

# Therapeutic Schoolyard Design for Children With Autism

By  
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A REPORT  
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Regional and Community Planning  
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## Abstract

It is estimated by the Center for Disease Control and Prevention that approximately 1 in every 88 children are diagnosed with some level of autism or various degrees of Pervasive Developmental Disorders (2012). Pervasive Developmental Disorders are commonly referred to as Autism Spectrum Disorders (and hereafter referred to as autism). Many children with autism have difficulty communicating, must cope with their disorder, and may need special considerations in the classroom. Needs of children with autism vary from child to child, but they all can benefit from environments that are designed with awareness of challenges and characteristics associated with autism.

Schoolyards commonly contain asphalt, turf, and traditional play structures that do not take into consideration the needs of children with mental or physical disabilities. However, schoolyards can be designed to provide therapeutic benefits on these children without segregating them from the larger school community.

In order to understand how a schoolyard might be designed as a therapeutic environment for children with autism the challenges, needs, and common therapies for children with autism must be understood. The characteristics of therapeutic landscapes for children must be considered in addition. After examining both therapeutic landscapes and the many facets of autism, the researcher applied lessons learned to the design of a schoolyard master plan for Amanda Arnold Elementary School in Manhattan, Kansas.





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## List of Abbreviations

ASD: Autism Spectrum Disorder

CDC: Center for Disease Control and Prevention

PDD: Pervasive Developmental Disorder

SCERTS: Social Communication Emotional Regulation Transactional Support



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Foreword  
Landscapes of Learning

## Foreword

The Landscape Architecture/Regional & Community Planning graduates of 2012 are the first class to participate in a collaborative studio process leading to completion of their individual master's reports. Seven of these graduates chose to work under the topic *Landscapes of Learning*. The interests of the group were broad: biophilia, access to nature for children, childhood development and special needs, ecological interpretation, participatory design, public play spaces, and landform as art. The common conversation centered around big questions: How can all children have access to nature for learning through play? What creates a rich, outdoor environment for all kinds of children and young adults?

A formative experience in my understanding of landscapes for learning occurred in 2008-2010, when I helped create a learning garden at a local elementary school. One hundred eighty people built the school garden over eighteen weekends. The garden was handmade. Raised planters were built by Boy Scouts and a kind dad with a miter saw. A talented landscape contractor helped build a 14-foot long limestone bench. The Parent-Teacher Organization's unofficial 'dad of the year' made it a family affair — his siblings, mother, father, and children all returned to the garden site for many weekends of work.

Sadly, the garden existed for just 153 days. The voting public passed a bond for school renovation and the elementary school received funds for a beautiful building expansion. The garden turned out to be too difficult to stage around during construction.

The learning garden had become a talisman to me. In it, I saw a kind of landscape I had never made in a professional firm. The garden was decidedly humble and handcrafted, made of

creamy Kansas limestone and native plants bought or donated and dug in a few at a time. The garden was 'quiet' aesthetically: native wildflowers and grasses, crushed stone paths, tree shade, planters with compost-rich soil. The garden was designed for diverse experiences: learning across the grades and curriculum, quiet time, and play. There was always a puddle somewhere, reflecting leaves and strands of switchgrass. During the fall it was completed, 4th graders would run to the side of the garden intern at recess to ask if they could help weed, or mulch, or rake. When the news sunk in that the garden was gone, I looked at its photographic ghost in satellite imagery. How could so many people want something, work so hard to make it happen, and yet it could not survive?

The humble learning garden had answered a creative drive for me. I had wanted to make social sculpture: to bring a socially-significant place to life beyond words and images. The garden's absence opened me to questions about landscapes of/by/for learning.

The 2012 Landscapes of Learning studio became a forum for these questions. Seven master of landscape architecture and master of regional and community planning students selected the studio as the crucible for their final year's projects. The graduate student researchers conceived of their bond as a colloquium, where each shared information freely to raise the expertise of all. Though each student defined his or her own project, all projects engaged the community of Manhattan, Kansas (the setting for Kansas State University); and all projects questioned what we as future landscape architects and planners assume about landscapes for children. In nine months' time, a diverse set of projects took shape to address a range of questions:

## The Questions

If we assume access to nature to be beneficial to children, are some children denied access due to socioeconomic status and its impact upon housing choice?

*Jonathan Knight, Wichita, Kansas*

In a neighborhood with no parks, can an oversized middle school property serve a joint use for school and neighbors?

*Shuang Hao, Manhattan, Kansas / Suihua, China*

How can an elementary school in a flood plain landscape meet diverse schoolyard needs while also interpreting the hydrologic cycle for children?

*Laura Weatherholt, Tulsa, Oklahoma*

How can a schoolyard be designed to be a therapeutic environment for all children, with an emphasis on benefiting those children with autism?

*Chelsey King, St. Peters, Missouri*

How can planners and landscape architects improve community participatory design methods for determining what children need and desire in a school landscape?

*Kweku Addo-Atuah, Accra, Ghana*

Contemporary schoolyards often lack creative expression. How can humanities research serve as evidence for the design of a functional schoolyard that is also a sculptural work of art?

*Rebecca Melvin, Seattle, Washington*

In the temperate Midwest United States, interiorscapes are seldom a feature of public schools. How should an interiorscape be designed to integrate the natural and built environment within an existing high school?

*Sukaina Fakhraldeen, Kuwait*

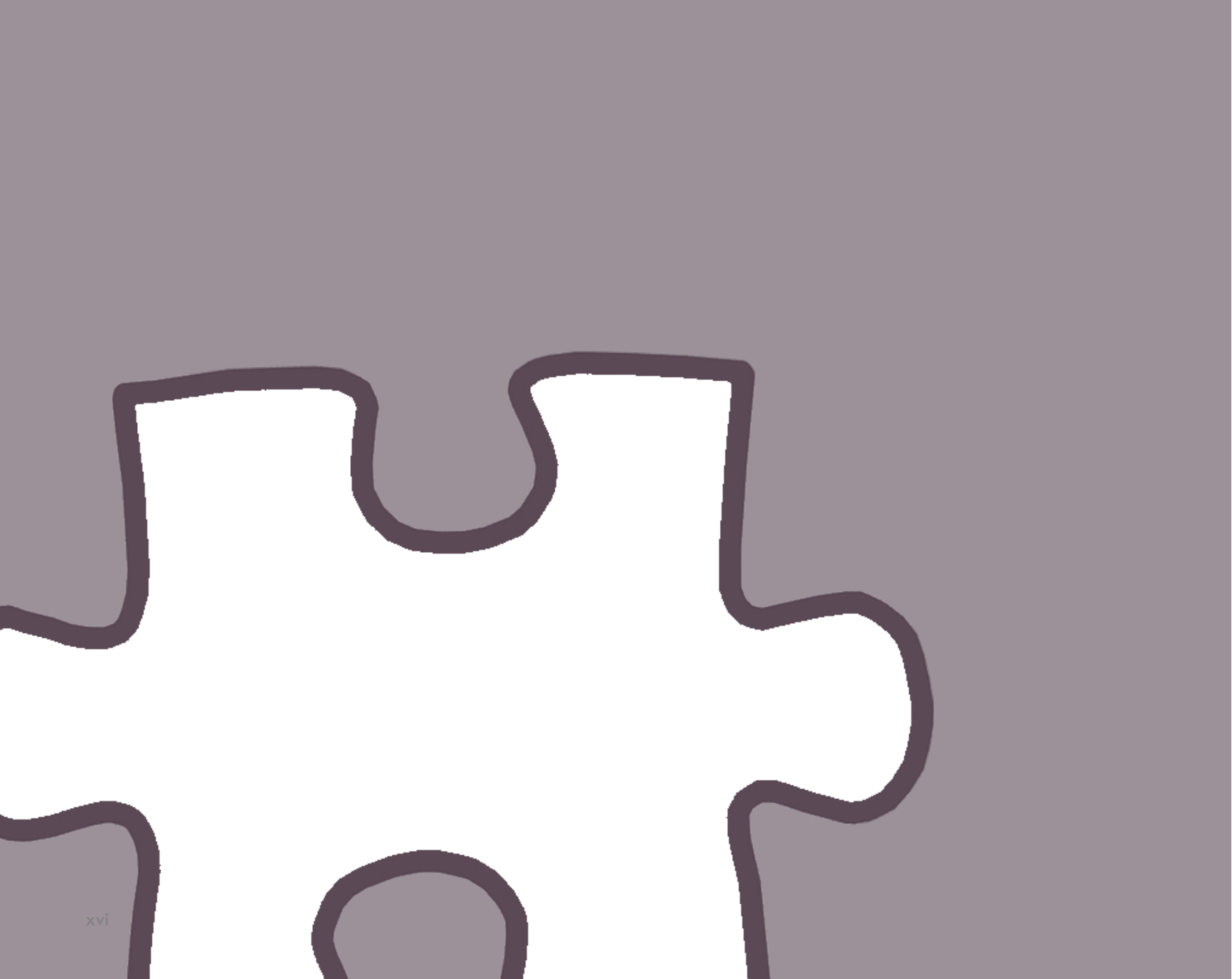
The reports address landscapes of learning at a range of scales: from city planning to interior scale. The projects also exhibit a great variety in conceptual approach: from personal and poetic design driven by humanities knowledge to participatory design process including nearly one hundred students. What is not evident in the list of questions is the interrelationship between projects. The individual report which follows will provide a point of reference. The individual researcher's goals will be made clear, but will also be linked to a collective annotated bibliography made by the studio. Some reports refer to the work of other students, as several projects were interdependent, but each report is original work, completed by the individual author.

As a whole, the 2012 Landscapes of Learning master's reports do not focus narrowly upon the most popular topics of the day: encouraging active play and control of childhood obesity. Instead, our holistic approach demonstrates creative and scholarly inquiry representing a breadth of themes in contemporary discourse about experiential learning environments for children.

Assistant Professor **Katie Kingery-Page**

Major Professor to the  
Landscapes of Learning Students

April, 2012



## Introduction: Shaping

This section introduces the driving forces behind this project, including the dilemma, thesis, research questions, and relevance to the discipline. In addition, this section introduces the project site: why it was selected, site constraints, and current conditions.

## Dilemma

Children with a wide variety of needs and abilities attend schools. Traditional playgrounds at schools, however, often do not accommodate children with special needs or impairments. Challenges that children with autism face vary depending on each child. For many, traditional playgrounds and the activities that occur within the schoolyard can be too overwhelming, resulting in stress and behavioral problems. While many schools have programs within the classroom environment that provide therapies and help for children with autism and other impairments, the design of the schoolyard often does not help to accommodate these challenges that children with special needs face.

## Thesis

Evidence suggests that contact with landscape and nature helps to reduce stress and improve overall well-being. Roger Ulrich and many others have conducted extensive research relating to the correlation between nature and well-being in settings within and beyond the healthcare realm (Lewis 1996; Ulrich 1999). People in everyday situations can benefit immensely from exposure to and interaction with the landscape. Schoolyard landscapes should be environments that help to reduce stress and allow a release from indoor, structured environments. For this project, ideas are pulled from restorative landscapes and incorporated into the public schoolyard. This creates an environment at Amanda Arnold Elementary School that is engaging and provides opportunities for experiential learning and play to children with various needs and abilities, specifically those with autism.

## Relevance

Landscape architects are increasingly interested in how spaces can be designed so a wider population can appreciate and benefit from the landscape. Ruth Wilson, in *Early Childhood Education*, states that “attention to creating a sense of place for young children can thus prove helpful in fostering a lifelong commitment to the environment” (Wilson 1997, 26). With an increasing number of children diagnosed with autism each year, creating an inclusive landscape with these children’s needs in consideration creates a positive environment not only for them, but also for all children attending the school and in the community.

“One of the difficulties I have in writing about the perfect environments for autistic children is that the children are all different and prefer different places. Also, there’s been so little information written about the design of these environments because there just aren’t such places. We’re all waiting for these places to be built so we can evaluate them and point out what works and what doesn’t”  
~Carol Krawczyk 2011

## Research Questions

In order to design, a variety of questions need to be answered in order to properly address the issues at hand, and to understand the issues influence on the project. These questions range from user specific to site specific. The questions on the adjacent page were answered in order to understand autism spectrum disorders (ASD) and the needs associated with autism and to understand how a landscape can be designed to be the most beneficial to the health and overall well-being of autistic children and all children.



### **Guiding Questions:**

- What are the needs of children with autism?
- What therapies can be conducted in the landscape?
- How can landscapes in a schoolyard be “restorative” or “therapeutic”?
- How does social and environmental interaction impact the experience of a therapeutic landscape?
- How can ideas and elements from restorative or healing landscapes be brought into a schoolyard to create a playground that fits the needs of students and children with autism?
- What are the constraints for designing a landscape for children with autism?

### **Site Specific Questions:**

- What classroom therapies are available for children with autism at Amanda Arnold Elementary?
- How do children with autism or special needs use the schoolyard?
- How is the schoolyard currently used at Amanda Arnold Elementary?
- Is there any connection between the Autism Suite and the schoolyard?

### **Primary Research Question:**

How can similar benefits of therapeutic landscapes be achieved in a schoolyard in order to go beyond meeting the requirements for most children to include and benefit those children with autism?

## Site Boundaries

Amanda Arnold Elementary School is located on the western side of Manhattan, Kansas (see figure 2.1) in the Manhattan-Ogden School District (USD 383). Children attending this school range from pre-kindergarten to the sixth grade. Amanda Arnold Elementary underwent renovations in 2010 resulting in additional rooms in the back of the school and renovated portions of the interior, creating an Autism Suite that accommodates children with autism in the Manhattan-Ogden area. The schoolyard includes a greenhouse constructed under the ProjectPLANTS program at Kansas State University, a play structure, asphalted area for ball games, a baseball field, two soccer fields, and a track.

With the location of this school in the midst of a neighborhood (see figure 2.2), and that this elementary school serves as the magnet school for children with autism in the district, Amanda Arnold Elementary is an ideal project site. The school accommodates a range of students including those on the more severe end of the spectrum. Opportunities exist to not only transform the schoolyard into an amenity to the school by becoming a rich learning and therapeutic schoolyard for the students, but also a community amenity.

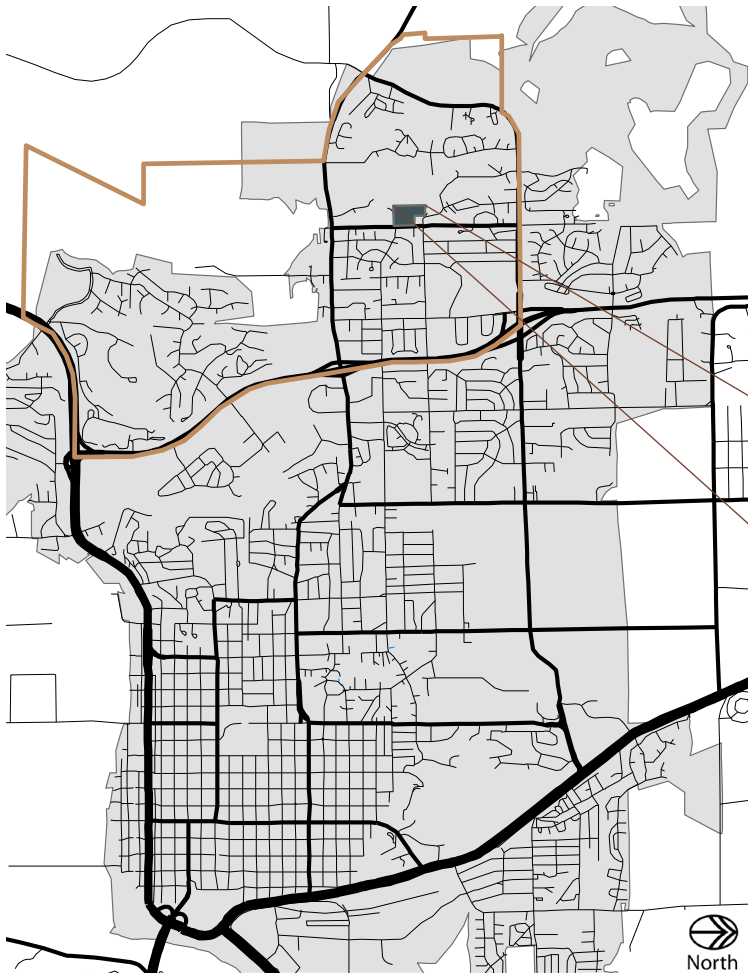
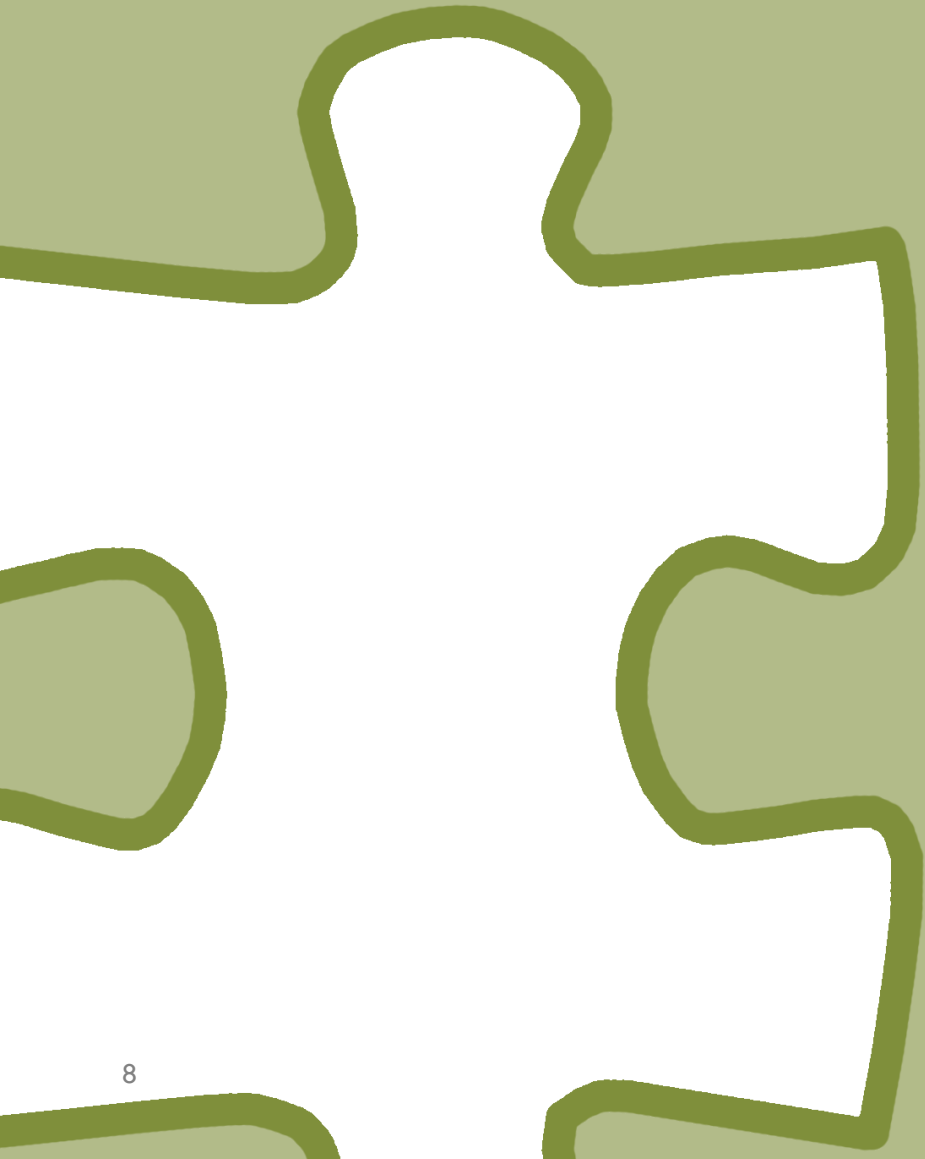


Figure 2.1 Context of Amanda Arnold Elementary within Manhattan, Kansas (author 2012).



Figure 2.2 Location of Amanda Arnold Elementary in relation to roads and surroundings (author 2012).



## Informing

This section reveals the information that drives and informs the design of the schoolyard including the qualities of a therapeutic schoolyard, autism and the typical characteristics associated with the disorder, and the overall analysis of the site.

## Therapeutic Schoolyard

The schoolyard is the child's domain. Every facet of the landscape is subject to transformation limited only by the imagination of the children. Playground equipment becomes a castle; the ground below, a dangerous swamp; rocks are mountains; creatures hide in the grasses. But many schools where children spend much of their childhood have limited outdoor play opportunities. Recess in elementary schools provide children with time to play outside, but many of the playgrounds are not engaging to students, lacking elements that would provide them with opportunities to experience nature and limiting imagination (Danks 2010).

Playgrounds at many schools are cookie-cutter and do not consider the varying needs and abilities of the users. Restorative landscapes serve to improve the well-being of all users, healthy or ill, able or disabled. Schoolyard landscapes should be environments that help to reduce stress and allow a release from indoor, structured environments. Schoolyards have the potential to be welcoming, therapeutic environments for children. While children may not understand a change in their health, they are aware of the way spaces make them feel. A well-designed, responsive environment that provides a multitude of opportunities to interact with their environment and peers, can be a therapeutic environment for children.

Schools provide many children exciting experiences in the schoolyard, with friends and adventures awaiting them every day. For children with autism, however, schoolyards can be overwhelming, terrifying spaces. Traditional playgrounds at schools may not be accessible or inclusive for children who have special needs or impairments. Taking into consideration the health and needs of all children, including those with autism, the hierarchy of goals and emphasis for this project became evident in a word diagram (Figure 3.1), with clear emphasis being on children, therapeutic, landscape, autism, and design.



Figure 3.1 Key words relating to project goals and emphasis (author 2012).

## What is Autism?

Pervasive development disorders are neurological disorders that are increasingly affecting more children each year. Pervasive development disorders (PDDs) include autism spectrum disorders, Asperger's disorder, Rett's disorder, childhood disintegrative disorder, and pervasive developmental disorder, not otherwise specified (PDD-NOS). These disorders are commonly referred to as autism, and will be referred to as autism in this project, meaning the various disorders associated with PDDs. Each of these disorders exhibit their own challenges, with the common threads between the different 'categories' being social impairments, challenges in verbal and non-verbal communication, and commonly repeated behaviors by children who are on the spectrum (Wolfberg 2009). Each child with autism has unique needs and challenges, making it difficult to define the specific needs of people on the spectrum. According to the CDC, one out of every eighty-eight (1:88) children are affected by some spectrum of autism, with one out of seventy (1:70) of these diagnoses being male (CDC 2012). With the increasing numbers of children being diagnosed with autism, the environments they spend the majority of their time in should be conducive to helping them cope and develop the skills that they might be challenged with.

## Characteristics of Autism

Children with ASD often play differently than typically developing children. While typically developing children often play in groups with others, children with autism may tend to be more withdrawn. Along with being considered shy, children with autism tend to struggle with spontaneity. Thus, a child with autism might play the same game day after day, whereas a typically developing child will vary their activities greatly (Wolfberg 2009). In children with autism, structure and clearly defined spaces are important, as they often associate specific activities with certain places. This becomes important when designing for children with autism because it is important for spaces and activities within those spaces to be clearly defined. In a building, this can be achieved through walls or curtains. In the landscape, this can be achieved through vegetation of varying heights, changes in ground material, or changes in elevation. Responding to the possible different needs of children with autism can be a challenge, but through clearly defined areas, variety in the character of the spaces, and flexibility within spaces, the schoolyard can become a landscape that is beneficial and responsive to the needs of children with autism, while still being enjoyable for typically developing children.



## SCERTS Model

While there are many models pertaining to working with children with autism, the SCERTS model is one that influences design decisions in this project. Developed by Barry Prizant, Amy Wetherby, Emily Rubin, and Amy Laurant, the SCERTS model focuses on the common challenges that children with autism face: social communication, emotional regulation, and transactional support. Social communication focuses on building the relationships between children with autism and other children, along with the adults they work with through the development of communication skills. Emotional regulation deals with teaching the children how to react appropriately to different situations and to cope with their emotions. Transactional support helps those who work with children with autism to adjust the environment to best meet the needs of those children while enhancing learning experiences (Prizant, Wetherby, Rubin & Laurent 2003).

## Why Amanda Arnold Elementary?

Amanda Arnold Elementary has approximately 450 students currently enrolled from pre-kindergarten to fifth grade. This is a large population of children who are influenced by the environments they are in daily. If the landscape is designed to foster learning, play, and interaction, it not only benefits the children with autism, but all the children who participate in the activities of the schoolyard. Amanda Arnold has an Autism Suite which accommodates children with more severe cases of autism in the Manhattan- Ogden area. As illustrated in figures 3.2 and 3.3, the current schoolyard does not provide any connection to the Autism Suite.



Figure 3.2 Layout of Amanda Arnold Elementary in relation to site (author 2012).

