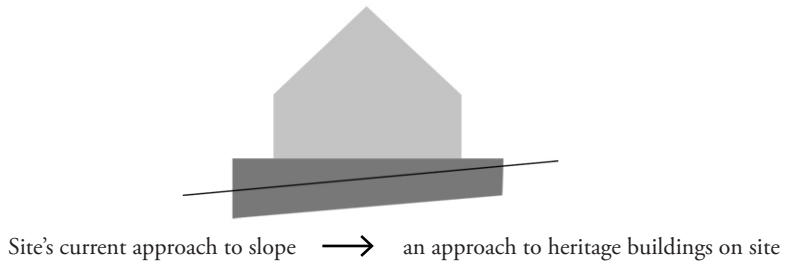


Fig 3.27: Plinth Approach

The historic approach to erecting buildings on the sloped site was to establish a raised plinth. This created a character of buildings on raised platforms. This existing condition becomes an approach to the significant buildings.

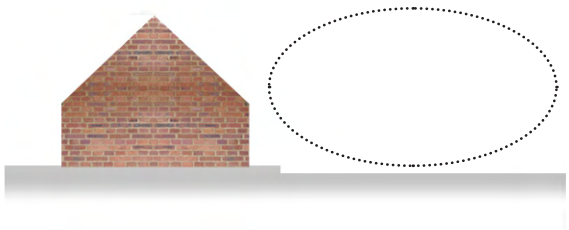


Fig 3.28: Courtyards and public squares

Each heritage building has a relationship with an open space along its side or in front of it; defining the edge of a courtyard, street or public square.

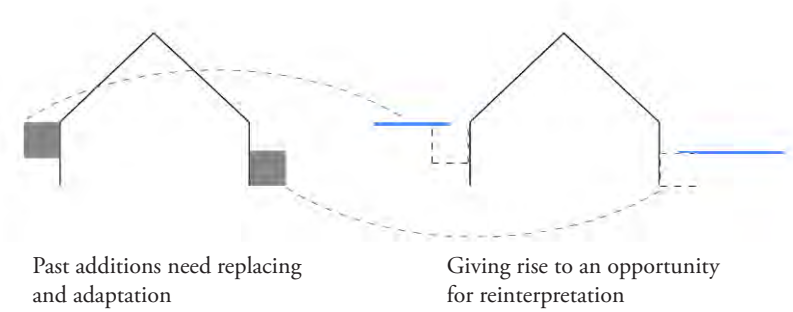


Fig 3.29: Adaptations

Many additions were made to buildings which have heritage significance. They also established the character of the site. These additions are to be removed and reinterpreted to create a new engaging edge for the site.

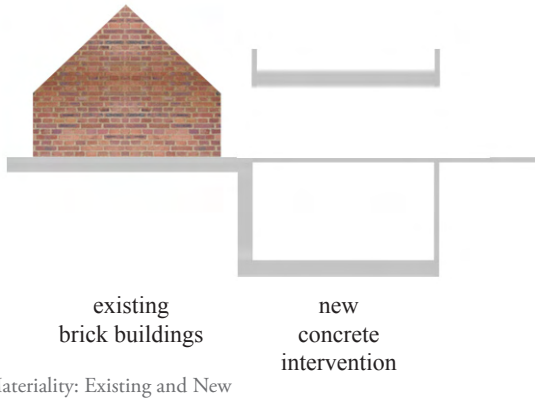
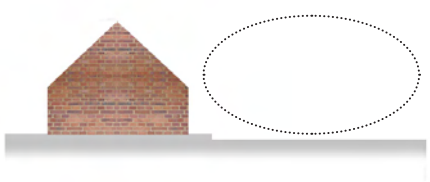


Fig 3.30: Materiality: Existing and New

A language of materiality is established.

© University of Pretoria



COURTYARDS AND PUBLIC SQUARES

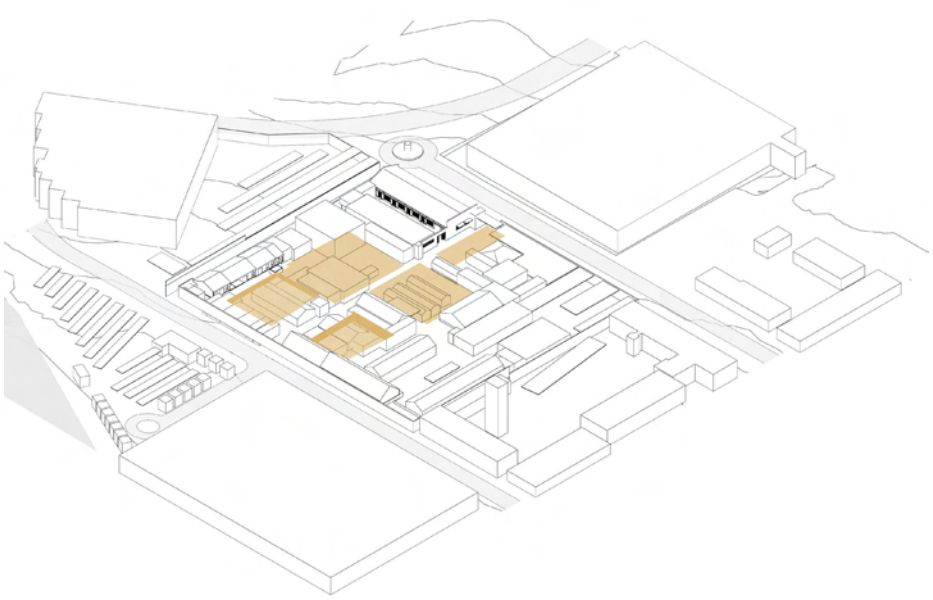


Fig 3.31: Previous additions need replacing and adaptation

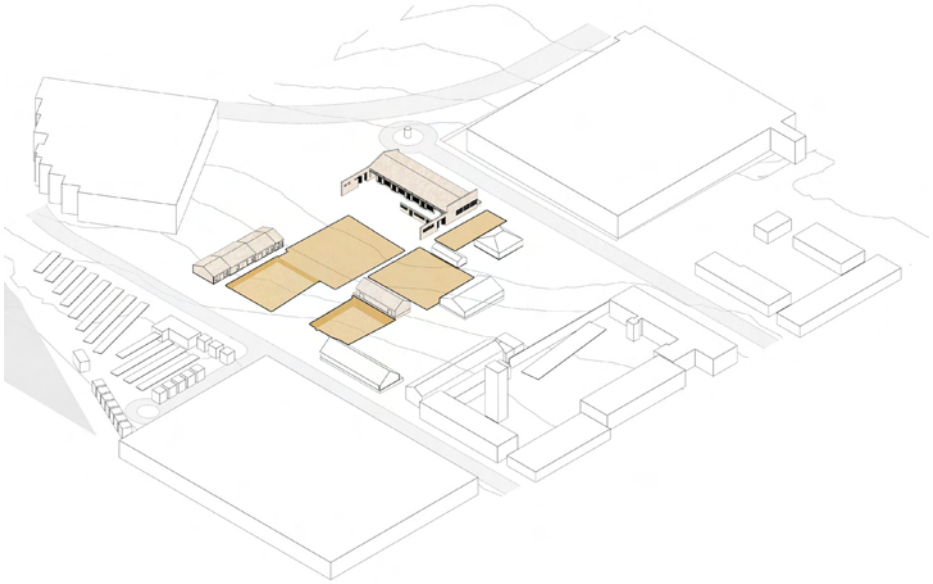
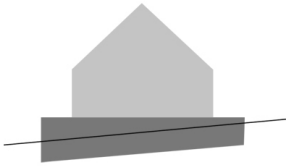


Fig 3.32: Giving rise to an opportunity for reinterpretation

© University of Pretoria



PLINTH

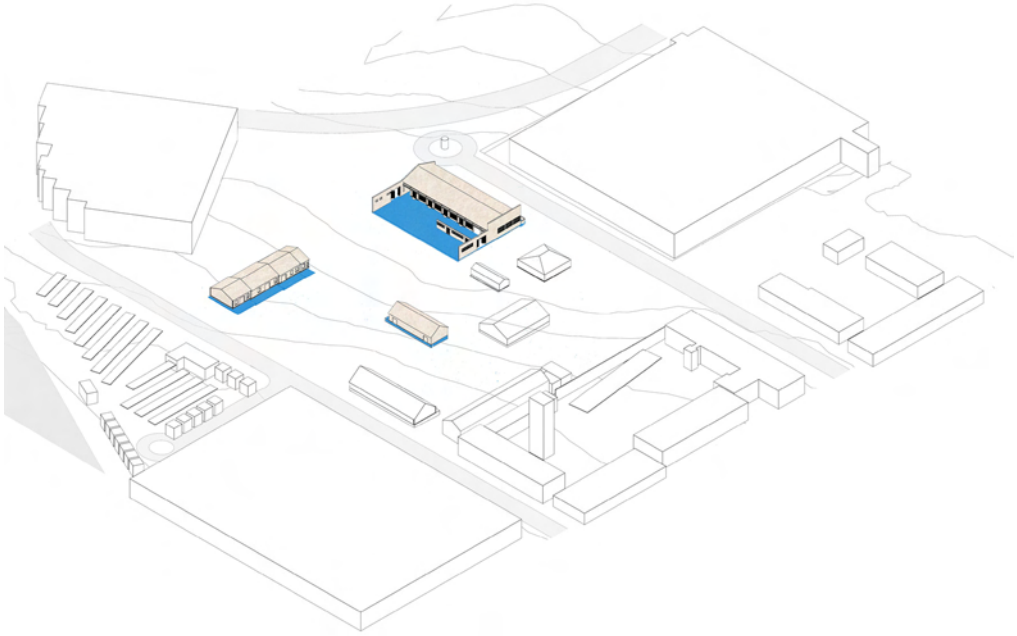


Fig 7.33: Site's current approach to slope

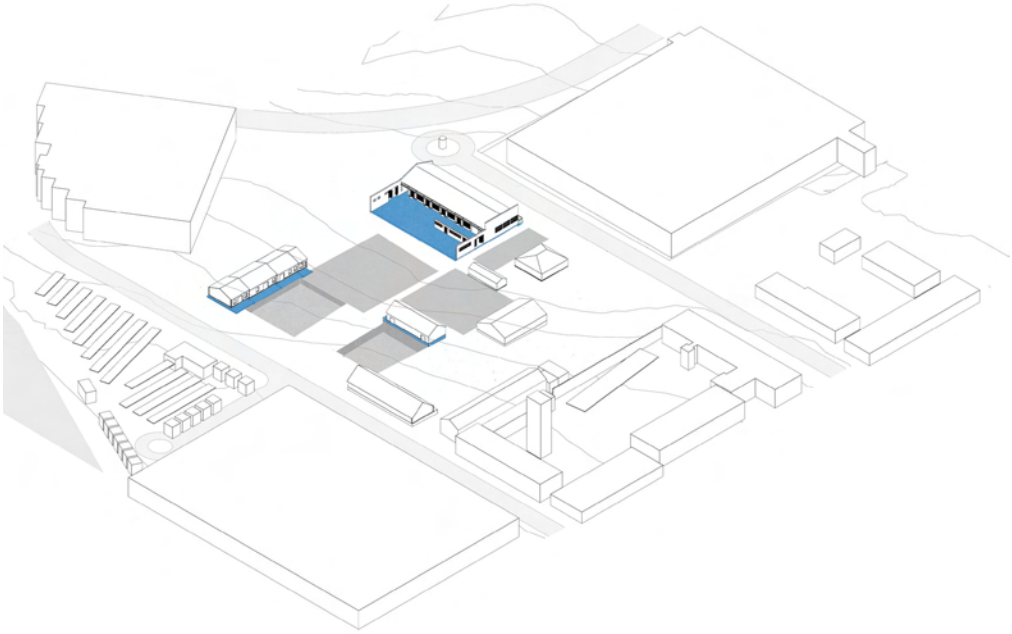
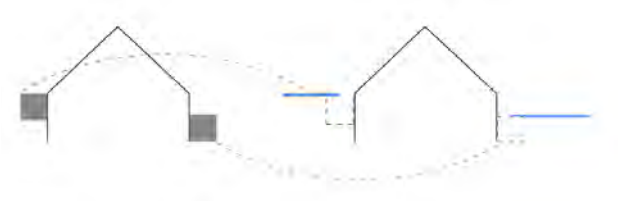


Fig 7.34: Plinth as an approach to heritage buildings in relation to the courtyards

© University of Pretoria



ADAPTATIONS

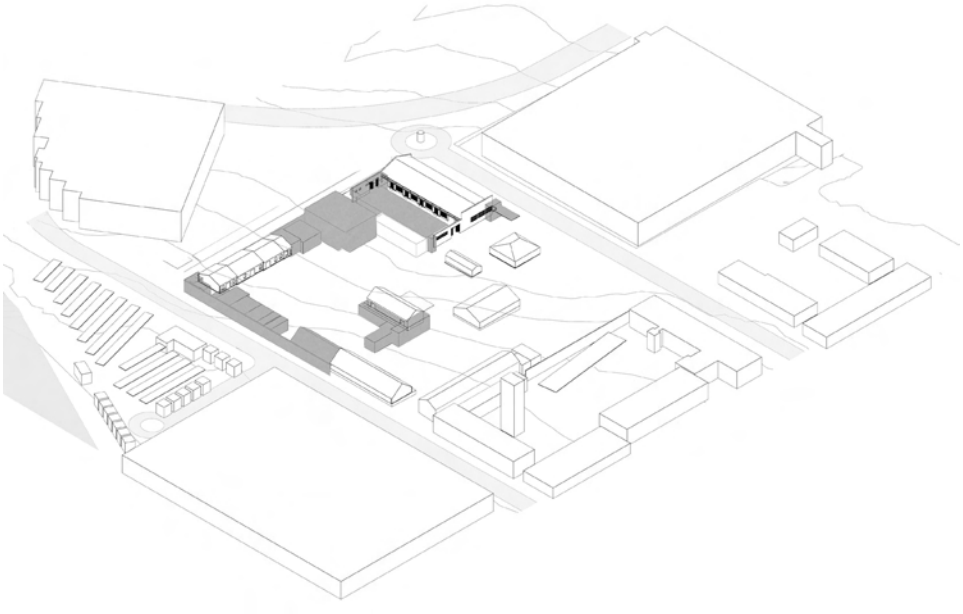


Fig 3.35: Previous additions need replacing and adaptation

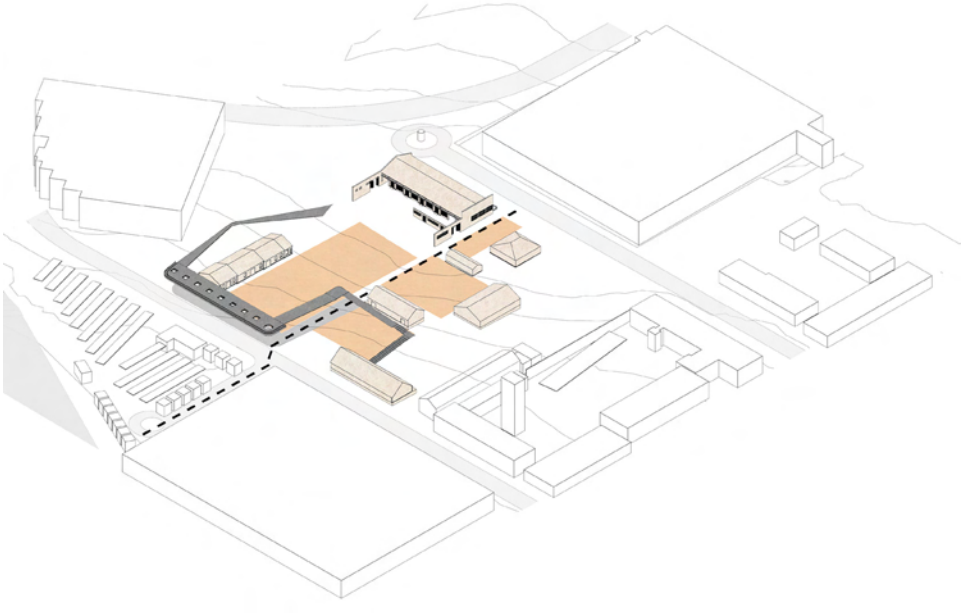
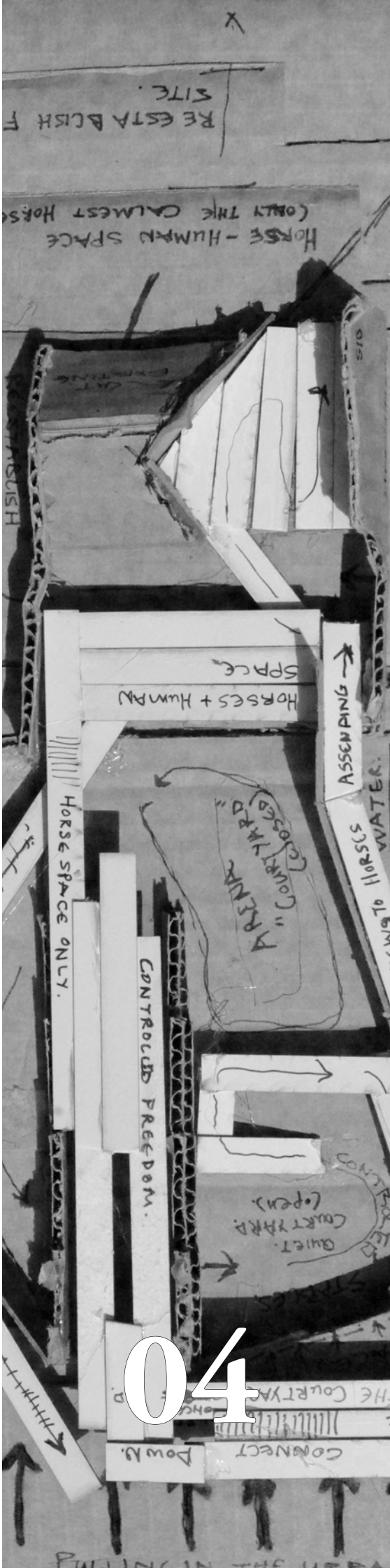


Fig 3.36: Ramp as reinterpretation and edge to courtyards

© University of Pretoria

PROGRAM

Chapter 4 firstly discusses the relationship between man and horse and how it has developed over time. Secondly it highlights the potential that horses can offer Pretoria in the 21st century and establishes requirements for an equestrian facility within Museum Park.



04

© University of Pretoria

Ode to the Horse

`Where in this wide world can men find nobility without pride,
Friendship without envy, or beauty without vanity?
Here, where grace is laced with power and strength tempered by gentleness.
He serves without servility, he has force without enmity.
There is nothing so powerful, nothing less violent.
There is nothing so quick, nothing more patient.
Our pioneers were borne on his back,
Our history is his industry.
We are his heirs and he is our inheritance...
The horse.'

by Robert Duncan

© University of Pretoria

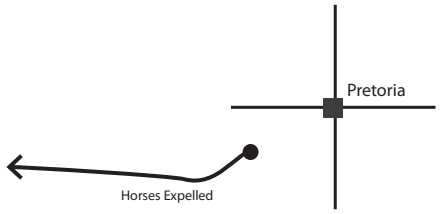


Fig 4.1: Expulsion of the horse

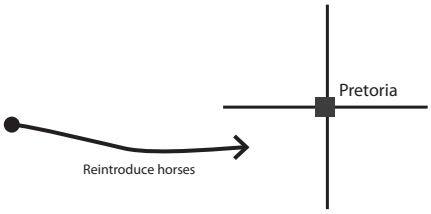


Fig 4.2: Re-introduction of the horse

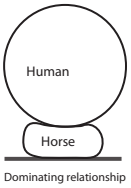


Fig 4.3: Past + present view of horse human relationship

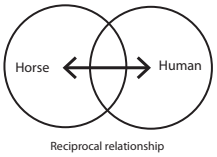


Fig 4.4: Present + encouraged future view of horse human relationship

4.1 HISTORY OF HORSES AND CIVILISATION

"People have always invested nature, including other animals, with symbolic meanings and mystical powers." Johns (2006:9)

We have the ability to do many things that land animals can. However some animals are larger, stronger, swifter, fiercer or alternatively far more patient, fertile and silent. For these reasons people have always held dear the qualities of the animals they domesticate. The horse is no exception as Johns (2006:9) describes: "They are beautiful creatures whose form and action appeal powerfully to human sensibility."

Johns (2006:9) emphasises that: "The role they have played in human society since they were domesticated some six thousand years ago has been so crucial that it is no exaggeration to say that the development of nations and cultures would have been quite different had they not existed."

In South Africa horses played a role in the Groot Trek, in the Anglo-Boer War (Pakenham 1979:487) and in the early development of Pretoria up until the advent of more progressive technology, after which horses slowly became a redundant technology and were expelled from the urban environment.

Equestrianism continues to play a part in our social and cultural activities which include; recreational riding, sport as well as ceremonial processions like the opening of parliament.

Horses have over time become our companions. It is from this perspective that the scheme suggests the reintroduction of horses into the urban environment of Pretoria. Not only as a technology, but in a reciprocal capacity they can add great value to people's lives, as both companion and service animals.

Equestrianism is inclusive, allowing for different age groups as well as aiding people with disabilities. Riding is also permitted in most countries in both rural and urban areas including large metropolitan cities.

Pretoria CBD's socio-economic environment hinders people from having large companion animals. This has significantly reduced people's contact with other animals. The proposed scheme provides an environment where people can interact with communal companion animals as well as other people. Horses facilitate the development of relationship skills through learning to interact with horses.

© University of Pretoria

Horses become a catalyst for assimilation within a segregated urban environment. By using a seemingly 'elitist' program and making it accessible to all, allows a common interest to guide the place making and culture forming processes.

4.2 EQUESTRIAN CENTRED PROGRAMS

Within the Equi Scape horses act as an external common denominator to facilitate indirect interaction between people of different socio-economic, ethnic and religious backgrounds.

The equestrian centred programs include; the Mounted Unit, a centre for equestrian therapy and riding school as well as a carriage service for tourists.

A spectacle is created by the ritualistic processional of the Mounted Unit through Minnaar Street. Activating Museum Park each morning and afternoon in sync with the major pedestrian activity in the area. The carriage service will provide a similar effect, but will be present the entire day. While the Mounted Unit and carriages are afoot, the site becomes occupied by equestrian therapy and riding school activities. The horses that are off duty are allowed to graze in the paddock spaces and activate the Equi Scape paddock.



Fig 4.5 : Mounted units in wedge formation

© University of Pretoria

4.3 MOUNTED UNIT

4.3.1 SOUTH AFRICAN POLICE SERVICE (SAPS) MOUNTED UNIT STABLES PRETORIA WEST

Mounted Unit Stables are currently located at the SAPS academy in Pretoria West. This has resulted in the unit becoming completely disconnected from the city, which prevents people from interacting with the more approachable side of the SAPS. The site provides stabling for one hundred and fourteen horses, however only thirteen horses are currently stabled. It is clear that in South Africa the value of the Mounted Unit is sorely underestimated.



Fig 4.6.1: SAPS horses in their paddock



Fig 4.6.2: SAPS horse grazing



Fig 4.6.3: Current SAPS Stables



Fig 4.6.4: SAPS Stables - interior view

© University of Pretoria

4.3.2 SOUTH AFRICAN POLICE SERVICE (SAPS) MOUNTED ACADEMY POTCHEFSTROOM



Fig 4.9: Horse training grounds



Fig 4.10: Horses box for training



Fig 4.11: Foot soaker at farrier workshops



Fig 4.12: Horse training lunge ring

© University of Pretoria



Fig 4.13: Pharmacy



Fig 4.14: Food store



© University of Pretoria



Fig 4.15: Stable



Fig 4.16: Lunge ring for a training a horse

© University of Pretoria



Fig 4.17: Stable door latch and protective steel plate cover

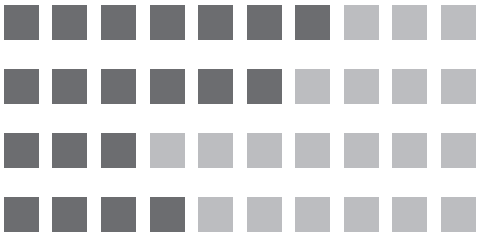


Fig 4.18: Stable door detail image showing steel capping



© University of Pretoria

4.3.3 STATISTICS OF SOUTH AFRICAN'S PERSPECTIVE OF THE SAPS



33% of South Africa's youth fear the police

40% of South Africa's youth do not trust the police

70% of South Africa's youth believe police performance is declining

60% of South Africa's adults do not trust the police
(City Press 2013)

4.3.4 MOUNTED UNIT ADVANTAGES

In South Africa people have lost their faith in the police due to high crime rates and police brutality. In this regard, the mounted unit can provide valuable aid to improve this negative image or perception. Firstly, the unit has higher visibility due to their height the visible policing is a crime preventative measure. Secondly in their capacity as companion animals, horses become a catalyst, allowing for better interaction between the public and the police.

To exploit and maximise these benefits, a satellite facility will be established in Museum Park on the edge of the CBD. The unit acts as a display unit which makes the Mounted Unit more publicly accessible and engaging, which increases people's awareness of their training and purpose in the city. The Equi Scape has a training and initiating function, by exposing them to the urban environment: ensuring that they do not easily spook when exposed to various urban situations.

4.3.5 LOS ANGELES POLICE DEPARTMENT MOUNTED PLATOON

CALIFORNIA

Bune (2007) in an article entitled Mounted Units Significantly Impact Crime and Victimization, suggests that it is vital that crime prevention strategies be implemented, the article suggests that Mounted Units can be an effective mechanism in this regard.

The Los Angeles Police Department Horse Mounted Unit consists of 32 horses and officers who work in teams of two. Since their presence in the Skid Row area there has been a reported reduction in crime of up to 30%, including violent crimes such as homicide, breaking and entering and assault (Bune 2007).

© University of Pretoria

4.3.6 PROPOSED STRUCTURE OF THE SATELLITE MOUNTED UNIT

The inner city unit will consist of ten mounted police officers and a herd of fourteen horses. As a unit greater than this is not anticipated for this satellite unit in the inner city, and future growth will occur at the main stables in Pretoria West. The system will operate with two herds which rotate every two weeks to Pretoria West for a break from the city.

The unit will initially consist of ten police officers; of which three officers are also trained as vet assistants and another as a farrier. The unit officers will therefore provide the basic care and training required for the horses.



Fig 4.19: Location of the current SAPS Mounted Unit in Pretoria West as well as the proposed site.

[a] _ The current SAPS stable for the Mounted Unit in Pretoria west
[b] _ Proposed SAPS satellite site (of the same area as currently used in Pretoria West)

4.3.7 GREAT SCOTLAND YARD STABLES
LONDON

Figures 4.20 to 4.22 show the Great Scotland Yard multistory stable building interior, with its equestrian ramp leading to the first floor stables.



Fig 4.20: Ramp and balustrade of the equestrian ramp at the Scotland yard stables



Fig 4.21: Closed off stables with mechanical ventilation systems



Fig 4.22: Equestrian ramp at Scotland yard's stables

© University of Pretoria

4.4 THE EQUESTRIAN THERAPY AND RIDING SCHOOL

The equestrian therapy and riding school herd will consist of ten horses. These horses will be far more active in terms of the Equi Scape than the Mounted Unit, with direct contact with the public in the main arena space.

4.4.1 EQUESTRIAN THERAPY

"It's been clinically proven that just being in the vicinity of horses changes our brainwave patterns" Franklin Levinson (in Brown 2011)

McCullum, an occupational therapist as well as a senior instructor for the South African Riding for the Disabled Association (SARDA) in an interview with Health24 (2010); described therapeutic riding as activities used by occupational, speech and physiotherapists as well as psychologists. Within these professions trained horses are used for either equestrian-assisted therapy or hippotherapy. Equestrian-assisted therapy can be used to improve a person's physical, psychological, cognitive and/or social behaviour. Hippotherapy on the other hand makes use of the three dimensional swinging motion of the horse to strengthen the patient's core.

One of the major benefits of equestrian therapy is that it is free from the stigma attached to some other therapies. People's perception is that they are simply touching the horse or riding it, when in actual fact these activities have therapeutic benefits.

As the equine therapy is closely linked to the riding school it will allow people with disabilities or social challenges to engage with others around a similar interest.

The therapy will be used by the police, the school and any victims of violent crime.

The therapy also allows for people with disabilities, who have an interest in horses, to engage with horses and other people while their emotional and motor skills improve.

4.4.2 RIDING SCHOOL

This riding school aims to make equestrianism less exclusive, while at the same time encouraging people from different walks of life to interact with one another. Classes will be offered to students at both during the day and at night.

It is envisaged that the riding will be used by the learners from the Urban School that forms part of the framework. Building on the secondary function of this site and in keeping with the educational theme of the Museum Park; the SAPS-college's students will use this space as training grounds.

As a training facility, the school will encourage people who live in the urban environment to learn about the grooming, feeding, riding and bonding between horses. The trainees then become another link between the urban and horse, as they informally guide people's interactions and relationships with the horses.

During the day classes will be offered to the adjacent or visiting schools, as well as any other city dwellers who may be interested. At night classes are offered to adults and residents in the area.

The arena also becomes a point of attraction on the site, when jumping or dressage shows are held. The arena also has the potential to become a multifunctional public space due to its close location to the transport precinct.

© University of Pretoria

4.5 PROGRAMS ON MUSEUM PARK EDGE

The facility provides carriage rides through the Museum Park, as well as guided horse rides down Minnaar Street and through to Burgers Park. This aides in the branding of Museum Park by reinforcing a link to Pretoria's horse history.

The existing workshop buildings through adaptive reuse: becomes a complement of the National Cultural History Museum. By housing an exhibition telling the story of the role horses played in the development of South Africa. Supporting facilities include: carriage storage, restaurant and ablutions. This building also acts as an entrance into the main internal courtyard and arena for performances and participation.



Fig 4.23: Horse and carriage

4.6 PROGRAMS ON THE URBAN EDGE

These facilities are meant to encourage unintentional engagements between people and horses, as they make use of these spaces on the edge of the site.

4.6.1 Public amenities
- Showers and toilets for travellers
- Water point for washing taxis, an activity which frequent this part of the city.
- Seating for waiting travellers and passersby.

4.6.2 Retail, food court and informal food stalls

4.6.3 Leather workshop for the repair and making of shoes and saddles.

4.6.4 Horse betting facility with adjoining bar
(Aimed at both locals and tourists)

4.6.5 SAPS office



Fig 4.24: Shop entrance onto Scheiding Street in Pretoria

© University of Pretoria

4.7 EQUI SCAPE DESIGN CONSIDERATIONS

4.7.1 HORSES SUITED FOR AN URBAN ENVIRONMENT

Burns (2010:13) explains that Boerperd and Friesian breeds are preferred by the Mounted Unit because of their good temperament. Horses are screened and selected based on their ability to handle a busy, noisy urban environment without distress, even when the situation becomes aggressive, the horses must remain brave, calm and obedient.

The same selection process will be used in the selection of horses for equestrian therapy and the riding school, to ensure the horses are not easily spooked or distressed by the urban environment in which the project is established.

4.7.2 SITE AS MEDIATOR

In most cities where horses are still kept, they are mainly required to adapt to an environment designed for people. Hausberger (in Martine et al. 2008:11), emphasizes the effect that a site has on a horse's personality, describing it as "a multi-dimensional factor." The primary consideration is the condition of the environment and secondly the relationship between the public and the horses which the site needs to mediate.

Ross-Williams (2007) suggests creating a landscape that can entertain the horse, which includes adequate uneven surfaces for the horse to move, with rocks, logs, shrubs and trees to scratch and interact with, and creating spaces for water and dust baths.

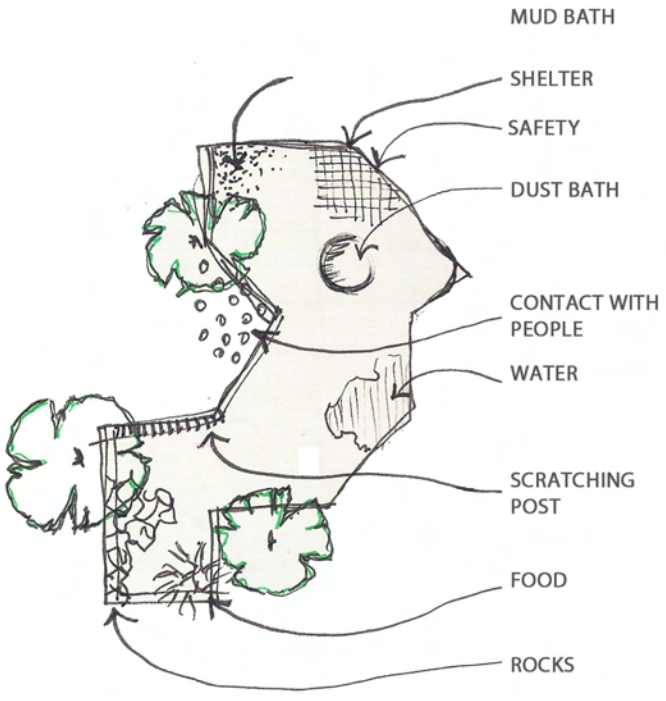


Figure 4.25: Paddock-space landscape elements

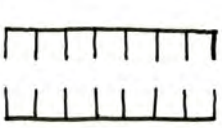


Fig 4.26.1: Horse in stable courtyard on site with other horses

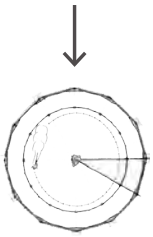


Fig 4.26.2: Horse in Lunge ring training

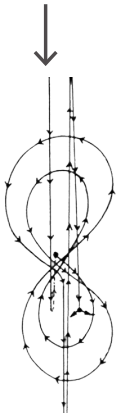


Fig 4.26.3: Horse in Arena training

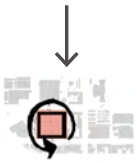


Fig 4.26.4: Horse on site paddock spaces + ramp; first introduction to the city

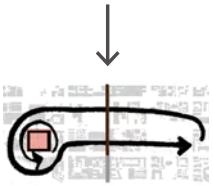


Fig 4.26.5: Horse in Museum Park; second progression into the city

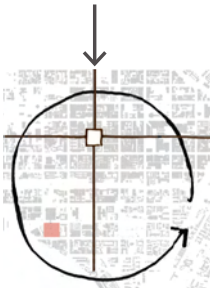


Fig 4.26.6: Horses introduction from the rural to the urban environment

© University of Pretoria

4.7.3 SCALE

The edge of the site needs to accommodate various users. The scale of spaces relate directly to its use and users. Here the user scale varies from the human to the horse scale. Edge spaces become rich and dynamic when these scales are considered in design. They transform and distort, spaces, doorways, openings and balustrades.

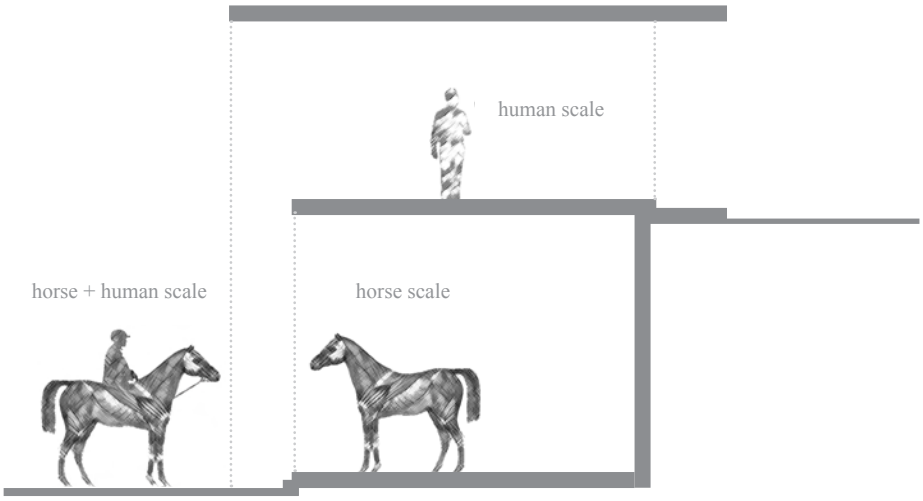


Figure 4.27: Relationship between various scales to be considered in the design

4.7.4 EQUINE VISION

One of the most important senses to both people and animals is sight, hence it becomes an important consideration in the design of a human-horse landscape.

COLOUR

Dr. Grimek's experiments proved that horses can distinguish between yellow, green, red and blue (Smith & Goldman 1999:14). Horses not only have the ability to distinguish between colours, they can, through experience, start to associate different activities with those colours (Martine et al 2008:2).

This allows for a potential interaction and 'communication' through the architecture with the horses. Allowing them to anticipate through association with space and colour what activities to expect. These colours can also be used to create specific moods for people's experience of a place.

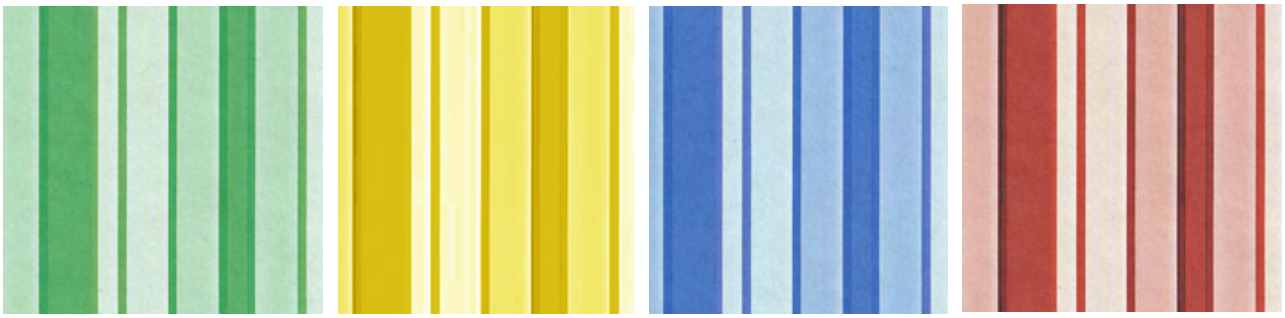


Figure 4.28: Colours visible to horses

© University of Pretoria

4.7.5 HORSE BEHAVIOUR

4.7.5.1 HERD

Horses are synonymous with their herd, they instinctually depend on and have evolved as herd animals. The herd represents safety and security; separation from the herd causes stress and anxiety (Ross-Williams 2007).

"Group living horses are found to be easier to handle and train." (Martine et al. 2008:12) A horse should therefore never be completely separated from the herd, as they learn through social interactions, to respond to herd and human signals.



Figure 4.29: Herd animals: safety and comfort in numbers

4.7.5.2 GRAZING

Horses need food ad lib as they tend to graze all day. They also graze in patterns, as they are herd animals they tend to move through a landscape together. These grazing patterns can be altered through conditioning , thus the use of the paddock can be greatly predetermined by using the grazing patterns and conditioning to expose the horses to different sections of the paddock, based on where food is made available.

Feed provision:
Paddock _ hay /grass
Stables _ total mix ration/complete feed (lowers the risk of colic as it can be fed ad lib)
(Emma Mc Connell Interview with a horse vet [BVM & S MRCVS])

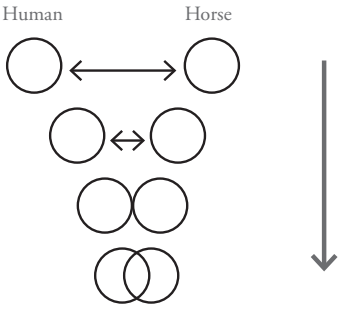


Fig 4.30: Desired development of people's relationship with horses after multiple encounters

4.7.5.3 WATER

Water points become another consideration, as horses will migrate towards water at certain times of the day, to drink or cool off, creating rituals of movement.

Average usage per horse:
25 l for drinking
20l for washing of horse and stables
(Emma Mc Connell Interview with a horse vet [BVM & S MRCVS])

4.7.6 HUMAN – HORSE RELATIONSHIP

People's relationships with horses partly depends on society. Owner's perceptions of their horses greatly determine the way they 'manage and handle them (Martine et al. 2008:10).

Non-horse users have varied reactions from one extreme to another. They are either scared or over confident when interacting with horses. It is essential that people are informed about human-horse dynamic in order to build a positive relationships.

Hinde (in Martine et al. 2008:21) suggests that; "each interaction is influenced by the previous one(s) in the process of developing a relationship" Associated memories in humans and horses, either positive or negative, create expectations of a specific person's behaviour, and thus determines the future reactions in relation to that person. Emphasis is therefore placed on people's understanding of how to behave around horses. A system is required that will teach people to interact with horses.

The Equi Scape allows for the establishment of new cultural practices centred around these large companion animals. Creating a sense of ownership of the place and its equine inhabitants.

© University of Pretoria

CASE STUDY

4.8 BARAGAN'S EQUESTRIAN TRILOGY

4.8.1 PROCESSIONAL AVENUE

Las Arboledas
residential
Mexico
1961

As the rider moves along the main processional avenue water becomes a continuous companion (Ambasz, 1976:61).

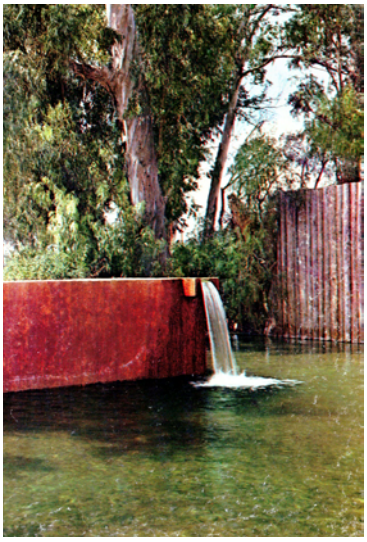




Fig 4.31: Water and processional avenue

4.8.2 THE TEMPLE

Los Clubes
Mexico
1964

"A long pink stucco wall assumes here the role of an abstract frieze against which the profiles of approaching horsemen turn into dynamic bas reliefs." (Ambasz 1976:73)

An echo chamber is created where two walls meet, here the sound of hooves resonate, with the sound of water as a backdrop.

"A pagan temple for the communion of horse with rider." (Ambasz 1976:73)





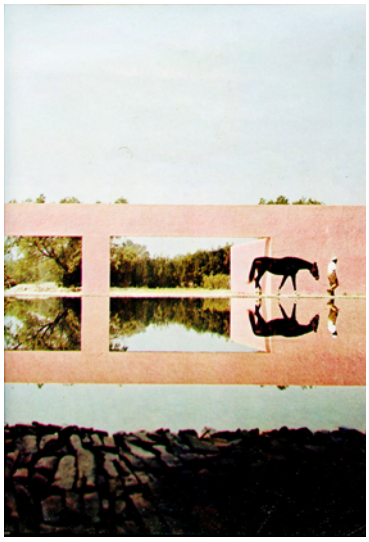
Fig 4.32: Frieze

4.8.3 THE ACADEMY

San Cristobal
(Stable, horse pool, swimming pool and house)
Mexico
1968

The building is designed such that the horses follow a fixed ritual each day in which they are first trained and then allowed to run in an adjoining paddock space (Ambasz 1976:91).

Walls are designed to the scale of the horse and create the set for the horse as the main actor as they move through openings in the wall or are shown off against them.



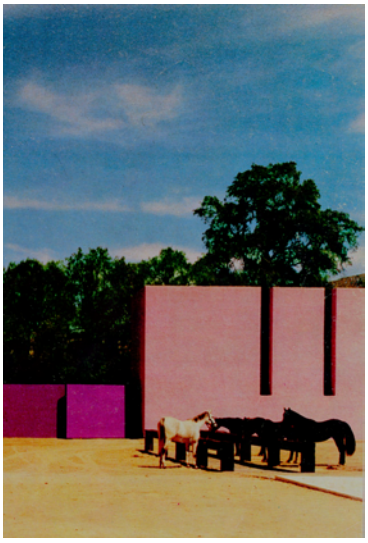


Fig 4.33: Wall scale

© University of Pretoria

4.9 EQUINE ERGONOMICS

Within this scheme one of the most important informants of form is the response to ergonomics of both humans and horses. The relationships between the human body and the horse's is explored and exploited in order to create a sense of place.

4.9.1 HORSE SCALE

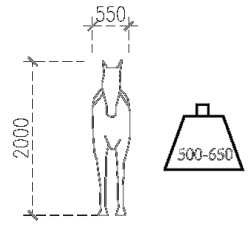


Fig 4.34: Horse dimensions + Weight

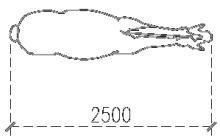


Fig 4.35: Horse dimensions

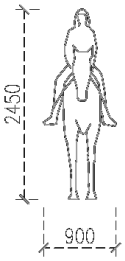
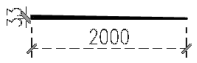
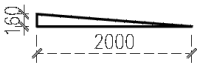


Fig 4.36: Mounted horse dimensions

4.9.2 HORSE STABLES



Minimum stable floor slope 1:60



Maximum stable floor slope 1:12

Fig 4.37: Stable slope for drainage

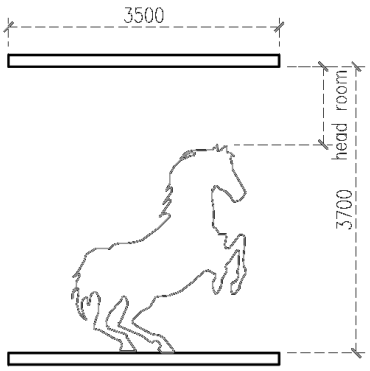


Fig 4.38: Stable head height

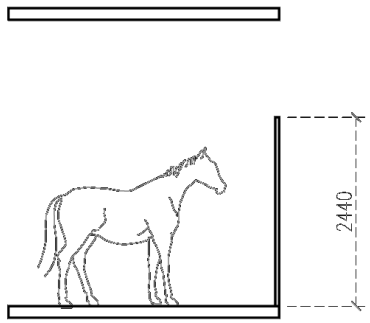


Fig 4.39: Stable door scale

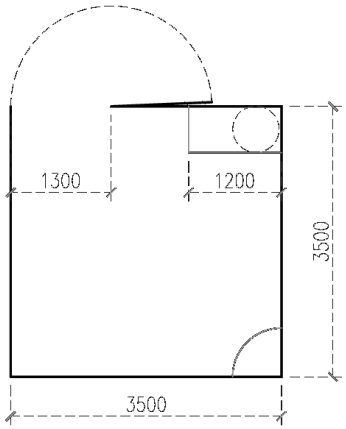


Fig 4.40: Typical stable layout

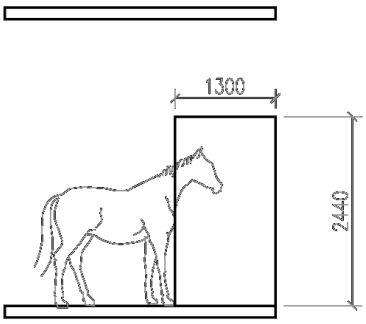


Fig 4.41: Stable door scale

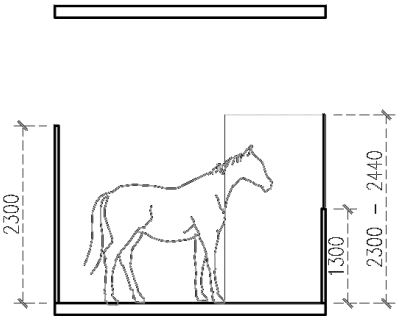


Fig 4.42: Stable enclosure and exposure

© University of Pretoria

4.9.3 ERGONOMIC CONSIDERATIONS FOR A MOUNTED HORSE IN TRAINING

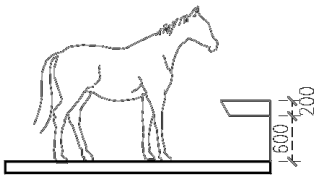


Fig 2.43: Manger height and size

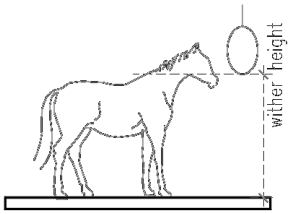


Fig 2.44: Hay net height

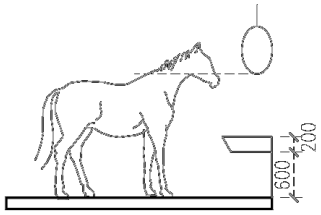


Fig 2.45: Hay above manger to catch wasted food

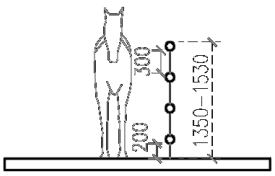


Fig 2.46: Fence height

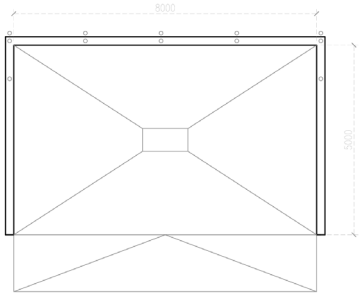


Fig 2.47: Wash bay dimensions

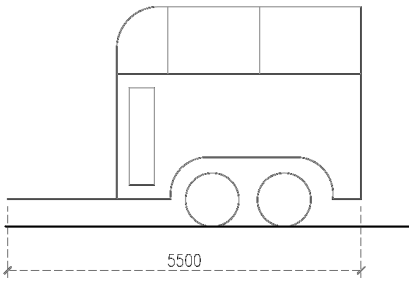


Fig 2.48: Horse box dimensions

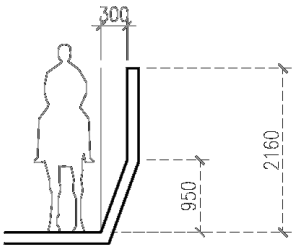


Fig 4.49: Indoor arena edge

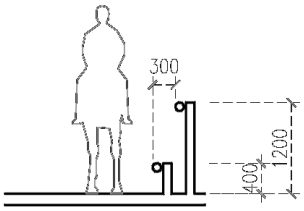


Fig 4.50: Outdoor arena edge

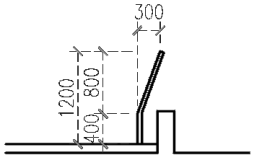


Fig 4.51: Lunge ring edge

© University of Pretoria

4.10 EQUI SCAPE'S PROGRAMMATIC REQUIREMENTS

STABLE YARDS			
	1	MOUNTED UNIT YARD	12 horse stables
	2	EQUESTRIAN THERAPY & RIDING SCHOOL YARD	18 horse stables
		Total	**30 horse stables** [3.5m x 4m each]
ACCESS		4 x 4 and trailers for deliveries to stores 4x4 and horse box	
PARKING			
		Trailer	2
		4x4	2
STORAGE SPACE REQUIREMENTS		**Horse Feed**	
		(to be replenished every two weeks)	5 Pallets: 2 - 3
		Total design area	**10m²** (refer to appendix A)
		Hay	
			2650kg Hay be delivered every 2 weeks Average: 6 Pallets total
		Total design area	**10m²** (refer to appendix A)
		Bedding	
		(Assumption that stables will be cleaned each day)	
		Total design area	**13 m³** (refer to appendix A)
		Equipment Store	
		Total design area	**12 m²**
		Compost heap sizing	
		(Assumption that stables will be cleaned each day)	Manure and soiled bedding waste
		Total design area	**19 m³** (refer to appendix A)
			The horse manure does not contain an adequate amount of energy for a biogas generator, therefore it forms part of a compost heap, producing compost for Burgers Park, Pretorius Park and Pretoria's municipal gardening service.



Fig 4.52: Equipment required for mucking out stable stalls

© University of Pretoria

HOUSEKEEPING

TACK ROOM

1. Mounted Unit

	18 x lockers (600 x 600 x 1000)
Total design area	12m²

2. Riding school & Equestrian therapy

	12 x lockers (600 x 600 x 1000)
Total design area	9m²

STAFF LAVATORIES AND SHOWERS

Total design area	22m² each
Male and female	
Refer to Appendix B	

STAFF REST ROOM (in tack room)

Total design area	10m² each



FARRIER
(specialist in equine hoof care)

WORKSPACE 1 (with anvil, gas burner and tool store to shape shoes)	10m²
HOOF STORE	4m²
WORKSHOP 2 (place to set hooves, clamp horse and fix shoes)	10m²
Total design area	24m²

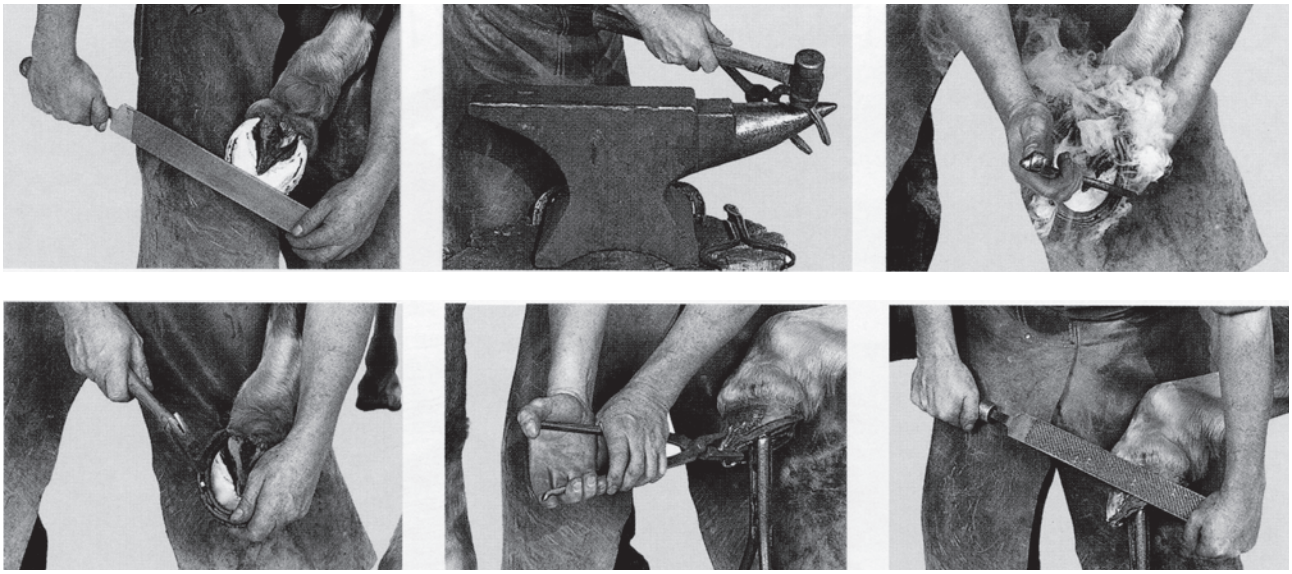


Fig 4.53 - 4.59: Illustrating the process of changing a horses shoe, which is put on display for the visitors of the Equi Scape

© University of Pretoria

EXTERNAL FACILITIES	**WASH BAY** Textured rubber mats over concrete (impervious to water, drain to detritus trap)] Total design area	[5m x 8m 40m²
	PADDOCKS (hay racks important to alleviate boredom) Area	 2850m²
	CARRIAGE STORE x 2 Total design area	 [5,5m x 2m = 11m² each]
HEALTH	**SICK STABLE** Total design area	8m x 4m [space for walking, with a toilet close at hand for the care giver] 32 m²
	HORSE BODY CLAMP	
	VETERINARY ROOM Total design area	 22m² each
TRAINING AND RIDING	**LUNGEING RING** (circular ring for training)	18m Ø.
	HARD SURFACE ARENA (in Minnaar Street for Mounted Unit training)	
	SOFT SURFACE ARENA (Surface: reconstituted rubber shreds)	The size of an arena is dictated by the ability of fast moving horse turn 10 -11 m Ø." (Neufert 1980:344) **Standard arena sizes:** • International arena size : 60 x 20 • Elementary arena size: 40 x 20 • Military school: 54.86m x 18.29 **Height of building** 4000-5000 (Neufert 1980: 344) The minimum clear floor area required is 40 x 20 m, this implies an arena space of 42 x 22 which allows for tilted kicking boards along the edges of the arena (Geraint 1970:344). As the arena will not be used for international shows the standard arena shape may be altered.

Stables are required to link to the main arena as well as the external paddock spaces. Stables need direct access to feed, midden and equipment stores.

The stable courtyards create a calming space for horses. It insulates, yet allows for internal connectivity between a horse and its herd. The courtyards should therefore be accessible to horse boxes, as it creates a calming environment to which the horses may be slowly introduced into the urban environment.

© University of Pretoria

"All at once the contemporary city is landscape, building, and infrastructure spread across, urban, rural, and wilderness territories, a theoretical positioning of the city as no longer in dialectic with "nature," but by the same token a positioning which can once again naturalize and therefore justify everything humans make of the world." (Weller 2006:71)

THEORY

Chapter 5 explores ideas related to the design of the equestrian scape and its edges. Drawing from various concepts, namely Landscape ecology, mental edges, heterotopias, human-nature hybrids and landscape urbanism and its relation to infrastructure, a design approach is established for the creation of a niche in Museum Park, to which a human-horse culture may be grounded.



05

© University of Pretoria

5.1 LANDSCAPE ECOLOGY

Landscape ecology will provide the backdrop to understand the interaction between ourselves and the environment, as it can be used to describe any landscape; be it natural, human or hybrid.

Forman (1986:20) in his book Landscape Ecology uses the following terms to describe landscapes and the interaction between the different elements:

[PATCHES]
non-linear surface areas

[CORRIDORS]
systems of movement

[MATRIX]
the underlying connection
between all parts.

Together patches and corridors create a matrix. The focus of this dissertation is on the edges which are created where patches or patches and corridors grade into one another. These edges create the richness in the tapestry of the landscape.

Patches in nature have a distinct pattern, however their edges do not have abrupt boundaries but instead are bound by transitional spaces, referred to as ecotones (Dee 2001:121). These edges are important as they accommodate life from more than one patch (Forman 1986:26).

Another important aspect of landscape ecology is scale. As the elements mentioned above may be found at every level of magnification (Forman 1986:26). Edges play vital roles within the landscape from the macro down to micro scale.

Edges become the general as well as the architectural focus of the dissertation down to the detailed articulation of where planes meet to form an edge.

Ecotone is where the ocean meets the land, the mountains or forests the fields and where the ground and sky come together.



Fig 5.1: Ecotone

© University of Pretoria

[EDGES]

The interface between two spaces that have different functions and/or physical characteristics.
(Dee 2001:116)

[BARRIERS]

"Dramatic or abrupt physical separation between one space and another."
(Dee 2001:125)

When zooming out to view Pretoria CBD as a whole, the matrix of the city grid is evident. The size and scale of the city blocks create a specific character for both the transport Precinct and the CBD, Museum Park is situated between these two grains. The Museum Park offers a unique opportunity for engagement, between every day city dwellers as well as tourists.

When zooming closer to Museum Park, it has two self evident edges. The edge to the east is Burgers Park, which can be described as engaging. The second to the west is created by a cul-de-sac at the end of Minnaar street, which terminates one's experience abruptly.

If the level of magnification is increased once more street edges start to become significant to the experience of Museum Park. According to Dee (2001:125) physical separation between places establishes barriers, physically as well as mentally. Within Museum Park fences have been erected which create barriers, this was both intentional and unintentional, and has created a segregated environment.

© University of Pretoria

[EDGES]

" Edges are interlocking forms or places of transition that enclose and separate different spaces."
(Dee 2001:115)

5.2 THOUGHTS ON EDGE

From ecotones we can establish various design guidelines to apply, through which our urban edges may create the same richness on a social and cultural level, as they contain in nature.

Edges are places with a richness created by an ever present tension. These are places of augmentation and conflict, as several species come together resulting in a multitude of interactions (Porter 2004:66).

Physical edges as well as conceptual edges are important considerations within design as it support diverse human uses and experiences, and accumulates cultural meanings (Dee 2001:117).

Due to binary thinking mass and space are often categorised, this results in the neglect of edges in design. Spaces should be seen and designed as a 'hybrid', neither space/nor mass but both simultaneously (Dee 2001:117).

Depending on articulation, an edge can vary from being a barrier to a transitional space. Its articulation should be based on a multitude of factors; user, program and context being the fundamental considerations. They respond to their context through the places and forms which they enfold and connect. To their users by being inclusive rather than exclusive, permeable opposed to impermeable, allowing them to become habitable spaces and not fixed boundaries of separation.

A city's edges create the character of the streets and city. As thresholds and mediators they have the latent potential to become dynamic points of social and cultural connection. Ultimately urban edges need to foster a sense of ownership, making the city and its urban rooms safer, and through user action, establish a sense of place.

Edges are places of diversity, where people meet nature, architecture the landscape or where a pane of glass meets a concrete mass in space. It is a characteristic of edge that through contrast the characteristics of both are emphasized at their abut.

© University of Pretoria

[HEALING]

"Requires a profound change in attitude, not only to oneself and to the world, but to oneself in the world."
(Mc Callum 2010:14)

[MENDING]

'Quick fix' – "As necessary and as convenient as it may be, it seldom makes any demands on one's capacity to reflect or to change one's ways."
(Mc Callum 2010:14-15)

5.3 MENTAL EDGES

The word edge has positive and negative associations, respectively it can refer both to innovations or to a the marginalised (Dee 2001:122). A variety of meanings are attached to edges, therefore architectural edges may be interpreted by different cultural groups in different ways. This needs to be considered in the design of edge spaces, so that they are inclusive.

The relationship between physical and metaphysical edges become significant, as their relationship initially informs design, but then starts to inform our experience of a space, and how we see ourselves in the world. This implies an opportunity for a change in attitude to arise from the experience of architecture.

An important question then becomes, how does this scheme wish to construct a new conception of ourselves in the world. The answer lies in the fundamental edge which we have created between ourselves and the first nature or wilderness. For centuries we have tried to create a split between ourselves and nature. This barrier has resulted in our view that we are separate form nature, ideas which become strengthened or weakened through the manner in which we physically construct our environment.

Simply put, edges which separate spaces create both physical and mental boundaries (Dee 2001:125).

Another type of psychological edge is created where social territories meet and overlap. The design of these places can have a significant effect on the way in which these territories meet and on people's perceptions of one another.

Boundaries can only be challenged if the conventions from which they are erected are also brought into question. The Equi Scape challenges the existing relationship between people, animals and technology in the city and weaves them together through the design of the Scape edge, which renegotiates their proximity and interface.

© University of Pretoria

5.4 HETEROTOPIA

Jormakka (2006:16) in his essay Theoretical Landscape, suggests that 'Heterotopic thinking' is a major resource of landscape architecture, one which has the capacity to enhance current architectural theory.

"The heterotopia is capable of juxtaposing in a single real place several spaces, several sites that are in themselves incompatible." (Foucault 1984:25).

This relates back to the story of Sophronia, discussed in Part 2, in which the story of the two half cities is told. What was conveyed is that in their incompleteness the one half city remained only an unrealised potential. When this idea is applied to Pretoria one can easily identify such half cities, that the dissertation aims to bring together, juxtapose and invert.

The Equi Scape is informed by the juxtaposition of other places, for example two stable courtyards introduce the horses onto the site in an environment that mimics their stables and yards in Pretoria West. The paddock space attempts to create an environment which mimics their 'natural' environment. The arena represents the chora at which point horses and people from the urban environment interact for the first time. The design also mimics elements from the urban environment, for example infrastructure that becomes an introduction for the horses to the urban environment and desensitise them to changes in material, level changes and urban activities.

In this sense the site's landscape is heterotopic as it represents other places in miniature. Architectural elements are used to create a micro model of the city and its surrounding environment: the house, the plaza, the market, the mall, the bridges, the trees, the rural farm. This creates the conditions on site through which the horse becomes introduced to the city or people to the horses.

© University of Pretoria

"In general, the aspects of nature that do not affect our interests remain in the background and we take notice only of the qualities that matter to us."
(Jormakka 2012:32)

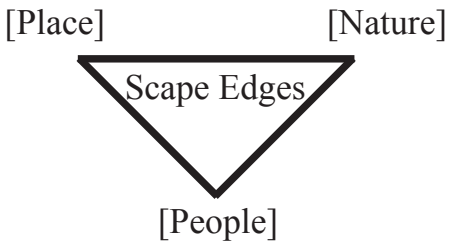


Fig 5.2: Elements for creating a scape edge

5.5 HUMAN-NATURE HYBRIDS

When considering the domestication of the horse, Swart (2010:209) points out that "an argument could be made that some agency was exercised on the part of the animal, that the process may have begun as a symbiosis, in which certain species of animals 'chose' to become associated with human societies as a survival strategy." As the dominant species, people were able to exploit horses but simultaneously provide protection. Johns (2006:12) describes it as; "a kind of social co-evolution." The human horse relationship can therefore be seen as a culture-nature hybrid, as the domestication of an entire species requires adaptation on both sides, which essentially aligns the course of both species' evolution.

These hybrids are essential to the future development of our relationship with nature, because as Ipsen (2013:60) describes "the modern city understood itself as emancipated from nature and landscape, which were imagined as outside the city.

"Landscapes are important nature-culture hybrids within all cities, as spaces where the relationship between humans and nature may be re-evaluated. This is significant as Ipsen (2013:61) suggests that people's relationship with nature, is associated with both the environmental problems as well as solutions.

Architecture and landscape architecture have always created the edge between humans and nature, and thus can continue to play an important role in the development of this relationship into the future.

In the past attempts were made through design to 'control' nature. Design has the potential to make us reevaluate our current perception of ourselves in nature, much as Johns' perception of the human-horse relationship as a socio-coevolution transforms the horse from an object into another subject. Thus altering our relationship with nature.

Here landscape architecture can play a vital role as it designs for life other than human life, creating systems which are continually perpetuated.

Mossop (2006:170) describes systems based on ecological processes within the urban environment as:

"Bringing all the factors together in complex, requiring a synthesis of social, political, and economic factors, as well as issues related to urban wildlife and water management."

This intention has grown from the acceptance of city landscapes as hybrid nature. Allowing for an approach which on the one hand addresses human action, while on the other uses processes found in nature in the creation of hybrid ecologically based systems.

The dissertation explores the possibilities of an architecture which has been decentred from its anthropocentric preoccupation, by reintroducing horses into the city.

A hybrid architectural landscape designed to accommodate both people and horses. Opportunities are revealed by adjusting the focus of architecture. Thus allowing it to explore various potentials of culture-nature hybrids.

The dissertation explores the possibility of using existing hybrids, namely the urban landscape and horses, to regenerate the site and with time Museum Park, while simultaneously allowing people to re-evaluate their relationship with 'nature'. The reciprocal relationship which would grow between the rural and urban hybrids, would eventually sustain one another.

As Jormakka (2012:23) notes:

"In the end, architecture and landscape are 'not about technology, but about a world view and ethos in harmony with working principles and laws of earth's biotic mantle, mankind's nurturing natural home."

© University of Pretoria

"Koolhaas reads the city as simply "SCAPE" - a condition in which architecture, infrastructure, and landscape are undifferentiated and subject to the same forces."
(Weller 2006:77)

5.6 SCAPE

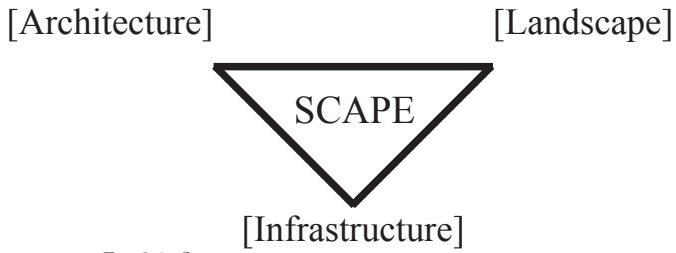


Fig 5.3: Scape components

Stan Allen (1999:57) suggests that "The time has come to approach architecture urbanistically and urbanism architecturally."

In light of Allen's statement, this section looks at landscape urbanism and its approaches as an informant to the establishment of an approach to architecture. Mossop (2006:165) suggests that "the discourse of landscape urbanism establishes the significance of infrastructure and its associated landscape in the development of contemporary urbanism, and in the generation of public space."

From these stances the dissertation approaches the design from three design disciplines: namely architecture, landscape architecture and urbanism. Traditionally these focus on three very different scales of design. This scheme investigates some of the possible links and overlaps, which may start to inform one another in an approach to a contextual architecture which starts responding to the environment at various scales. Further consideration is infrastructural spaces as they create or affect spaces at all three scales, and thus becomes a link throughout.

Technical efficiency has and continues to drive infrastructure to become standardised, this fixed yet narrow intention has led to the neglect of infrastructures response to social, aesthetic and ecological functions (Mossop 2006:171).

According to Mossop one of these neglected aspects of infrastructure are the in-between spaces they create.

Infrastructural spaces become valuable, when one considers all spaces as valuable, opposed to restricting these spaces to parks and squares in line with traditional values. These lost spaces need to be engaged with by designers, as they have the potential to become multifunctional inhabitable spaces that could make significant contributions to the urban environment. The function of infrastructure need not be the only consideration as it can engage with environmental, social and cultural needs of a community (Mossop 2006:171). Imagine the potential of spaces under bridges, highway interchanges and parking garages if we are able to adjust our perceptions.

"Infrastructure's medium is geography." (Allen 1999:54) This suggests that infrastructure is a site forming activity and constructs new landscapes which creates opportunities for future architectural events.

The dissertations architectural landscape employs infrastructural elements and works to create voids (patches) and corridors within the urban environment, which creates a new geographical niche for the horse in the city. Thus, as Allen Points out: "Infrastructural work recognizes the collective nature of the city and allows for the participation of multiple authors." (Allen 1999:54)

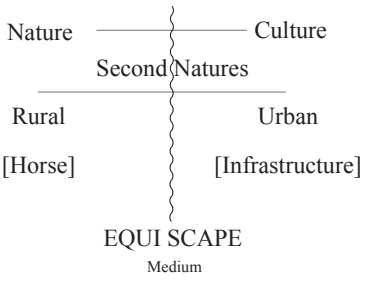


Fig 5.4: Scape Edge as a mediator

© University of Pretoria

5.7 THE NICHE

"What gives a location it's character, and transforms an abstract space into a concrete place, is the way in which a work of architecture provides a visualisation of the genius loci." (Hale 2000:115)

The niche created for the horses, becomes constructed out of various courtyards which represent, in miniature, the rural environment from where they came. The edges draw in both rural and urban scales and through their accommodation express various possible relationships.

"Tschumi also makes an interesting counterpoint to the idea of place as something fixed and stable, as he describes a more dynamic and flexible situation where activities themselves establish new kinds of places." (in Hale 2000:115)

The intervention aims to create a place in which a new way of living in the city may be established. A publicly engaging place is created where the reciprocal relationship between humans and horses (animal) can bring change to social life. The Equi Scape creates a **hybrid niche** in which culture and nature are woven together.

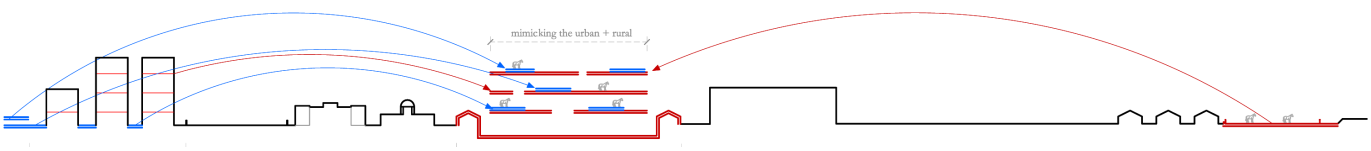


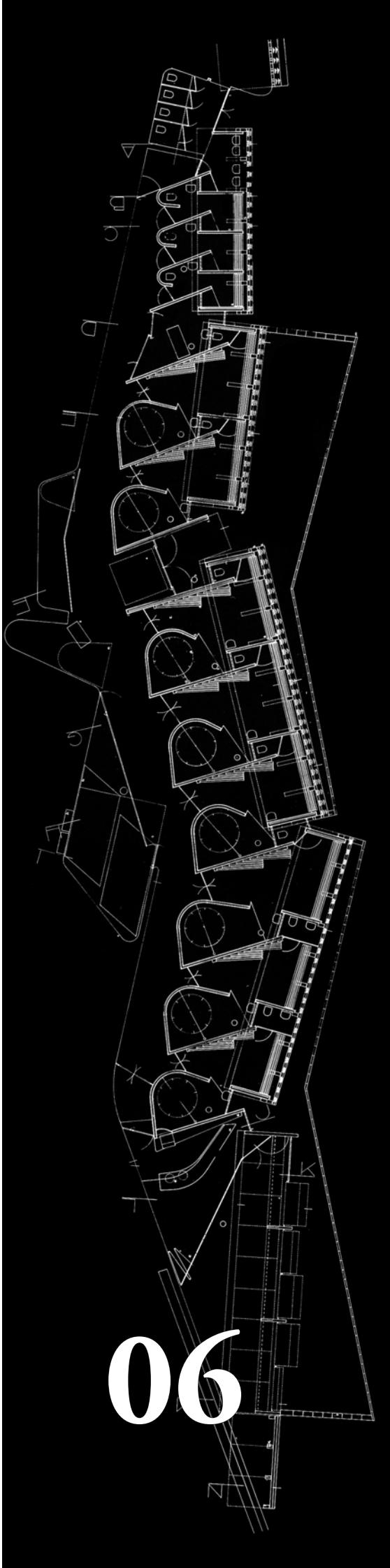
Fig 5.5: Scape created through mimicking urban and rural elements

© University of Pretoria

PRECEDENT

Chapter 2 investigated a contextual precedent, relating to edge conditions and lost space. Chapter 3 included Mounted Unit case studies, as well as functional precedents by Luis Baragan.

In chapter 6 Enric Miralles is the primary precedent, informing the dissertation's approach to architecture, materiality, and technology. Lastly Kengo Kuma informs the approach to materials and technology.



06

© University of Pretoria

6.1 ENRIC MIRALLES

The idea of place relates to the link between human activities and pre-existing traces in the geographical and cultural landscape. “His family of forms is guided by several impulses to do with the reading of programme and of place.” (Curtis 2005:9)

Miralles explores the connections between sculpture, architecture, urbanism and landscape architecture, creating in his projects a middle ground (Curtis 2005:9). By identifying several layers a 'field' is created consisting of nodes, networks, focal points and routes to name a few. This then informs the manner in which the architecture is approached at various scales. Firstly this emphasizes the existing as well as hidden forces of a landscape, strengthening the sense of place, while at the same time creating tensions and encouraging interactions between people (Curtis 2005:9).

Miralles does respond to local conditions in a particular way, although there is not a visible regional approach throughout the work. What becomes interesting in the work is the establishment of a 'landscape typology', the work is establishing a tradition of Architecture as landscape, which becomes an approach to urban expansion. Within this tradition, the 'social landscape' becomes significant in the work as conscious attempts are made to stich the typography, new developments and the established community together (Curtis 2005:10).

