Reining In:

Applying the Sustainable Sites Initiative to Equestrian Facility Design

By

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A Report

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MASTER OF LANDSCAPE ARCHITECTURE

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Abstract

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The Sustainable Sites Initiative (SSI) put forth by the American Society of Landscape Architects and the Lady Bird Johnson Wildflower Center is a set of standards which promotes sustainable land development and management practices. The SSI allows the role of the landscape architect to become increasingly important with society's push to be sustainable. This has become evident with the involvement of landscape architects in projects not traditionally associated with the profession. Equestrian facilities that were once designed solely by "horse people" are now being designed by architects and landscape architects. Equestrian facilities are complex developments that have multiple functions and needs, most importantly being the safety of the horse and rider.

Kansas State University has determined a need for a new facility to host the equestrian needs of the campus and has chosen a site located near the corner of Kimball Avenue and Denison Avenue, north of the main campus. Using the location chosen by K-State as a hypothetical site, a program for the EquiCenter was developed to meet the needs of the Animal Science Program, the equestrian and rodeo teams and the Equine Assisted Human Development and Rehabilitation Program. Precedent studies informed the early stages of this project and a thorough review of the SSI led to a selection of credits for application in this project. The selected credits were then applied to the equestrian facility program and the site in a design process. Evaluation of the design concepts yielded a determination regarding the ability of this facility to receive a sustainability rating.

Due to constraints of the site and the SSI, it has been determined that the K-State EquiCenter will not be eligible to be rated sustainable under the Sustainable Sites Initiative. The SSI presented unique challenges in developing the equestrian facility. These challenges presented opportunities to discuss limitations and recommend changes to the SSI that may allow equestrian facilities to receive a sustainability rating in the future.

Acknowledgements

First, I would like to thank my family for their constant support and guidance. For instilling in me a work ethic to complete this master's project and report.

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Third, I would like to thank my fellow graduating class of 2010. I never would have made it through the long nights and hours of construction and studio without you.

Finally, I would like to thank the Kansas State Equestrian Team current and former coaches and members. My time on the team gave me a way to express my passion for horses. It allowed me to escape the confines of studio, without which I may not have gotten through this program.

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"A horse is the projection of peoples' dreams about themselves - **strong, powerful, beautiful** - and it has the capability of giving us escape from our mundane existence"
- Pam Brown

Introduction 1

Introduction

The sustainability movement has taken over the design professions. While architects are designing buildings according to the LEED® (Leadership in Energy and Environmental Design) standards set forth by the U.S. Green Building Council, landscape architects are striving to create a standard by which to promote sustainable land development and management practices. The Sustainable Sites Initiative (SSI) has been set forth by the American Society of Landscape Architects and the Lady Bird Johnson Wildflower Center. It is anticipated that these guidelines will be incorporated into future iterations of the LEED® Green Building Rating System™. The role of the landscape architect is becoming increasingly important with society's push to be more sustainable. This has become evident with the employment of landscape architects in projects not traditionally associated with the profession.

Equestrian facilities have traditionally been designed by horse people, and with good reason. Horses are big animals with specific needs that can only be understood by individuals with an intimate knowledge of the interaction of horses and people. The incorporation of a 1200 lb animal into a design adds a whole new dimension. Factors such as the animal's size, "flight" reaction, and horse and rider safety have to be taken into consideration.

Recently, architects and landscape architects have become involved in the design of equestrian facilities, both large and small. Kansas State University, for instance, has collaborated with the architecture firm Sheldon Architects to design the new Equine Education and Activities Center (EquiCenter).

> "The purpose of this state-of-the-art equestrian complex is to capitalize on the growing interest and demand for academic and professional equestrian pursuits across the United States. The EquiCenter will serve as an educational complex to meet the growing demands of the University's equestrian sciences program, and as a performance and training complex for KSU's rodeo and equestrian riding teams. The Equicenter's facilities will make it possible to host national-level professional horse shows and exhibitions, as well as training programs for amateur horse enthusiasts. In addition, the planned facilities will serve as an ideal venue for a wide range of non-agricultural events."
>
> (Equine Center)

Insertion of landscape architects into the design process of equestrian facilities is a relatively new process. They have the knowledge to best understand the interrelationships between the site, the micro-climate and the natural and historic resources. With a proper understanding of horses, landscape architects can assist the client with everything from stable design to rings, pastures, trails, indoor arenas and maintenance facilities. Most importantly, landscape architects have the ability to create unique environments that foster an array of emotions from the users, which allows for a richer experience while on the site.

The introduction of the landscape architect as a designer is important because the inherent user needs of equestrian facilities are by their very nature unsustainable. What defines equestrian facilities as unsustainable?

One of the major environmental concerns that equestrian facilities present is the mismanagement of manure on site. Manure is known as non-point source (NPS) pollution. When not managed correctly, an accumulation of small pollution sources (like manure piles or paddocks) can cause significant degradation to water quality in surrounding water resources.

A second major environmental concern involving equestrian facilities is wastewater management.

> "Although horse wastes (manure, urine and soiled bedding) are organic, biodegradable materials, many of their physical, biological and chemical properties (such as sediment, phosphorous, nutrients, and bacteria) can be detrimental to water quality and can adversely affect human health and aquatic life in water bodies. Many of the nutrients ingested by horses return to the environment in feces and urine. When carried by runoff to streams and lakes, excessive amounts of these same nutrients can stimulate unwanted algae blooms in creeks and streams, causing a decrease in dissolved oxygen in water, which stifles aquatic life. Some activities, such as heavy grazing or pasture use, remove the soil's vegetative cover and can expose the soil surface. Exposed soil is easily transported by runoff to streams and creeks, and excessive sediment can fill pools, smother aquatic habitats, and cover food supplies. Bacteria, such as fecal coliform, are present in horse manure. Fecal coliform is a pollutant

of concern because it is an indicator of potential viruses and pathogens that cause swimmer-associated sickness in water bodies. Chemicals used during horse grooming and shelter/living area maintenance may cause adverse health effects to humans and are toxic to aquatic life"

(Orange County Watersheds)

A third environmental concern is the horses' effect on the soil.

"Pastoral livestock production systems are subject to soil and animal interactions. One of these interactions is the effects of livestock treading on soil and the subsequent effect on pasture. Intensively managed grazing systems can result in reductions in pasture yield, biodiversity, increased soil erosion and overland flow, reduced soil weight-bearing capacity, reduced soil quality and increased soil compaction. These effects are likely to occur in temperate climates under moisture excess conditions."

(Drewry, 2009)

Dilemma

Kansas State University has determined a need for a new facility to host the equestrian needs of the campus. Equestrian facilities are complex developments that have multiple functions. The safety of the horse and rider is paramount. This master's project is an exploration of applying sustainable practices to an equestrian facility and determining what rating might occur with a functional and sustainable design. For the purpose of this project, the term sustainable will be defined by the requirements put forth by SSI. The inherent user needs of equestrian facilities are by their very nature unsustainable. The SSI presents a set of standards that can improve the sustainability of the site. How can the guidelines and benchmarks of the Sustainable Sites Initiative be incorporated into the design of the Kansas State University EquiCenter, while maintaining the complex needs of equines but also creating an environment that fosters intimate relationships between horse and rider?

Thesis

Through the creation of several alternatives for the Kansas State University Equine Education and Activities Center, it can be determined that the Sustainable Sites Initiative will have a certain degree of utility as a “guide” for the design of equestrian facilities. This project will identify limitations and propose possible changes to the 2009 edition of the Sustainable Sites Initiative.

Relevance to Contemporary Landscape Architecture

The Sustainable Sites Initiative is the guideline that landscape architects will be using from this day forward as the standard for sustainability. It insures that the sites we develop “meet the needs of the present without compromising the ability of future generations to meet their own needs”. The biggest challenge of the SSI is how it applies to a wide variety of sites and their uses.

Equestrian facilities present a unique challenge in that the function of the site and the safety of the user comes before the environment. It seems counter intuitive for landscape architects, but human interaction with 1200 lb. animals can be dangerous and design must be centered around the safety of both the horse and rider.

The sport of horses and horse ownership require large plots of land. This presents opportunities for landscape architects who must meet both the functional program of an equestrian facility as well as have an impact on neutralizing the carbon footprint of the building with the site. Developing the Kansas State Equicenter according to the Sustainable Sites Initiative will test the viability of equestrian facilities to provide services such as climate regulation, clean air and water, and improved quality of life.

Personal Goals and Objectives

Goals and objectives were developed at the beginning of the project and updated throughout the year to reflect the evolution of the project. They define benchmarks in learning as well as design. The goals listed were met and exceeded, as will be demonstrated throughout this master's report.

- Define what makes an equestrian facility unsustainable.
- Identify specific design criteria for an equestrian facility and safe environment for both horse and rider.
- Design an environment that creates unique experiences and evokes a variety of emotions.
- Create intimate spaces that promote bonding between horse ad rider.
- Create a functional equestrian facility that meets the guidelines for a sustainable site as put forth by the Sustainable Sites Initiative.
- Gain a better understanding of the Sustainable Sites Initiative and the impacts it has on the design of a site.
- Explore how the Sustainable Sites Initiative can be modified to better suit equestrian facility design, construction and maintenance.
- Continue to develop a design philosophy that reflects my personal values.

"There is something about the **outside** of a horse
that is good for the **inside** of a man" - Winston Churchill

Design Process 9

Design is an evolving process that is guided by many aspects including personal values, knowledge, nature, human experience and travel. These influences have driven the process of this master's project. A process diagram was developed to represent this master's project path, tasks and time line.

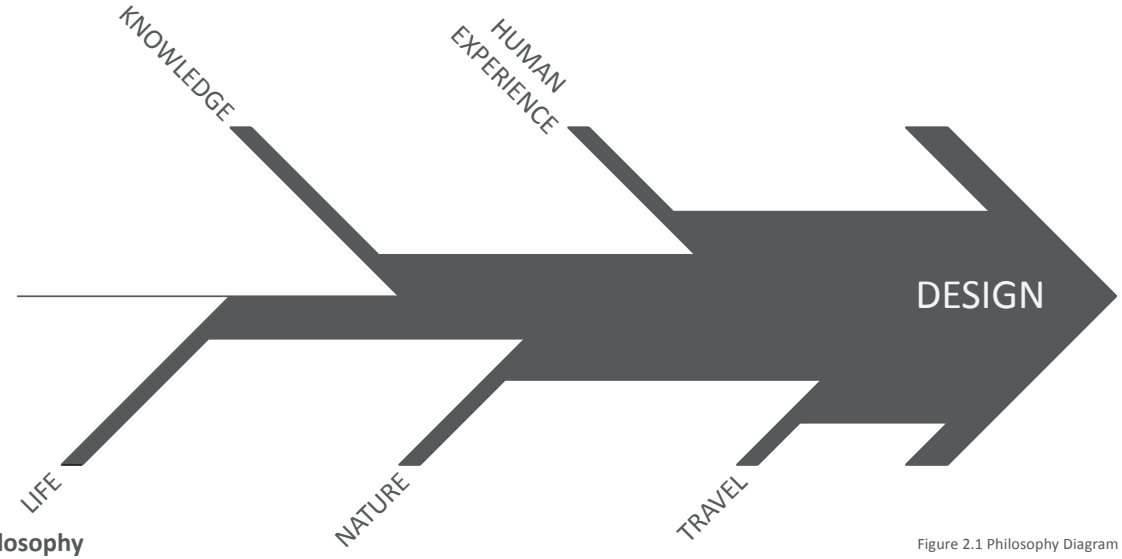


Figure 2.1 Philosophy Diagram

Design Philosophy

Design is influenced by many important aspects in a designer's life. My design philosophy begins with the values of life my parents instilled in me. It extends to the knowledge I have gained in and out of school. The landscape has had a large influence on my personal values that lead to design decisions. Every designer's life experiences guide the design process and the final design product. Finally, my personal design philosophy is shaped by my travels across the North America and Europe, which have shaped the way I think about culture and nature interactions.

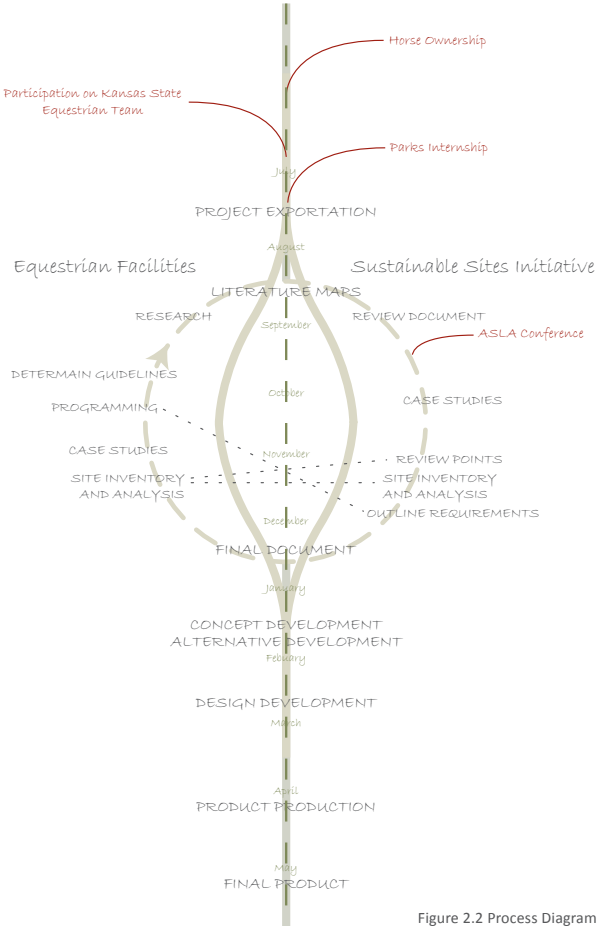


Figure 2.2 Process Diagram

Design Process Diagram

This diagram represents the path of the project, the tasks accomplished through 2009-2010, and the time line of those tasks.

The path of the project represents the combining of two seemingly unrelated items. The thought process was unified early in the project. As research for the SSI and equestrian facilities began the project split into two separate paths. Through the research, connections were made between the two different subjects. These connections began to bring the two paths back together, creating a project that combined the SSI and equestrian facility design.

The time line occurs over a year long period, specifically from June of 2009 to May of 2010. The influences discussed in the philosophy section, however, have occurred many years prior to this time. The specific influences that have driven this project are represented in red.

The tasks to be completed for the master's program are included along the time line.

Design Process Conclusion

My design philosophy is driven by my personal values, knowledge, the landscape around me, my experiences and the cultures and places I have traveled to. These influences have guided the process of this master's project. My lifelong love of horses inspired the project, along with knowledge gained through my internship for St. Louis County's Parks and Recreation Department. The two aspects of this project led to a unique split path, which through research and analysis was united to create a compelling project.

"In riding a horse, we borrow freedom"
- Helen Thompson

Background

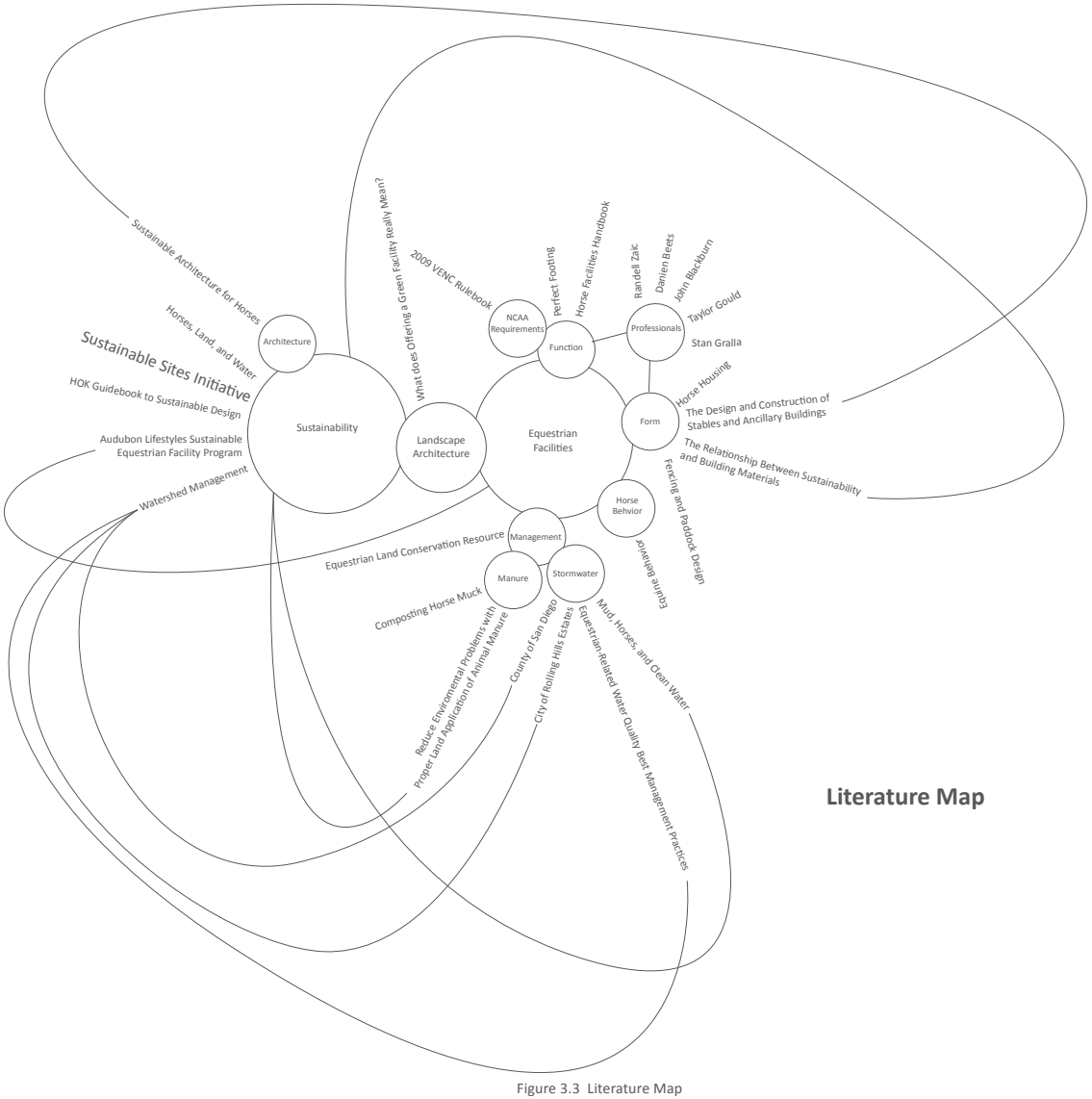
Key literature used during research is represented using a literature map diagram to show connections made between sustainability and equestrian facilities. The literature review summarizes the most important key literature which will allow the reader to pursue further information.

A list of operational definitions for both equestrian facilities and sustainable design practices is provided so when they are used throughout the document the reader will understand the terms. The definitions are supplemented with images for further understanding.

Finally, research was conducted on existing sustainability programs for equestrian facilities. The Audubon Lifestyles Equestrian Facility Program is recognized and discussed as background information.

Literature Map Description

The literature map reflects the two unique aspects of sustainability and equestrian facilities and how they may come together through landscape architecture. Key literature is represented and the reader can begin to understand how connections are made between sustainability and equestrian facilities.



Literature Map

Figure 3.3 Literature Map

Literature Review

The literature review summarizes key resources used during the development of this master's project. It includes articles, books, professionals, rating systems, and websites.

Audubon Lifestyles. Audubon Lifestyles Sustainable Equestrian Facility Program. Accessed on August 3, 2009.
Audubon Lifestyles is a non-profit organization based on sustainable programming. They have developed a program, along with Equestrian Services, LLC. that will assist those seeking to become local, regional, national and international models of sustainability. The program differs from the SSI in that it is specifically geared to equestrian facilities. The website highlights the requirements to meet in order to receive sustainability ratings.

Calderon, Juan Gonzalez. 2008. Sustainable architecture for horses. Paper presented at PLEA 2008 - 25th Conference on Passive and Low Energy Architecture, October 22 - 24, in Dublin, Ireland.
This paper presents two different aspects of a sustainable building. On one hand it demonstrates how to meet comfort conditions for horses in two fundamental aspects of passive and low energy architecture: natural ventilation and lighting. On the other hand, the paper focuses on the building's design as a promoter of environmental consciousness.

Equestrian Land Conservation Resource: Advancing the conservation of land for horse-related activity. Equestrian Land Conservation Resource 2000 - 2009. Lexington, KY. http://www.elcr.org/index.php
Equestrian Land Conservation Resource is an organization that exists to educate the public on the loss of land that threatens the future of equestrian sport, recreation, and industry. It provides topics on land conservation tools, community land use planning and zoning practices, equine economic development, land and trail stewardship management practices and trail access, connectivity and shared use.

Freeman, David, Jay Harmon, Bill Koenig, Pat Murphy, and Eileen Wheeler. 2005. Horse Facilities Handbook. Ames, Iowa: MidWest Plan Service.
The Horse Facilities Handbook covers information related to site selection and site layout; building and stable designs and layouts; manure handling and treatment; ventilation and environmental control; and fire safety. I specifically used this source for definitions of terms related to program elements.

Hill, Cherry, and Richard Klimesh. 2002. Horse Housing: How to Plan, Build, and Remodel Barns and Sheds. North Pomfret, Vermont: Trafalgar Square Publishing.
The authors address planning, design and building of equestrian facilities in general ways. The book provides inspiration to the author and to the reader. The author would like to note that if the reader is wishing to construct any type of building, he or she should contact a professional to ensure safety of the horse and rider.

Horses, Land and Water: Community of Practice. http://www.horseslandwater.com/
Horses , Land and Water is an online source of horse keeping and good land management practices. It outlines management guidelines for the whole of the property, paddock management, and intensive horsekeeping. Specific information relevant to my project includes management guidelines for steep slopes, weed control, manure, and shade and shelter. It provides a good guide to land management strategies specifically centered around horses.

Mouch, Allison. "What Does Offering a Green Equestrian Facility Really Mean?" Equestrian Services, LLC. http://www.equestrianservicesllc.com/news-room/articles-green.cfm. Accessed August 3, 2009.
The article by Equestrian Services, LLC is a "beginning", providing initial steps a facility can take to promote sustainable land use. While it does not provide specific information, it presents ideas for a reader beginning the process of developing a sustainable amenity.

Populous. 2009. Equestrian Design Standards.
This document, created by the architectural firm Populous, provides a background and needs of the variety of riding disciplines. It is a good introduction to the equestrian sport. Several of the diagrams provide inspiration to sustainable architectural design of barns and stables.

Smith, Peter C. 1989. The Design and Construction of Stables and Ancillary Buildings. London: J. A. Allen and Co. LTD.
Smith has provided simple barn designs that provide inspiration for facility layouts. The author would like to note that if the reader is wishing to construct any type of building, they contact a professional to ensure safety of the horse and rider.

Sustainable Stables. http://www.sustainablestables.com. Accessed August 3, 2009.
Sustainable Stables is an organization whose mission is to provide and disseminate information on how equestrian activities affect the environment; promote enviromentally-friendly, sustainable horsekeeping; and identify and research green products and services for the equestrian community. The organization provides resources on best practices for equestrian facilities.

Williams, Carey A. 2006. Mid-Atlantic Equine Pasture Initiative: What Does it Mean for You? Paper presented at the Proceedings of the 4th Mid-Atlantic Nutrition Conference, in College Park, MD. Pages 49 - 55.
The goal of the Mid-Atlantic Equine Pasture Initiative is to train professionals to understand and advocate best pasture management practices. The program is focused in the Mid-Atlantic region however information included pertains to the K-State EquiCenter.

> "Controlled, intensive, and rotational grazing are all various terms for management-intensive grazing (MIG). It is termed MIG because they require more animal handling and more applied knowledge of forage and plants and pasture-animal interactions. This includes rotating animals throughout equal-sized paddocks, which reduces the grazing pressure on the paddocks. Strip grazing uses an electric fence to divide off sections of the pasture, which helps utilize the pasture more efficiently. The stocking densities of continuously grazing animals should be followed closely. If overstocked, pasture pressure can be minimized by removing the animals for a few hours a day and supplementing their diet with grain or hay. Also, in a MIG system, animals help maintain weed populations by grazing on these weeds when they are in the tender growth stages. However, when mowing pastures, it is important that it be done before the weeds flower and produce seeds that could disperse and plant more weeds in the surrounding areas."

2009. The Sustainable Sites Initiative. http://www.sustainablesites.org/
The Sustainable Sites Initiative is a joint effort by the American Society of Landscape Architects and the Lady Bird Johnson Wildflower Center to create a set of benchmarks and guidelines for landscape architects that are modeled after the Leadership in Energy and Environmental Design Green Building Rating System (LEED). It is my primary source for "sustainable"

elements related to my site development. This version of the SSI was released in November of 2009 and was the first to apply points to each credit. It outlines the amount of points needed and how they should be achieved in order to receive a sustainability rating.

Professionals
The following professionals were contacted in 2008 and 2009 to assist in various projects related to equestrian facilities and landscape architecture. I discussed with these professionals, among other things, circulation and function, aesthetics of form and space, ecological issues, and some technical issues associated with the design of equestrian facilities. Their help over the years has been invaluable.

John A. Blackburn, AIA - Senior Principal. Blackburn Architects, PC. Washington DC.
Blackburn provided key articles on site planning for equestrian facilities which occurred in the 2008 edition of Western Horsemanship. They discuss traffic movement throughout the site and placement of site elements.

Stan W. Gralla, AIA - Principal, Founder and Jim Kudrna, AIA, LEED AP - Director of Design. GH2 Architects, LLC. Norman, OK.
Gralla was able to provide information on land planning. Specifically, understanding drainage and wind direction. Also having projects utilize natural ventilation, passive solar energy, and natural lighting. He also emphasized the separation of animal and human traffic. Kudrna was able to provide information for precedent studies.

Taylor Gould, CLA, ASLA,APA - Associate, Senior Landscape Architect and Land Planner. MMM Design Group. Norfolk, VA.
Gould was able to provide information on the landscape architect's role in designing equestrian facilities. He also discussed the complex nature of the horse and the relationship humans have with them.

Danien Beets - Architect. Timothy Court and Company Architects Pty Ltd. Sutton Forest NSW, Australia.
Beets discusses the equestrian facilities' need to accommodate large animals. He emphasizes the importance of safety and function.

Randall Zaic - Principal Architect. Zaic and Associates, Architects. Ball Ground, GA.
Zaic emphasized the circulation and functionality of a site. Specifically, the needs of large vehicles on the site.

Equestrian Facility Operational Definitions

Many program elements of an equestrian facility are specific to that type of site. The operational definitions provide a list of possible elements that may be included in an equestrian facility. Not all elements will be used on the K-State EquiCenter site, however they may be discussed in other sections of this master's report. It is important for the reader to have an understanding of the elements and their functions on a site.

Administration Building
The administration building will host offices of equestrian science professors, the equestrian team coaches, and other professionals associated with the equestrian facility and the university.


Figure 3.4 Anderson Hall

Education Building
The education building hosts classrooms of the equestrian science program. It also home of the Equine Assisted Human Development and Rehabilitation Program (E.A.H.D.R.), which is a multi-disciplinary program that incorporates faculty expertise in the departments of Animal Sciences, Kinesiology, Psychology, Sociology, Anthropology and Social Work, and Family Studies and Human Services (see E.A.H.D.R. description).


Figure 3.5 Hale Library


Figure 3.6 Nichols Hall

The buildings illustrated here are on the Kansas State University campus and embody local materials and historic building methods.


Figure 3.7 Outdoor Classroom 1


Figure 3.8 Outdoor Classroom 2

Outdoor Classrooms
Outdoor classrooms provide an opportunity for students to experience nature while learning. An outdoor classroom associated with an equestrian facility could provide a unique opportunity to study horse behaviors in a pasture or training techniques in an arena.


Figure 3.9 Team Area

Team Area
The team area provides the K-State Equestrian Team with a designated space for meetings that are held throughout the year. It would need to comfortably hold 80 members and coaches. It also has locker rooms where the team could change for practices or competitions. Having this area located near the stall barn is desirable, but not essential.

Pedestrian Trails

Pedestrian trails provide a connection to the rest of the K-State campus located to the south of campus. They could also be linked to Meadowlark Hills located to the East of the site. These trails are separate from the equestrian trails located on the site. They could be either be nature trails or ADA accessible trails. Pedestrian trails should be five or six feet wide to allow adequate passing room for wheelchairs.

Figure 3.10 Pedestrian Trail


Figure 3.11 Performance Arena 1


Figure 3.12 Performance Arena 2

Performance Arena
The performance arena will serve to host competitions for the K-State equestrian and rodeo teams. It could also be available for other uses such as demonstrations, practices, or similar events. This is the largest riding arena on site. Bleachers are available around the arena to provide seating to spectators.


Figure 3.13 Indoor Training Arena


Figure 3.14 Outdoor Training Arena

Warm-up Arena
During competitions, the warm-up arena allows horses and riders to prepare to show without disturbing the ongoing competition. It also servers as a smaller arena for training and practices. It could also serve as a second competition arena if needed. There is limited to no seating associated with the warm-up arena.

Indoor Arena Complex

The indoor arena complex can be as simple as a covered arena with seating or it can be a large building that houses the education building, administration building and team areas. It will contain an arena that is enclosed for year-round riding, which allows the equestrian and rodeo team to hold practices in all weather. It will also serve as an additional performance arena with plenty of seating for spectators. Permanent rest room facilities are associated with the indoor arena.

Figure 3.15 Indoor Arena Complex 1

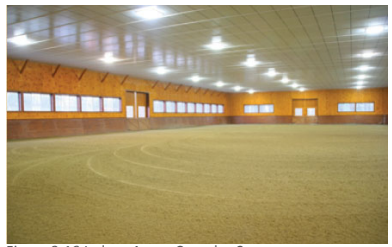


Figure 3.16 Indoor Arena Complex 2


Figure 3.17 Indoor Gate Area


Figure 3.18 Outdoor Gate Area

Gate Area
Associated with the performance arena is the gate area where horses wait to enter the arena. This space is large enough for at least two horses to pass each other comfortably. There is also a waiting area near the outdoor where competitors and horses wait to compete. It is large and holds many horses.


Figure 3.19 Concession Stand

Concession Stand
Concessions are located near the performance arena which can provide fund-raising opportunities for the equestrian and rodeo teams. Many competitions can last all day, so it is essential to provide beverages and snacks for spectators.


Figure 3.20 Announcer's Stand

Announcer's Stand
An announcer's stand overlooks the performance arena which allows for easy viewing of the competition.

Manure Storage

A typical horse weighing 1,000 pounds will produce approximately 50 pounds of manure and 10 pounds of urine a day. Horses that are housed in stalls may generate an additional 20 pounds of soiled bedding.

Composting is the acceleration of a natural biological process that converts organic matter into a stable humus-like material. Composting produces a material that can be used as a low-grade fertilizer, mulch for reducing weed ingestion, and soil amendment for retaining soil moisture.

K-state currently has a manure compost located adjacent to the Beef Cattle Research Center at 3115 College Avenue where the EquiCenter's manure could be incorporated. Until transportation to this facility, manure needs to be stored on site.

Figure 3.21 Manure Storage 1

Figure 3.22 Manure Storage 2

Figure 3.23 Stall Barn Interior

Figure 3.24 Stall Barn Exterior

Stall Barn

The stall barn houses horses that are not kept in the pastures. Its basic purpose is to provide an environment that protects horses from temperature extremes, keeps them dry and out of the wind, eliminates drafts through the stables, provides fresh air in both winter and summer, and protects them from injury. An individual standard stall is 12 x 12 feet. The walkway between stalls are 14 feet wide to allow room for moving horses, a small truck, or tractor pulling a wagon. A stall barn would also have a tack room to store equipment for horse riding and training, a feed room to keep supplemental feed besides hay, and a grooming area to tack horses. A stall barn may also have an office, supply room, rest room, or locker rooms located within the building.

Horse Paths

Horse paths are the walkways around the equestrian facility that connect the horse related program elements. They are wide enough for at least two handlers and horses to pass each other comfortably. The area surrounding them should also be free of obstructions for safety reasons.

Figure 3.25 Equestrian Path

Round Pens

Round pens are used for a variety of purposes including exercise, training, show and demonstration, and sales. They come in a variety of diameters, 30-150 feet, depending of use. The absence of corners makes the round pen a safe area for a horse or rider to have new training experiences. Smaller pens are preferred for limiting the horses maneuverability while larger pens are suitable for less stressful lunging and training. Round pens are very helpful for both riders and instructors associated with the therapeutic riding program. They help riders with limited mobility to easily control their horse. They also create an intimate experience between the horse, rider and instructor.

Figure 3.26 Round Pen


Figure 3.27 Outdoor Wash Racks

Wash Racks
Wash racks can be located indoors or outdoors and can be used for either bathing a horse or grooming. Most important is safety in this area. The flooring should be sloped so that water can drain away and flooring material should be “non-slip”.


Figure 3.28 Grazing Area

Grazing Areas
Grazing areas are flexible in size and shape. Technically they can be anywhere that grass is located that a horse can graze. More desirable are areas that are shaded during the hot summer months, have privacy, are located within sight of arenas, and are open enough to safely handle a horse without obstructions.

Quarantine Barn
A quarantine area is separated from the main horse zone. It can have several functions. First, it separates a sick horse that could infect others. Second, it can house injured horses that could get over excited by other horses.


Figure 3.29 Quarantine Barn

Hot Walker
A hot walker is used most commonly to cool horses down after a hard workout. A walker allows a handler to complete other tasks while his or her horse cools down.


Figure 3.30 Hot Walker

Fencing
Fencing must be safe and free of obstructions that may harm the horses. The fencing should be visible and durable. A variety of materials are currently available for construction of fencing.


Figure 3.31 Fencing


Figure 3.32 Pasture

Pasture
Pastures are well-maintained vegetative areas that are used primarily for grazing and have the added benefit of being an area in which the horse can exercise. Horses of the K-State EquiCenter will receive supplemental feeds such as hay and grain. The pastures will be the main housing for horses on the site.


Figure 3.33 Paddocks

Paddocks
Paddocks are small fenced outdoor areas where a horse is kept. They may have a dirt or grass surface. Paddocks are often used as temporary containment to keep horses off of larger pastures, or for turn-out of horses that are kept stabled. Paddocks need to be carefully monitored so they do not become overgrazed. They are not meant for permanent housing of horses.

Runs

Runs are small outdoor fenced areas used for holding horses for short periods of time. They are usually dirt and are designed to allow horses to run around and exercise. Runs can be connected to stalls to allow stabled horses exercise opportunities.

Figure 3.34 Runs

Run-in Shelter

These shelters are needed so horses who are kept outside can have an area to protect themselves from the severe weather elements such as strong winds, snowstorms, rain, hail, and sun during hot weather.

