

# EXPLORING THE SCHOOLYARD

POTENTIALS FOR CREATING A LEARNING-RICH ENVIRONMENT AT BERGMAN ELEMENTARY SCHOOL

by

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# Abstract

The landscapes that surround our elementary schools today do very little to support the education being taught in the classrooms, and often fail to meet the most basic needs of children. This is due to a myriad of different reasons, such as budget-tight school districts spending very little of their resources on outside learning environments, fear of litigation leading to sterile and lifeless schoolyards, and lack of time and resources for educators to implement desired changes. Children learn through direct interactive experience and, as a result, they need complexity and variety in the landscape to stimulate their imaginations and promote self-guided learning. A natural outdoor environment is ideally suited for both interactive learning and a diversity of experiences. Many schools are missing an opportunity to make their outdoor spaces into interactive learning environments.

This report explores the issues and opportunities to create stimulating environments at Frank V. Bergman Elementary School in Manhattan, Kansas. Numerous studies have identified the benefits of interactive natural environments on children's development and academic performance (Moore and Wong 1997; Louv 2008; Bell and Dymont 2006; Fjortoft 2001; Malone and Tranter 2003). Building upon this research, goals and objectives for Bergman's schoolyard are outlined that focus on creating a positive learning environment for all students, supporting school curriculum, encouraging interaction with nature, and linking the schoolyard to the surrounding community.

A master plan for Bergman's schoolyard is presented. The plan addresses the current needs of the schoolyard to improve accessibility. In addition, the master plan presents ideas for strengthening the circulation pathways to connect all areas of the schoolyard together, developing outdoor classroom spaces with connections to state academic standards, and incorporating community amenity features into the landscape. Recommendations for construction, maintenance, and phasing are suggested.

*To April  
for her love  
and support*

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I want to express my appreciation to my studio-mates, for their friendships and honest opinions.

Finally, I would like to thank Addisyn, Connor, and Logan whose innocence and laughter got me through many stressful times.



## NATURE

Oh nature I do not aspire  
To be the highest in thy quire,  
To be a meteor in the sky  
Or comet that my range on high,  
Only a zephyr that may blow  
Among the reeds by the river low.  
Give me thy most privy place  
Where to run my airy race.  
In some withdrawn unpublic mead  
Let me sigh upon a reed,  
Or in the woods with leafy din  
Whisper the still evening in,  
For I had rather be thy child  
And pupil in the forest wild  
Than be the king of men elsewhere  
And most sovereign slave of care  
To have one moment of thy dawn  
Than to share the city's year forlorn.  
Some still work give me to do  
Only be it near to you.

-Henry David Thoreau

## Preface

I have always loved nature. My childhood is filled with fond memories of hiking through the deciduous forests near my home in Maryland, swinging Tarzan-style from the mature willow tree at grandma's house, and climbing to the summit of mountains in the Appalachians with my scout troop-where I could see for miles and watch the eagles fly below me closer to the forest canopy. I loved learning about science and nature in school. I remember how exciting it was to learn about the environment in school and then experience it in outings with family and friends, rattling off all I had learned along the way. These experiences with nature are a cherished part of my childhood and are, at least in part, the reason I am in landscape architecture today.

Now, with three small children of my own, I am becoming increasingly concerned that they will not be given the same types of experiences with nature as they grow up. Several studies have shown an alarming trend that children are spending less time outdoors than in generations past (Moore 1997). Reasons for this trend include: an increase in traffic dangers with little thought given to pedestrian needs, fear of child abductions, a lack of available play spaces for children in residential areas, a reduction of children's playtime both at school and by more tightly structured out-of-school schedules, a growing number of single-parent families and families where both parents work, the growing availability of electronic media, and the commercialization of play by for-profit organizations (Moore 1997).

Richard Louv, chairman of the Children & Nature Network and author of bestselling book *Last Child in the Woods*, claims that our children are suffering from a nature-deficit disorder. The symptoms of this phenomenon are a diminished use of the senses, attention difficulties, and higher rates of physical and emotional illnesses (Louv 2008). In short, children today are not receiving the benefits of personal interactions with nature.

As my oldest child comes closer to entering Kindergarten, I began to wonder if could be done to merge nature and school to create a more engaging place for children to learn and to play. Many of the schoolyards we see in neighborhoods today are devoid of interesting natural features. Greening our schoolyards can be a way for children to have daily interactions with nature that will both excite their imaginations and support their formal learning activities. The first chapter of this report will show that children, like all people, learn by experience and interaction with their environment; so creating a place filled with objects that children can explore and discover will support the educational goals of the schools.

### Selecting a School

The landscape architecture profession is at the forefront of community design and development. My education in this field has instilled in me an enthusiasm for strengthening the communities in which we live. As a result, it was important that I work with a school that had real needs for improving their school grounds. I began my search by visiting the elementary schools here in Manhattan, Kansas and researching them online. As I looked over the site plans for several of the schoolyards, I was disappointed with the lack of vision that was demonstrated for the design of the places these children are to occupy (see fig 0.1). I feel that our children deserve more exciting play and learning spaces than what we are currently giving them (I wonder who first made the decision that asphalt surfaces would be the most appropriate play spaces for children)?

After visiting all the elementary schools in Manhattan, I contacted three of the schools that I felt had the greatest potential for exploring new design concepts. The principal at Frank V. Bergman Elementary school (see fig 0.2) responded with needs relating to the site plan.



Figure 0.1 - Bergman Elementary School site plan. Author, 2011.

*Thoughts on Working with Public Schools*

It was brought up very early in this process that implementing changes to a schoolyard could be more easily done at a private school, where more resources are available. However, it was important to me that I focus on public education for several reasons. First, public schools serve a greater population of children than private schools. I wanted this project to inspire many people to think about how changes can be made to their schools. Second, public schools have tremendous potential for bringing communities together. Schools serve the neighborhoods that surround them and they offer an assortment of activities and programs for community members to work together and socialize. I wanted a project that would strengthen communities and bring people together.

Public schools offer their own set of challenges, too.

Admittedly, I have no direct experience working on the administrative end of public schooling, but I do know that it can be extremely difficult to try to make changes that affect the existing framework. In addition, super-tight budgets that do not allow for flexibility and change do little to improve the situation. Conversations with the principal at Bergman and with several professors have assured me that these challenges are in full effect in Manhattan's school district today. Despite these difficulties, I believe there are devoted parents, teachers, and community members that are willing to work together, become involved, and sacrifice to make essential changes that will benefit our children.

*Personal Goals*

My goals for this project are, first, to explore how schoolyards can be better designed to meet the learning and developmental needs of children. This is accomplished primarily through in-depth research of childhood development, educational theories, and the impact of nature on both. My second goal is to inspire designers, educators, parents, and children to change the way we traditionally view schoolyard design to include environments where children can explore nature, interact with their surroundings, and learn in ways that suit each individual's needs. This will be accomplished through a redesign of Bergman's schoolyard.

*Process*

I acknowledge that the process I went through for this master's report conflicts with the ideal process that should be used to make changes to a schoolyard (see fig 0.3). Time, or the idea that the making of a schoolyard should be an evolutionary process, is a critical component that was lost in this project; mostly due to the academic deadlines that had to be met. Schoolyard design should involve the public; especially the students. Parents, teachers, administrators, and community members should all be involved in the decision making process (see fig 0.4). Because of the scope of my report as an academic endeavor with specific time constraints, public involvement was limited to a few conversations with the principal and PTO members, and a questionnaire, distributed to interested parties.

**Legend**

- Frank V. Bergman Elementary
- Kansas State University
- City of Manhattan, Kansas
- Road

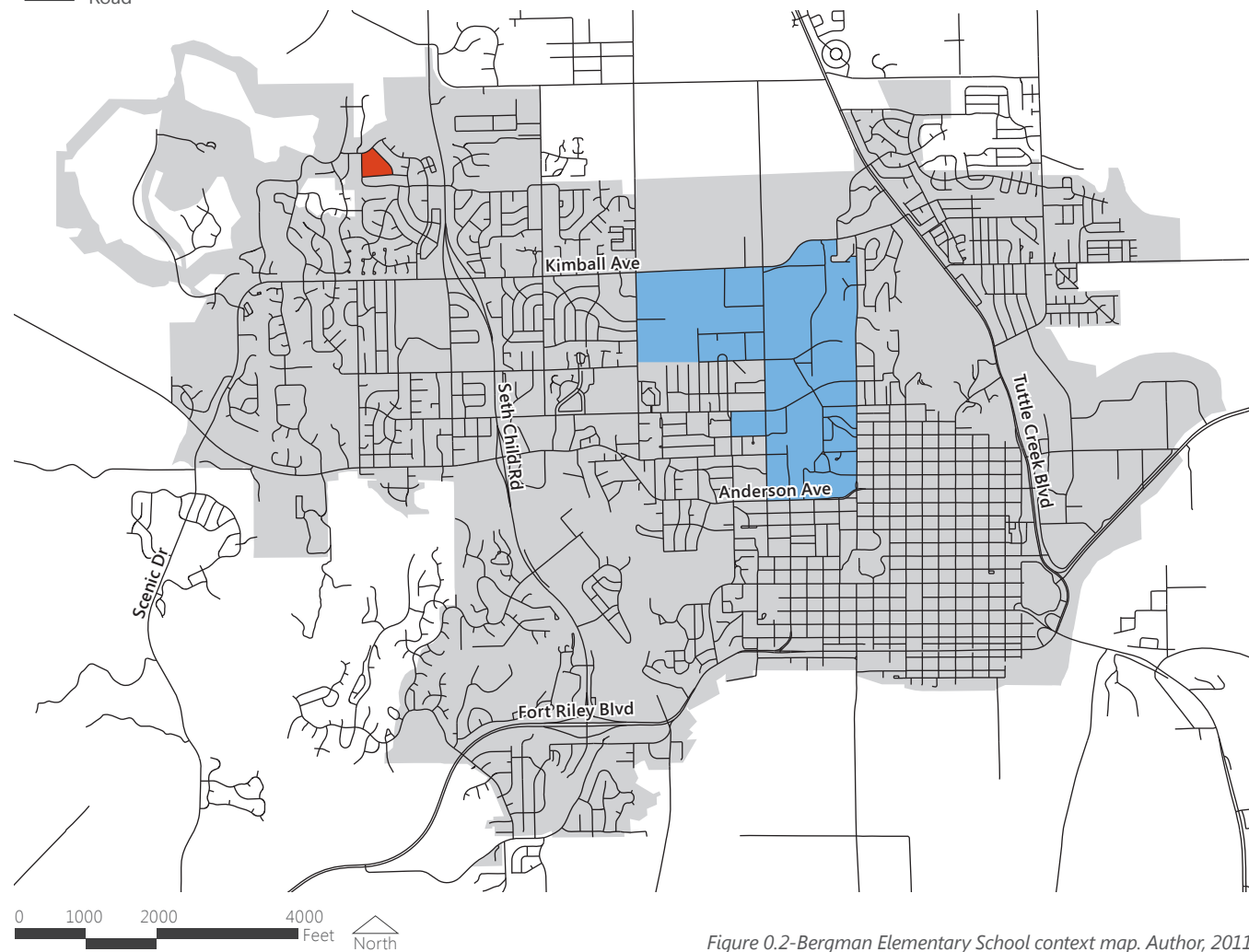


Figure 0.2-Bergman Elementary School context map. Author, 2011



Figure 0.3- Master's report process. Author, 2011.

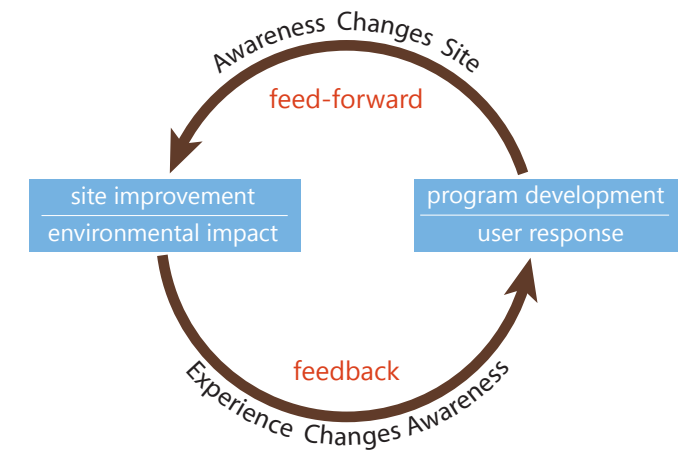


Figure 0.4-Schoolyard evolutionary design process. Adapted from Moore and Wong 1997, 240.

A high-contrast, black and white photograph of a hand holding a pen, poised to write on a document. The document is partially obscured by a bright green diagonal overlay in the bottom right corner. The text 'Chapter One: Needs and Nature' is written in white on this green area.

# **Chapter One: Needs and Nature**

## Dilemma

### Problems with traditional schoolyard design

A traditional schoolyard is defined as a schoolyard where play is seen as synonymous with physical exercise and recreation. Typically you will find pre-fabricated playground equipment, asphalt play surfaces, and a high percentage of grass fields which are mostly used for sports and other recreational activities (Malone and Tranter 2003).

The problem with traditional schoolyards today is they do not meet the basic needs of children (Evans 1997; 1998 cited in Malone and Tranter 2003). Schoolyards are primarily used for recess periods-as a break from the classroom atmosphere-and are not seen as a fundamental part of the learning experience. Children learn through moving and interacting with their environment and, as a result, the schoolyard holds tremendous potential to support both formal learning and informal learning.

Formal learning occurs through instruction and guidance from teachers and other supervisors who are trying to reach educational objectives. Maria Montessori, an Italian educator and founder of the Montessori Method of education, argues, "When we think of intellectual activity, we always imagine people sitting still, motionless. But mental development must be connected with movement and be dependent on it. It is vital that educational theory and practice should be informed by that idea" (Mau et al 2010, 81). However, many times schoolyards fail to meet the educational needs of children. Too often we see schoolyards consist solely of blacktop, manufactured playground equipment, a lot of turf, a few ornamental trees, and not much else. David Susuki, an award winning scientist and environmentalist said, "[Children] are going to spend the bulk of their lives, when they're young, in and around the schoolyard, and yet we have made them into these sterile biological deserts" (Mau et al 2010, 140). Truly, in a landscape without much 'stuff' in it, there is little to excite the imagination and engage children in the process of learning.

Informal learning occurs through play. "Play is a means by which children learn without being taught. It involves doing, exploring, discovering, failing and succeeding" (Malone and Tranter 2003, 3). Tight budgets and fear of litigation have stripped school grounds down to their bare essentials.

School administrators and parents seem to be so concerned with the physical safety of their students and children that they have taken the risk right out of the schoolyard. The consequence of this is that when the risk is removed, so is the challenge, and when then challenge is taken away so are opportunities for learning and growth. "Interesting and diverse spaces increase the intensity of play and the range of play behaviors; bland or crowded play spaces limit behavior, restrict opportunities for social interaction and ecological experience, and worsen problems such as bullying and depression" (Malone and Tranter 2003, 7).

We tell our children in school that education is important and that they are important, but fail to address their most basic needs when constructing the landscape of the school. This is sending conflicting messages to our children. For example, Bergman Elementary School was listed in the local newspaper as having one of the least handicap accessible school grounds in Manhattan yet it is the host school for the district's Severely Multiple Handicapped Education Program (PTO Meeting Notes, October 2010).

### Visions for the future (Thesis)

Despite the problems listed above, existing school landscapes can be transformed into places of exploration, discovery, and education. Instead of landscapes plagued with asphalt and turfgrass, the outdoor environment can be made more engaging by incorporating a framework of natural materials into the schoolyard and by focusing on the developmental needs of the children. By adding more 'stuff' into the landscape, environments can be explored and manipulated and children will have more opportunities for both teacher-initiated learning activities and child-initiated play activities.

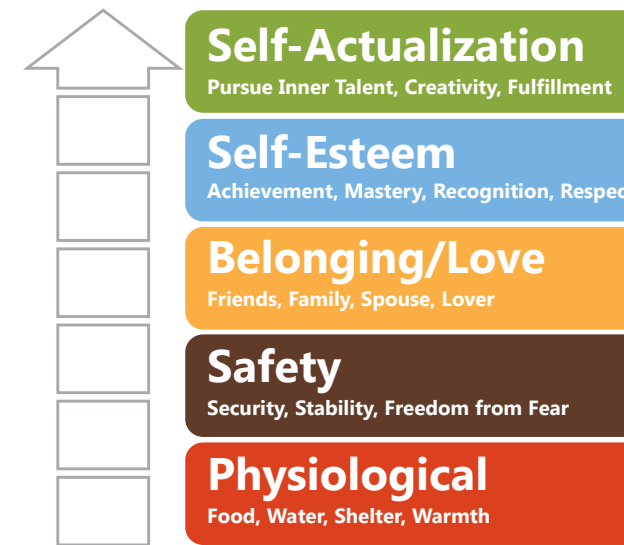


Figure 1.1-Maslow's hierarchy of needs. Author, 2011.

## Basic Needs

Children come in a variety of shapes, sizes, backgrounds and developmental stages. It is important that the schoolyard landscape address the complexities of growth in children; from basic human needs, to developmental stages, to personality and intelligence types. Understanding childhood development needs is extremely complex. The purpose of this discussion is not to attempt to address all the theories of human needs and child development, but to look at a sample of important theories and developmental milestones; to better understand how needs can be met in the landscape.

All humans today respond to the same basic needs of food, shelter, and safety. Abraham Maslow, one of the founders of humanistic psychology, developed a model describing five stages of human growth (see fig 1.1). The five stages begin with the most basic of human needs and progress until the highest needs of self-actualization are reached. Each need has to be satisfied before the next one can occur. For children, fulfilling these needs leads to healthy development while shortages in a particular stage can hinder performance (Mau et al 2010). Our education system encourages children to explore their creative potentials but in order for children to reach the highest stage in the hierarchy of needs in school, all other stages must be met. Schools must be perceived as being safe and secure by the children that attend them.

Another important theory in the field of human psychology is Howard Gardner's theory of multiple intelligences (Berk 2009). The basic idea of this theory is that children have different ways of processing information which influences their ability to solve problems, be creative, and learn (see fig 1.2). A child may be strong in a logical-mathematical sense but weak in linguistics. This does not mean that the child who is weak in logical intelligence but strong in another will fail at math. In fact they may do very well at math if they are allowed to express it through their intelligence strengths.

For example, a child low in logical intelligence but high in naturalist intelligence may be better at solving mathematical problems as they relate to the processes in the natural world. Many schoolyards today only cater to those students in the bodily-kinesthetic category, while doing very little

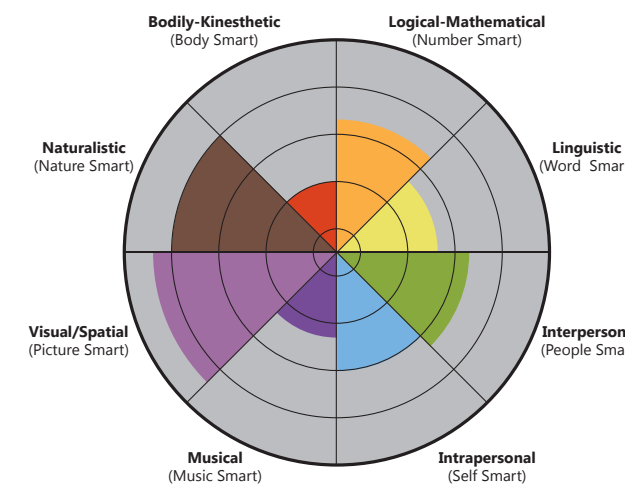


Figure 1.2-Representation of an individual's intelligence. Author, 2011.

to support the other intelligence types. Given a choice, children will choose activities that illuminate their individual strengths (Mau et al 2010). Thus, a landscape must be full of opportunities for children to express themselves in a way best suited to their own needs and strengths.

*Developmental Needs of Children*

As it was mentioned earlier, children develop and learn through play activities. Through play children learn to solve problems, experiment with creative thought, communicate, cooperate, resolve interpersonal problems, demonstrate personal responsibility, and exercise their imagination (Malone and Tranter 2003). There are three basic categories that children’s play activities fall into; play as it relates to physical and motor skills development, play as social development, and play as cognitive development. All are important aspects of overall healthy child development (see table 1.1). A brief explanation of each of the three categories is outlined below.

*Physical Development*

Physical development relates to the ability of children to engage in gross motor skill activities—running, jumping, crawling, climbing, and swinging—as well as fine motor skill activities—cutting, writing, drawing, and tying shoelaces. Encouraging strong physical developments in children will lead to a healthy childhood and set the stage for

responsible physical behaviors later in life (Malone and Tranter 2003). During the preschool years (4 and 5 years of age) children’s gross motor skills are becoming more refined. At this age, children spend a great amount of time practicing motor skills; in other words, their general level of activity is really high. Children in the middle childhood years (6 to 12 years of age) are growing at a slower and steadier rate. Gross and fine motor—skills, meaning their muscular and manipulative skills, advance to near-adult levels (Feldman 1997).

Traditional schoolyards are very good at meeting the needs of gross motor—skills development. There is plenty of room for children to run, swing, climb, and jump. Schoolyards that have spaces to sit can also address many of the fine motor skills. The problem with traditional schoolyard design is that many times it overemphasizes gross motor—skills development to the exclusion of social and cognitive development.

*Social Development*

Children need opportunities to engage in positive social play with peers (see table 1.2). Playing with others encourages social and emotional development by learning to share, cooperate, respect other points of view, and express ideas and feelings without adult intervention. Through social play children create their own identities and learn how to express this idea of self in relation to their peers (Malone and Tranter 2003). Preschool age children

engage in associated play and increasingly are engaged in cooperative play. They begin to see peers as individuals and make friendships based on trust and shared interests. Still, children at this age are primarily dependant on each other’s behavior and base their friendship on who shares with them, or how they engage in shared activities. Children in middle childhood are more concerned with mutual trust; who they can count on to help out when needed. Toward the end of middle childhood they begin to form friendships based on intimacy and loyalty. During this age group a separation of gender-related activities becomes more apparent; girls tend to pair off in small groups while boys play in large groups (Feldman 1997).

Most schoolyards could do more to incorporate spaces for positive socialization. Traditional schoolyards have plenty of open spaces for large group activities, but lack clear spaces for small groups and private interactions among pairs of friends. Additionally, there are not many places of retreat for children who need an escape from social pressures. A good hierarchy of large and small spaces, open and closed, public and private, will diversify the landscape and give children more opportunities for positive social interaction.

*Cognitive Development*

Through play children can develop a sense of the world around them. Play invites exploration, discovery, and experience in the social and physical environment where they can begin to recognize patterns and systems of life; how these patterns interconnect with each other and with themselves (Malone and Tranter 2003). During the early childhood years children participate in dramatic, or make-believe, play to express their thoughts and feelings. Cognitive play allows children to solve problems, make choices, construct, explore, and discover. Playing make-believe has proven to increase attention, memory, reasoning, and imagination in children (Berk 2009). Children at this age also engage in constructive play, which is where children manipulate objects to produce or build something (Feldman 1997). During middle childhood children begin to think more logically and display more effective spatial reasoning. They play more games with rules and can take multiple perspectives into account (Berk 2009; Feldman 1997).

One benefit of the schoolyard at Bergman Elementary is that there is a separation of playgrounds. The kindergartners have their own playground that is more suited to make-believe play while the rest of the grades go to the main playground that supports more games with rules (sports). Unfortunately, like most other traditional schoolyards, there is little in the landscape that children can manipulate to create their own play environments. Placing more interactive objects, especially natural objects, in the schoolyard will give children more to explore and discover on their own (see table 1.3).

Social Interaction	Characteristics
Solitary Play	<ul style="list-style-type: none"> <li>plays apart from others at a distance of one meter or greater</li> <li>engages in different activities</li> <li>pays little attention to other’s behaviors</li> </ul>
Parallel Play	<ul style="list-style-type: none"> <li>plays independently of other’s even within close proximity</li> <li>play occurs beside or in the company of others</li> <li>no interaction with companions occur</li> </ul>
Associated Play	<ul style="list-style-type: none"> <li>children play with others in similar activities</li> <li>communication and materials are exchanged</li> <li>no overall goal to the activity</li> </ul>
Cooperative Play	<ul style="list-style-type: none"> <li>organization into groups</li> <li>common goal or purpose</li> <li>focus is group-centered, regardless of activity</li> </ul>

Table 1.2-Structural forms of play within social participation context. Adapted from Malone and Tranter 2003, 4-5.

Category of Play	Developmental Improvements	Key Behaviors and Activities
Physical / motor-skill	<ul style="list-style-type: none"> <li>coordination</li> <li>bone and muscle growth</li> <li>strength</li> <li>agility</li> <li>endurance</li> </ul>	<ul style="list-style-type: none"> <li>playing on fixed structures</li> <li>participating in structured games</li> <li>using free equipment (such as balls and bats)</li> </ul>
Social / non-social	<ul style="list-style-type: none"> <li>sharing</li> <li>cooperation</li> <li>respect of views, ideas, feelings, and needs</li> <li>concept of self</li> </ul>	<ul style="list-style-type: none"> <li>talking with others</li> <li>watching others</li> <li>reading</li> <li>daydreaming</li> </ul>
Cognitive (imaginative and creative play)	<ul style="list-style-type: none"> <li>understanding of patterns and systems of life</li> <li>interconnectedness of elements</li> </ul>	<ul style="list-style-type: none"> <li>building or making things</li> <li>observation and interaction with nature</li> <li>exploring environment</li> <li>engaging in role play, dramas, or fantasy</li> </ul>

Table 1.1-Play in relation to children’s development. Adapted from Malone and Tranter 2003, 3-4.

	Early Childhood (3 to 6 years) <i>*adapted from (Feldman 1997)</i>	Spatial Needs	Potential Spaces, Forms, & Materials
Physical Development	<ul style="list-style-type: none"> <li>Height and weight increase rapidly.</li> <li>The body becomes less rounded and more muscular.</li> <li>Gross and fine motor skills advance quickly; children can throw and catch balls, run, use forks and spoons, and tie shoelaces.</li> <li>Children begin to develop handedness.</li> </ul>	<ul style="list-style-type: none"> <li>gross-motor development: large open spaces for running and jumping, three-dimensional forms for climbing</li> <li>fine-motor development: small protected spaces</li> </ul>	<ul style="list-style-type: none"> <li>manufactured climbing equipment</li> <li>small climbing trees</li> <li>boulders</li> <li>multiple surface levels</li> <li>grass fields</li> <li>small hills and valleys</li> <li>tables and chairs</li> </ul>
Cognitive Development	<ul style="list-style-type: none"> <li>Children show egocentric thinking (viewing world from their own perspective) and "centration," a focus on only one aspect of a stimulus.</li> <li>Memory, attention span, and symbolic thinking improve, and intuitive thought begins.</li> <li>Language (sentence length, vocabulary, syntax, and grammar) improves rapidly.</li> <li>Make-believe play becomes more complex as children build on each other's ideas and increasingly understand complex story lines.</li> </ul>	<ul style="list-style-type: none"> <li>flexible spaces where children can manipulate their environment</li> <li>loose parts both man-made and natural to become "props" for play</li> <li>objects to excite and stimulate the imagination</li> <li>reinforce school curriculum with real-world examples</li> </ul>	<ul style="list-style-type: none"> <li>plants with cones, seeds, leaves, flowers, twigs, etc.</li> <li>boxes and boards</li> <li>sandboxes</li> <li>simple shapes (circles, squares, triangles, symmetrical) in landscape forms</li> <li>imaginary play equipment (houses, boats, etc.)</li> </ul>
Social Development	<ul style="list-style-type: none"> <li>Children develop self-concepts, which may be exaggerated.</li> <li>A sense of gender and racial identity emerges.</li> <li>Children begin to see peers as individuals and form friendships based on trust and shared interests.</li> <li>Morality is rule-based and focused on rewards and punishments.</li> <li>Play becomes more constructive and cooperative, and social skills become more important.</li> </ul>	<ul style="list-style-type: none"> <li>places for groups of friends to engage in make-believe play</li> <li>places to retreat from social interactions</li> </ul>	<ul style="list-style-type: none"> <li>small, comfortable gathering spaces for pairs or small groups</li> <li>playground equipment</li> <li>large, open spaces for group activities</li> </ul>
	Middle Childhood (6 to 12 years) <i>*adapted from (Feldman 1997)</i>	Spatial Needs	Potential Spaces, Forms, & Materials
Physical Development	<ul style="list-style-type: none"> <li>Growth becomes slow and steady. Muscles develop and "baby fat" is lost.</li> <li>Gross-motor skills (biking, swimming, skating, ball handling) and fine-motor skills (writing, typing, fastening buttons) continue to improve to near adult levels.</li> </ul>	<ul style="list-style-type: none"> <li>gross-motor development: large open spaces for running and jumping, three-dimensional forms for climbing</li> <li>fine-motor development: small protected spaces</li> </ul>	<ul style="list-style-type: none"> <li>more challenging play and climbing equipment</li> <li>climbing trees</li> <li>big boulders</li> <li>stairs and steep hills</li> <li>large sports fields</li> <li>tables and chairs</li> </ul>
Cognitive Development	<ul style="list-style-type: none"> <li>Children apply logical operations to problems.</li> <li>Understanding of conservation (that changes in shape do not necessarily affect quantity) and transformation (that objects can go through many states without changing) emerge.</li> <li>Children can "decenter"-take multiple perspectives into account.</li> <li>Thinking becomes more logical and spatial reasoning becomes more effective.</li> <li>Language pragmatics (social conventions) and metalinguistic awareness (self-monitoring) improve.</li> </ul>	<ul style="list-style-type: none"> <li>reinforce school curriculum with more complex real-world examples</li> </ul>	<ul style="list-style-type: none"> <li>more complex shapes and 3-D forms (trapezoid, parallelogram, asymmetrical form)</li> <li>classroom demonstration spaces</li> <li>small group working spaces</li> </ul>
Social Development	<ul style="list-style-type: none"> <li>Children refer to psychological traits to define themselves.</li> <li>Sense of self becomes differentiated.</li> <li>Social comparison is used to understand one's standing and identity.</li> <li>Self-esteem grows differentiated, and sense of self-efficacy (an appraisal of what one can and cannot do) develops.</li> <li>Children approach moral problems intent on maintaining social respect and accepting what society defines as right.</li> <li>Friendship patterns of boys and girls differ. Boys mostly interact with boys in groups, and girls tend to interact singly or in pairs with other girls.</li> </ul>	<ul style="list-style-type: none"> <li>appropriate areas of socialization for each gender</li> </ul>	<ul style="list-style-type: none"> <li>large open spaces for boys to gather in groups</li> <li>smaller spaces for pairs of girls</li> </ul>

Table 1.3-Addressing developmental needs in children's play spaces. Author 2011.

*Diversity of Experience*

What these basic human needs and development categories suggest is that children need variety and complexity in their play spaces. Giving children a choice of activities will allow them to choose what interests them most and will illuminate their individual strengths. Sharon Stine in her book *Landscapes for Learning* describes nine dimensions that all children's play spaces should have to meet the needs of children physically, socially, and cognitively (see table 1.4). The contrasting pairs in the list are neither positive nor negative, but are all essential in the creation of outdoor settings that meet the most basic needs of children (1997, 40).

Basic Design Elements	Description
Accessible and Inaccessible	Confusion over what is accessible and what is not should be avoided as it detracts from play experiences. Inaccessibility is both a negative-as a learning limitation-and a positive-a clarity and safety provision.
Active and Passive	Spaces should be designed for vigorous and noisy play as well as for relaxation, meditation, and quiet. Children should be allowed to choose their own mobility (active or passive), without compromising the quality of either.
Challenge / Risk and Repetition / Security	Taking risks and facing challenges helps children learn about their competence and limitations. Overcoming challenges awards children with self-confidence. Repetitious activities at first can be a challenge, but later can provide security and comfort as it is practiced and repeated.
Hard and Soft	Children need elements that give way-such as sand, water, grass, pillows, rugs-in addition to hard elements for activities that require ease of cleanliness and maintenance. Environments that are primarily hard are more impersonal and less responsive to the needs of children.
Natural and People-Built	Natural materials give children sensory experiences different than what manufactured materials can provide. Human built objects teach children how humans solve complex problems.
Open and Closed	Open activities invite exploration, creativity, and emphasise process over final product. Closed activities follow rules and deliver an end product. Feedback from closed activities show the child when he has been successful; which helps to develop self-esteem.
Permanence and Change	Landmarks can help to orient the child, provide a sense of place, and instill a sense of security in the child that she will be able to find her way. Flexibility in space invites experimentation and stimulates problem-solving activities.
Private and Public	Children need the opportunity to choose when to be with people and when to be alone or with a friend. Private places can still be visible for security reasons. Public spaces give children an opportunity to interact with unique communities and to understand their place in them.
Simple and Complex	Simple activities have a singular use, giving the child structure and direction. Complex environments have multiple objects and materials; giving the child a chance to make choices and be creative in play.

Table 1.4-Children's play activity space needs. Adapted from Stine 1997.

*Meeting educational objectives outdoors*

While creating outdoor spaces rich in variety and complexity will support the informal play activities of children school landscapes, by their nature, must also support the formal lessons that children learn in their classrooms. It is true that many teachers are willing teach lessons outdoors, but they run into problems doing so. The following assumptions are made to explain why formal education does not take place outside. One of the most obvious reasons may be that traditional schoolyards do very little to support formal learning in their design. Scorching-hot asphalt surfaces and monotonous turf fields offer little comfort or structure that is needed to teach lessons outdoors. Another reason may be that teachers, who are very busy with their current lesson schedules, have little time to alter their plans to include the outdoor environment. Many teachers simply may not know how to teach a lesson using outside elements. With no formal training on the matter, and increasing pressures placed on them to get their students to perform well on standardized tests, teachers cannot afford to take time to experiment with new teaching styles.

So the question is, what can be done to support teachers to bring their lessons to the outdoor environment? One way would be to make the transition from indoor to outdoor learning as effortless as possible. Designing outdoor classrooms that function similar their indoor counterparts with comfortable places to sit, write, and gather together are essential. Adding more objects and materials into the landscape to interact with will bring complexity and variety to the schoolyard, but if these objects don't directly relate to assessment standards then they really provide little help

to teachers who are trying to meet these rigorous state academic standards. The schoolyard should include spaces, objects, and materials that will help teachers align outdoor instruction with the state's academic standards. Table 1.5 illustrates how academic subjects can be integrated into the schoolyard. The curricular benchmarks in the table come from the state of Kansas' academic standards for all grade levels. This table links academic standards to the physical objects and spaces that can occur in the schoolyard.

*Conclusion*

The schoolyard landscape has the potential to support both informal learning by paying special attention to play as it relates to the developmental activities of children. Schoolyards can also support formal learning by looking at the academic standards and making connections to the physical structure of the landscape. As table 1.6 shows there is a myriad of spaces, objects, and materials in the landscape that will simultaneously support academic learning and play activities. Not to put it too simply, but by filling our schoolyards with more 'stuff' the opportunities for both formal and informal learning activities increases.

*"Many schoolgrounds may 'look' impressive to adults, with shiny new play equipment, neatly mowed lawns, no "clutter" or untidiness, and aesthetically appealing flower gardens that are carefully tended by school gardeners. Yet children may extract little benefit from each of these features. Instead, our study reveals their preference is for loose materials to manipulate, long grass to play in, the freedom to make their own constructions and even to develop their own gardens" (Malone and Tranter 2003).*

Subject	Integration Concept	Benchmark Example <i>*(adapted from www.kerc-ks.org)</i>	Potential Spaces, Forms, & Materials
Reading	An environment rich with a variety of objects, materials, activities, and processes provides opportunities to learn new words.	1.2 The student reads fluently	outdoor reading areas, benches, tables, chairs
		1.3 The student expands vocabulary	variety of objects, materials, activities, and processes
Writing	Interesting spaces create certain moods, emotions, and experiences that give children something to write about.	1.1 The student writes narrative text using the writing process	observation points, activity zones (O.W.L.S., playground, sports field, curricular learning areas)
Mathematics	Math can be taught in the landscape in a variety of ways; plants and rocks can become things to count, paving patterns and shapes can reinforce geometry lessons and measurement exercises. Many of the principles of good design relate directly to math concepts (shape, form, line, repetition).	1.1 The student demonstrates number sense for whole numbers, fractions, and decimals using concrete objects in a variety of situations	objects in wholes and parts (logs, bricks, pavers, branches, leaves, etc.)
		1.3 The student uses computational estimation with whole numbers and fractions in a variety of situations.	planting beds, rock garden and other containerized objects in spaces
		2.2 The student uses symbols and whole numbers to solve addition and subtraction equations using concrete objects in a variety of situations.	variety of objects can act as math tools (rocks, twigs, shrubs, trees, leaves, etc.)
		3.1 The student recognizes geometric shapes and investigates their properties using concrete objects in a variety of situations.	paved areas and three-dimensional objects in geometric shapes
Science	The opportunities a naturalized schoolyard offers to teach science concepts are endless. The simple act of planting trees, grasses, and shrubs opens up teaching opportunities for children to learn about organism interaction, the changing of the seasons, the physical properties of materials, and so on.	3.- The student will develop an understanding of biological concepts through direct experience with living things, their life cycles, and their habitats.	meadows, woods, streams, trees, grasses, shrubs, nature path
		4.1 The student will develop an understanding of the properties of earth materials	soils, rocks, natural debris
		6.2 The student will understand scientific knowledge relative to personal health	vegetable garden, sports field, track, climbing equipment
History / Government / Geography	Students can be encouraged to participate in the building and maintenance of their schoolyard; which can teach them civic responsibilities. A schoolyard with more interesting places will also provide students with more things to map and to analyze about their environments.	6.3 The student will understand the impact of human activity on resources and environment	physical man-made structures (building, blacktop, birdhouses, trash bins)
		4.1 The student identifies and examines the rights, privileges, and responsibilities in becoming an active civic participant	natural features that need routine light maintenance
		3.1 The student uses maps, graphic representations, tools, and technologies to locate, use, and present information about people, places, and environments	separate areas of destinations, landmarks, clear pathways
Music / Theater / Visual Arts	A varied and complex outdoor environment can give children inspiration for artistic expression, props and backdrops for theatrical and musical performances.	3.2 The student analyzes the human and physical features that give places and regions their distinctive character	native planting, regionally appropriate material (i.e. limestone)
		Multiple	amphitheater, stage, natural materials for props / art projects,

Table 1.5-Curricular integration matrix. Author 2011.

Subject	Benchmark Examples	Potential Spaces, Forms, & Materials	Spatial Needs	Developmental Milestones	
Reading	1.2 Reads fluently	outdoor classrooms outdoor reading areas benches tables chairs playground sports field O.W.L.S.	Large open spaces for running and jumping, three-dimensional forms for climbing  Small protected spaces	Rapid increases in height and weight	<b>Physical Development</b>
	1.3 Expands vocabulary			Gross and fine motor skills advance quickly	
Writing	1.1 Writes narrative text	observation points objects in wholes and parts planting beds rock garden rocks twigs shrubs small gathering spaces trees leaves and landscape debris large, open spaces circles	Objects to excite and stimulate the imagination  Flexible spaces where children can manipulate their environment  Loose parts both man-made and natural to become "props" for play  Reinforce school curriculum with real world examples	Children can throw and catch balls, run, use forks and spoons, and tie shoelaces	<b>Cognitive Development</b>
				Children develop handedness	
Mathematics	1.1 Whole numbers, fractions, and decimals	paved areas in geometric shapes squares boxes imaginary play equipment buildings houses boards parallelogram sandboxes nature path trash bins pathways blacktop woods	Places for groups of friends to engage in make-believe play  Places to retreat from unpleasant social interactions	Children show egocentric thinking	<b>Social Development</b>
	1.3 Estimation			Memory, attention span, and symbolic thinking improve, and intuitive thought begins	
Science	2.2 Addition and subtraction	native planting triangles birdhouses limestone meadow trapezoid streams amphitheater landmarks grasses stage climbing equipment track soils small hills and valleys vegetable garden multiple surface levels	Large open spaces for running and jumping, three-dimensional forms for climbing  Small protected spaces	Language improves rapidly	<b>Physical Development</b>
	3.1 Geometric shapes and their properties			Make-believe play becomes more complex	
History / Government / Geography	3.- Biological concepts involving living things, their life cycles, and their habitats	climbing equipment track soils small hills and valleys vegetable garden multiple surface levels	Reinforce school curriculum with real world examples  Forms can become more abstract	Friendship are based on trust and shared interest	<b>Cognitive Development</b>
	4.1 Properties of earth materials			A sense of gender and racial identity emerges	
Music / Theater / Visual Arts	4.1 Rights, privileges, and responsibilities of an active civic participant	climbing equipment track soils small hills and valleys vegetable garden multiple surface levels	Appropriate areas of socialization for each gender	Children can take multiple perspectives into account	<b>Social Development</b>
	3.1 Maps, graphic representations, tools, and technologies			Play becomes more constructive and cooperative	
	3.2 Human and physical features that give places and regions their distinctive character			Growth becomes slow and steady	<b>Physical Development</b>
				Gross motor skills: biking, swimming, skating, ball handling	
				Fine motor skills: writing, typing, fastening buttons	<b>Cognitive Development</b>
				Physical development continues to improve to near adult levels	
				Children apply logical operations to problems	<b>Social Development</b>
				Understanding of conservation and transformation	
				Thinking becomes more logical and spatial reasoning becomes more effective	<b>Physical Development</b>
				Children refer to psychological traits to define themselves. Sense of self becomes differentiated	
				Friendship patterns of boys and girls differ; boys mostly interact with boys in groups, and girls tend to interact singly or in pairs with other girls	<b>Social Development</b>

Early Childhood (3 to 6 years)

Middle Childhood (6 to 12 years)

Table 1.6-Space, form, and material potentials. Adapted from www.kerc-ks.org and Feldman 1997. Author, 2011.



# The Benefits of Nature

Nature plays a powerful role in education, but it is something that is most often forgotten or not taken seriously in our education system today. The benefits that nature can offer our children cannot be ignored. Studies have shown that nature can increase a person’s overall well-being, improve developmental tasks, lead to greater academic success, and improve social behavior. Nature can be many things. It can be wide expanses of vegetation, habitat, single plants and animals, rocks, soil, water, and even man-made natural features (such as vegetable gardens). No matter the specific form of nature, it is essential that our schoolyards become nature-yards.