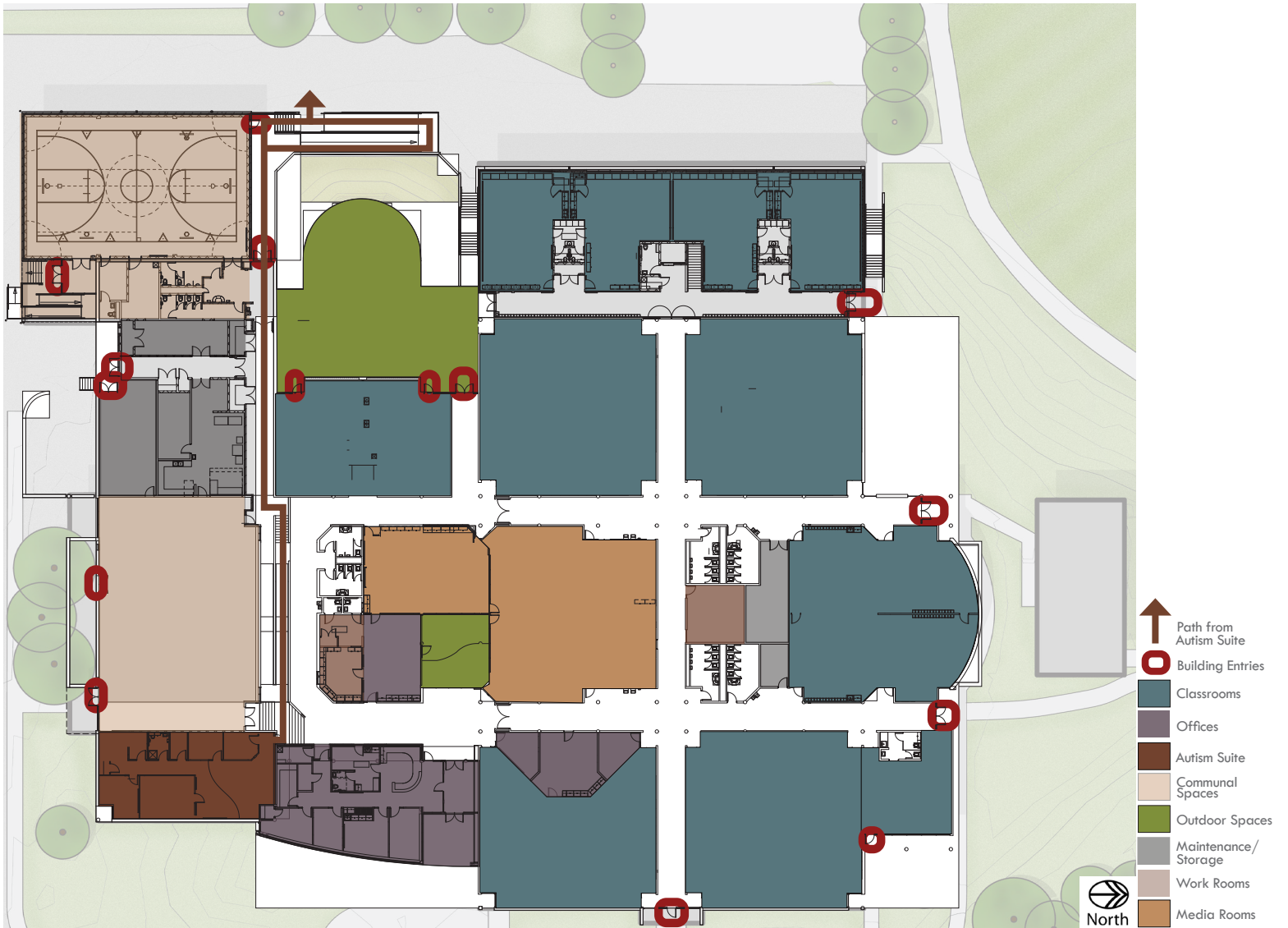


Figure 3.3 Layout of Amanda Arnold (author 2012).

## Site Opportunities

### Difficult Connection

Between the school and the schoolyard, better connections can be made in order to ensure the safety of the children and to make a more cohesive schoolyard. The rear exits of the school, shown in figure 3.4, require students to either use a ramp or stairs to reach the level of the schoolyard and cross the paved fire lane to enter the playground.



Figure 3.4 Access points from school (author 2012).

### Poor Track Condition

The track on site is crushed gravel. While this is inexpensive and easy to maintain, as seen in figure 3.5, portions of the track are washed out, making it difficult for children who have special needs to navigate the track. Children from the Autism Suite are brought outside to ride bikes and scooters on the track, so improvements should be made to the track along with providing a variety of other paths to use.



Figure 3.5 Current condition of track (author 2012).





Figure 3.6 Current location of greenhouse (author 2012).

### Separated Greenhouse

A high-tunnel green house, shown in figure 3.6, is located on the south side of the property separated from the rest of the used space of the schoolyard by a service lane and parking. If located elsewhere, it would have a better connection to the school building and be better integrated into the school curriculum.



Figure 3.7 Inaccessibility of current playground (author 2012).

### Inaccessible Playground

In its current state, the schoolyard has barriers that make it difficult for children with special needs to navigate the site. For example, as seen in figure 3.7, the playground area has a curb around it, requiring a step up into the play area.

## Site Opportunities

### Potential Outdoor Transition Space

Connected to the building is a courtyard that has potential to become a very welcoming space and entry into the schoolyard. As seen in figure 3.8, currently the courtyard is empty and seemingly under-used.



Figure 3.8 Under-used courtyard space (author 2012).

### Under-utilized Planted Area

Surrounding the back courtyard is a walled-in area with drainage. This space, shown in figure 3.9, is planted with grasses and could be turned into a rain garden that will serve as a learning space.



Figure 3.9 Planted area adjacent to courtyard (author 2012).





Figure 3.10 Condition of current field (author 2012).

## Worn Field

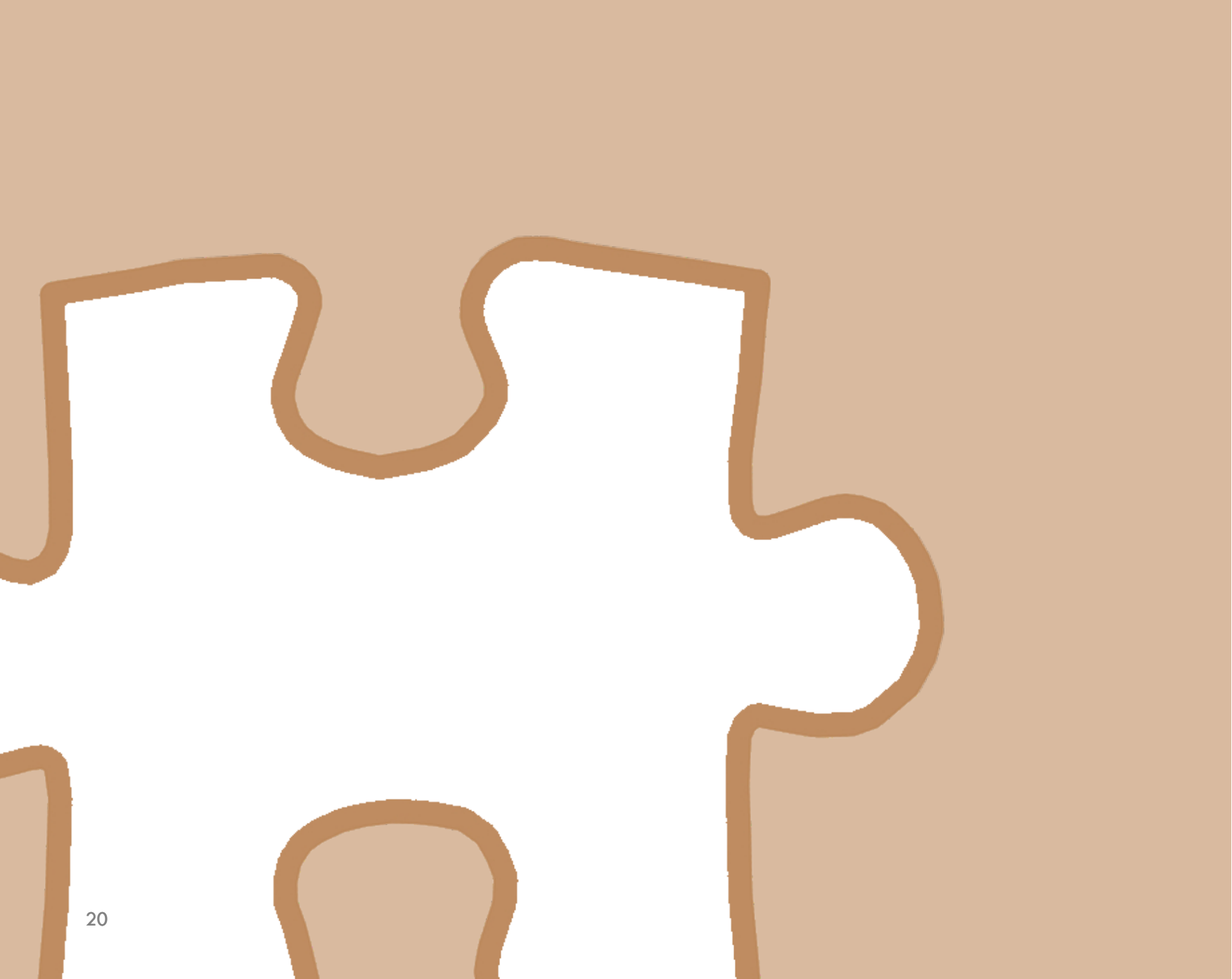
The field, shown in figure 3.10, is currently in rough condition. This area consists of a baseball diamond and two soccer fields. While these are heavily used fields, since they are unable to all be used at the same time, they can be combined into a flex-field in order to accommodate more uses.



Figure 3.11 Path from neighborhood (author 2012).

## Under-used Environment

At the top of the hill at the northern edge of the site is a well-worn trail from children walking to school. This area, shown in figure 3.11 also has well-established trees, creating a very nice environment. Due to the slope, however, it is not ADA accessible from the schoolyard.





## Approaching

This section covers the overall approach to the project, starting with the specific goals and objectives driving the project, the strategies that help to shape the project, and the program in relation to both the needs of the school and the needs of children with autism.

## Goals and Objectives

The over-arching goal for this project is to explore ways to redesign the schoolyard to create a healing environment for children with autism without segregating them from the larger student community, shown with figure 4.1. Within the school environment, social interaction is combined with nature and play, helping to build a stronger relationship between child and environment.

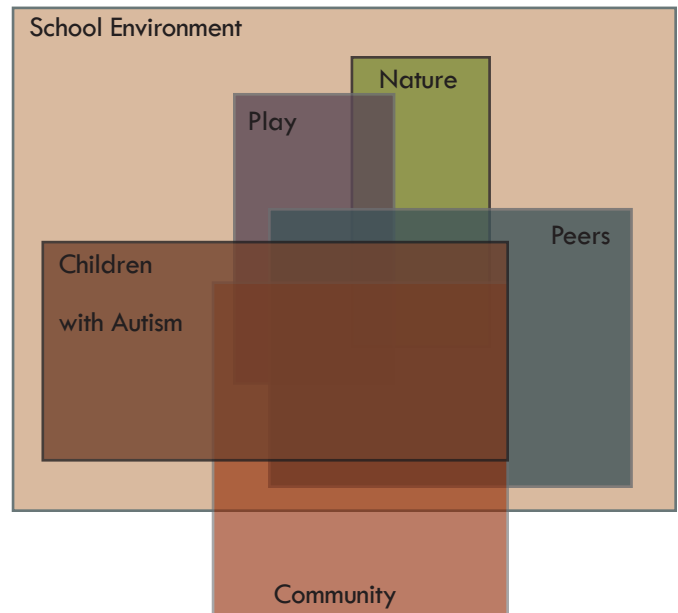


Figure 4.1 Goals and Objectives (author 2012).

## Project Goals and Objectives

**Goal:** Create a schoolyard that has positive influence on the health and well-being of all the students.

**Objective:** Determine what activities which encourage health and well-being can be incorporated into a schoolyard.

**Goal:** Create a schoolyard that encourages interaction with nature and learning while taking into consideration the needs and challenges of children with autism to create a therapeutic learning environment.

**Objective:** Introduce elements into the schoolyard that encourage learning and interaction with nature.

**Objective:** Define learning as experiential, formal, and informal.

**Objective:** Facilitate small group, large group, and individual learning opportunities.

**Goal:** Blend the lines between “typical” and “non-typical” developing children in order to create a landscape where all children have equal opportunities to learn and play.

**Objective:** Provide areas where all children can equally interact with each other and their surroundings.

## Research

Review of literature helped me to understand how a therapeutic landscape could be created in a public setting, such as an elementary school. This literature also helped to provide insight as to how a schoolyard or landscape can be designed for children and those with special needs, provided information as to the needs of children with special needs, the needs of children with autism, and the ways in which a schoolyard can be most beneficial to those with autism. Derived from this literature, the key take home points relating to the design of therapeutic landscapes are on the adjacent page. The framework for the project was developed from this literature, and along with precedents, shaped the program and other aspects of the project.

## *Affordances and the Perception of Landscape*

Harry Heft

As designers, it is necessary for us to consider how users will perceive the landscape, both through passive and active engagement.

## *Restorative Urban Open Spaces*

Kevin Thwaites, E. Helleur, and I.M. Simkins

Healing environments are important in the lives of all people, not only those in healthcare facilities. It is possible to incorporate aspects from healing gardens into public settings to benefit the larger population.

## *Using Behaviour Mapping to Investigate Healthy Outdoor Environments for Children and Families*

Robin C. Moore and Nilda G. Cosco

Different spaces designed for children can be designed to be beneficial to their health and help to expand their learning.

## *Green Nature/ Human Nature* Charles A. Lewis

Nature is important to the lives of all people and there are clear healing benefits from experiencing nature for even short periods of time.

## *Natural Learning* Robin C. Moore and Herb H. Wong

Schoolyards can go beyond the typical play structures to become actively engaging, ecologically rich outdoor classrooms that have a lasting influence on the children who experience the landscape.

## *Historical and Cultural Perspective on Healing Gardens* Clare Cooper Marcus and Marni Barnes

Nature has the ability to facilitate healing in healthcare facilities and settings beyond the healthcare realm through the beneficial effects of trees, water, flowers, wildlife, and rocks. Also, beyond incorporating nature, the spatial qualities, and options for degrees of interaction add to the quality of a healing environment.

## *Effects of Gardens on Health Outcomes: Theory and Research* Roger S. Ulrich

Well-designed landscapes can have healing effects on those who view the landscape, not just on those who are actively engaged with the landscape. Healing effects of gardens go beyond the healthcare realm and can have many of the same benefits in the public realm if designed conscientiously.

## *Design Philosophy*

Marni Barnes and Clare Cooper Marcus

Designing intentionally with the end goal in mind is important for landscape architects. We can not have successful design without having a goal for what the finished product will be.

## *Healing Gardens for Children* Robin C. Moore

Healing landscapes for children maximize the opportunities for children to interact with the environment in various ways. Beyond healthcare settings, landscapes can be designed for children with varying abilities and have restorative effects on the health and well-being of the children.

## *Play Therapy in Elementary Schools*

Pedro J. Blanco and Dee C. Ray

Schools can be designed to be “fully accepting of each child” in order to help meet the developmental, social, and skill needs of all children.

## *A Sense of Place* Ruth Wilson

Environments that children spend much of their time within, especially schools, can provide natural areas that include places for children to be alone, explore the environment, modify and create environments, and observe habitats. These interactions all affect the sense of place and overall experience of the schoolyard.

## *Children's Outdoor Play and Learning Environments*

Randy White and Vicki Stoecklin

Landscapes for children should emphasize learning and experience. Through their association with a firm that focuses on designing natural “discovery play gardens”, White and Stoecklin provide insight on design considerations for outdoor play and learning environments for children.

## *Restorative Gardens*

Nancy Gerlach-Spriggs, Richard Enoch Kaufman, and Sam Bass Warner, Jr.

Landscapes and contact with nature have been considered restorative environments throughout history. Restorative landscapes should be experienced by all, not just those with illnesses.

## *Sensory Integration and Contact with Nature*

Nilda Cosco and Robin Moore

Landscapes that are experienced by children have the potential to become therapeutic or healing environments through their design and the sensory stimulation they emphasize. Schoolyards and other landscapes can accommodate children of all needs, without segregating them by their abilities.

## Framework

Research led to the creation of a framework (figure 4.2) that is applied to this project, but can also be applied to a variety of projects dealing with integrating health and wellness into a landscape that benefits those with autism. Through researching literature and precedents pertaining to characteristics of therapeutic landscapes and the challenges associated with autism, the important aspects to consider were able to be distilled.

From this research, four common challenges associated with autism were identified as challenges with sensory processing, cognitive development, verbal and non-verbal communication, and fine and gross motor skills. As identified by Charles Lewis, the four dimensions of healing: mental, physical, social, and emotional were identified. These aspects shaped guidelines that relate to each of these aspects, in order to shape the considerations for creating a therapeutic landscape for all children, but also one with an emphasis on benefiting those with autism.

These guidelines can shape the program for any site or project. These guidelines, inspired by research and precedents, shaped the specific program for Amanda Arnold Elementary.

### Goals

Create a schoolyard that is conscientiously designed to be therapeutic for children with autism, allowing them to build the skills they struggle with, express themselves, and relate to fellow students.

Create a schoolyard that has positive influences on the health and well-being of the children.

Create a schoolyard that encourages interaction with nature and learning while taking into consideration the needs and challenges of children with autism to create a therapeutic learning environment with equal opportunities to learn and interact with surroundings and peers.

### Focus

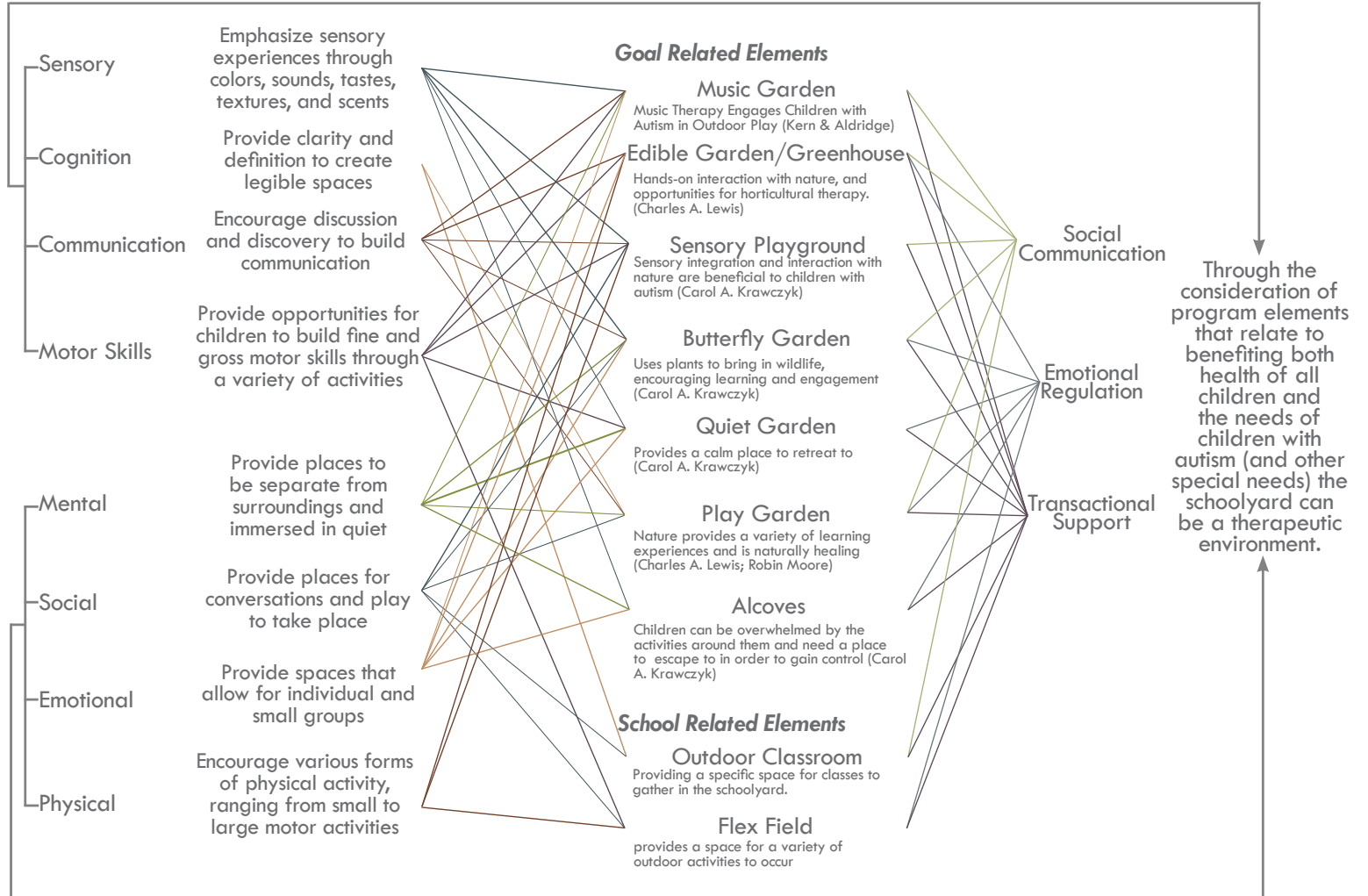
#### Common Challenges with Autism Spectrum Disorders

Children with autism often are challenged in verbal and non verbal communication, fine and gross motor skills, cognitive development, and are often hyper or hypo-sensitive to sensory stimulation. (Wolfberg 2009; Fowler 2008, CDC 2012)

#### Dimensions of Healing

Charles A. Lewis discusses the four aspects of healing: mental, social, emotional, and physical and how these four dimensions can be benefited through interaction with nature. (Lewis 1996)

Figure 4.2 Framework for project and program (author 2012).



## Program

Because autism presents with a range of severities, needs, and challenges, the program for a schoolyard designed for children with autism must have a variety of opportunities for interaction along with a variety in the character of spaces. Spaces that encourage sensory perception can be ideal, as they help children on the spectrum to overcome the sensitive they may have. On the other hand, overstimulation of the senses can cause a child on the spectrum a great deal of stress. Table 4.1 explains the program elements through their specific qualities, significance to improving health or positively influencing those with autism, the size of the space, and the considerations for placing the program elements is provided

A variety of opportunities for sensory stimulation, peer interaction, and play are provided to best cater to the needs of children, whether with autism or not. In various ways, the entire site serves as a sensory garden, providing a variety of sensory experiences across the site. Through plantings, activities, shading, and scale, a variety of sensory experiences will be created. Children with autism will gravitate to those experiences that intrigue them, while avoiding the areas that do not. Creating a variety of experiences within the schoolyard helps to ensure that each child can find areas that become special to them that they are drawn to. Throughout the site, placards with information pertaining to various plants or wildlife help to inform the children of what they are seeing. Children and autistic children in particular, enjoy learning, and through providing opportunities for them to teach themselves and their peers, confidence and peer interaction is emphasized.



<b>Program Element</b>	<b>Qualities</b>	<b>Significance</b>	<b>Gathering Size</b>	<b>Placement Considerations</b>
Music Garden	Outdoor music equipment, xylophones, drums, etc.	peer interaction positive response to music (therapy) Learning activity	small	Slope, Aspect Circulation More active, loud
Greenhouse/ Edible Garden	Plants, covered, currently on south side of building	peer interaction horticultural therapy Learning experience Nature connection	small-medium	Relocation slope, aspect, soils, circulation Quiet
Outdoor Classroom	Circular, stone, gathering area	Outdoor classroom Social interaction Learning area	medium-large	aspect, slope, soils, circulation Louder, larger groups
Art Area	Variety of art activities Smaller work spaces	socialization Motor skills Learning activity Art therapy	small-medium	Slope, aspect, soils, ambient sounds Quieter, group or individual activities
Butterfly Garden	native plants, seating areas, signage	monarch butterfly count (class activity), learning activity Nature connection	small-medium	Slope, aspect, soils Quieter, group or individual activities, circulation
Play Garden	Variety of activities, can be tailored to meet student needs	Motor skills physical activity Learning activity	medium	Slope, aspect, soils group or individual activity, adjacencies to rec area
Sensory Playground	accessible, textures, colors, climbing,	socialization Motor skills Learning Play	medium	Slope, aspect, soils Quieter, group or individual activities
Alcoves	small, slightly enclosed	escape from overwhelming activities	individual or small	Slope, aspect, ambient sounds
Rain Garden	adjacent to the building, native planting	learning opportunity, storm-water management	small	Slope, aspect, soils, drainage, circulation
Flex Field	Track, basketball court, baseball field, soccer field	socialization physical education recreation	medium-large	Slope, aspect, soils larger group activities, class activities Individuals

Table 4.1 Considerations and characteristics of proposed program elements (author 2012).

## Art Area

Providing a place for children to work on art projects outside creates a new environment beyond the classroom. Because the space is outside, it provides an opportunity for a variety of different activities to take place. The courtyard where the art area is serves as a primary exit from the school into the schoolyard, so this space becomes an important asset to the experience of the schoolyard.

## Rain Garden

The courtyard in the back of the school provides an ideal location for children to participate in small group gatherings, art projects, and other activities. Adding trees to the courtyard makes the space more bearable to all children, including those with autism who may have sensitivities to light. The surrounding planted area provides an ideal location to plant rain-tolerant plants in order to create a rain garden. This area would serve as a place for students to learn more about the environment, and also observe the insects and wildlife that would be attracted to the area.

## Greenhouse and Edible Garden

Providing children with opportunities to interact directly with plants has a positive influence on many facets of their lives. Horticultural therapy is used to help build motor skills, communication skills, cognition, and stimulates the senses. Working with plants also has multiple health benefits, including reducing stress and providing a sense of pride that contribute to increased mental, emotional, and social health. The hands-on activity of working with plants builds motor skills and encourages physical health (Lewis 1996).

## Outdoor Classroom

Specific space for classes to gather is beneficial not only to the class as a whole, but also to creating structure in the schoolyard. Teachers can gather their classes in the amphitheater space to tell stories, explain activities, and to teach. Drama therapy occurs as an after school club that some of the children with autism participate in. This group puts on plays, and could therefore use this space as a performance space with seating for the audience.

## Flex Field

The flex field provides a space for various games to take place. The space is large enough for organized games of soccer, kickball, softball, or baseball to take place. Beyond these sports, the field can be used as an area for various class activities, as needed.

## Ball Court

Providing spaces for traditional schoolyard play is important to building necessary skills. The basketball court area provides a hard top area for classes to gather, and a place for ball games to take place, such as kickball, four square, and basketball. The activities that take place within this space help to build communication and motor skills, with children playing games together and building coordination.

## Trail

Connecting across the site is a paved trail that is made to be accessible, creating a link between the various spaces. The trail provides a cohesive thread of experiences, bringing the children through a variety of sensory experiences and allowing them to travel from one activity area to another in a defined path.

## Sensory Playground

The sensory playground includes swings, and a modified traditional play structure. Traditional play equipment provides opportunities for children to build physical skills and interact with each other. Including various panels with information, textures, or colors adds a layer of interest to the playground that speaks to different children's likes and interests.

## Play Garden

Children respond positively to nature, including those with autism. If not providing a place for children to experience nature, this project would be lacking a great opportunity to engage children. The natural playground incorporates "found" play objects set in the landscape, allowing children to wander and find various objects to climb on, in or through. Rocks, logs, and other natural objects are emphasized over constructed play equipment.

## Quiet Garden

Children with autism often become over stimulated in traditional play situations. Providing a place where the children can escape the over-stimulating environment is important to helping the children regulate their emotions. The quiet garden consists of various areas for children to sit and observe what is going on around them and to be immersed in nature. Children with autism and typical children have responded positively to labyrinths. Walking them helps children to calm down or make sense of various things. The quiet garden is a place where the children can sit in small groups or individually, allowing them a place to retreat to.

## Music Garden

Incorporating a music garden provides autistic children with an opportunity to play alongside their peers in a setting that they enjoy. Music can help engage autistic children in play with their peers (Kern & Aldridge 2006). The music garden will have a variety of instruments that the children can play with, including drums, chimes, and xylophones, while also incorporating wind chimes. The music garden becomes a destination in the landscape that is connected to both the sensory playground and the quiet garden.