Figure 3.35 Permanent Run-in Shelter

Figure 3.36 Temporary Run-in Shelter

Equestrian Trails

Equestrian trails provide an opportunity for horse and rider to get out of the arena. They offer a chance to relax, but can also present challenges for training. Obstacles occur on trails that cannot be experienced in an arena such as creeks, open fields, and wildlife encounters.

Figure 3.37 Equestrian Trails

Sustainable Design Practice Operational Definitions

Several methods of design have been recognized as “sustainable practices” by the green community. The purposes of these elements are defined along with example images.

Rain Garden

Rain gardens are small depressed areas used to allow water to slowly soak into the ground. They filter contaminants and return clean water to the ground rather than to the sewer system. They are generally dry except during or immediately following a storm event. Rain gardens are typically planted with native plantings that are adapted to the local climate and soils.

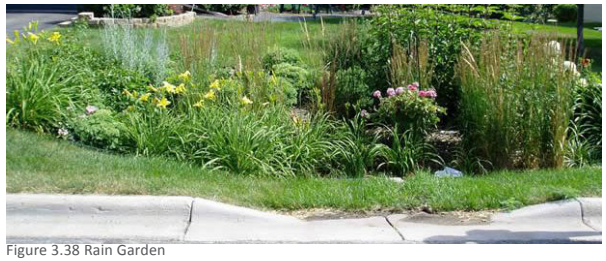


Figure 3.38 Rain Garden

Bioretention Ponds

Bioretention ponds collect stormwater for cleansing. They are larger than rain gardens and will hold water for extended periods of time. They should be designed to convey stormwater with minimal erosion potential.

Figure 3.39 Bioretention Ponds

Pervious Pavement

Pervious pavement is designed to allow infiltration of stormwater through the surface into the soil below where water is naturally filtered and pollutants are removed. A variety of materials may be used including porous concrete and asphalt, modular pavers and aggregate.

Figure 3.40 Permeable Pavement

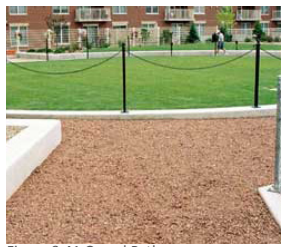


Figure 3.41 Gravel Path


Figure 3.42 Roof Garden 1

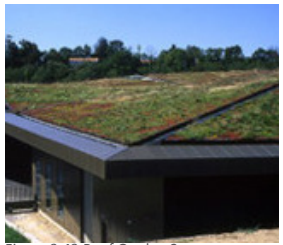


Figure 3.43 Roof Garden 2

Green Roof
Green roofs are roofs that are partially or completely covered with vegetation and a growing medium. Green roofs are built upon waterproofing membranes. These roofs serve to absorb rainwater, provide insulation, and combat the heat island effect.

Figure 3.44 Certified Wood

Certified Wood
Certified wood comes from well-managed, certified forests that exist to stem deforestation. Wood needs to be certified by the Forest Stewardship Council according to it’s principles and criteria.


Figure 3.45 Kansas Limestone

Regional Materials
Use of materials located within the region of a site reduces energy use for transportation. Elements such as plants, soils, and other materials extracted within the region support local business while decreasing our dependence on non-renewable resources.

Operational Definitions Conclusion

The operational definitions of both equestrian facility design and sustainable design practices allow the reader to understand discussions throughout the rest of this master's report. Knowledge of these elements informs the development of the program and concepts later in the document.

Audubon Lifestyles Equestrian Facility Program

A background study was conducted to review existing sustainability rating programs in place for equestrian facilities. The Audubon Lifestyles Equestrian Facility Program is recognized for its sustainability rating. It recognized its first Five-Star rated facility in 2009. The program serves as a resource when reviewing the Sustainable Sites Initiative.

Audubon Lifestyles is an organization that offers professional programs, products and services. The mission is to assist people in how they live, work, play, stay and learn to promote sustainable living and lifestyles. The basic objective of the Audubon Lifestyles Sustainable Equestrian Facility Program is to reduce the consumption of non-renewable resources, minimize waste, create healthy, productive environments, and inform the public, residents, guests, clients, and employees about the benefits of sustainably managed equestrian facilities (Audubon Lifestyles 2008).

Participants in the program, which is available to any existing or planned equestrian facility, strive to achieve the Seal of Sustainability from the International Sustainability Council (ISC) and to be designated as an Audubon Lifestyles equestrian facility. To receive designation, a facility must receive between 160 and 300 points. A facility that receives between 230 and 300 points will earn the ISC seal. Points are assigned under five topics: economics and business; horse care and safety; facility and operations; environmental; and outreach and education. The total amount of points for each category are added up to achieve a total amount of points. Points that can be earned consist of anything from business and marketing plans for the facility to horse weight monitoring to care for an older horse to a facility specific website. See Appendix A for a full list of topic criteria and points awarded for each.

This program for sustainability covers a range of criteria allowing a facility to receive points from a variety of places. Some of the points, however, seem to benefit Audubon Lifestyles more than the environment such as the ability to receive five points for adopting a local school program. The program addresses maintaining a sustainable facility and lifestyle, but does not address construction methods. If the program had a more holistic approach that addressed all steps in the construction and maintenance process, it would be a more viable rating system for sustainability vis a vie landscape architecture projects.

Background Conclusions

Several resources were consulted when researching material for both equestrian facility design and sustainable design practices. These resources were summarized for the reader to allow further research.

A list of key terms was completed for both equestrian facilities and sustainable design elements. The definitions were supplemented with images so the reader will have a greater understanding of the terminology.

The Audubon Lifestyles Equestrian Facility Program was studied as a precedent of an existing sustainability rating program for equestrian facilities. The Program addresses maintaining a sustainable facility and lifestyle, but not construction methods. It, however, can still be useful when analyzing the SSI for equestrian facilities.

"Horses change lives. They give our young people confidence and self esteem. They provide peace and tranquility to troubled souls - they give us hope"
- Unknown

An initial program for the K-State EquiCenter was developed by examining the program that was written by K-State Facilities in 2008.

The program was then expanded after exploration of the Equestrian Assisted Human Development and Rehabilitation Program (E.A.H.D.R.) and the needs of the K-State Equestrian Team. A study of users and program elements was conducted to determine prime facility use days and times.

A study of previously designed equestrian facilities was conducted to analyze functional adjacencies and program use zones.

Finally, program elements were assigned sizes and square footages.

Equestrian Facility

The K-State EquiCenter is meant to meet the growing demands of the University's equine sciences program as well as needs of K-State's rodeo and equestrian teams. It will also serve individuals with physical, emotional, and developmental challenges. Due to the large variety of types of users on the site, a program was developed to address the specific objectives of each user. The program also addresses selected credits of the Sustainable Sites Initiative and how they will be applied to equestrian facility design.

Equestrian Assisted Human Development and Rehabilitation Program (E.A.H.D.R.)

E.A.H.D.R. Explanation

K-State will house instruction and research in equine-assisted development and therapy for humans. The use of horses in the facilitation of human therapy for a wide number of physical, developmental and psychological problems is growing rapidly. This type of therapy is being used for the treatment of childhood developmental diseases, adult neuromuscular and musculoskeletal diseases, trauma-induced disabilities and behavioral disorders.

> "While there are numerous success stories of equine-assisted therapy, there is a small amount of controlled research data and qualified instructors with a substantial need to fill this void. Graduates of K-State's equine-assisted therapy program will have conducted research to arrive at research-based, scientific evidence and have the understanding of both the equine and human aspects."
>
> (Equine Center)

The horse's soothing rhythm, strength, warmth, and three-dimensional movement pattern provides healthy exercise while improving circulation and muscle tone. The discipline associated with working with horses and the social interactions between peers benefit the mind and spirit while raising self-esteem and increasing self-sufficiency through accomplishment. The unconditional love of the horses is proved to reduce anxiety, encourage interaction and offers a haven where riders can feel a sense of empowerment.

Therapeutic riding is appropriate for most people with disabilities, including Autism, Cerebral Palsy, Learning Disabilities, ADD, Muscular Dystrophy, Multiple Sclerosis, Paralysis, Amputations, Down Syndrome, Stress Disorders and more.

Horseback riding for the disabled is recognized as one of the more progressive forms of therapy. The ability to control a horse as well as one's own body inspires self-confidence, responsibility and teamwork. Best of all, it is a thoroughly enjoyable experience, which creates a special relationship between rider and horse and promotes personal challenges.

From the beginning, riders learn balance, coordination and self-assurance while receiving therapeutic muscle stimulation. As a result of carefully planned lessons, poise, posture, strength and flexibility improve. A strong sense of responsibility develops

as the rider learns to take part in the care of the horses and equipment. Advanced equestrian skills, teamwork and cooperation are learned as the rider becomes independent on horseback. Classes, horse shows and events encourage confidence, self-esteem and a sense of accomplishment as new levels of expertise are encountered and new goals are met.

Approaches to Therapeutic Riding

NARHA (North American Riding for the Handicapped Association), the accrediting body for therapeutic riding in the United States, divides the approaches to therapeutic horseback riding into four divisions. These include: 1) therapy, 2) education, 3) sport, and 4) recreation and leisure. These divisions are explained below.

Therapy
The goal of riding as therapy is to achieve measurable behavioral, cognitive, physical, psychological and communication goals. This section includes Hippotherapy, which is provided by Physical, Occupational or Speech Therapists, Developmental Riding Therapy, a multi-disciplinary approach to treatment, and Equine Assisted Psychotherapy, which is provided by licensed mental health professionals. Therapy can be provided in either group sessions or individually.

Education
The horse may serve as a motivator to achieve educational goals for people who have psychological, behavior and/or cognitive impairments. Often an educator serves as facilitator for these sessions. Again, these may be either group or individual sessions. Driving and vaulting, as well as riding are often used for educational purposes. Riders may achieve such educational goals as letter recognition, patterning, and memorization.

Sport
The primary focus of the sport approach to therapeutic riding is to participate in competition. Riding skills, rather than educational skills are emphasized. Competition may be in riding, driving or vaulting. Riders gain physical skills such as balance and coordination as well as cognitive skills such as following directions and sequencing. The focus of the acquisition of these skills is their use in a competitive environment.

Recreation and Leisure
Riding is a leisure activity enjoyed by many people with disabilities. Adaptations such as special saddles and reins or specialized instruction are provided in the recreation section of therapeutic riding. Therapeutic riding instructors provide a relaxing, enjoyable setting which also allows the rider to develop socialization skills and an improved quality of life.

Therapeutic riding overlaps all four of these sections. It is impossible to be involved in any one of these areas without gaining the benefits from the others. While receiving psychological therapy, for example, the rider is also gaining balance and coordination, learning sequencing and patterning, and developing social skills. The rider who rides for competition also increases mobility, improves his or her quality of life, and develops self-control. This is the miracle of therapeutic riding. (Fischbach 2007)

"Horseback riding is my life, it always comes first with me. It lets me go places I can't get to in my wheelchair. I can't make my legs do what I want when I am on the ground, but when I am on my horse, I can use my arms and legs to do amazing things."
- Rider for 26 years, Little Bit Therapeutic Riding Center

"One of the first riders I helped at Little Bit was six years old. At first I side-walked with him. When he didn't need a sidewalker, I switched to leading his horse. About a year and a half later, his instructor said he would be riding independently. Wow! The system worked! Little bit by little bit he'd learned to ride on his own. I was out of a job, and it felt wonderful!"
- Volunteer, Little Bit Therapeutic Riding Center

A narrative of the experience of an E.A.H.D.R volunteer is provided. It will give a greater understanding of functional uses of the equestrian facility as well as beneficial emotional responses that may be fostered while on the site of the K-State EquiCenter. The experience of a volunteer is different from that of all other users of the site. Volunteers are most concerned for the safety of the riders in the E.A.H.D.R program.

Experience of a Volunteer

I recently began volunteering at the Equine Assisted Human Development and Rehabilitation Center at K-State's EquiCenter. I began volunteering because I thought that community service would look good on my resume when I tried to get a job. Little did I know how much this center would impact my life. I begin by arriving and parking at the Center. I like to park a little farther from the doors to allow riders and their families the prime parking spaces. I notice I am the first volunteer to arrive, but the certified instructors are already here. Today, several of the professors from the joint research group will be joining us for our sessions. They represent several different departments at the University including Animal Sciences and Industry, Kinesiology, Psychology, Sociology, Anthropology and Social Work, and Family Studies and Human Services. They are here to check on the progress of some of the participants. I enter the barn and check the list of horses to be used today. There will be three being used in the first session and one in the second session. A second volunteer, Gloria, arrives as I am grabbing halters out of the tack room. She is an older woman who's daughter participated in therapeutic riding as a child. She wanted to be able to give back to all those people who helped her

daughter's life improve. We set out together to the pastures that house the horses, halters in hand. We each catch two horses and walk them back to the barn. I put the horse that will be used in the second lesson in a stall to munch on hay while we prepare the other horses for the first session. We tie the horses in the extra large cross-tie areas. These are extra large so that children in wheelchairs can have full access to groom the horses if their abilities allow. The Center thinks that this is essential for the participants' mind and spirit through social interaction. The horse interaction can also reduce anxiety before mounting the horse. Gloria and I begin by grooming the horse to make sure all dirt is removed, especially in the saddle region, to prevent rubbing. The first session is an advanced group so I purposefully leave a little dirt on the stomach so that when the participants arrive they can purposefully groom the horse. They can remove this dirt, which will help build muscle tone and create a sense of accomplishment. After grooming, we saddle the horses and put two of them on lunge lines and take them into the arena so they can warm-up. This is important because even though these horses have undergone intense training and are extremely gentle and quite, they also can have "wild " moments. We use this warm-up time to allow the horses to get rid of any excess energy. I spend about 10 minutes warming-up my horse, but Gloria's horse has proven that he has a lot of extra energy to burn today. I take the first horse back to the cross-ties and grab the third horse. We complete the warm-ups just as the first group of riders and their families begin to arrive. It is a good thing that the aisles are wide because there are a lot of people all of a sudden in the barn. The NARHA certified instructor has appeared with the research group along with the other volunteers that will help with the session. The instructor and lead researcher get everyone together and we discuss the goals of the session. It is important for all involved in these sessions to be on the same page for optimum results. We begin the session by allowing the participants to groom the horses. After, the research group returns to the viewing room to observe the session in privacy. The instructor will wear a microphone today so they can hear what is going on. The family members and friends go to the stands to watch the session. I bridle the horse that I will be leading for the day. Gloria and another volunteer do the same. We lead the horses to the mounting area. Three other volunteers assist the participants to the mounting blocks. When the instructor says "go" we begin the mounting process of the first participant. He is lifted from his wheelchair onto the back of the horse from an elevated platform. The other two riders mount from the ground. This is

an advanced group and rides independently. We go through a short series of exercises on the lead lines before allowing the three riders to take control of their own horses. It is enjoyable to be a volunteer at these times because these riders have improved so much. One is a stroke survivor that had left him paralyzed on his left side. Today he rides once a week and volunteers 3 days a week helping feed the horses and cleaning out stalls. Another of the riders has cerebral palsy and has limited mobility in her legs, however when she is on a horse she can do anything. It is a way for her to be competitive. The third rider is a veteran who has returned from Iraq and suffers from Post Traumatic Stress Disorder. Therapeutic riding helps increase concentration, calmness, and independence.

The second session will be more difficult than the first. It will require all the volunteers to be extremely attentive to the participant. This rider comes to us suffering from low-functioning autism. Autism is a neurological disorder that inhibits the development of social interaction and communication skills. He doesn't speak other than to occasionally repeat a word or phrase the instructor said. He sings to himself, and constantly shakes his head from side to side. He infrequently makes eye contact. I have worked with him pretty consistently for several months. In that time, He learned to use the verbal cues "walk on" and "whoa" to ask his horse to go and stop. He only uses these words when echoing what the instructor said. She tells him "tell him walk on" and he parrots right back "tell him walk on." But, after getting him to respond consistently, it became apparent that he was learning what those words actually meant. Today, we are going to continue the therapy. I am leading the quietest mare we have on site. I don't think she has ever hurt a fly. Two other volunteers walk along side the horse to ensure the rider stays stable and is safe. The instructor is standing in the center of the round pen. During the session we asked him to ask his horse to ""whoa," and immediately and without any prompting he said "tell him walk on." This is a huge step. He has learned to associate the words with the response of the horse. His parents, who are sitting outside the round pen, have begun to tear up. This seemingly easy recognition for "normal" people is a huge step for him. We complete the lesson, but he does not repeat the response. This is OK. It is all a process and we have hope that he will begin to do it more often with continued training.

As the instructor discusses the session with the parents and researchers, I take his horse back to the cross-ties and begin to untack and groom her.

She is such a gentle soul and has helped so many. Like all horses she seems to recognize when she has a fragile soul on her back. She moves extra careful and slow to protect her rider. I pamper her after her extra special day helping that little boy heal. I give her a few carrots and take her out to the pasture. Stopping at a patch of delicious looking grass, I allow her to graze. As I let her into her pasture, she trots away from me neighing to her pasture mates, as if to tell them about how great her rider did today.

I watch the horses for a while in the pasture. I can't believe I was so selfish to volunteer for the sole purpose of a boost on my resume. I did it to make myself look better, not because it was something I wanted to do out of the goodness of my heart. Volunteering has caused me to reflect on my life. I will continue to volunteer at therapeutic riding centers, wherever I get a job. I love sharing my passion for horses with people of all ages, but here I can see how horses can truly be healers.

K-State Equestrian Team

The Kansas State Equestrian Team became a NCAA varsity sport for Kansas State University in 2000. It consists of 60 women who compete in one of two disciplines, english or western. The team participates in approximately 15 competitions a year against other equestrian teams around the nation. To prepare for these competitions, the team members practice three to five times a week. The team needs areas to hold meetings on site as well as practice and competitions venues.

Kansas State University owns and cares for approximately 40 horses. These horses were either purchased or donated to the team. They are used every day for practice and used during home competitions. Several of the horses will be stalled in the barn, but the majority will be housed in pastures.

Similar to the experience of the E.A.H.D.R. volunteer, a narrative of the experience of a student athlete on the Kansas State Equestrian Team is provided. This helps the reader understand the everyday use of the site. It explains the elements needed to provide a functional and safe environment.

Experience of a Student Athlete

As usual, I got out of class late and now I am in a rush to get to practice. I am driving up Denison Avenue a little faster than I should. I slow down as I come to the entrance to the K-State EquiCenter that opened this fall. I take a moment as I pull in to recognize the new signage that was just installed. I feel a sense of pride as I read K-State EquiCenter, Home of the K-State Equestrian Team. This is OUR home, and anyone who drives by knows that. As I approach the barn, I take my time to glance at the horses grazing in the distance, surrounded by tall grass. I am relieved to reach the barn in such a short period of time. I park my car on the gravel lot next to the stall barn.

I pass the farrier working on a horse when I first enter the barn. This particular horse is know to be a kicker, and I am relieved that I can walk a safe distance away from the pair. I glance at the board that has today's list of horses for practice written out. Skylar, yes! Today is going to be a good day. Before I go catch my horse, I get out all the equipment for the day and put it in the spot where I will tack up, then I grab a halter from the tack room and head out to the pastures to grab her.

As I am walking to the second pasture, I glance down the walk and pause for a moment. Today is a crisp fall morning. The buildings and trees along the lane have enframed a picture perfect view of the surrounding hills. I feel really connected to the nature, and blessed to be located in such a beautiful setting. Sometimes I love to just come out and enjoy being surrounded by the peacefulness and serenity of the landscape. As I get to the pasture, I realize that the horses are on the other side of the pasture. Damn. I walk through the gate and start to look for the horses. About halfway to the back of the pasture, I hear a thunder of hooves. At this point I make myself as big as I can and start waving my hands. I don't want the horses to trample me as they stampede to the front of the pasture. Of course it is the psycho Skylar that is leading the pack. The horses run by me, but I do not feel threatened because of the large size of the pasture. There is plenty of room for them and me. After the horses run around for a while, I catch the mare I need. We exit through a large gate, leaving room for her and me. I walk her down the path and am grateful that it is wide, because Skylar is prancing sideways down the lane. She has a lot of energy today, and if there was anything to get in her way, either one of us could get hurt.

I lead Skylar back into the barn. This horse is “special” and does not like to be tied up. She gets nervous and wont stop moving and pawing, which is why I got out all our equipment before I got the horse. I am relieved we can stand in the main aisle, because it is very wide and multiple horses can pass safely. I tack her up with minimal problems and then head to outdoor arena where we are holding practices today.

As I exit the barn I can see that the practice before mine is just finishing which gives me just enough time to walk down the slight hill, horse in tow, and prepare to mount. As I enter the arena, I notice that the previous weeks’ rain has had little effect on the arena. It appears that all the water has properly drained away into the surrounding rain gardens, making me excited to have almost perfect footing. On a day like this I need all the help I can get; my horse is going to be crazy. We conduct practice as usual with five other team members. The large arena size allows us to have larger practices because there is room to maneuverer the horses safely.

Today we end practice a little early because our coach wants to reward us for all the hard work we have been doing lately, including winning our three opening competitions. We go for a trail ride through the native prairie that is on the site and then ride toward campus, up the hill. This is the first time I have been on a trail ride on the new property of the EquiCenter. The hill is a little challenging in places, but it makes both Skylar and myself think. This is what I love so much about riding horses. How many people can say that they have overcome critical thinking challenges with a 1200 lb. animal? But that does not compare to what I am about to experience next. As we mount the questa, my group turns around and stands in silent awe. Before us we can see the Flint Hills in all their glory. At this moment I want to be on this horse bareback, running through the tall grass prairie surrounding us, with my arms stretched out, feeling the wind on my face. I feel pure contentment on the back of my horse. At this moment I am able to forget all worries and feel a hope and optimism for my life. I am snapped out of my trance as my group begins to ride on the flat area atop the hill. Both horse and rider are full of joviality as we escape the confines of arena and experience the landscape as God envisioned. Soon we begin our descent down the hill, back to the barn.

As we get back to the barn we realize that the trail ride took a little longer than planned. We are in a rush to get to class and other obligations. I get Skylar untacked quickly and take her outside to

hose off the sweat that developed during our ride. The wash racks are large and made of permeable concrete (landscape speak) which allows the water used on the horses to be returned to the ground. There are also rain gardens that are created out of the way of the horses to add additional drainage to the area. I am most worried about getting the water off the concrete because Skylar does not stand still and slick surfaces could cause her to slip and fall.

After I hose Skylar off, I allow her to graze on grass along the walkway to the pastures. We stand under one of the trees for shade. I take a moment to reflect on our practice and think about what I need to improve on to make myself the best rider possible. I return her to the pasture with no incident.

When I return to the barn I begin to clean up the mess I have made before and after my practice. I return all the tack to it's respective locations. We sweep all the aisles and throw the horse poop into the wheel barrows and I take it behind the barn where there is a manure compost pile. I am relieved that it is close, because by now I am beginning to be really late for my class. I return all the cleaning items to their spots and run out of the barn, saying bye to the farrier on my way out.

As I pull out of the parking lot I view the surrounding prairie and am returned to my state of euphoria for just a moment. Then I begin to think about my day's activities and I feel a glimmer of hope that maybe things will be OK.

Typical Weekly Schedule by Users

The Kansas State University EquiCenter will be in constant use due to the many different users on site (Table 4.1). The weekends will be mostly free except on days when there is a competition. Several of the users that overlap would share the same spaces, especially in the arenas. It would be possible for the Equestrian and Rodeo Teams to share an arena. However, the E.H.A.D.R. will need its own space due to the specific nature of therapeutic riding. The EquiCenter has been programed to include enough riding areas to host all these different uses.

	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Equestrian Team		7:30 am - 6:00 pm	7:30 am - 6:00 pm	7:30 am - 6:00 pm	7:30 am - 6:00 pm		5:00 am - 10:00 pm
Rodeo Team		4:00 pm - 9:00 pm	4:00 pm - 9:00 pm	4:00 pm - 9:00 pm	4:00 pm - 9:00 pm		7:00 am - 10:00 pm
Students		8:00 am - 6:00 pm	8:00 am - 6:00 pm	8:00 am - 6:00 pm	8:00 am - 6:00 pm	8:00 am - 6:00 pm	
E.H.A.D.R.		12:00 pm - 6:00 pm	10:00 am - 4:00 pm	2:00 pm - 6:00 pm	10:00 am - 4:00 pm	2:00 pm - 6:00 pm	10:00 am - 4:00 pm
Visitors							9:00 am - 8:00 pm
Recreation	8:00 am - 10:00 pm	8:00 am - 10:00 pm	8:00 am - 10:00 pm	8:00 am - 10:00 pm	8:00 am - 10:00 pm	8:00 am - 10:00 pm	8:00 am - 10:00 pm

Table 4.1 Typical Weekly Schedule by Users

Precedent Studies

The precedent studies were conducted on three equestrian sites provided by Gralla Equestrian Architects out of Norman, Oklahoma. Due to client privacy concerns, they were unable to disclose site specific information. However, I was still able to use these sites to study the adjacencies and scope of program elements. I also Identified groupings of uses in several zones.

Program Zones

- Indoor Active Horse Zone - indoor arenas, stall barns, indoor round pens
- Outdoor Active Horse Zone - outdoor arenas, outdoor round pens, horse paths
- Passive Horse Zone - pastures, paddocks, trails
- Public Vehicle Zone - visitor parking
- User Vehicle Zone - everyday user parking, team parking
- Service Zone - trailer parking, service areas, manure storage, equipment and hay storage

Facility “A” Explanation

Program Elements
Teaching Arena Facility
Teaching arena
Covered connector with cattle pens
100 stall barn
Practice arena
Future barn (100 stall increments)
Trailer parking
Future trailer parking
Public parking
Service/Emergency access
Main public entry
Exhibitor’s entry

Facility “A” is classified as a clustered organization.

This site has two different uses, one is for a teaching facility and the other is for a harness facility. The two uses are separated on the site and have no relation other than a road that links them together. The K-State EquiCenter has no need for a harness facility, but the concept of several uses on site is applicable. K-State’s education area does not necessarily need to be adjacent to the competition area, however, it is desirable.

Horses can be dangerous if a person does not know how to properly interact with the animal. This is why it is important to keep spectators’ direct interaction with horses at a minimum. Public parking for Facility “A” is located west of the indoor teaching arena which allows direct access to the seating for spectators during competition (Figure 4.46).

The exhibitor parking is located south of the indoor teaching arena the horse stalls. This zone is meant for those who have direct interaction with horses. It gives everyday users direct access to the stall barns. Located east of the stall barn is trailer parking and the service area, which are accessed through the exhibitor parking.

The service area located adjacent to the barn allows for easy management. The training facility’s indoor arena and practice arena are connected to the 100 stall barn through a covered connector. The second stall barn is surrounded by vehicle zones, which is not safe for horses and riders wanting to use the arenas. There is a definite conflict area between horse and pedestrian and vehicle (Figure 4.47).

Facility “A” Program Element Diagram

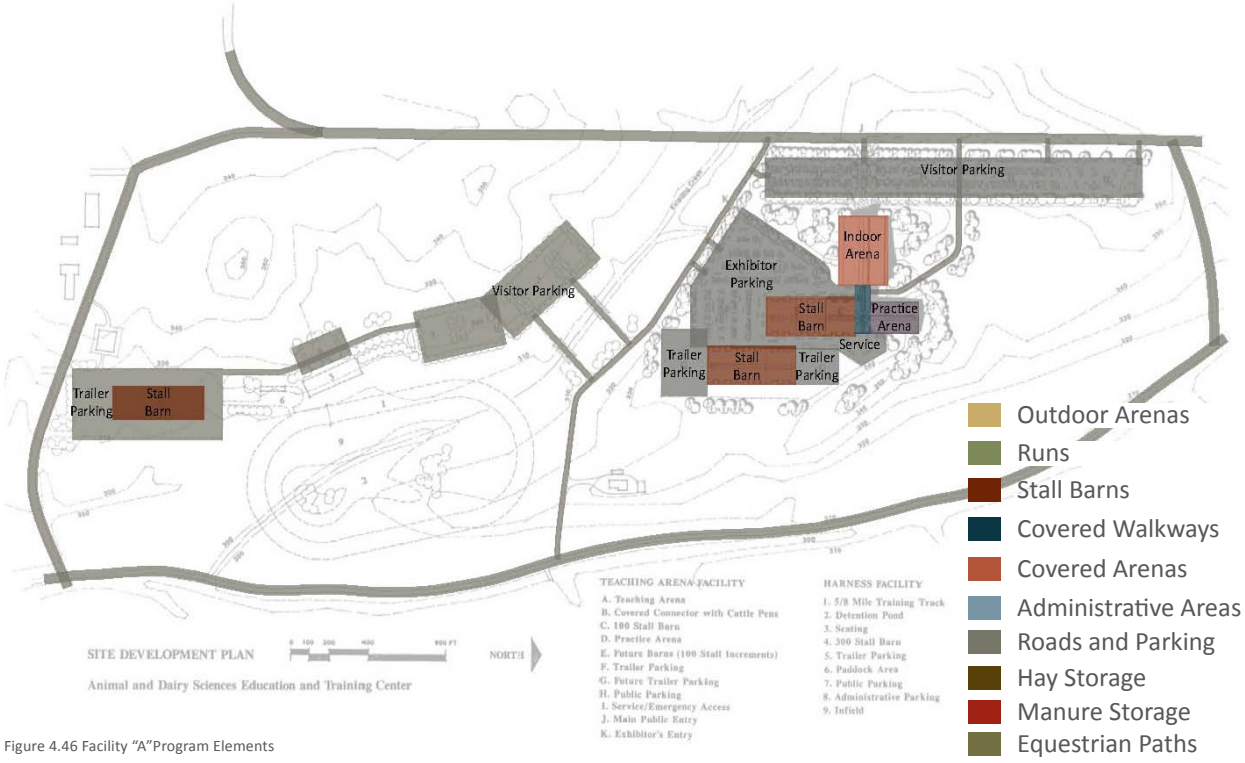


Figure 4.46 Facility “A”Program Elements

Facility “A” Program Zones

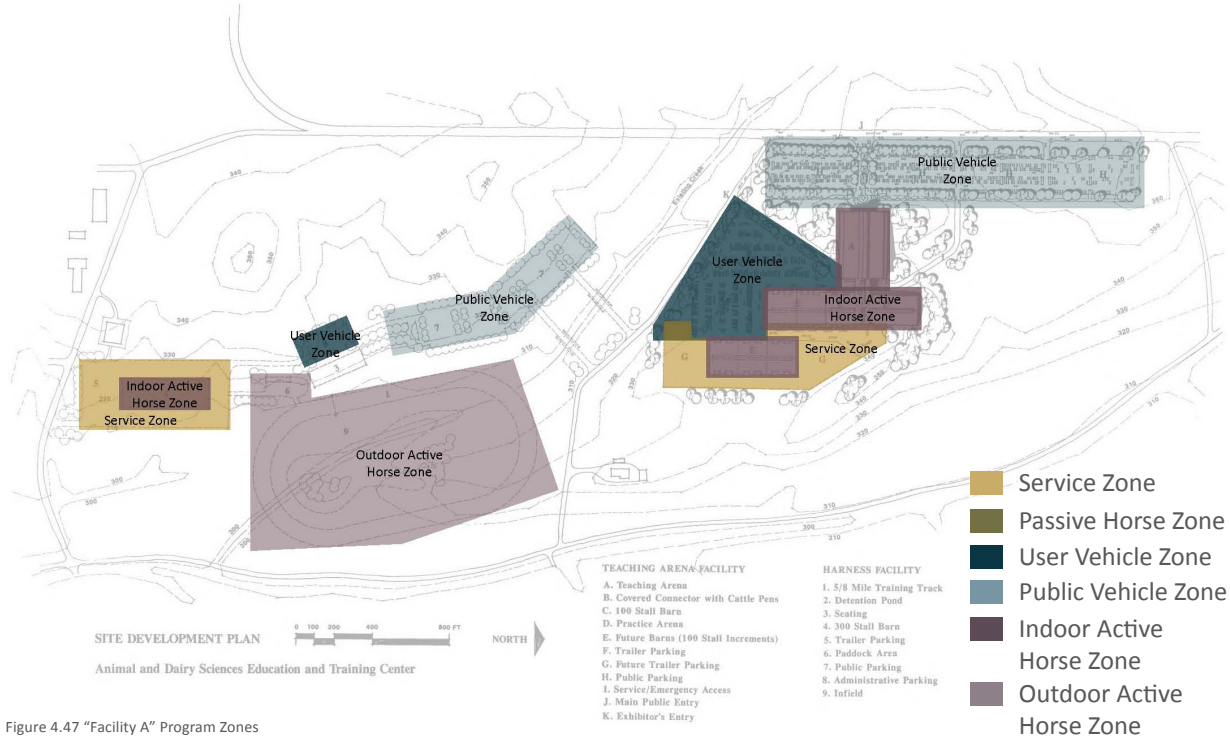


Figure 4.47 “Facility A” Program Zones

Facility “B”

Program Elements
Indoor Training Arena - 120’ x 250’ with
Indoor warm-up arena - 70’ x 120’
Typical 20-stall barn (80 stalls total)
Administrative offices
Barn manager, laundry, and team meeting area
Covered round pen / exerciser
Hay / Equipment barn
Covered trailer storage - 10 spaces
Service area / trailer parking
Covered manure storage area
Student athlete parking
Trailer parking
Student athlete / service entry

Facility “B” is classified as a centralized organization

This site has a clear separation of the zones (Figure 4.50). The public zone is located on the south portion of the site and is directly connected to the indoor training arena and the administrative offices. It is important to keep spectators’ direct interaction with horses at a minimum. The indoor arenas are connected to the barns through an enclosed walkway separated from the public spaces (Figure 4.49). The team meeting area is also connected to the barns. The student parking is located adjacent to the barns and indoor arena for easy access during practice and competitions.

The outdoor arenas allow for multiple users to ride at the same time. These arenas are located adjacent to the barns for easy access and safety reasons. They are all connected by a series of horse paths. The paths are wide and access all necessary program elements throughout the site.

The service area is separated from the horse zones. Hay is stored away from the stall barns for safety. The manure storage is separated from the stall barns, also for health and safety reasons. It helps control the fly population during the summer months. The service area provides adequate area for a truck with trailer and service vehicles to turn around and park. There is plenty of parking for trailers which allow the site to host competitions where horses are brought onto the site.

Most of the passive horse zones are located in the floodplain. The extra wet conditions could create muddy areas where the horses congregate. This also contributes to soil compaction, which limits infiltration rates.

