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Panda-monium: A Panda Environment for the Henry Doorly Zoo

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Panda-monium: A Panda Environment for the Henry Doorly Zoo
by

Rosey I M Masek

A Terminal Project

Presented to the Faculty of

The College of Architecture at the University of Nebraska

In Partial Fulfillment of Requirements

For the Degree of Master of Architecture

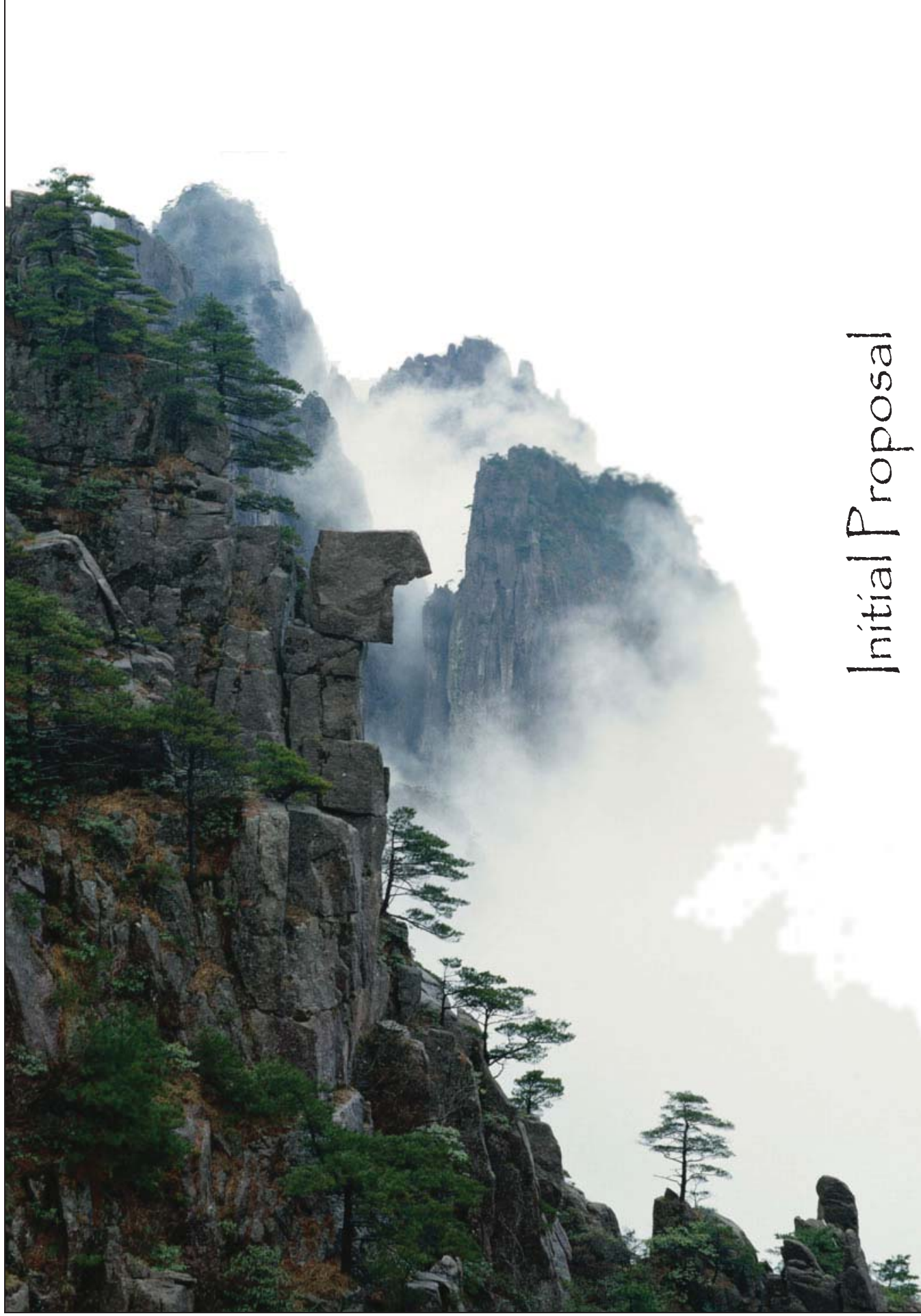
Major: Architecture

Under the Supervision of Professor Bill Borner

Lincoln, Nebraska

May, 2008



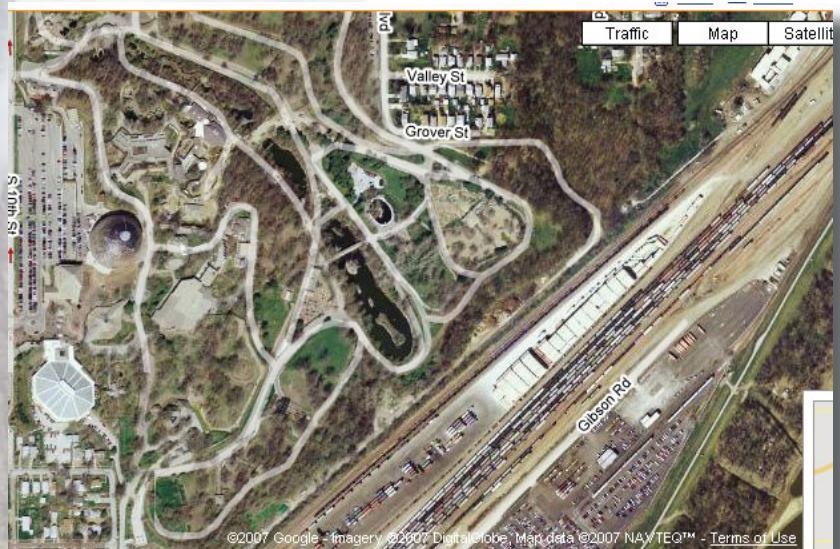


Initial Proposal

Panda-monium: A Panda Environment for the Henry Doorly Zoo

The project that I am proposing to accomplish would be to design a Panda Exhibit located at the Henry Doorly Zoo in Omaha, NE. The project would really begin this summer of 2007. John Armknecht from Stanley How Architects in Omaha has been contacted for consultation and mentoring purposes since their firm handles the Zoo's designs. Previously he has also helped another student with his thesis design for the expansion of the Gorilla Complex, and he said he would be glad to help out again. Work has preliminarily begun on the panda design by their firm; however, only the site location has been decided. Over the summer I would meet with him and/or zoo representatives and be able to get specific input on the site location as well as goals for the overall display. Bill Borner will help by mentoring my project because of his previous involvement with the similar mentioned project where he worked with the zoo and communicated with John Armknecht.

*Located in Omaha, NE just south
of I-80 on the 13th Street Exit.
Next to Rosenblatt Stadium.
Courtesy of Google Maps



*The Giant Panda is in the Animal Kingdom
It is of the Chordata Phylum. This group consists of
mainly vertebrates. They are united by having at some
point a hollow dorsal nerve cord, pharyngeal slits, and
endostyle, and a muscular tail.*

*The Panda is of the Mammalia, or Mammal class.
This of course means they produce milk in females and
give birth to live young.*

*They are also of the Carnivora Order. For although they eat
mainly bamboo they occasionally will eat fish, like oth-
er*

carnivores who eat meat in their diet.

*They are of the Family Ursidae. This is the bear family or
animals with a bear-like nature.*

*Finally their Genus is Ailuropoda and they are the only Species,
Ailuropoda melanoleuca, in this Genus.*



This project interests me because of the potential it contains for increasing awareness about depleting animal species throughout the globe and the ability to spark change in the public today. The panda species is a perfect opportunity to demonstrate the harm humans can cause because of their precise diets. The panda relies primarily on the bamboo plant for survival, and with humans invading the bamboo forests pandas face a hard time ahead for continued existence. The children especially have a huge responsibility as they grow to save regions of the earth as well as the species of plants and animals that inhabit those areas. This exhibit, although special merely because of the rarity of the animal, could educate why the pandas are so rare and what needs to be done to prevent extinction. The display could be more than pure entertainment for the observers. An emotional and empathetic response could be created through the procession and how the audience experiences the space so that an accepted feeling of responsibility could be evoked. The easily lovable animal could ignite sympathy with the observers, creating a will to change current destructive actions. This could inspire small changes with a far reaching goal of saving this species and those in trouble like it. I am interested in creating this because I believe all architecture has a responsibility and/or potential to evoke thoughts and opinions, and this ecological theme by example of the endangered species of pandas could easily live up to this duty, and be so much more than a mere five minute walk through of passing amusement.

Another interesting aspect to my project is the issue of the client. For although the Henry Doorly Zoo is the overall client; specifically it is the panda and the observers who I must design for. When designing for humans the wants of the client are a little easier to understand because they can simply be voiced. However, designing for animals could be more difficult and a better understanding about the process of listening can be learned. Opinions and thoughts of selected experts must be heard and taken into consideration, which actually gives more voices to the needs and wants of the project. Rather than one individual deciding what is needed, it is best to get feed-back from many. Also, one observer might voice an opinion on the design of the display but another might completely disagree with that. So again it is best to hear many thoughts that way a general consensus can be reached. I think by designing for the public as well as a non-human client can improve my awareness about the listening process and the relationships that must exist between both.

*** Summer Research**

During this summer phase I would develop a program for the nature of the project and information on the requirements of the animal housing. From here extensive research would be conducted about the animal itself with the help of others more experienced and knowledgeable. One goal would be to even talk to existing zoo keepers for information about general captivity and the animal itself. This information will be beneficial when creating the routes through the exhibit and the interaction with the people. I will also develop a detailed analysis of the site, the surrounding exhibits, and the contours of the land to help me understand why the site was chosen and how the areas around it can be utilized when creating the design. By the time the fall semester would begin my goal would be to have precedent site visits, a project program, site models and specifics and information about the animal prepared and ready for the initial schematic design phase. This project would be aimed more at choreographing the process and voyage through the exhibition for zoo visitors and how the people would view and engage their surroundings for a favorable and educational experience.

*** Precedent Studies**

Visits to other zoos of approximately the same size would be arranged, as well as a study of the Henry Doorly Zoo itself, to determine how each of these zoos entertain the people while persuading them to interact in a non-threatening and informative way with the animals on display. Graphic documentation by ways of camera will be used so as to not forget exhibits that inspire or that I believe need work. Also immediately after each visit, a written document shall be written about the visitation to keep the thoughts and feelings fresh in the mind. By asking for a letter of introduction from the Henry Doorly Zoo, perhaps more information could be given and more help could be received from the zoos I visit. Some of the larger zoos to visit or merely study would be the Bronx Zoo, the L.A. Zoo, the San Diego Zoo, The National Zoo, The London Zoo and the zoos in Chicago and Milwaukee. The San Diego Zoo, the National Zoo, the zoo in Atlanta, and finally the zoo in Memphis would be the most helpful and have a higher priority because of their success already in having housed the Panda animal. These examples would be recorded to help decide which direction the design should take. By observing the exhibits, as well as how the typical visitor approaches these displays could give great insight on things that work well and things that have room for improvement. Research on captive environments and where they originated would also be beneficial. By looking at how zoos have evolved from being mere cages to where they are now- by trying to recreate the animal's actual environment- could help determine just what steps should be taken to create a 21st century zoo exhibit.

Existing Locations of Panda Exhibits: San Diego, California; Memphis, Tennessee; Atlanta, Georgia; National Zoo in Washington D.C.



* Role of Precedents and the Preparation needed

Precedents would be most significant in my research as I see what has been done and what has yet to be done in modern zoos. When visiting these precedents, observing human behavior and what types of exhibits elicit the best reactions would end up being the most important aspect in the design. Conceptual statements and goals of each zoo can be learned through written statements as well through observation and inferences. Also by looking at how newer exhibits are planned out in contrast to the old exhibits will help portray the methodology that is implied in the evolution of the zoo design, hinting at where it is next to go. These will provide an understanding of how zoos were thought of from day one and where they could be in thirty to fifty years. It would essentially be master planning of where I believe the site has room to grow, and where it needs to expand not only in quantitative measurements but in qualitative as well. Preparation ahead of the project would have to be well organized and laid out so time could be planned when site visits and precedent visits could fit best into the project's schedule.



*map from Bronx Zoo- An example from one of the precedents

*Museum Involvement

Also looking at museums, particularly the newer Natural History Museums, would be of value to my project. These tend to take a more educational approach as opposed to mere entertainment and I believe incorporating this aspect into the exhibit would be important. The natural history museums usually have a way of creating a more hands-on approach to learning that engages the children without intimidating them with an overload of information. From here more research would be needed to discover the differences and the success of regular display versus that of live animals. Observatory visits as well as potentially setting up meetings with curators could help to understand how displays should be created and set up. If this approach could be utilized more, the animal viewings could produce a sympathetic response from the visitors and could stress the teaching about humans' impact on the wildlife population. If the exhibition supported hands-on displays with informative games while the crowd waits to see the animals, a proper anticipation could be built up. Then while exiting the area after seeing the displayed animal, more information could be presented on ways to help preserve the animals' natural habitat in a way that challenges and inspires the visitors. How the space is experienced is essentially important in order to create a sense of branding on the visiting public. An emotional attachment will need to be evoked so that people will not forget what they have seen, will want to return, and will want to make a difference. If this emotional bond can be created, it could help people to better realize the concept of an ecological footprint, and just how large theirs is.

*Writing, Speaking, Research, and Dedication to NAAB criteria

The beginning, middle, and end of this project would meet and exceed the minimum number of NAAB criteria. This project would require many phone interviews as well as letters or emails requesting information. In some instances visits to other zoos might also require some sort of questionnaire asking the public's opinion on ways to enhance their viewing and learning experience. These requests would help enhance my writing skills and speaking skills pointing organization and prioritization while not forgetting essential pieces of information. My research skills would go hand in hand with the writing as a lot of my information may be gained from books or online, but a lot could be from personal sources. It is more than likely that I will find through my different modes of research that a method I had thought to be minimal would indeed prove to be most beneficial, therefore utilizing as many different venues of research could exceptionally increase what research skills I have.

* Site Study and Design Criteria

The site especially is essential as the zoo only owns certain areas of property that aren't in use. Rather than running with the proposed site, in depth research will be done to figure out why this is the best possible site. By understanding the reasons for the placement, the project can be more thorough and sensitive to its surroundings. The project must use this land in the most effective and complete ways. Every public space of the exhibit needs to be designed to accommodate variations of physical abilities and all of the systems of the building must come together in a complete integrated design. Finally, the actual plan of the exhibit must use fundamental design skills with the laying out of space, structure and fitting in to the surroundings. All specifics of people must be thought of and prepared for so that the exhibit could be enjoyed by all including the handicapped, young, elderly, multitudes of children, and older school groups.





-Map Courtesy of www.omahazoo.com

*Building Structure

The structure of the building itself should reflect that of the animal's habitat as well as the message that humans should try to take better care of their surroundings. This can be spoken in the way the design relates to its surroundings and be making the building as LEED certified as possible while being a GREEN design. All this as well as other research and design ideas that develop along the way must be portrayed in a graphically pleasing presentation, which will be confidently given as all types of media are used to portray an exact idea of what I had designed through examples of exhibit education to images on a broader scale of the whole structure.

*Finalization

Although this project is based on the environment of an animal, it is also entirely architectural in the way that the people perceive the space. Architecture is more than the building that the pandas would be housed in. It is the build up of excitement, the procession to the main event, the climax of the voyage and the cool-down with reflection afterwards. Creating an inviting structure and space while informing and teaching, in hopes of later preserving the animal with their environment, is the architecture of the project. It is a building as well as an exhibit design and the clients would be the people as well as the animals. Most research and programming will be conducted throughout the summer months that way when fall semester begins the schematic design can take full priority. All schematic designing will be completed by the end of Arch 613 that way Arch 614 can be devoted to the detailing of certain aspects of the design. The final project will consist of a finalized floor and site plan as well as detailed sections, elevations and perspectives that show detailed areas with examples of material choices and reasons for the materiality and durability as well as some informational displays.

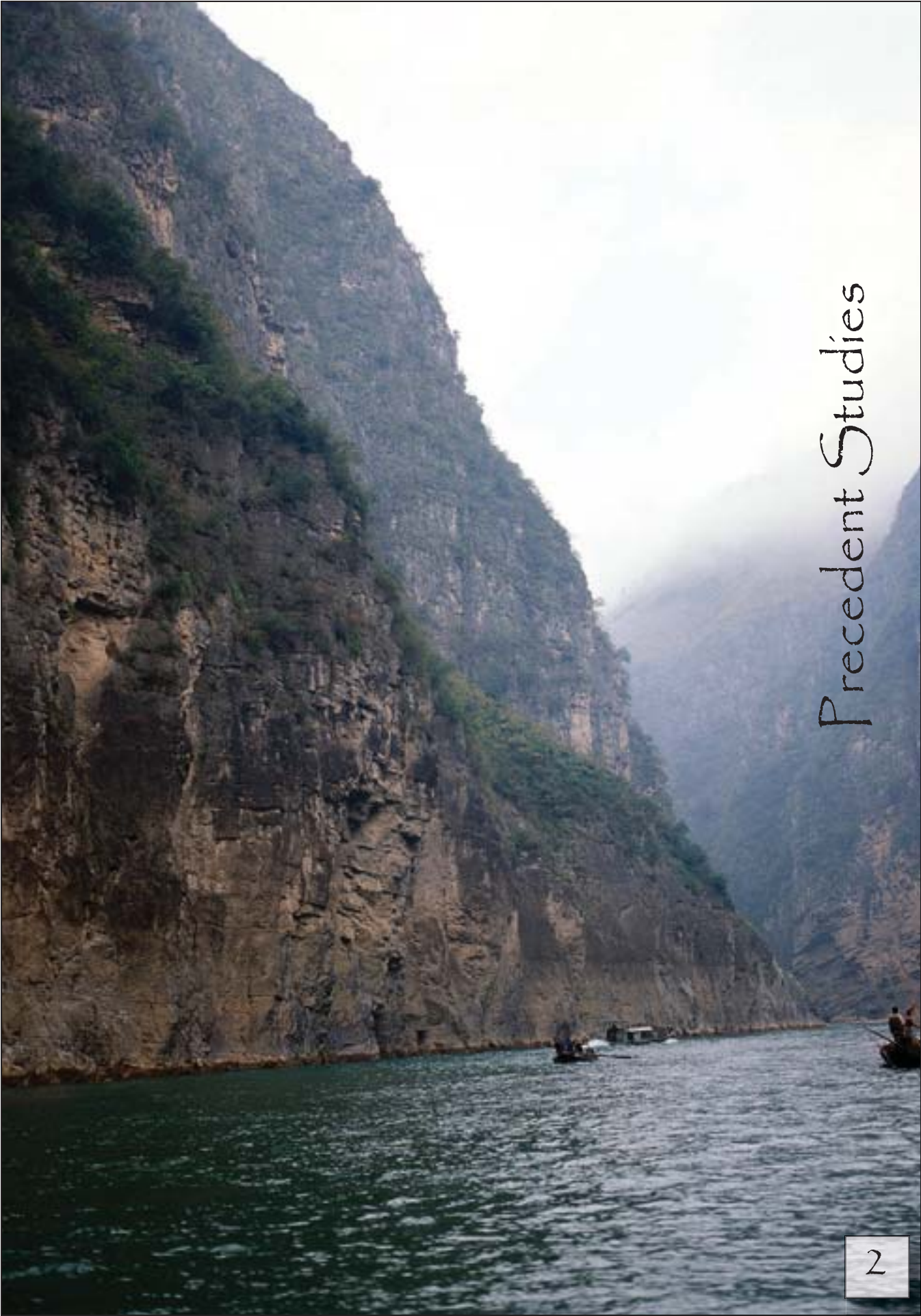
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Research/Analysis



Precedent Studies



The Bronx Zoo

- New York City, New York



Harish Educational Games



Harsh Educational Games



Interactive Educational Elements

~ Observations

Some exhibits were of the older ideas, while they had some newer "naturalistic" displays.

The Zoo was fairly spread out, and even in the middle of March I found myself not enjoying the long pauses between exhibits.

The Kingdom of the Night exhibit could have used toe lights or something to prevent visitors from walking constantly into the walls.

Some of the exhibits tried to really stress the conservation of the animals. The information was very helpful, although on some of the exhibits it seemed a little extreme for kids.

The Tiger Valley was the newest exhibit there. It was really interesting looking, however I noticed again that when the exhibit is placed in the same area as the animal, and the animal is out, the public tends to ignore the informational areas if they seem to large or daunting.

There were multiple entrances to the zoo. I believe this helped cut down on the necessity of putting the multi-season exhibits all in one area. Things could easily be near one or the other of the entrances.

On the newer exhibits they did have more of small educational tidbits that seemed useful and utilized.

The Bronx Zoo

- New York City, New York



Digital Display that has Impact Potential



Newer Naturalistic Exhibit



Interactive Educational Elements



Newer Naturalistic Exhibit



Interactive Educational Elements



Newer Naturalistic Exhibit

A close-up photograph of a museum exhibit. A person's hand is pointing to a dark, curved fossilized tooth mounted on a circular plaque. To the right of the tooth, a small informational label reads: "This is a cast of one of the". The background shows a blurred view of a museum gallery with a patterned floor and other exhibits.



Bong

When we look out into space, we see stars and galaxies. But what we don't see is the vast, empty space between them. This is the cosmic void, and it's the most common feature in the universe.

Evolution of the Universe

Scientists think that our universe began as a tiny, hot, dense ball of energy. This ball expanded and cooled, and eventually formed the first stars and galaxies. The universe has been expanding ever since, and it's still expanding today.

Early Universe

The early universe was a hot, dense ball of energy. It was so hot that it was a plasma, and it was so dense that it was a single, continuous mass. As the universe expanded, it cooled, and the plasma broke apart into individual particles.

Midway Universe

As the universe expanded, it cooled, and the plasma broke apart into individual particles. These particles eventually formed the first stars and galaxies, which began to cluster together.

Local Universe

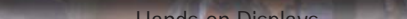
The local universe is the part of the universe that we can see. It's the part of the universe that's closest to us, and it's the part of the universe that we can study in detail.

Very High Energy

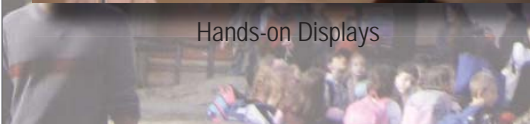
Low Energy

Looking Light for Information Sources

Light is the most common form of energy in the universe. It's the only form of energy that we can see, and it's the only form of energy that we can study in detail. By looking at light, we can learn about the universe and its evolution.



Hands-on Displays



~Observations

There were employees with information stations at exhibits throughout the museum which were utilized and proved helpful.

The people exhibits did not seem to inspire as much interest as that of the animals.

The colorful displays as well as the to-scale replica of the whale are what made the underwater area so impressive.

The science area also seemed to be the most crowded. All the digital displays with interactive computers were a big hit. AND they all seemed to be working. Especially the exhibits that were more three dimensional rather than just in a short wall. The ones that you could walk on, or bend over and touch, were the ones that people wanted to crowd around more.

The gemstone area was also a large hit. But not because of the rocks. A lot of the kids were interested in getting to and from different looking rocks because of the multiple levels that existed in that particular exhibit. There were ramps and two foot ledges to scamper on everywhere. The kids were accidentally getting an education as they struggled to get to every new area.

The more 3-dimensional the display and the more it moved, or you could make it move, the more the kids loved it. The dinosaurs were a big hit, because they are dinosaurs, but I noticed the kids moved through that area faster than one would have originally thought.

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The Natural History Museum

- New York City, New York



Multiple Levels in Rock Displays



Large Display with Potential Impact



Employees at Educational Booths



Beautiful Display of Information

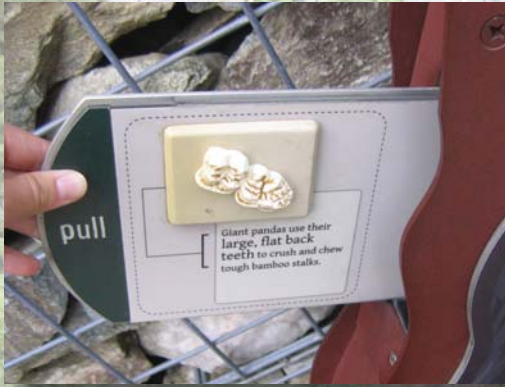


Interactive Floor



Hands-on Displays

The Smithsonian National Zoo -Washington D.C.



Hands-on Displays



Visible Bamboo Storage Helps Emphasize
Importance of the Plant

~ Observations

One conversation I overheard, "When they make the habitats more natural it seems like you see the animals less." Answer - "Yeah, but the animals aren't as unhappy." This helps show the public is willing to head in the better direction.

Inside the indoor dens they used concrete and matting for easy cleaning purposes.

Pandas are a great animal for the public to connect with. There was a grandmother in a wheelchair who visited the zoo that day, having followed the baby panda for two years online. She even had recently bought a tattoo of him. And she is 70 yrs Old!

Lots of levels seemed to work better. The area can be larger and more natural with all the levels and trees as well as with rocky areas. Yet the multiple levels made sure everyone could always see one animal. 360 degree viewing.

All interactive things were utilized. However the placement might need to be rethought or made more flashy. It seemed the most informational area and space where people can get involved in the protection of the species was utilized the least due to placement and loss of working interactive areas.

Having the bamboo storage visible was a great idea, however if it could be celebrated more rather than be a dead end the public might have found it more interesting.

The Smithsonian National Zoo -Washington D.C.



Under-Utilized Educational Area



Animals' Private Den - They Rub Everywhere



70-yr old Lady that had Connected with a Panda

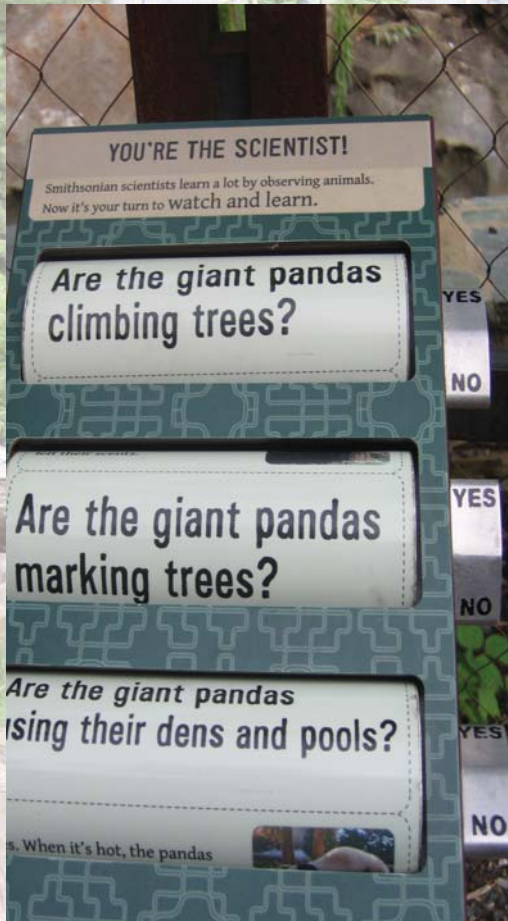


Behind the Scene-can be viewed from above



Inside Exhibit - Not naturalistic

The Smithsonian National Zoo -Washington D.C.



Interactive Educational Exhibits



Exhibits that can be Experienced
by Animal AND Public

~ Observations

The inside den area seemed really old fashioned in comparison to the extravagant outside.

The inside interactive area seemed to be utilized much more than the outside area.

The National Zoo seemed to be very good at having small interactive things throughout the site that educated the public as they walked along. There was a main area, but it was good to have these little pieces of information throughout the rest of the exhibit. As the zoo got busier more and more people turned their interest from the animal itself to the educational plaques.

Also, elements that were in place in the exhibit were executed along the outside as well. This way the people could understand WHY something was or was not placed in the exhibit.

The kids really seemed to like these ideas the most.

The Pandas seemed very well taken care of and the youngest was actually pretty active. However, he did seem to have developed some stereotypes that my readings had suggested were not good.

But this could be because he was born there in captivity. The crowd paths tend to get full quickly in the afternoon, it might be best if they were slightly wider.

Underground peeks into sleeping dens could help with the problem of Pandas always sleeping during the peak hours.

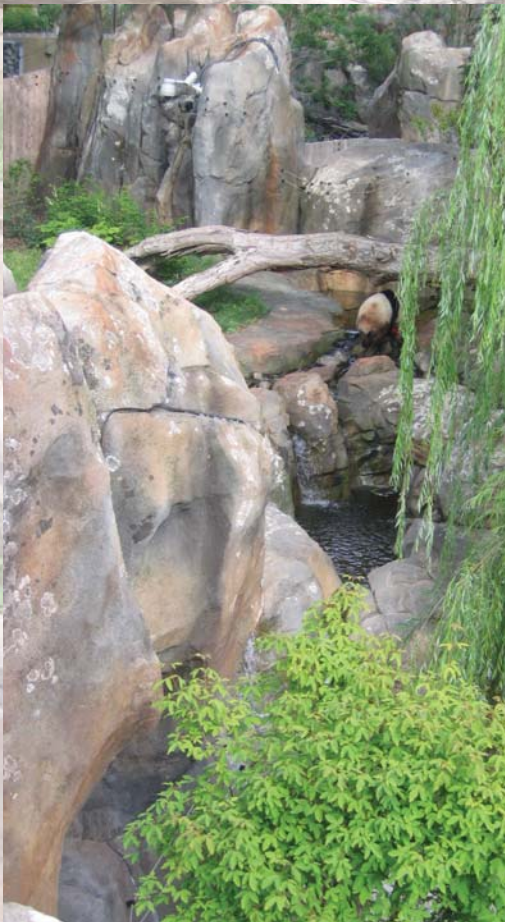
The Smithsonian National Zoo -Washington D.C.



Interactive Education Area



Panda Bribe by Food to sit near Window



Panda Scampering as seen from Top Tier



Map for Public - Educational with Panda Needs



Multiple levels of Outside Exhibit

The Smithsonian National Zoo -Washington D.C.



Baby Panda displaying Stereotypes:
Head Tossing and waiting by door



Content Panda eating lazily

~ Advice and Information Interview with Lisa Stevens: Panda Curator

The Pandas tend to avoid the mist areas, they tend to enjoy the fog areas more.

When asked if the Pandas were sensitive to noise she responded no, because they have been in captivity all their lives. Although she said they sometimes show unease when they hear a musical instrument or high pitch noises.

The adults love the water pool areas, however the young Pandas tend to be wary of it at first.

Also the facilities must be continuously updated. The Pandas tend to rub a lot on things three feet or lower, and this can cause paint to peel along with other problems.

The animals are not completely separated. They leave the choice up to them, however they separate them right before mating time and when the female is pregnant. They are provided with other barriers so if they want to be separated they can be.

The transport of animals from place to place is done through a series of tunnels with gates. They try to minimize as much human physical contact as possible since the ultimate goal is not just the zoo but perhaps someday to be released into the wild.

The baby is kept with the mother for the first 19 months, so the Exhibit Area must be large enough for both mother and cub.

The San Diego Zoo -San Diego, CA

Chomp! Huff! Bark! Understanding panda vocabulary

We're working to decode panda sounds.

As pandas grow, they stop cooing and crying and begin to make other sounds. Vocalizations help communicate. We've learned that these sounds reflect both the panda's well being and, in adults, their readiness to mate. Vocalizations tell us how the animals are reacting to changes in their environment. These behavior tells us how they've adjusted to new surroundings.

Female pandas chirp for a mate.

A female panda's chirp and sounds tell males nearby when she's ready to mate. Females make a lot more noise when they're in heat. At this point, females make friendly chirps to let the male know it's time. Males in the wild make aggressive sounds toward other males who are competing for a female.



The Giant Panda Research Station is a quiet area, in part, so that no one can hear any vocalizations. Adult pandas make up to 12 different sounds, and our SDZ staff are listening for every one.

Bleat: Both males and females make this sound when they're in heat.

Chirp: This call is often made by a female when she's in heat.

Squeal: Baby pandas use this sound to get their mother's attention when they're cold, scared, or in pain.

Creak: Adult males make this "creak" sound when they're competing for a mate.

Only one phone on the display could be heard



Entrance to Panda Education was hidden and No one Ventured In



Pandas could be seen easily because of Small Exhibit Area

~ Observations

I was disappointed at the exhibit and was confused as to how it had received so much praise.

The exhibit was a lot smaller than I had anticipated. The Panda enclosure was very small. This seemed wrong since in the wild they tend to forage a lot.

The forced progression of the people was difficult to deal with, I suppose it was necessary with large crowds though.

I was mainly disappointed by the Info center. It is completely off the main path and hardly used. All the displays look out of date and attract small, if any, crowds. Also the technology was faulty on a lot of displays. The graphics were all bad, and not nearly exciting. There was no connection between this area and the crowd waiting to see the Pandas.

Before entering, the crowd had to wait in a line outside. This would have been the perfect place to make the crowd go through the information. Also there was nothing to protect from the elements such as the sun or the rain, even though rain is slim.

The exhibit was slightly wide, but not too deep. This was good for the crowd for they could ALWAYS see them, but it seemed unfair to the animals.

Please use quiet voices
Bajen sus voces

The San Diego Zoo -San Diego, CA



Under-Utilized Educational Area



Long line before even entering Exhibit



Short Glass Separating Exhibit and Public



Panda cam that was un-viewable due to glare



Crowd was forced to continuously move

The San Diego Zoo -San Diego, CA



Very narrow Exhibit Area



Off to the side Donation Box



Pandas could be seen easily because of Small Exhibit Area

~ Observations

Rather than the large glass that the National Zoo used, the San Diego zoo went with a large ditch and a railing to keep the crowd out and the pandas in.

There was a zoo keeper speaking softly into a microphone to the side of the exhibit that constantly reported news to the people coming in. That was a good idea and it DID help keep noise levels down some.

The exhibit was a ramp which automatically provided handicap solutions as well as multiple levels. It forced people to utilize both heights.

There was a camera on the newly born cub and mom, however it was only one camera and the baby was shielded the whole time.

Perhaps if the walking areas were to go around the animal area could be bigger.

This zoo keeps the mother and father separated physically and from sight. About 2-3 weeks before mating they give protected viewings.

I was able to talk to the zoo keeper and she happily answered questions for me. She said the Fisheries and Wildlife were the ones that approved enclosures for Pandas.

This exhibit was at the rear of the zoo, forcing the crowd to go to the back.

Please use quiet voices
Bajen sus voces

The San Diego Zoo -San Diego, CA



Narrow Exhibit with Two Tiers of Ramp



Glass and Ravine Separating Public and Panda

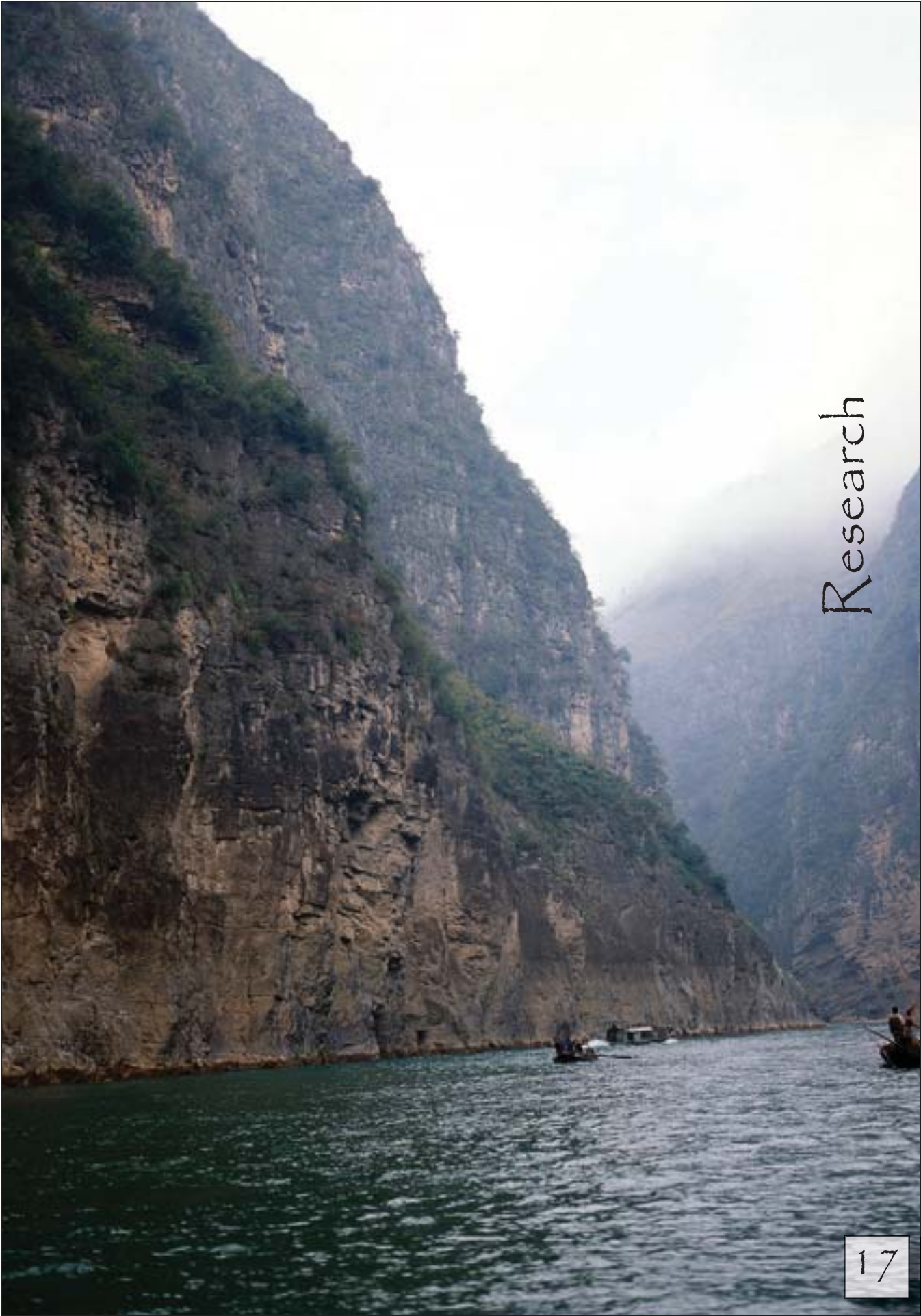


Narrow Exhibit with Two Tiers of Ramp

Locations of Pandas

-National Zoo and San Diego Zoo





Research

Panda Information

Giant Pandas by Wildt, Zhang, Zhang, Janssen, and Ellis

Important Information about Giant Pandas that is Relative to the Design

- The reason it is hard to stabilize these animals is because of the difficulty the female has reproducing.
- The female is only sexually receptive for 2-3 days a year. She can produce twins, but can usually only care for one.
- The Panda's fancy name is Ailuropoda Melanoleuca which means black & white cat-footed bear.
- The coloring helps them to blend-in with the snowy winter Mountain regions, however it is not as important during the summer seasons.
- The nearest genetic relative is the spectacled bear in South America.
- 99 percent of their diet is bamboo, although in the wild they will eat up to 7 different species of it.
- The shape of their skull and jaw could make it a powerful carnivore. Yet it is still mainly a herbivore even back to earliest fossil records.
- Their jaws are strong enough to crush bones with their teeth.
- They have a modified 6th toe almost like a thumb that grasps food securely.
- They have superb isolation in the wild, and they have NO tolerance for heat.
- They do not hibernate. They need to forage all year to satisfy and create enough energy from their low energy bamboo diets.
- They average 14 hrs a day searching for and consuming bamboo

Panda Information

Giant Pandas by Wildt, Zhang, Zhang, Janssen, and Ellis

Important Information about Giant Pandas that is Relative to the Design

- The female is in heat in the late winter/early spring and for 2-3 consecutive days.
- They are native to the Mountains of Sichuan, Gansu, and Shaanxi Provinces in China.
- The Min Shan Mountains are the heart of the territory.
- There are 30-40 distinctive populations of Pandas.
- Historically there used to be around 100,000 Giant Pandas. Now there are only 1500.
- The terrain is ridiculous to manage there. Logging and Farming Operations on the lower elevations are resulting in habitat loss.
- The mid 1970s-1980s were the worse in terms of loss time and hunting of the panda was finally banned in 1963.
- They have 5,000 square miles of habitat left now.
- In 1996 they quit taking them for zoos from the wild, and luckily the food source is not as much of a threat as originally thought.
- From 1990-2002 179 cubs were born and 71 % survived.
- In 1989 there were 13 Panda Reserves, today there are over 40 Reserves
- The rent-a-panda program began in the 1980s and still exists today.

