

GIBBON REFUGE AT SUNSET ZOO: A CONSERVATION BASED EXHIBIT FOR
SPECIES PRESERVATION

by

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Abstract

[The primary reasons for the existence of contemporary zoological parks are presented as conservation and conservation education. But in reality, human entertainment is the primary function of traditional zoos. There is a moral dilemma behind the practice of removing wild animals from their native habitats and holding them captive, primarily for the purpose of human entertainment and education. Exhibits designed with these human desires in mind never completely meet the needs of the animal.

An exhibit designed with conservation in mind can fully address animal needs. The moral dilemma of keeping wild animals captive can be reconciled if the purpose of conservation shifts to the forefront of exhibit design. The term conservation, in this setting, refers to a habitat where a healthy, captive population can be sustained. Conservation means acquiring an in-depth understanding of an animal species and combining it with thoughtful, insightful design that responds to the species' needs first.

Secondary design considerations include facilitating the work of the animal keeper and visitor education and recreation. The keeper plays an important role in the health and well-being of the animal; a functional workplace is essential to the keeper's job. The visitor plays an essential role in maintaining the funding that supports the zoo. In order for zoos to maintain adequate funding, they need visitors. To make this experience mutually worthwhile, exhibit design must create an experience that visitors want to be a part of, and the exhibit should impart an educational message to these visitors.

This conservation-minded approach results in an exhibit that will serve primarily as a conservation facility. The exhibit is better suited to the animal by encouraging natural behavior and more accurately recreating natural habitat. A conservation exhibit can also fulfill the secondary purpose of human education by providing the visitor with a much richer depiction of the animal in its natural state, as well as showing visitors the need for species conservation.]

[Gibbon Refuge at Sunset Zoo: A Conservation Based Exhibit for Species Preservation](#)

Gibbon Refuge at Sunset Zoo: A Conservation Based Exhibit for Species Preservation



Sarah Morrow

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(<http://www.ms-starship.com/journal/aug00/images/GIBBON-md34P52083.jpg>)

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Chapter One: Project Introduction

Bringing Gibbons to Sunset Zoo.



Previous Page:
(Photo:
[http://homepage.
mac.com/wild-
lifeweb/mammal/
white_cheeked/gib-
bon01.jpg](http://homepage.mac.com/wildlifeweb/mammal/white_cheeked/gib-bon01.jpg))

Abstract

Dilemma + Thesis in Abstract

The primary reasons for the existence of contemporary zoological parks are presented as conservation and conservation education. But in reality, human entertainment is the primary function of traditional zoos. There is a moral dilemma behind the practice of removing wild animals from their native habitats and holding them captive, primarily for the purpose of human entertainment and education. Exhibits designed with these human desires in mind never completely meet the needs of the animal.

An exhibit designed with conservation in mind can fully address animal needs. The moral dilemma of keeping wild animals captive can be reconciled if the purpose of conservation shifts to the forefront of exhibit design. The term conservation, in this setting, refers to a habitat where a healthy, captive population can be sustained. Conservation means acquiring an in-depth understanding of an animal species and combining it with thoughtful, insightful design that responds to the species' needs first.

Secondary design considerations include facilitating the work of the animal keeper and visitor education and recreation. The keeper plays an important role in the health and well-being of the animal; a functional workplace is essential to the keeper's job. The visitor plays an essential role in maintaining the funding that supports the zoo. In order for zoos to maintain adequate funding, they need visitors. To make this experience

mutually worthwhile, exhibit design must create an experience that visitors want to be a part of, and the exhibit should impart an educational message to these visitors.

This conservation-minded approach results in an exhibit that will serve primarily as a conservation facility. The exhibit is better suited to the animal by encouraging natural behavior and more accurately recreating natural habitat. A conservation exhibit can also fulfill the secondary purpose of human education by providing the visitor with a much richer depiction of the animal in its natural state, as well as showing visitors the need for species conservation.

A Redesign at Sunset Zoo

Sunset Zoological Park, of Manhattan, Kansas, is anticipating a redesign of one of its original exhibits. This exhibit is currently occupied by Brownie the Bear. Brownie's exhibit is located along the zoo's "Asia Forest Trail," despite the fact that he is a North American species. The staff at Sunset Zoo is aware that Brownie is nearing the end of his life and are expecting the need to fill his place. When Brownie passes away, the exhibit is set to house gibbons, an arboreal species native to southeastern Asia.

A Design Challenge

The redesign of this exhibit into a gibbon habitat presents a design challenge and also raises ethical questions. The exhibit itself is considered to be of historical significance to Sunset Zoo as well as the City of Manhattan. The exhibit was constructed during the 1930s in conjunction with a Works Progress Administration (WPA) Project. The original form and structure of the exhibit has largely been maintained to this day. The exhibit is formed by a limestone wall, columns, concrete floor and wrought iron bars (pictured in Figures 1.1-1.4) typical of earlier styles of animal exhibiting. Due to its historical significance, it is mandatory that the original limestone structure be retained.

There is also a moral dilemma behind animal exhibiting in general that must be addressed in the design of any exhibit. In the case of Sunset Zoo,

there is the ethical issue behind exhibiting gibbons, a species whose wild population has been severely threatened.

A vastly different exhibiting approach will need to be undertaken for the new design of this enclosure. In order to reconcile the issue of exhibiting a very sensitive species, the focus of this exhibit must shift towards conservation. This includes careful habitat recreation and an emphasis on the animal's needs. A major design challenge will be to combine this structure, a visual reminder of the zoo's history and as an entertainment center, with the concepts of conservation and naturalistic habitat recreation.

Opportunities

The redesign of this exhibit offers a wealth of new opportunities for Sunset Zoo, its visitors, and the conservation movement. Sunset Zoo and the surrounding community have the chance to embrace a new type of exhibition that is intended to truly educate visitors and support conservation efforts.

The combination of the old with the new also presents a unique opportunity for visitors to absorb the history of zoological exhibiting and see the progress we have made reconciling entertainment and conservation.



Clockwise from top left:
Figure 1.1. Chain link fence and metal bars divide the animal from the viewer. (Photo: Morrow, 2008).



Figure 1.2. Viewing overlook with stonework original to the WPA project (Photo: Morrow, 2008).



Figure 1.3. Wrought iron bars and chain link fence separate the visitor from the exhibit (Photo: Morrow, 2008).



Figure 1.4. View from overlook area into the exhibit (Photo: Morrow, 2008).

Chapter Two: Zoological Park History

How we arrived where we are today.



Zoological Park History

Understanding Then and Now

Sunset Zoological Park was constructed at a time in which the primary purpose of zoos was human recreation. The future gibbon exhibit will be implemented in one of the original 1930s exhibits, and at the request of Sunset Zoo, its historic limestone shell will be retained. While this shell is indicative of the zoo's entertainment focused past, it has the potential to serve as a reminder of the growth we have had in our regard towards the natural world and its species. For this reason, it is necessary to look at the evolution of the zoo in order to comprehend how we arrived at our current understanding of a zoological park.

Origins of the Zoological Park

The concept of a zoological park is one that has been continually evolving since its inception. The notion of a zoological park began as a form of human recreation. Over time the concept evolved into a form of research and education. Unfortunately, in the past 150 years, as people recognized the ethical questions behind keeping captive animals, zoological parks have shifted from entertainment centers to a conservation necessity. While moving towards a more humane method of keeping and displaying captive animals, the focus of these parks has also begun to shift towards conservation and preservation.

Previous Page:
Chimpanzee at the
Baltimore Zoo
(Photo: <http://www.oac.cdlib.org/affiliates/images/csdhi/kt0290182t/hires/8878-3.jpg>)

Evidence of containing exotic animals for entertainment purposes exists from as early as 2500 B.C. (Hoage, Roskell, and Mansour, 1996). Throughout history and across nearly every society, the wealthy and powerful collected and displayed animals for amusement. Even when zoos became

accessible to the public, these places remained symbols of status and human domination over nature.

Early zoological history can be divided into five major phases (Veltre, 1996). The earliest phase is the Prehistoric Period. During this period there is evidence that large animals were detained for reasons other than the purpose of providing food. It is speculated that the possession of a collection of animals probably served as a display of status to other societal groups (Veltre, 1996).

The second phase, referred to by Veltre as the "Period of the Paradeisos," is derived from a Persian word meaning a walled facility for the containment of animals for the enjoyment of a monarchy (21, 1996). The animals in the facility made appearances at royal processions and served as prey for royal hunts. Animals received as gifts from foreign nations were also housed in the Paradeisos (Veltre, 1996). Records of these types of institutions exist in China, Assyria, Babylonia, and Egypt. The Paradeisos came to an end with the fall of the Roman Empire, except in China, where the practice continued into the 19th century (Veltre, 1996).

Following the Paradeisos is what Veltre classifies as the "Period of the Menagerie" (Veltre, 1996). A menagerie, like a Paradeisos, was available only to the powerful and wealthy. The menagerie also served as status symbol. Animals in the collection were often given to royalty by explorers in hopes of receiving future funding (Polakowski, 1987). As knowledge of the practice of animal taxonomy spread, animals contained in menageries began to be ordered by species (Veltre, 1996). Although

there was some 'scientific' order to the arrangement of the animals, the purpose of menageries was entirely to amuse and satisfy human curiosity. Menageries are conceptually and sometimes structurally where the concept of contemporary zoos originated.

It was not until the 18th century that the Period of the Classical Zoo arrived. At this time societies began to view this type of facility as an important public recreational and education tool that should no longer exist exclusively for the elite (Veltre 1996). Private menageries transformed into public institutions and new zoological parks began to appear in nearly every major city in Europe. Eventually the concept appeared in the United States. These facilities were funded either publicly or by private zoological organizations (Veltre, 1996). Zoos served a dual function, providing entertainment for the general public and a laboratory for the scientific community (Veltre, 1996). This period extended well into the next century. Classical zoos were a source of major civic pride and an emphasis was placed upon achieving the greatest "collection" as society still identified zoos as a symbol of status. Zoos and zoological societies wanted to attain the best representation of the animal kingdom as it was then classified, particularly species perceived to be the most dangerous or exotic (Ritvo, 1996).

The Classical period was also a time of scientific experimentation, often at the animal's expense. For instance, zoological societies and collectors alike sought to adapt exotic animals to survive the conditions of foreign climates, a process known as acclimatization (Baratay, 1998). This meant that if the animal managed to survive the conditions of international travel, it was to be subjected to a

whole new set of environmental challenges.

The experimentation yielded little success. Little understanding of animal needs and no provisions against climactic exposure resulted in drastically reduced life spans. At this time, London's Regent's Park Zoo big cats' life span was about two years, meaning a cat was lost monthly due to inadequate accommodations (Ritvo, 1996).

A major advancement in zoological exhibit design came in 1907 when Carl Hagenbeck, a German animal dealer, collaborated with sculptor Urs Eggenschwyler of Switzerland to construct the first bar-less exhibits. These bar-less exhibits utilized nearly invisible moats to separate humans and animals. This was also the first attempt to recreate the animal's natural habitat. Hagenbeck operated on the assumption that a more naturalized habitat would encourage natural behavioral patterns. This change in design signified the beginning of the Modern Zoological Park Period (Veltre, 1996).

However, Hagenbeck's concept was not universally embraced. In the mid 20th century, with the advancement of scientific knowledge, as well as an accumulation of wealth, the western world entered a phase of laboratory style zoological exhibiting. People became focused on sanitization and cleanliness and exhibits took on an appearance that reflected this. Glass fronted, concrete walled cages were easy to clean, and were thought to be in the best interest of animal health (Jones, 1985).

Zoos in America

The capture and display of animals began in the U.S. shortly after the arrival of the colonists. In the 18th century wealthy individuals or zoological societies began exhibiting native species and by the 1720s, exotic species. Facilities that are classified

as menageries appeared in the late 18th century and not long after these were established came traveling menageries (Kisling, 1996). The traveling circus became extremely popular and this often included a traveling troop of trained animals. The desire for a zoological park grew out of European influence and the popularity of these traveling shows. Eventually it became socially acceptable and financially feasible to establish government funded zoological parks in the United States. The first was initiated in Philadelphia in 1859 (Kisling, 1996). Fifteen years following the opening of the Philadelphia Zoo, came the National Zoological Park, which stood as a symbol of “American greatness.” In addition to being a symbol of national pride, the values upon which the zoo was created helped to model those of zoos to follow. These values included recreation, education and scientific advancement (Kisling, 1996).

Contemporary Zoological Parks

Following WWII, zoos evolved from community institutions to tourist attractions meant to captivate large audiences. Some zoos provided a stationary circus show of trained animals, including chimpanzee tea parties and jazz concerts. In others scenery was created within the zoo to promote the feeling of attending a “show” (Baratay, 1998).

Criticism

As early as the 1880s, visitors to these parks began to express concern for the animal’s living conditions. Gradually these complaints began to gather momentum. People expressed concerns about cruel trainers and insufficient and dirty enclosures. In 1929, a Geneva newspaper published readers’ disgusted response to a newly planned zoo, claiming that animals were not created to be caged (Baratay, 1998). Societies for animal

protection began to react against zoos as well. Incidents involving tragic accidents between animals and children increased discontent. By the 1960s and 1970s outrage grew and the number of organizations for the protection of animals continued to increase. Films displaying animals pacing or acting out due to psychological distress drew the attention of animal experts. At the same time Jean Dorst, a French professor, began to publish writings on the future demise of the natural world. He criticized zoos for not preparing for the impending environmental crisis by creating sanctuaries or safe havens where animals could live comfortably and be encouraged to reproduce (Baratay, 1998). Since the 1970s a number of investigations have concluded that zoological parks existed largely for recreation and making money. The majority of zoos claimed to participate in research during this time, but their refusal to release any information to prove their involvement in studies stirred doubt about these claims.

As a reaction to the public dissent, zoological parks, in the latter half of the 20th century, redefined themselves as conservation, research, education and recreational institutions. This claim has been well received by most animal protection organizations and people in general (Baratay, 1998). Imitation of nature in exhibit design and re-release programs have since become popularized.

Professional Organizations

Over the last century, several organizations have risen in the United States to regulate the care of captive animals. These organizations exist to promote better exhibiting standards. A key organization is the American Zoo and Aquarium Association (AZA). Nearly every major zoo in the United States is accredited by this association. The

AZA annually inspects the facilities it accredits to assess the quality of animal care. AZA guidelines, at this time, do not define minimum enclosure spaces or specific care standards for many species. However, species specific organizations exist, such as cooperative breeding programs with their own species survival plans (SSPs) or manuals that define the minimum acceptable living, care and enrichment standards (Kreger et al). All zoological parks are regulated by the Animal Welfare Act which outlines minimal living standards for nearly every mammal species. The regulations, for some, are as specific as the treatment, handling and transportation, living quarter dimensions, and enrichment (<http://www.nal.usda.gov/awic/legislat/usdaleg1.htm>). Some city and state laws also have their own specific requirements that apply as well.

Conclusions

It has only been in very recent history that the zoos have begun to lose their identity as status symbols for monarchies and empires. However, competition does remain between zoos to house the largest or most diverse “collection,” which may or may not benefit the species residing in the park. But a more positive form of competition has formed and that is for success as centers for conservation and species preservation. Zoological Parks today earn respect for creating an environment to which animals respond positively, and that can be evaluated in the success of animal reproduction rates. It is a celebrated event when some of the world’s most endangered species successfully reproduce in a zoo context.

Although we would like to think our contemporary zoos are a far cry from their predecessors, the reality of the situation is that the world’s most well established zoological parks have grown out

of the framework of earlier facilities. Zoos that exist today are remnants and remodels of these places. Designers working within the framework of a preexisting zoo face an interesting challenge of working in the context of the original facilities that were built in a different time with different values in mind.



Chapter Three: Contemporary Exhibit Design

Improving design and husbandry technique.



Previous Page:
 Pair of bengal tigers
 at the Baghdad Zoo
 play with a ball in
 their enclosure
 (Photo: <http://latimesblogs.latimes.com/photos/uncategorized/2008/08/08/tiger2.jpg>).

Above:
 Figure 3.1.
 Naturalistic
 Enrichment Features
 at the Saint Louis
 Zoo. Man-made logs
 encourage climbing
 and can be changed
 out over time (Photo:
 Hickey, 2007).

Contemporary Exhibiting

Most contemporary zoological parks recognize the needs for species specific considerations in exhibit design. There are many established techniques to create safe and comfortable enclosures. These techniques have helped to reinvent early cage-like enclosures as habitats where animals can live comfortably. These include environmental enrichment and landscape immersion.

Environmental Enrichment

Environmental enrichment is an animal husbandry practice to enhance the quality of life for and the care of captive animals in farms, zoos and laboratory environments. This strategy involves identifying and providing the appropriate stimuli to the captive animal to encourage physical psychological well-being. (Shepherdson, 1998). Studies in environmental enrichment have been

shown to increase normal healthy behaviors and abnormal behaviors across a wide range of animal species. Additionally, this husbandry practice, when used in the care of multiple species, has resulted in a drop in excess aggression and an increased ability to cope with stress (Markowitz and Aday, 1998). For this reason, environmental enrichment is a widely accepted (and in many cases, legally required) practice in zoological exhibiting (Mench, 1998). Enrichment can take many forms and can be as simple as adding climbing structures (See Figure 3.1) and hiding food to encourage scavenging, or as complex as the addition of mechanical device to imitate prey. It is important to note that environmental enrichment is not a strategy to encourage or create new behaviors in a species. Rather, the desired result is to promote natural, species specific behaviors and skills (Markowitz and Aday, 1998).

Enrichment can also be used to help meet the psychological needs of a captive animal by increasing the complexity of the animal's daily life (Poole, 1998). According to author T. B. Poole, there are several factors which enrichment should address.

Major Environmental Enrichment Principles

Security

A captive animal must have a species appropriate resting place that is protected from view with the proper bedding or nesting materials to which it may retreat in times of stress.

Complexity

The animal's habitat should encourage the use of all the species' natural abilities such as climbing,

walking, or flying (See Figure 3.1). It should also stimulate the animal's intellect to the appropriate level.

Achievement

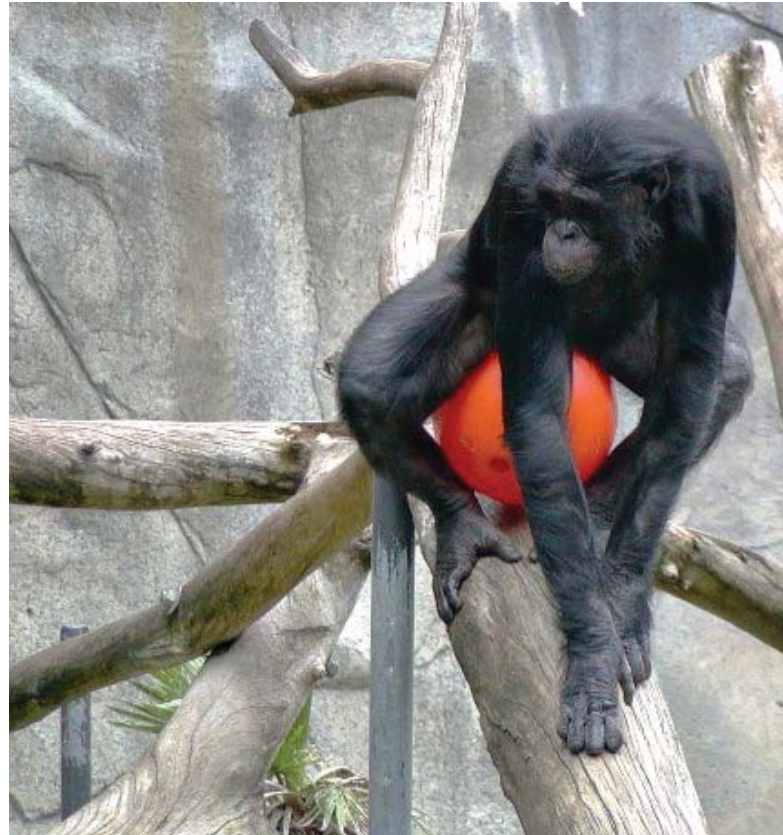
The animal should be presented with tasks for which it can receive satisfaction, such as foraging for food. The satisfaction of providing its own food, according to Poole, also offers the animal a feeling of control within its environment. A beautiful naturalistic environment that offers no intellectual stimulation or motivation for the use of skills may be less satisfying to some species than a concrete enclosure where the animal is challenged intellectually and physically. Poole explains that while to the human eye the naturalistic environment appears to be the best option, the mental stimulation within the concrete enclosure may offer a better quality of life. Poole illustrates this point through the analogy of the many humans living highly complex and satisfying lives in extremely artificial urban contexts.

Novelty

An animal that is restricted to the same enclosed space day after day needs an element of novelty to appeal to its sense of curiosity. Unpredictably, change and new information help to stimulate the animal mentally. This can be as simple as the addition of a new play object (See Figure 3.2).

Human Caregivers

Keepers play a critical role in the health and welfare of captive animals. Poole claims that many mammals are aware of their dependence on their keeper. A trusting relationship between keeper and animal can lead to easier routine daily care and occasional medical treatment. Training facilitates this relationship but many zoos are afraid of the



stigma that comes with training (Poole, 1998). Training is perceived as not taking the role of keeper seriously as humans often associated it with circus acts.

An Important Tool in Exhibit Design

Environmental enrichment is an important tool for conservation as well. Reproduction is often more successful in a habitat with a well thought out enrichment plan. Appropriate parental behaviors are also more likely to occur, critical for

Figure 3.2. A child's toy, such as this ball, can make a very mentally stimulating addition to a primate's enclosure (Image Source: www.pittsburghzoo.org/zoo.asp?SectionID=7).

captive breeding programs of endangered species. Reduction of stress levels increases overall animal health, which is also important to reproductive behaviors (Kreger et al.). Enrichment is not only required by numerous organizations and state laws, it is essential to creating an exhibit that considers animal well-being.

Landscape Immersion

Landscape Immersion is an exhibit design technique developed by exhibit designer Jon Coe. Landscape immersion occurs when a zoological exhibit is designed to accurately reflect a natural habitat. This habitat is extended into the space occupied by the viewer so that both animal and human have the experience of this environment (Jones et al, 1976).

An immersion exhibit very precisely simulates the species' natural environment and strictly maintains a naturalistic appearance. This simulated landscape expands into the space occupied by the viewer in order to give the viewer the sense that they are actually visiting the animal's native habitat. Keeper entries, mechanical devices and other unnatural exhibit elements are concealed to maintain an uninterrupted depiction of the habitat. Containment features are naturally hidden with the design method; however, it is also important to the experience of landscape immersion to create an illusion of a limitless habitat. This can be done by borrowing views to distant landscapes. In this design strategy, nature is the model to be emulated (Coe and Mendez, 2005).

Other non-visual concepts are also integral to a landscape immersion exhibit. Animals must be presented respectfully and the exhibit should

accentuate the intrinsic beauty and value of the species. Animals should assume a dominate position in the exhibit. This may mean that the animal is elevated so that humans must look up to view the animal. The viewing area should not surround the animal. Views through the exhibit may also open upon a neighboring species for a feeling of continuity through the habitat.

Affiliative Behavior

Coe also suggests that certain design techniques may be applied to increase affiliative behavior between animals and visitors. Affiliative behavior between the animal and the human means that the animal is accepting of the existence of this relationship. Affiliative behavior can also include associative behaviors in which both the humans and animals relate to each other in way one or another. This is achieved through the use of affiliative design, or the arrangement of space and features of an exhibit in order to encourage affiliative behaviors (Coe, 1999). While efforts of conservation may be undermined by encouraging associative behaviors between animals and people, arrangement of the space in a fashion that allows the animal to be accepting of the presence of humans could be helpful in the effort to ease undue stress on the animals.

The Unzoo Alternative: Education

The unzoo alternative is a concept proposed by authors Jon Coe and Ray Mendez that would drastically affect the way people feel and think about zoos. In this design strategy, a zoo would be a place where people come to experience other places, plants, and animals through recreated habitats.

In addition to adhering to the principals of landscape immersion and affiliative design, Mendez and Coe suggest the following additions to zoo design and programming.

Walk Through Exhibits

The idea of a walk through exhibit is not unique to landscape immersion. However, the concept has not yet reached its full potential in most zoological parks. This type of exhibit allows for multiple species who interact together to be placed together. These exhibits can also be larger in size, without a traditional cage or enclosure to hinder animal movement. Some type of barrier contains the visitors and allows them to move through the space, experiencing the habitat and animals from a variety of angles. With the amount of space, and increased numbers of animals interacting, visitors will also see a wider range of more natural behaviors.

Rotation Exhibits

Rotation exhibits are a series of exhibits designed to house a variety of animals from the same native habitat. The species are then rotated through the exhibits for varied time periods to increase stimulation and reduce boredom. When a species is allowed to occupy the space of another, it is encouraged to explore the new spaces and smells, much like it would when encountering new territory in the wild. Rotation also allows vegetation of an exhibit to periodically recover from heavy use.

Extended Day Programs

The use of an extended day program takes advantage of the fact that many of the animals people most want to see are nocturnal. Extending zoo hours into the evening allows people see many species at their most active. This schedule also

accommodates the animal's natural behavioral patterns instead of encouraging them to change to suit human schedules.

Conclusions

Landscape immersion principles place a high priority on the needs of the animal as it requires an in-depth understanding of the animal species and its native habitat. Landscape Immersion also takes into account that environmental recreation is essential to encouraging healthy animal behaviors. As a result of this habitat recreation, animals are healthier and more active which creates an experience in which visitors will be excited to partake. There are also some limitations to the immersion technique. While landscape immersion is a very strong way to create a naturalistic habitat, there is a large emphasis on the visitor's experience. At times, this focus on the visitor could be detrimental to the animal's well-being.

Chapter Four: Gibbons

A complex species.





Previous Page: Pair of Gibbons in Borneo (Photo: http://dsc.discovery.com/convergence/quest/borneo/field-guide/field-guide_03.html).

Above: Figure 4.1 White-handed lar gibbon of the hylobates group (Photo: http://dic.academic.ru/pictures/enwiki/87/White-handed_Gibbon_Hylobates_lar_Orange_1900px.jpg).

Figure 4.2 Agile gibbon of the Hylobates group (Photo: <http://www.olympicanimal-sanctuary.org/images/crisis/largibbon.jpg>).

Gibbons at Sunset Zoo

Sunset Zoological Park will be receiving a male and female pair of gibbons upon completion of habitat construction. It is anticipated that the pair will reproduce in the future and that the exhibit will house the family group. A necessary component to conservation design is to have a thorough understanding of the gibbon, in the wild and in captivity, to ensure that their needs inform the design.

The Gibbon Species

Gibbons belong to the ape group and are the smallest members of this classification that includes gorillas, chimpanzees, orangutans and other large primates (Mootnick, 2007). Apes are differentiated from monkeys because of the size of their brains and their ability to brachiate, or swing from tree to tree by the arms. Although a gibbon appears,



because of its small stature, to be more visually comparable to the species within the monkey group, the brain and body type make the gibbon an ape. Four distinctly different groups or genera of gibbons exist today including lar or dwarf gibbons, hoolock gibbons, siamang gibbons and crested gibbons. Within these genera are 15 subspecies (See Figure 4.3. Gibbon Genera and Subspecies). The genera can be differentiated by their cranial shapes, number of chromosomes and sometimes by their physical shape. One of the most distinct differences among the gibbon groups is their coloration. However, coloration can vary widely (See Figures 4.1 and 4.2) within the distinct groups according to gender and age, and is therefore an unreliable method for species identification. A recording of gibbon songs is often one of the most reliable means to determine the species.