Facility “B” Program Element Diagram

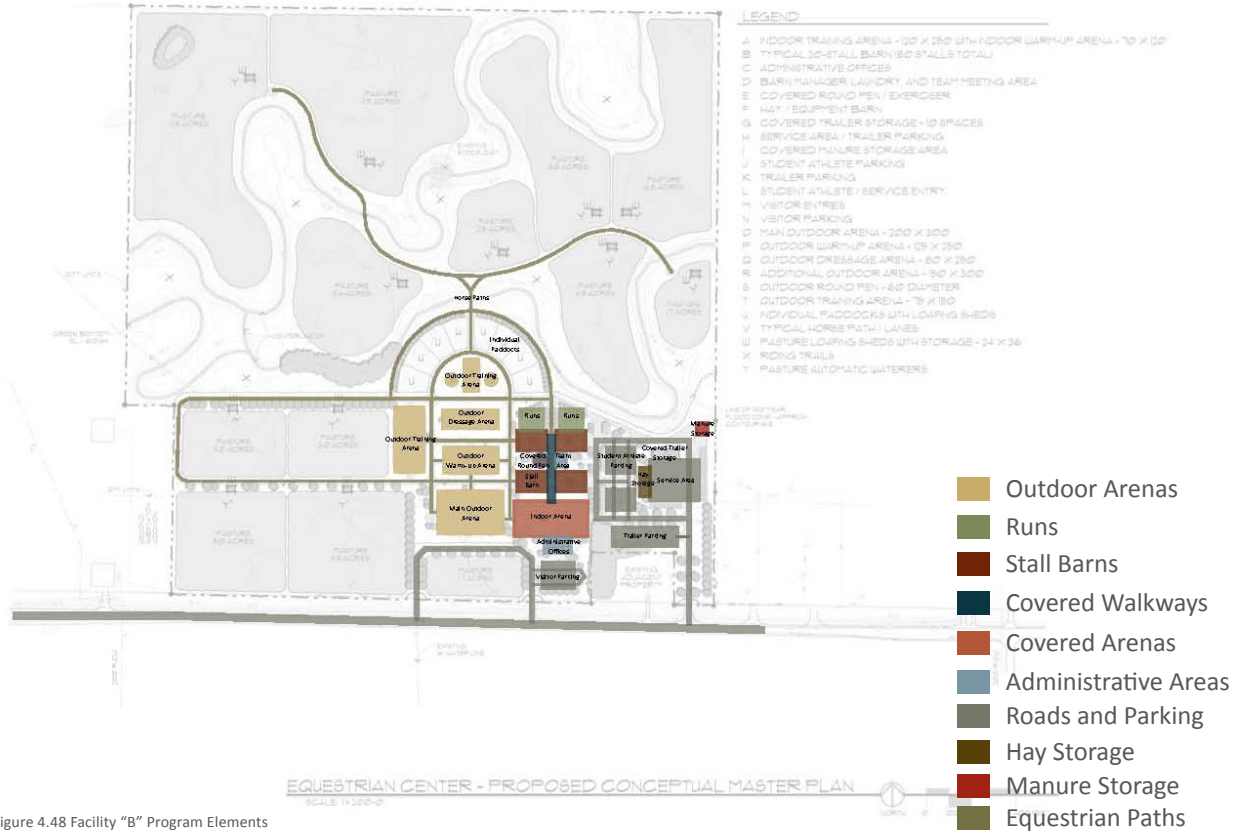


Figure 4.48 Facility “B” Program Elements

Facility “B” Program Element Diagram - Central Facilities Enlarged

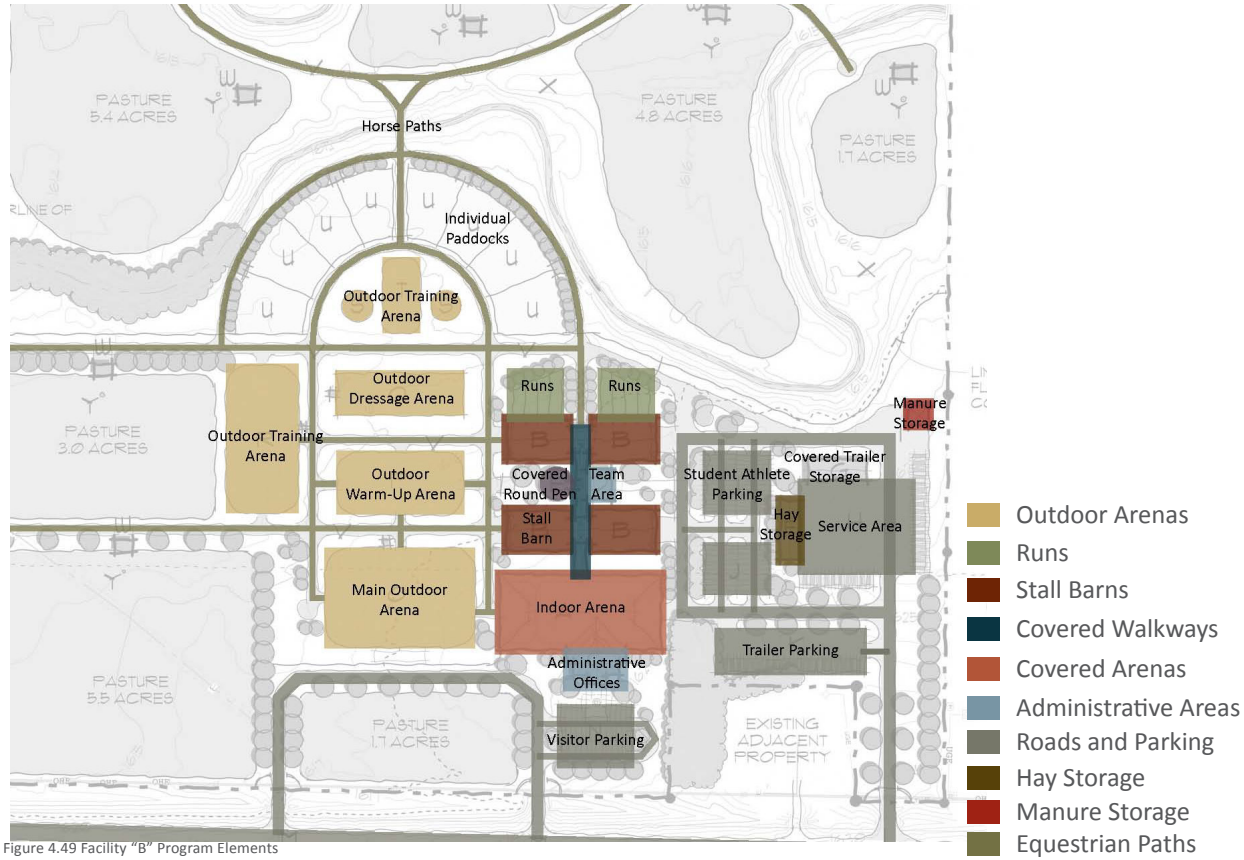


Figure 4.49 Facility “B” Program Elements

Facility “B” Program Zones

Figure 4.50 Facility “B” Program Zones

Facility “C”

Program Elements
Covered training ring floor - 125’ x 250’
Covered portable bleacher area - seating 250 people
Public Restrooms
Game management office
Sports medicine room
Mechanical / electrical rooms
Covered staging area at end of training ring
Announcer stand
Outdoor arena 120’ x 300’
Outdoor warm-up arena 100’ x 200’
Equipment / storage shed
Service area
Pasture
Visitor parking
Round pen - 135’ diameter
Covered round pen - 45’ diameter
Outdoor arena 120’ x 250’
Horse Path
Stall Barns - 14 stall, 16 stall, 20 stall
Team headquarters
Paddock

Facility “C” is classified as a linear organization.

Linear schemes can be difficult because program elements are forced to be separated from one another. In the case of Facility “C”, the arenas are located on the north end of the site while the stall barns and paddocks are located on the south end of the site (Figure 4.51). This could be potentially dangerous because if a rider was in the outdoor arena farthest from the barns by them self and they got hurt, it would be unknown to the other users of the site. Generally, clear sight lines through all areas are desirable.

An adequate amount of parking is located on the south end of the site, which gives team members direct access to the stall barns. Parking is also located on the north end of the site adjacent to the show arenas. This parking is primarily for spectators. Signage would be required throughout the site in order to maintain spectator / horse separation (Figure 4.52).

Horse paths are located throughout the site connecting program elements, however there are several conflicts with vehicular traffic. The 20 stall barn located the most south is surrounded by vehicular zones. Access to the paddocks requires crossing the major road through the site. These situations can be

dangerous if the horse is not comfortable with cars and spooks, putting itself and the handler at risk for injury.

The service area and equipment storage area are located on the north end of the site away from the stall barns. This could make everyday maintenance difficult. The service area is also located adjacent to the performance arena, which could be distracting during competitions.

Facility “C” Program Element Diagram

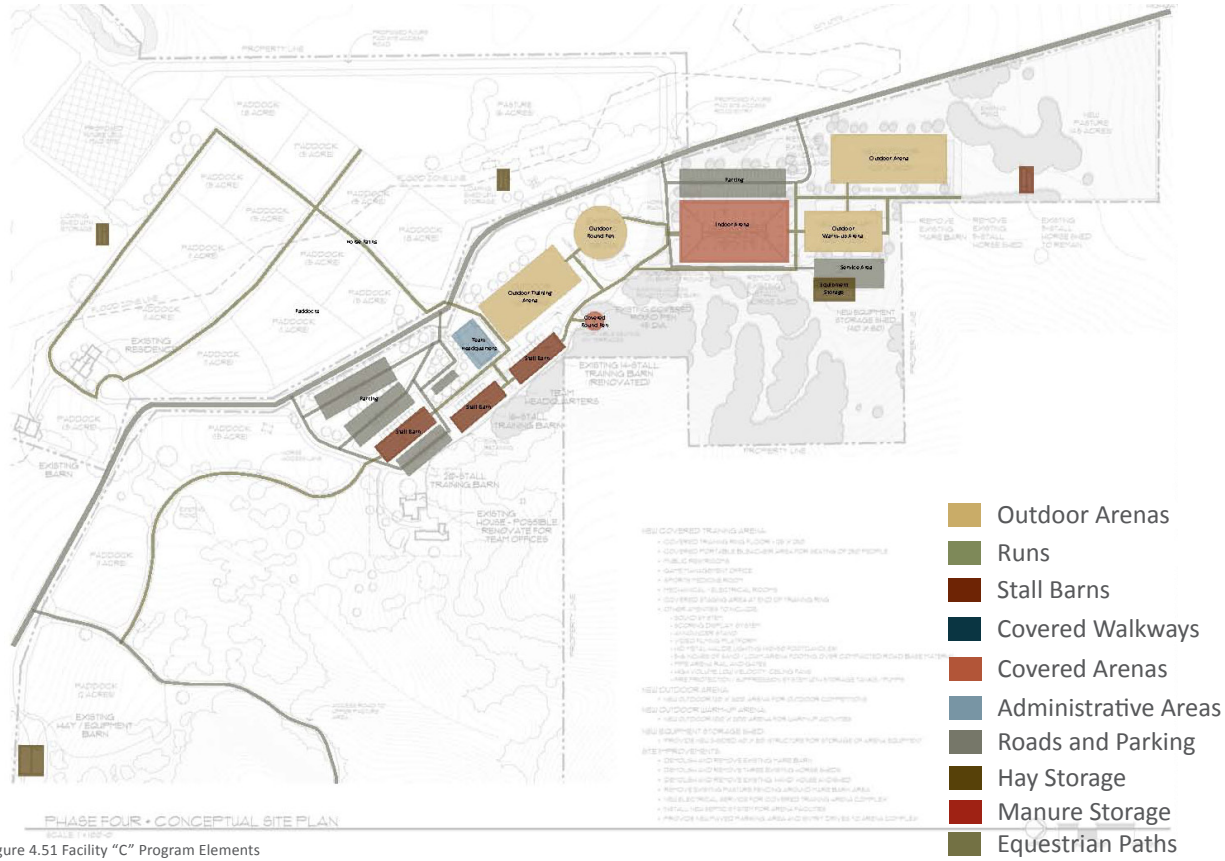


Figure 4.51 Facility “C” Program Elements

Facility “C” Program Zones

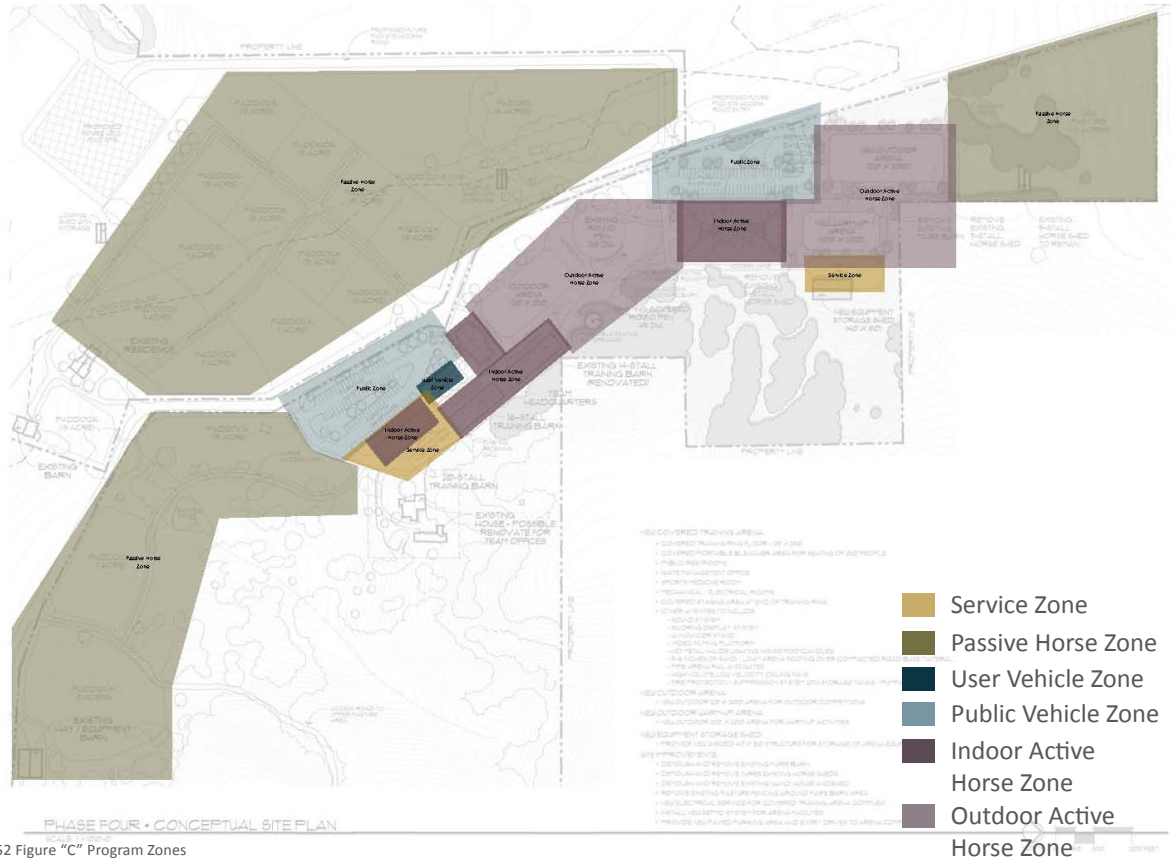


Figure 4.52 Figure “C” Program Zones

Program Elements for K-State EquiCenter

A list of the program elements for the K-State EquiCenter was developed through analyzing the K-State facilities' program and through a study of precedents. The list includes the element, what is included in that element, and the desired size (Table 4.2).

The program is split into functional zones that have been identified for the site. These zones include the education zone that is accessed by professors, students, and E.A.H.D.R. participants. The active horse zone includes areas where horses are most used. These are areas where there is a lot of human/horse interaction. The passive horse zone includes areas where human/horse interaction is kept to a minimum or occurs in an intimate way. Vehicle Zones are where the highest vehicle traffic occurs on the site. These areas should be separated from the horse zones.

Program Element	Description
Education Zones	
Education Building	Entry Lobby - 500 sq. ft. Classroom Arena (90 x 180) - 16,200 sq. ft. Office Area - 900 sq. ft. Classroom Viewing Arena - 1,200 sq. ft. E.A.H.D.R Arena Floor (60 x 120) - 7,200 sq. ft. Conference/Classroom - 720 sq. ft. Observation Room - 400 sq. ft. Physical Therapy Room - 400 sq. ft. Office Area - 1,500 sq. ft. Total -29,000 sq. ft.
Team Area	Offices Meeting Room Team Lockers Visitor Lockers
Pedestrian Trails	5’ min. width
Rainwater/Stormwater Features	As needed
Restored Prairie	As needed

Table 4.2 Program Elements

Program Element	Description
Active Horse Zones	
Indoor Arena Complex	Entry Lobby - 1,000 sq. ft. Arena Floor (150 x 300) - 45,000 sq. ft. Bleachers (2,000 seats) Concessions Area Home and Visitors locker rooms - 2,000 sq. ft. Misc. storage and mechanical, electrical and circulation - 4,500 sq. ft.
Performance Arena	200’ x 300’ 60,000 sq. ft.
Training Outdoor Arena	150’ x 300’ 45,000 sq. ft.
Warm-up Arena	125’ x 250’ 31,250 sq. ft.
Concessions	200 - 400 sq. ft.
Announcer Stand	
Outdoor Seating	Seating for 200 800 - 1,000 sq. ft.

Program Element	Description
Manure Storage adequate for 9-12 months before off site compost by KSU	80 sq. ft. per horse approximately 5,000 sq. ft.
Stall Barn	32 stalls 12’ x 12’ Tack room, feed storage, grooming area
Horse Paths / Circulation	Min. 10’ wide
Round Pens	60’ diameter 90’ diameter
Wash Racks	10’ x 12’ Two minimum
Grazing Areas	Where applicable
Passive Horse Zones	
Pastures	5, 1 - 3 acres per 1,000-pound horse for year-round grazing with additional supplemental feed
Paddocks	10, 1,000 sq. ft. minimum per horse
Runs	10, 600 sq. ft. minimum per horse, 12’ x 80’
Run-in Shelter	5, 150 sq. ft. / animal

Program Element	Description
Equestrian Trails	8’ - 10’ wide
Vehicle Zones	
Equipment / Hay Storage	8,000 sq. ft.
Service Area	Variety of vehicles including trash trucks, farm vehicles, semi-trailers 60,000 sq. ft
Visitor Parking	150 - 200 spaces approximately 75,600 sq. ft.
Team Parking	80 spaces approximately 30,240 sq. ft
Trailer Parking	20 - 30 spaces 80’ x 30’ average per trailer approximately 78,000 sq. ft.

Program Element Proportions

The program proportions diagram illustrates the program element sizes compared to each other and to the site at the same scale. It becomes clear that the program elements will need a large amount of space.

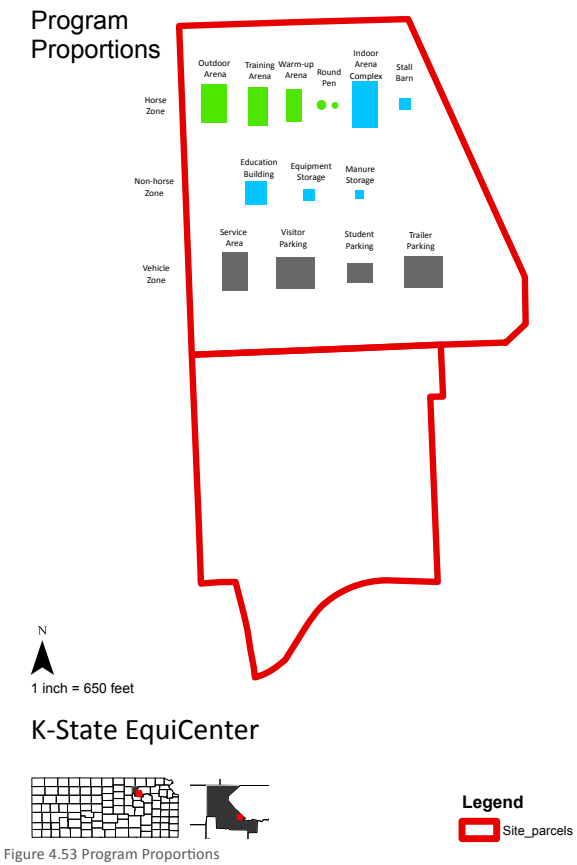


Figure 4.53 Program Proportions

Uses of Program Elements

Each identified user will interact with the program elements differently. The Table 4.3 highlights the user needs of each, and where on the site they will be interacting. It also highlights which program elements will be most used on the site. The indoor arena complex, for example, will be used by each group.

	Education Building	Administration Building	Team Area	Outdoor Classroom	Pedestrian Trails	Rainwater/Stormwater Features	Indoor Arena Complex	Performance Arena	Warm-up Arena	Concession Stand	Announcer Stand	Outdoor Seating	Manure Storage	Stall Barn	Horse Paths	Round Pens	Wash Racks	Grazing Areas	Quarantine Barn	Hot Walker	Equipment/Hay Storage	Service Area	Visitor Parking	Team Parking	Trailer Parking and Access	Pasture	Paddocks	Runs	Run-in Shelter	Equestrian Trails
Equestrian Team			x		x		x	x	x		x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x
Rodeo Team			x		x		x	x	x		x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x
Students	x	x		x	x		x							x									x							
E.H.A.D.R.	x				x		x	x	x			x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Visitors	x	x			x		x	x		x		x											x							
Recreation					x		x	x	x				x	x	x	x	x	x			x	x		x	x	x	x	x	x	x

Table 4.3 Use of Program Elements

Sustainable Sites Initiative

The purpose of the Sustainable Sites Initiative (SSI) is to

> "foster a transformation in land development and management practices that will bring the essential importance of ecosystem services to the forefront. For the purposes of the SSI, land practices are defined as sustainable if they enable natural and built systems to work together to meet the needs of the present without compromising the ability of future generations to meet their own needs."
>
> (Sustainable Sites Initiative)

The Guidelines and Performance Benchmarks of the SSI encompass a series of prerequisites and credits for measuring site sustainability. Benchmarks outlined under prerequisites are required and must be met in order for a site to participate in this voluntary program. Benchmarks outlined under the credits are optional, but a certain number of them must be attained for a project to achieve eventual recognition as a Sustainable Site.

The SSI committee members completed a series of weighting exercises to establish a ranking system for the 51 credits based on the Initiative's Guiding Principles. This resulted in the development of a 250-point system. Prerequisites are required and therefore are not assigned a point value. Credits are assigned a point value and in many cases they offer a range of points, providing projects additional flexibility in selecting the level (or benchmark) that is appropriate and achievable for them.

2009 Rating System:	250 Points Total
One Star:	100 points (40% of total points)
Two Stars:	125 points (50% of total points)
Tree Stars:	150 points (60% of total points)
Four Stars:	200 points (80% of total points)

The SSI is intended to be completed by an integrated design team that includes the owner/client and professionals knowledgeable in landscape design, construction, and maintenance. The design team is expected to collect and assess information to help identify opportunities to protect and improve ecosystem services and use sustainable strategies to guide the design, construction, operation and maintenance of the site. This type of project would realistically take place over several years. For these reasons, I have chosen to focus on a few specific credits of the SSI when developing a program for the K-State EquiCenter (Table 4.4).

- Credit 3.4 - Rehabilitate lost streams, wetland, and shoreline
- Credit 3.5 - Manage stormwater on site
- Credit 3.7 - Design rainwater/stormwater features to provide a landscape amenity
- Credit 4.4 - Minimize soil disturbance in design and construction
- Credit 4.6 - Preserve or restore appropriate plant biomass on site
- Credit 4.9 - Restore plant communities native to the ecoregion
- Credit 6.3 - Promote sustainability awareness and education
- Credit 6.7 - Provide views of vegetation and quiet outdoor spaces for mental restoration
- Credit 6.8 - Provide outdoor spaces for social interaction

These credits present program elements for the K-State EquiCenter site. They are higlighted in Table 4.4. Specifically, the program element goals are

- Rehabilitated stream
- Rainwater/stormwater features
- Native plant communities
- Features that promote sustainability awareness and education
- Spaces for mental restoration
- Spaces for social interaction

The SSI's application to the site will be discussed in more detail in the Concept Development and Findings and Conclusions sections. The site inventory and analysis in the Discovery section will demonstrate the rational for choosing these credits as the most appropriate for this project. Many of the other credits are applicable and will be assumed applied when rating the concepts, however due to time constraints, the credit was not applied in detail.

	Sustainable Sites Initiative Guidelines and Requirements	
1	**Site Selection (21 possible points)**	
1.1	**Limit development of soils designated as prime farmland, unique farmland, and farmland of statewide importance**	
1.2	**Protect floodplain functions**	
1.3	**Preserve wetlands**	
1.4	**Preserve threatened or endangered species and their habitats**	
1.5	Select brownfields or greyfields for redevelopment (5-10 points)	
1.6	Select sites within existing communities (6 points)	
1.7	Select sites that encourage non-motorized transportation and use of public transit (5 points)	
2	**Pre-Design Assessment and Planning (4 possible points)**	
2.1	**Conduct a pre-design site assessment and explore opportunities for site sustainability**	
2.2	**Use an integrated site development process**	
2.3	Engage users and other stakeholders in site design (4 points)	
3	**Site Design - Water (44 possible points)**	
3.1	**Reduce potable water use for landscape irrigation by 50 percent from established baseline**	
3.2	Reduce potable water use for landscape irrigation by 75 percent or more from established baseline (2-5 points)	
3.3	Protect and restore riparian, wetland, and shoreline buffers (3-8 points)	
3.4	Rehabilitate lost streams, wetland, and shorelines (2-5 points)	
3.5	Manage stormwater on site (5-10 points)	
3.6	Protect and enhance on-site water resources and receiving water quality (3-9 points)	
3.7	Design rainwater/stormwater features to provide a landscape amenity (1-3 points)	
3.8	Maintain water features to conserve water and other resources (1-4 points)	
4	**Site Design - Soil and Vegetation (51 possible points)**	
4.1	**Control and manage known invasive plants found on site**	
4.2	**Use appropriate, non-invasive plants**	
4.3	**Create a soil management plan**	
4.4	Minimize soil disturbance in design and construction (6 points)	
4.5	Preserve all vegetation designated as special status (5 points)	
4.6	Preserve or restore appropriate plant biomass on site (5 points)	
4.7	Use native plants (1-4 points)	
4.8	Preserve plant communities native to the ecoregion (2-6 points)	
4.9	Restore plant communities native to the ecoregion (1-5 points)	
4.10	Use vegetation to minimize building heating requirements (2-4 points)	
4.11	Use vegetation to minimize cooling requirements (2-5 points)	
4.12	Reduce urban heat island effects (3-5 points)	
4.13	Reduce the risk of catastrophic wildfire (3 points)	
5	**Site Design - Material Selection (36 possible points)**	
5.1	**Eliminate the use of wood from threatened tree species**	
5.2	Maintain on-site structures, hardscape, and landscape amenities (1-4 points)	

	Sustainable Sites Initiative Guidelines and Requirements	
5.3	Design for deconstruction and disassembly (1-3 points)	
5.4	Reuse salvaged materials and plants (2-4 points)	
5.5	Use recycled content materials (2-4 points)	
5.6	Use certified wood (1-4 points)	
5.7	Use regional materials (2-6 points)	
5.8	Use adhesives, sealants, paints, and coatings with reduced VOC emissions (2 points)	
5.9	Support sustainable practices in plant production (3 points)	
5.10	Support sustainable practices in materials manufacturing (3-6 points)	
6	**Site Design - Human Health and Well-Being (32 possible points)**	
6.1	Promote equitable site development (1-3 points)	
6.2	Promote equitable site use (1-4 points)	
6.3	Promote sustainability awareness and education (2-4 points)	
6.4	Protect and maintain unique cultural and historical places (2-4 points)	
6.5	Provide for optimum site accessibility, safety, and wayfinding (3 points)	
6.6	Provide opportunities for outdoor physical activity (4-5 points)	
6.7	Provide views of vegetation and quiet outdoor spaces for mental restoration (3-4 points)	
6.8	Provide outdoor spaces for social interaction (3 points)	
6.9	Reduce light pollution (2 points)	
7	**Construction (21 possible points)**	
7.1	**Control and retain construction pollutants**	
7.2	**Restore soils disturbed during construction**	
7.3	Restore soils disturbed by previous development (2-8 points)	
7.4	Divert construction and demolition materials from disposal (3-5 points)	
7.5	Reuse or recycle vegetation, rocks, and soil generated during construction (3-5 points)	
7.6	Minimize generation of greenhouse gas emissions and exposure to localized air pollutants during construction (1-3 points)	
8	**Operations and Maintenance (23 possible points)**	
8.1	**Plan for sustainable site maintenance**	
8.2	**Provide for storage and collection of recyclables**	
8.3	Recycle organic matter generated during site operations ad maintenance (2-6 points)	
8.4	Reduce outdoor energy consumption for all landscape and exterior operations (1-4 points)	
8.5	Use renewable sources for landscape electricity needs (2-3 points)	
8.6	Minimize exposure to environmental tobacco smoke (1-2 points)	
8.7	Minimize generation of greenhouse gases and exposure to localized air pollutants during landscape maintenance activities (1-4 points)	
8.8	Reduce emissions and promote the use of fuel-efficient vehicles (4 points)	
9	**Monitoring and Innovation (18 possible points)**	
9.1	Monitor performance of sustainable design practices (10 points)	
9.2	Innovation in site design (8 points)	

Table 4.4 Sustainable Sites Initiative Prerequisites and Credits with Selected Criteria

250 points total

Program Conclusion

A final program was developed for the K-State EquiCenter by exploring the needs and desired experiences of the users while on the site.

A study of previously designed equestrian facilities was conducted to analyze adjacencies and program use zones.

Program elements were assigned sizes and specific attributes where necessary. This allowed an exploration of element proportions as well as a study of which elements are used by which users.

Finally, several credits of the Sustainable Sites Initiative were chosen to guide the combination of program elements in the design of the K-State Equestrian Facility.

"The **air of heaven** is that which blows between a horses ears" - Arabian Proverb

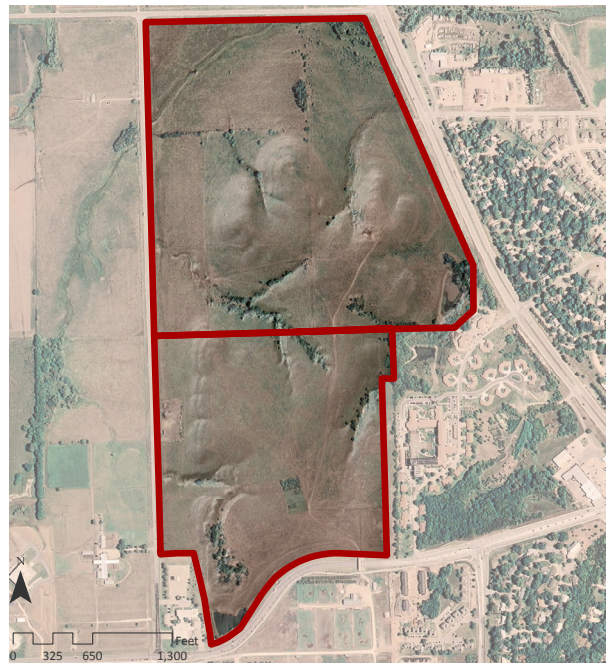
Discovery 85

Kansas State University has chosen a site for the future location of the Kansas State University Equine Education and Activities Center. Construction began in the Fall of 2009.

I have chosen the K-State EquiCenter's new site as a hypothetical location for the purposes of this master's project. It was chosen because the goal of this project was to complete an equestrian facility design that was guided or influenced by the application of the Sustainable Sites Initiative. An inventory of existing site conditions was completed. An analysis was conducted according to the program element needs that were identified in the Program chapter. After completion of inventory and analysis, two locations on the site were identified as viable alternatives for construction.

Site Inventory Methodology

A inventory of the existing site conditions was completed. This inventory included cultural as well as natural elements. Aspects important to siting program facilities elements according to the SSI are highlighted here. These include a study of soils, slopes, aspect, winds, and drainage.



Site Image

K-State EquiCenter

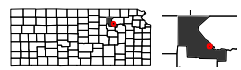
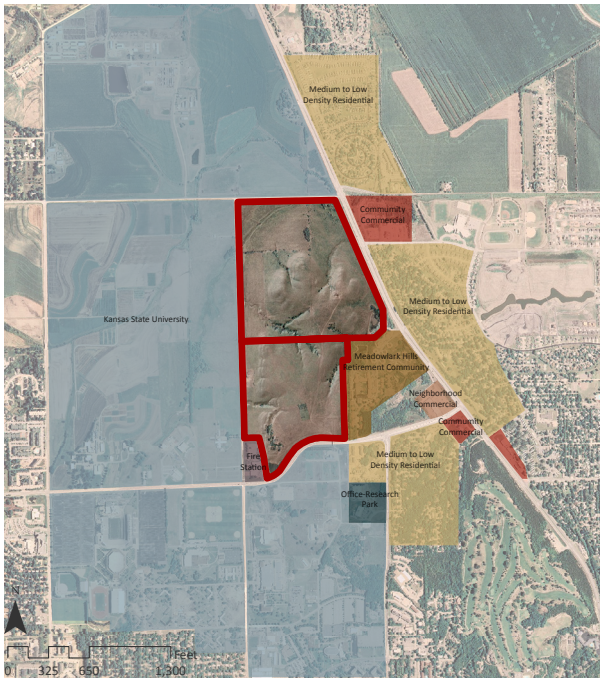


Figure 5.54 Site Image



Site Context

K-State EquiCenter

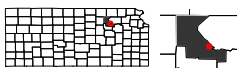


Figure 5.55 Site Context

Site Context

The site of the K-State EquiCenter is located north of Kimball Avenue, east of Denison Avenue, south of Marlatt Avenue, and west of Tuttle Creek Blvd. It is surrounded on three sides by property of Kansas State University. South of Kimball Avenue is the Purebred Beef Teaching Unit. The Manhattan Fire Department's headquarters is located in the southwest corner of the site. Meadowlark Hills Retirement Community is located directly east of the site. Meadowlark Hills is a continuing care retirement community offering services from independent living to assisted living to round-the-clock skilled nursing. Tuttle Creek Blvd., located along the east portion of the site, is extremely difficult to cross and becomes a barrier to the residential area to the east.