### Overall well-being

It was mentioned earlier that trends in our current society have distanced us from nature. Richard Louv argues that we are suffering from nature-deficit disorder. This non-medical diagnosis has detrimental effects to our physical and emotional well-being. Studies have demonstrated that nature can have restorative benefits to humans. Individuals who live in close proximity to natural features have a higher degree of life satisfaction. Even simply having a view of natural features out of a window can have important psychological benefits to humans. Such benefits include personal enjoyment, relaxation, reduced stress-levels, and increased physical health (Kaplan and Kaplan 1989).

### Developmental Tasks

Other research has demonstrated that play in nature can lead to significant increases in physical development. Researchers in Sweden observed two groups of kindergartners from two demographically similar schools. The reference group spent their outdoor play time in traditional playgrounds while the experimental group played almost exclusively in woodlands close to the school building. Children from both schools took a series of motor fitness tests before the trial period and again nine-months later. In the pretest the reference group held a slight advantage over the experimental group but after the trial period the experimental group caught up and surpassed their reference group peers. Significant differences were

found in balance and coordination (Fjortoft 2001). The children who spent time in the natural landscapes, playing in its rough topography and climbing its trees, improved in physical developmental tasks.

### Academic success

Interaction with the natural environment can significantly improve a child’s academic learning; and not just in science but in all subjects. Research has shown that even simple things such as having an ample amount of natural lighting in classrooms can help students to improve twenty percent on math tests and twenty-six percent on reading tests (Schneider 2002). The following are examples of studies that were performed in which nature produced greater academic successes in children:

- An elementary school in Dallas, Texas involved its children in an environmental-based learning program. The passing rates of these children surpassed those students in an earlier, traditional class by thirteen percent. This is significant compared to the statewide average gain of one percent during the same period (Louv 2008).
- In Portland, Oregon middle school teachers employed a curriculum using local rivers, mountains, and forests. They planted native species and studied the Willamette River. Ninety-six percent of these students met or exceeded state standards for math problems solving—compared to only sixty-five percent of eighth graders at comparable middle schools (Louv 2008).
- State officials in North Carolina raised their academic standards and produced a fifteen percent increase in the proportion of fourth-graders scoring at the “proficient” level in statewide math scores. But at an environmental based school in Asheville, North Carolina the number high-scoring fourth-graders increased to thirty-one percent (Louv 2008).

### Improvements to behavior

In addition to academic success, children who spend time learning in the natural environment show a decrease in behavioral problems. Some of examples are listed below:

- Students in Little Falls, Minnesota participated in an environmental-based program and had fifty-four percent fewer suspensions than other ninth-graders (Louv 2008).
- In Dallas, Texas 560 disciplinary referrals were made to the principal’s office in a single year. Two years later, after the environmental-based program was initiated, the number dropped to fifty (Louv 2008).
- In 2005 American institutes for research reported a study of twenty-five at-risk sixth graders from four elementary schools who attended three outdoor education programs over a period of several months. The study compared the results from this group with that of a control group who did not have the learning experience. The findings, submitted by the California Department of Education, included; a twenty-seven percent increase in measured mastery of science concepts, better problem-solving, higher motivation to learn, and improved classroom behavior (Louv 2008).
- Playing and learning in natural settings has also proven to help students who have difficulties learning in formal school environments. It has been found that children with Attention Deficit Disorder (ADD) had fewer attention deficit symptoms after spending leisure time in natural settings (Bell and Dymont 2006).

### Benefits of greening schoolyards

In summary there are numerous benefits that greening a schoolyard can have on the school population. Students experience more meaningful and experiential play and learning opportunities, safer and less hostile outdoor environments (including less exposure to toxins), improved academic performance, and better spaces that meet the needs of all genders, intellects, cultures, and ages. Teachers benefit from naturalized schoolyards through new connections to curriculum, increased enthusiasm for teaching and learning, and reduced discipline and classroom management problems. Finally the community benefits of greening the schoolyard are a stronger sense of community, increased community satisfaction, increased community health, and more active involvement from parents in school matters (Raffan 2000).

Formal Learning	Informal Learning
teacher-driven methodical structured curricular	individual-driven creative play imaginative
<b>NATURE</b>	
complexity real-world examples requires flexibility	variety interaction exploration

Table 1.7-. How nature can support learning types. Author, 2011.

# Key Case Study: The Environmental Yard

Note: Additional precedents described in Appendix B

## Location:

Washington Elementary School—a K-3 university lab school in Berkeley, California.

## Date Designed:

1971 through 1981 as part of an “action-research” project by the designers.

## Site Designers:

Robin C. Moore and Herb H. Wong. Wong was the school principal but also served on the Berkeley Unified School District and the UC Berkeley School of Education. Additionally he was a field naturalist with a background in science education and reform. Moore was a neighborhood resident, Washington parent, and a member of the landscape architecture faculty at UC Berkeley.

## Project Background

The schoolyard at Washington Elementary school began as an acre and a half layer of asphalt, almost completely lacking any plant and animal life (see fig 1.3). Children attending the school were bored in the schoolyard and, as a result, engaged in bickering, bullying, fighting, and other antisocial behaviors. The designers felt that by giving attention to the outdoor school environment they could change the quality of children’s social relationships and broaden the educational opportunities (Moore and Wong 1997).

Their concept was to create an “integrated, child-centered curriculum, based on the value of informal play as the first motivational step in both nonformal education and formal classroom instruction” (Moore and Wong 1997, 6). The designers embarked on a seven-month community participatory process which included interested parents, teachers, and volunteer professionals. The designers used surveys, student questionnaires, and teacher driven studies to gather important information regarding the needs and desires for the school grounds.

## Making the Yard

The development of the Yard began by tearing out much of the old asphalt. Nothing was immediately constructed in its place but over time the Yard began to evolve as teachers and designers experimented with the objects and areas in the schoolyard. Nature was brought into the schoolyard in many forms. Gardens, ponds, streams, native plants, and wildlife added elements that children could interact with and learn from. The designers brought all these elements together in a natural resource area. This area in the schoolyard was where the majority of their environmental education experiences took place; yet children were encouraged to use this area during their informal play time.



Figure 1.3-The environmental yard before and after. Moore and Wong 1997, 140.1.

### Integrating Curriculum

Curriculum co-evolved with the schoolyard. The focus was learning about the environment and learning through the environment. Creative teachers modified lessons to include the outdoors. Math, vocabulary, science and other subjects were taught by using the objects and spaces in the Yard (Moore and Wong 1997).

### The Yard Today

In 1995 the school went under renovations. In the wake of construction many of the site features, such as the stage, community play area, and more than thirty shade trees were removed and replaced with a rectangle of grass and basketball courts (Moore and Wong 1997). "Although neighborhood residents protested energetically, they were not strong enough to counter the will of the school district. Needless to say, the students and neighborhood residents did not have a genuine voice in these decisions to radically change their environment" (Moore and Wong 1997, 251).

### Significance

The creation of the Yard brought about many positive changes that are too numerous to mention here. Movement, imagination, positive social interactions, and sensory stimulation was part of the day to day experiences of children. Educational objectives were met in the landscape and the diversity of spaces, materials, and objects in the schoolyard meant that children with different learning styles could be included in the educational process. Children who were considered disruptive in class were much more willing to follow directions outside, and even became leaders in outdoor activities (Moore and Wong 1997).

The building of the Yard took time. Making changes to the schoolyard meant changing people's preconceptions about education. A few people had to be willing to take the initiative to get done what was in the best interest of the child. In the end, the success of the Yard only happened because of the participation and involvement of the community (Moore and Wong 1997).

### Relevance

This case study is an inspiration to those who want to see such changes take place in their own schoolyard. Even though the Yard today is not what it used to be, over the twenty years of its existence, it benefited hundreds of children. The eventual demise of the Yard is a testament that it is not easy in our current system to convince those in power (principals, school boards, community members) that cost is not as important as the healthy development of our children. It is both a success story and a reality check, that these kinds of changes will not come without a fight, but when changes are made they will benefit many lives.

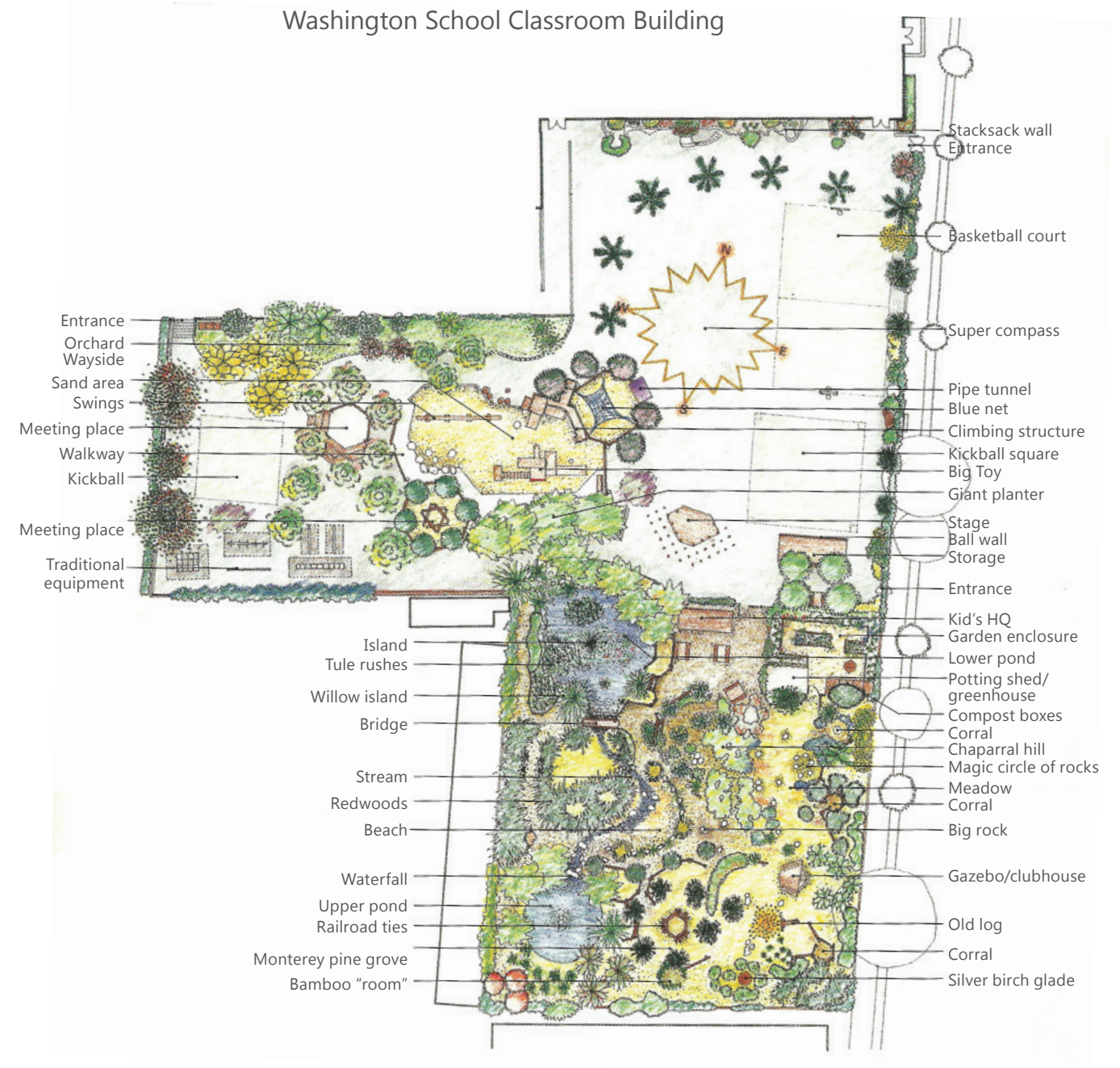
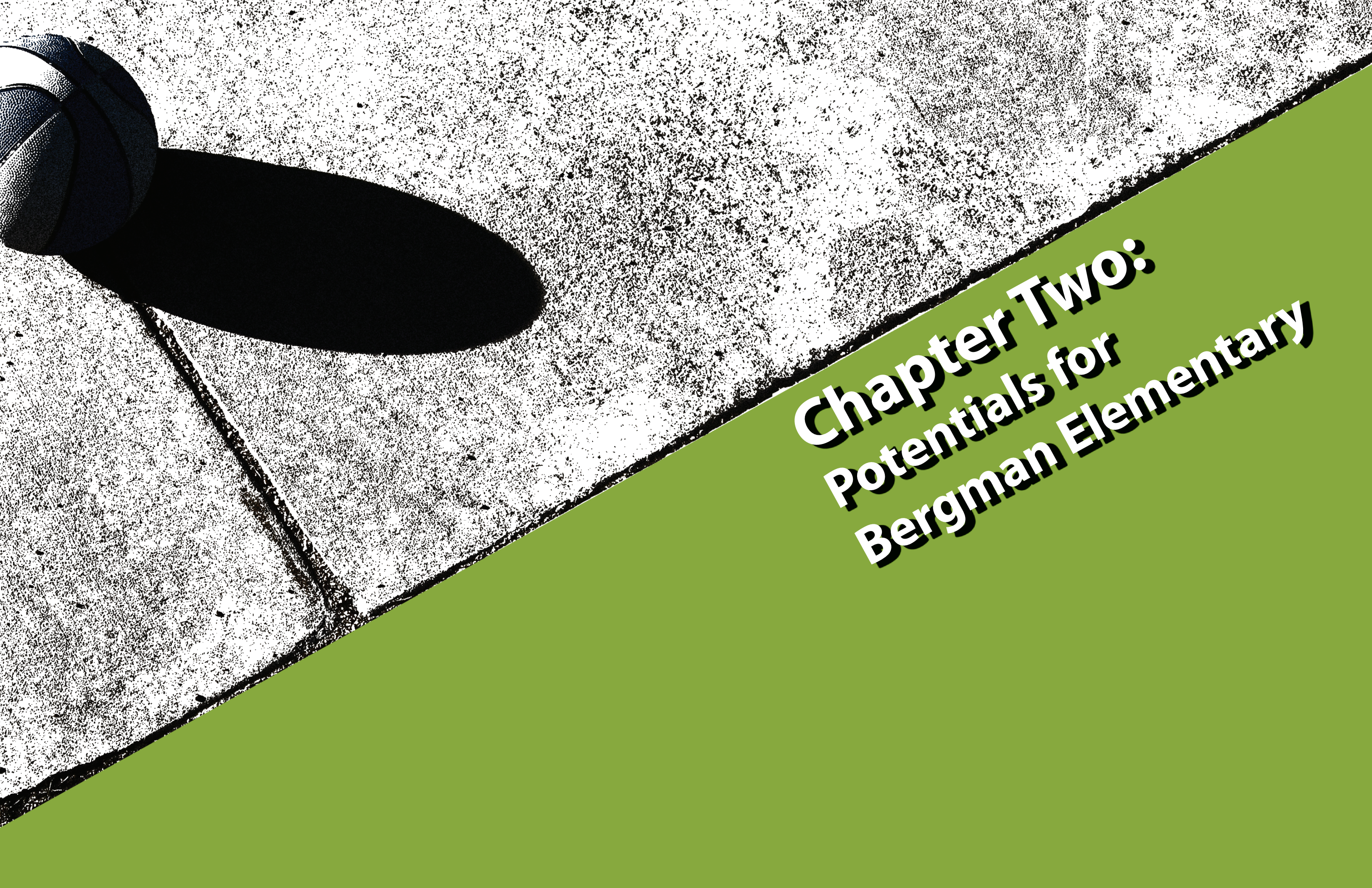


Figure 1.4-The environmental yard illustrative plan. Moore 1997, 140.3.



**Chapter Two:  
Potentials for  
Bergman Elementary**

# Project Goals

During the very beginning phases of this project I visited the school grounds at Bergman Elementary school to take pictures. I was there on a warm September afternoon. Morning rains had cleared up but the rainwater had not yet made its way into the soil. The gravel fill that lies underneath the playground was still holding significant amounts of rainwater, forming giant puddles next to the swings and slides. Two neighborhood girls were playing at the playground at the time of my visit. Can you guess what they were playing with? The playground equipment was hardly acknowledged as the girls tried their every best to form a water channel in the gravel that would connect one great puddle to another.

I couldn't help but think of a number of things these children were learning about through their little experiment: properties of matter, physics (movement and gravity), problem solving skills, and communication skills. This same gravel fill that provided so many learning opportunities for children has been a nuisance for teachers and parents for years. The gravel enters into children's shoes and gets tracked in classrooms and homes. It spreads onto the blacktop creating slipping hazards and, at several inches deep, it is not accessible to all students.

This same material carries both opportunities and constraints to children's learning. The question arises; what to do with it now? To help answer this and other questions goals were developed based on the needs of the school and

the research mentioned in chapter one. These goals help to guide decisions on what specific site factors are important to consider and how these factors translate into the design of the schoolyard.

## Goal 1: Encourage Positive Growth for All

According to the research outlined in the first chapter children need a place that meets their most basic human and developmental needs. Maslow's hierarchy of needs demonstrates that children need a safe and secure environment to play in before they can freely use their imagination and be creative. Gardner's multiple intelligences theory necessitates that the schoolyard be varied and diverse to respond to children who learn differently and express their knowledge through varied means. Lastly, all children should have access to these safe and interesting spaces. Universal accessibility to all areas of the schoolyard is something that Bergman is lacking; which neglects an important part of their school population.

Objectives:

- Provide a physically safe and healthy environment
- Make all areas of the schoolyard accessible
- Meet the developmental needs of children
- Opportunities for exploration and learning should occur in all areas of the schoolyard



Figure 2.1-After the rainstorm at Bergman. Author, 2011.

## Goal 2: Support School Curriculum

As it was mentioned in chapter one besides pure open space, which supports little more than group gatherings and activities that require props, traditional schoolyards do not support formal learning activities. A more diverse and complex landscape creates more opportunities to engage in teaching formal lessons. By filling the landscape with more material, especially natural material, opportunities for learning activities can occur across multiple subjects. The point was made in the case study of the Environmental Yard that much of the formal learning that took place in the schoolyard was due to the creativity and ambition of the teachers. However, teaching curricular concepts is much easier to accomplish when a good physical framework is in place. Linking physical forms to the state's curricular standards will aid teachers who are willing to take lessons outdoors but don't have the time, or experience, to link curriculum to the environment.

Objectives:

- Forms, materials, and spaces in the landscape should easily tie back to the state of Kansas' academic standards
- Outdoor spaces should encourage formal learning activities across many disciplines
- Bringing lessons outside should be made effortless by providing ample and comfortable spaces for children to gather

## Goal 3: Promote Experiential Learning through Nature

Bringing nature into the schoolyard will occur in two ways; nature through habitat and nature through experience. Nature through habitat refers to dedicating large areas within the schoolyard to either meadow or wooded areas. These habitats which will attract wildlife, be large enough that natural processes can occur and be observed, and act as learning laboratories where children can explore and discover new things about nature. Nature through experience refers to the placement of natural forms-such as plants, rocks, and water-throughout the entire schoolyard. The children will be able to experience an assortment of colors, sounds, textures, tastes, and smells in every

part of the schoolyard. Naturally there is some crossover between these two categories as even isolated plants can be a habitat for very small animals and large habitats can also house a variety of sensorial qualities. Ultimately, the goal of each of these categories is the same; to place a natural framework into the schoolyard where children can experience the world around them in positive ways.

Objectives:

- Create areas of habitat that are able to house a variety of natural plant forms, encourage wildlife, and demonstrate natural processes
- Natural elements should be selected based on their experiential qualities; how they feel, smell, taste, sound and look
- Nature, in some form, should be integrated in all areas of the schoolyard

## Goal 4: Make the Schoolyard a Community Amenity

*"Neighborhood schools have the potential to reflect a community to its children, become the locus of integration and the thriving soul of a community"* (Akinsanmi 2009, 2).

John Dewey, an American philosopher, educator, and social critic, best known for his beliefs, books, and projects on education believed that, *"the school is primarily a social institution"* and that *"education, therefore, is a process of living and not a preparation for future living"* (Mau et al 2010, 108). The schoolyard should be an active place for community members to gather during non-school hours. Schools are often used to house a variety of public and community programs; from craft fairs to voting administration, childcare programs to sports team's practices. The landscape surrounding the school should be able to support these programs and be a destination point for unstructured activity.

Objectives:

- Support community programs
- Make the schoolyard a destination for community members
- Encourage community involvement in the evolution of the schoolyard

# Inventory and Analysis

The purpose of this section is to document key site conditions that are important to consider before becoming involved in the design. Analyzing these conditions and drawing conclusions from them will help to reveal patterns and relationships that might be hidden at first glance. Using the project goals as a guide, key issues were identified and mapped in the following pages (see table 2.1).

**Goal 1: Encourage Positive Growth for All**

- 1.1 - physical health and safety
- 1.2 - universal accessibility
- 1.3 - meet developmental needs
- 1.4 - opportunities for exploration

**Goal 2: Support School Curriculum**

- 2.1 - tie back to academic standards
- 2.2 - learning across disciplines
- 2.3 - make outdoor classroom space

**Goal 3: Promote Experiential Learning through Nature**

- 3.1 - create habitat
- 3.2 - provide sensory experiences
- 3.3 - spread nature throughout schoolyard

**Goal 4: Make the Schoolyard a Community Amenity**

- 4.1 - support community programs
- 4.2 - make schoolyard a destination
- 4.3 - encourage community involvement

Inventory Maps	Related Goals and Objectives
site context	--
key existing site features	1.1; 1.4
slope aspect	1.1; 3.1
slope percentage	1.1; 1.2
circulation	1.2
existing vegetation cover	1.4; 3.3
surface material	1.1; 1.2; 3.3
bergman service area	4.2; 4.3
population distribution	4.2; 4.3
neighborhood circulation	4.2; 4.3
neighborhood amenities	4.1

Analysis Maps	Related Goals and Objectives
accessible areas	1.1; 1.2
shade analysis	1.1; 3.1
availability of natural environments	3.1; 4.2

Table 2.1-Relationship of inventory and analysis maps to goals and objectives. Author, 2011.

# Site Context

Frank V. Bergman Elementary school is located in northwestern Manhattan, Kansas just a few blocks north of the Candlewood shopping area and a few blocks east of the Colbert Hills golf course. The neighborhood surrounding Bergman is bounded by two major arterial roads; Seth Child Road (Hwy 113) on the east and on the south by Kimball Avenue.

Housing types are mainly single-family residential, with a few multi-family units close to Seth Child Road. The neighborhood character is that of traditional middle-class suburban America.



Figure 2.2-Site context. Adapted from www.bing.com/maps and maps.google.com, 2011.

## Site Character

The character of the elementary school is typical of what you would see in many of the traditional schoolyards today. Major elements include turf fields, asphalt play surfaces, manufactured playground equipment, and ornamental planting. One unique characteristic of the site are the steep slopes that are found in almost all areas of the school grounds.

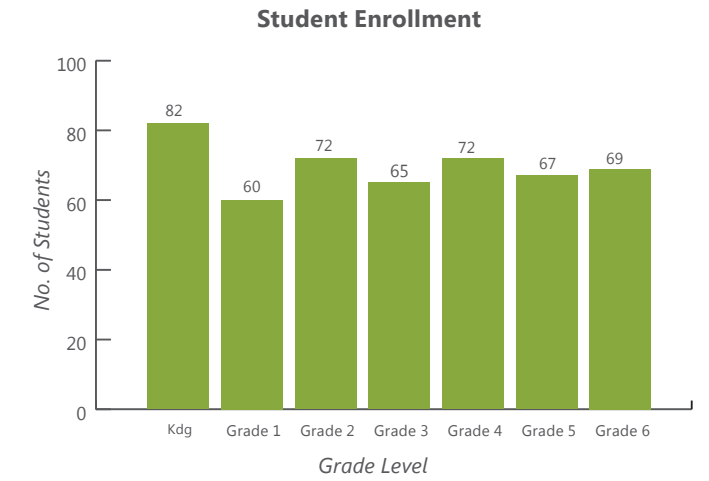


Figure 2.3-Site character photos. All photographs by author, 2010.

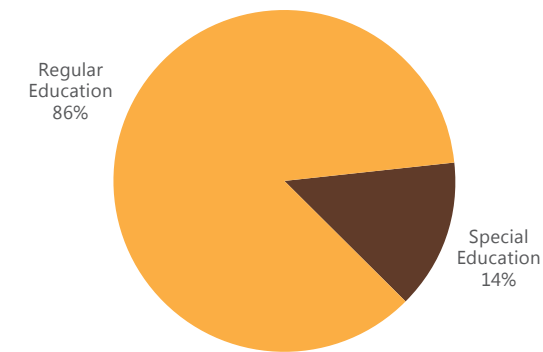
## Student Profile

### Student Body Statistics

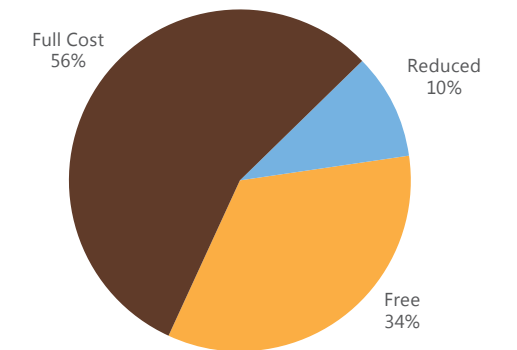
- 487 Total students enrolled
- 25% Ethnically diverse
- 44% Live in poverty
- 14% Defined as disabled
- 3% Defined as gifted
- 96% Had parents attending conferences
- 23% Defined as mobile on annual basis
- 16% Have 1 or more parents in the military
- 25% Have >1 of 23 languages spoken at home
- 40% Ride a bus to school



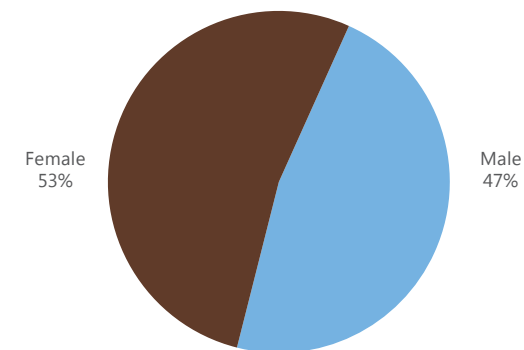
### Special Education Enrollment



### Lunch Support



### Gender



### Ethnicity

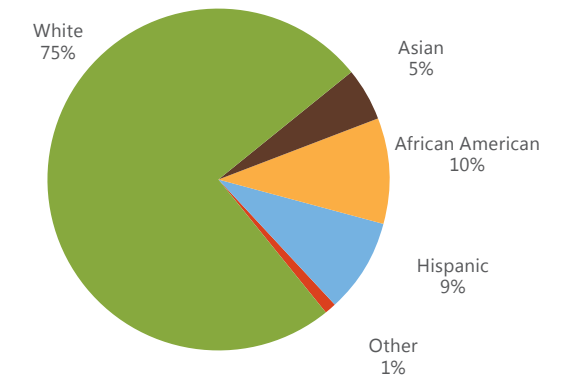
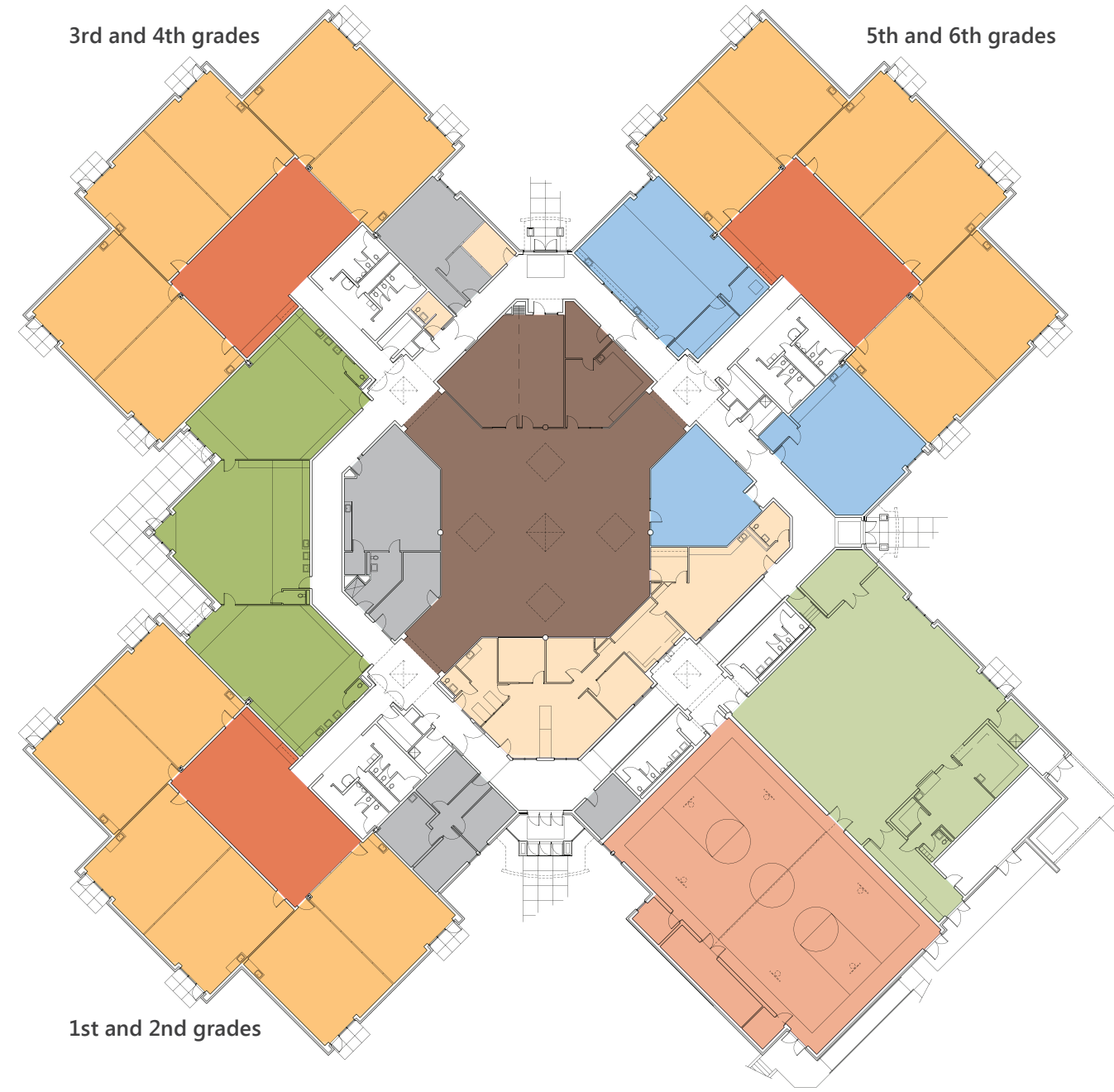


Figure 2.4-Student profile. Adapted from Team Dolphin Site Report, October 2010.

## Building Floorplan

### Legend

<span style="display:inline-block; width:15px; height:15px; background-color:orange; border:1px solid black;"></span> Group activity / flex space	<span style="display:inline-block; width:15px; height:15px; background-color:darkorange; border:1px solid black;"></span> Media center
<span style="display:inline-block; width:15px; height:15px; background-color:lightgreen; border:1px solid black;"></span> K classrooms	<span style="display:inline-block; width:15px; height:15px; background-color:yellowgreen; border:1px solid black;"></span> Kitchen / cafeteria
<span style="display:inline-block; width:15px; height:15px; background-color:orange; border:1px solid black;"></span> 1-6 classrooms	<span style="display:inline-block; width:15px; height:15px; background-color:lightorange; border:1px solid black;"></span> Administration, staff
<span style="display:inline-block; width:15px; height:15px; background-color:blue; border:1px solid black;"></span> Computer, music, art	<span style="display:inline-block; width:15px; height:15px; background-color:gray; border:1px solid black;"></span> Special education, gifted, speech, LD, volunteer
<span style="display:inline-block; width:15px; height:15px; background-color:lightorange; border:1px solid black;"></span> Gymnasium	



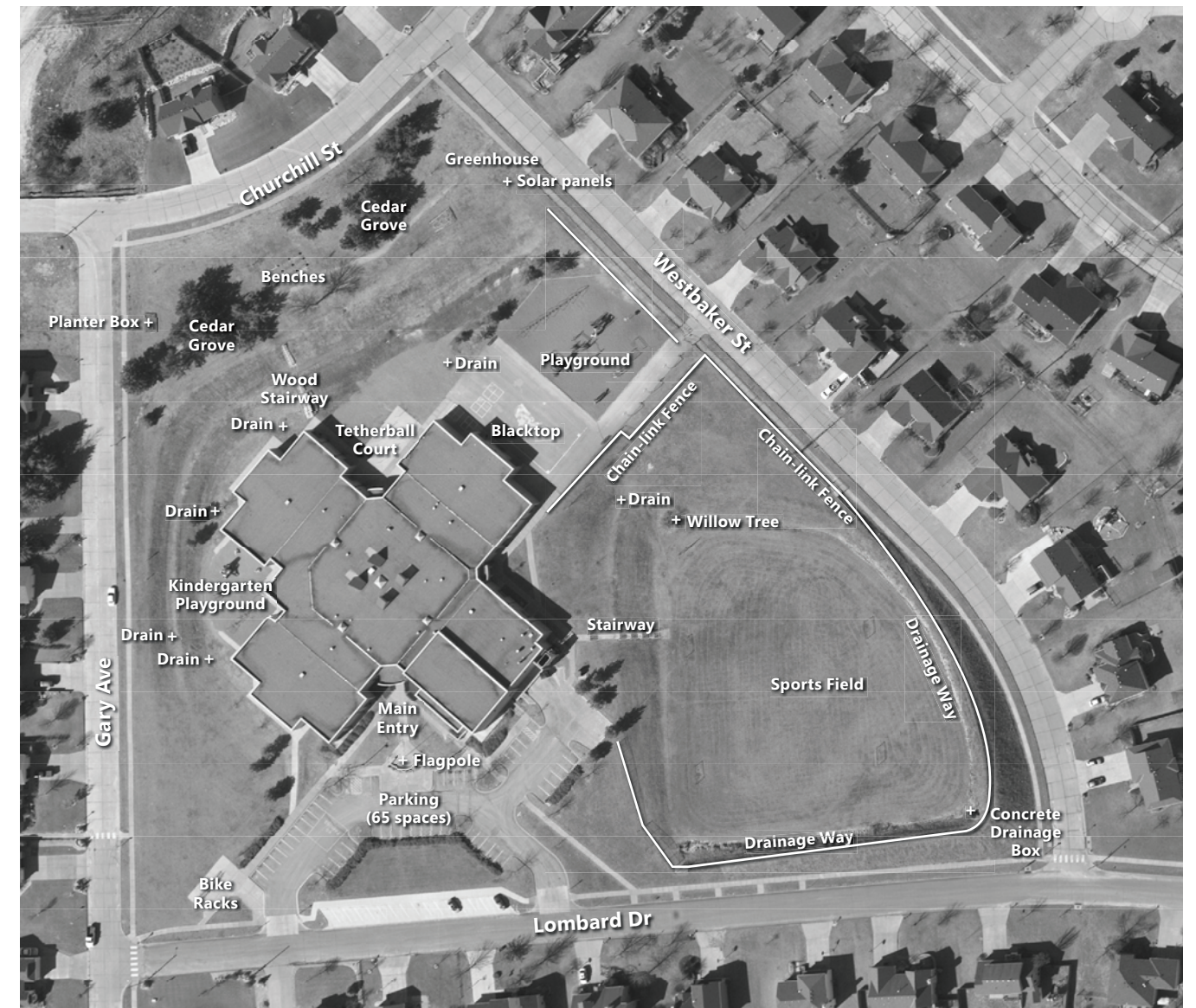
Not to scale  
North

Figure 2.5-Bergman building floorplan. Adapted by author, www.usd383.org, 2011.

## Key Existing Site Features

This map records the important site features found at Bergman Elementary during a site visit in the first week of November. Generally speaking the site can be divided into four main areas by function: (1) the southwest area is the parking and entry space, (2) southeast is the sports field, (3) the middle areas are playgrounds, and (4) the northern area is the outdoor wildlife learning site.

Other important observations were; overflow parking takes places along Gary Ave, drainage ways were wet and flowing with water hours after rainfall, and the playgrounds hold traditional equipment over a gravel fill.



0 75 150 300 Feet  
North

Figure 2.6-Key existing site features. Base aerial from Riley Co., 2003. Author, 2011.



## Site Topography

The school grounds at Bergman slope upwards in a northwest direction. With over sixty feet of grade change from the southeast corner to the northwest, much of Bergman's landscape consists of steep slopes and terraces.

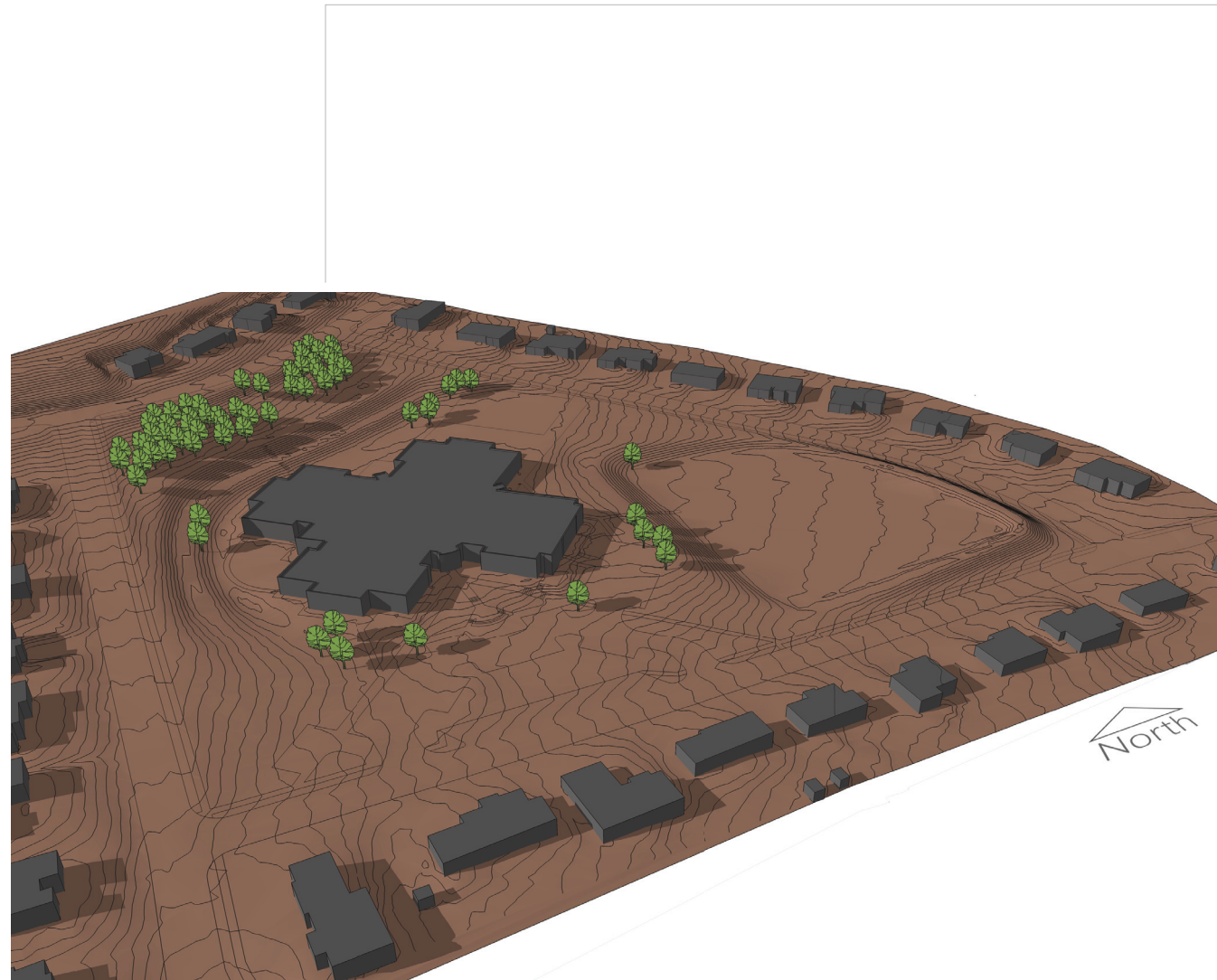


Figure 2.7-Site topography. Author, 2011.










## Slope Aspect

*Goal 1: Encourage Positive Growth for All Inventory*

On a site where there is lot of change in terrain slope aspect influences the health and safety of the children. Slope aspect refers to the cardinal direction the broad side of a sloped surface faces. Slopes that are north and east facing receive less sunlight and will be more prone to icy

conditions in the winter. For example, the blacktop area is on a north-east facing slope, and with the additional shadow that is cast on it from the school building, the space becomes a high risk area for ice in a place where children are frequently very active.