Significant to the design approach is the manner in which simple elements are repeated and juxtaposed in the design, giving rise to a labyrinth in plan and section. A similar strategy is used with shapes for example the 'serpentine reverse curve' which becomes used at various scales (Curtis 2005:11). This approach creates a continuity and consistency, however it allows for invention within the design, while at the same time becoming an approach to construction and materiality.

The architectural language in the work becomes grounded in an approach to structure, as from the designs the materiality and construction may be deduced, as some spacial effects are only possible in concrete, for example large floating slabs and cantilevers (Curtis 2005:17).

© University of Pretoria

ARCHERY RANGE

Architect: Enric Miralles
Vall de Hebron,
Barcelona, Spain
1989/1992

COMPETITION AND TRAINING BUILDINGS

Both have an almost identical program, both develop the landscape in front of and behind them, by becoming a part of the earth they are embanking. Thereby both become part of the landscape (Cecilia & Levene 2005:80).

They differ in occupancy and hence form, as the competition buildings distribute the 4000 spectators, while the training facility follows the movements of athletes and becomes an introverted experience. The focus of the next part of the case study will be on the competition building.

COMPETITION BUILDING

Here Miralles creates several edges, the primary edge is the building as retaining wall.

Precast concrete, and factory made components become the key to the design, allowing a great amount of difference to occur on the horizontal planes. Yet it still brings the whole project together. Allowing for complexity and simplicity to coexist.

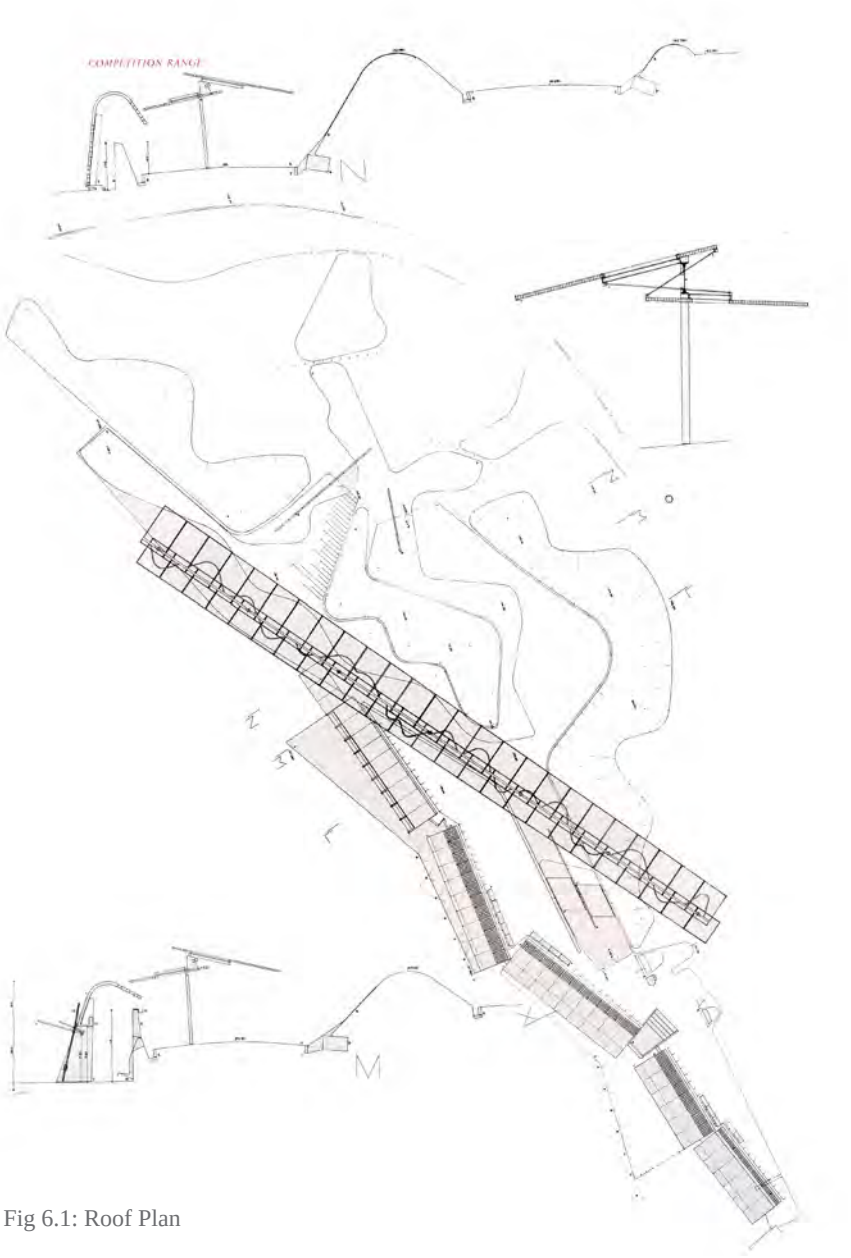


Fig 6.1: Roof Plan

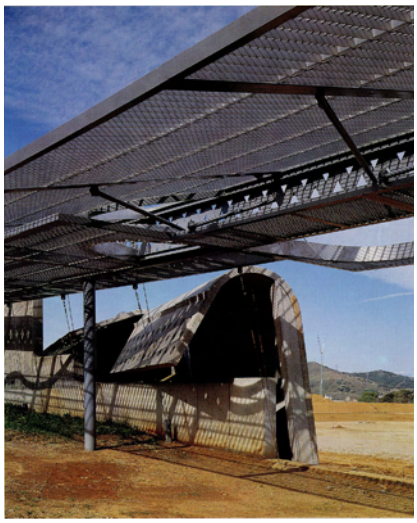


Fig 6.2: Shows a layering of space form material and edges

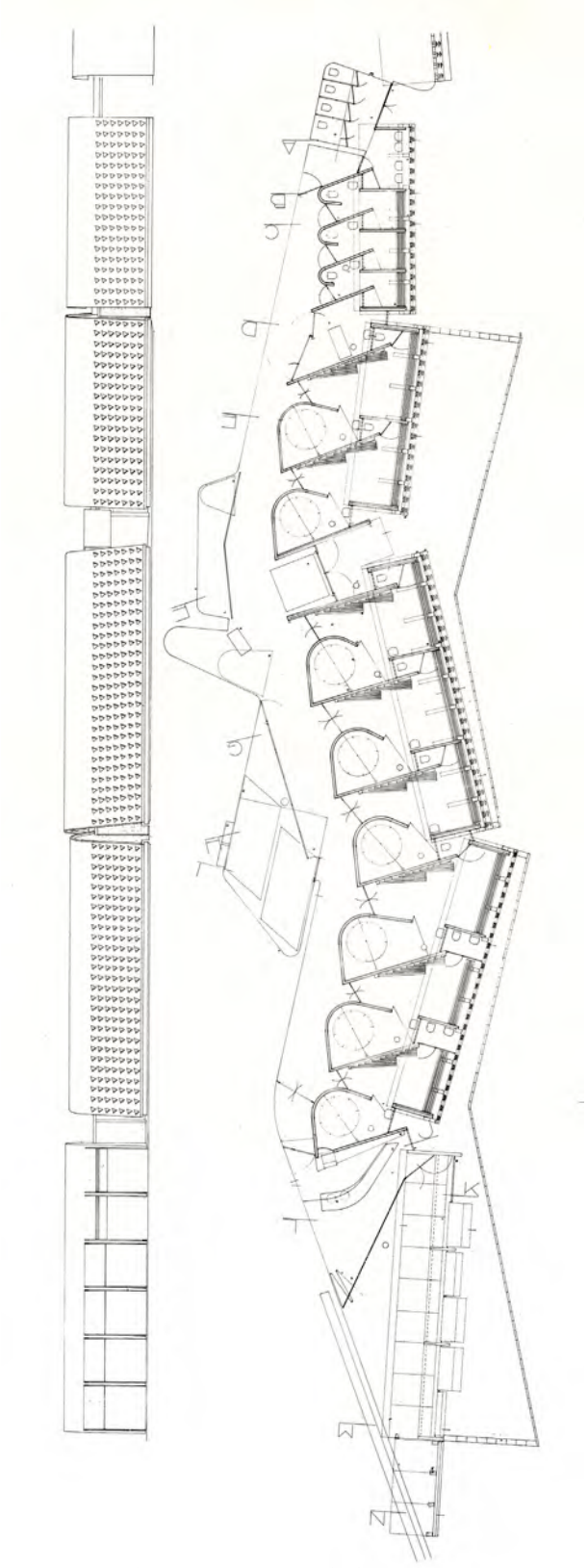


Fig 6.3: Use of a precast concrete facade element



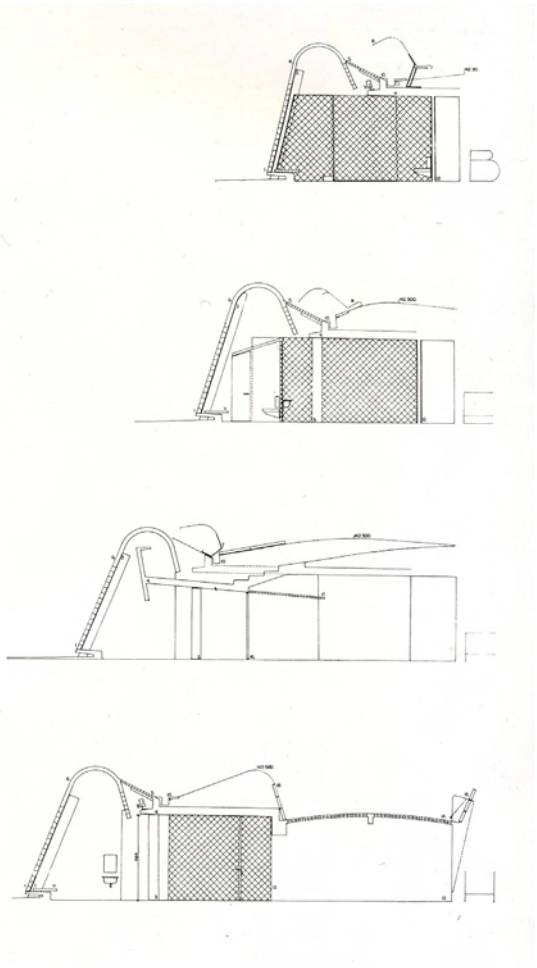
Fig 6.4: Precast vault

© University of Pretoria



Facade Ground Floor Plan

Fig 6.5: Design Drawings of the Competition Building



Sections

These design drawings illustrate the simplistic rhythm of the facade, the complexity yet unity of the plan, and its relationship to the sections. The facade is constructed from large precast elements which create a continuity despite the complexity of the design.



Fig 6.6: Illustrates the layering of form, materials and functions which end at different points as it extends into the landscape, softening the edge.

© University of Pretoria

6.2 KENGO KUMA

MUSEUM OF HIROSHIGE ANDO/WOOD 2000

"The closer architectural elements are to the body, the more delicate and finer they should be."
Kuma (2010: 39)



Fig 6.7: Exterior view of the rhythm created by the louvres



Fig 6.8: Light filtering through the layers revealing the structure

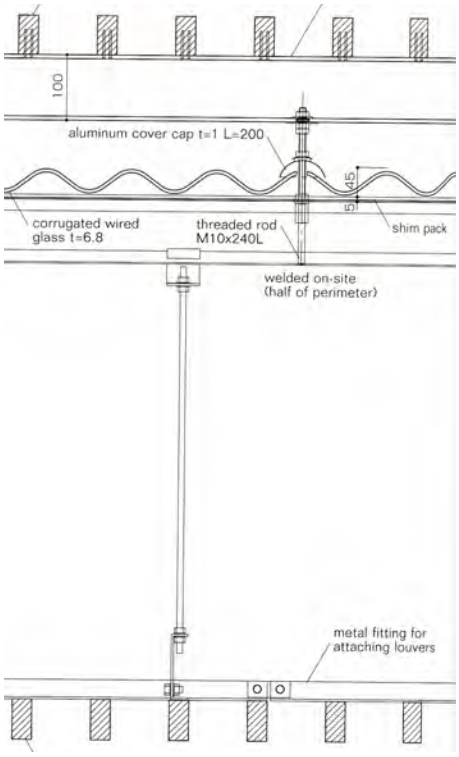


Fig 6.9: Section illustrating the layering of the roof

The wood museum is very expressive of timber, as it aims to celebrate the material. The design is multi-layered; this allows the timber to be used in such a way that it is brought to the foreground and is therefore on display for the user to experience the material's tactile and visual qualities. Layering occurs both vertically and horizontally. The building's roof has three layers: which consists of a metal roof with glazed skylights sandwiched between two Yamizo fir louvre layers. Light entering the spaces gains texture as it filters through (Kuma 2010:39-48).

© University of Pretoria

DESIGN SYNTHESIS & DEVELOPMENT

Chapter 7 initiates the process of renegotiating and reinterpreting the current site boundary walls, a process which becomes the primary focus of this dissertation.

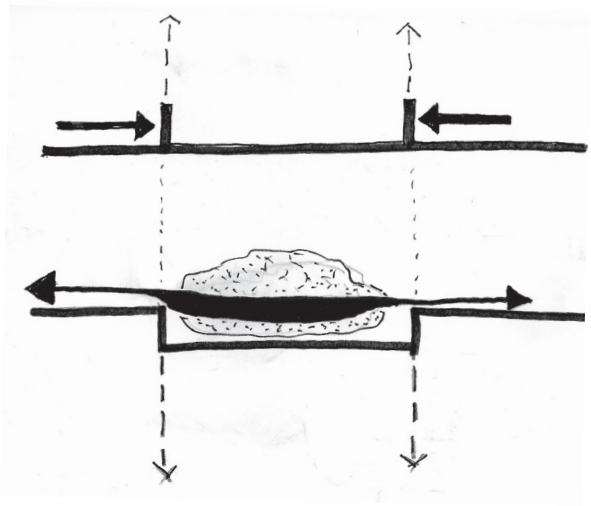
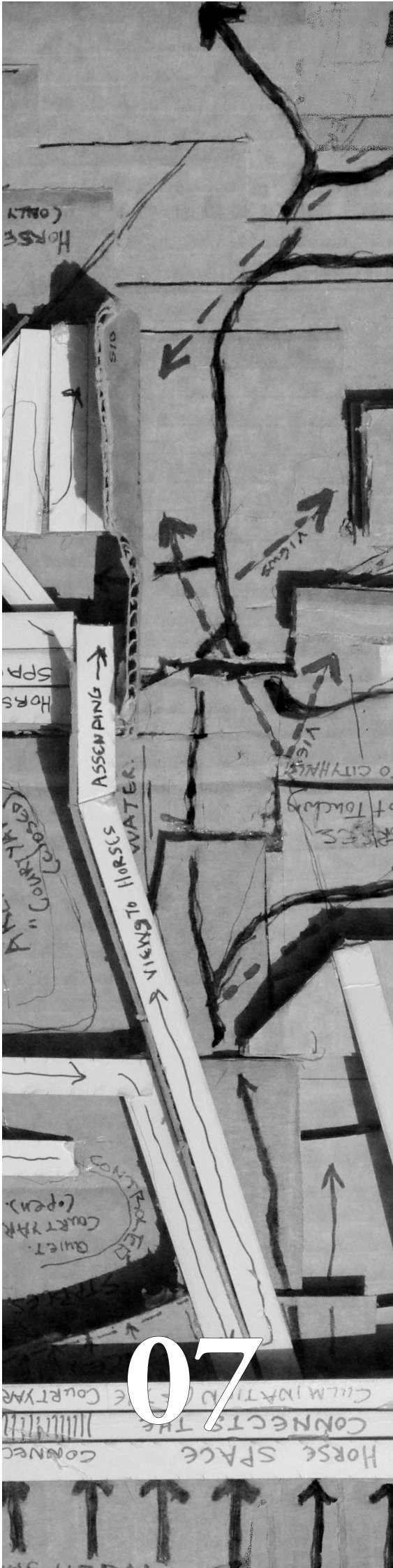


Fig 7.1: Diagram illustrating a change in creating of barriers

Edges are the over-arching theme of this investigation. It relates to the context study whence the problem of segregating barriers emerged.

The theory deals with several edges, relating to the relationship between humans and nature as well as infrastructure, landscape and architecture.

These all extend and influence mental edges and perceptions of the environment. The horse became such a significant informant to the investigation of edges as it created a need for an architecture that will respond to various edge requirements, both physical and metaphysical, allowing the 'problem of barriers' to be renegotiated and become an architectural solution.



07

© University of Pretoria

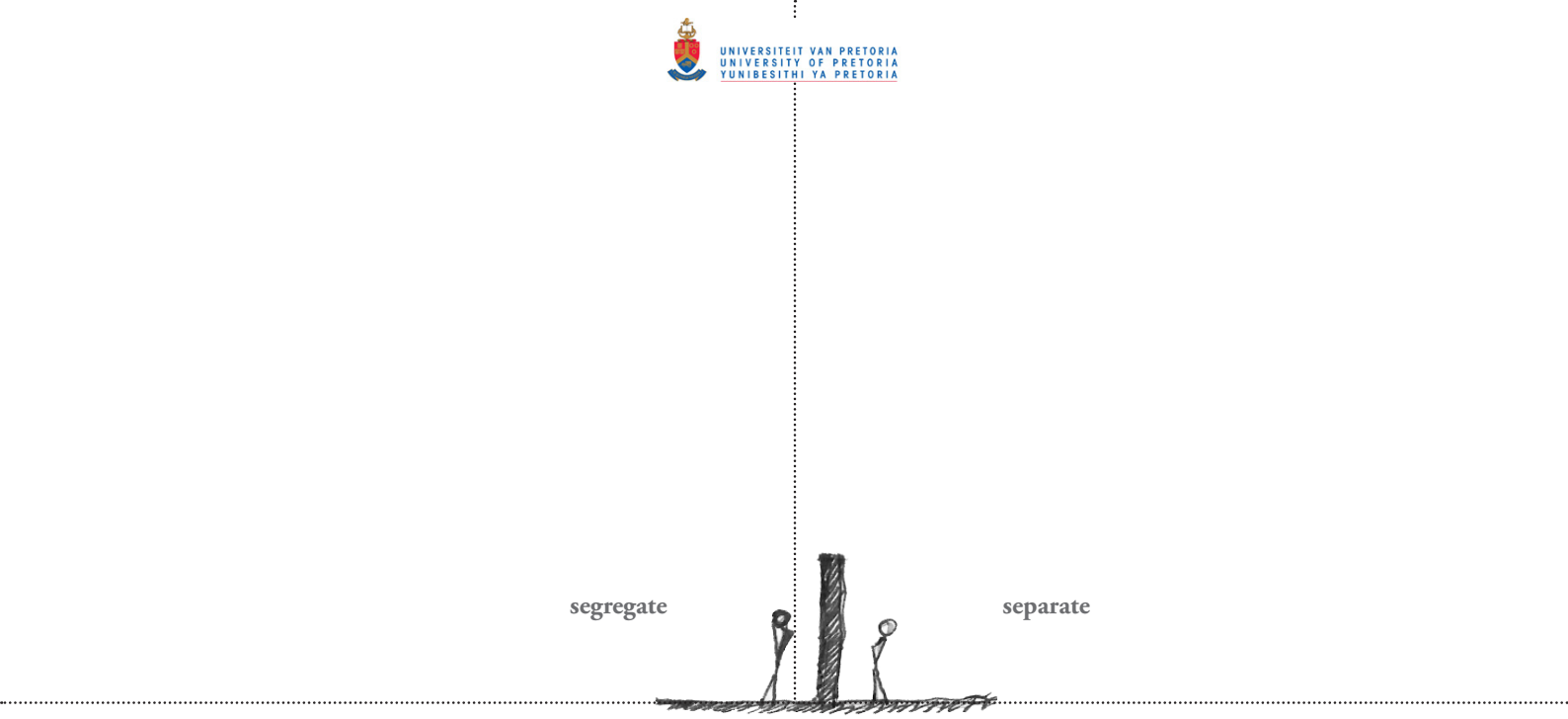


Fig 7.2: Current effect of the PWD ground's boundary wall

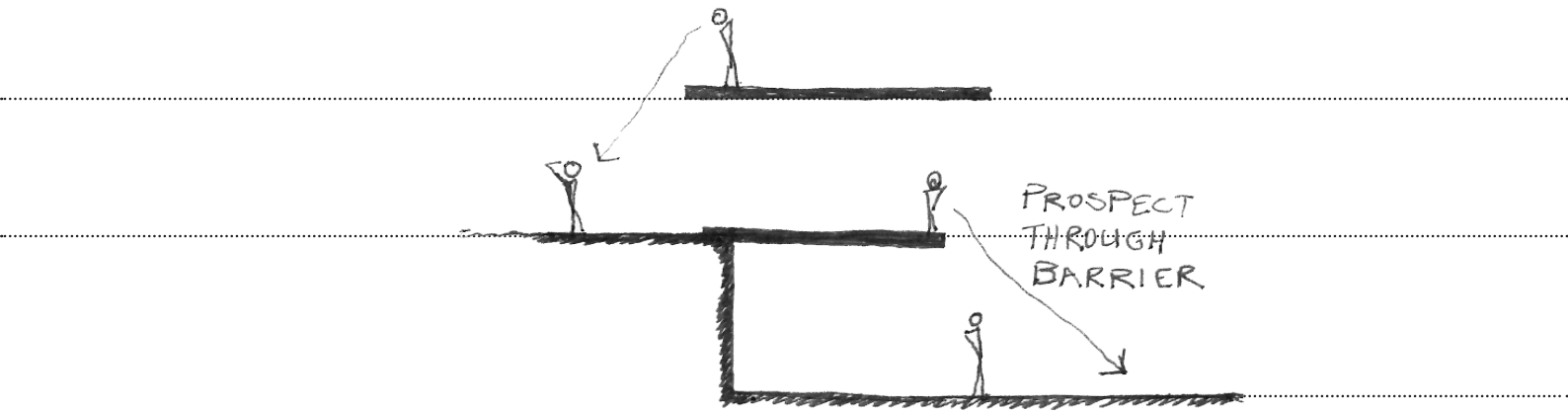


Fig 7.3: Proposed ramp edge which creates an interface

This chapter establishes a tool kit for the establishment of edges as an mediator and platform for initiating the horse into the city. Transitional spaces are created which become physical manifestations of mental transitions, ultimately bringing people and horses closer together.

The current PWD grounds create permanent barriers and even reinforce these through the use of razor wire and surveillance cameras.

The scheme renegotiates these barriers, by creating several edges which act as thresholds before establishing a barrier. Barriers are an essential design tool, however they need to be well considered as they become the edges of city blocks, giving the city it's character. This investigation makes use of barriers to restrict direct contact between horses and the public, however still allows for visual connections.

© University of Pretoria

7.1 EXPLORATION OF BARRIERS WITH PROSPECT

[variations and degrees of physical and visual separation]

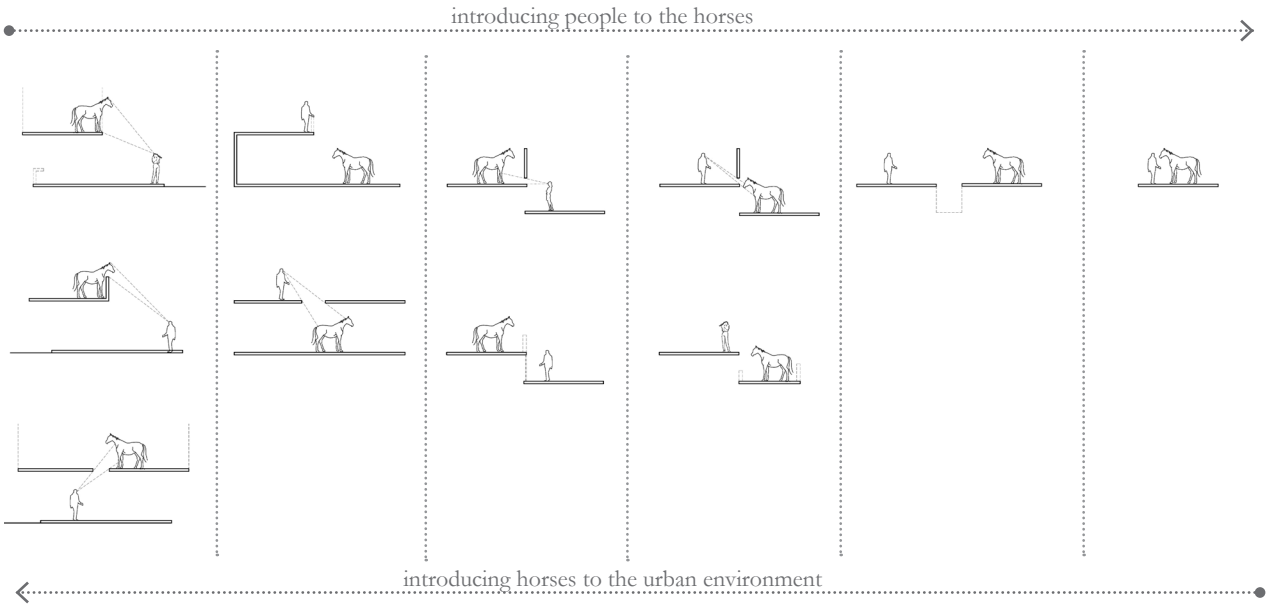


Fig 7.4: Exploring edges from barriers to mental mediators of people and horses

The figures above illustrates the change in relationship created by the intervention between horses and people as they move from the Museum Park to the urban edge and vice versa.

A vertical, horizontal and diagonal layering of edges in the design starts to alter people's experience of space and of their relationship with the environment. This gave rise to the idea of a ramp as edge, that facilitates relationships and alters our perceptions of our relationships with horses, the environment and other people.

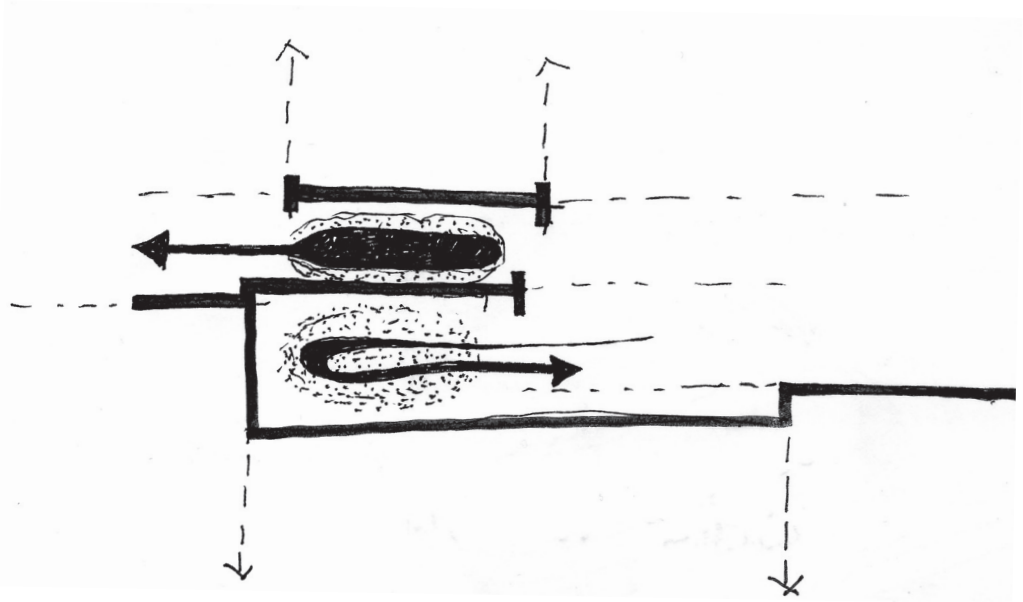


Fig 7.5: Diagrammatic section: ramp as edge that captures and releases energy allowing for spontaneous engagements between people and horses

© University of Pretoria

7.1.1 SKETCHES OF POSSIBLE PHYSICAL BARRIERS

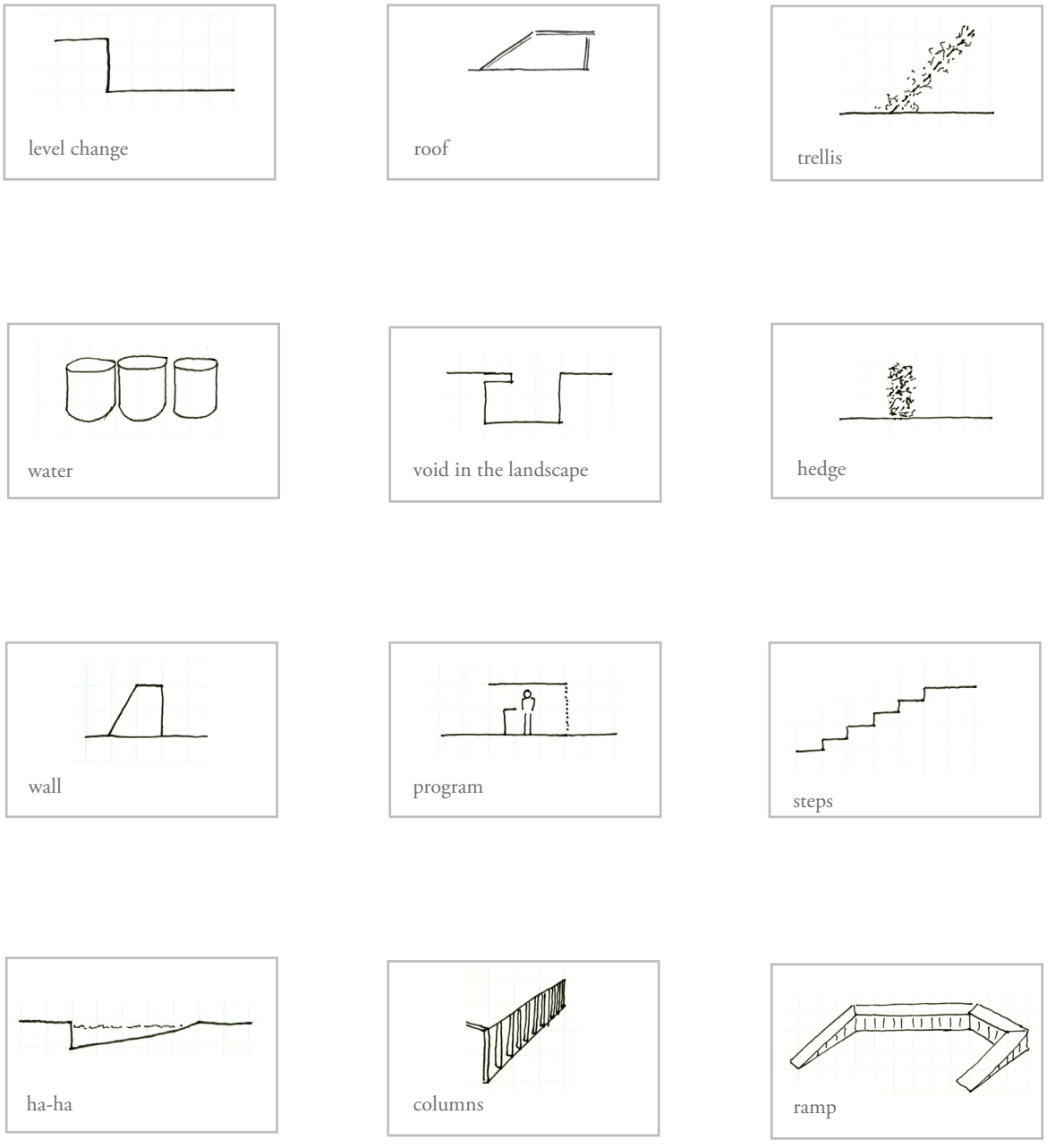


Fig 7.6: Possible physical barriers



Fig 7.7: Users of the scape-edge

© University of Pretoria

7.2 EQUI SCAPE INFORMANTS

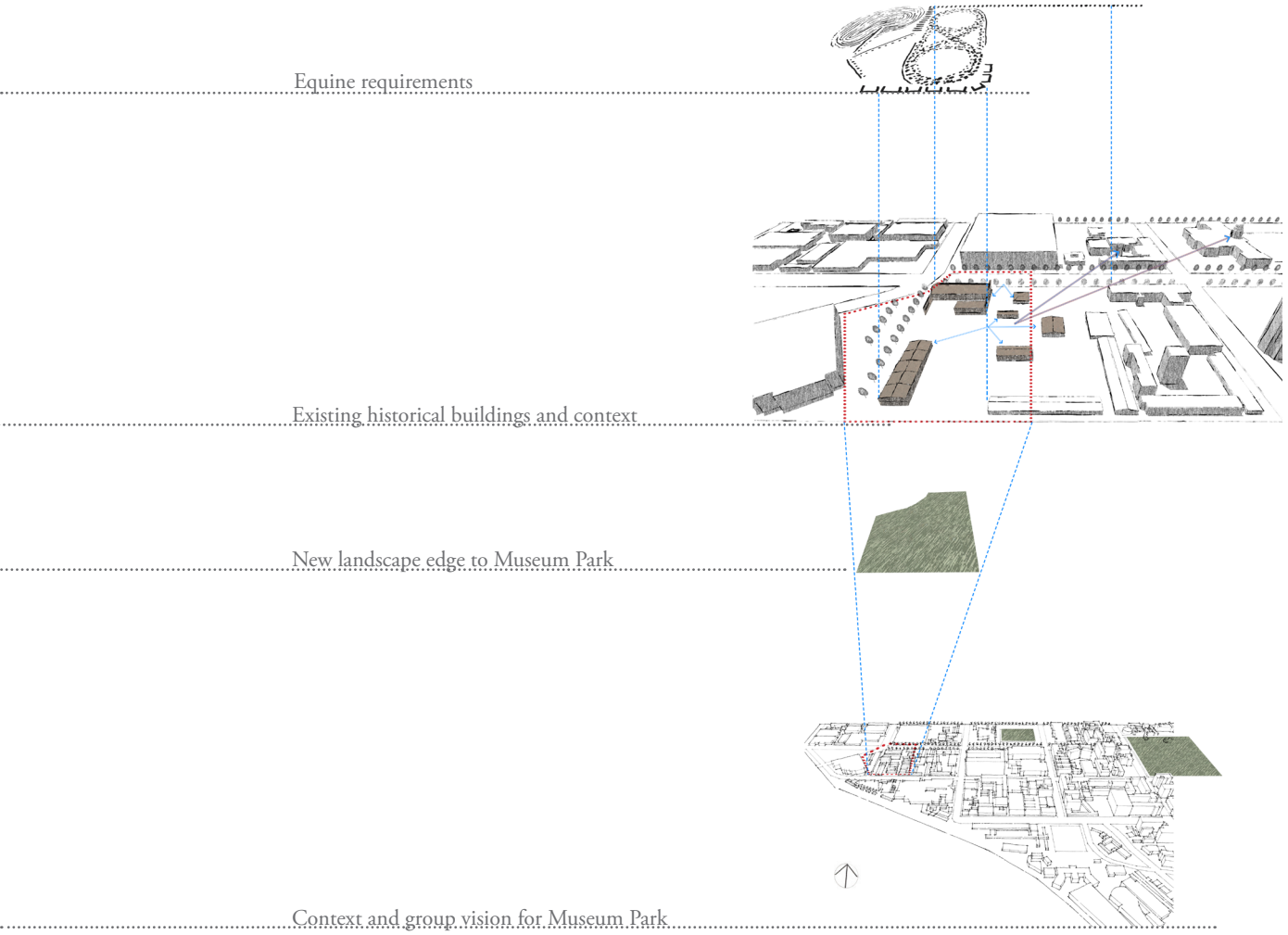


Fig 7.8: Diagram illustrating aspects that informed the Equi Scape design

At the city scale the infrastructural intervention changes the matrix of the city by implementing a new corridor (thoroughfare) through the city block. This increases the edge perimeter of the site, alters the scale of the city block and changes its character.

At the site scale the single courtyard typology of the PWD grounds becomes split into four different courtyard patches(refer to figure 7.9). These patches become voids in the built environment by firstly cutting into the site in places and filling it in others. The courtyards become the spaces that enhances the interaction between people and horses as well as earth and sky. The edges of these courtyards accommodate: the public and private, animal and human, circulation and programs which relate to its urban context.



© University of Pretoria

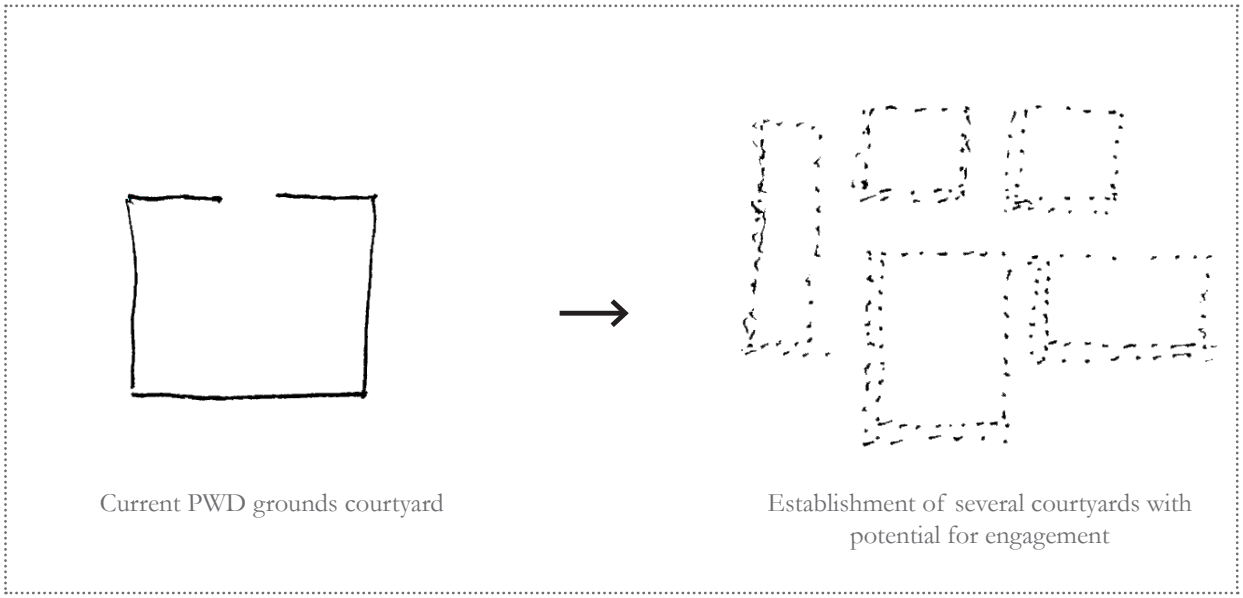


Fig 7.9: Diagrams illustrating the approach to the current site's courtyard typology

7.3 CONCEPT MODEL

The concept model in figure 7.10 illustrates the intentions of the intervention. The establishment of a new edge articulated by a ramp that responds to its micro and macro context, while creating a niche for the horse in an urban environment.

The ramp links courtyards and introduces the horse to the urban environment to the south, creates an edge that responds to the Equi Scape and the urban condition. As the ramp elevates itself it allows for pedestrian movement from and to the taxi rank. Simultaneously the ramp creates sub-spaces with the potential for human habitation.

© University of Pretoria

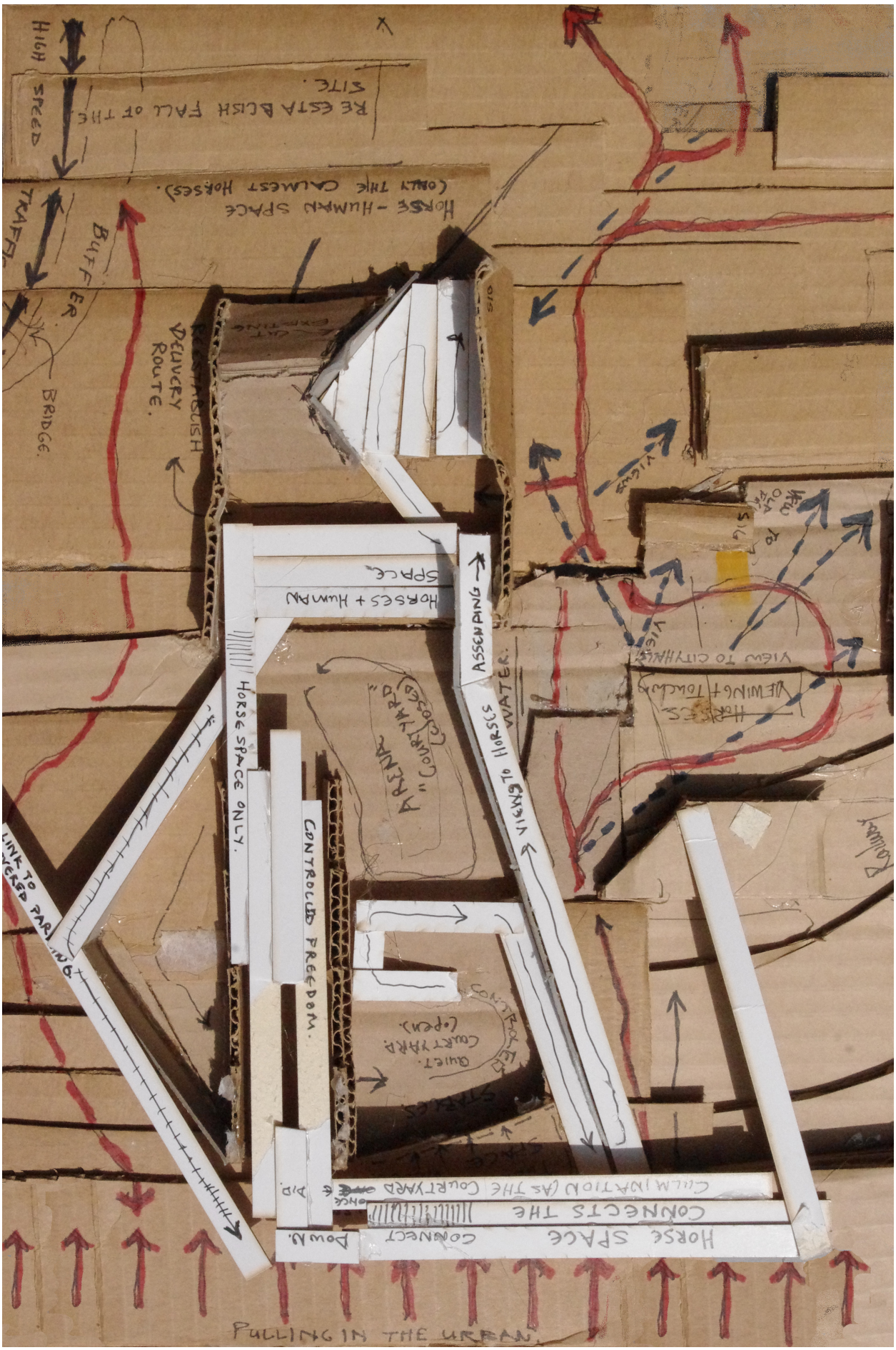


Fig 7.10: Concept model: illustrating the ramp as edge, as connector, as boundary, landscape and mediator

© University of Pretoria

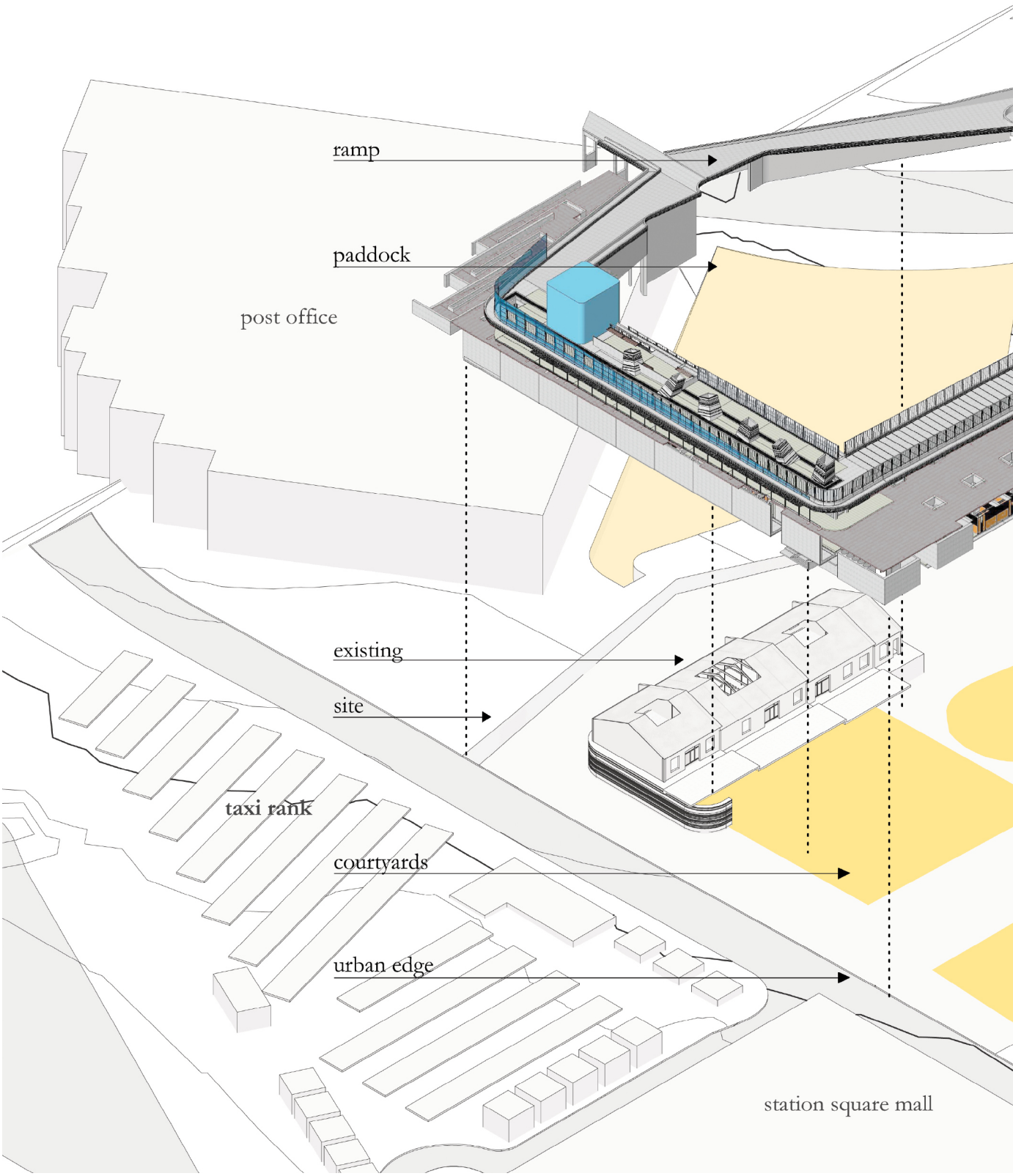
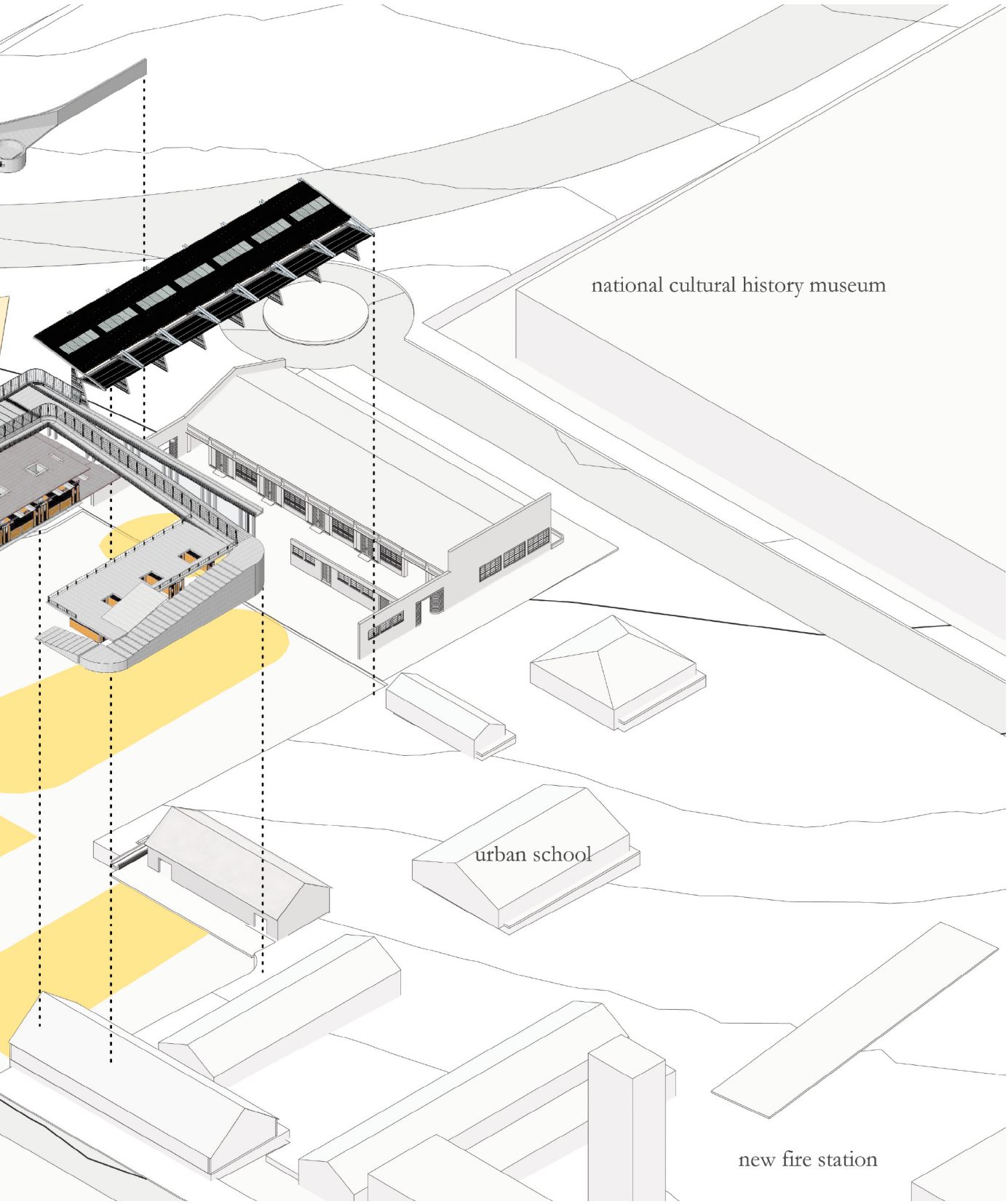


Fig 7.11: Axonometric diagram for the Equi Scape

© University of Pretoria



The southern most infrastructural intervention in the form of a raised horse-movement-and-training-corridor, which aims to assimilate horses back into the urban environment. The corridor takes the form of a ramp which firstly connects the various courtyards, secondly creates an engaging site edge and lastly protects the animals from people with ill intentions, while introducing horses to various urban conditions.
The ramp edges become the places where the reintroduced horse meets the urban environment; beneath, in and on top of the infrastructural second nature.
Essentially the constructed landscape with its infrastructural interventions create the foundation for the introduction of the horse back into the urban environment.

© University of Pretoria

7.4 DESIGN EXPLORATION

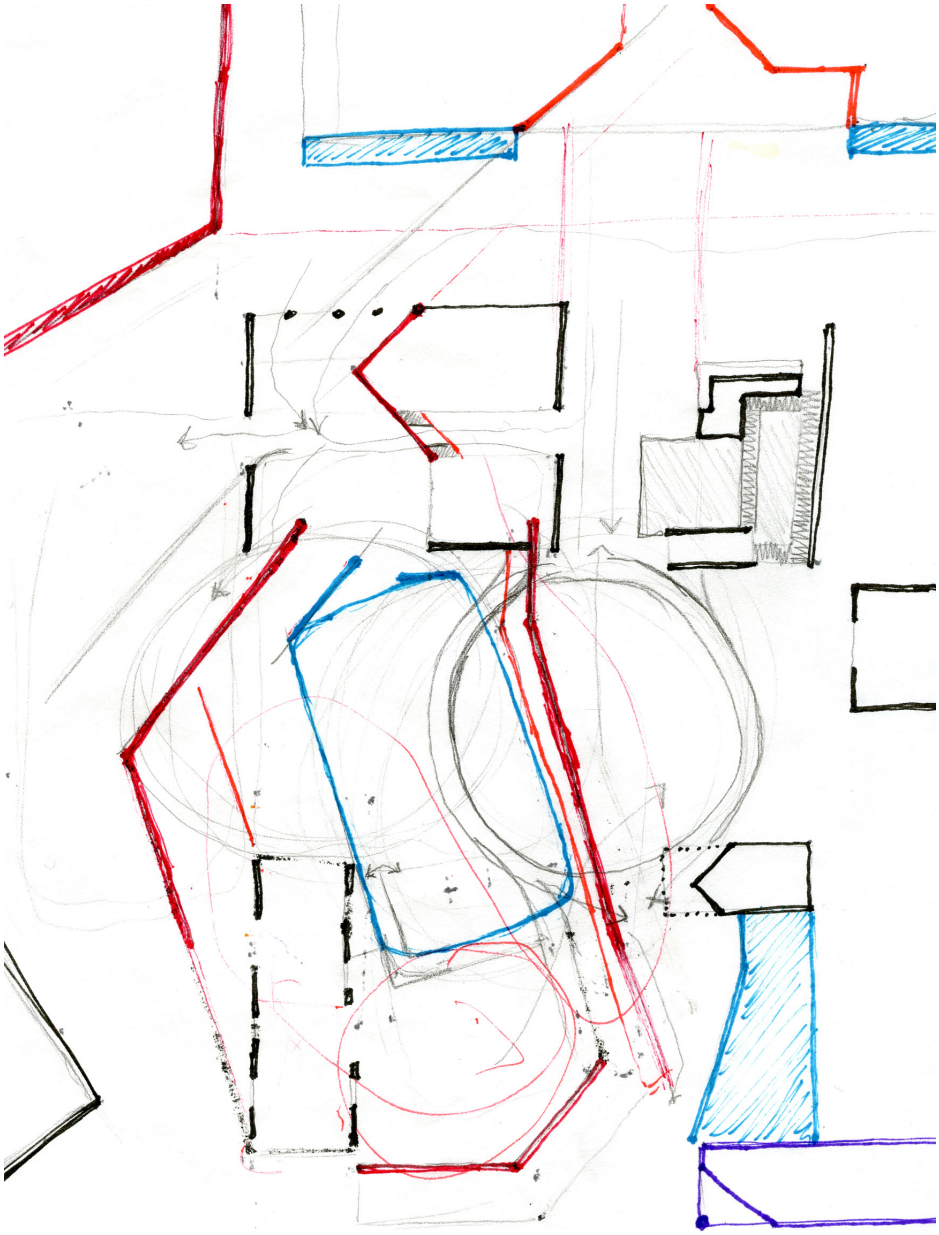


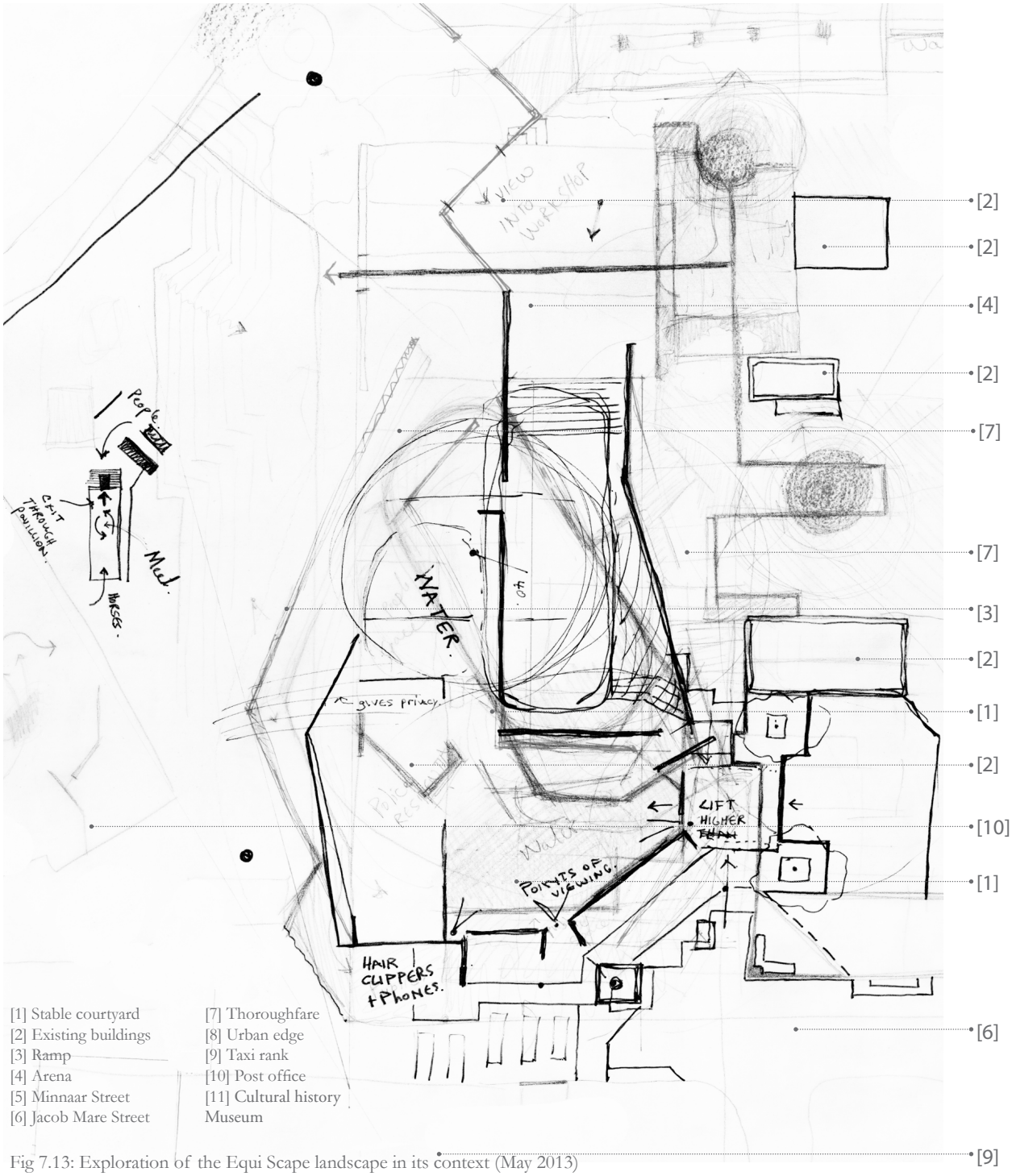
Fig 7.12: Diagram illustrating the initial investigation of the design of the landscape (April 2013)

The previous chapters created an understanding of the context, site and programmatic requirements; as well as establishing theoretical informants for the design of the Equi Scape. These chapters collectively establish a body of informants from which edges were identified as an over arching focus.

With these informants in mind an intuitive approach to the design of the Equi Scape was taken, and from this the ramp as scape-edge emerged. Concept models, along with explorations on plan allowed the ramp to weave itself into the context and become a new edge for the site.

The primary site forming activities are infrastructural, the effect of which is firstly the manifestation of four urban voids (courtyards), secondly a ramp which links these courtyards. The various courtyards each developed with a specific character determined by the events which occur in them as well as the character of its edges. Edges which are designed to become a joint between various scales of users, namely humans, horses and horsemen/women.

© University of Pretoria



[1] Stable courtyard
[2] Existing buildings
[3] Ramp
[4] Arena
[5] Minnaar Street
[6] Jacob Mare Street
[7] Thoroughfare
[8] Urban edge
[9] Taxi rank
[10] Post office
[11] Cultural history Museum

Fig 7.13: Exploration of the Equi Scape landscape in its context (May 2013)

The ramp-edge responds differently to the various conditions which surround it. The Museum Park edge north of the site is designed for people with the intention of visiting Museum Park and the Equi Scape. To the west it responds to Schubart Street and the Post Office building. Towards the South it creates an urban edge and facade designed for people using the taxi rank. To the east the intervention responds to the Urban School and shared public square by opening up the building edges at these points. The new thoroughfare edge is the most permeable edge, allowing both the Equi Scape and Urban School to activate the shared public spaces.

Internally the ramp responds to the heritage buildings on site, as well as the courtyards which accompany them. These courtyards are programmed with equestrian activities; therefore where the ramp becomes the edge to a courtyard its design responds to these contextual informants.

© University of Pretoria

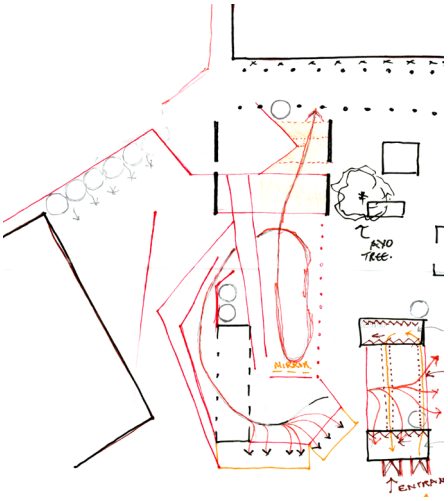


Fig 7.14.1: Investigation of circulation on site (April 2013)



Fig :7.14.2 Initial planning exercise, placement of arena, courtyards and edges (April 2013)

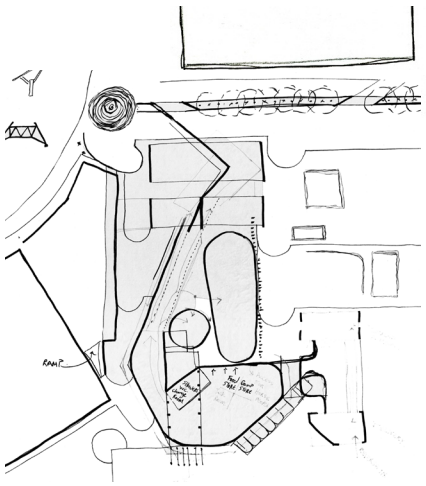


Fig 7.14.3: Initial sunken stable courtyard with edged with stables (May 2013)

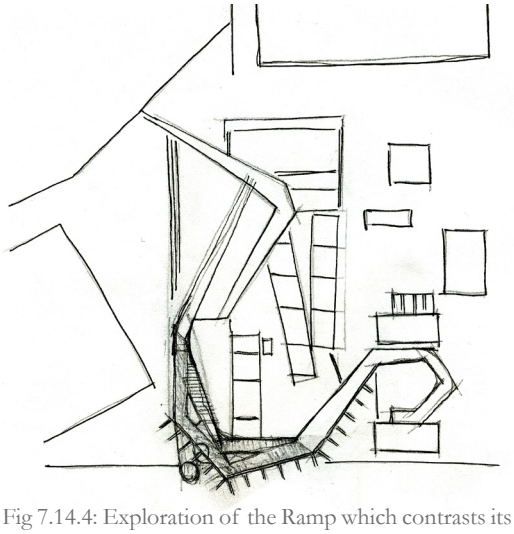


Fig 7.14.4: Exploration of the Ramp which contrasts its context through form (June 2013)

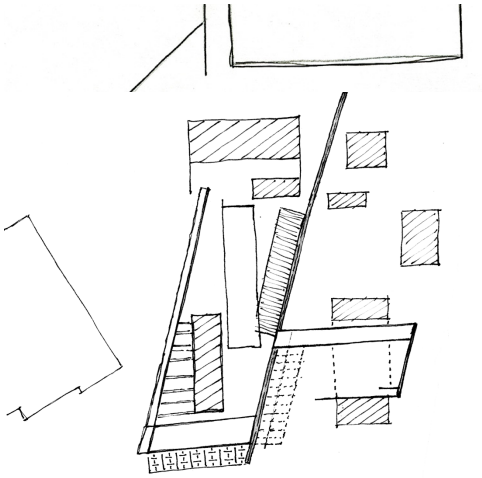


Fig 7.14.5: Exploration of the ramp, which both contrasts and relates to the existing (June 2013)

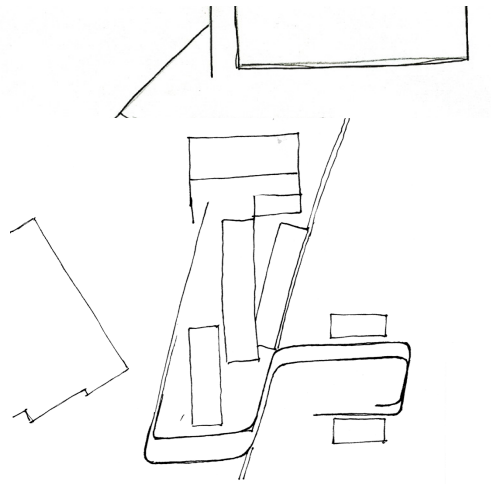


Fig 7.14.6: Exploration of the ramp with rounded edges to aid equine movement (July 2013)

© University of Pretoria

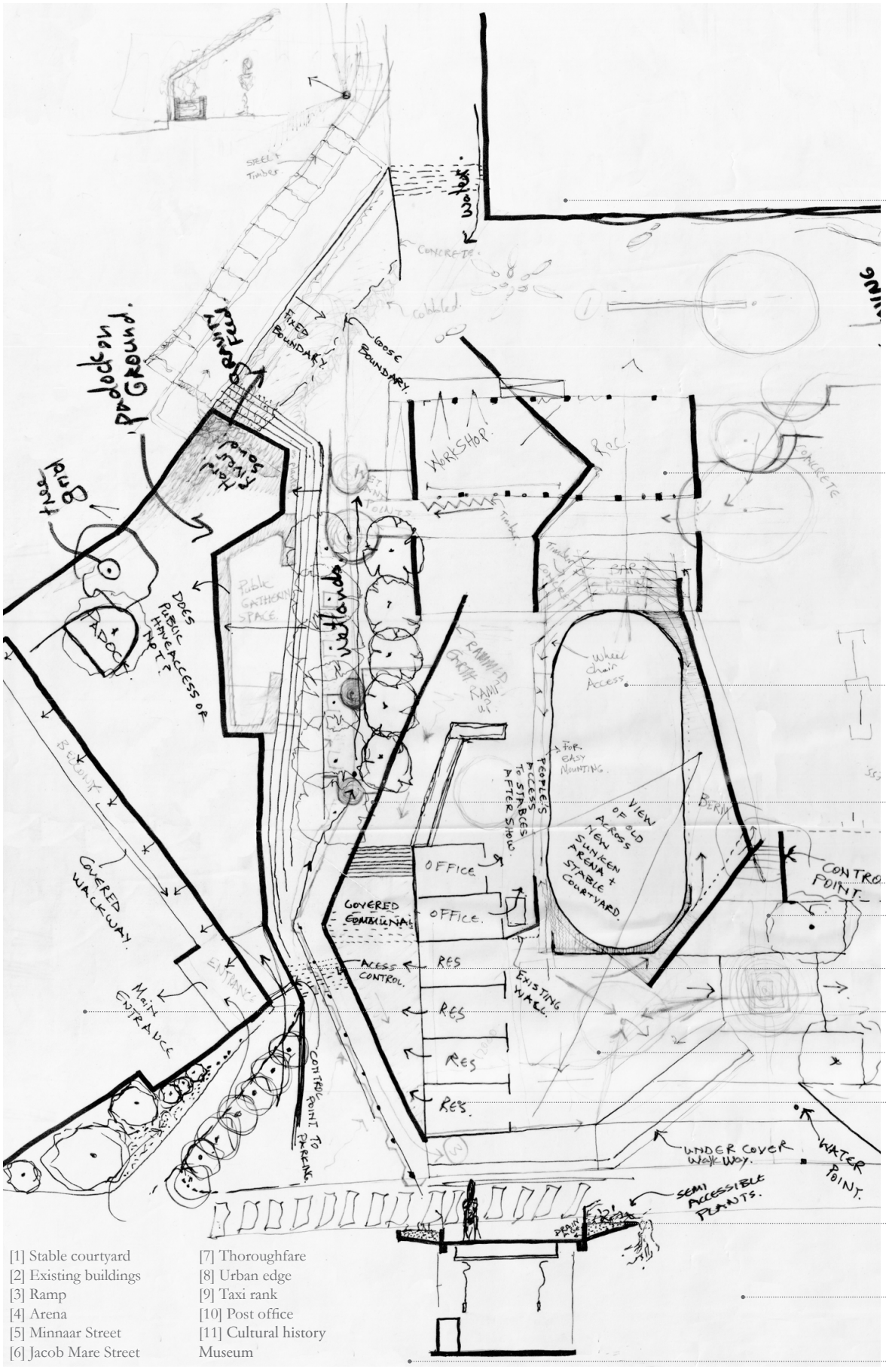


Fig 7.15: Initial drawing showing an intuitive design response to the site and its context (May 2013)

© University of Pretoria

7.5 AN EQUINE NICHE IN THE URBAN LANDSCAPE

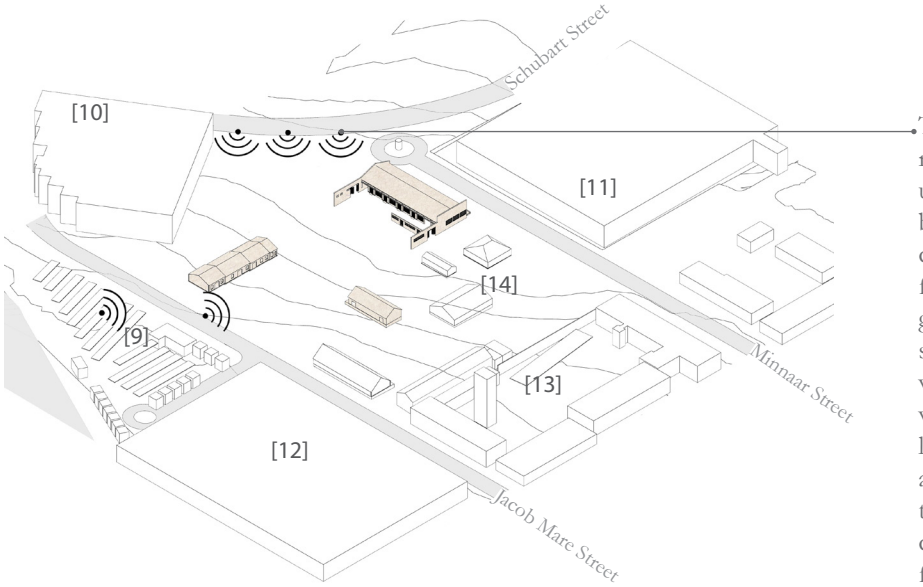


Fig 7.16.1: Noise generators

The noise generated by the busy roads, taxi hooters and rank users are dealt with by creating barriers. The first strategy is to create a raised barrier in the form of a paddock (for horse grazing), raised above a parking structure. A second strategy was to create stable courtyards which are sunken into the landscape by excavating, this allowed the soil to insulate the courtyards from sound creating a quiet environment for horses to be stabled.

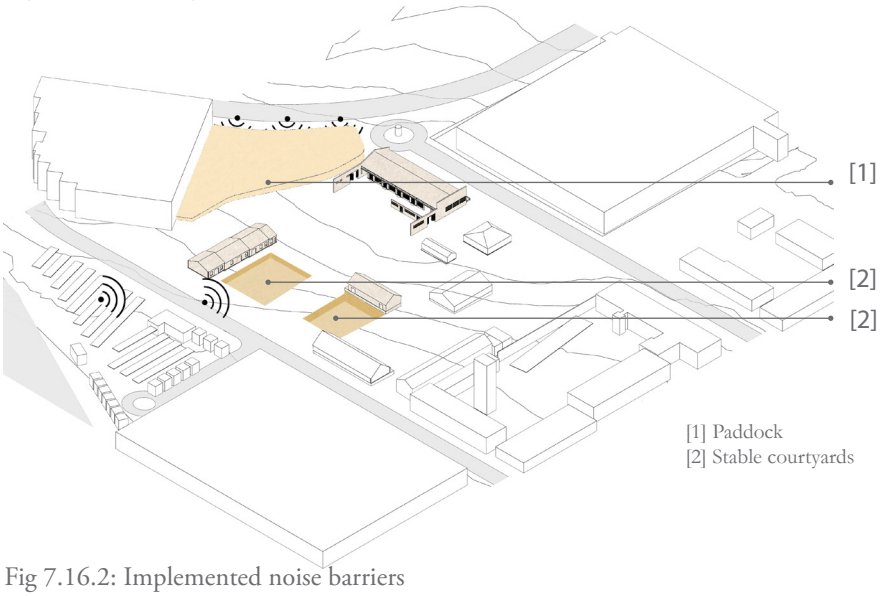


Fig 7.16.2: Implemented noise barriers



Fig 8.23: Excavation as noise barriers

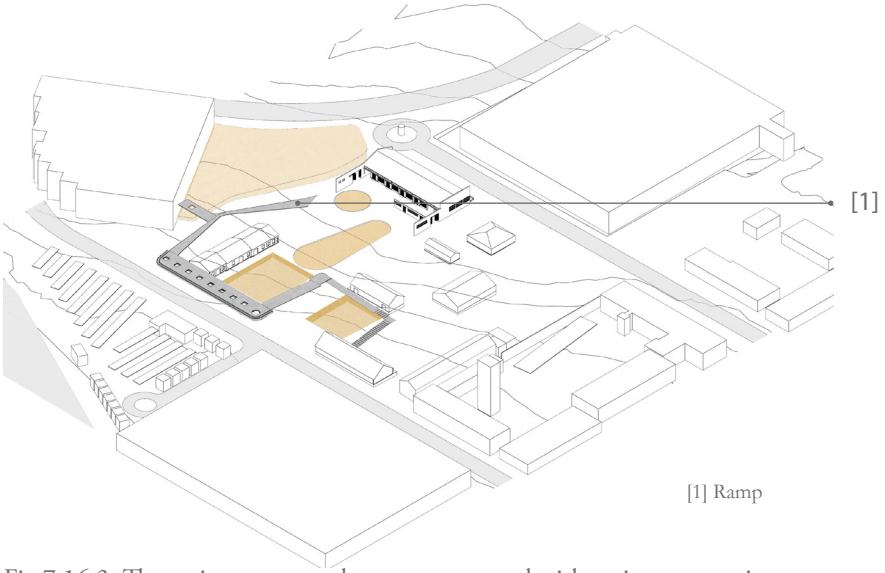


Fig 7.16.3: The various courtyards are programmed with various equestrian activities held together by the ramp.

As the ramp weaves through and around the existing buildings and new courtyards, a new site edge is created, which also creates a noise barrier. However, it also acts as a stage for equine processionals which links and defines various courtyards and their edges while exposing the equine users to a variety of urban sounds and activities in a controlled environment.