Existing Site Conditions

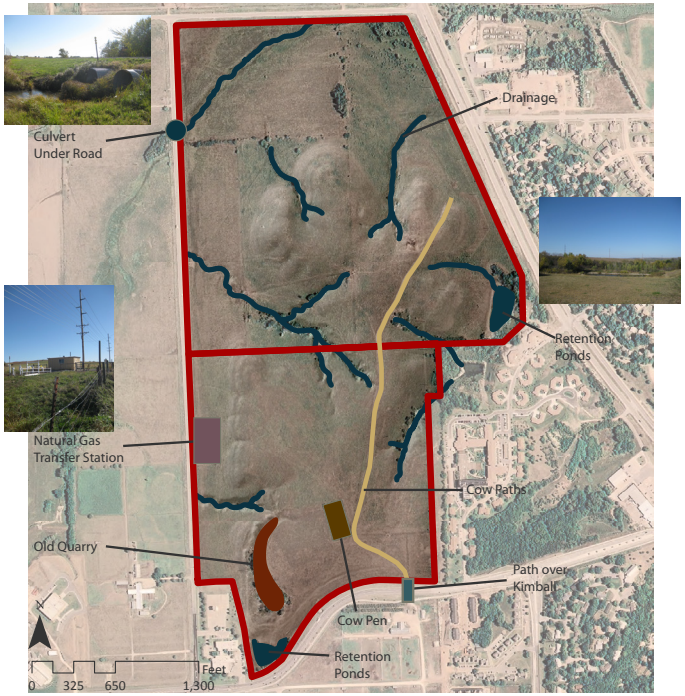
The future location of the K-State EquiCenter is currently being used to graze cattle used for K-State's Purebred Beef Teaching Unit. The cattle access the site via the bridge that passes over Kimball Avenue on the southern end of the site. A visible cow path can be seen in the aerial image that runs north to south and uses the most gentle slopes to access the northern portion of the site. A cow pen is located on the highest point of the site. This is used to round-up cattle.

An old quarry is located in the southwestern corner of the site.

A natural gas transfer station is located on the western portion of the site and is accessed from Denison Avenue. The station is fenced in and will remain on the site.

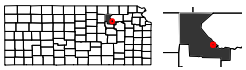
A culvert is located on the western portion of the site and passes under Denison Avenue. During the site visit there was a lot of standing water at the entry point of the culvert, possibly because the culvert is not deep enough for all the water to pass through. This will need to be addressed.

The main drainage ways on the site are highlighted. These are the vegetated areas of the site. Two retention ponds are located on the site. They are man-made ponds for other developments. One is located on the southern most tip of the site adjacent to the fire station and the second is located on the eastern most portion of the site adjacent to Meadowlark Hills.



Existing Site Conditions

K-State EquiCenter



Legend

Site_parcels

Drainage_Corridor

Figure 5.56 Existing Site Conditions

Utilities

Utilities are located to the north, east, and south of the site. Connections for the buildings on the site will depend on where buildings are located.

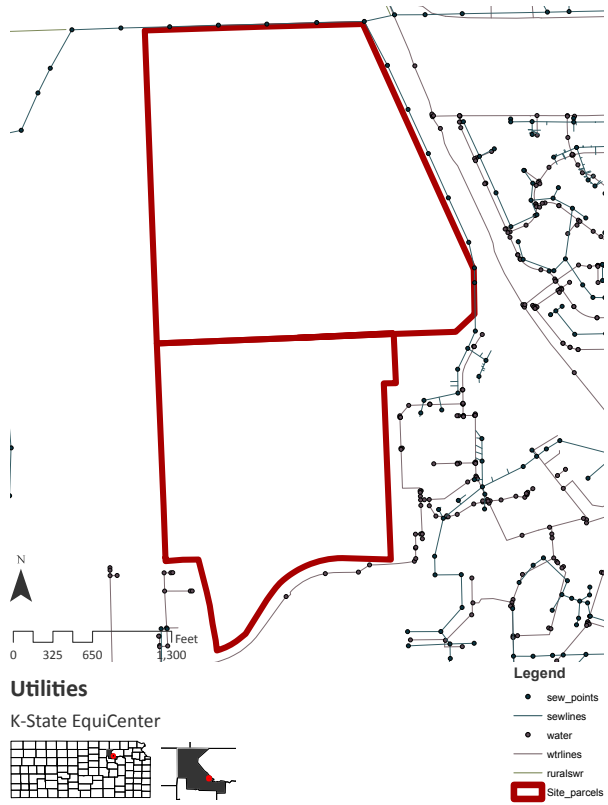


Figure 5.57 Utilities

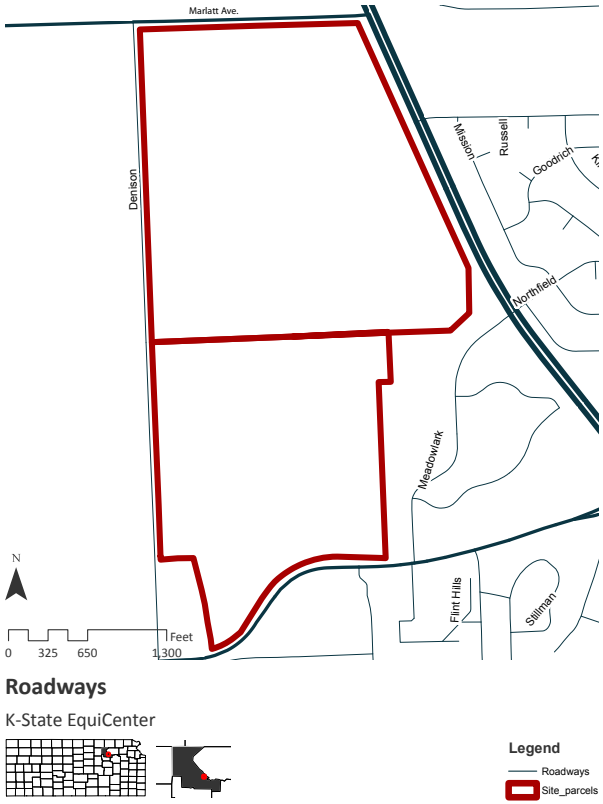


Figure 5.58 Roadways

Roadways

Tuttle Creek Blvd. is an arterial road located east of the K-State EquiCenter site. Marlatt Avenue and Kimball Avenue are collector streets located north and south of the site, respectively. Denison is a local street located west of the site.

Soils - Drainage Classification

The drainage of soils are important for equestrian facilities because of the uses that occur on site. Program elements like outdoor riding arenas need to be will drained in order to maintain quality footing in the arena. Horses can be damaging to soils, especially when they are wet. It is important for water to be removed from the site quickly. All soils on this site are well drained or moderately well drained, which is ideal for the program of the project.

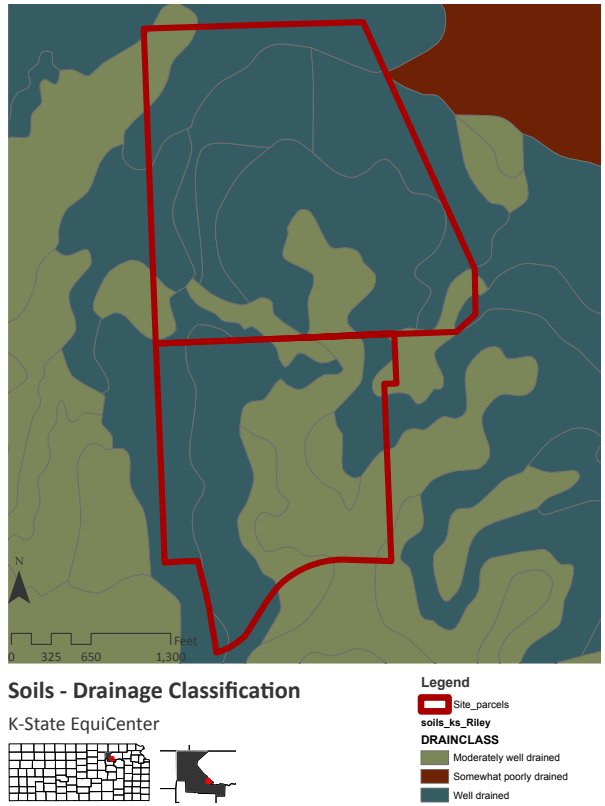


Figure 5.59 Soils - Drainage Classification

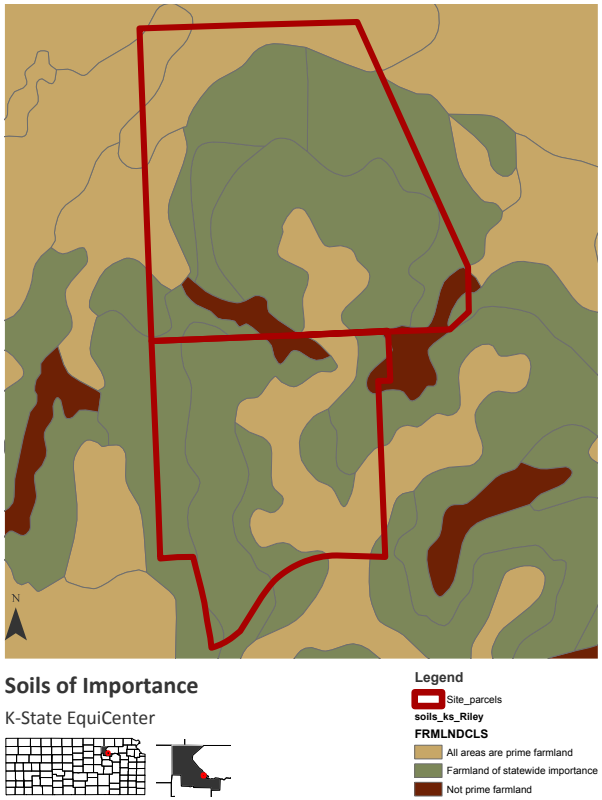


Figure 5.60 Soils of Importance

Soils of Importance

According the Sustainable Sites Initiative, soils designated as prime farmland or soils of statewide importance should not be built on for the purpose of preserving the soil. This site has both types of soils covering most of the site.

Contours

The site contours represent the elevations and landforms of the site. They reveal the drainage ways of the site as well as the form of the cuesta. Contours are drawn at a one (1) foot interval.

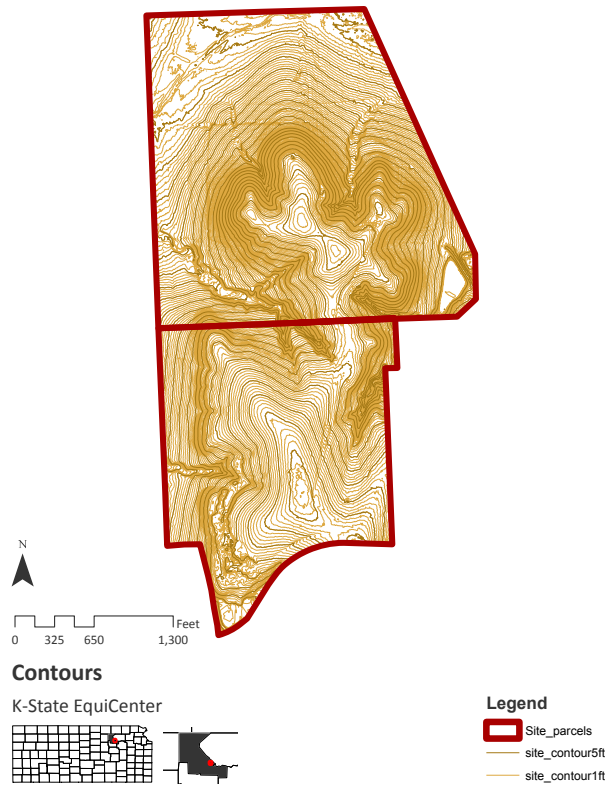


Figure 5.61 Contours

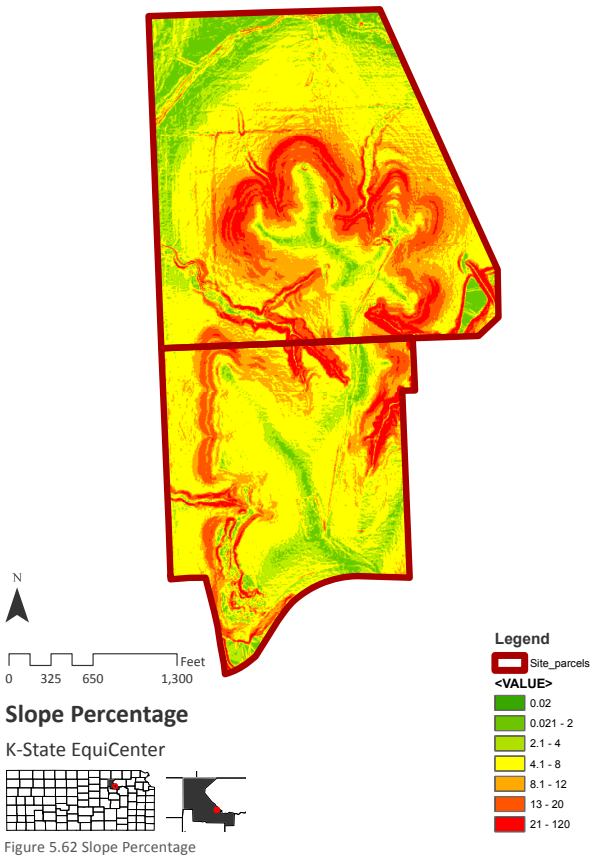


Figure 5.62 Slope Percentage

Slope Percentage

Slope is the single most important site analysis factor. Many program elements need to be built on relatively flat slopes. The site provides challenges in that it is segmented by steep slopes, which limits the area for large program elements.

Slope Aspect

Slope aspect indicates the direction of the slopes on the site. It is most important for exact building placement. Aspect can influence the directional aspect of a building for maximum solar gain.

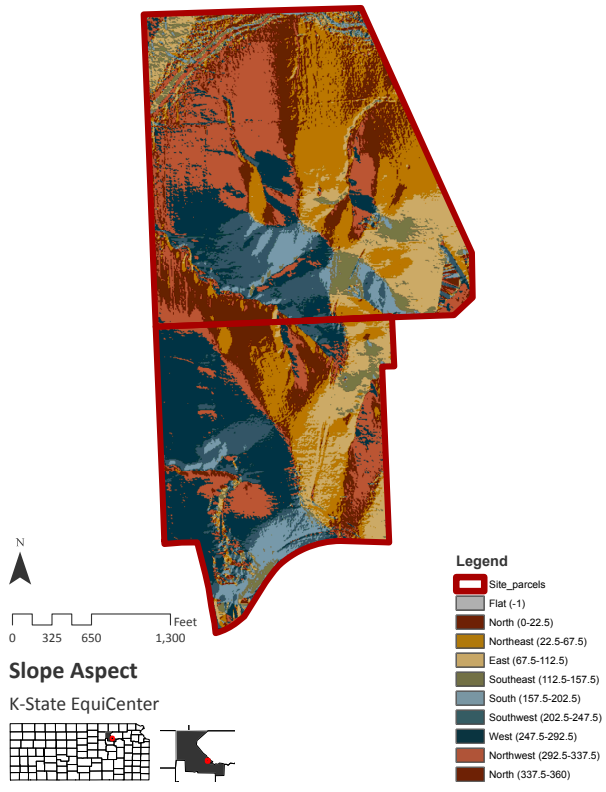


Figure 5.63 Slope Aspect

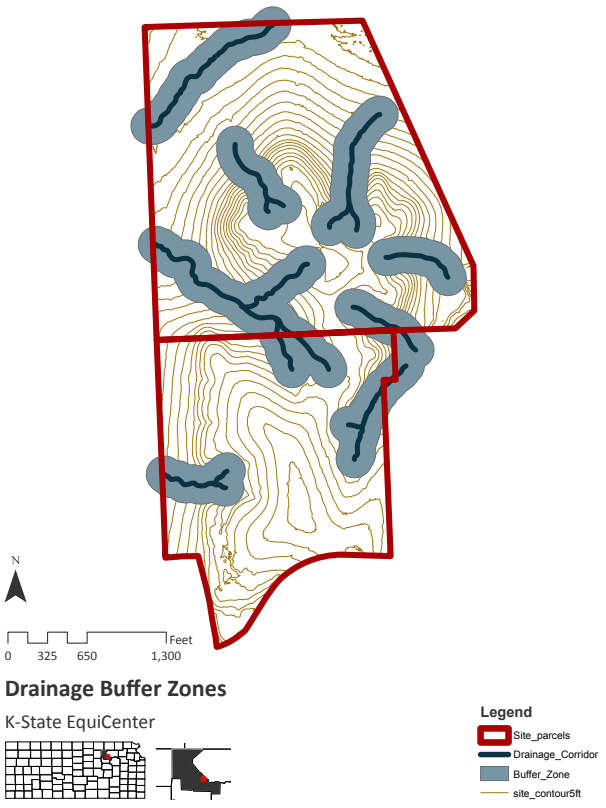


Figure 5.64 Drainage Buffer Zones

Drainage Buffer Zones

To obtain points for the SSI, a buffer must be established around riparian zones. For protection of water quality a buffer between 100 ft and 200 ft must be established. A 150 ft buffer is proposed around the designated drainage ways for this project.

Landcover

Trees and shrubs cover a small portion of the site, mainly in drainage ways and along fence lines. Tall grass covers the rest of the site. There is no impervious pavement on the site, however there are areas of compacted soil and gravel.

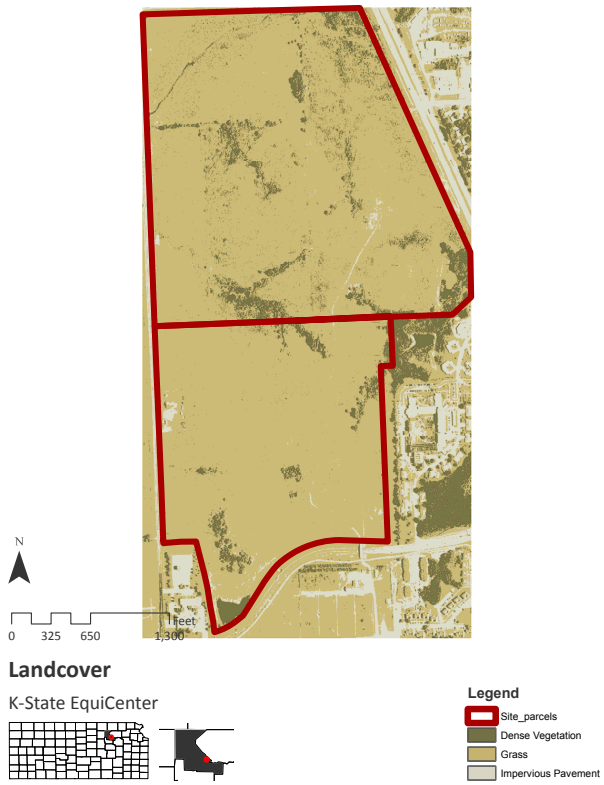


Figure 5.65 Landcover

Windroses

The windrose indicates the direction the wind blows on the surface of the earth. It is illustrated using the percent of time during a month that the wind blew from that direction. The number in the center of the windrose indicates the intensity at which the wind is blowing. In Manhattan, Kansas for the month of January, the windrose indicates that surface winds come from two primary directions, north-northwest and the south (Figure 5.66 and 5.67). For the month of June, winds occur primarily out of the south.

Winds are important to equestrian facilities for natural ventilation. Program elements such as barns need to be sited properly in order to take advantage of the winds during the summer, yet they need to properly blocked during the winter to reduce heating costs.

January Windrose

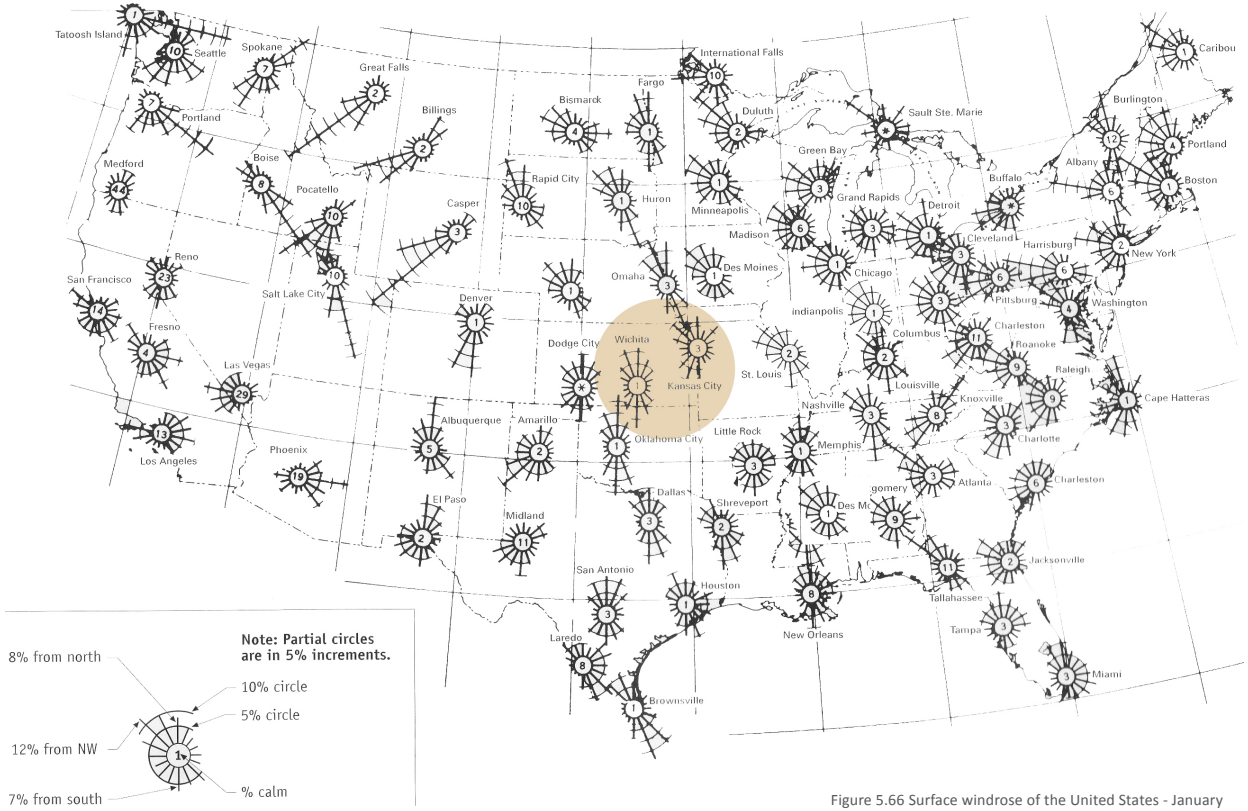


Figure 5.66 Surface windrose of the United States - January

June Windrose

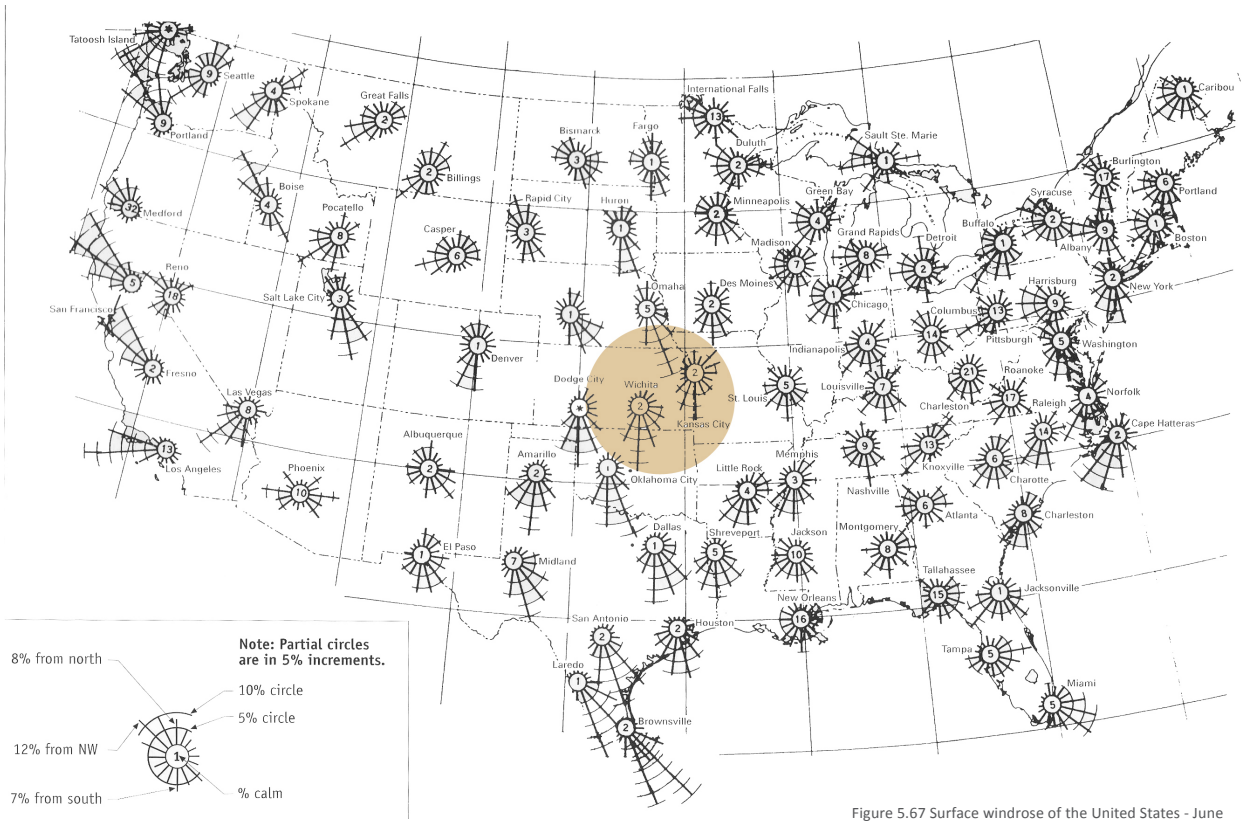


Figure 5.67 Surface windrose of the United States - June

3 dimensional model of the K-State Equicenter site created with ArcGIS

Views were selected to reveal landform and drainage in more detail.

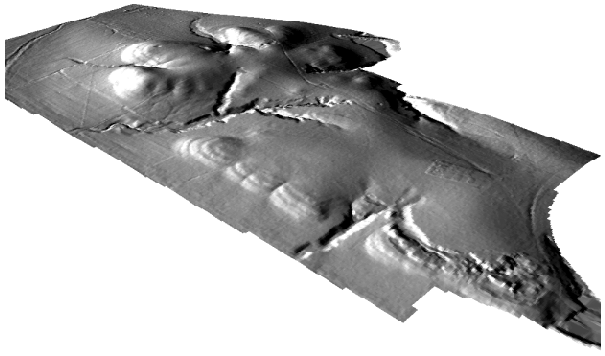


Figure 5.69 View to the northeast_Entire Site

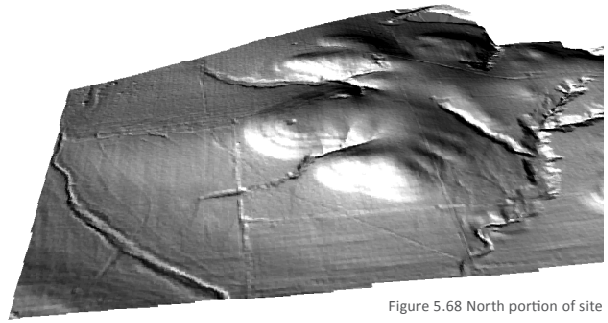


Figure 5.68 North portion of site

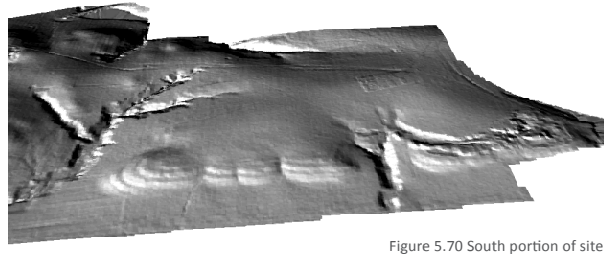


Figure 5.70 South portion of site

Site Analysis Methodology

In the previous chapter, the size of each program element was identified. This identification was important because program elements of equestrian facilities have very specific needs. The site inventory identified the cultural and natural aspects of the site. The analysis will combine the cultural and natural aspects with the specific needs of the program elements to determine the vulnerable/suitable areas of the site. The opportunities and constraints are identified for each program element in relation to site characteristics. The overall findings determine the best locations for construction on the site.

Parking Vulnerability/Suitability

Parking is ideally located on slopes between 1% and 3%. This allows for adequate drainage while also maintaining an accessible slope for pedestrians. Slopes between 3% and 10% are located on most the site. Parking areas may require additional grading.

Opportunities:
Parking can be fitted to the topography in creative ways. It can be stepped down with the grade with transitional areas occupied by plantings.

Constraints:
The steep slopes and drainage way buffers leave little space for adequate parking around buildings.

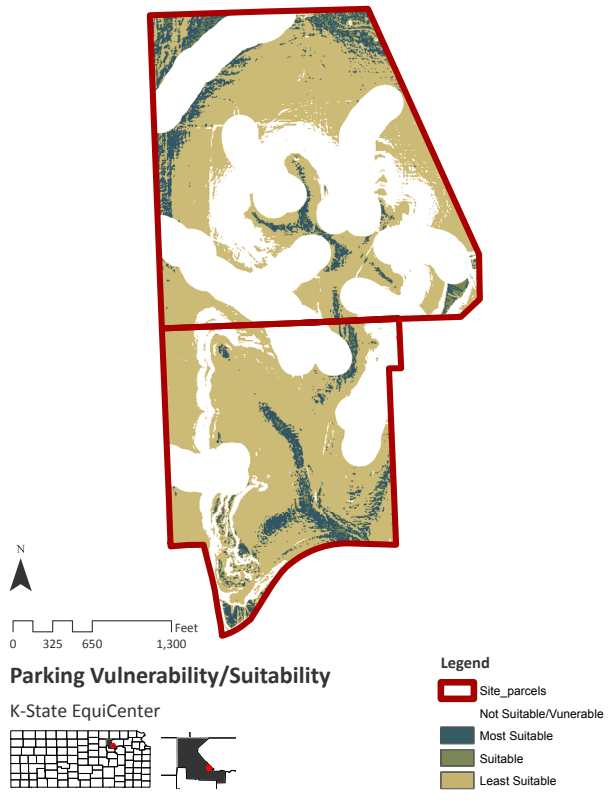


Figure 5.71 Parking Vulnerability/Suitability

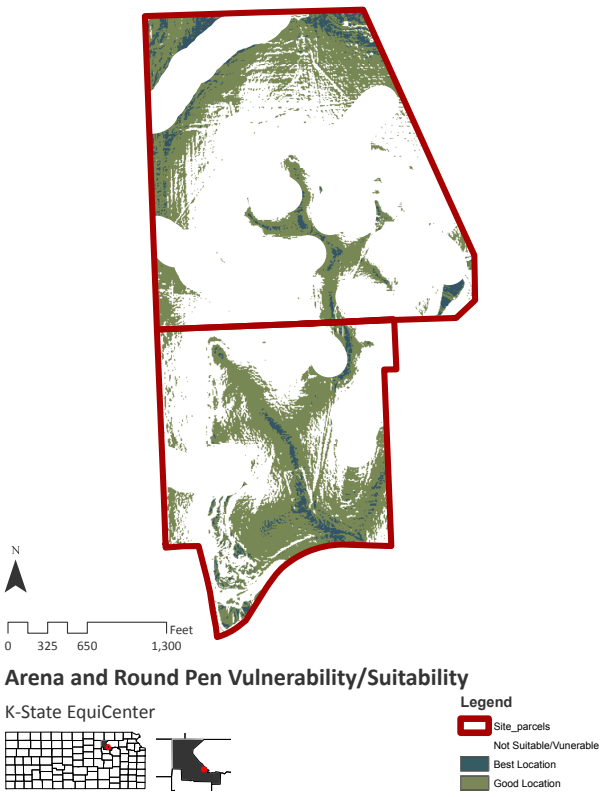


Figure 5.72 Arena and Round Pen Vulnerability/Suitability

Arena and Round Pen Vulnerability/Suitability

Arenas and round pens are large program elements that need to be located on flat slopes. Slope less than 2% are the most desirable. Slopes between 2% and 6% are suitable with some grading. Arenas and round pens should not be built on slopes over 6%. Arenas and round pens should also be located away from drainage ways. Properly drained arenas are important for arena footing.

Opportunities:
The southern portion of the site provides flat slopes for siting arenas and round pens. The southern portion of the site will also provide adequate drainage.

Constraints:
The lack of flat slope on the northern portion of the site will make siting the multiple elements difficult.

Pedestrian Trails Vulnerability/Suitability

Pedestrian trails can be located on slopes less than 10%. The most suitable areas are located in areas of 1%-5% slopes. These are easy trails that can be used by all users. Suitable trails are located on slopes less than 1%. These trails need to have cross slope to ensure water drainage off the trail. Slopes that are least suitable are those with percentages between 5 and 10. These trails can be classified as difficult and need a more experienced user. Drainage corridors can also prove to be difficult for some trail users.

Opportunities:
The site provides opportunities for trails both at the base and the top of the cuesta. The drainage corridors provide a unique experience for the user.

