# Designing for Those Without Voices:
## Transitions from Nature to Built Form - from Animal to Human.

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Bachelor of Science - Arts and Design
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Submitted to the Department of Architecture in partial fulfillment of the requirements for the degree of

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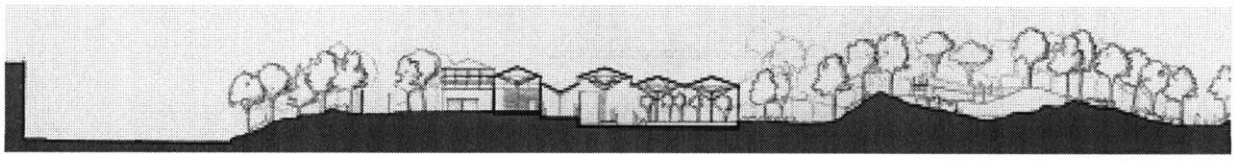

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# ABSTRACT

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"In the end, we will conserve only what we love. We will love only what we understand. We will understand only what we are taught."
*- Baba Dioum -- Senegalese conservationist*

In the past two decades, zoos have taken on new responsibilities and roles shifting them from places of primarily recreation and entertainment to places where education and conservation are at the forefront. These changes impact all aspects of the zoo, most importantly its design.

Visitors journey to the zoo in search of animals. They could find them behind bars, in the center of a deep moat or search for them in an extensive landscape that replicates the animal's wild habitat. The later is clearly the situation that can not only fascinate, but also educate the visitor.

There are many existing animal exhibits that use the idea of landscape immersion in their design, but still they fall short of their potential. This thesis focuses its efforts on the design of one habitat for a zoo in Boston, Massachusetts. The mammalian residents of the exhibit, from the Congo region in Africa, are not often seen in zoos but their need for help is no less pressing.

The thesis pushes the boundaries of the idea of what an exhibit should be and challenges the already traditional aspects of zoo design. It explores the potential that an exhibit can have not only from the point of view of the animals, but also from the visitors. Clear ideas on path and place manifest themselves in the design, which allows visitors to move through the habitat freely, offering the possibility to see its residents from unique views and spaces, all the while learning about important issues surrounding these animals in Africa and issues surrounding the zoo community. The messages are sent overtly to the visitor through distinctive displays and interactive learning stations. In addition, messages can be received subconsciously simply through the different experiences that the visitor is exposed to while moving through the interior and exterior parts that compose the exhibit.

The design strives to integrate the landscape with the built form. Through this integration we learn as much as about the union of the parts as we do about the individual pieces. The two areas are less about the separation of inside to outside or nature to building as they are about environments to live and learn in. They are inseparable and need each other to function, a point often missed in current exhibits.

Results of this thesis show the great possibilities that are inherent in each exhibit design; and stress that the potentials for a new habitat design should be seen as a challenge whose resolutions should present distinct experiences for visitors that educate and fascinate, as well as offer an extraordinary home for its animal residents.

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Thesis Advisor : Jan Wampler - Professor of Architecture

## ACKNOWLEDGEMENTS

In the study of architecture, there are layers upon layers of knowledge to be sought out and discovered if you open yourself up to the challenge. Although the complexities involved in this type of study can only be understood fully by those close to the discipline, the pure exhilaration of moments like this, the completed thesis, happily can be shared by everyone.

The journey to this thesis has been in the making my whole life. In this one project I have combined my two passions, architecture and animal welfare. Separately, the two have taught me about myself and shaped my goals, values and dreams. Together, they have taken the meaning of these things to a deeper level and directed me towards my objectives in a clear light. The knowledge and insight that I gained throughout this process was not just a self-directed effort though. It took the help and guidance of many people along the way. Although too numerous to name them all, I would like to thank a few now.

Thank you to my mother, my teacher, who has always believed in me and through her relentless support always helps me to reach and intensify my dreams and aspirations.

Thank you to Brian whose love and dedication during my time at MIT has been constant and appreciated. You will never know how much your "just being there" means to me.

Thank you to my professor, Jan Wampler. You have helped me discover the hidden layers of architecture and given me the tools I need to keep discovering them for myself.

Of course, a special thank you to the members of my thesis committee. Eran, Bill and David, your input throughout the semester was insightful and invaluable.

I would also like to say thank you to the countless people I have come in contact with in the zoo community. From designers, to directors, to caretakers, your discussions have been of tremendous benefit. I hope we may continue them as peers.

Finally, a special thanks to my friends in thesis room 7-401 for keeping the music rockin' and the energy soaring during the semester. Good luck to everyone!

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TITLE POSTER

# Designing for Those Without Voices:
## transitions from nature to building - from animal to human

early 20th century animal cage building

We stand guard over works of art, but species representing the work of eons are stolen from under our noses.

-Aldo Leopold

He who would harm animals is both cowardly and ignorant.

-Tolstoy

protesting bears for "entertainment"

No one has the right to take life he cannot create.

-Ghandi



habitat area modeled in these designs

In the end, we will conserve only what we love. We will love only what we understand. We will understand what we are taught.

-Baba Dioum

I must interpret the life around me as I interpret the life that is my own. My life is full of meaning to me. The life around me must be full of significance to itself.

- Dr. Albert Schweitzer

image from Congo area

penguin exhibit at London Zoo

"The hallmark of high-style Modernism of the 50s in zoos was that it was an architectural expression of sculpture with animals in it. They were beautiful forms and shapes that had almost nothing to do with the animal's behavior."

-Jon Charles Coe

Franklin Park Zoo map

It is this drive to manipulate his environment, extended from garden to field to plains to mountains, that has brought man to a global crisis of environmental misuse.

-Thomas L. Kimball

"The message zoos should communicate is that wild animals and wild habitats are inseparable and neither can survive alone."

bongo

duiker

sitatunga

# INTRODUCTION

I must interpret the life around me as I
interpret the life that is my own.
My life is full of meaning to me.
The life around me must be full
of significance to itself.

-Dr. Albert Schweitzer

With every passing day, 74 plant or animal species fall into extinction.[1] At this rate, we are destined to lose over 20% of the Earth's species within a mere 30 years.[2] Habitat depletion is moving at similar alarming rates and it seems as if no one has the power to stop it. Humans who tamper everyday with the delicate balance of ecosystems that compose the Earth are responsible for these crises. As we encroach on once un-touched regions for farmland, logging and housing the animal inhabitants are forced into smaller and smaller areas. They fight for food and often starve to death, if they are not hunted or poached first for trespassing on land that was once theirs to roam freely.

Efforts to save animals and their habitats have been going on for decades, but unfortunately is has not been enough. Preserves exist around the globe to protect the lucky few species that live inside of their walls, but others continue to die. Zoos also exist. However, for too many animals the cramped, oppressive conditions they face everyday are a horrible price to pay for life. Cages, bars, filthy pits, concrete slabs, and areas too small for one animal, packed with ten, are all too often the scene at zoos today. Some zoos/conservation parks are fortunate to have the money and foresight to design exhibits that try to replicate the habitat of the animal. All too often however, the efforts made are only to visually appease the visitor and do little to help the animals' living conditions.

It is time to raise the standard of care in the world and in zoos. The responsibility to enact this change falls to us, co-inhabitants of the planet Earth, but what is the solution?

One large part of the solution begins in zoos. Whether or not they were ready, zoos have become the bastions of hope for species that cling to life in lands far from home. The role of the zoo has shifted from place of recreation to that of a teaching environment for the visitor and a home away from home for its residents. The great tasks that now face zoos are crucial and cannot be ignored. These tasks not only require responses in the form of time, money and effort, but most importantly in their design.

Zoos comprised of well-designed exhibits, which immerse animals and visitors in landscapes that simulate habitats in Asia, Africa or the Antarctic are simply better than those that do not. The effects of immersion exhibits are vast and have positive impacts on not only the visitor, but also more importantly, on the animals that live in them. The fundamental goals facing zoos today are to increase public awareness on the necessity of habitat conservation, wildlife conservation, and the need for zoos to exist as places that are for more than simply public recreation. The origin of the

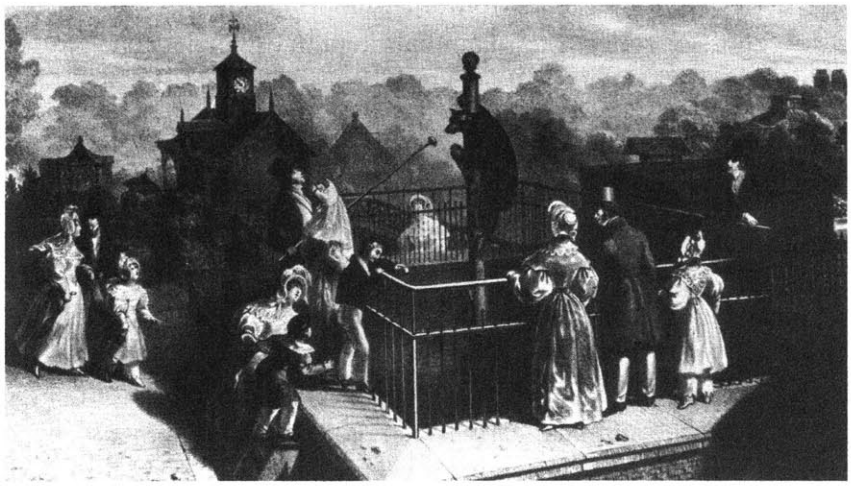
effort is to be found in the actual individual animal exhibits. Zoo animals must be displayed so, "their reason for being and rights to existence are intuitively self-evident to viewers."[3] Once this is achieved, then the education on other issues plaguing the animals and their habitat may begin. Unfortunately, for many zoos the exhibits fall very short of the goal. They often leave the visitor feeling sorry for the animal, or in no way affected by the experience.

The goal of this thesis, *Designing for Those Without Voices: transitions from nature to building – from animals to humans*, is to examine challenges facing zoos today and investigate the ways in which the solutions are revealing themselves through the design.

# HISTORY

It is this drive to manipulate his environment, extended from garden to field to plains to mountains, that has brought man to a global crisis of environmental misuse.

- Thomas L. Kimball



Shaped by political and environmental forces since their creation, zoos have undergone drastic changes in size, appearance and focus. It is therefore necessary to have a basic understanding of the evolution of zoos and the changes which took place before any further examination of the thesis can occur.

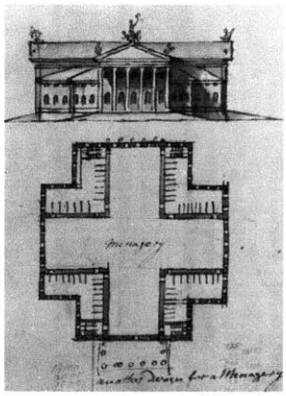
The earliest known collection of animals was documented on a stone tablet, which described a collection of animals from the Sumerian city of Ur; it dated back to 2300 BC.[4] Records of collections of animals kept in Egypt date back to 1500 BC.[5] Also, in China the Zhou Dynasty that existed from 1027-221 B.C. kept animals in the "Garden of Intelligence" and in Roman times there are many accounts of collections of animals kept for the fights that took place in the Coliseum up until 476 AD.[6] Centuries later, kings and conquerors throughout the East kept animals as symbols of power and victory.

Early in the 18th century, animals were still collected and displayed by European royalty as an example of power and wealth. The conditions were poor to say the least, and the overall design of the cages was to facilitate the view of the spectators with no concern for the animals' daily living requirements. These menageries, as they were then termed, were infamous for their poor living conditions and care. The animals were often teased and prodded to excite and anger them during a show. These displays served only to demean the animal and provide entertainment for the viewer.

Thankfully, the elite viewing of animals diminished soon after as nobility lost power and control over the common people in different parts of the world. Thus, animal collections became accessible to all.[7] However, animals were still looked at as mere curiosities, not as links to other parts of the world or as co-inhabitants of the planet.

Although menageries became popular destinations, the conditions under which the animals lived remained unchanged. Typical examples of animal housing were barred

Provoking a bear for entertainment



Menagerie Building Plan

cages with no place for the animals to retreat from view. Sometimes housing included placing animals in buildings similar to that of their native land. These buildings, usually fashioned out of concrete, served only to dwarf the animal in scale and grandeur and related in no way to their spatial needs.

During the 19th century three major events sparked changes in the menagerie and led to the development of the zoological garden. First, the idea of a city was developing. As many people, industries, and businesses were crowding together in cities, space problems arose and the need to preserve parkland for human recreation and health came to the forefront.[8] The survival of the natural world became an increasing concern, and a hunger for a scientific understanding of wildlife developed.[9] The menagerie moved to parkland, and animals, though still in barred cages, were being displayed alongside plants.[10]

Also during the 19th century, British naturalist, Charles Darwin wrote his book, The Origin of Species by Means of Natural Selection. Theories that arose from this book, termed Darwinism, led to an explosion of interest in natural history, zoology and the study of living beings.[11]

Finally, in this century came the founding of the Zoological Society of London, which aided in the opening of the first real zoo, Regent's Park, in 1826. Although the zoo existed as a menagerie since the early 1700s, sometimes housing its animal collection in the Tower of London, it quickly took shape on its own and was the first zoo with a mission to collect animals for study, not just for entertainment.[12] The animals in the collection were housed in taxonomic lines, demonstrating the very scientific approach of the zoo.

The rest of the century led to the emergence of numerous zoological parks in Europe as well as in the United States. It was clear zoological parks were becoming an integral part of life. They offered the visitor a place to escape the hectic style and congestion of the city, while having the ability to relax and enjoy the natural setting

Caged Tiger

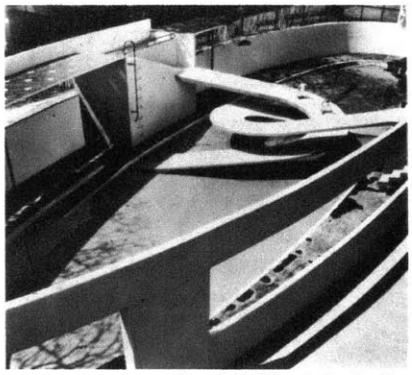
Carl Hagenbeck

of a park. Unfortunately, these parks did not afford the same experiences to the animals. This was due in part to a lack of concern, but more importantly due to the lack of knowledge of how to care for exotic animals. "Animal management, largely by trial and error, was not adequate by today's standards," writes Linda Koebner in Zoo Book.[13] It was often the case that only the trappers and a few others at the zoo had ever seen the animals in their natural habitats. No one took the time to study behaviors or what daily life in the wild consisted of. Zookeepers were forced to guess as to what these needs were.

