PLAYSCAPE AFFORDANCES

Encouraging Experiential Learning

by

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A REPORT

submitted in partial fulfillment of the requirements for the degree

MASTER OF LANDSCAPE ARCHITECTURE

Department of Landscape Architecture/ Regional and Community Planning
College of Architecture, Planning and Design

KANSAS STATE UNIVERSITY
Manhattan, Kansas

2014

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Abstract

According to Barbara Hendricks, play environment designer and consultant, "If we want children to grow up with a zest for living we need to give them living spaces that express life as a grand experience." Hendricks emphasizes playtime is important for children to process formal lessons (Hendricks 2011). This applied design research project seeks to facilitate child development through an experiential learning playscape while addressing stormwater management for Bluemont Elementary School.

The central research question of this project is:

How can school playgrounds be designed to afford children improved social interactions and experiential learning?

An exploration of landscape affordances theory (Sanseter and Hansen 2009, Heft 1988) and experiential learning (Kolb 1984), combined with social interactions and cognitive child development (Addo-Atuah 2012), formed a theory base for the project. Playground observations, stakeholder surveys, stakeholder interviews, and site inventory and analysis informed the eventual design.

Major factors influencing students' play include age, playground rules, equipment available for use, and weather. Site conditions, including topography and site drainage, can also influence students' play. In current conditions, stormwater is a schoolyard liability restricting play and safe site circulation.

The researcher gathered insights from student surveys, playground observations, teacher interviews, and site inventory and analysis to complete a comprehensive master plan. The comprehensive master plan and detailed stormwater management plan address the schoolyard over the next twenty to fifty year outlook. The designs resolve practical issues while increasing the variety of site educational and play affordances available to students and teachers for play and learning. A primary goal of the detailed plan is to convert stormwater schoolyard liabilities into amenities and educational tools.

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Table of Contents

List of Figures

*All plan figures built from survey data provide by BG Consultants, Inc.

List of Tables

Dedication

To the Bluemont Elementary community of teachers, parents, and students, may this report encourage more outdoor learning through the facilitation of the advocacy for schoolyard improvements.

Mom and Dad, in the pursue of my dreams success would not be as sweet without family standing beside me.

Acknowledgments

A fortunate beginning, the decision to attend Kansas State University for Landscape Architecture, I have benefited from the dedication and endless support of the outstanding professors in the Landscape Architecture Department. Through their encouragement and shared knowledge, I have discovered the career path I can be passionate about. The beginning of this pursuit begins with my master's report. Many people have contributed their time, knowledge, and support throughout the entire process.

I am greatful to the professors whom dedicated extra time to serve on my master's committee. Professor Kingery-Page was available to give extra design critiques and has been most supportive and encouraging, and when needed gave me an extra motivational push. Professor Hunt continues to encourage me to push myself to design and explore my graphic style. Thank you for the extra design critiques. Professor Fees, thank you for guiding my research in child development and providing feedback on my attempts to understand the complex elements of child development in relation to play and social interactions.

A special thank you to Bluemont Elementary Principal, Kathy Stitt, for your insight and support throughout the research and design process. Without your cooperation and support, the surveys, interviews, and observations would not have gone as smoothly. I want to thank the teachers, students and parents who participated in the interviews, surveys, and observation, I feel fortunate to receive successful participation and insight that guided much of my design process. I feel fortunate to know the Bluemont Elementary Parent Teacher Organization, thank you for welcoming my ideas with open-minds, I hope the following information will continue to be of use to you, the school, and district.

Through site survey data I gained a better understanding of the utilities, this is attributed to BG Consultants INC; thank you for sharing Bluemont Bluemont Elementary's site survey.

Professor Lee Skableund, thank you for partaking in an onsite discussion about effective stormwater management solutions o and relevant literature.

To the landscape architecture class of 2014 I have appreciated your insights and willingness to discuss projects. To the Landscape Affordance Network, I have enjoyed working together. From sharing resources, to providing feedback , and to helping me understand my own project your insights and friendship have proven to be invaluable.

Kenneth Beyer and Karen Fergen, I greatly appreciate the words of encouragment and time spent editing my report.

Thank you to my friends and family for keeping me grounded. I am fortunate to have such a great support system.

Thank you for your contributions to this project whether it was information, guidance, design feedback, or support; during this process you not only impacted my project but also have made an impression on me.

Preface

Research on outdoor experiential learning through play inspired personal reflections on my outdoor experiences from childhood to today. Reflecting on my own experiences led me to evaluate my understanding of play on my personal development. I can now pick out several defining lessons from my play environment.

Most formative play memories began after moving to the country just outside of a small town. For sixteen years, I grew up on a five acre lot in the middle of a pasture on a country road, two miles east of a small town. My family's five acres and the surrounding pastures and creeks were my naturalized playground. I was exposed to a traditional playground during elementary school. The school play structures consisted of swings, teater totters, a small contemporary play structure, a snake ladder, an old merry-go-round; our asphalt activities included basketball, foursquare, tetherballs, and hopscotch; our open field activities included tag, soccer, and football. My school days were spent playing with these different play elements while my evening and weekends at home involve more pretend play with my animals including sheep, cows, chickens, cats, and a dog. I count my play experiences with gratitude.

Not only was I exposed to a wide variety of play but I also participated in both 4-H and Girls Scouts. In Girl Scouts as ,a junior, I helped lead younger girls in games and activities. During my time in 4-H I had similar experience; however, as I got older I was elected on to the Kansas 4-H Youth Leadership Council. On the council I had the opportunity to help develop a program for twelve to fourteen year olds. I learned at an early age the importance of explaining lessons through games, songs, and stories. I recognize play as the tool that facilitated my joy for problem solving, creativity, and skill development. Through leadership roles I found enjoyment in guiding skill development in younger children through games and activities. I believe through community and playground design, there is an opportunity to impact a child's development, encouraging them to grow through their interactions with their environment.

CHAPTER 01

INTRODUCTION

Chapter 1 introduces the evolving relationship between research and design in school grounds. I developed and modified the thesis statement throughout the research and design processes. The project was developed through the discovery of driving conditions revealed through multiple methods of research including stakeholder input and site analysis. Along with the site selection process, research questions and design goals begin to foreshadow the final designs.

Introduction to Play

Feet off the ground and flying up towards the sky, a swing affords children the experience of flight. A swing is an immobile and non-living object; however, it provides a child with the opportunity to perform an action. The action of swinging contributes to the development of a child's physical and mental wellbeing. Learning from the experience of flight, children begin to understand pumping their legs faster results in swinging higher. Through play, children form affordances with their surrounding environments, resulting in experiences that contribute to their social, physical, and cognitive development.

An interest in the potential of landscape affordances on playgrounds and how children form affordances to learn from the social interactions and experiences gained through the act of play, guides this project. The projected site is Bluemont Elementary School. After an initial look at literature and a discussion with the principal and Parent Teacher Organization, several conditions driving the project emerged.

Overarching Research Question

How can school playgrounds be designed to afford children both social interactions and experiential learning?

Driving Conditions

A playground is comprised of many different elements, which depending on a child's perception, lead to a great variety of affordances resulting in diverse experiences. The elements and affordances vary from playground to playground. In the article *Affordances for Risky Play in Preschools* the authors cite several studies supporting the importance of child development through play (Sandseter 2009). Associate professor S. H. Lee, presented a study at the Playground Safety International Conference of 1999, on children's cognitive development compared three types of playgrounds: traditional play area, contemporary play area, and natural play area. A traditional play area includes swings, slides, and seesaws, while contemporary play areas are comprised of novel manufactured forms of varying heights that are aesthetically pleasing. The natural play area is wild, and utilizes native plantings and natural materials including wood and ropes (cited in Sandseter 2009).

The first driving condition is provided by literature, as Bluemont Elementary's playground design is in between a traditional and contemporary playground. The results from Lee's study revealed that while each playground type displayed a predominant pattern of activities and uses, a traditional playground's contribution to child development was lower than that of a contemporary or naturalized playground (Lee 1999). A contemporary playground encouraged the most associative play where naturalized playgrounds encouraged cooperative play and dramatic play(Lee 1999). Bluemont Elementary has a contemporary play area. The existing design may not provide the challenging environment children need to encourage multiple types of social interactions that lead to experimentation and learning through the act of play.

In 2012, Kweku Addo-Atuah's master's report research was developed around valuing children's input during the planning and design of a schoolyard space. Addo-Atuah draws a comparison between Jean Piaget and Lev Vygotsky's philosophies on children's cognitive development (Addo-Atuah 2012). Piaget and Vygotsky research agrees that social interaction is important to child development (Piaget 1970, Vygotsky 1978). Piaget's research concludes that child development occurs through the reconstruction or reinvention of something observed (Piaget 1970). Vygotsky's reasearch concludes that language and social interaction are tools that facilitate child development (Vygotsky 1978). Furthering Addo-Atuah's research on Piaget and Vygotsky's philosophies, this project studies and applies how the availability of different play elements can influence the social interactions and the surrounding environment to impact child development.

Bluemont Elementary's Parent Teacher Organization (PTO) and principal instigate the second driving condition, the need to improving the school's exterior appearance. This group also recognizes that students would benefit from an improved schoolyard to facilitate outdoor classroom environments.

A third driving condition involves stormwater management, explored in the detailed design solutions. Existing topography (very flat) and stormwater conditions hinder students and teachers' ability to use their outdoor resources to the full extent. Unchanged stormwater conditions could affect the structural stability of the building's foundation and become a schoolyard liability.

Design and report audiences incorporated a fourth driving condition to satisfy the needs and requirements expected by all audiences. The fourth condition prompted many changes throughout the design and report processes. Each audience has a different set or variance of needs to be recorded and addressed in relation to the design. The audiences of this project include Manhattan- Ogden USD 383, Bluemont Elementary's Parents, Teachers, Administration, Students, Parent Teacher Organization, the Boys and Girls Club, Kansas State University, Master's Committee, and the broader public (figure 1.1).

Facilitating the development of research questions and an informed approach to design, the four driving conditions instigated a mixed methods approach including literature, playground observations, student surveys, teacher interviews, and site inventory and analysis to better understand the site and site users.

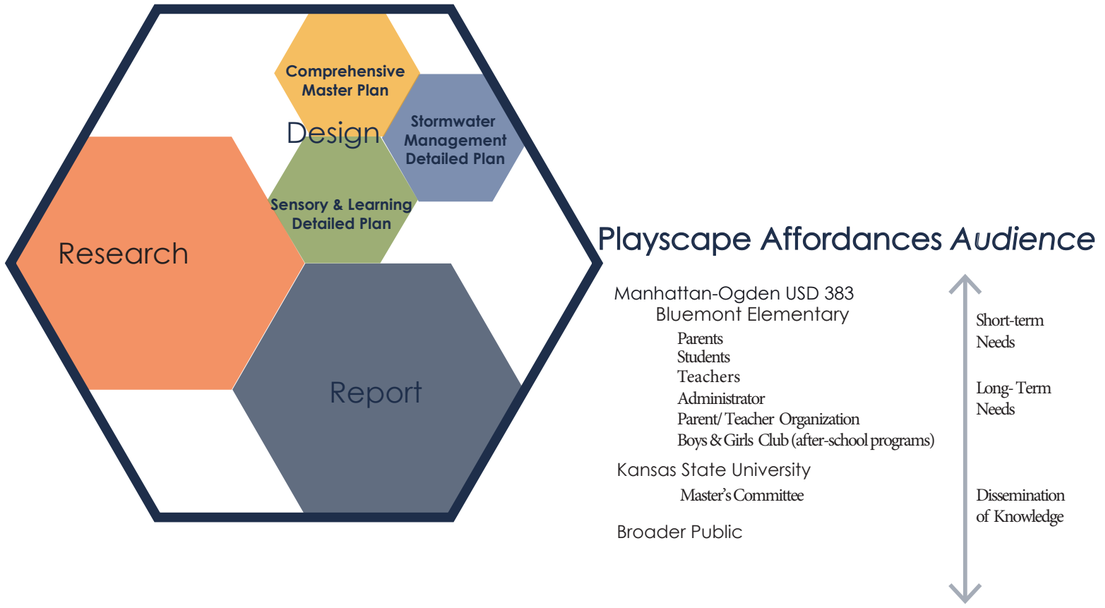


Figure 1.1. Playscape Affordance Audience. By Author, 2014

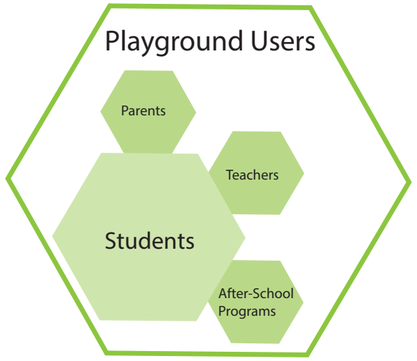


Figure 1.2. Expected Playground Users. By Author, 2014.

Site Introduction

My interest in playground design led to a discussion with my major professor regarding the sites in Manhattan, Kansas. During the discussion, I was informed the principal and Parent Teacher Organization (PTO) at Bluemont Elementary expressed a desire for design ideas (figures 1.1-1.2). During an initial meeting with the PTO, members repeatedly expressed interest in design ideas that would improve the aesthetic quality of the school (figure 1.3). Other design interests included a butterfly garden and raised gardening beds.

Figure 1.3. Bluemont Elementary. Photo by Author, 2014.

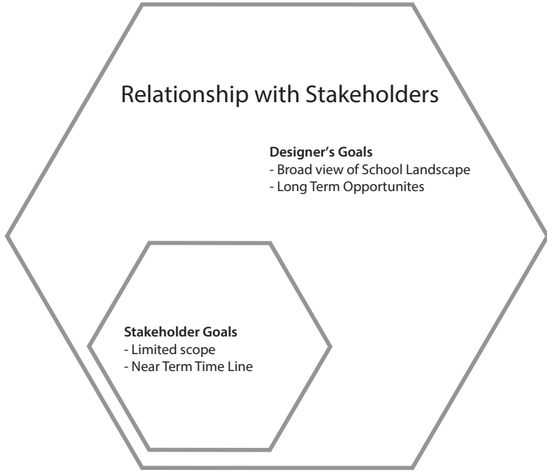


Figure 1.4. Relationship with Stakeholders. By Author, 2014.

After a site visit and quick site inventory, I decided to focus my research and design on a Comprehensive Master Plan and a Detailed Plan that would help guide present and future school ground improvements(figure 1.4). The proposed designs improve the environment to afford greater opportunities for play, learning, social interaction, and aesthetic experiences.

Bluemont Elementary is a public school within the Manhattan-Ogden Unified School District 383, identified with the "bobcat" as a school mascot. The bobcats' school is located on the corner of Bluemont Avenue and Juliette Avenue. The elementary is comprised of kindergarten through sixth grade students, each class has approximately twenty to twenty-five students. The onsite Boys and Girls Club hosts before- and after-school activities for students. The school playground is accessible to the community after dawn and before dusk except during school hours. Each piece of information has contributed to a better understanding of how the school and community interact.

Research Questions

Each of the following questions, with related sub-questions, contributed to the overall project development.

- **What affordances in the elementary schoolyard can provide a high capacity for experiential learning?**
- How do affordances provided differ between traditional, contemporary, and natural play areas?
- What types of play do children in kindergarten through sixth grade engage in on the playground?
- What types of playgrounds provide affordances for a variety of social interactions between peers and individual experiential learning and play?
- **What affordances allow diverse play experiences for children (e.g. individual, small or large group)?**
- How do children use the existing affordances provided by their current playground equipment?
- What improvements to the existing playground will provide experiences that contribute to students' cognitive and social development?
- How do the different age groups of children use affordances in the existing schoolyard at Bluemont Elementary?
- **How can stormwater management become an education amenity versus a school yard liability?**
- What is the potential stormwater volume output by the Elementary roof drains along the building foundation?
- What design solutions near the school building can accommodate a short term budget in an educational manner?
- What types of plants will be perennial, hardy, and suitable for rain gardens, and withstand Kansas drought conditions?

Goals

The overall project goals have evolved as research and design was completed.

- Provide viable **stormwater management solutions** that address the recurring drainage issues in **an interactive and educational manner for students and teachers.**
- Provide a **sustainable ecological landscape** that will enhance the aesthetic quality of the school. Provide a plant palette with suggestions that **requiring less maintenance** as additional grounds maintenance occurs on a volunteer basis.
- Provide **age appropriate playscapes** which increase the variety of landscape affordances for kindergarten through sixth graders **encouraging experiential learning outdoors using a combination of natural and built program elements**.

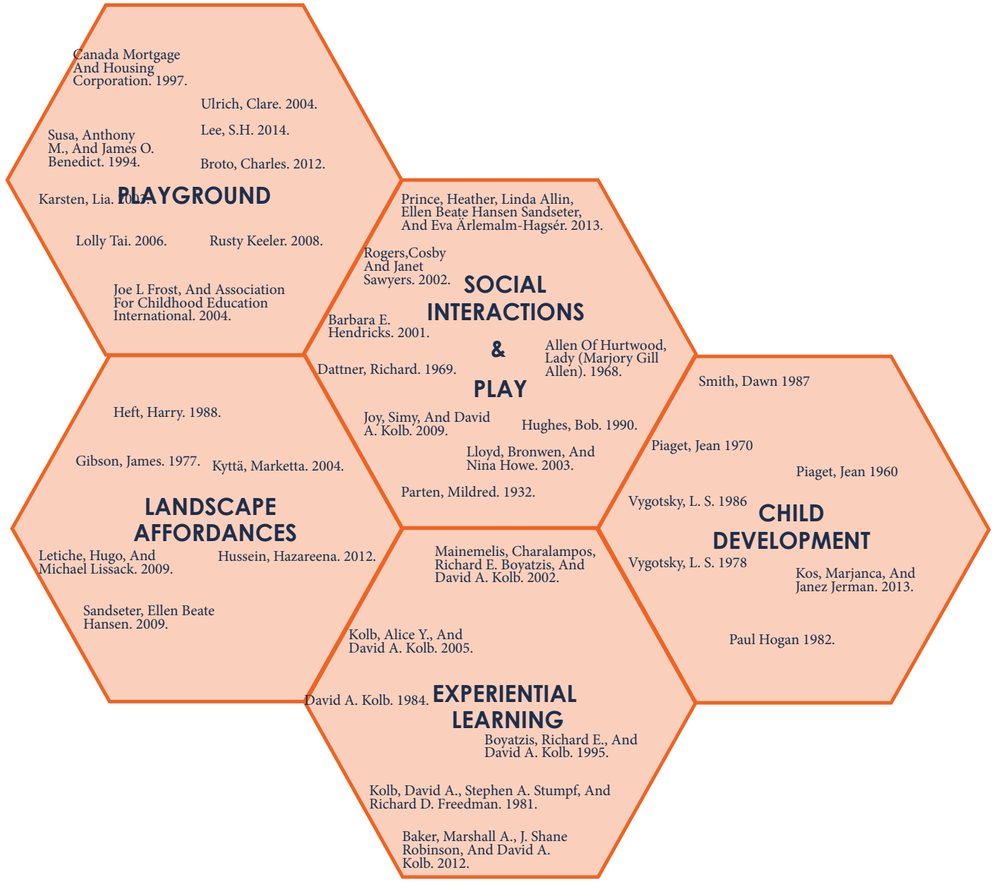


Figure 2.5. Literature Map. Arranged by Author, 2014.

CHAPTER 02

BACKGROUND

Beginning with a brief history and review of playgrounds and children's play, this chapter concludes by answering questions about landscape affordances, child's play, and social interactions which contribute to the overall development of children through experiential learning (figure 2.5).

History of Play

Reviewing the history of play and playgrounds in America has provided insight into how social, economic, and cultural influences have shaped the environments in which children play. *A History of Children's Play and Play Environments* by Joe Frost relays the history with clarity and in great depth; from classic Athens and Greece to the standardized playgrounds and impacts of the technological information era. The role of play and playgrounds for children has changed over time due to the difference in quality of living; Playgrounds in the United States began during the Child Saving Movement in the 1890s through the early 1900s. During this time of reform, the movement addressed issues such as child welfare, child labor, juvenile justice, playgrounds, and health. The Child Saving Movement spurred other movements to incorporate elements for school gardens, nature elements, children's museums, organized camps, and play and playground movements. Each movement tackled issues that contributed to child development and health and welfare. One of the first "model playgrounds" was installed at the Hull House in Chicago in 1892 under the direction of Jane Addams, an advocate for children and their need for play. The "model playground" consisted of "…sand gardens, sand pile, building blocks, swings, a giant stride, an indoor gymnasium, and outdoor games" (Frost 2010).

During the playground movement, Henry Curtis and Luther Gulick founded the Playground Association of America to facilitate the exchange of ideas regarding play and playgrounds. As cities and schools installed playgrounds, the importance of play and play environments for children became increasingly evident. By the 1970s and 1980s, the playgrounds became standardized and modular, the progressive similarity resulted from companies replicating and modifying competitors' designs. Playgrounds were valued for their contributions to physical, social, and cognitive development, as well as the safety, health, and welfare of the children within a community (Frost 2010).

Frost notes the concerns for present day playgrounds include a technology-driven society, increasing litigation, and providing safe and challenging play environments (2010). Refer to figure 2.5, a diagram illustrating the literature relationship.

Play

Richard Dattner expresses that playing is not just to "let off steam" but so children can learn through play (1969). Children process their experiences and lessons through play. Play is a response or interaction with their surroundings providing insight into lessons learned, while improving well-being and self-development (Hansen and Sandseter 2009). As children grow, they pass through various phases of play, from the pre-conceptual phase to the formal operation phase(Piaget 1970). Each category of play contributes to the different set of skills acquired contributing to the overall developmental growth. Categories include physical games, creative games, social games, and sensorial games (Piaget 1970). According to Titman's article cited in the "Affordances of Sensory Gardens", children need playgrounds to express themselves through doing, thinking, feeling, and being, which leads to experiential learning (1994, cited in Hussein 2012). Mature play is integrative to the acquisition of skills, leading to the growth of a child's capacity in all domains of development including social, physical, and cognitive (Broto 2012).

Landscape Affordance Theory

Playgrounds provide children with the opportunity to expand their knowledge through interacting with the landscape. A slide affords some children the opportunity to slide down, while it affords others the opportunity to climb upwards. Each child perceives affordances differently. Therefore, the designed intention for the play equipment may differ from the actualized affordance. Heft established ten functional affordance categories including graspable, climb-on-able, sit-on-able, lift-able, stand-on-able, walk-on-able, hide-behind-able, climb-over-able, and crawl-underneath-able (1988). The Bluemont Elementary playground will be evaluated on how children actualize the existing playground's affordances.

Experiential Learning Theory

Children learn through the cycle of experiential learning by formulating and testing a hypothesis, resulting in concrete experiences which lead to reflections, observations, and the development of a new hypothesis (Kolb and Kolb 2005, Piaget 1970). The holistic theory of experiential learning correlates to the four modes of learning discussed by Kolb and Kolb (2005). The modes include concrete experience, reflective observation, abstract conceptualization, and active experimentation. Each mode emphasizes the learning as a process of developing and testing ideas through experience. Playgrounds afford children the opportunity to develop concrete experiences through informal observation, testing, and reflection.

Child Development & Social Interactions

Rogers and Sawyers cite Jean Piaget's stages of cognitive development in *Play in the Lives of Children* (2002). Each stage is associated with the emergence of a particular type of play. According to Piaget, children learn primarily through exploration, discovery and experimentation, processes which are presented during mature play. Children progress from the sensory-motor substage (birth to twenty-four months) to the preoperational substage (twenty-four months through seven years) and then the concrete substage (seven to eleven years). Piaget states three factors contribute to a child's developmental progress: maturation, experience of the physical environment, and the action of the social environment (1970, 719). In accordance with the development stages, children progress through Piaget's different stages of play: practice play, symbolic play, and games with rules (Rogers and Sawyers 2002; Mooney 2000; Piaget 1970). As children explore and discover new experiences with maturity, play may involve new combinations of practice and representational thinking (Rogers and Sawyers 2002).

Rogers and Sawyers emphasize a relationship between child development and the six types of peer interactions as described by Mildred Parten (Parten 1932).

In "Social Participation among Pre-School Children" published in the Journal of Abnormal and Social Psychology (1932), Parten identified a typology of social interactions among children during play. The typology describes the level interaction between typically developing children in a play setting from none to collaboration. The six types of social interactions are unoccupied, onlooker, solitary independent play, parallel activity, associative play, and cooperative or organized supplementary play (1932; Rogers and Sawyers 2002). Parten recognized the age of the child influences the social interactions. Parten noted childhood behavior influences the habits carried through to adulthood (1932).

Kweku Addo-Atuah's synthesis of Piaget and Vygotsky's philosophies illustrated the common thread between the two: "Interaction with peers assists cognitive development" (2012). Although the roots of Piaget and Vygotsky's philosophies are opposite, they agree social interaction is important to the development of children.

Piagetian Theory

"development precedes learning" (Addo-Atuah 2012, 10; Piaget 1970, 716)

As children mature, they learn from their interactions with their environment, including reacting to objects during constructive play. Through the interactions with people and environment during development, self-regulation encourages progression toward a balance between assimilation and accommodation, thus making it possible for an individual to maintain objectivity and

understand another's viewpoint (Piaget 1970, 708-710). While the social interactions and physical environments can influence development, assimilation or learning only occurs if a child can reconstruct or reinvent the observed (Piaget 1970, 21). The reconstruction of new discoveries enables children to understand the lesson completely (Piaget 1970, 715). However, a level of developmental "readiness" is necessary in order for children to learn something new (Piaget 1970, 712).

Vygotsky

"learning precedes development" (Addo-Atuah 2012, 10)

Play is the primary process for learning among preschool age children. A child's learning advances development gradually. Children play in order to satisfy unmet desires through an imaginary situation. Children's real behavior is opposite their behavior during in play as it abstracts reality, thus freeing them to act independently of the motives and perceptions of their environment. The union of perceptions and motives are relevant to the development of language. As children play together they can contribute to each other's ability to learn (Vygotsky 1978).

The primary differences between the two theories include the use of language and advancement of learning through the interactions with social influences of peers and teachers (Mooney 2000). Vygotsky notes that language is a tool allowing children to express themselves in self-regulation and imagination. Language and social interactions with peers and teachers are successful tools used to facilitate the construction knowledge (Mooney 2000, 83). While placing less emphasis on the development of language, Piaget notes that language is acquired through imagination and other symbolic actions; however, the intersection between figurative and symbolic activities allows for further language development (Piaget 1970, 717).

Figure 2.6 calls attention to key terms found in literature describing the development stages, social interactions, landscape affordance taxonomy, and experiential learning contributing to a child's play and learning experiences. The terms became the guiding vocabulary throughout the project and are defined clearly in Appendix H: Glossary.

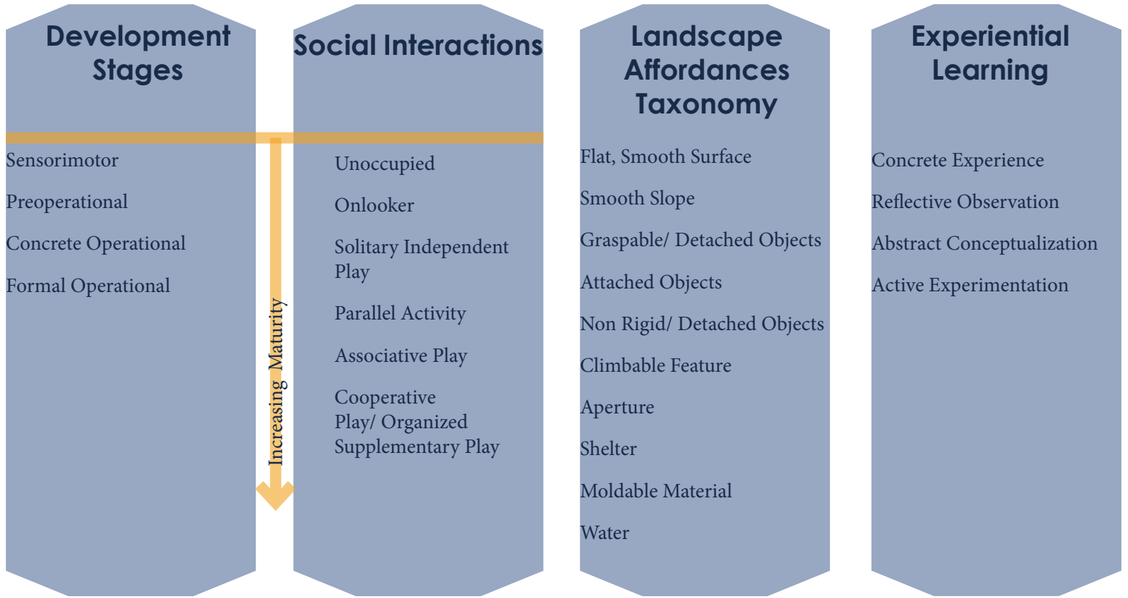


Figure 2.6. Key Literature Vocabulary. Arranged by Author 2014, Piaget 1970, Vygotsky 1978, Heft 1988, Kolb and Kolb 2005.

