Nature's touch: engaging children's sensory learning and development through nature-based play

by

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A REPORT

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Abstract

Full of stimulating elements, nature provides a dynamic setting where children engage all of their senses and deepen their understanding of the world. Play is essential to a child's physical, cognitive, and social development, and playing in nature simultaneously engages a child's sensory learning and development. By incorporating natural elements into early childhood spaces, children become more attuned to themselves, others, and the environment around them. Designing outdoor play spaces that engage all of their senses in early childhood enhances their cognitive and physical development, social skills, emotional regulation, and creativity. The goal of this research design is to explore the landscape architect's role in creating play environments that nurture sensory development in early childhood. The primary outcome from the research project will be a projective design for the Kansas State University Center for Child Development (CCD), focused on enhancing sensory experiences in a nature-based environment for young children. Serving the K-State and Manhattan communities, the CCD provides child care and a rich learning environment, prioritizing nature-based learning and exploration through its evidence-based practices. To inform this design, an in-depth literary review, analysis of existing nature-based play guidelines, and exploration of built works was conducted, providing design considerations for engaging sensory integration patterns and the seven main senses in a nature-based play environment. Beyond the CCD, this project sought to highlight the importance of sensory-rich play in early childhood and provide a framework to help landscape architects when designing similar settings.

nature's touch

Engaging Children's Sensory Learning and Development Through Nature-Based Play



Michaela Coulter

nature's touch

Engaging Children's Sensory Learning and Development Through Nature-Based Play

A Landscape Architecture
Master's Project & Report



[fig. 0.1] (Coulter 2025)

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Acknowledgments

Every child, no matter their background, age, or ability, deserves a place to play openly and freely in nature. For me, this research and project came from my passion for play and nature. I combined my love for play spaces, the outdoors, and landscape architecture into a fun and interesting project at the Center for Child Development at K-State.

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abstract

Full of stimulating elements, nature provides a dynamic setting where children engage all of their senses and deepen their understanding of the world. Play is essential to a child's physical, cognitive, and social development, and playing in nature simultaneously engages a child's sensory learning and development. By incorporating natural elements into early childhood spaces, children become more attuned to themselves, others, and the environment around them. Designing outdoor play spaces that engage all of their senses in early childhood enhances their cognitive and physical development, social skills, emotional regulation, and creativity. The goal of this research design is to explore the landscape architect's role in creating play environments that nurture sensory development in early childhood. The primary outcome from the research project will be a projective design for the Kansas State University Center for Child Development (CCD), focused on enhancing sensory experiences in a nature-based environment for young children. Serving the K-State and Manhattan communities, the CCD provides child care and a rich learning environment, prioritizing nature-based learning and exploration through its evidence-based practices. To inform this design, an in-depth literary review, analysis of existing nature-based play guidelines, and exploration of built works was conducted, providing design considerations for engaging sensory integration patterns and the seven main senses in a nature-based play environment. Beyond the CCD, this project sought to highlight the importance of sensory-rich play in early childhood and provide a framework to help landscape architects when designing similar settings.

contents

01 introduction.....1

02 background.....6

03 methods.....28

04 findings.....46

05 projective design.....112

06 conclusion.....190

07 end matter.....196

List of Figures

front matter

Cover Image Girl Searching Nature. (Coulter 2025)
Figure 0.1 Girl Running on Stumps. (Coulter 2025)

chapter 1

Figure 1.1 Girl Watching Nature. (Coulter 2025)

chapter 2

Figure 2.1 Play & Physical Development. (Coulter 2025)
Figure 2.2 Play & Social Interaction. (Coulter 2025)
Figure 2.3 Play & Risk and Independence. (Coulter 2025)
Figure 2.4 Play & Learn About the World. (Coulter 2025)
Figure 2.5 Nature play quote from Moore 2014. (Coulter 2025)
Figure 2.6 Sensory Integration Processing Patterns Diagram. (Coulter 2025)
Figure 2.7 Sensory Integration Diagram. (Coulter 2025)
Figure 2.8 Proprioception sense. (Coulter 2025)
Figure 2.9 Vestibular sense. (Coulter 2025)
Figure 2.10 Tactile sense. (Coulter 2025)
Figure 2.11 Visual sense. (Coulter 2025)
Figure 2.12 Auditory sense. (Coulter 2025)
Figure 2.13 Olfactory sense. (Coulter 2025)
Figure 2.14 Gustatory sense. (Coulter 2025)

chapter 3

Figure 3.1 Methods Diagram. (Coulter 2025)
Figure 3.2 Existing Design Guidelines Diagram. (Coulter 2025)
Figure 3.3 10 Guiding Principles Diagram. (Coulter 2025)
Figure 3.4 Nature Play and Learning Places Diagram. (Coulter 2025)
Figure 3.5 Precedent Study Diagram. (Coulter 2025)
Figure 3.6 Precedent Study Location Map. (Coulter 2025)

chapter 4

Figure 4.1 Design Guideline Findings Diagram. (Coulter 2025)
Figure 4.2 10 Guiding Principles Findings Diagram. (Coulter 2025)
Figure 4.3 10 Guiding Principles Matrix. (Coulter 2025)
Figure 4.4 Nature Play and Learning Places Findings Diagram. (Coulter 2025)
Figure 4.5 Nature Play and Learning Places Matrix. (Coulter 2025)
Figure 4.6 Design Guidelines Organized into the Six Principles. (Coulter 2025)
Figure 4.7 Design Guidelines and Principles Matrix. (Coulter 2025)
Figure 4.8 Precedent Study Location Map. (Coulter 2025)
Figure 4.9 Dimensions Outdoor Classroom. (Coulter 2025)
Figure 4.10 Dimensions Outdoor Classroom. (Coulter 2025)
Figure 4.11 Dimensions Outdoor Classroom. (Coulter 2025)
Figure 4.12 Dimensions Outdoor Classroom. (Coulter 2025)
Figure 4.13 Dimensions Outdoor Classroom. (Coulter 2025)
Figure 4.14 Dimensions Outdoor Classroom. (Coulter 2025)
Figure 4.15 Dimensions Outdoor Classroom. (Coulter 2025)
Figure 4.16 Dimensions Outdoor Classroom. (Coulter 2025)
Figure 4.17 Dimensions Research Facility Outdoor Classroom Matrix. (Coulter 2025)
Figure 4.18 Ruth Staples Child Development Lab. (Coulter 2025)
Figure 4.19 Ruth Staples Child Development Lab. (Coulter 2025)
Figure 4.20 Ruth Staples Child Development Lab. (Coulter 2025)
Figure 4.21 Ruth Staples Child Development Lab. (Coulter 2025)
Figure 4.22 Ruth Staples Child Development Lab. (Coulter 2025)
Figure 4.23 Ruth Staples Child Development Lab. (Coulter 2025)
Figure 4.24 Ruth Staples Child Development Lab. (Coulter 2025)
Figure 4.25 Ruth Staples Child Development Lab. (Coulter 2025)
Figure 4.26 Ruth Staples Child Development Lab. (Coulter 2025)
Figure 4.27 Ruth Staples Child Development Lab. (Coulter 2025)
Figure 4.28 Ruth Staples Child Development Lab. (Coulter 2025)
Figure 4.29 Ruth Staples Child Development Lab. (Coulter 2025)
Figure 4.30 Ruth Staples Child Development Lab Matrix. (Coulter 2025)
Figure 4.31 Entry Gate. (Didier Design Studio n.d.)
Figure 4.32 Garden. (Didier Design Studio n.d.)
Figure 4.33 Aerial of garden. (Didier Design Studio n.d.)
Figure 4.34 Open area and seating. (Didier Design Studio n.d.)
Figure 4.35 Fossil ground surface. (Didier Design Studio n.d.)
Figure 4.36 The Grotto. (Didier Design Studio n.d.)
Figure 4.37 Rock collection area. (Didier Design Studio n.d.)
Figure 4.38 Garden area. (Didier Design Studio n.d.)
Figure 4.39 Glass house. (Didier Design Studio n.d.)
Figure 4.40 Childhood’s Gate Children’s Garden Matrix. (Coulter 2025)
Figure 4.41 Water area. (Zhang n.d.)
Figure 4.42 The Archaeology Dig. (Zhang n.d.)
Figure 4.43 Entry area. (Zhang n.d.)
Figure 4.44 Water wading area. (Zhang n.d.)
Figure 4.45 The Wetland. (Zhang n.d.)
Figure 4.46 The Hollow Tree. (Zhang n.d.)

Figure 4.47 Water feature. (Zhang n.d.)
Figure 4.48 Water feature. (Zhang n.d.)
Figure 4.49 The Hollow Tree. (Zhang n.d.)
Figure 4.50 Jester Park Natural Playscape Matrix. (Coulter 2025)

chapter 5

Figure 5.1 Center for Child Development South Playground. (Coulter 2025)
Figure 5.2 Center for Child Development Student to Staff Ratio. (Ramirez 2024)
Figure 5.3 K-State Campus Map. (Swaney 2024)
Figure 5.4 K-State Campus Map. (Coulter 2024)
Figure 5.5 Center for Child Development Existing Site Plan. (Ramirez 2024)
Figure 5.7 Center for Child Development South Playground. (Coulter 2024)
Figure 5.8 Center for Child Development South Playground. (Coulter 2024)
Figure 5.9 Center for Child Development South Playground. (Coulter 2024)
Figure 5.10 Center for Child Development South Playground. (Coulter 2024)
Figure 5.11 Center for Child Development South Playground. (Coulter 2024)
Figure 5.12 Center for Child Development South Playground. (Coulter 2024)
Figure 5.13 Center for Child Development South Playground. (Coulter 2024)
Figure 5.14 Center for Child Development South Playground. (Coulter 2024)
Figure 5.15 Center for Child Development South Playground. (Coulter 2024)
Figure 5.16 Center for Child Development South Playground. (Coulter 2024)
Figure 5.17 Center for Child Development South Playground. (Coulter 2024)
Figure 5.18 Center for Child Development South Playground. (Coulter 2024)
Figure 5.19 Center for Child Development North Playground. (Coulter 2024)
Figure 5.20 Center for Child Development North Playground. (Coulter 2024)
Figure 5.21 Center for Child Development North Playground. (Coulter 2024)
Figure 5.22 Center for Child Development North Playground. (Coulter 2024)
Figure 5.23 Center for Child Development North Playground. (Coulter 2024)
Figure 5.24 Center for Child Development North Playground. (Coulter 2024)
Figure 5.25 Center for Child Development North Playground. (Coulter 2024)
Figure 5.26 Center for Child Development North Playground. (Coulter 2024)
Figure 5.27 Center for Child Development North Playground. (Coulter 2024)
Figure 5.28 Center for Child Development North Playground. (Coulter 2024)
Figure 5.29 Center for Child Development North Playground. (Coulter 2024)
Figure 5.30 Center for Child Development North Playground. (Coulter 2024)
Figure 5.31 Hydrology and Vegetation Diagram. (Ramirez 2024)
Figure 5.32 Play Zones Diagram. (Ramirez 2024)
Figure 5.33 Indoor-Outdoor Relationships Diagram. (Ramirez 2024)
Figure 5.34 Circulation Diagram. (Ramirez 2024)
Figure 5.35 The Senses Diagram. (Coulter 2025)
Figure 5.36 Sensory images. (Coulter 2025)
Figure 5.37 Process work. (Coulter 2024)
Figure 5.38 Meeting Outline. (Coulter and Ramirez 2025)
Figure 5.39 Design Review Meeting Flyer. (Ramirez 2025)
Figure 5.40 Design Review Presentation. (Ramirez 2025)
Figure 5.41 Proposed Site Plan. (Ramirez 2025)
Figure 5.42 Design Review. (Goold 2025)
Figure 5.43 Design Review. (Goold 2025)
Figure 5.44 Design Review. (Goold 2025)
Figure 5.45 Design Review. (Goold 2025)
Figure 5.46 Design Review. (Goold 2025)
Figure 5.47 Design Review. (Goold 2025)
Figure 5.48 Design Review Sticky Notes. (Coulter 2025)
Figure 5.49 The Flint Hills at the Konza Prairie Trail. (Coulter 2024)
Figure 5.50 Center for Child Development Projective Site Plan. (Ramirez 2025)
Figure 5.51 Narrative Diagram. (Ramirez 2025)
Figure 5.52 Play Zones Diagram. (Ramirez 2025)
Figure 5.53 Surface Materials Diagram. (Coulter 2025)
Figure 5.54 Circulation Diagram. (Ramirez 2025)
Figure 5.55 Center for Child Development Projective Site Plan South Playground. (Ramirez 2025)
Figure 5.56 Mushroom March. (Coulter 2025)
Figure 5.57 Climb, Crawl and Slide. (Coulter 2025)
Figure 5.58 Loose Parts Lot. (Coulter 2025)
Figure 5.59 Infant Lawn. (Coulter 2025)
Figure 5.60 In the Treetops. (Coulter 2025)
Figure 5.61 Center for Child Development Projective Site Plan North Playground. (Ramirez 2025)
Figure 5.62 Dry River Bed. (Coulter 2025)
Figure 5.63 Burrow and Build. (Coulter 2025)
Figure 5.64 Rhythm Ridge. (Coulter 2025)
Figure 5.65 Outdoor Classroom and Food Forest. (Coulter 2025)
Figure 5.66 Little House on the Prairie. (Coulter 2025)
Figure 5.67 *Acer saccharum* (caddo sugar maple). (K-Research and Extensions 2003)
Figure 5.68 Sugar Maple Seeds *Acer saccharum.* (Mullen 2009)
Figure 5.69 *Asimina triloba* (paw paw). (Plant Image Library 2017)
Figure 5.70 *Asimina triloba* (paw paw) leaves in autumn yellow. (Winder 2016)
Figure 5.71 *Andropogon gerardii* shrub. (Voekler 2012)
Figure 5.72 *Andropogon gerardii.* (Lavin 2009)
Figure 5.73 Creeping Thyme. (Hollinger 2009)

Figure 5.74 *Thymus serpyllum* Pink Chintz. (Stang 2006)
Figure 5.75 Monarch Butterfly on Purple Coneflower. (USFWS Midwest Region 2018)
Figure 5.76 *Echinacea purpurea Spinus tristis.* (Cephas 2022)
Figure 5.77 *Fragaria virginiana* (wild strawberry). (John 2008)
Figure 5.7 *Fragaria virginiana.* (Stang 2006)
Figure 5.79 Sand and Water. (Coulter 2025)
Figure 5.80 Natural Loose Parts. (Coulter 2025)
Figure 5.81 Structures and Mounds. (Coulter 2025)
Figure 5.82 Climbing and Sliding. (Coulter 2025)
Figure 5.83 Active Play. (Coulter 2025)
Figure 5.84 Natural Loose Parts. (Coulter 2025)
Figure 5.85 Sand and Water. (Coulter 2025)
Figure 5.86 Sensory Tables. (Coulter 2025)
Figure 5.87 Active Play. (Coulter 2025)
Figure 5.88 Natural Beauty. (Coulter 2025)
Figure 5.89 Clearly Defined Areas. (Coulter 2025)
Figure 5.90 Musical Instruments. (Coulter 2025)
Figure 5.91 Outdoor Classroom. (Coulter 2025)
Figure 5.92 Birds, Bees, and Butterflies. (Coulter 2025)
Figure 5.93 Rain Garden. (Coulter 2025)
Figure 5.94 Edible Vegetation. (Coulter 2025)
Figure 5.95 Garden and Greenhouse. (Coulter 2025)
Figure 5.96 Food Forest. (Coulter 2025)
Figure 5.97 Picnic Tables. (Coulter 2025)
Figure 5.98 Projective Site Plan. (Ramirez 2025)
Figure 5.99 Center for Child Development Matrix. (Coulter 2025)

chapter 6

Figure 6.1 Mushroom March. (Coulter 2025)
Figure 6.1 Outdoor Classroom. (Coulter 2025)

"Nature awakens your senses and paying attention to sensory details inspires imagination."

– Mary Schramski, *Happiness Rehab: 8 Creative Steps to A More Joyful Life*

(Schramski and Archer 2012)

Glossary

sensory development – The process by which a child's senses cultivate and they determine how to use them and explore the world.

sensory play – Play activities that engage all seven senses.

nature-based play – Outdoor play activities that allow children to explore and learn about the natural world around them in a contained environment

Sensory Integration Patterns

low registration – Does not actively seek out experiences to meet sensory needs

sensory integration – How one processes sensory input from their body or environment and sort it out so they can respond to it.

sensory sensitivity – Does not actively change the environment to meet sensory needs; reaction to overstimulation which may or may not be immediate

sensation seeking – Need extra stimuli to engage all their senses

sensation avoiding – Engages in behaviors to avoid overstimulation and opportunities to take control of their environment

The Seven Senses

proprioception – This sense gives one the ability to sense different parts of the body without looking at them and helps regulate how much force is needed to complete tasks.

vestibular – This sense helps one understand spatial awareness and navigate their environment easily.

tactile – The sense of touch is the first to develop and the largest sensory organ (skin) that receives tactile information.

visual – The sense of vision comes from using light to interpret the environment. It helps one navigate places and objects around them.

auditory – The auditory sense is located in the inner ear that helps one listen and interpret sounds.

olfactory – The olfactory sense helps people identify and interpret smells.

gustatory – The gustatory sense allows one to perceive flavors and how taste is processed.



introduction

Summary

Problem & Introduction

Goal of this Report

Overview

Research Question

Summary

Playing outdoors is one of the most important parts of a child's development because it enables them to explore and engage with the world around them and foster an appreciation and understanding of the natural environment. Play supports physical, mental, emotional, and social development in children. Additionally, the outdoors provides diverse sensory experiences that are important for sensory development. Playing in a constantly changing environment, children are exposed to a variety of sensory experiences—sounds, sights, textures, and smells—that they may not encounter indoors. Playing outdoors allows children to build neural connections and foster an appreciation for the world.

Problem & Importance

In a society increasingly focused on indoor activities, academics, and technology, children today are missing out on the rich sensory experiences gained from spending time outdoors. As a result, their sensory development is significantly restricted. With less time spent in natural environments, many children are not getting the outdoor play opportunities they need to fully engage their senses and support their overall development.

Children have long used the outdoors for play; "it is a natural and critical part of a child's healthy development" (Moore et al. 2022, 1). For many children, play fills 3,500 of the 8,760 hours in a year (Austin 1974). Today, playgrounds are places where children can safely explore the world and learn important life skills (Austin 1974; Besio et al. 2017; Brett et al. 1993). A child's ability to play independently is critical to their sensory development, risk perception, imagination, social relationships, and fine and gross motor skills (Besio et al. 2017; Hanscom 2016; Moore et al. 2022). Providing quality outdoor play areas that enhance these areas is important in early childhood.

Play is one of the most important parts of a child's day because it enables them to strengthen physically, make cognitive connections, and develop social skills. Playing outside also fosters an appreciation and understanding of the natural environment. The outdoors provides diverse sensory experiences, and it is imperative to give children ample time to actively play outside, build sensory connections, and foster an appreciation for the world.

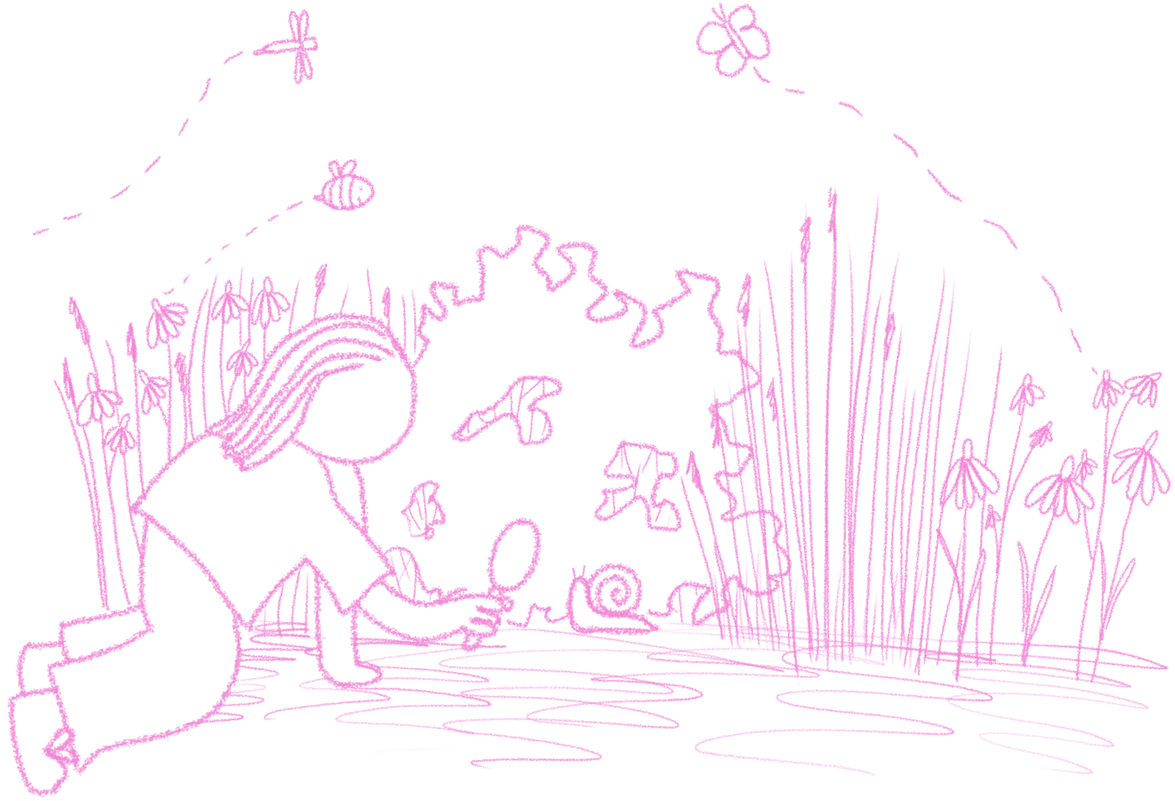
Goal of this Report

The goal of this research is to explore developmental and learning benefits children gain from nature-based play and apply the findings to the redesign of the Kansas State University Center for Child Development. Additionally, the report outlines how landscape architects can design these play spaces by exploring literature and precedents. There are three goals for this study:

- Explore the importance of play for children's sensory learning and development.
- Create guidelines for landscape architects that are designing in similar settings.
- Produce a projective design for the KSU Center for Child Development that promotes sensory learning and development through literary research, existing design guidelines, and precedent examples.

Overview

This report is organized into six chapters: an introduction, background, methods, findings, projective design and conclusion. In the Background chapter, a literary review of play and development, nature-based play, sensory development, and the seven senses. The methods chapter will discuss existing design guidelines for nature-based play spaces as well as explore several successful nature-play spaces. The findings chapter will discuss the application of these guidelines and precedents for the overall projective design. The Projective Design chapter will show the design process and master plan for the K-State Center for Child Development. Finally, the Conclusion chapter summarizes the takeaways, analyzes the limitations, and explores the future opportunities of this report.



[fig. 1.1] (Coulter 2025)

research question:

How can landscape architects design nature-based play spaces for children that promote sensory learning and development?

sub-question:

What are important design considerations when designing a nature-based playground?

background

02

Why Play?

Nature-Based Play

Sensory Development & Play

The Seven Senses

BACKGROUND



[fig. 2.1] Play & physical development (Coulter 2025)

Why Play?

Physical Development

Physical activity is an important part of play because of the development that it enables. Some studies suggest children need at least 40 to 60 minutes of moderate to vigorous physical activity daily (Cardon et al. 2009; Escalante et al. 2014; Stevens et al. 2023). However, young children, infants to preschoolers, should get between two to five hours of active outdoor play a day (Hanscom 2016). Types of physical activities that children engage in during free play include creeping, walking, running, jumping, climbing, grasping, swinging, lifting, balancing, rolling, and pushing and pulling (Austin 1974; Sunger and Czaplinska 2018).

During play, children develop gross and fine motor skills (Hanscom 2016). Gross motor skills are whole-body movements and coordination of the legs, arms, and other body parts in order to walk, run, and climb (Hanscom 2016). Fine motor skills use small muscles in the hands and fingers in coordination with the eyes (Hanscom 2016). To master fine motor skills, children first need gross motor strength (Hanscom 2016). The outdoors is the most appropriate area for a child to freely develop these motor skills because of the variable terrain, obstacles, and exploration (Hanscom 2016; Sunger and Czaplinska 2018).

Children stimulate and engage their entire body and minds when they are playing outdoors (Austin 1974). Physical benefits include longer duration of play before exhaustion, slight decline in rate of breathing, ability to attain greater oxygen consumption, greater utilization of energy reserves, lower resting heart rate, increase in the range of motion of joints, and increase in strength (Austin 1974). Greater amounts of physical activity are also shown to reduce the risk of childhood obesity, improve bone health, reduce the risk of disease, and strengthen immune systems. (Bento and Dias 2017; Cardon et al. 2009; James et al. 2022; Stevens et al. 2023). Playing in green environments is also shown to promote better mental health and higher levels of attention (Bento and Dias 2017; Cardon et al. 2009). Physical activity is shaped by the environment (Arroyo-Johnson et al. 2016). Some environmental characteristics that allow for this are a variety of interests and experiences, intensified natural functions of play, space to meet a range of recreation requirements, consideration of all age groups, and availability of individual and group opportunities (Austin 1974).

BACKGROUND



[fig. 2.2] Play & social interaction (Coulter 2025)

Social Interactions

The playground is a child's social space where friendships are developed and strengthened because of the spontaneous free play that occurs (Olsen and Dieser 2021). Children highly regard playgrounds because they offer "substantial social value" (Burke 2013). Friendships help children become more independent, engage in fantasy play and understand people better (Soloman 2014). By connecting and interacting with other people their age and developing communication and social skills, children gain a sense of community (Movahed et al. 2023). The social environment of play takes two or more children collaborating around a common goal, and the physical environment should encourage this cooperative play and interaction (Movahed et al. 2023). Providing opportunities to develop socially, effective outdoor play encourages children to communicate, express their feelings and maintain friendships (Olsen and Dieser 2012; Soloman 2014). Children require friendships for not only companionship but for "exchanging fears and dreams, for learning to share and compromise, and for challenging each other physically and creatively" (Soloman 2014, 104).

The outdoor environment can offer interesting conditions for socialization that can't happen indoors (Bento and Dias 2017). Children tend to cooperate more outside, and less conflict occurs (Bento and Dias 2017). Open and predictable space allows for development of common goals, accomplishing tasks and completing challenges which leads to companionship and friendship (Bento and Dias 2017). The outdoors also allows these interactions to happen naturally and gradually, giving children the possibility to choose moments to connect with others (Bento and Dias 2017).

BACKGROUND



[fig. 2.3] Play & risk and independence (Coulter 2025)

Risk & Independence

In a world concerned about the safety of children and the fear of lawsuits, it is challenging to understand the concept and importance of risky play (Soloman 2014). Today's playgrounds are often "anything but playful," but instead they are designed to make sure children do not hurt themselves (Olsen 2015, 57). Parents and professionals fear the potential of accidents in outdoor play (Bento and Dias 2017). "Risk-averse" thinking diminishes creativity and imagination and prevents children from overcoming challenges on their own (Burke 2013). A culture of fear has led us to underestimate children's capabilities and prevented critical development (Bento and Dias 2017).

Taking risks and challenges are critical for a child to learn and become independent. However, there is a clear difference between taking risks and encountering hazards. Hazards present possible life-threatening dangers which should be avoided (Soloman 2014). On the other hand, risks are situations with unclear outcomes (Soloman 2014). Risky activities include achieving fast speeds, climbing to great heights, being able to hide or get lost, using potentially new and risky tools, and rough-and-tumble play (Soloman 2014). Having the illusion of danger makes playgrounds appear riskier than they really are (Soloman 2014). The outdoors is a dynamic environment where children can experience freedom and deal with risk (King et al. 2024).

When children are exposed to risks, they have a chance to overcome fears at their own pace (Soloman 2014). Children are adept at identifying and overcoming fears by regulating risky play (Soloman 2014). When children complete challenges or master a new skill, they have feelings of success and happiness (Bento and Dias 2017). Removing risks from play can lead to missed opportunities for children to face and overcome their fears and lead to stress and anxiety as a child matures (Soloman 2014).

BACKGROUND

Learn About the World

Play allows children to practice key life skills and learn about the world in a structured environment (Austin 1974). A child's play world is creative and imaginative, so slowly integrating real world interactions into play allows them to learn how to navigate the world (Burke 2013). Play environments should be welcoming and allow for mistakes to be made and lessons learned (Burke 2013). Nature provides an environment for exploration, investigation, and discovery (King et al. 2024). The natural environment promotes learning and child-nature relationships (King et al. 2024).

Play also allows children to independently observe the world before interacting with it (Brett et al. 1993). Sitting and observing other children playing and interacting enables children to discover important functions of life and allows them to understand themselves and others (Brett et al. 1993). Child-directed play allows children to discover natural and human systems on their own and encourages them to follow their own interests (King et al. 2024). Through play, children become decentered and learn to understand there is more to the world than the human world (King et al. 2024). For the first two years of life, children are quickly growing and learning about themselves. When children spend ample time in nature from a young age, they begin to understand the value of the natural environment and systems (King et al. 2024).



[fig. 2.4] Play & learn about the world (Coulter 2025)

nature play: a designated, managed location in an existing or modified outdoor environment where children of all ages and abilities play and learn by engaging with and manipulating diverse natural elements, materials, organisms, and habitats, through sensory, fine motor, and gross motor experiences.

– Robin Moore, *Nature Play and Learning Places*

(Moore 2014, 5)

[fig. 2.5] Nature play quote image (Coulter 2025)

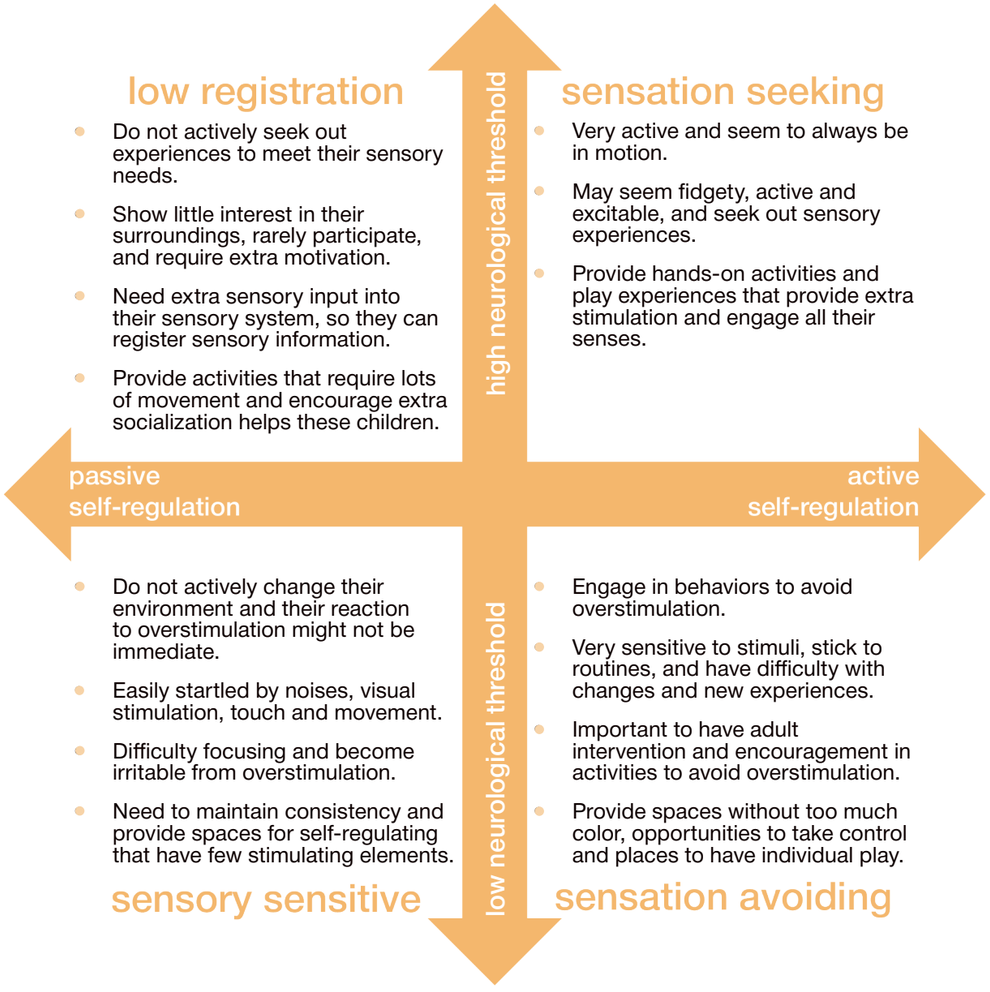
Nature-Based Play

Nature play is a growing trend in modern playgrounds not only for its multiple physical and cognitive benefits but also for the learning, sustainable, and sensory aspects (Figure 2.2) (Bento and Dias 2017; Gano and Krull 2020; Moore 2014). Nature playgrounds allow children to explore and learn about the natural world around them in a contained environment. They can learn how to care for the world by caring for a garden or picking up trash (Gano and Krull 2020; Moore 2014). Immersing children in nature helps them to learn to appreciate the environment around them (King et al. 2024; Moore 2014).

Natural Stimulus

The stimulus of the outdoor environment is hard to replicate inside (Bento and Dias 2017). Nature is constantly changing and providing different stimuli. Nature is full of diverse and stimulating elements that help children grow and develop (Beery and Jorgensen 2018). Children need to learn how the world feels, smells, tastes, looks, and reacts (Moore 2014; Schrank and Peteron 2004). Play allows children to engage all their senses, so it is crucial for children to play in nature to further develop their senses (Gano and Krull 2020; Hanscom 2016). Different senses that are engaged in outdoor play are proprioception, vestibular, tactile, visual, auditory, olfactory, and gustatory (Gano and Krull 2020; Hanscom 2016; Moore 2014). When children use their senses in nature play, their brains are actively creating nerve connections (Gano and Krull 2020; Hanscom 2016).

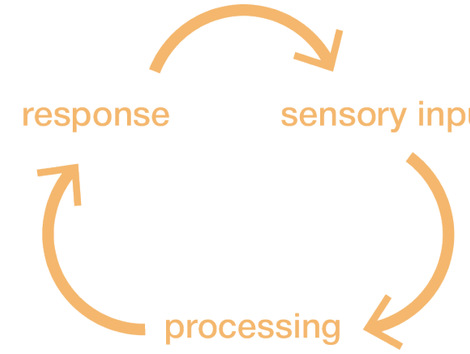
Sensory Integration Processing Patterns



(Thompson and Raisor 2013)
[fig. 2.6] Sensory integration processing patterns diagram (Coulter 2025)

Sensory Development & Play

For children, senses are how they develop gross and fine motor skills, learn about themselves and the world, and overcome challenges (Hanscom 2016). Sensory play helps develop strong, healthy, and capable children and prevents them from falling behind in developmental milestones (Hanscom 2016). Much of a child's development occurs within the first year of life (Galley 2010; Hanscom 2016). Babies are seeing, feeling, hearing and trying to make sense of their environment. The outdoors provides interesting visual, tactile and auditory experiences (Galley 2010). It is important for children to further refine through a variety of movements and play exercises (Hanscom 2016). Opportunities to climb, hide, listen, and so on help stimulate their senses and create those connections in their brains (Beery and Jorgensen 2018).



[fig. 2.7] Sensory integration diagram (Coulter 2025)

Sensory Integration

Sensory integration is how one receives sensory input from our bodies and the environment and processes it so they can adapt or make an appropriate response (Figure 2.3) (Thompson and Raisor 2013). All children process and respond to their environment differently based on their abilities (Thompson and Raisor 2013). Overstimulated children have too many stimuli in their environment than their sensory integration can handle (Thompson and Raisor 2013). Children that are understimulated do not have enough stimuli in their environment (Thompson and Raisor 2013). Providing too many stimuli or not enough can lead to difficulty maintaining emotions or engaging in activities (Thompson and Raisor 2013). Each child processes sensory information differently, so structuring the play environment and activities to meet all of their needs is important. Different sensory processing patterns include low registration, sensory sensitivity, sensation seeking, and sensation avoiding (see Figure 2.4) (Thompson and Raisor 2013).

