

Nurture through nature: a comparative study between standard and nature-based play in outdoor preschool environments

by

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A REPORT

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## Abstract

Nature-based play is gaining attention in early childhood education because of the social, physical, and cognitive benefits from interacting with nature at a young age (International Play Association 2014). Some studies provide strong evidence to suggest that nature-based unstructured play can have a positive benefit on early childhood development and improve the socialization, problem solving, confidence, creativity, autonomy, and self-awareness in children as well as their physical health (Fjortoft 2004, Louv 2005). The purpose of this study is to identify differences in play behavior among preschoolers that may influence early childhood development between standard or traditional playgrounds and playgrounds designed with interaction with nature, or access to nature, and, thus, to suggest design solutions for play environment, which responds to the issues this research identifies.

This is a comparative observational study on play behavior between two study settings, including nature-based and standard/traditional-play environments with nature access. Comparative observations were conducted at the Center for Child Development (nature-based) and Hoeflin Stone House Early Childhood Center (standard) at Kansas State University in Manhattan, Kansas. Preschoolers' play behaviors and behavior-environment interactions in both settings were compared using behavioral mapping and time-lapse observation (20 minutes per subject) techniques in which their location, activities, and interactions were recorded.

Findings suggest that children in nature-based playgrounds are more likely to be physically active and creative with their play. Also, movable and manipulative play elements ("loose parts") allow children to engage in more social activities than standard anchored playground element vs. standard playgrounds, however, allow children to explore games with rules and provide valuable development for motor and social skills. Therefore, this study suggests a design approach that is a hybrid between designed nature and standard play in a way that utilizes the positive aspects of both types of play. These findings will lead to a call for research and design into the direction of creating outdoor play environments that infuse standard play structures with natural environments.



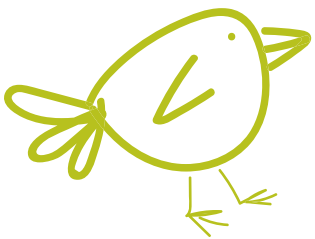






# **NURTURE THROUGH NATURE**

**A Comparative Study Between Standard and  
Nature-Based Play in Outdoor Preschool Environments**



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## Abstract

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## Personal Motivation

Growing up, I was not highly motivated to explore the many dimensions of the outdoor environment. I played outside, climbed trees, rode my bike, and explored my neighborhood without fear, but I was never the type of child to come home covered in mud, cuts, and bruises. I spent my time in nature unaware of the effects it had on my childhood or how it may have affected my health both mentally and physically. As I grew older and began to go down the path that led me to Kansas State University and landscape architecture, I still did not realize the importance that nature had on me at such a young age. It was not until I read *Last Child in the Woods* by Richard Louv during my third year of school that I discovered how important nature could be.

The idea that children were spending more time staring at screens than they were spending outside astounded and horrified me. It made me reconsider the way I spent my own free time. Was I spending all my time online as well? Through Louv's book I was introduced to the idea of Nature Deficit Disorder: the idea that when children aren't exposed to nature enough as children, it can have detrimental effects on them as teens and adults. Thinking back on my own childhood, I realized that most of the games I played and places I went with my neighborhood friends would never be considered safe by today's standards. This led me to wonder what can be done to ensure that children today can get the exposure to nature they so desperately need in order to raise a healthy and earth-conscious next generation.

My interest in playground design stemmed from my lack of playground experiences. Growing up, my elementary school did not have any sort of playground. Kindergarteners played in a small yard with a few trees, and grade school and middle school students had no nature access at all. We were limited to the unoccupied area of the school parking lot, devoid of any life except the small sliver of grass used to occasionally divide parking spaces. The idea of designing playgrounds that not only provide children with the chance to explore, exercise, and imagine combined with fostering stewardship for the environment is manifested in the ever-growing field of nature-based playground design. This project stemmed from the desire to create places where children can safely enjoy and connect with the outdoors while also reaping all the benefits that come with combining the act of play with natural exploration.

## Acknowledgements

Completing this report would not have been possible without the help of the faculty and my friends in the Department of Landscape Architecture and Regional & Community Planning. First, I would like to thank my major professor Dr. Hyung Jin Kim for all of his help with this study and all he has done with leading my research in the right direction. I would also like to thank my committee members Jon Hunt and Dr. Bronwyn Fees, for this study would not have been possible without their help and expertise.

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Thank you to the Studio Squad for keeping me sane. These past five years would have been miserable without you all and I'm going to miss you all so much after we graduate.

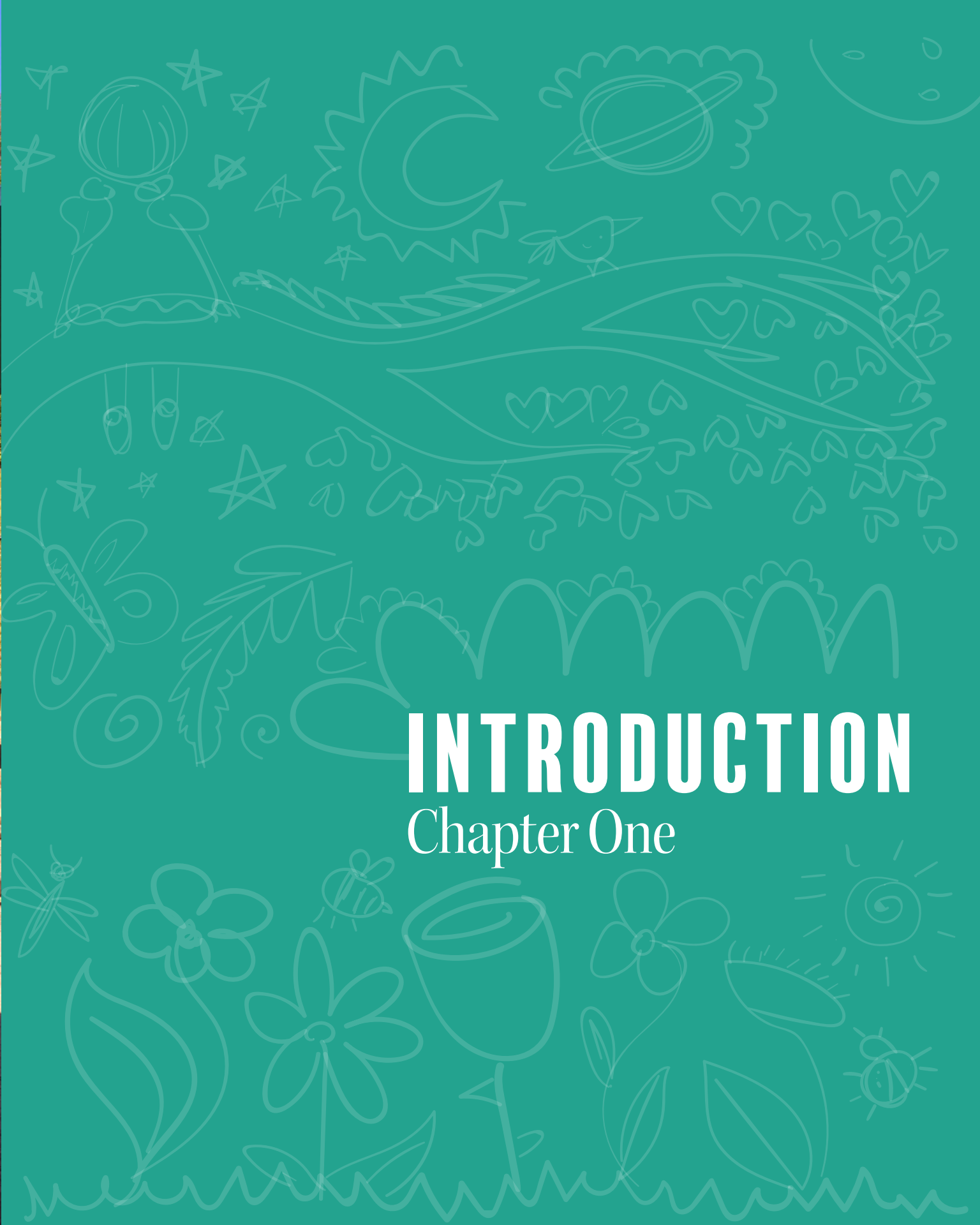
A final thanks to my parents, who have supported me for the past five years as I complete my degree. You may not completely understand landscape architecture yet, but you have never doubted my decisions and you have always encouraged me to pursue my passion. Thank you for believing in me; I could not have done it without you.





Center for Child Development Nature Play Area





# INTRODUCTION

## Chapter One

# PROJECT BACKGROUND

## Purpose and Significance

The purpose of this study is to understand the difference in play between nature-based play landscapes and standard play landscapes in early childhood educational environments. In Kansas alone, there are 5,673 licensed child care facilities and 138,204 children that attend these facilities (Kansas Department of Health and Environment 2016). Kansas also does not require licensed preschool facilities to provide outdoor play. According to Kansas law (K.A.R. 28-4-434: Preschools (c)), “Outdoor play space shall not be required” (KDHE 2016). This law was put in place in 1983 and has not been amended or changed since 1984 despite the large amount of research showing that children need to be outside at a young age in order to learn.

Children in schools today are being denied playtime, preschools in particular due to liability and budgeting issues (Chmelynski 2006, Louv 2005, Schouten 2015, Wascoe 2006). Without recess and time to play, children are unable to remain focused and are hindered academically whether their recess is in a natural environment or not (Pellegrini and Bohn 2005). Outdoor play is relevant in children of all ages—exposure to nature from an early age not only places children at an advantage physically, allowing for improved motor skills such as coordination and balance, but also places children at an advantage mentally, teaching them skills such as teamwork, autonomy, and confidence (Fjortoft 2004, Louv 2005).

Denying the children time for natural play limits the opportunity for child development such as socialization, problem solving, confidence, creativity, self-awareness, autonomy, and more. This understanding of the value of nature play leads to the question of whether children play differently depending on the design of their environment, whether that environment is designed with nature in mind or not. Understanding how design impacts play behavior allows future designs to become more effective in affording valuable play that children can gain social, mental, and physical developmental benefits.



## Defining Nature Play

It is important to understand exactly what is meant by the word 'play'. The standard definition of play is "recreational activity, *especially*: the spontaneous activity of children" (Merriam Webster, 2015). However, such a broad definition does not go into the detail required to understand exactly what play is. According to *Play in the Lives of Children* by Cosby S. Rogers and Janet K. Sawyers, play can be split into six dispositions, as follows: "play is intrinsically motivated, relatively free of externally imposed rules, carried out as if the activity were real, focuses on the process rather than any product, is dominated by the players, and requires the active involvement of the player" (Rogers and Sawyers 1988, 1). Nature-based play can then be defined as when these types of activities take place not only in an outdoor setting, but in an outdoor setting where children are directly interacting with their own environments. Interaction with nature is an incredibly important part of the learning process and natural environments supports the six C's of intrinsic motivation: curiosity, choice, content, collaboration, challenge, and context (Moore 2014). Children who are engaged with the outdoors in an environment that provides access to and contact with nature as well as living out the six C's of intrinsic motivation and the six dispositions of play are taking part in nature-based play.

## Research Questions

This study is guided by the following research questions:

1. How do children play differently in nature-based playgrounds compared with standard playgrounds?
2. How can playgrounds be designed to encourage interaction with nature while also affording positive childhood development?
  - a. What guidelines currently exist for nature-based playgrounds and how well do they support children's play?
  - b. What, and how, are elements in the play environment considered appropriate for nature-based play?

## Research Objectives

1. Identifying a difference in play
2. Identifying play settings and experiences
3. Applying evidence-based design to outdoor preschool environments

These research objectives can be achieved through a series of different methods as seen in Figure 1.2. Each of these methods assists in answering a particular research question while fulfilling a research objective. Each method relies on the one before it, culminating in the final method, site design. This can be seen in Figure 1.3: Study Design.

# LINKING RESEARCH AND METHODS

## RESEARCH OBJECTIVES

## RESEARCH METHODS

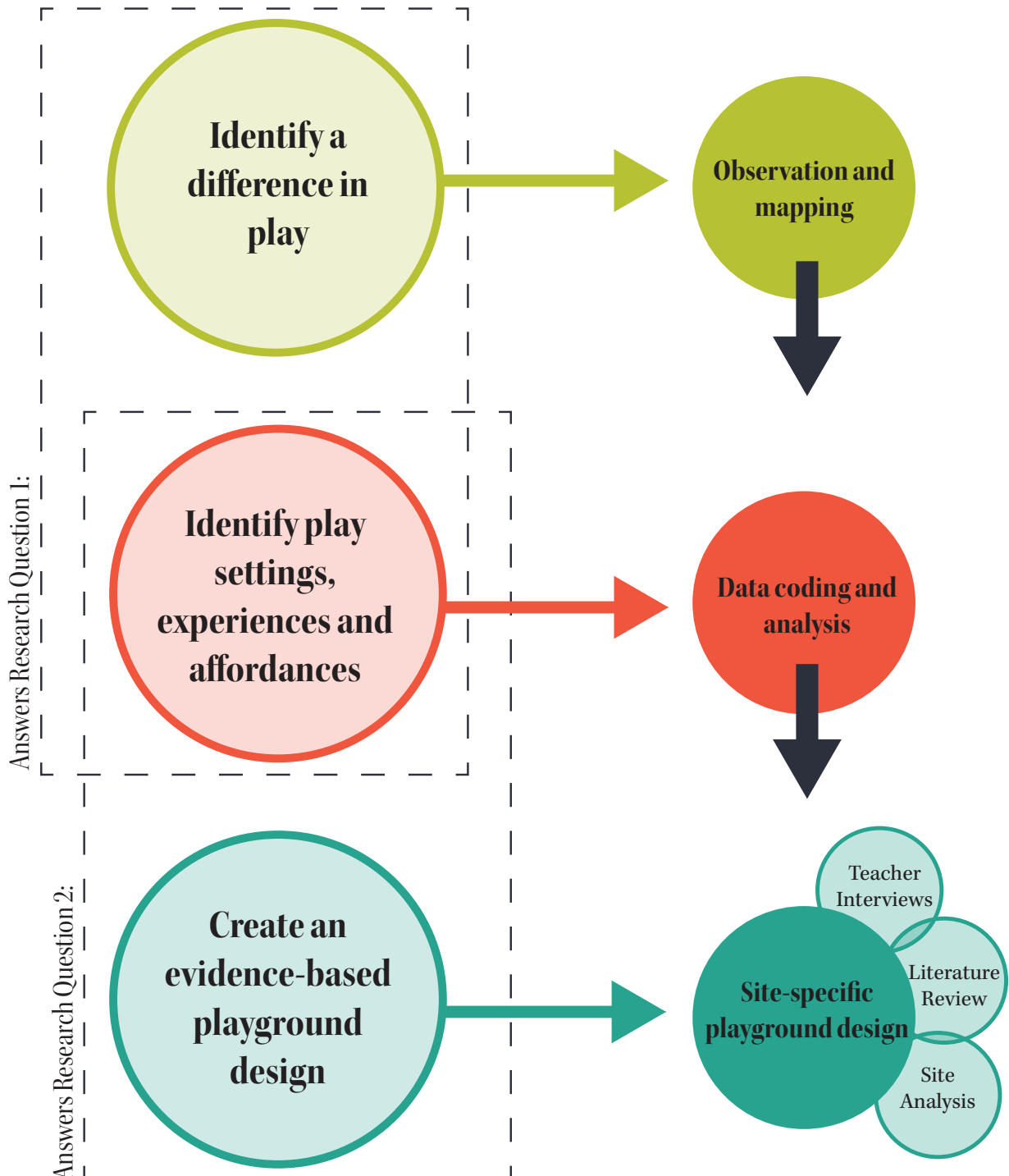


Figure 1.2: Linking Research and Methods

# STUDY DESIGN

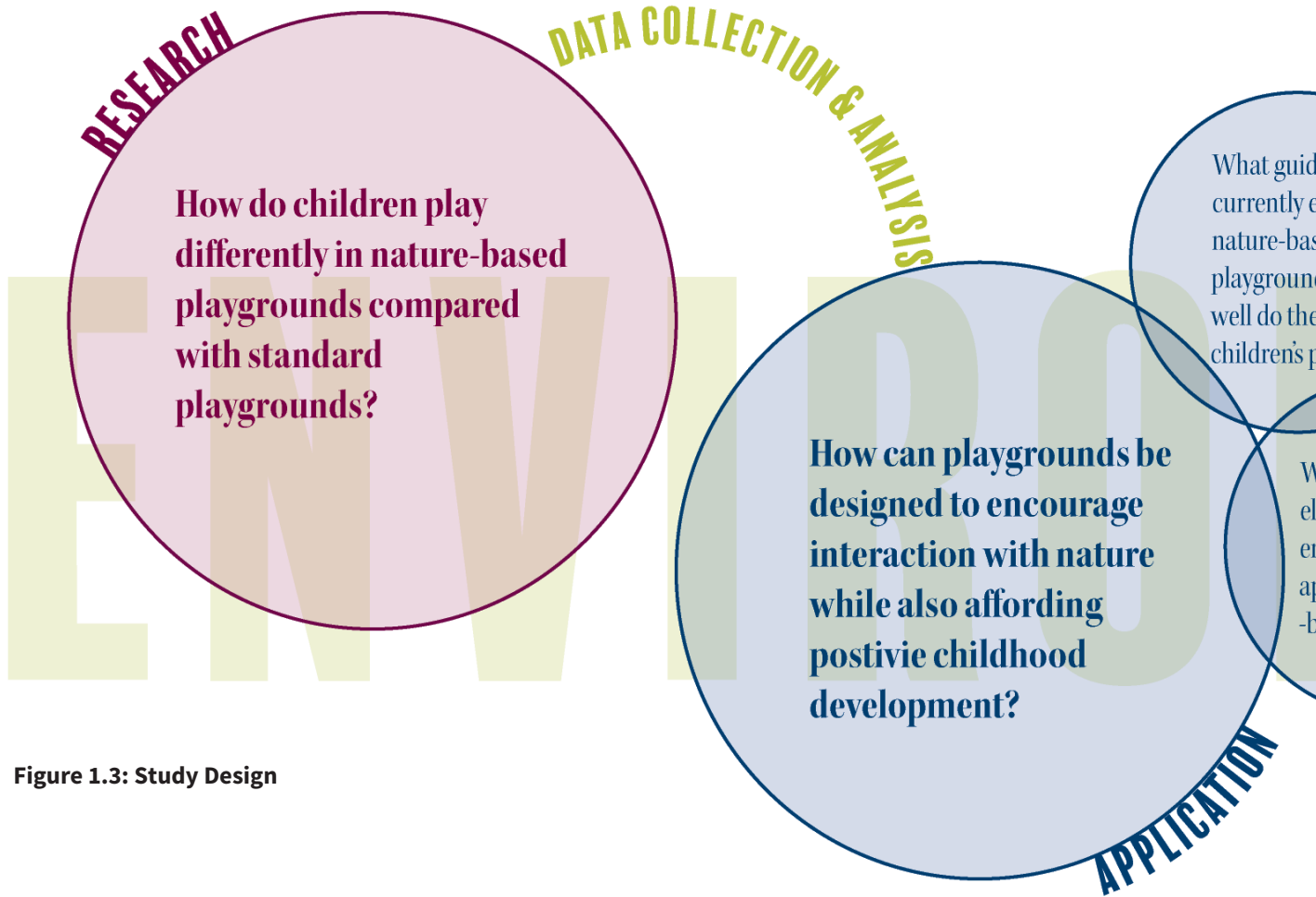
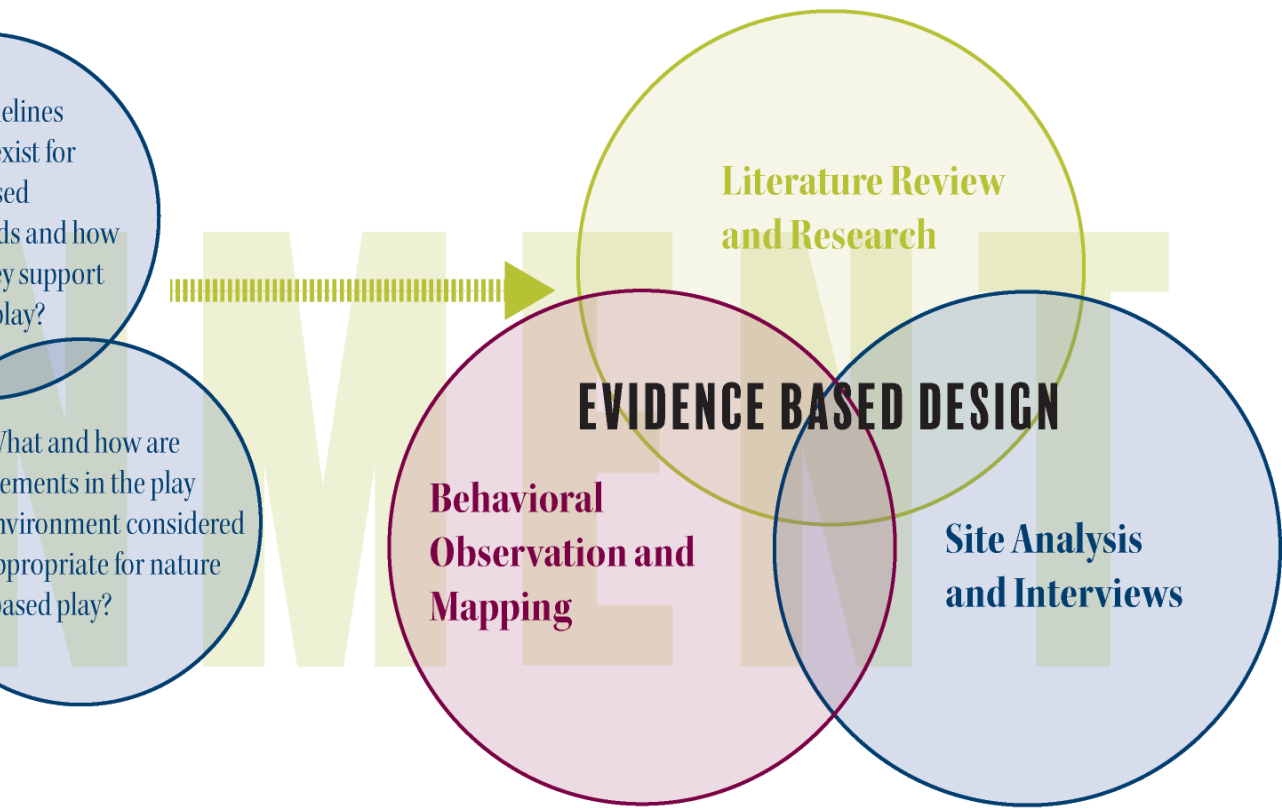


Figure 1.3: Study Design



## Study Relevance

Understanding how play and design are or are not related is important to contemporary landscape architecture because, as landscape architects and regional and community planners, we have the opportunity to positively affect the health and welfare of others. This project is interdisciplinary, integrating policy regarding playground safety and design, product design regarding play structures, landscape architecture regarding the design of the actual site, and the research as a whole relating to early childhood development. We currently exist in a world in which children are increasingly unhealthy due to sedentary behaviors related to heavy use of video technology, fear of the outdoors, and an increasingly stressful pressure on academic success early in life that is preventing young children from getting outside and reaping the benefits nature has to offer (Louv 2005). Integrating nature with preschool and elementary school play environments not only offers children a release from the pressures of the classroom but also allows them to more intimately experience the natural world. This interaction with nature actually rejuvenates children and allows them to direct their focus on school, improving their performance and in the long run, improving their lives (Bergman et al, 2008). As landscape architects, we are able to design and encourage these kinds of improvements.

This topic is also important to those not in the design profession such as early childhood educators and parents of young children. Understanding the importance of nature access as an early childhood educator affects the way a teacher engages children in the classroom and has an effect on those children's development. Educators who undervalue nature-based play may not be providing opportunities for their students to learn as much as they could if they were in an integrated nature and standard environment. This goes for parents as well. Encouraging children to explore nature in a safe way provides them with many benefits that they would not have access to indoors. Parents can ensure that children gain the confidence, autonomy, and social skills that will assist them as they grow older by understanding







Figure 2.1: CCD Playground - South





# LITERATURE REVIEW

## Chapter Two

# PLAY AND EARLY CHILDHOOD DEVELOPMENT

## The Importance of Play

the play environments of the preschools they enroll their children in. Play is a vital part of early childhood development. So vital, in fact, that the United Nations considers it to be a fundamental right for children, stating that “Every child has the right to rest and leisure, to engage in play and recreational activities appropriate to the age of the child and to participate freely in cultural life and the arts,” (International Play Association 2016). The International Play Association is an organization that recognizes the necessity of play and is dedicated to preserving the right to play. Play is “a process that has evolved because it advantages the development of bodies, relationships, and minds. Playing is a process, not an activity... [it is] self-chosen, for without active choice and engagement the activity is reduced in meaning and significance... [it is] pleasurable for each child; it gives enjoyment, satisfaction, and ‘fun’ in the moment of playing – it is a valued part of childhood,” (IPA 2014, 1).

Through play, children pave the path that will lead them to becoming healthy and happy adults. Studies have shown that limiting child-led play can “result in a generation of anxious, unhappy, and socially maladjusted adults,” (Wenner 2009). When children are unable to play, they are more likely to become violent, aggressive, and antisocial adults (IPA 2014). They are also more likely to be overweight or obese (Louv 2005, IPA 2014). Lack of play may also contribute to sensory deprivation and may affect the development and function of children’s brains. Lack of sensory stimulation combined with lack of human contact—human contact that children would engage in while playing with their peers—can create symptoms such as depression (IPA 2014).

Play is a means for children to adapt to their environment. Previous studies have been conducted with the notion that play is only beneficial to children as they mature, when more recent studies show that play is actually a means for them to develop skills that will assist them in their current child lives as well as adult lives (Lester and Russell 2010). The amount of time children spend being children before growing into adult roles has evolved over history. This evolutionary process occurs in order to “enable children to ‘best fit’ the environments of their childhood” and that “play exists to enable a child to be a better child in their unique and complex environments, and thus enhance their chances of survival as a child... it follows from this that being a better child also establishes strong foundations for

becoming a competent adult, but this is not a simple cause/effect relationship,” (Lester and Russell 2010). Play also acts as a way for children to develop valuable social skills. While play between parent and child is beneficial and allows children to create bonds with their family members, play between peers is the key to developing their social abilities. This concept is where the importance of play in a preschool setting becomes even more essential. When preschoolers engage in imaginative play amongst themselves, they have to learn to articulate ideas and thoughts that are not truly there—they are only being represented in play. These ideas have to be communicated through descriptive language and context clues. During play between preschoolers and adults, adults often fill in those context clues for them (Wenner 2009).

The way children play changes as children grow older and their minds and bodies change. There is a drastic change both cognitively and physically between a two-year-old and a five-year-old; it makes sense that the two would not engage in the same types of play. There are several different types of play, each engaged in by all age groups but more important for development at particular ages than others: practice play, symbolic play, and games with rules (Rogers and Sawyers, 1988). Play among preschoolers age two to five years is inclusive of several categories: unoccupied, onlooker, solitary independent, parallel, associative, cooperative, functional, and constructive (Rogers and Sawyers, 1988). As children grow older, these types of play change. Catherine Garvey identifies four of these reasons in her 1977 book *Play*. Biological maturation accounts for a large part of change in play. As children’s bodies grow stronger, taller, and more agile, they require different challenges to improve their skills. Next, there is a desire for heightened elaboration and more complex play scenarios. Types of play may be combined to create new games, imaginative activities, or discoveries.

As children grow older, they learn control and how to be independent. This leads to a desire to control their own games, create their own realities, and manipulate the world around them. Children may shift from onlooker or solitary independent play to cooperative or organized supplementary play as they gain confidence and a sense of autonomy (Garvey 1977, Rogers and Sawyers, 1988). Another reason children change the way they play as they grow is that they experience more

and increase their world view. The more children see and learn, the more diverse their imaginative games or playing pretend (Garvey 1977). The most common type of play among children ages two to seven is symbolic play. Symbolic play can be defined as “the beginning of representational thought through the use of substitute objects or actions,” or in other words, playing pretend (Rogers and Sawyers 1988, 18). Symbolic play is an imitation of reality, an opportunity for children to apply what they have seen or learned through observing adults or other children and act it out in their own lives. Symbolic play in young children evolves as children mature into more dramatic play, where children take on roles and act out scenarios that involve social interaction (Rogers and Sawyers 1988). It is because of these drastic changes in types of play in such a short period of time in the life of a child that playground design should be approached carefully and with a depth of understanding regarding how children play at a



Figure 2.2: Practice Play at CCD



## Benefits of Green Spaces

variety of ages.

Attention Restoration Theory (ART) is “a cognitive framework concerned with recovery from mental fatigue or directed attention fatigue,” (Berto 2005). According to the Selhub and Logan study using ART, restorative environments have four major components: being away, fascination, extent, and compatibility (Selhub and Logan 2012). Being away could be considered being literally away from one’s environment or simply changing one’s view. Fascination refers to “soft fascination,” or a natural element that captures the attention such as wildlife or a sunset. Extent means engaging the mind to a certain level of depth in order to achieve cognitive restoration. Compatibility, the fourth component, is referencing the specific needs of an individual has being met by the natural environment. This theory of attention restoration is one of the driving factors in the importance of nature-based play (Selhub and Logan 2012). It supports the belief that children require a cognitive break where their minds can recover from the focused, attention-demanding time they spend in the classroom, referred to as “cognitive interference” (Pellegrini and Bohn 2005).

ART also comes into play during mental fatigue in that overtaxing one’s brain not only has negative effects in the long-term, but can also have more immediate negative effects. A mentally fatigued person is more likely to fall prey to their own anger and impulsivity, making rash decisions and risky choices (Selhub and Logan 2012). It can be concluded from this that reactions such as anger and impulsivity due to lack of cognitive interference would be more prominent in children who are less able to be in control of their own emotion. In addition to this emotional instability, Pellegrini and Bohn argue that the longer children spend in the classroom without breaks for play, the less information they absorb. The researchers found that children were more focused and attentive after recess than before. This shows that playtime provides a necessary break where cognitive interference can take place and ART becomes incredibly important. Even in a preschool environment, children are constantly learning and having time to recharge through shifting their attention is a vital part of development.