## Butterfly Garden

Children are intrigued by wildlife, be it insects, rodents, birds, or other creatures. Bringing a butterfly garden into the schoolyard creates a unique area where children can observe wildlife, connect with peers, and retreat to if feeling overwhelmed. At Amanda Arnold, students participate in a monarch butterfly count. By integrating a butterfly garden into the site, it provides habitat for butterflies, bringing them into the children's environment for them to experience. Plantings will be selected that invite and attract all stages of the butterfly.

## Alcoves

Autistic children have high sensitivity to things that typical people do not notice. It is important to provide the children with places to escape to when they are feeling overwhelmed. These spaces are placed throughout the site, providing a variety of opportunities for children to sit down and observe their surroundings away from the aspects that may bother them or that they may be unsure of.

## Planting

Plants are important to creating experience across the site. Plants bring nature into the site, provide hands-on opportunities for sensory exploration, and encourage interaction and learning. Plants will be selected on a variety of qualities in order to emphasize the senses and create the desired atmosphere for each area, explained in table 4.2. For a landscape that will be used primarily by children, it is important that the plants selected are safe, therefore they must not be poisonous, have thorns, or otherwise be considered dangerous. Specifically focusing on bringing plants into the landscape that emphasize the senses in different ways to provide sensory inputs for children with autism, table 4.3 shows a sample of plants and their contribution to sensory inputs. Through this variety of plantings, a variety of sensory experiences can be brought into the schoolyard, bringing children closer to nature and helping to build a variety of skills and tolerances.

Sense Emphasized	Plant Suggestions	Related Program	Other Considerations
Smell	Herbs; Flowers	Greenhouse; Edible Garden; Butterfly Garden	Too many scents can be overwhelming
Touch	Soft Flowers, Fuzzy Leaves, Rough Bark	Greenhouse; Edible Garden; Butterfly Garden; Sensory Playground	Rocks, logs, sculptures
Taste	Fruits; Vegetables; Herbs	Greenhouse; Edible Garden; Butterfly Garden	Non-poisonous plants
Sight	Flowering plants; Vibrant seasonal changes	Greenhouse; Edible Garden; Butterfly Garden; Rain Garden; Sensory Playground	Mobiles, wind chimes, colored lighting, mirrors, shade/sunlight
Hearing	Soft and hard plants (lush versus twiggy); attractive to birds	Edible Garden; Butterfly Garden; Rain Garden; Sensory Playground	Wind chimes, water elements, instruments

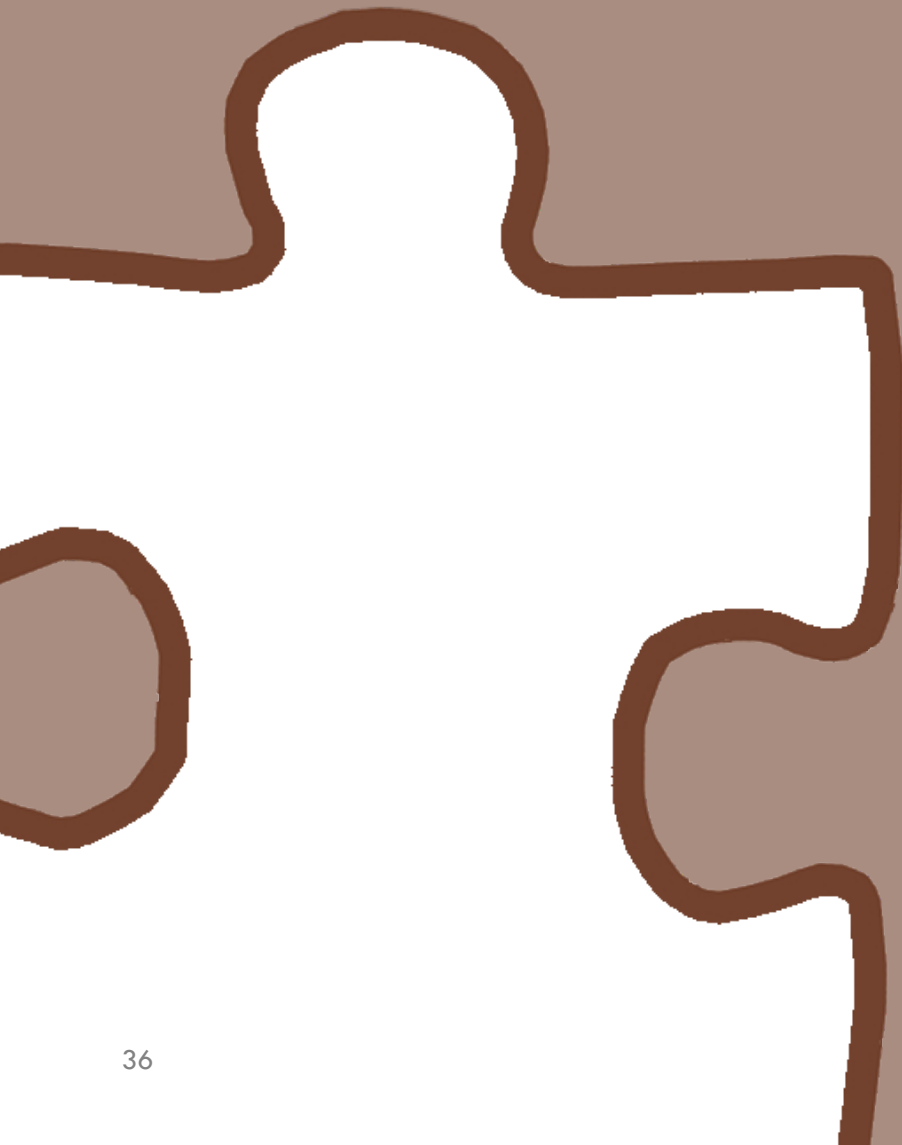
Table 4.2 Matrix for sensory integration through plants and landscape elements. *adapted from www.autismpda.org* (author 2012).

## Plant Selection

	Sight	Touch	Sound	Scent	Taste
<b>Butterfly Garden</b>					
Butterfly Bush	X	X	X	X	
Aster	X			X	
Goldenrod	X			X	
Violets	X			X	
Purple Coneflower	X			X	
Lavender	X	X		X	
Lilac	X	X		X	
Herbs	X	X		X	X
<b>Prairie Mix</b>					
Little Bluestem		X	X		
Buffalo Grass		X			
Prairie Dropseed	X	X		X	
Purple Coneflower	X	X		X	
Big Bluestem		X	X		
Switchgrass		X	X		
<b>Trail Plantings</b>					
Red Stemmed Dogwood	X		X		
Butterfly Bush	X	X	X	X	
Border Forsythia	X			X	
Burning Bush	X	X			
Lamb's Ear	X				

Table 4.3 Plant list (author 2012).

	Sight	Touch	Sound	Scent	Taste
<b>Edible Plants</b>					
Tomatoes	X	X			X
Cucumber	X	X			X
Strawberry	X	X		X	X
Blueberry	X	X		X	X
Blackberry	X	X		X	X
Potatoes	X	X			X
Bell Peppers	X	X			X
Apples	X	X		X	X
Herbs	X	X		X	X
<b>Trees</b>					
Red Bud	X	X			
White Ash	X	X	X		
Red Maple	X				
Silver Maple	X		X		
Apple	X			X	X





## Envisioning

This section shows the vision for the site, the possibilities for change within the site, and the way the site can be transformed into a therapeutic schoolyard that is inclusive for all children.

## Site Design

Based on research involving literature and precedents, a design approach was developed in order to transform the schoolyard at Amanda Arnold Elementary into a landscape that would provide rich educational opportunities to all students, have benefits on the health of the students, and also benefit children with autism who attend the school or live in the nearby area. This plan, (figure 5.1) with the proposed program elements, creates better connections between the schoolyard and the school building. For this design, the focus was on the rear schoolyard, (figure 5.2), where the students would spend the majority of their time, since this is where the current playground and recreation areas are located.

Legibility of the site is created through clearly defined spaces shaped by paving, vegetation, and landform. An educational zone containing the structured learning spaces, such as the art area, outdoor classroom, and edible garden, are located in closer proximity to the school, creating a clear learning space. Further from the school building is the Play Garden area, which contains the playgrounds, music garden, and quiet garden, providing a looser structured environment. While each space provides different types of learning experiences, by separating the structured learning spaces from the informal learning spaces, there is more clarity in the landscape. A sensory trail lined with a variety of plantings connects across the site, linking between the different activity areas. In addition to the Quiet Garden, alcove seating spaces are located throughout the site allowing the children to slip away from the activities and rejoin when they feel ready, or allow them to watch what is going on around them.

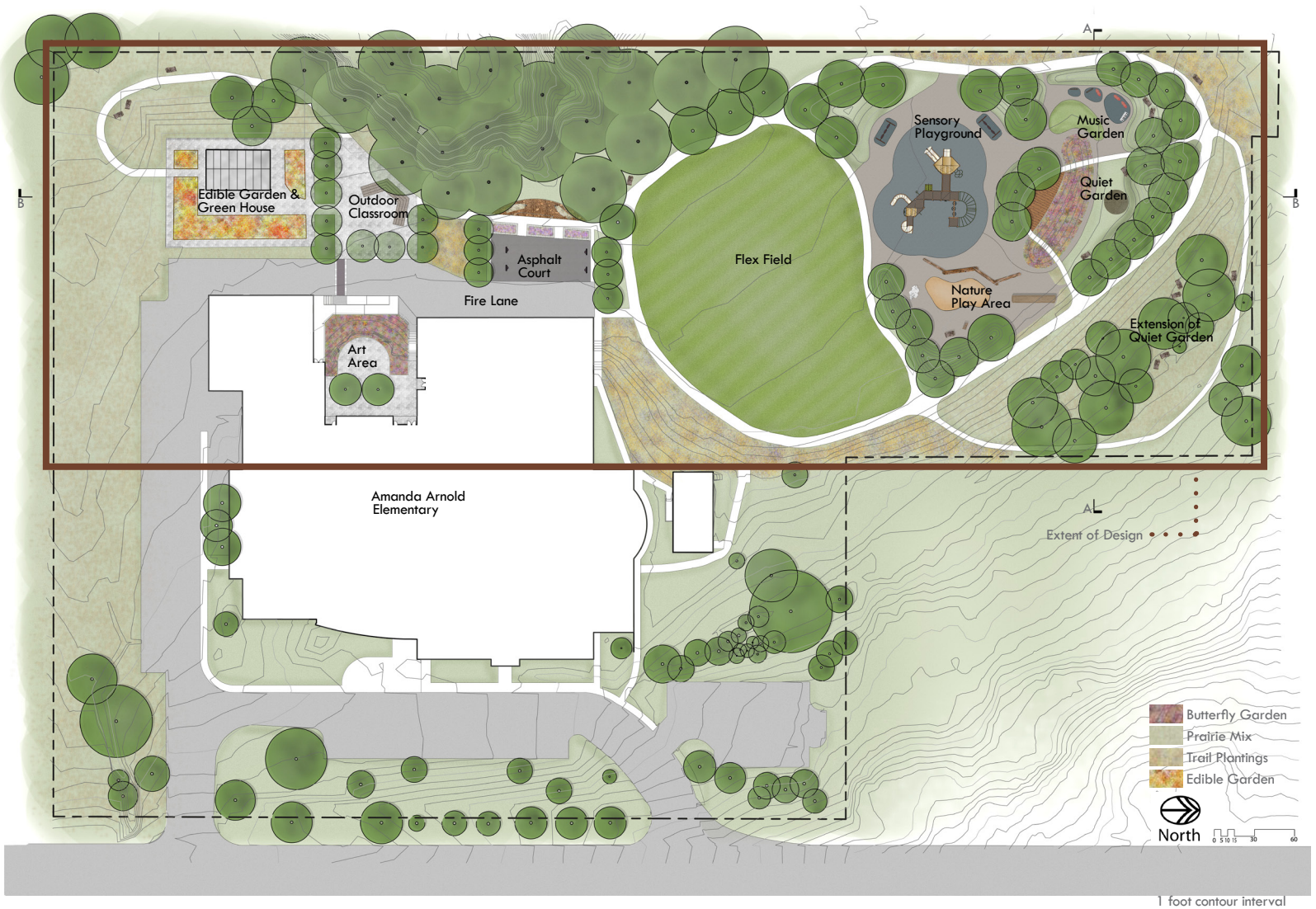


Figure 5.1 Master plan of site with delineation of focused design area (author 2012). Plan of play structure selected from Columbia Cascade Company, not custom (TimberForm 4898-TF, Columbia Cascade, <http://www.columbia-playground.com>).





Figure 5.2 Focus area master plan (author 2012). Plan of play structure selected from Columbia Cascade Company, not custom (TimberForm 4898-TF, Columbia Cascade, <http://www.columbia-playground.com>).





## Shaping space through topography and vegetation

From these site sections, figures 5.3 and 5.4 it is seen that the majority of the focus area is flat, allowing for easy accessibility. Grade level changes across the site help to shape spaces, giving clearer definition to the various play spaces. The berms are grassy, providing spaces for the children to observe the activities going on around them.

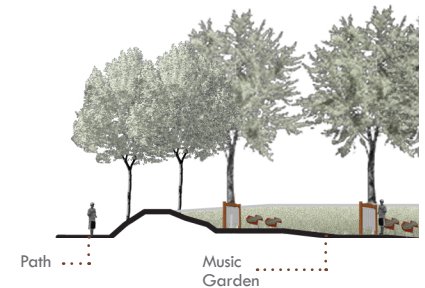


Figure 5.3 Section AA: Play garden topography, looking north (author 2012).

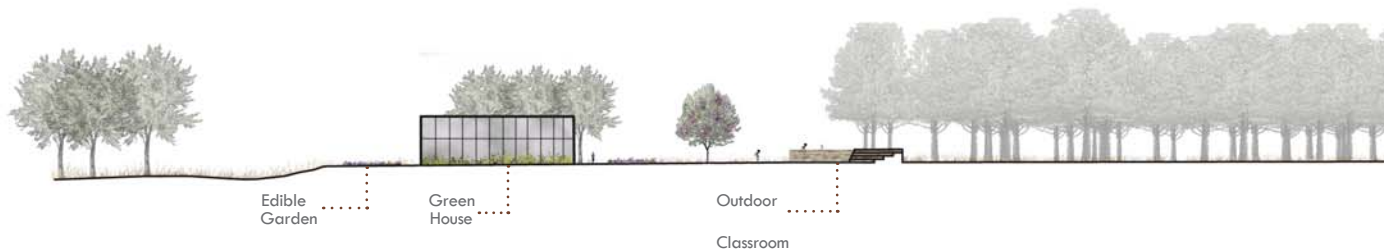
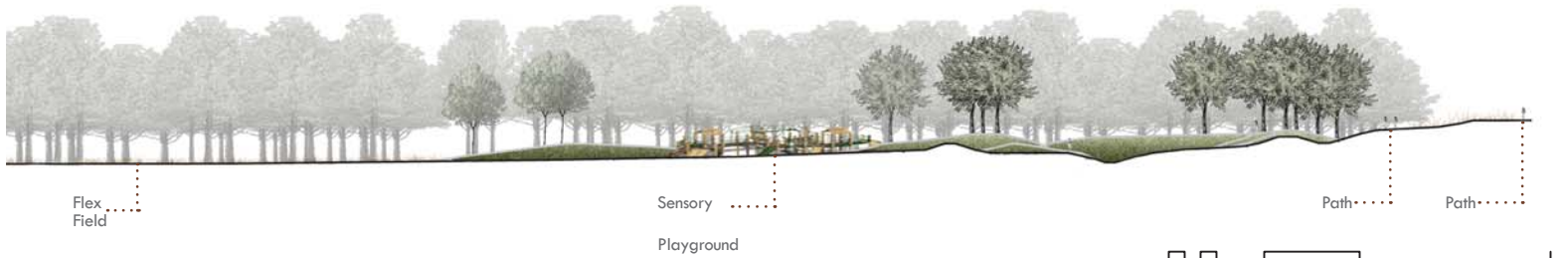
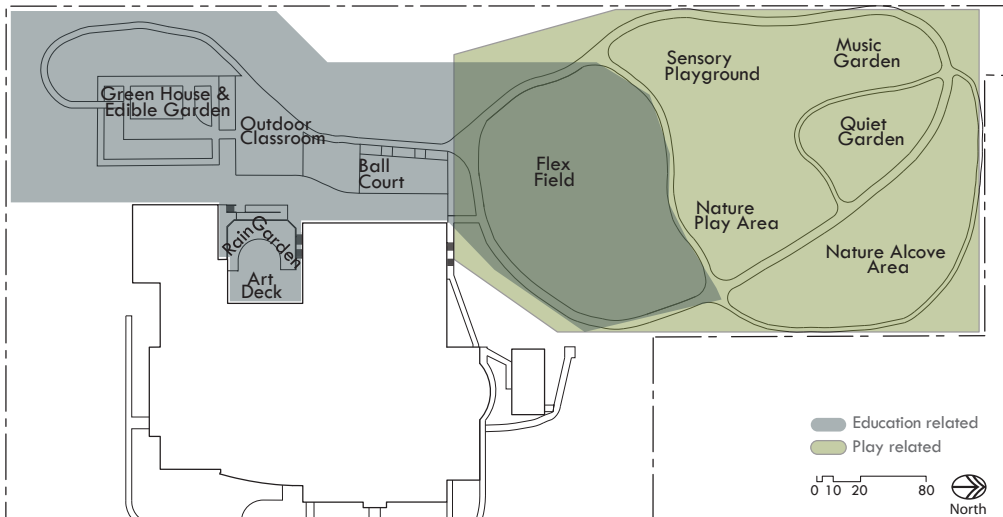


Figure 5.4 Section BB: Topography across site, looking west towards Little Kitten Creek (author 2012).





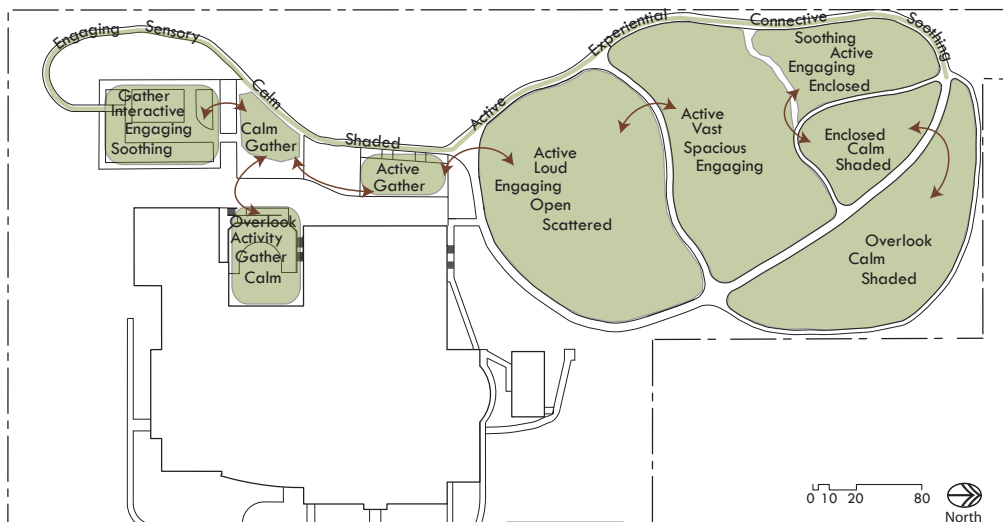
## Application of Framework



## Spatial Configuration

Spaces that emphasize learning and structured activities are located closer to the building, while areas for play and unstructured activities are located further from the school (figure 5.5). This helps to create a clear separation between the learning environment and the play environment.

Figure 5.5 Spatial configuration (author 2012).



## Spatial Relationships

The character of each individual space is related in similarity to the adjacent spaces, gradually introducing children to different spaces, reducing drastic and overwhelming changes and allowing for a variety of spaces for the children to experience (figure 5.6).

Figure 5.6 Spatial relationships (author 2012).



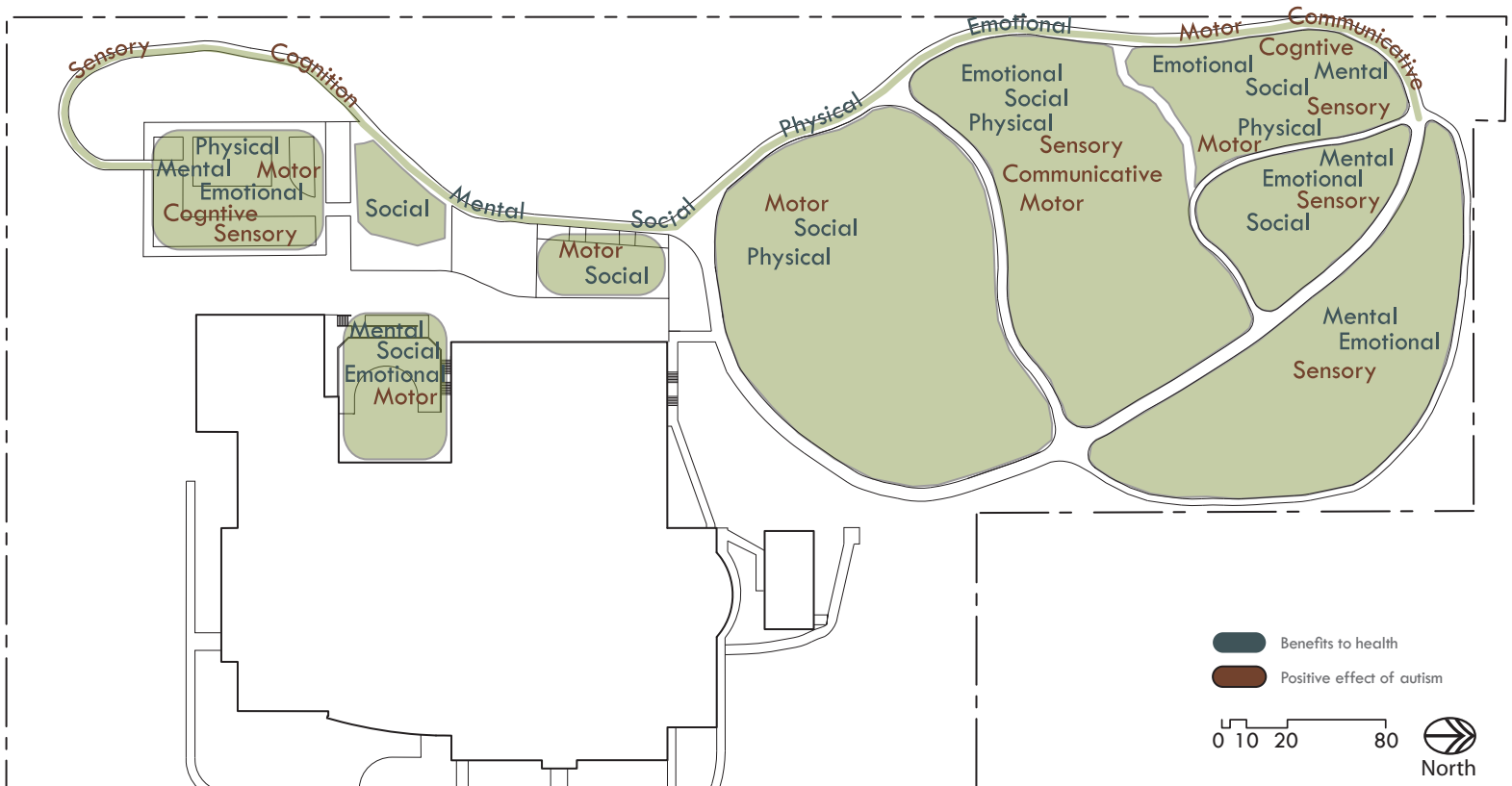


Figure 5.7 Benefits to overall health and positive effects on autism (author 2012).

## Potential Benefits to Overall Health and Positive Effects on Autism

Each program was selected to benefit children with autism while having positive influences on the health of all children in a variety of ways. Some spaces emphasize certain aspects of health or autism more than others, depending on the character and intended use of the space. This correlation between spaces and their benefits to health or positive effects on autism is shown in figure 5.7.

## Accessibility of Site

In order to create a schoolyard that is usable by all children, it is important to ensure that the majority of the site is ADA accessible. All the program elements are accessible, meeting requirements for slopes, and having accessible ground materials. Illustrated in Figure 5.8, the majority of the site meets the requirements for being accessible. Along the school building, there were steep slopes, creating the need for the stairs to remain. At the northern edge of the site is a shaded area with trees and seating rocks which due to slopes is inaccessible. Due to this inability, there are no programmed elements in this area, but seating is provided. While the majority of the site is accessible, the planted areas and the berms are not necessarily accessible.

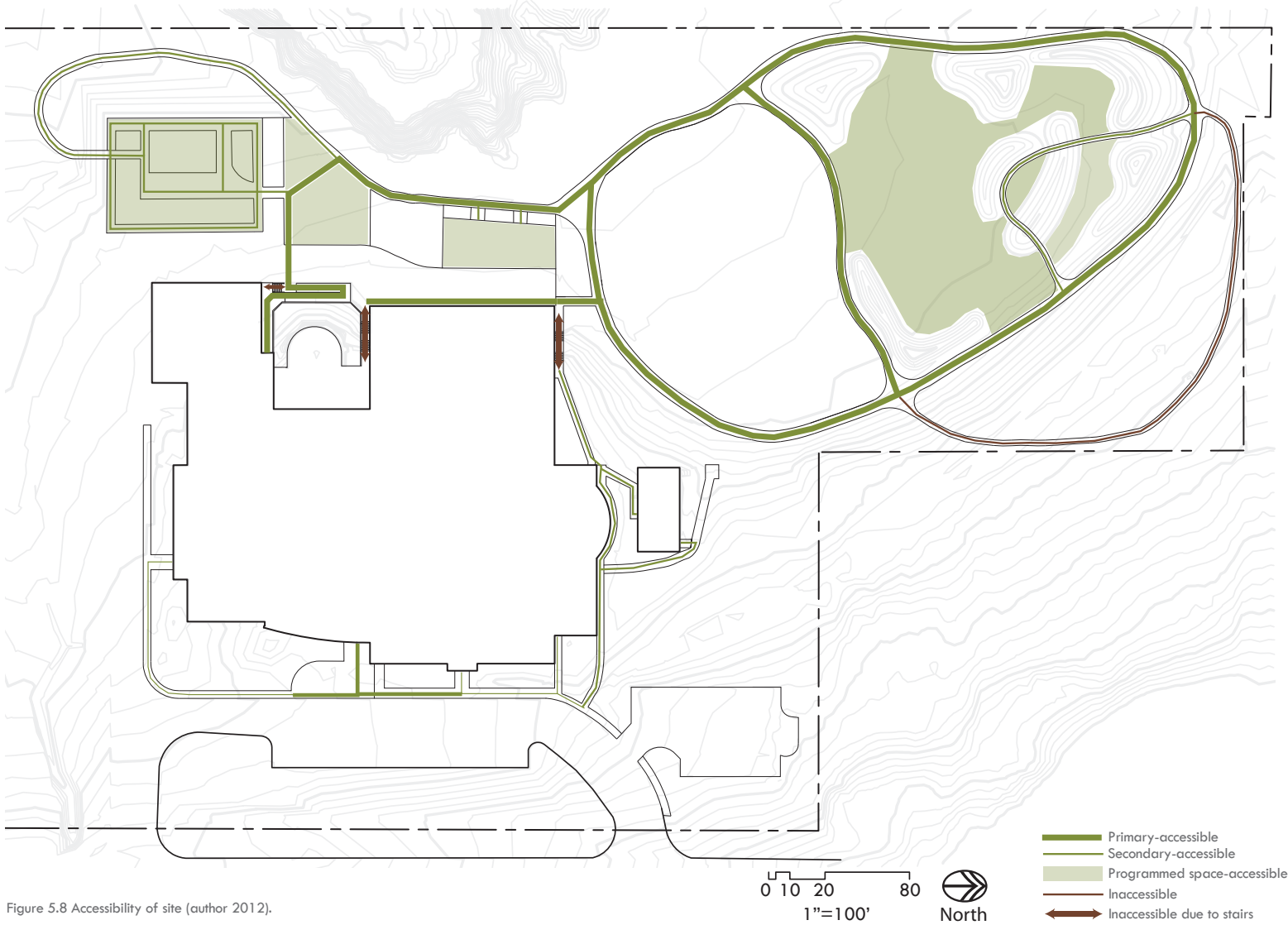


Figure 5.8 Accessibility of site (author 2012).