All genera of gibbons are considered to be endangered and the most threatened primate in the world, *Nomascus nasutus hainanus*, is a gibbon subspecies (Mootnick, 2007).

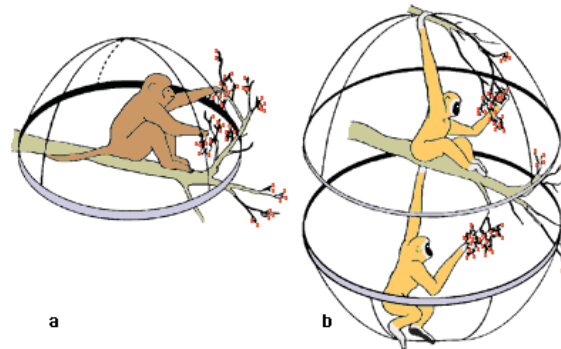
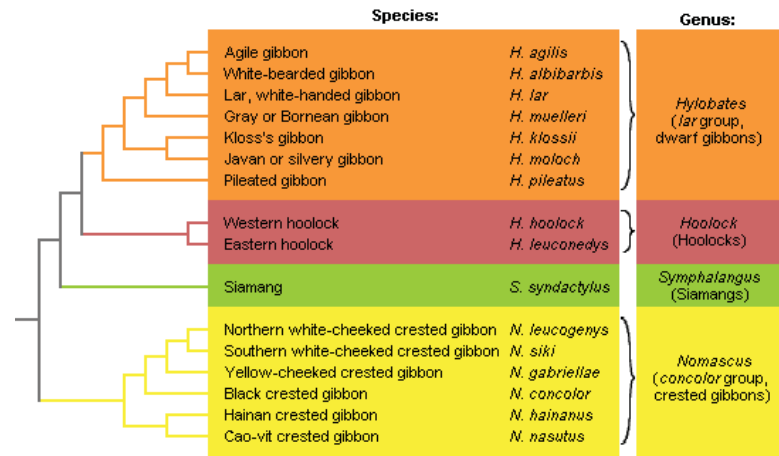
Distribution

Gibbons inhabit the tropical and semi-deciduous forest habitats of southeast Asia (Mootnick, 2007). Today gibbons can be found in Assam and Bangladesh, Southern China, Vietnam, Malaysia, Thailand, Sumatra, Java and Borneo (Cheyne, 2005).

Physical and Behavioral Characteristics

Gibbons have very specialized hands, arms, and legs. Arms and legs of the gibbon are extremely long in proportion to their body size. Additionally, the first digit of both the hands and feet are very long and curved and extend farther away from the hand than that of most other primates.

Gibbons are an arboreal species, rarely dwelling away from trees. The trees provide shelter, food and secure sleeping sites to the gibbon. The elongated arms, legs and hands are an anatomical adaptation that facilitates their locomotion from tree to tree. Brachiation, swinging by the arms (See Figure 4.5. Brachiation Photo Series), and bipedalism, walking on upright on two legs without the aid of the hands and arms, are the two major forms of locomotion by which the gibbon travels. While most primates are arboreal, gibbons are even more so adapted to this habitat because of their ability to brachiate. The gibbon's arms are approximately 1.5 times the length of its body (Mootnick, 2007), allow the gibbon to swing in a pendulum like motion through the trees. A gibbon can brachiate at speeds of 40 kilometers per hour, can pull its self a distance of 4 meters horizontally and can leap a



From Top:
Figure 4.3.
Gibbon Genera
and Subspecies.
Geissman, 2002; Roos
& Geissman, 2001.

Figure 4.4 Arm Span
Radius of a Macaque
(a) versus Arm Span
Radius of a Gibbon
(b) (Grand, 1972).

distance of up to 15 meters horizontally with a single swing (Mootnick, 2007).

The gibbon's small stature and its methods of travel allow it to access fruit and leaves on the thin, delicate outer branches of the rainforest trees. This means the gibbon can gather the fruit of every branch of the tree (See Figure 4.4 got illustration). The only other competition for this particular type of nutrition are non primates such as squirrels. The ability to swing from branch to branch also increases the speed of movement. This

Figure 4.5.
Brachiation Photo
Series (Emerl and
DeVore, 1969).



also enables gibbons to cross large gaps in the canopy. Hanging from branches also means that gibbons do not expend energy balancing as another primate would while standing upright on a branch. Anatomical adaptations specific to brachiation are the hook like hands and strong fingers which help the gibbon to maintain contact with tree branches while swinging.

When gibbons are not brachiating, they are walking upright on two legs. Gibbons, aside from humans, walk upright more than any other primate species. However, the preferred method of movement is brachiation.

Social Structure

Gibbons live in family groups. These usually consist of a monogamous adult couple and one to three immature offspring. An adult couple stays together for many years and rarely mate outside of the partnership. Adult gibbons of the same sex usually do not interact well together and this type of pairing should be avoided in zoos. Offspring depart from the family group when they reach sexual maturity to find a partner of their own. Occasionally, offspring may reside with the family group for ten or more years. The father in some gibbon species is as active in parenting as the mother.

A family group establishes a territory and adults defend this territory from other species and especially from other same sex gibbons. The group territory can span many hectares. Gibbons are so strongly attached to their territory that even when the area is disturbed they will not reestablish themselves in a new territory. This behavioral quality makes the species especially vulnerable during habitat destruction. The canine teeth of the gibbon are its primary weapon of defense while defending its territory. The teeth are extremely sharp and can be very dangerous to an enemy (Mootnick, 2007).

Singing Behavior

One of the most distinct characteristics of gibbons is their singing behavior. Gibbons use their songs to express their ownership of a territory and songs can be audible from a distance of 2 kilometers (Mootnick, 2007). Song length varies from 10 to 20 minutes depending on the species. Songs are gender and species specific. Some adult pairs combine their songs into elaborate duets with alternating male and female parts. While songs are thought to be used to 'mark' gibbon territory, it is also suspected that it may be used to attract a partner, to make a partnership known to other gibbons, and even as a form of bonding between paired gibbons (Geissmann, 1999; Geissman and Orgeldinger, 2000). Gibbons typically sing in the

morning hours and, as previously noted, gibbon species can be readily identified by their song characteristics.

Diet

Gibbons exist primarily on fruit, particularly figs. Leaves and insects are also part of the gibbon diet. The sharp canine teeth are extremely useful in carrying food while traveling through the forest as well as for tearing through tough skinned fruits (Mootnick, 2007). Gibbons play an important role in the forest ecosystem as they cover hundreds of hectares eating a variety of fruits and help to disperse and regenerate trees (Mootnick, 2007).

Daily Activity

Gibbons are extremely elusive and for that reason the ability of many researchers to observe them in the wild has been very limited (Mootnick, 2007). D. J. Chivers conducted a long term observational study of siamang gibbons in Malaysia (1974). A typical day consists of the following activities listed in table 4.1.

Life Span

The gibbon maturation process has been documented both in the wild and in captivity. The gestation period of the gibbon is approximately 7 months. *Hylobates* reach sexual maturity between the ages of six and eight. In captivity, males sometimes begin to breed around the age of four and females at five. Gibbon studies in zoos suggest that the four in Table 4.2 classes may be used to define the age for all species of captive gibbons (Geissmann, 1993). In the wild, gibbon maturation is a much slower process. Gibbons may reach up to approximately 48 years of age in captivity. Wild gibbons are thought to live up to 25-35 years.

Typical Daily Activities of Siamang Gibbons

Developed from long term observational study of Malaysian Siamang Gibbons (Chivers, 1974, 1977)

Timeframe	Activity
Early Morning	Gibbons begin their days by feeding in the very early morning, as early as 6 am.
Mid-Morning	By mid-morning the group rises to high branch to rest and sing. Sometimes they call out to neighboring groups. The occasionally move around the territory and if another group is encountered, the female and young step back while the males either glare or chase. Travel is alternated with periods of rest and feeding.
Afternoon	Afternoon heat slows activity and the group rests. Travel is alternated with periods of rest and feeding if temperatures allow. In major rain, the group will head to sleeping location and remain there for the rest of the day. In cooler months the gibbons will retire to their sleeping sites earlier as well.
Early Evening	By early evening, the group is usually ready to sleep for the night. Young typically sleep in the arms of a parent. More mature young sleep at a distance from the parents
Night	Gibbons remain at rest until the next morning.

Table 4.1. Typical Daily Activities of Siamang Gibbons (Chivers,1974).

Life Phase Classifications for Captive Gibbons

Developed by Geissmann, 1993.

Life Phase	Years of Age
Infant	0 to 2
Juvenile	2 to 4
Subadults	4 to 6
Adults	6+

Table 4.2 Life Phase Classifications for Captive Gibbons (Geissmann, 1993).

Gibbons and Chinese Culture

Gibbons have long been intertwined with ancient Chinese culture, literature, music and art. Gibbons appear in many writings, paintings and proverbs. The gibbon's songs inspired Chinese poets and writers and became a symbol of the sadness of a traveler missing his home.

This is one of the locations where gibbons were also kept as pets. A mother with an infant would be killed with a dart and the infant gibbon would be raised by a human. The owners would often become extremely attached to the pet gibbon.

Gibbons were also tied into supernatural beliefs of ancient China. Gibbons were considered to have the power to transform into humans and live for hundreds of years.

The prevalence of the gibbon in Chinese writing and culture has provided researchers with a means to record where gibbons occurred historically (Geissmann, 2003).

Humans and Gibbons

Gibbons are threatened by a wide variety of human activities. These include habitat destruction or fragmentation from timber felling and plantations. Illegal wildlife trade is also a problem. Mother gibbons are still killed for the capture of the young. The bodies of the adult gibbons are used for traditional medicines and the young are often distributed as pets (if they survive the trauma) or to tourist attractions (Cheyne, 2005).

Gibbons in Captivity/Gibbon Rehabilitation

There are currently many on-going research efforts concerning gibbons and their rehabilitation needs. Dr. Susan Cheyne is a researcher currently studying gibbons in Central Kalimantan, Indonesia. Dr. Cheyne is studying the behavior of the wild gibbons in order to understand the implications for current and future conservation facilities as gibbons are already approaching extinction in the wild. Dr. Cheyne is part of an on-going research project in the Natural Laboratory of Peat Swamp Forest in Sebangau National Park, Central Kalimantan, Indonesia. The project is aimed at discovering the proper methodology for gibbon rehabilitation and re-release into the wild. The project targets gibbons that are victims of illegal animal trade.

There is a large need for Cheyne's rehabilitation efforts. Many of the gibbons collected illegally do not survive to maturity because of the emotional stress or as a result of inadequate care. As gibbons reach maturity they typically become aggressive towards owners and are abandoned. Gibbon centers have been created to collect unwanted gibbons throughout southeast Asia as an alternative to abandoning the gibbon to city streets. Owners deposit their pets here when they can no longer care for the animals or no longer wish to. Researchers and animal experts then attempt to rehabilitate the collected gibbons.

Rehabilitation, according to Dr. Cheyne, is process that attempts to rescue orphaned gibbons and "provide them with an environment where they are (1) encouraged to become more self-sufficient and (2) provided with the opportunity to live as they should in the wild" (Cheyne and Brule, 2004).

The ultimate goal of this process is to support conservation of wild populations by returning rehabilitated gibbons to the wild. Conservation of gibbons, according to Cheyne, is twofold, addressing both the management and protection of wild populations and the rehabilitation of wild-born and captive raised gibbons through rehabilitation projects (Cheyne, 2005).

Rehabilitation centers can also serve as educational and research centers by communicating the problem behind the illegal wildlife trade. This dual role can also help raise funds for the rehabilitation efforts. Cheyne and Brule note that rehabilitation projects combined with tourism have failed in the past and that mixing visitors with gibbons must be avoided (Cheyne and Brule, 2004).

The Reality of Rehabilitation

A completely successful rehabilitation and reintroduction process has not yet been established. However, a portion of the gibbons rehabilitated through these types of projects are successfully returned to the wild, and those who are not able to become entirely self-sufficient can live peacefully within the confines of the sanctuaries. In a survey of existing rehabilitation projects, Cheyne described the most successful centers to be those that limited, if not completely avoided extraneous human contact. The projects which encouraged tourism and daily human visitation were the least successful in reintroducing gibbons to the wild. Another issue leading to the demise of a rehabilitation center is providing a habitat that is not part of the contiguous forest, which requires a large

Unhealthy Gibbon Behaviors, Causes and Possible Solutions

From Dr. Susan M. Cheyne's "Unusual behaviour of captive-raised gibbons: implications for welfare," 2006.

Behavior	Causes	Possible Solution
Rocking	Cramped physical conditions	Provide large and stimulating enclosure
Twitching	Physical or social deprivation	Provide large and stimulating enclosure
Repetitive Swinging	Inadequate supports for swinging in enclosure	Change enrichment, provide necessary equipment for swinging
Self Harm	Lack of social stimulation	Provide large and stimulating enclosure, provide mate/companion
Teeth Scraping	Lack of social stimulation and/or inadequate diet	Provide large and stimulating enclosure, adjust diet
Frequent Walking on Ground Plane	Lack of adequate swinging supports, lack of vertical space	Create natural forest floor, provide necessary equipment for swinging, increase space
Fear of Heights	Lack of vertical space	Increase vertical space, gradually introduce gibbon to verticality of new space
Human-Directed Masturbation	Social deprivation	Provide mate/companion, reduce human contact
Presentation of Rump to Humans (Posterior Presenting)	Social deprivation and excessive human contact	Provide mate/companion, reduce human contact

Table 4.1. Unhealthy gibbon behaviors, causes, and possible solutions (Cheyne, 2006).

dependency on human caregivers to provide food and water (Cheyne, 2005). Continued physical and/or visual contact results in gibbons that are still very strongly attached to humans (Cheyne and Brule, 2004). A very successful rehabilitation project is the Kalaweit Gibbon Rehabilitation Program in Central Kalimantan, Indonesian Borneo. This center does not welcome tourism and works actively in the surrounding community to raise awareness about the threats on wild gibbon populations (Cheyne, 2005).

Rehabilitation Issues

Several non-wild behaviors or stereotypic behaviors have been observed in wild-born captive gibbons during rehabilitation efforts. Stereotypic behaviors (SB) are repetitive, unchanging behaviors with no goal or function (Cheyne, 2006). As these behaviors are never observed in the wild and serve no purpose, it has been concluded that these behaviors are most likely indicative of psychological stress resulting from captivity. Cheyne suggests that a significant portion of the rehabilitation process is eliminating these behaviors and replacing them by establishing and maintaining a set of normal behaviors. Because these behaviors are indicative of emotional stress, they are therefore considered to be detrimental to the success of rehabilitation (Cheyne, 2006). Although across the majority of the 75 gibbons observed, the behaviors either ceased or improved within days and weeks of their arrival to the facility, any of these behaviors are signal that the facility is not meeting the needs of the animal. Dr.. Cheyne consistently found that with increased environmental enrichment and the addition of an opposite sex companion, these behaviors declined.

The following table lists the unusual behavior, the suspected cause and the solutions observed to be successful within gibbon rehabilitation (See Table 4.1).

Conclusions

The gibbon is a sensitive and complex species that is quite vulnerable in the wild, and even more so in captivity. There has yet to be a rehabilitation strategy that is fail-proof. It is important that an enclosure is considerate of gibbon needs in order to make the gibbon as comfortable as possible. The design of any gibbon facility must be approached very thoughtfully to encourage mental and physical well-being.

Zoological Parks have the potential to play a significant role in the preservation of the gibbon. As certain gibbon species are already approaching extinction in the wild, zoos will have the ability to serve as centers for conservation. A conservation center will support a healthy population of captive gibbons. Should gibbons become extinct in the wild, the gibbons in these facilities could help to re-establish wild populations.

Chapter Five: Design Philosophy

A hierarchy of needs.



Design Philosophy

It is apparent from research regarding contemporary exhibit design technique and the gibbon species, the typical design approach would not be appropriate for Sunset Zoological Park.

In order for the keeping of gibbons at Sunset Zoo to be ethical in nature, it must hold a greater purpose than the exhibition of gibbons for the recreation and education of human beings. This purpose must be conservation.

The design of the gibbon exhibit should be based on a hierarchy of user needs illustrated in Figure 5.1. There are three users, the animal, the keeper, and the visitor. Historically, the visitor is often given the highest priority. In the case of a conservation based exhibit, the animal's needs will take precedence over all other users. The animal, or in this case, the gibbon, is the principal user of the space. The gibbon does not have the ability to speak for itself and did not ask to be put into this situation. It is the job of the designer to find out what the gibbon needs to be comfortable, secure and healthy. The comfort and health of the gibbon takes the highest priority in all decisions concerning the exhibit design.

The second priority user is the keeper. The keeper plays a supporting role in the health and well-being of the animal. A safe, functional facility will better enable the keeper to care for the animals.

The third priority user is the visitor. The visitor is vital to maintaining the funding that allows the animal to be fed and the keeper to be paid. In turn, the exhibits must attract visitors and hold their attention to make the experience worthwhile. In addition to being entertained, the visitor should be able to leave having learned something the animal, its habitat, and conservation.

The needs of the keeper and the visitor are very specific and easily identifiable things or concepts. Those of the animal are much more difficult to pinpoint and require extra research thought, and care to be uncovered.

Previous Page:
 (Photo: http://www.saczoo.com/view_image?id=450)

user needs diagram

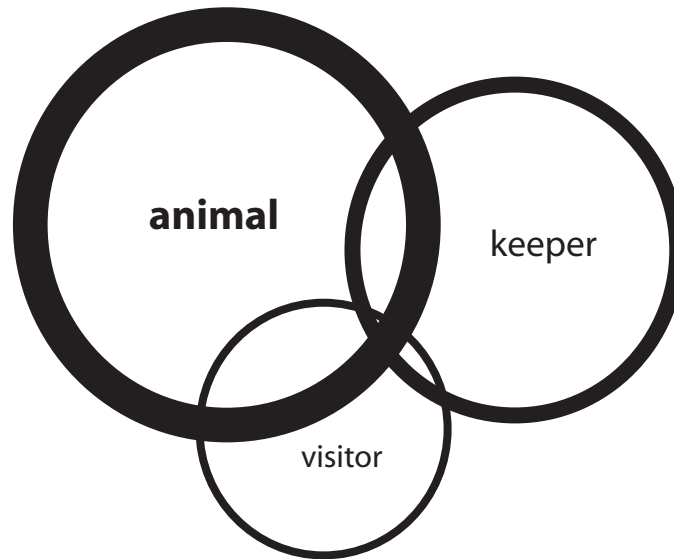
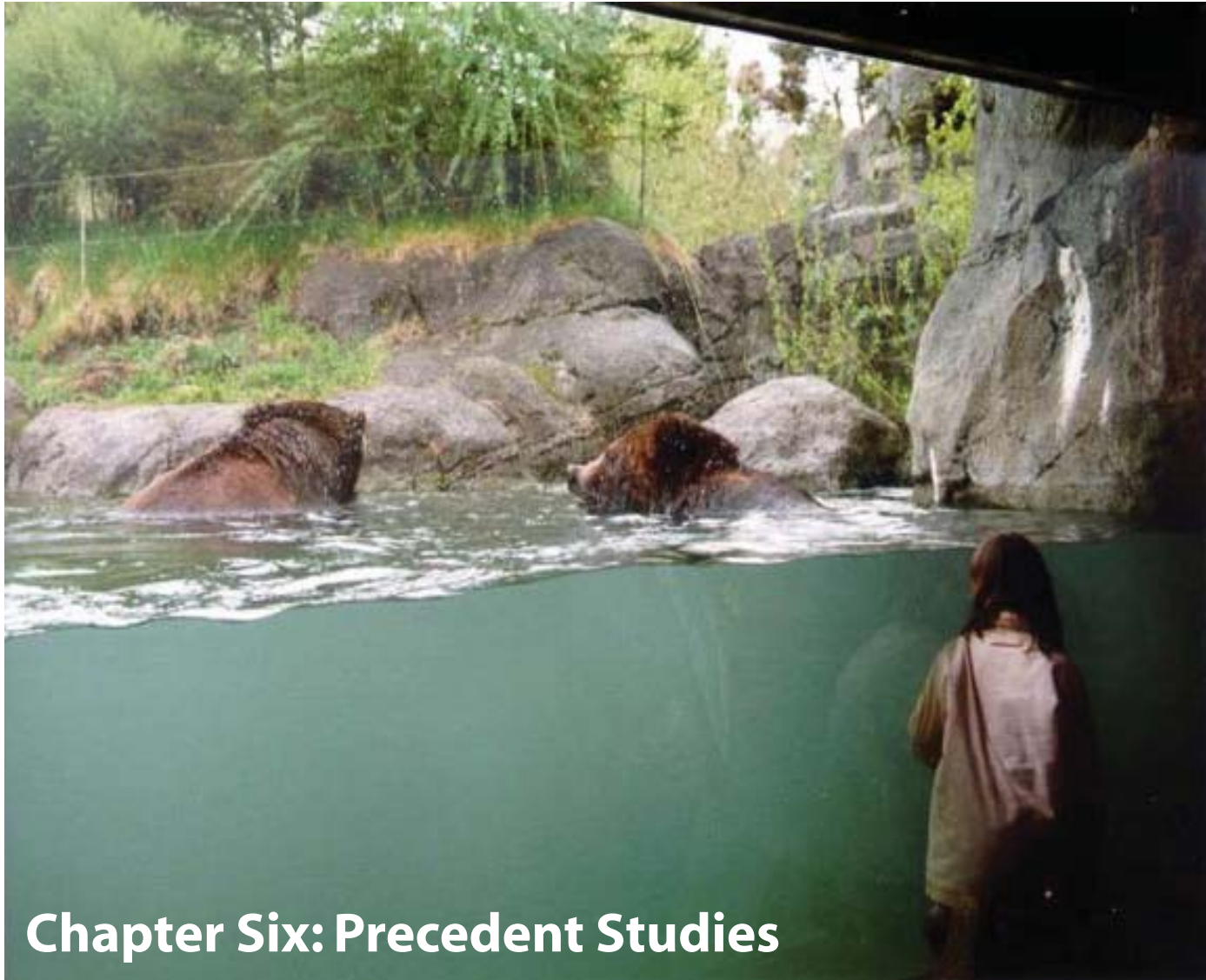


Figure 5.1. User Needs Diagram (Morrow, 2008).



Chapter Six: Precedent Studies

Previous Page:
Northern Trail's
Bears Exhibit (Photo:
Ebenhoh, 1999).

What are Precedent Studies?

In this case, precedent studies help to identify the design solutions that have been employed by previous designers, animal experts, and zoo keepers. Precedent studies can also help to identify solutions that were not satisfactory. Understanding what has worked historically and why it worked is key knowledge to have in hand when embarking on a new but similar situation. For this study, examples were sought that emphasized animals' needs as described in the previous section.

Precedents were evaluated on how well they addressed user needs addressed in Chapter 5. The key to a successful exhibit design is one that satisfies the needs of all three primary users. These are the animal, the keeper, and the visitor. The diagram illustrating the hierarchy of user needs presented in Chapter 5 will be used as an analysis aid in the evaluation of precedents.

User Needs Diagram

The key to a successful exhibit is finding a solution that satisfies the needs of all three primary users. The needs that take precedence are those of the animal, the user who cannot speak for it self. The keeper's needs take second priority because this role supports the well-being of the animal. A safe keeper with a functional facility will be better enabled to care for the animals. The lowest priority level needs are the visitor's. If the exhibit is to be successful it must hold some meaning or message

that remains with the visitor. The needs of the visitor and the keeper are very specific, easily identifiable things or concepts. Those of the animal are much more difficult to list and identify. The following is a visual representation of the hierarchy of needs as well as a general list of items that are encompassed in those needs. This diagram, shown in Figure 6.1 will serve as an analysis aid in the study of precedents.

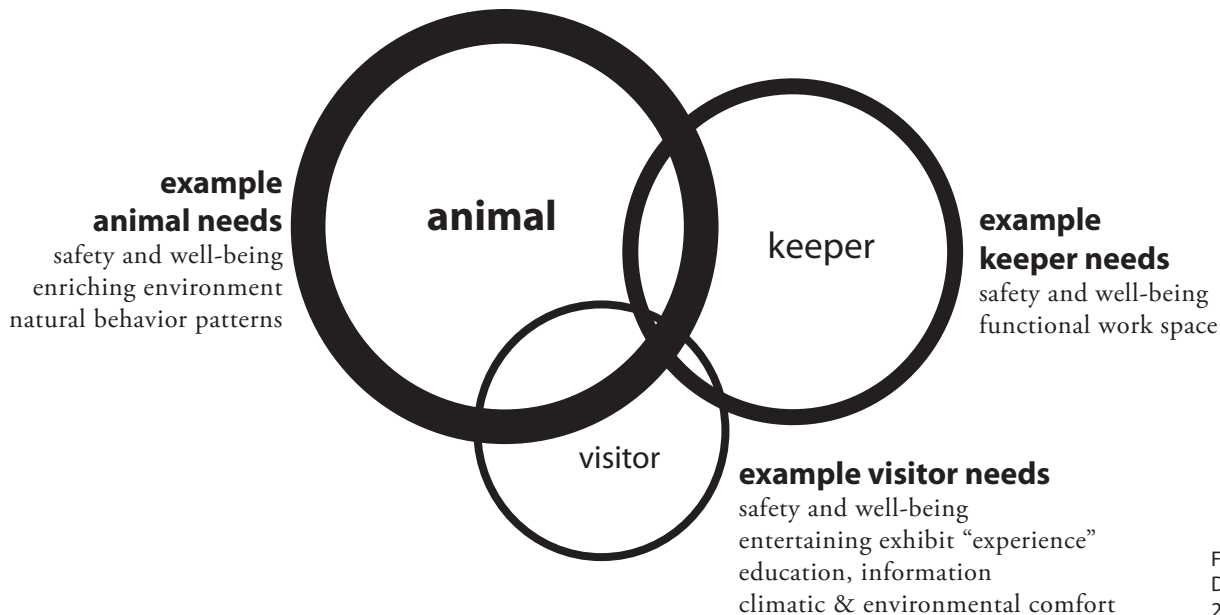


Figure 6.1. User Needs Diagram (Morrow, 2008).