There is a pressing concern among researchers that children are losing contact with nature due to both development of the urban world as well as an increasing limitation on childhood freedoms due to over-programming children’s time (Spencer 2006). This has led to

the question, “is contact with nature important?” (Spencer 2006, p. 125). Studies have shown that children who engage in play in green environments take part in more creative forms of play than children who engage in built play environments as well as barren outdoor environments. These children who engaged in green environments also had more access to adult interaction, which leads to stronger social development (Spencer 2005). In a study that focused on children who lived in rural environments, it was found that children with nature near the home had lower ratings of “behavioral conduct disorders, anxiety and depression... indicating that they were less psychologically distressed than peers with less near-home nature... [the children] also rated themselves higher on a global measure of self-worth than peers with less.” (Spencer 2006, 130, Wells and Evans 2003).

Near-home nature can have just as strong of an impact in urban environments as it does in rural environments. In a study done on near-home nature in urban environments on self-discipline in youth, girls who had greener views from their home on average were more skilled at tests of concentration, inhibition of initial impulses, and delay of gratification while green views had little to no effect on boys (Taylor, Kuo, and Sullivan 2003). Interaction with nature is an important part of the learning process and natural environments supports the six C’s of intrinsic motivation: curiosity, choice, content, collaboration, challenge, and context (Moore 2014). These six C’s are concepts that are learned through hands-on, interactive learning and are more easily achieved in a natural environment. Children become deeply connected to their world and learn through experience, skill, and understanding of their world and each other while also becoming environmentally literate and stewards for the earth (Moore 2014).

## Benefits of Unstructured Play

Nature-based play is just one way of allowing children to participate in unstructured, free creative play, which has its own benefits. Free play allows children a much-needed break from their educational environment while still developing valuable skills such as problem-solving, creativity, autonomy, and competence (Alison and Brookfield 2014, Bauman et al, 2011, Gray 2013). According to Peter Gray (2013) in “Free to Learn,” children learn more when playing because they have no fear of failure (Gray 2013). Once children have mastered the current skill level, whether it be something physical or something related to problem-solving, they push themselves to the next level of difficulty on their own (Gray 2013). This is especially important for children who are less successful in the classroom—studies suggest that children are able to solve complex problems in a game or while playing that they were previously unable to solve in a classroom setting (Gray 2013).

Additionally, studies show that unstructured play allows children to become more independent and self-reliant than if they were to spend all their time in structured activities. Studies show that the more time children spend in unstructured activity where they make the decisions, such as what games to play, how to interact with elements, and how they want to socialize, the more likely they are to perform well in self-directed activities (Barker et al. 2014). Benefits of play not only include behavioral and mental development benefits but health benefits as well. Many professional and scientific organizations agree that children should engage in at least one hour of physical activity each day, and they achieve that physical activity through play (Rose 2011). Playgrounds and navigating play equipment improve children’s physical health without them realizing they are exercising and improving their balance, flexibility, strength, and endurance (Rose 2011).

Promoting physical activity among children is important because of the rise in childhood obesity and an increasingly sedentary lifestyle among children. Unstructured gross motor play also can improve memory, creativity, problem solving, reduce depression, and increase self-esteem, reinforcing the idea that play is a vital part of childhood development both mentally and physically (Rose 2011). In a study of children that compared fixed playgrounds to nature playgrounds that allow for unstructured play, children on average played for



several minutes longer in nature playgrounds than in standard fixed playgrounds (Herrington and Brussoni 2015). It was also observed that the children who played on the fixed playground spent a large amount of time waiting in line to use the play equipment, something that was not observed at all on the natural playground (Herrington and



Figure 2.3: Practice Play at Stone House



## Behavioral Effects of Nature-Based Play

Brussoni 2015).

Louv (2005) suggests that it is a common belief that outdoor play and interaction with natural environments can be used to treat Attention Deficit Hyperactivity Disorder (ADHD), although this has not been clinically proven. Millions of children living in the United States have disorders such as this, and that number is constantly increasing (Louv 2005, Visser, SN et al). Interaction with nature is believed to be a vital and restorative, attention-directing treatment for children with such disorders based on Attention Restoration Theory (Faber-Taylor, Kuo 2011). In an experiment by Faber-Taylor and Kuo, children who were regularly exposed to “doses” of natural green environments typically had lower symptoms than children who played in non-green environments in both the hyperactive and non-hyperactive groups (2011).

Another study in which parents rate the changes in their child’s behavior after play showed that children typically had fewer ADHD symptoms after engaging in play in green spaces than they did in indoor or built outdoor spaces (Spencer 2005). In another study by A.E. van den Berg and C.G. van den Berg, children with ADHD were observed in both natural and built environments. The children displayed a much more positive response to the natural environment and had a higher level of cognitive functioning than while in the built environment (Van den Berg and Van den Berg 2011). This study provides evidence to support the idea that interaction with natural elements and outdoor settings helps children function on a higher level than if they were to not interact with nature at all. In addition to improving the focus of children with ADHD, free play in general helps improve social skills (Panksepp and Six 2012, Wilkes 2011).

Outdoor play also provides opportunities for children on the Autism spectrum. While many children with autism can be overwhelmed by sensory experiences, for those who are able to participate in outdoor play it can provide a chance for them to practice physical skills on different surfaces, run off excess energy, interact with peers in a setting that is easier for them to understand and participate in games that have simpler rules than indoor games like board games, and helps them practice coping with the world around them in a

# BARRIERS TO PLAY

## Limitation of Child-Led Play

controlled way (Moore 2008).

Lack of dedicated time for children to engage in unstructured play during their educational experience can have incredibly negative effects on children (Chmelynski 2006, Louv 2005, Wascoe 2006). Almost 40% of the nation's public schools have either eliminated, considered removing, or modified recess (Chmelynski 2006, 11 ). School board members believe that by eliminating recess, children can spend more time in classes and will achieve higher test scores, although this is directly in contrast with Attention Restoration Theory (Chmelynski 2006: 11; Louv 2005: 99; Miller and Almon 2009; Wascoe 2006).

Educators are feeling the pressure to succeed, and laws such as the No Child Left Behind law and Reading First were put into place as a way to provide a framework for improving scores but has unintentionally forced educators to reduce recess and physical education time in exchange for more time for lessons (Miller and Almon 2009, Wascoe 2006).

Other arguments proposed eliminating recess include the risk and high cost of liability insurance, and this is especially the case for nature-based play. Many games that are high in physical activity, involve running, chasing, etc., are being banned because they are considered unsafe (Kumar 2006). The majority of playground accidents are a result of falling from equipment, which is to be expected because studies show that children are more drawn to playground equipment that they consider more challenging or requires a greater risk (Little and Eager 2010). This is partially due to the fact that limited play or lack of sufficiently challenging playground equipment drives children to create their own, new challenges by using the equipment inappropriately or dangerously, putting themselves at risk (Little and Eager 2010). The issue of liability has greatly affected playtime, and many schools are doing away with the practice due to fear of being sued by parents of children who were injured while playing (Chmelynski 2006, 12).

On the other side of the spectrum, some schools that have banned games like tag have been met with criticism from parents who say their children need to have time to run around and play on their own (Schouten 2015). Reduction in recess and child-led play in general can have severe implications on the academic and social development of young children and can force them into adapting to

more adult-like behaviors before truly necessary (Ginsburg 2007). Children who are denied unstructured playtime and instead are put into directed, structured activities like sports teams provide some developmental benefit but those children are lacking the benefit of improved cognitive, emotional, and imaginative strength that comes from free play. Over-scheduled children may thrive, but many may also experience increased stress and anxiety due to pressure from peers and parents to perform well academically and in extra-curricular experiences (Ginsburg 2007). In addition to issues regarding reduced playtime, limits to play can be purely physical as well: lack of proper play environments can be viewed as a serious road block leading to more limited access to play. Issues such as this include things such as staff availability to supervise the children playing, weather limiting time for play, lack of upkeep or management of play areas leading to dangerous conditions, lack of storage, and play areas being located too far from preschool facilities to access safely (Warden 2005).



Figure 2.4: Nature Interaction at CCD

## Lack of Children's Access to Nature

Lack of unstructured play is not the only issue children face today. Loss of recess and removal of playtime from schools affects only children's time spent away from home. However, children are not spending time in nature even in their home and neighborhood environments. The rising popularity of technology has drastically impacted how children spend their free time, with the average child spending 6.5 hours per day—45 hours per week—using an electronic device and spend more time watching television per year—1,023 hours—than they spend in school (Louv 200, 119, Strife and Downey 2009). In addition to the rising popularity of technology, modern Americans spend a great deal of time in the car. Suburbs and sprawling cities are often not walkable, and as cities continue to grow outwards dependence on vehicular travel grows.

On average, Americans spend over 100 minutes in the car each day (Louv 2005, 119). Spending so much time in the car limits the amount of time they can spend exercising, let alone exercising outdoors. Many children are even more nature deprived than others, at no fault of their own. Children from poor socio-economic backgrounds and children who are minorities have even more limited access to nature than Caucasian children (Strife and Downey 2009). Studies have shown that people of Latino or African American descent are less likely to use outdoor public spaces such as parks, nature centers, and recreation fields, and find that children from White high-income families have far more opportunities for outdoor recreation and therefore have a more positive association with nature (Strife and Downey 2009).

Lack of children's access to nature is also something that can be a result of changing parenting styles. In the 1950's and 1960's, children were expected to play outside for long stretches of time, unsupervised, but as time has passed, children have lost more and more freedom due to a shift from pedestrian-dominated streets to vehicle-dominated streets and growing concerns from parents regarding children's safety (Karsten 2005). Fear and perceived danger has had a huge impact on children's access to nature. Parents today want to know where their children are 24 hours a day and refuse to let their children play unattended. The media has played a large part in perpetuating this fear, with missing children organizations in the 1990's claiming that over 4,000 children were abducted each year when the true statistic

was less than 300 (Louv 2005). It is important to understand that a large part of children's access or lack of access to nature is beyond their control, almost entirely in the hands of their parents. In order for children to be able to play in nature, parents need to be made aware of the benefits and the myths and dangers addressed.

When children are already experiencing a lack of access to nature in their home lives, it is even more important for schools to acknowledge the importance of natural interaction. Preschools today are reducing time spent outdoors in exchange for more time in the classroom in order to develop literacy skills, which are vital to preschool children when they enter the elementary school system (Nicolopoulou 2010). However, cognitive development is greatly improved by play. Child-led play helps to develop cognitive and social skills and allows children to develop "the most crucial foundations for emergent literacy...they can be fostered more effectively by play-based practices that engage



# STANDARD VS. NATURE-BASED PLAYGROUND DESIGN

## Designing for Standard Play

children’s interest and initiative,” (Nicolopolou 2010).

Play can occur in a variety of settings, but the majority of those settings are playgrounds, backyards, or indoor environments. Places that offer a wide variety of activities or movements are best suited for play (Lester and Russell 2010). Few officially mandated standards for playground design exist, and there are no federal standards for public playground design or safety, although national standards do exist. The National Program for Playground Safety references standards set by the American Society for Testing and Materials, the Americans with Disabilities Act, and the U.S. Consumer Product Safety Commission ([playgroundsafety.org](http://playgroundsafety.org)). While some school districts do have suggestions for more natural areas, majority of school district playground guidelines make no mention of natural elements at all and focus solely on what types of playground equipment are safe and unsafe (Boulder Valley School District 2006).

Natural playgrounds are also much more common in preschools than elementary schools due to school district affiliation and maintenance issues. The general consensus on what designers should concern themselves with is far more focused on safety, programming, and accessibility than interaction with nature, and the biggest challenge according to the Whole Building Design Guide is finding a way to engage children in fun and challenging activities while simultaneously ensuring their safety (Ruth 2008). The USCSPC’s Public Playground Safety Handbook provides a vast amount of detail regarding equipment guidelines, site selection, playground layout, and materials selection but goes into virtually no detail regarding natural elements, even considering grass and dirt as “inappropriate surfacing” for play environments (USCSPC 2015). Appropriate elements for play are exclusively standard play sets—slides, swings, stairs, and seesaws, with no mention of elements such as hills or open green spaces, water elements, or nature-based play areas (USCSPC 2015). More examples of age-appropriate play equipment can be found in Appendix 1.1. Alternatively, some school districts are taking the reins when it comes to designing for play and providing guidelines for play that incorporate and encourage interaction with nature. Many school districts’ design guidelines feature goals such as including green spaces, promoting sustainable design and materials, encouraging un-programmed play, and providing an eco-play area to allow for interaction with nature every day (BVSD 2006).



The U.S. Consumer Product Safety Commission is the governing body used to guide playground safety regulations recommended by the Kansas Department of Health and Environment. The state of Kansas itself has few requirements for outdoor play areas, stating that facilities that do choose to offer outdoor play must provide at least 75 square feet of space per child using the space. The space must also accommodate at least either one half of the facility or occupy 750 square feet (Kansas Dept. of Health and Environment 2016). The CPSC details in their Handbook for Public Playground Safety the appropriate heights, lengths, distances and materials required for preschool-age children for each part of the playground. It does not go into specifics regarding children with disabilities, but does take into account that ADA compliant surfaces and accessible play equipment should be considered when designing playgrounds. The USCPSC also details what are called “use zones” in which there must be at least six feet of space between each piece of playground equipment so long as that piece of equipment’s surfaces are no more than 30” high. If the equipment is taller than 30” then nine feet of space must be left between each space (USCPSC 2015, 26). There are no specific height requirements for slides, however for preschool age children spiral slides with more than one 360 degree turn are not recommended (USCPSC 2015, 33). The Handbook for Public Playground Safety also defines any opportunity for entanglement or entrapment as unsafe.

**Table 2.1: Play Structure Requirements (USCPSC 2105).**

Type of Access	Requirement for 3-5 Year Olds
RAMPS	
Slope (vertical:horizontal)	≤ 1:8
Width (single)	≥ 12”
Width (double)	≥ 30”
STAIRWAYS	
Slope	≤ 50 degrees
Tread width (single)	≥ 12”
Tread width (double)	≥ 30”
Tread depth (open riser)	≥ 7”
Tread depth (closed riser)	≥ 7”
Vertical rise	≤ 9”

Type of Access	Requirement for 3-5 Year Olds
STEP LADDERS	
Slope	50 - 75 degrees
Tread width (single)	12 - 21”
Tread width (double)	not appropriate
Tread depth (open riser)	≥ 7”
Tread depth (closed riser)	≥ 7”
Vertical rise	≤ 9”
RUNG LADDERS	
Slope	75 - 90 degrees
Rung width	≥ 12”
Vertical rise	≥ 12”
Rung diameter	0.95 - 1.55”

## Designing for Nature-Based Play

While standard playgrounds and fixed play equipment are beneficial to children in comparison to no playground at all, fixed equipment can only afford limited opportunities for growth when it comes to engaging children in stimulating activity. The more children are able to interact with and be a part of their environment, the better (Rose 2011). Nature-based play areas are also an increasingly important part of the community, especially in urban environments. The integration of nature with play elements creates a more aesthetically pleasing area, which then leads to more use, which eventually leads to a healthier community (Rose 2011). Children appreciate spaces that are free from rules and structure. Spaces that lack rules and structures help engage children in a way that makes them feel like they have ownership or a sense of belonging in the space (Lester and Russell 2010). Ingredients for a natural playground include natural or man-made objects that engage the senses and allow the child to interact with their world—look, feel, taste, touch, smell, and hear (Keeler 2008). These types of elements would be things like hills to climb, water to listen to and play in, plants that are dynamic in shape and color, textural elements like sand and dirt, as well as open areas and hideouts where children can explore (Keeler 2008).

Boulder Valley School District in Boulder, CO has set guidelines for playground design that stand out among public school districts. BVSD's eco-play guidelines suggest similar programmatic elements that mimic their surrounding landscapes in order to emphasize the ecosystems on-site. Elements suggested include features such as shaped earth, native plantings, wooded areas, grasslands, and dry streambeds (BVSD 2006, p. 8-1). These ingredients and guidelines can be synthesized and seen in the national guidelines provided by the Natural Learning Initiative (NLI) and the National Wildlife Federation (NWF). These two organizations teamed up in 2014 to create a set of detailed guidelines for designing nature play and natural learning spaces. These guidelines go through each element featured in many nature-based playgrounds and goes into great detail on each element's affordances and considerations (Moore 2014). The guidelines are divided into "common activity settings" including pathways, plants,

surfacing, construction, signage, boundaries, and more and provides an incredibly comprehensive approach to the design process, from conceptual design to construction (Moore 2014).

James J. Gibson's theory of affordances also provides a set of guidelines for designing nature based play areas (Herrington and Brussoni 2015). According to Gibson, each feature within an environment affords the potential for a specific type of action. These affordances differ from person to person based on age and ability, but can be incredibly valuable when designing for a specific age group or demographic such as pre-school aged children. Natural play areas provide more affordances than standard fixed play areas due to the changing nature of the elements involved (Herrington and Brussoni 2015). In natural playgrounds, children make the decision: what is this, do I climb this or can I slide down this? In fixed playgrounds, the decision is made for them: this object is a slide so I am going to slide down it. These affordances can be synthesized into seven C's, similar to the six C's of intrinsic motivation referenced by Moore (Moore 2014; Herrington and Brussoni 2015). The Seven C's for designing for play affordances are: character, context, connectivity, change, chance, clarity, and challenge (Herrington and Brussoni 2015). Character, context, connectivity, and change all refer to the feeling and design of the space: materials, colors, location, visibility, hierarchy of spaces, etc, while chance, clarity, and challenge refer to the opportunities for emotional growth, physical activity, interaction with the environment, and level of engagement the space provides to children (Herrington and Brussoni 2015).

# SUMMARY

Play is a vital part of what it means to be a child and should be considered necessary when thinking about the daily lives of children. Play is even more important in children's preschool years when they are forming connections with nature, each other, and themselves. Exposure to the natural world is also incredibly important at the preschool level. Combining play experiences with nature experiences not only provides an enriching and educational environment for preschoolers but also combines the benefits that come from those experiences. Children are able to form connections with the earth, understand their environment, and grow as stewards for nature when they spend time in the outdoors. Traditional playgrounds afford children a wide variety of types of play that can benefit them in many ways, serving a much more complex purpose than simply to have fun. Playing outdoors in environments that integrate natural experiences ties in the cognitive, physical, and mental benefits that preschoolers gain during traditional play. While no specific standard for integrating nature with play exists, it is still a powerful design move that will instantly enhance the playground.





Figure 2.5: Nature Access Play





Figure 3.1: CCD Playground - Southeast





# METHODOLOGY

## Chapter Three



# Part One

# **OVERVIEW**

# OVERVIEW

## Study Overview

This study consists of two parts: research and design (Figure 1.3). Research in this study focuses on answering the question “How do children play differently in nature-based playgrounds than in standard playgrounds?” while design in this study uses the data gathered from research done at the Center for Child Development and Hoeflin Stone House Early Childhood Center in order to design an outdoor play landscape for Hoeflin Stone House. Both preschools are located on the Kansas State University Campus in Manhattan, Kansas

Observation and mapping was chosen as the primary method of data collection for this study. According to “A Practical Guide to Behavioral Research” by Robert and Barbara Sommer (1980), there are several different types of observation: casual and systematic, as well as qualitative approaches. This study uses casual observation due to its lack of structure or categories of observation. For example, scores will not be assigned based on what behaviors are observed. Rather, the observer will simply map and take notes without a pre-determined categorization system of exact items. It is also noted that because an outside observer, not a participatory observer, will do this observation. Child behaviors could change due to the children becoming aware that their actions are being noted. No outside video footage will be recorded because of this—the presence of a camera will cause bias in ongoing behavior (Sommer and Sommer 1980). A variety of observation strategies as stated in “Doing Research In Design” will also be implemented (Crouch and Pearce 2012). The researcher will be using preliminary observation or practice observation sessions prior to official study-related observation in order to learn to efficiently take notes. Writing, drawing, and listening and recording notes will make up the majority of observation strategies used (Crouch and Pearce 2012).

Individual-centered and place-centered behavioral mapping will also play a large role in the methods used in this study because it will allow the observer to record the type of behaviors taking place in specific locations on the site as well as focusing on specific subjects in particular as representatives of the group as a whole (Martin and Hanington 2014). Martin and Hanington do make a point to say that participant interviews may be necessary to fully understand the results of the maps, and this is something that will influence the second portion of the methods of this study.

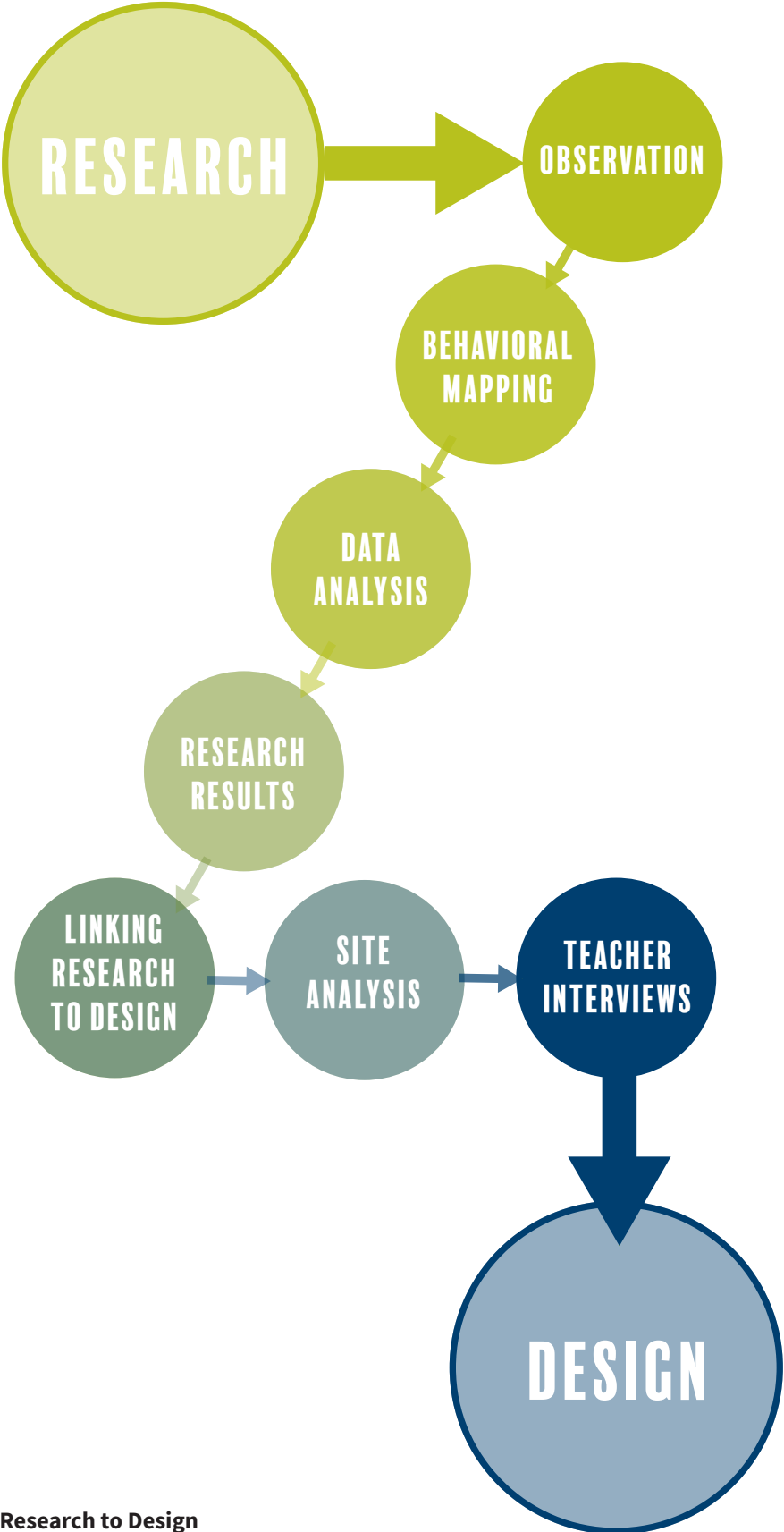


Figure 3.2: From Research to Design





**Part Two**  
**RESEARCH METHODOLOGY**

# OVERVIEW

Research in this study focuses on answering the question “How do children play differently in nature-based playgrounds than in standard playgrounds?” This question was answered by performing behavioral observation on seventeen children from a preschool with a nature-based playground at KSU’s Center for Child Development (CCD) and fifteen children from a preschool with a standard playground, Kansas State University’s Hoeflin Stone House Early Childhood Center. Children in this study were randomly selected from each center’s preschool classrooms with parental consent. Children in these preschool classrooms range from three to five years in age, a vital stage in early childhood physical and cognitive development. The Center for Child Development (CCD) at KSU is located on Jardine Drive on the north end of the main university campus.



Figure 3.3: Map of Study Settings

# STUDY SETTING AND PARTICIPANTS

## Setting 1: Designed Nature The Center for Child Development

The CCD is a licensed child care facility serving over 200 children in the Manhattan, Kansas area. Founded in 1984, the CCD provided child care for students, faculty, and community members as the KSU Child care Cooperative in Jardine Apartments on K-State's Campus. Over the years, the need for early childhood learning opportunities has grown and the CCD began to expand. The KSU Childcare Cooperative became an official affiliate of Kansas State University in 2006, renaming itself the K-State Center for Child Development.

The Center's current facility opened in 2010 and has double the capacity of the previous building in Jardine Apartments. The Center is licensed by the Kansas Department of Health and Environment and accredited by the National Association for the Education of Young Children, one of only eight percent of centers in the United States with this type of accreditation ([www.k-state.edu](http://www.k-state.edu)). The Center provides care to children aged six weeks to five years of age during the academic year, and provides care to children up to twelve years of age during the summer months ([www.k-state.edu](http://www.k-state.edu)). The CCD focuses on "encouraging children to be enthusiastic learners" in everything they do ([www.k-state.edu](http://www.k-state.edu)). The Center fosters a sense of cultural diversity through the children's interactions and enrolling students from a wide variety of geographic and financial backgrounds. The curriculum emphasizes introducing children to different cultures, traditions, and lifestyles both unique from and reflective of their own.

The Center's three programs are divided by age: six weeks to two-years of age, three to five years of age, and six to twelve years of age during in the summer program. Children in the CCD's preschool are engaged in developing their social, physical, cognitive, and linguistic skills through exploring their environment and interacting with their world ([www.k-state.edu](http://www.k-state.edu)). Children in the preschool spend time in both indoor and outdoor learning environments. The CCD's philosophy focuses on seeing the outdoor and indoor learning world as equally important parts of children's learning experiences. Children at the CCD spend up to an hour outside per day in temperatures ranging from sixteen degrees Fahrenheit to ninety-five degrees. ([www.k-state.edu](http://www.k-state.edu)). The CCD is home to two nature-based playgrounds: one for the infant/toddler program known as the lower playground, and one for the preschool program known as the upper playground. For the purpose of this study, only the upper playground will be discussed. The CCD's upper

playground is heavily integrated with nature and features a nature-based outdoor classroom environment. The playground includes natural elements such as loose branches, dry creek beds, small huts woven from sticks, bridges, garden areas, open green spaces, wood chips, sand, water, and non-maintained natural areas. In addition to these natural elements, the upper playground also features a gazebo with a play kitchen, a slide structure, tricycles, sand toys such as shovels, buckets, and trucks, rubber tires, and a variety of other small toys. For the purpose of this study, only the upper playground will be discussed.



## **Settings 2A and B: Standard Playground with Nature Access**

### **Hoeflin Stone House Early Childhood Center**

Hoeflin Stone House Early Childhood Center is an academic center within the School of Family Studies and Human Services at Kansas State University in Manhattan, Kansas. Stone House is located on Jardine Drive east of the Center for Child Development. Stone House is the child development laboratory school and supports the pre-professional early childhood teacher education program. Stone House offers both full-day and part-day programs, is licensed by the State of Kansas and accredited by the National Academy of Early Childhood Programs of the National Association for the Education of Young Children.

Full Day programs include the infant program, exclusive to a maximum of eight children from six weeks to two years of age; the toddler program, exclusive to a maximum of twelve children from two to three years of age, and the preschool program with two classrooms, each exclusive to a maximum of eighteen children from three to five years of age. The part-day program enrolls a maximum of twelve children. Because of the teaching and research mission of the facility, teachers strive to enroll equal numbers of boys and girls and children across the age range of the classroom. The facility is housed in a two-story building with three playgrounds, none of which are specifically designed with the intent of being nature playgrounds but all incorporating nature in some way. Children at Stone House spend up to one hour outside each day, and will go outside in temperatures as low as sixteen degrees Fahrenheit

The preschool playground on the north side of the building includes raw natural elements, rather than intentional in design. It features a sandbox, tricycle paths, a slide and climber structure, three swing sets (one of which is a handicap accessible swing), a small plastic playhouse, open spaces, and nontraditional toys such as a tractor tire and rubber hoses. A chain-link fence borders the grounds on three sides whereas the north side is open to a small wooded area. These woods are open for play with teacher supervision and the children are encouraged to run through the paths and climb the trees in the woods. This does not fall into the nature playground category in this study because the woods are an existing condition incorporated into play at Stone House, not an intentional design element created for the sake of children's play. Fifteen children from this facility participated in the study (7 boys and 9 girls).

## Observation and Behavioral Mapping

Behavioral observation and behavioral mapping were the primary methods for gathering data in this study. Maps were created for both the CCD and Stone House facilities prior to observation. Behavioral mapping was used in order to get a better understanding of the way children in both settings behave as a whole through the movements of a smaller group of specific participants (Martin and Hanington 2014). Mapping as an observer rather than through video footage removes the risk of children seeing a camera or recording device and behaving differently. Instead, an in-person observer blends in and appears to be just another teacher so children behave as they would any other day (Sommer and sommer 1980). Children were observed and their movements mapped individually in 20-minute increments, with subject selection alternating in sex until enough data was collected to understand play patterns and behaviors for an equal or near-equal number of female and male children. Children were limited to the classrooms outside at the time of observation and the classrooms scheduled for outdoor play at the time of observation. Any child without parental consent was identified prior to observation so that they would not be chosen as a random participant. Once a child was selected, notes on weather conditions, shade/sun conditions, time of day, ground conditions, and any other significant environmental factors were gathered.