### Legend

 North	 South
 Northeast	 Southwest
 East	 West
 Southeast	 Northwest
	 Contour 1 ft

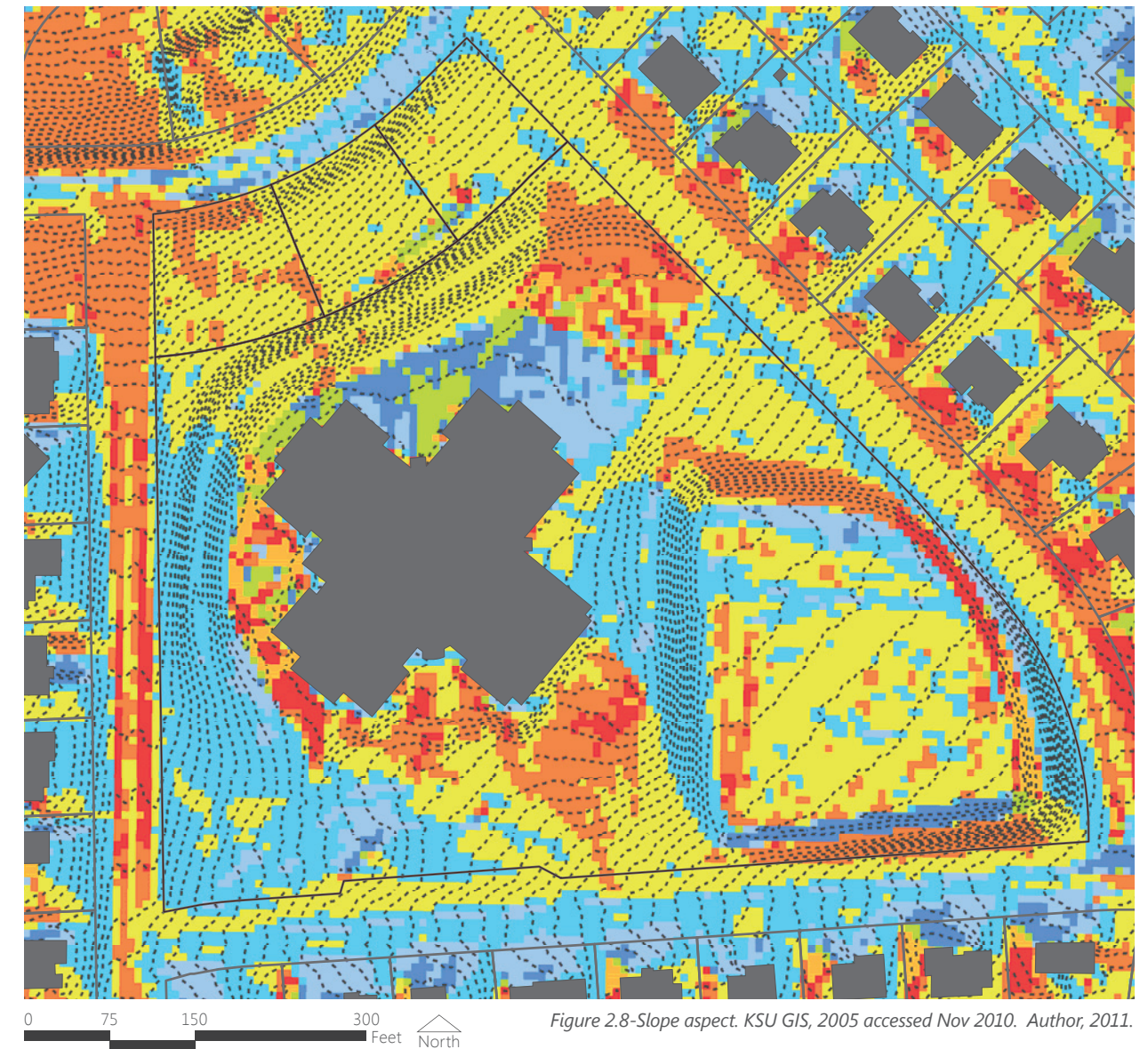


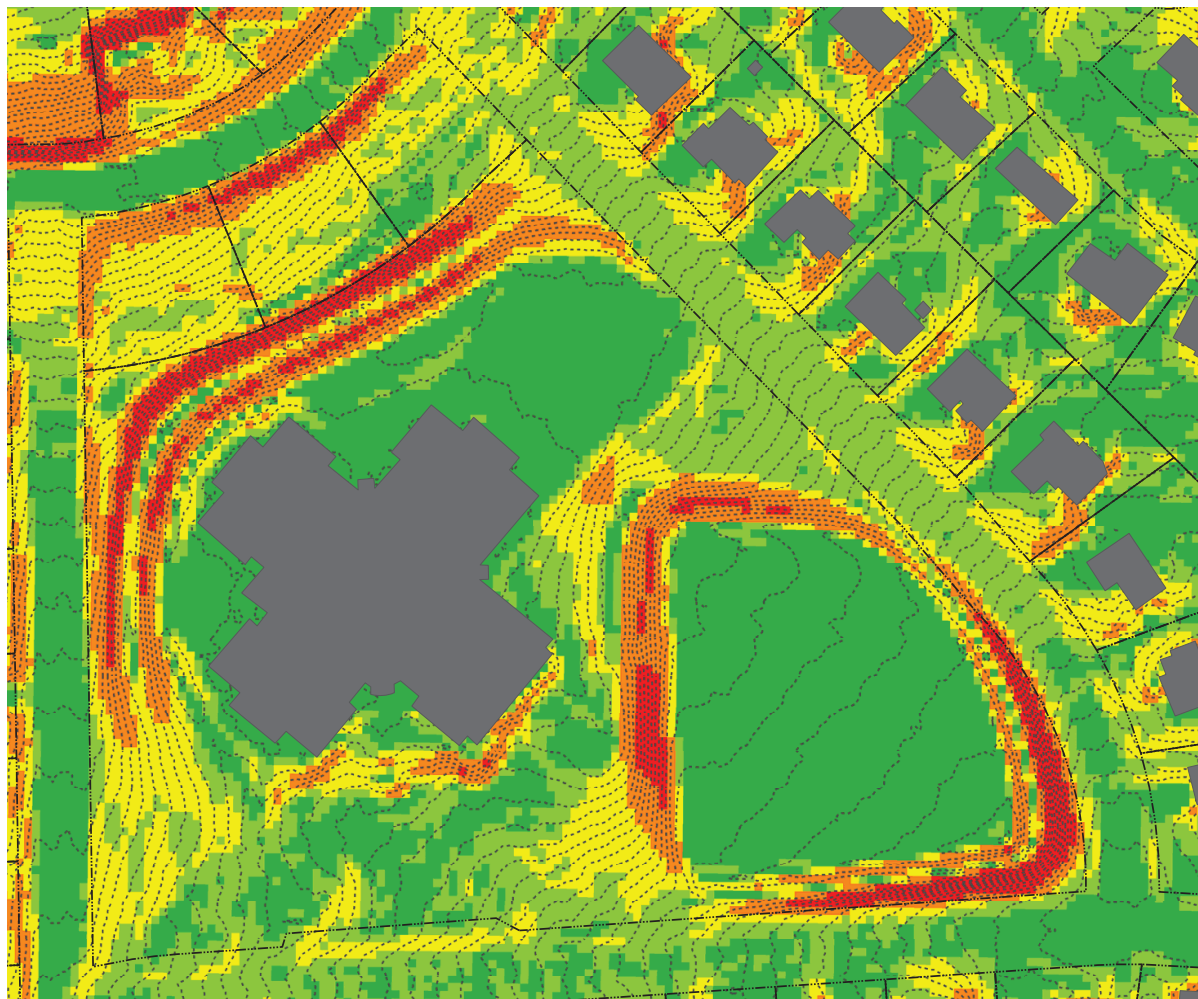
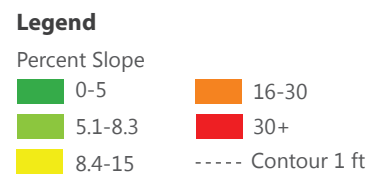
Figure 2.8-Slope aspect. KSU GIS, 2005 accessed Nov 2010. Author, 2011.

## Slope Percentage

Goal 1: Encourage Positive Growth for All Inventory

The areas in green on this map are the universally accessible spaces (under 8.3 percent slopes). Those areas include the parking lot, sports field, and playground areas.

The slopes leading to the sports field and the outdoor wildlife learning site are mostly over 30% slope and are perceived as dangerous to the health and safety of the children. On a site visit, which was during a recess period, teachers frequently reminded small groups of children that they were not allowed on these slopes.



0 75 150 300 Feet North *Figure 2.9-Slope percentage. KSU GIS, 2005 accessed Nov 2010. Author, 2011.*

## Circulation

Goal 1: Encourage Positive Growth for All Inventory

The pedestrian circulation around the building is functional and adequate for the needs of most students. However, the stairways along the pathways to the sports field and the outdoor wildlife learning site act as a barrier to students with special physical needs. In addition, the pathways around the school bisect the two main playgrounds and the vehicular service area; which means people moving along

these pathways might have to go right through a kickball game or avoid the delivery truck when trying to reach their destination.

Vehicular circulation occurs around the perimeter of the site with a one-way parking lot flow inside the site. Buses park in the parking lot and along Lombard Drive to wait for the children.



*Figure 2.10-Circulation. Author, 2011.*

# Accessible Areas

Goal 1: Encourage Positive Growth for All  
Analysis

Bergman Elementary is the host school for the district's Severely Multiple Handicapped Education Program. Ironically, the school also has the least universally accessible site design of any of the Manhattan schools.

The figure below is an analysis of the surface materials, circulation, and the slope maps. It illustrates the areas that are inaccessible due to either excessive slopes or poor

material choice. The red areas either have slopes greater than 8.3 percent or are flat areas that are inaccessible due to steep slopes and no ramps. The orange areas are playgrounds with gravel fill as the base material. The gravel is over an inch deep and too difficult to maneuver in for those with special needs. Only 32% of the total outdoor surface area is universally accessible and much of that is taken up by parking and is not usable for play.

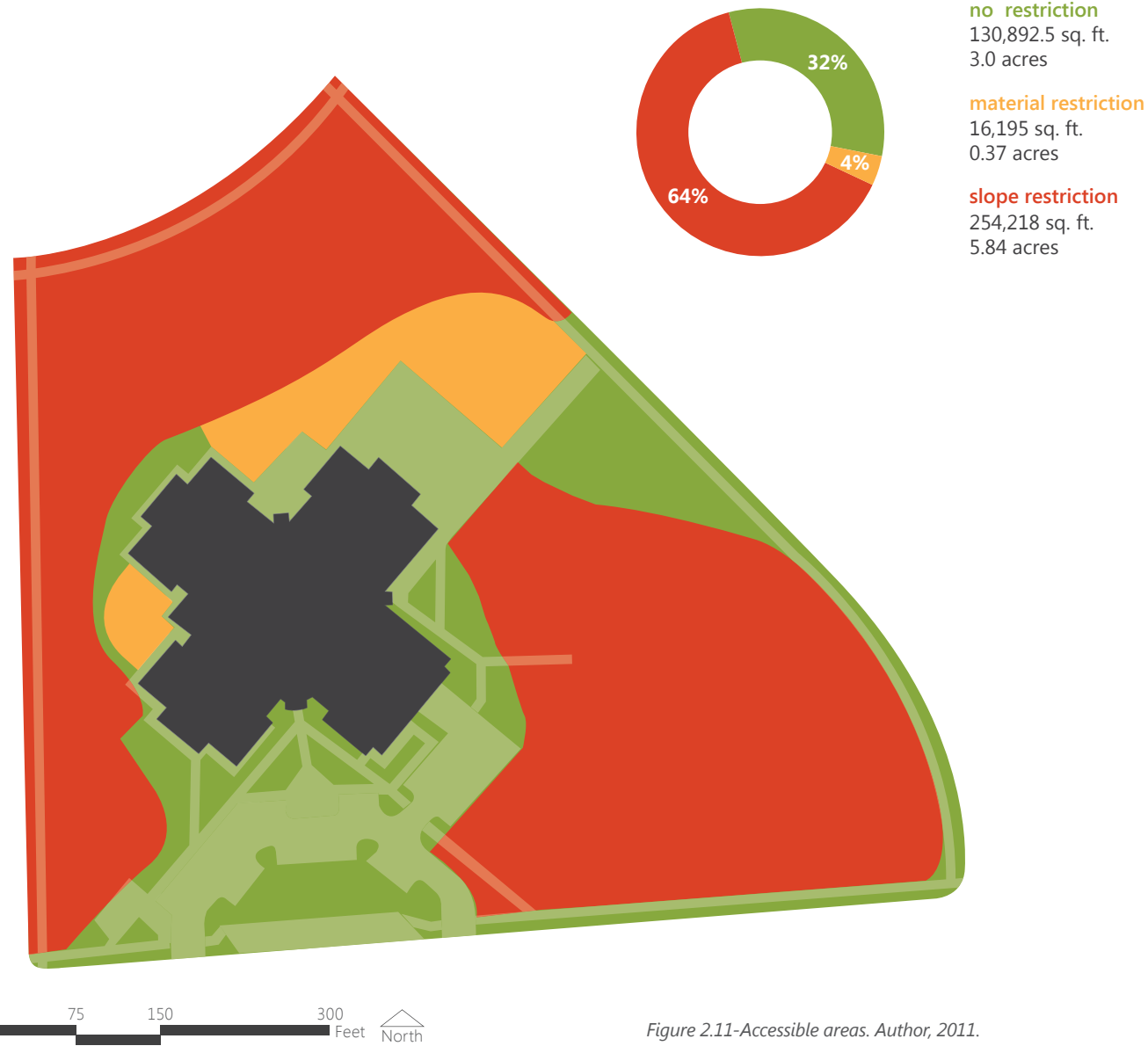


Figure 2.11-Accessible areas. Author, 2011.

# Shade Analysis

Goal 1: Encourage Positive Growth for All  
Analysis

This analysis illustrates the variation in shade patterns cast by the building and by major vegetation throughout the year. Shade is important to consider as it provides comfortable

conditions for people to sit and gather during the warmer months and potential slipping hazards during the colder months as ice forms.

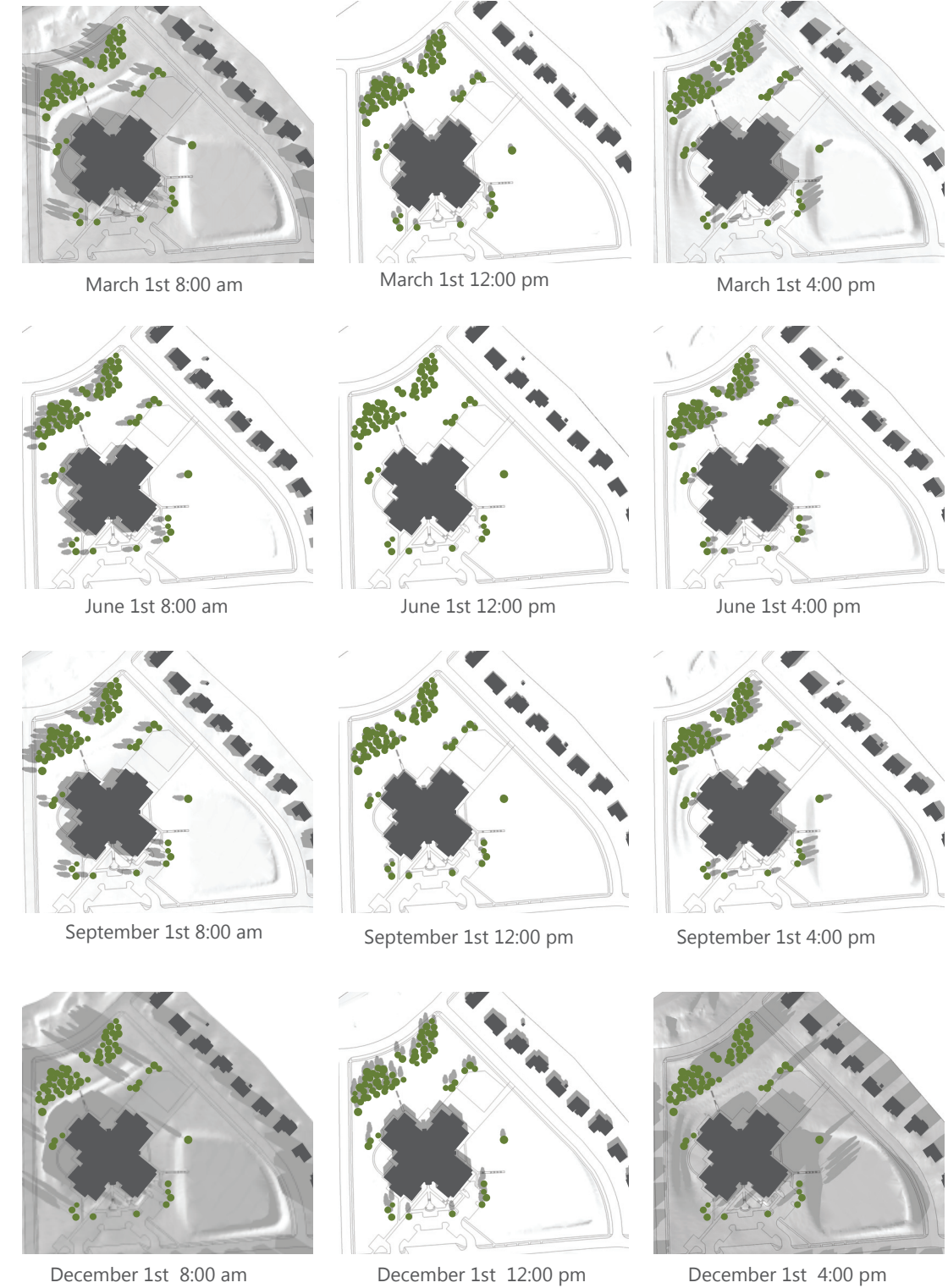


Figure 2.12-Shade analysis. Author, 2011.

## Use of Space

Goal 2: Encourage Positive Growth for All  
Analysis

The diagram illustrates data from site observations and conversations with the faculty on the frequency of use of Bergman's schoolyard spaces. The majority of activity from both the school's children and community members is focused around the playgrounds. The school principal mentioned the sports field and outdoor wildlife learning site are underused areas in the schoolyard.

### Legend



Figure 2.13-Use of space. Author, 2011.

## Availability of Natural Environments

Goal 3: Promote Experiential Learning through Nature  
Analysis

As outlined in chapter one, interaction with the natural world benefits children in a number of ways. This map illustrates the natural environments the children at Bergman have available to them both at school and where they live. Inside the boundaries of the city, there are limited natural environments where children can play. At first glance it would appear that outside of the city there is a better place for children to experience nature, but when you overlay

which areas are open to the public (defined as government-owned parcels) and major roadways as barriers to movement, it becomes clear that children who live within Bergman's district have virtually no access to natural environments on a daily basis. This strengthens the case that creating a natural environment in Bergman's schoolyard would be an asset to the children who attend and to the communities where they live.

### Legend

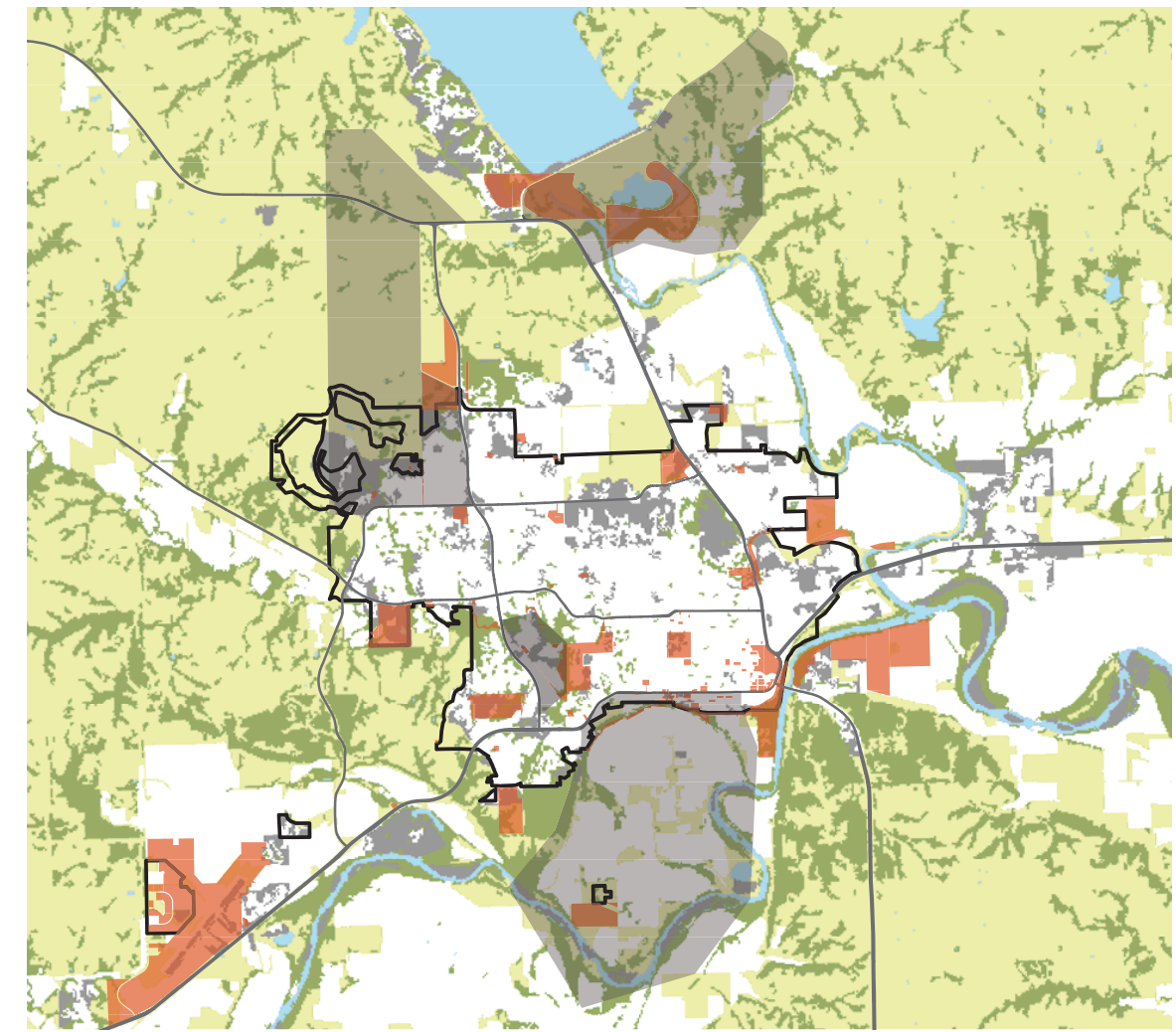
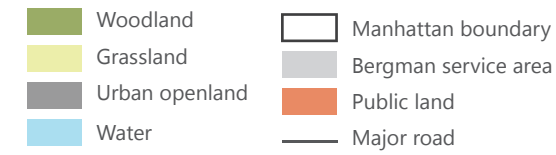


Figure 2.14-Availability of natural areas.  
"Kansas landcover, 2005" Riley Co. Author, 2011.

## Existing Vegetation Cover

Goal 3: Promote Experiential Learning through Nature Inventory

Plants can be an important part of a child's learning experience. They stimulate the senses and support diverse activities. Most schools today pay little attention to planting, expect for an occasional ornamental tree. Turf is easy and cheap to maintain, and as a result, it is the choice plant for budget-tight school districts.

Bergman's schoolyard is not any different, primarily consisting of turfgrass. The tree groves in the outdoor wildlife learning site are cedar trees-a native, yet invasive,

tree in Kansas-and are in a location in the schoolyard that receives little use. The planting beds surrounding the parking lot are isolated from the daily interactions the children could have with them. The large planting area south of the play fields is also isolated by slopes and a chain-link fence and is made up of only one type of groundcover. There are many opportunities to enhance the vegetation in all areas of the schoolyard to provide a rich diversity of experience for the children.



Figure 2.15-Existing vegetation cover. Author, 2011.

## Surface Material

Goal 3: Promote Experiential Learning through Nature Inventory

Surfaces are especially important to consider when designing for children. Materials should be safe and interesting for children to interact with. Children are more physically vulnerable than adults and need surfaces that are forgiving to bumps and falls. Children also live closer to the ground and look to the surface for cues to know where to go and what activities to do. It is important to choose materials that will support and encourage active exploration and learning.

The different surfaces and their representative percentages of area are illustrated here. Ornamental turf makes up about 45% of the entire schoolyard surface. These are areas which are not actively being used by anyone and provide little educational and interactive experiences to children.



Figure 2.16-Surface material. Author, 2011.

# Bergman Service Area

Goal 4: Make the Schoolyard a Community Amenity Inventory

Out of all the school areas in the Manhattan school district, Bergman's is the most fragmented. The geographic boundaries of the school are separated into four distinct areas that span from the northern-eastern side of Manhattan to the most southern side. 40% of the school's children ride the bus to school every day (Site Report, 2010). As a result, there are two communities to address; the school community within the school's service area and the neighborhood community that is geographically closest to the school.

The neighborhoods within the school district's boundaries represent some of the richest areas in the city as well as some of the poorest; and from suburban to rural. The fragmented nature of the school's service area presents challenges for the school to become an amenity that strengthens the community. The travel distance by many of the school's families may weaken their connection to the school and as a result their dedication to support changes to the schoolyard.

### Legend

- Bergman service area
- Road
- Manhattan city boundary

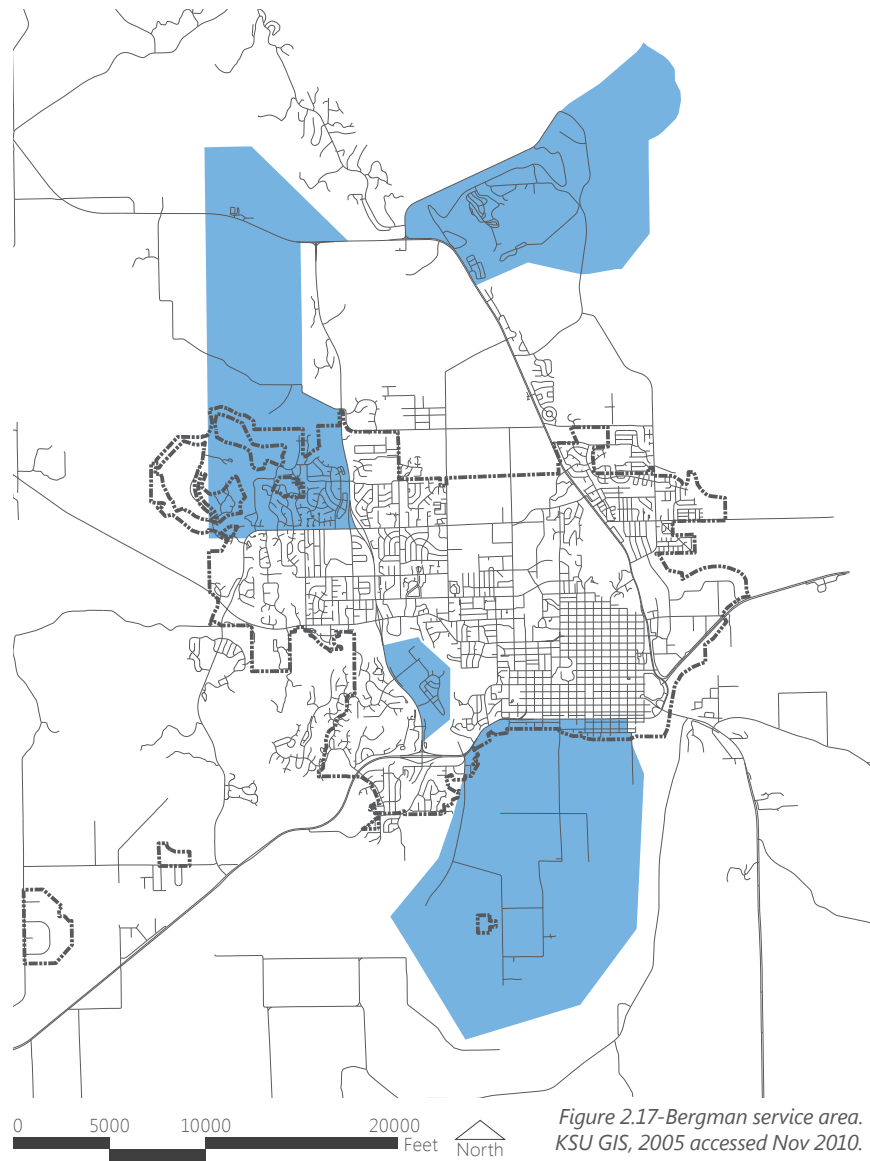


Figure 2.17-Bergman service area. KSU GIS, 2005 accessed Nov 2010. Author, 2011.

# Population Distribution

Goal 4: Make the Schoolyard a Community Amenity Inventory

This map shows the population distribution for Bergman's school service area according to the census data from the year 2000 (the most recently available data). According to this census, the school district should serve a population of about 8,900 people. Young people ages 5-17 make up approximately 17% of this group.

As the map indicates, the densest area in Bergman's school district is the one adjacent to the school itself. It is important to note that while the geographic area of the service area is large and widespread, the population in the outlying areas is relatively sparse and represents only a small portion of the student body.

### Legend

- 1 Dot = 5 people
- Population in year 2000
- Age 5-17
- Bergman School District
- Road
- Manhattan City Boundary

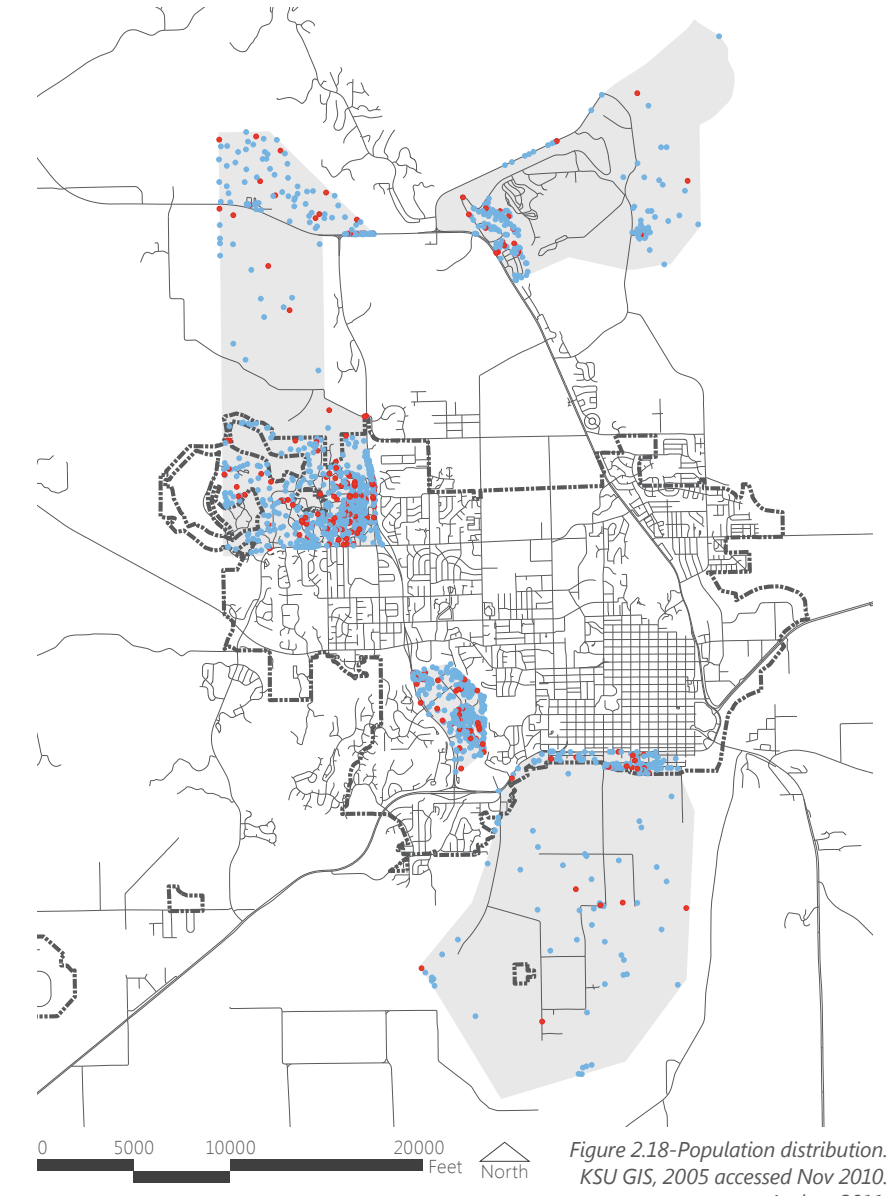


Figure 2.18-Population distribution. KSU GIS, 2005 accessed Nov 2010. Author, 2011.

## Neighborhood Circulation

Goal 4: Make the Schoolyard a Community Amenity Inventory

Like most places in the city of Manhattan, the neighborhood surrounding Bergman Elementary has an auto-centric circulation pattern. Sidewalks exist on only a few of the streets and only then on one side. There are many dead-end streets and cul-de-sacs that offer no pedestrian connections through them. Most children walking to school will have to venture out into the road during some portion of their commute.



Figure 2.19-Neighborhood circulation. Author, 2011.

## Neighborhood Amenities

Goal 4: Make the Schoolyard a Community Amenity Inventory

As the map below illustrates, there are few amenities in the neighborhood adjacent to Bergman Elementary. A few of the nicer outdoor amenities, such as Cico Park is cut off from the neighborhood by a major arterial roadway

(Kimball Avenue) or are lacking entrances into them from neighborhood pathways (Marlatt Park). There exists a need for a community gathering space and destination point in the neighborhood.



Figure 2.20-Neighborhood amenities. Base aerial from Riley Co., 2003. Author, 2011.

# Questionnaire Responses

In order to better understand the needs and desires of the school community with regards to the schoolyard, a brief questionnaire was prepared and distributed to the parent-teacher organization and to school teachers and staff members. A total of eight questionnaires were returned. The responses are listed below.

**Please list the current problems with the schoolyard that you think should be minimized or overcome in the design.**

- Gravel filler under the playground is a safety issue-gets swept onto the pavement and becomes a slipping hazard. A child coming into the home or classroom with gravel in their shoes is a very common annoyance.
- Basketball goals are too high for children
- Color is “blah” and unexciting
- No equipment for special needs children
- No area for pretend/imagination play
- Kindergarten area is too close to the road and potentially unsafe
- Unsafe older slides
- Limited climbing equipment-overcrowding occurs on existing equipment with kids getting pushed around by each other
- Limited grass area-not enough space to kids to run and play sports (which currently occurs on the asphalt)
- Noise levels of the playground and the proximity to the classrooms is distracting to learning
- Sports fields in inaccessible most days because of its lack of proximity to supervision
- There are several blind spots around the corners of the building and around the exits
- Play space is too small
- Balls are often kicked onto building roof and onto playground; hitting students
- Not enough room for basketball
- Sports field is not used-wasted space
- Large rocks need to be removed (kids unearth rocks by running up or rolling down hills)
- Sand is needed around equipment
- Possibly full court basketball-not enough room for games like knockout
- Throwing rocks is a safety issue
- Children run towards building with glass doors and windows
- Too many kids confined in small area
- Not enough equipment for kids

**Please list all of the positive elements and qualities of the schoolyard that should be retained or enhanced in the design.**

- Kick-ball playing field
- Slides
- Swings
- Low maintenance equipment
- Areas are distinct; tetherball & 4-square are in one area while climbing is in another, allowing kids with different interests to play and choose games.
- Separation of kindergarten playground
- Adequate number of play structures
- Equipment is good
- Lots of space-just not used well
- More room for kickball and 4-square activities
- “Really there are none.”
- Enhancements needed:
  - Colorful elements
  - Variety of textures
  - Appropriate height of equipment
  - Sensory elements; not just ‘athletic style play’
  - Fine and gross motor skill activities
  - Additional climbing structures (small or medium sized) added to Kindergarten play area
  - Small grassy area for Kindergarten play area
  - Sandboxes in Kindergarten play area
  - Small benches in the Kindergarten area that would hold 2 children

**Please list those non-curricular activities in which you want to participate in the schoolyard.**

- Soccer fields
- Basketball goals
- Kick-ball field
- Strength (monkey bars, etc.)
- Area for PTO movie nights
- Sensory exploration areas
- Imaginary play equipment-houses, boats, etc.
- Grass field for organized sports during recess
- More climbing equipment
- Hopscotch
- Tag

- Swinging
- Jumprope
- Walking and running for exercise and leisure
- Toss
- Kick back
- More than one blacktop
- Football
- Whiffle ball

**Please list those curricular based activities you would like to see integrated into the schoolyard.**

- Reading/Writing/Languages
  - Quiet outdoor spaces for reading activities on nice days
  - Writing areas that use outdoors for inspiration
  - Materials: amphitheater, picnic tables, chairs, benches, small learning spaces
  - Observation points-writing about observations
  - Small tables for writing
- Mathematics
  - Real world application using nature
  - Measurement opportunities
  - Shapes
  - Materials: outdoor learning labs with roofs
  - Lanes for relays of testing the distance an object can travel
- Science/Geography/Environmental
  - Every science standard could be taught outdoors
  - Materials: pond, plants, garden, storage for outdoor science lab tools
  - Water tables
  - Sensory exploration
  - Gardening-plant life cycle
  - Rain gauge-water cycle
  - Rock garden
- History/Geography
  - Murals of historical events or people on the ground or walls?
- Visual Arts
- Performing Arts
  - Amphitheater
  - Stage

**Other comments or questions**

- Low maintenance landscapes
- Include equipment for special needs children
- Opportunities are need for children to work together and socialize
- Steep slopes and sand make emergency escape difficult for both students and staff (potential targets).

*Summary*

The responses to this questionnaire were very informative and aided in design decisions. A common theme throughout most of the responses is that more variety is needed in the schoolyard. The safety of the children was another theme of interest to these parents and teachers. While there were conflicting opinions on what should be the adequate number and type of play equipment in the schoolyard, most agreed that the sports field was an asset.



## The Master Plan

Producing a master plan of Bergman's schoolyard may seem at first to be going against the idea that schoolyards need time to evolve and respond to the needs set forth by teachers, students, and parents. The development of the landscape at schools can occur in a piecemeal fashion, adding new spaces as time and funds allow, such as occurred in the development Moore's Environmental Yard. However, in his work on the Yard Moore acknowledges the importance of a master plan as a development and communication tool; presenting user needs on paper so they could be taken seriously. The master plan evolved through time, recording new planning and design decisions as modifications were made from user feedback. Especially early on, the master plan served as critical fundraising tool. Moore observed that *"the eagerness of potential donors could be measured in direct proportion to the sense of reality presented by a good-looking, convincing master plan"* (Moore 1997, 222).

The proposed master plan for Bergman provides a framework for decision making and a starting point for future discussion. The design addresses the specific site concerns at Bergman's schoolyard and visually communicates the potentials of the schoolyard to support enriching learning activities.

### Key

- 1 Main entrance
- 2 Parking lot
- 3 Service area
- 4 Garden
- 5 1st-2nd grade area
- 6 Kindergarten area
- 7 Reading space
- 8 3rd-4th grade area
- 9 Outdoor wildlife learning site
- 10 Scenic overlook
- 11 Amphitheater
- 12 Water play area
- 13 Blacktop play area
- 14 Seating space
- 15 Main playground
- 16 5th-6th grade area
- 17 Sports field
- 18 Ephemeral stream
- 19 Planted hillside

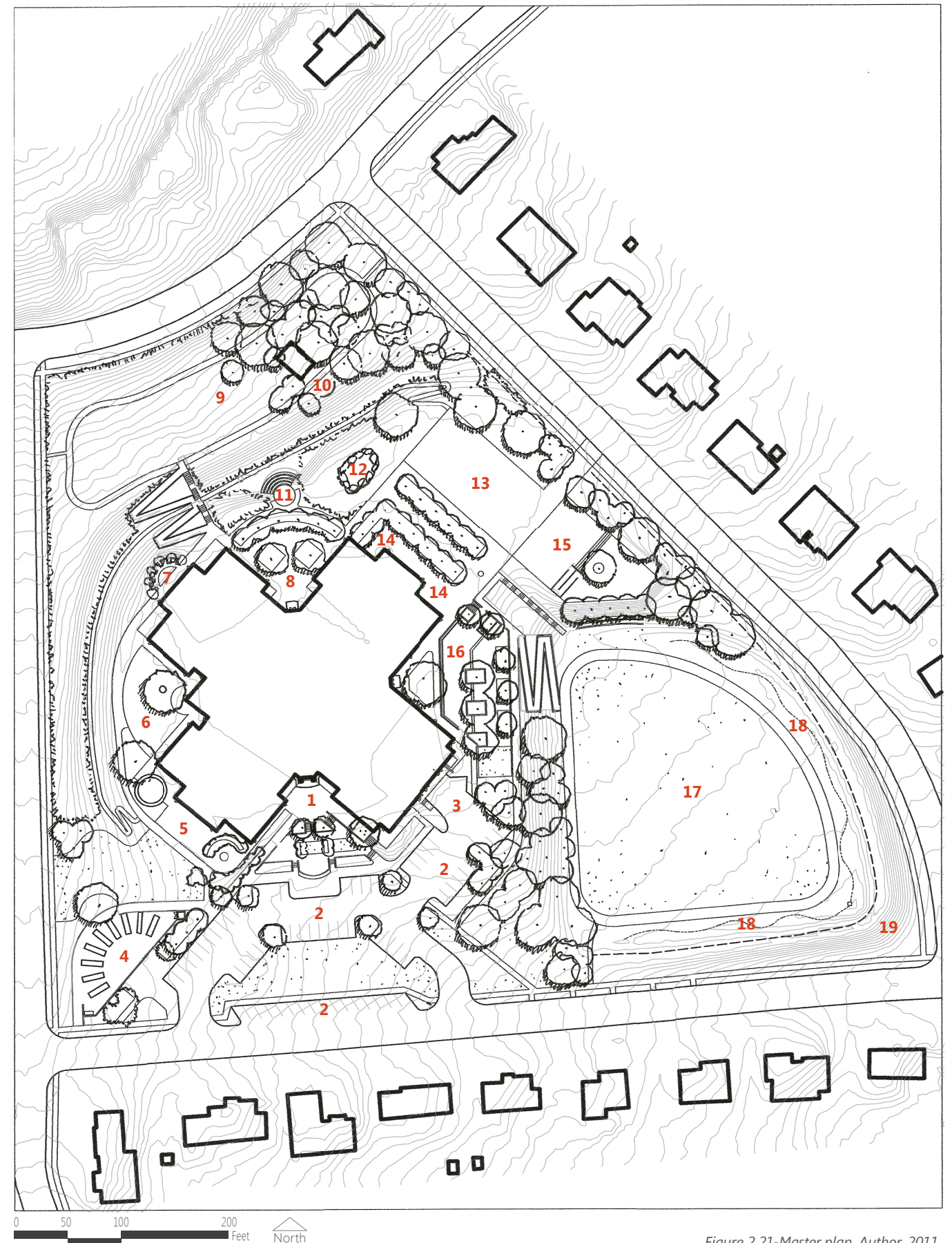


Figure 2.21-Master plan. Author, 2011.