## North Entry to Play Garden

Upon entering into the Play Garden from the north, you can see across the entirety of the site (figure 5.9). Directly to the left is the Quiet Garden and the butterfly garden. A swath of butterfly bushes creates a border for the quiet garden and leads the child toward the butterfly garden. To the right, a low berm provides a seating spot, and shapes the edge of the Music Garden. Beyond the Quiet Garden and Music Garden is the Sensory Playground. Each of these spaces provide a variety of opportunities for interaction among children, and a variety of sensory stimulation for children with autism to experience. Signs along the path explain plantings, providing facts and information to the children, helping to build interest and encourage social interaction.

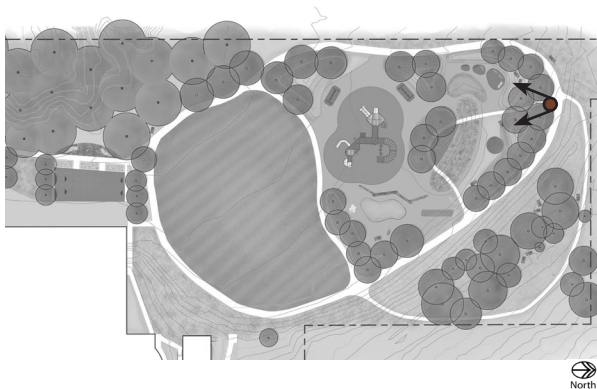


Figure 5.9 Vision for Play Garden (author 2012). Playground structure selected from Columbia Cascade Company, not custom (TimberForm 4898-TF, Columbia Cascade, <http://www.columbia-playground.com>).









## Butterfly and Quiet Gardens

Within the Quiet Garden is the Butterfly Garden. Along the trail that is adjacent to the Quiet Garden is a deck that overlooks the Butterfly Garden (figure 5.10). This deck serves as a place for teachers to gather students to observe the butterfly garden. Beyond serving as an outdoor classroom space, the deck is also a sensory experience for children, with a series of panels that each have different tactile pieces to interact with. The deck becomes a lively place for learning and observation that is separate but connected to the Butterfly and Quiet Gardens.

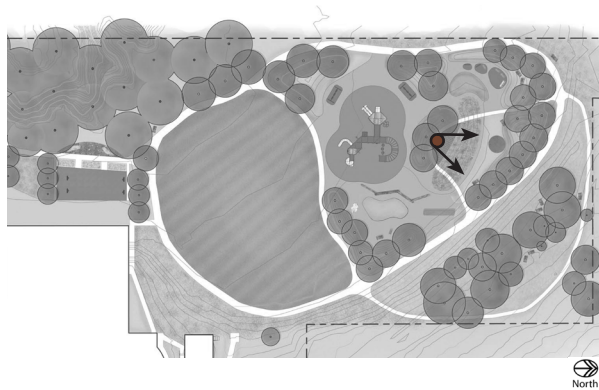
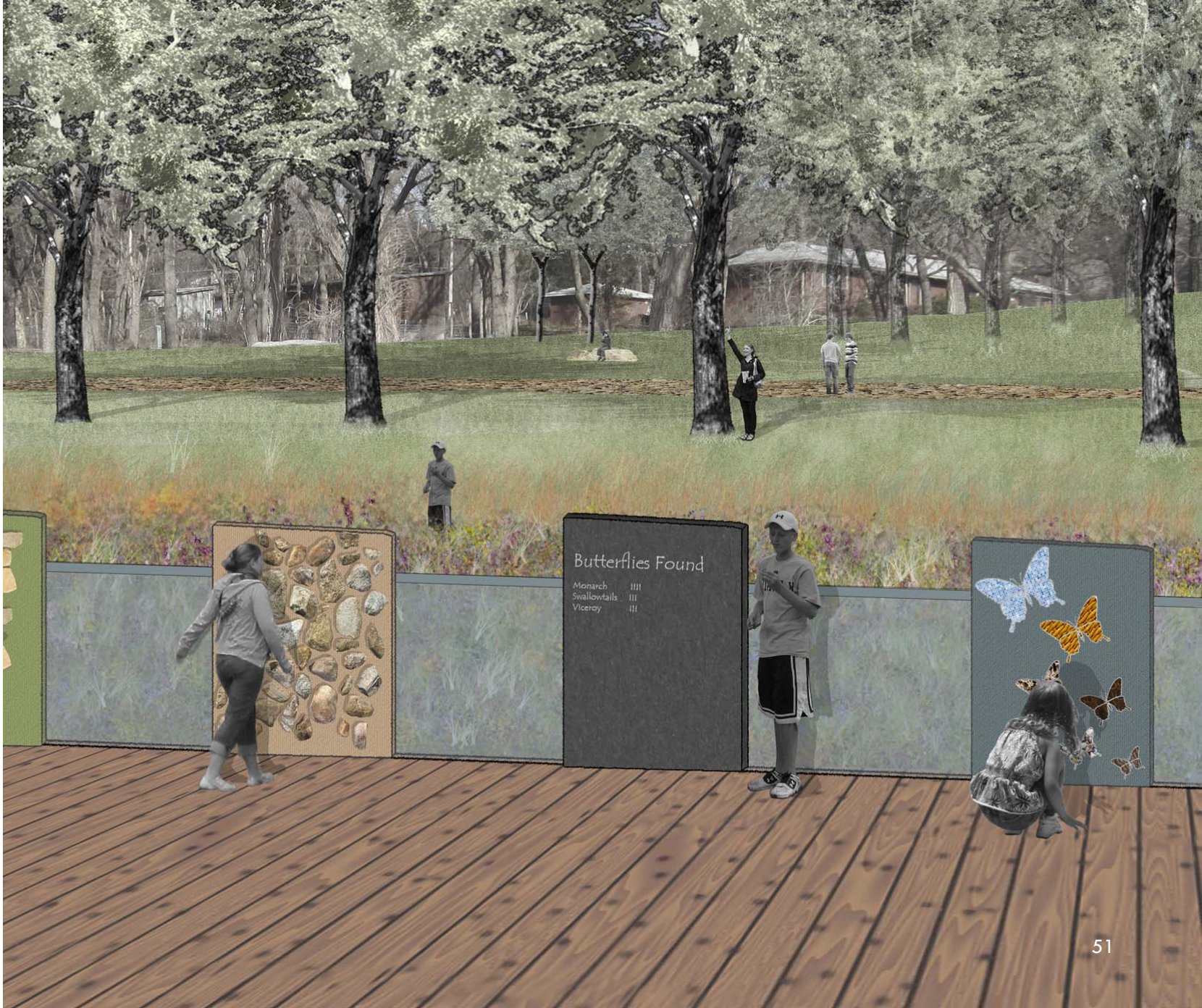


Figure 5.10 Vision for Butterfly Garden Observation Deck and Quiet Garden (author 2012).





Butterflies Found

Monarch	
Swallowtails	
Viceroy	



## Trail along Basketball Court

Winding throughout the site is a Sensory Trail that connects the various spaces together and provides a variety of path choices for various activities, especially for the children with autism who are often outside with their occupational and physical therapists. Separating the path from the basketball court area became important to provide clear circulation through the site, shown in figure 5.11. The seat walls along the planters provide separation, and the seating area off the path provides opportunities for children to sit and watch the activities going on around them.

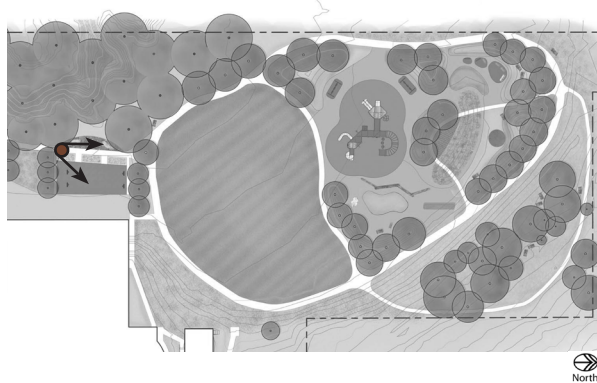


Figure 5.11 Separation between high activity areas (author 2012). Playground structure selected from Columbia Cascade Company, not custom (TimberForm 4898-TF, Columbia Cascade, <http://www.columbia-playground.com>).









# Nature Play Area

Adjacent to the Sensory Playground is the Naturalized Play Area, illustrated in figure 5.12. This area provides children with opportunities to interact with more natural elements and play in a less formal setting. This area provides informal play opportunities in a more natural setting with natural elements, such as logs, sand, and grasses. Incorporating elements such as the Cozy Cocoon and the crawling log provide spaces where an overwhelmed child can go to calm down.

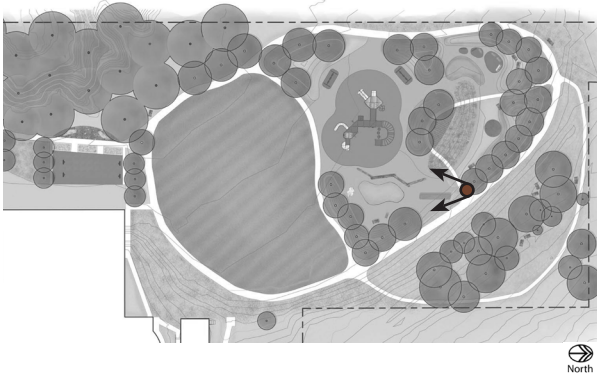


Figure 5.12 Vision for Naturalized Play Area (author 2012). Cozy Cocoon swing selected from Playworld Systems, not custom (Cozy Cocoon, Playworld Systems, <http://www.columbia-playground.com>).









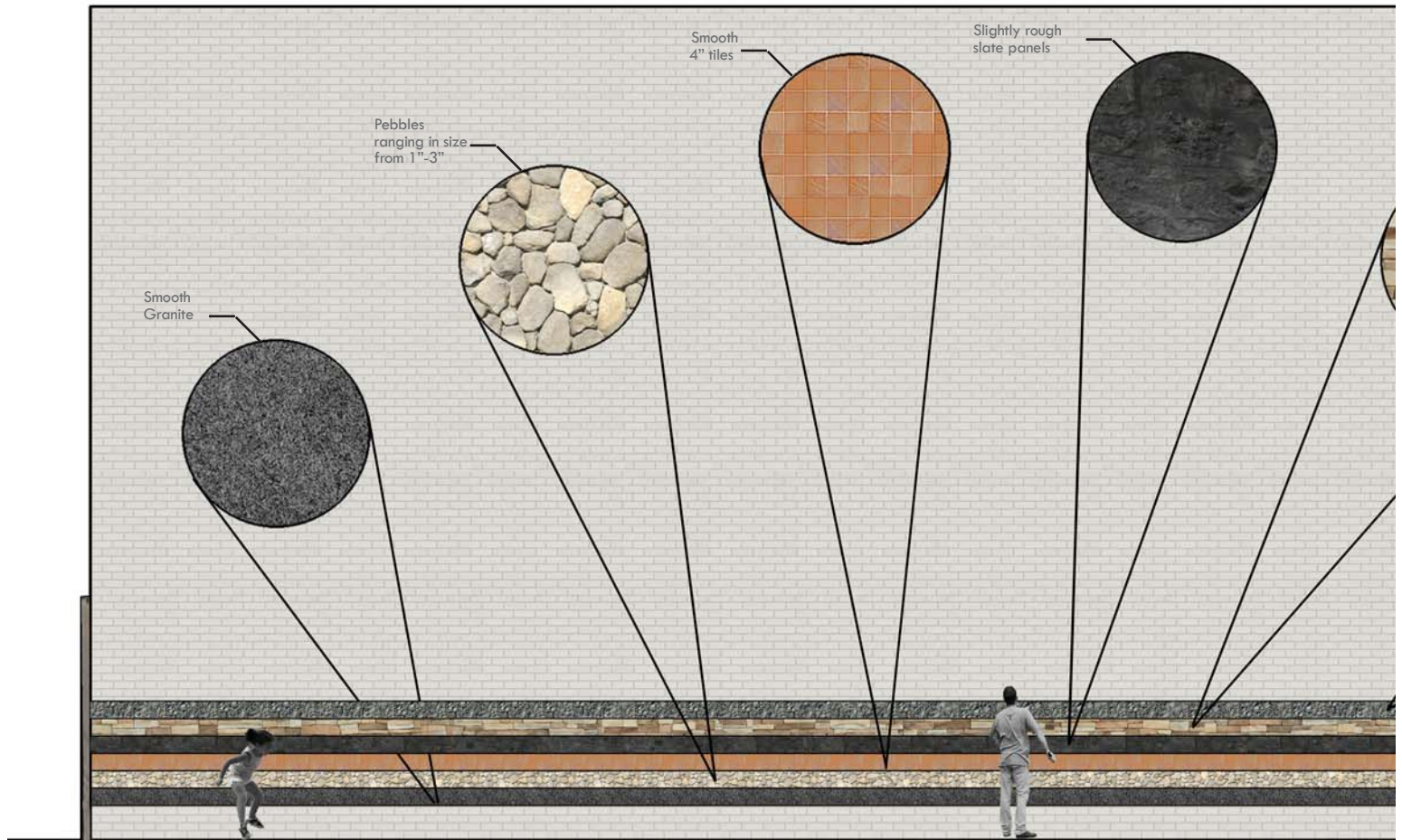
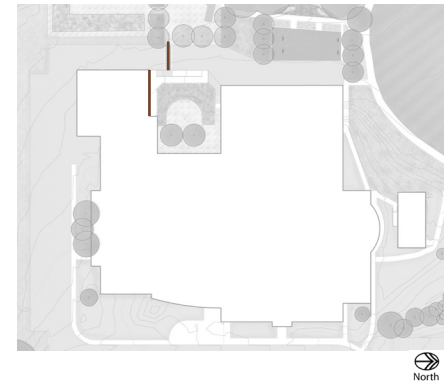
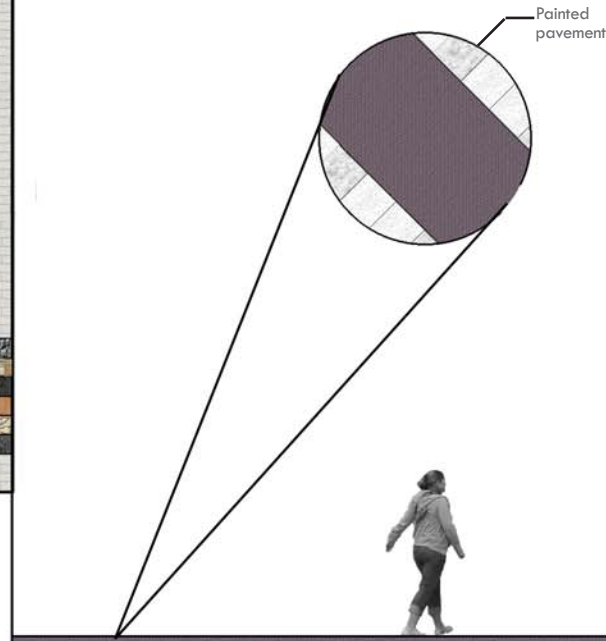
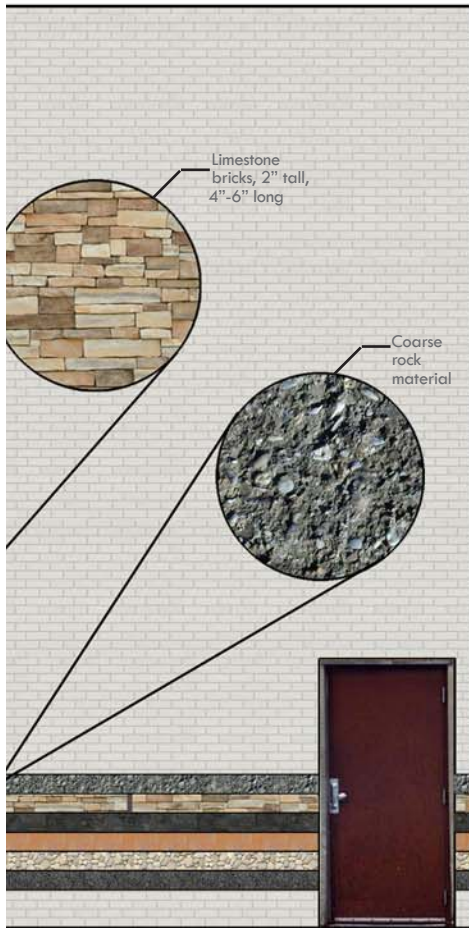


Figure 5.13 Detail of sensory wall and crosswalk of Amanda Arnold Elementary Building (author 2012).



## Tactile Wall and Crosswalk

From the Autism Suite within the school, the children are led outside along the exterior wall of the building and across the fire lane to enter into the schoolyard area. In order to help make this a calming and understandable experience, panels are attached to the wall (figure 5.13) each having a different tactile character that the children can follow. The crosswalk area has been carefully delineated in order to signify to the children where to cross.



## Signage

Children with autism struggle with interpreting their surroundings and with communicating their observations and desires with those around them. Through using a Picture Exchange Communication System (PECS), these children can more easily communicate with their teachers and peers. In order to help a child express where they want to go in the schoolyard or what they want to do, a set of example signs have been developed, shown in figure 5.14. Signs for each area and activity of the site would be created to help the children best communicate with educators and peers.

These signs can contain images representing the various spaces on the site, or images representing the individual activity the child may want to participate in. For this project, these images are photo-real, representing what would actually be present within the schoolyard. The images on the signs would match pictures the children would use, either in a binder or on a technological device, so that they would easily be able to communicate where they want to go or what they would like to do.

In addition to signs that would help the children communicate the activities or spaces they want to experience, signs would also serve to identify plants (seen in figure 5.9). Children with autism like facts, so by providing signs along the path that have different factual data about the plants would help to foster communication and interaction between individuals with autism and their peers or educators. These signs would be able to be changed out throughout the season in order to provide new facts and to help reflect what is going on with the plant in terms of seasonality or wildlife it is attracting.

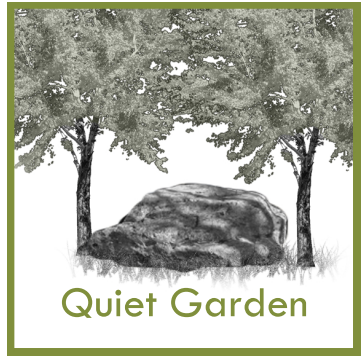
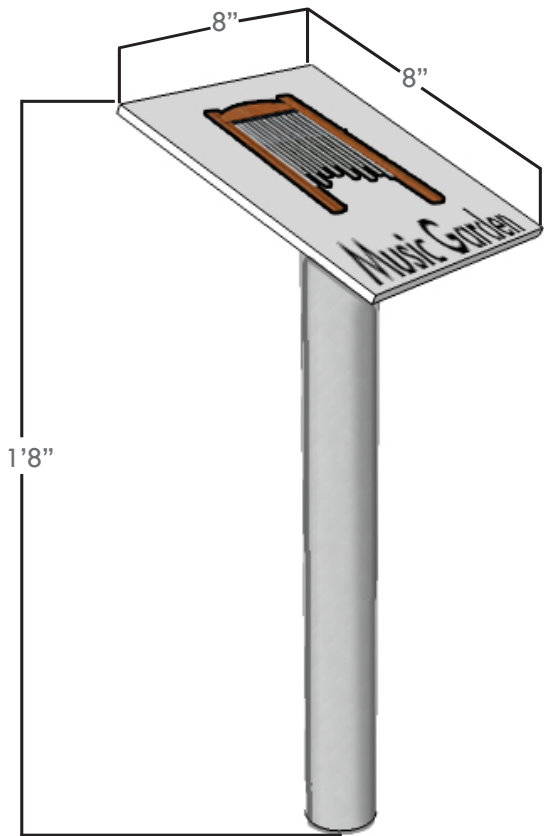
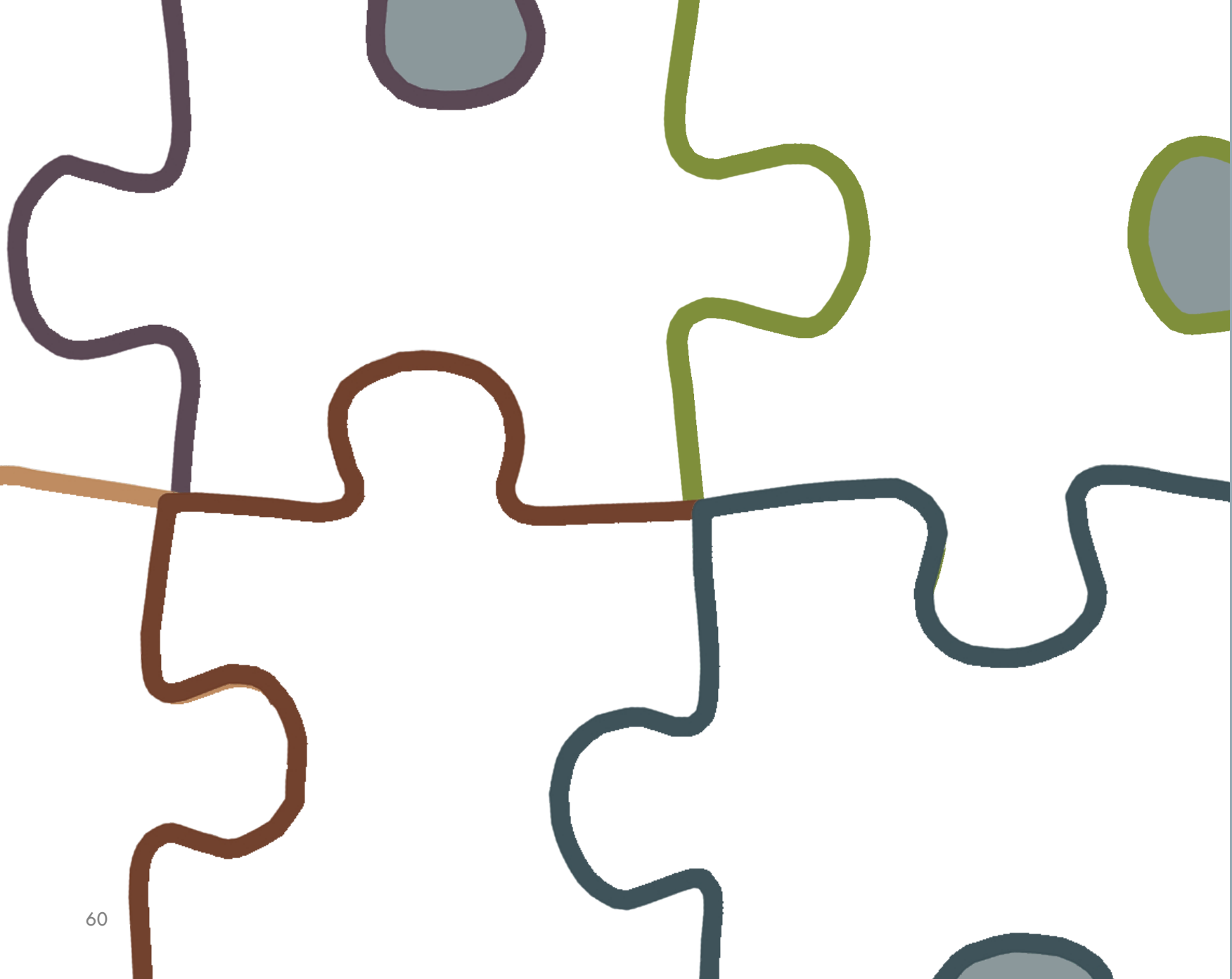


Figure 5.14 Detail of typical signage for the various spaces (author 2012).





## Concluding

This section explains the conclusions and limitations of the project and research, the significance of this project to the research and design community, and the directions for future research.

## Conclusions

Based on research of autism and the needs or challenges typically associated with autism, the landscape can be designed in such a way that it not only serves as a canvas upon which children with autism can learn basic skills, but also can serve to intrigue and excite them, helping to further develop their skills beyond that which could occur in a traditional playground or classroom setting. Creating cohesive, decipherable spaces is important in designing for children with autism because they are fact-driven individuals and tend to respond best to clear boundaries. By creating a variety of spaces that have...

- **Unique Identities:** such as the Music Garden, Butterfly Garden, and the Quiet Garden, which each have their own identifying characteristics
- **Clear Boundaries Between Spaces:** such as the paths, landforms, and vegetation creating boundaries between spaces
- **A Range from High-activity Levels to Low-activity Levels:** such as the playground being balanced by the quiet garden and the basketball courts with quiet alcoves

...children with autism may respond more positively to their environment, as they are able to gravitate towards that which is comfortable or intriguing to them.

Beyond being a therapeutic environment for those with autism, a schoolyard designed with these characteristics would be an enjoyable and therapeutic place for all children to interact with their peers and surroundings.

## Limitations

It is possible for a schoolyard to be designed to become a therapeutic landscape for all children, while specifically benefitting children with autism. However, because there are many factors that play into the final outcome on the health and behavior of humans, it can be difficult to measure the true benefits of specific elements on the users, especially those with special needs who may not be able to communicate their view on the benefits they recognize coming from their individual experience.