Animals were often housed alone, even though they might be highly social and live in groups in the wild. Cages were small, barren concrete slabs surrounded by bars. There were no rocks to sit or scratch on, no trees to provide shade, no running water to drink or play in. Needless to say, boredom was common amongst the animals. The only highlights of the day were being fed and possibly being moved so the cage could be cleaned.[14]

Finally, a revolutionary change in the way animals were displayed came in 1907 with the opening of the Stellingen Zoo. The man who envisioned the design was German animal collector, Carl Hagenbeck. Although Hagenbeck originally was an animal dealer for menageries and circuses, he "dreamed of creating a spacious zoological park where he might display animals in settings that resembled their natural habitats."[15] Exhibits in the Stellingen Zoo had no bars or concrete slabs, but rather were rolling green landscapes that contained many animals and species. Artificial mountains and invisible moats separated predators from prey, while visually keeping them together. One final change was that the animals were displayed according their continent of origin, not taxonomic group. This display technique helped to educate the visitor as to which species were to be found together in the wild and also helped explain, for example, the similarities that animals from the Artic had which differed from animals from Africa.

Regrettably, due to the radical nature of the ideas and the expense involved with



Penguin Exhibit at the London Zoo

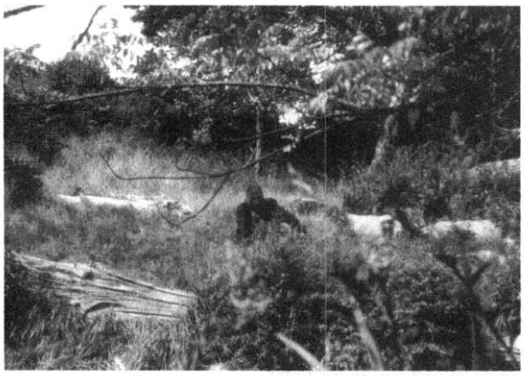
this type of design, much of the motivation provided by this zoo was quickly lost. The barred and tiled cages with concrete slabs continued, as exhibits turned into architecture showcases with the animals as mere props in the concrete landscape. Trends in zoo design were still not coming from research on animal requirements in the wild, but rather from the current movements in architecture. Jon Charles Coe, of CLR design, summed up the principles of zoo design in the mid 20th century well when he said,

> The hallmark of high-style Modernism of the fifties in zoos was that it was an architectural expression with animals in it. They were beautiful forms and shapes that had almost nothing to do with the animal's behavior.[16]

A classic example of this is seen in the penguin exhibit at the London Zoo. Here a double helix ramp serves as the center focal point of the otherwise boring concrete oval that houses the artic birds. Although the ramp serves as a place for the birds to sun themselves, one hardly gains any knowledge about the species or their habitat from this design.

Also in the late 50s and early 60s, animal psychologist, Dr. Heini Hediger, published two books in Germany, The Psychology and Behaviour of Animals in Zoos and Circuses and Man and Animal in the Zoo: Zoo Biology. The two were not translated into English until the mid 60s, but nonetheless they were and still are invaluable resources for animal behaviorists and zoo designers. In the books, Hediger speaks about the animals' needs in captivity versus in the wild and what elements are needed in zoos to combat boredom and foster natural behavior. Even though controversial in some ways, these books had monumental effects in the field of zoo design. They challenged the zoo to push farther and think more openly about their roles and responsibilities.

For numerous reasons, change slowly started to occur in the 1960s and later a more aware public was spurred on by the media and such shows as Wild Kingdom,



Woodland Park Gorilla Exhibit

which discussed the fight of animals in the wild from extinction.[17] The TV images of animals running free in open plains were not what visitors were seeing when they went to the zoo. Pressure to make changes in the appearance of the exhibits grew as visitors were opposed to seeing animals in the isolation of the current conditions. In addition, the problem of depleting natural habitats only continued to grow, and it became clear that zoos were going to be the link to help save endangered species from extinction. Awareness continued to increase in 1973 with the passing of the Endangered Species Act, which attracted attention from the media and was kept in the public eye by animal rights groups.[18]

In 1978, a major revolution occurred in Seattle, Washington. The Woodland Park Zoo under director David Hancocks opened a new gorilla habitat designed by Dennis Paulson, Grant Jones, FASLA, and Jon Coe, FASLA. The design shocked the zoo community, amazed the public, and effectively put the zoo design world on a new track. The exhibit brought a miniature piece of Africa to Seattle and gave the visitor a sense of stumbling upon the gorillas in the wild. In addition, it benefited its inhabitants greatly.

Still in use today, the gorillas are displayed in a troop and live in a habitat that resembles their natural one. The habitat helps to foster natural behaviors such as foraging for food, wrestling for dominance, and even breeding. The "neurotic behavior" the gorillas were displaying while living in the old exhibit disappeared.[19] The new exhibit shows the public not only the wonder of wild animals in a fascinating landscape but also the importance of the gorillas' connection to their natural habitat. This type of design strategy is referred to as "landscape immersion," a term created by Jones, Coe, Hancocks and Paulson in the 70s, which is still used today.[20]

Anne Powell explained why this immersion exhibit was seen as such a great

departure from the traditional zoo design as it,

> . . .reflected a pronounced shift in philosophy from the homocentric view – the zoo as a display of human power over nature-to the biocentric view-zoo as an educational medium that strives to explain the interrelationships between animals and the natural world.[21]

This shift in attitude is still stressed today in exhibits and is even more important as it is a key in the conservation race that continues. Unless we can understand our place on the earth, as part of something larger than humankind, we cannot fully understand the importance of conservation of all living things from animals to plants. The 1978 gorilla exhibit was a crucial turning point that led to increased responsibilities of zoos and organizations surrounding the conservation of animals and plants.

It is clear that during the last 20-30 years zoos have taken on a much higher and more significant level of responsibility. Be they called zoos, nature centers, "animal kingdoms," "bioparks," or conservation parks, the messages they send must be in the same vein. Zoos are not only places of recreation but are also serving as the modern Noah's Ark, as well as educators and promoters of animal welfare and habitat conservation.

# THE EVOLVING ZOO

We humans cannot help but seeing ourselves in other creatures. We and they share too many qualities to ignore, beginning with the miracle of our existence. For the same reason, we can't help but feel a powerful sense of loss when a life-form vanishes, never to return. Suddenly our planet seems a bit more lonely, our underpinnings a little less solid.

-Douglas H. Chadwick

In order to understand all of the influences that a zoo operates under everyday one must understand its roles and responsibilities, some old, many new.

These roles are affecting the requirements of the design which in turn affect the perception of the visitor.

* * *

## ZOO AS ARK

We're not playing God. We're simply trying to save some of these things while we can. Once they are gone, they are lost forever.
-Johnny Arnett

Gorilla Family

Polar Bear and Cub

There are many people and interest groups that would rather see zoos closed than open, but we must face the fact that the zoo has become a modern day version of Noah's Ark. In many cases, it offers the last bastion of hope for the animals inside of its walls. Zoos have become conservation outposts, taking it upon themselves to sustain species. In addition, some have even established large retreats to assist the breeding of large mammals.

Zoos are also helping in the goal of breeding in order to release back into the wild. Some of the statistics surrounding captive breeding are alarming. For example, Siberian tigers exist in higher numbers in zoos than in the wild. There are less than 400 left in the wild and about 800 in captivity.[22] The projection is that the tigers will become extinct in the wild in only a few years, if nothing is done. Populations will only exist in captivity. Thankfully, breeding programs are in place so that eventually some of the captive tigers may be safely released into the wild.

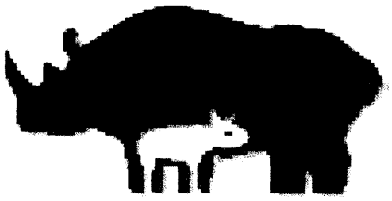
In order to accomplish the goal of repopulation, the design of the habitats in the zoos must mimic the animal's natural habitat. In an environment that meets these needs it has been proven that the animals are less stressed and can therefore engage in natural behaviors, one of which is mating. Through programs such as the SSP, Species Survival Plan, the zoological community is making an effort to breed animals from zoos across the country while keeping track of the gene pools to prevent inbreeding.

Zoos are preparing for future breeding as well. At the Cincinnati Zoo's Center for Reproduction of Endangered Wildlife, semen and eggs from endangered species are kept frozen, waiting to be used in future breeding. It is clear however, that even these attempts cannot hope to repopulate the wild completely in the future. But they do offer hope to many species and that is motivation enough to continue.

# ZOO AS ROLE MODEL

Conservation is a way of living and an attitude
that humanity must adopt if it wants to live
decently and permanently on eath.

-Paul Bigelo Sears



Species Survival Plan Logo

Another role that the zoo is taking on in an increased capacity is that of public role model. Participation in programs such as the SSP and other conservation efforts shows zoos leading the fight and demonstrating to the public the importance of the conservation effort. In addition, many zoos offer safari travel programs to Africa and Asia where anyone can go and see many of the same species they saw in the zoo, now at home in their native habitats. These trips not only continue the research effort for the zoo, but also allow the public to see first hand the beauty of the wild and the tragic destruction of land.

Another way zoos are making their goals known is through outreach programs. Many zoos take a selection of their animals to elderly homes, youth centers and hospitals, where they may talk about species and habitat issues one on one. For example, the Audubon Zoo in New Orleans often takes some of its smaller residents to cheer up children in local hospitals.[23] This type of outreach helps to garner support for the overall issues that the zoo is fighting for and brings joy to the community.

Zoos have also been given the responsibility to raise public consciousness about the right that all animals have to share the world with us. However, the problem that they are faced with is more of a cultural problem than a communication problem. Animal specialist George Schaller points out,

> There are a hell of a lot more Rembrandts in the world than there are Sumatran rhinos. But, the value that is placed on them is different. You have donors who will give a million dollars to a zoo, but you have donors that will give hundreds of millions of dollars of art to a museum. That's the difference in cultural values. An artist can replicate a Rembrandt, but nobody is ever going to duplicate a Sumatran rhino.[24]

The difficult task is to help visitors believe that animal conservation is an important cause to fight for. Certainly, a well-designed zoo with exhibits that educate visitors, consciously and sub consciously, is the place to start.

There must be a determined effort made in the zoo that the public sees on a daily basis. This not only refers to general zoo appearance, but most importantly, each habitat must be designed carefully with effort placed both on the animal's habitat as well as the visitor's experience in that habitat. After all, visitors come to the zoo with the first goal in mind of seeing animals. Unkempt polar bears in small concrete

pens leave the visitor with negative impressions that have the power to undermine all of the messages trying to be sent by the zoo. On the other hand, discovering a gorilla foraging in a lush habitat through the dense thicket imparts a much different and altogether positive impression. Zoo designers must push to leave the visitor with positive impressions and offer them the ability to enjoy themselves while learning, throughout the habitat.

## ZOO AS EDUCATOR

Animal exhibits are the heart and soul of the zoo.
. . . a zoo's primary educational tool is the exhibit.

-Seidensticker and Doherty

Docent at Zoo Atlanta

Perhaps the most important role zoos have is that of the educator. Zoos must be leaders on the educational front if the messages they are promoting are to ever gain strength.

They want to teach the basic idea of respect for animals, but are hard pressed to do this when their own animals sit in filthy or cramped conditions. Through the architecture, changes can be made. Zoos offer an incredibly unique setting for learning to take place. Unlike a sterile classroom with blackboards and overheads, a zoo has the potential to stimulate all of one's senses thus giving more power and life to the lessons to be learned. If the images visitors see truly touch their emotional side they are more likely to act to make change.

The design implications of this role are far reaching. It is clear that the designer must foster a human engagement with the animal. Be it a three inch long toad or a six hundred pound lion, the architecture of the enclosure must enhance the connection, not detract from it. Bars are simply not the right way, and neither are ten-foot deep pits that the visitor stares down into to see the animals. The design needs to link the wild animal with their wild habitat. Nothing important is learned from viewing a lion in a muddy pit surrounded by a water moat. The visitor gains, understands and remembers more by seeing this animal perched at the top of a hill keeping watch, while his mate rests below, under a tree in the shade from the afternoon sun.

* * *

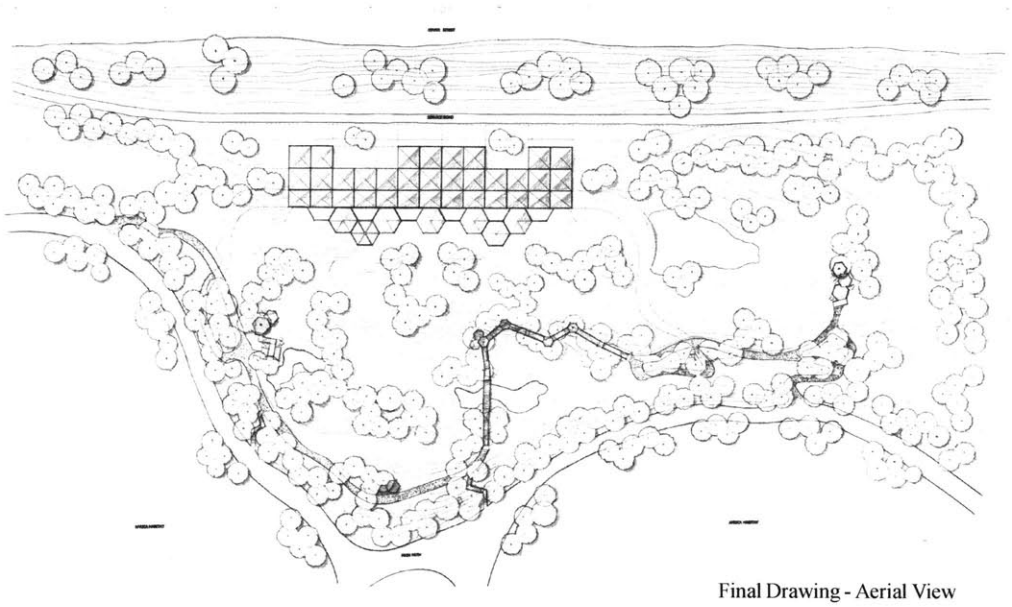
The forces that sparked these role changes in the late 1960s are still driving much of zoo design today. Many advances have been made, but it is clear that many more are still to come. It takes research, insight, education and most importantly imagination to design an animal habitat that accounts for the new and more involved roles zoos are undertaking. If done well, the benefits are infinite.

With this in mind, I have taken a somewhat different approach to design in this thesis. By placing aside some design ideas that have quickly become traditional, I have opened the possibility of creating a new idea of zoo design which has positive affects on both the animals and their human visitors.

# THE PROJECT

The world is as delicate and complicated as a
spider's web. If you touch one thread you send
shudders running through all the other threads.
We are not just touching the web, we are tearing holes
in it. Now think of the web as a safety net. The
thin strands of survival. Help us tend it, repair it,
hold it together..