Children at the CCD were observed during late afternoon play from 3:00 PM to 5:00 PM, while children at Stone House were observed during late morning play from 11:00 AM to 12:00 PM. An audio alert system was used in order to stay focused on the children. A 20-minute audio recording would play into headphones worn by the observer and a tone would sound every 30 seconds, notifying the observer to make a note of the observed child's position and behavior at the time. This was repeated for the entire 20 minute period and reset at the beginning of observation with a new child. Using this audio alert system reduced distractions and allowed the observer to fully focus on the task at hand rather than having to reset a 30 second timer. If the subject was highly active, their path between 30 second intervals was also marked by a dashed line on the map. Each of these 30-second interval points are referred to in this study as behavior points.

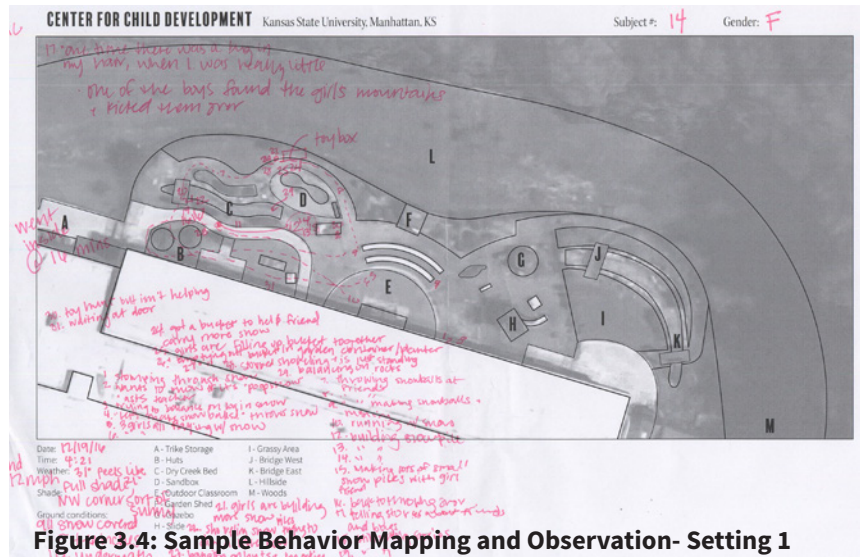


Figure 3.4: Sample Behavior Mapping and Observation- Setting 1

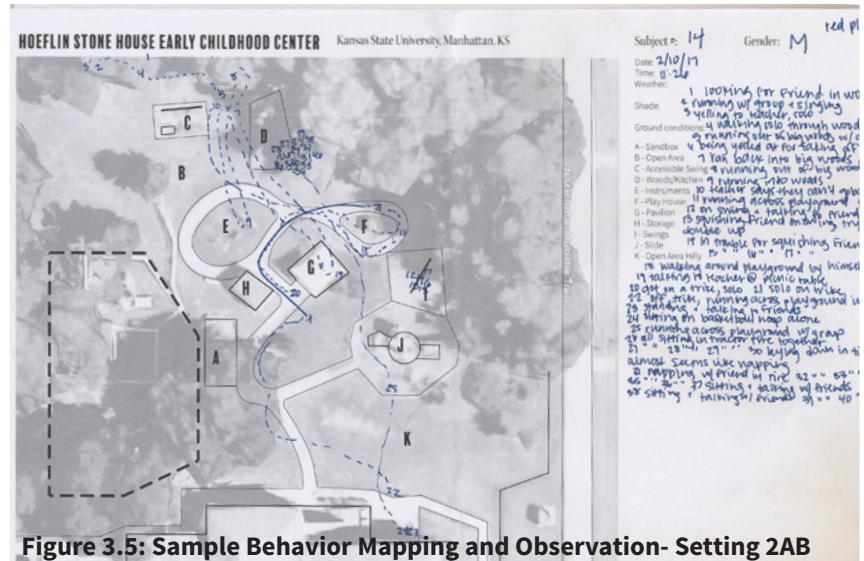


Figure 3.5: Sample Behavior Mapping and Observation- Setting 2AB

Table 3.1: Study Setting Groups and Behavior Points

	Setting 1: Designed Nature	Setting 2A: Standard Play	Setting 2B: Nature Access
Setting	CCD	Stone House	Wooded Area
Number of Children	17	15	6
Number of Behavior Points (30-second interval)	n=583	n=394	141

## Data Coding and Analysis

Maps of each child's movements were scanned into a computer and a digital map was created in order to understand the most popular areas within each playground. Behavioral observation data was entered into an excel spreadsheet and each 30-second increment of play was identified as either solitary or group play, sedentary, light, or moderate to vigorous physical activity, and as practice play, symbolic play, games with rules, or non-play according to the code assigned by the play matrix (insert or reference). This was done for every subject that participated in the study. Categories in the play matrix were assigned based on the literature review. Practice play is any type of play that repeats a behavior or skill in play that will later be used in real life. For the purposes of this study, practice play includes any type of play that is not dramatic or a game with rules, such as waiting in line to go inside, talking with a teacher, putting away toys, etc. These actions are all activities that will be used later in life as a skill. Symbolic play is any type of play where words, objects, or actions are used to represent different words, objects, or actions. Other definitions of this type of play may be dramatic or imaginative play. Within this study, symbolic play was largely identified through behavioral observation and conversations between the subject and other children as part of whatever activity they were engaged in at the time. Games with Rules can be defined as any type of game that is structured or has a clear set of rules or guidelines to be followed. In this study, games with rules include interaction with structured play objects such as the slide and climber due to the strict type of use that their design dictates (climb up, slide down) unless the subject was observed using the structure in a nontraditional way. Other games with rules include running games such as tag or chasing games, catching and throwing, and traditional sports games like basketball. Any behavior observed that did not fit into these categories was determined to be Non-Play. Instances of non-play would include a child standing alone and sedentary in which no conversation or apparent activity was observed.

Table 3.2: Defining Play Types

TYPE OF PLAY	DEFINITION	EXAMPLES
Practice Play	Play that repeats a behavior or skill that will later be used in real life situations	Conversation, balancing, climbing, waiting in line, putting away toys, sharing
Symbolic Play	Play that uses words, objects, or actions to represent different words, objects, or actions	Playing house, role playing, making up a game, using objects as props
Games with Rules	Play that is structured, has a clear set of guidelines, or an instruction on how to behave	Tag, hide and seek, sports, swinging, sliding
Sedentary Activity	Lack of physical activity or movement; stationary play	Sitting, standing, laying down
Light Activity	Non-strenuous physical activity or movement	Walking, climbing up stairs, sliding, swinging, low climbing, balancing
Mild to Vigorous Physical Activity	Activity requiring large amounts of movement, can become strenuous	Running, jumping, high climbing, strenuous balancing

Table 3.3: Data Coding System

		A	B	C	D	E	Code
		Individual	Group	Practice Play	Symbolic Play	Games with Rules	
<b>SEDENTARY ACTIVITY</b>	1						1AC
							1AD
							1AE
	2						2BC
							2BD
							2BE
<b>LIGHT ACTIVITY</b>	3						3AC
							3AD
							3AE
	4						4BC
							4BD
							4BE
<b>MILD TO VIGOROUS ACTIVITY</b>	5						5AC
							5AD
							5AE
	6						6BC
							6BD
							6BE





**Part Three**  
**DESIGN METHODOLOGY**

# OVERVIEW

The design part of this study seeks to take the information gathered from the research phase and implement it by redesigning the areas of the playground in disrepair, creating better connections with nature, integrating more natural elements throughout, and identifying underutilized elements in order to create a more engaging and developmentally beneficial play environment. Stone House was selected for this study because of its existing early childhood education program and spacious playground space with nature access but a lack of designed play space. While their current playground is efficient, safe, and fun for the students at Stone House, there is room for improvement.

Hoeflin Stone House Early Childhood Center features three architect-designed playgrounds, however these playgrounds do not utilize the ample space they have as beneficially as they could be. The preschool playground is spacious and hilly, with woods as its north border. It provides room for children to run and play and has features that engage the kids in a variety of activities, but feels disjointed and is in disrepair. There is no clear organization to the playground, no central space, and has a large shed blocking teachers from seeing clearly across the play space. The playground lacks “loose parts” play elements and has almost no natural features aside from the sandbox and woods access. Drainage is a major issue and there is little landscaping to be seen aside from the lawn spaces. The playground is in full sun at mid-day and during the summer months there is little opportunity for shade aside from the woods to the north and the trees to the southwest.

The results from the research phase of the study were analyzed and mapped in order to understand any similarities or differences between the way children engage with their environments at the CCD and at Stone House. The CCD and Stone House have playgrounds that differ greatly in their size, design, and types of elements included. Identifying the most popular elements at the CCD and the types of behaviors they afford, may justify design elements at Stone House useful for child development. Each interval of play was identified on a map and on an excel spreadsheet according to a letter assigned to the particular location of the behavior on the map. Through this analysis, popular spaces on each playground were identified.

## Teacher-Engaged Design

A series of interviews with teachers from Stone House was conducted in order to get a better understanding of what their opinion of the current playground was and an idea of what they would like to see in the future. Questions were focused on the existing conditions of the playground and potential design ideas for the future playground as well as nature play and the staff's opinions on the importance of nature in preschool play. The following questions were asked to teachers at Hoeflin Stone House Early Childhood Center:

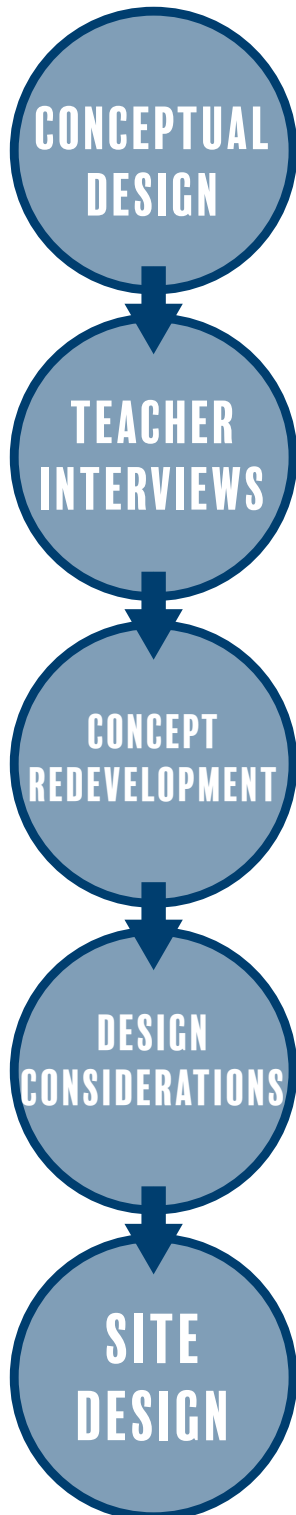
- What are your perceptions of nature-based play and how it relates to early childhood development?
- How do you compare play behaviors between the “big woods” and the rest of the playground?
- Have you been to the CCD Playground? If yes, what are your thoughts on it in comparison with the playground at Stone House?
- Do you have any ideas for improving the playground at Stone House?
- Are there any other thoughts you have on nature play or the playground at Stone House?

## **Design Approach**

The proposed design for Stone House was developed based on an evidence-based design approach. This design approach begins at conceptual design and incorporates the data analysis from the research phase of the project as well interviews with teachers. This allows for a concept that is backed up not only by qualitative data but by quantitative data as well. The teacher interviews and data analysis inform what types of elements should be included in the design as well as what parts of the playground are or are not successful. The design process can be seen in Figure 3.6.



# DESIGN PROCESS



## Objectives

- Brainstorm ideas for playground design at Stone House
- Develop understanding of how data will translate to design
  
- Identify what teachers feel afford valuable play
- Learn about design concerns teachers may have
- Find out what teachers would like to see in their playground
  
- Develop site program
- Identify spaces for active and passive, group and individual play
- Determine what to keep, add, or remove
  
- Develop grading plan to address drainage issues
- Consider ADA accessibility and designing for inclusive play
  
- Specify materials, plants, and products used in design

Figure 3.6: Design Process





Figure 4.1: Climbing Trees in the Woods at Stone House





**RESULTS**  
Chapter Four



**Part One**  
**RESEARCH**



# OVERVIEW

Overall, 32 children were observed and mapped: 17 from the Center for Child Development (n = 9 male) and 15 from the Hoeflin Stone House Early Childhood Center (n = 7 male). Data gathered from Stone House was further separated into two categories (traditional playground area and nature access area) in order to analyze the differences in child behavior in fully natural as well as standard play settings. The three groups were observed and analyzed in order to understand differences or similarities in both group and individual play as well as types of play (practice, symbolic, or games with rules). Setting 1 is a designed nature environment, Setting 2A is a traditional play environment, and Setting 2B is a nature access environment. These three separate settings show the difference in the types of play that occur in environments ranging from completely undesignated to designed with detail and intention.

**Definition: Instances of observed behavior in 30-second intervals are referred to as “behavior points.”**

# RESULTS



Figure 4.2: CCD Playground in the Snow

## The Center for Child Development: Setting 1 Group (Designed Nature)

Setting 1 represented a designed nature setting that falls between the aesthetic of Stone House's main playground and Stone House's woods. The CCD playground contains natural elements and lacks standard play pieces and was designed with the intent of nature-based play. The playground features include natural materials, timber structures, sand and water play, and movable elements. Children at the CCD favored playing alone, with 56.61% of all play behavior points categorized as individual play and 43.06% of all play behavior points categorized as group play. Children at the CCD were also more likely to engage in standard-structure games such as catch, tag, and chasing games with 39.97% of all observed play behaviors falling into the games with rules category. The second most popular type of play at the CCD was practice play at 31.56% of all observed play behaviors, followed by symbolic play at 21.1%.

The most instances of recorded behavior points within the CCD playground occurred at the sandbox. Although the sandbox was covered by a tarp for the winter season, 16.64% of all observed play behaviors at the CCD occurred near or around the sandbox space (Area G). In addition to the sandbox having the highest concentration of behavior points, it was also visited by the highest number of unique subjects with 15 out of the 17 children using it at some point during observation. The slide tower (Area M) had the second highest concentration of behavior points on the CCD playground. 14.92% of all recorded behavior points occurred on or near the slide. However, the slide was not in the top four most widely used elements on the playground. The slide had only nine of the seventeen participants use it during observation.

Observation also shows that the rock wall access point of the slide was the most popular, but children also spent a great deal of time standing at the top of the tower and observing their peers as well as hiding underneath the tower in the dark space below in addition to using the slide's intended function of sliding. The basketball hoop (Area F) contained the third highest concentration of behavior points, with 13.38% of all observed play behavior points. The basketball hoop was also tied for the second-most widely used element on the playground with eleven out of the 17 children interacting with the hoop at some point. The fourth most popular element on the CCD playground was the dry creek bed (Area D). This natural play area accounted for 10.63% of all recorded behavior points, and it was tied with the basketball hoop for unique users with 11 out of 17 children interacting. The open space (Area I) did not achieve a high percentage for behavior point concentration but tied for second most widely used space with 11 unique users out of the 17 observed children.

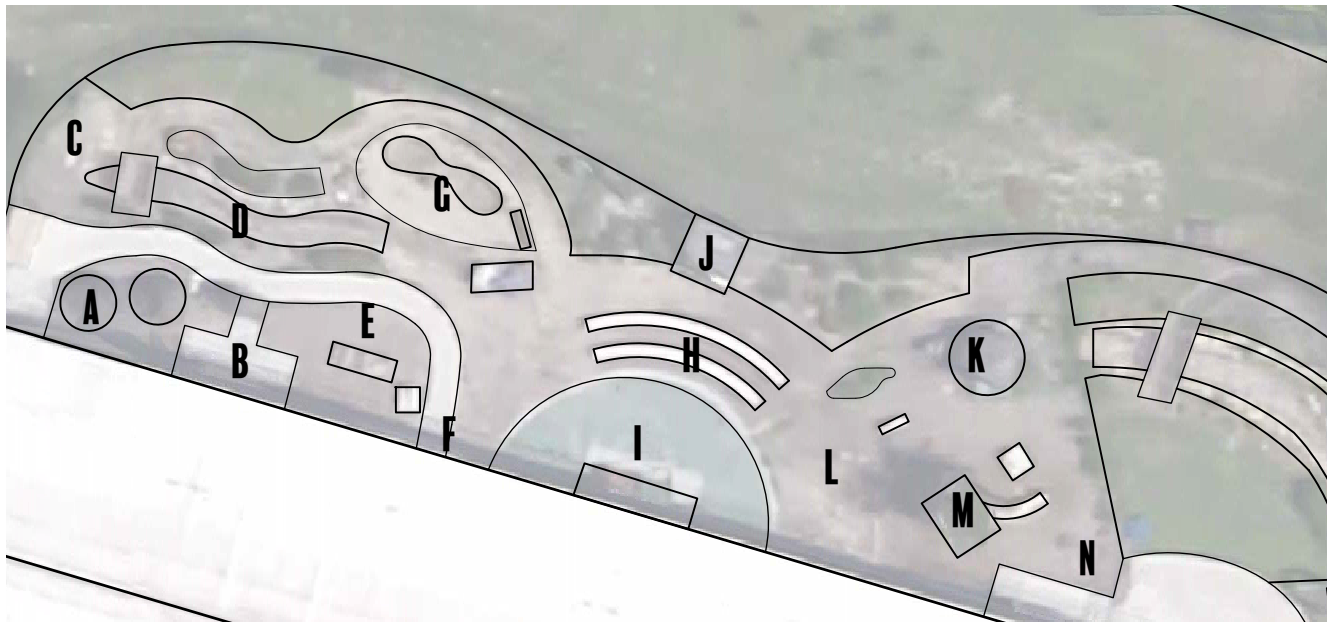


Figure 4.3: Setting 1 Map

**Map Key**

- A: Play huts
- B: Classroom entry
- C: Open area
- D: Creek bed
- E: Jeep
- F: Basketball hoop
- G: Sandbox
- H: Outdoor classroom
- I: Open area
- J: Garden shed
- K: Gazebo
- L: Logs
- M: Slide
- N: Classroom entry

**Table 4.1: Participants Per Play Area (Setting 1)**

	# of Participants observed in Area (n=17)	% of Total Behavior Points Recorded (n=583)
G: Sandbox	15 of 17	16.64%
M: Slide	9 of 17	14.92%
F: Basketball Hoop	11 of 17	13.38%
D: Dry Creek Bed	11 of 17	10.63%
I: Open Space	11 of 17	6.86%

The most frequent specific types behaviors recorded at each behavior point were first Group MVPA Games with Rules at 17.5% of all recorded behavior points (N=583), followed by Group Light Symbolic Play at 12.52%, and Individual Light Practice Play at 11.66%. Each area within the playground also afforded specific types of play. Of the 14 areas in the CCD playground, six afforded more opportunity for Games with Rules than any other type of play. These areas were the open area on the west side (C), the basketball hoop (F), the central open space (I), the gazebo (K), the movable logs (L), and the slide (M). Four areas afforded more opportunities for practice play than any other type of play. These elements included the wood huts (A), the classroom door on the west side (B), the dry creek bed (D), and the classroom door on the east side (N).

## **Hoeflin Stone House: Setting 2A Group (Standard Playground)**

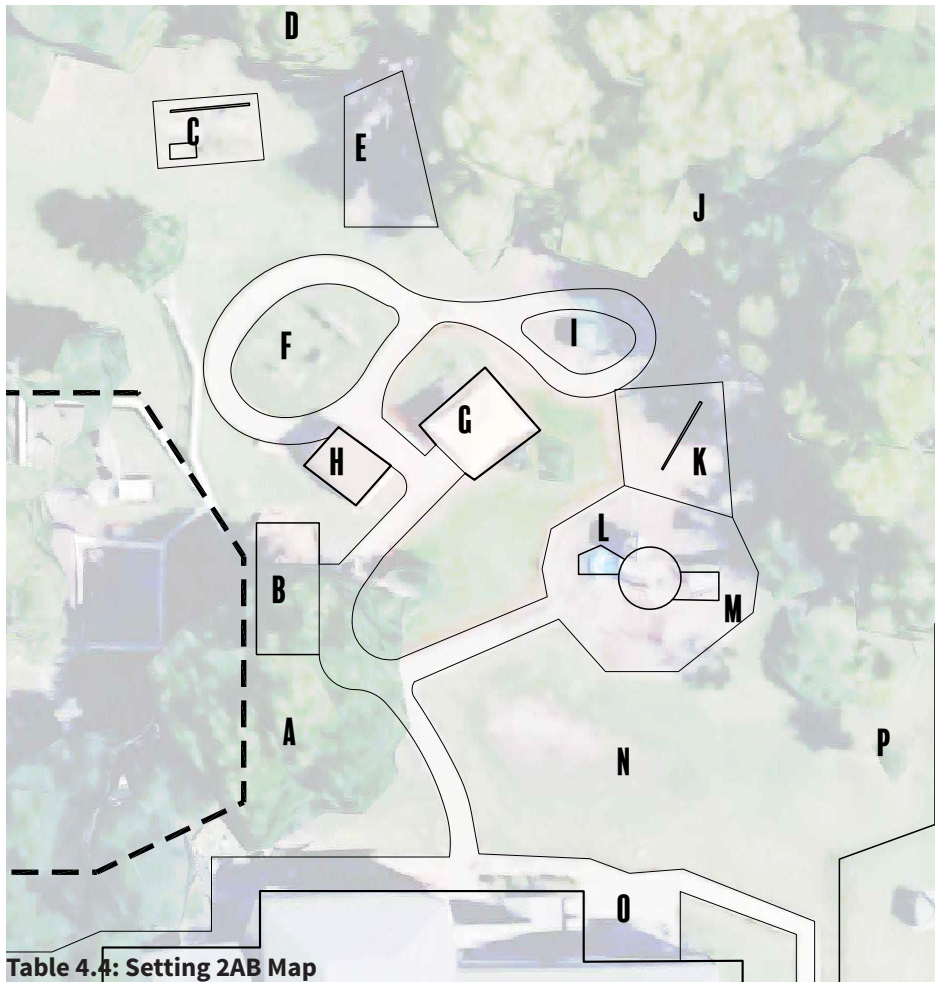
Hoeflin Stone House Early Childhood Education Center features two different types of play settings: a standard playground with very little nature (Setting 2A) and a densely wooded area with very few play elements (Setting 2B). Setting 2A contains elements typical of any other playground including a climbing structure with slides, a swing set with tire swing, a sandbox, a trike path, a small plastic playhouse, and a concrete stage. Setting 2B contains a few dirt paths through the trees as well as remnants of play elements that have been left in the woods. Of the 15 children observed at Stone House, only 6 engaged in play within Setting 3 while 14 subjects engaged in play within Setting 2.

Behavior Points in Setting 2A indicated that 62% of all recorded play behavior points (N= 394) were group play while 37.04% were individual play. Practice play was the most commonly observed type of play in this setting. Setting 2 had 51.2% of all behavior points fall into the practice play category. Symbolic play was second-most common for Setting 2A, with 19.18% of behavior points categorized as symbolic play. Games with Rules was the least common type of play within this play setting, with 16.93% of behavior points falling within this category in Setting 2A.

The most widely used area of Setting 2A was the playhouse (Area I) with 12 out of 15 children interacting with this area during observation. The playhouse also had the highest concentration of behavior points within setting 2A; 13.41% of behavior points were recorded in or around the playhouse. The climber (Area L/M) was second for the most widely used area within setting 2A. Eleven out of 15 children interacted with the climber, although only 8 used the slide. 12.29% of behavior points were recorded on the climber. 8.19% of the 12.29% of points were on the slide while 4.1% were on the opposite side of the structure. The third most widely used area in Setting 2 was the concrete pad or “stage” in the center of the site (Area G). This is contrary to the third highest concentration of behavior points, which was the swings (Area K). While the concrete pad had 9 of the 14 children interact with it at some point in observation, only 5.40% of all



behavior points were recorded there. Only 6 children interacted with the swings, however, the swings accounted for 12.1% of all recorded behavior points. The fourth most widely-used area of the site was the concrete slab outside the classroom door, near the basketball hoop (Area O). This area had 8 out of the 14 children engage in play there, however only accounted for 3.35% of all recorded behavior points.



#### Map Key

- A: Canoe
- B: Sandbox
- C: Accessible swing
- D: Woods
- E: Play kitchen
- F: Musical instruments
- G: Stage
- H: Storage
- I: Playhouse
- J: Woods
- K: Swings
- L: Slide
- M: Climber
- N: Open Area
- O: Classroom entry
- P: Open area

Table 4.4: Setting 2AB Map

The most frequent specific types of behaviors recorded at each behavior point in Setting 2A were first Group Light Practice Play at 12.29% of all behavior points in this setting, followed by Group Light Symbolic Play at 11.17%, then Individual Light Practice Play at 10.99% and Group Light Games with Rules at 8.75%. This differs from Setting 3, where the most common types of play were a three-way tie between Group Light Symbolic Play, Group Light Practice Play, and Individual Light Practice Play all at 17.02% of recorded behavior points within the setting. This was followed closely by Group Mild to Vigorous Physical Activity Practice Play at 16.31% of behavior points in the setting. Of the 15 areas in Setting 2A, 9 afforded more opportunity for practice play than any other type of play. These areas were the canoe (A), sandbox (B), kitchen (E), instruments (F), concrete stage (G), playhouse (I), climber east (M), and classroom entry (O). Six afforded more opportunity for games with rules. These areas were the accessible swing (C), storage shed (H), standard swings (K), climber slide (L), open area (N), and the fence (P). None of the areas in Setting 2A or 2B had high enough concentrations of symbolic play to be categorized as a symbolic play affording element. Areas were not determined within Setting 2B but over 70% of all recorded behavior points within Setting 3 were categorized as practice play.

**Table 4.2: Participants Per Play Area (Setting 2A)**

	# of Children observed in Area (n=15)	% of Total Behavior Points Recorded (n=394)
I: Playhouse	12 of 15	13.41%
L/M: Climber	11 of 15	12.29%
G: Concrete "Stage"	9 of 15	5.40%
K: Swings	6 of 15	12.1%
O: Basketball Hoop	8 of 15	3.35%

## **Hoeflin Stone House: Setting 2B Group (Nature Access)**

Data gathered from Setting 2B was originally gathered as Setting 2A data but later separated to better understand how children behave in a traditional playground. When combined with Setting 2, 26.44% of all behavior points fall within the Setting 2B area despite only 6 children observed there (n=535). Setting 2B is considered a “nature access” area, situated entirely in the woods north of Setting 2A. In Setting 2B, group play dominated at 56.74% while individual play was at 43.27% (n=141). Setting 3 had 73.05% of all behavior points (n=141) qualify as practice play. Symbolic play followed in second at 22.7%. Games with Rules was the least common type of play in Setting 2B, with only 4.26% of behavior points in this category. Specific areas were not assigned within Setting 2B due to a lack of visibility or defined play spaces.

# COMPARISON BY SETTING

The three setting groups (designed nature, standard and nature-access groups) are compared by the following parameters: (a) individual and group play (Table 4.3); (b) play types (i.e., practice, symbolic, game with rules and non-play) (Table 4.4); and (c) amount of play areas for practice, symbolic and rule plays (Table 4.5). The comparison results are as below:

## Individual vs. Group Play Comparison

Children in Setting 1 at the CCD engaged in a much higher amount of Games with Rules style play than children at Stone House in both Setting 2A and Setting 2B. Children in Setting 1 also engaged in a higher amount of individual play, while children in Settings 2 and 3 engaged in more group play.

**Table 4.3: Individual vs. Group Play Comparison**

	<b>Setting 1: Designed Nature (n=583)</b>	<b>Setting 2A: Standard Play (n=394)</b>	<b>Setting 2B: Nature Access (n=141)</b>
Individual Play	<b>56.61%</b>	37.04%	43.27%
Group Play	43.06%	62.93%	56.24%

Note: n= the total number of behavior points within the setting.

## Comparison of Play Types

None of the observed play settings afforded equal opportunities for all types of play. Children at the CCD in Setting 1 engaged more in games with rules play than any other type, while that was the least common type of play occurring at Stone House in both Settings 2-A and 2-B. However, all three play settings had relatively equal amounts of observed symbolic play.

**Table 4.4: Comparison of Play Types**

	<b>Setting 1: Designed Nature (n=583)</b>	<b>Setting 2A: Standard Play (n=394)</b>	<b>Setting 2B: Nature Access (n=141)</b>
Practice Play	31.53%	51.2%	<b>73.04%</b>
Symbolic Play	21.1%	19.18%	22.7%
Games with Rules	<b>39.97%</b>	16.93%	4.26%
Non-Play	7.4%	12.69%	0%

Note: n= the total number of behavior points within the setting.

## Comparison of Play Areas

Of the three play settings, Setting 1 at the CCD is the most well-balanced in affording a variety of types of play. Setting 2A has elements that afford both practice play and games with rules, but does very little to encourage symbolic play. Setting 3 was not divided into subareas, however based on the results from the behavior points within Setting 2B it can be assumed that this area has little to afford games with rules.

**Table 4.5: Comparison of Play Areas**

	<b>Setting 1: Designed Nature (n= 14)</b>	<b>Setting 2A: Standard Play (n= 15)</b>	<b>Setting 2B: Nature Access</b>
Practice Play	<b>4 of 14</b>	9 of 15	N/A
Symbolic Play	4 of 14	0 of 15	N/A
Games with Rules	6 of 14	6 of 15	N/A

Note: n= the total number of play elements within the setting.



## Playhouse

The huts in Setting 1 were not commonly used although they afford a similar opportunity for play as the playhouse at Setting 2A. In Setting 1, while the huts had 10 unique subjects play near or with them out of a potential 17, only 4.46% of behavior points occurred there. Both afforded practice play more than any other type of play, then games with rules, and then symbolic play. Symbolic play had the least behavior points in both Settings 1 and 2A.

### Setting 1



Figure 4.5: Setting 1 Playhouse

### Setting 2A



Table 4.6: Setting 2A Playhouse

## Slide

The slides in Settings 1 and 2A varied greatly in design but were consistent in popularity. Setting 1's slide structure is taller than Setting 2A's and has no opportunities for other types of movement except for climbing and sliding. The slide in Setting 2A is low to the ground and provides little challenge but is easy to access and is connected to a climber that offers a variety of other play experiences. Both slides afforded Games with Rules play first, followed by practice play. Both slides had extremely low concentrations of behavior points indicating symbolic play.

### Setting 1



Figure 4.7: Setting 1 Slide

### Setting 2A



Figure 4.8: Setting 2A Slide

## Log climbing

Setting 1 offered some opportunity for interacting directly with nature as it grows and occurs. Setting 2A offered no opportunity for interacting directly with nature. Setting 2B offered a completely immersive opportunity for interacting with nature. The logs in Setting 1 had 10 unique users of a potential 17, while the “Big Woods” in Setting 3 had only 6 unique users of a potential 15. The logs in Setting 1 afforded more opportunity for games with rules play, while the “Big Woods” afforded more opportunity for practice play.