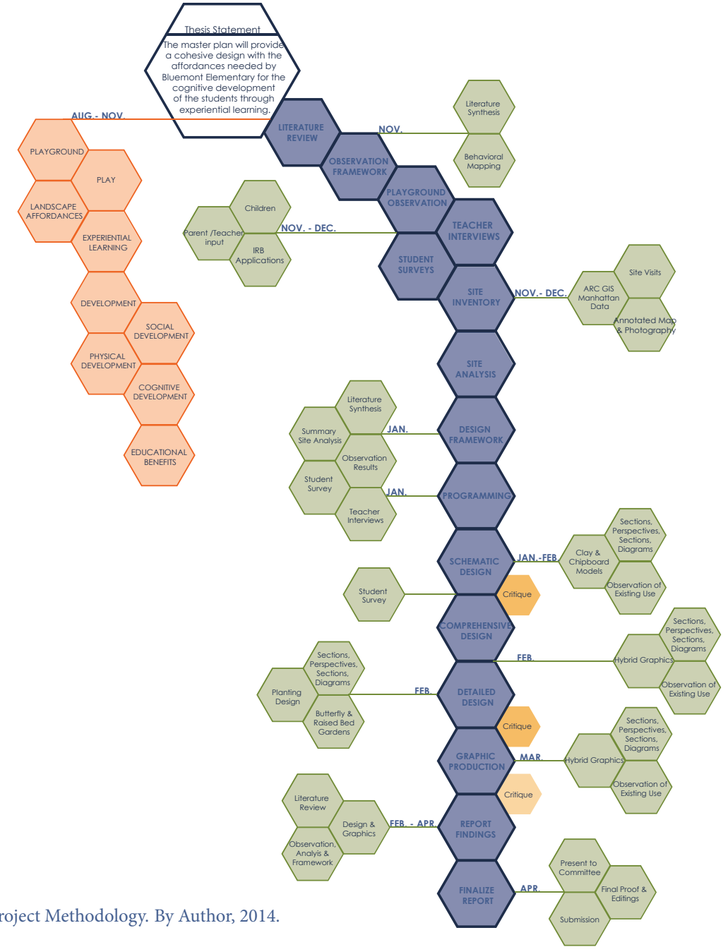


Figure 3.7. Project Methodology. By Author, 2014.

CHAPTER 03

INFORMED APPROACH

Experiential learning theory, landscape affordance theory, and philosophies of child development form the basis for this report. The literature reveals how play and social interaction vary between different ages of children. Chapter three explains the process, methods, and path chosen to relate the literature to the site specific data gathered from Bluemont Elementary through observations, interviews, surveys, and site inventory and analysis. The data gathered by a mixture of methods was synthesized and used to inform design solutions, (figure 3.7).

Mixed Methods

The following diagram, figure 3.8, illustrates the philosophy, path, and methods used to structure the research and data contributing to the comprehensive master plan and the detailed plan. Mix Methods(figure 3.7) presents path and methods used throughout the project. Primary methods and tasks are listed in the center of the diagram and accompanied by the intermediate steps needed to complete each task. The diagram also illustrates the general time line of the project's progression. It is important to note the diagram illustrates the project's forward motion; however, it has not been a linear process. Understanding the site information gathered required an iterative review of the results and responses, this continuous review encouraged a holistic understanding of the existing conditions, user affordances, conditions, needs, and wants contributing to the comprehensive master plan.

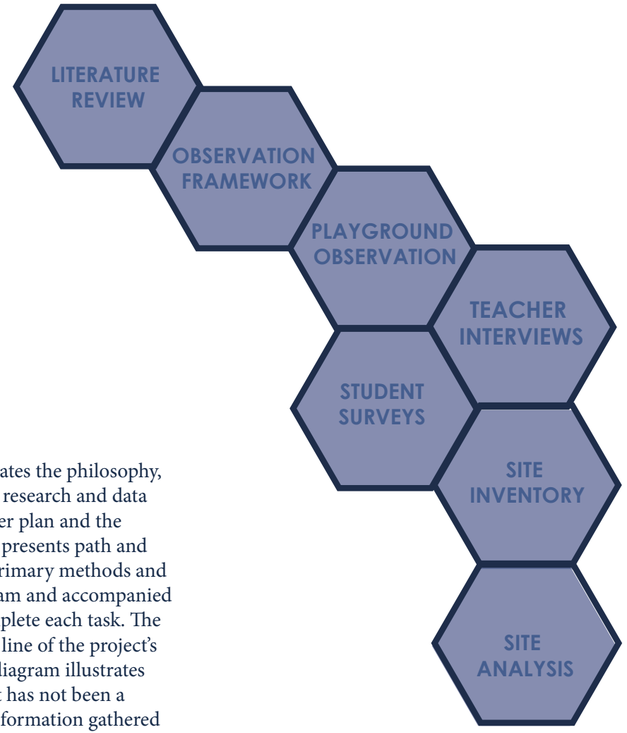
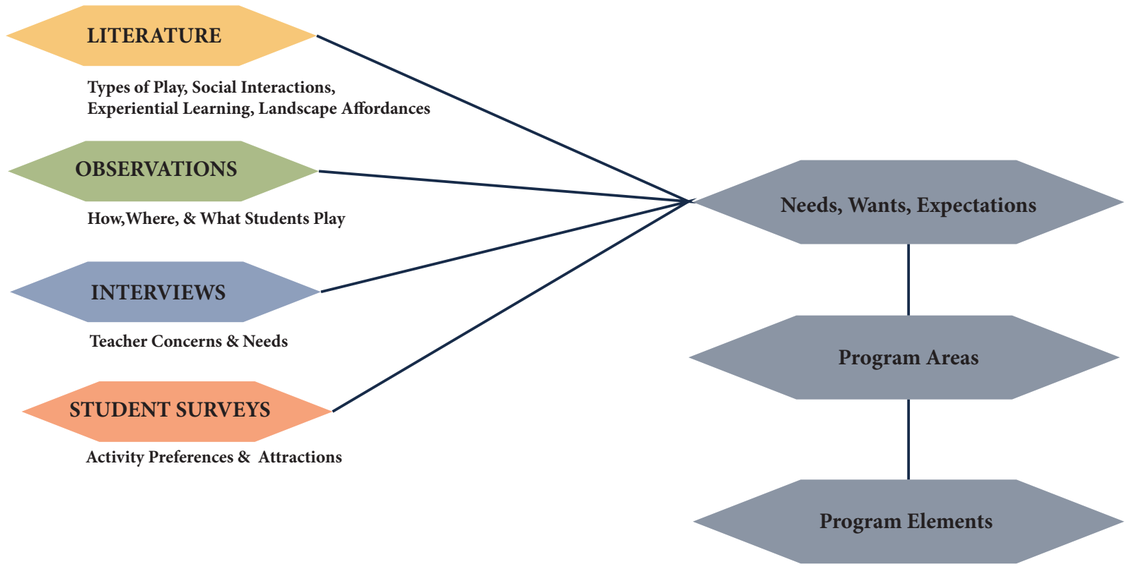


Figure 3.8. Mixed Methods. By Author, 2014.



Informed Design

For a better understanding of the relationship between each method and the contributions to the final designs (figure 3.9). I have described the process used and discussed the relevance of each method; results follow later in this chapter. As illustrated in figure 3.9, each method of site-specific research contributed to the development of a summary table of needs. The summary table of needs (table 3.4) was used to develop program areas and elements that support teachers and student creative and educational interactions with the school grounds.

Figure 3.9. Informed Design. By Author, 2014.

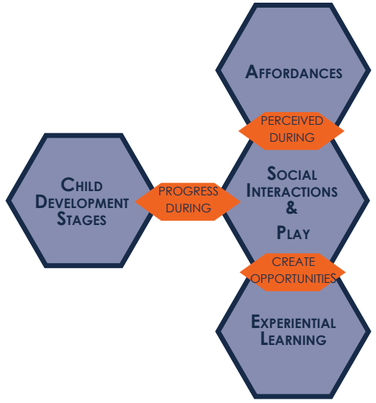


Figure 3.10. Literature Relationship.By author, 2014.

Literature

As described in Chapter II, Background, the literature contributed to an understanding of how the types of play, social interaction, and cognitive development varies in relation to a child's development(figure 3.10). The literature supplied a knowledge base to compare and properly analyze the results of observations, interviews, and surveys.

Parten, Vygotsky, and Piaget's research explains relationships between types of play and social interactions in which children engage. The experiences vary depending on a child's stage in development. A common set of ideas and theories became a baseline to compare data collected during each of the following methods. A common way to review data allowed for the synthesis of information to go more smoothly.

During teacher interviews, knowledge gained from literature led me to modify questions depending on the age of students the teachers taught. The baseline ideas enabled me to perceive students' interactions and play recorded at lunch recess during observations. The phrasing of survey questions for children and response options became varied depending on age groups and the potential types of play.

The relationship between development, play, experiential learning theory, and landscape affordance theories provided direction on how to evaluate the current and proposed benefits and constraints of the existing site. An object in the existing playground can be evaluated on its ability to afford or engage a child during play or formalized learning situations. My conclusions were based on the inventory of the actions performed on or with an object or element of the schoolyard, paired with the types of play and social interaction, which led to the recognition of the potential for creating conditions for experiential learning.

Interviews

Preceding the design process, it was important to understand teacher's perceptions of existing and potential outdoor amenities to anticipate the type of curricular affordances teachers value for learning. In order to provide teachers with usable outdoor classrooms and simplify recess supervision, I approached teachers and staff as suggested by Bluemont Elementary's principal. The principal suggested teachers I could interview, based on their interest in outdoor learning spaces and desire to improve the play area.

I utilized an open-ended interview format as described by Schensul, Schensul, and LeCompte (1999). Open-ended interviews provide a flexible format, allowing the interviewee to respond freely with a relevant response(Schensul et al., 121). Open-ended Interviews occurred both on an individual basis and within focus groups. In the focus groups, I met with kindergarten teachers and a group of para-professionals. Individually, I met with the principal, a second grade teacher, a physical education teacher, and the director of the Boys and Girls Club. Each interview began with similar open-ended questions. Interview questions facilitated discussions about teachers' anticipated needs for outdoor lesson plans, issues and concerns with the existing landscape, and play opportunities they think are important or missing. It was important to locate similarities and differences between each interview. Interview responses are listed in Appendix C. Key statements are identified in table 3.2, the statements are incorporated into the development of program areas and elements listed in figure 4.29. Initial Open-ended questions are listed to the right.

Open-ended Questions

School Grounds Improvements

- What improvements would you like to see in the playground?
- Are there other improvements you would like to see in the school grounds? (e.g. Parking, Pick-up/Drop-off, Tree Coverage)

Activities and Types of Play Observed

- Where do your students mostly play?
- Are there other elements from which you think students would benefit?

Current / Future Outdoor Learning Projects

- What types of skills are taught during classes?
- What types of outdoor installations make your job easier?
- What kinds of outdoor learning /teaching do you currently use?
- Are there lessons you like to teach outside?
- What type of areas do you need access to?

Observations

In early December, I passively observed children playing to collect information about the existing playground. Observation is defined as "what can be seen through the eyes of the researcher", thus the observations "are always filtered through the researcher's interpretive frames"(Schensul et al. 95). Passive observation, otherwise known as "Non-participant" is used to understand individuals or groups spatial relationship and interactions with their surrounding environment (Thwaites and Simkins 2007). Passive observation occurred with the anonymous participation of kindergarten through sixth grade students currently in attendance at Bluemont Elementary. To protect student identity, they remained unidentified beyond their actions and location. To further maintain anonymity, I did not use video or photographic documentation.

Observation periods occurred during lunch recess and afternoon recess (table 3.1).

I recorded observations by employing two techniques: Annotations and behavioral mapping. Behavioral mapping involves using a map of the existing playground to document where activity occurs (figures 3.11). Employing both annotation and behavioral mapping became more difficult as the number of students on site increases, (refer to table 3.3). The Lunch Recess Schedule illustrates the time overlap of classes on the playground at the same time. The overlap of play altered the method for collecting observations. I switched to maintaining an annotated list of playground activities (figure 3.12). The list began with a timestamp, type of play or activity, number of students involved, and location. The overlap in play and less regularly-timed afternoon recesses contributed to a difficulty in discerning which students belonged to each grade. Observation periods occurred during lunch recess and afternoon recess (table 3.1).

Observation Questions

My intent was to deduce the following information from the observations:

- What types of play and social interactions are observed during recess, as described by Parten (1970)?
- What types of games and activities are observed during recess?
- Where does play occur?
- How many students are involved in each activity?
- How do teachers interact with students as they supervise play?

The questions were derived from the original research questions: What types of play do children in kindergarten through sixth grade engage in on the playground?

- Do children find particular affordances in the landscape for group play or individual play?
- What does the current playground equipment afford children to play?
- Do observed affordances differ by age group using the existing schoolyard at Bluemont Elementary?

Observation Schedule

		Monday	Tuesday	Wednesday	Thursday	Frdiay
Lunch	11:20 - 12:35 pm	63 °F	52 °F		60 °F	26°F
Afternoon	2:00 - 3:50 pm		52°F	68 °F	60 °F	

Table 3.1. Observation Schedule and Temperatures. By author 2014, weather data from weather.com2014.

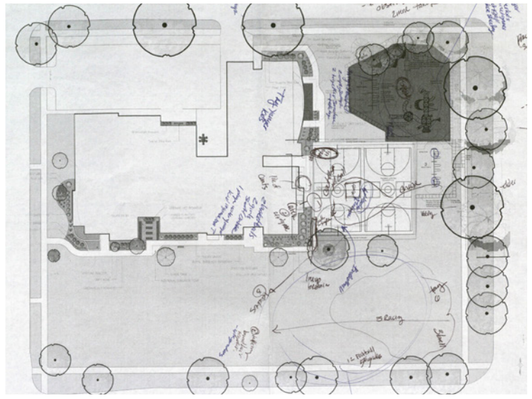


Figure 3.11. Sample Observation Annotated Map.
Annotations by author 2014, base image by Blueville Nursery 2013.

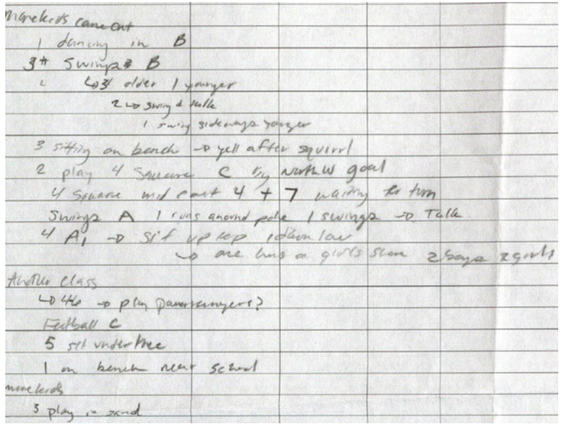


Figure 3.12. Sample Annotated List of Observations. By author 2014.

Student Surveys

Observations provided insight into the uses of the existing site during the span of one week. Observations occurred during the month of December, in an unseasonably warm week. The Season likely affected the way students interacted with their environment. Interviews addressed the faculty's concerns and potentials for the existing play area and school grounds. Observations and interviews were insightful; however, the student perspective was missing.

Collecting student input was done through a four-question survey (Appendix D Survey Results). The primary intentions for the student surveys included gathering student input regarding:

1. The location of student activity within the existing play area.
2. Activities participated in by students at recess.
3. The types of activities students are drawn to, especially those not possible on the existing site(figure 3.14).

Survey methods maintained student anonymity. Coordinating with the principal and teachers, I delivered a survey to the elementary school. The teachers received a set of black and white copies, and projected the survey on a screen in color. Teachers distributed, collected, and returned completed surveys to the office, thus protecting student anonymity by minimizing my interactions with students.

Three variations of the student survey were created. Each variation was tailored to the age group. Age groups were as follows: Kindergarten through second grade (seven classes); third through fourth grade (three classes); and fifth through sixth grade (two classes). A total of twelve classes participated. Each set of questions was the same: the answer options were the primary variant between each survey. The multiple choice question allowed for multiple answers. Questions were answered through the selection of words and images that best suited the student's preference. The survey was designed to be taken without impacting the teacher's daily schedule. Upon the collection of the survey, data was organized and analyzed through the use of Excel and illustrator diagrams.

Survey Questions

1. Where do you prefer to play? (Circle one picture)
2. What do you like to play during recess? (Circle three activities)
3. How many friends do you play with at recess?
4. Which two images look the most fun? Put a star by the one you like the most! (Figure 3.14)

Figure 3.13. Survey Sample Image Question Four. Copyright free image from http://www.sortedpictures.com/.

Results

The use of a single method only provides a singular perspective of the needs, wants, and expectations for a play area and school grounds. A set of mixed methods provides a more holistic understanding of needs and wants for the school grounds by teachers, faculty, students, and parents. Figure 3.9 illustrates the relationship between the research methods and findings. Findings of the interviews, observations, surveys, site inventory, and site analysis are discussed and synthesized into a summary of needs and wants (table 3.4).

Figure 3.14. Distillations of Interview Responses. By author, 2014.

Interview Results

Interview responses fall into three categories of improvements: school grounds, play area, and educational improvements. Prominent site concerns identified for the grounds and play area include student safety, student activities, and student involvement in physical activity. School ground improvements included improving student safety through sand removal, site grading, and new signage. Play area improvements included more play structures to encourage physical activity for all ages, sensory experiences (like music), increasing spacing between asphalt activities, increasing shade, and seating. Educational improvements included butterfly gardens, a picnic area, raised gardening beds, and a nature trail. To view interview responses and notes, refer to the Appendix C.

Interview responses varied from teacher to teacher and group to group depending upon individual needs and wants of the school grounds, play area, and educational elements. In order to determine the key "takeaway" from each interview, I selected key statements based on repeated and unique ideas, and topics sustained as the primary focus of interviews (table 3.2). In several instances, key statements from different interviews had common ideas or concerns. It became important to distill the list of key statements to a manageable number of ideas that could be used to determine possible program areas and elements.

Distillation of key statements was accomplished by meeting one or more of the four types of criteria, including applicability to the site, commonality of needs and wants, connection to education, and unique ideas (figure 3.14). The distillation of key statements was a necessary precursor to the development of potential program areas and elements, because it led to a table of needs and wants. The development of the needs and wants table facilitated the prioritization of possible program elements.

A variety of ideas during the early stages of design and programming can facilitate design creativity and unlimited possibilities. Site applicability addresses and emphasizes realistic achievable ideas. Needs and wants of teachers, faculty, and after-school programs, identify the potential site uses for outdoor learning opportunities. Addressing the common needs and wants increases the instilled value and potential of use by many, instead of few. Every playground and school deserves a unique identity, a sense of place. Creating a unified identity can encourage community pride and the potential for memorable experiences.

The principal's goals for a future design would include the following: promote health and wellness through physical education; provide areas that encourage students to relax, giving them a "brain break"; encourage social interactions and development through activities on the school grounds. Through these social interactions, students should be encouraged to perform activities and games that lead to character and team building.

Key Statements

- Rope and Obstacle Course- Equipment for 4th - 6th graders with climbing feature
- Sand Play Area, shovels, buckets, sensory experience, crane digger, Etcha sketch with sand
- Jungle gym- need more age appropriate monkey bars (small medium large)
- Hills
- Outdoor storage- balls, jump ropes, sidewalk chalk
- A place for kickball, basketball, foursquare
- Add paving under tether poles - fix grassy area between Kindergarten wing and sand pit
- Musical Instrument-sounds... a mallet and different materials- wood, metal, pvc
- Asphalt paintings- circle meeting place, hopscotch, foursquare, chalking, map of the USA, numbers, lines for end of recess lineup, kickball, basketball, tetherball
- Adjustable basketball Goals
- Seating located for optimum playground surveillance

- Nature trail, benches, native plants
- Nature walking along inside of the fenced area- start discussions about plants and animals.
- Signage- school time, emphasis front entry, help take care of our plants
- Well placed benches
- Raised garden beds - show root-growth
- Butterfly, sensory, and music gardens- herbs(smell, visual, texture-lilac, mint, basil), pipes, mallets, sound
- A tree to hang bird houses, pinecone feeders, powercat stepping stones outside kindergarten wing
- Rainbarrel and raingardens- recycle rainwater
- Picnic tables, garden seating(a place for silent reading/lunch), drawing, journal writing, enough space for a class
- Location for giant sunflowers-natural life cycle
- Fountain, water action, pond
- Butterfly house (children to see but not touch), butterfly attracting plants
- Soil sorting- small, medium, large pebbles
- Bridge of a dry creek, stepping stones
- Maintain a soccer ball field size- if possible

- More shade trees- more variety
- Plants- noise buffers along Bluemont Avenue and Juliette Avenue for the openfield and playground area
- Fence Entries along Bluemont Avenue- hazardous but possibly necessary for exits
- Find a new place or ways to disguise the dumpster- attracts bees, crows, whasp, and leaks
- Shade cloth
- More seating
- New sidewalks, widen sidewalk for service entrance
- Separation between recess areas and P.E. lawns
- Designated areas for lining up- end of recess
- Remove sand from primary areas of current circulation

Table 3.2. Key Statements from Interviews. Interviews collected by author 2014.

Observation Findings

From my observation position, I was able to see the whole play area that is used for recess; however, my position restricted the ability to interpret students involvement in games as the activity moved further from me. Observations are more detailed in the north section of the play area, because I was able to hear and see what occurred. I relied heavily on the visual identification of activities on the middle and south play areas. A few observations include a misinterpretation of an activity later clarified during discussions with teachers and faculty. Many times during the process of recording activities and locations it became difficult to deduce the age or grade of a student because there was often two or three classes out at recess at once (table 3.3). Observations were recorded by hand and then transcribed into an Excel document (Appendix B).

Observations are divided into activities by location. Following the activity description of existing program area observed, a set of key observation conclusions are discussed(refer to figure 3.15).

General Activity
(Occurring throughout the Play Area)

Students play tag throughout the whole play area. All accessible playground affordances may be utilized in a game of tag, in one form or another. For example, existing play structures were used to remain out of reach or for quick getaways, while benches and trees became safe zones.

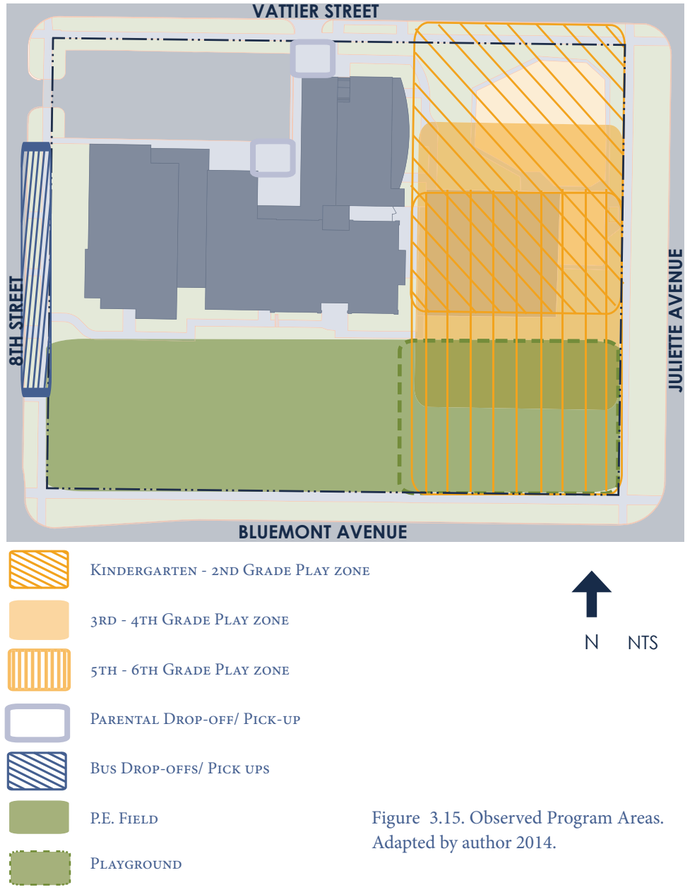


Figure 3.15. Observed Program Areas. Adapted by author 2014.

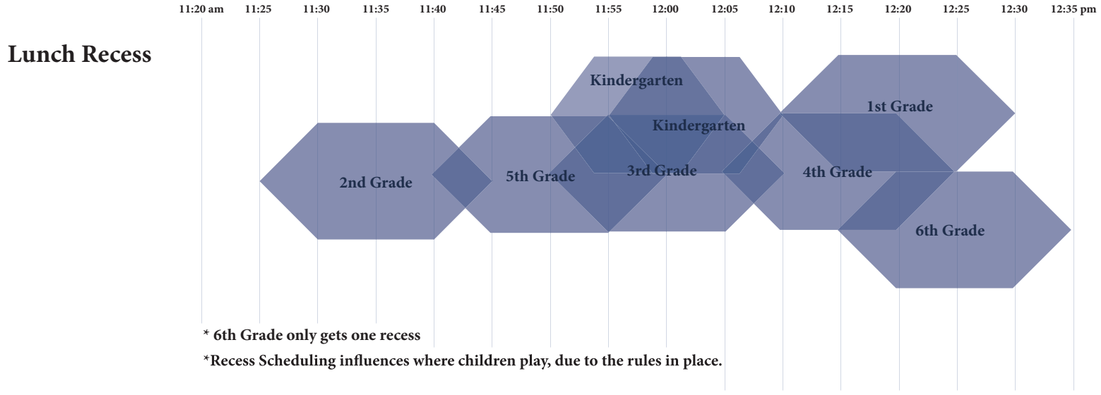


Table 3.3. Student Recess Time Overlap. Bluemont Elementary Lunch Schedule 2014, adapted by author2014.

Asphalt Activity

Observations indicated that foursquare was one of the most popular asphalt activities. Lining up (a movement that allows the teacher to ensure everyone is together and allows students to calm down before entering the school) occurs on the asphalt surface. The area designated for lining up is often being used in for play while students attempt to line up. Over four days and six observation periods, the types of games and play seemed very similar. One day, a set of jump ropes was available and several small groups of students showed interest. Occasionally, I viewed older students playing basketball or shooting and dribbling. On fewer occasions I saw one or two younger students trying to shoot baskets, but most were unsuccessful. The goals are ten foot goals, and not easily utilized by younger students. The swing set adjacent to the kindergarten classrooms appears to be used mostly by kindergarten through second grade students. The swing set adjacent to the asphalt is used by all students, but primarily by the older students.

Play Structures

Play structures supported both individual and group play, encouraging the use of imagination and physical development through climbing, hanging, running on, and sliding down. While the weather was warm for a winter day in December, students played in the sand enjoying the warmth of the sun. Sand afforded individual solitary play, associative play, and group play. Students dug holes to aid in their pretend play or used sand to construct things like sand castles. The current pebble size of the sand is too large, thus it doesn't hold a shape during the construction of a castle. Other elements facilitating solitary play includes sidewalks surrounding the school building, students use the sidewalks to for sidewalk art, hopscotch, and jumprope.

