# *ANIMAN* SPACE DESIGN:
## A PARROT *ANIMAN* PRECINCT

*Integrative human and animal habitats at the National Zoological Gardens of South Africa*

By

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I am indebted to many professionals, for encouragement, inspiration, support and/or technical assistance throughout this year and my previous years of study. Thank-you Professor Barbara Jekot, Nico Botes, Piet Vosloo, Mr. Kitshoff and the Zoo Staff. Thanks also to friends and family for their encouragement.

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Thank you all.

## ABSTRACT

This project stems out of the need to improve the quality of life for both animals and humans, and facilitate the interaction between both environments into one habitat. The design will serve as a framework for the co-habitation and interaction of humans and animals in one habitat. At the core of this dissertation lies the concept of an *animan* habitat. This term embodies the concept of an intergrated habitat for all species.

In arriving at the final design, a sequential thought process was applied. The logic behind this process will now be outlined (each corresponding section will be addressed in this document). Exploring the diversity of Architectural habitats and products has made it evident that involving Architects and Interior Architects into projects concerning animal space design can benefit wild animals and humans alike. Research into South African recreational nature spaces show the importance of the conservation of these existing spaces to different parties on local, national and international levels. The investigation of the importance of experiential nature spaces in Tshwane and the Tshwane CBDs (section 2.2.2) shows the importance and location of an establishment (the National Zoological Gardens of South Africa) with great human experiential, and animal conservation opportunities. The study of the contributions of global zoos to the world (section 2.3) confirms that any designs need to consider the principles and ethics followed by these zoos-conservation, recreation, education, experience, research, and community values. Behavioural enrichment (section 2.4) as a conservation contribution of zoos is an aspect that can be reinterpreted and incorporated into animal enclosures to enrich their environments, and further educate visitors. Studies about zoo evolutions (section 2.5) through the ages show how thoughts about captive environments are evolving. The subsequent study of exhibit design (section 2.6) makes clear the importance of considering the needs of the environment, animals, zoo occupants and visitors alike. Furthermore, research into design styles and illusions (section2.6) prove that designs (using whichever approach) should consider the wellbeing of animals before educating or entertaining humans. Design illusions could instead be used to change mans' negative perceptions about zoos and other conserving environments. A study into design elements and principles (as studied by Ching and Miller) are currently used at the Zoo (section 2.7) to claim human and animal spaces. A variety of precedent investigations (section 3) make it clear that other institutions, zoos, reserves, bird parks, discovery centres, playgrounds, and an amphitheater, individuals (the work of Frei Otto) or companies (lightweight structure experts) offer products and techniques that could well suit *animan* space design.

The result of the above is the cohabitation and respect for humans, animal and the environment in a bidirectional habitat. This forms the core of the *animan* concept and approach for the design of the Parrot *Animan* Precinct at the National Zoological Gardens of South Africa (Zoo).

This development is a turnkey solution comprising of Site Selection and Study (section 4); Design Discourse (section 5); Technical Investigation (section 6) and Design Drawings (section 7).

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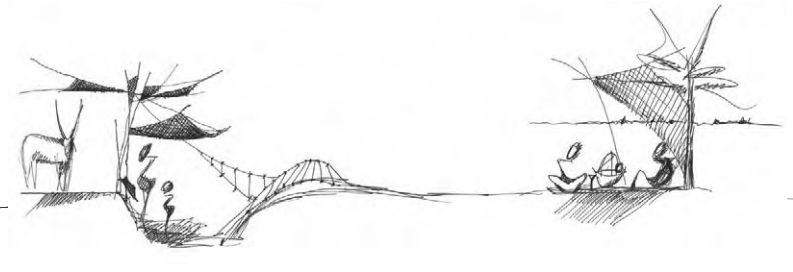


# INTRODUCTION AND BACKGROUND

Foreword.
Enclosures and animal spaces refer to enclosures where captive animals live. Human spaces refer to spaces accommodating human dwelling, education, recreation, or research in these environments. For the purpose of easy reading, the abbreviation IA will refer to the field of Interoir Architecture. The term *animan* will refer to a method of human and animal spatial integration. *Animan* precinct or Parrot *Animan* Precinct will refer to where the integrative spatial concepts are used at the specific enclosure mentioned . The National Zoological Gardens af South Africa (formely known as the Pretoria Zoo) will be referred to as the SA Zoo.

## 1.1. DISSERTATION IDEA DEVELOPMENT

Currently wild animals and humans live and experience each other in separation. Humans have developed bad attitudes towards captive environments where they believe animals are forced to adapt to our ways. Captive environments need improvement. These places are unexperiential, and unaccommodating to different kinds of people. Visitors do not realise that not visiting means a lack of resources to use to improve animals lives. It is important to visit these places that educate us about animals and our world. Captive environments should advance their contributions of conserving, recreation, education, and research. There is thus a need to add new goals and objectives for advancing these places and how they carry out their principles, and to study a specific area to prove its importance..

## 1.2. PROBLEM STATEMENT AND BACKGROUND

This project aims to develop new concepts and ideas (*animan* space design) for captive environments, and apply this to an existing Parrot enclosure and its immediate surroundings at the SA Zoo as a sample for alternative environments.

### 1.2.1. Problem Importance and Relevance.

Man's encroachment in nature has lead to the destruction of the world for economic development. New ideas can create a model for future zoos and captive environment designs. Changing attitudes could bring visitors, money, and therefore animal enrichment. Of specific importance is the improvement of the SA Zoo in South Africa and Tshwane. This is for the animals conservation, peoples' needs, for recreation, education, conservation, research and accommo-dation. It is therefore important to choose the Parrot enclosure because it is currently uneducative, has minimal recreation value, has poor accommodation and could be better enriching the animals environments. It is important for world zoos, captive animals, children, adults, temporarily/permanently and/or partially/fully disabled people and zoo management.

### 1.2.2. Delimitations

This project acknowledges that many areas (human and animal) could be improved, however the design focuses on the Parrot enclosure and its' immediate surroundings. A bordering Antelope enclosure will be part of the design, however, only the threshold, and not the whole animal space. There is also currently a secondary Parrot breeding enclosure elsewhere at the zoo. This enclosure will be considered for its function, however it will not form part of the new design.

### 1.2.3. Assumptions

Incorporated into this proposal is an existing proposal of a Life Science Discovery Centre at the SA Zoo. It will also be assumed that a percentage of the resources set aside for the Centre can be used for the Discovery Haven in the new Parrot *Animan* Precinct.

## 1.3. Research Methodology and Thesis outline

Firstly, the Context study (chapter 2) will look at the diversity of projects in the field of Architecture and IA, including their contributions to animal space design. In this chapter, an outdoor recreation study aims to highlight the importance of the outdoors Tshwane and South Africa. It suggests that human spaces can be merged with these outdoor spaces into one habitat. Also in Chapter 2, is a study about Zoos' contributions to society, animals and the environment. Zoos' responsibilities regarding conservation, recreation, education, experience, research, community values, and animal enrichment were researched. Zoo evolution and exhibit design were also researched in this chapter. Design elements and principles according to D.K. Ching and Miller were investigated as aspects used in the design of human and animal spaces at the SA Zoo. This chapter enlightens issues that can inform any *animan* design decisions and objectives.

Chapter 3 (Site selection and study) is devoted to the existing Parrot enclosure at the SA Zoo. The site, and its animal and human spaces are assessed to find advantages and disadvantages that can inform its improvement.

Chapter 4 (Design Development) focuses on what human and animal spaces should have and be at the Parrot *Animan* Precinct.

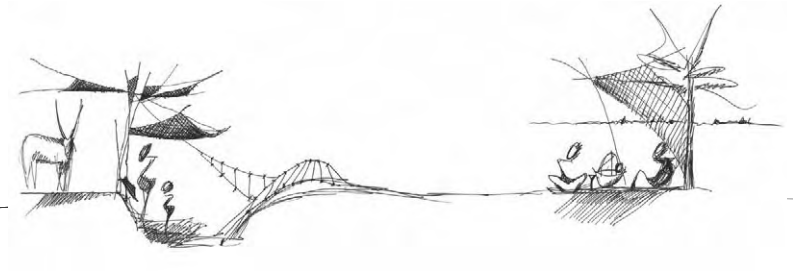
Chapter 5 (Technical Investigation Treatise) discusses and illustrates design decisions used in the final Parrot Ani*man* Precinct, including perspective drawings.

Chapter 6 (Precedents Investigations) analyses precedents used regarding animal and human spaces in captive environments. Following is an examination of precedent lightweight structures. Discovery and educational centres are furhter studied as precedents, as well as playgrounds, amphitheaters and buildings with heritage value. All of these precedents influenced design decisions on conceptual and technical levels.

Chapter 7 (Technical Drawings) includes drawings which will technically illustrate the techtonics of the final design (with the use of plans, section, details and isometric drawings).

Chapter 8 offers a conclusion of design drawings reassessed with Ching's and Miller's spatial design concepts

Chapter 9 is an appendix including information gathered.



# CONTEXT STUDY

## 2.1. ARCHITECTURAL DIVERSITY - AN EXPANSIVE ENQUIRY INTO THE FIELD

### 2.1.1. Architecture habitats

Architecture creates spaces for human use, however, there is a world trend towards creating people and environment friendly habitats which moves away from total destruction and heads towards the co-habitation and improvement of these spaces. Architecture may also deal in creating animal spaces especially those in confined spaces. Polakowski states that the design of animal spaces can depict a particular attitude about the relationship of humans, animals and the environment. The design of enclosures, services for enclosures and objects within the enclosures are all contribution factors. Using a multidisciplinary approach to contribute to zoological park design, promotes creative thought and unique design solutions according to Polakowski. Including Architects and Interior Architects at early stages of designs can result in creative design solutions for educational messages, ecological principles and conservation issues. Today a typical multidisciplinary team for exhibit designing includes wildlife management professionals; exhibit designers; landscape architects; botanists; architects; graphic designers; environmental educationalists; and professionals from schools of natural resources. Interior Architects today are fully equipped to partake in the designs of these environments together with the aforementioned experts.

### 2.1.2. Interior Architectural Habitats

As previously stated, contemporary Interior Architects have a wide range of skills relating to 'internal' space creation. IA focuses on "humanistically conceived space, distinguishing [it] from the current practice of either arch or interior design" (Kurtich, Eaken 1993:3). It is the "link between art, architecture, and interior design" and is thus "created by the fusion of related disciplines' (Kurtich, Eaken 1993:3). Most importantly IA is 'the holistic creation, development, and completion of space for human use' (Kurtich, Eaken 1993:3). Currently the realm of IA boasts a diversity of space creation categories. Contemporary projects include, claiming spaces by designing conventional Interiors in projects with Architects, Landscape Architects, and other professionals. In addition to these projects, Interior Architects are involved in restoring and rehabilitating existing structures; designing spaces for transport; claiming internal space in external space in (not only in architectural shells) – see figure 1 ,2; claiming internal spaces in temporary structures; designing thresholds (approaches and entrances) and also creating an experience.

Simple construction in space creation is becoming increasingly well accepted in various applications.

Figure 1. *A defined walkway.* Internal space is claimed in the external by the addition of small

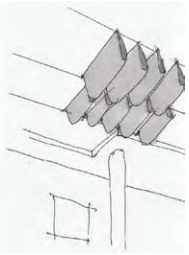


Figure 2. *Lightweight sun protection device.* The creation and accommodation of space on a patio with use of lightweight retractable canvas sheets serves as a sun protective

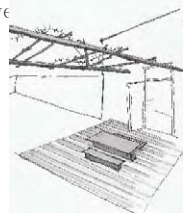


Figure 3. *A defined patio.* Contrasting floor materials and simple overhead construction further defines an

To conclude, the contribution to the design of animal enclosures and their visitors' spaces, design elements and principles (see section 2,6) must be applied after careful consideration of animals and humans, their needs, their behaviours, and other aspects by using a similar analytical design process as would be followed with the design of human spaces.

## 2.2. OUTDOORS AND RECREATIONAL ENRICHMENT FOR MAN: a habitat for all life forms

To design a successful *animan* precinct, the importance of recreational nature spaces and reasons for their conservation should be noted. Animal and plant habitats are in danger all around the world, and the less responsive we are to this problem, the worse their habitats become. Their environments should be conserved to meet their basic needs for survival. With an "environmental" or 'green movement' in society it is contradictory that the more we improve the standard of our housing and develop new technologies (to the extent that we can completely shut ourselves off from the environment), we are turning more and more to outdoor leisure activities and holidays to take us from the environment we live in and have invested millions in" (Cave 1998:2). We need nature spaces for peace, restoration, mastering of new skills, stimulation seeking, and to confirm our basic activities. Outdoor recreation also provides humans with intellectual stimulation, helps us unwind from our busy lives, encourages socializing, provides solitude and aesthetic expression.

### 2.2.1. Importance of outdoor spaces in South Africa

According to Norberg–Schulz humans need 'centres' or places where activities and interaction can take place. Animals also require such centres where the natural environment can be preserved and recreated. Humans also need 'paths' (circulation) which connect our places/centres. In addition, places defined in areas represent 'domains', which in conjunction with places and paths can provide us with 'existential space'. This kind of space becomes a real dimension of human existence. Map 1 shows some South African existential spaces where people can carry out activities and interact with animals. These include game reserves, nature parks, animal rehabilitation centres, zoos, breeding facilities, aquariums and more. These places are important for tourism, conservation, breeding, recreation, education and other reasons. Each of these places offer a variety of animal spaces, and diverse human spaces.

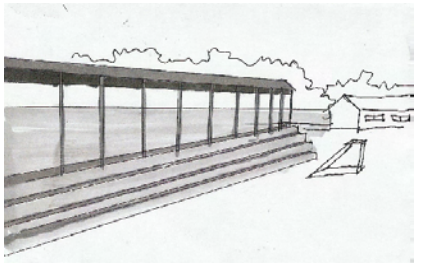


Figure 4. *A pavilion at Glenstantia Primary School, Pretoria.* The design of a school pavilion offers weather protection.

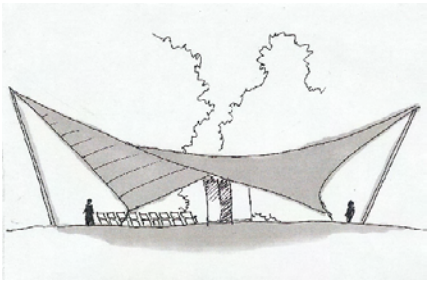


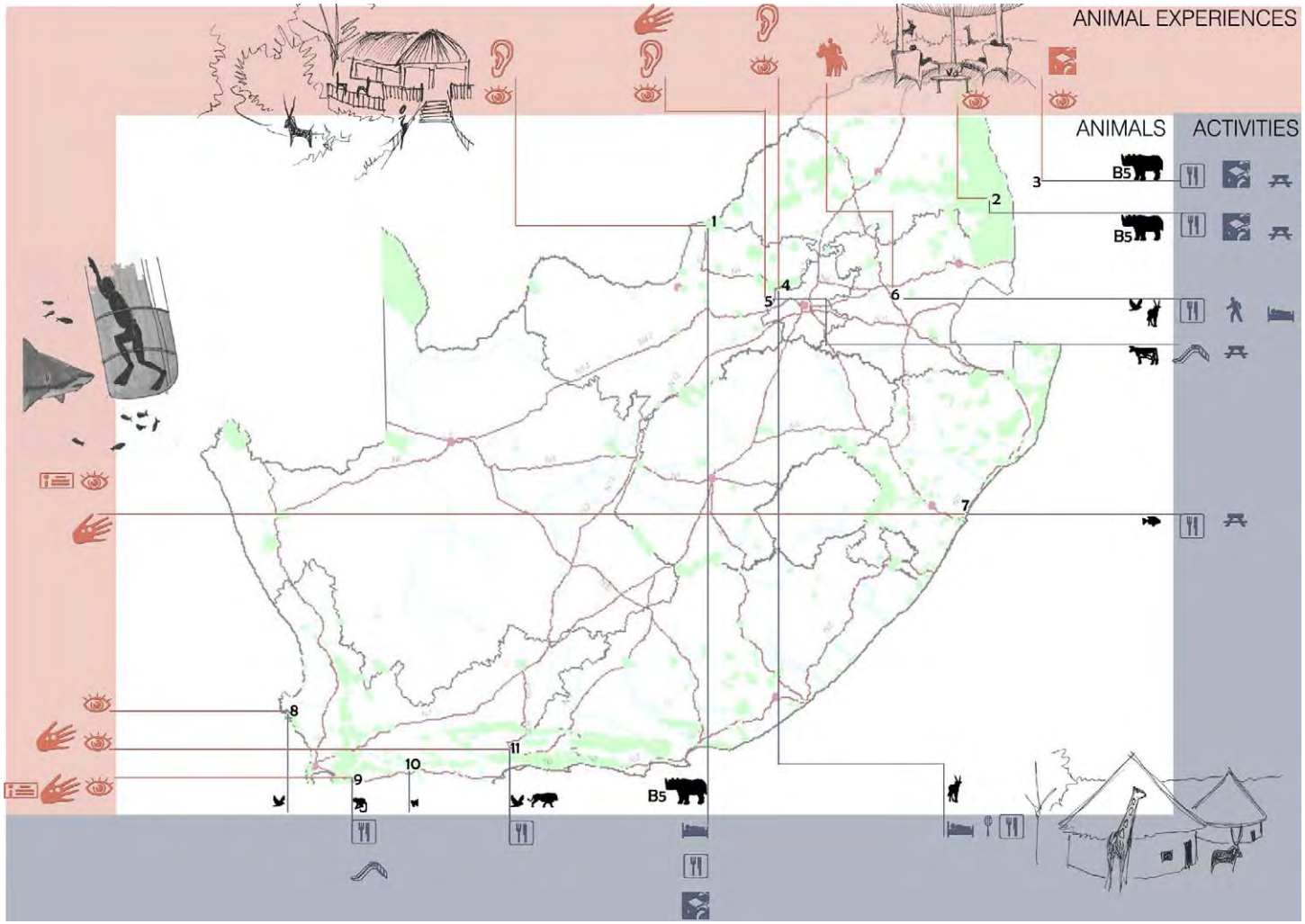
Figure 5. *The Federal Garden Kassel, Germany 1955.* A music pavilion, space is claimed and protected by a lightweight structure.

Humans can interact and exist amidst animals in these areas. Hencethey are designed specifically to accommodate animal well-being and a range of human experiences. Specific human use spaces within these nature places (whether it be a simple lapa area or a hotel at a game reserve) are significant to human spaces. "Humans act in space, perceive space, experience the sensation of space" as Leaonard suggests (as cited in Norberg-Schulz 1971:11), exist in space, think about space, and also create space. It is important for these mentioned places to offer a diversity of spaces for people. This can heighten visitors' experiences and encourage revisits that will in turn boost revenue valuable to the conservation of the enclosed animals.

The sheer vastness and openness of a game park enables humans to see, and experience live animals in what is perceived as their own environment because human encrouching is at a minimum.

Visitors are left with the impression that they have become part and parcel of the animal habitat. The Parrot *Animam* Precinct aims to achieve this on a much smaller scale.

Within the microcosm of our society we are unfortunately relient on zoos for the majority of our people to be able to experience and view animals. The aim should be to make these enclosures as animal friendly and true to life as possible.

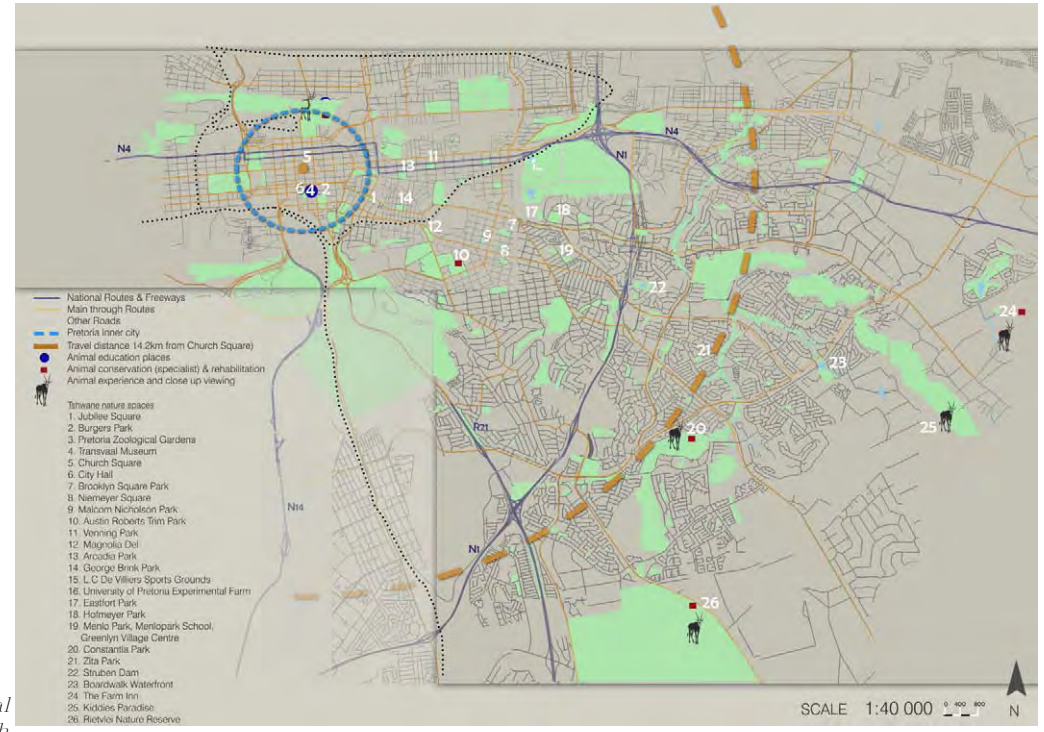



1. Madikwe Game Reserve
2. Thornybush Game Reserve
3. Motswart Game Reserve
4. Heia Safari Game Reserve
5. Moms & Tots Farmyard
6. Forever Resorts
7. uShaka Marine World
8. Birdwatching Salt Marshes
9. Butterfly World
10. Monkey Town Primate Centre
11. Safari, Ostrich Show farm

Map 1. *Some South African existential nature spaces with animals.*

### 2.2.2. SA Zoo as an important establishment in Tshwane

Appendix A shows some semi-experiential nature areas in Tshwane CBD and 21km eastwards include parks and greens offering minimal of only small animal interaction and education (nature spaces 1,2,5,6,7,8,9,11,12,13,14,15,17,18,21,22,25) – see Map 2. Some of these parks do not even provide creative play areas. Few of these nature areas within the designated Tshwane area that provide animal interaction, include nature spaces 3,4,10,16,19,20,23,24,26. Interaction here includes feeding, touching, riding animals, dining among animals and learning about animals. But these areas offer moderate animal interaction mainly concentrated 14km from the CBD (except for the SA Zoo). The SA Zoo boasts varieties of animal environments among a concrete city. It has the potential to offer animals and city dwellers rich natural recreation spaces that suburban dwellers have in abundance. The city dwellers can also find easy and cheap transport to visit the zoo. If any of these areas mentioned above could use improvement and advancement, it would be the SA Zoo, for animal benefits, and also to bring more city dwellers and those from afar to a variety rich nature area.




Map 2. *Some Tshwane existential nature spaces with animals.*


Map 3. *Educational instititions in Tshwane CBD and some of its eastern suburbs.*

To conclude, the *animan* precinct approach to improving facilities for both animals and humans at the SA Zoo, should thus propose new and extra experiences for people, and be a suitable living habitat for animals, that people can recognize as suitable (not harshly captive) in its nature. The *animan* precinct approach should encourage other green areas and parks in Tshwane to become more experiential and educational about nature and its inhabitants.

### 2.2.3. Contribution to the Tshwane Innercity Regeneration Strategy

The aim of the *animan* precinct approach is to enhance and improve animal spaces as well as new human spaces and experiences to the SA Zoo as this could help the Tshwane Inner City Development and regeneration strategy.

Improving human and animal areas at the SA Zoo will educate people about fauna and flora and including their conservation and rehabilitation. Such an improvement will support Tshwane's cultural prominence as the SA Zoo is seen as an important provincial and national asset. New ideas for the improvement of the SA Zoo and its exhibit design could help build Tshwane's international image and reputation regarding zoo design. The strategy states that natural and cultural resources must be preserved, utilized and enhanced – see figure 6. Experiential development of the inner city is important as it could help attract people again to the Inner City for recreation and entertainment purposes. Improving animal living conditions and human spaces could help in changing negative perceptions of the inner city and in turn help to boost investor confidence. Tshwane needs an exceptional public environment (public spaces–parks, recreation areas and squares– and streetscapes; architectural quality of buildings; urban forestry; natural environment) that can compete with all the best cities in the world. The neglected area in front of the SA Zoo detracts from this world–renowned attraction. This project will assume that the proposal to redeveloped the neglected area is on its way. It aims to provide attractive small business opportunities for creative industries that will contribute to the creation of a tourism hub around the SA Zoo. It is thus evident that reviving parts of the SA Zoo will thus aid in reviving the inner city.

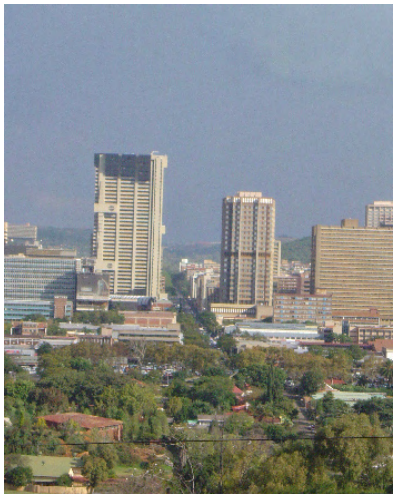


Figure 6. *Tshwane CBD.* Nature life at zoo filtering into the Tshwane CBD via the Paul Kruger street corridor.

#### *2.2.3.1. Locations of Zoos worldwide*

The SA Zoo is one of the many zoos around the world that exist in a CBD. It has responsibities and is a valid area that should not be discarded even if the idea of a zoo is a contradictory statement. Zoos among "urban concrete landscape that excludes animals and discards insects" should be preserved according to Polakowski (1987:40). Captive animals are the "...reminders, in countryside or inner city, of their counterparts still remaining in the wild, of a finer period in the world's history, a period that is by no means lost and has the potential of reclamation" as stated by Jones & Jones (as cited in Polakowski,1979).

## 2.3. ZOOS CONTRIBUTIONS TO SOCIETY, ANIMALS AND THE ENVIRONMENT.

### 2.3.1. Zoo Philosophy

In order to redesign or enhance existing animal and human spaces, the many contributions of zoos must be identified. This can provide solutions in the designs of spaces at the SA Zoo. We are in an age wherein humans are finally being forced to become concerned with the health of their environment. Visitors see the SA Zoo as ill-equipped in contributing to the preservation of animals, however this is an exact place that conserves animals succesfully. Visitors see cages, and concrete walls, but are blind to the Zoo's conserving and preserving nature. The SA Zoo is aware that some animal enclosures need to be redesigned to better suit animal needs, but without visitors, resources are limited. The *Animan* Precinct needs to uncover new ways of designing animal and human spaces by studying the zoos' duties towards animals and people. These duties include conservation and also (in no order of importance) recreation, education, experience, research and community values.

### 2.3.2. Conservation

According to Jones & Jones (as cited in Polakowski, 1979), zoos and aquariums have a responsibility to assist in the conservation of the world's wildlife heritage. Jones further sees that we have finally become aware of the connectedness of everything on our planet and the ability of our species to wreak it in such a short time. A major conservation message to zoos, is to remind the visitor to "think globally and act locally" (Polakowski 1979:41). Signage showing threats to the environment can educate people, but poor quality and placement of these signs may further uninform people of these issues. Zoos keep a variety of life forms, exotic and endangered animals; commonly found animals; and animals from other countries and continents. Zoo keepers constantly monitor the wellbeing of these animals and enrich their lives daily. In conclusion, any design of an animal space the SA Zoo must conserve the animal as its natural habitat would. In addition, any design of a human space near an animal enclosure at the SA Zoo must therefore make visitors aware of the conservation in place, and the importance thereof.

### 2.3.3. Recreation

Recreation is an important reason for zoo attendance by visitors. As Polakowski states, providing recreation is an important service to the community in its own right, apart from its value to the zoo in attracting paying customers. Most people need a break and an interesting time, and this attitude is shared by many different individuals (seniors, toddlers, intellectuals, mentally disadvantaged, and the physically handicapped). For the city dweller "...a good zoo offers a respite from the artificiality of the city, an oasis of living diversity among its architectural bones, bricks, and busses" as Conway suggests (cited in Polakowski).

Problems include that zoos, providing a recreational experience of some length, are considered places to visit primarily on weekends and holidays. The SA Zoo is also unaccommodating to the physically and mentally disadvantaged. As Polakowski states, "recreation facilities provide the primary attraction for the visitor and it is necessary for the economic survival of a zoo"(as cited in Polakowski 1979:30). It is therefore paramount to note that when redesigning or enhancing any new and existing recreation spaces, they should be accommodating to all. An advancement of Recreational spaces at the SA Zoo require advanced materials and techniques, but any solutions must be unintrusive to the surroundings, and need not compromise the animals' wellbeing. These recreation spaces can be made more experiential by the addition of educational experiences.

### 2.3.4. Education

Joslin (as cited in Polakowski 1979:30) presents the thought that "however, it is also recognized that this is not how the zoo or aquarium is perceived in the eyes of the average visitor whose primary interest is in the institution as a recreational resource". Recreation and education as goals should not conflict with each other or the environment, but instead be integrative to these. Conway, (as cited in Polakowski 1979: 30), "Generations are growing up without any natural contact with wild creatures.." and the "opportunity to observe and learn directly from a living collection of wild animals is a zoo's unique educational offering". "Even at the simplest level, direct contact with live animals can stimulate the imagination, sharpen observation, and enrich the thinking of zoo visitors". (Polakowski 1979:30).

People are generally ill-informed about unique characteristics of each animal species; wildlife ecology, and the relationship of the environment with humans, fauna and flora. Educational information can inform on scientific (see figure 7), and non-scientific levels (see figure 8). Educational tools can better educate visitors. Firstly designing enclosures to allow close viewing; and using participatory displays (dynamic labelling; technical and less technical information; unanswered labels; and conversation promoting information) are educational tools, in that they have animal knowledge and the ability to strengthen visitor experiences. The circulation paths between enclosures also serve as a tool to heighten a visitor's absorption of information. This can be achieved by combining walk-through; ride through; and float through enclosures (figure 9, 10). Animal demonstrations are educational tools and promote contact and experiences of a different kind. Special Tours are also educational tools that involve different visitors. These include specific tours for disadvantaged visitors.

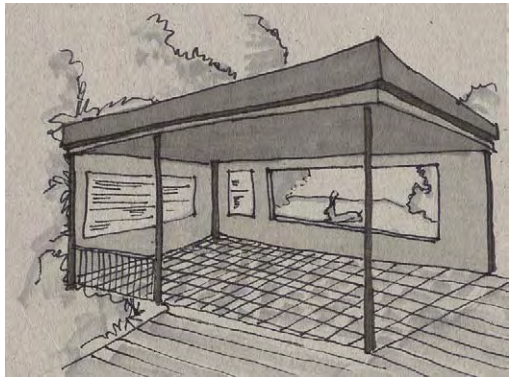


Figure 7. *CBD Zoos.* Informatiohn sheds at the SA Zoo. These sheds are few and uninteresting.

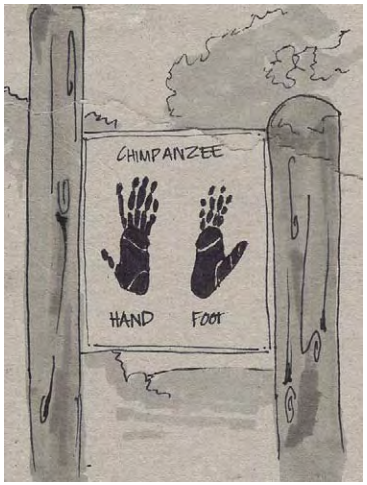



Figure 8. *Interactive signage, Chimpanzee Enclosure pathway, SA Zoo.* Diagramatic signage can involve humans in understanding animal characteristics.

### 2.3.5. Zoos offer visitor experience

As previously stated Norberg-Schulz reveals that man's existence is dependant upon the establishment of a meaningful and coherent environmental image or existential space. The task of the architect, therefore, is to "...help humans to find an existential foothold by concretizing his/her images and dreams" (Norberg-Schulz 1971:114). This approach is well used at the uShaka Marine World in Durban, South Africa. There are different levels of existential space used at the uShaka Marine World that can be incorporated at the SA Zoo. Norberg-Schulz Levels: Level 1 is an experience of objects of a size determined by the hand (e.g. pamphlets or touching animals). Secondly, level 2 is an experience of furniture and elements of sizes determined by the body (e.g. being immersed in a tank lowered in the animals' environment - see figure 9. Level 3 is an experience of a structure or element with dimensions determined from extended bodily movement and actions (e.g. being immersed in the greater fish enclosure free to move with the animals - see figure 10. Level 4 is the experience on an urban level determined by social interactions (becoming the sponsor of animals). Level 5 is an experience on a landscape level determined by humans' interaction with the natural environment (e.g. programs helping to clear litter from beaches). Level 6 is the experience on a geographic level determined by traveling from one landscape to another (e.g. traveling to other oceans and diving). From a family perspective. The zoo has been traditionally the first point at which humans are introduced to the animal kingdom.

### 2.3.6. Research

Breeding programs and animal conservation requires much knowledge and skill. Research needs to be done in order to understand animals and their environments. Not only do zoo keepers use the research conducted at the zoos, but scholars and students require different information for assignments. Recorded information and special magazines and books that are kept at zoos should be made available to the public. Daily records and documentation about the enclosed animals, their behaviours, and their environments can in turn benefit these animals and their environments (as stated by Polakowski).

### 2.3.7. Community Values

An *animan* precinct should thus provide archives and research spaces. It is important to realise that the nature or design style of a zoo exhibit can depict a particular attitude about the relationship of man, animal and habitat. "Zoos are a reflection of their communities" ( as cited in Polakowski 1979:46). Zoos must be sensitive to community feelings and encourage an increase in public funds for zoo operation and animal enrichment.

Figure 9. *Visitors swim with sharks, uShaka Marine World, Durban.*

Figure 10. *Diving visitors, uShaka Marine World, Durban.*

## 2.4. DESIGN FOR BEHAVIOURAL ENRICHMENT

Visitors are presented with illusions about nature and see animals as 'docile', approachable, and as 'man's friends', different from their counterparts in the wild. They are the same physically, but behaviorally different from their wild counterparts (Polakowski 1987:3). People go to the zoo to be entertained by frisky and friendly animals. Visitors may be upset to learn about the reality of survival in nature. The risk of offending the public by presenting images of reality may be too great and costly for zoo management. Animals however need to act out normally and programmes offer this. As Polakowski poses, resolving the dilemmas mentioned in a manner that respects the animals and excites the visitor, requires an innovative and creative design philosophy and approach.

### 2.4.1. Why Behavioural Enrichment

Animals in captivity may become stressed and act in stereotyped manners when taken care of in captive environments. They can not act out all of their usual behaviours as they would in their natural habitats. Behavioural enrichment co-ordinators are employed by zoos to help provide stimuli for the animals – see figue 11. Enrichment programs are designed to help in building animals' immune systems and reduce stereotyped behaviours (Carlstead p172-183). Stimulation can take place in the form of interactive techniques. Hot spot temperature elements; raising and lowering beaver water levels, creating an illusion of instability; fake wood rats in puma cages are moved to induce the running of the puma and artificial termite.

Behavioural enrichment takes place, and visitors are generally unaware that animals are very carefully monitored and cared for by co-ordinators. If this aspect of the zoo contribution could be visible to the public, visitors would understand the caring nature of the zoo and not feel negative about captive environments. Design opportunities to increase and encourage natural behaviour must go beyond the provision of gadgets or props – an appropriate enriched environment is a better solution (Polakowski 1987:98). Risks when designing environments need to be considered (Baer p277-301). Animals' sensory modalities should be considered, and thermal qualities of the environments should not affect the animals psychology and behaviour.

Enrichment structures and programs can become part of the design of the *animan* precinct visible and beneficial to the public as well. Animal enrichment can improve enclosure designs, and involve visitors in the future, thus helping to change mindsets about animal spaces and zoos.

Figure 11. *A Rhino Enclosure, SA Zoo.* A curator interacting with a rhino.

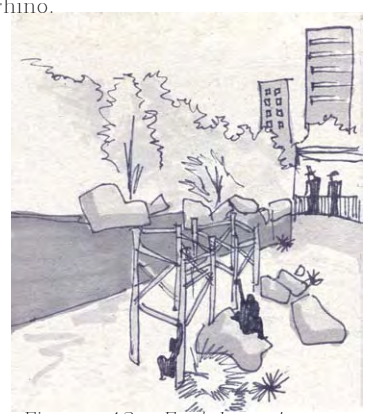


Figure 12. *Enrichment props at a Chimpanzee enclosure, SA Zoo.*

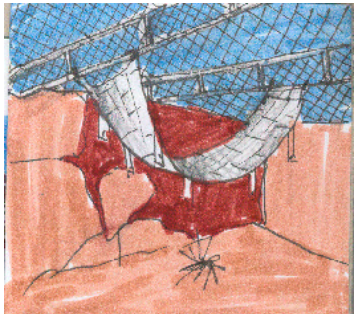


Figure 13. *A play element at a Baboon enclosure, SA Zoo.*

**2.5. ZOO EVOLUTION** on page 18

### 2.5.1 The concept of travelling menageries

The travelling "menagery" concept has not completely fallen away. Today some zoos offer a mini-travelling zoo for entertainment at parties held at zoo facilities. These concepts should be substituted with tours, and event facilities that overlook animal enclosures. Animals should not be moved or adapt to human event, unless the interaction offers animal stimulation.

### 2.5.2 Animal enclosures using architectural styles

Many animal enclosures have buildings of solid construction that create unnatural habitats for the animals. These buildings attempted to imitate illusions and architectural styles associated with the animals' native habitat. Alternative construction techniques need to be developed.

### 2.5.3 Mixed species exhibits and barless zoo concept

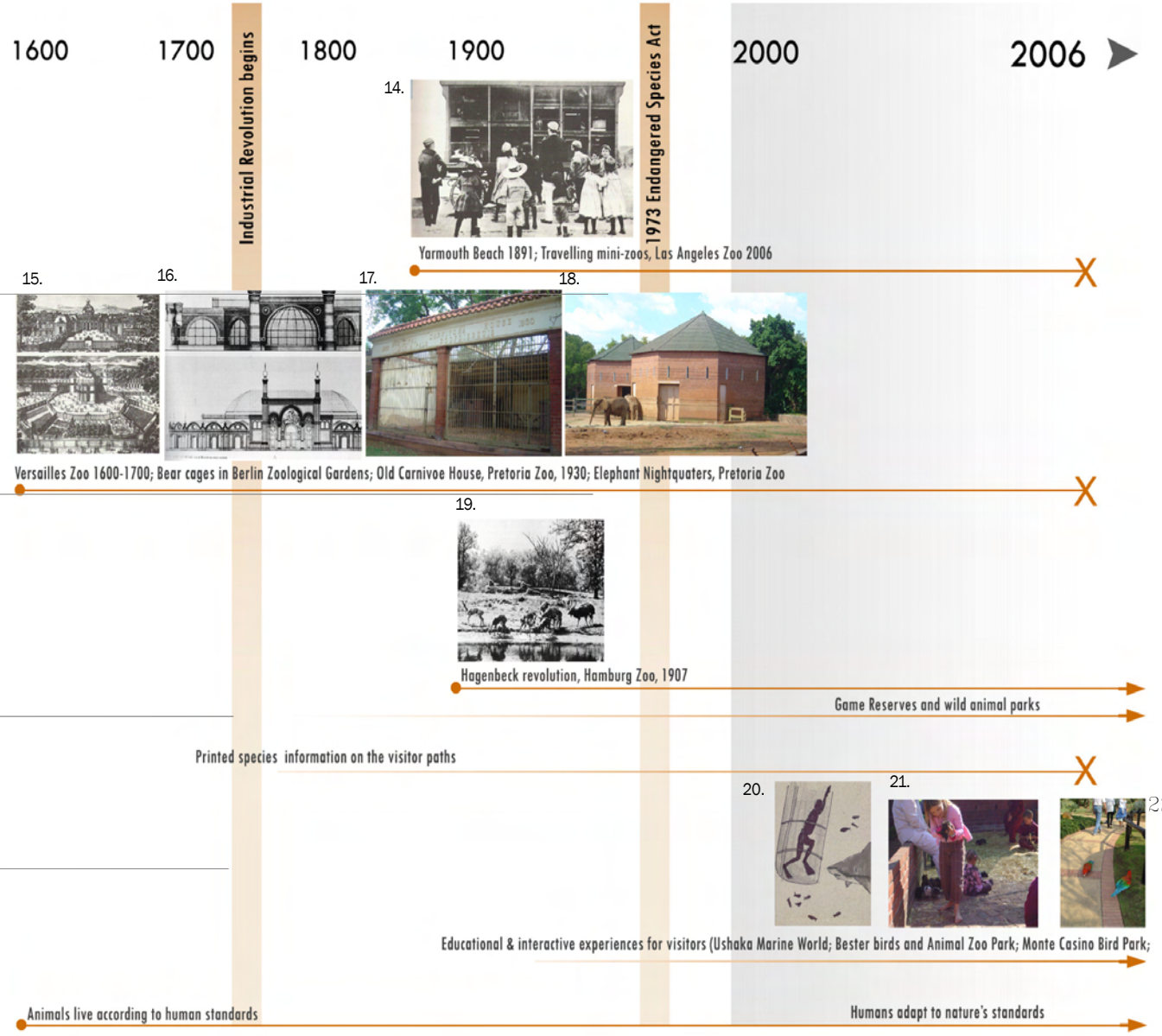
In 1907 Carl Hagenbeck developed a cageless zoo at Stellingen, Hamburg. He developed a system of moats and ditches (instead of fences) as barriers giving the public open views of the animal exhibits creating the illusion of animals "exposed to each other in a continuous vista" (Polakowski 1987:10). These enclosures require more space, but today many zoos continue to incorporate this concept into the enclosures to rid animal-human thresholds of typical fences. (Polakowski 1987:20) Game Reserves and Wild animal parks are important places that offer different animal-enclosing spatial concepts.

