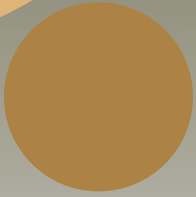


The background is a solid light brown color. It features several abstract geometric elements: a large orange circle in the top left corner, a smaller dark brown circle below it, and a very small light brown circle to the left of the dark brown one. A thick white curved line starts from the left edge and curves downwards and to the right. Another thick white curved line starts from the top right and curves downwards and to the left, crossing the first white line. In the bottom right corner, there is a dark brown circle and a large orange circle partially visible.

ADVENTURES IN MIMICRY

ENHANCING CHILDREN'S MOTOR SKILLS
THROUGH IMITATION PLAY AND INTERACTIVE
HABITATS IN THE KANSAS CITY ZOO

REBECCA PRUETT | THESIS 2017-2018





ADVENTURES

IN

MIMICRY

ENHANCING CHILDREN'S MOTOR SKILLS THROUGH IMITATION PLAY
AND INTERACTIVE HABITATS IN THE KANSAS CITY ZOO

A DESIGN THESIS SUBMITTED TO THE
DEPARTMENT OF ARCHITECTURE AND LANDSCAPE ARCHITECTURE
OF NORTH DAKOTA STATE UNIVERSITY

BY
REBECCA PRUETT

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF
BACHELOR OF LANDSCAPE ARCHITECTURE



PRIMARY THESIS ADVISOR



SECONDARY THESIS ADVISOR

MAY 2018
FARGO NORTH DAKOTA





THESIS ARCHIVAL NOTE

The following thesis project, entitled *Adventures in Mimicry: Enhancing Children's Motor Skills Through Imitation Play and Interactive Habitats in the Kansas City Zoo*, was composed over the course of the 2017-2018 academic school year. The Thesis Program, as contained here, was initiated and completed in the fall semester as a part of the LA 563: Programming and Thesis Preparation course. Supplemental material, including the Thesis Boards and the Thesis Presentation documents, were generated in the spring semester as a part of the LA 572: Design Thesis studio. Any inconsistencies between the different documents, in terms of research and design, should be excused per the evolution of the project across the two semesters.

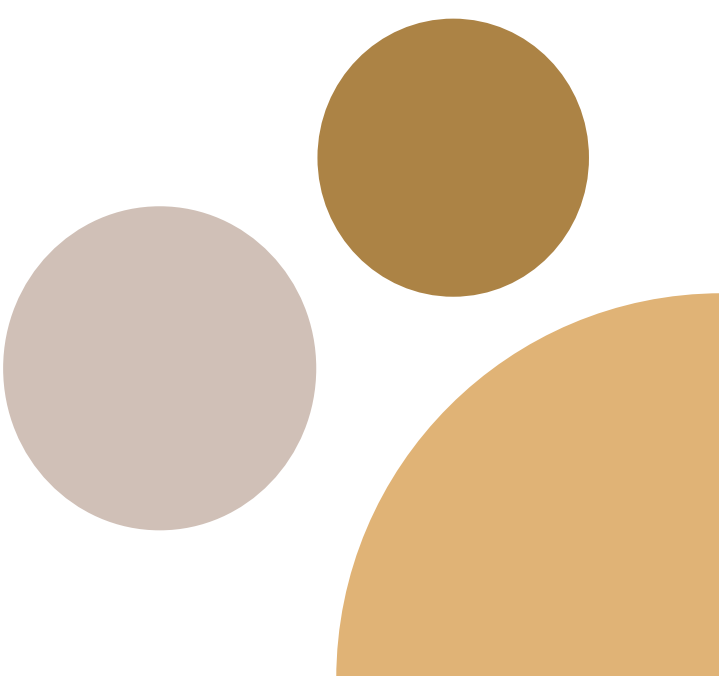
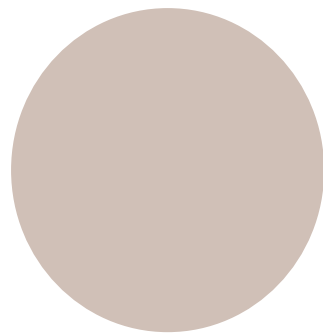
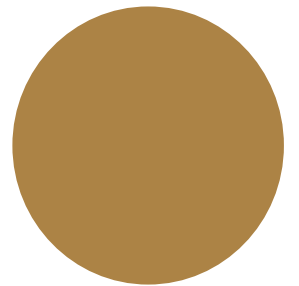
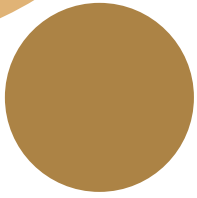
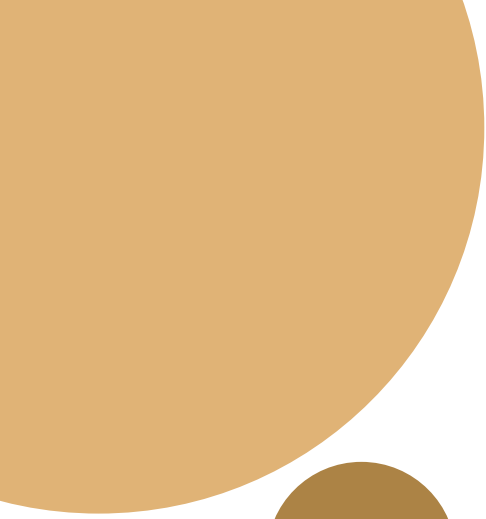




TABLE OF CONTENTS

Abstract	9
Narrative	10
Typology	12
Precedent Research	13
Major Elements	20
Project Emphasis	21
Client	22
User	22
Site	23
Goals	24
Plan For Proceeding	26
Research	28
Literary Review	30
Research Summary	36
Context	38
Justification	44
Site Analysis	46
Performance Criteria	52
Program Appendix	57
References	59



TABLES & FIGURES

Orangutan Exhibit Design | FIG. 1

Zoo Habitat Art [Photograph found in Kansas City]. (n.d.). Retrieved October 15, 2017, from <https://www.pinterest.com/pin/448671181604992337>

Maggie Daley Park Map | FIG. 2

Site Map [Photograph found in Chicago Parks District, Chicago]. (n.d.). Retrieved from <http://maggiedaleypark.com/about/design/>

Zoological Site Map | FIG. 3

Ohio's Backyard Discovery Zone [Photograph found in Concept Plans, Cleveland]. (n.d.).

Healesville Entry Monument | FIG. 4

Healesville Entry Monument [Photograph found in Melbourne Day 7]. (n.d.). Retrieved from <http://www.madpsychman.com/2015/05/melbourne-day-7>

Kansas City Zoo Logo | FIG. 5

KC Zoo Logo [Photograph found in Kansas City Zoo, Kansas City]. (n.d.). Retrieved from <https://www.kansascityzoo.org/>

Kansas City Zoo Map | FIG. 6

KC Zoo Map [Photograph found in Kansas City Zoo, Kansas City]. (n.d.). Retrieved from <https://www.kansascityzoo.org/visitor-info/zoo-map/?location=maintenance>

Wood Chip Sample | FIG. 7

Site Map [Photograph found in Chicago Parks District, Chicago]. (n.d.). Retrieved from <http://maggiedaleypark.com/about/design/>

Sythetic Turf Sample | FIG. 8

Ohio's Backyard Discovery Zone [Photograph found in Concept Plans, Cleveland]. (n.d.).

Sand Sample | FIG. 9

Healesville Entry Monument [Photograph found in Melbourne Day 7]. (n.d.). Retrieved from <http://www.madpsychman.com/2015/05/melbourne-day-7>

Ape Training Mechanisms | FIG. 10

KC Zoo Logo [Photograph found in Kansas City Zoo, Kansas City]. (n.d.). Retrieved from <https://www.kansascityzoo.org/>

Tiger Training Mechanisms | FIG. 11

Zoo Habitat Art [Photograph found in Kansas City]. (n.d.). Retrieved October 15, 2017, from <https://www.pinterest.com/pin/448671181604992337>

Natural Playground | FIG. 12

Site Map [Photograph found in Chicago Parks District, Chicago]. (n.d.). Retrieved from <http://maggiedaleypark.com/about/design/>

Polar Bear KC Exhibit | FIG. 13

Ohio's Backyard Discovery Zone [Photograph found in Concept Plans, Cleveland]. (n.d.).

Orangutan KC Exhibit | FIG. 14

Healesville Entry Monument [Photograph found in Melbourne Day 7]. (n.d.). Retrieved from <http://www.madpsychman.com/2015/05/melbourne-day-7>

Ape Exhibit | FIG. 15

KC Zoo Logo [Photograph found in Kansas City Zoo, Kansas City]. (n.d.). Retrieved from <https://www.kansascityzoo.org/>

Adventure Play | FIG. 16

KC Zoo Map [Photograph found in Kansas City Zoo, Kansas City]. (n.d.). Retrieved from <https://www.kansascityzoo.org/visitor-info/zoo-map/?location=maintenance>

Commanding Nature | FIG. 17

Site Map [Photograph found in Chicago Parks District, Chicago]. (n.d.). Retrieved from <http://maggiedaleypark.com/about/design/>

Kansas City Zoo Map | FIG. 18

Ohio's Backyard Discovery Zone [Photograph found in Concept Plans, Cleveland]. (n.d.).