## Connections-Curriculum-Community

The concept for the design of the schoolyard revolves around three points: creating connections, curricular cores, and community edge (see fig 2.22, 2.23).

### Creating connections

Creating connections addresses the current problems with site accessibility. By strengthening the circulation pathways around the school, children of all abilities can reach their destinations easily; which helps to meet the objectives in the first goal of encouraging positive growth for all through site accessibility. These pathways link all spaces in the schoolyard together, helping to cultivate a sense of community between children at different grade levels. The circulation pathways not only help children to connect to each other, but also to connect to their environment. The pathways are meant to be experiences themselves, where children can interact with nature-lined trails and make connections to classroom lessons.

### Curricular core

The curricular cores are outdoor extensions of the classroom and are places for active formal learning experiences. The three core areas are separated according to grades; kindergarten through second grade in one space, third and fourth grades in another, and fifth and sixth in another. This separation helps to specifically address the variations in curriculum complexity and developmental stages. In addition, giving each grade their own space gives

children a sense of ownership over a particular space in the schoolyard. Each of these core areas provides open space for students to gather as a class as well as smaller spaces for group work. The lessons taught in the classroom are reinforced through the design of these core spaces. Natural elements are brought into these spaces to give children places to explore and encourage informal learning.

### Community edge

The community edge is located around the perimeter of the schoolyard. It acts as a place for community gathering for both the school community and the neighborhood community. As the interface between the neighborhood and the school, this area is made to be welcoming and to reflect the values and ideals of Bergman Elementary school. The community edge supports informal learning activities in the playground and sports field areas but also supports formal learning activities in the garden and outdoor wildlife learning site. Nature as habitat occurs in several of these spaces; giving children many occasions in explore natural environments.

It is important reinforce that the idea of curricular cores and community edge are not exclusive of one another. The curricular core areas can support small community events or be places of informal play. In the same way, the community edge has tremendous opportunities for formal teaching and classroom instruction. This way a diversity of experiences over the entire schoolyard can be realized.

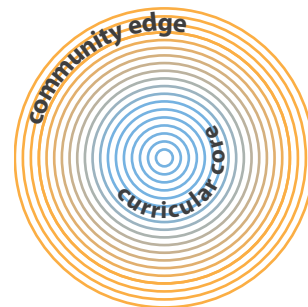


Figure 2.22-Design concept diagram. Author, 2011.

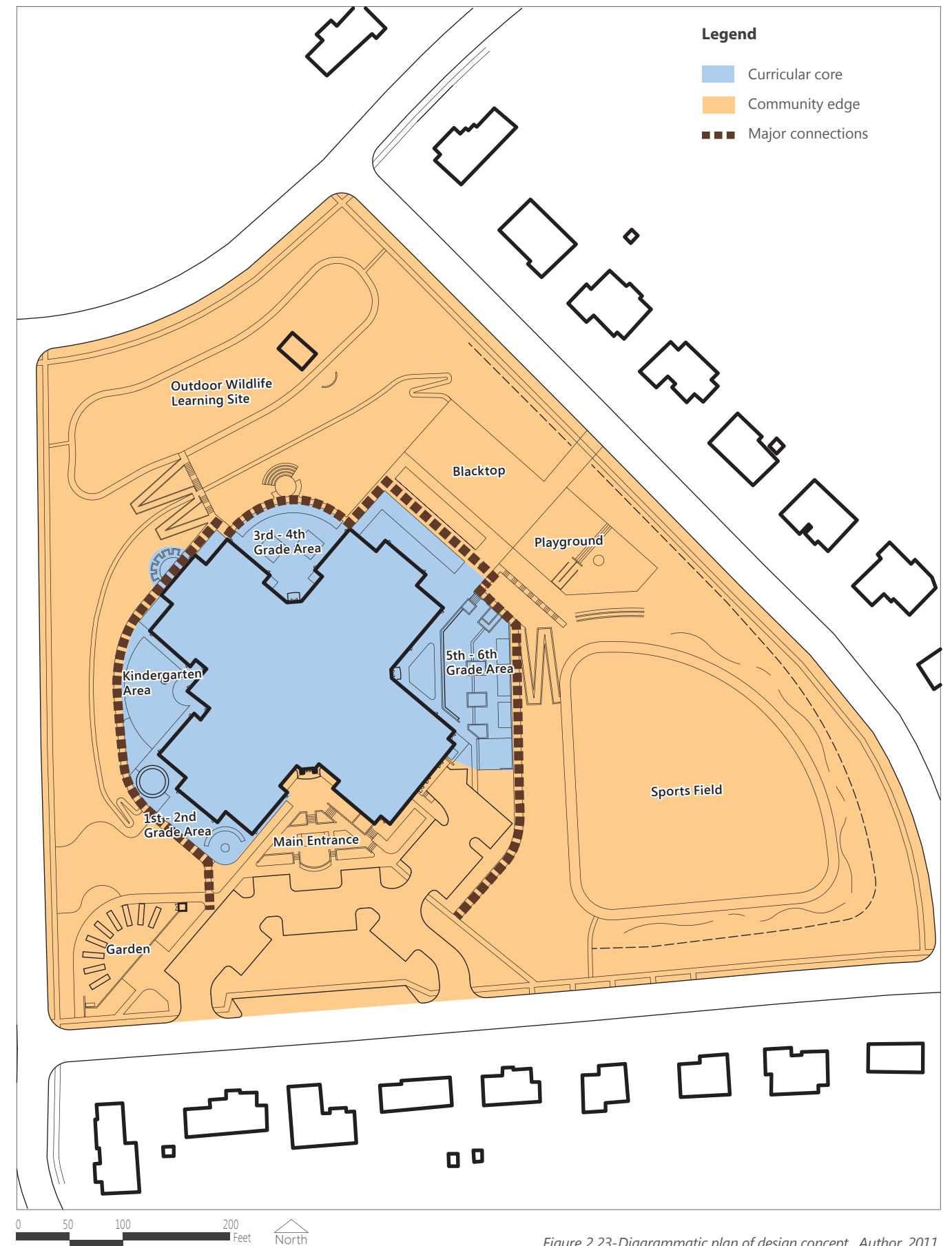


Figure 2.23-Diagrammatic plan of design concept. Author, 2011.

## Creating Connections: Pathways

The pathways that currently exist at Bergman fail to provide access to all areas of the schoolyard. In addition, the pathways are indirect and are interrupted by having to pass through a service area and actively used blacktop.

### **Design Opportunities**

#### *Encourage Positive Growth for All*

The primary pathway around the schoolyard acts as the interface between the curricular core and the community edge; linking these two zones together and providing seamless movement between the two. This pathway provides accessible ramps that meet ADA (American Disability Act) requirements to the currently isolated sports field and outdoor wildlife learning site.

#### *Promote Experiential Learning through Nature*

The ramps leading to the outdoor wildlife learning site and the sports field not only provide access to these areas, but are meant to be experiences themselves. The space in between the ramps is planted with sensory stimulating plant materials. Small shrubs, annuals, and perennials give color to the pathways and stimulate the senses; such as plants with thick hairy leaves or long spindly stems.

#### *Support School Curriculum*

These pathways also double as a nature walks, and can be an experience in formal learning. Native trees, shrubs, flowers, groundcovers, and other natural materials follow the pathway and teach children about plants of the region, the change and seasonality of the environment, and our responsibilities to protect and preserve nature.

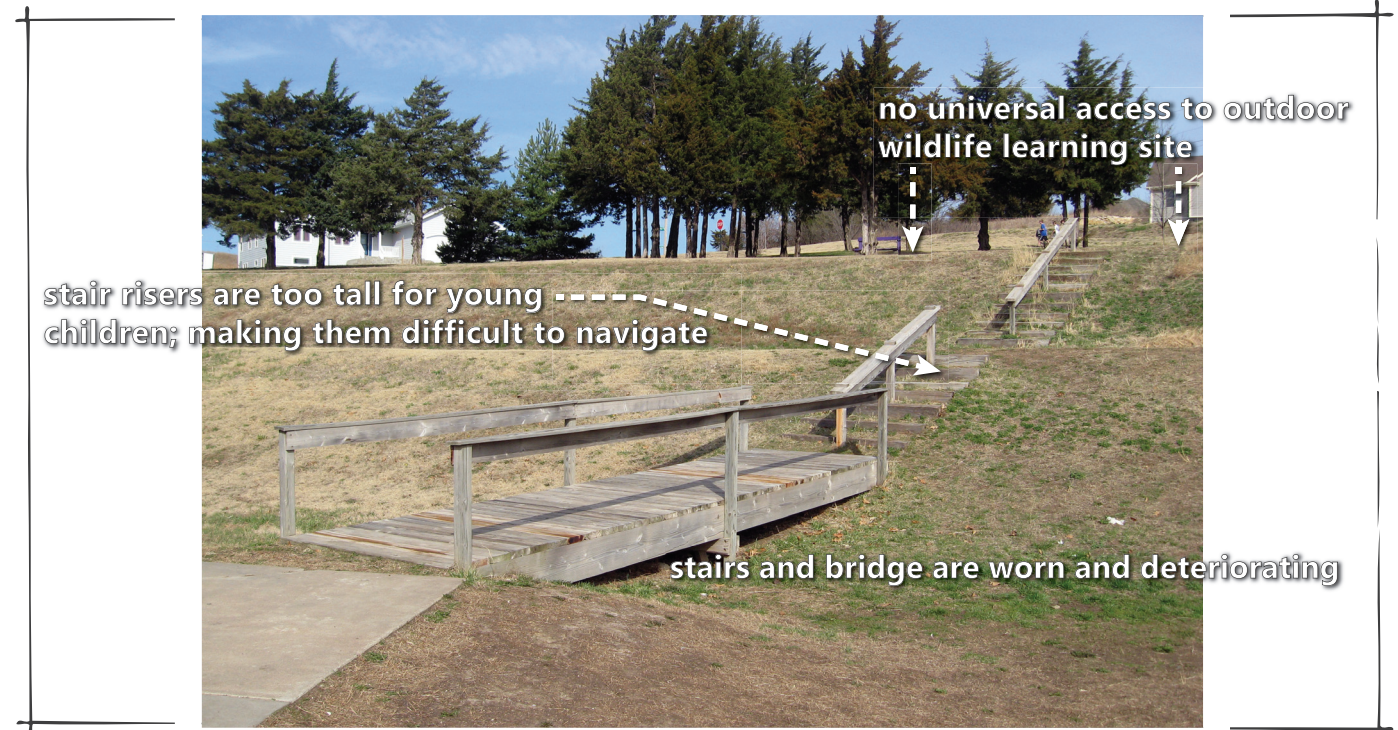


Figure 2.24-Current accessibility limitations. Author, 2011.

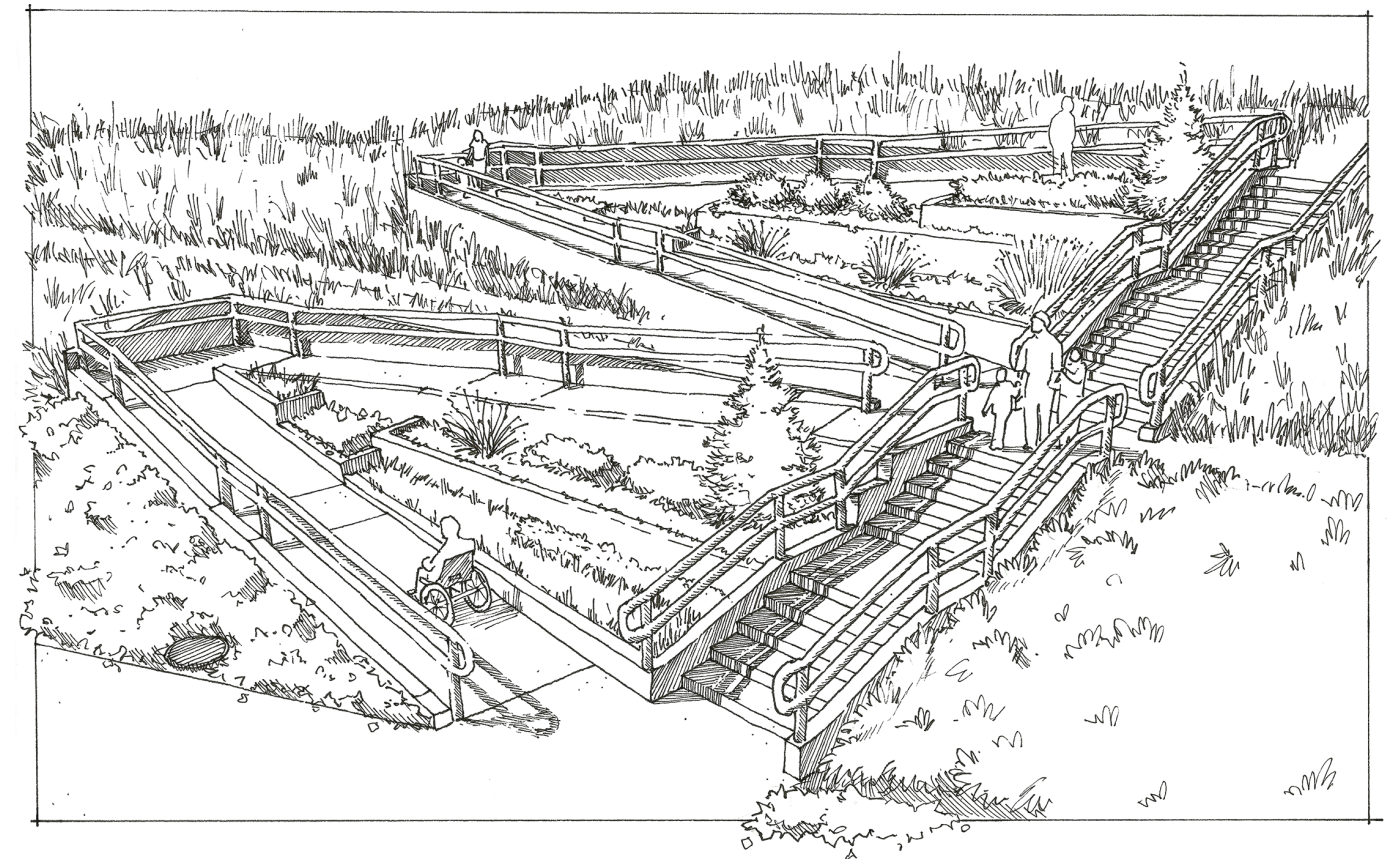


Figure 2.25-Universally accessible ramp to outdoor wildlife learning site. Author, 2011.

### Creating Connections: Pathways

The primary pathways that occur on the sidewalks surrounding the schoolyard will remain as they are currently. Changes will be made to the existing pathways by creating another primary circulation route that moves along the edge of the outdoor classroom spaces. This way, important learning activities or informal games do not have to be interrupted by individuals or groups passing through. Secondary and tertiary pathways improve circulation within spaces and connect key site features together.

- Legend**
- Primary pathway
  - Secondary pathway
  - Tertiary pathway



Figure 2.26-Creating connections pathway diagram. Author, 2011.

## Curricular Core: K - 2nd Grade

One of most universal concerns mentioned by parents and teachers is the playground's gravel fill. The material is considered a nuisance by spilling out onto the walkways, creating safety hazards and unsightliness. The kindergarten playground's proximity to the road, without any fence or other barrier, is a concern for teachers (see questionnaire summary). A lack of adequate seating, shade, and appropriate surfaces can make this space uncomfortable to be in and limits its use to solely equipment play.

### Design opportunities

#### Encourage Positive Growth for All – Promote Experiential Learning through Nature

To make the playground accessible for children of all needs, the gravel fill is replaced with a rubberized playground surface that is both soft and accessible. The safety issues are addressed by plating the terraced hillside with tall, meadow grasses on the upper slope and shorter shrubs and groundcovers on the lower slope. These plant materials add physical barriers which deter unwanted wandering into the street. Shade trees, benches and tables are added to the area to make it comfortable and to support quieter, more formal activities.

Developmental needs are met in several ways. A variety of objects such as rocks, trees, play equipment, and uneven play fields give children a chance to run and climb, encouraging physical growth. Added plant materials give children more loose parts to play with, enhancing make-believe play. Finally, designing both open and private spaces give children varied social opportunities. A sandbox common area links the kindergarten area to the first and second grade area, inviting socialization between the grades and giving these children opportunities manipulate their own environment.

#### Support School Curriculum

The geometries of the spaces also support formal learning. Simple shapes, such as rectangles, squares, and circles are designed into the spaces to help children recognize these shapes and explore their attributes. The grid scoring pattern in the pavement can be used to teach measurements, direction, and place values. A variety of materials from shrubs, trees, rocks, and twigs, can be used for reinforce counting, estimation, and other math concepts. The natural planting in this space can teach children about the characteristics of living things, the properties of earth materials, and changes in the seasons. These same elements can also give children new vocabulary words to learn as they discover new things in their environment.



Figure 2.27-Existing problems near the kindergarten through second grade classrooms. Author, 2011.

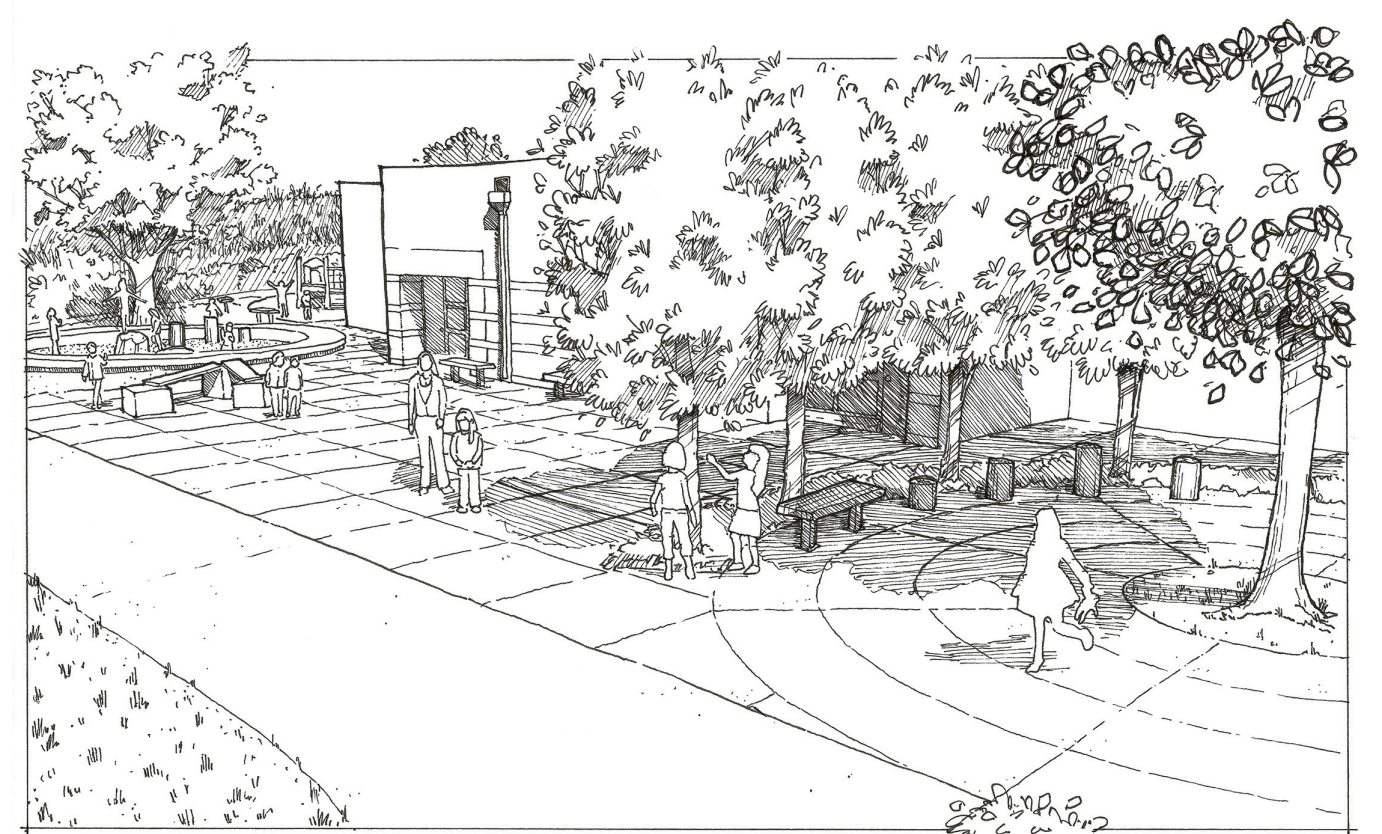


Figure 2.28-Kindergarten through second grade area concept sketch. Author, 2011.

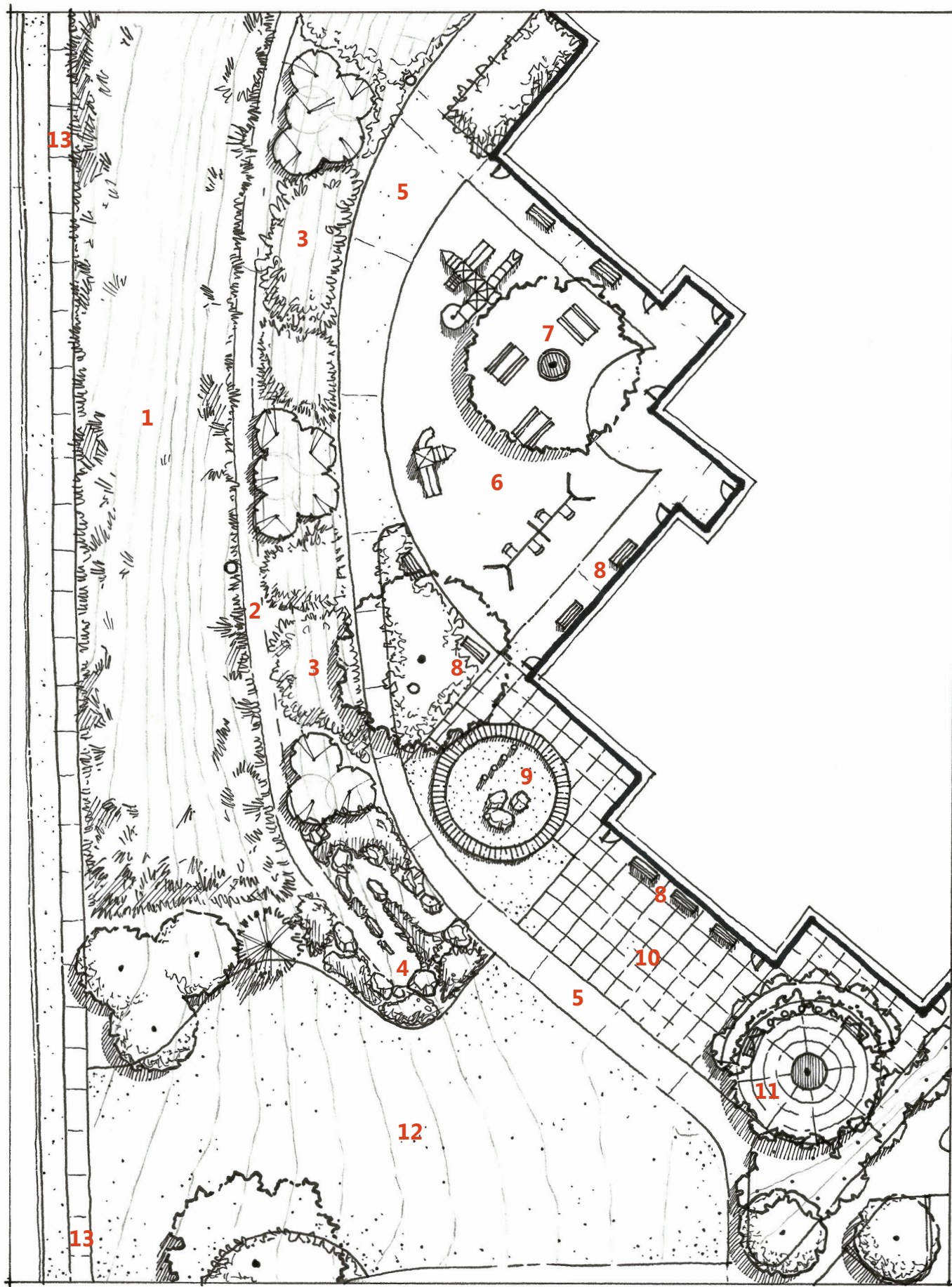


Figure 2.29-Kindergarten through second grade master plan. Author, 2011.



**Key**

- 1 Tall-grass meadow
- 2 Challenge trail
- 3 Sensory garden
- 4 Rock garden
- 5 Main circulation path
- 6 Kindergarten playground
- 7 Picnic tables
- 8 Benches
- 9 Sandbox
- 10 1st and 2nd grade gathering space
- 11 Small gathering space
- 12 Turf field
- 13 Sidewalk

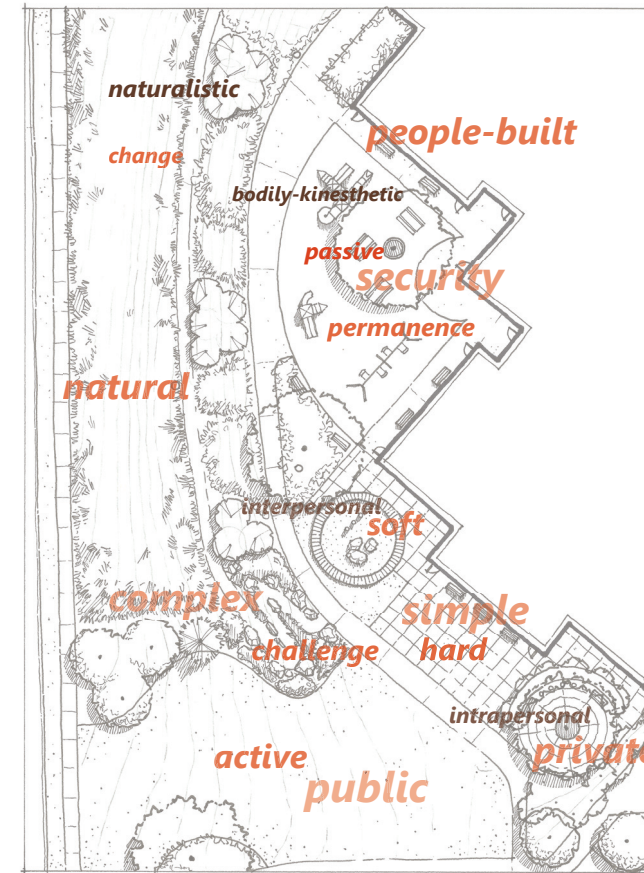
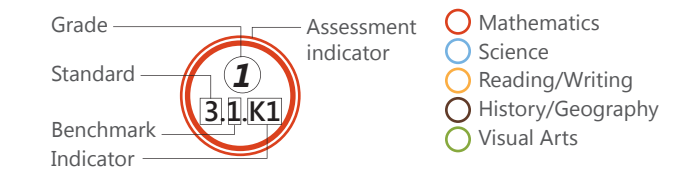


Figure 2.30-K-2 diversity of experiences diagram. Author, 2011.



Figure 2.31-K-2 curricular connections. Author, 2011.



\*see appendix A for listing of academic standards

## Curricular Core: 3rd - 4th Grade

This area of the schoolyard is currently a barren open space occupied only by rows of tetherball poles. Concrete pathways line the building and fill the space underneath the tetherball courts. The only other material in this area is a thin layer of gravel fill. The space is lifeless and unexciting; even the view of the terraced hillside does not add much to the scene.

### Design Opportunities

#### Encourage Positive Growth for All

The gravel is again removed and the concrete expanded to provide a flat and universally accessible surface. The tetherball courts are relocated to the playground area. In its place, a rich hierarchy of spaces is created to give children opportunities to gather as a class or break off into smaller learning groups.

#### Promote Experiential Learning through Nature

Plant materials are added to breathe life into the space with different textures and colors. Trees provide shade to make the area comfortable for formal learning activities and play. The curved row of trees and other plantings help to enclose the area and separate it from the amphitheater and main circulation path beyond.

#### Support School Curriculum

Ties to the curriculum can be found again in the geometry of the ground plane. Scoring lines in the concrete pavement bring measurable shapes to the space. A grid on the ground surface can aid in the teaching of more complex shapes, counting, and coordinates. The symmetrical layout reinforces geometry concepts being taught at this grade level. Formal plantings can teach children about environmental stewardship and the basic needs of different organisms in their environment.

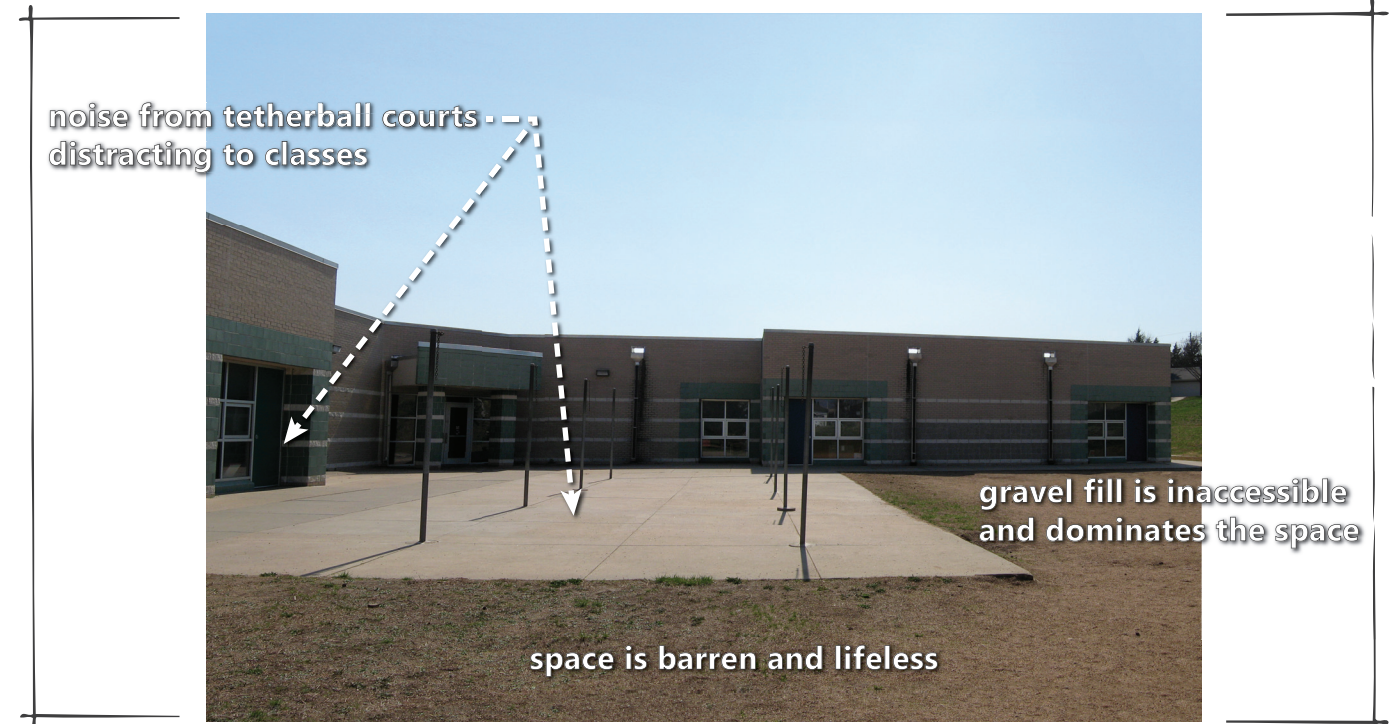


Figure 2.32-Existing problems near the third and fourth grade classrooms. Author, 2011.

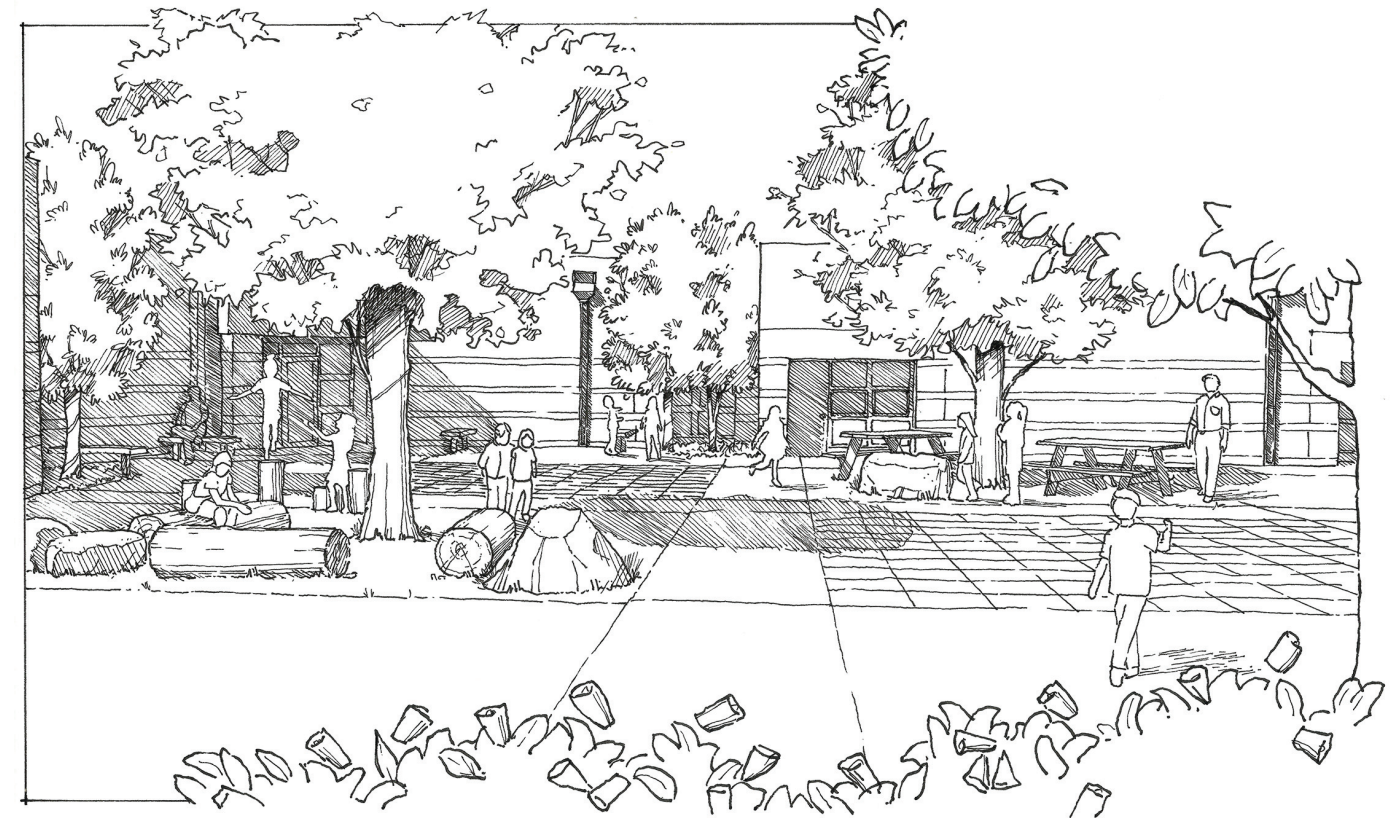


Figure 2.33-Third through fourth grade area concept sketch. Author, 2011.

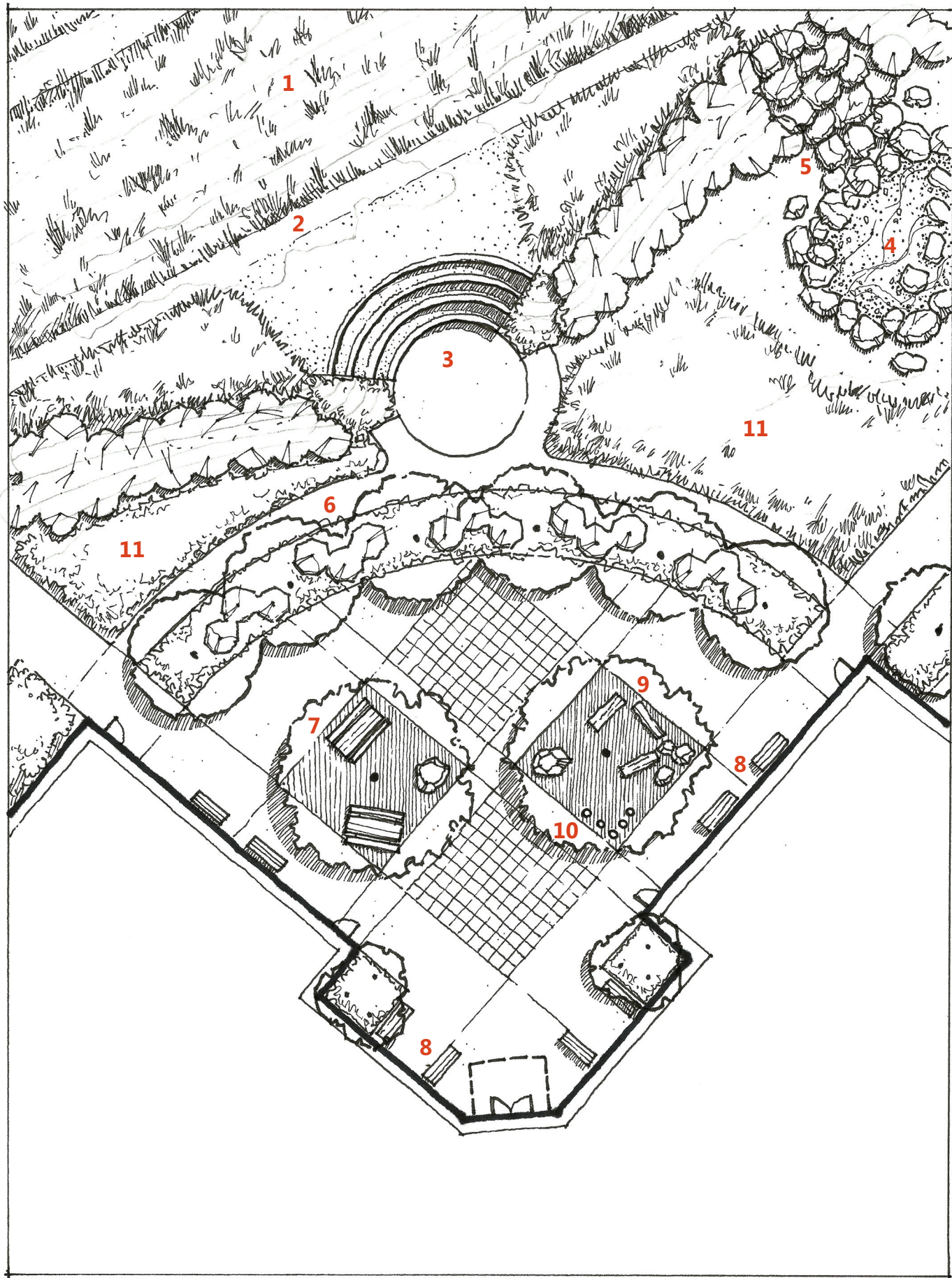


Figure 2.34-Third through fourth grade master plan. Author, 2011.

**Key**

- 1 Tall-grass meadow
- 2 Challenge trail
- 3 Community amphitheater
- 4 Water play area
- 5 Climbing rocks
- 6 Main circulation path
- 7 Picnic tables
- 8 Benches
- 9 Fallen log
- 10 Sitting stump
- 11 Groundcover planting



Figure 2.35-3-4 diversity of experiences diagram. Author, 2011.

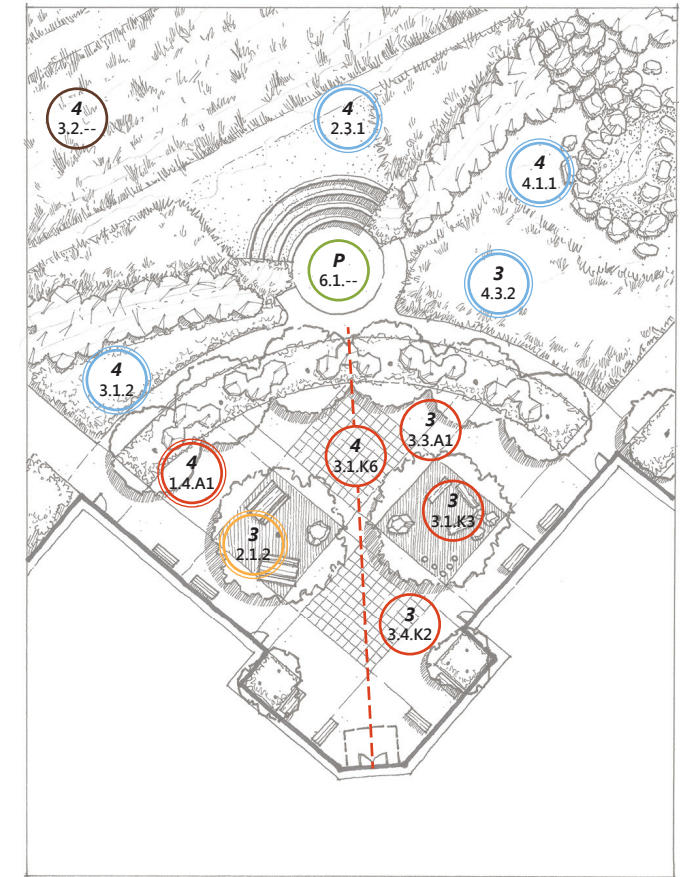


Figure 2.36-3-4 curricular connections. Author, 2011.

- |           |                      |                   |
|-----------|----------------------|-------------------|
| Grade     | Assessment indicator | Mathematics       |
| Standard  |                      | Science           |
| Benchmark |                      | Reading/Writing   |
| Indicator |                      | History/Geography |
|           |                      | Theatre/Drama     |

\*see appendix A for listing of academic standards



## Curricular Core: 5th - 6th Grade

The existing space in this area consists of a sloped turf field with a small ornamental tree. The slopes of the area make it undesirable for sports play and inaccessible for those with special physical needs. The current use of the space is mainly as a circulation path for those students leaving the cafeteria and heading toward the playground for recess.