Panda Information

Giant Pandas by Wildt, Zhang, Zhang, Janssen, and Ellis

Relevant Information about the Six Main Reasons for Captive Panda Population

1. **Ambassadorial Value:** Few people have been fortunate enough to see a giant panda in the wild. Even so, this rarely glimpsed creature has become a worldwide ambassador for the need to conserve threatened habitats and diverse species. What happens to the giant panda also happens to other species sharing the same habitat - the 'umbrella' effect. Because of the precarious status of wild populations and the difficulty in viewing them in nature, giant pandas in zoos and breeding centres play a crucial role in educating the public. Giant pandas 'up close and personal' are commanding emissaries for their wild counterparts and a tangible reminder of why so much effort needs to be directed at saving wild places.

2. **Educational Value:** In a similar fashion, there is a need to educate the general public about the precarious status of wild populations. Those facilities exhibiting pandas have the responsibility to provide visitors with synthesized lessons about animal anatomy, physiology, ecology and behavior, ultimately instilling an appreciation of the species and its particular adaptations to the natural environment. Most importantly, zoos and breeding centres must emphasize the imperiled status of wild giant pandas and send the message that captive management is not a substitute for intensive efforts to conserve the species and its habitat in nature. And, finally, given the rapid progress made from systematic studies, we would suggest that interest in giant pandas and the stories emanating from research could become a model to 'turn on' the general public (especially children) to science by demonstrating its value in managing and conserving one of the world's most beloved species.

3. **Insurance Value:** The status of wild giant panda populations is uncertain at best. Although logging operations have ceased, Chinese forests remain fragmented, corridors among habitats have not been established, and new reserves are not yet capable of optimal management. Humans often encroach upon and economically exploit existing reserves, reducing the quality and quantity of habitat. Most worrisome is the lack of reliable knowledge about numbers, demography and genetic viability of giant pandas in each of these isolated populations. A fragmented population is highly vulnerable to unpredictable events, for example, a disease epidemic or natural catastrophe such as a bamboo die-off. Thus it makes sense that any species facing such a precarious future be 'insured'; a captive program provides an insurance policy. However, part of the dividend payment by zoos and the public they serve must be dedicated to protecting pandas in nature, thereby avoiding the need to ever 'cash in' the policy.

Panda Information

Giant Pandas by Wildt, Zhang, Zhang, Janssen, and Ellis

Relevant Information about the Six Main Reasons for Captive Panda Population-continued

4. **Funding Value:** Whether we like it or not, the ability to 'experience' giant pandas can have a profound impact on our ability to raise funds - in no other case is it routine to generate \$1 million per year to import a wildlife species. Panda appeal translates into serious funding for conservation, not just benefiting giant pandas but many other species sharing the same habitats. Under present conditions set in place by the US Fish and Wildlife Service, the \$1 million per year from each panda-holding zoo in the USA becomes available for building capacity, whether it involves building roads and ranger stations at newly developed protected areas or training the next generation of Chinese field biologists and zoo scientists. Access to giant pandas held in zoos and breeding centres helps to convince politicians, corporations and the private sector to give money that, in turn, will help to ensure resources for conservation now and long into the future.

5. **Value for Scholarly Knowledge:** A captive giant panda population serves as an invaluable resource for basic and applied biological research. Overall, there has been little detailed, integrated knowledge about giant panda biology, especially in the life sciences. Yet our descriptions above, about species uniqueness explain the need for many more systematic studies. How, for example, can one study disease susceptibility, digestion dynamics or sperm biology in a species that lives in remote and thick, mountainous bamboo forests? One of the most exciting progressions in panda biology in the last few years is agreement among holders that the captive population must be used to better understand the species from a scholarly perspective. Buy-in to this concept is assisted by the realization that the resulting information will vastly improve captive management and eventually may contribute to more enhanced wild conservation. This book is a testament to the advantage of having accessibility to giant pandas living in controlled environmental conditions for research.

6. **Unknown value for the future:** There is a sixth undefined reason for maintaining giant pandas in captivity, and that involves unpredictable future advantages of maintaining a genetically viable population. Certainly from an applied conservation perspective there have been recurrent discussions about reintroducing giant pandas into nature - adding new individuals to existing or new reserves. In an ideal world, wild individuals would serve as the source for these movements. However, we must also consider that, realistically, captive populations may be the most reasonable source for these individuals (despite our current vast lack of knowledge about exactly how to reintroduce captive-produced pandas into wild habitats). And, finally, from a scholarly angle, one never knows how basic studies of one species will benefit another. For example, how indeed can a species evolve and survive to modern times when the female is sexually actively for less than 1% of an entire year? Perhaps there are lessons here for other mammals (including humans) in what controls reproductive success. Thus who knows what can be learned from the biologically mysterious giant panda that will benefit other living things?

Panda Information

Giant Pandas by Wildt, Zhang, Zhang, Janssen, and Ellis

Important Information about Giant Pandas that is Relative to the Design

-Later on it was determined that inadequate bamboo diets can lead to lower reproductive success.

-In the wild, cubs stay with the mother for 1.5-2.5 years. The reservations began weaning them at 6 months. However this may lead to problems with reproduction later in life and people are starting to stop this early weaning.

-Their personality and behavior may affect how they mate. So far if the Panda is wild born and is aggressive is it a positive contributor to reproduction. Temperament, stress, and inadequate husbandry practices all lead to failure.

-Their diet primarily consists of bamboo, yet only 25 percent or less of the dry matter in bamboo can be digested.

-The Panda can consume more than 25 wild plant species and animal based foods, and water is very important to their digestive process.

-The Panda needs multiple presentations of fresh bamboo at least 3 times daily and they begin having digestive problems when they eat less than 60 percent bamboo. Bamboo is VERY important.

-It can be hard to tell if the female is pregnant, for she can develop a pseudo pregnancy – to the point of producing hormones that are emitted when pregnant.

Panda Information

Giant Pandas by Wildt, Zhang, Zhang, Janssen, and Ellis

Important Information about Giant Pandas that is Relative to the Design

-“Suboptimal captive environments for wildlife are associated with abnormal behaviors, stress, and poor reproduction. Besides of them being too small, more importantly zoo enclosures lack complexity and opportunities to perform natural behaviors.”

-Prevailing Theory: Ethological needs model of motivation: Proposes that animals are motivated not only to obtain important resources such as food and shelter, but also to perform the behaviors that have evolved within the species. Thus an animal given a bowl of processed food fails to use its evolved behavioral strategies to search for, extract, and handle food for ingestion.

-Stereotypes are a highly repetitive behavior that does not vary in form and has no apparent function or goal. These are developed while an animal spends time waiting for food delivery and etc.

-Unfortunately this became common in Panda breeding facilities. More and more displayed a high incidence and impressive array of stereotypes including pacing, head tossing, pirouetting and cage climbing. Extreme cases: this occurs for hours or at rates of nearly 80 bouts per hour.

-Thus began environmental enrichment. How did animals make a living in nature? What are their critical resources and how are they obtained? Size of home range? Locating and choosing mates?

-Therefore design of captive habitat is important. Enrichment can be trees, logs, stumps, wooden climbing structures, stones, digging pits, bushes, tall bamboo. Hiding food enrichment is important too as 98 percent of the Panda life is spent eating and sleeping.



Panda Information

-The Giant Pandas of Wolong by Schaller, Jinchu, Wenshi, Jing

Important Information about Giant Pandas that is Relative to the Design

-The book is slightly older, but even in 1985 they recognized the importance of the Panda as an icon for endangered species.

-General Information: The panda is about 160-180 cm in length, and it is a plantigrade (walks with toes turned in.) Their hair is slightly oily and some belly hairs can be 10 cm long – to keep very warm and to keep water from penetrating

-Their eyes are sensitive like that of a cat to see better at night.

-It has a diagonal walk that is typical of most mammals, and they descend rump first when coming down trees. They are very flexible.

-Pandas have an altitude level of around 3200-3500 m, but they can go up to 4000m. They have been eating bamboo for a very long period of time. In 1985 there were three major Panda Reserves: Foping, Wolong, and Tangjiahe.

-The climate of the area consists of long winters. The snows last from November to March with cool summers usually beneath a layer of cloud. The Winters are cold, but not too extreme. The high humidity and non-extreme temperatures make it more of a typical coast rather than an inland temp. Snowfall is average of 22.5 inches, and rainfall is average 40 inches a year.

-The temp from Nov – March is below freezing with coldest days reaching 9.5 degrees Fahrenheit. June, July, and August are the warm months with daily max temp reaching 60-70 degrees Fahrenheit. Humidity is above 85%, never below 50%. At least 15 days a month it rains.



Panda Information

-The Giant Pandas of Wolong *by Schaller, Jinchu, Wenshi, Jing*

Important Information about Giant Pandas that is Relative to the Design

- The Panda still has a stomach of a carnivore. That is why they must eat so much, yet be not as active. Their body easily uses up too much of their energy.
- Animal bones HAVE been found in droppings, however lack of prey and slow movement of the Panda might be why they don't eat meat usually.
- They eat about 10.4 kg of fresh weight of leaves daily, and can defecate up to 100 times a day.
- Pandas prefer forests with coverage of 70% or more of canopy. They also are more abundant on stripped plains, valley terraces, heads of streams, and just above or below cliffs. All areas that are spacious and level with a gradient of 20 percent or less.
- They tend to favor North or East facing slopes in the wild.
- In their natural habitat there are 4 different forest types that they wander through depending on the altitude.
- The sub-tropic, evergreen and deciduous, Mixed coniferous, and deciduous broadleaf, and the sub-alpine coniferous which is the most extensive and the highest altitude. Different bamboos grow in each different area.
- Also the Pandas tend to favor the thicker stemmed bamboos which usually grow on the outer edges of patches.



Panda Information

The Giant Pandas of Wolong by Schaller, Jinchu, Wenshi, Jing

Important Information about Giant Pandas that is Relative to the Design

-When keeping in mind the other things that can be placed in each exhibit one could include the vegetation, site, and other mammals.

-Other rocks that tend to populate the area are:

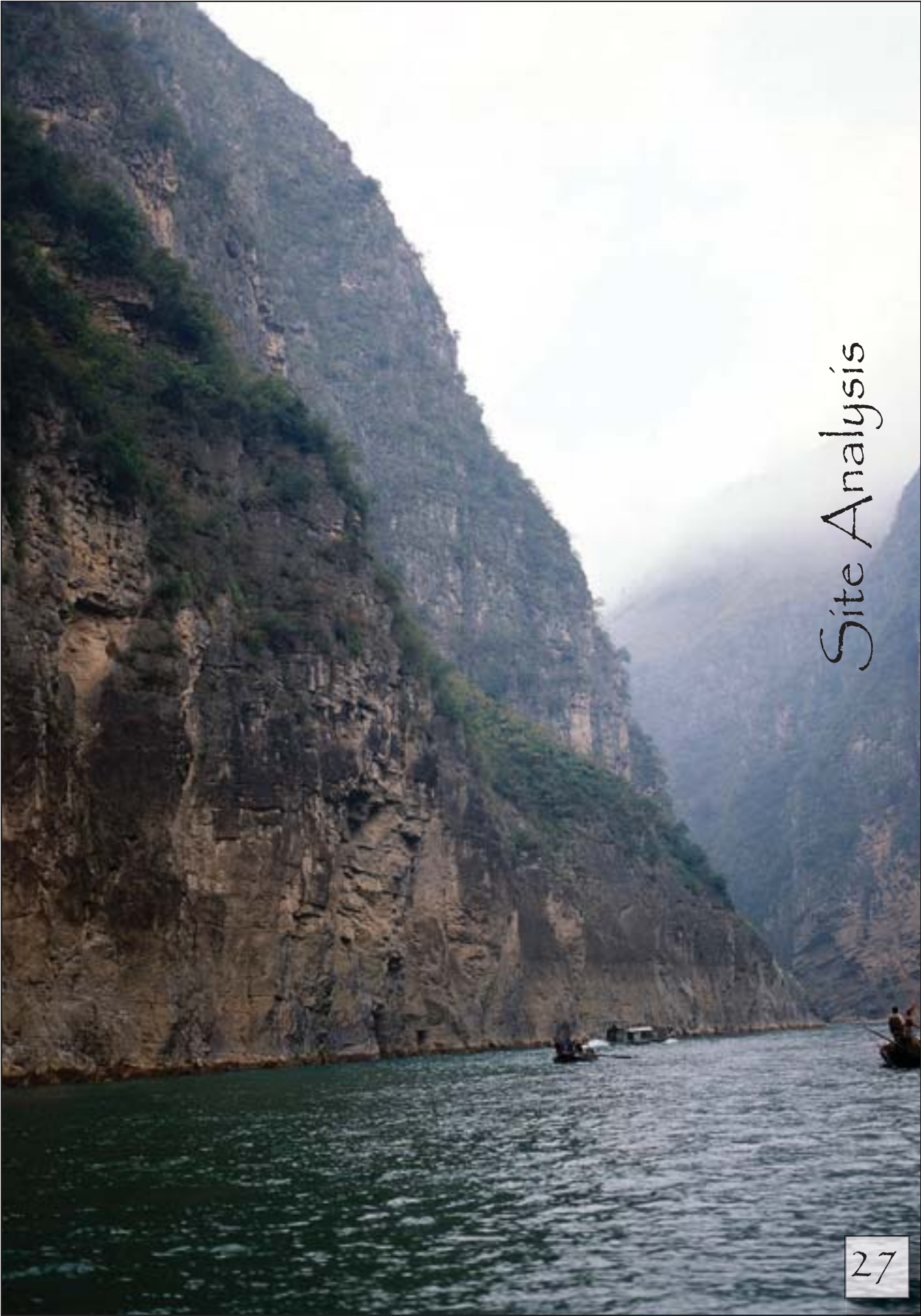
Sandstone, Slate,
Schist, Siltstone,
Gneiss, Quartzite,
Granite, and Granodiorite.

-Other mammals that are in the Pandas natural habitat include:

Green tailed Monal
Giant Salamander
Temminck's Tragopan Pheasants
Golden Monkey
White Tipped Deer
Tufted Deer
Takin Goat Antelope
Snow Leopard
Red Panda
Serow
Muntjac

-Other existing trees or vegetation:

Oak, Birch,
Beech, Maple,
Dogwood, Hemlock,
Spruce, Larch,
Basswood, Cherry
Fir, Rhododendron



Site Analysis

Henry Doorly Zoo -History

1894 – Riverview Park was founded by the City of Omaha
1898 – The Park had an animal population that included deer, grizzly bear, two bison on loan, and 120 other animals.
1900 – 1952 – New exhibits and other improvements were made to support the growing number of animals in the park.
1952 – Omaha Zoological Society was organized to improve the Zoo and provide admin help.
1963 – Margaret Hitchcock Doorly donated \$750,000 to the Zoo with the stipulation that the Zoo be named after her late husband, Henry Doorly, chairman of the World Publishing Co.
1965 – The Omaha Zoological Society was reorganized to plan construction, operate and maintain the Zoo for the city as a non-profit organization. The first phase of the Zoo was dedicated to Henry Doorly. The bear grottos, gorilla and orangutan buildings, and Ak-Sar-Ben Nature Kingdom were part of this phase
1967-68 – A pachyderm exhibit was build on the old baseball diamond site, and the Omaha Zoo Railroad was inaugurated.
1968 – With the help from Union Pacific, 2 ½ miles of track was laid through the zoo. The Omaha Zoo Railroad made its inaugural run in July
1970 – The 1916 public swimming pool that had been buried in 1944 was “rediscovered” and converted to a sea lion pool.
1972 – The Ak-Sar-Ben Waterfall was constructed.
1973 – Swan Valley and Primate research building completed. New diet kitchen completed.
1977 – The largest Cat Complex in North America opened. The hospital and nursery opened.
1981 – The Giraffe and hoof stock complex opened.
1983 – The Worlds second-largest walk-through aviary opened.
1984 – The salt-water aquarium opened
1985 – Gorilla and Orangutan buildings renovated.
1987 – Hands-on Education building, Mutual of Omaha Wild Kingdom Pavilion, was completed..
1988-1992 – Construction of \$15 million Lied Jungle was constructed.
1989 – Durham Family's Bear Canyon was dedicated and the Zoo received AAZPA Bean Award
1990 – Dairy World opened and the worlds first test-tube tiger was born
1991 – Worlds first artificially inseminated tiger was born
1993 – Old Aquarium was closed and the Walter and Suzanne Scott Kingdoms of the Seas opened
1997 – Lozier IMAX Theater opened, then Garden of the Senses was created
2000- The Zoo joined the Okapi Species Survival Program and became one of 14 zoos in North America to receive Okapi. Koala visited.
2001 – Cheetah Valley exhibit opened.
2002 – Desert Dome opened. Hubbard Gorilla Valley Construction Began
2003 – Kingdoms of the Night opened beneath the Desert Dome
2004 – Hubbard Gorilla Valley opened. Two new elevators also were opened
2005 – Orangutan Forest opens. As does a giraffe feeding station. Construction begins on an addition for the Conservation and Research Center
Coming Soon – Butterfly Pavilion and Panda Exhibit!

Interview with John Armknecht and Dr. Lee Simmons

On June 19th, 2007, I met with Architect John Armknecht of Stanely Howe Architects to discuss programming for a Panda Exhibit and what the Henry Doorly Zoo might require. John Armknecht is a principal at Stanley J How Architects, the firm that is responsible for many, if not all, of the Henry Doorly Zoo designs. From him I was able to get an idea of where to start, and the important factors that needed to be kept in mind when designing.

Then on July 10th I conducted an interview with Dr. Lee Simmons, the director of the Henry Doorly Zoo, and his right-hand man Mr. Dan Morris. From this meeting I was again reminded of factors that are important to a zoo design for the animals as well as for the Zoo as a business. From this meeting and the previous one with John Armknecht I was able to put together a list of conditions mentioned whether they were advice or were things that they were already contemplating for their Panda Exhibit.

- Remember the temperature differences between our zoo and the National and San Diego Zoos. Our exhibit will have to be primarily indoors.
- Video Cameras are a bonus to help track the movement of the animals. These provide the public with an idea of the animal even if they cannot physically see it in the exhibit.
- The budget is approximately \$10 million for the entire project. Zoo construction is typically \$500 a square foot. Therefore the exhibit would be about 20,000 sq. feet.
- Glass for the exhibit would be $\frac{1}{2}$ inch tempered glass. It would be ultra-clear, this is the glass used in the gorilla exhibit, however there they had to include 3 of these on top of one another for strength.
- It would be best if other animals from the area could be included in the exhibit area. This gives it a more naturalistic idea and helps the public be enthusiastic as they feel they are experiencing the area, and not just looking through glass.
- The inside should be a 3-dimensional space. The pandas should get more than one level since they are natural climbers and to provide them with an enriched space.
- The exhibit needs to be close to the front gate. It is cheaper to build there than down near the lagoons because of the kind of dirt and cost of excavation. Also people will attend the zoo in the winter if they know the exciting new stuff is near the front. That is why our attendance in the winter time is better than that of Toronto for example. Although Toronto is bigger, their exhibits are too spread out in the winter months. Another example of increased attendance was that of the elevator. Numbers multiplied when the public realized they did not have to walk as much to see the exhibits.

Interview with John Armknecht and Dr. Lee Simmons

-I double checked these figures and the statement about increased attendance is true. In an email from Sue Lyons at the Henry Doorly Zoo I had received a statement that in January of 2006 the zoo had seen a total of 37,725 people. Later I received an email from Reynaldo de Guzman, CMA, of the Toronto Zoo with a January attendance total of only 22,946 people.

-Baby Pandas, if conceived, will belong completely to China. So only temporary areas are needed for two years for if the mother conceives while here.

-Also, Pandas are only ever a loan. The building needs to be designed so that it can be retrofitted after 10 years for another animal. This way it does not become wasted space. It would be best for traveling exhibits or temporary displays.

-Display-wise it is best to stay away from large static graphics. Interactive panels tend to work best, although the digital ones seem to never stay working.

-3-dimensional displays seem to come across better and are easier to remember when taken home, however graphics should be slightly low key so as NOT to distract from actual animal.

-The bamboo would be coming in from Mississippi for at least 4 yrs until they can purchase land and get a big enough bamboo stock. They would need refrigerated semis in order to get this to work.

-Once the Chinese say yes, it would take about 2 yrs to build the building and receive permits.

-Letting the people see behind the scenes is a good idea.

-The Pandas will be separated except during the time of breeding. However it is best to have mere physical barriers, but still allow the Pandas to see or smell each other, this way reducing the possibility of injury to one another.

- Also the basics are essential with this project. Parking for the semis that will arrive bi-weekly is important. They need to be able to load and unload. Also perhaps one truck can stay and plug in while the other is on the road.

-Since the Panda does not care about the public in the slightest he can be on display more than other animals. The management will be comparable to the Memphis Zoo.

-The Panda Area should be at least 24 feet high. Trees in the complex will be important and will most likely be similar to that of the Sun Bear Trees.

Interview with John Armknecht and Dr. Lee Simmons

The next pieces of information are open for dispute in my opinion. Therefore I have listed what they have stated, but have added whether I agree or disagree with it and give an example of what I would do different.

-They planned a two-story building, however the bottom level is primarily storage and for moving the Pandas. This is a good idea, however I found that using multiple levels allows the public to have a better percentage of actually viewing the animal. Therefore I believe the public should be able to view on both stories or at least more than one.

-The outside viewing is two-stories, and can be seen from inside but minimally outside the building due to the location and how narrow the exhibit would be. I agree that the outside viewing be two-storied, however if this exhibit is planned to bring in crowds during the winter or non-summer months than when they are outside during these colder months they should have full-access viewing.

-The inside would be the primary viewing and holding area, yet from the plans I had seen the inside square footage seemed smaller than the outside. I agree that the Pandas could be primarily inside, however if this is to be their main habitat it should have the most square footage.

-There will be video to track the movement of the Pandas within the exhibit. I agree that this is a good idea that will keep all the levels of the crowd pleased.

-The bamboo holder is below the floor with no access for public viewing. I disagree with this. Even if the bamboo is below the floor, there should be a window showing its content to give the public a general scope of how heavily the Panda relies on this resource.

-It will be connected to the lower level of the Lied Jungle for easier access and with the Birthday House moved to the side. There will be a joint kitchen so the Pandas can be used for gala events. The middle would then open up. If this site is indeed the best for the exhibit than I agree that connecting it to an existing building is a good idea. This provides sheltered walking to the exhibit. Also allowing the area to be used for other events could increase the potential for re-use of the building.

-The Panda habitat would extend up multiple stories with trees for climbing. This also is a good idea, the Panda needs plenty of room to move about and having it go higher than the public is not that big of an issue.

-There would be a viewable control room. I agree this is a good idea for it allows the public at all times to be able to see a Panda, providing them with a reason to return to the zoo.

Henry Doorly Zoo

-Existing Exhibit Observations



3-Dimensional Exhibits



Bad Design as the Animals aren't visible through Rail



Good Design that allows kids to Interact



Information that could be more interactive



Use of multiple levels allows for better view

Henry Doorly Zoo

-Existing Exhibit Observations



Successful Garden of the Senses Design



Cat Complex exhibits Reconstruction



Incorporating Public with Animals through Design



Example of still existing unsuccessful exhibits



Example of Natural Habitat in new Gorilla Valley

Henry Doorly Zoo -Possible Panda Sites



Area 1 - By Sea Lions



Area 5 - Near Bear Valley/Cat Complex



Area 2 - Sheltered Picnic Area



Area 6 - Near Desert Dome/Stone House



Area 3 - Picnic Area by Wallabies



Area 7 - Behind Garden of the Senses



Area 4 - Near Aviary/Gorilla Valley

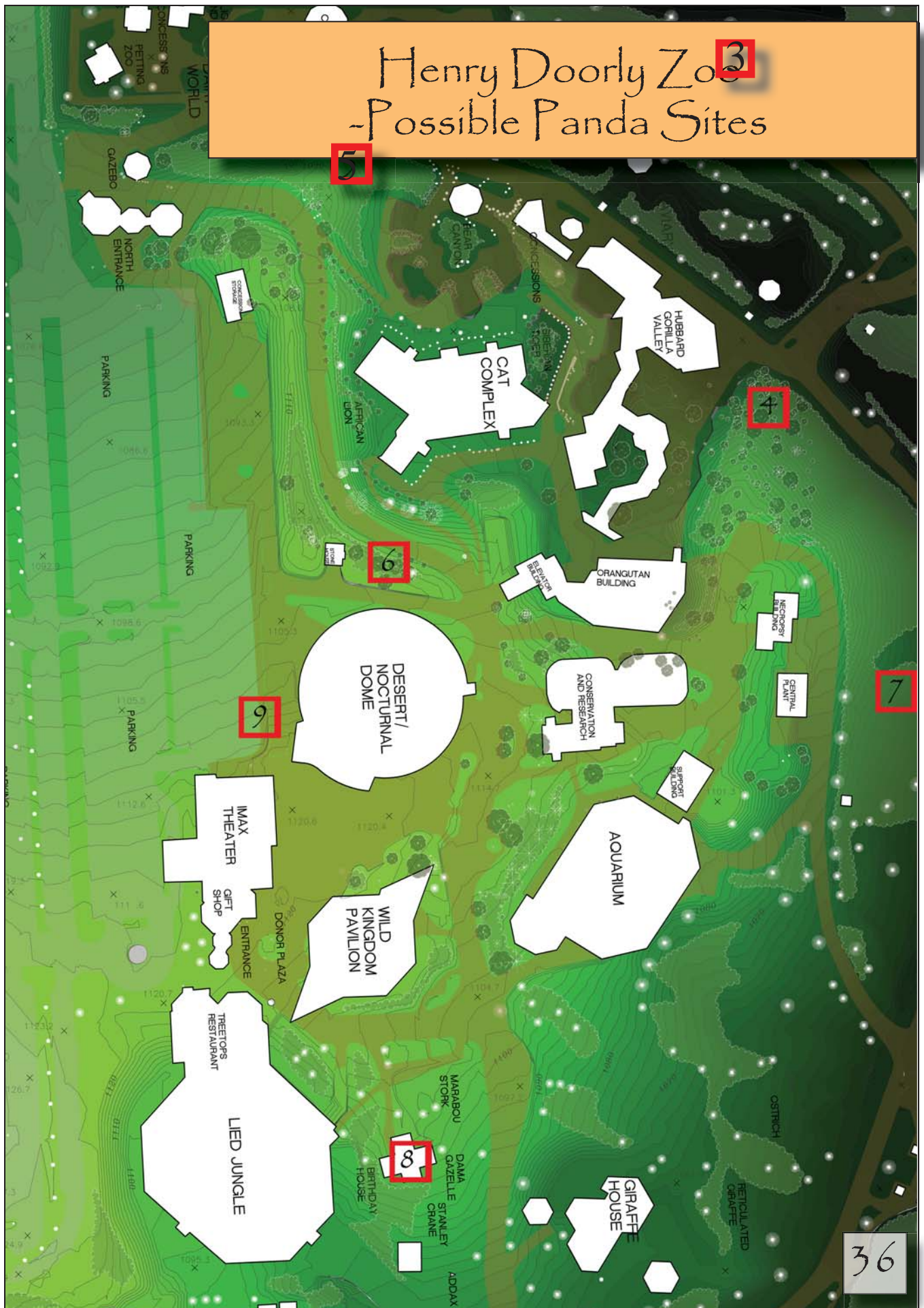


Area 8 - Birthday House/Existing Proposal

Henry Doorly Zoo -Possible Panda Sites



Henry Doorly Zoo -Possible Panda Sites



Henry Doorly Zoo -Possible Panda Sites



Area 1 - By Sea Lions



Area 5 - Near Bear Valley/Cat Complex



Area 2 - Sheltered Picnic Area



Area 6 - Near Desert Dome/Stone House



Area 3 - Picnic Area by Wallabies



Area 7 - Behind Garden of the Senses



Area 4 - Near Aviary/Gorilla Valley



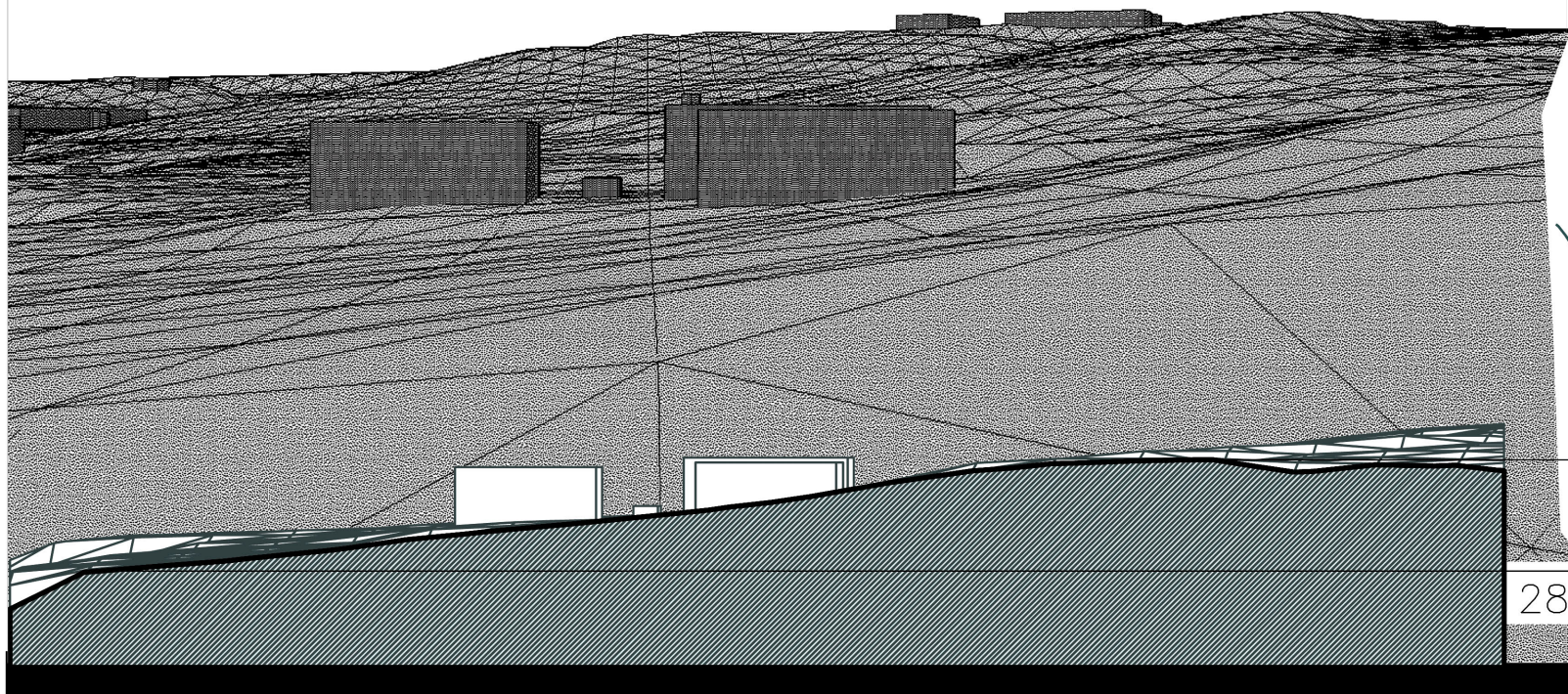
Area 8 - Birthday House/Existing Proposal

Conditions to be Rated for Each Potential Site

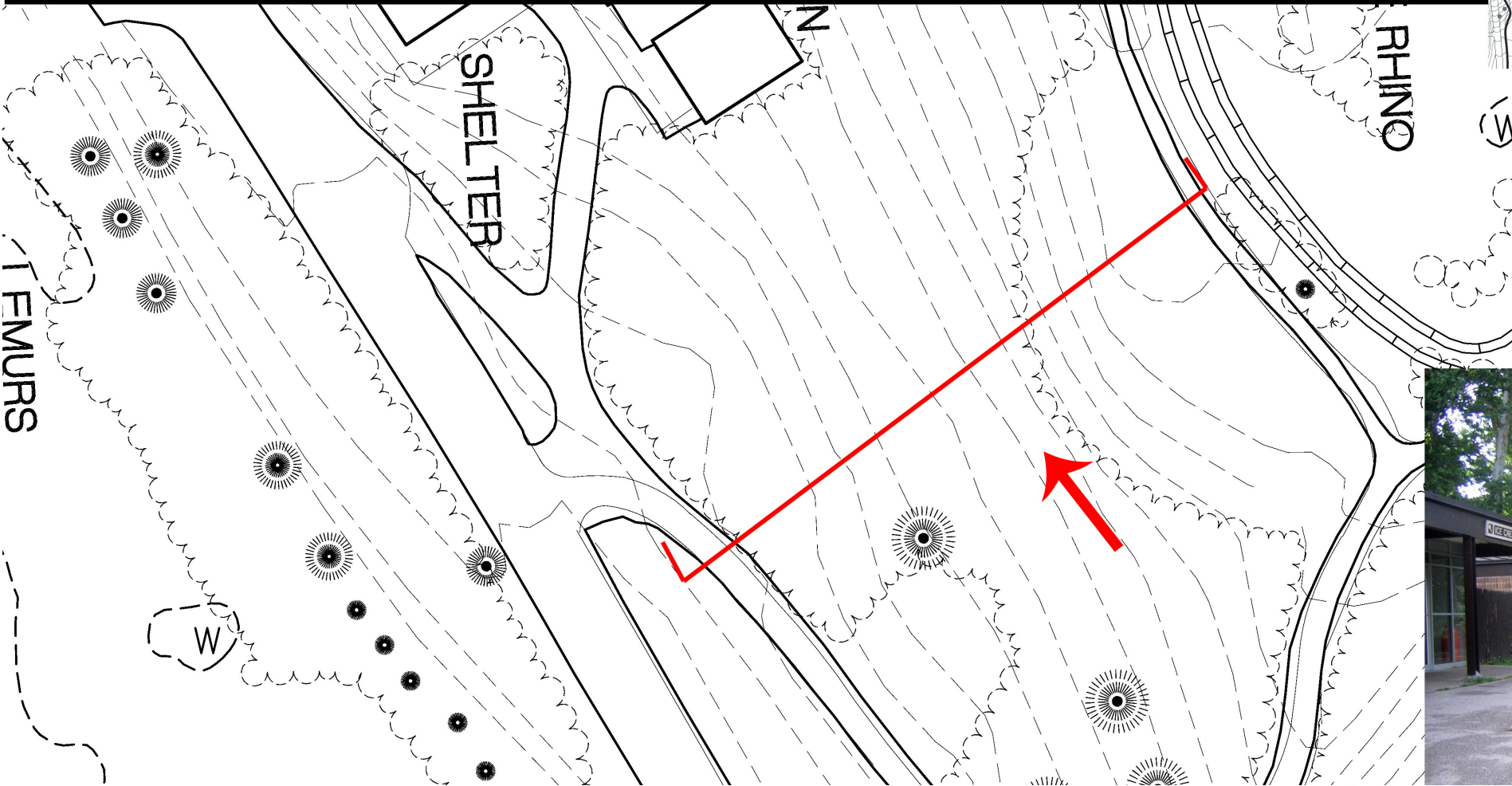
All conditions will be placed in a Matrix and rated 1-8 to determine the site that satisfies most needs.

- The Proximity to the front of the zoo for extreme weather conditions. Especially during the winter months.
- What is the donor's preference?(Correlates with the front of the zoo)
- What is the cost of excavation? – It costs more to build down by the lagoons. Where else?
- What is the elevation of site in comparison to the Pandas' natural habitat? The grade could then be utilized.
- Is there accessibility for loading/unloading in reference to refrigerated semis for bamboo?
- Is there a noise factor? – High pitched and mechanical noises tend to bother Pandas.
- How close is it to other multi-season exhibits? This would help attendance.
- What is it's availability to change function after 10 years? Especially in terms of location?
- How close is it to the elevator? Being close could help out in winter months.
- What is the percentage of shade on the site in winter, fall, spring? Pandas prefer 70 percent canopy, and having pre-established trees can cut down on cost.
- Is there availability to have wide paths for maximum viewing?
- Is there availability for under-area peeks into dens like the bear canyon, as well as water pooled areas?
- Would the site bother nearby exhibits if microphoned?
- Are there flashing lights nearby that can harm Pandas' sensitive eyes?
- Is there enough square footage to build a 20,000 square foot exhibit as well as walking path room?

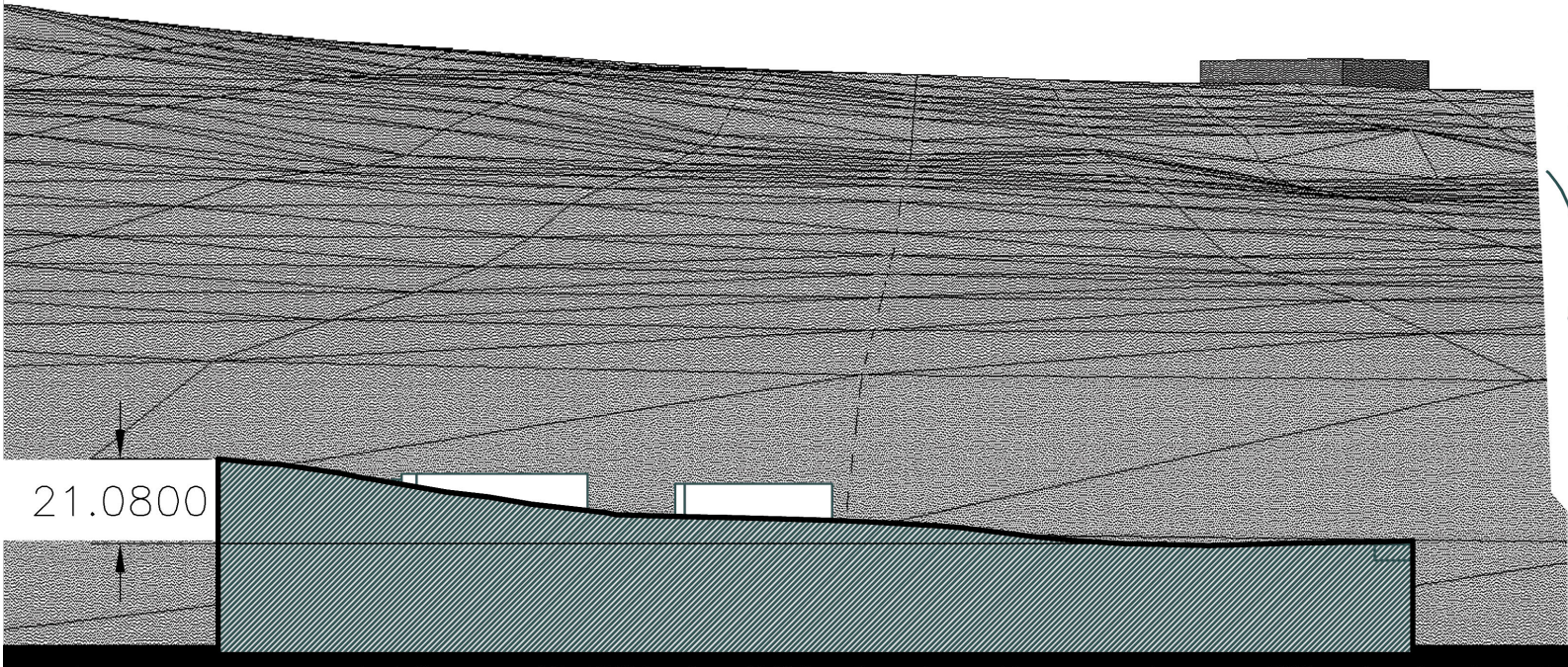
Area 1: South East of Sea Lions
Square Footage: Approximately 44,000 sq.ft.