Monkeys of Makokou

Zoo Atlanta, Atlanta, Georgia

Designer: CLRR, Philadelphia, PA

Opening date: September 21, 1990

Local Climate Conditions:

Average temperature of 61 degrees Fahrenheit and an average of 48 inches of rain yearly

Client: Zoo Atlanta

Size: 250 square meters

Physical Context: Monkeys of Makokou is located in Zoo Atlanta's Ford African Forest Trail

Theoretical Context:

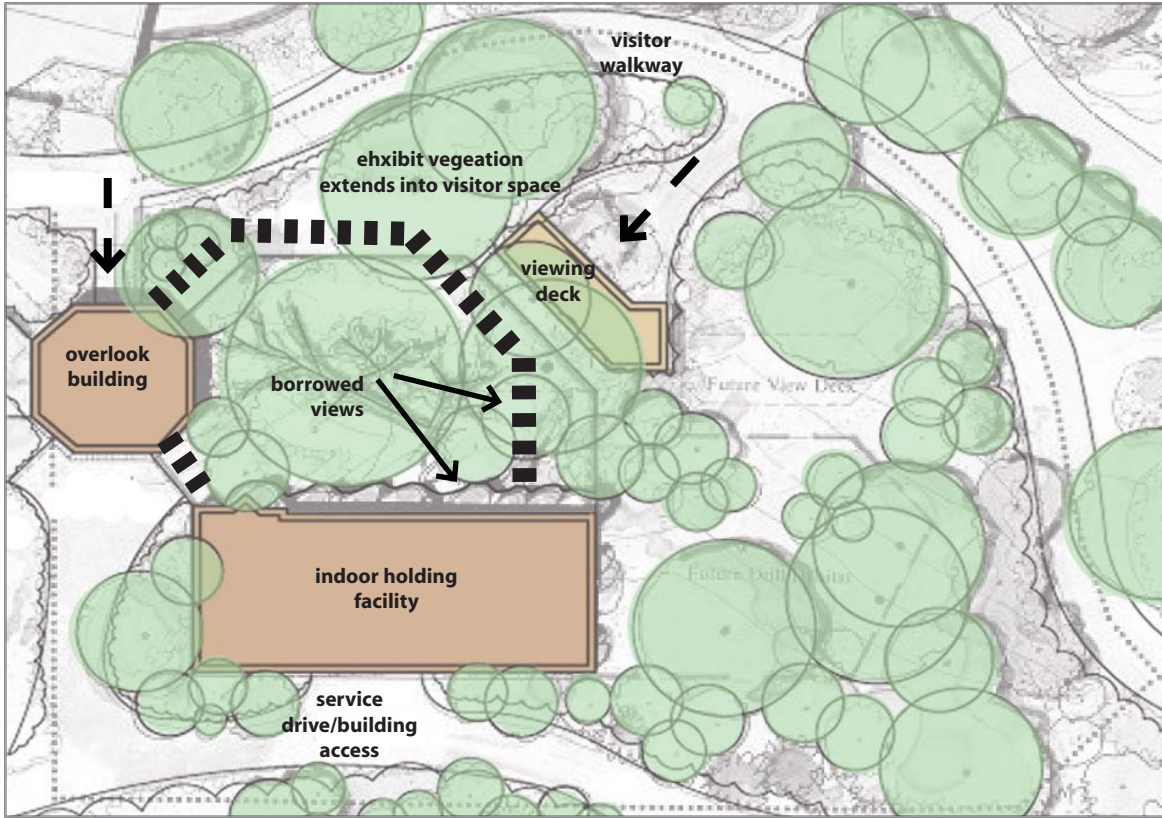
The principles of landscape immersion were incorporated into the design by the designers from very early on. The designers used nearly every immersion technique possible, and major features include a meticulously recreated habitat and a conscious extension of the exhibit landscape into the viewer's space (See Figure 6.4. Vegetative Cover).

Background/History: The exhibit houses two types of arboreal apes, mandrills and mona monkeys. The designers took advantage of some mature existing vegetation and designed the exhibit to include these trees.

Animal Features

Monkeys of Makokou is a mixed species exhibit that houses mandrills and mona monkeys, both small, climbing primates.

Visitor viewing is limited to two locations denoted by dashed arrows on the site plan to the right. Viewing is restricted to allow the animals some degree of privacy. The restricted access is illustrated by Figure 6.3. User Space. The indoor holding facility and vegetation prevents visitor viewing on the remaining exhibit borders.

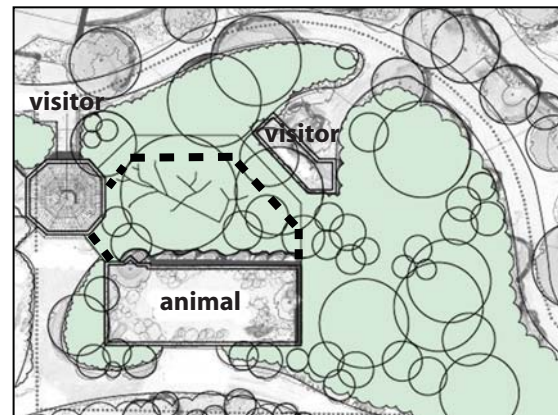
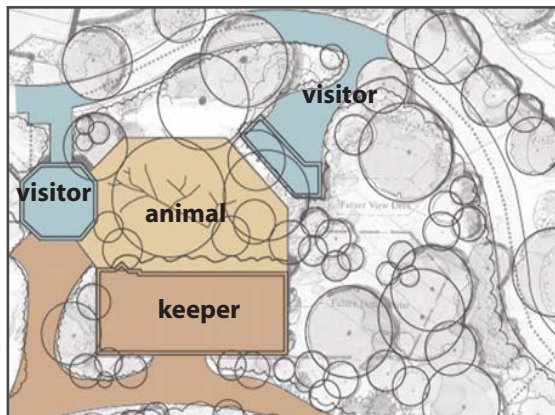


Clockwise from Top:

Figure 6.2 Site Plan (Image Source: CLRR 1989 adapted by Morrow, 2008).

Figure 6.3. User Space. The central space is occupied by the animal. The blue and dark brown spaces are occupied by visitor and keeper but these spaces are limited and do not completely surround the animal's space (Image: CLRR, 1989 adapted by Morrow, 2008).

Figure 6.4. Vegetative Cover. Exhibit vegetation extends beyond the exhibit into the viewer's space, giving the viewer a sense of what it is like to be in this habitat (Image: CLRR, 1989 adapted by Morrow, 2008).





From Left:

Figure 6.5. "Fallen" trees were incorporated into the exhibit to encourage the monkey to use all levels of the forest, as they would in the wild (Photo: Lash, 1991).

Figure 6.6. Artificial and actual vines allow for tree to tree travel (Photo: Lash, 1991).

The exhibit was designed around existing, large shade trees to begin the simulation of a rain forest canopy. The plantings added to the space were chosen in an effort to recreate the natural habitat of the species, a tropical African forest. Fallen trees (See Figure 6.5) and vining vegetables were also included to add another dimension of interest for both the animal and the visitor. Not only do these vines further the illusion of an African rainforest, they provide an additional food source the animals may seek out themselves. Finally, a seed mix of fast growing, wildlife attracting plants were added to the exhibit. These draw insects and small birds for visual interest and also expedited the appearance of a lush African rainforest in the exhibit (See Figure 6.9).

The exhibit vegetation extends beyond the borders of the exhibit, blurring the lines of the enclosure as illustrated in Figure 6.4. Vegetative Cover. Features have been included that encourage the



monkeys to forage and explore as they would in their native habitat. A combination of real and synthetic trees, vines, and rocks help to recreate habitat in both horizontal and vertical dimensions and can be seen in Figures 6.6-6.9.

The animals are contained by a wire mesh that is difficult to see against the sky (See Figure 6.10). This is hoped to reduce the feeling of being enclosed.



Clockwise from top left:

Figure 6.7. Synthetic trees provide sturdy climbing surfaces that would otherwise take years to grow. Minute details of the tree surface are carefully included (Photo: Bruner, 1991).

Figure 6.8. Synthetic rocks conceal the facade of the indoor holding facility and provide an additional climbing surface (Photo: Bruner, 1991).



Figure 6.9. Lush, fast growing plants were selected to maintain a lush, thick appearance similar to the animal's native habitat (Photo: Bruner, 1991).

Figure 6.10. Wire mesh is used to enclose the exhibit (Photo: Bruner, 1991).

Figure 6.11. Indoor climbing limbs and vines provide stimulation to the monkeys while indoors. All times are easily sanitized by the keepers regularly, as required by the USDA (Photo: Bruner, 1991).



Keeper Features

The exhibit also has an attached holding facility with four transfer tunnels for keeper convenience and safety pictured in Figure 6.12. The keeper can move the monkeys from the outdoor exhibit to indoor holding area by guiding the monkeys through a series of overhead cages into a larger holding spaces (See Figure 6.11). The smaller transfer cages can also be used to quarantine an individual monkey if medical attention is required.

The indoor facility also provides the keeper with an on site work space. The building holds a small, utilitarian kitchen with a refrigerator and sink adequate for the keeper to prepare the inhabitants' meals on site shown in Figure 6.13.

An effort was made to provide clear views through the holding facility at all entry points for the safety of the keeper (See Figure 6.14). Additionally, a set of double doors were included at the main exit of the holding area to prevent egress in the case of an escape.

The larger indoor holding spaces contain enrichment features that are beneficial to the animal's mental stimulation but also easily sanitized keepers (See Figure 6.11).



Clockwise from Top Left:

Figure 6.12. Overhead transfer cages allow for easy movement from the indoors to the outdoors (Photo: Bruner, 1991).

Figure 6.13. Kitchen with storage space, sink and refrigerator is convenient for the keeper when preparing meals (Photo: Bruner, 1991).



Figure 6.14. The keeper has views into every corner of the indoor holding facility (Photo: Bruner, 1991).



Clockwise From Left: Figure 6.15. Exhibit vegetation extends into the viewing space. This provides relief from the sun on hot days and also gives the viewer a sense of what it feels like to be in an African Rainforest (Photo: Lash, 1991).

Figure 6.16. View through the glass window inside the overlook building (Photo: Bruner, 1991).

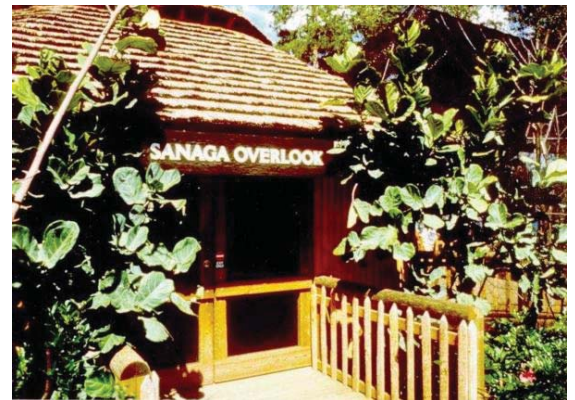
Figure 6.17 The Sanaga Overlook building provides visitors with an overhead view of the exhibit (Photo: Lash, 1991).

Visitor Features

Dedication to creating a rich, layered habitat to benefit the animal results in an interesting and appealing experience for the human visitor, who is surrounded by the same vegetation throughout the exhibit (See Figure 6.15). Animals in this exhibit have successfully reproduced, a sign to their caretakers that they are feeling at home within their space and that visitors are seeing natural behaviors.

Additionally, The space provides a snapshot of the African rainforest ecosystem to the human visitor. The careful reproduction of the native habitat encourages natural behavioral patterns, providing humans with the experience they seek in zoological parks.

Points of particular interest to the animal have been located near viewing areas. A viewing deck (Figure 6.18) allows visitors a mid-canopy view through wire mesh. A viewing shelter (Figure 6.17)



provides an upper story view through a glass wall (See Figure 6.16). This area also provides them with a shaded place to sit watch the activity below in air conditioning.

Significance: Monkeys of Makokou is an immersion exhibit that exemplifies the principles of immersion exhibits. The exhibit is also a successful mixed species habitat. A mixed species exhibit is a stronger in terms of conservation as it is a more realistic setting for the animals it houses.

Relevance: Monkeys of Makokou is a very strong example of an immersion exhibit that incorporates features to satisfy the needs of all three primary users, animal, keeper, and visitor. The exhibit also illustrates how immersion principles can be applied to small, arboreal apes, such as Gibbons. This exhibit is also very accommodating to the keeper through the careful design of the indoor holding facility.

(Source: Fiby, Fiby, and Zeigler, 2006)



Figure 6.18. The viewing deck allows the visitors mid and low level views of the exhibit (Photo: Lash, 1991.)

Monkey Jungle: Wild Monkey Swimming Pool

Du Mond Conservancy
Miami, Florida

Designers: Du Mond Conservancy

Founding Date: 1933

Size: 265,000 SQFT

Physical Context: The Wild Monkey Swimming Pool is located within the context of the semi-free range macaque habitat of Du Mond Conservancy in Miami, Florida.

Historical context: Du Mond Conservancy opened in 1933 to care for retired laboratory primates. These animals are not self-sufficient enough to be returned for the wild so the conservancy offers them the experience of an almost free-range habitat.

Significance: This exhibit turns around the concept of a typical zoo as Jon Coe describes in his writings discussing the 'unzoo alternative.' In this context the human is caged and the animal moves around and views him or her.

Relevance: This exhibit is relevant because of its use of barrier-free design methods. It relies upon natural landscape features that naturally hinder movement to contain the macaques.



Animal Features

The Monkey Jungle is a semi-free range park. There is no typical boundary that prevents the animal from leaving the space. Instead, at the outskirts of their habitat is a barren pine forest where tree to tree travel is nearly impossible. This feature is almost always enough to encourage the monkeys to remain on the preserve as this species is most comfortable in the security of dense vegetation.

A main function of their habitat is to encourage them to form social units as they would in the wild. This happens more naturally because of the free-range nature of the site as well as the abundance of space for the animals to form distinct groups.

Additionally, the Florida climate is one of the most well-suited to tropical primate species in the United States. This makes recreating the natural habitat less of a challenge. Additionally, the site has the

potential to produce leafy greens and fruits that tropical primates would find in their own habitats. This allows them to forage for a lot of their diet as they would naturally.

A pond was added to the site by the keepers to add another element of enrichment as Macaques typically “fish” for part of their diet in a native setting (Figures 6.19-6.20).

Proof of creating an environment where the animals feel safe and secure, Macaques have been successfully breeding here since the introduction of the first male-female pair in 1934.

From Left:

Figure 6.19. Macaques will not enter water of a certain depth. This prevents them from passing into the viewer’s space. However, the location of the water feature near a viewing deck allows the visitor to view one of the more active daily pursuits (Photo: Fiby, 2000).

Figure 6.20. Ropes allow the macaques to cross to small islands but not into the viewer’s space (Photo: Fiby, 2000).

Figure 6.21. A structure cages the humans within the Monkey Jungle exhibit and the monkeys roam free over it (Photo: Fiby, 2000).

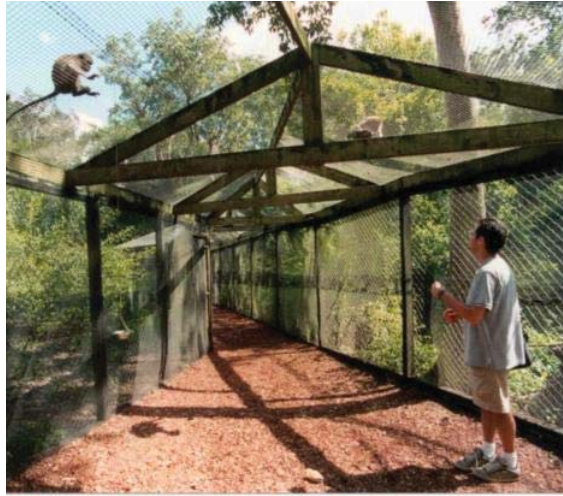


Figure 6.22. Du Mond Conservancy takes advantage of natural barriers to monkey movement to separate viewers from animals (Photo: Fiby, 2000).



Visitor Features

Visitors pass through covered walkways which the macaques pass over (Figure 6.21). This reverses the traditional experience and cages the human visitor while the animal is free to move about. As a result, visitors acquire a new perspective on this relationship.

The feeding pond serves as a natural barrier between a wooden shelter and the dense vegetation (Figure 6.22). From the shelter visitors can get an up close view of one of the macaques gathering food and socializing near the water. The water becomes too deep for the macaques to comfortably cross into the human area. (Source: Fiby, Fiby, and Zeigler, 2006)

Northern Trails

Bears

Woodland Park Zoo

Seattle, Washington

Designers: CLRdesign inc, Philadelphia, PA; The Stafford Architects, Seattle, WA

Opening Date: October 6, 1994 (Design began November 11, 1990)

Client: Woodland Park Zoo

Size: 2.4 Hectares are devoted to Asia trail. The Northern Trail's Bears exhibit covers 15% of this total.

Awards: 1995 American Zoo Association Exhibit Award

Physical Context

The exhibit (Figure 6.23) is located along the Woodland Park Zoo's Northern Trail with other North American species including river otters, mountain goats, wolves, elk and eagles. Although the zoo is located in Seattle, Washington, the landscape of this exhibit simulates an Alaskan habitat.

Background

Woodland Park Zoo's Long Range Plan, developed in 1976 by Jones & Jones, is directed towards the complete redevelopment of the zoo into naturalized exhibits. The plan is very dedicated to landscape immersion principles.

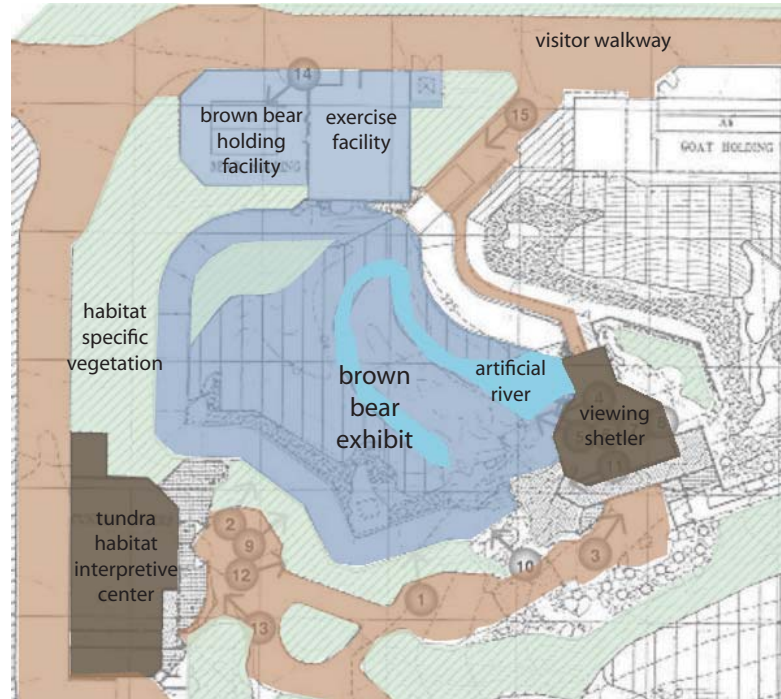
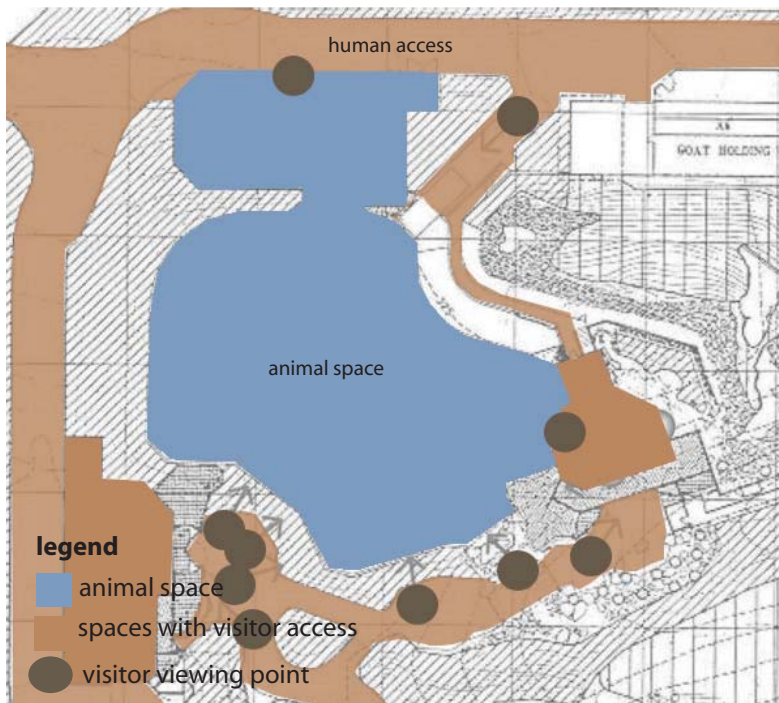


Figure 6.23. Site Plan (Image Source: CLR, 1990 adapted by Morrow, 2008).

Animal Features

The landscape is adequately complex to provide the brown bear with opportunities to exercise both physically and mentally. New deadfall and other plant material is often added to the exhibit for the bears to explore. The exhibit incorporates an artificial river which circulates water through the site. The river falls into a pool. The depth of this pool varies to allow for swimming completely submerged or wading above the water (Figure 6.27).



Clockwise from left:

Figure 6.24. Viewing Points (Image Source: CLR, 1990 adapted by Morrow, 2008).

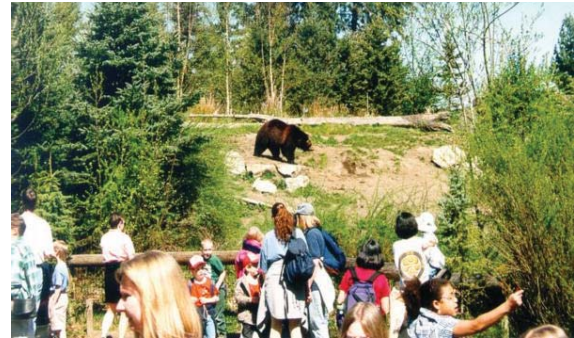
Figure 6.25. Views to other exhibits, in this case mountain goats, make the Asia Trail appear barrier less (Photo: Ebenhoh, 1999).

Figure 6.26. Visitors must look UP to view the animal, putting it in the position of dominance (Photo: Ebenhoh, 1999).

An exercise area that incorporates non-naturalistic features (Figure 5.27) is available to the bears but is not visible to the viewer. This area provides opportunities to climb and play. Another important feature of the exercise area is an elevated platform from which the bears have a 360 degree view of their surroundings.

Animals are never completely surrounded by viewers. Only three up-close viewing points are available to visitors. The exhibit is elevated above many of these viewing points so that the bear is in the position of dominance when its confronted by visitors to reduce the animal's feelings of being threatened or intimidated (Figure 6.26).

Distant views to neighboring exhibits create the



appearance of a limitless habitat (Figure 6.25). This allows the bear's to be alert to the scents and sounds of other species as they would in the wild.

Keeper Features

The exhibit was design to house a specific set of bears, a male and female pair of siblings and an unrelated adult female, who cannot occupy the space safely at the same time. The holding facility was designed to accommodate the need for quick, easy and frequent rotation of these bears. A remote control system is used to control the doors in the holding area so that keepers can view the area from a safe distance before entering after a rotation.



A bridge was installed for keepers to be able to easily deliver new deadfall and other heavy materials into the exhibit.

The keeper facility is centralized between exhibits along Asia Trail and this space has all the requirements for food preparation and storage. Keepers can access any part of the keeper facility without passing through the visitor traffic.



From left:

Figure 6.27. An exercise facility, is available to bears but is concealed from visitors as not to detract from the naturalized appearance of the exhibit (Photo: Ebenhoh, 1999).

Figure 6.28. An artificial river cycles through the site. The river ends in a pool deep enough for swimming (Photo: Ebenhoh, 1999).

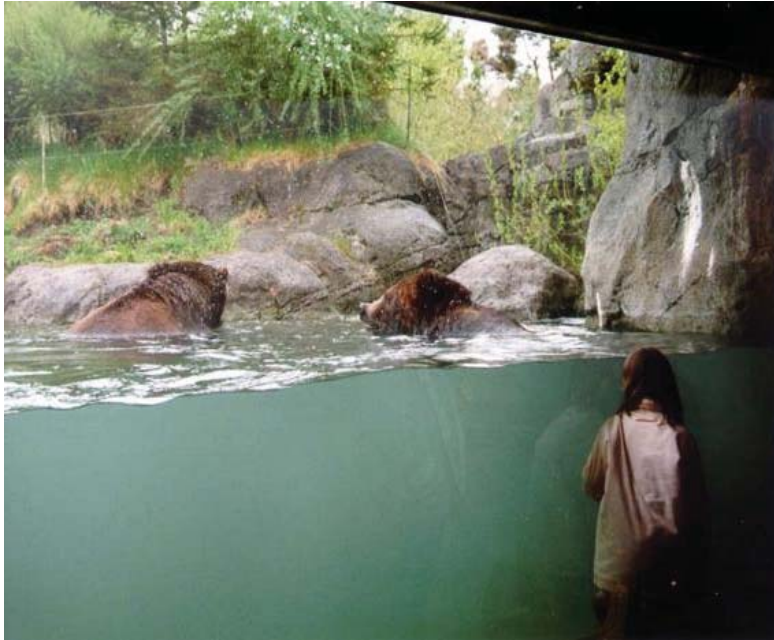


Figure 6.29. Viewers can get an up-close look at the brown bears swimming underwater (Photo: Ebenhoh, 1999).

Visitor Features

Vegetation from the habitat extends into the viewing area to provide visitors the experience of being surrounded by the Alaskan habitat.

Visitors can descend into a replicated cave to view the bears swimming in the pool. The structural components of this viewing area are concealed by a simulated avalanche. The view through the glass provides an up-close view (Figure 6.29) while the two other viewing points on site provide a more distant view.

Educational features are an integral part of the exhibit. Signage, video and a small classroom are used to educate visitors about the habitat, behavior and endangerment of the brown bears.

Significance

The Northern Trail's Bears exhibit is an example of a landscape immersion experience applied to a much larger scale.

Relevance

Although there are no similarities between Gibbons and bears, nor the climate of Northern Alaska and Southeast Asian rainforests, the design theory and careful planning behind the Northern Trail's Bears exhibit are valuable and can be applied to other contexts. The brown bear exhibit is an excellent example of immersion.

Careful attention was given to every aspect of the exhibit's appearance to adhere to strict standards of naturalism and realism. Minute detail has been incorporated to any unnatural or synthetic feature, with the help of artists and naturalists to help create the illusion of an Alaskan habitat. Holding structures, doorways and mechanical devices have been very carefully obscured to avoid breaking the illusion. The exhibit appears almost completely borderless. The illusion of an Alaskan habitat is further enhanced by the use of distant views. Mountain goats are visible just beyond the bear habitat and no barrier is visible between the two species.

Cultural references to the people and places that would be located near a brown bear's habitat in northern Alaska are made through signage and structures on site. However, these cultural features do not compete with the actual bears. In fact,

the viewer is, at many points through the walk-through, forced to look up in order to view the bear.

The exercise area incorporates non-naturalistic features. For that reason, it is available to the bears but is not visible to the viewer, to avoid interrupting the naturalistic landscape. This area provides opportunities for much needed exercise and play. Another important feature of the exercise area is an elevated platform from which the 360 degree view of the surrounding area which allows bears to see actually see all the foreign scents they are curious about inhaling.

It is apparent that the bears' needs were at the forefront of the exhibit design. Careful, thoughtful consideration has been given to create a secure, comfortable habitat for the bears.