The Seven Senses

Proprioception

The proprioception sense gives one the ability to sense different parts of the body without looking at them and helps regulate how much force is needed to complete tasks (Gano and Krull 2020; Hanscom 2016). The receptors for this sense are found in joints, muscles, ligaments, and connective tissues (Gano and Krull 2020; Hanscom 2016). The receptors send messages to the brain about where body parts are without looking at them (Gano and Krull 2020; Hanscom 2016). For children in play, this sense is developed through pushing and pulling (Hanscom 2016). Activities such as picking up rocks and sticks and setting them down, raking leaves, shoveling sand, or pushing friends on wagons (Hanscom 2016). Play items that promote this sense include sandboxes, rocks to move, or buckets to carry water. Generally, children with a poor proprioceptive sense are more prone to fractures, falls, dislocations and injuries (Hanscom 2016). This sense is important for children to achieve gross motor milestones (Hanscom 2016).

Activities:

- Jumping
- Pulling
- Pushing
- Walking
- Lifting
- Balance
- Running
- Wheeled toys



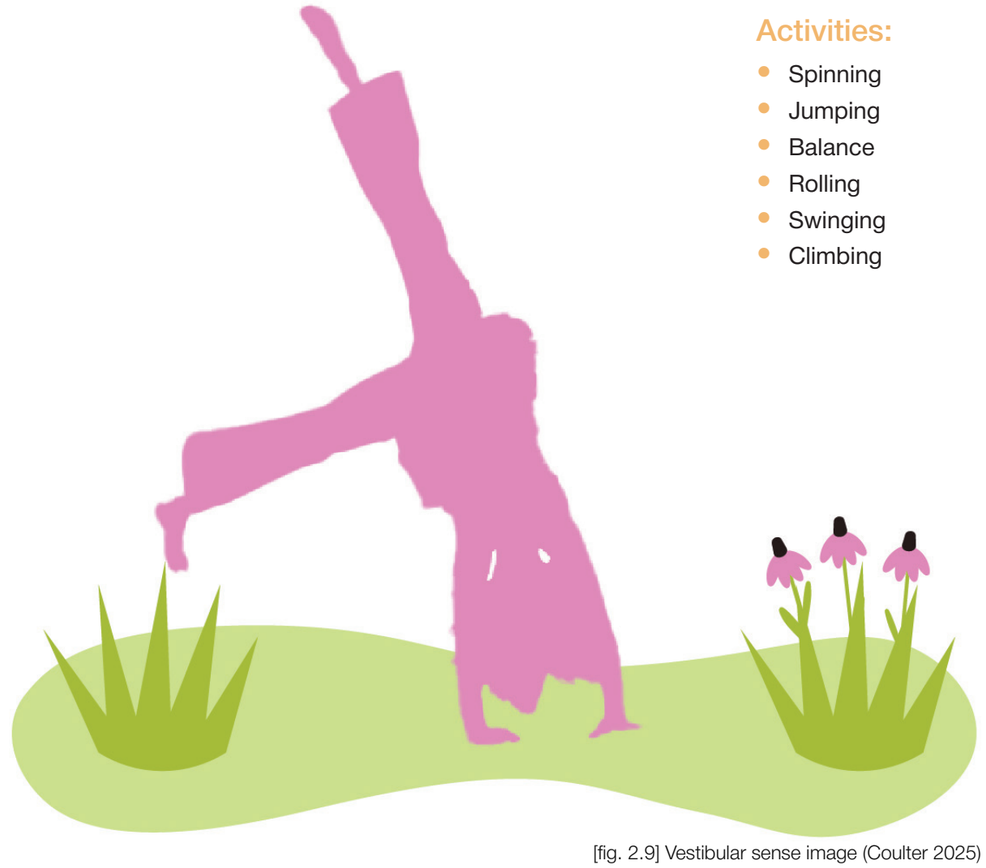
[fig. 2.8] Proprioception sense image (Coulter 2025)

Vestibular

The vestibular sense is based in the inner ear, and it is the sense that helps one understand spatial awareness and navigate the environment with ease (Gano and Krull 2020; Hanscom 2016). The receptors are little hairs in your inner ear, and when we move our head and body, the fluid in the inner ear moves back and forth (Hanscom 2016). A child with a good vestibular sense will have expert coordination, accurate spatial awareness, and great balance (Hanscom 2016). This sense is one of the most essential because it is interconnected with the auditory and visual sense (Hanscom 2016). When one of these senses does not work properly, the others will also be affected (Hanscom 2016). Today, children often lack efficient movement opportunities creating an underdeveloped vestibular sense (Hanscom 2016). This results in fidgeting, aggression, and trouble with attention (Hanscom 2016). Play that involves going upside down, spinning, tumbling, and swinging will help develop the vestibular sense (Hanscom 2016). Including play areas with monkey bars, swings, spinners, and hills to roll down are important in helping develop this sense (Hanscom 2016).

Activities:

- Spinning
- Jumping
- Balance
- Rolling
- Swinging
- Climbing



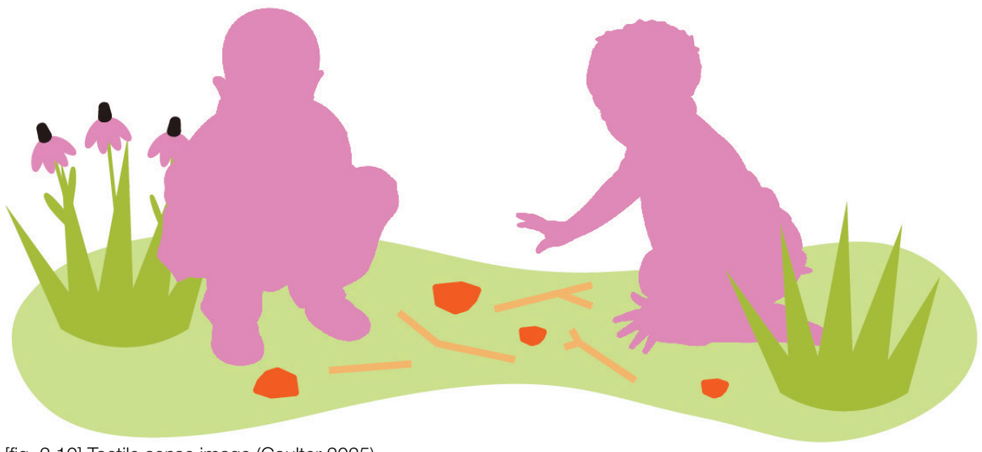
[fig. 2.9] Vestibular sense image (Coulter 2025)

Tactile

The sense of touch is the first to develop and has the largest sensory organ—skin (Hanscom 2016). Tactile information is received through sensory receptors all over our skin (Hanscom 2016). Sensations that activate the tactile sense include pressure, vibrations, movement, temperature, and pain (Hanscom 2016). Touch gives one the necessary information about the environmental temperature or alerts people of danger (Hanscom 2016). As children are exposed to new tactile experiences, their sense of touch develops (Hanscom 2016). Some children have tactile defensiveness where they may negatively react to tactile experiences that are not necessarily dangerous (Hanscom 2016). On the other hand, some children may be under-sensitive to touch and not feel potential hazards (Hanscom 2016). Tactile engagement is very important to develop especially at an early age (Gano and Krull 2020). Connecting babies to grass, soil, sand, water and other outdoor experiences will help develop their tactile sense. Hands and bare feet experience the different texture and temperature of the outdoor environment, providing strong nerve connections (Gano and Krull 2020).

Activities:

- Natural textures
- Loose parts
- Building
- Temperature
- Climate
- Music



[fig. 2.10] Tactile sense image (Coulter 2025)

Visual

The visual sense derives from using light to interpret the environment and it helps us investigate places and objects around us (Hanscom 2016). It enables one to investigate other senses (e.g. seeing where a smell is coming from) (Hanscom 2016). Sight also helps one examine if an object or situation is safe (Hanscom 2016). Newborns have rudimentary sense of sight and have trouble focusing (Hanscom 2016). They begin developing their sense of sight by following objects, people or animals that grab their attention (Hanscom 2016). Simultaneously, they are building stronger neck muscles (Hanscom 2016). Bringing babies into nature gives them opportunities to examine the rich outdoor environments and stimulate sensors and make sense of the world (Galley 2010). Children with visual difficulties have trouble focusing, scanning rooms, analyzing depth and sensitivity with light (Hanscom 2016). Ways to develop a child's sense of sight include helping them to move and see at the same time (Hanscom 2016). Flashlight tag, swinging, jumping, and playing on playground structures all help develop the sense of sight (Hanscom 2016). Play objects can also help children understand water, weather, and wind patterns. Having water play to see how water moves or flags and banners to see wind and motion can help children see how nature patterns work (Gano and Krull 2020). There is much to be examined and observed in nature (Gano and Krull 2020).

Activities:

- Vision changers
- Natural patterns
- Natural textures
- Flora & Fauna
- Moving
- Seasonal interest



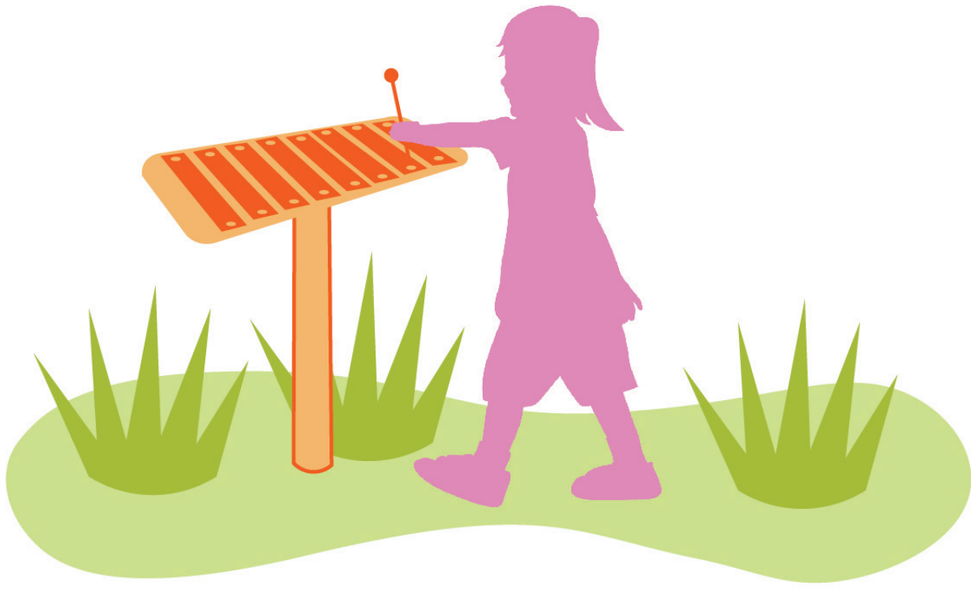
[fig. 2.11] Visual sense image (Coulter 2025)

Auditory

The auditory sense helps one listen and interpret sounds (Hanscom 2016). Listening connects people to the environment and provides a three-dimensional sense of the space (Hanscom 2016). The auditory and vestibular systems are found next to each other in the ear and influence one another (Hanscom 2016). Moving around may stimulate the auditory receptors (Hanscom 2016). Sounds can also affect concentration and regulating emotions (Hanscom 2016). Certain noises may overstimulate children that are oversensitive to noise (Hanscom 2016). In nature, there are so many sounds that will help develop the auditory sense. Natural sounds like birds chirping, insects humming, or leaves rustling can be heard outdoors (Gano and Krull 2020). Teaching children about the types of birds they hear and showing them what they look like could also create connections between their auditory and visual senses. Play areas can also include objects where children can make their own sounds. Including musical instruments such as bells, chimes, and drums adds to the variety of sounds in the outdoor play space (Gano and Krull 2020).

Activities:

- Music
- Chimes
- Flora & Fauna
- Human noises
- Water



[fig. 2.12] Auditory sense image (Coulter 2025)

Olfactory

Smell alerts us to danger, connects us to our emotions, and creates feelings of joy (Hanscom 2016). When we smell, we pull air molecules to the receptors in our nose (Hanscom 2016). This sends signals up the olfactory tract to the limbic system of our brain which controls emotions, motivations, and pleasure (Hanscom 2016). This is why the sense of smell plays a big role in our emotions (Hanscom 2016). Smells can stimulate different feelings. A newborn's sense of smell is well developed but is not further refined or developed as they grow up like the other senses (Hanscom 2016). Using plants in play areas that have distinctive scents creates places of beauty and wonder (Gano and Krull 2020). Flowering plants like gardenia, viburnum and jasmine create pleasant smells. Planting small herb gardens with basil or rosemary creates nice scents and allows children to connect their sense of smell and taste.

Activities:

- Vegetation
- Gardens
- Food



[fig. 2.13] Olfactory sense image (Coulter 2025)

Gustatory

The sense of taste is closely related to the sense of smell (Hanscom 2016). People are only able to taste five things: sweet, salty, bitter, sour, and umami, but with our sense of smell one is able to distinguish flavor (Hanscom 2016). Taste is well developed in newborns (Hanscom 2016). Infants tend to put objects in their mouths to better understand it (Hanscom 2016). Children that have difficulty processing the sense of smell or taste become overly sensitive or even nauseated by certain smells and tastes (Hanscom 2016). Oftentimes, this creates picky eaters that can only eat certain, often plain, foods (Hanscom 2016). Play experiences that enhance children's sense of taste could include growing their own edible foods from seeds or seedings (Gano and Krull 2020). This teaches children about the food cycle and exposes them to different scents, textures, and tastes (Gano and Krull 2020; Hanscom 2016). Growing food like vegetables, herbs, and berries can also make children more open to new foods and tastes (Hanscom 2016). Eating outside also takes away distractions and really connects the flavors and aromas of food (Gano and Krull 2020).

Activities:

- Gardening
- Edible plants
- Snack time
- Animal feeders
- Compost



[fig. 2.14] Gustatory sense image (Coulter 2025)

Conclusion

The seven senses that children engage in nature play are proprioception, vestibular, tactile, visual, auditory, olfactory, and gustatory. It is important to understand how children process and engage each of these senses in play to provide better play environments.

Considerations for the CCD redesign:

- Climb and crawl space
- Swinging
- Jumping
- Push and pulling
- Rolling
- Open space
- Balance
- Wheeled toys
- Mounded play
- Varying heights of play
- Loose parts
- Natural construction and building
- Music instruments
- Flora and Fauna
- Gardens
- Water play
- Sandbox
- Mud play

methods

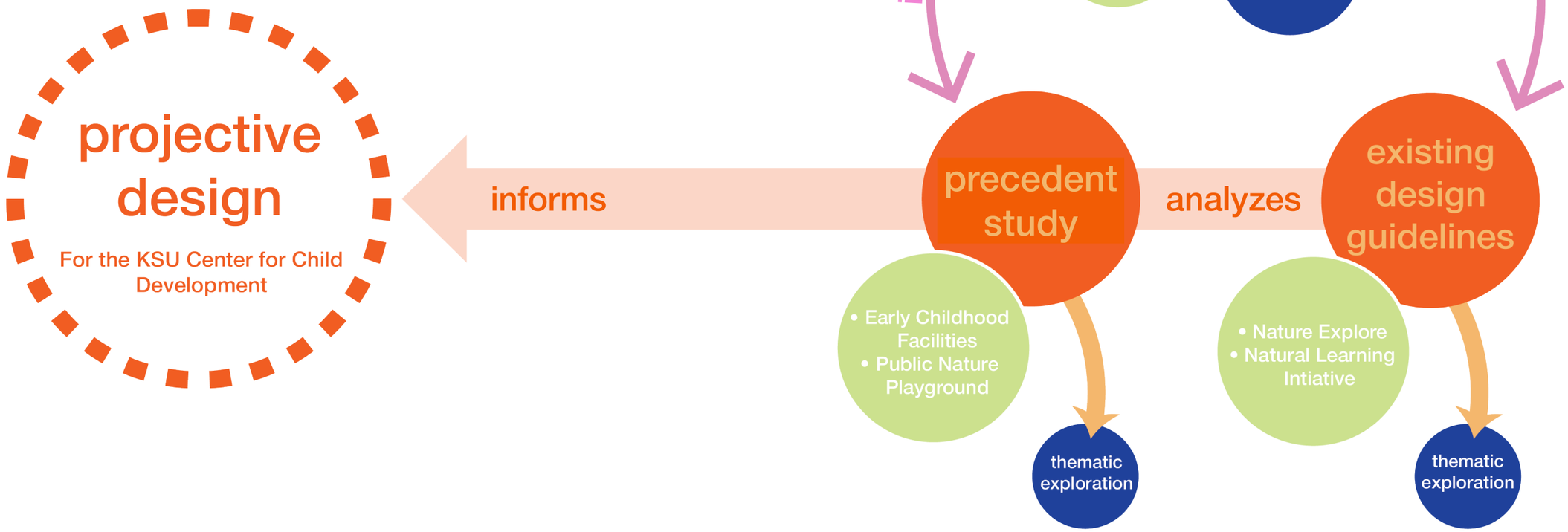
Review of Existing Design Guidelines

Precedent Studies

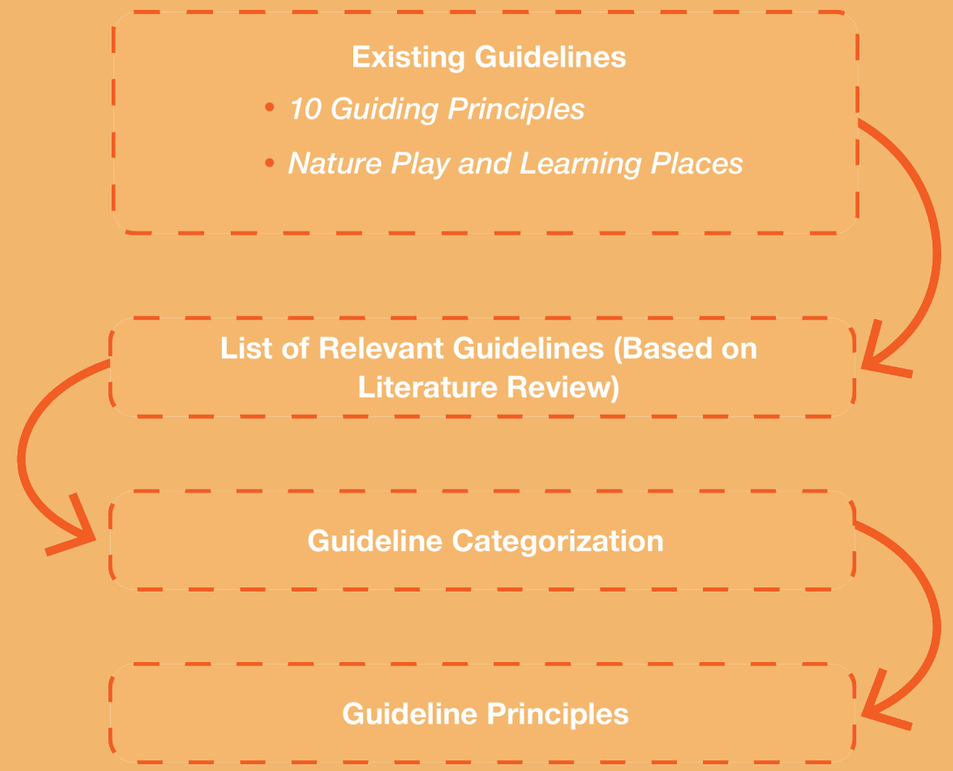
03

Methodology Overview

In order to answer the research question, the following qualitative methods were used: a review of existing design guidelines and an analysis of four precedent studies. The findings from the methods informed the overall projective design for the CCD. This is a joint methodology and project with Ady Ramirez.



[fig. 3.1] Methods diagram (Coulter 2025)



[fig. 3.2] Existing design guidelines diagram (Coulter 2025)

review of existing design guidelines

Purpose

The purpose of reviewing existing design guidelines is to understand nature play recommendations and what is available for landscape architects and early childhood educators that is rooted in research. We also looked at design guideline recommendations for both home and center-based childcare facilities. The selected design guidelines emphasize the importance of playing outside for healthy development and offer recommendations for a nature-based play space.

Selection Criteria

The guidelines that were selected are widely accepted methods by nature-based early childcare centers. The Nature Explore guideline is privatized while the Nature Learning Initiative guideline is public. Additionally, the private guideline also requires a follow-up certification and was requested by the main client for this project.

Documents Reviewed

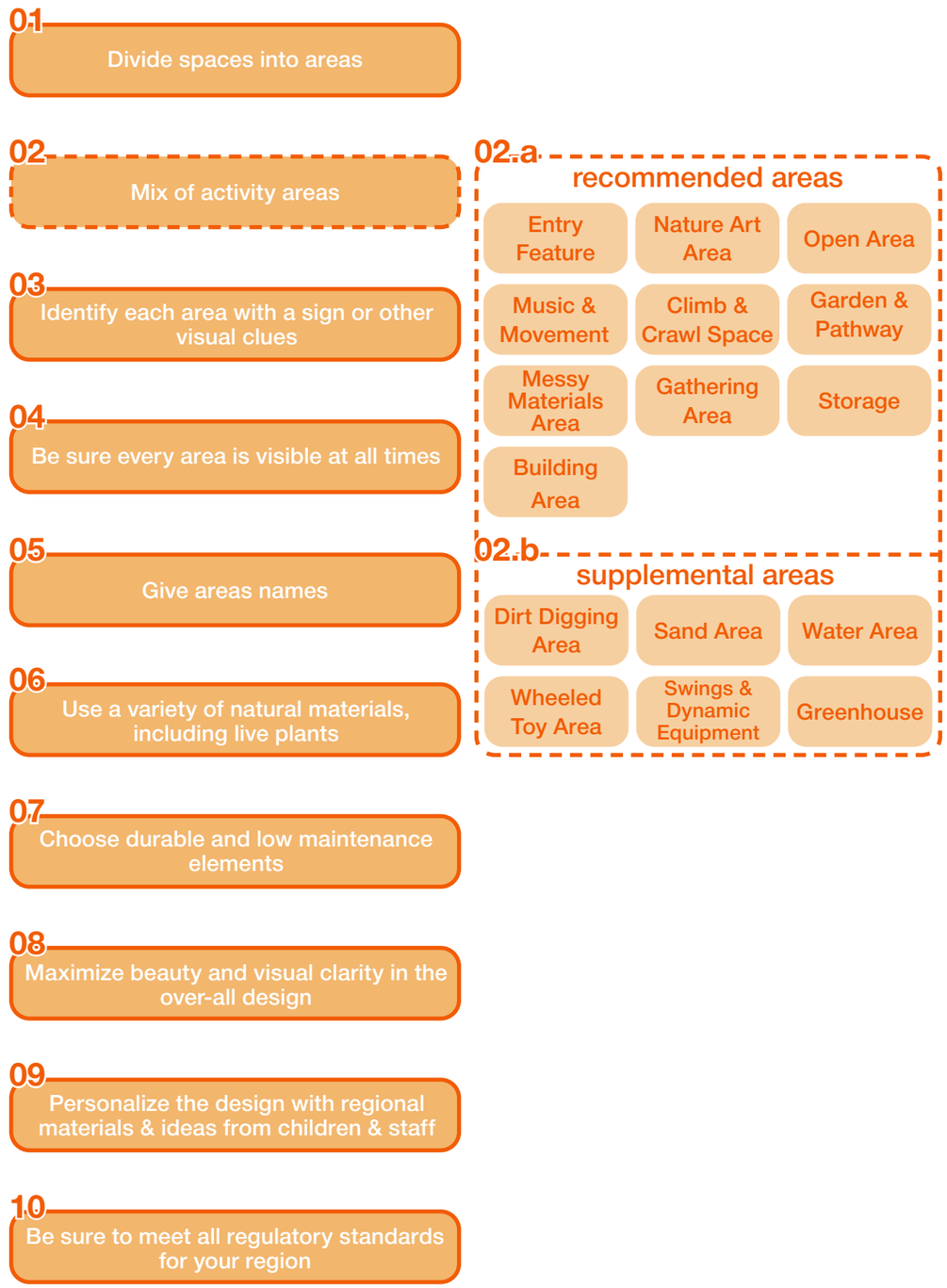
- *Ten Guiding Principles* by Nature Explore
- *Nature Play & Learning Places: Creating and Managing Places Where Children Engage with Nature* by Robin C. Moore 2014

Procedure

Each guideline was reviewed to understand the best practices, rooted in research, applicable to the CCD and promote sensory learning and development. After the guidelines were thoroughly reviewed, they were grouped and categorized into six principles. From that list of design principles, they were used to analyze the precedents.

10 Guiding Principles by Nature Explore

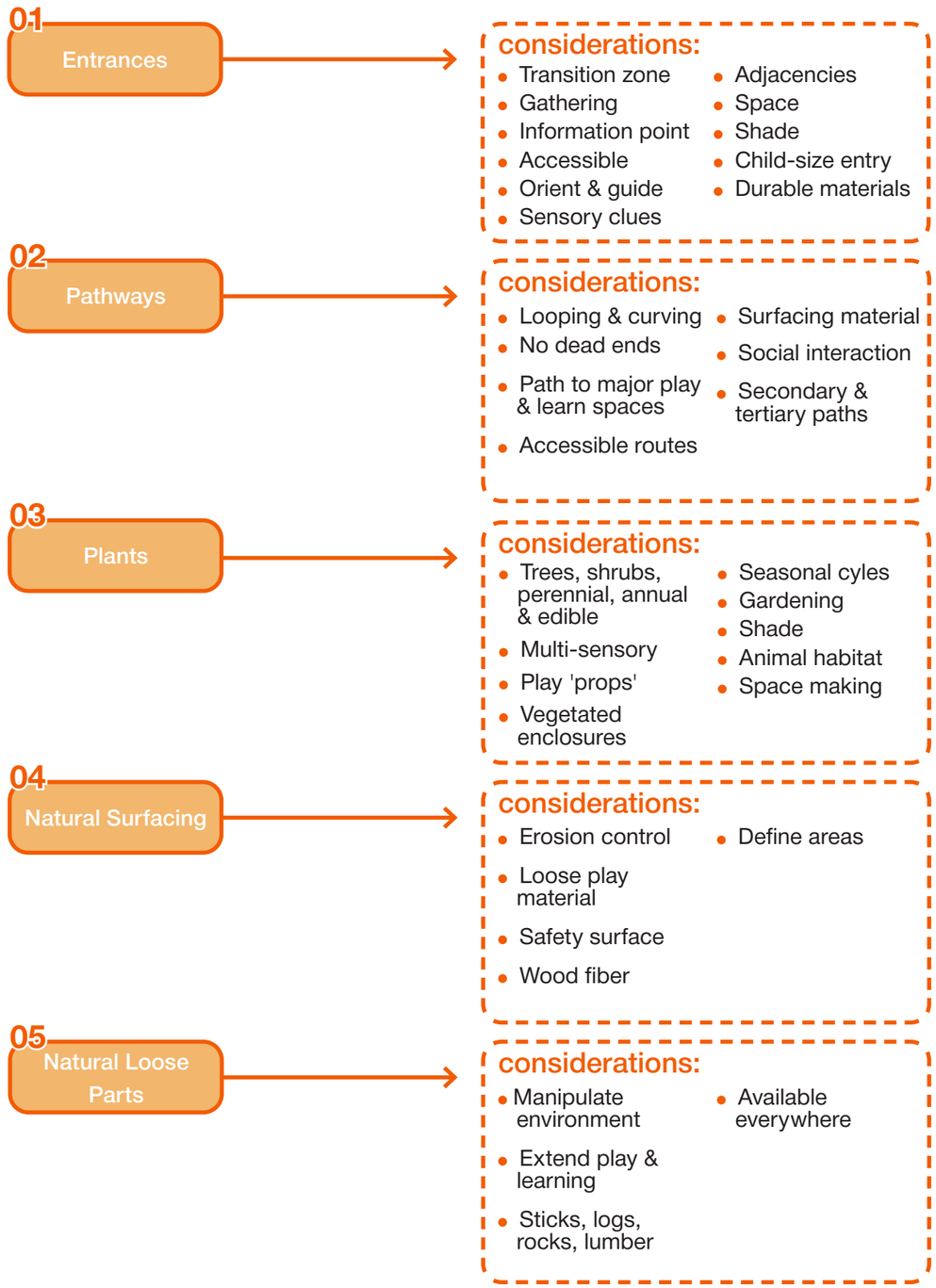
The *10 Guiding Principles* is a research-based and field-tested design guideline by Nature Explore. Nature Explore is a "national nonprofit program of Dimensions Educational Research Foundation, which works collaboratively with a network of organizations throughout the nation" (Nature Explore Talking Points 2024, 1, [Appendix 1]). The goal is to integrate nature into the daily lives of children through play. Research shows that children need a connection with the natural environment for healthy development. Direct observation of Nature Explore classrooms has provided evidence of foundational learning including math, spatial awareness, music and movement, literacy, art, science, etc (Nature Explore Talking Points 2024, 1, [Appendix 1). A Nature Explore Outdoor classroom is a dynamic, nature-based outdoor space that allows "children to explore and develop a connection to the natural world through engaging in open-ended play while enhancing the physical environment and adding natural beauty to the space" (Nature Explore Talking Points 2024, 1, [Appendix 1).



[fig. 3.3] 10 Guiding Principles diagram (Coulter 2025)

Nature Play & Learning Places: Creating and Managing Places Where Children Engage with Nature by Robin C. Moore

Nature Play and Learning Spaces is a set of nature play guidelines developed by Robin Moore with Nature Learning Initiative (NLI). The NLI's mission is to create environments that promote healthy development for children. They engage children and families in the natural world through "participatory environmental design, action research, education, and dissemination of information" (Moore 2014, iii). Research shows that children must spend time outdoors for their health and the well-being of the plant. If they do not spend enough time outdoors engaged in nature, their bodies will not properly develop and will never appreciate or understand human's dependence on the natural environment (Moore 2014).



[fig. 3.4] Nature Play and Learning Places diagram (Coulter 2025)

06 Natural Construction

considerations:
- Positive impact on mental health
- Develop social skills
- Learn properties of natural materials
- Tree trunks, branches, large leaves, etc.
- Locate in corner

07 Natural Play Structures

considerations:
- Support gross motor play
- Dramatic play
- Play houses, enclosures, stages, logs, etc.
- Local materials

08 Multipurpose Lawns

considerations:
- Support informal games
- Large groups & gathering
- Programmed activities
- Events

09 Meadows

considerations:
- Easy & accessible explorable ecosystem
- Seasonality
- Native plants
- Needs maintenance
- Sunlight

10 Woodland

considerations:
- Diverse ecosystem
- Adventure play
- Games
- Natural construction
- Seasonal cycles

11 Landform

considerations:
- Fantasy play
- Orientation skills
- Lookout spots
- Rolling, crawling, sliding, balancing, jumping (activates vestibular sense)
- Varied slopes
- Integrate fixed features

12 Animals

considerations:
- Resource for learning
- Ecological niches and life
- Foster empathy for life
- Non-harmful insects, birds, small mammals, amphibians & reptiles

13 Aquatics

considerations:
- Hands-on
- Multi-sensory experience
- Designated aquatic setting
- Misters, foggers, & sprays

14 Sand, Soil, & Dirt

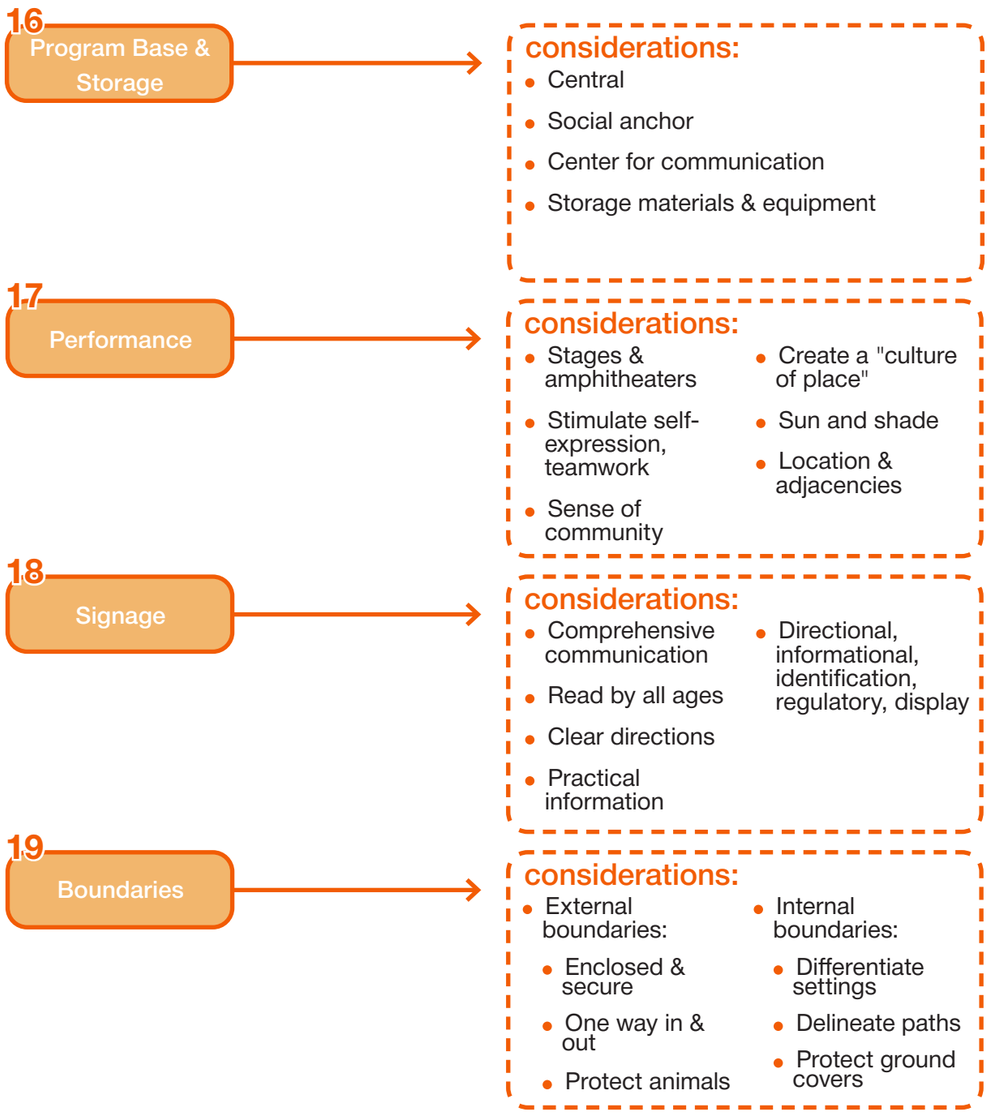
considerations:
- Engage in creative, imaginary experience
- Sensory qualities
- Social interaction
- Water nearby
- Solid boundary
- Close to pathway

15 Gathering

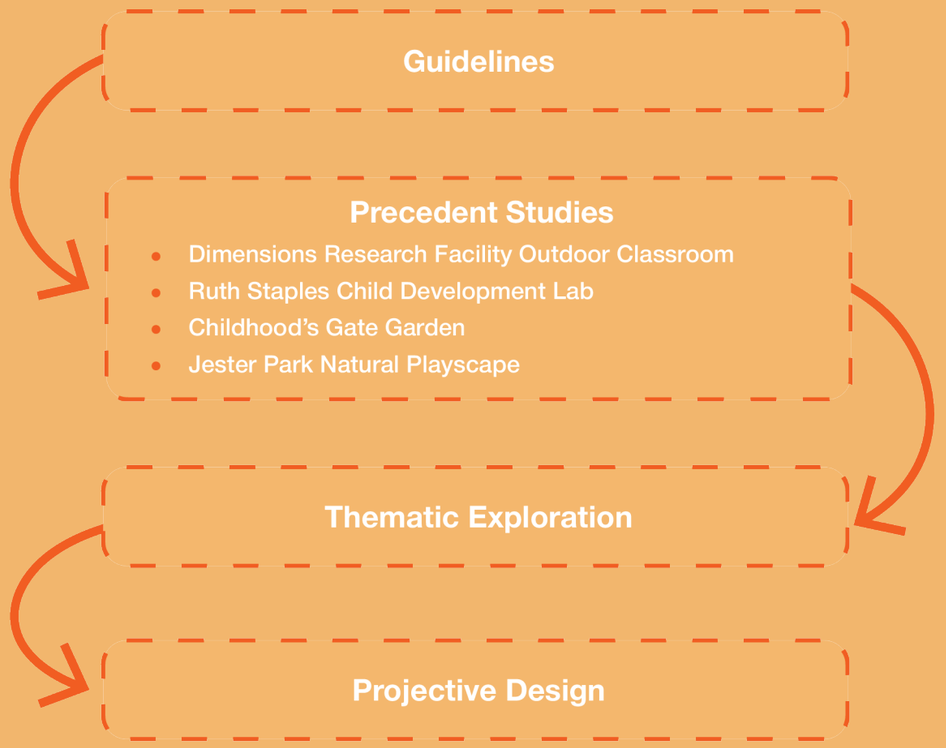
considerations:
- Opportunities for socializing
- Build community
- Dramatic play
- Learning environments
- Hang out for adults
- Accessible
- Vary in size

[fig. 3.4] Nature Play and Learning Places diagram cont. (Coulter 2025)

METHODS



[fig. 3.4] Nature Play and Learning Places diagram cont. (Coulter 2025)



[fig. 3.5] Precedent study diagram (Coulter 2025)

precedent study analysis

Purpose

The purpose of the precedent study is to identify built works that display and reinforce the findings from the literature review and design guideline review. Four precedents were chosen that are good examples of sensory learning and development and nature-based play. The takeaways from the precedent study will inform the CCD design and program.