Open Field

The Open Field is primarily used for soccer, football, and tag. It appeared that with grass, children were more likely to lie down or run around and happily fall down. On two different days, six girls would hold hands and run in a circle as fast as they could. As recess progressed, they modified a game of "tag" so that the "it" person was lying on the ground for a period of time. In several instances, the movement and coverage of students playing football or soccer interrupted their activity.

Key Conclusions

Recorded observations show students playing various games with rules primarily in the asphalt and open field areas. Play structures were highly attractive to a variety of types of play including individual solitary play, associative play, group symbolic and cooperative play. A student's imagination can lead to equipment, like swings becoming the obstacles to run through without getting hit. An element can gain new meaning and uses depending on a child's perception of the types of actions that can be done on, around, and through an object.

Weather can influence social interactions and the activity during recess. Sometimes older and younger students partake in game with rules together; however, I rarely saw a mix between ages in the play structure area. Little shade is provided through the middle of the site, thus it would be difficult to play or observe children in warm months in the current supervision locations without being in direct sunlight. Teachers supervising recess often stand between two areas of activity or in the middle of an area, and move around as students play. Teachers and paraprofessionals intervene in student play when students appear to be breaching a possible threshold of risky behavior or reacting to risky behavior. Other times, students may become more involved in the playful activity, such as pushing a student in the swing, playing foursquare, or turning the jump rope. Many variables influence the way children perceive playground affordances ranging from playground rules, weather, interests, age, number of friends, and the teacher's involvement.

Survey findings

I collected and transcribed survey results into an Excel document, where survey responses were briefly reviewed. To better understand the findings, I created diagrams to illustrate each set of survey results. Each diagram used a system of a hexagon shape proportional to the number of responses per each answer. Findings were explained by question. Each finding was drawn from the response with the most students; these were developed from the raw data. Key findings were discussed and emphasized in the key takeaways.

Preferences in Play Location

Determining where students prefer to play hints at the types of activities and play they enjoy. Further questions would have facilitated better understanding of the character and qualities students prefer in the location. Kindergarten through second grade students chose their preferred play location between elements found in the north portion of the play areas (figure 3.16). The majority of these students preferred the larger play structure. Third through sixth grade students were asked the same question; however, the possible answers were different. The second and third versions of the survey showed images of the three play areas: play structure area, asphalt activity area, and open field area. Third and fourth grade students prefer the play structure area; however, this doesn't specify which play structures they prefer. Fifth and sixth grade boys preferred the open field, while girls preferred the play structure area, with asphalt activity and open field following closely(see figure 3.16).

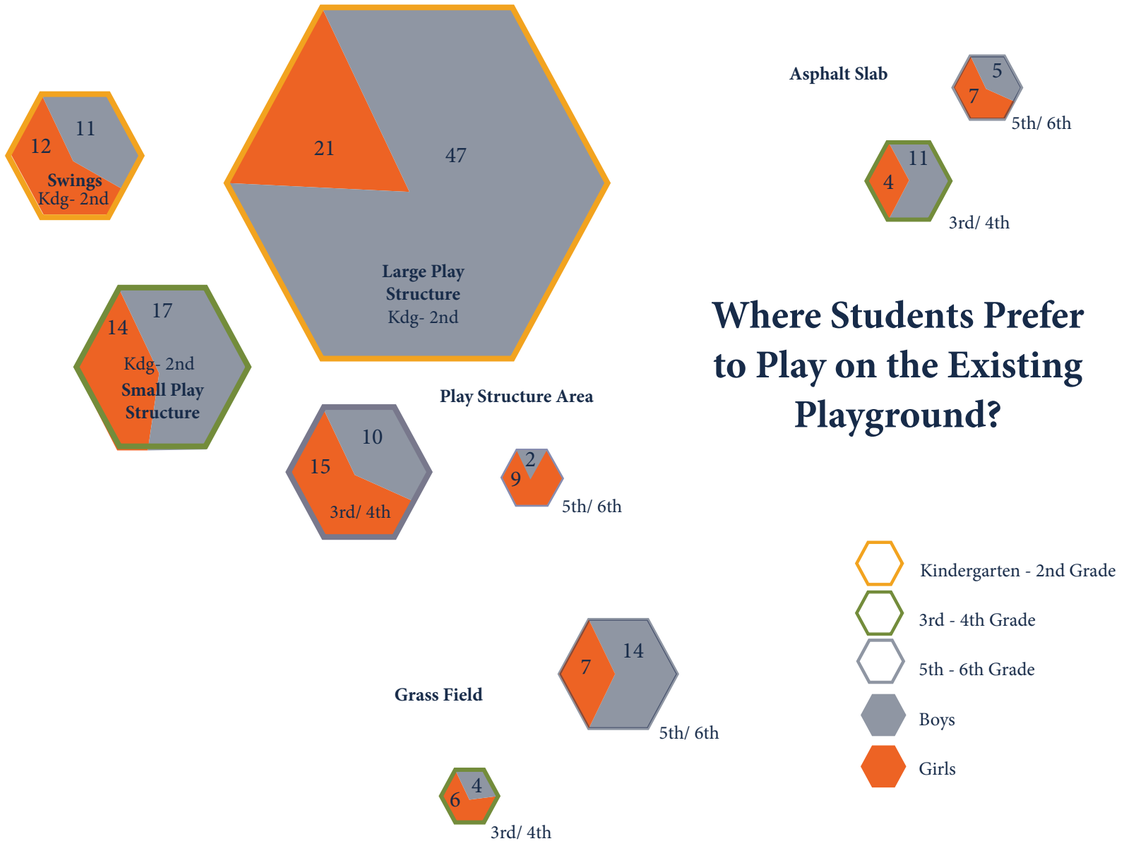
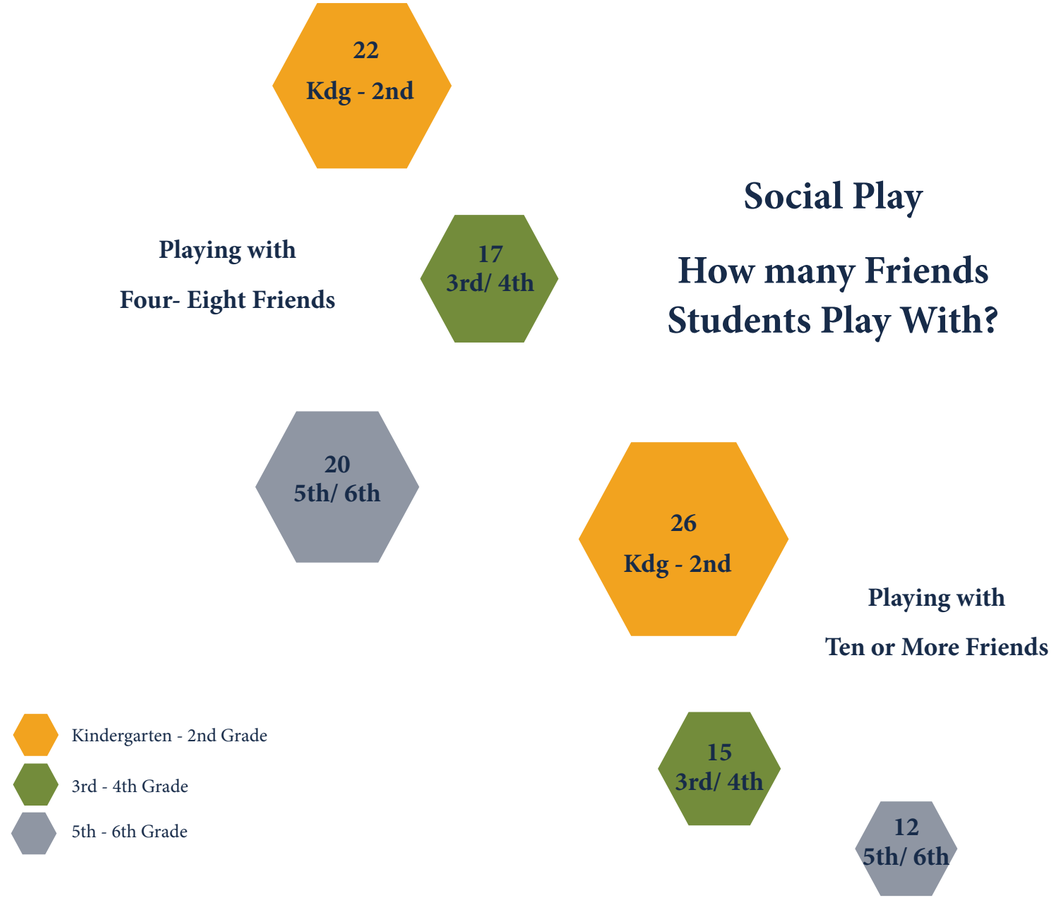


Figure 3.16. Student-Preferred Play Location. Interpreted by author, student surveys, 2014.

Understanding the number of students involved in play activities can help determine the approximate spatial needs for various games. The question and available answers remained consistent for each survey. Kindergarten through second grade students play in small groups of one to three friends. Third and fourth grade boys play with ten or more friends, while girls play with four to eight friends. Fifth through sixth grade students play with groups of four to eight friends (figure 3.17).

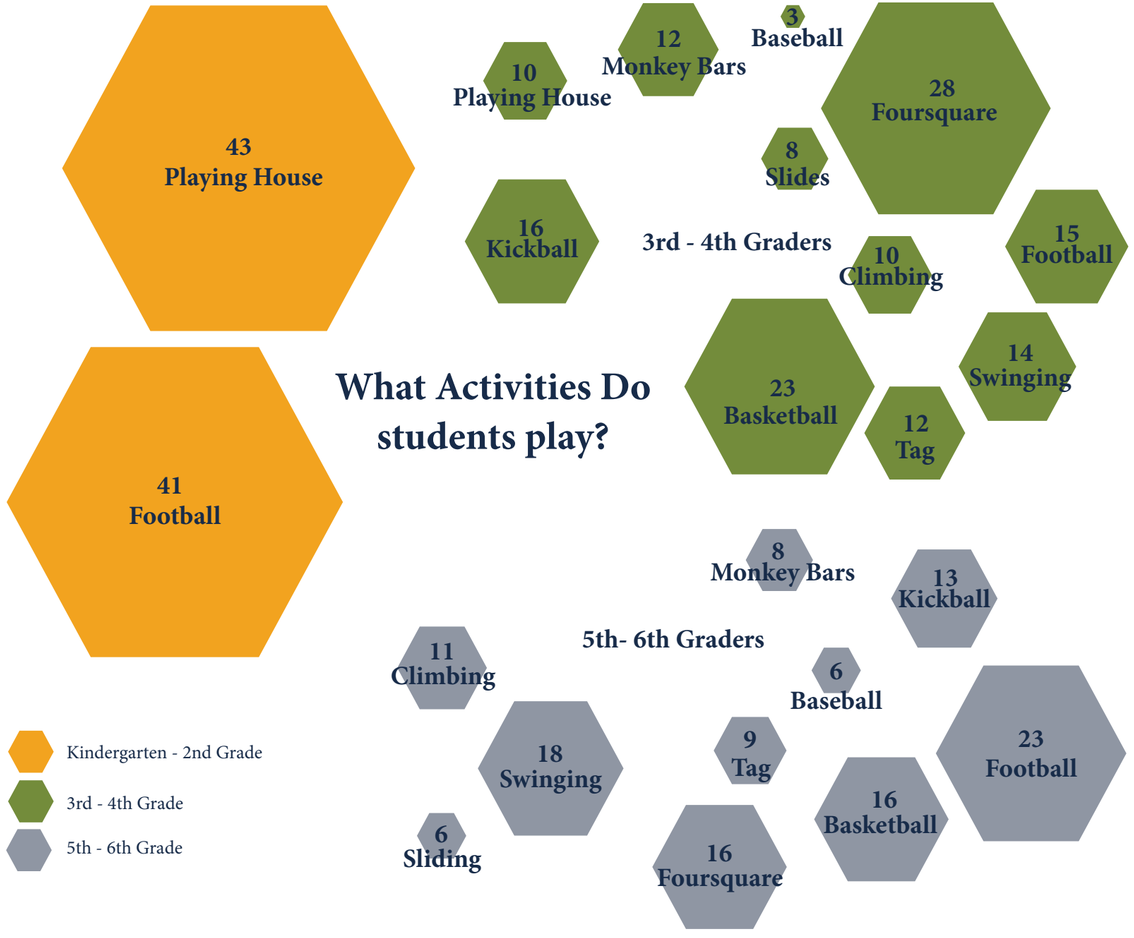
Figure 3.17. Student Social Interactions.
Interpreted by author, student surveys 2014.

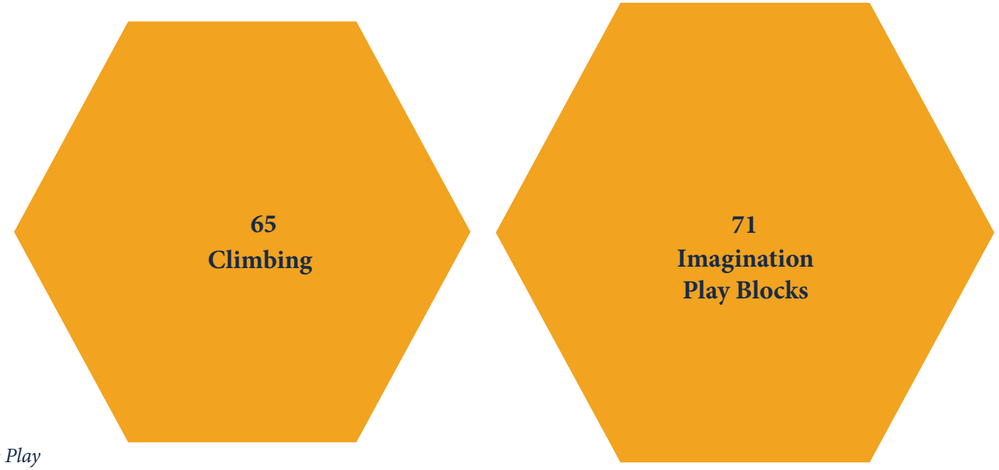


Activity Preferences

Reviewing activity preferences also adds a level of detail to the needed spatial requirements of preferred activities (for example football, soccer, and basketball). Each grade was asked the same question; however, the answer selections differed slightly for the fifth-6th graders, as students were allowed to choose multiple answers. The top answers are listed. Kindergarten through second grade boys preferred football, tag, and basketball, while girls preferred playing house, swings, slides, and tag. Third and fourth grade boys preferred organized sports, while girls preferred monkey bars and foursquare. Fifth through sixth grade students preferred organized sports, specifically football, while girls preferred swinging, basketball, and football (figure 3.18).

Figure 3.18. Students Preferred Activities. Interpreted by author, student surveys 2014.





Most Attractive Play

Determining the types of play children are most attracted to helps support the addition of various types of play structures or affordances. It is important to provide for affordances in their play environment that will encourage their curiosity and enthusiasm. Again, each grade was asked the same question; however, images from which to select were different. In the selected images children of relevant age playing using potential playground elements. Students were asked to select two images and star the one they believed to be the most fun. Maintaining the previous procedure, I noted the interests of the majority of students. Kindergarten through second grade students preferred climbing structures, imagination play blocks (allowing construction activities), and a willow hut. Third and fourth grade students preferred climbing structures, willow huts, foursquare and soccer. Fifth and sixth grade students preferred the various climbing and play structures (figure 3.19).

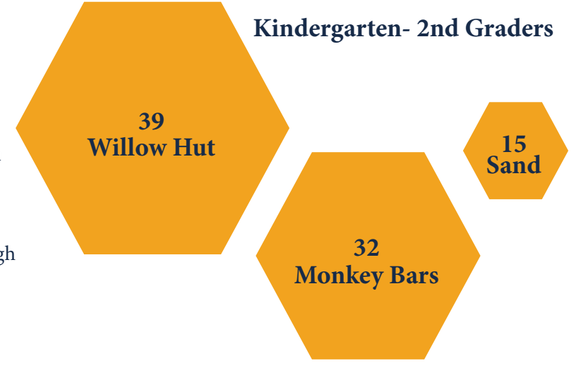
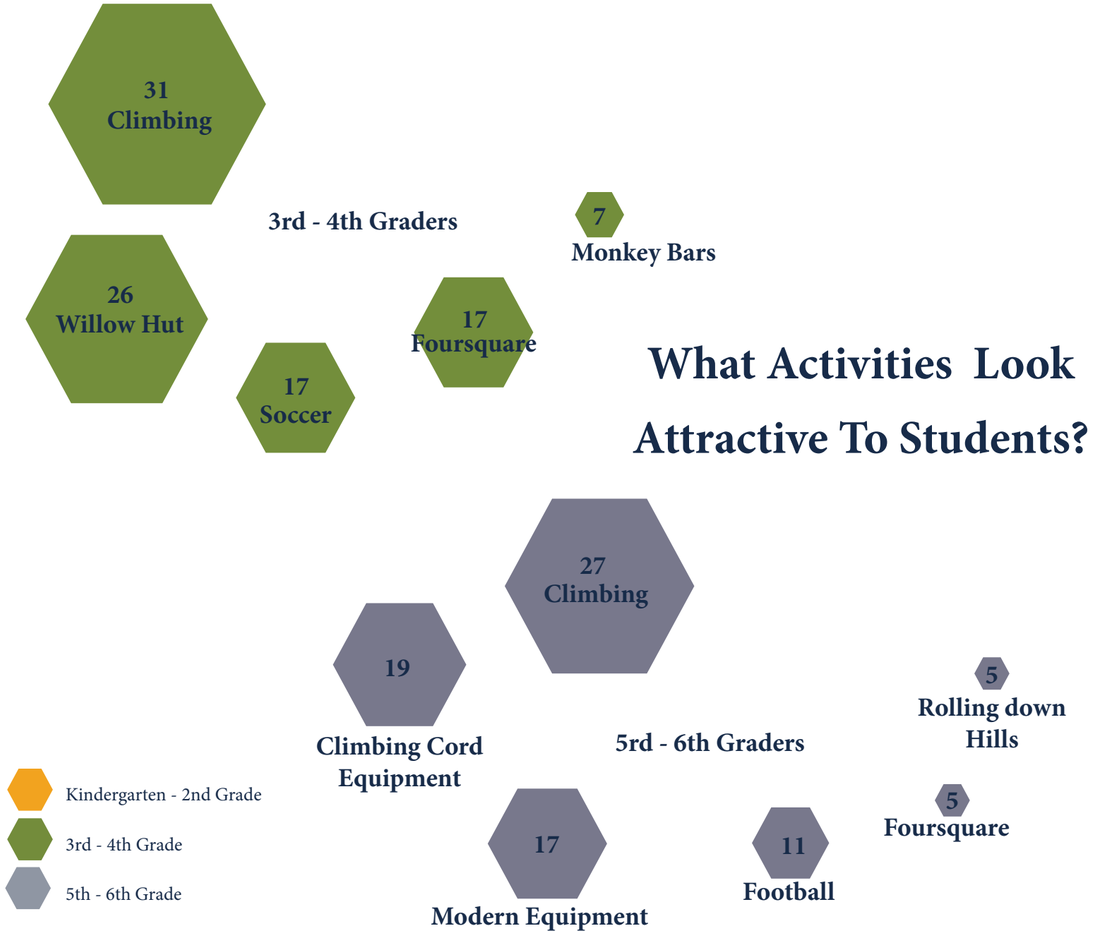


Figure 3.19. Activities Attractive to Students. Interpreted by author, student surveys 2014.



Survey Key Conclusions

As students age and their interest in activities develops, the number of friends they play with may change, depending on the number of students required to play different games or activities. As indicated by the current students and their activity preferences, games with rules are very popular; however, activities such as tag have been observed to include the use of play structures. Existing activity preferences and preferences in play areas suggest that girls in kindergarten through sixth grades prefer the play structures over organized games with rules. The interest in swinging suggests that the current number of swings available should be maintained. It appears that every age group enjoys and is attracted to some form of climbing or play structure. Students are drawn to the opportunity of constructing their play environment (e.g. imagination play). Students are also attracted to areas that look relaxing and are different from their existing play environment (e.g. willow huts).

Site Inventory & Analysis

Through site visits and a survey (provided by BG Consultants), I was able to gather information regarding the existing site conditions. From the site survey, I gained understanding of the site's utilities, topography, and changes due to recent building construction. In addition to the existing site conditions, I recorded the current uses and concerns spatial as discussed during the interviews and observations.

Site Inventory

The current school ground elements include a play area with sand, two swing sets, an asphalt surface with two sets of basketball goals, four faded foursquare areas, a small and large play structure, an open field divided by a set of soccer goals, and a dead-end parking lot. Shade is on the perimeter of the site. There are many benches along the edges of the site and along the building. Existing signage discourages community use prior to dawn and following dusk and during school hours; however, uninhibited entrances to the grounds fail to discourage use during school hours. There is little variety of vegetation with which students can interact; sand and turf grass are the primary exposure to materials other than play structures (figure 3.22).

Existing affordances in the play structure area are used primarily by younger students for tag, swinging, sliding, climbing, house, and building sand castles. The existing asphalt activities encouraged a variety of uses, including jumping rope, two basketball courts, three newly- painted foursquare courts, and a second set of swings. On the final day of observations the foursquare courts were repainted, this was important as it will temporarily satisfy the students needs for more foursquare courts. The original court was used daily, and had a line of 4-7 students waiting their turn to play. Currently, along the east fence are two unused tetherball poles, due to the lack of proper equipment, including balls and rope.

The open field area on the southside allows for various collaborative games with rules. I observed a football game, a game of tag, and game of soccer occurring at one time. A students age, development, and experiences can alter students' perceptions of their environment thus determining a wide range of potential landscape affordances. Unfortunately, playground rules dictate where students are allowed to play depending on the age of other students present on the playground. During site visits, I observed very few fourth-sixth grade students using the existing play structures due to the kindergarten through second grade use. The current allocation of play space placing a play structure on the south portion of the play area seems beneficial.

Teachers primarily use the outdoors for recess or to complete educational activities with students that need more space. I learned from a second grade teacher that students raise butterflies inside and release them outdoors after they become adults. Because there is no plant material to provide habitat, the butterflies leave. The physical education(P.E.) teacher utilizes the open field and play area for various P.E. games and activities. After-school programs such as the Boys and Girls Club often utilize the asphalt area for a variety of educational, character, or team building activities, using the available resources, and involves chalking lines for activities.

Site Conditions

After several site visits in the spring it became apparent with the rain and melting snow that site drainage is an issue that needed to be addressed.

Impervious Surfaces vs. Pervious

Six years ago, the building was reopened and has had major remodeling done, as well as building additions. During this construction process, BG Consulting designed a temporary parking lot along the south side of the building. The temporary parking lot was returned to a grassy lawn; however, due to the inability of grass to grow and the standing water, there is evidence of soil compaction and grading issues. Even more impervious surfaces include sidewalks, asphalt activity area, and the asphalt parking lot on the north side of the building along Vattier Street (figure 3.20).

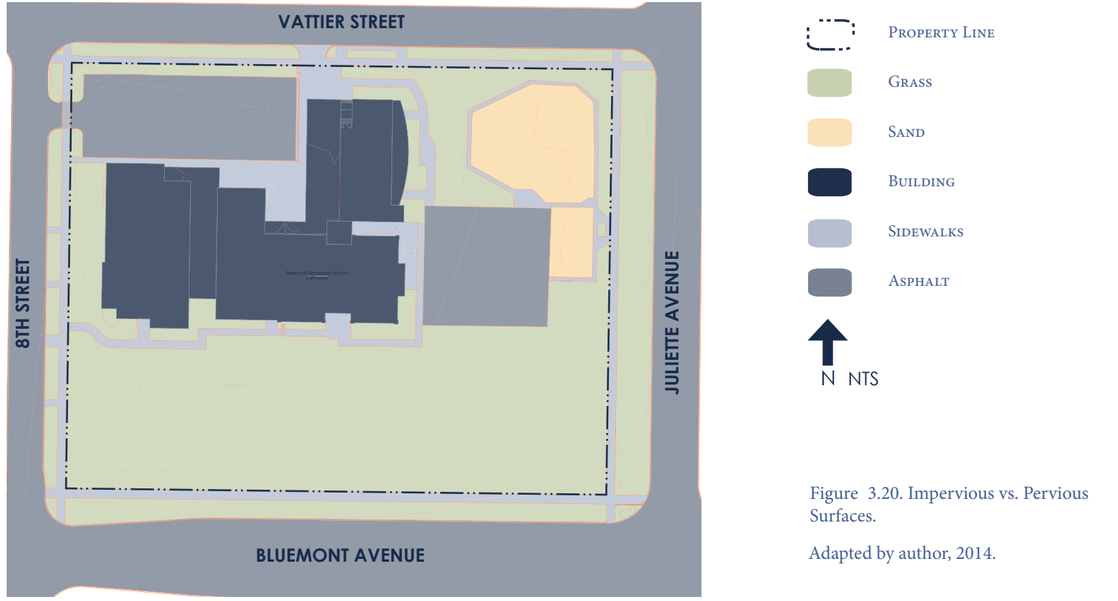


Figure 3.20. Impervious vs. Pervious Surfaces.

Adapted by author, 2014.

Existing Trees

Existing shade trees are primarily located outside the school grounds fence on the east side. While the edges of the site are shaded, most of the site is exposed and has potential to be very warm during spring, summer, and early fall. A few trees located within the school grounds are young and will not provide substantial shade for many years to come (figure 3.21).

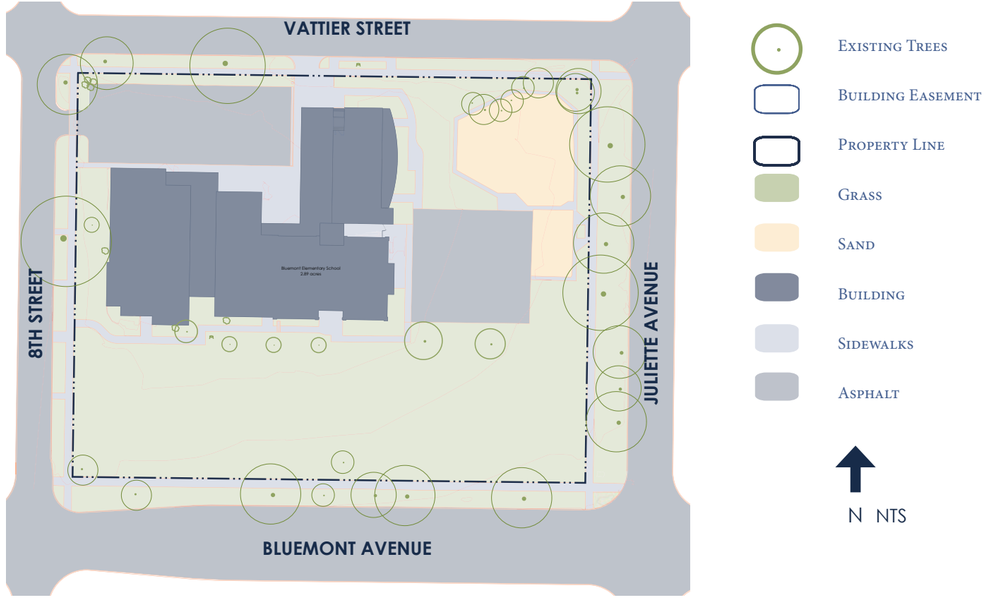


Figure 3.21. Existing Trees. Adapted by author, 2014.

Utilities and Amenities

Most utilities are located towards the outer edge of the site; however, several connections are made to the building for gas, water, fiber optics, sewer, and electricity. Power lines are located along the 8th street. Two sewer lines move across the middle of the site influencing the placement of site elements and plants (figure 3.22).

Many of the site amenities are used for recess, P.E. or other outdoor activities (figure 3.23)Benches are located along the sidewalks and near play areas. Swings and play structures are a few of the existing amenities encouraging play.

Noise Pollution and Directional Winds

Noise pollution affecting the school grounds comes from the surrounding vehicular traffic and Fort Riley Military Base. High volumes of traffic on Bluemont Elementary contribute the most noise pollution, thus preventing teachers from giving clear directions for educational activities(figure 3.26). Traffic on Juliette Avenue also contributes to noise pollution at a lower level. Frequent operations at Fort Riley cause a range of high to low noise disturbance. No noise buffer exists between the surrounding vehicular circulation and the school grounds.