### 2.5.4 Human educational and interactive experiences

An important shift in educating and entertaining visitors is currently taking place. This shift is from using 2D printed information to using exciting, experiential, educational tools.

### 2.5.5 Human and Animal Existence at zoos

The "unzoo" concept is developed to create a place where the residents share the land. "Create a place where the viewer is not the owner but a humble guest. Remind people that we are all connected and that wild places have spiritual and emotional wealth beyond dollar value. Make that your mission!" argues Mendez (as cited in Jon Coe :2005)


1600
1700
1800
1900
2000
2006
Industrial Revolution begins
1973 Endangered Species Act
14.
Yarmouth Beach 1891; Travelling mini-zoos, Las Angeles Zoo 2006
15.
16.
17.
18.
Versailles Zoo 1600-1700; Bear cages in Berlin Zoological Gardens; Old Carnivoe House, Pretoria Zoo, 1930; Elephant Nightquaters, Pretoria Zoo
19.
Hagenbeck revolution, Hamburg Zoo, 1907
Game Reserves and wild animal parks
Printed species information on the visitor paths
20.
21.
22.
Educational & interactive experiences for visitors (Ushaka Marine World; Bester birds and Animal Zoo Park; Monte Casino Bird Park;
Animals live according to human standards
Humans adapt to nature's standards

### 2.5.6. Zoos of tomorrow

To generate new concepts for zoos, we can thus reaffirm that shifts in mindsets need to take place in order to improve these environments. Enclosed caged animal spaces, open 'barless' grottos and mixed species exhibits can be further replaced by 'immersion' exhibits with hidden barriers. Zoos outlooks should tend to an "unzoo approach" as Coe points out (Coe 2005:1). As they state, a zoo was originally a "park displaying live animals...from different parts of the world...kept in cages or enclosures for people to come and see, and where they are bred and studied by scientists." (Coe 2005:1). It can become instead an unzoo: "a place where the public learns about wild animals, plants and ecosystems through interaction with and immersion in original or recreated natural habitats". In reaffirmation, an important concept for future zoos is to become a place where humans adapt to nature's standards. We need to "[c]reate a place where the residents share the land [and create] a place where the viewer is not the owner but a humble guest." He also states that it should be zoos' missions to "[r]emind people that we are all connected and that wild places have spiritual and emotional wealth beyond dollar value" (Mendez 1999 :11). Exhibit design must be well researched to bring about successful changes in zoo concepts for the future.

## 2.6. EXHIBIT DESIGN

Exhibit designers must use a process to assess the needs of inhabitants and functions of the enclosure and its surrounds in order to design a qualitative animal space which humans can view and experience. A "good exhibit is about people, animals, and plants. It is an exhibit that makes people feel good about the animal, understand the animal/plant/people relationship, and educates the zoo visitor about major concepts of conservation" proposes Robinson (as cited in Polakowski 1987 :78). "Ultimately, the look and feel of our exhibits is symbolic of the linkages we try to make between our increasingly urban world and the receding domain of nature" (Bierlein 2003:1). The designer depends on design elements (size, shape, colour, texture etc.) and design principles (rhythm, repetition etc) to create a memorable exhibit for communicating, educating (educational messages; ecological principles; and conservation issues) and entertaining. Satisfying the diverse and often conflicting needs of the animals, visitors, and management can be difficult if each party's needs are not clear.

### 2.6.1. What exhibits must be for animals

Exhibits must be qualitative. As Hutchins, Hancocks, Crockett, (as cited in Polakowski 1984:85) state "If zoo visitors see animals in ugly conditions engaging in aberrant behaviour, they are likely to feel nothing more than revulsion". The exhibits should be designed according to the behavioral aspects of the animals. The exhibit should not be designed to go beyond physical sensations (loud noise, abrupt movement, unpleasant odours) suitable to the well-being of the animal. It is also stated that the exhibit should be influenced by the site, the character of enclosure, the topography, the orientation, the vegetation, and the services. The exhibit should not be overshadowed by man-dominated objects, and offer the animals spaces necessary to carry out their normal behaviour as they would if they were in the wild (for e.g. birds eating, resting, breeding, nesting, searching, hiding, moving). Animals also require protection from man and other animals.

### 2.6.2. What exhibits must be for humans

Any style of presentation of the animals will reflect the underlying philosophy and goals of the zoological park. For curators and zoo keepers the exhibit should have spaces to monitor animals easily without disturbing them and storage spaces for a variety of equipment (cleaning equipment and recorded data and literature). In addition, it should offer the keepers and maintenance equipment easy access to and from the enclosures. For visitors it should be a place where people feel good about the animals' environments and a place where humans can understand the animal/plant/people relationships as Robinson suggests (as cited in Polakowski 1985:78). It should educate people about a multitude of subjects (ecological and conservation concepts; adaptation; habitat threats). In addition, it should be accessible, recreational and experiential to visitors of a variety of ages, social classes, sizes and to those who are physically or mentally (partially or fully) disabled. It should also allow for positive interaction and it is the "[d]esigner's task to get the visitors involved with the exhibit to the highest level of interaction" (Polakowski 1985:86). The exhibit should also be a safe environment and designed form a holistic point of view, and focus on interrelationship between people, plants, animals, and our environment. As Polakowski also states, it should be tranquil and simple in mood so that educational, and conservation messages will not be lost. The exhibits may be adventurous and have elements of uncertainty/mystery/and exploration to heighten visitors' experiences.

To conclude, people visit zoos and captive environments to learn about animals and plants; to encounter the usual and the exotic; to relax in a pleasant environment; to be entertained by the strange curious behaviours of animals, and to become more aware of relationships between animals, plants, humans and the environment. Once different parties' needs have been studied, design styles can be researched.

### 2.6.3. Design Styles

Style is the aspect of design influenced by a designer's philosophy, nature of the message, place, time, locale (variables). Scene/exhibit styles are numerous and include realistic, abstract, sculptural, architectonic, romantic, formal, impressionistic, representational, ornamental, romantic-exotic ; and ornamental-exotic (Polakowski 1985:8) Each style mentioned has a rightful place in the role of communicating and presenting ideas, opinions, and facts to observers. Any style used should however allow adaptability. The exhibit should be designed in such away as to accommodate future changes. Zoo ideas have been changing ever since the idea of captive animals began. At the SA Zoo animals are occasionally shifted to other locations therefore the exhibit should allow for future changes if necessary.

#### *2.6.3.1. Exhibit Dilemmas and Illusions*

Designs based on deceptions pose important issues and it must be remembered that the exhibit is more importantly for the life of an animal than for the education of man. Animals resort to deception for protection (camouflage, hiding, killing) yet in zoos, animals are easy to spot. This causes stress among animals animal which may lead to sickness or even death. To be a successful exhibit that will meet the needs of the abovementioned parties, adaptability and dilemmas in exhibit design were studied.

### 2.6.3.2. Design Illusions

*(a) Zoo as a theater.* Design illusions may bring stimulation to the animal's natural habitat; produce an atmosphere similar to the animal's environment; focus on the outstanding physical features of the animal; emphasize ecological relationships between animals, plants, and man; or even help educate the zoo visitor (about the reality of the animal's natural habitat, biological and ecological principles, the impact of man on plants and animals, and predator–prey relationships). "The zoo exhibit, like the theater, is concerned with creating illusions to carry a particular message or attitude. Its success is dependant on the images and messages it conveys to the visitor. The art and science of exhibit design relies on illusions to attract the visitor's attention, instill a memorable impression, promote an enjoyable experience, and convey a clear educational message" (Polakowski 1987:11). Design illusions using contour, size, perspective, depth and distance can increase the complexity of a scene and add to the mystery of the enclosure.

*(b) Boundaries.* The choice of materials for boundaries, their positions, and types can destroy or enhance the integrative qualities of exhibits. Boundaries should be interpreted as human protection barriers and not as animal confining barriers. In figure 23 the use of minimal and slender man–made materials and techniques together with natural materials and allow people to feel less guilty about an animal's circumstances when the focus is not placed on a man built animal environment.

Various mentioned illusions can be used in different approaches - e.g landscape immersion approach (placing visitors inside the habitat landscape and extending the complexity of the animal's environment into areas where visitors walk, stand or sit). This can remind visitors that they are respectful intruders in the animal's wild domain. This approach can allow our experiences of animals more on their terms than on ours. (Bierlein 2003:3). It is evident that many design styles are available and convey different ideas, but whichever illusions and approaches are used in the design of an exhibit, it should not compromise the wellbeing of the animal enclosed.

Figure 23. *Chimpanzee Enclosure and adjacent human space, Johannesburg Zoo.* The use of a variety of materials (natural and man–made) of different shapes for barriers between the animal and human space, creates an illusion of one space separated only by small vegetation. The spaces are on similar levels to portray the illusion of integrated spaces.

## 2.7. DESIGN ELEMENTS AND PRINCIPLES FOR SPACE DEFINITION (AS USED IN THE SA ZOO)

This study is based on Ching's and Miller's spatial design concepts. This will show that spatial concepts are used in the qualitative design of both human and animal spaces. Space claiming, enhancing elements and principles, as used by Miller, were also studied. These space enhancing sensory tools include temperature, tactility, sound, and scent. Miller's approach is to create spaces for functional requirement and also for ambience reminding us that when designing a space, design elements and principles and sensory tools all add to the psychology and well being of creatures in their spaces.

### 2..7.1. Primary Elements

#### *2.7.1.1. Point.*

Indicates a position in space.

#### *2.7.1.2. Line.*

An extended point with length, direction and position.

#### *2.7.1.3. Plane.*

An extended line with length, width, shape, surface, orientation, position.

#### *2.7.1.4. Volume.*

An extended plane with length, width, depth, form, space, surface, orientation, position.

### Human spaces for viewing animals


Figure 24. *Chimpanzee Enclosure, SA Zoo.* Volumetric Linear elements are used as visual barriers between animals and humans for animal benefit.

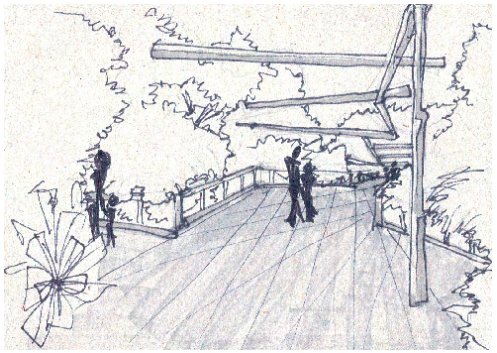


Figure 26. *A path to the Reptile Enclosures, SA Zoo.* Volumetric Linear elements approaching an enclosure defines a plane above to enhance an approach –

### Animal living spaces

Figure 25. *Gibbon Enclosure, SA Zoo.* Volumetric linear elements are used for animals to walk on and to play on (structural steel skeleton and wire mesh).

Figure 27. *Primate enclosure, SA Zoo.*

Human spaces for viewing animals

Animal living spaces

## 2.7.2. Form

Form refers to the internal structure and external outline of a three-dimensional mass or volume:

### *2.7.2.1. Surface configuration of form*

Shape manipulation can claim space

*(a) Primary Shapes.* The use of circles, triangles, and squares can defines spaces. Extensions of these shapes exist (see figure 8) These can also define spaces.

*(b) Primary Solids.* Primary solids include sphere, cylinder, cone, pyramid and cube. Volumetric forms can claim spaces and by this way add validity and function to the spaces. Primary solids and irregular solids are used in human and animal spaces. Volumetric elements (as suggested by Miller) include movable objects; stationary objects; and furniture.

Regular and irregular forms. Many enclosures at the zoo have regular forms mainly cubic in volumetric form. These shapes are easy for visitors to understand, which may cause visitors to have bad attitudes about the enclosures in which the animals live.

Elements not included by Ching include movable objects; stationary objects, and furniture. They can create a sense of place, define a private or public space; enhance a focal point; and also add a feeling of permanence. For aquatic life some tank shapes allow water movement (figure 29).

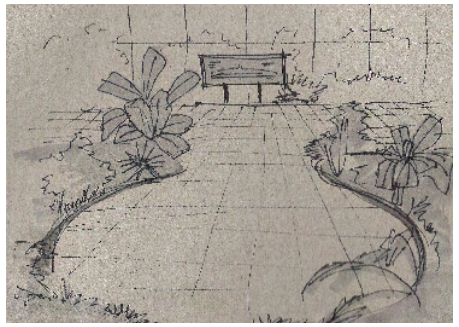


Figure 28. *Space near the Vulture Enclosure, SA Zoo.* Humans understand that this place is different from the adjacent spaces due to its circular base shape.

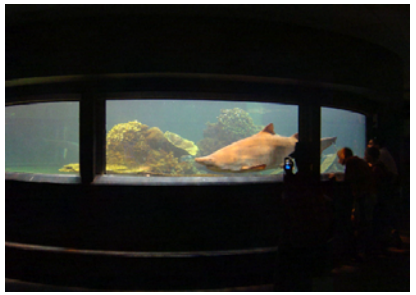


Figure 29. *The Shark Tank, SA Zoo Aquarium.* Animals do not live in perfect primary shapes in the wild, but these cylinder shaped spaces are still used in the zoo.

### 2.7.2.2. Visual tactile properties of form

When manipulated to claim spaces, the properties size, colour, and texture of form can produce interesting results in both human and animal spaces. Texture can add visual properties to a form, and also add tactile properties to form that may claim different spaces (*figure 30). For animal spaces (at the SA Zoo) forms are created with smooth textures (figure 31).

### 2.7.2.3 Transformation of form

Forms can be manipulated by changing the dimensions or by adding or subtracting to or from the form. These transformations include dimensional, subtractive, and additive transformations. Additive form (by adding elements to a form) further include spatial tension; edge–to edge contact; face to face contact; interlocking volumes; centralized form; linear form; radial form; clustered form; and grid form. Animal spaces are designed to include some interlocking volumes like the fibreglass rocks in a Leopard Enclosure (figure 31.)

Human spaces for viewing animals

Figure 30. *A viewing structure at the Lion Enclosure, SA Zoo.* Thatch and wood gives the view space natural qualities, but the solid shape detracts from its surroundings.

Figure 32. *A viewing path at the Baboon Enclosure, SA Zoo.* Interlocking volumes are used in some viewing pathways. The themed use of fiberglass materials create an intimate viewing space.

Animal living spaces

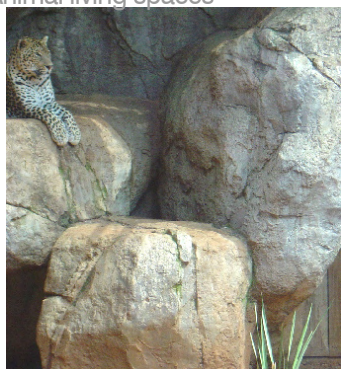


Figure 31. *Perching space at the Leopard Enclosure, SA Zoo.* Fibreglass rocks have smooth edges comfortable for perching.

### 2.7.3. Plans as Forms in Space

Horizontal planes (base, elevated, depressed, overhead) define spaces. In animal enclosure textiles as elevated planes can provide shade (figure 34).

#### 2.7.3.1. Light and Views

An opening in planar elements, can allow different functions to happen in the space and add a different mood to spaces. The mood may be attributed to the light that an opening can permit, and the views that the opening can provide. Openings may also enhance the air quality of spaces.

*(a) Light.* Light may add comfort (figure 35), and character to a space. Light can also be a vehicle of colour and help us distinguish between primary (size, shape) and secondary qualities of objects (colour, texture, sound, smell) as well. In addition, according to Abercrombie, light proves to be an important part of an objects message by showing highlights and shadows. Amount and quality of light can thus cause spaces to be perceived differently. Animals need protective shaded areas for their conservation. Food for exotic parrots is placed under a solid plane for sun, weather and contamination from above (see figure 36).

*(b) Views.* For animals, views give them a feeling of protection (figure 36).

Human spaces for viewing animals

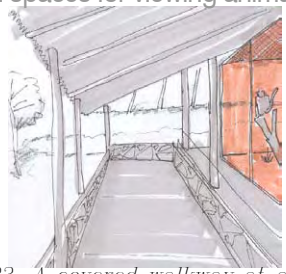


Figure 33. *A covered walkway at a private enclosure, SA Zoo.* Horizontal elevated planes, and a base plane are connected using vertical elements, creating an intimate human viewing space.

Figure 35. *A pathway at the Leopard Enclosure, SA Zoo.* This passage way uses enclosing planes to keep the majority of the space dark for a certain ambience, but gaps in these planes allow light and air into the space.

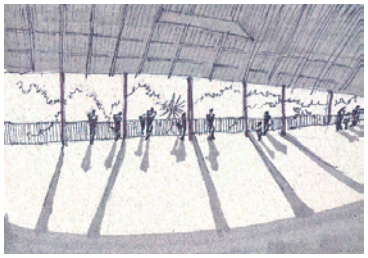


Figure 37. *A viewing space above the Hippopotamus Enclosure, SA Zoo.* An opening between a thatch lapa and the ground offers animal viewing.

Animal living spaces

Figure 34. *A private enclosure, SA Zoo.* Horizontal elevated planes of textile are used as a shading device for the enclosure.

Figure 36. *A parrot breeding enclosure, SA Zoo.* A recessed structure in a parrot breeding enclosure provides protection. The recess also allows views facing the rest of the enclosure.

### 2.7.3.2. Organization of space

Most spaces are composed of a number of spaces which may be related to on another by function, proximity, or a path of movement. Spaces can be connected by different principles. These include spaces within spaces (figure 38); interlocking spaces. adjacent spaces; and spaces linked by a common space.

Adjacent spaces may include spaces at different heights that can define separate areas. According to Miller, these different levels and the climbing devices that join them can become opportunities for evolving psychological states (figure 40).

Places require different kinds of spaces, and Ching states that these spaces can be organized and arranged in different manners by central, linear, radial, clustered, and grid organization. Animals in captivity also require different kinds of spaces to keep them as stimulated as they would be if they were in the wild (figure 39).

Human spaces for viewing animals

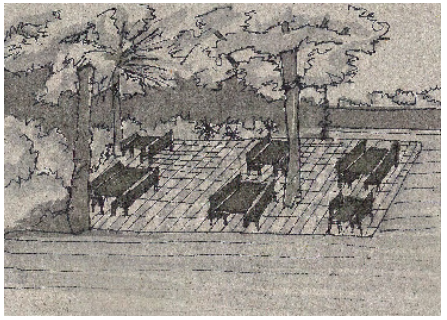


Figure 38. *A space for relaxing and eating, SA Zoo.* This area infront of the aquarium at the zoo has a subspace for picnic use, and this space is defined using a different floor material.

Figure 40. *Viewing structures of the Bear Enclosure, SA Zoo.* Three covered viewing structures are repeated along the main path in a linear organization, for visitors to recess in these spaces while watching the animals at a different height.

Animal living spaces

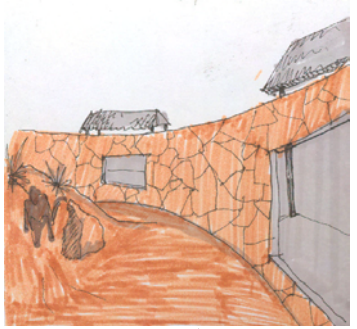


Figure 39. *The Gorilla Enclosure, SA Zoo.* Animal enclosures have depressed spaces adjacent to viewing windows in order to interact with the humans at the same level, and when they need their own privacy, they may move back up a hill.

## 2.7.4. Circulation through space

Circulation paths connect spaces. Circulation can occur to, from or through spaces, frontally, obliquely (figure 41) or spirally to the space. The configuration of the paths can also be linear, radial, spiral, grid, network, or composite in their nature. As previously stated, animals circulate differently than humans do, and not on a designated pathway. Animals decide on their own pathways, line of movement in their environments (figure 42).

### *2.7.4.1. Entrance*

Entrances to spaces may suggest a concept of the spaces in advance and are critical points in our appreciation of that space (figure 43). Entrance as well as exit points have psychological significance to humans.

Animals move freely in their enclosures and do not need man made entrance points in their habitats, unless they are moved to night-quarters (figure 44).

Human spaces for viewing animals

Figure 41. *A pathway to the Elephant Enclosure, SA Zoo.* An oblique approach can be mysterious and interesting.

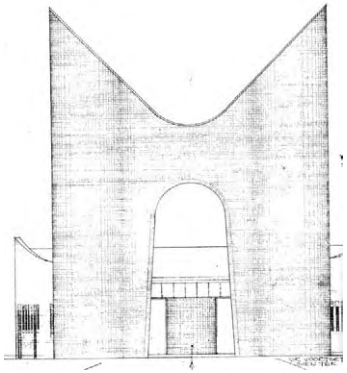


Figure 43. *The Main Entrance to the SA Zoo.* The form entrance is a preview to the theme of the zoo's original architecture - morphic and organic in form.

Animal living spaces

Figure 42. *The Tiger Enclosure, SA Zoo.* The tiger creates his own path down the slope to a dry moat.

Figure 44. *A bird of prey enclosure, SA Zoo.* The service entrance parts at a bird enclosure.

#### *2.7.4.2. Path-space relationships*

Paths may be related to the spaces they link by path–space relationships including paths that pass by spaces; pass through spaces; and terminate in a space. These properties of path–space relationships could further be categorized into enclosed paths; path spaces open on one side; and paths open on more than one side (figure 45).

For animals however, as previously mentioned, the form of the circulation paths depend on ease of movement for the animal. Contours should allow ease of movement, exercise, and replicate the natural habitat in which the animal would naturally live (figure 47).

### 2.7.5. Proportion and scale

Material and structural proportions and scale may be used to define and enhance spaces. Different types and sizes of vegetation are used to add variety in animal enclosures.

### 2.7.6. Principles

All forms and spaces can be ordered by using principles. These principles (as examined by Ching) include axis, symmetry, hierarchy, datum, rhythm, repetition, and transformation.

### 2.7.7. Temperature

Controlling indoor climate can claim relaxation spaces. Adding irrigation for cooling in animal enclosures can claim cleansing spaces, and the use of solid materials that retain heat can become an area to promote breeding or living during the winter.

Animals' sequence of spaces include clear open spaces where they can view humans and each other, followed by dense landscapes for more private protected spaces.

Human spaces for viewing animals

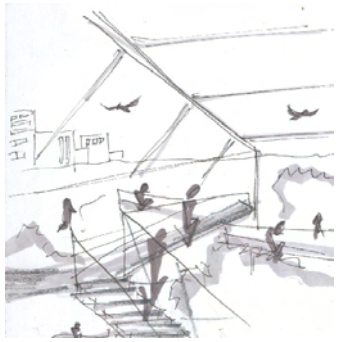


Figure 45. *A walk–in bird aviary, SA Zoo.* Passing through the space animals all round you.

### 2.7.8. Sound – Acoustic Planning

Depending on function and ambience of spaces that is required, sound isolation can be achieved using materials in the structure, and this can help claim private spaces. Certain animals claim their territory by noises, especially if another animal is trespassing.

### 2.7.9. Smells

The farm animal grounds have a strong scent, enriching a visitor's experience of this area. Zoo management adorns some animal spaces with fragrant vegetation. Unlike humans, animals claim their territory by releasing odours onto or around their space.

### 2.7.10. Activities changing spaces

Activities and equipment to carry out activities in spaces can define the function and mood of spaces. Some animals perch for extended periods on natural surfaces, and this may take the form or scent of the animal and in turn define its territory.

### *2.7.11. Signage*

Signage can identify and give meaning to different spaces. Design elements and principles can be used to design signage and arrange it in a manner best suited to the space in which it must be. Signage can however not claim different zones in animal enclosures.

To conclude, each of the abovementioned spaces that were defined (using Ching's criteria) using design elements and principles, have a function and ambience that was created. Miller's focus is on environmental psychology in the architecture of interior spaces, and how design principles and elements can be manipulated to create a range of different types of spaces (stimulating, private, relaxing, comfortable, mysterious spaces). The animan precinct approach should consider the above mentioned spatial concepts and criteria to improve the animal and human spaces, while considering all the exhibit design criteria previously mentioned.

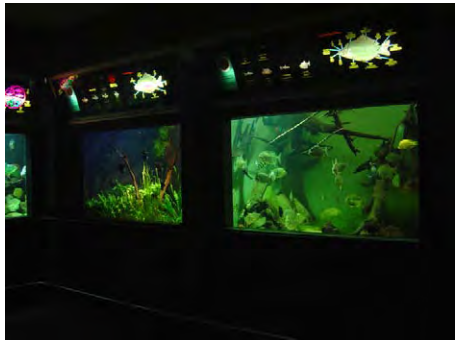
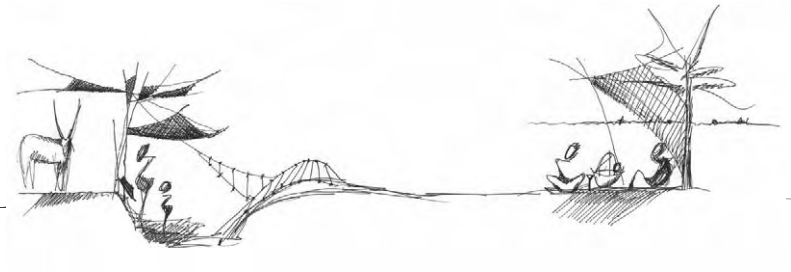


Figure 46. *The Aquarium signage, SA Zoo.* The glowing signage makes interesting learning in a dark space accentuating the fish and their colours.



# PRECEDENTS INVESTIGATIONS

## 3.1. PRECEDENTS A – WORLD ZOO FEATURES

World Zoos are assessed to view trends, types of spaces, and facilities offered in animal and human spaces. Each is assessed on the three main criteria of animal spaces; human spaces; and heritage considerations. Human space types available in the zoos include eating facilities; event facilities; picnic spots; children's or petting zoo; playgrounds; educational or discovery centers; amphitheater or show spaces; commercial services. Animal spaces criteria include types of advanced space concepts. Heritage consideration include; reused cage for animals; and reused cages for alternate facilities.

Table 1. *World Zoo Facilities* (a dash denotes none; an empty cell denotes information is not known.)

| | 1. Atlanta Zoo | 2. Bronx Zoo | 3. Cincinati Zoo | 4. Detroit Zoo | 5. Los Angeles Zoo | 6. Lincolc Zoo | 7. Philadelphia Zoo | 8. Pheonix Zoo | 9. San Diego Zoo | 10. San Diego Wild Animal Park | 11. London Zoo | 12. Whipsnade Wild Animal Park | 13. Singapore Bird Park | 14. Singapore Zoo | 15. Melbourne Zoo |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3.1.1 HUMAN USED SPACES | | | | | | | | | | | | | | | |
| 1. Eating Facilities | 6 | 8 | 2 | 4 | 10 | 2 | 10 | 13 | 8 | 6 | 3 | 5 | 6 | 9 | 5 |
| 2. Event Facilities | 9 | 3 | 1 | 1 | 3 | – | 5 | 2 | 8 | 1 | 2 | – | 2 | 5 | 3 |
| 3. Picnic Spots | – | – | 1 | 1 | 3 | 1 | 4 | – | – | 6 | – | – | 1 | 1 | 2 |
| 4. Children's/Petting Zoo | 1 | 1 | 1 | – | 1 | 2 | 2 | 1 | 1 | – | 1 | 1 | – | 1 | – |
| 5. Playground | 3 | – | – | – | 2 | 1 | 1 | – | 1 | – | – | – | 2 | 1 | 1 |
| 6. Educational/ Discovery Centre | 1 | 2 | 3 | 4 | 1 | 2 | 2 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 3 |
| 7. Amphitheatre/Show Space | 1 | – | – | – | 1 | – | – | 2 | 3 | 2 | 2 | 1 | 2 | 1 | 1 |
| 8.Commercial Services | 1 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 8 | 3 | 3 | 2 | 3 | 1 | 3 |
| OTHER – HERITAGE RESPECT & CONSIDERATIONS | | | | | | | | | | | | | | | |
| Reused Cage for new animals | | | √ | √ | √ | √ | | | | | √ | | √ | √ | |
| Reused Cage for other facilities | | | √ | √ | | √ | | | | | √ | | | | |

### 3.1.2 ADVANCED ANIMAL SPACE CONCEPTS:

1. Atlanta zoo is divided into two main zones: the African Rain Forest Plains, and the Asian Forest.
2. Bronx Zoo has a precinct approach for the Gorilla Forest.
3. Cincinnati Zoo uses the animal island concept, and has a barless Tiger Enclosure.
4. Deroit Zoo has a Penruinarium with life support systems used to maintain a penguin environment.
5. Los Angeles Zoo has mixed species in a walk through aviary.
6. Lincoln Zoo has an enriched Africa Apes Enclosure.
7. Philadelphia Zoo has birds in an open-air exhibit.
8. Phoenix Zoo has an open air Monkey Village.
9. San Diego Zoo uses moats to separate enclosures.
10. San Dieago Wild Animal Park has large spaces and enriched enclosures.
11. London Zoo uses enriched environments.
12. London Whipsnade Park has mixed bird species in a Bird Garden.
13. Singapore Bird Park has a large mixed species aviary.
14. Singapore Zoo has dry and wet moat boundaries of vegetation or boundaries dropped below visitors' lines of vision.
15. Melbourne Zoo has a mixed species Butterfly House.

## 3.2. PRECEDENTS B – SA PLACES WITH ANIMAL AND HUMAN SPACES

A study on Monte Casino, Johannesburg Zoo; Bester Birds and Animal Park; Rietvlei Nature Reserve (the precedents to follow) will indicate different animal enclosure design concepts, and the different kinds of human spaces that are offered. The assessment points of animal spaces of each precedent include types of animal spaces offered; the structural components used; enrichment offered; advantages of materials used; the environment within enclosures; shading, and human(keeper) access and breeding spaces. The human spaces are studied regarding covered walkway spaces; viewpoint and pathways; materials of viewpoints and pathways; spaces for educational shows or demonstrations; furniture; spaces for parties relaxation and play; spaces for people to interact; signage; landscape concepts; and consumer services.

The Rietvlei Nature reserve has one open space for small and large wild animals including predators to roam in, and interact with each other freely. The human spaces are limited, and the visitors experience and view these animals from the safety of their cars, and at partly secured designated view point structures.

Monte Casino, the Johannesburg Zoo, Bester Birds and animal Park are assessed and show different ideas in captive animal enclosure designs, and the human spaces surrounding them. Monte Casino is a great example of the use of different kinds of enclosures that birds can breed and live in. The Johannesburg Zoo, shows how different animals enclosures can be designed in different ways. The Bester Bird and Animal Park shows how much closer humans can get to the animals, and roam with, feed and touch them.

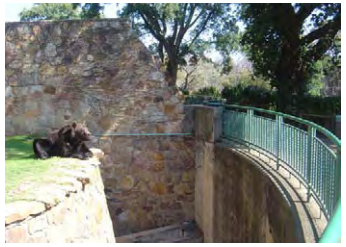
## ANIMAL SPACES Types

| | Monte Casino Bird Park | Johannesburg Zoo | Bester Birds and Animal Zoo park | Rietvlei Nature Reserve |
|---|---|---|---|---|
| (a) Free Roaming animals with designated eating/resting space. |  Figure 47. *Open-air Macaw Enclosure.* |  Figure 48. *Open-air Lemur Island.* |  Figure 49. *Enclosed and free roaming animals.* | The game roam free and have no specific living space designed by humans. |
| (b) Breeding Enclosure |  Figure 50. *Protected bird breeding enclosures.* |  Figure 51. *A variety of animal breeding spaces.* |  Figure 52. *A Small Cockatoo Breeding Enclosure.* | Rietvlei Nature Reserve has no designated breeding enclosures. |
| (c) Mixed Species |  Figure 53. *A mixed species walkthrough Bird Aviary.* |  Figure 54. *A large mammal mixed species enclosure.* |  Figure 55. *A mixed species protected enclosure.* | The reserve houses,small and large wild animals. |

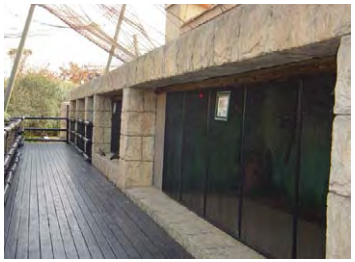
## ANIMAL SPACES

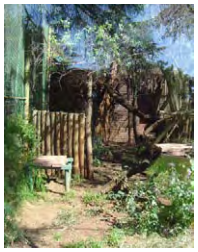
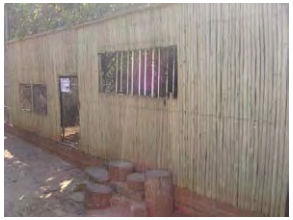
### Types

(d) Protected Open-air enclosure.

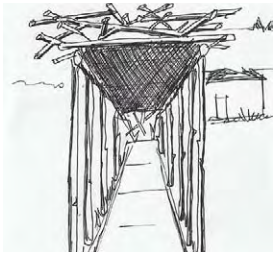
| Monte Casino Bird Park | Johannesburg Zoo | Bester Birds and Animal Zoo park | Rietvlei Nature Reserve |
|---|---|---|---|
|  |  |  |  |
| Figure 56. *An open-air Crane Enclosure.* | Figure 57. *A moat boundary at a Bear Enclosure.* | Figure 58. *An open-air mixed species enclosure.* | Figure 59. *A large open-air enclosure protected at the park limits.* |

(e) Protected enclosures

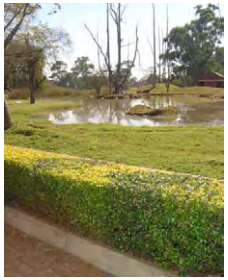
| | | | |
|---|---|---|---|
|  |  |  | |
| Figure 60. *The Snake Enclosures are of heavy solid architecture.* | Figure 61. *Some protected animal enclosures densely vegetated.* | Figure 62. *A protected bird enclosure.* | There are no defined protected enclosures in Rietvlei Nature Reseve. |

| | Monte Casino Bird Park | Johannesburg Zoo | Bester Birds and Animal Zoo park | Rietvlei Nature Reserve |
|---|---|---|---|---|
| ANIMAL SPACES<br>Structures | | | | |
| (a) Structure for a visual barrier to hide from humans. |  <br>Figure 63. *A protective barrier Cranes in breeding.* |  <br>Figure 64. *A wooden visual barrier for animal hiding.* |  <br>Figure 65. *Wooden poles form a visual barrier wall for the Kelp Gulls.* |  <br>Figure 66. *Vegetation used as visual barriers for animals to hide behind.* |
| (b) Structure |  <br>Figure 67. *Slender mesh connections for protected breeding enclosures.* |  <br>Figure 68. *Steel supports forming the skeleton of enclosures.* |  <br>Figure 69. *Steel frames and mesh protect the enclosures.* | Wire mesh boundary material. |
| (c)Playful enrichment tools/ environment |  <br>Figure 70. *Play components in the open-air Macaw Enclosure.* |  <br>Figure 71. *An enriched environment with a deep soil level for animals to burrow into.* |  <br>Figure 72. *Play components enrich a Black-Faced Spider Monkey Enclosure.* | No enrichment components are used. |

| ANIMAL SPACES Structures | Monte Casino Bird Park | Johannesburg Zoo | Bester Birds and Animal Zoo park | Rietvlei Nature Reserve |
|---|---|---|---|---|
| (d) Useful boundary material |  Figure 73. *Birds can grip onto enclosure mesh.* |  Figure 74. *Primates grip onto enclosure mesh.* |  Figure 75. *Bats grip onto enclosure mesh.* | No man-made boundary is used by the animals. |
| (e) Environment movement, through space | Each bird enclosure has different components spaced apart to encourage bird movement. | Each animal enclosure has different components spaced apart for animal movement. |  Figure 76. *The Bat-caved Fox Enclosure.* Shaded, feeding, cleansing, drinking, hiding, and breeding spaces are placed throughout the enclosure to encourage animal movement. | Animals roam freely. |
| (f) Shade |  Figure 77. *Textiles provide shade in the protected breeding enclosures.* |  Figure 78. *Wooden branches and textiles provide shade for the birds.* | Double mesh layers and overhead shade textile provide protection and shade in the Red Panda protected enclosure. | Animals rely on vegetation for shade. |

| | Monte Casino Bird Park | Johannesburg Zoo | Bester Birds and Animal Zoo park | Rietvlei Nature Reserve |
|---|---|---|---|---|
| ANIMAL SPACES<br>Structures<br>(h)Access and breeding spaces |  <br>Figure 79. *Human access in a breeding enclosure are visible to visitors.* |  <br>Figure 80. *Human access doors are visible to visitors.* | Access doors are from the front of the enclosures. | No protected enclosure access doors exist. |
| Human Spaces<br>(a)Covered walk-ways |  <br>Figure 81. *Wooden walkways are supported by solid construction.* |  <br>Figure 82. *A covered walkway at the Snake Enclosure.* | No covered walkways exists. |  <br>Figure 83. *Natural materials are used for covered path-ways.* |

## Human Spaces

| | Monte Casino Bird Park | Johannesburg Zoo | Bester Birds and Animal Zoo park | Rietvlei Nature Reserve |
|---|---|---|---|---|
| (b)Interesting viewpoints & pathways |  Figure 84. *Adventurous pathways wind and rise.* |  Figure 85. *Pathway barriers blend into the surroundings.* |  Figure 86. *Uncovered unexperiential visitor walkways.* |  Figure 87. *An elevated pathway to a viewing structure.* |
| |  Figure 88. *Natural and subtle pathway materials.* |  Figure 89. *Pathway barriers are of natural materials.* | Pathways are of masonry. |  Figure 90. *An enclosed walkway encloses human scent and hides visitors for protection.* |
| (c) Shows or demonstrations |  Figure 91. *An open-air amphitheater provides sun and rain protection.* | The Bandstand event area facilitates for shows and events. | Visitors are allowed to feed animals. | None. |

## Human Spaces & elements

| | Monte Casino Bird Park | Johannesburg Zoo | Bester Birds and Animal Zoo park | Rietvlei Nature Reserve |
|---|---|---|---|---|
| (d) Furniture |  Figure 92. *Wood topped concrete seats at the Amphitheater.* |  Figure 93. *Benches are placed at different places.* |  Figure 94. *Plastic furniture is placed under trees for resting.* |  Figure 95. *Furniture is limited to viewing structures with partitions and seats.* |
| (e) Play, party, relax | No known party accommodating facilities exist. |  Figure 96. *Play structures do not allow animal views* |  Figure 97. *Play, party and relaxing spaces are very close to animal enclosures.* | Lapa areas offer facilities for parties |
| (f) People interacting | People walk amongst free-roaming Parrots. | People cannot interact with animals. |  Figure 98. *Low enclosure walls allow children to interact with farm animals.* | People are not encouraged to interact with the animals, but horse-riding is available. |

| OTHER | Monte Casino Bird Park | Johannesburg Zoo | Bester Birds and Animal Zoo park | Rietvlei Nature Reserve |
|---|---|---|---|---|
| Signage |  Figure 99. *Uninteresting signage is small and unaccommodating to the visually impaired.* |  Figure 100. *There are a few unadvanced interactive signages.* |  Figure 101. *Uninteresting unaccommodating signage.* | There is no signage with species information. |
| Landscape |  Figure 102. *An exotic landscape sets an interesting atmosphere.* |  Figure 103. *Lush vegetation creates a mysterious pathway.* | |  Figure 104. *Variety in the landscape.* |
| Consumer services | A restaurant provides refreshments. |  Figure 105. *A conference facility overlooks the Lion Enclosures.* |  Figure 106. *Birds and bird accessories are sold at the entrance.* | Braai and event facilities are available in the reserve. |

## 3.3. PRECEDENTS C – LIGHTWEIGHT STRUCTURES

Simple construction can provide comfort, function and flexibility.

### 3.3.1. Frei Otto

Frei Otto, (with skills in architecture, structural engineering, philosophy) designed lightweight, and demountable structures. He generated tent–like interior spaces; hydro's and pneus; suspended constructions; grid shells; arches; and branching structures. The structures avoid the use of expensive expanses of solid construction materials. The works minimize mass and energy usage. It implements building adaptability and changeability. This method and choice of construction proves that complex structures are not needed to improve people's living conditions.