Solar Panels | FIG. 19

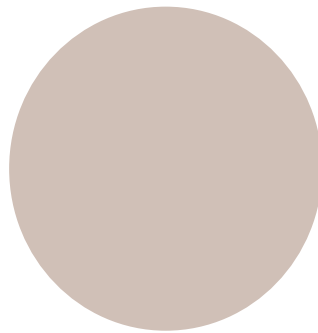
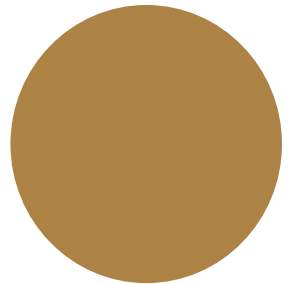
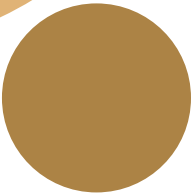
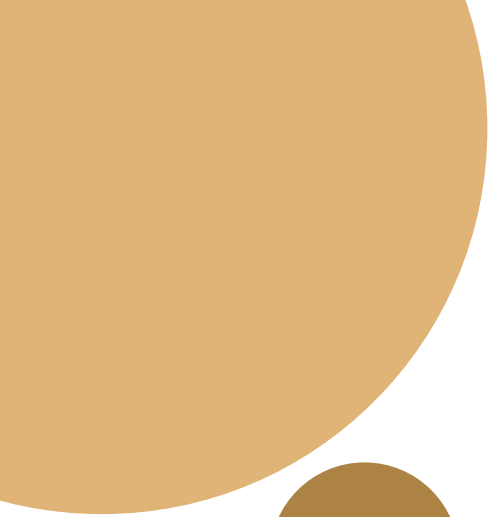
Healesville Entry Monument [Photograph found in Melbourne Day 7]. (n.d.). Retrieved from <http://www.madpsychman.com/2015/05/melbourne-day-7>

Code Compliance | FIG. 20

KC Zoo Logo [Photograph found in Kansas City Zoo, Kansas City]. (n.d.). Retrieved from <https://www.kansascityzoo.org/>

Donation Bin | FIG. 21

KC Zoo Map [Photograph found in Kansas City Zoo, Kansas City]. (n.d.). Retrieved from <https://www.kansascityzoo.org/visitor-info/zoo-map/?location=maintenance>



IN A WORD...

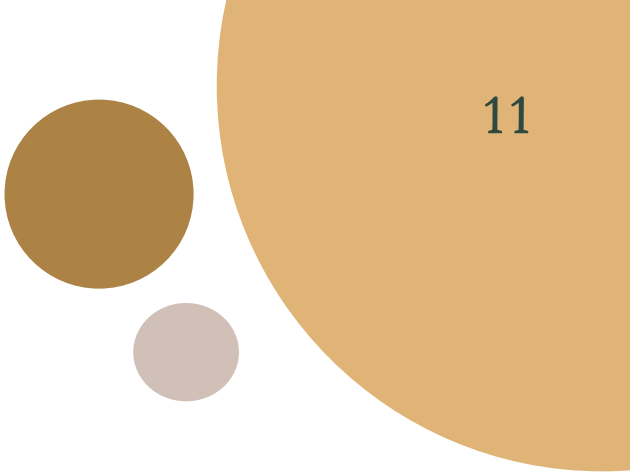
The creation of a collection of exhibits focused on well being, natural enrichment, and personal development for the inhabitants as well as all that visit them. To create spaces that encourage play and learning between species and give users an outlet for development outside a classroom.

...ADVENTURE.

CREATION OF WILDNESS:

Rebecca Pruett – 10.14.2017

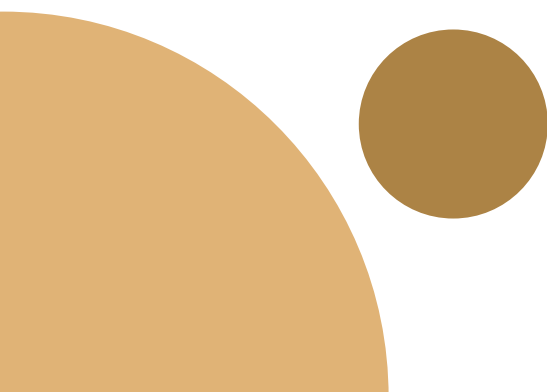
Wild animals have always captivated my attention. From some of the first projects I started at NDSU, I realized my passion was to design for the life around us. However, over time that passion has begun to meld with my experiences working with children. I have spent my entire college career focusing on design for animals and children in a cooperative environment. So much so I obtained a second degree in Zoology. Which leads me to believe my thesis project should incorporate the epicenter of wild animals and possibly wild children, a zoo.



Zoos often fall under controversy. What is a zoo's purpose? Are they a place of conservation? Or a place to gawk at animals? Possibly even just a place to run through in half an hour? These last two ways of thinking are what gets zoos in trouble, and can give them a bad reputation. The biggest critique a zoo will frequently receive is that their animals are deprived of a healthy lifestyle. Research and development of new techniques and practices are helping zoos continually strive to better the life of the animals in their care. The next largest issue zoos face is the lack of connectivity between the animal environment and the area kids are free to roam. Anyone who has been to a zoo can relate, the animal they were so excited to see is too far away, and the exhibit seems lifeless.

My research will focus on pulling case studies from both sides of the issue together to create a seamless environment fit for both children and creatures alike. Looking for specifics on the creation of imaginative play. This interaction could range from development of gross motor skills, to even math and reading depending on age. While other projects will help to shape the research on the zoological side. Both sides will include research data that can help to quantify the need for an environment that feels continuous throughout, allowing to the children to romp and play, side by side with the animals.

Zoos have come a long way, since their start in the backyards of kings. Modern zoos are continually striving to create a unique and educational experience, all while keeping their focus on conservation. I intend to study the styles and mechanisms for interactive play, both in animals and children, because of the positive impacts the learning style can bring to the zoo environment.



TYPOLGY:

Zoos have always fallen into many categories of design. They are often civic projects done by the city, and are largely impacted by city laws and regulations.

However city rules are just the framework for good design. Zoos can be classified as many things; environmental art, habitat design, even playgrounds. This creates a design that must function on many levels, must have elements that address a variety of needs and create spaces that facilitate connection between them .



PRECEDENT ANALYSIS:

In order to create a unique experience that meets every user's needs there needs to be research pulled from each perspective.

NATURAL PLAY



Chicago, Illinois

MAGGIE DALEY PARK

Using the topography and movement in a site to create structure and programming.

CULTIVATING CURIOSITY



Cleveland Zoo

NATURE PLAYSCAPE

Using natural materials to create a unique and interactive play opportunity in a zoo environment.

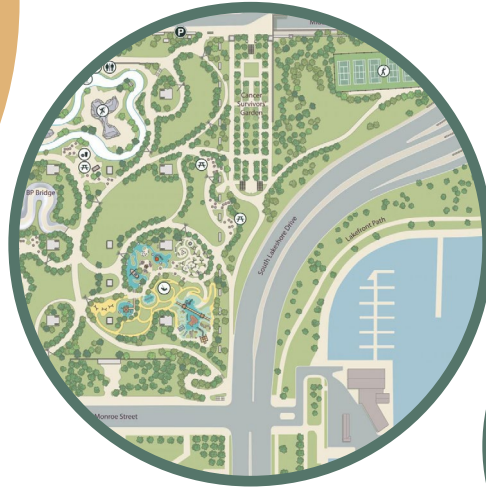
ANIMAL ENRICHMENT



Healesville Sanctuary

TASMANIAN DEVIL EXHIBIT

Creating enrichment opportunities for species in captivity through design and manipulative features.



NATURAL PLAY



MAGGIE DALEY PARK

TYPE: Playground / Public Park

LOCATION: Grant Park in Chicago, Illinois

SIZE: 20 Acres

CREATOR: Michael Van Valkenburgh

On the site there are two central axes, each providing a different necessary function of the park. From northeast-to-southwest is the 'Park Axis' while the 'Play Axis' runs from northwest-to-southeast. This study will focus on the 'Play Axis' as it is most relevant to the new design. Another crucial piece of the site is its unique terrain and elevation challenges. Much of this site has underground roads, buildings and parking lots that challenge the way it can be designed.

These axes provide an interesting way of connecting the greenest parts of downtown Chicago. Van Valkenburgh created unique play structures for each specific age group. The separation of skill levels among children has become common practice, its the playful nature and intricate design of the space that makes the site successful.

The site filled a gap between the harsh inner city, and the pristine landscapes that are in the surrounding area. Giving children a place to romp and explore.

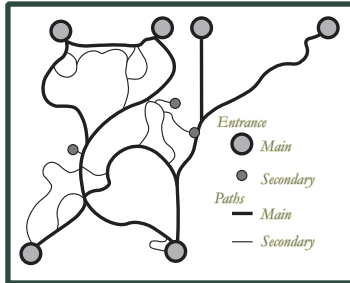
FEATURES OF THE PLAY AXIS

- Ice Skating Ribbon
- Tennis Courts
- Rock Climbing Walls
- Play Garden

ANALYSIS:

Part of the success of Maggie Daley Park, is simply the intricacy of the site.