-Gerald Durrell



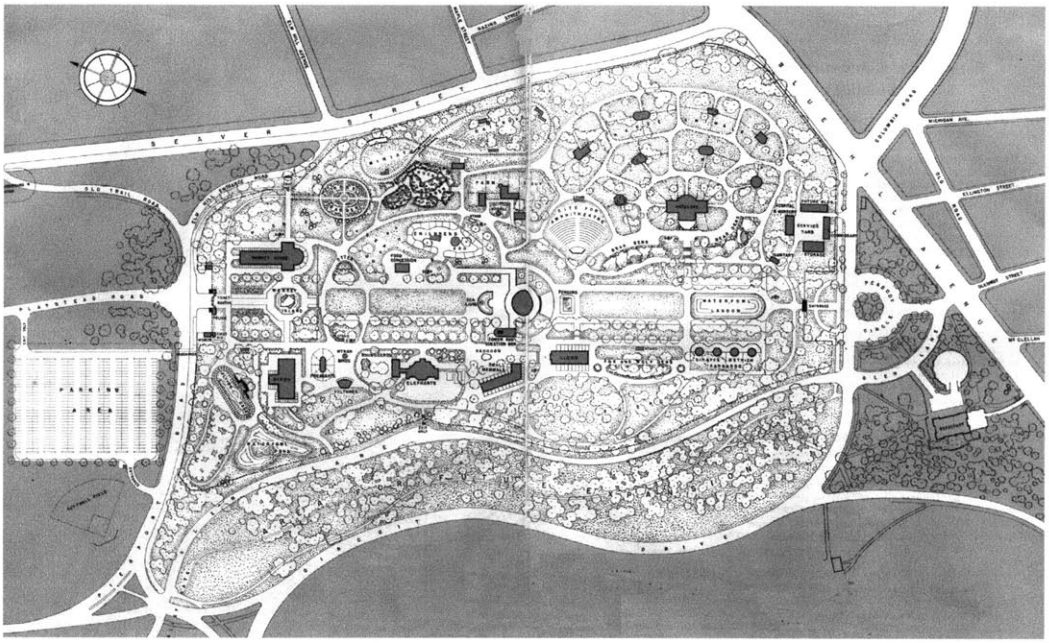
Final Drawing - Aerial View

# INTRODUCTION

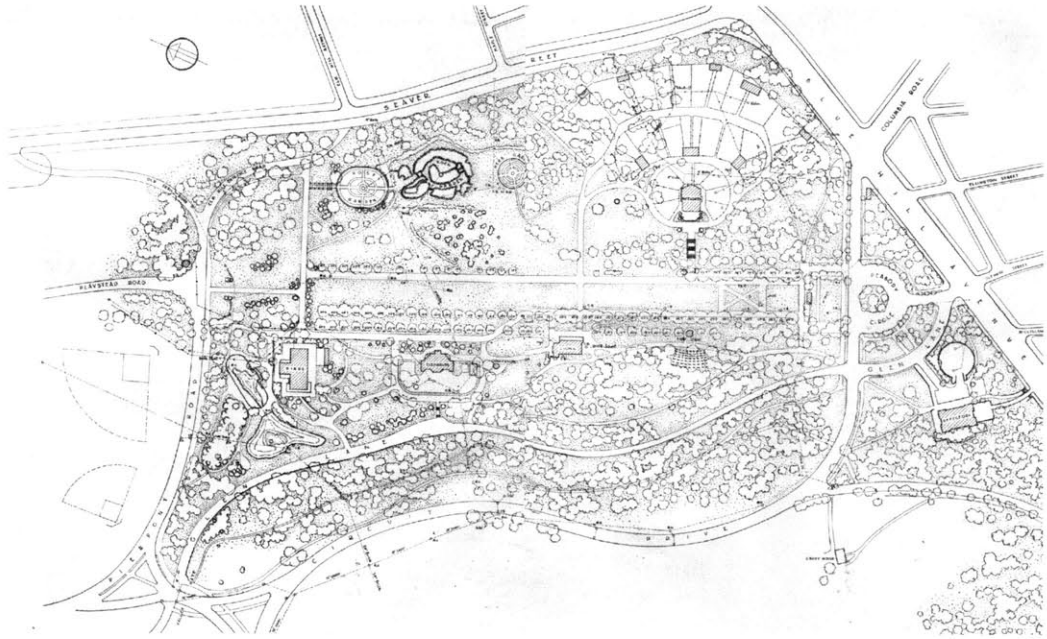
This thesis actually began over ten years ago when the idea of combining my love for animals with my interest in architecture first became apparent. Since then I have been focused intensely on both areas. The most significant push came in January of 1999, when I began extensive research. Through letters, e-mails, phone calls and meetings, I was able to speak with many of the top zoo designers as well as meet with zoo directors and on staff architects. These meetings and discussions helped to clarify the most important issues and challenges facing zoo design today. The discussions also allowed me to address specific design issues in this thesis and to confront some of the traditions that have developed, but should be challenged.

The semester was a mere thirteen weeks, which forced a quick pace throughout. At the beginning, I established the overall goals for the project and laid out a schedule that would allow me to meet all of them. Although the thesis expanded from its initial ideas, it never lost its sense of focus, which was driven by the belief that I was working on a project whose results meant more than the simple completion of MIT institute requirements. I was not only researching and discovering for myself and others, but also I was working for the animals. In this thesis that was over ten years in the making, I was working for myself and ***designing for those without voices.***

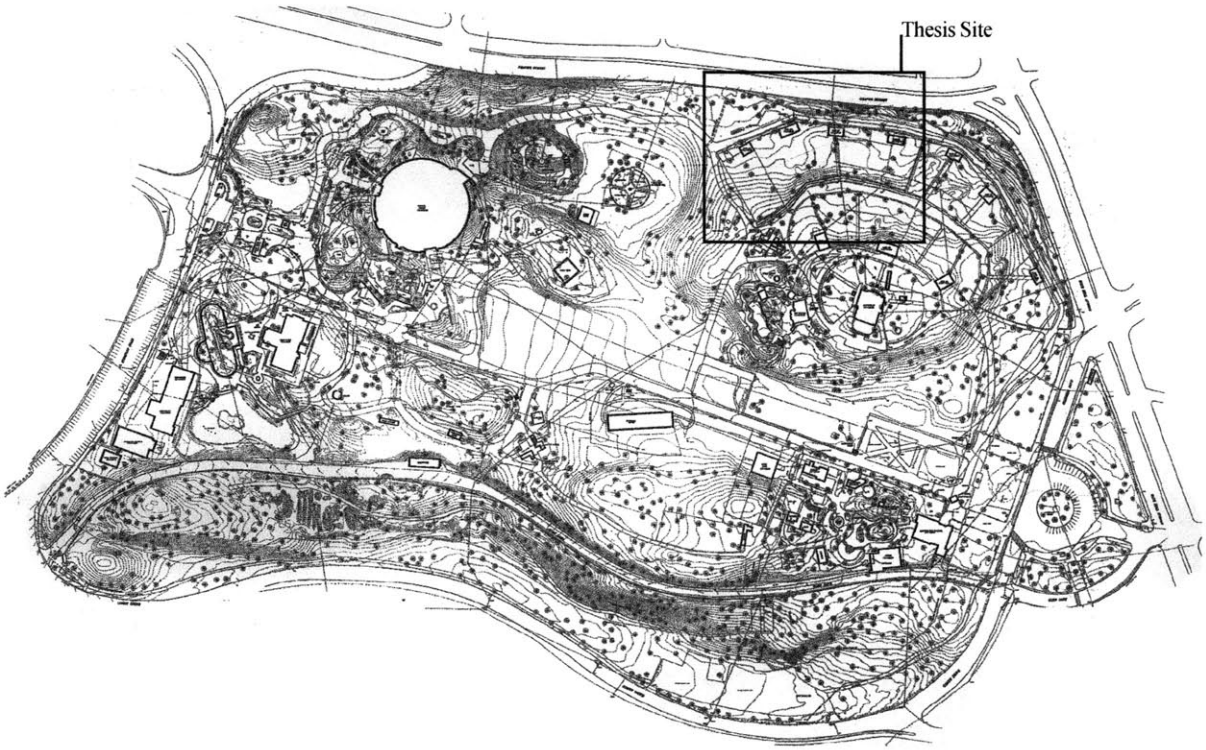
# SITE HISTORY




Initial Site Plan




Site Plan from the 1950s




Current Site Plan

The site for this thesis is the Franklin Park Zoo, in Boston, Massachusetts. Although it offers unique opportunities, it is important to know that the site chosen could have been anywhere. It was not the catalyst for the design, nor was the purpose to respond to the mission of the zoo or the current buildings on site. Rather, this design must be thought of as an exploration of a strong idea in which the site gives certain elements for the design to respond to such as climate, orientation, and general site limits. With that in mind, it is however important to know general information about this zoo and how it came into being.

In 1886, Frederic Law Olmstead proposed a design for Franklin Park. In the plan he called for a portion to be used for a zoo which was to house native animals. It took almost thirty years, but finally in 1912 the construction for the zoo began. The development plan came from Arthur Shurcliff who, "envisioned the eventual creation of a very large zoo with a wide variety of exhibits."[25] Over the years since its construction, the zoo has undergone many changes not only affecting its plan but also affecting its collections, size and type.

Today, the zoo encompasses over 80 acres, 54 of which are currently used. The other unused portion lies between Glen Lane and Circuit Drive. It provides a buffer from noise and other park and street activities and affords the zoo with the potential space to expand. New exhibits and renovations are occurring at the park, but unfortunately their quality is to be questioned.

Franklin Park is home to over 200 species of animals and even has a branch zoo, the Stone Zoo, located in Stoneham, MA. There is clearly progress occurring at the zoo, but it needs to be directed and focused. Perhaps this design can lend itself toward that direction.

The location of the new design is in the northeast corner of the zoo. The 95,000 $ft^2$ design is located within an area that has been closed off to the public, awaiting a new design. It currently serves as a holding area for some of the animals that are not on exhibit or who are waiting to be transferred to other zoos. Around this area are exhibits for lions, giraffes, zebra, ostriches, and ibex all from regions throughout Africa. Thus, using a portion of the closed area for an exhibit to house African hoof stock fit in well with the current scheme of the zoo.

# SITE PHOTOS

Existing Exhibit Barriers

Exisiting Two Sided Path

Existing Animal Holding

## CLIENTS

Another important concern of the design is its clients. In this case, they are both human and animal. Zoo visitors have already been spoken about and will be addressed later as well. It is important to now focus on the residents of the exhibit, the animals.

There are three main mammals around which this exhibit is designed, as well as numerous other animals that find their homes in the interior exploration area.

Again, any animals could have been chosen for this design, and in fact the choice was a topic of discussion for quite awhile. Finally, after a visit to the zoo in late August, I had a discussion with a zookeeper, which led me to the first of the three animals, the bongo.

The bongo comes from edge-mountain regions in Africa. It is a hoof stock mammal that is endangered but rarely seen in zoos. While researching the bongo, I came across an article in a 1995 July issue of National Geographic on the Congo region of Africa. Two other species from that area were discussed that specifically interested me, the Yellow-Backed Duiker and the Sitatunga. Both are endangered hoof stock and inhabitants of the Congo area along with the Bongo.

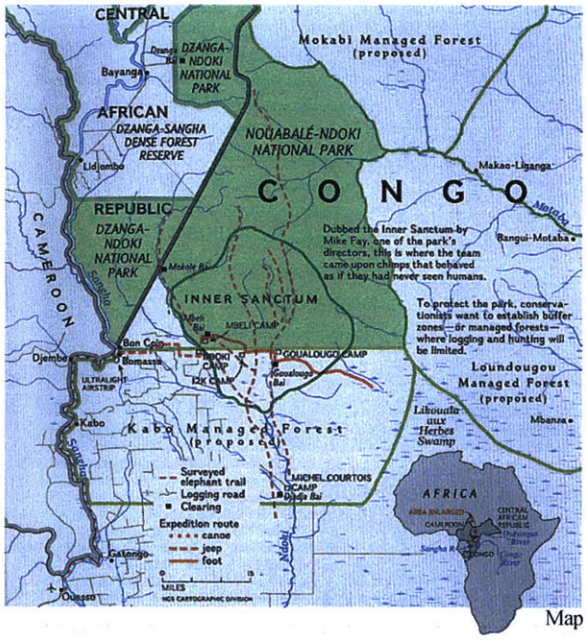
Although, not the usual crowd pleasers as the bears, giraffes or lions are, these three animals have just as much reason to be in the zoo as the rest. Their limited numbers in zoos suggested a need to conquer the design challenge that awaited me.

In addition to the three hoof stock, there are a variety of other species that live in the exhibit, pottos, western tree hyrax and a few amphibians. They live in the same habitat as the bongos, duikers and sitatungas in Africa and are in the exhibit primarily to illustrate the need for species conservation.

CONGO, AFRICA

Watering Hole Image

Aerial Image




Map

## THE BONGO

# BONGO

*tragelaphus euryceros*

## Description:

Height: 44 -54 inches at the shoulder

Weight: female - 462-557 lbs
male - 528-589 lbs

Markings: short, glossy, brown coats with vibrant yellow-white stripes that provide camouflage in the forest. Both females and males have horns as well as notably large ears.

Diet: herbivores and browsers. they eat leaves, flowers twigs, saplings and thistles.

Habitat: across tropical Africa from the Sierra Leone in West Africa to Kenya in East Africa. Found in dense lowland or montane forests.

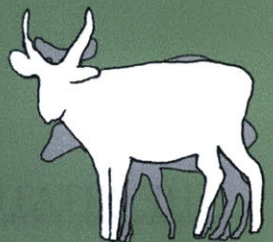
Facts: lifespan of 19 years in a zoo, less in the wild. one of the few social antelopes, only one to form herds. nocturnal in nature. use prehensile tounge to grasp vegitation. very few bongos are kept in zoos, less than 1/5 of the amount of lions, elephants, or giraffes.

Status: threatened due to habitat depletion and human hunters who have eliminated them totally in areas across Africa.


Area which exhibit design is modeled after.


Bongo habitat across Africa.

Bongos in their natural habitat.



Bongo silhouette versus duiker and sitatunga.

Map and photos from National Geographic and Audobon Field Guide to African Mammals.

## THE SITATUNGA

# SITATUNGA:

## tragelaphus spekei

### Description:

Height: 45-50 inches at the shoulder

Area which exhibit design modeled after.

Weight: 120 - 185 lbs female
160 - 240 lbs male

Markings: shaggy coat adaptation for aquatic habitat conditions and is coated with an oily-water repllent. females have red-brown coats while males have a gray-brown coat. hindquarters higher than forequarters.

Sitatunga habitat across Africa.

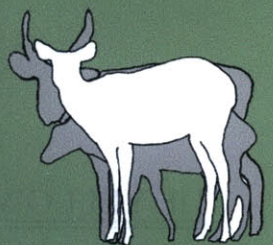
Diet: herbivores. they eat water plants, bullrushes, sedges, grasses and leaves.

Habitat: across the savanna and areas of East Africa from Tanzania, Kenya and Uganda. found in marshes, water-meadows, and rainforests.


Natural habitat.

Facts: lifespan of up to 19 years in captivity. readily uses pools and wallows to cool off. has a more developed hoof that allows it to run over muddy ground and to swim with ease.