Bluemont Elementary is positioned on the edge of a neighborhood in addition to the school building contributes a slight wind block on the north western side of the site; however, the only site vegetation is limited around the school building or on the edge of the grounds. The vegetation on the edge of the site are primarily shade trees and block little, if any winter or summer winds (figure 3.26).

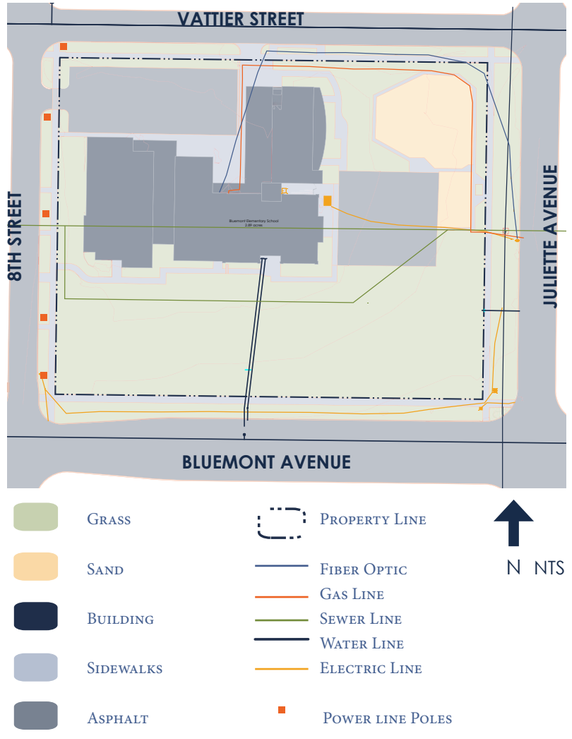


Figure 3.22. Existing Utilities. Adapted by author, 2014.

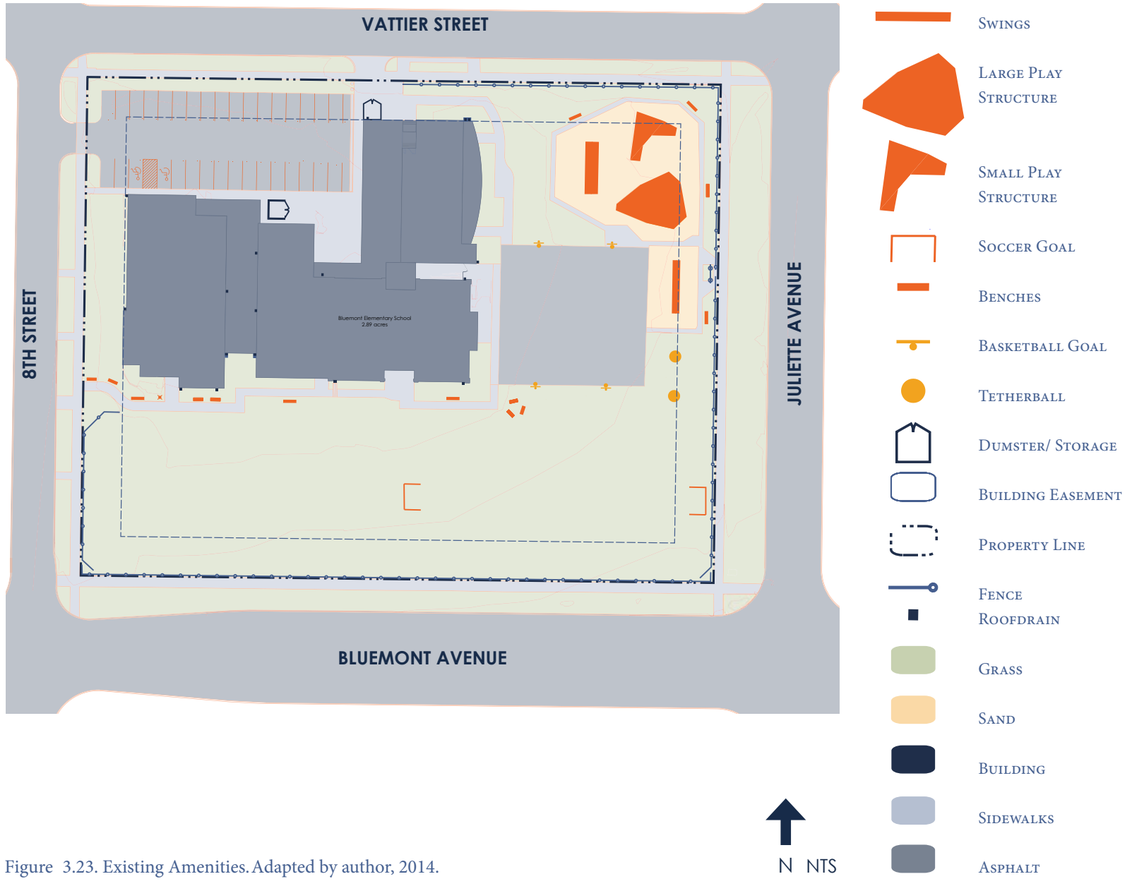


Figure 3.23. Existing Amenities. Adapted by author, 2014.

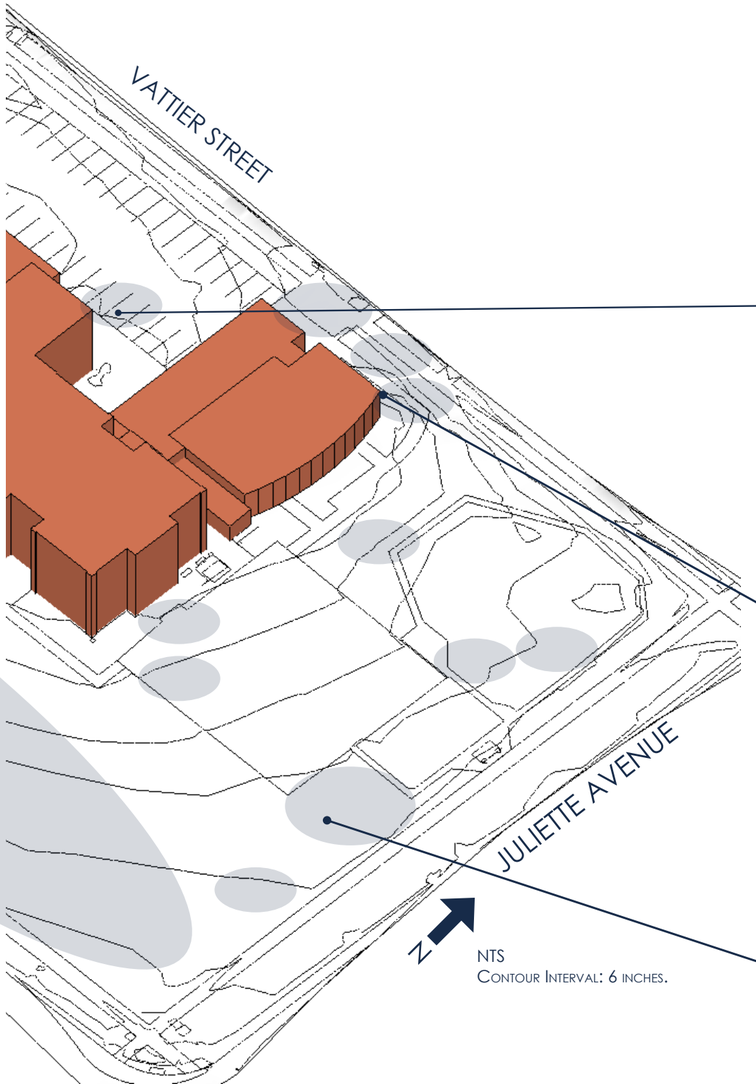
Stormwater and Topography Concerns

Many stormwater concerns are directly related to the four feet of elevation change; a site survey provided by BG Consulting shows contours at a six inch interval. A temporary parking lot constructed during Bluemont Elementary's remodeling resulted in compacted and uneven soil, causing water to collect on the current P.E. Field. Following a large ice melt and an spring rain, I visited Bluemont Elementary. Figure 3.24, illustrates existing stormwater conditions through images and topography. Thirteen of sixteen roof drains connect directly to the ground, a majority of stormwater issues result from water collecting near the building which may effect the stability of the foundation.

Erosion and pooling created by inadequate materials on ground plane and lack of slope aways from school.

Erosion and pooling at the building foundation.

Location of temporary parking, compacted soil and flat topography causes water to pool.



Water pools on the sidewalk and parking lot.

Topography change along the Northside of the building; winter rains and snowmelt refreezes creating sidewalk slipping hazards and erosion.

Pooling occurs in areas of play.

Figure 3.24. Existing Stormwater Conditions. Photos by author 2014, adapted by author 2014.

Site Circulation

Circulations affecting the site includes the surrounding vehicular circulation and pedestrian traffic. The outer edge of the block has a sidewalk to aid in pedestrian traffic along the city streets. The southeast corner is the location of the crosswalk for pedestrians to access Bluemont Elementary. There are currently five entrances to the play area, two located off east and west corners of Bluemont Avenue, one on Vattier Street, another on 8th street, and the last one on Juliette Avenue. Vehicular circulation has highest volumes on the four lanes of Bluemont Avenue and the two lanes of Juliette Avenue. Parents picking up student use street parking along Vattier Street. Buses pick up and drop off students at the front building entrance along the west side of the site on 8th street. Service entry access is intended to occur on the north side of the site along the Kindergarten building and requires an eight foot wide clearance for access; however, the six-foot sidewalk doesn't support vehicular access without the potential for wheel ruts to occur on either side of the sidewalk.

Formalized circulation used by students and teachers is located surrounds the school building and along the perimeter of the site connecting to other city sidewalks. The circulation along the building is inefficient, as it has been underwater at several points this spring, interrupting site circulation and leading to potential site liability (figure 3.25). The rest of the school ground's circulation is informal, encouraging students to roam and play.

Multiple playground entrances allow community members to enter the playground with ease; but may also be an issue as signage does not discourage playground use by community during school hours. With only openings and no actual gate, the corner openings along Bluemont Avenue pose little deterrence to students, if they choose to chase balls that have escaped over the schoolyard fence.

Aesthetics

The refuse dumpster is located on the northside of the school adjacent to a prominent pick up and drop off location.

In summation of the Site inventory, conditions can become either opportunities or constraints, depending on the programs selected for certain areas. Utilities and existing circulation may restrict the addition of new trees, while the placement of quiet activities will be set along quieter streets, unless a noise buffer is created to decrease noise interference. An opportunity exists to strategically re-grade the site to accommodate safe open field play conditions and resolve standing water issues.

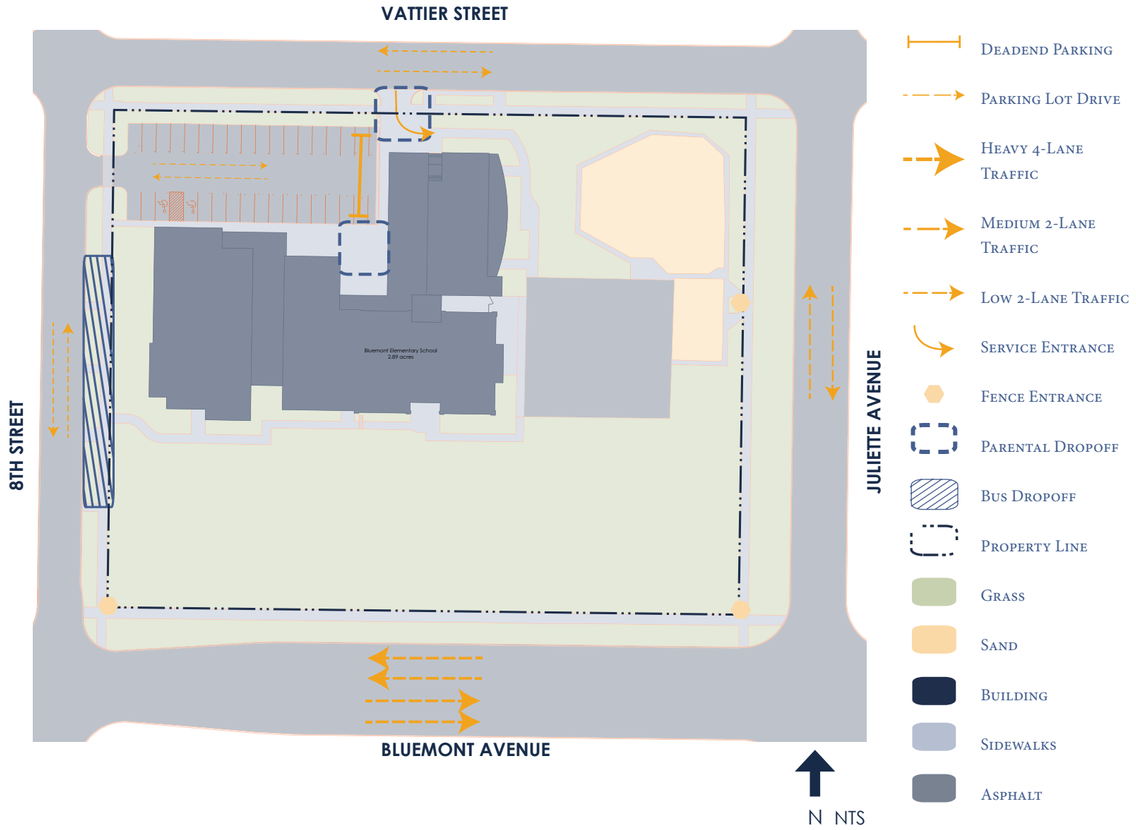


Figure 3.25. Existing Site Circulation. Adapted by author 2014, survey data courtesy of BG Consulting.

Summary Site Analysis

A synthesis of the mixed research methods research facilitated the development of a summary site analysis (figure 3.26). The synthesis aids in the selection and placement of program to be discussed in chapter four.

Interview responses highlighted areas of concern, including children falling due to sand spilling over concrete and asphalt surfaces. An uneven open field causes falling injuries, and the issue with grading causes pooling of water. Roof drainage of stormwater and grading contributes to issues that may become safety liabilities. The current location of the refuse smells and is aesthetically unpleasing. The north existing sidewalk is not wide enough to support the eight foot service entrance needs.

- The existing office entrance needs to be re-emphasized. Confused guests try to access the building from the Kindergarten wing or other doors along the north side of the building. This could be considered a safety issue.
- The location of playground equipment and activities for the younger grades should be placed toward the northeast corner for ease of site access and with minimal breaks in the fence for students to sneak off. It is also located next to the Kindergarten education wing.
- Fence exits at the south corners along Bluemont are also hazards, as anyone can access the school grounds with ease during the middle of the school day. The schoolyard is a valuable asset to the surrounding neighborhood as a park; however it is a breech of school security to have unannounced visitors onsite. Through the use of signage the community can be inform of the proper hours for playground community use.
- Concerns of obstructive noises are primarily located along Juliette Avenue and Bluemont Avenue. High traffic on Bluemont Avenue contributes to the student's inability to receive instruction from teachers when in the south open field. They would benefit greatly from a noise buffer. The lack of trees along the southwest corner of the grounds makes this location the ideal sun requirements for gardens, including raised garden beds.

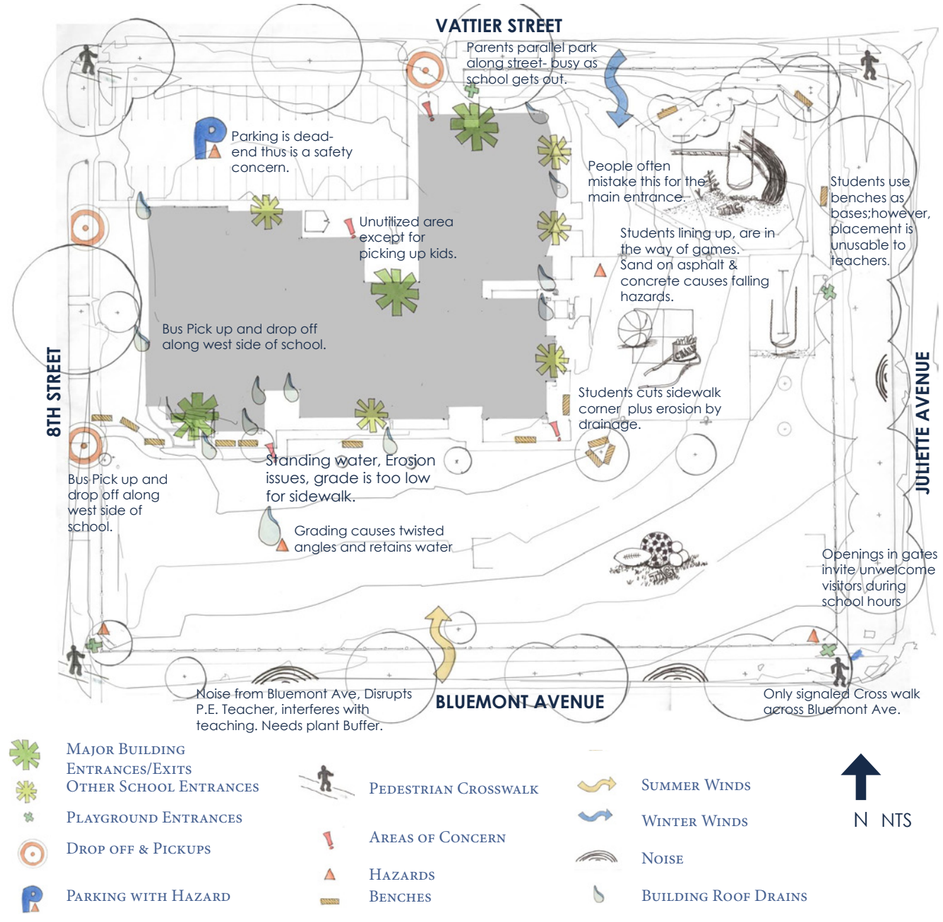


Figure 3.26. Site Inventory & Analysis. Adapted by author 2014, basemap courtesy of BG Consulting.

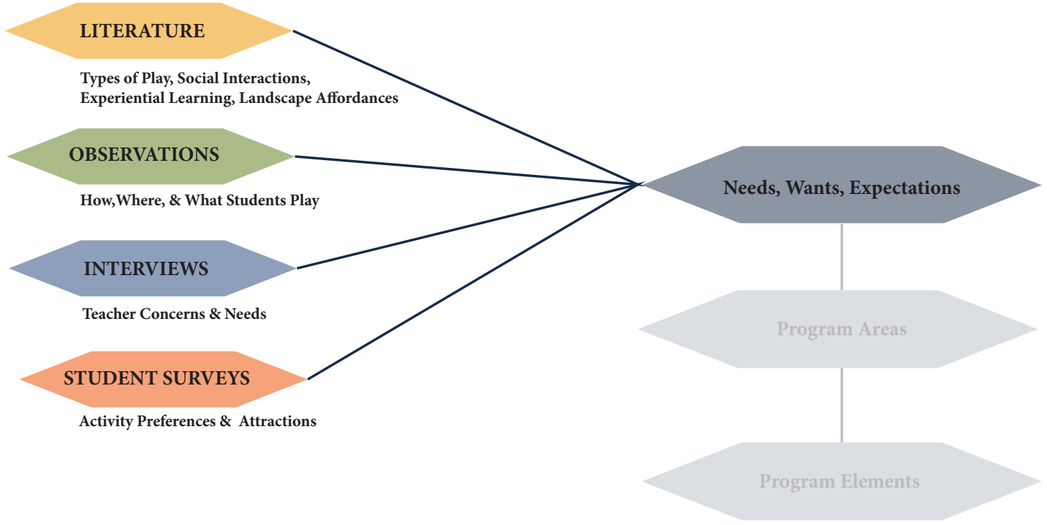


Figure 3.27. Informed Approach to Distillation of Needs and Wants. Surveys, interviews, observations distilled by author2014.

Synthesis: Needs and Wants

The development of a summary table provided a process for synthesizing and conveying the findings from each method, as well as relaying the potential school grounds and playground improvements. For students and teachers the needs, wants, and expectations may not always align directly; however, there is potential for overlap. The overlapping needs and wants facilitated programmatic development, (table 3.4 and figure 3.25).

Needs & Wants

The needs and wants synthesis is divided into the categories of general site, teachers, and students. Each need is followed by a clarifying statement discussing its' an applicability need or want.

General Site Needs

- A new school entrance that is easily recognized and easily accessed by the parking lot and Vattier Street. Vattier Street is the main parking location for visiting parents and faculty.
- An increase in signage to discourage community site use during school hours, and discourage vandalism.
- Update or fix existing playground structures, including pieces of the equipment that are either broken or worn-out.
- Outdoor storage to encourage a sharing between grade of play equipment such as balls, jump ropes, and chalk. This will help increase the variety of equipment available to students for use during recess.
- Redesign the dead-end parking lot; the current parking lot has a narrow sidewalk that students use to walk toward their parents on the north side. During the winter, snow was piled on the sidewalk, obstructing the safe circulation path. The current perpendicular parking increases the chances that a student may not be seen as vehicles back out of the parking lot. If parking vacancies are unavailable, drivers are forced to back out of the parking lot on to Eighth Street.

School Grounds	Teachers' Needs	Students' Needs	Shared Needs
Emphasize the School Entrance	Benches for Supervision	Area for Sand Play	Nature walks/path inside school fence
Signage- for garden and school grounds	Place to hang bird feeders and houses	3rd-6th Play Structure for Play Structure	Butterfly house/garden-staging area for butterfly units
More Seating	Raised Garden Beds	Repaint Activities/Games on Asphalt - e.g. hopscotch, foursquare, Map, basketball, Meeting circle	Safe places to line-up at end of recess
More Shade	A place for quiet class time	More space between Asphalt Activities	Interaction with water
Separation of the Playground /P.E. Field	Trees with various character through seasons	A place to hang out	Interaction with sound or music
Update/Maintenance Check on Equipment	Plant Maintenance Training	Experience a change in elevation	
Outdoor Playground Storage		Adjustable Basketball Goals for Younger Students	
New Solution to dead- end parking		Regrade and fill in "Muddy" Holes	
Remove sand from the playground primary circulation			
Relocate Refuse			
Blending Natural with Built			

Table 3.4. Summary Table of Needs and Wants. Surveys, interviews, observations distilled by author, 2014.

Teachers' Needs

- Include affordances that facilitate outdoor teaching and learning with students. Each element listed will contribute to the improvement and the opportunities of urban environment, creating the experiential learning opportunities. Picnic tables would provide teachers the opportunity to teach classes outside that require a surface. It could act as a more formal outdoor classroom setting. A picnic area would also be a great place for silent reading and picnic lunches. Additional seating positioned for optimum supervision of the site would be useful for teachers, as well as other site visitors.

- Teachers often teach units involving plants and insects, but much of this takes place indoors. With raised garden beds, this activity could be moved outdoors. Quiet places could encourage moments of reflection for the class or individually. Adding a greater variety of trees with seasonal interest could aid in the education about seasons and the plant life cycle. Teachers, as well as the community, may need training in site plant maintenance.

- Benches placed with supervision in mind: Although teachers may not be encouraged to sit during recess, the site is also used by the neighborhood. Benches placed where teachers need to be could also be utilized for teachers to sit with students to discuss playground rules, when necessary.

- Multiple raised garden beds could contribute to various class lessons, including science units on plant cycles, root growth, soils and insects, health and wellness, and where food originates. Teachers of all grades could potentially benefit from raised garden beds.

- A quiet place for class time outside would allow teachers to encourage integrating the classroom with a new, engaging atmosphere for learning. A space with tables would allow for reading and writing, while a grassy lawn could also contribute healthy interactions with the outdoor environment.

- Trees with various character interests throughout the seasons contribute to the education of students about plant lifecycles, comparing a tree, annual, and perennial. This also encourages students to interpret what they see through critical thought or creative writing or drawing.

- Encouraging plant maintenance training for teachers would allow classes to care for any new plant material installed at Bluemont Elementary. Teachers could then teach the stewardship of plants and the environment. The involvement of teachers and students will decrease the dependence on parental volunteers who currently take care of the additional plant maintenance.

Students' Needs

- The Bluemont Elementary principal mentioned the USD 383 intends to remove the sand from under play structures and replace it with artificial turf. While the removal of sand contributes to improving maintenance issues, a complete removal of sand will restrict students tactile and sensory experiences. Students would benefit from an installation of a smaller sand area. Placing the sand further from the building entrances and providing a buffer for the sand will decrease the current maintenance issues associated with sand.

- Third through sixth grade students need to participate in more whole body physical activity. This can possibly be achieved by providing play structures for older students, specifically, a place of their own.

- Students need games and activities repainted on the asphalt because undefined boundaries and rules can lead to arguments. There is opportunity to provide a larger variety of games including hopscotch, foursquare, Map of the USA, a basketball court, meeting circle, plinko ball, and identifying Kansas animal tracks.

- All students and specifically fifth and sixth grade students need a place to hang out, relax, talk, and reflect.

- New experiences that are caused by a change in elevation such as hills would be beneficial and be an interesting addition to a flat site.

- Current basketball goals work for older students; however, young or short students have trouble getting the ball over a ten foot rim. The students would benefit from adjustable basketball goals.

- The current uneven site contributes to students falling as they run through the open field, tripping on holes and clumps of grass. The open field needs to be regraded and seeded.

Shared Needs

- Teachers, students, and community need a meandering path with the schoolyard to promote nature explorations, exercise, or self-reflection. Occasionally observed during recess students were assigned as a disciplinary action “think time”. Nature walks are beneficial for neighborhood families, who like to walk but dislike walk next to the road. The meandering path would act as an opportunity for brain breaks.

- Multiple kindergarten through second grades participate in a butterfly units during science class. During interviews teachers expressed a needs for a staging area and a garden to release butterflies. Extending the interaction with butterflies could encourage the a more integrated use by other grades. Other potential lessons include the food web and life cycles of other animals.

- Students currently lineup in the middle of active play. They need a place to line up out of the way, thus reducing the likely hood students will be injured by errant balls.

- Addressing the stormwater concerns is a high priority need, the benefit stormwater can be used to create opportunities for fun education interactions with water. Potential solutions include rain barrels, roof drains, rain gardens, and cisterns through interactive stormwater solutions.

- The other needs explore four of the five senses. The fifth sense hearing can be address through the installation of an interactive music garden. An outdoor garden allows teachers to teach music outdoor and allows students to compare sounds indoor verse outdoor sounds.

- Each of these needs can be satisfied overtime with proper planning and funding. Each need contributes to a potential idea for programming. The possible programming elements have great potential to fulfill the Principal’s expectations and goals for the new playground design. The summary of needs and wants contributed many ideas to the potential program areas and elements.