CONNECTIONS



Walking Paths

RECREATION

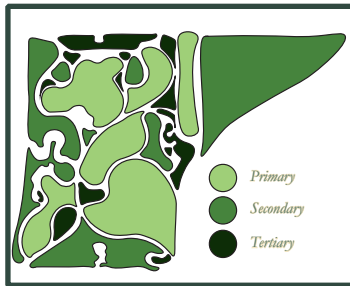


Preschool (2-5)

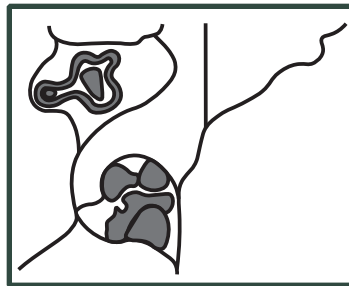
TOPOGRAPHY



Slide Crater



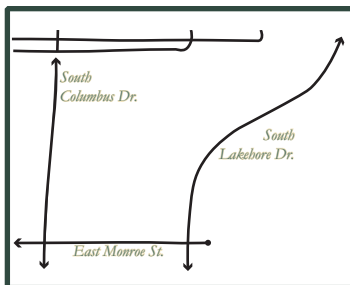
Vegetative Spaces



Elementary (5-12)



Climbing Park



Major Roads



Adults



Tower Bridge

CONCLUSION:

Based on the research, it appears there is large success by creating direct main traffic-ways, and by grouping specific activities based on skill level. It is very apparent that in order to match the surrounding city, elevation was added in appropriate spaces.



CULTIVATING CURIOSITY



NATURE'S PLAYScape

TYPE: Playground / Zoological Park

LOCATION: Cleavland Zoo

SIZE: < 1 Acre

CREATOR: Learning Landscapes

The site was created as an extension of the current playground and carousel, in the Discovery Ridge Nature Play Area. The central idea is to explore the concept of wildlife in the surrounding Ohio area. There are millions of 'backyard wildlife' programs, but this one takes it a step further. Programming spaces to mimic the habitats of native wildlife, and allowing children to make their own programming decisions.

The site is based around the question, 'Who lives in my backyard?' From there they challenge children to think about three facets of their environment.

- 1) Can I get water for this animal?
- 2) Can I build/find a good house for this animal?
- 3) Can I feed this animal?

From there children are encouraged to search for and create the environment they believe will best suit the animal of their choice.

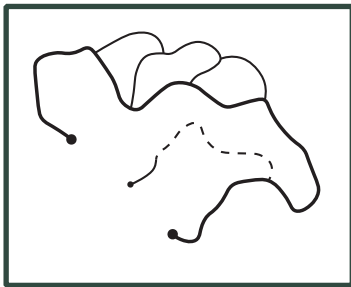
FEATURES

- Native Edges
- Boulder Outcropping
- Squirrel Cafe
- Observation Deck
- Wetland
- Waterplay
- Thicket
- Eagle's Nest

ANALYSIS:

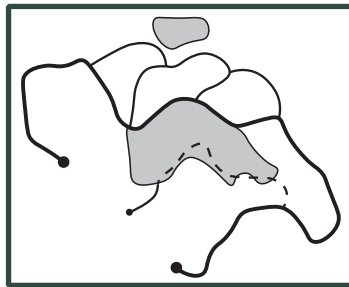
The small space, provides an intimate 'backyard' setting. Analysis compares style of play to the companionship needed, and the program elements involved.

CONNECTIONS



Walking Paths

RECREATION

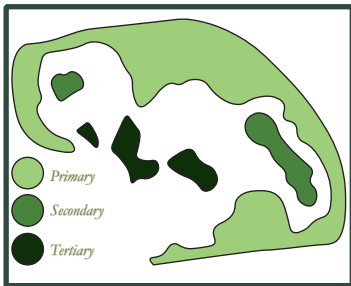


Active Play

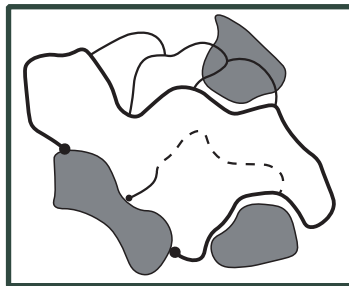
FEATURES



Willow Tunnels



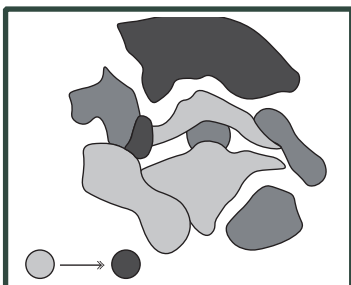
Vegetative Spaces



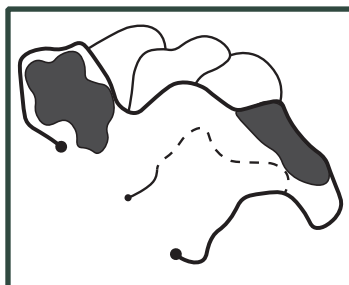
Passive Play



Building Materials



Public vs. Private



Water Play



Problem Solving

CONCLUSION:

The style of backyard wildlife is trendy, yet this is taken to a new level, making it more relatable to kids. This style of design could easily be adapted to suit environments all over, while still posing the same three questions.



ANIMAL ENRICHMENT



TASMANIAN DEVIL

TYPE: Exhibit / Zoological Park

LOCATION: Healesville Sanctuary

SIZE: 87 Tasmanian Devils - 9 specific study participants

CREATOR: Tierney O'Neal

The research looked at a few specific questions.

- 1) Do enrichment items have an effect on activity levels?
- 2) What types of enrichment are most effective?
- 3) How do behaviors change over time after multiple exposures of the same item?
- 4) Which behaviors are elicited by different types of enrichment?

ENRICHMENT TESTED

FOOD RELATED

- Pegged-Down Carcass
- Bungee Carcass
- Meat Smear
- Mulch Pile
- Kibble Ball

NON-FOOD RELATED

- Kangaroo Scats
- Koala Scats
- Burramys Substrate
- Fort Change
- Mulch Pile

Each novel enrichment was placed in the enclosure and then behavior was monitored. Behaviors were categorized three ways, curious, defensive, or feeding. Curious behaviors could include; sniffing, scratching, nudging, digging, carrying, or climbing. Scent marking or urinating were seen as defensive.

ANALYSIS:

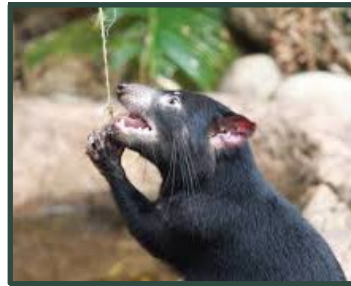
Behaviors were categorized and timed to determine the success or failure of different enrichment items.

BEHAVIOR



Defensive

ENRICHMENT



Bungee Carcass



Curious



Kibble Ball

CONCLUSION:

The results of this study are interesting. The initial goal was to raise activity levels by introducing novel items. This however was not the case. For most of the enrichment items, the animal would spend a significant amount of time in direct contact, focused on the new addition. This lowered their activity level, however raised their mental stimulation. Species specific enrichment is important, and even more important is individual specific enrichment.

MAJOR ELEMENTS:

Creation of new spaces is just the first step in the new play center at the Kansas City Zoo. The new design will also be taking over an existing portion of the zoo. Some of this is open/dead space, however some of it is programmed. All of the programmed space will be transformed or re-purposed to accommodate all animals.

EXISTING:

Exhibits

- Kangaroo Habitat
- Sheep
- Waterfowl
- Camel

Buildings

- Eco-House
- Exploration Center
- Camel Wintering
- Sheep Barn

Spaces

- Open Field
- Playground
- Stream
- Unused Exhibit

NEW:

Exhibits

- Kangaroo Viewing Platform
- Stream Ecosystem
Water fowl and platypus
- Camel Run
- Koala Forest
- Spider Center
- Death Defies

Each exhibit will have a coordinating public playspace devoted to child development and learning.

PROJECT EMPHASIS:

The new addition to the KC Zoo will strive to create three major things; creative housing for zoo residents, learning through play for children, and the break down of barriers between the two.

CREATIVE HOUSING:

Exhibits have come a long way in the past from concrete rooms to the unique enrichment seen in the Tasmanian devil case studies. Through this project, the research will prove that by purposefully creating permanent play features, as well as visual access, inhabitants will have improved well being and temperament.

LEARNING THROUGH PLAY:

As seen in Nature's Playscape, it is largely beneficial for children to play a role in their education. This is made available through design. Spaces were created to help children grow. They can be as specific as scientific learning on monotremes, or as diverse as play spaces designed to challenge motor skills. Both are important to master as a child grows, and are easily adapted to match play styles of different aged children.

BREAKING DOWN BARRIERS:

The iron bars and chain link fences from the past has lingered on too long, causing a sense of insecurity around zoo animals. While some of this is well deserved, proper design can give peace of mind while still allowing up-close encounters with wild species. This thesis will explore both the use of glass and open exhibits, as well as elevation as a means of security.



CLIENT:

The initial client is the Kansas City Zoo, the site needs has been designed for best use by the owners and operators for the zoo. This means that it has been created to optimize monetary benefits, ease of use, and other client benefits. However, the end client is blurred, and it could be stated that the zoo keeper, and animal are the client. This is where specific user design is important.

USER:

When designing for a zoo, most people think how to design for best visitor experience. However, this is just one example of a user. For this particular project, I will focus on 5 specific users, each with different wants and needs. These can be generally categorized into two groups; visitors and residents.