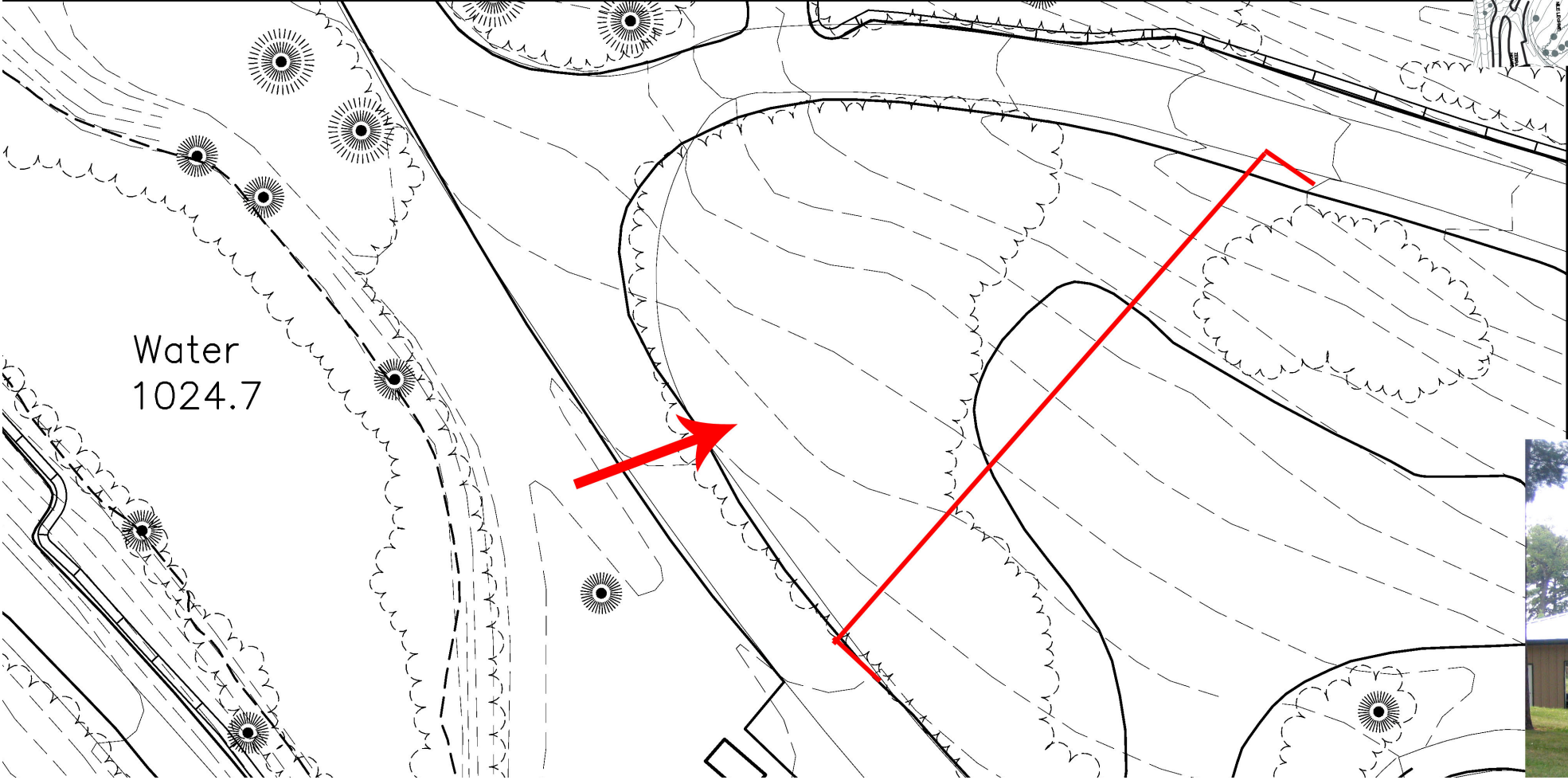
Area 1



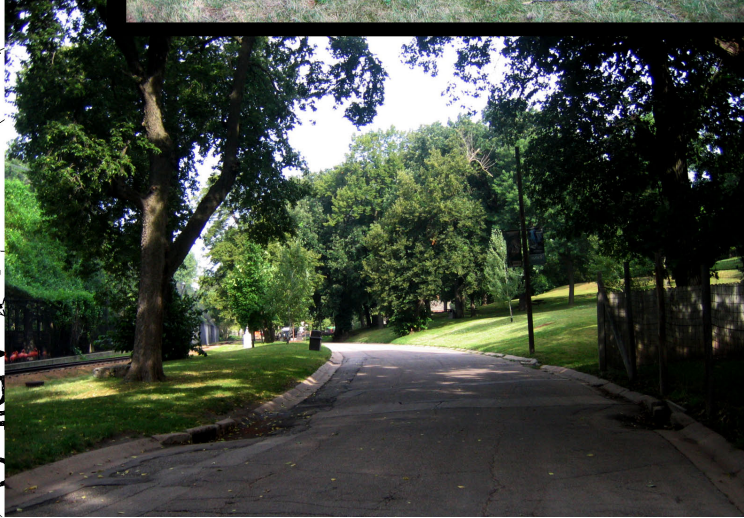
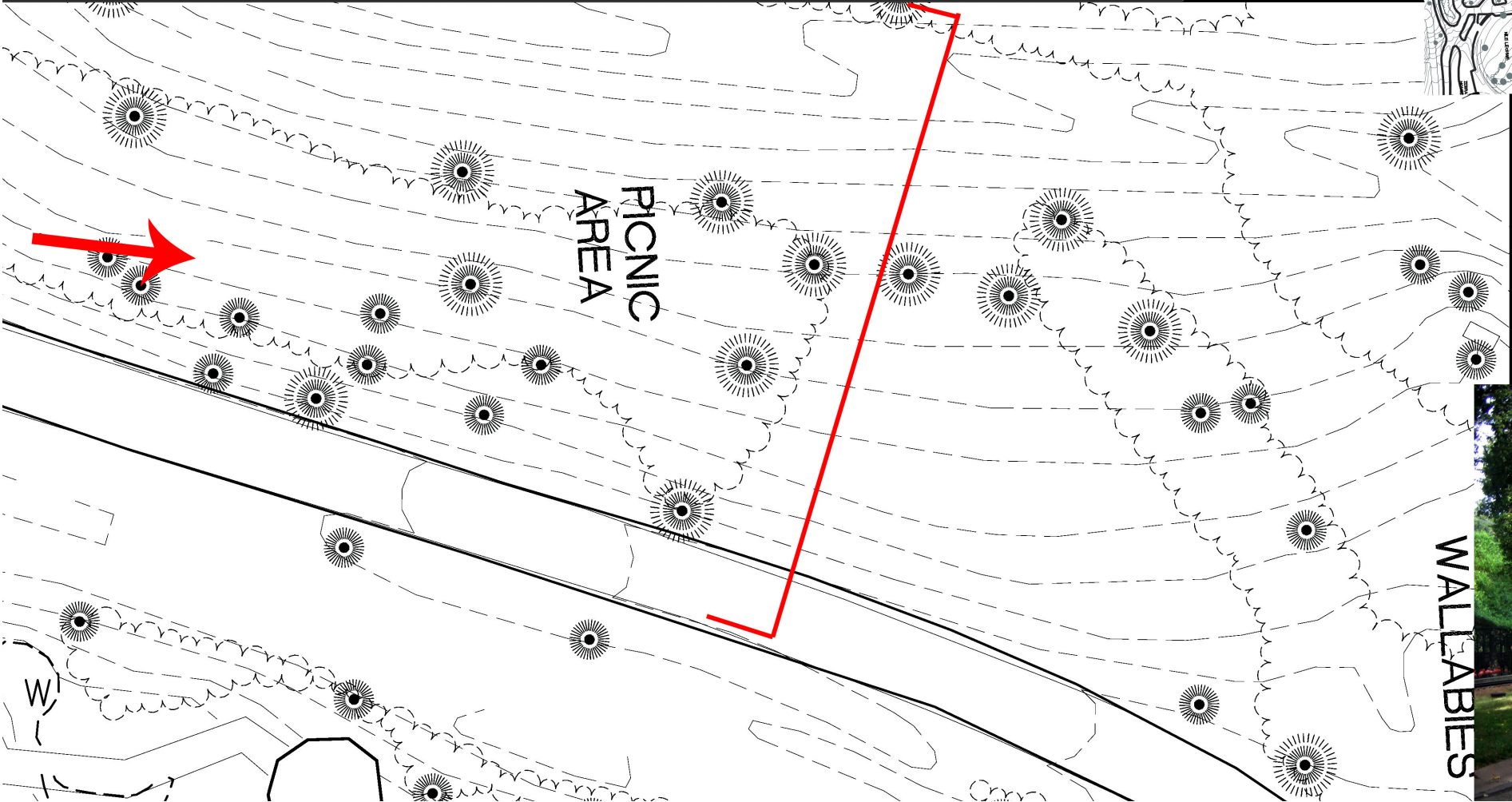
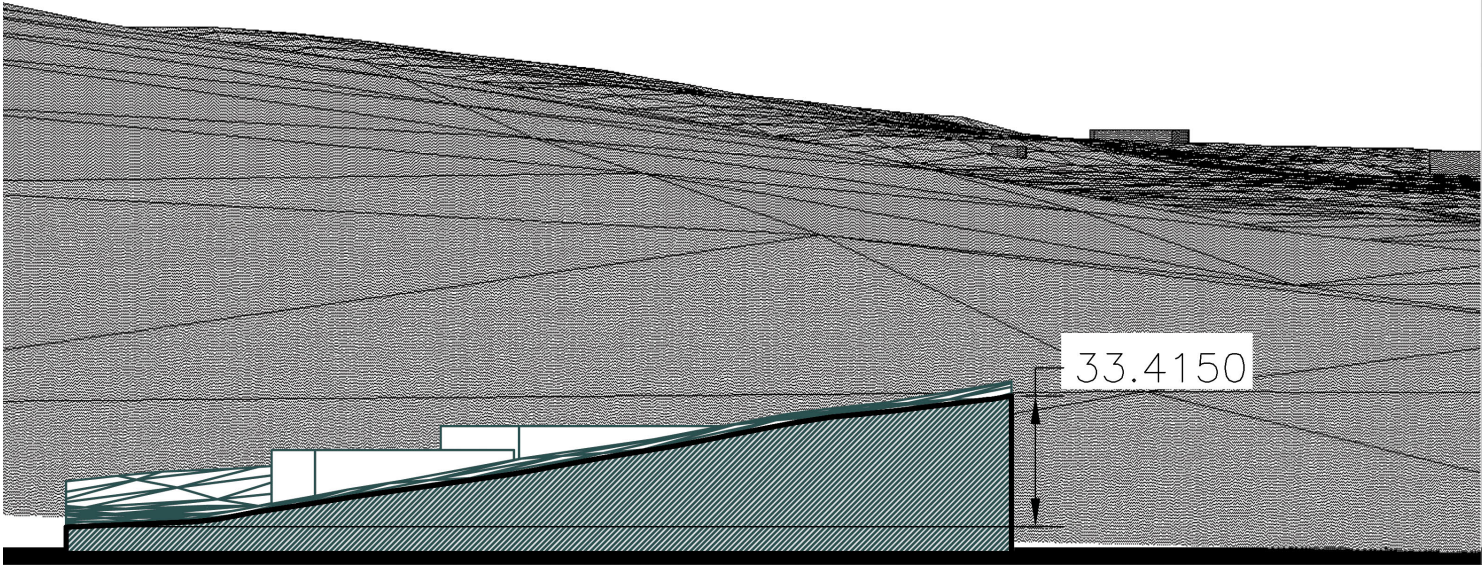
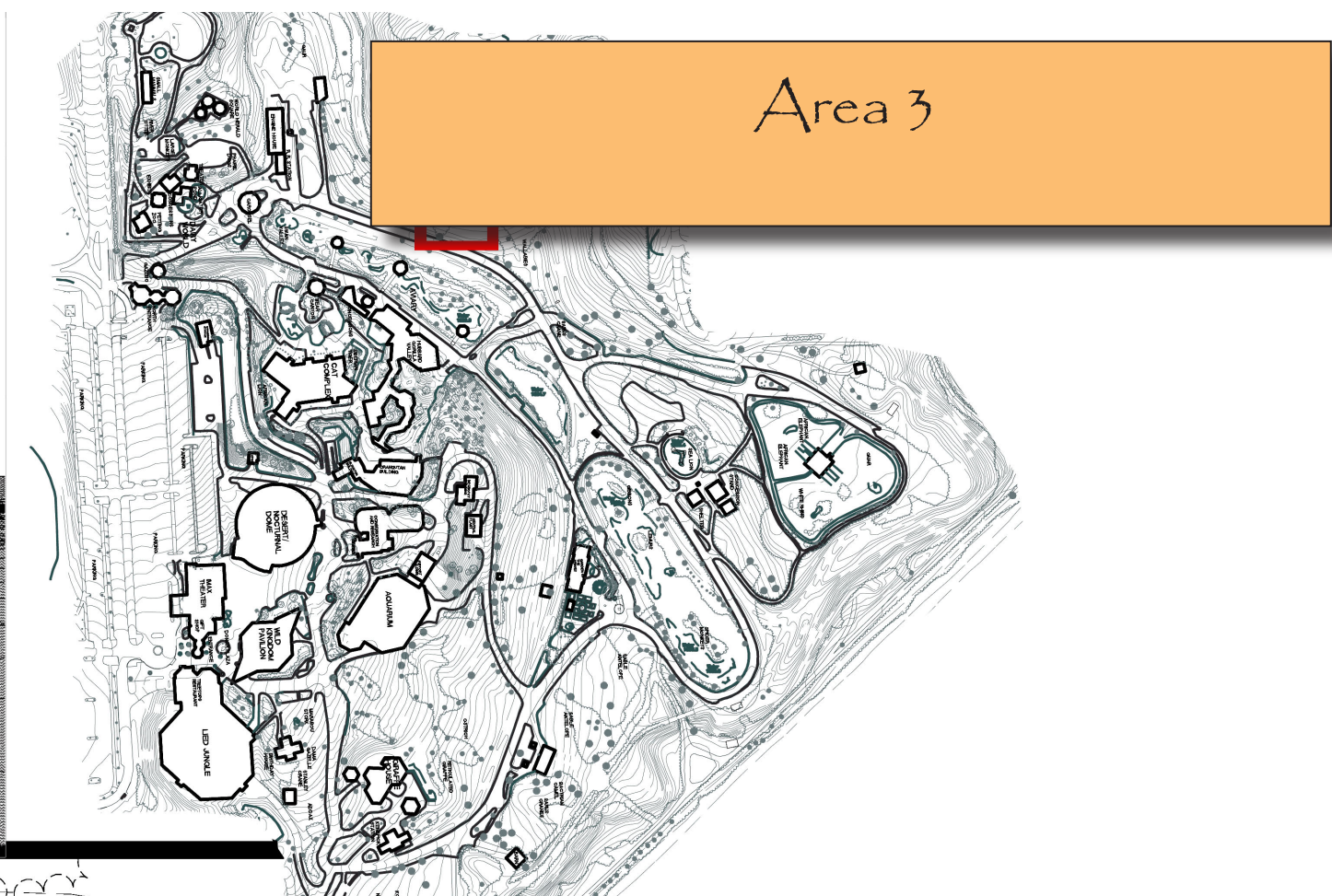
Area 2: North West of Sea Lions
Square Footage: Approximately 47,000 sq.ft.



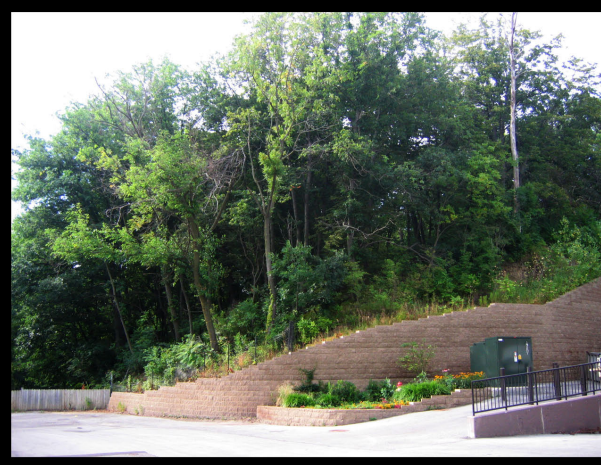
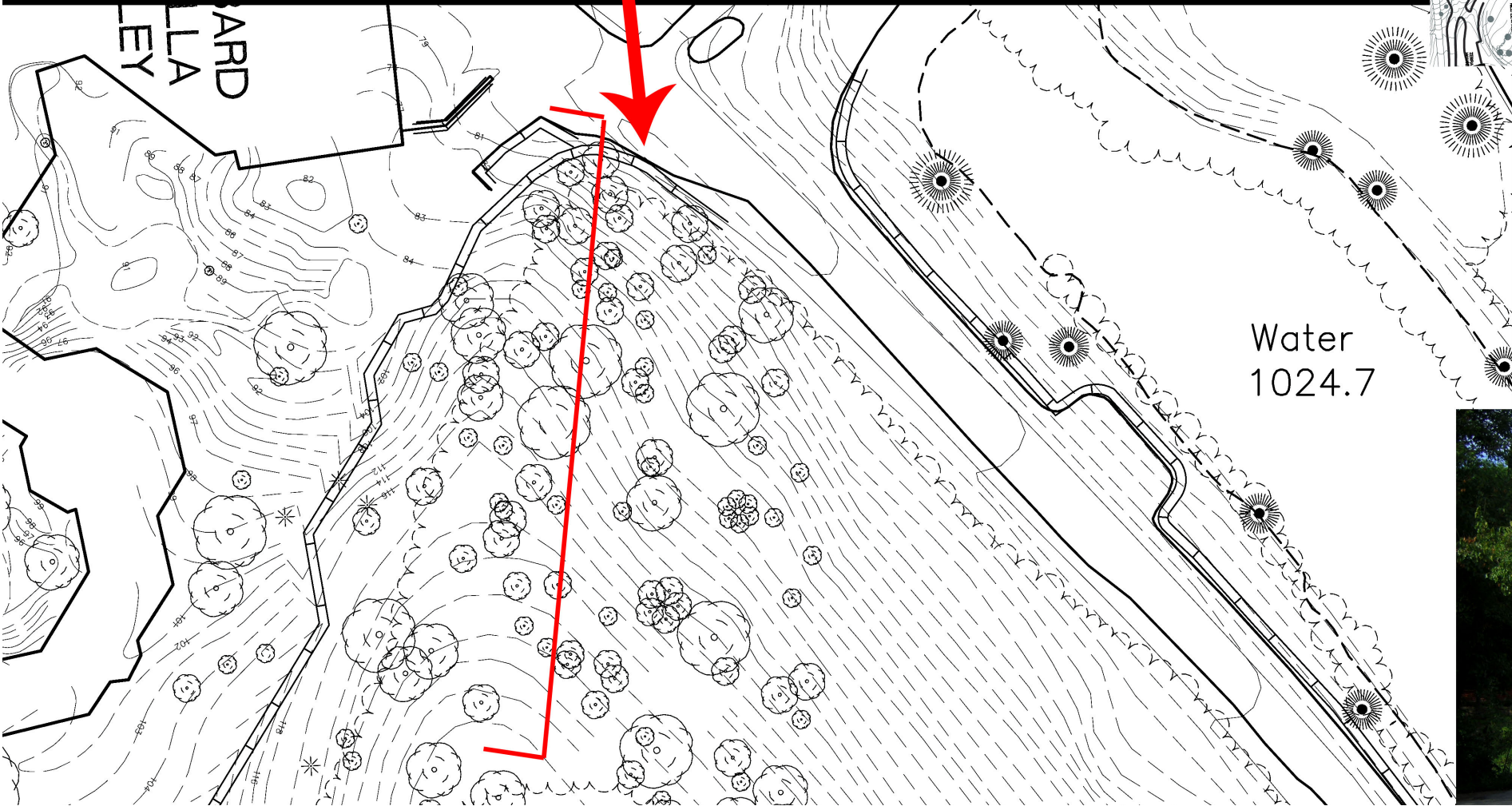
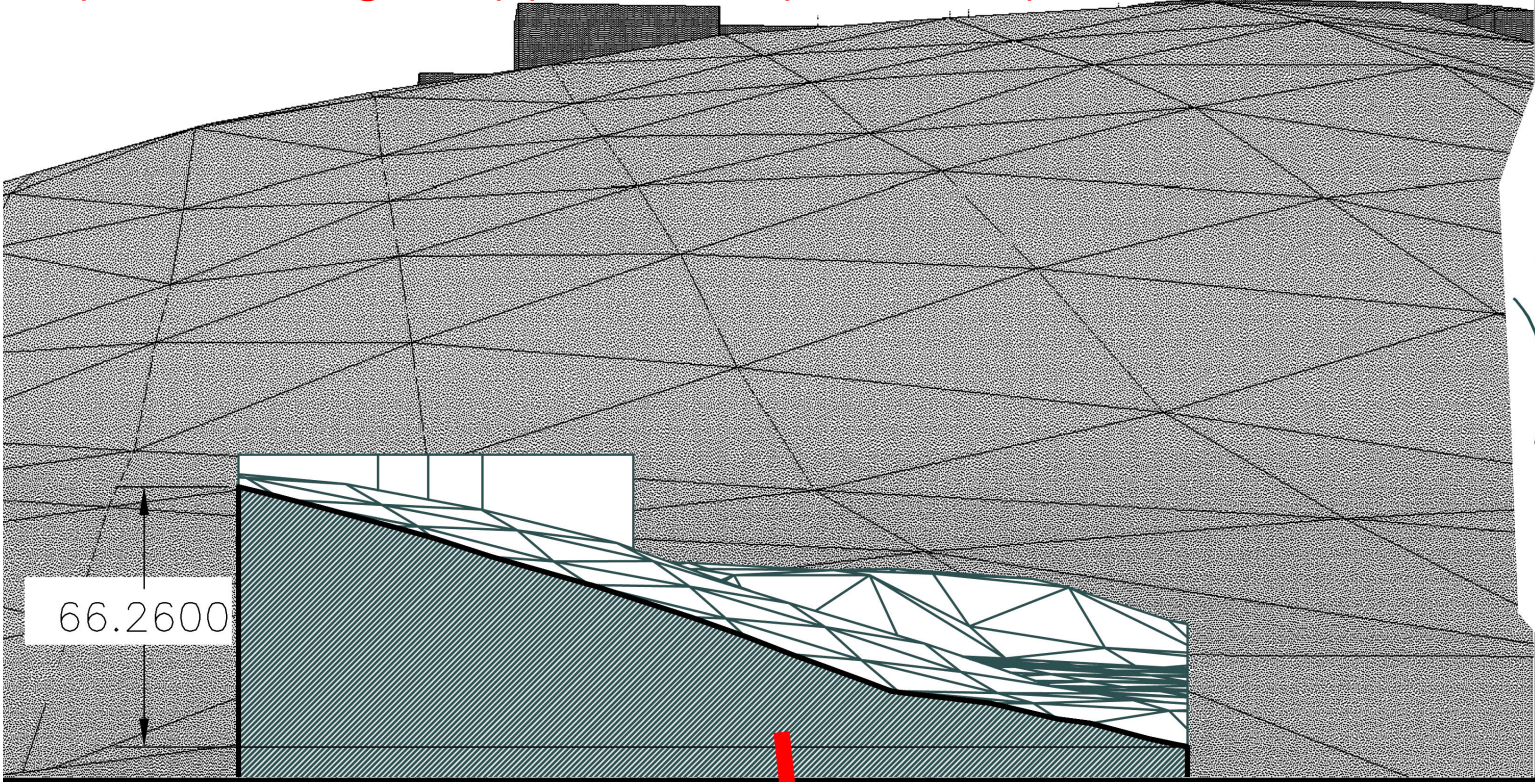
Area 2



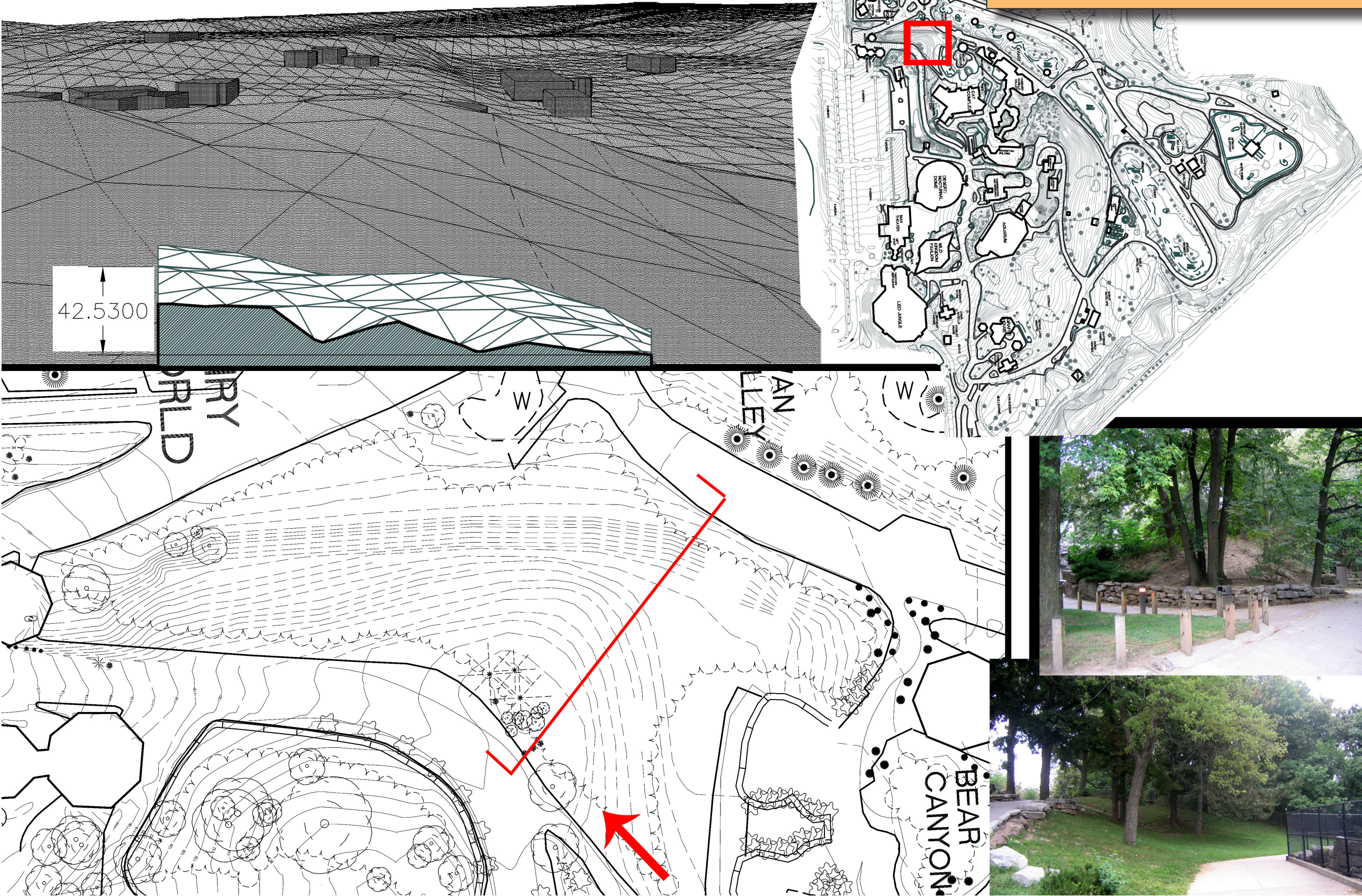
Area 3: Picnic Area Northwest of Wallabies
Square Footage: Approximately 72,000 sq.ft.



Area 4: Hill East of New Gorilla Valley
Square Footage: Approximately 27,000 sq.ft.

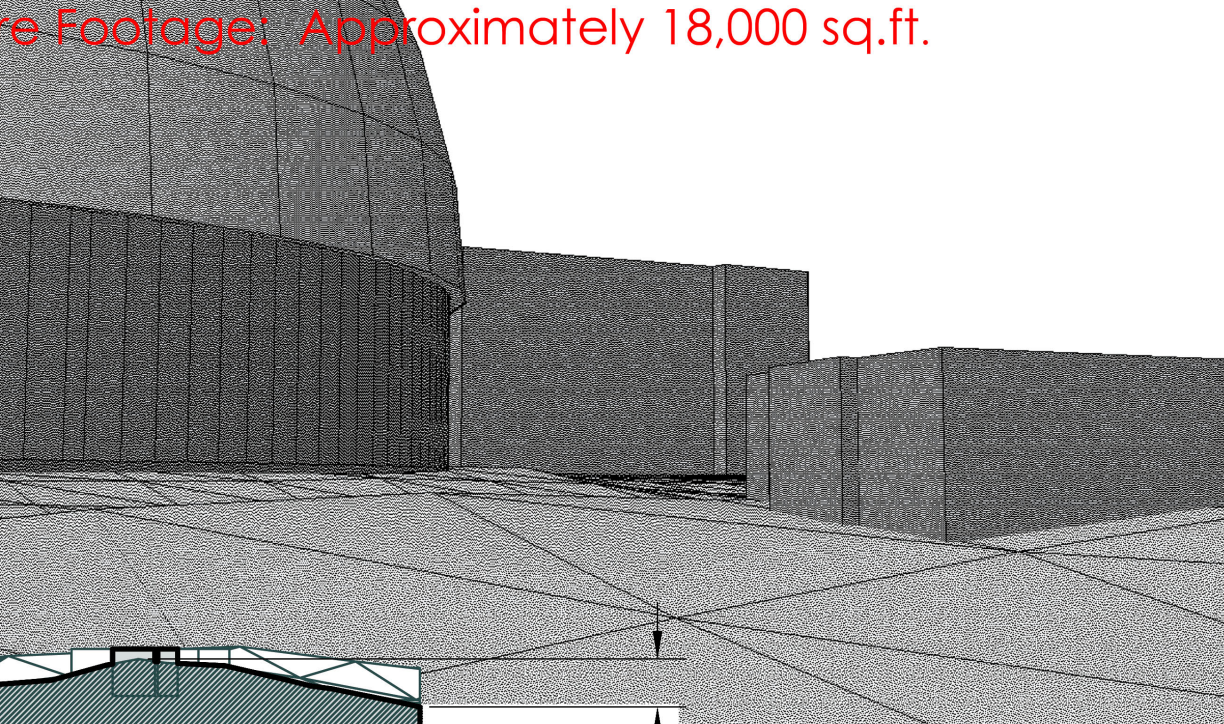


Area 5: Hill Northwest of Bear Canyon
Square Footage: Approximately 27,000 sq.ft.



Area 5

Area 6: North of Dome, at Stone House
Square Footage: Approximately 18,000 sq.ft.



12.1700

A detailed topographic map of a park area, labeled 'Area 6' in a large orange box at the top. The map shows various trails, buildings, and natural features. A red square highlights a specific location on the map, near the 'TANTRUM INDOOR WALL' and 'WILD OAK PARK'.

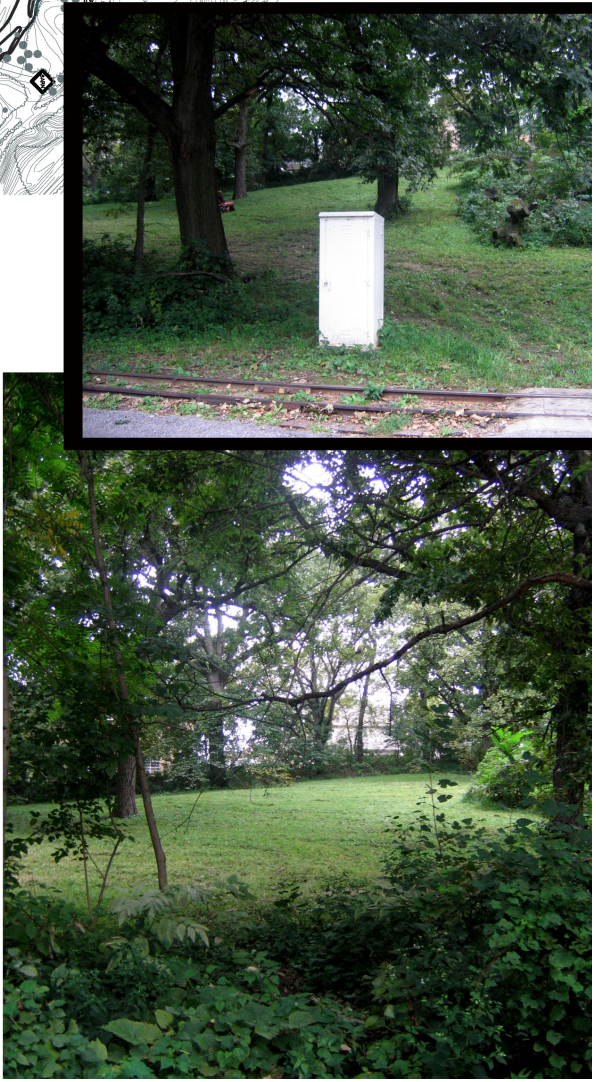
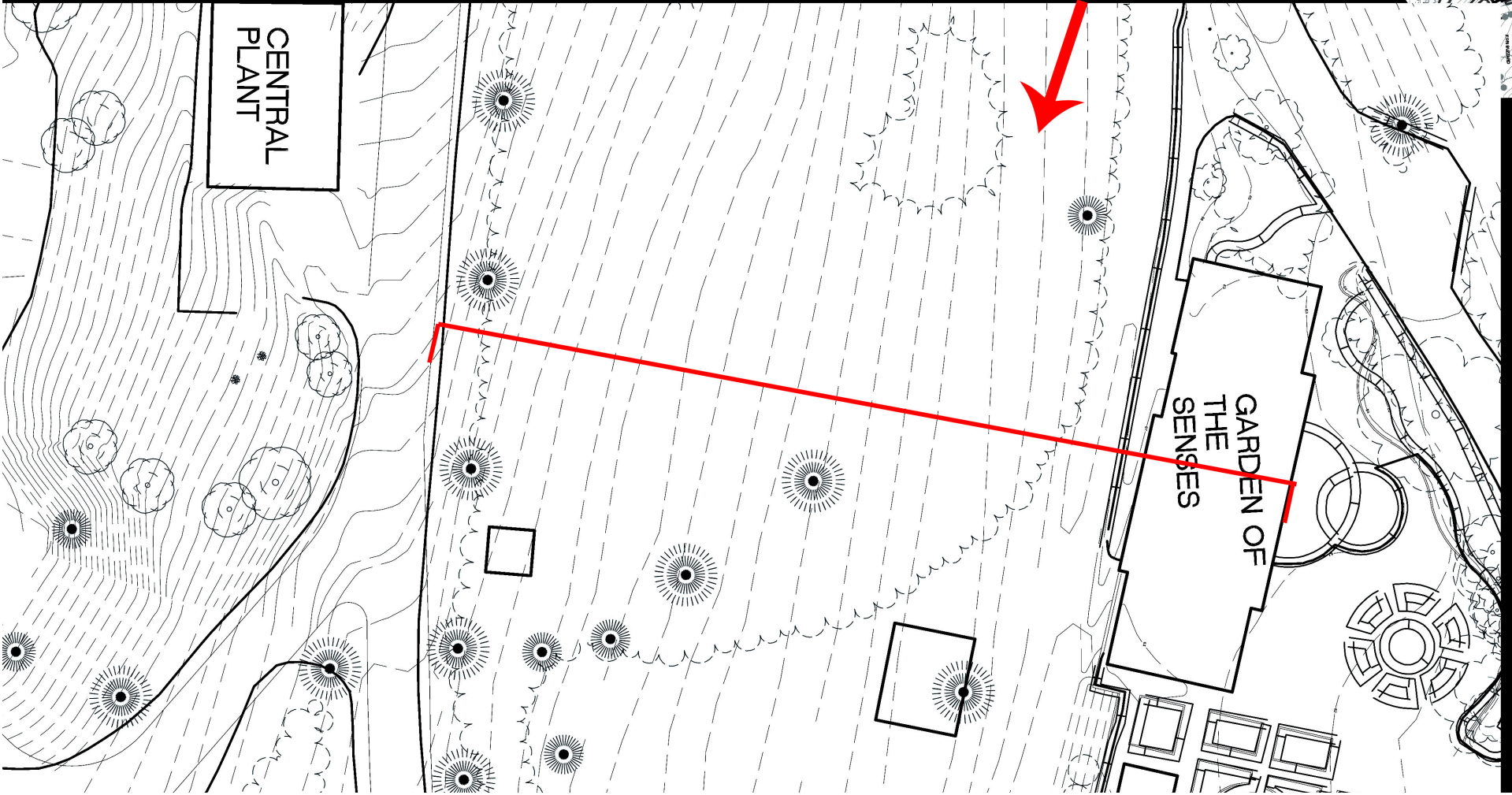
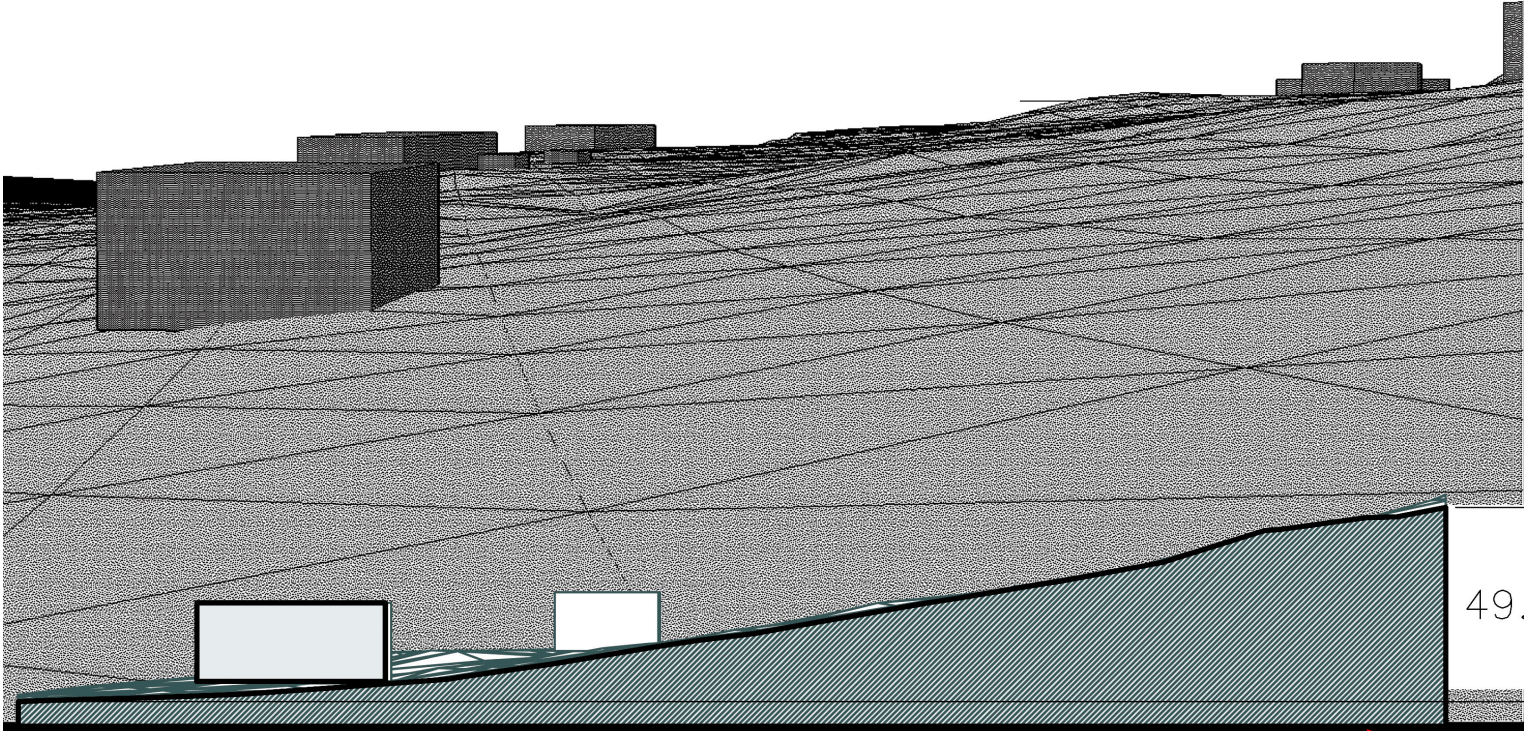


Area 7: West of Garden of the Senses
Square Footage: Approximately 62,000 sq.ft.