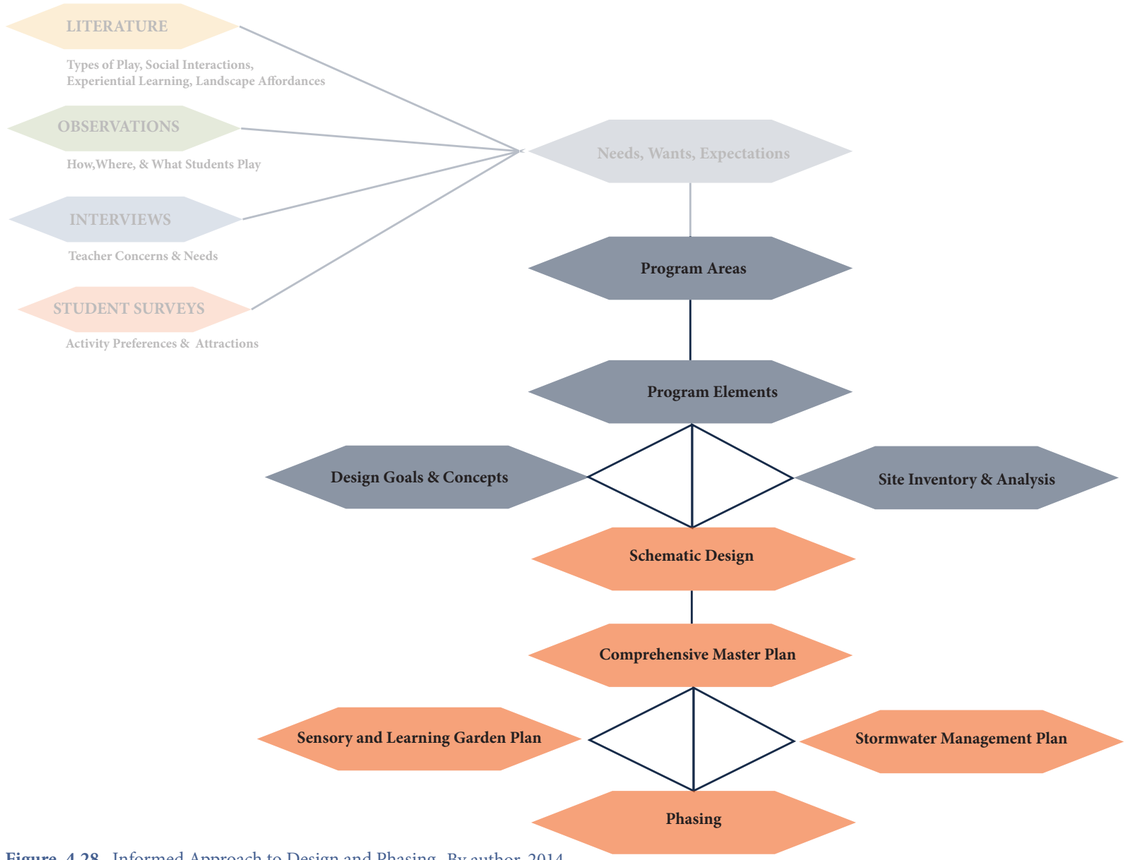


Figure 4.28. Informed Approach to Design and Phasing. By author, 2014.

CHAPTER 04

INFORMED DESIGN

The informed design chapter portrays the design ideas and concepts developed following site programming. Designs are illustrated through plans, diagrams, tables, and perspectives. Figure 4.28, illustrates the strategic application of the results gathered through the informed approach to a design. The summary of needs (table 3.4) combined with site analysis and design goals facilitated the development of program areas and elements. This informed design seeks to address each design goal while providing solutions to accommodate the needs of the teachers and students. Throughout the design process feedback was provided by my masters report committee and the PTO Landscape Team.

Design Goals

Drafted following the review of literature, design goals changed as the project evolved. The goals guided the selection and placement of programming.

Interviews and site analysis indicate existing stormwater conditions are currently a liability and cause a multitude of issues describe in the site analysis.

- Provide viable **stormwater management solutions** that address the recurring drainage issues in **an interactive and educational manner for students and teachers.**

Interviews and discussions with the PTO Landscape Team resulted in a better understanding of the how the current landscape is maintained. Maintenance is limited at the district level and requires upkeep on a volunteer basis.

- Provide a **sustainable ecological landscape** that will enhance the aesthetic quality of the school. Provide a plant palette with suggestions that **require less maintenance,** as additional grounds maintenance occurs on a volunteer basis.

Literature informs the need for age appropriate playscapes for safety and development. Lee's study of types of playgrounds suggests that children benefit from natural or designed contemporary playgrounds (year). Observations revealed that children gravitate toward similar activities(eg. football, foursquare, tag, and sand play) during the period of one week. Survey results suggest that students are drawn toward climbing structures and natural features.

- Provide **age appropriate playscapes** which increases the variety of landscape affordances for kindergarten through sixth graders, **encouraging experiential learning through nature using a combination of natural and built program elements**.

Figure 4.29. Three Scales of Design.
Design by author, site survey by BG Consulting.

Programming

Information synthesized into the table of needs and wants contributing to the development of design goals and program areas and elements. Combining the needs and wants with the site analysis, I was able to determine program placement and the necessary relationship between each element within each program area. I asked a series of questions that facilitated the process of placement and narrowed down program elements. The questions address concerns such as site users, needs of users, site amenities, and learning elements (figure 4.10).

Guiding Questions

Questions were answered during the mixed methods of the informed approach; however, I had to consider all pieces in a cumulative manner ensuring the program areas addressed the needs and wants of the users.

- Who will be using the playground?
- What affordances are missing from the Bluemont Elementary play area?
- How do the affordance needs vary from teacher, to parents, to students?
- What site elements are missing?
- What playground affordances do teachers and kindergarten through 6th grade students at Bluemont Elementary need?
- What affordances would teachers use in their classes, if provided?
- What affordances do children need to participate in group or individual play?

The playground is used by several different groups, including kindergarten through sixth grade students, teachers, and the Boys and Girls Club. The school grounds are also open to surrounding neighborhood and community use, which requires strategic selection of new equipment.

Major affordances missing from Bluemont Elementary School Grounds include outdoor interactions with nature (bugs, plants, and animals), play structures for the fourth through sixth grade students to use when younger students are outside, and quiet, reflective places for learning and individual play. With the intended removal of existing sand, it will be important to provide a new sand area for sensory play.

Teachers need affordances that will encourage and aid in teaching classes outdoors; this includes educational areas such as butterfly gardens, raised garden beds, music areas, and picnic areas.

Students need affordances that create experiential learning opportunities. They can be activities guided by teachers and parents or areas that allow students to play and experiment individually and in groups (Table 3.1 Summary Table of Needs).

Parents and the surrounding neighborhood use the school grounds as a neighborhood park. Parents need a place that is entertaining, educational, and fun to take their children for safe play outside. Site elements missing from the current playground include a quiet, reflective place for students, and a picnic area for outdoor classrooms and neighborhood use Increased community use can potentially minimize the chances of vandalism.

Utilizing information gathered during interviews and stakeholder meetings, I believe the best potential site elements for teachers include places to teach outside, rain gardens, raised gardening beds, and butterfly gardens. Each element incorporated into the site's design contributes educational value, or improves the site's usability, accessibility, and safety.

Providing appropriate spaces will encourage group play or individual play. Individual play may need places that are quiet and more reflective or affordances that are easily maneuverable on their own. In order to encourage group play, spaces for climbing, sanding, and running must have room for more than two to three students to stand.

The comprehensive master lan is comprised of Program Areas and Program Elements Table 4.0 Programming Table. The comprehensive master plan is filled with potential ideas, and each piece can be modified to fit the needs of students and teachers. Elements can be added to increase the number of potential activities, such as painting new lines on the activity asphalt area (table 4.0 and figure 4.1).

While developing the program it was important to maintain an expanded list of program options. However, there is a concern of putting too many overlapping activities in one space. After the development of potential program elements and areas, I began refining ideas of how the pieces fit together in schematic design.

The relationship between the program area and elements is further discussed in the comprehensive master plan section.

Design Goals	Program Areas	Program Elements
Age-Appropriate Playscapes Natural and Built Program Elements	Play Structures	Kindergarten - 2nd Grade Play Structures
		3th-4th Grade Play Structure
		5th- 6th Play Structures
		Swings
	Asphalt Activities	Basketball Courts
		Plinko Ball
		Foursquare
		Map of the USA- Flint Hills Region
		Imagination Play(Blue Blocks)
		Wildlife Tracks
		Chalking Area
	Open Field	Recess Open Field
		P.E. Open Field
		Unorganized Football, Soccer, Kickball
	Bobcat Hills	Hills
		Sand Pit
Stormwater Management Sustainable Ecological Landscapes	Bobcat Gardens & Outdoor Learning Kindergarten Wing	
		Sand Area
		Snoozle Lawn
		Butterfly Garden
		Raised Garden Beds
		Rain Garden
	Bobcat Gardens	Sensory & Learning Garden
		Outdoor Classroom
		Interactive Rain-barrel
		Bobcat Butterflies
		Gardening
		Bobcat Nature Loop
	General Site Improvements	Angled Parking and Drive Through Dropoff
		New Building Entrance
		Relocated Refuse
		New Bicycle Parking
		New Sign

Figure 4.30. Programming Table According to Goals. By author, 2014.

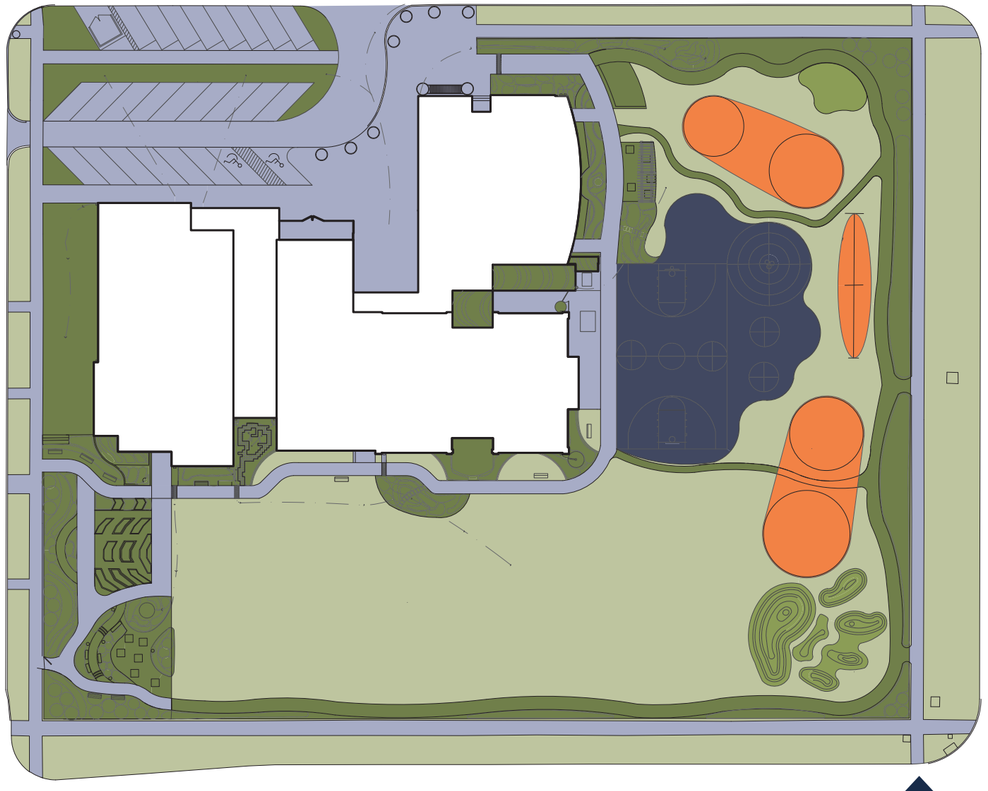


Figure 4.31. Program Areas. Design by author 2014.

Figure 4.32. Program Elements. Design by author 2014.

Preliminary Process and Feedback

The preliminary process involved the development of three schematic design alternatives. The schematic designs explored the spatial relationships between program areas and elements. Beginning with bubble diagrams, it quickly expanded to diagramming spatial relationships using circles that expressed relative spatial size of each element. Through this process, it became easier to discern which elements would fit together and provide a cohesive design.

Throughout the design process, I met with the stakeholders, consisting of the Bluemont Elementary Parent Teacher Organization (PTO) and Principal. Meetings typically alternated between the stakeholders and my masters committee. This was an effective dynamic, as it set deadlines and facilitated time management. PTO meetings involved the evaluation of program elements. Meetings with the masters report committee and major professor allowed feedback on the design process and concepts.

The first meeting with the PTO Landscape Team and the Principal was utilized to review the site inventory and analysis, and schematic designs. Acting as the primary stakeholders throughout the design process, and their intimate knowledge of the site needs, their insight guided the program development, adding value to various elements raking importance and narrowing down the program table. The first meeting was focused on developing a schematic design with the appropriate programming. It allowed for a question and answer session relating to the placement and program changes. During the first meeting, it became apparent that the stakeholders were interested in maintaining a small sand area with a buffer zone to prevent sand from progressing into the school. They also showed interest in a garden, picnic area, and the butterfly garden. Concerns expressed included maintenance and seasonal blooming times. Of major concern during and after the meeting were the storm water issues.

Feedback from the mid-critique with the masters report committee revealed that program relationships within the three schematic designs needed to be reevaluated and further developed. During a second meeting with Professors Hunt and Kingery-Page, I presented two new schematic designs based on the mid-critique feedback. The new designs began to look more cohesive, but were missing an overall concept. The design progressed from two schematic designs to one Comprehensive Master Design. Combining feedback and design concepts from each schematic design led to the development of one cohesive plan. Seeking aid to understanding the extent of Bluemont Elementary's stormwater issues and possible solutions, Professor Kingery-Page and I conducted an additional site visit with Professor Skabelund. Professor Skabelund provided applicable suggestions for cost effective stormwater management solutions. Prepared with notes from each of these meetings, I began to tackle the Stormwater Management Detailed Plan.

A second meeting with the stakeholders provided feedback on the overall design, the stormwater management plan, and Phase 1.1 Front Entry and Sensory and Learning Garden detailed plan. The primary focus of this meeting was the potential design for the Phase 1.1. Feedback included a request for a more information regarding the interactive roof drain and plant palette and concerns with seasonality and maintenance. The result was a detailed design document complete with a cost estimate,refer to Appendix F.

Feedback has contributed greatly to the design development and process of creating Bluemont Elementary's Comprehensive Master Plan, Stormwater Management Detailed Plan, and Front Entry and Sensory & Learning Garden Plan. Processing feedback and stakeholder input has been an extremely valuable piece of informed design process. Refocusing on the stormwater management plan with educational amenities has started a conversation between the district and the school about funding.

Bobcats in the Flint Hills

A Comprehensive Master Plan

Centered on Manhattan's eco-region and Bluemont Elementary's mascot, the Comprehensive Master Plan is designed with both elements of playful experiences that can be used during recess and outdoor education. The program includes playscape affordances that encourage experiential learning and social development through play and outdoor education classrooms. The Master Plan focuses on the overall relationship and site improvements for the next twenty to fifty years.

The master plan addresses design for the entire Bluemont Elementary property, Refer to figure 4.31. Program placement and design details were guided by overlaying two organizational grids, Refer to figure 4.32 Organizational Grids. The intricate orthogonal grid was developed using the building entrances, facade, and windows; in areas where the grid was less defined, a similar rhythm was created by repeating the pattern created by the windows, building edges, and entrances (figure 4.33) Orthogonal Grid. The orthogonal lines served as an ordering system, as the s-curve overlay became a method to break the grid and creating a structured organic landscape (figure 4. 34).

Previously discussed mixed methods informed the development of program areas and elements. The combined information gathered from interviews, observations, student surveys, site inventory, and analysis was important to the finalization of the Program areas and Elements, refer to figures 4.28 Program Areas, figure 4.29 Program Elements, and table 4.1 Programming. The Programming Table coordinates with both the program areas diagram and the program elements diagram.

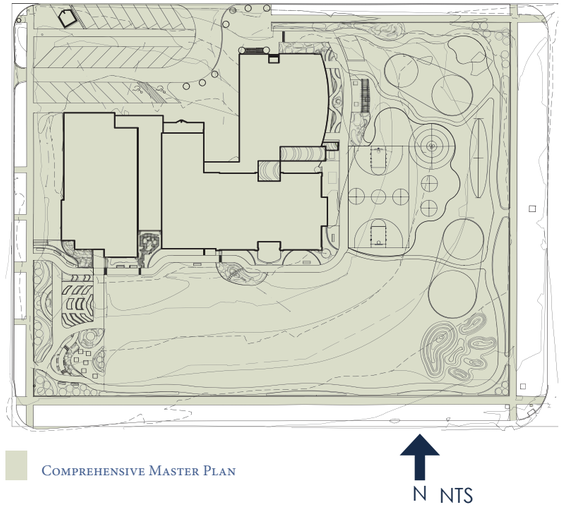


Figure 4.33. Scope of Design: Master Plan Design by author 2014.

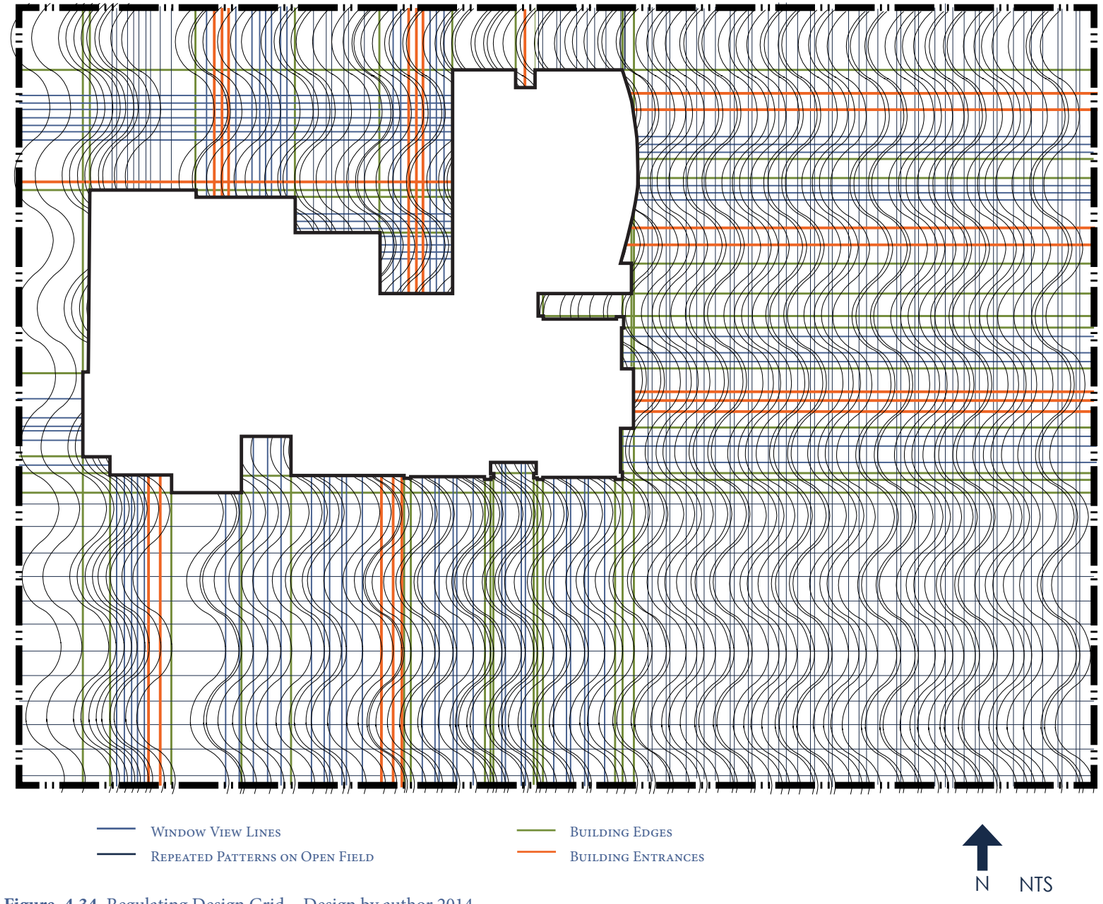


Figure 4.34. Regulating Design Grid. Design by author 2014.

The table shows the relationship between each area and program. Each program area satisfies one or more of the design goals. Refer to figures 4.34 to 4.35 to further understand the relationship between the relationship between design goals, mix method, and design.

The increase in varied play structures and asphalt activities provide students with more exploratory options. Their perceptions may differ from the design intent but the broad range of activity is intended to support the activities that encourage physical cognitive and social development.

The comprehensive design provides opportunities of recreation to the surrounding neighborhood as an enriched park has experienced it could become a neighborhood attraction for family outings. The nature trail provides a safe walking or running track. The playground could become a valued source of community unity and pride.

Overall site improvements include vehicular circulation around the site and site parking. Student safety is improved through new signage at gate entrances to the playground; perimeter planting provides a slight noise barrier to the high traffic roads. Throughout the site, available seating is increased. Enhancing the north entry student drop off was accomplished by moving the refuse away from the building. Decreasing schoolyard liabilities occurs through the establishment of stormwater solutions that capture or increase the ability of stormwater to infiltrate on site.

Each program area discussed in detail on the following pages.

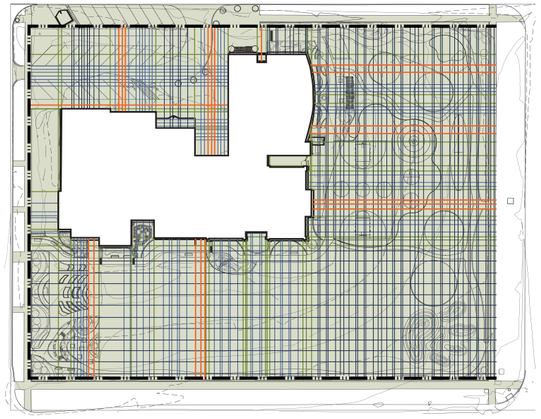


Figure 4.35. Orthogonal Grid Overlay. Design by author 2014.

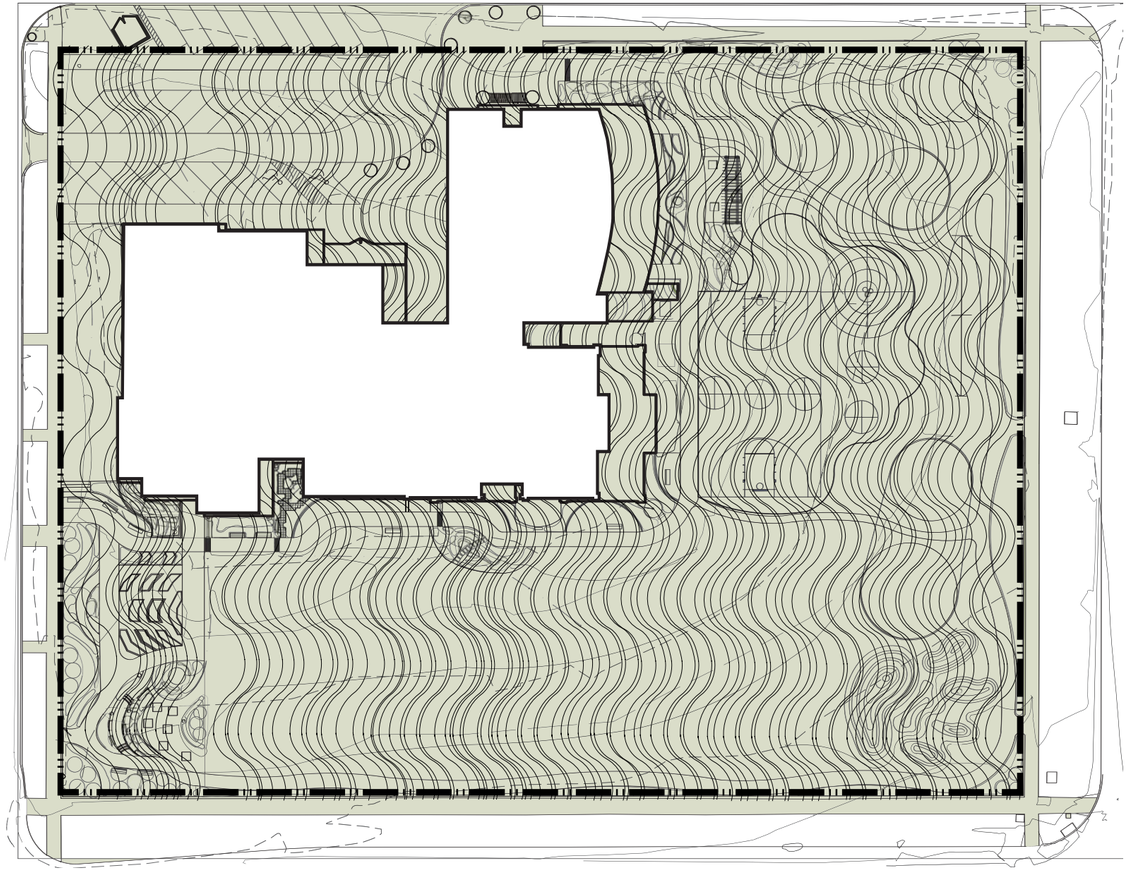


Figure 4.36. S-Curve Overlay. Design by author 2014.

PLAY STRUCTURES

The built play structures are located in the eastern portion of the site, maintaining the current location of play structures is important to the physical and social development of children. Play structures provide a multitude of affordances including climbable, attached objects, graspable, and flat/smooth elements created for play. I observed children using the existing play structures for multiple types of play and social interactions from pretend play to games with rules, thus social interactions varied from individual solitary play to collaborative play. Current playground rules prevent third through sixth graders from using the play structures when occupied by younger students, as observed and discussed during interviews. The older students would also benefit from a more challenging play structure.

I propose new play structures for the following age groups, however, specific structures are not mentioned as history has shown play structures evolve overtime.

- Two structures for Kindergarten - 2nd Grade
- 3rd - 4th Grade
- 5th - 6th Grade
- Swings

Providing age appropriate structures is important because it determines the dimensions needed to provide safe play structures geared towards the age groups stage in learning and exploration. The structures address stormwater with the installation of a surfacing that is permeable encouraging the infiltration of water.

1. Kindergarten- 2nd Grade Play Structure
2. 3rd - 4th Grade Play Structure
3. 5th - 6th Grade Play Structure
4. Swings
5. Asphalt Activities
6. Open Play Field
7. Bobcat Hills & Sand Pit
8. Bobcat Garden
9. Outdoor Classroom
10. Green Roof
11. Kindergarten Picnic Area
12. Snoozle Lawn
13. Sand Area
14. Kindergarten Butterfly Garden
15. Interactive Rain Barrel
16. Rain Garden
17. Bluemont Elementary Sign
18. Parking Bioswale
19. Raised Garden Planters
20. Bobcat Garden Picnic Area
21. Sensory& Learning Garden
22. In-ground Cistern
23. Basketball Court
24. Plinko Ball
25. Foursquare
26. Imagination Play/Chalking
27. Interactive Roof Drain
28. Play Area Storage
29. Garden Storage
30. Sound Garden
31. Refuse
32. Butterfly Garden

Figure 4.37. Master Comprehensive Plan. Design by author 2014.

ASPHALT ACTIVITIES

The proposed asphalt activities occur in the same location as the existing surface (figure 4.37). The new, permeable, organic-shaped surface provides a broader range of available activities including plinko ball, full court basketball, foursquare courts, a map of the USA, chalking, imagination play, and animal tracks. The activities are primarily painted on the surface; however, I recommend new adjustable basketball goals becoming available to younger students. The plinko game requires the purchase of three to four drop shot basketball hoops at varying heights, the funnels can be aligned so that as the ball falls from one hoop it drops to another. The plinko game combines a shooting with mathematics, design by a principal Sam Slarskey and built by Landscape Structures (Education World 2014, and Landscape Structures 2014). The smooth surface provides opportunities running, drawing, and use of detached objects such as basketballs providing numerous affordances. The painted lines facilitate the boundaries and rules of established games. The asphalt areas sport all types of social interactions and types of play as describe by Parten(1932).

"Asphalt activities" provide an unlimited educational opportunities from lessons on mathematics and geography to animal track comparisons. The surface has few vertical obstructions, thus increasing the ability to play unprogrammed games or educational activities to be conducted by teachers or after school programs. Imagination play is a tool kit of blocks and other pieces that create stackable affordances. The Imagination play are loose pieces that allow students to construct their play environment(Imagination Playground 2013).

The addition of outdoor storage provides easy access to all playground equipment to be shared by all grade levels. The outdoor storage would allow play equipment to be available to each student.

- Imagination Play and Chalking
- Basketball Court
- Plinko Ball
- Foursquare
- Asphalt Activities
- Animal Tracks
- Map of the United States

The permeable asphalt surface aids in stormwater management but can also contribute to stormwater education as it can be sloped toward a rain garden, thus encouraging the use of ecological landscaping in an educational manner, demonstrating recycling water and the water cycle. The built surface program becomes an age appropriate playscape through the affordances perceived by students. The program elements provide the lines, however students' perceptions will determine the rules and outcome of the games.

"Asphalt activities" addresses the needs of the site through permeability while providing a hard surface for all kinds of activity that can be determined by any of the site users from teachers and students to the surrounding neighborhood.