### 3.3.2. Marquees

Temporary marquees (mostly A–frame) are popularly used for people who want to be protected by the weather while at an outdoor event. The structures consists of aluminium profiles that are solid, hard pressed, four–groove hollow poles. Ground anchoring is achieved with base plates (with peg holes) and ground stakes/weight (depending on the floor surface). These marquees have extra facilities and materials available to suit different needs. These include aluminium hinged and sliding doors; aluminium windows; porticoes; hard wood flooring; and roof ventilators. Canvasses can be translucent and can have transparent sections to allow light in while keeping the rain out. Marquees are mostly imported (from Germany), and these are more elegant structures than the South African manufactured marquees. They both however offer similar facilities. To add to both types' advantages these structures have easy to fit connections, and can take one to afternoon install a 30x15m marquee. Marquees come in different sizes range from R1000–R34560 per structure (excluding transport and labour costs). There are standards in place for these types of temporary demountable structures.
These structures are temporary in nature, easy to install and demount, and use simple anchoring methods. They have different materials and elements to allow light and air penetration and offer views to the external surroundings.
(Berman Hire, and MPR hiring personal communication)
(Berman Hire, and MPR hiring product information pamflets)

### 3.3.3. Canobrella

These shading structures are custom designed for different kinds of spaces. Consultation with a Canobrella Operation Manager (Volkan Eriltutmus) made it clear that different construction methods and materials can form shading to suit the needs of the different spaces. Custom designed awning coverings are also installed using simple construction methods (steel frames with meranti strips, canvases stapled to meranti strips and rubber strips stapled over canvas staple connections to protect the joints and finish aesthetically).

Figure 107. *Sandton.* Photograph taken by Volkan Eriltutmus

### 3.3.4. Cable mesh structures - Carl Stahl

After researching the Carl Slahl Product guide 2006, it was noted that lightweight architectural stainless steel cable mesh (X-Tend) can be used in various applications. Tensioned flexible stainless steel cables are available in different diameters, lengths and widths, with various ferrule fixture sizes. This architectural mesh can be used for custom designed, diagonal and irregular spaces. X-tend supports loads and creates tension in three dimensions. The product is available in different colours. X-Tend minimizes material usage, and has a high economic efficiency. In South Africa however, cables and cable mesh are imported at high prices. There are various connection possibilities, and these include net ferrule connections; round tube or rod support and border frames or border cables. Architectural mesh blends easily into its' surrounding environment. Through careful study of this product, it was decided that instead of using expensive imported architectural mesh, South African manufactured welded, expanded or flexible diamond wire mesh can also be used in various applications.

Figure 108. *A stainless steel cable and ferrule connection.* (Charl Stahl p143, 2006 photo by Kuhnle & Knödler) (Radolfzell, Germany)

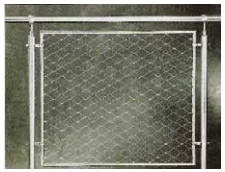


Figure 109. *A balustrade of X-tend mesh, Germany.* X-tend offers transparency.

Figure 110. *Burger's Zoo, Arnhem.* The Netherlands Leopard and jackal enclosures. Stainless steel cable net. Artificial trees are used for support to help the existing oak trees support the enclosure. (p111,114) (photo by Hans George Esch, Germany)

Thus we see that lightweight structures can claim space using simple assembly techniques and materials when compared to solid construction. By adding different elements, the moods of these spaces can be further enhanced. This product can also be used in conjunction with awning material and glass for overhead weather protection. The better a structure blends into the surroundings the better suited it is for a application for animal spaces and the humans that view them. No matter the size or location of the space (inside of or external to an architectural shell), if the space claiming structure is simple, if one is reminded of the surrounding context, if the structure interacts with nature, and if it is a product of space-time, it is indeed a piece of architecture.

## 3.4. PRECEDENTS D – EDUCATIONAL DISCOVERY CENTRES

### 3.4.1. Bondi Beach Marine Discovery Centre

The Bondi Beach Marine Discovery Centre is a visitor centre that represents different characteristics of Bondi Beach with the use of theatrically designed spaces. The centre takes visitors from a known world of Bondi Beach (sand, sea, surf), to the little known underwater world in Bondi Bay. Sounds, LCD displays, live Aquaria, shimmering elements, and interactive touchscreens create an educational yet theatrical experience for the visitor.

### 3.4.2. University of Pretoria Discovery Centre

The University of Pretoria's Discovery Centre – accommodates for different information medium in a variety of zones. The changes in level; floor material; furniture and experiments create and define the different spaces.

Information in these different zones consist of static information (posters and labels); interactive displays and experiments (a variety of sensory stimulation – see figure 114); hardcover or paperback literature (see figure 117) and digital information (see figure 115). All the information is mostly inaccessible to the visually impaired.

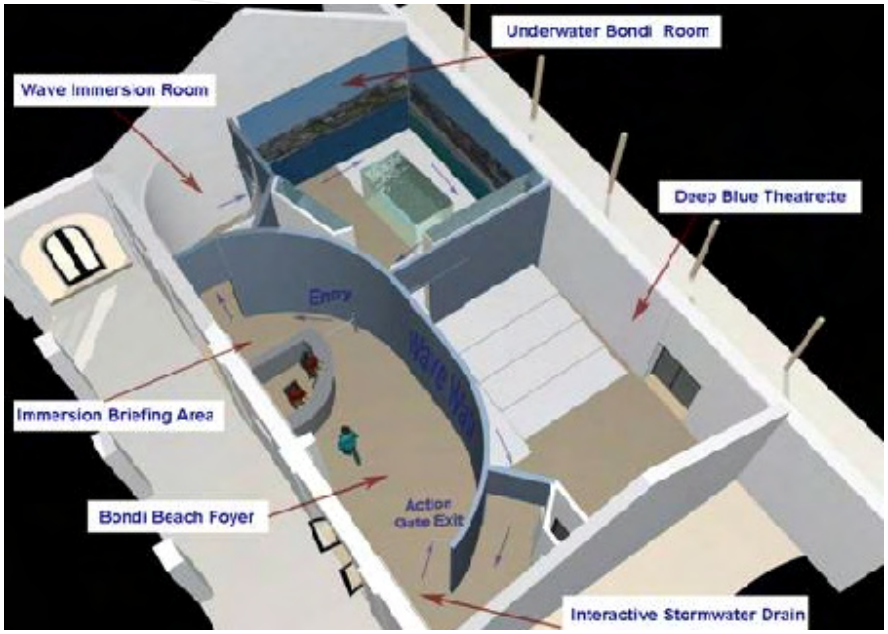



Figure 111. *The centre offers a theatrical and adventurous experience avoiding the typical discovery centre display of information or pictures.*

Figure 112. *A quiet literature information and reading zone.*

Figure 113. *Sub–zones with experiments and information on display tables.*

Figure 114. *A typical display table with in–teractive experiments.*

Figure 115. *A computer information zone.*

## 3.5. PRECEDENTS E – PLAYGROUNDS

Children enjoy learning about the environment, and manipulating it, by doing experiments. We can reinforce curiosity by designing spaces for children that have memorable experiences. "Children love to engage in creative play, using whatever materials are available (or e.g. pillows, chairs, blankets) to build tunnels, and form enclosures etc" (Miller 1985:24). "Children attempt to re-arrange furniture to build their play structures" (Miller 1985:25). It is important to reinforce childrens' tendencies to control their environments. Typical outdoor adventure playgrounds include swings, jungle gyms and other play objects and spaces. To create an experiental environment for children, a variety of spaces is also needed. These spaces can include physically stimulating spaces; mentally stimulating spaces; nothing spaces; spaces where children can feel in control; sensory experiential spaces (water, texture, sound, visuals, scent); and ambiguous spaces where they can add their own creativity as opposed to typical jungle gyms.

### *3.5.1. Learning curves. A feast for the senses." Unkown author Landscape Design, 199604 vol 1996/249 p22-28)*

Learning curves by A. Frank is a sensory adventure playground that stimulates visitors with its interactive features. Ramps and raised pathways weave among the trees in the playground taking visitors on a journey. The playground offers slides and swings suitable for the disabled. Sensory experiences are achieved by adding height to the pathways making them exhilarating. Wind, water, light, sound, movement, textures colours, and smells were all employed. Tactile experiences include a multimaterial colourful sensory balustrade.

### *3.5.2. "A Different way to play" – L.W. Murray Landscape Architecture, 2004 Aug vol 94/8 p130-133*

This playground by LW. Murray and J. White is a step toward bringing non-typical play elements into the American playground aesthetic. No aluminium or plastic play slides are used. Talk tubes, custom-made xylophones, prisms and columns create a sensory environment. A big feature in this playground was the underground tunnel system.

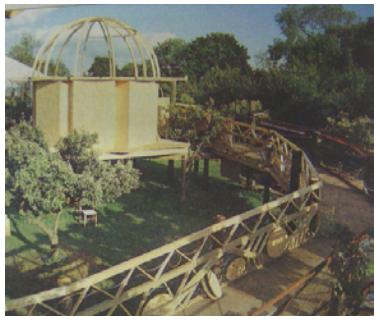


Figure 116. *Meldreth Manor School Adventure Playground, Cambridge, United Kingdom.*

Figure 117. *The Head Start Adventure Playground, Massachusetts, USA.*

### 3.5.3. "For Children only" C. Cooper Marcus. Landscape architecture. 2001/12 vol 91/12 p66-71&85.

A playgroung by Land Use Consultants in London's Kensignton Gardens offers a variety of play zones for different ages. The playground blends into its surroundings. Distinct subareas are designed to promote a different kind of play experience, which addresses a different aspect of child development (one area has manipulative materials). Areas include a semi-underground building, an Oak Tree Village, a Mermaid's Fountain, a Beach cove, a shelter, a Tipi Camp , Tree house Encampment and Music and movement garden.

### *3.5.4. "Spray and splash water park" unknown author. Parks and grounds. 1996/06 vol 96/90 p 52-53.*

This is a safe playground among water, using water jets of different shapes and designs. Non-slip finishes are used around water slides, shallow pools and splash spaces. Interactive – kids stand on jets so water shoots out of others stronger.

Figure 118. *The Princess of Whales Memorial Playground, London, United Kingdom.*

## 3.6. PRECEDENTS F – AMPHITHEATERS - Steel pines. V.Mays. Architecture 200/08. vol 91/8. pg 62-67.

Regency Park, North Carolina.
By William Rawn associates.
A permanent open-air stage adapted for theater, opera and dance performances. With the use of slender steel and wood, this whole place is integrated into its surroundings with a great focus placed on an open grass slope for the audience to be able to sit in the pine woods while watching performances. The development includes a VIP dining shelter, and lawn where the audiences can sit on blankets and in folding chairs. It is not one complete building, but a series of spaces accommodating guests in different manners.

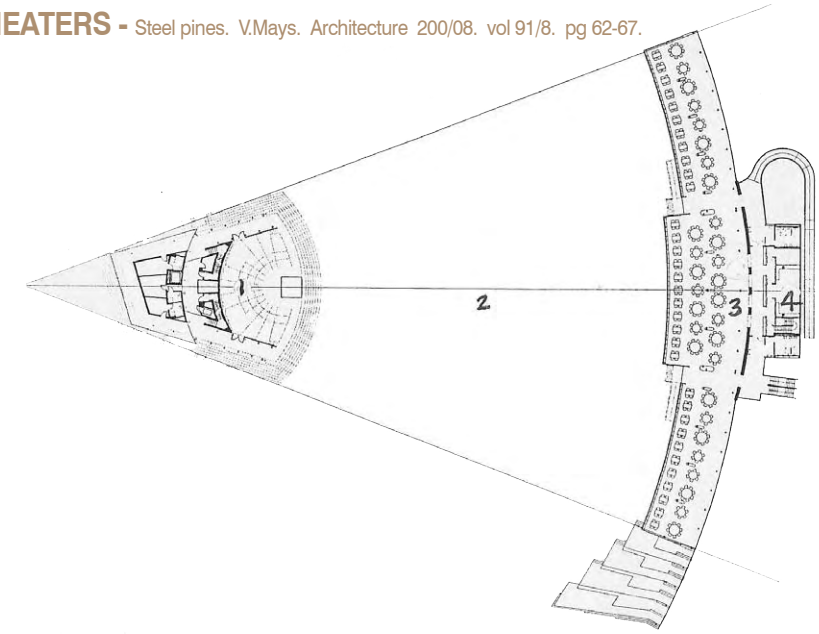



Figure 119. *Plan of Regency Park Amphitheater.* A variety of spaces accommodating the audience. 1 – Stage; 2 – Lawn; 3 – VIP Dining; 4 – Ablutions

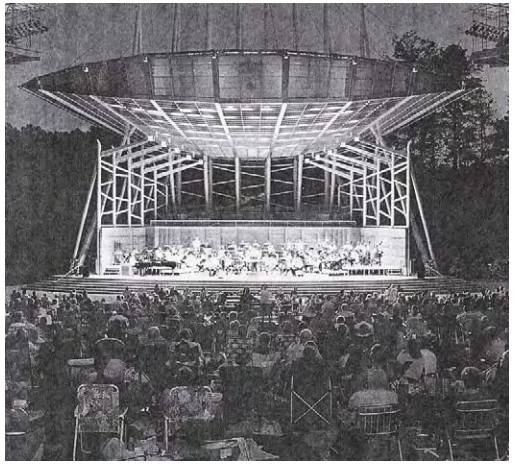
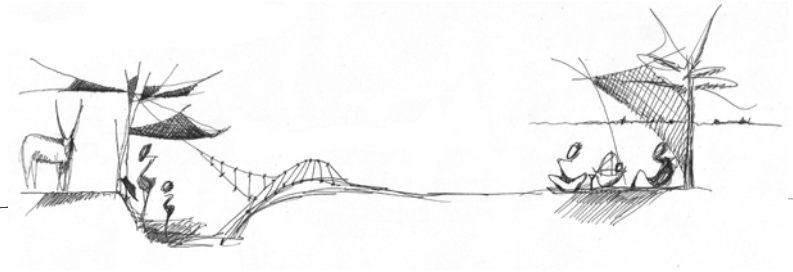


*Figure 120. Lawn at the Regency Park Amphitheater.*



# SITE SELECTION AND STUDY –

## THE EXISTING PARROT ENCLOSURE

## 4.1. INTRODUCTION

Many exhibits in the Zoo can be improved on, for example the baboon, leopard and chimpanzee enclosures. After careful study of each of these areas, it was decided that the Parrot Enclosure Area form the crux of this project, as a sample that could be used for future improvements on other enclosures. The existing enclosure study was conducted with the help of the enrichment co-ordinator (Robynn Ingle-Möller) and the parrot curator (Sara Shabangu).

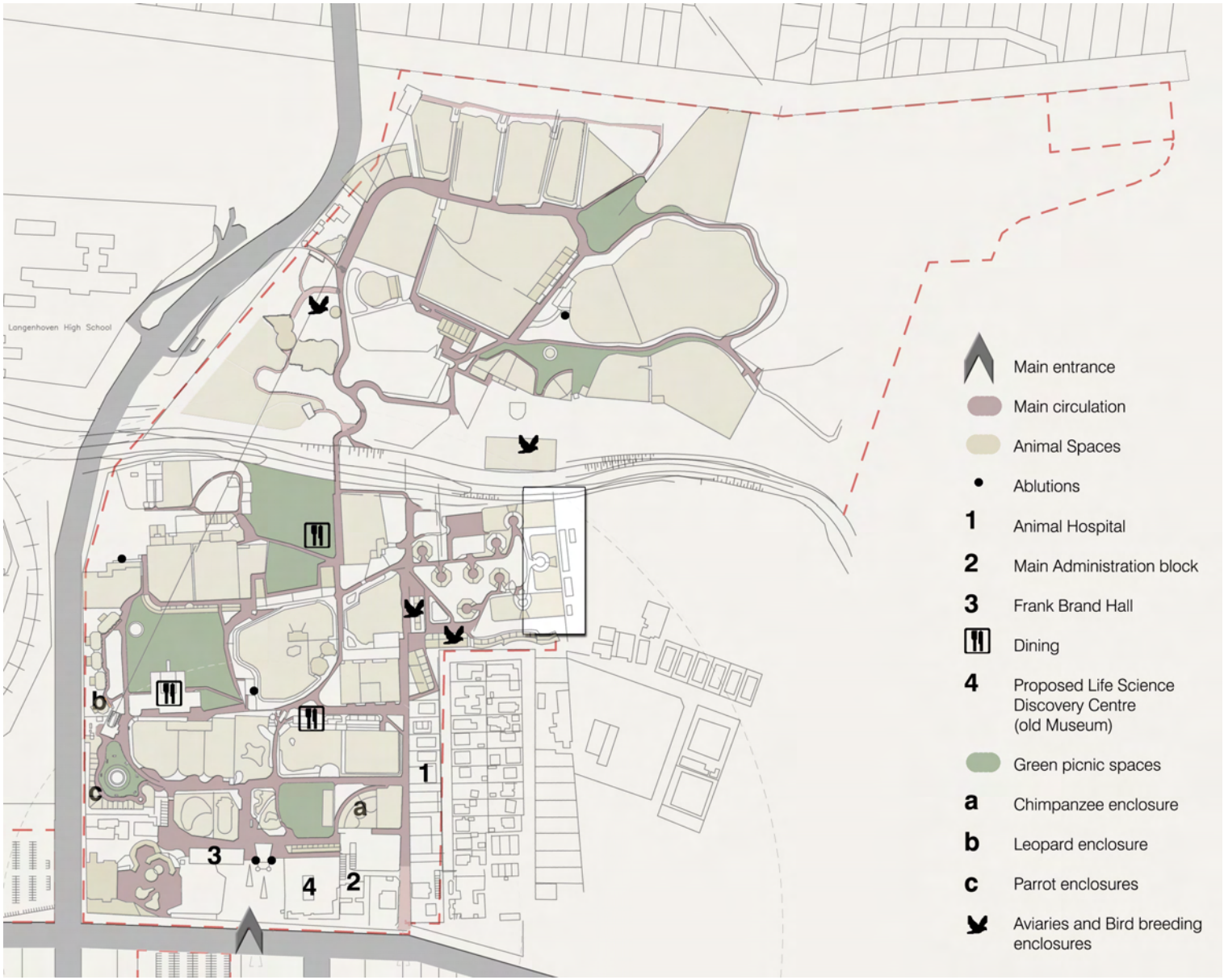
### 4.1.1 General

There is an existing Parrot Breeding Unit at the Animal Hospital at the SA Zoo where small chicks are artificially incubated and raised. The Parrot Enclosure Area initially used for displaying exotic and indigenous birds. Gradually the enclosure began to be used as extra breeding spaces for different birds including cranes and even owls in some occasions. Most of the breeding of parrots however is not visible to the public and takes place at the aformentioned Parrot Breeding Unit. The Zoo's main aviary does not house any parrots currently, but they are searching for exotic birds to include in the walk-in aviary. Available parrots could not be moved into the existing walk-in aviary due to their valuable nature, however many exotic parrots were also stolen at the more controlled parrot enclosure.

Any improvements to this enclosure would need to happen in a subtle fashion, sensitive to the animals. The parrots are noted by the parrot curator to share many human qualities, and would experience tremendous stress should they be suddenly moved to another location.

### 4.1.2. Bird enclosures

The parrot enclosures were built in 1970 and currently house different bird species. Some are larger in size than others, and one of the parrot enclosures house mixed species. It is noted by the above mentioned curator that many animal exhibit designers are surprised by the large sizes of the existing enclosures, since most breeding enclosures are almost half the size. The curator agrees however that no test exists to measure what size spaces these birds need to breed in. These enclosures are however not just for breeding, in fact, the birds are not moved elsewhere after breeding, and they remain in these enclosures that are their homes. It is however a great issue at the Zoo to save as much space as possible, and use spaces very wisely and efficiently due to the large number of animals living at the Zoo. Regardless, the curator does believe that providing larger spaces for these birds could give the animals freedom of greater movement and thus their behaviours could be carried out as if they were free to fly great lengths in the wild. The enrichment co-ordinator admits that some bird spaces at the Zoo are not big enough to encourage muscle development. The parrot curator states that there is no concrete floor below each enclosure. At the animal hospital the breeding enclosures' ground of river sand is replaced once a year. Some birds at the parrot enclosure need more cleaning of the soil than others. A thin layer of sand is used to top the soil with.




Map 4. *Existing SA Zoo facilities and enclosures (a,b,c) needing improvement.*

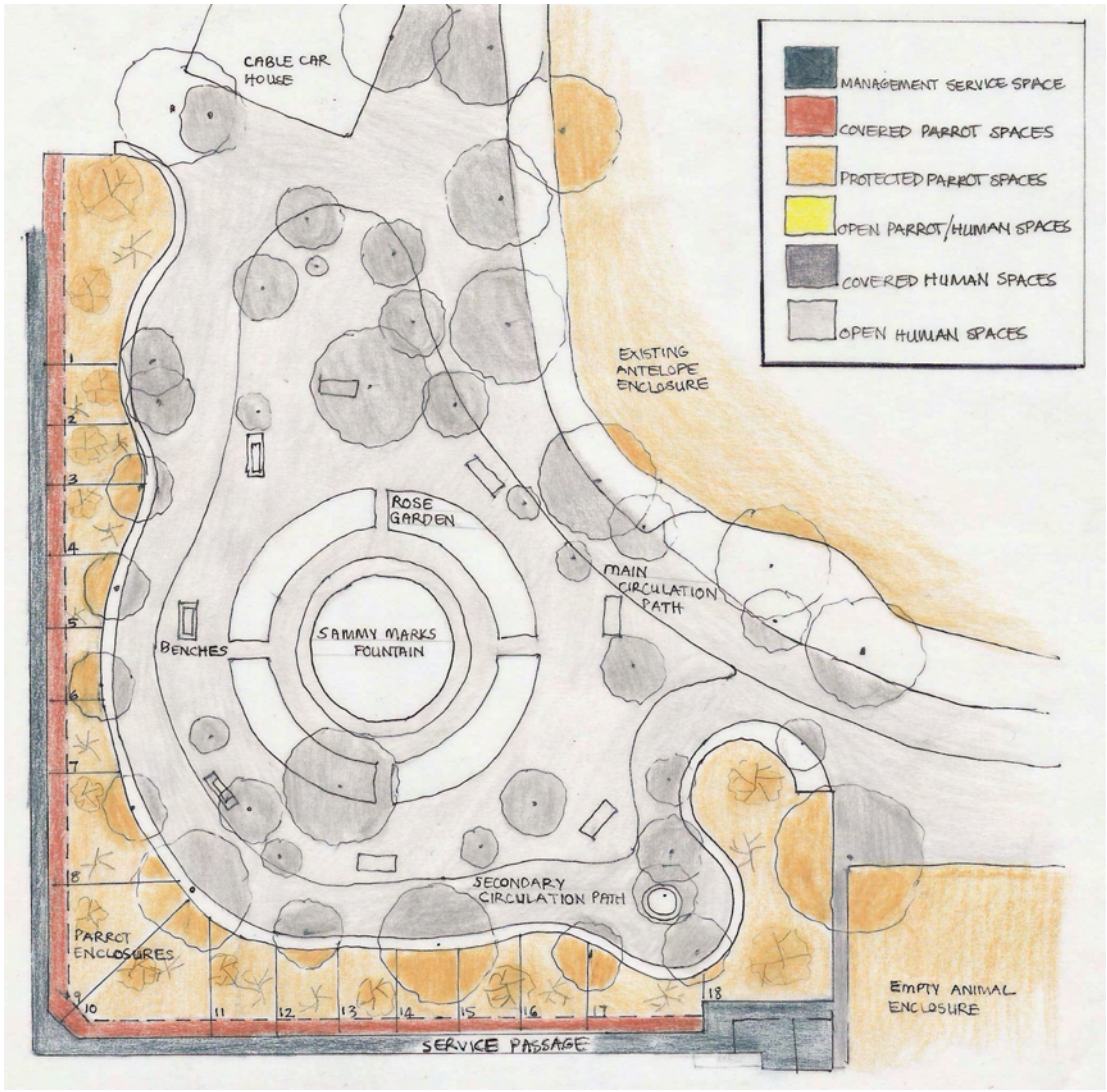



Figure 121. *Plan of an existing Parrot Enclosure area.*

The exhibit should have sufficient space, ventilation, lighting, privacy, shelter, and effective drainage to allow the animals' behaviors to be carried out.

#### *4.2.2.1. How different animals and their behaviours are catered for in the existing parrot enclosures.*

*(a) Flying.* Animals need sufficient space to move and carry out the natural behaviours.

*(b) Feeding.* Metal bowls are provided daily above metal perch tables, covered above with a concrete overhang.

*(c) Nesting or Breeding.* Bird breeding boxes vary in sizes and are accessible from the service passage (figure 123)

*(d) Resting.* There are only a few perch surfaces, and these include sun exposed dead trees; partially shaded live trees; and rain and sunlight protected metal perch tables.

*(e) Cleansing.* Periodic water from irrigation and water bowls allow birds to clean and groom themselves.

*(f) Protection.* Birds are protected from three sides at the back of the enclosure. The overhang protects them from the weather (figure 125). There is little vegetation behind which larger birds can hide (from visitors, keepers, and from other birds within the enclosure).

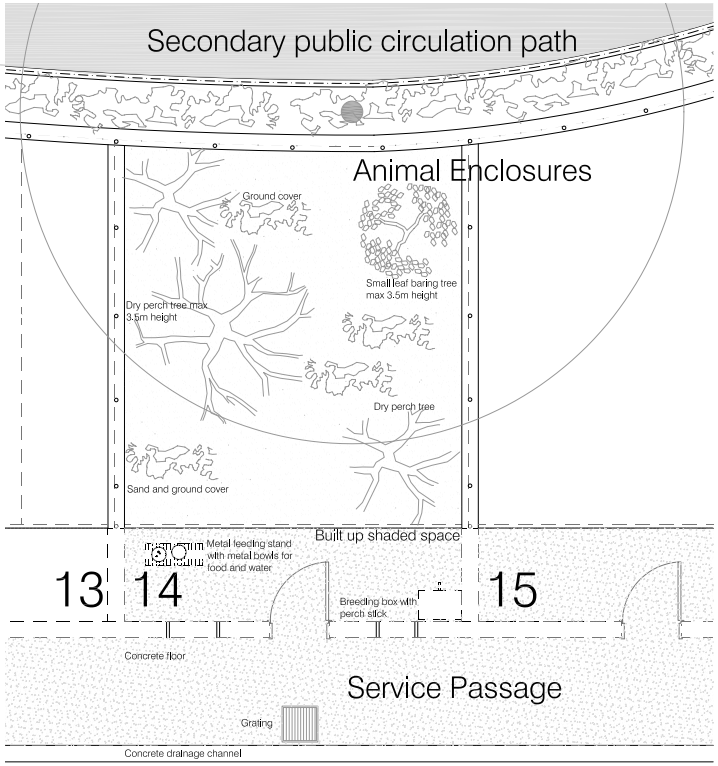



Figure 122. *Plan of an existing protected parrot enclosure.*

Figure 123. *A breeding box at an existing parrot breeding enclosure.*

Figure 124. *The enclosures' irrigation system.* Water supply pipes run above to the middle of each enclosure.

Figure 125. *An existing parrot enclosure.*

#### 4.2.2.2. Services

The parrot curator and other zoo keepers can see when a bird is getting hot. The parrot curator states that these birds also have personalities like humans. Irrigation in the enclosures is controlled manually, therefore their conditions can be altered if the curator feels it to be necessary. The controls of the irrigation points are easy to reach because during summer months, the enclosures can be irrigated three times a week, and if the curator feels necessary, this could also happen hourly. Water (new clean municipal water) is used for irrigating the enclosures, and reused water from the borehole is used for irrigating the surrounding grass area.

#### 4.2.2.3. Bird Enrichment Programmes

Behavioural enrichment co-ordinators provide enrichment techniques to these exotic birds to ensure their well being. The visitors should be made aware of these enrichment techniques in order to understand the nature of the Zoo and its caring principles. An example of an enrichment technique is when curators manipulate the animals' food in different ways to encourage them to search and seek for their food as they would in the wild. No climbing opportunities have been used in the parrot enclosures for enrichment as these gadgets and swings are scarce and need to be custom made. The parrot curator agrees that enriched environments could be practical and be helpful in working the birds' muscles, beak and feet.

### 4.2.3. Human Spaces

#### 4.2.3.1. Service areas for management.

(a) *Circulation.* The parrot curator uses visitor circulation paths to monitor the birds. Circulation in an existing Service Passage is dark, and narrow. (figure 126).

(b) *Eating.* No designated lunch area is currently provided.

(c) *Resting.* Zoo keepers use one of the two rooms (undefined use) to rest in during shifts. The existing Service Passage is well drained, but not well ventilated. It has limited access to the outdoors.

(d) *Ablution.* Zoo keepers make use of the visitor ablution services.

(e) *Protection.* During rainy or windy conditions, zoo keepers reside in the passage. The curator has an office at the Main Administration Block of the Zoo.

(f) *Learning.* Temporary workers train in animal keeping, however there is no nearby space to accommodate this, and they use other spaces at the Zoo's Main Administration Block.

Figure 126. *The existing Service Passage.*

Figure 127. *Access to breeding boxes from the existing Service Passage.*

Figure 128. *Drainage gratings in the Service Passage.*

Figure 129. *Wheep-holes in the walls of the existing Service Passage.*

*(g) Viewing.* Zoo keepers and the parrot curator require spaces from where they can monitor and record data regarding animals' behaviours and well-being. The service passage offers no view spaces, unless the keeper enters the enclosures and disturbs the birds.

*(h) Work - recording or monitoring.* As mentioned above, satisfactory recording space is non-existent. The curator and zoo keepers find it difficullt to monitor the birds from the openings in the wall in the service passage. These openings are the access to the breeding boxes (see figure 123) and the curator notes that they are at an unpractical height.

*(i) Work - cleaning or preparation.* Animal food is prepared at the Zoo's Main Animal Food Preparation Zone, and dropped off on small ledges in the service passage. The drainage system in the service passage allows it to be easily cleaned while water quickly moves away through grating (figure 128) to a concrete channel behind this passage. The passage is cleaned three times a week, and the concrete floor sections in each enclosure is washed as well. This water drains through the dividing wall between the enclosures and the Service Passage via wheepholes through the masonry wall (see figure 129).

*(j) Work - storage.* Existing rooms have no specific functions and are used as storage. Cleaning equipment and data information is disorganized in these two rooms in the Service Passage, and at the Curator office at the Zoo's Main Administration Block. An office at the Precinct could be practical.

The existing Service Passage acts as a second threshold for escaped birds (the first being the door to the enclosures), and the two doors at the entrance to the passages are another barrier that prevent birds from escaping, should they have escaped into the passage from their enclosures. As previously mentioned, the Service Passage is very dark and not well ventilated, therefore there is a fluorescent lighting system in place. This enclosed passage stops birds from escaping.

#### 4.2.3.2. Visitor areas.

The circulation path and other open spaces that humans can use around the Parrot Enclosure Area are unaccommodating. It is necessary to design new parrot habitats to allow animals privacy for breeding, but still provide accommodating facilities for humans to view, learn about, walk by and play near the birds. The curator believes that it could be a good idea to change the existing Parrot Enclosure Area to a display orientated precinct for visitors, as breeding does happen elsewhere at the zoo. Facilities can not include night tours as the parrots get frightened and could fly into the enclosures' boundary wire mesh.

*(a) Circulation.* The main circulation route branches off to a secondary route which passes the enclosures and branches back to the main circulation. The circulation path does not offer seating for reclining while watching the animals. The main and secondary pathways are unexperiential and unaccommodating (figure 130). They are not shaded and offer no rain protection to visitors, in fact, there is no overhead protection within 90m from the Parrot Enclosure Area. Pathways and signage are also unaccommodating to people with temporary or permanent, full or partial disabilities.

*(b) Eating.* Food can be bought approximately 93m away. Water points are not accessible to the public and are only used for irrigating the vegetation at the Parrot Enclosure Area and for the individual parrot enclosures.

*(c) Resting.* Visitors can recline on old benches placed on paved sections on the grass (figure 131).

*(d) Ablution.* Ablution facilities are available (also accessible for the disabled) 173.5m away.

*(e) Protection.* Protection from animals exists. Protection for visitors from rainy and windy conditions is however non-existent.

*(f) Education.* Information regarding the existing Parrot Enclosures is absent. Information regarding each enclosed species is printed, placed on metal sheets and bolted to bold wooden posts. Signage is interactive yet a blind person can not learn anything at the zoo unless there is a special function being held for the blind. The signage blocks views (figure 132), and the information is uninviting. Some enclosures have no signage. Approximately 90m before and after the enclosure, there are 'information sheds' with information regarding different animals. Parrot information is not included.

*(g) Viewing.* Visitors can view animals from uninteresting positions while on the circulation path that passes alongside the enclosures.

Figure 130. *A secondary circulation pathway*

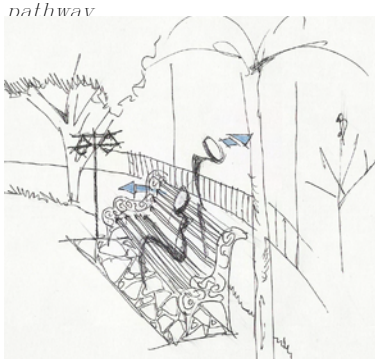


Figure 131. *Benches adjacent to the visi-*

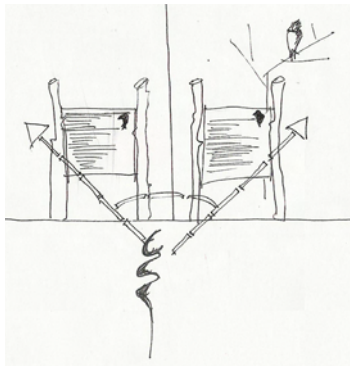


Figure 132. *Existing signage blocks views.*

*(h) Playing.* There are no designated play areas, and the open green lawn is the only areas where children can run and play.

*Other services.* Lamp posts automatically light up when cloudy weather prevails, however should the cloudy weather bring rain visitors are not protected and can not stay to watch the birds.

Figure 133. *Sammy Marks Fountain.*

### 4.2.4. The Landscape

Different tree species are placed throughout the existing Parrot Enclosure Area. Palm trees are strategically placed on the edges of the lawn. A rose garden is assumed to have no heritage significance and makes the greens unaccommodating for picnics. They also block views from passers-by.

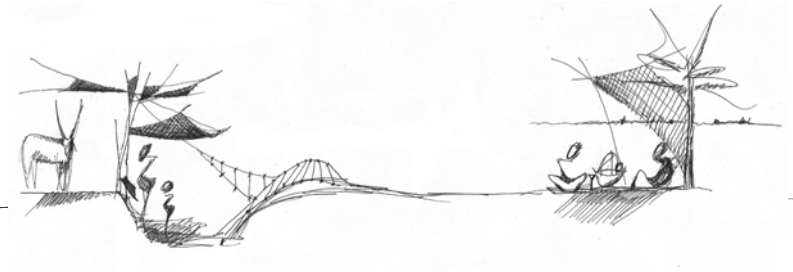
### 4.2.5. The Sammy Marks Fountain

The Fountain was presented to the National Zoological Gardens of South Africa by Sammy

### 4.2.6. Summary of visitors and management accommodation and facilities.

Table 2. *Summary of visitors and management accommodation and facilities.*

| | Circulate | Eat | Rest | Ablution (less than 50m) | Circulat-ion | Learn | View | Play | Work - record or monitor | Work - cleaning or preparation | Stora-ge |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Managem-ant | √ | x | x | √ | | x | x | - | x | x | Poor |
| Visitors | √ | x | Poor | x | √ | Poor | √ | x | - | - | - |



# DESIGN DEVELOPMENT

## 5.1. AIMS AND GOALS

Existing and new principles and objectives for designing the *Animan* Parrot Precinct are summarized.
The aims are to expand architecture and Interior Architecture in its range of subjects;
–To conserve the existing human and animal green spaces as recreation spaces.
–To improve experiential spaces for man in recreation spaces
–To improve the qualities of the captive environments' surroundings (in this case the SA Zoo).
–To make light of the captive environments' contributions to man and animal and the environment (contributions include conservation, education, experience, community values).
–To create or enhance animal spaces using enrichment (enrichment of the environment, not just using props) to make this visible and an experience for humans and animals.
–To create models for zoos to use when redesigning or improving animal or/and human spaces.
–To consider the needs of the different parties, animals and the environment when designing animal or human spaces in captive environments.
–To use design illusions to rather heighten human experiences than compromise animal well–being.
–To use design elements and principles (in this project those mentioned by Ching and Miller) as a basis when creating new or improving existing animal or human spaces. These principles can be used for large structures and even down to small details.
–To choose a problem site that needs valid improvements.
– To accommodate service workers
– To accommodate birds needs
– To accommodate different visitors
– To use design elements

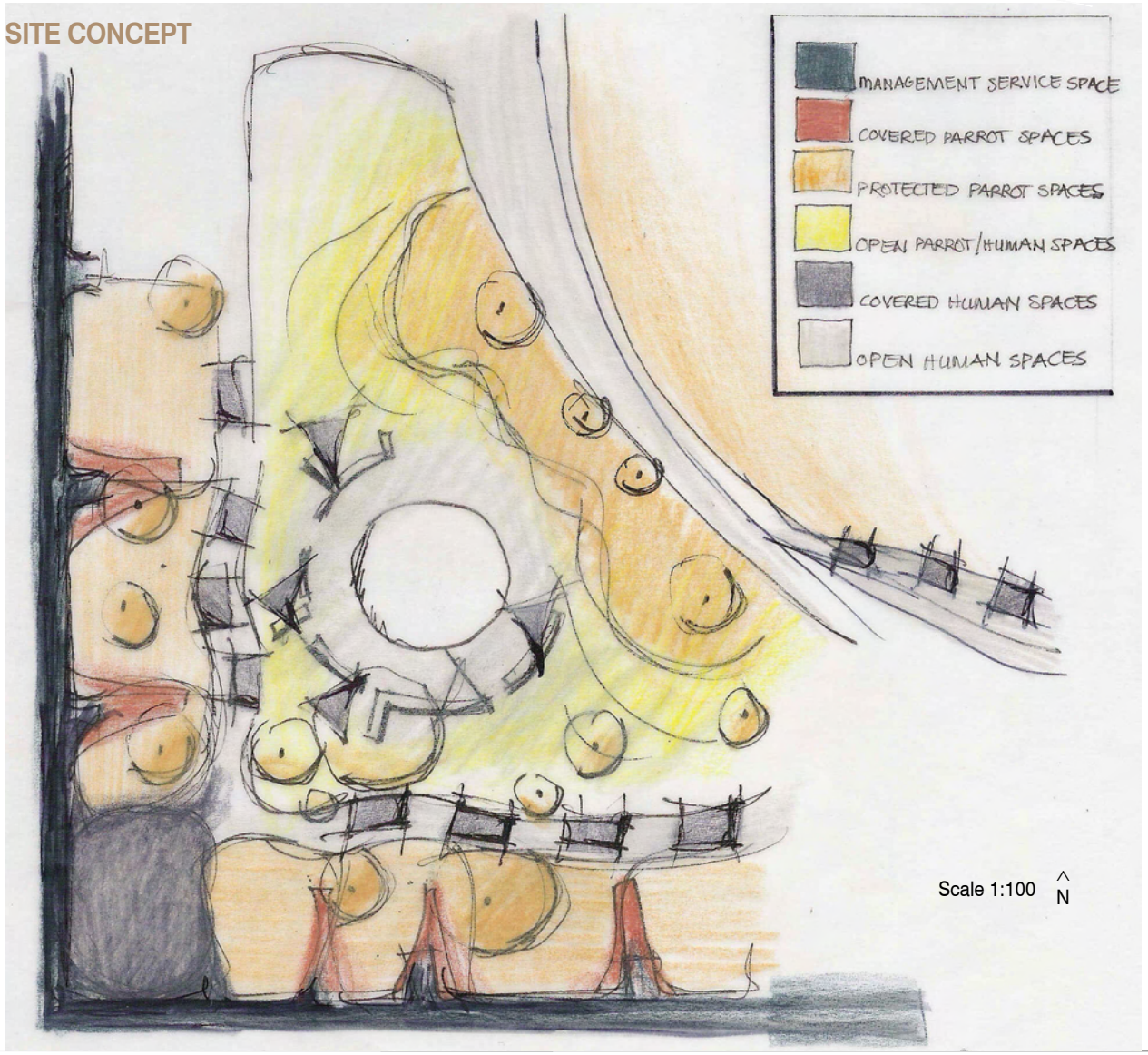



Figure 134. *New Parrot Animan Precinct – Concept Plan.*

## 5.2. AN ANIMAL PRECINCT

According to the curator, a variety of new habitats (enclosures) at the existing Parrot Enclosure Area would be useful. An *animan* precinct could bring more human activity than is usual to these birds, however some of these birds are noted to breed in noisy circumstances anyway. Should the parrot curator note that any parrots are not behaving as they should in this new Parrot *Animan* Precinct, there are measures that can be taken to take care of them. The zoo management and parrot curator would need to discuss what these could be. The structure should thus allow for privacy of the animals to be altered.

### 5.2.1. Birds Spaces

It has been decided to incorporate new Protected Parrot Habitats (that can facilitate breeding) as well as Open-air Habitats (to facilitate free-roaming birds with clipped wings). Parrots in the existing enclosures will be kept, and the other species (cranes and owls) will be shifted to other locations.

#### *5.2.1.1. Protected Parrot Habitats*

Birds to remain and those to be shifted into the new Protected Parrot Habitats include pairs of Brown-necked parrots; Little Corellas; Abbot's yellow crested Cockatoos; Scarlet Macaws; Major Mitchells Cockatoos; Blue-fronted Amazons; Illiger's Macaws and Sulphur-crested Cockatoos.

*(a) Flying.* The new habitats will have larger spaces than the existing enclosures to facilitate flying (figure 135).

*(b) Feeding.* The new design of feeding trays (figure 136) will be of a material and shape that can be easily cleaned and does not attract pests. The design has feeding trays positioned off the ground and protected above from direct sunlight (with the incorporation of an overhead structure – figure 137). This structure will also avoid contamination from enclosed birds and wild birds in flight (McMillan, online)

*(c) Nesting or Breeding.* A solid separating structure in the Protected Habitats will separate breeding spaces adjacent to each other, due to the fact that some birds become aggressive when breeding. The breeding space must be protected from atleast two sides, and placed above ground (figure 138). The breeding space must be protected from atleast two sides, and placed above ground (figure 138). Nesting boxes will be available all year round so that when the birds are ready for breeding, they can move to these areas.