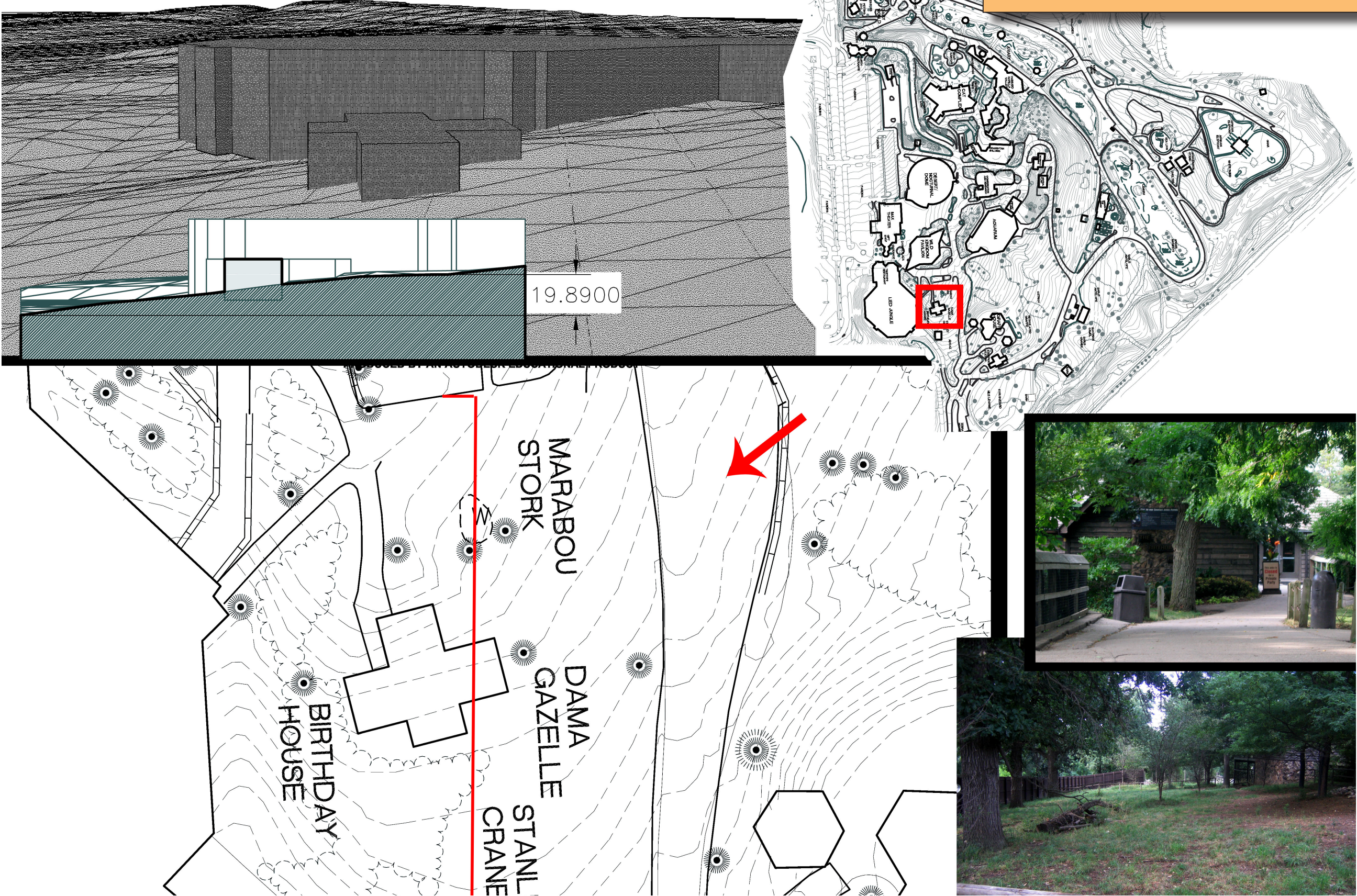


Area 7

49.5000



Area 8: Existing Birthday House/Proposed Site by Zoo
Square Footage: Approximately 58,000 sq.ft.





Matrix

Ranking 1-8: 1 being the most ideal condition

- Proximity to front of Zoo
- Donor Preference
- Cost of Excavation
- Elevation in Comparison to Natural Habitat
- Accessibility for semis
- Noise Factor
- Proximity to other multi-season exhibits
- Availability to change function in 10 Years
- Proximity to elevator
- Amount of trees for natural canopy
- Availability to have wide paths
- Availability to have under-area dens and water pools
- Would it be bothersome if microphoned
- Flashing lights for Sensitive Panda Eyes
- Enough square footage to build big enough

Area 1	Area 2	Area 3	Area 4	Area 5	Area 6	Area 7	Area 8
8	7	6	4	3	2	5	1
8	7	6	4	3	2	5	1
4	6	3	8	5	2	7	1
5	6	4	1	3	8	2	7
5	7	6	8	4	1	3	2
1	2	5	6	3	7	4	8
7	6	8	5	4	2	3	1
6	7	8	5	2	3	4	1
8	7	5	3	2	1	6	4
5	8	2	1	3	7	4	5
3	4	1	7	6	8	2	5
6	7	4	2	1	8	3	5
1	5	6	8	4	2	7	3
4	2	1	5	3	8	6	7
5	4	1	6	6	8	2	3

Average	5.07	5.67	4.40	4.87	3.47	4.60	4.20	3.60
Ranking	7	8	4	6	1	5	3	2

- Area 1 = The area just Southeast of the Sea Lions
- Area 2 = The area just west of the Sea Lions where the sheltered picnic area is
- Area 3 = The picnic area just Northwest of the Wallabies
- Area 4 = The hill near the gorilla complex where the exhibit originally would have been
- Area 5 = The area just Northwest of bear complex on that big hill
- Area 6 = The area just North of the Dome where the Stone House is at
- Area 7 = The area just West of the garden of the senses on the hill behind
- Area 8 = Where the existing Birthday House is and where it is proposed to place it.

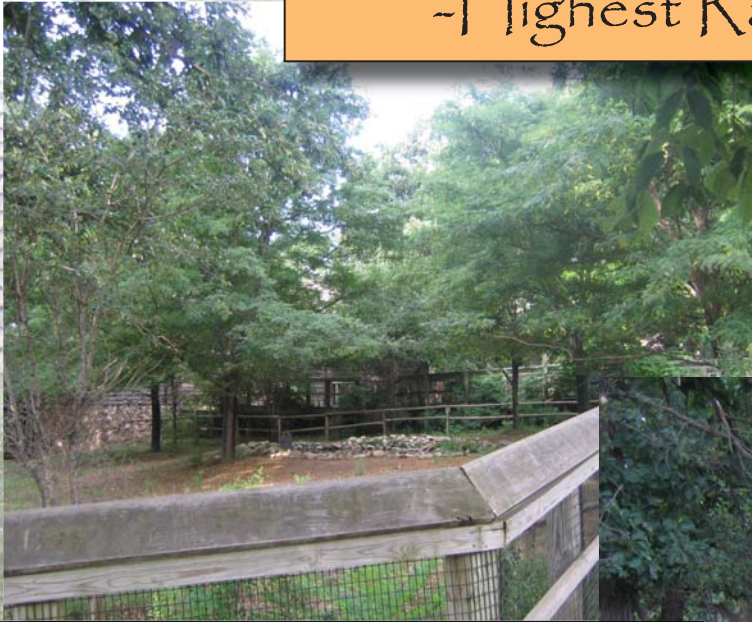
Site Analysis Matrix and Results

Area 5 and 8 -Highest Ratings in Matrix

Area 5 received a high ranking due to numerous factors from the matrix. For instance, although it is not directly near the main entrance, it is only slightly off the old North entrance and is still in the front half of the zoo, thus giving it more of a visual presence for donors. The cost of soil excavation would most likely be more than some due to the slope of the site, however it would not be as much as if down near the lagoons. The elevation of the site is actually helpful because it is more natural to that of the Panda's native Mountain range and can be exploited as such. The accessibility for semis should be fairly easy because of its location to the back service entrance near the desert dome. Also the noise factor for high pitch or mechanical noises would not be extreme here, although it would not be as peaceful as some of the rear sites. It is closer to some of the multi-seasonal exhibits thus giving visitors a reason to visit in the winter time. It's location also serves as a good spot for any number of different exhibits for when the 10 year loan is ended. It's proximity to the new elevator is another good thing as this may help persuade people to visit more frequently. The area already has a number of established trees which could help provide natural shade for the Panda and again make it appear more like it's native land. However the spot is narrower than some, which could cut down on the ability to have wider paths for circulation. However, this narrow area and elevation help provide ways that can contribute to under-den peeks and small water pool areas. Another good thing is the animals that are nearby; none are severely sensitive that would be bothered by microphoned conversation. It seems to be primarily away from flashing light areas except if the carousel would reach up to the area. Also, the square footage is slightly limited, yet there is still a sufficient amount to build upon.

Area 5

Area 5 and 8 -Highest Ratings in Matrix



Area 8 also received a high ranking due to numerous factors from the matrix. One of the main reasons is it's proximity to the main entrance of the zoo. This helps in winter months as well as pacifying a donor. Also the cost of excavation may be slightly more due to the removal of an existing building, however it is still less expensive than building by the lagoon. The elevation in comparison to the Panda's natural habitat is less but the semis near the front entrance have a lot easier time accessing the site. The noise factor for this exhibit is slightly bad, since a lot of construction constantly happens near the front, and this is where crowds of kids will all enter at. However the proximity to other multi-seasonal exhibits will severely help in the winter for the short visits. Also with its location after ten years it would be easy to turn the site into a visiting exhibit. The elevator is still a little ways away and does not effect this site. The site is lacking in trees more so than Area 5, however the ability to have wide circulation paths is more prevalent here. Due to the less steep site it would be a little harder to incorporate under-area peeks or water pooled areas. However this site would also not bother nearby exhibits since most animals are accustomed to noise all around and because many of the exhibits are all enclosed. However flashing lights again due to the number of people through the front gates might be a little annoying to the animals. There is sufficient square footage here to not only build the exhibit but to enhance the ones around it to reflect their native land.



Area 8

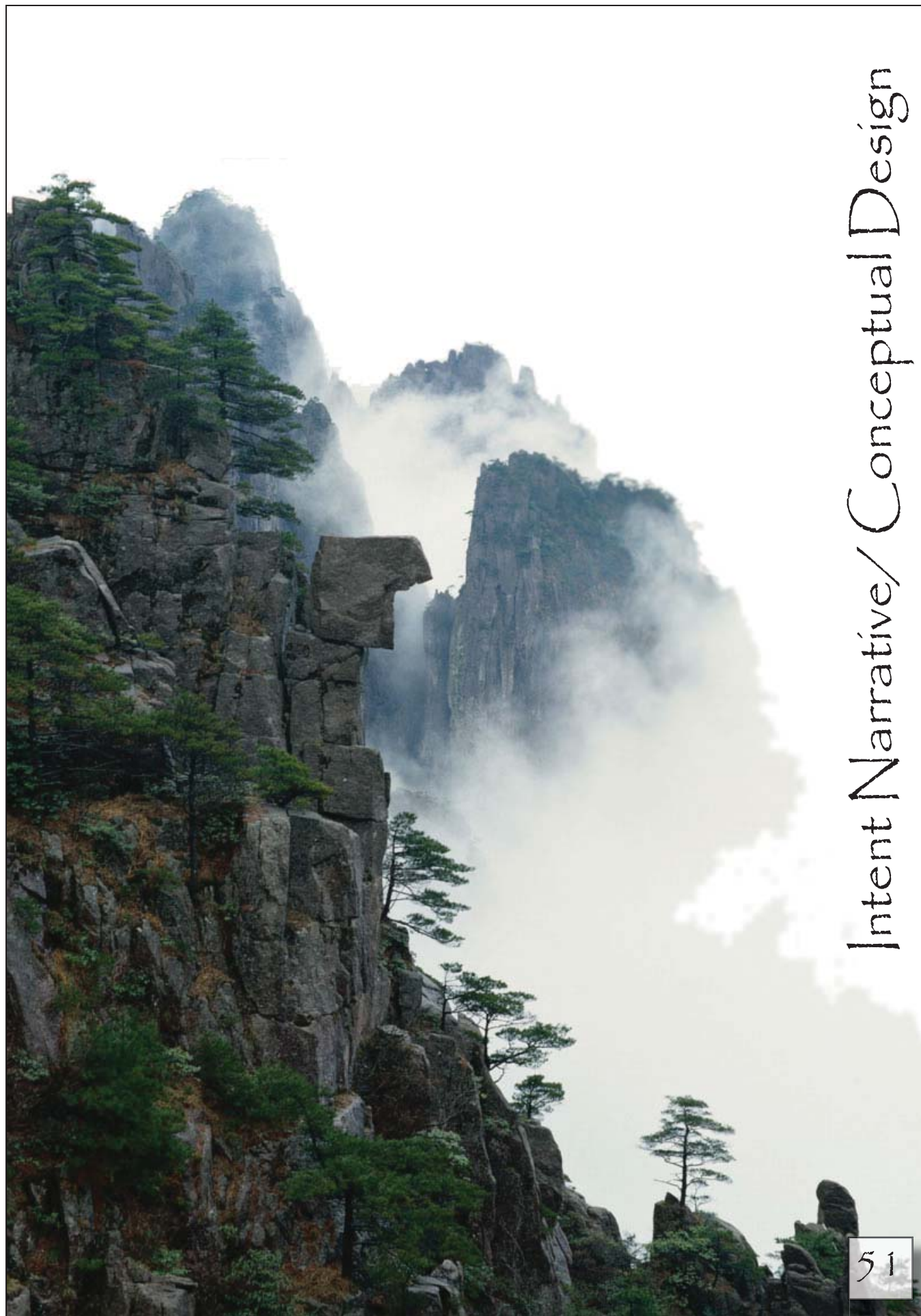
Area 5 and 8 and 9 -Highest Ratings in Matrix



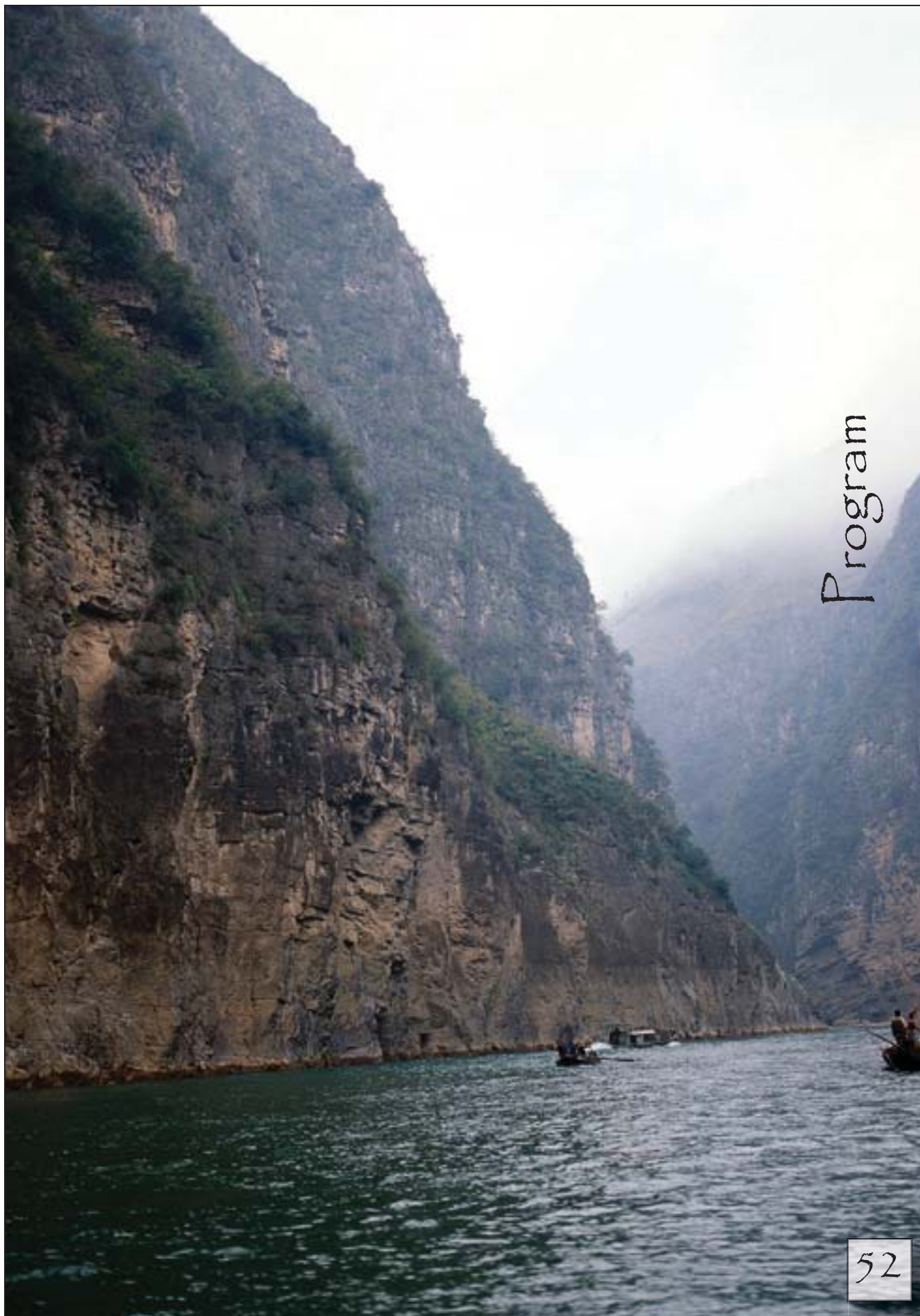
Area 9 was actually added after the Matrix had been created and thought through. Recently after studying all the potential sites the Rosenblatt Stadium had begun to look at selling the property. If this were to happen then the possibility that the zoo would pick up the site for more zoo property would be high. Most likely it would be used for more parking, which would then free up some more areas for zoo expansion. This leaves Area 9 as a great spot for further development. After talking with Mr. Armknecht it was discovered that the need for another office building could be something that the zoo would be interested in. Therefore this site could be used as an exhibit area as well as a functioning office building. The ability for the building to have multiple functions would be a great asset for when it might have to be re-done in ten years. Also it would then be located rather close to the front entrance. Another great thing to help would be the visibility from the road. By having this building near the front the Pandas be a great way to earn publicity for the zoo. Also some of the harsh summer sun could be blocked by the Imax Theater. Service entry would be easy to create since the existing roads around already are for service and delivery. Some of the drawbacks would be the noise factor since a lot of the motor vehicle traffic would be easily heard from the site. Also blocking harsh west sun and letting in morning light would be difficult to do due to surrounding buildings and lack of them on the West side. There is high potential for the site with some challenging setbacks.



Area 9



Intent Narrative/ Conceptual Design



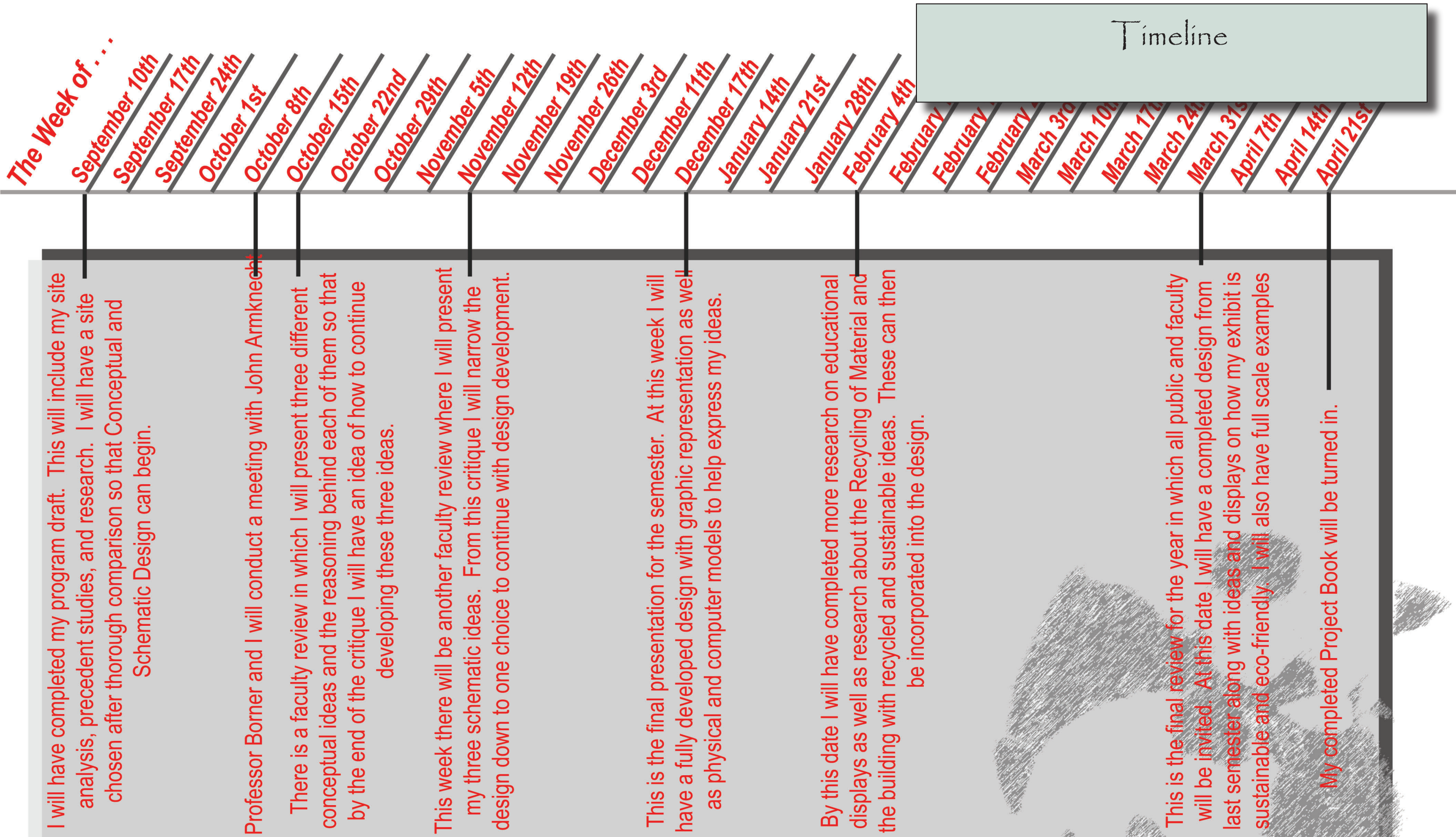
Program

Benchmarked Goals

The following are the dates by when I want things accomplished

- September 13th - My program for the project as a whole to be complete. This includes all previous Research and Analysis and Conclusions that I have achieved through Precedents, Interviews, and Readings. The exhibit itself will have a rough outline of what is needed.
- The week before the first faculty critique, the week of the 8th of October, Professor Borner and I will travel to Omaha and have a meeting with architect John Armknecht to discuss design possibilities. By this time I will have a site securely picked out as well as three conceptual directions that my design could take.
- Following this week, during the week of October 15th, I will present my ideas to the faculty board for my first review. For this review I will present my research and precedents, and conclusions I have reached from them. These conclusions will lead to three different conceptual ideas on one site, each with a rating and the advantages or disadvantages displayed and listed.
- The week of the 12th of November I will have another critique in which each of these three schematic ideas have been thought-out and developed. Diagrams and perspectives with some study models will be presented. From this interview I will determine, along with help from the critics, which of the three designs satisfies most of my design goals. This will then be the idea that I develop for the rest of the year.
- The final week of the fall semester I will have my last design presentation. Here I will have a fully developed idea complete with model and perspectives to fully explain my design intention and my belief that I had met my personal design goals.
- The beginning of the next semester will start my research for educational and sustainable goals. By the week of January 21st I will have researched enough to start incorporating these ideals and concepts into my design to become a better exhibit.
- The week of February 4th will be another faculty review. Here I will begin to explain my research and display ways in which I have incorporated what I have found into my design.
- The final week of March 31st will be my final presentation. For this review I will have previous models and perspectives as well as new ideas that show the re-use and recycling of materials as well as educational displays. I will have diagrams that explain the sustainable building as well as full scale educational exhibits that can intrigue and teach the public viewers.
- The week of April 21st is the final week of all process and will be the day when my Thesis book is turned in, bound, and published.

Project Timeline



Goals and Objectives

The following are goals that I plan to achieve by the end of project.

- Firstly, to create a Panda Environment that is healthy for the visiting animals.
- To design a progression through the space of the exhibit that not only allows the public to view the animal, but to create an environment that entertains, educates, and creates an empathetic and emotional response among the crowd.
- To provide informational ideas through the design that can guide humans' involvement in the saving of endangered species that are primarily effected by our habits and actions.
- I propose to create an exhibit that follows the increased awareness of animal enrichment and naturalistic environments that are paving the way for the future of zoos.
- I will design some hands-on educational displays that provoke the viewers' curiosity and encourages them to engage in learning what they can about the animal and how the pandas environment is affected daily by human involvement. This will help portray the idea of an ecological footprint, and just how large each person's is.
- I will create a building that not only is suited for the Pandas, but that can be utilized by other functions for when the 10 year loan agreement has come and gone.
- I will have learned listening skills, as I do not have one voice for a client but many concerning the animal itself, the zoo as a business, and the people as individuals and as a crowd.
- To create a successful design that can be experienced and create an emotional attachment with so that people will not forget what they had seen, will want to return, and will want to make a difference.
- To create a sustainable and/or eco-friendly design utilizing many recycled materials to show and explain the numerous ways that humans can take care of the planet, and in turn, the life that inhabits it.
- I will have fully utilized all methods of research and feel confident that I could do the same for other projects. I will be comfortable writing emails and making phone calls in an attempt to locate information, and I will have become competent at organizing and prioritizing so as to not forget essential pieces of information. All information shall be presented in a complete and thorough manner, explaining each step that I had taken and why it was essential.
- The architecture would be more than the building in this project. It is the build-up of excitement to see the animal, the procession to the main event, the climax of the viewing, and the cool-down with reflection afterwards that allows one to analyze their thoughts and ways they should, and could, get involved.
- All schematic designing will be completed by the end of the fall, that way the spring can be devoted to the sustainable contemplation as well as the educational displays including material choices and reasoning behind the displays.

Building Program

-Conclusions from Precedents and Documents

All Programming is based off of interviews and things I had observed while visiting other zoos.

- The building has a budget of approximately \$10 million. The average zoo construction cost is approximately \$500 a square foot. This leaves the building/exhibit to have 20,000 sq. feet.
- The building needs to have access for semi-trucks and perhaps parking for a refrigerated semi during the week.
- The exhibit needs to be flexible and able to be reused. This may mean having multiple functions in there as well as designing for traveling exhibits or other uses.
- The building needs to have indoor space as well as outdoor space for the animals during different seasons. The indoor would be of a larger amount than the outdoor due to circulation as well as the amount of time Pandas would be indoors compared to outdoors.
- Sheltered walkways would be best for providing access to the exhibit from an entrance during the winter months. Also public restrooms will most likely be needed as well.
- A research/video room should be part of the design so as to bring the people in on the research and allow them to see the animal at all times. This way they will return more frequently.
- The bamboo storage should be incorporated into the circulation in some way, so that the public can grasp the importance and the quantity of the plant needed to sustain the bears.
- The viewing area should be from more than one side, and on more than one level. The more levels and the more degrees of the exhibit there are, the better chance there is of the public having a view of the bears.
- Panda transport needs to be done in a way that minimizes all human contact with the bear. This way they are not used to human touch and could help increase the chance of one day designing in a way that prepares the bear for the wild.
- Part of the exhibit needs to accommodate a mother and a baby if by chance one is born during the stay at the zoo.
- There needs to be more than one enclosure with the possibility of keeping the pandas separated physically to cut down on injuries and fights.
- The exhibit should be designed to cut down on noise factors in case of pregnancy and moodiness.
- The design should include areas for education and possibly a station for a zoo keeper to be on staff to answer questions or talk about the animal.
- The building exhibit also needs to include spaces for other animals from the same area. This way the exhibit is more of a habitat display rather than an animal, and portrays more about the natural conditions and wildlife of that area.

Habitat and Education Design Goals

These are goals concerning the educational aspect of the design

- Upon leaving the exhibit it is my goal that each set of people has at least one person that was able to identify an organization that supports the conservation of endangered species, in the hopes that they join or contact them.
- That while wandering through the exhibit in hopes of viewing the Panda, each person finds their eyes inadvertently wanting to stray and read some educational piece of information and potentially retains it.
- That although the Pandas are wonderful at creating an emotional feeling among the public by themselves, the exhibit itself finds a way to teach about the animal creating an empathetic response.
- That the Pandas be mostly content with their habitat and portray less of the stereotypes that can be prevalent among other animals or other zoos.
- Upon leaving the exhibit or wandering through it, each person is left with an impression in their head about what the natural environment surrounding the Pandas' homeland is. What kind of vegetation it might have as well as the mountains and other surrounding landscapes.
- That the hands-on displays are utilized primarily by the child and perhaps the adults. This will provide them with entertainment while learning; in case the bear is difficult to locate at any particular moment.
- Also that each person is at least aware of the practice of conserving resources and helping out the planet earth.
- That most people are aware of recycling, and using recycled sources for everyday things as well as big things such as buildings.
- That most people are aware when leaving of GREEN design and can point out one interesting way in which the building functions in an eco-friendly way.



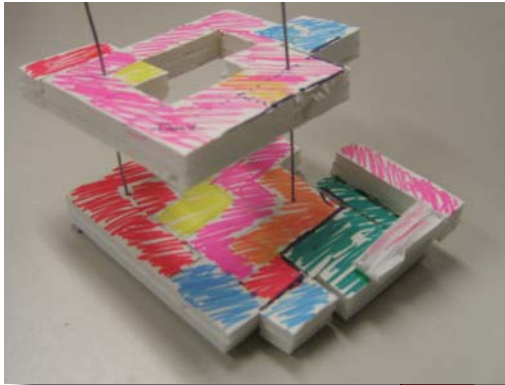
Analysis of The Three Potential Sites

All of the three sites have their pros and cons. First of all, Site 9 has lots of potential for some long term use. It also provides another use for the building besides being just an exhibit. Site 8 as well as Site 9 could also be used for another venue with the wining and dining of potential donors. Both of them are close enough to the front entrance to where walking to the event could be easily done. Site 5 could also be used for wining and dining, however I think the walk to or from the front entrance could be too long to be used as an entertaining venue.

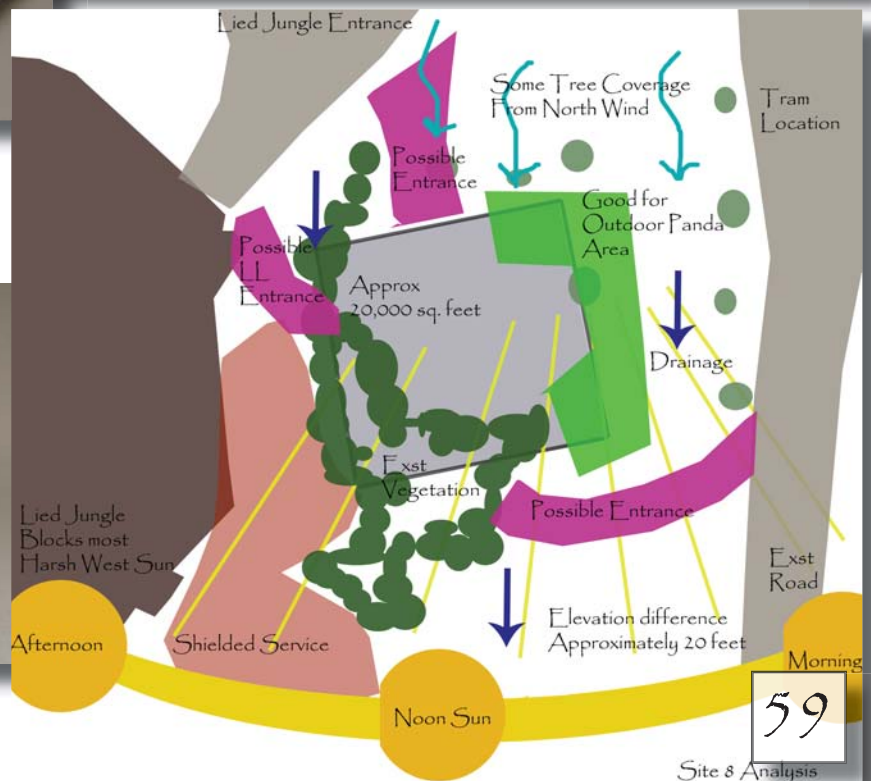
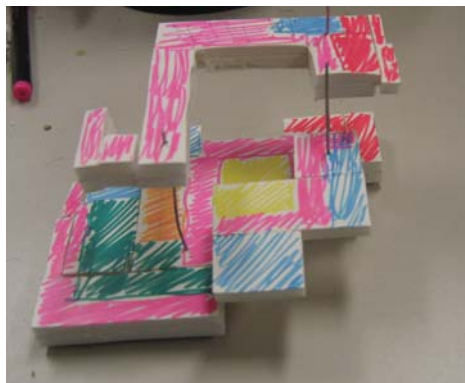
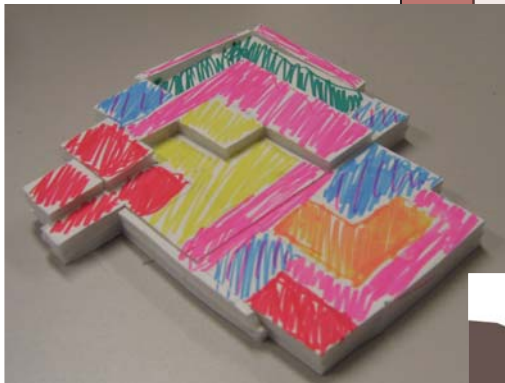
Site 5 has the better location in terms of education. With the site being right next to the Bear Pavilion the educational aspects of the site are better than that of the others. Site 8 also might have potential what with being near another jungle. Although the Rainforest Jungle is not the same as a bamboo forest, the difference could easily be explained and really celebrated as an educational tool. However the same could be said for Site 9. The difference between the desert dome area and an Asian panda forest could easily be expressed and again celebrated in terms of education.

From here it would be best to really look closer at the sites for each of them. By looking closer in depth at each site and how the buildings could potentially be laid out could help show which choice would be wiser one. Another site analysis as well as potential floor plan layouts or sections could really help look at the extra pros and cons of the site. By building small models as well as drawings I could really get a look at what was needed for the site.

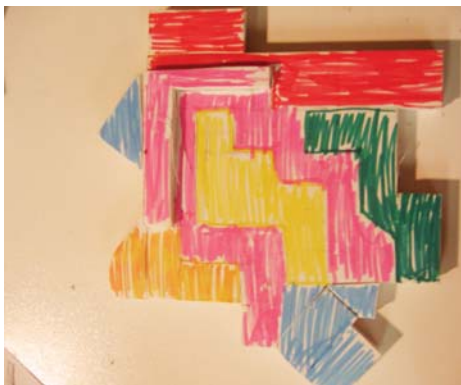
Area 8 - Site Analysis



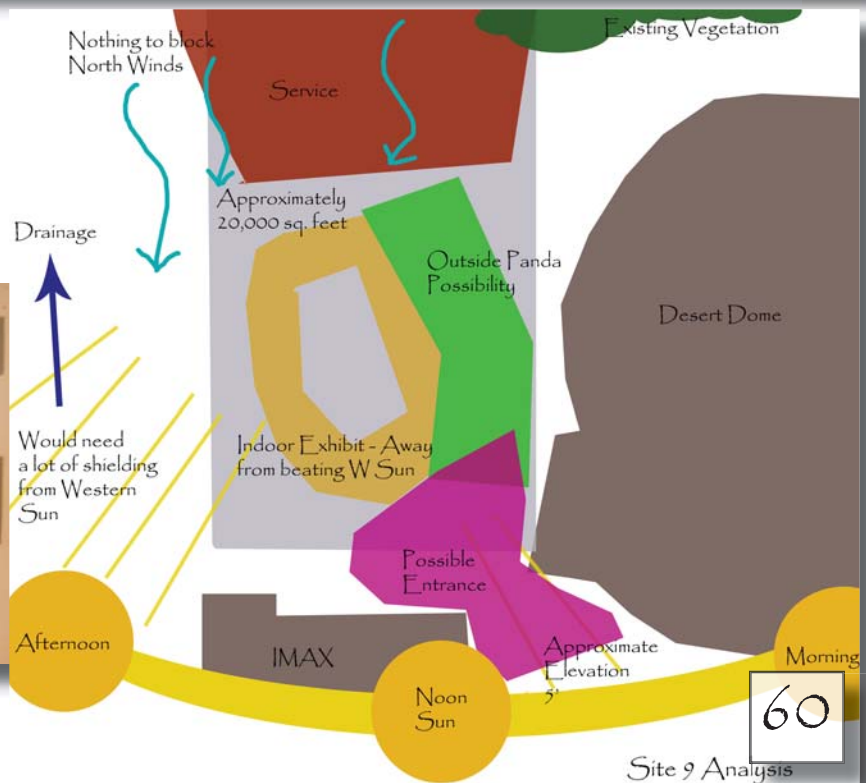
The analysis of Site 8 began with looking at the site then creating various floor plans to work with what was observed. Site 8 has a lot of potential for Southern sun exposure which could be welcome or a hindrance depending on the time of year, but definitely a bonus for the winter months. Also the Lied Jungle would block much of the harsh west sun. There are three great potential entrances for the building, with two upper and one leading from the lower level of the Jungle. Also the entrances could easily tie into the localized tram stops. An existing Service entrance for the Jungle is already on the Southwest side. By looking at multiple levels, with making sure the Panda or other animal exhibits are always a couple stories, it was decided that the best place for the outside exhibits could be on the East or the Northeast side. The North winds could be bad, however what with it being a southern sloping hill the winds could easily be muted a little bit. Therefore small models were made, with consistent coloring throughout all the model building. Pink is always circulation; Red is service; Green is outdoor exhibit; Blue is education; Yellow is Panda inside exhibit; Orange is other animal indoor exhibit area.