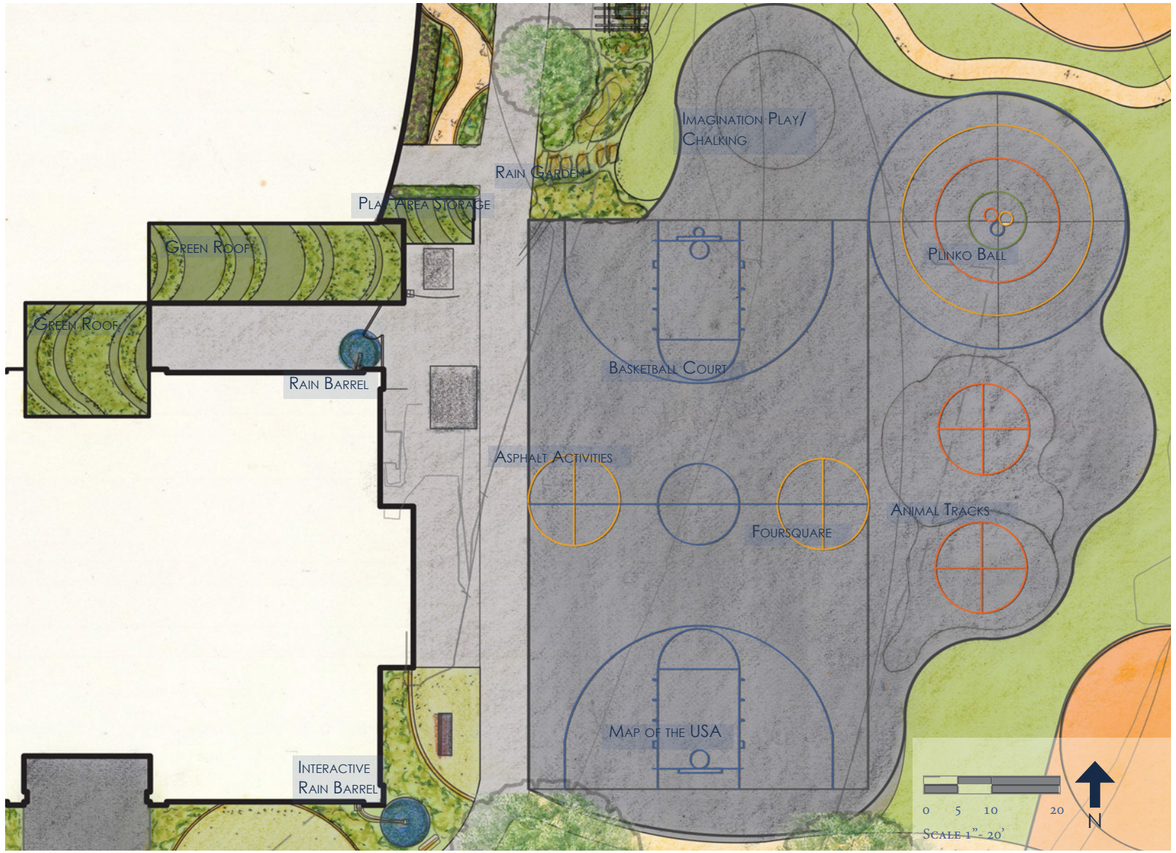


Figure 4.38. Proposed Asphalt Activities. Design by author, 2014.

Open Field & Bobcat Hills

The inclusion of natural elements as well as built elements is important as it provides a different experience often involving the use of the senses.

- Bobcat Hills and Sand Pit
- Design Goals

The hills provide a new perspective in regards to being able to run up and down or simply to roll down the hill. The existing site is relatively flat. In between the center of the hill is a second sand pit. The second sand pit is surround by a buffer zone grass thus minimizing the amount of sand to be carried into the school or home.

A second element illustrated in the plan to the right is the open field. Another element open for program to be interpreted. According to several sources including the Field Guide, Time-Saver Standards for Landscape Architects, and FIFA Laws of the Game each mention different buffer zones required for regulation size fields. Unfortunately the school grounds lacks sufficient space for a regulation field. Teachers, students, and community should beware of the surrounding obstructions including trees, benches, and other plantings.

The current rules for recess play in the open field would still be in standing if desired by the teacher; Students can be required to stay east of the edge of the school building.

The new open field address stormwater issues through regrading of the site. By regrading and decompacting the openfield will enable water to be moved away from the school building and provide a more permeable surface. The smoother grade should decrease the issues of students falling. The decompacted soil should encourage the healthier growth of grass.

The Bobcat hills satisfy the needs for a new natural program element, they can be utilized to discuss the relationship between the eco-region and the landforms.

Figure 4.39. Proposed Bobcat Hills & Sand Pit, and Open Field. Design by author 2014.

South Entrance and Gardens

The south entrance combined with the Bobcat garden provides more natural playscaping for students to experience individually or in groups guided by teachers or self-exploratory. The gardens provide opportunities to explore the senses. Each garden is focused on a different sense. The south entrance and Bobcat Gardens are broken down into multiple smaller gardens or areas:

- South Entrance
    - Bluemont Elementary Sign
    - Sensory and Learning
        - Interactive Roof drain
- Bobcat Gardens
    - Butterfly Garden
    - Edible Garden with Raised Planters
    - Picnic Area
        - Inground Cistern
    - Music Garden

The South Entrance is emphasized with a new limestone marquee sign, notify passing vehicles of upcoming events. The Sensory and Learning Garden and Interactive Roof-drain are further discussed in the stormwater management plan. Each piece of the design offers new ways to learn outdoors, individually, in groups, or as a class.

The butterfly garden provides staging area for butterflies in the Spring and Fall, facilitate learning about the butterfly life cycle. This need was discovered during interviews with the kindergarten and second grade teachers.

Interest expressed during meetings and interviews demonstrated the need for a raised gardening area. Through raised gardening students have the opportunity to learn about healthy lifestyles, plant life cycles, plant physiology, and sensory exploration through touch, taste, and smell. It can facilitate the student stewardship of their surrounding environment, learning where their food comes from. During discussions with teachers and parents, high interest was expressed in the Edible Gardens with raised bed gardens facilitating the education of students about life cycles.

A partially shaded picnic area provides a more formalized area for as an outdoor classroom. The picnic area can be used for various activities including silent reading, journal writing, and activities.

An inground cistern is placed at a low-point of the rain garden, the cistern is used to collect water running off of the open-field and water from the roof drains on south building entry. The inground cistern is an opportunity to teach students about the water cycle and recycling water. The collected rainwater can be used to water the Edible Garden or plants in the picnic area and Music Garden.

The experiences guided in the each garden can be altered to create an age appropriate experience. The gardens provide a base for students to experience. Depending on their age affordances of the garden can vary from age to age, even student to student. For example, younger students may use the Music Garden to create “noise” by exploring the different sounds, while older students may use the garden to recreate musical tunes heard previously.

Each garden provides teachers and students with the materials needed to create learning affordances. Students can explore on their own or be guide through a class lessons. The gardens are designed with drought tolerant plants that can be supplemented with stormwater collected in a cistern.

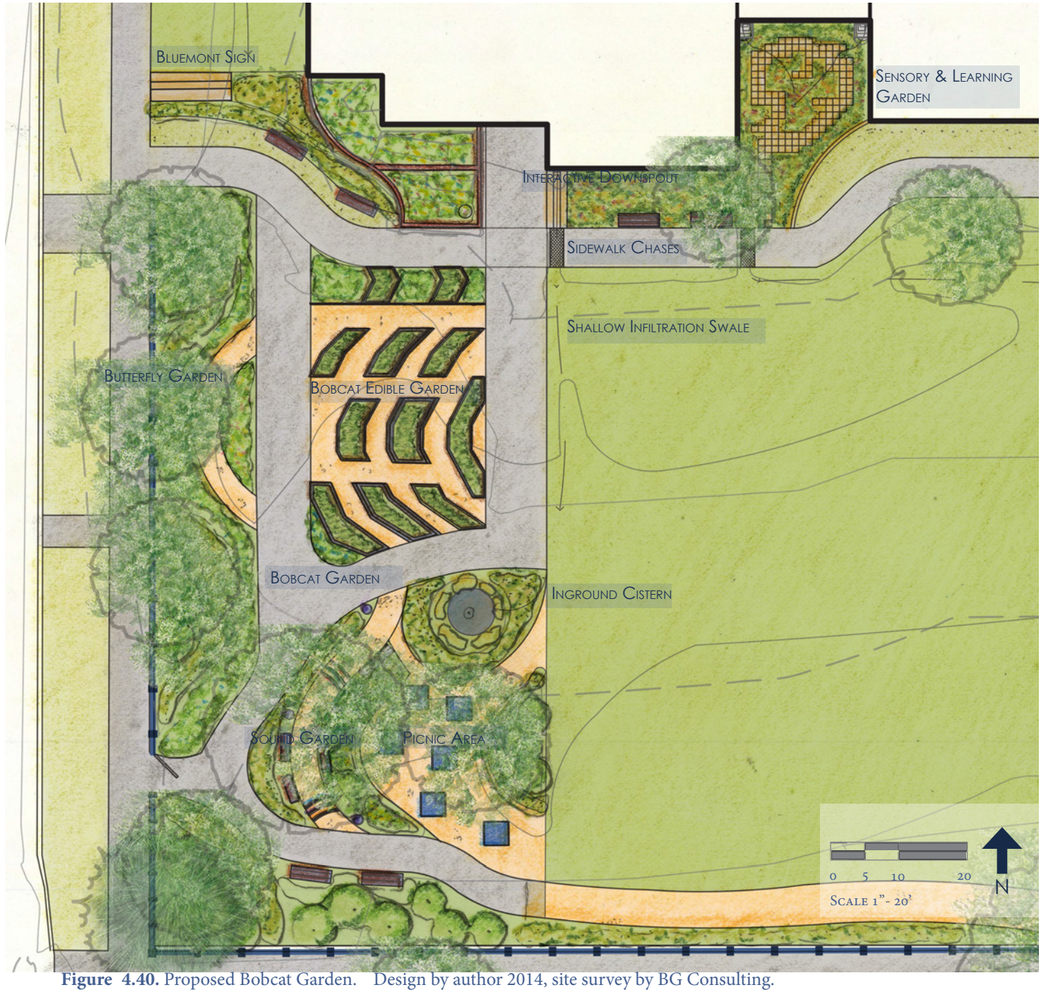


Figure 4.40. Proposed Bobcat Garden. Design by author 2014, site survey by BG Consulting.

Kindergarten Exploration Garden

A garden geared toward the younger students, contains the following:

- Snoozle Lawn
- Raised Planters
- Picnic Area with Pergola
- Kindergarten Garden
- Bobcat Walk
- Rain Gardens
- Sand Area

A snoozle lawn as described in the *Gardening for Children with Autism Spectrum Disorders and Special Educational Needs* by Natasha Etherington(2012), is a small sloped lawn with taller grasses for children to lay upon. Etherington states there are many benefits including "decreasing blood pressure and anxieties, multi-sensory, soft thus safe, and pleasing to the eye" (2012,114).

The exploration garden satisfies the needs for stormwater management as an educational tool. Adjacent to the garden is a storage building for playground equipment with a green roof. Adjacent roof drains brings opportunity to discuss the infiltration of rainwater in the rain gardens.

Facilitating plant stewardship and education, occurs through the following elements: raised planters, butterfly plants, rain gardens, and roof gardens. An ornamental tree, either a redbud or dogwood provides an attraction to birds. A tree also provides the opportunity to hang bird houses and feeders. The tree allows an opportunity to emphasize tree growth and seasonal changes. Plantings are intended to be primarily native plantings and drought tolerant to prevent excessive watering.

Rain water is collected in a nearby in a rain barrel collected from a roof drain. The collection of water will aid in the education of recycling rain water. The rainwater can be used by students to water plants, during the drier part of the season.

A pergola partially shades a set of picnic tables. The pergola provides a different type of shade and education exploration learning about vines and different types of shadows.

The kindergarten area combines built and natural play elements. The spatial proximity provides multiple age-appropriate elements including play structures, swings, and asphalt activities.

Influenced by recess observations and interviews, the Bobcat Walk satisfies the need for a "think" path. A "think" path is a element used for a student to walk and reflect during recess as per the teachers' assignment. The paths can be used to set recess boundaries when needed.

Although the district intends to remove all sand from under the current structures, many resources recommend sand for child's play. According to *Asphalt to Ecosystems*, sand provides children with a broad creativity including explorations of sculptural forms and tactile experience enhancing imaginative play in acts of digging and construction(Danks 2010).

Figure 4.41. Kindergarten Exploratory Garden & Picnic Area. Design by author 2014.

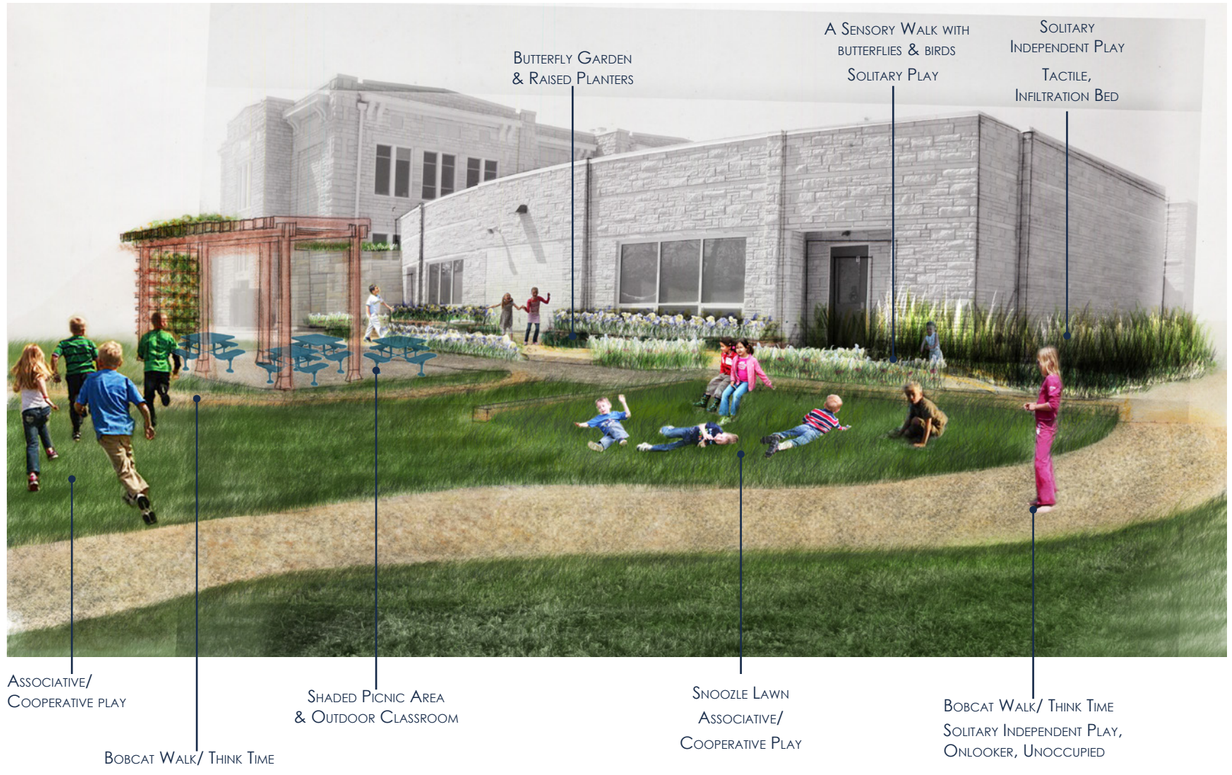


Figure 4.42. Kindergarten Exploratory Garden & Picnic Area. Design and photo by author 2014.

As previously explained, a snoozle lawn benefits students in many ways encouraging reflection and calming. As an element for play it encourages children to roll down or play as individuals or in groups. Another benefit of the element is a comfortable place for children to sit outside during educational units (figure 4.42). Taller grass provides a cushioned ground plane. A short retaining wall along the high point of the snoozle lawn. The wall provides seating for teachers, as they lead a class discussion or read a book. The snoozle lawn is shaded in the morning by near by trees and in the late afternoon by the building.

Figure 4.43. Kindergarten Exploratory Garden & Picnic Area . Design and photo by author 2014.

Stormwater Management Detailed Design

Goal: Provide design solutions to embrace storm water as an educational amenity, not a schoolyard liability.

The stormwater management detailed Plan provides education design solutions to address the storm water issues discussed in the site inventory and analysis section (figure 4.20). The stormwater program occurs within a ten to twenty foot buffer zone around the Elementary Building and also includes the Bobcat Garden mentioned in the comprehensive master plan.

Program ideas contributed to stormwater management in a playful manner to encourage educational experiences involving the water cycle. In order to develop appropriate stormwater solutions, it was important to understand potential volume of water that is needed to be transferred away from the building foundation. Kansas in a given twenty-four hours during a one hundred year storm (used as the maximum number) to a one year storm (used as the minimum) can average a range of 2.4 inches to 7.25 inches in a twenty-four hour period (Kansas Average Rainfall 2014, Hannan 2006). Taking these numbers, I found the surface area of the entire school roof (Appendix E). Multiplying the surface area and the minimum rainfall or the maximum rainfall contributed to understanding the range of potential stormwater volume traveling from school roof to grounds during rain storms.

Stuart Echols and Eliza Pennypacker discuss design techniques to display stormwater as pieces of education and art. They suggest lessons about best management practices, site's historic water conditions, and riparian plant associations through games and tours (Echols and Pennypacker 2008).

Butterfly gardens, inground cisterns, interactive rain barrels, rain gardens, infiltration lawns, green roofs, bio-swales, and permeable surfacing all engage students in an interactive educational experience but also accomplish the practical needs of moving water away from the building foundation (figure 4.43). By managing stormwater, it becomes an education amenity instead of a liability (figure 4.44). In the following section on detailed designs stormwater solutions are illustrated.

Installation is proposed to occur in three phases, a stop gap, thorough, and ideal.

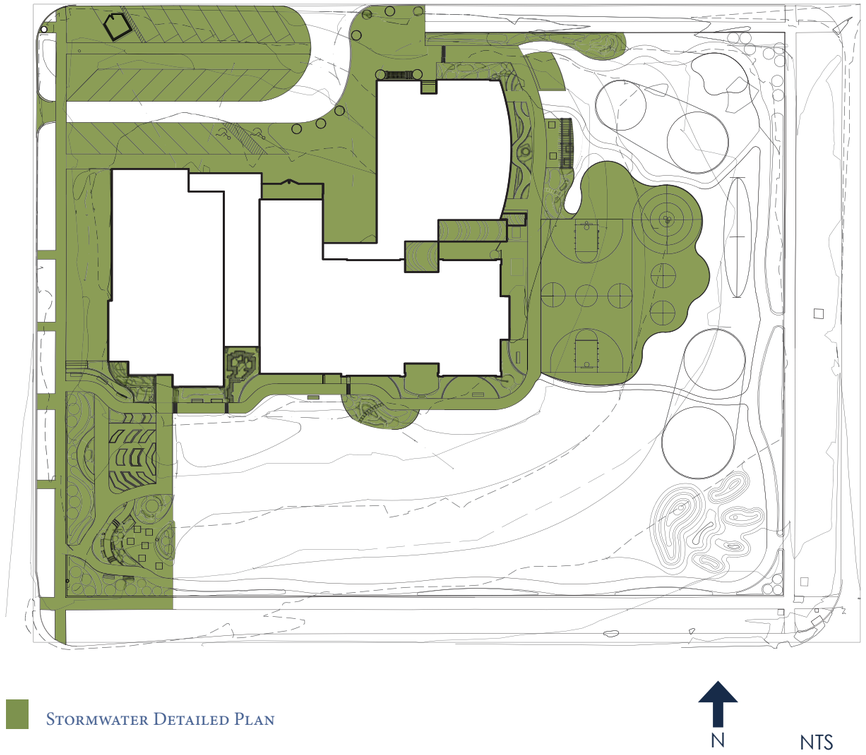


Figure 4.44. Design Scope of Proposed Stormwater Solutions. Design by author 2014.

A Sensory & Learning Garden
B Interactive Roof Drain
C Bobcat Garden
D Inground Cistern
E Butterfly Garden
F Bobcat Picnic Area
G Bobcat Sound Garden
H Rain Gardens
I Outdoor Classroom
J Green Roof
K Permeable Paving
L Interactive Rain Barrel
M Rain Barrel
N Kindergarten Picnic Area
O Kindergarten Butterfly Gardens& Raised Planters
P Infiltration Bed of Grasses
Q Parking Lot Bioswale
R Infiltration Lawn

Figure 4.45. Proposed Stormwater Detailed Plan. Design by author 2014.

Phasing

There are two levels of phasing. One set of phasing occurs in four phases over a period of fifty years with the comprehensive master plan(figure 4.36). The stormwater management plan is a more detailed plan, and is intended to be completed as soon as possible. With in the four phases, the bolded text represents the elements of the Stormwater Management Plan (figure 4.44).

Comprehensive Master Plan

Phase one suggests elements to be installed during the spring of 2014 throughout spring 2015 carried out by the Ogden-Manhattan School District, Bluemont Elementary PTO, and Community. Several items depend on additional funding.

Stormwater Management Plan

Addressing the stopgap, thorough, and ideal steps toward a strong stormwater solution. Stopgap solutions are ones, are the most cost efficient often temporary fixes or a portion of a solution. Stop gap solutions are the quick solutions, where as the thorough is the next step bridging the gap toward rectifying a stormwater concern toward the ideal solution. An example to consider is the South Entrance The large over lapping boxes in figure 4.44 demonstrate the overlap of the four phases to accomplishes the three phases of stormwater management. Based on the feedback and immediate needs of the PTO, I completed a South Entrance Detailed Design packet, pertaining to Phase 1.1 Spring (Appendix F).

PHASE 1	PHASE 2	PHASE 3	PHASE 4

Year 0 -1
1.1 Spring 2014
• South Entrance
  • **Sensory & Learning Garden**
  • **Temporary Interactive Roof drain**
  • **South Stormwater Sidewalk Chase**
• Physical Education Field
  • **Regrading & Reseeding the P.E. Field**
1.2 Summer 2014
• Removal of Sand
  • Replace with other surfacing
• Asphalt Activity
  • Resurfacing and Paint
• Sand Area
1.3 Spring 2015
• **North Rain Infiltration Bed**
	Year 5 -10
	• Front Entrance
	  • Bluemont Elementary Sign
	  • **Interactive Roof drain**
	• Bobcat Garden
	  • Raised Garden Beds
	  • Butterfly Gardens
	  • Picnic Area
	  • **Inground Cistern**
	• Kindergarten Garden
	  • Picnic Area
	• Bobcat Walk
	  • Kindergarten Loop
	• Play Structures
	  • Third- Fourth Graders
	  • Fifth - Sixth Graders
	• **Regrade West Infiltration Lawn**
		Year 10 - 20
		• Kindergarten Play Structures
		• Bluemont Elementary Sign
		• **Bobcat Garden**
		• Kindergarten Garden
		• **South Entrance**
		• Bobcat Hills
		• Bobcat Walk (complete other loops)
		• **2nd Rain Barrel**
		• **Rain Gardens**
			Year 20 - 50
			• **Permeable Paving**
			  • North Entrance
			  • Parking Lot
			  • Drive Front Entrance
			  • Asphalt Activities
			• Parking Lot Bioswales
			• Sensory & Learning Garden
			• Physical Education Field
			• Asphalt Activities
			• New Playground Structures
			  • Kindergarten - Second Graders

STOP GAP	THOROUGH	IDEAL	

Table 4.1. Comprehensive Master Plan Phasing. By author 2014.

South Entrance and Sensory & Learning Garden

The detailed design of the South Entrance includes the Sensory & Learning Garden(figure 4.45). The design currently addresses aspects of each design goal. The education opportunities can be adjusted for age-appropriate lessons about stormwater management and sustainable plantings. The design improves the site conditions, while addressing needs of the Bluemont Elementary community including parents, teachers, students, and after-school programs.

The design is a natural program elements with a sensory path for children to walk between native species discovering the different scents and textures of flowers. The plants were selected based on the seasonal qualities, hardiness, and cultivation conditions. The plants selected for this area of the site can withstand both drought and mesic soil conditions, in partial shade. The use of plants to slow stormwater increases the volume of water infiltrating into the bed. Along the sensory walk students can observe stormwater drainage as it passes through the garden and under the sidewalk chase into the shallow swale. From the shallow swale the water progresses down to either inground cistern in the Bobcat Garden or the near by rain garden to the east. Near the South Entrance students can experience the cool water as it exits the roof drain nearest the school entrance (figure 4.46). The water flows down an interactive flow form encouraging students to follow the water under the stormwater sidewalk chase down to the inground cistern and out to the open field.

The design address the needs of site as it prevents erosion and provide opportunities for water to infiltrate naturally into the site or be used to water plants in the Bobcat Garden. The Sensory & Learning Garden provides teachers and students learning on plant and butterfly life cycles, encouraging observation as smell, sight, hearing, and touch. A Sensory & Learning Garden opens a multitude of opportunities of learning and social interaction (figure 4.48- 4.50).

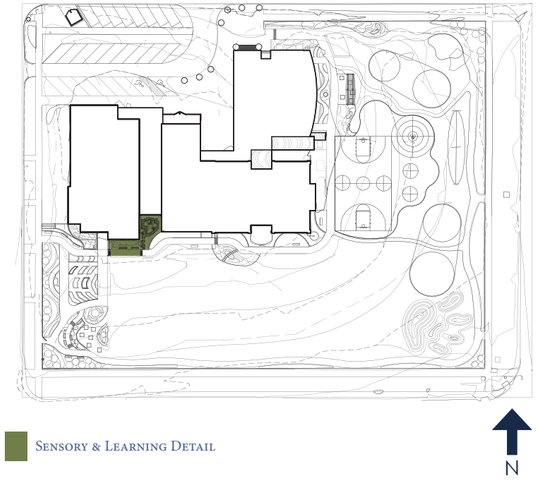


Figure 4.46. Phase 1.1 and Stop Gap Stormwater Solutions.
Design by author, site survey by BG Consulting.

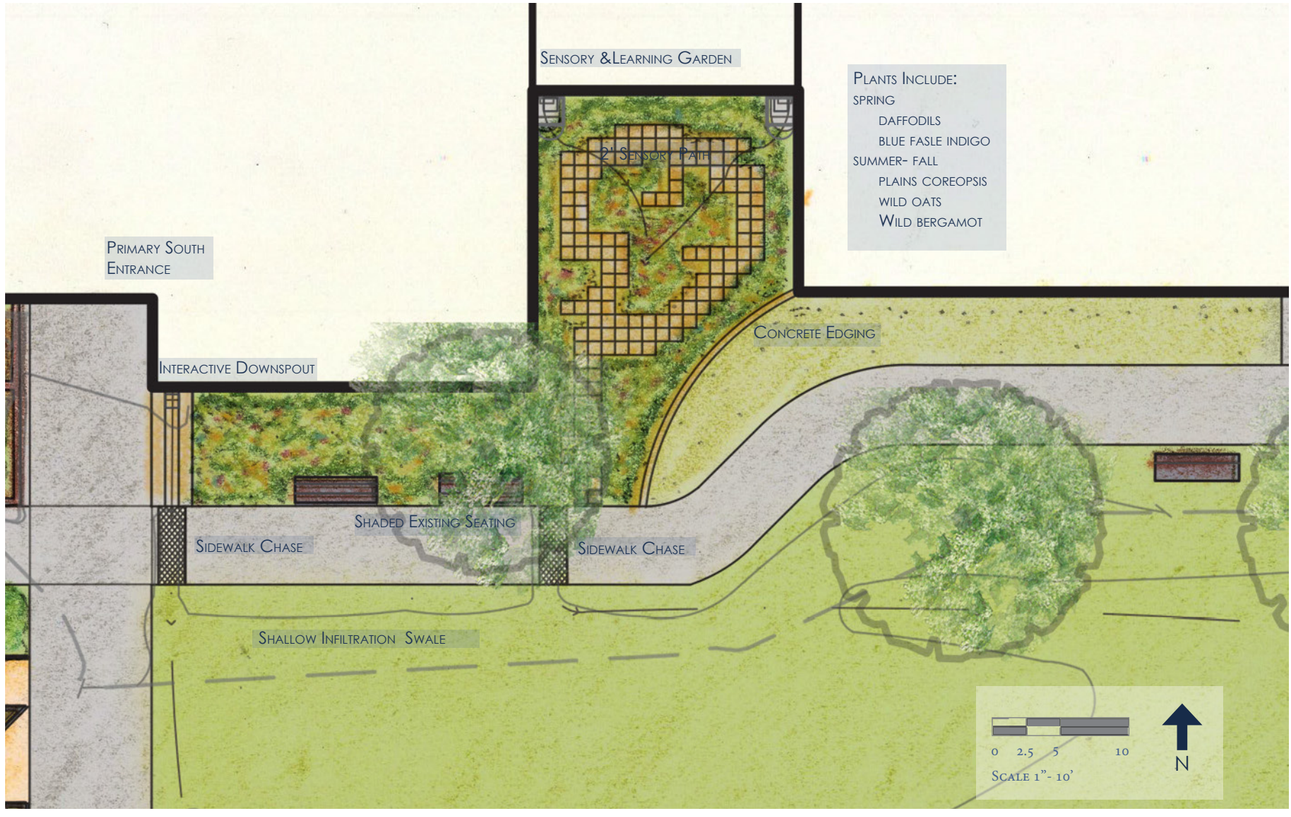


Figure 4.47. Plan: Phase 1.1 and Stop Gap Stormwater Solutions. Design by author 2014.