*(d) Resting.* Replaceable perching sticks will be of natural branches of varying diameters (figure 139), and not dowel perches (bought in pet stores). Dowel perches are unhealthy for the development of birds' feet because it does not provide enough friction and stimulation to the feet, resulting in abnormalities and calluses (McMillan, online ) The new perches will be placed far enough apart to allow maximum flight for exercise, but not too close to the boundary mesh so that birds do not rub against it in flight and injure themselves (McMillan, online). Perch spaces will be supplied at different levels, and different places to accommodate for boredom and

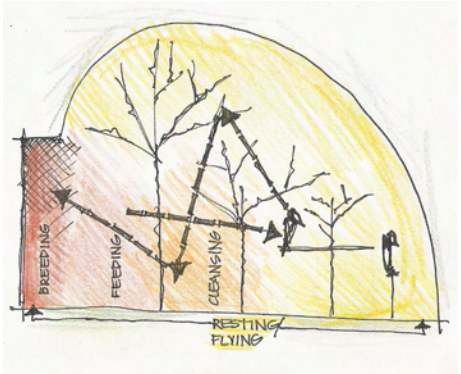



Figure 135. *A new Protected Habitat's concept of spaces.*


Figure 136. *Bird feeders' conceptual form and orientation.*

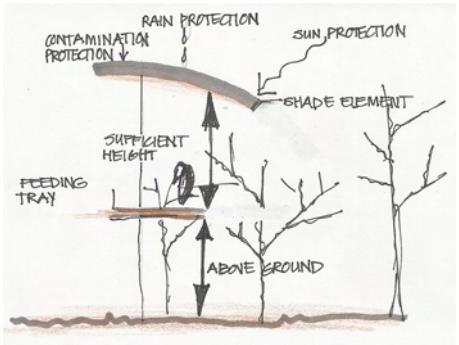



Figure 137. *A structure feeding zone to cover the birds'.*

depression of birds in their environment – see figure 140 (McMillan, online) Some of the new perches will be shaded, but all of these must be disinfected and treated for parasites.

*(e) Cleansing.* Bird water baths in the new Protected Habitats will allow normal grooming bird routines. The provision of baths help the birds control external parasites, as stated by McMillan.

*(f) Protection.* The new Protected Parrot Habitats will have atleast two solid planes at breeding areas (figure 138). A rear barrier wall and overhang give the animals a sense of protection. Base barriers (a concrete floor) will be incorporated below the soil in each enclosure. *Toucans at Riverbanks Zoo.* (online) also mentions that birds need to feel protected when breeding to prevent rats, mice and predators from burrowing into the habitats from below. These base barriers will allow easy cleaning and replacement of the covering soil. Baffles and site barriers will be used (birds need visual protection from humans and other animals). Any barriers should not be positioned to form enclosed corners and instead need to provide an exit from atleast three sides according to Rason (online).

### 5.2.1.2. Open-air Habitats

Open-air Habitats will be added into the Parrot Animan Precinct as these add an element of interest into the precint, and the roaming birds can further educate visitors on a different experiential level. Humans will watch the birds

#### 5.2.1.2.1. Services

Irrigation will be placed so that it can be manually controlled by management.

#### 5.2.1.2.2. Enrichment

Visitors should be made to feel like humble guests in the birds' open environment. Blue-throated Macaws and Citron-crested Cockatoos will inhabit the open-air enclosures and will be free to roam the precinct.

*(a) Flying.* Birds wings will be clipped so these birds can fly short distances but will generally remain in the borders of the main *Animan* Parrot Precinct. Climbing objects and perches in the Open-air Habitats will promote movement and muscle development (figure 141).

*(b) Feeding.* As with the Protected Habitats, food containers will be designed of a material and shape that is easy to clean. It will be positioned

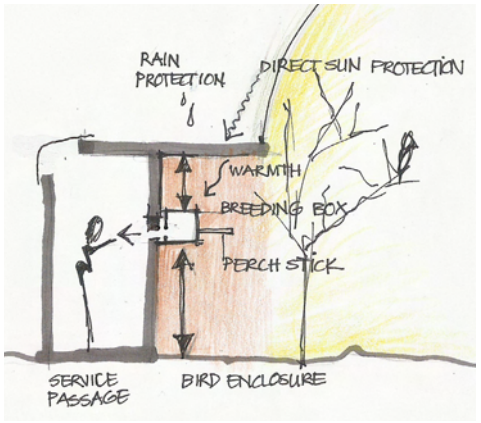



Figure 138. *A typical breeding zone in a new protected parrot habitat.*

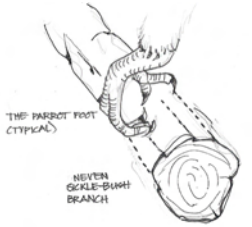



Figure 139. *Concept for all perch elements.*

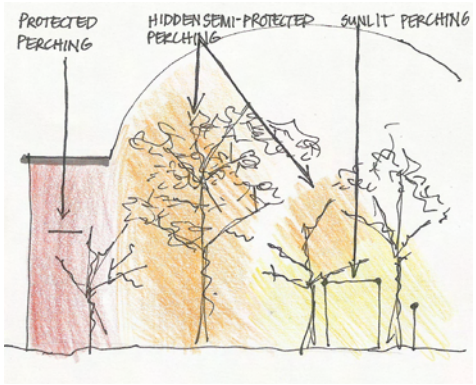



Figure 140. *Concept for variety of resting spaces in the new enclosures.*

above ground and covered overhead to avoid contamination and sunlight and rain protection (figure 141).

*(c) Nesting/Breeding.* Protected breeding spaces will not be provided at these habitats, because the birds will be too distracted to breed.

*(d) Resting.* Shaded and sunlit resting spaces are required to offer the animals a variety of spaces (as noted by the curator). The position, materials and shapes of perching branches have similar requirements to those of the Protected Habitats (figure 139). The free roaming birds can find spaces to rest beyond the Open-air Habitats.

*(e) Cleansing.* Grooming and cleansing will take place under a covering where water can also be protected from weather and contamination from other birds

*(f) Protection.*

A structure will protect the food and water from above, and a human barrier will border the habitat to allow animal but not human movement in and out of the habitat. Vegetation can further create hiding spaces for these animals.

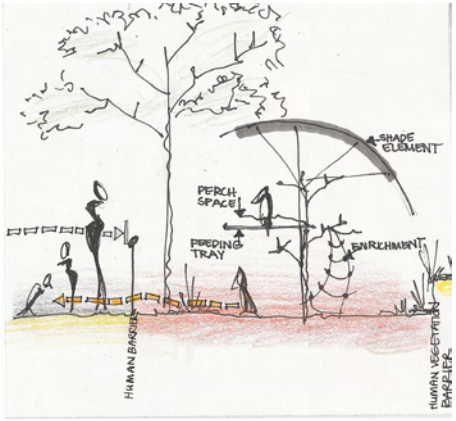



Figure 141. *Concept for an Open-air Habitat.*

## 5.2.2. Human Spaces

A variety of human spaces will be designed (figure 142) for both visitors and management alike.

### *5.2.2.1. Management Service spaces*

Record keeping is essential to maintain detailed records on each bird kept.

### *5.2.2.2. Visitor spaces*

*(a) Experi-path educational space.* Signage especially close to the Protected Habitats to inform visitors in conjunction with a proposed Life Science discovery centre at the entrance of the zoo. Education should be diagrammatic, in a position easier for visitors to move closer and focus on, and at a height and angle that will not block others' views from the birds. Easy to reach signage can be easily changed, and accessible to those who need to feel Braille. A textured pathway will aid in guiding the visually impaired to the Braille panels. These information panels should provide steps onto which children can step onto and have fun elevated experiences. The pathway need not be too wide as large crowds of visitors get split into smaller groups, and the circulation should not allow overcrowding. Signage should include parrot conservation information.

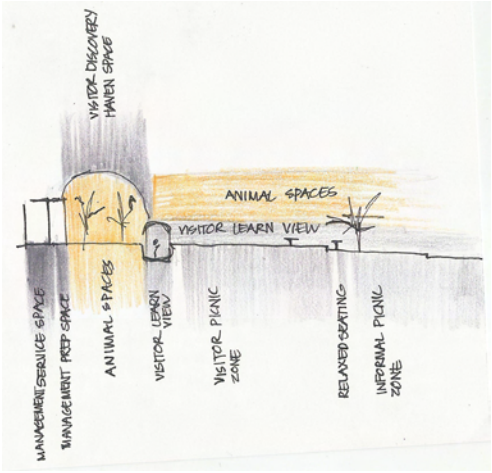



Figure 142. *Concept of spaces in the Animan Parrot Precinct.*

*b) Discovery Haven.* An area will be designed in which visitors can learn through a variety of multimedia, and view the birds from covered, hidden vantage points. The area will have information and multimedia equipment and will be able to be locked up and controlled. The space should be of a design that allows adaptability for exhibitions or events.

*(c) Picnic Zone.* A proposed picnic lawn and shaded seating will attract visitors, and encourage them to stay regardless of the weather conditions.

*(g) Relaxing Watch spots.* Integrative seating with open-air habitats create an extra experience for visitors.

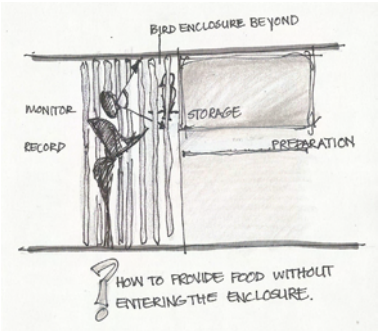



Figure 143. *Concept for a preparation and monitoring area.*

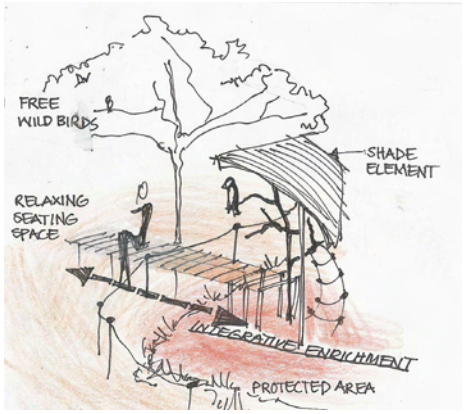



Figure 144. *Open-air Habitat concept.*

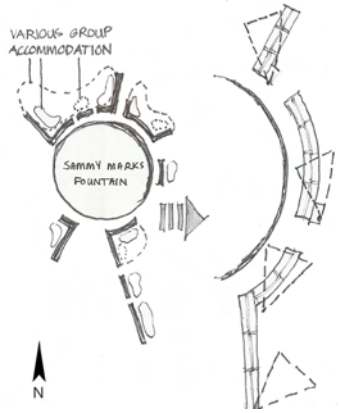



Figure 145. *Picnic Zone concept*

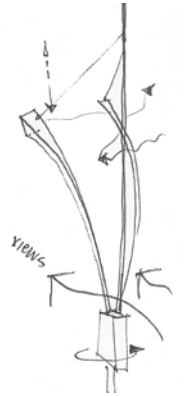



Figure 146. *Picnic Zone concept*

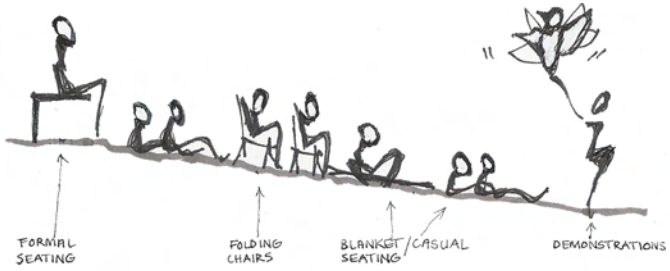
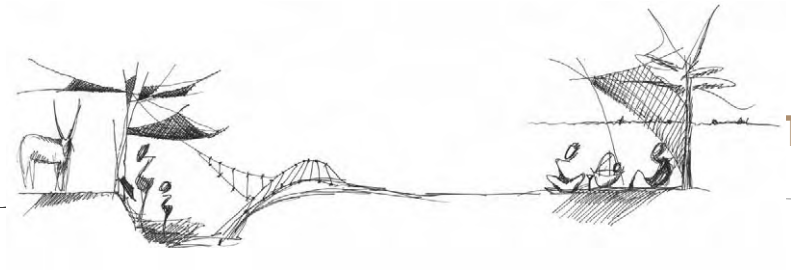



Figure 147. *Sloped lawn concept.*



# TECHNICAL INVESTIGATION TREATISE

## 6.1. AN ANIMAL PRECINCT

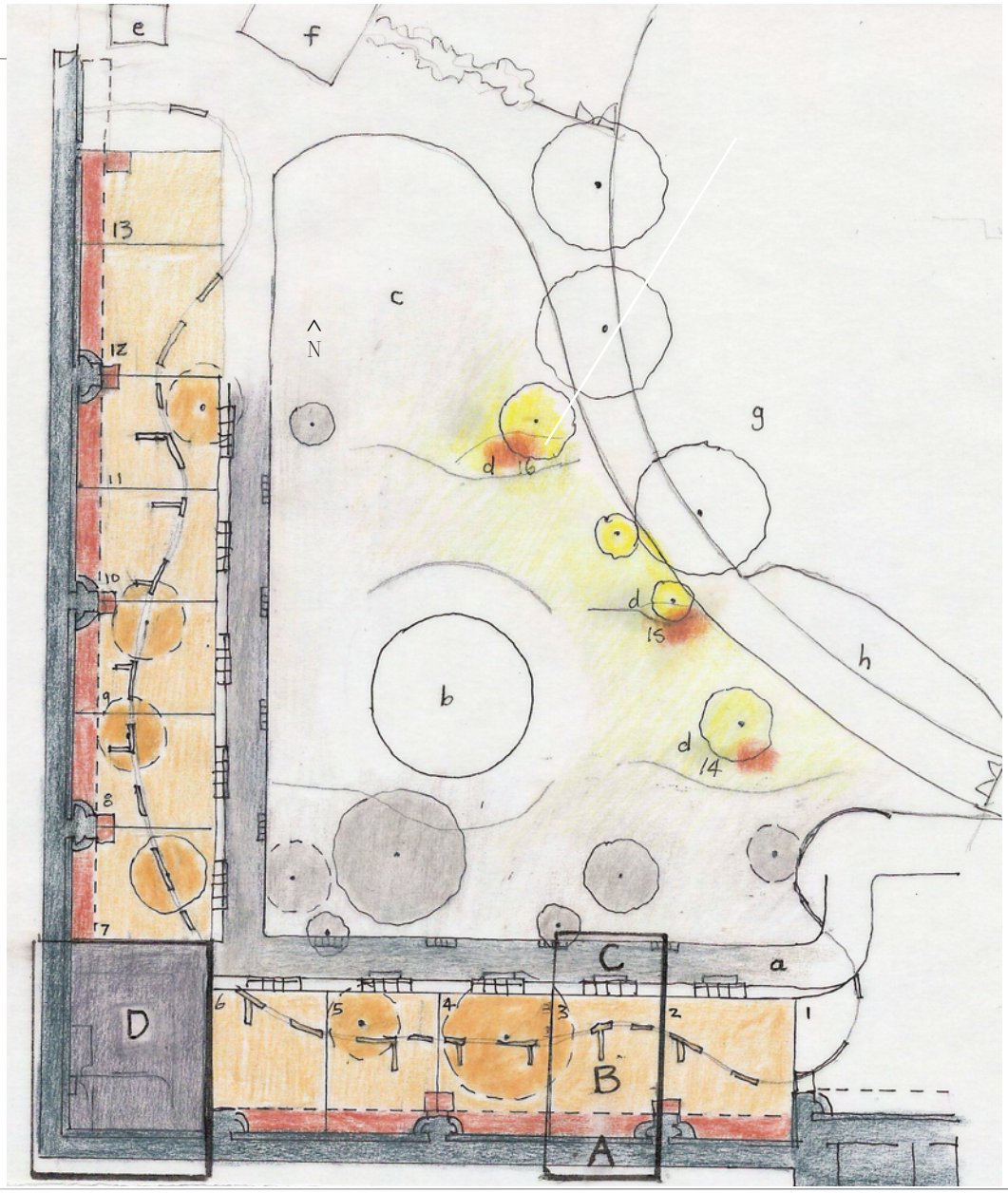
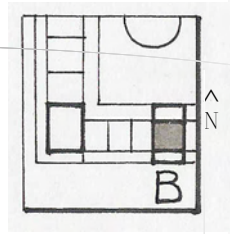



Figure 148. *Plan of new Parrot Animan Precinct Scale 1:500,*

A – New Service Passage
B – Protected Bron–necked Parrot Habitat
C – Experi–path
D – Discovery Haven

a. Experi–path.
b. Sammy Marks Foundation.
c. Sloped Picnic and demonstration lawn.
d. Open–air Parrot Habitat and visitor bench.
e. Proposed ablution block.
f. Cable car house.
g. Existing Antelope Habitat.
h. New proposed Experi–path.

1. Proposed land bird habitat.
2. Mixed species breeding enclosure.
3. Brown–neck parrot.
4. Little Corella.
5. Yellow streaked Lory.
6. Abbott's yellow crested cockatoo.
7. Scarlet Macaw.
8. Major Mitchel's cockatoo.
9. Blue–fronted Amazon.
10. Illiger's Macaw.
11. Sulphur crested cockatoo.
12. Blue and Gold Macaw.
13. Cape Parrot.
14. Blue–throated Macaw.
15. Citron–crested cockatoo.
16. Blue–throated Macaw.



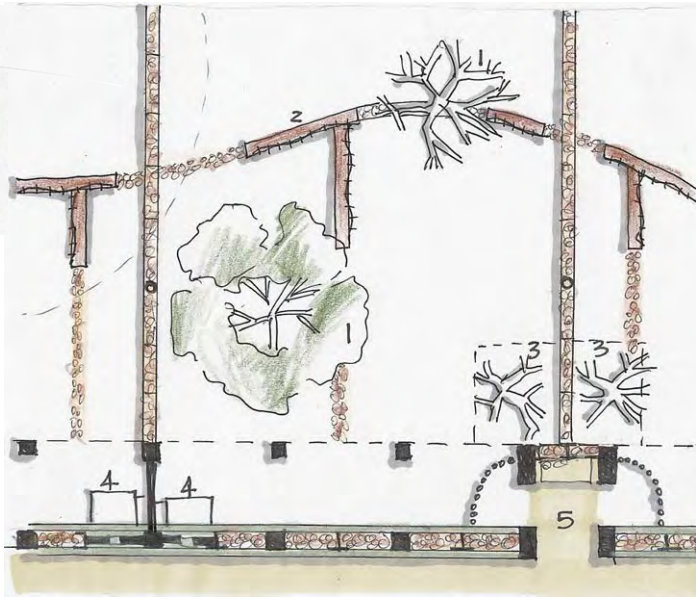




Figure 148. Plan of the Brow-necked Habitat. 1 - New trees; 2 - Existing walls with perch structure; 3 - Shading structure; 4 - Feeding and Perching Zone; 5 - Breeding Zone; 6 - Preparation and Monitoring Zone.

## 6.1.1. Animal Inhabited Spaces:

### *6.1.1.1. Protected Parrot Habitat*

*(a) The Structure*

• *Shape.* The shape of the structure encourages birds to perch at lower levels towards the front of the enclosure. The choice of an organic form allows easier movement for birds. The structure's shape is similar to that of the covered pathway under which humans travel. The similarity of the shape and materials (curved steel members) used in the human walkway and the Protected Habitat develops a notion that the human space is another version of the birds' space. Visitors can understand that the Protected Habitats are useful structures and not cage-like and limitingThe skeleton is made up of the above mentioned circular hollow curved steel members and cross members onto which diamond mesh is attached. Steel cables further support the mesh. Dividing each Habitat is a system of vertical circular hollow steel members connected to a strip of welded mesh stone-filled baskets. Mesh is drawn up the side of the steel member.

• *Materials.* Steel members add a technical finish and form the skeleton onto which diamond mesh is attached. The members connect to the roof of the Service Passage (see section7, drawing A1, 2), and to the retaining wall infront of the Protected Habitat.

*(b) The Services.* Irrigation supply pipes extend above every second curved skeleton member at the division of each Habitat, and further extend into each enclosure. These pipes supply water to irrigate plants but also to (when in drip-mode) drip from points in the pipe onto a concrete channel, built in place of the demolished low walls (see section 7, drawing B8). The dripping water will provide a place for birds' to clean and groom themselves.

*(c) Birds required spaces*

• *Flying.* The increse of space from the previous enclosures encourages more bird movement aiding muscle development (see figure 149)

• *Feeding.* Feeding trays (in each habitat) are stainless steel, bent to avoid sharp edges. The trays are longitudinal as opposed to the round metal bowls placed on metal perch surfaces. The choice of this shape aids in camouflaging the form of the tray amongst the

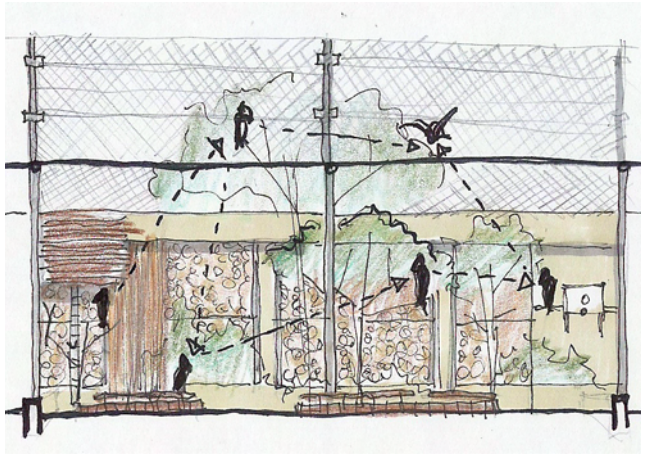


Figure 149. Protected Habitat Bird Movements

perch branches and surrounding perches. The trays rest on rods mounted to the steel wall support structure with steel angles. Two peg type attachments provide sufficient support inside the Service Preparation Zone to withstand the forces of birds pecking and sitting on it. The tray can slide in and out of the Habitat through the welded mesh strip in the Service Passage wall, thus making it easy to clean, and refill. A shade element above the feeder tray is of a steel bent frame with a waterproof metal sheet cladded with Sickle-bush branches. This element (and the surrounding trees) shade the feeder tray from sunlight, rain, and bird faeces (see figure 150). The curved profile shape of the shade element is unaccommodating, should birds want to perch on it (see section 7, drawing B5, 6 and 8).

• *Nesting or breeding.* The position of the breeding boxes is towards the back of the enclosure, covered by a concrete roof overhang, and flanked by a concrete wall barrier (wood trowelled and painted with natural liquid Sand Paint, colour warm sand). These intimate warm protected areas of the enclosures are the quietest sections of each Protected Habitat. Breeding boxes of different sizes have perch branches connected to the boxes and the adjacent wall.

• *Resting .* New trees are to be of a shape with a wide canopy and many branches throughout the height of the tree. Perch spaces include live trees; dry perch trees; and steel supported Sickle-bush branche structures. Sickle-bush branches are placed at different heights and distances (but not too close to the boundary mesh) and are attached to parts of the remaining existing low walls (cleaned) to curved hollow steel supports (see section 7, drawing B8). Visitors are given the opportunity to view animals that will perch in different positions due to the variety of perch spaces made available (see figure 151). Sections of the existing low walls are to be demolished and replaced with pebbles in rememberence of the old enclosures. Visitors can view that the new Protected Habitat are more accommodating in size.

• *Cleansing.* The demolished sections of the dividing walls (where not substituted with pebbles) are replaced with a concrete channel into which irrigation is controlled to drip, providing the birds with a place to clean themselves. The concrete channel can be easily cleaned and disinfected daily (see section 7, drawing B8).

• *Protection.* Birds can hide behind the vegetation for protection, and

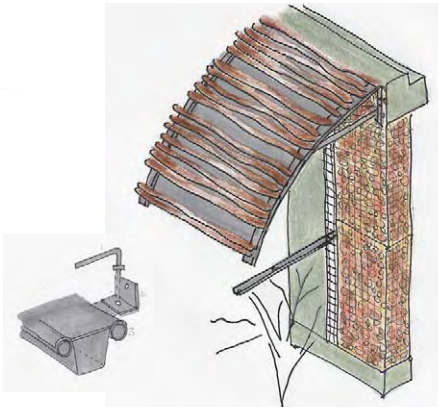


Figure 150. Shading structure and Feeding Tray.1 – Stabilization; 2 – Wall brackets; 3 – Rod supports. (See section 7, drawing B6)

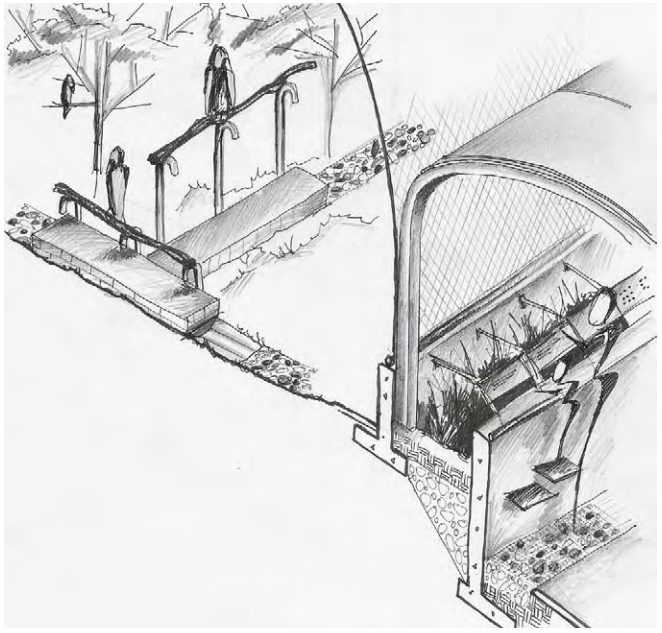


Figure 151 . *Experi-path and Protected Parrot Habitat.* Forms, materials, and textures are repeated in animal and human habitats.

visitors can find it an adventure to spot them. The harder it is to spot the animal, the less the visitors may feel sad about its environment.

## 6.1.2. Management occupied Spaces:

### *6.1.2.1. Service Passage*

The passage in its linearity allows easy quick passage for the keepers to access each enclosure. The existing backwall is restored and the rest of the top removed, cleaned and topped with a mortar topping. A gap between a new cantilevering concrete roof and the existing wall is filled with steel circular sections and expanded metal. This allows light and air in, but keeps unwanted animals out (see figure 153). Should any parrots escape into the passage, the expanded metal and the Service Passage main entrance will ensure birds do not escape into the open. The floor of the Service Passage is sloped to drain water to an external concrete channel. Existing wheepholes in the existing back wall will allow water passage out into the channel behind the back wall. The existing concrete floor is wood floated, and resealed with particle enhanced epoxy for an extra slip proof texture. Gratings covering extra drainage pipes also lead to the external concrete channel. The new wall structure between the Service Passage and the Protected Habitats (see section 7, drawing A1, 2, 3) is composed of a series of concrete columns (painted with liquid Sand Paint colour – warm sand) on a concrete footing (also painted with liquid Sand Paint and sealed with a Protecta Plus sealer). Concrete footings have wheepholes to drain water when the enclosures are being cleaned. Steel angle columns are raw bolted to the concrete columns and concrete footing to act as support for welded mesh stone–filled baskets. These baskets are then welded and bolted to the steel columns (see figure 154). This stone basket wall infill system aims to steer away from traditional solid masonry construction used in Service Passages throughout the Zoo. The objective is to border the back wall of the enclosures with natural stone and not masonry (which has house building connotations). The system also allows for easy adaptability should changes need to occur.

The roof extends over a section of the Service Passage, over the new wall structure and overhangs into the Habitats. A rise in the roof overhang supports the Habitats' enclosing steel skeleton

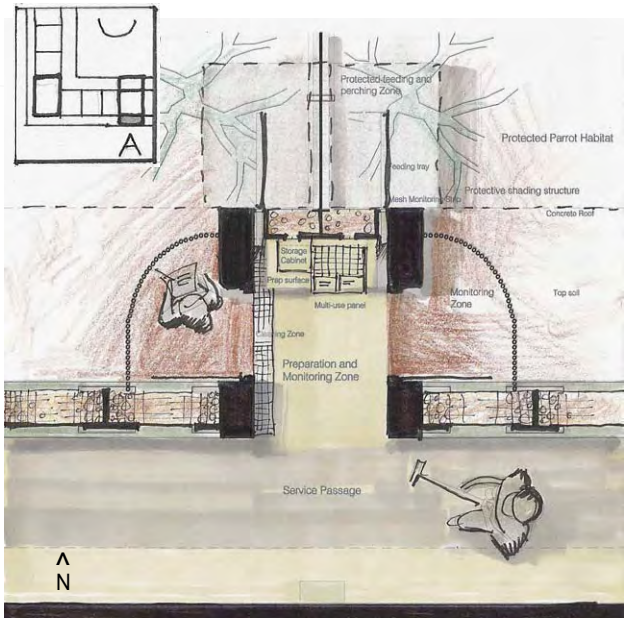



Figure 152 . *Plan of the Preparation and Monitoring Zone,* Service Passage. (See section 7, drawing A).

Figure 153 .Service Passage.

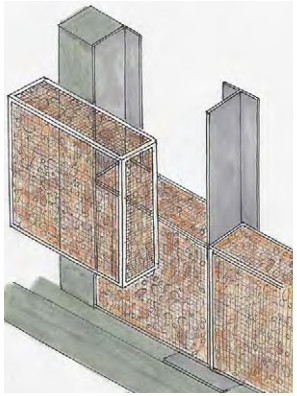


Figure 154. *Structured Wall System.* Welded mesh stone–filled baskets are fixed to steel columns and concrete columns (see section 7, drawings A1 and 2).

members and diamond mesh. The roof is sloped from two sides down to the middle of its width where water can drain into a down pipe set into the concrete columns and footing. It extends out of the concrete footing to drain into the Service Passagee (section 7, drawing A).

*(a) Service Passage Preparation and Monitoring Zone.*
Food prepared at the Service Block's Main Animal Food Preparation building is dropped off at the Main Parrot Food Preparation Area in the Service Passage. The zoo keeper can check the Main feeding Schedule board as he or she enters the service passage, and then take the correct food from the Main Parrot Food Preparation Area to the specific enclosures' Preparation and Monitoring Zone. Here the feeding tray can be cleaned and the food and water placed inside. This Preparation and Monitoring Zone is a multi-use area, with a Multi-use Unit; a Preparation Surface; a Storage cabinet; Monitoring space, and a Cleaning Zone.

The orientation, height and layout of the Preparation and Monitoring zone avoids frontal opening of doors into the enclosure and minimizes zoo keeper intrusion. The new wall support structure and welded mesh stone-filled basket system forms the boundary of this zone.

- *Multiuse Unit.* A steel frame panel of welded mesh is designed to require unlocking at one place only, and with the use of tracks and guides, it slides open to expose the Preparation Surface and open the Mesh Storage Cabinet (see figure 156). Tracks fixed at the top of the panel, and at the middle under the table surface allows movement, as well as guides running on the edge of the preparation surface. Roller wheel guides with a guide strip attached to the concrete floor retains the lower half of the panel's horizontal movement. The nature of the welded mesh infill allows a clipboard to be attached on the front for data recording. The profile of this panel is ergonomically shaped to support these functions and allow the keeper leg space and arm resting space while recording. A welded mesh paper tray fixed to the back of the panel provides storage for recorded data, close to the recording space, and underneath the preparation surface (see section 7, drawings A5,6,7).

- *Preparation Surface.* The surface is a 30mm hardwood base with a melamine coated surface easy to clean and is attached to the steel columns with angles bolted to both the table surface and the steel column (see section 7, drawing A5).

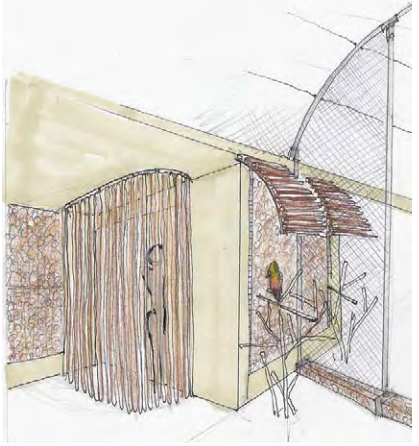


Figure 155. *Preparation and Monitoring Zone*

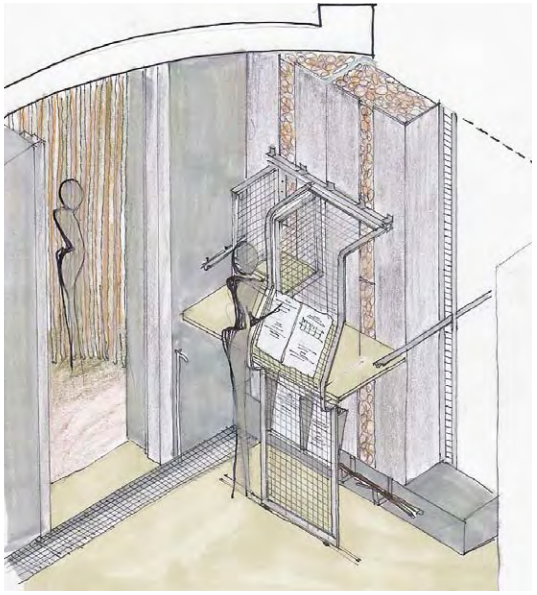


Figure 156. *Perspective of the Preparation and Monitoring*

• *Mesh Storage Cabinet.* A steel framed cabinet with welded mesh border planes has no separate cabinet door, instead, as the sliding mesh panel is unlocked, the storage cabinet is made accessible. The mesh allows easy monitoring and cleaning of storage (see section 7, drawing A5).

• *Sickle-bush perch branches and feeding tray storage.* Steel angles are attached to the concrete footing offering extra storage space for perch sticks and feeding trays. The storage space is not enclosed, and is thus easy to clean and monitor (see section 7, drawing A5).

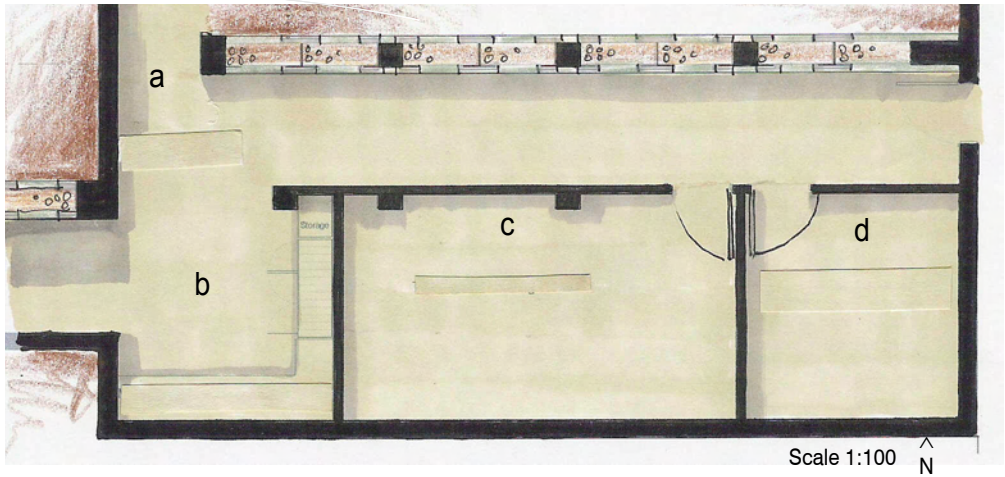



Figure 157. Plan of administrative spaces (see section 7, New Plan). a – Main Parrot feeding Schedule Zone; b – Main Parrot Food Preparation Zone; c – Training and Meeting Office; d – Breeding and Conservation Office.

• *Monitoring Zone.* Between the Habitats' access doors and each Habitat there is enough space for the zoo keeper or curator to enter and close the door while remaining hidden behind heavy suspended sisal ropes. The ropes are threaded over a horizontally curved steel member (bolted to the concrete soffit) and the rope overturn is clamped. This prevents birds from escaping. The use of natural sisal ropes avoids injury, should the bird get frightened and brush past the ropes when the keeper enters. The ropes allow keepers to monitor the enclosure without having to be inside the Habitats. Visitors are also less unlikely to see a human in the birds' Habitats. The overhang shades the area around the rope bordered zone, and this makes it difficult for birds to view the keepers as it is a darker space.

• *Cleaning Zone..* The floor of the Preparation and Monitoring Zone is finished similar to the rest of the passage – wood floated, and resealed with particle enhanced epoxy for an extra slip–proof texture. There is a water supply tap and built–in channel in the ground with a steel grating cover to drain the feeding tray waste and other refuse (see section 7, drawing A5).

### *6.1.2.2. Breeding and Conservation Office*

There is a space dedicated to administrate the new = Parrot Animan Precinct, provided with a space for office equipment and data archiving. The parrot curator's main office will remain at the Main Administration Block of the Zoo.

### *6.1.2.3. Training and Meeting Office*

A new Training and Meeting Office space is provided, and will cater for classes and training or meetings that need to take place.

#### *6.1.2.4. Main Parrot Food Preparation Zone*

One Main Bird Food Preparation Zone provides a main area for food drop off (from the Main Animal Food Preparation Building). This new zone has a preparation surface, and additional equipment storage that can facilitate preparation of food. Enrichment food and play props can also be prepared here, as there is also water services provided.

#### *6.1.2.5. Main Parrot-feeding Schedule Zone*

Upon entry of the Service Passage, a feeding and maintenance schedule wall provides easy schedule checking and recording. This area zone is close to the Main Bird-feeding Preparation Zone for practical purposes.

### 6.1.3. Visitor occupied Spaces

#### *6.1.3.1. 'Experi-path'*

The Experi-path is a depressed walkway running alongside the protected enclosures. The change in level is to highten visitors' psychological states. It facilitates walking, learning, and relaxed viewing for different ages of visitors, as well as for the disabled (mentally or physically, partially or fully incapacitated). The depth of the path places the visitor at an inferior position, and also allows viewers at higher levels and further distances to see above the signage and other viewers. (See section 7, drawing plan C). The roof structure of the Haven is a lightweight Shade Structure of similar materials and techniques used for the Experi-path Shade Structure. Curved and cross mild steel members form the skeleton for the meranti strips onto which canvas is tensioned and stapled. The mild steel members are connected to the rise of the adjacent Service Passage concrete roof.