Status: threatened due to habitat depletion. swamp land being drained and running sitatungas out of habitat. hunted by humans who run them out into water where speared from boats


Sitatunga silohuette versus duiker and bongo.

Maps and photos from National Geographic and Audobon Field Guide to African Wildlife.

# THE YELLOW-BACKED DUIKER

# YELLOW-BACKED DUIKER

## cephalophus silvicultor

### Description:

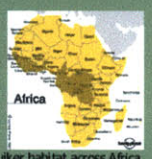
Height: up to 35 inches at the shoulder

Weight: 100 - 145 lbs female
125 - 175 lbs male

Markings: short, dark coat with long yellow hair that stands erect along the top of the back. both female and male have horns. largest of all the duiker species.

Area which exhibit design is modeled after.

Diet: herbivores and browsers. they eat fruit, seeds, fungi, bark of trees and berries dropped by monkeys in the treetops.



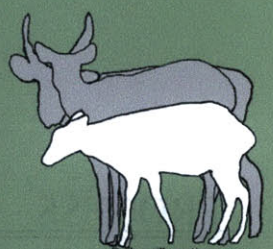
Duiker habitat across Africa.

Habitat: across central Africa. west from Senega to Kenya in the east and south to Angola. Found in heavy undergrowth of riverine or montane forests.


Natural habitat image.

Facts: lifespan of up to 12 years in captivity. male and female pairs bond for life, but spend most of their time apart. duikers spent a lot of time grooming each others heads as a way to bond and demostrate they are a couple.

Status: threatened due to habitat depletion and human hunters who eat them. also threatened by humans who use body parts for charms against evil spirits.

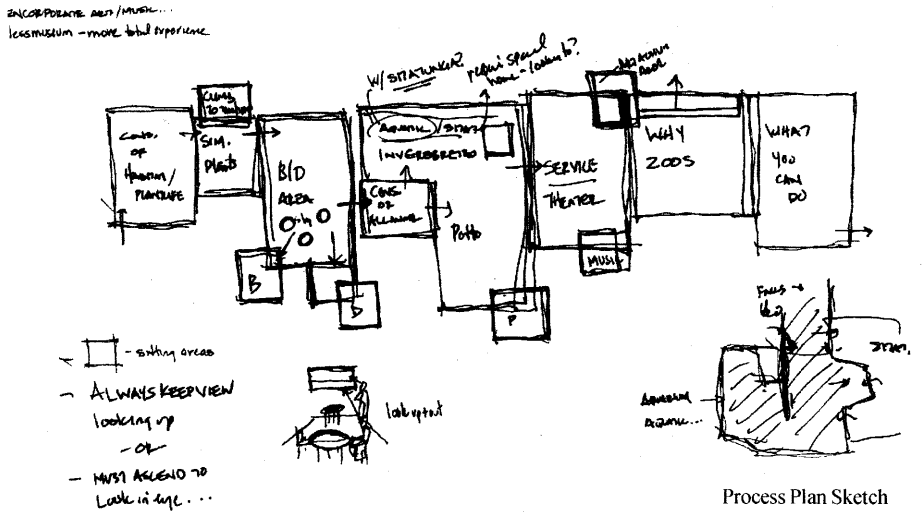

Duiker silhouette versus bongo and sitatunga.

Maps and photos from National Geographic and Audobon Field Guide to African Wildlife.

# PROCESS

We stand guard over works of art, but
species representing the work of eons are
stolen from under our noses.

-Aldo Leopold




Process Plan Sketch

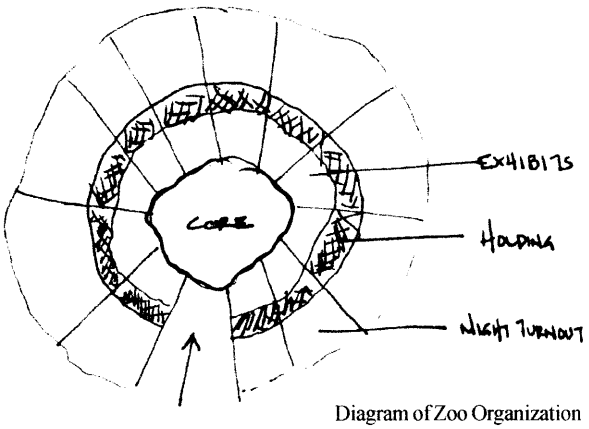
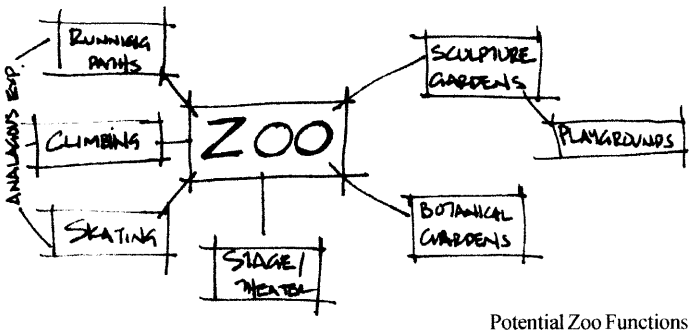



Diagram of Zoo Organization




Potential Zoo Functions

## SKETCHES

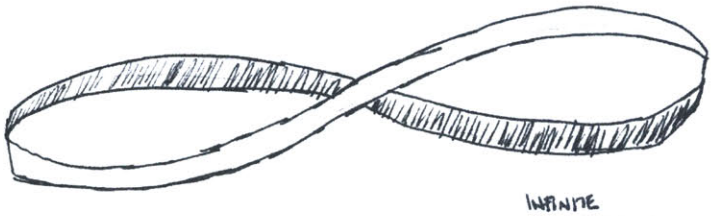
This design demanded working both in model and drawing and the process which evolved was key to the end result. Each model and sketch showed areas that were working well, or needed attention. In addition, new ideas were generated in the models and drawings that naturally suggested a direction to move in. A complete understanding of the process explains the final design and is useful at this point.

* * *

At the beginning of the design, before a site and species were chosen, I did a lot of sketching to push the ideas I wanted to see developed in the thesis. Although all of the time spent was valuable to the thinking process, there are a few sketches that stand out that were key in the design.

The first sketch is an idea about the overall organization for any zoo. Although this does not apply at the Franklin Park Zoo, the idea is still interesting and useful. In the sketch the basic plan is a circle with a main core surrounded by smaller spaces. The heart of the zoo is in the core, where the visitors are as well as the animal exhibits. The spaces that extend out around the core are the animal habitats. During operating hours the animals are in the front of their habitats where visitors can see them. After closing, the animals transfer into their holding areas, which are located in the center ring, or they can move out into the larger night turnout where they can forage or perhaps "hunt" for their meals. Many animals kept in zoos are nocturnal and the larger turnout area in the circle plan gives the needed space to run, browse or just sleep. The design allows for keepers to walk or drive up and down the perimeters of the individual habitats to keep watch on their animals. In addition, the turnout can be separated into smaller areas for sick animals, or for babies.

The second sketch is a diagram of ideas. I believe that a zoo can be more than just a place to see animals. It can bring together many experiences and thus make the one place meaningful in many ways to a much wider audience. These experiences will not take away from the messages the zoos are sending or demean the animals, rather they can enhance both. Fostering the connection between human and animal can occur through countless ways at the zoo, the main way being of course through the exhibit experience but there can be more. For example, all zoos should have sculpture gardens filled with scale models of animals, created by local artists, that can be touched and even climbed on. Children and adults can begin to give scale to the animals they see from a distance. In addition, there can be areas where visitors participate in analogous experiences to animals in order to understand them better. For example, there can be an area where a visitor tries to climb a tree to get a banana faster than the quickest chimp in the zoo, or perhaps there can be a large




Mobius Strip

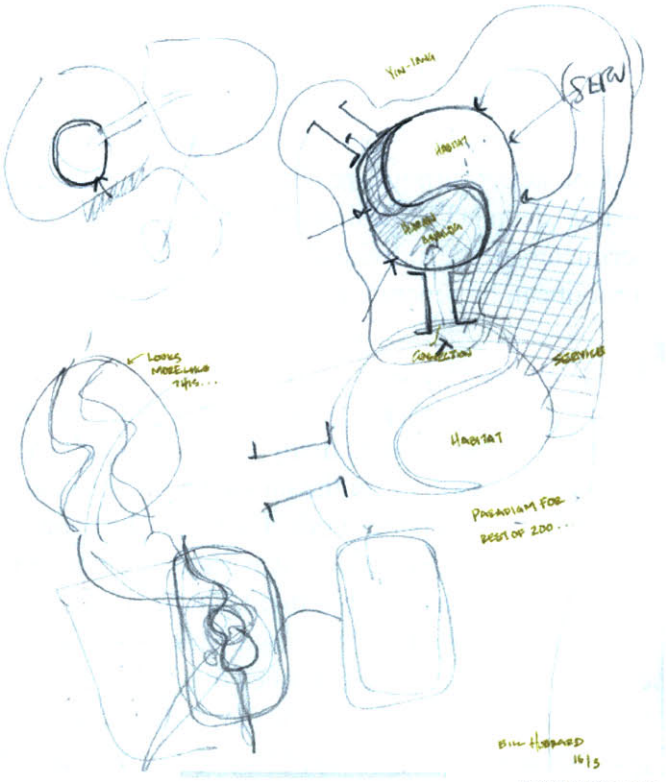


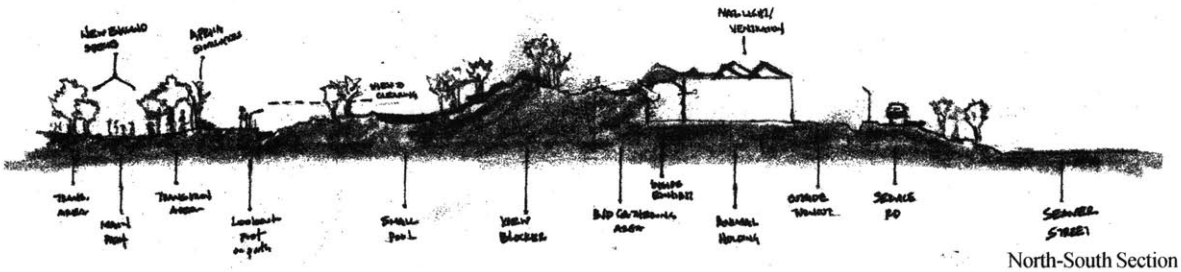

Exhibit Diagram

reflecting pool and fountain around the polar bears and penguins that converts to an ice skating rink in the winter. Visitors can skate on the ice while watching the penguins try and traverse the ice in their habitat or watch the polar bears break through it to go for a swim in their pool. Not only are the visitors having fun in a unique setting, but they are inherently learning about their Artic friends.

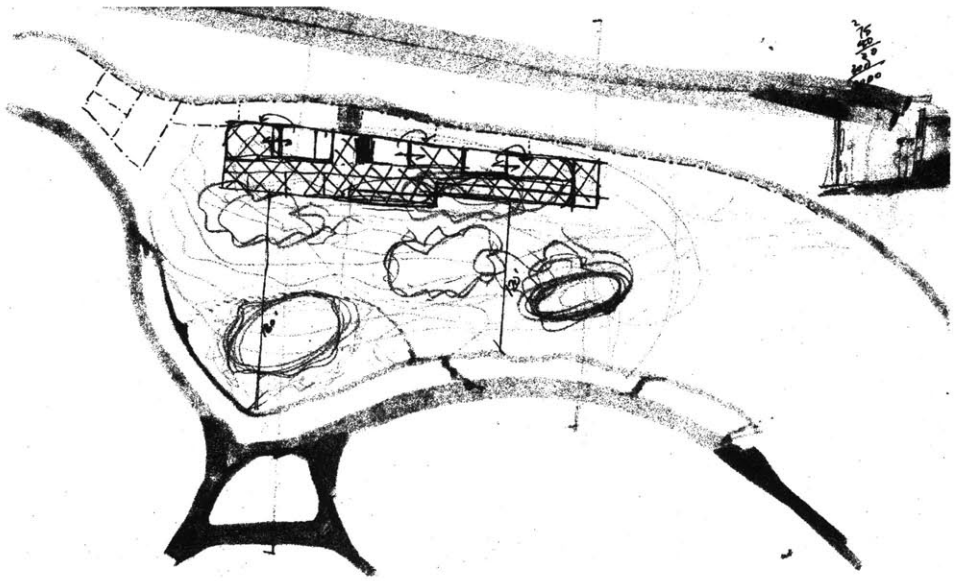
The next sketch is of a Mobius Strip. It provided one of the metaphors from which to begin the design. The Mobius Strip is a one-sided strip that has no true beginning or end, nor does it have a front or back, inside or outside. It is constructed by taking a strip of paper, twisting it once and connecting the two ends thus making it continuous. The idea of making a once two-sided object one-sided was very important to the design. It suggests that the animal side of the exhibit can be integrated into the visitor side of the exhibit and the two can become one. The boundary between the two can be blurred and the separation made almost invisible.

The final sketch is based on a similar idea of integration, the ying and yang circle. The sketch talks about the connection between the animal side of the exhibit and the visitor side. The goal was to make the two inseparable and linked on many levels. It also began to talk about how entry to the exhibit would occur and how this exhibit would connect to the rest of the zoo. The exhibit is a self-contained habitat that links to other self-contained habitats creating a zoo.

All of these sketches were generators for the project and reference points for early design moves and decisions.