Area 9 - Site Analysis



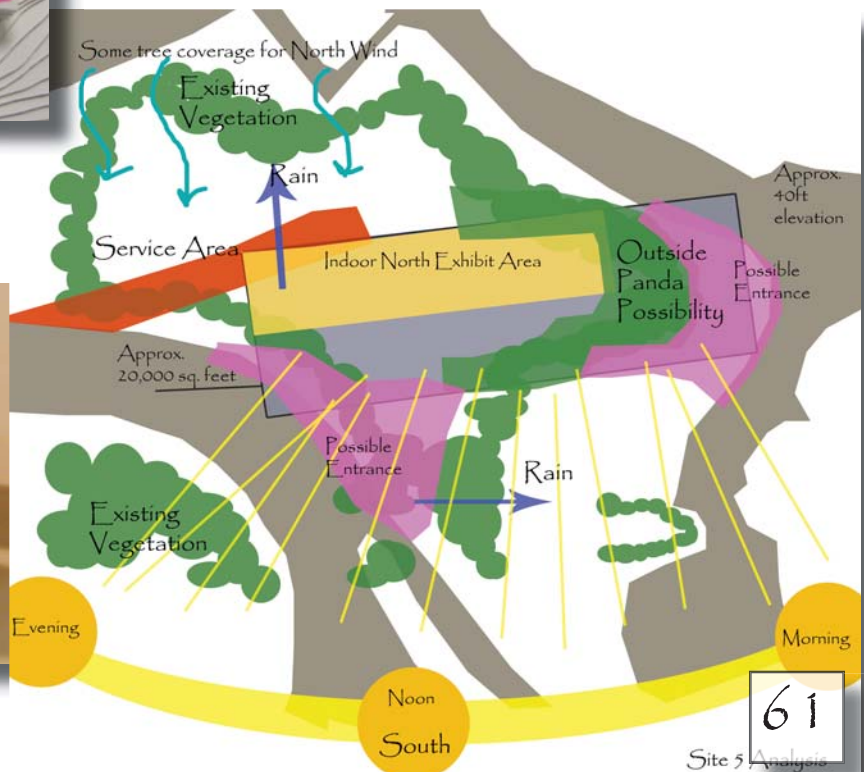
The analysis of site 9 started with looking at entrance areas. That seemed to be the largest concern, what with large crowds moving through, I needed to be sure that the entrance wasn't too narrow. Also, the only part that seems suitable for the animals to be outside would be that of the East side closest to the Dome. However right now that is where a lot of the mechanical equipment for the Dome is located, which could lead to some technical problems. Service would be easy to accommodate since it is already existing to the North. Also there is no vegetation or buildings to the West to help block the harsh west sun, which could be a challenge. Model building then took a couple different approaches. At first I was looking at making another great entrance into the zoo using the road in between the hill and the Desert Dome. However after awhile I realized that might not work as well. That path is too narrow to move large crowds, and the encouraged circulation through the zoo and the building exhibits would be interrupted. Therefore I began looking instead on ways to create a path in and out through the same way, in between the IMAX and the Dome. This way it would be more of a continuous loop through the building.



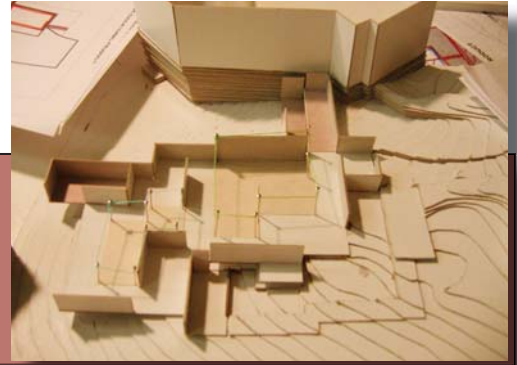
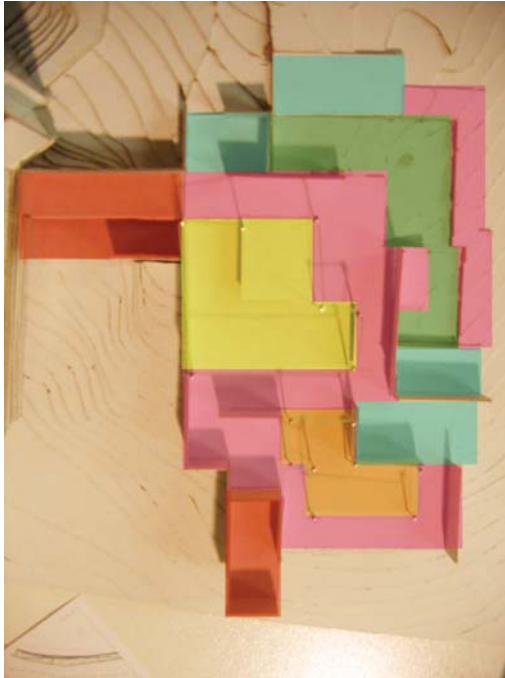
Area 5 - Site Analysis



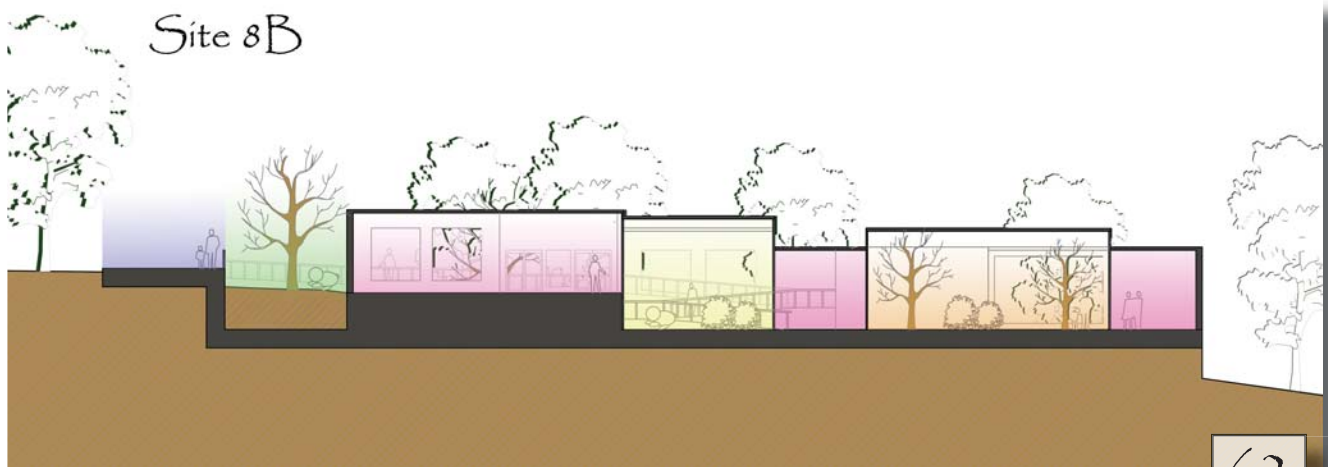
The analysis of Site 5 began more with the look at the extreme hill that is located on the site. There is great potential for southern sun exposure in the winter time, with natural filtering of it in the summer from the deciduous trees. There are 2 or 3 possibilities for entrances as there are 3 existing roads that tie into the hillside. Also the service could most likely be simple enough as there is already a service road near the North entrance. It could therefore easily then come down the hill. The north winds could be brutal as they come up the hillside, however this could merely be a design challenge rather than a problem. With Site 5 the important thing to do was to make the model of that area. Since the hill was so extremely steep it was one thing to draw a two-dimensional drawing and another to make a 3-d model. Therefore rather than one large piece of foam colored on it was easiest to make small pieces of the approximate size of the area and try to set them on or in the hillside. This way various layouts could be done and analyzed according to what might work best with the site plan.



Area 8 - Site Analysis



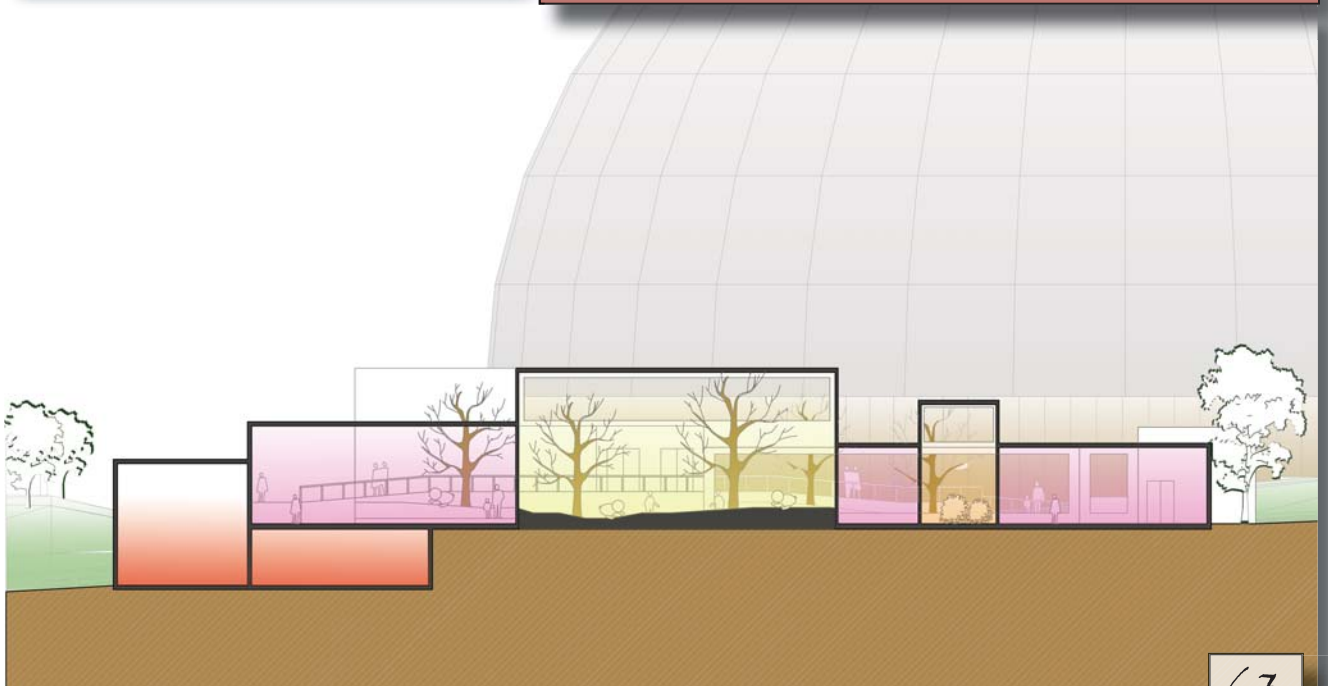
After figuring out what might work best according to a site plan it was best to really test this theory and put a very programmatic and orthogonal plan onto this area. So I carved out this floorplan and again organized things according to the same color configurations. By using the same color configurations all throughout the project it made it easier to not be confused. I also then made a programmatic section to really look at how this thing might be able to perform in the vertical way as well as the horizontal. Although the education has designated spaces usually near the entrance, it would be spread out throughout the entire building really looking at ways in which teaching could happen at the same times as the exntertaining experience. The exhibits tended to be put towards the interior of the building, with an occasional edge towards the service area. The Panda outside exhibit was also placed on the Northeast side, with a lot of the circulation sharing windows or the regular circulation space.



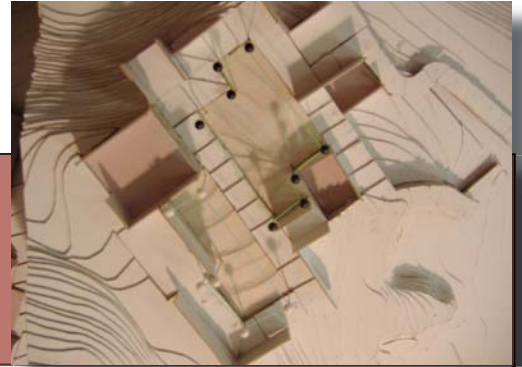
Area 9 - Site Analysis



Site 9 was slightly harder to decide on one floorplan. Eventually I had to orient the building as originally thought, with one main entrance/exit area. I also thought it best to keep all or most of the exhibits away from the western exterior wall, to help shield against the harsh afternoon sun. The service could have small areas that were sandwiched between the buildings as well as a larger one bordering the parking lot area. The outside exhibit would have to be on the east side as well. This way they can be shielded from the oppressive western sun as well as from any winds that might bother. Also the indoor and exterior exhibits could help share the circulation spaces. The building would also have to be more of a narrow building than that of free-ranging building.

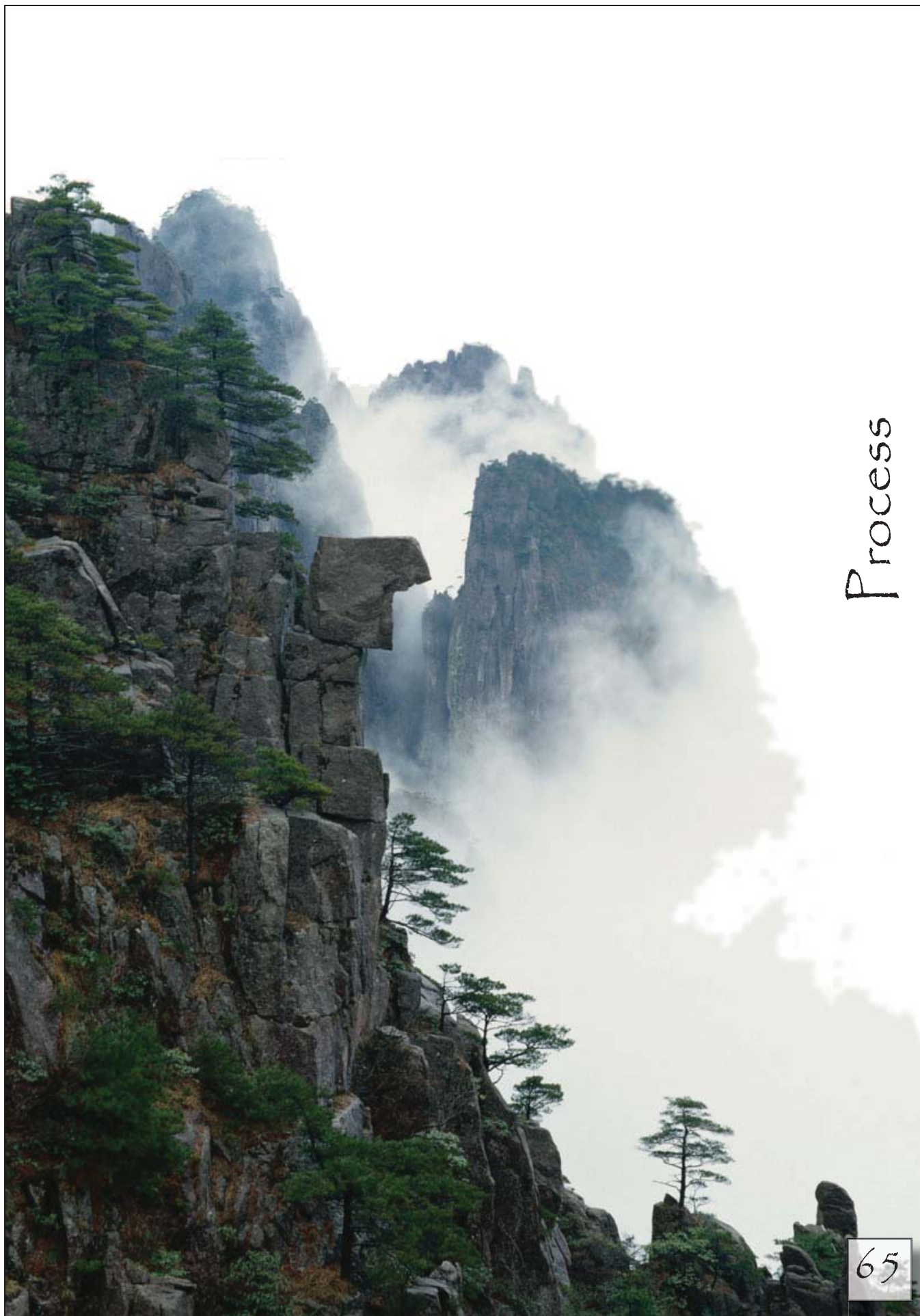


Area 5 - Site Analysis



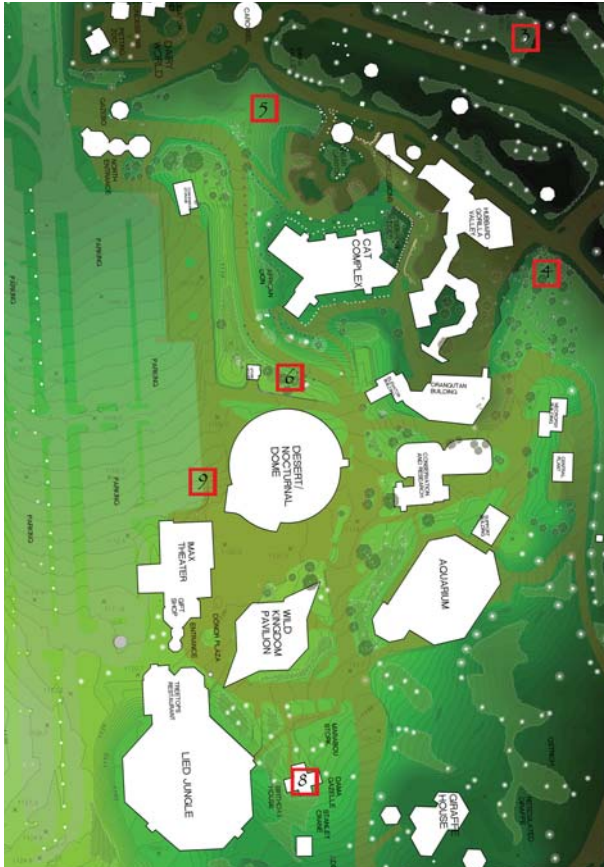
Site 5 was again a little harder to orient. Finally I was able to carve out a plan that would work on the site. The exhibits were kept to the inside, again in case the southern sun proved to be too harsh. The circulation was able to take the public from the top of the hill and the first road to the bottom where it could join again with the bottom road. Also an existing dead end road above the polar bears was able to join in on the ramp as well. This led to the exhibit area being a giant ramp down the hillside. The outside exhibit could be located on the East side, again keeping it out of the harsh east sun and also allowing it to be near the other bears for further education.



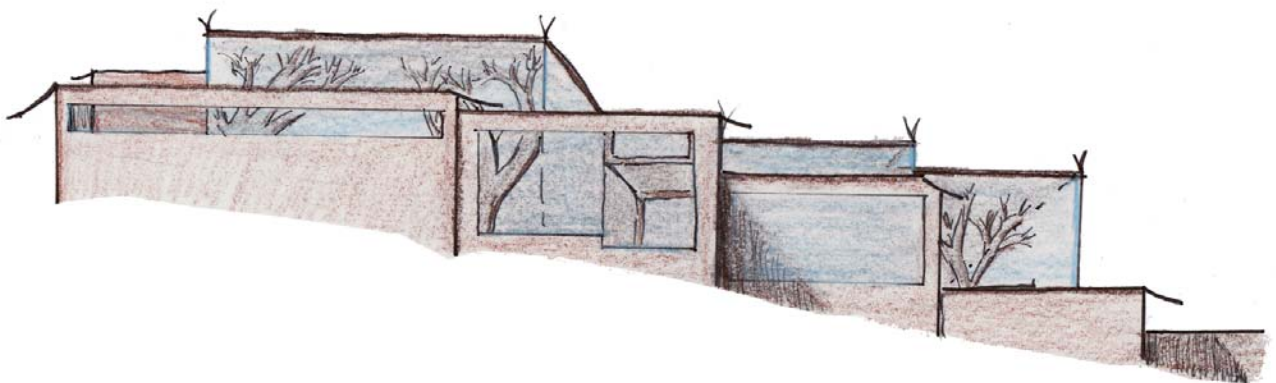


Process

Area 5 - Overall Choice



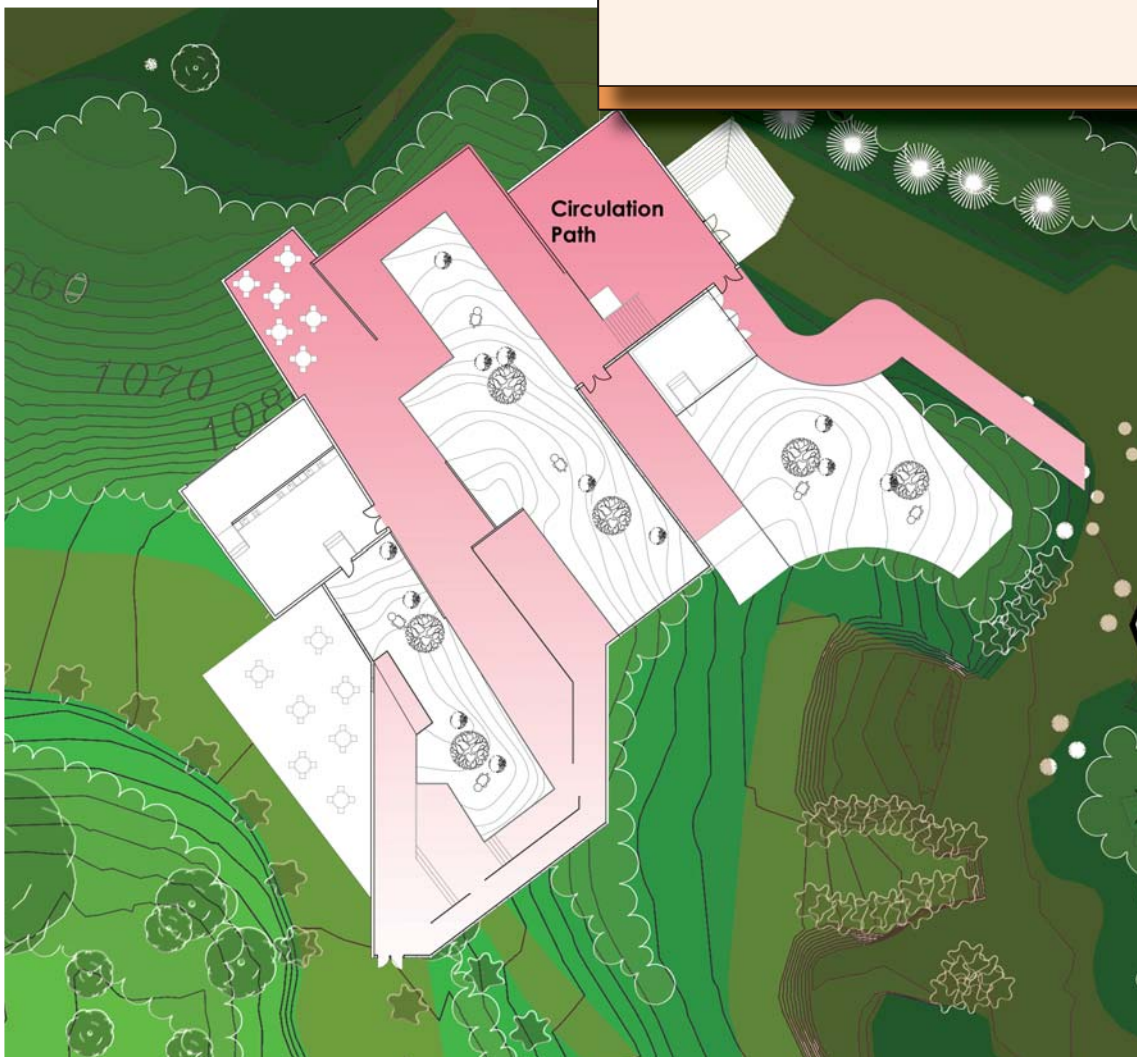
Site 5 ended up being the best choice. Not only does it work out perfectly for educational purposes with it near the Bear Pavillion, but it also works better for the animals themselves. If the weather did happen to be agreeable then the outside area on the secluded east side would be a great place for the animals to be on display. The noises would be a bit more minimalistic and the shade from the natural tree canopy would be welcome for the hotter days. Also the blending of the interior trees with the exterior canopy could feel like one fluid movement rather than different pieces. After establishing the site and location as well as the programmatic layouts, just some quick sketches were done to try to figure out what this building could look like. Below is an example of how it could look in boxes if all the circulation was one story while the rest of the exhibits are multi-story.



Area 5 - Programmatic Layouts



Before beginning anything else it was necessary to really tie down what I wanted these spaces to do and how I wanted them to perform. The first was to determine the circulation space. I wanted it to move up and over the exhibits at one point or at least to freely move about them. This way there could be 360 degree viewing, or close to it. The circulation should be a continuous path that not only goes through the educational areas and the dining, but also should give choices as to whether it should go above or below specific exhibit areas. This way everything can be seen and experienced.



Area 5 - Programmatic Layouts



The dining area was originally thought of to be two separate areas. One inside, as well as one on the outside. Both are situated around the service entry so as to make it easier to function with the building. The interior dining was made a little smaller so that the exterior one could serve as the main functioning eating area. Again the outside one is along the main road to make for easier access and convenience. The interior one was placed on the North side, with the idea being that it contains some of the only fenestrations on the North-side, and be used primarily for viewing purposes of an existing pond and waterfall area.



Area 5 - Programmatic Layouts



The service areas were divided up to make for easier access to the interior as well as the exterior Panda areas. The smaller one is located near the exterior exhibit with the idea that its size reflects the amount of time that Pandas would actually be located outside. Both of them were created with ideals close to that of the National Zoo. Although the service is out of the main path, views in or above the area could really help to educate the public about the needs of the bear. So with look-ins at bamboo areas and medical attention spaces the public could get a great idea about the inner workings of Panda care.



Area 5 - Programmatic Layouts



Although it seems the educational areas are limited to the entrance area, really they are more in focused areas and then spread throughout the building. This way they can be used at all times throughout the visit, but with larger areas to satisfy the larger crowds, or for in case the animal is off-display or can't be seen at the time. Also if the larger display areas could be created to seem like the public is walking straight into an existing bamboo forest then this could be a great way for the crowd to learn about the existing environment of the Panda. The front entrance on the top of the hill was now moved to the extreme southern end, rather than the top of the hill, to minimize winds from the North penetrating the building.



Area 5 - Programmatic Layouts



The Panda areas are set up so that way if necessary the Panda can move completely from area to area. I had hoped to have areas where the Panda moves over or under the circulation areas. This would then again give the opportunity for more degrees of viewing of the Pandas. Also, a lot of the time the Pandas need to be separated with the male in one area, and the female in another. However the exhibits are set up in a way where they can still sense or smell the other one to help them get to know each other. Also again it could be interesting for the public to see the Pandas get from one area to the other and back again.



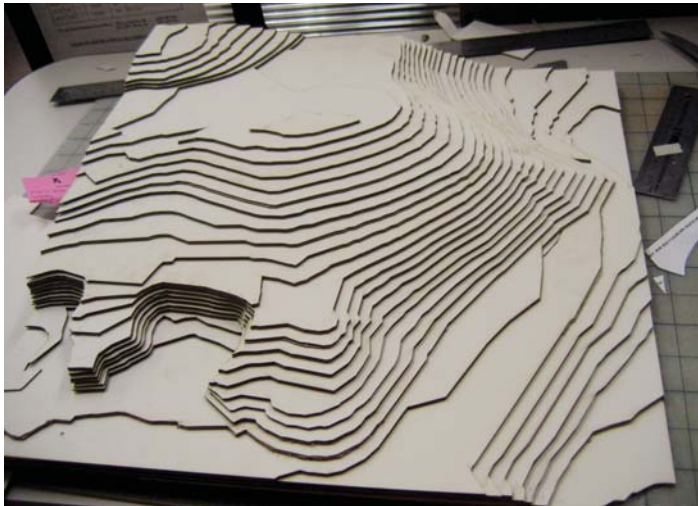
Area 5 - Programmatic Layouts



Finally I combined all the areas to see how it could all flow together. Again, it was interesting to see how the spaces could fit. We still have the great southern sun exposure with a lot of the north closed off. The path was still able to wander down the hillside. Yet the main goal was that the circulation and the education area always are overlapping. Also with all the areas designated it is a little easier to get out ideas about how the spaces can interact with each other.



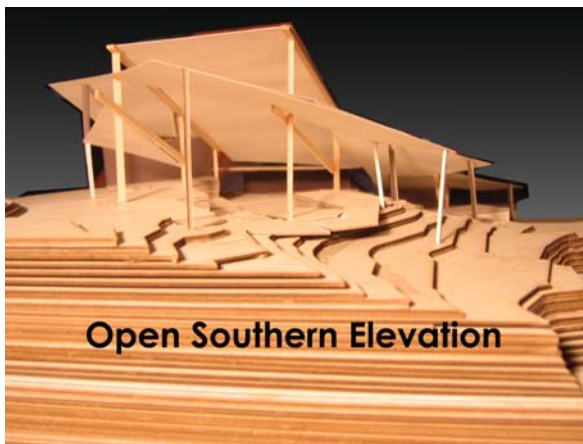
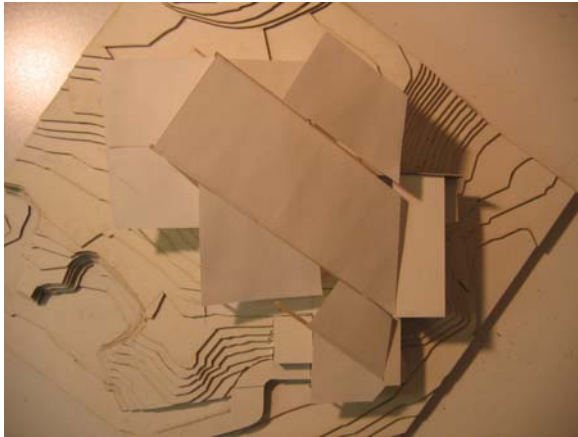
Designing the Enclosure



After the laying out of the programmatic spaces it was important to figure out how this building should be enclosed. Again remembering that the exhibit spaces should be multi-story, yet not abruptly so, otherwise the public will not be able to see the animals in the upper areas. Then it was remembered the potential the site had for winter southern sun exposure. I began with a quick sketch, looking at how the angles of the roof could effect how much light comes into the building. With the building on a hill, it would be easier to shoot light back all the way into the rear of the building merely from these southern windows. By providing enough of an overhang the south could let winter light in, but minimize the summer sun. Also by having more than one upper area for light, it could really reach the far corners of the building without having such an extremely tall front. Therefore another model was created that the floor plan could be placed upon so that way different roof options could be looked at.

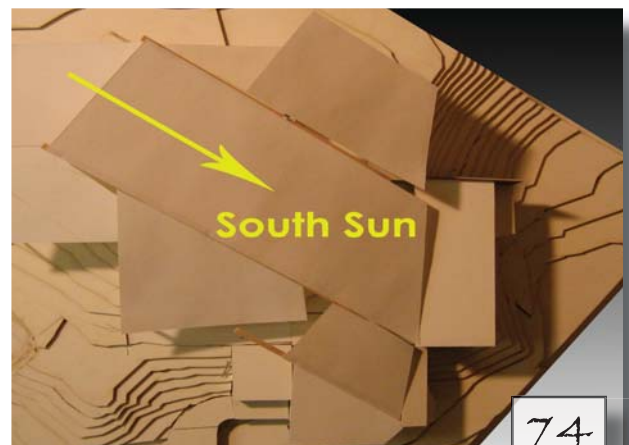
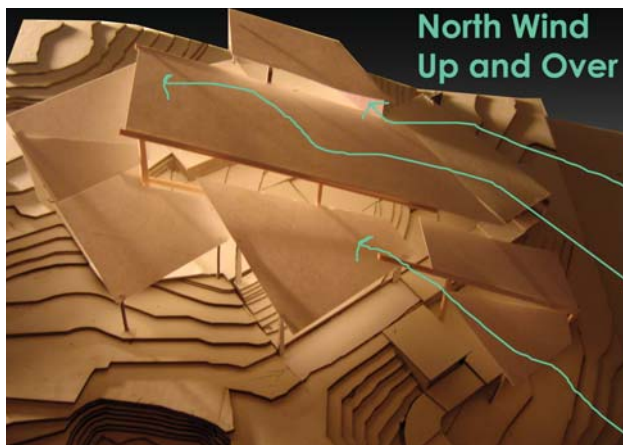


Designing the Enclosure -Roof A

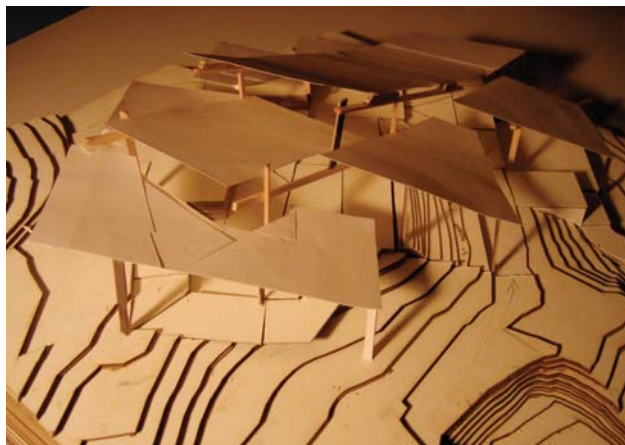
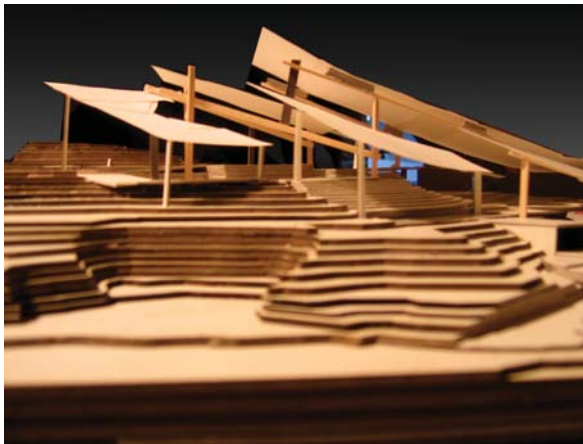
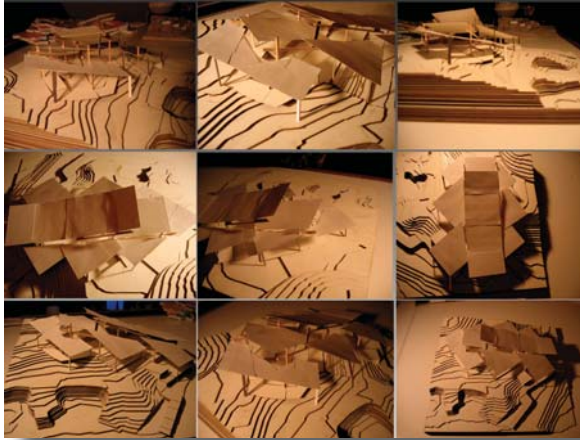


The options began with Roof A. This roof option had all the basic principles that I was thinking of, while looking at how the spaces were laid out. The angle for the winter sun was carried throughout all the the roofs.

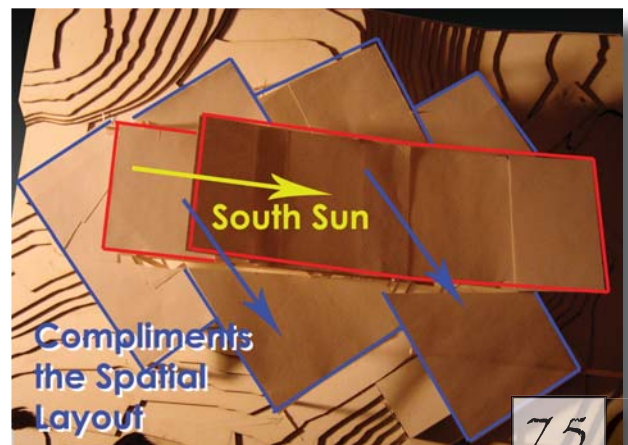
Therefore it began with one larger angled roof to slope to the North, allowing the winter winds to go up and over the building. This piece was also directly overhead the Panda exhibits, placing an emphasis on the importance of the animals. The other roofs seem to go out at a different angle to this, but those are to more compliment the rest of the organization of the spaces. Since they aren't a major part of the exhibit areas they could then be at a lower height so the building wouldn't seem as daunting. Unfortunately the front entrance would still be fairly large, and the entire flow of the roof structure just doesn't seem to be of one working system, so more options were explored.



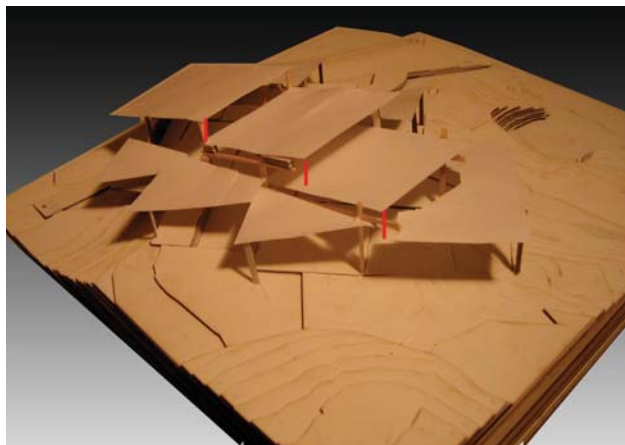
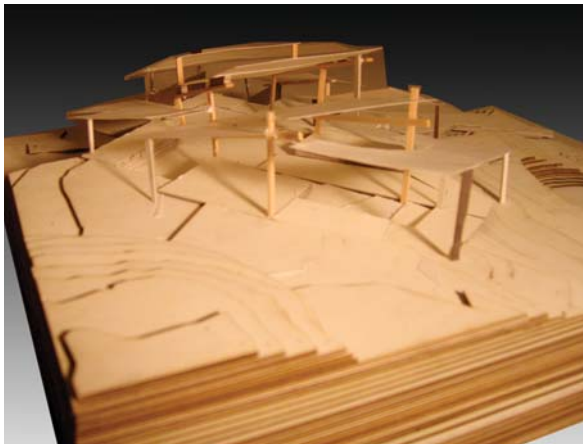
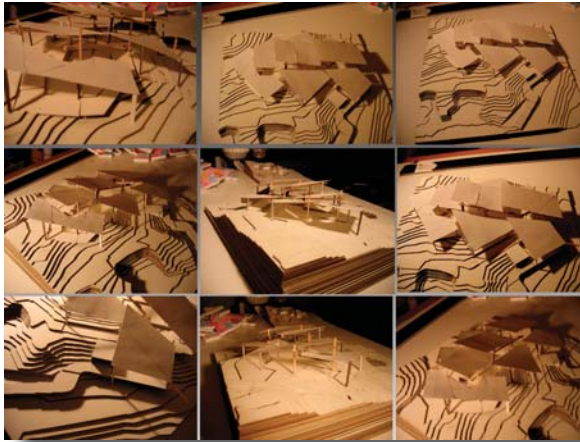
Designing the Enclosure -Roof B_1



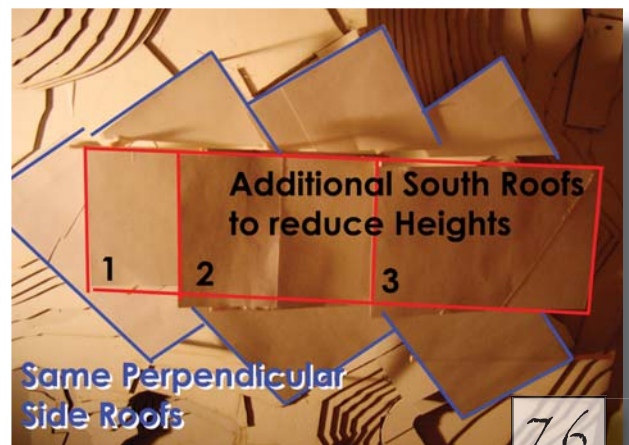
There were three Roof B options that happened after A. Although they are all three different designs, only small things were tweaked which was why they were still all considered B options. This first one took the options of A and attempted to make everything a bit more cohesive. Rather than one large piece angled for the sun, it was broken into two pieces to minimize the height of the entrance. Also the surrounding pieces were looked at as a whole so that they all had the same language and really fit together as a design. Also the side pieces now sloped to the east more, while the main one still sloped to the North. This would then give different options for drainage and still make the water flow essentially down the hill like it would have on the ground. Unfortunately it still seemed a little off with lots of pieces so small minor things were tweaked from Roof B option 1 to the next option.