© University of Pretoria

7.6 RAMP AS RELATIONSHIP MEDIATOR

Equine (private)

Transitional

Public

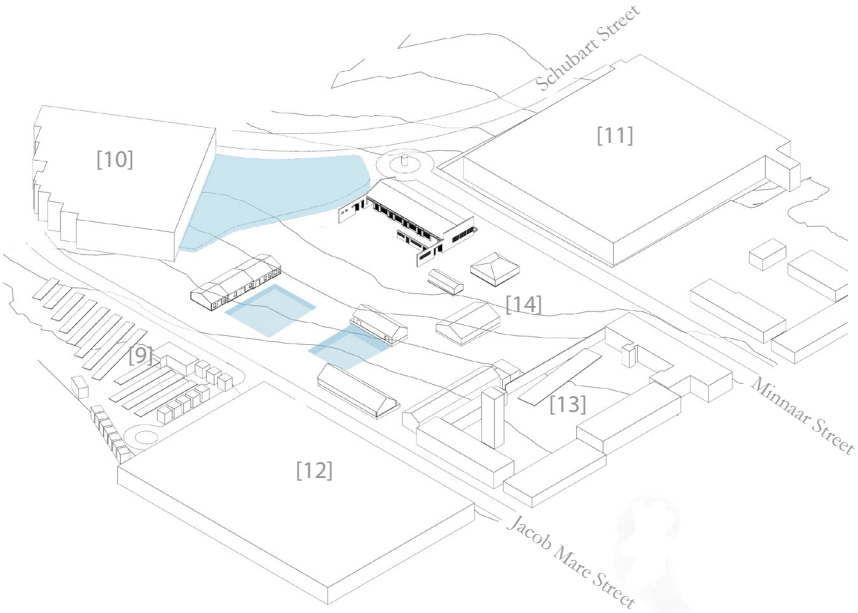


Fig 7.17.1: Equine space which has restricted physical public engagement.

The various equine spaces needs to be restricted from direct, uncontrolled access and physical engagement. This prevents injury to both horse and uninformed people. Injuries are far more likely if a person is unaccustomed to horses, their behaviour and needs.

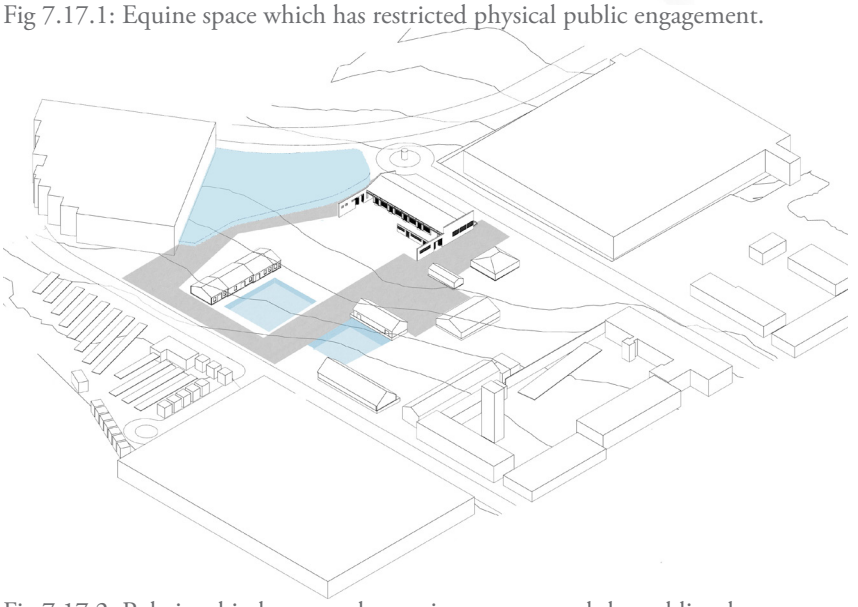


Fig 7.17.2: Relationship between these private spaces and the public edge.

The form and position of the ramp on the site developed by responding to courtyards and connecting these void-elements. The ramp further creates an edge between the new private equine courtyards and public spaces, by accommodating both in a variety of ways.

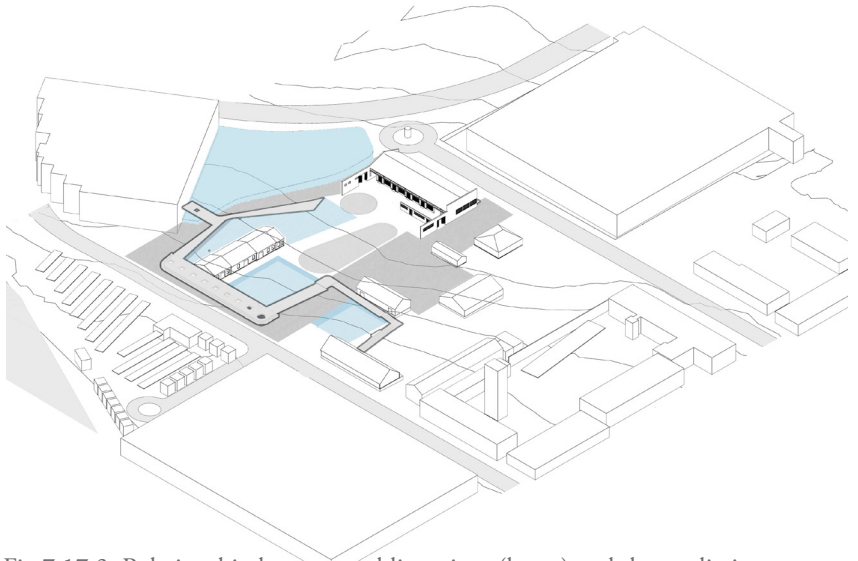


Fig 7.17.3: Relationship between public, private(horse) and the mediating spaces between them

© University of Pretoria

7.7 EDGES AS SEGREGATING BARRIERS versus A BARRIER ESTABLISHED THROUGH LEVEL CHANGES

The design process challenges the mental edges which the old site created through its use of walls that resulted in a site segregated from its context. The intervention questions how, through design, we may include users which have been excluded. The design challenges conventions by manifesting the presence of the horse in the city.

Barriers are approached as edges which may separate spaces but should preferably never segregate environments. Considered barriers should allow for a variety of interactions. Unplanned barriers often exclude users and are generally found to be unresponsive to its context.

This dissertation requires the manifestation of an edge which can mediate human - horse relationships. The ramp-edge is designed to create a barrier, that responds to different stimuli in the urban environment and thus manifests itself differently as it winds and weaves through the site and contextual conditions, programs and users; establishing new interfaces. The ramp's sub-spaces becomes a series of dynamic places, with a distinct collective character, created through various junctions, which make these spaces ideal for the assimilation of different people, cultures and practices.

Junctions require the ramp to develop into a threshold: a scape-edge that consists of several horizontal planes layered over each other. this results in a layered edge condition and allows it to become a threshold.

The ramp creates a barrier that feathers out, by using a series of thresholds that create minor interruptions in the visual and spatial continuity of the ramp's sub-spaces, as the user moves from the urban to the Equi Scape courtyard edge. At this point there is an abrupt level change, which creates a physical barrier, yet allows for prospect.

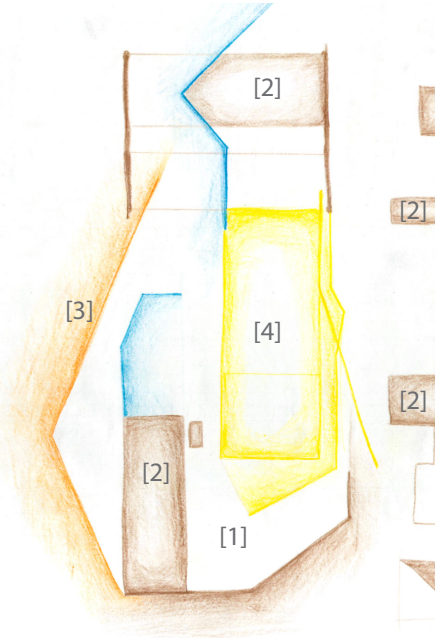


Fig 7.19: Diagram showing the existing in brown, blue as public, yellow as horse-human interaction space and orange as the start of the ramp

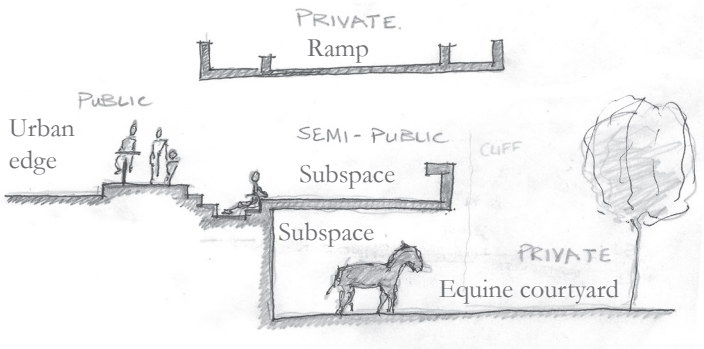


Fig 7.18: Section showing the ramp as a mediating spaces

As a threshold the ramp has qualities of the various spaces it connects, as it responds to these conditions the edge created by the ramp becomes a place or several linked places for the assimilation of different people, cultures and practices.

© University of Pretoria

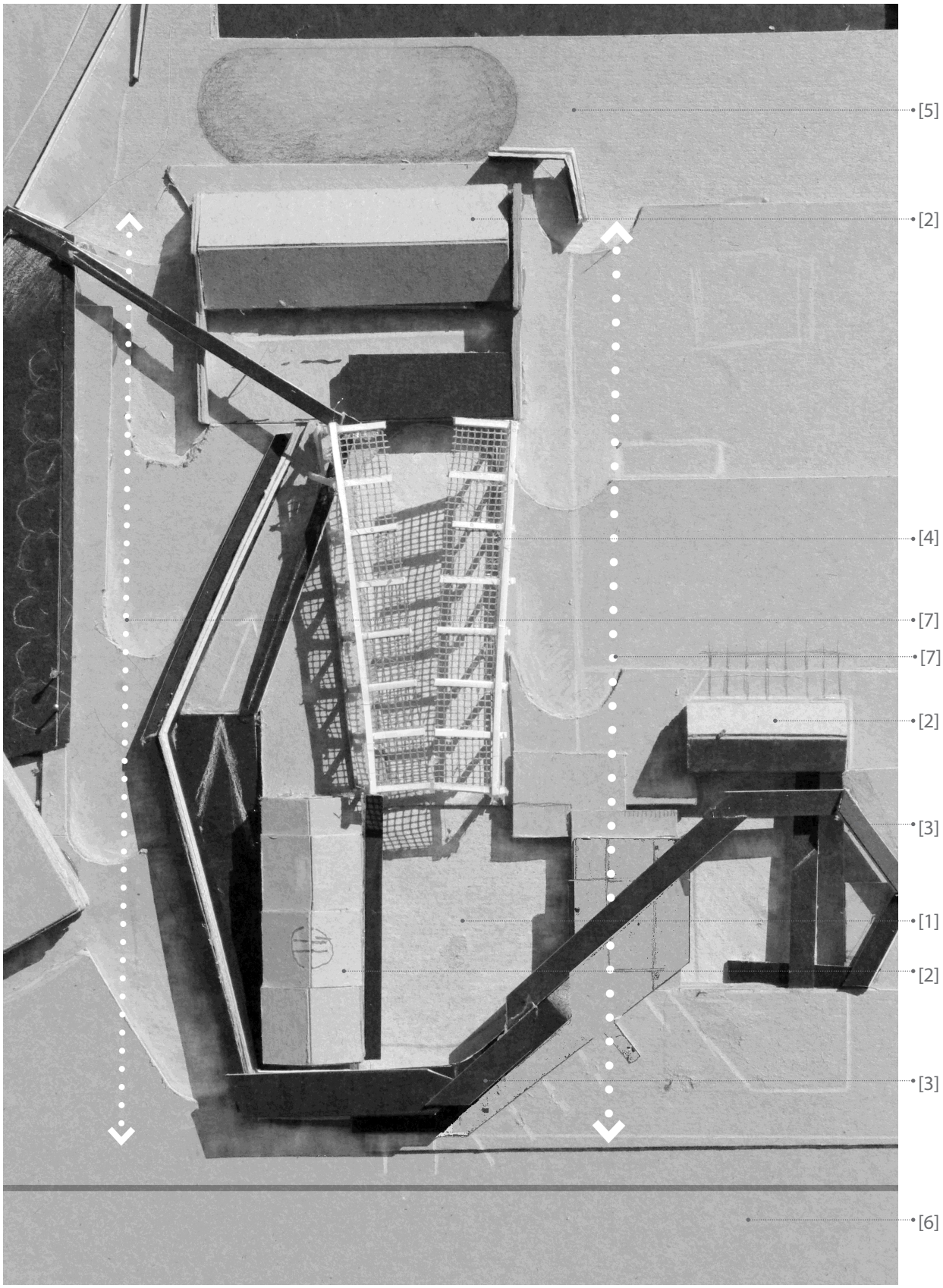


Fig 7.20: Model exploration of the site levels and connecting ramps.

[1] Stable courtyard
[2] Existing buildings
[3] Ramp
[4] Arena
[5] Minnaar Street
[6] Jacob Mare Street
[7] Thoroughfare
[8] Urban edge
[9] Taxi rank
[10] Post office
[11] Cultural history Museum
[12] Mall
[13] New Fire Station
[14] Urban school

The ramp (in black) embraces the various courtyards and physically creates a link between the various parts of the site despite the existing and proposed thoroughfare

© University of Pretoria

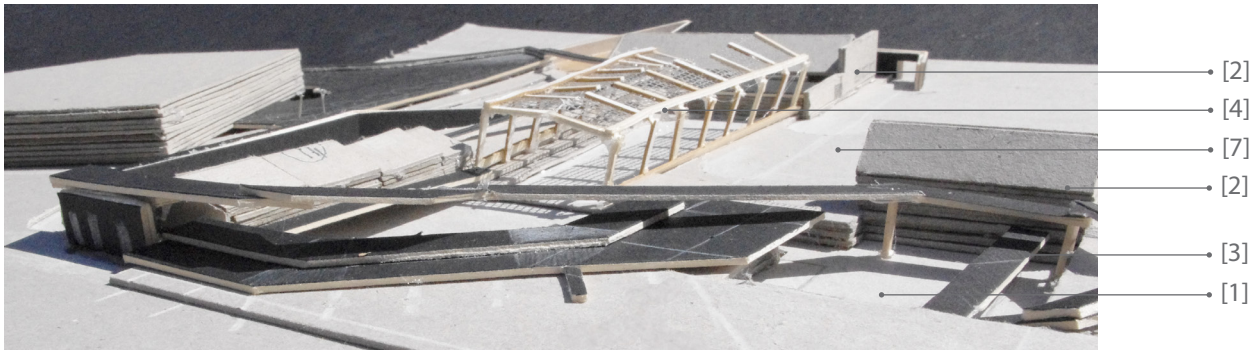


Fig 7.21: Model showing the elevated ramp on the southern urban edge

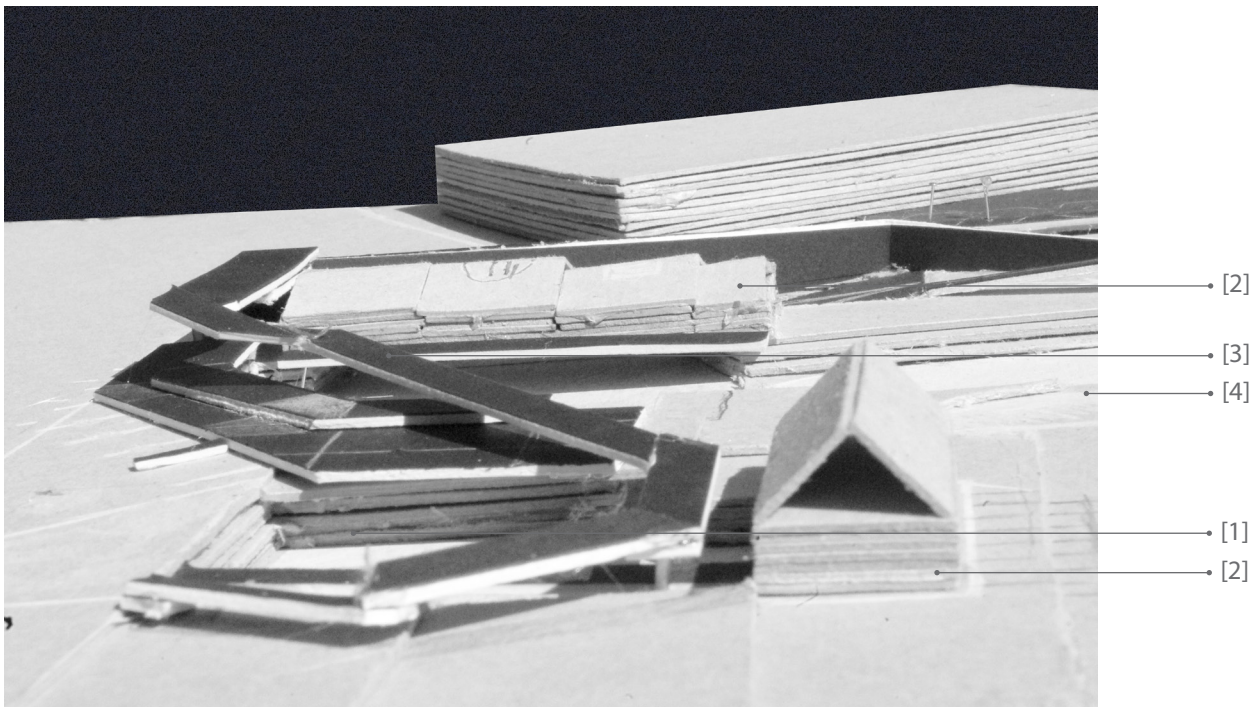


Fig 7.22.1: Model showing the elevated ramp on the southern urban edge

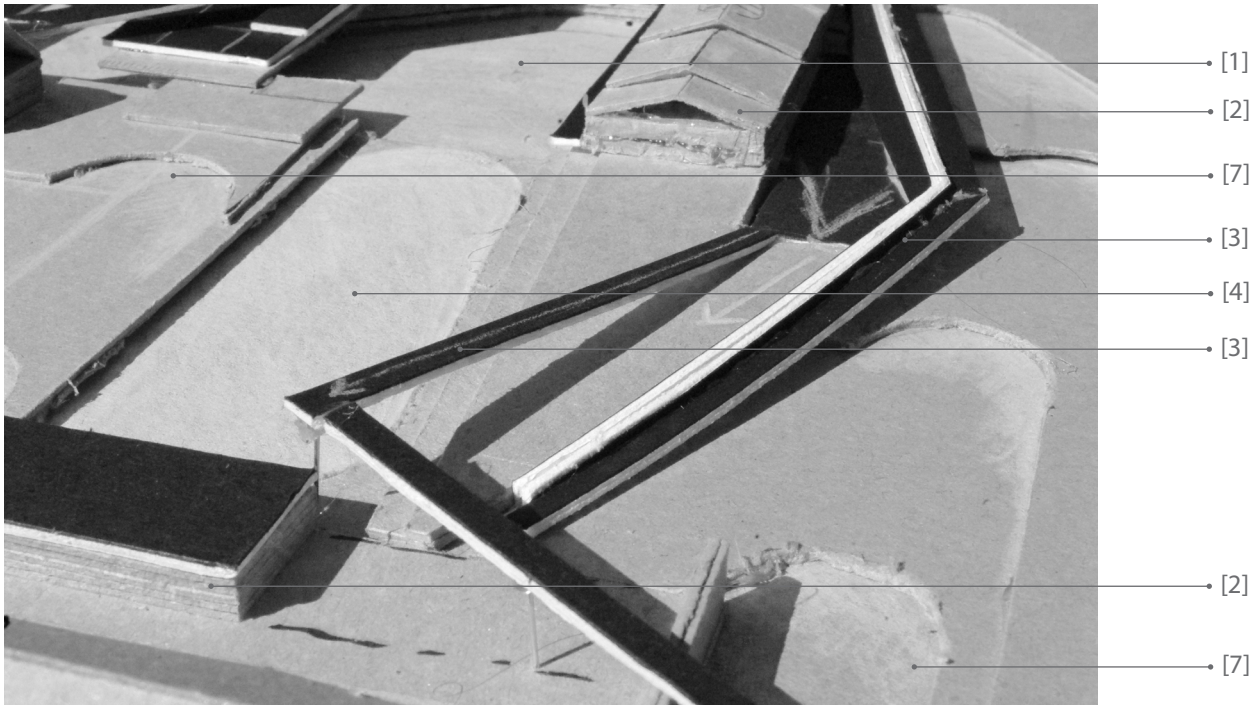


Fig 7.22.2: Model showing two new ramps in black

© University of Pretoria

7.8 EDGES [zooming in]

MUSEUM PARK SCALE

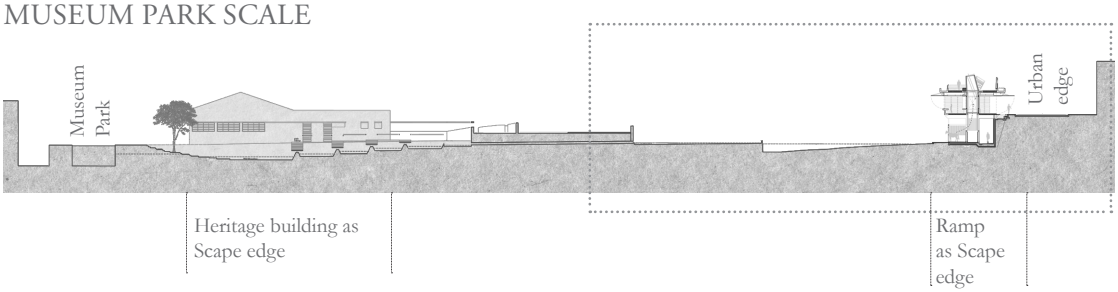


Fig 7.23: The scape becomes an edge which complements Burgers Park to the East

SCAPE SCALE

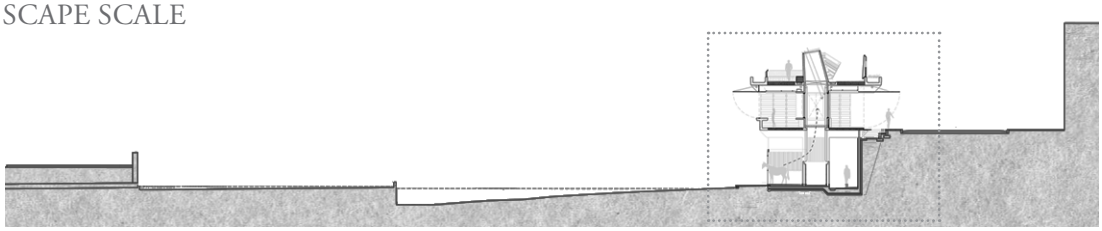


Fig 7.24: The site creates a transitional space between the urban transport precinct and Museum Park, as well as between human and horse space.

URBAN PEDESTRIAN SCALE

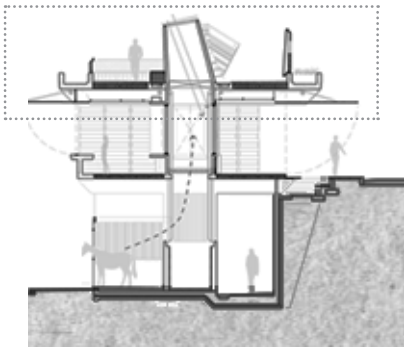


Fig 7.25: The ramp acts as a series of horizontal edge planes which accommodate both people and horses

SPECIFIC USER SCALE

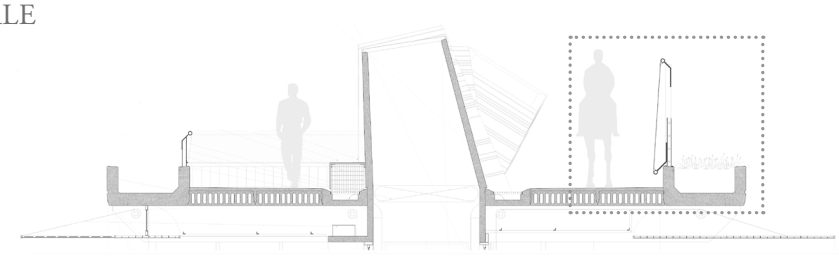


Fig 7.26:The edges of these horizontal planes respond directly to its specific human or horse users.

DETAIL SCALE

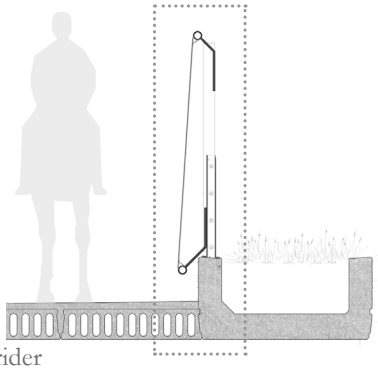
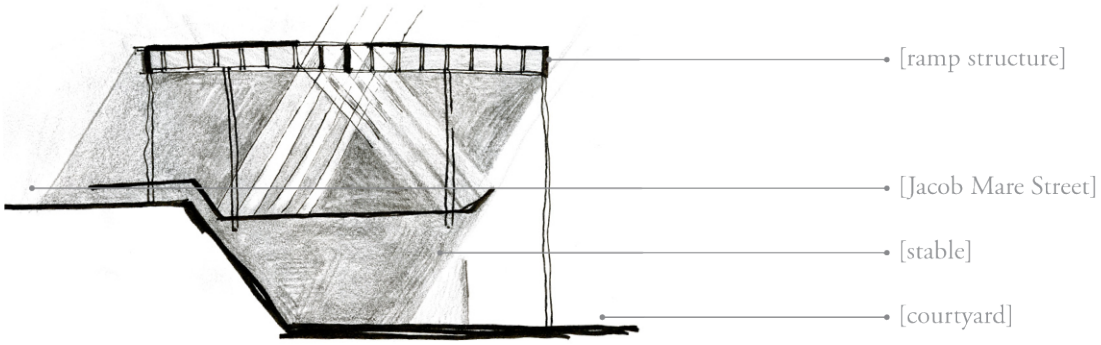
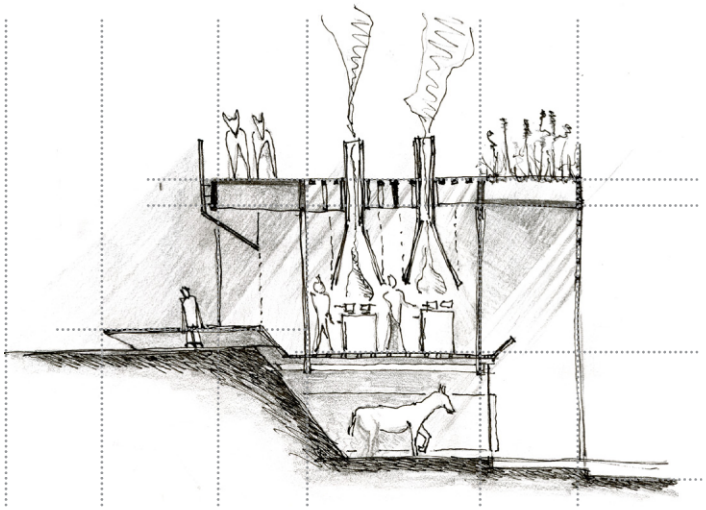


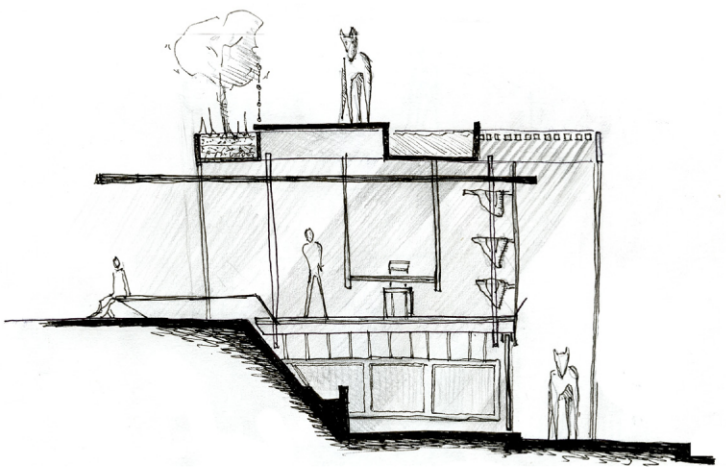
Fig 7.27: Balustrade as edge that responds both to the horse and its rider

© University of Pretoria

7.9 URBAN - EQUI SCAPE INTERFACE





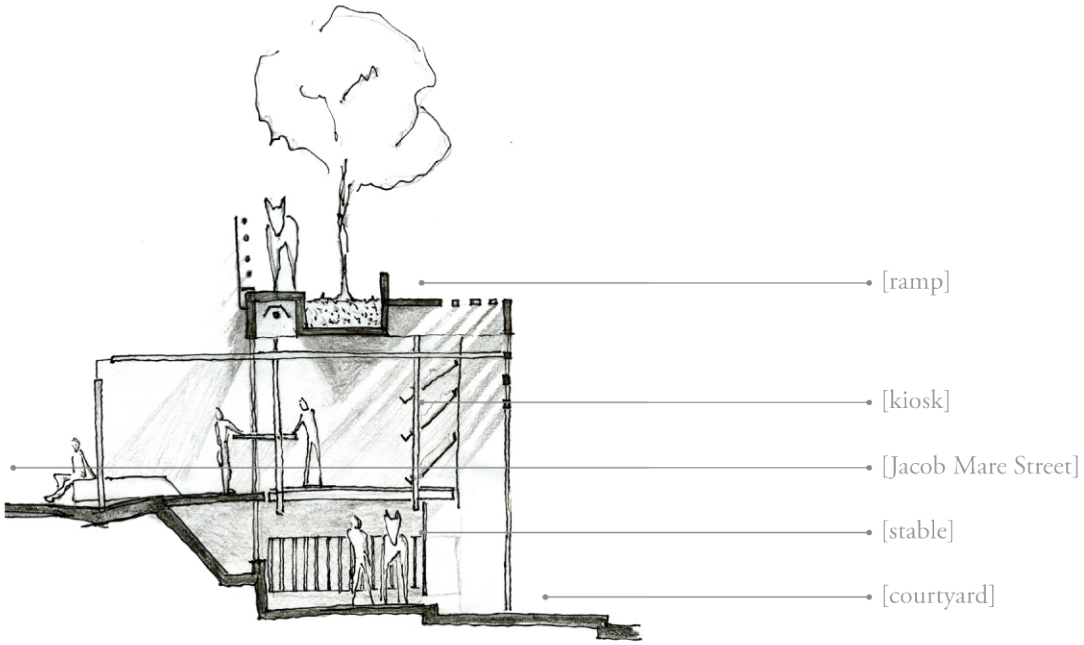


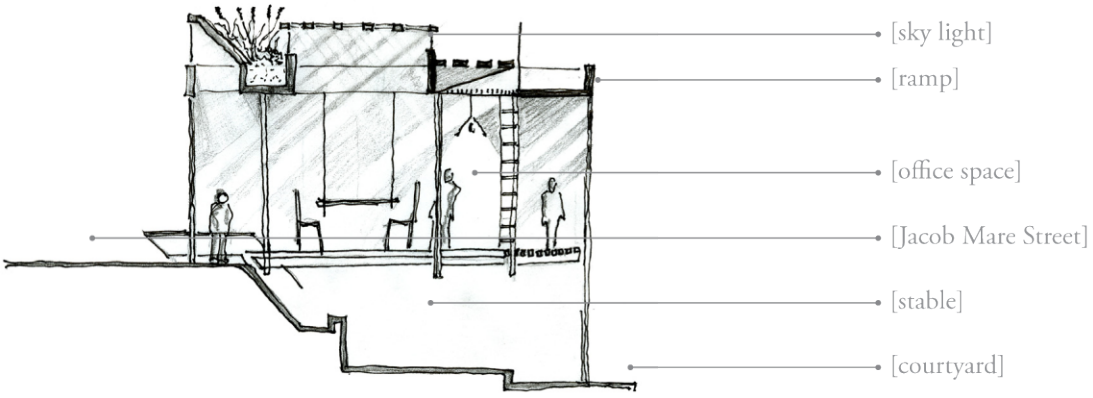
The ramp and its sub-spaces developed spatially from a variety of informants, primarily through the layering of human and horse spaces, allowing the ramp to create a variety of possible relationships between people and animals.

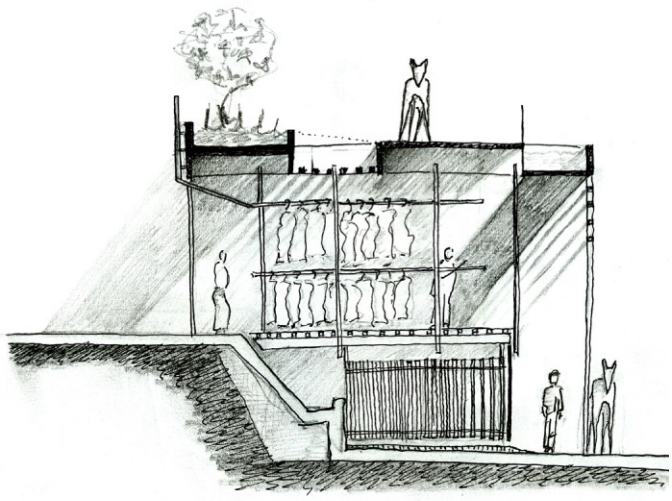
These sections through the ramp illustrates the layering of vertical and horizontal elements which together allows the ramp to become a threshold to a softened barrier. A barrier pronounced through the change in level but also the change in scale.

Fig 7.28: Sectional explorations of the ramp as edge May 2013: Layering of the architectural edge

© University of Pretoria





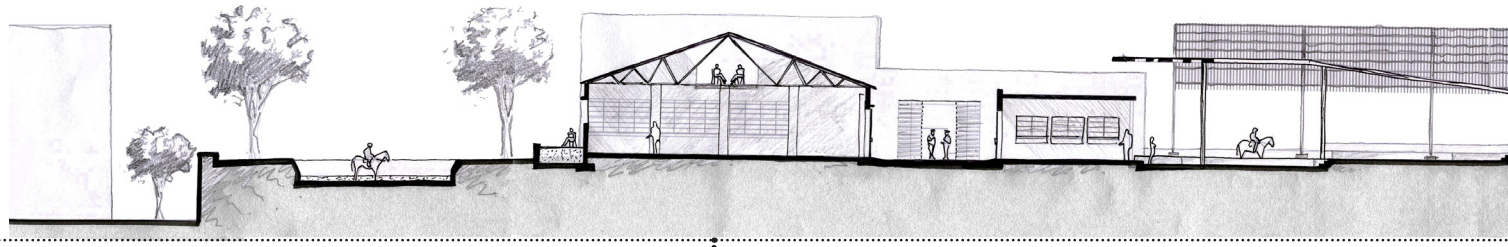


These sections are also a continuation of the exploration into the ramp as edge between infrastructure, architecture and landscape, the ramp stitches the overlaps together creating a scape.

The sections explore this stitching by experimenting with the possibility of light filtering through the infrastructural ramp elements, into the architectural spaces below, this in turn creates a relationship between the ramp sub-spaces and ramp landscape created above. At this stage of the investigation all the human spaces were designed as lighter elements suspended from the equine infrastructural ramp.

129

© University of Pretoria



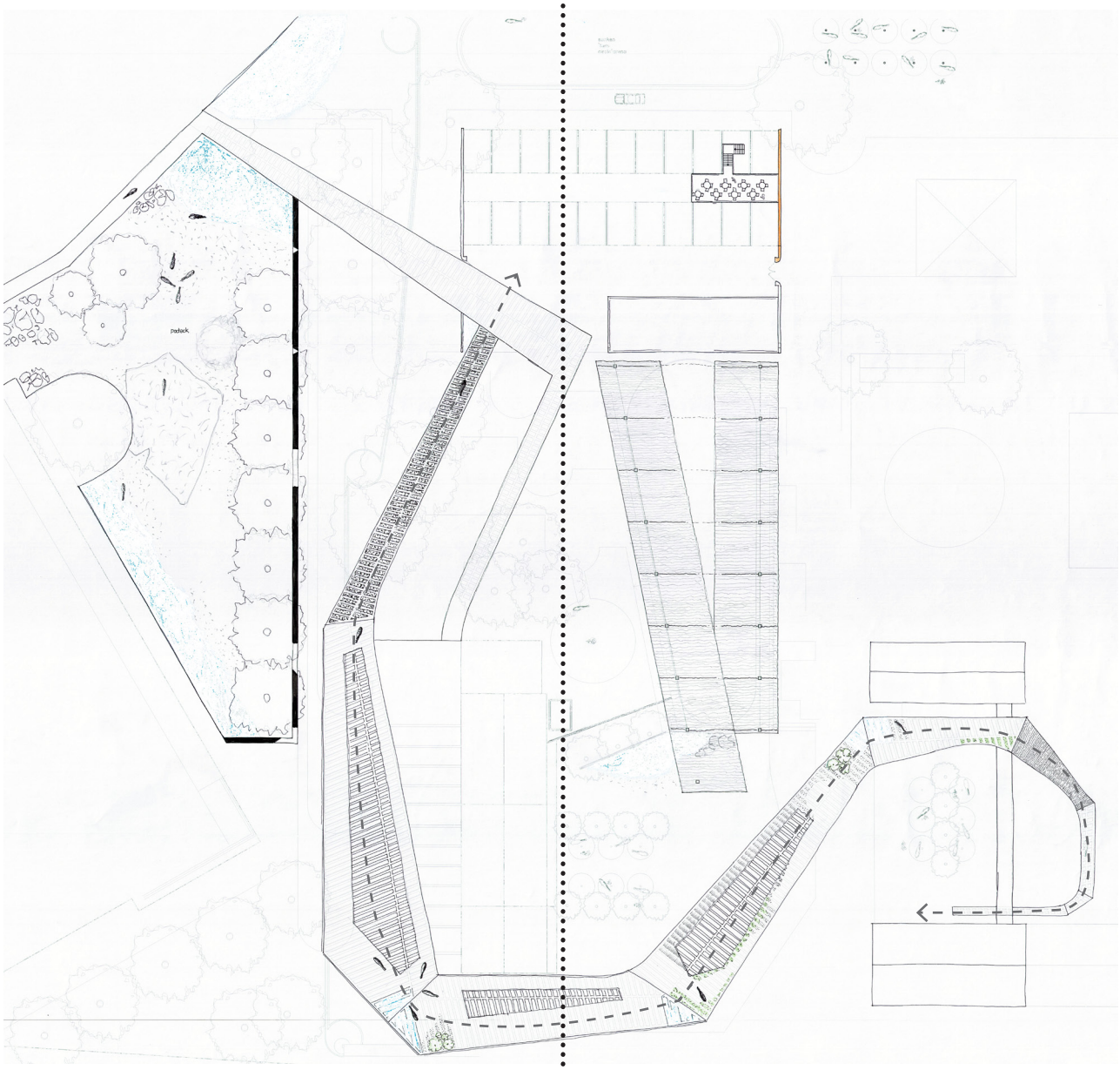


Fig 7.29: Development of roof plan (June 2013)

© University of Pretoria

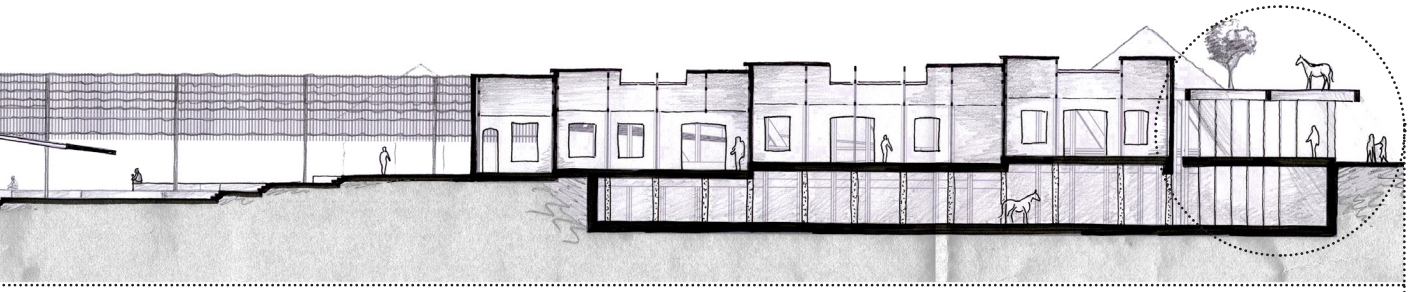


Fig 7.30: North - South section through entire site looking east (June 2013)

7.10 RAMP

The June Crit highlighted the importance of the ramp and the urban edges which it creates. This resulted in a shift in focus, in which the ramp became the deciding factor as to the success of the intervention within its context, and thus became the primary focus of the dissertation.

From this point onwards the majority of the project's development related to the ramp as an ecotone between different habitats, thus spaces were designed for overlap.

Due to the infrastructural nature of the project, questions were raised about the ramp's structural system and the way it would house its inhabitants, thus materiality was also called into question.

The site edge at the macro scale is explored at the micro scale where people and horses interface

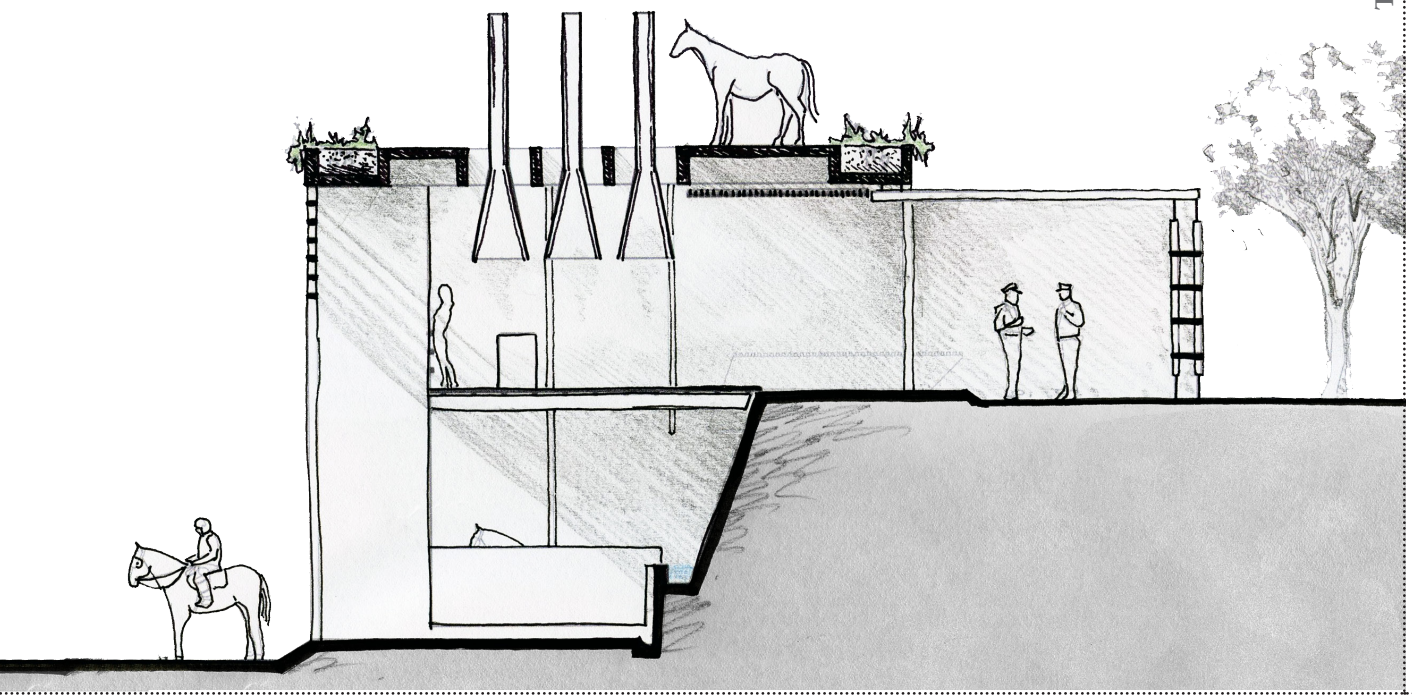


Fig 7.31: N-S Section through ramp looking East (June 2013)

© University of Pretoria

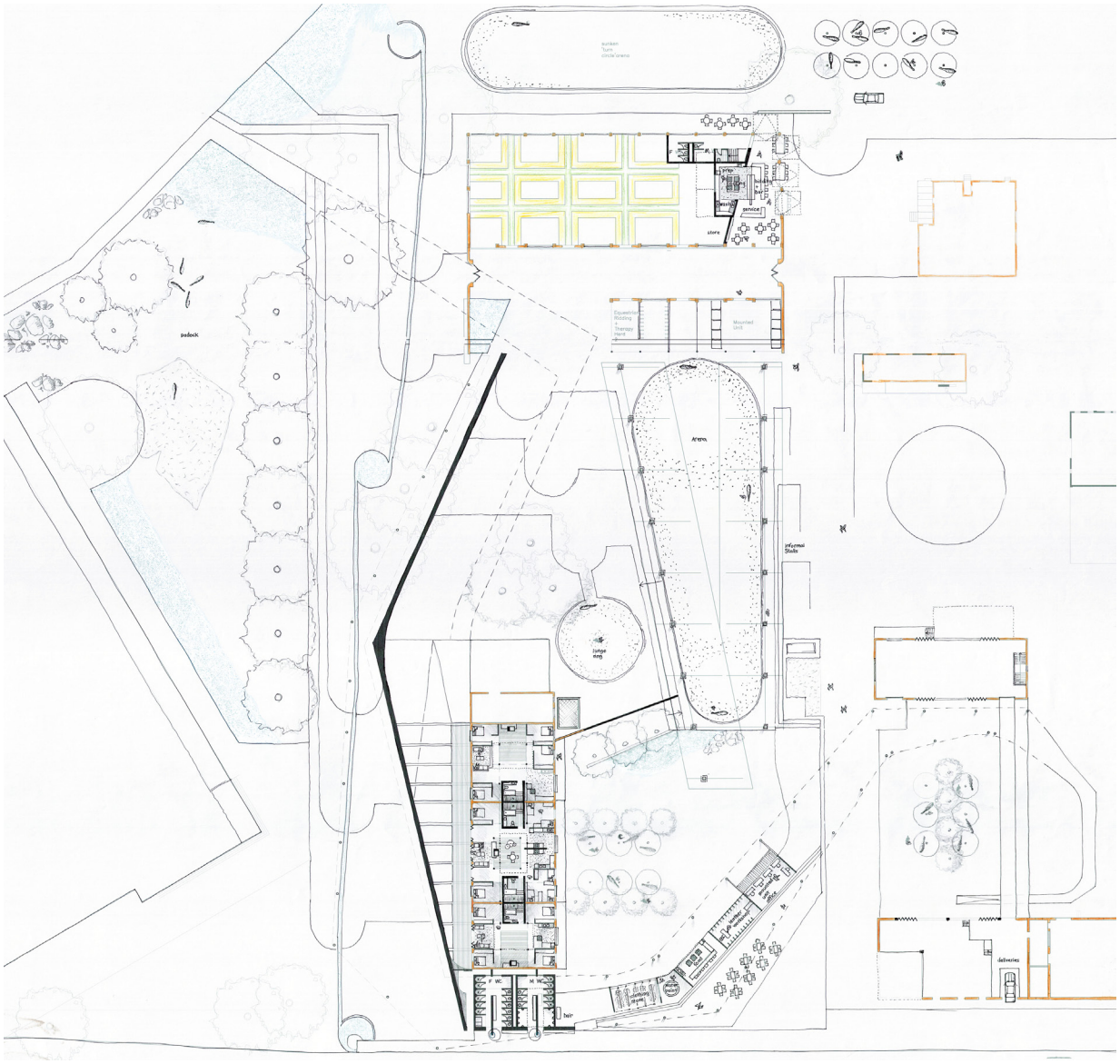


Fig 7.32: Development of ground floor plan (June 2013)

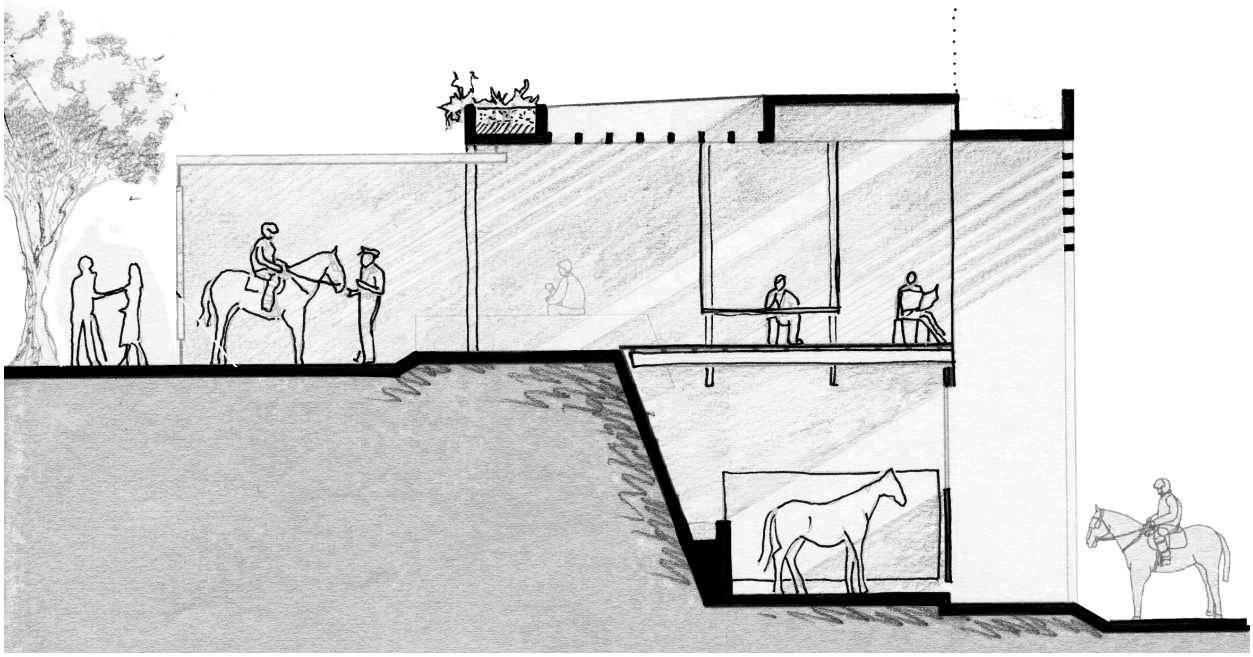


Fig 7.33: N-S Section through ramp looking west (June 2013)

© University of Pretoria

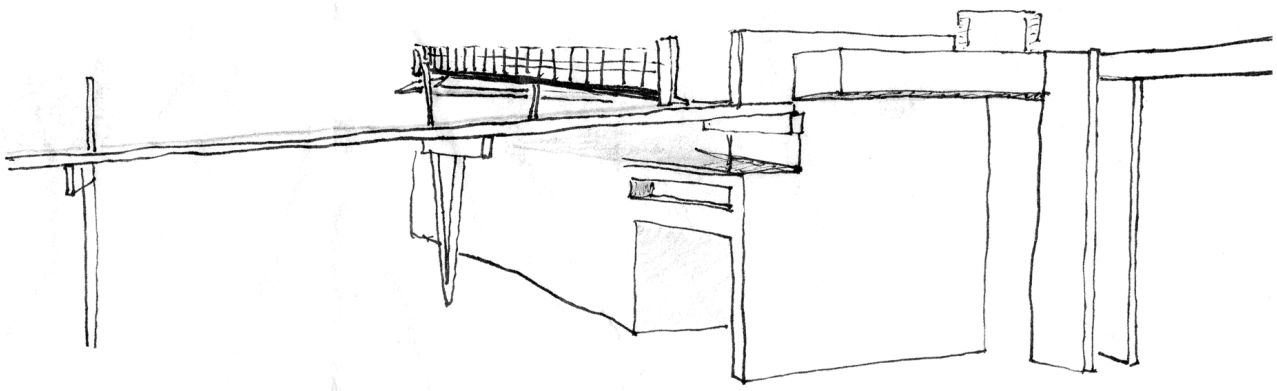


Fig 7.34: 3D sketch of the ramp where various materials join (July 2013)

The sketches in figures 8.28 to 31 shows a consideration and exploration of materiality, as well as the joints between the grounding concrete elements and the tectonic elements that bridge between them. There is also a distinct change in spatial effects, predominantly created by the form, materiality and structure of the ramp.

The ramp tells a story as it relates to the context and the users' experience.

The ramp started off as a heavy element that eventually rises from the landscape, and weaves and meanders through the site.

As it does this, the ramp becomes lighter. The nature of the programs housed underneath the ramp changes with the changes in ramp conditions, creating a link between the experience the ramp creates for the horse and for its human inhabitants.

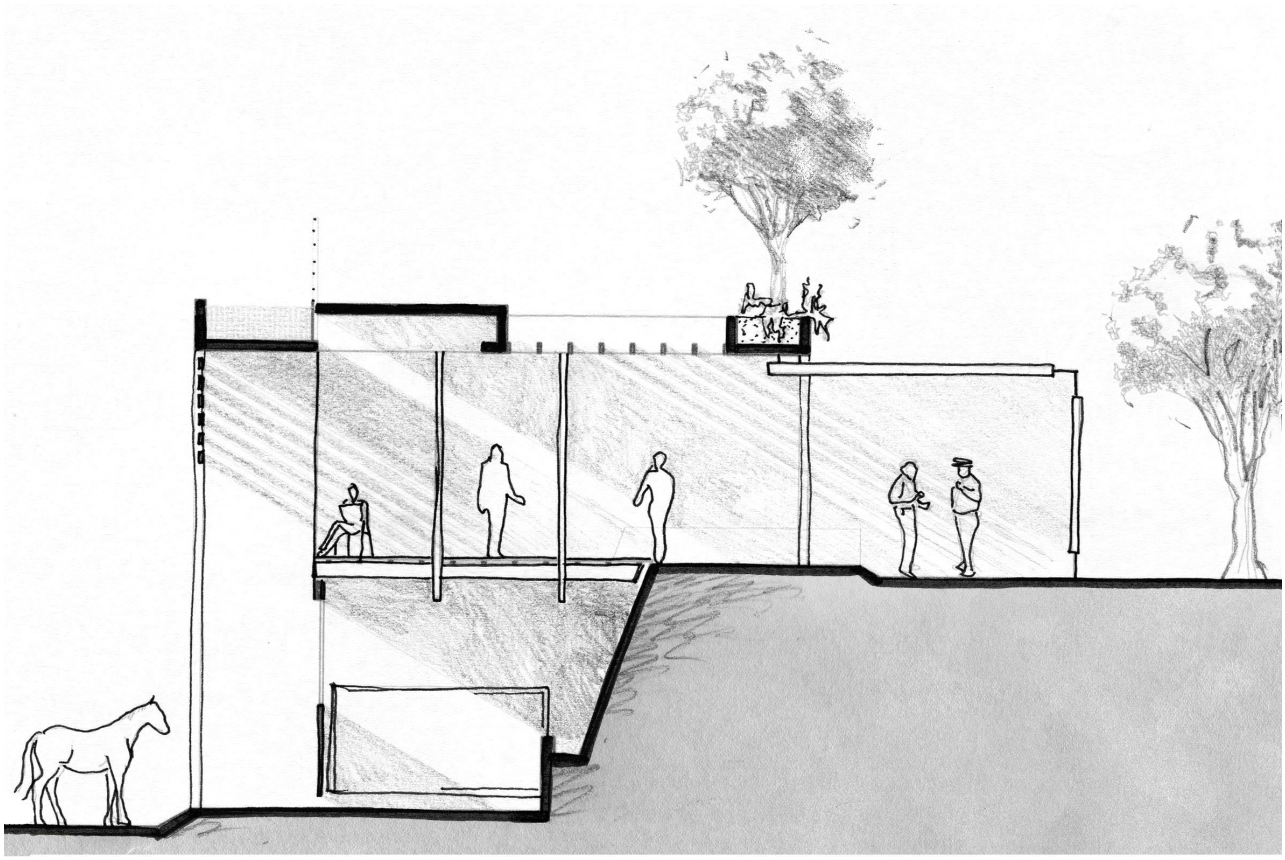


Fig 7.35: N-S Section through ramp looking east (June 2013)

© University of Pretoria

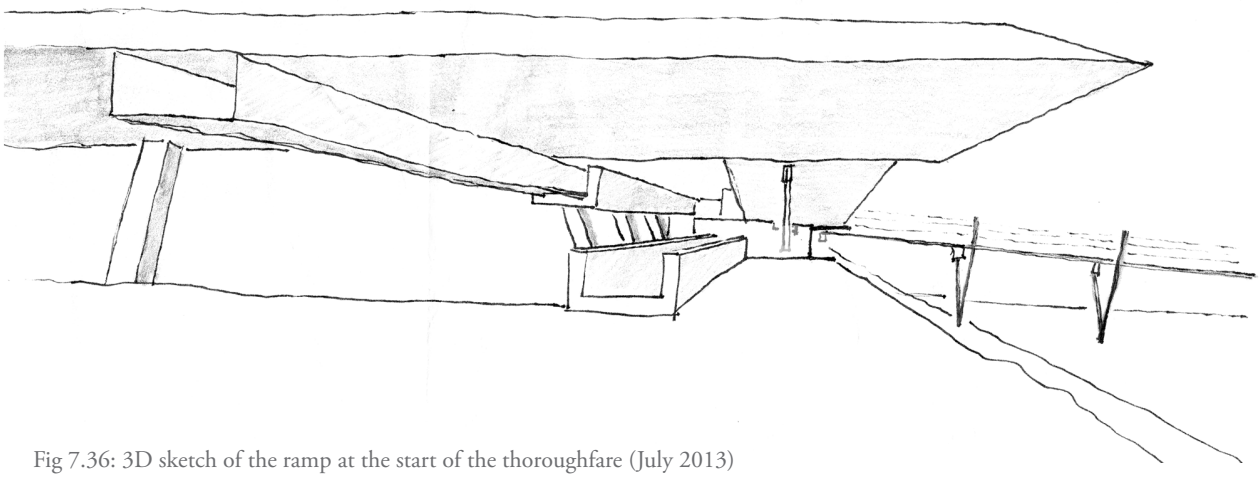


Fig 7.36: 3D sketch of the ramp at the start of the thoroughfare (July 2013)

This exploration led the intervention into a new direction, where the ramp starts off at a gradual curve and then as it reaches the urban edge it becomes more angular, this creates various ramp conditions which gradually initiates the horse into the urban environment. This intention also allows the ramp to respond to its context from both a human and equine point of view. The ramp acts as a promenade that leads the horse through different urban conditions, simultaneously allowing people to become accustomed to horses in the urban environment through a series of interactions (conceptually illustrated in figure 7.4).

As the ramp is an infrastructural element its structure played a major role in creating sub-infrastructural habitable space. It also emphasizes the materiality of the building and the joints between, steel, timber and concrete planes. Essentially the entire ramp becomes grounded to the landscape by concrete structures, between which pre-cast elements bridge and connect.

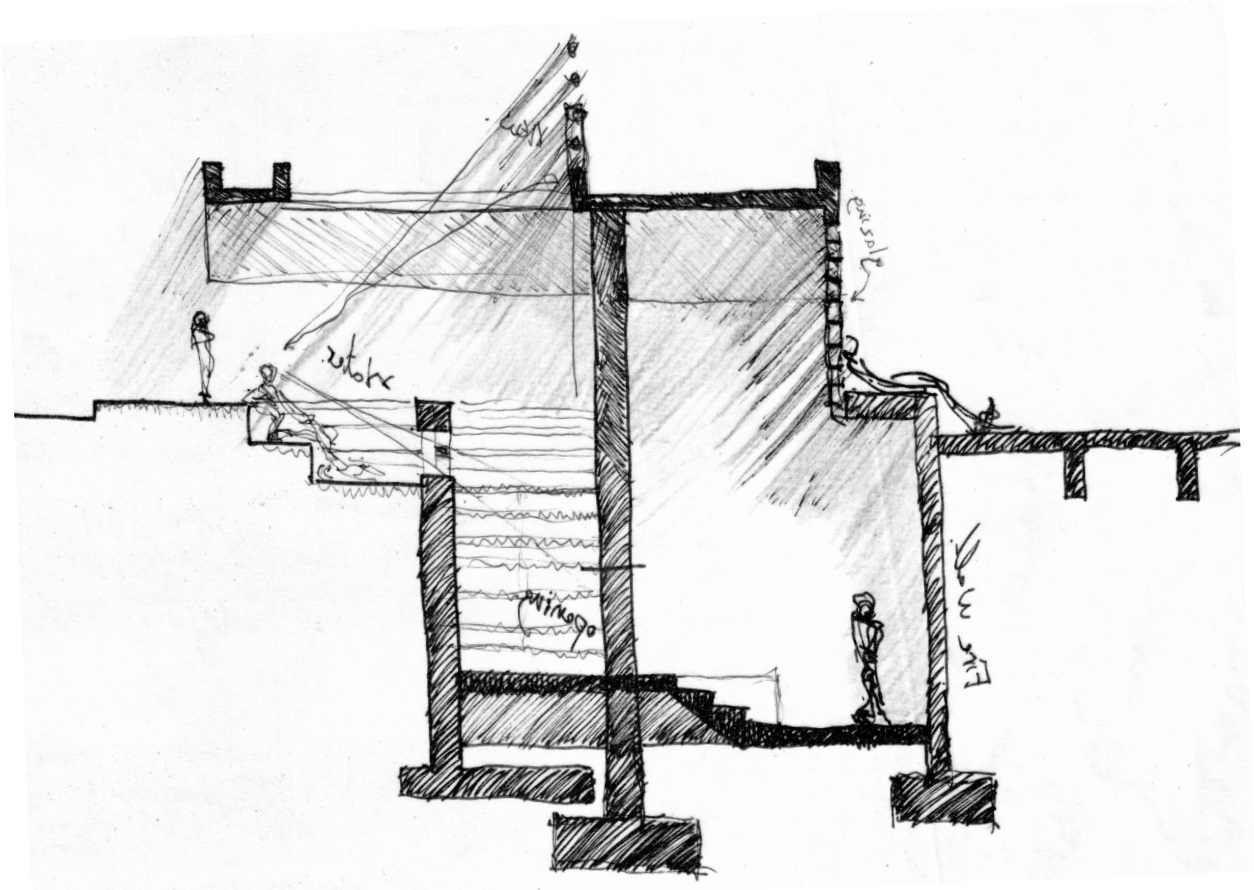


Fig 7.37: Section through ramp looking West, exploration of edges, light, level changes and prospects (July 2013)

© University of Pretoria

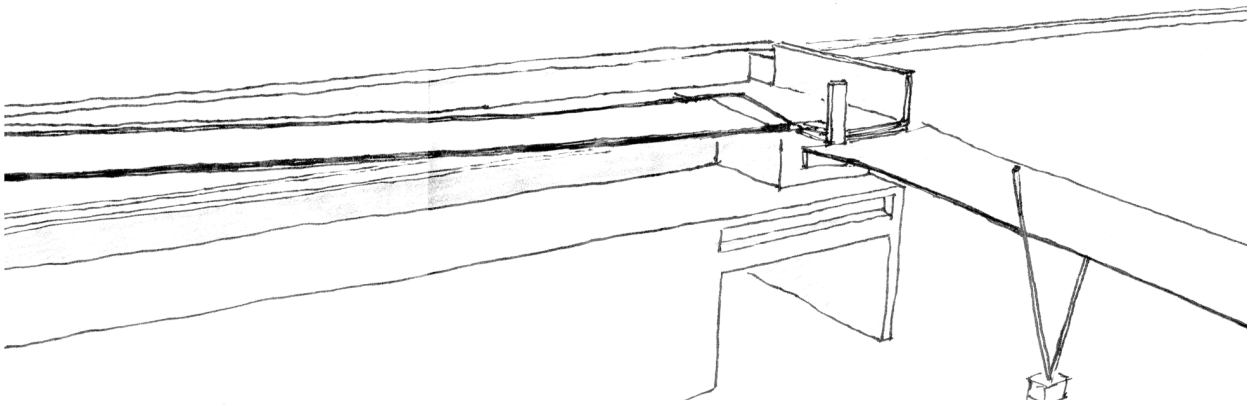


Fig 7.38: 3D sketch of the ramp where various materials join

7.11 RUGGED AND SMOOTH EDGES

[RUGGED EDGES]
Diverse, with enclosed sub-spaces as part of their form.

[SMOOTH EDGES]
Simple, minimal variation without sub spaces.

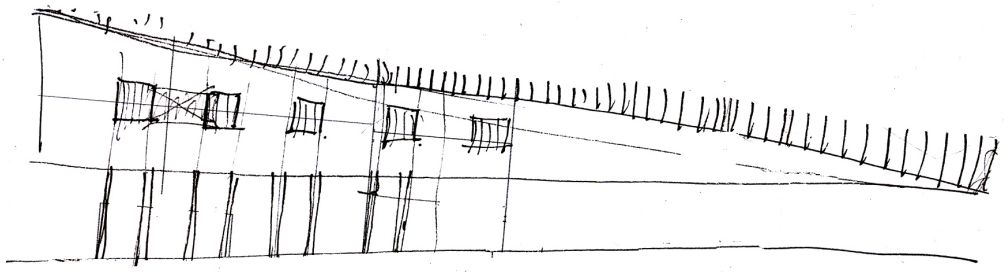


Fig 7.39: Urban (south) facade concept sketch _ from heavy to light allowing for moments of reveal as horses move atop the ramp while simultaneously creating a smooth urban edge

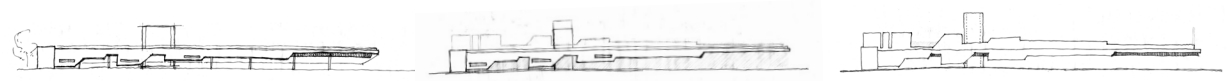


Fig 7.40 : Urban (south) facade exploration

At this scale the ramp is articulated by the combination of rugged and smooth edges. The ramp which becomes both a ground and sky plane, has a smooth edge created by the channels which run along its edges.

Below the ramp a rugged edge is created with several sub spaces which become places for social activities and interaction, around food, music and visual entertainment. Sub spaces include shops, Shisanyama, a food court, bars and spaces for sitting, meeting, eating and resting.

When considering both horizontal and vertical planes, the street and side walk along with the ramp creates a smooth edge, this is juxtaposed by the ramp's set back edge, which is rugged and therefore interlocks various places. The ramp edge therefore simultaneously draws pedestrian space in and underneath the ramp, while creating a smooth edged facade.

A layering of edges both rugged and smooth allows for a grading from the private to the public. It also creates an edge space which, on the one hand creates a holistic feel for the building, while simultaneously creating an edge filled with sub-spaces where spontaneous interactions can occur. The diagrams in figure 8.41 to 8.43 illustrate this layering.

The design of the urban edge explores its ability of these sub-spaces to respond to an ever altering urban environment. This is made possible by the infill strategy used in creating habitable spaces underneath the ramp.

© University of Pretoria

7.11.1 LAYERING OF EDGES

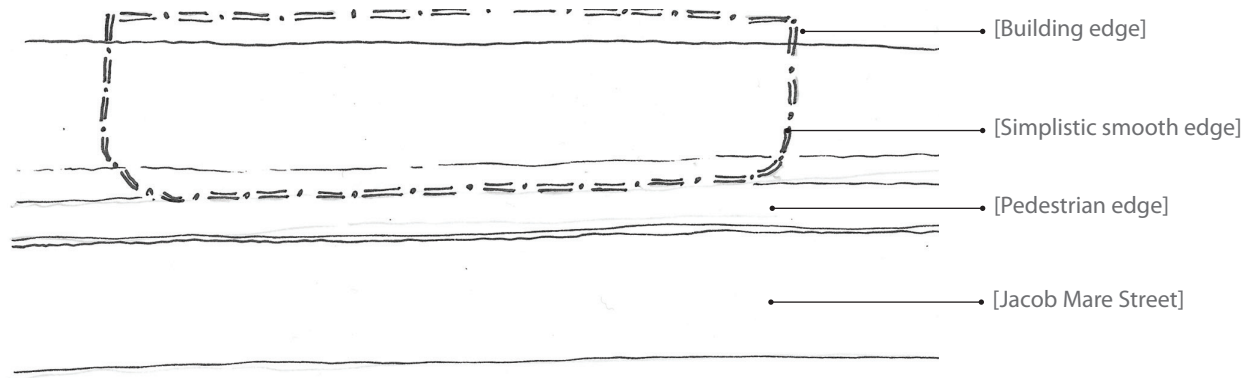


Fig 7.41: Diagrammatic plan showing the smooth edges

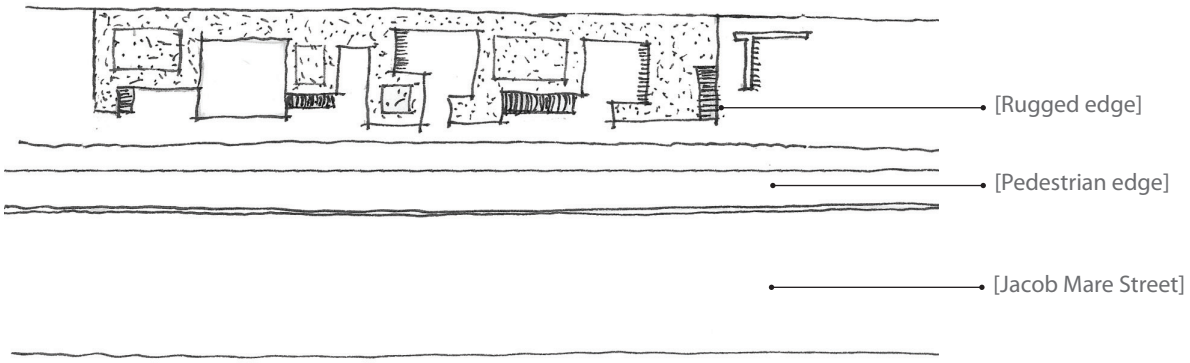


Fig 7.42: Diagrammatic plan showing the rugged edges

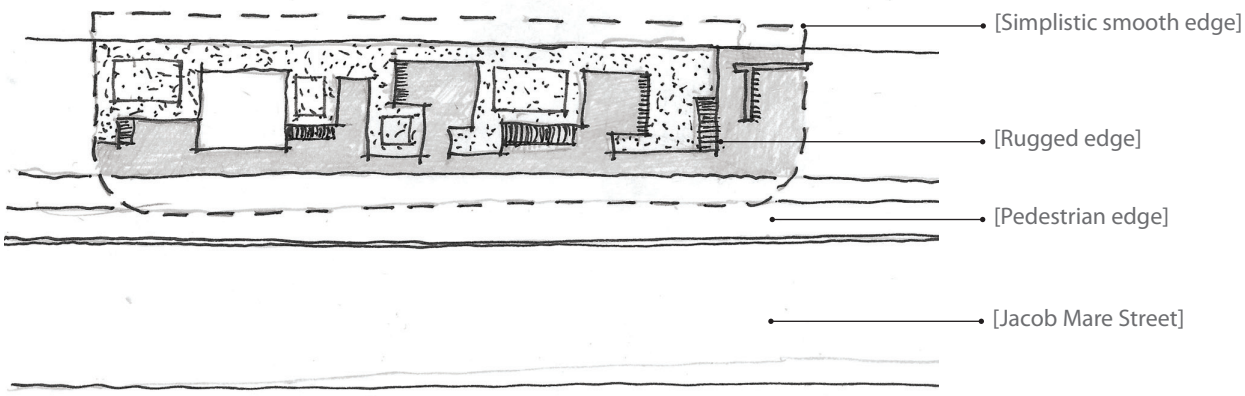


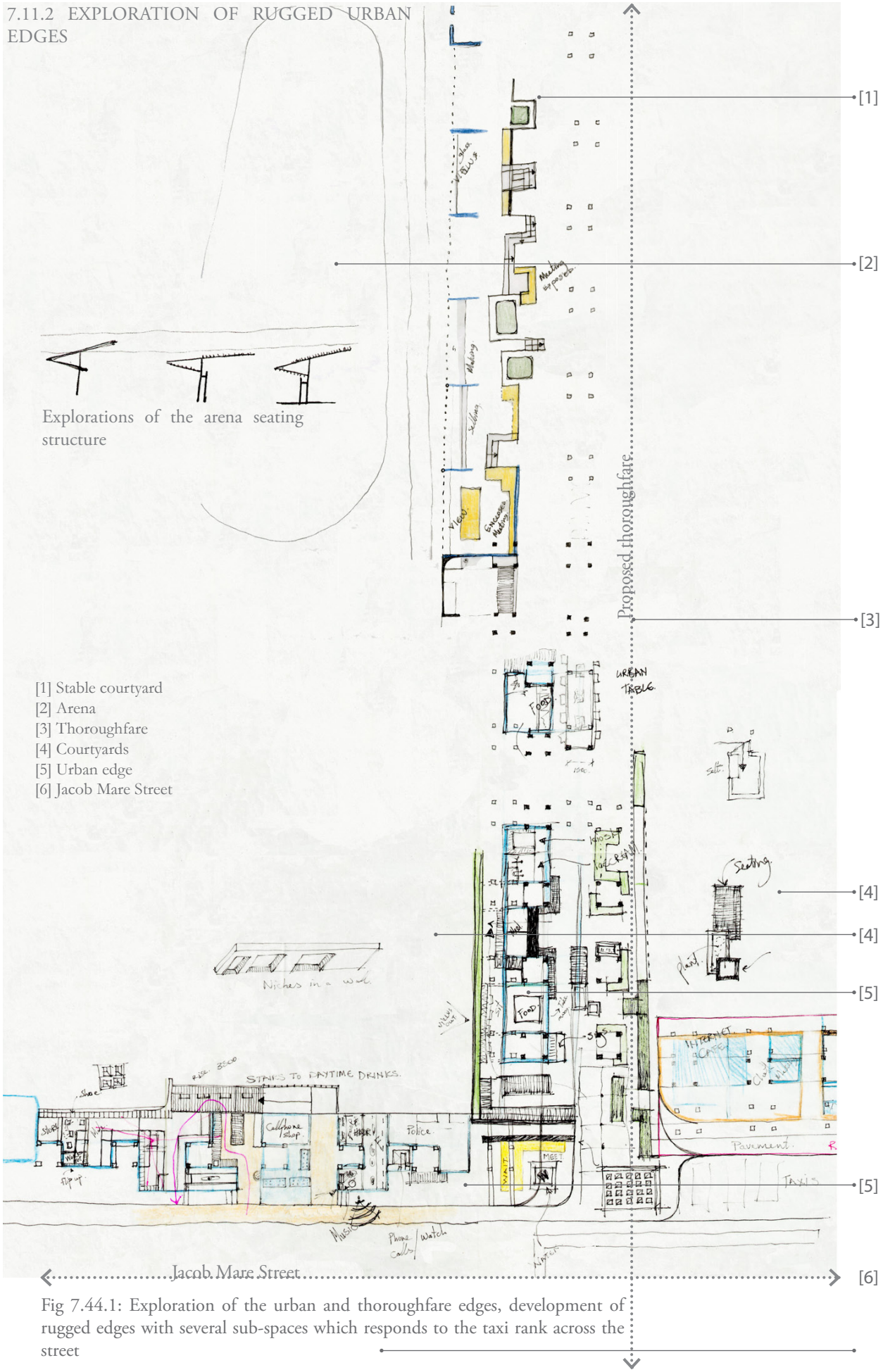
Fig 7.43: Diagrammatic plan showing the interaction between smooth and rugged edges

Vertical and horizontal layering of edges, to create both a wholistic feel to the building while simultaneously creating an edge filled with sub-spaces where spontaneous interactions can occur. the diagrams illustrate the concept.