(Source: Fiby, Fiby, and Zeigler, 2006)

Chapter Seven: Design Goals + Guidelines



Goals for the Gibbon Exhibit at Sunset Zoo

While it is not realistic to imagine a rehabilitation center of the likes of that in the National Peat Swamp Forest discussed in Chapter 4, Sunset Zoo has the potential to become a facility to support gibbon populations, both captive and wild. The efforts of Dr. Cheyne are to return wild-born captive raised gibbons to the wild. Ideally, gibbons born into captivity at Sunset Zoo would have the potential to be returned to their habitat, rehabilitated and released through a similar process to Cheyne's, despite being captive born. Sunset Zoo would be a stepping stone in the process to reaching rehabilitation. This result would be a complicated and carefully orchestrated collaboration with an established rehabilitation center, and for this reason, should be a future goal of Sunset Zoo.

A more realistic goal, that is feasible in the near future for the gibbons at Sunset Zoo is to establish a healthy, reproducing family group that will support captive populations of gibbons. Although supporting a captive population is not as ideal as supporting a wild population, it does address the potential issue of species extinction in the wild. In the worst case scenario, a captive population will be all that remains from which to reestablish the wild population. A healthy gibbon group at Sunset Zoo can be established by implementing a number of strategies that originate from both science and design that place gibbon needs as the highest priority. It is important to note that meeting gibbon needs may be detrimental to the visitor experience at times. However, accommodating gibbon health is a far more important objective of gibbon conservation and is part of the

transformation that zoological parks must make to fully transition from places of recreation to centers of conservation. The procedures used to establish this first, smaller goal of creating a healthy, reproducing gibbon group and carefully recreated habitat would support the ultimate goal of being a stepping stone to rehabilitation in the wild.

A secondary goal of the facility at Sunset Zoo is to spread a message about the illegal wildlife trade that threatens wild gibbon populations. While the threat of habitat destruction is great, it is not unique to gibbons; the illegal pet trade is. The trading of gibbons as pets is a cruel act which will resonate with visitors. Informed people have the potential to counteract this type of animal cruelty. An awareness of the cruelty behind this practice can lead to the avoidance of places of business and institutions which support it, within the U.S. or while traveling foreign nations. This type of animal cruelty issue occurs so far from American eyes, that it is easily overlooked. Sunset Zoo provides an opportunity for the people to establish a stronger connection to a distant problem that may be supported by the actions of the uninformed. Money raised by gibbon specific programs at Sunset Zoo could help to support the projects and agencies that have formed to rehabilitate gibbons. It could also be a future goal for Sunset Zoo to accept only rescued pet gibbons into the facility. Sunset Zoo would then be a refuge for the gibbons affected by the pet trade.

Sunset Zoo also has a unique opportunity to be a leader in the movement towards conservation and away from recreation. This is a transition that zoological parks world-wide are beginning to make

Previous Page:
(Photo: <http://www.animalpicturesarchive.com/ArchOLD-6/1162796855.jpg>)

slowly, but will be forced to make in the future as some animal populations cease to exist outside of animal refuges and sanctuaries.

The user needs hierarchy presented in Chapter 5 will play an important role in creating a gibbon conservation exhibit. The use of this philosophy will require responding first to the needs of the gibbon, then the keeper, and finally the visitor.

Design Guidelines

Design guidelines will help direct the physical manifestation of the design philosophy. Design guidelines for this project are derived from two different experts in different but related fields.

Increasing Affiliative Behavior

The first set of guidelines, shown in Table 6.1. Primate Exhibit Design Guidelines, are adapted from Jon Coe's design methods to increase affiliative behavior between great apes and human visitors. As previously stated, affiliative design strategies are used to increase both affiliative and accepting behaviors. In the design of the gibbon conservation facility, it is important to reduce human interaction where it is not necessary. As a result, interaction between humans and animals is not a primary goal for this project, and only those strategies which encourage accepting behaviors have been included. However, in this case, it should be noted that decreased awareness of humans would be considered positive interaction. Positive interaction can also be achieved, in part, by the use of design features to encourage accepting behaviors. Accepting behaviors help to ease an animal's

potential discomfort at being displayed. An animal that does not feel threatened when it is observed by a crowd of people is more likely to exhibit natural, healthy behaviors, providing visitors with a much greater, worthwhile zoo experience.

It should also be noted that while the guidelines are presented by Coe as strategies for large apes, these strategies are also applicable to smaller apes, such as the gibbon.

The guidelines in Table 7.1 is adapted from Jon Coe's design methods to increase affiliative behavior between great apes and human visitors.

Table 7.1 Primate Exhibit Design Guidelines (Adapted from Coe, 1999).

Primate Exhibit Design Guidelines

Adapted from John Coe's Strategies for Increasing Affiliative Behavior in Great Apes, 1999

Strategy	Rationale
Distribute key areas, such as areas of shade, feeding areas, watering areas, and enrichment features widely throughout the site.	This allows the primate the opportunity to have some control over the exhibit. The primate can choose where and with whom they wish to be.
Provide continuous pathways through trees and on the ground plane. Avoid dead ends.	Dead ends are a problem during times of group conflict or for primates who frequently find themselves the subject of group aggression. Continuous pathways make it difficult for a primate to become cornered by the other animals in the exhibit.
Provide high, comfortable perching areas that accommodate several individuals at one time.	High perches allow dominant individuals, or groups to overlook the exhibit and surrounding areas.
Subdivide the exhibit.	A divided exhibit can give the animals an opportunity to escape each other in a relatively small space. Primates occasionally need personal space, or need to escape the aggression of dominant group members.
Incorporate features that encourage linear movement through the site.	Primates are often territorial. This allows for patrolling type behaviors.
Allow visual and auditory access between indoor holding facility and all isolation rooms.	Social contact can be comforting during times of stress. Isolation is often uncomfortable for gibbons. Social contact may lessen the discomfort.
Locate viewing areas below primate areas.	The highest/higher point is often occupied by the socially dominant primate. The animal should be allowed to occupy this position in relation to human visitors as well. Not only does it reinforce the concept of respecting the animal to the human, it increases the animal's comfort.
Viewing areas should be on equal/level ground or below primate eye level.	This reinforces the animal's feeling of dominance and control on the situation.
Distribute several smaller viewing areas rather than creating one large viewing area.	Crowds of people can encourage aggressive behavior in primates. Smaller groups may be perceived as less threatening.
Provide areas for keeper/researcher observation with widespread visual access to the exhibit.	Not only does this facilitate research, it allows a keeper to monitor animal needs and easily view problems or emergencies and quicken response time to emergencies.

Gibbon Enclosure Design

The table below lists the design strategies adapted from Dr. Susan Cheyne's work to rehabilitate gibbons. The guidelines are aimed at creating enclosures that encourage gibbon mental health as a function of supporting gibbons healthy enough for rehabilitation.

Gibbon Enclosure Design Guidelines

Adapted from Proposed Gibbon Rehabilitation Guidelines (Cheyne, Chivers & Sugardjito, 2005)

Strategy	Rationale
Create areas intentionally for sleeping. Provide baskets or appropriately sized branches.	Gibbons in the wild have preferred sleeping areas that are used on a consistent basis. They may derive a sense of security from having a familiar, comfortable place to sleep.
Avoid the use of man-made materials that can be picked or pulled apart.	Gibbons in captivity will pick apart and swallow non-edible materials given the opportunity.
Provide an earthen floor.	The earthen floor will provide an array of insects which are the protein component to a gibbon's diet. A wet, damp ground will also discourage them from sleeping on the ground (unnatural behavior common in captivity) and will also expose the gibbon to parasites which builds immunity and antibodies.
Vertical dimensions should mimic the rainforest layers.	Vertical space is important to gibbons who spend most of their time in the trees.
Provide areas for privacy and for socialization.	Gibbons need to be able to distance themselves from other gibbons at times and should have areas to hide and to gather.
Employ enrichment objects.	Objects that the gibbon can manipulate or climb on have been observed to greatly reduce boredom and stress in captivity. These items include balls, magazines, uprooted trees, cardboard boxes, highway safety cones and mirrors.
Provide objects to encourage brachiation and balance.	The presence of tire swings and ropes increase the occurrence of this natural behavior in captivity.
Avoid feeding at ground level.	Wild gibbons rarely collect dropped fruit from the forest floor. An aerial feeding mechanism would be preferable to encourage natural behavior.
Provide water in a way that encourages gibbon to drink as it would in the wild.	Wild gibbons drink by placing a paw in a pool of water and drinking the water droplets from their fur-not from bottles or hoses.

Table 7.2. Gibbon Enclosure Design Guidelines (Adapted from Cheyne, Chivers and Sugardjito, 2005).

Preventing Unhealthy Behaviors

Cheyne has also developed a list of abnormal and unhealthy gibbon behaviors also noted in Chapter 4. As previously mentioned, these non-wild behaviors, also called stereotypic behaviors, have been observed in wild-born captive gibbons during rehabilitation efforts. Stereotypic behaviors (SB) are repetitive, unchanging behaviors with no goal or function (Cheyne, 2006). As these behaviors are never observed in the wild and serve no purpose, it has been concluded that these behaviors are most likely indicative of psychological stress resulting from captivity. Cheyne suggests that a significant portion of the rehabilitation process is eliminating these behaviors and replacing them by establishing and maintaining a set of normal behaviors. Because these behaviors are indicative of emotional stress, they are therefore considered

to be detrimental to the success of rehabilitation (Cheyne, 2006). Any of these behaviors are signal that the facility is not meeting the needs of the animal. Table 7.3 outlines the SB, potential cause and possible solution. These solutions should be viewed as guidelines for the design as a preventative measure to SBs.

Unhealthy Gibbon Behaviors, Causes and Possible Solutions

From Dr. Susan M. Cheyne's "Unusual behaviour of captive-raised gibbons: implications for welfare," 2006.

Behavior	Causes	Possible Solution
Rocking	Cramped physical conditions	Provide large and stimulating enclosure
Twitching	Physical or social deprivation	Provide large and stimulating enclosure
Repetitive Swinging	Inadequate supports for swinging in enclosure	Change enrichment, provide necessary equipment for swinging
Self Harm	Lack of social stimulation	Provide large and stimulating enclosure, provide mate/companion
Teeth Scraping	Lack of social stimulation and/or inadequate diet	Provide large and stimulating enclosure, adjust diet
Frequent Walking on Ground Plane	Lack of adequate swinging supports, lack of vertical space	Create natural forest floor, provide necessary equipment for swinging, increase space
Fear of Heights	Lack of vertical space	Increase vertical space, gradually introduce gibbon to verticality of new space
Human-Directed Masturbation	Social deprivation	Provide mate/companion, reduce human contact
Presentation of Rump to Humans (Posterior Presenting)	Social deprivation and excessive human contact	Provide mate/companion, reduce human contact

Table 7.3. Unhealthy Gibbon Behaviors, Causes and Possible Solutions (Cheyne, 2006).

Chapter Eight: Program



Previous Page:
 (Photo: http://www.rogerthomas.me.uk/images/New_Images/zoo/zoo_Gibbon04.JPG).

What is a program?

A program is a list of requirements or features for a design. The program for Sunset Zoo's gibbon exhibit is derived from the design guidelines outlined in Chapter 7. Additional requirements include those required by Sunset Zoological Park and the city of Manhattan, Kansas. The program drives the design of the gibbon exhibit.

The program is derived by combining the needs of Sunset Zoo with the design guidelines derived from expert sources including Jon Coe and Dr. Susan Cheyne. The program is divided into Tables 8.1-8.3 by categories: Animal/Outdoor Exhibit Program Requirements, Keeper/Sunset Zoo/Indoor Holding Facility Program Requirements, and Visitor/Educational Program Requirements.

requirement
Distribute key areas, such as areas of shade, feeding areas, watering areas, and enrichment features widely throughout the site.
Provide continuous pathways through trees and on the ground plane. Avoid dead ends.
Provide high, comfortable perching areas that accommodate several individuals at one time.
Subdivide the exhibit.
Provide "hiding" areas.
Incorporate features that encourage linear movement through the site.
Locate viewing areas below primate activity areas.
Viewing areas should be on equal/level ground or below primate eye level.
Distribute several smaller viewing areas rather than creating one large viewing area.
Provide areas for keeper/researcher observation with widespread visual access to the exhibit.
Create natural forest floor
Reduce direct physical contact with humans where possible, i.e. food should not appear to come directly from human hands, develop creative feeding strategies
Maximize vertical space
Identify and include plant material suitable to KS climate to recreate SE Asian rainforest
Conceal all mechanical devices, entryways, boundaries.
Take advantage of borrowed views
Plan for environmental enrichment opportunities. (Enrichment should be naturalistic in appearance when possible.) These features should challenge the gibbon in the areas of feeding and balance (i.e. uprooted trees, swinging objects).
Space tree branches, vines and ropes at a distance that will allow for full arm motion during brachiation.
Provide a pool or series of pools that cycle water but do not spray or spout water.

rationale	target user	source	inventory/analysis items
This allows the primate the opportunity to have some control over the exhibit. The primate can choose where and with whom they wish to be.	Gibbon	Coe	Square Footage, Dimensions
Dead ends are a problem during times of group conflict or for primates who frequently find themselves the subject of group aggression. Continuous pathways make it difficult for a primate to become cornered by the other animals in the exhibit.	Gibbon	Coe	Square Footage, Dimensions
High perches allow dominant individuals, or groups to overlook the exhibit and surrounding areas.	Gibbon	Coe	Vertical Area
A divided exhibit can give the animals an opportunity to escape each other in a relatively small space. Primates occasionally need personal space, or need to escape the aggression of dominant group members.	Gibbon	Coe	Existing Division of Space
These areas allow gibbons to escape each other and the human visitors in times of stress.	Gibbon	Cheyne	Existing Division of Space
Primates are often territorial. This allows for patrolling type behaviors.	Gibbon	Coe	
The highest/higher point is often occupied by the socially dominant primate. The animal should be allowed to occupy this position in relation to human visitors as well. Not only does it reinforce the concept of respecting the animal to the human, it increases the animal's comfort.	Gibbon Visitor	Coe	Potential Viewing Areas, Existing Topography
This reinforces the animal's feeling of dominance and control on the situation.	Gibbon Visitor	Coe	Potential Viewing Areas
Crowds of people can encourage aggressive behavior in primates. Smaller groups may be perceived as less threatening.	Gibbon Visitor	Coe	Potential Viewing Areas, Flow of Patrons
Not only does this facilitate research, it allows a keeper to monitor animal needs and easily view problems or emergencies and quicken response to emergencies.	Keeper	Coe	Potential Viewing Areas
Encourages gibbon to walk upright but not excessively, encourages them not to sleep on the floor, exposes them to insects (a part of their natural diet), exposes them to bacteria which raises antibodies, increases usable space	Gibbon	Coe	Square Footage
Increases feeling of self-sufficiency, encourages pairing/mating/inter-species socialization	Gibbon Keeper	Coe	
Gibbons spend most of their time in the upperstory of the forest.	Gibbon	Cheyne	Vertical Area
Necessary to accurately recreate SE Asian rainforest habitat	Gibbon Visitor	Coe	Climate of KS, inventory of SE Asian rainforest
Create consistency naturalistic appearance	Visitor	Coe	Existing Entryways, Features
Visually increase the size of the space, create the illusion of a limitless habitat.	Visitor	Coe	Potential for borrowed views, Existing Topo
Naturalistic enrichment objects/features will not detract from the illusion of a SE Asian rainforest. Encouraging the gibbon to engage in finding its food and to be active will help maintain overall health.	Gibbon	Coe Cheyne	Square Footage Available, Division of Space
The opportunity to brachiate will allow for exercise and maintenance of upper body strength.	Gibbon	Cheyne	Available Square Footage
A non spraying water feature will force the gibbon to drink as it would in the wild by dipping its hands into the water.	Gibbon	Cheyne	Water Connections

Table 8.1
Animal/Outdoor
Exhibit Program
Requirements
(Morrow, 2008).

requirement
Retain as much of the original limestone as possible.
Work within the context of the surrounding exhibits of "Asia Forest Trail" at Sunset Zoo.
Allow space for small kitchen with sink, refrigerator, storage and garbage.
Provide isolation cages that are interconnected.
Allow visual and auditory access between indoor holding facility and all isolation rooms.
Meet USDA sanitation standards for indoor primate exhibits.
Provide as much stimulation as possible within the indoor holding facility.
Create easy access from indoor holding facility to outdoor exhibit.

requirement
Create easy access from indoor holding facility to outdoor exhibit.
Create educational/interpretive experience associated with gibbon (which may or may NOT expand upon existing strategies at Sunset Zoo). Any signage/interpretive material should not trivialize or downplay respect to the animal.
Engage all ages in education.
Make conservation goal/message explicit.

rationale	target user	source	inventory/analysis items
Exhibit shell is original to the zoo and was a WPA project, considered important to city history	Sunset Zoo, City of Manhattan	Sunset Zoo.	Existing limestone features
An established concept of "Asia Forest Trail" exists. Gibbon exhibit must fit into this context.	Visitor	Sunset Zoo.	Map of existing exhibits at Sunset Zoo, Design Standards
Allow for convenient food preparation.	Keeper	Sunset Zoo.	Electric, Water Connections, Existing Entryways
Allows for easy and safe movement of gibbons from exhibit to confinement for medical treatment.	Keeper	Coe	Space Available for Indoor Holding
Social contact can be comforting during times of stress. Isolation is often uncomfortable for gibbons. Social contact may lessen the discomfort.	Gibbon	Coe	
Surfaces, climbing structures and enrichment objects must be easily sanitized by Sunset Zoo weekly.	Keeper	Sunset Zoo.	List of USDA Requirements
Kansas winters force gibbons to be indoors several months out of the year. The indoor area needs to be as stimulating as the outdoor component.	Gibbon	Coe	
Easy access/convenience will increase the number of times on unusually warm times during the winter season that the gibbon will get to go outdoors.	Gibbon, Keeper	Sunset Zoo.	Square Footage Available, Division of Space

Table 8.2. Keeper/ Sunset Zoo/Indoor Holding Program Facility Requirements (Morrow, 2008).

rationale	target user	source	inventory/analysis items
Easy access/convenience will increase the number of times on unusually warm times during the winter season that the gibbon will get to go outdoors.	Gibbon, Keeper	Sunset Zoo.	Square Footage Available, Division of Space
Signage should continue message of respect toward the animal.	Visitor	Coe	Existing Educational and Research Efforts at Sunset Zoo
A variety of people of a variety of ages visit Sunset Zoo and each should have the benefit of an age appropriate educational experience.	Visitor		Existing Educational and Research Efforts at Sunset Zoo
Should strive to teach visitors that the real reason behind these types of facilities is not entertainment, but conservation.	Visitor		Existing Educational and Research Efforts at Sunset Zoo

Table 8.3. Visitor/ Educational Program Requirements (Morrow, 2008).

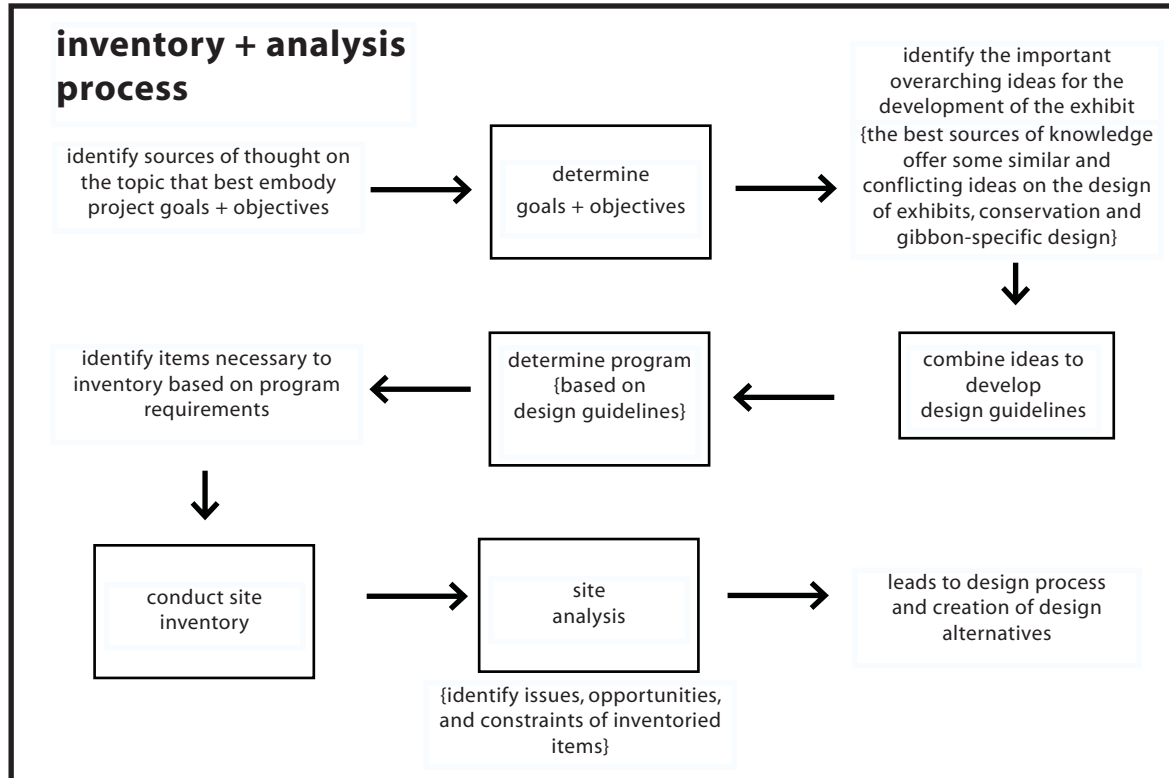


Purpose

The site inventory and analysis will determine how the program can be applied to this specific site. Inventory and analysis will reveal important information regarding program suitability to the site, for example if one area is more suitable to a particular program element than another.

Methods

The items selected for inventory and analysis are directly related to the Program. Inventory and analysis items are necessary to determine the suitability of the program to the site. The detailed process from determining design guidelines to inventory and analysis is outlined in the diagram below.



Previous Page:
Overlook area, future
gibbon exhibit,
Sunset Zoo (Photo:
Morrow, 2008).

Figure 9.1. Inventory and Analysis Process Diagram.

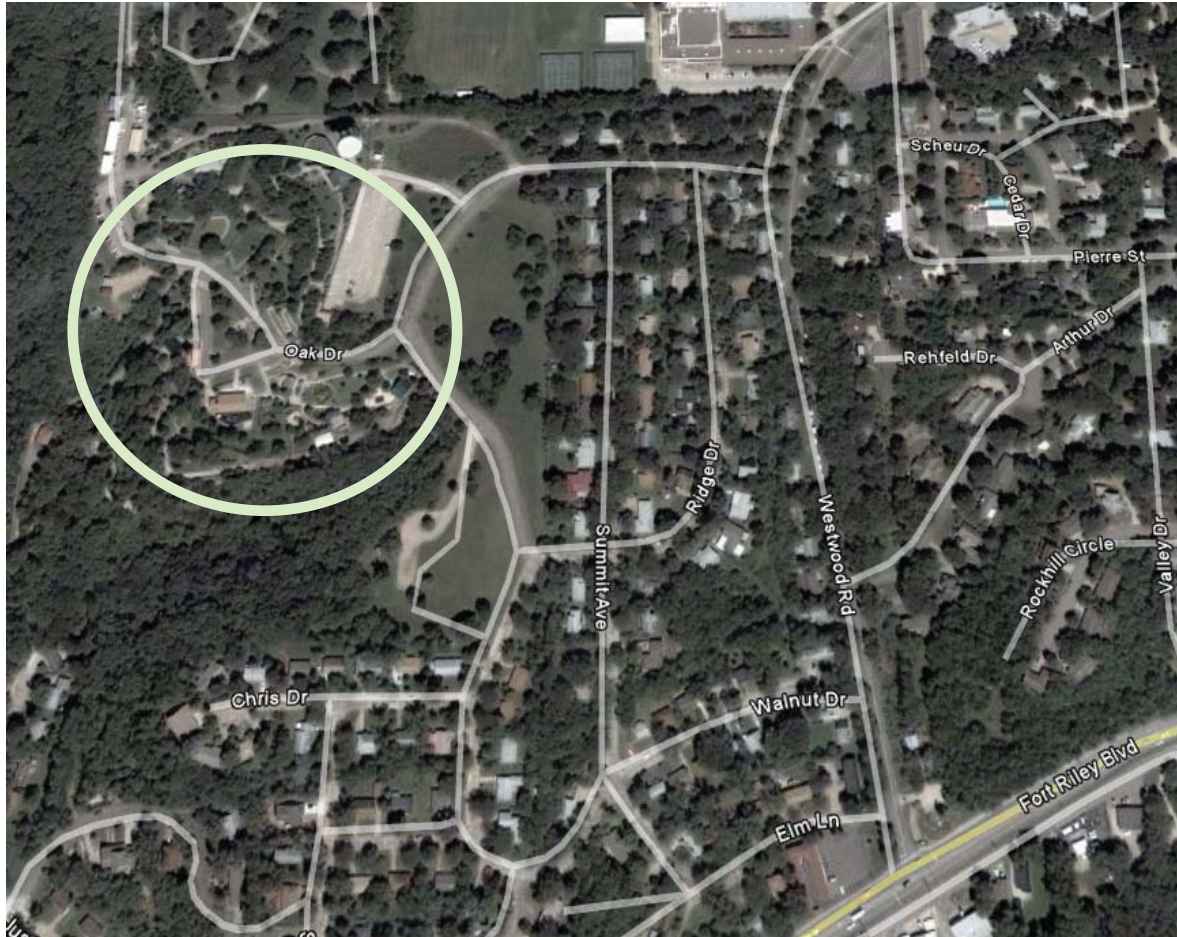


Figure 9.2. Context Map (Google Earth, 2008).

Sunset Zoological Park Context

Sunset Zoological Park is located in the city of Manhattan, Kansas. Construction on Sunset Zoo began in the early 1930s in association with a Works Progress Administration Project. The zoo has been expanding and growing outward ever since. The zoo has remained a popular attraction to the Manhattan community.