Starting with residents, the group can be broken down even further into zoo animals, and zoo keepers. Both need specific aspects designed to keep each other safe. Each animal has distinct food, safety, activity needs that will be addressed both from the view of the animal and the keeper. Spaces will need to be designed with ease of access, for trainers, vet staff, and large equipment needed to move larger animals around.

The other group is visitors, specifically children. Spaces have been designed to give children the upper hand, created for their size, education level, and motor skill. This works for one child or a single family, but there also needs to be spaces that can handle large groups of school children. Lastly there are the adults. These are the paying customers that keep the zoos revenue steam. They must have spaces that cater to their needs as well, while maintaining a fun and inviting space for the children they brought.





SITE:

The Kansas City Zoo, in Kansas City, Missouri, has always been supported by the surrounding public. This mid-size Midwestern zoo is continually striving to create a better and more adaptive environment. They have recently created new exhibits for both a polar bear and penguins to help round out their habitat diversity. The zoo was built in the 1909 and has only grown from there.

The particular site chosen centers around the old ape house. The exhibit was built in 1966, but has since been vacated, and demolished in 2015. The space now sits empty, and is surrounded by underdeveloped land or poorly executed exhibits. This is open space and the abundance of school children visiting the site create an opportunity for a design to be utilized year-round.

EXHIBITS INVOLVED:

Within the zoo, this site was chosen because of its run-down state. The chosen site contains 4 existing exhibits; kangaroos, sheep, waterfowl, and camels. Each of these will either be redesigned or relocated to a more appropriate place in the zoo.

GOALS:

The end result of this design is the physical realization of the three points of emphasis. Each of which plays a role in the theoretical, physical and social goals associated with a zoo design project. When all three can come together, the zoo no longer just has a new exhibit, or a donated playground. They have a space to offer hands on learning experience to schools in the area, a place to take the grandkids when they have too much energy. As well as an ideal space to house and maintain the wellbeing of the animals in their care.

From a theoretical standpoint, all zoos will move to create exhibits that follow this pattern of design. Creating educational play components to match the interior exhibit design, however this isn't practical. Zoos have been constantly changing and adapting with new theories arising every day on what is best. The goal of the first half of the project is to show the concept and possibility of creating a group of exhibits that portray this new theory. While the second portion is an ability to take preexisting exhibits and add play features to create a more well-rounded space.

The Association of Zoos' mission statement says a lot about the professional goals for the physical zoo environment. Across the front of their website scrolls large graphic of a child interacting with an animal and the text "We believe in a better future for all living things. We envision a world where all people respect, value, and conserve wildlife and wild places." This, in theory, is how all zoos should be designed. The goal of this thesis project will be to not only create a better design for the animals involved but for the future generations that may inhabit this space.

Another large portion of the professional impact of this project is conservation. While there are no specific measures in place to save a specific species, there are methods of awareness. Zoos are all about conservation and the empowerment that comes with knowledge.

This makes the ability to view and learn about a specific animal extremely important. It is well-known that the cutest-and-cuddliest of the animal world have the largest following and support. This project is an attempt to help the animals that have been left behind and give recognition and conservation support to some of the outliers, all while maintaining the site theme in the Kansas City Zoo.

In the KC Zoo specifically, the public takes great pride in the exhibits that are made available. The zoo has a large social following and is able to make an impact on a wide range of visitors. Even simple changes at the zoo cause a commotion, the rise of a new exhibit will spark attendance, recognition, and revitalization of school trips to see the new site. This is important to continue the role of conservation and public education, by continually getting the public involved.

In global terms, this could be a site that focuses on an under-served population of animals, creates a direct impact on public education, and could cause waves among designers. This is also an opportunity for academic advancement for species that are less well known. By getting their names out there, more funding becomes available and the KC Zoo has the opportunity to branch out into more conservation research.

The goal first and foremost is to create exhibits that provide only the best in terms of mental and physical health, while creating an educational habitat for the development of children in the area. By achieving this, it helps open doors into more in-depth conservations, education, and awareness for species in danger of extinction.

A PLAN FOR PROCEEDING:

RESEARCH DIRECTION:

The project has been laid out in such a way to provide direction and theories to create the optimal zoo environment. Research will continue to advance in the three main fields; learning landscapes, exhibit design, and motor skill development. Future case studies may be added as well from the landscape architecture side, as well as peer reviewed studies for child development.

Further research and analysis on the Kansas City Zoo will need to be completed to define specific site boundaries. This will also help inform which exhibits will be included in the final scope of the design. By studying specific micro climates and the change in topography, unique spaces will be created to accentuate the positive features of the site, and upgrade the existing exhibits.

METHODOLOGY:

Information found on the topic will be compiled from previous research as a base of information. For all landscaped design a graphic analysis will be completed as well as interviews of the site owners and everyday users. For specific exhibits, research will be compiled on that animal's requirements, both physically and mentally. Interviews will be carried out with keepers of each species to get a firsthand account of behavior, mentality, and primary needs.

Once needs are mapped out, statistical analysis will be used to determine the best alignment of spaces. This will also help inform which species can potentially share exhibit space, and auxiliary spaces needed for movement.

DOCUMENTATION:

Documentation will be portrayed in a chart of coordinating spaces. Interview scripts will be provided in the appendix of the documentation for future readers.

WORKING CALENDAR:

Week 1-2	Complete program, Complete preliminary site analysis.
Week 3-4	Finish interviews, Compile preliminary personal research
Week 5	Create final proposal and program
Week 6-7	AutoCad Design Work, Create all base maps
Week 8	Compile research, Choose species for exhibit
Week 9-11	Create all interior exhibits
Week 12-14	Create all learning landscapes
Week 15	Compile all spaces, Check for incongruity
Week 16-17	Create Digital Model
Week 18	Create all graphics
Week 19	Create Boards
Week 20	Finalize presentation, Create 3-D Model

RESEARCH:

Parents want nothing more for their children than a safe and educational play environment. Playgrounds can be deemed education for multiple reasons; the most common would be the physical signage and themes explored. The other option is one that helps develop motor coordination and decision-making skills.

This later option is to be explored in my hands-on research with three groups of children in the greater Kansas City area; preschoolers, 3rd graders, and middle schoolers. The test will be similar for each age classification, with adaptations to make it easier for each group to answer. The first portion of the test will have rows of different play equipment, that vary in difficulty or style of play all based on a specific motor skill. Each skill will have its own row, and the difficulty levels will be scrambled throughout the columns (to combat pattern recognition). The children will then be asked to rank each row from most fun to least fun in their opinion. This information will then be compiled to determine what styles of activity do children enjoy among the ages, pertaining to different motor skills.

The second half of the study will use a similar set-up, with rows of activities. However, these activities will all be very similar in nature, differing in skill level needed. Children will be asked which ones they see as boring, which they see as fun, and which ones seem dangerous. This will help to determine where the line is drawn for the adrenaline rush vs. actually viewed as scary.

The second half of the study will use a similar set-up, with rows of activities. However, these activities will all be very similar in nature, differing in skill level needed. Children will be asked which ones they see as boring, which they see as fun, and which ones seem dangerous. This will help to determine where the line is drawn for the adrenaline rush vs. actually viewed as scary.

This area of research helps to ground the play space in a reality of what children will enjoy. However, no matter how great the children think the site is, if the parents think it is unsafe the place will be a ghost town. The goal is to create a site that children will perceive as 'risky' while their parents can see that they are in no real danger. This can be mitigated by using safety surfacing.

Eight types of safety surfaces were ranked from best to worst in six categories, (price, toxicity, color, natural appearance, accessibility and maintenance.) This created a score for them in relation to each other suited for a zoo environment. The top-ranking materials were; wood chips, synthetic turf, and sand, in that order. Typically surfacing materials are chosen for a combination of two reasons, fall height and fall direction.



LITERATURE REVIEW:

Research for this design has been separated into three main categories; animal enrichment, animal-visitor interaction in zoo settings, and the education and motor skill development for children.

Is Training Zoo Animals Enriching?

Zoo animals go through daily training, keepers go through their wellness checks, and maintaining safe environments. This training has been associated with many benefits when used in a zoo environment, however in some cases the training has been considered enriching. The term most frequently used in environmental enrichment (EE) is behavioral husbandry.

Previous to this research many papers infer that the training of animals is enriching and that this behavior modification is enjoyable. However, without real studies, this inference is just that. A guess based on anecdotal evidence. In this study by Vicki Melfi, research was done to determine if training animals to perform certain behaviors enrich their lives. Five hypotheses were used in determining this.

1. Does training provide learning opportunities?
2. Can training achieve the same results as conventional enrichment?
3. Does it increase human-animal interaction?
4. Does it provide a dynamic change in the animal's day?
5. Will it facilitate another form of enrichment?

By meeting one or more of these requirements the training program could then be seen as enriching for the animal.



Training as a Learning Tool

This paper defined learning as an opportunity to change behavior based on practice or experience. There is data that shows that active learning in promotes brain development and coping skills, which proves that learning can be a beneficial and enriching experience. Animals have also been proven to seek out the more adventurous tasks, that provided learning opportunities. The phenomenon was coined contrafreeloading. The benefits to contrafreeloading are still up for debate, but it has been shown that when captive species were presented with a 'free' resource and 'hard-to-get' resource that were identical, the species showed fondness for the more difficult resource. In other studies zoo animals were shown to have preferred food placed in enrichment items, as opposed to an open platter. This sort of behavior is in pursuit of knowledge, and gaining new skills. This however creates an issue, with the system. The issue is that once an animal learns the skill, it no longer becomes enriching.