© University of Pretoria

7.11.2 EXPLORATION OF RUGGED URBAN EDGES

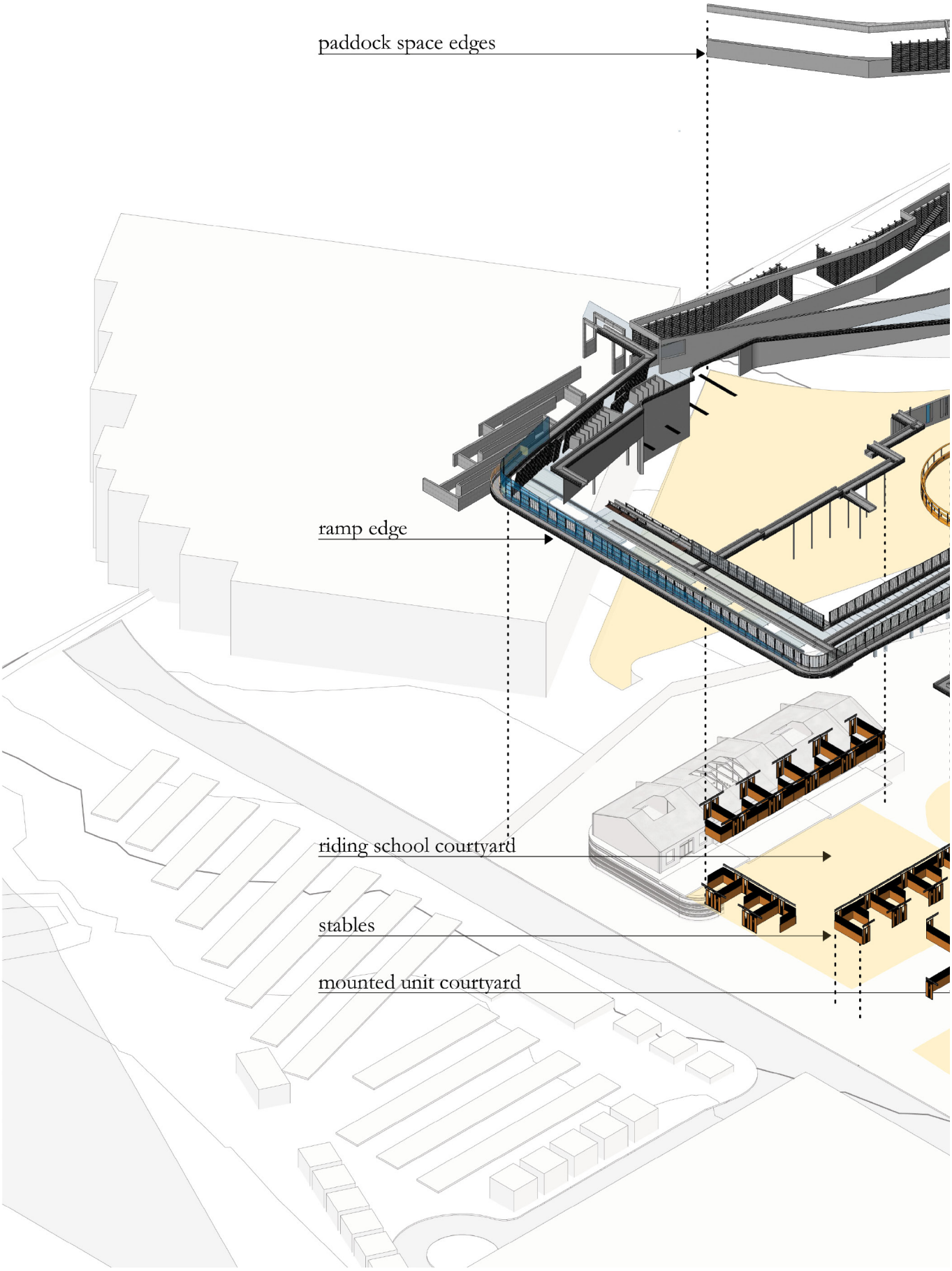
Explorations of the arena seating structure



[1] Stable courtyard
[2] Arena
[3] Thoroughfare
[4] Courtyards
[5] Urban edge
[6] Jacob Mare Street

Fig 7.44.1: Exploration of the urban and thoroughfare edges, development of rugged edges with several sub-spaces which responds to the taxi rank across the street

© University of Pretoria



© University of Pretoria

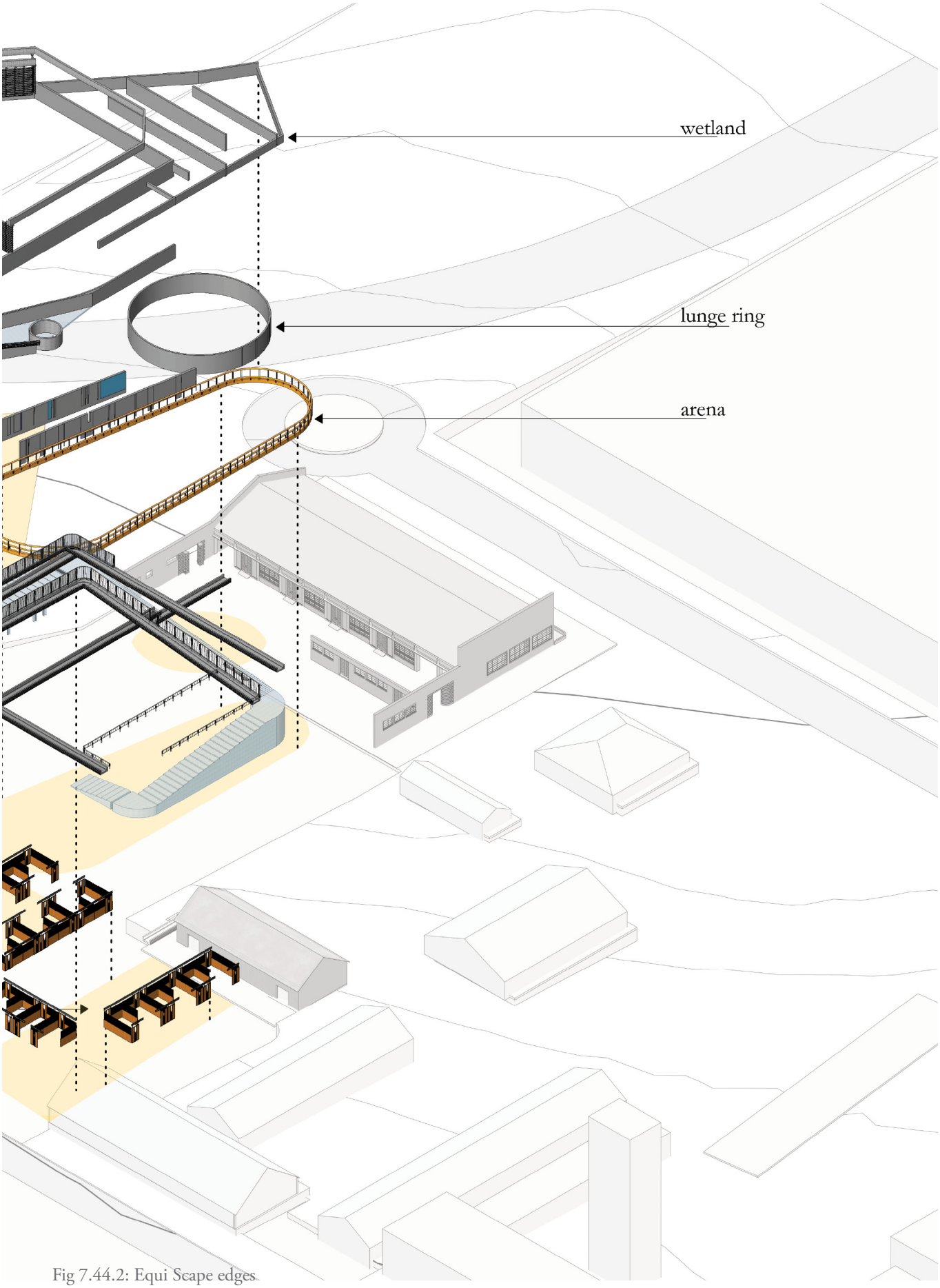


Fig 7.44.2: Equi Scape edges

© University of Pretoria

7.12 EQUI SCAPE EQUINE DESIGN

7.13.1 ARENA

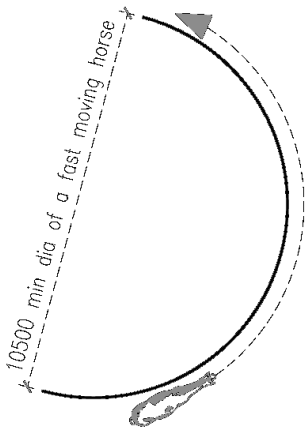


Fig 7.45.1: Minimum turn for a fast moving horse

The size of the central arena is dictated by the ability of fast moving horse turn, 10 -11 m Ø." (Neufert 1980: 344)

Due to site restrictions and space restrictions the arena size is determined by the minimum turning circle of a horse at high speed, namely 10.5m Ø. This becomes the internal diameter from which the minimum turning circle of two fast moving horses is calculated.

900mm is required for each mounted horse. Therefore a diameter of 14.1m Ø is required. To the south of the site where there is more space allocated the arena Ø is 20 m. An arena length of 54m fits comfortably between the existing buildings and courtyards. This arena could accommodate at least 8 fast moving horses at the same speed.

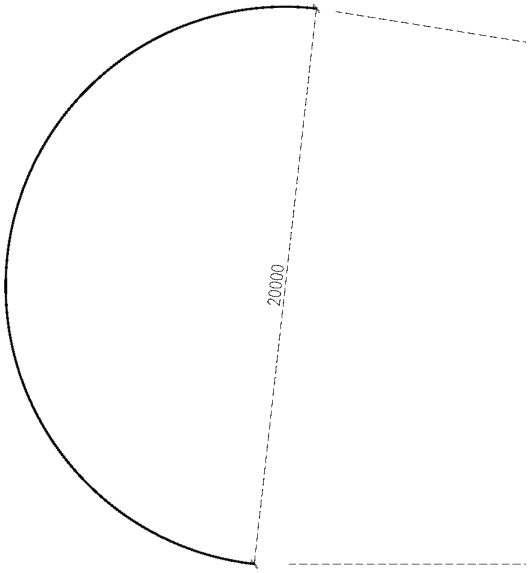
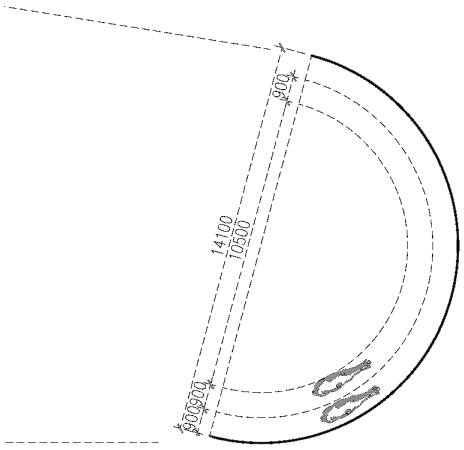


Fig 7.45.2: Large diameter circle



Small diameter circle

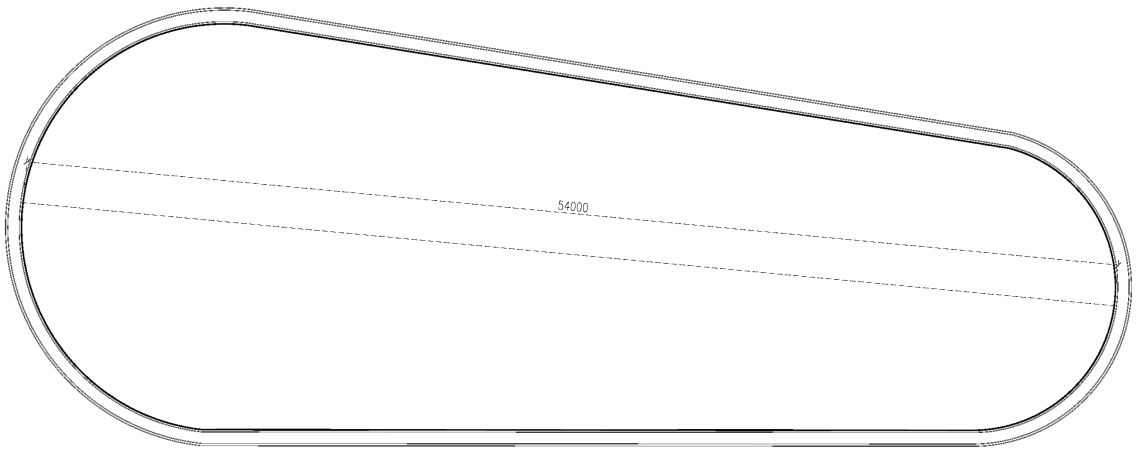


Fig 7.45.3: Equi Scape Arena

© University of Pretoria

7.13.2 EQUINE RAMP DESIGN

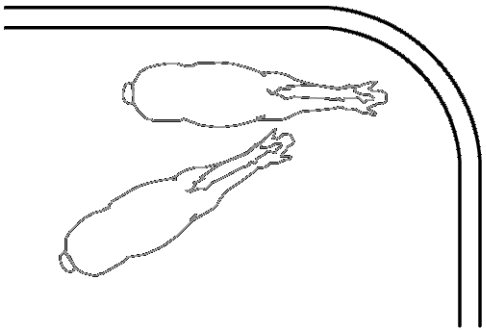


Fig 7.46: Rounded Corners for paddock spaces to allow a bullied horse to escape

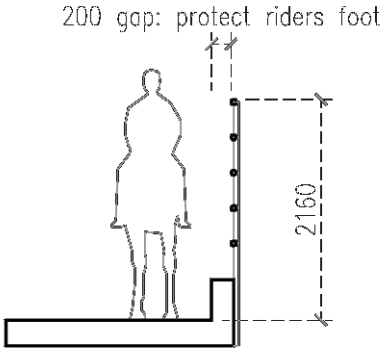


Fig 7.47: Design considerations for a platform raised above the ground

7.13.3 DESIGN OF THE EQUI SCAPE STABLES

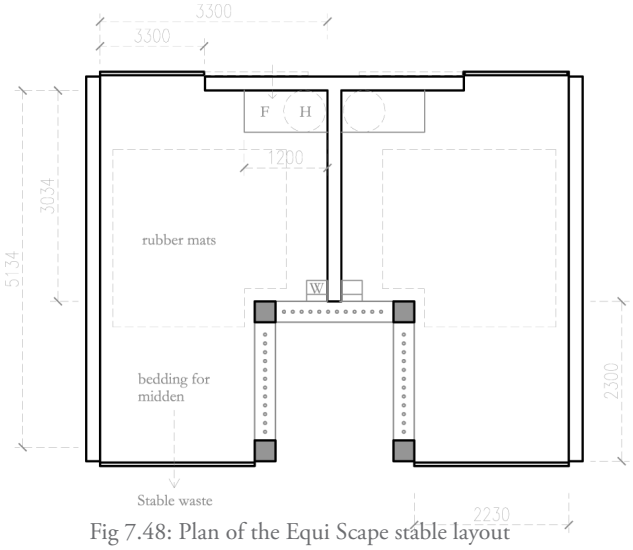


Fig 7.48: Plan of the Equi Scape stable layout

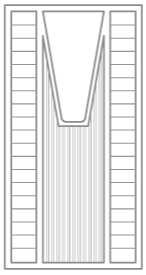


Fig 7.49: Equi Scape stable door design allowing ventilation at all heights

© University of Pretoria

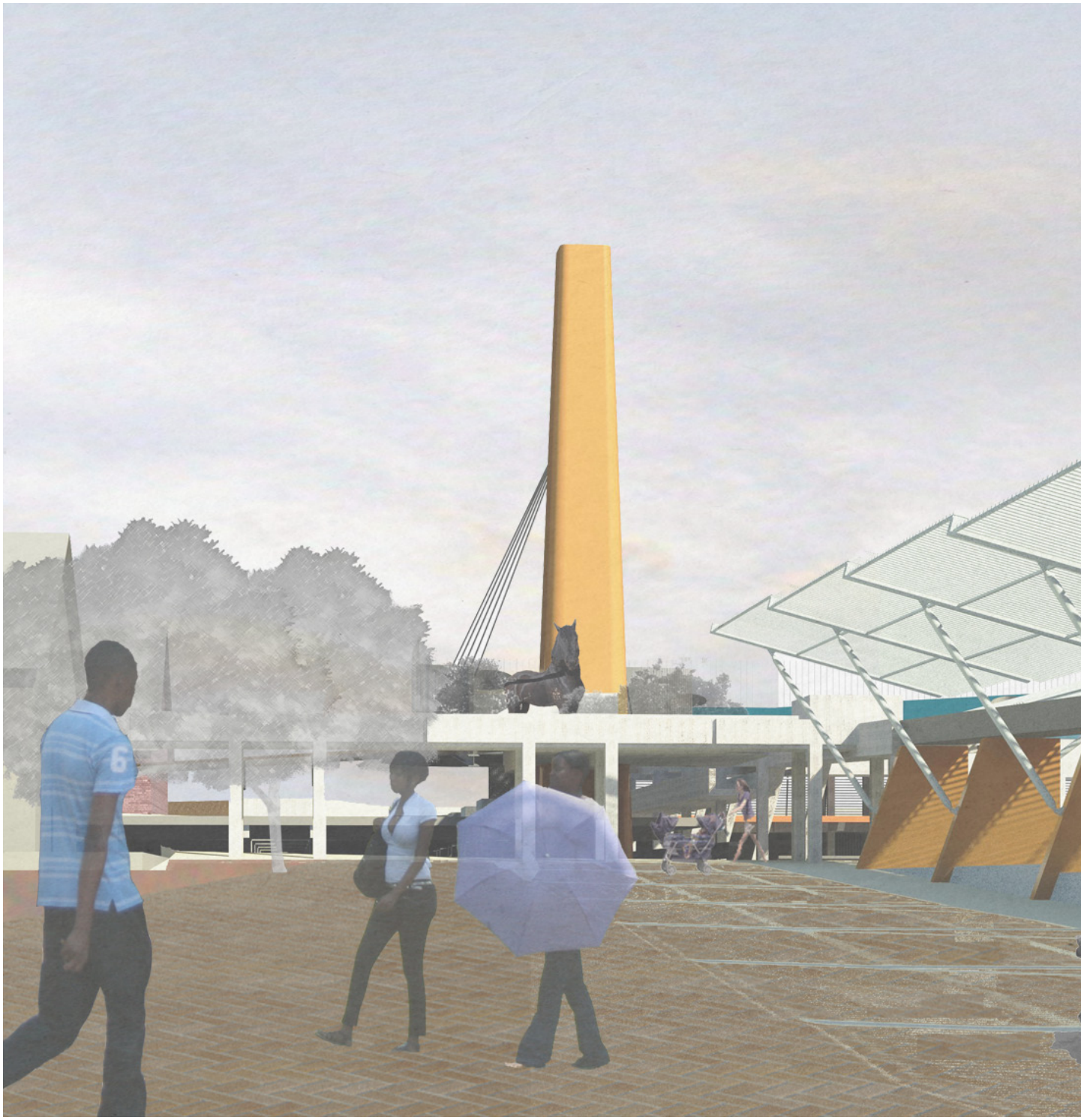


Fig 7.50: An impression of the thoroughfare looking towards the arena seating (July 2013)

© University of Pretoria



© University of Pretoria

7.13 DESIGN PLANS

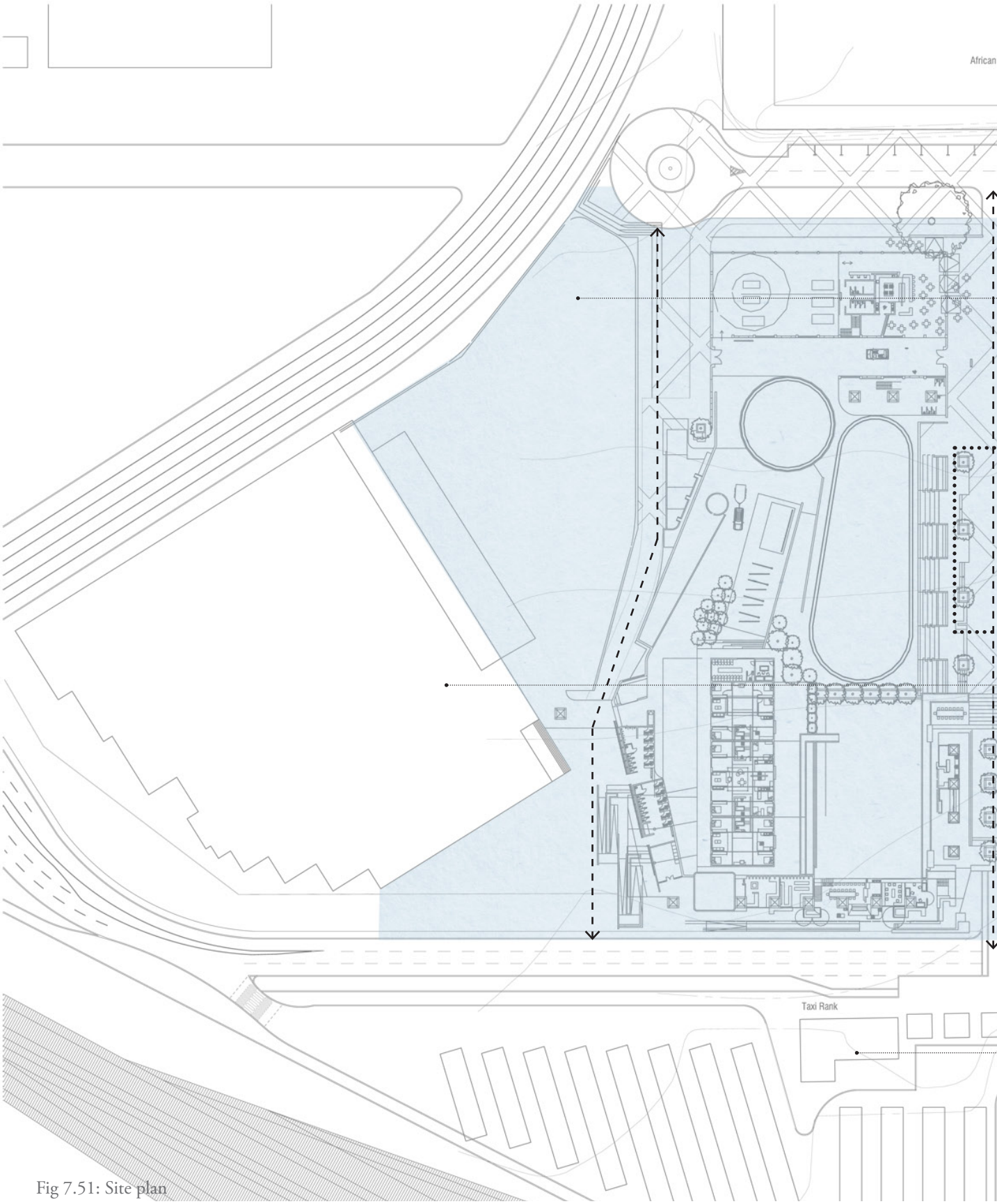
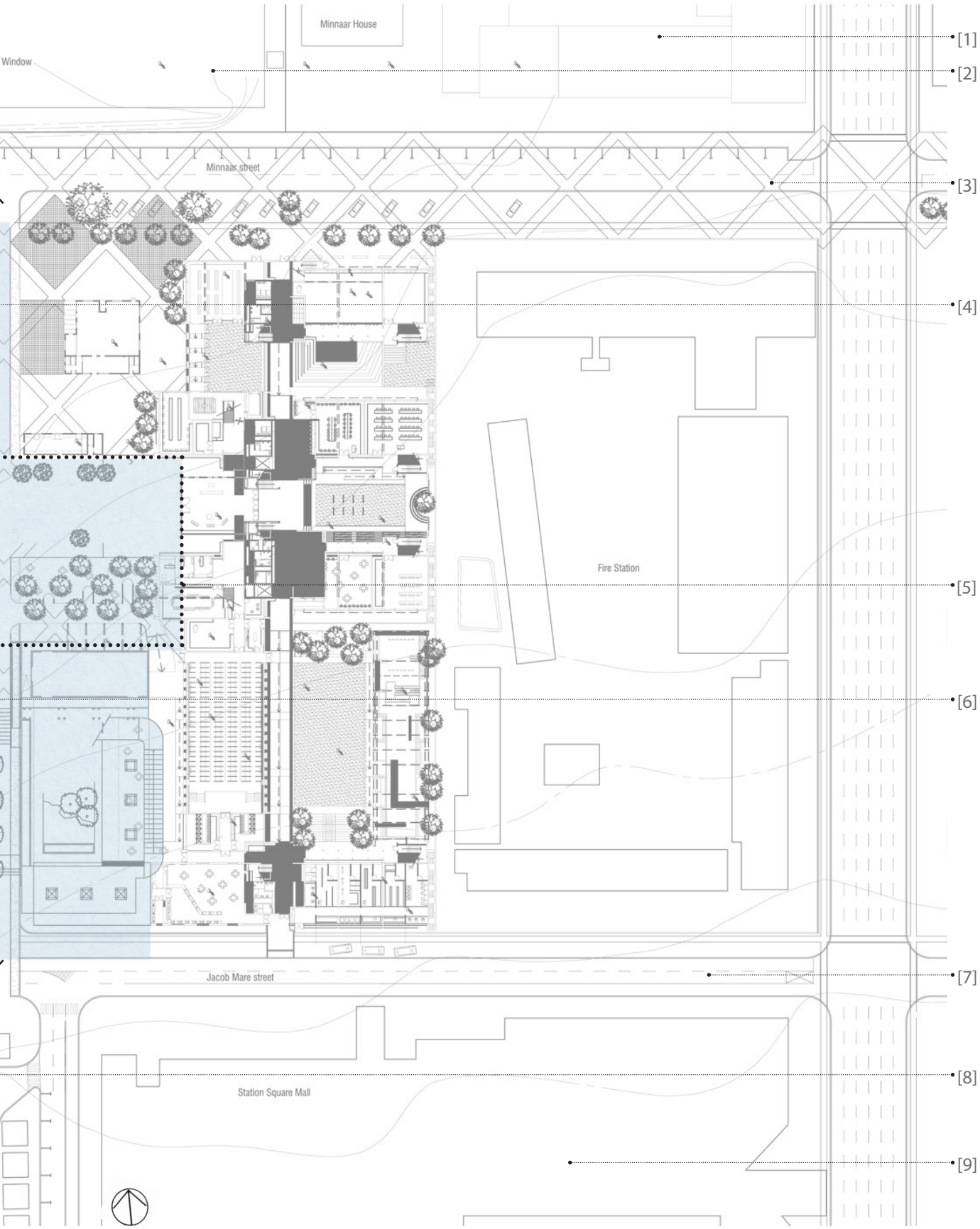


Fig 7.51: Site plan

© University of Pretoria

[1] Old fire station
[2] National Cultural History Museum
[3] Minnaar Street
[4] Paddock
[5] Square along thoroughfare
[6] Post office
[7] Jacob Mare Street
[8] Taxi Rank
[9] Station Square Mall

Thoroughfare
Square



© University of Pretoria

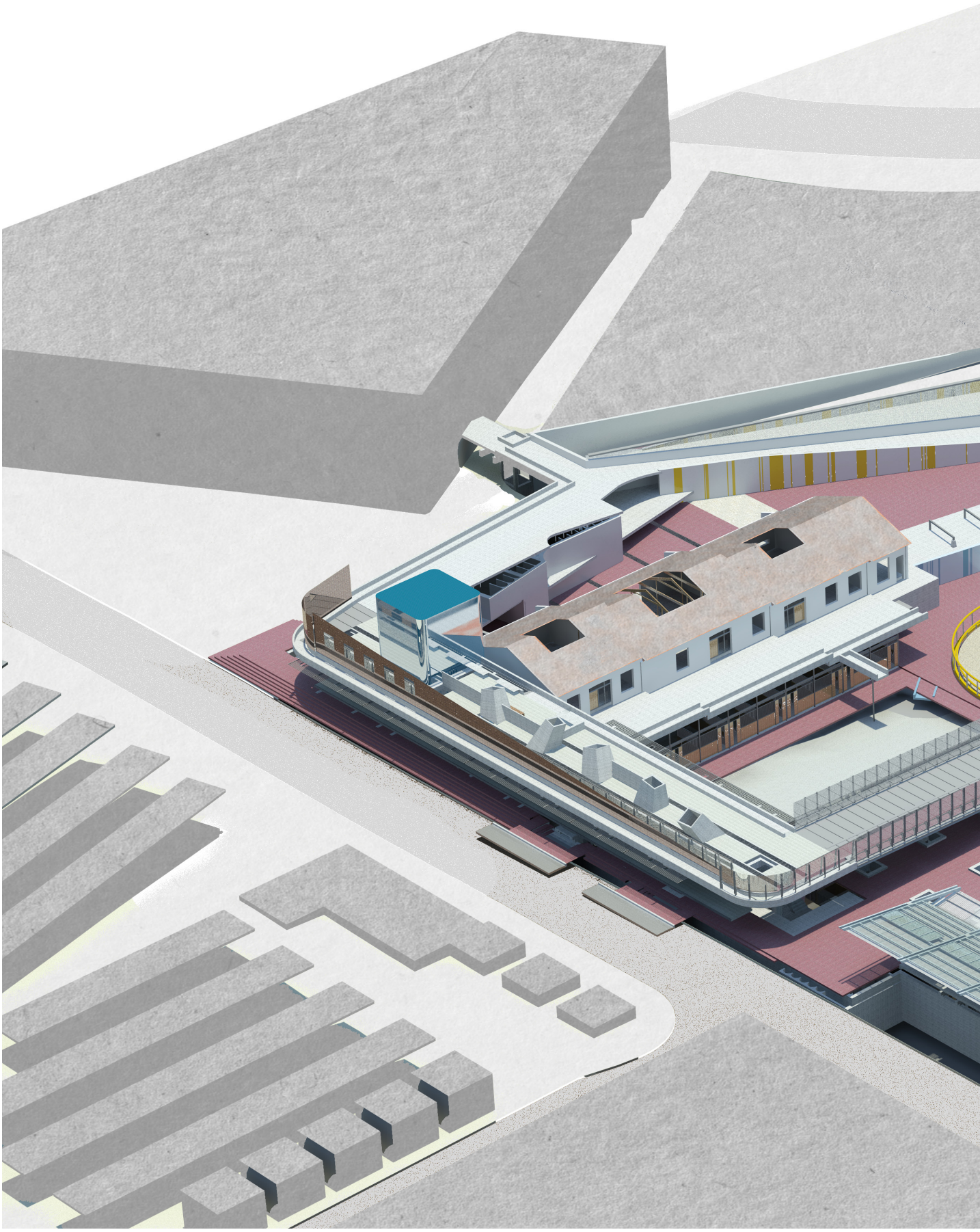
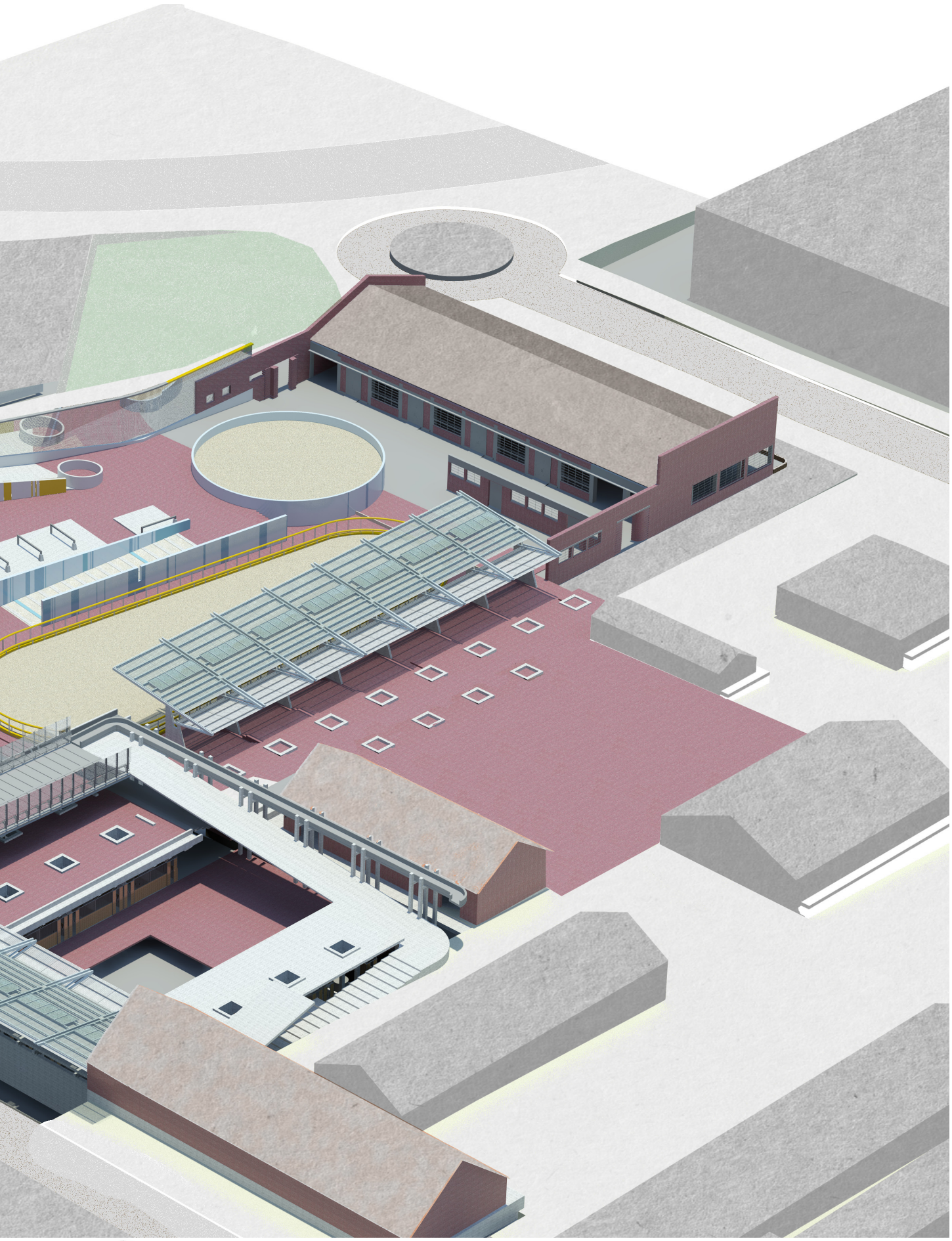


Fig 7.52: Three dimensional view looking N_W (September 2013)

© University of Pretoria



© University of Pretoria

[1] Minnaar Street
[2] Equine Museum
[3] Restaurant
[4] Wetland
[5] Bar
[6] Lunge Ring
[7] Parking
[8] Seating
[9] Arena
[10] Ramp Start
[11] Ties for saddling
[12] Riding school + therapy courtyards
[13] SAPS courtyard
[14] Stable
[15] Change rooms
[16] Water Storage
[17] Paddock
[18] Riding school + therapy office +tack room
[19] SAPS Residence
[20] Ablutions
[21] Thoroughfare
[22] Urban retail + food court + police office
[23] Jacob Mare Street

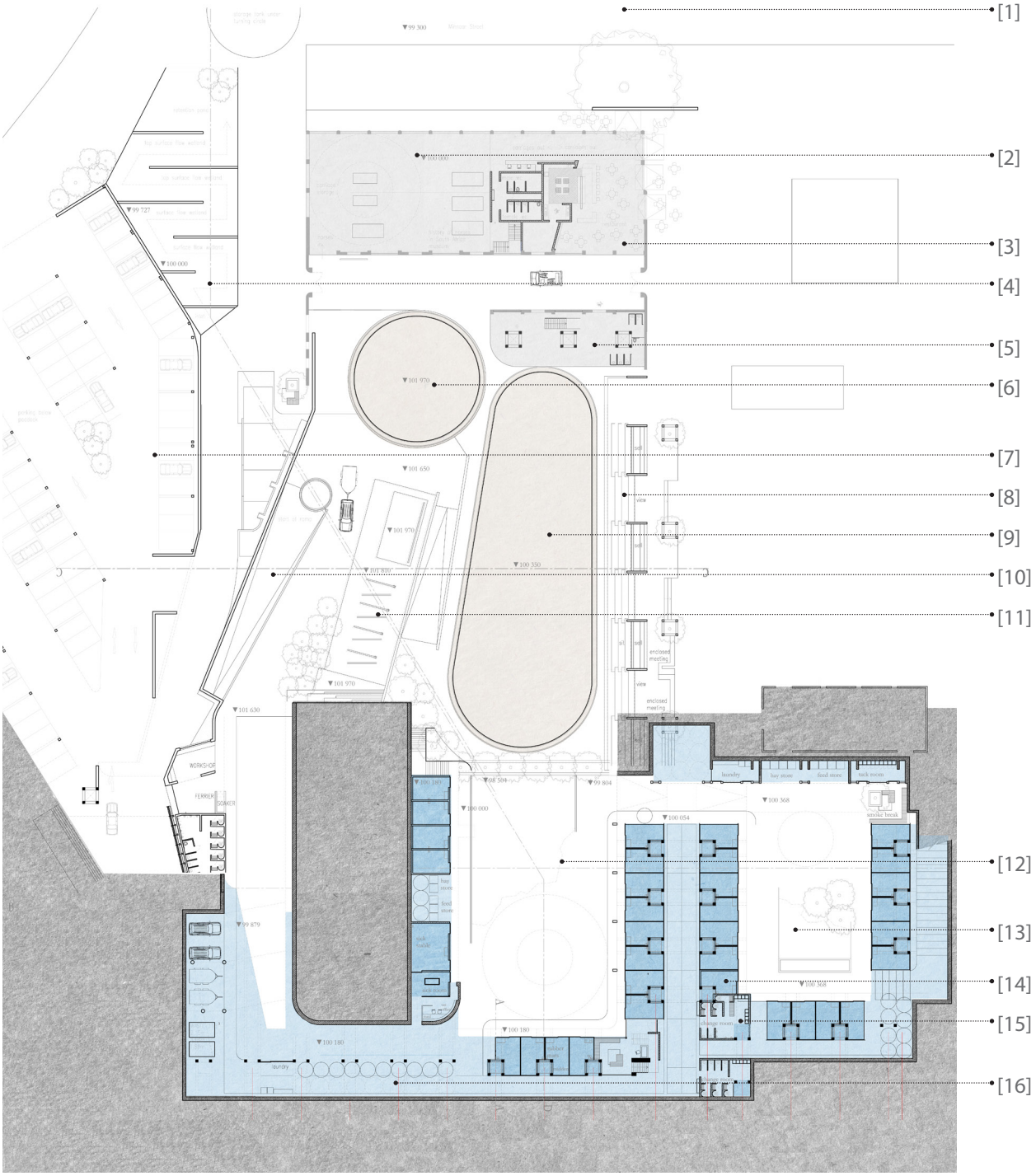


Fig 7.53: Basement plan

© University of Pretoria

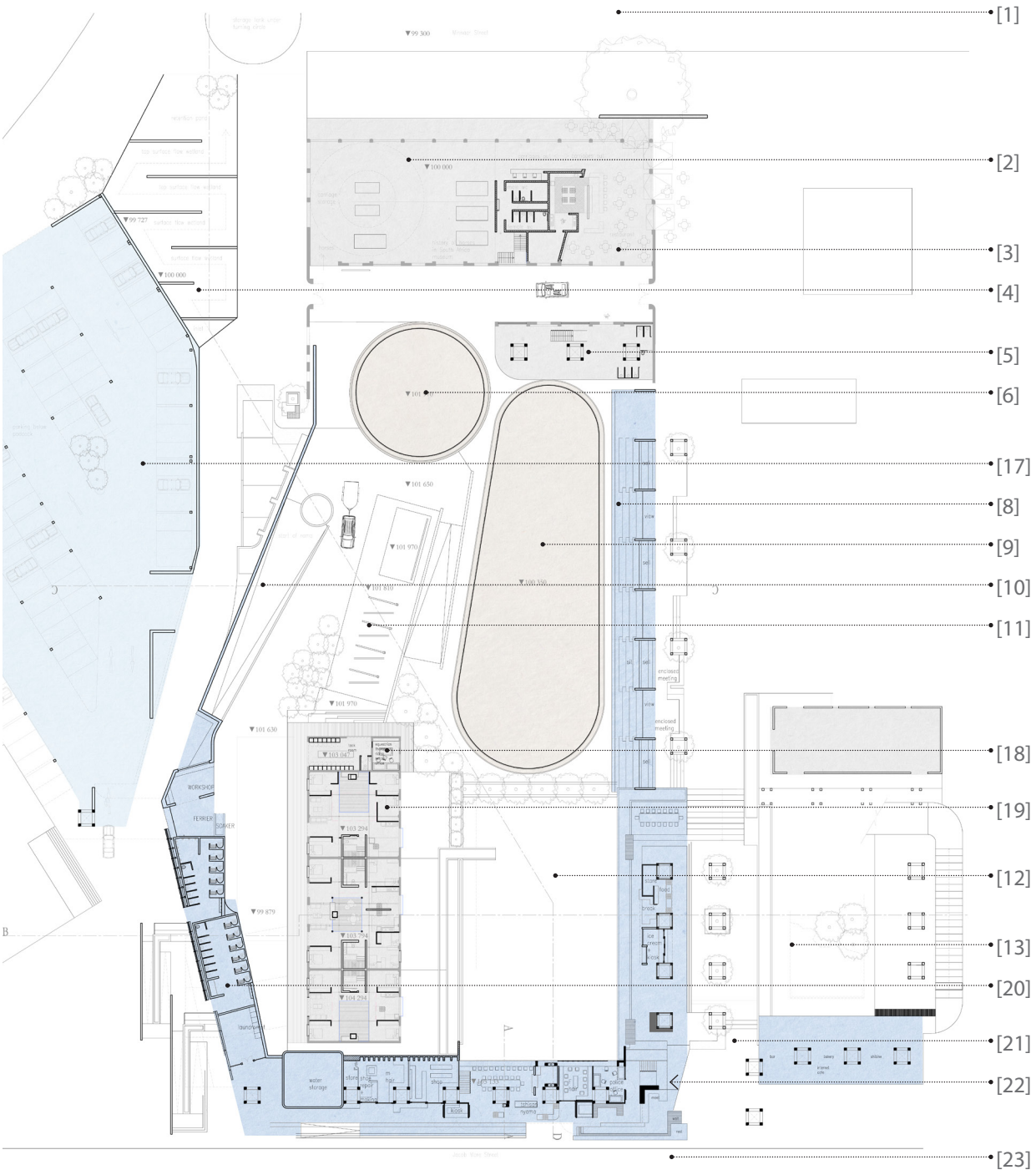


Fig 7.54: Ground floor plan

© University of Pretoria

[1] Minnaar Street
[2] Equine Museum
[3] Restaurant
[4] Wetland
[5] Bar
[6] Lunge Ring
[7] Parking
[8] Seating
[9] Arena
[10] Ramp Start
[11] Ties for saddling
[12] Riding school + therapy courtyards
[13] SAPS courtyard
[14] Stable
[15] Change rooms
[16] Water Storage
[17] Paddock
[18] Riding school + therapy office +tack room
[19] SAPS Residence
[20] Ablutions
[21] Thoroughfare
[22] Urban retail + food court + police office
[23] Jacob Mare Street
[24] Ramp
[25]Arena roof

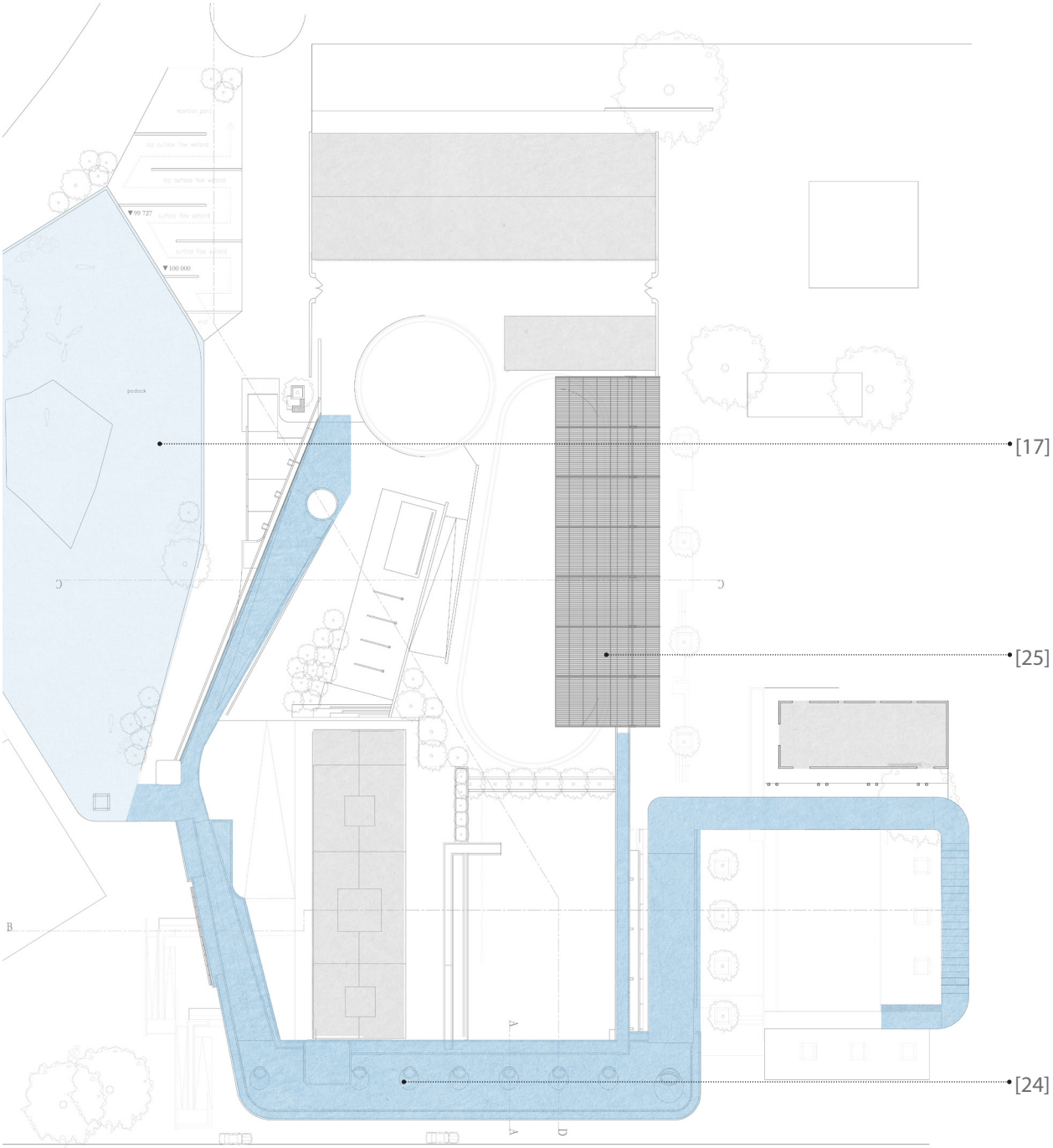


Fig 7.55: Roof plan

© University of Pretoria

7.14 DESIGN SECTIONS

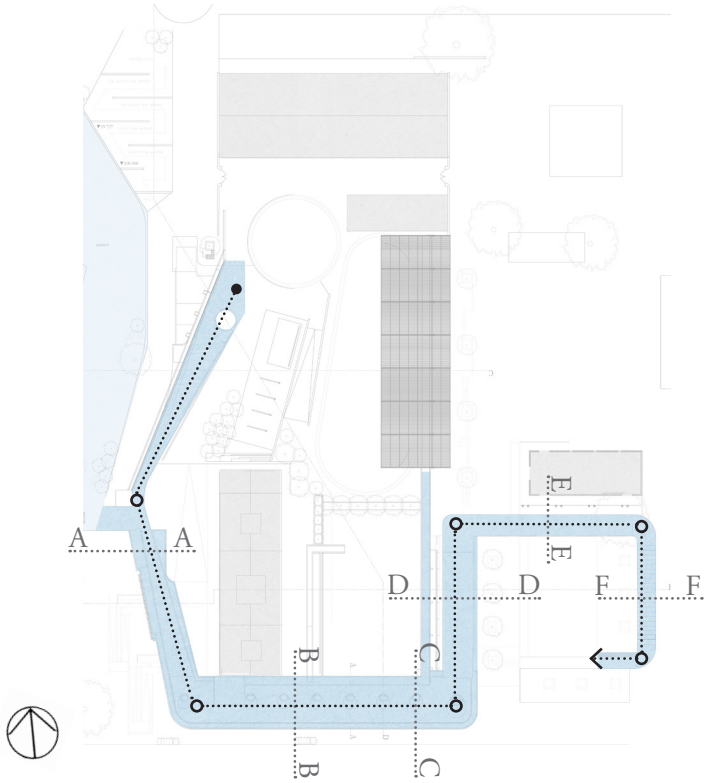
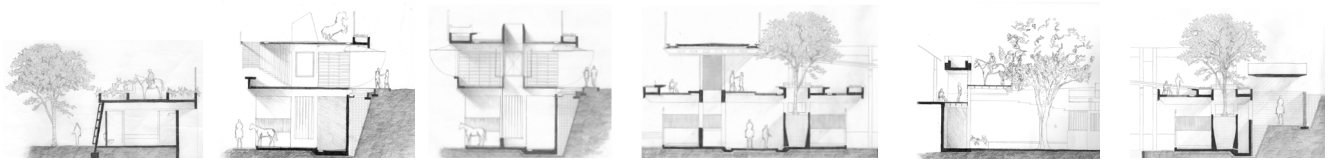


Fig 7.56: Key plan

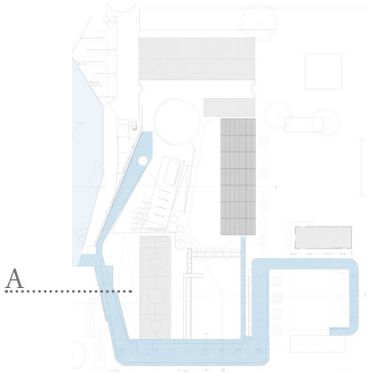


A_A B_B C_C D_D E_E F_F

Fig 7.57: Key sections

The following pages show sections through the ramp, illustrating changes in relationships, of materials, people - horses, ground - sky and public - private as the ramp moves through the site, responding to a multitude of different informants, at various scales.

© University of Pretoria



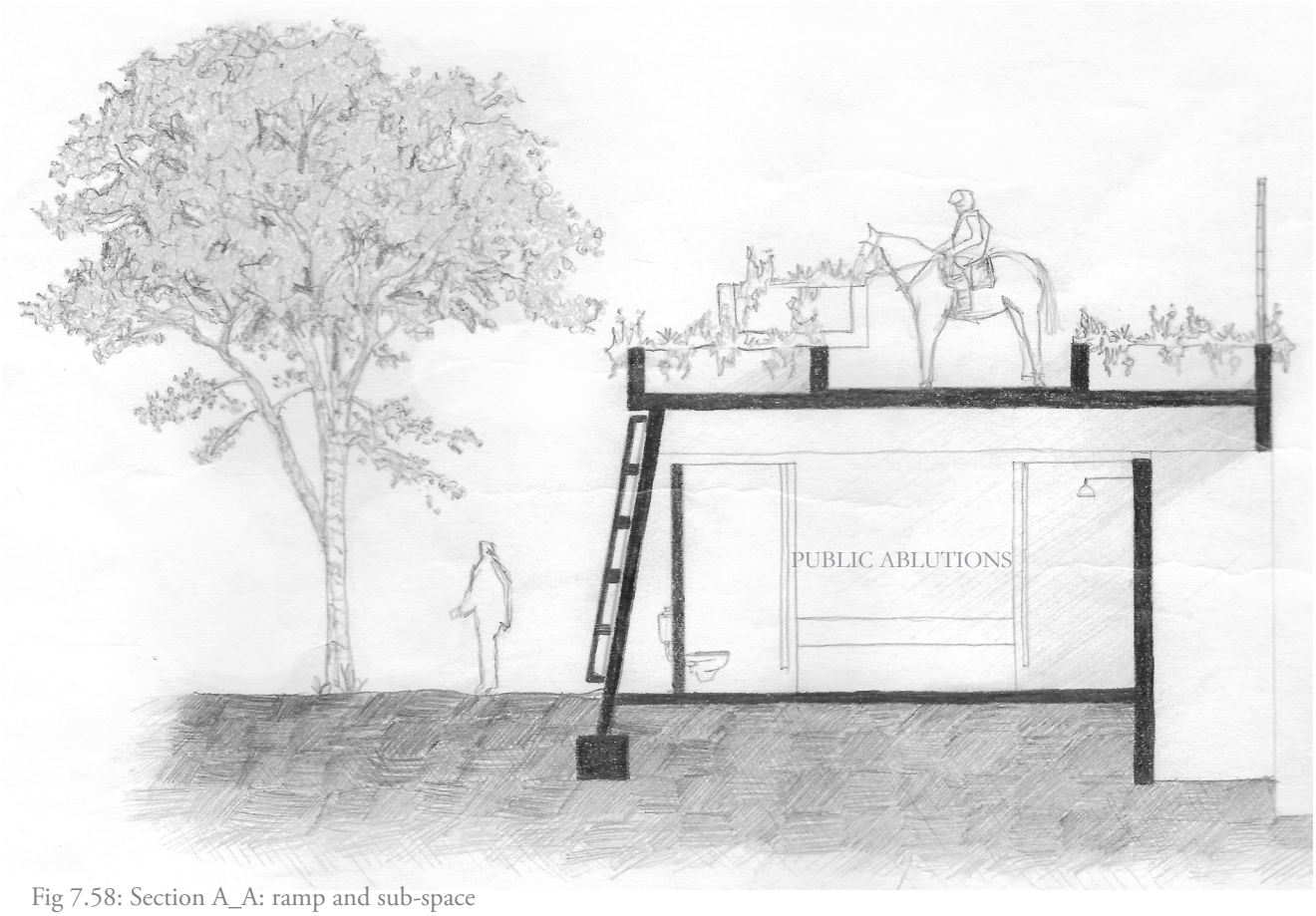


Fig 7.58: Section A_A: ramp and sub-space

As the ramp rises off the ground, a second ground plane is created, underneath which habitable space is created. In figure 7.58 the ramp is firstly creating a barrier between accessible private space (wc) and inaccessible private residential space towards the east, secondly it creates a wider thoroughfare while simultaneously providing ablutions (placed here specifically due to public need, as expressed by the thoroughfare currently being used as a public ablution space).

© University of Pretoria

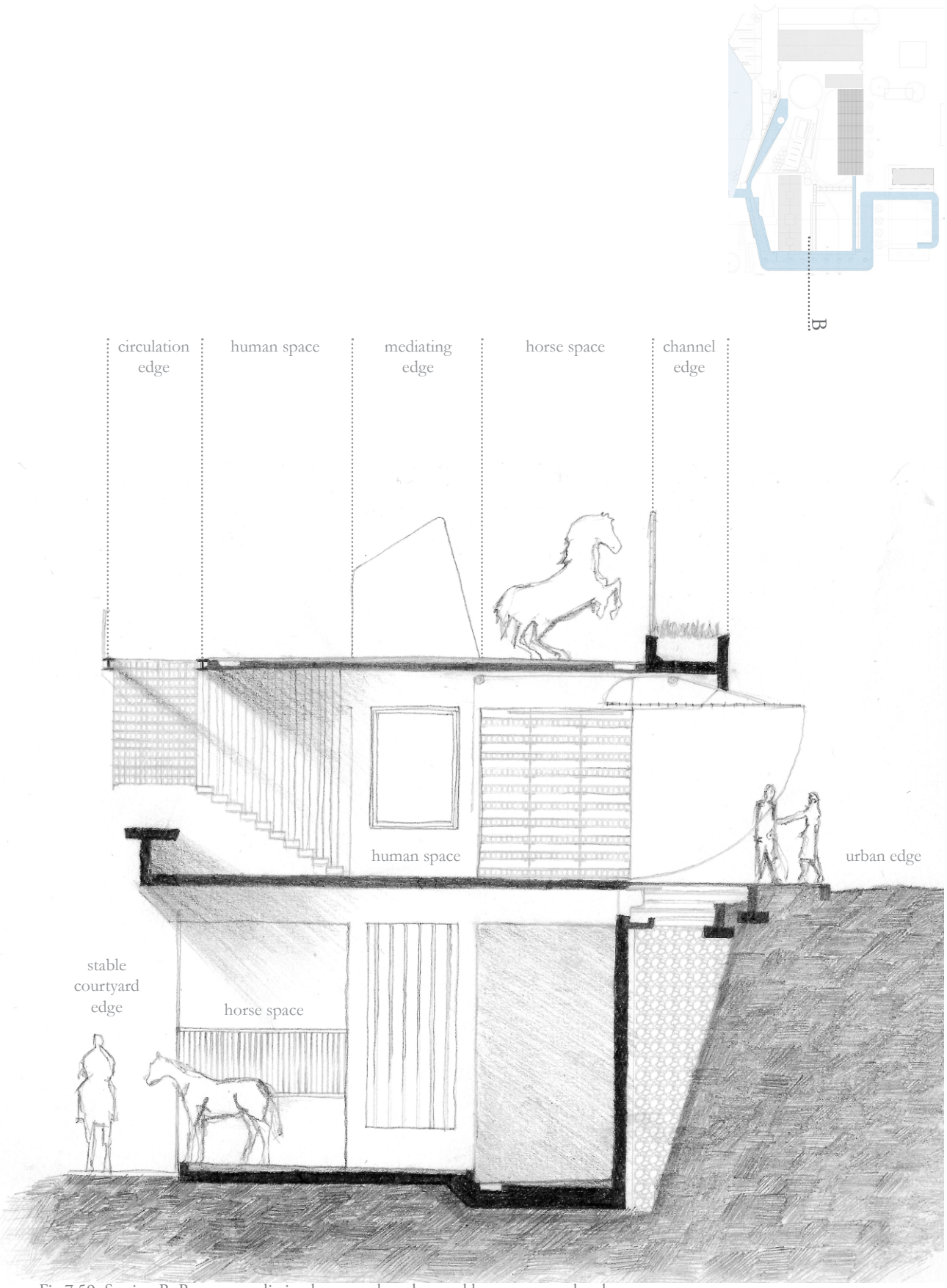


Fig 7.59: Section B_B: ramp mediating between the urban and horse courtyard scale

As the ramp continues to rise and become an edge to the excavated courtyard, the space underneath it becomes larger and more dynamic, as it starts mediating the relationship between the urban, with its vibrant taxi rank, and the quiet horse courtyards, it also starts accommodating the various scales associated with each.

© University of Pretoria

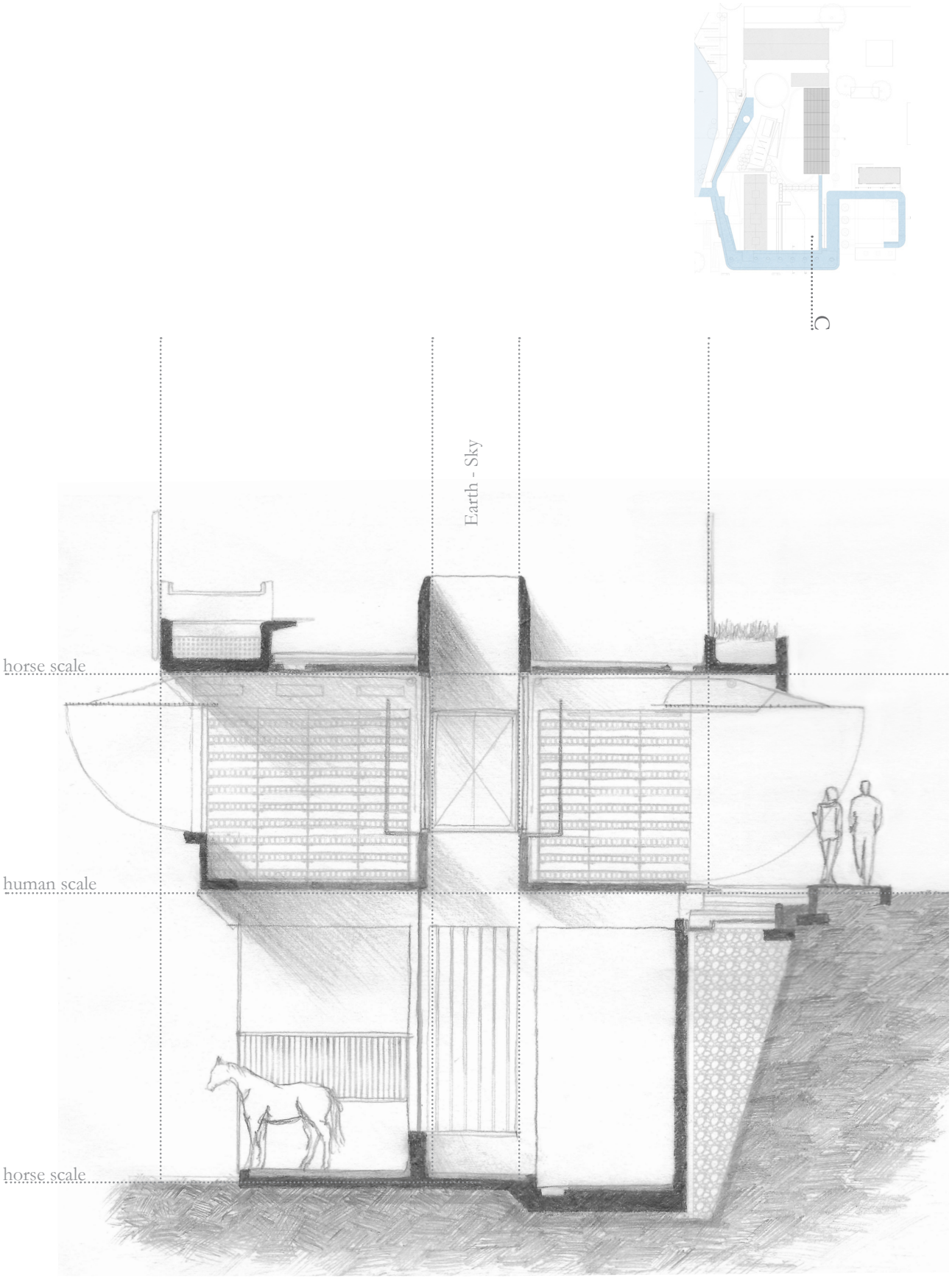
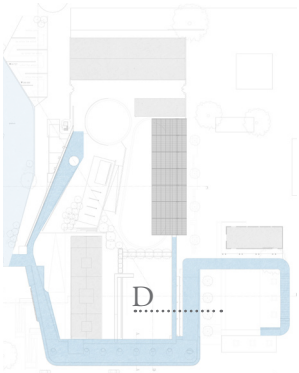


Fig 7.60: Section C_C: section through the ventilation and lighting shaft

This section also shows the new structural system in elevation, which used to be on the edges of the ramp (June crit), a central column system from which cantilevering beams extend which support the ramp.

© University of Pretoria



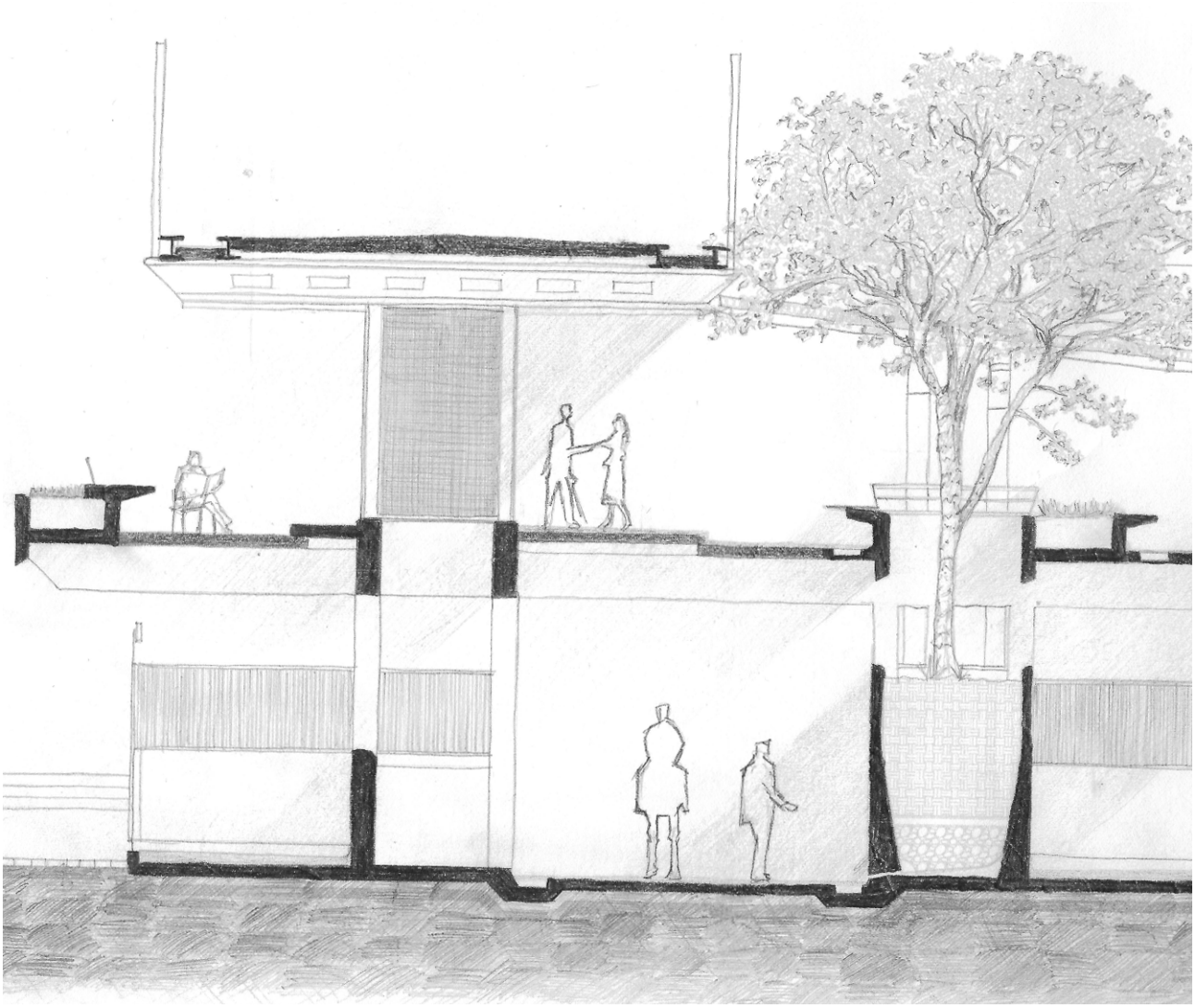
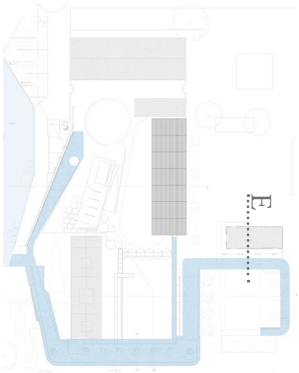


Fig 7.61: Section D_D: Concrete sub-structures, supporting steel ramp above

As the ramp continues to weave through the site becoming lighter, it eventually becomes a steel ramp which, firstly allows the horse to experience a surface which vibrates as it moves across it. Allowing the horse to become accustomed to the sensation of an seemingly unstable surface. Secondly it will make people below the ramp aware of the horse moving above them.

© University of Pretoria



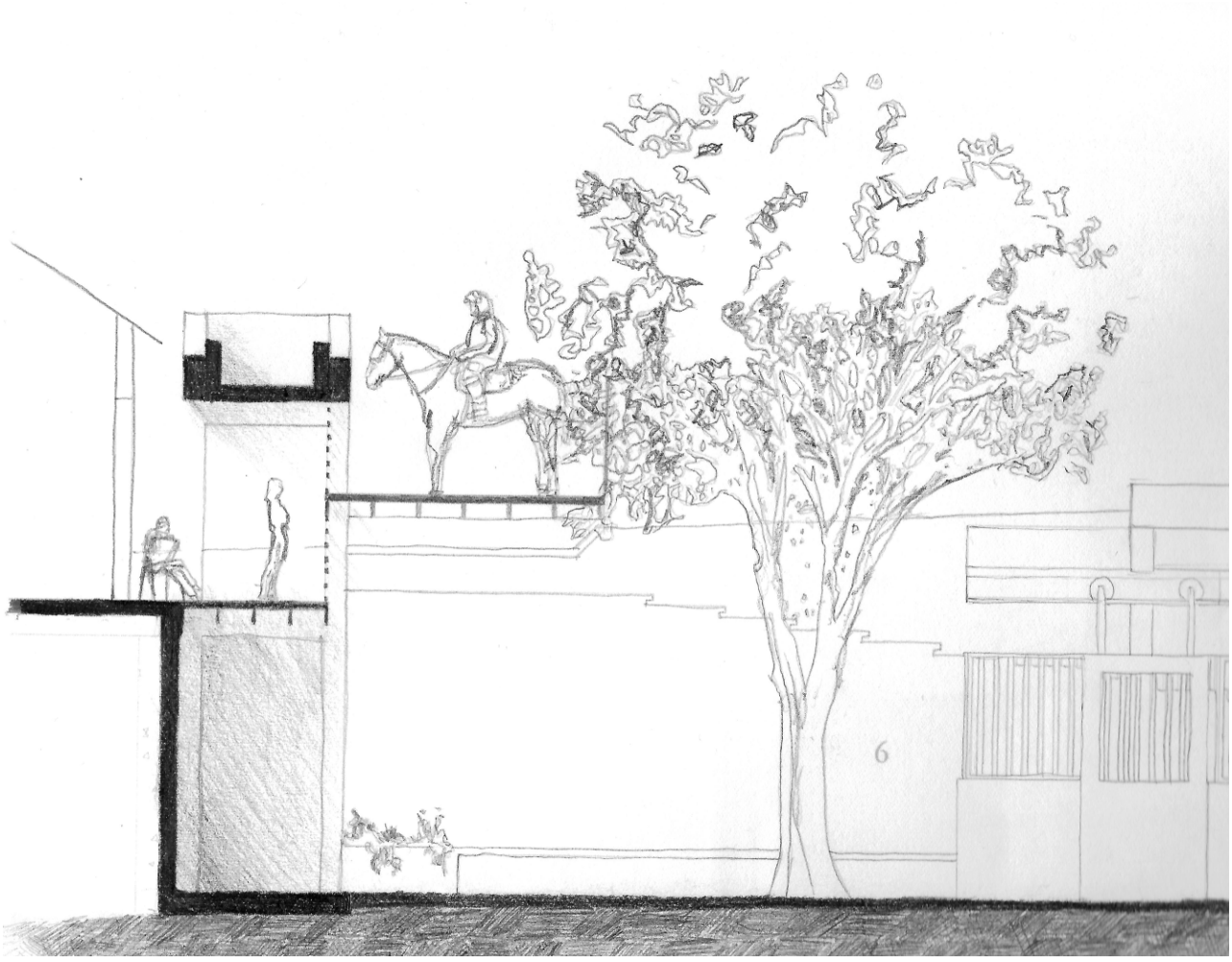
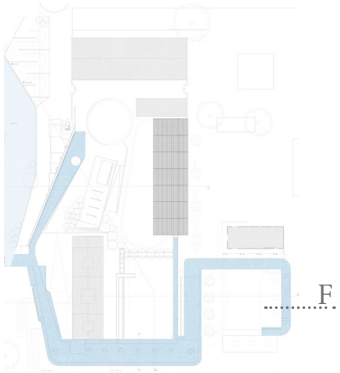


Fig 7.62: Section E_E: through timber section of the ramp

© University of Pretoria



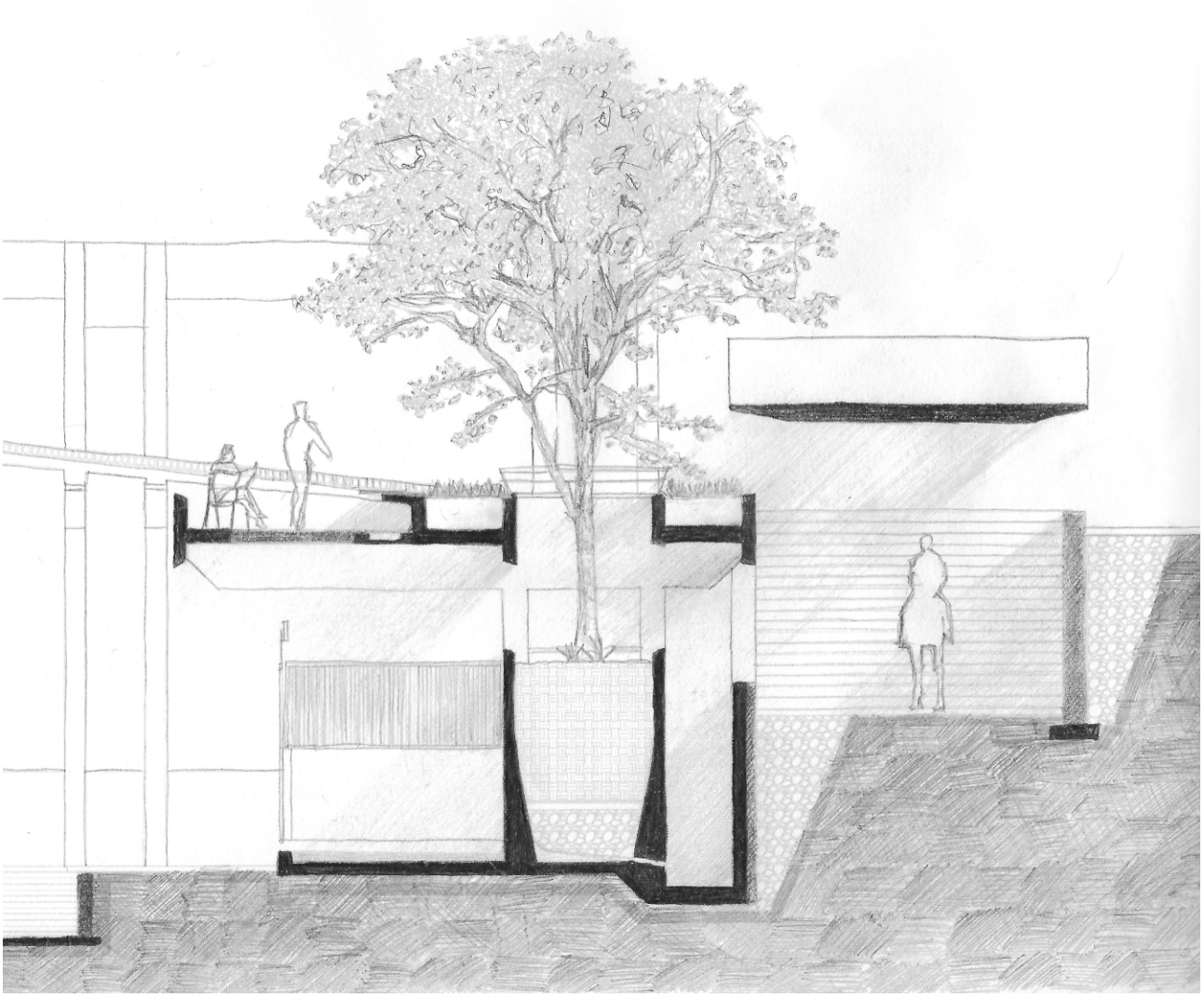


Fig 7.63: Section F_F showing the tunnel submerged underneath the ground plane

The last section of the ramp slowly descends into a tunnel, submerged underneath the surface which terminates in the Mounted Unit stable courtyard. This allows the horse to become used to moving from a very exposed to a very enclosed condition.