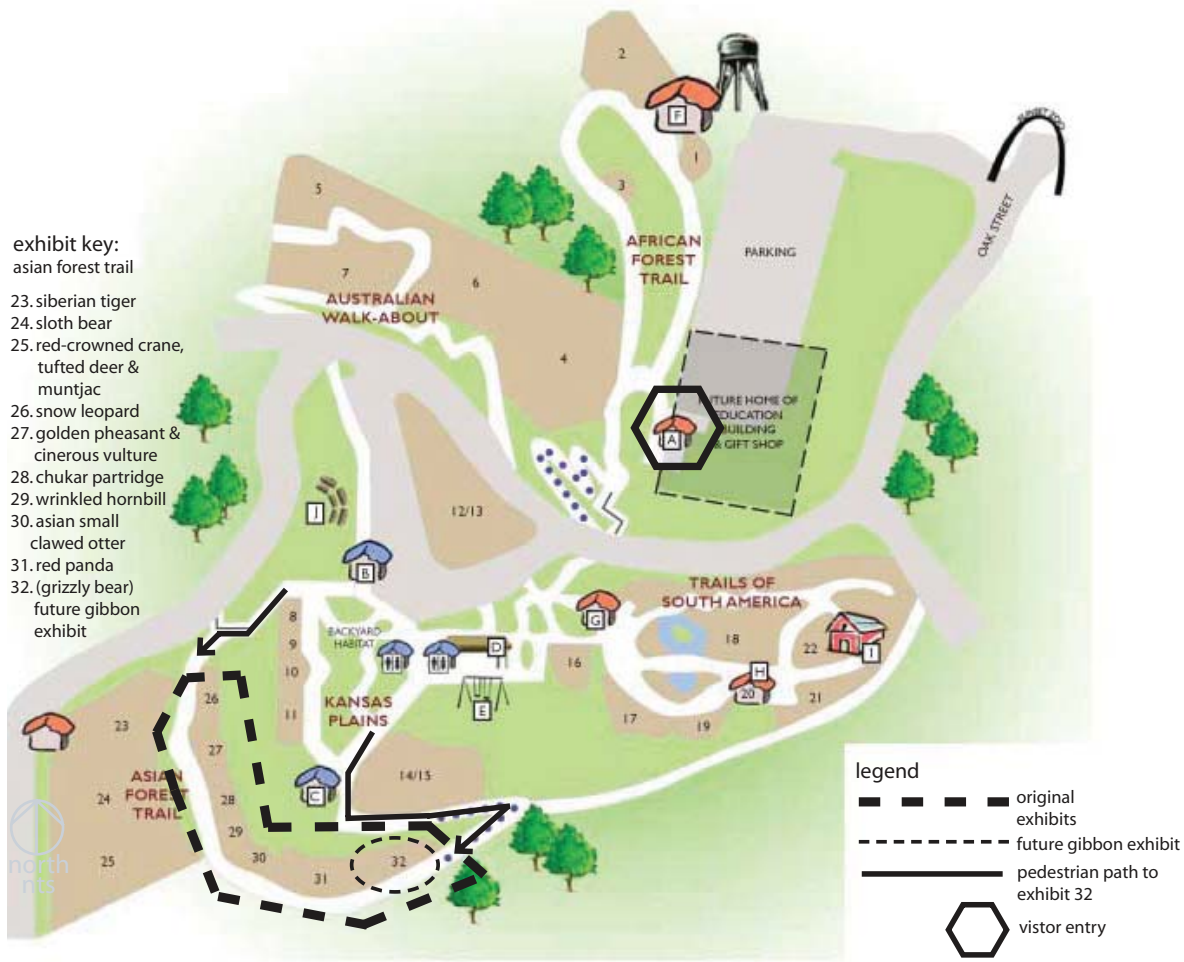


Figure 9.3. Sunset Zoological Park Map (Sunset Zoo, 2006 adapted by Morrow, 2008).

Sunset Zoological Park Map

Brownie’s Exhibit (exhibit 32) is located in the southwest corner of the park. This exhibit is one of a cluster of original exhibits, built in the 1930s as part of a Works Progress Administration project. Today the area of the zoo containing exhibit 32 is part of the Asian Forest Trail walk, which contains Asian species.

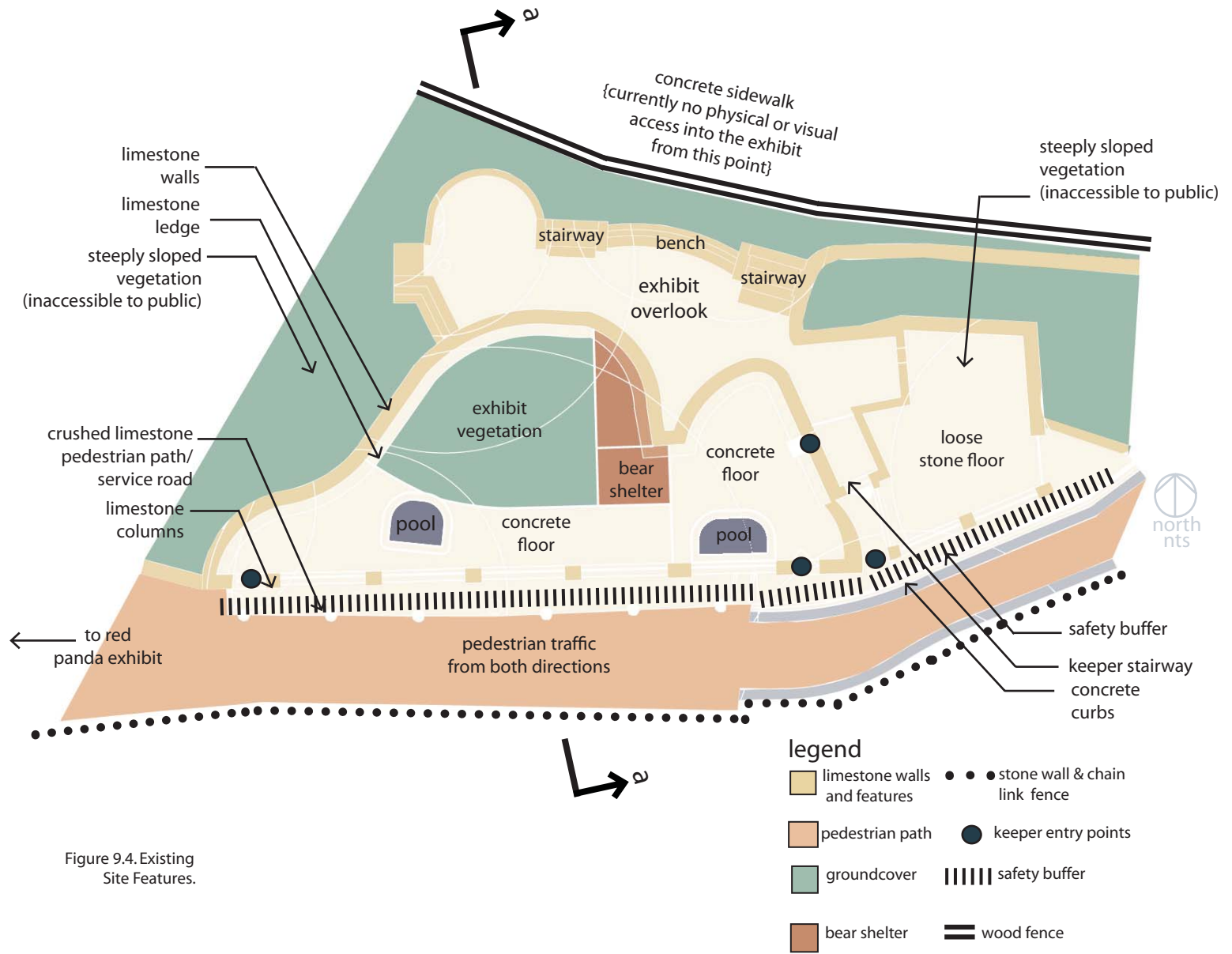


Figure 9.4. Existing Site Features.

Existing Features

The limestone shell (See Figure 9.4 Existing Site Features) that surrounds the exhibit space, as well as the bench, retaining wall and stairs to the north of the exhibit, were all built as part of a Works Progress Administration Project in the 1930s.

The exhibit originally housed three different species and was partitioned into three smaller enclosures. The two enclosures to the west have since been combined to provide the current inhabitant, Brownie the Bear, more adequate space. For this reason, there are still signs of the earlier divisions within the exhibit. The entire space will be dedicated to the future gibbon exhibit.

The exhibit floor was originally completely paved. In recent years a portion of the stone floor was removed to add vegetation to increase the comfort of Brownie.

A shelter was also added for Brownie.

Two small concrete lined pools, one of which is visible in Figure 9.5, are located in the western part of the exhibit. These pools are painted a chipped iridescent blue, and while the pools fulfill their purpose or providing Brownie with a place to swim, their appearance is very harsh and unnaturalistic.

At present, the limestone columns that cross the south end of the exhibit are connected by the original wrought iron bars pictured in Figure 9.6. The bars terminate with spiked prongs that face inward to deter the animal from escaping. These bars are very visually indicative of a 1920s-1930s era zoo.



Figure 9.5. Exhibit pools are concrete lined and painted blue (Photo: Morrow, 2008).

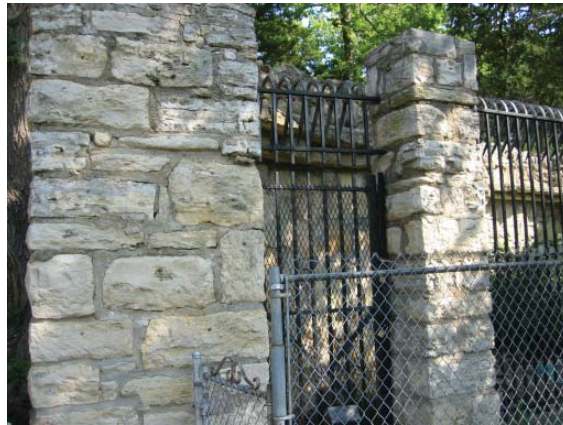


Figure 9.6. Spike pronged wrought iron bars (Photo: Morrow, 2008).

In later years a chain link fence was placed in front of the iron bars to further distance the public from the animals for safety reasons.

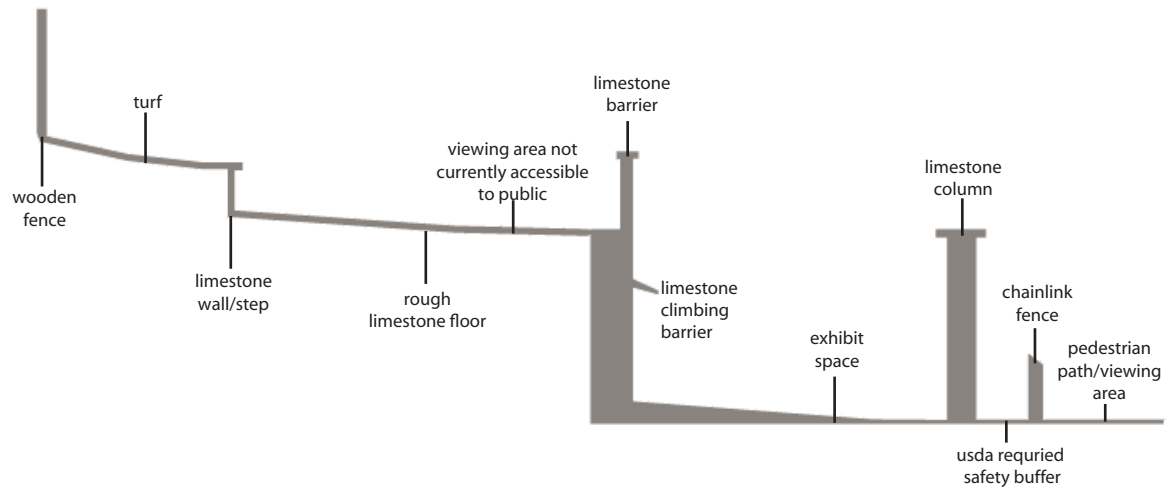


Figure 9.7. Site Section AA (Morrow, 2008).

Relationship of Site Features

The exhibit has two viewing areas. To the north there is an overlook, where the visitor can look down into the exhibit. From the south visitors can see into the exhibit from ground level.

The ground level viewing area has been maintained by the zoo since the exhibit's opening. The overlook, however, has been closed to the public for many years. As a result, the limestone features here have fallen into disrepair.



The Overlook

The overlook area (See Figure 9.4. Existing Site Features), is currently in a state of disrepair. The public has not had access to this area for many years and as a result there has been no maintenance of the limestone features here. The overlook is accessible by two limestone stairways. The limestone is weathered and the steps have sunken into the ground overtime (See Figure 9.8 above).

The feature which has survived with the least damage is the limestone bench pictured in Figure 9.9.

A small retaining wall on the west side of the overlook area is largely still in place. However, several stones have been upturned by the growth of tree roots.

Major concern for the overlook area are accessibility and safety. The overlook area is currently unsafe for visitors and would require major improvements to become safe.



From Top:

The stairways and earthen floor need are presently safety issues. Pavement and a ramp will be necessary make the exhibit accessible to all visitors.

Figure 9.8. Overlook area, including bench, stairway and earthen floor (Photo: Morrow, 2008).

Figure 9.9. Limestone Bench (Photo: Morrow, 2008).

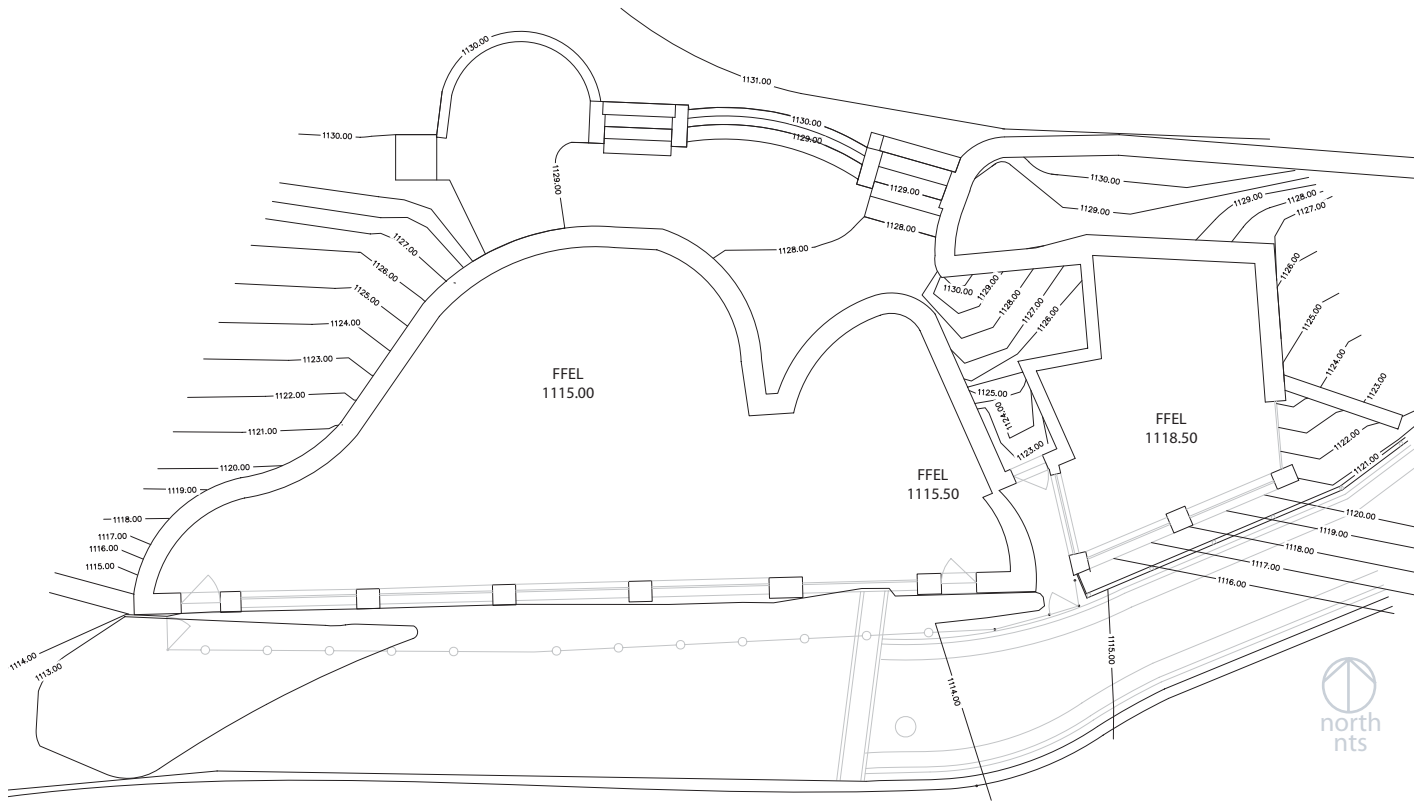


Figure 9.10. Site Topography (Morrow, 2009).

Site Topography

The topography is one of the site features that makes the exhibit very visually interesting. There is currently 23 feet of topographic change across the site. On the south side of the exhibit is a ground level view. The north side of the exhibit is essentially a second story view into the exhibit.

Although the topography is complex, it will not cause major issues in the design of the space as it is suited to the historic features already situated on site. Because the historic features are not to be disturbed, the design will be forced to conform to the existing topography.

Utilities and Fencing

A wooden fence to the north of the site currently prevents visitor access to the northern elevated viewing area. A chain link fence directly south of the exhibit provides a required barrier distance between the visitor and the animal. A second chain link fence separates the adjacent property to the south prevents access to this area.

A water line runs to the west of the exhibit and an overhead electric line is located directly north of the site.

Two drainage points handle the storm water on site. One drain runs perpendicular to the pedestrian path south of the exhibit. Two additional drains capture the runoff from the overlook area.

Due to the close proximity of existing utilities, there should be limited difficulty in creating connections to existing utilities for the water features and the indoor holding facility.

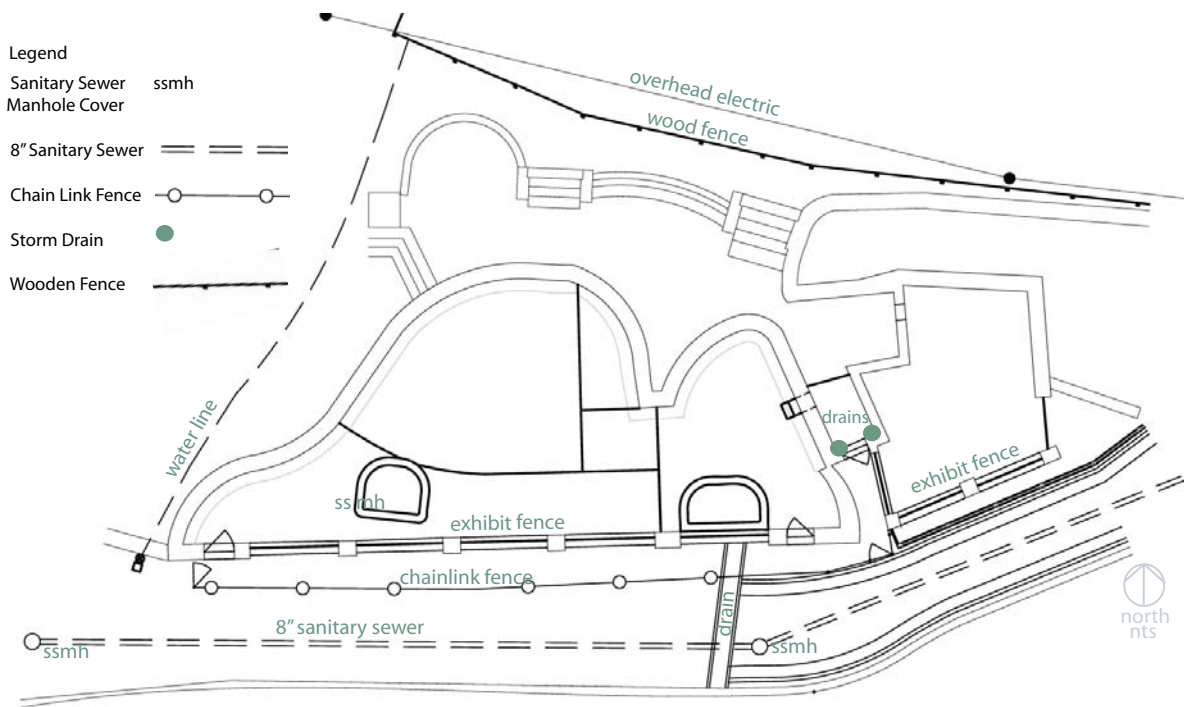


Figure 9.11. Utilities Map (Morrow, 2009).

Drainage Patterns

The site generally drains from the north to the southwest. Drains are located throughout the site (and located on the utilities map). The drains located in the elevated viewing area drain to the exhibit below and appear to have been constructed with the original exhibit. Some of the drainage pipes appear to be in disrepair.

The drainage from the overlook area to the walkway below appears to be original to the 1930s construction. A lot of debris, including soil and fallen leaves collects over the drainage pipes and could possibly clog and cause flooding.

The overlook runoff and exhibit runoff both drain to the walkway below. The walkway is itself a drainage channel for runoff from uphill. The use of the walkway as a drainage channel could be an issue during heavy storm events. It would be beneficial to pedestrian safety if the exhibit runoff water could be intercepted before it crosses the walkway. The existing drainage patterns within the exhibit need improvement to prevent water from pooling in the habitat. Sitting water can cause several issues to gibbon health. However, removal of the cracked concrete flooring, a feature already determined within this analysis as one to remove, will help to alleviate some of the drainage issues.

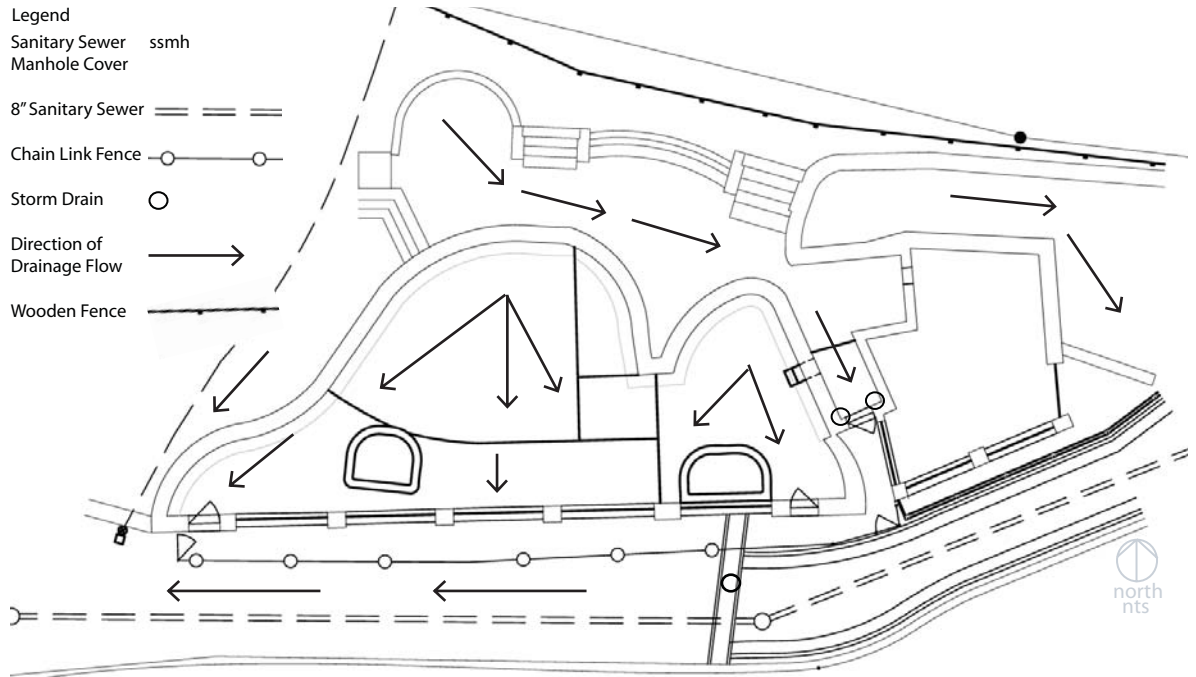


Figure 9.12 Drainage Patterns (Morrow, 2008).

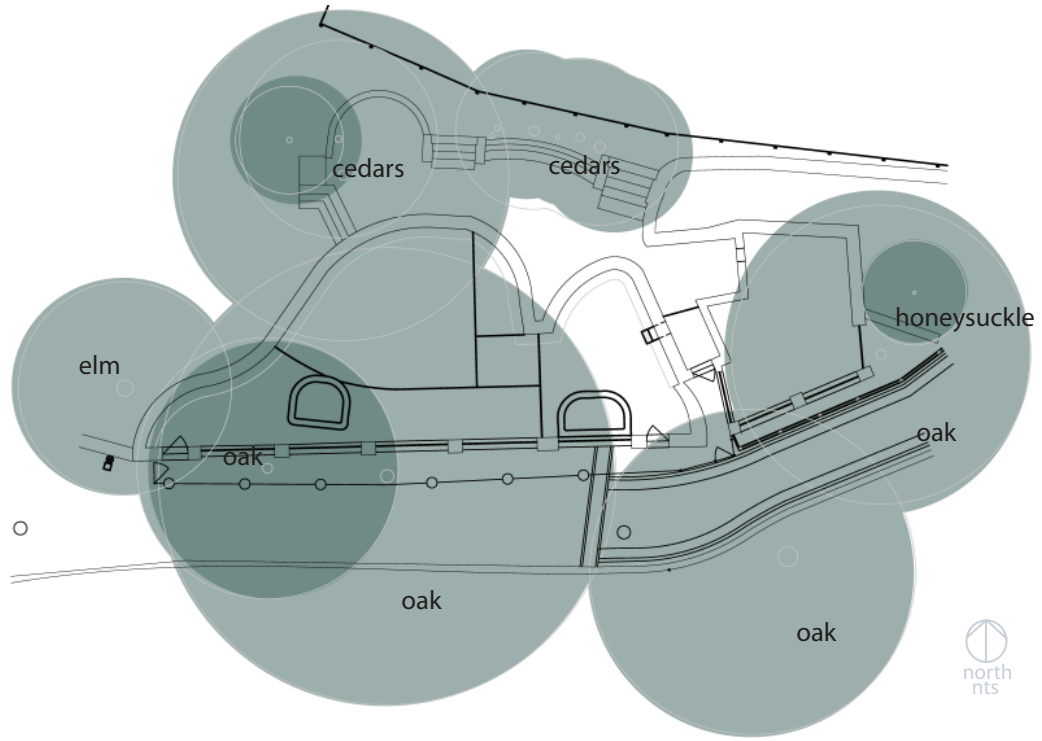


Figure 9.13. Existing Tree Cover (Morrow, 2008).