### Design Opportunities

#### Encourage Positive Growth for All

In order for this space to be level enough for universal access it was divided into three terraced levels. The upper level is primarily used for circulation into and out of the school. A large tree with a high canopy helps to create a unique space and additionally acts as a way-finding feature. The second level is enclosed by a small retaining wall and fence. This space is for larger gatherings of students for classroom demonstrations or instruction. The third level is one foot below the second and is accessed by wide stairs that double as seating spaces. This level is divided into several smaller spaces to create areas of socialization that are developmentally appropriate for this age group. These smaller spaces can also support groups engaged in formal learning activities. Planting and tree cover in all these levels provide comfort and interactive opportunities for children.

#### Support Curriculum

Children at this age are beginning to think more logically and can understand transformation of shapes. As a result, the geometries of this area are more abstract. Students learn about shapes such as trapezoids and parallelograms in the math lessons, and these shapes are found in the geometries of the space and the scoring pattern on the ground plane. Additionally, different sizes and forms of planter beds reinforce transformation of three-dimensional shapes. Smaller spaces can be used for reading and writing activities. Planting material can teach many science concepts such as the adaptations of organisms to their environment, provide live material for the observation of cells structure, or help children investigate the effects of human activities on the environment.

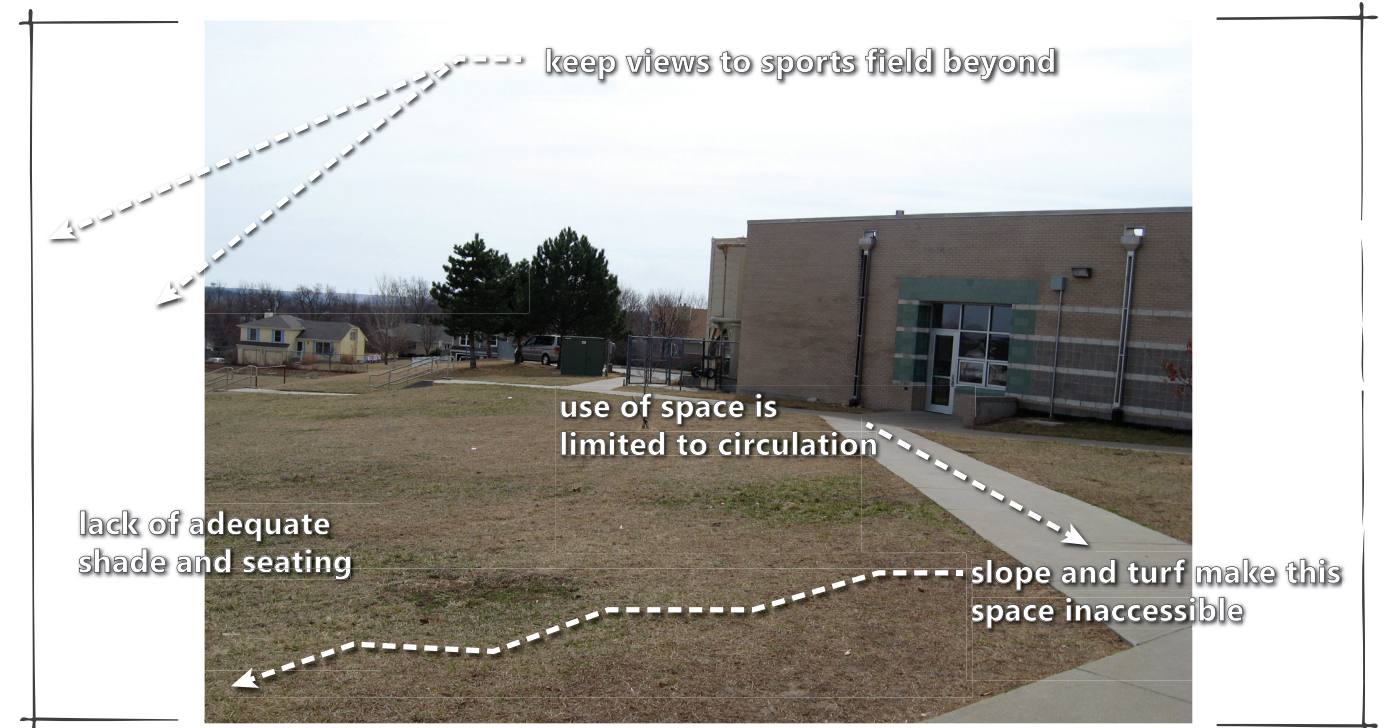


Figure 2.37-Problems and opportunities near the fifth and sixth grade classrooms. Author, 2011.

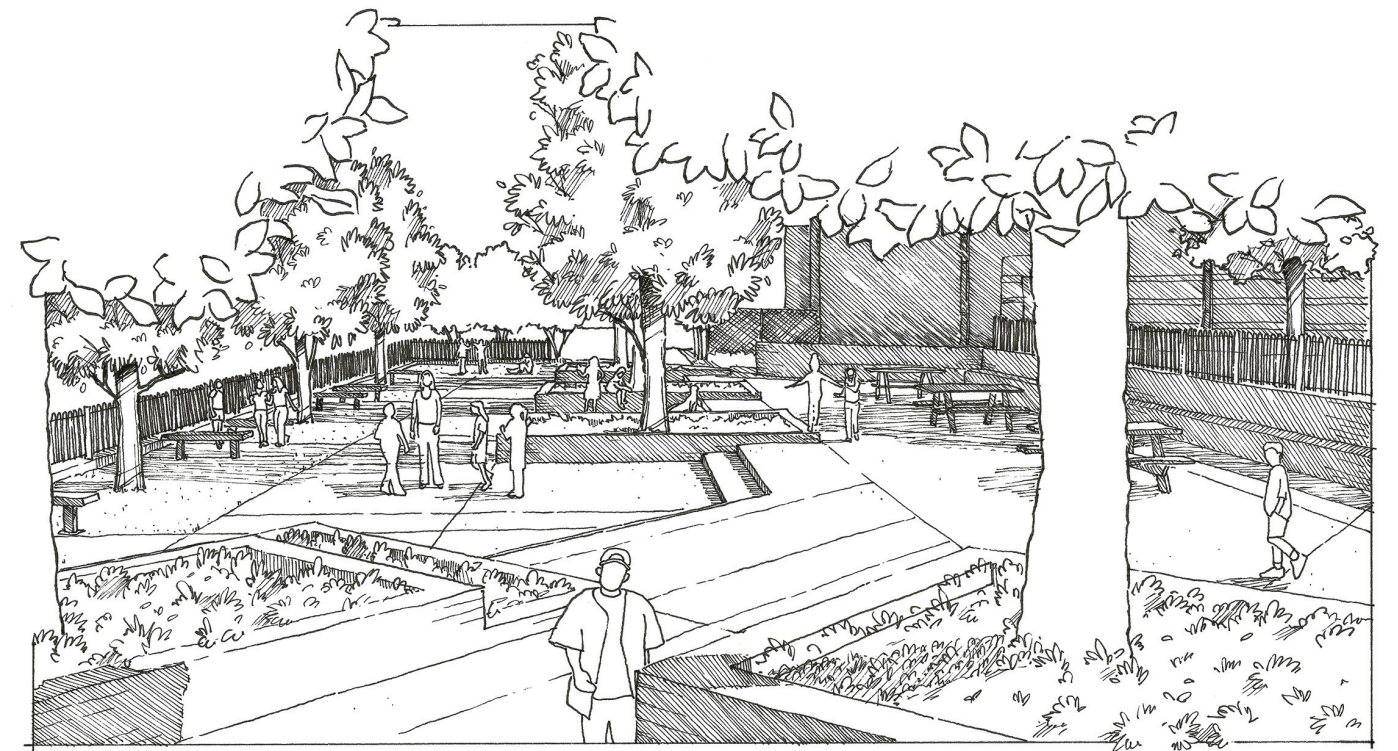


Figure 2.38-Fifth and sixth grade area concept sketch. Author, 2011.

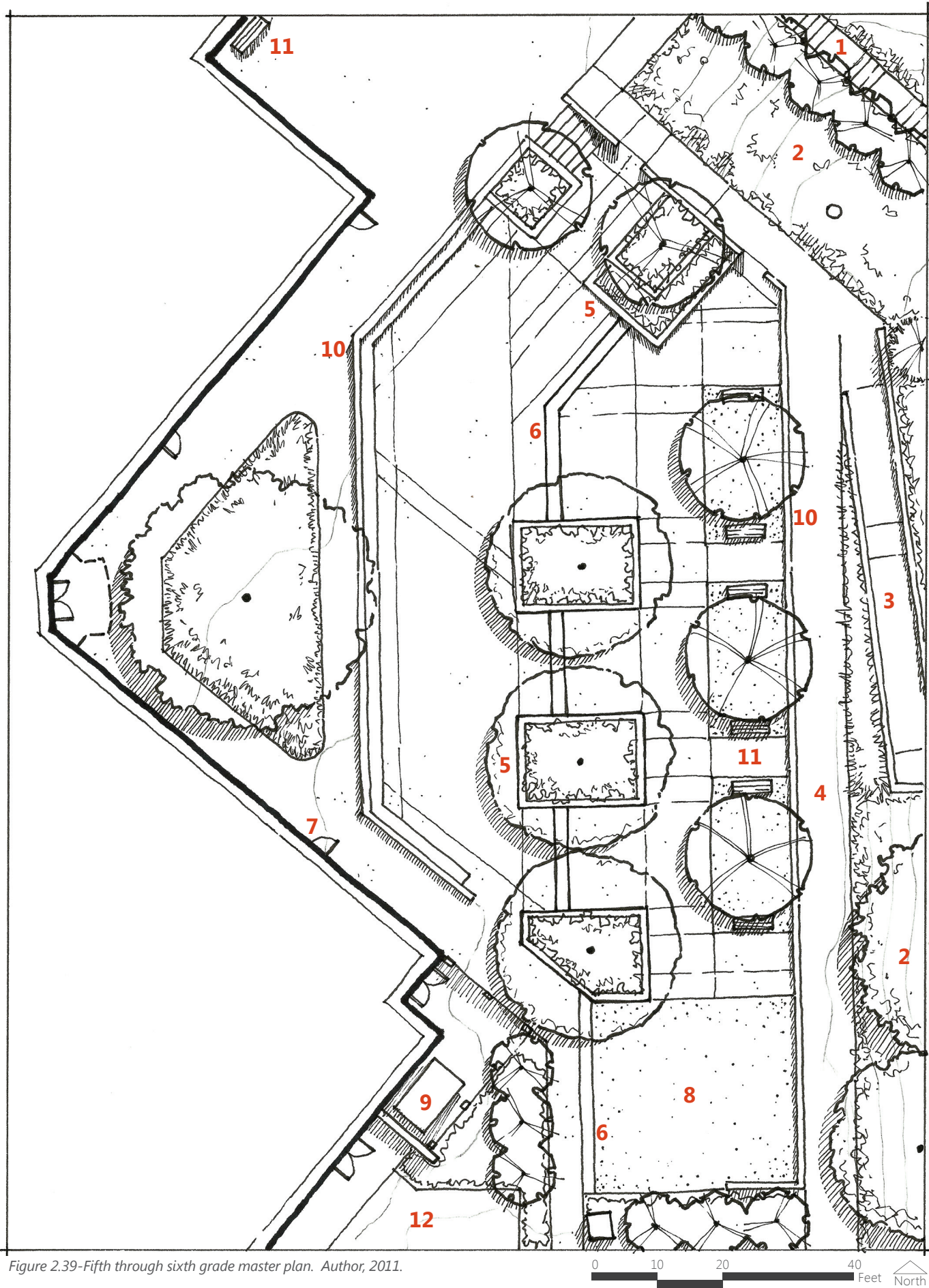


Figure 2.39-Fifth through sixth grade master plan. Author, 2011.

**Key**

- 1 Stairs to sports field
- 2 Planted hillside
- 3 Accessible ramp
- 4 Main circulation path
- 5 Raised planter
- 6 Seating steps
- 7 Cafeteria exit
- 8 Turf field
- 9 Utility tower
- 10 Retaining wall and guardrail
- 11 Small seating space
- 12 Service area

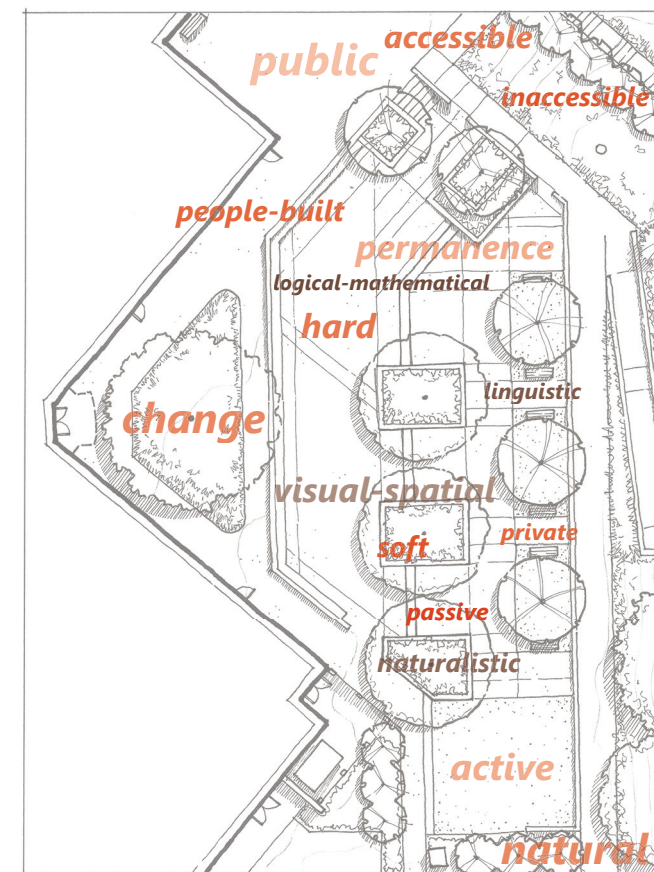


Figure 2.40-5-6 diversity of experiences diagram. Author, 2011.

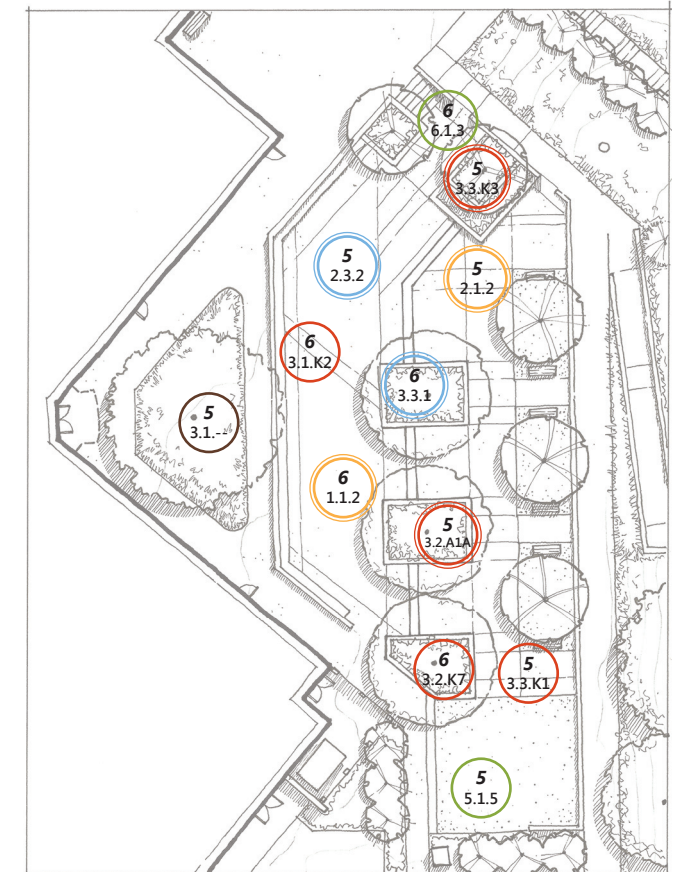


Figure 2.41-5-6 curricular connections. Author, 2011.

- |           |                      |                      |
|-----------|----------------------|----------------------|
| Grade     | Assessment indicator | ○ Mathematics        |
| Standard  |                      | ○ Science            |
| Benchmark |                      | ○ Reading/Writing    |
| Indicator |                      | ○ History/Geography  |
|           |                      | ○ Physical Education |

\*see appendix A for listing of academic standards

## Curricular Core: Outdoor Reading Space

An outdoor reading space, designed for all students is located in a quiet and secluded area of the schoolyard. An overhead canopy of trees helps to enclose this space and make it a private, comfortable place to read. This space helps to reinforce reading and writing curricula, while space geometries and planting can help to reinforce concepts in math and science.



Figure 2.42-Problems and opportunities of space by the third and fourth grade classrooms. Author, 2011.

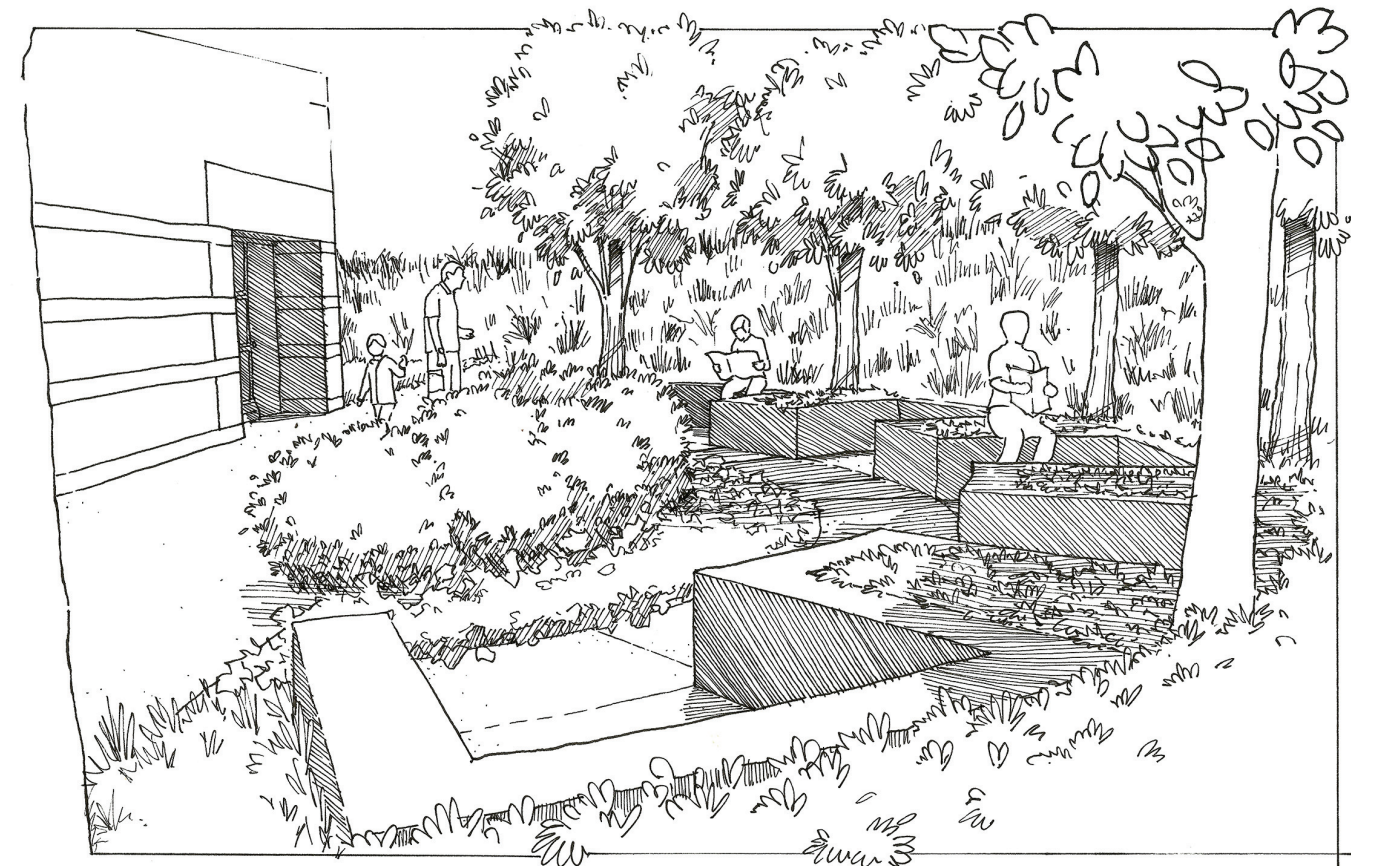


Figure 2.43-Quiet reading space concept sketch. Author, 2011.

## Community Edge: Main Entrance

The configuration of the walkways that lead to the main entrance are designed in such a way that they keep people moving into and out of the school without providing any place to stop, gather, or wait to pick up a child. There are several feet of grade change from the parking lot to the doors of the building. Consequently, the spaces in between the walkways are filled with sloped turf grass. The accessible ramp does not meet current ADA requirements of having proper landings every thirty feet. Finally, the main entrance is not particularly welcoming and does little to reflect the core values of the school community.

### Design Opportunities

#### *Make the School a Community Amenity*

Creating small gathering places for people to linger near the main entrance is achieved by splitting up the space into three levels with ample seating and comfortable conditions. To make the entrance more welcoming more trees were added to provide shading and turf areas were reduced in size or replaced with planting beds. The existing flagpole and dolphin statue remain in place to welcome students and visitors to the school. Finally, the accessible ramp was reconfigured to meet current ADA requirements.



Figure 2.44-Problems and opportunities near the main entrance. Author, 2011.

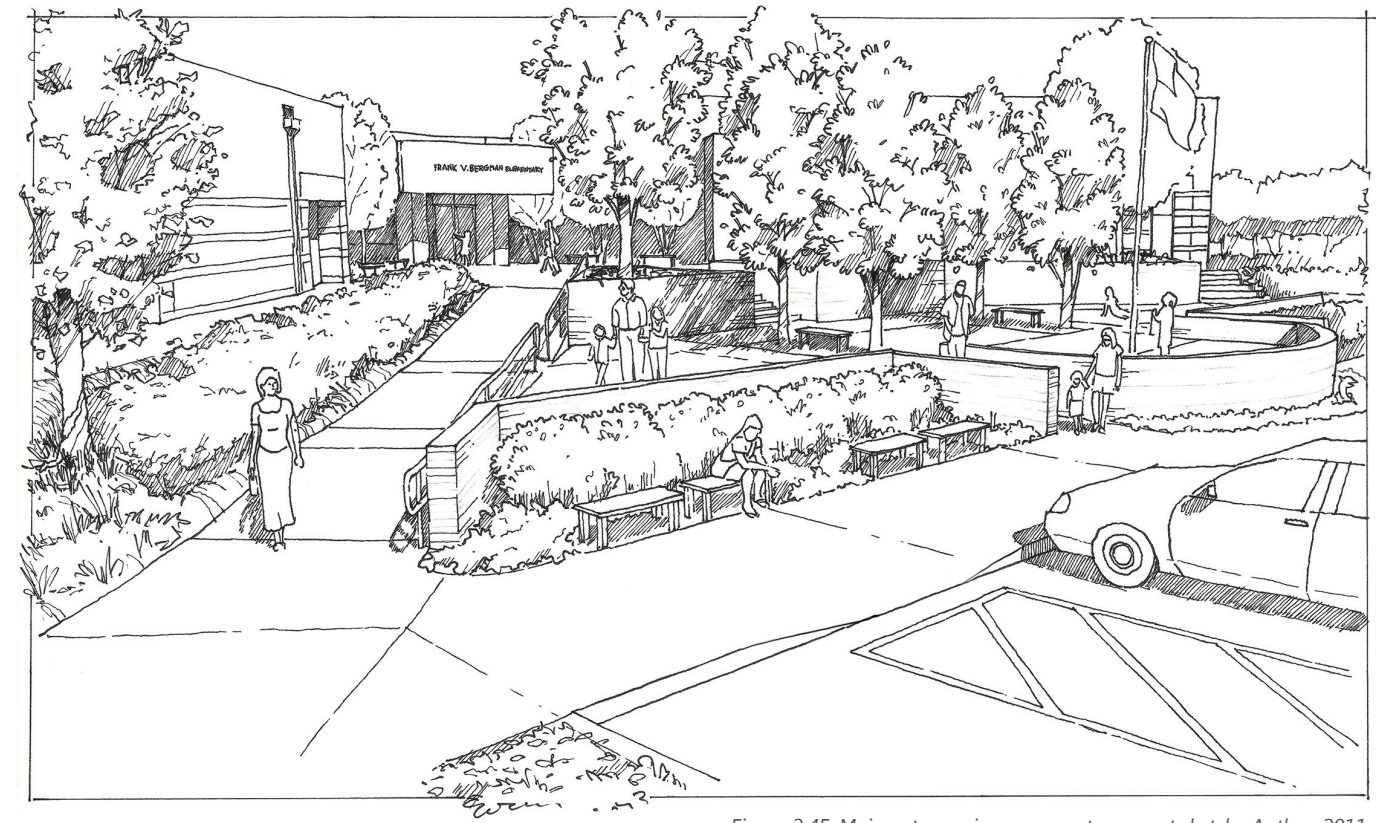


Figure 2.45-Main entrance improvements concept sketch. Author, 2011.

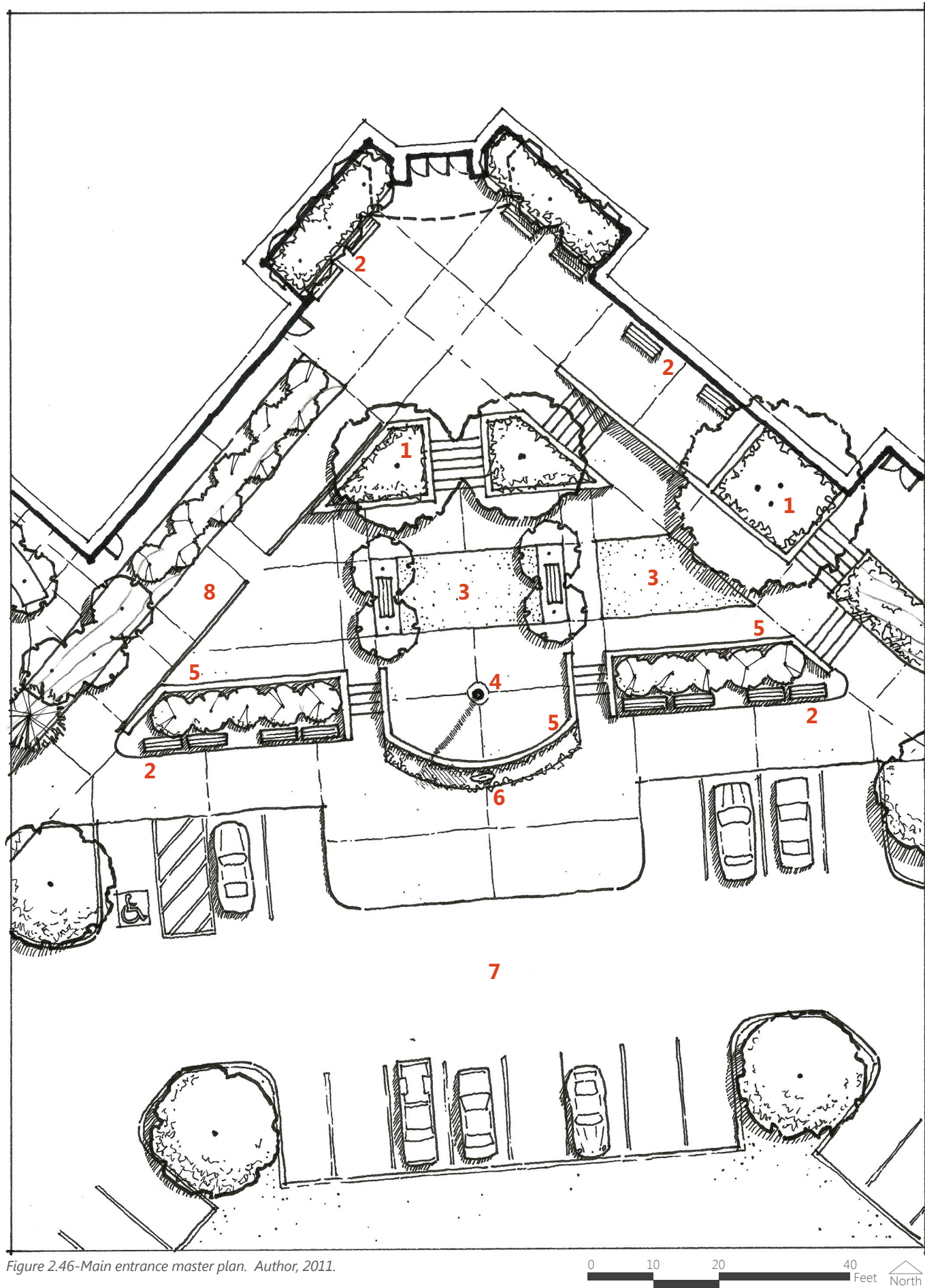


Figure 2.46—Main entrance master plan. Author, 2011.

**Key**

- 1 Raised planter
- 2 Benches
- 3 Turf area
- 4 Flagpole
- 5 Retaining wall
- 6 Dolphin statue
- 7 Parking lot
- 8 Accessible ramp

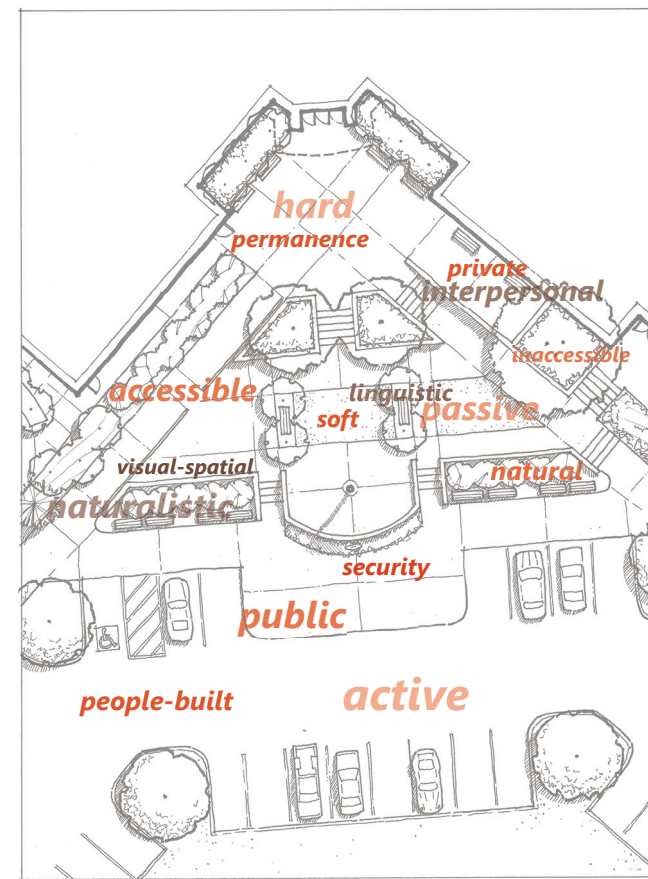


Figure 2.47—Main entrance diversity of experiences diagram. Author, 2011.

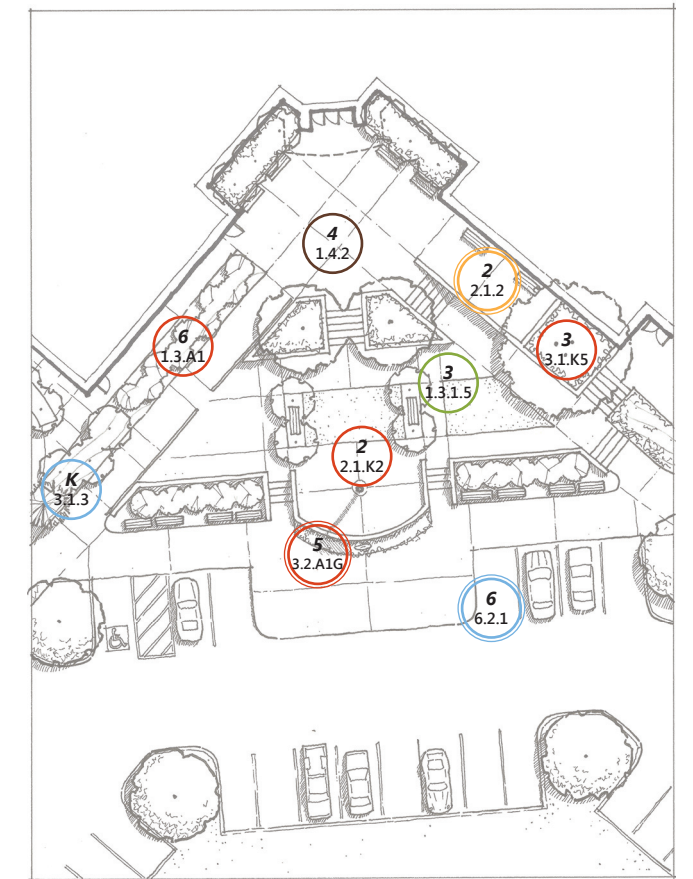


Figure 2.48—Main entrance curricular connections. Author, 2011.

- |           |                      |                     |
|-----------|----------------------|---------------------|
| Grade     | Assessment indicator | ○ Mathematics       |
| Standard  | ○                    | ○ Science           |
| Benchmark | ○                    | ○ Reading/Writing   |
| Indicator | ○                    | ○ History/Geography |
|           |                      | ○ Counseling        |

\*see appendix A for listing of academic standards

## Community Edge: Garden

The existing garden is actually a greenhouse structure located in the southeast corner of the outdoor wildlife learning site. The garden may have been used once for formal lessons, but now it sits weedy and unused by the school community. One reason for its underuse may be that it does not hold a prominent place in the schoolyard and is therefore easy to leave unattended and forgotten. Bringing the garden into a more prominent place in the schoolyard will ensure that it receives good use and attention from the school.

### Design Opportunities

#### Make the Schoolyard a Community Amenity

The new garden is located in the southwest corner of the site. This placement gives the garden a highly visible place in the schoolyard. Due to its location, the garden also acts as a place of entrance into the schoolyard for the neighborhood community; reflecting the values of education that are important to Bergman. Gardening is to be used by the students to support their formal learning objectives, but it can also be used as a neighborhood community garden if the school finds it difficult to fill all of the plots.

#### Support School Curriculum

The garden is meant to be a place for the formal teaching of science and health concepts, but it also supports additional academic subjects as well. Geometry can be taught using the forms of the space, estimation can be taught using the vegetable plants in the garden plots, and addition, subtraction, multiplication, and division can be taught as vegetables are planted and harvested.

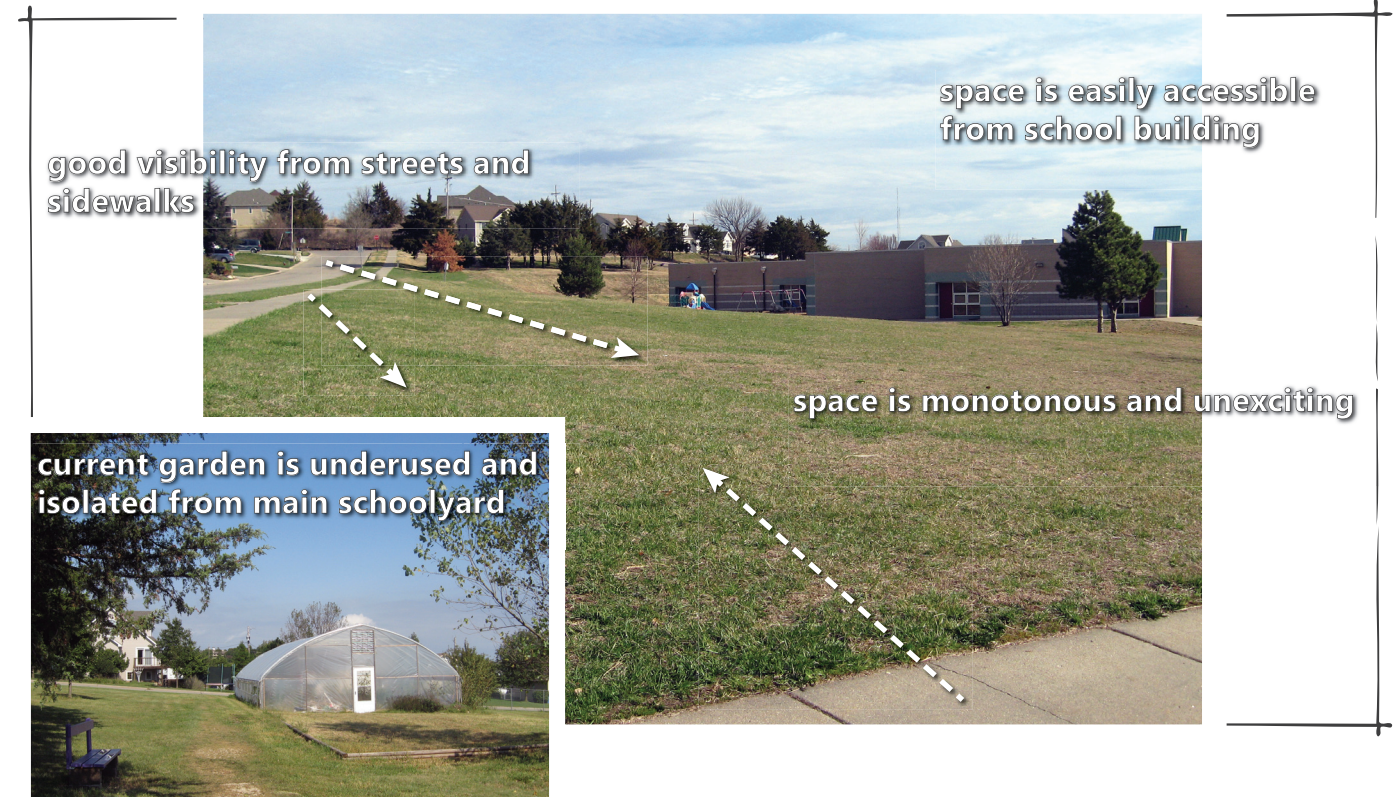


Figure 2.49-Problems and opportunities for school garden. Author, 2011.

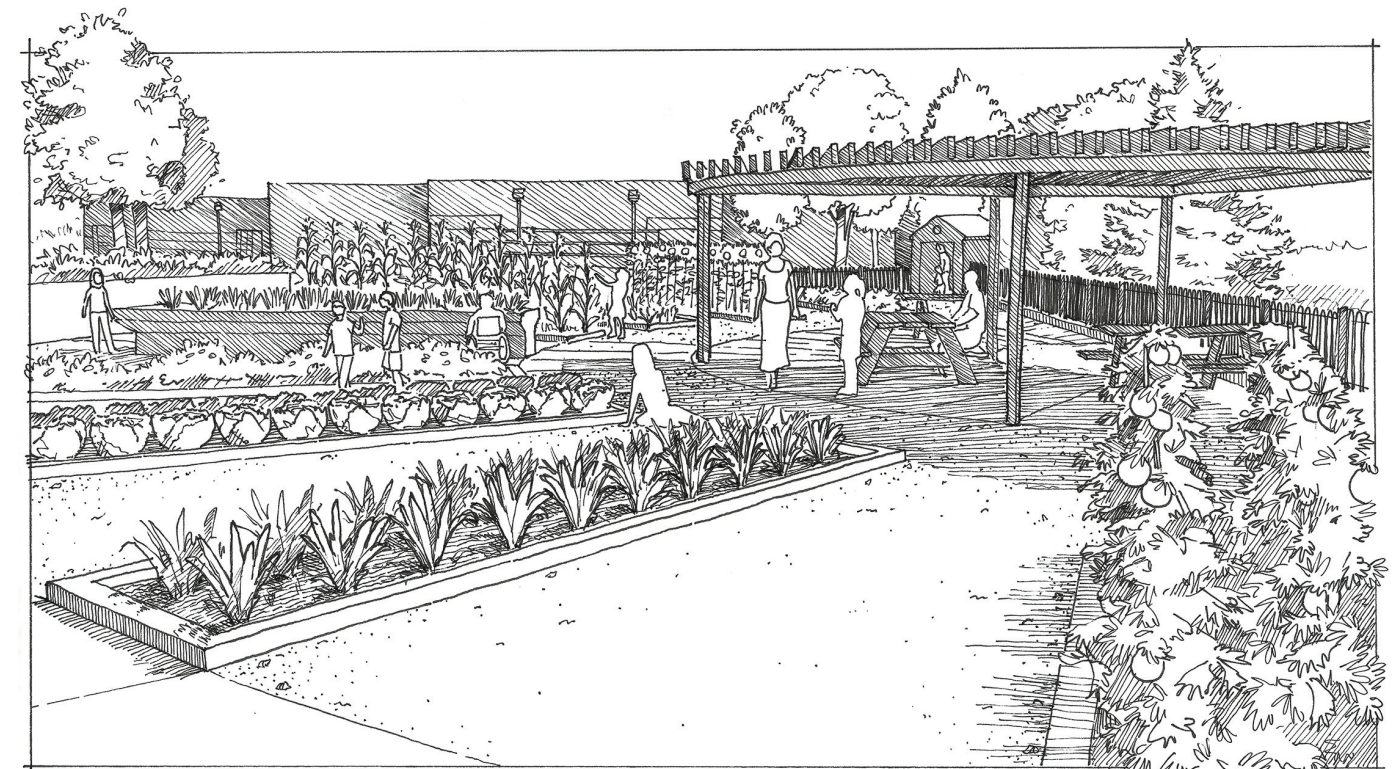


Figure 2.50-Vegetable garden concept sketch. Author, 2011.