*(a) Floor.* The surface of this pathway is filled with stones collected on site. Strips of welded mesh, covering the stones form the edges along the pathway. The strip running along the opposite edge are made with the same materials and define the paths' Relax Zone. The strip closest to the enclosure defines the Learn Zone. In between the above mentioned baskets a concrete floor slab placed over compacted ground defines the Walk and Watch Zone. It overlaps under the Relax Zone to provide a rough level surface onto which one can firmly lift off when changing one's position. The concrete surface is wood float finished and tinted to the Sand Paint colour Warm Sand with a product Dry Shake (a cementitious tint). A Protecta Plus Sealer with UV Protection is used to seal the concrete. A textured strip runs along the length of this concrete pathway. Rubber prints are pushed into the cement to obtain a textured shape, and then removed. This strip is painted and also sealed with the Protecta Plus sealer, and defines the Guiding Zone. This zone guides visually impaired visitors along the enclosures. The strip moves across to the seating on the one side, and to Braille information panels on the other side. It also moves

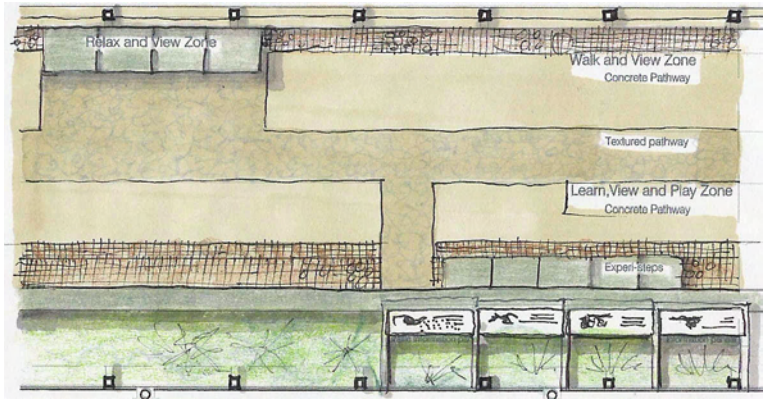



Figure 158. Plan of Experi-path (see section 7, drawing C1). Scale 1:100

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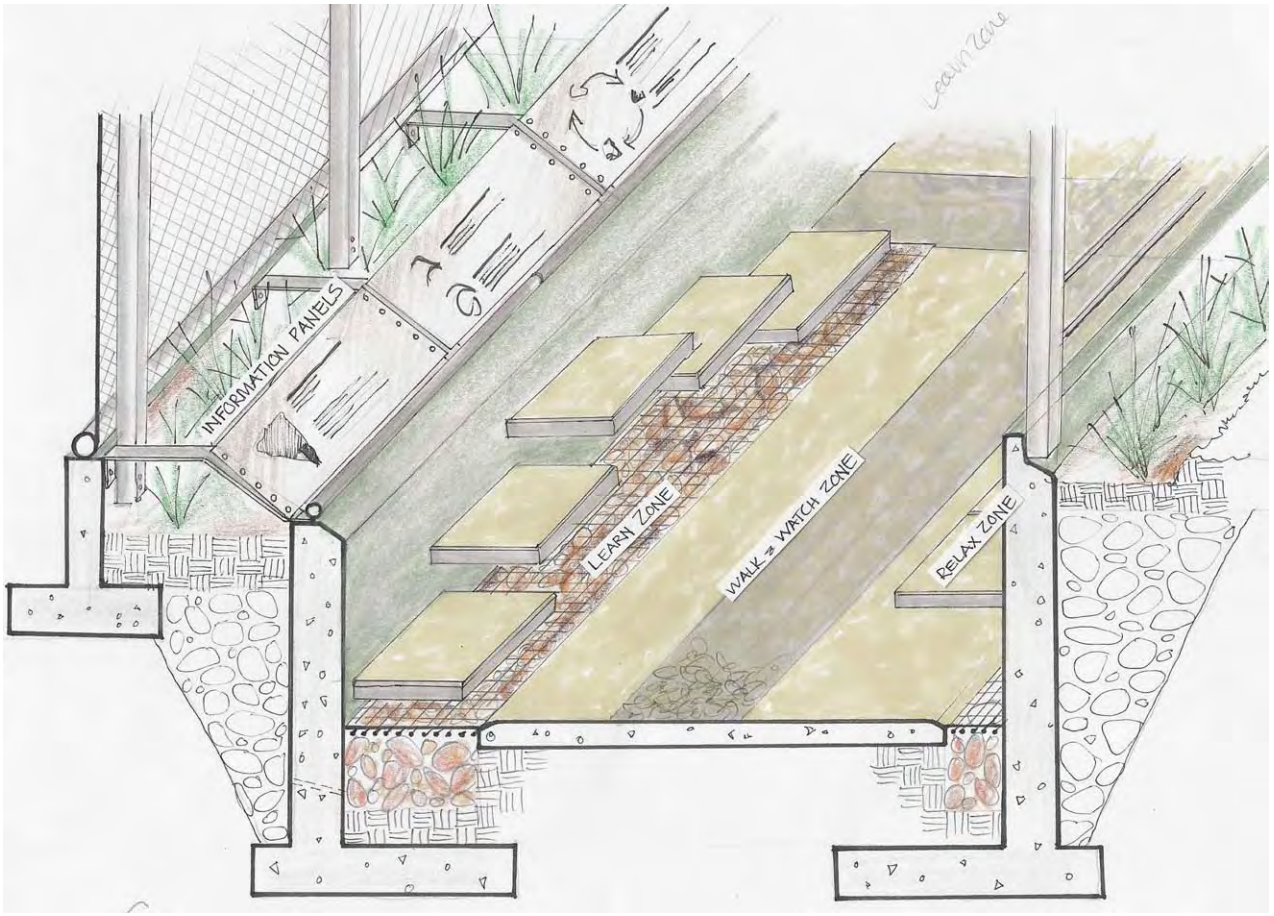



Figure 159. *Experi-path.* Zones are defined with materials, texture and form (see section 7, drawing C2).

into, and out of the Discovery Haven. This textured floor strip moves towards the picnic zone and also connects to the main circulation path out of the Parrot *Animan* Precinct (see figure 159 and section 7, drawing C1).

*(b) The Learn Zone.*

This zone is compromised of steel tray steps filled with textured screed (to 50mm). The use of male/female connections from the trays into the concrete provide support for the textured Experi-steps. These steps allow small children to elevate themselves to different viewing positions, and to view the information panels at a suitable height. Diagrammatic

vinyl-printed information is bonded to sheet metal. The metal is mechanically fixed to two steel frame members that are bolted to the two retaining walls. These information panels are placed at an angle for easy viewing and quick comparison of information to the live birds (see section 7, drawing C1).

*(c) The Relax Zone.* Screed-filled steel trays are attached onto the retaining wall with male-female connecting tubes. The cantilever position ergonomically allows seated people to push themselves off the ground (see section 7, drawing C1).

*(d) Walk and Watch Zone.* This zone is wide enough for families or guided tours which usually take place in groups of 10. The floor finish also helps to guide excited school children, keeping their movement somewhat organized (see section 7, drawing C1).

*(e) Services.* A drainage pipe runs between the mesh basket strips in the Learn Zone, to the strips in the Relax Zone, under the concrete Walk and Watch Zone, to be channelled away (see section 7, drawing C1).

*(f) Shade Structure.* The covering structure is shaped to allow intimate viewing, weather protection and drainage. Bent mild steel sections (70x70) are connected to two retaining walls on either side of the Experipath at every 1.2m (see figure 161). Cross members at every 500mm centres keep stability in the structure and supports the canvas. Meranti strips are screwed to the top of the mild steel section. Canvas is then tensioned at four sides and stapled to the Meranti strips and covered with Rubber strips. This simple lightweight structure does not distract viewers from their surroundings as the other viewing platforms at the Zoo do. The canvas only covers (width way) the signage panels, and extends over to cover the seats on the opposite side of the Experipath. Sections not covered bythe Canvas allow views, light, and air passage in the Experi-path.

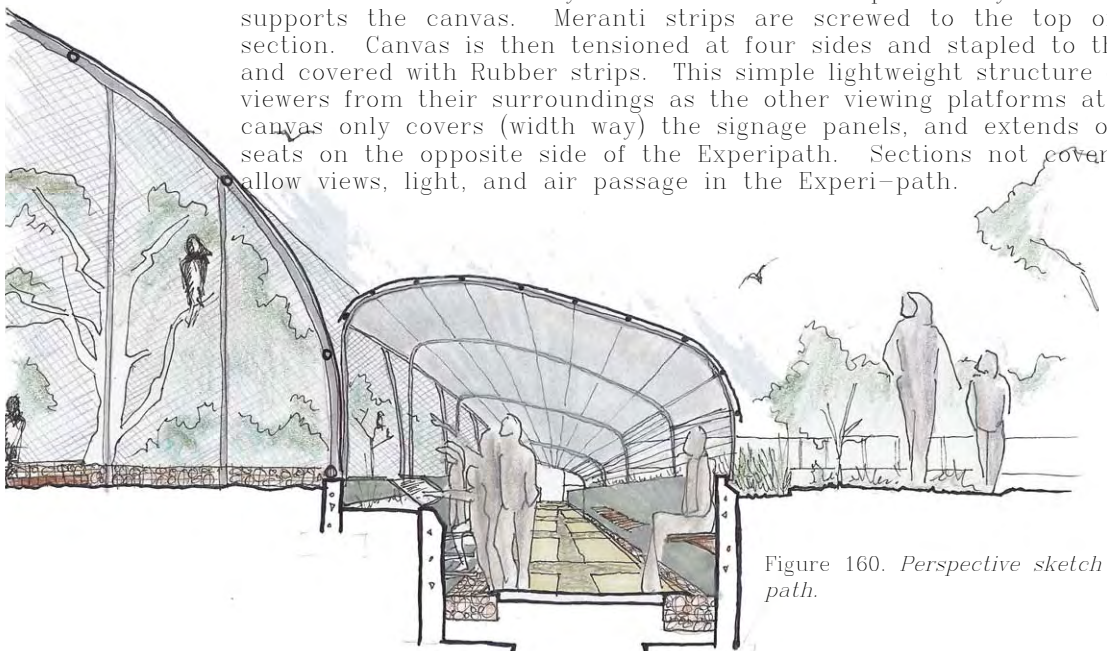


Figure 160. *Perspective sketch of the Experi-path.*

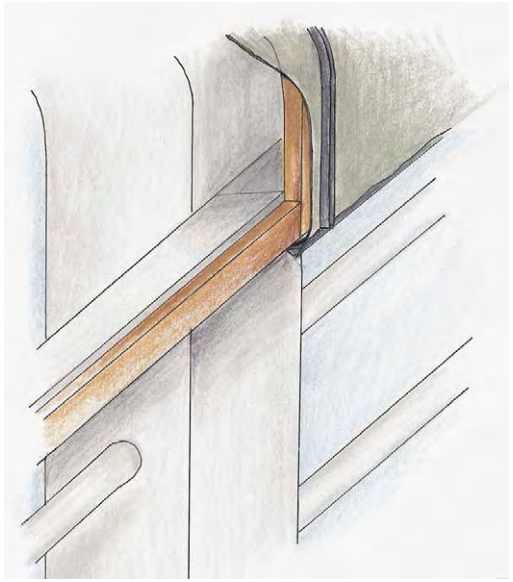
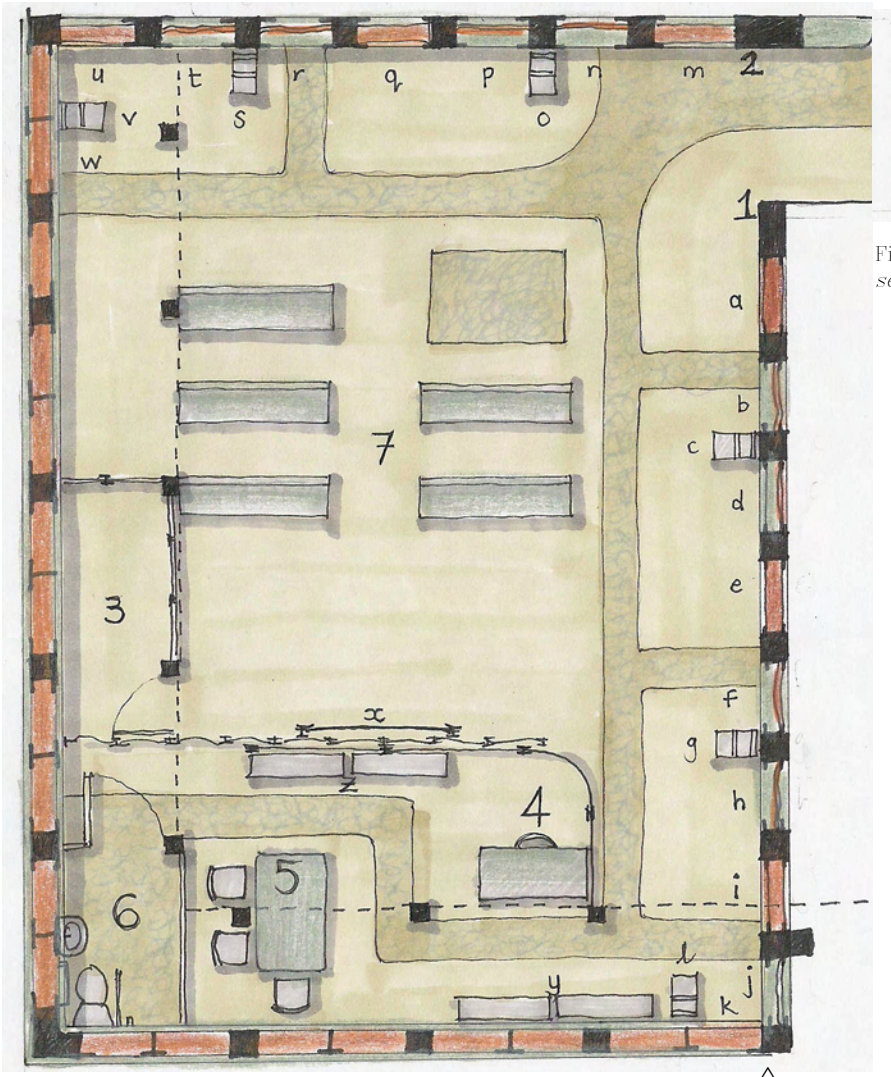


Figure 161. *Experi-path Shade Structure Detail.* Mild steel members support meranti strips onto which canvas is tensioned and stapled (see section 7, drawing C3).

### 6.1.3.2. Discovery Haven

The Discovery Haven forms a hidden climax in the discovery of the site. It is a place where visitors can learn different species and ecological information via different medium. This Haven is comprised of a quiet Reading Zone in a Literature Archive; interactive Information Walls, and a video projection and viewing space (see section 7, drawing D1).



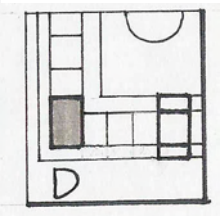




Figure 162. *Plan of the Discovery Haven (see section 7, Plan D).*

a. Information (Habitat 1,2)
b. Braille Information (Habitat 1,2)
c. Interactive Touchscreen (Habitat 1,2)
d. Hidden Viewpoint
e. Information (Habitat 3,4)
f. Braille Information (Habitat 3,4)
g. Interactive Touchscreen (Habitat 3,4)
h. Hidden Viewpoint
i. Information (Habitat 5,6)
j. Hidden Viewpoint
k. Braille Information (Habitat 5,6)
l. Interactive Touchscreen (Habitat 5,6)
m. Information (Habitat 7,8)
n. Braille Information (Habitat 7,8)
o. Interactive Touchscreen (Habitat 7,8)
p. Hidden Viewpoint
q. Information (Habitat 9,10)
r. Braille Information (Habitat 9,10)
s. Interactive Touchscreen (Habitat 9,10)
t. Hidden Viewpoint
u. Information (Habitat 11,12)
v. Interactive Touchscreen (Habitat 11,12)
w. Braille Information (Habitat 11,12
x. Projected Displays
y,z. Literature Archive – Printed literature resources shelves.

1,2. Information Wall.
3. Media Storage
4. Literature resources management.
5. Reading Zone.
6. Ablutions
7. Seating Zone.

*(a) Structure.* The Discovery Haven is on the same level as the Experi-paths. The structural wall system is comprised of concrete columns on a concrete footing that acts as a retaining wall to adjacent enclosures. Steel angle columns are bolted to the concrete and infilled with alternating elements (welded mesh stone-filled baskets, and wire mesh in a steel frame connected between steel angle columns followed by Sickle-bush branches attached horizontally to the steel columns). The use of stone filled baskets links the natural surroundings with the new structure. It also avoids the use of typical solid construction, and instead uses welded mesh. The other infills of wire mesh Sickle-bush branches are for hidden viewing and this allows air passage, but hides the viewer in a the dark Haven (see figure 164, and section 7, drawing D4,5,6).

*(b) Interactive Discovery Walls.* Printed vinyls glued onto metal panels are easy to fix to metal frames and then onto the structural wall system (concrete columns and steel angle columns). They are positioned at angles that facilitate easy reading. Braille panels are provided at lower heights (see figure 163, and section 7, drawing D43,4,5,6).

*(c) Literature archive.* Currently the only archive of books, magazines and journals is at the Frank Brand Administration building. The materials in this small library are inaccessible to the public and special permission is needed to enter. People could aquire more information about animals if literature holdings were spread around the zoo iinstead of at one small library at an administration building, or at the library at a proposed Life Science Discovery Centre. Lightweight partitions defining the Literature Archive include a Sickle-bush Partition, and a welded mesh partition (both with steel frames (see section 7, drawing C6,7)

*(d) Display Projections.* People are drawn to informative sound, and this type of information can be necessary for visually impaired visitors. The space is open to allow visitors to walk in and sit as they please. Visitors can watch educational footage while comparing information panel content, and watching the animals through the wall structures while they are covered ahead. The Frank Brand Hall is used for educational lectures and displays, but more spaces can accommodate lectures and visitor accommodation. Special exhibitions (parrot week, or weeks for the blind) can vary due to the open plan and space adaptability of the Discovery Haven.

*(e) Interactive Touchscreens.* These tools are necessary to stimulate young minds in the current age of technology. This type of information can enhance learning with playing.

*(f) Office.* The management offices are a great distance from the habitats. An office at this Precinct can store important written material (books, records, schedules) needed by curators.

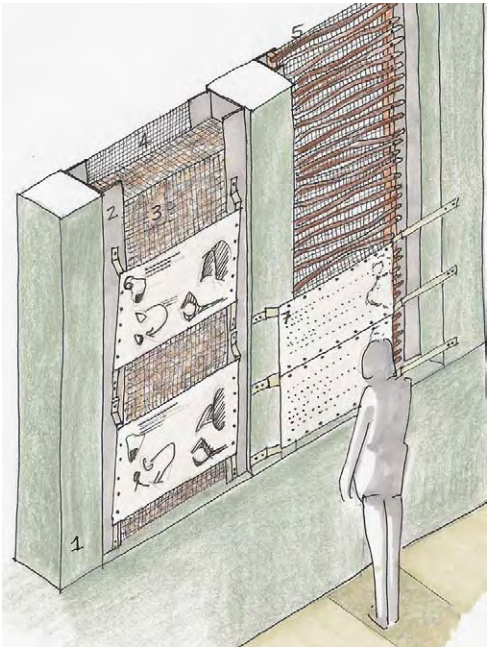



Figure 163. Structured Wall Systems. Welded mesh stone-filled baskets are fixed to steel columns and concrete columns (see section 7, drawings A1 and 2).

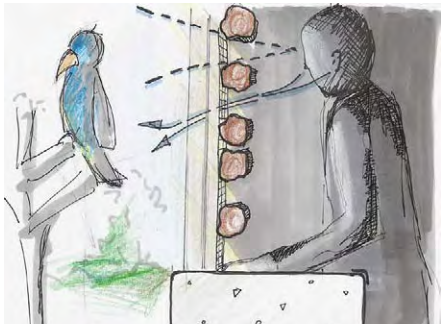


Figure 164. Hidden Viewpoints, Discovery Haven. Sickle-bush and welded mesh backing are positioned to provide sensory experiences for visitors.

*(g) Services.* Direct spotlighting is needed for the information panels, but the Discovery Haven should be kept as dark as possible (for projections to be clear, and for the animals not to view the hidden visitors). One ablution facility is provided, inconjunction with the New Proposed ablutions in the Precinct

### 6.1.3.3. Service Areas

Water points will be provided for picnic use. There is a proposal for a New Ablution block in the Precinct.

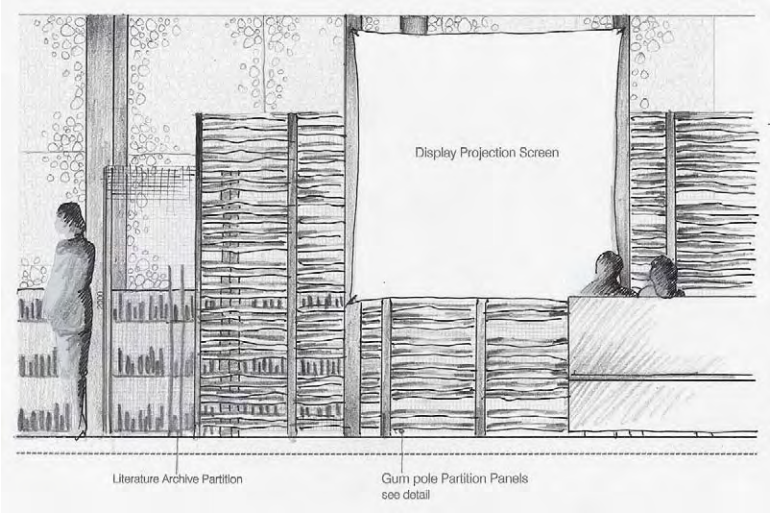



Figure 165. *Discovery Haven Partitions.* Gum–pole and welded mesh partitions claim the Literature Archive (see section 7, drawings D1, 2, 7 and 8)

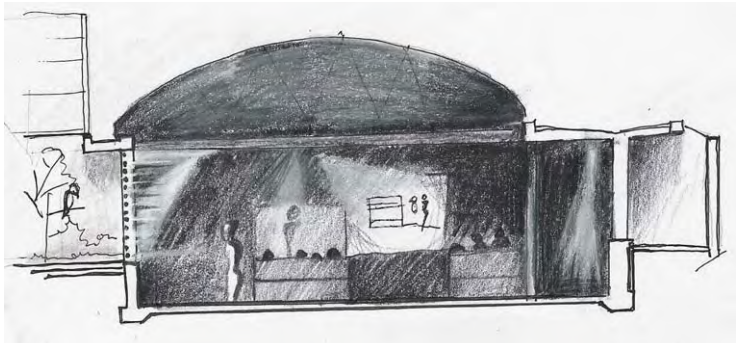


Figure 166. *Lighting,* Discovery Haven.

### 6.1.3.4. Summary of Accommodation Provided

Table 3. *New Management and Visitor Accommodation*

| | Circulate | Eat | Rest | Ablution (less than 50m) | Protection | Learn | View | Play | Work – record /monitor | Work – cleaning / prepara–tion | Storage |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Management | √ | - | √ | √ | √ | √ | √ | - | √ | √ | √ |
| Visitors | √ | √ | √ | √ | √ | √ | √ | √ | - | - | - |

Figure 167. *Discovery Haven, Perspective drawing.*

## 6.2. LEGAL ASPECTS

This project must be seen as a capital expenditure project, all contractual aspects of this Parrot Animan Precinct design will be delt with as per existing municipal regulations and procurement policies. The possibility exists for Public Private Partnership or sponsorship. The introduction of a direct procurement for this project will be undertaken on the basis of a public tender in order to demonstrate not only the value of such a project but transparency throughout. All current expenditure i.e. the day to day running of the enclosure can be amortized against: events; educational tours; entrance fee at the Precinct; demonstrations; interactive tours; educational courses; hiring of an open-air events space.

The real return of investment will be twofold, firstly in terms of the added value and enhancements to the overall appearance of the zoo, and secondly from the added visitor and public interests from this Precinct. In real revenue terms, it would be expected that this Precinct will be profitable as a section of the zoo within a period of 10 years, and this is based on visitors, purchases, and added attraction as against initial purchase and maintenance for the given period. Replacement and facelifts for this enclosure are envisaged after year 5 to 15. The aim is to provide a financially viable project with a minimum life-span of 20 years. The project is both scalable and financially viable.

The Civil and horticultural department of the Zoo (headed by Mr. D. Moodley) will develop and manage the construction.

## 6.3. ECONOMIC ISSUES

The new development will use local skills and materials. Simple lightweight shading structures are labour intensive for unskilled laborers. Welded mesh, concrete, stone-filled baskets, diamond mesh are low maintenance materials. Stones for the welded mesh baskets can be collected on site.

## 6.4. ADAPTABILITY AND FLEXIBILITY

The open-plan nature of the Discovery Haven can allow the space to be hired out for different functions. This will help sustain the project. The flexibility of the wall systems, (Service Passage and Discovery Haven) allow for future changes. Experi-path and Discovery Haven Shade Structures are lightweight and can be easily dismantled. The Protected Habitats steel frame can also be easily dismantled. The Stones occur in abundance at the Zoo, and require no manufacturing.

## 6.5. VENTILATION AND LIGHT

In the Discovery haven the use of welded mesh panels in the wall system allow light and air passage. Light is kept to a minimum to keep the space dark for hidden viewing and display projection viewing. The Service Passage roof aperture allows light and air penetration. The Experi-path Shade Structure is of a shape to maximize views and protect visitors. The Protected Habitats roof overhang and shade structure shade and protect breeding and feeding zones.

## 6.6. ACCOMMODATION SCHEDULES

Table 4. *Protected Habitat Accommodation Schedule*

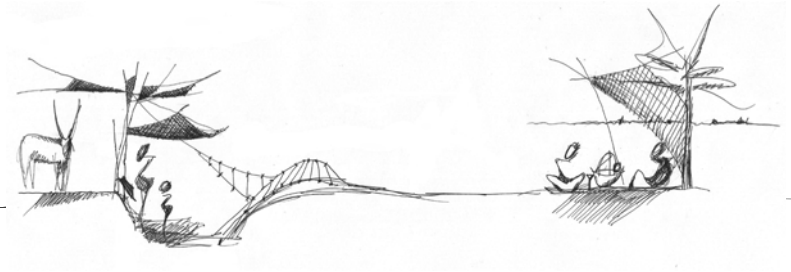
| No. | Space name | Activity and use spaces | Max Birds | New Size | Original Size | Equipment | Services | Finishes |
|---|---|---|---|---|---|---|---|---|
| 1 | Protected Parrot Habitat | | | | | | | |
| | | | Two | 236m³ | 160m³ | | | |
| | | Flying | | | | | | Unexposed mesh |
| | | Feeding | | Perch trees | Table - 0.32m² | Feeding tray | Clean water and food | Metal tray with bent edges |
| | | | | Feeding Tray -0.5 m² | Bowl - 30mmØ | Shading structure | Water for cleaning trays | |
| | | | | | | Perch trees | | |
| | | Nesting/ breeding | | 0.15m³ | 0.15m³ | Breeding Box | | |
| | | | | | | Perch sticks | | |
| | | Resting | | New Perch trees and perch structure | | Perch structure | | Hard Sickle-bush branches, treated |
| | | | | | 0.2m² | Perch trees (dead existing, and new) | | |
| | | Cleansing | | 600mmx230mm Bath | - | Concrete bath | Clean water for grooming | Sealed for easy maintenance |
| | | Protection (weather) | | Concrete roof - 27.5m³ | Concrete roof - 31.7m³ | Protective mesh structure | Concrete floor and top soil cleaning | Sickle-bush sticks on structure to be treated. |
| | | | | Shade structure – 1.3m³ | | Shading structure | | Metal panel with bent edges to protect food from weather and contamination |
| | | | | | | Concrete roof | | |
| | | | | | | Vegetation visual barrier | | |

Table 5. *Management Accommodation Schedule.*

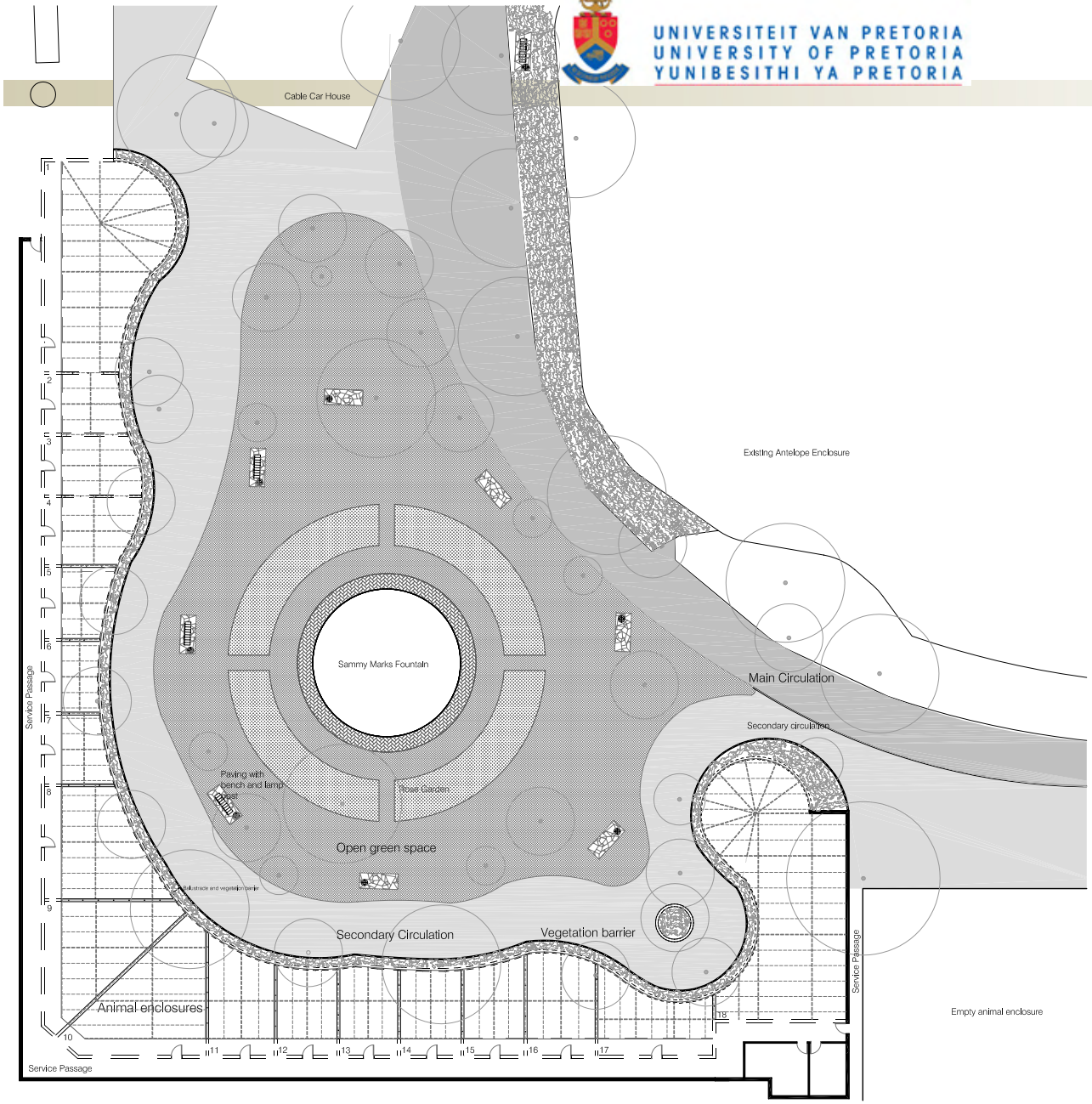
| No. | Space name | Sub-spaces | Max People | New Size | Original Size | Equipment | Services | Illumination | Finishes |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Management Spaces | | | | | | | | |
| | | Service Passage | 5 | 305 $m^2$ | 271 $m^2$ | Perch stick storage br | Water supply and storage | Flourescent lighting system | Concrete and welded mesh materials |
| | | Preparation & Monitoring Zone | 2 | 6 of 4 $m^2$ | - | Perch stick storage brackets; storage cabinet; multi-use unit; data storage | Water supply and storage | Flourescent l.s. | Concrete, and welded mesh materials |
| | | Breeding and Conservation Office | | 8.1 $m^2$ | - | Storage, furniture, data storage | Electricity points and illumintaion | Flourescent l.s. | - |
| | | Training and Meeting Office | | 15.6 $m^2$ | - | Storage, furniture, educational equipment | Electricity points and illumintaion | Flourescent l.s. | - |
| | | Main Parrot Food Preparation Zone | | 5 $m^2$ | 3 of 1 $m^2$ | Storage, WB | | Flourescent l.s. | - |
| | | Main Parrot Feeding Schedule Zone | | 7.5 $m^2$ | - | Schedule board | | Flourescent l.s. | - |

Table 6. *Visitor Accommodation Schedule.*

| No. | Space name | Sub-spaces | Occupancy Class | Max People | New Size | Original Size | Equipment | Services | Finishes |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Visitor Spaces | | | | | | | | |
| | | Experi-path | A5 | 2pp/3m² | 2512m width | - | Steps, seats, signage panels | | Concrete and welded mesh; canvas for roof |
| | | Discovery Haven | C1 | 50-60 | 118.6m² | - | Signage, furniture | Information, ablution | Concrete, sickle-bush |
| | | | | | | | | | Welded mesh |
| | | | | | | | | | Canvas for roof |
| | | 1. Media Storage | J3 | 3 | 33m² | - | Shelves, cupboards | | |
| | | 2. Literature Archive | J2 | 5 | 1908m² | - | Book shelves | | Welded mesh and sickle-bush materials |
| | | 3. Reading Zone | J2 | 4 | 6.25m² | - | Tables, chairs | | |
| | | 4. Ablution | | 1 | 3.6m² | - | WC, WB, handrails | Water supply | |
| | | 5. Display Projection . and Seating Zone | C1 | 30 | 33m² | - | Display screen, seating | | Guiding textured floor pattern |
| | | | | | | | | | |
| | | | | | | | | | |

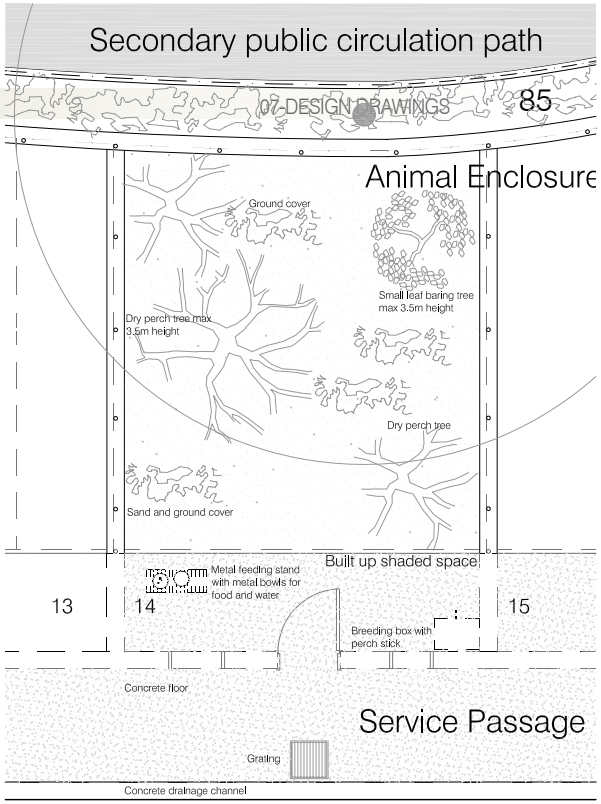


# DESIGN DRAWINGS




## Existing Parrot Enclosure

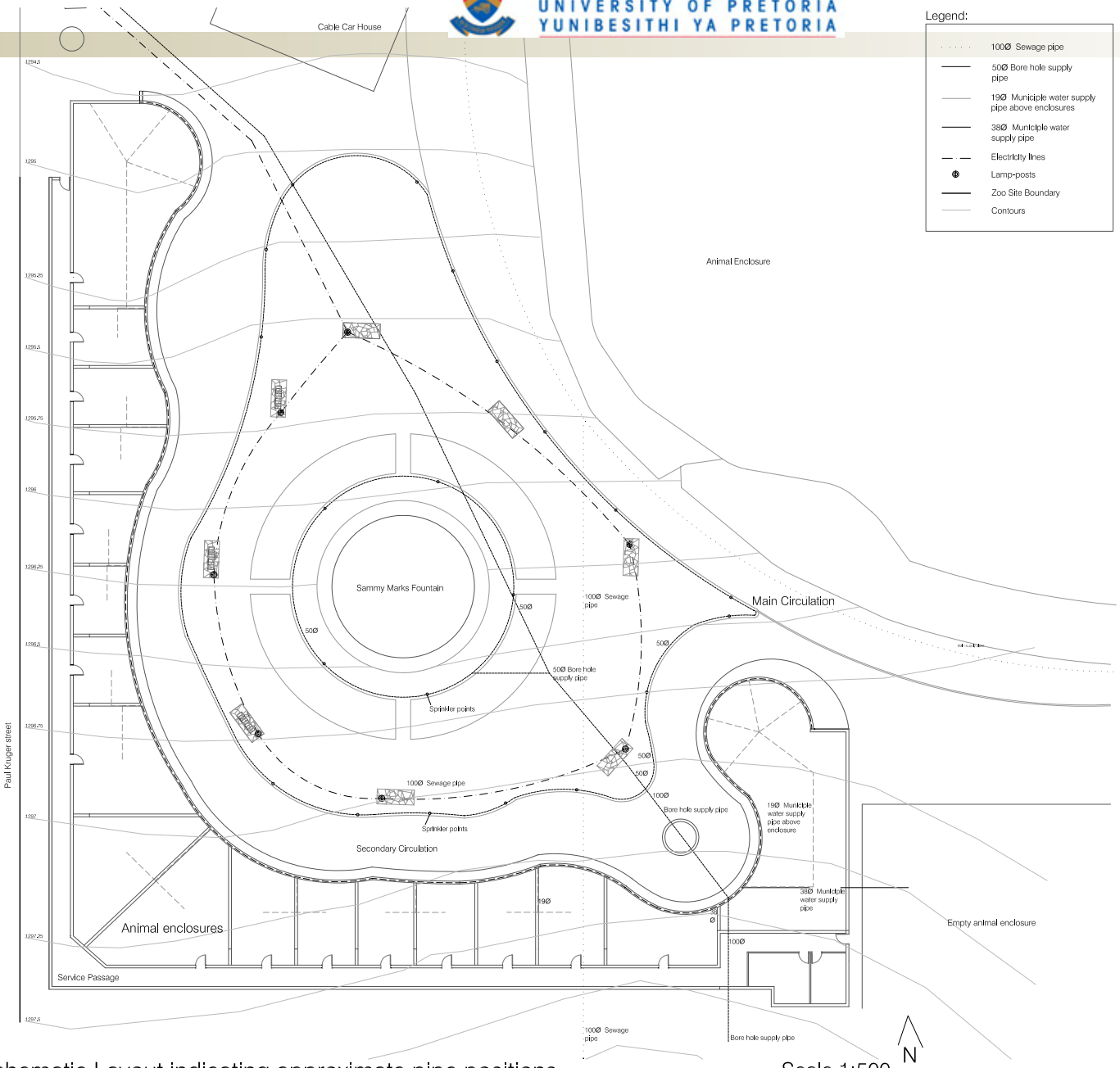
Site Plan Scale 1:500




## Existing Little Corella Enclosure

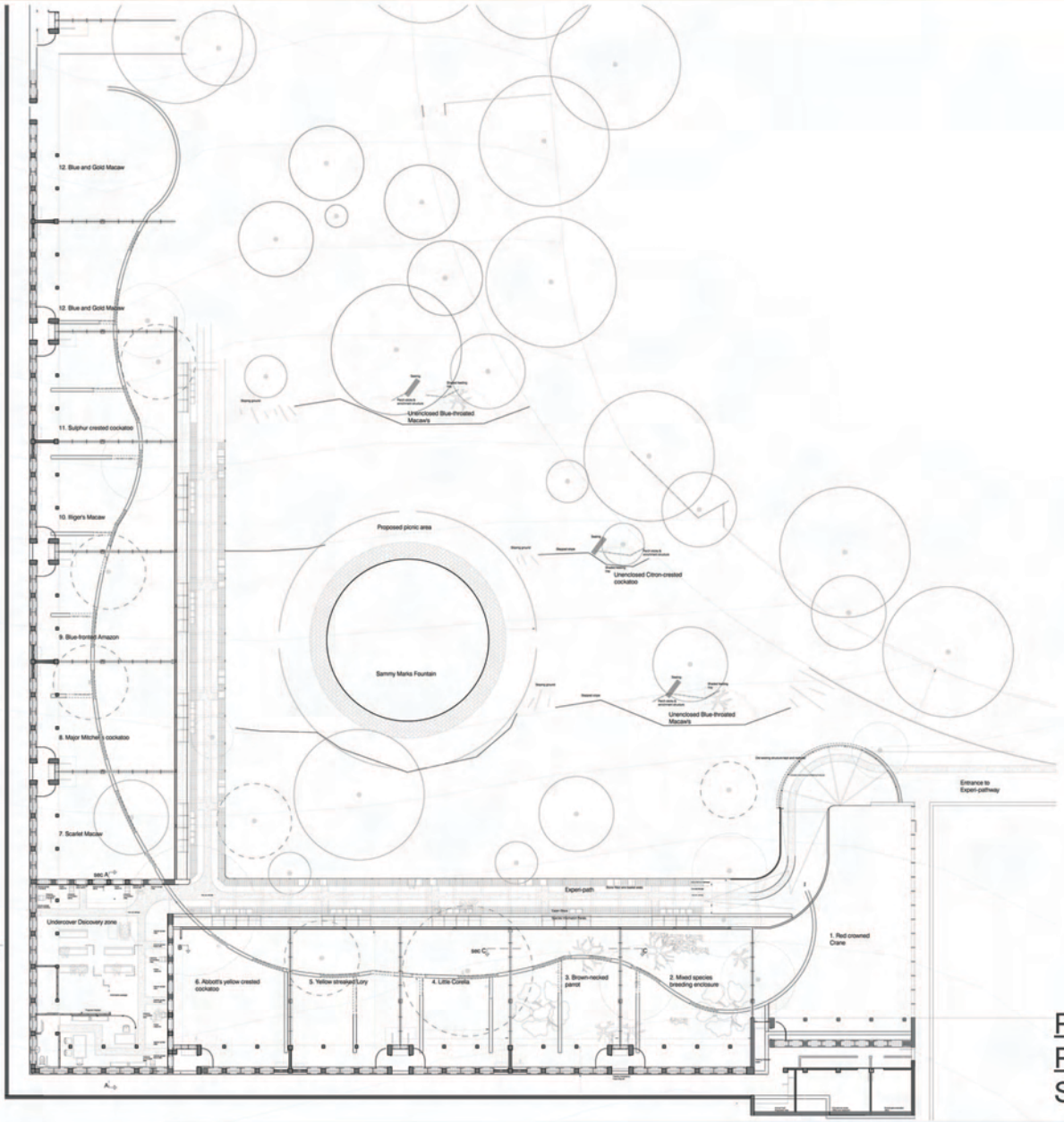
Site Plan Scale 1:100

- Walls to be deomlished
- Overhead enclosure structure to be demolished
- Shrubs and ground cover
1. Waldrapp Ibis enclosure
2. Illiger's Macaw enclosure
3. Yellow-headed Conure enclosure
4. Pantagamon Conure enclosure
5. Blue-fronted Amazon enclosure
6. Major Mitchell's Cockatoo enclosure
7. Scarlet Macaw enclosure
8. Cape Eagle Owl enclosure
9. Southern-ground Hornbill enclosure
10. Empty enclosure
11. Helmeted Guineafowl enclosure
12. Abbott's yellow-crested Cockatoo
13. Yellow-streaked Lory enclosure
14. Little Corella Enclosure
15. Empty enclosure
16. Brown-necked Parrot enclosure
17. Empty enclosure
18. Red-crowned Crane enclosure