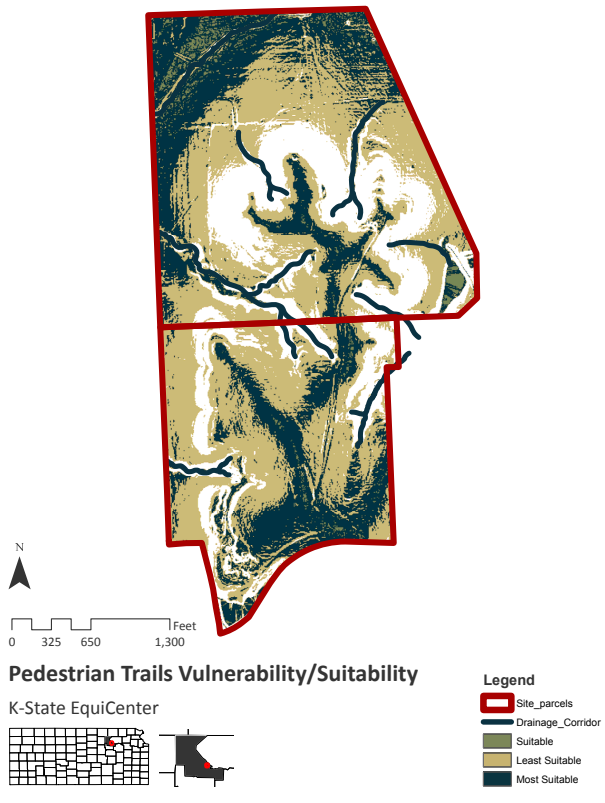


Figure 5.73 Pedestrian Trails Vulnerability/Suitability

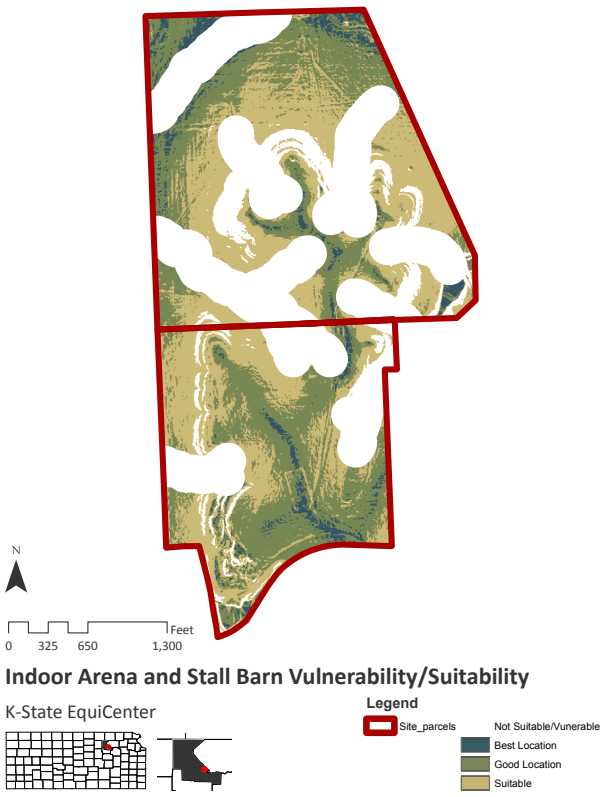


Figure 5.74 Indoor Arena and Stall Barn Vulnerability/Suitability

Indoor Arena and Stall Barn Vulnerability/Suitability

The best location for the indoor arena and stall barns are slopes less than 2%. These program elements require large flat locations, making locating the buildings difficult. Good locations for the buildings will be on slopes less than 6%. Suitable but undesirable locations are on slopes between 6% and 10%. These locations would require innovative design. To gain credits for the SSI, a 150 ft. buffer must be located around all drainage corridors.

Opportunities:
Slopes provide the opportunity for innovative building placement and design.

Constraints:
The flattest area of the site is located on the southern portion, however it is difficult to get to due to the steep slopes. The northern portion of the site has limited space, but easy access.

Equestrian Trails Vulnerability/Suitability

Horses have limitations of slope percentages they can travel on with a person on their back. 0% to 10% slopes are most suitable for equestrian trails. Trails with 10% to 15% slopes can be sustained for short periods of time. Drainage ways provide unique experiences for trail users.

Opportunities:
Equestrian Trails are used for relaxation and fun. There is no need for direct paths when creating trails. The slopes allow the trails to wind through the site and create a more interesting experience. Steep slopes can provide challenges for advanced riders and allow them to improve their skills.

Constraints:
There are several areas that not suitable for equestrian trails due to the steep slopes.

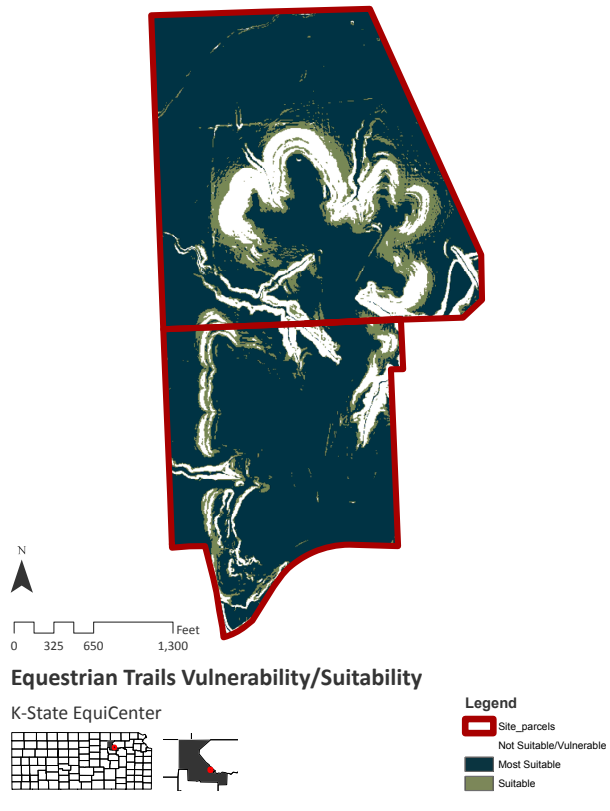


Figure 5.75 Equestrian Trails Vulnerability/Suitability

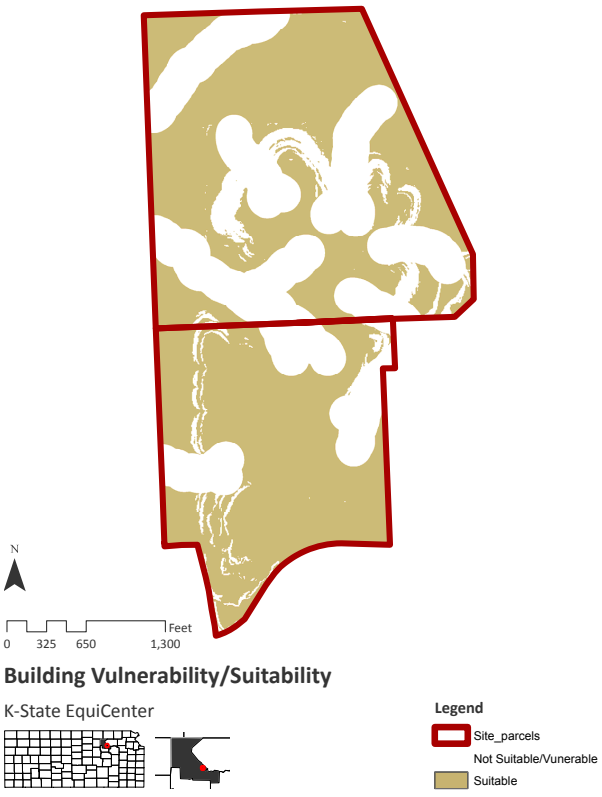


Figure 5.76 Building Vulnerability/Suitability

Building Vulnerability/Suitability

Buildings can be located on slopes up to 15% without extreme construction expenses.

Opportunities:
Slopes provide the opportunity for innovative building placement and design.

Constraints:
The flattest area of the site is located on the southern portion, however it is difficult to get to due to the steep slopes. The northern portion of the site has limited space, but easy access.

Figure 5.77 Best Opportunities for Construction

Overall Analysis

After conducting an inventory of relevant site conditions and an analysis of the site by program elements, two areas were determined to be suitable for the K-State EquiCenter. Each area contains opportunities and constraints.

The first area is located on the northern portion of the site. The location provides easy access for trucks with trailers and service vehicles. The soils are well drained which is important to prevent compaction and erosion during site use. The north portion contains moderate slopes which will drive the placement of program elements due to specific needs. Placement of elements on the north portion of the site will allow Meadowlark Hills to maintain unimpeded views. The north portion has been heavily grazed. Currently, the plant biomass includes few natives. A steam is located on this portion of the site. The stream is highly eroded due to livestock access to it. Sun intensity is less than on the southern portion of the site which makes using the site more comfortable.

The second area is located on the southern portion of the site. The greatest opportunities lie in the flat slopes located at the top of the cuesta. The location also allows a direct connection to the Kansas State University campus. Program elements will be visible from the recreation center on campus. The biggest constraint is the difficult access to the site. Steep slopes make it difficult for trailers and service vehicles especially during inclement weather when the roads are slippery. The top of the cuesta also exposes program elements to the weather conditions such as sun and winds. The barn needs to be situated to maximize the southern summer winds and block the northwest winds of the winter. The sun is also very intense at the top of the cuesta. Prairie grasses exist on the south portion of the site that will be removed during construction.

"My horses' feet are as swift as **Rolling Thunder**, he carries me away from all my fears, and when the world threatens to fall asunder, his mane is there to wipe away my tears"
-Bonnie Lewis

Concept Development

Two alternatives were developed using the K-State EquiCenter site as a hypothetical location. One alternative was developed on the north portion of the site and one on the south portion of the site. Selected attributes of the Sustainable SItes Initiative guided the design of both alternatives. Several credits were chosen as a focus due to time and personnel constraints.

After Alternatives A and B were completed, a framework was developed in order to evaluate the two alternatives. This framework included rating criteria based on experience, function, economy, and sustainability. Applying this framework allowed an optimal alternative to be selected.

Exploring Options

Design Alternative A

This alternative occurs on the north portion of the site directly south of Marlatt Road (Figure 6.78). It is a mostly flat location adjacent to the stream. The design of the site was driven by the functional needs of the equestrian facility, the experience of the user while on the site, as well as selected credits of the SSI.

The program elements are arranged in a linear way along the stream. When approaching the site from the main portion of the Kansas State University campus, the user will enter the site from Denison Avenue on the west edge of the site. Traveling along the main road, he or she will find the education building that hosts classrooms and a small riding arena for the E.A.H.D.R. program. Two arenas are located adjacent to the stream. After passing the barns, the user can enter the main parking for the site. This parking is associated with the main indoor arena complex, and provides paths to the performance arena. Located between the indoor arena complex the barn and the performance arena is the service area (maximum slope of 4%). A service road is located north of the program elements to provide access to service and maintenance vehicles as well as horse trailers. Trailer parking is located in the northeast corner of the site, as well as the manure storage. The pastures and paddocks are located south of the main road.

The main activity area is located around the indoor arena, stable, and performance arena. The training arena, round pens and education building are located further away from the activity area to foster an intimate learning environment.

To gain points under the SSI, the stream was rehabilitated and returned to a meandering path. This also created more flat land upon which to construct facilities. Since the program elements occur adjacent to the stream, Alternative A will be able to gain points under the SSI by using the stream as an amenity. Being close to the stream does have its constraints, however. The proximity of the horses to the stream limits the amount of distance and time stormwater has to cleanse and infiltrate into the ground before running into the stream and potentially off-site.

Other main applications of the SSI to Alternative A include the restoration of the prairie to the South portion of the site. Warm season grasses already exist, so through careful maintenance, this area should be able to be returned to natural biomass.

The location of Alternative A also limits the amount of healthy soils disturbed because it occurs on previously heavily grazed areas. These soils are compacted due to overgrazing and therefore healthy soils are not disturbed.

Through the 51 credits possible in SSI, several were chosen to receive special focus. These were the credits that would have the most effect on site design. Other credits were achievable. However, for the purposes of this project, they were not covered. A full list of achievable credits are available in the appendix. The credits applied in creating Alternative A were:

3.4 - Rehabilitate lost streams, wetland, and shoreline
3.5 - Manage stormwater on site
3.7 - Design rainwater/stormwater features to provide a landscape amenity
4.4 - Minimize soil disturbance in design and construction
4.6 - Preserve or restore appropriate plant biomass on site
6.3 - Promote sustainability awareness and education
6.7 - Provide views of vegetation and quiet outdoor spaces for mental restoration

Figure 6.78 Alternative A Master Plan

Grading and 3-D Massing Study

A three dimensional massing study was completed to study the grading implications of Alternative A. This study revealed the difficulty of proper drainage around large program elements. The location of Alternative A required the catchment of storm and wastewater before reaching the stream to ensure only clean water was flowing off site. Placing the roads and program elements to fit the existing contours allowed for less grading during construction, which reduces the cost. Remediation of the stream created more flat land for site elements, which also minimized the amount of grading necessary.

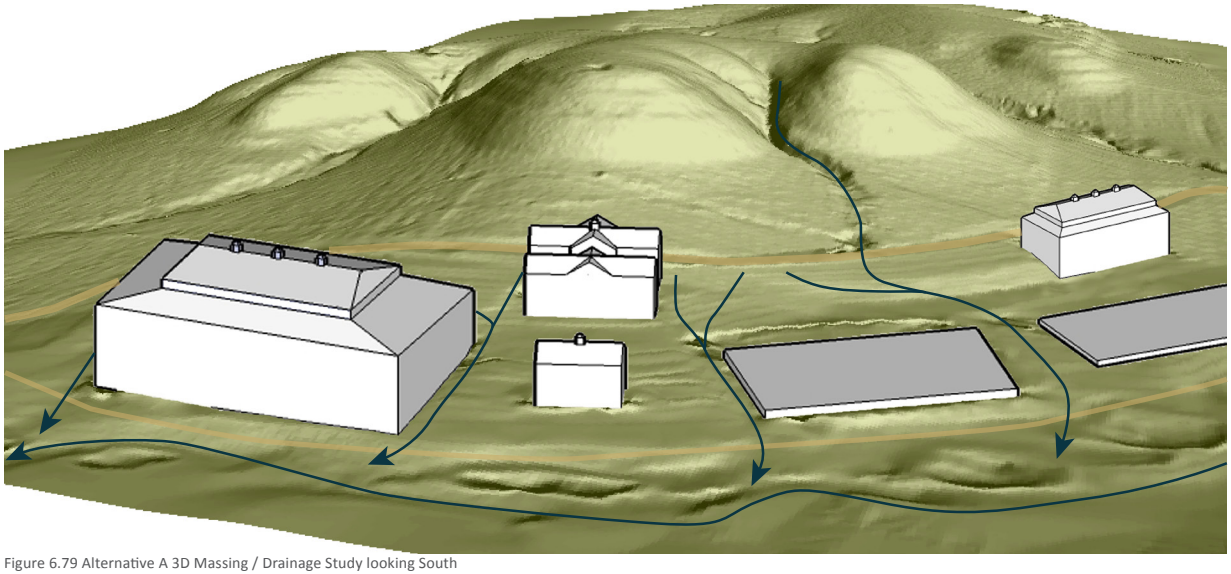


Figure 6.79 Alternative A 3D Massing / Drainage Study looking South

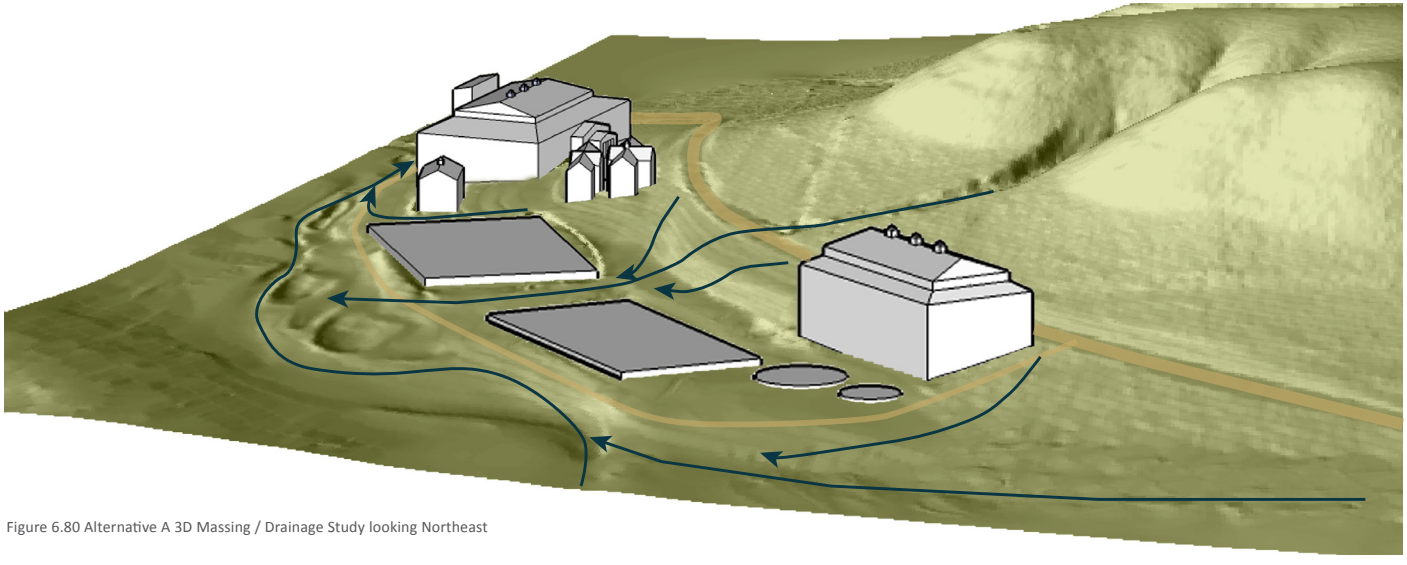


Figure 6.80 Alternative A 3D Massing / Drainage Study looking Northeast

Alternative A
Application of SSI

The credits that can be applied to Alternative A have been highlighted in brown. The amount of points anticipated to be received from each credit is also listed. Prerequisite 1.1 is highlighted because it cannot be met for this site. The implications of the SSI will be explained further later in the document.

	Sustainable Sites Initiative Guidelines and Requirements	
1	**Site Selection (21 possible points)**	
1.1	**Limit development of soils designated as prime farmland, unique farmland, and farmland of statewide importance**	
1.2	**Protect floodplain functions**	
1.3	**Preserve wetlands**	
1.4	**Preserve threatened or endangered species and their habitats**	
1.5	Select brownfields or greyfields for redevelopment (5-10 points)	
1.6	Select sites within existing communities (6 points)	
1.7	Select sites that encourage non-motorized transportation and use of public transit (5 points)	
2	**Pre-Design Assessment and Planning (4 possible points)**	
2.1	**Conduct a pre-design site assessment and explore opportunities for site sustainability**	
2.2	**Use an integrated site development process**	
2.3	Engage users and other stakeholders in site design (4 points)	4
3	**Site Design - Water (44 possible points)**	
3.1	**Reduce potable water use for landscape irrigation by 50 percent from established baseline**	
3.2	Reduce potable water use for landscape irrigation by 75 percent or more from established baseline (2-5 points)	5
3.3	Protect and restore riparian, wetland, and shoreline buffers (3-8 points)	8
3.4	Rehabilitate lost streams, wetland, and shorelines (2-5 points)	3
3.5	Manage stormwater on site (5-10 points)	10
3.6	Protect and enhance on-site water resources and receiving water quality (3-9 points)	3
3.7	Design rainwater/stormwater features to provide a landscape amenity (1-3 points)	3
3.8	Maintain water features to conserve water and other resources (1-4 points)	4
4	**Site Design - Soil and Vegetation (51 possible points)**	
4.1	**Control and manage known invasive plants found on site**	
4.2	**Use appropriate, non-invasive plants**	
4.3	**Create a soil management plan**	
4.4	Minimize soil disturbance in design and construction (6 points)	
4.5	Preserve all vegetation designated as special status (5 points)	5
4.6	Preserve or restore appropriate plant biomass on site (5 points)	3
4.7	Use native plants (1-4 points)	1
4.8	Preserve plant communities native to the ecoregion (2-6 points)	
4.9	Restore plant communities native to the ecoregion (1-5 points)	3
4.10	Use vegetation to minimize building heating requirements (2-4 points)	
4.11	Use vegetation to minimize cooling requirements (2-5 points)	2
4.12	Reduce urban heat island effects (3-5 points)	
4.13	Reduce the risk of catastrophic wildfire (3 points)	3
5	**Site Design - Material Selection (36 possible points)**	
5.1	**Eliminate the use of wood from threatened tree species**	
5.2	Maintain on-site structures, hardscape, and landscape amenities (1-4 points)	

Table 6.5 Alternative A Application of SSI

	Sustainable Sites Initiative Guidelines and Requirements	
5.3	Design for deconstruction and disassembly (1-3 points)	1
5.4	Reuse salvaged materials and plants (2-4 points)	2
5.5	Use recycled content materials (2-4 points)	
5.6	Use certified wood (1-4 points)	3
5.7	Use regional materials (2-6 points)	4
5.8	Use adhesives, sealants, paints, and coatings with reduced VOC emissions (2 points)	
5.9	Support sustainable practices in plant production (3 points)	3
5.10	Support sustainable practices in materials manufacturing (3-6 points)	
6	**Site Design - Human Health and Well-Being (32 possible points)**	
6.1	Promote equitable site development (1-3 points)	
6.2	Promote equitable site use (1-4 points)	3
6.3	Promote sustainability awareness and education (2-4 points)	2
6.4	Protect and maintain unique cultural and historical places (2-4 points)	
6.5	Provide for optimum site accessibility, safety, and wayfinding (3 points)	3
6.6	Provide opportunities for outdoor physical activity (4-5 points)	4
6.7	Provide views of vegetation and quiet outdoor spaces for mental restoration (3-4 points)	3
6.8	Provide outdoor spaces for social interaction (3 points)	3
6.9	Reduce light pollution (2 points)	2
7	**Construction (21 possible points)**	
7.1	**Control and retain construction pollutants**	
7.2	**Restore soils disturbed during construction**	
7.3	Restore soils disturbed by previous development (2-8 points)	
7.4	Divert construction and demolition materials from disposal (3-5 points)	
7.5	Reuse or recycle vegetation, rocks, and soil generated during construction (3-5 points)	3
7.6	Minimize generation of greenhouse gas emissions and exposure to localized air pollutants during construction (1-3 points)	
8	**Operations and Maintenance (23 possible points)**	
8.1	**Plan for sustainable site maintenance**	
8.2	**Provide for storage and collection of recyclables**	
8.3	Recycle organic matter generated during site operations ad maintenance (2-6 points)	2
8.4	Reduce outdoor energy consumption for all landscape and exterior operations (1-4 points)	1
8.5	Use renewable sources for landscape electricity needs (2-3 points)	2
8.6	Minimize exposure to environmental tobacco smoke (1-2 points)	2
8.7	Minimize generation of greenhouse gases and exposure to localized air pollutants during landscape maintenance activities (1-4 points)	
8.8	Reduce emissions and promote the use of fuel-efficient vehicles (4 points)	
9	**Monitoring and Innovation (18 possible points)**	
9.1	Monitor performance of sustainable design practices (10 points)	10
9.2	Innovation in site design (8 points)	4
		113 points total

Design Alternative B

Alternative B is located on the southern portion of the site on the top of the cuesta (Figure 6.81). It is connected to the Kansas State University campus by the bridge over Kimball Avenue. The design of Alternative B was driven by functional needs of the site and program elements. Adjacencies of program elements was important in this design.

The elements are arranged in a cluster format. Access to the site is located along Denison Avenue. Either entrance will require that the user drive up a steep slope (maximum of 10% slope) to the program elements. The main parking area is located between the indoor arena complex and the education building. The parking, with a maximum slope of 4%, provides direct access to the barn and performance arena. A service road is located northeast of the indoor arena and connects across Kimball Avenue to the beef production research center. This connection may be used by service vehicles and trailers during inclement weather when ascending the steep slopes may be dangerous. The service area (also at a maximum of 4% slope) is located directly behind the barn and is large enough for service vehicles to turn around. Trailer parking is located northeast of the service road.

Additional parking for team members is located east of the performance arena and is accessed through the service drive. The training arena and round pens are located away from the main activity area, which will foster learning and a closer connection between the horse and rider. The paddocks and pastures are located around the program elements.

The location of Alternative B allows stormwater the maximum amount of distance and time to cleanse and infiltrate before running off-site. Pastures need to be properly maintained to ensure that pathogens are not flowing in stormwater.

Of the 51 possible credits in the SSI the credits selected for Alternative B were:

3.4 - Rehabilitate lost streams, wetland, and shoreline
3.5 - Manage stormwater on site
4.9 - Restore plant communities native to the ecoregion
6.3 - Promote sustainability awareness and education
6.8 - Provide outdoor spaces for social interaction

Figure 6.81 Alternative B Mater Plan

Grading and 3-D Massing Study

A three dimensional massing study was completed to study the grading implications of Alternative B. This study revealed the difficulty of placing roads on steep slopes. Construction should minimally disturb soil while grading the roads to the proper slopes. The top of the cuesta has flat slopes adequate for the large program elements required of an equestrian facility. Placing the program elements to fit the existing contours minimized some grading during construction. Finally, grading of the site revealed that catching and cleansing stormwater or wastewater before it travels down the slopes is difficult because of the proximity to the steep slopes.

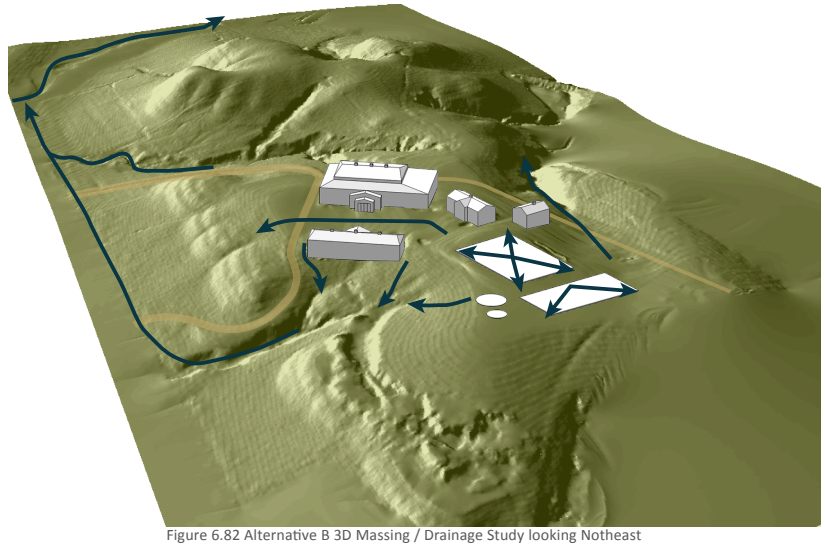


Figure 6.82 Alternative B 3D Massing / Drainage Study looking Notheast

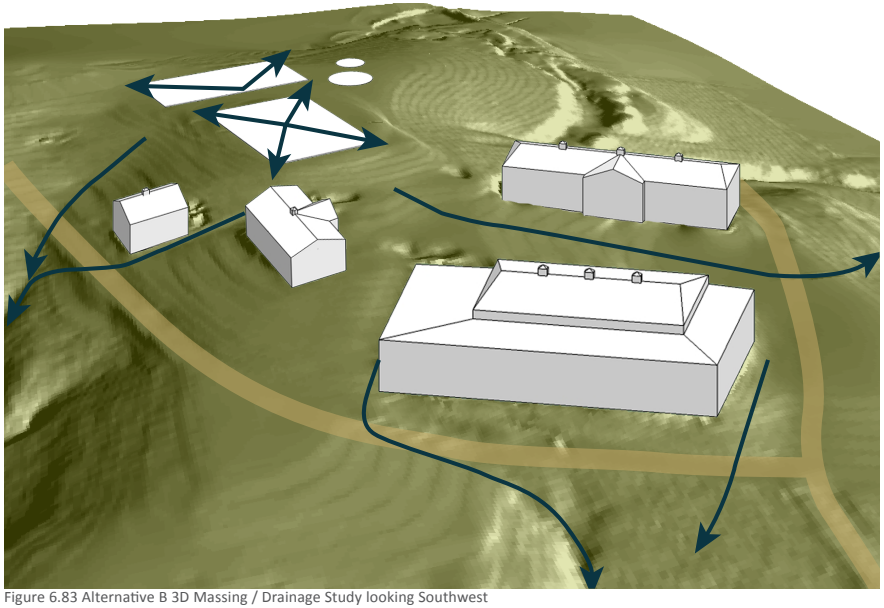


Figure 6.83 Alternative B 3D Massing / Drainage Study looking Southwest

Alternative B
Application of SSI

The credits that can be applied to Alternative B have been highlighted in brown. The amount of points anticipated to be received from each credit is also listed. Prerequisite 1.1 is highlighted because it cannot be met for this site. The implications of the SSI will be explained further later in the document.

	Sustainable Sites Initiative Guidelines and Requirements	
1	**Site Selection (21 possible points)**	
1.1	**Limit development of soils designated as prime farmland, unique farmland, and farmland of statewide importance**	
1.2	**Protect floodplain functions**	
1.3	**Preserve wetlands**	
1.4	**Preserve threatened or endangered species and their habitats**	
1.5	Select brownfields or greyfields for redevelopment (5-10 points)	
1.6	Select sites within existing communities (6 points)	
1.7	Select sites that encourage non-motorized transportation and use of public transit (5 points)	
2	**Pre-Design Assessment and Planning (4 possible points)**	
2.1	**Conduct a pre-design site assessment and explore opportunities for site sustainability**	
2.2	**Use an integrated site development process**	
2.3	Engage users and other stakeholders in site design (4 points)	4
3	**Site Design - Water (44 possible points)**	
3.1	**Reduce potable water use for landscape irrigation by 50 percent from established baseline**	
3.2	Reduce potable water use for landscape irrigation by 75 percent or more from established baseline (2-5 points)	5
3.3	Protect and restore riparian, wetland, and shoreline buffers (3-8 points)	8
3.4	Rehabilitate lost streams, wetland, and shorelines (2-5 points)	5
3.5	Manage stormwater on site (5-10 points)	10
3.6	Protect and enhance on-site water resources and receiving water quality (3-9 points)	5
3.7	Design rainwater/stormwater features to provide a landscape amenity (1-3 points)	
3.8	Maintain water features to conserve water and other resources (1-4 points)	3
4	**Site Design - Soil and Vegetation (51 possible points)**	
4.1	**Control and manage known invasive plants found on site**	
4.2	**Use appropriate, non-invasive plants**	
4.3	**Create a soil management plan**	
4.4	Minimize soil disturbance in design and construction (6 points)	
4.5	Preserve all vegetation designated as special status (5 points)	5
4.6	Preserve or restore appropriate plant biomass on site (5 points)	3
4.7	Use native plants (1-4 points)	1
4.8	Preserve plant communities native to the ecoregion (2-6 points)	
4.9	Restore plant communities native to the ecoregion (1-5 points)	3
4.10	Use vegetation to minimize building heating requirements (2-4 points)	
4.11	Use vegetation to minimize cooling requirements (2-5 points)	2
4.12	Reduce urban heat island effects (3-5 points)	
4.13	Reduce the risk of catastrophic wildfire (3 points)	3
5	**Site Design - Material Selection (36 possible points)**	
5.1	**Eliminate the use of wood from threatened tree species**	
5.2	Maintain on-site structures, hardscape, and landscape amenities (1-4 points)	

Table 6.6 Alternative B Application of SSI

	Sustainable Sites Initiative Guidelines and Requirements	
5.3	Design for deconstruction and disassembly (1-3 points)	1
5.4	Reuse salvaged materials and plants (2-4 points)	2
5.5	Use recycled content materials (2-4 points)	
5.6	Use certified wood (1-4 points)	3
5.7	Use regional materials (2-6 points)	4
5.8	Use adhesives, sealants, paints, and coatings with reduced VOC emissions (2 points)	
5.9	Support sustainable practices in plant production (3 points)	3
5.10	Support sustainable practices in materials manufacturing (3-6 points)	
6	**Site Design - Human Health and Well-Being (32 possible points)**	
6.1	Promote equitable site development (1-3 points)	
6.2	Promote equitable site use (1-4 points)	3
6.3	Promote sustainability awareness and education (2-4 points)	2
6.4	Protect and maintain unique cultural and historical places (2-4 points)	
6.5	Provide for optimum site accessibility, safety, and wayfinding (3 points)	3
6.6	Provide opportunities for outdoor physical activity (4-5 points)	4
6.7	Provide views of vegetation and quiet outdoor spaces for mental restoration (3-4 points)	3
6.8	Provide outdoor spaces for social interaction (3 points)	3
6.9	Reduce light pollution (2 points)	2
7	**Construction (21 possible points)**	
7.1	**Control and retain construction pollutants**	
7.2	**Restore soils disturbed during construction**	
7.3	Restore soils disturbed by previous development (2-8 points)	
7.4	Divert construction and demolition materials from disposal (3-5 points)	
7.5	Reuse or recycle vegetation, rocks, and soil generated during construction (3-5 points)	3
7.6	Minimize generation of greenhouse gas emissions and exposure to localized air pollutants during construction (1-3 points)	
8	**Operations and Maintenance (23 possible points)**	
8.1	**Plan for sustainable site maintenance**	
8.2	**Provide for storage and collection of recyclables**	
8.3	Recycle organic matter generated during site operations ad maintenance (2-6 points)	2
8.4	Reduce outdoor energy consumption for all landscape and exterior operations (1-4 points)	1
8.5	Use renewable sources for landscape electricity needs (2-3 points)	2
8.6	Minimize exposure to environmental tobacco smoke (1-2 points)	2
8.7	Minimize generation of greenhouse gases and exposure to localized air pollutants during landscape maintenance activities (1-4 points)	
8.8	Reduce emissions and promote the use of fuel-efficient vehicles (4 points)	
9	**Monitoring and Innovation (18 possible points)**	
9.1	Monitor performance of sustainable design practices (10 points)	10
9.2	Innovation in site design (8 points)	4

250 points possible **114 points total**

Framework for selecting an Optimal Alternative

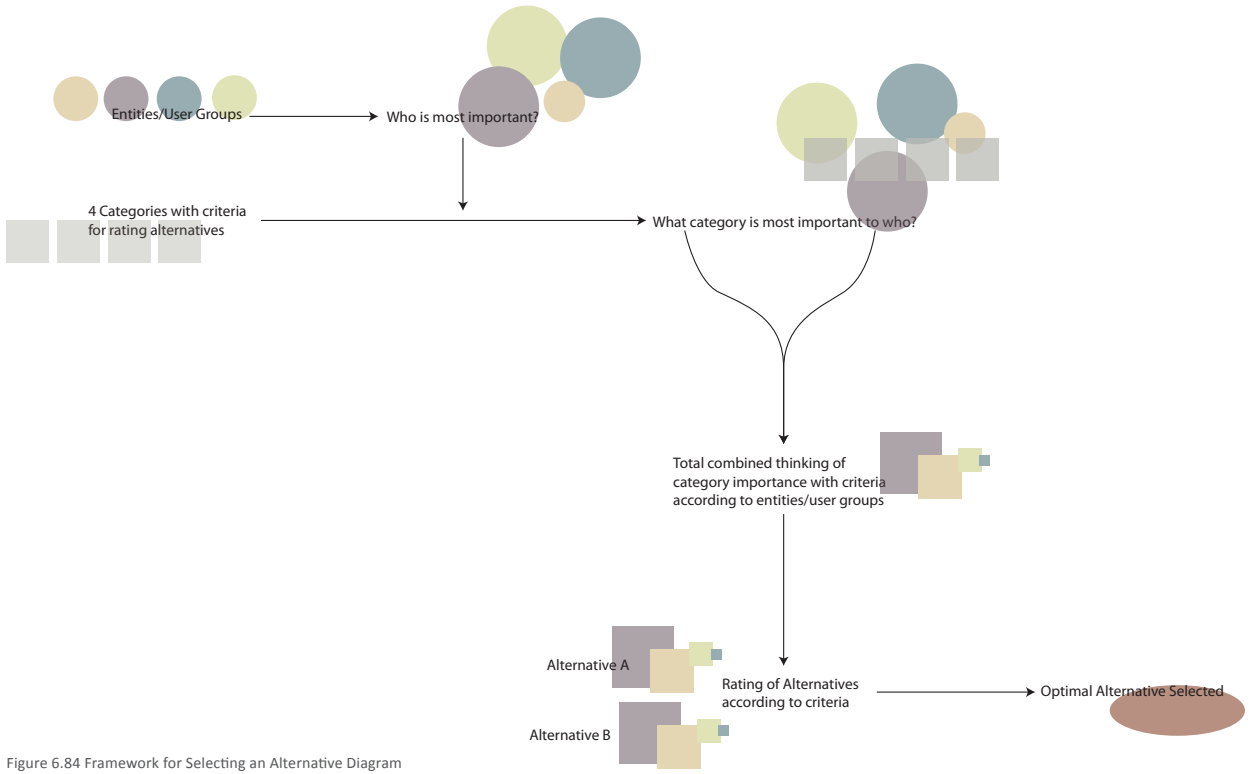


Figure 6.84 Framework for Selecting an Alternative Diagram

Identified Users

Four main entities / user groups of the K-State EquiCenter were identified. These entities / user groups have the most influence on the selection of an alternative.