© University of Pretoria



Fig 7.64: An impression of Jacob Mare street with the ramp as a new edge (July 2013)

© University of Pretoria



© University of Pretoria

In architectural terms edge conditions are found at various scales of making architecture, from the threshold between the natural and built environment down to assemblies where various building materials join (Porter 2004:66).

TECHNICAL DEVELOPMENT

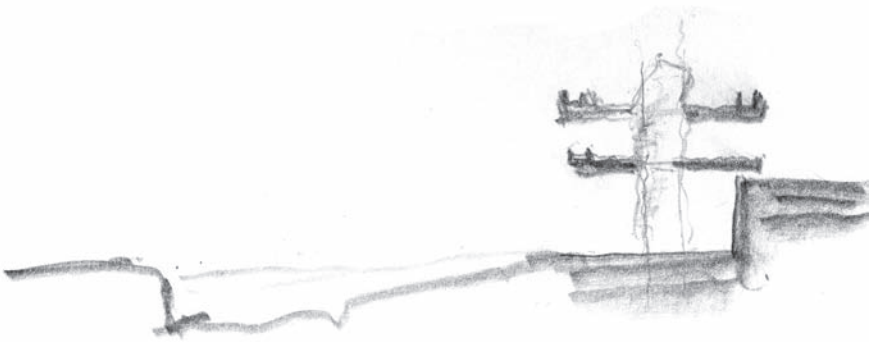
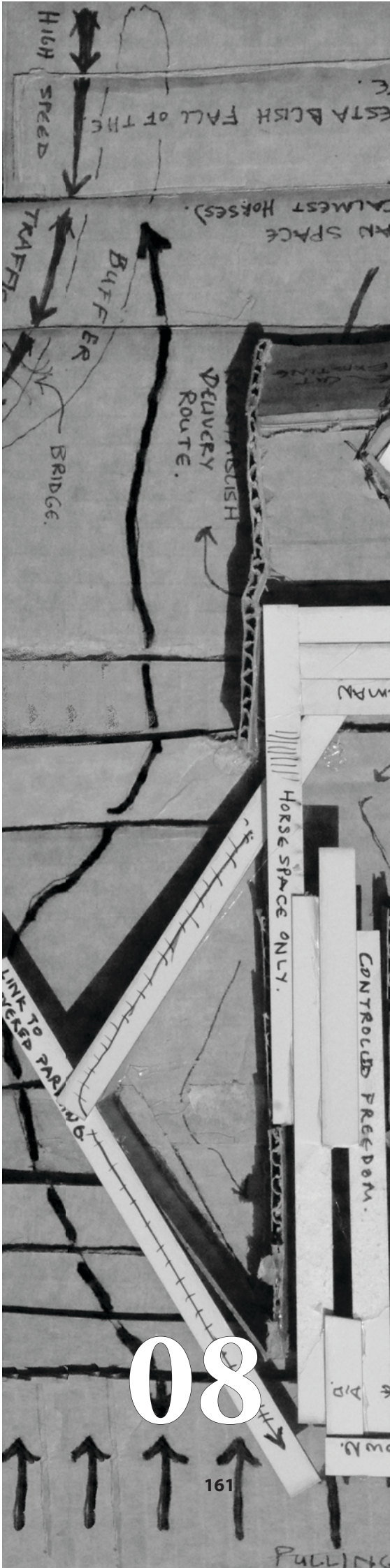


Fig 8.1: Technical concept diagram

Utility and function play a major part in the resolution of an equine facility, as surfaces needs to be easily cleaned, yet resistant to wear by horse shoes. Durability, robustness and 'horse friendly' edges are essential to a technical resolution of an equine facility.

This chapter introduces the process of creating a niche for the horse in the city. The diagrams in figure 9.2 illustrate this process with a focus on the Equi Scape edges.

Finally, due to the high water demand of the facility, catchment and treatment of water is discussed.

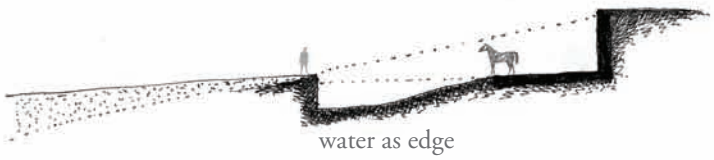


08

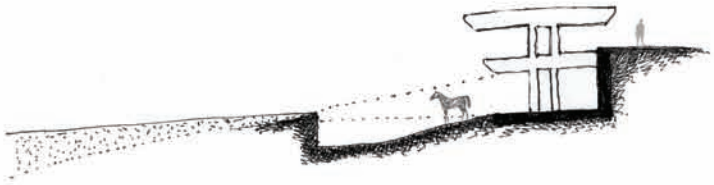
© University of Pretoria



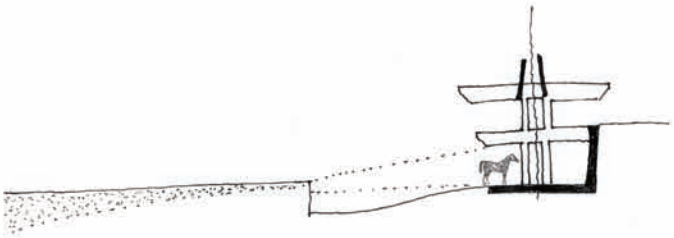
MAKING A NICHE
[Excavation]



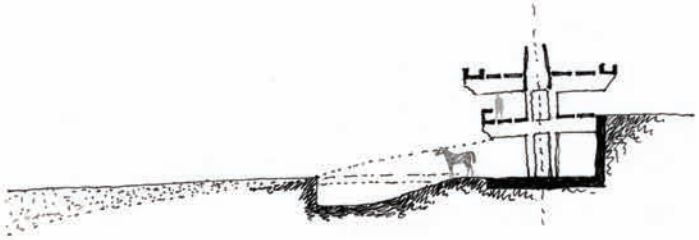
SHAPING THE LANDSCAPE
[Excavation]



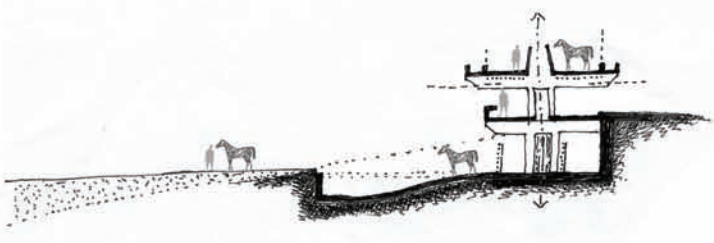
INFRASTRUCTURE
[Primary structure]



MAKING INFRASTRUCTURE HABITABLE
A duct with an in-situ concrete cap, links earth and sky by punching through the ramp.



ARCHITECTURAL PRECAST INFILL
[Secondary structure]



ACCESSORIES
Steel and timber accessories, contrasts the heavy concrete infrastructure. The accessories are designed to be user specific [human or horse specific].

Fig 8.2: Technical development diagrams

© University of Pretoria

The horse forms part of a system which engages with the landscape, architecture and infrastructure. Culminating and creating a new topography which allows people to engage with nature, through both animals as well as through hybrid ecological systems.

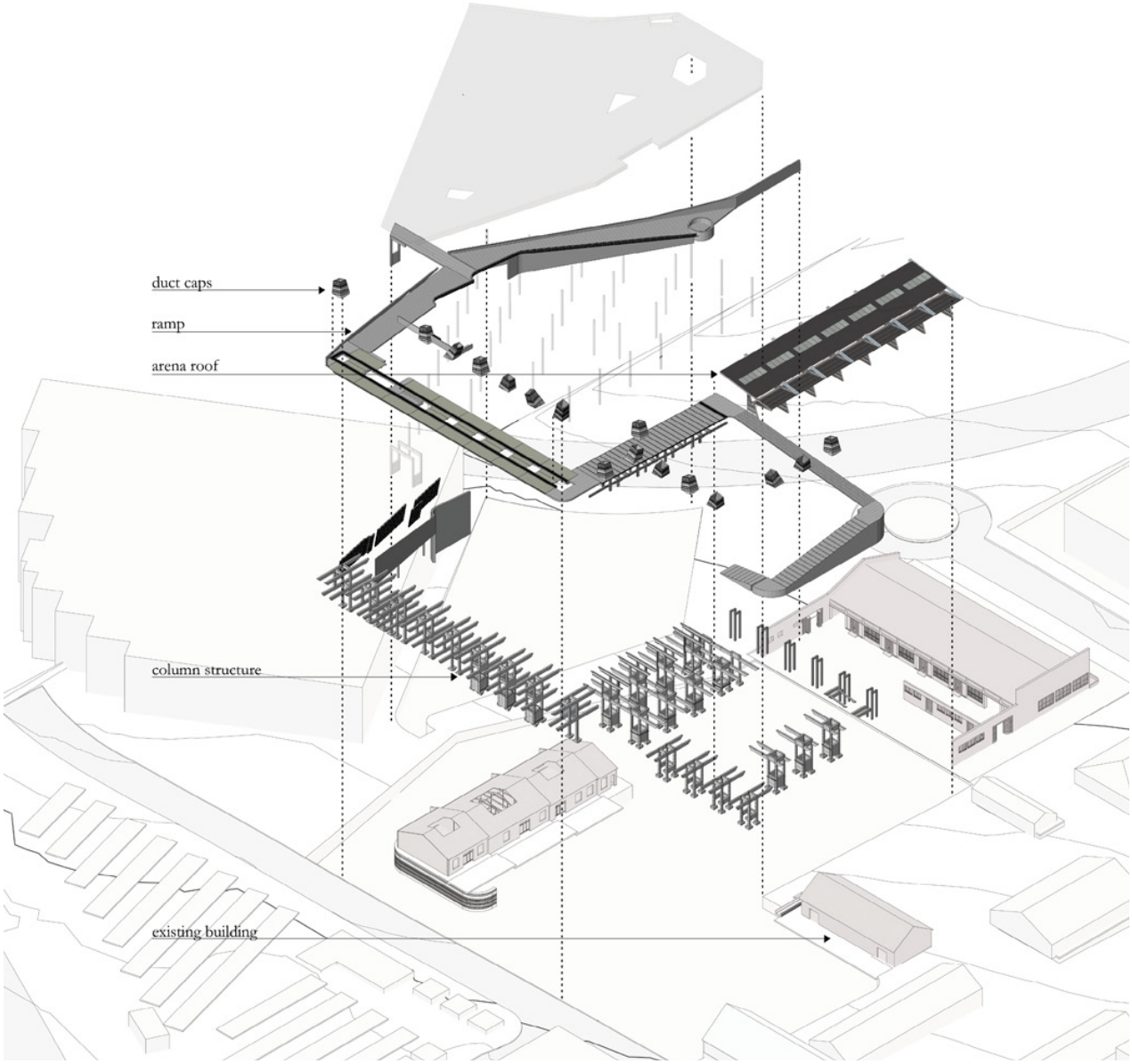


Fig 8.3: Exploded axonometric showing the ramp, its structure and landscape

The tectonic intention developed from the idea of a scape edge which becomes a joint between infrastructure, landscape and architecture. The ramp as scape edge creates a path, linking several spaces together, creates an edge for the site, while allowing the architectural landscape to be stitched into the urban fabric.

© University of Pretoria



8.1 TERRAFORM

Infrastructure's medium is topography. The intervention shapes the landscape in several ways in the creation of a niche for the horse in a human habitat. The primary alteration is the excavation. The secondary infrastructural intervention is the ramp, which rises out of the landscape: initially grounded to the landscape, but then gradually separates itself from it, allowing the horses to be introduced to the urban environment and its various conditions. The ramp creates various experiences of enclosure and exposure through changes in height, materiality of bridges, tunnels as well as relationships to people and taxis. The ramp creates the experience of moving from a ground plane to a sky plane to a condition that submerges itself into the landscape.

Fig 8.4: Desired concrete texture, created by the shuttering

© University of Pretoria

8.1.1 EXCAVATIONS TO CREATE A NICHE

The idea for excavation in the creation of a niche came from the National Cultural History Museum and its approach to the landscape. An approach which was adopted to create courtyards; peaceful places for the horses away from the noise generated by traffic. The level change also created an edge between people and horses.



8.1.2 SHAPING THE LANDSCAPE

The courtyards have several functions but primarily they become an approach to the heritage, which creates voids in front of their main facades. The courtyards also house and protect the horses in the city, while creating a space for controlled contact.



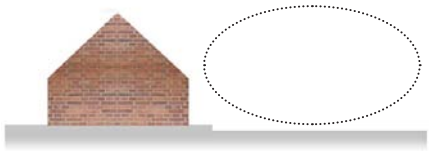


Fig 8.5: Courtyards and public squares

8.1.3 EXISTING MATERIAL PALETTE



Fig 8.6: Store room trusses

© University of Pretoria

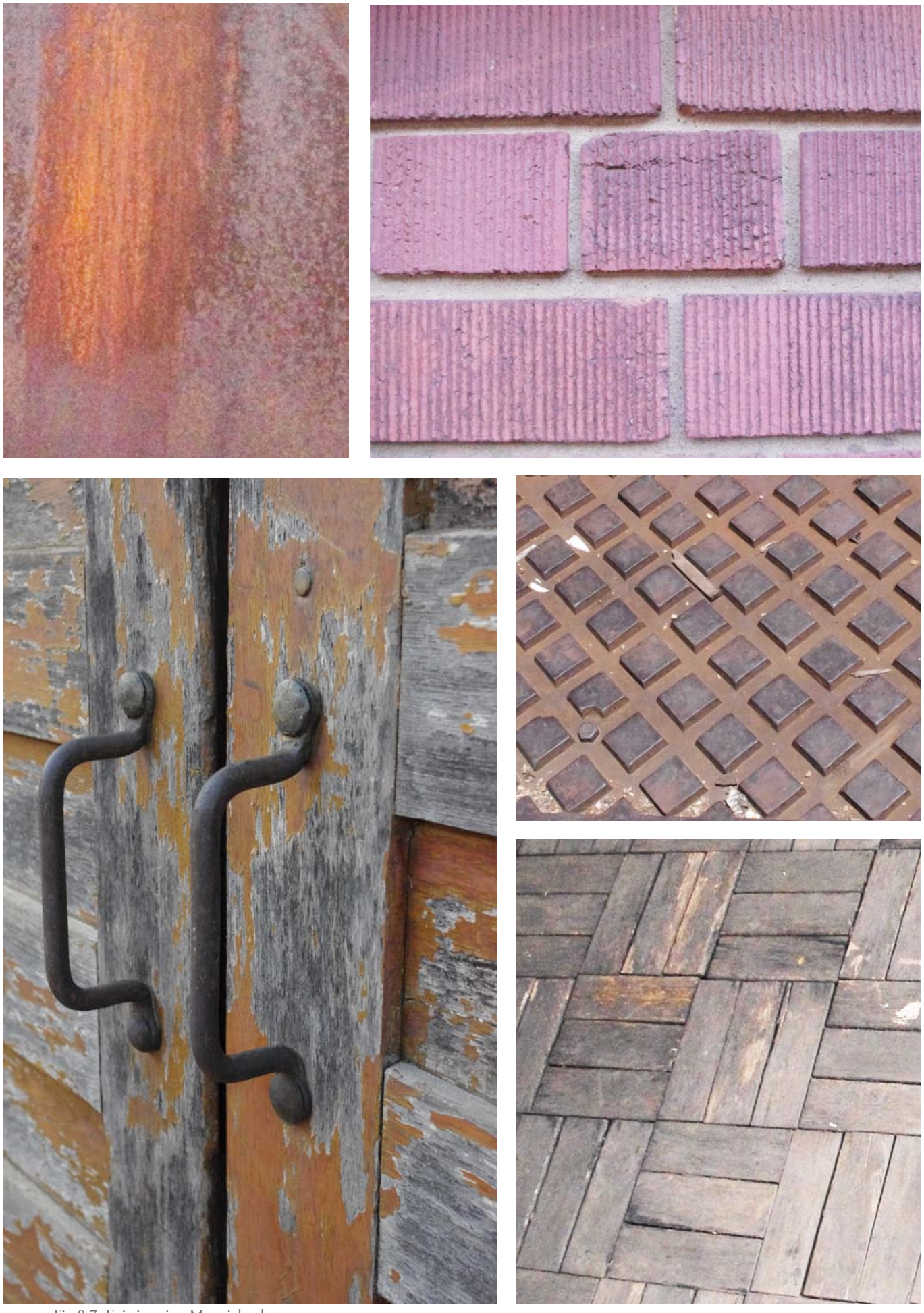
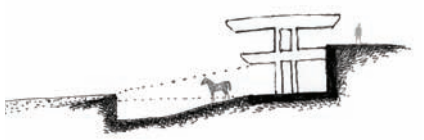


Fig 8.7: Existing site: Material palette

© University of Pretoria

8.2 PRIMARY STRUCTURE
INFRASTRUCTURE



Infrastructure with an architectural landscape intent.

The material used for the ramp's primary and secondary structure is concrete. This allowed for the establishment of a language of difference between the existing heritage buildings and the new intervention: setting apart the old and new.

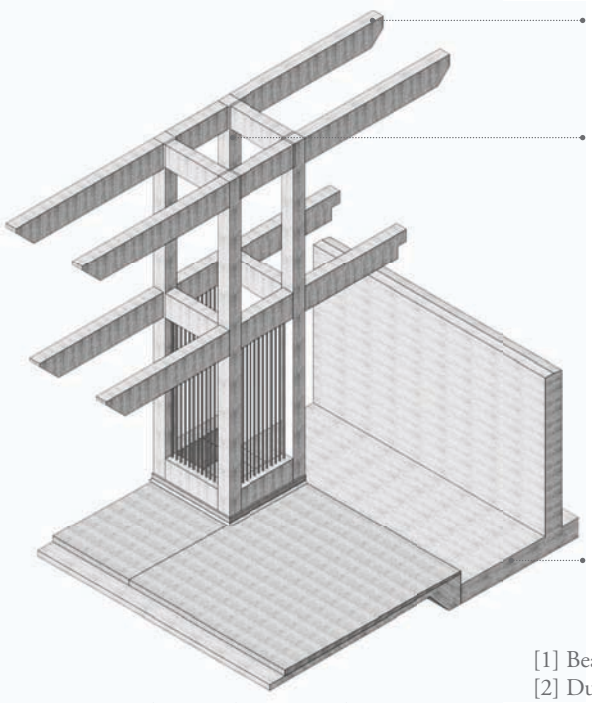
The excavated courtyards are edged by the ramp. This establishes an architectural edge which firstly accommodates people and horses; secondly brings landscape architecture and infrastructure together.

The ramp's primary structure is an in-situ reinforced concrete column and beam system. These structural elements are seen as the vertebrae of the ramp.

The concrete finish as seen in figure 8.9, is created by the joints between rough sawn timber sheets as shuttering.

The structural elements are to be cast in situ, this suggests a certain level of permanence. The ramp is viewed as a lasting intervention on the site.

Museum Park has a low density which is not likely to increase in future although the city around it will. The Equi Scape is therefore viewed as an architecturally edged landscaped complement to Burgers Park if its equestrian function were to fall away.



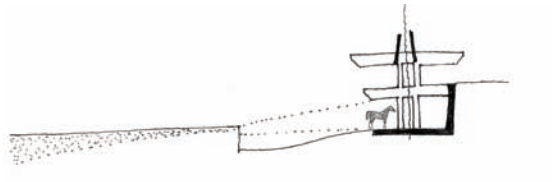
[1] Beams
[2] Duct core
[3] Tanked basement (retaining wall)

Fig 8 8: 3D showing the structural system (with its duct core which allows for drainage, lighting and ventilation)

Fig 8.9: Desired concrete texture, created by the shuttering

© University of Pretoria

8.3 MAKING INFRASTRUCTURE HABITABLE



In order to make the infrastructure more habitable alterations were made to its structure. By exploding the structure into four columns a duct core is created within each structural element. This allows for natural ventilation and lighting, as well as water drainage from the ramp.

The core duct allows for the reevaluation of infrastructural sub-spaces.

8.3.1 SUNLIGHT

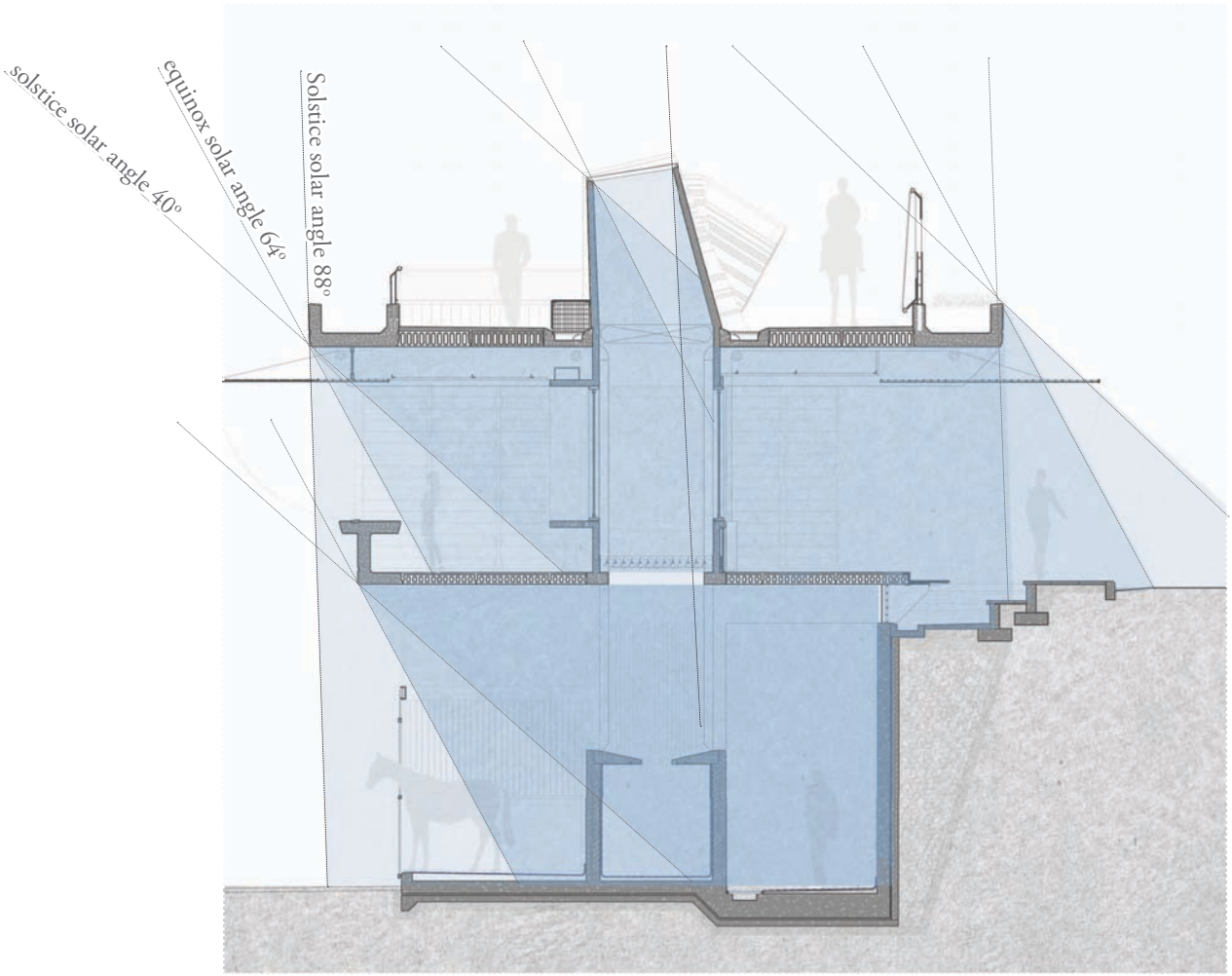


Fig 8.10: Section illustrating natural day lighting into the infrastructural sub-spaces

© University of Pretoria

8.3.2 STABLE VENTILATION

Ventilation processes:
1. Air exchange
2. Distribution

Most **comfortable temperature zone** for a horse **7 - 24 oC**
(Wheeler & Zajaczkowski 2009:7.2)

According to Wheeler and Zajaczkowski (2003:7.1) "inadequate ventilation is the most common mistake made in modern horse facilities." This is because often stables are designed for people's perception of comfort opposed to considering horses, as livestock, with their own specific needs. The stable needs to be far from air tight to allow the removal of moisture, odour, dust and mold through the constant flow of air.

Horses tolerate cold well thus the focus of the stable design is in the creation of a well ventilated rather than 'warm' environment.

"The stable environment in winter is almost as cold as outdoors but comfortably dry with no condensation dripping from the ceiling." (Wheeler and Zajaczkowski 2003:7.2)

Wheeler and Zajaczkowski (2003:7.15) also emphasizes that it is preferred to have a small amount of rain enter the stable a few times in a year rather than having a stuffy barn for an entire season.

8.3.2.1 NATURAL VENTILATION OF A BUNKED STABLE

1. Transpiration and evaporative cooling in courtyard

2. Stack system created by the infrastructural structure. This component is equipped with a fan to encourage air movement for wind still days in Pretoria.

3. Ventilation is often one of the most neglected aspects of stable design. The stables were designed with specific entry points for fresh air and exit points for stale air.

Ventilation duct cores are evenly distributed; providing constant fresh air constantly provide fresh air to each horse.

8.3.2.2 STALL PARTITION CONSIDERATIONS FOR IMPROVED VENTILATION

1. Gaps between stall boards
2. Open grills between stables which also aids horse's visibility
3. A full length mesh door
(Wheeler & Zajaczkowski 2009:7.13)

8.3.2.3 MECHANICAL VENTILATION

(A converted rule of thumb for each 450kg horse)

- 44 m^3/h for moisture control in cold weather conditions
- 170 m^3/h for heat removal in mild weather conditions
- 340 - 595m^3/h for hot weather conditions

(Wheeler & Zajaczkowski 2009:7.13)

© University of Pretoria

8.3.3 VENTILATION STRATEGIES IMPLEMENTED

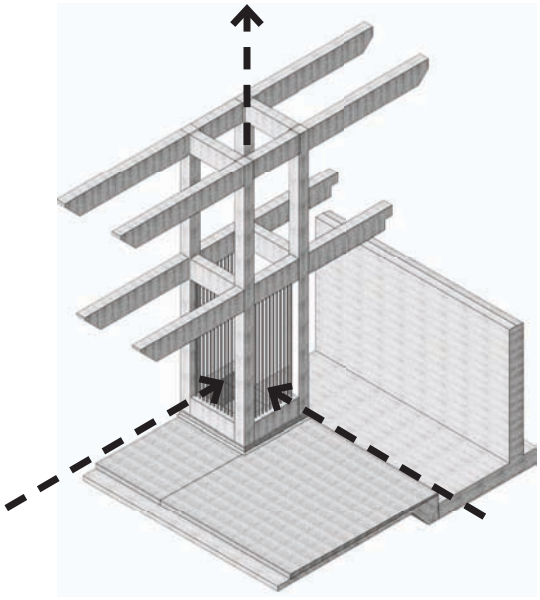


Fig 8.11: Column core as ventilation duct

8.3.3.1 EQUI SCAPE STABLE DOORS

The Equi Scape stable doors (figure 8.12) are designed to encourage fresh air distribution: allowing the inflow of air through the entire height of the stable.

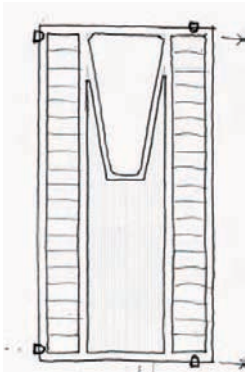


Fig 8.12: Stable door design to optimise ventilation across the entire height of the stable

8.3.3.2 FAN

A solar driven DC 12V fan, with electrical backup, is used to mechanically ventilate the stables. The fan is powered by direct current from solar panels or by deep cycle battery storage system when direct current is insufficient.



Fig 8.13 DC 12V fan

8.3.3.3 SOLAR PANELS

Translucent solar panels, mounted on shutters which pivots open, converts sunlight into electricity used for ventilation: 75% for charging the batteries for after hour use and 25% for direct use.



Fig 8.14 PV cells imbedded in 3.2 tempered safety glass [artsolar 125 watt peak power 17% efficiency]

8.3.3.4 HORIZONTAL LOUVRE SYSTEM

The translucent horizontal louver system from Colt allows for more control of the stable's ventilation, while still allowing some daylight into the stable.

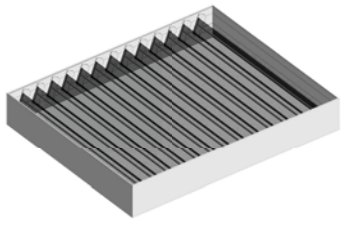


Fig 8.15 : Illustration of Euro Co polycarbonate horizontal louvre roof ventilation system from Colt

© University of Pretoria

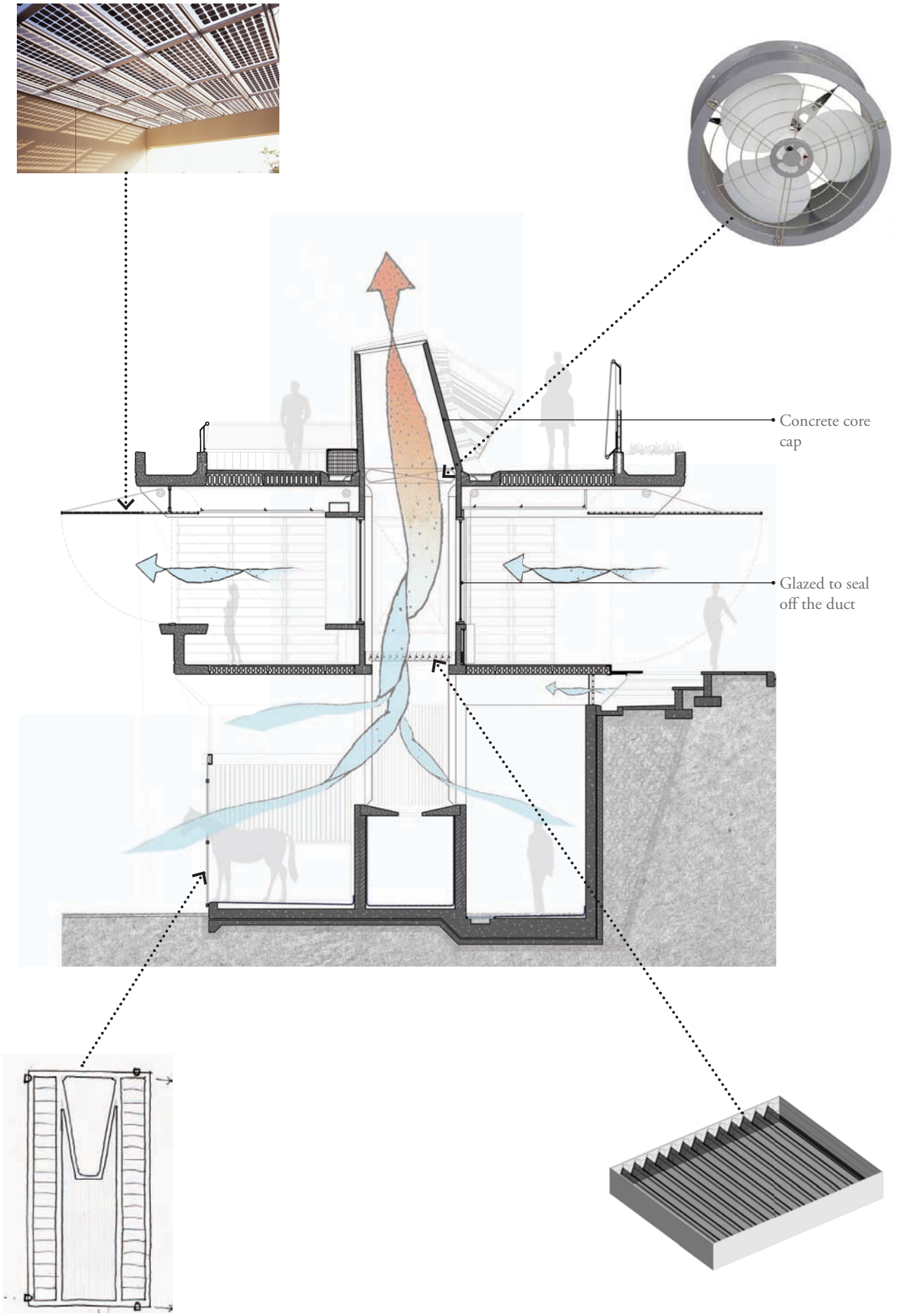


Fig 8.16: Section illustrating the separate ventilation systems for human and horse infrastructural sub-spaces

© University of Pretoria

8.3.4 RAMP DRAINAGE

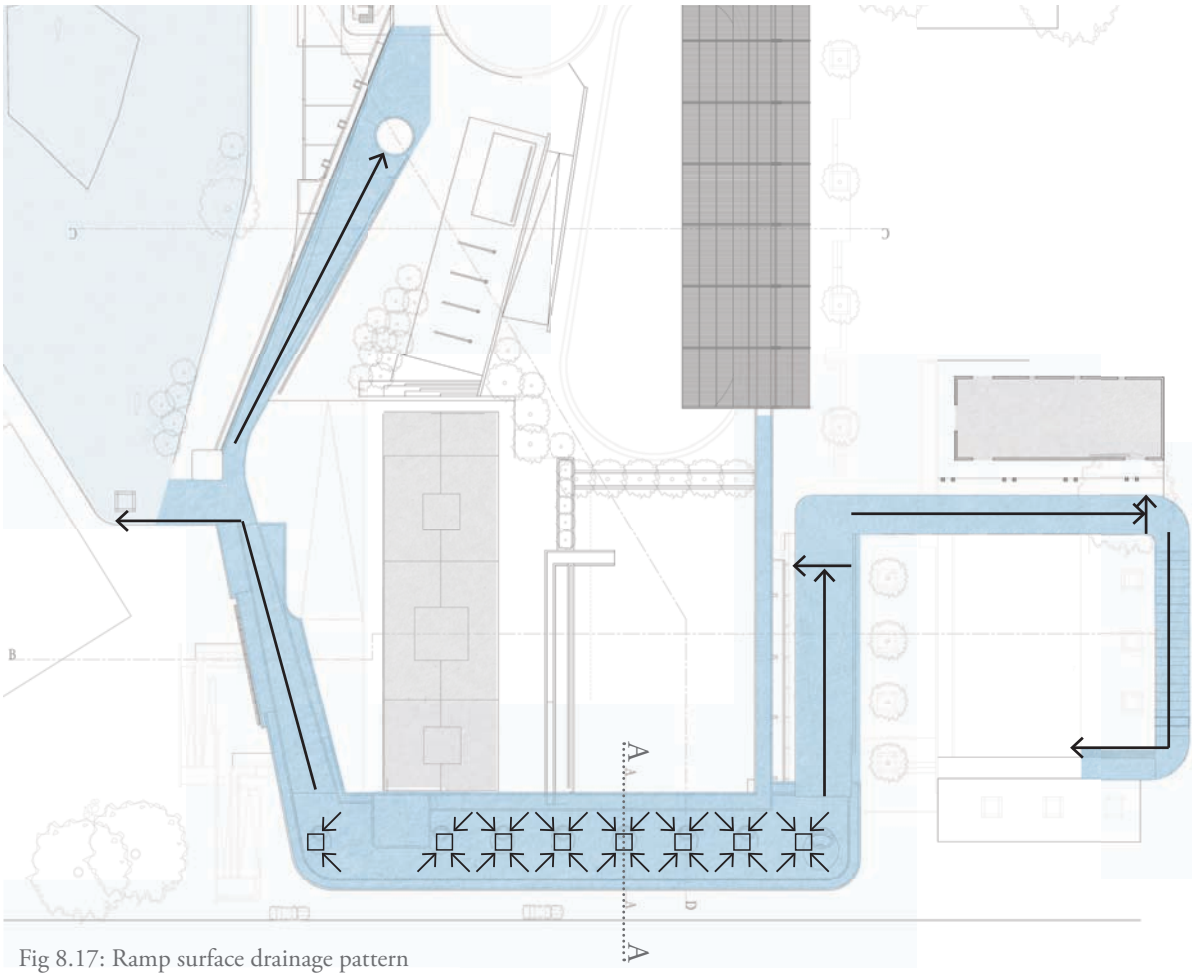


Fig 8.17: Ramp surface drainage pattern

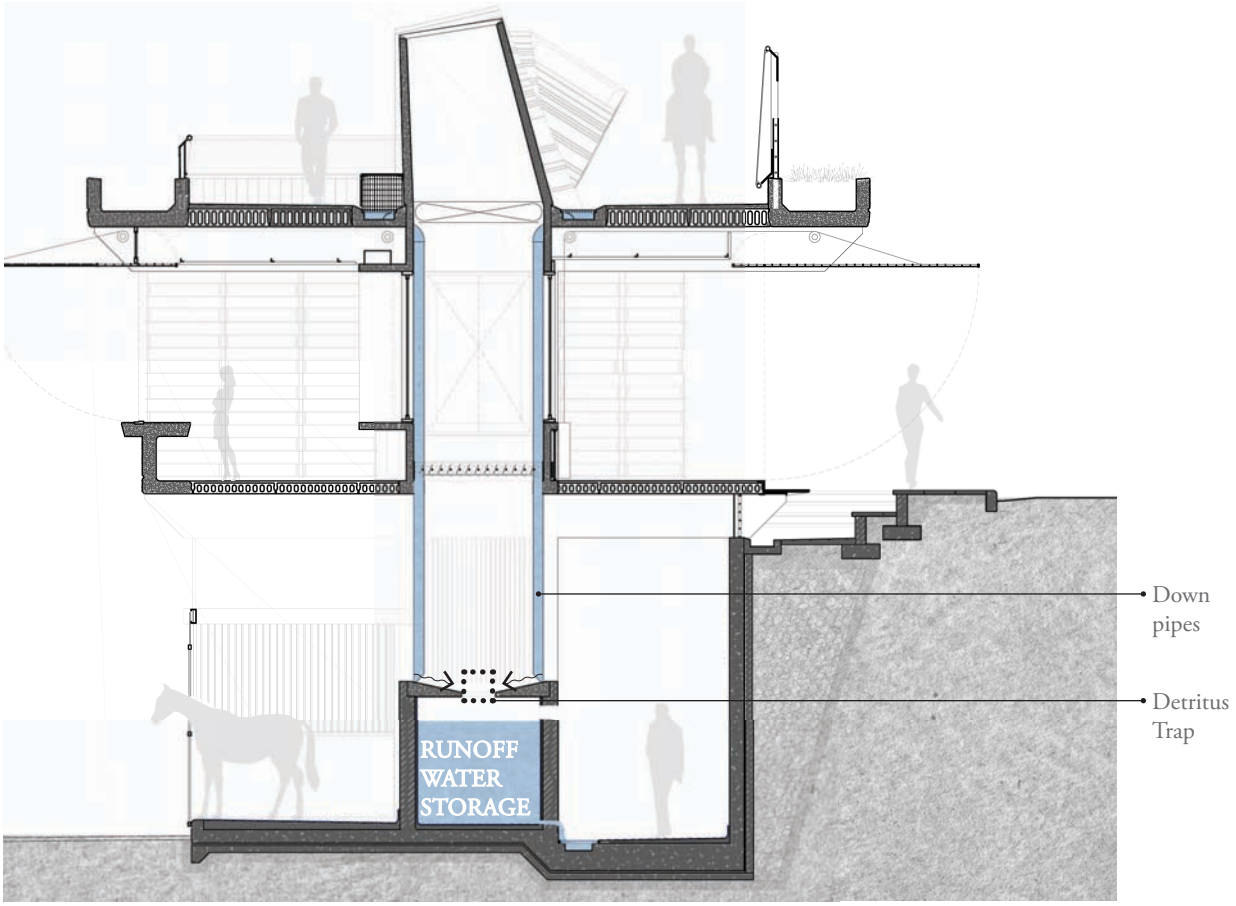


Fig 8.18: Ramp drainage down the core

© University of Pretoria

8.3.5 SECTION EXPLORATION

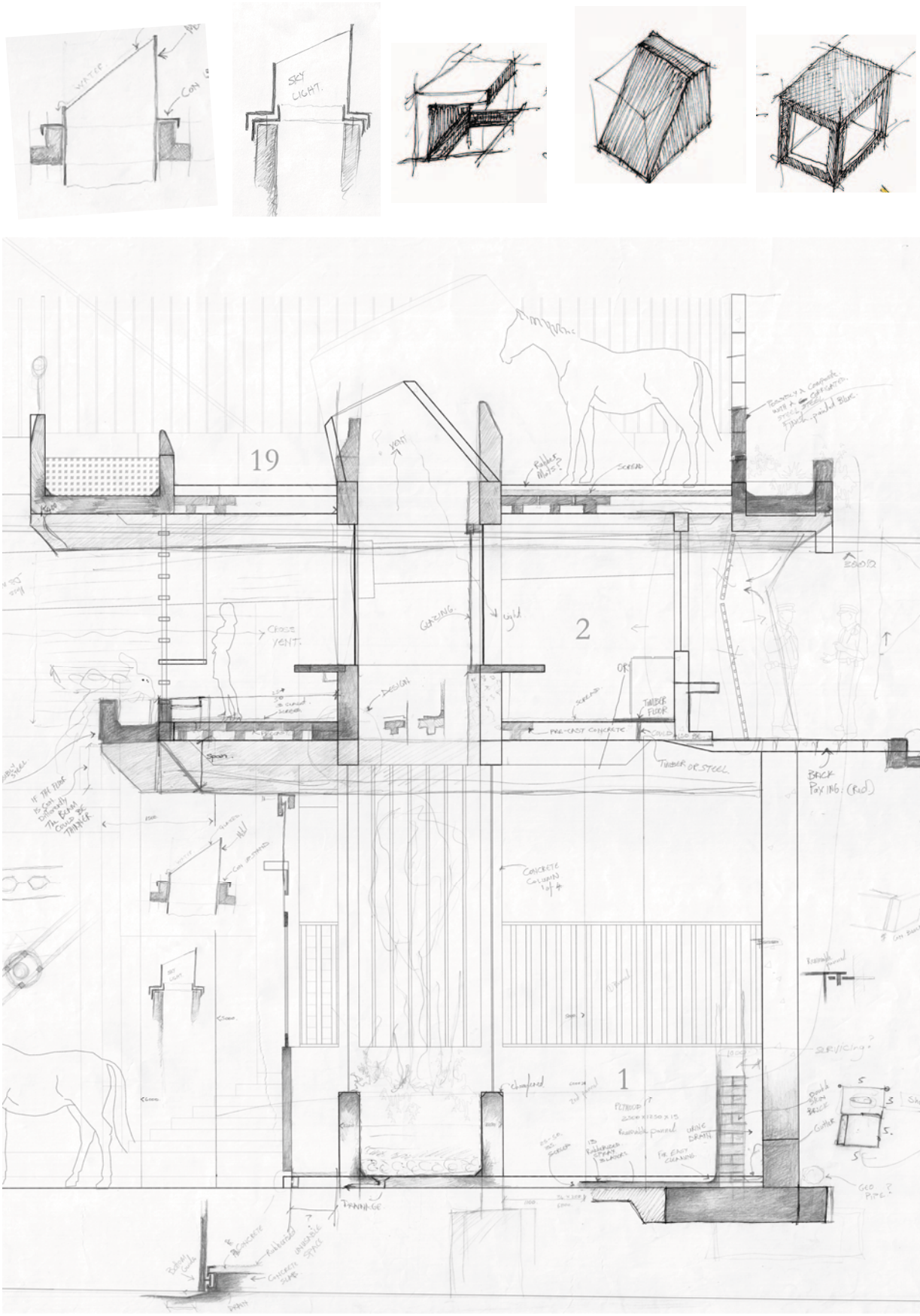


Fig 8.19: Section A_A exploration of technology

© University of Pretoria

8.3.6 DUCT CORE CAP EXPLORATIONS

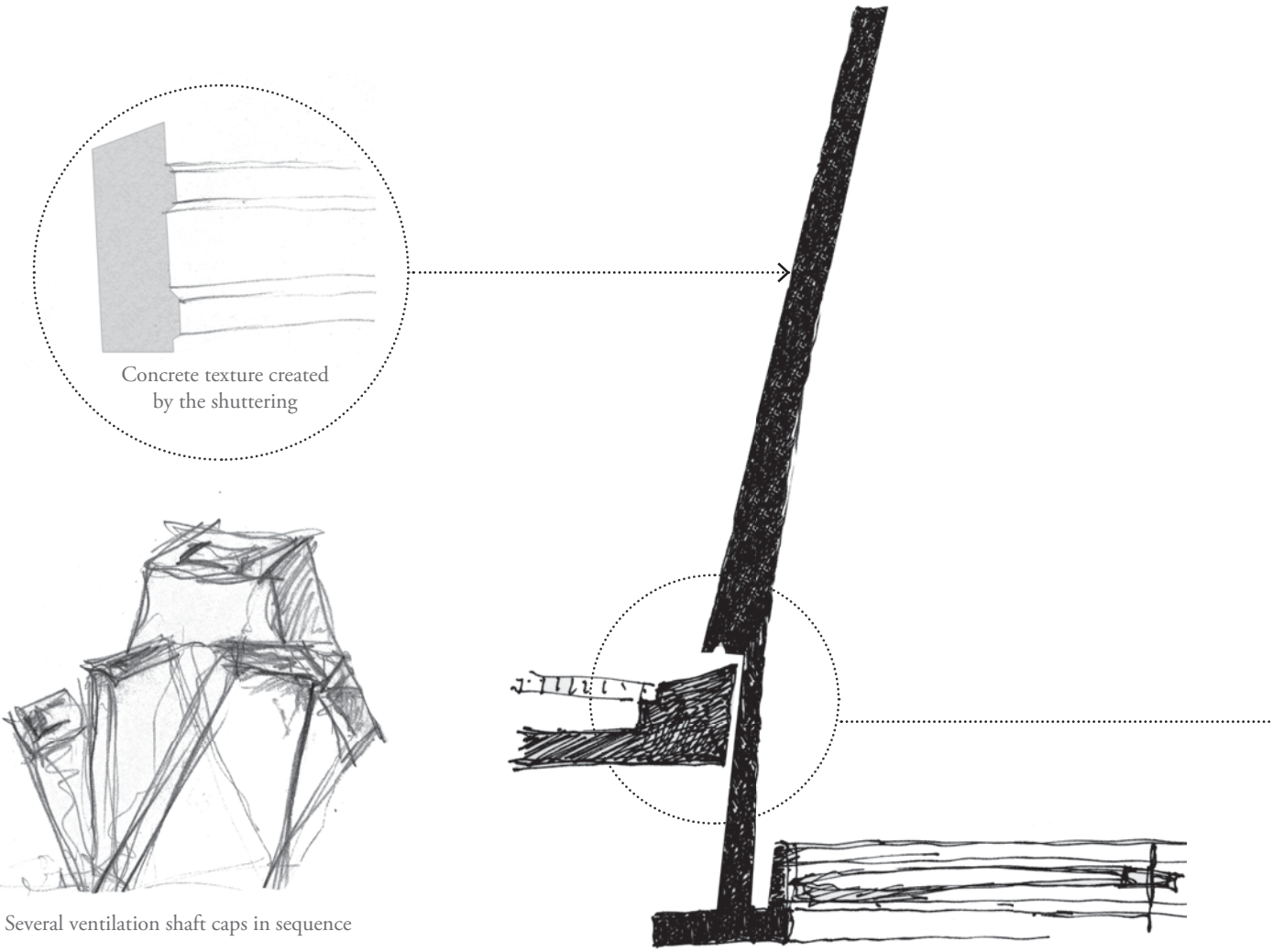
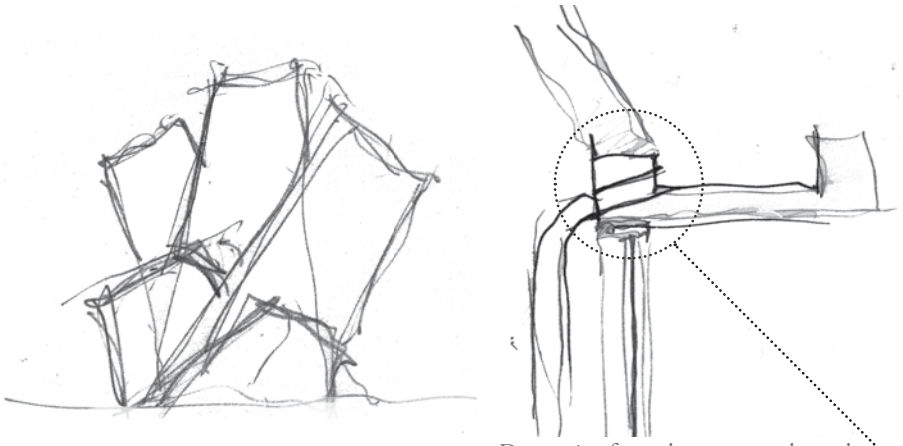
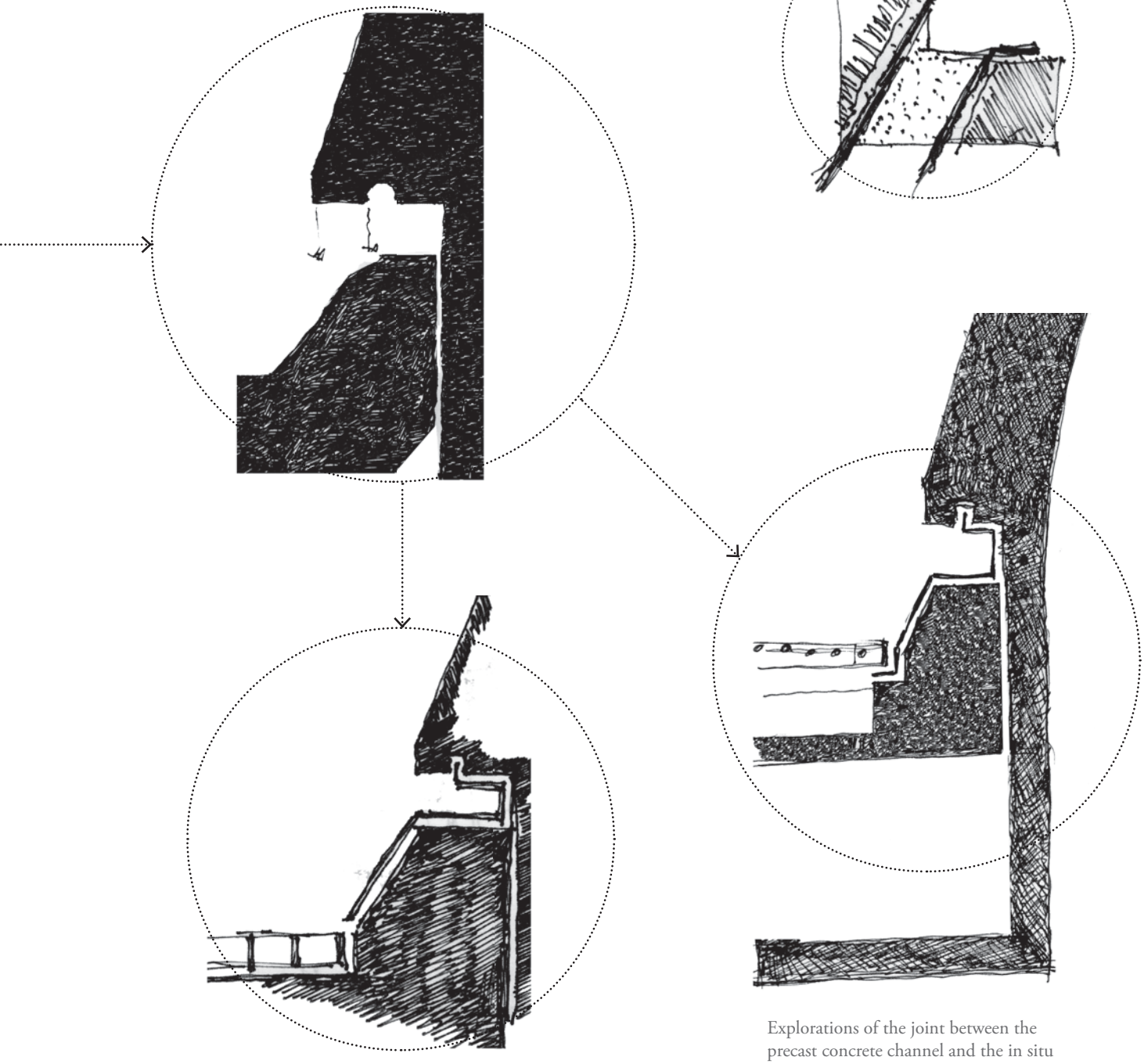


Fig 8.20: Sketches: exploring the duct core cap (September 2013)

© University of Pretoria



Down pipe from the concrete channel

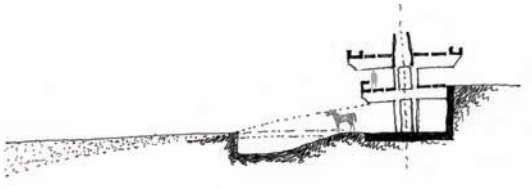


Explorations of the joint between the precast concrete channel and the in situ concrete cap

© University of Pretoria

8.4 SECONDARY STRUCTURE

ARCHITECTURAL PRECAST INFILL



Depth	Width	Self wt	Reinforcement	Superimposed loading in kN/m² with limiting clear span in metres						
mm	mm	kg/m²		1,5	2,0	3,0	5,0	7,5	10,0	kN/m²
120	1 200	216	Min	3,8	3,6	3,2	2,7	2,4	2,1	metres
			Max	6,0	5,9	5,8	5,1	4,5	4,1	metres

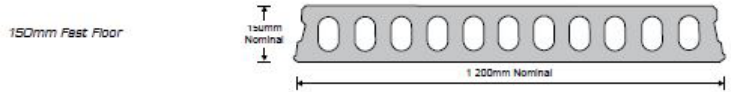


Fig 8.21: Precast concrete Echo Slabs for floors supporting people

Depth	Width	Self wt	Reinforcement	Superimposed loading in kN/m² with limiting clear span in metres						
mm	mm	kg/m²		1,5	2,0	3,0	5,0	7,5	10,0	kN/m²
120	1 200	216	Min	4,6	4,4	4,0	3,4	3,0	2,7	metres
			Max	7,5	7,4	7,0	6,3	5,6	5,1	metres

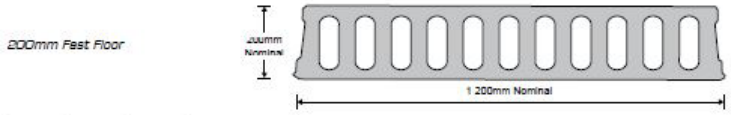


Fig 8.22: Precast concrete Echo Slabs for floors supporting horses

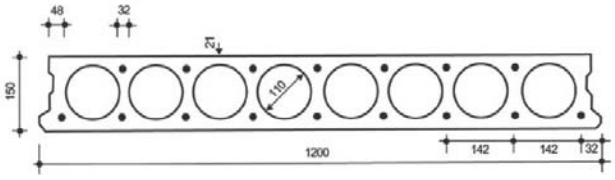


Fig 8.23: Precast concrete top floor Echo Slabs for making vertical concrete screens

8.4.1 PRECAST CONCRETE

The ramp is constructed from a few precast concrete elements. Mass production of specific components therefore becomes viable.

The site allows for a crane to gain easy access to the ramp edge at various points, making it possible for the use of heavy precast concrete elements.

8.4.2 HOLLOW CORE PRE-CAST SLAB SYSTEM

The ramp surface is predominantly constructed out of hollow core pre-cast slabs, they are to be sourced from Echo a local manufacturer.

© University of Pretoria

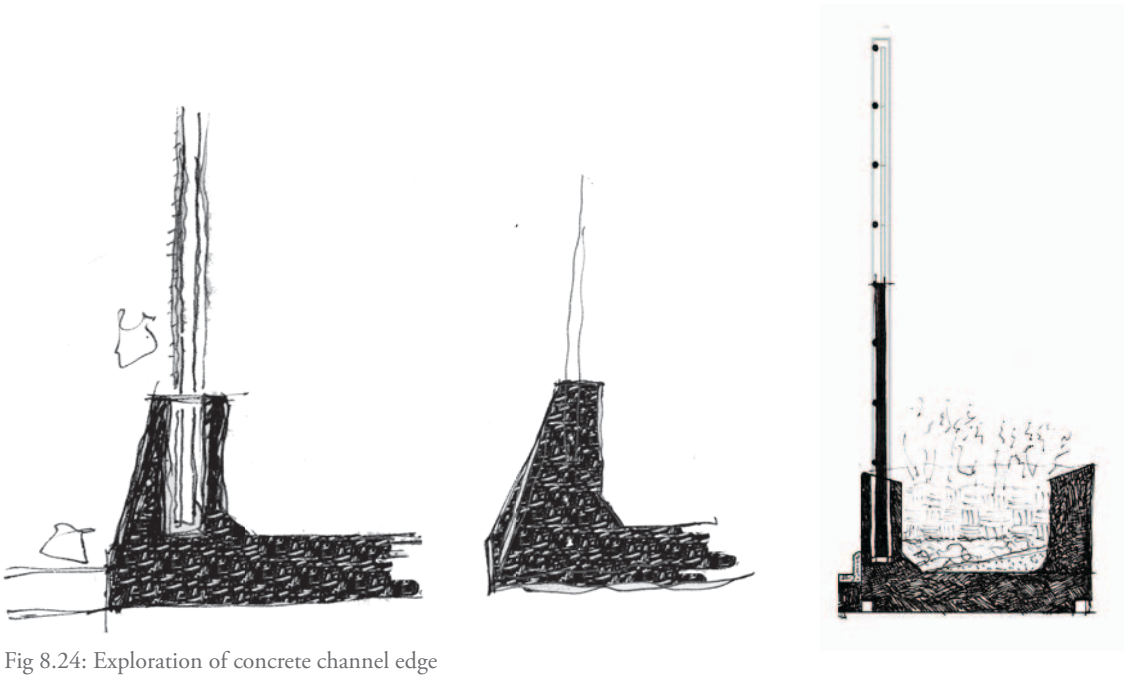


Fig 8.24: Exploration of concrete channel edge

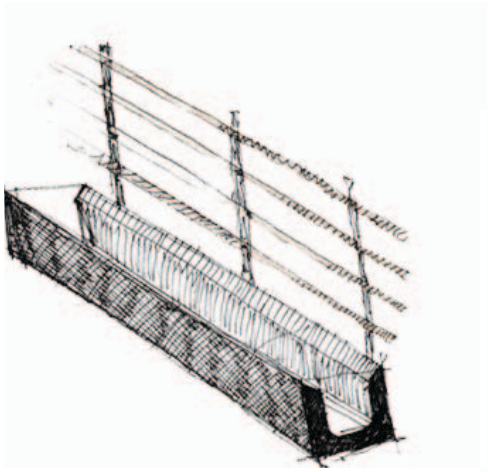


Fig 8.25: Exploration of concrete channel balustrade

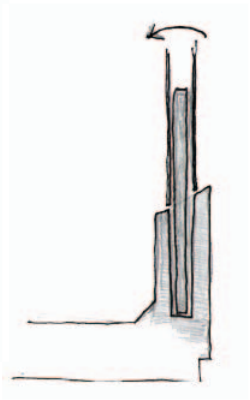
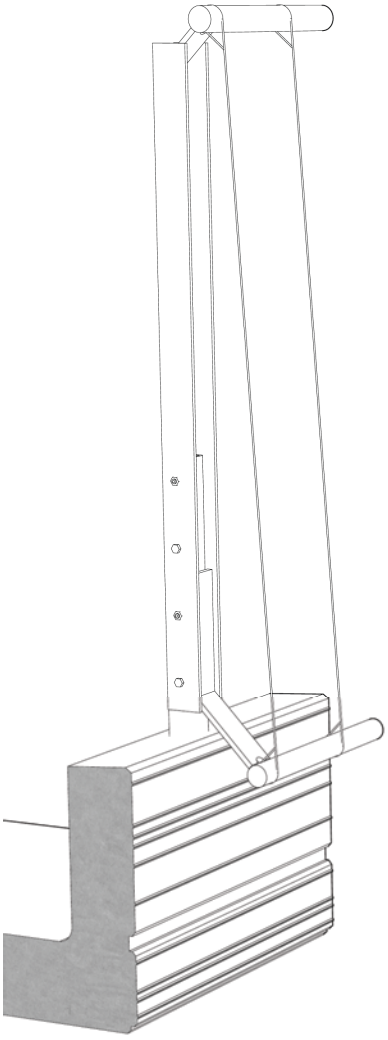


Fig 8.26: Due to the potential lever force generated when a horse pushes against the balustrade, the concrete channel is designed to withstand such forces



8.4.3 PRECAST CONCRETE CHANNEL EDGE

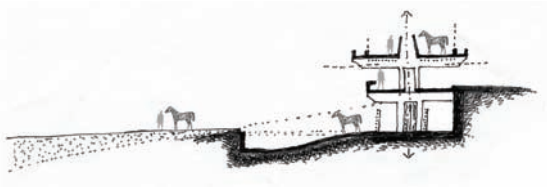
The Ramp edges are designed as precast channels, into which some details and fixings are to be factory cast. These edges are held in place by gravity.

The sides of the channels have a concrete finish with expressed joints. This allows the channels to create a continuous flowing edge, when placed in sequence, despite the vertical joints between the channel components. The finish also creates a texture which breaks the surface of the channel up into horizontal strips.

© University of Pretoria

8.5 ACCESSORIES

Steel and timber accessories contrasts the heavy concrete infrastructure. The accessories are designed to be user-specific [human or horse specific].



8.5.1 EXPLORATIONS FOR A MOUNTED HORSE BALUSTRADE

The balustrade design stems from the ergonomics study in chapter 4, as well as the location of the balustrade on the ramp which creates specific considerations in terms of safety. The bottom rail of the balustrade needs to protrude so as to keep the horse's body from pushing the rider up against the balustrade, increasing the risk of injury.

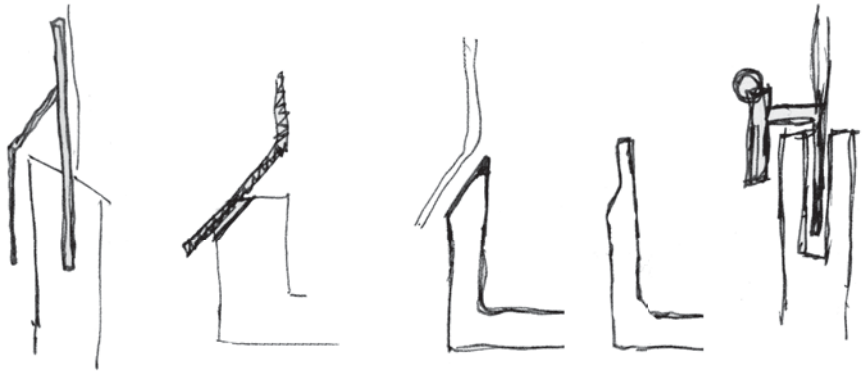


Fig 8.27: Exploration fixings to of channel edge

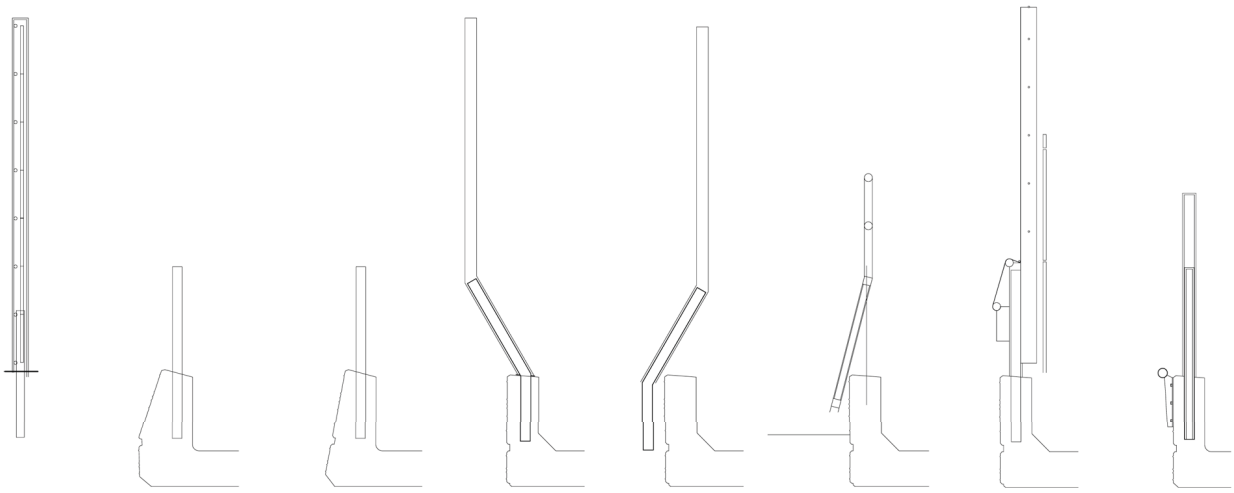
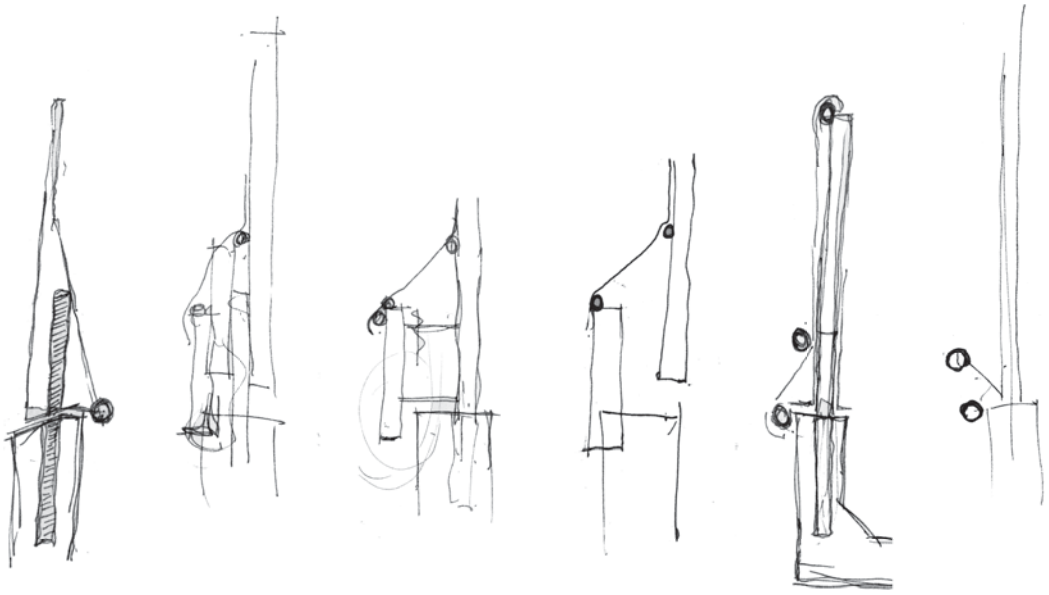
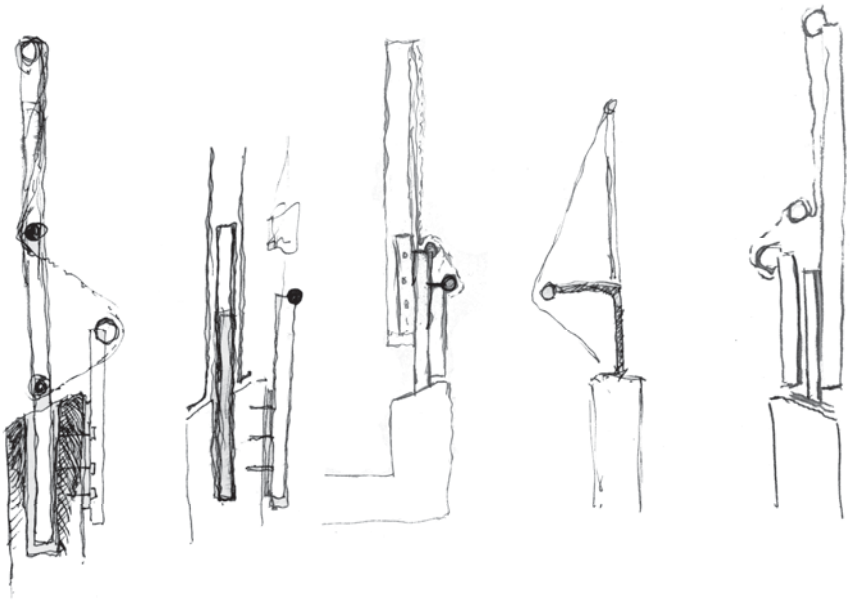
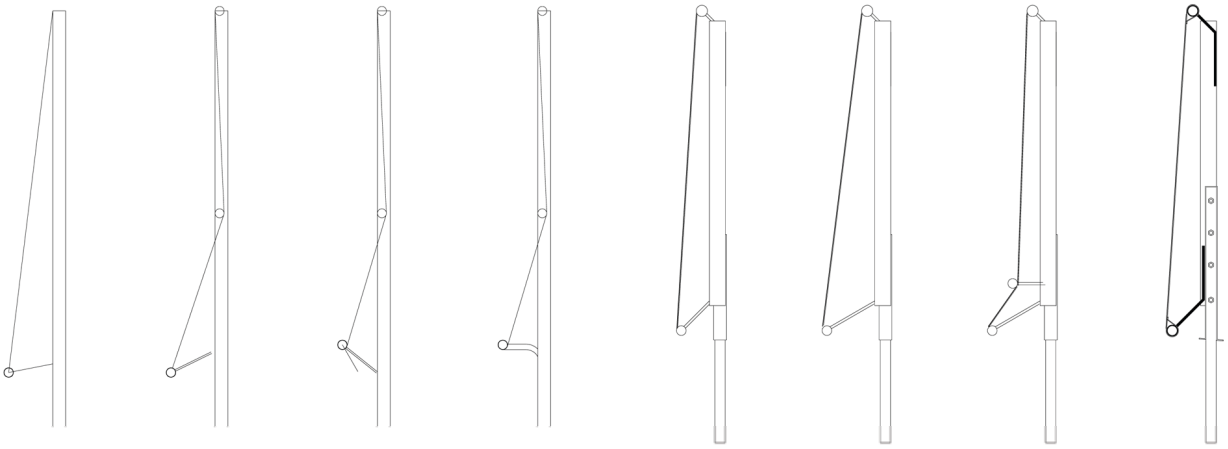


Fig 8.28 Exploration of a variety of balustrades and their relationship to the channel

© University of Pretoria







© University of Pretoria

8.5.2 STEEL ACCESSORIES

Steel and timber accessories are attached to the concrete channels. Accessories include balustrades, seating and screens. Both the precast concrete and steel balustrade detail shown below are factory manufactured, which increases its accuracy.