Designing the Enclosure -Roof B_2



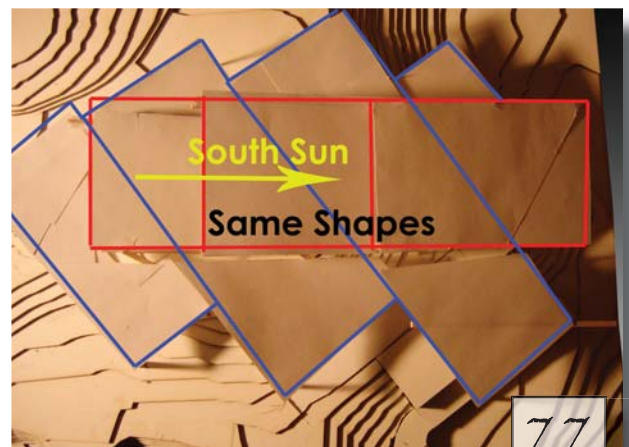
The first thing to start tweaking from Option 1 to Option 2 of the Roof Bs was the main North sloping roofs. Again the previous option still had seemed very monolithic and way too large for the space. The heights of the roofs would get way too extreme and by increasing the number of roofs in that direction it would be easier for the building to blend in to the surrounding tree canopy. The other roofs weren't tweaked in this example so that way their interaction with the main roofs could be seen. Unfortunately, although they line up at specific points with the others, these details are not easily seen which makes it look a little too chaotic and not enough like a flowing system. Therefore other small things needed to be looked at for the next option.



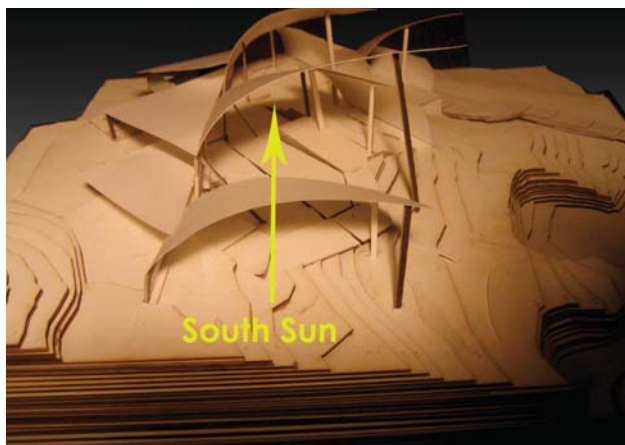
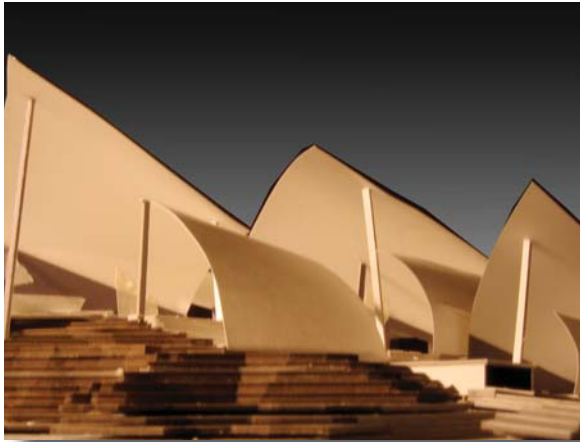
Designing the Enclosure -Roof B_3



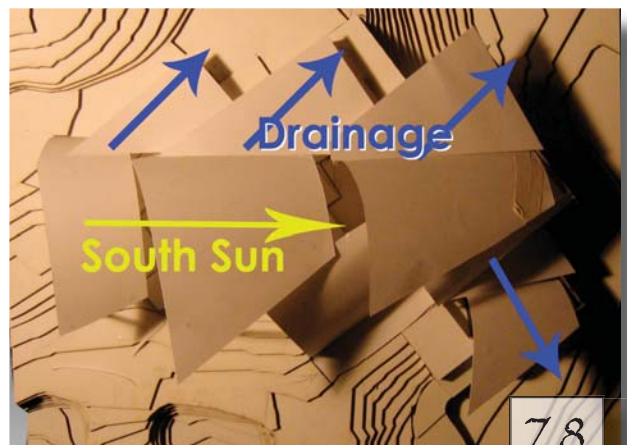
Option three only tweaked another small area of the puzzle. Drainage could be a serious issue with each of the larger roofs flowing flatly into the other. Therefore an additional slope was added to the larger of the angled roofs. This way they not only flowed down to the North, but also could empty to the East as well. This could additionally leave interesting options on how to re-use the runoff roof water for outside displays or waterfalls. The only issue is by raising up the side to the West for this slope, more harsh western light could potentially be let in. And again the additional roofs were left on their patterning, but attempted to line up a bit more with the other roofs. After this idea, it seemed like I should try a completely different tact, rather than attempt to tweak this one further. That way I would have three overall ideas that I could potentially choose from.



Designing the Enclosure -Roof C

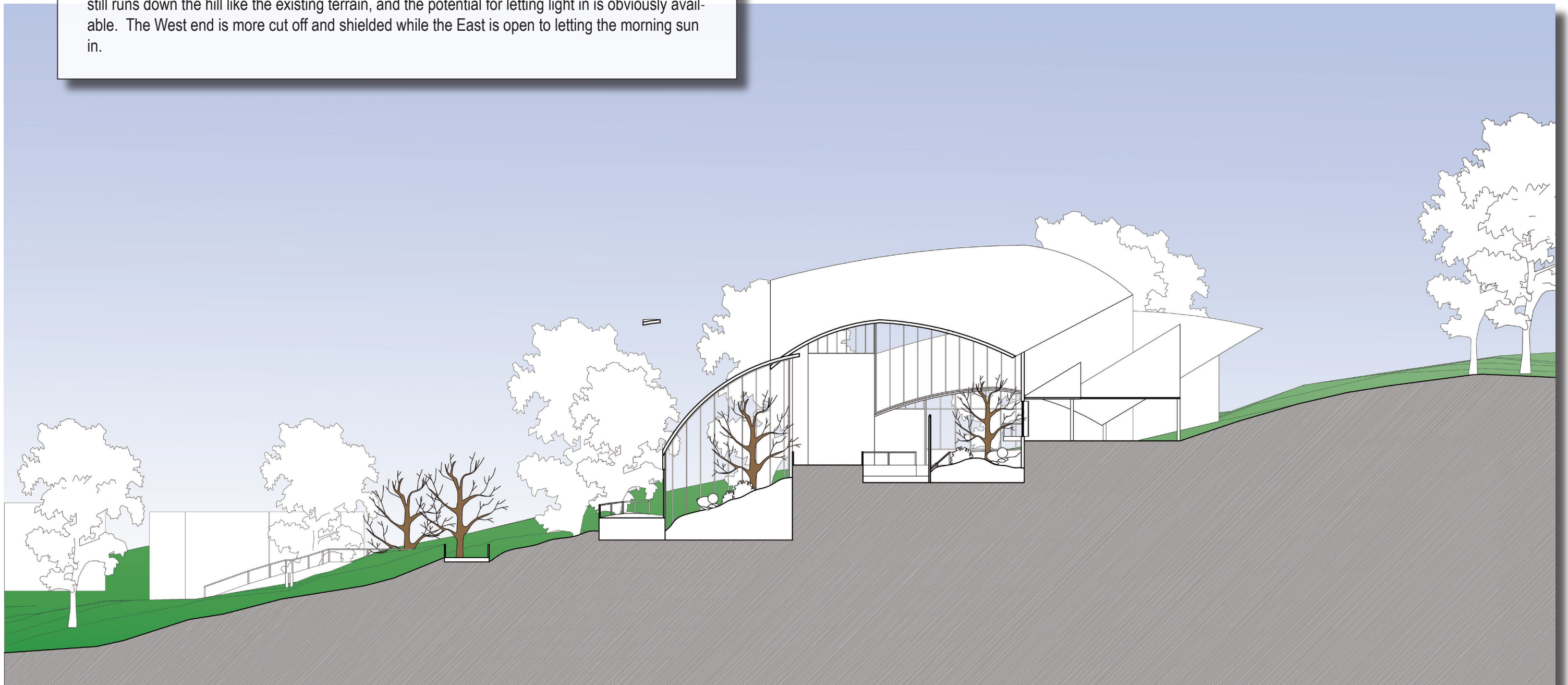


Since drainage and light seemed to be the two most driving factors in the other design, I decided to take them into account for this one as well. However I decided to try a new idea and go with curved roofs instead. These of course would make it more complicated, but now I could have drainage flow off to either side of the main roofs without letting in too much of the harsh west sun. The southern sun could still come in for the winter, and the main lines of the roof could be on those specific angles to let maximum light in for the winter. The drainage could still flow from either side of these main roofs and move down the hillside, still leaving potential for re-using the water in the exhibit displays. After looking at all of the options it seemed like the last one, Roof C, would be the best for the exhibit. This way the main Panda exhibits are still emphasized by the main curving roofs, but also drainage and the rest of the roof layouts are considered as well.



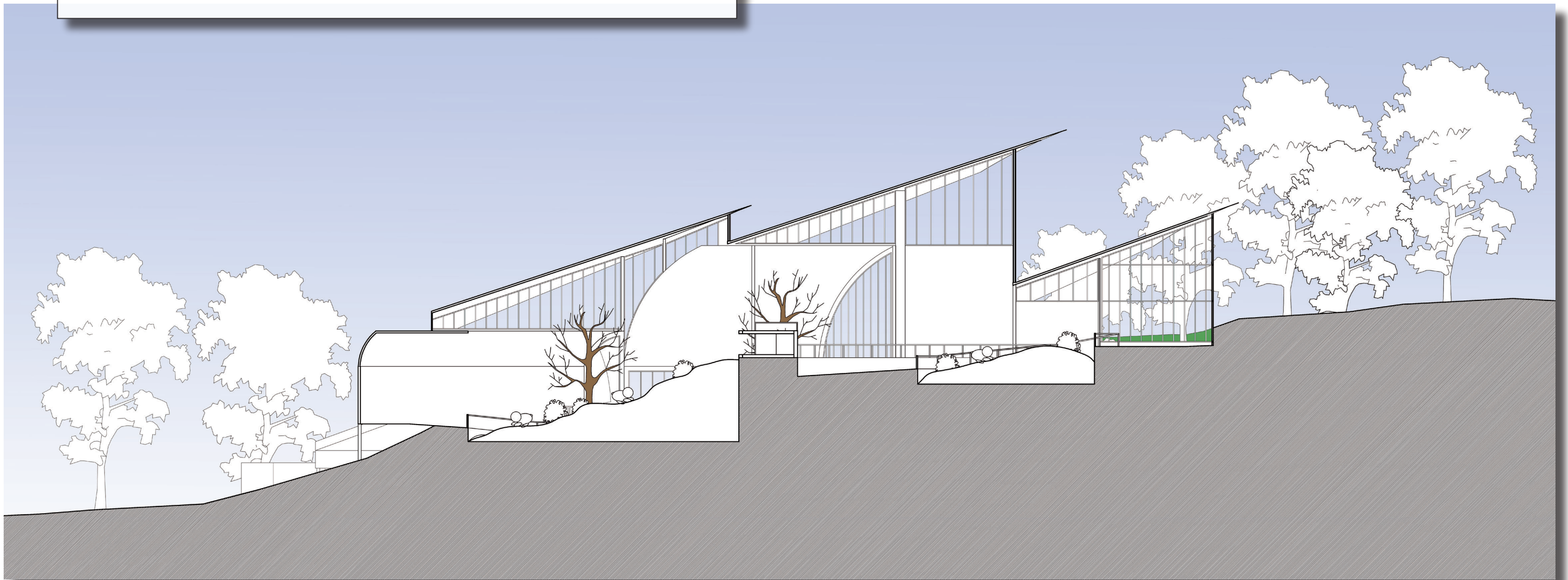
Designing the Curved Roofs -Section A

This is a section that was cut perpendicular to the floor plan running Northeast to Southwest. This cut really shows the potential for the floorplan to have multiple degrees of viewing of the exhibits. Also it helps explain how these curved roofs can really work. Again the main ones are over the exhibit areas, while the *side ones help with the circulation spaces*. The building still runs down the hill like the existing terrain, and the potential for letting light in is obviously available. The West end is more cut off and shielded while the East is open to letting the morning sun in.



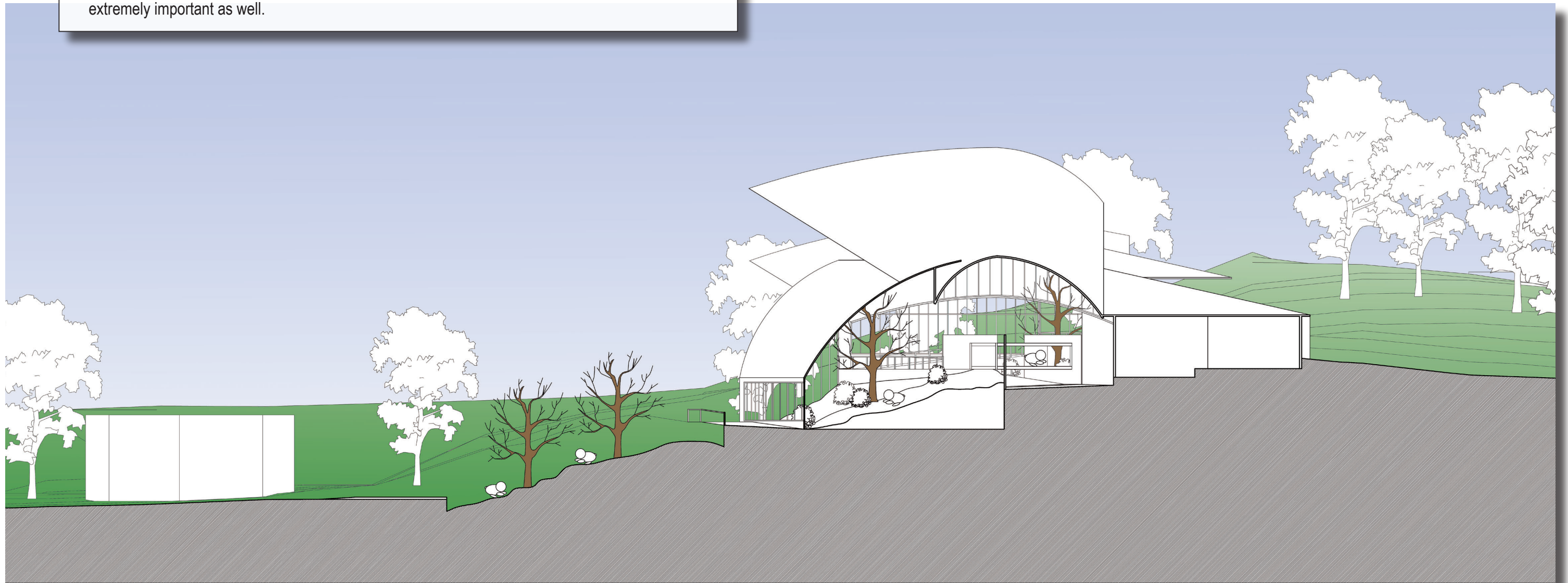
Designing the Curved Roofs -Section B

Section B is cut North to South, directly down the high point of each main roof structure. Here it especially is easy to see how the light in the winter can easily penetrate the building and reach all the way to the far North end. Also it helps to show the emphasis the roofs put on the Panda areas. Each main exhibit still resides mostly under these important roofs. Plus this helps to see some of the roof shapes that exist after the main roofs. They again curve towards the middle, allowing interesting drainage and shaping to the building. Additionally it shows the importance of the building following the terrain and sloping down the hillside.



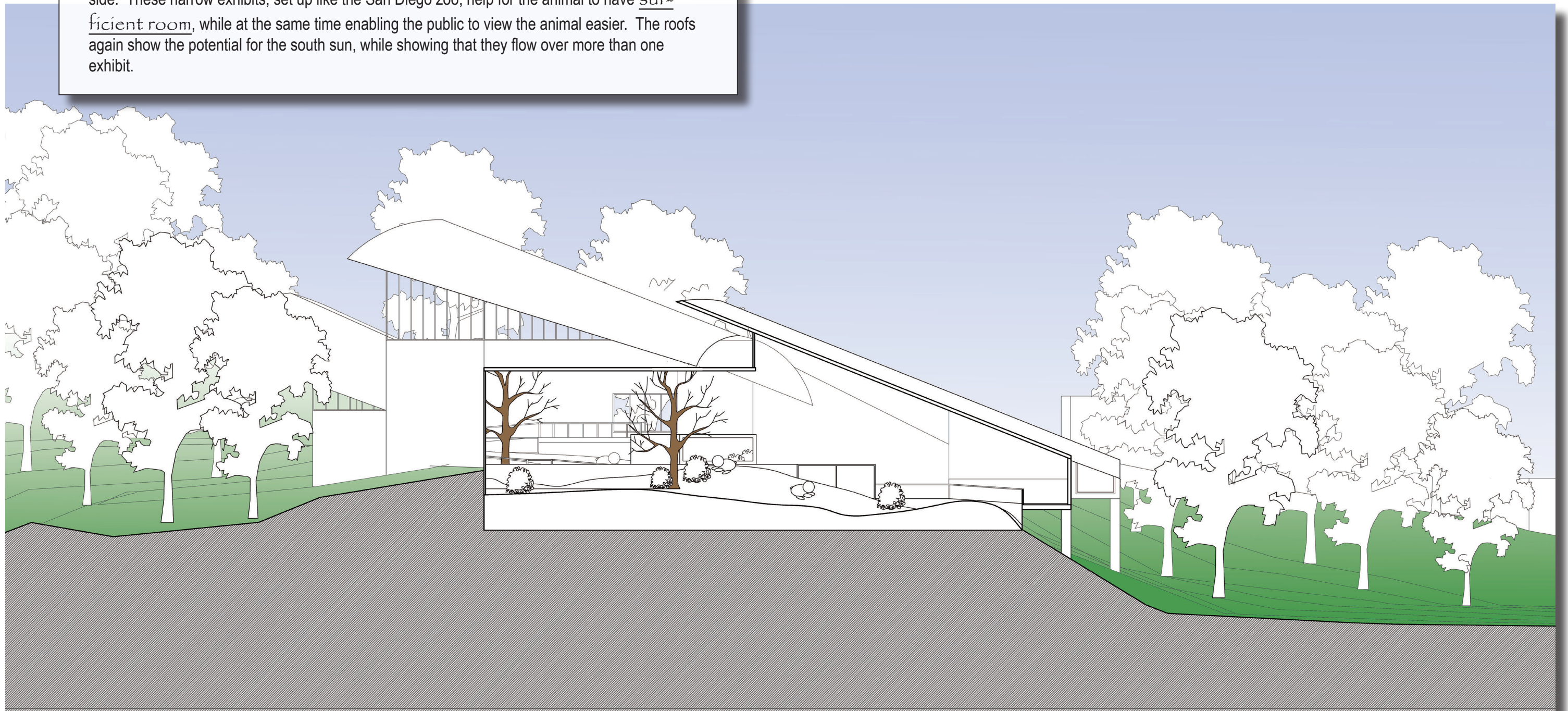
Designing the Curved Roofs -Section C

Section C is cut perpendicular to the roofs, so it runs directly East to West. This one really shows the relationship the outside exhibit can have to interior ones. Still close enough to the building so that it is viewed as part of it, while at the same time the circulation space looking into the building can also be used to view the outside exhibits. Also its a little easier to understand the secluded area that the Pandas would be located in outside. Although not all the context is included, just the landform itself shows that the Pandas could be in a more private area. And again being able to see all the way through the building to show the potential for the Southern exposure is extremely important as well.



Designing the Curved Roofs -Section D

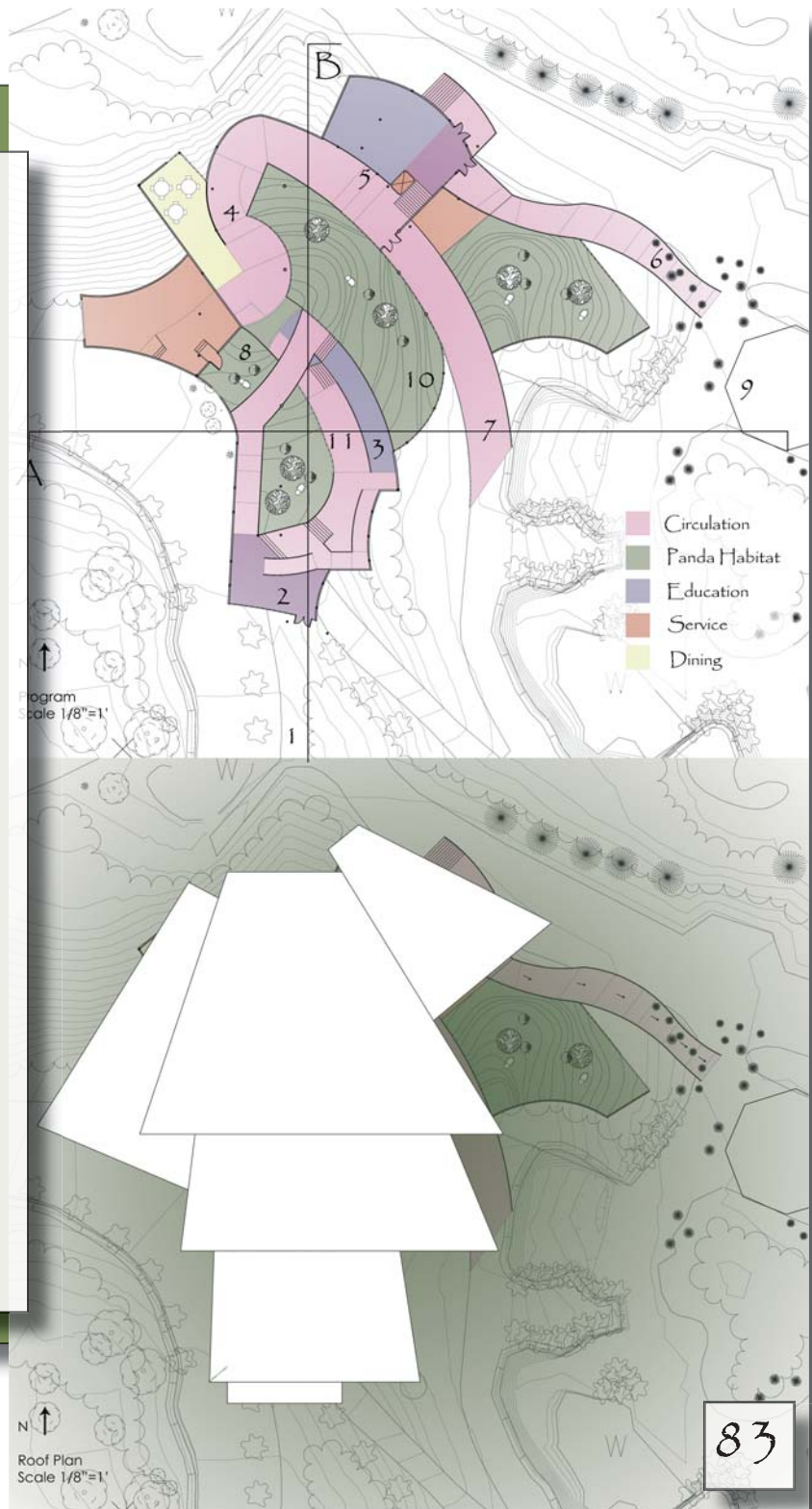
The final section is cut perpendicular to the plan again, so it would run Northwest to Southeast. This time it is cut in the second Panda exhibit. This shows how the Pandas can have the main area, and through all of them it shows how the exhibits can be long like this, yet skinny from the side. These narrow exhibits, set up like the San Diego zoo, help for the animal to have sufficient room, while at the same time enabling the public to view the animal easier. The roofs again show the potential for the south sun, while showing that they flow over more than one exhibit.



Simplifying and Demonstrating -Semester Review

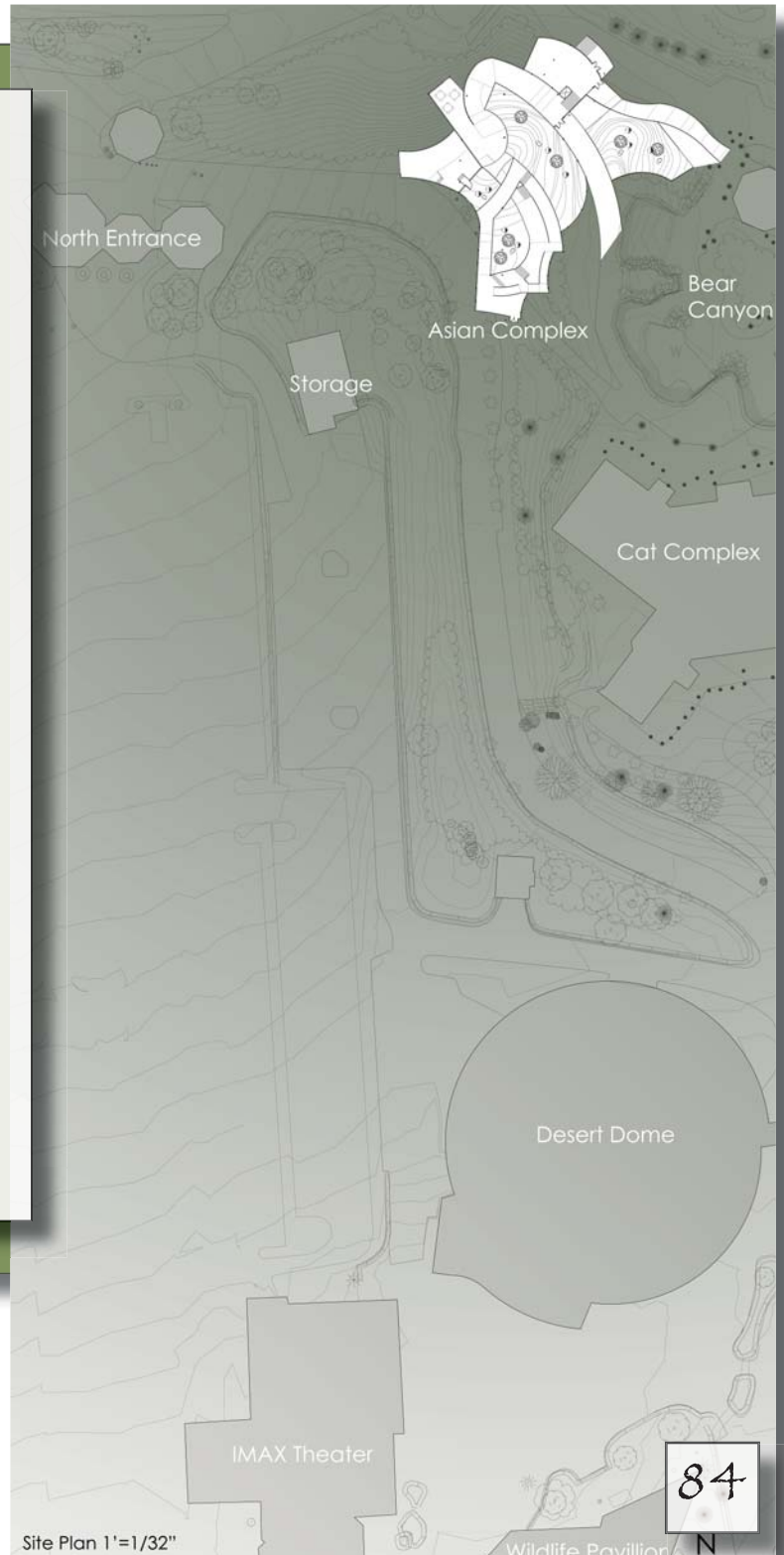
After much discussion and reviews, the floor plan and the roof plan were revised and tweaked again. To start with the floor plan, it was re-worked to be more naturalistic rather than the orthogonal. In one of the reviews it was mentioned that to be less invasive to the site it was best to make the curves of the building go parallel to the contours rather than perpendicular. Therefore the plan was reworked to be less invasive, yet to achieve the same goals. Also there was potential to not only have the Pandas go overhead the people, but also at a point to have the people be able to go over the Pandas as well, again giving more viewing options.

The roofs were then reworked. Although I had liked the general idea behind the roofs, the numerous roofs were slightly too complex and would work better if it could be simplified. Therefore the main angled roofs that were so important in the design were then enlarged and used to cover the entire area, rather than only a specific part. The two other roofs are then slightly different because they are the areas for education, or for service, but aren't requiring the emphasis over exhibit area that the main roofs do. So the building still mimics the landscape while providing necessary drainage and allowing the sunlight in.



Simplifying and Demonstrating -Semester Review

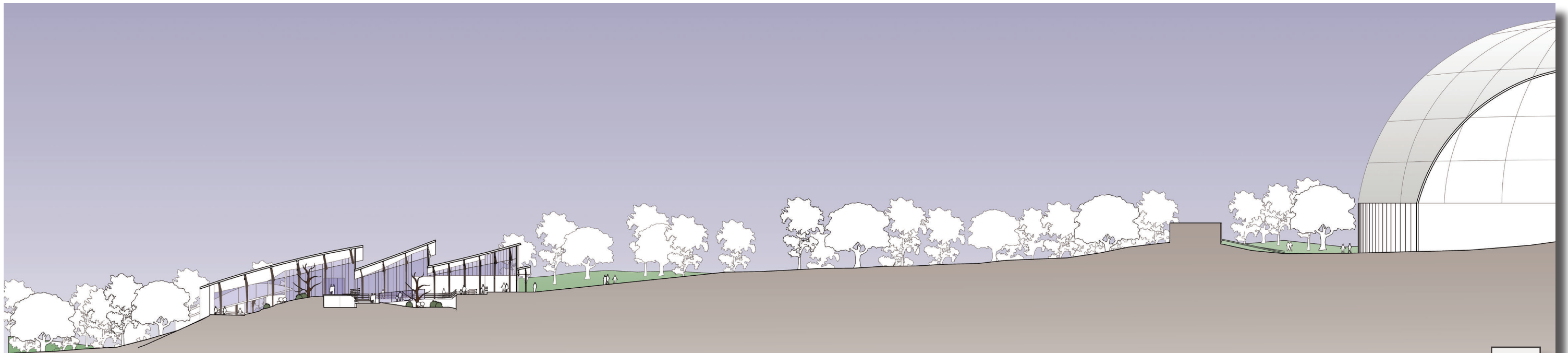
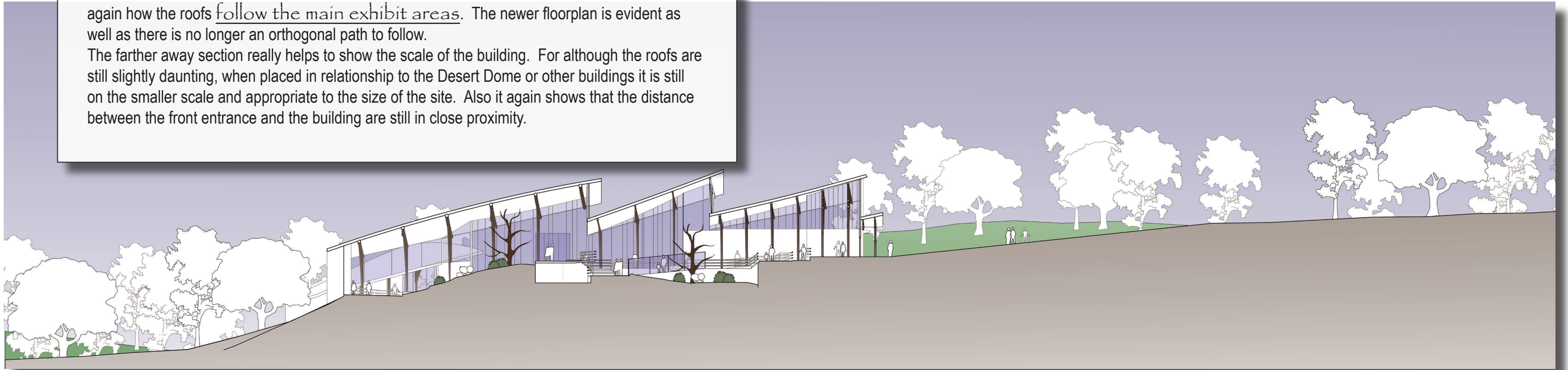
For the semester review not only was it necessary to show the floorplan of the building, but it was needed to explain its relationship to the surrounding areas as well. Here is the building while showing how it sits in the site as well as the distance to the Desert Dome and the front entrance. As you can see, the reasons why the site was chosen is that it is still in fairly close proximity to the front of the zoo, and for the busy summer months when the north entrance is open it is convenient as well. Also, the main circulation of the zoo is encouraged to start at the front entrance, and head around the desert dome along that western road. By following that main circulation the Panda area is strategically placed along this path with the front entrance open to the people. Then by moving through the building the public would empty out right at the Bear Pavillion, again following the main paths that the zoo encourages. Plus the unused dead end that overlooks the bear pavillion can now be used as it enters the new Panda exhibit towards the middle of the ramp down the hill side.



Simplifying and Demonstrating -Longitudinal Section

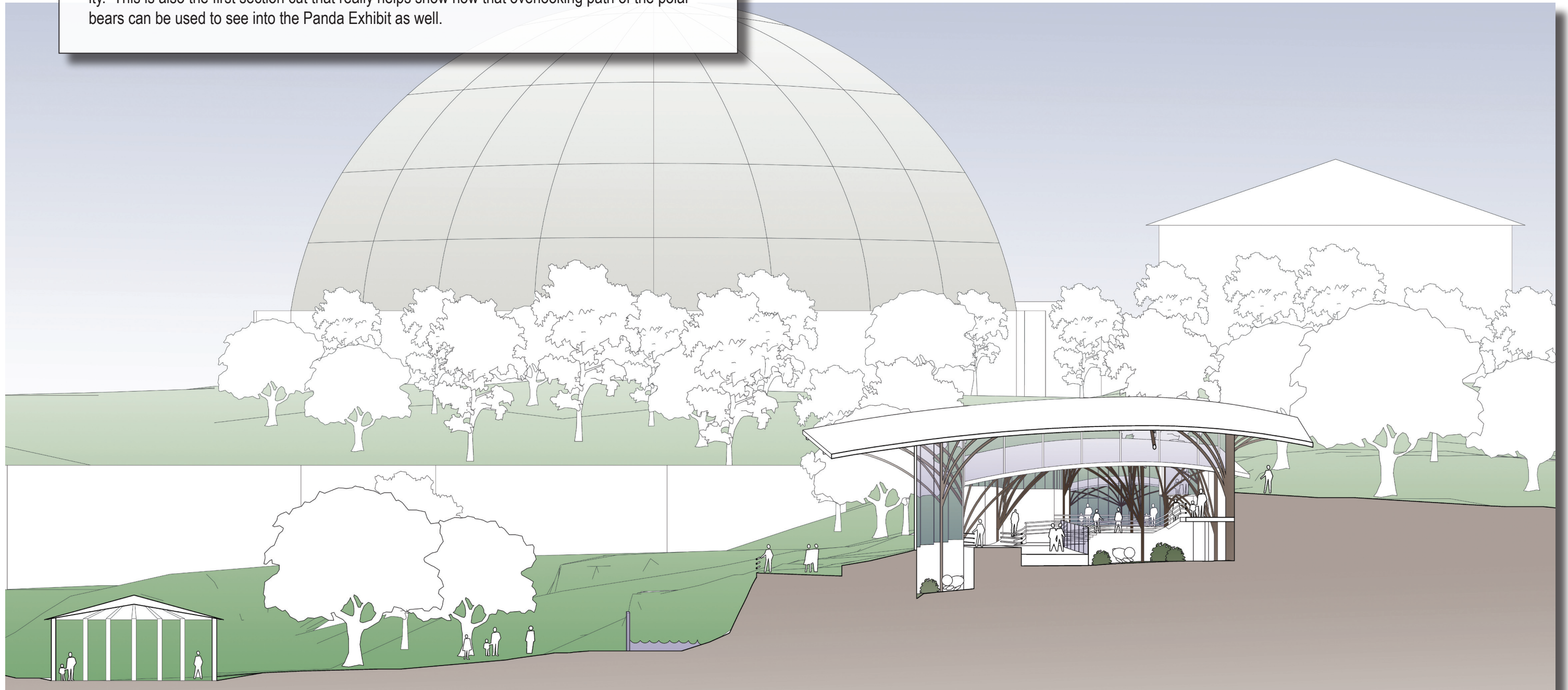
The simplifying of the roofs can really be seen in these simple sections. Now there are no extra frivolous roofs attached to the side. Instead the section cut follows the high point of each roof, helping to show the slope to the sides that can help divert drainage. The closer one really shows again how the roofs follow the main exhibit areas. The newer floorplan is evident as well as there is no longer an orthogonal path to follow.

The farther away section really helps to show the scale of the building. For although the roofs are still slightly daunting, when placed in relationship to the Desert Dome or other buildings it is still on the smaller scale and appropriate to the size of the site. Also it again shows that the distance between the front entrance and the building are still in close proximity.



The transverse section cut helps show not only the scale, but also the floating quality that the roofs have, like a suspended canopy. Also this section helps show the structure that was chosen for the building. Vertical columns that branch out can really help give the feel of a bamboo forest. These can be exterior as well as interior helping to bring the concept out from the building and blend with the surroundings. The scale of the building is evident as well, with the larger IMAX and Desert Dome in the background helping to put it in perspective. This cut also shows the gentle slope of the roofs, and how they are not too extreme, again giving it that floating quality. This is also the first section cut that really helps show how that overlooking path of the polar bears can be used to see into the Panda Exhibit as well.