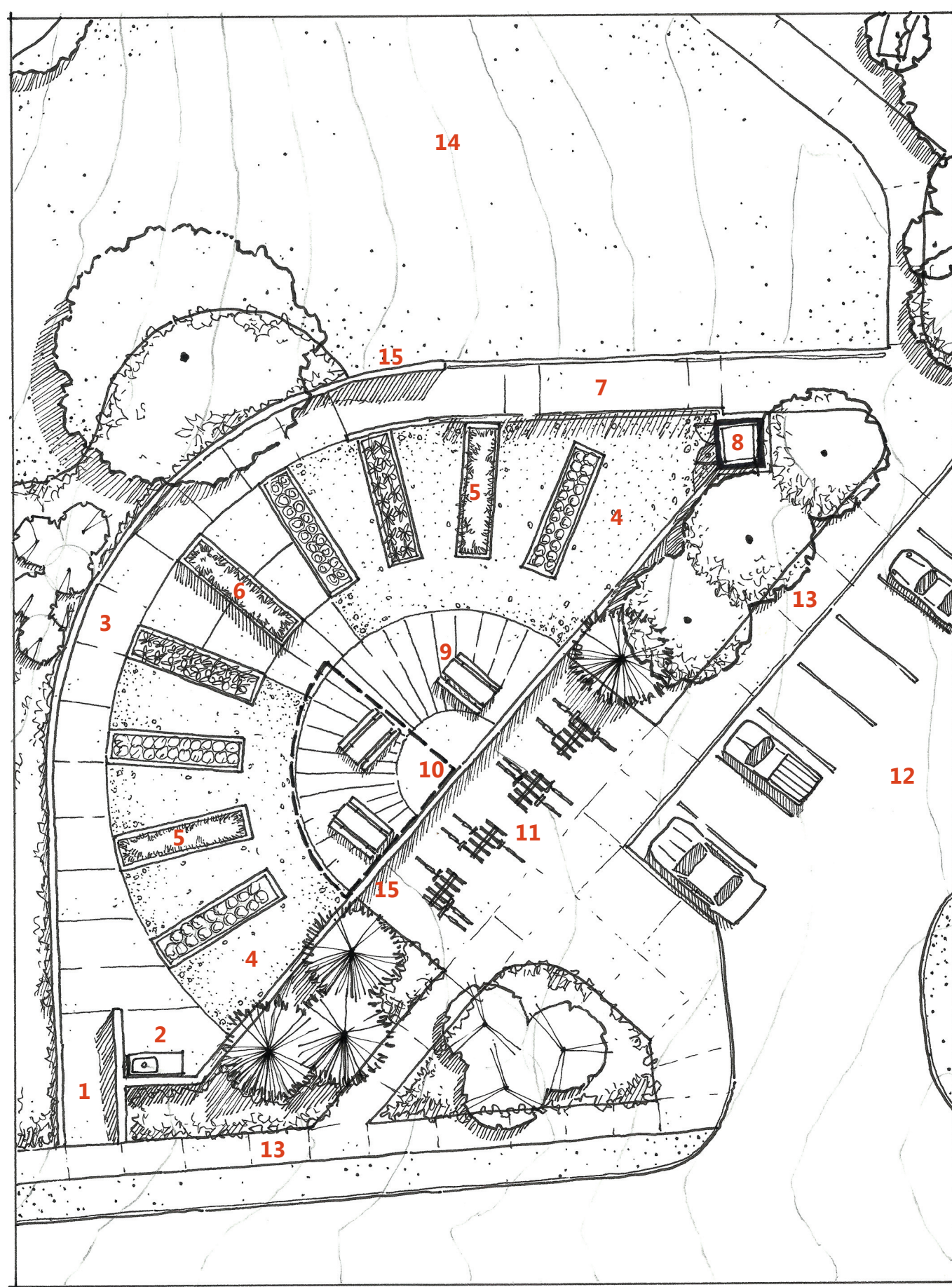


Figure 2.51-School garden master plan. Author, 2011.



**Key**

- 1 Entry ramp
- 2 Wash area
- 3 Paved pathway
- 4 Crushed gravel surface
- 5 Garden plot
- 6 Wheelchair accessible plot
- 7 Accessible ramp
- 8 Storage shed
- 9 Picnic tables
- 10 Overhead shade structure
- 11 Bike racks
- 12 Parking lot
- 13 Sidewalk
- 14 K-2 turf field
- 15 Retaining wall



Figure 2.52-Garden diversity of experiences diagram. Author, 2011.



Figure 2.53-Garden curricular connections. Author, 2011.



\*see appendix A for listing of academic standards

## Community Edge: Playground & Sports Field

One of the concerns that was brought to light through the questionnaire is that the proximity of the blacktop to the school building is undesirable. The noise from the children playing outside is distracting to the children trying to learn in their classrooms. Safety is a concern as children who play on the blacktop frequently run towards the building doors and ground-level windows. Balls are kicked regularly on the roof of the school during gameplay and the gravel fill of the playground spills over onto the blacktop creating slipping hazards.

A high percentage of respondents in the questionnaire commented that they would like to have places for children to play different kinds of sports. The problem with the current sports field is that its steep slopes are considered unsafe and it is separated from the playground by fencing and distance. Conversations with the principal revealed that the sports field use is limited to occasional gym classes. The placement of the stairway down to the sports field is far removed from the playground, making it difficult for children to access during their recess periods. As a result, the children are limited to play exclusively on the blacktop and playground equipment.

### Design Opportunities

#### Encourage Positive Growth for All

To avoid these problems listed above the blacktop is moved away from the school building and placed on the location of the existing playground equipment. The playground is moved to the south the blacktop area and the gravel fill is replaced by a rubberized surface material. In order to meet accessibility requirements, while keeping approximately the same square footage of playground space, the new playground area will need to be split into two levels-linked together by a ramp and wide stairs. These stairs can be a place for children to sit and climb and the elevation change offers a low-risk challenge that promotes positive development.

In order to make the sports field more accessible to all students, a ramp was provided down the steep slopes to a walking and running track surrounding the perimeter of the field. The stairway is relocated away from the service area and parking lot and placed closer to the playground and blacktop.

#### Promote Experiential Learning through Nature

Both the blacktop and the playground spaces will be surrounded by a diversity of planting and other natural materials. These naturalized spaces will give the children opportunities to interact with nature during their informal play time, provide many sensorial qualities and loose parts to play with, and be places to explore and discover new things on their own.

#### Make the Schoolyard a Community Amenity

Simply having open fields in the neighborhood invites community use. The track around the field attracts runners and its adjacency to the playground gives parents opportunities to exercise while being within sight distances of children on the playground. A few small amphitheater-like seating terraces are provided at the base of the slope by the playground. These seating spaces act as natural bleachers for people to sit or where parents can watch their children play.

#### Support School Curriculum

Stormwater converges on the sports field from several on-site drains; entering into two drainage swales that flow into a concrete drainage box. The ephemeral drainage swales are kept and enhanced with more river rocks and plantings to act as a simulation area for streams ecosystems.

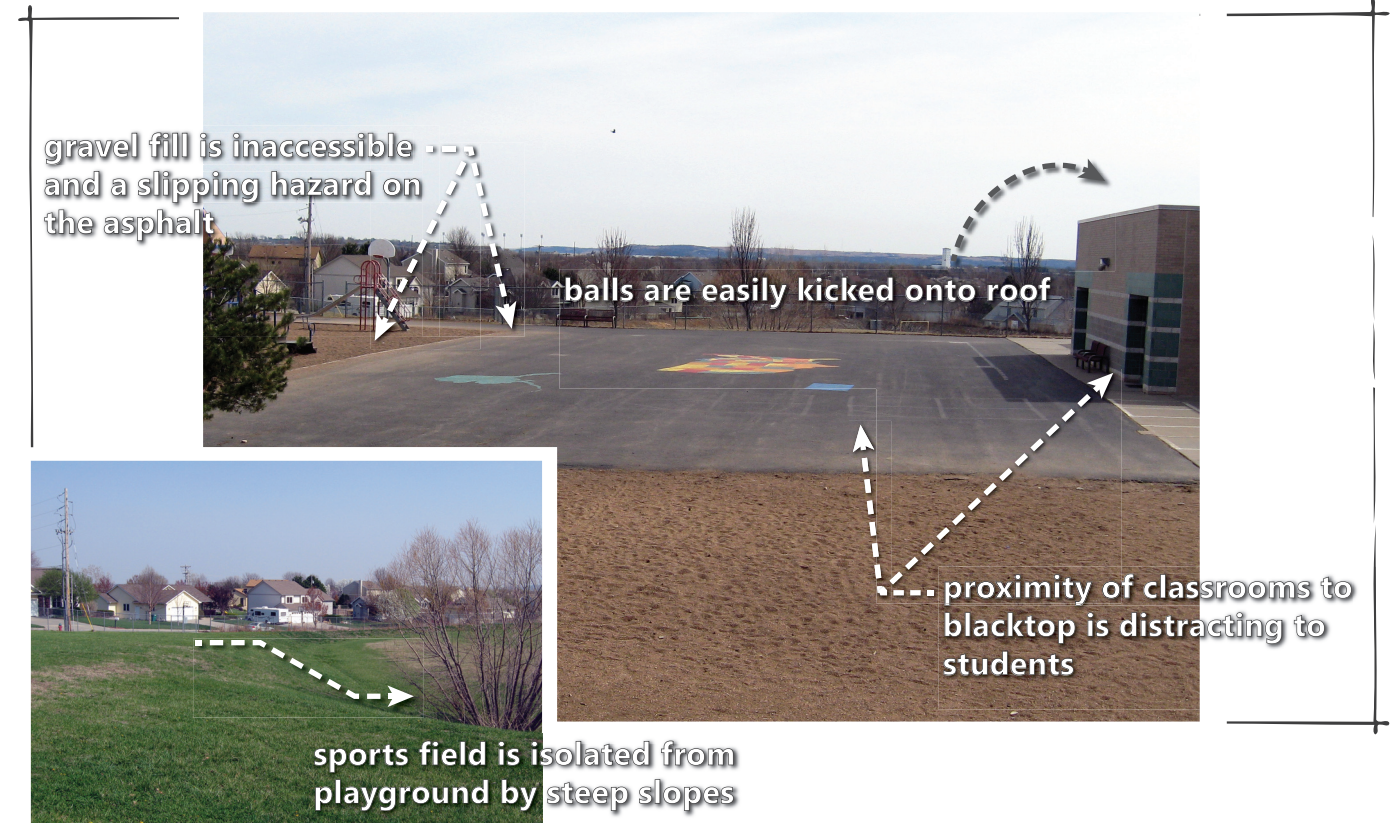


Figure 2.54-Problems with the playground and sports field. Author, 2011.

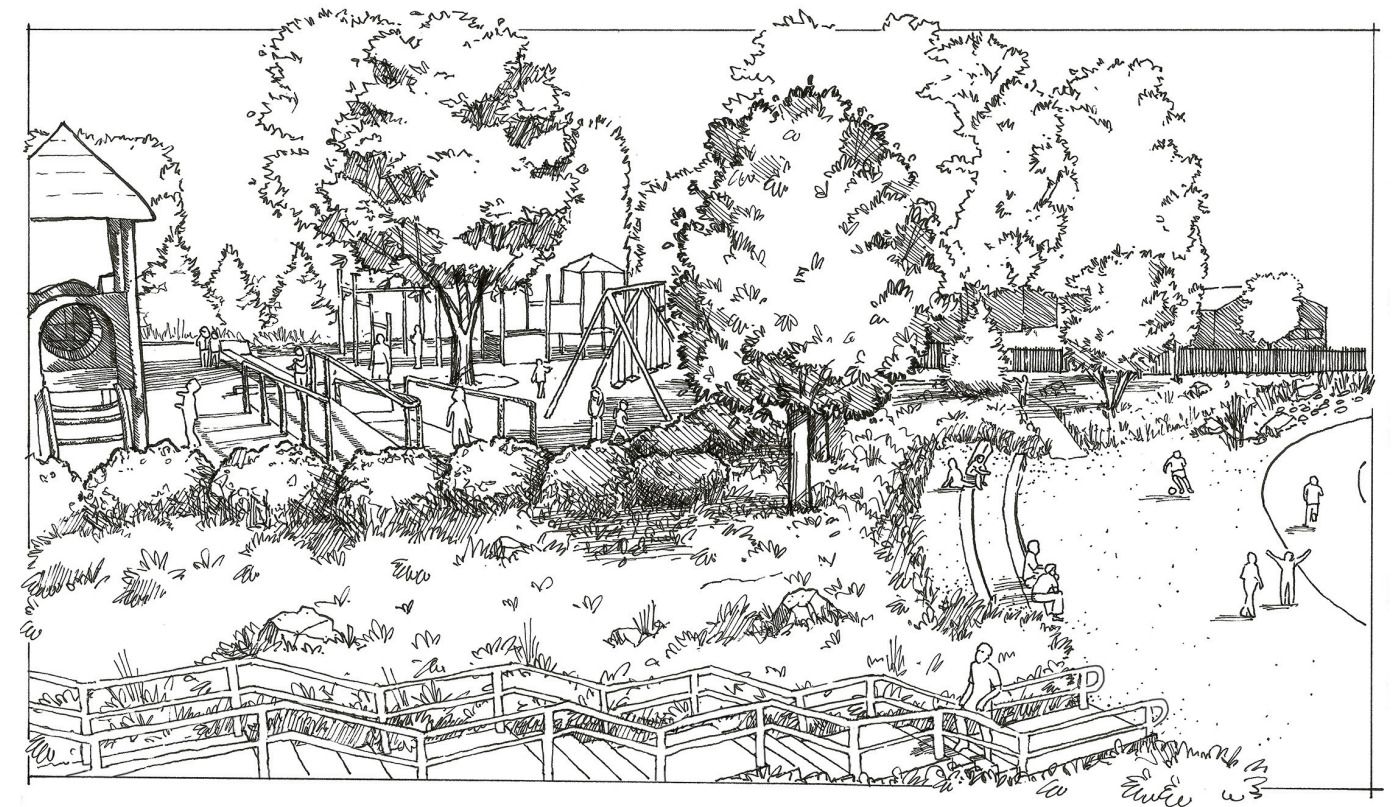


Figure 2.55-Playground and sports field concept sketch. Author, 2011.



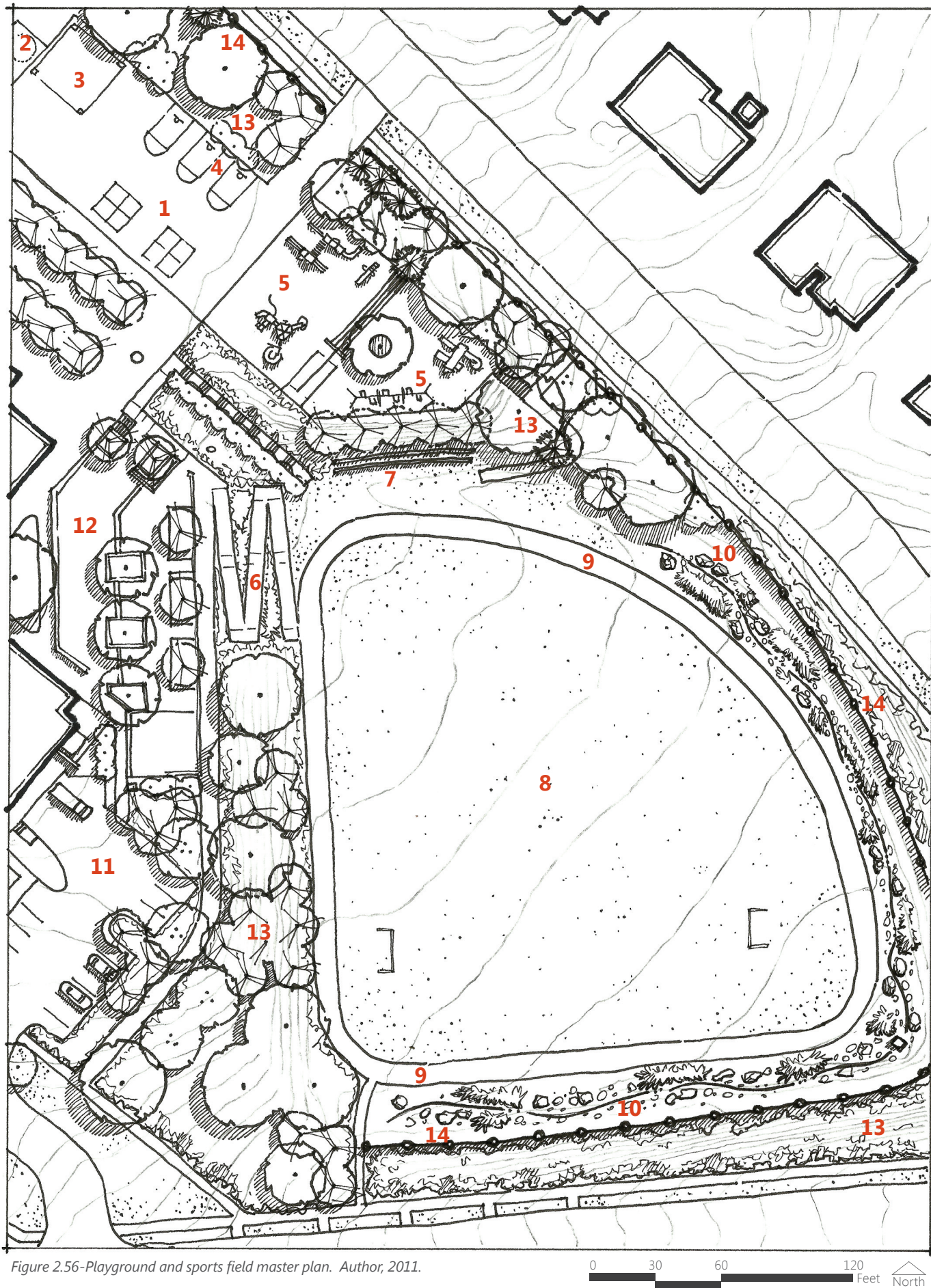


Figure 2.56-Playground and sports field master plan. Author, 2011.

**Key**

- 1 Blacktop play area
- 2 Tetherball courts
- 3 Kickball
- 4 Basketball hoops
- 5 Traditional play ground equipment
- 6 Accessible ramp
- 7 Grass and concrete bleachers
- 8 Sports field
- 9 Jogging track
- 10 Ephemeral stream
- 11 Service area
- 12 5-6 grade area
- 13 Naturalized planting
- 14 Security fence

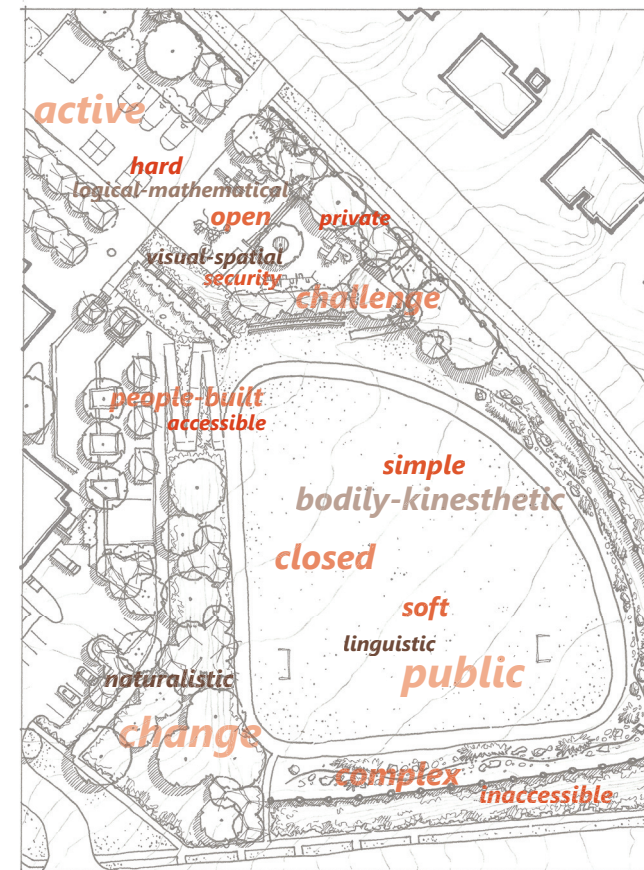


Figure 2.57-Playground diversity of experiences diagram. Author, 2011.

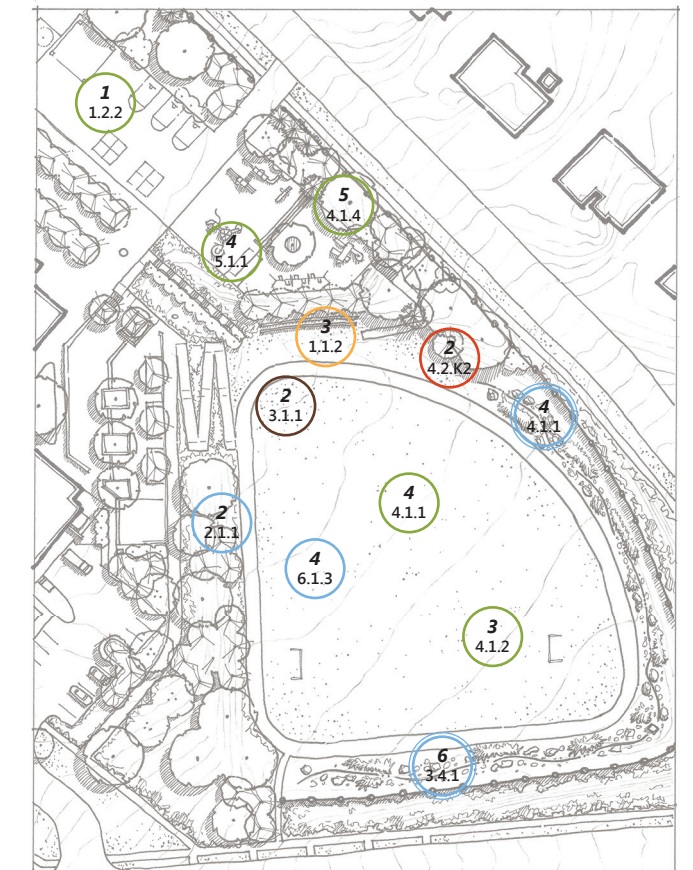


Figure 2.58-Playground curricular connections. Author, 2011.

- |           |                      |                      |
|-----------|----------------------|----------------------|
| Grade     | Assessment indicator | ○ Mathematics        |
| Standard  |                      | ○ Science            |
| Benchmark |                      | ○ Reading/Writing    |
| Indicator |                      | ○ History/Geography  |
|           |                      | ○ Physical Education |

\*see appendix A for listing of academic standards

## Community Edge: Outdoor Wildlife Learning Site

The existing outdoor wildlife learning site has a lot of potential to demonstrate to students working habitats for plants and animals. The site is located on top of the terraced hillside, separated from the rest of the schoolyard by topographic barriers. The fact that it is more isolated makes it a unique space that is more suited for a wilderness theme. The benches and tables that exist there now are deteriorating and vandalized. The vegetation is sparse except for the turf understory and the two small groves of eastern red cedar trees, a native yet invasive tree in the state of Kansas.

### Design Opportunities

#### Promote Experiential Learning through Nature

In order to increase the natural diversity of this space, additional native tree species are brought in and encouraged to grow naturally on the eastern side of the space. This small, heavily planted area will simulate native woodland habitats. On the western end, a tallgrass meadow will teach children about the native ecosystems of the region. These two habitats will attract wildlife and give children and community members opportunities to explore nature and learn from the natural processes within.

#### Encourage Positive Growth for All

In addition to the plantings, a looped trail will bring people close to these natural environments and encourage interaction with them. The trail connects to the main schoolyard through a stairway and an accessible ramp. The southern edge of the trail will be universally accessible to all students while the remaining sections will be naturalized and more challenging to the children. Connections to the neighborhood are also made on both the eastern and the western ends of the outdoor learning site.

#### Support School Curriculum

Environmental learning stations can be incorporated along the trail to teach specific curricular concepts (Moore 1997). The stations could include areas for teaching concepts such as climate change, animal habitat, native vegetation, the properties of soil, or the water cycle. A small pavilion tucked into the wooded area acts as a place for gathering, a place for families to have a picnic, or for teachers to talk to students about the nature around them. An observation point looks out over Manhattan and acts as a community attraction or a place for children to learn about the context of their school within the greater community.

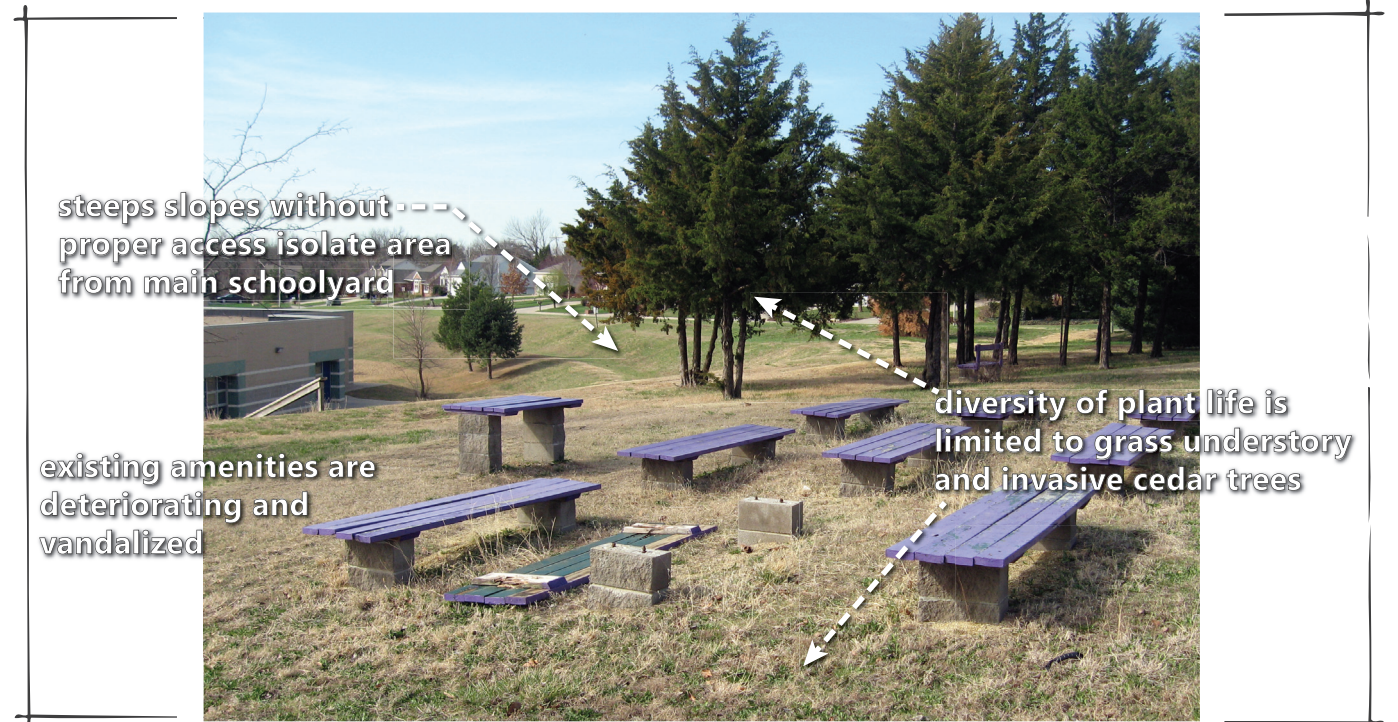


Figure 2.59-Problems with outdoor wildlife learning site. Author, 2011.



Figure 2.60-Outdoor wildlife learning site concept sketch. Author, 2011.



Figure 2.61-Playground and sports field master plan. Author, 2011.

**Key**

- 1 Pavilion
- 2 Woods
- 3 Meadow
- 4 Scenic overlook
- 5 Nature trail
- 6 Educational learning station
- 7 Accessible ramp
- 8 Reading space
- 9 3-4 grade area
- 10 Amphitheater
- 11 Water play area
- 12 Challenge trail



Figure 2.62-Wildlife site diversity of experiences diagram. Author, 2011.

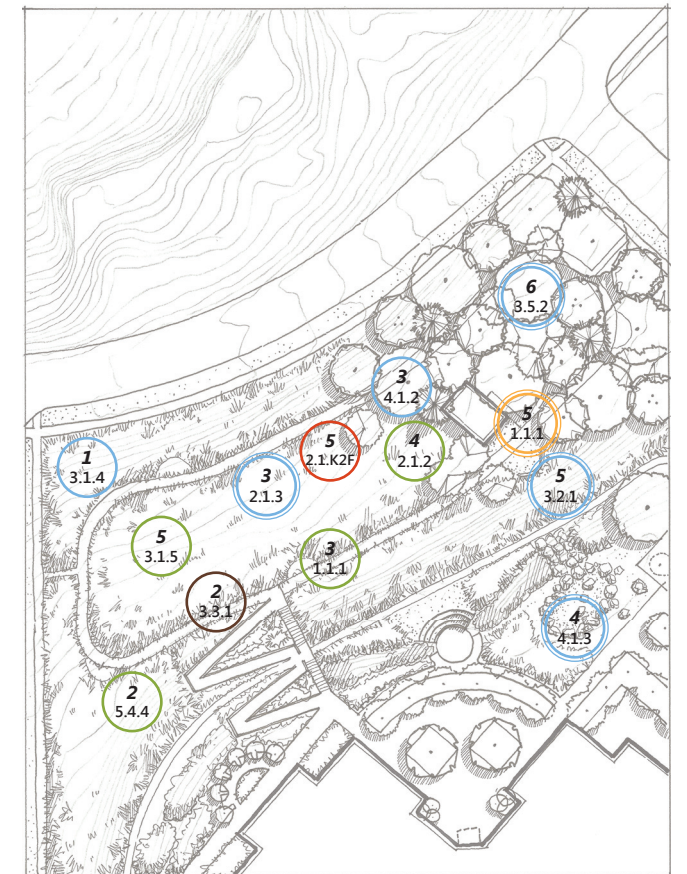


Figure 2.63-Wildlife site curricular connections. Author, 2011.

- |           |                      |                           |
|-----------|----------------------|---------------------------|
| Grade     | Assessment indicator | ○ Mathematics             |
| Standard  |                      | ○ Science                 |
| Benchmark |                      | ○ Reading/Writing         |
| Indicator |                      | ○ History/Geography       |
|           |                      | ○ Environmental Education |

\*see appendix A for listing of academic standards

## Community Edge: Amphitheater and Water Play

An amphitheater sits just north of the third and fourth grade area. Tucked into the hillside, with wide terraced seating and soft grass to sit upon, the amphitheater creates spaces for classrooms to gather in a more formal way. The amphitheater can additionally be a performance space to teach subjects such as music and theater.

Located adjacent to the amphitheater is an interactive water play space. This space in the schoolyard is perceived as a nuisance as it frequently floods and remains wet for long periods of time. One way to address this problem, while simultaneously giving children an interactive learning experience, is to make this space an area where children can play with and explore the properties of water. Bounded by natural rocks and filled with gravel and large stepping stones, children can use these elements to manipulate their environment and to learn how water moves and interacts with materials. Water can be provided to the space through natural precipitation, or mechanically, through a pump that can be locked up during non-supervised hours.

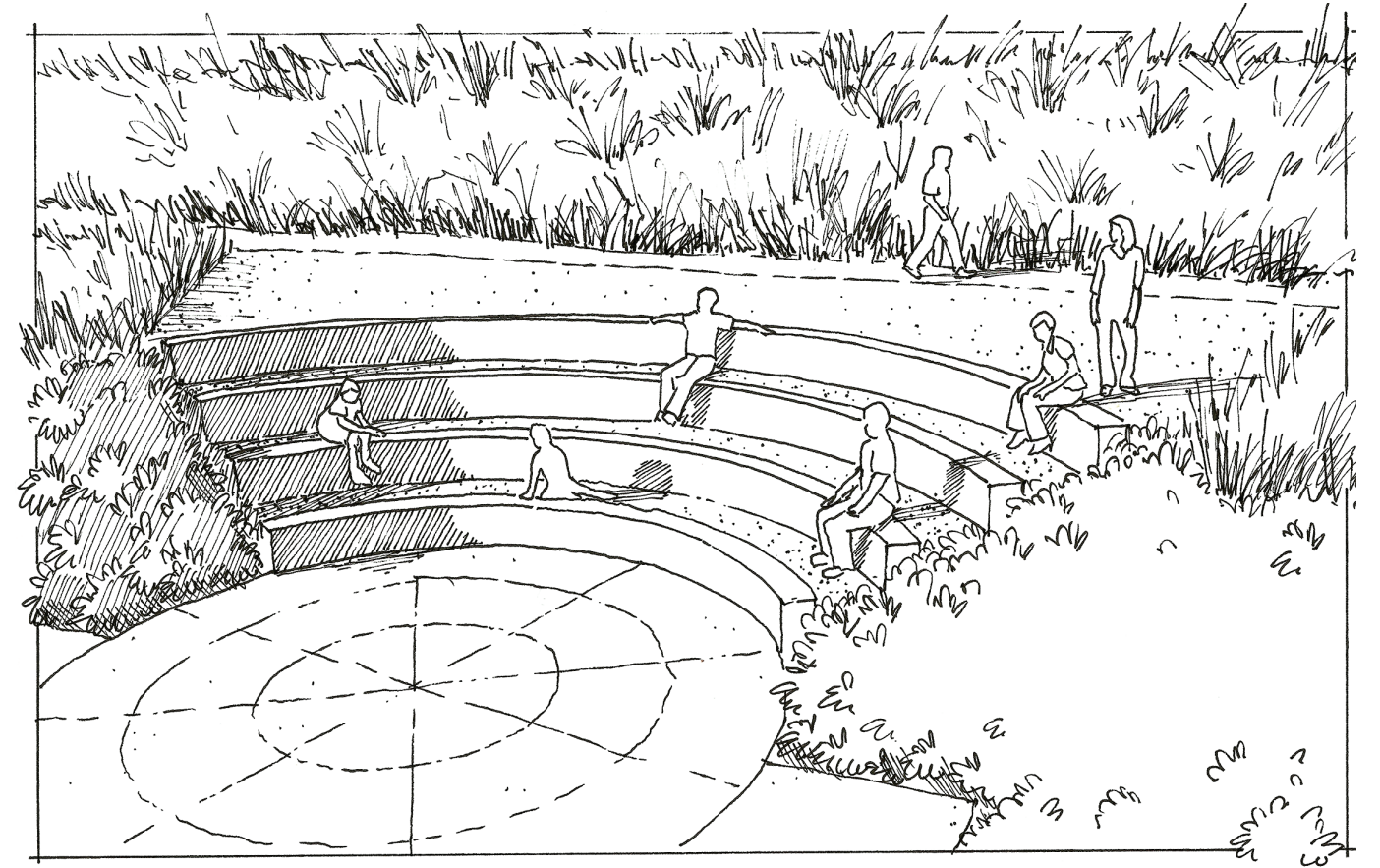


Figure 2.65-Amphitheater sketch. Author, 2011.

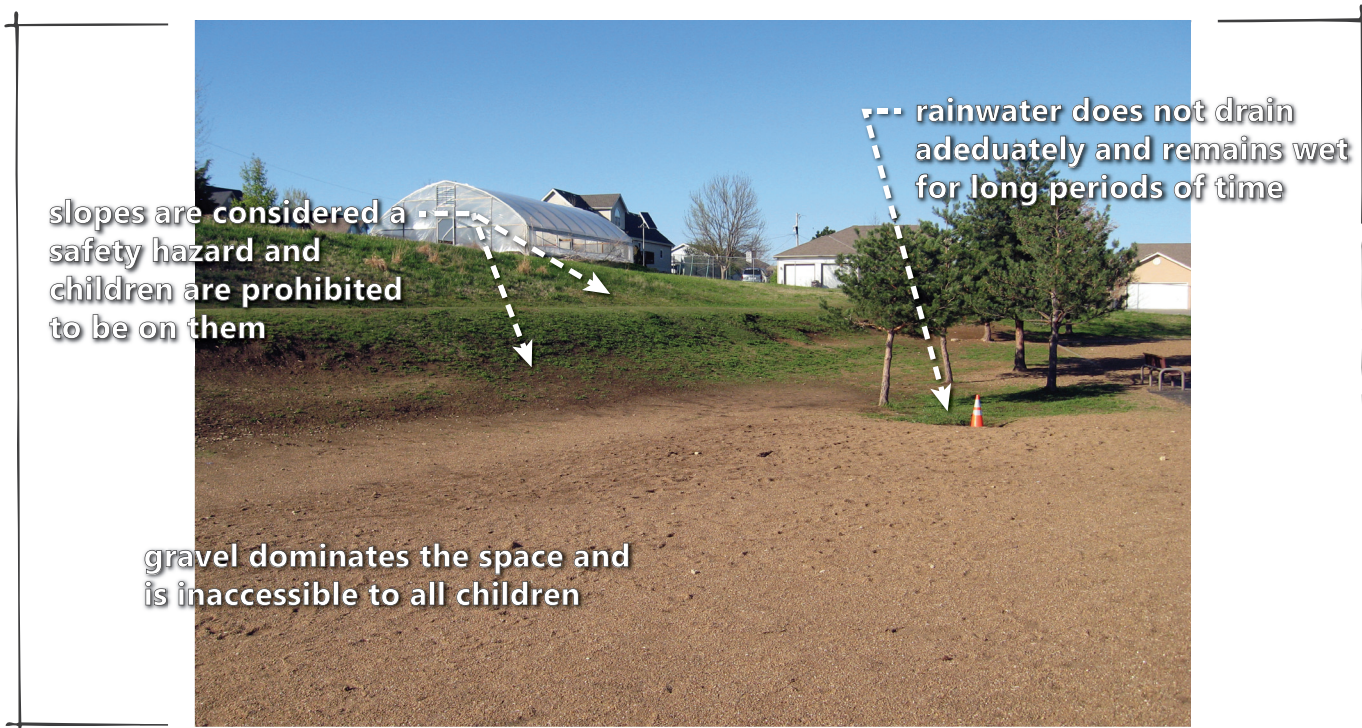


Figure 2.64-Problems with drainage and slopes in the schoolyard. Author, 2011.

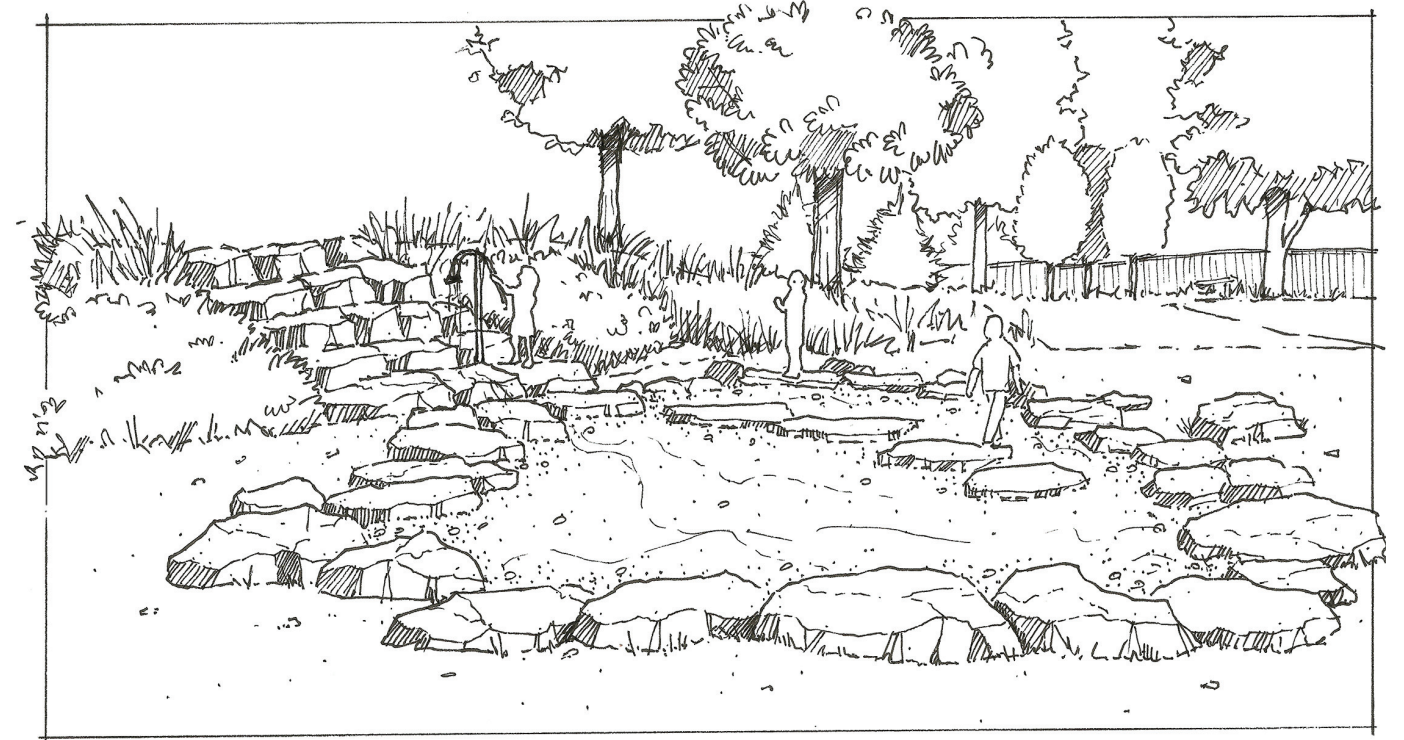


Figure 2.66-Water play area sketch. Author, 2011.



**Chapter Three:  
Making it Happen**

## Recommendations for Success

I am sure that there are many school administrators who will look at this design and be overwhelmed by the construction costs and the maintenance costs that need to go into such a complex schoolyard. I admit that implementing these changes will take time, money, and considerable coordination between community members and district officials. Again, I want to reinforce that this design has not gone through a community feedback loop and would be modified as a result. My hope is that the design will facilitate discussion about improvements that need to be made to Bergman’s schoolyard and act as a springboard for change.

While construction and maintenance costs were considered in the design of the schoolyard, the primary focus was on creating rich, interactive spaces that could support formal and informal learning for the entire student body. One of the realities of the site is there is over sixty feet of grade change from the southeast corner to the northwest. Such dramatic changes in the terrain make it necessary to add retaining walls and terraces (which substantially increase cost) in order to make safe and accessible places for children to use. However, retaining walls and raised planters also add significant learning value in three-dimensional geometries, measurement opportunities, learning about infrastructure, erosion, and more. Replacing turf areas with trees, shrubs, and groundcovers will add to the routine maintenance but the experiences the children will have in nature, and the developmental and academic benefits associated with it, substantially outweigh the costs.