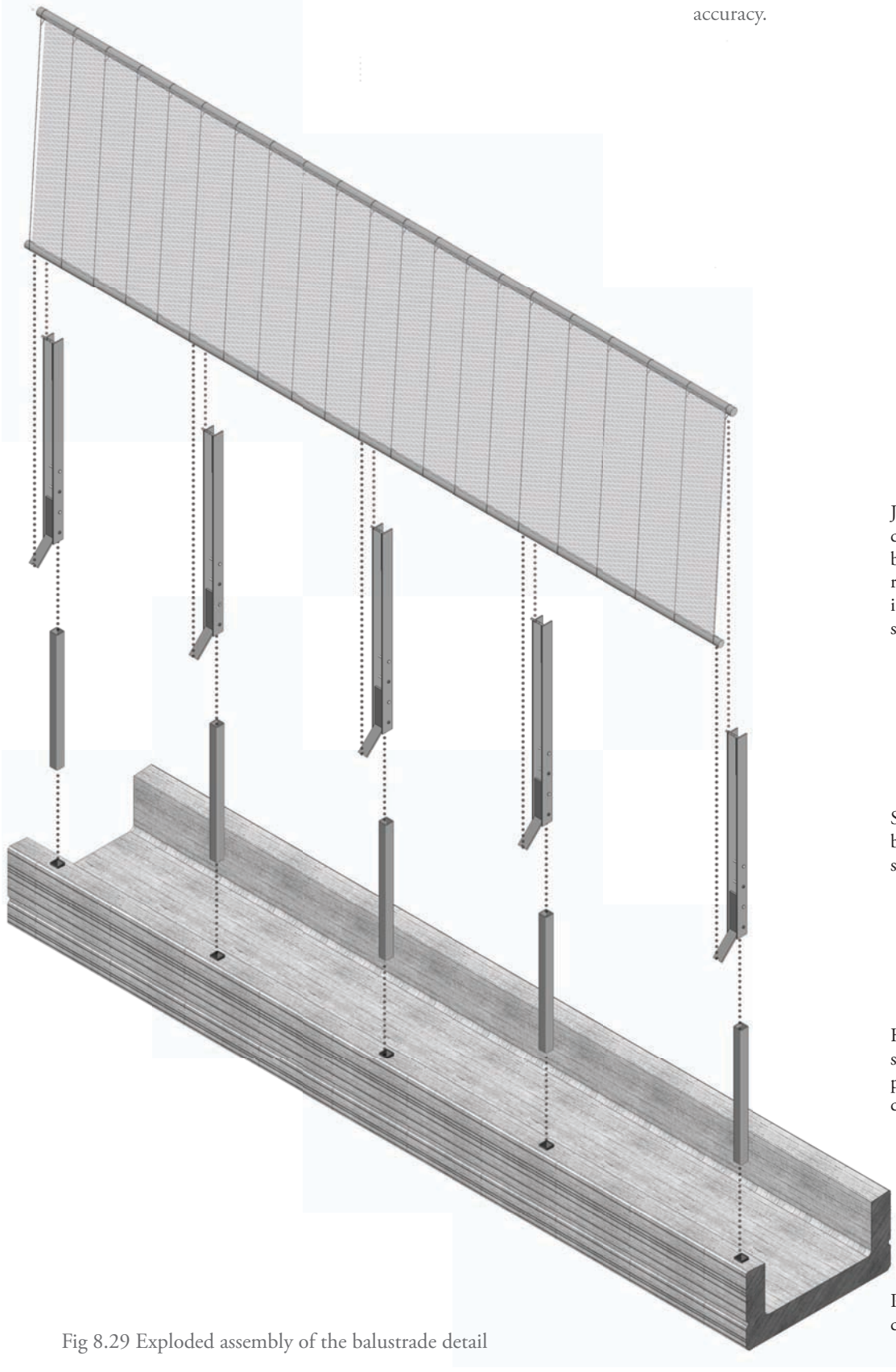


Fig 8.29 Exploded assembly of the balustrade detail

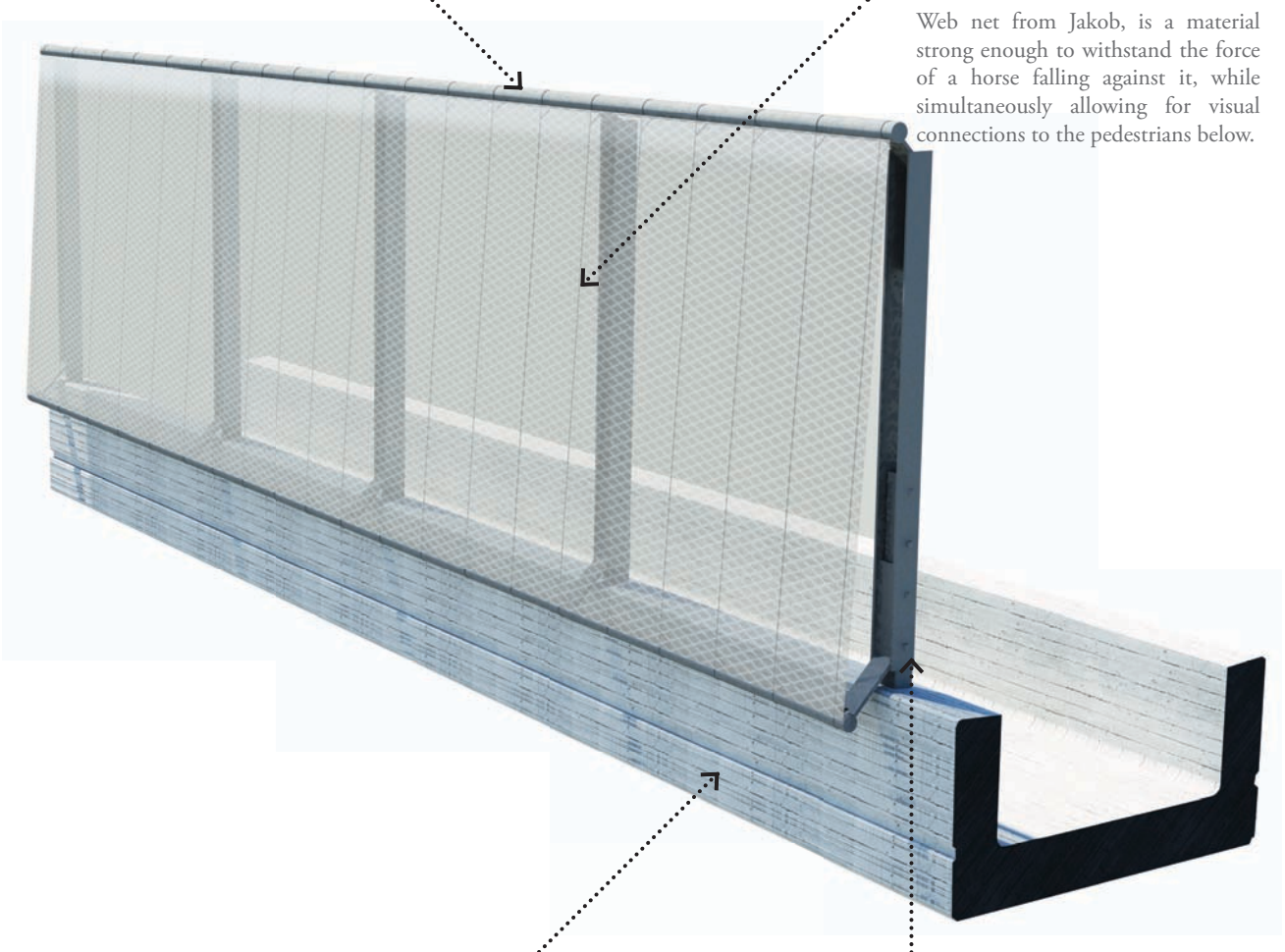
© University of Pretoria

The top and bottom rail of the balustrade will be made from a hollow circular galvanised steel section.





Web net from Jakob, is a material strong enough to withstand the force of a horse falling against it, while simultaneously allowing for visual connections to the pedestrians below.



Concrete texture, created by the joints between the shutter joints





Galvanised steel baluster all joints to be factory welded and then galvanised, upon arrival on site it can simply be bolted to the channel's cast in sections.

Fig 8.30 Assembly detail with assigned materials

© University of Pretoria

8.5.3 COLOUR PALLET BASED ON EQUINE VISION

In chapter 4 equine vision was discussed: in relation to the colours visible to horses as well as the associations which horses can make between colours and activities.

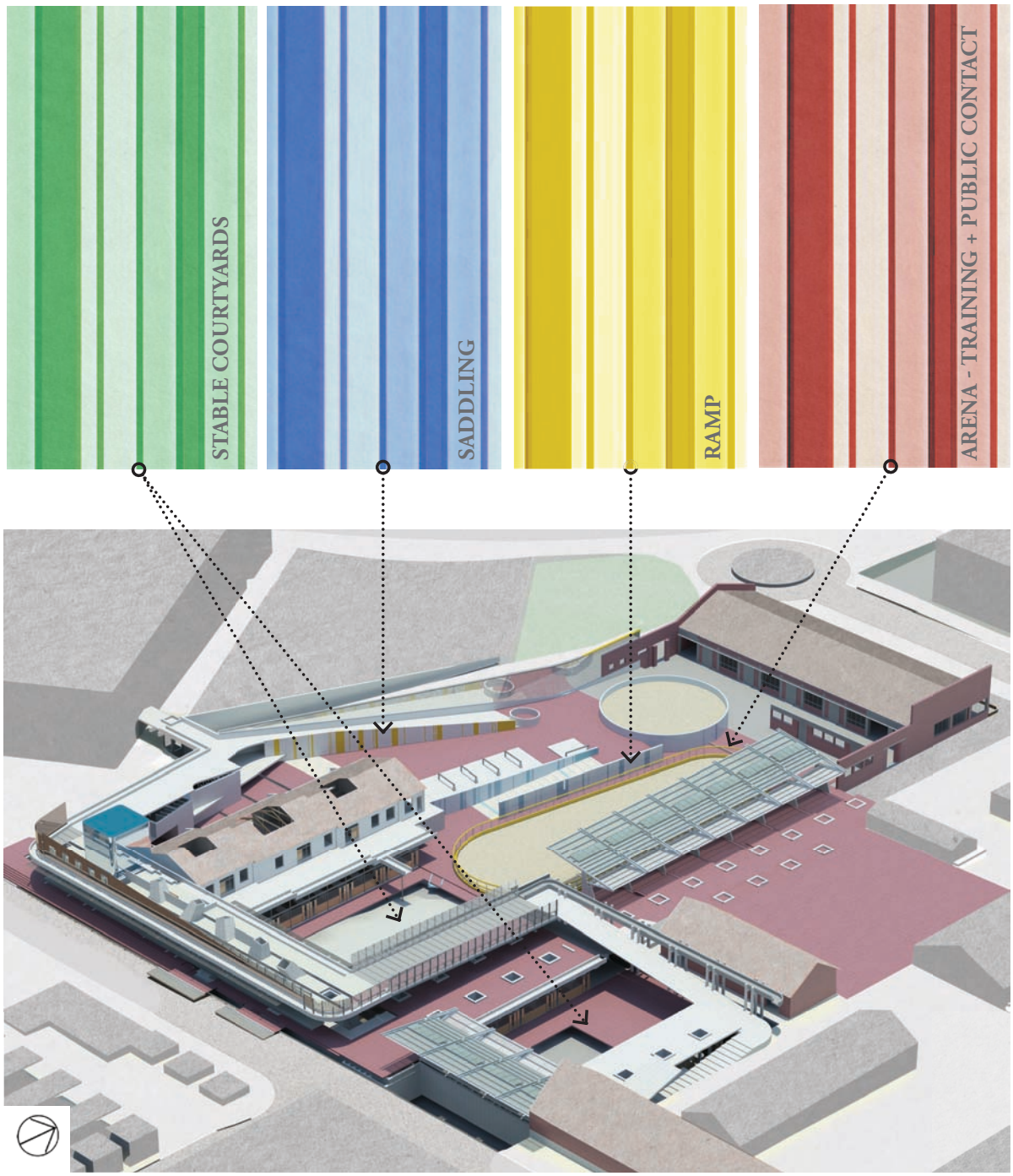


Fig 8.31: Surfaces to be painted colours which are visible to horses

© University of Pretoria

8.5.4 ARCHITECTURAL IN-FILL AND REUSE OF MATERIAL

The architectural in-fill ensures that the ramp becomes micro contextual. Spaces are articulated differently as it winds through the site, responding to context and users.

The buildings that are being demolished on site provides an opportunity for the reuse of building materials. Timber, steel sections and glazing can be reused as in-fill for the ramp sub-spaces as well as in the manufacturing of accessories.

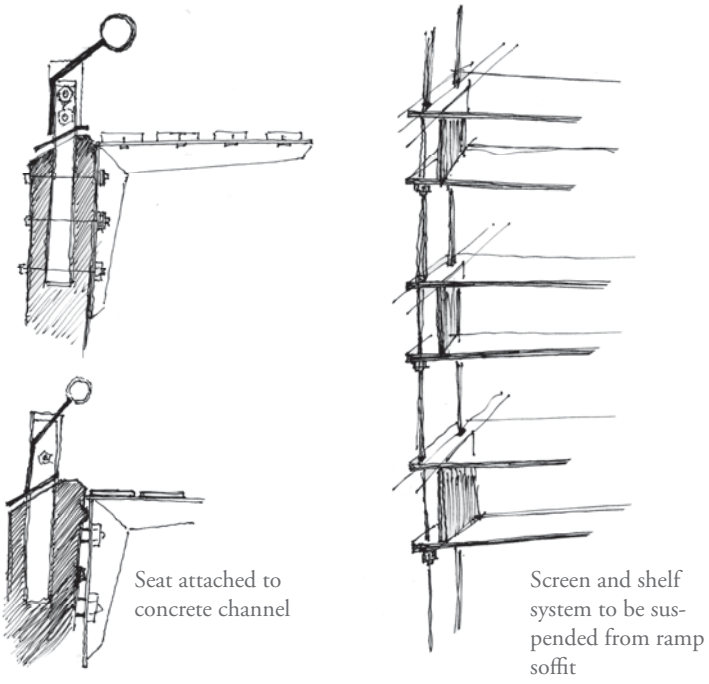


Fig 8.32: Sketches illustrating examples of timber and steel products that have the potential to be made from reused material

REUSE OF MATERIAL

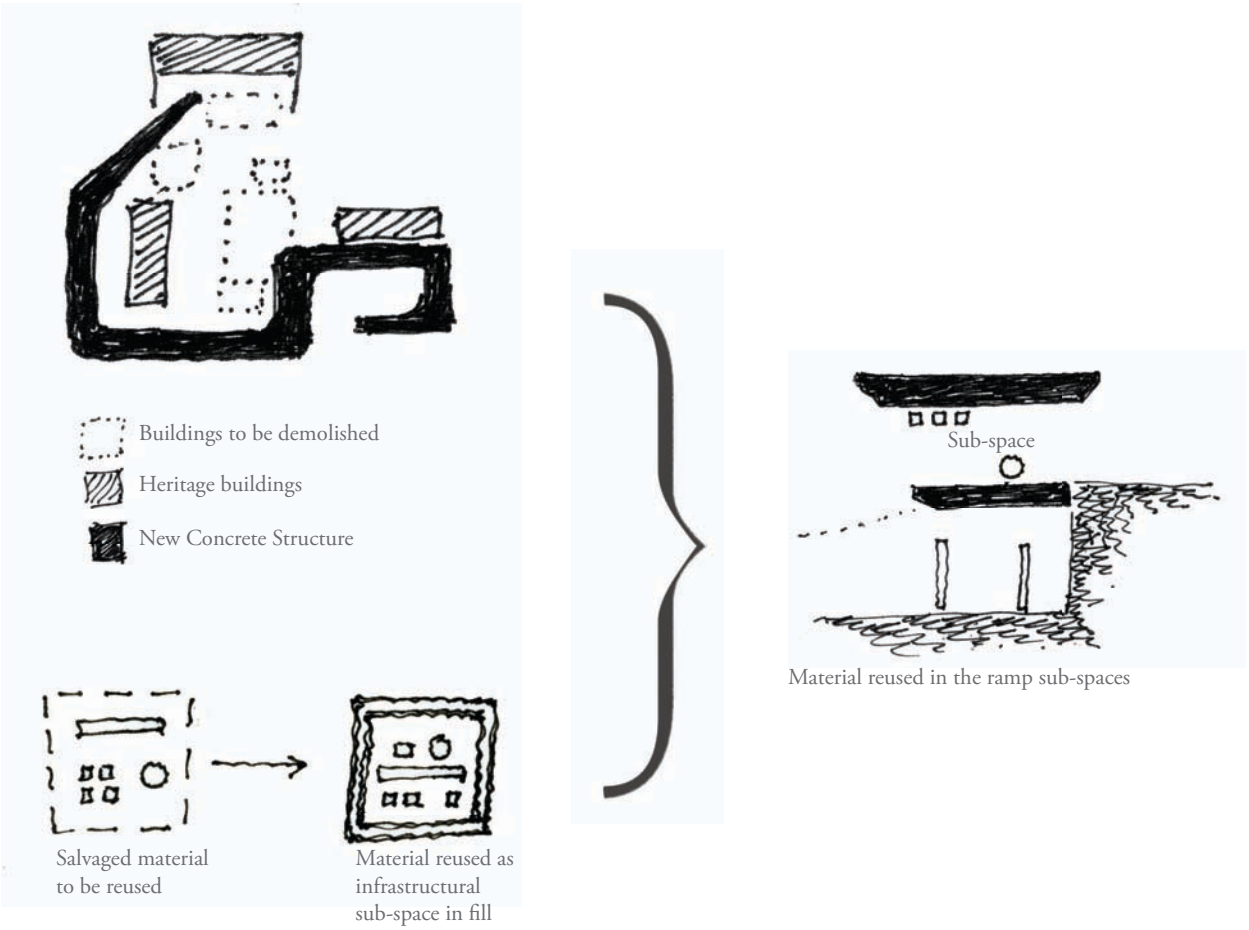
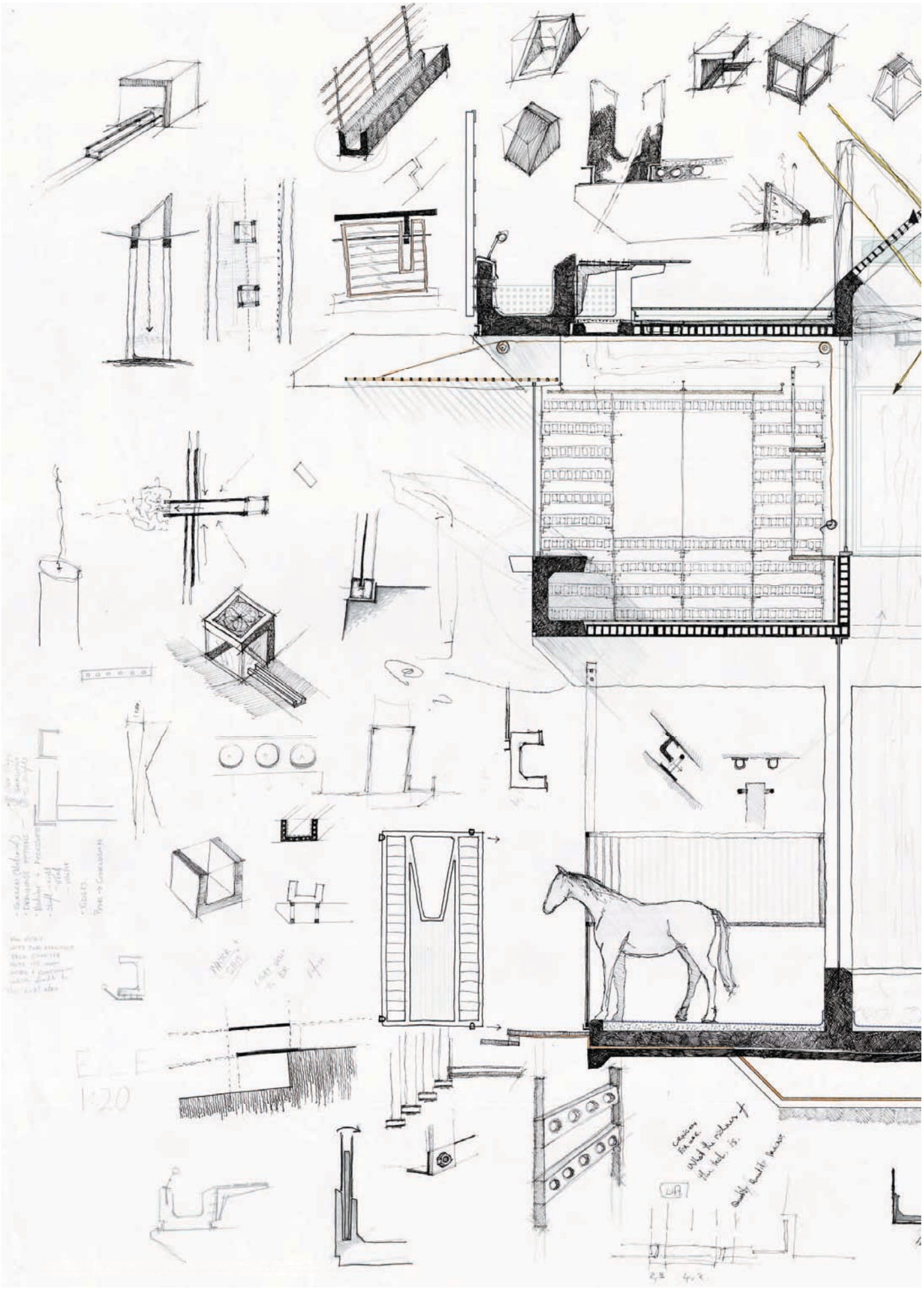
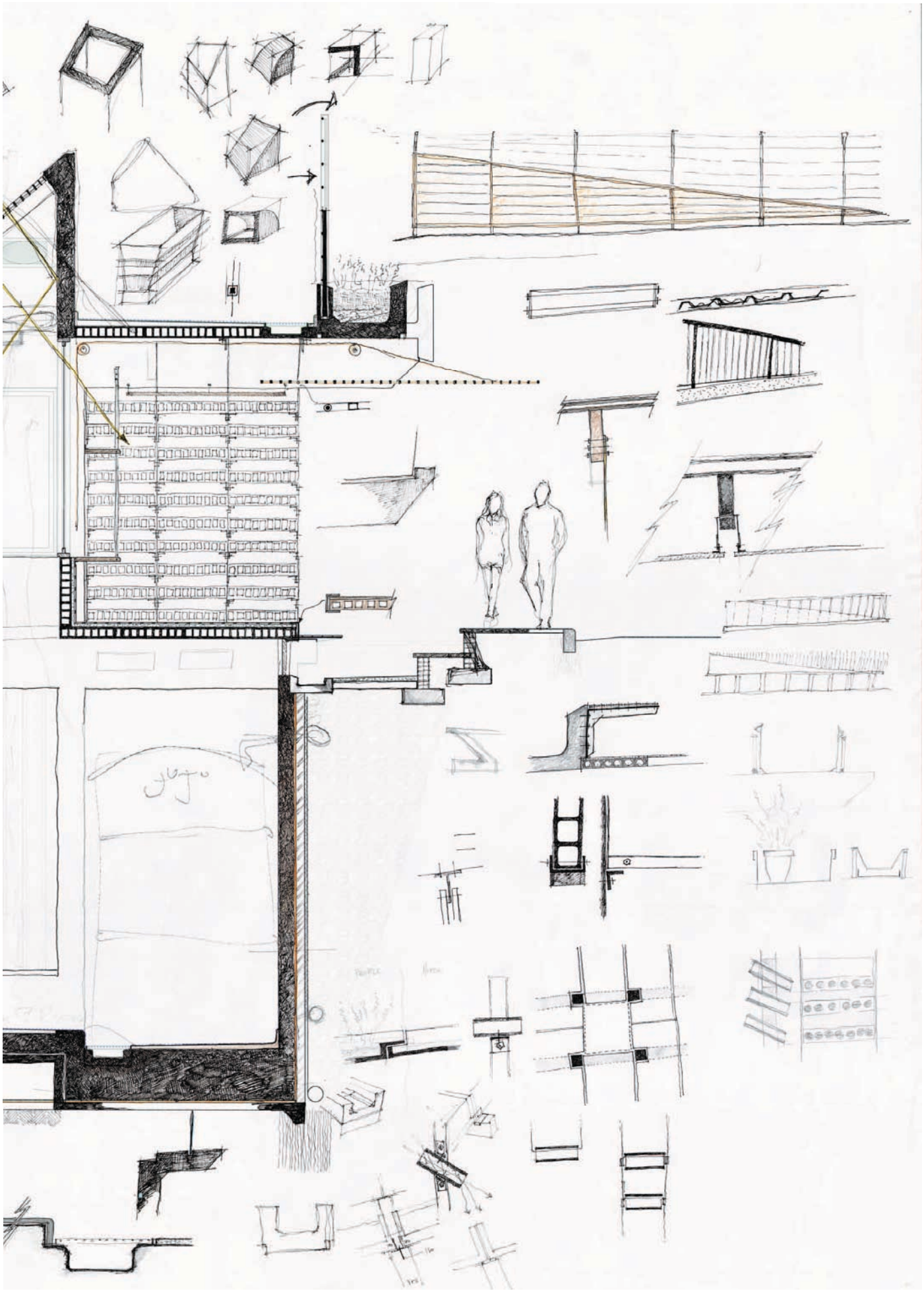


Fig 8.33: Texture created by a precast concrete screen

© University of Pretoria



© University of Pretoria



© University of Pretoria

8.6 EQUINE WASTE

8.6.1 STABLE WASTE

The stalls are designed with impervious floors, sloped towards the drain. Concrete is selected as it meets most of the requirements for a good stable floor.
Concrete is also durable and easily mucked out. Despite these advantages concrete is not favourable for horse's legs therefore concrete floors require more bedding or rubber mats.

Wheeler and Zajaczkowski (2002:4.2) point out that most horses are good house keepers, suggesting that geldings will generally urinate and defecate in the same spot. Through the use of rubber mats and selected use of bedding, the horses will be trained to use a certain place in the stable as a midden, this will decrease the demand for bedding and water for cleaning, while simplifying mucking out the stables. Rubber mats provides a surface with some give, it also provides a non-slip surface. Rippled or bumped surfaces increase traction.

8.6.2 SOLID WASTE

Waste management is essential to the functioning of the facility to minimise water pollution as well as nuisances such as insects, rodents, odours as well as aesthetics of the site.

The majority of the waste will be concentrated in the stables however other areas will be exposed to manure as well and thus need to be properly managed. This management includes the daily removal of all manure from the facility to a composting heap. Drainage of surface runoff becomes essential in areas where manure is allowed to accumulate between rainfalls, as the water will become nutrient-rich. Manure is therefore to be picked up from the arena, courtyards, lunge ring and paddocks.

8.6.3 COMPOSTING

By composting raw stall waste a valuable fertilizer is produced. Composting decreases the threat of pollution and reduces the volume of waste by 40-70% (Wheeler & Zajaczkowski 2009:3.13). The compost will be used in gardens and landscaping on site, at Burgers Park and Pretorius Park.

The high temperature at which composting occurs kills insect eggs. If the composting process is managed properly the stall waste can be converted to compost in 4 weeks. Proper management requires the heap to be turned and irrigated weekly, as microbes need oxygen, moisture and ideal temperatures. If managed properly compost can be produced in 2 weeks (Wheeler & Zajaczkowski 2009:3.13).

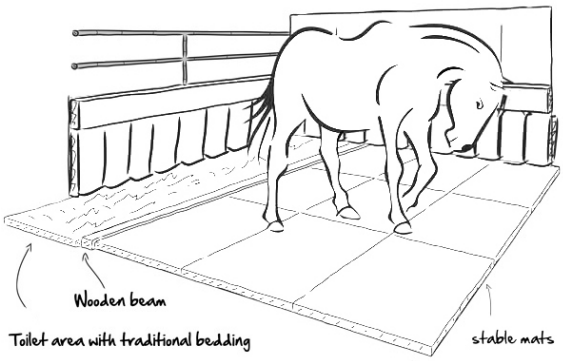


Fig 8.35: Stable design with rubber mats

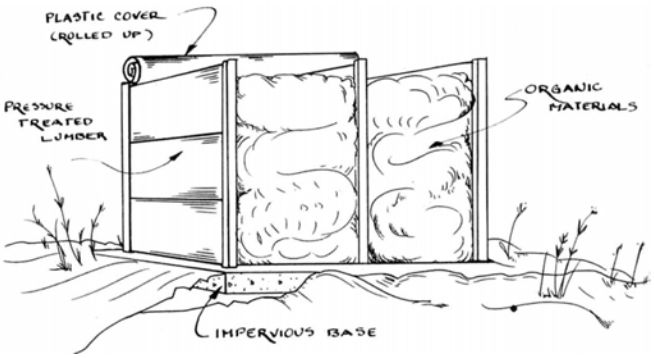


Fig 8.36 Compost heap

© University of Pretoria

8.7 GREY WATER REUSE

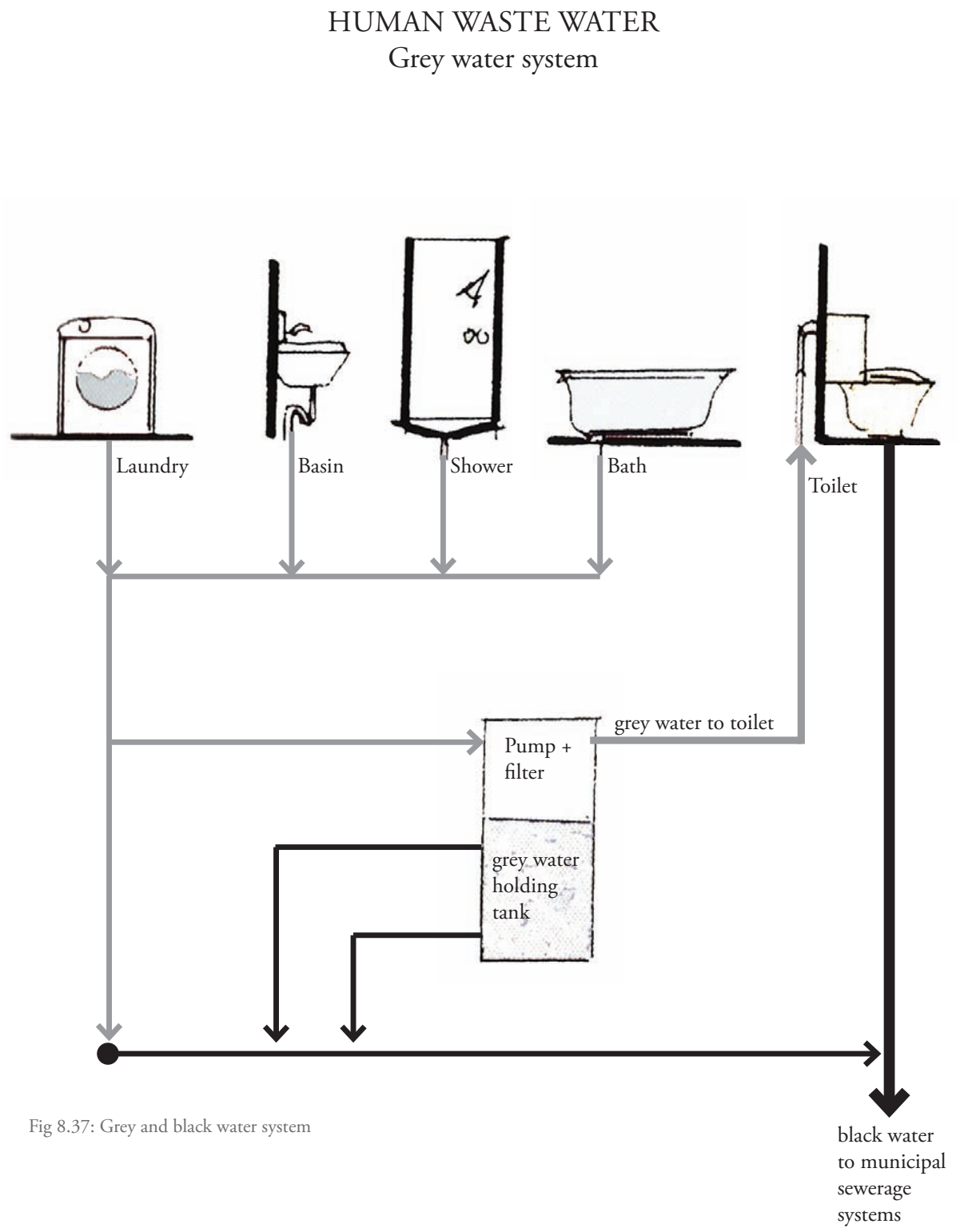


Fig 8.37: Grey and black water system

© University of Pretoria

8.8 EQUINE WATER DETAILS

The ramp becomes an edge which accommodates various aspects of life; water, soil, horses, plants, people and allows them to co-exist. Allowing people to become accustomed to one another as well as these natural elements.

Mossop (2006: 170, 171) describes ecologically based systems within the urban environment as: "Bringing all the factors together in complex, requiring a synthesis of social, political, and economic factors, as well as issues related to urban wildlife and water management." This intention has grown from the acceptance of city landscapes as hybrid nature (Mossop 2006: 170). Thus allowing for an approach which on the one hand address human action, while at the other using processes found in nature in the creation of hybrid ecologically based systems.

8.8.1 STORM WATER MANAGEMENT

8.8.1.1 COURTYARD WATER

Firstly the proper maintenance of the site become central to water not becoming overly contaminated by horse manure, a proper manure management plan will have to be drawn up to ensure that all manure is collected daily and placed in a compost heap, in a controlled area away from water. Water runoff from the compost heap is to be collected and used as a liquid fertilizer.

8.8.1.2 RAMP

The ramp will be cleaned by collecting the majority of the manure and then cleaned with water, which will dissolve the rest or the waste and be drained to a septic tank (43m^3). During rain the first 20mm of ramp runoff will be held and slowly released into the septic tank, this acts as a first flush. Assuming that the majority of the waste has been cleaned, ramp runoff will then be diverted to the stable courtyard where the water will be temporarily detained and slowly released into the wetland.

8.8.1.2 MOUNTED UNIT COURTYARDS

The courtyards are to be cleaned daily, however there is a risk of contamination therefore all runoff is to be sent through a wetland. The courtyards have retention ponds with additional capacity to detain water during rain. The retention ponds have plants as well as water features which oxygenate the water for a healthy aquatic system.

8.8.1.3 PADDOCK

Paddock spaces will be planted with grass, this area acts as an absorber of water detaining the water during a storm and then slowly releasing it into the storm water system, as the lawn will remove most of the organic waste from the paddock space.

8.8.1.4 ARENA DRAINAGE

Arena surface material: Sand with reconstituted rubber shreds

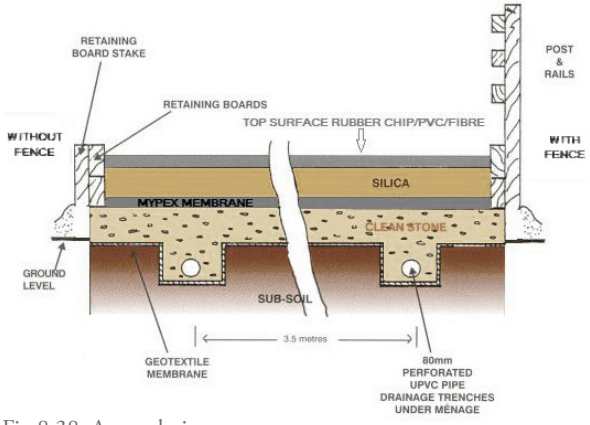
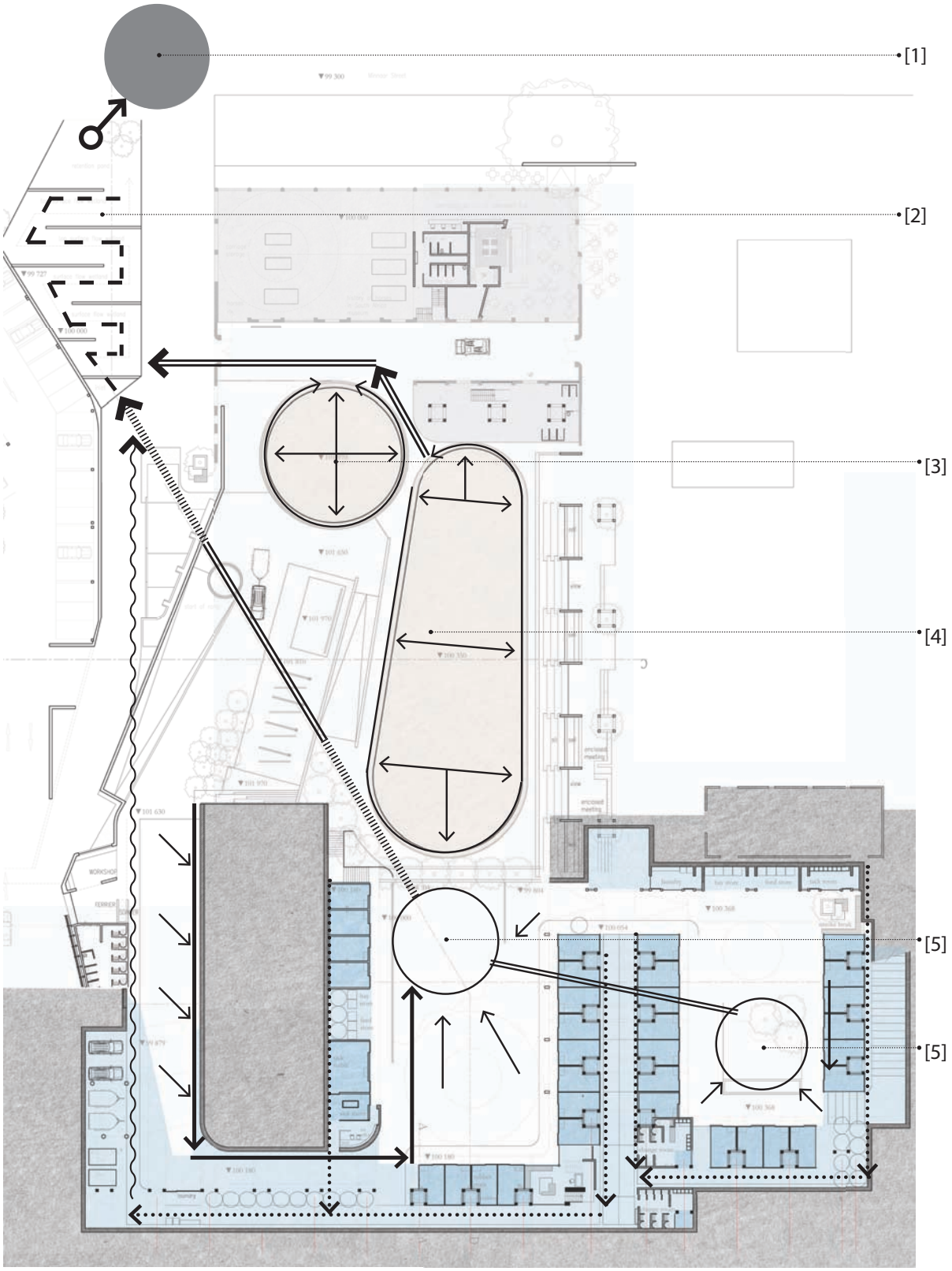


Fig 8.38: Arena drainage

© University of Pretoria

8.8.2 STORM WATER DRAINAGE TO THE WETLAND



[1] Retention
[2] Wetland
[3] Lunge Ring
[4] Arena
[5] Pond in stable Courtyard

— Runoff
═ Water flow in pipe
ıllıllıll Swales and weirs
▬ Wetland
• • • Stable waste water
~ Pumped to wetland from septic tank

Fig 8.39: Drainage of contaminated surfaces to the wetland (October 2013)

© University of Pretoria



Fig 8.40: Sub-surface flow wetland

Within Sub-surface flow wetlands water flows underneath the reed bed. This is ideal for water with bad odour as gasses are less likely to escape. Through anaerobic micro-organisms nutrients are taken up (Bainbridge & Haggard 2011:196).



Fig 8.41: Surface flow Wetland

Top surface flow wetlands increase the oxygen levels in the water, which allows aerobic micro-organisms to grow and absorb nutrients (Bainbridge & Haggard 2011:196).

EQUINE BLACK WATER SYSTEM (FROM THE STABLES TO THE WETLANDS)

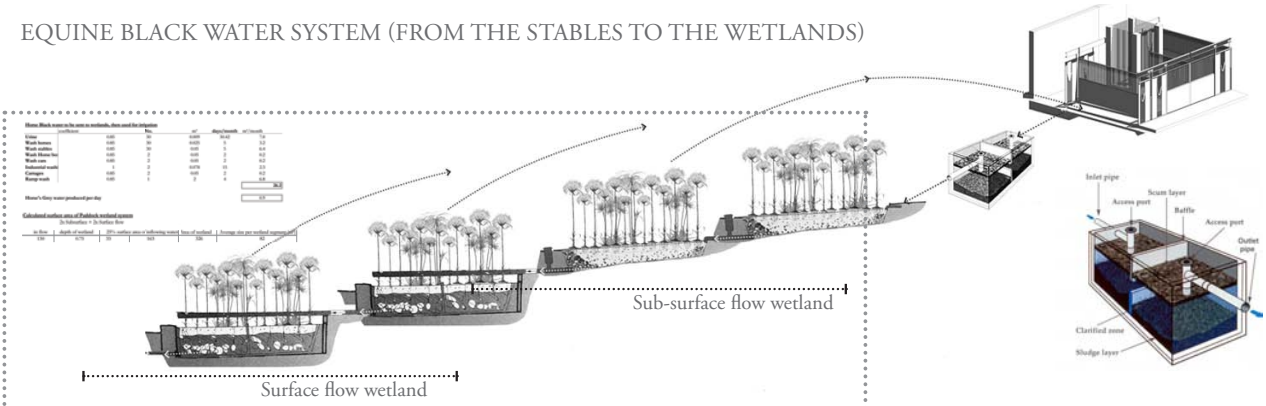


Fig 8.42: Diagram illustrating the black water system from the stables to the wetlands

Fig 8.43: Septic tank

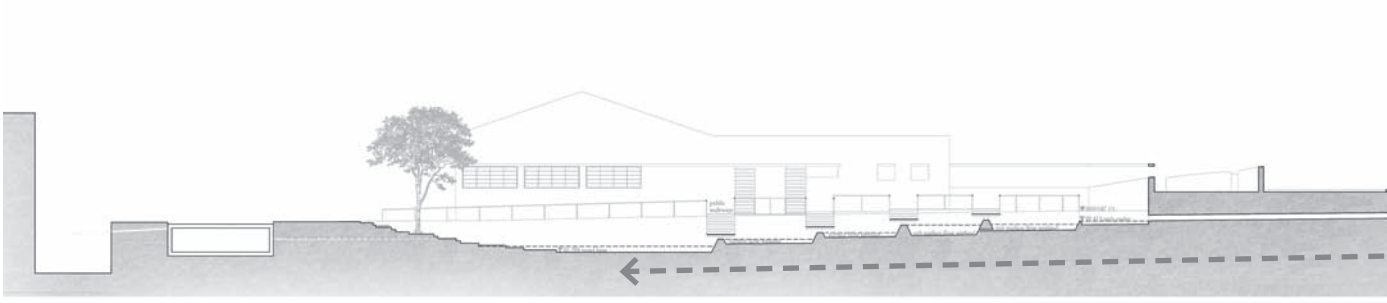


Fig 8.44: Section A_A through the Equi Scape Landscape showing the fall of the site from the stables to the wetlands

© University of Pretoria

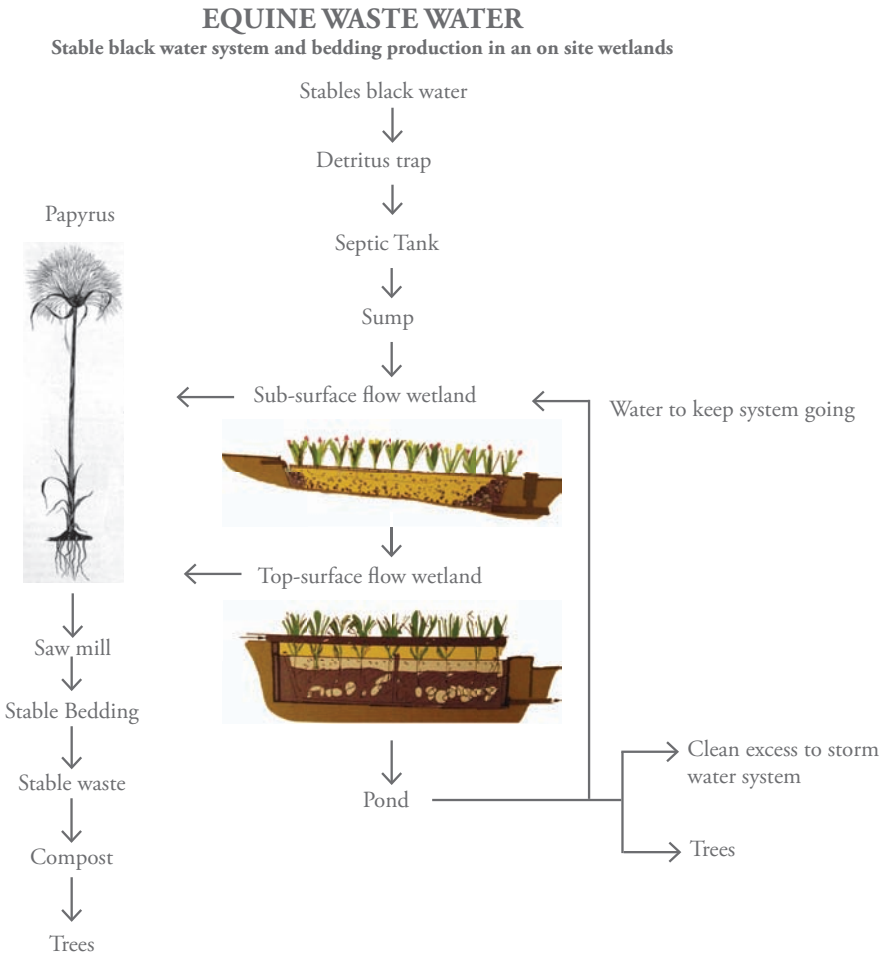


Diagram illustrating the black water system

8.8.4 PAPYRUS SYSTEMS

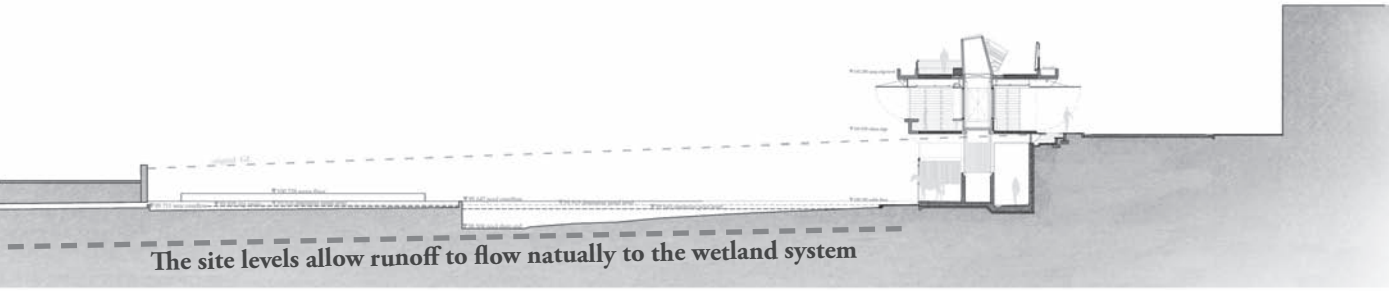
Papyrus is endemic to Southern Africa, growing in areas of thick permanent swamps in thick floating mats (McIntyre 2010:266).

Due to specific adaptations (namely carbon 4 pathways and nitrogenous bacteria in their leaves) in the presence of water and sunshine, papyrus are among the fastest growing plants in the world (McIntyre 2010:266).

Papyrus stems are both strong and thick but also very light, each with a life cycle of 3 months, growing to maturity, flowering and then dying in this short period (McIntyre 2010:266).

According to "Plant Poisonings and Mycotoxicoses of Livestock in Southern Africa" by Kellerman, Coetzer, Naude and Botha (2005:301) Papyrus has no negative effect on livestock. Papyrus once dried and put through a shredder could be used as a bedding material.

Black water from the stables can provide good nutrients for these plants, which in turn clean the water. The 3 month life cycle of the plant creates an opportunity for the production of a bedding material for the horse's stables. The wetland system will be designed in such a way that different sections of the wetland can be harvested in a sequence which allows it to continue functioning despite harvesting.



The site levels allow runoff to flow natually to the wetland system

© University of Pretoria

8.9 SECTION C_C

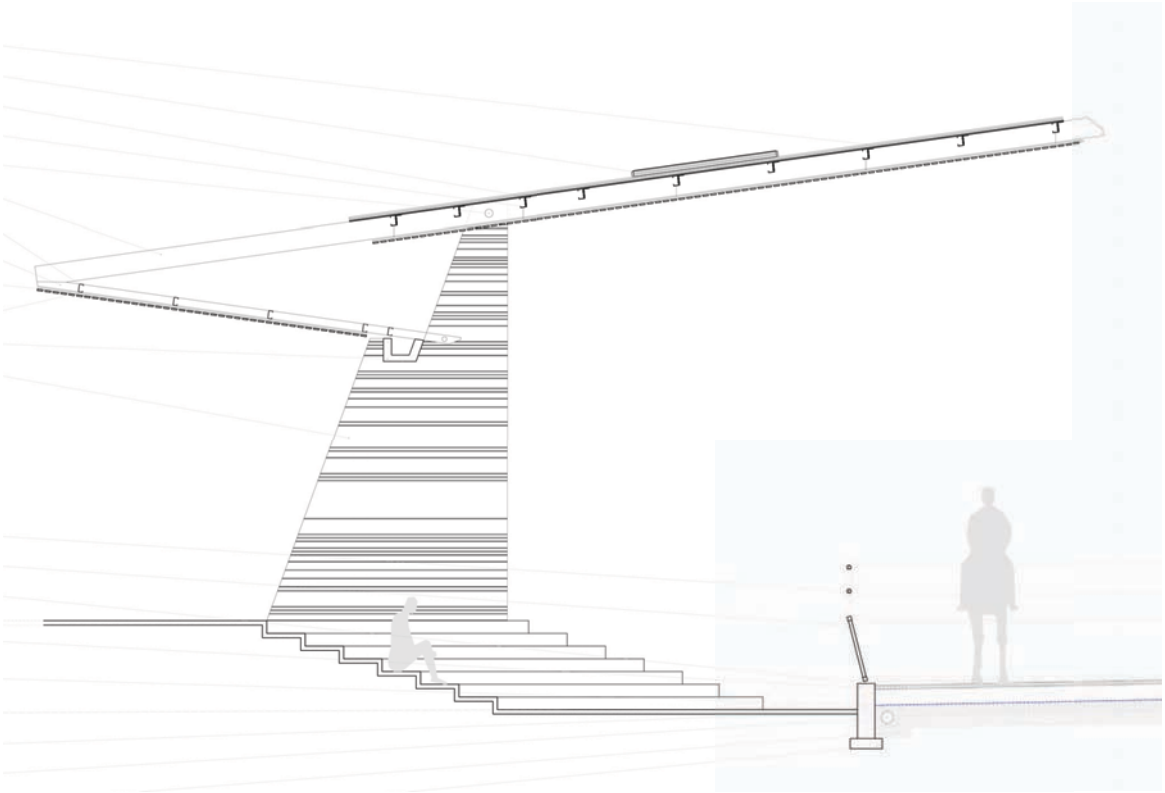


Fig 8.46: Section C_C through Equi Scape arena seating (October 2013)

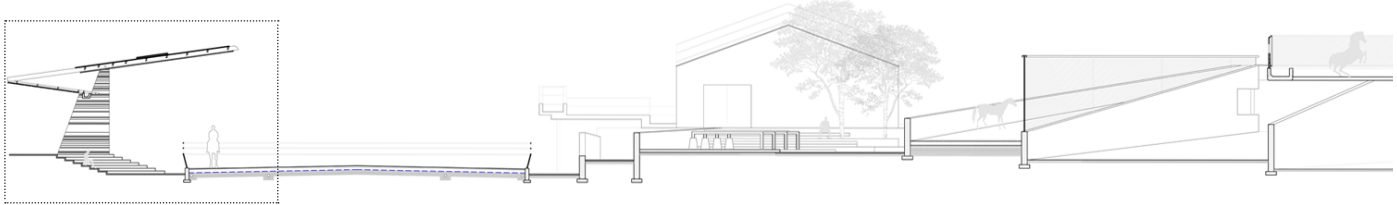


Fig 8.47: Section C_C (October 2013)

© University of Pretoria

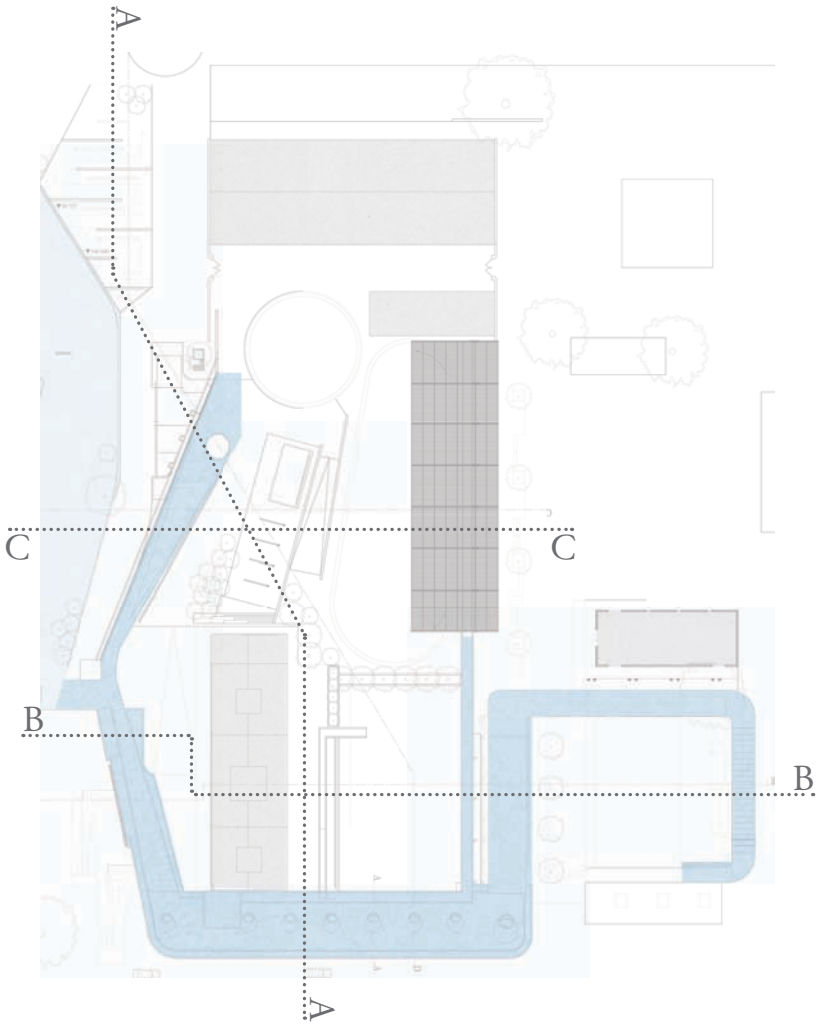


Fig 8.48 : Roof plan showing section lines

© University of Pretoria

8.10 SECTION A_A

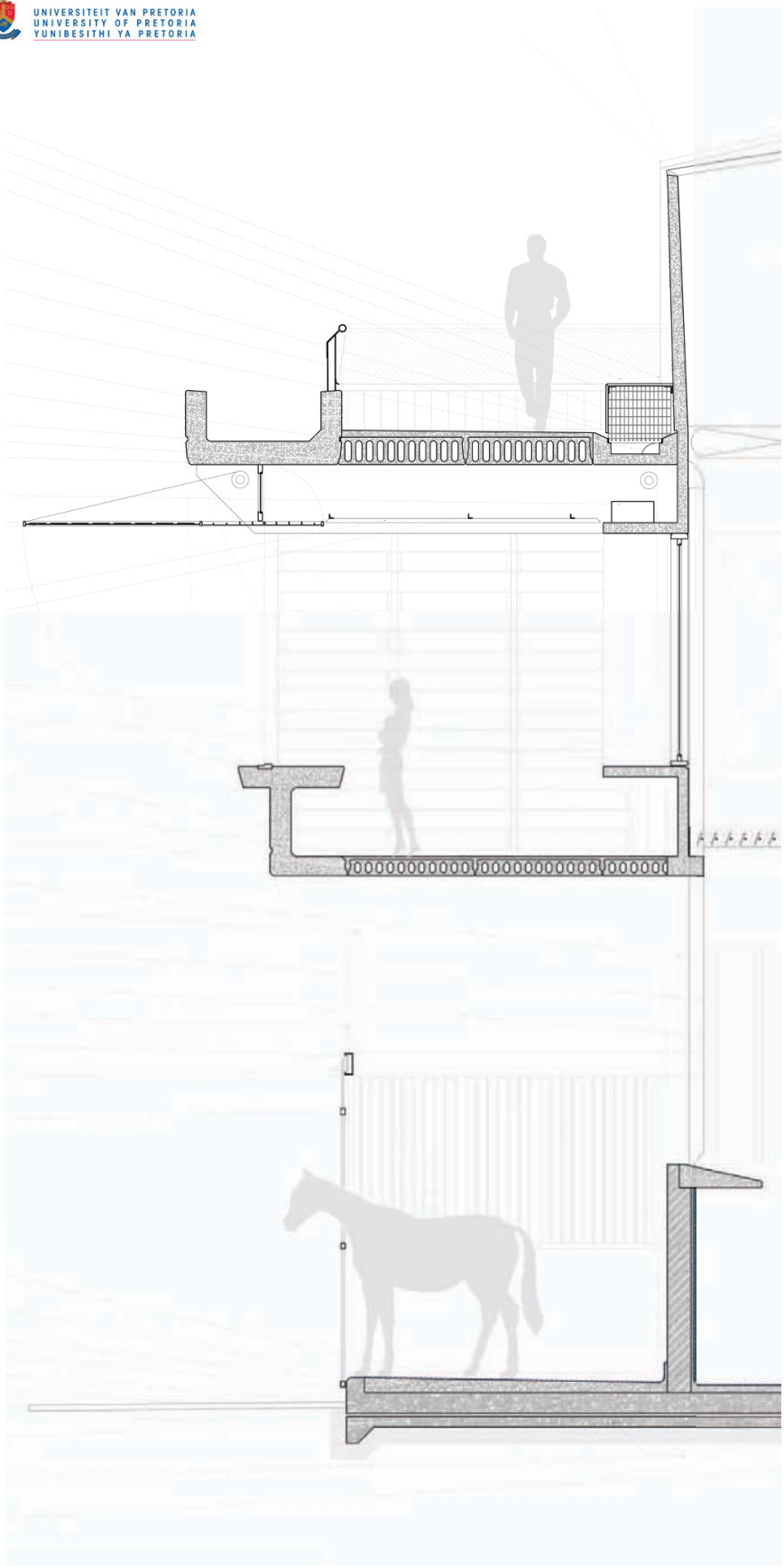


Fig 8.49: Section A_A (October 2013)

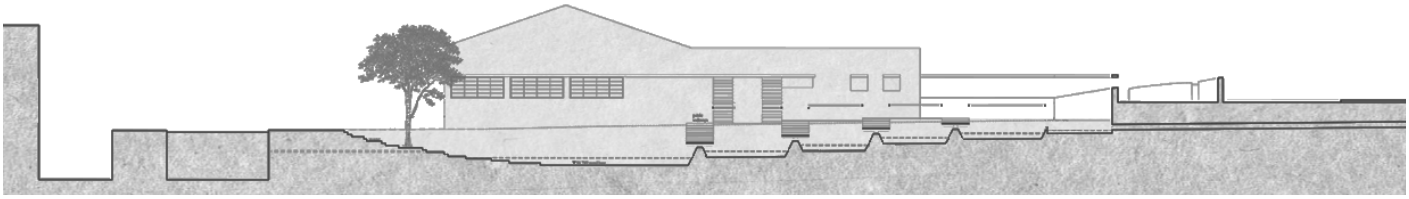
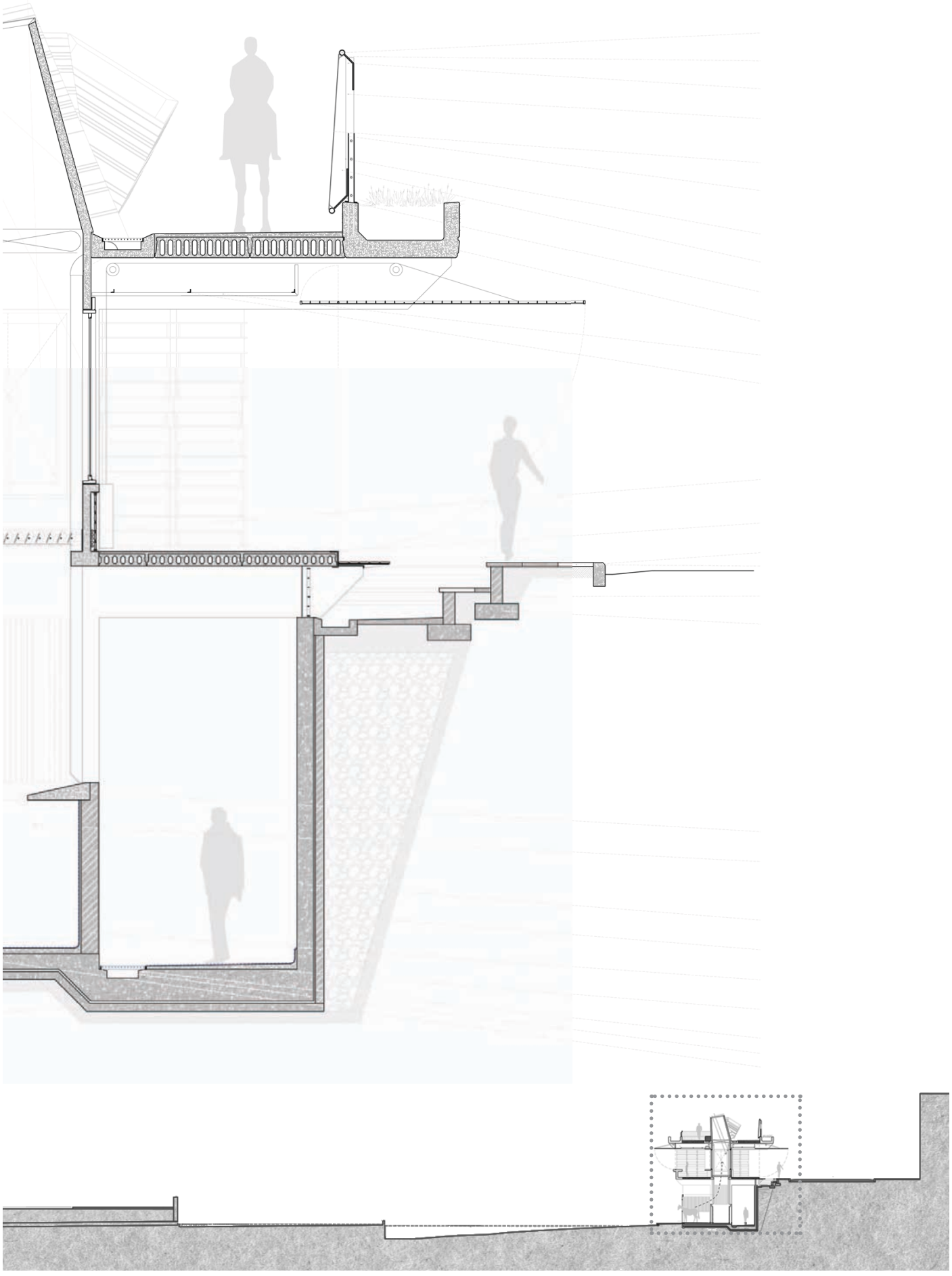


Fig 8.50: Section A_A through the Equi Scape Landscape and ramp edge (October 2013)

© University of Pretoria



© University of Pretoria



Fig 8.51: Three dimensional illustration of section A_A

© University of Pretoria



© University of Pretoria

8.11.1 ASSEMBLY DRAWING

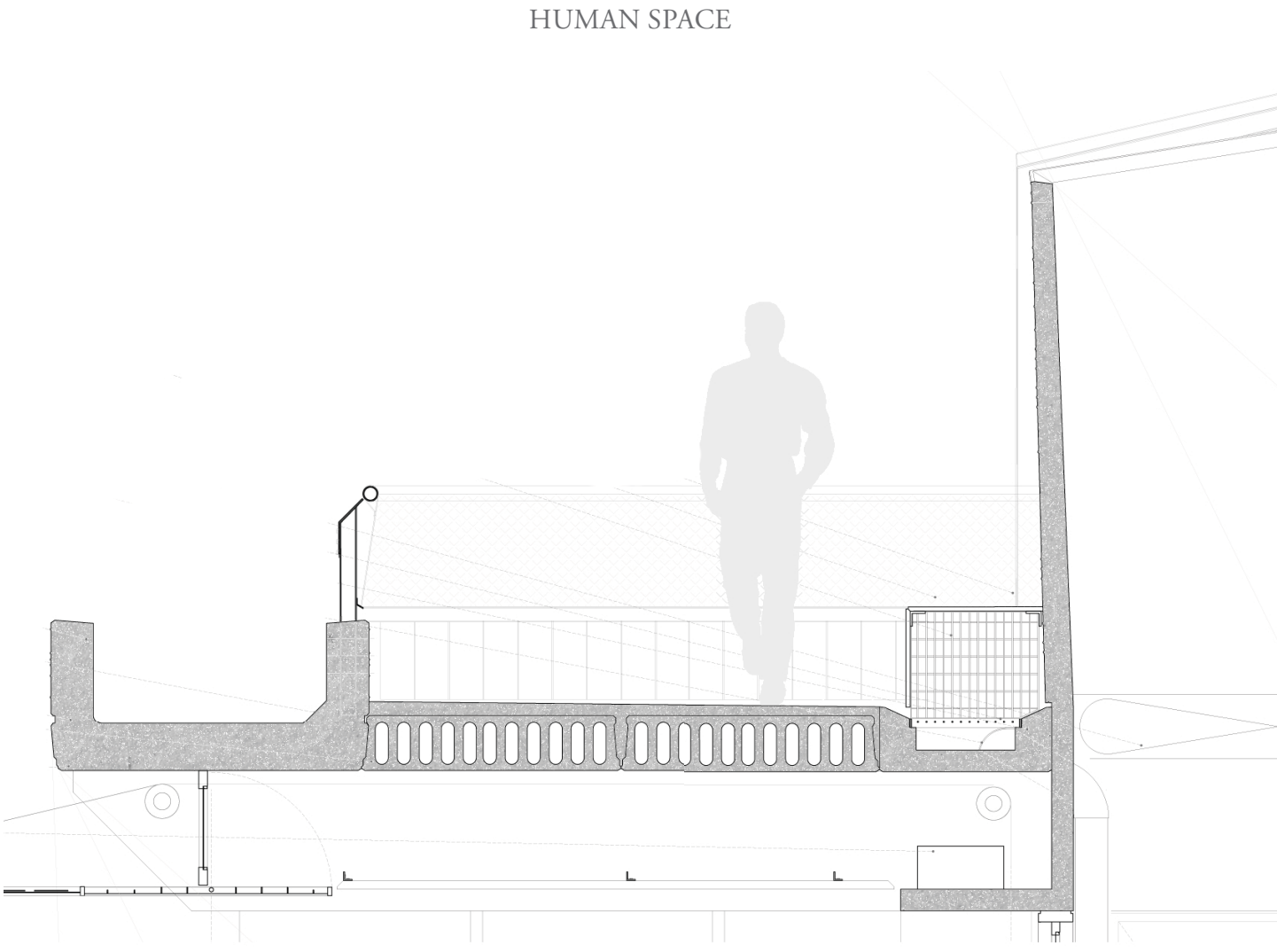
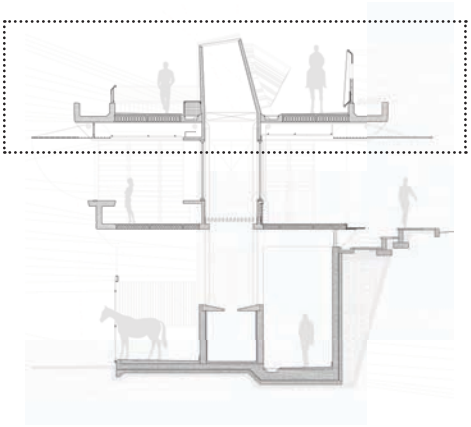
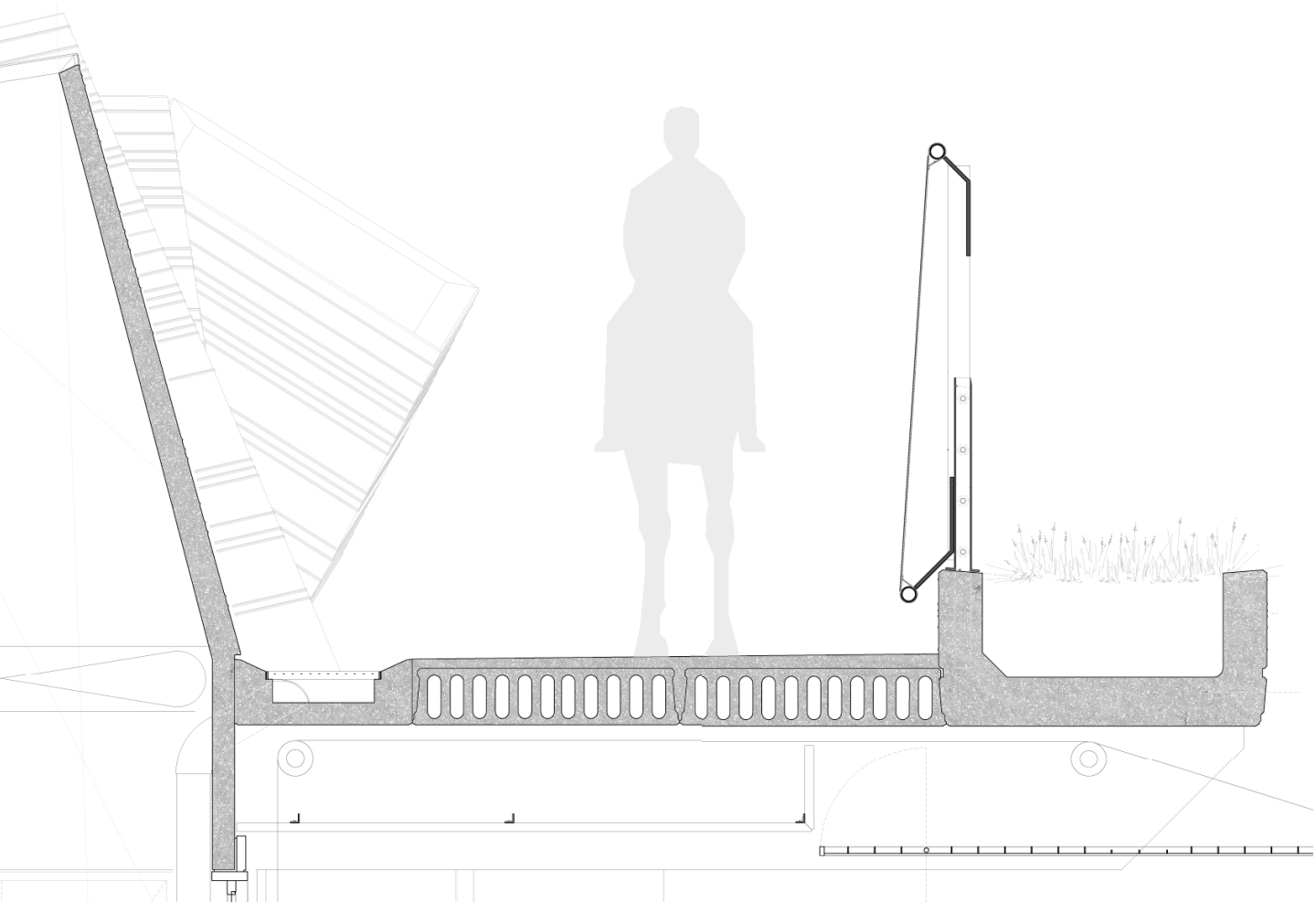


Fig 8.52: Assembly drawing of the ramp's top from Section A_A (October 2013)

© University of Pretoria



HORSE SPACE



© University of Pretoria

8.11.2 BALUSTRADE FOR A MOUNTED HORSE

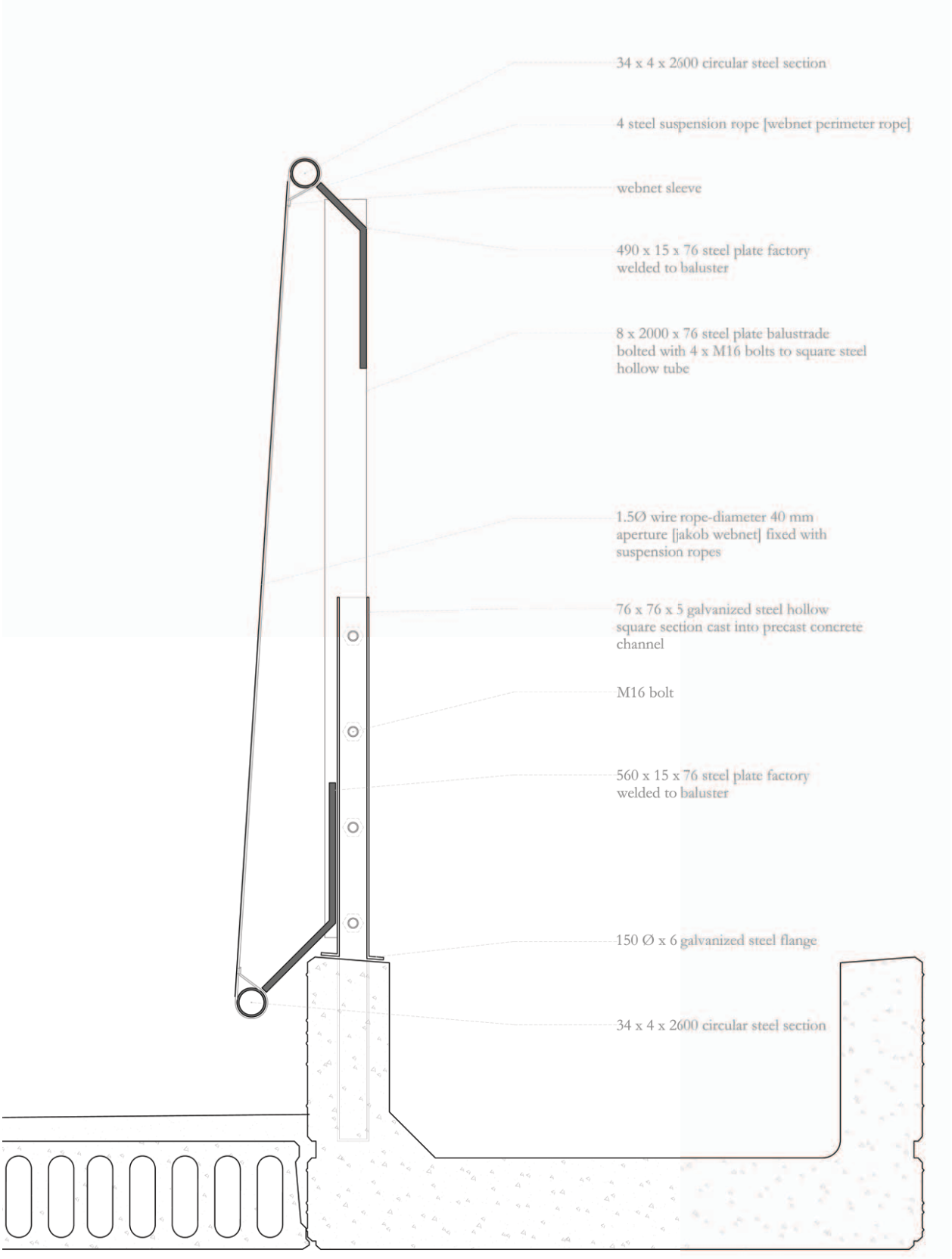


Fig 8.53: Preliminary balustrade detail (October 2013)

© University of Pretoria

SPECIFIC USER SCALE

The balustrade detail in figure 8.53 illustrates how the precast concrete channel edges of these horizontal planes respond directly to its specific users through the accessories attached to them. As its design is a direct response to the ergonomics of a mounted horse as explored in chapter 4, as well as its role in forming part of the southern facade of the building.