Educational Affordances

LIFE CYCLE

Insects
- Pollinators
- Butterflies
- Humming Birds

Animals
- Animal Forage
- Habitat

Plants
- Perennials vs Annual Plant

SOIL PROPERTIES

Size
- Slit
- Sand
- Pebble

Moisture
- Dry
- Mesic
- Wet

Supporting plant growth

SENSORY EXPERIENCE(FLOWERS AND LEAVES)

Smell
- Scents

Touch
- Textures

Visual
- Color

Hearing
- Insects and animals

Taste
- Insects and animals

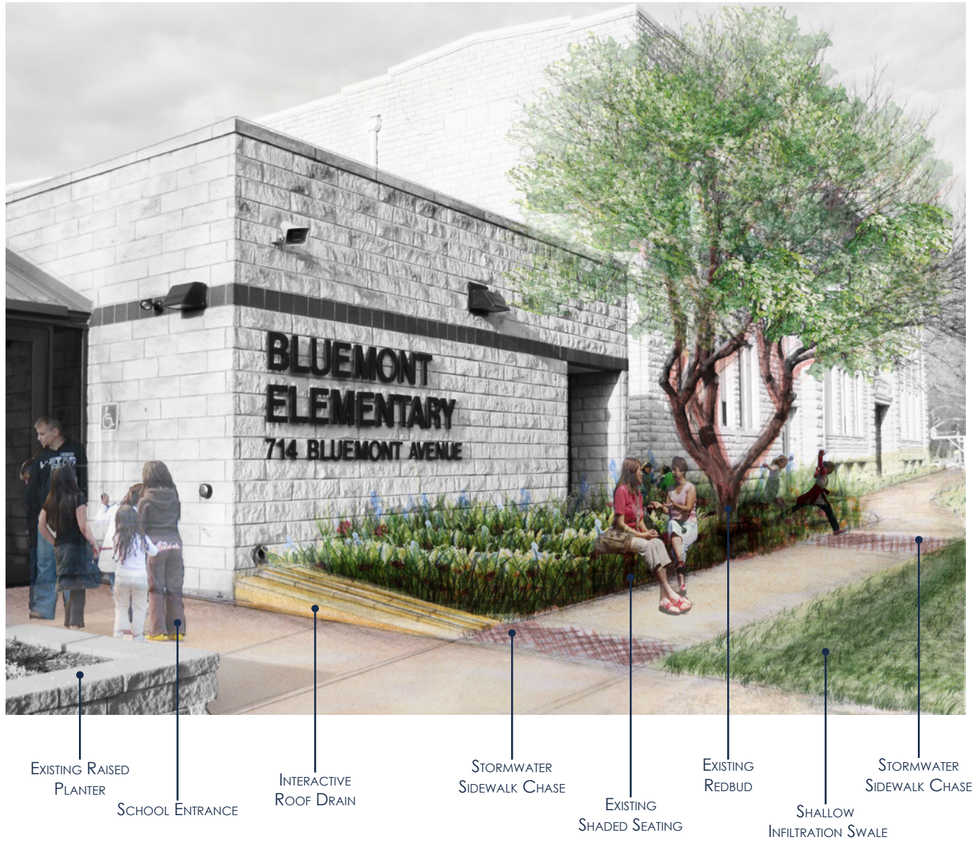


Figure 4.48. Sensory & Learning Garden Interactive Roof Drain. Design and photo by author 2014.

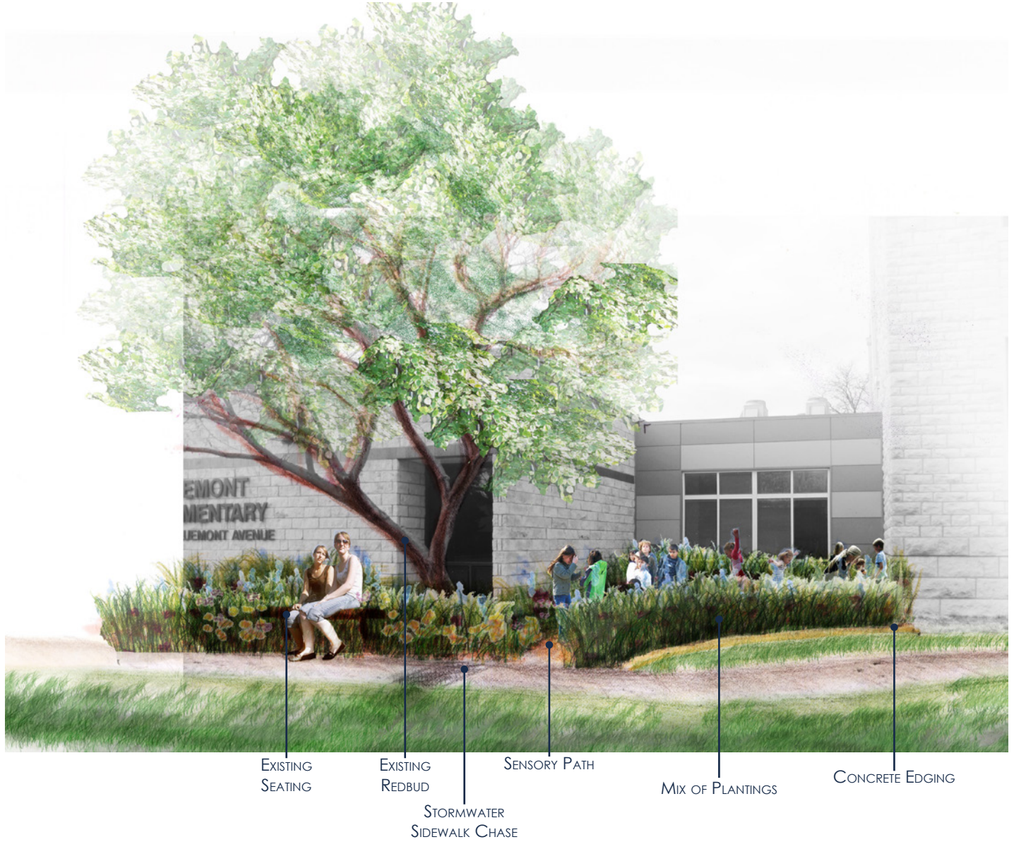


Figure 4.49. Sensory & Learning Garden: Sensory Path. Design and photo by author 2014.

Textures & Scents

Figure 4.50. Sensory & Learning Garden: Textures & Scents. Design and photo by author 2014 .

The Sensory & Learning Garden provides several educational opportunities as illustrated by figures 4.49- 4.50. The Sensory & Learning Garden satisfies several basic needs for sensory exploration and learning science through inquiry.

Butterflies Life Cycle

Figure 4.51. Sensory & Learning Garden: Butterfly Attraction. Design and photo by author 2014.

Stormwater Education

A detailed view of a small portion of the stormwater plan (figure 4.51) shows the elements designed for stormwater education. These elements include an outdoor classroom space with permeable paving, a stormwater sidewalk chase to a rain garden, and an interactive rain barrel.

The outdoor classroom can be used for various discussions on may reveal how stormwater is allowed to pass through the paving and infiltrates into the ground below.

The Rain garden allows students to trace the stormwater flow from the roof drains to the rain gardens and they can practice plant care. Other lessons to be learned include sensory observation lessons, plants and their cultivation conditions, plant care, and plant life cycles. Lessons can be manipulated to encourage age-appropriate activities.

The interactive rain barrel is a large contributor to the plant care lessons. Students can trace the flow of water from the roof downspout to the rain barrel to the flow of water transported by a host to water near by plants. Review figures 4.52-4.54 for a better understanding of the educational opportunities.

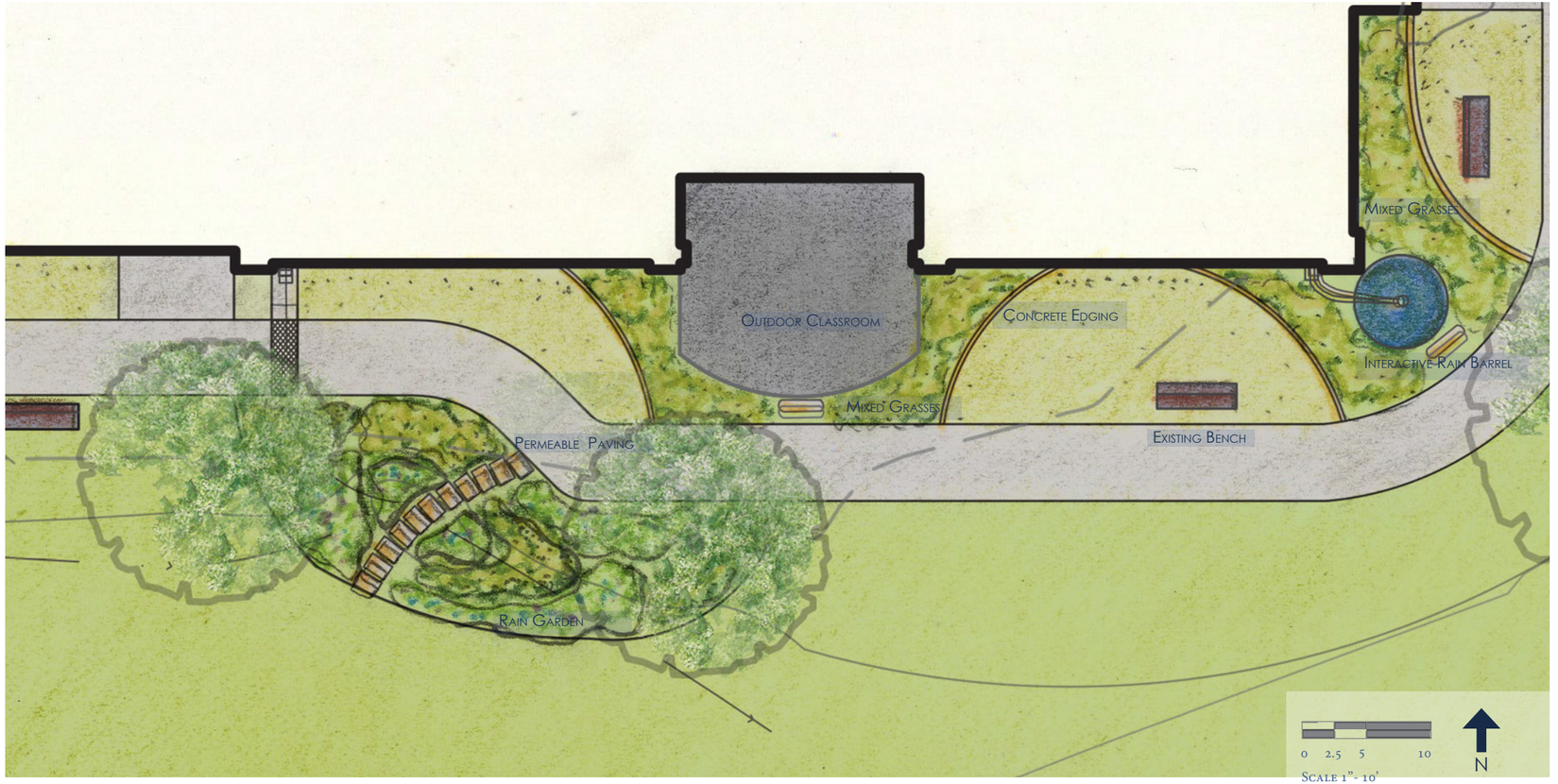


Figure 4.52. Sensory & Learning Garden: Sensory Path. Design and photo by author 2014.

Figure 4.53. Interactive Stormwater Management. Design and photo by author 2014.

Stewardship through Plant Care

Figure 4.54. Plant Care Stewardship
Design and photo by author 2014.

The Sensory & Learning Garden provides several educational opportunities including recycling water through interactive rain barrels aiding the stewardship through plant care.

Interactive Rain-barrel

Figure 4.55. Stormwater Management: An Interactive Rain Barrel.
Design and photo by author 2014.

Benefits of Going Green & Blue

Each element of the Stormwater Management Plan is listed in the center column of table 4.2, Benefits of Going Green and Blue. Through the program elements, I sought to satisfy each of the design goals:

- Provide interactive and education stormwater management solutions.
- Provide a **sustainable ecological landscape**
- Provide **age appropriate playscapes using a combination of natural and built program elements**.

The benefits of going 'Green' and 'Blue' are divided into two types of benefits, site and educational, and lists each element. By focusing on sustainable landscaping and stormwater management, Bluemont Elementary may be come a leader not only in the district but for the surrounding community. As a leader of the community, Bluemont's design can facilitate the education of students and their parents about the benefits of stormwater management, water cycles, and recycling water. With a focus on sustainable landscaping, the school is promoting water conservation, the use of native species, and demonstrating urban butterfly and bird habitats. Its broad variety of elements and affordances may attract families to spend time together exploring the program elements such as the Sensory & Learning Garden.

The potential site and educational benefits are not limited to figure 4.54. Increasing community education will benefit the community, city, and county; possibly opening up funding options for the other design phases.

Going Green 'sustainable landscaping'	Design Elements	Going Blue 'stormwater management'
Educational • Outdoors Classrooms • Exposure to Flora and Fauna, pollinators • Plant Life Cycle, Food-web, Food cycle, • Food pyramid, Healthy life styles • Instilling community Pride • Stewardship of the land • Eco-regions- Flint Hills • Soils Site Benefits • Decreasing Erosion • Achieving Desired Aesthetic Quality • Native Species , Drought Tolerant • Maintenance- reduce mowing, over time water will be manageable. • Reduce site erosion.	Bobcat Garden • Outdoor Classroom(Picnic Area) • Outdoor Classroom (Historic Building Entrance) • Interactive Rain Barrel • Additional Rain Barrel • Additional Cistern • Rain Gardens • Interactive Downspout • Green Roofs(1,2,3) • West Infiltration Lawn • Butterfly Gardens • Sound Gardens • Bio-swale Northside Parking Lot • Parking Lot with Permeable Paving • Asphalt Play Surface Permeable Paving	Educational • Outdoors • Exposure to Flora and Fauna- need for water • Education about the Water Cycle and recycling water. Site Benefits • Rain water is captured and used to water plants on site. • More water is infiltrated on site instead of sheeting water to the streets and storm drains. • Water is moved away from the Building Foundation. • Maintaining Circulation paths, reducing liability. • Decreases site erosion.

Table 4.2. Benefits of Going Green and Blue. Design by author, 2014.

CHAPTER 05

REFLECTIONS

The project began with the overarching research question:

How can school playgrounds be designed to afford children both social interactions and experiential learning?

Chapter 5 reflects on the project holistically yielding thoughts on project evolution, future needs, project limitations, and further research.

Project Reflections

The project research and design scope changed in response to site information gathered through teacher interviews, student surveys site inventory, and analysis.

Through design, the needs of each audience are addressed. The proposed, design phases can be realized through the resolution of future needs. Future needs include funding, communication, volunteers, training, and design consultations.

Project limitations impacted the design scope. Limitations included a need for additional research, site conditions, audience expectations, and time.

The literature review and informed approach methods revealed valuable information about the relationship between Bluemont Elementary, teachers, students, and perceived affordances. I narrowed the research question through sub questions to focus on the specific relationship between child development and affordances.

Potential areas for future research include:

- Expand observations studies to include students' perceived playground affordances over multiple seasons
- Explore the change of perceived affordances influenced by age, development, and cultural surroundings
- Compare the child development benefits of naturalized, contemporary, and constructive playgrounds (eg. Imagination Playground)
- Compare successful educational playscapes using stormwater as a site amenity

Project Evolution

The project evolved to include a comprehensive master plan, detailed stormwater management plan, and design detail of the sensory & learning garden.

The original informed approach focused on observation and site inventory and analysis; the approach expanded to include student surveys and teacher interviews. The additional methods contributed to a cohesive understanding about the site conditions and stakeholder needs. The project focus pivoted one evening after the encountering stormwater issues following a spring storm and snow melt. I adjusted the design scope to address the stormwater issues through creative, practical, attainable, interactive, and educational solutions.

Throughout the design process the Bluemont Elementary PTO and administration maintained focus on the short term goal to improve the aesthetics south entrance. In response, I provided a detailed design packet including existing site conditions, an annotated plan, a plant palette, and a cost estimate. The document facilitated the initial conversation between the PTO, school district's director of maintenance and facilities, and BG Consulting to discuss design, implementation and funding.

The project expanded to address the needs and expectations of each audience. The project addresses Bluemont Elementary's short and long term design goals impacting the site through creating an educational playscape. Developing a design from an informed approach and recording the process complied with the expectations of my master report committee and the dissemination of knowledge to the the broader public.

As the project evolved, it became enriched with information. The report provides design support to the school while demonstrating the value of an mixed method approach.

Future Needs

Phasing of the comprehensive master and stormwater management plan addresses the distinction between short and long term goals. I prioritized each program element to fit within a twenty to fifty year span. Phasing is intended to facilitate the discussion of Bluemont Elementary needs to the district, PTO and the surrounding community.

Each phase needs substantial funding prior to installation. Potential funding includes private or government grants, fund-raiser events, private donations, the School District budget, city of Manhattan, or a partnership with the Boys and Girls Club. Each funding options requires substantial communication between Manhattan-Ogden USD 383, current members of the PTO, surrounding neighborhood, BG Consultants, and the teachers, parents and students.

Volunteer manual labor is a cost effective solution for the installation and maintenance of the proposed design; however, additional support is needed at a school district level. Volunteer training provides plant care and cultivation education. Volunteer education can reduce plant replacements and increase plant care efficiency. Educating volunteers facilitate the healthy vegetation growth and contributes to increasing community knowledge about native plant habitats.

Phasing over twenty to fifty years will require consultation with a landscape architect, engineer, or designer to create details of the proposed design phases or update the master plan as new needs arise. BG Consultants, the school district and Bluemont Elementary are currently discussing proposed stormwater solutions portrayed in this report.

A post evaluation of the installed design may prove to be valuable to Bluemont Elementary and the School district. A post evaluation can call attention to the educational benefits and set a precedent for the school district. A post evaluation also encourages adjustments to improve the design function. Understanding the design benefits through evaluation may increase funding opportunities.

Pending available funds a portion of phase one will be installed during Summer of 2014. The PTO are funding the installation of the proposed design for the South Entrance and Sensory and Learning Garden. The School District through budget funds are financing the removal of sand, installation of play turf, and asphalt resurfacing and painting of the “asphalt activities”.

The goal of this report is to facilitate the continued communication of needs and wants to improve the school grounds to the benefit students, teachers, and the community of Bluemont Elementary.

Project Limitations

Throughout the project research and design, I encountered multiple limitations, including protecting student anonymity, observation variables, survey question and answer process, teacher interviews, and site conditions .

Students under eighteen presented several limitations. In order to complete observations and surveys, I had to comply with restrictions preventing direct interaction with students and restricting use of photography, video, tapes, and other identifiable information. Observation and surveys were approved through the Bluemont Elementary administration and the K-State Institutional Review Board.

Passive student observations informed me about existing site conditions by students, unfortunately was limited by the weather, length of recess, and grade recess overlap. The weather limited observations from a week to four days. The weather also impacted the games students played as half were bundled in coats. The length of recess was short and overlapped with other grades interfering with connecting the activity and social interaction to a student's age. Annotated observations were limited to the activity, location, and number of students involved. My point of observation on the north portion of the play area restricted my observations to activity by visual recognition.

The survey was limited to four question due to project time restrictions and the attempt to keep the survey simple. Additional clarifying questions could have provided information about affordances perceived by students. A limited time frame prevented extensive comparisons between the survey results, including additional diagrammatical comparisons of gender preferences for each question. Limited to black and white, surveys were supplemented by projected images. Despite the limitations the still survey results provided valuable information about the site.

During teacher interviews, the responses for activities they teach students outdoors was limited. It might be beneficial to have an outdoor classroom workshop and then discuss other outdoor teaching opportunities.

Limited by the scope of research completed in a semester, my knowledge base was limited in regards to child development. The literature guidance and discussions with committee members increase my understanding, but not to the level of an expert.

Designing for a budget is a limiting process. The budget required additional phasing for the interactive roof drain. Not only does it challenge creativity, material selection, and installation.

The final limitation of the project includes the site conditions. The lack of topography and stormwater drainage cause a change from the original project direction.

The limitations aided the defitniton and structuring of the project throughout the design process. Occasionally limitations can lead to a stronger design.

Areas for Future Research

Several areas for future research were inspired by project limitations. Future research opportunities include additional student observations and surveys, comparisons of child development and affordance perceptions, comparisons between contemporary, naturalized, and constructive playgrounds, and reviewing successful stormwater amenities in schoolyards.

Seasonal Use

By expanding observations and surveys to collect additional information about playscape affordances in relation to a student's perception and their development. Possible methods to explore this includes a more thorough survey inquiring about how students use different playground elements using video clips in place of images. A second method expands passive observation periods to include each season and each recess in a day. The expanded study could provide information about how play changes through the seasons.

Influences of Perceived Affordances

S.H. Lee compared traditional, designed contemporary, and natural playgrounds in regards to the level of challenging play and safety (1999). A comparison between the specific affordances perceived by students could facilitate the development of a framework relating playground elements to the type child development. Future research could focus on connecting the affordance with types of play and social interactions. It could be interesting to compare the specific affordances provided by each playground in relation to the skills children develop.

Successful Educational Playscapes Utilizing Stormwater

A study exploring successful integration of educational stormwater amenities into the schoolyard. The study would illustrate the educational benefits of stormwater playscape amenities. A study of precedents should provide solutions based on stormwater volumes as the average rains vary state to state.

Each area for future research incorporates the exploration of child development, landscape affordances, and students.

Conclusions

Through the research and design process, I learned about the research process, site design, working with stakeholders, landscape affordances, and child development.

While using an informed approach of multiple methods to collect stakeholder input was tedious, the information gathered provided a strong base for design. I was able to justify each the placement and selection of each design element.

Student surveys showed students are attracted to images of activities they have encountered or actives not available within their playground environment. Students are drawn towards play structures for climbing. Play structures are often used for tag.

Through design we can guide the uses depending on the placement and design of an element. Designed elements are placed strategically with a specific affordance in mind; however, the actual affordance of an element is determined by the students' perceived use. Any element in a students, immediate environment, including benches, become a part of play. Teacher supervision can help encourages appropriate and safe use of play structures and elements but, it can also restrict play.

Educational elements can be incorporated into the site's landscape to supply teachers and students with learning experiences. Education elements can range from equipment to plants or even water found on site including stormwater.

Stormwater can become an artful amenity instead a liability. As an educational tool use can be tailored to create an age appropriate lesson; for example, the interactive rainbarrel: one class may use it to discuss the water cycle, while another may use it to encourage plant stewardship.

Also by creating a variety of elements the site is enriched by numerous potential affordances perceived by students. Affordances may not always be apparent. With a little guidence teachers can influence safe and age-appropriate activity. In order to encourage a valued experience from play, students need safe age-appropriate elements supporting the opportunity to hypothesize, test, and reflect an element's affordance.

The designs produced during this project provide Bluemont Elementary with material to start a new conversation between the school, PTO, School District, and the City.

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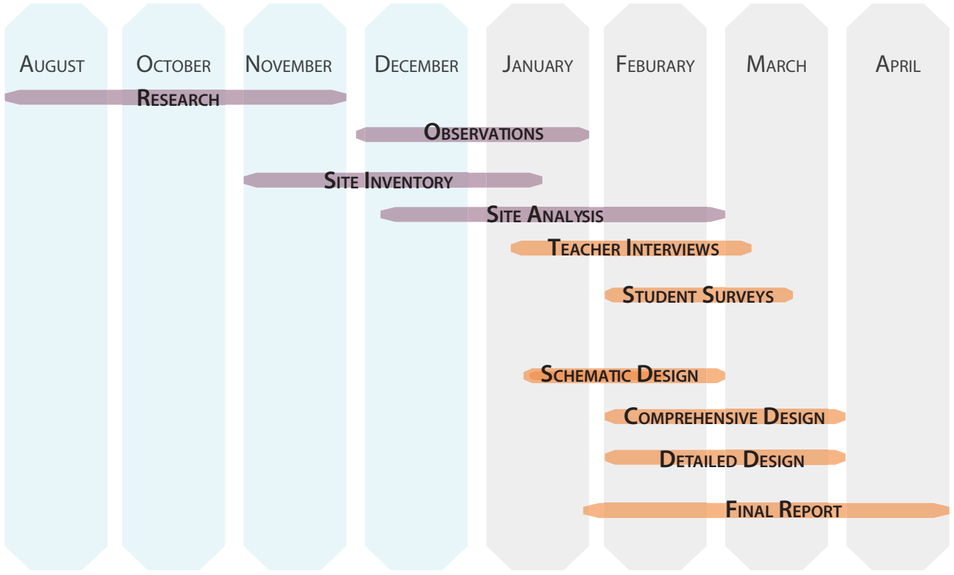
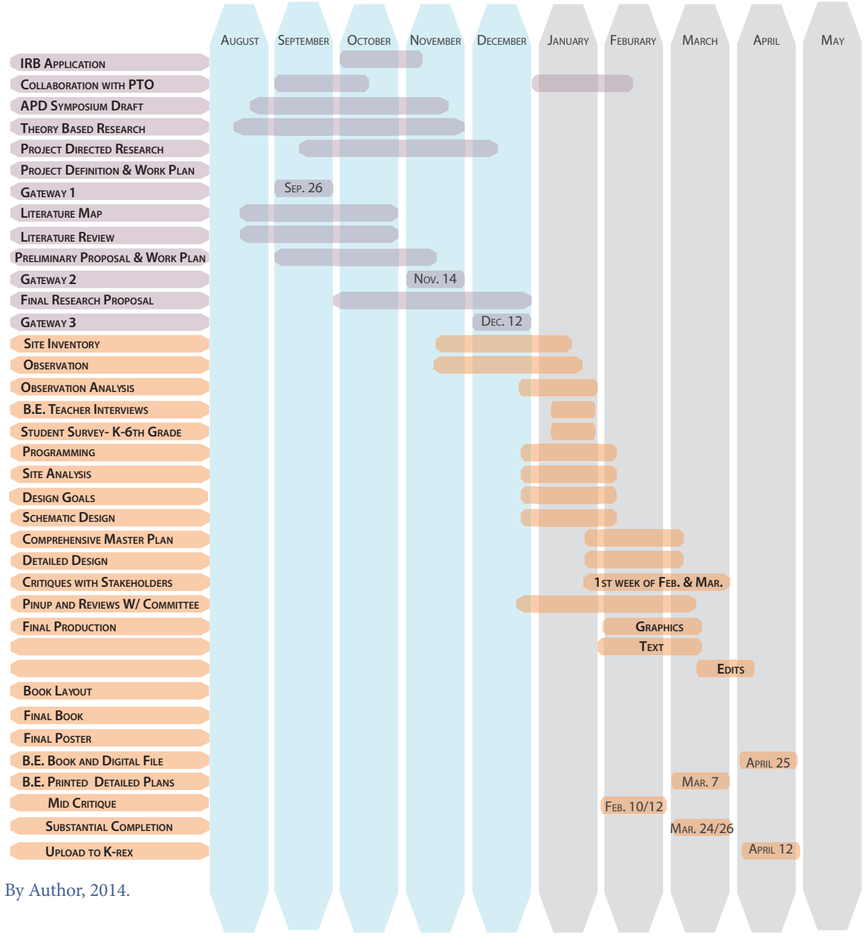
APPENDICES

APPENDIX A

PROJECT SCHEDULES



A.1. General Project Schedule. By Author, 2014.