Selection Criteria

The precedents that were selected are fully built, nature-based environments, early childhood spaces, and educational facilities and public parks.

Procedure

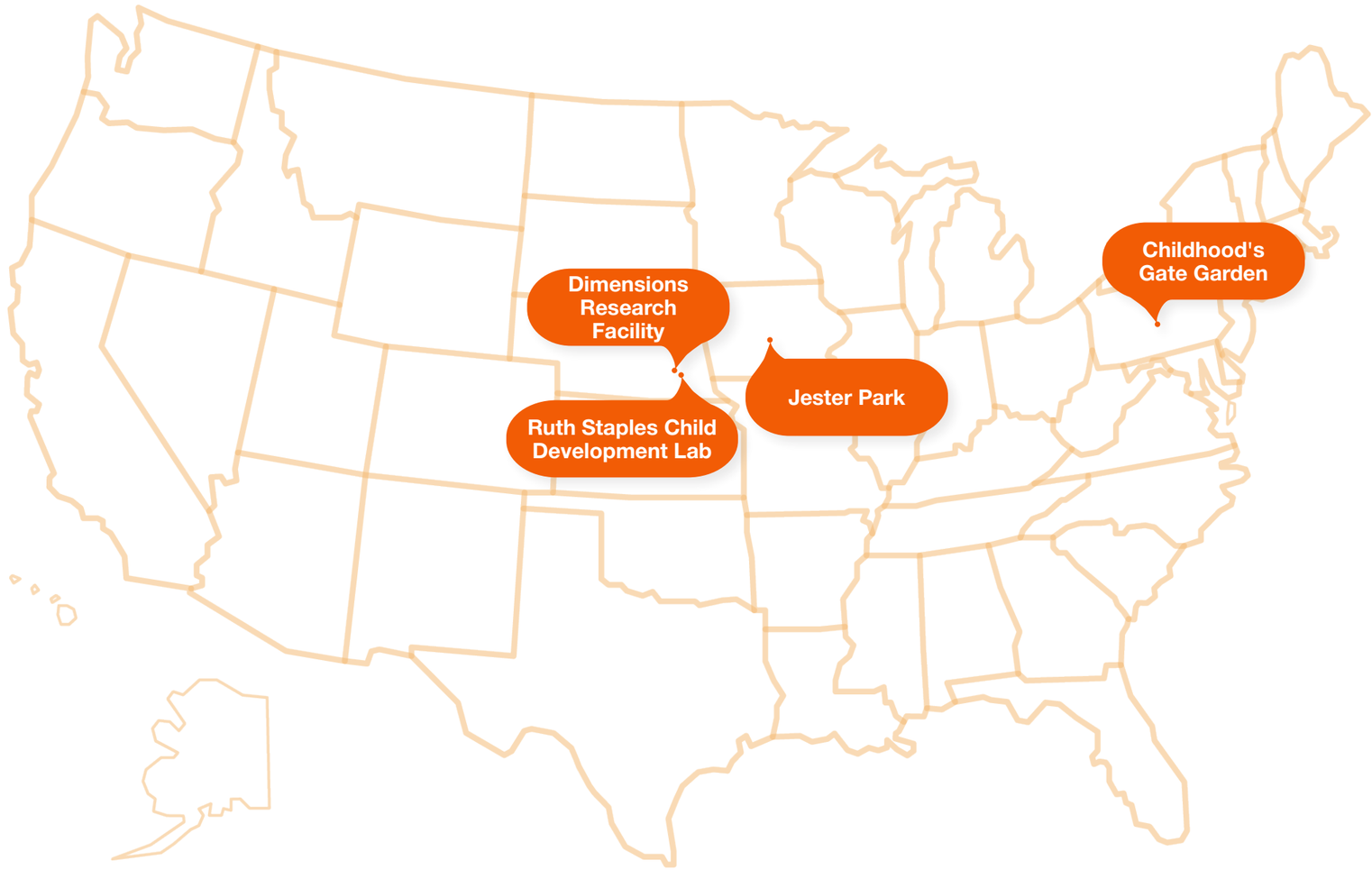
The following criteria will be assessed for each precedent:

- Name
- Designer
- Size
- Location
- Climate
- Design Approach
- Key Features that Inspire Sensory Learning, Development Engagement
- Applicability to the CCD Site

METHODS

Project Locations

- Dimensions Research Facility Outdoor Classroom (Lincoln, Nebraska)
- Ruth Staples Child Development Lab (Lincoln, Nebraska)
- Childhood’s Gate Garden (State College, Pennsylvania)
- Jester Park Natural Playscape (Granger, Iowa)



[fig. 3.6] Precedent study location map (Coulter 2025)

findings

Design Guidelines Findings

Precedent Study Findings

04



[fig. 4.1] Design guideline findings (Coulter 2025)

existing design guidelines findings

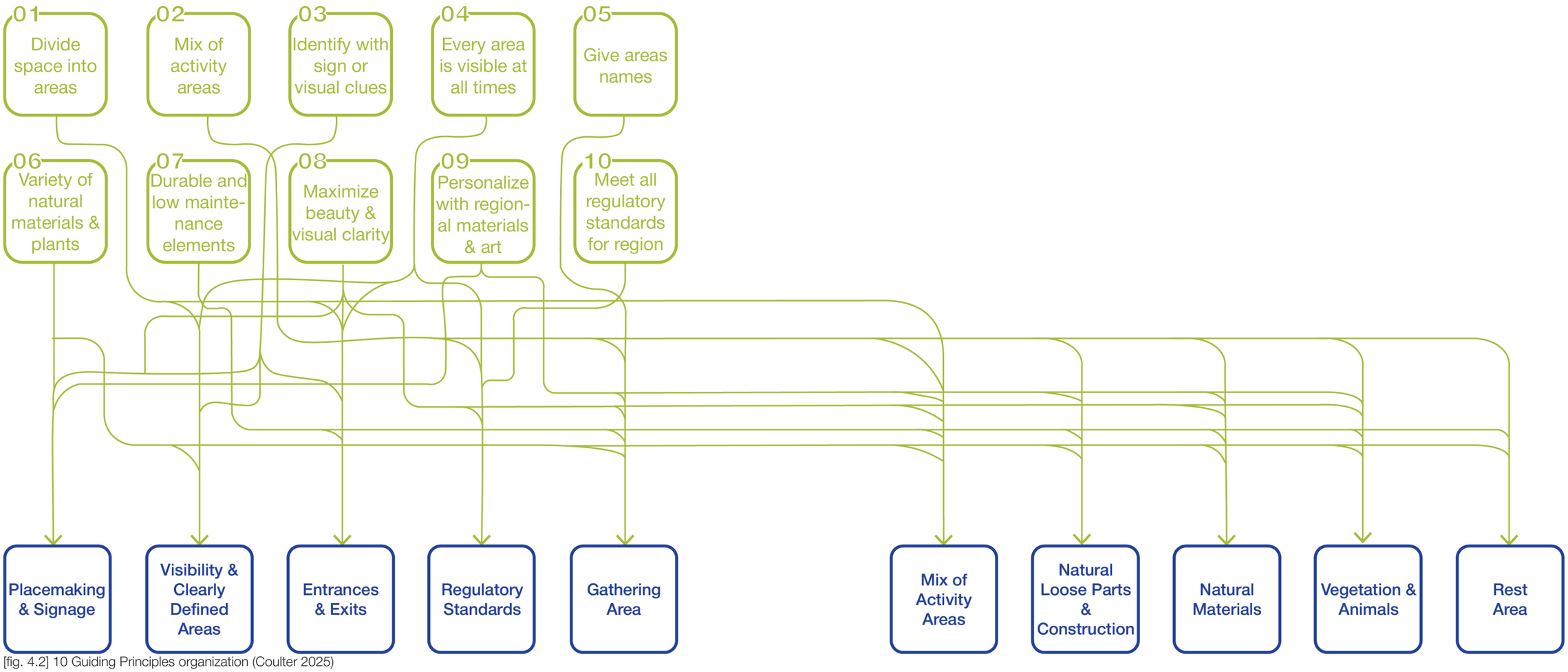
Introduction

After the *10 Guiding Principles and Nature Play and Learning Spaces* guidelines were thoroughly reviewed, with the background literature and research in mind, they were grouped into ten overall guidelines and were organized into six relevant design principles. These principles are: Program, Site Layout, Safety, Maintenance and Accessibility, Nature-Based, Senses, and Sensory Integration.

categorization of existing design guidelines

Using the nature and sensory play suggestions from the literature review, the *10 Guiding Principles* and *Nature Play and Learning* guidelines, were organized into 10 relevant guidelines. These guidelines are: placemaking and signage, visibility and clearly defined areas, entrances and exits, regulatory standards, gathering areas, mix of play areas, natural loose parts and construction, natural materials, vegetation and animals, and rest area. Figure 4.2 illustrates the how the *10 Guiding Principles* were organized.

10 Guiding Principles



[fig. 4.2] 10 Guiding Principles organization (Coulter 2025)

10 guiding principles

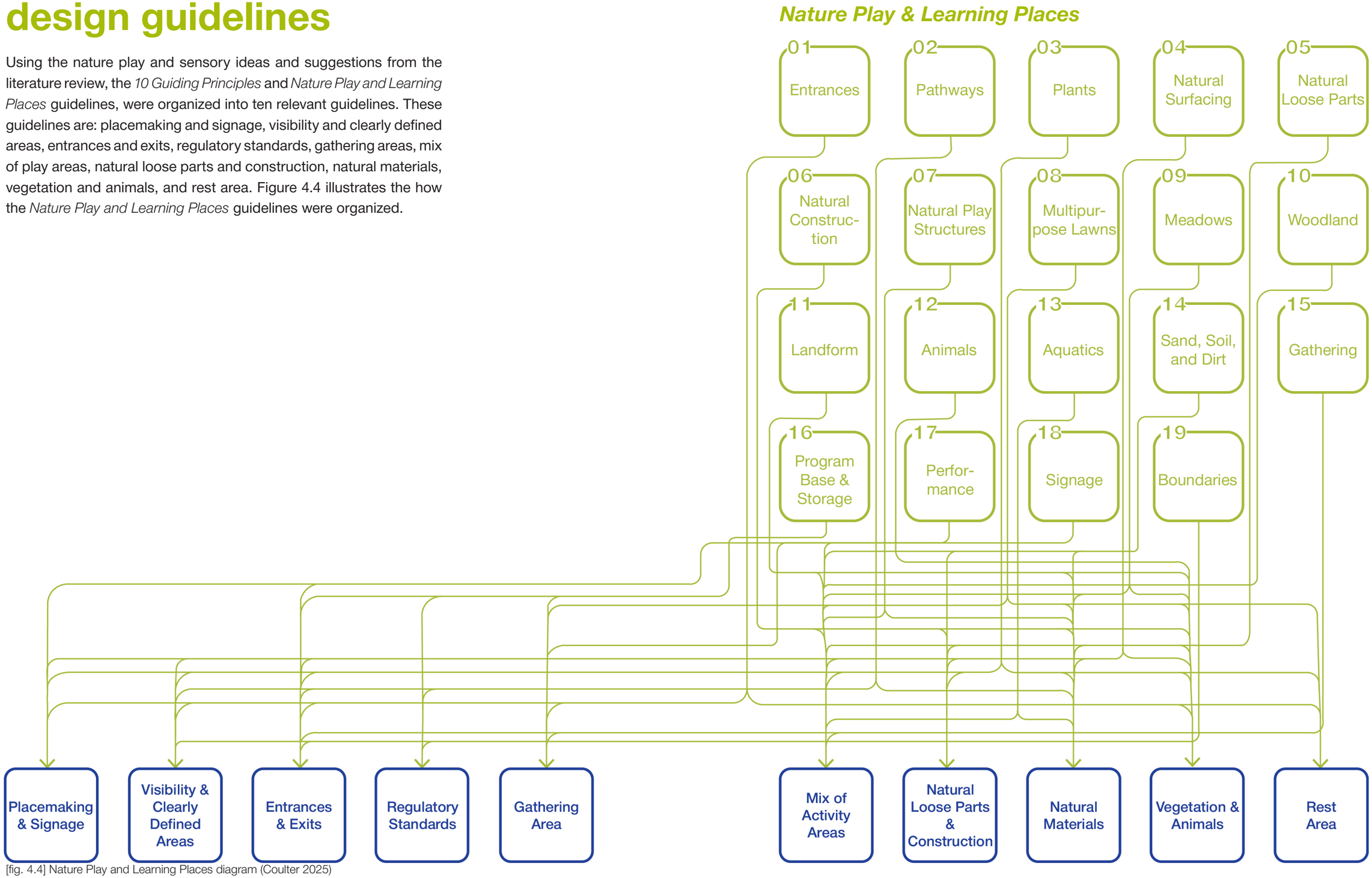
For more clarity, a matrix was used to show how each of the *10 Guiding Principles* guidelines were organized into the ten guidelines.

10 Guiding Principles

Guidelines	Placemaking & Signage	Visibility & Defined Areas	Entrances & Exits	Regulatory Standards	Gathering Area	Mix of Play Areas	Loose Parts & Construction	Natural Materials	Vegetation & Animals	Rest Area
Divide space in areas		●	●			●				
Mix of activity areas				●	●	●	●	●	●	●
Signage & Visual Clues	●	●	●							
Visibility		●	●	●						
Name areas	●									
Natural materials & plants	●	●			●	●	●	●	●	●
Durable & low maintenance elements			●		●	●	●	●	●	
Maximize beauty & visual clarity	●	●	●		●	●		●	●	
Personalize with regional materials & ideas	●				●	●	●	●	●	
Meet all regulatory standards for region				●						

categorization of existing design guidelines

Using the nature play and sensory ideas and suggestions from the literature review, the *10 Guiding Principles* and *Nature Play and Learning Places* guidelines, were organized into ten relevant guidelines. These guidelines are: placemaking and signage, visibility and clearly defined areas, entrances and exits, regulatory standards, gathering areas, mix of play areas, natural loose parts and construction, natural materials, vegetation and animals, and rest area. Figure 4.4 illustrates the how the *Nature Play and Learning Places* guidelines were organized.



[fig. 4.4] Nature Play and Learning Places diagram (Coulter 2025)

nature play & learning places

For more clarity, a matrix was used to show how each of the *Nature Play and Learning Places* guidelines were organized into the ten guidelines.

Nature Play & Learning Places

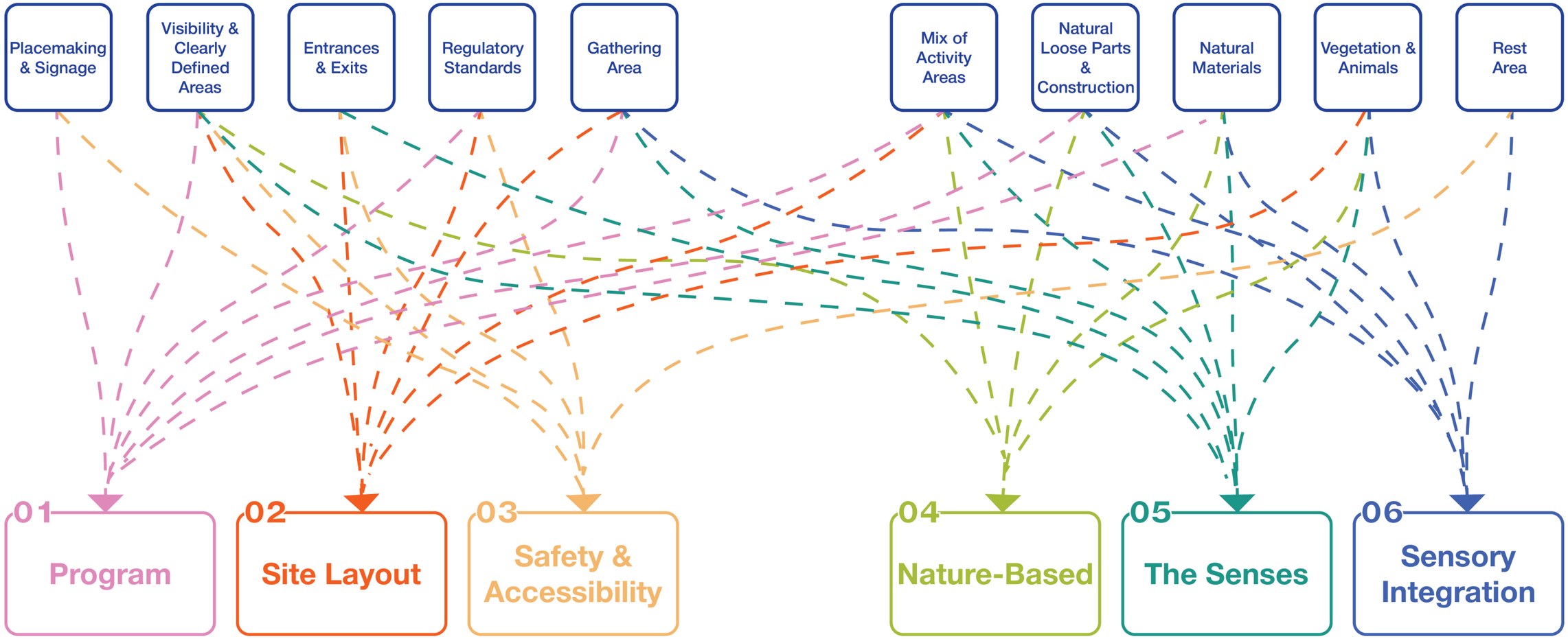
Guidelines	Placemaking & Signage	Visibility & Defined Areas	Entrances & Exits	Regulatory Standards	Gathering Area	Mix of Play Areas	Loose Parts & Construction	Natural Materials	Vegetation & Animals	Rest Area
Entrances	●	●	●		●				●	●
Pathways		●	●	●				●		
Plants	●	●	●			●	●	●	●	
Natural Surfacing	●	●			●	●		●	●	
Natural loose parts						●	●	●	●	
Natural construction						●	●	●	●	
Natural play structures						●		●		
Multipurpose lawns					●	●		●	●	●
Meadows						●		●	●	
Woodland						●		●	●	
Landform						●		●	●	
Animals									●	
Aquatics						●		●		
Sand, soil & dirt						●	●	●		
Gathering area			●		●	●				
Program base & storage			●	●						
Performance					●	●				
Signage	●		●							
Boundaries		●	●	●					●	

[fig. 4.5] Nature Play and Learning Places matrix (Coulter 2025)

FINDINGS

categorization of the ten design guidelines

Next, the 10 guidelines were organized into six main design principles. These principles guided the analysis of the precedent studies and the projective design for the CCD.



[fig. 4.6] Design guidelines organized into the six principles (Coulter 2025)

categorization of the 10 design guidelines

The six principles and 10 guidelines were organized into a matrix to better organize and illustrate the relationships. This matrix will be used to analyze the four precedent studies and projective design of the CCD to demonstrate the application of nature-based design recommendations.

10 Guidelines / Principles	Program	Site Layout	Safety & Accessibility	Nature-Based	The Senses	Sensory Integration
Placemaking & Signage	●		●			
Visibility & Clearly Defined Areas	●	●	●	●	●	
Entrances & Exits		●	●		●	
Regulatory Standards	●	●	●			
Gathering Area	●	●			●	●
Mix of Play Areas	●	●		●	●	●
Natural Loose Parts & Construction	●			●	●	●
Natural Materials	●			●	●	●
Vegetation & Animals		●		●		●
Rest Area			●			●

[fig. 4.7] Design guidelines and principles matrix (Coulter 2025)

01 program

The program has a diverse mix of nature-based play features and activities that are easily identified with visual cues, signage, and natural materials. All programming should be accessible and age appropriate.

Placemaking & Signage

- Personalize to the region's natural ecosystem
- Native and regional vegetation
- Play zones are identified with a name and signage

Visibility & Defined Areas

- Each programmed play zone is visible to adults
- Play zones are easily determined by children

Regulatory Standards

- Each programmed activity meets safety standards
- All play areas are accessible via pathways

Gathering Area

- Program base for learning
- Outdoor Classroom
- Open space

Mix of Play Areas

- Variety of play features and activities
- Structures, Climb/Crawl area, Music, wheeled toys, swings, dynamic equipment, landforms, woodland, and prairies

Loose Parts & Construction

- Sand, dirt, and water
- Wood, sticks, and branches

Natural Materials

- Program is rooted in nature
- Play structures and activities are made and use of natural materials

02 site layout

The site layout of a nature-based play space should have clearly defined paths and play areas using vegetation and natural, regional materials.

Visibility & Clearly Defined Areas

- Areas are clearly defined with natural materials and vegetation
- Vegetation does not block visibility to all areas

Entrance & Exit

- Entry feature
- Eating areas are near building entrance
- Enough transition space inside to outside

Regulatory Standards

- Boundaries

Gathering Area

- Near the entrance
- Caregiver and first aid supplies are nearby
- Restrooms nearby

Mix of Play Areas

- Loose parts are located in a corner
- Sand and water near each other

Vegetation & Animals

- Mix of naturalized spaces (meadows, woodland, and landform) and man made play areas
- Natural boundaries and buffers

03 safety & accessibility

Nature-based play spaces should follow all regulatory and accessibility standards for the area. Spaces should be clearly defined, accessible, durable, and visible for both children and adults.

Placemaking & Signage

- Signage and visual clues for children to understand the play activities

Visibility & Clearly Defined Areas

- No blind spots for adults
- Visibility to whole play space

Entrance & Exit

- Accessible and safe pathways
- Storage
- Boundaries are secure
- One way in and out

Regulatory Standards

- Follow all child care standards for region
- Follow ADA standards

Rest Area

- Seating for adults
- Area for children to self regulate

04 nature-based

Play activities, structures, and zones should be nature-based using local, regional materials, vegetation, and forms.

Visibility & Clearly Defined Areas

- Natural visual beauty
- Define areas with vegetation and natural materials
- Natural boundaries

Mix of Play Areas

- Nature are and messy materials
- Natural play areas (woodland, meadows, and landform)
- Sandbox
- Dirt digging
- Water
- Gardening

Natural Loose Parts & Construction

- Natural construction and building
- Plants with loose parts

Natural Materials

- Wood, timber and logs
- Rocks and gravel
- Woodchips
- Grass

Vegetation & Animals

- Native plants
- Attracts fauna and insects
- Gardens and edible plants

05 the senses

Play spaces should be a multi-sensory experience by providing a mix of nature-based play activities to engage all the senses.

Visibility & Clearly Defined Areas

- Visual stimuli throughout the play space (art, shrubs, trees, sand, water, gardens)
- Paths have visual clues and sense of discovery

Entrance & Exit

- Visual, auditory, and tactile clues in the entry
- Tables for eating in entrance (gustatory)

Gathering Area

- Open area to engage the vestibular and proprioception senses
- Communication and socialization to engage auditory sense

Mix of Play Areas

- Music instruments to engage to auditory and tactile senses
- Swings, landform, and wheeled toys to engage vestibular senses
- Structure, climb, and crawl space to engage proprioception sense

Natural Loose Parts & Construction

- Rocks, sticks, sand, dirt, and water to engage tactile and proprioception sense

Vegetation & Animals

- Pollinator and animal attracting plants to engage visual and auditory sense
- Edible plants and greenhouse to grow them to engage gustatory sense
- Flowering plants to engage olfactory sense

06 sensory integration

Each child's sensory integration pattern is different, so, in a nature-based play space, there should be places for children to engage all their senses or self regulate from overstimulation.

Gathering Area

- Open space, outdoor classrooms, and large paths for children with low registration and sensation seeking patterns

Mix of Play Areas

- Wheeled toys, swings, structures, music, climb, and crawl space for low registration and sensation seeking children

Natural Loose Parts & Construction

- Sand, dirt, water, sticks for children with low registration, sensation avoiding, and sensation seeking patterns

Natural Materials

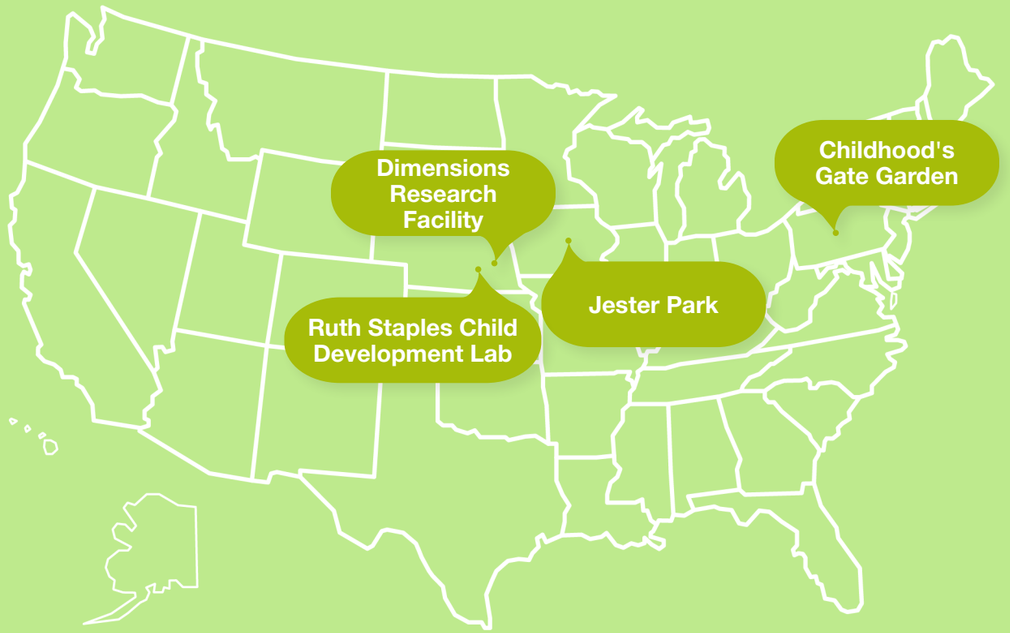
- Natural material for sensory sensitive and sensation avoiding children

Vegetation & Animals

- Gardens and greenhouse for children with sensory sensitive and sensation avoiding

Rest Area

- Seating and quiet space for children with sensory sensitivity pattern



[fig. 4.8] Precedent location map (Coulter 2025)

precedent study findings

Introduction

After thoroughly reviewing the design guidelines, four precedents were studied and reviewed to understand how the guideline suggestions worked in a real context. Two early childcare facilities in Lincoln, Nebraska were visited, Dimensions Research Facility Outdoor Classroom and Ruth Staples Child Development Lab. Additionally, two public nature-based playgrounds were studied to understand how nature-based design can be implemented in a public context. These playgrounds were Childhood's Gate Children's Garden in State College, Pennsylvania and Jester Park Natural Playscape in Granger, Iowa. The design concepts were then applied to the CCD redesign.

dimensions research facility outdoor classroom

Designer

Nature Explore

Size

1930 sf

Location

Lincoln, Nebraska

Climate

Humid Continental

Design Approach

The Dimensions infant and toddler outdoor classroom is divided into two yards: one specifically for infants and one that is divided into two halves for younger and older toddlers (Nature Explore Program 2025a). This outdoor classroom applies a research-based approach by using the space all year in all types of weather (Nature Explore Program 2025a). They even do normal indoor activities outside such as napping or diaper changing. The Dimensions outdoor classroom includes activities like building, art, digging with natural materials, playing with music instruments, climbing and crawling on play structures, and gardening beds (Nature Explore Program 2025a).

[fig. 4.9] Dimensions outdoor classroom (Coulter 2025)

01 program

Defined areas

Signage for each play zone

Program base & outdoor classroom



[fig. 4.10] Dimensions outdoor classroom (Coulter 2025)

02 site layout

Secure boundary, entrances & exits into play space

Defined play zones with natural materials



[fig. 4.11] Dimensions outdoor classroom (Coulter 2025)

03 safety & accessibility

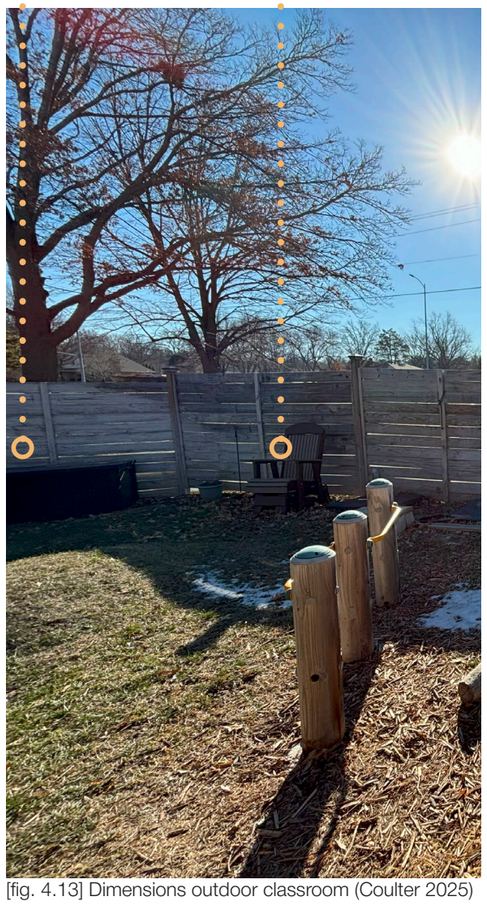
Bridge over exposed tree root

Changing table

Rocking chair



[fig. 4.12] Dimensions outdoor classroom (Coulter 2025)



[fig. 4.13] Dimensions outdoor classroom (Coulter 2025)

04 nature-based

Wood play zone boundary

Natural loose parts



[fig. 4.14] Dimensions outdoor classroom (Coulter 2025)

05 the senses



[fig. 4.15] Dimensions outdoor classroom (Coulter 2025)

06 sensory integration



[fig. 4.16] Dimensions outdoor classroom (Coulter 2025)

dimensions research facility outdoor classroom matrix

The Dimensions Research Facility and outdoor classroom engaged children's senses through several play activities. They had sand and dirt play, musical instruments, loose natural parts, and nature art. They also labeled all of the zones with signage and clearly defined them with natural materials. The infant area was also programmed appropriately and included care giving support.

10 Guidelines / Principles	Program	Site Layout	Safety & Accessibility	Nature-Based	The Senses	Sensory Integration
Placemaking & Signage	●		●			
Visibility & Clearly Defined Areas	●	●	●	●	●	
Entrances & Exits		●	●		●	
Regulatory Standards	●	●	●			
Gathering Area	●	●			●	●
Mix of Play Areas	●	●		●	●	●
Natural Loose Parts & Construction	●			●	●	●
Natural Materials	●			●	●	●
Vegetation & Animals		●		●		●
Rest Area			●			●

[fig. 4.17] Design guidelines and principles matrix (Coulter 2025)

ruth staples child development lab

Designer

Nature Explore

Size

26,400 sf

Location

Lincoln, Nebraska

Climate

Continental

Design Approach

Ruth Staples Lab School's outdoor classroom is located on the University of Nebraska-Lincoln's campus (Nature Explore Program 2025c). The outdoor classroom is a culmination of a century of leading early childhood care (Apel 2023). The classroom is modeled to represent Nebraska with wooden structure representing big cities and natural play to represent the rural areas (Nature Explore Program 2025c). Throughout the space, native materials and vegetation are used to create visual interest and attract wildlife (Nature Explore Program 2025c). Play activity areas include climbing structures, messy materials, nature art, sand, water, swings, music, gardening, etc. (Nature Explore Program 2025c). Pathways around the space allow for open-ended, uninterrupted play. Annually, the school hosts a cleaning day where parents can clean, plant new annuals, or repair play elements (Nature Explore Program 2025c). The Ruth Staples Child Development Lab promotes respect of the natural world by providing a diverse learning experience for children (Ruth Staples Child Development Laboratory n.d.).