**Setting 1**



**Figure 4.9: Setting 1 Log Play**

**Setting 2B**



**Figure 4.10: Setting 2B Log Play**



## Open space

Teachers at Stone House expressed a need for open space in Setting 2. Setting 1, while significantly smaller than Settings 2A and 2B, had much more opportunity for games with rules due to the open space in the center of the playground. Setting 2A has very little flat open space, limiting the types of games the children can play. The majority of the open space in Setting 2A is on a steep slope. While this provides the opportunity for children to play on the hill and explore, it is not useful for running games or rules games.

Setting 1



Figure 4.11: Setting 1 Open Space

Setting 2A



Figure 4.12: Setting 2A Open Space

## Sandbox

The sandbox in Setting 1 was much more popular than the sandbox in Setting 2A. The two sandboxes also afforded two different types of play. The sandbox in Setting 1 had more instances of practice play while the sandbox in Setting 2A had more instances of symbolic play. Both sandboxes had the fewest instances of games with rules. The sandbox in Setting 1 was covered by a tarp for the majority of the observation period while the sandbox in Setting 2A was not. However, children playing in Setting 1 had greater access to sand toys such as buckets and pails while children in Setting 2A did not.

### Setting 1



Figure 4.13: Setting 1 Sandbox

### Setting 2A



Figure 4.14: Setting 2A Sandbox



# COMPARISON BY PARTICIPANT

## Mapping Paths

Looking at the paths of individual children rather than comparing play elements by setting can provide more insight as to what parts of the playground are well-used, what parts are not, and what type of play children engage in. In table 4.6 the path of every participant is laid out as well as the types of play that child engaged in and whether it was in a group or as an individual. The table shows patterns in play as well as features observation notes that were qualitative and could not be coded with the rest of the data that provide more detail as to the types of behaviors each participant engaged in. The letters within each path symbol correspond to the play area in the given study setting.



PARTICIPANT	SEX	PATH FOLLOWED	OBSERVATION NOTES
Participant 12	F		Ground was covered in small puddles and subject was overheard saying “everyone, step in muddy puddles!” during observation
Participant 13	M		This subject engaged in more symbolic play than any subject to this point. Observation took place after a snow event and the ground was covered in two to three inches of snow.
Participant 14	F		Subjects engage in more symbolic and imaginative play when the ground is covered in snow.
Participant 15	M		Ground conditions during this observation period included partial snow cover with puddles and mud. The entire class spent the play period with buckets and shovels making “potions.”
Participant 16	F		This subject was heavily influenced by the teachers in Setting A and participated in whatever games with rules they suggested.
Participant 17	M		Subject 17 had a tendency to follow the other children around, even though he tended to engage in primarily individual play. He played by himself near other groups of children.



PARTICIPANT	SEX	PATH FOLLOWED	OBSERVATION NOTES
Participant 10	M		Play within the “Big Woods” is heavily dominated by practice play and has very few instances of games with rules play.
Participant 11	F		Observation was cut short when subject went inside.
Participant 12	M		The subject engaged in much more symbolic play than others, and fluctuated between group and individual play. This subject may enjoy symbolic play more than other types.
Participant 13	F		The subject and her friends are playing an imaginative game where they pretend that they are royalty as well as mermaids. They play their pretend game as they climb on fallen trees.
Participant 14	M		This subject engaged in a large amount of non-play and spent time basking in the sun on a 55 degree sunny day in February.
Participant 15	F		Subject’s imaginary/symbolic play revolved around “cooking dinner” in the play kitchen on the playground in Setting 2A.



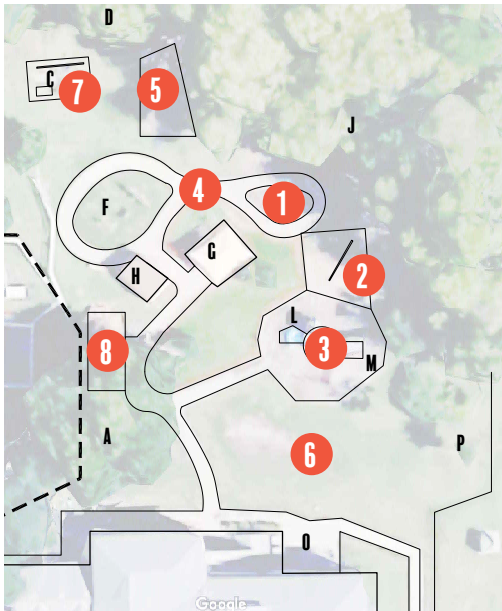


**Part Two**  
**DESIGN**

# OVERVIEW

Using the data from the research portion of this study, the playground at Stone House can be better understood and improved. Using the information gathered in all three play settings, designed nature, standard play, and nature access, it is easier to understand what elements in each environment allow children to play in specific types of ways. By combining these three environments into one composite playground, children will be able to gain the benefits that come wfrom both standard play as well as nature-based play. This hybrid playground features the best and most frequently used design elements from each play setting. It fuses the three settings in a way that creates one ultimate playground in which children can engage with nature, grow socially, develop physically, and challenge themselves physically and mentally while also forming vital connections with the earth and their environments.

# SITE INVENTORY



## Map Key

1. Playhouse
2. Swing set
3. Climber
4. Bike path
5. Kitchen
6. Hillside
7. ADA Swing set
8. Sandbox



Figure 4.15: Site Inventory

# LINKING RESEARCH AND DESIGN

## Behavioral Observation

Behavioral observation allowed the researcher to get a better understanding of the different types of play and what activities were associated with those types of play. This was then developed into Table 4.7 where behavioral observation informs design concepts. There was a high percentage of group play activities observed in Setting 2A and 2B. Group play activities observed consisted of a large portion of Games with Rules play, something that Setting 1 had a high occurrence of. Setting 2A did not have as high of an occurrence of Games with Rules play due to the lack of open space. Providing an open, flat space in the site design will afford both group and Games with Rules play. This also ties in with observed active play. Active play during observation consisted mainly of chasing games, sports such as catch or basketball, or racing games.

Individual play was more structure-based, with most observed individual play occurring on play structures rather than in open spaces. These play structures include the swing set, sandbox, climber, and slide. Passive play also was observed at many of these same structures. The sandbox and swing set were both settings in which passive play was frequent.



Table 4.7: Behavioral Observation Notes

PLAY TYPE	ACTIVITIES OBSERVED	DESIGN CONCEPT
Group Play	Games with Rules play <ul style="list-style-type: none"> <li>- Chasing games</li> <li>- Sport games</li> <li>- Racing games</li> </ul> Symbolic play <ul style="list-style-type: none"> <li>- Role playing</li> <li>- Hiding/spying games</li> </ul> Practice Play <ul style="list-style-type: none"> <li>- Climbing</li> <li>- Exploring</li> <li>- Conversation</li> </ul>	<ul style="list-style-type: none"> <li>- Open flat space for playing games with rules and other games that require large spaces and vigorous physical activity</li> <li>- Paved paths for racing</li> <li>- Provide larger spaces on or near play elements for larger groups to engage in play</li> <li>- Create diverse environments that can be interpreted for imaginative and symbolic play</li> </ul>
Individual Play	Games with Rules play <ul style="list-style-type: none"> <li>- Swinging on swing set</li> <li>- Slide</li> </ul> Symbolic play <ul style="list-style-type: none"> <li>- Object symbolism</li> </ul> Practice Play <ul style="list-style-type: none"> <li>- Digging in sandbox</li> <li>- Climbing</li> <li>- Exploring</li> </ul>	<ul style="list-style-type: none"> <li>- Provide standard play elements that encourage individual and autonomous play</li> <li>- Create pocket spaces throughout site for small groups or individuals</li> </ul>
Active Play	Games with Rules play <ul style="list-style-type: none"> <li>- Chasing games</li> <li>- Sport games</li> <li>- Racing games</li> </ul> Symbolic play <ul style="list-style-type: none"> <li>- Hiding/spying games</li> </ul> Practice Play <ul style="list-style-type: none"> <li>- Climbing</li> <li>- Exploring</li> </ul>	<ul style="list-style-type: none"> <li>- Open flat space for playing games with rules and other games that require large spaces and vigorous physical activity</li> <li>- Create access points between playground and woods</li> <li>- Provide elements that challenge the physical limits of older preschool children</li> </ul>
Passive Play	Games with Rules play <ul style="list-style-type: none"> <li>- Swinging on swing set</li> </ul> Symbolic play <ul style="list-style-type: none"> <li>- Role playing</li> <li>- Object symbolism</li> </ul> Practice Play <ul style="list-style-type: none"> <li>- Exploring</li> <li>- Conversation</li> </ul>	<ul style="list-style-type: none"> <li>- Provide standard play elements that encourage individual and autonomous play</li> <li>- Create pocket spaces throughout site for small groups and individuals</li> <li>- Provide spaces with manipulatable elements and tactile play</li> </ul>

## Engaged Design: Interview Result

Teachers at Stone House understand the value of nature-based play and are aware of the limitations of their own playground. Interviews were conducted with one leader from each of the three preschool classrooms. These interviews provided a large amount of design direction and were used to better understand where the Stone House playground could be improved and what the most pressing issues are. While Settings 2 and 3 at Stone House may not be designed with the intention of nature-based play, it is still important to the classrooms' day to day activities. "I believe that interaction with nature on a day to day basis, for hours, is beneficial for children. It allows varied opportunity in development...I think it also helps develop that sense of emotional peace and calming," reports Teacher A on her perceptions of nature-based play. Teacher C agreed, stating that "I think it's important to use it and allow children to go out into nature... just go outside for a time to see animals and trees and leaves." Teacher C also noted that when her children were playing in the woods, although their play was the same as on the standard playground, "they're more likely to recall information they have seen before" and incorporate it into their play "whereas on the playground space, unless there are specific materials provided, they are more just about climbing and playing a game, [in the woods] they are more on the imaginative side."

When asked what parts of the Stone House playground they would change, Teacher A expressed interest in adding smaller, more pocketed areas to the playground that "always make sure there's space for few children and space for many children... pairs rather than six or seven at a time." Teacher B communicated that "[The CCD] had more flat spaces for children to play... When our kids get to playing there's just this one little space where they can play. Compared between [the CCD] I think I see a little more imaginative play here," and wished Stone House had a similar flat play area. Teacher B also expressed that she wished parts of Setting 3 were less densely forested, pointing out that she would "push the fence back a little bit. Not clear out the trees, but make it more so we can see in [the woods] so they don't have to ask a teacher to go back there with them."

The need for greater challenges within Setting 2 was a common theme. Teacher A noted that the current movable climber elements in Area C provided varying challenge for the children because they can be made

higher or lower and that is something that interests both the youngest and oldest children in the playground. She also stated that “I don’t think the slides add enough challenge for this age group.” Teacher B agreed, stating that if she could improve the current playground she would add a “more challenging climbing structure. I think it’s very underutilized because after a while the kids get bored with it... rock climbing walls would be cool to have on a climbing structure.” Teacher C mentioned a desire for more challenge for “the older kids who have mastered the monkey bars... provide somewhere for them to climb that would have more hills or something of that nature.”

Teachers at Stone House also understood the value of Setting 3 and expressed a desire for more integration of Setting 2 and Setting 3. “[The woods are] much more exploratory and full of curiosity and [children] question their own skill sets. Can I climb this tree? How high? Do I feel safe? Can I climb differently? Whereas on the playground, they’re really limited to the climbing structure... there’s more opportunity in the woods,” says Teacher A. Teacher A also expressed a desire for more natural-looking wood structures, doing away with plastic and synthetic elements altogether. Teacher B felt that integrating Setting 2 and Setting 3 would be beneficial and made a point to say that “I do think kids need a balance between some structural guided play materials like a climbing structure” in addition to having natural elements. Teacher B also stated that “I like the idea of bringing in nature-based things but not to the extent of CCD.” Teacher C agreed, saying that “there’s benefits to both of them,” but she would like to see “more trees within the actual playground space, I know kids want to climb them, but also to provide shade and animals within the playground space. It gets really warm and very hot so we don’t get a lot of shade.” All three teachers that were interviewed also expressed a desire for a flat space where kids can engage in more Games with Rules style play, as the current playground is very sloped and does not offer a large flat area for games.

Results from teacher interviews can be seen compared with design guidelines from the literature review as well as side by side with what the observational data suggests for design in Table 4.8.

**Table 4.8: Interview Results**

	<b>TEACHER A</b>	<b>TEACHER B</b>	<b>TEACHER C</b>	<b>LITERATURE</b>	<b>DATA</b>
<b>Improve</b>	<ul style="list-style-type: none"> <li>- Move playhouse</li> <li>- Move storage</li> <li>- Climbing structure isn't challenging enough</li> </ul>	<ul style="list-style-type: none"> <li>- Climbing structure isn't challenging enough</li> <li>- Clear parts of woods for less dense nature area</li> </ul>	<ul style="list-style-type: none"> <li>- Move storage</li> <li>- Climbing structure is not challenging enough</li> </ul>		<ul style="list-style-type: none"> <li>- Playhouse needs replacing</li> </ul>
<b>Add</b>	<ul style="list-style-type: none"> <li>- Level open area for games</li> <li>- Digging pit</li> <li>- Trees for climbing</li> <li>- Spaces for small group play</li> <li>- Natural materials</li> </ul>	<ul style="list-style-type: none"> <li>- Creek with bridges</li> <li>- Rock wall climbing element</li> <li>- Interactive water elements</li> <li>- Garden</li> <li>- Level open area for games</li> </ul>	<ul style="list-style-type: none"> <li>- Trees for shade</li> <li>- More hills for running games</li> <li>- Level open area for games</li> </ul>	<ul style="list-style-type: none"> <li>- Textured and colorful plants</li> <li>- Hands-on tactile activity</li> <li>- Natural materials</li> </ul>	<ul style="list-style-type: none"> <li>- Level open area for games</li> <li>- Creek with bridges</li> </ul>
<b>Remove</b>	<ul style="list-style-type: none"> <li>- Playhouse</li> <li>- Corkscrew climbing element</li> </ul>				<ul style="list-style-type: none"> <li>- Musical instrument play</li> <li>- Canoe</li> <li>- Adaptive climber</li> </ul>
<b>Keep</b>	<ul style="list-style-type: none"> <li>- Sloped areas</li> <li>- Bike track</li> <li>- Sandbox</li> <li>- Swing set</li> <li>- Canoe</li> </ul>	<ul style="list-style-type: none"> <li>- Sloped areas</li> <li>- Basketball hoop</li> <li>- Tire swing</li> </ul>	<ul style="list-style-type: none"> <li>- Musical instrument play</li> </ul>		<ul style="list-style-type: none"> <li>- Swing set</li> <li>- Climbing structure</li> <li>- Nature access areas</li> <li>- Playhouse</li> </ul>
<b>Address</b>	<ul style="list-style-type: none"> <li>- Drainage near building</li> <li>- Adaptive and ADA play elements</li> </ul>	<ul style="list-style-type: none"> <li>- Drainage near building</li> <li>- Balance between natural and play areas</li> </ul>	<ul style="list-style-type: none"> <li>- Drainage near building</li> <li>- Maintenance and upkeep</li> </ul>	<ul style="list-style-type: none"> <li>- Legality of play elements</li> </ul>	<ul style="list-style-type: none"> <li>- Accessibility of woods</li> </ul>

# DESIGN CONCEPT AND PROGRAMMING

## Design Development

The data gathered from this study combined with the teacher interviews conducted and information gathered from the literature review lead to the conclusion that the best play environment for children is one that combines nature with play while maintaining elements at both ends of the spectrum. Understanding how programming plays a role in design plays a major role in this project. Figure 4.16 shows the early stages of thinking about design programming and the types of spaces that are needed at Stone House, providing spaces for both active and passive play, social and individual play, and practice, symbolic, and games with rules play begin to inform a more inclusive and well-rounded design.

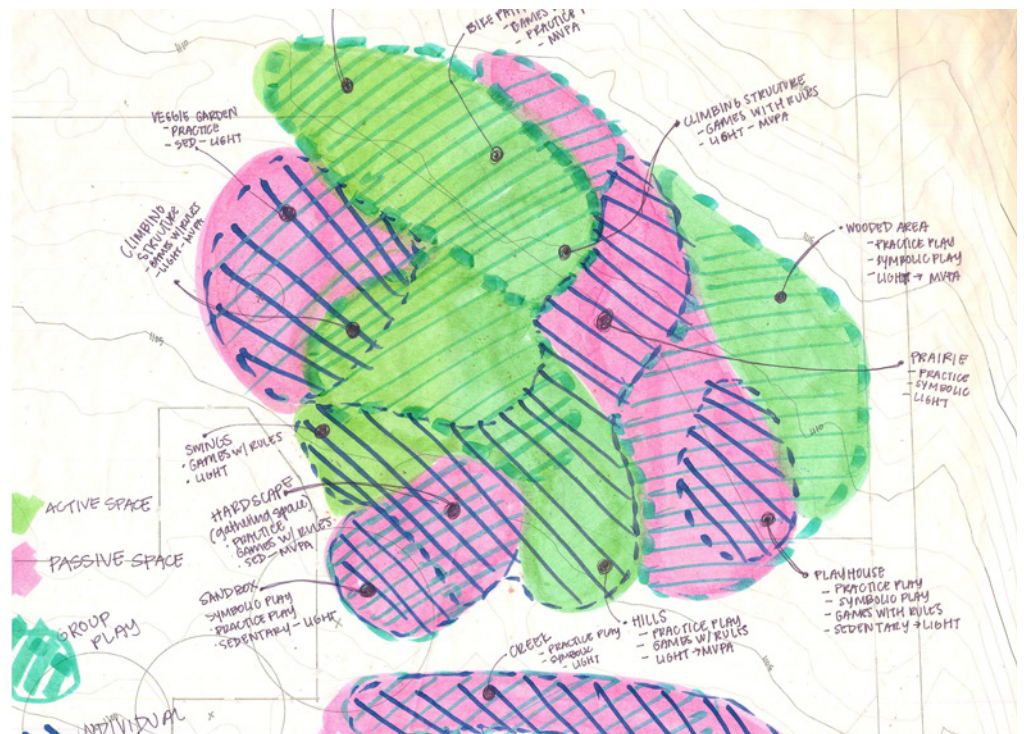


Figure 4.16: Programming Process Work



## Design Objectives

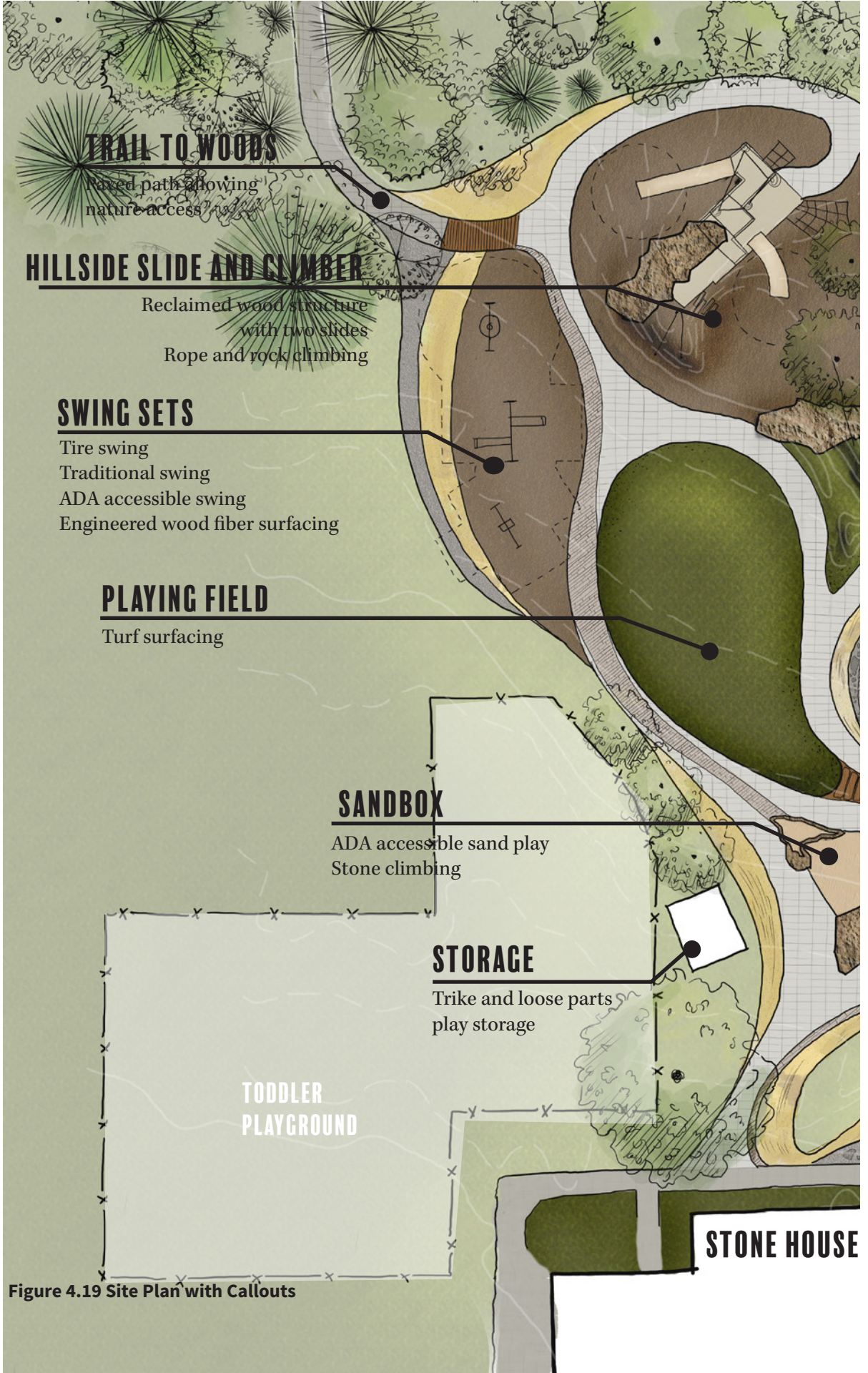
Three design goals sum up what is achieved through this design. The first is to make nature accessible. The second is to provide spaces for all types of play. The third is to merge natural elements with standard (traditional) elements. This site design achieves those three goals through careful design consideration that uses literature, observation, and interviews to create a playground that is a hybrid between the three observation settings of designed nature, standard playgrounds, and nature access.

This design relies heavily on programming and teacher-aided design to ensure that it provides spaces for all types of play and children looking for a wide variety of experiences. Table 4.8 provides more insight as to what the teachers at Stone House look for in a playground as well as what they wish to see added or removed from their current playground.



Figure 4.18: Design Process





**TRAIL TO WOODS**

Paved path allowing nature access

**HILLSIDE SLIDE AND CLIMBER**

Reclaimed wood structure with two slides  
Rope and rock climbing

**SWING SETS**

Tire swing  
Traditional swing  
ADA accessible swing  
Engineered wood fiber surfacing

**PLAYING FIELD**

Turf surfacing

**SANDBOX**

ADA accessible sand play  
Stone climbing

**STORAGE**

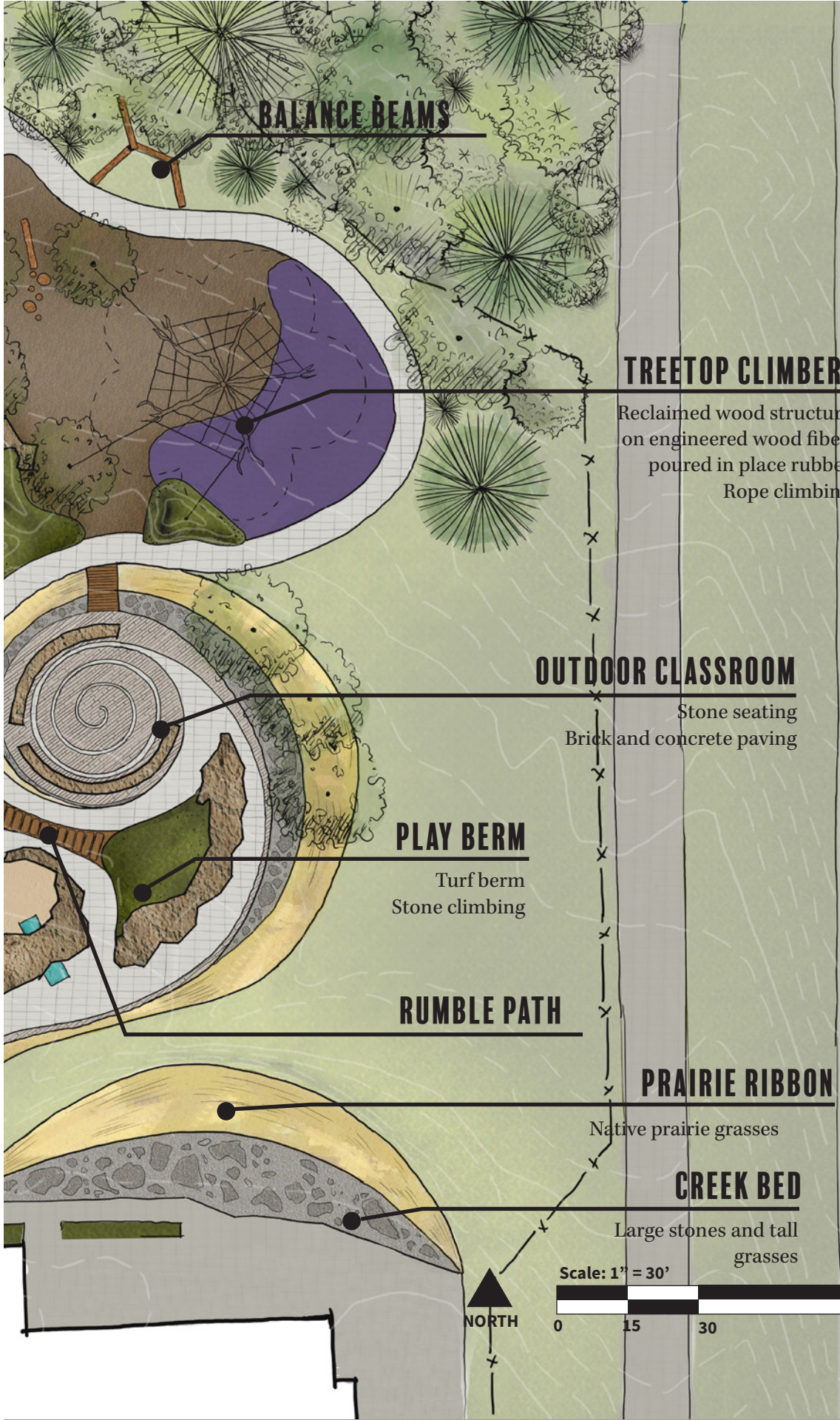
Trike and loose parts play storage

**TODDLER PLAYGROUND**

**STONE HOUSE**

Figure 4.19 Site Plan with Callouts





### BALANCE BEAMS

### TREETOP CLIMBER

Reclaimed wood structure  
on engineered wood fiber,  
poured in place rubber  
Rope climbing

### OUTDOOR CLASSROOM

Stone seating  
Brick and concrete paving

### PLAY BERM

Turf berm  
Stone climbing

### RUMBLE PATH

### PRAIRIE RIBBON

Native prairie grasses

### CREEK BED

Large stones and tall  
grasses

N. MANHATTAN AVE

Scale: 1" = 30'



NORTH

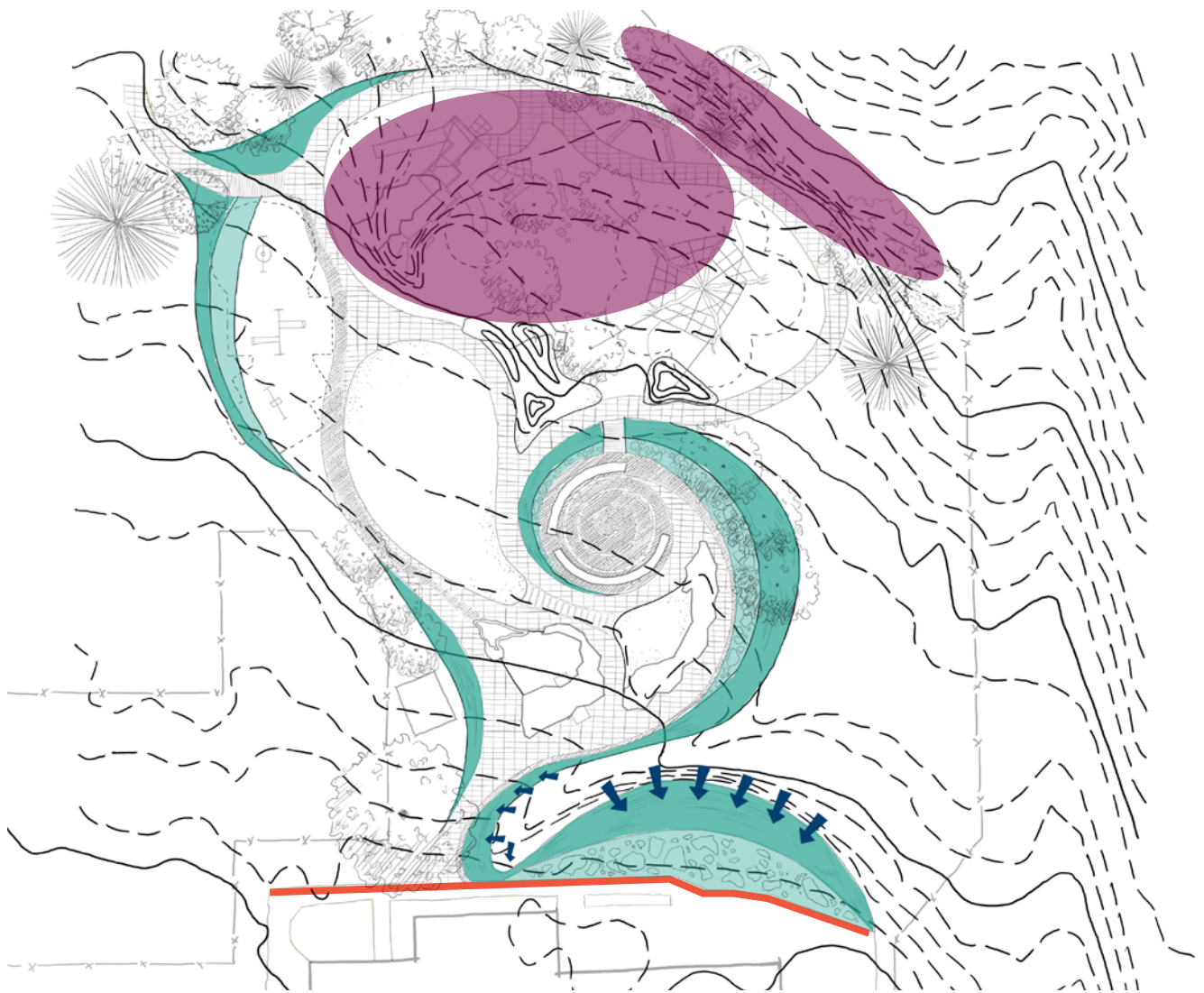
## Site Improvement

Drainage at Stone House is a pressing issue on the playground. Currently the site slopes down toward the building on the south end at a steep slope, causing water to pool at the base of the building and create mud puddles. The teachers of Stone House have taken planks from the playground and bridged them across the mud, but the site is in need of a more permanent solution. All three teachers addressed wanting a better system for dealing with stormwater runoff during teacher interviews.