Existing Vegetation: Tree cover

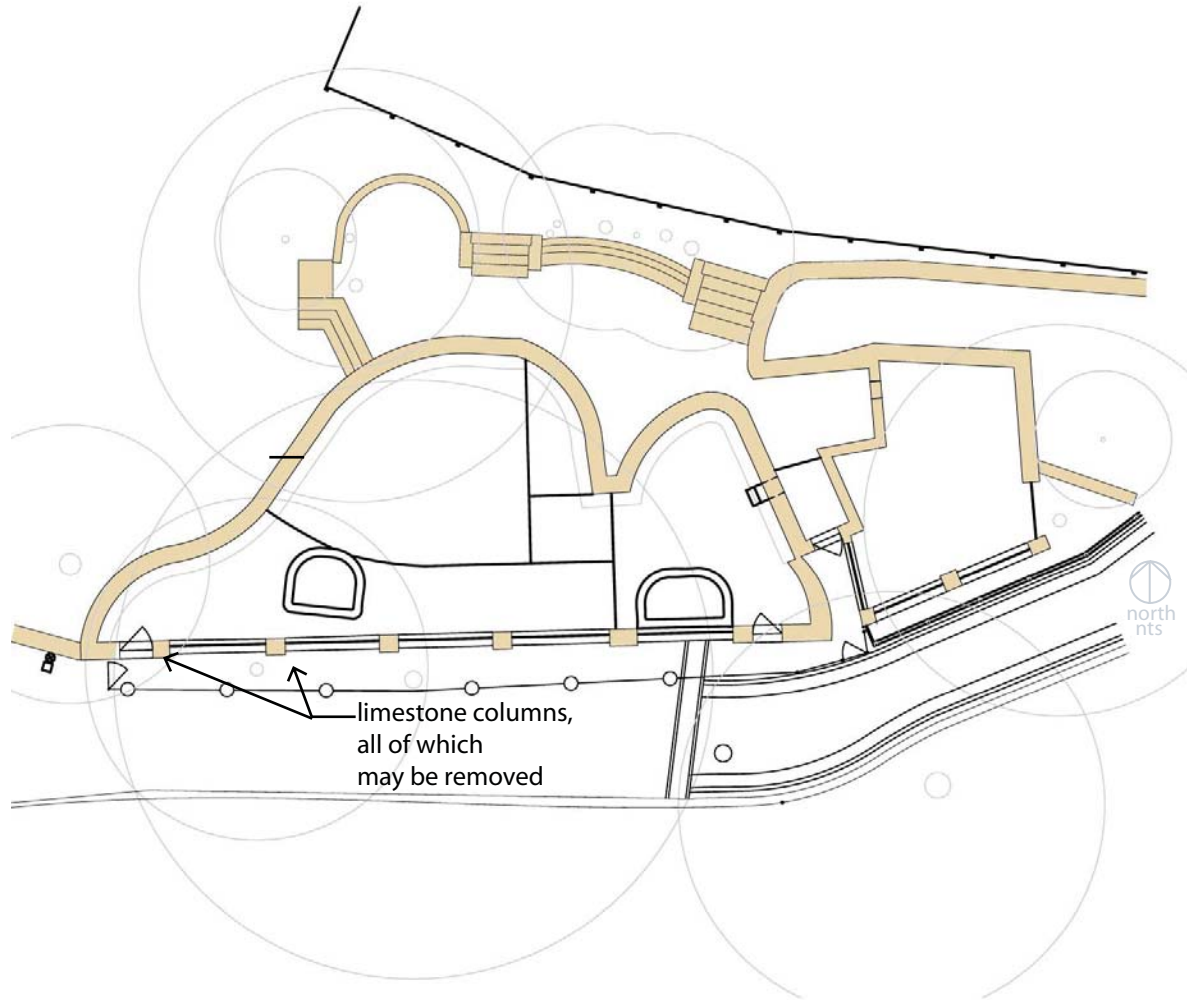
The exhibit is surrounded by mature vegetation and trees. The areas accessible to the visitor are almost completely bathed in shade in the afternoon hours. The exhibit itself is largely protected from the sun as well.

The existing tree cover is well suited to creating an immersion experience. The density of the canopy helps provide a sense of enclosure. The canopy also visually and physically links the site to surrounding areas. Additionally, the shade provides climatic comfort and protection from afternoon sun.

The limbs of the trees currently extend into the exhibit. These limbs may pose a problem when the exhibit is developed into a gibbon habitat. Limbs that are physically accessible to the gibbon could provide a potential “escape” route.

The large oak trees to the south of the site provide the most potential risk for interference with the exhibit.

Figure 9.14.
Works Progress
Administration (WPA)
limestone to be
retained (Morrow,
2008).



Works Progress Administration Limestone

The limestone shell of the exhibit was created in the 1930s as part of a Works Progress Administration (WPA) project and is considered historically significant by the City of Manhattan. The zoo and the city would like to retain as much of the original limestone as possible, however, the limestone columns may be removed if necessary.

The retention of the limestone shell limits the potential for expansion of the exhibit in horizontal directions.

However, there is nothing to limit the growth of the exhibit in a vertical direction, a dimension that will be critical for gibbon habitat. Additionally, the potential to reopen the overlook area could provide a new point of view for visitor viewing.

While the retention of the original structure is a constraint to the physical dimensions of the exhibit, the historic aspect of the shell may provide an opportunity for education about the changing role of zoological exhibiting. The exhibit will ultimately combine the zoo's historic method of exhibiting with conservation style exhibiting.

The exhibit is currently not ADA accessible from any side. The reopening of the overlook could provide an opportunity to make the exhibit accessible, however, in its current condition, the overlook is not up to standards.

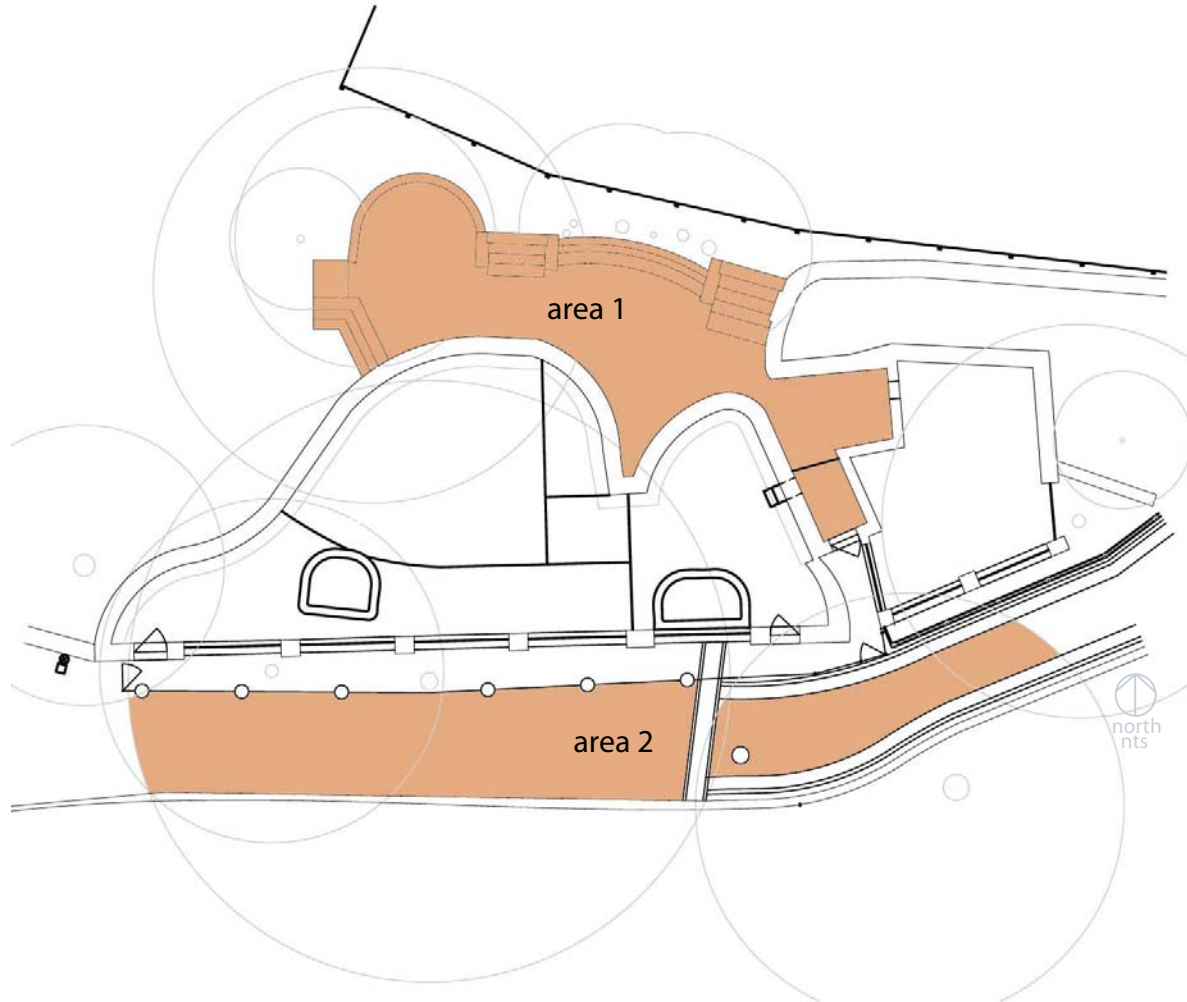


Figure 9.15. Site features in need of repair (Morrow, 2008).

Areas in Need of Improvement

Areas 1 and 2 have been identified as areas to be retained but are either unsafe, inaccessible, or not aesthetically pleasing.

The limestone features in Area 1 have been inaccessible to the public for a number of years and are in disrepair. The entire area is currently not ADA accessible and generally unsafe for pedestrians. The limestone stairways and benches are cracked and uneven. The limestone flooring below the benches, stairway and seat walls is also cracked and, in many places, overgrown with vegetation. These problems will need to be amended to make this area safe and ADA accessible for zoo patrons and keepers.

Area 2 is usable in its current state. However, the crushed limestone walkway detracts from the overall appearance of the exhibit. This walkway is an opportunity to add another level of cultural or environmental interest to the new gibbon exhibit when it is reconstructed.

Area 2 is also separated from the exhibit by a chain link fence. This barrier is required by USDA regulations but impairs the views into the site and would impede the implementation of a more naturalistic exhibiting style. A more preferable barrier would appear more fully integrated into the exhibit.

Existing Division of Space

The exhibit originally housed three different animals and is divided into three different areas. It is currently occupied by one animal and the metal gateway between areas 'A' and 'B' is left open for passage through.

Area "C" cannot currently be accessed from areas 'A' and 'B.' However, this physical separation creates an opportunity for the location of the indoor holding facility. In addition to being physically detached from the rest of the exhibit, Area "C" and is smaller in square footage, making it suitable for the development of the indoor holding facility.

Areas "A" and "B" are only separated by a metal gate which can easily be removed without damage to the limestone shell. The combination of areas "A" and "B" will enlarge the space that is accessible to the gibbons, but also provide two distinct areas that will allow the gibbons to distance themselves from each other both physically and visually.

Area "A" is large enough to allow for features that encourage brachiation, an important requirement for the outdoor exhibit.

Water, electric and sanitary sewer connections are in close enough proximity to the exhibit that connections may be established from most points without difficulty, which will be most important for the construction of the indoor holding facility.

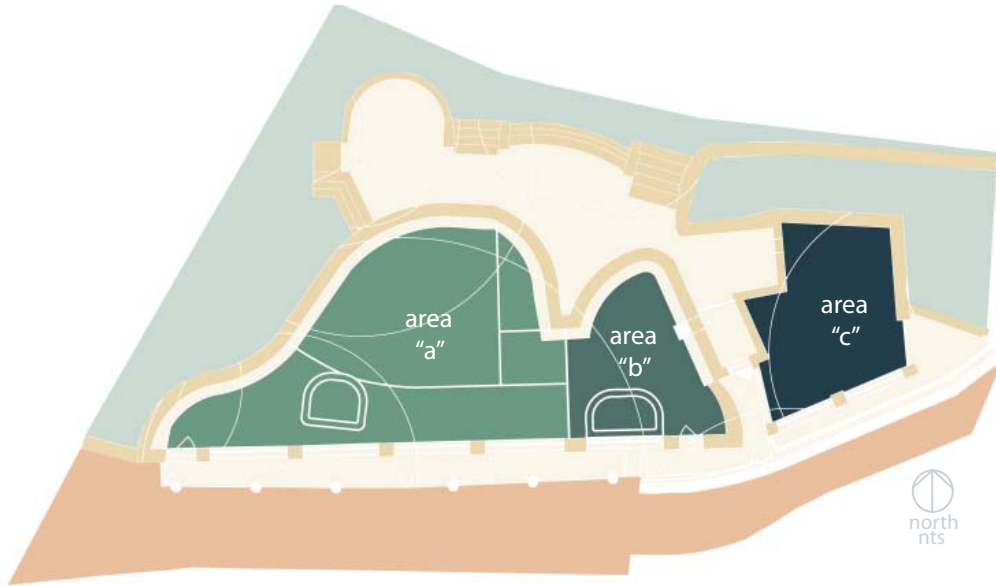


Figure 9.16 Existing Division of Space (Morrow, 2008).

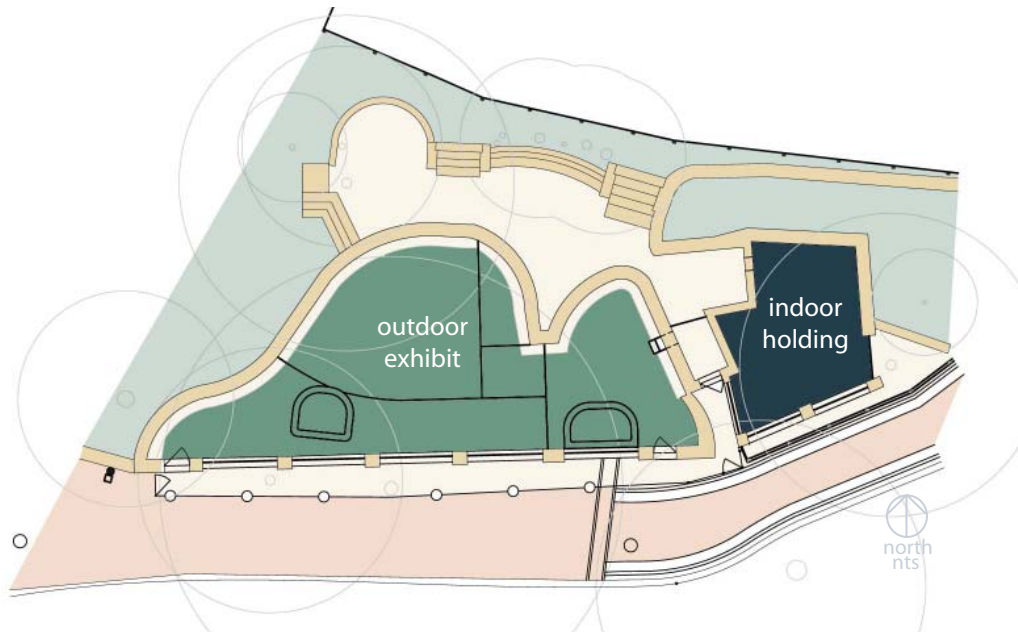


Figure 9.17. Reallocation of Space. (Morrow, 2008).

Educational Programming

Sunset Zoological Park is currently taking part in a Conservation Action Partnership (CAP) called CAP Paraguay. The goal of this CAP is to work with Paraguayan institutions to develop a wildlife conservation plan and to advise and assist zoos in Paraguay on standards of animal care in zoo settings.

The zoo is also involved with ChimpanZoo, a research group that is interested in Chimpanzee behavior, both captive and wild. Sunset Zoo is one of 22 zoos currently taking part in this research effort, based on techniques developed by the behavioral research of Jane Goodall.

Sunset Zoo also offers a wide range of workshops and educational programs for kids aged to 12 years. These include all day visits, after school meetings, and overnights and family events. The zoo has also recently extended its program to include more evening opportunities for adult patrons. Some of the newer exhibits, such as the flamingos, are also used to host night time events and fund raisers. Another new opportunity is “Date Night” where a limited number of people are allowed evening access to the zoo (www.ci.manhattan.ks.us/index.asp?NID=384).

Sunset Zoo has a strong record of involvement in both local, national, and international educational and research efforts. Local programs for schools, families and individuals have been successful at the zoo and there is potential for a successful future program to educate patrons about the gibbons.

There is potential for the gibbon exhibit to educate people about a multitude of things. The exhibit is an opportunity to teach zoo patrons about the

nature of the gibbon and its habitat. The experience of the exhibit will allow the visitor to establish some appreciation of an endangered animal from another part of the world. Hopefully this connection to the gibbon will provide deeper meaning to an educational message about the plight of the gibbon. Additionally, this exhibit will provide an opportunity to spread a message about how what we do here in the United States affects the gibbons in southeastern Asia.

Also, the reopening of the limestone overlook could potentially create an actual physical space where a gibbon specific learning program could take place.

Borrowed Views

To the south of the exhibit is a fairly steep slope that is heavily vegetated. The slope allows for distant views and the vegetation, in summer months, conceals most of the nearby development.

Existing landscapes to the south provide a great opportunity to borrow views, visually expanding the dimensions of the exhibit (see Photo G in Figure 9.19). The vegetation to the south is also dense enough immediately surrounding the exhibit to help create a sense of enclosure to the viewer.

The exhibit is also encased on the north and south sides by mature trees. These provide a frame to distant views. The trees to the north of the site also work to screen other zoo exhibits and structures beyond this exhibit. A chain link fence separates the visitor from the property to the south.

Borrowed views would be very helpful on the north side of the space to creating the illusion of a border-less exhibit for the viewers looking up and to the north. Thickening the existing vegetation with addition of new plant material may help to screen the rest of the zoo from this vantage point.

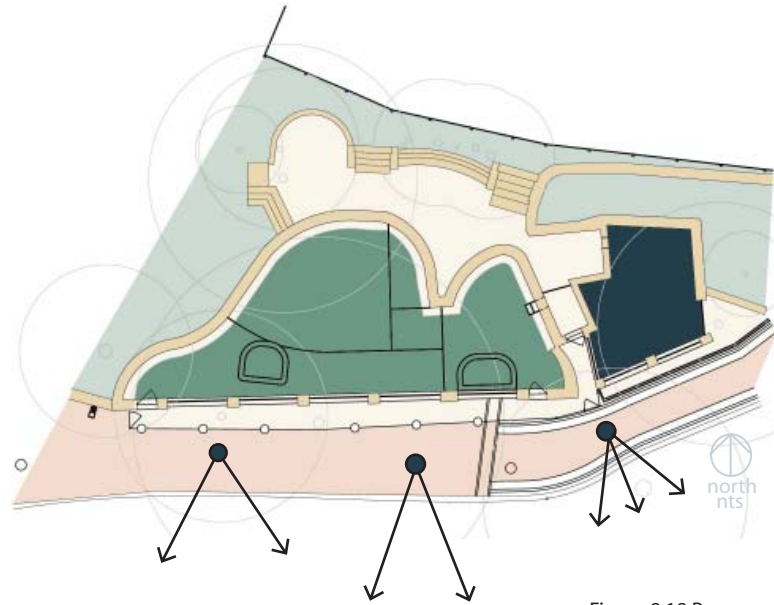


Figure 9.18 Borrowed Views (Morrow, 2008).

Pedestrian Safe Areas

Certain portions of the exhibit will need to be made unavailable to the visitor. These are the yellow areas on the Restricted Areas diagram. Possible access areas are denoted in red in the Figure 9.19. Potential Pedestrian Accessibility Diagram.

Some of these areas will be restricted in response to USDA requirements. A barrier must separate the zoo visitor from the exhibit for a minimum distance of three feet. A chain link fence is currently in place on the south end of the exhibit for this purpose and denotes the safe distance that will need to be maintained by the future barrier.

A similar barrier will need to be created between the overlook area and the exhibit. The overlook area, once repaved, will be suitable for some use by visitors. However, pedestrian access will need to be restricted here as certain spaces shown in Figure 9.20 will be unsafe for pedestrians under any condition, even after renovations. These areas are either too close to the exhibit to maintain a three foot safe distance, or contain steep drops that would be dangerous for visitors to navigate.

Areas that are safe for pedestrians will ultimately be further reduced from the areas shown in red in Figure 9.19 to a smaller number of visual/physical access points to meet the program requirement of limited viewing space.

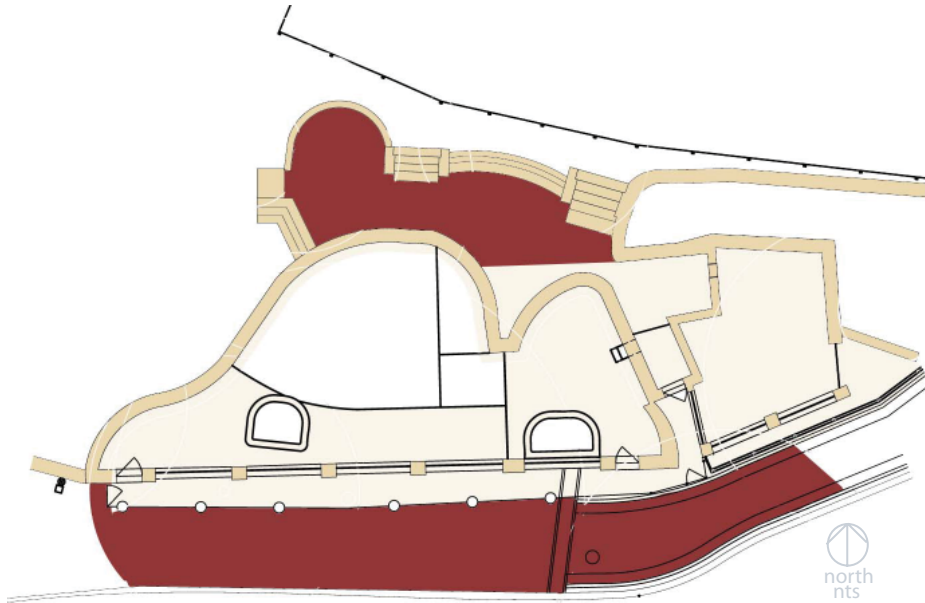


Figure 9.19.
Potential Pedestrian
Accessibility (Morrow,
2008).



Figure 9.20.
Restricted Areas.
(Morrow, 2008)

Optimal Viewing Locations

After eliminating viewing areas that are potentially dangerous, the remaining viewing areas are as follows.

The exhibit is currently visible from anywhere along the walkway running east to west on the south side of the site. Visual access will need to be restricted to meet the program requirement of limited viewing areas and avoid a 360 degree display. The areas pinpointed are potential viewing areas to consider during the design. These points offer a sample of all exhibit areas to the viewer. Visual access points may need to be further reduced depending on the exhibit design.

The need to limit viewing will create an opportunity to use new and existing vegetation to meet the landscape immersion program goal. Habitat simulating vegetation can be used to screen viewing, especially at exhibit edges that share the viewer's space.

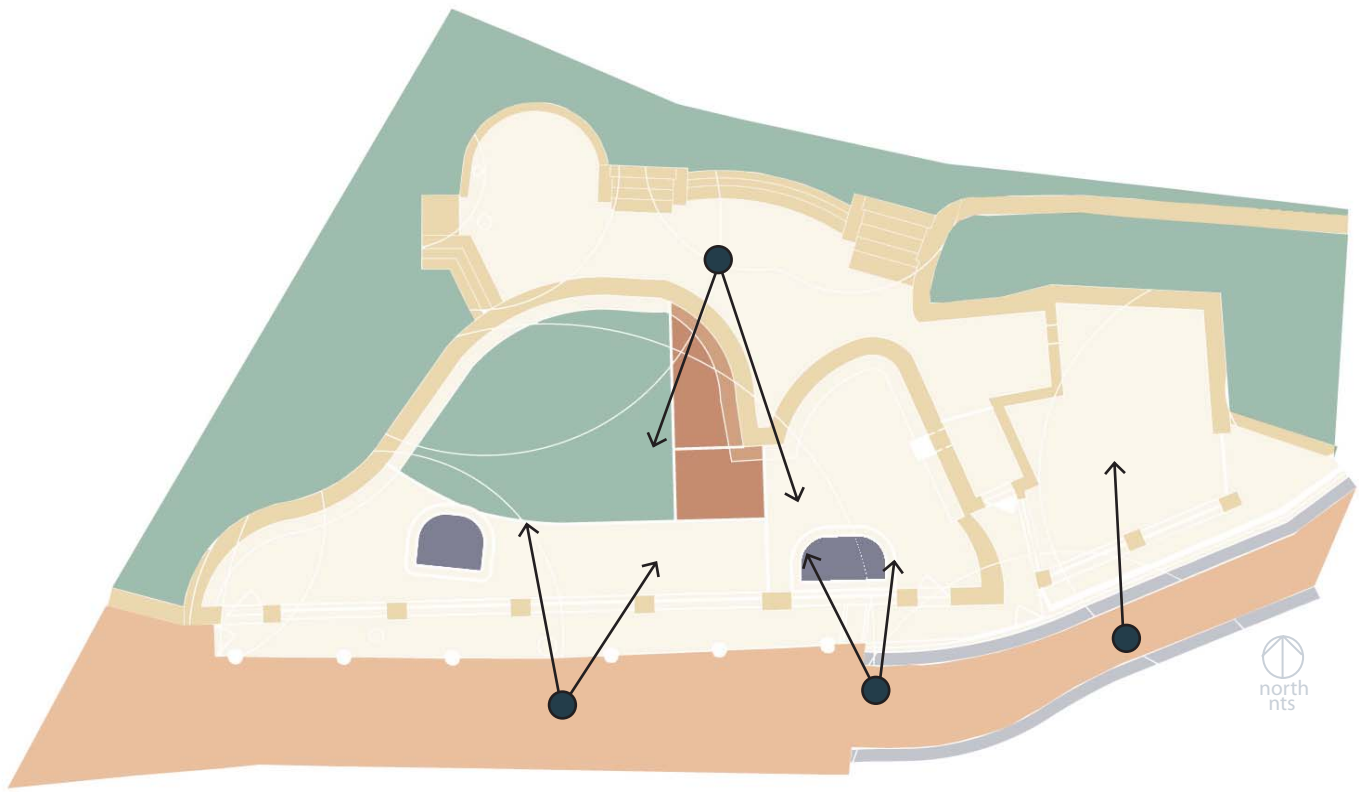


Figure 9.21. Optimal Viewing Locations (Morrow, 2008).

Sunset Zoo Exhibit Design Standards

Sunset Zoo has several standard methods for barriers, signage and structures along Asia Forest Trail. An attempt should be made to create an exhibit that will be cohesive with existing exhibits. However, the different approach behind the design of this exhibit will necessitate a different overall appearance.

A handful of exhibits are accompanied by educational programming (Figure 9.22, photo F).

Figure 9.22 shows common materials include wooden fencing, glass walling when possible, and wire mesh.



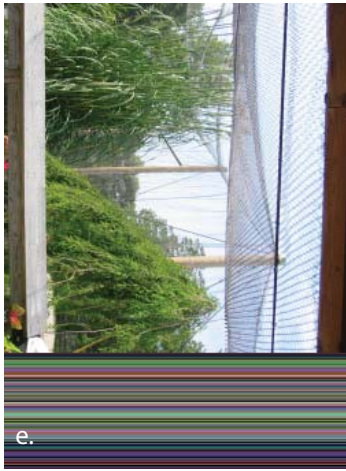
a.



c.



d.



e.



f.

<http://www.ci.manhattan.ks.us/index.asp?nid=370>

Legend

- a. Use of viewing glass
- b. Wire mesh barrier, pvc pipe coated supports
- c. Original limestone exhibit with wooden safety barrier
- d. Wooden safety barrier
- e. Wire mesh barrier, pvc pipe coated supports
- f. Sunset Zoo Educational Program

Figure 9.22. Sunset Zoo Exhibit Design Standards (Photos A-E, Morrow, 2008).

Chapter Ten: Design Alternatives



Previous Page:
(Photo:
<http://www.pbase.com/trashtalker3/image/38023640>)

From Inventory and Analysis to Design

Inventory and Analysis of the site helps to identify where program elements are best suited to the site. Along with the program, exhibit design and gibbon research, this information guides the design.