## Significance

As the number of children diagnosed with autism increases, there is an increased need for environments to be conscientiously designed for the needs of these children. Though not part of this particular project, through post-occupancy evaluations, the guidelines established for designing a landscape for children with autism can be tested in order to determine the actual benefits. This project is one application of a multitude of research drawn from a variety of sources and precedents. The guidelines resulting from this research can be applied in a variety of sites or regions in order to design for the autistic population.

## Directions for Future Research

If this project were to continue into further detail and evolve, there are many things that would help to strengthen it. For one, receiving input from students along with parents and educators would help to give more direction for what a child would like to see in their schoolyard. Additionally, being able to implement a landscape based on the guidelines established (shown in Approaching section, figure 4.2) and conducting post-occupancy evaluations would help to determine the success of such a landscape. It would be beneficial to truly be able to understand and design for what would be most beneficial to the majority of children with autism.

“One of the difficulties I have in writing about the perfect environments for autistic children is that the children are all different and prefer different places. Also, there’s been so little information written about the design of these environments because there just aren’t such places. We’re all waiting for these places to be built so we can evaluate them and point out what works and what doesn’t”

Carol Krawczyk 2011



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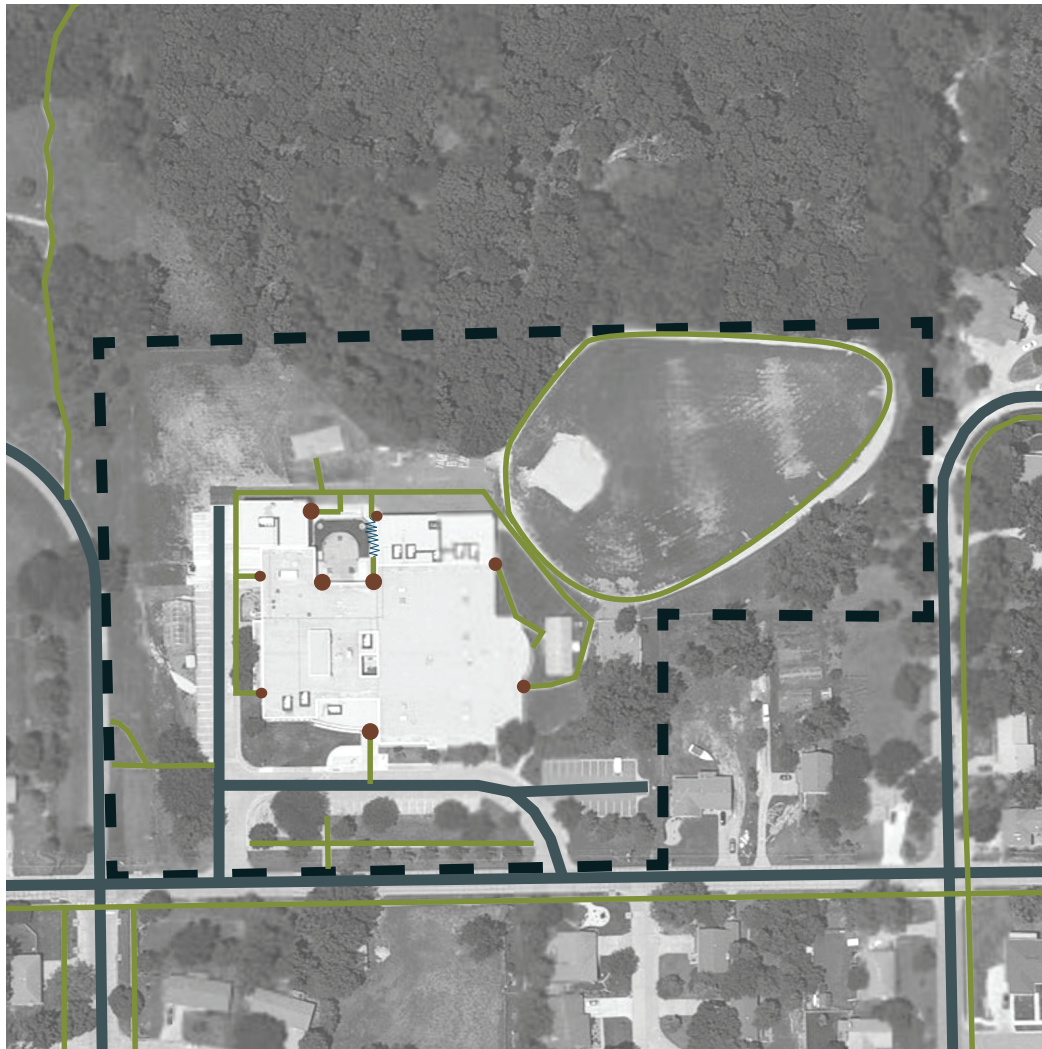
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# Appendix A

Additional site information

## Site Inventory: Site Circulation



A variety of circulation occurs within and around Amanda Arnold Elementary (figure A.1). The Hudson Trail runs along Hudson Avenue cutting through the woods to the neighborhood to the west. Crossing Hudson Avenue from the east lacks defined crosswalks. Within the site, there is little to no conflict between pedestrians and vehicles. Entrances that are level with the schoolyard are on the side of the building, the rest need the use of stairs and ramps.

### Legend

-  Site Boundary
-  Stairs
-  Pedestrian Circulation
-  Vehicular Circulation
-  Building Exits

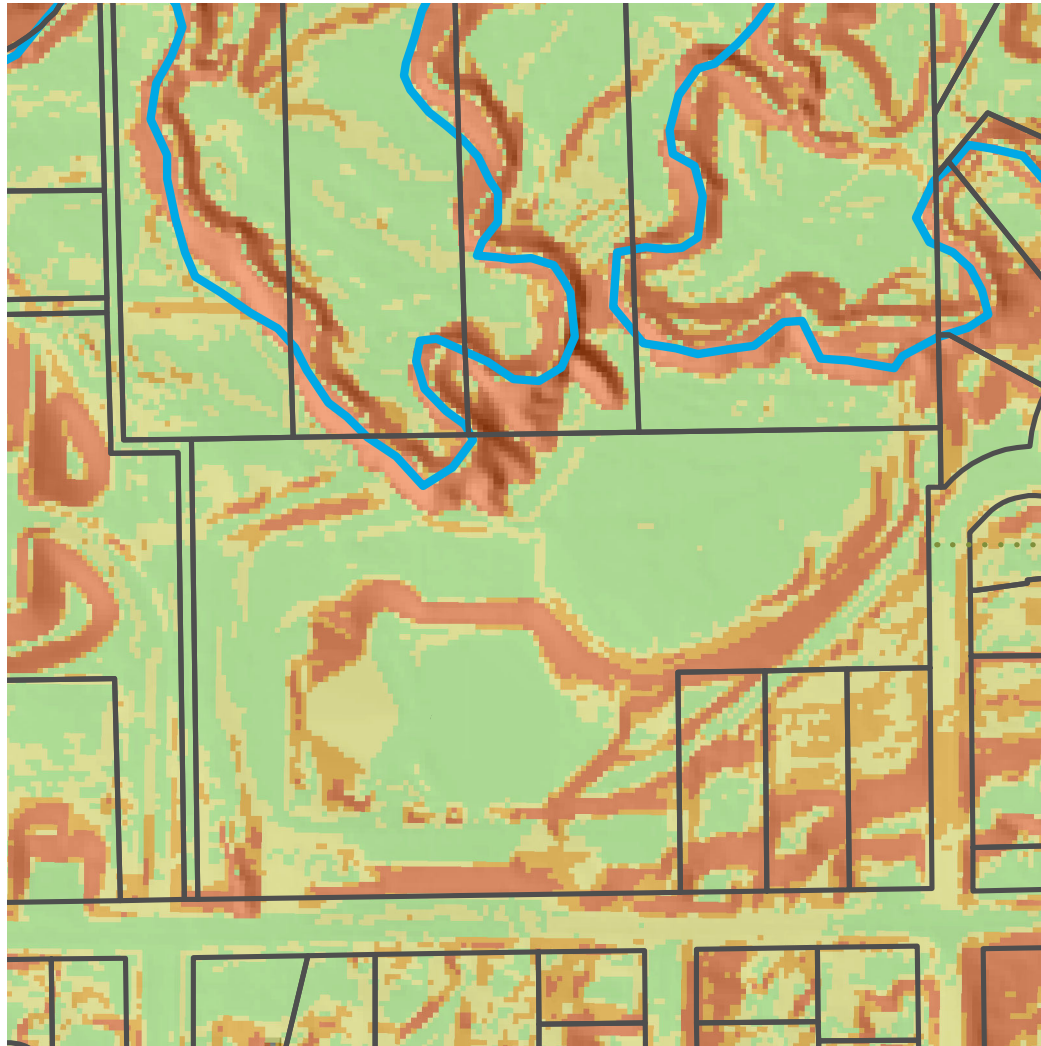


1"=0.035 miles  
1"=1,848 feet



Figure A.1 Circulation Inventory, Created with basedata from Bing Maps (<http://www.bing.com/maps>) (author 2012).






## Site Inventory: Site Slope



Amanda Arnold's site is fairly flat, but has many steep areas, shown in figure A.2. The steep grade changes between the school building and the schoolyard requires the use of steps and ramps. Little Kitten Creek to the west creates very steep slopes along the western edge of the site.

Amanda Arnold Elementary  
School Site Boundary

### Legend

-  0%
-  0.01%-5%
-  5.01%-8.33%
-  8.34%-12%
-  12.01%-170.21%



North

1"=0.04 miles  
1"=234 feet

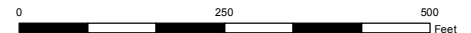
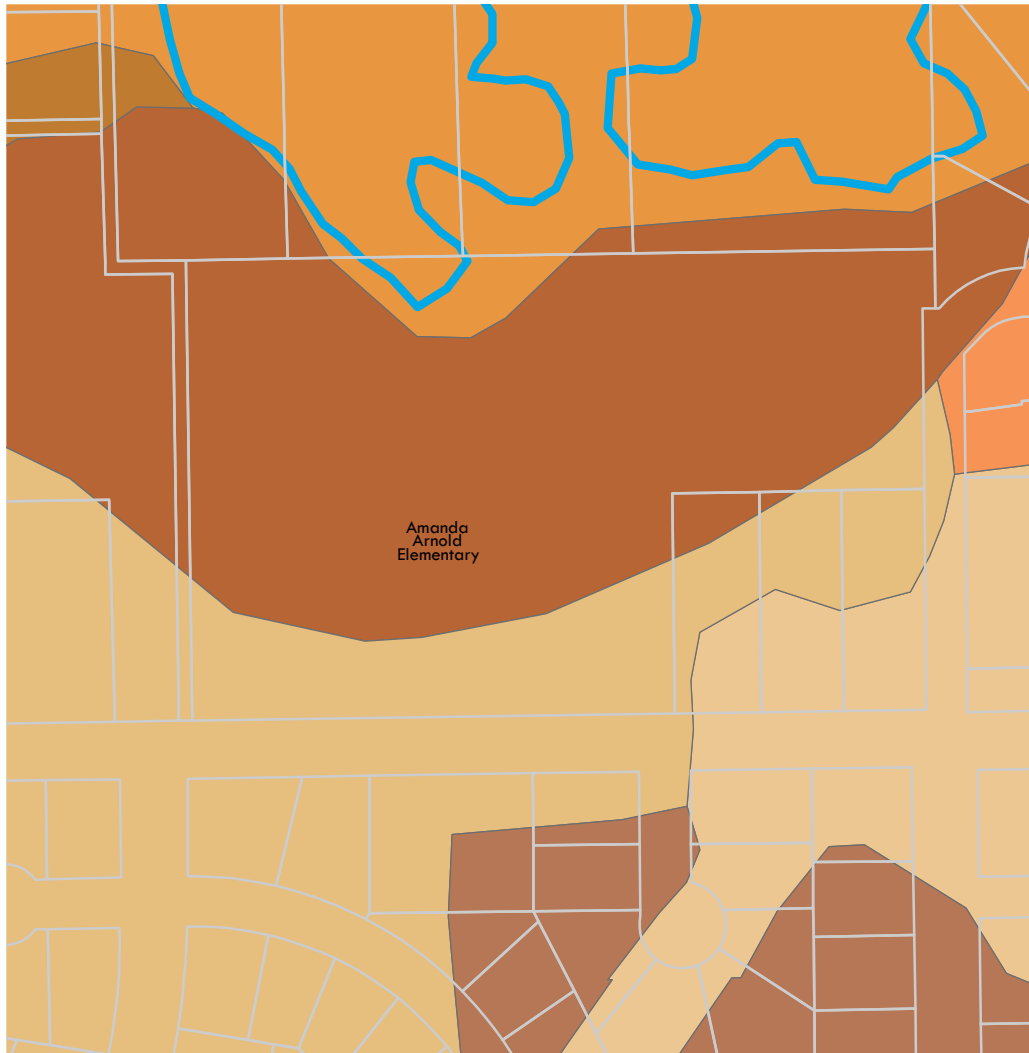


Figure A.2 Slope Inventory, Source data: *Kansas Atlas* (author 2012).



## Site Inventory: Soils



The soils across the site do not vary much (figure A.3). The soil will ultimately play a role in determining what plant groups will occur where. Also, the characteristics of the soils will help to determine what program elements and plants are most suitable for different areas on the site.

### Legend

- Clime Sogn, 3-20%
- Ivan Silt Loam, channeled
- Reading Silt Loam, 1-3%
- Reading Silt Loam, rarely flooded
- Smolan Silty Clay Loam, 3-7%
- Smolan Silty Clay Loam, 3-7% Eroded
- Tully Silty Clay Loam, 3-7%
- Wymore Kennebec



North

1"=.04 miles  
1"=234 feet

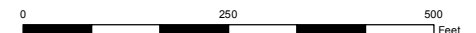
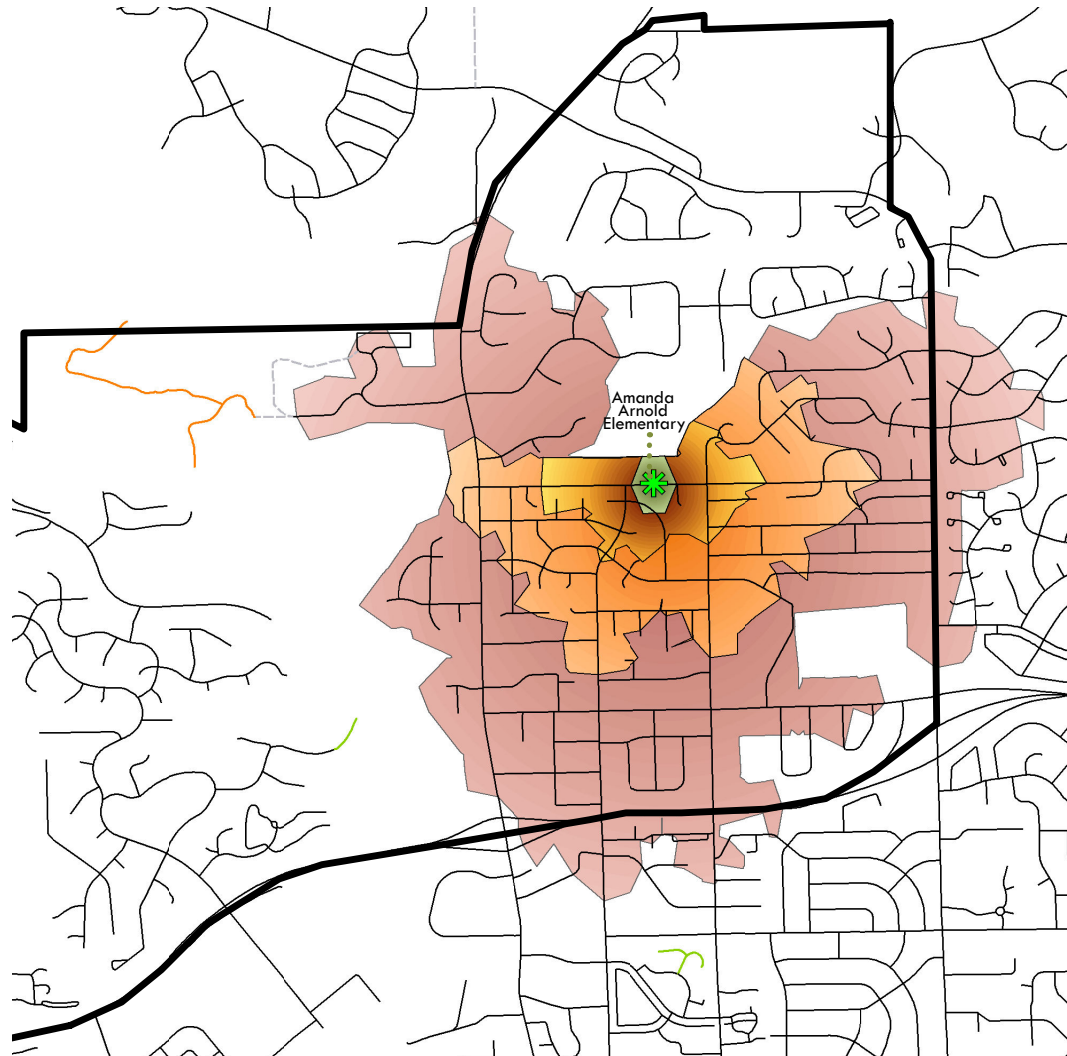


Figure A.3 Soil Inventory, Source data: Kansas Atlas (author 2012).

## Site Inventory: Walking Distances



Much of the service area of Amanda Arnold is within at least a twenty minute walking distance, shown in figure A.4. In the southern portion of the service area, there is a greater population density, but due to a lack of pedestrian amenities that area is not a good walking distance away from the elementary school.

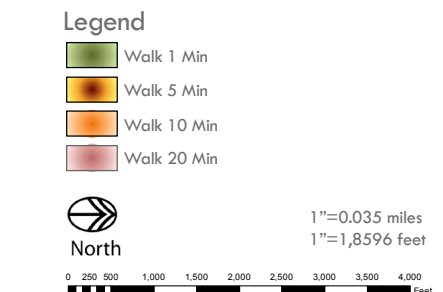


Figure A.4 Walking distance inventory, Source data: Kansas Atlas (author 2012).



# Appendix B

Literature

In deciding upon literature to influence this project, books and articles were selected that would inform design decisions for a therapeutic landscape for children with autism. It was important to look at literature that related to therapeutic landscapes, the influence of landscapes on health, the needs of autistic children, and design considerations for schoolyards. While as a group, Landscapes of Learning had overall keywords to relate our literature to, there were some topics, such as restorative and healing landscapes, that were unique to this research. As shown in table B.1, some key authors on the topic of therapeutic landscapes include Clare Cooper Marcus, Marni Barnes and Roger Ulrich. Robin Moore and Nilda Cosco are extremely influential in the design of landscapes for children. Charles Lewis, along with these other authors, places emphasis on the importance of interaction with nature and the positive emotional, physical, mental, and social effects of spending time in nature (1996). For the most part, connections between the literature pertained to designing school environments, restorative and healing landscape design and considerations, experiential learning, and human-nature interaction (figure B.1). The literature helped to provide background information and inspiration for the potential for a schoolyard to be designed as a therapeutic landscape for children with special needs. Through the literature, theories about how schoolyards can best benefit students, how therapeutic gardens can be implemented beyond the healthcare realm, and how landscapes can be better designed for children were made clear and brought to light more possibilities.

Note: A collective annotated bibliography for the Landscapes of Learning umbrella group can be found on the K-State Research Exchange database under the Landscapes of Learning Collection. The URL to retrieve this document is <https://krex.k-state.edu/dspace/handle/2097/13625>.

	School Environment	Restorative & Healing Landscapes	Landscapes for Children	Human-Nature Interaction	Design Metrics	Experiential Learning	Ecological Design
Blanco, P. (2011)							
Gerlach-Spriggs N. (1998)							
Heft, H. (2010)							
Herzog, T. & Strevey, S. (2008)							
Lewis, C. (1996)							
Moore, R. (1999)							
Moore, R. & Cosco, N. (2009)							
Moore, R. & Cosco, N. (2010)							
Moore, R. & Wong, H (1997)							
Marcus, C. & Barnes, M. (1999) Intro							
Marcus, C. & Barnes, M. (1999)							
Thwaites, E. (2005)							
Ulrich, R. (1999)							
White, R. & Stoecklin V. (1998)							
Wilson, R. (1997)							

Table B.1 Matrix of literature topics (author 2012).

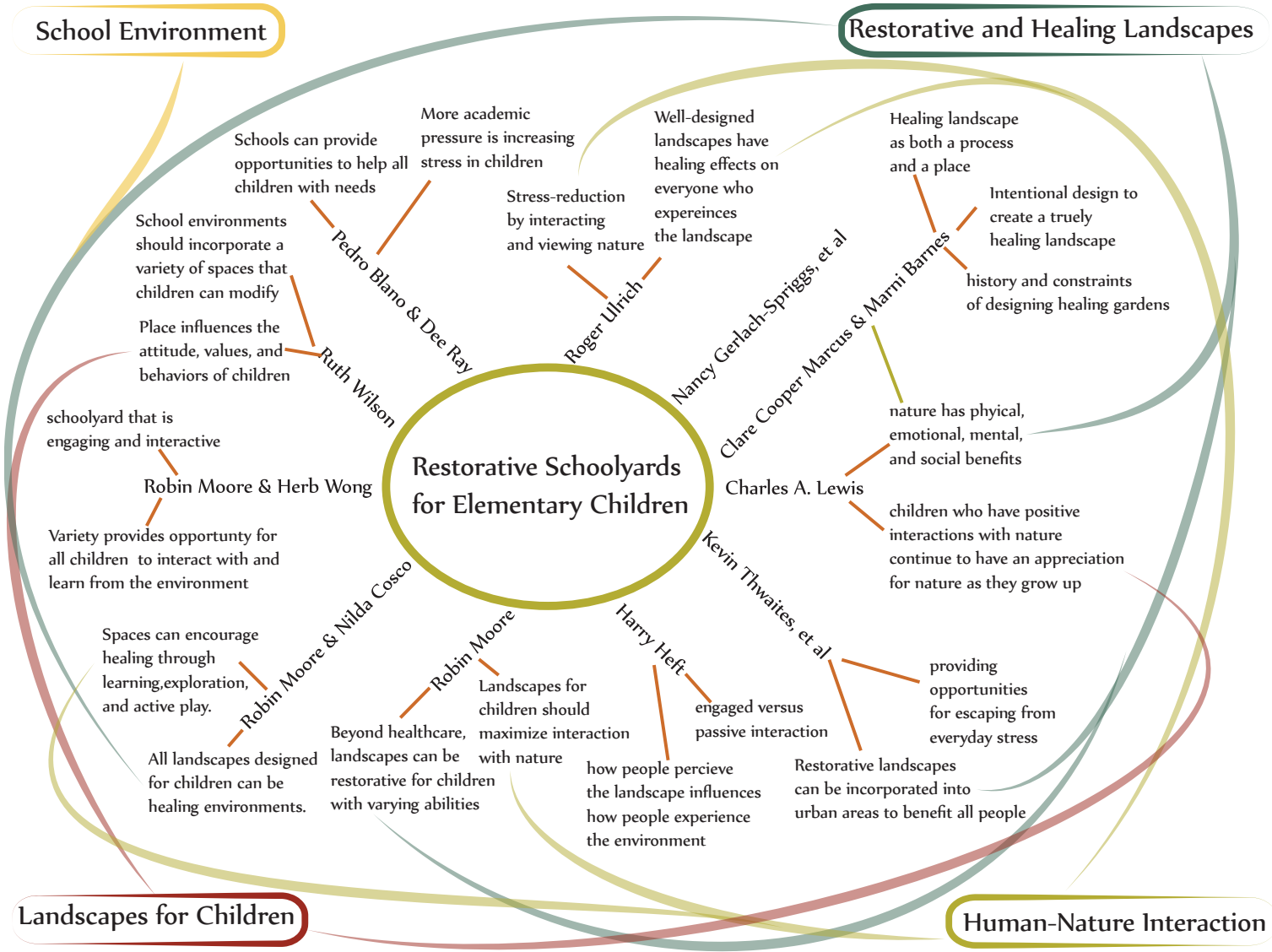


Figure B.1 Literature map showing connections between literature (author 2012).



# Affordances and the Perception of Landscape

## Harry Heft

Keywords: Design Considerations; Human-Environment Interaction; Perception

Heft's chapter in *Innovative Approaches to Researching Landscape and Health* relates to environmental design and the perception of landscapes. Heft states his thesis of the chapters as "the way that environmental psychologists and designers think about processes of perceiving has a direct bearing on how they think about the visual experience of landscape, and in turn how they approach landscape perception research and aesthetics" (2010).

He discusses previous studies on the perception of landscapes and cites many of the findings from these studies. Specifically, Heft discusses the Kaplan's and their study rooted in cognitive psychology relating to present properties, such as what is seen, versus suggested or inferred properties, for example legibility or mystery (2010). He criticizes that the studies take an approach where the landscape is perceived by an observer rather than an engaged user.

Importance is placed on the difference between viewing a landscape and experiencing a landscape and how the viewer's perception differs based on active or passive engagement. Relating to the perception of landscape, Heft discusses affordances, which are the opportunities present within a landscape to engage the user and influence the perception of the landscape. He concludes that perception leads to exploration and action.

Heft's chapter defines and describes information that becomes important to consider when thinking about landscapes and how users will connect with the environment that they perceive. He places importance on paying attention to how landscapes might be perceived by the users, and how perception varies whether the user is viewing the space from the exterior or engaging directly with the space.

Source: Heft, Harry. 2010. "Affordances and the perception of landscape: An inquiry into environmental perception and aesthetics". In *Innovative approaches to researching landscape and health*, ed. Catharine Ward Thompson, Peter Aspinall, and Simon Bell, 9-32. New York: Routledge.

## Restorative Urban Open Space

Kevin Thwaites, E. Helleur, and I.M. Simkins

Keywords: Restorative Landscapes; Public Space Design

Therapeutic landscapes are consistently associated with healthcare facilities. Thwaites et al. focuses on how the healing benefits of therapeutic landscapes of healthcare facilities can be brought into the public realm, in order to improve the quality of life for people suffering from everyday stress and fatigue. Well-designed spaces in urban environments can have restorative benefits on the people who utilize the space.

Building off of the Kaplan's idea of providing spaces that enact feelings of "being away, extent, fascination, and compatibility" the authors stress that these feelings can have a restorative benefit on the users in the urban environment (529). The importance of restorative spaces in the urban fabric comes from the ability to facilitate social interaction and to provide an escape from the stress and headaches of urban life by "combining mental and physical worlds: allowing the mind to wander" (545).