Does Training Emulate Conventional Enrichment

Initially conventional environmental enrichment (CEE) was used to increase species specific behaviors. Or to mitigate abnormal behaviors as a result from captivity. This has been proven to benefit mental health and even deleterious behavior. In this study, it was proven that trained behaviors could have similar impacts. This could be used to train out negative behaviors and provide entertainment.



Human Provided Enrichment

Human-animal Interactions (HAI) are often a major piece of a captive animal's daily life. Animals in captivity interact with two groups of people, visitors and their keepers. Each of these groups provide drastically different HAIs. The differences often lie in education. The keepers that have constant interaction with these species, know the behaviors and attitudes of the species. They also have the opportunity to learn the quirks between different individuals.

Visitors on the other hand are only able to pick up on cues available that day, even then they may or may not interpret them correctly. This can create animosity between the animals and the zoo visitors, leaving the animals to resent the visitors.

Dynamic Change

The process of training is a repetition of actions to achieve a requested behavior. However, this is an unnatural behavior for most species. Animals in the wild face changes and challenges in their everyday life. This is one of the most difficult pieces of typical ecosystems for zoos to emulate. Daily enrichment gives keepers the ability to change up what they are experiencing every day. Training can be incorporated, yet is often not able to keep up with the enrichment needs of an individual.

Facilitating Enrichment

This offers a more intriguing opportunity. Using training as a means of introduction to a novel experience as a form of enrichment. Trained behaviors also help to control the situation in case of an unintended consequence or action stemming from the experiences. While the training itself may not be considered enrichment, it offers the opportunity to create a sustainable enrichment environment.

Motor Skill Development

A major portion of growing up is learning how to operate in the world around you. One of the biggest components of this is the development of motor skills. This can be broken into two general categories. Gross Motor skills are movements that incorporate large muscle groups, while fine motor skills are movements that incorporate small muscle groups. Children are developing and fine-tuning these skills the minute they arrive on earth.

While all children develop differently, there are milestones that most children meet, if developing normally. Starting with between 6-12 months, children are beginning to crawl and can stand with support. This all changes by 18 months, with children beginning to walk and even running. As children get older, they begin to change more rapidly. By four years old, a child can typically stand on one foot, kick a ball, recognize and avoid obstacles, walk a straight line, and be able to jump over an object. This is a considerable amount of growth and the beginning of growth and the beginning of life. By 1st grade a child has refined their jumping skills and has significantly improved their hand eye coordination. Giving rise to the ability to move their body with relative grace and maneuver around difficult obstacles.

Fine motor skills take longer to develop. The pincer grasp is one of the first to develop, using the fingers to move small objects. Even citing that children love to build up a tower of blocks, just to knock it over again in order to practice the skills. Children use these initial fine motor skills to string together long sequences. This begins to form the movements and abilities they will have as adults.

Animal Visitor Interaction and Conflict

An article by Fernandez and colleagues, called *Animal-Visitor interactions in the modern zoo: conflicts and intervention*, proved to be a wealth of information on how to mitigate stress in animals in response to human interaction. They initially spoke to how difficult it is for zoos to maintain their five primary goals. According to the AZA in 2008, they were listed as; animal welfare, conservation, education of the public, research and entertainment. While they would like to be able to focus on the first four, the entertainment value is how they gain visitors, and in turn revenue. Their full review was broken into three sectors. The first sector dealt with the attitude and behavior of visitors based on the presentation and behavior of the animals. Specifically, how exhibit design, animal activity level, number of visitors and their visit length caused changes in perception. The second area of study was the direct effects visitors had on the animals. They specifically studied visitor frequency and crowd-size for different species. Lastly they determined how interventions could be used to mitigate negative animal-visitor interactions. In this final area of research, they begin to focus on how this research could be used to help mitigate conflict in current exhibits, as well as how to design future enclosures to eliminate the issues.

How Presentation Can Influence Behavior

In their preliminary research it was determined that “naturalistic” exhibits were preferred over simple concrete ones. Furthermore, when viewing through the concrete and iron bar style of exhibit the viewer focused more on the exhibits appearance and the animals ‘perceived domesticity’ as opposed to the animal itself. Styles of exhibits were rated on a scale, from negative to positive. The concrete and iron bar style rated worst, then the naturalistic environments, and the most favorable were the natural environments with no perceivable barriers. The most praised exhibits were defined as ‘realistic with easily viewable animals.’ While the least popular exhibits were

defined as ‘realistic with easily viewable animals.’ While the least popular exhibits were defined as ‘dark and small.’ Typically, visitors were most happy with exhibits that combined the close proximity with ease of viewing, as well as the animal’s activity level. However, this section of research focused solely on the viewers attitude and opinion towards an exhibit style without looking deeper into the mechanisms behind that.

An example of this was seen in a gorilla exhibit that allowed researchers to assess both the visitor’s perceptions as well the gorilla’s actions. They placed a camouflage net over the viewing window to block visitors from the gorilla’s view. The reaction was two-fold, changes could be seen both in the viewers perception of the animal, as well as their actions in proximity to the animal. They surveyed the visitors following their viewing and those who had seen the gorilla through the net found the gorilla significantly more ‘exciting’ and showing less aggressive behavior than those who viewed without the net. The more surprising finding was that the net changed the behavior of the human participants as well. The net tended to create a sense of ‘wildness’ that caused the crowds to remain quieter than those without. Specifically citing that parents were telling their children “they were now in the ‘jungle’ and hence should be quiet.” This proved that even the simple addition of camouflage netting was able to produce a more ‘natural’ environment, which has been proven to be a factor in promoting conservation efforts.

Another factor in exhibit design, is the species activity level. Species that have high activity levels, or are often seen roaming their exhibit have higher positivity ratings. This was seen in the polar bear exhibit in the Philadelphia Zoo. In times that the polar bears were active, visitors engaged in significantly higher animal-related conversation than in times where the polar bear was inactive, or unable to be seen. While this seems self-explanatory it provides a good base of knowledge on how to mitigate the issue, and the power animal activity has in getting viewers attention.

RESEARCH SUMMARY:

The previous three articles, and the research within them are the base of the redesign of the zoo. They each hold a basic necessity that needs to be present within the design; the use of enrichment for animals, motor skill development for children and finally the interaction between the humans and the animals on site.

In terms of zoo design, the main goal is creating an environment that suits the species to the best of their ability. The article was a critique of how training is viewed in a zoological setting. This becomes applicable to the design. Creating a site that can use the training patterns of the different species to introduce new and unique challenges to the animals. This could be applied in an open area both in the front and back of the enclosure. This gives the keeper a space to have personal interactions with the animal that can either be on display, or hidden from the public. The space that would be on display would be for non-critical training behaviors, or at times where visitors heckling would have a major impact. The interior training space would be used for times where the keeper needed to more thoroughly check over the body. Another addition that would play a major role in the training and enrichment would be spot locations in the exhibit that the animal could be signaled to, that would initiate an enrichment sequence.

This begins to inform how the visitors of the zoo will be encouraged to interact with the animals. There will be many opportunities that the animal can choose to hide from the public eye, and will feel secluded. One-way glass will become an integral component of how to give the public an inside look at how the species interacts in a simulated wild environment. However, visitors also pose a new and novel enrichment option. This creates an interesting opportunity to play with moving features that allow the species to manipulate pieces of their exhibit to allow view the zoo visitors if they want to.

The final piece of the puzzle is how to weave an interactive play space throughout the exhibit. The goal is to create a challenging play environment that could go unnoticed by most. Imaginative children, and care-free adults will be able to choose activities based on their skill level and get to view the exhibits from different vantage points. This uses a reward system for the interactive play, and teaches kids to look at things differently. However, each of these play features among the exhibits will be something that challenges the mind and body, creating an experience that is constantly changing. This will mitigate the problem of programmed experiences.

Options are endless in creating natural features, but a focus will be on manipulating height and texture, as these are two major things children are drawn into (dependent on age.) Water will also be a feature, however will be used sparingly to create an environment suitable for school groups. Each individual age category will need a range of play features that are mixed into the site and will often use features that get more difficult with height. This will help children know analyze their decisions and take steps to mitigate risk.

As a whole, the site will integrate the necessities for each species and then will pull similar features into the environment surrounding giving kids a chance to expand on and mimic the play styles they view from the animals. This will also help to create a more seamless environment.



HISTORICAL CONTEXT:

Kansas City Zoo

The Zoo is located in the heart of Kansas City, in Swope Park, started as just a dream. Activists went to the government looking to create the largest zoological park in the United States. To achieve this dream, Thomas Swope donated the land in 1896 to the city, and it was allocated for a recreational and zoological park. When the zoo first opened in 1909, the menagerie was meager. With only four lions, three monkeys, and a few small mammals and birds.

The Zoo has gone through many expansions over the years. One of the most notable was the expansion in 1948, with the addition of 'Touchtown,' the interactive children's zoo. This created a petting zoo, and many other freestanding features specifically for play. In 1964, a puppet theater was added, which later became the Education building. It can be seen in the Discovery Zone today.

With a constant fear of becoming outdated the city gave up control to a private non-profit group. With this Randy Wisthoff, of Friends of the Zoo, INC, became the executive director setting the stage for many of the new projects to come. This is apparent by simply walking through the zoo and seeing that since 2007, the zoo has invested over \$85million in capital projects.