North-South Section

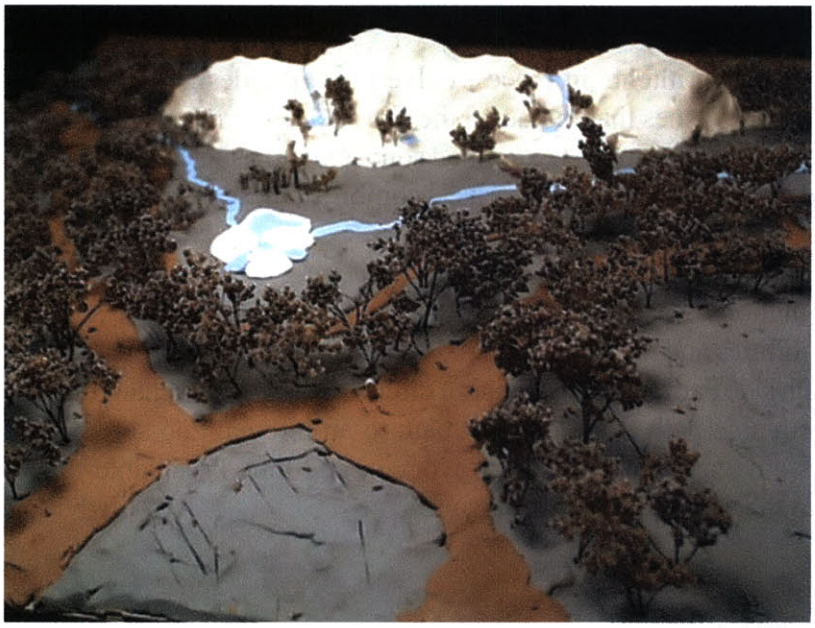


Plan Sketch

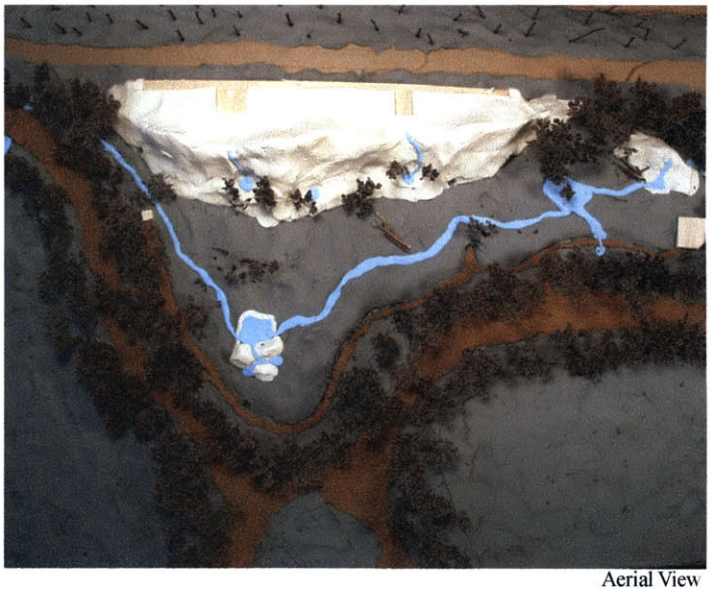
## 1"=64'- 0" SKETCHES

With goals set and design intents in place I delved into the design process with a look at climatic issues that impacted the site such as, sun pattern and predominate wind direction. In addition, I examined some existing site conditions such as slope, area, and current circulation patterns. I combined these explorations with diagrammatic drawings at 1"=64'-0."

From this initial examination I was able to get a full understanding of the site and grasp its potential possibilities and limitations. I made a few initial design decisions such as keeping the south side path as the main visitor circulation route and changing the function of the north side path from a visitor path to an internal zoo service road. These decisions gave a clear direction to work in and thus I was able to comfortably move onto the first model of the design.



Aerial View

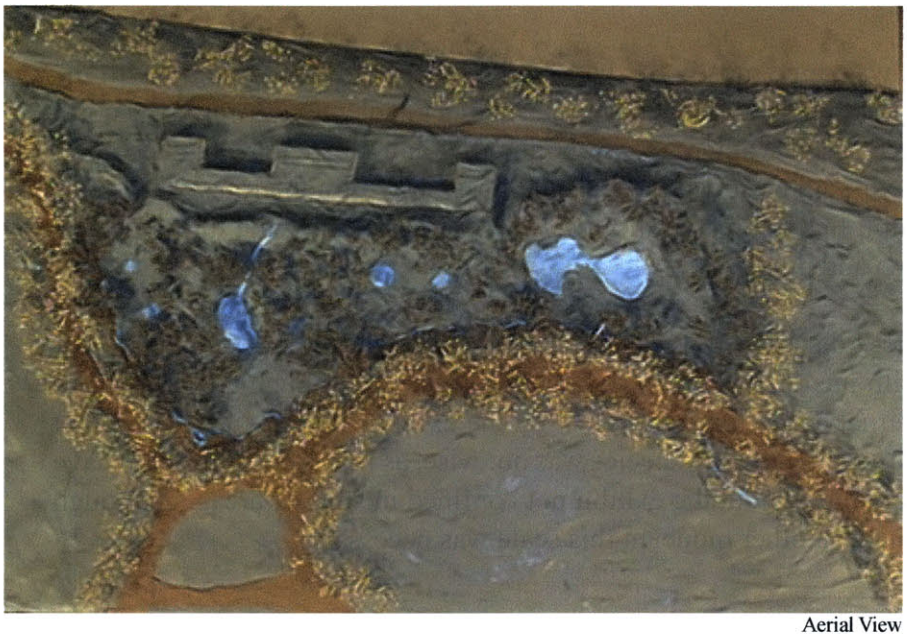


Aerial View

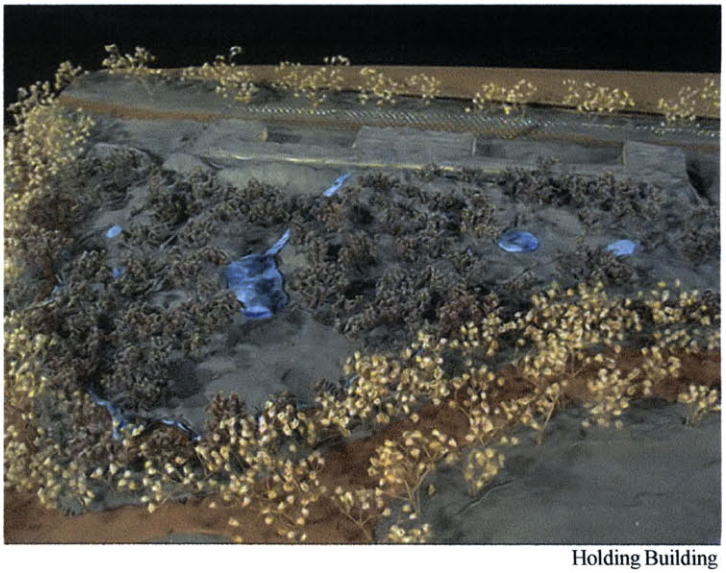
## 1”=32’- 0” SITE MODEL

This model was done mostly in clay. It allowed me to quickly play with the contouring of the site and led to a proposal of a tall element towards the north edge of the site, which would contain the internal animal shelter. In addition, I looked at the two-path system as well as the possibility of numerous water areas within the exhibit that addressed the specific needs of each of the three species, sitatunga, bongo and duiker.

From this model I discovered it was necessary to change the current slope of the site to work with the design intent. It was also clear that enough area existed to propose an internal space for visitors within the exhibit. Finally, it seemed that designing areas specific to each species was not wise, as it was design goal to have them roam freely throughout the exhibit not confined in smaller areas. Although progress was made another model at this scale was necessary.



Aerial View



Holding Building

1"=32'- 0' SITE MODEL

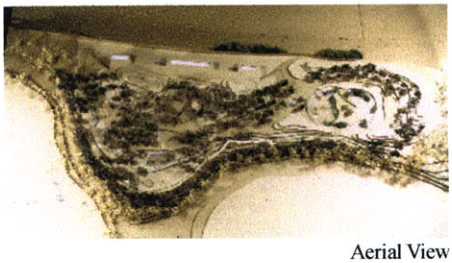
Again the model was made mostly out of clay. In this model I examined the built areas of the site more. The somewhat rectangular dimensions of the site clearly suggested that the visitor area be integrated with the animal holding. This met with another of the design goals, which was to break down the mystery of what goes on behind the scenes at the zoo. The connection of the two areas lent itself to the possibility of allowing visual connections and was efficient in terms of construction. In this model, the height of the mountain that the built forms were nestled in was lowered. This gave a more realistic scale and made the mountain form believable and similar to those found in Africa.

Finally, I worked on some landscape issues. I designed numerous interconnected water areas, instead of three independent ones. Also, the trees and shrub plantings were well thought out as they created areas for the animals to gather in shade that put them in full view of the visitors on the path.

The design ideas were strong enough that they needed to be explored at a larger scale and in new materials. In addition, the design of the animal holding and visitor area were looked at in greater detail.

Habitat Entrance

Habitat Bridge



Aerial View

## 1"=16'- 0" SITE MODEL

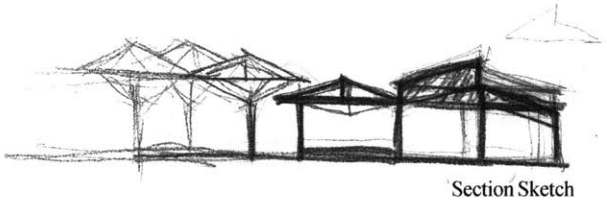
The sixteenth inch scale model was very revealing. It was constructed out of eighth inch cardboard, therefore all of the contours of the land had to be known unlike in the clay models. In addition, the larger scale helped me to look at the previous design decisions in greater detail. I learned the most in the actual construction of the model for these reasons, rather than in looking at it after completion. It showed the areas in the design that needed to be examined further and those that were working well.

Areas that were working well included, the placement on the site of the built forms, the large watering area for the Sitatungas, separation of main visitor path from exhibit path, general contours of the site, interconnected water areas and planting areas that were beginning to create a diverse habitat simulating the African habitat from which the animals came.

The areas that required further investigation were the built forms and the internal path. It was still unclear as to how the visitor exploration area was going to work. What was its main purpose? How did it translate into plan? How was it going to relate to the animal holding areas? How does a visitor get in to it? All of these questions needed to be answered.

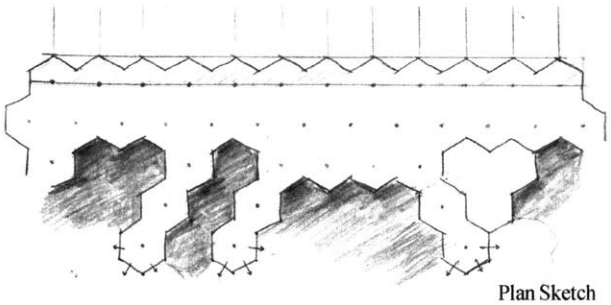
The second area that needed to be examined was the internal path. Not only was it too similar to the main visitor path, but it also needed to do more to engage the visitor. Could it go further into the site? Could there be areas where visitors could move off of it? There were clear issues here that needed to be addressed in drawings.

Section Sketch

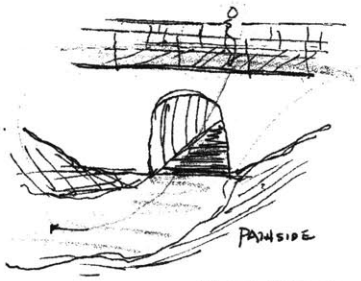


Section Sketch

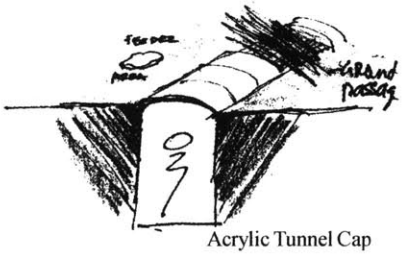
Viewing Bubble



Plan Sketch



Tunnel Entrance



Acrylic Tunnel Cap

## 1”=16’- 0” SKETCHES

At sixteenth scale I looked at the two pressing issues. From the days spent sketching it was clear that the inside spaces were going to take on an entirely more crucial role that had been anticipated in the initial design. This change was welcome, but required more attention as they were proving difficult to design.

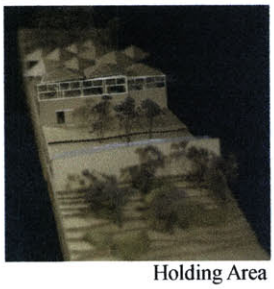
During this time I became very interested with the canopy of trees that flowed through the sixteenth inch model. The canopy made the two independent areas of the animals and visitors one, at least in the sky zone. In "planting" the numerous trees in the models I became intrigued with the branched structural system of the tree and I wanted this feeling to carry over into the internal spaces. The metaphor of the canopy therefore became a generating idea for the structure of the buildings.

I also spent time sketching the path and looking at the different qualities that it could have along the length of the exhibit. It was clear that the path needed to differentiate itself from the main path in shape, width and function.

A design goal from the beginning was to play with the eye level of the visitor. Normally in the zoo, the animal is looked down upon. This gives a very distinct message of human dominating the subordinate beast inside of the walls. I had already dissolved the walls of the exhibit and made them as invisible as possible, and lowered the path as to have the visitor looking up as much as possible rather than down. I also thought it would be great if somehow the visitor could look up at the underside of the animals as they passed overhead. This would truly be unique.

This idea seemed to fit into the design seamlessly and was the solution to an earlier problem of how to get the visitors to the internal areas. I created tunnels where the visitors would pass under the exhibit and come up into the inside spaces. This worked in section with the contour of the land and allowed for a transition zone from outside to inside. Along this underground tunnel would be areas open to the light and exhibit above, but covered with a clear acrylic half-cylinder, similar to some aquarium exhibits. Here animals could look down at the visitor and the visitor in turn would look up at the animal. Not only would this allow a further understanding of the animal, but it also allowed natural daylight into the tunnel. In addition, there could be small domes along the path that a visitor could climb up into to look out for a 360-degree view of the exhibit from the viewpoint of the animals in it.

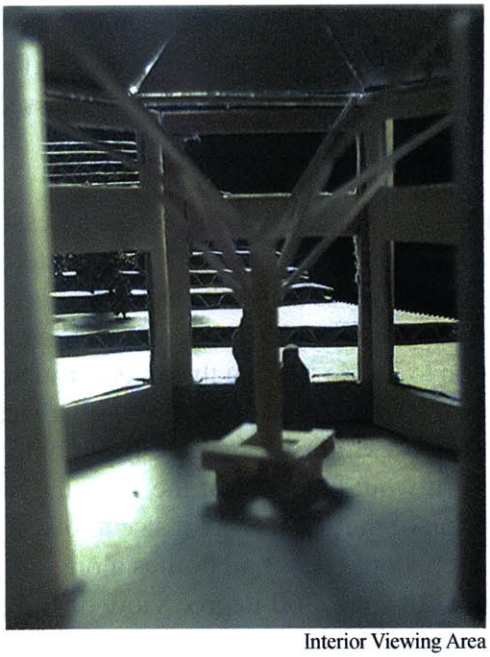
Further investigation of these ideas demanded a sectional model that looked at the site from north to south.



Holding Area

Exhibit Path

Exhibit Path



Interior Viewing Area

## 1"=8'- 0" SECTION MODEL

For this model I took a sixty-four foot wide strip of the site running north to south. It covered the entire site from Seaver Street to the main circulation path. I was able to study and work with a manageable piece of land at a very large scale. I was able to construct the interior spaces and look at the transition from one to the other. I took pieces apart and rebuilt them many times until I was satisfied. In addition, I was able to examine some of the landscape issues I was dealing with, including how earth could flow right onto areas of the roof.

The first issue I encountered came at the zone between the main path and exhibit path. Here I wanted to play with the species of the trees. It was a design goal that the zoo extends itself to include a botanical garden. Therefore, the main path along with open public spaces contains species that are indigenous and frequently seen throughout the New England area. However, the exhibit path contains perhaps less common New England species as it is trying to simulate the plants and look of the African Congo. In the model I was able to determine the width needed between paths as to not have the shift between planting schemes abrupt, but rather smooth, as you move through it at the entrance/exit points where the shift would be visible.