Key Information Uncovered

Information that is particularly important is that which concerns comfort and safety of the gibbon especially the need for reduced public viewing area. Another important find is the potential need to eliminate some of the existing tree canopy to prevent “escapes.”

Keeper related concerns include the identification for the ideal location for the indoor holding facility and the keeper work space.

Issues regarding the visitor are mainly safety related. Areas which are not safe for the visitor have been identified, as well as locations which need improvement to be safe for pedestrian access.

Design Alternatives

Following the inventory and analysis, the site information was used in conjunction with exhibit design research and gibbon research to create two design alternatives. Each alternative is aimed at encouraging a particular aspect of gibbon behavior, typically limited by captivity, that needs to be facilitated and maintained by the exhibit design.

Concept A

Design Alternative A is aimed at encouraging gibbon socialization and social structure with features that facilitate the related behaviors.

Major Design Features

Animal

The canopy has been sub-divided into two different size clusters. The larger spaces are suitable for the family group to congregate and smaller spaces provide areas for individuals to seek solitude.

Keeper

The keeper has covered on-site work space with room for a small kitchen and a transfer system to move gibbons from the outdoor exhibit to the indoor exhibit.

Visitor

The visitor will have the opportunity to view the gibbons from a viewing shelter located in the overlook area, as well as at ground level.

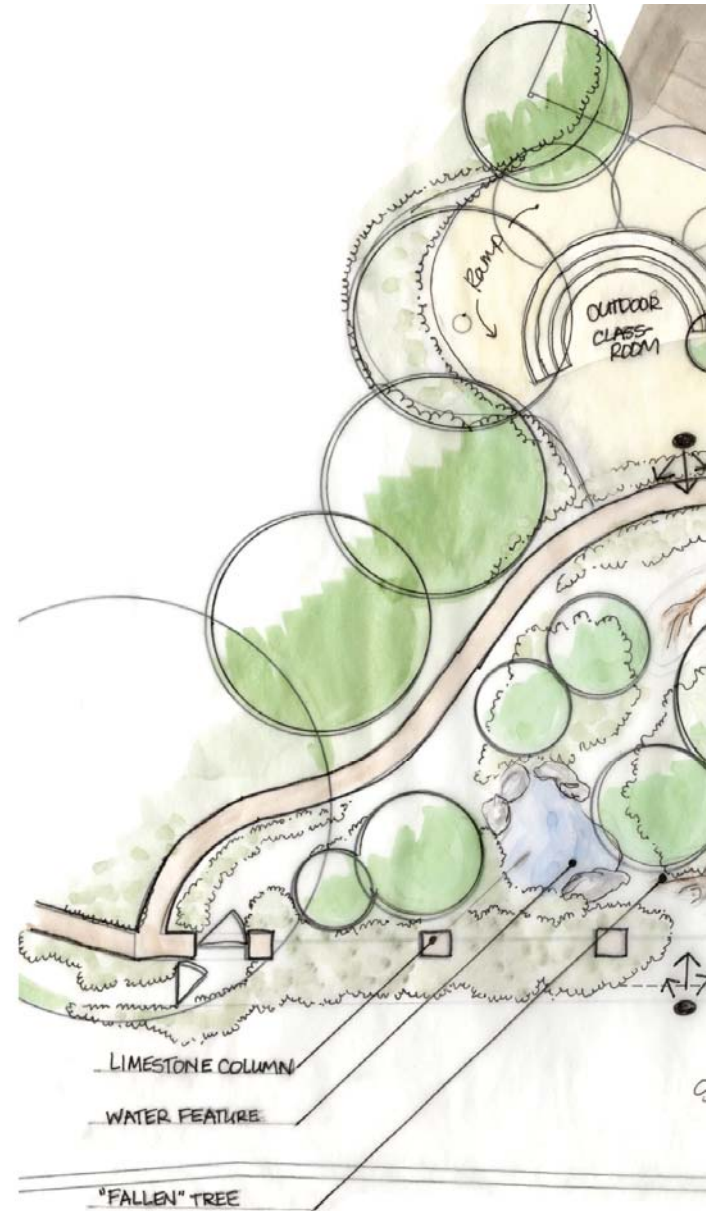




Figure 10.1. Site Plan:
Design Alternative A
(Morrow, 2009).

Concept B

Alternative B is arranged to encourage brachiation, the gibbon's method of moving from place to place. The canopy allows the gibbons to reach any point of the exhibit without touching the ground plane.

Major Design Features

Animal

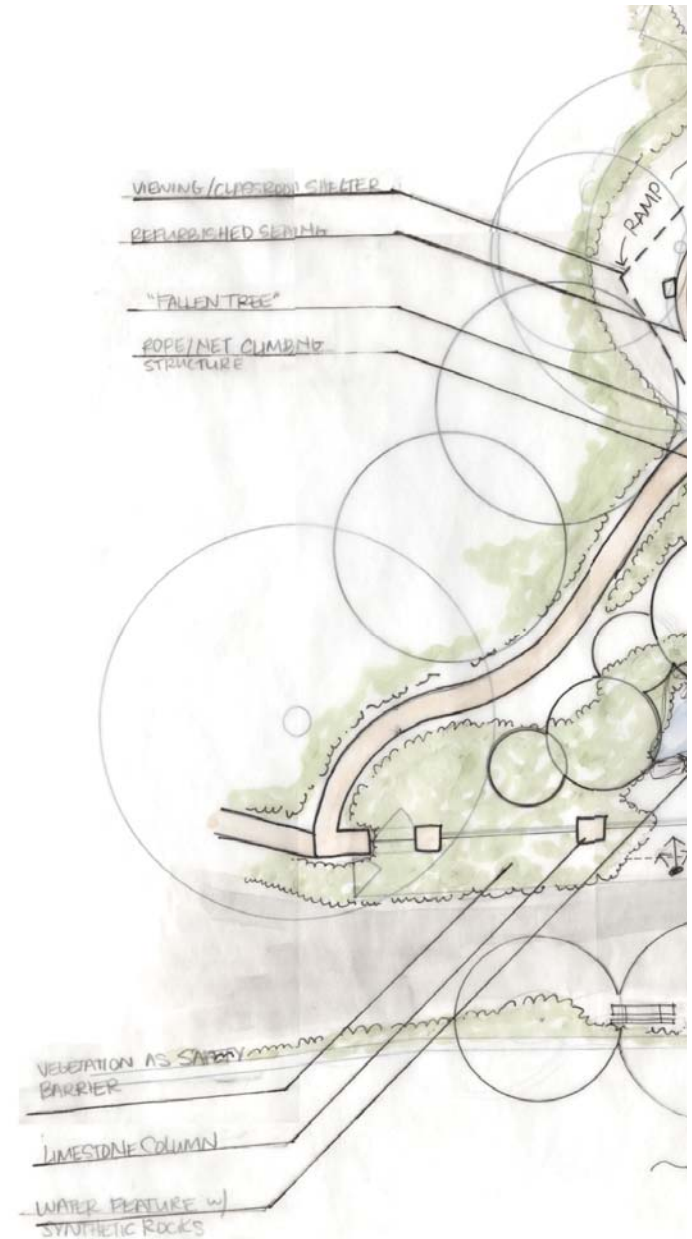
The tree canopy will allow the gibbon to reduce use of the ground plane, an unnatural behavior often seen in captivity, and maintain strength and balance as a result of brachiation.

Keeper

The keeper will have a reasonably sized work space within the indoor holding facility for food preparation and supply storage. The keeper will also have space within the overlook for storage and observation that is off limits to the public. This space could also be used for an overhead feeding mechanism so that the keeper can support healthier gibbon behaviors.

Visitor

The visitor will have an overhead view from an open air viewing pavilion which will also encompass outdoor seating. The visitor will also have visual access into the site from below as well.



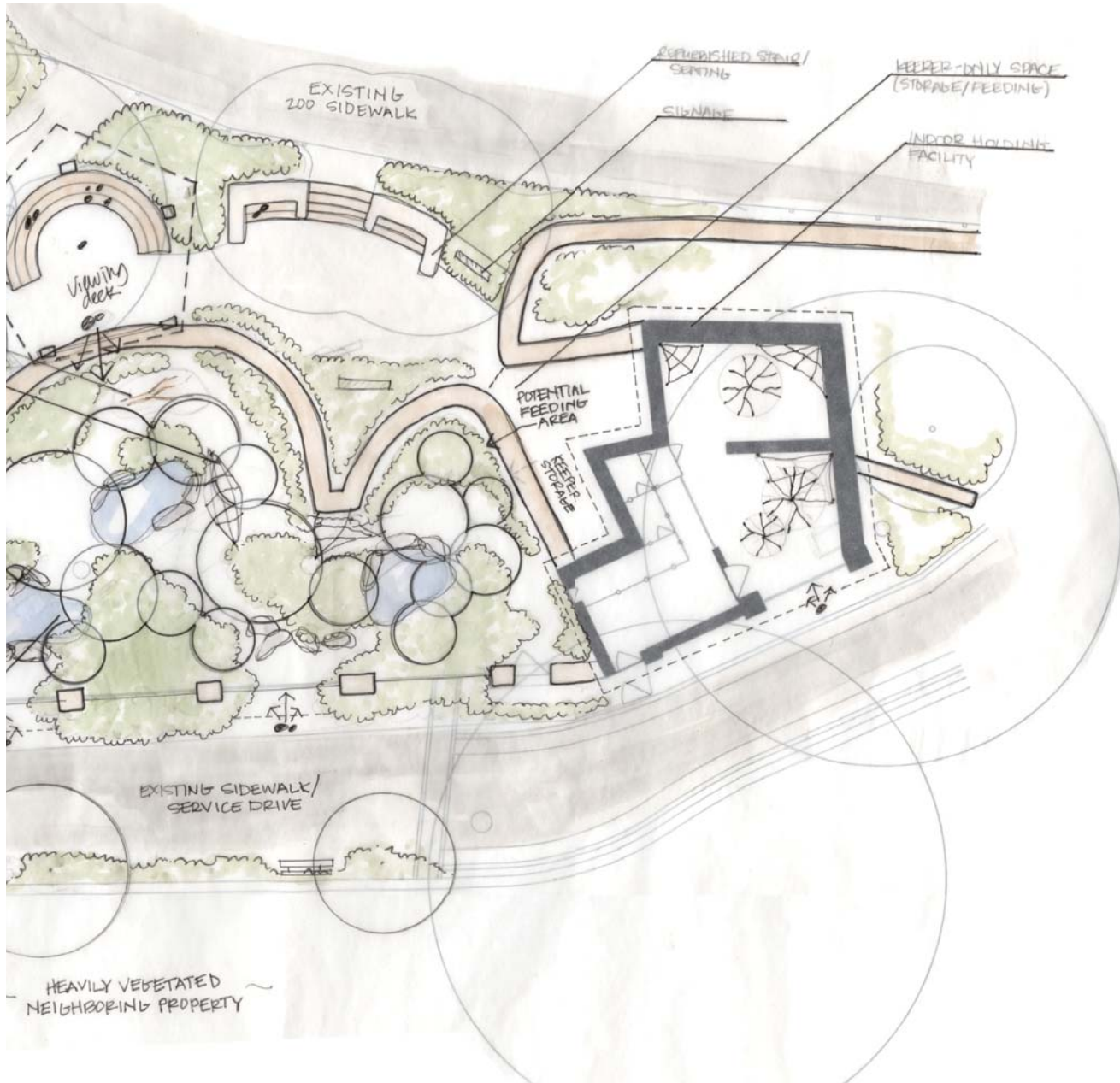


Figure 10.2. Design Alternative B. (Morrow, 2009).

Chapter Eleven: Exhibit Design



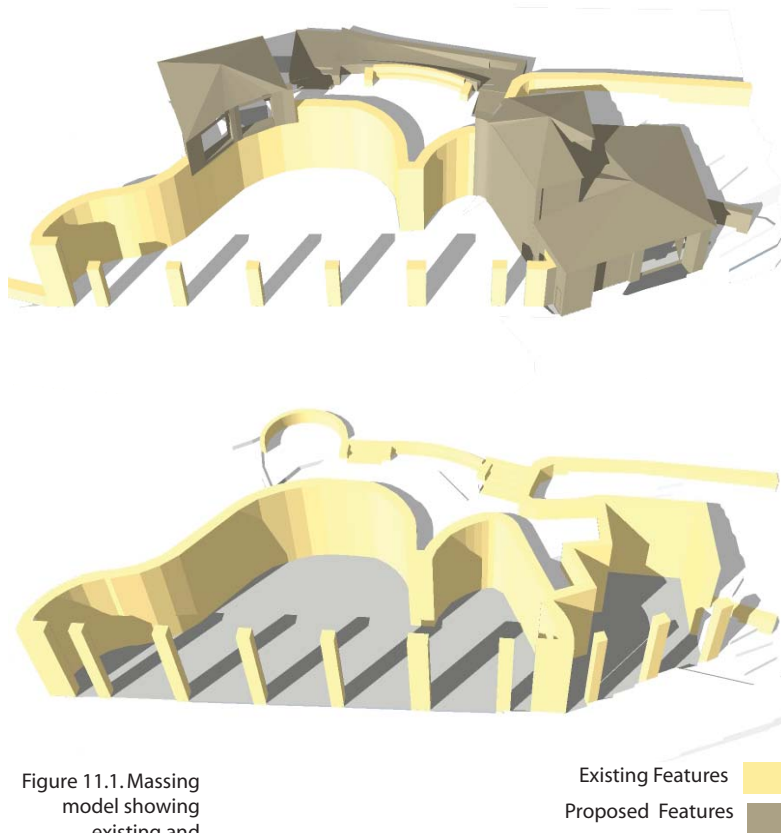


Figure 11.1. Massing model showing existing and proposed conditions (Morrow, 2009).

Sunset Zoological Park Gibbon Exhibit

The final site design incorporates features from both design alternatives presented in Chapter 10 in order to encourage as many healthy gibbon behaviors as possible.

The site was designed from the inside out, beginning with the needs of the gibbon followed by those of the keeper. When developing the visitor's space, changes were made in a back and forth manner to make sure that the visitor features responded to the exhibit without overwhelming it.

Site Plan: General Overview

The majority of the structural changes occur around the original limestone shell, which is illustrated by the massing models in Figure 11.1. The exhibit's historic limestone walls and columns remain intact with little impact from the new construction.

The site improvements occur in a new material to distinguish the new work from the historic WPA work. A theme of the exhibit is to show the change in our values towards animals and exhibiting. Instead of blending the new with the old, the new features will be evident in order to illustrate the differences in standards these changing values have created. The differing materials are denoted on the site plan by color in Figure 11.2.



Figure 11.2. Site Plan (Morrow, 2009).

Exhibit Overview

The exhibit is densely vegetated habitat that will benefit both the gibbon and the visitor. The rich habitat will support gibbon health and behaviors. In turn, the visitor will see a wider array of gibbon healthy gibbon activities and gain a better understanding of conservation based exhibit design.

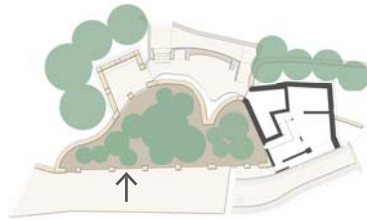




Figure 11.3. Site Elevation (Morrow, 2009).

Relationship of Site Features

The exhibit is accessible to visitors from two locations. On the north side visitors can access the site from the overlook area above the exhibit. From the overlook visitors can see into the exhibit and beyond. On the south side visitors coming from the west and the east can see into the exhibit from ground level.

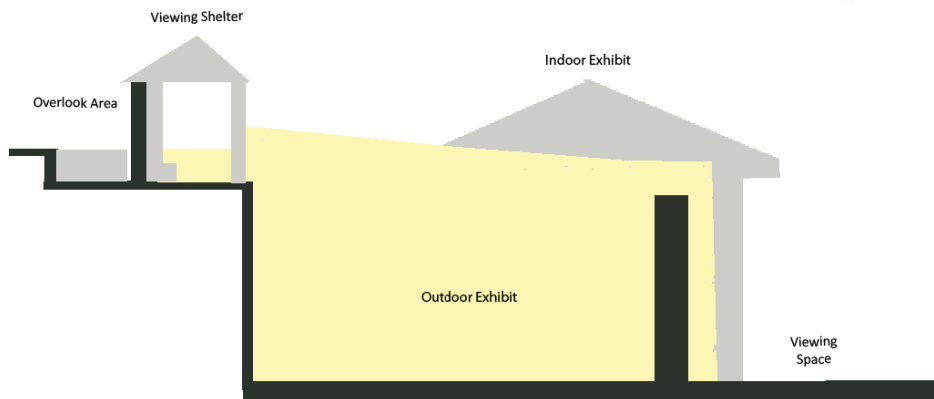
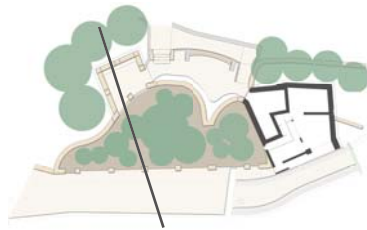




Figure 11.4. Site Section and Schematic Section (Morrow, 2009).

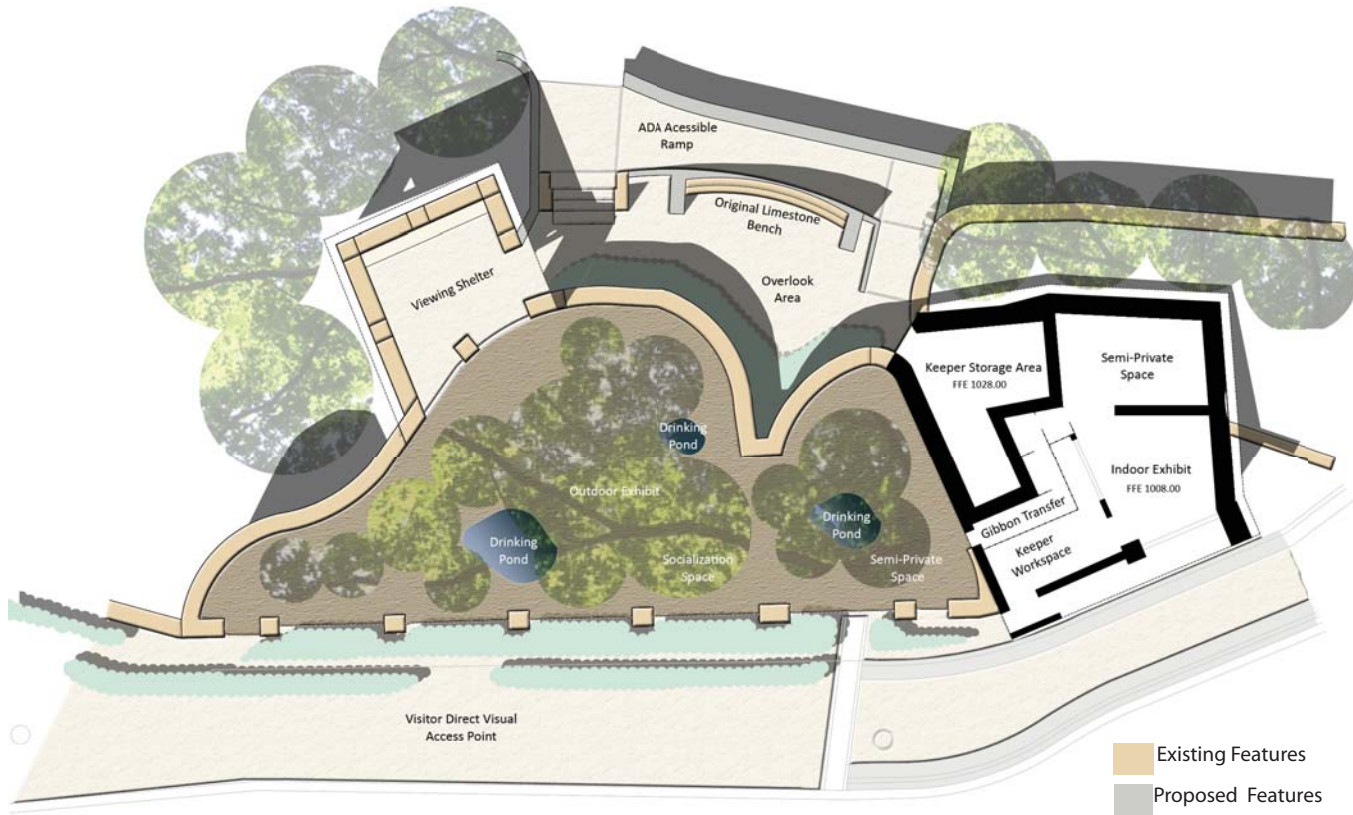


Figure 11.5. Site Plan: Animal Features (Morrow, 2009).

Animal Features Accommodating Gibbon Behaviors

The exhibit is arranged to encourage brachiation, the gibbon’s method of moving from place to place, by creating a canopy that allows the gibbons to reach any point of the exhibit without touching the ground plane.

Gibbons have highly specialized bodies in order to brachiate and in the wild the majority of locomotion is by brachiation. Encouraging brachiation promotes a natural physical behavior,

and it will encourage the gibbons to maintain their strength and balance by regularly practicing this movement.

The exhibit is also aimed at encouraging gibbon socialization and social structure with features that facilitate these behaviors. Gibbons are complex social creatures, needing to be both social and solitary. At times the gibbon will need to separate itself from the group and at others it will seek company.

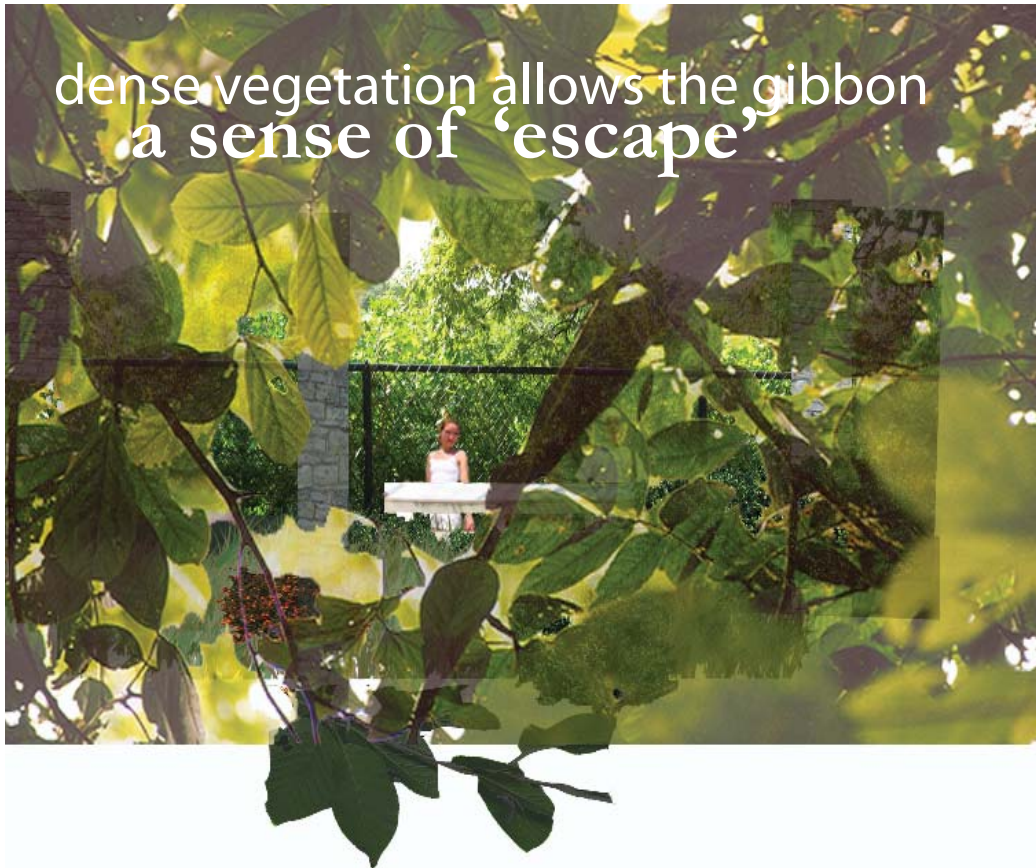


Figure 11.6. View from Gibbon's Perspective: Looking from inside the exhibit out (Morrow, 2009).

Gibbons are also territorial. In the wild, much of their day is spent patrolling their family group's territory. At the end of the day, gibbons return to the same space every night to sleep and require a specific space to establish their sleeping space.

The exhibit at Sunset Zoo will begin by housing a male-female pair who will hopefully reproduce in the future. This means that eventually there could be up to 6 gibbons in the exhibit at one

time as a male-female pair could be caring for up to 3 offspring ranging in ages up to 6 years old.

Accommodating social behavior will be extremely important for several gibbons to be comfortable in a small space.

To encourage healthy social behaviors, the tree canopy has been divided into two physically distinct clusters. This allows a larger space for the family group to congregate and a smaller space

From Left:
 Figures 11.7-
 11.9. Temporary
 Interchangeable
 Enrichment Features,
 provide additional
 mental stimulation,
 such as new dead
 fall, a hammock or a
 tire swing, to provide
 new climbing space
 to explore (Morrow,
 2009).



for individuals to seek solitude. The widespread canopy allows the gibbons to establish a space of their own for sleeping. The ability to choose an area to spend time, rather than being forced to congregate in one centralized area provides the gibbons with a sense of control over their environment.

The smaller cluster of trees has also been developed as a more private area for the gibbons to seek refuge from human view when necessary. One of the three water features has been located in this area so the gibbon need not leave the refuge for

any reason. There is very limited visitor visual access into this space. The keeper will have a small window into the area to aid in the transfer process and to oversee gibbon health and activity. Throughout the exhibit, densely layered vegetation provides the appropriate habit and also acts as a barrier between the gibbon and the visitors. Figure 11.6 shows the gibbons perspective from inside the exhibit looking outward. The vegetation adds another degree of privacy for the gibbons.

Enrichment Features

The exhibit will also have space along the ground



plane for temporary enrichment features that can be rotated in and out by the keepers. Providing changing objects of interest will peak the curiosity of the gibbons and provide increased mental stimulation. New objects to encourage climbing and balance such as new “fallen trees,” a tire swing or a hammock, as show in Figures 11.7-11.9.

Drinking Ponds

Three small ponds have been incorporated into the design (see Figure 11.5). Having multiple watering locations will allow the gibbons’ to have some control over the environment as they will have option to choose where to drink. The water features



will encourage the gibbons to drink as they would in their native habitat, by gathering water with a paw.

Exhibit Ground Plane

There is a dense layering of vegetation. The gibbons’ native habitat in southeast Asian rainforests is composed of thick layers of plant material. The vegetation in the exhibit simulates some of the complexities of the rainforest. The use of dense vegetation protects the gibbon from view in many locations and also discourages the gibbon from walking upright on the exhibit floor.

Keeper Features

The layout of the indoor holding facility provides the keeper with ample on-site work space. The Keeper Work Area, shown in Figure 11.10, can be used for food preparation and storage of supplies.

In addition to this space, the keeper will also have access to the Keeper Storage Area, also shown in Figure 11.10, within the overlook area for storage and observation that is off limits to the public. This area could hold larger, less frequently used equipment.