The Prairie Ribbon and Dry Creek Bed solves this drainage issue. The dry creek bed was the fourth most visited area of the CCD playground with 11 out of 17 children and 10.63% of behavior points, suggesting that it would also be an extremely well-used element at Stone House. The prairie ribbon and creek weaves its way throughout the playground, beginning from the very top of the site and making its way down to the bottom. Lining the creek with this ribbon of native prairie grasses will absorb a large amount of runoff into the root systems of the plants. Any additional runoff will fill the usually-dry creek bed and channel its way neatly through the site and away from the building.

The prairie ribbon adds textures, colors, and interest to the playground that Stone House currently does not have. Children can feel like they are on an adventure in the native grasses that are as tall as they are while remaining in a safe and controlled environment. Adding these colors, textures, and sounds made by the grasses will enhance the play of the children at Stone House (BVSD 2006, Keller 2008). The dry creek bed will also provide opportunities for learning about ecosystems as the children engage in the creek in times of dry and wet weather. They will see how weather conditions have an impact on how the creek functions. These natural elements also provide opportunities for symbolic and practice play as children create their own games and balance on the large rocks that fill the creek.





- Creek
- Prairie Ribbon
- French Drain
- Direction of Flow
- Hill
- 1ft Contour

**Figure 4.20: Drainage**

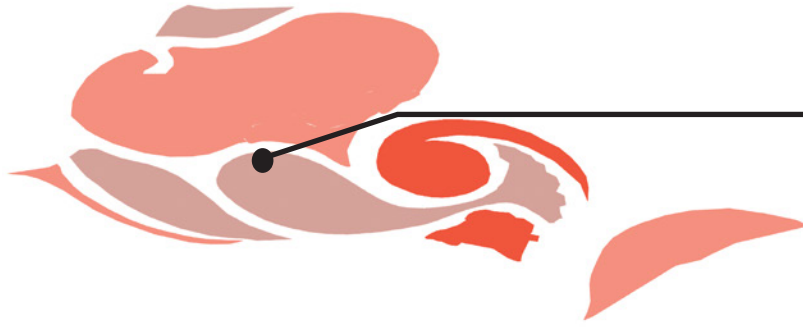
A significant amount of grading is required in order to achieve the proposed design. The Stone House playground sits on a slope with approximately 25 feet of grade change from the building's base to the fence on the north side. This creates many challenges as far as accessibility and drainage. Because of this large amount of grade change, several different landforms were moved or changed in this design. A large hill was created in the wooded play area in order to create flat land for the climbing structure as well as the outdoor classroom. A second, steeper hill was created north of the wooded play area in order to design a sidewalk that is ADA compliant. A ridge along the prairie ribbon and dry creek bed was also created in order to direct water into the plantings and creek so it can be absorbed before reaching the building.

## **Playground Activity**

The redesign of Stone House's playground ensures that children have access to all types of play they may choose to engage in. This means areas for individual play, such as the sandbox, swing set, and hillside slide, as well as areas for group play, such as the playing field, outdoor classroom, and treetop climber. The program of the site also provides areas for ADA accessible play, taking into account children who may be mobility-impaired. These areas include the swing set, sandbox, outdoor classroom, treetop climber, and first platform of the hillside slide. Children who are bound to a wheelchair can still engage in play with children who are able-bodied

## TYPES OF PLAY

Practice Play  
Symbolic Play  
Games with Rules



## PHYSICAL ACTIVITY

Active Play  
Passive Play



## ACCESS AND CIRCULATION

Paved Paths  
ADA Accessible Play Structure

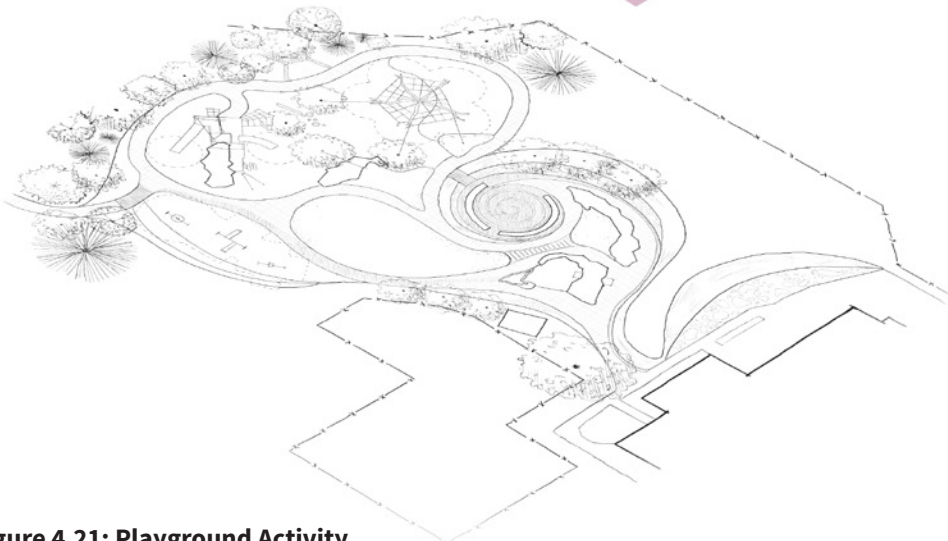
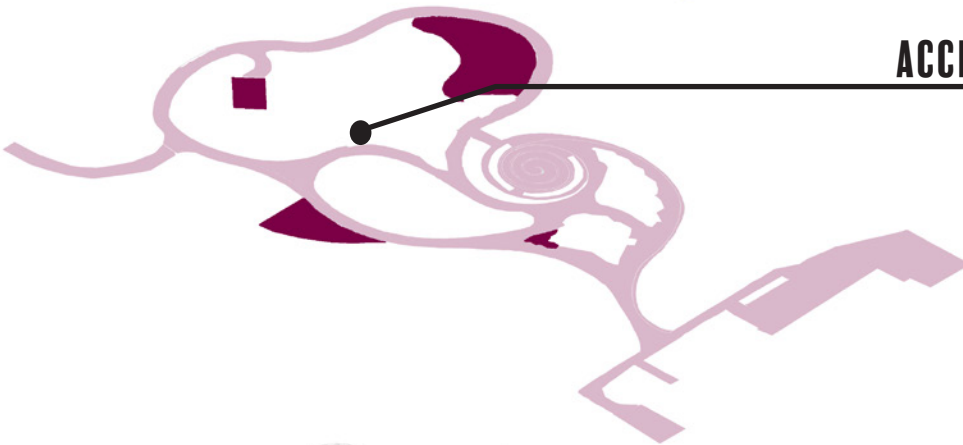


Figure 4.21: Playground Activity

## Planting Plan

Plants chosen for this project were selected for three reasons: texture, smell, and function. These plants can be seen in Figure 4.30. Many of the trees in this design were chosen for the textures that they provide the playground with in addition to providing shade. The Eastern redbud brings color to the playground with its blossoms while the Northern catalpa's seed pods are long and linear, providing children with a new natural object to play with as they fall from the tree. Rosemary, while not traditionally found in forested areas, adds the experience of smell to the playground while Lamb's ear provides a unique touch experience. Turf as groundcover in the open play area provides a base for children to play a variety of games, whether they are running or kicking a ball. The prairie plants selected are native to the site's eco-region. These deep-rooted grasses will allow stormwater runoff to be collected and infiltrated back into the soil before reaching the building at the base of the site.

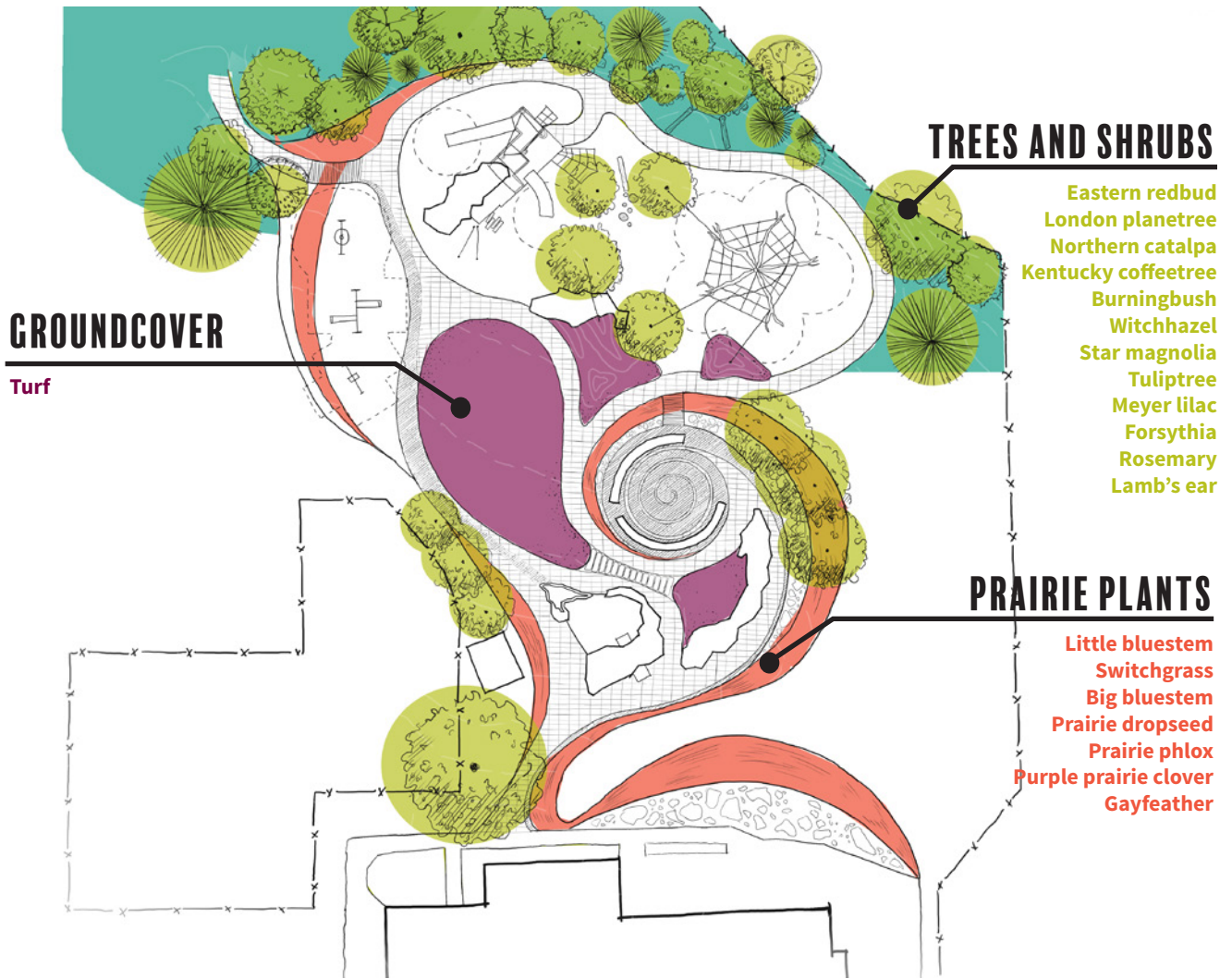


Figure 4.22: Vegetation





Figure 4.23: Outdoor Classroom, Looking South





## Outdoor Classroom

Creating an outdoor classroom provides opportunities for children who attend preschool at Hoeflin Stone House to engage in the learning process outside of their traditional learning environment. Research shows that nature has a calming, focusing effect on children that allows them to better engage in their studies (Pellegrini and Bohn 2005). Teachers at Stone House expressed an interest in more open spaces, and the outdoor classroom provides one of two open spaces within the playground. This outdoor classroom features two curved benches that create a circular, amphitheater-like environment in which the children can have all eyes on their teacher while engaging in class activities. The ground plane is paved in a distinctive swirl of red brick and concrete, creating unique textures and colors for the children to experience as they engage in play. The outdoor classroom is shaded by several ornamental trees as well as a shade structure, providing relief from the sun in the hot summer months as well as shelter from snow in the wintertime. The prairie ribbon encircles the classroom, giving children a sense of privacy and separation from the rest of the playground while also maintaining visibility for teachers. A bridge from the outdoor classroom crosses the dry creek bed and connects children to the wooded play area. Enclosing the outdoor classroom to the south is a small grass hill that can be used as additional classroom seating if necessary.



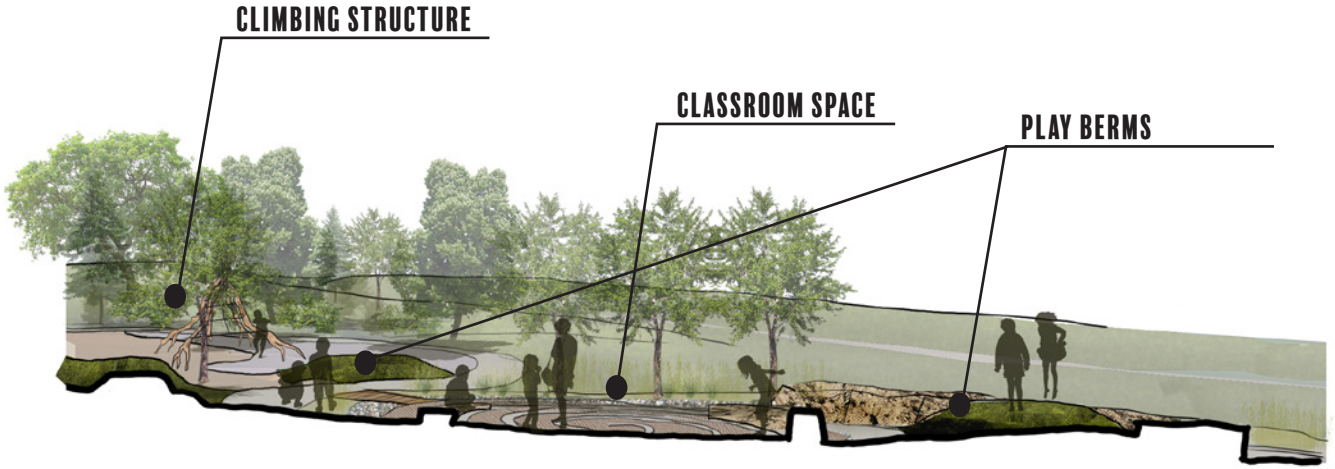
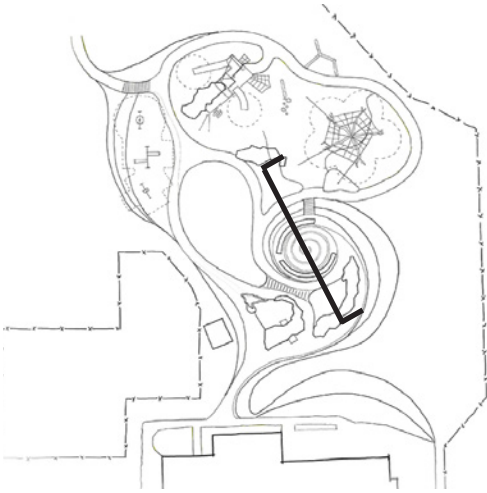
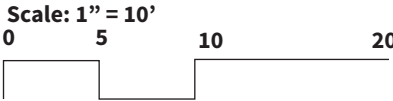


Figure 4.24: Section: Outdoor Classroom looking East



Key Map



Figure 4.25: Hillside Slide looking Northwest





## Hillside Slide

Stone House currently has one slide that does not particularly challenge the preschoolers. Despite this, the slide structure was one of the most popular elements on this playground as well as on the playground at the CCD. When interviewed, the teachers at Stone House mentioned wanting a slide and climbing structure that would provide more challenge to their students. The Hillside Slide structure will provide new opportunities both for climbing, sliding, and natural discovery.

The Hillside Slide provides two different slide challenges for children at Stone House. Nestled into the terrain, children have the option to climb up stairs, run up the slope, climb up the rock wall, or take the paved path to reach the top of the lower slide, which is embedded into the hill. This sunken slide connects children directly with their surroundings and helps them better understand the earth. This platform is also wheelchair accessible via the paved path. Children also have the option to challenge themselves further and climb higher to the second, raised platform in order to slide down the tube slide. This higher climb helps them form a connection to the trees as they lay down and slide through the clear tubing, looking at the tree canopy and sky as they slide. Built from reclaimed wood, the natural timber of this climbing structure and the cooperation with the terrain within the forest helps create lasting impressions of nature while also allowing children to gain a better understanding of their environment.

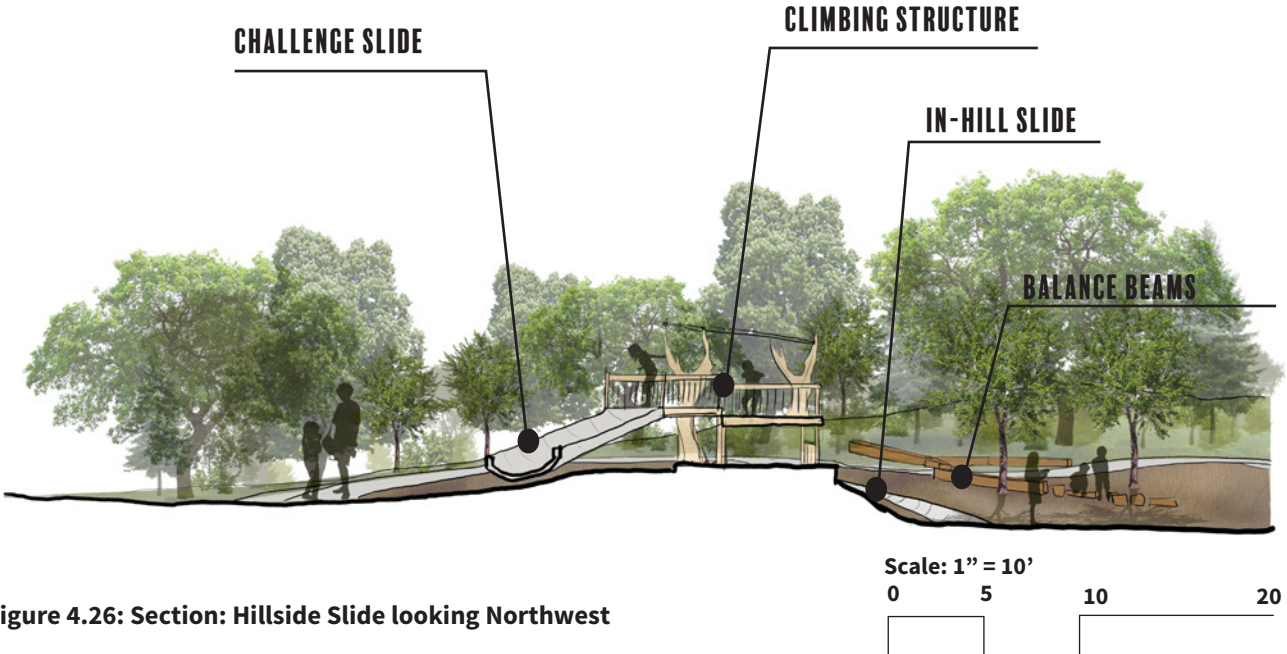


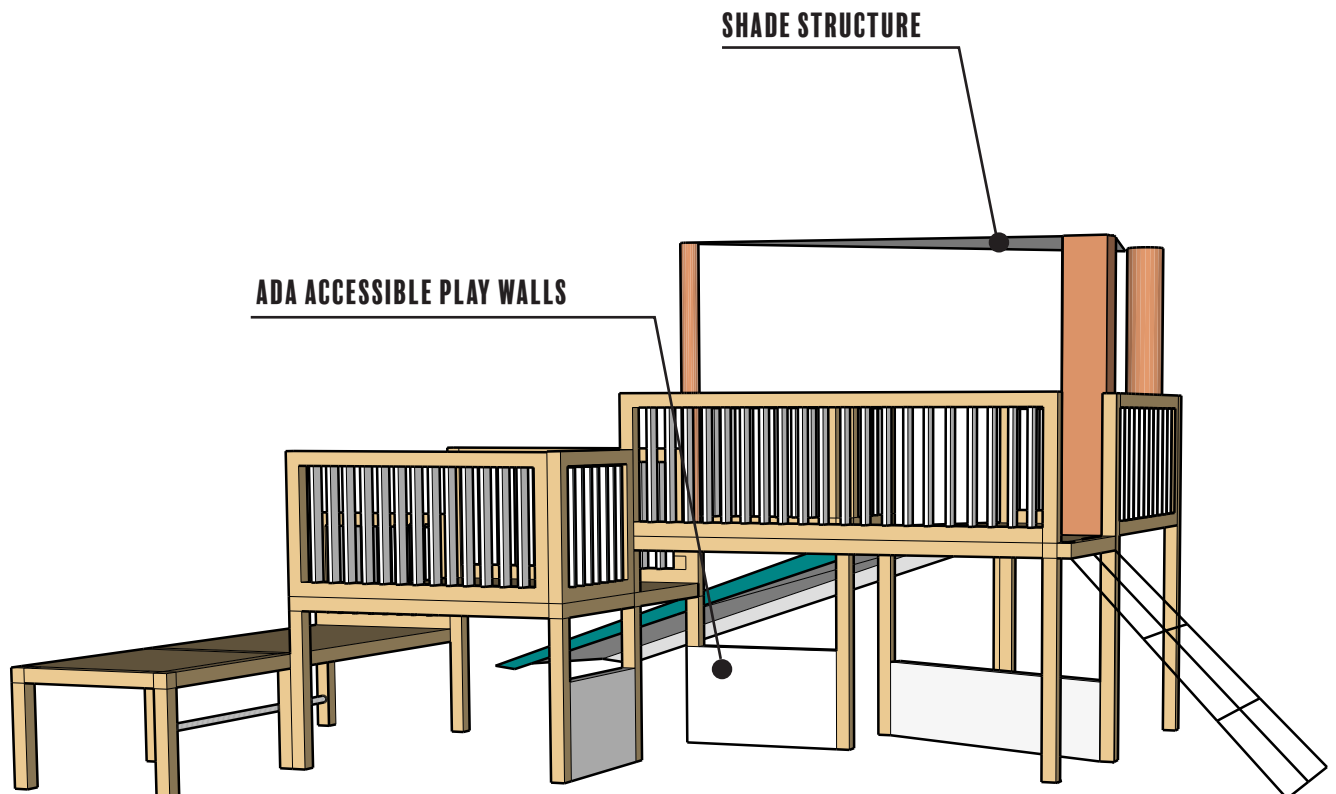
Figure 4.26: Section: Hillside Slide looking Northwest



Key Map



The hillside slide structure (Figures 4.31-4.33) sits atop the hill in the northern play area. It features two slides. One slide, not pictured, is built into the slope of the hill and can be seen in figures 4.28 and 4.29. The second slide, on the side opposite the first, is taller, more challenging, and a straight slide, making it faster. This structure was designed with the intention of providing a variety of challenges to children ages three to five. The three platforms, two, three, and four feet high respectively, allow children to feel as though they are climbing up higher into the trees. Beneath the platforms are a series of low handicap accessible panels which could feature a variety of ADA sensory play items such as play instruments, hands-on tic-tac-toe, and more. The highest platform is reachable either by climbing the platforms like stairs or using the rope ladder. The lowest platform can be reached by climbing a small two-rung ladder.



**Figure 4.27: Slide Structure - View from South**

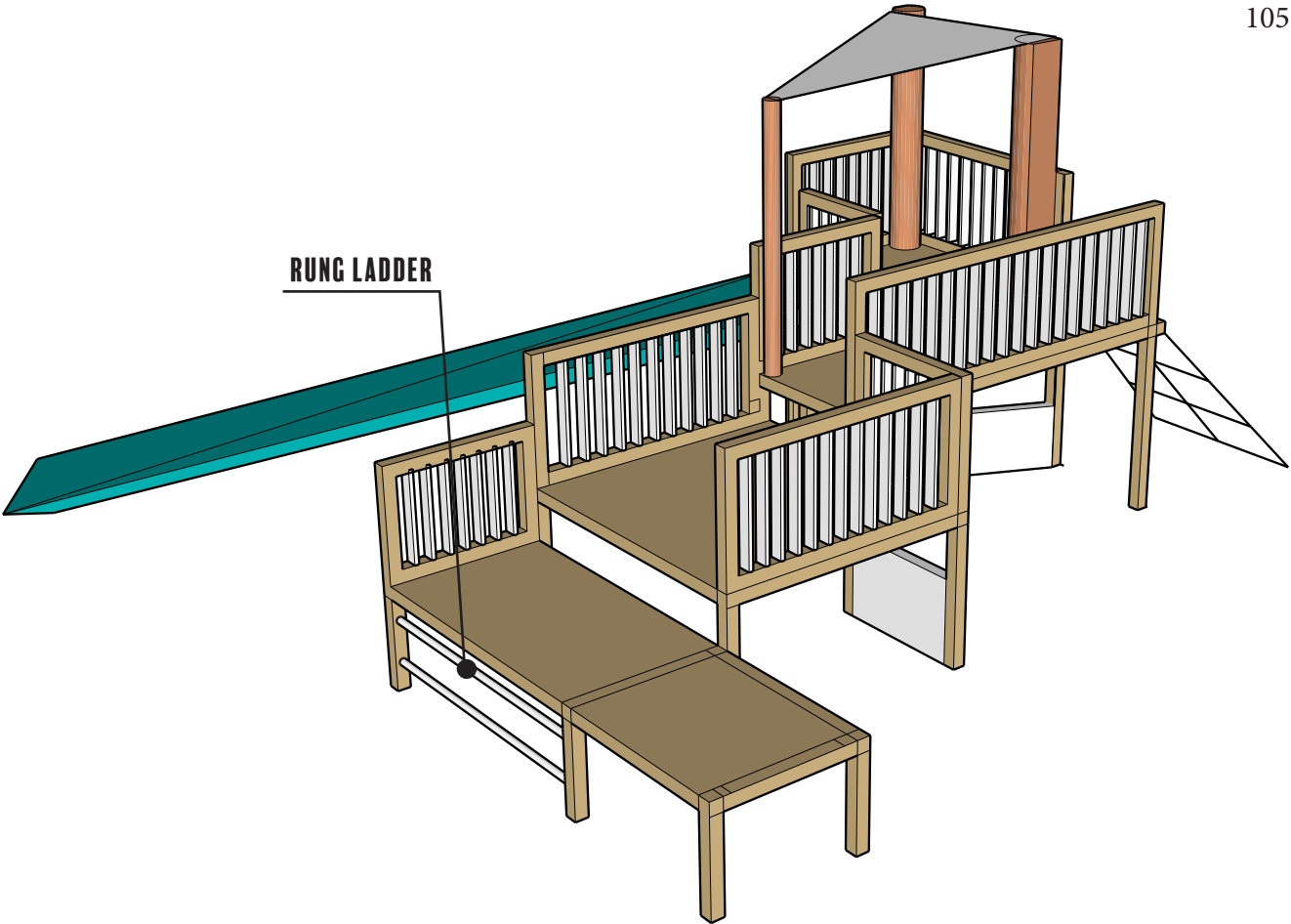


Figure 4.28: Slide Structure - Aerial View looking Northeast

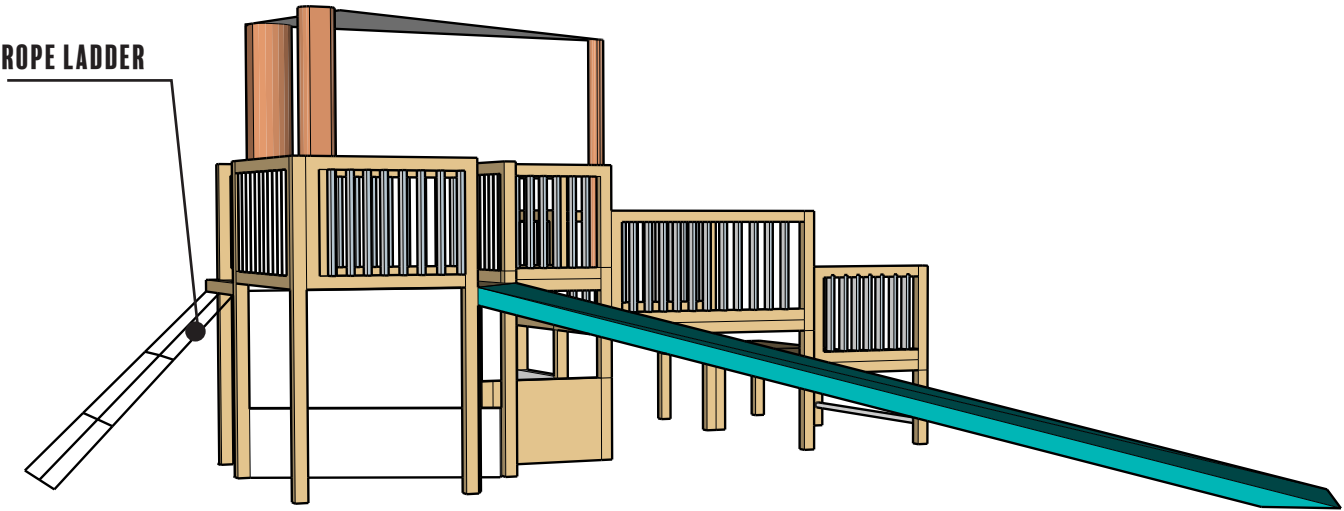


Figure 4.29: Slide Structure - View from North





Figure 4.30 Treetop Climber





## Treetop Climber

Adding an updated and more challenging climbing structure will enhance play experiences for children of all ages at Stone House and provide opportunities for their play to grow with them rather than have them grow out of the play the current structure offers. In interviews with teachers, the desire to bring in a taller structure came up several times both with teachers A and B. This is also supported by the popularity of the current climbing structure, which was visited by 11 out of the 15 subjects observed at Stone House and contained 12.29% of all recorded behavior points at Stone House. The slide was also one of the most popular elements at the CCD. The CCD slide fits better with the descriptions from both teachers A and B. It is taller and provides a more challenging slide with a rock climbing wall, however it lacks the more natural timber look desired by both teachers.