Environment - This entity is concerned about protection of the land in the present and for future generations. Under the SSI the environment is also concerned about the experience while on the site.

University - Kansas State University serves as the client. It is concerned with the cost of construction as well as maintenance and life-cycle costs. It is also concerned about the safety and welfare of the horse and equestrian on the site. A functional site is important for maintenance of the facility as well as way finding for users.

Spectator - These users are on the site for a short time. They are there to enjoy a competition. They need to be comfortable and safe. They should have limited direct interaction with the horses on the site.

Equestrian - These users are most concerned about safety of the horse and the rider. They are the team coaches, team members, EAHDR participants and volunteers, veterinarians, farriers, anyone who is on the site everyday. It is important to provide an environment where the equestrian can foster a relationship with the horse. They should enjoy their time spent on the site. It is also important to promote learning and relaxation.

Rating Categories

Four major categories were determined to rate the two alternatives in order to choose the most appropriate alternative. Those four categories include function, experience, sustainability, and economy.

Function refers to the relationship of spaces including the effectiveness of circulation, access to the site, the relation to the University campus, and the relation of program elements to each other according to common equestrian adjacencies.

Experience refers to the quality of spaces created on the site including the variety of spaces for the many users of the site, the quality of views, the quality of trails, the proximity of elements to the road, the experience of the spectator while on the site, the relationship fostered between the horse and rider, and the experience that is maintained from the adjacent Meadowlark Hills.

Sustainability refers to the site's relation to the environment. Sustainability is defined by the SSI and the credits achieved though it. It includes stormwater features as an amenity, minimizing soil disturbance, preserving or restoring appropriate plant biomass, promoting sustainability and awareness, and rehabilitating "lost" streams.

Finally, Economy refers to the cost of construction, maintenance, and life cycle of the site and its facilities.

Each category was rated on the criteria listed using a high, medium and low rank. The scale was applied after it was determined how successful the site was at completing the criteria. High indicates the site was very successful at addressing that criteria while low indicated the site was unsuccessful at addressing the criteria.

4 Categories for rating concepts - Alternative A

Function - relationship of spaces
- Effectiveness of circulation
  - User . . . . . H
  - Vehicle . . . . . H
  - Horse . . . . . M
  - Spectator . . . . . M
- Access . . . . . H
- Relation to off site manure compost. . . . . M
- Relation to campus L

Experience - quality of spaces
- Variety of spaces for variety of users . . . . . H
- Quality of views . . . . . H
- Quality of trails . . . . . H
- Experience for horse/rider . . . . . H
- Meadowlark Hills . . . . . H
- Proximity of elements to road . . . . . M
- Experience for spectator . . . . . M

Sustainability
- Stormwater features as an amenity . . . . . H
- Preserve or restore appropriate plant biomass . . H
- Promote sustainability and awareness . . . . . H
- Rehabilitate “lost” streams . . . . . M
- Minimize soil disturbance . . . . . M
- Point values received through SSI (113) L

Economy
- Cost of construction . . . . . M
- Cost of maintenance . . . . . M
- Life cycle cost . . . . . M

H - Highly successful

M - Moderately successful

L - Low, not successful

Table 6.7 Alternative A Categories of Rating Concepts

Alternative A Rating Description

Function - Access onto the site is effective and clear as is user and vehicle circulation. Horses need to cross the main road to access the pasture, which could be a safety hazard. The north location separates the site from campus making it difficult to make connections. It is located near the off site manure compost, making transport efficient.

Experience - The experience while on the site rates high overall. Equestrian users have a variety of spaces and experiences that allow them to connect to their horses. Constructing the EquiCenter on the north portion of the site allows residents of Meadowlark Hills Assisted Living to maintain the views they currently have. Spectator circulation between the performance arena and indoor arena complex may be difficult which could diminish the experience.

Sustainability - The location of Alternative A allows the site to maximize the points its receives through the SSI. The stream presents opportunities for education as well as use as a stormwater feature. The alternative also allows the prairie to be restored on the southern portion, which already contains some warm season grasses. Alternative A would only receive one star under the SSI.

Economy - The initial cost of construction for Alternative A would rate moderate. The location minimizes the amount of grading needed. The cost of maintenance rates moderate because maintenance of pastures can be intensive due to the amount of animals that will be housed in the pastures. The life cycle costs are rated moderate because the cost to maintain safety and welfare of horse and rider on the site can be expensive, however the landscape of most of the site requires minimal maintenance.

4 Categories for rating concepts - Alternative B

Function - relationship of spaces	
Effectiveness of circulation	
Vehicle	H
Horse	H
Spectator	H
User	H
Relation to campus	H
Access to site	L
Relation to off site manure compost	L
Experience - quality of spaces	
Proximity of elements to road	H
Experience for spectator	H
Quality of views	H
Quality of trails	M
Experience for horse/rider	M
Meadowlark Hills	L
Variety of spaces for variety of users	L
Sustainability	
Rehabilitate “lost” streams	H
Stormwater features as an amenity	M
Preserve or restore appropriate plant biomass	M
Promote sustainability and awareness	M
Point values received through SSI (113)	L
Minimize soil disturbance	L
Economy	
Cost of maintenance	H
Life cycle cost	M
Cost of construction	L

H - Highly successful

M - Moderately successful

L - Low, not successful

Table 6.8 Alternative B Categories for Rating Concepts

Alternative B Rating Description

Function - Alternative B is highly effective in circulation. A service road is located behind the site elements for service vehicles as well as everyday users, separate from the spectator circulation. Horse circulation is kept separate from the main vehicle circulation for safety reasons. Access to the site is difficult because of the slope that exists on the main drive. During inclement weather, these could be difficult to transverse with a truck and trailer or service vehicle. Relation to the off site manure compost is also difficult because of the slopes.

Experience - Elements are located away from the main roads surrounding the site due to the slopes which allows more privacy for the horse and rider in training. A spectator on the site has great views of the surrounding landscape. They are also able to navigate the site easily. The location on the south portion of the site takes away the current views of Meadowlark HIlls Assisted LIving. Due to the isolated cluster format of Alternative B, there are limited spaces for the horse and rider to escape and have total privacy.

Sustainability - To obtain the credit for the SSI, the existing stream was rehabilitated, however, there is no interaction between the users and the stream. Other stormwater features were created to use as amenities. It will be more difficult and expensive to restore the northern portion of the site to prairie due to the existing vegetation. Grading that needs to take place to allow access to the southern portion of the site will disturb existing soils. Alternative B would receive one star under the SSI.

Economy - Once established, the cost of maintenance for Alternative B is low. The life cycle costs are rated moderate because the cost to maintain safety and welfare of horse and rider on the site can be expensive, however the landscape of most the site requires minimal maintenance. Most materials used in equestrian facilities can be sustainable and retain their quality for long periods of time. The initial cost of construction for Alternative B is high because of the grading needed to build the site on the top of a cuesta.

Selected Alternative

In selecting an alternative, several factors were considered.

After applying the SSI to Alternatives A and B, it was determined that they would receive approximately the same scores, even though they addressed different aspects of the SSI. Both alternatives are anticipated to cost approximately the same overall. Although Alternative B has a higher cost of construction, its cost of maintenance is lower.

Alternative A presented unique opportunities to use the rehabilitated stream as a teaching tool for sustainability. It also protected the views of neighboring Meadowlark Hills.

Access to Alternative B is difficult for trailers and service vehicles, especially during inclement conditions. It does, however, provide excellent separation of circulation between the horse and vehicles.

After all factors were considered, Alternative A was selected as the optimal alternative. It was chosen because of the visibility of sustainable factors recognized under the SSI. The experience for the users is also rated higher than Alternative B.

Experiential Montages

A series of conceptual photo montages was completed to illustrate aspects of selected Alternative A. They depict activities that occur on the site, from a competition to an intimate moment shared between horse and rider. They represent emotions that may be cultivated while on the site.

Figure 6.85 Performance Arena

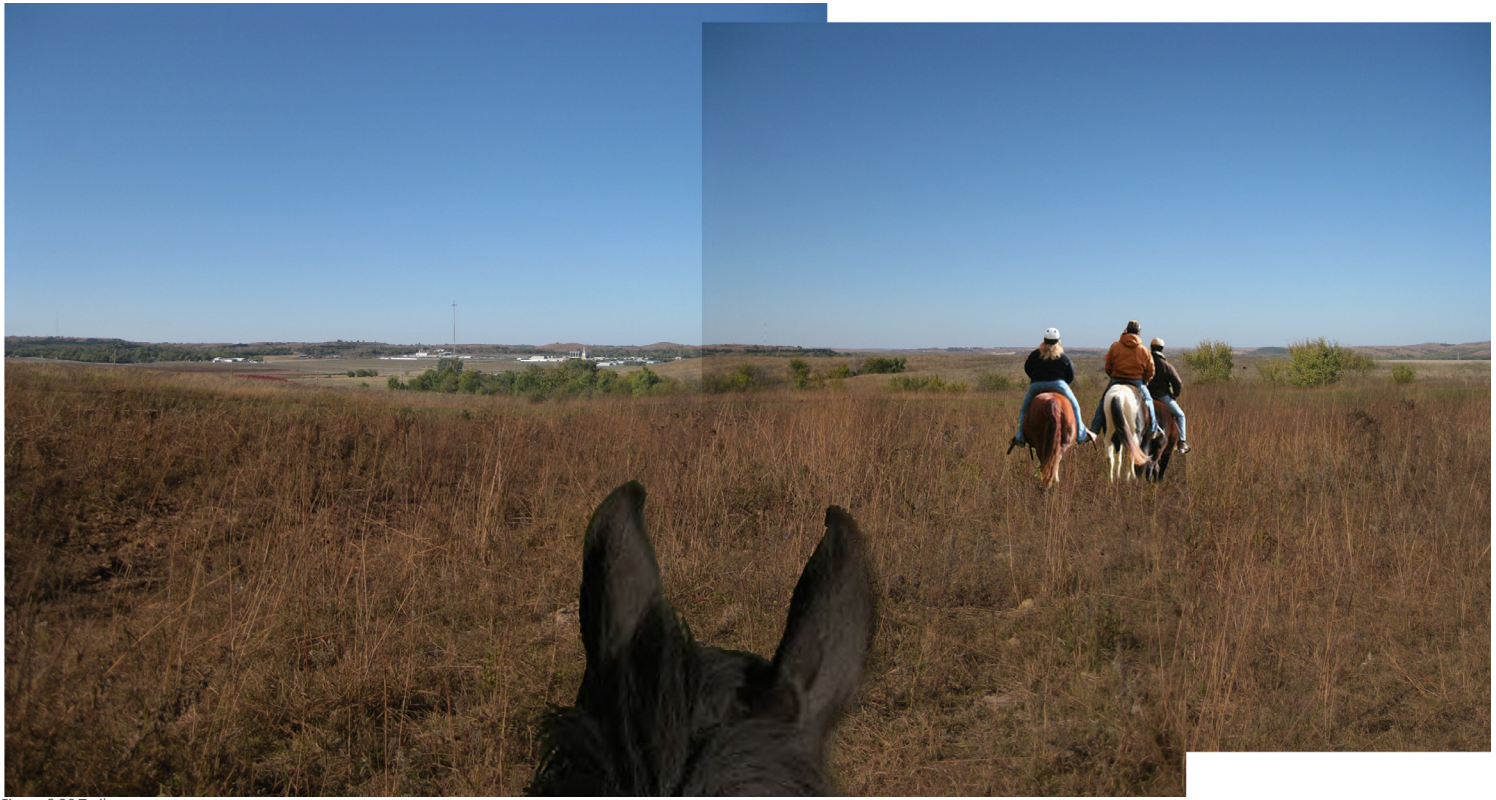


Figure 6.86 Trail

Facing Page: The image represents a moment during a competition. Spectators watch a rider and horse complete a jump course. The rain garden in the foreground depicts the drainage that is directed around the arena to ensure safe footing.

This page: This image occurs on the top of the cuesta at the southern portion of the site. It is viewing land to the north. It represents trails through the restored prairie. The isolated setting depicted is also meant to foster an intimate relationship between the horse and rider.

Figure 6.87 Horse Grazing

This page: The image is looking to the southwest and captures the view of the cuesta with horses grazing in pastures. It represents an intimate experience between horse and rider.

"I saw a child who couldn't walk, sit on a horse, **laugh and talk**... I saw a child who could only crawl, mount a horse and sit up tall. I saw a child born into strife, take up and hold the reins of life. And that same child was heard to say, **Thank God for showing me the way**." - John Anthony Davis

Findings and Conclusions

After applying the SSI to Alternatives A and B, several credits were noted as particularly difficult to apply to equestrian facilities. These credits will be defined and an explanation will be given as to why they are difficult to achieve.

Applying the SSI to Alternatives A and B also stimulated the recognition of several missing components to existing credits and a few topics / issues not recognized by the SSI that are important and relevant to making equestrian facilities sustainable. These proposed changes to the SSI are discussed.

Typical credits of the SSI not achieved by equestrian facilities

It should be noted that every site is different and some equestrian facilities may meet these credits. Innovative design and construction methods would prove to allow sites to obtain these credits. This project was intended to be an exploration of the SSI through traditional equestrian facility development practices and was meant to represent most equestrian facilities currently being built.

Prerequisite 1.1 - Limit Development of soils designated as prime farmland, unique farmland, and farmland of statewide importance

Equestrian facilities usually require large amounts of land that is relatively flat. For most places in the US, this land is listed as prime farmland. Under the current SSI, it would be impossible for an equestrian facility built on prime farmland to receive any sustainability rating because it does not meet a prerequisite.

Specifically, the K-State EquiCenter site is located on prime farmland. The hypothetical application of the SSI to the two alternatives would not be recognized because they do not meet this prerequisite.

Credit 1.5 - Select brownfields or greyfields for redevelopment (5 - 10 points)

Placing an equestrian facility on a brownfield is potentially hazardous to the horses that would be grazing on the site. Site remediation would need to occur before any animals were allowed on the site to ensure hazardous chemicals have

	been removed from the site. It is possible to build equestrian facilities on greyfields. The sites are not hazardous for grazing, but they have been previously developed which may cause it to be expensive to remove the existing materials in order to make it safe and functional for equines on the site. Most sites, like the K-State EquiCenter site, chosen for construction of equestrian facilities are greenfield sites. They provide large areas for grazing and other program elements.
Credit 1.6 - Select sites within existing communities (6 points)	The large sites needed to meet all the program needs of equestrian facilities make it difficult to build within an existing community according to the SSI. Requirements include selecting a site located on an infill site or a site within 0.5 mile walking distance of at least five basic services.
Credit 1.7 Select sites that encourage non- motorized transportation and use of public transit (5 points)	Most equestrian facilities are not located near public transit lines due to their program needs. Many projects are located in rural areas where large amounts of pasture land is available. They are located on rural roads that do not have a lot of traffic for safety reasons. These rural roads do not meet the requirements to obtain points for this credit which include being located on a street with bicycle lanes,

	being connected to a bicycle network, or being within .25 mile walking distance of mass transit.
Credit 5.2 - Maintain on-site structures, hardscape, and landscape amenities (1-4 points)	The requirement to meet the minimum of the credit requires the site design to maintain 55 percent of structures, hardscape, and landscape amenities in their existing form. It is impossible if the chosen site has no previous development on it, like many equestrian facility sites do. If a site is chosen that has previous development, it would need to meet the rigorous standards of safety required for equestrian facilities.
Credit 6.2 - Promote equitable site use (1-4 points)	Horses can be dangerous animals to interact with if a person has not been properly trained in how to handle them. Most horse owners do not want untrained individuals handling their animals for safety of both the horse and the handler. For this reason, most equestrian facilities require visitors to be accompanied by an experienced individual. Opening an equestrian facility to the public could be potentially dangerous if not monitored properly. The SSI requirement for this credit requires the site to host events for the community that were identified as a community need during meetings

with the local community. The events occurring on equestrian facility sites include competitions, which are not recognized as a community need.

Credit 7.3 - Restore soils disturbed by the previous development (2-8 points)

This credit requires at least 90 percent of the total surface area of soil disturbed by previous development meet soil restoration criteria by the SSI. This credit becomes difficult to receive because of the size of the sites chosen to build equestrian facilities upon.

The K-State EquiCenter site, for example, has been overgrazed and suffers from soil compaction. Restoring 90 percent of 280 acres would not be impossible, but would be expensive.

A total of 37 points out of 250 points are identified as typically not achievable by equestrian facilities. This means it is impossible for an equestrian facility to receive a four star rating according to the 2009 edition of the SSI. Several of the credits overlap in their purpose, which could mean that achieving one might preclude achieving another.

Most equestrian facilities would not be rated sustainable under the SSI because they would not meet the first required prerequisite of limiting development on prime farmland. If a facility did meet this prerequisite, it could earn up to a rating of three stars. Most equestrian sites would earn a rating of one star.

Proposed changes to the SSI

Several items were identified through the concept development and selection process as missing pieces of the SSI. These items are proposed to be added to the SSI in order to make it a more holistic sustainability rating system. Most of these items directly relate to equestrian facilities, but can be added to existing credits and be applied to other types of sites.

A second option is to follow the approach of LEED which has developed separate ranking systems for different types of buildings. The SSI could have several rating systems, depending on the type of site, program, or region of the country. This would allow credits that are more specific to equestrian facility projects.

Animal nutrient plan

The most specific credit proposed to be added to the current SSI, the animal nutrient plan, would require sites that house animals provide documentation of the feed given to the animals on the site. Organic horse manure specifically contains Nitrogen, Phosphorus, and Potassium. Many horses kept at equestrian facilities receive supplemental feed that negatively alters the traditional nutrient product

of manure. Additional unwanted nutrients and chemicals are being added to the surface water. A controlled animal nutrient plan can improve the surface water as well as manage the quality of fertilizer that is produced after composting.

This proposed credit would be most probable if a rating system were developed for equestrian sites. It would be difficult to propose adding this credit to the existing SSI because it is so specific.

Erosion control plan

An erosion control plan helps protect the slopes of the site and the integrity of the land. Specific to equestrian facilities, pastures should not be built on slopes steeper than ten percent in order to prevent erosion. Trails should be designed to topography to minimize erosion. Gate areas in pastures and paddocks should be stabilized in order to prevent erosion.

This credit can be applied to sites other than equestrian facilities. Erosion control plans should exist for any natural material trail system used on a site. Steep slops should also be protected not just during construction, but during site use as well.

This credit would receive between three (3) and five (5) credits. Erosion control is important to

	preserving the land for future generations, which is the definition of sustainability according to the SSI.
Irrigation for arenas	Irrigating arenas is one of the biggest water uses of equestrian facilities. Traditional equestrian facility design uses potable water that is used throughout the rest of the facility. Water for irrigation could be rainwater, recycled wastewater, recycled greywater, etc. The SSI credit 3.2 is intended to reduce potable water use for landscape irrigation by 75 percent or more from an established baseline. Adding irrigation of arenas to this credit would allow the SSI to include equestrian facilities without disturbing the use of this credit for other sites. The point total would remain the same.
Remove poisonous plants from site	Grazing animals present a unique challenge because they may eat something that could kill them. Most animals know to stay away from these plants, but accidents do happen. A full list of plants toxic to horses is available in Appendix E. Prerequisites 4.1 and 4.2 require control and maintenance of known invasive plants as well as using non-invasive plants in the landscape.

	These prerequisites should also include poisonous plants that may harm animals or humans. This addition could apply to all sites.
Prevent soil compaction during site use	Prerequisite 4.3 requires a soil management plan, however, the plan needs to only address soil management during construction. A management plan also needs to be developed for site use after construction. This could also be addressed in the erosion control plan proposed. Horses, specifically, are prone to cause soil compaction because of their size and herd habits. Pastures that are overgrazed suffer soil compaction and are not able to produce the correct forage for the animals. This should be included in a soil management plan for the post-construction period. The soil management plan should be a requirement under the SSI.
Wastewater Management	The SSI addresses stormwater management, but does not address the management of wastewater. Water that has touched areas where horses have been, specifically where horses have deposited feces or urine, is wastewater because it has become contaminated.

Buffers around riparian, wetland areas, and along shorelines should prohibit livestock

Mitigation of wastewater should be required under the SSI due to the adverse effect it could have on the surrounding water supplies. Other sites could also benefit from this requirement.

Livestock that graze these areas are depositing manure directly into water sources. Without mitigation, this could cause high concentrations of pathogens such as bacteria, parasites, and viruses. They also erode the stream banks and can create soil compaction in wetlands.

Credit 3.3 addresses protecting and restoring riparian, wetland and shoreline buffers by creating a vegetation and soil protection zone around the area that includes stabilization of the stream channel and re-vegetation with native plant communities. This buffer should also include the prohibition of livestock within 50 feet of the steam, wetland, or shoreline by fencing or other barriers of movement to allow proper wastewater mitigation. The credit point would remain the same.

Conclusions

Overall, only a few new credits need to be added to address issues that might be present when adding a horse to a site. Several existing credits need to be modified in minor ways to address particularities of equestrian facilities design.

The 2009 edition of the SSI uses prerequisite 8.1 to address site maintenance as a whole. The prerequisite includes everything from plant stewardship, invasive species management, organic materials management, soil stewardship, irrigation and water use, stormwater management features and BMPs, snow and ice, materials management, recyclable materials, landscape maintenance equipment, and sensitive site features. This maintenance plan asks that sites address these issues but does not address how to specifically complete the maintenance. The SSI was specific on how to sustainably construct the site. It seems maintenance needs to be addressed much more thoroughly in the SSI. This project proposes specific maintenance plans that affect equestrian facilities; it would be advantageous for the SSI to develop other specific maintenance plans for various types of developments.

The Sustainable Sites Initiative needs modification and refinement because it does not differentiate between sites that span a continent, and that exist in a variety of ecosystems with varying terrain and programmatic elements. Breaking up the SSI into several site or project types and possibly addressing regional bioclimatic differences might make the rating system more flexible and usable.

The SSI presented stimulating challenges in developing two alternative concepts for the Kansas State University EquiCenter. These challenges presented opportunities to discuss limitations and propose changes to the SSI that may allow other equestrian facilities to receive a sustainability rating in the future.

Table of Contents

Audubon Lifestyles Equestrian Facility Program

Program Audit & Verification Guidelines

Facility Name _____

Applicant Name _____

Relationship to Facility _____

Address Info _____

_____

_____

Phone & Fax Numbers _____

Website address _____

Email address _____

Other Information

total site acreage _____

total horses capacity _____

total horses boarded _____

total number of employees _____

total miles of trails _____

number of ponds/lakes _____

streams/rivers onsite? _____

Program Requirements

R1	The facility is currently registered in the Audubon Lifestyles Equestrian Facility Program, and maintains annual membership fees?	Y/N
R2	The facility has adopted and publicly displays a Sustainability Charter for the Equestrian Facilities?	Y/N
R3	The facility requires that all persons under the age of 18 wear ASTM/SEI- approved helmets while mounted?	Y/N
R4	Horses at the facility have access to clean, fresh water at all times?	Y/N
R5	There is no barbed wire anywhere horses are contained on the facility?	Y/N
R6	The facility policies include a requirement for proof of negative Coggins test for all horses visiting or living in the facility?	Y/N
R7	The facility has a Nutrient Management Plan (NMP), and a copy has been sent to Audubon Lifestyles for review?	Y/N
R8	The facility meets the minimum point requirements in each section of the Audubon Lifestyles Equestrian Facility Program Audit, and a copy of the audit has been sent to Audubon Lifestyles?	Y/N
R9	An Exit Interview with an Audubon Lifestyles representative is scheduled (or has already taken place) either onsite or via telephone?	Y/N

I (print name) _____ do attest to the accuracy of every item presented within this audit. The Audubon Lifestyles Equestrian Facility Program is a voluntary program, and I recognize that the principles upon which driv e the program can only be made possible through honest participation from all participants.

Signed: _____ Date: _____

Economics & Business

verification options & points awarded

** Please note that only one method of verification is required for any Topic Criteria, and only one method of verification can be applied to Facility Points for any specific Topic Criteria. Multiple methods of verification does not accumualte additional Facility Points.*

	Topic	Criteria	Photo / Image	Written	Verbal	Map / Drawing	On-site Verification	✔
a01	**Business**	The facility has developed a printed business plan that encourages successful strategies for running and a managing the facility		3	1		4	
a02		The facility has a clearly written Vision & Mission Statement in Place		2	1			
a03		The facility has preformed a SWOT Analysis (strengths, weaknesses, opportunities, threats)		2	1			
a04		The facility performs an annual review of all business plans, SWOT, etc.		2	1			
a05		The facility has an appropriate accounting system in place			1			
a06		The accounting system and tax prep are reviewed by an accountant			1			
a07		The facility has preformed a Competitive Analysis		2	1			
a08		The facility has equestrian programming in place			1		2	
a09		The equestrian program is reviewed annually and changed as necessary			1			
a10		The facility has a written annual budget		2	1		3	
a11		The facility has a written marketing plan		2	1		3	
a12		The facility has adequate revenue considerations/subsidizations in place			1			
a13		There are boarding agreement for all boarded horses on file		2	1		3	
a14		A written customer service model has been created by the facility		3	2			
a15	**Marketing**	The facility has a logo that is used specifically for the facility	2		1			
a16		The facility has a brochure that is used to promote the facility		2	1		3	
a17		The facility has a website or web page specific to the facility		2				
a18		The facility has and uses a answering machine or service and returns all calls within a 24 business hour window			1			
a19		The facility has a newsletter and client data base		2	1		3	
a20	**Insurance/Legal**	The facility has a General Liability insurance policy		2	1			
a21		The facility has a Comprehensive insurance policy		2	1			
a22		The facility has Care, Custody & Control insurance		2	1			
a23		The facility has Instructor's Insurance		2	1			
a24		The facility has Loss of Use on expensive horses insurance		2	1			
a25		The facility has Workers Compensation		2	1			
a26		The facility has Health Benefits for staff		2	1			
a27		All Release of Liabilities are reviewed by an attorney			1			
a28		Proper signage regarding risk exposure has been posted	2		1		3	

a29		Barn Rules are displayed in a highly visible area	2		1		3	
a30	**Staff Housing Benefit**	Clean, safe and desirable living conditions for staff exist on site			1		2	
a31		Fire Alarms are installed and checked biannually	2		1		3	
a32		Behavior protocols are in place for anyone living on-site			1			
a33		Cleaning expectations are written		2	1			
a34	**Employees**	Job descriptions are clearly defined, written, and on file for each employee		2	1		3	
a35		References are checked for new employees			1			
a36		Annual review for employee performance are preformed			1			
a37		Drug testing performed on all employees			1			
a38		W-4 and I-9 are filed annually		2				
a39		The facility has a written employee manual or Rules and Regulations document and is given to all employees		4				
		Maximum Allowable Points	**8**	**50**	**20**	**0**	**35**	
		Facility Total Points						

Innovation	The facility is doing something that is not listed in this section and would like to apply for additional points. Up to two items can be listed for this section for a maximum total of 6 points. Points and items are awarded exclusively by Audubon Lifestyles, and at their sole discretion. Use the space below to list additional items for this section, and attached any nessesary verification documentation/photos etc.

Minimum Points Required	**Facility Final Section Score**
30	

Horse Care & Human Safety

verification options & points awarded

** Please note that only one method of verification is required for any Topic Criteria, and only one method of verification can be applied to Facility Points for any specific Topic Criteria. Multiple methods of verification does not accumualte additional Facility Points.*

	Topic	Criteria	Photo / Image	Written	Verbal	Map / Drawing	On-site Verification	☑
b01	**Safety of Horses**	A written Risk Mitigation Plan (RMP) has been created for the facility		2	1			
b02		The RMP includes a weather emergency plan		2	1			
b03		The RMP includes a fire evacuation plan		2	1			
b04		The RMP includes an emergency plan for horses in case of severe injuries		2	1			
b05		RMP drills are performed annually			1			
b06		An assessment of turn out and pasture buddies has been performed for all horses			1			
b07		A First Aid kit for horses is available	2		1		3	
b08		All horses name's are clearly posted on all stalls	2		1		3	
b09		The horse owner's name and emergency number are clearly posted	2		1		3	
b10		An Advanced Directive for every boarded horse is on file		2	1		3	
b11		A policy that requires that all dogs of clients and guests are leashed is strictly enforced		2	1			
b12		The veterinarian phone number is clearly posted	2		1		3	
b13	**Safety of Riders & Visitors**	The facility has had zero accidents that involved EMS or a trip to the doctor's office in the last year for staff, guests and clients			4			
b14		A Risk Mitigation Plan (RMP) includes human safety protocols		2	1			
b15		A Human Emergency Policy and Procedures has been written with assistance from local emergency providers, and signed off on by all employees		2	1			
b16		A procedures and protocols policy has been written to ensure the safety of riders and non-riders		3	1			
b17		A CPR-First Aid poster has been posted in a visible location	2		1		3	
b18		ASTM-SEI Certified helmets are modeled and worn by the staff			1			
b19		An Orientation Plan has been written for family and guests of participants		3	1			

b20		An Orientation Safety Program has been written for beginner riders		2	1			
b21		Barn Rules have been posted in a highly visible location	2	2	1		3	
b22		No Smoking signs have been posted in the barn	2		1		3	
b23		A Release of Liability is on file and updated annually for all (including staff)		2	1		3	
b24		A Life Flight helicopter landing area has been identified	2		1	2	3	
b25		A First aid kit is available and accessible for humans	2		1		3	
b26		Facility requires proper riding attire (boots with heel, breeches or snug fitting pants, no loose and dangling objects, hoods, jewelry, etc).			1			
b27	**Safety of Staff**	Continued safety evaluations and training for all barn staff are preformed			1			
b28		Workers compensation and other employee notices are clearly posted	2		1		3	
b29		All staff are First Aid and CPR trained		2	1			
b30	**Horses**	All horses are at the facility have a minimum Body condition Score (BCS) of 4			1		3	
b31		A schedule for farrier exists (every 6 to 8 weeks)			1			
b32		Have parasite control program established that includes fecal float analysis and strategic deworming.		2	1			
b33		The facility performs annual dental check-ups for all horses			1			
b34		Proof of appropriate vaccinations for each horses are based on facility veterinarian recommendations		2	1			
b35		Horses are fed at least twice daily or have access to ample, adequate natural forage			1			
b36		Health records are kept for each horse. Records include: health history, vaccinations, worming, injections, injuries, vet visits, dental visits, diet changes, shoeing dates, supplement changes, medications and notes, behavioral notes (eating habits, clipping habits, trailer loading, farrier habits), travel information (dates, shipped to location).		2	1		3	
b37		Night Checks are performed			1			
b38		Regular shoe checks are performed			1			
b39		Overall body are checked daily for injury			1			
b40		Staff are certified in Horse First Aid		2	1			
b41		Staff can wrap and boot legs correctly			1			
b42		Horses get stall breaks and/or turnout daily			1			

b43	**Trail Crossing Safety**	The facility maintains proper signage at all crossing locations	**3**		**1**	**3**	**4**	
b44		Run away barriers present at all trail crossings	**3**		**1**	**3**	**4**	
b45		The facility incorporates calming devices (ie speed bumbers and dips) for vehicles on approach	**3**		**1**	**3**	**4**	
b46		The facility has a written Emergency plan for trail emergencies		**2**	**1**			
		Maximum Allowable Points	**30**	**40**	**20**	**14**	**40**	
		Facility Total Points						
	Innovation	The facility is doing something that is not listed in this section and would like to apply for additional points. Up to two items can be listed for this section for a maximum total of 6 points. Points and items are awarded exclusively by Audubon Lifestyles, and at their sole discretion. Use the space below to list additional items for this section, and attached any nessesary verification documentation/photos etc.						