The Design Site

A major portion of the site is part of the larger Kansas City Zoo, and was formally home to the great ape exhibit. This space age exhibit was built in 1966, obtaining the nick name of the 'monkey Hilton.' This relic was partially emptied in 1995, when the monkeys and apes were moved out into their spacious new homes in the African Safari. The Orangutan were left in their space-age home until much later in 2002. In 2002, the zoo had an altercation with the Department of Agriculture in regards to the welfare of the orangutans. The zoo almost lost their accreditation with the American Zoo and Aquarium Association. To which they answered with a domed cage, saying it was temporary. That lasted until spring of 2016 when they received their new six-million-dollar open-air exhibit.

The exhibit itself when built was the most iconic piece of the zoo. It was featured on all the memorabilia, signage, and advertisements for the zoo at the time. There was a time when it was the most impressive feature at the zoo, until it started being used. From the very start the large exhibit had a major starting flaw, it was dark dingy pit of concrete. It has also been reported on many occasions that the animals were unhappy, and began to act out. One example of which was the throwing of excrement out at the visitors of the zoo as a source of entertainment.

Since 2003, the fate of the exhibit has been unknown. There was a significant push to keep and re-purpose the old relic. However, this was deemed unattainable and the building was demolished and the pit was filled in 2015. The site has been left a grassy mound since then.



SOCIAL CONTEXT:

Kansas City Zoo

The Kansas City zoo has an incredible reach into the surrounding public. A prime example of which is their public education. The zoo offers many daily opportunities through keeper chats, exhibit signage, and their shows throughout the park. Each of these are scheduled into the routine of the zoo, and always changing to keep each trip exciting and educational.

However, their outreach moves even further, with day camps for children. For younger children, they offer 'Zoofari Adventures', Junior Zoologists programs, and Act like an Animal camps. For older children they also offer 'Keeper for a Day' programs, that allow the kids to reach more in depth into zoo life. They even offer overnight programs giving kids a chance to experience the zoo in a unique way. These types of adventures help to get children out into nature, while giving them a chance to learn and grow. While the zoo offers many programs that can be attended by signing up as an individual, they have even more opportunities for groups. Day activities created specifically for preschool and elementary school classes, and tours of the main exhibits. Other programs are available for scout groups, or any other group that would like to learn about the zoo more in depth. Another program they provide are programs for home school students.

Children are an important sector of the zoo's outreach; however, they are not the only piece. They offer guided tours for participants of all ages, and strive to create an environment that can suit anyone's needs. They have several options as easy as an African Golf Cart Safari, to relax on the African Plains. With a more intense option in the Wild Safari Walking Tour.



The Design Site

While the zoo as a whole does a fantastic job of reaching out to the community, no section is makes a greater impact than the Discovery Zone. This area of the zoo gives children an opportunity for hands on learning. Many of the children that visit the zoo come from either the inner city, or the surrounding subdivisions. For many of these children, their pets at home are the only examples of 'wild' animals they have in their lives.

The Discovery Zone has quite the menagerie for children to interact with. There are three main sections; exotics, the Discovery Barn, and the surrounding barnyard. The largest being the exotics outside with unique architectural features and playground spaces. The main attraction is a koi pond. This seems insignificant to many, but gives kids a chance to exercise their wants and opinions. By dropping food at the koi pond, it causes a reaction amongst the fish. When kids are given an opportunity, it allows them to recognize their body autonomy. The discovery Barn interior has many species, most notably; the scarlet macaw, meerkats, ring-tailed lemurs and many species of amphibians. Each of the species has an exhibit that caters to the young and old. Intermixed between the exhibits are colorful play features that get children engaged and learning. This style of learning needs to be pulled from the interior to the exterior, and into the rest of the site. The final section of the site is arguable the most important. The site boasts interactive exhibits that allow children to get into the pen with farm animals on site. By using farm animals, parent's minds are put at ease, while children's mind's run wild with imagination.

While all of these spaces are significant, the most important piece is the comradery that is inherent within the site. The space is designed to be relatable, to offer chances of mimicry and teamwork.

PHYSICAL CONTEXT:

The physical address of the Kansas City Zoo is 6800 Zoo Dr, Kansas City, MO. The 202-acre site is located in the larger Swope Park. The Blue River creates a natural boundary along the Northeastern edge. This river then moves south into the site, create unique challenges and adaptive spaces. The site for my design, the rest of Australia and the Asian trail reside on the west side of the river. With the African Safari on the east side. Much of the site is wooded, this presents a few design challenges but gives rise to many opportunities for immediate shade.

The zoo has done an impeccable job of using the topography to their advantage. This can be seen in the many exhibits that keep the visitors on a varied elevation from the animals they are viewing. As well as using topography to get around other physical barriers with the train tracks and the Blue River.

Another design challenge to overcome with the varied topography is the chance of flood. With the Blue River in close proximity, the chance of flood in a major storm event is high. This is mitigated by keeping a majority of the animal enclosures out of the flood plain. Even going so far as to burning parts of the peninsula to create safe usable space for animals who don't mind the swampy earth.

Surrounding the zoo is a very diverse social group, there is a suburb on the south west side, made up of single family homes. The rest of Swope park is to the west of the zoo, with a community center just north. East of the site are continuations of Swope park, and portions of the Swope Memorial Golf Course.

VALIDITY IN CONTEXT:

After reviewing the site, it is evident that Kansas City is very interested in creating and maintaining an enriching environment. They have plenty of examples of new development, and they have many areas of promise, however it appears that some of the most unique spaces have been left behind. With such a rich history, it only makes sense to push forward, being in the forefront of zoo design, and a pioneer in the creation of educational play environments in zoological parks.

By creating a site that mirrors a zoo's want for conservation with communities need for developing playgrounds, the zoo will have a space that can be used for years to come. Play spaces have been defined as many things, and in recent years have moved away from the standard equipment. Typically, programmed pieces of equipment bought from a catalogue. This is challenged by the concept of 'adventure' playgrounds. In New York City, there is a play-space that is known as the first adventure playground in the city in decades. Play:GroundNYC, can be found on governors island, and it's all about letting children explore their creativity in risky situations.

While the city may not want to promote a space quite as intense as some of the most well-known parks, the premise can be used and melded into an educational setting. By getting children to make choices, and exercise their minds and bodies, it creates healthier life habits. By giving them a chance to make safe 'risky' decisions, it help mitigates the need to partake in real life risky behaviors. By creating an adventure park in the zoo, they are not only educating kids on animal behavior, but also how to handle their own behavior.



PROJECT JUSTIFICATION:

On a personal level, I am extremely interested in the correlation between landscape architecture and zoology. I believe they can hold a ton of overlap, especially when employed in a way that exemplifies the similarities. At this stage in my academic career, I am finished with my zoology degree and working on the completion of my final capstone project. I strived over the years to put my knowledge of ecological processes to good use through design, however this is the first time that

I will be able to take full advantage of this learning. In terms of professional development, this is just the first stepping stone to achieving my dreams. The goal has always been to design zoo exhibits and the spaces that surround them. I am looking forward to this first opportunity of many. However, while this is one of the first times I have been able to use my second skill set, I still have a lot to learn. This is especially true when dealing with specific codes, and how to maximize impact while minimizing risk.

For the design, Zoo exhibits are constantly being improved, as researchers develop new ways to mimic natural environments in hopes of creating the idea exhibit to maintain animal health. However, this animal only helps the zoo if they can have patrons view the species in a way that is deemed 'exciting.' When that excitement is lost, the numbers of zoo visitors begins to dwindle. By adding a new exhibit that is entirely flexible, the experience will be constantly changing. This creates excitement beyond the new and shiny material, and into how people feel about the space. The funds for the project will likely come from a few sources, the first of which is the tax base of the Jackson and Johnson counties. Other sources of funds will be attained through grants and private donations. The zoo could retain the option to charge for the play structure. Recommendations will be made that the site remain free, or minimum contribution. Nearly all returns will be intangible and will be used more as a visitor draw than a monetary attraction.

Site impacts will be great, there will be significantly more patrons in the currently underutilized space. This will have great implications in terms of stress levels on vegetation as well as the animals housed on site. These stressors could be mitigated and justified as a means of conservation awareness and monetary gain. Within the same line of thinking, the current state of technology is sub-par with large sections being inoperable or outdated. The update would likely lower energy costs and maintenance needs, creating a site with lower needs than right now.

In terms of social impact, this project has the means to rock the boat. The design could be furthered in a direction that sparks curiosity, and creates a unique space in Kansas City. Or it could be created in such a way that the design fits so seamlessly into the new 'exhibit' that patrons don't even notice its truly been designed. This has started to become the trend in many spaces, and would only further the role landscape architects have in the zoological field.