The Treetop Climber is a unique climbing structure designed specifically to merge nature with traditional play. Similar to a standard jungle gym, the Treetop Climber provides children with the opportunity to pick their own path to climb up, across, around, or through the forest. This climber is made of reclaimed tree trunks, forming a structure designed with the intent to appear to be constructed of branches, twigs, and rope. The appearance of tree branches falling together to create this structure allows children to feel as though they are climbing through the forest, high above the ground even while they are truly only one to two feet up. They can play imaginatively, climb safely, and explore nature in any way they choose. This structure sits atop poured-in-place rubber, providing a softer surface if they should fall as well as providing ADA access for children who may be mobility-impaired. The cable “ropes” connect not only the branches within the structure but extend out to other elements within the playground such as existing trees and hilltops, allowing children to truly feel they are climbing through the forest canopy.

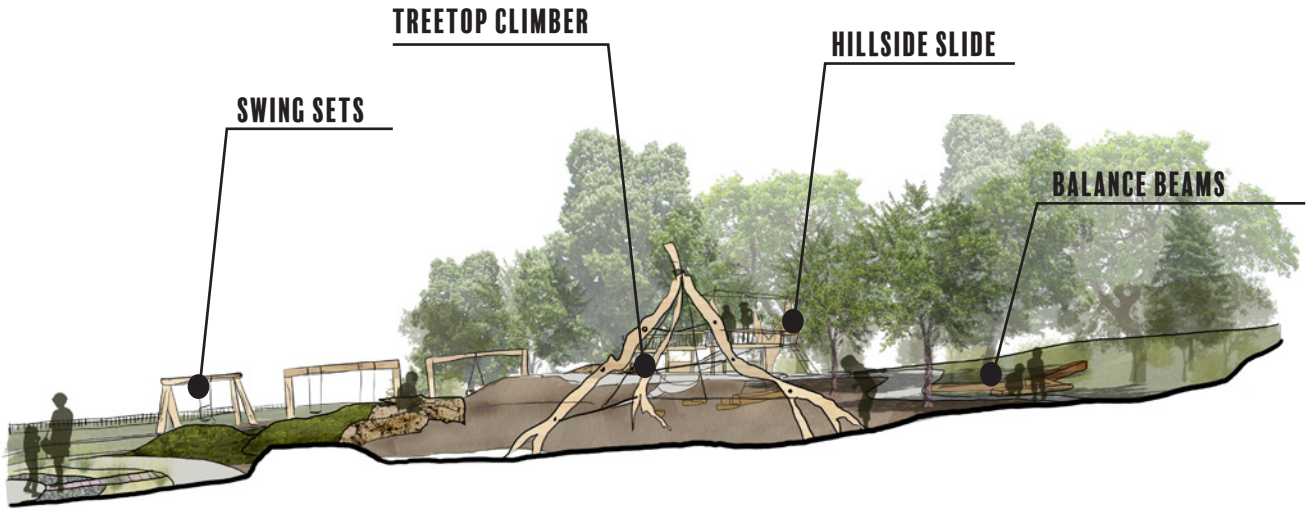
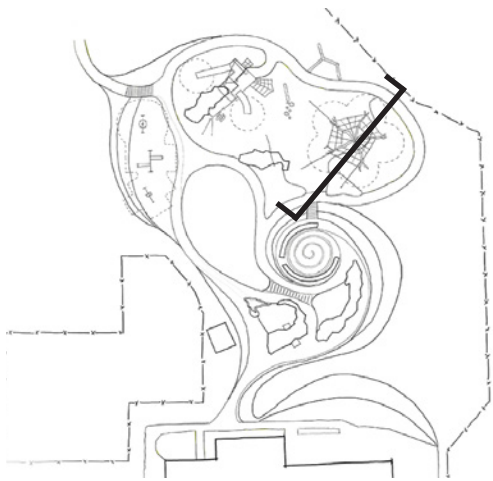
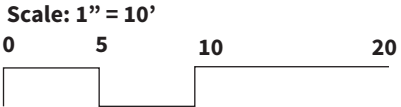


Figure 4.35- Section: Treetop Climber looking Northwest



Key Map

## Summary

This playground successfully merges the natural world with the designed world in a way that provides children with the opportunity to play in any way they may choose. The different areas of play create environments in which children may play traditional games or on standard structures like slides and jungle gyms but in a way where they are still in contact with the natural environment. Three design goals have been achieved through this playground design. The first, making nature accessible, is achieved through the variety of paths the children may take during their playtime. Children can choose to remain away from the woods and in more familiar areas, or they can cross the bridge, take the path, and enter a wooded area that immerses them with nature completely. The second design goal, provide spaces for all types of play, is achieved through the variety of play spaces within the playground and can be understood better through the activity diagram (Figure 4.23). The third design goal, merging natural elements with standard (traditional) elements, is achieved in the details of the playground. The materials chosen, the plantings installed, and the layout of the playground all create connections with nature and blurs the lines between what is traditional and what is natural. These three design goals help create a hybrid playground in which children can play freely, safely, and beneficially.









Figure 5.1: ECD Playground: Open Space





# CONCLUSION

## Chapter Five

## Summary of Key Findings

Children in designed nature environments experienced all the same types of play as children in standard and nature access environments. These categories of play—practice play, symbolic play, and games with rules play—are equal in value. While the participants in each setting were observed engaging in the same types of play, there was an observable difference in play. The difference observed was the amount of each type of play that occurred. Certain play elements afforded more opportunity for practice play than games with rules play. Other play elements afforded more opportunity for games with rules play than symbolic play. The environmental makeup of the playground had less of an impact on behavior than the functions of the play elements within the playground did. This supports the design goal of merging natural elements with standard elements. Simply focusing on designed nature or traditional play areas does not provide children with a variety in play opportunities.

If playgrounds are to enhance development, a combination of nature and standard elements are to be included in the design. Setting 1, the designed nature playground supported games with rules play because of the open spaces that allowed for running across the site uninterrupted. Setting 2 did not support games with rules play because there were no continuous, flat open spaces in which children could run freely. Settings 2A and B afforded more opportunities for practice play because of the opportunities for climbing and challenge. Participants were able to explore their physical ability to climb and balance on both the climbing structure as well as in the nature access area. Setting 1 did not have many opportunities to climb, therefore did not have as high of a percentage of practice play. Setting 2 afforded more opportunity for group play than Setting 1. Setting one's reliance on "loose parts" play elements allowed children to play in a more individualized way in which they could pick up a play element and carry it with them. This eliminated a need to share space. Setting 2 did not have any "loose parts" elements. Because of this, children were required to engage more with each other to stay entertained. They could not pick up a toy and play in their own space. Based on this information, it can be understood that a playground with elements from all three play settings provides the most opportunity for diverse play among preschool children.



## Limitations

While this study included small numbers of children in each setting, this is a consequence of licensure limitations on group size per classroom. To increase this sample would require additional facilities with the same playground designs. The small sample size of children in this study limited the amount of data collected and the amount of variety in that data. Observing a larger group of children would allow for a better understanding of the different ways children interact with their environments. Observation was conducted in December 2016 at the Center for Child Development (CCD) and in February 2017 at Hoeflin Stone House Early Childhood Center. The weather was very cold and most vegetation was dead or snow-covered. This may have an impact on the way children engage with their natural environment. These low temperatures might cause children's behaviors to be different than in warmer weather, but this limitation can also be interpreted as a strength as well.

Another major limitation in this study is that the teaching styles between the CCD and Stone House differ, resulting in different levels of teacher involvement. In many cases, play at the CCD was led or influenced by a teacher. This removes the unstructured element on play from the child's experience and may have impacted how the children at the CCD interacted with their environment. It was also observed that certain teachers had greater influence on play. If a teacher at the CCD was engaging in play with the children, the children were more likely to play whatever it was the teacher was playing as well. Therefore if the teachers played more games with rules such as tag or catch, children would be more likely to play those games too. Other limitations to this study include the time of observation. The CCD was observed in late afternoon and Stone House was observed in late morning. The time of observation may impact children's play, because children at the CCD may have been restless from a day in the classroom and children at Stone House may have been anxious to go inside for lunchtime. Classroom lessons also may have impacted the way children play. For example, one day children at the CCD learned to make paper airplanes and were allowed to use them in outdoor play, which was not typical for their outdoor time.

The biggest limitation to this study is the lack of secondary observers to eliminate bias and reinforce observations. The single observer may have missed a specific behavior or interpreted it differently than an additional observer would have. This lack of an observation team limits the study to what the single observer saw. Having a second observer map on the same 30-second interval system would also help the behavior point data more reliable. The single observer was not able to cross-check data points with another map.

## Relevance and Future Study

It is important to understand how children will interact with their environment in order for them to benefit from it. There is research that shows the benefits of children engaging with nature but far less research showing how effective nature playgrounds are after they have been installed. The support for nature-based play is there, but the proof that specific design moves will have their desired effect is lacking. This research is important because it is a step towards designing more purposeful playgrounds that children will truly enjoy, engage with, and learn from. The more purposefully designed a playground is, and the more confidence a designer can have that it will be used in the way it was intended, is the first step towards getting today's children to gain back the connection with nature they may have lost otherwise and show them that the outdoors can be just as fun as a video game, given the right circumstances. Well-designed, engaging, and nature-filled playgrounds in preschool environments will foster a connection with the earth that a standard playground cannot, and that will stay with a child throughout their lives.

Future research for this study includes comparing play behavior throughout the year to understand the effect that weather can have on play. This study is unique because primary observation was done in below freezing temperatures. Typically, parents and teachers are reluctant to let children play outdoors for extended periods of time in freezing weather, but both Stone House and the CCD's policies called for outdoor play so long as the temperature stayed above 16 degrees with wind chill. Similar studies have been done in warm weather, but few have been conducted in winter. This wintertime play study fills a research gap and adds data to support the argument that play is

valuable in all seasons and settings . To improve upon this study, future data should be collected over the course of one year with observation taking place in all four seasons. Children are more likely to play longer in warmer weather, and it can be assumed that they will play differently as well. Conducting observation in each season will provide a better understanding of how children play in their environment and whether play changes with the seasons or remains a consistent behavior year round. Additionally, research can be conducted at a more extreme “standard” playground. Stone House was an exception to the rule in that it was bordered by a forested area, which most likely impacted the way children played. Schools that have no option for nature most likely have students that behave differently with the environments they are given. Future research would need to be conducted to fully understand the impact of seasonal difference.

# CONCLUSION

This master's report informs the growing popularity of nature-based play and whether designing for nature play is more successful for affording a variety of experiences than designing for standard play. This project has provided evidence to suggest that a large amount of designing for nature-based play is designing for opportunity and has little to do with the physical elements themselves. Many of the areas in Setting 1: Designed Nature were not used at all despite the careful consideration that was put into their design. It also shows that while nature-based play is important for the developmental benefits it provides, it is important to think about the type of play children should be engaging in. The playground at the CCD was designed with the intent of providing nature play opportunities, however most of the play that occurs there is teacher-led games with rules play. Stone House is less formally designed than the CCD, but lacks spaces for children to engage in games with rules style play. Children in the two different preschools played differently because of the design of their environments. Each design decision has an effect on play.

Understanding the goals for a playground is just as important as creating a design that achieves those goals. Evidence from this study suggests different elements in each playground afforded different types of play. Designers and educators should ask themselves when thinking of playgrounds not as cut-and-paste pieces to be laid out on a site, but what each of those pieces provides and how they can be combined with each other to enhance the play experience of children. The question is not "should we have a nature playground or a traditional playground," but "what parts of each of these playgrounds can be used to enhance play?" Neither play environment is better or more important than the other, because each affords different opportunities. The landscape architectural profession is preoccupied with creating natural play spaces that connect children with nature in unique and creative ways. This is by no means bad, but it disregards the positive play behaviors that traditional playgrounds can afford children as well. Diverse play cannot be achieved through a homogenous design. Diverse and valuable play that affords opportunities for active and passive, group and individual play is achieved by taking elements that evidence suggests affords these types of behavior and combining them in a way that creates a cohesive, safe, and effective play space.





Figure 5.2: Tree Climbing in Setting 2B



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**NOTE:**

All photos, diagrams, and figures were created by the author of this report unless otherwise stated.





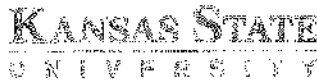




# APPENDIX

The appendices of this report provide supplemental information and may not be relevant to the entire body of this report.

# APPENDIX A: IRB APPROVAL AND MODIFICATION



University Research Compliance Office

TO: Hyung Jin Kim  
IARCP  
Seaton Hall

Proposal Number: 8513

FROM: Rick Scheidt, Chair  
Committee on Research Involving Human Subjects

DATE: 10/27/2016

RE: Proposal Entitled, "Redefining Playscapes: Interaction with Nature at the Center for Child Development"

The Committee on Research Involving Human Subjects / Institutional Review Board (IRB) for Kansas State University has reviewed the proposal identified above and has determined that it is EXEMPT from further IRB review. This exemption applies only to the proposal - as written - and currently on file with the IRB. Any change potentially affecting human subjects must be approved by the IRB prior to implementation and may disqualify the proposal from exemption.

Based upon information provided to the IRB, this activity is exempt under the criteria set forth in the Federal Policy for the Protection of Human Subjects, **45 CFR §46.101, paragraph b, category: #2, subsection: ii.**


Certain research is exempt from the requirements of HHS/OHRP regulations. A determination that research is exempt does not imply that investigators have no ethical responsibilities to subjects in such research; it means only that the regulatory requirements related to IRB review, informed consent, and assurance of compliance do not apply to the research.

Any unanticipated problems involving risk to subjects or to others must be reported immediately to the Chair of the Committee on Research Involving Human Subjects, the University Research Compliance Office, and if the subjects are KSU students, to the Director of the Student Health Center.



University Research Compliance Office

TO: Hyung Jin Kim  
LARCP  
Seaton Hall

FROM: Rick Scheidt, Chair   
Committee on Research Involving Human Subjects

DATE: 12/08/2016

RE: Proposal #8513.2, entitled "Redefining Playscapes: Interaction with Nature at the Center for Child Development."

A MINOR MODIFICATION OF PREVIOUSLY APPROVED PROPOSAL #8513.1,  
ENTITLED, "Redefining Playscapes: Interaction with Nature at the Center for Child Development"

Add Dr. Bronwyn Fees to the protocol.

The Committee on Research Involving Human Subjects at Kansas State University has approved the proposal identified above as a minor modification of a previously approved proposal, and has determined that it is exempt from further review. This exemption applies only to the most recent proposal currently on file with the IRB. Any additional changes affecting human subjects must be approved by the IRB prior to implementation and may disqualify the proposal from exemption.

Unanticipated adverse events or problems involving risk to subjects or to others must be reported immediately to the IRB Chair, and / or the URCO.

It is important that your human subjects project is consistent with submissions to funding/contract entities. It is your responsibility to initiate notification procedures to any funding/contract entity of changes in your project that affects the use of human subjects.

TO: Hyung Jin Kim  
LARCP  
Seaton Hall

FROM: Rick Scheidt, Chair   
Committee on Research Involving Human Subjects

DATE: 12/08/2016

RE: Proposal #8513.2, entitled "Redefining Playscapes: Interaction with Nature at the Center for Child Development."

A MINOR MODIFICATION OF PREVIOUSLY APPROVED PROPOSAL #8513.1,  
ENTITLED, "Redefining Playscapes: Interaction with Nature at the Center for Child Development"

Add Dr. Bronwyn Fees to the protocol.

The Committee on Research Involving Human Subjects at Kansas State University has approved the proposal identified above as a minor modification of a previously approved proposal, and has determined that it is exempt from further review. This exemption applies only to the most recent proposal currently on file with the IRB. Any additional changes affecting human subjects must be approved by the IRB prior to implementation and may disqualify the proposal from exemption.

Unanticipated adverse events or problems involving risk to subjects or to others must be reported immediately to the IRB Chair, and / or the URCO.


It is important that your human subjects project is consistent with submissions to funding/contract entities. It is your responsibility to initiate notification procedures to any funding/contract entity of changes in your project that affects the use of human subjects.





University Research Compliance Office

TO: Dr. Hyung Jin Kim  
Landscape Architecture and Regional & Community Planning  
Seaton Hall

FROM: Rick Scheidt, Chair   
Committee on Research Involving Human Subjects

DATE: 02/14/2017

RE: Proposal #8513.3, entitled "Nurture Through Nature: A Comparative Study Between Standard and Nature-Based Play in Outdoor Preschool Environments."

A MINOR MODIFICATION OF PREVIOUSLY APPROVED PROPOSAL #8513.2,  
ENTITLED, "Redefining Playscapes: Interaction with Nature at the Center for Child Development"

The Committee on Research Involving Human Subjects at Kansas State University has approved the proposal identified above as a minor modification of a previously approved proposal, and has determined that it is exempt from further review. This exemption applies only to the most recent proposal currently on file with the IRB. Any additional changes affecting human subjects must be approved by the IRB prior to implementation and may disqualify the proposal from exemption.

Unanticipated adverse events or problems involving risk to subjects or to others must be reported immediately to the IRB Chair, and / or the URCO.

It is important that your human subjects project is consistent with submissions to funding/contract entities. It is your responsibility to initiate notification procedures to any funding/contract entity of changes in your project that affects the use of human subjects.

# APPENDIX B: CONSENT FORMS



THE COLLEGE of  
ARCHITECTURE, PLANNING & DESIGN // K-STATE

## Graduate Research at the Center for Child Development

### Photo Release Form

Hello parents of the CCD! My name is Abigail Fiala and I am a graduate student in the Department of Landscape Architecture and Regional & Community Planning. I am doing my graduate research on nature-based play in preschool environments and would like to do some behavioral observation at the Center for Child Development..

Nature-based play is an extremely valuable part of childhood development and education. I will be observing playtime at the Center for Child Development using my own notes as well as video footage to supplement my observations. I will be observing the CCD's preschool playtime for one hour per day for five consecutive days. I will not be interacting with the children in any way and will not alter any aspect of their day-to-day experiences at the CCD. The resulting observations will be used to develop a set of guidelines for designing for nature-based play. I will use these guidelines to create an improved and enhanced design for the play areas at the CCD that allow children to fully experience nature and its benefits while engaging in active and creative play. This study will involve no more risk than the minimal risk the children experience every day during their playtime.

I am asking for permission to take photos of the children at play. Photos may be used in my final publication which I will share with the CCD and relevant journals. **No identities of any children will ever be recorded or released for any reason.** Participation in this study is by no means required and you may discontinue your participation at any time. Please feel free to contact me with any questions or concerns. Please return this form to your child's classroom teacher.

Thank you,  
Abigail Fiala, Graduate Student  
[afiala@ksu.edu](mailto:afiala@ksu.edu) | 314.780.0690

University Research Compliance:  
[comply@ksu.edu](mailto:comply@ksu.edu) | 785.532.3224

Hyung Jin Kim, Major Professor  
[hyungjin@ksu.edu](mailto:hyungjin@ksu.edu) | 785.532.4753

IRB Contact: Rick Scheidt  
[rscheidt@ksu.edu](mailto:rscheidt@ksu.edu) | 785.532.1483

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Parent Signature

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Date

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Your Child's First Name



THE COLLEGE of  
ARCHITECTURE, PLANNING & DESIGN // K-STATE

## Graduate Research at the Stone House Facility

### Release Form

Hello parents of Stone House! My name is Abigail Fiala and I am a graduate student in the Department of Landscape Architecture and Regional & Community Planning. I am doing my graduate research on nature-based play in preschool environments and would like to do some behavioral observation at the Hoeflin Stone House facility.

Nature-based play is an extremely valuable part of childhood development and education. I will be observing playtime at Stone House using my own notes as well as photographs to supplement my observations. I will be observing Stone House's preschool playtime for one hour per day for five consecutive days or until the desired amount of subjects have been observed. I will not be interacting with the children in any way and will not alter any aspect of their day-to-day experiences at Stone House. The resulting observations will be used to develop a set of guidelines for designing for nature-based play. This study will involve no more risk than the minimal risk the children experience every day during their playtime.

I am asking for permission to take photos of the children at play. Photos may be used in my final publication which I will share with the Stone House and relevant journals. **No identities of any children will ever be recorded or released for any reason. Still photos may be taken, but no specific child will be identified. Faces, should they appear, will be blurred to remove the ability to identify.** Upon completing this study, data will be given to Dr. Hyung Jin Kim and kept under lock and key. Participation in this study is by no means required and you may discontinue your participation at any time. Please feel free to contact me with any questions or concerns. Please return this form to your child's classroom teacher.

Thank you,  
Abigail Fiala, Graduate Student  
[afiala@ksu.edu](mailto:afiala@ksu.edu) | 314.780.0690

University Research Compliance:  
[comply@ksu.edu](mailto:comply@ksu.edu) | 785.532.3224

Hyung Jin Kim, Major Professor  
[hyungjin@ksu.edu](mailto:hyungjin@ksu.edu) | 785.532.4753

IRB Contact: Rick Scheidt  
[rscheidt@ksu.edu](mailto:rscheidt@ksu.edu) | 785.532.1483

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Parent Signature

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Date

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Your Child's First Name

# APPENDIX C: INTERVIEW TRANSCRIPTS

## Interview: Teacher A

### **Q: What are your perceptions of nature-based play and how it relates to early childhood development?**

I believe that interaction with nature on a day to day basis for hours is beneficial for children. Allows varied opportunity in development. Motor skills social skills understanding our effects on nature on each other it can aid in building cognitive skills, math measurement length height... I think it also helps develop that sense of emotional peace and calming... going outside allows children who may not be as successful indoors to be successful outdoors because they can use different skill sets. We know young children really need to use their whole bodies. Interacting with nature allows them to use their bodies in a different way outdoors than indoors.

### **Q: How do you compare play behaviors between the “big woods” and the rest of the playground?**

Much more child led. Less teacher-led, per se, much more exploratory and full of curiosity and questioning their own skill sets. Can I climb this tree, how high, do I feel safe, can I climb differently? Whereas on the playground they're really limited to the climbing structure. Off record there's more opportunity in the woods. It's a little bit higher, there's a little more challenge. The dramatic play opportunities out there, that play is a lot different than the stage area in the playground. Much more free and open. Less prescribed.

### **Q: Have you been to the CCD Playground? If yes, what are your thoughts on it in comparison with the playground at Stone House?**

When it was being created. I have not been since it was completed. We have the ability to have multiple groups of children in our space, I think that aids in the challenge for children. If I see peers achieving from other classrooms so I can do that too. I know they have access to the wooded area but ours is very big. Aids in a different kind of play. Prefers to get rid of all man-made materials.

### **Q: Do you have any ideas for improving the playground at Stone House?**



I would love to have more of that, (natural-made stumps) different pockets of play areas, I would love to develop an area where there is more symbolic play available, where there is more of a cognitive shift, not just cause and effect. The other thing that I would love to change and shift would be level out parts of the playground. Finding more level ground for the children to explore, just ball games or games with groups of children which is challenging itself. We have a drainage issue because of the slope so we have a ton of muddy places great for exploratory play but it limits the children in their opportunity to explore the entire space. On the other hand the slope really gives a lot of great opportunities for learning.

I would keep the sidewalk space the way it is. I would keep the bike track area, I appreciate that it has some flat vs. some sloped areas, I think that adds a great challenge for children. I like the setup of the concrete stage area, but I don't know that it's facilitated well enough. I think that it could include outdoor storage for symbolic or dramatic play props because really it's just used for meal times or table activities. The little house area I would completely remove that and make it a digging pit. I would put the house in the woods. I would actually pull the house itself into the woods and really build it in as a solid structure.

I like the bushes area because it gives a lot of ideas for family play and hide and seek. I would keep the bushes. They're lilac bushes. Whole other opportunity for exploration. I would pull the house and put it way back in the woods towards the back of the fence line so they have to come into the wooded area to get to it. The climbing structure and the swing area, I would leave the swings, I think they're a really vital part. Both the tire swing and the two small swings. I would keep those. The movable climbers. I would keep those any day because the children can challenge themselves by making them higher and lower. I think adaptive equipment is really important so I would keep the adaptive equipment on the playground. There also are things like the steering wheel on the climbing structure, the mirror on the side of the shed, there's ramps into all of the play areas. I would keep the sand area just the way it is. The beautiful part about sand play and water play is in the summer we just turn on the hose and put it into the sandbox and let it go. The shed is a necessary component, I would not have it in the middle of the playground where it is. It's important for it to be accessible. The garden gets planted every spring, I think that's

an important component, growing food for children. I think that the climbing structure could be taller. I appreciate that it's wood but it could be more natural, it could have the climbing wall instead of the corkscrew climber. I don't think the slides add enough challenge for this age group. I would plant more trees. Always. I think they can be more interactive for children, not just beautiful. I would beef up some of the climbing trees. I would have more climbing trees. Not necessarily trees but some sort of climbing structure that would be natural in its space. I would keep some of the hill slope towards the outer right side of the playground because that allows for a lot of exploratory play. I would change the drainage path that the sidewalk has created. We need a drain at the bottom of the sidewalk so the path down the stairs isn't a mud pit. I would keep the boat, I think the boat allows for a lot of sensory or symbolic play.

**Q: Are there any other thoughts you have on nature play or the playground at Stone House?**

One of the things that you mentioned was the teacher being in the middle space and being able to view all areas. One of the things we really encourage students to do is engage in the play. Be a part of that play. Those little challenges where we try and facilitate further because of placement of our bodies and how we're engaging in play. Always making sure there's spaces for few children and spaces for many children. Spaces for pairs rather than six or seven at a time. We try for up to three hours a day.

## **Interview: Teacher B**

### **Q: What are your perceptions of nature-based play and how it relates to early childhood development?**

I know our small woods and our big woods are really big hits with our kids. I think you have to kind of give a little guidance to begin with. My classroom had never been in the big woods, we had never had the opportunity so we went in there today. We went on a bear hunt. After they went and engaged in that space we came back and they continued to do what they were doing in the woods. They didn't touch any toys, they picked up wood and played with the wood chips and used nature materials to push their play along. I really like our playground, I like the natural hill, the kids love to roll their bodies down the hill, running up and down it.

### **Q: How do you compare play behaviors between the “big woods” and the rest of the playground?**

Today it sparked their imaginations a little more than just going out and having them run around. I know some of us teachers have stopped getting out as many materials and are just letting the kids play with what's naturally available. Like the sand using stumps and sticks instead of buckets and shovels, we've stopped getting out balls so they roll wheel shaped wood chips down the hill.

### **Q: Have you been to the CCD Playground? If yes, what are your thoughts on it in comparison with the playground at Stone House?**

I have. I think it's good in theory, but I do think kids need a balance between some structural guided play materials like a climbing structure. I like that they have more flat spaces for the children to play. I know when our kids get to playing there's just this one little space where they can play. Compared between the two I think I see a little more imaginative play here.

### **Q: Do you have any ideas for improving the playground at Stone House?**

So I do like the concept of having a small creek kind of thing with a bridge to go over. I do like that about CCD. I like how the toddlers have

a rock pit, where they have pebbles and stuff where they take sand toys or trucks in there and I've seen a lot of wonderful play. I would say maybe more of a gradual hill here, not so steep, but I do like the concrete right here with the sensory table. And I like the basketball goal. I think in our small woods, maybe some more space, push the fence back a little bit. Not clear out trees, but make it more like we can see in there so they don't have to ask a teacher to go back there with them. I think a more challenging climbing structure. I think it's very under-utilized because after a while the kids get bored with it. I like our tire swing, it's a huge hit. I think rock climbing walls would be super cool to have on a climbing structure. I love having our sandbox there, and we have a climbing tree that the kids can climb back there, and our boat. We did the bear hunt today and there was no creek to row a cross so they all got in the boat and went across the river. I wish we had maybe a creek with a bridge over it on the playground somewhere.

In the winter the rock bridge would be awesome with like ice and natural discovery. I think the big climbing structure with maybe a rock wall on the north side, and a more challenging slide, and the gradual hill, sandbox, maybe move the swings over here.

**Q: Are there any other thoughts you have on nature play or the playground at Stone House (show concepts)?**

I really like what you said about having the water down here and maybe a bridge. I mean, I like the concept of our playground but I like your idea of a playing field. A space to be for everyone to congregate if they want to be together. I like the idea of bringing in nature-based things but not to the extent of CCD. Finding a balance between the three. I like the idea of the big space and maybe a garden and break it up with small zones. Zones with the swings and the slides and all the things.

## Interview: Teacher C

**Q: What are your perceptions of nature-based play and how it relates to early childhood development?**

I would say my perception would be that nature should be incorporated into the early childhood setting, into the classroom or out on the playground. There are programs that are more nature based than others depending on what theory they're going off of, so it depends on what the center or belief of that program is. I think it's important to use it and allow children to go out into nature even just go outside for time to see animals and trees and leaves.

**Q: How do you compare play behaviors between the “big woods” and the rest of the playground?**

A: I can't think of anything specific, because they still like to climb, come up with different ideas. I almost would say they're more likely to recall information they have seen before, like camping behaviors or fishing. Whereas on the playground space unless there are specific materials provided they are more just about climbing and playing a game, they are more on the imaginative side.

**Q: Have you been to the CCD Playground? If yes, what are your thoughts on it in comparison with the playground at Stone House?**

I've walked by but I've never seen it.

**Q: What are your thoughts on nature playgrounds in general?**

They created environments to learn more about the animals and their behavior outside... I feel like they're just a lot more natural things such as... like here we have the climbing structure and there they have more wood based things that aren't as plastic looking. I think there's benefits to both of them and I see why people want to do a nature based area but I see that people think a typical playground is more convenient almost... to find the materials.