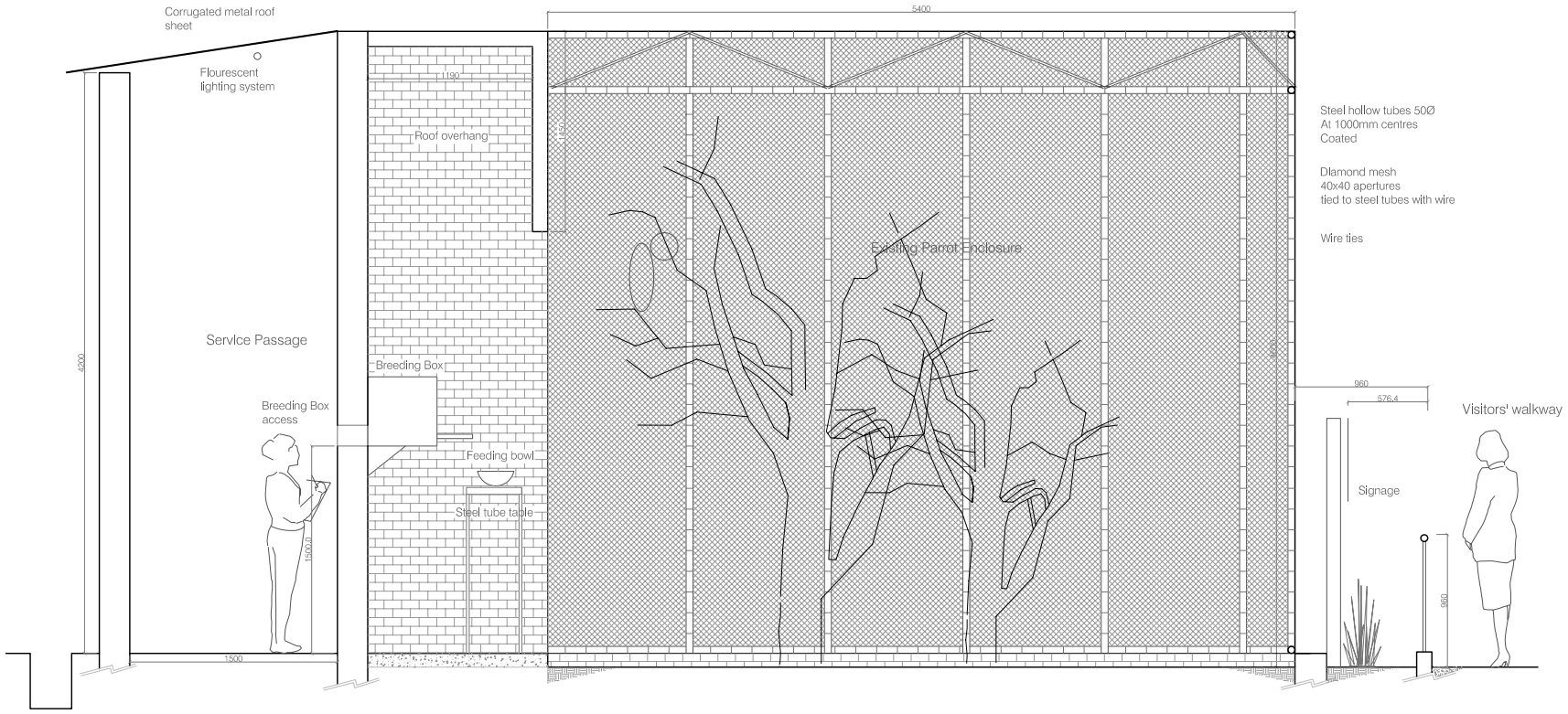



Schematic Layout indicating approximate pipe positions

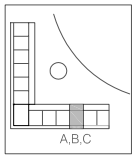
Scale 1:500

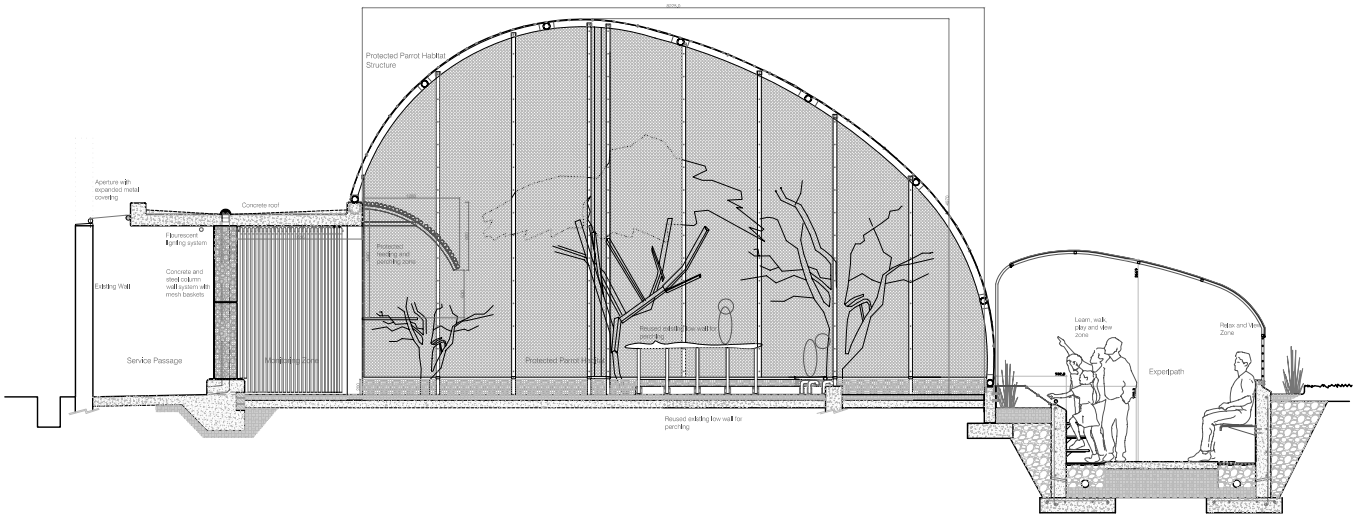



Plan - New Parrot Animan Precinct
Scale 1:500

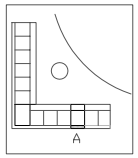


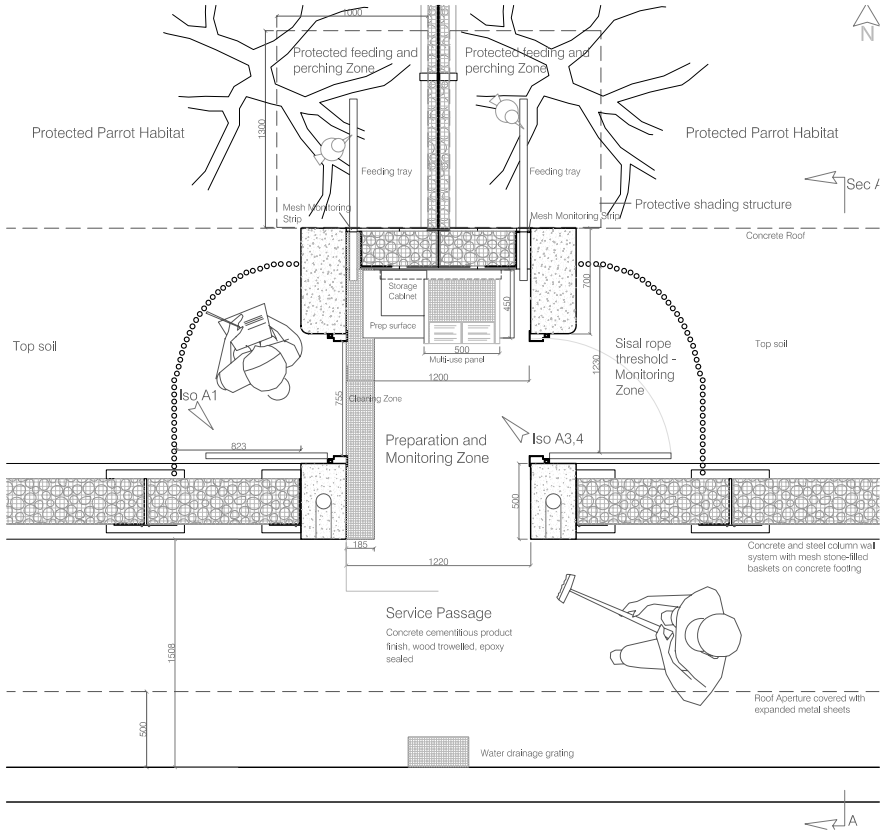

Section Existing Parrot Breeding Habitat
Scale 1:50



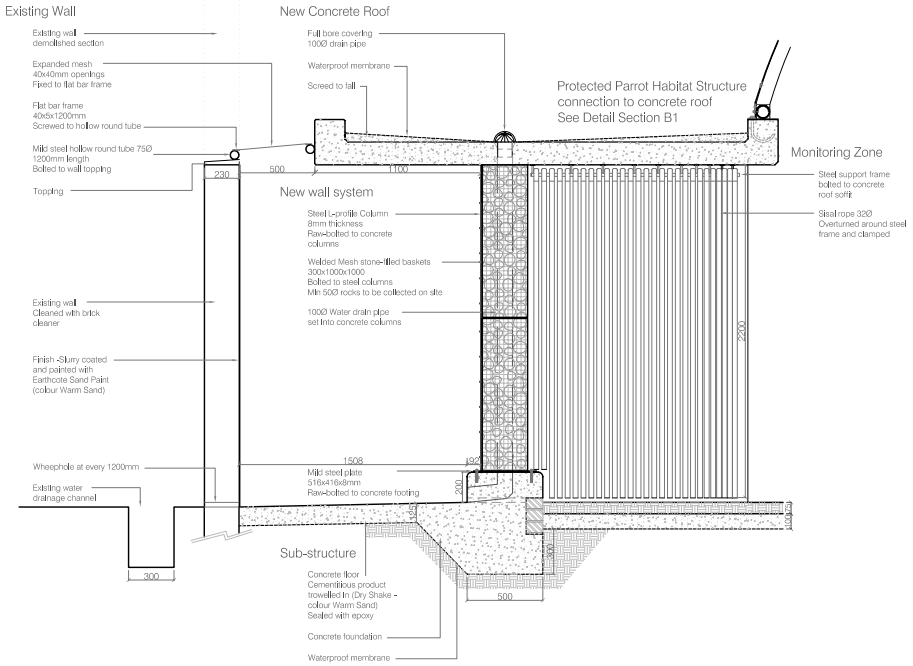




Section ABC - Service Passage, Parrot Habitat, and Experi-path
Scale 1:100

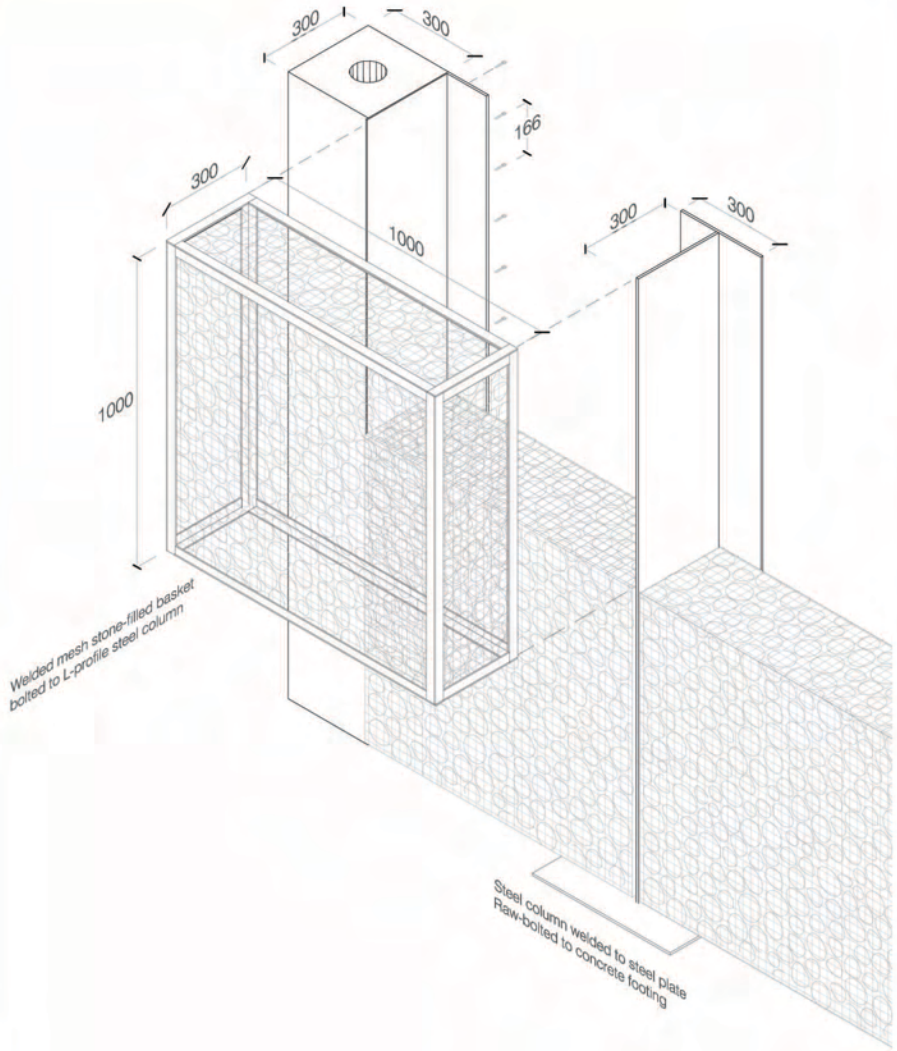


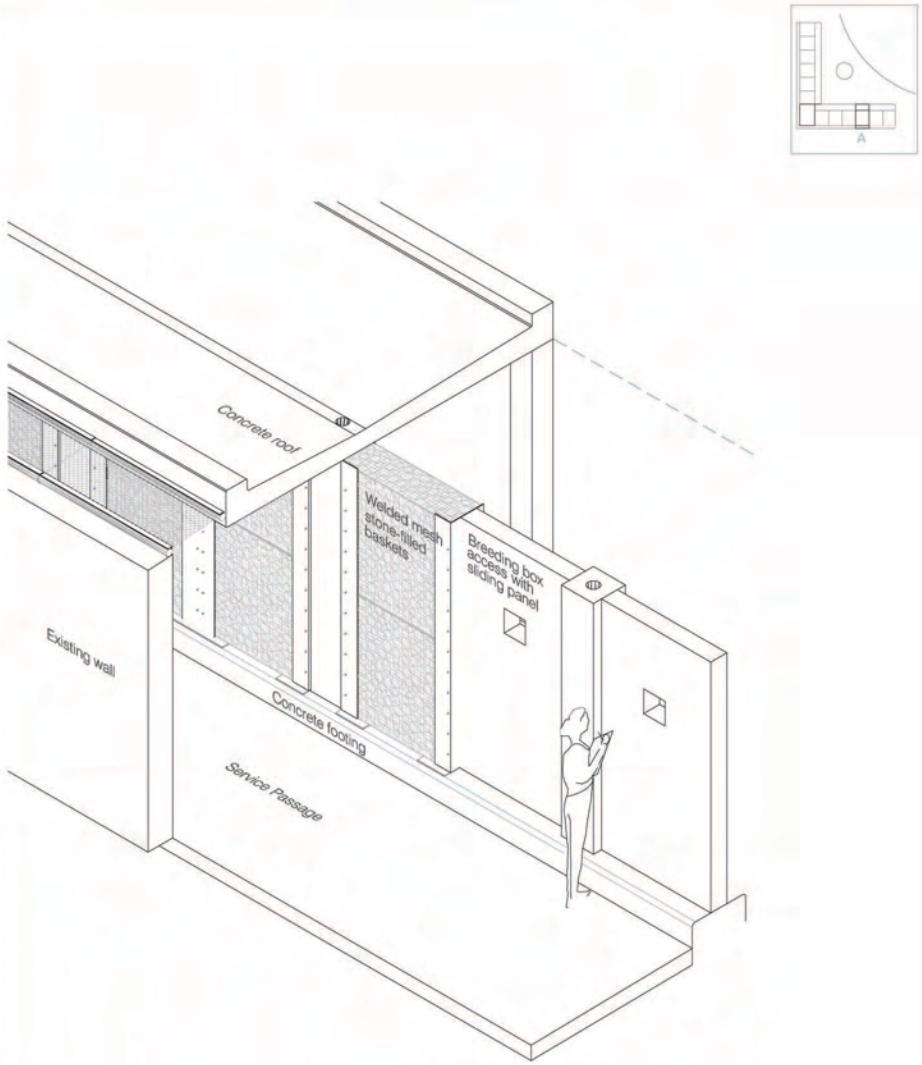

Plan Service Passage, Preparation, Recording, Cleaning, Monitoring, Zone
Scale 1:100



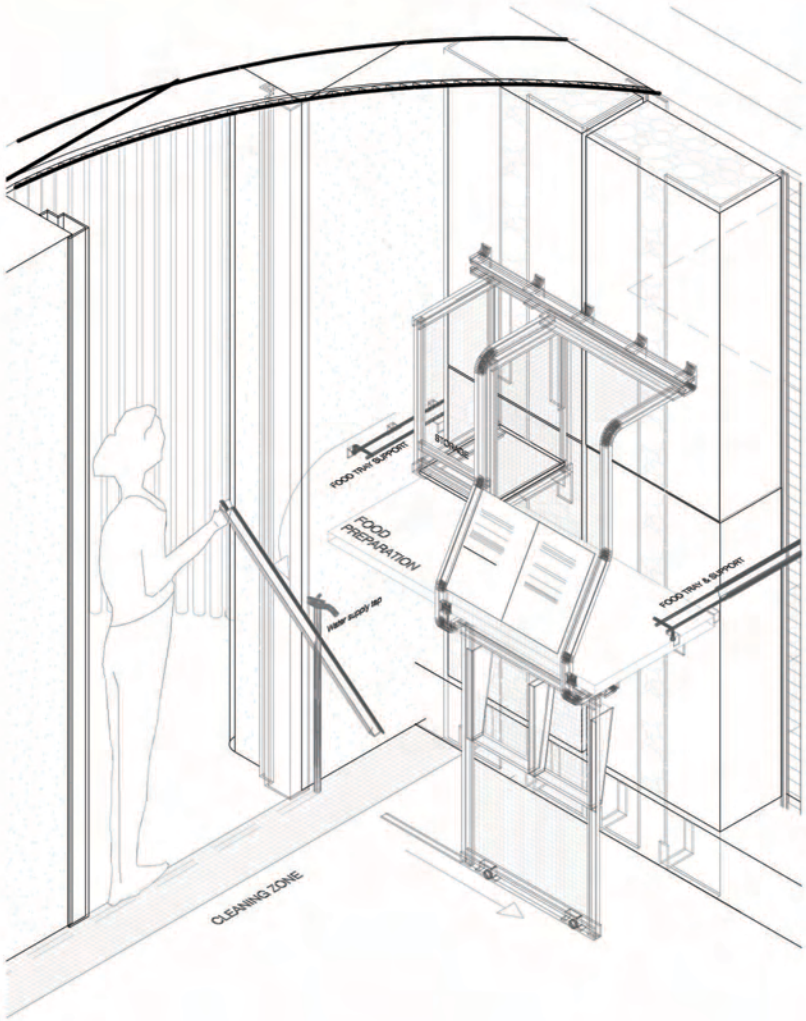

Section A
Scale 1:100



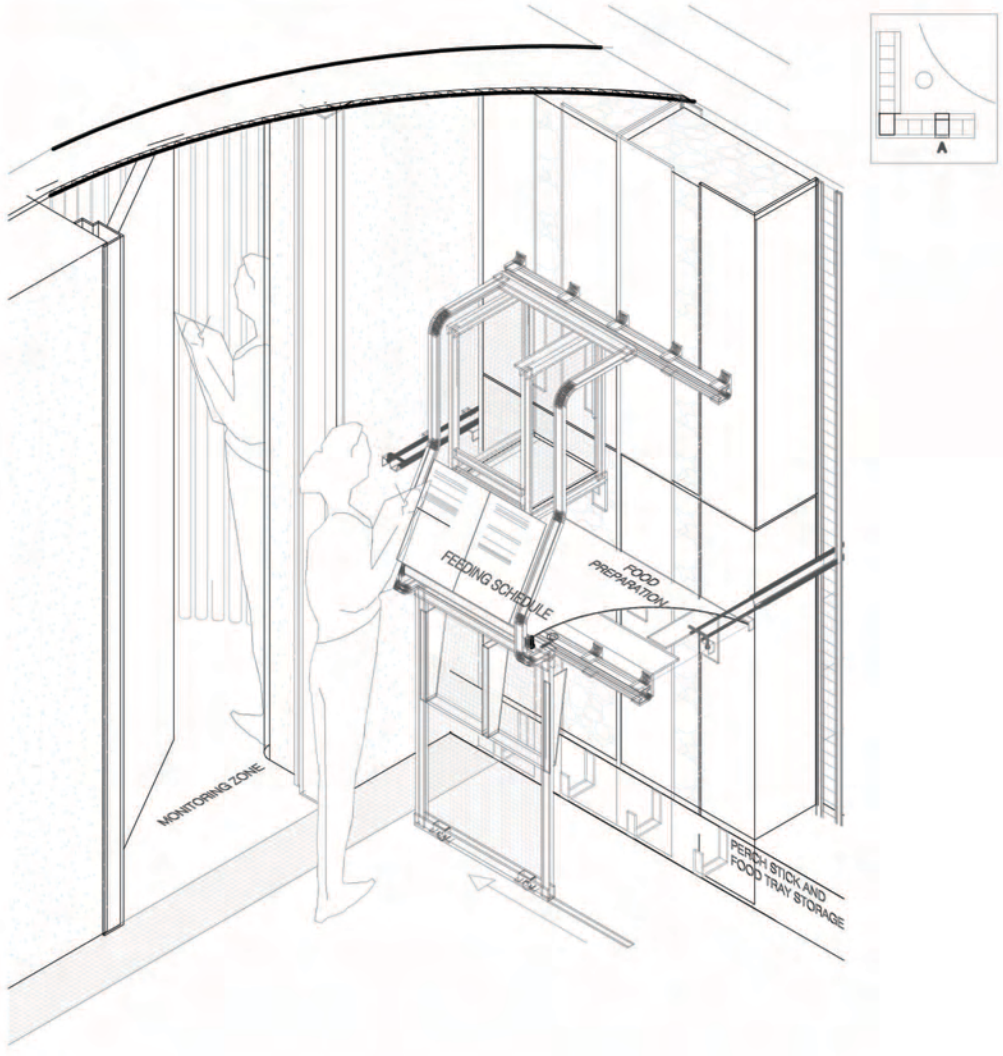

Isometric Detail A1 - Structural Wall system
Scale 1:20



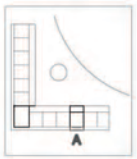

Isometric A2 - Structural Wall system
Scale 1:50

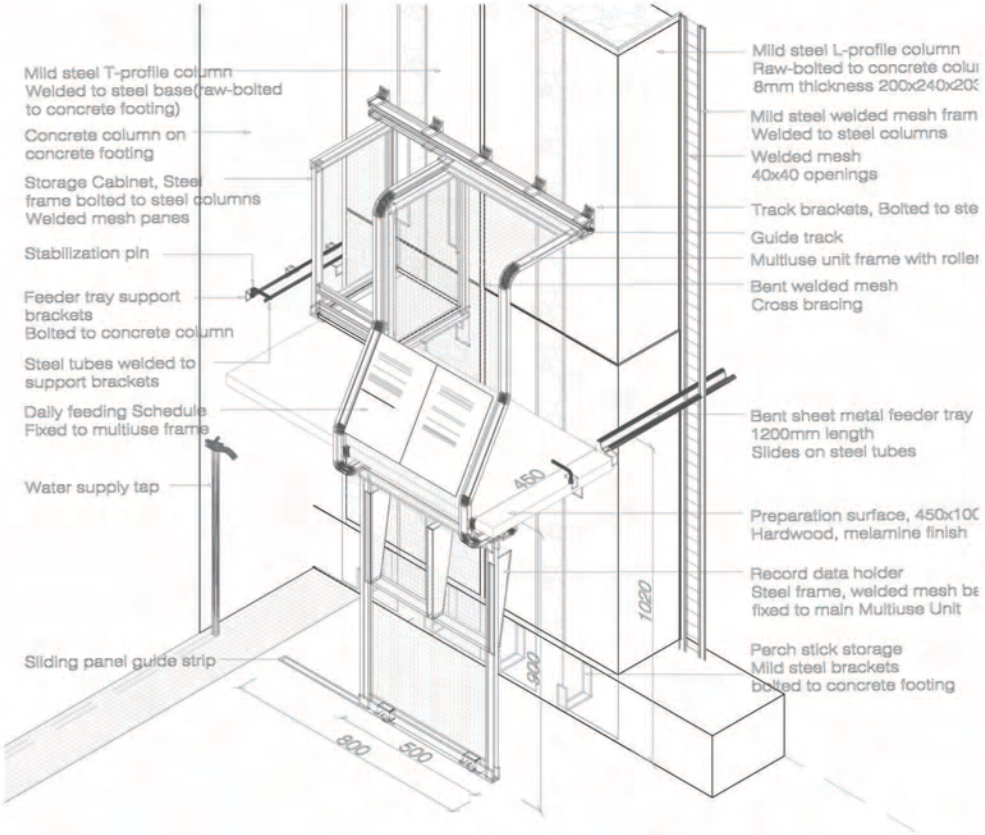



Isometric A3 Preparation, Cleaning Zone
Scale 1:20



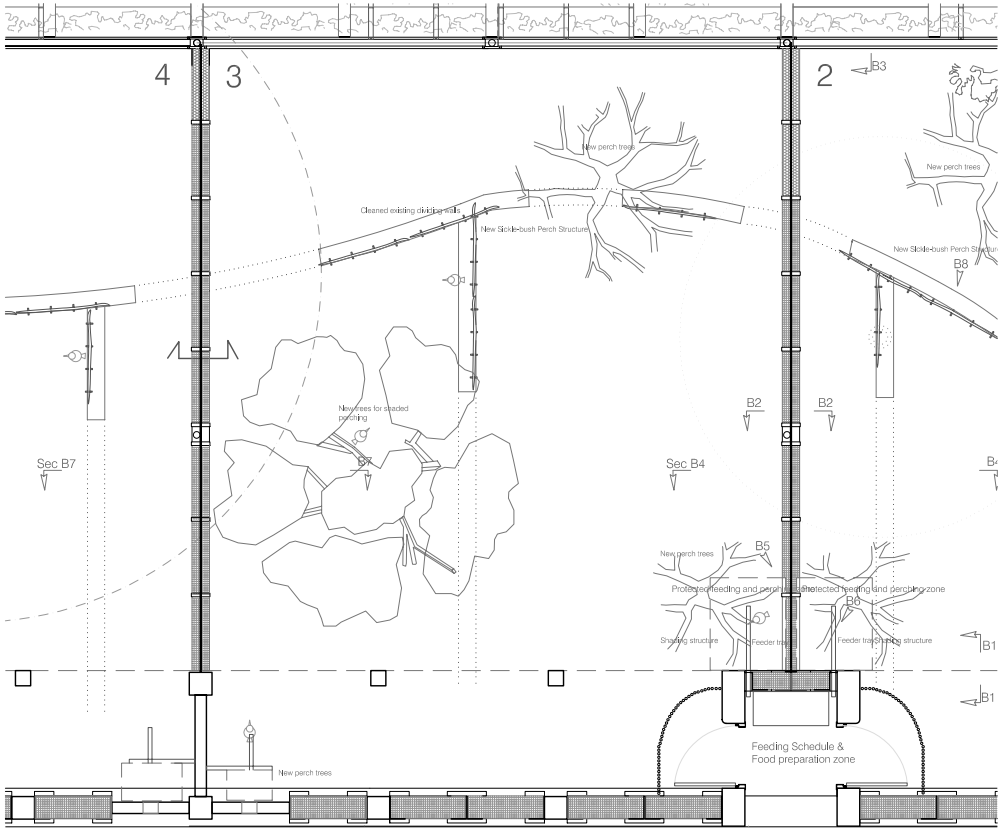

Isometric A4 Monitoring, Recording Zone
Scale 1:20

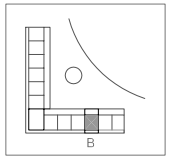



Isometric Detail A5 - Preparation, Recording, Cleaning, Monitoring Zone

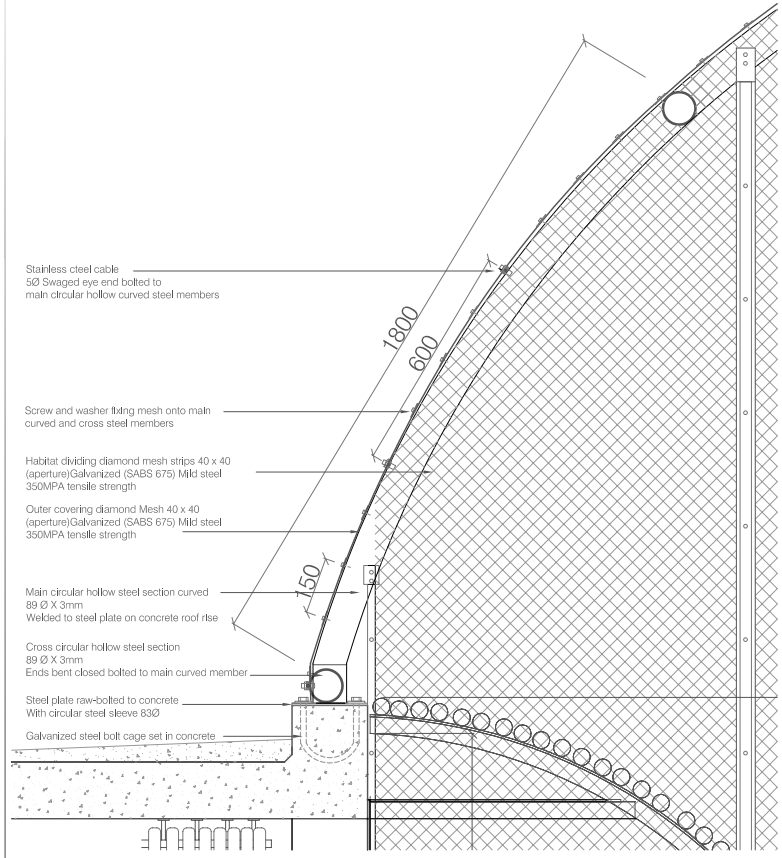
Scale 1:20



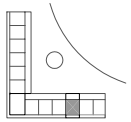



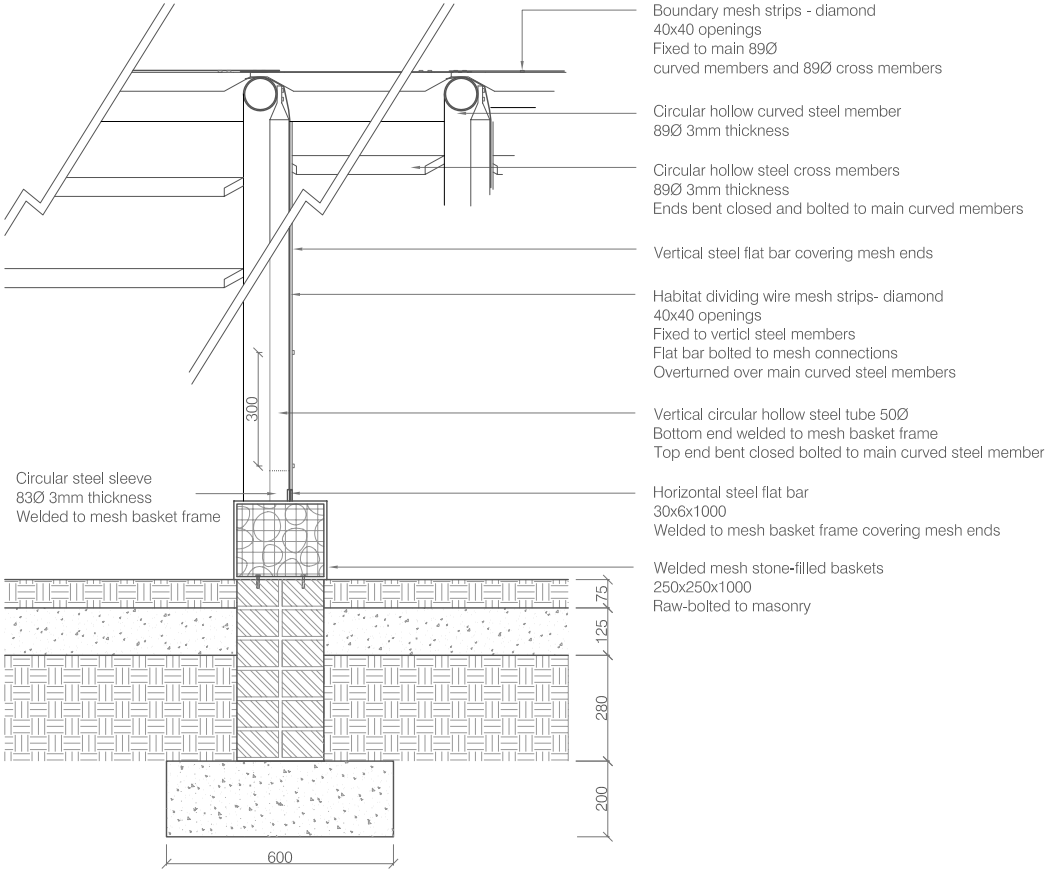

2 Mixed species habitat
3 Brown-necked parrot habitat
4 Little Corella habitat
Walls to be demolished
Walls to be restored
Trees to be demolished
Trees to be preened
New Trees (wide canopy)
New perch trees
New ground cover

Plan - New Protected Brown-necked Parrot Habitat
Scale 1:50

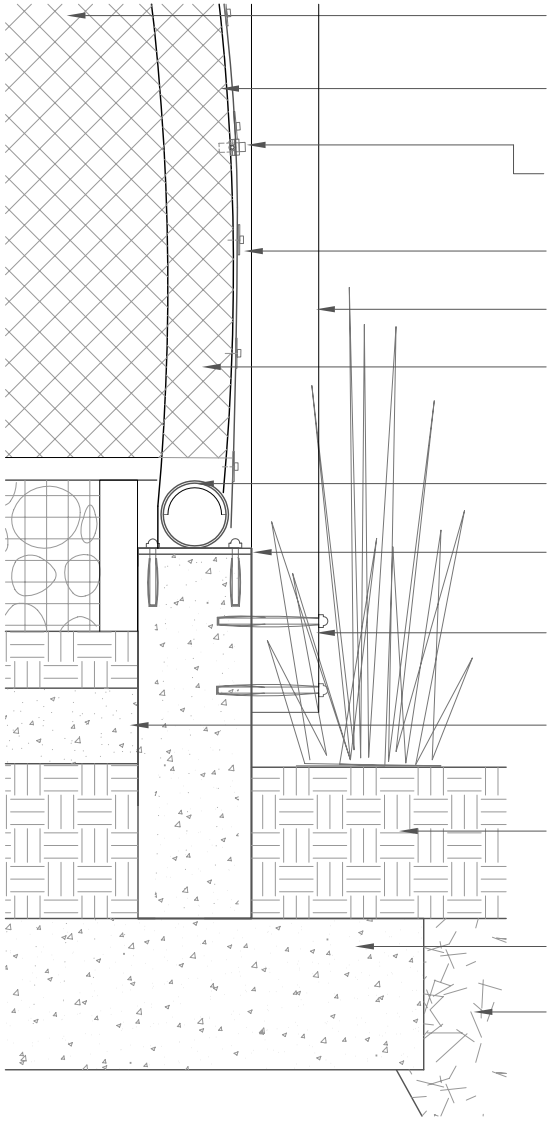



Detail Section B1 - Protected Habitat Structure and Service Passage roof connection
Scale 1:20




Isometric B2 - Structural Wall system
Scale 1:50



Habitat dividing diamond mesh strips 40 x 40 (aperture)Galvanized (SABS 675) Mild steel 350MPA tensile strength

Outer covering diamond Mesh 40 x 40 (aperture)Galvanized (SABS 675) Mild steel 350MPA tensile strength

Stainless cteel cable 5Ø Swaged eye end bolted to main circular hollow curved steel members

Screw and washer fixing mesh onto main curved and cross steel members

Experi-path Shading Structure

Main circular hollow steel section curved 89 Ø X 3mm Welded to steel plate on concrete roof rise

Cross circular hollow steel section 89 Ø X 3mm Ends bent closed bolted to main curved member

Steel plate raw-bolted to concrete With circular steel sleeve 83Ø

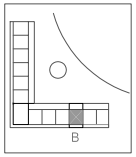
Experipath Shading Structure connection to concrete