Minimum Points Required	Facility Final Section Score
30	

Facility & Operations

verification options & points awarded

** Please note that only one method of verification is required for any Topic Criteria, and only one method of verification can be applied to Facility Points for any specific Topic Criteria. Multiple methods of verification does not accumualte additional Facility Points.*

	Topic	Criteria	Photo / Image	Written	Verbal	Map / Drawing	On-site Verification	✓
c01	**Equestrian**	The facility offers a program to teach the basics of grooming			1			
c02		The facility offers a program to teach the basics of tacking			1			
c03		The facility offers a program to teach the basics of mounting			1			
c04		The facility offers a program to teach the basics of horse handling			1			
c05		The facility offers a program to teach the basics of horse anatomy			1			
c06		The facility teaches Emergency Dismount to all new riders			1			
c07		The facility teaches how to handle buck, rear, and take off to all new riders			1			
c08		Tack and equipment safety are checked regularly			1			
c09		Tack fitting for lesson horses are performed monthly			1			
c10		The facility offers a program to assess a rider's ability level			1			
c11	**Certification of Instructor**	The Certification Instructor is ARIA ,CHA USDF, ICP-USEA or BHS certified		3	1			
c12	**Certification of Barn Manager**	The Barn Manager is ARIA or CHA certified		3	1			
c13		The Barn Manager has some Hospitality /public relations training			1			
c14		The Barn Manager has completed college coursework or classes in business management, and/or accounting			1			
c15		The Barn Manager has some kind of other Professional training - demonstrated either through experience, college degree, or continuing education credits			1			
c16	**Barn/Stable**	Adequate cross ventilation exists on the Barn/stable	2			1	3	
c17		The barn/stable incorporates dust control methods			1		2	
c18		The barn/stable has wash stalls and they have appropriate drainage	2		2		3	
c19		Stalls are cleaned daily			1			
c20		Design features that encourage the use of natural lighting such as windows in the barn door, skylights, etc. exist	2		1		3	
c21		The barn/stable incorporates the use of recycled materials in its construction			1		2	
c22		The barn/stable is positioned in such a way to avoid wind tunnels			1	2		
c23		Farrier/Vet station present	2		1	2	3	
c24		The barn/stable has stalls with a size of 12x12 or larger	2		1	2	3	
c25		Clean water is available in all occupied stalls at all times			1			
c26		Flooring and/or subfloor for all areas of barn other than dirt present	2		1		3	
c27		Stall bedding is present where appropriate	2		1		3	

c28		The facility maintains a temperature controlled feed room			1		2	
c29		The facility maintains a temperature controlled tack room			1		2	
c30		Hay storage is located in a separate structure from the barn/stable	2		1	2	3	
c31		Feed stored in a place that is clean and free of contaminants and rodents			1		2	
c32		Feed and hay are free from mold			1		2	
c33		Overall, the barn is safe and free of clutter	1				2	
c34		The walls in each of the stalls are cleaned and disinfected on a schedule		2	1			
c35	**Outdoor Arena**	The outdoor arena has an engineered riding surface	2	2	1		3	
c36		Procedures are in place to mitigate dust in the outdoor arena			1			
c37		The outdoor arena is no smaller than 66' x 197' (small dressage arena)	2		1	2	3	
c38		Sub base and compacted base are present in the arena			1		2	
c39		The outdoor arena has a crowned grade design **OR**	3		1		4	
c40		The outdoor arena has a table grade design and water does not pool anywhere on area surface	2		1		3	
c41		Perimeter fencing exists around the entire outdoor arena	2		1	2	3	
c42		The outdoor arena is dragged and maintained			1			
c43	**Storage Areas**	Hay is stored in a covered structure and stacked for optimum ventilation	2		1		3	
c44		All flammable materials are stored in flame resistant cabinet(s)	2		1		3	
c45		Facility equipment is stored in a covered structure(s) (except horse trailers)	2		1		3	
c46	**Pastures**	Pastures are located near the barn to increase labor efficiency			1	1	2	
c47		Lay up paddock present in pasture			1	1	2	
c48		Safe rounded corners in pastures exists	1				2	
c49		Pastures are free from standing water, accumulated waste, sharp objects, debris and maintained for safety	1		1			
c50		Shelter (either built or natural) that protects from inclement weather conditions are available in pastures	2					
c51		Clean water is available at all times in water dispensers and free of debris and algae			1			
c52		Water dispensers are cleaned regularly			1			
c53		Fencing is well maintained and in good repair	1		1		2	
c54	**Quarantine Area**	A quarantine area exists onsite	2		1	2	3	
c55		The quarantine area is located more than 300 yards away from the herd			1	2	3	
c56		Turn out is available in the quarantine area			1			
c57		Vet access is present in the quarantine area			1			
c58		Electricity present in the quarantine area			1		2	
c59	**Quarantine Barn**	The quarantine area includes a separate barn from main facility	2		1	2	3	
c60		Hot and cold water present in the quarantine area			1		2	
c61		A written Quarantine Plan has been established with disinfectant protocols in place		2	1			

c62		The Manager requires health exam and vet records before arrival of all horses			1			
c63		Grooming tools and all other instruments are not shared or if shared they are disinfected prior to sharing			1			
c64	**Privately Owned Trails**	Less than 20% of all trails on-site are not aligned with roads	2		1	2	3	
c65		Trails are cleared from branches, downfalls and other obstacles that could injure riders or horses			1		2	
c66		Trails are established in permanent amenity areas			1	2	3	
c67		Trails are linked offsite to other recreational areas			1	2	3	
c68		Trails are designed to topography to minimize erosion			1	2	3	
c69		Natural surfaces utilized on all trails	2		1		3	
c70		Bridge crossings exist at all stream crossing locations	3		1	3	4	
c71		Trails are closed during wet seasons to prevent erosion			1			
c72		Safety and trail signage posted in multiple locations	2		1	2	3	
c73		Riders are not permitted to roam at will and are confined to maintained and managed trails			1			
c74	**Overall**	Perimeter fencing of the entire equestrian facility exists			1		2	
c75		The facility is clean, neat and orderly	1		1		2	
c76		Restroom facilities are present and are clean	1		1		2	
		Maximum Allowable Points	**50**	**10**	**30**	**30**	**60**	
		Facility Total Points						

Innovation

The facility is doing something that is not listed in this section and would like to apply for additional points. Up to two items can be listed for this section for a maximum total of 6 points. Points and items are awarded exclusively by Audubon Lifestyles, and at their sole discretion. Use the space below to list additional items for this section, and attached any nessesary verification documentation/photos etc.

Minimum Points Required	Facility Final Section Score
40	

Environmental

verification options & points awarded

** Please note that only one method of verification is required for any Topic Criteria, and only one method of verification can be applied to Facility Points for any specific Topic Criteria. Multiple methods of verification does not accumualte additional Facility Points.*

	Topic	Criteria	Photo / Image	Written	Verbal	Map / Drawing	On-site Verification	☑
d01	**Manure Management**	A manure system is in place to collect, store, and manage manure	3		1		4	
d02		A covered storage structure for manure exists **OR**	3		2		4	
d03		Water runoff is managed from where manure is stored	2		1		3	
d04		If manure is spread, it is spread on non-horse pasture and only where no creeks or streams are present or adjoining the property				1		
d05		Manure Storage facility is in good repair	1				2	
d06		The facility performs weekly removal of manure in pastures			1			
d07		The manure is emptied from the storage area and properly disposed of, or utilized at least twice a year, or as often as required			1			
d08		Horse manure is stored more than 200 feet from any wetland or water body			1	2	3	
d09	**Manure Composting**	Horse manure is composted	4		2		5	
d10		Manure is reused as fertilizer in appropriate locations	3		2	3	4	
d11		Smaller amounts of manure are composted in a three-bin system in which material is moved (and turned and mixed) from to bin to bin	2		1		3	
d12		Composting on a larger scale is undertaken by local agents			3			
d13		Manure is stacked into long rows on a concrete or other similar pad	3		2		4	
d14	**Habitats**	Pastures are free from poisonous plants to horses			1		2	
d15		Wildlife corridors are present between pastures	2		1	2	3	
d16		Grassy buffers for nesting birds are present along the perimeter of pastures	2		1	2	3	
d17		Native vegetation (non toxic to horses) are used in landscaping	3	3	1	3	4	
d18	**Water**	Policies and practices are in place to prevent nutrients from reaching surface waters	2	1	1	2	3	
d19		An infiltration trench exists. An infiltration trench is a rock filled trench with no outlet that receives stormwater runoff.	2				3	
d20		Porous pavement exists in the parking area as a permeable surface to reduce the amount of surface runoff before it infiltrates into the subsoil.	3		1		4	
d21		The facility uses bioretention areas. These areas are landscaping features where surface runoff is directed into shallow, landscaped depressions. These depressions act as a filtration system and pollutant removal.	3		1		4	

d22		The facility uses a sand filter system consisting of two or three chambers or basins. The first is the sedimentation chamber, which removes floatables and heavy sediments. The second is the filtration chamber, which removes additional pollutants by filtering the runoff through a sand bed. The third is a discharge chamber.	2		1		3	
d23		The facility incorporates grassed swales to treat stormwater. As stormwater runoff flows through these channels, it is treated through filtering by the vegetation in the channel.	2		1		3	
d24		All water bodies located on-site incorporate bufferzones along the water edge.	2		1	2	3	
d25		Washwater is not discharged directly to a water body, but is allowed to filter through grassy or forested areas prior to discharge.	2		1		3	
d26		Runoff from parking lots is filtered through grassy or forested areas prior to discharge.	2		1	2	3	
d27	**Pasture Maintenance**	Pastures are divided and managed for horse rest and rotation			1	2	3	
d28		Horses are pastured only in areas that are less than 10% slope			1	2	3	
d29		Sacrifice/dry lots are present in the pasture	2		1	2	3	
d30		When pastures are too wet, when pasture grass is inadequate/overgrazed/in regrowth, recently fertilized, or have been recently treated with herbicides the sacrifice areas are used			1			
d31		Pastures are mowed or used for grazing when grass reaches 6"-10" in height			1			
d32		Local agriculture extension office are consulted on pasture maintenance			1			
d33		Horses do not have access to streams, creeks, ponds, rivers or wetlands			1		4	
d34	**Erosion Control**	High traffic areas are stabilized to and from barn to prevent erosion	2		1		3	
d35		High traffic areas are stabilized in some way to prevent erosion	2		1			
d36		Gutters and downspouts exist around barn	1				2	
d37	**Integrated Pest Management**	Feed rooms include rat wire to prevent rodents	1				2	
d38		When pest problems exist, the underlying conditions are eliminated that may favor the pest, and the problem is treated quickly to reduce the risk of large-scale infestation			1			
d39		The facility disposes of and stores garbage in a way that discourages insect and rodent infestation			1			
d40		Pesticides are not stored on the premises, or are stored in contained areas designed to prevent spills	2		1		3	
d41		The Facility encourage bats, insect eating birds, or other fly predators for flying insect control	2		1			
d42		Plastic Owls or other similar deterrents have been mounted to reduce pest problems	1				2	
d43		The facility encourages other natural pest control methods			1			
d44	**Chemicals**	Chemicals are stored on plastic or metal shelving away from consumables	2				3	
d45		Liquid chemicals materials are stored below dry materials	2				3	
d46		A spill containment kit is available and list of procedures readily at hand	2	2	1		3	

d47		Pesticide containers are disposed of in a legal toxic waste facility			1			
d48	**Resource Conservation**	Compact florescent lighting is used where appropriate throughout the facility	1		1	1	2	
d49		Conservation easements exist on the property			1	2	3	
d50		The facility has and uses recycle bins for cans, bottles, paper and glass	2		1		3	
d51		The facility uses recycled paper for all daily office activities			1			
d52		Motion sensor lights are installed at the facility			1		2	
d53		Staff turns the power off on all office equipment at end of the work day			1			
d54		The facility achieves significant energy and money savings through proper use of programmable thermostat	1				2	
d55		100% of the appliances used on-site are Energy Star Rated or higher	2		1		3	
d56		Solar power, or other alternative energy system is used on-site	3		1		4	
d57		A rain water collection system is present on-site	3		1		4	
d58		At least 10% of human consumables purchased are produced locally		2	2			
d59		At least 10% of horse consumables purchased are produced locally		2	2			
d60		Hay is produced on-site			3		4	
		Maximum Allowable Points	**70**	**10**	**15**	**28**	**80**	
		Facility Total Points						
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Minimum Points Required	Facility Final Section Score
30	58

Outreach & Education

verification options & points awarded

** Please note that only one method of verification is required for any Topic Criteria, and only one method of verification can be applied to Facility Points for any specific Topic Criteria. Multiple methods of verification does not accumualte additional Facility Points.*

	Topic	Criteria	Photo / Image	Written	Verbal	Map / Drawing	On-site Verification	☑
e01	**Fact Sheets Onsite** *(1 point for each factsheet up to a maximum total of 10 points)*	Trail Riding Etiquette for Horse Enthusiasts		1				
e02		The Basics of Equine Behavior		1				
e03		Vaccination and Disease Primer		1				
e04		Stressing Indicators for Horses		1				
e05		Saddling and Bridling Horses Safely		1				
e06		Mounting, Dismounting and Riding Horses Safely		1				
e07		Horse Trailer Maintenance and Trailering Safety		1				
e08		Stress Management for Equine Athletes		1				
e09		Establishing and Managing Horse Pastures		1				
e10		Best Management Practices for Horse Manure		1				
e11		Composting on Small Farms		1				
e12		Equine Barnyard Management		1				
e13		The Basics of Equine Nutrition		1				
e14		Care for the Older Horse: Diet and Health		1				
e15		Safety Recommendations for the Stable, Barn Yard, and Horse/Livestock Structures		1				
e16		Horse Trailer Maintenance and Trailering Safety		1				
e17		Fire Prevention and Safety Measures Around the Farm		1				
e18		Machinery and Equipment Safety		1				
e19		Factsheets listed above are available onsite and printed on recycled paper			2		4	
e20	**Website & Internet**	The facility has a website or web page specific to the equestrian facility		4				
e21		The facility has a web pages describing the sustainable attributes of the equestrian facility		3				
e22		The facility displays the Audubon Lifestyles Logo on our website	2					
e23		The facility has a link to the Audubon Lifestyles website from their website		2				
e24		The facility has an International Sustainability logo on their website	2					
e25		The facility has a link to the International Sustainability Council Website from the website		2				
e26		The facility has publicly displayed Sustainability Charter on the website.		2				
e27		The facility has a digital newsletter that is used to provide information describing the sustainability efforts of the equestrian facility.		3				
e28		Digital versions of factsheets are available on the website (1 point for each factsheet listed up to a total of 10 points maximum)		10				

e29	**Signs & Displays**	The facility displays the Audubon Lifestyles Logo in a publicly visible location on-site	1				2	
e30		The facility displays the International Sustainability Council logo at in a publicly visible location	1				2	
e31		The facility has signs or a display at the facility describing the value of native plants	2				3	
e32		The facility has a series of plant id signs to inform guests, clientele, and staff of specific plant species located on-site	2				3	
e33		The facility has signs or a display at the facility informs the public about, local or migratory birds	2				3	
e34		The facility has signs or a display at the facility informs the public about, local wildlife	2				3	
e35		The facility has signs or a display at the facility describing the local watershed and/or the importance of watersheds	2				3	
e36	**Other Outreach Opportunities**	The facility staff has hosted a group of children (school classroom, 4-H, boy scouts, other) to the site for a tour and discussed the importance of sustainable equestrian facilities			2			
e37		The facility staff has hosted a group of children (school classroom, 4-H, boy scouts, other) to the facility and provided a workshop to create bird nest boxes.			2			
e38		The facility staff has spoken either on-site or off-site to an adult group about the importance of managing sustainable equestrian facilities.			2			
e39		The facility has adopted a local school by paying their annual membership in the Audubon International Adopt a School Program		5	5			
e40		Volunteer groups help maintain public trail systems	3		2			
e41	**Education**	Reference book available onsite: Hands-on Horse Care from Horse and Rider			1		2	
e42		Reference book available onsite: The Complete Book of Equine First Aid			1		2	
		Maximum Allowable Points	**30**	**45**	**15**	**0**	**25**	
		Facility Total Points						

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Minimum Points Required	**Facility Final Section Score**
20	

Equestrian Facility Summary Page

Category	Minimum Points Required	Maximum Points Allowed	Adjusted Facility Score
Economics & Business	30	70	
Horse Care & Safety	30	70	
Facility & Operations	40	80	
Environmental	40	80	
Outreach & Education	20	60	
TOTAL	160	360	0

Audubon Lifestyles Designation	Points Required	ISC Seal Earned	☑
Audubon Lifestyles Equestrian Facility – 1 Star	160	NO	
Audubon Lifestyles Equestrian Facility – 2 Star	200	NO	
Audubon Lifestyles Equestrian Facility – 3 Star	230	YES	
Audubon Lifestyles Equestrian Facility – 4 Star	260	YES	
Audubon Lifestyles Equestrian Facility – 5 Star	300	YES	

INTERNATIONAL SUSTAINABILITY COUNCIL

The Audubon Lifestyles Equestrian Facility Program was created through a collaborative process that involved experts in the fields of equestrian facility management, wildlife management, and sustainability. This includes but is not limited to individuals representing Audubon Lifestyles, Equestrian Services LLC, and the International Sustainability Council.

Equine Education Center
Program Statement

March 2008

Prepared by:
KSU Facilities Planning
The Equine Planning Committee

Equine Education Center

Introduction

In response to the increasing need to provide educational opportunities for students interested in the horse industry, Kansas State University has developed plans for a privately funded Equine Education Center. This facility will be located northeast of the intersection of Denison and Kimball Avenues just north of the KSU Purebred Beef Unit.

This facility will meet the needs of four core programs: 1) Equine academic program for the Department of Animal Sciences and Industry 2) KSU Women's Equestrian Team 3) KSU Rodeo Team; and 4) Equine Assisted Human Development and Rehabilitation Program. Additionally, the complex will be used by student organizations with an equine emphasis. New courses in equitation will also be offered upon completion of the complex.

Current Conditions

We have seen a huge increase in our student population with an equine interest. In response, several new equine courses have been offered and an Equine Certificate Program was developed in 2005. The Certificate requires 20 semester hours in Equine Science. Currently there are 76 students in the certificate program and numbers are steadily increasing.

Currently we have very limited equine facilities for teaching, research and extension functions of the university. Our training classes are very weather dependent and students are unable to ride year round. We are unable to accommodate more students in our hands-on horse related classes due to lack of adequate facilities.

The KSU Women's Equestrian Team is currently housed in rented facilities. This privately owned stable is located six miles west of Manhattan. The facility is stretched to capacity to house the team horses limiting the growth of the program. Furthermore, adequate arena time and space is often a limiting factor for practice since the facility has only one covered arena (120' x 200') that must meet the practice needs of 65-70 athletes on the English and Western teams. The close proximity of the proposed facility to campus will be a major asset to the team.

The KSU Rodeo Team practices in a number of facilities in the Manhattan area and hosts an annual rodeo in Weber Arena in February. The 2008 KSU Rodeo hosted over 500 participants from 24 colleges and universities in the Central Plains Region. Inadequate parking space for contestants, warm up areas for horses, and limited access is a major problem. The new facility will provide for a rodeo team home, as well as a site for hosting the rodeo with sufficient parking.

Kansas State University will develop an Equine Assisted Human Development and Rehabilitation Program to include a certificate. This program will be multi-disciplined and incorporate faculty expertise in the departments of Animal Sciences and Industry; Kinesiology; Psychology; Sociology, Anthropology and Social Work; and Family Studies and Human Services. Specialized facilities are proposed to conduct research and teaching.

Project Description

The proposed Equine Education Center will have a large indoor arena (200' x 320' building), a classroom arena building (120' x 180'), two 70' x 120' stall barns, six outdoor lots for horses, outdoor space for rodeo stock, two round pens, a 240' x 300' outdoor arena, hay and equipment storage and parking space . Phase one of the project includes the following facilities.

1. Indoor Arena
   200' x 360' building with 180' x 300' arena floor

The indoor arena will be the primary practice arena for the KSU Equestrian Team. This large arena has the capability to be subdivided to accommodate both the English and Western Teams. It will also be used for Rodeo Team practice and use. This building will include rodeo chutes, bleachers, restrooms and home and visitor locker rooms. This facility will also serve as the home for the equine academic program and the equine-assisted human development and rehabilitation program until the remainder of the facilities are completed.

2 Indoor Horse Stalls
   1- 72' x 120' buildings with 32- 12' x 12' stalls each.
   Tack rooms, feed rooms, wash racks and grooming stations in each.

This will be a stall barn associated with the Indoor Arena. .

3. Outdoor Horse Pens
   6 outdoor lots with 10 horses per pen, with a minimum of 600 square feet per horse
   These lots will each have a minimum of 1 - 16' x 30' 3-sided sheds open to the south.

The outdoor housing will be shared between the department and the equestrian team.

4. Outdoor Arena with lighting, rodeo chutes and holding areas for rodeo stock
   240' x 300'

This would provide a large (150' x 300') arena and a parallel (70' x 300') track arena. The outdoor arena primarily serves the needs of the Rodeo Team and the Women's Equestrian Team. It will also serve the needs of the equine academic program while the remainder of the facilities are being built.

5. Hay and Equipment Storage

With the large number of horses expected at this site we need accommodations for hay and feed. The remainder of the facility will be built as funds allow.

SHELDEN
architecture

31 March, 2008

Kansas State Foundation
David Weaver, VP Real Estate and Investments
Aaron Hund, Director of Development
2323 Anderson Avenue
Suite 500
Manhattan, KS 66502-2911

Re: KSU Equine Education Center

Dear David,

Below we have outlined the scope of the project and have reviewed it with the key state holders of the university. This estimate along with a narrative regarding the project (being put together under the direction of Kenneth Odde) is to be used for the purposes of obtaining approval from the Board of Regents. As we move forward from here we are working with Jerry Carter to draft an agreement between Shelden Architecture and the Foundation for the services required to move this project forward.

PROJECT SCOPE - EQUINE EDUCATION CENTER PHASE ONE

Indoor Arena

1.	Entry Lobby	1,000sf	@	$150/sf	= $150,000
2.	Arena Floor(150x300)	45,000sf	@	$45/sf	= $2,025,000
3.	Temporary Bleachers And Concessions Area (2,000 seats)	10,000sf	@	$85/sf	= $850,000
4.	Admin Area	1,500sf	@	$150/sf	= $225,000
5.	Home (70) And Visitor (30) Locker Rooms (no showers)	2,000sf	@	$150/sf	= $300,000
6	Misc. storage and mechanical Electrical and circulation	4,500sf	@	$150/sf	= $675,000
	Sub-Total (200'x320')	**64,000sf**	**@**	**$66/sf**	**= $4,225,000**

Horse Barns for Permanent Stalls (Attached to Indoor Arenas by Breeze-Way)

1. 32 Stalls (12x12)
2. 1 Tack Room (12x24)
3. 1 Feed Bay (12x12)
4. 1 Wash/Grooming area

Sub-Total (2) 8,600sf (each) @ $70/sf = $602,000

Outdoor Arena (not covered)

1.	Arena Floor (150x300)	45,000sf	@	$3/sf	= $135,000
2.	Dressage/warm-up (60x300)	18,000sf	@	$3/sf	= $54,000
3.	Run-in Lane (10x300)	3,000sf	@	$3/sf	= $9,000
4.	Chute Area (150x30)	4,500sf	@	$3/sf	= $13,500
5.	Stock Pens (160x80)	12,800sf	@	$3/sf	= $38,400

6.	Bleacher Area - 4,000 (80x300)	24,000sf	@	$5/sf	= $120,000
7.	Concessions/R.R. (30x150)	4,500sf	@	$100/sf	= $45,000
	Sub-Total	**111,800sf**	**@**	**$3.7/sf**	**= $414,900**

Outdoor Horse Pens and Lots

1.	6 - 1 Acre Lots (Fenced with (16x30) 3 Sided Shed)				
		Lump sum	@	$10,000(each)	= $60,000
	Sub-Total				**= $60,000**

Misc. Parking Areas, Service Areas & Utilities (Trailer/Cars) **= $250,000**

PHASE ONE SUB-TOTAL **=$5,551,900**

PHASE ONE ARCHITECTURAL AND ENGINEERING FEES 8%??? **=$444,152??**

OTHER FEES/EXPENSISES ???? **=$100,000??**

PHASE ONE GRAND TOTAL **=$6,096,052**

PROJECT SCOPE - EQUINE EDUCATION CENTER PHASE TWO

Classroom Arena and Equine Assisted Human Development and Rehabilitation Building

1.	Entry Lobby	500sf
2.	Classroom Arena Floor(90x180)	16,200sf
3.	Office Area (1 - Animal Science)	900sf
4.	Classroom (40) Viewing Arena	1,200sf
5.	E.A.H.D.R. Arena floor(60x120)	7,200sf
6.	Conference/Classroom (25)	720sf
7.	Observation Room (25)	400sf
8.	Physical Therapy Room	400sf
9.	Office Area (3 - E.A.H.D.R.)	1,500sf
	Sub-Total	**29,020sf**

Outdoor Covered Round Pens

1.	Pen (60 Foot Dia.)	3,000sf
2.	Pen (90 Foot Dia.)	6,000sf
	Sub-Total	**9,000sf**

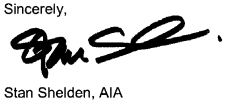
Hay Barn/Maintenance Building

1.	Hay/Shavings/Equip. Storage	8,000sf
	Sub-Total	**8,000sf**

Misc. Parking Areas, Service Areas & Utilities (Trailer/Cars)

We have not put any costs to **PHASE TWO** due to several unknown factors but we believe this represents the complete project as of today. Also please note we have not identified a line item for any contingency and I think it would be wise to set aside 5%-10% for all the unknowns that come up during most projects. If you or Aaron have any questions please don't hesitate to call me. As I stated earlier I will contact Jerry Carter and get a letter of intent together so that we can keep the process moving forward. We are very excited to see this project get underway and are proud to be a part of it.

Sincerely,



Stan Shelden, AIA

Cc. Kenneth Odde
Mark Taussig
Jerry Carter

NCAA Equestrian for Women

Equestrian for women is recognized as an emerging sport for NCAA Divisions I and II.

Information Related the Sport

- Varsity Equestrian information: http://www.varsityequestrian.com/propspectiveuniversities.html
- Level of Participation (high school/college): Twenty-four Division I and II varsity programs are reported in the NCAA and the International Horse Show Association (IHSA) reports over 300 collegiate members.
- Number of Student-Athletes Needed: The number of riders participating in tryouts ranges from 5 to 120 with an average of 40 athletes.
- Estimated Start-Up Costs: Equestrian ranks among the least expensive sports at $3-7,000 per student athlete. Total operating expenses range from $100,000-450,000.
- Equipment Needed: Horses: In most cases, programs have met their horse needs through individual donations to the animal science, athletic or university foundation and/or from a pre-existing club team. Some programs choose to lease or borrow horses instead of owning.
- Facilities Necessary: Institutions with existing equine and/or animal science departments will typically already have facilities on campus. However, the minimal requirements for any program are: riding area, jumps, stalls/paddocks for horses, tack (saddle, bridle, etc.) and storage. Generally, facilities will be the largest part of the budget for an equestrian program. Southern Methodist pays one flat fee per year and the facility provides horse, practice facilities, tack, vet services and feed. Others, such as Kansas State and the University of South Carolina lease a privately owned stable.
- Number of Coaches Needed: Currently, NCAA allows each program to have one head coach and two assistant coaches. Most programs have at least 2 full time coaches.
- Typical Season (dates, duration): The length of an institution's playing season in equestrian shall be limited to a 144-day season, which may consist of two segments (each consisting of consecutive days) and which may exclude only required off days and official vacation, holiday and final-examination periods during which no practice or competition shall occur. Practice cannot begin before September 7 or the first day of classes.
- Remarks: Athletes, coaches and fans enjoy the flexibility of equestrian. Teams compete head to head or in a tournament style format. Each team is required to ride the same horse and judges' scores are compared across horses. The host school provides the horses and tack at each competition, so hauling horses is not required. The format includes hunt seat equitation on the flat and over fences, western horsemanship and reining. A university may choose to offer only English or western based on the student body's interest.

Key Organizations/Agencies

- Varsity Equestrian: http://www.varsityequestrian.com/about.html
- International Horse Show Association: http://www.ihsainc.com/

http://www.ncaa.org

Plants Toxic to Horses

Adam-and-Eve (Arum, Lord-and-Ladies, Wake Robin, Starch Root, Bobbins, Cuckoo Plant) | **Scientific Name:** *Arum maculatum* | **Family:** Araceae
African Wonder Tree | **Scientific Name:** *Ricinus communis* | **Family:**
Alocasia (Elephant's Ear) | **Scientific Name:** *Alocasia spp.* | **Family:** Araceae
Alsike Clover | **Scientific Name:** *Trifolium hybridum* | **Family:** Leguminosae
Ambrosia Mexicana (Jerusalem Oak, Feather Geranium) | **Scientific Name:** *Chenopodium botrys* (*Ambrosia mexicana*) | **Family:** Chenopodiaceae
American Bittersweet (Bittersweet, Waxwork, Shrubby Bittersweet, False Bittersweet, Climbing Bittersweet) | **Scientific Name:** *Celastrus scandens* | **Family:** Celastraceae
American Holly (English Holly, European Holly, Oregon Holly, Inkberry, Winterberry) | **Scientific Name:** *Ilex opaca* | **Family:** Aquifoliaceae
American Mandrake (Mayapple, Indian Apple Root, Umbrella Leaf, Wild Lemon, Hog Apple, Duck's Foot, Raccoonberry) | **Scientific Name:** *Podophyllum peltatum* | **Family:** Berberidaceae
American Yew | **Scientific Name:** *Taxus canidensus* | **Family:** Taxaceae
Angelica Tree (Hercules' Club, Devil's Walking Stick, Prickly Ash, Prickly Elder) | **Scientific Name:** *Aralia spinosa* | **Family:** Araliaceae
Apple (Includes crabapples) | **Scientific Name:** *Malus sylvestrus* (*other Malus species*) | **Family:** Rosaceae
Apricot (Group also includes Plum, Peach, Cherry) | **Scientific Name:** *Prunus armeniaca* (*other Prunus species*) | **Family:** Rosaceae
Arum (Cuckoo-pint, Lord-and-Ladies, Adam-and-Eve, Starch Root, Bobbins, Wake Robin) | **Scientific Name:** *Arum maculatum* | **Family:** Araceae
Autumn Crocus (Meadow Saffron) | **Scientific Name:** *Colchicum autumnale* | **Family:** Liliaceae
Avocado (Alligator Pear) | **Scientific Name:** *Persea americana* | **Family:** Lauraceae
Azalea (Rosebay, Rhododendron) | **Scientific Name:** *Rhododendron spp* | **Family:** Ericaceae
Barnaby's Thistle (Yellow Star Thistle) | **Scientific Name:** *Centaurea solstitialis* | **Family:** Compositae
Bead Tree (China Ball Tree, Paradise Tree, Persian Lilac, White Cedar, Japanese Bead Tree, Texas Umbrella Tree, Pride-of-India, Chinaberry Tree) | **Scientific Name:** *Melia azedarach* | **Family:** Meliaceae
Bergamot Orange (Bergamot, Citrus bergamia) | **Scientific Name:** *Citrus Aurantium* | **Family:** Rutaceae
Bird of Paradise Flower (Crane Flower, Bird's Tongue Flower) | **Scientific Name:** *Strelitzia reginae* | **Family:** Strelitziaceae
Bird's Tongue Flower (Bird of Paradise Flower, Crane Flower) | **Scientific Name:** *Strelitzia reginae* | **Family:** Strelitziaceae
Bishop's Weed (Greater Ammi, False Queen Anne's Lace) | **Scientific Name:** *Ammi majus* | **Family:** Apiaceae
Bitter Root (Dogbane Hemp, Indian Hemp) | **Scientific Name:** *Apocynum androsaemifolium* | **Family:** Apocynaceae
Black Calla (Solomon's Lily, Wild Calla, Wild Arum) | **Scientific Name:** *Arum palestinum* | **Family:** Araceae
Black Laurel (Dog Hobble, Dog Laurel, Fetter Bush, Sierra Laurel) | **Scientific Name:** *Leucothoe davisiae* | **Family:** Ericaceae
Black Nightshade (Nightshade, Deadly Nightshade) | **Scientific Name:** *Solanum nigrum* | **Family:** Solanaceae
Black Walnut | **Scientific Name:** *Juglans nigra* | **Family:** Juglandaceae
Blackjack Pine (Ponderosa Pine, Western Yellow Pine, Yellow Pine, Bull Pine) | **Scientific Name:** *Pinus ponderosa* | **Family:** Pinaceae
Bobbins (Arum, Lord-and-Ladies, Adam-and-Eve, Starch Root, Wake Robin, Cuckoo Plant) | **Scientific Name:** *Arum maculatum* | **Family:** Araceae
Bog Laurel (Pale Laurel, Bog Kalmia) | **Scientific Name:** *Kalmia poliifolia* | **Family:** Ericaceae
Bracken Fern (Brake Fern, Umbewe, Brake, Pasture Bracken, Hog-Pasture Bracken, Eagle fern, Umhlashoshana, Adelaarsvaring) | **Scientific Name:** *Pteridium aquilinum* | **Family:** Polypodiaceae

Brake Fern (Braken Fern, Umbewe, Brake, Pasture Bracken, Hog-Pasture Bracken, Eagle fern, Umhlashoshana, Adelaarsvaring) | **Scientific Name:** *Pteridium aquilinum* | **Family:** Polypodiaceae
Branching Ivy (English Ivy, Glacier Ivy, Needlepoint Ivy, Sweetheart Ivy, California Ivy) | **Scientific Name:** *Hedera helix* | **Family:** Araliaceae
Bread and Butter Plant (Indian Borage, Spanish Thyme, Coleus, Maratha, Militini, East Indian Thyme) | **Scientific Name:** *Coleus ampoinicus* | **Family:** Labiatae
Brunfelsia (Yesterday, Today, Tomorrow, Kiss-Me-Quick, Lady-of-the-Night, Fransiscan Rain Tree) | **Scientific Name:** *Brunfelsia species* | **Family:** Solanaceae
Buckeye (Horse Chestnut) | **Scientific Name:** *Aesculus spp* | **Family:** Hippocastanaceae
Buckwheat | **Scientific Name:** *Fagopyrum species* | **Family:** Polygonaceae
Buddhist Pine (Yew Pine, Japanese Yew, Southern Yew, Podocarpus) | **Scientific Name:** *Podocarpus macrophylla* | **Family:** Podocarpaceae
Bull Pine (Ponderosa Pine, Western Yellow Pine, Yellow Pine, Blackjack Pine) | **Scientific Name:** *Pinus ponderosa* | **Family:** Pinaceae
Burning Bush (Wahoo, Spindle Tree) | **Scientific Name:** *Euonymus atropurpurea* (*Euonymus occidentalis*) | **Family:** Celastraceae
Buttercup (Butter Cress, Figwort) | **Scientific Name:** *Ranunculus sp.* | **Family:** Ranunculaceae
Calamondin Orange | **Scientific Name:** *Citrus mitis* | **Family:** Rutaceae
Cape Jasmine (Gardenia) | **Scientific Name:** *Gardenia jasminoides* | **Family:** Rubiaceae
Cardboard Palm (cycads and zamias) | **Scientific Name:** *Zamia furfuracea* | **Family:** Cycadaceae
Cardinal Flower (Lobelia, Indian Pink) | **Scientific Name:** *Lobelia cardinalis* | **Family:** Campanulaceae
Carolina Maple (Swamp Maple, Scarlet Maple, Red Maple, Curled Maple, Acer Sanguineum, Soft Maple, Rufacer Rubrum) | **Scientific Name:** *Acer rubrum* | **Family:** Aceraceae
Castor Bean Plant (Castor Oil Plant, Mole Bean Plant, African Wonder Tree, Castor Bean) | **Scientific Name:** *Ricinus communis* | **Family:** Euphorbiaceae
Chamomile (Manzanilla, Garden Chamomile, Roman Chamomile, True Chamomile, Corn Feverfew, Barnyard Daisy, Ground-apple, Turkey-weed) | **Scientific Name:** *Anthemis nobilis* | **Family:** Compositae
Charlock (Wild Mustard, California Rape) | **Scientific Name:** *Brassica kaber* | **Family:** Cruciferae
Cherry | **Scientific Name:** *Prunus species* | **Family:** Rosaceae
Chinaberry Tree (Bead Tree, China Ball Tree, Paradise Tree, Persian Lilac, White Cedar, Japanese Bead Tree, Texas Umbrella Tree, Pride-of-India) | **Scientific Name:** *Melia azedarach* | **Family:** Meliaceae
Chinese Evergreen | **Scientific Name:** *Aglaonema modestrum* | **Family:** Araceae
Christmas Rose (Hellebore, Lenten Rose, Easter Rose) | **Scientific Name:** *Helleborus niger* | **Family:** Ranunculaceae
Chrysanthemum (Daisy, Mum; many varieties) | **Scientific Name:** *Chrysanthemum spp.* | **Family:** Compositae
Clematis (Virgin's Bower, Leatherflower) | **Scientific Name:** *Clematis sp.* | **Family:** Ranunculaceae
Climbing Bittersweet (Bittersweet, Waxwork, Shrubby Bittersweet, False Bittersweet, Climbing Bittersweet, American Bittersweet) | **Scientific Name:** *Celastrus scandens* | **Family:** Celastraceae
Climbing Nightshade (European Bittersweet, Deadly Nightshade, Violet Bloom, Blue Nightshade, Soda Apple, Poisonous Nightshade, Felonwort, Devil's Apple, Scarlet Berry, Woody Nightshade, Blue Blindweed) | **Scientific Name:** *Solanum dulcamara* | **Family:** Solanaceae
Coffee Tree (Wild Coffee, Geranium-Leaf Aralia) | **Scientific Name:** *Polyscias guilfoylei* (*Aralia guilfoyei*) | **Family:** Araliaceae
Coleus (Indian Borage, Bread and Butter Plant, Spanish Thyme, East Indian Thyme, Stinging Thyme, Country Boarage; many others) | **Scientific Name:** *Coleus ampoinicus* | **Family:** Labiatae
Common Privet (Privet, Amur, Wax-leaf) | **Scientific Name:** *Ligustrum vulgare* | **Family:** Oleaceae
Coontie Palm (Sago Palm, Cardboard Palm, cycads and zamias) | **Scientific Name:** *Zamia pumila* | **Family:** Cycadaceae
Cow parsnip (Giant Hogweed) | **Scientific Name:** *Heracleum maximum* | **Family:** Apiaceae
Cowbane (Water Hemlock, Poison Parsnip) | **Scientific Name:** *Cicuta species* | **Family:** Apiaceae
Cuckoo-pint (Arum, Lord-and-Ladies, Adam-and-Eve, Starch Root, Bobbins, Wake Robin) | **Scientific Name:** *Arum maculatum* | **Family:** Araceae
Cycads (Sago Palm, Fern Palm) | **Scientific Name:** *Cycas and Zamia species* | **Family:** Cycadaceae