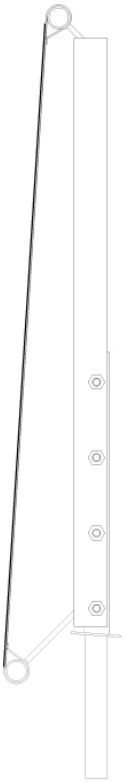


Fig 8.54: Side elevation of the Baluster

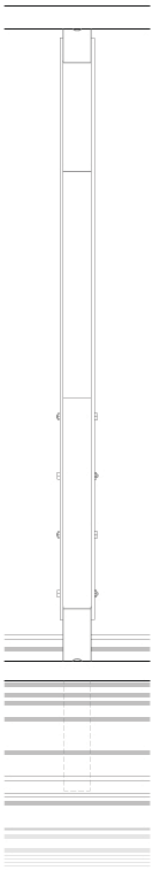


Fig 8.55: Front elevation of the Baluster

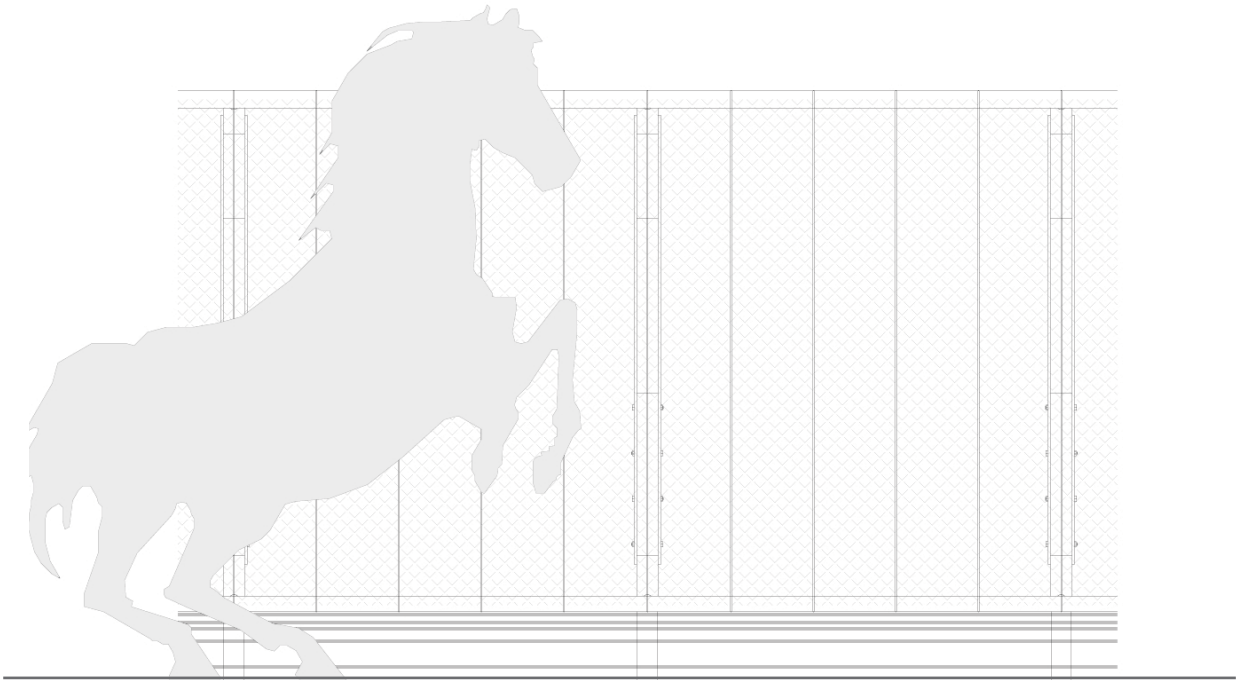


Fig 8.56: Front elevation of the Balustrade

© University of Pretoria

8.11 SECTION B_B

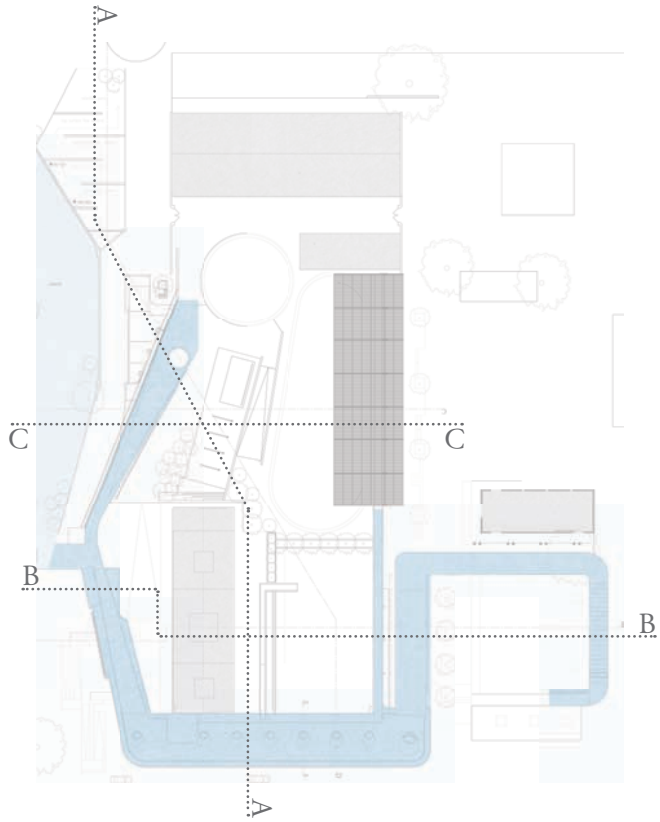


Fig 8.57 : Roof plan showing section lines

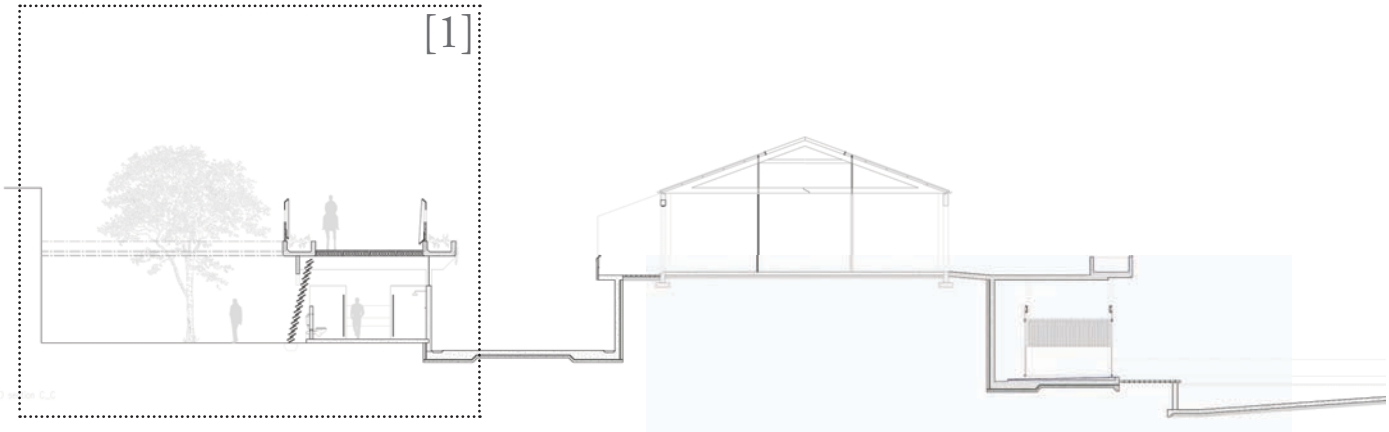


Fig 8.58: Section B_B [west - east]

© University of Pretoria

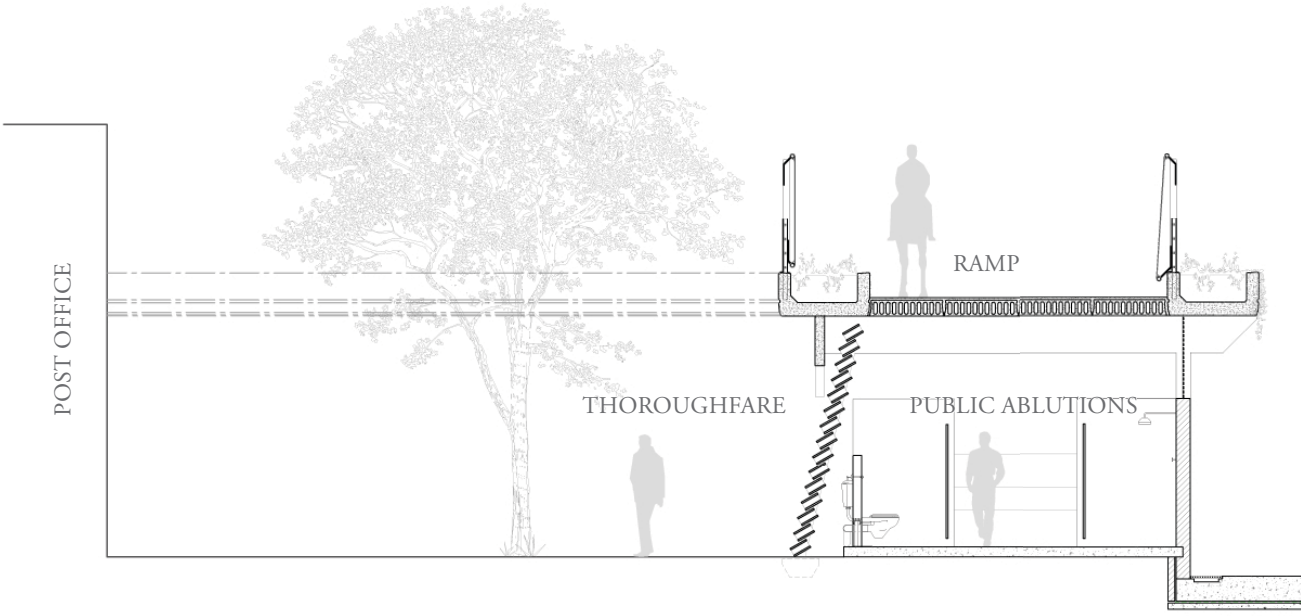
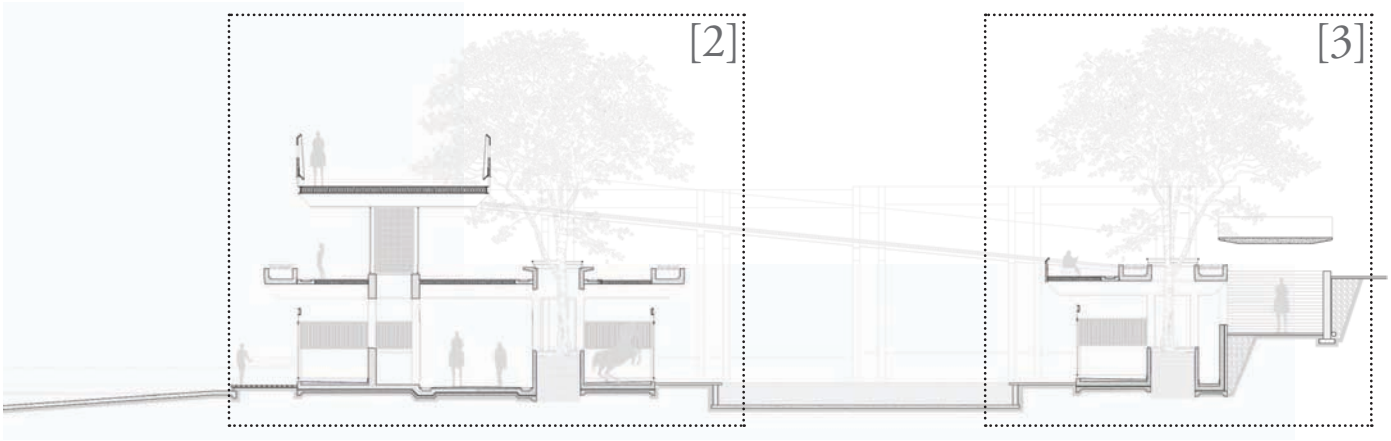


Fig 8.59 : Section B_B [1] showing the ramp with ablutions below and thoroughfare between ramp and Post Office to the left (October 2013)



© University of Pretoria

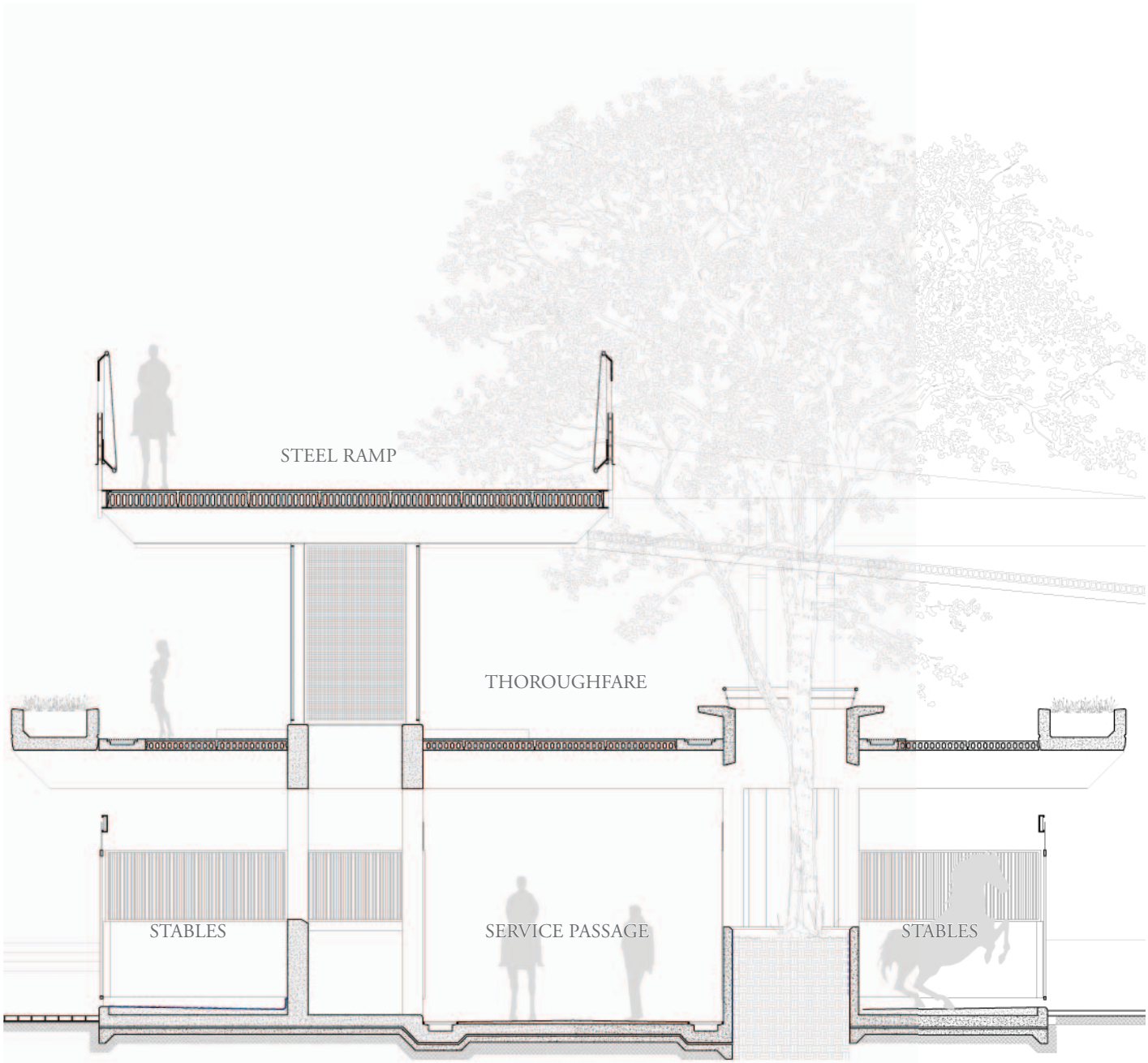


Fig 8.60: Section B_B [2] through Equi Scape ramp edge (October 2013)

© University of Pretoria

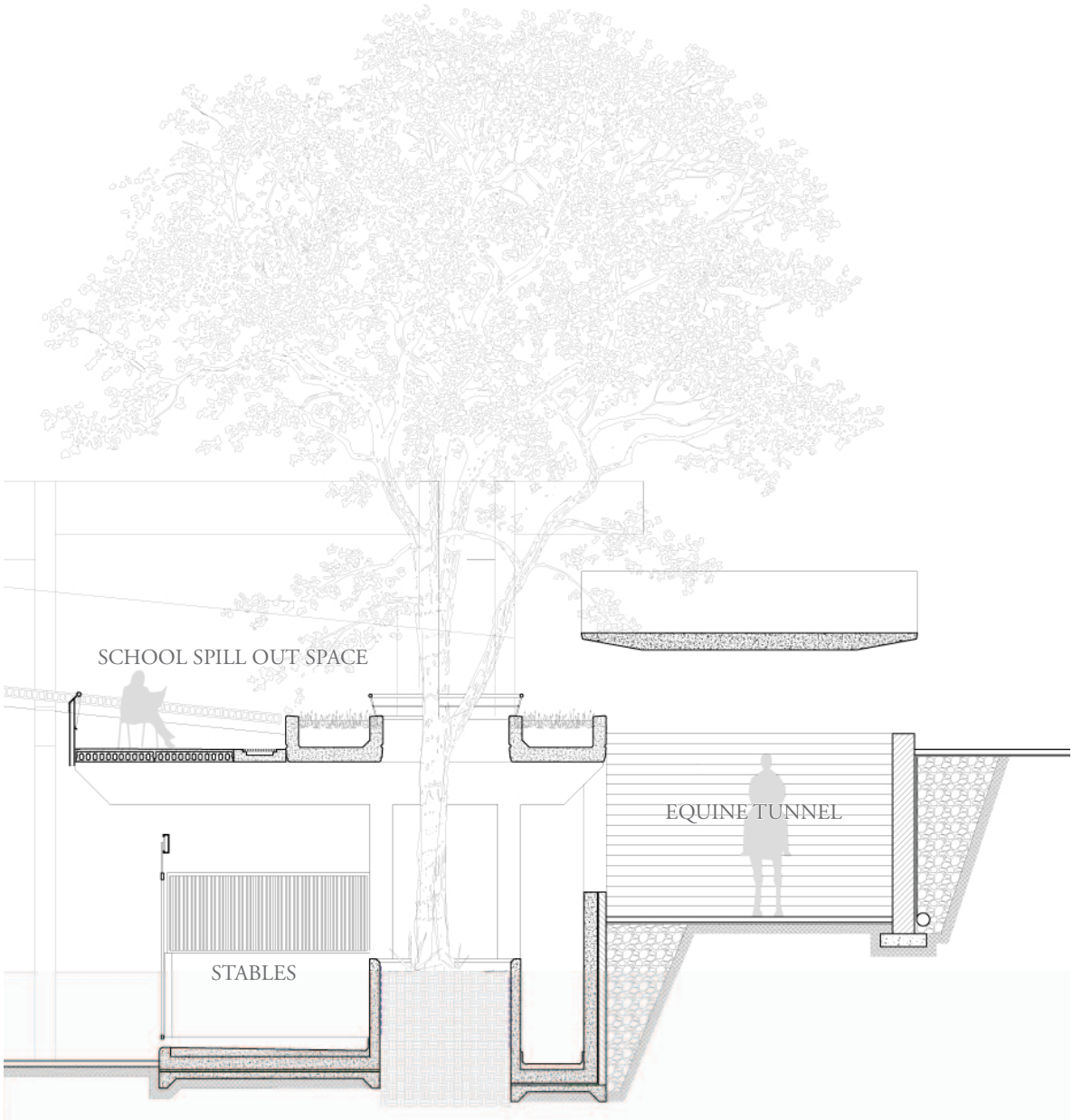


Fig 8.61: Section B_B [3] Through Equi Scape tunnel (October 2013)

© University of Pretoria

CONCLUSION

The Equi Scape is an 'urban room' for the horse in Pretoria. The scape manifests the horse's presence in the city, while its edges allow for the horse's transition back into the urban environment, through its human-horse interface. The investigation illustrates that the reinterpretation of a barrier can lead to the establishment of a new edge language.

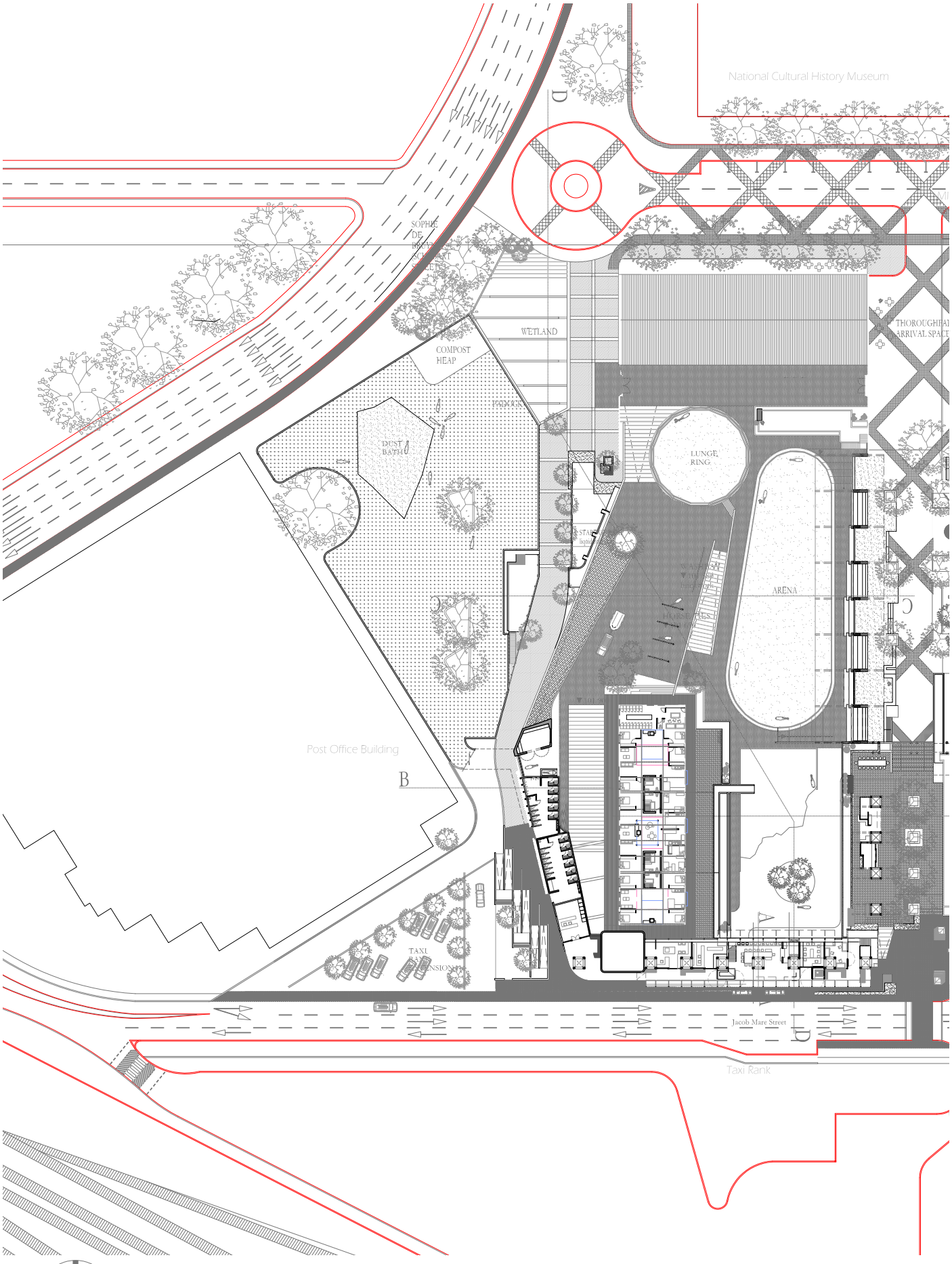
Gently, yet firmly, some of the conventions that have manifested as fixed barriers were shifted, by altering the manner in which they manifest. The dissertation transforms the boundaries of the PWD into the edges of the Equi Scape, which affords its edge users the opportunity to reevaluate the conventions by which they live.

To live a new perspective, is to alter our understanding of our past, which is one of the greatest opportunities the present holds.



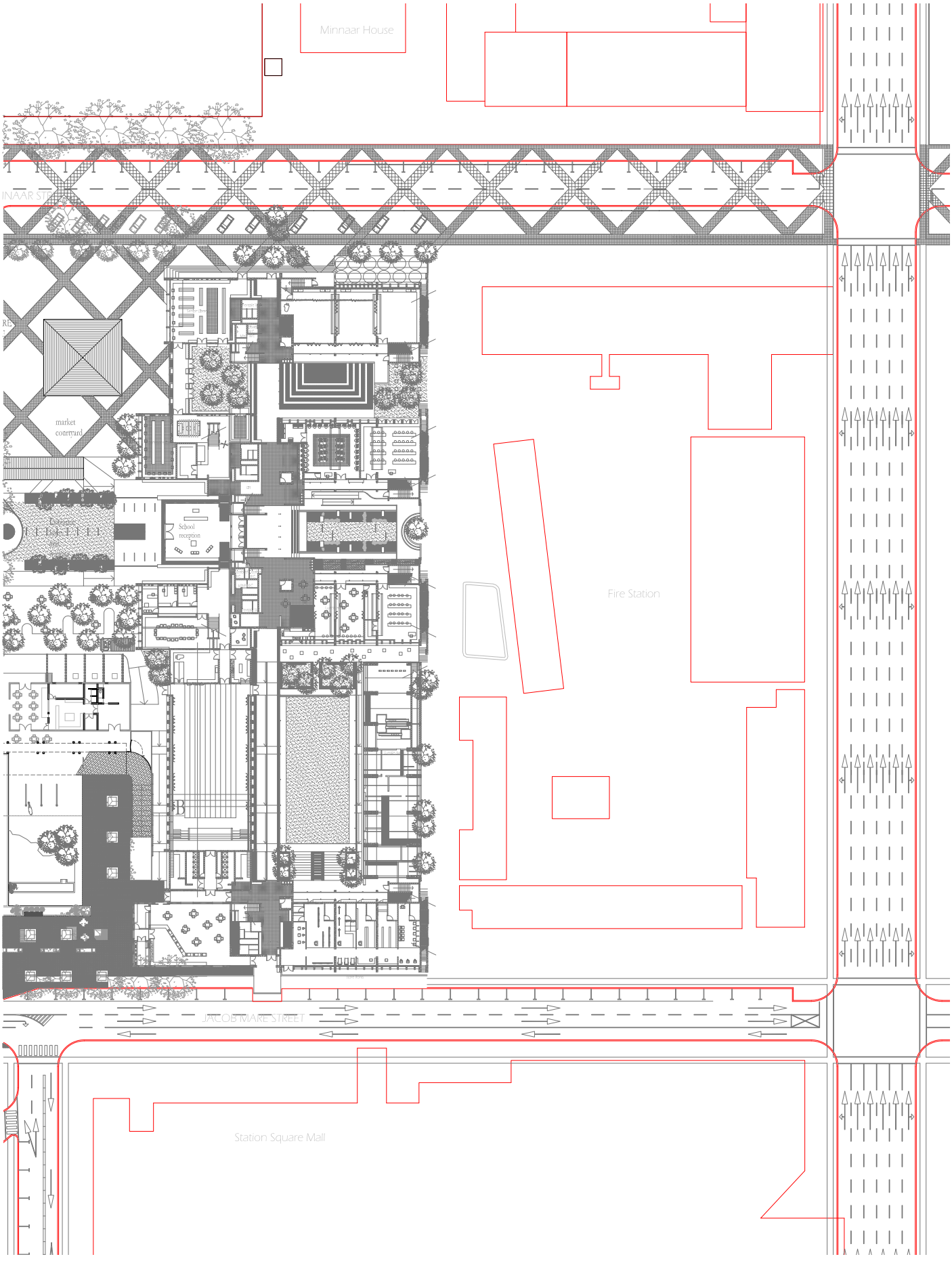
09

© University of Pretoria



SITE
plan

© University of Pretoria



© University of Pretoria

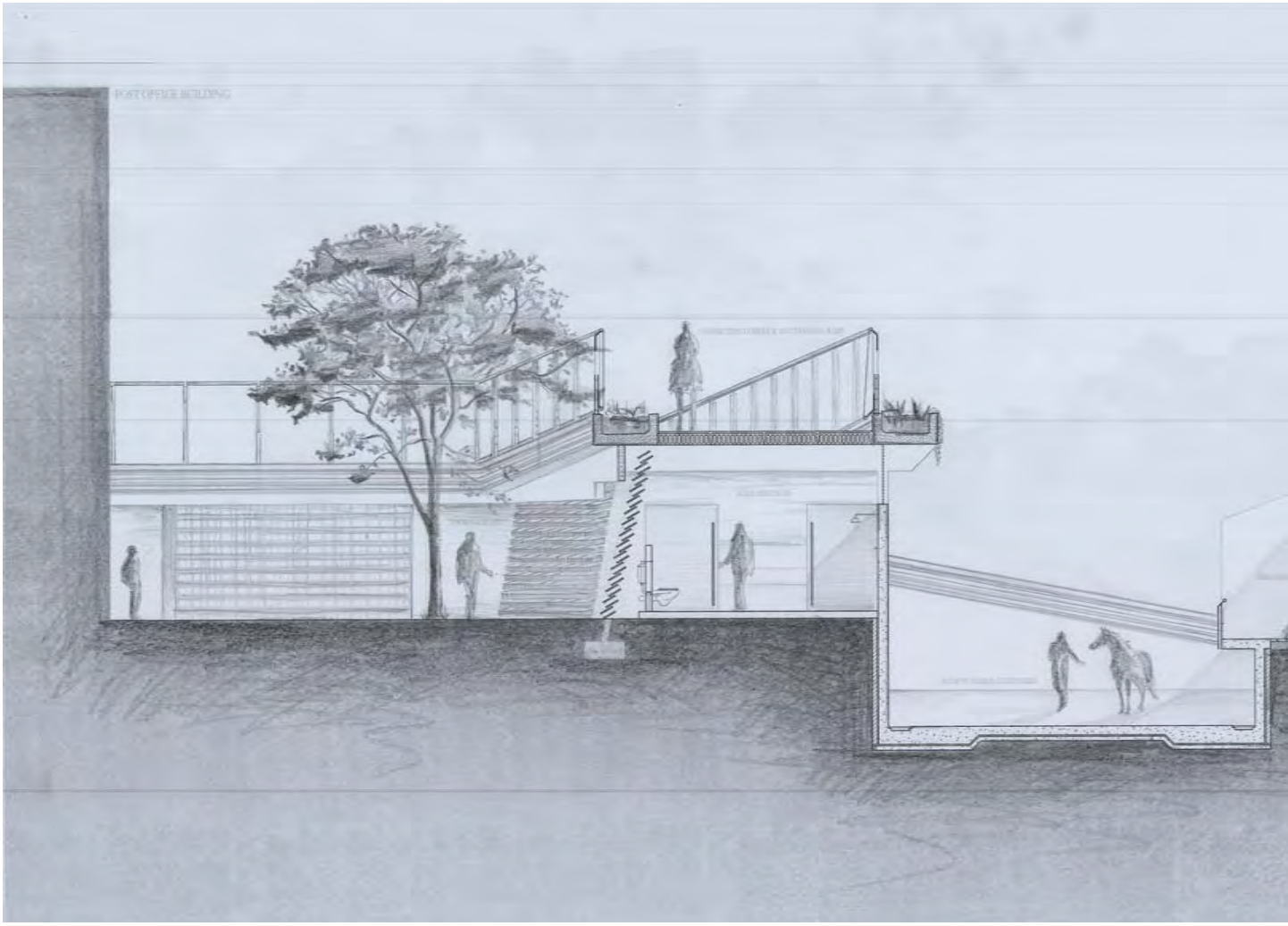


Fig 9.2.1: Section B_B [NTS]

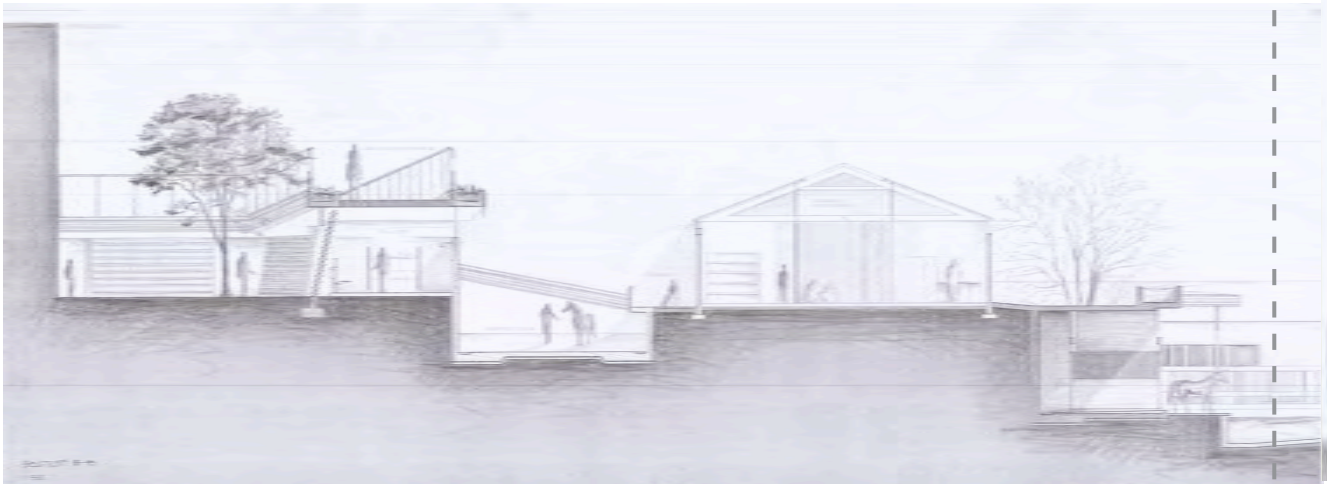
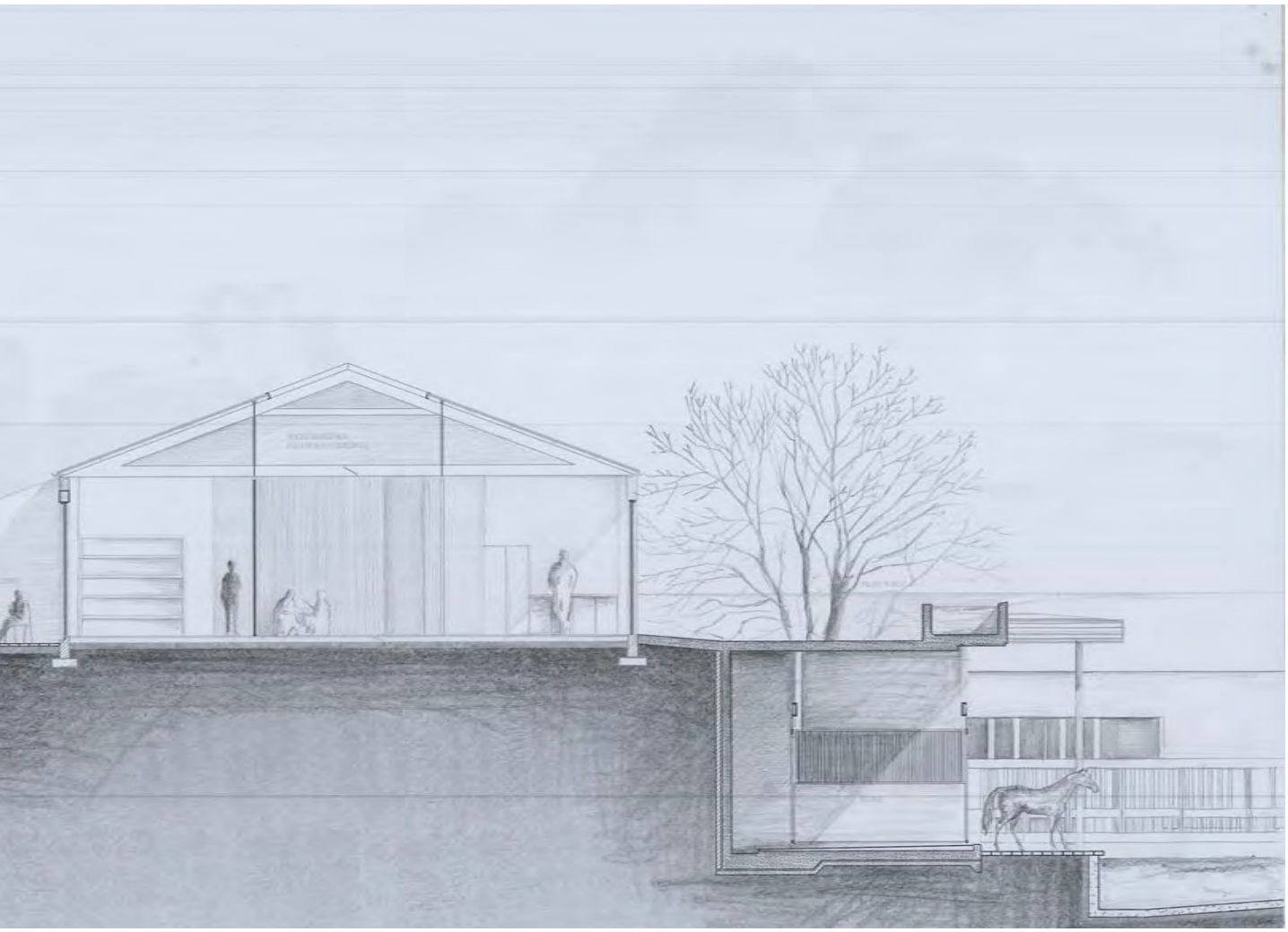


Fig 9.2.2: Section B_B [NTS]

© University of Pretoria





© University of Pretoria



Fig 9.2.3: Section B_B [NTS]

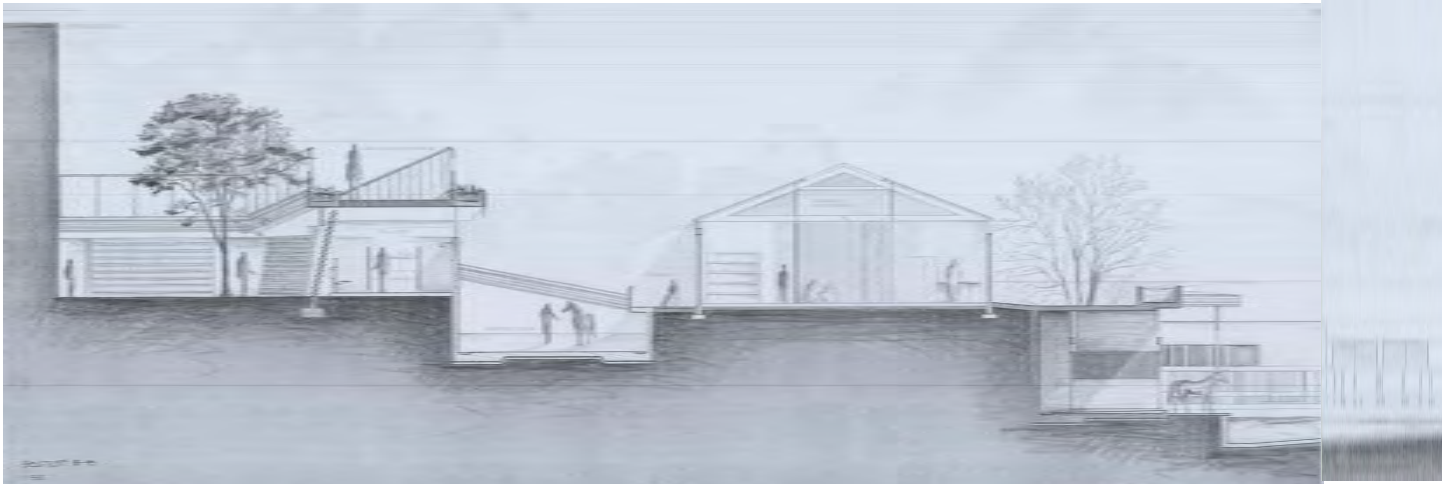
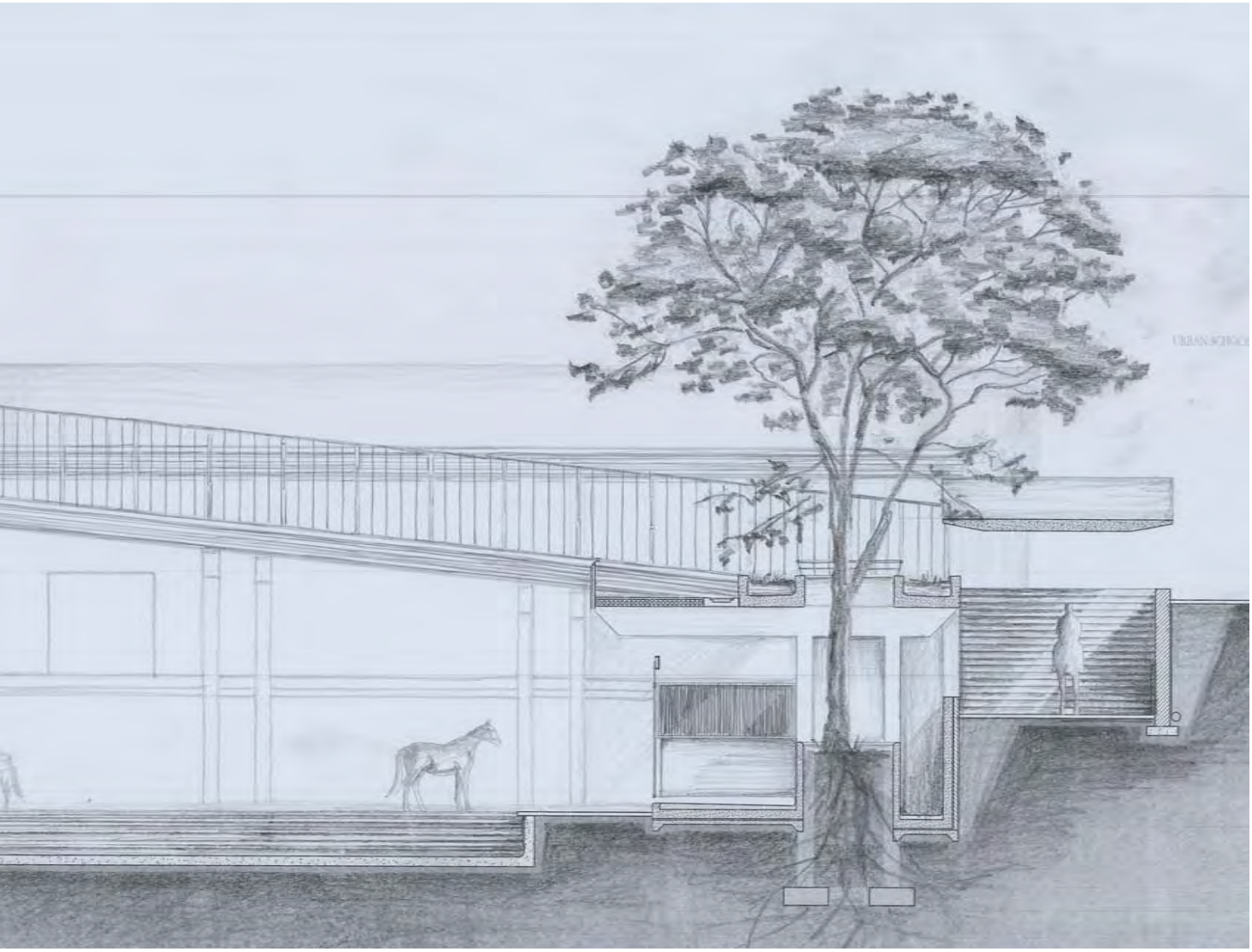


Fig 9.2.4: Section B_B [NTS]

© University of Pretoria





© University of Pretoria

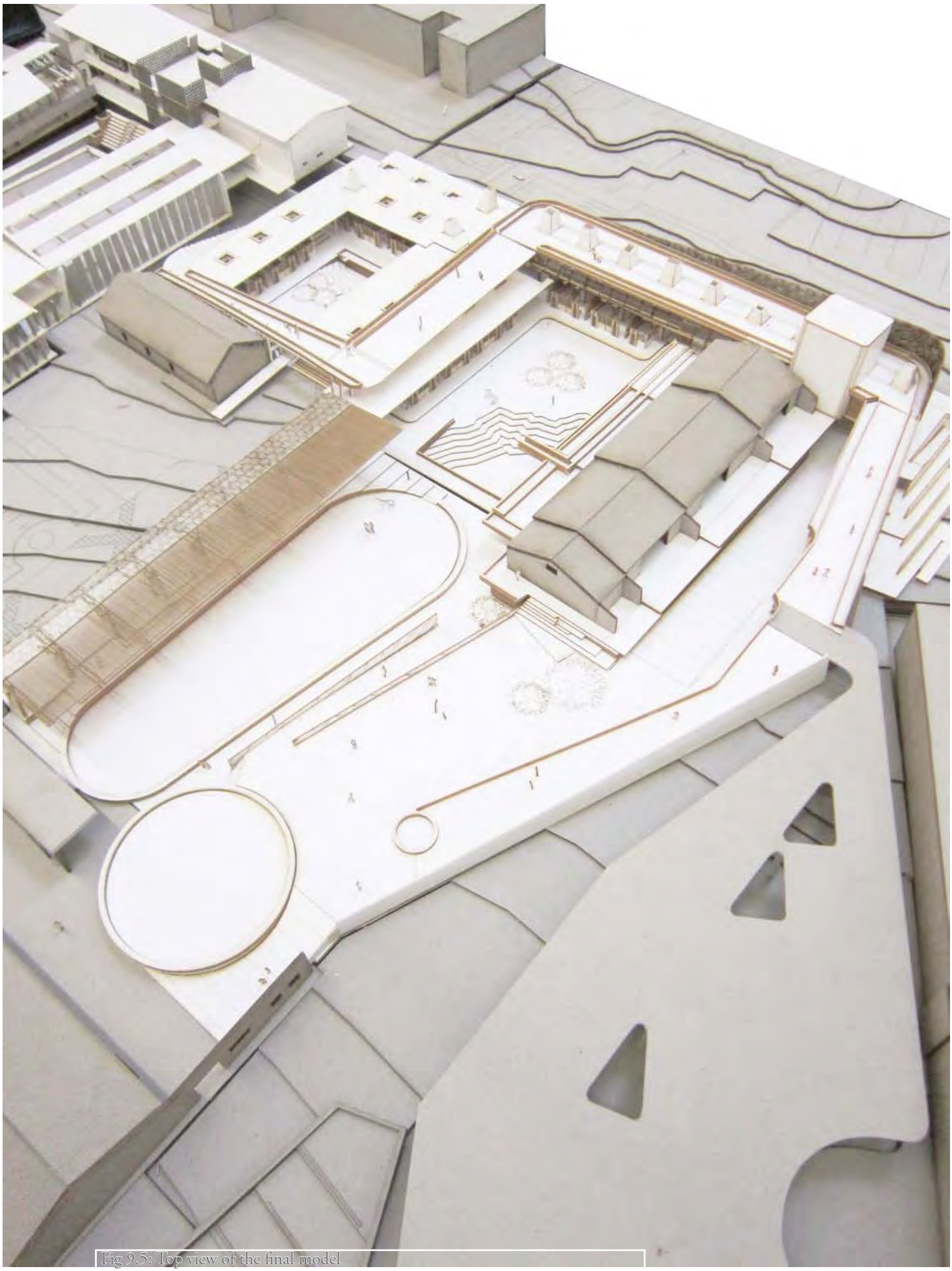


Fig 9.5: Top view of the final model

© University of Pretoria

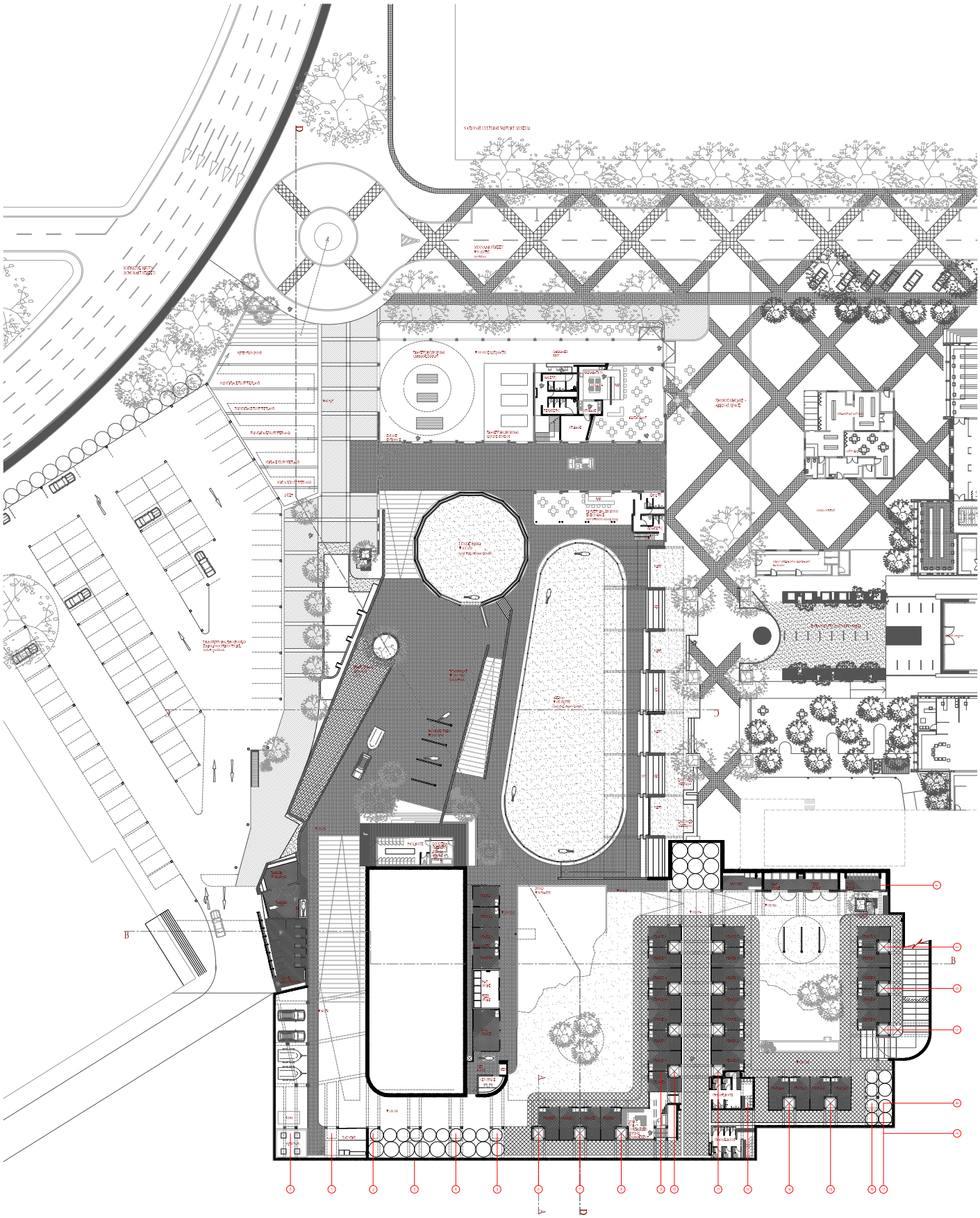


Fig 9.6: Ground Floor Plan [NTS]

© University of Pretoria

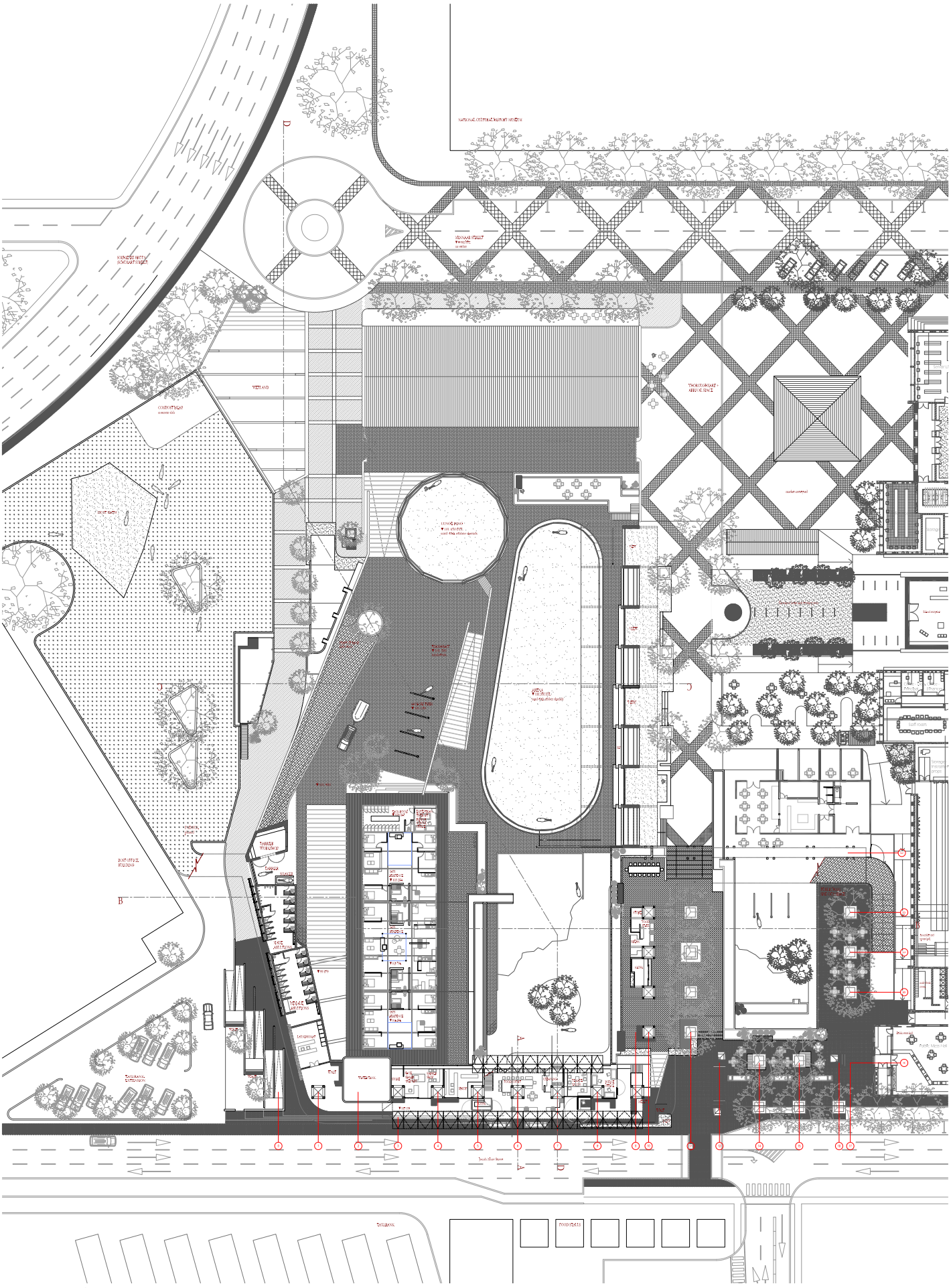


Fig 9.7: First Floor Plan [NTS]

© University of Pretoria

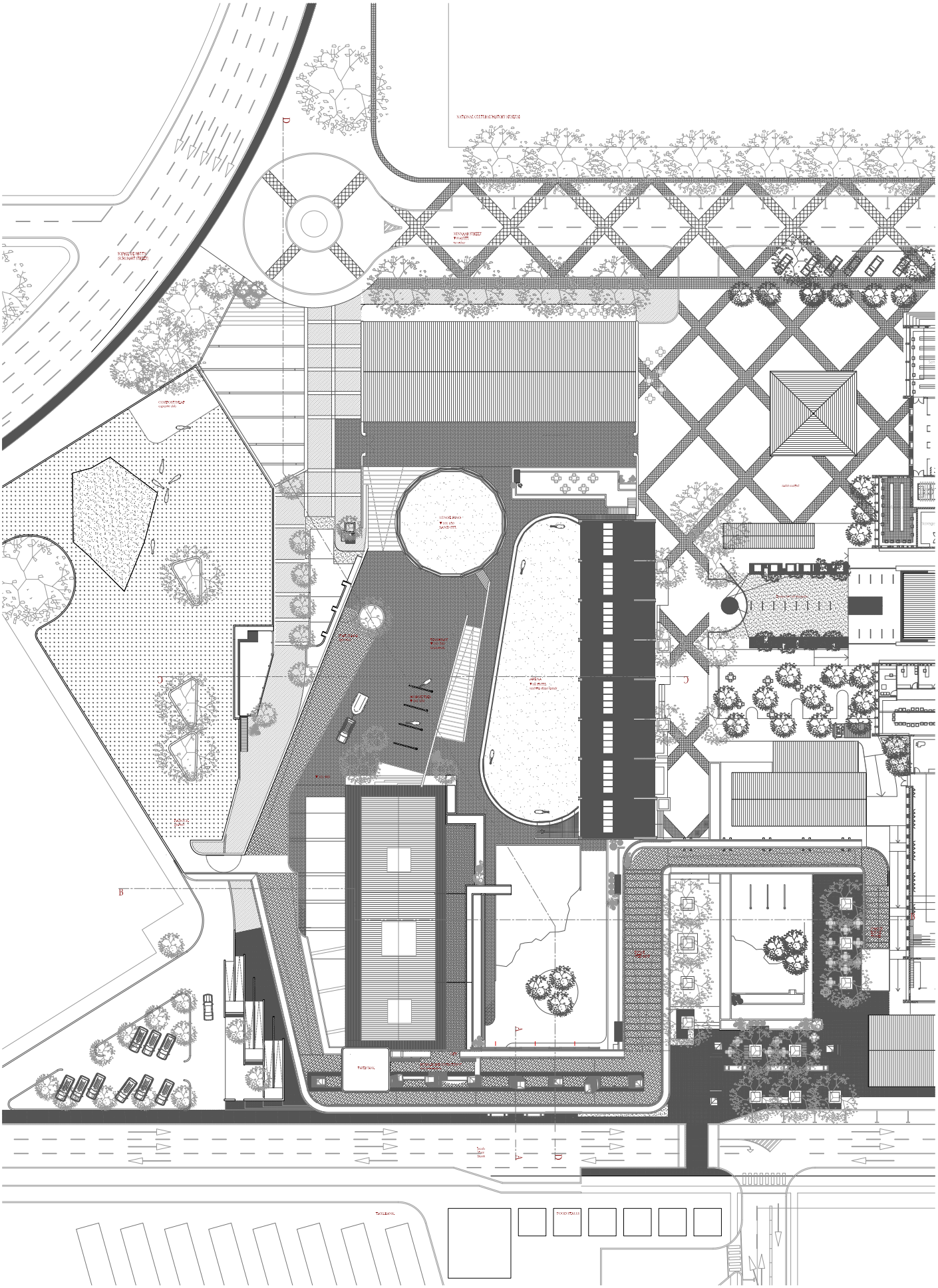


Fig 9.8: Roof Plan [NTS]

© University of Pretoria

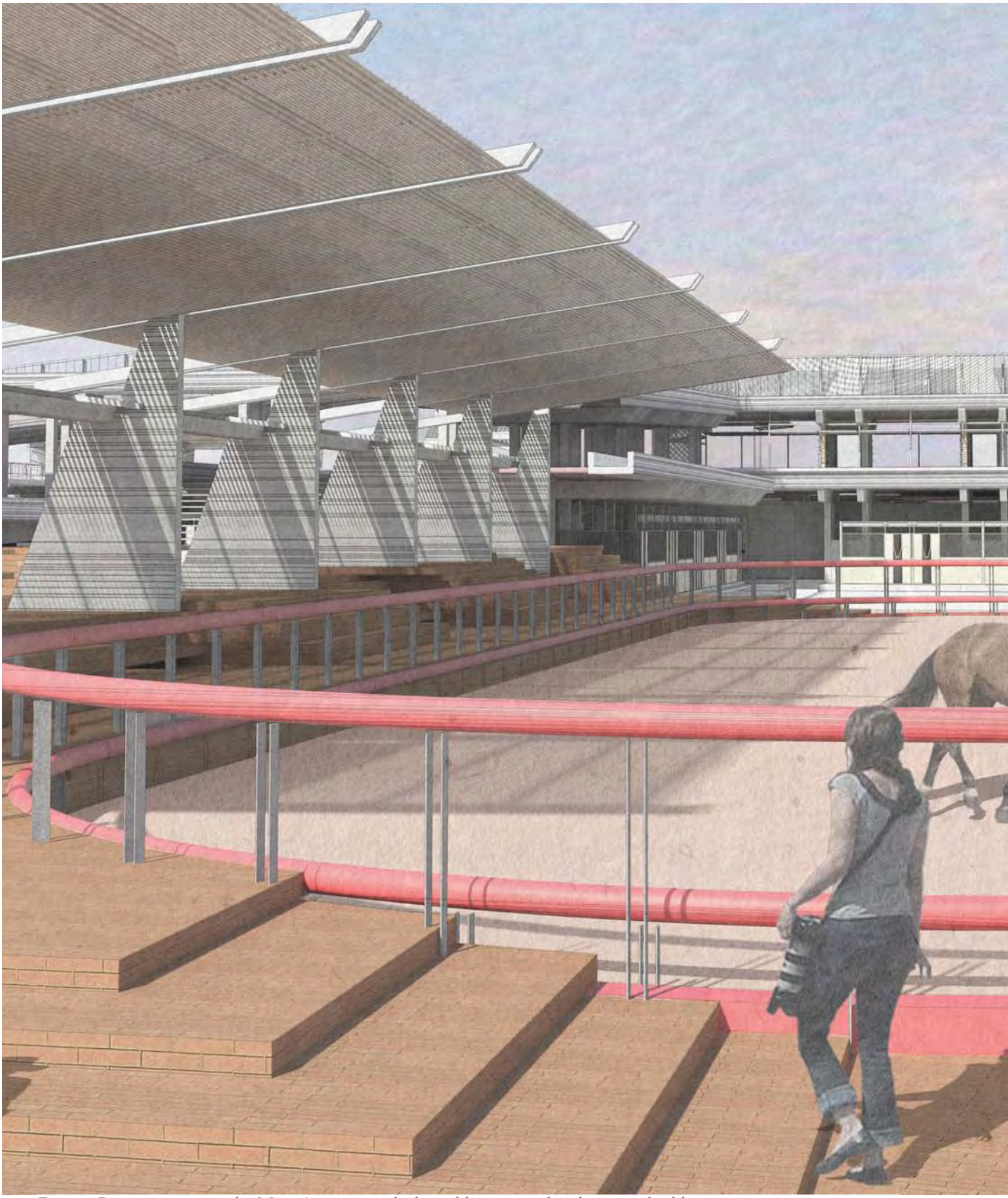


Fig 9.9: Perspective across the Main Arena towards the stable courtyard and existing building

© University of Pretoria



© University of Pretoria



Fig 9.10: Perspective across the stable courtyard with the existing building towards the right

© University of Pretoria



© University of Pretoria

SECTION A_A

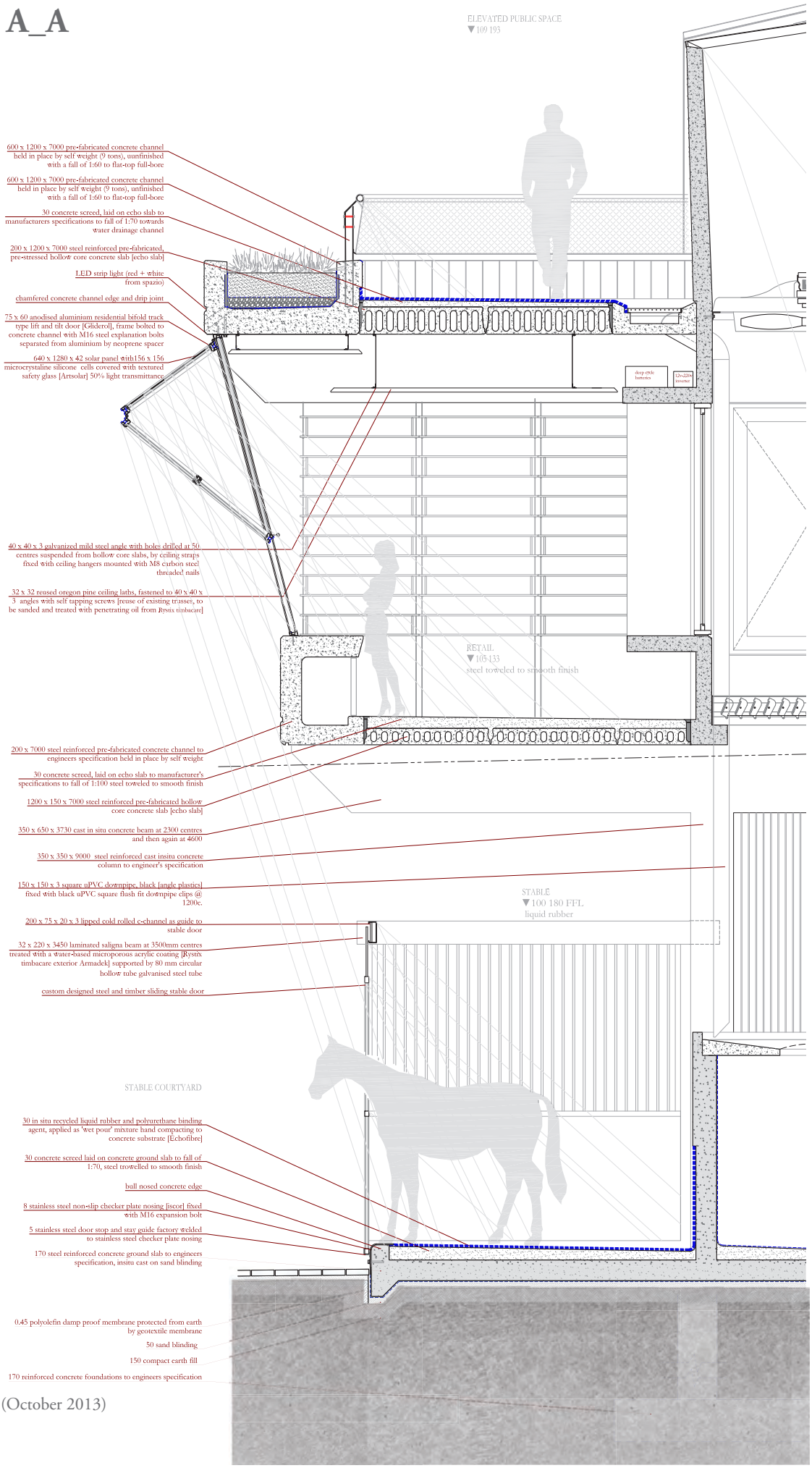
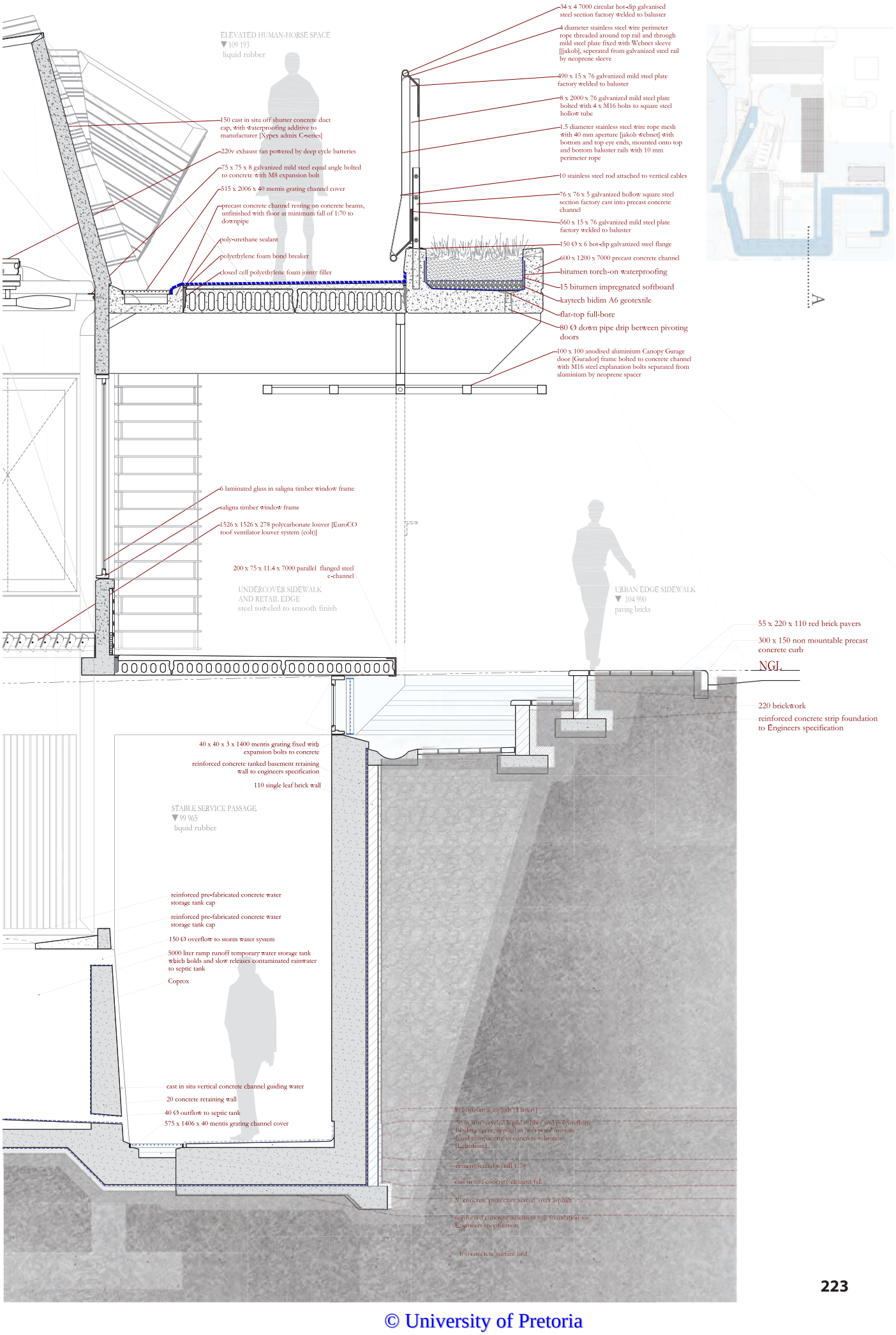


Fig 9.11: Section A_A (October 2013)