**Q: Do you have any ideas for improving the playground at Stone House?**

The main thing that comes to my mind is the shed that we have for toys and materials. It needs to be expanded and potentially moved to a different location because it's currently a visibility hazard, because children can move to the outside of the shed and no one can see it. I would say including more trees within the actual playground space, I know it cause kids to want to climb them but to provide shade and animals within the playground space. It gets really warm and very hot so we don't get a lot of shade other than our canopy. Other than that I can't really think of too much that I would ideally want to change, I think it's a pretty good space. Maybe including the musical area more within the whole space of the playground instead of being in that one area. I think it's a great way for them to experience twigs and things. I haven't been on many other playgrounds so I don't know what others look like, it would be nicer to have the [climber] higher for those kids who are able to challenge themselves and do more things, it is a very typical playground situation. Really the only climbing per se that can happen where the children can try different things is on the outside of the climbing structure which isn't the safest place to climb so maybe something that provided more of a challenge to the older kids who have already mastered the monkey bars... provide somewhere for them to climb that would have more hills or something of that nature. The only other thing that popped into my head is we have really bad drainage. It results to everything coming right to where the stairs are so being able to somehow adjust that... whenever it rains we get lots and lots of mud right by the doors which is why we have planks there.. it's partially because of the hill. I like the hill. Also a wide flat space, there's not a flat space to play soccer or anything. Those things have to be done on the hill which.. if you kick to hard it'll go down the hill.

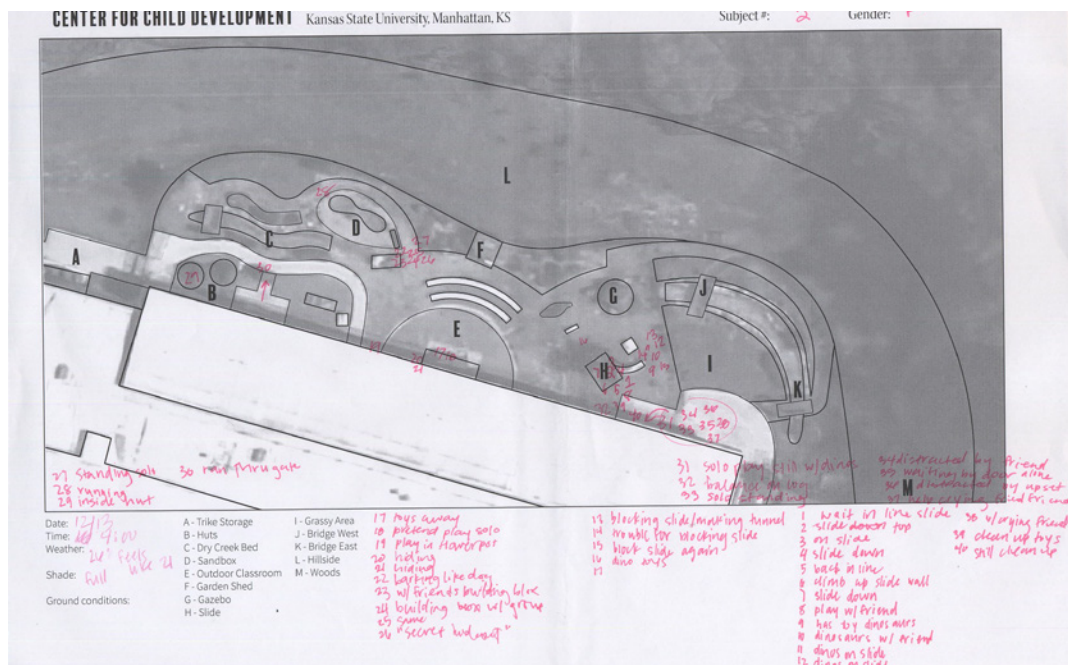
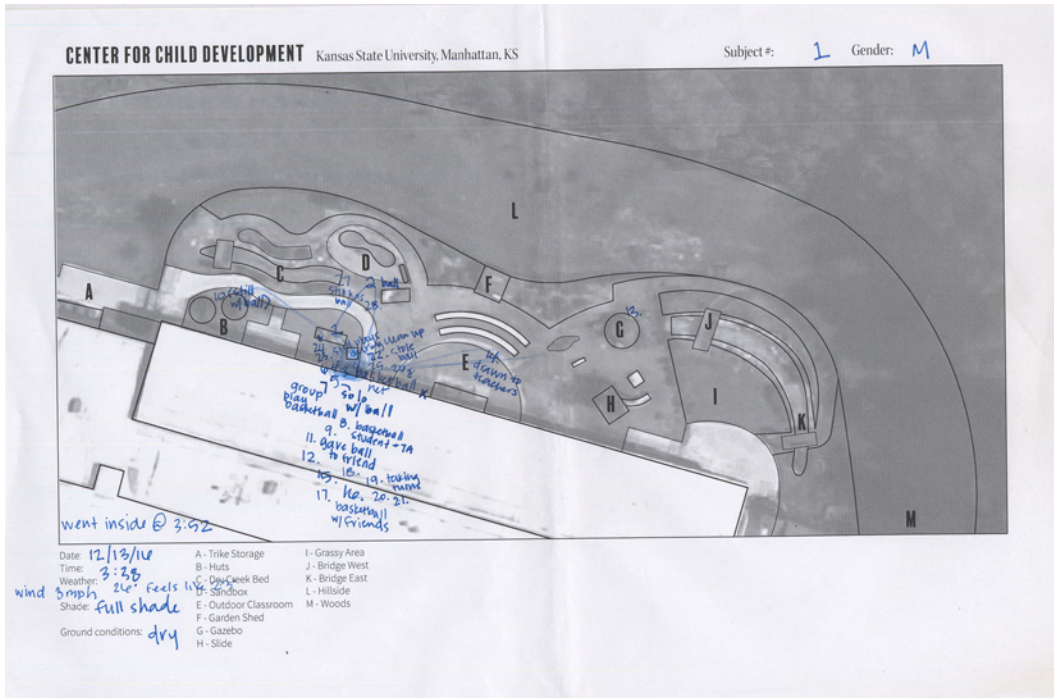
**Q: Are there any other thoughts you have on nature play or the playground at Stone House (show concepts)?**

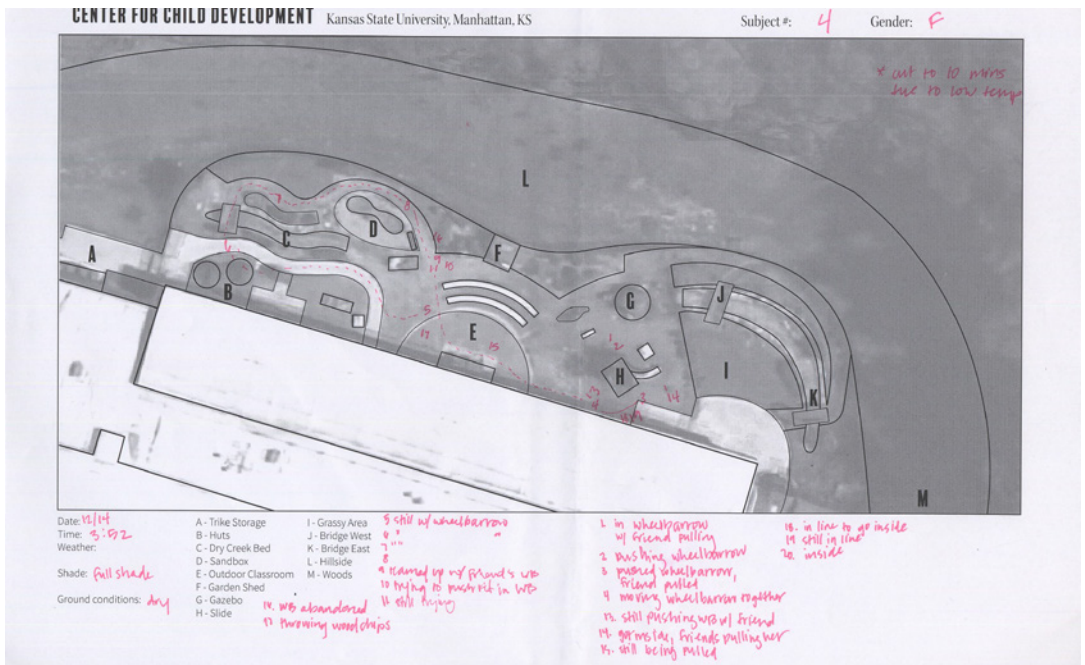
I think the main thing that I always think of is in the woods we always have a teacher back there so making sure the play areas in the main space are accessible to all the teachers so if we only have one or two teachers there they can still see all the children. Because sometimes

now we have to close it because we don't have enough staff to go back there and play with the children. The only other thing is the grass would be very very nice... we always have problems growing grass. We can't really grow it... our kiddos play on it so maybe it doesn't. The university maintains it... they come in and mow it for us... the grass and the trees and all those things are from the university.

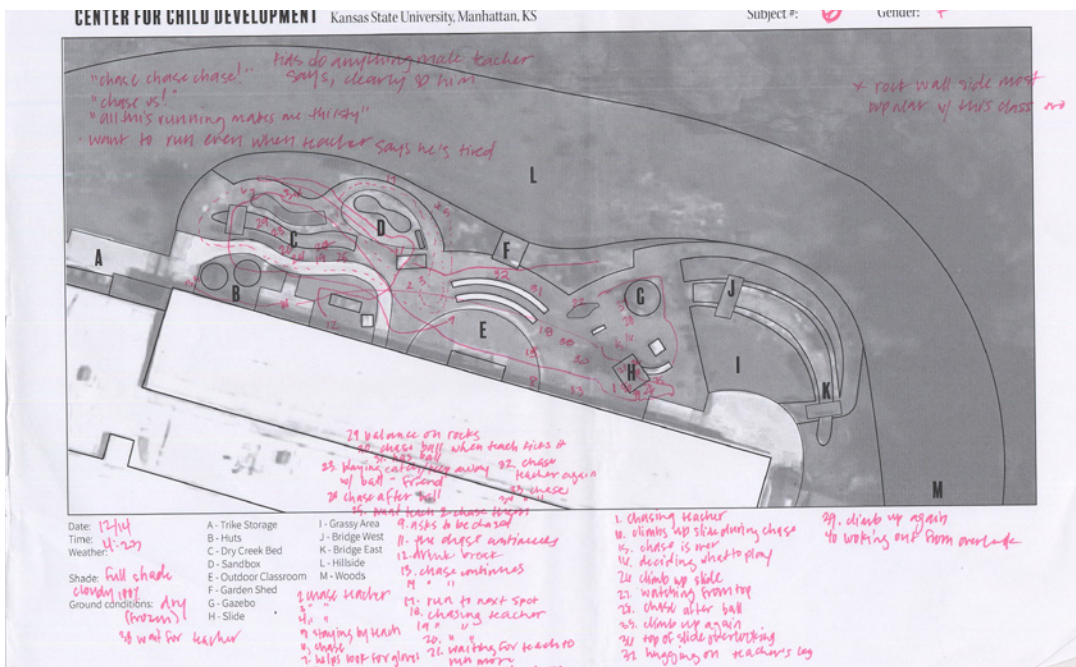
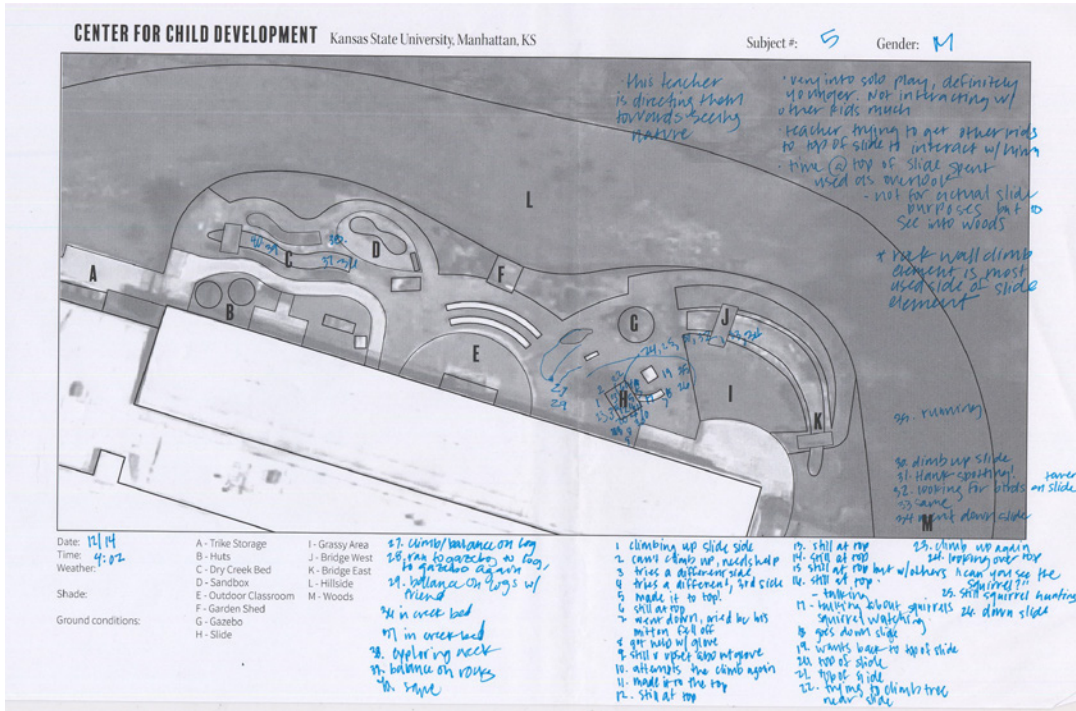
# APPENDIX D: DATA COLLECTION AND ANALYSIS MATERIALS

## Behavior Maps

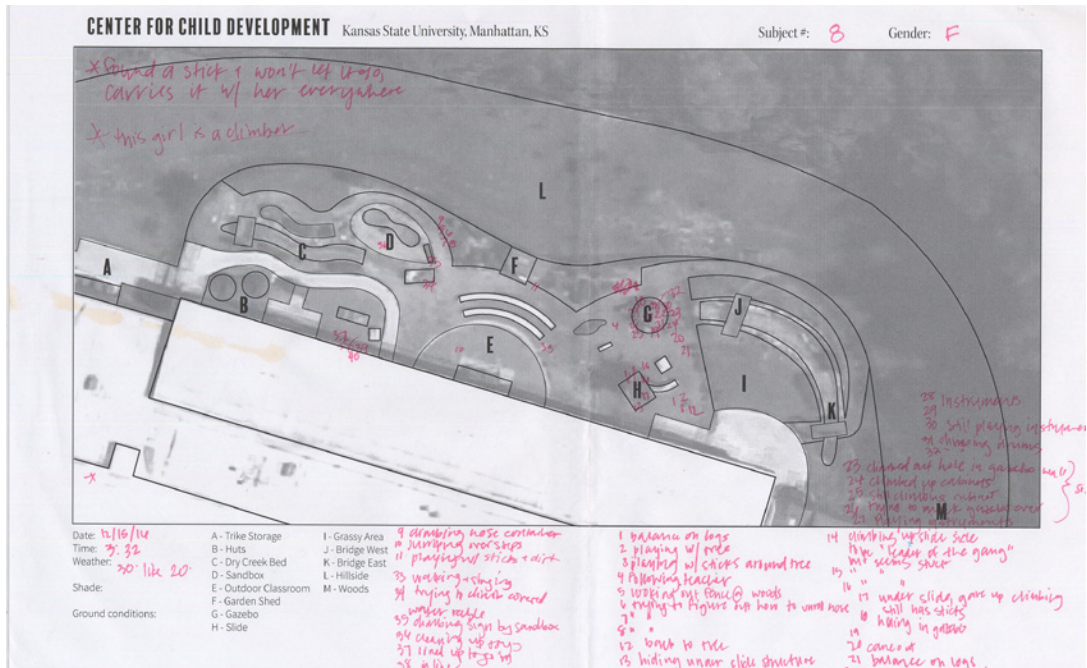
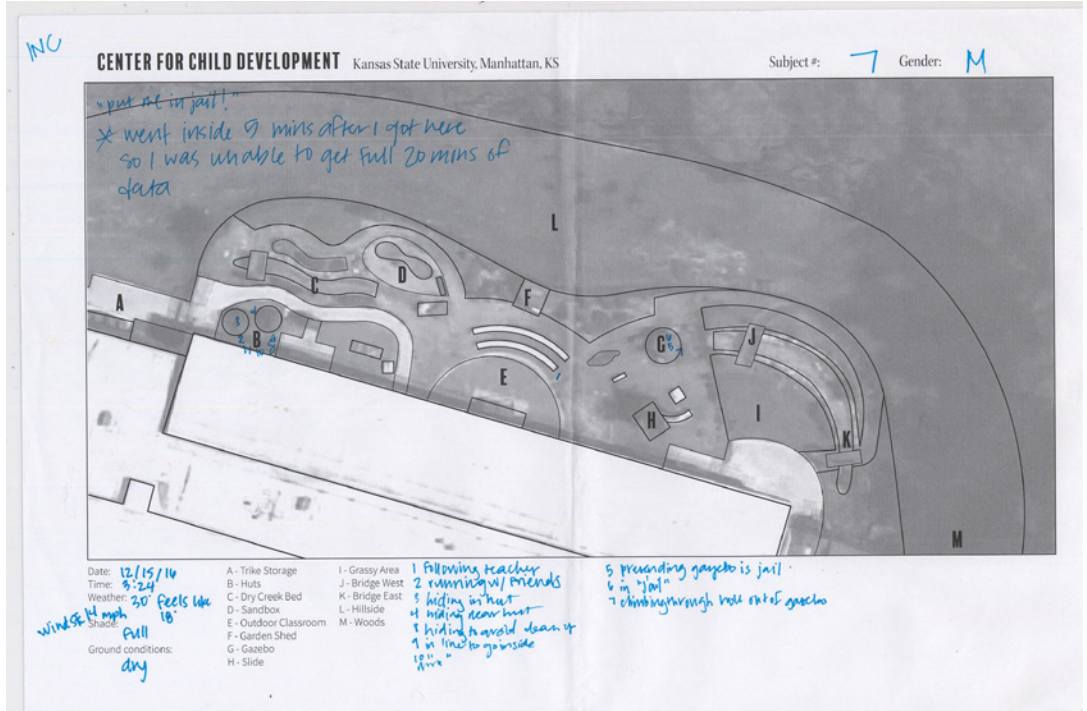






















**CENTER FOR CHILD DEVELOPMENT** Kansas State University, Manhattan, KS

Subject #: 15 Gender: M

Today is the warmest day we've had since beginning observation. The "feels like" is full 20° higher than yesterday.

- they're all confused bc their snowman melted
- V upset about Robert the grasshopper who they found yesterday
- why is this class so intimidating patterns?

as, digging up mud/mulch  
24. digging up from under sand/center  
25. "ohh" "ohh" "ohh" "ohh" "ohh" "ohh"  
26. still looking for snow now re: "H class is making patterns"  
27. ...  
28. making the other boys in front to make patterns  
29. "ohh" "ohh" "ohh" "ohh" "ohh" "ohh"  
30. focused on filling up the bucket  
31. looking for grasshopper "ohh"  
32. playing recess on the path  
33. "ohh" "ohh" "ohh" "ohh" "ohh" "ohh"  
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Date: 12/20/14  
Time: 8:23  
Weather: 44° feels like  
Shade: Wind S 3 mph  
cloudy (full shade)  
Ground conditions:  
snow partially melted on N end of play area (sandbox + beyond)

A - Trunk Storage  
B - Huts  
C - Dry Creek Bed  
D - Sandbox  
E - Outdoor Classroom  
F - Garden Shed  
G - Gazebo  
H - Slide  
I - Grassy Area  
J - Bridge West  
K - Bridge East  
L - Hillside  
M - Woods

1. "ohh" "ohh" "ohh" "ohh" "ohh" "ohh"
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99. "ohh" "ohh" "ohh" "ohh" "ohh" "ohh"
100. "ohh" "ohh" "ohh" "ohh" "ohh" "ohh"

**CENTER FOR CHILD DEVELOPMENT** Kansas State University, Manhattan, KS

Subject #: 16 Gender: F

subject is only F in classroom today

first time class has stayed outside longer than 20min in entire time observing

boys turn into animals/dogs when patterns are complete

5 kids all playing monkey in the middle. Fog their officially outside for 40+ minutes, double the length they were outside yesterday

1. "ohh" "ohh" "ohh" "ohh" "ohh" "ohh"  
2. "ohh" "ohh" "ohh" "ohh" "ohh" "ohh"  
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22. "ohh" "ohh" "ohh" "ohh" "ohh" "ohh"

Date: 12/20/14  
Time: 8:45  
Weather: 44°  
Shade: cloudy, full  
Ground conditions:  
snow partly melted

A - Trunk Storage  
B - Huts  
C - Dry Creek Bed  
D - Sandbox  
E - Outdoor Classroom  
F - Garden Shed  
G - Gazebo  
H - Slide  
I - Grassy Area  
J - Bridge West  
K - Bridge East  
L - Hillside  
M - Woods

1. "ohh" "ohh" "ohh" "ohh" "ohh" "ohh"
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22. "ohh" "ohh" "ohh" "ohh" "ohh" "ohh"



**CENTER FOR CHILD DEVELOPMENT** Kansas State University, Manhattan, KS

Subject #: 17 Gender: M

this subject tends to just follow other kids around  
 not allowed to go down slide in snow

1. find out outside  
 2. looking around trying to decide what to do  
 3. slowly exploring in snow  
 4. playing in covered walkway  
 5. looking for a toy but can't quite reach  
 6. help of teacher, digging up sticks/snow  
 7. randomly choosing snow  
 8. snow has snow from all over, walking around  
 9. no exploring more, this boy covered table top  
 10. watching friend who came off another friend  
 11. back to sleeping up snow

13. seeing snow storage on hill  
 14. climbing around in snow  
 15. trying to kick snow around  
 16. digging up snow/sticks in creek  
 17. exploring snow on island  
 18. found a chunk of snow  
 19. watching friend throw snowballs  
 20. friend and he all went to get teacher  
 21. explanation what happened to teacher  
 22. most boys - still up snow  
 23. making snowballs  
 24. looking at a construction friend made  
 25. wandering across bridge  
 26. following friend who was  
 27. looking at the playground  
 28. watching on outside edge of the bridge  
 29. trying to climb over the edge  
 30. holding behind sign  
 31. holding out fence  
 32. " "  
 33. " "  
 34. " "  
 35. " "  
 36. " "  
 37. " "  
 38. " "  
 39. " "  
 40. " "

Date: 11/20/14  
 Time: 4:07  
 Weather: 44° Feels like 44°  
 Shade: pull shade  
 Ground conditions: mostly sites  
 Snow: slightly melted, WET, 1/8" lay down yesterday

A - Trunk Storage  
 B - Huts  
 C - Dry Creek Bed  
 D - Sandbox  
 E - Outdoor Classroom  
 F - Garden Shed  
 G - Gazebo  
 H - Slide  
 I - Grassy Area  
 J - Bridge West  
 K - Bridge East  
 L - Hillside  
 M - Woods

**HOEFLIN STONE HOUSE EARLY CHILDHOOD CENTER** Kansas State University, Manhattan, KS

Subject #: 1 Gender: F

Date: 2/1/2017  
 Time: 11:15  
 Weather: 35° Feels like 20° Wind NE 13 mph  
 Shade: overcast, cloudy  
 Ground conditions: dry + mostly plays alone

1. tripped on sidewalk  
 2. waiting for to y park area  
 3. walking towards playhouse  
 4. inside playhouse w/ friend  
 5. talking w/ friend thru window  
 6. going towards sandtable  
 7. inside sandtable  
 8. walking around alone  
 9. moving back towards playhouse  
 10. wandering around  
 11. standing outside playhouse alone  
 12. wandering around swings  
 13. watching friends swing (and a stick)  
 14. found a stick - is swinging it around like a wand  
 15. on climber 1st looks like a hut w/ group  
 16. traffic jam inside climber sitting on edge  
 17. sitting on edge of climber  
 18. " "  
 19. wandering alone  
 20. running after teacher → changing her  
 21. stopped chasing to watch friends swing  
 22. hugging swingset pole, watching friends swing  
 23. climbing swingset pole  
 24. walking towards climber  
 25. wandering alone across play area  
 26. " "  
 27. trying to climb swings again  
 28. time to go inside  
 29. went inside

A - Sandbox  
 B - Open Area  
 C - Accessible Swing  
 D - Woods/Kitchen  
 E - Instruments  
 F - Play House  
 G - Pavilion  
 H - Storage  
 I - Swings  
 J - Slide  
 K - Open Area Hill





**HOEFLIN STONE HOUSE EARLY CHILDHOOD CENTER** Kansas State University, Manhattan, KS



Subject #: 4<sup>157</sup> Gender: M  
 Date: 2/2/17  
 Time:  
 Weather: 1 running into the woods to join friends  
 Shade: full sun 2 climbed a tree 3 in tree 4 still in tree 5 in tree 6 falling out now to climb down 7. "I'm up high!" B. still in tree "I'm gonna fall!"  
 Ground conditions: dry 8. successfully climbed out of tree  
 A - Sandbox 9. hiding deeper into woods w/ friends  
 B - Open Area 10. hitting one with the sticks, playing with airplanes  
 C - Accessible Swing 11. "I'm gonna fall!"  
 D - Woods/Kitchen 12. "I'm gonna fall!"  
 E - Instruments 13. tilted to shed back to main play area  
 F - Play House 14. distracted by shed roof that is missing  
 G - Pavilion 15. looking for a place to "hide from the bear" in the woods w/ group  
 H - Storage 16. found a stick, looks like a gun  
 I - Slides 17. back in tree, with stick that is like a gun  
 J - Slide 18. pretending stick is a gun, shooting from tree perch  
 K - Open Area Hill 19. in tree trying to figure out how to get down again  
 20. Teacher helping him get out of the tree  
 21. out of tree, immediately tries to climb back-up  
 22. shed climbed up the tree, with stick  
 23. in tree w/ stick, protecting the woods  
 24. talking to friends in woods from tree perch  
 25. "27" "28" "29" still in tree, alone  
 26. still in tree, alone 30. "31"  
 32. trying to get out of tree 33. solo in playhouse climbing table structure 34. yelled at for climbing table structure 35. teacher helped him down  
 36. talking to friend to stick 37. still holding on to stick 38. talking to friend as trying to help friend unhook from swing so he can have a turn  
 39. teacher got friend unhooked  
 40. still trying to unhook

**HOEFLIN STONE HOUSE EARLY CHILDHOOD CENTER** Kansas State University, Manhattan, KS



Subject #: 5 Gender: F Purple hair  
 Date: 2/3/17  
 Time: 11:40  
 Weather: 30 feels like 24  
 Shade:  
 Ground conditions:  
 A - Sandbox 1 watching friends climb up hill, run to jungle gym  
 B - Open Area 2 all friends underneath climber  
 C - Accessible Swing 3 run out from under climber  
 D - Woods/Kitchen 4 group to playhouse  
 E - Instruments 5 group all in playhouse together  
 F - Play House 6 discussing game they will play  
 G - Pavilion 7 how to fill pit in house "sit-down"  
 H - Storage 8. "sit down" "sit down" "sit down"  
 I - Slides 9. still all in playhouse together  
 J - Slide 10. running in a group all over  
 K - Open Area Hill 11. playhouse is kind of "home base" when running  
 12. still in playhouse, talking about why not to run w/ gun in your mouth  
 13. "I got out of this house!"  
 14. still at house, 6 of them in there "in jail"  
 15. still in house, talking about gun...  
 16. running across playground, "follow"  
 17. hiding behind bushes  
 18. arguing about rules of their game  
 19. "we're gonna run to..."  
 20. "to the house!" running all over  
 21. running game continues  
 22. hiding in park behind storage shed  
 23. back to the house, examining something together  
 24. back to the shed  
 25. still behind shed hiding  
 26. "I got out of this house!"  
 27. still behind shed in huge group, talking  
 28. discussing their game behind the shed  
 29. back in playhouse, hiding from teacher game  
 30. "everyone get down in the house! down now!" when teacher gets close  
 31. hiding from teacher in house  
 32. chased teacher away 33. back in the house  
 34. explaining game to teacher  
 35. hiding in house  
 36. pretending out of house in pretend war  
 37. "you make the food!" pretending to cook  
 38. running to hide again

**HOEFLIN STONE HOUSE EARLY CHILDHOOD CENTER** Kansas State University, Manhattan, KS



Subject #: **6** Gender: **M** glasses navy coat

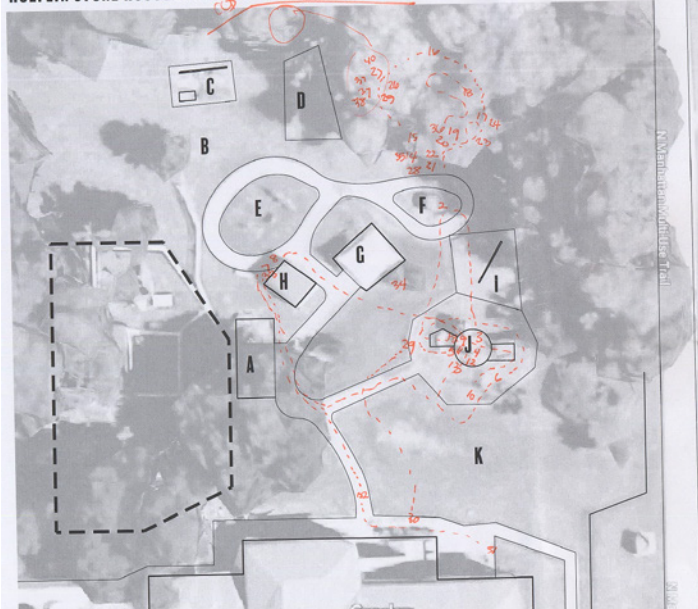
Date: 2/6/17 11:00  
 Weather: 47° feels like 44 w 5mph  
 Shade: cloudy/no sun

Ground conditions: dry

A - Sandbox  
 B - Open Area  
 C - Accessible Swing  
 D - Woods/Kitchen  
 E - Instruments  
 F - Play House  
 G - Pavilion  
 H - Storage  
 I - Swings  
 J - Slide  
 K - Open Area Hill