The following section pulls from case studies and research that others have performed on the barriers that we are likely to face in implementing these design changes. Also included are the recommendations that will lead to successful implementation and long performance life.

### Barriers to Success

Making changes, such as the ones recommended in this document, can be very challenging in the public school setting. Financial stresses to public education will certainly make it difficult to find the necessary budgets for construction and maintenance of landscape features. Bergman Elementary’s fragmented school service area, and

the distances needed to travel to the school location, may limit the support from the parents and families of Bergman students. In general most other barriers can be categorized as “educational barriers” and “institutional barriers” (Kingery-Page et al 2010).

### Educational Barriers

Educational barriers refer to the lack of prepared curricula and the lack of time that teachers need to prepare for instruction. Surveys performed on school gardening indicated that teachers found the preparation for gardening activities to be the most time-consuming element. These teachers had to find the time to search for horticultural information that would assist them in their gardening activities as well as gather the necessary tools and plant materials (DeMarco 1997, 142). Such difficulties with gardening activities can easily occur in the preparation of other outdoor related learning activities.

### Institutional Barriers

Institutional barriers occur when school or district administrators does not (or cannot) support outdoor education activities (Kingery-Page et al 2010). This lack of support may occur for several reasons; school or district policy may restrict certain actions in the schoolyard, limited funding, or provisions for maintenance (Azuma et al 2001, Brink and Yost 2004, Carlsson and Williams 2008, DeMarco 1997 cited in Kingery-Page 2010). Despite these challenges there have been numerous success stories and studies performed on how to have successful school landscapes.

### Recommendations for Success

First, organize a team. Team members should be highly motivated individuals who are willing to put forth the time and effort to see the project through completion. Those team members will surely have to meet often to resolve conflicts, keep the project progressing, be willing to coordinate efforts between the school community and the school board, and be willing to pursue these goals in the face of opposition. Team members should include at least: the school principal, interested teachers, involved parents, custodians or maintenance supervisors, and designers. The designers could be parents or community members with

professional design backgrounds, or in many cases local university faculty members, possibly teaching in landscape architecture or horticulture (Kingery-Page et al 2010, Moore and Wong 1997).

Second, designate a leader. Survey data revealed that one of the most essential factors in the success of school gardening was a person, or persons, who could take charge of the gardening program and organize all the logistics of its use, funding, and maintenance (DeMarco 1997). This lead person can be a teacher, groups of teachers, or a community-based instructor. Appointing a single-teacher, however, may be difficult due to the high demands already placed on them (Kingery-Page et al 2010). Another option would be to appoint a full-time outdoor resource teacher. One study showed that this was more effective than several part-time staff members (Moore and Wong 1997).

Third, educate teachers. Many teachers may be willing to use outdoor classroom spaces or teach in natural environments, but do not have the training to do so. It is recommended that teachers receive in-service training or professional development (not as an added duty) to help them bring lessons outdoors (DeMarco 1997). “*Teachers need access to organized curricular ideas, rather than general possibilities, in order to avoid the pitfall of limited time to prepare*” (DeMarco 1997 cited in Kingery-Page et al 2010).

Fourth, involve the community. Collaboration with parents, children, families, experts, extension agencies, and volunteers is vital for success in creating and maintaining the outdoor learning environment (Azuma et al 2001 cited in Kingery-Page et al 2010). By involving the community we can support teachers in their duties without taking away additional time. It is important to involve more than just families of students (who are very busy themselves) and reach out to other interested community members, such as university students or “energetic retirees” (Moore 1997, 237). Community events can be organized to help perform maintenance, or to raise money to go to additional construction and maintenance of the schoolyard. One school in Colorado organized a yearly “Frogathon” walk which enabled them to raise enough money to maintain a small wetlands ecosystem in their schoolyard (Leccese 1998).

While much of the construction and maintenance could, and should, be done by paid professionals, involving children in the building and maintaining of the school grounds is very beneficial. Helping with the creation of their schoolyard will give children a sense of ownership and pride in the place where they play and learn. In fact, routine maintenance and some construction projects could be made part of the school’s curriculum (Stine 2009, Moore and Wong 1997).

Stage	Time	Description
<b>I</b> Initiation	1-2 years	Preliminary site survey; community survey and interaction; discussion and review of existing developments; curricular explorations of existing conditions; project endorsement by local, state, and national authorities; search for money; preliminary master plan
<b>II</b> Small Changes	2-3 years	On-site, temporary changes; importation of materials; documentation; evolution of small-scale permanent elements; community feedback and incorporation into master plan; search for money; development of master plan
<b>III</b> Big Changes	3 years	Big decisions, big-scale changes; incremental development of zones; firm master plan; search for money
<b>IV</b>	2-5 years	Possible conflicts with insurance, administration, etc.; legitimization; regional significance; service and training activities; discussion of new personnel roles; HQ enclosed space needed
<b>V</b>	3-5 years	Regional training site
<b>VI</b> Evolution	5-10 years	Institutionalization and maturity; transfer to other sites
<b>VII</b> Renewal	10-20 years	Renewal, new initiative, responses to new conditions or danger of collapse

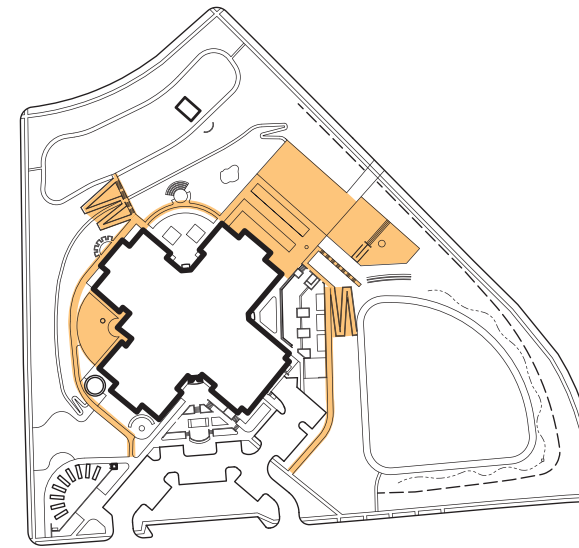
Table 3.1-Life history profile of school grounds development. Adapted from Moore and Wong 1997, 240.

## Phasing

Transforming Bergman's schoolyard will most likely take place in multiple phases (see fig 3.1) as funding is made available and the plan evolves according to the needs of the school. In order to meet the most pressing needs of the schoolyard first it is recommended that the initial phases of construction focus on providing access to all areas of the schoolyard. The gravel fill underneath the playgrounds should be removed and replaced with a universally accessible material. Ramps should be built to provide access to the sports field and the outdoor wildlife learning site.

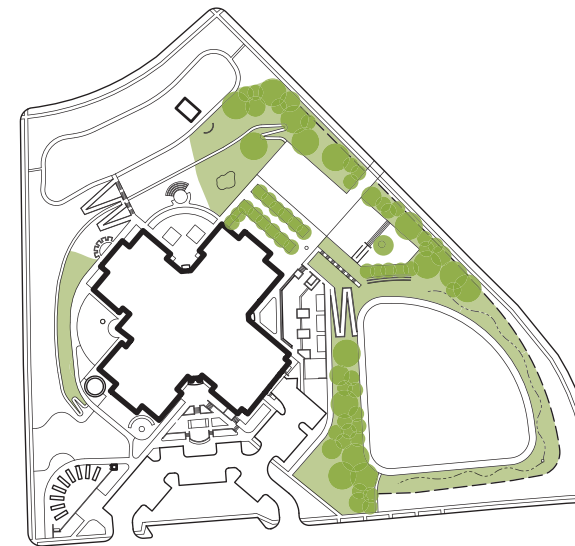
The second phase should focus on increasing the diversity of plant materials in the school grounds. Again, nature offers some of the most powerful and exciting learning tools available for children. Increasing the diversity of plantings will help to meet curricular learning activities, developmental needs of all children, and promote creativity and learning through interaction. Planting should begin in the most active areas in the schoolyard, near the playgrounds, in order to give children opportunities to explore nature as they play. A emphasis should be made on selecting plants based on their sensorial and experiential qualities.

The retaining walls and paved areas of the main entrance, garden, and curricular core areas should come in the third phase as funding and other resources allow.



### Phase I

- Playground and blacktop are relocated
- Gravel fill is replaced by soft and accessible material
- Ramps are constructed to provide universal access to currently isolated areas
- Circulation pathways are strengthened



### Phase II

- Trees, shrubs, and groundcovers are encouraged to grow around areas of most active use: the playground, sports field, and kindergarten playground areas.



### Phase III

- Hardscape construction around the main entrance, curricular core, and garden should occur as time and funds allow.
- Planting around the curricular core, outdoor wildlife learning site, and other peripheral areas should occur.

Figure 3.1-Phasing diagram. Author, 2011.

## Conclusion

There is an interesting program on the web called *Wordle* which generates “word clouds” from text provided by the user. “The clouds give greater prominence to words that appear more frequently in the source text” (Feinberg 2009). While many people simply type in the words that they want bigger more often to produce this effect, I believe that the real power of this program is in discovering something new in text already written. I took the text from the preface and all three chapters of this report (approximately 14,000 words) and copied them into the wordle program. The results are in the image to the right (fig 4.1). For me, this process reveals the ideas and themes that are most important, through the words that were used most frequently. It is not surprising that the word used most often in the body of the report is ‘children’, but it reminds us that our focus needs to be on the children when making our schoolyards. Too often the needs of children become second place, behind cost or ease of maintenance or fear of litigation.

Other key terms that appear in prominence are ‘play’ and ‘learning’. Schoolyards have great potential to support both formal learning activities and children’s play activities. Many times schools, like Bergman, fail to live up to this potential in their landscape. Admittedly, there are significant obstacles in the policies and politics of our education system that prevent schoolyards from becoming rich learning environments. Until changes are made to our nation’s education system, it will always be a battle to implement positive changes to schoolyards. But I believe the battles are well worth it; and the sacrifices made by dedicated teachers and community members pay off in the form of exhilarating experiences for our children that meet their developmental needs and strengthen their formal education.

### *Additional research*

When I first set out on this project to explore the possibilities for Bergman’s schoolyard, I grappled with whether to make this project grounded in the realities of what could actually be built or to explore the ideal solution. The end result tends to lean towards the ideal; while the realities of construction and maintenance were considered, but not heavily explored. Due to this fact, I worry that the Bergman community and other interested readers may disregard this project as too idealistic, with no real benefit to their current needs in the schoolyard. Unquestionably, there are additional areas of research that could have been performed that this report does not address. Most important is first, taking a closer look at the costs of construction and maintenance that are needed to implement the proposed design and second, involving the community in the process of design.

To achieve the goal of encouraging positive growth for all through providing access to all areas of the schoolyard, several accessible ramps were proposed. While constructing these ramps is one of the most pressing issues in Bergman’s schoolyard, the resulting costs could be significant. Additional research needs to be performed to address the realities of constructing a universally accessible schoolyard. Chapter one explored several of the key theories of human development and childhood development needs. Admittedly, this summary takes only a cursory look and the complex fields of human and child psychology. Additional research into the specific developmental needs of each age group could bring to light important considerations for landscape spaces, forms, and materials that will support development.

In the second goal of supporting school curriculum, the forms, materials, and spaces that were suggested in the design came from an evaluation of state of Kansas’ academic standards and my personal assessment of how these standards could be met in the landscape. In the evolutionary design process of schoolyard development, teachers should be heavily involved in the development of the curriculum using outdoor resources. “The curriculum must be allowed to evolve from the characteristics of the individuals involved, the resources available, and their growth and change through time” (Moore and Wong 1997). Involving the teachers in the development of Bergman’s schoolyard, so that stronger ties could be made to formal lesson plans, would be essential additional research.

One of the most important claims of this report is that nature can universally meet the most basic developmental needs of children and simultaneously give rich formal education opportunities. Indeed, the research performed by professionals that suggest that interaction with nature can improve test scores, behavior problems, and developmental needs cannot be ignored. Additional research could be performed, however, to address the feasibility of establishing natural environments in Bergman’s schoolyard.

Where are the most ecologically vulnerable areas on site? Which plant species will thrive in the schoolyard and support learning activities? What are the cost and maintenance considerations of natural environments?

I believe the master plan presented in chapter two provides solid solutions for many of the problems that Bergman is facing in their schoolyard, but it should not be considered the final or even the best solution. As mentioned before, the tight timeline and deadlines of this master’s project meant that I was not able to involve the community as much as I would have liked. As a result, the design was not modified based on feedback received from interested community members. It is essential that schoolyard design be driven by the school community. Others looking to follow up on the work of this report should consider the importance of involving all user groups—parents, teachers, students, administrative staff, after-school users, and neighborhood residents. These people should provide input into the design of the schoolyard and give feedback to the proposed and actual changes (see fig 0.4). Inquiries could be made through the use of surveys, questionnaires, cognitive maps, personal conversations, and public meetings.



Figure 4.1—Most prominent terms word cloud. www.wordle.net. Author, 2011.



## Final Thoughts

Watching my three children grow, it is interesting to see how they are both fascinated with and terrified of nature. They love playing outdoors. On walks around the neighborhood they will collect rocks, twigs, pinecones and dandelions, but if a bug crawls or flies near them they run for cover. I hope that as they grow older, they will continue to have exhilarating experiences with the natural environment and look back later in life with fond memories. My hopes are that we, as a society, can begin to give children more positive daily interactions with the world around them.

The design at Bergman Elementary school is one way that we can give children exciting and enriching experiences that will impact them throughout their lives. I hope that this design will be the starting point for more dialog and action to create meaningful places for our children to learn. The process of exploring the schoolyard-its potentials and limitations-for this master's report has opened my eyes to many of the concerns and the needs of our public schools today. I believe that we can overcome these challenges and begin to find ways for children to explore the schoolyard; to discover and learn in fun and stimulating ways.

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# Appendices

## Appendix A: Sample of Kansas' Academic Standards

Grade	Subject	Standard. Benchmark. Indicator	Description
K	Number and Computation	1.1.K2	The student compares and orders whole numbers from 0 through 20 using concrete objects (2.4.K1a).
K	Number and Computation	1.2.A1	The student solves real-world problems with whole numbers from 0 through 20 using place value models (2.4.A1b), e.g., group the class into tens, count by tens; then continue counting by ones to find the total.
K	Geometry	3.1.K1	The student recognizes circles, squares, rectangles, triangles, and ellipses (ovals) (plane figures/two-dimensional figures) (2.4.K1e).
K	Life Science	3.1.3	The student observes living things in various environments.
K	Writing	1.1.3	The student writes about one idea using pictures, letters, and words. (Ideas and Content: prewriting, drafting, revising: N,E)
K	Civics-Government	1.4.1	The student demonstrates good citizenship (e.g., sharing, listening, taking turns, and following rules).
1	Geometry	3.2.A3	The student locates and names concrete objects that are about the same length, weight, or volume as a given concrete object (2.4.A1a).
1	Geometry	3.2.K1	The student uses whole number approximations (estimations) for length and weight using nonstandard units of measure (2.4.K1a), e.g., the width of the chalkboard is about 10 erasers long or the weight of one encyclopedia is about five picture books.
1	Geometry	3.1.K1	Recognizes and draws circles, squares, rectangles, triangles, and ellipses (ovals) (plane figures/two-dimensional figures) (2.4.K1f).
1	Life Science	3.1.1	The student discusses that organisms live only in environments in which their needs can be met.
1	Life Science	3.1.4	The student examines the structures/parts of living things.
1	Physical Education	1.2.2	The student demonstrates motor patterns in simple combinations.
2	Number and Computation	1.2.K2+	The student represents whole numbers from 0 through 1,000 using various groupings and place value models emphasizing 1s, 10s, and 100s; explains the groups; and states the value of the digit in ones place, tens place, and hundreds place (2.4.K1b) (\$), e.g., in 385, the 3 represents 3 hundreds, 30 tens, or 300 ones; the 8 represents 8 tens or 80 ones; and the 5 represents 5 ones.
2	Algebra	2.1.K2	The student uses the following attributes to generate patterns: geometric shapes (2.1.K2c), measurements (2.1.K2d)
2	Data	4.2.K2	Collects data using different techniques (observations, interviews, or surveys) and explains the results (2.4.K1h).
2	Life Science	3.1.4	The student examines the structures/parts of living things.
2	Physical Science	2.1.1	The student observes properties of objects and measures or describes those properties using age-appropriate tools and materials.
2	Earth and Space Science	4.1.1	The student observes, compares, and sorts earth materials.
2	Science in Personal and Environmental Perspectives	6.1.2	The student discusses healthy foods.

Table 5.1-Sample of Kansas' academic standards. Adapted from <http://www.kerc-ks.org/index.aspx> by author, 2011.

+ = assessed indicator

2	Reading	1.3.2+	The student determines the meaning of unknown words or phrases using picture clues and context clues from sentences and paragraphs.
2	Literature	2.1.2+	The student identifies and describes setting.
2	Civics-Government	1.5.1	The student demonstrates leadership in the classroom.
2	Geography	3.1.1	The student makes and uses maps to represent and locate familiar places within cities and Kansas (e.g., title, symbols, legend, compass rose, cardinal directions, grid system).
2	Geography	3.3.1	The student describes how weather affects environment (e.g., deciding when crops are planted and harvested, lack of rain causes drought, early freeze kills plants).
2	Environmental Education	5.4.4	Identify and describe the effects of their own actions and the actions of others in the past, present, and future on the environment.
3	Geometry	3.1.K3	Recognizes the solids (cubes, rectangular prisms, cylinders, cones, spheres) (2.4.K1f).
3	Geometry	3.3.A1	Recognizes real-world transformations (reflection/flip, rotation/turn, and translation/slide) (2.4.A1a), e.g., tiles in a ceiling, bricks in a sidewalk, or steps on a playground slide.
3	Geometry	3.4.K2	Identifies points on a coordinate plane (coordinate grid) (2.4.K1a).
3	Geometry	3.1.K5	Recognizes and describes a quadrilateral as any four-sided figure (2.4.K1f).
3	Life Science	3.2.1+	The student compares, contrasts, and asks questions about life cycles of various organisms.
3	Physical Science	2.1.3+	The student observes and records how one object interacts with another object.
3	Earth and Space Science	4.3.2+	The student observes, describes, and records daily and seasonal weather changes.
3	Earth and Space Science	4.1.2	The student experiments with a variety of soil types (clay, silt, sand, and loam).
3	Literature	2.1.2+	The student identifies and describes the setting (e.g., environment, time of day or year, historical period, situation, place) of the story or literary text.
3	Writing	1.1.2	The student practices writing by using (1) personal experience (2) observations (3) prior knowledge. (Ideas and Content: prewriting, drafting, revising: N,E,T)
3	Physical Education	4.1.2	The student understands the importance of being active within the target heart zone.
3	Environmental Education	1.1.1	By the end of the fourth grade, the students: identify some of the forces that cause erosion and other changes within their own region. Example: If they revisit study sites regularly, children will develop an understanding that the earth's surface is constantly changing. They can also simulate some changes, such as erosion, in a small tray of soil or a stream table, and compare their observations with photographs of similar, but larger scale changes.
3	Counseling	1.3.1.5	The student recognizes situations in which adults in the school or community are needed to keep students safe.
4	Number and Computation	1.4.A1+	Solves one- and two-step real-world problems with one or two operations using computational procedures.
4	Geometry	3.1.K6	Determines if geometric shapes and real-world objects contain line(s) of symmetry and draws the line(s) of symmetry if the line(s) exist(s) (2.4.K1f).

Table 5.1-Sample of Kansas' academic standards. Adapted from <http://www.kerc-ks.org/index.aspx> by author, 2011.

+ = assessed indicator

4	Life Science	3.1.2+	The student compares basic needs of different organisms in their environment
4	Physical Science	2.3.1+	The student identifies that the source of sound is vibrations
4	Earth and Space Science	4.1.1+	The student collects, observes properties, and classifies a variety of earth materials in his/her environment.
4	Earth and Space Science	4.1.3+	The student describes properties of water and process of the water cycle.
4	Science in Personal and Environmental Perspectives	6.1.3	The student assumes some responsibility for his/her own health, and the health and well being of others.
4	Civics-Government	1.4.2	The student recognizes how individuals have a civic responsibility for meeting the needs of communities (e.g., responding to disasters with donations and volunteering, recycling).
4	Geography	3.2.--	The student analyzes the human and physical features that give places and regions their distinctive character.
4	Physical Education	5.1.1	The student cooperates with all class members by taking turns and sharing equipment.
4	Physical Education	4.1.1	The student participates in selected activities that develop and maintain each component of physical fitness.
4	Environmental Education	2.1.2	classify or group plants and animals according to structures and basic needs (food, water, shelter, space, air, and sunlight). Example: Classify birds by foot type (e.g., webbed, clawed,taloned, etc.).
4	Health	3.1.--	The student will identify and demonstrate healthy behaviors to reduce health risks.
5	Algebra	2.1.K2F	Use these attributes to generate patterns: things related to size, shape, color, texture, or movement (2.4.K1a), e.g., square dancing moves (kinesthetic patterns).
5	Geometry	3.3.K3+	Recognizes three-dimensional figures (rectangular prisms, cylinders, cones, spheres, triangular prisms, rectangular pyramids) from various perspectives (top, bottom, side, corners) (2.4.K1g).
5	Geometry	3.2.A1A+	Length to the nearest eighth of an inch or to the nearest centimeter (2.4.A1a), e.g., in science, we are studying butterflies. What is the wingspan of each of the butterflies studied to the nearest eighth of an inch?
5	Geometry	3.3.K1	Recognizes and performs through two transformations (reflection, rotation, translation) on a two-dimensional figure (2.4.K1a).
5	Geometry	3.2.A1G	Perimeter of squares, rectangles, and triangles (2.4.A1g), e.g., Mark wants to put up a fence up in his rectangle-shaped back yard. If his yard measures 18 feet by 36 feet, how many feet of fence will he need to go around his yard?
5	Life Science	3.2.1+	The student differentiates between asexual and sexual reproduction of organisms.
5	Physical Science	2.3.2+	The student describes, measures, and represents data on a graph showing the motion of an object (position, direction of motion, speed).
5	Literature	2.1.2+	The student identifies and describes the setting (e.g., environment, time of day or year, historical period, situation, place) and explains the importance of the setting to the story or literary text.
5	Writing	1.1.1+	The student chooses and writes about a narrowed and focused idea and occasionally write about a given prompt. (Ideas and Content: prewriting, drafting, revising: N,E,T,P)

Table 5.1-Sample of Kansas' academic standards. Adapted from <http://www.kerc-ks.org/index.aspx> by author, 2011.

+ = assessed indicator

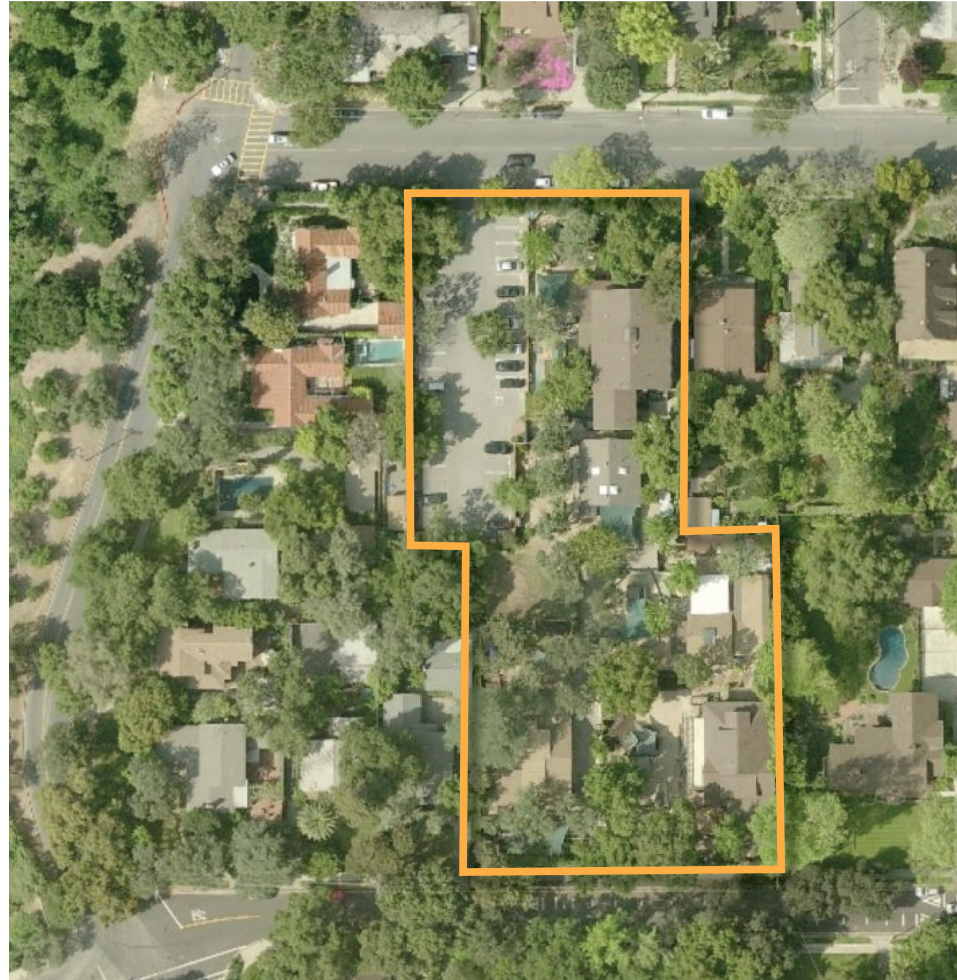
5	Geography	3.1.--	The student uses maps, graphic representations, tools, and technologies to locate, use, and present information about people, places, and environments.
5	Physical Education	5.1.5	The student encourages others regularly and refrains from derogatory statements.
5	Physical Education	4.1.4	The student meets the specific health related fitness standards.
5	Environmental Education	3.1.5	Predict how human-caused changes will affect future environments. Example: Study river channelization and the resulting environmental impact.
6	Number and Computation	1.3.A1	Adjusts original rational number estimate of a real-world problem based on additional information (a frame of reference) (2.4.A1a), e.g., given a large container of marbles, estimate the quantity of marbles. Then, using a smaller container filled with marbles, count the number of marbles in the smaller container and adjust your original estimate.
6	Geometry	3.1.K2	Recognizes and names regular and irregular polygons through 10 sides including all special types of quadrilaterals: squares, rectangles, parallelograms, rhombi, trapezoids, kites (2.4.K1g).
6	Geometry	3.2.K7	Finds the volume of rectangular prisms using concrete objects (2.4.K1g).
6	Life Science	3.3.1+	The student understands that internal and/or environmental conditions affect an organism's behavior and/or response in order to maintain and regulate stable internal conditions to survive in a continually changing environment.
6	Life Science	3.4.1+	The student recognizes that all populations living together (biotic resources) and the physical factors (abiotic resources) with which they interact compose an ecosystem.
6	Life Science	3.5.2	The student understands that adaptations of organisms (changes in structure, function, or behavior that accumulate over successive generations) contribute to biological diversity.
6	Science in Personal and Environmental Perspectives	6.2.1+	The student investigates the effects of human activities on the environment and analyzes decisions based on the knowledge of benefits and risks.
6	Science in Personal and Environmental Perspectives	6.1.1+	The student identifies individual nutrition, exercise, and a rest needs based on science and uses a scientific approach to thinking critically about personal health, lifestyle choices, risks and benefits.
6	Writing	1.1.2	The student uses (1) personal experience (2) observations (3) prior knowledge in written text. (Ideas and Content: prewriting, drafting, revising: N,E,T,P).
6	Physical Education	6.1.3	The student respects the physical and performance limitations of self and others.
Proficient	Theatre/Drama	6.1.--	Integrating Theatre: The student develops theatrical devices through the integration of other disciplines.
Proficient	Visual Arts	2.3.2	The student analyzes effectiveness of the use of elements and principles in communicating a message through art.

Table 5.1-Sample of Kansas' academic standards. Adapted from <http://www.kerc-ks.org/index.aspx> by author, 2011.

+ = assessed indicator

# Appendix B: Additional Case Studies

## Case Study #1: Pacific Oaks Children's School



Not to scale



Figure 5.1-Site context. Adapted from [www.bing.com/maps](http://www.bing.com/maps), 2010.

**Location:** Pasadena, California

**Date Designed:** Ongoing development since 1908-when the school was founded-with major renovations in the early 1980s.

**Site Designers:** Art Center College of Design (for the 1980s renovations) along with heavy involvement from the teachers.

**Client:** Pacific Oaks Children's School

At approx. 1.5 acres, Pacific Oaks is located in a traditional neighborhood development. It is bordered by California Blvd to the North and La Loma Rd to the south. Neighborhood homes border the east and west.

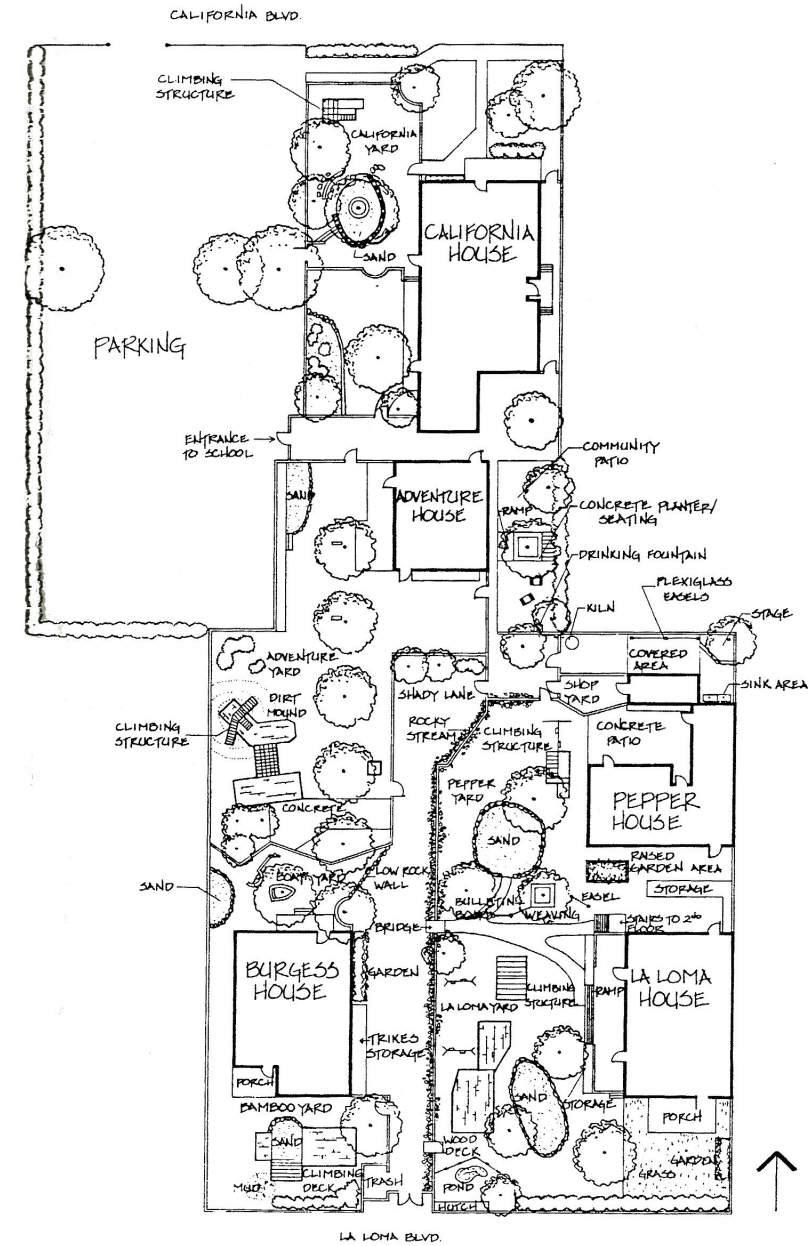


Figure 5.2-Pacific Oaks site plan. Stine 1997, 63.

Site Plan depicting the play areas, pathways, and community areas following the renovation and upgrading of outside spaces in the early 1980s.

### Project Background and History

Pacific Oaks Children's School began as Broadoaks School in 1910. Two sisters, Ada and Imelda Brooks, founded the school after taking in several orphaned children. The school was known as a pioneering endeavor in early childhood education. It caught the attention of young teachers interested in learning progressive new teaching methods and doubled as a teacher training facility. Official recognition by the California State Normal Training School occurred in 1912.

Outdoor environments were always a primary focus of the school's program. This fact is recognized in the official name of the school, "Broadoaks Outdoor School." The Brooks sisters believed that childhood education was facilitated "when combined with lessons from nature's wonderful pages" (Stine 1997, 52). Broadoaks encouraged initiative and inventiveness. Outdoor spaces were primarily used as a place to invent and to discover. The teachers used natural materials to encourage creative play and thinking. Leaves, flowers, sand, water, and a myriad of spare parts were used as the children's play equipment. The environment was flexible and used as a place of exploration, discovery, and inventiveness by teacher and student alike.

In 1945, the school was sold to a group of Pasadena Quakers. The name changed to Pacific Oaks Friends School but the focus on outdoor environments remained the same. This new era in the development in the school brought physical growth to the campus as well as expansions in the school's program, with more training sessions being added as well as a kindergarten program. Animals such as chickens, rabbits, guinea pigs, and lizards were added to the list of "natural materials" the children interacted with on a day to

day basis. During the 1960s and 1970s several additions were made to the outdoor environment. Quiet outdoor spaces were added next to the library, a special yard for younger children was built, and two large play structures were added. Still these spaces were designed to take advantage of the natural beauty of the trees and materials around them, incorporating textures such as "rocks, leaves, light, shadow and wood" (Stine 1997, 58).

During the next several years, Pacific Oaks continued to expand. The adult programs were moved to a new campus and the children's programs on the original site were enlarged. As these programs expanded, the outside environment began to show signs of serious wear from heavy use. In the early 1980s, the school hired a design team from the Art Center College of Design to develop a master plan for the school's outdoor spaces. Interaction with the designers led the teachers to rethink how they use their outdoor spaces and analyze their goals, uses, and problems with their schoolyards. After reviewing slides of images from the 1950s and 1960s they realized that their original vision had changed and that a focus on permanent play structures was limiting their thinking. Faculty debated the purpose and use of outdoor elements and the best ways to create spaces.

Eventually, the school decided it should provide three basic types of outdoor spaces: (1) transition spaces to use in poor weather for low-level activities, (2) yard space for physical, creative, social, imaginative, and cognitive play, and (3) community areas where children in different programs and age-groups might gather in cross-boundary types of



Figure 5.3-Children eating by flexible structures. Stine 1997, 52.



Figure 5.4-Natural character of Pacific Oak's schoolyard. Stine 1997, 58.

activities. The deteriorating wooden play structures were removed and structures with flexible parts were added. Sand areas were enlarged, plants and vegetable gardens were reintroduced; all elements that had existed in the school's past.

Today, Pacific Oaks continues to reflect the original vision of its founders, Ada and Imelda Brooks. Families and community members continue to donate their time and efforts to build and upgrade the school's outside spaces. Teachers continue to control the spaces they use; and over a hundred years later the school is still a place where the "children can experience the joy of discovery, test their ideas in action, and observe the results with a sense of wonder" (Stine 1997, 68).

"What supports children creating their own environments? Yards used to be 90% flexible; we need more spare parts, we need more private places like in the past; where are our jumping boards, wheelbarrows, wagons, pulleys, turnbuckles? How much of our current environment is manufactured and how much natural as it used to be? We've lost too many old trees. We must protect them and do more planting. Where are our pathways now, why and how do children and adults use them?" -Children's School Faculty Meeting Notes, October 1981 (Stine 1997, 62).

Pacific Oaks' approach to outdoor spaces can be summarized into three main points:

- Flexible structure
- Natural materials
- Teacher/Community driven design

Pacific Oaks School focuses on flexible structures to invite the children to be active and imaginative in the creation of their environments. This way children can explore, create, discover, solve problems, and learn in the ways that suit them best.

**Legend:**

- Flexible Structures
- Programmed Structures

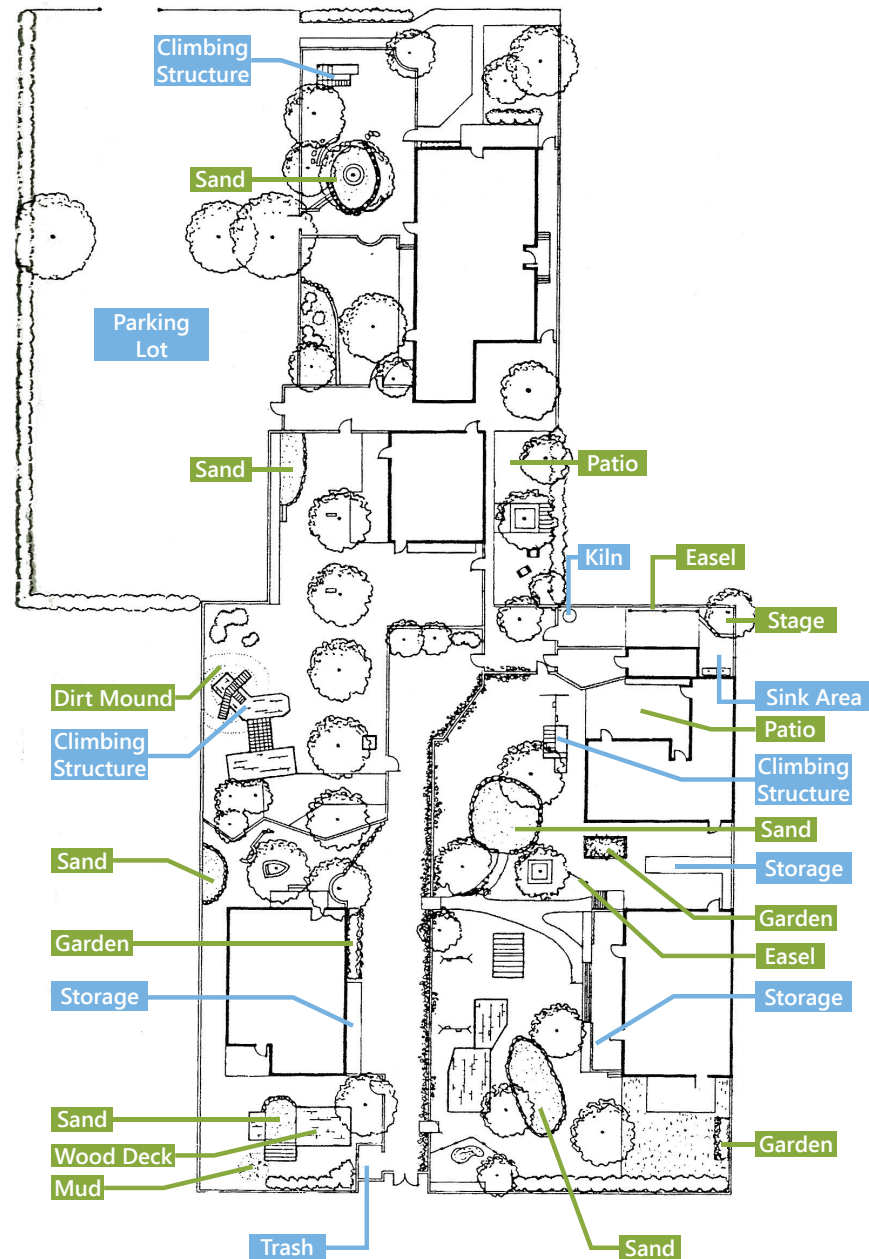


Figure 5.5-Flexible vs. programmed spaces. Base from Stine 1997, 52. Author, 2011.

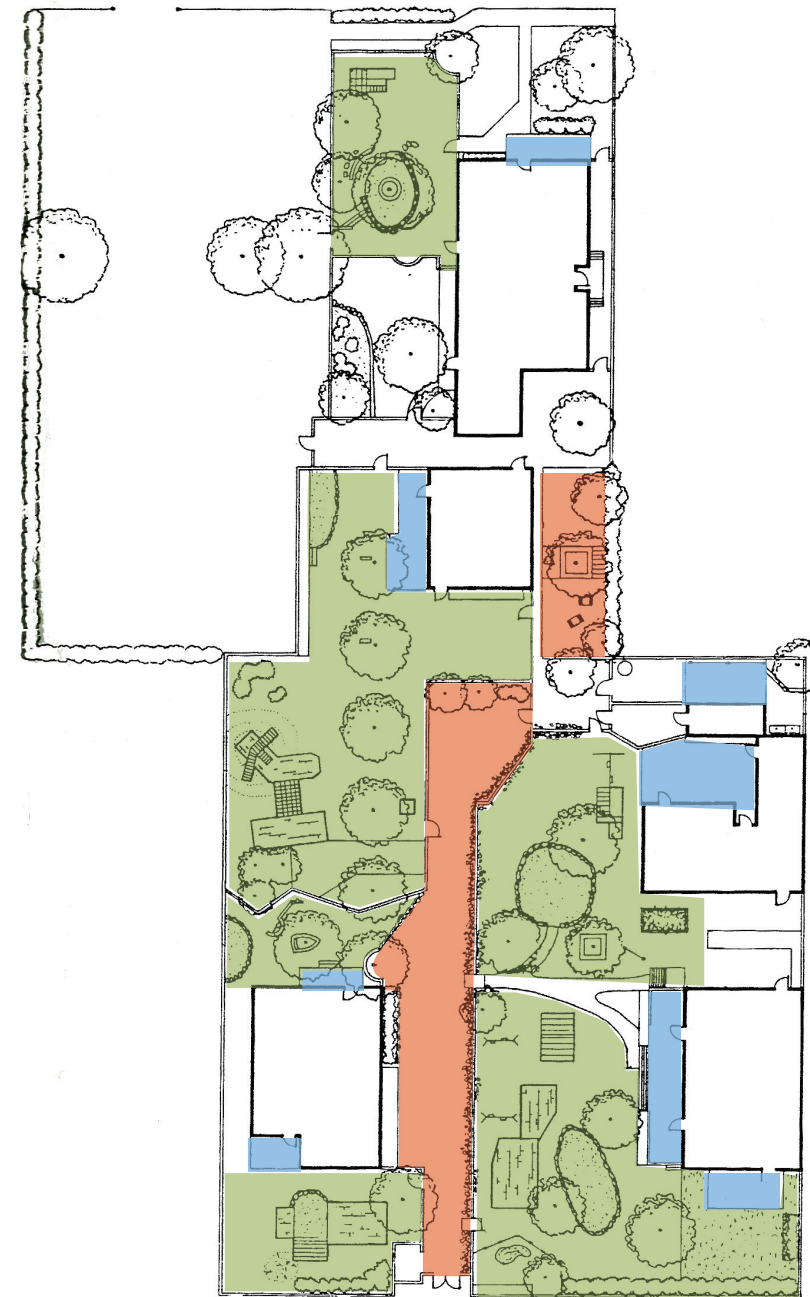


Figure 5.6-Outdoor spaces diagram. Base from Stine 1997, 52. Author, 2011.