© University of Pretoria



© University of Pretoria

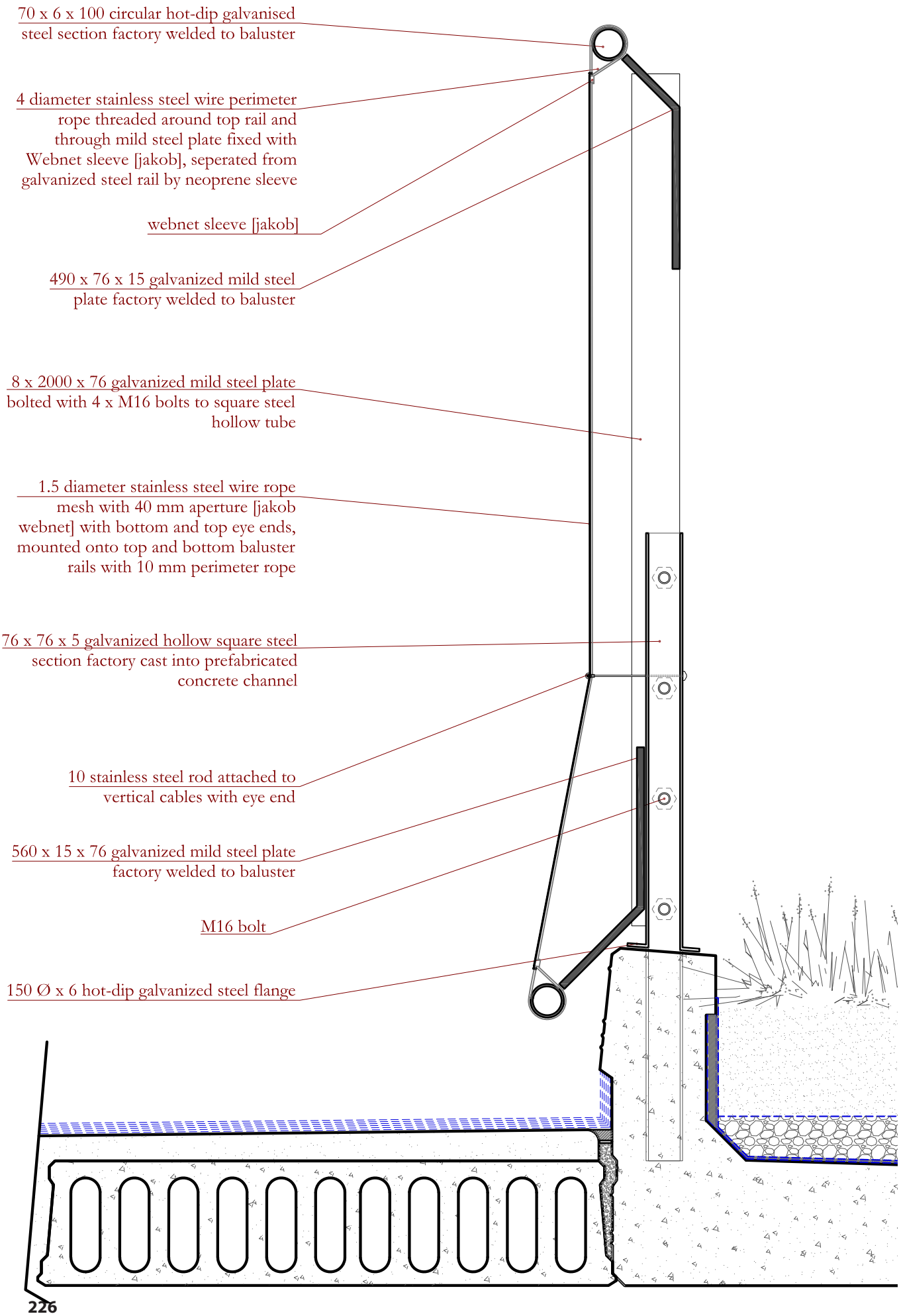


Fig 9.12: Horse training grounds

© University of Pretoria

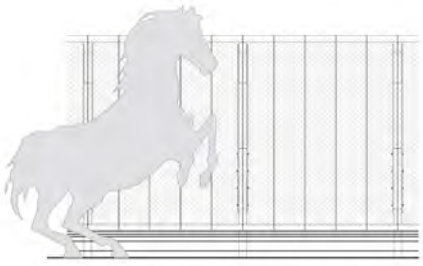


© University of Pretoria

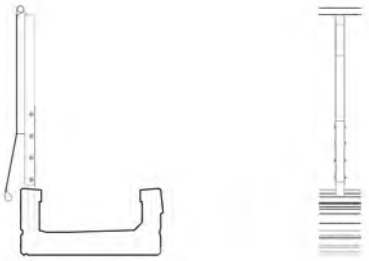


© University of Pretoria

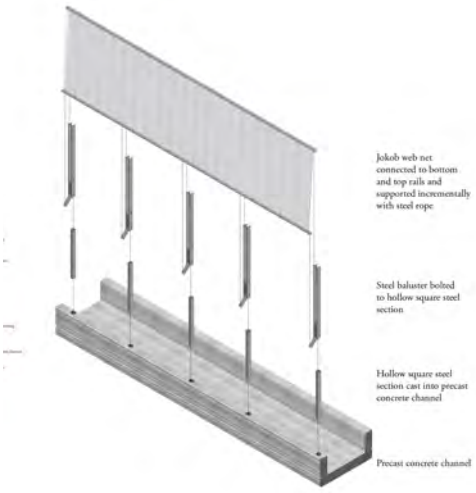
Fig 9.13: Balastrade and pre-fabricated concrete channel
Assembly drawing
1:10



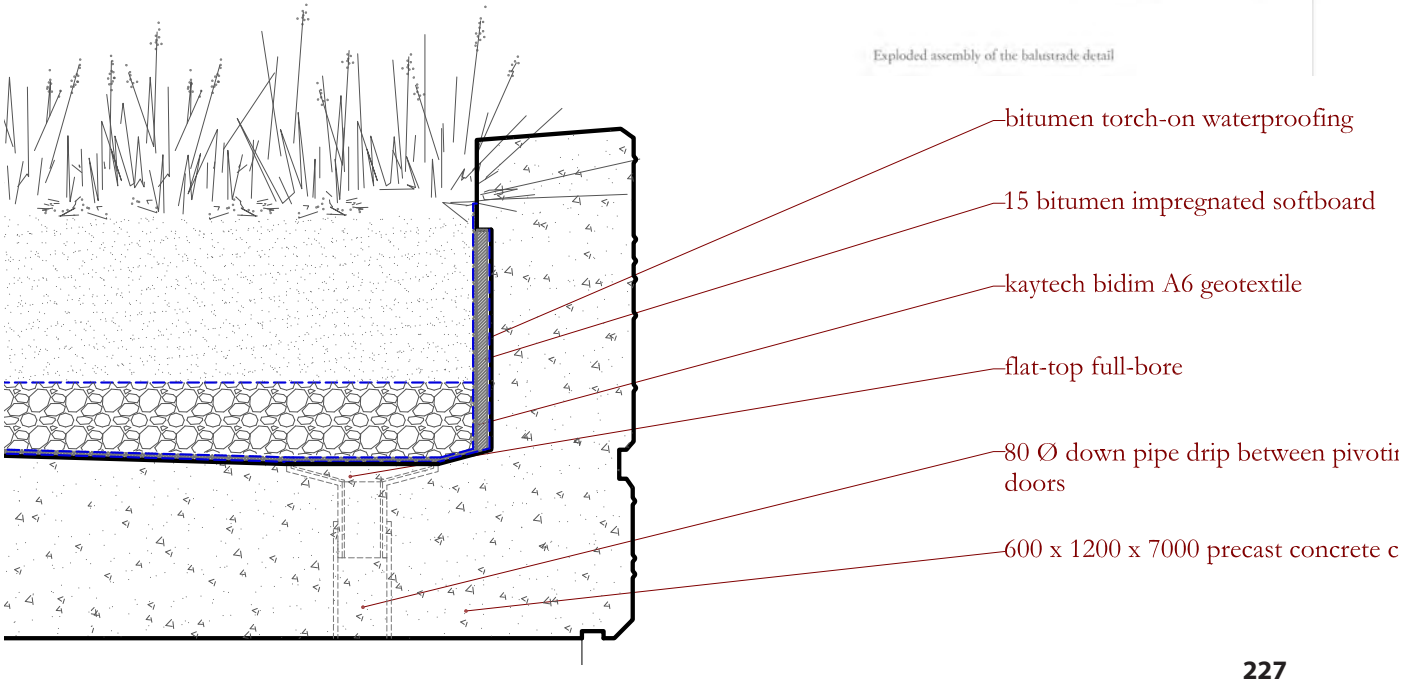
Balustrade [channel as edge]
front elevation
1:20



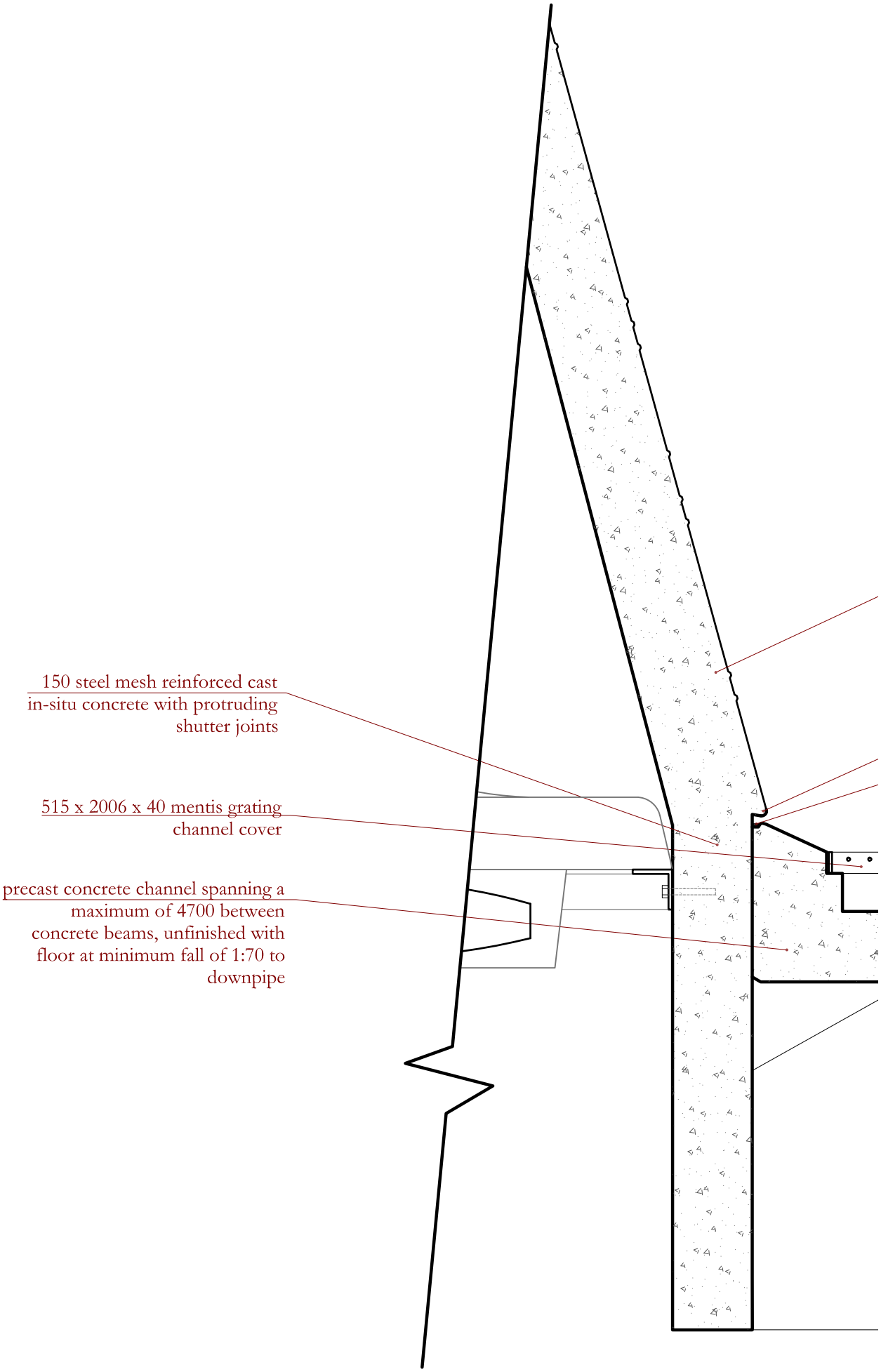
Balustrade [channel as edge]
side and back elevations
1:20



Exploded assembly of the balustrade detail

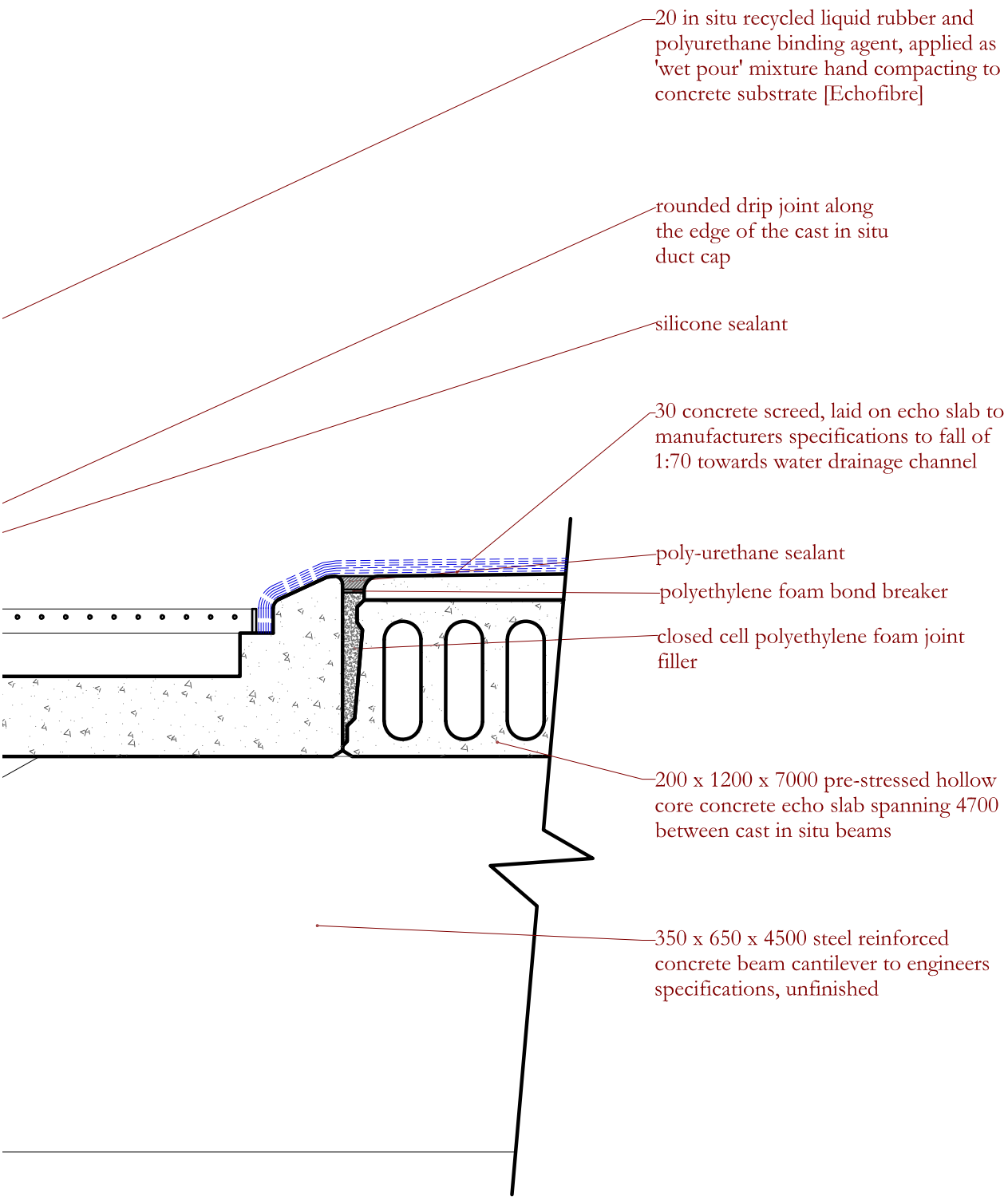


© University of Pretoria



© University of Pretoria

Fig 9.14: Duct Cap
Assembly drawing
1:10



© University of Pretoria

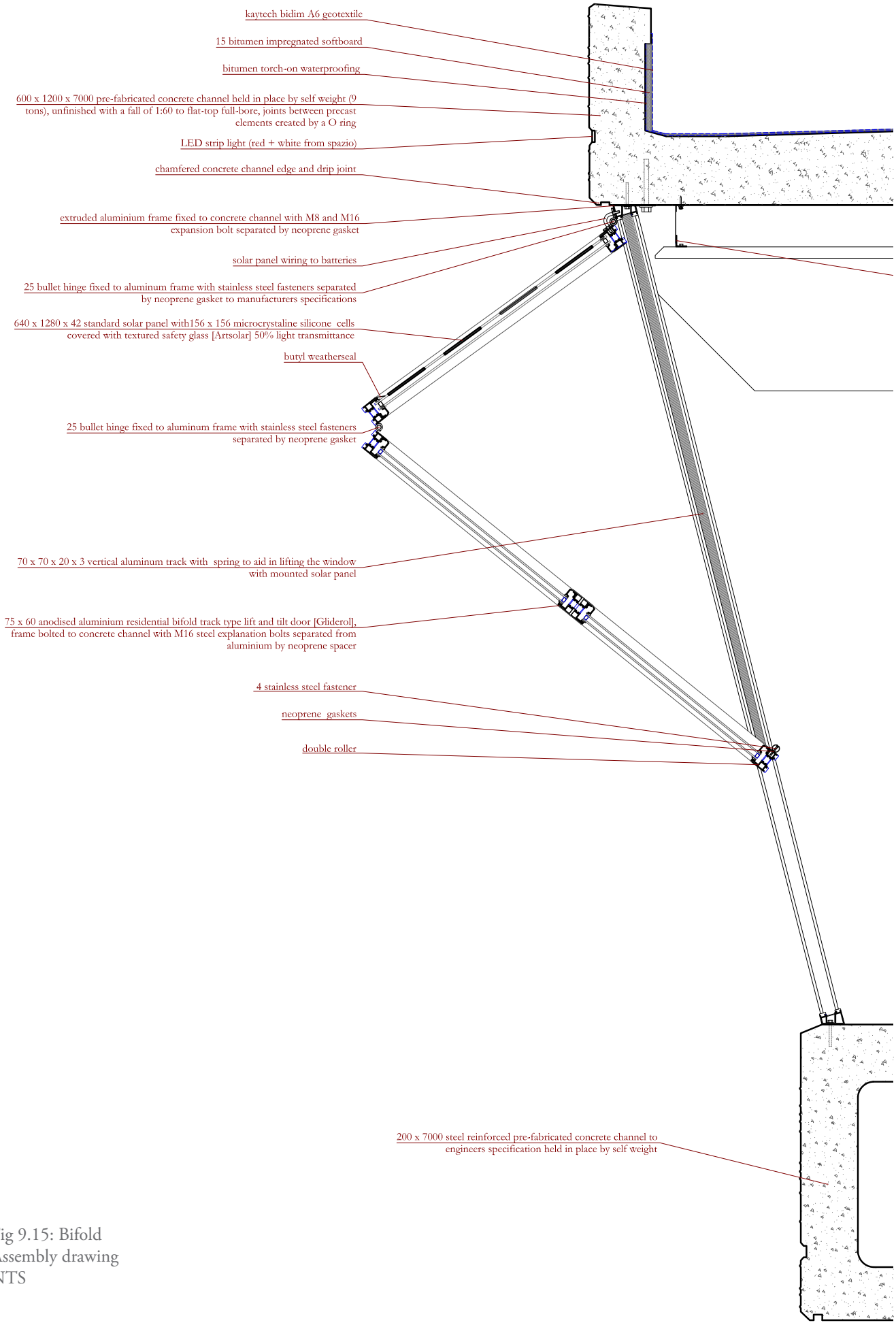
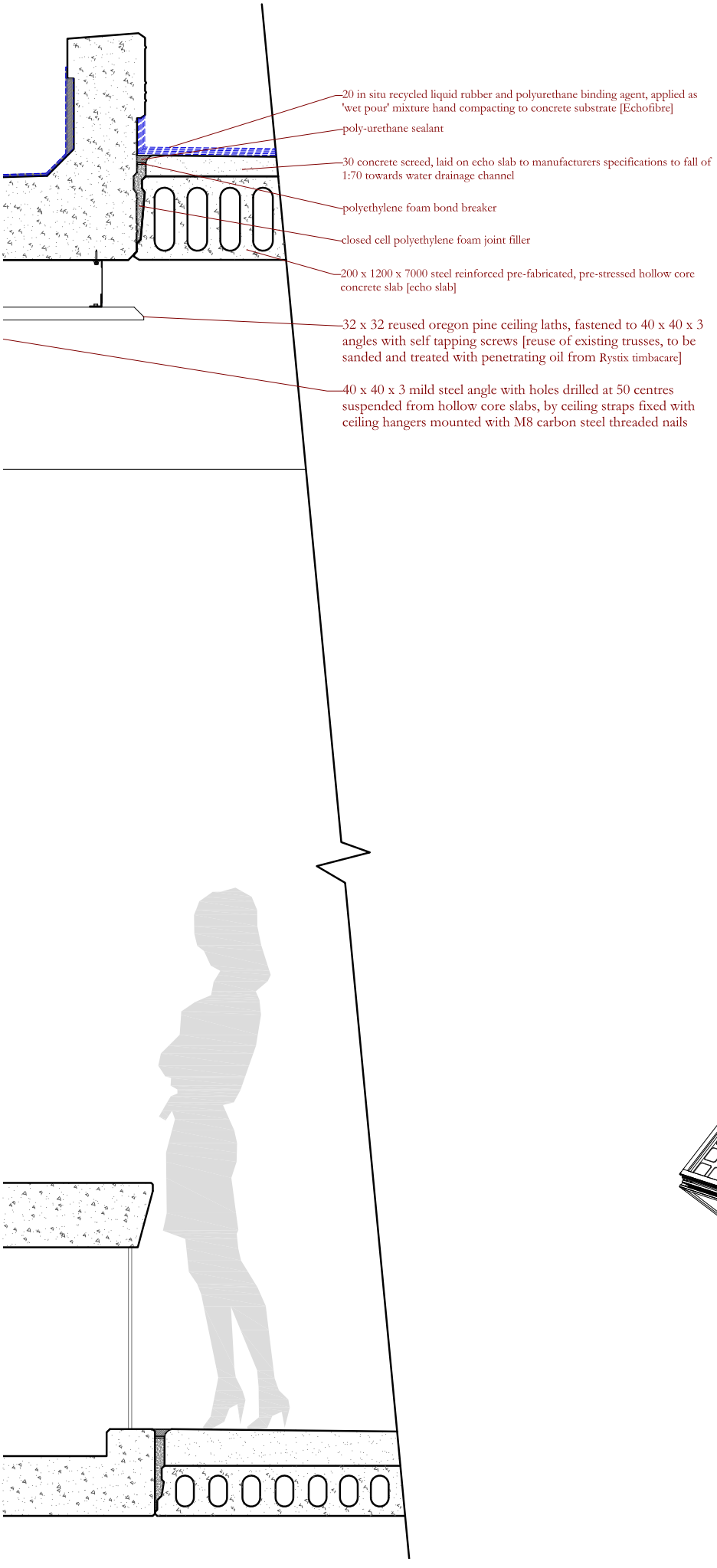
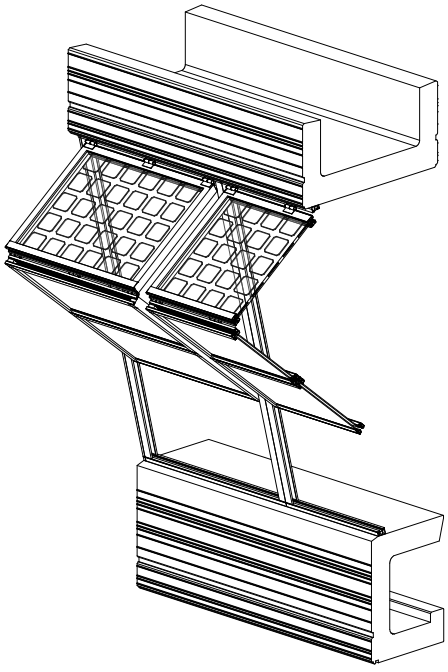


Fig 9.15: Bifold
Assembly drawing
NTS

© University of Pretoria





© University of Pretoria

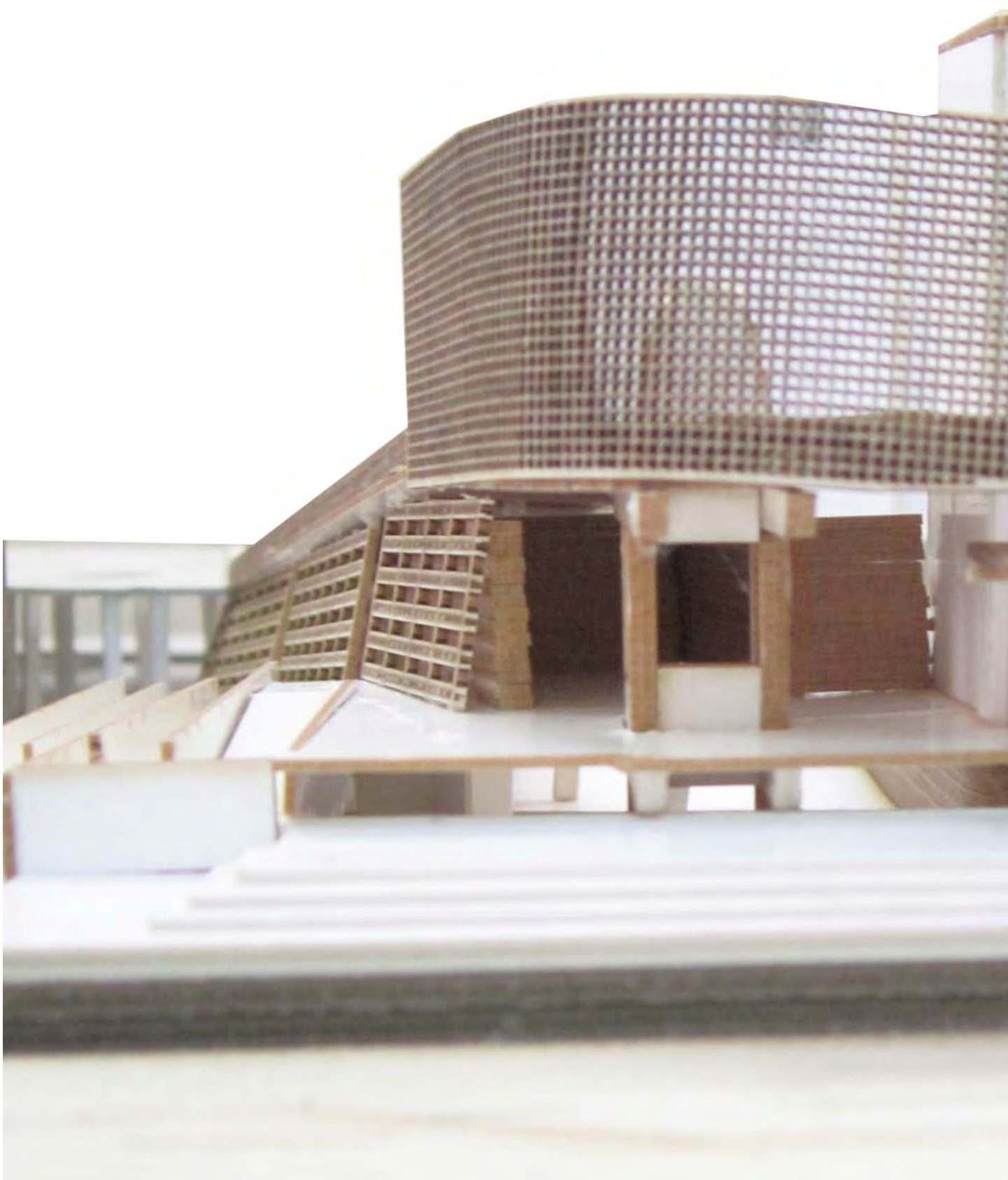
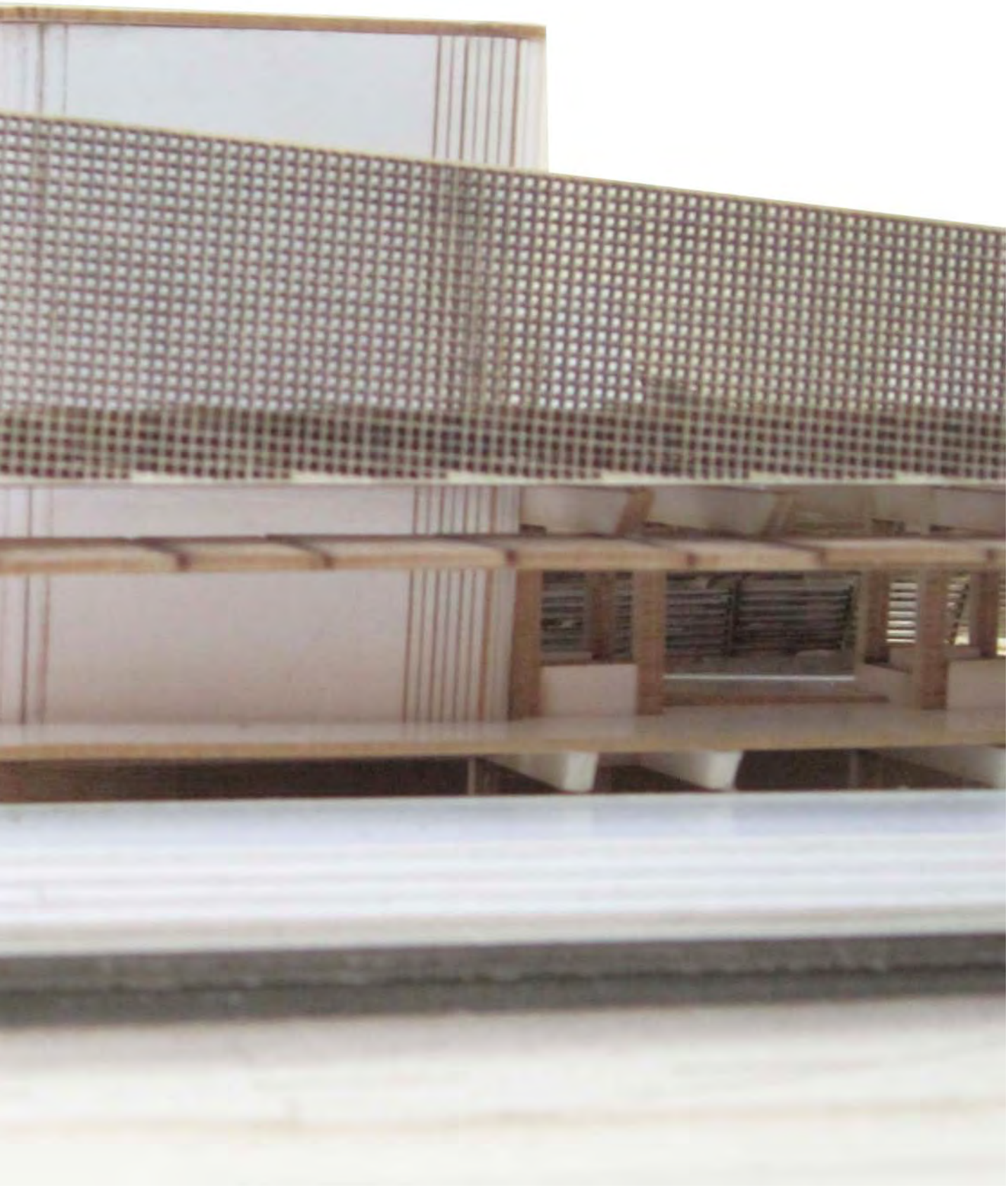


Fig 9.16: Urban edge of the ramp towards the south

© University of Pretoria



© University of Pretoria

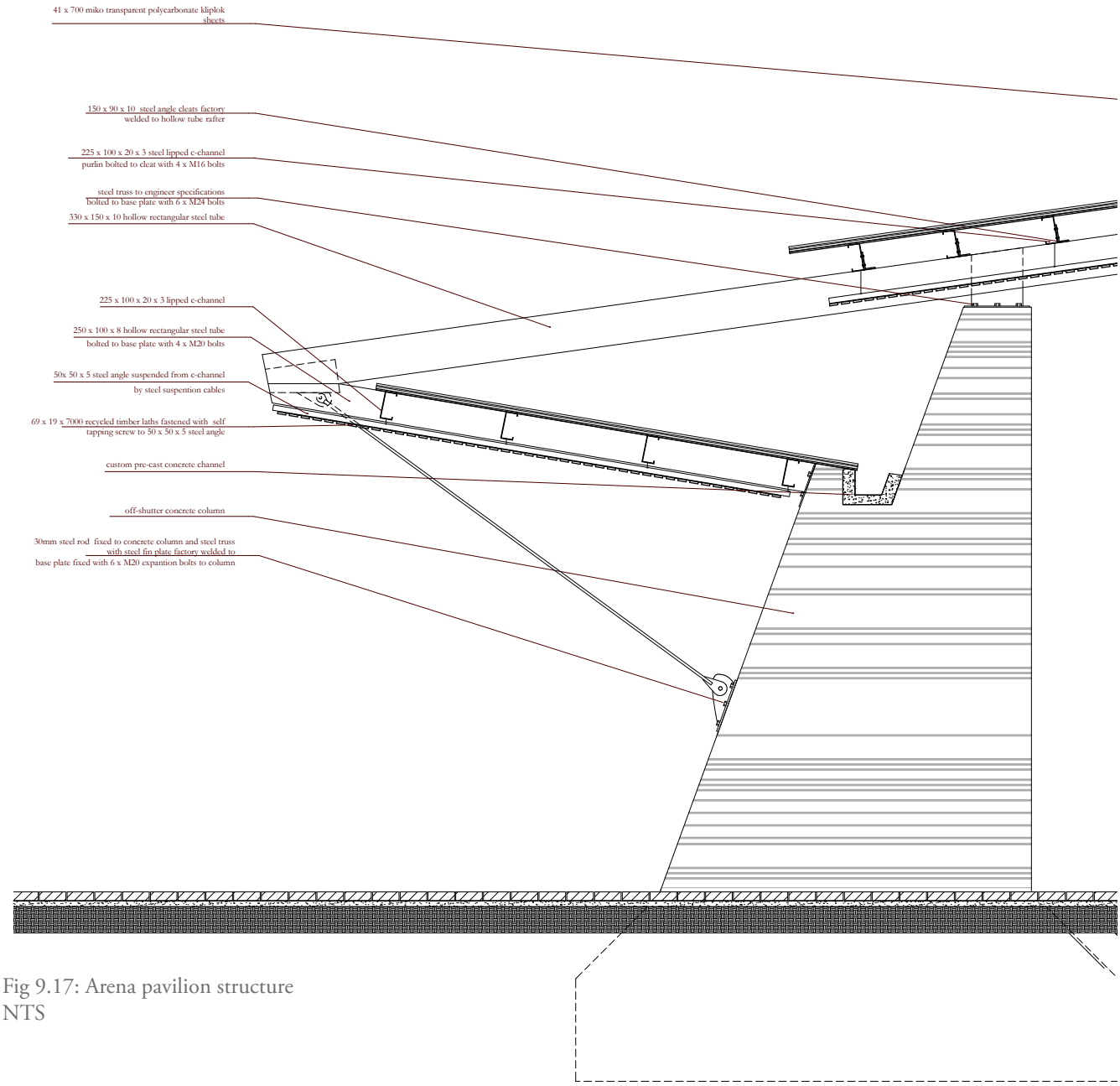


Fig 9.17: Arena pavilion structure
NTS

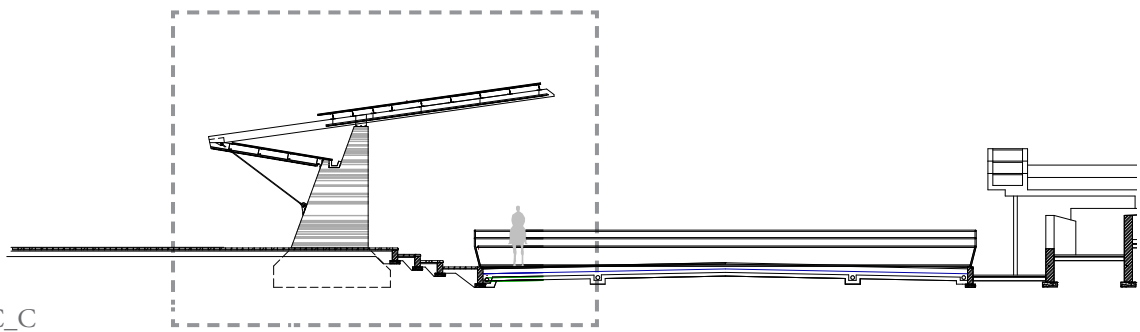
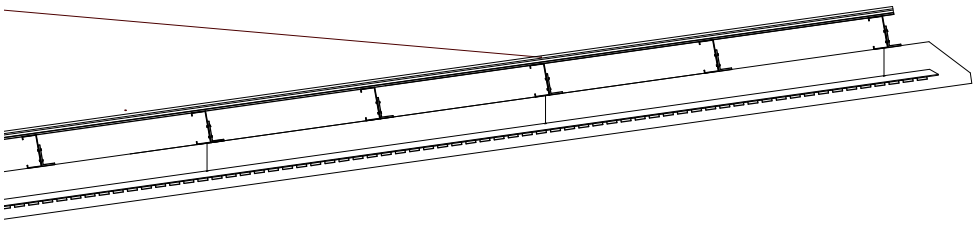
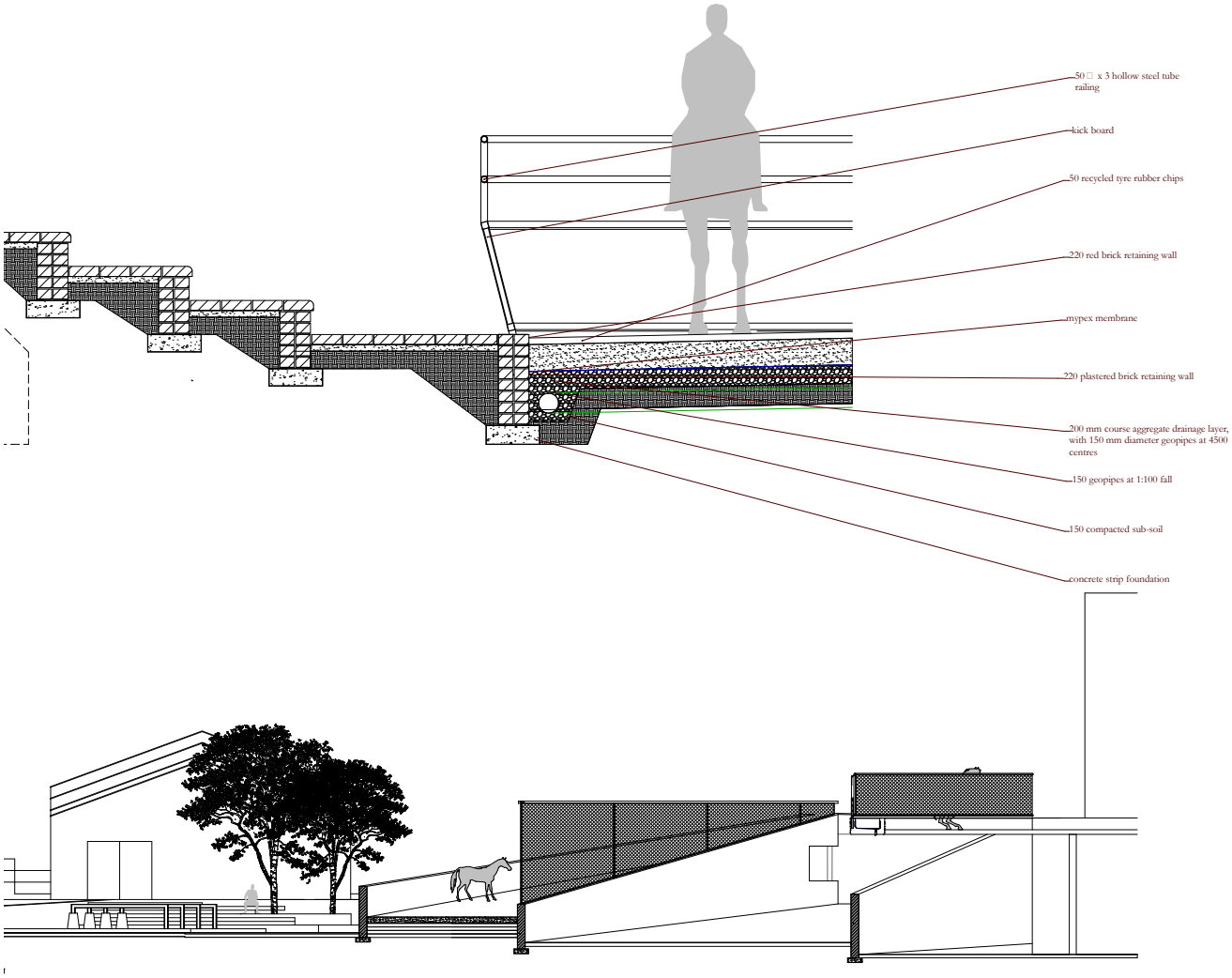


Fig 9.18: Section C_C
NTS

© University of Pretoria





© University of Pretoria



Fig 9.19: Perspective along Jacob Mare Street (Ramp Urban edge)

© University of Pretoria



© University of Pretoria



Fig 9.20: Perspective Equi Scape thoroughfare edge

© University of Pretoria



© University of Pretoria

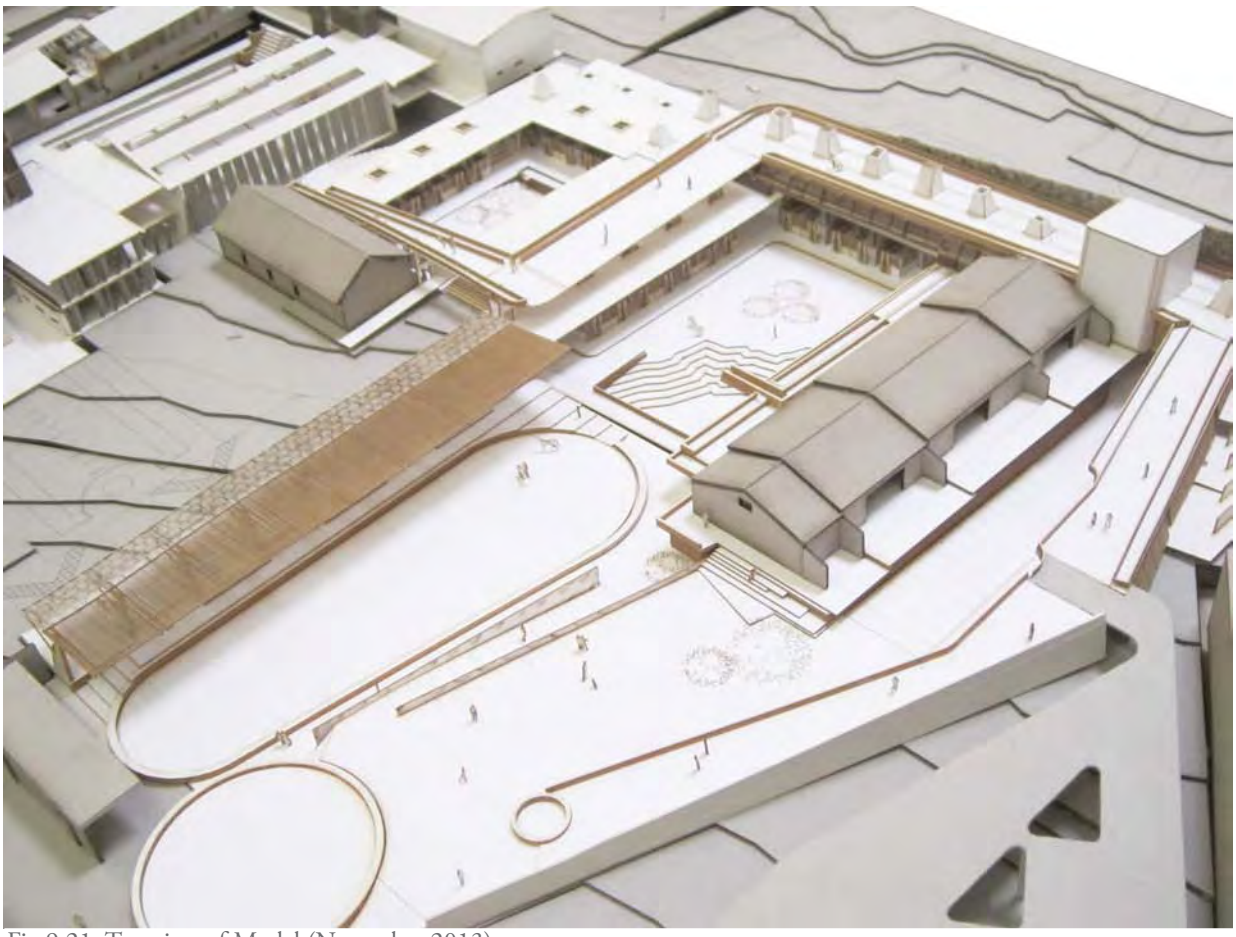


Fig 9.21: Top view of Model (November 2013)

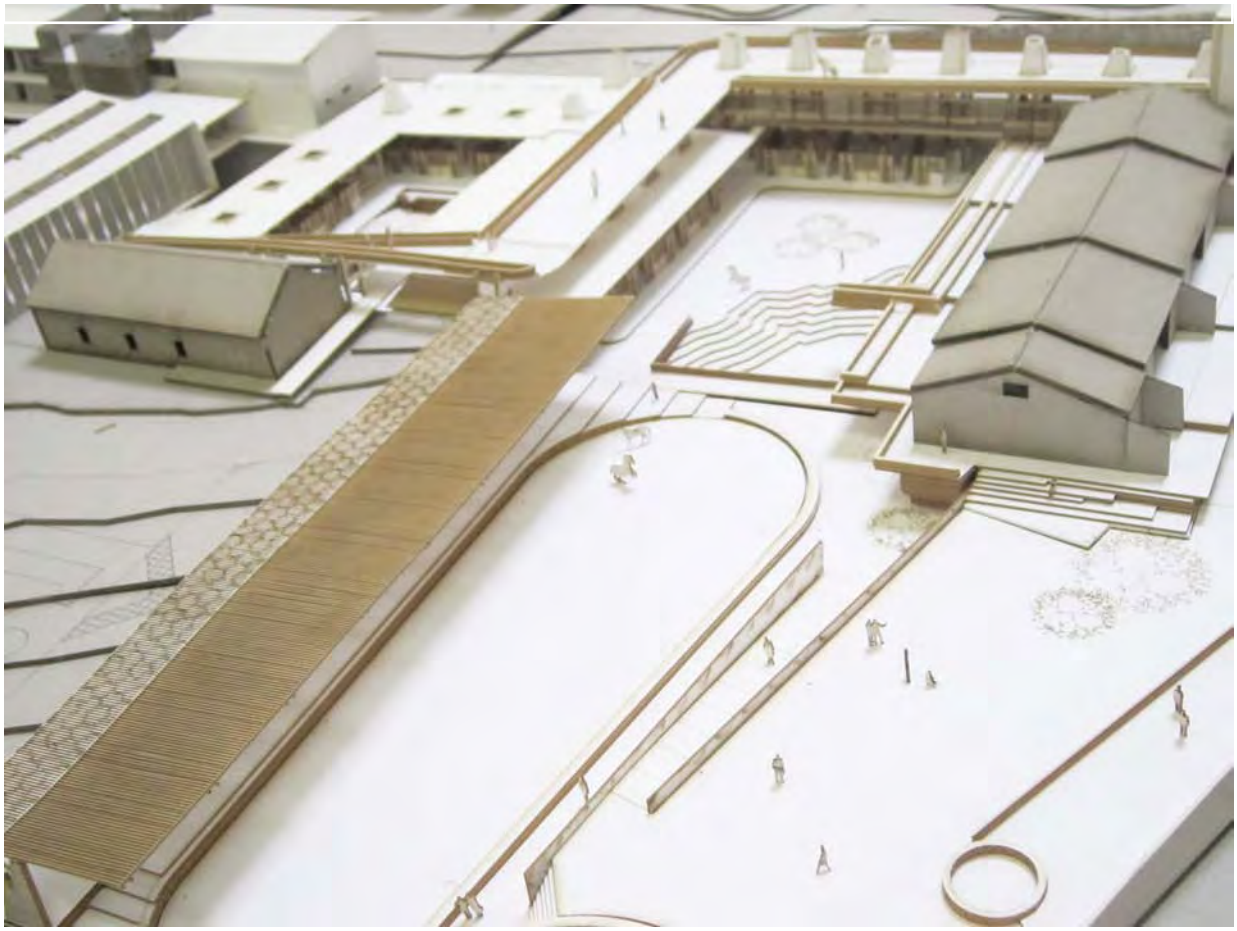


Fig 9.22: View of model: across the main arena towards the stable courtyards (November 2013)

© University of Pretoria



Fig 9.23: View of model: across the main stable courtyard, edged by the existing building and ramp (November 2013)

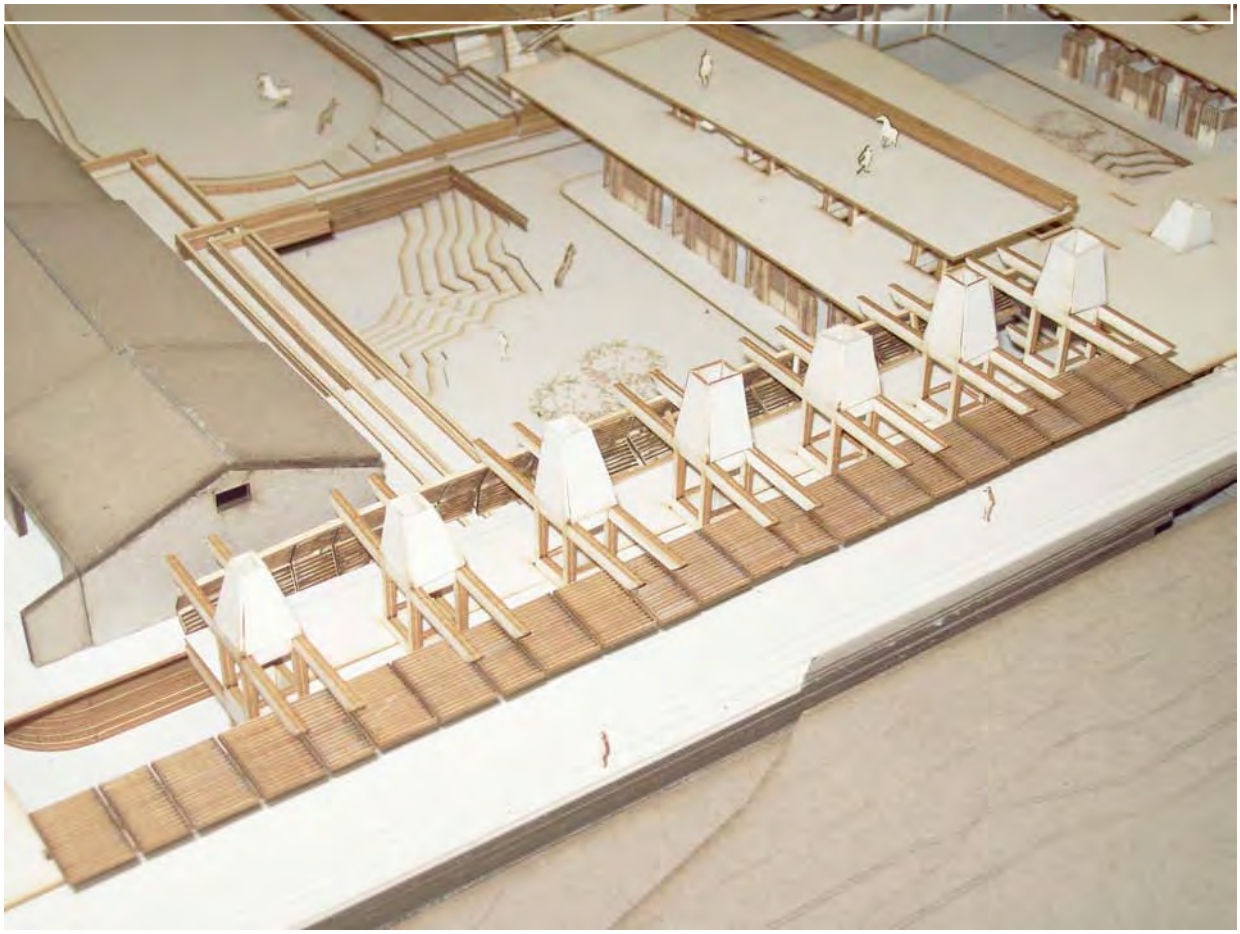


Fig 9.24: View of Model illustrating the ramp's structural system (November 2013)

© University of Pretoria

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

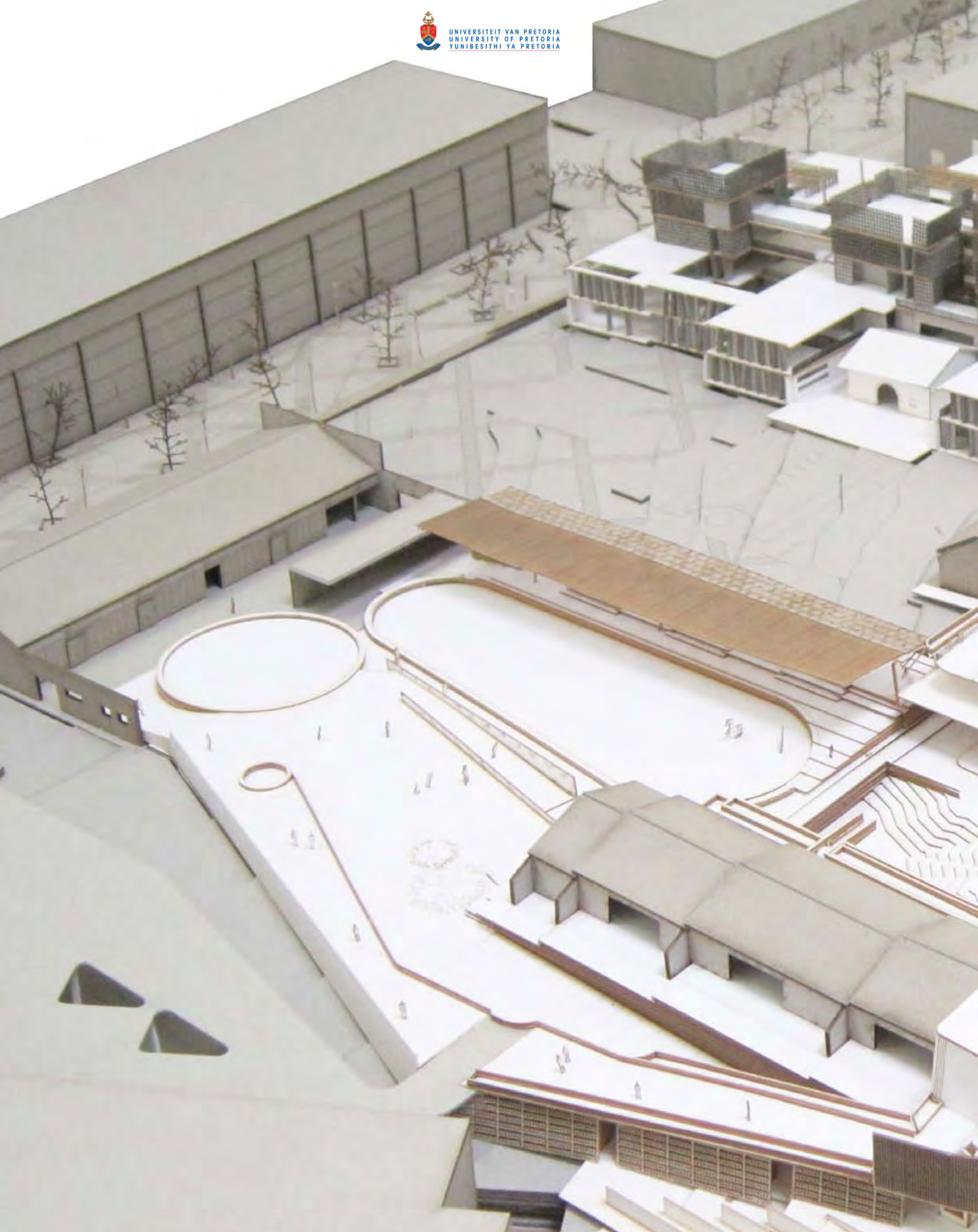
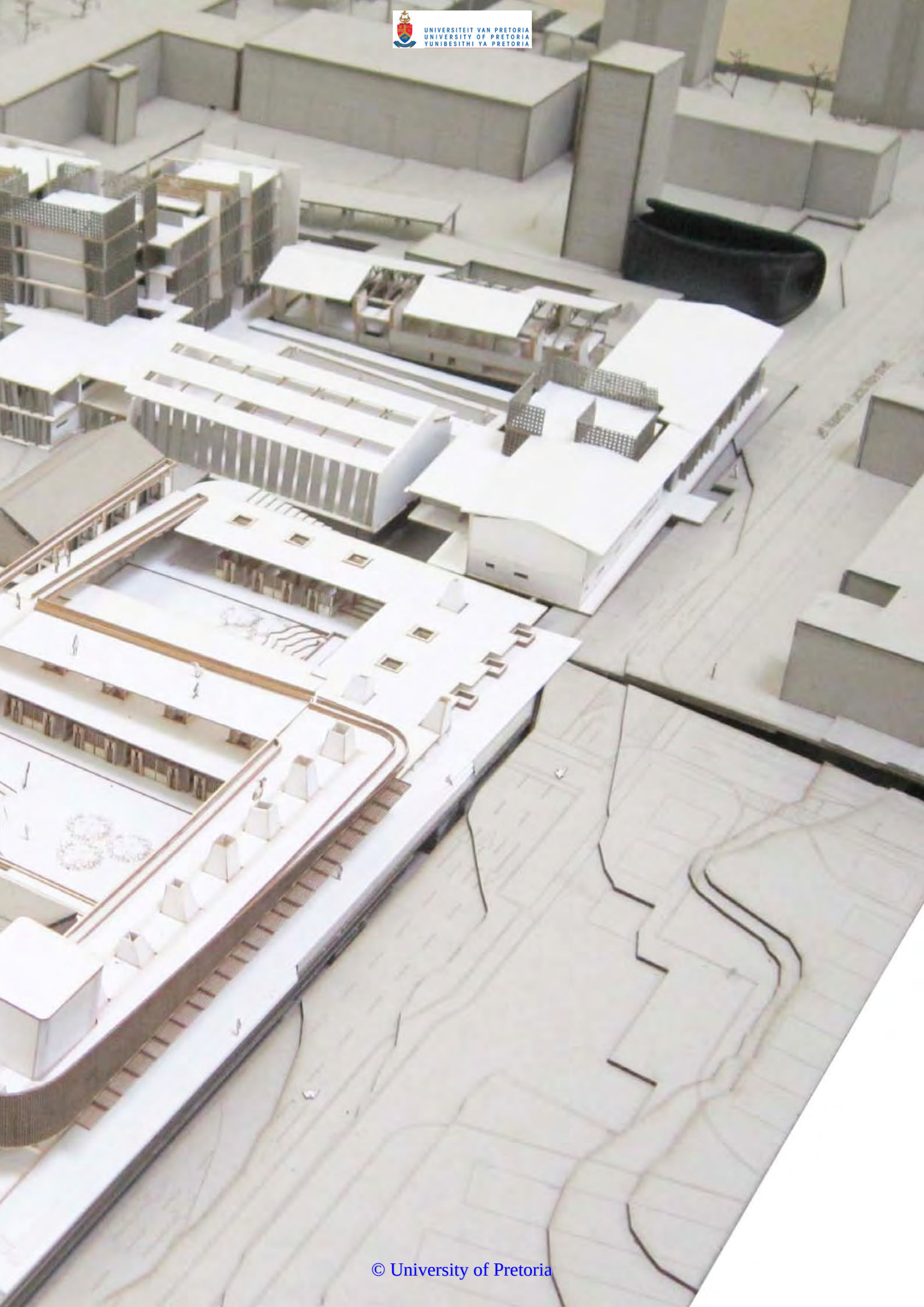


Fig 9.25: Model view looking NE

© University of Pretoria

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA



© University of Pretoria

APPENDIX

STORAGE SIZING CALCULATIONS

HORSE FEED (to be replenished every two weeks)

Expected feed consumption by horses (% bodyweight)

	Forage	Concentrate	Total
Mature Working horse			
Light	1.0 - 2.0	0.5 - 1.0	1.5 - 2.5
Moderate	1.0 - 2.0	0.75 - 1.5	1.75 - 2.5
Intense	0.75 - 1.5	1.0 - 2.0	2.0 - 2.5

(Kline 2000: 68)

Horses will be brought to the facility at four years old, w
assumed weight of 500 - 600 kg (Kline 2000:68).

Amount of complete feed required per horse:

2.5% of 600kg horse = 15kg feed required per horse per day.
5 kg of which is replaced by good quality grass hay
10 kg Complete feed ration needed per day

Total Amount of feed needed for 2 weeks:
10 kg x 30 (number of horses) x 14 (Days) = 4 200 kg

Cubic meter storage needed for Total Mix (complete feed) Rat
two weeks:

Densities of agricultural commodi
Hay in stack: 130 kg / m^3
Maize : 700 kg/ m^3 (Smith 2006:42

Density of complete feed = 472 kg
[130 kg (Forage)/m^3 x 40%] + [7
(Concentrate)/m^3 x 60%] = 472 kg/

4200kg x 472 kg/m^3 = 90.75 m^3 storage for the complete feed
4200kg ÷ 50kg bag = 84 bags
90.75 m^3 ÷ 84 bags = 1.1m^3 per bag
20 bags per pallet (4 layers of 5 bags each) = 1 ton
Volume per Pallet:
1.1m^3 x 20 bags = 21.1 m3 feed per pallet
Pallet size: 1.2m x 1.2m x 0.15m
Pallet volume: 0.216

Feed volume per pallet + Pallet: 21.32 m^3
5 Pallets: 2 - 3

A

© University of Pretoria

HAY

Amount of Hay required
5kg + 20% waste = 6.25 kg hay/day x 30 (horses) x 14 (days) = 2625 kg

10% Extra space needs to be allowed for ventilation and
remaining stock when new stock arrives (Neufert 1980: 345).

2650kg Hay to be delivered every 2 weeks

Hay Storage

2650 kg ÷ 130 kg (hay)/m^3 = 20.4 m3
2650 kg ÷ 25 = 106 rectangular bales every 2 weeks
Bale size: 450 x 450 x 900 (Neufert 1980: 345)
5 bales per layer x 4 layers = 500kg per pallet.

Average: 6 Pallets total

BEDDING (for a 600kg horse)

Mass: 9 kg/day/stable
Density: 150 kg (bedding)/m3
Volume: 0.06 m3 bedding material per horse per day (Adapted from Wheeler & Zajaczkowski 2009: 3.2)

0.06 m^3 x 30 (stables) x 7 days = 12.6 m^3

12.6 m^3 storage required (Assuming that stables will be cleaned each day)

MANURE AND SOILED BEDDING STORAGE REQUIREMENTS (for a 600kg horse)

Volume: 0.09 m^3 (Adapted from Wheeler & Zajaczkowski 2009: 3.2)
0.068 m^3 x 30 (stables) x 7 days = 18.9 m^3

18.9 m^3 storage required (Assumption that stables will be cleaned each day)

© University of Pretoria

APPENDIX

WATER AND SANITARY CALCULATIONS

Table 1: SANITARY REQUIREMENTS FOR THE INTERVENTION ACCORDING TO SABS STANDARDS (SABS, 1999:125)

	Occupancy			Population	Male				Female		
					wc	urinal	whb	showers	wc	whb	showers
Museum Park Edge	A1	**Entertainment + public assembly**	table 6	120	3	6	5	0	9	5	0
Urban Edge	A1	**Entertainment + public assembly**	table 6	220	4	7	6	0	10	6	0
Horse Facility	D3	**Low risk industrial**	table 6	30	1	2	2	0	5	3	0
Residential	H4	**Dwelling**	table 5	8	1	1	1	1	2	1	1

Table 2: WATER REQUIREMENTS FOR PEOPLE AND HORSES BASED ON GREY WATER REUSE

1 **Human use**	flow	m³	uses / day	m³/day
Flush a toilet[1]	half flush	0.005	120	0.54
Flush a toilet[1]	full flush	0.009	50	0.45
Flush a urinal[1]		0.005	120	0.54
Shower[1]	10L/min	0.04	60	2.4
Basin[1]	6L/min	0.003	120	0.36
Washing a taxi[3]		0.02	10	0.2
10 industrial washing machines	10	0.078	8	6.24
Washing dishes and cooking[2]		0.02	120	2.4
Total Water requirementsper day				13.13
Grey water available for flushing (showers and basins)				9
Flushing of toilets and urinals				-1.53
Excess grey water available for irrigation				7.47
Water consumption per day with grey water reuse				11.6
Water consumption per month with grey water reuse				352.87

	No.	m³	days/month	m³/Month
Washing horses°	30	0.025	5	3.75
Horses drinking water°	30	0.025	30.42	22.82
Washing stables[4]	30	0.05	5	7.5
Wash Horse boxes	2	0.05	2	0.2
Wash cars	2	0.05	2	0.2
2 industrial washing machines	2	0.078	8	1.248
Carrages	2	0.05	2	0.2
Ramp wash	1	2	1	2
Water consumption per month				37.91

Total human and horse consumption of water per month (m³)	391

[1] Green Building Handbook
[2] Third year silde lecture notes
[3] Assumption based on 20 L bukets used as observed on site
[°] interview with a Equine vet
[4] Assumption from observation

Table 3: RAIN WATER TANKS AS CALCULATED FROM CONSUMPTION + 40%

Average water consumption per mo [m³]	Low rainfall months	Required capacity [m³]	Contingency margin	Contingency [m³]	Total [m³]
220	4	880	40%	352	1,232

B

© University of Pretoria

Table 4: EQUINE BLACK WATER TO BE SENT TO WETLAND AND THEN USED FOR IRRIGATION

	coefficient		No.	m³	days/month	m³/month
Urine		0.85	30	0.009	30.42	7.0
Wash horses		0.85	30	0.025	5	3.2
Wash stables		0.85	30	0.05	5	6.4
Wash Horse bo:		0.85	2	0.05	2	0.2
Wash cars		0.85	2	0.05	2	0.2
Industrial washi		1	2	0.078	15	2.3
Carrages		0.85	2	0.05	2	0.2
Ramp wash		0.85	1	2	4	6.8
						26.2
Horse's Grey water produced per day						0.9
Excess grey water available after flushing per day						7.5

Waste water

- 50 liters to wash a stable once a week [6 stables washed per day, over a 5 day period]
- 25 liters to wash a horse once a week [6 horses washed per day, over a 5 day period]
- 9 liters Urine per horse per day of which 50% is absorbed
- 4.5 liters x 7days = 31.5 liters per week
- Water wasted during drinking is negligible

[50L+25L+31.5L] x 30 horses = 3195 liters per week
Design for 4000 liters per week

Water used for irrigation: Drippers on a time switch, provide 25 liters of water per tree per week

Overflow: Water which has passed through the wetland may be released into the storm water system if there is excess.

Table 4: EQUINE BLACK WATER TO BE SENT TO WETLAND AND THEN USED FOR IRRIGATION

30 Year	Coefficient	Peak rainfall (m/	Area	Storm water (m³)	
paddock	0.25	0.160	3050	122	122

Table 5: CALCULATED SURFACE AREA OF PADDOCK WETLAND SYSTEM

in flow	2x Subsurface + 2x Surface flow depth of wetland	25% surface area of inflowing water	Area of wetland	Average size per wetland segment (m²)
130	0.75	33	163	326	82

Table 6: IRRIGATION REQUIREMENTS PER MONTH DURING SUMMER AND WINTER

	(m/month)	Area irrigated [m²]	total/month [m³]	grey water available [m³]	Additional water required [m³]
Summer months *	0.16	2500	400	-296	104
Winter months *	0.125	2500	312.5	-296	17

© University of Pretoria

Table 7: RAIN WATER YIELD FROM EQUI SCAPE AND ADJACENT BUILDING ROOFS BASED ON PRETORIA'S AVERAGE MONTHLY PRECIPITATION (m^3 per month)

	Rainfall	Rainwater yield harvested on available roof areas (m^2) per month[1]					
	m	Workshop	Residential	Arena	Post Office	NCH Museum	Total
		1050	566	560	5550	3340	11066
January	0.136	128.52	69.28	68.54	679.32	408.82	**1354.48**
February	0.075	70.88	38.21	37.80	374.63	225.45	**746.96**
March	0.082	77.49	41.77	41.33	409.59	246.49	**816.67**
April	0.051	48.20	25.98	25.70	254.75	153.31	**507.93**
May	0.013	12.29	6.62	6.55	64.94	39.08	**129.47**
June	0.007	6.62	3.57	3.53	34.97	21.04	**69.72**
July	0.003	2.84	1.53	1.51	14.99	9.02	**29.88**
August	0.006	5.67	3.06	3.02	29.97	18.04	**59.76**
September	0.022	20.79	11.21	11.09	109.89	66.13	**219.11**
October	0.071	67.10	36.17	35.78	354.65	213.43	**707.12**
November	0.098	92.61	49.92	49.39	489.51	294.59	**976.02**
December	0.110	103.95	56.03	55.44	549.45	330.66	**1095.53**

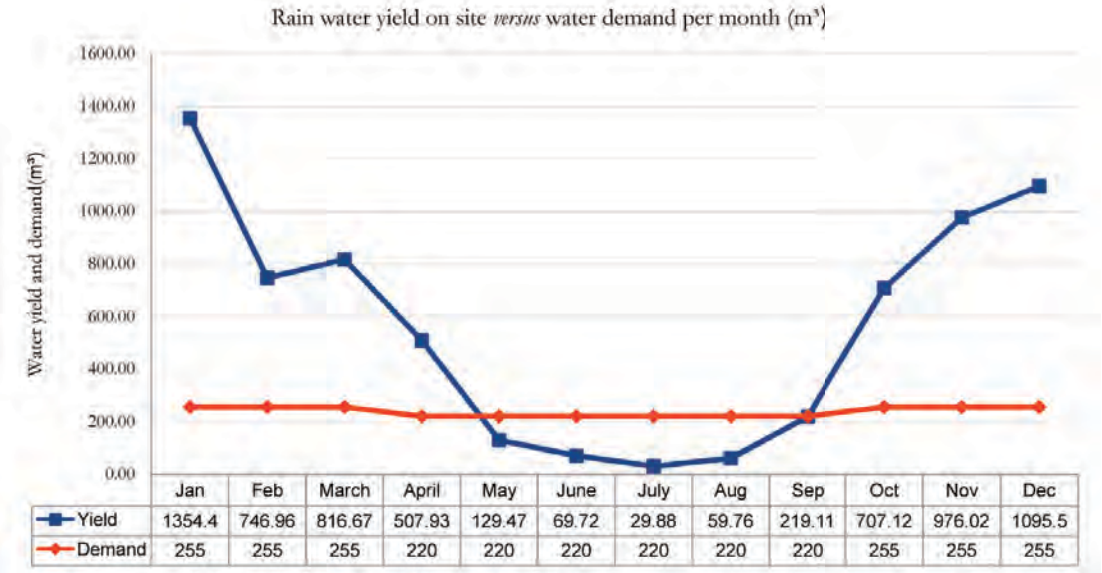


TABLE 8: RAIN WATER TANKS AS CALCULATED FROM GRAPH

Months with shortage			deficit			
	129.47	220	90.53	40%	36.21	126.74
	69.72	220	150.28	40%	60.11	210.39
	29.88	220	190.12	40%	76.05	266.17
	59.76	220	160.24	40%	64.10	224.34
	219.11	220	0.89	40%	0.36	1.25
						828.88

© University of Pretoria

Table 9: RAIN WATER YIELD ON SITE BASED ON PRETORIA'S AVERAGE MONTHLY PRECIPITATION (m^3 per month)

	rainfall (m)	rainwater yield harvested on available roof areas (m^2) per month[1]						
		ramp	courtyard 1	courtyard 2	paddock	arena	other	Total
		1050	566	560	3050	1080	1000	7306
January	0.136	128.52	69.28	68.54	373.32	132.19	122.40	**993.62**
February	0.075	70.88	38.21	37.80	205.88	72.90	67.50	**547.95**
March	0.082	77.49	41.77	41.33	225.09	79.70	73.80	**599.09**
April	0.051	48.20	25.98	25.70	140.00	49.57	45.90	**372.61**
May	0.013	12.29	6.62	6.55	35.69	12.64	11.70	**94.98**
June	0.007	6.62	3.57	3.53	19.22	6.80	6.30	**51.14**
July	0.003	2.84	1.53	1.51	8.24	2.92	2.70	**21.92**
August	0.006	5.67	3.06	3.02	16.47	5.83	5.40	**43.84**
September	0.022	20.79	11.21	11.09	60.39	21.38	19.80	**160.73**
October	0.071	67.10	36.17	35.78	194.90	69.01	63.90	**518.73**
November	0.098	92.61	49.92	49.39	269.01	95.26	88.20	**715.99**
December	0.110	103.95	56.03	55.44	301.95	106.92	99.00	**803.66**

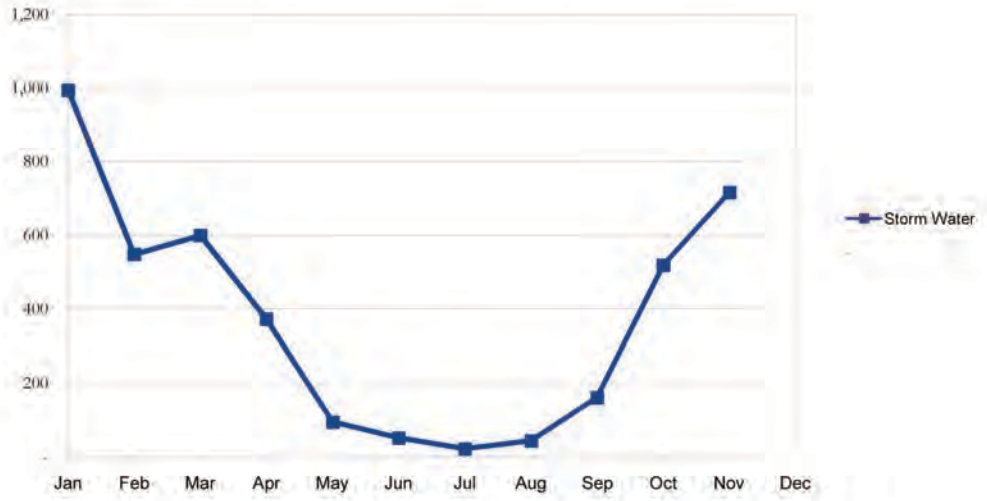


Table 10: FLOOD WATER

20 Year	Coefficient	Peak rainfall (m/h)	Area	Storm Discharge m^3/h
Ramp	0.85	0.054	1050	48.20
Courtyard1	0.85	0.054	566	25.98
Courtyard2	0.85	0.054	560	25.70
paddock	0.25	0.054	3050	41.18
Arena	0.25	0.054	1080	14.58
Other	0.7	0.054	1000	37.80
				193.43

50 Year	Coefficient	Peak rainfall (m/h)	Area	Storm Discharge m^3/h
Ramp	0.85	0.071	1050	63.37
Courtyard1	0.85	0.071	566	34.16
Courtyard2	0.85	0.071	560	33.80
paddock	0.25	0.071	3050	54.14
Arena	0.25	0.071	1080	19.17
Other	0.7	0.071	1000	49.70
				254.33

20 Year	Coefficient	Peak rainfall (m/h)	Area	Storm Discharge m^3/h
workshop	0.9	0.054	1050	51.03
residential	0.9	0.054	566	27.51
arena	0.9	0.054	560	27.22
post office	0.9	0.054	3050	148.23
NCH Museum	0.9	0.054	3340	162.32
				416.31

50 Year	Coefficient	Peak rainfall (m/h)	Area	Storm Discharge m^3/h
workshop	0.9	0.071	1050	67.10
residential	0.9	0.071	566	36.17
arena	0.9	0.071	560	35.78
post office	0.9	0.071	3050	194.90
NCH Museum	0.9	0.071	3340	213.43
				547.37

© University of Pretoria

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Philip Slabbert

© University of Pretoria