1. ran to teacher
2. ran up hill to top w/ friends
3. ran to fence to watch cars
4. asked me for a football
5. talking in woods alone
6. football because the friend stole it
7. talking to teacher w/ football
8. talking to teacher
9. talking with friends
10. by himself on swing
11. asked teacher to push him on swing
12. near him pushed on swing
13. on swing by himself. no other kids around
14. teacher talking to him, convincing him to go
15. play
16. teachers are setting up games for group with course hoops
17. ring toss/hoop game w/ teachers
18. hoop hoop hoop = it was it was way
19. " " 20. celebrating bc he tossed ring over cone
21. ring toss 22. ring toss 23. throw ring, ran away
24. walking in circles in sand/hill
25. climbed into accessible playhouse
26. solo in swing being pushed by teacher
27. being pushed by teacher in swing
28. being helped out of swing by teacher
29. playing tag w/ teacher
30. ran to playhouse + joined group
31. talking w/ friends inside playhouse, sitting
32. ran to the swing, playing round tag
33. talking to teacher, didn't get into swing
34. in line to go inside
35. went inside

**HOEFLIN STONE HOUSE EARLY CHILDHOOD CENTER** Kansas State University, Manhattan, KS



Subject #: **7** Gender: **F**

Date: 2/6/17  
 Time: 11:28  
 Weather: 1. running to climber  
 Shade: 2. in play house with friends  
 3. ran to top of climber, on bridge with friend  
 4. "m on base" playing tag + teacher is

Ground conditions: it

A - Sandbox  
 B - Open Area  
 C - Accessible Swing  
 D - Woods/Kitchen  
 E - Instruments  
 F - Play House  
 G - Pavilion  
 H - Storage  
 I - Swings  
 J - Slide  
 K - Open Area Hill

1. running to climber
2. in play house with friends
3. ran to top of climber, on bridge with friend
4. "m on base" playing tag + teacher is
5. "only blue is base" playing tag
6. running + playing tag
7. hid w/ friend, sliding, trying not to
8. "we're not playing" non-math
9. back to home base of climber
10. hiding from teacher, who is w/ keep
11. saying she's not playing, even though she is
12. back on home base
13. running on top climber
14. going to the big woods
15. running to the big woods
16. picking + walking in woods
17. big woods
18. found a huge stick + is running
19. playing tag/hiding from teacher
20. running fast in circles, playing tag
21. looking @ creek from top of bridge
22. back in woods + running, looking for places to hide
23. " "
24. " " running in circles through woods
25. running through woods + hiding
26. walking through woods
27. walking back over bridge
28. in house w/ friends
29. ran back to climber w/ friends
30. found a basketball playing with
31. playing basketball with a friend
32. playing basketball, walking with a friend
33. walking w/ friend + walking to teacher
34. walking w/ friend
35. back into big woods
36. running through woods w/ friends
37. walking to teacher
38. walking through woods, sitting on log
39. pulling on fence
40. pulling on fence









**HOEFLIN STONE HOUSE EARLY CHILDHOOD CENTER** Kansas State University, Manhattan, KS



Subject #: 12 Gender: M

Date: 2/9/14  
 Time: 11:41  
 Weather: 30° feels like 22 wind 10 mph  
 Shade: sunny

- Ground conditions:
- A. Sandbox
  - B. Open Area
  - C. Accessible Swing
  - D. Woods/Kitchen
  - E. Instruments
  - F. Play House
  - G. Pavilion
  - H. Storage
  - I. Swings
  - J. Slide
  - K. Open Area Hill
- 1 playing w/ hose in group
  - 2 inside playhouse in group
  - 3 running around w/ hose
  - 4 playing w/ hose, hiding behind shed
  - 5 hiding behind shed from teachers
  - 6 whole group hiding behind shed
  - 7 hiding + discussing game w/ friends
  - 8 running across playground w/ hose
  - 9 solo running w/ hose
  - 10 grab running to climber, being ninjas
  - 11 pretending to be ninjas w/ friends
  - 12 running across playground w/ hose chasing friends
  - 13 solo play w/ hose
  - 14 playing solo - ninjas - pretend walkie talkie
  - 15 still had hose, playing ninjas solo
  - 16 "17" hiding behind shed
  - 18 playing ninjas w/ friends still has hose
  - 19 playing ninjas solo
  - 20 watching teacher unfort
  - 21 playing pretend
  - 22 talking friends in house, playing pretend
  - 23 too many kids trying to fit in house, "ninja" is playing ninjas
  - 24 still has hose in house w/ friends
  - 25 pretend sword fight w/ friend w/ hose
  - 26 "17" solo walking in circles w/ hose
  - 27 group playing ninjas near sandbox
  - 28 "17" hiding behind tree
  - 29 drawing in dirt as part of ninjas game w/ pad
  - 30 climbing sand pit of box as part of play
  - 31 running across playground w/ pad
  - 32 hiding in playhouse
  - 33 drawing in playhouse
  - 34 drawing in playhouse as part of game
  - 35 "17" in room to friends by sandbox
  - 36 "17" hiding behind tree as part of game

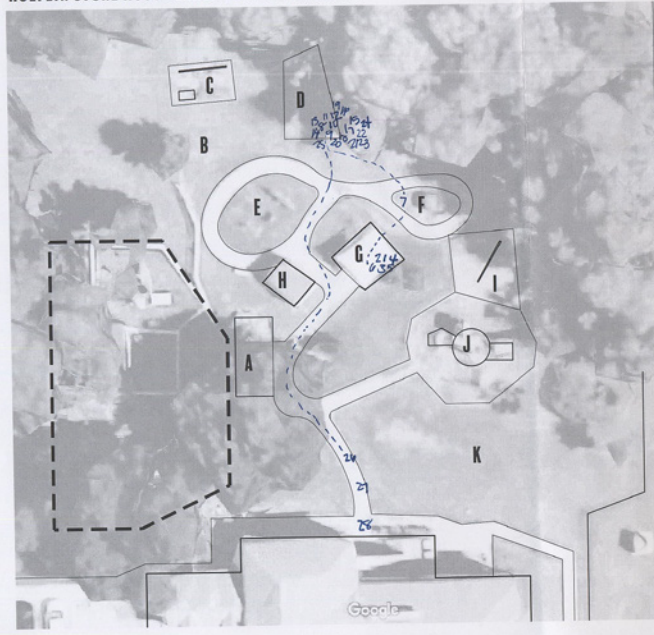
**HOEFLIN STONE HOUSE EARLY CHILDHOOD CENTER** Kansas State University, Manhattan, KS



Subject #: 13 Gender: F  
 Date: 2/10/17  
 Time: 09:00 feels like 55  
 Weather: 11:05  
 Shade: sunny

- Ground conditions: dry
- A. Sandbox
  - B. Open Area
  - C. Accessible Swing
  - D. Woods/Kitchen
  - E. Instruments
  - F. Play House
  - G. Pavilion
  - H. Storage
  - I. Swings
  - J. Slide
  - K. Open Area Hill
- 1 climbing tree w/ friends
  - 2 climbing tree w/ friends, is highest
  - 3 climbed down "it wasn't that high"
  - 4 deep in woods, building a line w/ friends
  - 5 whole class leaned up to build w/ sticks, in woods
  - 6 "all building together, pretending"
  - 7 class is leaning against tree in woods
  - 8 playing pretend w/ friends, king queen
  - 9 using sticks as walking sticks, climbing w/ friend
  - 10 back to climbing tree w/ friends
  - 11 climbing tree w/ friend
  - 12 climbed down from tree watching friends climb
  - 13 "where is the king? I know a king 'in a queen"
  - 14 walking + pretending in woods
  - 15 pretending to be ninjas w/ "Go Jim"
  - 16 walking w/ friends, pretend
  - 17 walking + pretend w/ friends
  - 18 standing on log + talking
  - 19 found a big piece of trash
  - 20 talking on log + talking about game
  - 21 "found a big piece of trash"
  - 22 "found a big piece of trash"
  - 23 climbing down from log, being ninjas
  - 24 climbing down from log, being ninjas
  - 25 climbing down from log, being ninjas
  - 26 climbing down from log, being ninjas
  - 27 climbing down from log, being ninjas
  - 28 climbing down from log, being ninjas
  - 29 climbing down from log, being ninjas
  - 30 found a big piece of trash
  - 31 needs friends to help move pieces of styrofoam in woods
  - 32 holding branches off trees - guess if that had sticks
  - 33 "a lot normal, we are gonna walk"
  - 34 playing pretend + walking through woods
  - 35 looking for the "bad sea octopus"
  - 36 walking + playing little newspaper in woods
  - 37 pretending + walking through woods, found a trail
  - 38 "40"

**HOEFLIN STONE HOUSE EARLY CHILDHOOD CENTER** Kansas State University, Manhattan, KS



Subject #: 15 Gender: F red over-short hair

Date: 2/10/17  
Time: 11:40  
Weather:

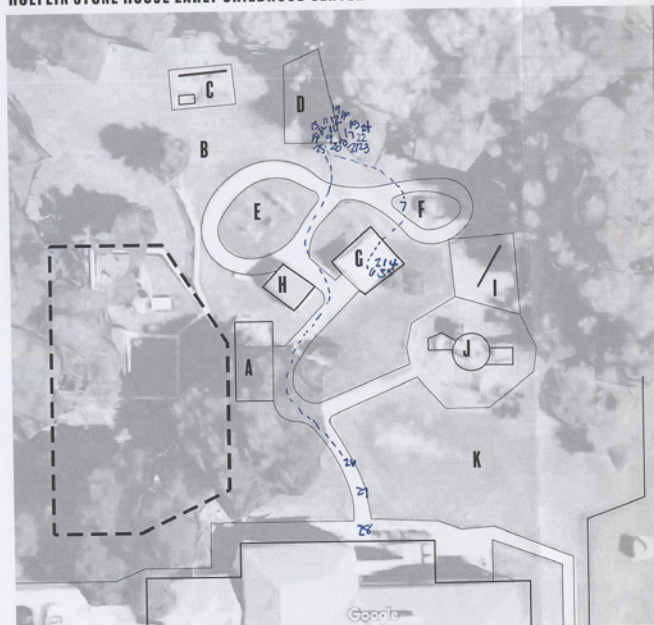
Shade:

Ground conditions:

A - Sandbox  
B - Open Area  
C - Accessible Swing  
D - Woods/Kitchen  
E - Instruments  
F - Play House  
G - Pavilion  
H - Storage  
I - Swings  
J - Slide  
K - Open Area Hill

1 walking around solo on playground  
2. basking in sun on picnic table  
3. 4" 8" 4 sitting at table watching other kids play  
7 walking around playground solo  
8 joined group at tractor tire - talking  
9 sitting in tire - talking w/ group  
10 playing pretend w/ group in the  
11 standing + playing w/ dirt in the soil  
12 taking shoes off on solo  
13 drawing in dirt w/ sticks solo  
14 digging a hole in dirt in the solo  
15 found a rock + examining it w/ friend  
16 pretending to cook in kitchen w/ pot  
17 " 18 spill cooking big rock in kitchen  
19 " 20 " 21 put rock in pot oven  
22 still pretending to cook rock w/ group 23 " 24 hiding solo, doesn't want to go inside  
25 teacher found her telling her to get inside  
26 upset she has to line up 27. in the hgs inside  
28 went inside

**HOEFLIN STONE HOUSE EARLY CHILDHOOD CENTER** Kansas State University, Manhattan, KS



Subject #: 15 Gender: F red over-short hair

Date: 2/10/17  
Time: 11:40  
Weather:

Shade:

Ground conditions:

A - Sandbox  
B - Open Area  
C - Accessible Swing  
D - Woods/Kitchen  
E - Instruments  
F - Play House  
G - Pavilion  
H - Storage  
I - Swings  
J - Slide  
K - Open Area Hill

1 walking around solo on playground  
2. basking in sun on picnic table  
3. 4" 8" 4 sitting at table watching other kids play  
7 walking around playground solo  
8 joined group at tractor tire - talking  
9 sitting in tire - talking w/ group  
10 playing pretend w/ group in the  
11 standing + playing w/ dirt in the soil  
12 taking shoes off on solo  
13 drawing in dirt w/ sticks solo  
14 digging a hole in dirt in the solo  
15 found a rock + examining it w/ friend  
16 pretending to cook in kitchen w/ pot  
17 " 18 spill cooking big rock in kitchen  
19 " 20 " 21 put rock in pot oven  
22 still pretending to cook rock w/ group 23 " 24 hiding solo, doesn't want to go inside  
25 teacher found her telling her to get inside  
26 upset she has to line up 27. in the hgs inside  
28 went inside



## Data Analysis: Setting 1 Overall

Code	% of All Points
Row Labels	Count of Code
1AC	9.78%
1AD	0.69%
1AE	1.03%
2BC	1.37%
<b>3AC</b>	<b>11.66%</b>
3AD	7.38%
3AE	7.03%
4BC	3.60%
<b>4BD</b>	<b>12.52%</b>
4BE	4.63%
5AE	9.61%
<b>6BE</b>	<b>17.50%</b>
6BC	2.92%
5AC	2.23%
1AF	6.69%
2BF	0.17%
3AF	0.51%
2BE	0.17%
2BD	0.51%
<b>Grand Total</b>	<b>100.00%</b>

Area	% of All Points	
Row Labels	Count of AREA	Area
A	4.46%	Huts
B	2.57%	Classroom Door
C	3.60%	Open Area
D	<b>10.63%</b>	Creek Bed
E	2.92%	Jeep
F	<b>13.38%</b>	Basketball Hoop
G	<b>16.64%</b>	Sandbox/Toybox
H	3.95%	Classroom
I	6.86%	Open Space
J	2.23%	Garden Shed
K	4.46%	Gazebo
L	6.35%	Open Space with Logs
M	<b>14.92%</b>	Slide
N	7.03%	Classroom Door
<b>Grand Total</b>	<b>100.00%</b>	

### Types of Play vs. % of All Points

SOLO	GROUP	PRACTICE	SYMBOL	RULES
9.78	1.37	9.78	0.69	1.03
0.69	3.6	1.37	7.38	7.03
1.03	12.52	11.66	12.52	4.63
11.66	4.3	3.6	0.51	9.61
7.38	17.5	2.92		17.5
7.03	2.92	2.23		0.17
9.61	0.17			
2.23	0.51			
6.69	0.17			
0.51				
<b>Totals:</b>				
56.61	43.06	31.56	21.1	39.97

## Data Analysis: Setting 1 by Play Area

A Huts

Row Labels	Count of Code		
1AC	19.23%	Subjects	10
1AD	7.69%	Instances	26
1AE	7.69%	<b>Practice</b>	<b>30.77%</b>
1AF	7.69%	Symbolic	23.08%
2BD	11.54%	Games	26.92%
3AC	3.85%	Non-Play	7.69%
3AD	3.85%		
3AE	3.85%		
4BC	3.85%		
4BE	11.54%		
5AE	7.69%		
6BC	3.85%		
6BE	7.69%		
<b>Grand Total</b>	<b>100.00%</b>		

D Dry Creek Bed

Row Labels	Count of Code		
1AC	1.61%	Subjects	11
1AE	1.61%	Instances	62
1AF	1.61%	<b>Practice</b>	<b>40.32%</b>
3AC	25.81%	Symbolic	19.35%
3AD	11.29%	Games	35.48%
3AE	12.90%	Non-Play	4.84%
3AF	3.23%		
4BC	1.61%		
4BD	8.06%		
5AC	8.06%		
5AE	6.45%		
6BC	3.23%		
6BE	14.52%		
<b>Grand Total</b>	<b>100.00%</b>		

B Classroom Door

Row Labels	Count of Code		
1AC	20.00%	Subjects	8
3AC	40.00%	Instances	15
3AE	13.33%	<b>Practice</b>	<b>66.67%</b>
4BE	6.67%	Symbolic	0
5AC	6.67%	Games	33.33%
5AE	6.67%	Non-Play	0
6BE	6.67%		
<b>Grand Total</b>	<b>100.00%</b>		

E Jeep

Row Labels	Count of Code		
1AF	5.88%	Subjects	8
3AD	29.41%	Instances	17
4BC	5.88%	Practice	5.88%
4BD	35.29%	<b>Symbolic</b>	<b>64.71%</b>
4BE	17.65%	Games	23.53%
6BE	5.88%	Non-Play	5.88%
<b>Grand Total</b>	<b>100.00%</b>		

C Open Area

Row Labels	Count of Code		
1AC	4.76%	Subjects	4
1AF	14.29%	Instances	21
3AE	4.76%	Practice	9.52%
4BC	4.76%	Symbolic	14.29%
4BD	14.29%	<b>Games</b>	<b>61.90%</b>
4BE	28.57%	Non-Play	14.29%
5AE	9.52%		
6BE	19.05%		
<b>Grand Total</b>	<b>100.00%</b>		

F Basketball Hoop

Row Labels	Count of Code		
1AC	16.67%	Subjects	11
1AF	23.08%	Instances	78
2BC	1.28%	Practice	19.23%
2BF	1.28%	Symbolic	5.13%
3AC	1.28%	<b>Games</b>	<b>51.28%</b>
3AD	2.56%	Non-Play	24.36%
4BD	2.56%		
4BE	1.28%		
5AE	12.82%		
6BE	37.18%		
<b>Grand Total</b>	<b>100.00%</b>		

G Sandbox

Row Labels	Count of Code	Subjects	Count
		Subjects	15
1AC	3.09%	Instances	97
1AF	10.31%	Practice	38.14%
2BC	2.06%	<b>Symbolic</b>	<b>40.21%</b>
3AC	22.68%	Games	9.28%
3AD	10.31%	Non-Play	10.31%
3AE	1.03%		
4BC	10.31%		
4BD	29.90%		
4BE	1.03%		
5AC	1.03%		
5AE	4.12%		
6BC	1.03%		
6BE	3.09%		
<b>Grand Total</b>	<b>100.00%</b>		

H Outdoor Classroom

Row Labels	Count of Code	Subjects	Count
		Subjects	9
1AF	4.35%	Instances	23
3AC	17.39%	Practice	30.43%
3AD	13.04%	<b>Symbolic</b>	<b>34.78%</b>
3AF	4.35%	Games	26.09%
4BD	21.74%	Non-Play	8.70%
6BC	13.04%		
6BE	26.09%		
<b>Grand Total</b>	<b>100.00%</b>		

I Open Area

Row Labels	Count of Code	Subjects	Count
		Subjects	11
1AC	7.50%	Instances	40
3AC	10.00%	Practice	37.50%
3AD	7.50%	Symbolic	22.50%
3AE	2.50%	<b>Games</b>	<b>40.00%</b>
4BC	10.00%	Non-Play	0
4BD	15.00%		
4BE	5.00%		
5AC	5.00%		
5AE	5.00%		
6BC	5.00%		
6BE	27.50%		
<b>Grand Total</b>	<b>100.00%</b>		

J Garden Shed

Row Labels	Count of Code	Subjects	Count
		Subjects	8
1AC	15.38%	Instances	13
1AF	15.38%	Practice	23.08%
3AD	15.38%	<b>Symbolic</b>	<b>38.46%</b>
3AE	7.69%	Games	23.08%
4BD	23.08%	Non-Play	15.38%
5AE	7.69%		
6BC	7.69%		
6BE	7.69%		
<b>Grand Total</b>	<b>100.00%</b>		

K Gazebo

Row Labels	Count of Code	Subjects	Count
		Subjects	7
2BC	3.85%	Instances	26
3AC	30.77%	Practice	34.62%
3AD	3.85%	Symbolic	15.38%
4BD	11.54%	<b>Games</b>	<b>50.00%</b>
4BE	3.85%	Non-Play	0
5AE	30.77%		
6BE	15.38%		
<b>Grand Total</b>	<b>100.00%</b>		

L Logs

Row Labels	Count of Code	Subjects	Count
		Subjects	10
1AC	2.70%	Instances	37
1AD	2.70%	Practice	21.62%
3AC	5.41%	Symbolic	5.41%
3AD	2.70%	<b>Games</b>	<b>72.97%</b>
3AE	2.70%	Non-Play	0
4BC	5.41%		
4BE	8.11%		
5AC	8.11%		
5AE	10.81%		
6BE	51.35%		
<b>Grand Total</b>	<b>100.00%</b>		

M Slide

Row Labels	Count of Code	Subjects	
1AC	5.75%	Instances	87
1AD	1.15%	Practice	11.49%
1AE	3.45%	Symbolic	19.54%
2BE	1.15%	Games	68.97%
3AC	1.15%	Non-Play	0
3AD	5.75%		
3AE	28.74%		
4BC	1.15%		
4BD	12.64%		
4BE	4.60%		
5AC	1.15%		
5AE	19.54%		
6BC	2.30%		
6BE	11.49%		
<b>Grand Total</b>	<b>100.00%</b>		

N Classroom Door

Row Labels	Count of Code	Subjects	
1AC	48.78%	Instances	41
1AF	2.44%	Practice	78.05%
2BC	9.76%	Symbolic	7.32%
3AC	7.32%	Games	12.20%
3AD	7.32%	Non-Play	2.44%
4BE	4.88%		
5AE	2.44%		
6BC	12.20%		
6BE	4.88%		
<b>Grand Total</b>	<b>100.00%</b>		



## Data Analysis: Setting 2A Overall

Code	% of Points
Row Labels	Count of Code
1AC	7.26%
1AD	2.61%
2BC	8.19%
3AC	10.99%
3AD	1.86%
3AE	5.21%
4BC	12.29%
4BD	11.17%
4BE	8.75%
5AE	0.74%
6BE	7.82%
6BC	8.19%
5AC	4.28%
1AF	2.79%
3AF	0.93%
2BE	2.23%
2BD	1.68%
6BD	1.49%
5AD	0.37%
2BF	1.12%
<b>Grand Total</b>	<b>100.00%</b>

Row Labels	Count of Area	Area
A	3.54%	Canoe
B	2.23%	Sandbox
C	3.54%	Accessible Swing
D	20.67%	Woods
E	7.08%	Play Kitchen
F	1.30%	Musical Instruments
G	5.40%	Concrete Pad
H	5.21%	Storage Shed
I	13.41%	Playhouse
J	5.77%	Woods
K	12.10%	Swingset
L	8.19%	Slide
M	4.10%	Climber Bridge
N	3.72%	Open Area
O	3.35%	Classroom Entry
P	0.37%	Open Area
<b>Grand Total</b>	<b>100.00%</b>	

SOLO	GROUP	PRACTICE	SYMBOL	RULES
7.26	8.19	7.26	2.61	5.21
2.61	12.29	8.19	1.86	8.75
10.99	11.17	10.99	11.17	0.74
1.86	8.75	12.29	1.68	2.23
5.21	7.82	8.19	1.49	
0.74	8.19	4.28	0.37	
4.28	2.23			
2.79	1.68			
0.93	1.49			
0.37	1.12			
<b>Totals:</b>				
37.04	62.93	51.2	19.18	16.93

## Data Analysis: Setting 2A by Play Area

A Canoe/Open

Row Labels	Count of Code	Subjects	
1AC	15.79%	Subjects	5
1AD	10.53%	Instances	19
3AC	10.53%	<b>Practice</b>	<b>52.63%</b>
3AD	5.26%	Symbolic	42.11%
4BC	21.05%	Games	5.26%
4BD	21.05%		
5AD	5.26%		
6BC	5.26%		
6BE	5.26%		
<b>Grand Total</b>	<b>100.00%</b>		

B Sandbox

Row Labels	Count of Code	Subjects	
1AD	8.33%	Subjects	5
3AC	25.00%	Instances	12
3AF	8.33%	<b>Practice</b>	<b>50.00%</b>
4BD	16.67%	Symbolic	25.00%
5AC	16.67%	Games	16.67%
6BC	8.33%	Non-Play	8.33%
6BE	16.67%		
<b>Grand Total</b>	<b>100.00%</b>		

C Accessible Swing

Row Labels	Count of Code	Subjects	
3AC	21.05%	Subjects	3
3AE	52.63%	Instances	19
4BC	21.05%	<b>Practice</b>	<b>42.11%</b>
4BE	5.26%	Symbolic	0
<b>Grand Total</b>	<b>100.00%</b>	<b>Games</b>	<b>57.89%</b>

E Outdoor Kitchen

Row Labels	Count of Code	Subjects	
1AC	7.89%	Subjects	5
1AD	5.26%	Instances	38
2BC	28.95%	<b>Practice</b>	<b>44.74%</b>
2BD	2.63%	Symbolic	36.84%
2BF	15.79%	Games	2.63%
4BC	7.89%	Non-Play	15.79%
4BD	26.32%		
6BD	2.63%		
6BE	2.63%		
<b>Grand Total</b>	<b>100.00%</b>		

F Musical Instruments

Row Labels	Count of Code	Subjects	
1AC	14.29%	Subjects	6
2BC	14.29%	Instances	7
4BD	14.29%	<b>Practice</b>	<b>57.14%</b>
5AC	28.57%	Symbolic	28.57%
6BD	14.29%	Games	14.29%
6BE	14.29%	Non-Play	0.00%
<b>Grand Total</b>	<b>100.00%</b>		

G Concrete Stage

Row Labels	Count of Code	Subjects	
1AC	3.57%	Subjects	9
1AF	17.86%	Instances	25
2BC	21.43%	<b>Practices</b>	<b>64.29%</b>
3AC	28.57%	Symbolic	7.14%
3AE	3.57%	Games	10.71%
4BC	10.71%	Non-Play	17.86%
4BD	7.14%		
6BE	7.14%		
<b>Grand Total</b>	<b>100.00%</b>		

H Storage Shed

Row Labels	Count of Code	Subjects	
1AD	10.71%	Subjects	6
2BC	21.43%	Instances	28
2BD	7.14%	<b>Practice</b>	<b>35.71%</b>
2BE	21.43%	Symbolic	28.57%
3AC	7.14%	<b>Games</b>	<b>35.71%</b>
4BC	3.57%	Non-Play	0
4BD	10.71%		
6BC	3.57%		
6BE	14.29%		
<b>Grand Total</b>	<b>100.00%</b>		

## I Playhouse

Row Labels	Count of Code	Subjects	Count of Code
1AF	4.29%	Instances	12
2BC	17.14%	Practice	70
2BD	8.57%	Symbolic	42.86%
2BE	5.71%	Games	31.43%
3AC	1.43%	Non-Play	21.43%
3AD	7.14%		4.29%
3AE	1.43%		
4BC	11.43%		
4BD	14.29%		
4BE	1.43%		
5AC	4.29%		
6BC	8.57%		
6BD	1.43%		
6BE	12.86%		
<b>Grand Total</b>	<b>100.00%</b>		

## K Swing

Row Labels	Count of Code	Subjects	Count of Code
1AC	10.94%	Instances	6
2BC	1.56%	Practice	64
3AC	7.81%	Symbolic	35.94%
3AD	1.56%	Games	1.56%
3AE	3.13%	Non-Play	59.38%
3AF	3.13%		3.13%
4BC	15.63%		
4BE	51.56%		
5AE	1.56%		
6BE	3.13%		
<b>Grand Total</b>	<b>100.00%</b>		

## L Slide Side

Row Labels	Count of Code	Subjects	Count of Code
2BE	2.27%	Instances	9
3AC	6.82%	Practice	44
3AD	2.27%	Symbolic	31.82%
3AE	9.09%	Games	9.09%
3AF	2.27%	Non-Play	59.09%
4BC	2.27%		2.27%
4BD	2.27%		
4BE	15.91%		
5AC	9.09%		
5AE	2.27%		
6BC	13.64%		
6BD	4.55%		
6BE	27.27%		
<b>Grand Total</b>	<b>100.00%</b>		

## M Bridge Side

Row Labels	Count of Code	Subjects	Count of Code
2BC	9.09%	Instances	8
2BE	4.55%	Practice	22
3AC	4.55%	Symbolic	45.45%
3AD	9.09%	Games	27.27%
4BC	22.73%	Non-Play	27.27%
4BD	13.64%		0
6BC	9.09%		
6BD	4.55%		
6BE	22.73%		
<b>Grand Total</b>	<b>100.00%</b>		

## N Open Area

Row Labels	Count of Code	Subjects	Count of Code
1AF	5.00%	Instances	5
3AC	10.00%	Practice	20
3AE	35.00%	Symbolic	40.00%
3AF	5.00%	Games	5.00%
4BC	5.00%	Non-Play	45.00%
4BE	5.00%		10.00%
5AC	10.00%		
5AE	5.00%		
6BC	15.00%		
6BD	5.00%		
<b>Grand Total</b>	<b>100.00%</b>		

O Classroom Entry

Row Labels	Count of Code	Subjects	8
1AC	27.78%	Instances	18
1AF	33.33%	Practice	55.56%
3AC	5.56%	Symbolic	0
4BC	11.11%	Games	11.11%
4BE	11.11%	Non-Play	33.33%
5AC	5.56%		
6BC	5.56%		
<b>Grand Total</b>	<b>100.00%</b>		

P Fence

Row Labels	Count of Code	Subjects	1
4BE	100.00%	Instances	2
<b>Grand Total</b>	<b>100.00%</b>	Games	100%



## Data Analysis: Setting 2B Overall

Code                      % of Points

Row Labels	Count of Code
1AC	12.77%
1AD	4.26%
2BC	3.55%
3AC	17.02%
3AE	1.42%
4BC	17.02%
4BD	17.02%
5AC	6.38%
5AD	0.71%
5AE	0.71%
6BC	16.31%
6BD	0.71%
6BE	2.13%
<b>Grand Total</b>	<b>100.00%</b>

SOLO	GROUP	PRACTICE	SYMBOL	RULES
12.77	3.55	12.77	4.26	1.42
4.26	17.02	3.55	17.02	0.71
17.02	17.02	17.02	0.71	2.13
1.42	16.31	17.02	0.71	
6.38	0.71	6.38		
0.71	2.13	16.31		
0.71				
<b>Total</b>				
43.27	56.74	73.05	22.7	4.26

D Big Woods

Row Labels	Count of Code	Subjects	
1AC	5.41%	Subjects	5
2BC	0.90%	Instances	111
3AC	21.62%	<b>Practice</b>	<b>72.97%</b>
3AE	1.80%	Symbolic	21.62%
4BC	19.82%	Games	5.41%
4BD	20.72%	Non-Play	0
5AC	6.31%		
5AD	0.90%		
5AE	0.90%		
6BC	18.92%		
6BE	2.70%		
<b>Grand Total</b>	<b>100.00%</b>		

J Mini Woods

Row Labels	Count of Code	Subjects	
1AC	40.00%	Subjects	1
1AD	20.00%	Instances	30
2BC	13.33%	<b>Practice</b>	<b>73.33%</b>
4BC	6.67%	Symbolic	26.67%
4BD	3.33%	Games	0
5AC	6.67%	Non-Play	0
6BC	6.67%		
6BD	3.33%		
<b>Grand Total</b>	<b>100.00%</b>		