Rodent protection concrete floor

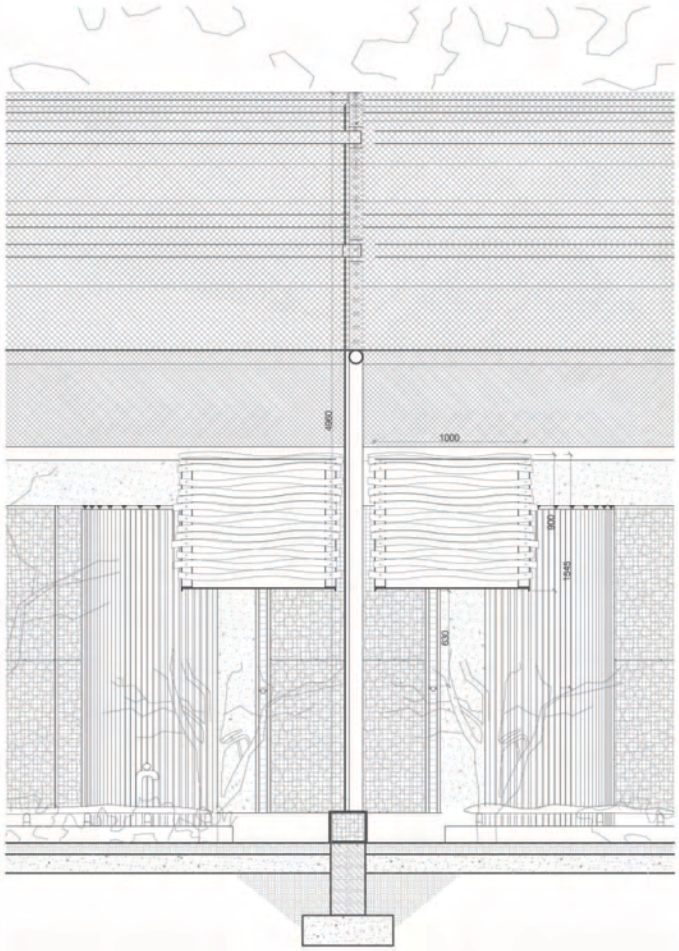
Top soil and ground cover

Concrete foundation

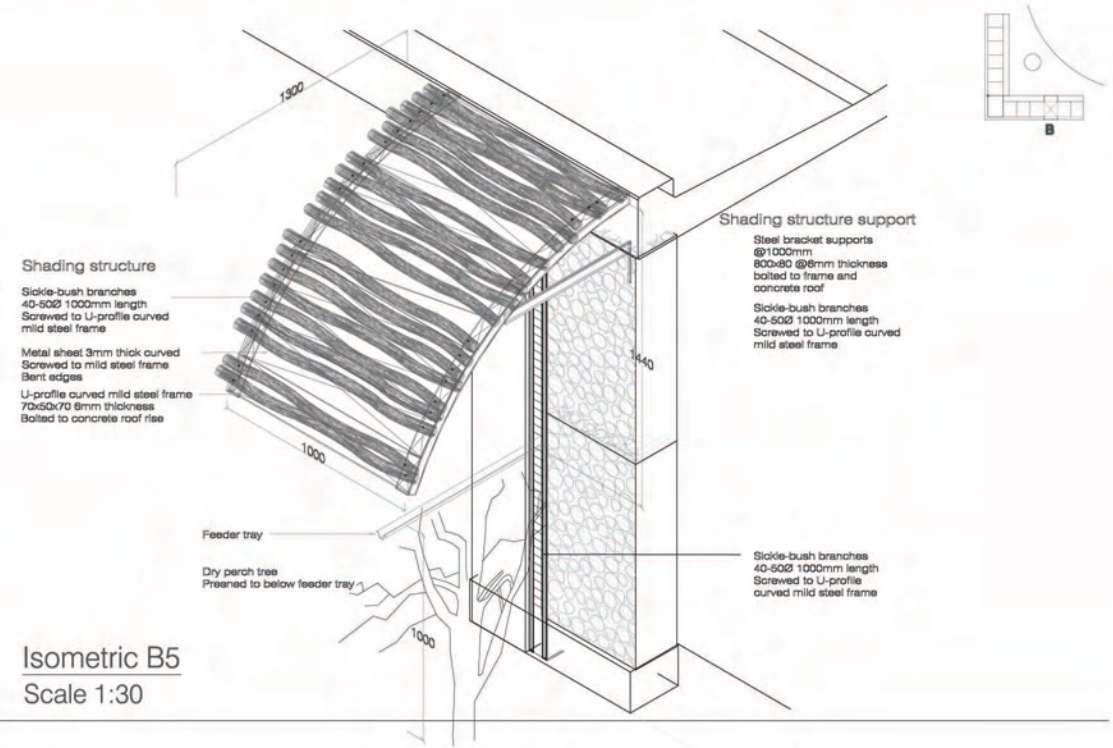
Gravel



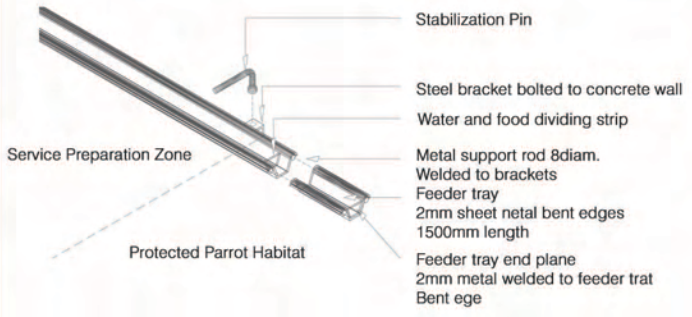

Isometric B3 - Parrot Habitat Structure and wall connection
Scale 1:50



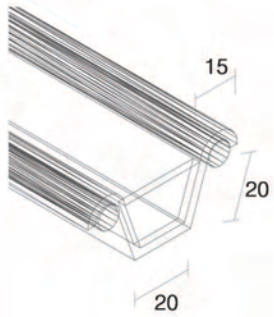

## Sectional Elevation B4 Feeding and Perching Zone
Scale 1:50



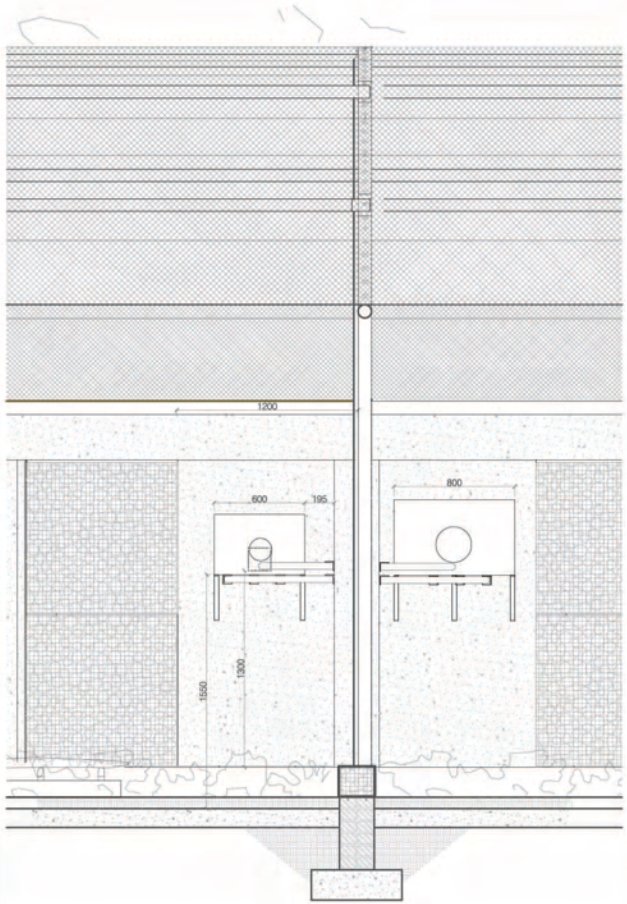

## Isometric B5
Scale 1:30



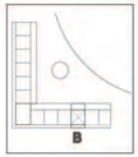

## Isometric Detail B6 Feeding Tray
Scale 1:10

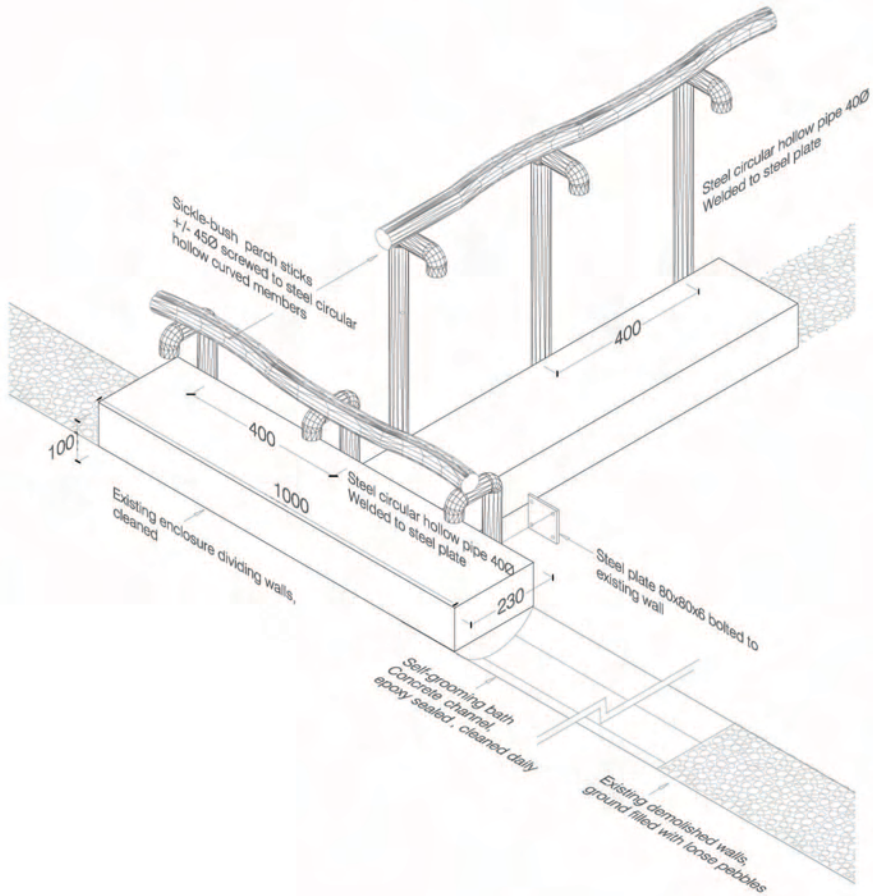



## Isometric Detail B6 Feeding Tray
Scale 1:2

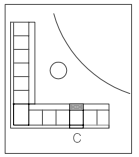


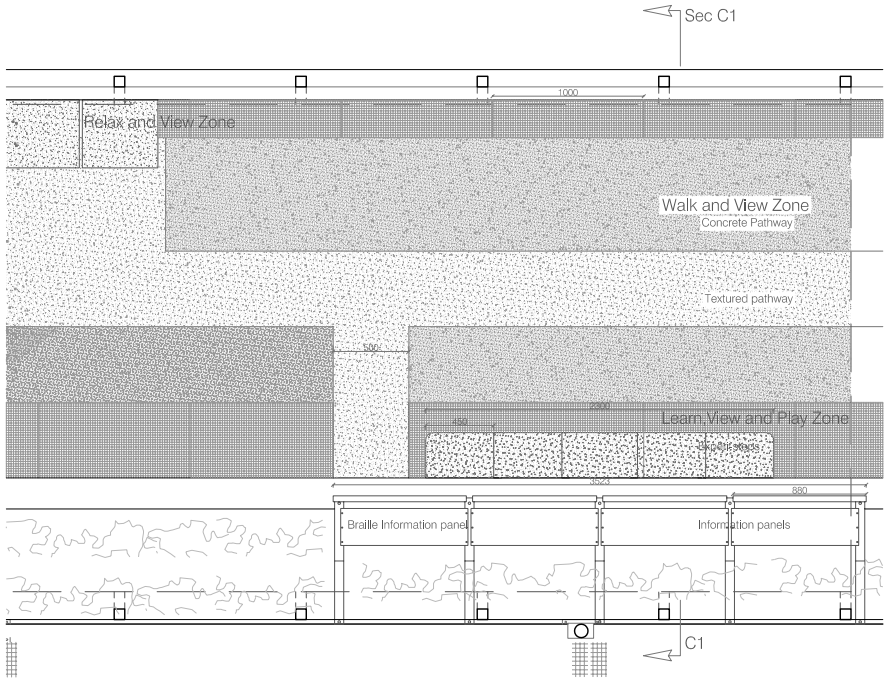

Sectional Elevation B7 - Breeding and Resting
Scale 1:50



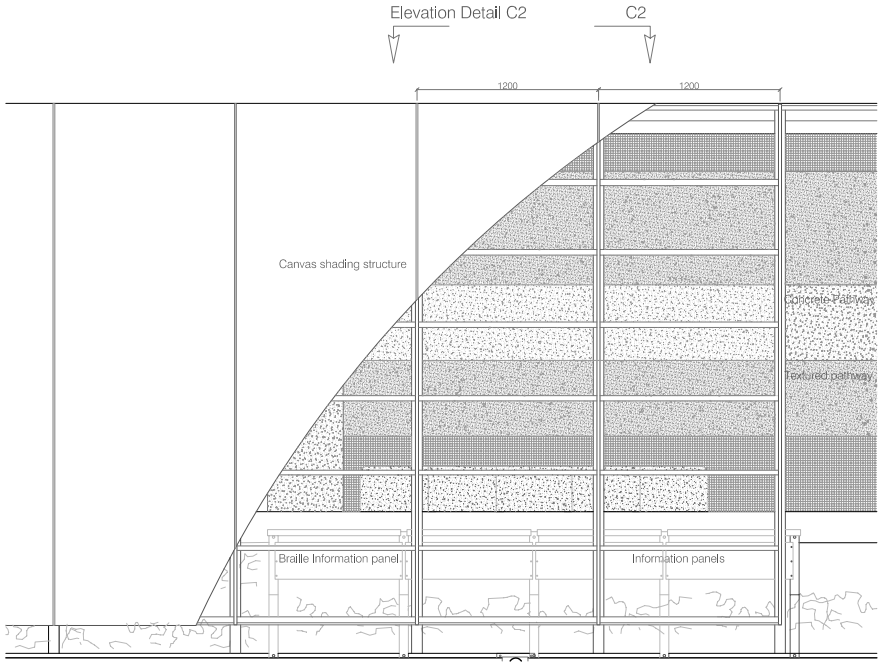




Isometric Detail B8 - Perching Structure
Scale 1:15

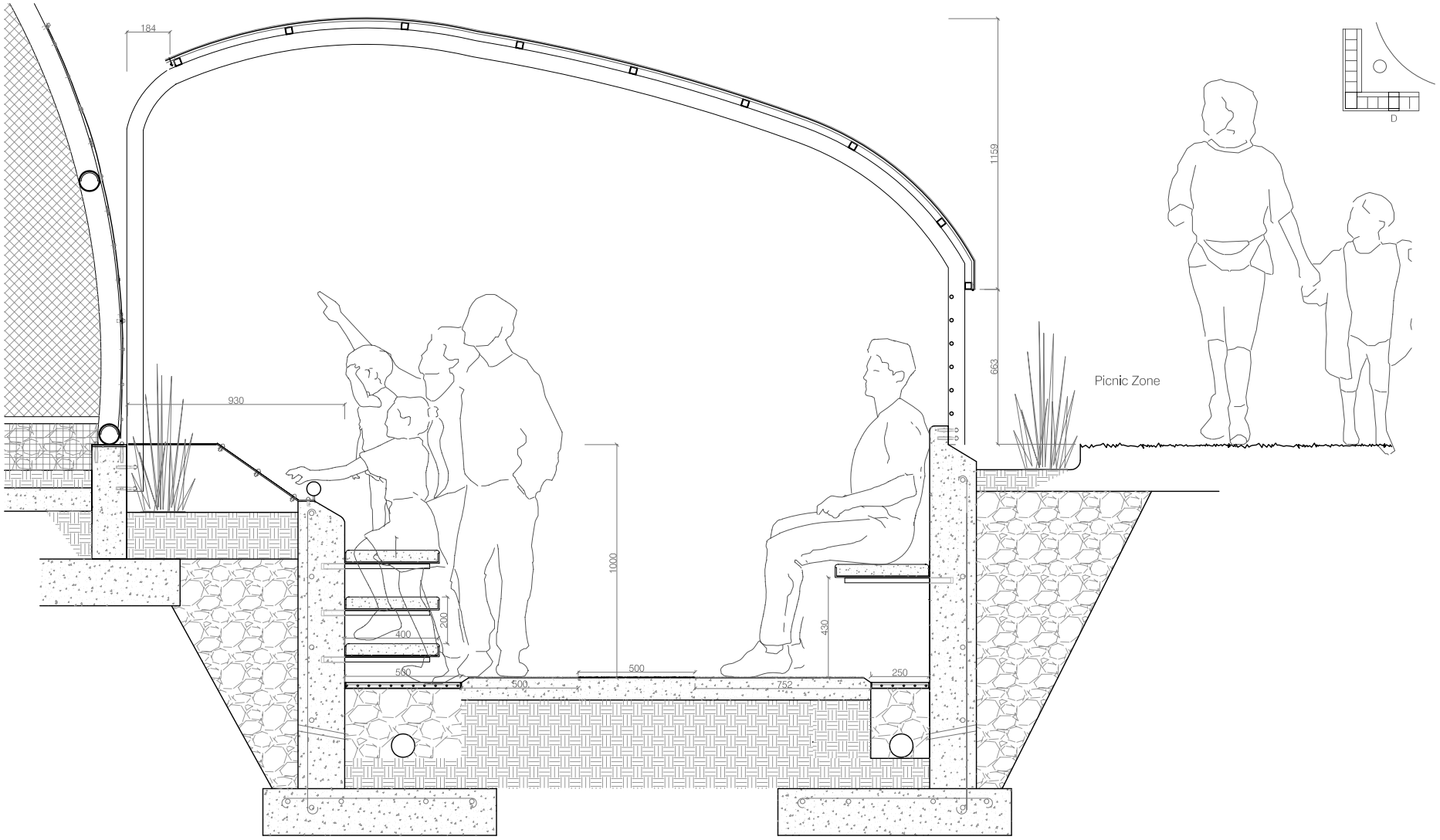


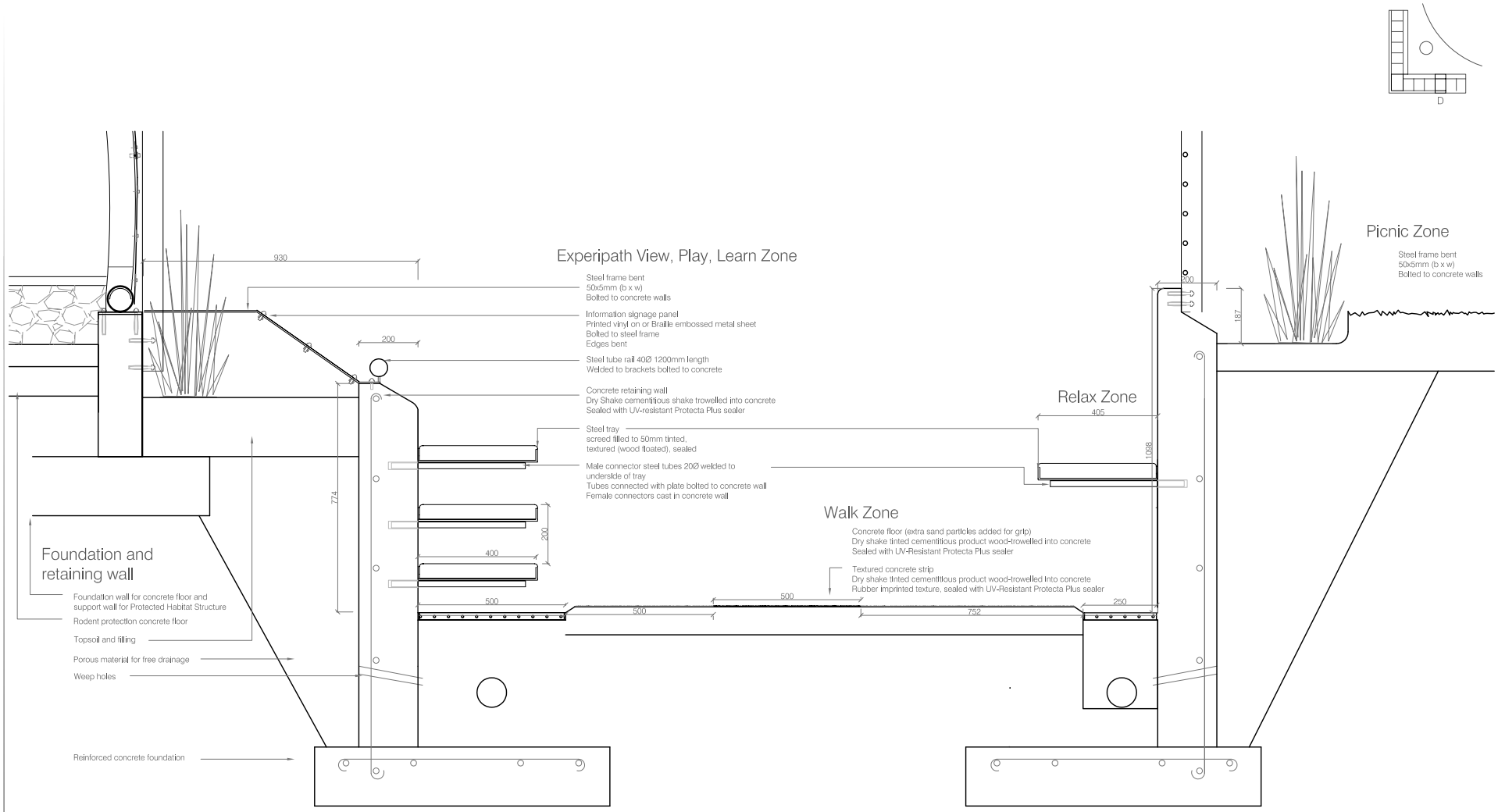

Plan C1 Experi-path
Scale 1:50




Plan C2 Experi-path Shade Structure
Scale 1:50

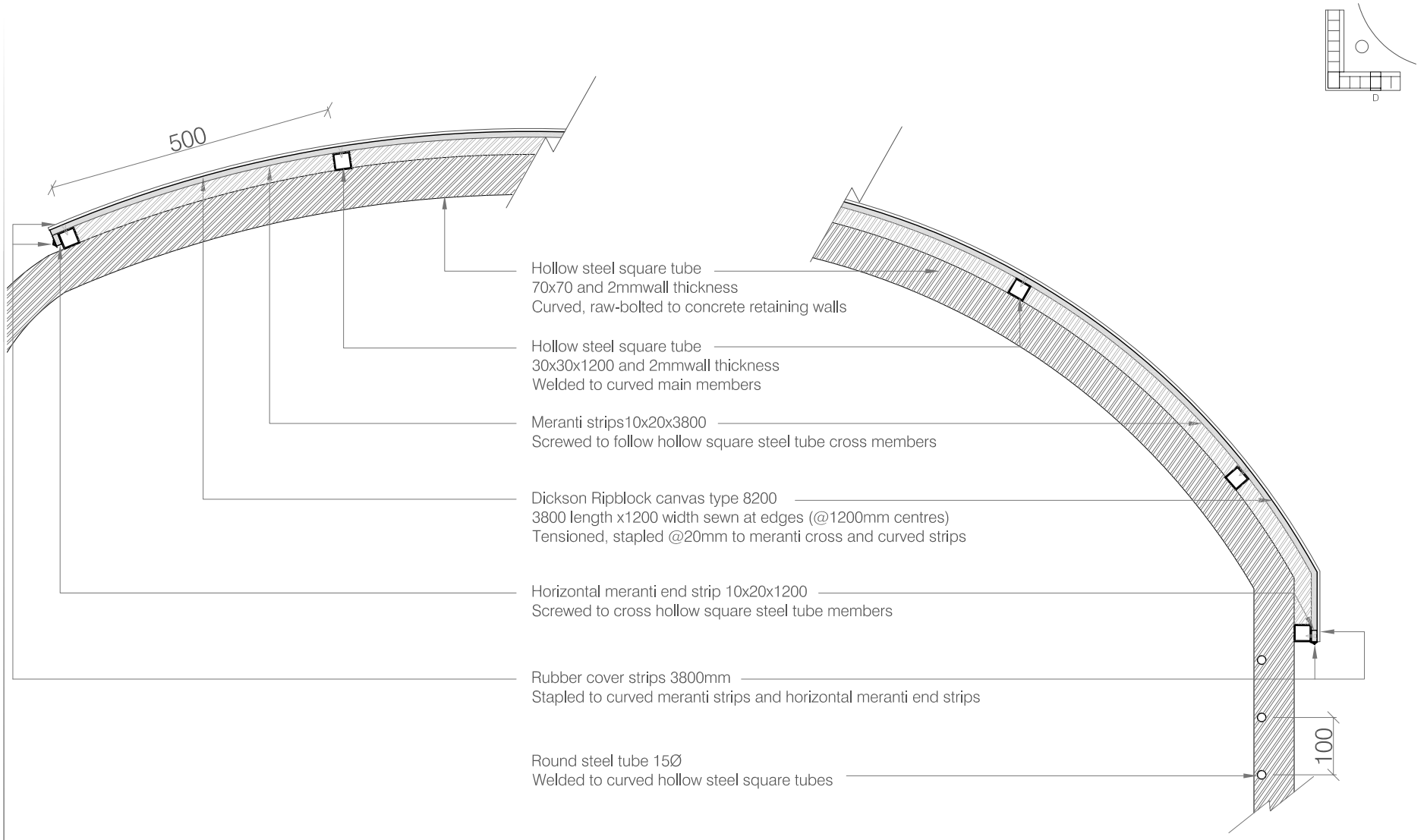



Section C2 Experi-path
Scale 1:25



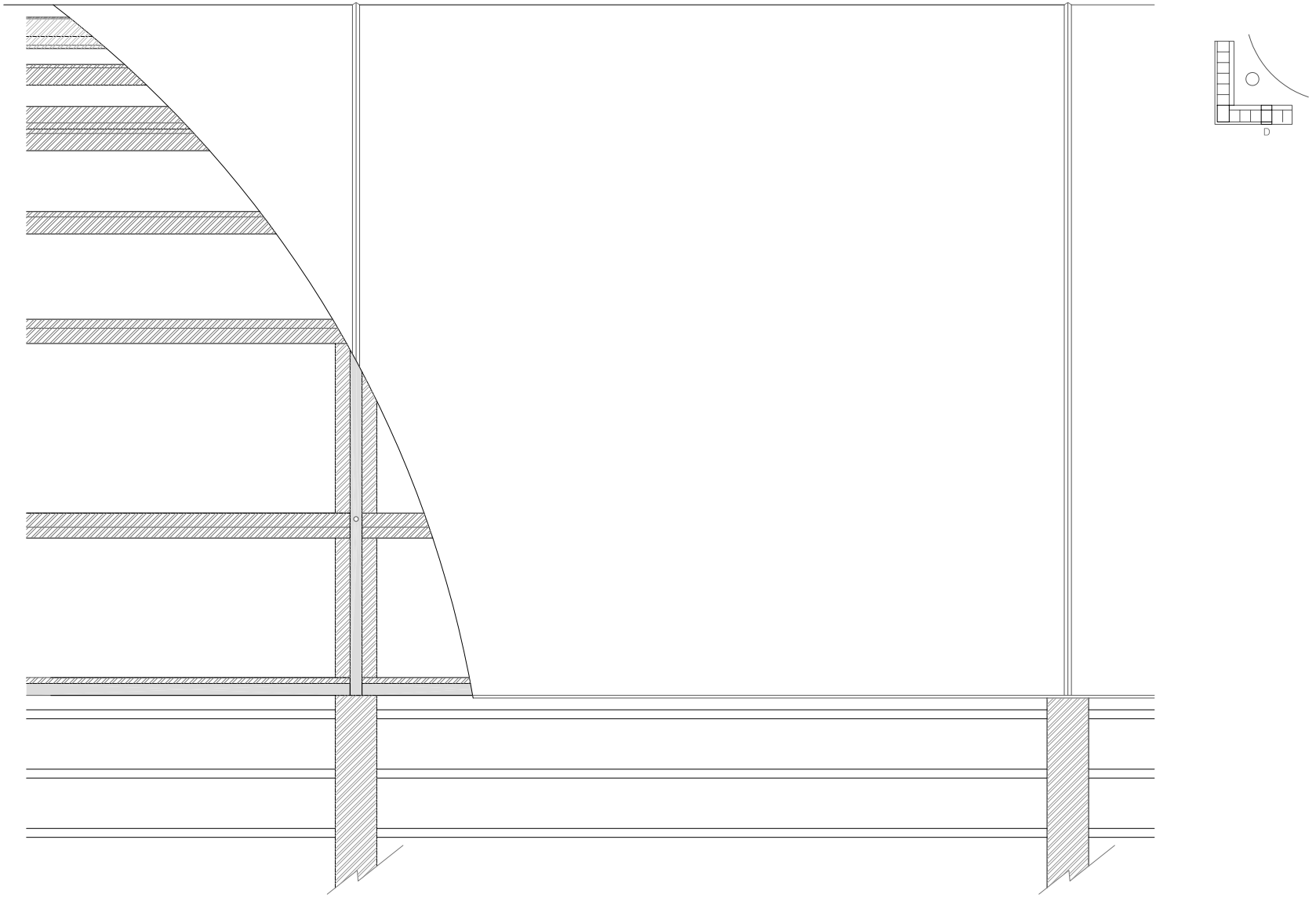

Detail Section C1 - Experi-path View, Play, Walk, Relax Zones

Scale 1:20

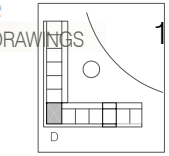


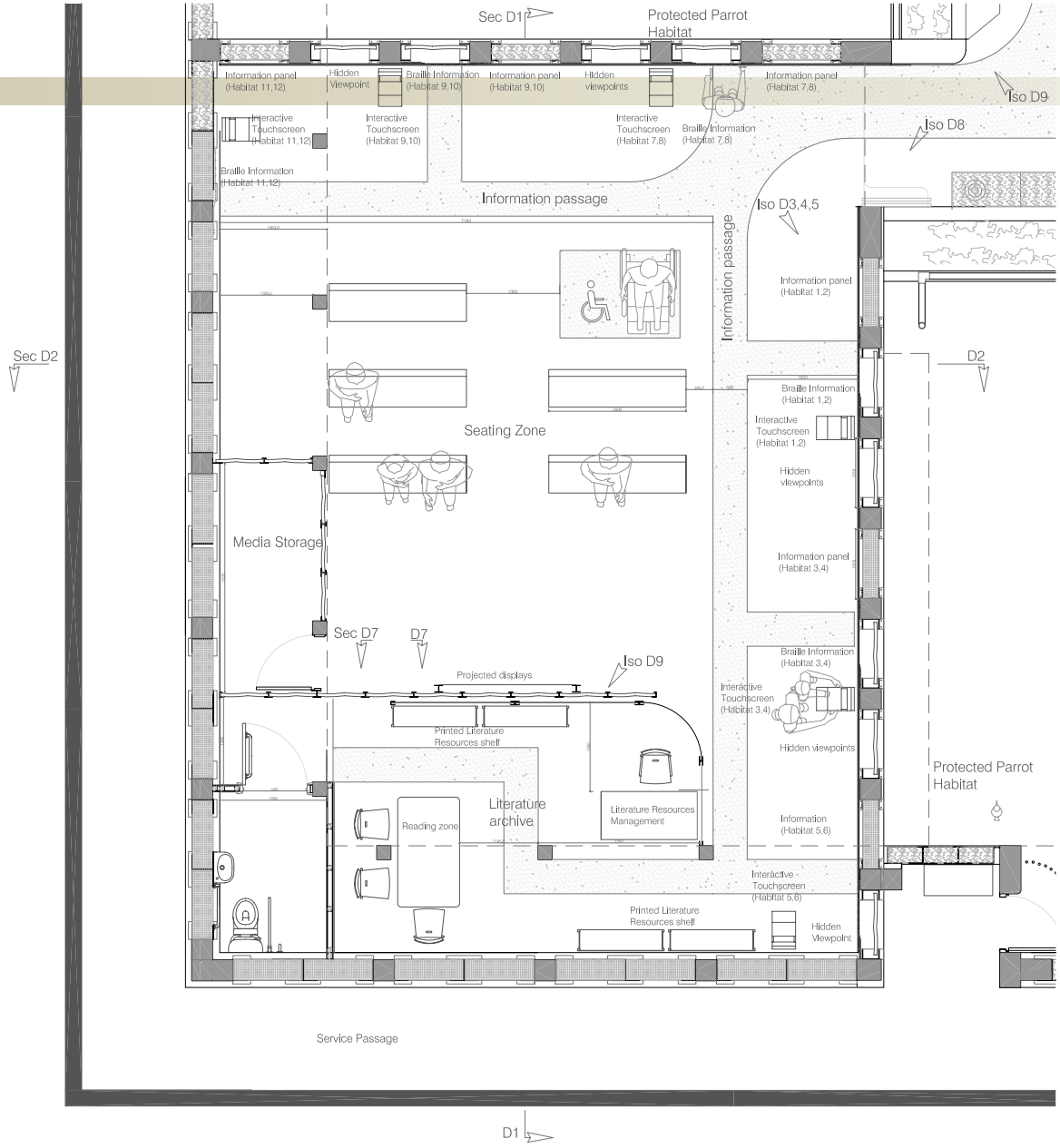

Detail of Section C1 Experi-path shade structure

Scale 1:20



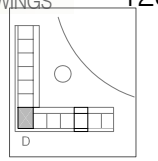
Elevation Detail C2 - Experi-path shade structure
Scale 1:10