This article provides a new insight to the field of healing, restorative environments. Typically thought of as environments only available in healthcare facilities, Thwaites et al. provides research and information that opens the restorative environment to the public in order to enhance the lives of users.

# Using Behaviour Mapping to Investigate Healthy Outdoor Environments for Children and Families

Robin C. Moore and Nilda G. Cosco

Keywords: Design Considerations; Human-Environment Interaction; Perception

Moore and Cosco look at ways to evaluate spaces that children occupy outside of the home environment using behavioral mapping, specifically using neighborhood parks, childcare centers, and a museum as examples. They evaluated each space on the way it was used by children, and the qualities the spaces possessed that made it a healthy environment. Some of these include the community engagement with the space, scientific learning, art, diversity, exploration, and active play. Moore and Cosco evaluate the spaces based on their “functional parts” that make up the space, including paths, gathering spaces, climbing areas, gardens, etc. (41). Included in the chapter are composite behavior maps that illustrate the authors’ findings for how children use the spaces.

As part of their research, Moore and Cosco consider community design and how, when designed to support health, it can ultimately influence the children who live in these communities. Through evaluating the different spaces frequented by children, Moore and Cosco acknowledge key considerations that can be implemented in other landscapes that are geared towards children.

Source: Moore, Robin C. and Nilda G. Cosco. 2010. “Using behaviour mapping to investigate healthy outdoor environments for children and families: Conceptual framework, procedures, and applications”. In *Innovative approaches to researching landscape and health*, ed. Catharine Ward Thompson, Peter Aspinall, and Simon Bell , 9-32. New York: Routledge

## Green Nature/ Human Nature

Charles A. Lewis

Keywords: Human-Environment Interaction; Restorative Landscape

Lewis discusses nature and the healing possibility nature and gardens have through psychological, physiological, and sociological benefits. He stresses the importance of having contact with nature in our daily lives and how this adds to the quality of life for people of all backgrounds, abilities, and stages of life. He discusses how nature can be beneficial in various settings, including urban neighborhoods, healthcare facilities, and in the everyday life.

One thing he emphasizes is the importance of children getting involved with nature at a young age. He points out that children who interact and develop a connection to nature at a young age continue to have an appreciation for nature into their adulthood (70). While he draws attention to the historical and present importance of the connection between nature and people, Lewis stresses that “every aspect of the gardening process is potentially of great therapeutic value” (83). Being involved with nature can help reduce stress and increase a sense of self confidence. Through direct interaction with nature, restorative benefits can influence mental, physical, social, and mental health.

Lewis places importance on the relationship and benefits of humans interacting with nature. He examines how humans and plants are interconnected and how interaction with nature improves the overall health and well-being of humans.

## Natural Learning

Robin C. Moore and Herb H. Wong

Keywords: Schoolyard Design; Ecological Design; Experiential Learning; Children's Landscapes

Moore and Wong focus on an elementary school in Berkley, California and how its schoolyard was transformed into an ideal learning environment for the children who attended school there. Information presented on this schoolyard provides insight for how a schoolyard's potential can be reached in engaging, teaching, and involving students in the natural environment. How the schoolyard was designed, the ongoing design process, and the influence that the schoolyard had on the children, teachers, and staff are explained by Moore and Wong. Each aspect of the schoolyard engaged the children differently, and provided unique learning experiences. For example, ponds were designed which provided a place for children to directly observe and interact with plants, fish, insects, and animals that were found in the water. Beyond their own learning, class lessons would revolve around what could be directly observed in the yard. Spaces were designed that provided for the needs of different students and classrooms, ranging from small nooks to escape from the group to larger areas with seating for gathering as a class. With vast variety in the design of the Yard, children with a range of needs and abilities could enjoy, learn from, and interact with nature in the schoolyard.

Going beyond the typical design of a schoolyard, Moore and Wong share how one school went beyond the basics of providing play space where students spend recess that fully engages the users and encourages connection between the landscape and the classroom educational experiences. Though greatly removed in a school remodel, the design, considerations, and impacts of the landscape are clearly explained by the authors.

Source: Moore, Robin C. and Herb H. Wong. 1997. *Natural learning: Creating environments for rediscovering nature's way of teaching*. Berkeley, California: MIG Communications.

# Introduction: Historical and Cultural Perspective on Healing Gardens

Clare Cooper Marcus and Marni Barnes

Keywords: Restorative/Healing Landscapes; Design Considerations; Human-Environment Interaction

In this introduction to the book *Healing Gardens*, the authors provide an overview of healing gardens, their history, and support for nature being healing. Healing and gardens are defined by the authors, shaping the way the words are used throughout the following compilations from various authors. Healing is described as “relief from physical symptoms”, “stress reduction” and “improvement to the overall sense of well-being” (3). Gardens are defined by the authors as being “any green outdoor space within a healthcare setting that is designed for use” (4). While the compilation relates directly to healing environments in healthcare settings, the findings and information presented can be translated into a variety of landscapes.

The authors proceed to describe a typical healing environment with the elements from nature that are considered to have beneficial effects, including trees, water, flowers, wildlife, and rocks. Spatial qualities should include places for social encounters, places to wander and walk, spaces where you can feel secluded from those around you, and choice for seating arrangement. Marcus and Barnes recognize the limitations of the existing research and studies, stating that they are not definitive, but rather suggestive. Thus, while improvements can be measured based on time spent experiencing nature, it is difficult to isolate those benefits to be directly from nature versus other means of healing.

The authors provide a wealth of information on the history, benefits, and design of healing landscapes. While recognizing the difficulty of proving the actual benefits of nature, Marcus and Barnes are able to provide substantial information to explain the benefits and design considerations that can help to maximize the healing capabilities of a landscape or garden

Source: Marcus, Clare Cooper and Marni Barnes. 1999. “Introduction: Historical and cultural perspective on healing gardens”. In *Healing gardens: Therapeutic benefits and design recommendations*, ed. Clare Cooper Marcus and Marni Barnes, 1-26. New York: Wiley.



# Effects of Gardens on Health Outcomes: Theory and Research

Roger S. Ulrich

Keywords: Restorative/healing Landscapes; Human-Environment Interaction

Roger Ulrich is one of the key researchers for the effect views and interaction with nature have on health. Ulrich's research focuses primarily on the impact of gardens in the healthcare realm, and this article outlines many of his theories and findings through his research. With much of his research focusing on the benefits visually experiencing nature has on health, Ulrich focuses more in this chapter on the passive engagement of gardens rather than active engagement.

Studying effects of nature on stress provides a concrete base on which research can be conducted to study the effects of nature on well-being. Stress is identified by Ulrich as one of the major things affecting the well-being of patients and people. He states that “gardens are needed that effectively foster coping and restoration in persons who range from being anxious to depressed, and from overexcited to under-stimulated”, all of which stem from stress (35). Going beyond the healthcare realm, Ulrich discusses the influence nature has on the well-being and stress reduction of non-patients in public environments, including parks and gardens.

Ulrich highlights the importance of gardens on health based on measurable stress reduction. By providing information on how gardens can be restorative and healing, Ulrich also informs his readers how viewing nature can be restorative for people who are not in healthcare settings. He places importance on designing gardens to be healing places, emphasizing that simply being a “garden” does not create a healing environment.

Source: Ulrich, Roger. 1999. "Effects of gardens on health outcomes: Theory and research". In *Healing gardens: Therapeutic benefits and design recommendations*, ed. Clare Cooper Marcus and Marni Barnes, 27-86. New York: Wiley.

## Design Philosophy

### Marni Barnes and Clare Cooper Marcus

Keywords: Restorative/healing Landscapes; Human-Environment Interaction

Barnes and Marcus pose the question, “Do landscape architects know enough to shape such gardens so that they can really help patients heal?” (87). The authors use this chapter to discuss the approaches for landscape design and how these approaches help or hinder the outcome of a healing landscape. They emphasize the importance of designers being intentional with designs and the “symbolic representation” that might be incorporated into a landscape, as these affect the perception of the landscape. The authors discuss three different perspectives that landscape architects often approach design from. These three perspectives include “traditional approaches”, “botanical/ecological approaches” and “people-oriented approaches” (92). The traditional approaches look at what have been done and bring them forward into new designs, adapting them to meet the needs. For example, ideas of Labyrinths and Japanese gardens are often brought into the design of modern restorative gardens, because these are already established as being “healing”. The second approach is based on sustainability and harmony with nature. This approach likely does not intrude as greatly on the surrounding ecosystems, and therefore creates a healthier environment for the users to experience (102). The final approach is the people-oriented approach which focuses on the relationship between users and environment, and the needs of the users. When designing, landscape architects typically work across these three perspectives.

The authors stress that it is important to think of the healing landscape being designed as both a process and a place, with emphasis on the users and being designed based on the knowledge gained from prior research. Barnes and Marcus conclude their chapter by concluding that “whatever approach is applied to the design, it must serve the user and his or her healing experience” (113). It is important to keep the goal in mind as the site is designed, so that the landscape will have the greatest potential to become the healing landscape that is desired.

Source: Barnes, Marni and Clare Cooper Marcus. 1999. “Design philosophy”. In *Healing gardens: Therapeutic benefits and design recommendations*, ed. Clare Cooper Marcus and Marni Barnes, 87-114. New York: Wiley.

## Healing Gardens for Children

Robin C. Moore

Keywords: Restorative/healing Landscapes; Human-Environment Interaction; Children's Landscapes

Moore is a leading researcher in the design of landscapes for children. In this chapter, he focuses on the design of healing landscapes specific to children. He emphasizes that an important element in healing landscapes for children is play. He states that “through playful interactions with people, natural objects, and materials, the child learns in a special boundless way that stimulates the development of mind, body, and spirit” and that “garden settings are especially satisfying because they are diverse, constantly changing, multi-sensory, and alive” (323). Healing landscapes for children can engage the children in various ways, stimulating them and providing them with an escape from the stressors around them.

Moore discusses healing gardens for children not only in healthcare settings, but also in play settings such as adventure gardens, and children’s farms. Key information that Moore provides are the “five basic assumptions of child development, play, and the outdoor environment” (326). These five assumptions are that: outdoor play is important to healthy development; environmental quality affects the child’s perspective to their surroundings, which affects the “range of depth of play activity”; contact with the “basic elements of life: sunlight, fresh air, soil, water, plants, and animals” is key to child-development through play; with trained play leadership can provide loosely directed play; indoor-outdoor links provide children with easy access to nature (326). The list provides information for how different aspects, instructions, and connections can be incorporated into children’s healing landscapes play areas for children. A key statement from Moore is “every type of institution dealing with children could offer similar outdoor natural settings, allowing children to escape into their own private world” (329). This chapter provides insight into how landscapes can be designed so they have healing or restorative benefits on children.

Source: Moore, Robin C. 1999. “Healing gardens for children”. In *Healing gardens: Therapeutic benefits and design recommendations*, ed. Clare Cooper Marcus and Marni Barnes, 323-384. New York: Wiley.

# Play Therapy in Elementary Schools

Pedro J. Blanco and Dee C. Ray

Keywords: Play-therapy

Blanco and Ray's article focuses on play therapy in the classroom. The information presented, however, can be related to the landscape of the schoolyard. They call attention to the fact that since the No Child Left Behind Act (2001), there is less attention paid to the mental health of students in favor of more attention to getting higher test scores. They infer that there is more pressure placed on students now than in the past, and therefore that increases the stress placed on children. Play therapy provides children with special needs the opportunity to work with a trained counselor and materials that encourage play in order for the child to "fully express and explore self through the child's natural medium of expression- play". Play therapy benefits the child through providing an atmosphere where the child is able to express their emotions and feelings while allowing the child to solve problems and gain responsibility.

Blanco and Ray bring up behavioral issues such as attention-deficit/hyperactivity disorder and aggression that are addressed by play therapy that can be resolved not only in the classroom environment, but also in the outdoor schoolyard. By placing more emphasis on the academic achievement of students, there is a lack of attention to children's social and emotional needs. One of the major issues with schools in the United States is that emphasis is placed on the standardized tests. By evaluating play therapy for students struggling in schools, the authors were able to measure the success of play therapy in the school system.

Source: Blanco, Pedro J. and Dee C. Ray. 2011. "Play therapy in elementary schools: A best practice for improving academic achievement". In *Journal of Counseling and Development*, 235.

## A Sense of Place

### Ruth Wilson

Keywords: Human-Environment Interaction; Experiential Learning; Schoolyard Design

Ruth Wilson discusses the influence sense of place has on the “attitudes, values, and behaviors” on the people who experience the place. Children are especially influenced by their surroundings and the sense of place that is associated with these environments. Wilson acknowledges that many educators are “well aware that children learn by interacting with their environment” but do not recognize that “not all environments are equal in terms of inviting or encouraging children to become actively engaged” (191). It is important for the environments that children spend their time in to promote self-esteem and provide opportunities for learning and exploration. Positive experiences in nature, Wilson states, “fosters a sense of wonder and enhance one’s aesthetic appreciation of the environment” (191). Specifically, Wilson addresses sense of place within the school environment and the importance of the experience that children have there. She outlines important design considerations for providing a sense of place for the schoolyard. These include providing natural areas adjacent to the school building, creating places for children to be alone, providing areas for exploration of the environment, encourage the children to modify and create their own environments, creating habitats that are complex and diverse, and encouraging immersion in the natural environment.

Wilson addresses the importance of creating a sense of place and experience especially in environments for children. The spaces that children spend time in greatly affect their outlook, values, and behavior. By creating spaces that allow the children to actively explore and fully engage in, environmental awareness, learning, and self-confidence, among others are enhanced.

Source: Wilson, Ruth. 1997. “Sense of place”. In *Early childhood education* 24(3):191-194.

# Children's Outdoor Play and Learning Environments

Randy White and Vicki Stoecklin

Keywords: Children's Landscapes; Experiential Learning

White Hutchinson, the firm this article is associated with, designs play gardens and natural playgrounds for children. White and Stoecklin highlight the importance of considering children when designing a landscape geared towards them. Adults think differently about play than children do, and often this is not considered in the design process. The authors point out that “outdoor spaces designed by children would not only be fully naturalized with plants, trees, flowers, water, dirt, sand, mud, animals, and insects, but also would be rich with a wide variety of play opportunities of every imaginable type”. Many of the playgrounds are manufactured and do not provide opportunity for children to experience the natural environment. One issue the authors bring up with how childhood has changed is the shift towards more structured and supervised lives, where they are enrolled in more sports and extracurricular activities that leave little time for free play.

White and Stoecklin emphasize that “environmental education needs to start at an early age with hands-on experience with nature.” Experiences that children have when they are able to interact with nature increases the well-being of the children. The authors provide information on how the firm thinks about landscapes for children, what they call “discovery play gardens”, advising that these gardens provide openness, variety, wilderness, and “opportunities for manipulation, exploration, and experimentation” in order to fully engage and immerse children in play.

Source: White, Randy and Vicki Stoecklin. 1998. “Children's outdoor play and learning environments: Returning to nature”. Retrieved September 7, 2011 from <http://www.whitehutchinson.com/children/articles/outdoor.shtml>.



## Restorative Gardens

Nancy Gerlach-Spriggs, Richard Enoch Kaufman, and  
Sam Bass Warner, Jr.

Keywords: Restorative Landscapes

Gerlach-Spriggs, Kaufman, and Warner's book provides a history of restorative gardens and case studies of various institutional restorative landscapes.

The authors describe a restorative garden as being a place for the healthy and the sick where well-being is improved for all through social interaction, contemplation, and relaxation (7). Throughout history, nature was viewed as a healing environment. The most common restorative gardens were and are still related to hospitals and institutions.

The authors state the primary issue of therapeutic or restorative landscapes is the lack of hard evidence that directly proves that nature is healing. It is generally accepted and observed, however, that interaction with nature makes most people "feel better". Research by the Kaplan's is presented by the authors, relating to the increase of stress and fatigue due to "directed attention". In this research, "recovery from this fatigue can be facilitated by the restorative experience" (36). They have found that contact with nature has the greatest influence on reducing stress and fatigue.

While restorative landscapes have often been associated with healthcare and institutions, the authors of this book provide insight for the influence nature has on the restorative process. Through presenting the history of restorative landscapes, the knowledge base relating to the restorative qualities, and the applications of these landscapes helps to build understanding for how people interact and experience restorative landscapes.

Source: Gerlach-Spriggs, Nancy, Richard Enoch Kaufman, and Sam Bass Warner, Jr. 1998. *Restorative gardens: The healing landscape*. New Haven: Yale University Press.

# Sensory Integration and Contact with Nature

Nilda Cosco and Robin Moore

Keywords: Design Recommendations; Restorative/healing Landscapes; Human-Environment Interaction; Children's Landscapes; Experiential Learning

Cosco and Moore discuss the importance of designing environments that accommodates children with a range of abilities and the importance of experiencing nature in their daily lives. The authors back up the idea that children's landscapes can be therapeutic due to their support of health, attention, harmony, and the feeling of being alive. Cosco and Moore provide information emphasizing the importance of school landscapes serving as an extension of the classroom that stimulates the senses, include children of all abilities, and instill a sense of stewardship in the children at a young age.

The authors support creating outdoor environments that cater to children with special needs or disabilities. They recognize that while there are more considerations in order to accommodate these needs, environments can be designed to provide opportunities for learning and play for children of all abilities. The best way to design for children is to design for sensory and interactive experiences such as trees to climb in, hills to roll down, and different textures to feel.

To conclude, Cosco and Moore provide some design recommendations from a previous article. These recommendations include creating a space that is comfortable to experience year-round, visually connecting outdoor space to interior spaces, considering the abilities of the users; including their abilities and possible impairments, designing areas for children to release stress, and many other considerations that lead to well-designed landscapes for children with a range of needs. The authors do an excellent job of providing information on how landscapes can be therapeutically beneficial to users of all abilities, and important aspects for designers to consider when challenged with designing a positive and engaging landscape for children.

Source: Cosco, Nilda and Robin Moore. 2009. "Sensory integration and contact with nature: Designing outdoor inclusive environments". In *NAMTA Journal* 34(2):158-177.



# Appendix C

Precedents

## Precedent Selection

### Amanda Arnold Elementary Precedent Criteria:

Through researching precedents for this project, the ways in which a schoolyard can be a healing environment for all children and for those specifically with autism were explored. Through the examination and evaluation of precedents, the different areas of consideration for this project were learned. Precedents were selected based upon a variety of criteria. I wanted to look at projects that were either in a public or school setting, considered to be a healing environment, emphasized interaction with nature, or had been designed with the ASD population in mind. Table C.1 shows how each selected precedent relates to these criteria.

### Landscapes of Learning Precedent Criteria:

Relating to the larger topic of Landscapes of Learning, as a group, we chose to examine each precedent for how well it encourages learning, how learning is incorporated, and what type of learning was most prevalent in the space. This helped to view a variety of precedents that may or may not be “landscapes of learning” through a critical lens for how they could potentially be educational landscapes.

	Formal	Informal		Intentional	Incidental		High	Low		Yes	No
Environmental Yard	Dark Purple	Dark Purple	Light Gray	White	Dark Teal	Light Gray	Green	White	Light Gray	White	Brown
Dinosaur Park	Dark Purple	Dark Purple	Light Gray	White	Dark Teal	Light Gray	Green	White	Light Gray	White	Brown
Kern Inspiration Playground	White	Dark Purple	Light Gray	White	Dark Teal	Light Gray	White	Green	Light Gray	Brown	White
Sequential Learning Environment	Dark Purple	Dark Purple	Light Gray	Dark Teal	White	Light Gray	Green	White	Light Gray	Brown	White
Unlimited Play	White	Dark Purple	Light Gray	Dark Teal	White	Light Gray	White	Green	Light Gray	White	Brown
	Learning			Healing		Nature Interaction			Designed for Autism		

Table C.1 Precedent Matrix (author 2012).



## Environmental Yard Berkeley, California

**Designers:** Robin Moore; architecture and landscape architecture students from UC Berkeley; Herb Wong, field naturalist and educator within the Berkeley school district.

**Client:** Washington Elementary School in Berkeley, California, a kindergarten through fifth grade laboratory school

**Design & Implementation:** The Environmental Yard was begun in 1971 as an ongoing design and implementation project that continued for approximately a decade. The design evolved over this time with students working with teachers, Moore, and university students to continuously improve the Yard.

**Concept:** Classes at Washington Elementary are very hands-on and encourage learning through experiences with interaction with plants and animals. The idea for the Environmental Yard stemmed from the desire to bring the schoolyard up to the experiential quality of the classroom, transforming the schoolyard into a community and educational amenity.

**Program:** Within the Environmental Yard, there are a variety of spaces, ranging from typical playground areas to more natural areas. A large portion of the site is the Natural Resource Area. This area is widely diverse, allowing a variety of plant communities to emerge. Moore had a strong desire to bring into the site plant communities that may have existed on the site pre-asphalt and within the surrounding area. Sherwood Forest, a dense wooded area planted by students with parents and community members, and hills covered with meadow grasses were designed to capture the surrounding character. Bringing water into the site was important, so a pond and small rivers were carved out, providing a place for children to observe and learn first-hand about aquatic life. In the natural areas, the children created their experiences, shaping their learning through curiosity.

In order to accommodate a variety of activities, spaces were created to accommodate specific needs. Larger amphitheater spaces were located so classes could meet. Smaller alcove spaces were provided, creating spaces for small groups or individuals.

While much of the site was converted to natural areas, the Yard still accommodated typical playground activities. Some blacktop was left near the school building, providing children a place to play basketball or kickball, along with climbing equipment.

**Site Analysis:** Prior to the redesign of the schoolyard, the site was primarily asphalt, lacking vegetation and shade. Lack of separation from a busy road adjacent to the school created a noisy and visually exposed atmosphere. With the redesign of the site, many of the issues were resolved, including an increase in vegetation and shade. Separation was created between the school and the road through vegetated screening. Attention was paid to the microclimates within the schoolyard and the various plant communities. The designers looked at the area of the city that the school serviced, the surrounding neighborhood, and adjacent high-school campus (figure C.1). They also looked at the reasonable walking distance to determine where weekend users would potentially be coming from. Every aspect of the design was carefully thought out in order to meet the needs of the site and the community of users.

**Historical Context:** Washington Elementary School opened in the early 1900's. In 1909, there was an on-site garden that students would work in. In 1950, the school was rebuilt and the garden removed. Until the Environmental Yard was built, the schoolyard was mostly asphalt, uninviting, perceived as “boring” by the students, and rarely used by the community.

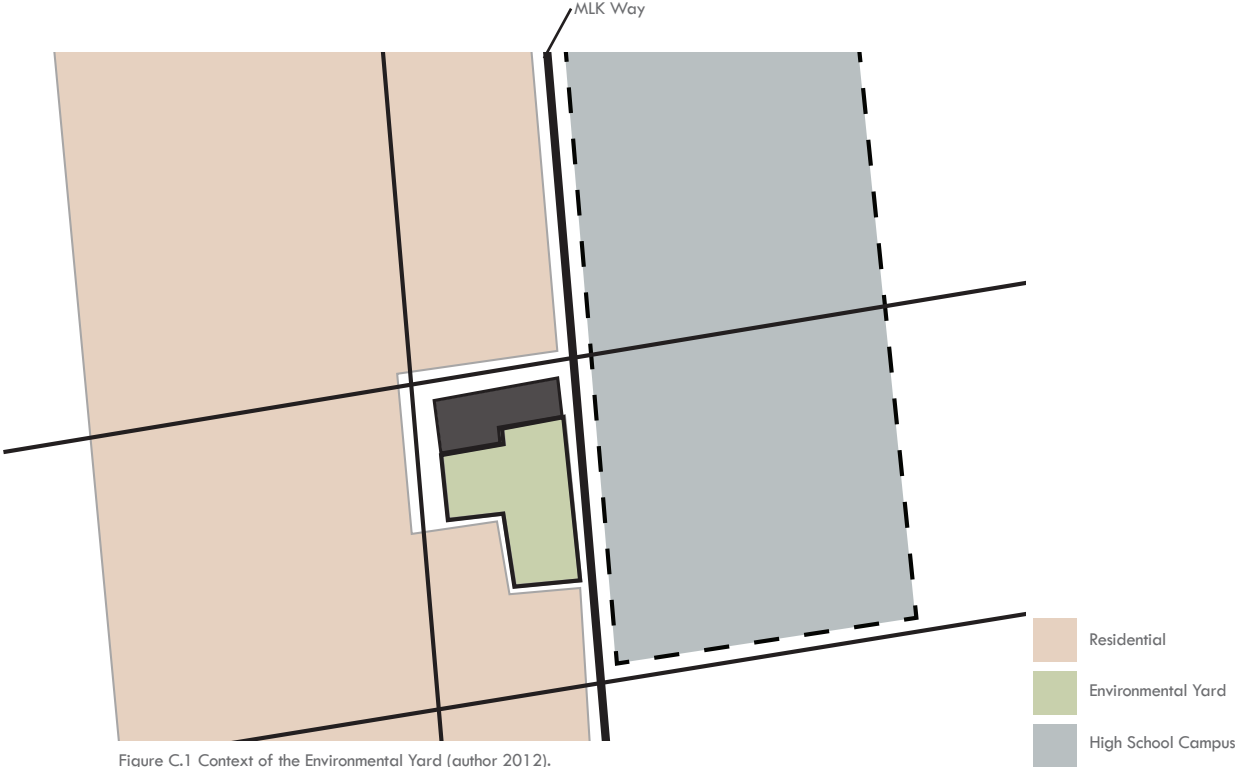


Figure C.1 Context of the Environmental Yard (author 2012).

### Pre-Environmental Yard:

Prior to the 1970s, the schoolyard of Washington Elementary was very much like a typical schoolyard. Asphalt covered much of the area, shown in figure C.2, allowing for games of basketball, kickball, and other activities to occur. This site however, was described by students as “boring”. With the lack of things to do, fighting was prevalent on the schoolyard. Moore and Wong saw an opportunity to change the dynamic of the yard.

### Environmental Yard:

In 1971, the process for redesigning and restructuring the schoolyard began. Much of the asphalt was removed, and almost immediately, plants emerged in the newly exposed soil, seen below in figure C.2. Working with the students and community, the site evolved into an ecologically rich learning landscape that had much more vegetation than the previous playground.

### After Environmental Yard:

In 1995-1996, Washington Elementary had to be restructured in order to meet earthquake standards. This meant that parts of the yard were removed and not replaced. As a result, portions of the site closely resemble what was present before the Environmental Yard was established. This transition is shown in figure C.2. In some areas, however, there are remnants of the Environmental Yard that the current principal continues to ensure are incorporated into classroom lessons.