Daffodil (Narcissus, Jonquil, Paper White) | **Scientific Name:** *Narcissus spp* | **Family:** Amaryllidaceae
Deadly Nightshade (Nightshade, Black Nightshade, European Bittersweet, Climbing Nightshade) | **Scientific Name:** *Solanum spp* | **Family:** Solanaceae
Desert Azalea (Desert Rose, Mock Azalea, Sabi Star, Impala Lily, Kudu Lily) | **Scientific Name:** *Adenium obesum* | **Family:** Apocynaceae
Desert Rose (Desert Azalea, Mock Azalea, Sabi Star, Impala Lily, Kudu Lily) | **Scientific Name:** *Adenium obesum* | **Family:** Apocynaceae
Dock (Sorrel) | **Scientific Name:** *Rumex sp.* | **Family:** Polygonaceae
Dog Daisy (Dog Fennel) | **Scientific Name:** *Achillea millefolium* | **Family:** Compositae
Dog Hobble (Dog Laurel, Fetter Bush, Black Laurel) | **Scientific Name:** *Leucothoe sp.* | **Family:** Ericaceae
Dogbane Hemp (Bitterroot, Indian Hemp) | **Scientific Name:** *Apocynum* | **Family:** Apocynaceae
Dwarf Poinciana (Barbados Pride, Peacock Flower) | **Scientific Name:** *Caesalpinia pulcherrima* | **Family:** Fabaceae
Easter Rose (Hellebore, Christmas Rose, Lenten Rose) | **Scientific Name:** *Helleborus niger* | **Family:** Ranunculaceae
Emerald Feather (Emerald Fern, Asparagus, Asparagus fern, Sprengeri fern, Plumosa fern, Lace fern, Racemose asparagus, Shatavari) | **Scientific Name:** *Asparagus densiflorus* | **Family:** Liliaceae
English Holly (European Holly, Oregon Holly, Inkberry, Winterberry, American Holly) | **Scientific Name:** *Ilex aquifolium* | **Family:** Aquifoliaceae
English Ivy (Branching Ivy, Glacier Ivy, Needlepoint Ivy, Sweetheart Ivy, California Ivy) | **Scientific Name:** *Hedera helix* | **Family:** Araliaceae
English Yew (Western Yew, Pacific Yew, Japanese Yew, Anglo-Japanese Yew) | **Scientific Name:** *Taxus baccata* | **Family:** Taxaceae
Eucalyptus (Many cultivars) | **Scientific Name:** *Eucalyptus species* | **Family:** Myrtaceae
European Bittersweet (Climbing Nightshade, Deadly Nightshade) | **Scientific Name:** *Solanum dulcamara* | **Family:** Solanaceae
European Holly (European Holly, Oregon Holly, Inkberry, Winterberry, American Holly, English Holly) | **Scientific Name:** *Ilex aquifolium* | **Family:** Aquifoliaceae
Everlasting Pea (Sweet Pea, Perennial Pea) | **Scientific Name:** *Lathyrus latifolius* | **Family:** Fabaceae
False Bittersweet (American Bittersweet) | **Scientific Name:** *Celastrus scandens* | **Family:** Celastraceae
False Queen Anne's Lace (Bishop's Weed, Greater Ammi) | **Scientific Name:** *Ammi majus* | **Family:** Apiaceae
Fern Palm (Sago Palm, Cycads) | **Scientific Name:** *Cycas species* | **Family:** Cycadaceae
Fetter Bush (Dog Laurel, Dog Hobble, Black Laurel) | **Scientific Name:** *Leucothoe sp.* | **Family:** Ericaceae
Fetterbush (Staggerberry, Maleberry) | **Scientific Name:** *Lyonia sp.* | **Family:** Ericaceae
Fiddleneck | **Scientific Name:** *Amsinckia species* | **Family:** Boraginaceae
Field Horsetail (Scouring rush, Common horsetail, Western horsetail) | **Scientific Name:** *Equisetum arvense* | **Family:** Equisetaceae
Field Pennycress | **Scientific Name:** *Thlaspi arvense* | **Family:** Brassicaceae
Fig (Weeping Fig, Indian Rubber Plant) | **Scientific Name:** *Ficus benjamina* | **Family:** Moraceae
Figwort (Buttercup, Butter Cress, Burwort, Crowfoot burwort) | **Scientific Name:** *Ranunculus acris* | **Family:** Ranunculaceae
Fleabane (Showy Daisy, Horseweed, Seaside Daisy) | **Scientific Name:** *Erigeron speciosus* | **Family:** Asteraceae
Foxglove | **Scientific Name:** *Digitalis purpurea* | **Family:** Scrophalariaceae
Franciscan Rain Tree (Yesterday, Today, Tomorrow, Lady-of-the-Night, Morning-Noon-and-Night, Kiss-Me-Quick) | **Scientific Name:** *Brunfelsia species* | **Family:** Solanaceae
Garden Chamomile (Chamomile, Ground Apple, Roman Chamomile) | **Scientific Name:** *Anthemis nobilis* | **Family:** Asteraceae
Gardenia (Cape Jasmine) | **Scientific Name:** *Gardenia jasminoides* | **Family:** Rubiaceae
Garlic (Stinking Rose, Rustic Treacle, Comphor of the Poor, Nectar of the Gods, Serpet Garlic, Rocambole) | **Scientific Name:** *Allium sativum* | **Family:** Liliaceae
Geranium-Leaf Aralia (Wild Coffee, Coffee Tree) | **Scientific Name:** *Polyscias guilfoylei* (*Aralia guilfoyei*) | **Family:** Araliaceae
Giant Hogweed (Cow Parsnip) | **Scientific Name:** *Heracleum maximum* | **Family:** Apiaceae
Glacier Ivy (English Ivy, Branching Ivy, Needlepoint Ivy, Sweetheart Ivy, California Ivy) | **Scientific Name:** *Hedera helix* | **Family:** Araliaceae
Gladiola (Many cultivars) | **Scientific Name:** *Gladiolus species* | **Family:** Iridaceae

Gloriosa Lily (Glory Lily, Climbing Lily, Superb Lily) | **Scientific Name:** *Gloriosa superba* | **Family:** Liliaceae
Goatweed | **Scientific Name:** *Hypericum perforatum* | **Family:** Clusiaceae
Golden Ragwort (Ragwort) | **Scientific Name:** *Senecio species* | **Family:** Compositae
Good Luck Plant (Shamrock Plant, Sorrel) | **Scientific Name:** *Oxalis spp.* | **Family:**
Grapefruit | **Scientific Name:** *Citrus paradisii* | **Family:** Rutaceae
Greater Ammi (Bishop's Weed, False Queen Anne's Lace) | **Scientific Name:** *Ammi majus* | **Family:** Apiaceae
Ground Apple (Chamomile, Garden Chamomile, Roman Chamomile) | **Scientific Name:** *Anthemis nobilis* | **Family:** Asteraceae
Groundsel (Ragwort, Senecio) | **Scientific Name:** *Senecio species* | **Family:** Compositae
Hahn's Self Branching English Ivy (Branching Ivy, Glacier Ivy, Needlepoint Ivy, Sweetheart Ivy, California Ivy, English Ivy) | **Scientific Name:** *Hedera helix* | **Family:** Araliaceae
Hashish (Marijuana, Indian Hemp) | **Scientific Name:** *Cannabis sativa* | **Family:** Cannabaceae
Heavenly Bamboo (Sacred Bamboo, Nandina) | **Scientific Name:** *Nandina domestica* | **Family:** Berberidaceae
Heliotrope | **Scientific Name:** *Heliotropium species* | **Family:** Boraginaceae
Hellebore (Christmas Rose, Lenten Rose, Easter Rose) | **Scientific Name:** *Helleborus niger* | **Family:** Ranunculaceae
Hercules' Club (Angelica Tree, Devil's Walking Stick, Prickly Ash, Prickly Elder) | **Scientific Name:** *Aralia spinosa* | **Family:** Araliaceae
Hibiscus (Rose of Sharon, Rose of China) | **Scientific Name:** *Hibiscus syriacus* | **Family:** Malvaceae
Hills of Snow (Hydrangea, Hortensia, Seven Bark) | **Scientific Name:** *Hydrangea arborescens* | **Family:** Hydrangeaceae
Hoary Alyssum | **Scientific Name:** *Berteroa incana* | **Family:** Brassicaceae
Holly (English Holly, European Holly, Oregon Holly, Inkberry, Winterberry, American Holly) | **Scientific Name:** *Ilex opaca* | **Family:** Aquifoliaceae
Horse Chestnut (Buckeye) | **Scientific Name:** *Aesculus glabra* | **Family:** Hippocastanaceae
Horseweed (Showy Daisy, Fleabane, Seaside Daisy) | **Scientific Name:** *Erigeron speciosus* | **Family:** Asteraceae
Hortensia (Hydrangea, Hills of Snow, Seven Bark) | **Scientific Name:** *Hydrangea arborescens* | **Family:** Hydrangeaceae
Hosta (Plantain Lily, Funkia) | **Scientific Name:** *Hosta plataginea* | **Family:** Liliaceae
Hound's Tongue | **Scientific Name:** *Cynoglossum amabile* (*Cynoglossum officinale*) | **Family:** Boraginaceae
Hyacinth | **Scientific Name:** *Hyacinthus orientalis* | **Family:** Liliaceae
Hydrangea (Hortensia, Hills of Snow, Seven Bark) | **Scientific Name:** *Hydrangea arborescens* | **Family:** Hydrangeaceae
Indian Apple (Mayapple, Indian Apple Root, Umbrella Leaf, Wild Lemon, Hog Apple, Duck's Foot, Raccoonberry, American Mandrake) | **Scientific Name:** *Podophyllum peltatum* | **Family:** Berberidaceae
Indian Borage (Bread and Butter Plant, Spanish Thyme, Coleus, Maratha, Militini, East Indian Thyme) | **Scientific Name:** *Coleus ampoinicus* | **Family:** Labiatae
Indian Hemp (Dogbane Hemp, Bitter Root) | **Scientific Name:** *Apocynum androsaemifolium* | **Family:** Apocynaceae
Indian Hemp (Marijuana, Hashish) | **Scientific Name:** *Cannabis sativa* | **Family:** Cannabaceae
Indian Pink (Lobelia, Cardinal Flower) | **Scientific Name:** *Lobelia cardinalis* | **Family:** Campanulaceae
Inkberry (English Holly, European Holly, Oregon Holly, American Holly, Winterberry) | **Scientific Name:** *Ilex opaca* | **Family:** Aquifoliaceae
Jack-in-the-pulpit (Three-leaved indian turnip, Devil's dear, Wake robin, Starch wort, Wild turnip, Dragon root, Bog onion, Pepper turnip, Brown dragon, Memory root) | **Scientific Name:** *Arisaema triphyllum* | **Family:** Araceae
Japanese Yew (English Yew, Western Yew, Pacific Yew, Anglo-Japanese Yew) | **Scientific Name:** *Taxus sp.* | **Family:** Taxaceae
Jerusalem Cherry (Natal cherry, Winter cherry) | **Scientific Name:** *Solanum pseudocapsicum* | **Family:** Solanaceae
Jimmy Weed (Burrow Weed) | **Scientific Name:** *Haplopappus heterophyllus* | **Family:** Mimosaceae
Jonquil (Daffodil, Narcissus, Paper White) | **Scientific Name:** *Narcissus jonquilla* | **Family:** Amaryllidaceae
Kaffir Lily (Clivia Lily) | **Scientific Name:** *Clivia minata* | **Family:** Amaryllidaceae
Kiss-me-quick (Yesterday, Today, Tomorrow, Lady-of-the-Night, Morning-Noon-and-Night, Fransiscan Rain Tree) | **Scientific Name:** *Brunfelsia species* |

Family: Solanaceae
Klamath Weed (St. John's Wort) | **Scientific Name:** *Hypericum perforatum* | **Family:** Clusiaceae
Kudu Lily (Desert Azalea, Mock Azalea, Sabi Star, Impala Lily, Desert Rose) | **Scientific Name:** *Adenium obesum* | **Family:** Apocynaceae
Lady-of-the-night (Yesterday, Today, Tomorrow, Kiss-Me-Quick, Morning-Noon-and-Night, Fransiscan Rain Tree) | **Scientific Name:** *Brunfelsia species* | **Family:** Solanaceae
Lambkill (Sheep Laurel) | **Scientific Name:** *Kalmia augustifolia* | **Family:** Ericaceae
Larkspur | **Scientific Name:** *Delphinium species* | **Family:** Ranunculaceae
Laurel (Mountain laurel, Spoonwood, Mountain Ivy, Calico Bush, Ivy Bush) | **Scientific Name:** *Kalmia latifolia* | **Family:** Ericaceae
Leatherflower (Clematis, Virgin's Bower) | **Scientific Name:** *Clematis sp.* | **Family:** Ranunculaceae
Leek (Elephant Garlic) | **Scientific Name:** *Allium ampeloprasum* | **Family:** Liliaceae
Lemon | **Scientific Name:** *Citrus limonia* | **Family:** Rutaceae
Lenten Rose (Hellebore, Christmas Rose, Easter Rose) | **Scientific Name:** *Helleborus niger* | **Family:** Ranunculaceae
Lily of the Valley | **Scientific Name:** *Convalaria majalis* | **Family:** Liliaceae
Lily-of-the-Valley Bush (Andromeda Japonica, Pieris) | **Scientific Name:** *Pieris japonica* | **Family:** Ericaceae
Lime | **Scientific Name:** *Citrus aurantifolia* | **Family:** Rutaceae
Lobelia (Cardinal Flower, Indian Pink) | **Scientific Name:** *Lobelia cardinalis* | **Family:** Campanulaceae
Loco Weed | **Scientific Name:** *Astragalus and Oxytropis species* | **Family:** Fabaceae
Locust | **Scientific Name:** *Robinia species* | **Family:** Mimosaceae
Lord-and-Ladies (Arum, Wake Robin, Adam-and-Eve, Starch Root, Bobbins, Cuckoo Plant) | **Scientific Name:** *Arum maculatum* | **Family:** Araceae
Maidens Breath (Baby's Breath) | **Scientific Name:** *Gypsophila elegans* | **Family:** Caryophyllaceae
Maleberry (Staggerbush, Fetterbush) | **Scientific Name:** *Lyonia sp.* | **Family:** Ericaceae
Marijuana (Indian Hemp, Hashish) | **Scientific Name:** *Cannabis sativa* | **Family:** Cannabaceae
Mayapple (Indian Apple Root, Umbrella Leaf, Wild Lemon, Hog Apple, Duck's Foot, Raccoonberry, American Mandrake) | **Scientific Name:** *Podophyllum peltatum* | **Family:** Berberidaceae
Mayweed (Poison Daisy, Stinking Chamomile) | **Scientific Name:** *Anthemis cotula* | **Family:** Asteraceae
Meadow Saffron (Autumn Crocus) | **Scientific Name:** *Colchicum autumnale* | **Family:** Liliaceae
Milfoil (Yarrow) | **Scientific Name:** *Achillea millefolium* | **Family:** Asteraceae
Milkweed | **Scientific Name:** *Asclepias species* | **Family:** Asclepiadaceae
Mistletoe "American" (American Mistletoe) | **Scientific Name:** *Phoradendron flavescens* | **Family:** Viscaceae
Mole Bean Plant | **Scientific Name:** *Ricinus communis* | **Family:** Euphobiaceae
Morning-Noon-and-Night (Yesterday, Today, Tomorrow, Kiss-Me-Quick, Lady-of-the-Night, Fransiscan Rain Tree) | **Scientific Name:** *Brunfelsia species* | **Family:** Solanaceae
Moss Rose (Wild Portulaca, Rock Moss, Purslane, Pigwee, Pusley) | **Scientific Name:** *Portulaca oleracea* | **Family:** Portulacaceae
Mountain Laurel | **Scientific Name:** *Kalmia latifolia* | **Family:** Ericaceae
Mum (Chrysanthemum, Daisy) | **Scientific Name:** *Chrysanthemum spp.* | **Family:** Compositae
Nandina (Sacred Bamboo, Heavenly Bamboo) | **Scientific Name:** *Nandina domestica* | **Family:** Berberidaceae
Narcissus (Daffodil, Jonquil, Paper White) | **Scientific Name:** *Narcissus spp* | **Family:** Amaryllidaceae
Needlepoint Ivy (Branching Ivy, Glacier Ivy, English Ivy, Sweetheart Ivy, California Ivy) | **Scientific Name:** *Hedera helix* | **Family:** Araliaceae
Nicotiana (Tree Tobacco, Tobacco, Mustard Tree) | **Scientific Name:** *Nicotiana glauca* | **Family:** Solanaceae
Nightshade (Deadly Nightshade, Black Nightshade) | **Scientific Name:** *Solanum spp* | **Family:** Solanaceae
Oak | **Scientific Name:** *Quercus species* | **Family:** Fagaceae
Oleander (Rose-Bay) | **Scientific Name:** *Nerium oleander* | **Family:** Apocynaceae

Onion | **Scientific Name:** *Allium cepa* | **Family:** Liliaceae
Orange | **Scientific Name:** *Citrus sinensis* | **Family:** Rutaceae
Oregon Holly (English Holly, European Holly, Inkberry, American Holly, Winterberry) | **Scientific Name:** *Ilex opaca* | **Family:** Aquifoliaceae
Ornamental Pepper (Natal Cherry, Winter Cherry, Jerusalem Cherry) | **Scientific Name:** *Solanum pseudocapsicum* | **Family:** Solanaceae
Pacific Yew (English Yew, Western Yew, Japanese Yew, Anglo-Japanese Yew) | **Scientific Name:** *Taxus brevifolia* | **Family:** Taxaceae
Pale Laurel | **Scientific Name:** *Kalmia polifolia* | **Family:**
Paper White (Daffodil, Jonquil, Narcissus) | **Scientific Name:** *Narcissus spp* | **Family:** Amaryllidaceae
Paraguayan Jasmine (Yesterday, Today, Tomorrow, Lady-of-the-Night, Morning-Noon-and-Night, Kiss-Me-Quick , Fransiscan Rain Tree) | **Scientific Name:** *Brunfelsia species* | **Family:** Solanaceae
Patterson's Curse (Viper's Bugloss) | **Scientific Name:** *Echium plantagineum* | **Family:** Boraginaceae
Peach (Plum, Apricot, Cherry) | **Scientific Name:** *Prunus species* | **Family:** Rosaceae
Peacock Flower (Barbados Pride, Dwarf Poinciana) | **Scientific Name:** *Caesalpinia pulcherrima* | **Family:** Fabaceae
Peony | **Scientific Name:** *Paeonis officinalis* | **Family:** Paeniaceae
Perennial Pea (Sweet Pea, Everlasting Pea) | **Scientific Name:** *Lathyrus latifolius* | **Family:** Fabaceae
Periwinkle (Running Myrtle. Vinca) | **Scientific Name:** *Vinca rosea* | **Family:** Apocynaceae
Pie Plant (Rhubarb) | **Scientific Name:** *Rheum rhabarbarium* | **Family:** Polygonaceae
Plantain Lily (Hosta) | **Scientific Name:** *Hosta plantaginea* | **Family:** Liliaceae
Plum (similar plants: apricot, peach, cherry) | **Scientific Name:** *Prunus species* | **Family:** Rosaceae
Poison Daisy (Mayweed, Stinking Chamomile) | **Scientific Name:** *Anthemis cotula* | **Family:** Asteraceae
Poison Hemlock (Poison Parsley, Spotted Hemlock, Winter Fern, California Fern, Nebraska Fern, Deadly Hemlock) | **Scientific Name:** *Conium maculatum* | **Family:** Umbelliferae
Poison Parsnip (water hemlock, cowbane) | **Scientific Name:** *Cicuta maculata* | **Family:** Apiaceae
Ponderosa Pine (Blackjack Pine, Western Yellow Pine, Yellow Pine, Bull Pine) | **Scientific Name:** *Pinus ponderosa* | **Family:** Pinaceae
Portulaca (Wild Portulaca, Rock Moss, Purslane, Pigwee, Pusley, Moss Rose) | **Scientific Name:** *Portulaca oleracea* | **Family:** Portulacaceae
Prayer Bean (Rosary Pea, Buddhist rosary bead, Indian Bead, Indian Licorice, Love Bean, Lucky Bean, Seminole Bead, Weather Plant) | **Scientific Name:** *Abrus precatorius* | **Family:** Leguminosae
Precatory Bean (Rosary Pea, Buddhist rosary bead, Indian Bead, Indian Licorice, Love Bean, Lucky Bean, Seminole Bead, Weather Plant, Prayer Bean) | **Scientific Name:** *Abrus precatorius* | **Family:** Leguminosae
Pride-of-India (China Ball Tree, Paradise Tree, Persian Lilac, White Cedar, Japanese Bead Tree, Texas Umbrella Tree, Bead Tree, Chinaberry Tree) | **Scientific Name:** *Melia azedarach* | **Family:** Meliaceae
Primrose | **Scientific Name:** *Primula vulgaris* | **Family:** Primulaceae
Privet (amur, wax-leaf, common privet) | **Scientific Name:** *Ligustrum japonicum* | **Family:** Oleaceae
Purslane (Wild Portulaca, Rock Moss, Portulaca, Pigwee, Pusley, Moss Rose) | **Scientific Name:** *Portulaca oleracea* | **Family:** Portulacaceae
Ragwort (Golden Ragwort) | **Scientific Name:** *Senecio species* | **Family:** Compositae
Ranger's Button (White Heads) | **Scientific Name:** *Sphenosciadium capitellatum* | **Family:** Apiaceae
Rattlebox | **Scientific Name:** *Crotalaria albida* | **Family:** Papilionaceae
Rayless Goldenrod | **Scientific Name:** *Haplopappus heterophyllus* | **Family:** Asteraceae
Red Maple (Swamp Maple, Scarlet Maple, Curled Maple, Soft Maple) | **Scientific Name:** *Acer rubrum* | **Family:** Aceraceae
Rhododendron (Rosebay, Azalea) | **Scientific Name:** *Rhododendron spp* | **Family:** Ericaceae
Rhubarb (Pie Plant) | **Scientific Name:** *Rheum rhabarbarium* | **Family:** Polygonaceae
Rock Moss (Wild Portulaca, Moss Rose, Purslane, Pigwee, Pusley) | **Scientific Name:** *Portulaca oleracea* | **Family:** Portulacaceae
Roman Chamomile (Chamomile, Garden Chamomile, Ground Apple) | **Scientific Name:** *Anthemis nobilis* | **Family:** Asteraceae

Rose of China (Hibiscus, Rose of Sharon) | **Scientific Name:** *Hibiscus syriacus* | **Family:** Malvaceae
Rose of Sharon (Hibiscus, Rose of China) | **Scientific Name:** *Hibiscus syriacus* | **Family:** Malvaceae
Rosebay (Rhododendron, Azalea) | **Scientific Name:** *Rhododendron spp* | **Family:** Ericaceae
Running Myrtle (Periwinkle, Vinca) | **Scientific Name:** *Vinca rosea* | **Family:** Apocynaceae
Russian Knapweed | **Scientific Name:** *Centaurea repens* | **Family:** Compositae
Sabi Star (Desert Azalea, Mock Azalea, Desert Rose, Impala Lily, Kudu Lily) | **Scientific Name:** *Adenium obesum* | **Family:** Apocynaceae
Sacred Bamboo (Heavenly Bamboo, Nandina) | **Scientific Name:** *Nandina domestica* | **Family:** Berberidaceae
Sago Palm (Coontie Palm, Cardboard Palm, cycads and zamias) | **Scientific Name:** *Cycas revoluta, zamia species* | **Family:** Cycadaceae
Scouring Rush (Field Horsetail, Common Horsetail, Western Horsetail) | **Scientific Name:** *Equisetum arvense* | **Family:** Equisetaceae
Seaside Daisy (Showy Daisy, Horseweed, Fleabane) | **Scientific Name:** *Erigeron speciosus* | **Family:** Asteraceae
Seven Bark (Hydrangea, Hortensia, Hills of Snow) | **Scientific Name:** *Hydrangea arborescens* | **Family:** Hydrangeaceae
Shamrock Plant (Good Luck Plant, Sorrel) | **Scientific Name:** *Oxalis spp.* | **Family:**
Sheepkill (Mountain Laurel) | **Scientific Name:** *Kalmia latifolia* | **Family:** Ericaceae
Showy Daisy (Seaside Daisy, Horseweed, Fleabane) | **Scientific Name:** *Erigeron speciosus* | **Family:** Asteraceae
Skunk Cabbage (Skunk Weed, Polecat Weed, Meadow Cabbage, Swamp Cabbage) | **Scientific Name:** *Symplocarpus foetidus* | **Family:** Araceae
Solomon's Lily (Black Calla, Wild Calla, Wild Arum) | **Scientific Name:** *Arum palestinum* | **Family:** Araceae
Spanish Thyme (Indian Borage, Bread and Butter Plant, Coleus, East Indian Thyme, Stinging Thyme, Country Boarage; many others) | **Scientific Name:** *Coleus ampoinicus* | **Family:** Labiatae
Spindle Tree (Wahoo, Burning Bush) | **Scientific Name:** *Euonymus atropurpurea* (*Euonymus occidentalis*) | **Family:** Celastraceae
Spring Parsley | **Scientific Name:** *Petroselinum crispum* | **Family:** Apiaceae
St. John's Wort (Klamath Weed) | **Scientific Name:** *Hypericum perforatum* | **Family:** Clusiaceae
Staggerbush (Fetterbush, Maleberry) | **Scientific Name:** *Lyonia sp.* | **Family:** Ericaceae
Starch Root (Arum, Lord-and-Ladies, Adam-and-Eve, Wake Robin, Bobbins, Cuckoo Plant) | **Scientific Name:** *Arum maculatum* | **Family:** Araceae
Stinking Chamomile (Mayweed, Poison Daisy) | **Scientific Name:** *Anthemis cotula* | **Family:** Asteraceae
Sudan Grass / Hybrid Sudan | **Scientific Name:** *Sorhum vulgare var. sudanesis* | **Family:** Gramineae
Superb Lily (Glory Lily, Climbing Lily, Gloriosa Lily) | **Scientific Name:** *Gloriosa superba* | **Family:** Liliaceae
Swamp Maple (Red Maple, Scarlet Maple, Curled Maple, Soft Maple) | **Scientific Name:** *Acer rubrum* | **Family:** Aceraceae
Sweet Pea (Perennial Pea, Everlasting Pea) | **Scientific Name:** *Lathyrus latifolius* | **Family:** Fabaceae
Sweetheart Ivy (English Ivy, Glacier Ivy, Needlepoint Ivy, Branching Ivy, California Ivy) | **Scientific Name:** *Hedera helix* | **Family:** Araliaceae
Texas Umbrella Tree (China Ball Tree, Paradise Tree, Persian Lilac, White Cedar, Japanese Bead Tree, Bead Tree, Pride-of-India, Chinaberry Tree) | **Scientific Name:** *Melia azedarach* | **Family:** Meliaceae
Tobacco (Tree Tobacco, Nicotiana, Mustard Tree) | **Scientific Name:** *Nicotiana glauca* | **Family:** Solanaceae
Tomato Plant | **Scientific Name:** *Lycopersicon spp* | **Family:** Solanaceae
Tree Tobacco (Nicotania, Tobacco, Mustard Tree) | **Scientific Name:** *Nicotiana glauca* | **Family:** Solanaceae
Tulip | **Scientific Name:** *Tulipa species* | **Family:** Liliaceae
Umbrella Leaf (Indian Apple Root, American Mandrake, Wild Lemon, Hog Apple, Duck's Foot, Raccoonberry, American Mandrake) | **Scientific Name:** *Podophyllum peltatum* | **Family:** Berberidaceae
Vinca (Periwinkle, Running Myrtle) | **Scientific Name:** *Vinca rosea* | **Family:** Apocynaceae
Viper's Bugloss (Patterson's Curse) | **Scientific Name:** *Echium plantagineum* | **Family:** Boraginaceae
Viper's Bugloss | **Scientific Name:** *Echium vulgare* | **Family:** Boraginaceae
Virgin's Bower (Clematis, Leatherflower) | **Scientific Name:** *Clematis sp.* | **Family:** Ranunculaceae
Wahoo (Burning Bush, Spindle Tree) | **Scientific Name:** *Euonymus occidentalis* (*Euonymus atropurpurea*) | **Family:** Celastraceae

Wake Robin (Arum, Lord-and-Ladies, Adam-and-Eve, Starch Root, Bobbins, Cuckoo Plant) | **Scientific Name:** *Arum maculatum* | **Family:** Araceae
Water Hemlock (cowbane, poison parsnip) | **Scientific Name:** *Cicuta maculata* | **Family:** Apiaceae
Water Hyacinth | **Scientific Name:** *Eichhornia crassipes* | **Family:** Pontederiaceae
Wax-Leaf (privet, amur, common privet) | **Scientific Name:** *Ligustrum japonicum* | **Family:** Oleaceae
Weeping Fig (fig, indian rubber plant) | **Scientific Name:** *Ficus sp.* | **Family:** Moraceae
Western Yellow Pine (Blackjack Pine, Ponderosa Pine, Yellow Pine, Bull Pine) | **Scientific Name:** *Pinus ponderosa* | **Family:** Pinaceae
Western Yew (English Yew, Pacific Yew, Japanese Yew, Anglo-Japanese Yew) | **Scientific Name:** *Taxus brevifolia* | **Family:** Taxaceae
White Heads (Ranger's Button) | **Scientific Name:** *Sphenosciadium capitellatum* | **Family:** Apiaceae
White Snakeroot (fall poison, richweed, tremetol) | **Scientific Name:** *Eupatorium rugosum* | **Family:** Asteraceae
White/Black/Yellow Indian Mustard | **Scientific Name:** *Brassica species* | **Family:** Brassicaceae
Wild Arum (Black Calla, Wild Calla, Solomon's Lily) | **Scientific Name:** *Arum palestinum* | **Family:** Araceae
Wild Calla (Black Calla, Wild Arum, Solomon's Lily) | **Scientific Name:** *Arum palestinum* | **Family:** Araceae
Wild Coffee (Geranium-Leaf Aralia, Coffee Tree) | **Scientific Name:** *Polyscias guilfoylei* (*Aralia guilfoyei*) | **Family:** Araliaceae
Wild Radish | **Scientific Name:** *Raphanus raphanistrum* | **Family:** Brassicaceae
Winter Cherry (Natal Cherry, Jerusalem Cherry) | **Scientific Name:** *Solanum pseudocapsicum* | **Family:** Solanaceae
Winterberry (English Holly, European Holly, Oregon Holly, Inkberry, American Holly) | **Scientific Name:** *Ilex opaca* | **Family:** Aquifoliaceae
Wintercress | **Scientific Name:** *Barbarea orthoceras* | **Family:** Brassicaceae
Wisteria | **Scientific Name:** *wisteria species* | **Family:** Fabaceae
Wormseed Mustard | **Scientific Name:** *Erysimum cheiranthoides* | **Family:** Brassicaceae
Yarrow (milfoil) | **Scientific Name:** *Achillea millefolium* | **Family:** Asteraceae
Yellow Oleander | **Scientific Name:** *Thevetia peruviana* | **Family:** Apocynaceae
Yellow Pine (Blackjack Pine, Ponderosa Pine, Western Yellow Pine, Bull Pine) | **Scientific Name:** *Pinus ponderosa* | **Family:** Pinaceae
Yellow Starthistle | **Scientific Name:** *Centaurea solstitialis* | **Family:** Compositae
Yellowrocket | **Scientific Name:** *Barbarea vulgaris* | **Family:** Brassicaceae
Yesterday, Today, Tomorrow (Morning-Noon-and-Night, Kiss-Me-Quick, Lady-of-the-Night, Fransiscan Rain Tree, Brunfelsia) | **Scientific Name:** *Brunfelsia species* | **Family:** Solanaceae
Yew (japanese yew) | **Scientific Name:** *Taxus sp.* | **Family:** Taxaceae
Yew Pine (buddhist pine) | **Scientific Name:** *Podocarpus macrophylla* | **Family:** Podocarpacaea
Yucca | **Scientific Name:** *Yucca sp.* | **Family:** Agavaceae

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"In the quiet stable, you hear a muffled snort,
a stamp of a hoof, a friendly nicker. Gentle
eyes inquire 'how are you old friend?' and
suddenly, all your troubles fade away"
- Unknown