SITE ANALYSIS:



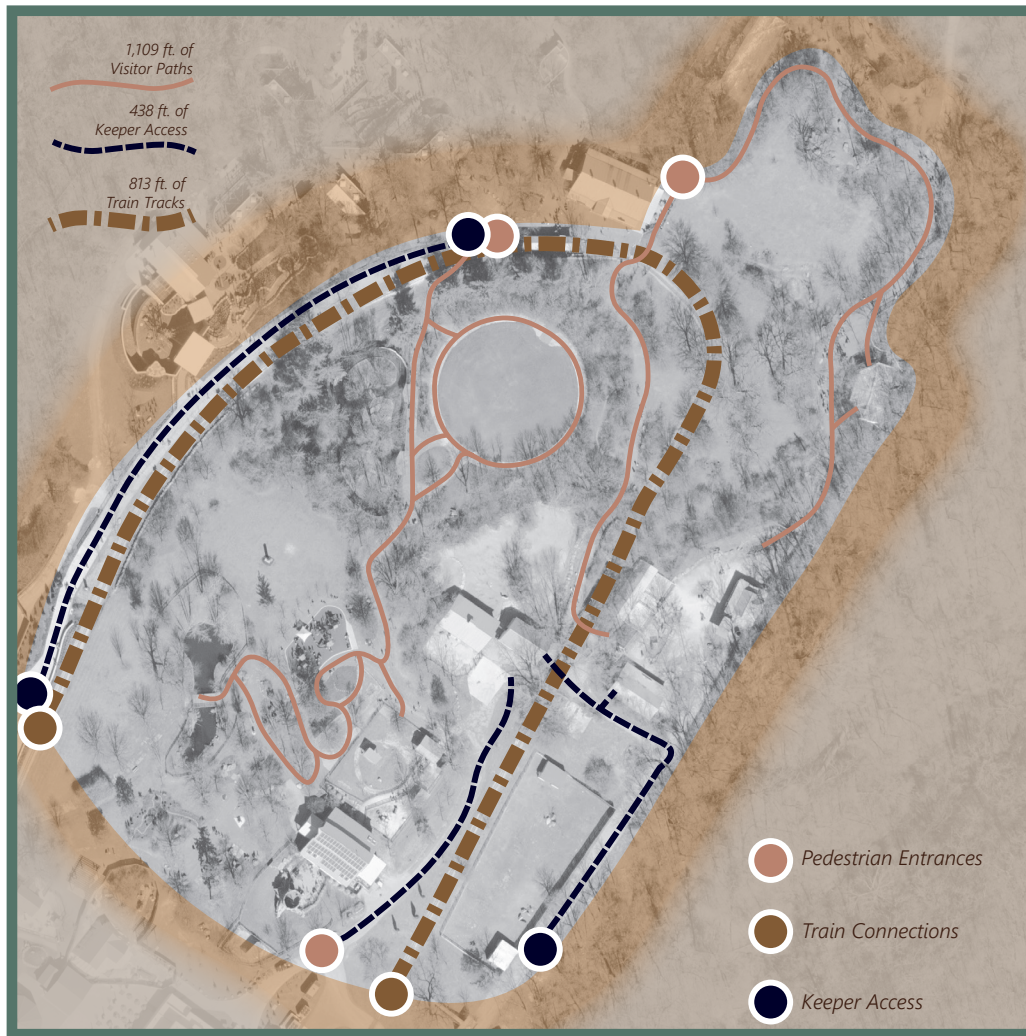
The nearly 13.5 thousand sqft. of outdoor animal exhibit space, houses six species of mammals, several species of waterfowl and a collection of koi fish. Each of the mammal species has an adjacent structure to provide winter shelter.

EXHIBIT SPACES:

There are also three educational buildings within the site boundaries. The first is the Green Revolution building. The first building visitors see when visiting the outback is the Green Revolution building. This was once a fantastic example of the technology available to better our lives and the environment. However as time marches on, the site needs to be revamped and new technology added to keep up with the ever changing market

Another building in the area is the Wonders of the Outback building. Often being cited as a source of confusion for most visitors. With little indication of the theme, it can begin to feel more like a hoarders hut than the trading post it was modeled after. This site could use renovation and better signage to really get the message across. The last building, and also the most engaging is the Discovery Barn. This building has many exotic species on the interior, while the exterior has a barnyard theme. This is one of the best examples of integrated play in the entire zoo.

CIRCULATION:



This area of the zoo is the connection between the Australian exhibits and the kid's discovery zone, with two visitor loop systems.

A major connection for this area of the site is the train station on the north section. This gives visitors an easy route to the front entry of the zoo, as well as giving the passengers a behind the scenes view of a few of the animals.

The site has a total elevation difference of 31 feet. The site quickly moves towards the river but these steep slopes and low river bank keep the site from being a part of the 100 year flood.

There are five water sources in the design area. The first is the Blue River, with no public access, and not even many viewable portions from this area of the zoo. The next is the Kangaroo Watering hole, this provides the species a method to cool off on extremely hot days.

The final two water zones are in specific exhibits.



DRAINAGE:



A With the apes moved into their new home, the old exhibit has been demolished. Leaving an empty space holding promise for new life. On the edge of 'Australia' it seems logical to be part of a revitalization of the dated 'Outback.'

B This section of the zoo is devoted to giving children a hands-on learning experience with farm animals. While well designed, the area lacks connectivity with the rest of the exhibits in the area.

C When finishing the 'Australian' trail, visitors are dumped out into a gravel field. With dated exhibits and buildings, they often feel lost and unconnected to the rest of the zoo.

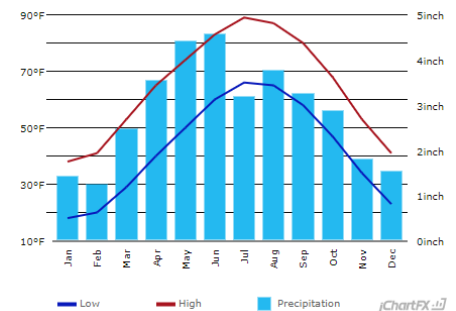
D The llamas are hidden from the general zoo visitors, only visible from the train. With little design put into the llama enclosure, they feel out of place and forgotten.

SITE ANALYSIS:

As illustrated in the maps previously, there are several sectors of the site. For the design three main spaces will be focused on; the dated outback, the discovery zone connections, and the empty ape exhibit. These have been outlined in the problem areas map, and are the areas of most concern.

With the massive amounts of existing vegetation, the design will have to be careful to conserve as much as possible, and add to places that have been stripped from previous development. To continue the appearance of a forest in the upper discovery zone areas. Another vegetation concern is to create a better micro-climate around the discovery zone. Much of this space is open and the winds blowing through can get chilly in the winter, as this is an all-season site. However, the outback zone and the old ape exhibits have been designed well for air flow and shade coverage. The site is fairly enclosed from most sides however, winds from the north west bring in cooler temperatures, while winds from south\southeast bring warmer temperatures.

Typical temperatures that should be expected in the summers range from 70-95 degrees Fahrenheit, often with very high humidity. Shade and resting spaces will need to be incorporated along all trails as well as periodic places to quench visitor's thirst. The winter however can be wildly variable from year to year. There are days that reach the low tens, but will average between 20-40 degrees Fahrenheit. See the chart for more averages.



Soils vary across the site, with sandy loam soils in some of the higher ground locations. Closer to the river becomes siltier, with pockets of silty clay loam. The site has fairly good drainage overall, leading towards the Blue River. The only major concern is the man-made creek on the south-east side of the kangaroos. It has become shallower than it should in order to continue to be a natural barrier for the kangaroos. More interviews with zoo staff will need to be conducted to determine if this is an issue in regards to kangaroo management.

Finally, in regards to the exhibits themselves, none are inherently bad, however most have been designed from the viewpoint as an adult. Meaning if a five or ten-year-old goes to look into the exhibit, they often cannot see the animal, or even much of the exhibit. This will need to be addressed both in containment styles as well as general vegetation and maintenance around the exhibits.

PERFORMANCE CRITERIA:

Allocation of Space:

The area will be roughly broken down into thirds. The first third will be used for viewable habitat space, the second will be space for keeper animal interaction, night time pen, and other off-view habitat spaces. The final third will be allocated for the public, this will include the play features, the viewing area, the planted zones and other appropriate features based on final design. Each of these will need to be evaluated differently, with different target goals, most of them will be evaluated simply by usage of different features and time spent. This can be accomplished with a visual tally and time table system. Final judgment will be easy to calculate, by ranking features based on number of uses and time spent at each.

Energy Consumption:

Energy consumption will be measured from three categories; light, heat, and energy created. The site will be used 24 hours, 365 days a year, by some of the animal inhabitants and will need to be designed accordingly. However, this will not be artificially lit on a regular basis. Lighting will be installed and turned on if needed to keep the public areas lit until six pm, and keeper access areas lit until 9om. None of the exhibits will be lit at night, except designated indoor zones. Other educational features and areas will also be lit with powered displays to stimulate the senses.

Most of the energy used will be to continually regulate temperature for enclosures. Each exterior habitat will have a heat rock for winter use, and a cooled den for summer use. Full heating and cooling systems will be in place for all indoor exhibits, and will be used to maintain standard temperatures for the animal in question. All energy created on site, will be kept and used for the running of other educational

processes. The ‘smart house’ on site will generate a small source of electricity, however it is largely used as an educational tool.

A light study will be used to determine what light levels, and spacing will be needed to keep the public safe while minimizing impact on the animal inhabitants. The goal will be to rely on minimal light levels and rely on natural light and energy use for a majority of the day. The final design will be judged on use of natural light, heating and cooling systems as well as cost.

Environmental Performance:

Thermal zones will be largely manipulated in the final design with each of the spaces being largely enclosed. This requires precision when designing a micro-climate. All spaces will have a light study to regulate temperature. As well as a wind study to maintain good airflow and to minimize bacteria. Each of the exhibits will have acoustical studies done as well to help mitigate the sound from the public spaces. By creating quieter spaces this will minimize stress on the animals.