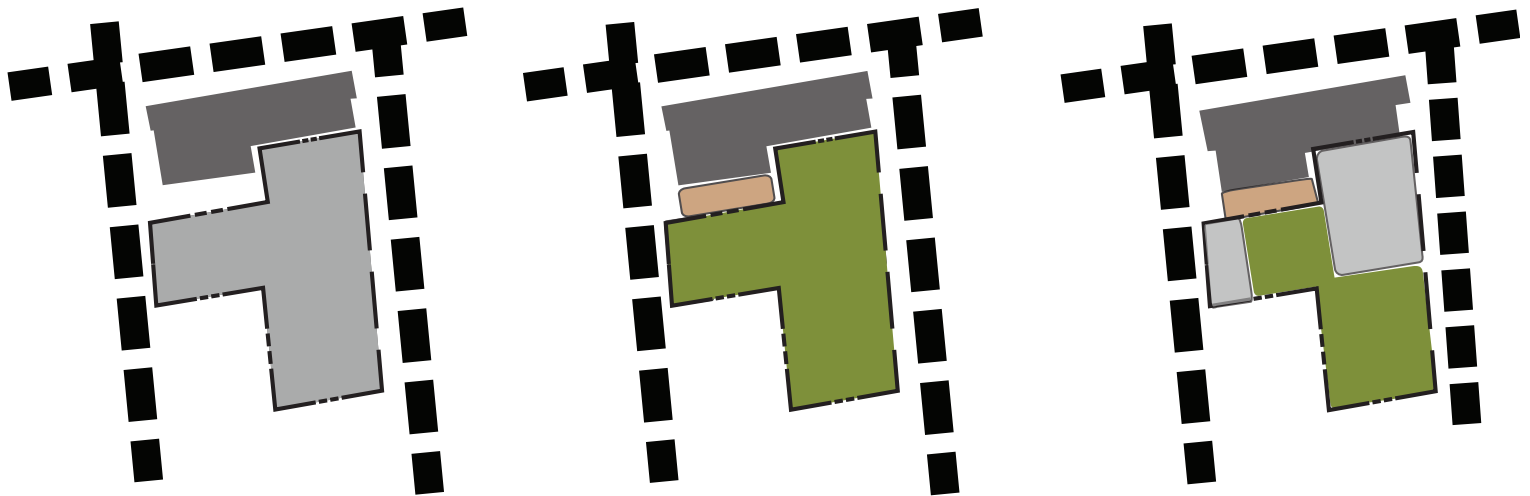


Figure C.2 Environmental Yard through time (author 2012).

**Relevance:** Many schools have a large asphalt area, lacking vegetated areas or grass for children to play in. Washington Elementary School serves as an example of how a typical schoolyard can be transformed from boring asphalt to an experientially rich learning environment. While the Environmental Yard was being designed and added to, the students were highly influential in the design. Teachers would work one-on-one with the students, while classroom activities would directly connect to the outdoor environment. Even though part of the Environmental Yard was removed when the school was restructured in 1995, the current principal has worked to ensure that the schoolyard continued to reflect the learning that was occurring in the classroom.

**Encouraging Learning:** The Yard was designed with the learning experience in mind. Staff and the designers paid close attention to ensuring that the landscape would reflect and enhance the learning that occurs within the classroom. Informal and formal learning were emphasized through interaction with the site. As the project evolved, it was realized that they were “creating a new form of recreative-educative urban landscape” that provided new ways for students to experience their environments (Moore & Wong, 32).

**Link to Research:** Through facilitating learning, social interaction, and environmental education, this schoolyard relates greatly to my project. The interactions that occur between students and with the environment support healing in the mental, physical, social, and emotional dimensions. The site provides opportunities for a range of play and learning styles. In many cases, teachers interact with students on a one-on-one basis. While portions of the site may prove to be over-stimulating for children with autism, the variety of spaces and activities provide an environment where children with autism can interact at their own levels, and choose the environment that they feel most comfortable in, while being able to interact with fellow students.

**Sources:**

Moore, Robin C. and Herb H. Wong (1997). *Natural learning*. Berkeley, California: MIG Publications  
 Moore, Robin C. "Healing gardens for children". In *Healing gardens*. Ed. by Clare Cooper Marcus and Marni Barnes. (1999). New York: John Wiley and Sons, Inc.  
 Solomon, Susan (2005) *American Playgrounds: Revitalizing community space*. Hanover: University Press of New England.

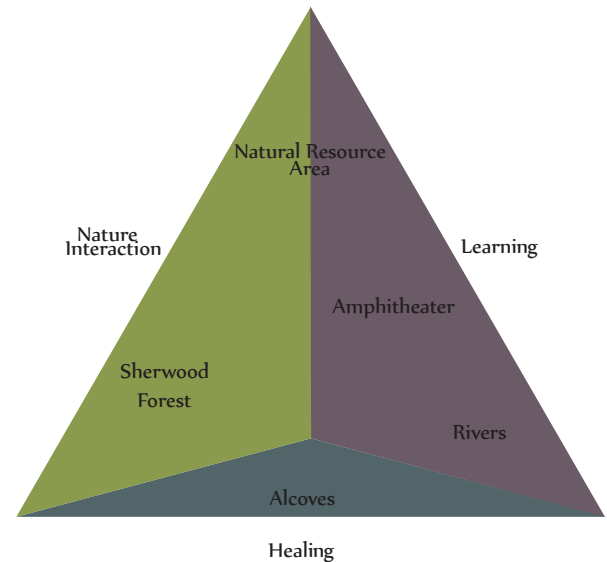


Figure C.3 Relation to driving concepts (author 2012).

**Diagram:** The Environmental Yard has a great emphasis on providing students with opportunities to learn and interact with nature, which is shown in figure C.3. Many of the spaces emphasize learning through interacting with nature. However, each space (except the Natural Resource Area) emphasize one aspect more than the others. While there are not any spaces that are specifically designed to be healing environments, through the experiences the children have, healing occurs incidentally. The alcoves that are tucked into the site provide a place for reflection and an escape from the surroundings, creating a healing environment.

## Dinosaur Park Houston, Texas

**Designers:** Parent organization, “Friends of Travis”; SPARK School Park Organization working in the Houston area to transform schoolyards into public parks; Scott Slaney, Landscape Architect

**Client:** Travis Elementary and the surrounding community

**Design & Implementation:** The “Friends of Travis” parents group formed in 1989 to set in motion the transformation of the school into a strong neighborhood asset. Redesigning the schoolyard began in 1989 and has been ongoing through 2011 as a SPARK project.

**Concept:** As the neighborhood that surrounds Travis Elementary school was declining, parents and community members came together to form the group, “Friends of Travis”, with the belief that “building a strong neighborhood school would build a strong neighborhood” (pps.org). They had a vision to turn the schoolyard into a community asset that would be used by both the school, and the people living in the community.

**Program:** Students at Travis Elementary provided input for the design of the Dinosaur Park through a project of designing their “ultimate playground” (pps.org). Through this participation, it was decided that the park would have an archaeological, artistic, and botanical theme. The park includes dinosaur play structures for climbing on, a rock climbing wall, a rock seating area for class meetings, and sandboxes. Beyond the dinosaur theme, the school also has typical play opportunities, including a four-square court and a play structure. In addition to what is associated with the Dinosaur Park playground, Travis Elementary accommodates a wide variety of outdoor activities. There is an outdoor classroom where presentations can be given, classes can meet, and students can gather before and after school. A butterfly garden and bird sanctuary provide opportunities for students to observe nature and working ecosystems, encouraging learning outside the classroom. There is also garden that provides students with the experience of planting, caring for, and harvesting fruits, vegetables, and herbs.

Another iconic element of Travis Elementary school is the giant chessboard that was built by Eagle Scouts. This chessboard has been beneficial to the students through thinking games, and improving the overall well-being of the students. “Chess does indeed strengthen a child’s mental clarity, fortitude, stability, and overall health” (pps.org). Having this large chess board in the schoolyard encourages all of these benefits of playing chess in a way that is more interactive and exciting for children.

**Location:** Travis Elementary is considered an urban school, located two and a half miles outside of Houston’s central business district in the historic Woodland Heights area (figure C.4). The neighborhood has many old live oak trees that shade the roads leading to the park. Dinosaur Park and Travis Elementary are said to be the “heart of the neighborhood” (pps.org), bringing the neighborhood together and creating a sense of place.

**Historical Context:** William B. Travis Elementary School was constructed in 1908-1909. In 1989, parents noticed that a lot of the families were moving out of the community to find better schools. The remaining parents formed the “Friends of Travis” group to transform Travis Elementary school into a community asset. The SPARK School Park Program selected this school as a project site, developing it into an asset for the community. Development began in 1992, and has been added to regularly.

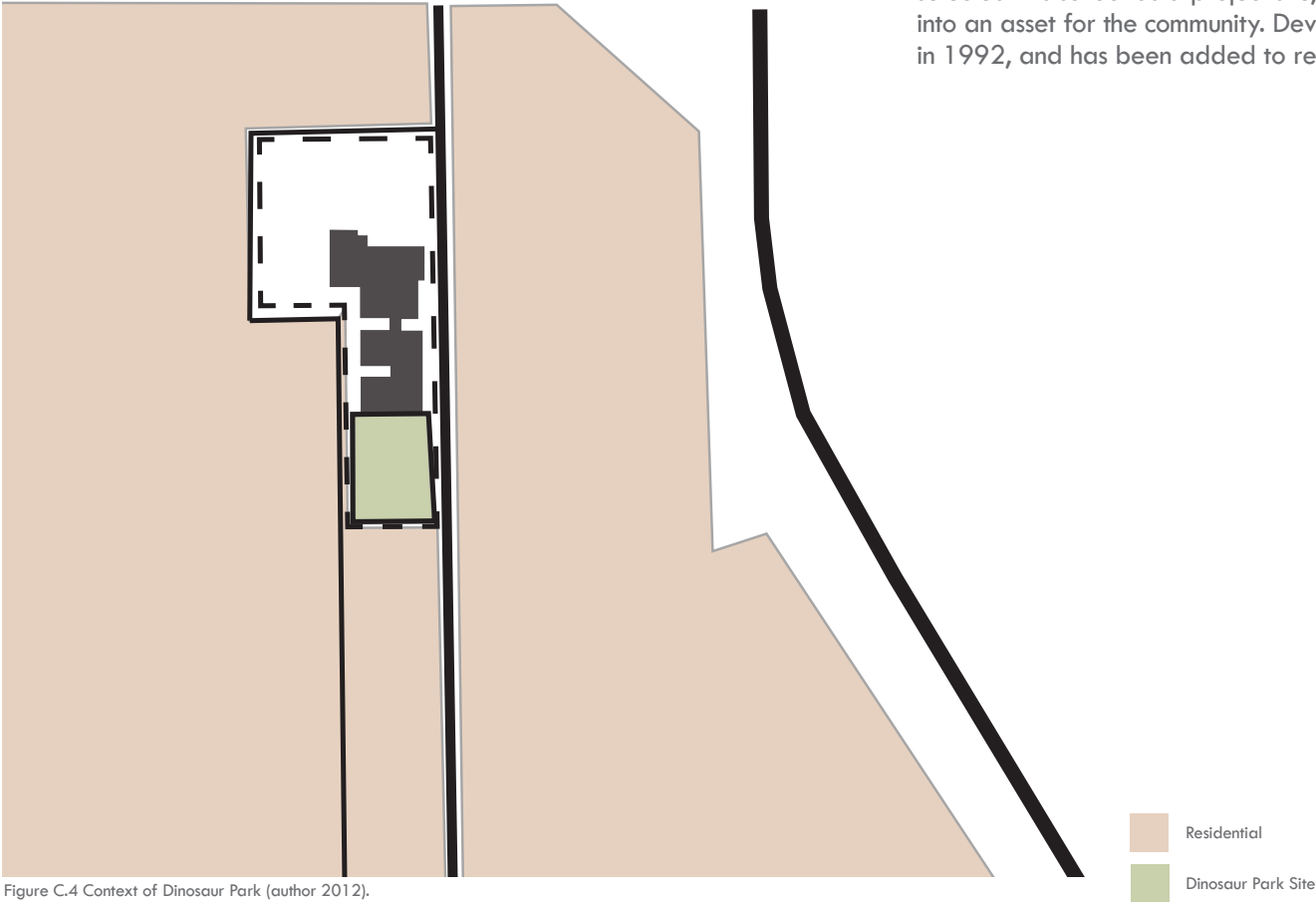


Figure C.4 Context of Dinosaur Park (author 2012).



**Relevance:** The schoolyard of Travis Elementary was re-designed with an emphasis on community involvement and interaction. This schoolyard is an excellent example of how a schoolyard located within a community can become an asset to all who live in the community. Many schoolyards feel off limits to people who do not belong to the school. Travis Elementary, however, embraces the community and encourages people to utilize the amenities.

**Encouraging Learning:** Both formal and informal learning are encouraged within Dinosaur Park and across the Travis schoolyard. There are areas where teachers often gather with their students for lessons, for example “Flintstone Village” and the outdoor classroom. Teachers also take their students to the gardens for hands-on experience. Children explore the schoolyard and learn various things from their own experience.

**Link to Research:** Travis Elementary’s schoolyard is an excellent example of how a schoolyard can be shared between school and community. It can be difficult to get approval for a schoolyard to be considered a community park. This landscape also accommodates a variety of students and users, while encouraging interaction with the environment and experiential learning.

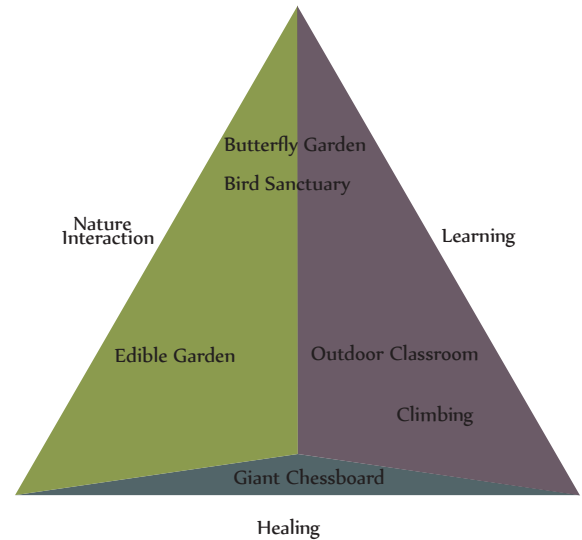


Figure C.5 Relation to driving concepts (author 2012).

**Diagram:** Dinosaur Park provides the students and the surrounding community with a landscape that provides learning experiences and interaction with nature in an area where park space was non-existent. The park encourages social interaction and learning through their environment. As seen in figure C.5, healing is not as emphasized in this landscape, as the other aspects the precedents were evaluated on.

**Sources:**

Ruthven, Les. (2003). “Project for public spaces: Travis Elementary School Dinosaur Park”. From [http://www.pps.org/great\\_public\\_spaces/one?public\\_place\\_id=608#](http://www.pps.org/great_public_spaces/one?public_place_id=608#)  
 Travis Elementary School. (2011). “Spark Park”. From [http://outdoors.traviselementary.org/?page\\_id=255](http://outdoors.traviselementary.org/?page_id=255)  
 Foster, Robin. (2011). “Travis playground is a community affair: School and neighborhood are intimately bound”. *The Houston Chronicle*.  
 From: <http://www.chron.com/business/homefront-neighborhoods/article/Travis-playground-is-a-community-affair-1354638.php>



## Inspiration Playground Bakersfield, California

**Designers:** Non-profit group, KaBOOM!, which builds playgrounds; input from children at the adjacent Valley Oaks Charter School; children with autism who attend the after school program at the Children's Discovery Center

**Client:** Kern County Museum's Children's Discovery Center, the local community, and students.

**Design & Implementation:** The Inspiration Playground in October of 2009, built in one day by more than 200 volunteers.

**Concept:** Construct a playground that provides sensory, social, and physical opportunities for children with autism to develop necessary skills, while providing a place for children to play outside at the museum.

**Program:** Emphasis was placed on the developmental and learning needs of children with autism. There are a variety of activities for both children with autism and typically developing children to participate in. The playground equipment was designed specifically for children with autism to stimulate the senses. The equipment is in bright, primary colors, and there are musical instruments to play with such as bells, chimes, horns, and drums that stimulate the auditory and visual senses. Typical play activities are accommodated through a four-square court, climbing equipment, and slides. There is also an outdoor classroom used by the supplemental autism after-school program.

**Location:** Kern Inspiration Playground is located at the Kern County Museum on 16 acres with over fifty historical buildings. The Kern Inspiration Playground is located outside the Kern County Museum's Lori Brock Discovery Center. As illustrated in figure C.6, the museum site is adjacent to a park and a Charter School, and a low density commercial and residential district.

**Historical Context:** The Lori Brock Discovery Center hosts a supplemental after school program for children with autism in conjunction with the local schools. The museum was opened in 1976 to provide children with hands on experiences.

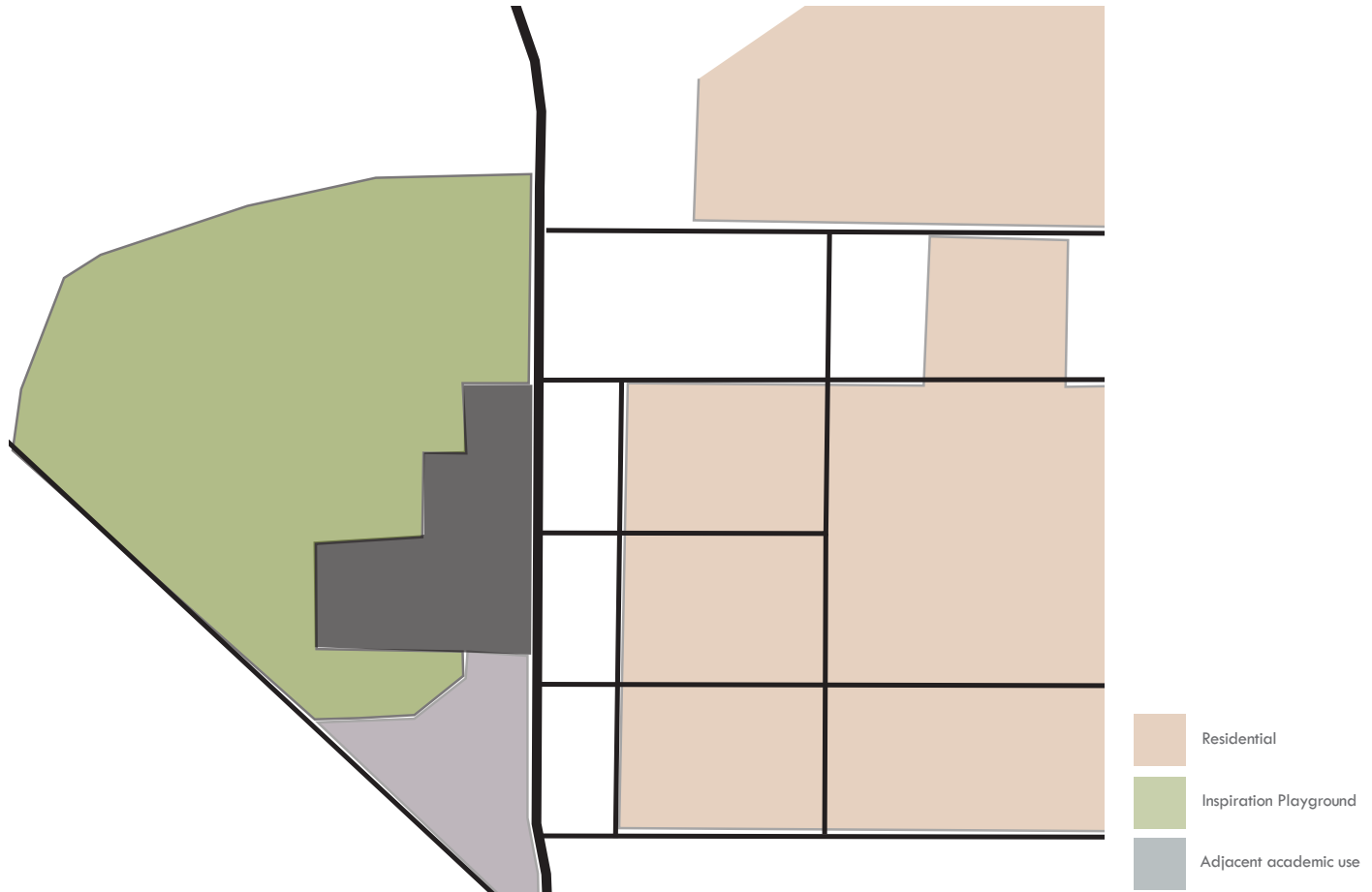


Figure C.6 Context of Inspiration Playground (author 2012).

**Relevance:** This landscape was designed with the primary audience being children with autism. Because of the varying functional levels of children with autism, it can be difficult to include all children in the design of a landscape. The site is at a public museum, but the site is not open to the surrounding community except for students at the adjacent school and the students who participate in the after-school program.

**Encouraging Learning:** Children with autism have different learning and developmental needs than typically developing children. Focus is placed on children with autism learning social skills, behavior, language, self-help, and fine/gross motor skills. Inspiration Playground places emphasis on allowing children with autism to learn skills they need for life. For typically developing children, the site does not seem to present opportunities for learning beyond social skills, but does provide a place for children to play outside when visiting the museum.

**Link to Research:** Inspiration Playground is a landscape that is “successful” at being a landscape that encourages learning and skill building in children with autism. Though it incorporates manufactured play structures, the site encourages learning and interaction, both formal and informal. For children, especially those with autism, the site facilitates healing in the mental, physical, social, and emotional dimensions. The playground was designed with the developmental and social needs of children with autism in mind, and is successful at catering to the needs of children with autism without segregating them from the larger population of children.

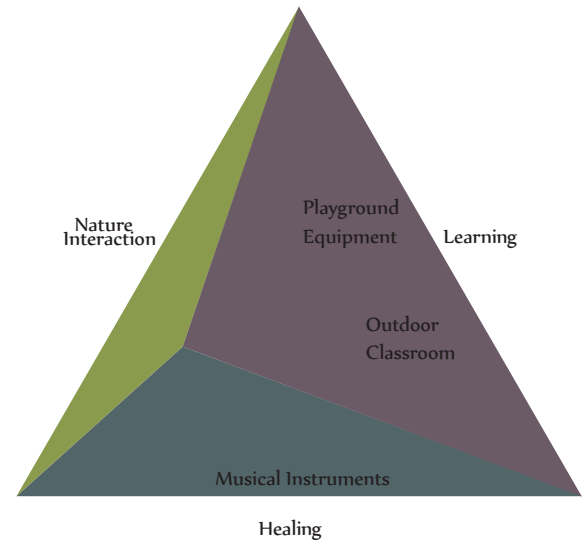


Figure C.7 Relation to driving concepts (author 2012).

**Diagram:** Inspiration Playground is a learning environment for children with autism. The equipment in the landscape promotes social, motor, and cognitive skills. As shown in figure C.7, there is little evidence that children are encouraged to interact with nature within the park. The playground is a type of healing environment for the children who attend the museum. By providing the children a place to play, it becomes a healing environment that improves their overall well-being.

**Sources:**

KaBOOM! “Supplemental Autism After-School Program Playground” last modified 2011. <http://playspacefinder.kaboom.org/>  
Kern County Museum. “Pioneer Village”. last modified 2011. [www.kcmuseum.org](http://www.kcmuseum.org)  
Patteson, E. “Playground goes up in a day with volunteer power,” Bakersfield.com, October 29, 2009.



## Sequential Outdoor Learning Environments Conceptual Landscape

**Designers:** Artemis Landscape Architects, Inc.;  
Principal/founder of Artemis, Tara M. Vincenta

**Client:** Communities and organizations that cater to the needs of children with autism, who wish to have a landscape that is designed for those needs.

**Design & Implementation:** Artemis Landscape Architects, Inc. won an ASLA award for the concept of the Sequential Outdoor Landscape in 2009. The concept of SOL is examined with this study, without a specific built environment.

**Concept:** Create a conceptual plan and idea for the design of a landscape that “supports children and families living with the challenges of autism and other special needs. These unique spaces, which are equally engaging for any child, offer a fun, safe and secure outdoor play and learning environment, while also presenting an array of opportunities to overcome common challenges” (from solenvironment.org).

**Program:** There are nine spaces within a SOL environment, each with its own program. At the beginning of the sequence is a small amphitheater for quiet activities. Next is a space that emphasizes building motor skills through climbing and balance activities primarily. A horticultural therapy space is provided, which builds motor skills, social skills, and emphasizes the senses. A nature trail allows children to have hands-on interaction with nature. Following the nature trail is a pet therapy area where animals are introduced through sound boards as well visual, textural and programmed introductions in safe environment. A challenge path has elements that encourage balance, strength, motor skills, and coordination allows children to also interact with nature. The “Mole Hill” area is a play area with tunnels and sensory experiences to help children with autism overcome sensitivities while building motor skills. The aquatic environment allows children to learn about the ecosystems while engaging in their environment. The final area of the SOL environment is the playground that provides a variety of opportunities for play to occur among children regardless of abilities.



**History:** The Sequential Outdoor Learning Environment was envisioned by Tara Vincenta as a place to connect children with autism and other disabilities with nature. After learning more about therapeutic landscapes, Vincenta developed an interest in how landscapes could be designed for children with autism so they could interact with nature while developing necessary skills. She worked to understand the therapies that are used for children with autism so she could understand how to bring what is taught in the classroom out into the landscape.

**Sequential Spaces:** The series of spaces in a SOL environment start out simple and increasingly gets more complex. As you progress through the landscape, different skills and activities are emphasized, as illustrated in figure C.8. Transitions are very clear, and there are a series of maps. This is because children with autism need the sense of clarity for where they are and what activities are occurring.



Figure C.8 Layout of the Sequential Spaces (diagram by author 2012, after Artemis, 2009).

**Relevance:** The concept for the Sequential Outdoor Learning environment stemmed from a desire to create a therapeutic learning landscape for children with developmental disorders such as autism. By learning about autism and the needs and complications associated with autism, a comprehensive plan was created that caters to the needs of this growing population. The design for these landscapes goes beyond an all-inclusive or accessible playground to design specifically for one group of children without segregating them from the larger population.

**Encouraging Learning:** The Sequential Outdoor Learning environment concept emphasizes helping to develop the skills that children with autism struggle with. The landscape is specifically designed to encourage children with autism and other special needs to interact with their environment and peers. Opportunities for formal and informal learning are found throughout the series of spaces in various forms, from learning life and developmental skills to learning about the surrounding plants and animals.