[fig. 4.18] Ruth Staples Child Development Lab (Coulter 2025)

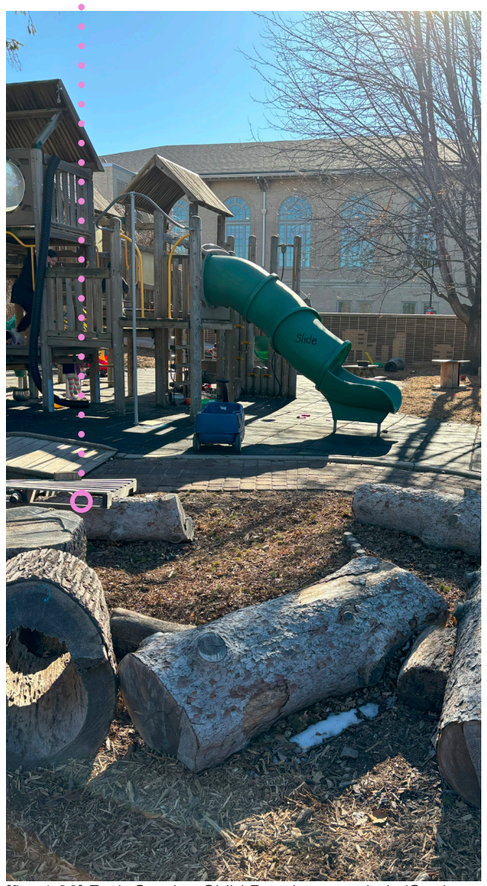
01 program

Signage

Play areas reflect parts of Nebraska



[fig. 4.19] Ruth Staples Child Development Lab (Coulter 2025)



[fig. 4.20] Ruth Staples Child Development Lab (Coulter 2025)

02 site layout

Play zones are clearly defined

Pathways throughout play areas



[fig. 4.21] Ruth Staples Child Development Lab (Coulter 2025)

03 safety & accessibility

Rest & eating area

Secure entrance & exit into play space



[fig. 4.22] Ruth Staples Child Development Lab (Coulter 2025)

04 nature-based

Natural loose parts & construction



[fig. 4.23] Ruth Staples Child Development Lab (Coulter 2025)

Landform

Large, mature trees



[fig. 4.24] Ruth Staples Child Development Lab (Coulter 2025)

05 the senses

Music

Structures

Swings

Loose parts

Climbing



[fig. 4.25 & 26] Ruth Staples Child Development Lab (Coulter 2025)



[fig. 4.27] Ruth Staples Child Development Lab (Coulter 2025)

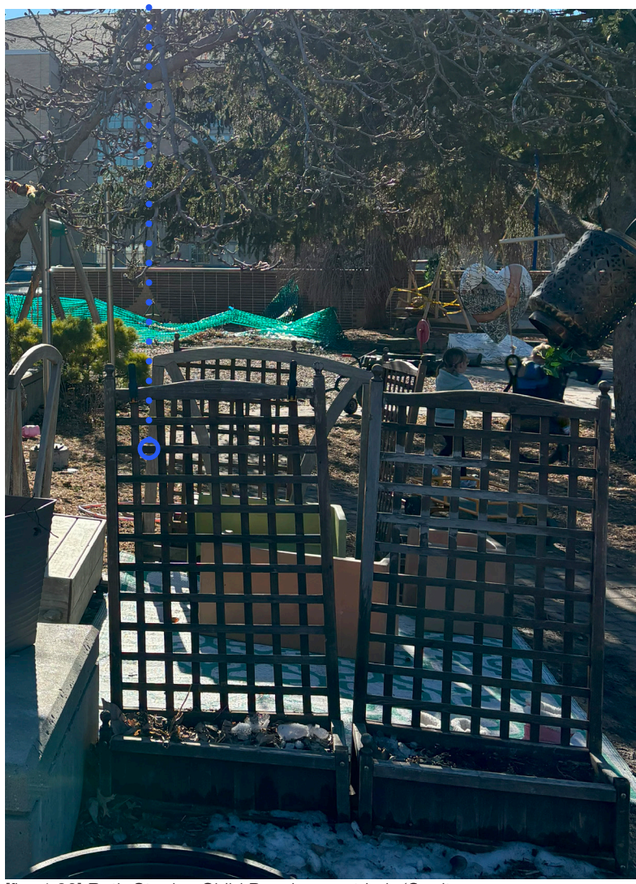
06 sensory integration

Individual & group play in sand area



[fig. 4.28] Ruth Staples Child Development Lab (Coulter 2025)

Library & seating



[fig. 4.29] Ruth Staples Child Development Lab (Coulter 2025)

ruth staples child development lab matrix

The Ruth Staples Child Development Lab has a strong placemaking through play zones modeled after Nebraska. They also have a large, mature tree canopy, and natural playscape. They also engage children's senses through several play structures, swings, sandbox, water play, wheel toys, gardening, and music.

10 Guidelines / Principles	Program	Site Layout	Safety & Accessibility	Nature-Based	The Senses	Sensory Integration
Placemaking & Signage	●		●			
Visibility & Clearly Defined Areas	●	●	●		●	
Entrances & Exits		●	●		●	
Regulatory Standards	●	●	●			
Gathering Area						
Mix of Play Areas	●	●		●	●	●
Natural Loose Parts & Construction	●			●	●	●
Natural Materials	●			●	●	●
Vegetation & Animals		●		●		●
Rest Area			●			●

[fig. 4.30] Design guidelines and principles matrix (Coulter 2025)

childhood's gate children's garden

Designer

Didier Design Studio

Size

3 acres

Location

University Park, State College, Pennsylvania

Climate

Humid Continental

Design Approach

Highlighting Pennsylvania's unique geography, Childhood's Gate Garden at the Penn State botanical garden bridges play, art, and science using native materials, vegetation, and geological forms (Didier Design Studio n.d.-a). Designed as an outdoor classroom, the garden provides multiple scales of activities and play areas that engage all senses. Visitors move through "rooms" to participate in a hands-on journey through Pennsylvania's geologic history (Didier Design Studio n.d.-a). For example, "The Grotto" features limestone stalactites, a waterfall, and a bronze bat colony (Didier Design Studio n.d.-a). Intending to connect children to nature, engage senses, and learn through play, the design provides access for all ages and abilities and tells a story through immersive play (Didier Design Studio n.d.-b).



[fig. 4.31] Childhood's Gate Garden Entrance (Didier Design Studio n.d.)

01 program

Learning about natural systems

Native and regional vegetation



[fig. 4.32] Garden (Didier Design Studio n.d.)

02 site layout

Pathway around whole site

Entry feature

Natural boundary



[fig. 4.33] Childhood's Gate Garden Aerial (Didier Design Studio n.d.)

03 safety & accessibility

Accessible paths

Seating

Adult visibility



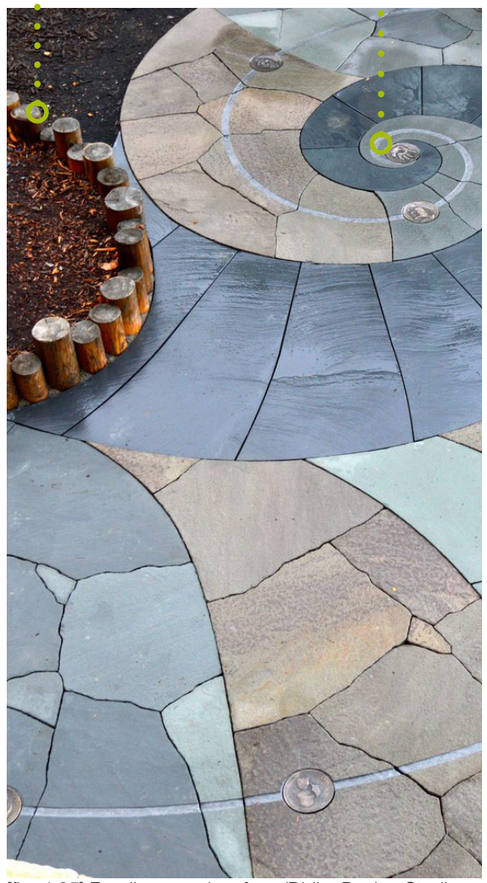
[fig. 4.34] Open area and seating (Didier Design Studio n.d.)

04 nature-based

Natural boundaries

Fossil groundcover

Natural geology



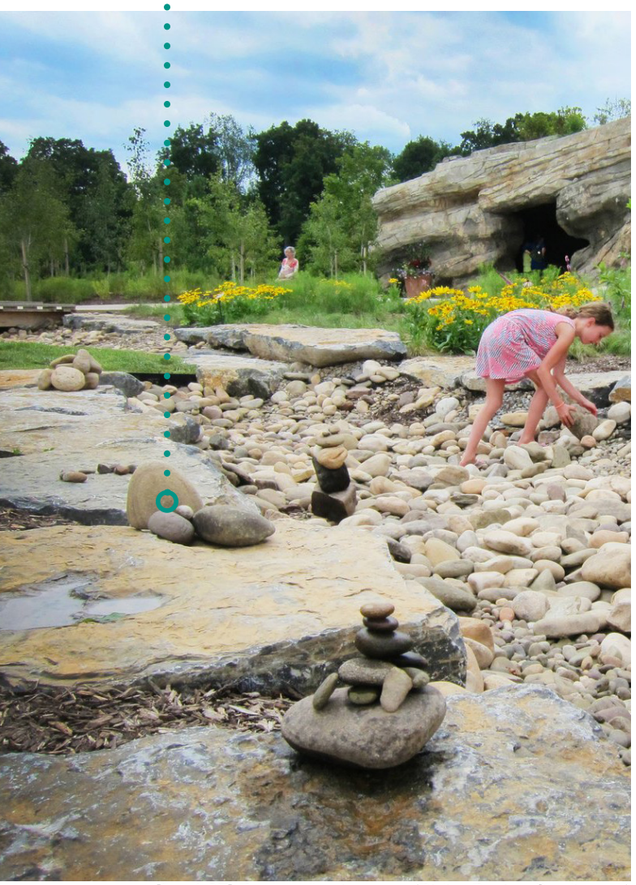
[fig. 4.35] Fossils ground surface (Didier Design Studio n.d.)



[fig. 4.36] The Grotto (Didier Design Studio n.d.)

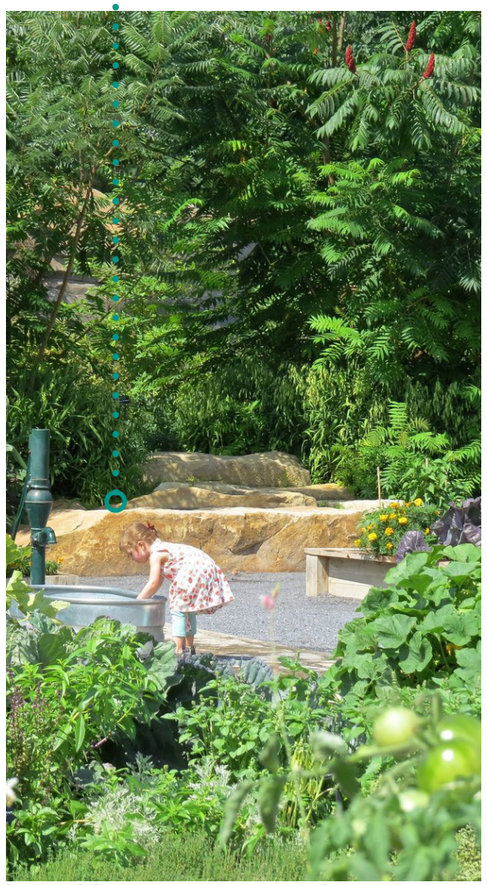
05 the senses

Rock collecting



[fig. 4.37] Rock collection area (Didier Design Studio n.d.)

Gardening



[fig. 4.38] Garden area (Didier Design Studio n.d.)

06 sensory integration

Glass house



[fig. 4.39] Glass house (Didier Design Studio n.d.)

childhood's gate children's garden matrix

Childhood's Gate Children's Garden is a great example of public nature-based play. They carefully program and name each play zone to mimic the natural geography of Pennsylvania. They also engage all of children's senses through gardening, rock collecting, and water play. They also provide spaces for adults to rest and supervise.

10 Guidelines / Principles	Program	Site Layout	Safety & Accessibility	Nature-Based	The Senses	Sensory Integration
Placemaking & Signage	●		●			
Visibility & Clearly Defined Areas	●	●	●	●	●	
Entrances & Exits		●	●		●	
Regulatory Standards	●	●	●			
Gathering Area	●	●			●	●
Mix of Play Areas	●	●		●	●	●
Natural Loose Parts & Construction	●			●	●	●
Natural Materials	●			●	●	●
Vegetation & Animals		●		●		●
Rest Area			●			

[fig. 4.40] Design guidelines and principles matrix (Coulter 2025)

jester park natural playscape

Designer

RDG Planning & Design

Size

2 acres

Location

Granger, Iowa

Climate

Humid Continental

Design Approach

Jester Park Natural Playscape is part of the recreation area, Jester Park, that has become a destination for people across Iowa (RDG Planning and Design 2022). Providing public and unique opportunities in nature, the play area offers physical exploration, natural stimuli, and safe risks for children (RDG Planning and Design 2022). Natural playscapes include “The Hollow Tree”, a salvaged timber log, “Stonehenge”, vertical stones with openings framing views, “The Wetland”, a shallow pool for wading, and “The Archaeology Dig”, a sandpit to discover artist-made fossils (RDG Planning and Design 2022). Jester Park Natural Playscape promotes learning of Iowa’s natural environment through engaging, natural play features.

[fig. 4.41] Jester Park water area (Zhang 2022)

01 program

Fossil dig

Sand area



[fig. 4.42] The Archaeology Dig (Zhang 2022)

02 site layout

Naturally defined areas

Entry feature



[fig. 4.43] Jester Park Natural Playscape entry area (Zhang 2022)

03 safety & accessibility

Water is not deep

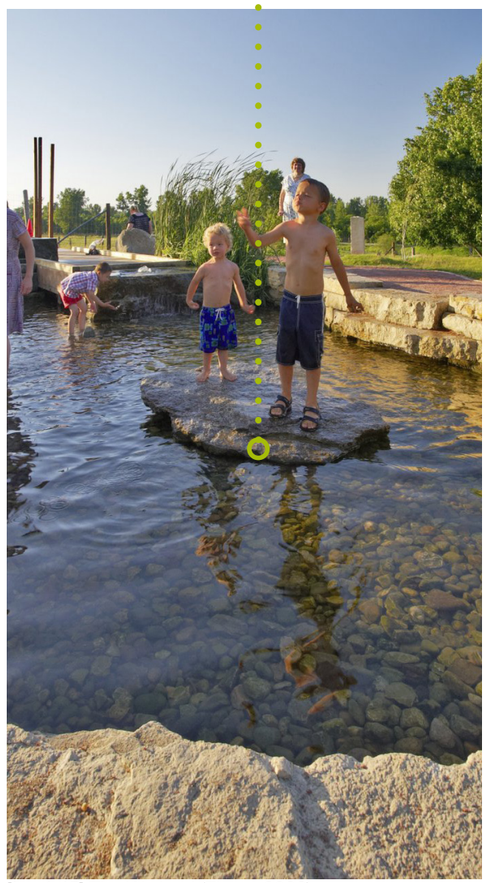
Adult visibility



[fig. 4.44] Water wading area (Zhang 2022)

04 nature-based

Water wading



[fig. 4.45] The Wetland (Zhang 2022)

Natural play structures



[fig. 4.46] The Hollow Tree (Zhang 2022)

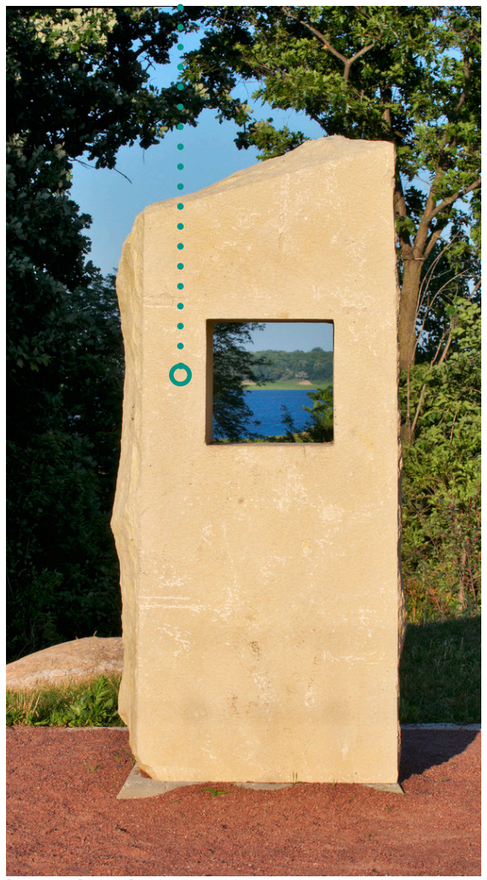
05 the senses

Water fountains



[fig. 4.47] Water feature (Zhang 2022)

Visual cutouts



[fig. 4.48] The Stonehenge (Zhang 2022)

06 sensory integration

Enclosures

Natural materials



[fig. 4.49] The Hollow Tree (Zhang 2022)

jester park natural playscape matrix

Jester Park Natural Playscape incorporates unconventional play equipment throughout the site that engage all the senses. They include a fossil sand digging pit, natural enclosures, and water play areas. Children are able to explore and be creative.

10 Guidelines / Principles	Program	Site Layout	Safety & Accessibility	Nature-Based	The Senses	Sensory Integration
Placemaking & Signage	●		●			
Visibility & Clearly Defined Areas		●	●	●	●	
Entrances & Exits		●	●		●	
Regulatory Standards	●	●	●			
Gathering Area						
Mix of Play Areas	●	●		●	●	●
Natural Loose Parts & Construction	●			●	●	●
Natural Materials	●			●	●	●
Vegetation & Animals		●		●		●
Rest Area						

[fig. 4.50] Design guidelines and principles matrix (Coulter 2025)

applicability to the CCD

Design Guidelines

The *10 Guiding Principles* and *Nature Play and Learning Places* guidelines provided a framework of research-backed recommended guidelines from professionals. For the CCD, it will be important to implement materials and vegetation that are natural and local to the Manhattan region. This allows for children to engage and learn about their local environment, flora, and fauna. Another consideration for the CCD is to expand on their sensory and malleable materials. Sand, mud, water, and loose parts engage several senses and allow children to be creative. Finally, incorporating rest spots, seating, and areas for individual play allow for children with different sensory integration patterns to adapt to the space. Seating throughout the outdoor classroom also lets adults rest and engage more with learning.

Precedent Studies

The precedent studies supply a visual representation of implementing the design recommendations. Ruth Staples Outdoor Classroom and Childhood's Gate Children's Garden successfully place make the spaces to their local environment. This same idea can be incorporated into the playground at the CCD. Jester Park Natural Playscape successfully implemented unconventional play structures that engage senses and creativity in children. Unconventional play materials, such as logs, fossil digging, and the wetland, are also more sustainable. The Dimensions Research Facility Outdoor Classroom has a strong program base and storage. Their program base is a great place for gathering and learning. Since the CCD recently removed their outdoor classroom, providing a designated spot in the redesign will be important.

projective design

Site Analysis

Design Review at CCD

Final Design

05

History

1984 — CCD is established by K-State's former President, Duane Acker, to meet the community's needs.

1985 — CCD acquired non-profit status and opened the K-State Childcare Cooperative with three programs.

2006 — The CCD officially becomes a part of the university, which increased the childcare capacity by 50%.

2010 — The current building opened serves up to 238 children of the Manhattan and K-State community.

2017 — The shade structure on the north playground was donated by the Social Services Advisory Board Utility Donation.

site analysis

Background

Location

Existing Playgrounds

SWOT Analysis



[fig. 5.1] South Playground of the CCD (Coulter 2025)

center for child development at kansas state university (CCD)

Family Centered

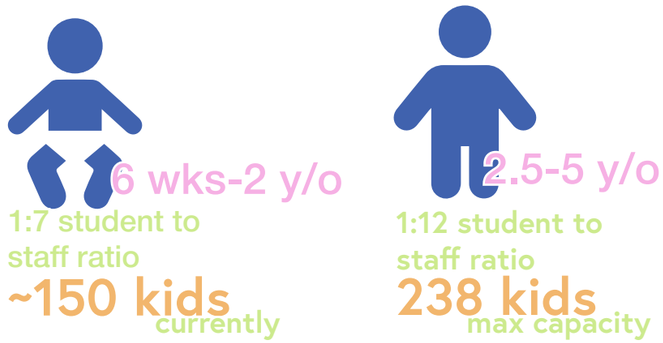
K-State's CCD's program integrates the experiences and principles from all families and provides opportunities for the children to learn about their diverse world.

Exploration

The CCD teaches their students about different cultures and traditions that may differ or be similar to their own. Students who attend come from all around the world, which provides opportunities to celebrate cultural uniqueness through art, music, and language. The CCD also encompasses their lesson plans with their outdoor play areas or "outdoor classrooms" to teach their students about science, biodiversity, and have a well-rounded experience with nature.

Evidence-Based Practice

K-State's CCD program through the Department of Applied Human Sciences, and utilizes research to inform their programs for early childhood development. The CCD is one of 8% of childcare centers that is accredited by the National Association for the Education of Young Children.



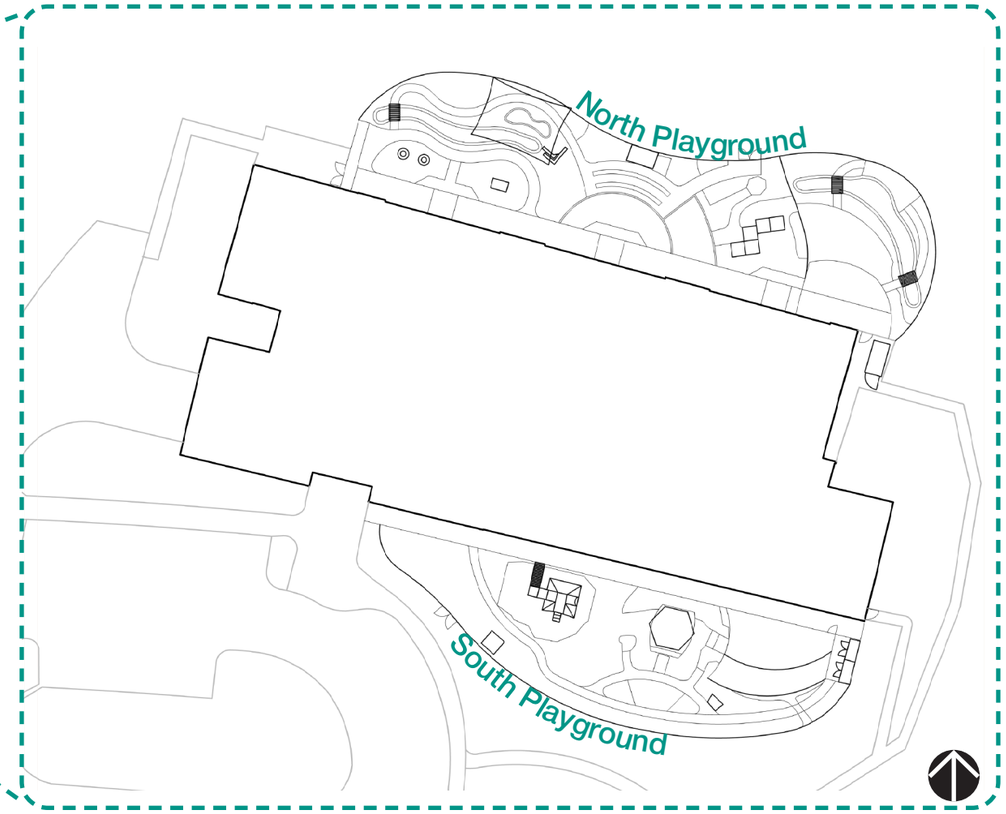
[fig. 5.2] CCD student to staff ratio (Ramirez 2024)

location



Context

[fig. 5.3] K-State Campus Map (Swaney 2024)

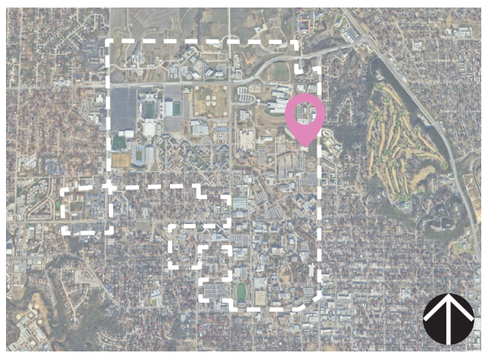


K-State's CCD

[fig. 5.5] Existing CCD playground (Ramirez 2025)

The South playground of the CCD is the infant and toddler playground where students 6 weeks to 2 years old play. The North playground is the preschooler playground where students 2 1/2 to 5 years old play.

- K-State's CCD
- Business Building
- Residential Building
- K-State Office Building
- K-State Greenhouses
- K-State Building
- Campus Police
- Parking

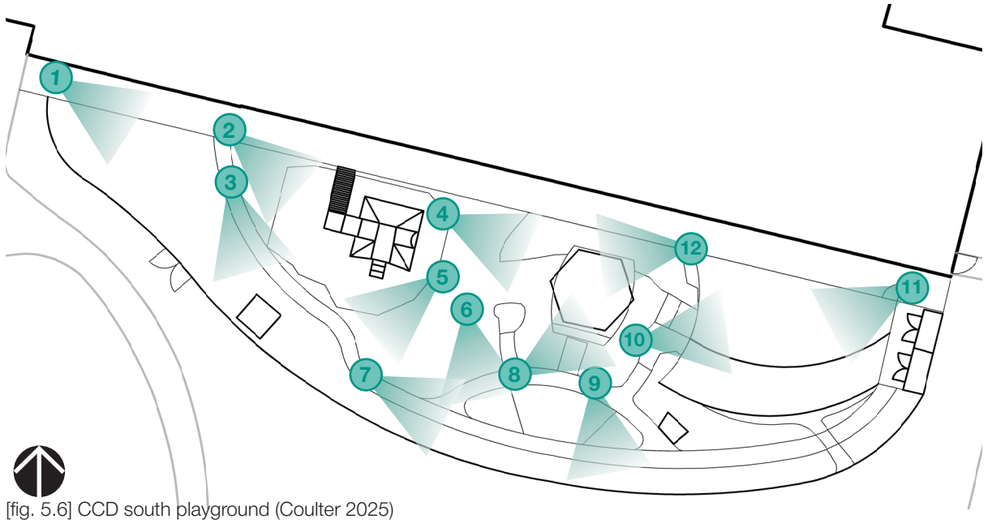


Campus Map

[fig. 5.4] K-State Campus Map (Coulter 2025)

existing south playground

While visiting the site for the first time, we noticed that many of the play structures were in good condition. However, we noted that the surface material was quite degraded and that many of the plants and vegetation were overgrown, especially in the infant lawn.



[fig. 5.6] CCD south playground (Coulter 2025)









[fig. 5.7-5.18] Images of existing CCD south playground (Coulter 2024)











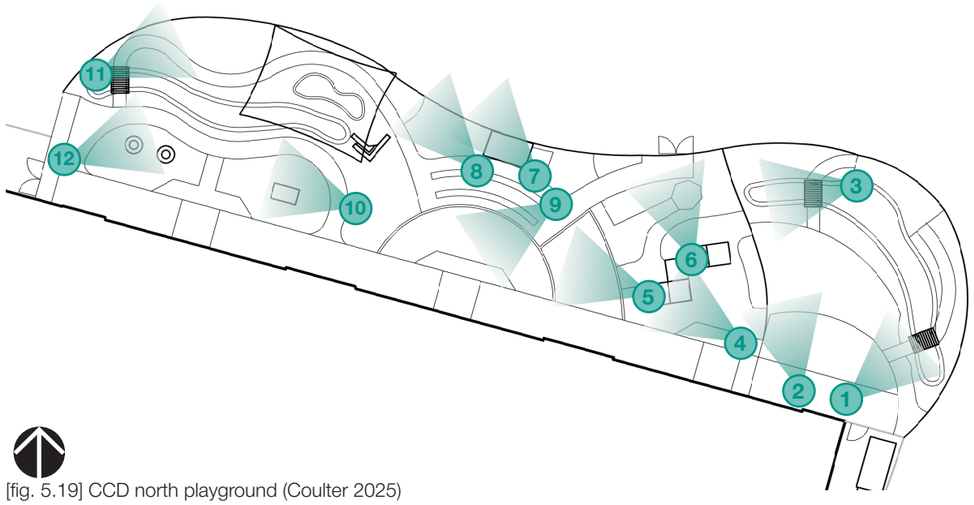






existing north playground

Again, in the north playground, the structures were in good condition, but the surface material, including the rubber and woodchips were degraded, and there were visibility issues with the large, dense shrubs. The limestone benches (image 9) in the outdoor classroom were removed shortly after our site visit.



[fig. 5.19] CCD north playground (Coulter 2025)









[fig. 5.19-5.30] Images of existing CCD north playground (Coulter 2024)











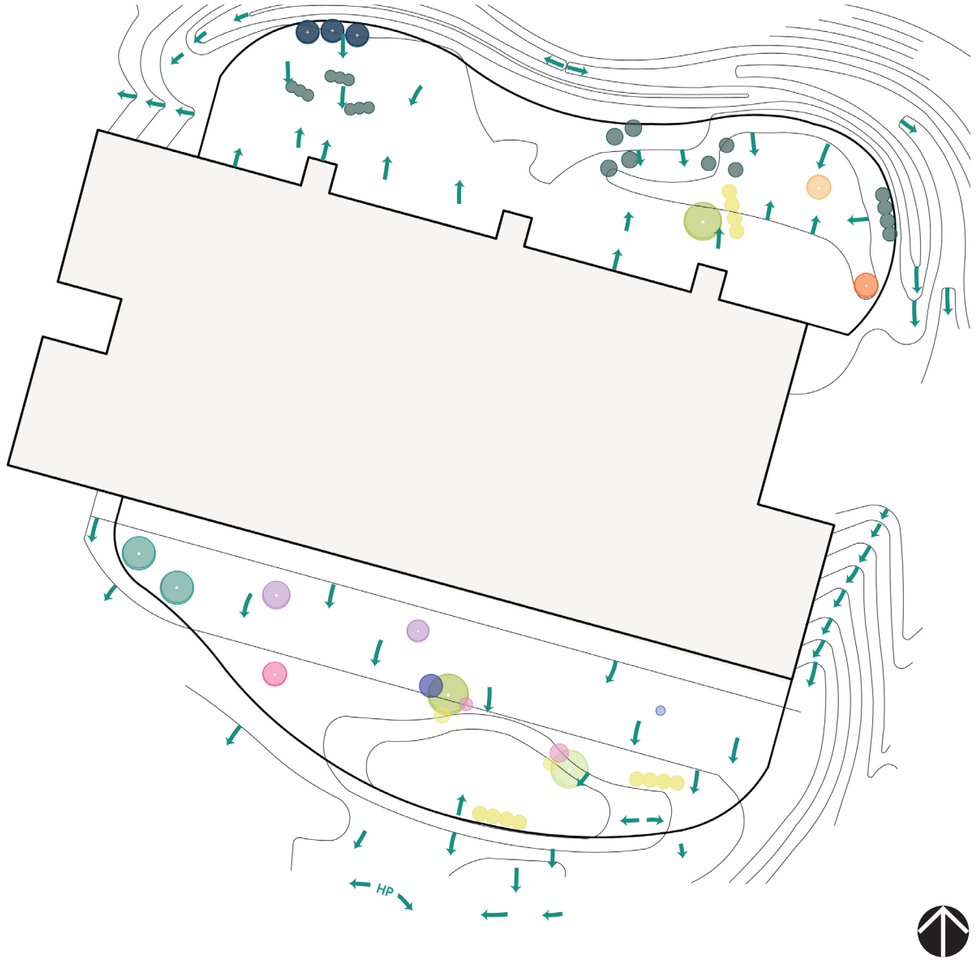






hydrology & vegetation

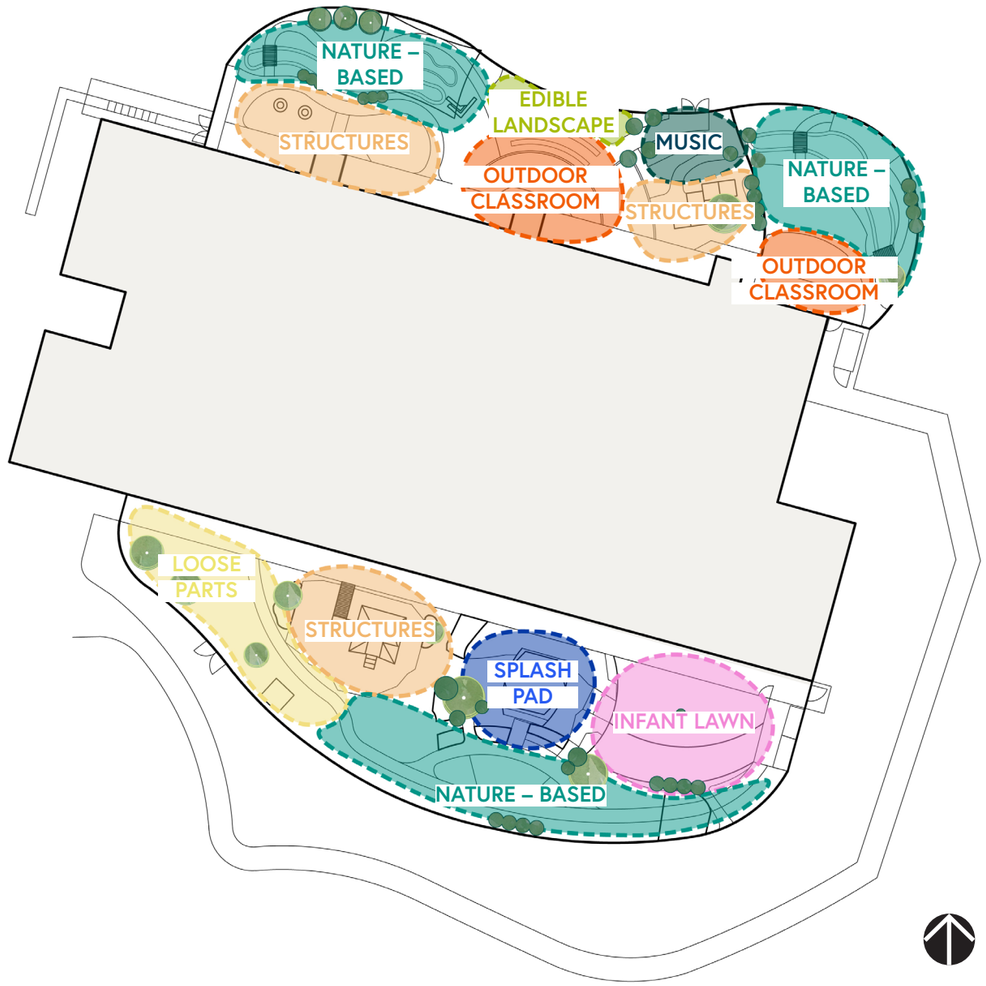
Previously, the CCD had erosion issues, but K-State grounds recently swaled the topography to direct water away from the playgrounds. Many of the existing plants on the playground weren't part of the original 2010 plans. The current vegetation lacks native plants, diversity, and the shrubs are dense and overgrown.



- Mugo Pine
  Pinus mugo
- Klein Forsythia
  Forsythia viridissima ‘Klein’
- Black Walnut
  Juglans nigra
- Thornless Honey Locust
  Gleditsia triacanthos var. inermis
- Common Peach Tree
  Prunus persica
- Eastern Redbud
  Cercis canadensis
- Ivory Silk Japanese Lilac
  Syringa reticulata
- Weeping Mulberry Tree
  Morus alba 'Chaparral'
- Cornelian – Cherry Dogwood
  Cornus mas
- Lamb’s Ear
  Stachys byzantina
- Rose of Sharon
  Hibiscus syriacus
- Siberian Elm
  Ulmus pumila
- Gold Cluster Forsythia
  Forsythia ‘Courtaneur’

[fig. 5.31] Hydrology and vegetation diagram (Ramirez 2024)

play zones



[fig. 5.32] Play zones diagram (Ramirez 2024)

Loose Parts

Stimulate imagination by allowing opportunities to explore, test, and adjust their environment.

- River rocks
- Recycled tree pieces
- Toys (buckets/shovels/blocks/etc.)

Nature-Based Elements

Help foster children's connection with the outdoors.

- The overall aesthetic is natural
- Includes specific tactile activities:
  - Faux river bed
  - Mud pit

Structures

Encourage safe risk in play.

- Allowing children to climb, hide, jump
- Fall zones

Age Appropriate Play

For different comprehension levels and stages of development.