The last issue I encountered was with the interior animal holding and the visitor exploration area. Through sectional and plan sketches during the modeling process it was clear that the structural system for the exploration area would be best as concrete hexagonal domes. They have the ability to hold the increased load of earth and the potential of animals walking on top of them. In addition, as each dome is self sustaining, it is possible to move some up to allow natural light to penetrate in at specific areas. The concrete domes are supported by columns and a branched structure, which connects the shell to the column at six points. When looking up at the system the metaphor of the canopy is clear, yet not overdone. The hexagonal pattern transferred to the plan and helped to define the extent of the building footprint. The next question however, was how to transfer this system into that of the very orthogonal plan for the animal holding area. Working in plan and model I was able to find a scheme that used a similar branched structural system with square concrete pyramids, rather than hexagonal domes.

There were also many things which this model proved were working: the lower visitor viewpoint, the necessity for two paths, the areas of the building that pushed out into the landscape and the night turnout area for the animals.

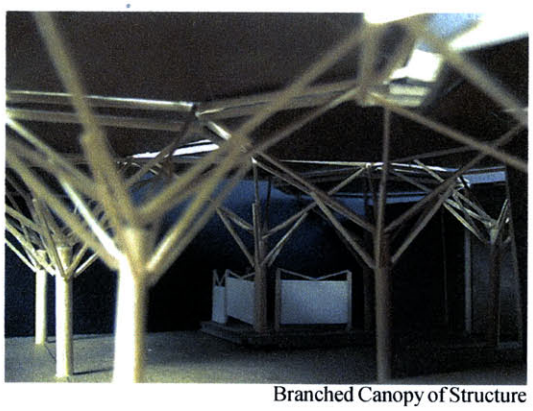
Along with this model, additional secondary design moves that would ultimately give life to the exhibit were being worked out in sketches.

# FINAL PRESENTATION

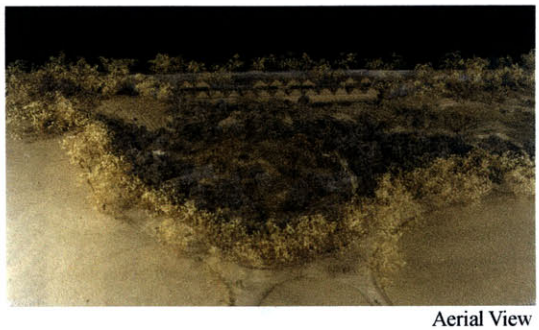
The visitor's entire experience, to one degree or another,
rests with how well the park is designed.

-David Towne

Branched Canopy of Trees



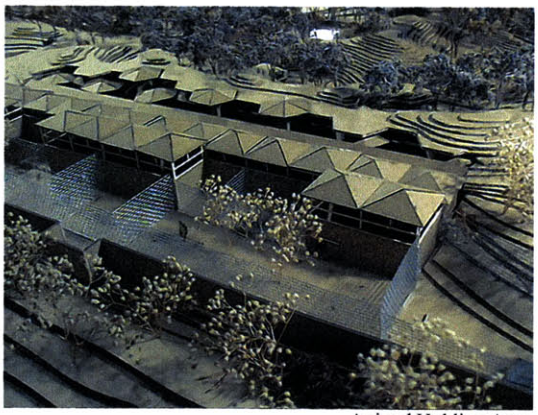
Branched Canopy of Structure



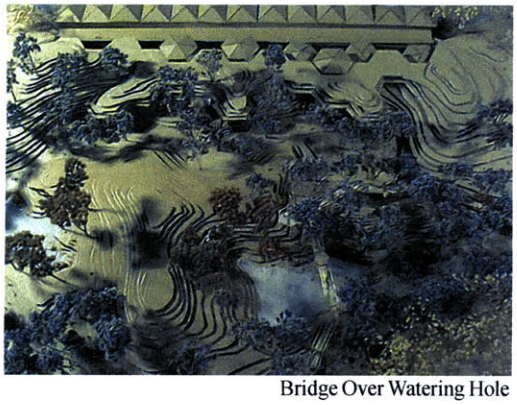
Aerial View

FINAL MODEL - 1”=16’- 0”

Bridge



Animal Holding Area



Bridge Over Watering Hole

Exploration Area and Holding

Exploration Area

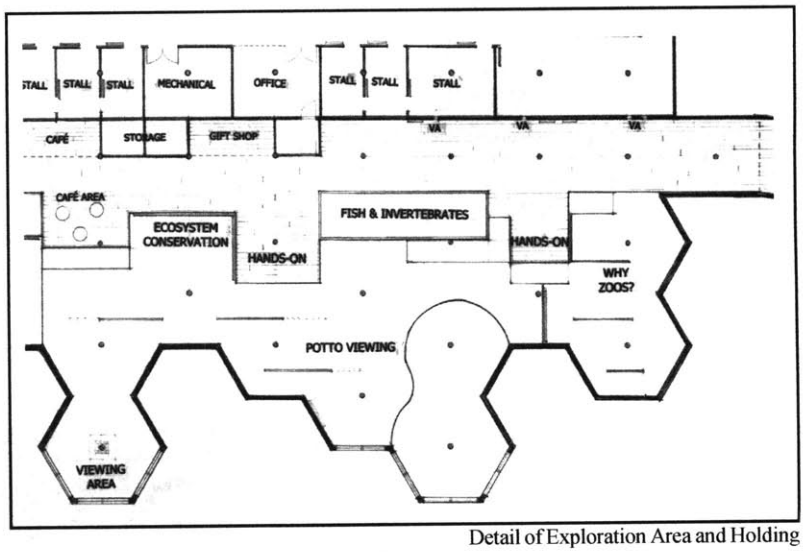
FINAL SECTION MODEL - 1"=8'-0"