**Link to Research:** Sequential Outdoor Learning environments are a clear healing environment for children with autism. The designer emphasizes the effect landscapes have on well-being through social, emotional, physical, spiritual, and mental healing. The way the SOL environments capture the attention of children and gradually introduce new experiences while building social and developmental skills creates a highly therapeutic and educational environment without necessarily being at a healthcare institution or school. The approach taken for designing an educational landscape for children with autism can be explored and adapted for various spaces.

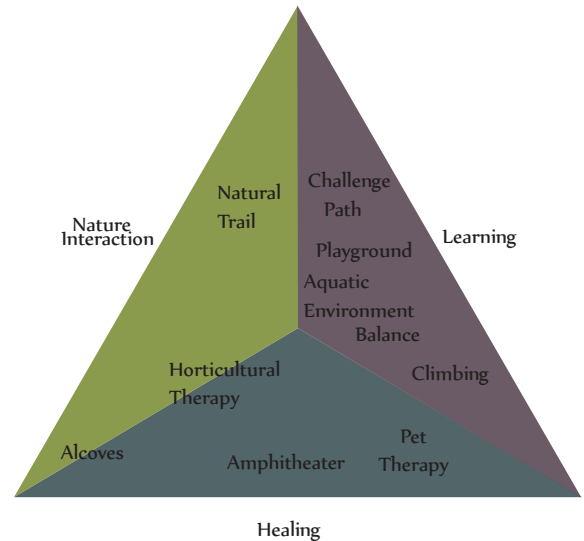


Figure C.9 Relation to driving concepts (author 2012).

**Diagram:** Sequential Outdoor Learning environments provide a balance between nature interaction, learning, and healing, shown in figure C.9. The site is specifically designed with the needs of children with autism in mind, along with the needs of all other children. SOL environments emphasize learning primarily, both through interaction with nature and through developing skills. Healing elements are incorporated with the activities that occur in the SOL environments.

**Sources:**

Artemis Landscape Architects, Inc. 2011. Sequential Outdoor Learning Environments. From solenvironments.org



## Unlimited Play Saint Charles, Missouri

**Designers:** Non-profit organization Unlimited Play

**Client:** Communities and families with the target group being designing for children with special needs

**Design & Implementation:** Throughout the Saint Louis/Saint Charles area, Unlimited Play has built four all-inclusive playgrounds

**Concept:** To “design and build fully accessible playgrounds that allow children--regardless of their abilities--to play together” because children, no matter their disability or challenge, love to play. The goal of Unlimited Play is to design playgrounds that all children can enjoy.

**Program:** Emphasis was placed on ensuring that children with a range of abilities would be able to enjoy and experience the playground in its entirety. There are a variety of activities for both children with special needs and typically developing children to participate in together. The playground equipment was designed specifically for children with special needs, including both climbing equipment and slides along with wheelchair accessible ramps. The equipment is in bright colors, themed to be of interest to children such as insects and castles. Musical instruments to play with such as bells, chimes, horns, and drum are included in the design which stimulate the auditory and visual senses.

**Location:** Unlimited Play is based out of O’Fallon, Missouri. They have completed parks in the Saint Louis area in Lake Saint Louis, Saint Charles, Clayton, and O’Fallon. These parks are located near residential areas, so they are accessible by residents to make these community parks.

**Historical Context:** Unlimited Play began in 2003 with the goal being to create playgrounds where all children could play together. Traditional playgrounds have barriers that prevent children in wheelchairs or impairments from being able to partake in the play activities with other children. Unlimited Play removes these challenges, allowing for more interaction and play opportunities for children with special needs.

**Relevance:** Unlimited Play playgrounds strive to include children of all needs and abilities into the important aspect of childhood- play. Children with autism have various impairments and needs.

**Encouraging Learning:** Unlimited Play playgrounds encourage learning not only in children with disorders, but also typically developing children. At one of the parks, imprinted on the play equipment is the alphabet in sign language, encouraging children to learn sign language as a play activity, rather than it being something that is forced in the classroom. Other learning experiences include the learning that occurs naturally as children explore their environment, and learning to help and accept those who are different.

**Link to Research:** Unlimited Play ensures that the playgrounds that they design and build in communities are accessible and enjoyable by all children. Children with autism have various needs and abilities that can keep them from being able to enjoy traditional playgrounds. By considering the needs of all children, the playgrounds that Unlimited Play designs encourages interaction among children and helps to desegregate children with special needs from typically developing children.

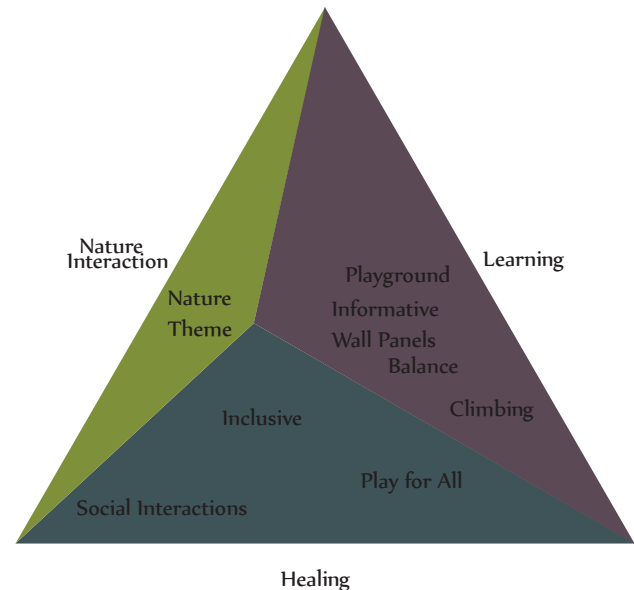


Figure C.10 Relation to driving concepts (author 2012).

**Diagram:** Unlimited Play playgrounds are learning environments for all children. There is an emphasis on learning and healing within these playgrounds, with less emphasis placed on interacting with nature, as seen in figure C.10. While natural elements may not be included as part of the playgrounds, some of the parks themes are inspired by nature.



# Appendix D

Process Diagrams



## Design Philosophy

With every project I have completed in my five years as a Master's student, I have strived to consider the experience created through aspects of health, learning, exposure to nature, and connecting to the community (figure D.1). I feel strongly that nature, health, community, and learning should be emphasized in every design. Improving the human and natural components of the environment through the design process creates a balance between the experience users have and the benefits to the environment. There are close interactions and ties that occur between these four ideas, and they should be brought together in design across scales.

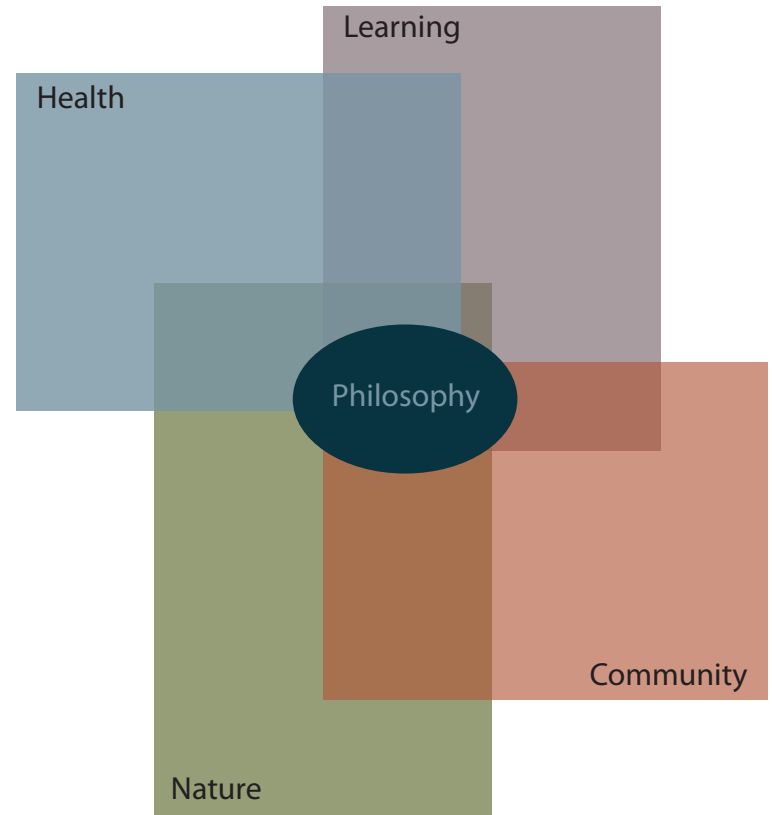


Figure D.1 Design philosophy (author 2012).

## Project Philosophy

Interaction with nature provides children with unique learning experiences, appreciation for nature, and improved well-being. Designing sites that encourage children to interact and learn from their surrounding encourages them to be environmentally conscience as adults (Lewis, 1996). For the philosophy directly tied to this project (figure D.2), healing, learning, and ecology, when acknowledged from the start, entwine with the process of design, and in the end come out in the final design and interaction with the built product.

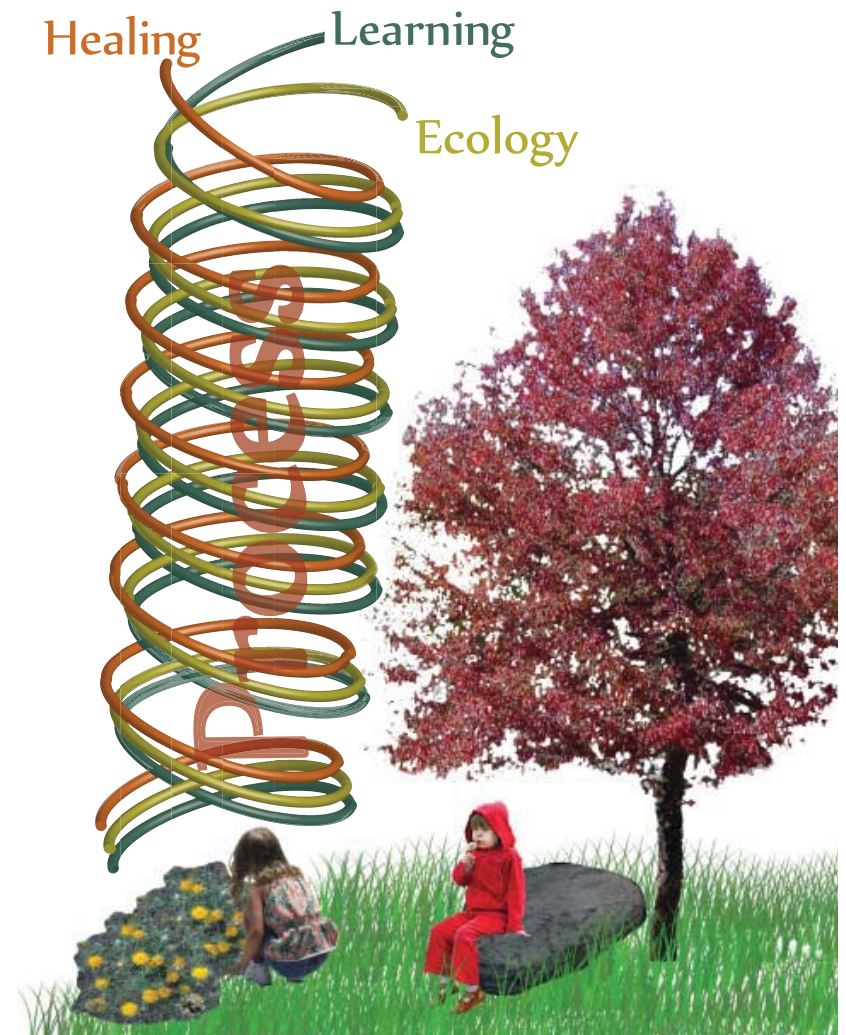


Figure D. 2 Project philosophy (author 2012).

# Process

## Task, Time, Path

The project path (shown in figures D.3 and D.4) began with a wide breadth of research, helping to shape the focus of the project. Under the Landscapes of Learning umbrella, I faced a challenge of how to bring my interest of therapeutic landscapes into a learning landscape.

Focusing on designing a landscape for children with autism allowed me to explore how a schoolyard could provide a therapeutic effect on those challenged with autism. Through a process of researching literature and precedents, the project became more refined, moving into site specific questions and challenges. Though a primarily linear process, there was a constant cycling occurring relating back to the larger questions and research, helping to link from early stages of the project to the development of the design.

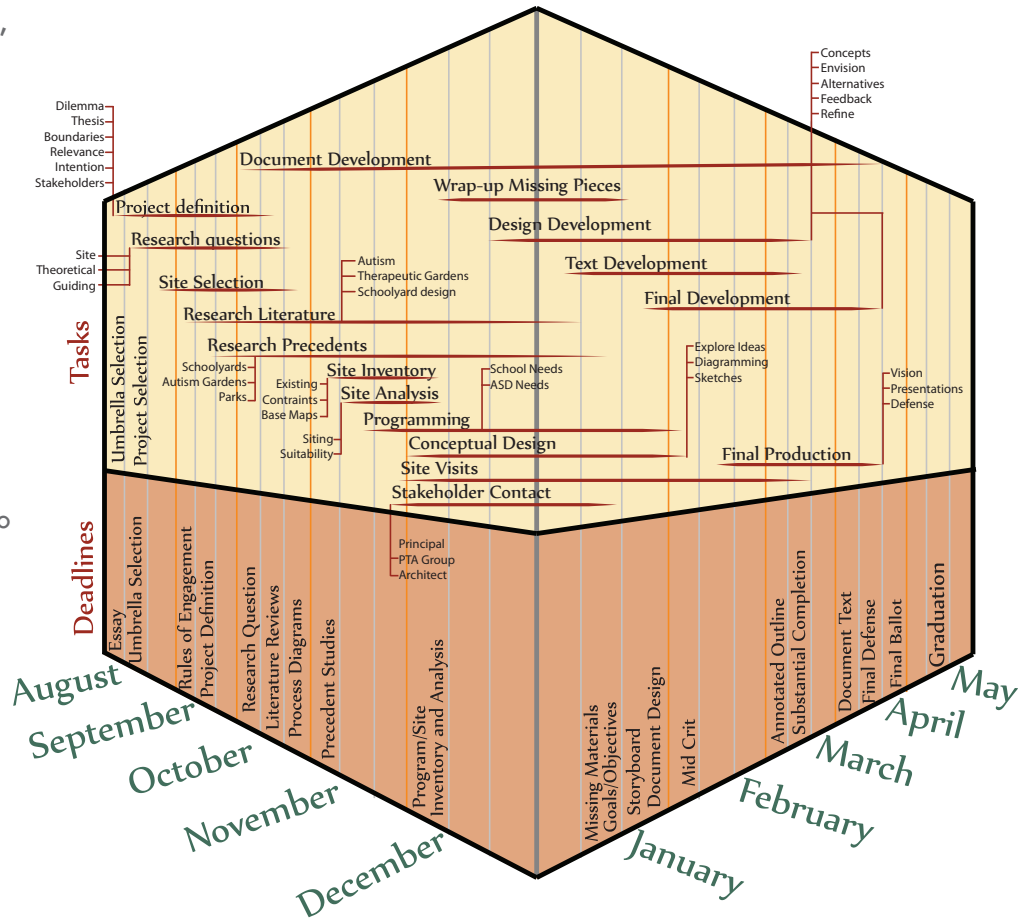


Figure D.3 Time, tasks, and path process diagram (author 2012).

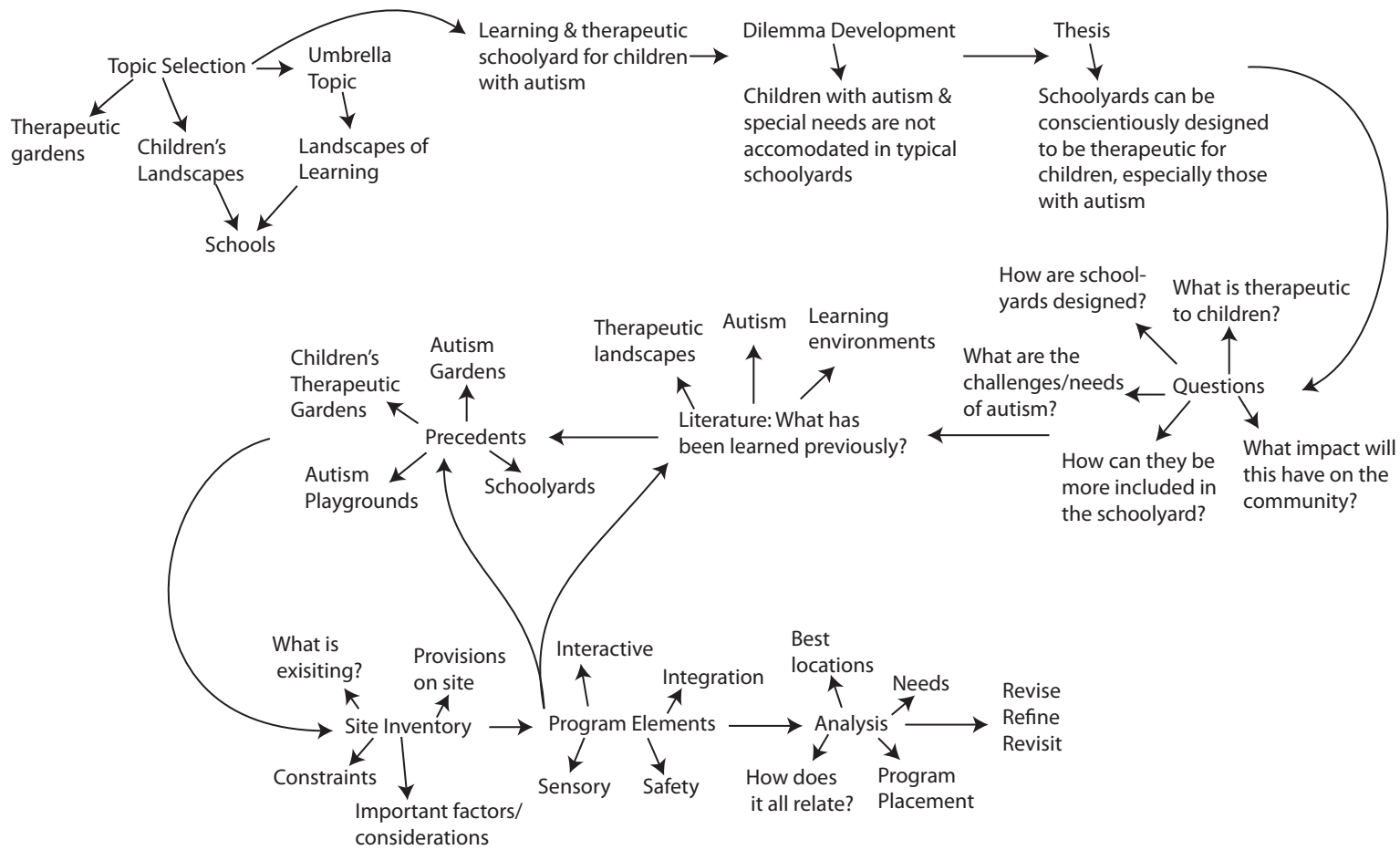


Figure D.4 Process (author 2012).

	Goals	Facts	Concepts	Needs	Problem
<b>Function</b> People Activities Relationships	Accommodate special needs; ADA accessibility; Experience for all children; Emphasize inclusion and needs for autism	Schoolyard; Accommodate PE classes; Approximately 455 children attending school; Approximately 20 children with autism	Natural play area; Sensory integration; Individual and group learning and play spaces	ADA accessibility; Connection to Autism Suite classroom; More interaction with surroundings	Accommodate the needs of all children with varying abilities; Provide opportunities for both structured therapies and for play; Meet community needs, school needs, and children's needs; Facilitate and encourage learning
<b>Form</b> Site Environment Quality	Natural elements; Existing Topography; Maintain creek corridor integrity	Bordered by school; Neighborhood and wooded creek area; Sunny site; Large, flat areas; Steep hills along building	Structure; Natural; Clear activity areas; Clear divisions between activities	Structure; Low maintenance; Interactive; Spectrum of shade and sun	Keep the integrity of the neighboring creek in tact; Use plantings and landform to shape and define space; Maintain visibility
<b>Economy</b> Initial Budget Operating Costs Life Cycle Costs	Low-cost; Local materials; Community and school	Public school funding; Efficient costs; Labor can be done as class projects/parent groups	Funding from outside sources; Using existing/local materials; Natural elements; Versatility; Phasing	Approval by school board; Community approval; Affordability; Feasibility by class/teachers/parent groups	Design with keeping in mind the feasibility of funding without restricting the exploration of ideas and solutions that speak to the larger goal of creating a landscape that is beneficial in health and learning for all students
<b>Time</b> Past Present Future	Improve existing conditions gradually; Phasing over period of time; Most beneficial and needed first	Currently used by school and community; Number of children with autism is increasing	Phasing; Maintaining existing as new is built/planted	Flexibility; Dynamic to fit school needs	With increased numbers of children being diagnosed with autism, and children coming from across the area to Amanda Arnold for the Autism Suite, the necessity of this project will become more evident

Table D.1 Pena Matrix adapted from Pena 2001 (author 2012).

## Connection to Health & Autism

To begin to understand how the schoolyard can be therapeutic for children with autism, I looked at the primary characteristics of both autism and healing (figure D.3). Children with autism benefit from sensory stimulation, through visual, textural, and auditory activities. Building cognitive, social/communicative, and motor skills are important and are often emphasized in classes and therapies for autism.

Along with looking at how elements of the schoolyard can be beneficial to children with autism, I also research how different types of healing can occur in the environments people spend time in. Lewis (1995) identifies mental, physical, emotional, and physical healing as four types of healing that occur in everyday environments.

In order to create a therapeutic landscape for children with autism, specific program elements were selected (based on previous research) to be beneficial to the health and development of children with autism.

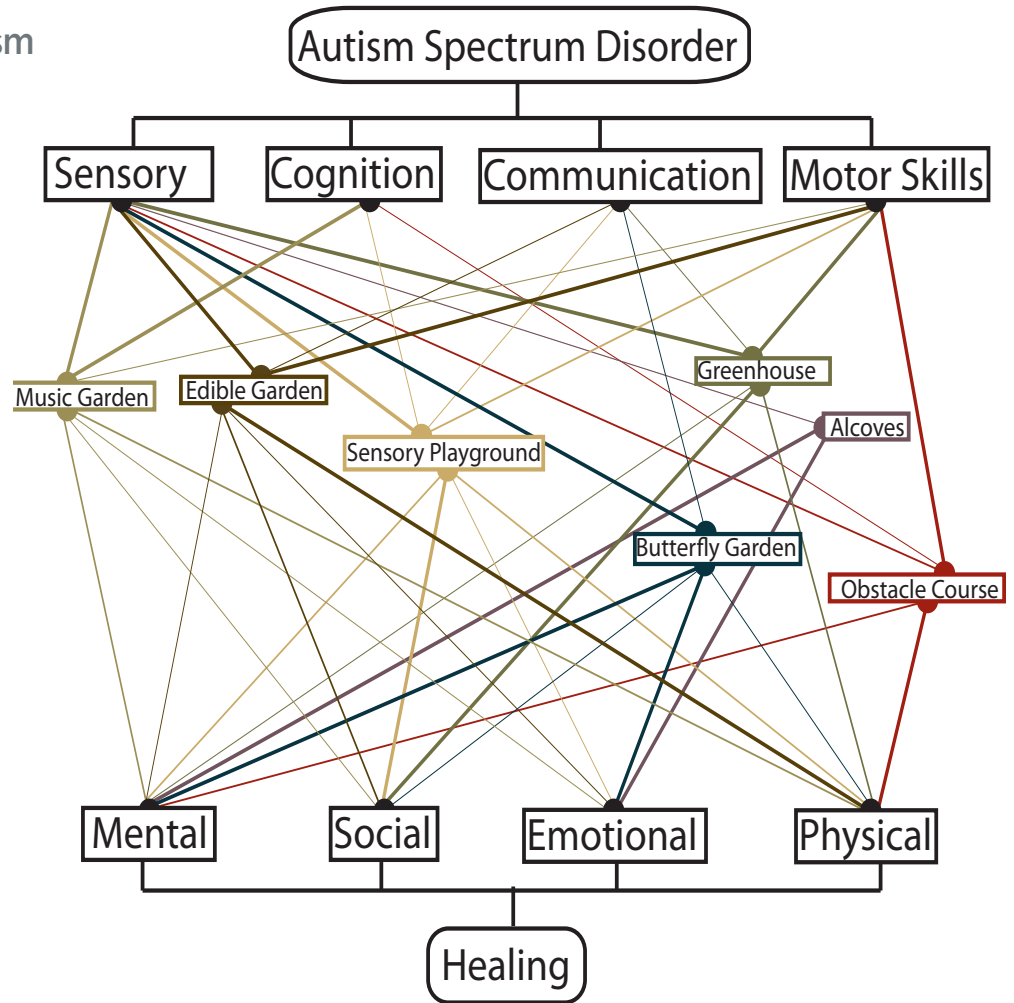


Figure D.5 Relationship between program elements and benefit on health and autism, Adapted from interpretation of research (author 2012).





# Appendix E

Glossary

# Glossary

## Autism Spectrum Disorder (ASD)

“a constellation of behaviors indicating social, communicative, and behavioral impairment or abnormalities. The essential features of ASD are impaired reciprocal social interactions, delayed or unusual communication styles, and restricted or repetitive behavior patterns. (CDC 2012)

## Healing

Relief from physical symptoms, stress-reduction, and improvement in the overall sense of well-being (Clare Cooper Marcus and Marni Barnes)

## Healing Landscape:

“Plant dominated environments...associated with hospitals and other healthcare settings....accessible to all, and designed to have beneficial effects on most users....may be further divided into specific types of gardens including therapeutic gardens, horticultural gardens, and restorative gardens” (American Horticultural Therapy Association)

## Pervasive Developmental Disorder (PDD)

“a group of disorders characterized by delays in the development of socialization and communication skills” (US Autism 2012)

## Restorative Landscape

Public or private landscape that “employs the restorative value of nature to provide an environment conducive to mental repose, stress-reduction, emotional recovery, and the enhancement of mental and physical energy....focuses on the psychological, physical, and social needs of the users” (American Horticultural Therapy Association)

## SCERTS Model

“a comprehensive, multidisciplinary approach to enhancing communication and socioemotional abilities of children from early intervention to the early school years....prioritizes Social Communication, Emotional Regulation, and Transactional support as the primary developmental dimensions that must be addressed in a comprehensive program designed to support the development of children with ASD” (Prizant, Wetherby, Rubin, and Laurent 2003)

## Well-being

Positive physical, mental, emotional, social, and mental health (Lewis 1996)





**THERAPEUTIC SCHOOLYARD**  
Design for Children with Autism

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