- Infant lawn
- Separated play spaces with differing structure and elements

indoor-outdoor relationship



Indoor-Outdoor Access

Windows

Views

[fig. 5.33] Indoor-outdoor relationships diagram (Ramirez 2024)

circulation



Indoor-Outdoor Access

Path Directed Circulation

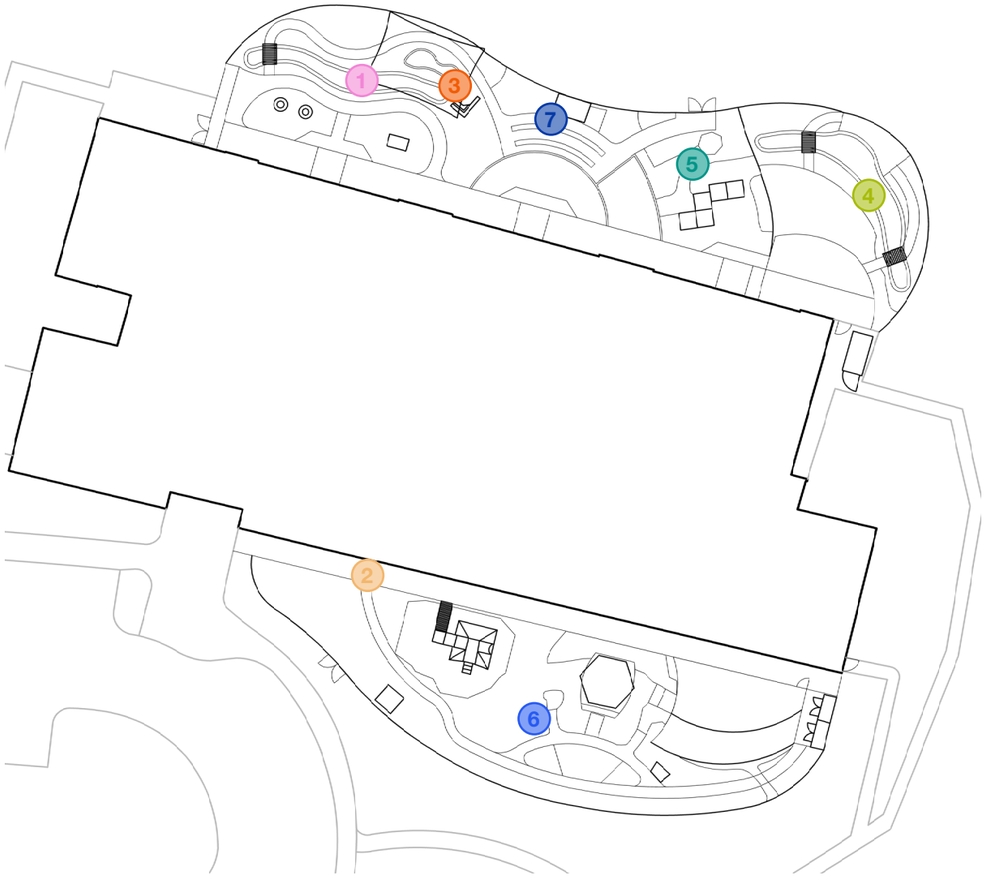
Free Movement

Outdoor Access

Staff Access Only

[fig. 5.34] Circulation diagram (Ramirez 2024)

the senses



- Proprioception
- Vestibular
- Tactile
- Visual
- Auditory
- Olfactory
- Gustatory

[fig. 5.35] Existing sensory diagram (Coulter 2025)















[fig. 5.36] Sensory images diagram (Coulter 2024)

S (strengths)

- Existing play and shade **structures are in good shape**
- **Flooding is under control** due to recent regrading
- Playgrounds have **strong indoor-outdoor connections** and visibility
- Variety of types of play and learning opportunities
- CCD encourages outdoor activity, rain or shine or snow!
- CCD allows limited risk during play
- The playgrounds are clearly loved by the CCD children and staff

W (weaknesses)

- Existing plants do not reflect the original planting plan and **lacks diversity and seasonal interest**
- **The wood chip play surface** wears down quickly and **requires frequent maintenance**
- Existing **gardens and planters are in need of maintenance** in the 0-2 y/o playground
- Outdoor classroom is not in great shape - the **limestone seats and rubber surface are hazardous**
- There are **few places for adults** to sit or be integrated into the play space with students

O (opportunities)

- Curate a more **contextually relevant and lower maintenance plant palette** that increases biodiversity, native plant species, and seasonal interest
- Select **ground plane materials that are more durable** to withstand the weather and foot traffic
- Compose spaces that **encourage interaction of adults and children** in play with children
- Weave in more outdoor educational opportunities (ex., lesson plans, signage, graphics, etc.)
- Create a playscape that could grant the Nature Explorer certification

T (threats)

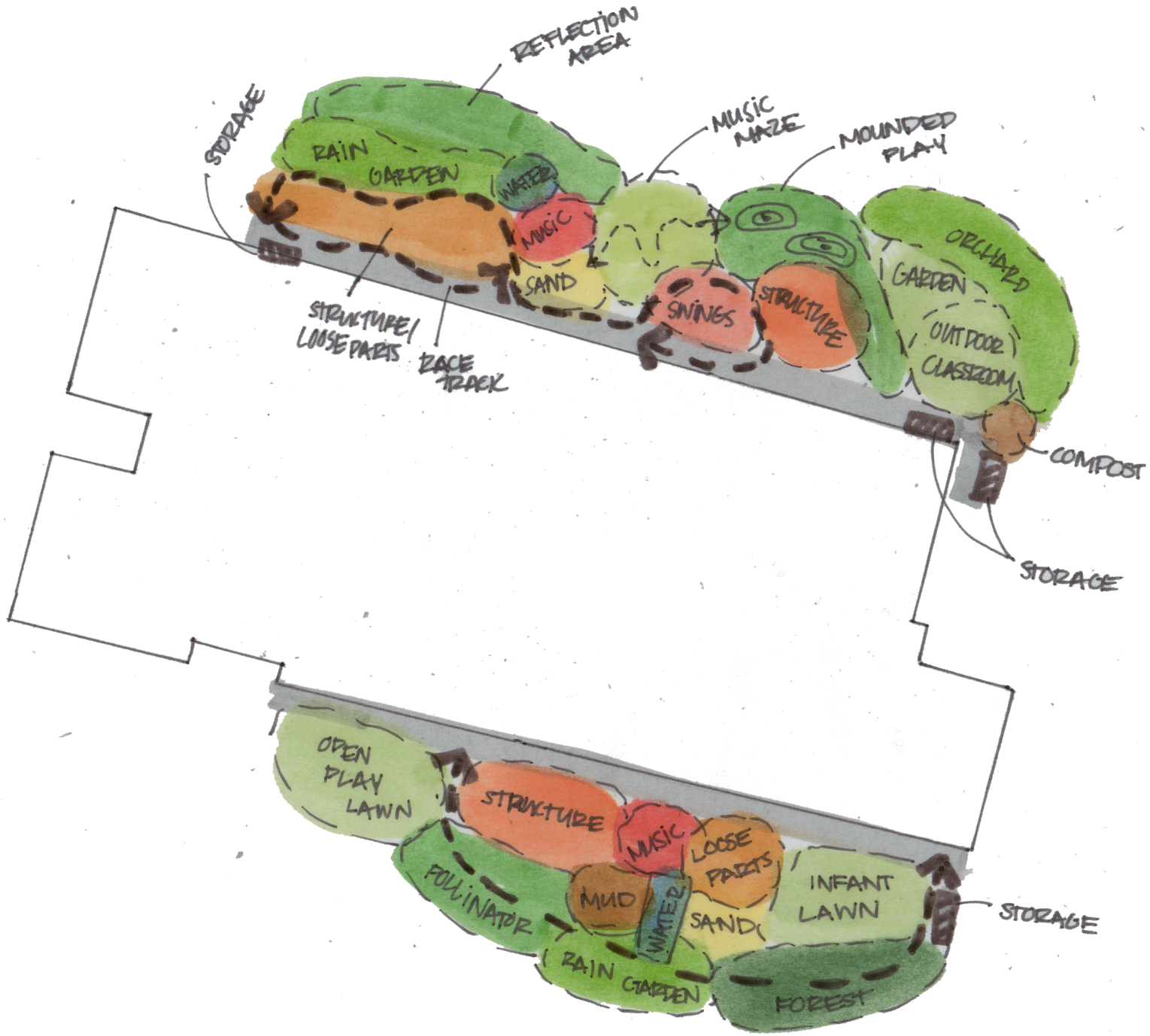
- Play **surface is eroded** due to previous flooding
- **Fall zones** wear down quickly
- KSU grounds is overworked, causing the **CCD sometimes to go long periods without landscaping**

CCD requests

- Incorporate the **existing play structures** that are in good shape
- **Resurface** deteriorating ground materials
- Maintain **visibility** in the playgrounds
- **Connect educators and staff** with children in play
- Provide **nature-based learning opportunities** in nature
- Consider **low-maintenance** solutions

process work

After a thorough site analysis, we developed a concept plan through many iterations. Once a final concept was developed, we reached out to the CCD to present and receive feedback on our design.



[fig. 5.37] Process work (Coulter 2024)

Timeline

- Create initial concept design based on initial research findings.
- Reach out to CCD and set a date and time for the design review meeting.
- Prepare meeting agenda, flyer, sign-up, and presentation materials.
- Give presentation to the CCD staff and record feedback.
- Update concept design based on feedback.

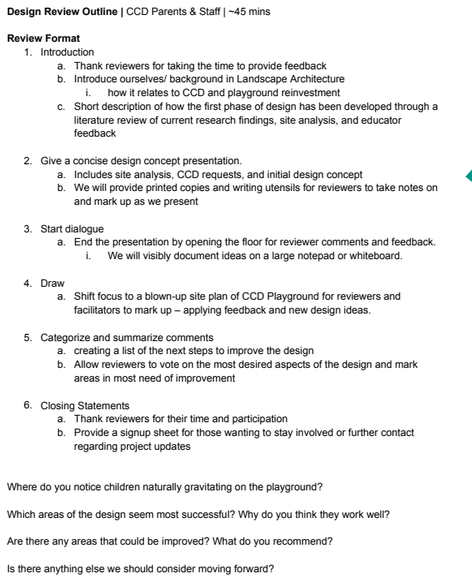
design review with CCD staff

Introduction

After initial research and conceptual development, the design team hosted a design review at the K-State Center for Child Development with some of the staff of the CCD. During this design review we presented our initial research, site analysis, and concept for the playgrounds. Then, we had an open conversation with the staff where they asked questions and stated comments and concerns with the conceptual design. We used their comments to refine the projective design for K-State's CCD.

Planning Process

We first created an outline of how we wanted to run the design review meeting and made a list of questions that we wanted to ask the staff. We sent a flyer with the meeting details, date, and a link to sign up to the CCD director, Berni Howe Beard, who sent it out to the staff. Next, we put together a digital presentation with our site analysis and concept. We also printed out a large poster of our concept site plan to put sticky notes on during the meeting.



Design Review Outline | CCD Parents & Staff | ~45 mins

Review Format

1. Introduction
   a. Thank reviewers for taking the time to provide feedback
   b. Introduce ourselves/ background in Landscape Architecture
      i. how it relates to CCD and playground reinvestment
   c. Short description of how the first phase of design has been developed through a literature review of current research findings, site analysis, and educator feedback

2. Give a concise design concept presentation.
   a. Includes site analysis, CCD requests, and initial design concept
   b. We will provide printed copies and writing utensils for reviewers to take notes on and mark up as we present

3. Start dialogue
   a. End the presentation by opening the floor for reviewer comments and feedback.
      i. We will visibly document ideas on a large notepad or whiteboard.

4. Draw
   a. Shift focus to a blown-up site plan of CCD Playground for reviewers and facilitators to mark up – applying feedback and new design ideas.

5. Categorize and summarize comments
   a. creating a list of the next steps to improve the design
   b. Allow reviewers to vote on the most desired aspects of the design and mark areas in most need of improvement

6. Closing Statements
   a. Thank reviewers for their time and participation
   b. Provide a signup sheet for those wanting to stay involved or further contact regarding project updates

Where do you notice children naturally gravitating on the playground?

Which areas of the design seem most successful? Why do you think they work well?

Are there any areas that could be improved? What do you recommend?

Is there anything else we should consider moving forward?

meeting outline

[fig. 5.38] Meeting outline (Coulter & Ramirez 2025)

flyer sent to staff



Dear CCD Staff,

Our names are Micheala Coulter and Adyline Ramirez, and we are graduate students in the landscape architecture program at Kansas State University. We've been collaborating with the Department of Applied Human Sciences on a fundraising initiative to renovate the playground here at the CCD. Where children play impacts their learning and development, and nature-based environments provide unique, enriching opportunities that are often unmatched inside. The redesign aims to enhance the existing play space through research-backed design strategies that promote sensory development and inspire creativity in early childhood.

As caretakers of the little ones who will benefit most from this project, your insight is invaluable to the process. We invite you to a design review where you can share your thoughts on the initial concept. Your perspectives and ideas will help guide recommendations and improvements for the playground, ultimately creating a space that enhances children's experiences and growth.

mark your calendars

The Center for Child Development

wednesday, march 12, 2025

5:45 p.m. – 6:45 p.m.

want to join the fun?
We ask that you please sign up in advance to help us plan for space and supply needs.

Sincerely,

Michaela Coulter
Master of Landscape Architecture
Department of Landscape Architecture and Regional & Community Planning
Kansas State University

Adyline Ramirez
Master of Landscape Architecture
Department of Landscape Architecture and Regional & Community Planning
Kansas State University

questions? we'd love to hear from you!
michaelacoulter@ksu.edu | adyline@ksu.edu

[fig. 5.39] Meeting flyer (Ramirez 2025)



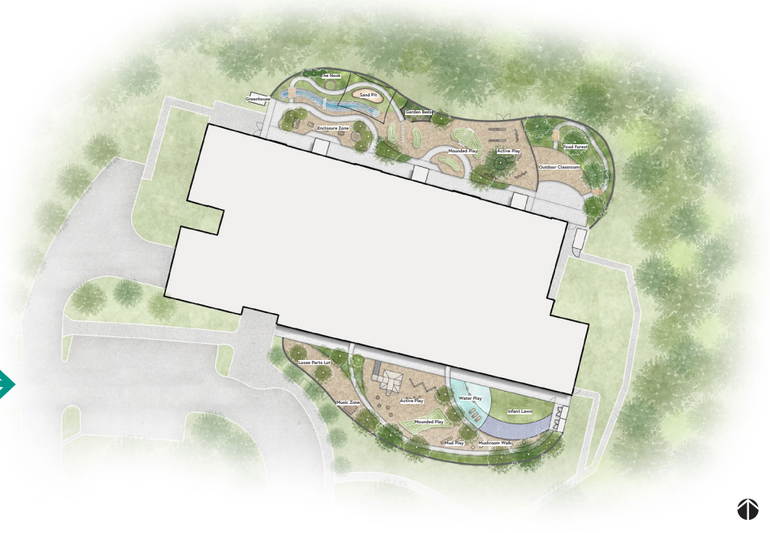
KSU CENTER FOR CHILD DEVELOPMENT PLAYGROUNDS CONCEPT REVIEW

Michaela Coulter | michaelacoulter@ksu.edu
Ady Ramirez | adyline@ksu.edu

digital presentation

[fig. 5.40] Digital presentation image (Ramirez 2025)

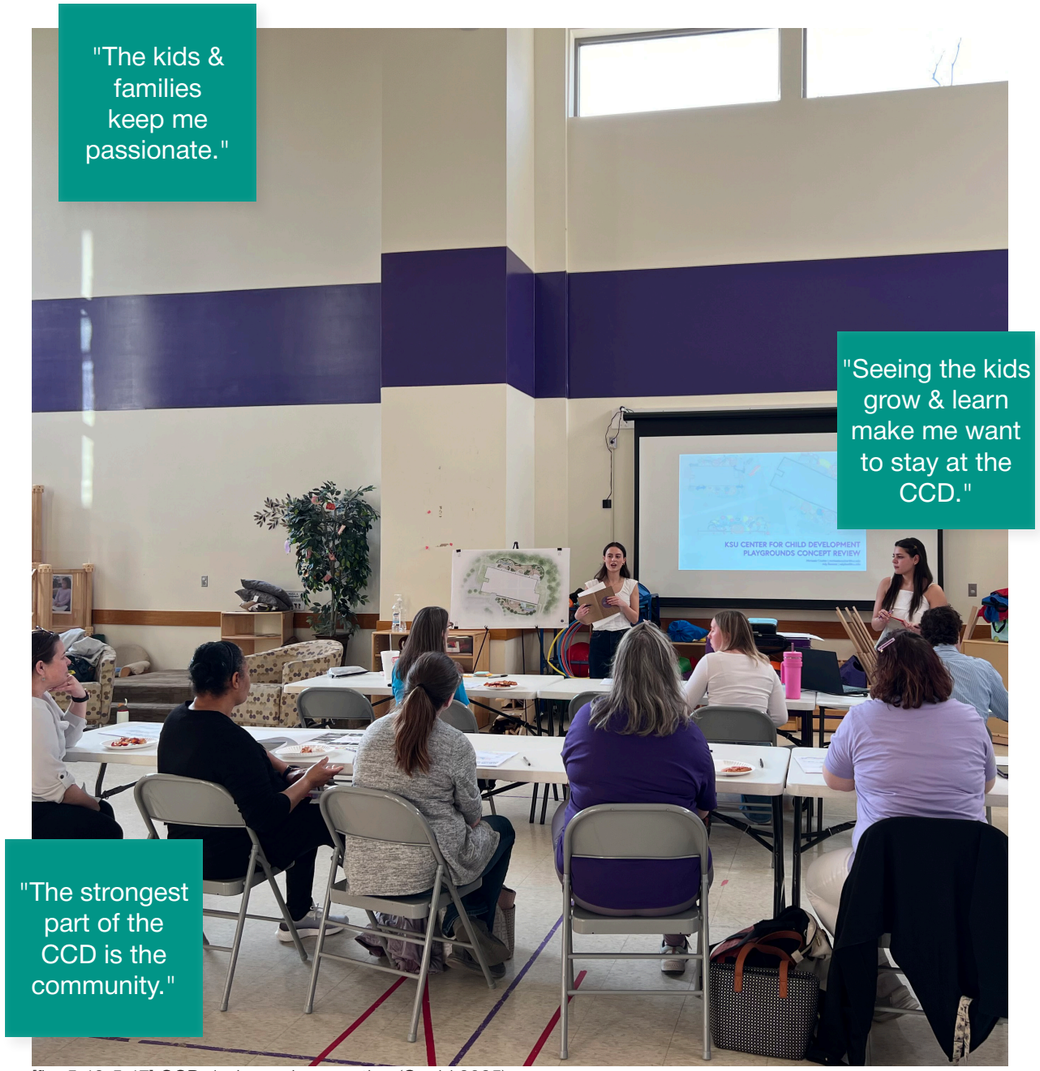
poster of concept plan



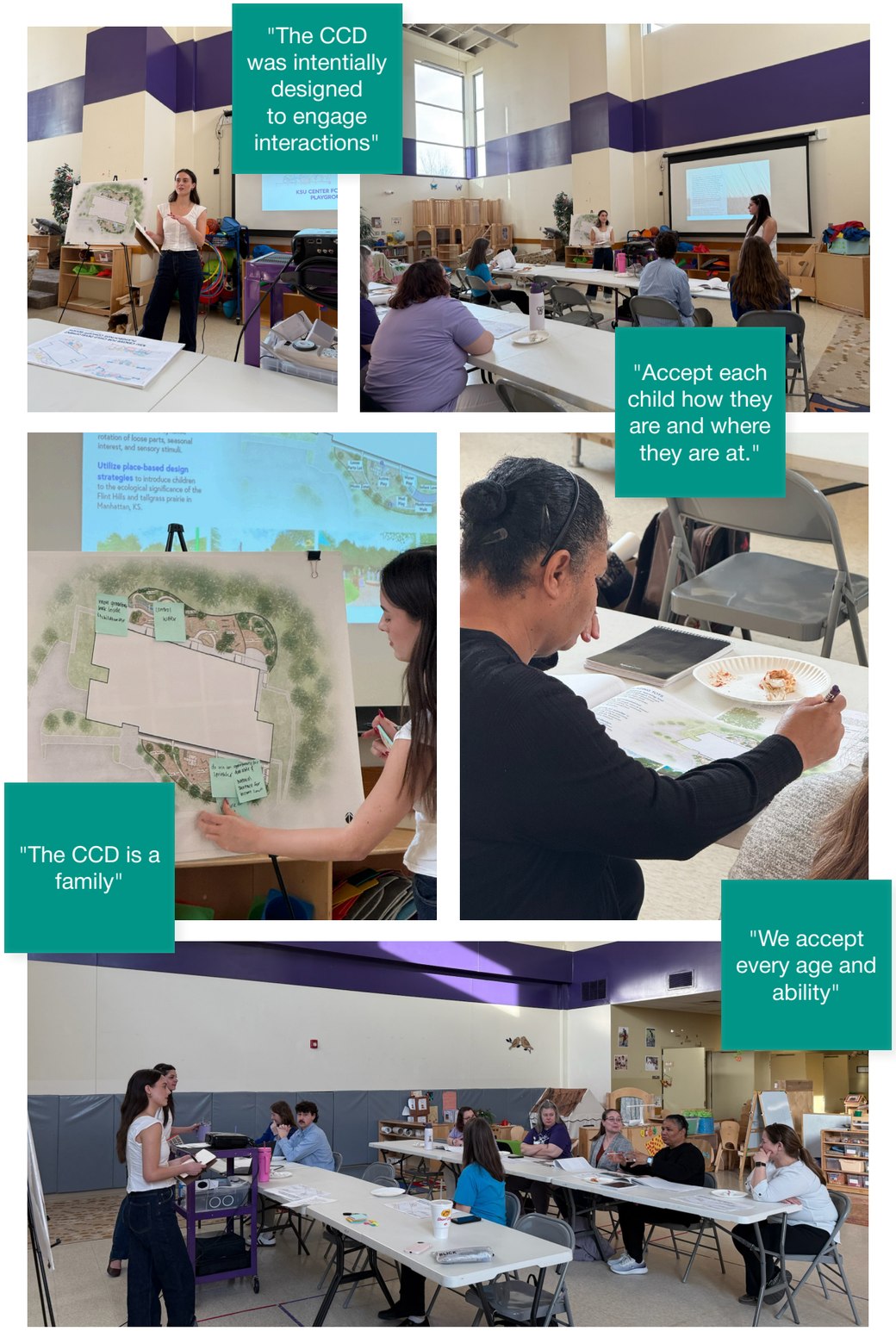
[fig. 5.41] Site plan poster (Ramirez 2024)

Design Review

During the design review, the design team presented our research, site analysis, and concept to six (6) CCD staff. The staff members that attended taught both the toddler and preschool classes and ranged in 9 to 15 years of work experience at the CCD. After our quick presentation, we received comments, questions, and concerns about our design. We wrote down these comments on sticky notes and placed them on the large site plan poster. To document the meeting, our classmates Gabby Smith and Alexina Goold took notes and pictures for us. After the meeting the notes were transcribed into a document [Appendix 2].



[fig. 5.42-5.47] CCD design review meeting (Goold 2025)





[fig. 5.48] CCD design review notes (Coulter 2025)

Takeaways

All of the comments and concerns by the CCD staff were written down and collected. The design team organized them into four topics including: indoor and outdoor connection, adult and child interactions, play areas, features and activities, and vegetation.

Indoor & Outdoor Connection

The CCD staff was open to the idea of doing everything outdoors that is done indoors, but they had some concerns with some of the activities. Some of the licensing requirements for Kansas require a certain amount of sanitation. Activities that would be hard to accomplish outdoors included nap time and diaper changing due to regulations and sanitation. However, they were open to holding more activities outdoors like snack time and hand washing.

Adult & Child Interactions

One of the CCD requests was to engage the adults more in children's play and learning on the playgrounds. The staff stated that there are quite a few blind spots on the playgrounds, so staff tend to stand on the edges of the playground with their backs to the fence. They liked the ideas of adding more seating around the playground and making play areas more visible by removing large, dense shrubs. They also suggested having more care giving supplies around the playground, including sanitizer, wipes, or tissues. They liked the idea of making interesting play activities that adults would want to engage in and encourage learning in children.

Play Areas, Features & Activities

Several play areas, features, and activities stood out as important features to maintain in the concept plan. On the playground, children tend to gravitate towards the sand and water features. During nice days and even rainy days, the children use the dry river bed to control the flow and play in the water. They did note that the dry river bed inside the north playground has degraded quite a bit due to children moving stones and erosion. The dry riverbed outside the fence is in better condition and children use the balance beams and play games there. The sandbox area in the south playground is very popular among the toddlers and could become bigger. The staff mentioned not having enough storage and to show where it was o the plan. They suggested accessible open shelving or something that could be closed and easily opened. Finally, they liked the idea of stamped concrete and pavers on the paths. They suggested adding some sort of signage to encourage learning.

Vegetation

Overall, the staff liked the idea of having native grasses and shrubs. Grasses would have more visibility than the current dense shrubs because the children like hiding in them. They were not concerned with bees and other pollinators potentially being around children because there's not much they can do to control that. They suggested keeping the greenhouse inside the playground because children and staff use it quite a bit to grow seedlings.

PROJECTIVE DESIGN

final design

Overview

After a careful site analysis, several design iterations, and staff feedback, we arrived at a final design that enhances the existing outdoor classroom and implements the research-backed design recommendations. The final projective design, Trailblazing Tots, aims to teach children about the local Flint Hills ecosystem.

trailblazing tots

Narrative Statement

The Flint Hills in Manhattan, Kansas, houses the largest expanse of tallgrass prairie left in the world. Home to over 500 species, the tallgrass prairie supports a diverse ecosystem, offering unique nature-based play and learning opportunities for students at the CCD. This projective design, maintaining the perspective that the environment serves as a third educator, aims to introduce ecological concepts and materiality of the tallgrass prairie and its history through carefully crafted, age-appropriate, exploratory play possibilities while fostering a connection to the local identity.

Sensory Learning & Development

The CCD redesign engages sensory learning and development through nature-based activities, features, and structures. The design invites in natural stimuli through native vegetation and open-ended play opportunities. The design also keeps in mind that each child processes sensory input differently

[fig. 5.49] The Flint Hills at the Konza Prairie Trail (Coulter 2024)

PROJECTIVE DESIGN

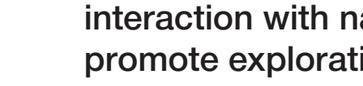
trailblazing tots
design goals & site plan

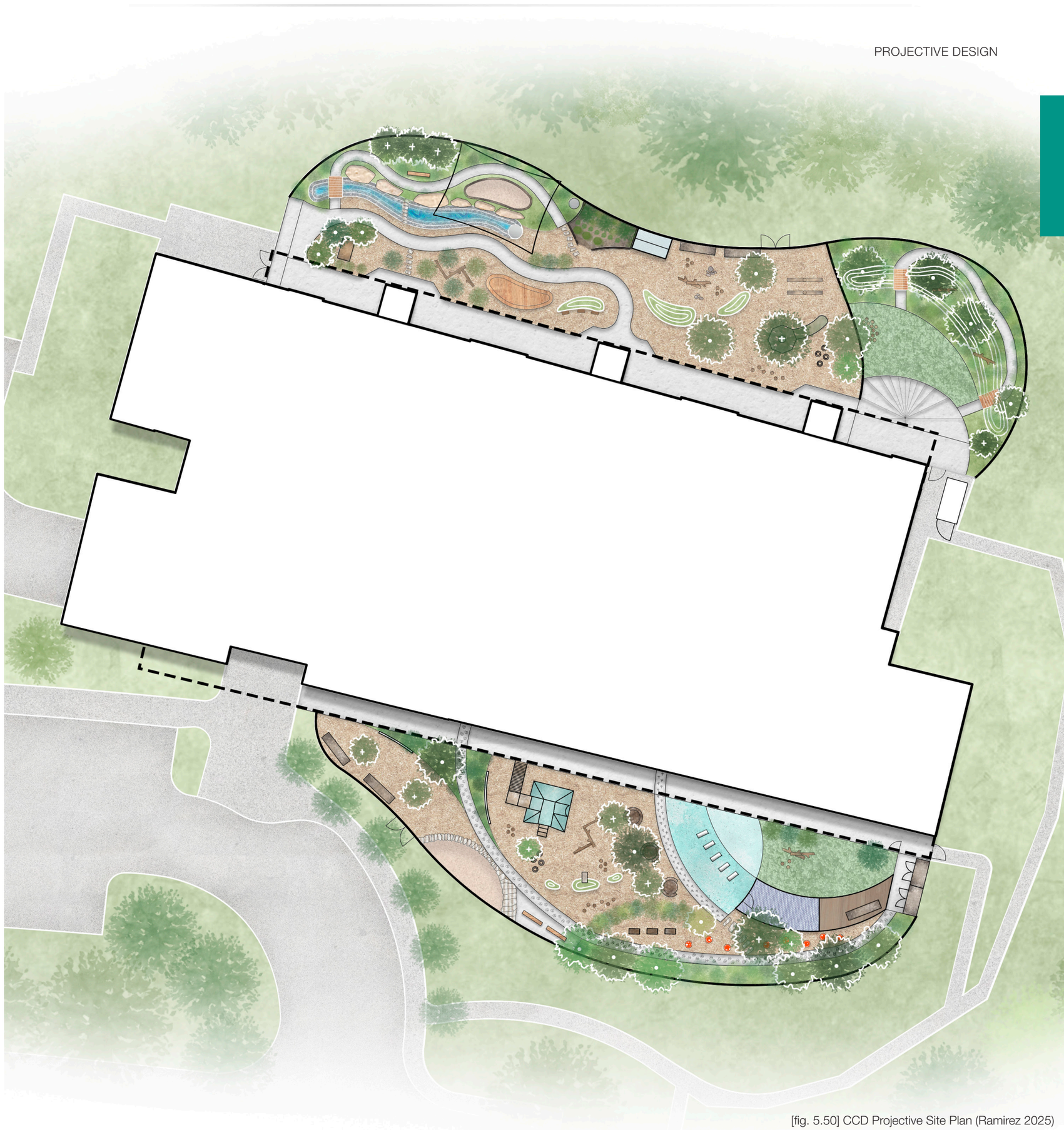
01 **Enhance sensory learning and creative development** through age-appropriate and intentional playground equipment and open-ended play opportunities.

02 **Encourage environmental stewardship** through nature-based learning opportunities and interaction with natural features to promote exploration.

03 **Inspire a sense of wonder** in nature through a diverse planting strategy to provide a dynamic rotation of loose parts, seasonal interest, and sensory stimuli.

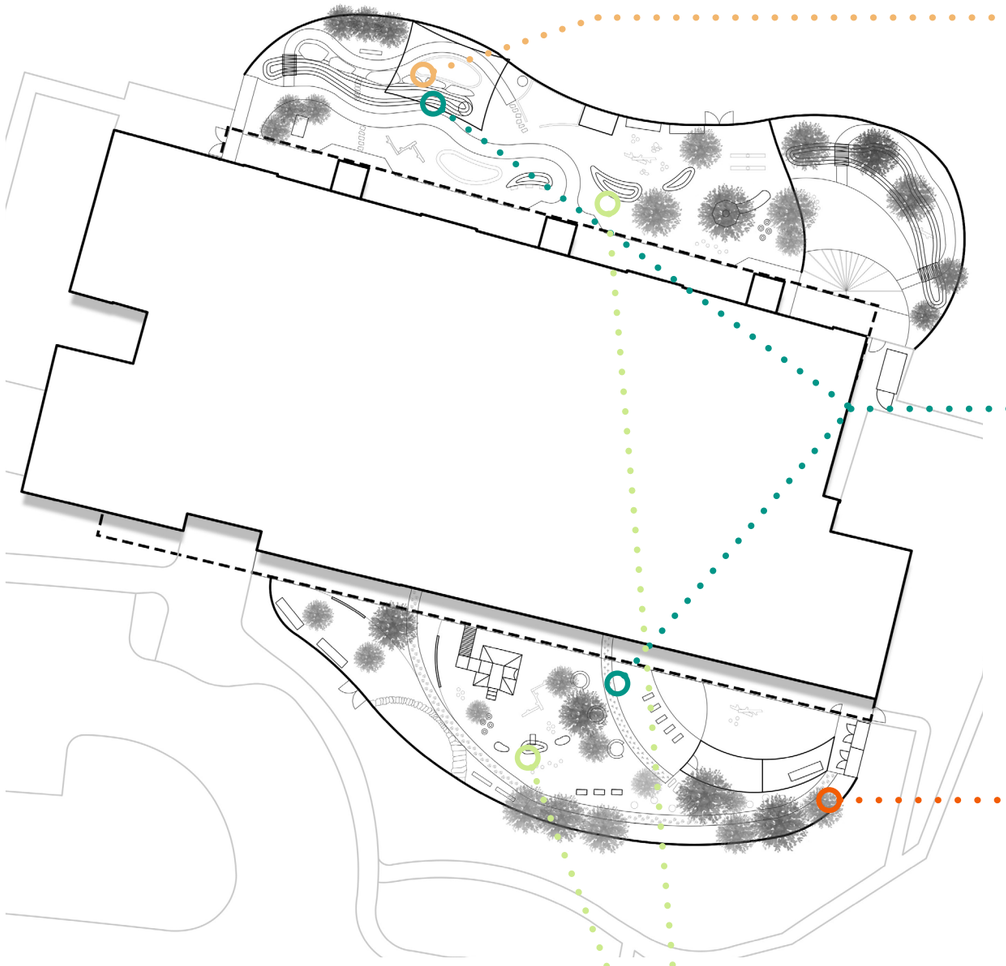
04 **Utilize place-based design strategies** to introduce children to the ecology of the Flint Hills and tallgrass prairie in Manhattan, KS.