Simplifying and Demonstrating -Transverse Section



Simplifying and Demonstrating -Semester Review

For the semester review a series of perspectives were created to help get a sense of the building. The first one is the front entrance of the building. Since the building is sunk slightly into the ground the path is at a lower elevation. As you can see on the approach the people are greeted with a larger height entrance that is brought down to scale by a front overhang. From here the floating roofs with the branching structure are seen, again giving the building a down-to-earth approach. On the bottom is a view of the building as it could be seen overall, without vegetation. The horizontal feel of the curving roofs help it to have a feel of the land, and the windows help the interior to come outside as well as the exterior to blend in, especially with the existing structure. The overall picture also helps to show that existing path above the polar bears and how it can tie into the building and the surroundings.



Simplifying and Demonstrating -Semester Review

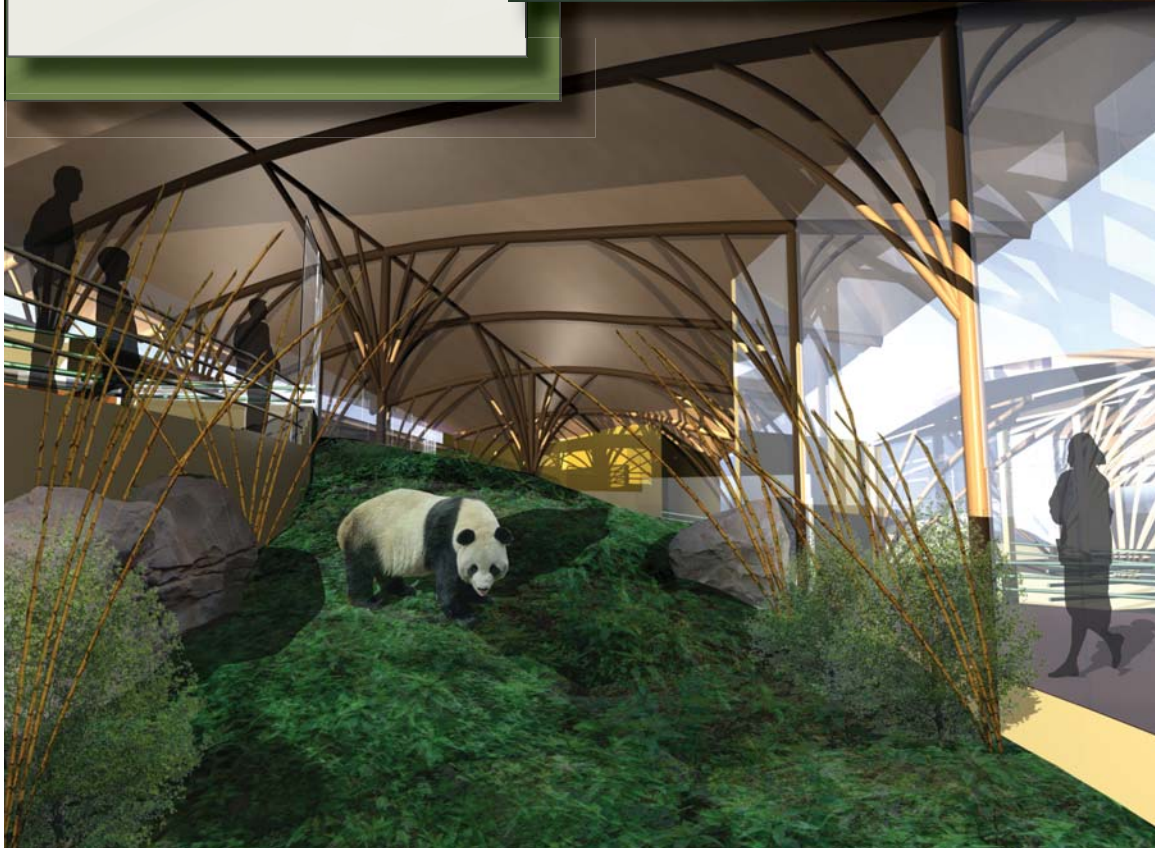
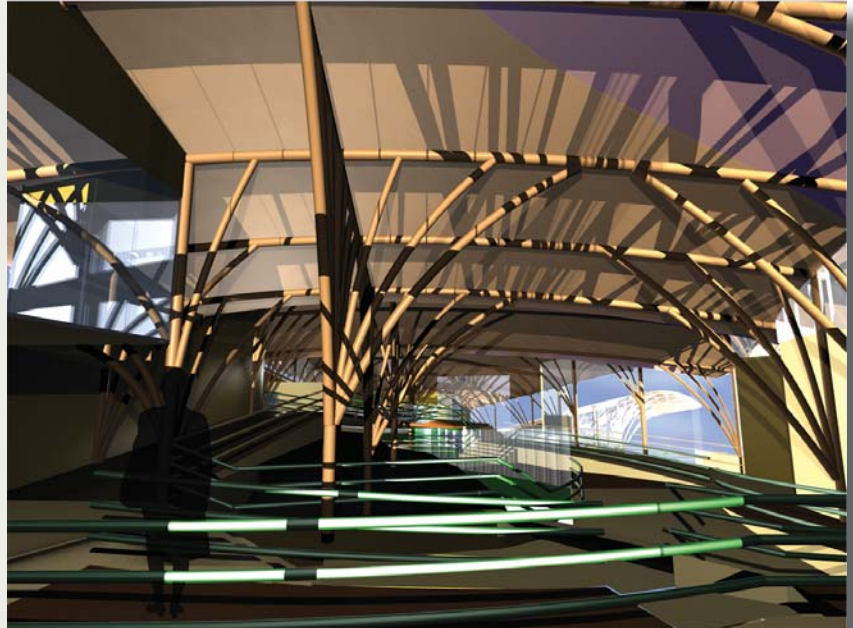
The view to my right is taken from down below the hill, around the polar bear exhibits. On the right side of the perspective is the secluded area of the outside Panda bears, just showing how it can tie into the bear area as well as the Panda building. Having the roofs be different sized really also gives it an overlapping, layering feel; again giving it a horizontal nature.

The bottom image helps show the degrees of viewing that the building can have. On the left is a Panda exhibit as well as on the right people are looking down into another Panda exhibit. This again gives the public multiple options. Also, the bridge overhead allows the people to fully go over the Pandas and look down into the areas, feeling close and personal with the animal.



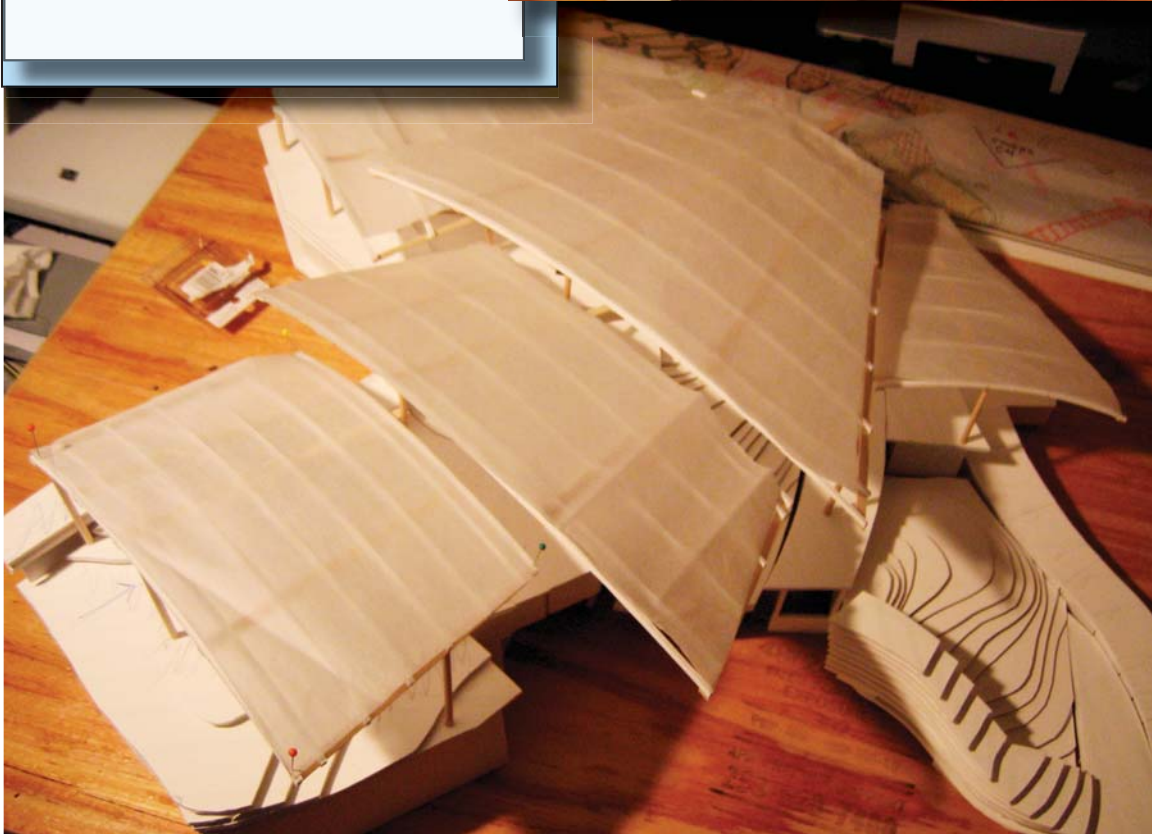
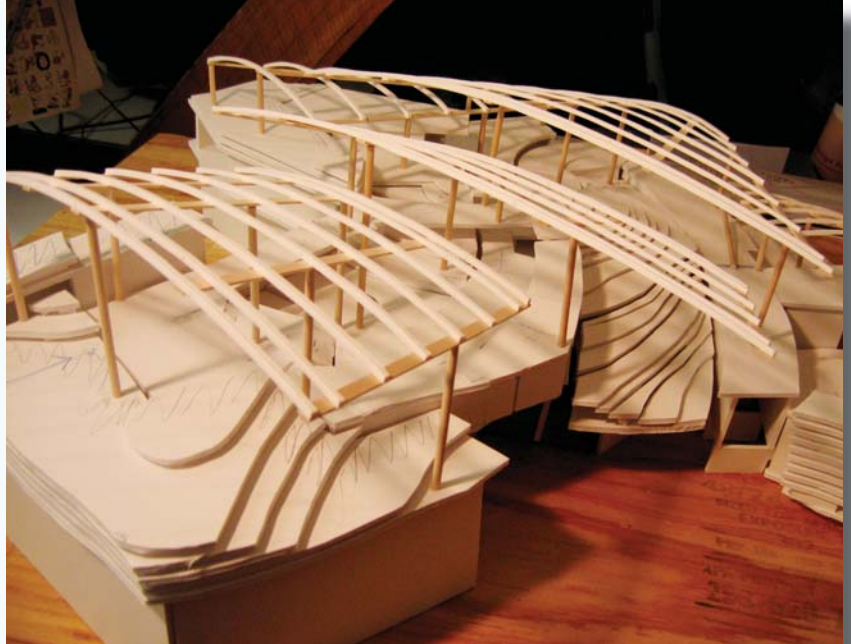
Simplifying and Demonstrating -Semester Review

The image to the right, although not fully developed, really helps show the potential for light coming in the building. This perspective is upon entering the building and looking down the length of it. The structure and the building help make for interesting shadows, again giving it that forest feel and texture. The bottom image is a look at directly inside the Panda enclosure. Although the vegetation may not be completely accurate or complete, it gives a great idea as to how the Panda can have a narrow, but extensive habitat area. Also the people up above on the left as well as those looking in from the outside demonstrate the ability to see the animals from multiple views. Plus the structure really blends into the surrounding habitat, which can be good at creating that forest feel.



Contours and Landscape

After the semester review the things that needed to be looked at especially included the contours and the existing landscape. The whole goal of the building was to be a large ramp down the hillside, and I needed to make sure that it could work, according to handicap accessibility restrictions. Therefore I began to build an eighth inch study model, which proved to be necessary as I kept getting small parts of it wrong. The model proved essential at critique time as well. It really helped the reviewers have an idea of the end goal that I was hoping to achieve. Also building the roofs was difficult for it and helped reinforce the notion that I should develop a realistic grid-like structure, similar to my previous shown work, to really help hold the roofs up.



Contours and Landscape

Also at critique time I showed a rendered roofplan, emphasizing the simplicity of the roofs and essentially what would or would not be covered and shaded. This is again where the larger study model proved effective. For although the roofs had been simplified a couple times, it made more sense to do it again. Rather than have 5 larger curving roofs, really the three facing south were the only ones that needed to be so extravagant. Also by simplifying the roofs over the education and service area it helped to place even more emphasis over the Panda area, where it should be. The quick rendering of the model needed to be done as well, because the difference between the interior and exterior was beginning to become confusing for some, which could be seen as a positive note, as the goal of blending the inside with the outside was looking achievable.



Contours and Landscape

The larger study model helped to rework the contours as well as the floor plan. My last critique had suggested that the numerous curves were too much and unnecessary. So the plan was again simplified. The curves were still left around the habitat areas, because it seemed essential to make those as natural as possible, while the rest of the curves were able to become angles. This could reduce costs while still keeping the idea that walls do not necessarily have to be 90 degree angled. The contours were able to be re-worked with an accessible ramp leading down from the main road into the building. This was also able to be tied into an existing road leading Southeast towards the cat complex. As many existing roads as possible were able to be kept. The road atop the hill, at the bottom of the hill, the sidewalk to the cat complex, and the road overlooking the bears were all able to be worked into the lay of the land and utilized.



Contours and Landscape

After looking at the contours the site was again analyzed in terms of vegetation purposes. Where the shade from the building would be, where the roofs might overhang growing vegetation, and areas of circulation were really looked at to get an idea of how the site could be landscaped. The overall goal was to landscape the plan so that it seemed like mid-west planting blending into an Asian bamboo forest feel. This could be achieved not through specific plants, but more of the look of plants. Therefore things with a cloud-like patterning, or plants with an extreme vertical nature became the ideal plantings. Also something would be needed on the north side for rain-water collection, as well as various plants throughout the site to discourage climbing or wandering of the path. Other things looked at were where crowds might want to linger or converge or places that could be used as resting spots. Also all service entries would need to be shielded or helped to discourage curiosity of wandering kids.

Project Description

This dreamscape is located in Omaha, NE at the Henry Doorly Zoo. The site itself is just North of the Cat Complex, South of the Petting Barn and barely Northwest of the Bear Canyon. The building itself ties in to the land at three different pedestrian levels.

The primary goals are to help the building blend in with its surroundings, to blend the landscaping from the interior (Panda habitat) to the exterior, and to transition from existing landscape to a Panda Forest.

Needs and Desires

- Shields for service areas and harsh elements
- Resting/Gathering places on the outside ranging from large to small groups
- Way finding views into the rest of the zoo.
- Views to see Pandas on the interior as well as outside.
- Wider paths for larger crowds
- Welcoming entrances from all sides
- Views from inside out that frame a lot of the zoo
- Filtered light into the building
- Ways to filter water and reuse if possible off the roof
- Wayfinding hardscapes, or educational hardscapes
- Incorporating education into the landscape
- Areas to collect rain.

Specific Wants from the Plants.

- Vertical elements like bamboo
- Plants with narrow or thin leaves looking delicate.



- Cloud elements



Site Analysis:

Firstly, there is a lot of sun exposure to most of this site. This can mean full sun, or where there is a lot of existing trees, partial shade.

Going with the sun, there are also large areas where the roof overhangs the landscape. Therefore the vegetation should only get so high and welcome part shade.

Other exhibits are nearby, which means some plants should be able to detour climbing.

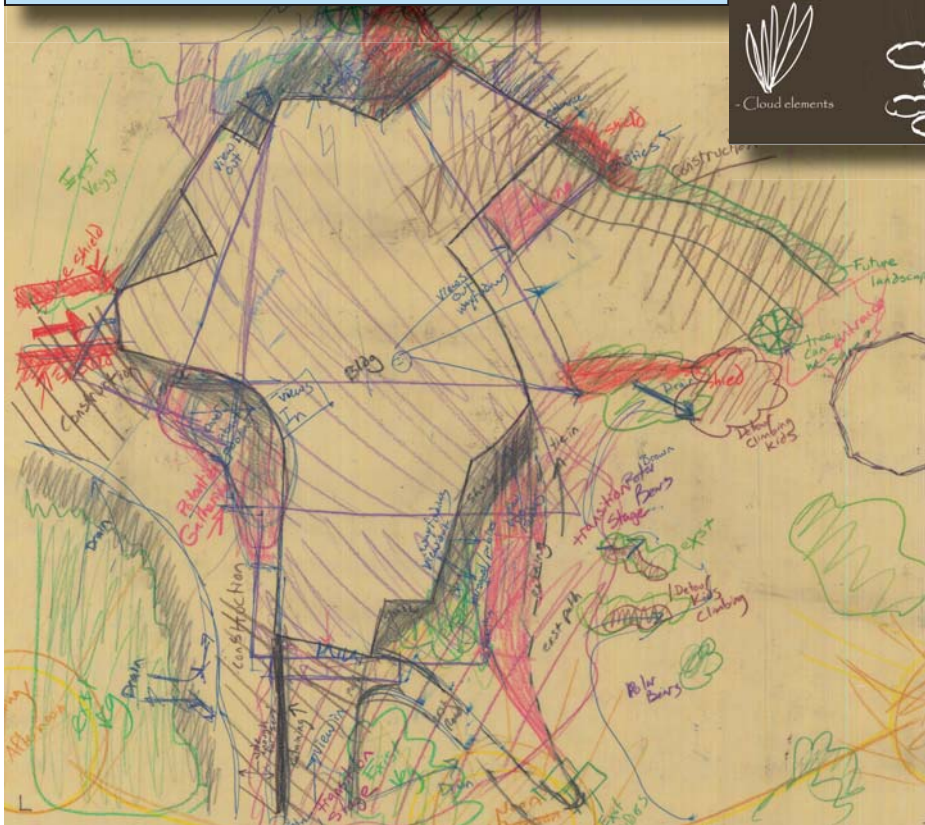
There is a large amount of rain water that will be moving off the roof towards the North, plants that like water should be planted there, also if they can go with little sun.

The North side is a steep hill with furious winter winds that sweep up and over the building. What ever is planted there should be able to withstand the cold.

There is also a lot of drainage running through the site and down the hill, so it must be well-routed and plants should be able to tolerate moist feet in some places.

Luckily there are two major roads on top and on bottom that can handle construction traffic. Certain trees should be specified to be saved or knocked down.

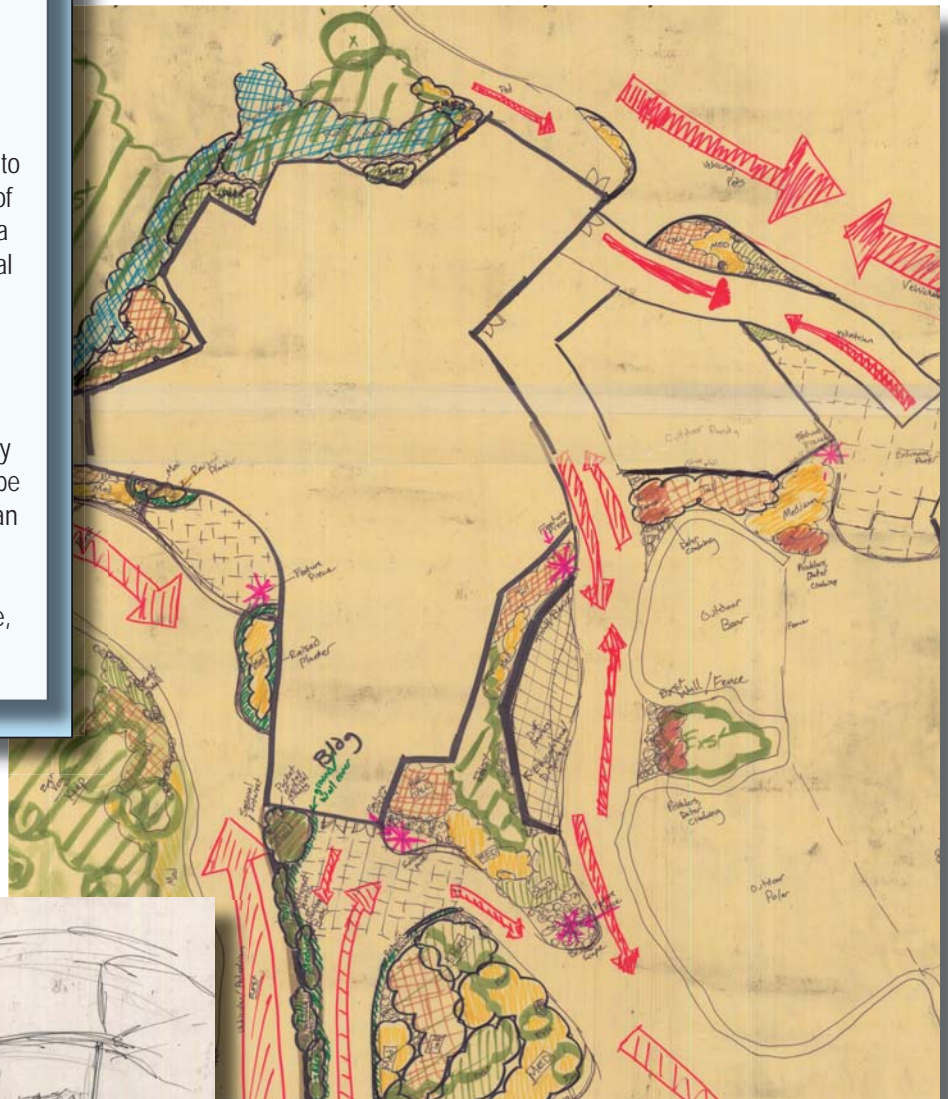
There are also plenty of opportunities for retaining walls and large parties of people to gather. These should be utilized and made the most of.



Contours and Landscape

-Concept 1

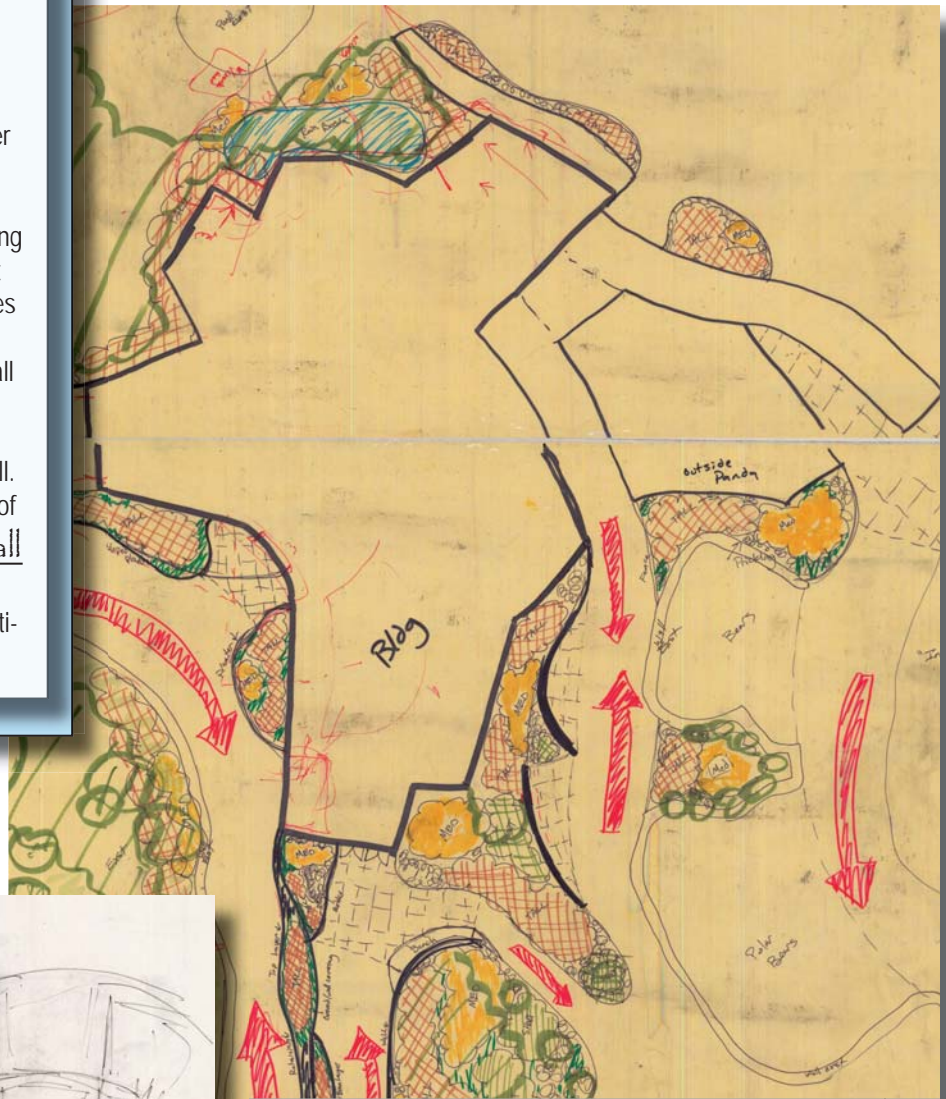
The first concept was based upon a blending of the mid-west plants gently with that of the Asian feeling plants. This way there would not be an abrupt transition, and the public would instead gently be immersed in the vertical foliage. Circulation was carefully considered to give ideal resting spots and benches for crowds to gather and rest. Plantings were then broke up into short, medium, or tall plantings to give an idea for achieving the goal of the plant blendings. The bottom is a quickly done sketch to show the goal of the entrance way. The retaining wall necessary for the ramp down could easily become an educational tool and a holder for different heights of plantings. This way information about the Panda could be included as the plantings of the Asian area are explained, as a welcoming way into the building. This helps blend what is inside with the outside, providing a more cohesive design.



Contours and Landscape

-Concept 2

Concept 2 is very similar to Concept 1, however instead of there being a general transition, the main goal is to suddenly immerse the public in the vertical forest feel. Therefore, rather than going from short, medium, to tall it will more likely go immediately from short plants to the tall and slender ones. The bench areas were also re-worked in this concept. The other main difference is that of the rain collecting system. The previous concept merely looked at water loving plants to head their own and accept the run-off. Concept 2 instead hopes to create a water basin to store the water before it becomes the waterfall down the hillside. The perspective below again demonstrates how the entry could be with the retaining wall. Rather than have different layering of heights it would primarily be tall or short, again trying to create that sudden immersion into the vertical forest.



Contours and Landscape

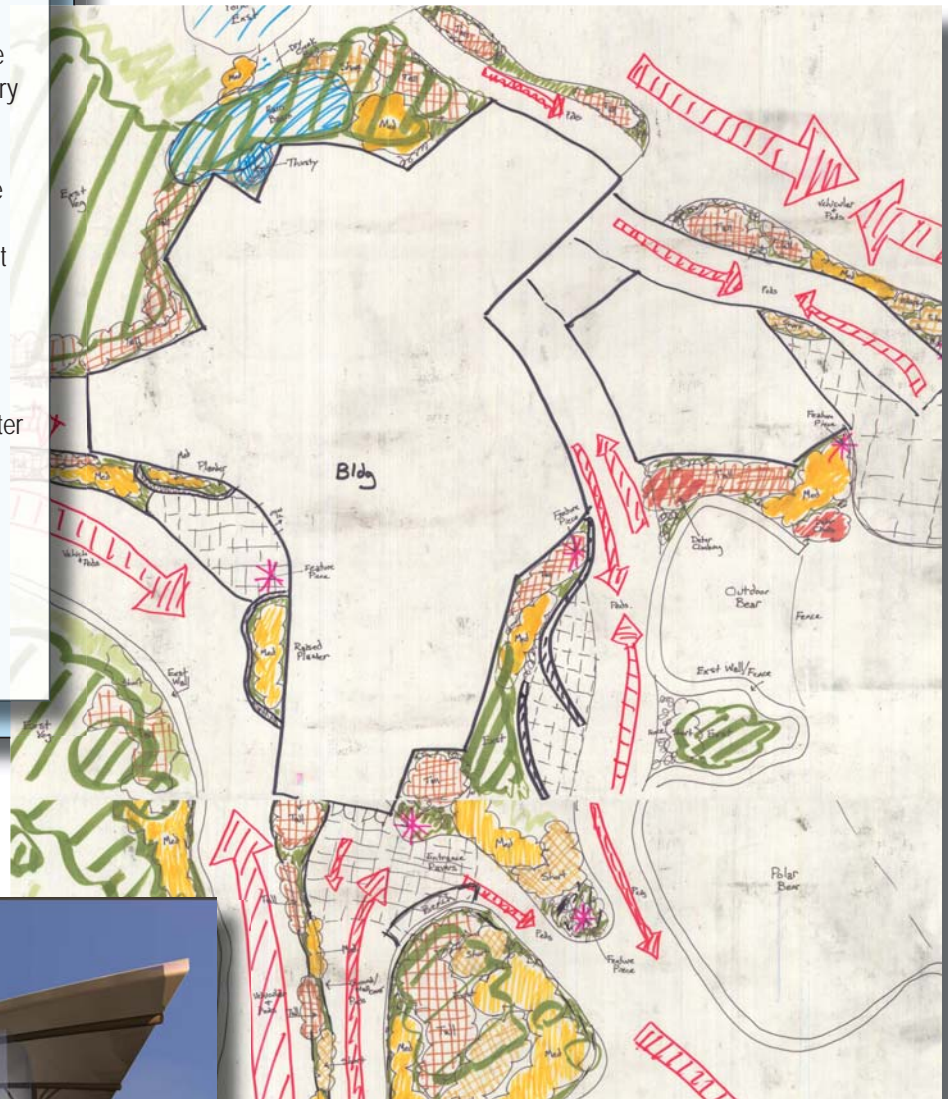
-Final Concept

Finally the end concept is that of the previous two combined.

The theme of gently going from short to tall was determined to be the better one. This provides the smoother transition and the ability to blend the Asian-feeling plants with that of the Mid-west. Also the water-retaining area to the North was decided to be a rain basin which can lead into a dry creek bed for the falls. This way if there is extra run-off from the rain it could easily be diverted through the falls as the basin area floods over.

The bench from the second concept was chosen because it flowed with the overall circulation and was able to seat a greater number of people. By combining the two I was able to choose which plantings worked better near the different public or service entrances.

The bottom image is another quick sketch about how the ground level can rise up to the building and the plantings can surround it and the public bench spaces.



Contours and Landscape -Final Plan

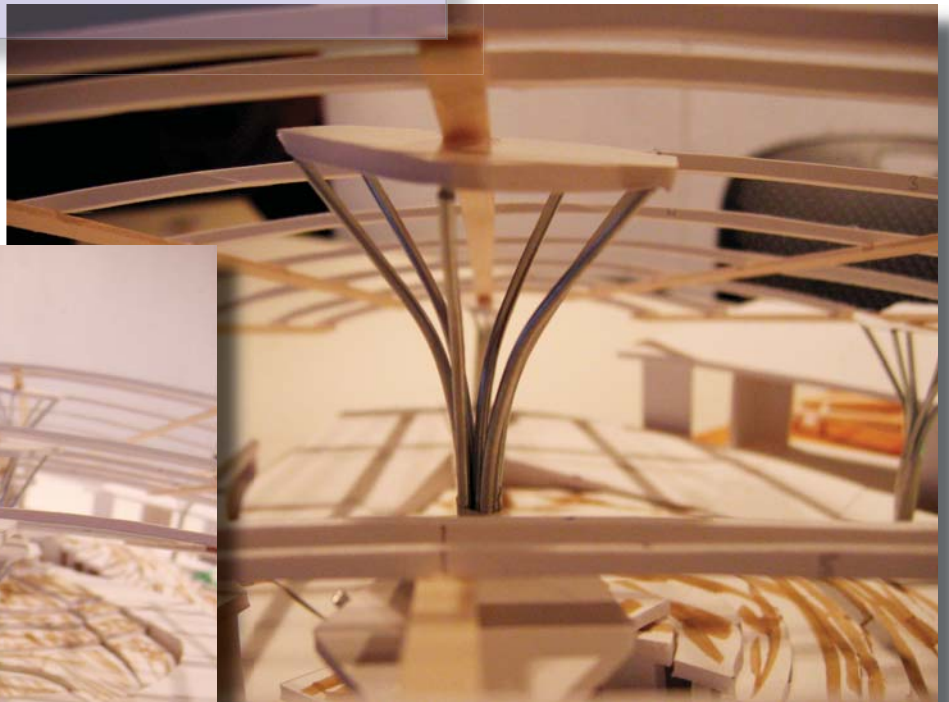
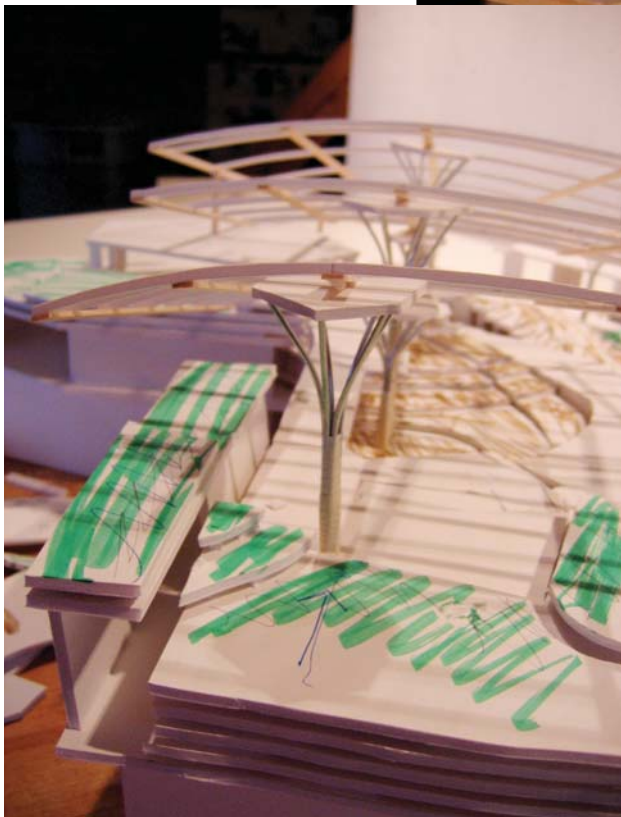
The end result is a final rendered plan complete with plant choices. Each of the plants was chosen carefully to fit into the pre-described goals while still being able to grow and thrive in the weather and soil that is in Omaha and at the Henry Doorly Zoo. Another plant that was essential was that of the bamboo that is native to the Midwest. Although not exactly like that of the Asian plantings it would really help bring out the feel of a bamboo forest and was necessary to be distributed throughout the plan.



Roof and Columns

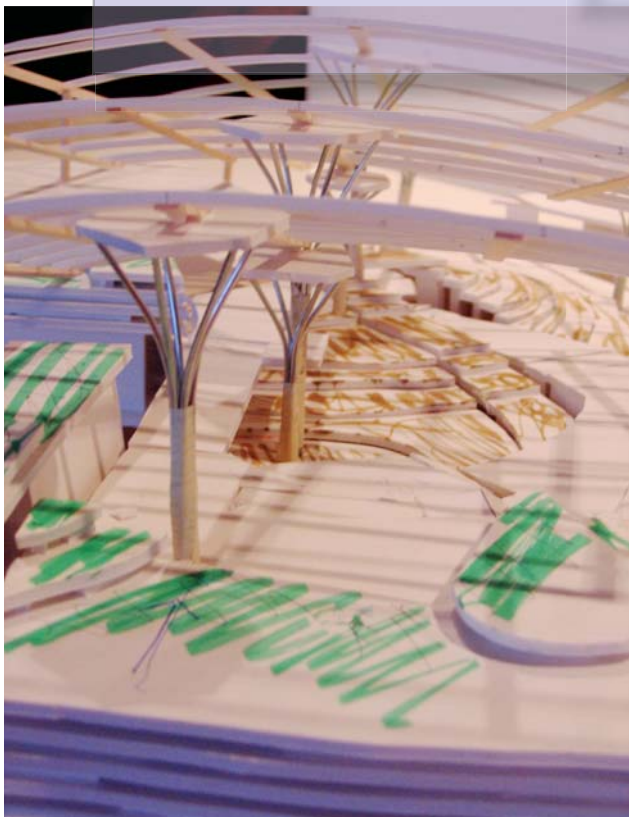
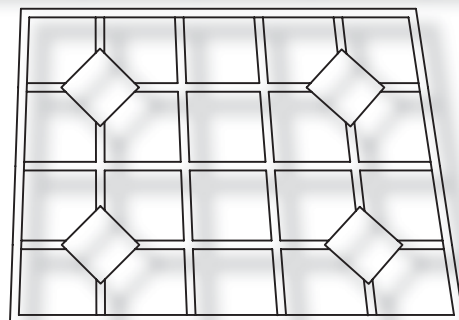
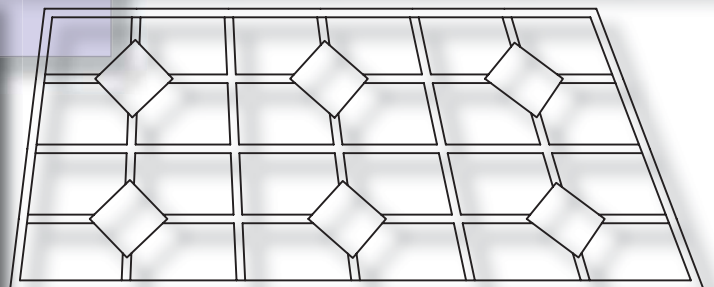
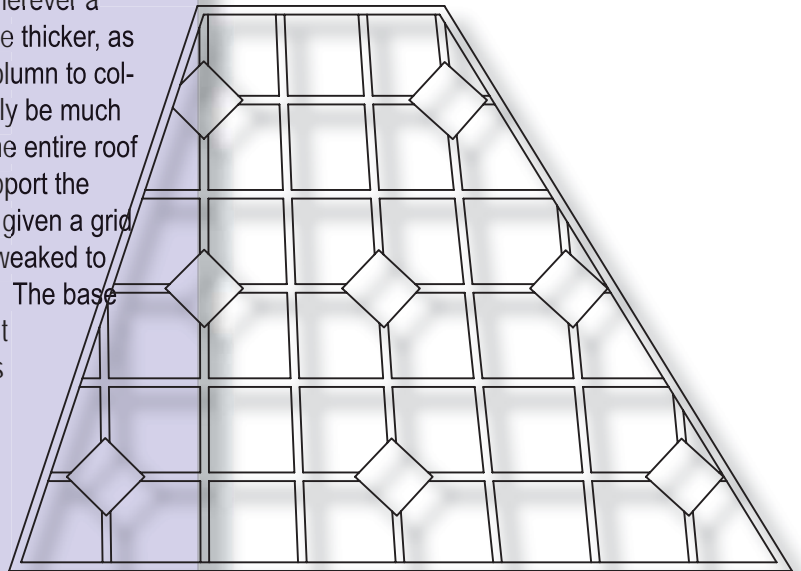
-Structure

Once the contours and landscaping had been established it was time to look at the structure again. After reviews and critiques it was necessary to make sure that the columns could withstand the roof load alone. By making the roof dependent solely on the columns, it would free the walls from having to be load bearing, thus allowing easier renovations in ten years. Yet the goal of the columns was to stand vertically, and break out at the top like that of bamboo as the wind would blow through it. This eliminated the continuously vertical middle column and increased the complexity of the load. All the weight would now be bearing down at the multiple points where the column hit the roof, as well as where the individual stems were to break apart. Also the columns would have to be on a structural grid, rather than appearing wherever it seemed necessary or constantly within a wall. A few rough attempts were added to the study model, each showing a flat platform that would help later in the process.