Layering of Concrete Domes

Viewing Pavillion

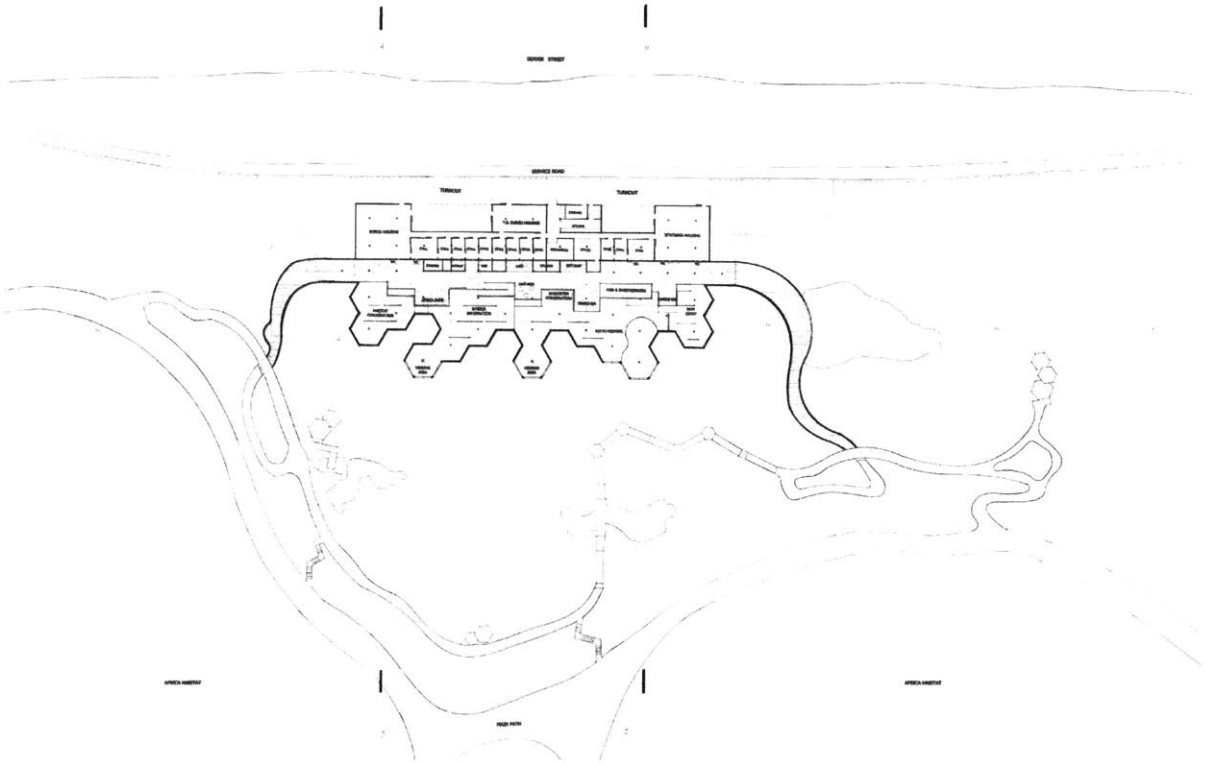
Built Structures

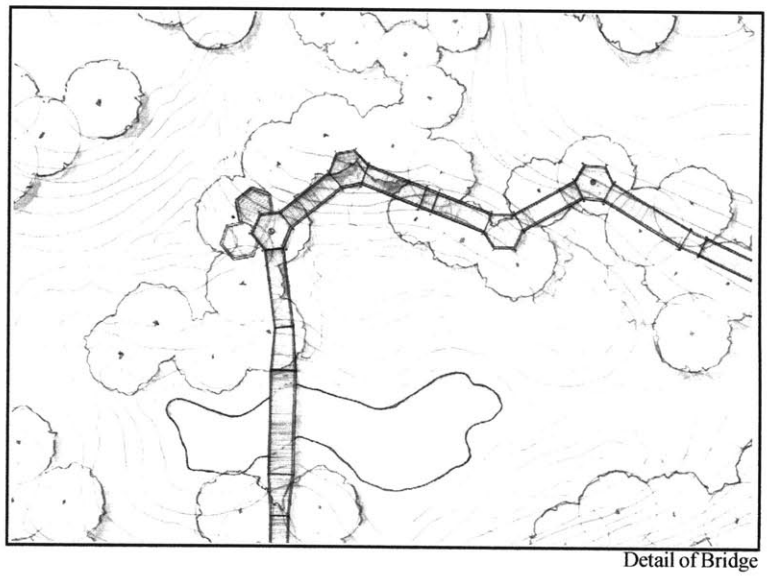
Structural Canopy




Detail of Exploration Area and Holding

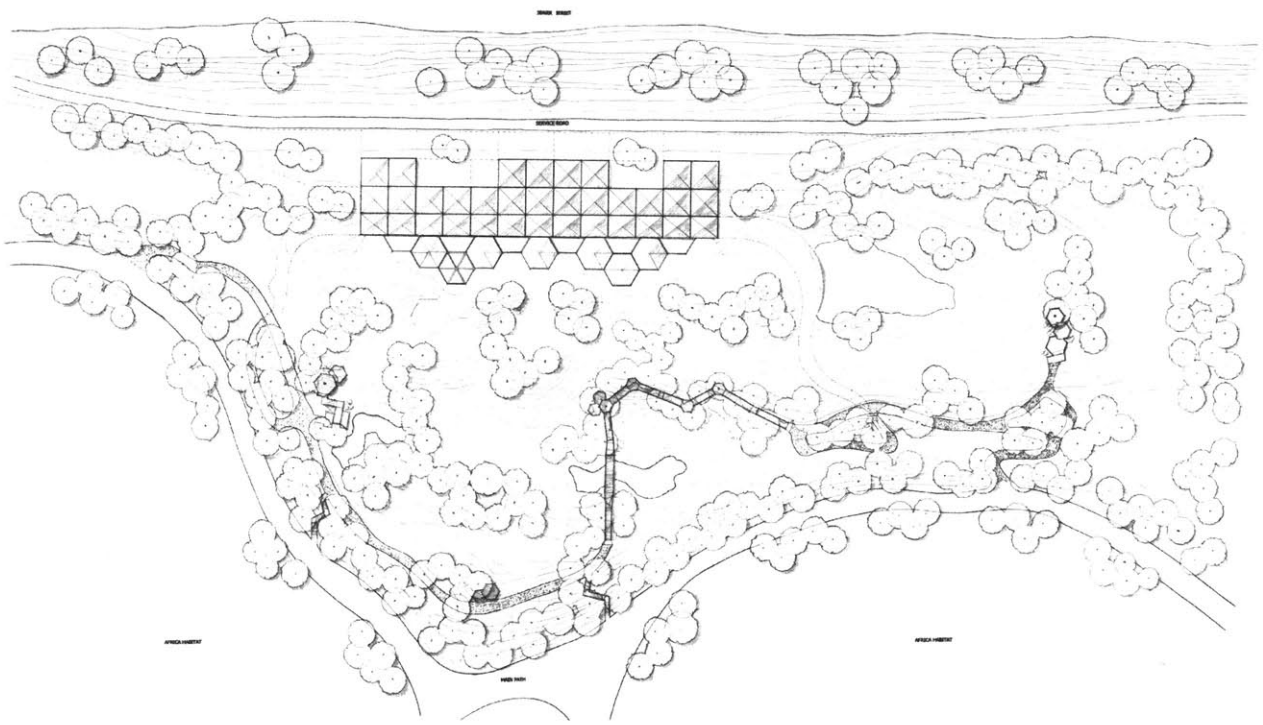
## PLAN



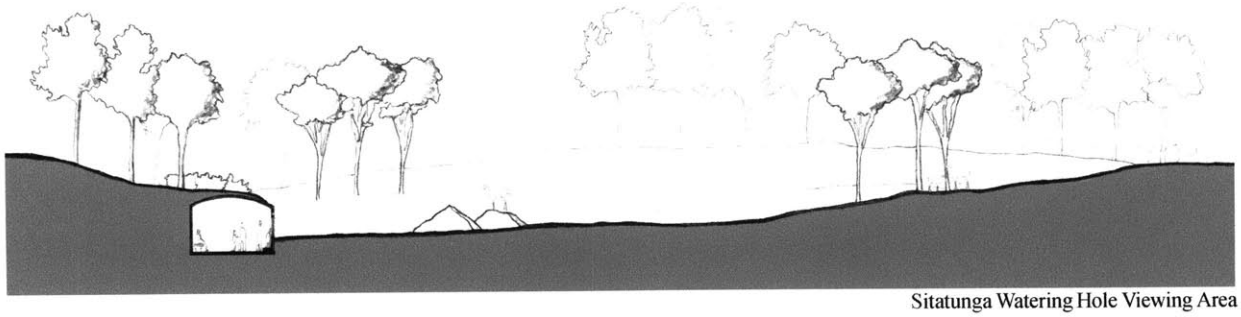


Detail of Bridge

## AERIAL

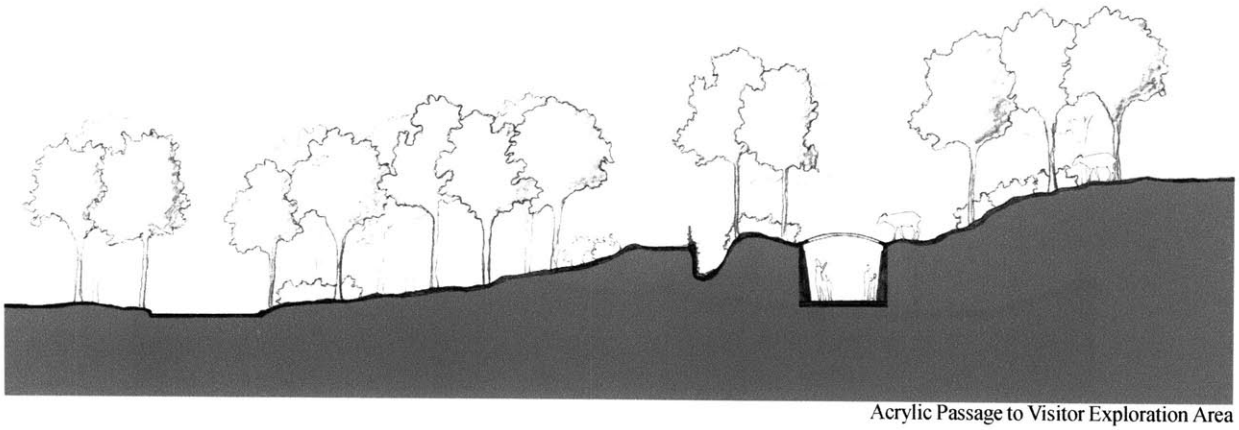


SECTION

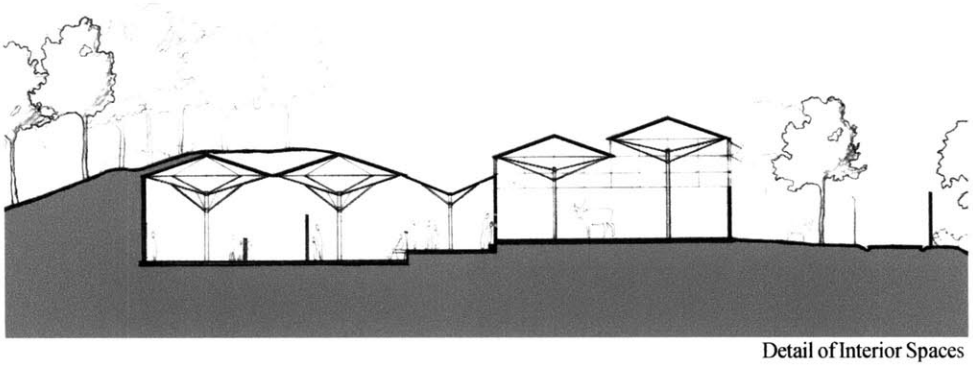


Sitatunga Watering Hole Viewing Area

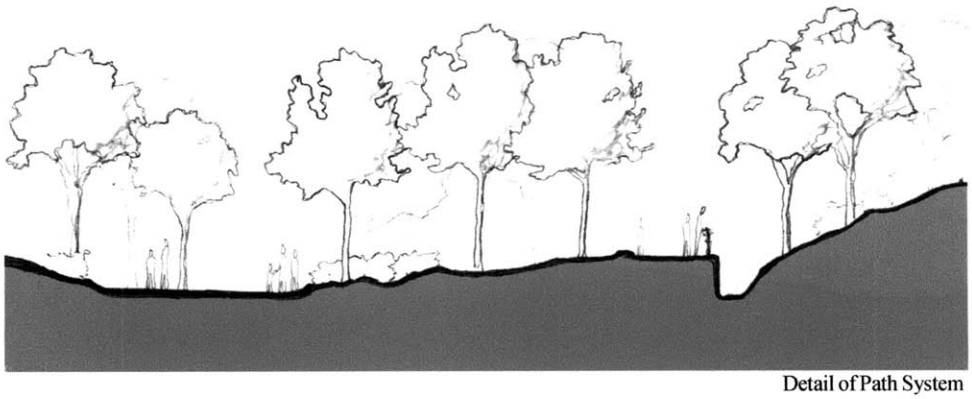
SECTION



Acrylic Passage to Visitor Exploration Area

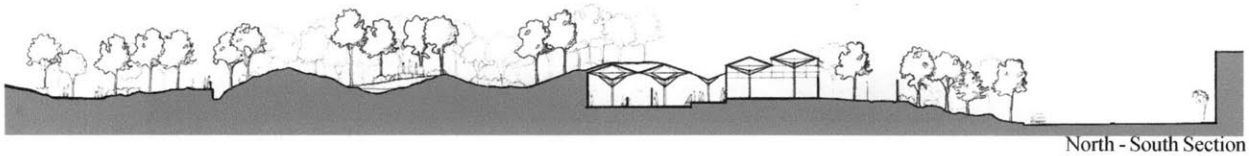


Detail of Interior Spaces

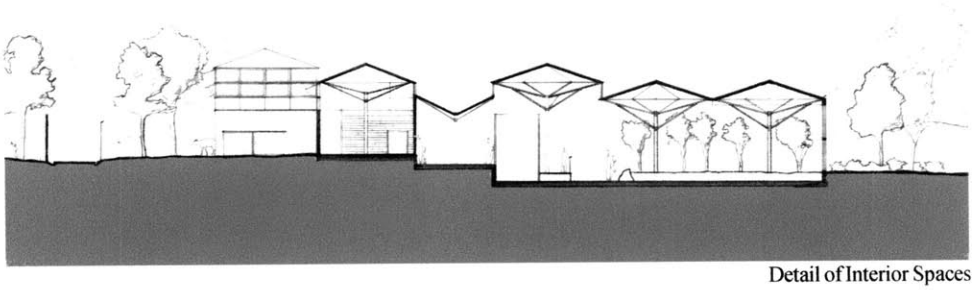


Detail of Path System

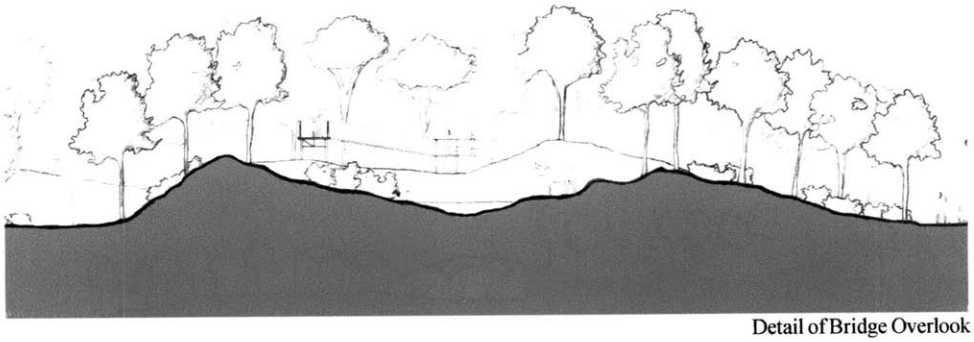
## SECTION



North - South Section

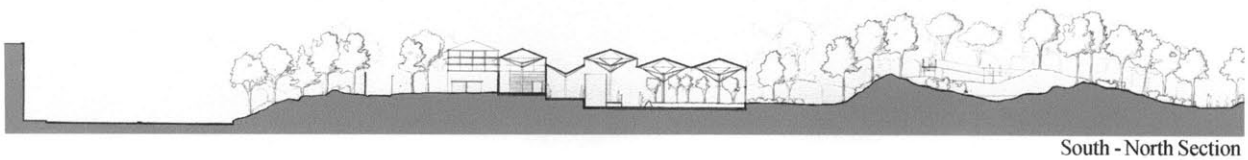


Detail of Interior Spaces



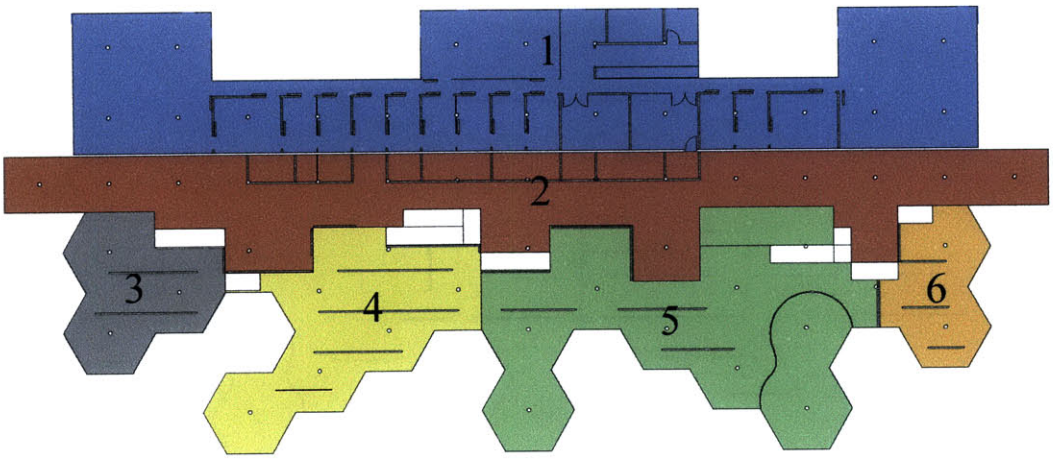
Detail of Bridge Overlook

## SECTION



South - North Section

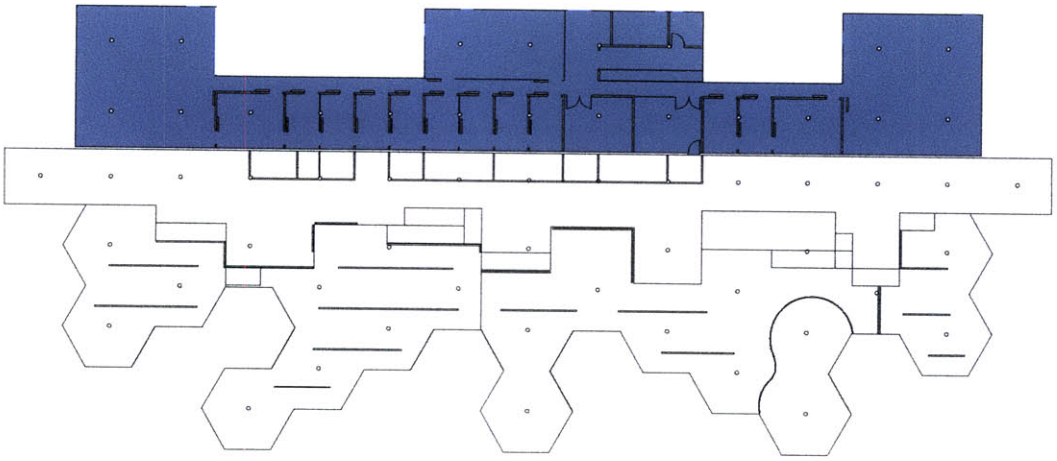
EXPLORATION AREA




The exploration area is composed of five levels, each with a specific function serving the overall structure. The animal holding and care area is separated from the exploration area along the reference level. There are however, numerous small windows along the reference level where a visitor can look into the care and stall areas.

1. Animal Holding
2. Reference Level
3. Habitat Conservation Level
4. Bongo/Duiker/Sitatunga Information Level
5. Species Conservation Level
6. Why Zoos Level

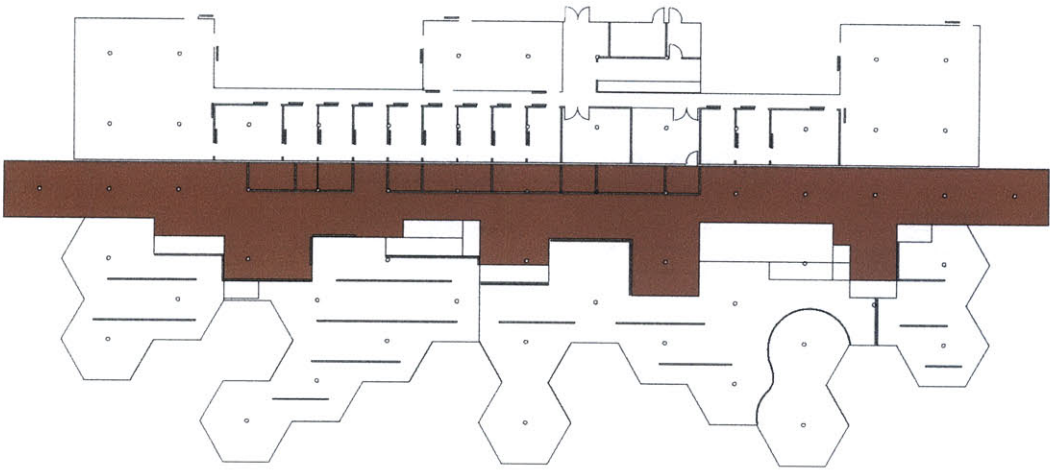
The following pages describe the functions of each level.



FOCUS - Animal Holding and Care

TEXT - There is no visitor access to this area. Instead, visitors may look into the care and stall areas through numeorus windows along the reference level.

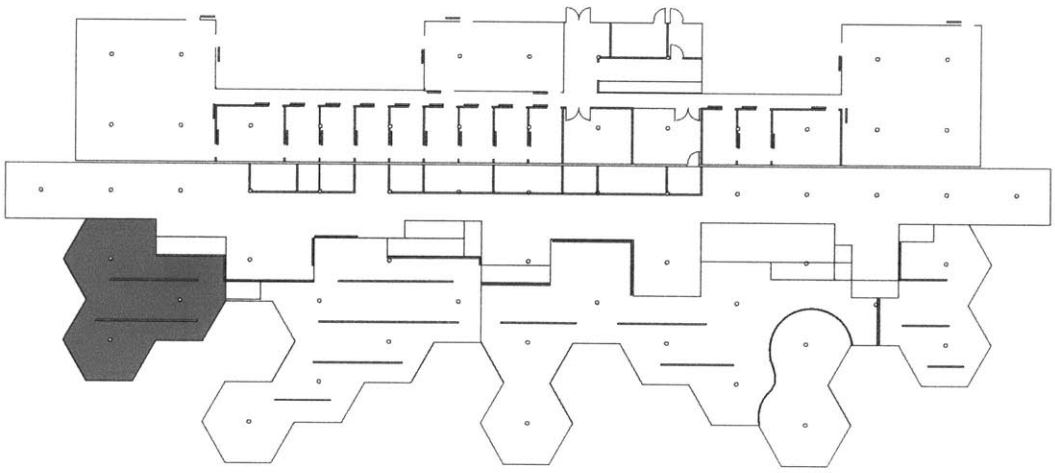
AREAS - Stalls, turnout, storage, kitchen and offices.



FOCUS - Reference Area

TEXT - Information about African culture,music, and climate is on this level.