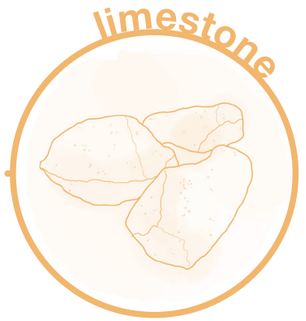




[fig. 5.50] CCD Projective Site Plan (Ramirez 2025)

narrative driven design





Local material significant to the ecology of the Flint Hills Ecoregion

- Used as stepping stones for tertiary paths encouraging exploration
- Varied to allude to limestone layers and fossils



Subtle cues throughout play spaces reveal and develop the greater unifying theme

- Dry river bed alluding to the former inland sea
- Bison hoof tracks imprinted into paths



Native vegetation to attract local fauna, particularly pollinators, insects, and birds

- Planting palette reflective of significant species found in the tallgrass prairie and Flint Hills ecoregion

Organic geometry mimics shapes found in natural environments

- Mounds graded to emulate the signature cuesta shape distinct to the Flint Hills
- Undulating shapes and free movement between play zones

[fig. 5.51] Narrative diagram (Ramirez 2025)

play zones



Seating & Rest Areas
- Variety of seating
- Visibility for care takers

Infant Zone
- Natural loose parts
- Natural ground cover
- Vegetation

Natural Loose Parts
- Rocks, sticks, leaves, etc.
- Storage

Climb, Crawl, & Slide
- Mounds
- Play structures
- Slides
- Balance beams and stumps

Nature Learning & Exploration
- Outdoor classroom
- Stump seating & chalkboard
- Sun dial

Malleable Natural Materials
- Sandbox
- Mud and dirt play
- Water play & pump
- Accessible play tables

Edible Landscapes
- Garden
- Greenhouse
- Edible shrubs and trees

Naturalized Areas
- Native perennials, shrubs, and trees
- Limestone stepping stones
- Balance beams

Music & Performance
- Xylophone, chimes, drums, etc.
- Stage
- Mounds

Imaginary & Dramatic Play
- Nest enclosures
- Play house
- Mushroom sculptures

[fig. 5.52] Play zones diagram (Ramirez 2025)

surface materials



[fig. 5.53] Surface materials diagram (Coulter 2025)

circulation

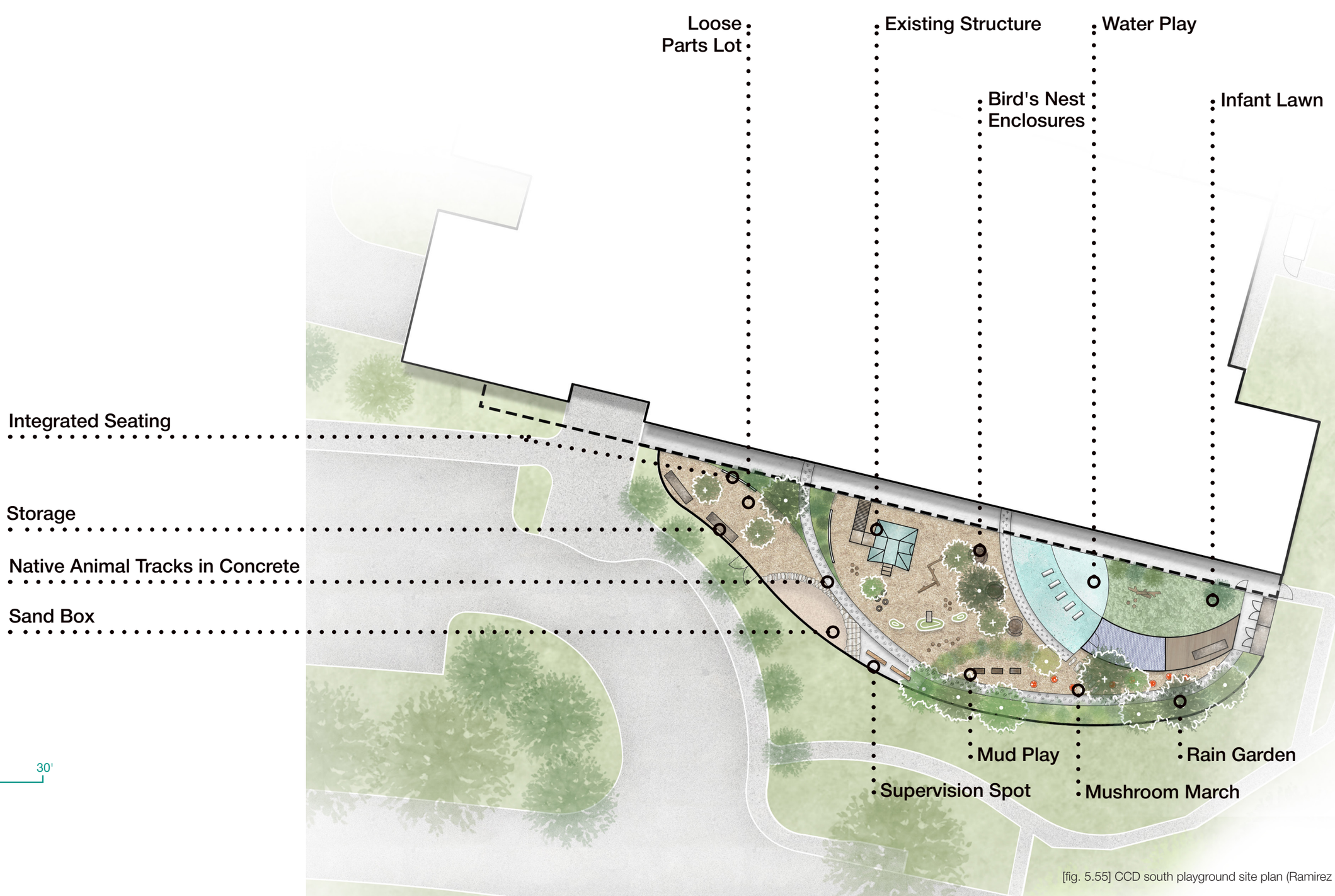


[fig. 5.54] Circulation diagram (Ramirez 2025)

PROJECTIVE DESIGN

little bluestem landing

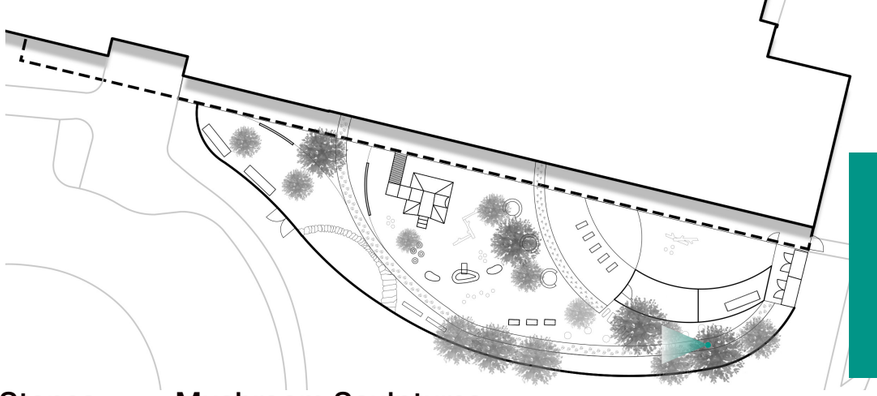
south playground • 6 wks to 2 y/o



[fig. 5.55] CCD south playground site plan (Ramirez 2025)

little bluestem landing

south playground • 6 wks to 2 y/o

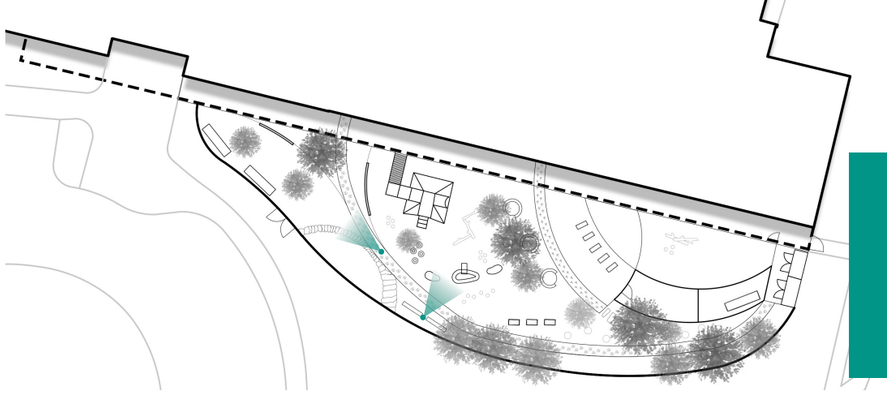


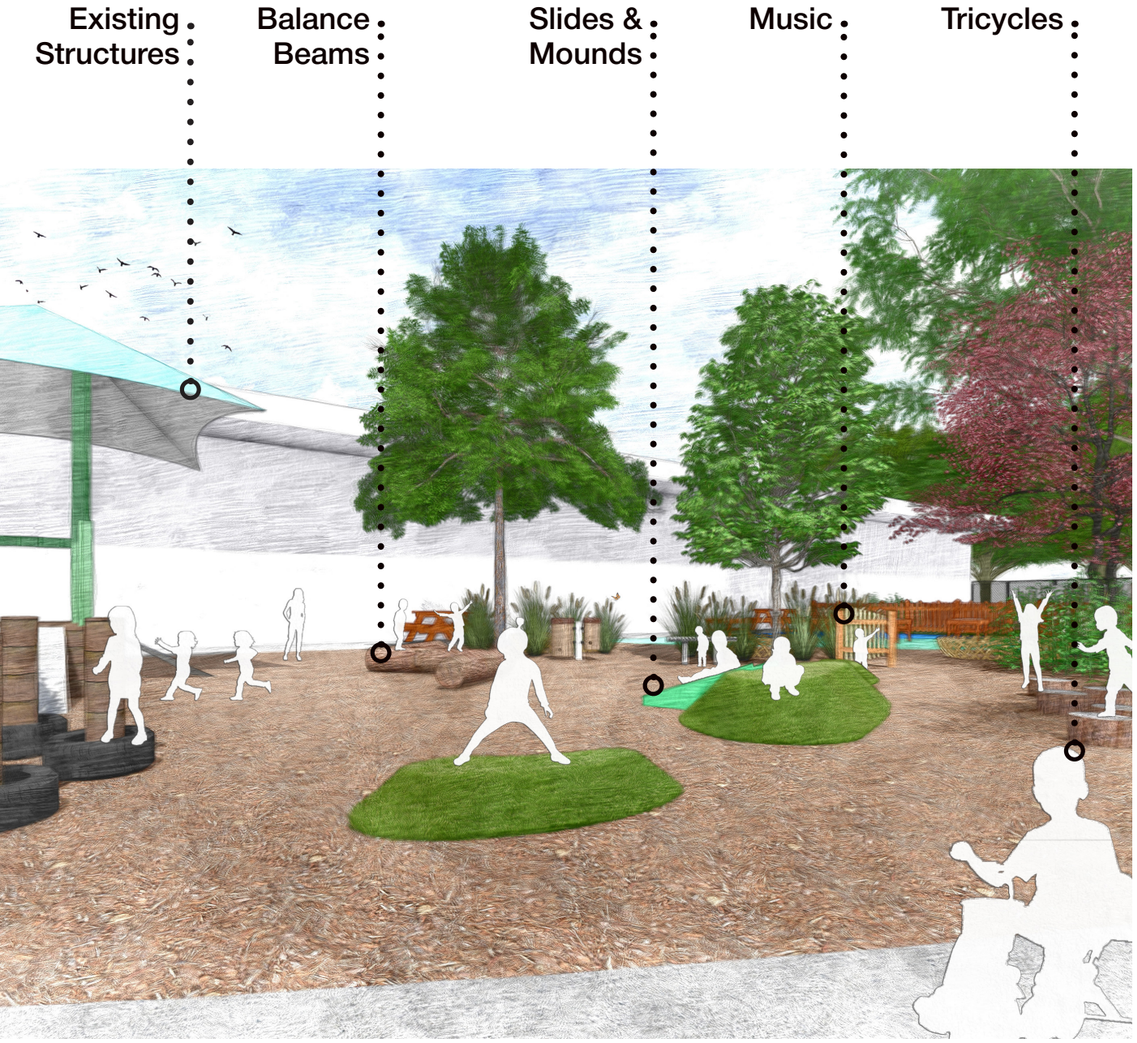


Mushroom March

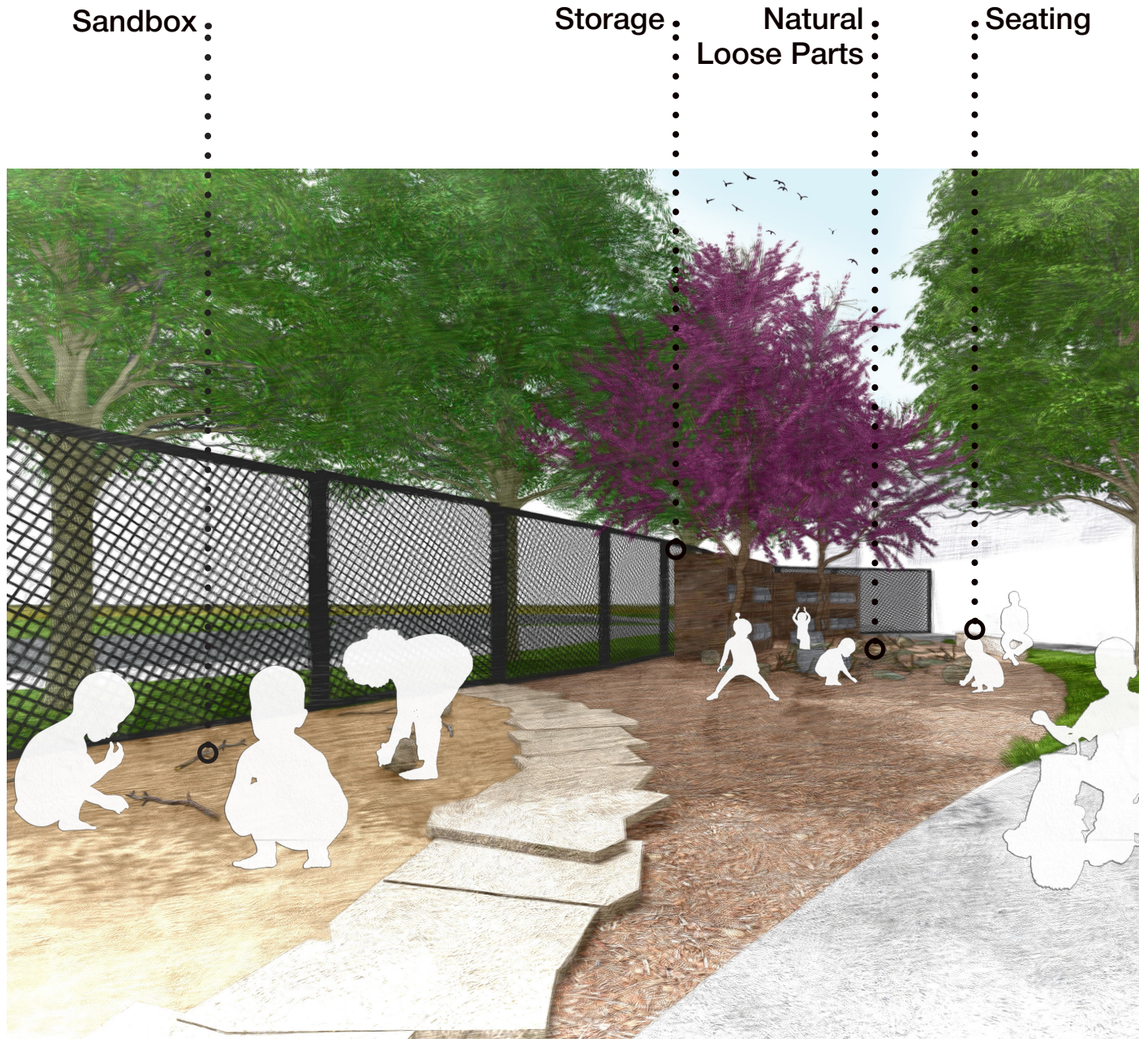
[fig. 5.56] View of mushroom sculptures and rain garden (Coulter 2025)

little bluestem landing
south playground • 6 wks to 2 y/o





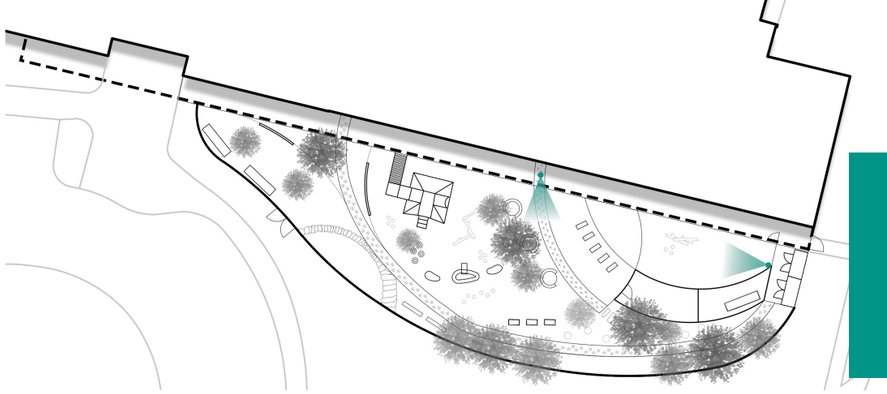
Climb, Crawl & Slide
[fig. 5.57] View of active play zone (Coulter 2025)

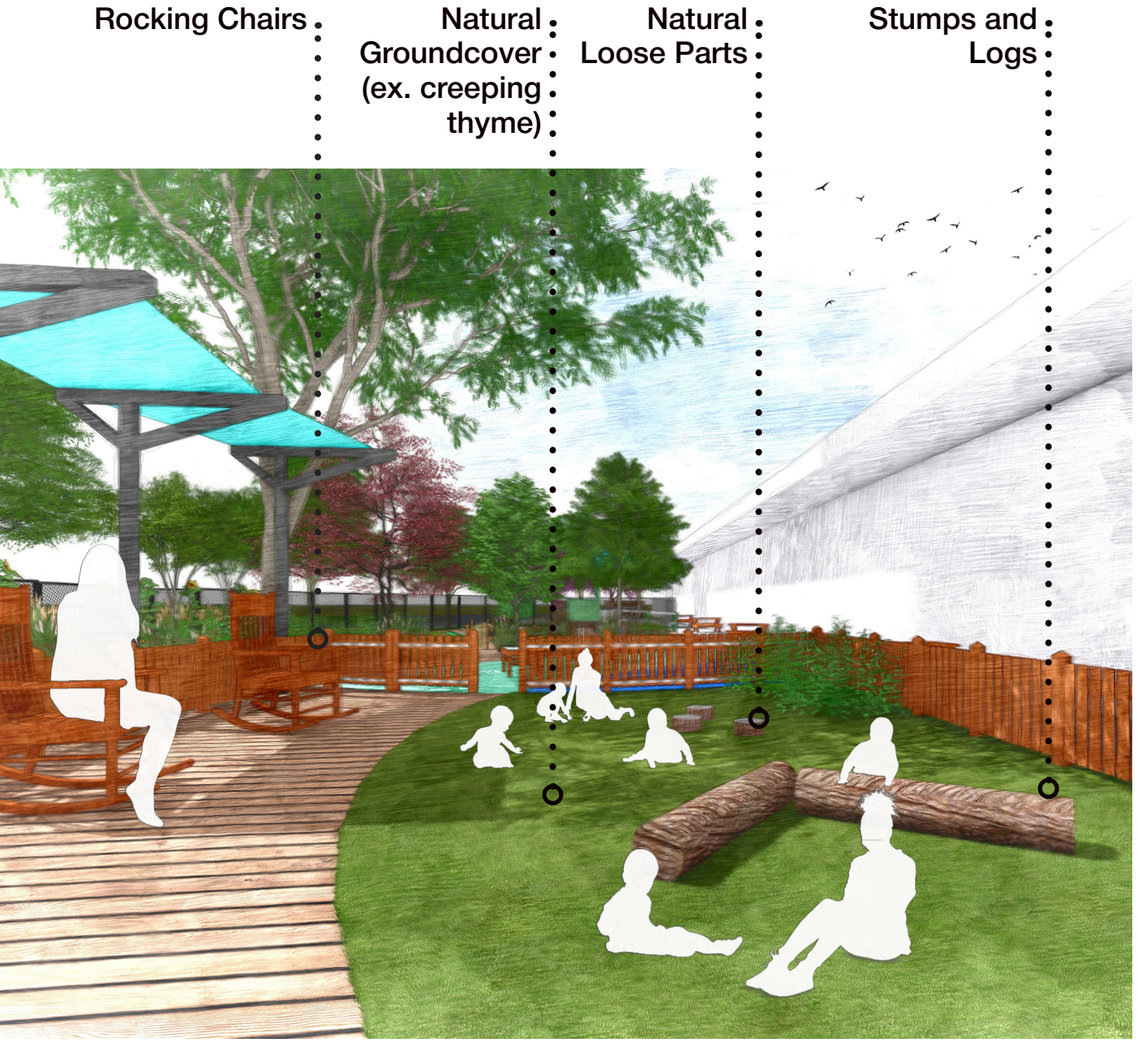


Loose Parts Lot
[fig. 5.58] View of sand and loose parts areas (Coulter 2025)

little bluestem landing

south playground • 6 wks to 2 y/o





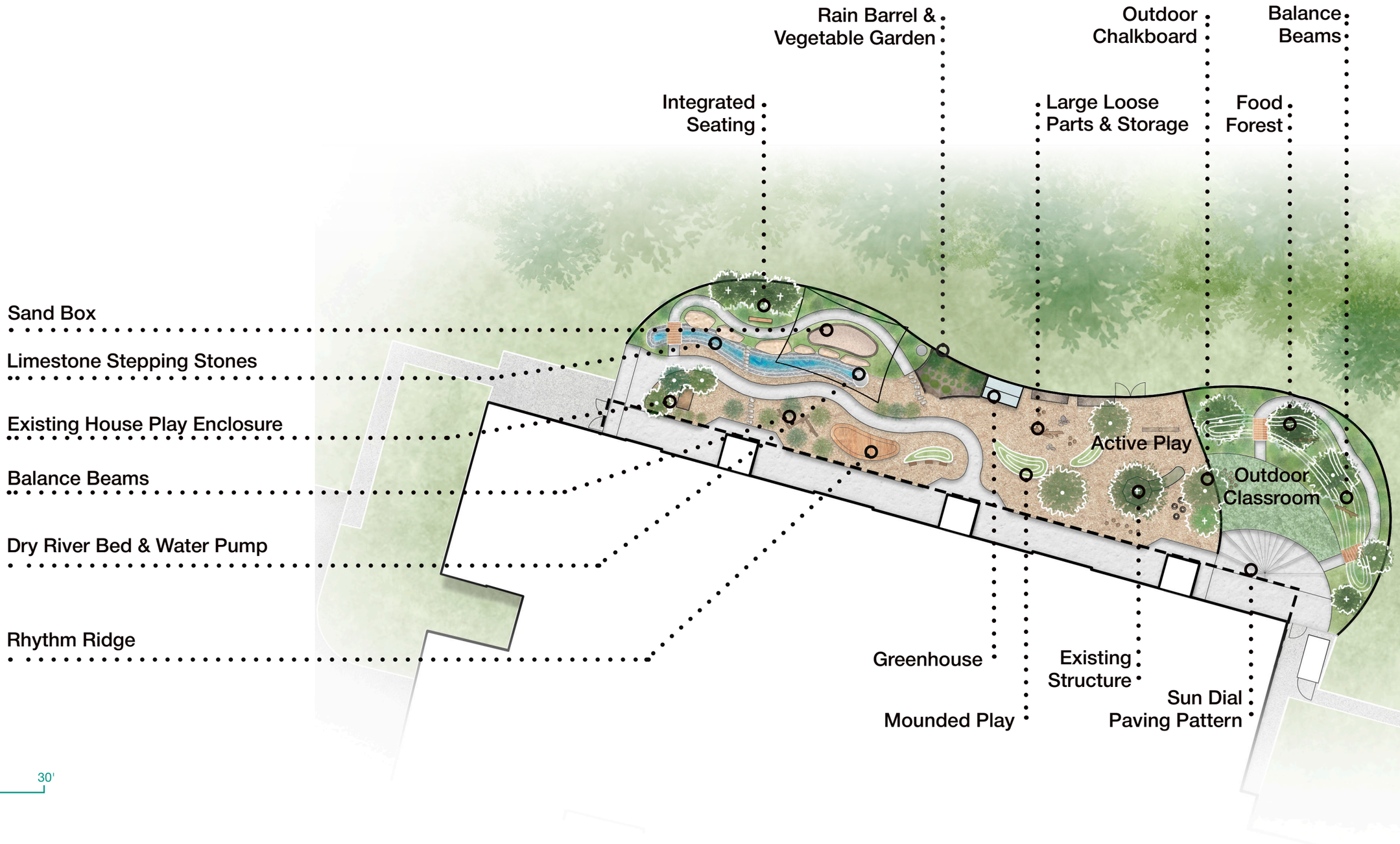
Infant Lawn
[fig. 5.59] View of infant area (Coulter 2025)



In the Treetops
[fig. 5.60] View of water play and nest enclosures (Coulter 2025)

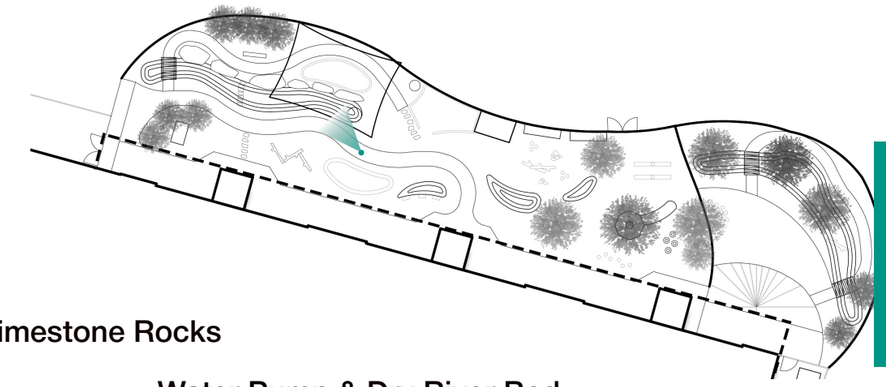
PROJECTIVE DESIGN

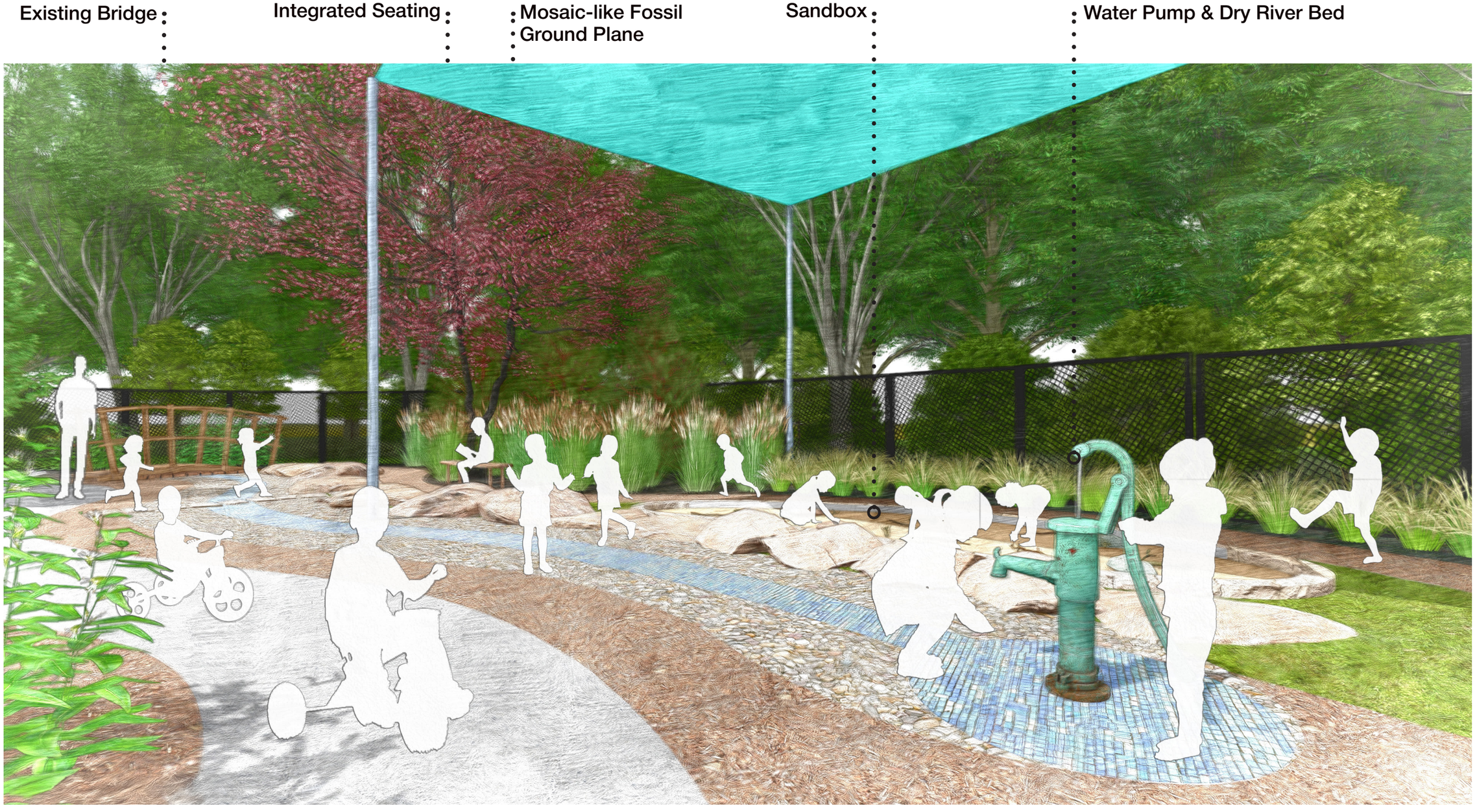
big bluestem bend
north playground • 2 1/2 to 5 y/o



[fig. 5.61] CCD north playground site plan (Ramirez 2025)

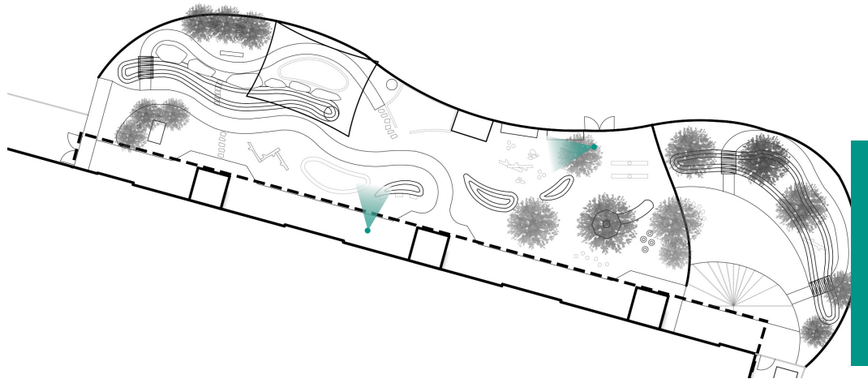
big bluestem bend
north playground • 2 1/2 to 5 y/o

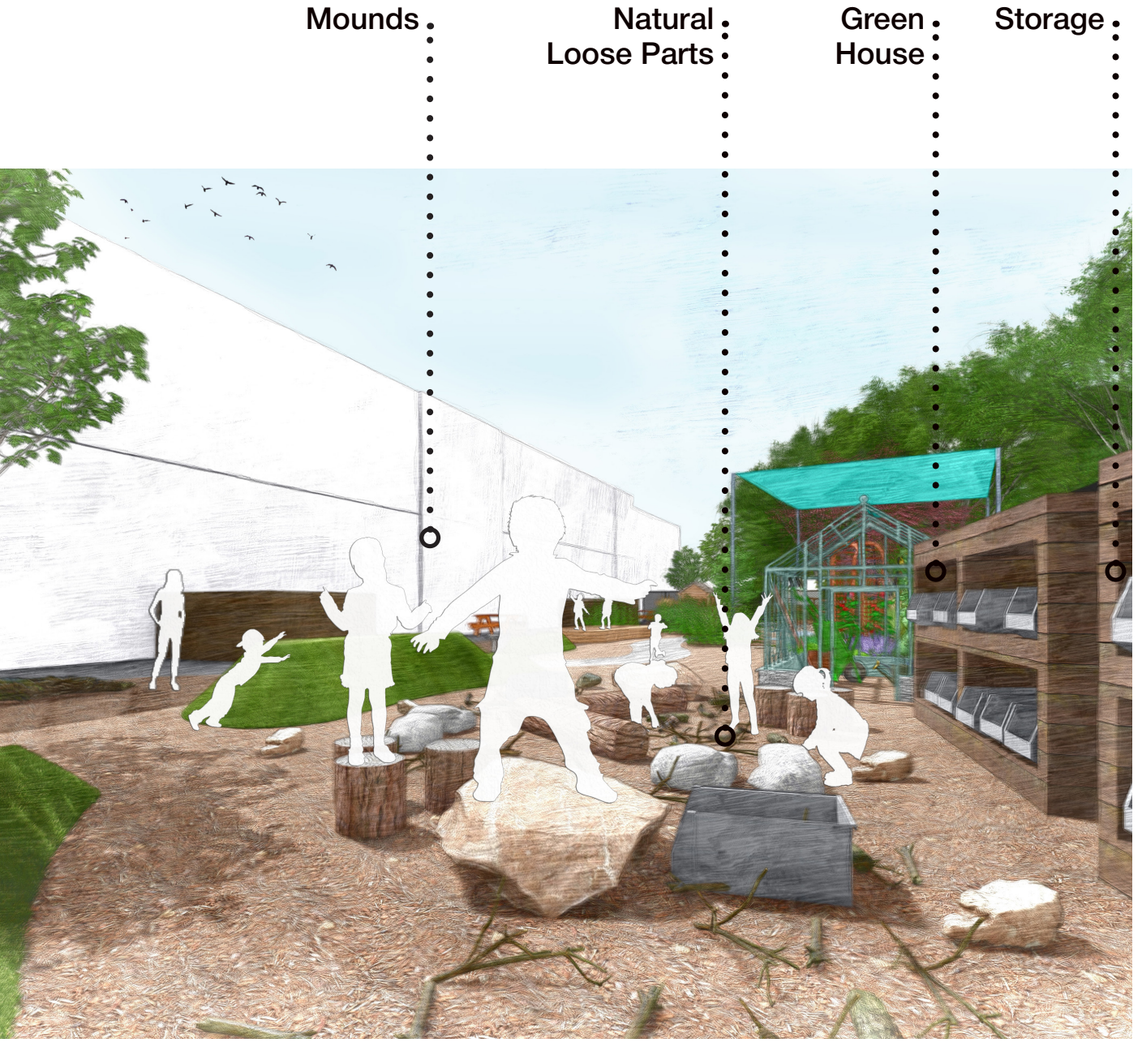




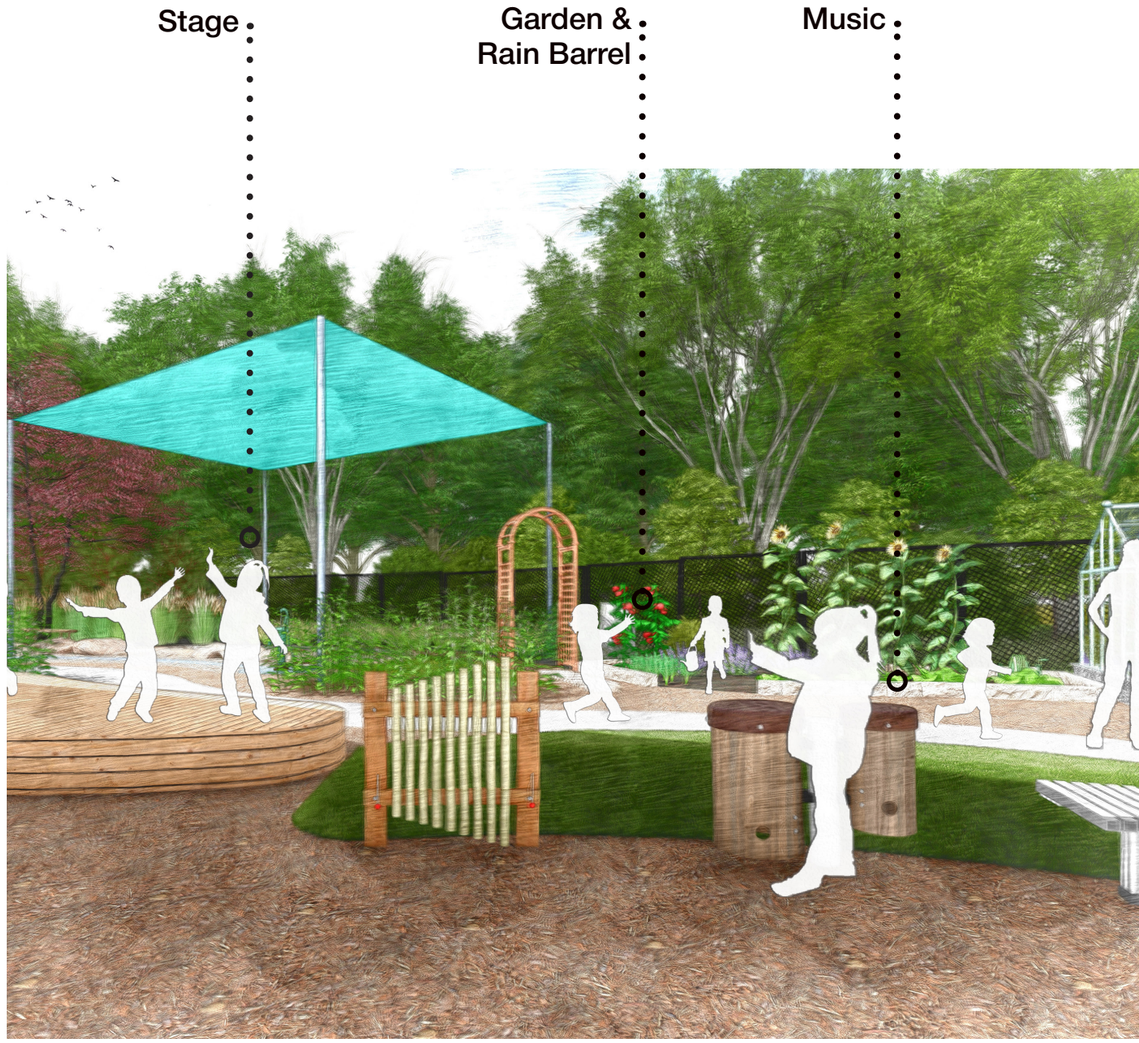
Dry River Bed
[fig. 5.62] View of dry river bed and sand area (Coulter 2025)

big bluestem bend
north playground • 2 1/2 to 5 y/o



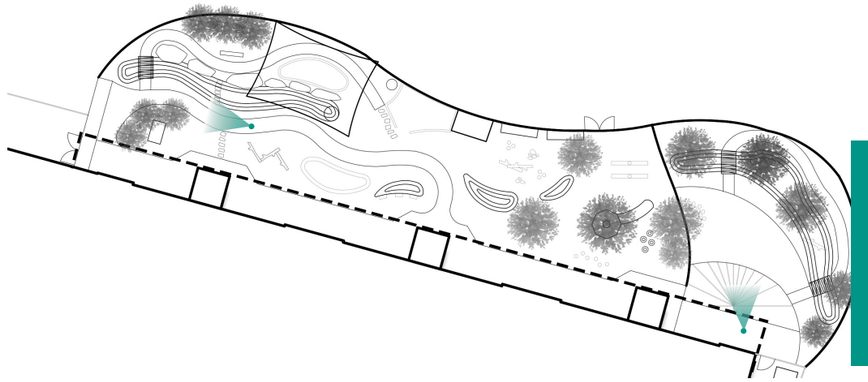


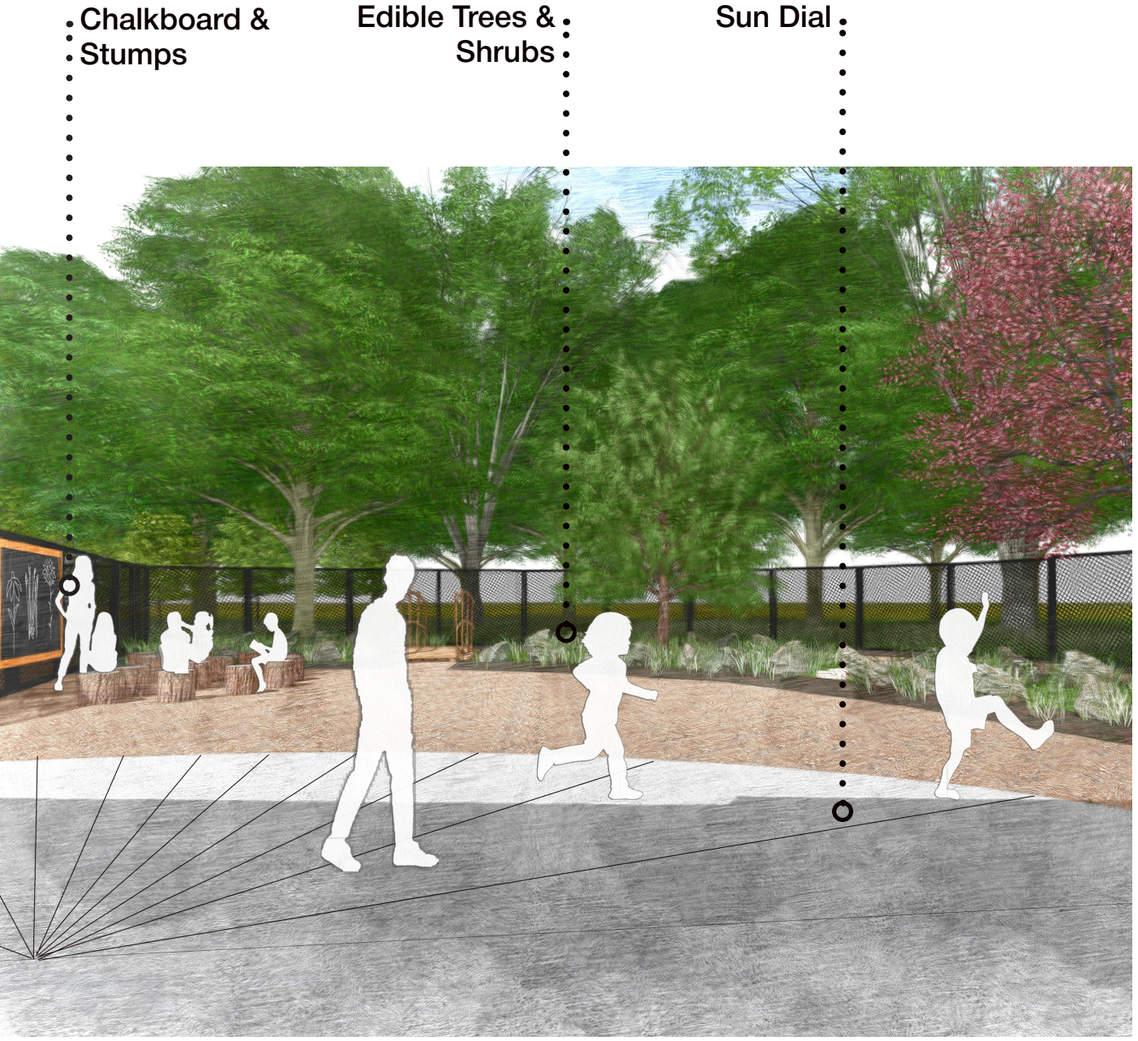
Burrow & Build
[fig. 5.63] View of loose parts area (Coulter 2025)