These spaces will be judged on their ability to create a suitable micro-climate for the animal in question, and by meeting the required needs as shown in the table.



Behavioral Performance:

Behavior performance will be measured in terms of adrenalin vs. motor skill development. The ideal structure will peak just at the 'adrenalin rush' without moving into the scary territory. This will create spaces that are divided by age/ability level. Allowing kids to move up the ranks, gaining new skills and stop when they feel their 'risky decisions' become dangerous ones.

Another measure of behavioral performance will be in the parent's ability to stay out of their children's way. To allow them to discover and learn on their own, and only step in, when invited. This will be mitigated through a devoted parent area, with easy access to the more intensive playground pieces.

Psychological Impact:

This will be broken down further into three sectors; child, animal, and parental impact.

Child Impact:

- Educational
- Given Opportunity for Choice
- Fun

Animal Impact

- Low Stress
- Given Opportunity for Choice

Parental Impact

- Viewing Area
- Parental Entertainment

Code Compliance:

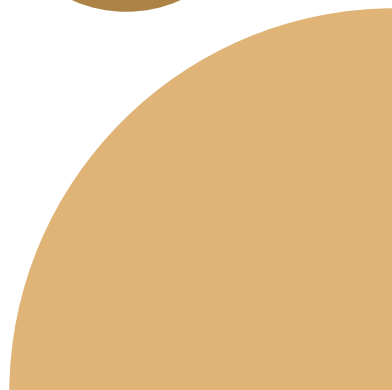
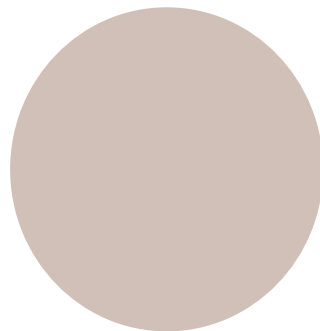
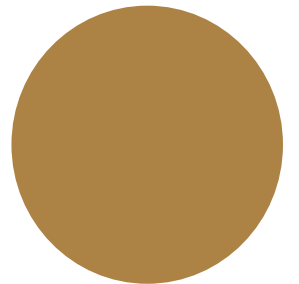
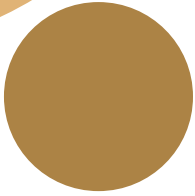
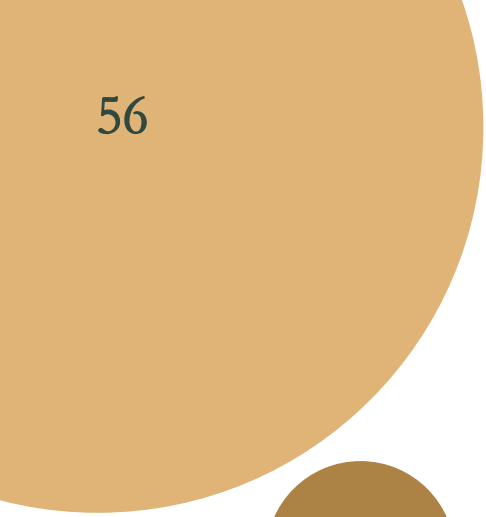
This will be judged on both AZA requirements, and other code requirements for the keeping of non-domesticated animals. This information will be directly pulled from the literature. In all cases possible a 15% increase will be taken into account over minimum code space requirements. A focus on hidden safety measures, with an emphasis on child access.

Cost:

In terms of cost, initial building costs will be minimized by utilizing many of the existing features. The final cost will be calculated once the design is finalized.

In terms of on-going cost, the maintenance will likely be the largest need. With upkeep needed on each of the exhibits to maintain cleanliness and safety.





PROGRAM APPENDIX:

Child Development:

<https://childdevelopment.com.au/resources/child-development-charts/gross-motor-developmental-chart/>

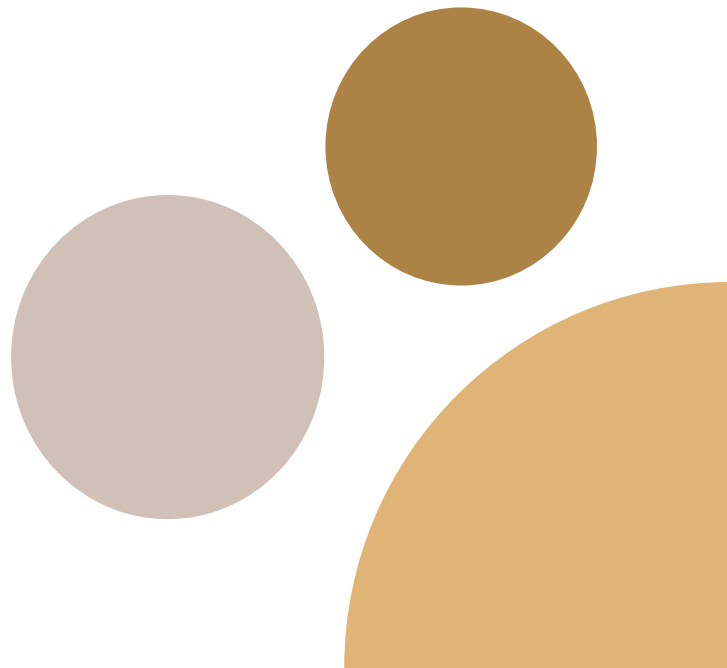
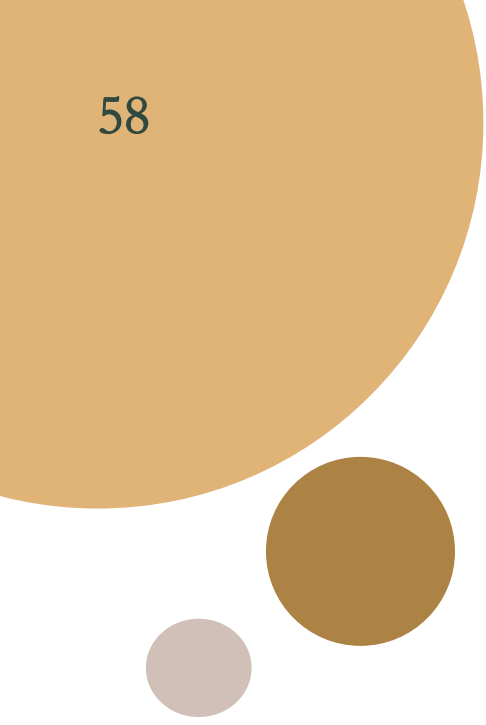
<https://www.parents.com/toddlers-preschoolers/development/physical/child-developing-motor-skills/>

<http://vacationidea.com/ideas/kansas-city-zoo.html>

Animal Enrichment:

Fernandez, E. J., Tamborski, M. A., Pickens, S. R., & Timberlake, W. (2009). Animal–visitor interactions in the modern zoo: Conflicts and interventions. *Applied Animal Behaviour Science*, 120(1-2), 1-8. doi:10.1016/j.applanim.2009.06.002

Melfi, V. (2013). Is training zoo animals enriching? *Applied Animal Behaviour Science*, 147(3-4), 299-305. doi:10.1016/j.applanim.2013.04.011



REFERENCES

- Cleveland Zoo Nature Playscape. (n.d.). Retrieved October 16, 2017, from <http://www.learninglandscapesdesign.com/projects/cleveland-metro-parks-zoo-nature-playscape/>
- Coe, J. (2011, July 10). How Can Zoo Architects Build-In Animal Enrichment Opportunities ...And How Can Enrichment Specialists Help? Retrieved from <http://www.joncoedesign.com/pub/PDFs/ArchitectsAndEnrichment2011.pdf>
- Design. (n.d.). Retrieved October 16, 2017, from <http://maggiedaley.com/about/design>
- Enclosure Design. (n.d.). Retrieved October 16, 2017, from <http://www.chesterzoo.org/education/case-studies/enclosure-design>
- Maggie Daley Park. (2017, October 15). Retrieved October 16, 2017, from https://en.wikipedia.org/wiki/Maggie_Daley_Park
- O'neal, T. (2011). Animal Enrichment Strategies for Promoting Natural Behaviors in Captive Populations of Tasmanian Devils (*Sarcophilus harrisii*).
- Orangutan Canopy. (n.d.). Retrieved October 16, 2017, from <https://www.kansascityzoo.org/ouranimals/orangutan-canopy/>
- Sheehan. (2015, April 18). Maggie Daley Park Retrieved October 10, 2017, from <http://chicago.com/completestreets.org/wp-content/uploads/2015/04/2015Seminar-3B-Sheehan-MDP.pdf>



PREVIOUS DESIGN EXPERIENCE

2nd Year

Fall:

Tea House (Public)
Cooper Community
Garden (Suburban)

Spring:

Agincourt (Civic)
Agincourt (Suburban)
Michelson (Public)

3rd Year

Fall:

Public Library (Urban)
Public Library (Suburban)

Spring:

Pocket Park (Urban)
Friluftsliv (Homestead)

4th Year

Fall:

Playground (Urban)

Spring:

Warroad (Suburban)

5th Year

Fall:

Port of Bismark (Heritage Site)





REBECCA PUETT

14605 w 89th St.
Lenexa, KS 66215

rpuett202@gmail.com

"I didn't know where I was going until I got there"