Roof and Columns -Structure

After deciding that a grid was necessary it was time to really look at how this would be laid out. Rather than have beams and girders of wood attempting to span the entire length of each roof it seemed best to make the roofs out of concrete. This way there could be two depths of the material. Wherever a column would contact the roof it could be thicker, as well as a waffle-like grid to span from column to column. The spaces inbetween could easily be much thinner, not only lightening the load of the entire roof but also only making it necessary to support the thicker areas. Therefore each roof was given a grid as the floorplan and walls were gently tweaked to coincide with the plans and fit around it. The base of the columns before they branched out could also be concrete with the columns themselves being steel. This could handle more of a load then that of actual bamboo, and the vertical feel, which was the important element, could still remain.

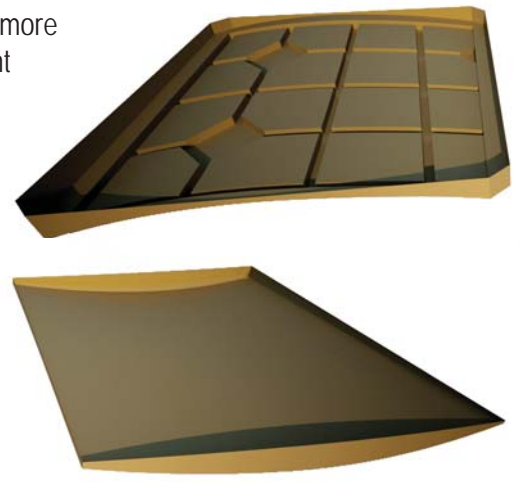


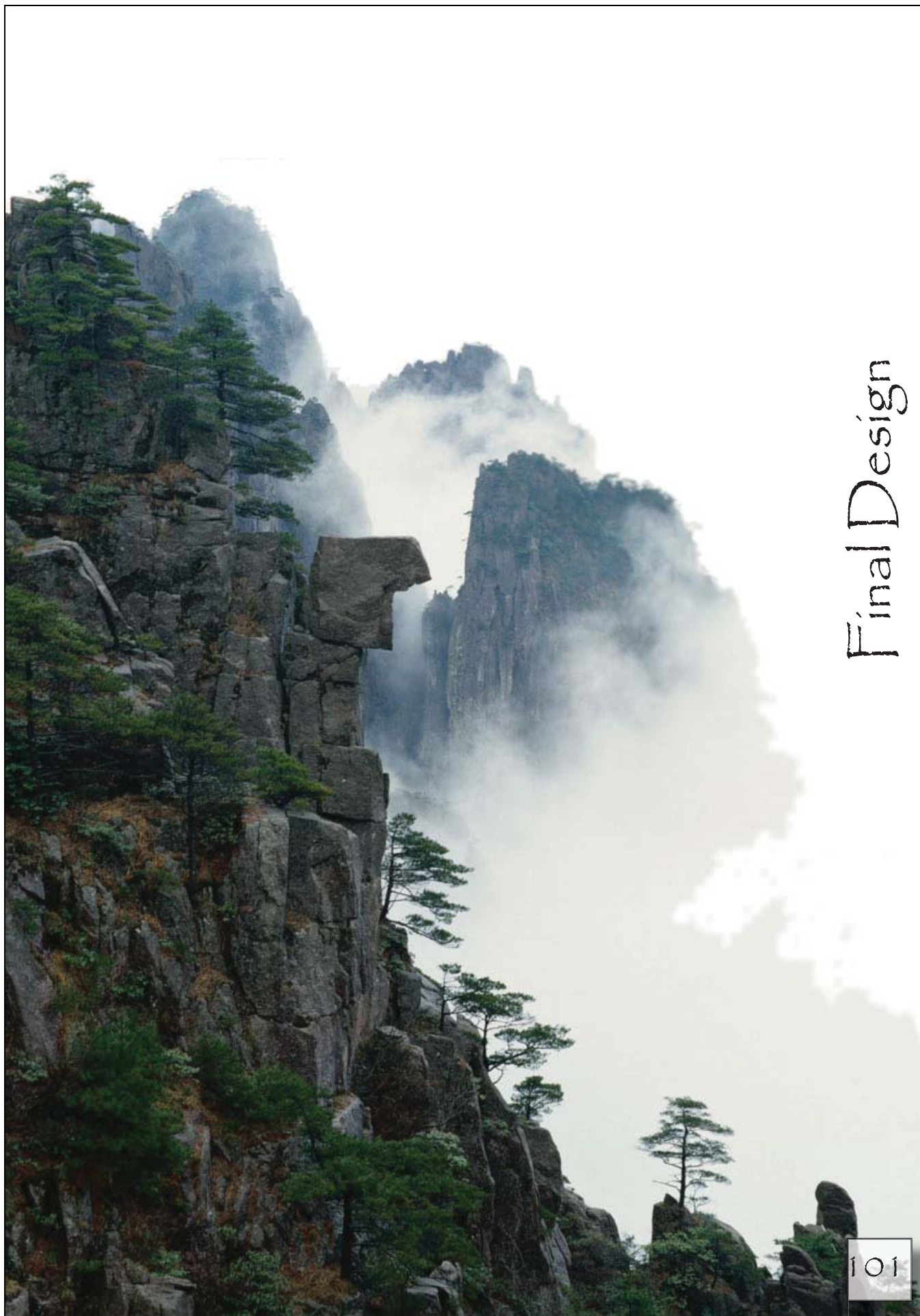
Roof and Columns

-Structure

After laying out the grid and deciding how the columns would support it, it seemed imperative that for my final section model the model roofs could reflect how the actual roofs would be built.

Therefore I began by taking each portion of the roof that was to be poured and created a 3-d computer form for it. I separated the top form from the bottom in hopes that I could merely push the two together and pour plaster of paris inbetween. After creating the forms I then sent them to a visual-mill software to create a file for the CNC routing machine. I then routed out the forms from a high density foam. Some complications occurred when the foam decided to bow during the drilling, which then led to uneven areas in the mold. This is evident in the picture below as some pieces then became too thin to hold its shape. However it was then tried again, and by preventing the foam from bowing I was able to have a more accurate mold. The form was poured again, and many times different thicknesses of the plaster of paris would have to be added, to help with the air pockets or the sanding of the material. In the end they were solid pieces that were attached to the columns and placed in the final model.





Final Design

Final Design

-Floor Plans

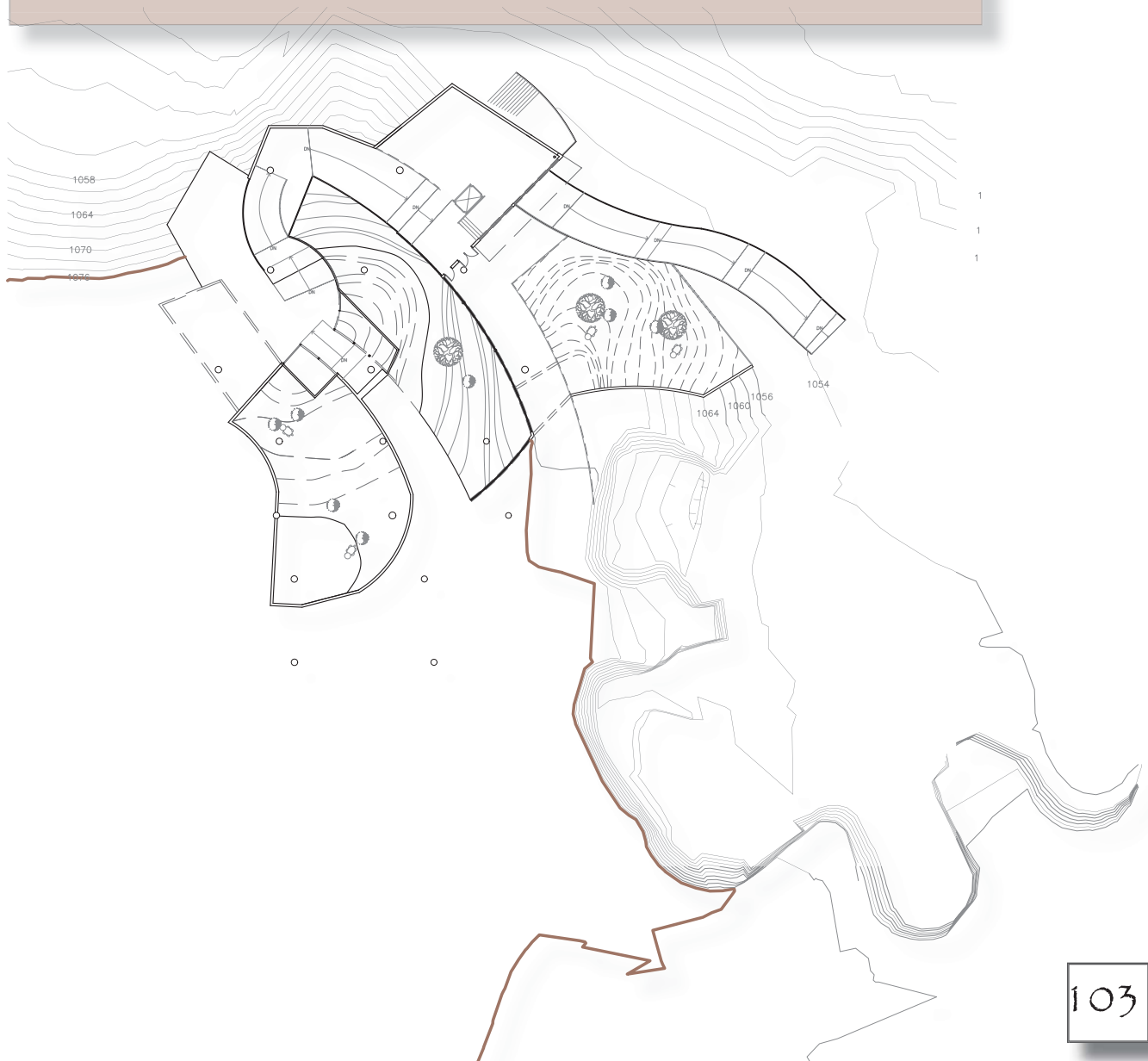
For the final design it was important to really explain how the floor plan is broken up in terms of heights. Therefore five cuts were taken of the building to really show which pieces are at what elevation, in hopes that this can help explain the building better. This first cut shows how low the Panda outside exhibit is to the rest of the building. Also the bottom entrance is quite a bit lower than the rest, allowing that educational room to be of good size. There is a visible gateway for the Pandas to move under the circulation paths from the outside Panda area at the top of the exhibit to that of the inside exhibit at its lowest point. The service area at the lower level is also visible here, as it is situated below a public look-out area on the higher elevations.



Final Design

-Floor Plans

The second cut shows more as it works its way up the hillside. Here the next objects are that of the circulation through the building until it approximately reaches in between the two exhibits. It also helps explain where the exhibit landscape is cut at according to the floor plan. For although the public circulation may not be shown yet, the exhibit would be lower and is therefore already shown on the plan. Also the exterior contours are shown cut in brown to really display the relationship of interior elevation compared to that on the outside. Also, since there needs to be a taller space in the bottom entrance area, this cut still shows that space and how large the volume of that area is.



Final Design

-Floor Plans

The third cut is definitely starting to show more of the building. Here all the animal displays are pretty close to being shown, as is the overhead bridge for the Pandas to move from one exhibit to the other. Also the service entry can now be seen, with the appropriate area for truck unloading, as well as entrance into the exhibit area. The pathway between the two main exhibits is shown, and it relates well with the outside area. The bottom entrance is now completely closed off with the projecting overhanging roof showing instead. The outside patio area can now also be viewed. This is the only area open on the north side, which should be welcoming in the harsh summer months.



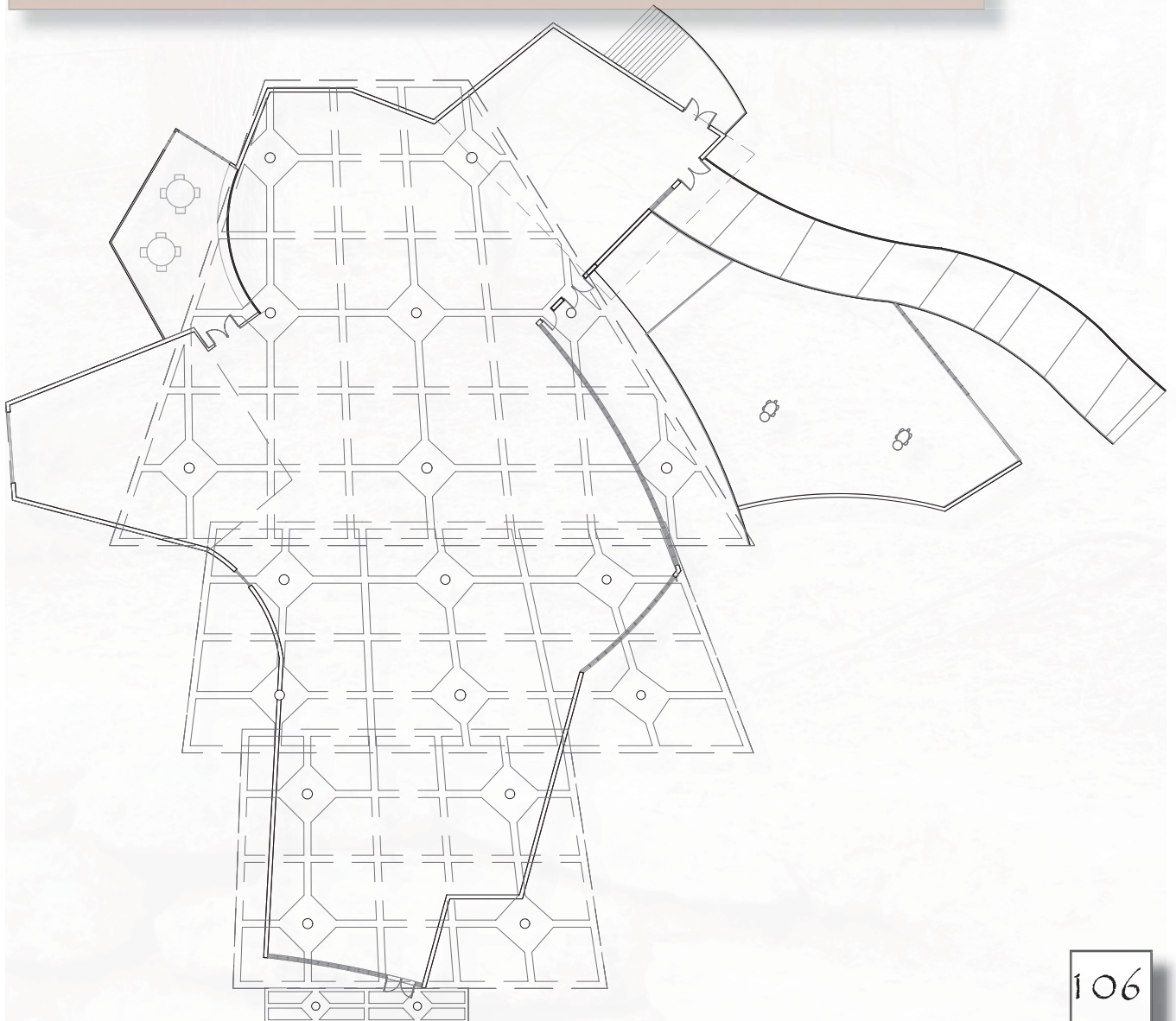
Final Design -Floor Plans

The fourth cut is the entirety of the building with the outline of the roof structures. Here you can see the entrance area as it is cut a couple feet off the ground. This also helps to show the entrance ramping. The jut-outs that overhang the exhibit areas are also now all completely visible which helps to get a better idea of what is inside. Also, although the roofs are primarily shown as overhead, the difference in their heights is evident as one can see the bottom roof is starting to be cut. The service entrance on top is fully visible, showing how the contours were re-worked to allow for trucks to approach the building. Also all the column bases are now in place, complete with the two in front for the entrance overhang.



Final Design -Floor Plans

The final cut is without contours and is more of a general roofplan. This drawing really displays the roof grid complete with column placement. Also the exterior walls are shown with where they fit underneath the overhangs, and how they interact with the columns. The lower roof is shown as more of an overhang over the general area, and the roof over the service area is a direct fit over the room below. Overall this drawing gives a good sense as to what is interior and what is exterior.



Final Design

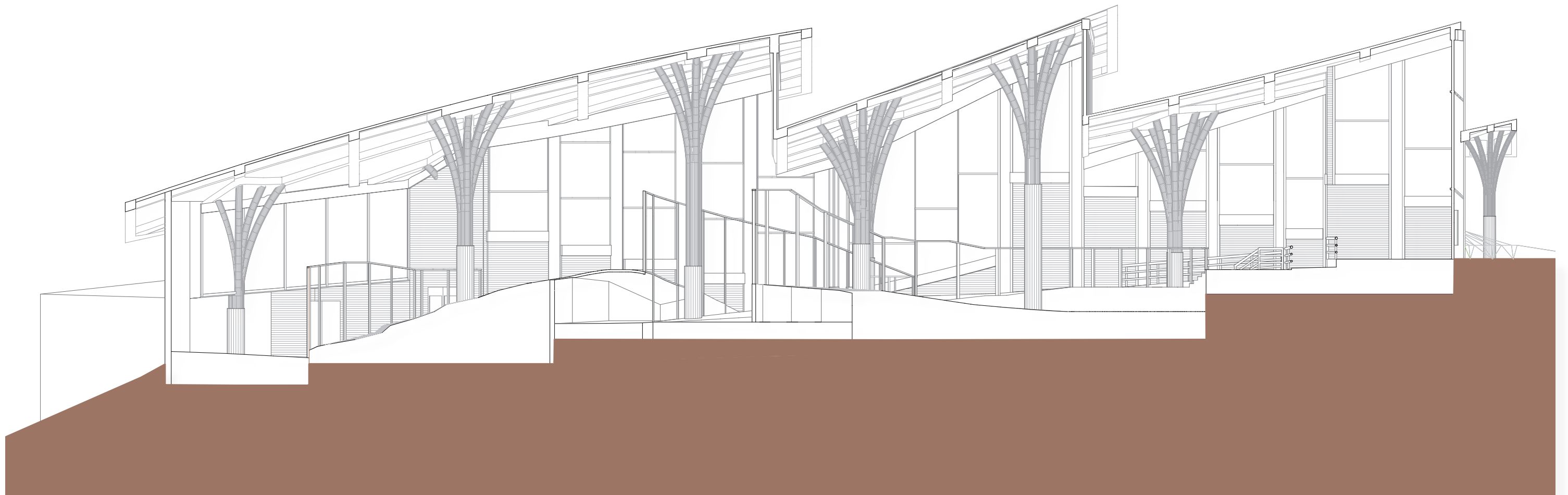
-Explanatory Floor Plan

This floorplan was created to give a good sense of what is interior and what is exterior according to the layout of the building. The solid outline is to show the inside conditioned space. Also the three Panda habitats are shown to give a good idea of where the circulation interacts with the actual animal habitat whether it be inside or outside. The arrows are to show public entrances into the building. As one can see the main entrance is through the southern side. From here the public can enter at the entrance below coming from either direction, or from the middle due to the Polar Bear overlooking path. This plan also gives a good idea to the re-worked site around it.



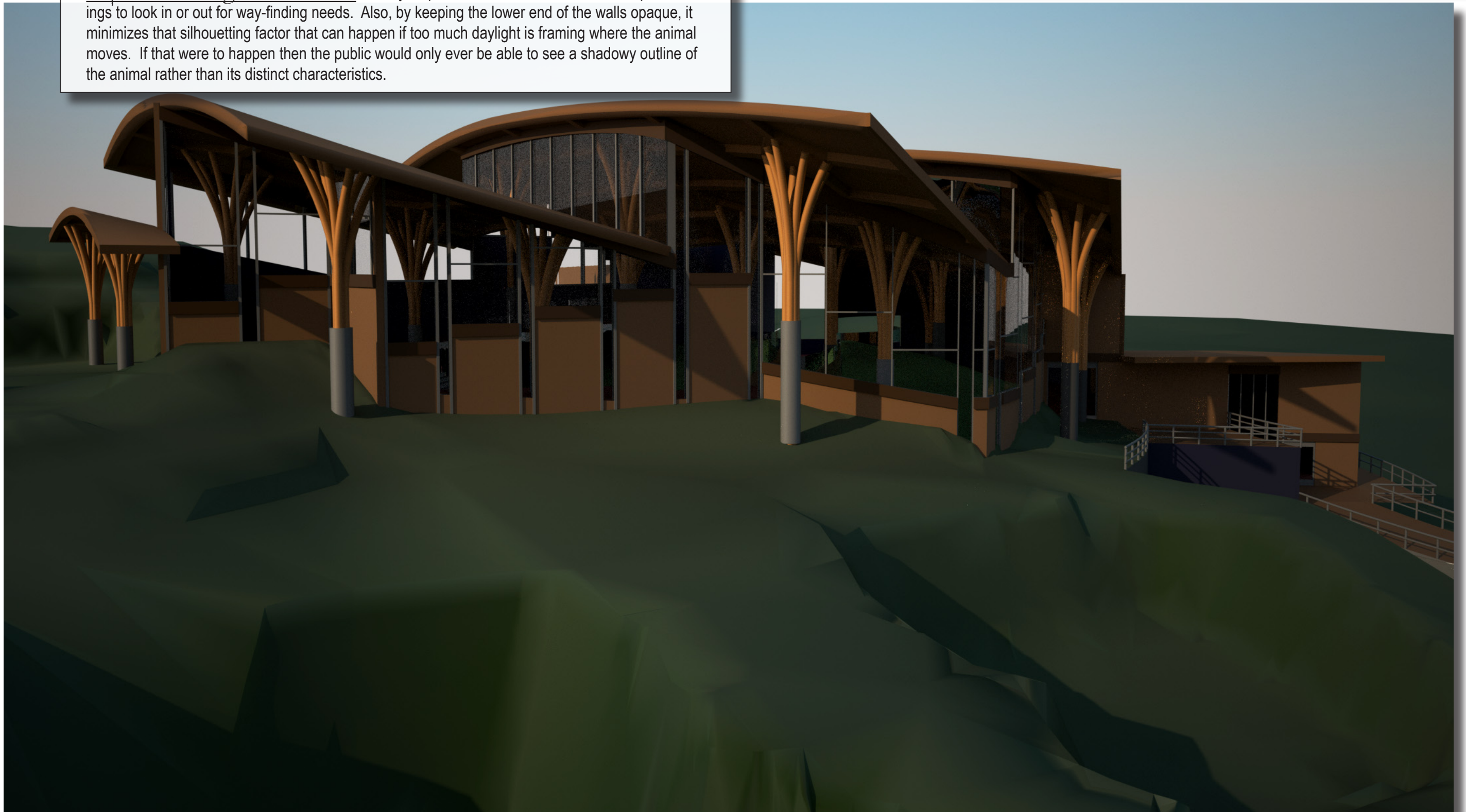
This longitudinal section was cut along the higher points of each roof. This gives the feel of how the columns are situated and where they intersect with each roof. Also it definitely gives a better feel as to what is exhibit space and what is circulation area for the public. The heights of the viewing glass are in there as well to help show areas that require a separation using taller glass, and those areas that only require handrails. Through this section cut underneath areas are visible as well. In both of the inside exhibits on the taller ends the public is able to go underneath the animal area and hopefully look up at the Pandas as they move about. This section, in addition, gives a general idea about what are the transparent walls and what is solid. The solid areas could of course be used for 2-d or 3-d displays as well.

Final Design -Longitudinal Section



This image is an overall exterior perspective without vegetation to help get a feel for how the building could look. Again the reaching columns solely support the concrete canopied roofs to give it that floating feel, without requiring any of the walls to be load bearing and support the roof load. Each column is set in a concrete base to help with the support. Also to the right of the image, railings are evident which help show the location of the exterior exhibit area. The walls emphasis the angle of the roofs as they step towards the ends, with vertical openings to look in or out for way-finding needs. Also, by keeping the lower end of the walls opaque, it minimizes that silhouetting factor that can happen if too much daylight is framing where the animal moves. If that were to happen then the public would only ever be able to see a shadowy outline of the animal rather than its distinct characteristics.

Final Design -Exterior Perspective



Final Design -Perspectives

This final perspective was created to give a feel for how the front entrance can function and appear. The contours here have been re-worked, creating retaining walls on the left and gentle slopes on the right. Also the roofs here look massive, yet completely separated. Despite their size they appear to float along the edges. The columns are visible whether they are on the inside or the outside, again helping to blend the inside Asian feel with that of the outside for a more cohesive design. The scale of the building also does not seem daunting, despite the known height of the first roof.



Final Design -Interior Perspectives



The two interior perspectives shown are to give a general idea about the building and the space. Of course the educational displays are not added yet, these are more to get a feel of the space and the structure. The image on the top is when someone first potentially walks in and is standing near the beginning railings. Immediately ahead is a Panda exhibit with opportunities to go above or below the grade you are standing. These give possibilities for walk-outs to better view the animals. After you walk a little way to the right, if you stop and turn back towards the front entrance, that is what the image to the right would be. Again you could see the animal to the right, as well as the entrance doors and the ramping or steps to get to where you currently are.

Final Design -Habitat Perspective

This perspective was chosen to show the inside quality of the Panda habitat. To the right in the image is the bridge over the pedestrian walk that allows the animal to travel from one exhibit to the other. Also this perspective helps show the light quality the building possesses as one faces towards the South. The habitat itself is heavily contoured, just as the terrain would be in the Panda's natural environment. There are possibilities for the public to stand in jut-out areas to better see the animal, and the animal has extensive room to run around in. The columns give the building that vertical sense while the roof planes help keep it feeling horizontal.



Final Design -Final Model

The final model was created using the plaster of paris previously stated for the roofs, along with basswood, wire, chipboard, clay, and various dried vegetation to use for the habitat areas. The hardest part was to measure the lengths out perfectly for the columns and to get them to angle exactly the way that was necessary. However it proved to be a success as the largest of the roofs was able to stand completely on its own without the addition of the walls. This would probably mimic the order in which it would have to be performed in real life. First the land, then the columns and roofs, finally ending with the walls.



Final Design -Final Model

This interior shot of the model really allows the viewer to see the care that was taken to help understand the building. The ramps and steps are all in place and shown, as is the detailed exhibit area. By showing how the exhibit can easily become steep on the edges helps show how it would probably be done in real life. This gives the animal less of an opportunity to get too close to the public. Also the heights of the exhibit walls grow and shorten accordingly, displaying how the public would be seeing the exhibit. Whether it be from a small area where there is merely a railing, or whether it is an area where the animal can get closer and therefore glass is necessary, the model reflects what would actually be required.



Final Design

-Final Model

Here it is better to see how this model was cut for the section. It seemed important to show more than one roof, so the cut was taken in an area where there could be at least two roofs with the addition of the overhang. Also this way definite ramps as well as jut-outs could be shown along with the few areas there are steps. Some example 2-d displays were inscribed on the wall, however other 2-d or perhaps 3-dimensional displays could be placed there instead. This section cut allowed for habitat area as well as circulation area to be shown, which really helps explain how the building is organized.



Final Design -Final Model

This is the final image which gives an overall view of the building itself as well as the contours that were re-worked around the area. One can see that the existing road on top was maintained, while an additional ramp from approximately the Cat Complex was able to be brought down to the building. Also there is a path to the right of the building that leads to lower levels as well. With the building sunk into the ground like that, higher windows on the inside then become eye-level on the upper road, allowing the public to view the animals from outside on the top road as well as the inside. Overall I believe my building was successful and achieved its goals.

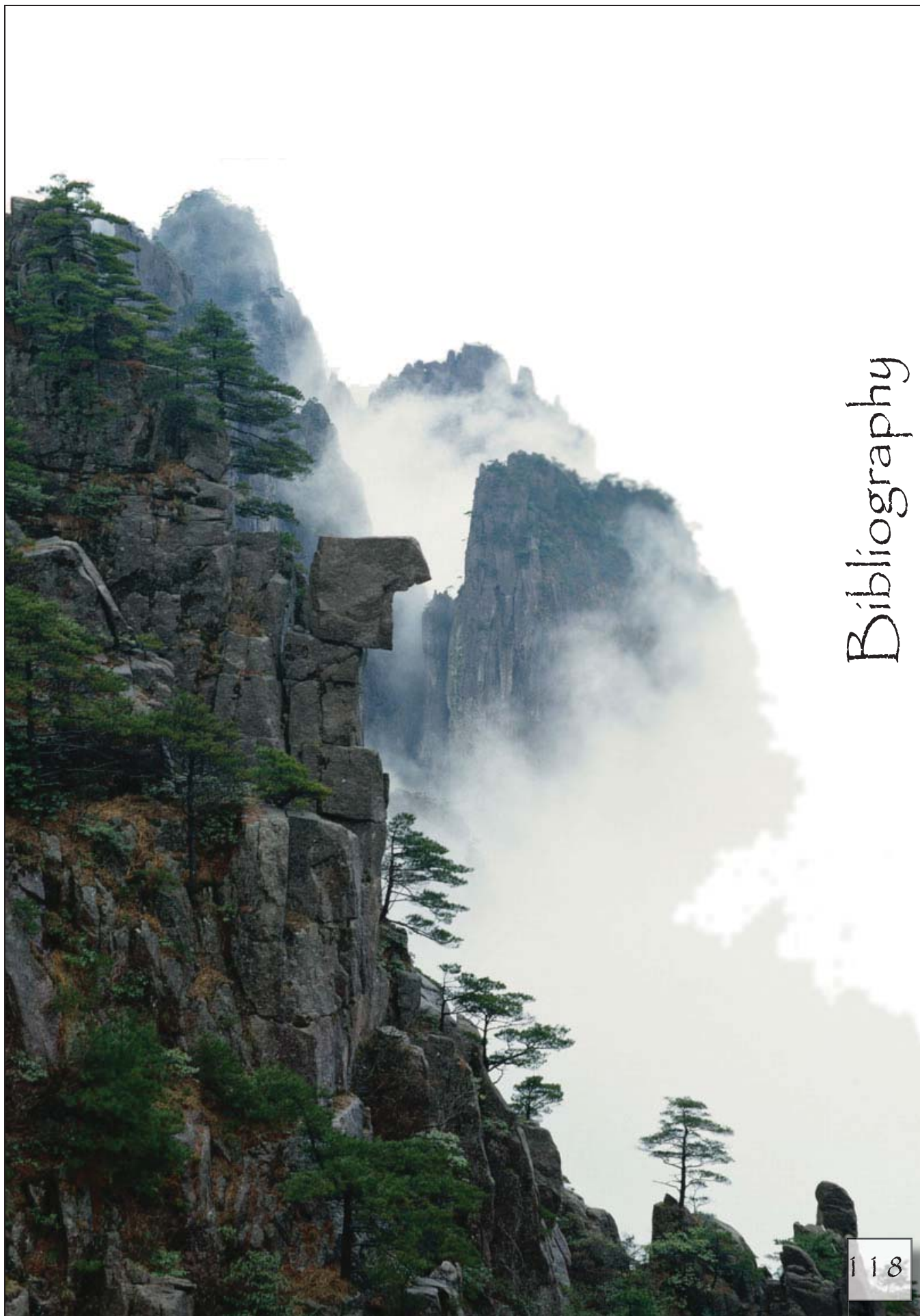


Final Design

-Final Thoughts

In the end my design went a completely different way then I was expecting. Yet that is what made me so satisfied with the project. I started the designing with no idea what the end result would look like. Instead I let each step mold and shape the project into what it wanted to be, and what it should be. My beginning benchmarked goals and timeline of course went awry. I was hoping to dive into the sustainability of the building, and the exactness of educational displays. However, as usual, time has a something different in mind. Yet I am satisfied with the areas that I focused on. For instance, although it took me a couple of weeks I am happy with the results of building the large study model. It honestly helped me to see where the ramps needed to be and how to get the existing contours to tie into the building. After all, that was an important part of my initial design, and it needed to be proved that it worked. Also the focus on the roofs was unforeseen, yet imperative. What better way to enable your building to be renovated then to have none of the walls be load bearing fro the roofs. Figuring out how the structure needed to work with the floor plan took up unforeseen time, yet helped the project to be so successful an thought-through. Given more time I would still like to dive into re-using the water run-off in the exhibit, and creating ways to recycle uses from the building, as well as incorporating specific educational displays with the ramp that was so carefully planned out. Overall I believe the project was successful and as complete as it could be in the time allowed.





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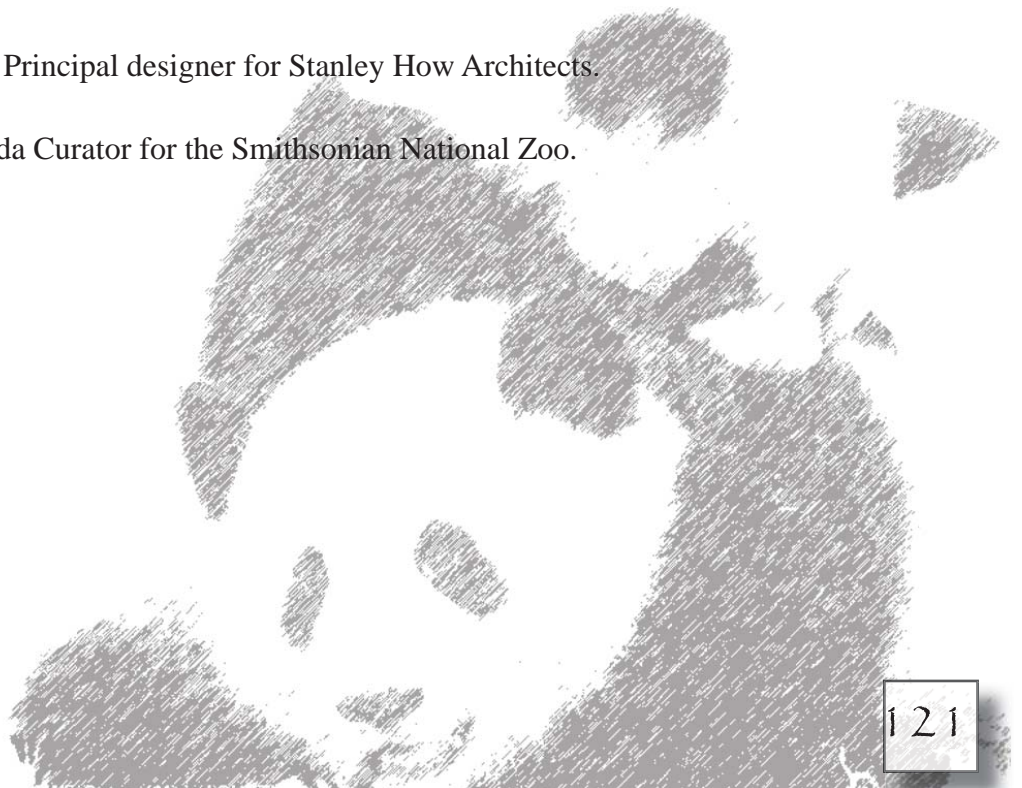
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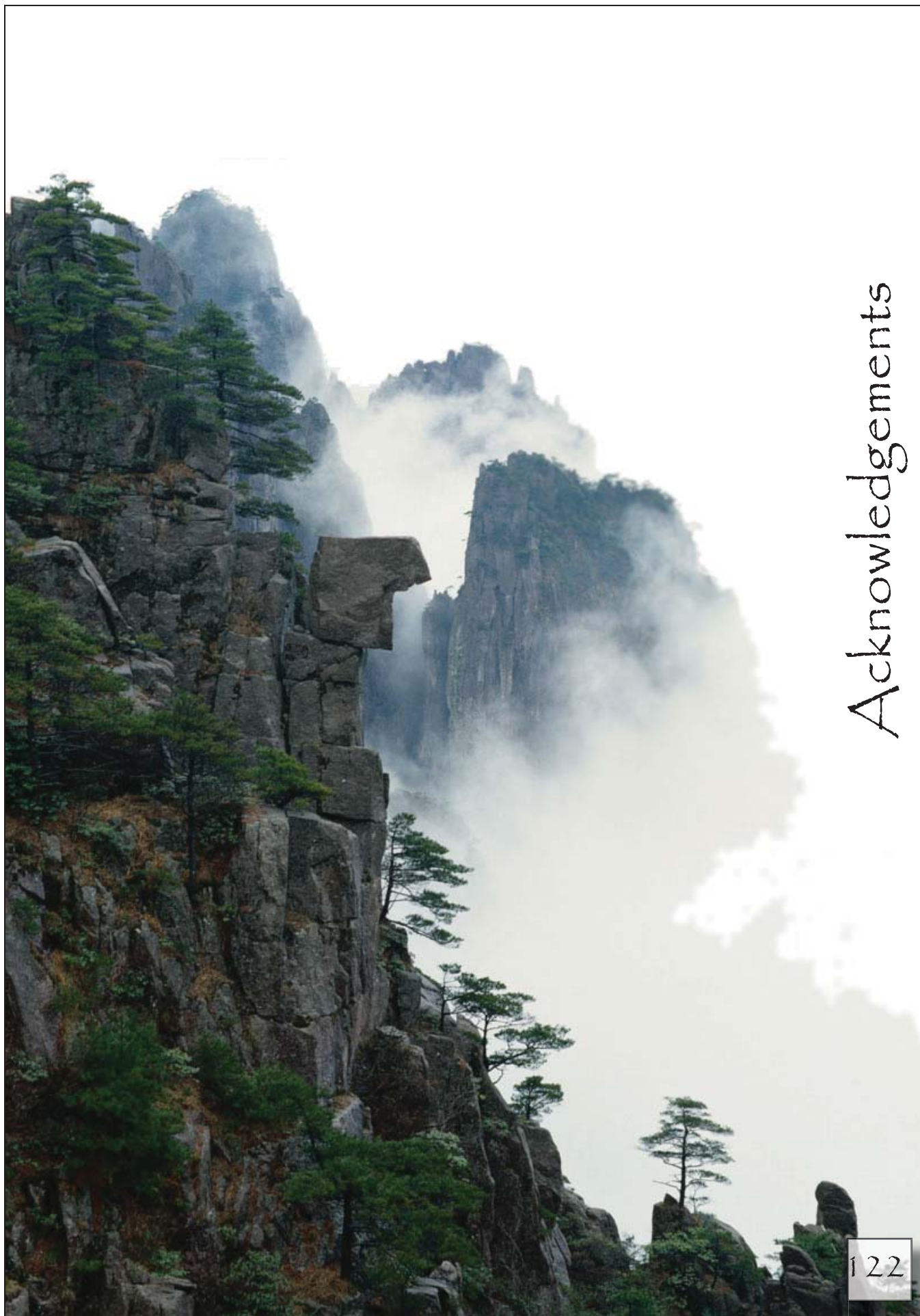
People

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John Armknecht. Principal designer for Stanley How Architects.

Lisa Stevens. Panda Curator for the Smithsonian National Zoo.





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Acknowledgements

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Finally I would like to thank everyone who helped complete the project. The Henry Doorly Zoo for being so cooperative, John Armnecht of Stanley How, the zoo keepers at San Diego Zoo, Lisa Stevens at the Smithsonian National Zoo, and everyone else who helped this project become what it is.