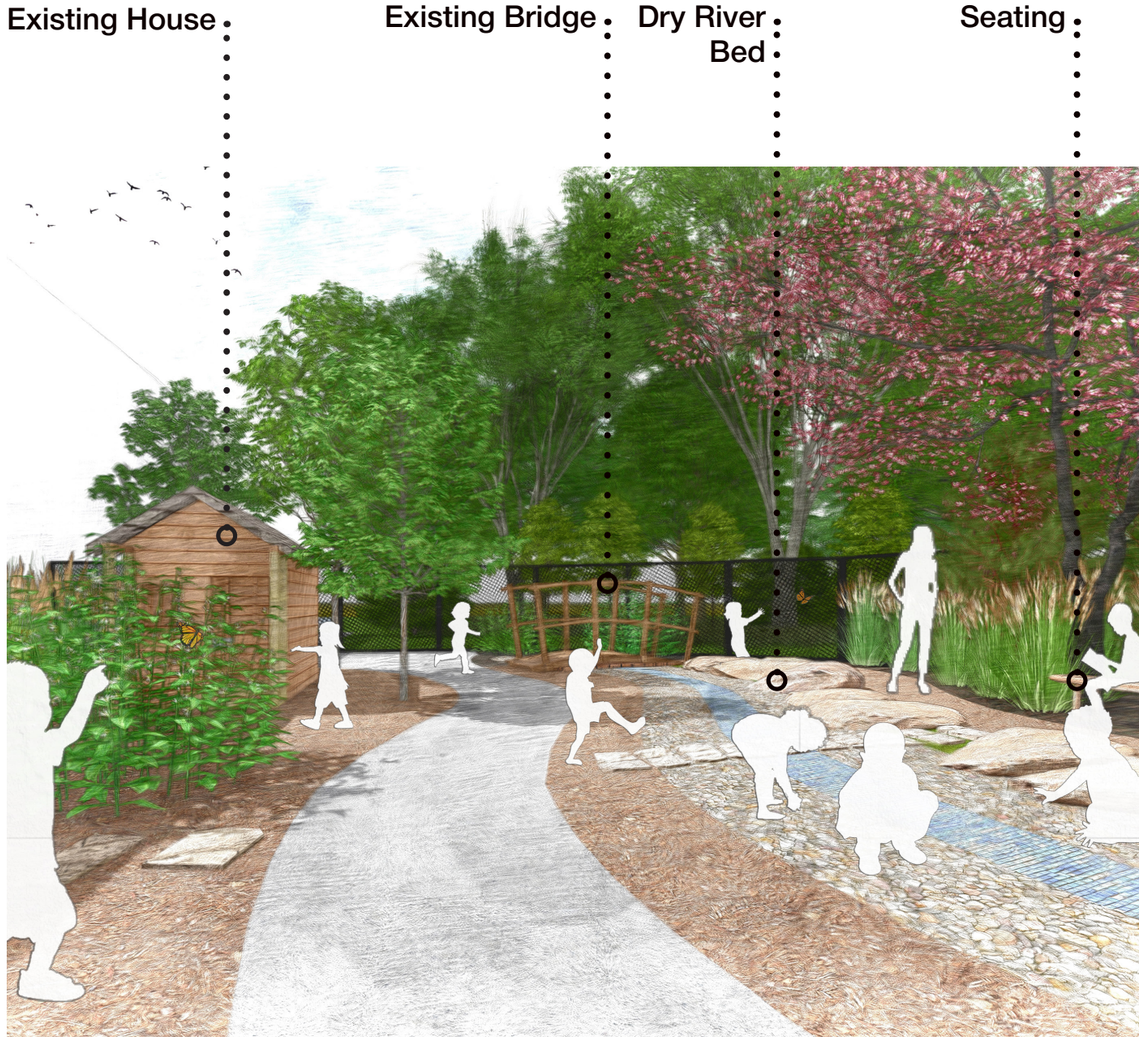
Rhythm Ridge
[fig. 5.64] View of music and stage (Coulter 2025)

big bluestem bend
north playground • 2 1/2 to 5 y/o





Outdoor Classroom & Food Forest
[fig. 5.65] View of outdoor classroom and food forest (Coulter 2025)



Little House on the Prairie
[fig. 5.66] View of dry river bed and play house (Coulter 2025)

vegetation

Natural Stimuli

Plants are constantly changing throughout the year and providing different stimuli for children to learn how the world feels, smells, tastes, looks, and reactions. Plants allow children to engage all of their senses.

Toys for Tots

Plants can provide children with natural tools for imaginative and constructive play that engages their tactile and proprioceptive senses. Twigs and branches from trees, leaves from grasses, and seeds from flowers supply endless constructive and imaginative play opportunities for children.

Visual Beauty & Seasonality

Plants also provide flowering buds and changing leaves that teach children seasonality and engage the visual sense. Visual stimuli engages learning about seasonality and plant life cycles.

Birds & the Bees

Plants throughout the play area invite creatures into the space. From birds nesting in the trees to pollinators buzzing around flowers, the space is full of stimuli that engages the auditory and visual senses.

From the Ground Up

Plants can be a teaching opportunity and hands-on activity for children to learn about the natural cycles. From seed to bloom, children can learn how food grows and looks, and they can engage their olfactory and gustatory senses.

Plant Palette

Trees

- Bladdernut Tree — *Staphylea trifolia*
- Caddo Sugar Maple — *Acer Saccharum 'Caddo'*
- Eastern Red Cedar — *Juniperus virginiana*
- Persimmon Tree — *Diospyros virginiana*
- Paw Paw Tree — *Asimina triloba*

Groundcover, Shrubs, & Perennials

- Big Bluestem — *Andropogon gerardii*
- Butterfly Bush — *Buddleja davidii*
- Creeping Thyme — *Thymus serpyllum*
- Cup Plant — *Silphium perfoliatum*
- Fragrant Sumac — *Rhus aromatica*
- Joe Pye Weed — *Eutrochium purpureum*
- Little Bluestem — *Schizachyrium scoparium*
- Northern Sea Oats — *Chasmanthium latifolium*
- Prairie Dropseed — *Sporocolus heterolepis*
- Purple Coneflower — *Echinacea purpurea*
- Red-Osier Dogwood — *Cornus sericea L. ssp. Sericea*
- Wild Bergamot — *Monarda fistulosa*
- Wild Sienna — *Senna hebecarpa*
- Wild Strawberry — *Fragaria Virginiana*

Seasonal Interest

S/S


[fig. 5.67] (K-State 2003)


[fig. 5.69] (Plant 2017)


[fig. 5.71] (Voekler 2012)

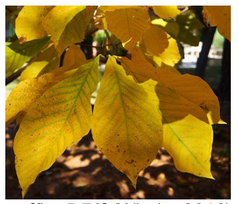

[fig. 5.73] (Hollinger 2009)


[fig. 5.75] (USFWS 2018)


[fig. 5.77] (John 2008)

F/W


[fig. 5.68] (Mullen 2009)


[fig. 5.70] (Winder 2016)

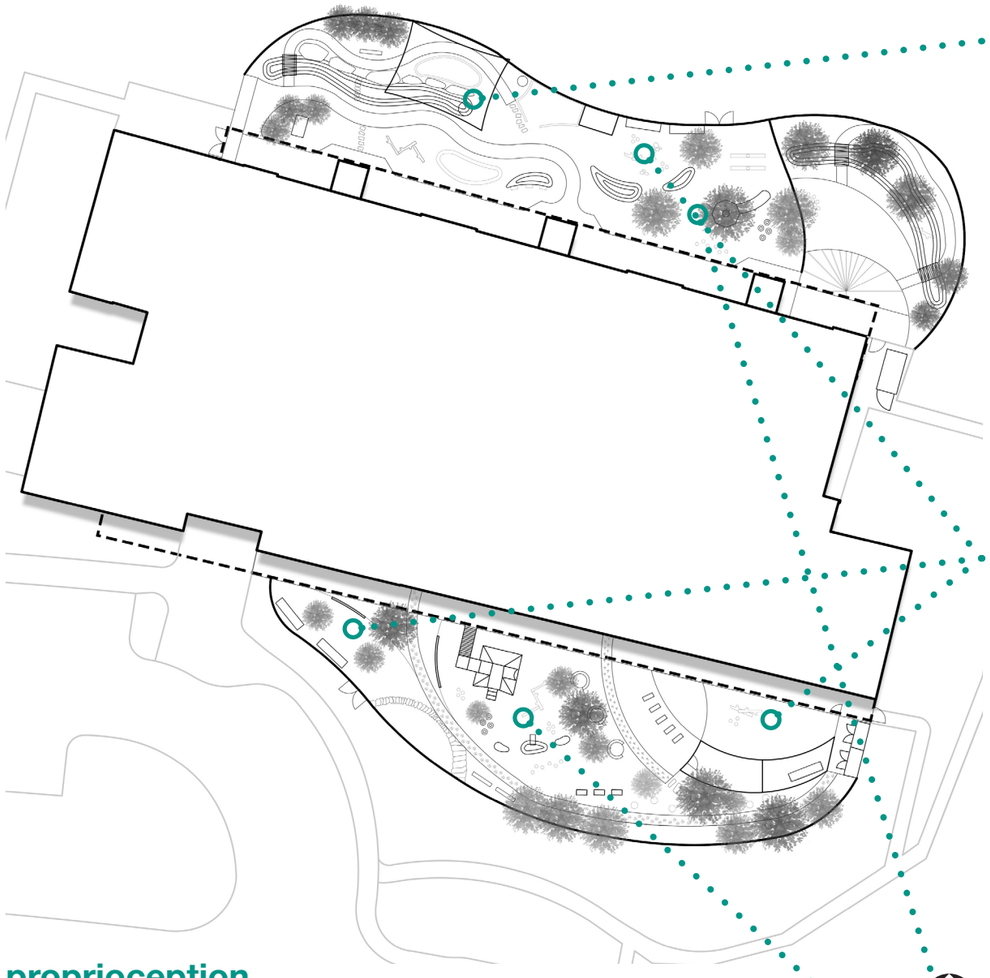

[fig. 5.72] (Lavin 2009)


[fig. 5.74] (Stang 2006)


[fig. 5.76] (Cephas 2022)


[fig. 5.78] (Stang 2006)

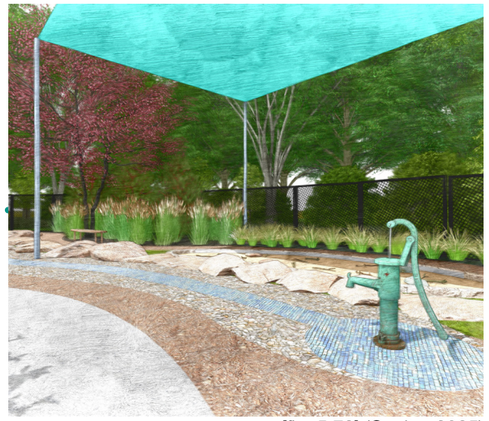
engaging the senses



proprioception

This sense gives one the ability to sense different parts of the body without looking at them and helps regulate how much force is needed to complete tasks.

[fig. 5.98] Projective site plan (Ramirez 2025)



[fig. 5.79] (Coulter 2025)

Sand & Water

- The water pump engages muscles through pushing and pulling.
- Constructing with rocking in the dry river bed and sandbox engages the body through lifting and pushing.



[fig. 5.80] (Coulter 2025)

Natural Loose Parts

- Rocks, sticks and other natural loose parts engage this sense through pushing, pulling, and lifting.



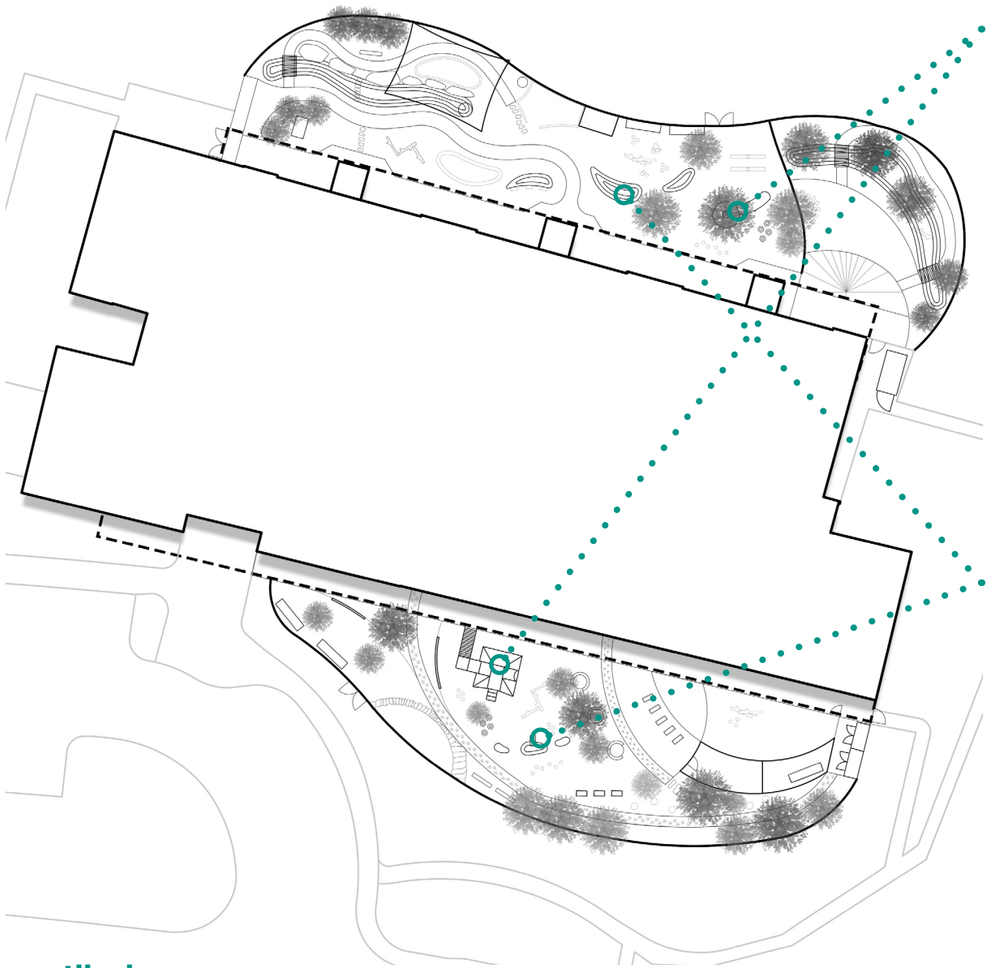
[fig. 5.81] (Coulter 2025)

Structures & Mounds

- Climbing structures and mounds engage this sense through climbing, jumping, pulling, and balance.

PROJECTIVE DESIGN

engaging the senses



vestibular

This sense helps one understand spatial awareness and navigate their environment easily.

[fig. 5.98] Projective site plan (Ramirez 2025)



[fig. 5.82] (Coulter 2025)

Climbing & Sliding

- Structures and slides engage this sense through sliding, climbing, and jumping.

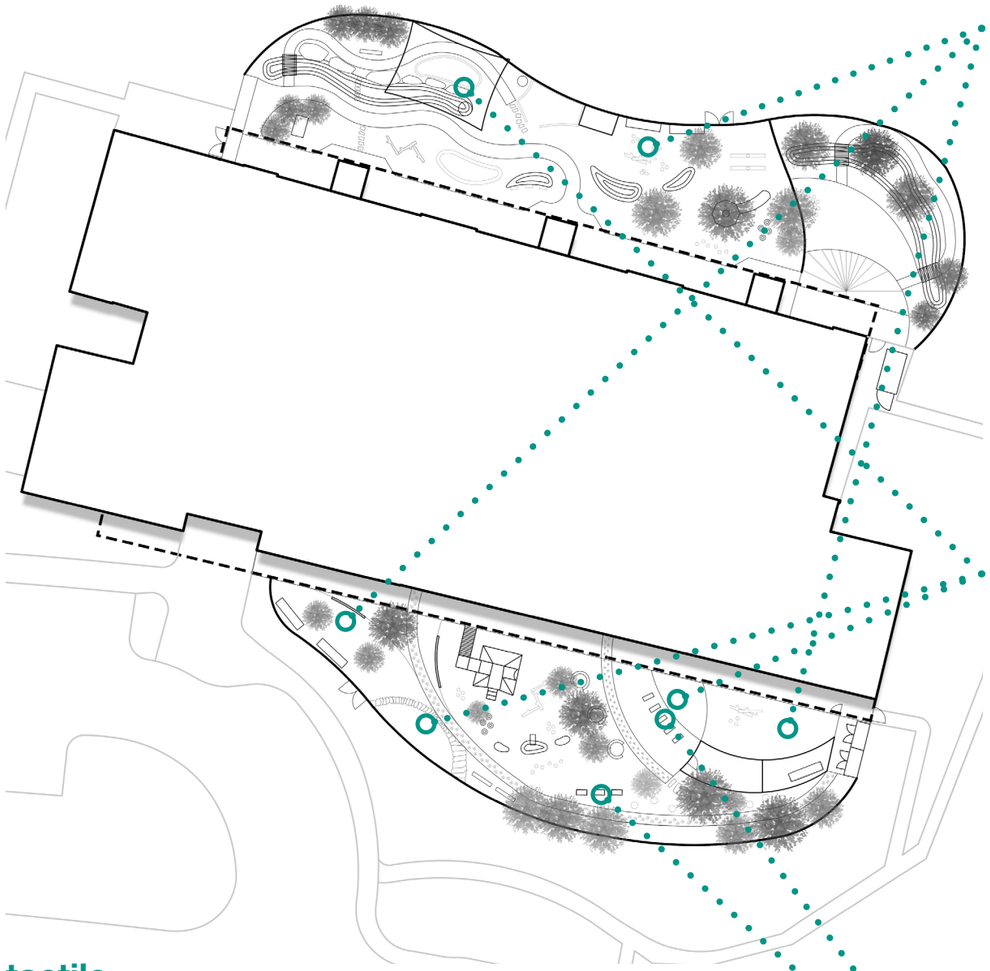


[fig. 5.83] (Coulter 2025)

Active Play

- Active play and mounds engage this sense through balance, rolling, spinning, jumping, and climbing.

engaging the senses



tactile

The sense of touch is the first to develop and the largest sensory organ (skin) that receives tactile information.

[fig. 5.98] Projective site plan (Ramirez 2025)



[fig. 5.84] (Coulter 2025)

Natural Loose Parts

- Natural loose parts engage the tactile sense through lifting, building, and touching.



[fig. 5.85] (Coulter 2025)

Sand & Water

- Sand and water engage this sense through touching different textures and materials.

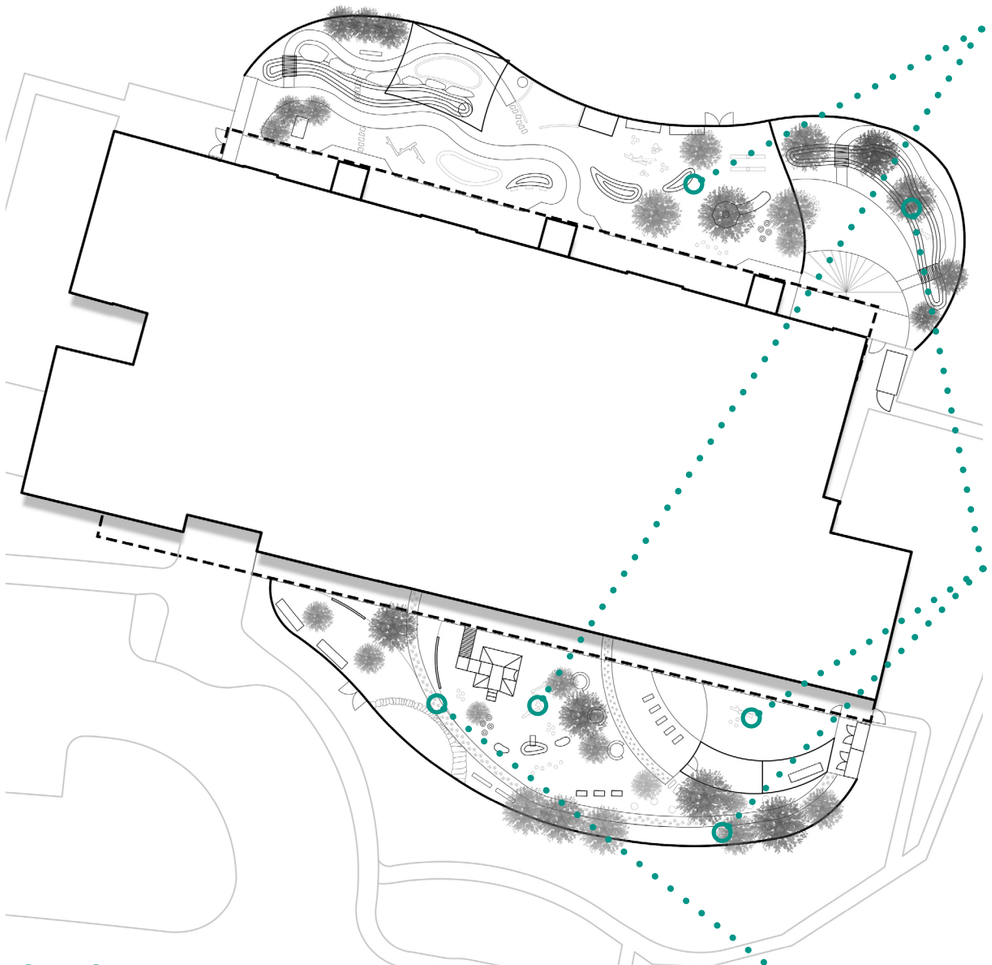


[fig. 5.86] (Coulter 2025)

Sensory Tables

- Sensory tables for mud and water engage are a more accessible way to engage the tactile sense.

engaging the senses



visual

The sense of vision comes from using light to interpret the environment.
It helps one navigate places and objects around them.

[fig. 5.98] Projective site plan (Ramirez 2025)

PROJECTIVE DESIGN



[fig. 5.87] (Coulter 2025)

Active Play

- Active play engages the visual sense through structures of natural materials and moving around.



[fig. 5.88] (Coulter 2025)

Natural Beauty

- Incorporating flowering plants and natural forms engages the visual sense.

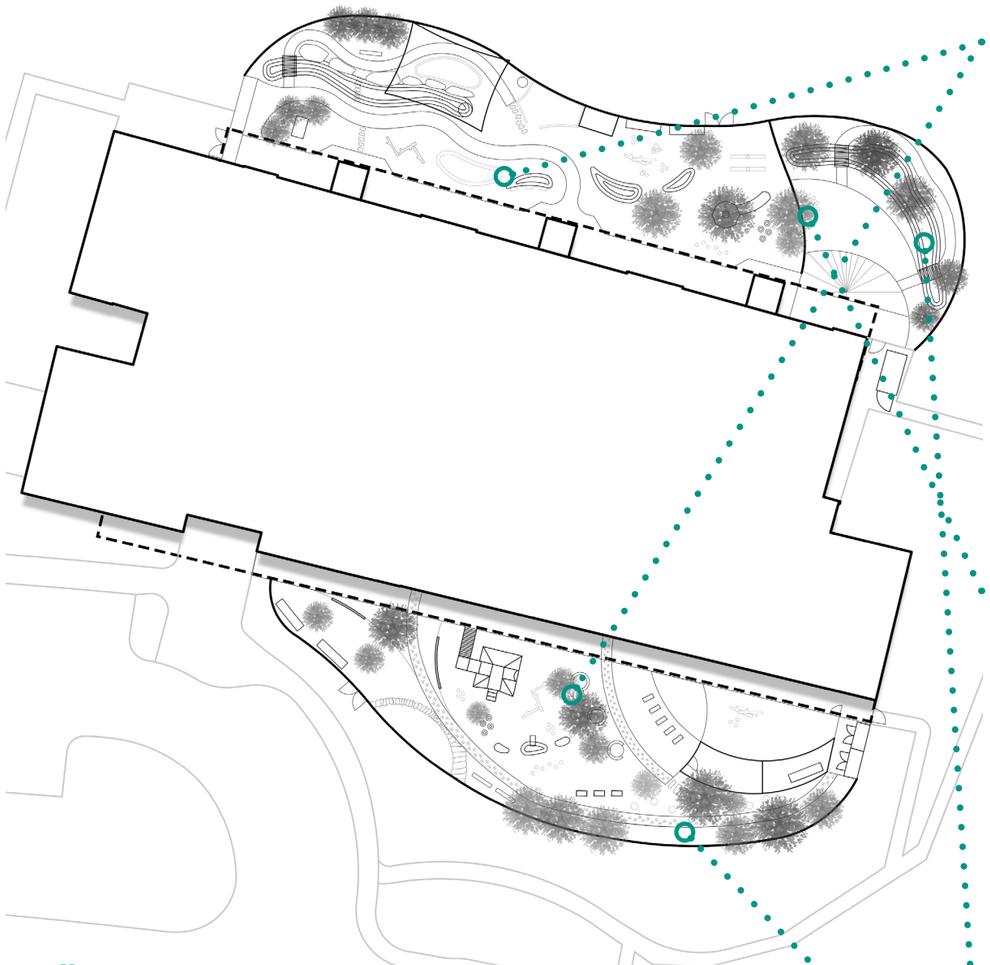


[fig. 5.89] (Coulter 2025)

Clearly Defined Areas

- Defining areas with natural materials gives children visual cues and defines play zones.

engaging the senses



auditory

The auditory sense is located in the inner ear. It helps one listen and interpret sounds.

[fig. 5.98] Projective site plan (Ramirez 2025)



[fig. 5.90] (Coulter 2025)

Musical Instruments

- Musical instruments engage the auditory sense through sounds and communication.



[fig. 5.91] (Coulter 2025)

Outdoor Classroom

- The outdoor classroom engages the auditory sense through listening, learning, and teaching.

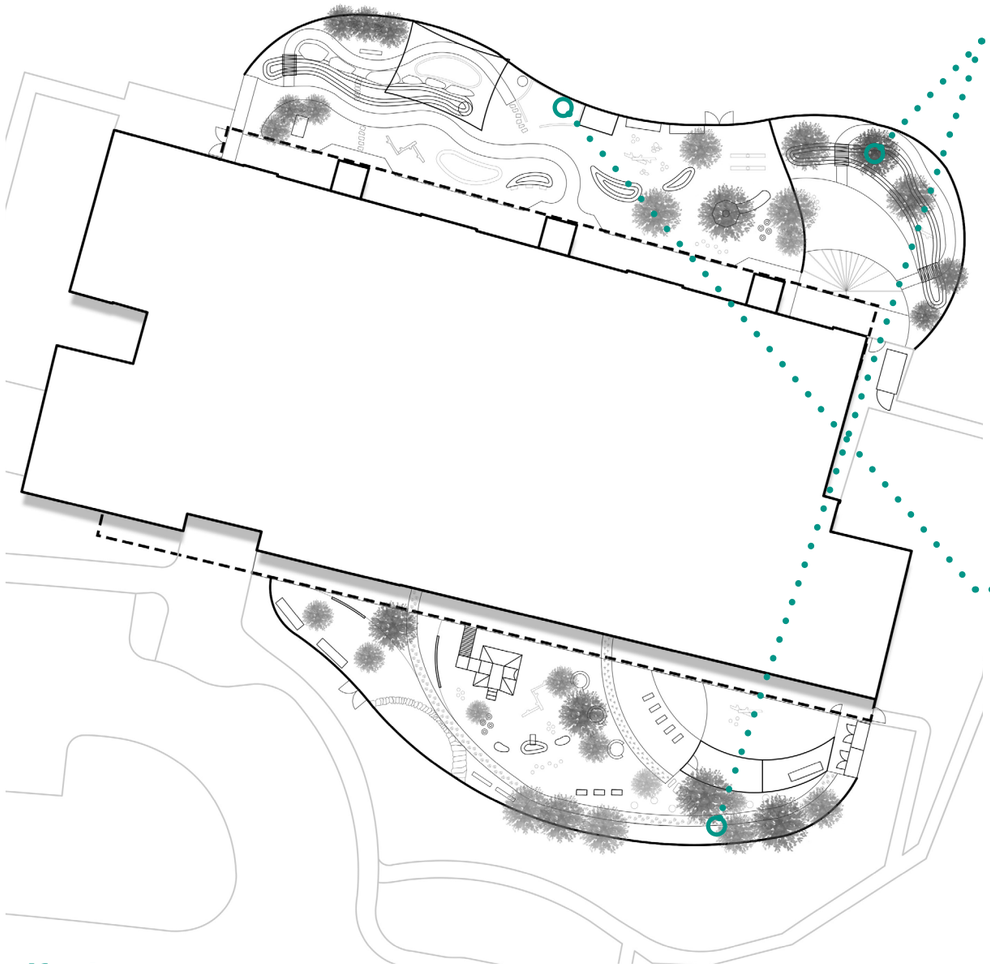


[fig. 5.92] (Coulter 2025)

Birds, Bees & Butterflies

- Plants invite in all sorts of creatures such birds, bees, and butterflies that engage the auditory sense through sounds and songs.

engaging the senses



olfactory

The olfactory sense helps people identify and interpret smells in their environment.

[fig. 5.98] Projective site plan (Ramirez 2025)



[fig. 5.93] (Coulter 2025)

Rain Garden

- The rain garden is planted with many different native flowering plants that have unique scents to engage the sense of smell.