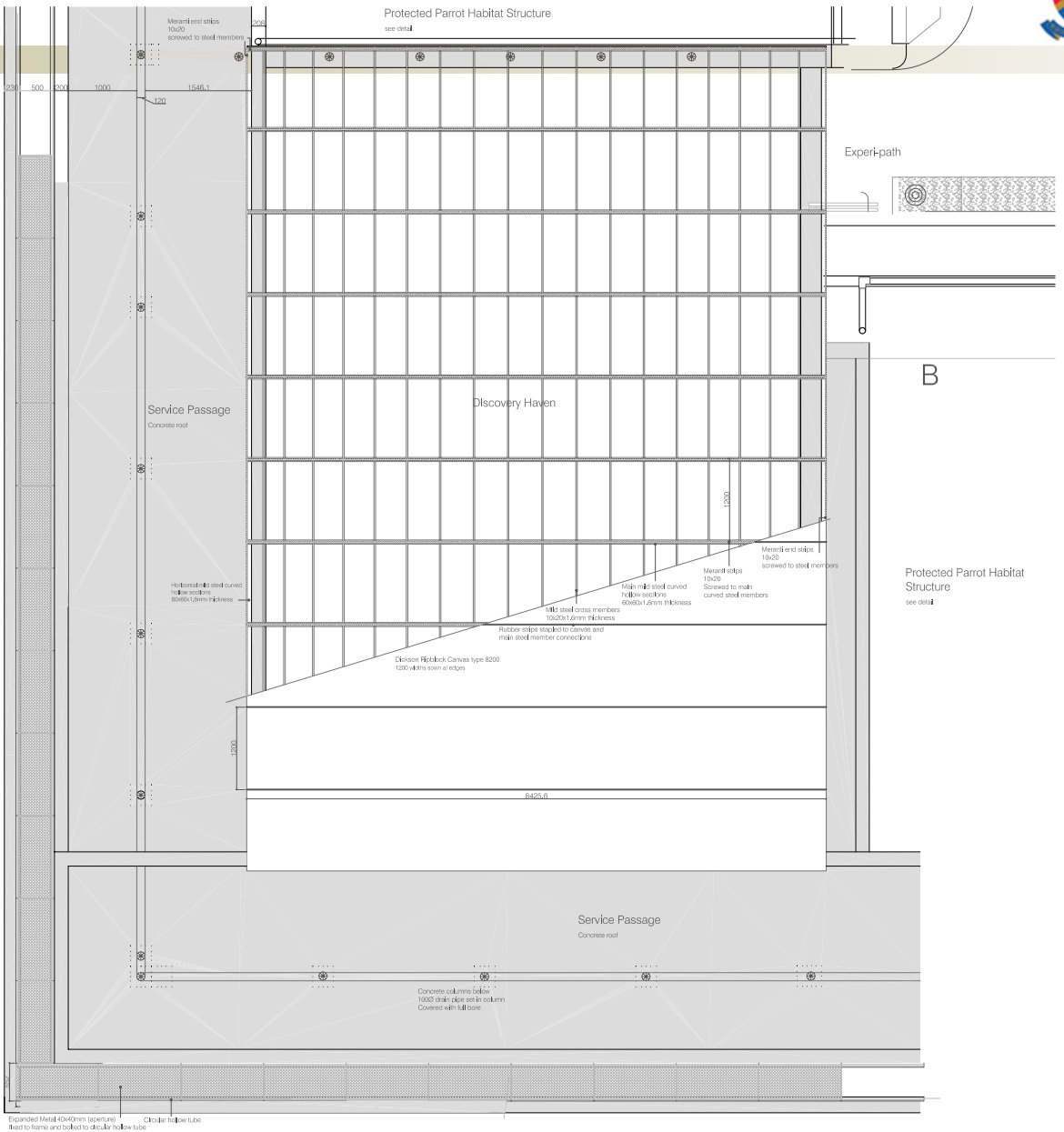



# Roof Plan D- Discovery Haven

Scale 1:100

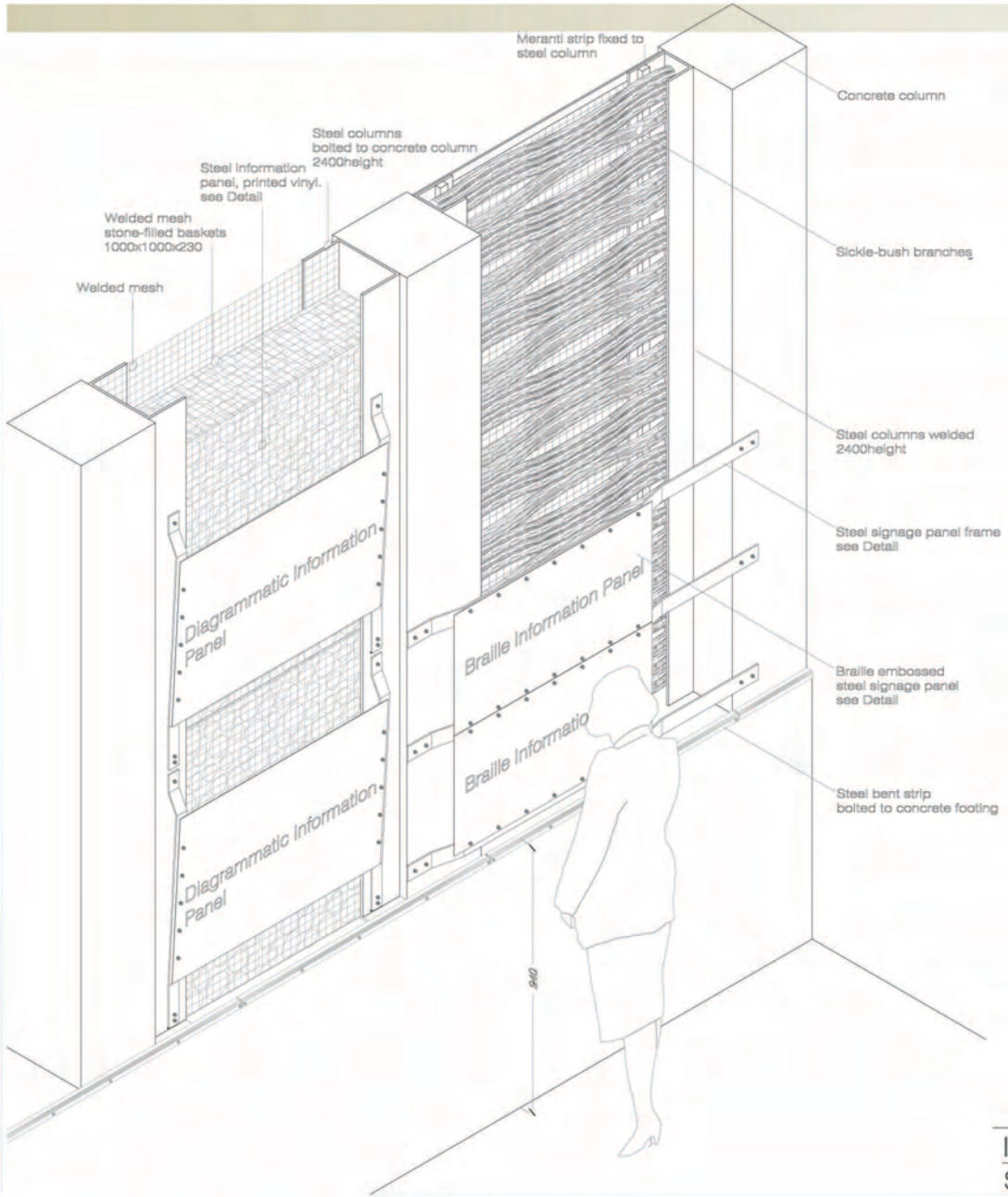


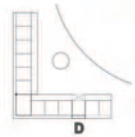





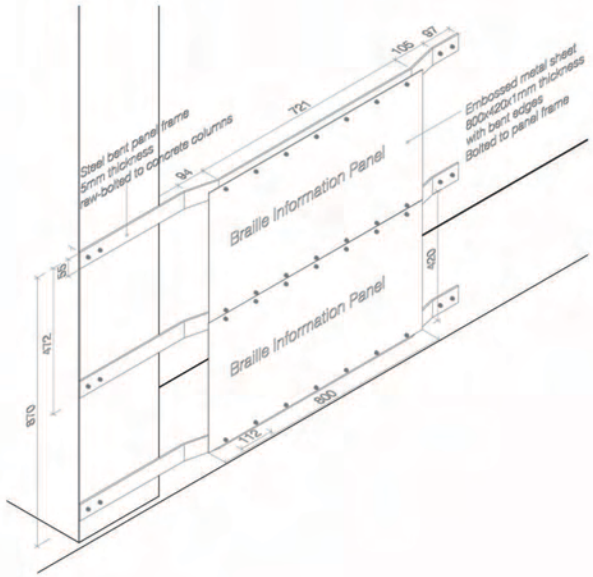
Roof Plan D- Discovery Haven

Scale 1:100

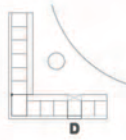


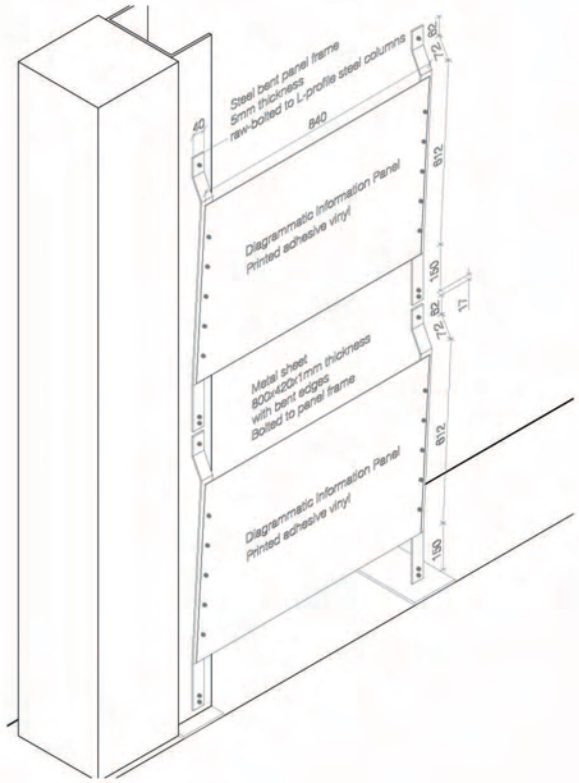




Isometric Detail D4 - Information Wall system
Scale 1:20

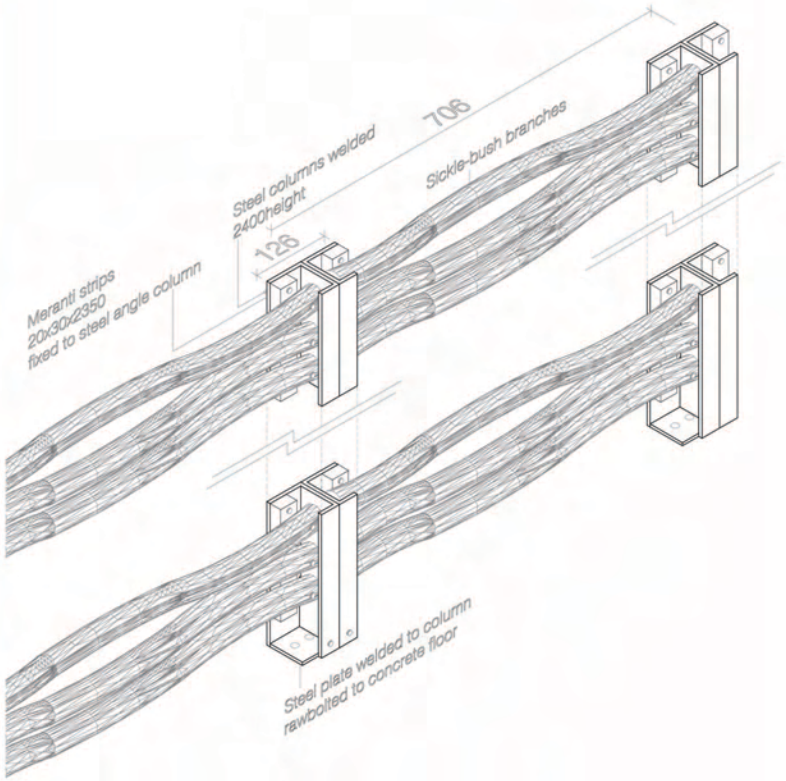



Isometric Detail D5 - Braille Information Panels
Scale 1:20

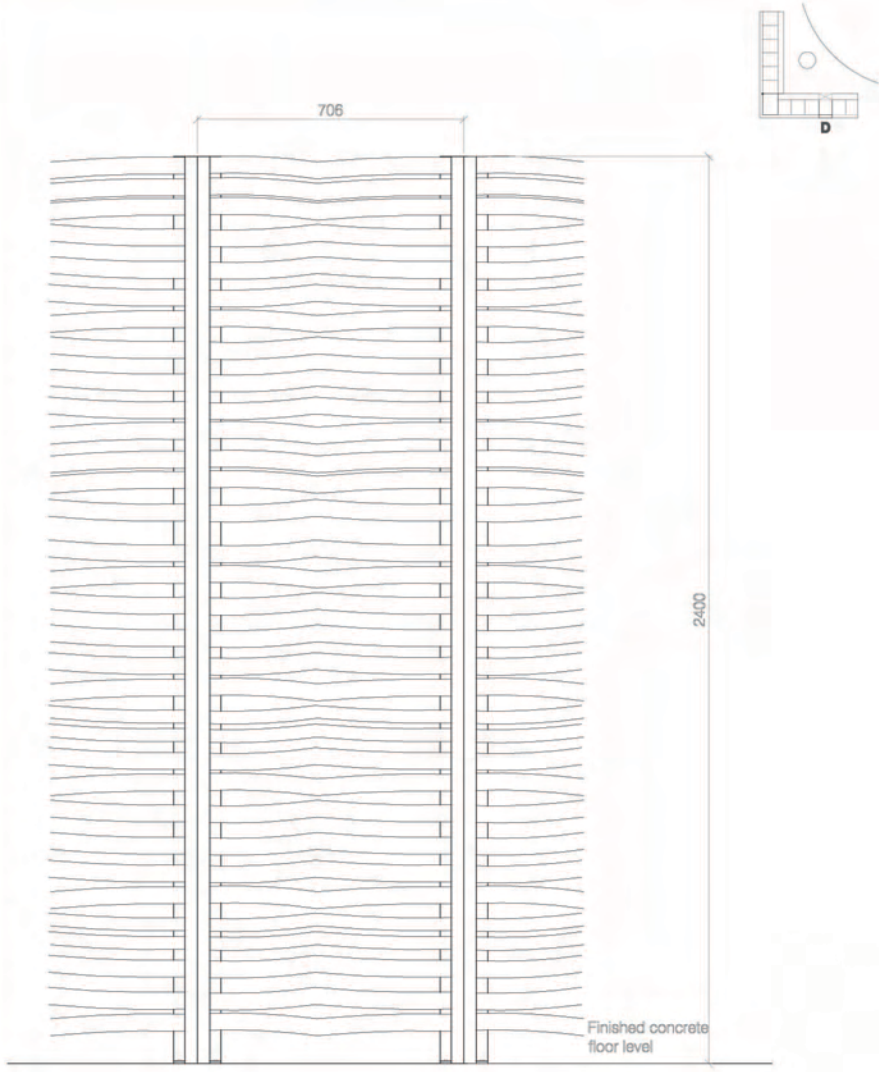


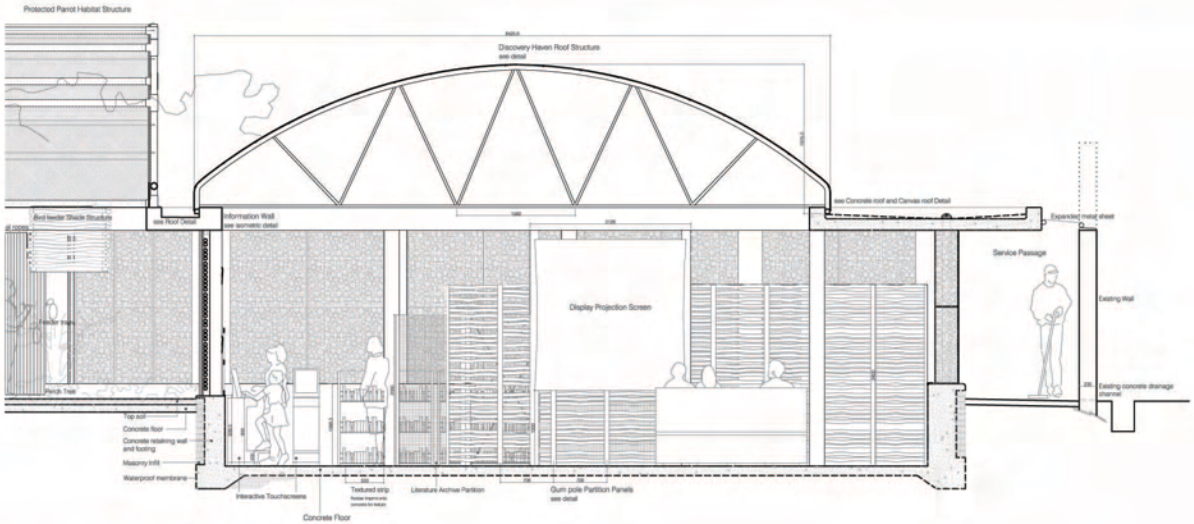

Detail Section D6 - Diagrammatic Information Panel
Scale 1:20



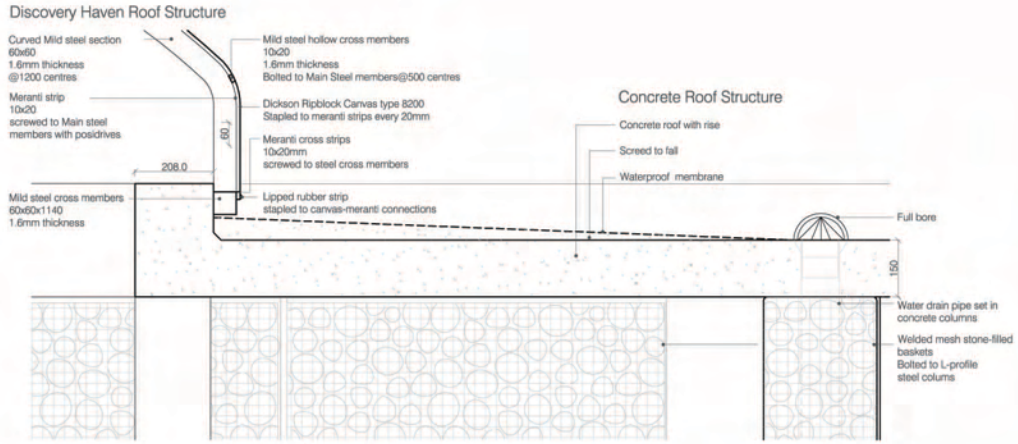

Isometric Detail D7 - Gum-pole Partition
Scale 1:10



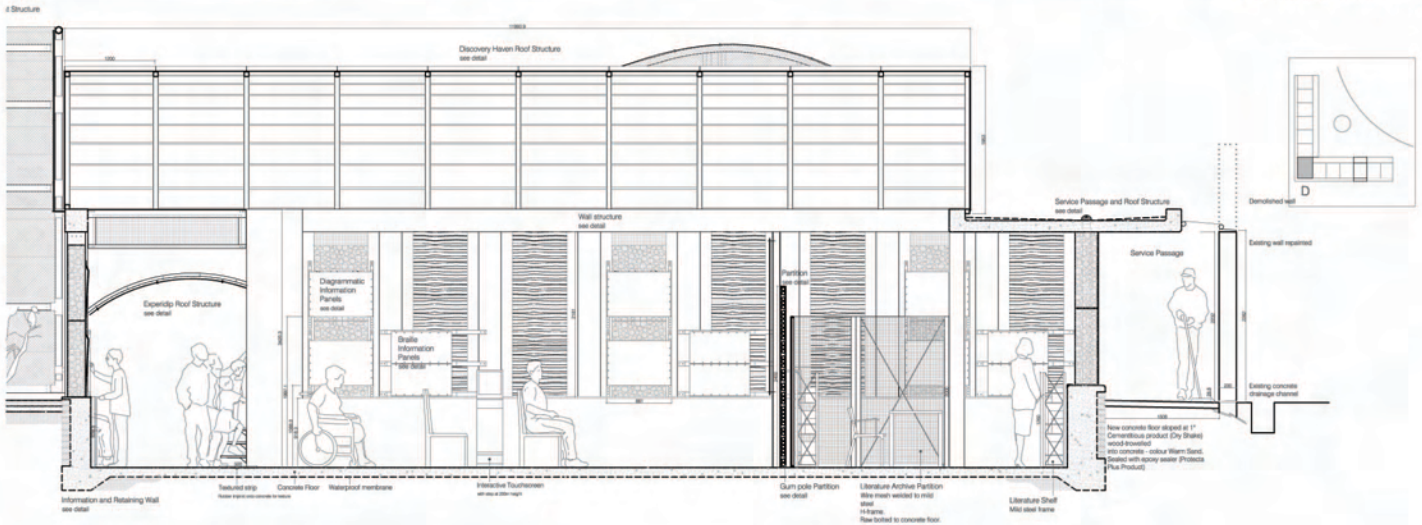

Detail Section D8 - Sickle-bush branch Partition
Scale 1:20

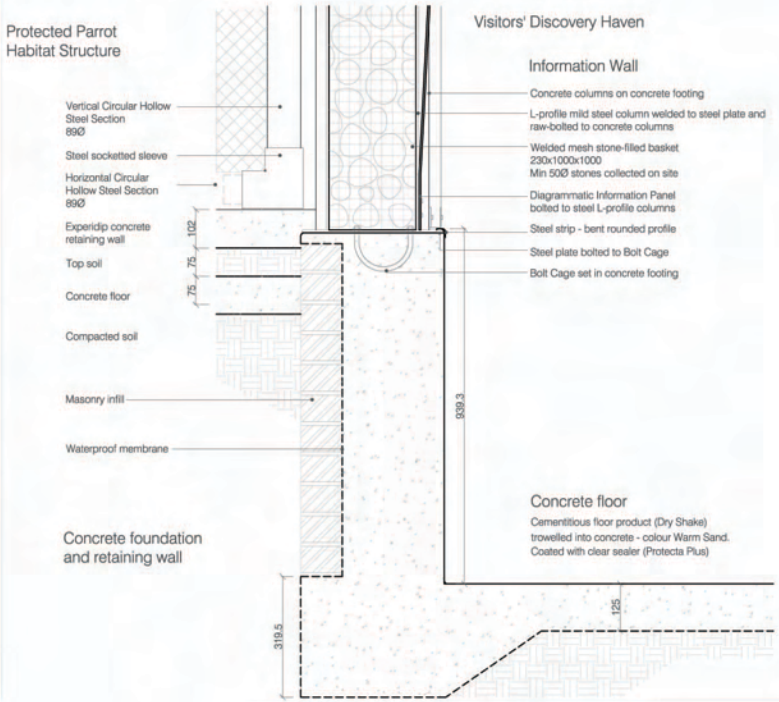

## Section B-B
Discovery Haven Scale 1:100



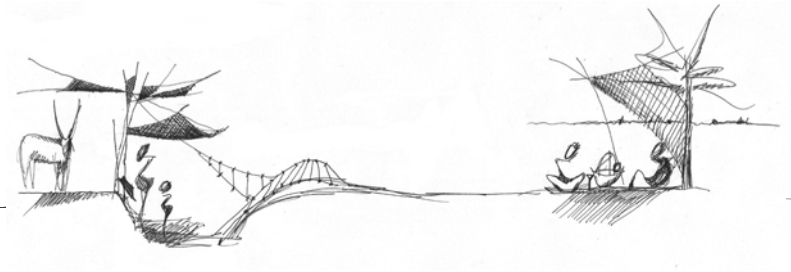

## Concrete roof and Canvas roof Detail
Discovery Haven Scale 1:100




## Section A-A
Discovery Haven Scale 1:100

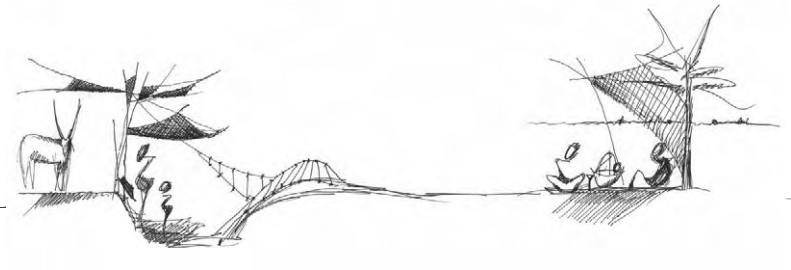



## Detail - Information and Retaining Wall
Scale 1:20



# CONCLUSION

The Parrot Animan Precinct is a successful example of a development boasting the co-habitation of animals, and humans in the environment. The design responds to each topic studied. The project enables an expansion in the field of Architecture. The Precinct conserves existing nature habitats and is important as a South African recreational space. The Precinct is an experiential nature space important to urban renewal in Tshwane. Furthermore the new development adds new concepts to the design of future animal environments. The use of the design elements and principles to advance, improve and integrate animal and human spaces are evident in the technical drawings provided.



# APPENDIX

Appendix A.

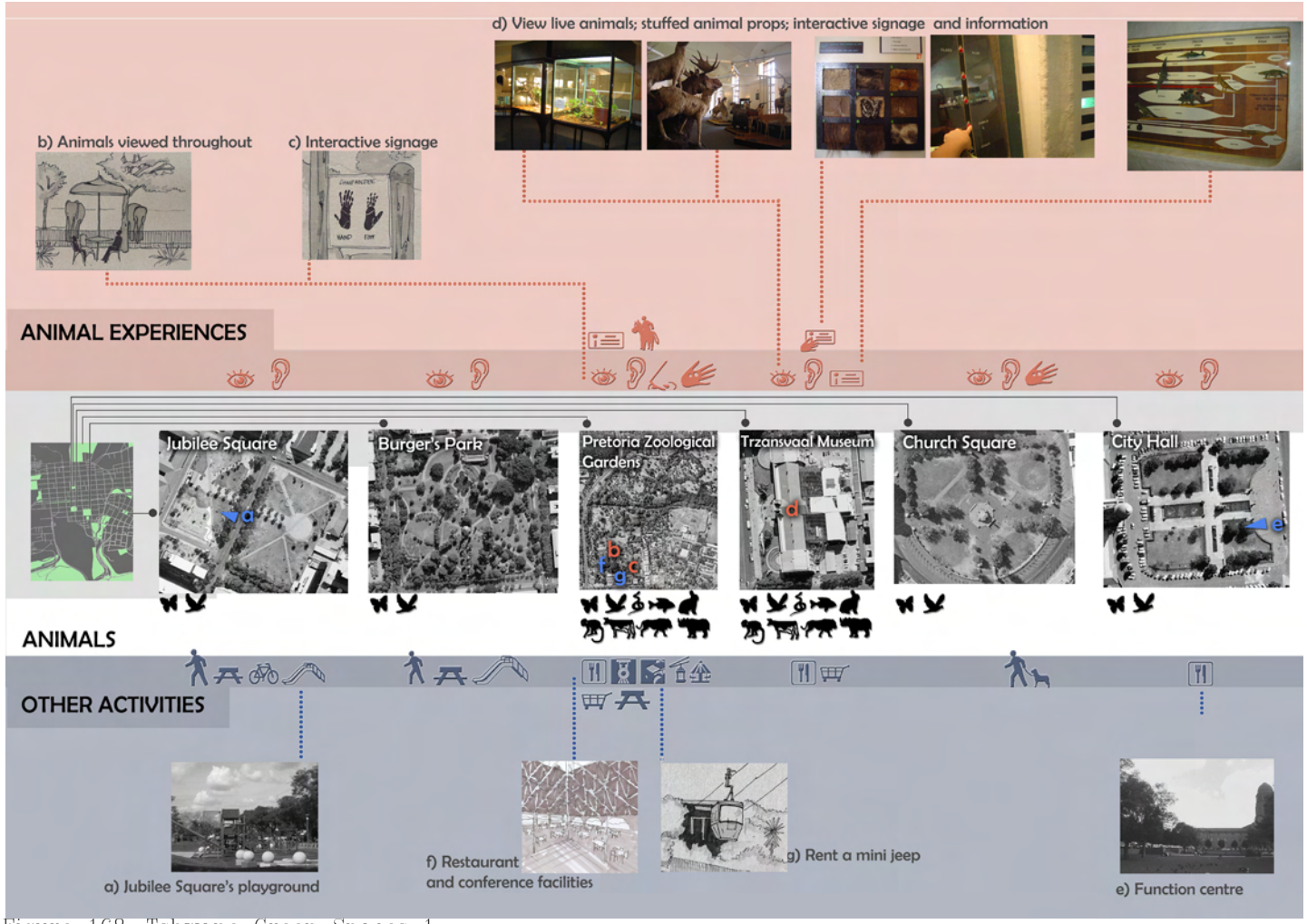



Figure 168. Tshwane Green Spaces 1.

Appendix A.

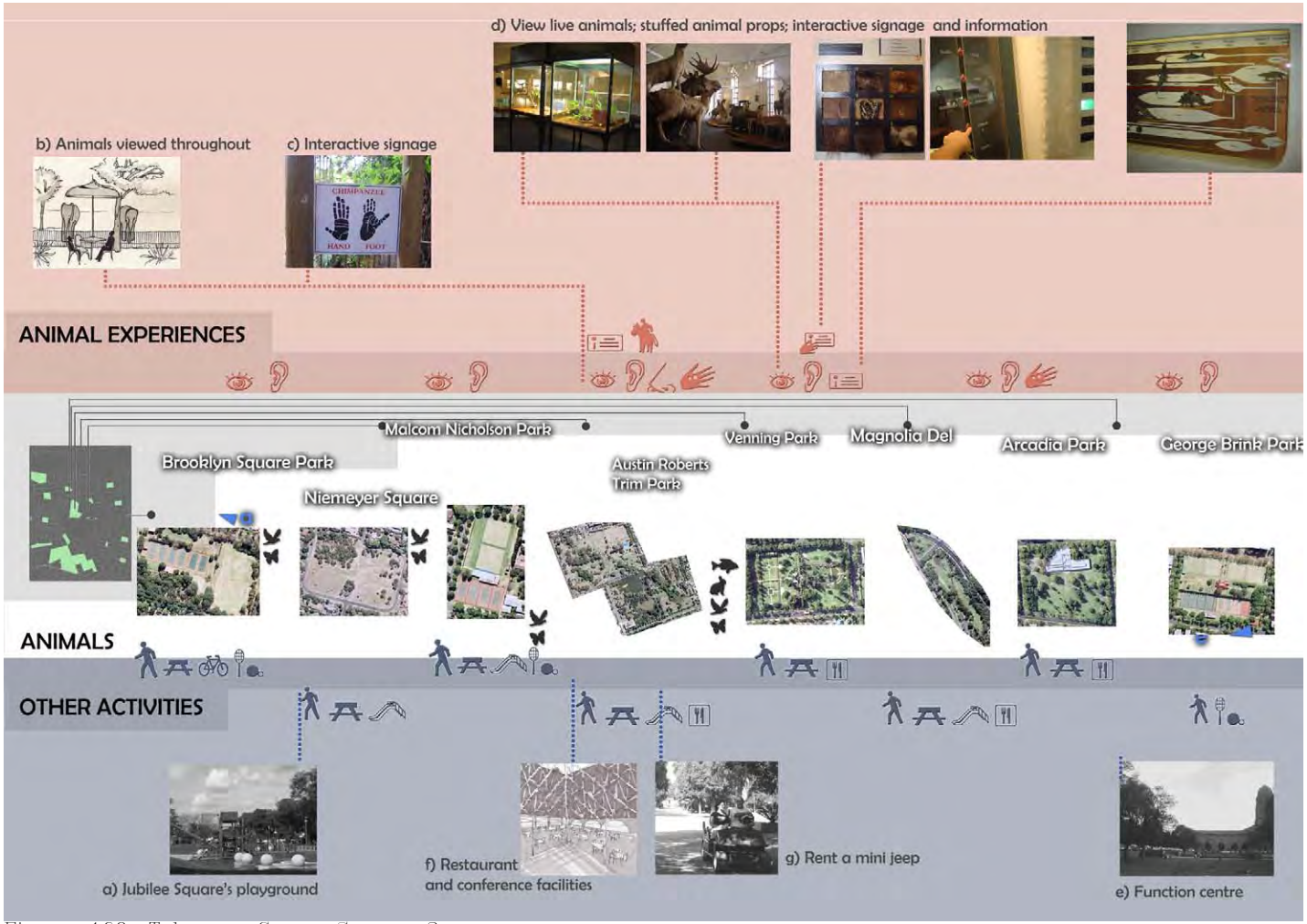



Figure 169. Tshwane Green Spaces 2.

Appendix A.

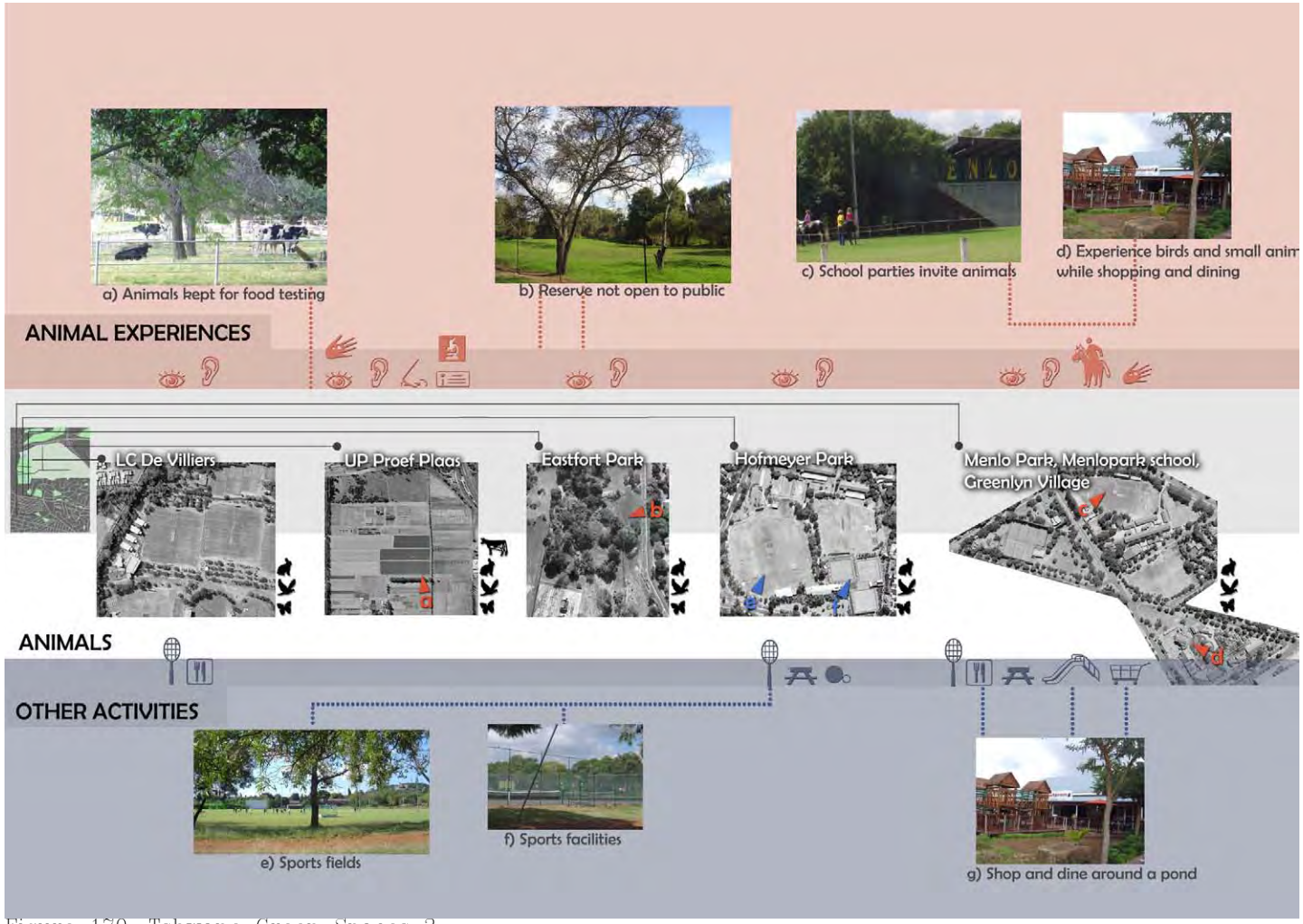



Figure 170. Tshwane Green Spaces 3.

Appendix A.

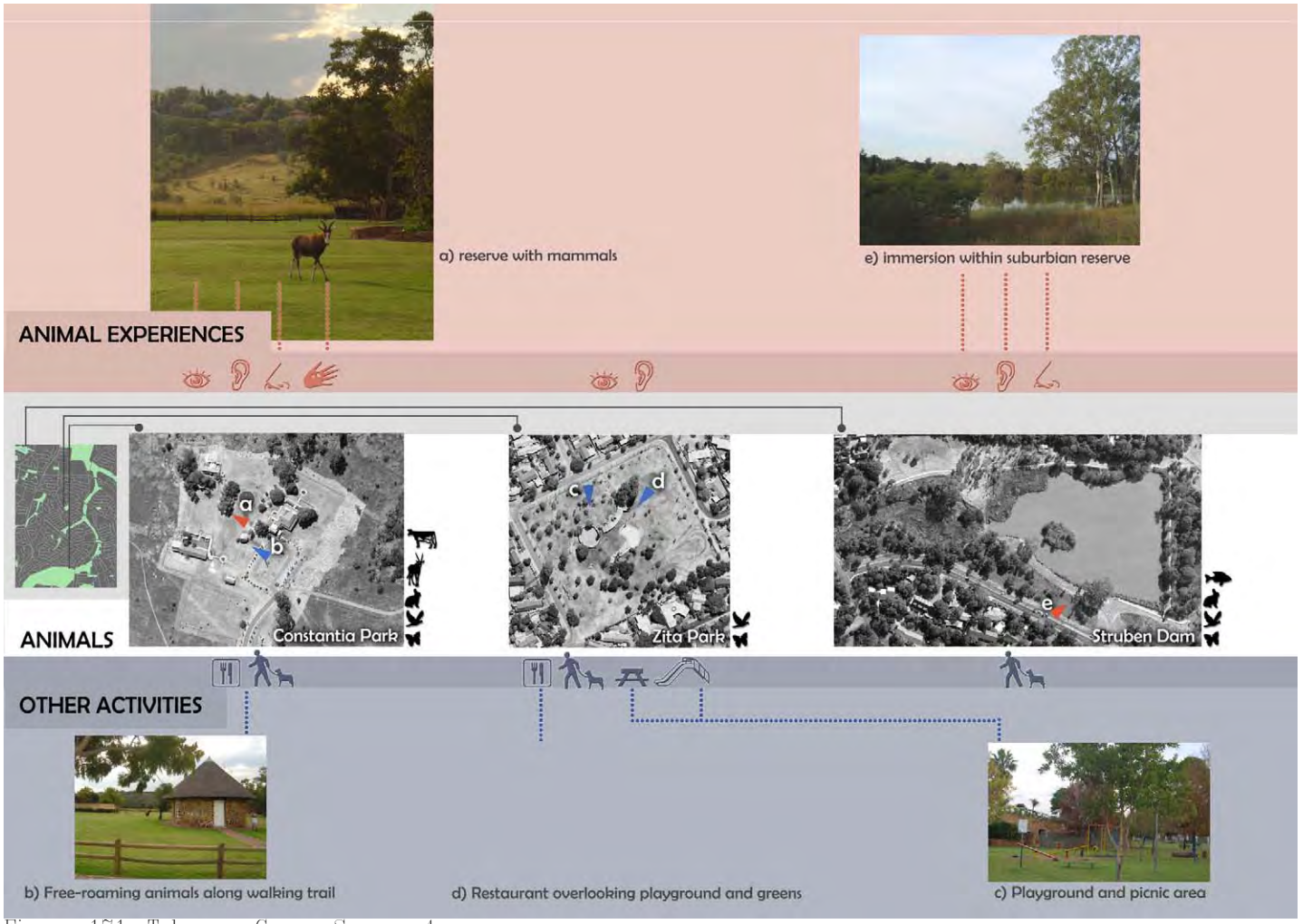



Figure 171. Tshwane Green Spaces 4.

Appendix A.

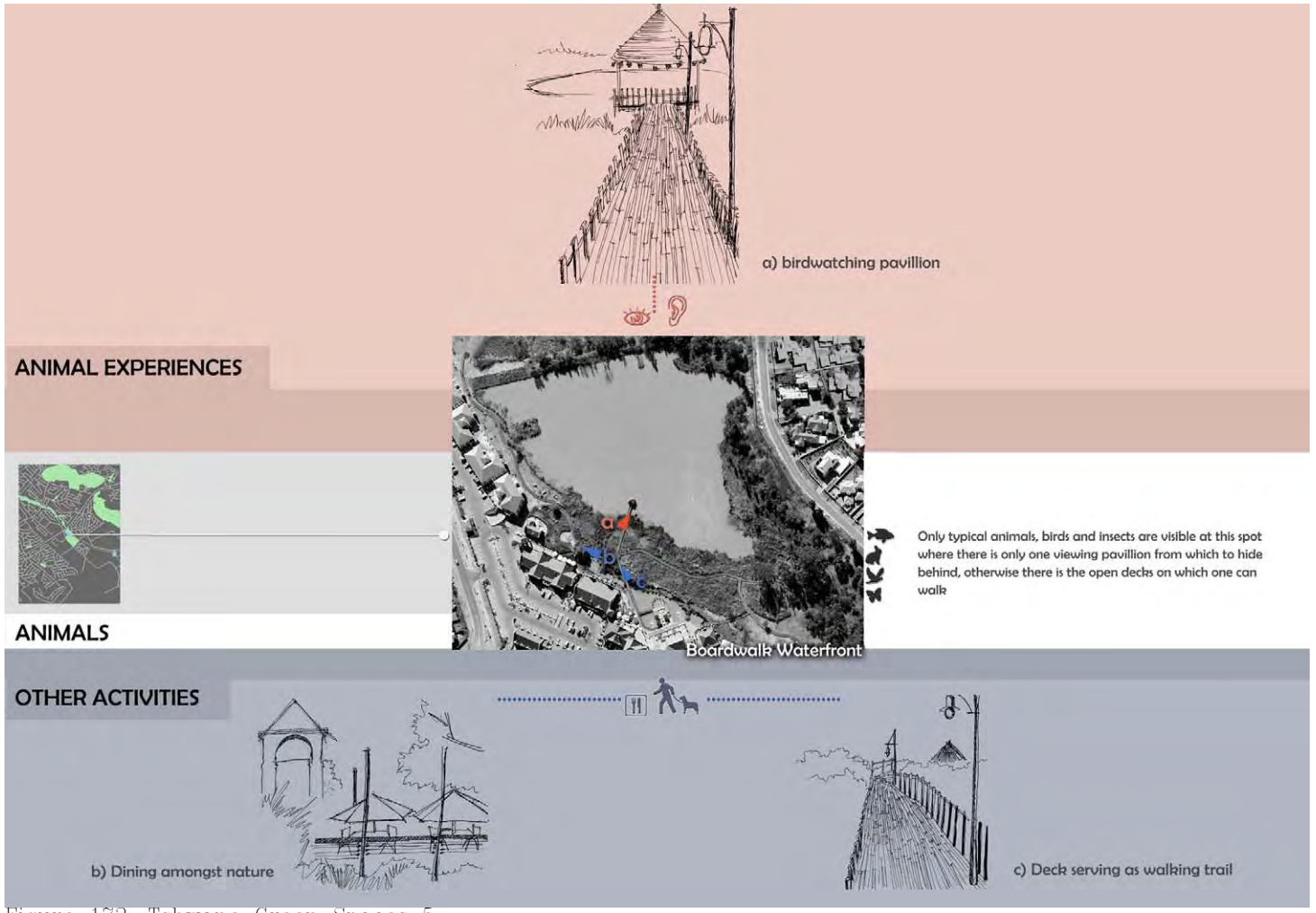



Figure 172. Tshwane Green Spaces 5.

Appendix A.

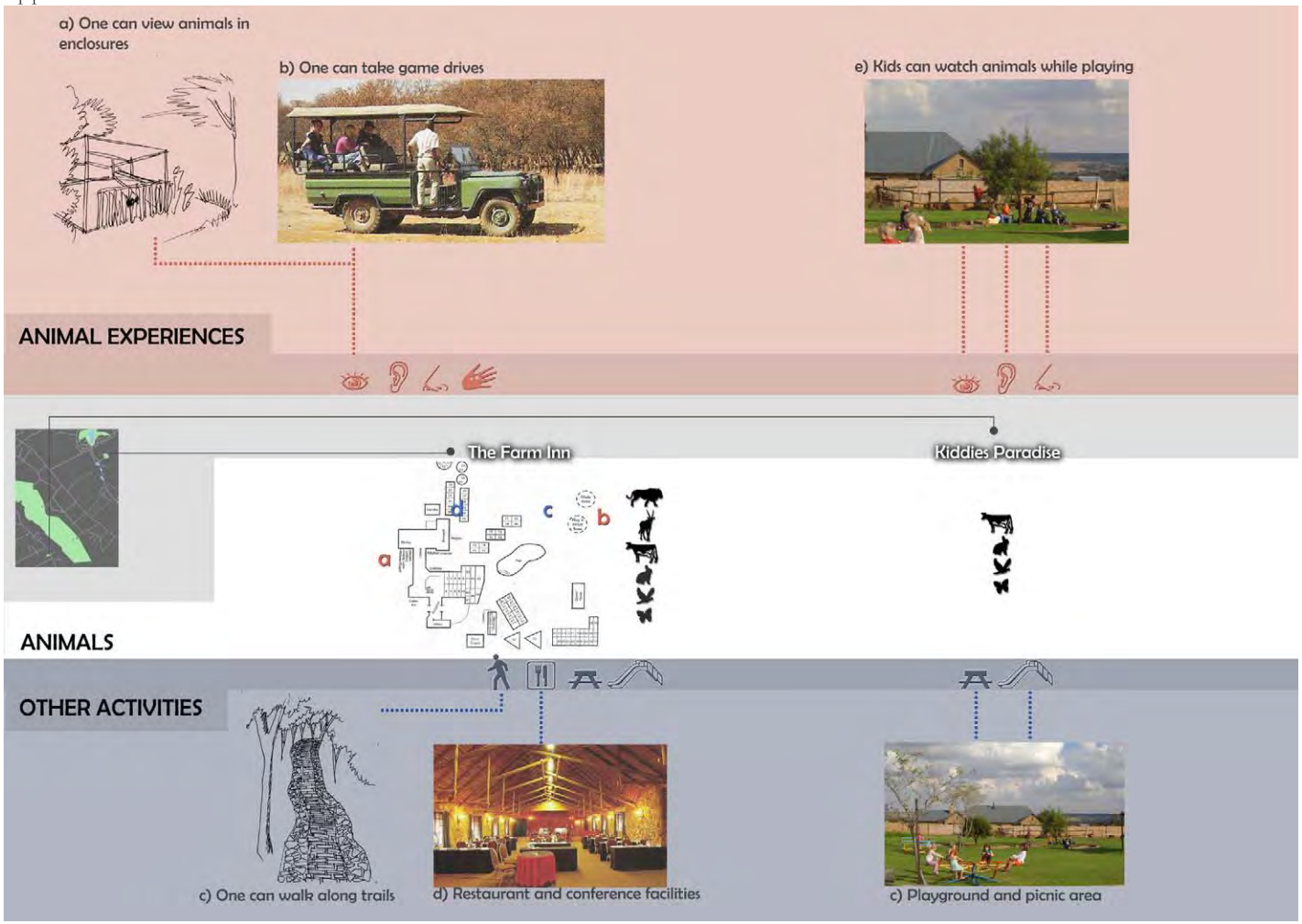



Figure 173. Tshwane Green Spaces 6.

Appendix A.

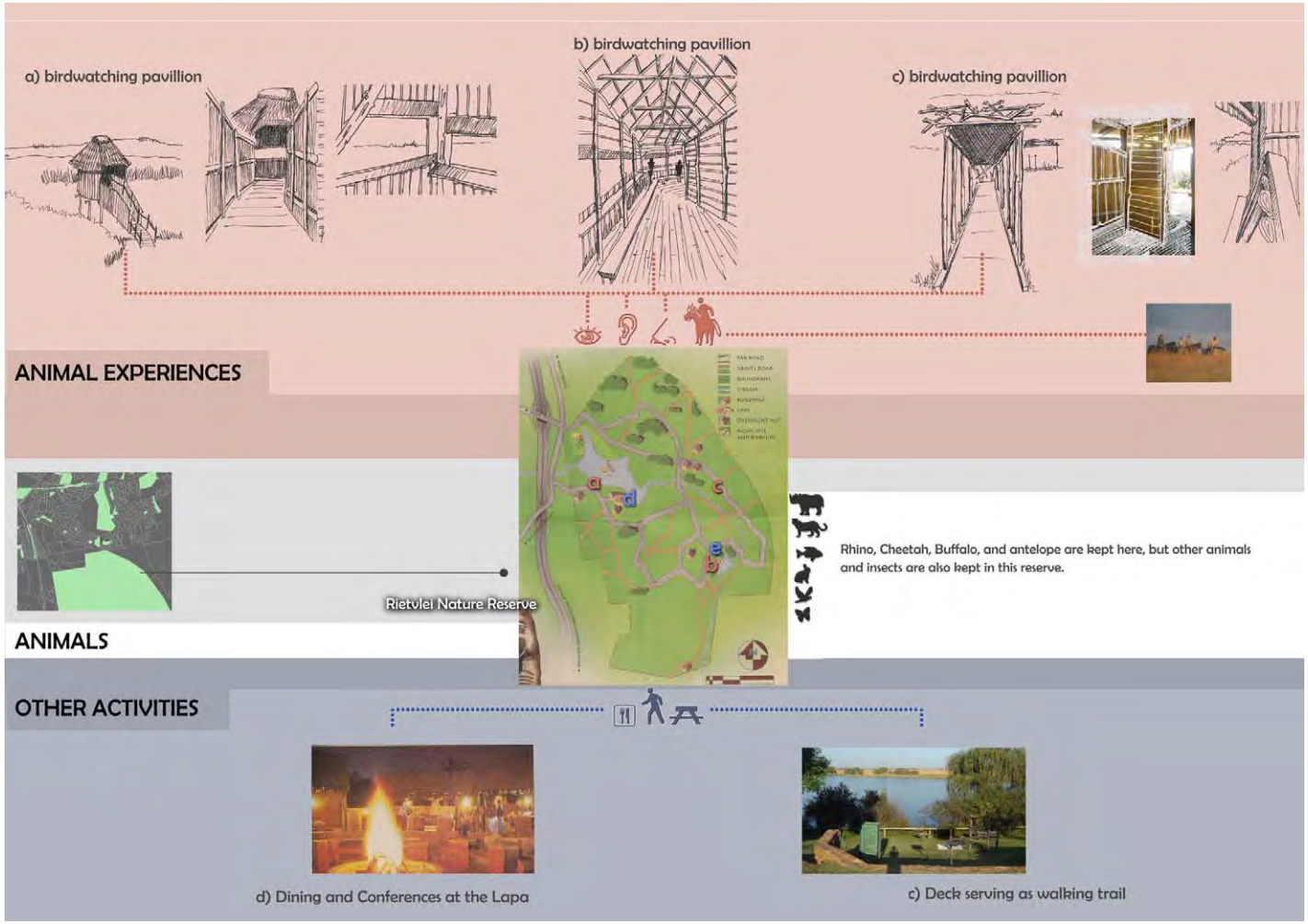
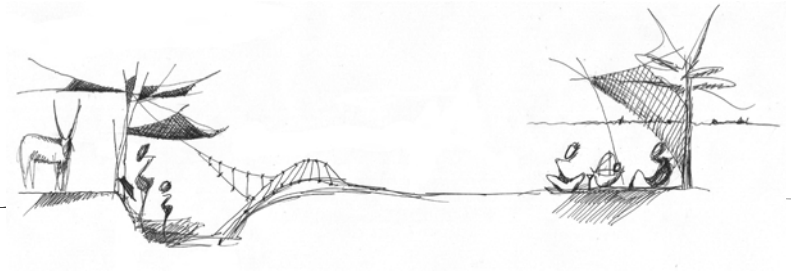



Figure 174. Tshwane Green Spaces 7.



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Centurion
19/07/2006. 13:30

Keeper Trainee
Tshwane
05/09/2006

Kitshoff, mr (architecture and construction co-ordinator)
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13/04/2006. 16:00

Kool Aluminium
Strydom Park
28/07/2006. 12:00

Mark Kaywood
Kya Sands, Randburg
28/07/2006. 11:00

Monique Lemillouo
Plasir du Jardin
Fourways, Johannesburg
17/08/2006. 14:00

Paul Venter (technical consultant)
Land Rehabilitation Systems
Tshwane, Menlyn
07/09/2006. 9:00
Robynn Ingle-Möller (enrichment Co-ordinator)
09/03/2006 – (senses and signs of aggression monitoring)
10/03/2006 – (ice lollies, popcorn)
Diets and nutrition revised and researched

Samuel Mabena
Landscape Servicer (SA Zoo)
05/09/2006

Land Rehabilitation Systems
Tshwane, Menlyn
07/09/2006. 9:00
Robynn Ingle-Möller (enrichment Co-ordinator)
09/03/2006 – (senses and signs of aggression monitoring)
10/03/2006 – (ice lollies, popcorn)
Diets and nutrition revised and researched

Samuel Mabena
Landscape Servicer (SA Zoo)
05/09/2006

Sara Shabangu (Curator for birds)
Tshwane
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Tony Marx (sales manager)
M.P.R Hiring
Booysens Reserve, Johannesburg
26/07/2006. 13:30

Ulrich, mr
Education dept SA Zoo (life science centre)
23/05/2006, 9:00

Volkan Eriltutmus (operations manager)
Canobrella
Tshwane, Constantia Park
08/10/2006. 19:00