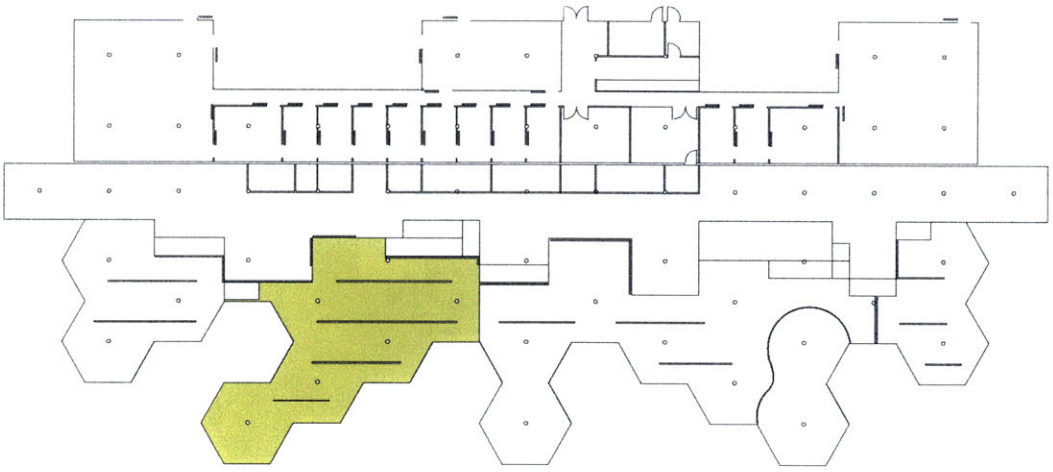
AREAS - There are display boards on African culture on this level as well as two hands-on display areas. In addition, there are numerous viewing areas into the animal holding. Visitor services such as a cafe, a gift shop and restrooms are on this level as well.



FOCUS - Habitat Conservation

TEXT - Reasons for habitat destruction. Information on natural resources versus consumption. Effects that habitat depletion has on animals and humans. Ideas on what the visitor can do to help.

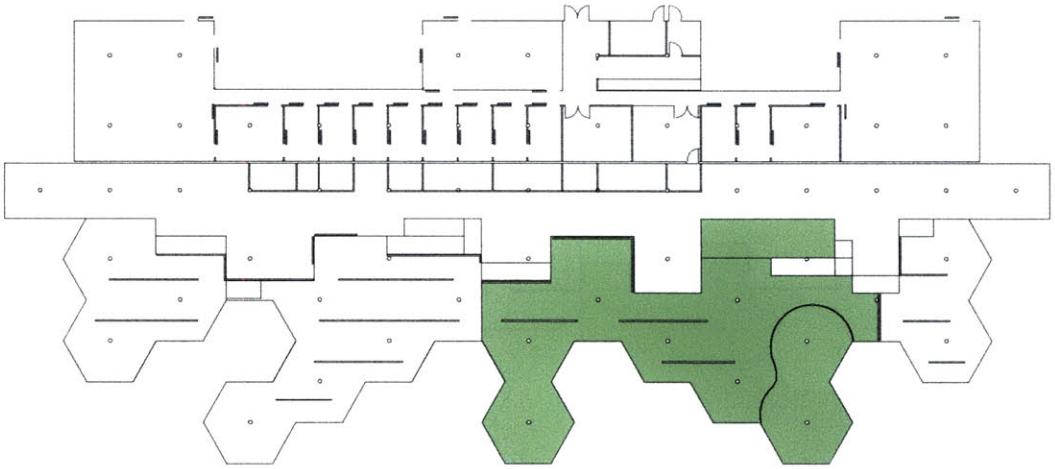
AREAS - Display panels and interactive stations are in this area.



FOCUS - Bongo/Duiker/Sitatunga Information

TEXT - Information on the animal's physical characteristics, habitat conditions, and reason for being endangered.

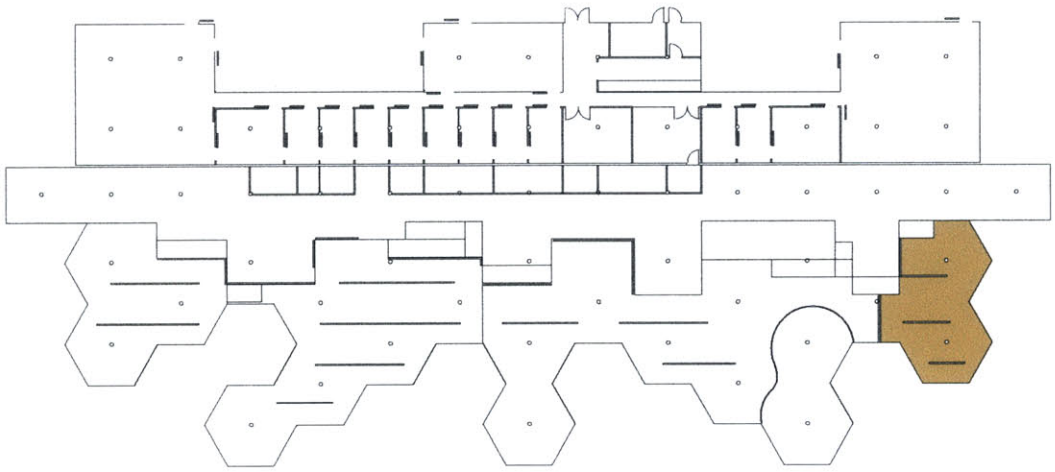
AREAS - Display panels and interactive stations are in this area as well as a viewing pavilion which looks out into the habitat.



FOCUS - Species Conservation

TEXT - Information on other species from the Congo. Reasons why conservation of all species and plants is important. Eco-systems explanation.

AREAS - Viewing area looking out into habitat. Aquarium with fish and amphibians from the Congo area. Hyrax and potto interior habitat and viewing area into their outside habitat. Display panels and interactive stations are on this level as well.



FOCUS - Why We Need Zoos

TEXT - Information on the positive actions zoos are taking to help animals and thier habitats. Why we need zoos to educate and lead in these areas.

AREAS - Display panels and interactive stations are in this area.

# NARRATIVE SEQUENCE

Perhaps the best way to understand all of the opportunities of the project is through a narration of one possible experience. Come along for a walk in the zoo. . .

* * *

It is a Saturday afternoon in late spring. The trees have bloomed and it's a warm, sunny day. You have somehow been coerced by friends to go to the zoo. But, you dislike zoos, a lot. The exhibits are too small for the animals that usually appear bored and listless, you rarely learn anything, and you dislike looking thorough chain-link fence to see an animal. But, you went anyway to meet your friends. It took longer to get there than you had expected, and when you arrived your friends were nowhere in sight.

You decide to wander around to try and find them; it's certainly nice to be outside. Hues of green fill your view from the numerous trees, not a feeling you get in the center of the city. Wandering down the main path you see children playing in the animal sculpture garden, a couple jogging off ahead, and others just casually walking off to the side. There is a lot going on. The change in pavement and the opening in the trees you notice off to the right catch your eye. You wander off of the paver-lined main path onto a narrower one which feels softer and is imbedded with hoof prints of different shapes and sizes. As you wind your way up on the path it gets a bit quieter. You notice the change in landscape and smell the new trees and shrubs that surround you. It feels as if you are entering a new world.

Suddenly, up ahead you see a small creature jump and run off, obviously startled by your presence. You can see ahead a bit further and hear the quiet murmur of a few other visitors on the path. Thinking it might be your friends, you walk on and stumble upon a lookout area. As you ascend the wooden platforms in front of you appears a large watering hole with a few animals standing in the shallow water. From the signs you read at the entry to the lookout you know these animals are sitatungas. "Beautiful," you think to yourself. "I wish I could get closer," are the words that you quietly utter. Curious to see if you can get closer, you descend and walk back to the main exhibit path. Movement high up on the mountain ahead breaks your concentration. It appears as if two animals are grazing together. You pause for a moment and sit on a bench in the shade. A few more signs inform you that the sitatungas share this habitat with two other species, bongos and yellow-backed duikers. Perhaps it is a pair of bongos who are grazing. You continue your walk to find out, all but forgetting about your friends.

The path leads to a bridge that begins to ascend and moves out into the habitat.

The bridge curves around trees and over water; you have to duck under some low-hanging branches as you traverse the wooden planks of the bridge. You hear the sound of running water somewhere close and see what appear to be windows in the mountain. Shadows of people dance and then disappear behind the glass. As you look closer, it seems that there is a building over there. Although curious, you continue onward.

Finally, at the crest of the bridge you see the pair of animals you were searching for again. They are in fact bongos. But just as you can see them they move under the bridge onto the other side. You run to try and catch them. Fortunately, they stop at a watering hole at the base of a small waterfall, to get a drink. "Ah, this is the running water I have been hearing." Descending the small staircase on the side of the bridge, you get to the lowest platform just a few feet off of the forest floor. "This is amazing! I am so close to these animals. I better remain still so I don't scare them." So many thoughts are running through your head. You can see the great horns that both animals have. You think they must both be male, but a small sign alongside of the railing informs you that you might be wrong. Both the male and female bongos have horns. You read on. The white stripes they both have help them to camouflage their brown bodies in the wild and almost all bongos have eleven to twelve stripes. Just then some other visitors pass by up on the bridge. The pair of bongos run off over a small hill. You are elated.

Back up on the bridge you seem to have lost your way. "Where is the main path?" You are totally surrounded by trees. Disoriented, you simply live in the moment and follow the bridge back to the main path. Continuing your nature walk, you have to duck low as the trees and brush becomes denser. The branches sweep across your back as you walk. Off to the right you see a much smaller animal than the bongos or sitatungas that you have seen today. It is resting in the dense undergrowth, and you can barely make it out. This must be the duiker you read about earlier. You move to read a sign that explains why the duiker likes to live in the undergrowth. It is all making sense.

Continuing along the path you come to another lookout. Tired from your previous encounters you choose to follow the small signs to the exploration area. This must be the building that was coming out of the mountain. As you ramp down through the trees you remark on how beautiful the landscaping is. It's a treat just to walk though here, even if you didn't stop to read the small plaques that explain the different species of flora. Passing though an open doorway you see light ahead. On the walls of the tunnel are images of the lush green trees and brush you have been walking through. The ceiling becomes transparent and you realize that you

are underground. Above you, is the underside of the trees, and your eyes get lost in all of the branches that intertwine. Off to the side some children have crawled up into a clear dome that lets them have a 360-degree view of the forest floor. They are giggling with excitement as an animal is approaching. You stop and look up as a duiker jumps across. "Whoa!" Everyone screams a bit. That was a shock. You have never seen the underside of an animal before, never mind in the midst of a leap.

You continue to walk and notice that the images which surround you are becoming less green. It appears that much of the forest has been cut down and then burned. "What is going on?" As you round the last corner you come into the exploration area. Natural light floods the inside. Your eyes adjust to the light and you take a moment to look at all of the things going on in this area. From your high vantage point you can see people milling around on four different levels. Some are intently reading information on the display panels while others are playing at the interactive stations.

Wanting to participate you walk down the ramp in front of you into the first area. Moving in and around the display boards you read about the destruction of natural habitats due to logging. The burned forest images you saw on the way in were of an area after it had been cleared, leaving no signs of life. The images are alarming. The term habitat conservation now means something and you understand why it's so important. Moving on you pass down another ramp and follow the sunlight into a glass enclosed area that looks out into the exhibit. In front of you stands a bongo grazing in the grass just on the other side of the glass. You move closer and can hear her chewing through the small windows that are open at the top of the walls. Fresh air pours into the space and you are again mesmerized by the coloring of this unique animal.

Some trees on the other side of the space catch your eye and you move toward them. The area is full of live plants and as you look closer animals as well. In this space are numerous other animals from the African Congo, pottos, hyrax, fish and few others. A display panel explains the concept of an ecosystem and how the survival of all animals and plants are important for balance to be achieved. You begin to understand how a two-pound turtle can be just as important as a three hundred-pound bongo. A bit overwhelmed by all of the information, you move on.

In the last area you find information about zoos. The images and text clearly identify the need for zoos in the world. They talk about the added responsibility

facing zoos and programs that are trying to save animals and habitats from destruction. Your view on zoos has changed. The animals have plenty of healthy space, they are not bored and you learned about pressing issues that affect everyone. The animals are ambassadors for their species, here at the zoo for many reasons, and you have benefited from that.

Thoughts are stirring in your head so you move back up onto the main level and get a coffee at the café. Leaving out of the opposite end that you entered, you find one more intriguing area. You are looking through glass into a four foot deep pond. You can see the body and legs of two animals standing on rocks off to the side. They are the sitatungas you saw when you entered. The signs etched onto the glass explain the unique shape of the hoof, which makes moving in water and marshy land easier for the sitatunga. You look closely through the water and can see the difference. "Amazing!"

You pass underground again, emerge back outside and walk up to the exhibit path. You are full of new information and feelings. Excited to see what else the zoo has in store you take a set of stairs out to the main zoo path. Up ahead are your friends. You call their names and run off to share your experience with them.

* * *

There are of course hundreds of possibilities for an encounter in this exhibit. It is clear that the potential experiences are diverse and the images powerful. On the whole, this design challenges what a current zoo exhibit is and shows all the wonder of what it can be.

# CONCLUSIONS

This being the only living world we are ever likely to know, let us join to make the most of it.

-E.O. Wilson

Throughout my life thus far, I have traveled to dozens of zoos, both in the United States and across Europe. I have seen animals too sick to stand, covered in green moss from lack of daylight and some so bored they used self-mutilation as a way to pass the time. Conversely, but at a much lower percentage, I have seen animals at home in their surroundings, running, chasing, grooming, foraging, partaking in their natural behaviors that we consider so important as a sign of happy living. Never, however have I left a zoo or animal park feeling good. I always feel more can be done, both from the side of the animal and the visitor. These visits are the source from which I draw my motivation, and it is the expressions of both joy and sadness in the eyes of the animals that give me my inspiration.

If I had the choice, I wouldn't go to zoos. I would much rather travel to Africa to see the sitatungas, Madagascar to see the lemurs, or even to Yellowstone National Park to see the wolves. However, it has already been established that due to human destruction there are fewer and fewer places for these animals to call home on the earth. Therefore, zoos are a requirement to sustain these precious lives while serving as places of education and research. They have the ability to bring positive thoughts and encounters with animals from places far away to the cities we live in. They have the power to expose the major problem of habitat depletion that is not only detrimental to the animal population, but whose negative consequences affect humans as well. But they lose all of this power if their animal habitats do not support these goals.

This thesis recognizes these factors and incorporates them into all aspects of the design. The process has been thorough and sometimes tedious, but was always exciting. Through it, an idea that began as a just a thought years ago came to life as a complete design that with the integration of nature and built form fosters an understanding between human and animal. The project must not be thought of as an end, but rather a beginning. A new way of thinking and designing has come to life here and that must continue.

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Until he extends the circle of his compassion to all
living things man will not himself find peace.

-Albert Schweitzer