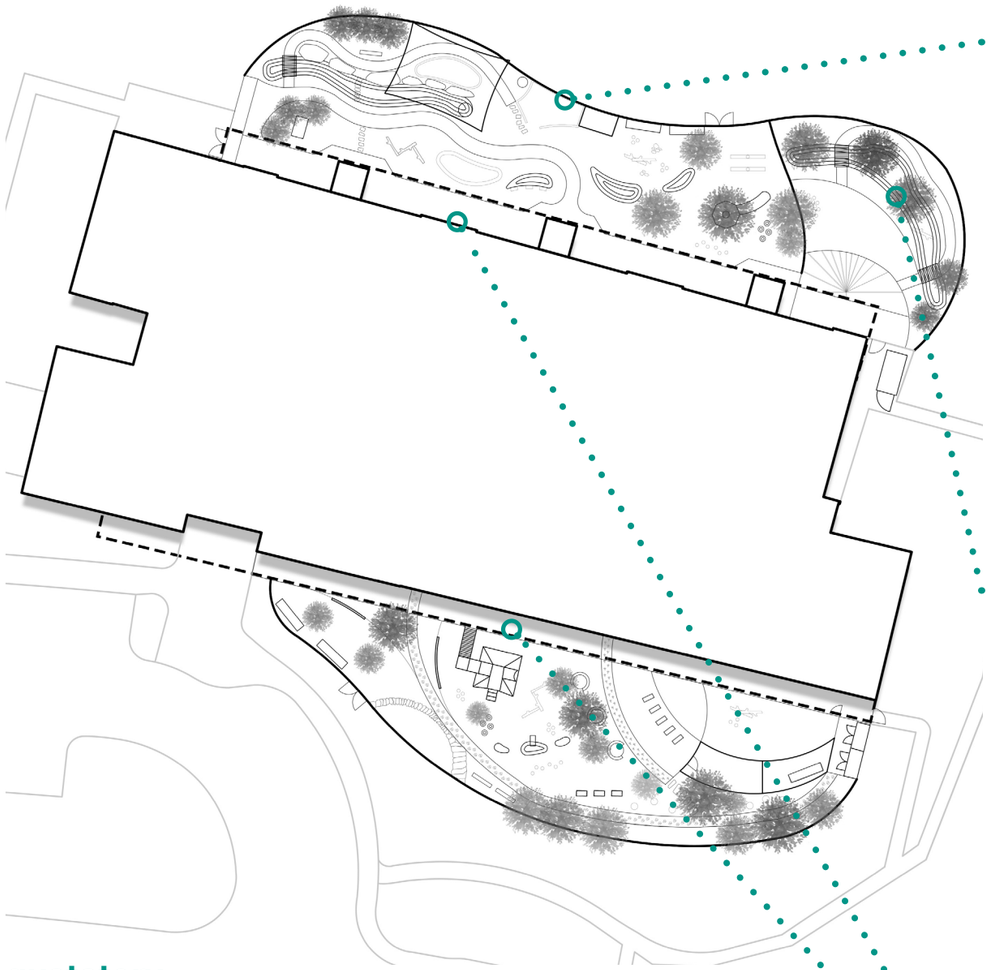


[fig. 5.94] (Coulter 2025)

Edible Vegetation

- Edible vegetation engages the sense of smell through fragrant foods being grown.

engaging the senses



gustatory

The gustatory sense allows one to perceive flavors and how taste is processed.

[fig. 5.98] Projective site plan (Ramirez 2025)



[fig. 5.95] (Coulter 2025)

Garden & Greenhouse

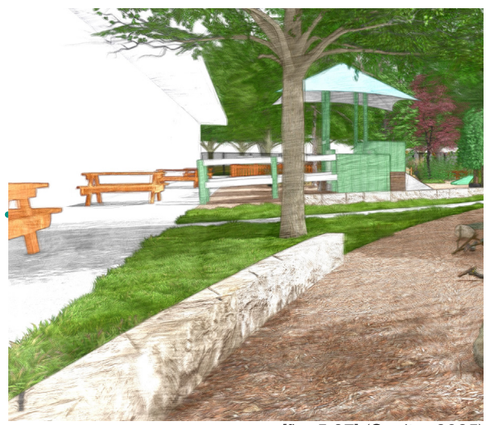
- Gardens and the greenhouse engage the gustatory sense through learning how to grow plants and tasting the fruits of their labor.



[fig. 5.96] (Coulter 2025)

Food Forest

- The food forest is planted with edible trees and shrubs that teach children how to forage wild edible plants.



[fig. 5.97] (Coulter 2025)

Picnic Tables

- Picnic tables allow children to eat outside on nice days.

PROJECTIVE DESIGN

projective design matrix

Finally, the projective design of the CCD covers all points of the guideline and principle matrix.

10 Guidelines / Principles	Program	Site Layout	Safety & Accessibility	Nature-Based	The Senses	Sensory Integration
Placemaking & Signage	●		●			
Visibility & Clearly Defined Areas	●	●	●	●	●	
Entrances & Exits		●	●		●	
Regulatory Standards	●	●	●			
Gathering Area	●	●			●	●
Mix of Play Areas	●	●		●	●	●
Natural Loose Parts & Construction	●			●	●	●
Natural Materials	●			●	●	●
Vegetation & Animals		●		●		●
Rest Area			●			●

[fig. 5.99] Design guidelines and principles matrix (Coulter 2025)

06

conclusion

Overview

Takeaways

Limitations

Future Opportunities

Future Opportunities



[fig. 6.1] (Coulter 2024)

overview

Supported by literary research, nature-based guidelines, precedent studies, and user feedback, the CCD playground projective design integrates nature-based experiences that engage all of the senses and sensory processing patterns of children. The CCD outdoor classroom provides an immersive natural environment where children can engage in play and learn about the world. Landscape architects play an important role in implementing nature-based and sustainable playground solutions. This research and projective design gives landscape architects the tool kit to design nature-based play spaces to engage sensory learning and development.

takeaways

From this research study and project, I learned a lot about the importance of play, sensory development, and nature-based play. Play is an essential part of a child's life because it is through play they develop physically, socially, emotionally, and cognitively. The outdoor environment is the perfect space for children to develop these essential skills.

The K-State Center for Child Development is an essential part of this campus because they support local families and encourage children to explore the outdoors. The CCD redesign enhances the existing space and implements research-backed design recommendations.



[fig. 6.2] (Coulter 2024)

limitations

During the completion of this research and design there were several limitations. If I had more time, I would have engaged more with the parents and children of the CCD. Parents and children have a unique perspective on their play behaviors, favorite areas on the playgrounds, and opportunities for the play space. Getting their feedback on the projective design of the CCD would strengthen the design recommendations. Also, I would have interviewed early childhood educators and landscape architects. Early childhood educators have vast knowledge of play and development. Landscape architects know more about the technical sides of playground design and regional standards. These two groups would add an additional level of support for nature-based play and playgrounds.

Another limitation is maintenance. Although native plants, limestone, and wood provide immersive nature and sensory experiences, they do wear down faster and require more maintenance than artificial play structures. If more time was available, I would create a maintenance plan with K-State grounds to ensure planting is low maintenance and well taken care of for the future children of the CCD.

future opportunities

A future opportunity for this project is that it will be used for visioning and fundraising for the Center for Child Development at KSU redesign. Currently, the CCD is actively searching for a donor for the playground redesign. This project could help support the vision for the playground fundraising and show the importance of the CCD on campus.

Another opportunity could be a longitudinal study for future landscape architecture students. Future students could take the background research from this study and use it to observe the children at CCD. They would be able to learn more in depth the play behaviors of children and the affordances of the space. It would be especially important in understanding the differences in behavior between the existing playground and the proposed redesign.

end matter

07

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Figures

Cover Image Coulter, Michaela. 2025. Girl Searching Nature. Digital Artwork.

Figure 0.1 Coulter, Michaela. 2025. Girl Running on Stumps. Digital Artwork.

Figure 1.1 Coulter, Michaela. 2025. Girl Watching Nature. Digital Artwork.

Figure 2.1 Coulter, Michaela. 2025. Play & Physical Development. Digital Graphic.

Figure 2.2 Coulter, Michaela. 2025. Play & Social Interaction. Digital Graphic.

Figure 2.3 Coulter, Michaela. 2025. Play & Risk and Independence. Digital Graphic.

Figure 2.4 Coulter, Michaela. 2025. Play & Learn About the World. Digital Graphic.

Figure 2.5 Coulter, Michaela. 2025. Nature play quote from Moore 2014. Digital Graphic.

Figure 2.6 Coulter, Michaela. 2025. Sensory Integration Processing Patterns Diagram adapted from Thompson and Raisor 2013 information. Digital Graphic.

Figure 2.7 Coulter, Michaela. 2025. Sensory Integration Diagram. Digital Graphic.

Figure 2.8 Coulter, Michaela. 2025. Proprioception sense. Digital Graphic.

Figure 2.9 Coulter, Michaela. 2025. Vestibular sense. Digital Graphic.

Figure 2.10 Coulter, Michaela. 2025. Tactile sense. Digital Graphic.

Figure 2.11 Coulter, Michaela. 2025. Visual sense. Digital Graphic.

Figure 2.12 Coulter, Michaela. 2025. Auditory sense. Digital Graphic.

Figure 2.13 Coulter, Michaela. 2025. Olfactory sense. Digital Graphic.

Figure 2.14 Coulter, Michaela. 2025. Gustatory sense. Digital Graphic.

Figure 3.1 Coulter, Michaela. 2025. Methods Diagram. Digital Graphic.

Figure 3.2 Coulter, Michaela. 2025. Existing Design Guidelines Diagram. Digital Graphic.

Figure 3.3 Coulter, Michaela. 2025. 10 Guiding Principles Diagram. Digital Graphic.

Figure 3.4 Coulter, Michaela. 2025. Nature Play and Learning Places Diagram. Digital Graphic.

Figure 3.5 Coulter, Michaela. 2025. Precedent Study Diagram. Digital Graphic.

Figure 3.6 Coulter, Michaela. 2025. Precedent Study Location Map. Digital Graphic.

Figure 4.1 Coulter, Michaela. 2025. Design Guideline Findings Diagram. Digital Graphic.

Figure 4.2 Coulter, Michaela. 2025. 10 Guiding Principles Findings Diagram. Digital Graphic.

Figure 4.3 Coulter, Michaela. 2025. 10 Guiding Principles Matrix. Digital Graphic.

Figure 4.4 Coulter, Michaela. 2025. Nature Play and Learning Places Findings Diagram. Digital Graphic.

Figure 4.5 Coulter, Michaela. 2025. Nature Play and Learning Places Matrix. Digital Graphic.

Figure 4.6 Coulter, Michaela. 2025. Design Guidelines Organized into the Six Principles. Digital Graphic.

Figure 4.7 Coulter, Michaela. 2025. Design Guidelines and Principles Matrix. Digital Graphic.

Figure 4.8 Coulter, Michaela. 2025. Precedent Study Location Map. Digital Graphic.

Figure 4.9 Coulter, Michaela. 2025. Dimensions Outdoor Classroom. Digital Photograph.

Figure 4.10 Coulter, Michaela. 2025. Dimensions Outdoor Classroom. Digital Photograph.

Figure 4.11 Coulter, Michaela. 2025. Dimensions Outdoor Classroom. Digital Photograph.

Figure 4.12 Coulter, Michaela. 2025. Dimensions Outdoor Classroom. Digital Photograph.

Figure 4.13 Coulter, Michaela. 2025. Dimensions Outdoor Classroom. Digital Photograph.

Figure 4.14 Coulter, Michaela. 2025. Dimensions Outdoor Classroom. Digital Photograph.

Figure 4.15 Coulter, Michaela. 2025. Dimensions Outdoor Classroom. Digital Photograph.

Figure 4.16 Coulter, Michaela. 2025. Dimensions Outdoor Classroom. Digital Photograph.

Figure 4.17 Coulter, Michaela. 2025. Dimensions Research Facility Outdoor Classroom Matrix. Digital Graphic.

Figure 4.18 Coulter, Michaela. 2025. Ruth Staples Child Development Lab. Digital Photograph.

Figure 4.19 Coulter, Michaela. 2025. Ruth Staples Child Development Lab. Digital Photograph.

Figure 4.20 Coulter, Michaela. 2025. Ruth Staples Child Development Lab. Digital Photograph.

Figure 4.21 Coulter, Michaela. 2025. Ruth Staples Child Development Lab. Digital Photograph.

Figure 4.22 Coulter, Michaela. 2025. Ruth Staples Child Development Lab. Digital Photograph.

Figure 4.23 Coulter, Michaela. 2025. Ruth Staples Child Development Lab. Digital Photograph.

Figure 4.24 Coulter, Michaela. 2025. Ruth Staples Child Development Lab. Digital Photograph.

Figure 4.25 Coulter, Michaela. 2025. Ruth Staples Child Development Lab. Digital Photograph.

Figure 4.26 Coulter, Michaela. 2025. Ruth Staples Child Development Lab. Digital Photograph.

Figures

Figure 4.27 Coulter, Michaela. 2025. Ruth Staples Child Development Lab. Digital Photograph.

Figure 4.28 Coulter, Michaela. 2025. Ruth Staples Child Development Lab. Digital Photograph.

Figure 4.29 Coulter, Michaela. 2025. Ruth Staples Child Development Lab. Digital Photograph.

Figure 4.30 Coulter, Michaela. 2025. Ruth Staples Child Development Lab Matrix. Digital Graphic.

Figure 4.31 “Entry Gate”. N.d. Didier Design Studio. Digital Photograph. Courtesy of Didier Design Studio. Accessed March 29, 2025. Reproduced from “Childhood’s Gate Garden at Penn State,” https://images.squarespace-cdn.com/content/v1/618bf01f6005f37750c9b322/3a52e60b-cdd0-472b-bb2e-b9d39d479fc2/childhoodsgate3.jpg

Figure 4.32 “Garden”. N.d. Didier Design Studio. Digital Photograph. Courtesy of Didier Design Studio. Accessed March 29, 2025. Reproduced from “Childhood’s Gate Garden at Penn State,” https://images.squarespace-cdn.com/content/v1/618bf01f6005f37750c9b322/a71fa260-ea94-45b3-8b13-db99ae7493ac/childhoodsgate8+%281%29.jpg

Figure 4.33 “Aerial of garden”. N.d. Didier Design Studio. Digital Photograph. Courtesy of Didier Design Studio. Accessed March 29, 2025. Reproduced from “Childhood’s Gate Garden at Penn State,” https://images.squarespace-cdn.com/content/v1/618bf01f6005f37750c9b322/c2d98075-a25d-48cf-8ece-f6cd0c4ca478/childhoodsgate2.jpg

Figure 4.34 “Open area and seating”. N.d. Didier Design Studio. Digital Photograph. Courtesy of Didier Design Studio. Accessed March 29, 2025. Reproduced from “Childhood’s Gate Garden at Penn State,” https://images.squarespace-cdn.com/content/v1/618bf01f6005f37750c9b322/232aa47f-7e6c-45eb-ac2a-90cb6bf878d3/childhoodsgate5.jpg

Figure 4.35 “Fossil ground surface”. N.d. Didier Design Studio. Digital Photograph. Courtesy of Didier Design Studio. Accessed March 29, 2025. Reproduced from “Childhood’s Gate Garden at Penn State,” https://images.squarespace-cdn.com/content/v1/618bf01f6005f37750c9b322/a44a9bd0-6608-4973-8d93-e78ef563aff3/childhoodsgate16.JPG

Figure 4.36 “The Grotto”. N.d. Didier Design Studio. Digital Photograph. Courtesy of Didier Design Studio. Accessed March 29, 2025. Reproduced from “Childhood’s Gate Garden at Penn State,” https://images.squarespace-cdn.com/content/v1/618bf01f6005f37750c9b322/de06e8c2-aae3-4ae7-834f-21f73226c0ce/childhoodsgate13.jpg

Figure 4.37 “Rock collection area”. N.d. Didier Design Studio. Digital Photograph. Courtesy of Didier Design Studio. Accessed March 29, 2025. Reproduced from “Childhood’s Gate Garden at Penn State,” https://images.squarespace-cdn.com/content/v1/618bf01f6005f37750c9b322/ebc9aaa1-66b4-42fa-9da3-0490bb67d8bb/childhoodsgate10.jpg

Figure 4.38 “Garden area”. N.d. Didier Design Studio. Digital Photograph. Courtesy of Didier Design Studio. Accessed March 29, 2025. Reproduced from “Childhood’s Gate Garden at Penn State,” https://images.squarespace-cdn.com/content/v1/618bf01f6005f37750c9b322/d4b1c108-661a-48a3-ae80-c080b2e9aed7/childhoodsgate7.jpg

Figure 4.39 “Glass house”. N.d. Didier Design Studio. Digital Photograph. Courtesy of Didier Design Studio. Accessed March 29, 2025. Reproduced from “Childhood’s Gate Garden at Penn State,” https://images.squarespace-cdn.com/content/v1/618bf01f6005f37750c9b322/5609ee65-1f0a-40cc-83e1-b28863385637/childhoodsgate1.jpg

Figure 4.40 Coulter, Michaela. 2025. Childhood’s Gate Children’s Garden Matrix. Digital Graphic.

Figure 4.41 “Water area”. n.d. RDG Planning & Design. Digital Photograph. Courtesy of of RDG Planning & Design, Kun Zhang | Dimension Images, All Rights Reserved. Accessed March 29, 2025. Reproduced from “Jester Park Natural Playscape,” https://rdgusa.com

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Figure 4.44 “Water wading area”. n.d. RDG Planning & Design. Digital Photograph. Courtesy of of RDG Planning & Design, Kun Zhang | Dimension Images, All Rights Reserved. Accessed March 29, 2025. Reproduced from “Jester Park Natural Playscape,” https://rdgusa.com

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Figures

Figure 4.47 “Water feature”. n.d. RDG Planning & Design. Digital Photograph. Courtesy of of RDG Planning & Design, Kun Zhang | Dimension Images, All Rights Reserved. Accessed March 29, 2025. Reproduced from “Jester Park Natural Playscape,” https://rdgusa.com

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Figure 4.49 “The Hollow Tree”. n.d. RDG Planning & Design. Digital Photograph. Courtesy of of RDG Planning & Design, Kun Zhang | Dimension Images, All Rights Reserved. Accessed March 29, 2025. Reproduced from “Unleashing Children into the Great Outdoors,” https://rdgusa.com

Figure 4.50 Coulter, Michaela. 2025. Jester Park Natural Playscape Matrix. Digital Graphic.

Figure 5.1 Coulter, Michaela. 2025. CCD South Playground. Digital Photograph.

Figure 5.2 Ramirez, Ady. 2024. CCD Student to Staff Ratio. Digital Graphic.

Figure 5.3 Swaney, Maddie. 2024. K-State Campus Map. Source map: CADMapper. Manhattan, Kansas. Accessed 27 August 2024. Adobe Illustrator.

Figure 5.4 Coulter, Michaela. 2024. K-State Campus Map. Source map: Google Earth Pro. Manhattan, Kansas. 39d11’14.75” N 96d34’54.83” W. Accessed 15 March 2025. Adobe Illustrator.

Figure 5.5 Ramirez, Ady. 2024. Center for Child Development Existing Site Plan. AutoCAD.

Figure 5.7 Coulter, Michaela. 2024. CCD South Playground. Digital Photograph.

Figure 5.8 Coulter, Michaela. 2024. CCD South Playground. Digital Photograph.

Figure 5.9 Coulter, Michaela. 2024. CCD South Playground. Digital Photograph.

Figure 5.10 Coulter, Michaela. 2024. CCD South Playground. Digital Photograph.

Figure 5.11 Coulter, Michaela. 2024. CCD South Playground. Digital Photograph.

Figure 5.12 Coulter, Michaela. 2024. CCD South Playground. Digital Photograph.

Figure 5.13 Coulter, Michaela. 2024. CCD South Playground. Digital Photograph.

Figure 5.14 Coulter, Michaela. 2024. CCD South Playground. Digital Photograph.

Figure 5.15 Coulter, Michaela. 2024. CCD South Playground. Digital Photograph.

Figure 5.16 Coulter, Michaela. 2024. CCD South Playground. Digital Photograph.

Figure 5.17 Coulter, Michaela. 2024. CCD South Playground. Digital Photograph.

Figure 5.18 Coulter, Michaela. 2024. CCD South Playground. Digital Photograph.

Figure 5.19 Coulter, Michaela. 2024. CCD North Playground. Digital Photograph.

Figure 5.20 Coulter, Michaela. 2024. CCD North Playground. Digital Photograph.

Figure 5.21 Coulter, Michaela. 2024. CCD North Playground. Digital Photograph.

Figure 5.22 Coulter, Michaela. 2024. CCD North Playground. Digital Photograph.

Figure 5.23 Coulter, Michaela. 2024. CCD North Playground. Digital Photograph.

Figure 5.24 Coulter, Michaela. 2024. CCD North Playground. Digital Photograph.

Figure 5.25 Coulter, Michaela. 2024. CCD North Playground. Digital Photograph.

Figure 5.26 Coulter, Michaela. 2024. CCD North Playground. Digital Photograph.

Figure 5.27 Coulter, Michaela. 2024. CCD North Playground. Digital Photograph.

Figure 5.28 Coulter, Michaela. 2024. CCD North Playground. Digital Photograph.

Figure 5.29 Coulter, Michaela. 2024. CCD North Playground. Digital Photograph.

Figure 5.30 Coulter, Michaela. 2024. CCD North Playground. Digital Photograph.

Figure 5.31 Ramirez, Ady. 2024. Hydrology and Vegetation Diagram. Digital Graphic.

Figure 5.32 Ramirez, Ady. 2024. Play Zones Diagram. Digital Graphic.

Figure 5.33 Ramirez, Ady. 2024. Indoor-Outdoor Relationships Diagram. Digital Graphic.

Figure 5.34 Ramirez, Ady. 2024. Circulation Diagram. Digital Graphic.

Figure 5.35 Coulter, Michaela. 2025. The Senses Diagram. Digital Graphic.

Figure 5.36 Coulter, Michaela. 2024. Sensory images. Digital Photograph.

Figure 5.37 Coulter, Michaela. 2024. Process work. Hand Drawing.

Figure 5.38 Coulter, Michaela and Ady Ramirez. 2025. Meeting Outline. Google Doc.

Figure 5.39 Ramirez, Ady. 2025. Design Review Meeting Flyer. Adobe Indesign.

Figure 5.40 Ramirez, Ady. 2025. Design Review Presentation. Adobe Indesign.

Figure 5.41 Ramirez, Ady. 2025. Proposed Site Plan. Digital Graphic.

Figure 5.42 Goold, Alexina. 2025. Design Review. Digital Photograph.

Figure 5.43 Goold, Alexina. 2025. Design Review. Digital Photograph.

Figure 5.44 Goold, Alexina. 2025. Design Review. Digital Photograph.

Figure 5.45 Goold, Alexina. 2025. Design Review. Digital Photograph.

Figure 5.46 Goold, Alexina. 2025. Design Review. Digital Photograph.

Figure 5.47 Goold, Alexina. 2025. Design Review. Digital Photograph.

Figure 5.48 Coulter, Michaela. 2025. Design Review Sticky Notes. Digital Photograph.

Figures

Figure 5.49 Coulter, Michaela. 2024. The Flint Hills at the Konza Prairie Trail. Digital Photograph.

Figure 5.50 Ramirez, Ady. 2025. Center for Child Development Projective Site Plan. Digital Graphic.

Figure 5.51 Ramirez, Ady. 2025. Narrative Diagram. Digital Graphic.

Figure 5.52 Ramirez, Ady. 2025. Play Zones Diagram. Digital Graphic.

Figure 5.53 Coulter, Michaela. Surface Materials Diagram. Digital Graphic.

Figure 5.54 Ramirez, Ady. 2025. Circulation Diagram. Digital Graphic.

Figure 5.55 Ramirez, Ady. 2025. Center for Child Development Projective Site Plan South Playground. Digital Graphic.

Figure 5.56 Coulter, Michaela. 2025. Mushroom March. Digital Rendering.

Figure 5.57 Coulter, Michaela. 2025. Climb, Crawl and Slide. Digital Rendering.

Figure 5.58 Coulter, Michaela. 2025. Loose Parts Lot. Digital Rendering.

Figure 5.59 Coulter, Michaela. 2025. Infant Lawn. Digital Rendering.

Figure 5.60 Coulter, Michaela. 2025. In the Treetops. Digital Rendering.

Figure 5.61 Ramirez, Ady. 2025. Center for Child Development Projective Site Plan North Playground. Digital Graphic.

Figure 5.62 Coulter, Michaela. 2025. Dry River Bed. Digital Rendering.

Figure 5.63 Coulter, Michaela. 2025. Burrow and Build. Digital Rendering.

Figure 5.64 Coulter, Michaela. 2025. Rhythm Ridge. Digital Rendering.

Figure 5.65 Coulter, Michaela. 2025. Outdoor Classroom and Food Forest. Digital Rendering.

Figure 5.66 Coulter, Michaela. 2025. Little House on the Prairie. Digital Rendering.

Figure 5.67 “*Acer saccharum* (caddo sugar maple)”. 2003. Photograph by Flickr user K-State Research and Extensions. Accessed April 8, 2025. Reproduced from Flickr. https://www.flickr.com/photos/ksrecomm/14096874769

Figure 5.68 “Sugar Maple Seeds *Acer saccharum*”. 2009. Photograph by Flickr user Dan Mullen. Accessed April 8, 2025. Reproduced from Flickr. https://www.flickr.com/photos/8583446@N05/3967705518

Figure 5.69 “*Asimina triloba* (paw paw)”. 2017. Photograph by Flickr user Plant Image Library. Accessed April 8, 2025. Reproduced from Flickr. https://www.flickr.com/photos/138014579@N08/36488336082

Figure 5.70 “*Asimina triloba* (paw paw) leaves in autumn yellow”. 2016. Photograph by Flickr user John Winder. Accessed April 8, 2025. Reproduced from Flickr. https://www.flickr.com/photos/83833206@N00/30870928121

Figure 5.71 “*Andropogon gerardii* shrub”. 2012. Photograph. Courtesy of Wikimedia Commons. Accessed April 8, 2025. Reproduced from user T.Voekler. https://commons.wikimedia.org/wiki/File:Andropogon_gerardii_shrub.png

Figure 5.72 “*Andropogon gerardii* (3904160434)”. 2009. Photograph. Courtesy of Wikimedia Commons. Accessed April 8, 2025. Reproduced from user Matt Lavin. https://commons.wikimedia.org/wiki/File:Andropogon_gerardii_%283904160434%29.jpg

Figure 5.73 “Creeping Thyme (3630261220)”. 2009. Photograph. Courtesy of Wikimedia Commons. Accessed April 8, 2025. Reproduced from user Jason Hollinger. https://commons.wikimedia.org/wiki/File:Creeping_Thyme_(3630261220).jpg

Figure 5.74 “*Thymus serpyllum* Pink Chintz 2zz”. 2006. Photograph. Courtesy of Wikimedia Commons. Accessed April 8, 2025. Reproduced from user David J. Stang. https://commons.wikimedia.org/wiki/File:Thymus_serpyllum_Pink_Chintz_2zz.jpg

Figure 5.75 “Monarch Butterfly on Purple Coneflower”. 2018. Photograph. Courtesy of Wikimedia Commons. Accessed April 8, 2025. Reproduced from user USFWS Midwest Region. https://commons.wikimedia.org/wiki/File:Monarch_Butterfly_on_Purple_Coneflower_(43299273534).jpg

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Figure 5.77 “*Fragaria virginiana* (wild strawberry) (Great Smoky Mountains, Tennessee, USA) 3 (36202781684)”. 2008. Photograph. Courtesy of Wikimedia Commons. Accessed April 8, 2025. Reproduced from user James St. John. https://commons.wikimedia.org/wiki/File:Fragaria_virginiana_(wild_strawberry)_(Great_Smoky_Mountains,_Tennessee,_USA)_3_(36202781684).jpg

Figure 5.78 “*Fragaria virginiana* 15zz”. 2006. Photograph. Courtesy of Wikimedia Commons. Accessed April 8, 2025. Reproduced from user David J. Stang. https://commons.wikimedia.org/wiki/File:Fragaria_virginiana_15zz.jpg

Figure 5.79 Coulter, Michaela. 2025. Sand and Water. Digital Rendering.

Figure 5.80 Coulter, Michaela. 2025. Natural Loose Parts. Digital Rendering.

Figure 5.81 Coulter, Michaela. 2025. Structures and Mounds. Digital Rendering.

Figure 5.82 Coulter, Michaela. 2025. Climbing and Sliding. Digital Rendering.

Figure 5.83 Coulter, Michaela. 2025. Active Play. Digital Rendering.

Figure 5.84 Coulter, Michaela. 2025. Natural Loose Parts. Digital Rendering.

REFERENCES

Figures

Figure 5.85 Coulter, Michaela. 2025. Sand and Water. Digital Rendering.

Figure 5.86 Coulter, Michaela. 2025. Sensory Tables. Digital Rendering.

Figure 5.87 Coulter, Michaela. 2025. Active Play. Digital Rendering.

Figure 5.88 Coulter, Michaela. 2025. Natural Beauty. Digital Rendering.

Figure 5.89 Coulter, Michaela. 2025. Clearly Defined Areas. Digital Rendering.

Figure 5.90 Coulter, Michaela. 2025. Musical Instruments. Digital Rendering.

Figure 5.91 Coulter, Michaela. 2025. Outdoor Classroom. Digital Rendering.

Figure 5.92 Coulter, Michaela. 2025. Birds, Bees, and Butterflies. Digital Rendering.

Figure 5.93 Coulter, Michaela. 2025. Rain Garden. Digital Rendering.

Figure 5.94 Coulter, Michaela. 2025. Edible Vegetation. Digital Rendering.

Figure 5.95 Coulter, Michaela. 2025. Garden and Greenhouse. Digital Rendering.

Figure 5.96 Coulter, Michaela. 2025. Food Forest. Digital Rendering.

Figure 5.97 Coulter, Michaela. 2025. Picnic Tables. Digital Rendering.

Figure 5.98 Ramirez, Ady. 2025. Projective Site Plan. Digital Graphic.

Figure 5.99 Coulter, Michaela. 2025. Picnic Tables. Digital Rendering.

Figure 6.1 Coulter, Michaela. 2025. Mushroom March. Digital Rendering.

Figure 6.1 Coulter, Michaela. 2025. Outdoor Classroom. Digital Rendering

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Appendix 1

Nature Explore. 2024. "Nature Explore Talking Points". Shared via email by Christine Kiewra.

Nature Explore Talking Points

WHAT IS NATURE EXPLORE?

Nature Explore is a national nonprofit program of Dimensions Educational Research Foundation, which works collaboratively with a network of organizations throughout the nation. Our goal is to help nature become an integral, joyful part of children's daily learning. Nature Explore provides research-based professional development, outdoor classroom design services, and field-tested resources created to support programs as they continue to connect children and families to the wonders of nature.

WHAT IS A NATURE EXPLORE CLASSROOM?

A Nature Explore Classroom is a dynamic, nature-based outdoor space developed by research-based, field-tested design principles focusing on youth education and whole child development. Nature Explore Classrooms allow children to explore and develop a connection to the natural world through engaging in open-ended play while enhancing the physical environment and adding natural beauty to the space.

THE NEED

Research shows that children need authentic connections with the natural world as a regular part of healthy growth and development. There is a growing concern that today's children are not getting adequate access to nature. Many lead overly-scheduled lives with decreased time spent outdoors exploring nature and increased time spent indoors (or on playgrounds devoid of rich sensory experiences). This disconnection contributes to increased childhood obesity, reliance on behavior-regulating medications, and a dislike or even fear of the unknown natural world.

WHAT MAKES NATURE EXPLORE EFFECTIVE?

Our outdoor classroom design principles and resources are grounded in nearly 30 years of research and field-testing by the Dimensions Foundation to help ensure developmentally appropriate benefits for children. Dimensions Foundation's research approach has been primarily qualitative action research but several studies include mixed methodologies as well. A unique characteristic of this research approach is the use of teachers as collaborators and co-researchers. Dimensions Education Programs teachers and independent researchers at other sites have been collecting data since 1998. Over the years, expanded research has included mixed-methods and outside researchers on larger studies.

HOW DO NATURE EXPLORE CLASSROOMS SUPPORT CHILDREN'S SKILL DEVELOPMENT?

One of the most significant findings of research shows that when children engaged in authentic play in Nature Explore Classrooms, they were developing skills in a variety of domains simultaneously. This is referred to as whole-child learning. Direct observation of children's work over time provides evidence that children are developing these foundational learning skills as they explore Nature Explore Classrooms with interested, caring adults: **Math/ Visual-spatial/ Music & Movement/ Art/ Close Observation/ Literacy/ Science/ Social-Emotional**

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WHY ARE EDUCATOR WORKSHOPS IMPORTANT?

Professional development provides educators and staff with field-tested, age-appropriate methods for reconnecting children with nature on a daily basis. Nature Explore offers engaging, hands-on workshops that provide comprehensive information on ways to support children's learning outdoors.

WHY IS FAMILY INVOLVEMENT IMPORTANT?

Families are a key part of what makes the comprehensive Nature Explore program so effective. When families enjoy nature with their children on a regular basis, children grow, and flourish.

The Nature Explore Families' Club has been created as a resource for organizations to help connect families with the outdoors, using developmentally appropriate activities for exploring the natural world together.

WHAT IS NATURE EXPLORE CERTIFICATION?

Nature Explore Classroom Certification is a national initiative that recognizes programs that have made a commitment to providing outdoor classrooms and comprehensive programming to help children use the natural world as an integral part of learning. Certification is open to any program able to meet the following yearly requirements:

- Well-designed outdoor space based on Nature Explore Guiding Principles
- Professional development
- Family involvement

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Appendix 2

Coulter, Michaela. CCD Design Review Notes. March 12, 2025.

Center for Child Development Design Review Notes

GENERAL INFO

Date: Wednesday, March 12, 5:45-6:45 pm

Who:

- ➔ 6 employees
- ➔ From both preschool and toddler & infant sides
- ➔ Experience at the CCD ranges between 9 to 15 years

What keeps you passionate and wanting to stay at the CCD?

- ➔ The kids and families
- ➔ Seeing kids grow and learn

Strongest part of CCD?

- ➔ Community - acceptance of each child, how they are and where they are at, every age and ability, both inside and outside
- ➔ Family
- ➔ Open hallway (to the upstairs and downstairs) to allow people to greet and see each other

CONCEPT DESIGN COMMENTS

- ➔ Previously, there used to be stepping stones, balance beams and logs but they naturally deteriorated over time. Find a way to keep and preserve those things.
- ➔ There also used to be a stage/platform that kids used a lot in different ways
- ➔ Where do the children gravitate towards?
  - ◆ Sand
  - ◆ Water
- ➔ Adult and Child Interactions'
  - ◆ Adults usually are positioned by doors for caregiving supplies (sanitizer, wipes, tissues, etc.)
    - Opportunity to incorporate caregiving supplies more into the play area
  - ◆ More seating throughout the play area for adults
  - ◆ Position themselves to supervise and help
  - ◆ Adults be more included in play and engage learning
    - Ask questions to children
  - ◆ Lots of blind spots
    - Stand with backs to fence and walls
    - Teamwork to cover all the spots
    - Up to 10-12 staff on playground (15 with aids)
  - ◆ Important to maintain visibility
- ➔ Greenhouse
  - ◆ Keep greenhouse inside the play space because it is used by the teachers and children
  - ◆ Children start their seedlings there, so concerned with moving it outside of the fence
- ➔ Native plants
  - ◆ Love the idea native plants
  - ◆ Not concerned with bees and pollinators because there's not much they can do to control that. Kids get stung all the time.
  - ◆ Tall grasses instead of bushes = have more visibility
    - Kids like to hide in bushes
- ➔ Riverbed
  - ◆ When it rains kids like the river bed, play in it, use pots and pans, etc.
  - ◆ Like the idea of the pump so kids can control the flow of water (gross motor skills)
  - ◆ They turn on the water when it is nice out
  - ◆ One in the playground has degraded over time due to flooding, sand, and wear and tear from kids. (needs durability)
  - ◆ Balance beams in food forest area have survived and are well used by kids
    - Dramatic play, trips, iSpy, etc.
- ➔ Infant Area
  - ◆ Try a lower maintenance ground cover like thyme or clover instead of grass.
  - ◆ Durability
  - ◆ Clear path to the area (use wagons to transport)
- ➔ Sandbox
  - ◆ South playground sand could be bigger.
  - ◆ More space for all children
  - ◆ A well liked space by all the children
- ➔ Bike / Path
  - ◆ Like concrete and pavers ideas
  - ◆ Signs for stamped concrete so children can learn and discover
  - ◆ Preschool playground has some stamps by the bridge
- ➔ Storage
  - ◆ Put it on the plan
  - ◆ Think about how it is utilized
  - ◆ The current sheds/shelves aren't great
  - ◆ Open shelving or easy to open doors
  - ◆ No storage in the infant playground
- ➔ Indoor / Outdoor
  - ◆ Changing table
    - Would be difficult logistically and with licensing
    - Hard to do outside with sanitation
    - Probably couldn't do it
    - Would need running water, trash and kids accessing it
  - ◆ Naps
    - Couldn't do outside with Kansas licensing
  - ◆ Snack time
    - Need running water and sink for hand washing
    - Do have snack time outside on nice days
  - ◆ Open do doing more things outside that are normally inside