This overhead space also has potential to be used to house an overhead feeding mechanism so that the keeper can support healthier gibbon behaviors. Receiving food while in the tree canopy would further discourage the gibbons from using the ground plane. Gibbons in the wild do not spend time on the forest floor in general and rarely scavenge the ground for food. If encouraged to do so by the keeper's feeding methods, captive gibbons will begin to spend excessive amounts of time on the exhibit floor.

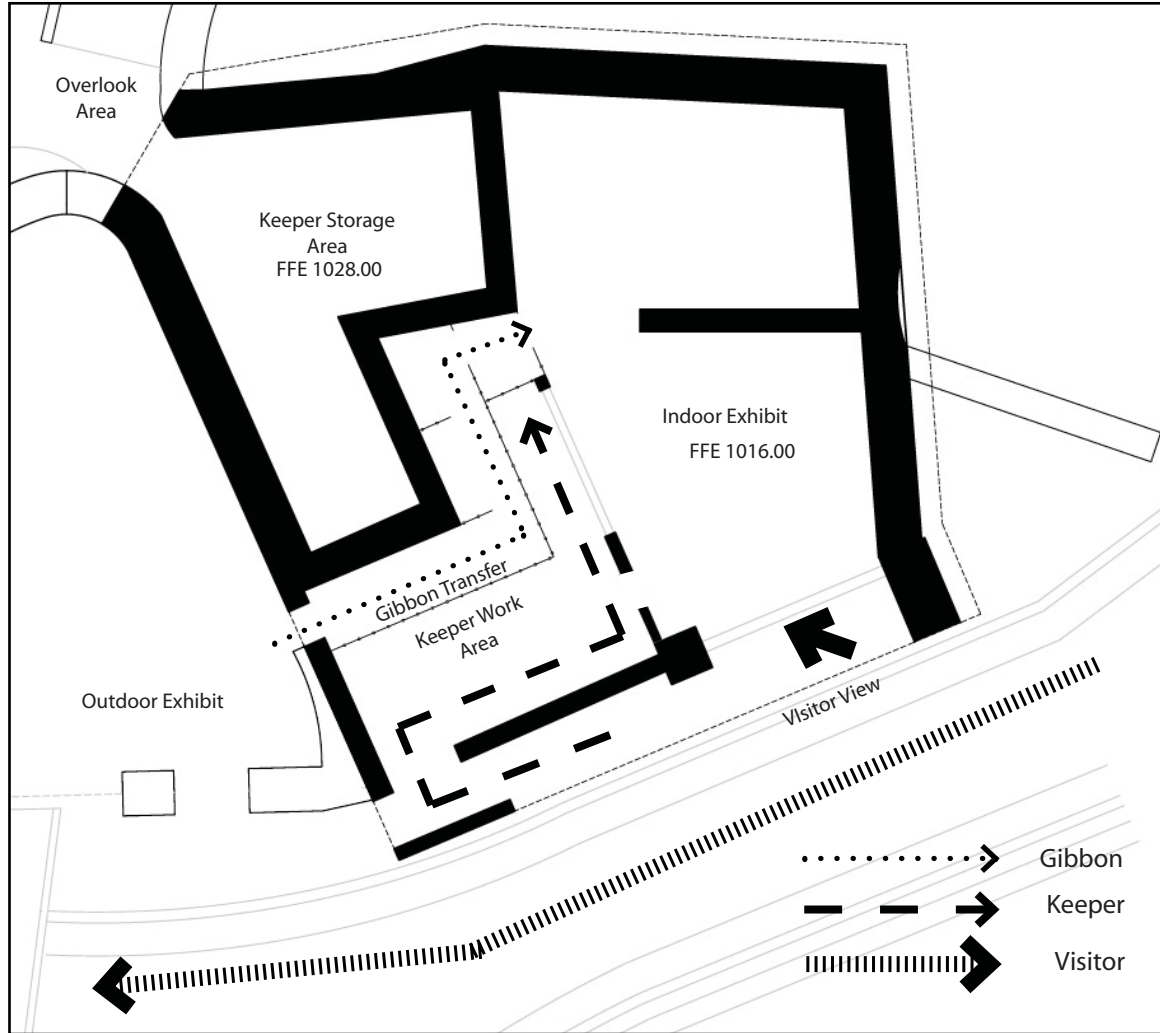
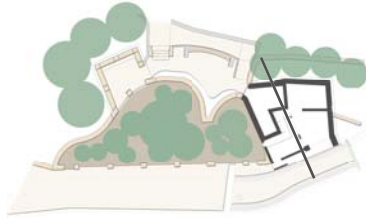


Figure 11.10. Indoor Holding Facility Layout (Morrow, 2009).

Transfer System

The facility also includes a transfer system for the passage of gibbons safely from the outdoor exhibit to the indoor exhibit. Having the indoor exhibit located along side the outdoor exhibit means that on warmer winter days the gibbons can be quickly and easily transported outdoors to enjoy some fresh air.

The keeper can see into the indoor and outdoor exhibits through one of two windows: one in the transfer area with a view of the outdoor exhibit and one from the transfer area to the indoor exhibit. These windows allow the keeper to see what is going on in either exhibit as he or she is conducting the transfer process. The transfer cages are stacked in two rows (See Figure 11.11). The bottom series of cages open onto each other and eventually into the indoor exhibit. The cages must be opened one at a time by the keeper to allow passage. If necessary, the keeper can close the transfer gates as gibbons are loaded into individual cages. Should only one gibbon need to be held for any reason, that gibbon may be loaded from the lower cages into the second row of cages, allowing the other gibbons clear passage into the indoor exhibit through the bottom row.



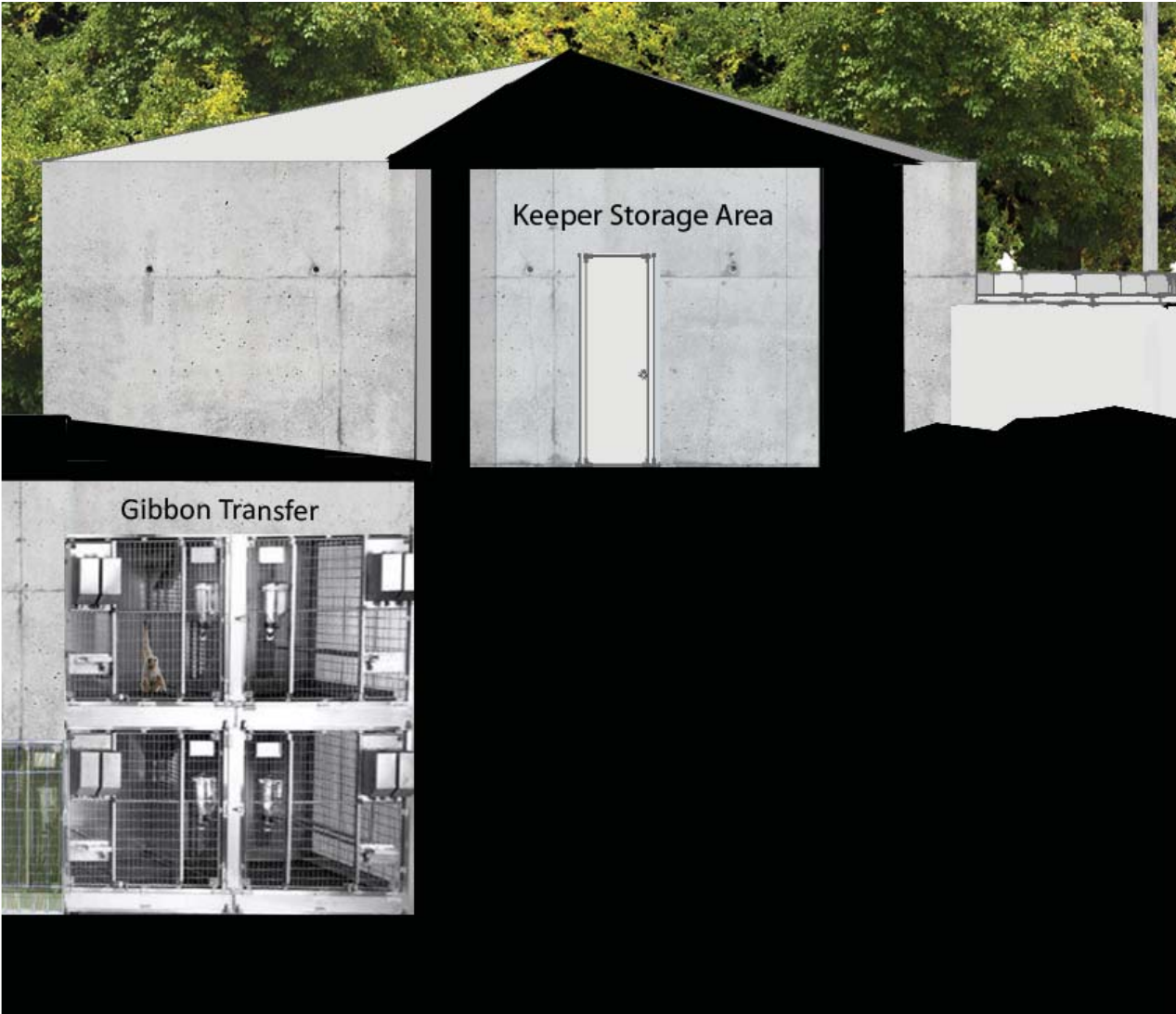


Figure 11.11. Gibbon Transfer System. The transfer system allows the keeper to safely and easily move the gibbons from the outdoor exhibit to the indoor exhibit (Morrow, 2009).

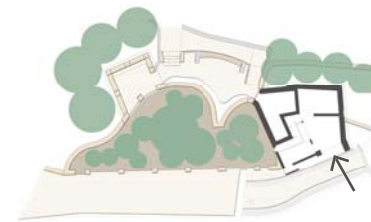


Figure 11.12. Indoor exhibit from visitor's perspective (Morrow, 2009).

The Indoor Exhibit

The indoor exhibit is designed to meet USDA sanitation standards. The walls, flooring and enrichment features are all easily cleaned by the keeper. Although initially visitors may perceive the indoor exhibit as rather stark, shown here in Figure 11.12, interpretive signage explains that the exhibit does in fact satisfy the needs of the gibbon. The indoor area is not naturalistic in appearance which is often perceived by visitors as cruel or unhealthy. However, to an ape such as the gibbon, manmade objects can be equally, if not more stimulating to their intellects as a natural landscape (see Chapter 3, page 15, "Achievement"). The enrichment features are easily interchangeable to provide the gibbons with changing objects to

explore. The indoor exhibit is also partitioned by a privacy wall so that the gibbons may escape viewing from time to time.



Visitor Features

Viewing

Visitors to this conservation based exhibit will have a very unique experience in a zoo setting. Unlike typical exhibits where there is panoramic visual access into the enclosure, viewing is restricted here. This allows the gibbons to escape being watched when crowds become overwhelming. However, this atypical method of exhibit design will provide the viewer with a much richer experience. Animals who are safe and comfortable, when visible, will exhibit a much wider range of natural behaviors.

The visitor will have visual access from two different viewing levels and two dedicated viewing points at the outdoor exhibit (See Figure 11.14). Along the south side of the exhibit, dense vegetation obscures the required safety barrier fence. This diminishes the appearance of the barrier and also discourages the visitor from lingering anywhere but at the specified viewing point, where the vegetation thins to reveal the fence.

On the south side of the exhibit, the visitor gets a ground plan view into the lower story of the exhibit. Here visitors will see the dense layering of vegetation and some of the temporary enrichment features and how they are utilized by the gibbons. One of the three water features has been located

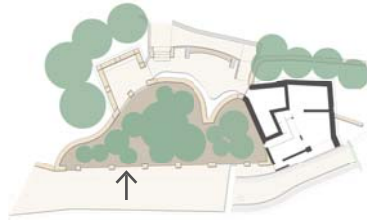




Figure 11.13. Visitor view from south side of exhibit. From here the visitor sees into the understory of the exhibit. This view shows the layering of vegetation and some of the temporary enrichment features (Morrow, 2009).

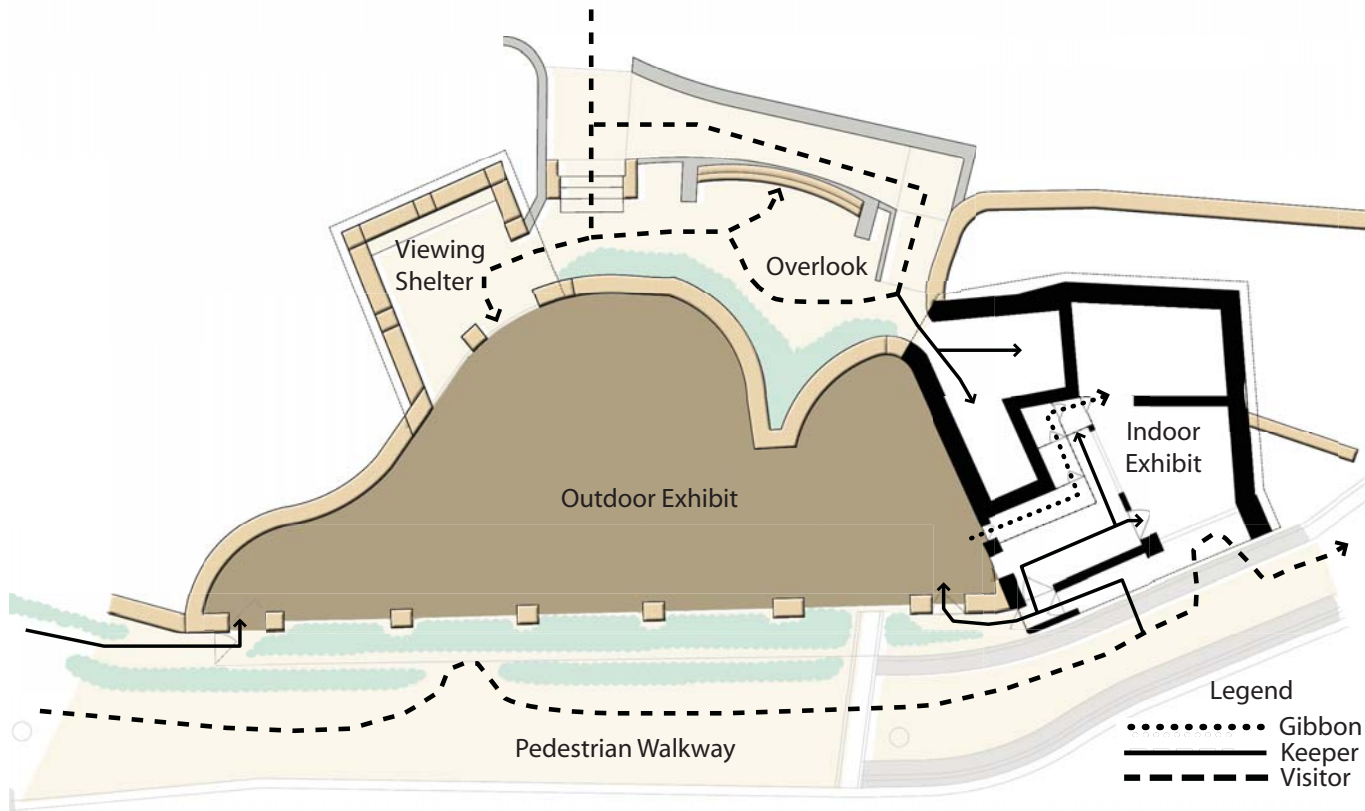


Figure 11.14.
Visitor Circulation
(Morrow, 2009).

near the viewing point. The light noise of the water feature helps to minimize the distraction of outside noises and will also encourage more gibbon activity in the viewing area.

Exhibit Access

While visitors have access to the exhibit from both the north and south sides, direct visual access into the exhibit is limited. A single viewing point into the outdoor exhibit is located on the south side. Also on the south side is a view into the indoor exhibit. On the north side, from the overlook area, visitors can see the exhibit canopy and landscape

beyond the exhibit, but will not be able to get close enough to the wall to peer down into the exhibit. However, a direct view into the exhibit is available in the viewing shelter where a glass wall extends from floor to ceiling. The redevelopment of the overlook will also make the exhibit accessible to all zoo patrons with the addition of ADA compliant ramp and newly paved walking surfaces.

The Overlook

From the overlook area visitors can see the canopy as well as the landscape beyond the exhibit (see Figures 11.15-11.16). The view to distant landscapes visually extends the limits of the exhibit. The viewing shelter provides the most direct view into the exhibit. From this location the visitors will have a barless aerial view into the exhibit.

During the cooler months the visitors can see the gibbons in the indoor exhibit. The visitor can see into a portion of this exhibit when it is too cold for the gibbons to utilize their outdoor exhibit.

The redevelopment of the overlook area will provide a space for gibbon specific programming. The space would be ideal for small educational gatherings offered by the zoo. The original limestone bench has been retained which provides seating for longer talks. Because the overlook has views into the canopy, it may be ideal for an early morning program that takes advantage of the gibbons' natural patterns of singing most energetically early in the morning.

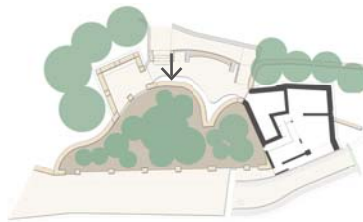


Figure 11.15. View from overlook area to the upper story of the exhibit and the landscape beyond (Morrow, 2009).



Figure 11.16. View from the overlook area (Morrow, 2009).



Figure 11.17. View from the viewing shelter into the gibbon exhibit (Morrow, 2009).

The Viewing Shelter

The viewing shelter provides the most direct view into the gibbons habitat and their activities inside it. The glass wall extends from the floor to the ceiling so that people of ages and ability can see into the exhibit.

Interpretive Signage

Signage around the exhibit will emphasize the conservation nature of the exhibit to the visitor. These signs will communicate the sensitive nature of the gibbon to human exposure to help the visitor understand the rationale for reduced visibility of the gibbons within the exhibit.

Signage will also explain the plight of wild gibbons and the reason why conservation and species preservation is needed within zoos, including habitat destruction and especially the illegal pet trade.

A final message that signage will impart is a note on the history of the exhibit. The exhibit, which at one time housed 3 different large mammals, including Brownie the bear, is now home to two gibbons. This display will illustrate to the viewer the changes in values and standards in animal exhibiting which have occurred since the exhibits construction in the 1930s.



Figure 11.18. Planting Plan (Morrow, 2009).

Planting Plan

The plantings for the exhibit (see Figure 11.18) were chosen for their ability to satisfy gibbon needs and suitability for the microclimate of the exhibit. A high priority was placed on choosing non-toxic plants that would be safe for the gibbons to touch and possibly consume.

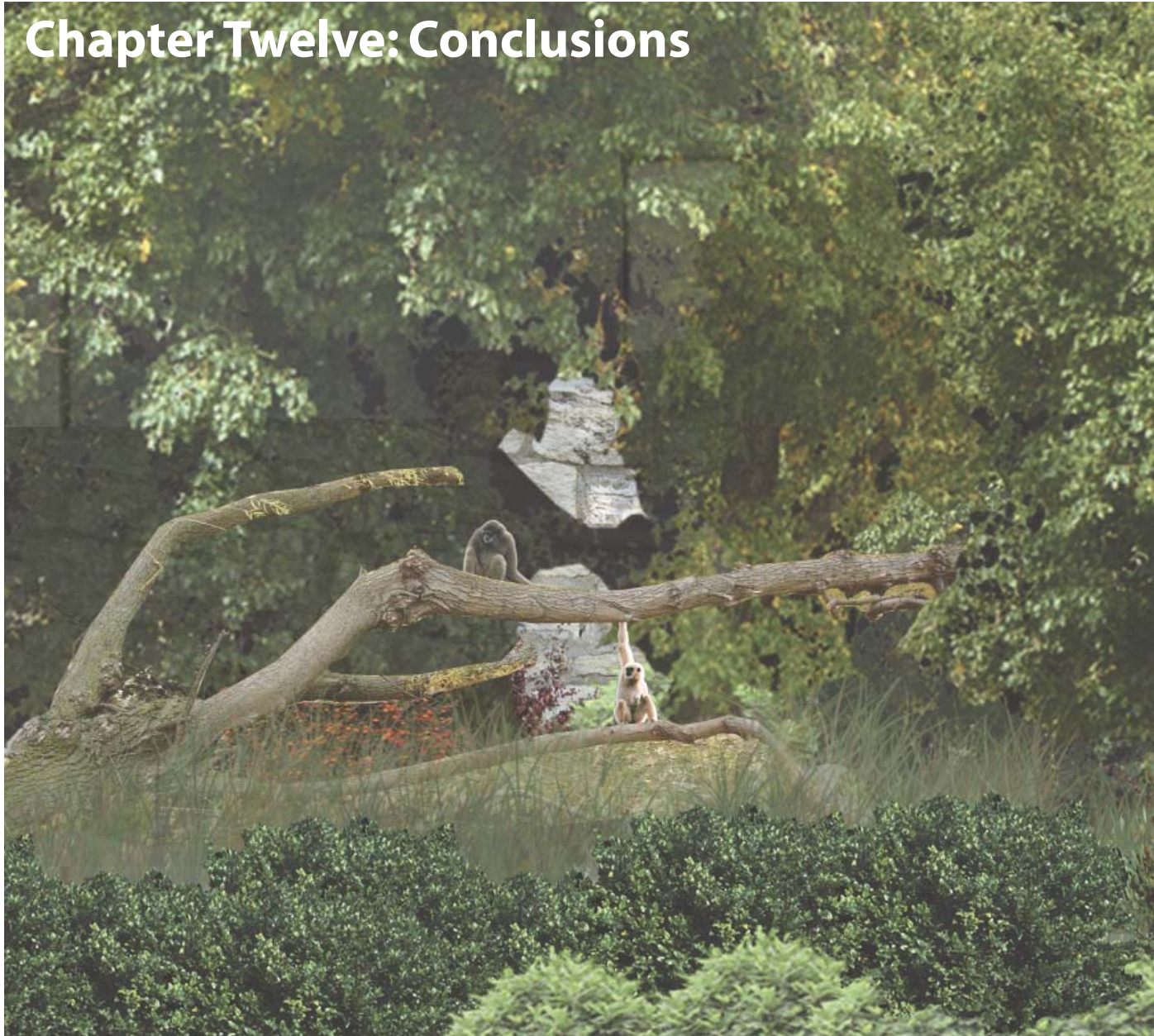
Sturdy trees that can withstand heavy use, support climbing and provide hiding spaces were selected to form the canopy (see Appendix B for expanded

information).

It was also important to select ground level shrubs and grasses that are dense enough to cover most of the exhibit floor in order to discourage the gibbons' use of the ground plane.

The overall effect is a densely vegetated habitat that mimics some of the layering that takes place in a rainforest environment.

Chapter Twelve: Conclusions



Conclusions

Although we are told by many of the world's most respected zoos that their most important goal is conservation, often the exhibits found with in these zoos do not reflect conservation values. Human entertainment remains the emphasis of these exhibits. It is unethical to detain wild animals principally for human amusement. Even though zoos can provide a refuge for many endangered species, retired circus performers, and unwanted exotic pets while entertaining humans, this does not allow animal needs to be fully addressed. When human entertainment is at the forefront of exhibit design goals, the needs of these animals are not being considered adequately.

A conservation focused exhibit truly considers an animal's specific needs. Conservation based exhibit design prioritizes the users differently than entertainment-based design. The needs of the animal, the user who cannot speak for itself, takes precedence over all others. The primary concern is to facilitate the animal's welfare and encourage its natural, healthy behaviors.

The keeper's needs are a secondary priority as this role supports the well-being of the animal. A safe keeper with a functional work place will be better enabled to care for the animals.

The third priority user concerns to be addressed are those of the visitor. The visitor's experience is still important, as visitors provide funding and an audience for the educational mission of conservation design. Although the conservation based exhibit visitor's experience is atypical, it is potentially much richer. Healthy, comfortable animals will reveal more of their natural behaviors when they are in an environment in which they

can thrive. By shifting the focus away from what the visitors want to see and onto what the animals need, the resultant exhibit conditions will fully respond to the animal's unique nature.

In the case of the gibbons at Sunset Zoological Park, their exhibit has been preliminarily designed from gibbon species research, as well as on the findings of Dr. Susan Cheyne's research concerning unhealthy gibbon behaviors in captivity. The design aims to encourage healthy, natural behaviors and discourage the unhealthy behaviors that can form when gibbons are placed in captivity.

A major facet of this exhibit is minimizing contact with zoo patrons by reducing visitors' visual access into the exhibit. This may be detrimental to the typical visitor experience. However, key component to conservation based exhibit design is education about the components of the exhibit. In addition to providing the visitor with a list of facts concerning the animal at hand, interpretive signage also explains why the visitor's experience is different.

Out of respect to the animal and its needs, visitors are no longer the most important player to cater to in the exhibit experience. When visitors understand and accept this change in roles, the exhibit experience will become much more mutually beneficial. With the gibbons' needs thoroughly addressed, the gibbon will be comfortable exhibiting a wide array of its natural behaviors. Not only is this a more accurate and informative depiction of gibbons to the viewer, visitors can feel good about their experience of healthy gibbons and having contributed to a worthy conservation effort.

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Appendix B: Expanded Plant Selection

Plant Type	Common Name	Latin Name	Height	Spread	Selection Rationale
Large Trees					
	Chinese Pistache	<i>Pistacia chinensis</i>	30-35'	25-35'	Suitable for climbing
	Sawtooth Oak*	<i>Quercus acutissima</i>	35-45'	35-45'	Suitable for climbing
Small Trees					
	Amur Maple	<i>Acer ginnala</i>	15-18'	15-18'	Creates hiding places
	Fringe Tree*	<i>Chionanthus virginicus</i>	12-20'	12-20'	Creates hiding places
	Blackhaw Viburnum*	<i>Viburnum prunifolium</i>	12-15'	8-12'	Creates hiding places
Large Shrub					
	Japanese Beautyberry	<i>Callicarpa japonica</i>	4-6'	4-6'	Creates hiding places
	Japanese Snowball	<i>Viburnum plicatum</i> 'Newport'	3-4'	3-4'	Hedge
	European Cranberry Bush*	<i>Viburnum opulus</i>	8-12'	10-15'	Creates hiding places
	Double-File Viburnum*	<i>Viburnum plicatum tomentosum</i>	8-10'	9-12'	Creates hiding places
Groundcovers					
	Japanese Grass Sedge	<i>Carex morrowii</i>	1-1.5'	1.5-2'	Shade tolerant
	Bishop's Hat	<i>Epimedium x youngianum</i> 'Tamabotan'	.5-1.5'	.2-1.5'	Shade tolerant, naturalizing
	Japanese Pachysandra*	<i>Pachysandra terminalis</i>	.5-1'	1-1.5'	Shade tolerant, naturalizing
	Common Periwinkle*	<i>Vinca Minor</i>	.25-.5'	.5-1.5'	Shade tolerant, naturalizing

Table B1. Expanded Plant Selection Rationale (Morrow, 2009).

*Indicates Alternative Plant Selection