The faculty at Pacific Oaks agrees that there should be three basic types of outdoor spaces: (1) transition spaces to use in poor weather for low-level activities, (2) yard space for physical, creative, social, imaginative, and cognitive play, and (3) community areas where children in different programs and age-groups might gather in cross-boundary types of activities.

**Legend:**

- Transition Space
- Yard Space
- Community Area



### Significance

Pacific Oaks is unique when compared to traditional schoolyards. The founders and subsequent teachers at the school recognized the importance of learning through discovery and creative play. Their landscapes are far from barren, but are full of objects and materials that stimulate the imagination and get children involved. This flexible structure allows for a variety of hands-on activities. For example, the school installed an "activity fence" which included a Plexiglas easel, a seating bench, large smooth stones, a raised garden, a frame for weaving, and a wooden bar used for hanging child-created mobiles (Stine 1997).

The site was designed by the teachers and faculty that worked with the children everyday. This community based approach to the design is essential for school environments to succeed. The teachers are the ones who guide childhood learning in the classroom, so it would be foolish to discount this role when it comes to making outdoor learning environments.

### Relevance

The goals and ambitions of the Pacific Oaks School are admirable. Their outdoor environments truly are spaces where children can explore, discover, and learn in the way that suits each individual. The school's focus on creating natural play spaces in an urban neighborhood environment relates to this report directly. The challenge will be to find how these same principles of natural materials, flexible structures, and teacher driven design can be integrated into public schoolyards. Pacific Oaks' history was unique as outdoor environments have always been a primary focus for the school; which is not true with most public schools today. Teachers are given no control over the structure of the outdoor environment and the only goals which seem to drive the design are whatever costs the least to install and maintain.

## Case Study #2: Crest View Elementary School



Not to scale  
North

Figure 5.7-Site context. Adapted from [www.bing.com/maps](http://www.bing.com/maps), 2010.

**Location:** Boulder, Colorado

**Date Designed:** 1990

**Site Designers:** Design Concepts and The Restoration Group

**Client:** Boulder Valley School Districts and Crest View Elementary Parent Teacher Organization

Crest View Elementary School is located within a traditional neighborhood development. The Habitat is located on the school property just west of the school building. The rest of the schoolyard appears to be asphalt and turfgrass.

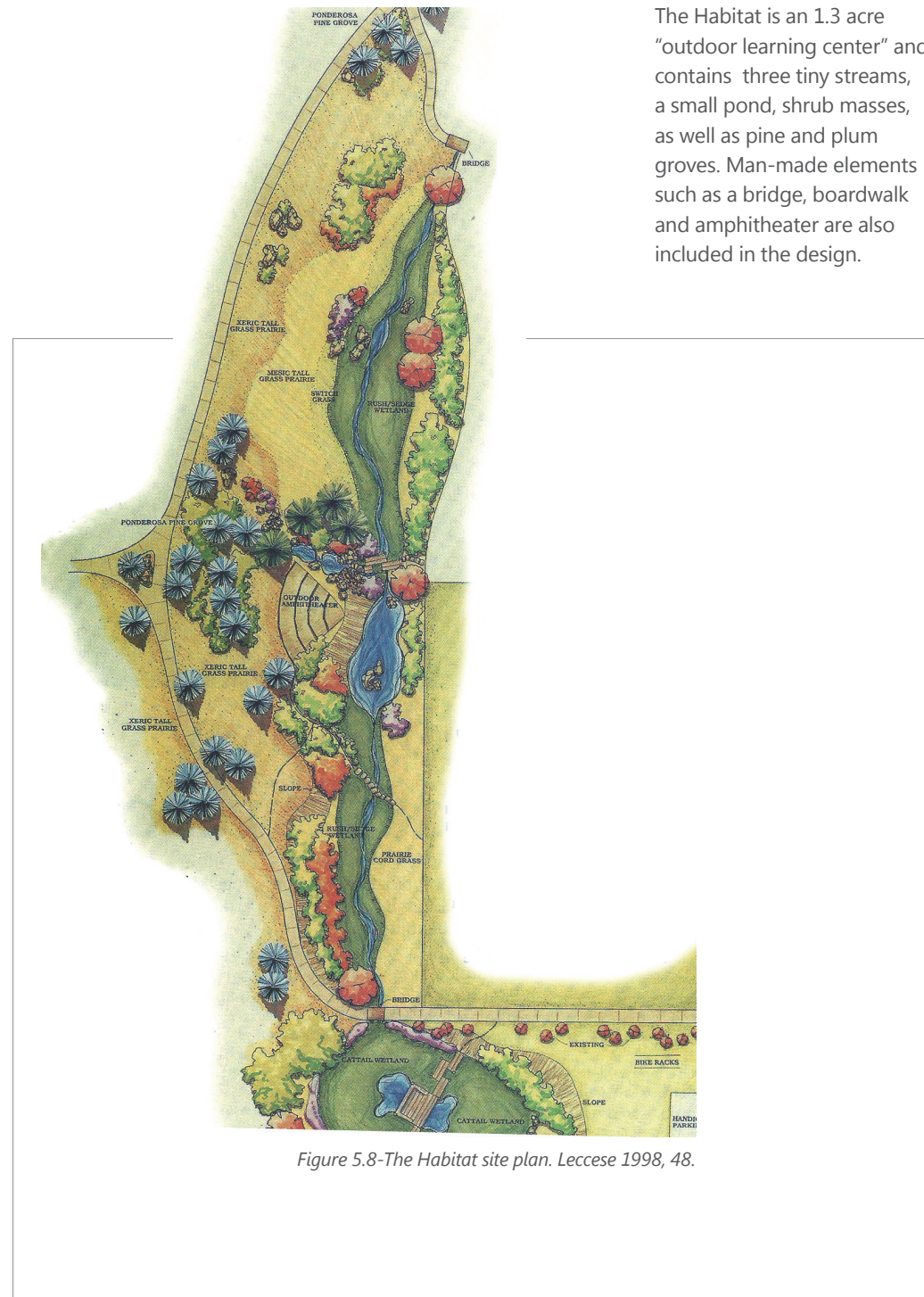


Figure 5.8-The Habitat site plan. Leccese 1998, 48.

The Habitat is an 1.3 acre "outdoor learning center" and contains three tiny streams, a small pond, shrub masses, as well as pine and plum groves. Man-made elements such as a bridge, boardwalk and amphitheater are also included in the design.

#### Project Background and History

In the 1950s Crest View Elementary School was built on an existing natural marsh. In order to build the school the marsh was filled with earth from a nearby road construction project. Despite the constructors best intentions, the wetlands never really went away. Wet conditions were a reoccurring problem so the school decided to install a concrete drainage ditch to move the water away. In 1989 interested parents approached the principle with a proposition; to remove the ditch and replace it with what she called "a natural habitat for exploration and learning-a place where field trips could be taken at any time without leaving school grounds" (Leccese 1998, 49).

The project was initially met with resistance. The school's grounds manager wanted sod and a few neighbors feared mosquito infestations. The sod was installed, but nature eventually won over, flooding the area again and "leaving the newly installed sprinkler heads six inches underwater" (Leccese 1998, p.50). Installation of the wetland began soon after.

The decision was made early on that the water should not be deeper than one foot, to reduce the risk of drowning, and it was also proposed that mosquito-eating minnows be bred in the ponds to control insects. The PTO gathered the funds, materials and labor. They hired a professional design company to develop the site plan. Community members donated further materials and gathered together on building and planting days to help make the wetland a reality.

As the wetland matured the project eventually caught the attention of the larger community. Public grant money came in and the project won the design company the American Society of Landscape Architects chapter award.

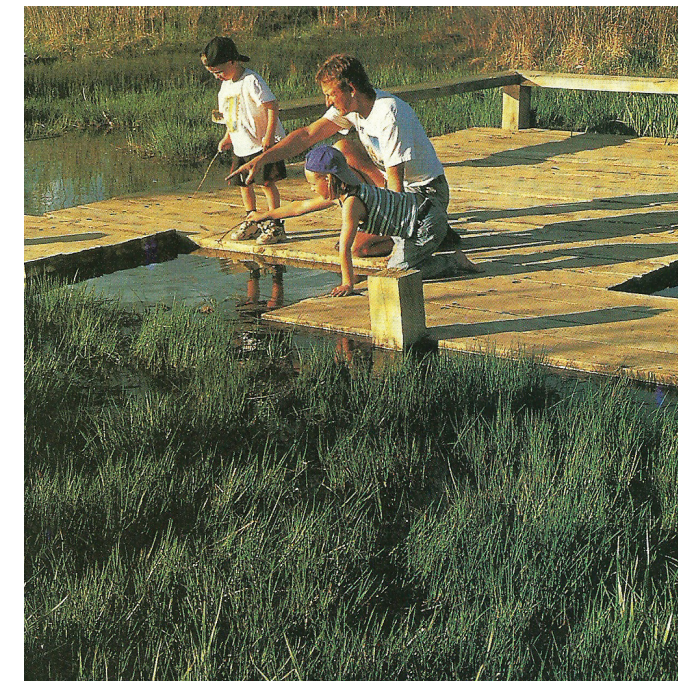


Figure 5.9-Boardwalk through the wetlands habitat. Leccese 1998, 46.

## Appendix C: Glossary

### *Program Elements*

The wetlands provide several key functions to the overall learning experience of the school's children. The Habitat offers a place where children can experience the natural world on a daily basis. Classes are often held in the Habitat which focus on ecology and natural systems. Fifth graders are required to sketch, conduct pH testing, and measure water flows as part of their curriculum. One teacher has mentioned that the wetlands has inspired some students to consider careers in biology and environmental science (Leccese 1998). An amphitheater provides a place for gathering in the natural space and facilitates outdoor classroom experiences.

The Habitat functions as a playground, or park, as well as a hands-on science lab. Children use the wetlands to play hide-and-seek in the tall grasses and are highly visible from almost anywhere on the school's west side, providing adequate supervision over the children.

### *Significance*

The creation of the wetlands habitat at Crest View Elementary School was a pioneering achievement in a trend toward naturalizing the nation's 100,000-plus schools. Incorporating natural habitats into our school's outdoor environments is proving to be essential to childhood learning. In the 1980s the Harvard Graduate School of Education conducted a study on children learning in natural

environments. The results showed that children who had hands-on nature programs at their elementary schools scored higher in literary skills and music appreciation than those who had no nature programs at their schools (Leccese 1998, 48). Many more studies can be cited proving the importance of natural landscapes as learning environments. Natural environments are critical in order to stimulate types of learning in children; physically, cognitively, and socially.

### *Relevance*

This project differs from Pacific Oaks in several key components. First, its design was a retrofit into an existing landscape instead of a continual process of additions and changes over a century's time. Bergman Elementary School is also an existing landscape that is in need of a retrofit. Second, the wetland is designed as a natural system in the schoolyard, where Pacific Oaks' focus was on natural materials. I envision my project as being a hybrid of these two case studies—where there are natural systems located on the school property for children to explore and teachers to use in class, but also natural play equipment and flexible structures to give children a variety of experiences. My criticism for Crest View is that the wetlands seems to be surrounded on all sides by a traditional, "sterile" school environment. The lessons of a naturalized learning landscape were not carried throughout the site.

**Child Development**—changes made biologically and psychologically to children as they mature toward increased self-dependence (Berk 2010).

**Cognitive Development**—development involving ways that growth and change in intellectual capabilities influence a person's behavior (Felman 1997, 672).

**Creativity**—the process of transcending old ideas and paradigms to create meaningful new ideas, forms, and methods (Feldman 1997).

**Education**—the process of teaching particular skills or knowledge necessary for a certain profession or for a mature life (Feldman 1997).

**Formal Learning**—teacher-initiated learning typically found in traditional school classrooms.

**Informal Learning**—individual-driven learning. Occurs as a child becomes engaged in play activities.

**Learning**—the process through which knowledge or skill is acquired. This can be through direct experience, training, or practice (Feldman 1997).

**Maslow's Hierarchy of Needs**—a hierarchical listing of the most basic needs of human beings—from most primal to the peak of human existence: Physiological, Safety, Belonging/Love, Self-Esteem, and Self-Actualization. Learning and creativity occur only in the last stage (Mau et al 2010).

**Natural Landscape**—landscapes that include characteristics of wilderness; habitat, ecosystems, a myriad combinations of plant materials and earth materials.

**Nature-deficit Disorder**—a non-medical diagnosis describing the human costs of alienation from nature including: diminished use of the senses, attention difficulties, and higher rates of physical and emotional illnesses (Louv 2008).

**Physical Development**—development involving the body's physical makeup (Feldman 1997, 676). The ability of children to engage in gross motor skill activities as well as fine motor skill activities.

**Play**—spontaneous activity that is child initiated and terminated (Stine 1997, 17).

**Social Development**—The way in which individuals' interactions with others and their social relationships grow, change, and remain stable over the course of life (Feldman 1997, 678).

**Theory of Multiple Intelligences**—argues that the traditional notion of intelligence, based on I.Q. testing, is far too limited. Instead, seven types of intelligences are proposed that account for a broader range of human potential. They are: linguistic intelligence ("word smart"); logical-mathematical intelligence ("number/reasoning smart"); spatial intelligence ("picture smart"); bodily-kinesthetic intelligence ("body smart"); musical intelligence ("music smart"); interpersonal intelligence ("people smart"); intrapersonal intelligence ("self smart"); and naturalist intelligence ("nature smart") (Louv 2008, 72).

**Traditional Schoolyard**—a schoolyard where play is seen as synonymous with physical exercise and recreation. Typically you will find pre-fabricated playground equipment, asphalt play surfaces, and a high percentage of grass fields which are mostly used for sports and other recreational activities (Malone and Tranter 2003).

# Appendix D: Process Diagrams

## Project Path

The path taken for this project begins with going through a cycle of research, precedents, and redefining a learning landscape. This process centers around the ideas of childhood development as it relates to learning, experience in nature as it relates to exploration and discovery, and educational theory as it relates to creativity.

The process then moves to a cycle of inventory analysis and program with continued influence from the research and definition cycle.

The inventory and analysis cycle then informs the design cycle with continued influences from new information discovered in research.

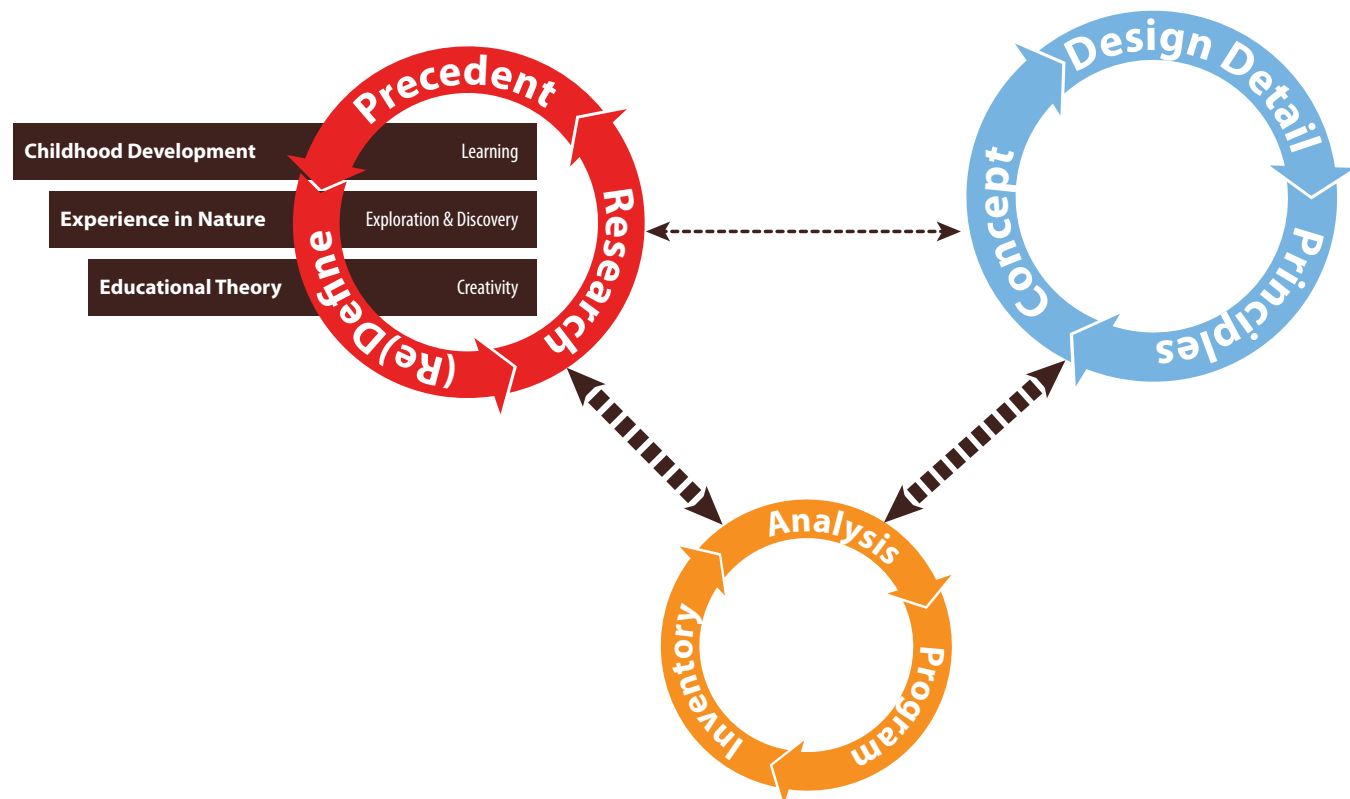


Figure 5.10-Project path. Author, 2010.

## Time and Tasks

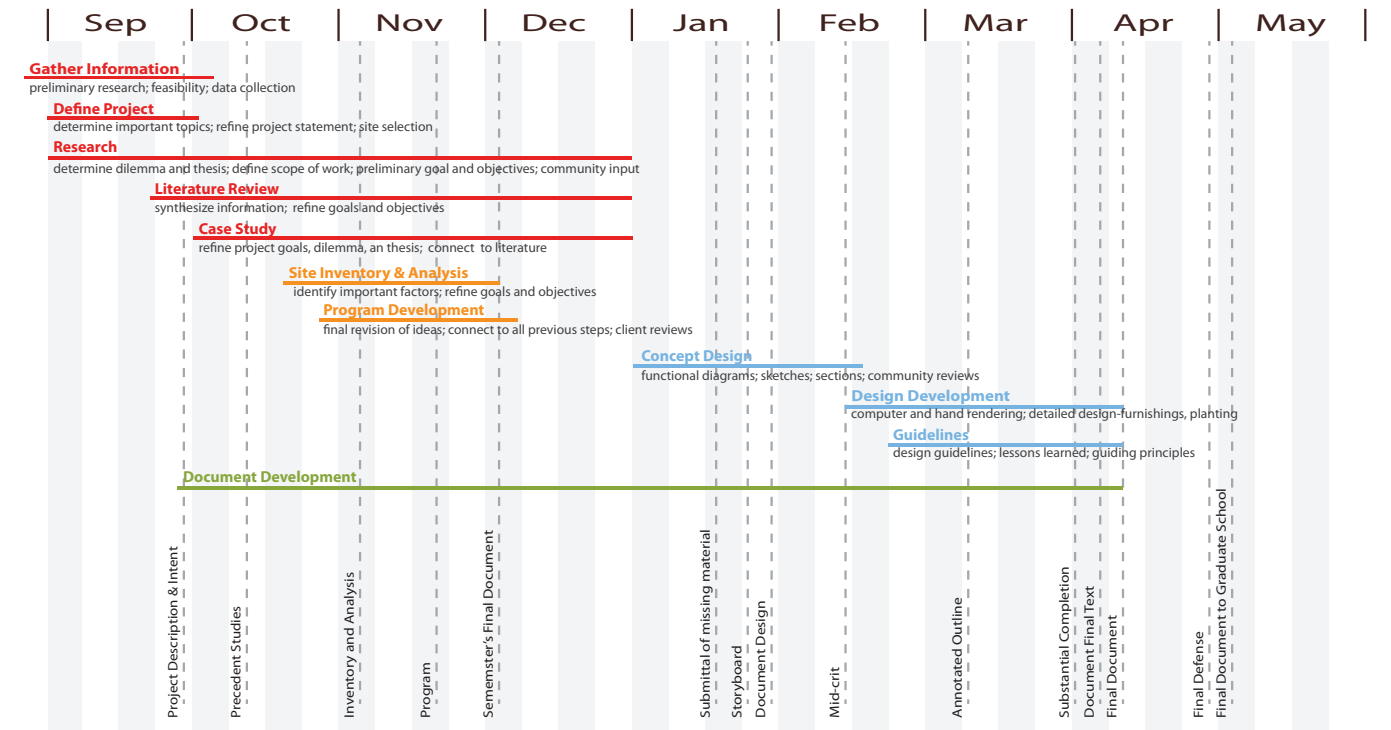


Figure 5.11-Time and tasks. Author, 2010.

# Appendix E: Annotated Bibliography

## Grounds for Action: Promoting Physical Activity through School Ground Greening in Canada.

Anne C. Bell + Janet E. Dymont (2006)

This report presents strong evidence that greening school grounds can promote physical activity in children. The study discusses the enabling and the limiting factors related to physical activity in the design of schoolyards. As outlined in this study, greening a schoolyard has several key benefits, including; encouraging children to explore the natural world, promoting more cooperative play and civil behavior, and increasing concentration and self-discipline.

## The Third Teacher: 79 Ways You Can Design to Transform Teaching & Learning.

Bruce Mau Design + OWP/P Architects + VS Furniture (2010)

Written in collaboration with three top design firms, The Third Teacher is a collection of case studies, student and professional interviews, tips, and writings on education and creativity. Each of the seven chapters includes valuable pieces of information that are relevant to the design of creative schoolyards and interactive development.

### 1. Basic Needs

- Discusses the basic needs of safety and security for children.
- Overview of Maslow's Hierarchy of Needs—or the five stages of human growth-listed from most basic to the peak of human existence: Physiological, Safety, Belonging/Love, Self-Esteem, and Self-Actualization (35). Creativity and the pursuit of inner talents only occur at the highest level.
- Considerations for designing for smaller body types (36).
- Daylight in classrooms has been shown to improve test scores and reduce absenteeism (46).
- Change locations of activities to explore new surroundings.

### 2. Minds at Work

- "Students who are not exposed to arts and music at school score lower on standardized tests and have worse communication skills than those who do" (52).

- Sir Ken Robinson interview – there needs to be a good balance of all the subjects, creative and academic. Facilities must reflect this balance. Promote collaboration between disciplines with flexible spaces.
- Howard Gardner interview excerpt– according to his Theory on Multiple Intelligences we must allow children to exercise more than just linguistic and logical intelligence. Schools of the future are more likely to resemble museums.
- School programs must allow students time and space to choose what they want to do-to illuminate their individual strengths.
- Displaying student work tracks progress.

### 3. Bodies in Motion

- Maria Montessori links motor development with body movement, "The task of the educator lies in seeing that the child does not confound good with immobility and evil with activity" (80).
- Dr. Dieter Breithecker -Children need to move to concentrate.
- Spaces that can be reconfigured to engage different kinds of learning.
- Taking the risk out of playgrounds, we also remove a lot of the challenge, and the potential for development.
- Naturalizing play spaces will provide endless opportunities for play and discovery.

### 4. Community Connections

- John Dewey-ideas about schools as social reformers as a real and vital form of community life.
- Community/parent involvement is the key for enacting change in our schools today.
- Children need comfortable spaces at school just like home.

### 5. Sustainable Schools

- David Suzuki-reconnecting children (and schools) with nature and focusing on the school grounds, both indoor and outdoor, as a complete environment.

- Reveal how stuff works in the infrastructure of the school.
- Change the curriculum to align with the ecological timeclock.

### 6. Realm of the Senses

- Use produce from the schools's gardens for lunches.
- An environment rich in sensory experiences will help children retain information and retrieve what they learned.

### 7. Learning for All

- One way to incorporate universal design into a school is to include students and designers with disabilities.
- "The Key features of an inclusive play environments are: person-accessible, activity-based, sensory-rich, developmentally appropriate, and flexible" (204).

### 8. Rewired Learning

- "Plan for the unknown-design a learning environment that will allow the teachers to modify their methods and expectations as technology changes" (233).

## The Natural Environment as a Playground for Children: The Impact of Outdoor Play Activities in Pre-Primary School Children.

Ingunn Fjortoft (2001)

A study performed on school-age children in Norway shows that children who were played in natural settings (specifically among trees, rocks, and uneven ground in this study) scored better on motor fitness tests (specifically balance and agility) than those children who played in traditional flat playgrounds.

## Children and Nature: Psychological, Sociocultural, and Evolutionary Investigations

Peter H. Kahn Jr. + Stephen R. Kellert (2002)

This book is a collection of studies done that examine the experiences of children with nature. The authors state that "direct and indirect experience of nature has been and may

possibly remain a critical component in human physical, emotional, intellectual, and even moral development" (vii).

Kahn argues that children are suffering from a loss of "intimate positive affiliations with nature" and that as we "accept negative experiences (such as pollution) as the norm, we suffer physically and psychologically and hardly know it" (113). He proposes that children become more engaged in "constructivist environmental education" and increase their interaction with nature. He notes that it is important to remember that children construct knowledge and values not only from the physical world-nature- but also through the social world.

"We must recognize the need for a more pristine and at times wild nature so that adults and children alike can experience it, construct concepts of ecological health, and be nourished by it in body and mind" (114).

Kellert's work focuses on the children's emotional, intellectual, and values-related development as its dependence on natural experience. Data and theory both support the hypothesis that a child's development is "greatly enhanced by, varied, recurrent, and ongoing contact with relatively familiar natural settings and processes" (146). He also concludes that the current trends of our society has reduced the quality and quantity of children's direct experiences of the natural world-and that the "increased indirect and vicarious contact with nature do not appear to offer an adequate substitute for diminished direct encounters in ordinary and accessible natural environments" (147).

## The Experience of Nature : A Psychological Perspective.

Rachel Kaplan + Stephen Kaplan (1989)

A synthesis of a comprehensive group of studies on humans and the natural environment, the book reveals important information with about human's preference for nature and the benefits and satisfactions we receive from nature.

## Last Child in the Woods: Saving our Children from Nature-Deficit Disorder.

Richard Louv (2008)

Richard Louv describes the consequences of our society's increasing trend toward urbanization and alienation from the natural world. He describes this phenomenon as the "nature-deficit disorder" (see glossary). Louv argues that the relationship between children and nature has changed and that our society today criminalizes natural play. This criminalization comes from the increasingly restricted uses of land governed by private governments, public governments, protected areas, and the poor land-use decisions these bodies make.

The consequences of this removal from natural settings are affecting our children. The rapid urbanization of our society, along with the continuing technological developments, coincides with a rapid increase in childhood obesity and a decrease in emotional health (50).

*"Studies show a relationship between the absence, or inaccessibility, of parks and open space with high crime rates, depression, and other urban maladies" (36).*

Recognizing that children are suffering from a lack of direct experience with nature, Louv reports on numerous studies that show the benefits of interaction with nature. For example, he cites reports that show that exposure to nature may reduce symptoms of ADHD and that it can improve a child's cognitive abilities and relieve stress and depression (35).

*"Playtime-especially unstructured, imaginative, exploratory play-is increasingly recognized as an essential component of wholesome child development" (48).*

*"Children need nature for the healthy development of their senses, and, therefore, for learning and creativity" (55).*

Louv also is a proponent of natural school reform. He again cites reports that demonstrate improvements to academic and behavioral performance in environment-based school programs (208).

*"For more effective education reform, teachers should free kids from the classroom" (206).*

## Natural Learning : The Life History of an Environmental Schoolyard : Creating Environments for Rediscovering Nature's Way of Teaching.

Robin C. Moore + Herb H. Wong (1997)

This book records the ten year action-research process carried out by the authors at Washington Elementary School in Berkeley California. Herb was the school principal and Robin was a Washington parent and landscape architecture faculty member at UC Berkeley. The book records their efforts to involve students and community members in renovating Washington's schoolyard to "reveal the potential of urban schoolyards as educational and recreational resources capable of supporting healthy child development" (xv).

Their successes in this schoolyard include; replacing the asphalt with an environment incorporating plant and animal communities of the local region, integrating the schoolyard into the educational program, and a strong community involvement in the design and maintenance of the new schoolyard.

## Plants for Play : A Plant Selection Guide for Children's Outdoor Environments.

Robin C. Moore (1993)

*"Because of their interactive properties, plants provide intrinsically interesting, open-ended settings that stimulate exploration and discovery, dramatic play, and imagination" (4).*

*"Plants stimulate the senses-touch, sight, taste, smell, and hearing-so it is not surprising that children are closely tuned to vegetated environments" (4).*

## The Need for Nature: A Childhood Right.

Robin C. Moore (1997)

*"Children live through their senses. Sensory experiences link the child's exterior world with their interior, hidden, affective world. Since the natural environment is the principal source of sensory stimulation, freedom to explore and play with the outdoor environment through the senses in their own space and time is essential for healthy development of an interior life. . . . This type of self-activated, autonomous interaction is what we call free play. Individual children test themselves by interacting with their environment, activating their potential and reconstructing human culture. The content of the environment is a critical factor in this process. A rich, open environment will continuously present alternative choices for creative engagement. A rigid, bland environment will limit healthy growth and development of the individual or the group. A boring environment will likely lead to antisocial, unhealthy behavior" (209-210).*

## Childhood's Domain : Play and Place in Child Development.

Robin Moore (1990)

*"Play lies at the heart of childhood, limited in its boundaries only by the opportunities afforded by physical settings and by the attitudes and commitment of those whose business it is to manage them" (18).*

## Landscapes for Learning: Creating Outdoor Environments for Children and Youth.

Sharon Stine (1997)

*"So often we discount the potential of outside space as a setting for learning. The outside areas of schools are frequently neglected or seen as places to pause between lessons learned inside" (xii).*

Sharon Stine addresses this problem quoted above directly in her book. The purpose of the book is to "help designers and teachers think about the quality of outside school environments as leaning places" (xii). She describes the outside learning environment as a place with the "potential for rich sensory input, flexible furnishing, and endless possibilities for exploration" (xii).

Stine stresses the importance of play as the way to promote healthy growth and development in children. Building on the work of others done in the field of social research, she outlines four assumptions regarding play: (1) play is the way children learn and is an essential part of their growth and development, (2) play is not limited to young children, (3) playing outside is an intrinsic need because it provides a uniqueness of experience that cannot be offered elsewhere, and (4) play environments are educational settings (17).

*"To meet the program goals of socialization, cognitive development, and physical maturation, authors in both early childhood education and environmental design focus on the importance of facilitation of children's play" (16).*

The physical environment must support play behavior in three key ways: (1) problem solving opportunities, (2) potential for choice, and (3) sustained interest over time (19).

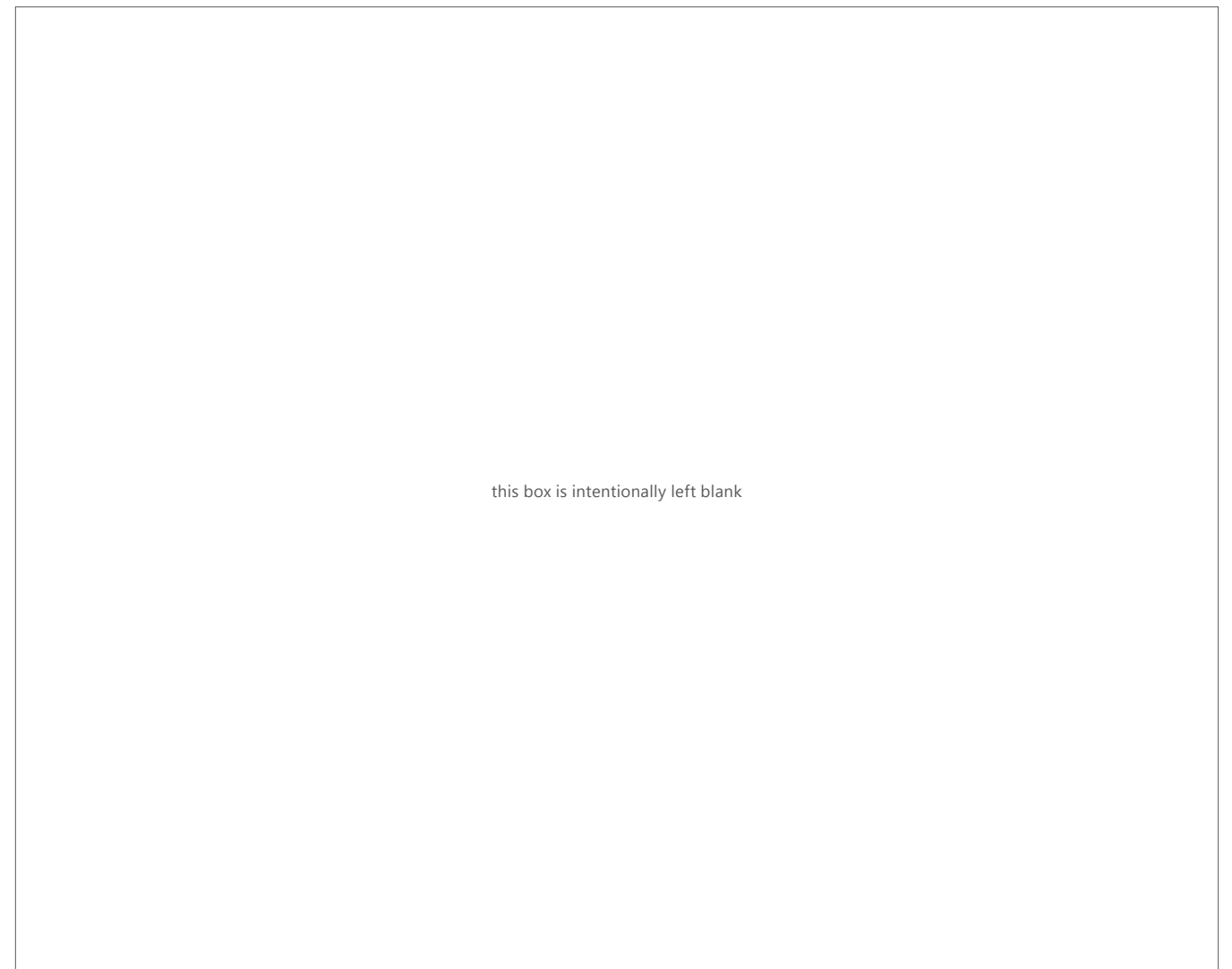
*Basic Design Elements:*

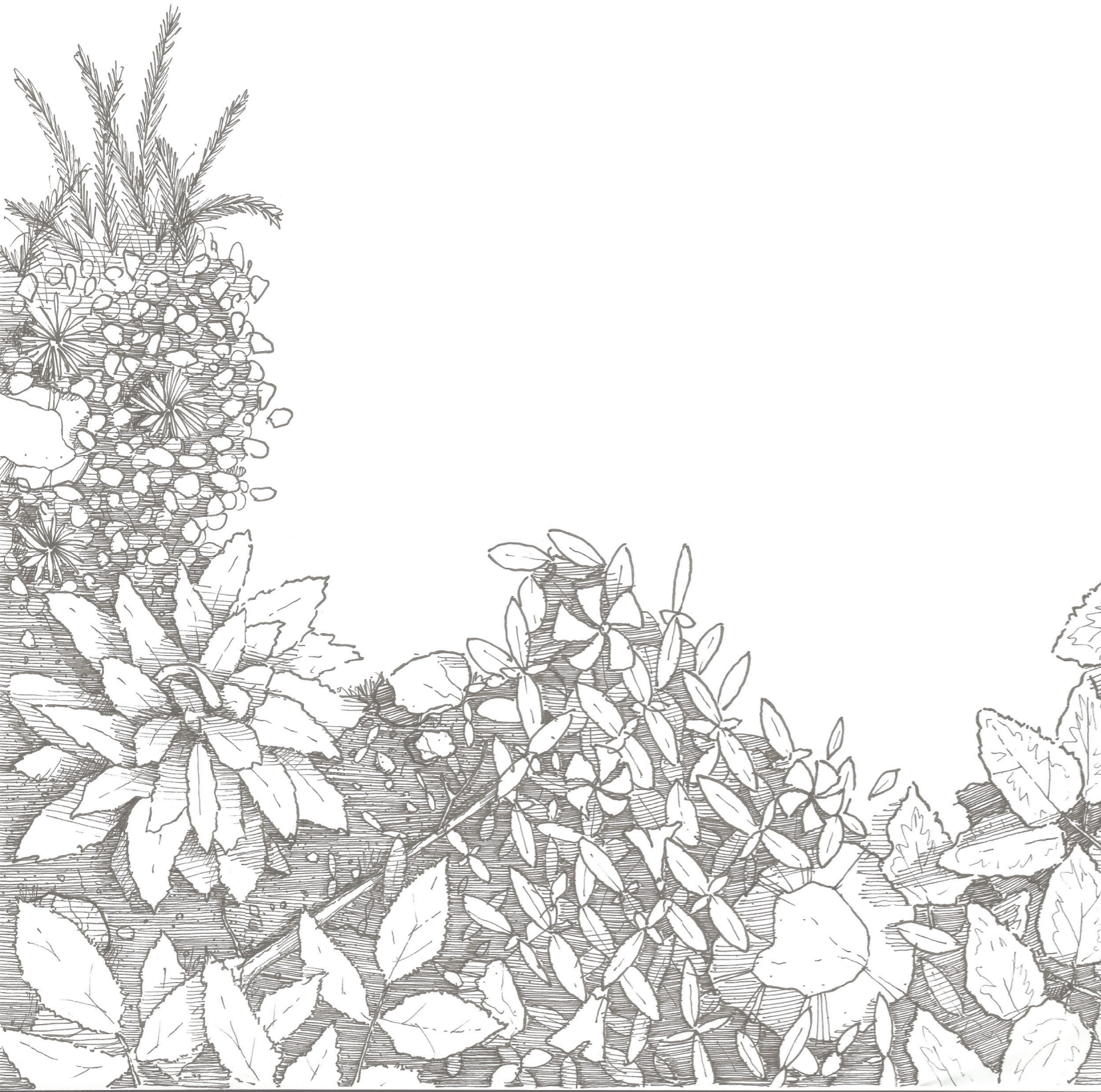
The following are dimensions are key points to use in the assessment of creating of outside play environments. They can be used as a checklist of elements to create outdoor settings that meet the needs of children intellectually, socially, cognitively, and physically.

*"The pairs of contrasting words described in this section are applied to children and their opportunities to learn through play activities"(25).*

1. Accessible and Inaccessible
  - a. Confusion over what is accessible and what is not should be avoided as it detracts from a child's play experiences.

- b. Inaccessibility is important to recognize both as a negative-a learning limitation- as well as a positive-a clarity and safety provision.
  - c. Differences in surface materials can define and clarify activities.
  - d. Elevation is a vantage point typically not accessible to children. Making it available gives the children a different perspective of their environment and can invite exploration of accessible and previously inaccessible areas.
2. *Active and Passive*
- a. Outside spaces should be used for vigorous, noisy, and active play but children also need places to relax, meditate, dream, and to be quiet.
  - b. The edges between active and passive spaces are important to consider-how does the activity of an active space affect the nearby passive space? How can we allow children to choose their own mobility, active or passive, without compromising the quality of either?
3. *Challenge/Risk and Repetition/Security*
- a. Children represent a wide range of physical ability. Therefore what is challenging to one child may be hazardous for another.
  - b. Taking risks and facing a challenge (within the limits of security) helps children learn about their competence and limitations, while overcoming a challenge awards them with self-confidence.
  - c. There is security and comfort in repetition. At first a new activity can be a challenge for a child, then repeated and practiced over time can be a source of joy, comfort, and security.
4. *Hard and Soft*
- a. An outdoor environment needs to include elements that give way under the body's touch-sand, water, grass, pillows, animals, rugs-and hard elements for activities that require cleanliness and ease of maintenance.
  - b. Environments that are primarily hard appear impersonal and are less responsive to the needs of children.
5. *Natural and People Built*
- a. Human built objects give children the opportunity to learn how humans solve complex problems; and by tinkering with objects children experience things being made learning processes and their connection to materials.
  - b. Natural elements provide sensory experiences different from those of manufactured materials.
  - c. Children's connection to nature is becoming weaker as we become more isolated from rural life.
6. *Open and Closed*
- a. Open activities invite exploration, creativity and are more concerned with the processes than a final product.
  - b. Closed activities follow rules and deliver an end product. Feedback from these activities show the child when he has been successful. This helps develop self-esteem based on competence.
7. *Permanence and Change*
- a. Permanence in the form of landmarks can help to orient the child, give her a sense of place, and provide security that she will be able to find her way.
  - b. Flexibility in space invites experimentation and stimulates problem-solving activities.
8. *Private and Public*
- a. Children need the opportunity to choose when to be with people and when to be alone or with a friend.
  - b. Private places can still be open and visible for security purposes yet give children a place to withdraw from social interaction.
  - c. Public spaces give children a place to be a part of unique communities and help them understand their place as individuals within the whole.
9. *Simple and Complex*
- a. Simple activities tend to have a singular use
  - b. Complex environments have more than one object or material which allows the child to manipulate or change in some way.
  - c. Simple play gives youth structure and direction while complex play encourages choice and inventiveness.





EXPLORING THE SCHOOLYARD

Scot Talbert



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