A.2. Detailed Project Schedule. By Author, 2014.

APPENDIX B

OBSERVATION RECORDS

Monday				
Date: 16 Dec 2014		Temperature: 62F		
Time	**# of Kids Involved**	**Activity**	**Field Locations**	
		Tag		B
		Swing Contest		A
11:45:00				
	9	Playing tag		C
	1	Recess Timeout- walking the path		A
	2	Swinging		B
	7	Foursquare		B
	3	Playing on Equipment	A1	A
	2	Chalk-Drawing on sidewalks		A
11:30:00		A 4th joins field Activity primarily uses the slide (bar)		A
11:52:00				
	11	football		C
	1	Walk aroud timeout path		A
	10	Foursquare		B
	2	Sitting on sidewalk talking	edge between A&B	A
	2	Tag		A
	4	next to teacher under tree		
	3	kindergartners		
	3	pretending		
	7	pretend/tag- being chased		
	1	solidary next to 3		A
		Tag		
	2	Swinging- teacher give 3 pushes		
	10			A
	2	playing in the sand		
12:00:00				
	4	sand		A
	7	tag-benchbase		A
	5	Swing		A
	1			
	3			
	4			
	10			
	7	Tag		A
		Hanging with teacher's help	A1	A
		sliding		A
	4	playing on monkey bars		A
	1	industrial collecting leaves on a stick		A
	5	playing in the sand- groups of 2 and 3		A
12:05:00				
	8	playing in the sand		A
	2	swing/push		A
	4	run between swing(hotlava-6)		A
	1	leaves-1 stacking leaves spurs another to collect pine needles		A
	4	tag with capture		A
12:11:00		students stopped from runing between swings		A
	3	sunlight 3		B
	1	laying on a bench		B
	7	football field		C
	4	Large 9		A
	1	play with mom and sister?		A
12:17:00				
	5	playing tag		A
	3	boys swinging		
	1	girl- plays on	A1	A
	4	swinging- jump out of swings- 1 pushes- full out of swing		A
	1	boy try to climb up slide		A
	1	Sand		A
12:26:00				
	2	w basketball- 1 follow		A
		Football		A
	2	wrestling in the sand		A
	1	kicks sand as she walks around the		A
	2	pretend play- big monster		A
	1	laying on a bench		C
	9/10/2014	Football		C

B.1. Observation Results: Monday Lunch Recess

Tuesday		
Date: 17 Dec 2014	Temperature: 52F	
Time	**# of Kids Involved**	**Activity**
11:40:00		
	6	Football
	2	playground-sitatop/climb up slide
	2	swinging
	4+2	Foursquare
More kids comeout		
	1	Dancing
	3/ 3 older +1 Younger	2 older talk & Swing/ 1 younger Swing sideways
	3	sitting on bench/ yell after a squirrel
	2	foursquare
	4+7	mid court Foursquare
	1+1	1 runs around pole/ 1 swings talking to eachother
	4	Sit Uptop/1 Down low
Another class		
	4+2	play powerrangers
		Football
	5	sit under tree
	1	on bench near school
More _?		
	3	play in sand
	4	on swings- 2 together/2 solitary
	6	On swings
		Multiple games going on at
	2	climb up spiral
	7	Tag
	1	on slide by self
	4	playing tag,easy way run downslide?
	15	play football
	1	sits by tree/teacher
12:01:00	Class lines up	
12:04:00		
	2 girls	touch observer"touche"
	4+7	Foursquare
	10	Tag
	3	dancing in westside
	2	Shootbaskets south hoops
	3	Swings- 2 swings+ 1 twists
	4	play in sand- 1 gets hurt
	1+1	steals hat/other gives chase
Four teacher oversee		
12:07:00		
	2	play in sand next to swings
	1 boy	hits tree bark near
12:01:00	Class lines up	
12:04:00		
	2 girls	touch observer"touche"
	4+7	Foursquare
	10	Tag
	3	dancing in westside
	2	Shootbaskets south hoops
	3	Swings- 2 swings+ 1 twists
	4	play in sand- 1 gets hurt
	1+1	steals hat/other gives chase
Four teacher oversee		
12:07:00		
	2	play in sand next to swings
	1 boy	hits tree bark near
12:08:00	2 classes line up	
	1 +6	laying down+ 6 run around(tag) C
	3	Walk around pole C
	3	tag/1 chase C
	3 boys	play in sand A
	5	hide/seek/tag A1/A2
	3 - 4	slide down spiral A1
	4+4	foursquare B
	2	Shoot hoops B
	1 +1	older girl tries to teach younger boy how to swing
	6 girls?	
12:13:00	Kindergarten go inside	
	1	swings B
	1+5	roles on ground/jumps over/hold hands & move in a circle/ spin in 2 groups C
	7	foursquare B
	2	still play basketball B
	2	girls walk & talk A/B
12:17:00	more kids come out (1st&6th grade)	
	2	play catch A
	4 kids	A1 spiral-tag bench is base A
	2	Swings individual play A
	9	gather round /2 climb on window A2/1 watches/talks
	3 girls	basketballs/dribble/shoot/talk
	2	Swings B
	6	girls-circle/giving eachother piggy backrides C
	2	lays in the sand (acts like dogs) A
	8	Foursquare/kids like up to play cheer& comment
	3	Climbing on A1
	5	push&shove
	2	sitting in the window A2
	4 - 5	push and tackle wrestling
	2- 3	Football moved to sand A
	5	play football C/B
12:26:00	Class goes inside	
	1	eats?
	3	play football A
	2	pile sand between PE/sandpile/dig A
	1	climbs up slide/1 atop growls A
	4 girls	
	1 girl	shooting baskets south hoop b
	3	playing dogs
	8	play football C
	3	play football A
	2	play tag/chase A
	3	guard tower acting like dogs A1
	4 -5	play tag
12:31:00	Younger Class lines up	
	3	basketballs/ shoot hoops
	3	stand& talke- 1teacher& 2 students
	1	sits on bench C
	8	play football C
2:30:00		
	9	Playing games with rules C
	4	Chase/Tag B
	3	Keep away A
		hiding in the sand A
		sand on A2
	3	limbo A-pretending(family)- props/2nd graders A
	3	A2
	1	Active play /Individual A1
	1	2nd grade boy/ individual play resistant
2:33:00		
	12	
	3	Tag AB
1 + 1		Shooting hoops/ dribbling
	1	individual play A1
		Tag moves to /base bench B
	1	individual play A1
2 - 5		Soccer C
	6	Huddle B
	2	foursquare+young girl+ teacher B
2 girls		dribbles
		Slides useful for fast get aways
		swing for 2 minutes
		Buried a ball in the sand/is dribbling 5 minutes
	6	1st/kndg
	2	play catch/with kickball
2:41:00	1 girl	upside down on bars A1
2:43:00	Another Class Join the Playground	
1 boy		Dribbles & Shoots C
	9	Foursquare B
2:44:00	Kindergarten Joins Playground	
	6	Sending Hot wheels up & down slides
	1	plays in sand (sulking admits to throwing a fit)
	5	Football C
	2	multiple balls soccer B
	7	playground equipment A1
2:50:00	Class Leaves	
2:51:00	Another Class Leaves	
	6	play foursquare
	3	Slide A1
	2	Play in sand A2
	1	Napping on bench
	1	Slides headdown 1st
		Kindergartner- tag/ - sit when lining up to go inside
3:00-3:08	3	Swinging
2 +1		2 disagreement + 1 Observer
	9	Football- kicking balls/various games w balls B
4 - 5		House- tag A

B.2. Observation Results: Tuesday Lunch & Afternoon Recess

Wednesday

Date: 18 Dec 2014	Temperature: 69F		
Time	**# of Kids Involved**	**Activity**	**Field Location**
2:06:00			
	1 Male-Teacher/2 playing /3 observers	Foursquare	B
	1	wanders and interacts with foursquarers	B
	8	kicking/throwing/catching balls	C
	3	Playground equipment	A1
2:08:00	A class goes back inside		
2:18:00	2 +1=3 +3=6	Running/Racing=link hands run in circles/in aline/ smaller groups of three/ spin in circles/hold hands and move back and forth	C
	2	boys shoot baskets	B
	4 player+ 4 Observer/waiting	foursquare	B
2:30:00			
	1 girl	Mopes by self in the swing/ called over for discussion/appoligies/allowed to play again	
2:31:00	1st/kindergartners comeout		
	1		A2
	2	swinging/kicking- branches	
	1	girl laying down 6 circle/dispurse/girl laying down chases	C
	4 boys	playing catch	
	1 boy	joins the basketball shooting	
	2 girls	Next to the building(talking and playing w/ chalk)	A
2:35:00	Another Class Comesout		
	2 +1	share candy +walk and talk	A
	1 girl	swings byself	
	1	older group foursquare	B
	3	1 group younger foursquare	
	1 girl +1 girl	Watches then engages-talking the girl swinging/ begins pushing	B
2:38:00	older class goes inside		
	4	sit and talk by swings	B toA1
	9	boys football- kick, throw,catch	C
2:40:00	another class comes out- whole class does one lap around A		
	3 girls	behind trees,boy tries to scare	
	1	group / race downslides	A2
	4+1	foursquare	B
	2 boys	Strategy/pretend play	
	1 boy	sits on the top of the monkey bars	A1
	1 boy	sits with teacher	B/C under tree
	1 girl	has paper/works	A
	2 boys	skips while doing laps	A
	3 boys	hiding together/pretend play	A1
	5 girls	talk to teacher	
	1 girl	sits at the top of the slide-involved in 3 person tag	A
2:47:00	Another Class comes outside		
	8?	play tag	A2
	2+1	draw strategy in the sand	A
	2 girls	swing together	
	1 girl	plays with ball+ another kid stops to talk	
	2 girls + 1 boy	swinging get pushed by teacher	A
	1 boy	Shoots baskets	B
	1 girl	dribbles	B
	2	foursquare	B
2:51:00	1 class in 1 class out		
	2 girls	Dig in the sand	A
	1 teacher + Students	try to push in swings	A
	4		
	1 girl	shadows/questions researcher	A
	1 boy+3 girls	sand, creates a hole, bed with sand pillow	
	1 girl	try to push two kids/switch places boy pushes girl 5	
	boy	tries to leave path,sees me watch	
	6	playground equipment/pretend play	A1
	1+ 4	swings/hanging -slide	A
	2 + 2	swings+ push	A
	2 +1	shooting basketball+ 1 boy kicks it	B
3:00:00	Class Lines up		
	2 girls	play catch	
	6	play equipment	A1
	3+1	Tag on red thing with holes	A2
3:02:00	Another Class Leaves		
	2 girls +1 boy	Playground play house	A1
	1	makes sound by klinking a rock on	A2
3:05:00	Class lines up		
	1	plays on broken musical clinker	A2
3:06:00	Class lines up		
	2 boys	comeoutside by self- return inside after teacher/para instructed their return	

B.3. Observation Results: Wednesday Afternoon Recess

Thursday

Date: 19 Dec 2014	Temperature: 59F		
Time	**# of Kids Involved**	**Activity**	**Field Location**
11:40:00		Tag/Race- tree is base	C
11:42:00	1st Group Leaves the Playground		
11:45:00			
	6	foursquare	B
	2	Swinging	B
	6 -14	Football	C
	1	walking laps round	A
	2	sitting	
	3	play	A2
	1	sitting on bench moves toward C (solitary play)	
11:50:00	New Group Comes Out		
	2 - 3- 4	swings	A
	4 +10	foursquare 4 participants+ 10 observations	B
	2	tag	B
11:54:00	talk with a teacher about the playground		
	5	plays equipment	A1
11:56:00	Another class comes out		
	2 -3	Climbing	A2
	3	play in sand	A2
	10	foursquare/ older take younger	
	6 -8		A2
	1	Swing	A
	3	Swing	B
	3	talking out problems	A
11:59- 11:45	Students line up for lunch		
	3	Kids dancing	B
	1	plays W Observer hiding behind	A
	4	swing near but not with	
	2	walking laps	A
	2	Filing a bag of sand /move from swings to fill a plastic bottle with sand	A
	7	Drawings/observing someone draw 1 observer/3 coloring	A
	3 boys	playing in the sand	
	6	tag	C
	3+ 1	3 push/ 1 swings = swings wonky	A
	4	dogpile in sand(2 boys wrestling)	A
	2	standing sticks up in sand & fill bottle with sand	
	6	tag- take chase after one another	
	1	little boy asks what observer is doing	A
	2	tag	A1
	5	slide 1 asked to move away from bottom of slide by teacher	A1
	2	basketball	B
	2	basketball	
- older kids not allowed on A1(3rd& up Not allowed on A1/A2 when K-3 is on it)			
	4 +3	play foursquare	B
	5	playground equipment	A2
12:13:00	Kindgarteners leave A empty		
	4 + 2	foursquare	B
	3	pretend play	A
	2 boys	Shoot baskets	B
	2 girls	near by actively observer	
	2	From wandering and talking/swings B/ Bench	C
12:17:00	More kids		
	1	swing, another talking together/ wonky swings/singing	A
	5	Tag	
	2		
	6	younger kids join foursquare	B
	4	Boys kick a basketball around	A
	4	Grabbing leaves & throwing & running	C
	1	eating next to tree(solitary?) joins ativity	A2
	3 +3	tag between +ask to join	A2 -A1
	1	hangs on monkey bars	
	3 + 1	Swings	
12:23:00	5th/ 6th came outside		
		Begin game of football	C
	2+2	observe+race downslides	
	2	still swing + sing together/moves to A1/perform for teachers/" some day i'll be living in a big old city"/ Line up sing it to 1 girl + 2 boys	
	1 solitary		
	1 girl + 1 boy	play in sand	
	5 girls	playing on playground equipment	A2
	4	Tag	A2/B
	4	play	
	2	huddle for warmth near by	
	2	play karate	
	1	plays by self & continues to build	
	5	Pretend play together	
12:31:00			
	1	Shoots basketballs	
	14	plays football	
	1	laying on a bench	
	3	talking with teacher/para	
12:35:00	line up for lunch		

B.4. Observation Results: Thursday Lunch Recess

Thursday- Afternoon Recess			
Date: 19 Dec 2014	Temperature: 59F		
Time	**# of Kids Involved**	**Activity**	**Field Location**
2:00:00	1	student builds a castle	
Another Class Joins			
	2	Play football	
Foursquare is blocked off to be repainted			
	2	Girls playing in the sand	
	3 -4	Walking around	A
	1	Swinging + Hanging from Monkey Bars	
	4 girls	play in the sand_associative play	
	2 girls	construct/dig together	
	6 students		
	2 - 5th/6th graders	shooting and playing basketball	
	7 students	Watch the foursquare has been painted	B
2:13:00	Kindergarten, return to class		
	2 girls +1	playing in the sand-digging	
	6	play tag	
	1 girl	Sweeps to help clear ground for a second foursquare	B
	3	Older kids play tag	A
	4	Kids on Benches	
	6 or more	Playing Football	C
	2	play kick/catch with kickball	C
	2	run around older	A
	2	Pretend bad guys	
	1 girl	Scoots on ground/ sand	
2:19:00			
	1 girl	skoots in the sand around	A1
	10	Playing Football	C
	8	Tag	
	6	Tag Older	A1/A2/ Around A
	1	Pencil & Paper on swings- Drawing and Observing	A
A Teacher Paints			
	3	Observe and runoff to get a ball	
	5	More to observe the painting	
2:24:00			
	5	Swing(who can swing higher/ trying to touch pine needles)	A
		1 starts Swinging Sideways /4 girls/ 1 boy swing on stomache	
	A different Girl	Sweeps Off the Concrete for Paint	
A girl originally sweeping is rewarded & get to pain second foursquare			
	11	play Football	C
2:29:00			
	Girls switch swing and talk	Begin to twist/a girl pins discussion walks from	C
	2 girls	talk by A2	
	2 girls	work together to paint	
Teachers take pictures of progress			
		Moves from swings to bench by them C/ lays down	C
		Everyone moves Forward	C
	2 girls	Stop to Observe& talk to girls painting	B
2:34:00			
	1	Shoots Basketballs	
	1 girl	sweeps	
	2 girls	work together to paint	
	2 girls	Kick soccerball	
	11	2 footballs/catch 500?	
	1 girl	retreives ball	A
	2 girls	talk as on hold a ball and the other sweeps the path around A	
	1 girl d	dribbles a basketball	
	2 girls	Kick balls across B	
	Teacher touches up paint lines		
2:41:00			
	1 girl	still sweeping	A
	2girls	swing and talk	B
	2	dribble basketballs	B
	1 boy	Still lays on a bench	C
	2 girls	Paint Foursquare	B
	8	Playfootball	C
2:44:00			
	girls start working on the 3rd Foursquare(switched tasks_1 paints other moves bucket		
	2 girls	talk and Swing	B
	1 boy	still laying on benches C	
	3 girls	Shootbaskets/ move to swings= 5 on swings	
2:46:00		new class of students come outside	
	Class starts off with a lap around A		
	4	discuss game rules	A1
	1 boy	Swings	
	3 girls	jump into sand	
	1	continues to walk around	A
2:51:00		3rd grade? come outside	
	3 Boys	Tag	A2
	1	plays music instrument	A2
	3 girls	compliment older girl on her signing_ passes of broom to younger	A1
	3 boys	Spiral	A1
	1 girl	Shooting basketball with a kickball	B
	4+3	Teacher encourages/ starts a foursquare game in the corner	B
	2 girls	Sweep path around A	
2:57:00		Another Class comes outside	
	2	play on the monkey bars together	
	1 girl	with paper & pencil	
	1	Basketball	
	2 girls + 1 boy	boy tries to scare girls... ends up in a chase around	A2
	4	try to start Double Dutch?	
	1 girl	sits by herself	
	8 - 10	Football	
	1 girl	A different girl sweeps around	A
3:03:00			
	4+3	Foursquare	
	1 girl	Stands in teh NE Corner	
	3 -4		
	1 girl	paper/ pencil observing/ journalling	
3:07:00	3rd grade lines up		
	12	Football game	
	4 +2	game of foursquare (Teacher enforces rules/plays)	
	3	individual jump rope/ 1 teacher + 2 students	
3:11:00	2nd Graders line up		
	1	still writing /drawing/ observing	
	1 girl	practies monkey bars/ shows off to teacher	
	1(6)	lays on slide_sits backward	
	teacher +3	Jump rope	
	6	3 footballs(running /screaming/ playing catch/	
	Teacher(5th grade)	helps turn the jump rope	
	2 girls	try to jump rope	
	2 boys	try to jump rope	
3:16:00			
	1 +1 girls	wants to learn what the other is writing	
	1 girl +1 girl	swings high	B
	2 boys	play individually on / near	A2
	6	Football	
	1 boy	dances with jumprope + girl	
	1 girl	dribbles basketball	
	1 girl	Sweeping- talks to Observer	
3:20:00	Another class comes outside		
	7	Footballl	
	3+ 2	foursquare	
	2	play in the leaves/throw at eachother	
	2 boys	Pretend fighting	A2
	2 girls+1 boy	2 turn 1 jumps..teacher joins	
	2 girls	sit on bench, 1 has the notepad	
	1 boy	shoots hoops	
	1 girl	playing in the sand fills up her shirt	A
	2 boys	play on equipment	A2
	3 boys	with balls	B
	1 boy	Footballl	B
	6 Boys	Footballl	C
	1 boy	pushes the ball in the sand to make a path	A
	1 girl	Hangs upside down on Monkey bar/ rides spiral down	A1
	6 boys	copy her	A1
	1 girl	Climbs up slide	A2
	5 boys	play together	A2
	2 teachers	turn rope for student	B
	3 boys	Footballl	
	4 boys	Footballl	
3:33:00	mrs. Chitwood Second grade - lines up to go inside		
3:37:00	finally go inside		

B.5. Observation Results: Thursday Afternoon Recess

APPENDIX C

INTERVIEW RESPONSES

	Statements
	Bluemont Elementary Principal
1/17/2014	if sand is remove a feature that has sand(near tot he equipment for teachers ease of overseeing
	Have great Teather ball poles but the disappear/get lost/ stolen
	Sixth graders only get recess once aday thus they tipically play fooball/soccer, girls talk on swings or play Basketball/ maybe join the boys game
	Maintanence Kieth Nold- kathy is sending an email- Rotation Among Schools Improvements
District Changes	Corners along Bluemont Avenue- are hazardous anyone could come in during the school day...Most visitors park along the street or vattier
Removal of Sand	Wouldn't be disappointed if the corners were closed.. drill can be rerouted to the Prespetierian Church at 9th
Repaving the Court	Hazard(fencing) attracts creepers and kids want to chase balls that fly into bluemont
$80000 worth of work	Signs for School Times
	Water source on the Eastside
	P.E. & Recess may overlap in same spaces
	1. Promoting physical fitness, health, wellness
	2. Brain breaks
	3. Social development
	4. Character-team building -Taking Turns Good Sportsmanship
	A play sand area, small area for shovels, buckets/ etc, sensory
	Other sensory areas? not sure what.
	Option of organized play versus(soccer field) Individual setting(swings)
	Would love a walking trail... may be along the inside of the entire fenced in area

C.1. Interview Responses: Bluemont Elementary Principal. Recorded and transcribed by author, 2014.

	Second Grade Teachers
1/22/2014	2nd grade has signed up to recieve their butterfly kit on April 21st- kit is shared between the two 2nd G. Classes
1 Teacher	Other science activities include: Lifecycles in general- meal worms, chicks, ants(ant farm)
	Sand/ pebble/ silt unit(maybe other materials)-
	Concerns- sand on sidewalks and asphalt make the surface slippery
	There is not alot of affordances that initiate the senses
	K-3 use the equipment at the same time-
	likes the spongy surface-but has found metal in it(concern for children falling)
	Circle around the equipment is used as a timeout- 1-2 minutes in trouble=1-2 laps sometimes kids maywalk the whole recess(possibly something away from kids playing?
	Kids Love to use the Sidewalk Chalk
	possibly use sand to create etcha sketch/drawing with sand/ contained sand
	Benches are placed along the edge- not placed well for watching students- teachers usually stand
	Class size Averages 20-23 students
	1st grade does a unit on plants
	if the olderkids are not out the boys will play football or on the
	Resources are limited for balls, jumpropes...typically varies by class-Storage out doors? often donated or brought from home(used only at morning and afternoon recess)
	Foursquare- when the lines disappear...rules are challenged and causes fighting
	Lunch recess is caotious

C.2. Interview Responses: Second Grade Teachers. Recorded and transcribed by author, 2014.

	Boys and Girls Club
Boys & Girls Club Director	Black top games- sidewalk chalk, Basketball lines, foursquare lines, hopscotch(not as much)
	Students need a place to hangout(ie willow huts)
	Imagination blocks Looked amazing but storage would have to be outside for ease
	Likes the idea of Sandboxes
	Expressed interest in using outdoor classrooom spaces
	Students get dropped off in the parking lot infront of the door(B&G Club Entrance)
	Olderstudents need a place to hang out (of their own away from underclassman)
	G&BClub- Socialization, learning projects, technology(ipads), Relays
	Summer programs 40-80 students potential
	Summer gardening, previously used community garden plot, would help maintain, create areas specifically for eac class?
	Nature(sound- would beexciting on the playground for a time- use during quite/relaxing more peaceful with interactions between children are more thoughtful)
	- Need space to RUN-directed running?
	Prioities...Removing sand that is causing injury
	Would utilized and emphasize outdoor learning- soucial ragtime, relatiation/ hangout/ active games
	Largest groups range-22-25/15-18
	Doesn't anticipate needing seating
	Gardening anticipates doing alittle bit of everything

C.3. Interview Responses: Boys and Girls Club Director. Recorded and transcribed by author, 2014.

	Kindergarten Team
Three Teachers	***Lessons***
	Life Cycles- Fall (Sept- Nov) Introduction- Spring(Review)
	Nature Walks- talk about plants and Animals
	Raised gardening beds with plexiglass/ with side covers(to uncover- show root growth)
	Birdhouses without backs-(see how animals live family styles)
	Natural Conservation(some kids kill bugs without considering)
	Use plants to watch insects
	Natural Life cycle of a giant Sunflower- Creating things kids can take home with them.
	How do we get kids to Explore more?
	We have to teach/encourage kids to put their hands in the sand and dirt.
	Playing to theSenses- bringing in visual, touching
	Herb Gardens- Lilac, Mint, basil
	Cooking with the class
	(currently brings in window boxes, plant seeds marigolds, and watch them grow with in the classroom)
	Stewardings a generation of Growers/planters and Not Destoryers
	Divide butterfly garden into two places?
	Attract butterflys as well as have a staging place to grow plants that will attract butterflys
	Capture rain in barrels(use conservation?)
	Giving children the stewardship and pride of taking care of the gardens?
	Create Paw stepping stones?
	Create a destination in the back of the (infront of kindergarten rooms)
	Plant a tree to attract birds- use pinecone feeders, and bird houses
	Picnic Table in the garden- firt whole class
	More tables and spread them out,
	have silent reading outside?/ Draw pictures
	Gardening beds make manmade materials but make it look natural feeling.
	Don't like the pine trees
	Draw trees through the seasons- use to have a cherry tree
	Care taking- get whole community involved(ask families to donate money)
	Journal writing/ get away time
	Big enough space for a whole class to sit in the garden
	Fountain/ water action
	Signage(help take care of the plants- this was created by.../)
	Have training- How to maintain and car for the plants- ask college students/parents to advise
	Owl project- a pond accessible but in accessible- just enough water- 6"
	The space between the kdg facade and the sand pit- muddy, gross, causes maintance issues
	Raise up sand- step off and up
	Bridge dry creek
	Painting during recess
	mallets, pvc gazebo(KSU Child Development Center)
	Stepping stones
	Cement cars
	Different materials- Blending Natural and metal
	Current issues
	music doesn't work- its more annoying
	3rd-4th if they don't play football, soccer, or basketball, they are lost/ sit on swings and gossip- need a jungle gym or big kid play toy(scaled right)
	They get into trouble
	Teather ball was nice..but difficult, and in a muddy circle
	Extend playground tot he south? with more asphalt?
	Steering wheels don't work wobble and annoying
	Pho Rock/ rockwall gets slick- have to watch kids closer- fewer kids use it
	Slides hurt their butts-- because of the bubbles
	kindergarten on the field when big kids arnt
	most play on equipment except maybe 5.
	Not enough space for kickball,basteball, foursquare, and football on the asphalt
	during line up kdg have to run through the cauost without getting hit
	dumpster is ugly(attracts bees, crows, and whasp, and leaks)
	Where's the office, people knock on kdg doors
	Wants
	Jungle gym
	Likes the Ksu Child Development and Northview Elementary
	Need more monkey bars... Small , Medium, Large
	need adjustable basketball hoops for shorter kids
	To include on asphalt: Kickball bases, lineup lines, classmeeting circle(name it?), Hopscotch
	Make the back less industrial and more greenerys...evergreen+ nice na pretty
	Something friendly
	Emphasize the front Entry
	Fenced court? tennis / Volleyball/ Whole body movement?

C.4. Interview Responses: Kindergarten Team: three Teachers. Recorded and transcribed by author, 2014.

	Para Professionals
	No sand- causes falls_All Sand or None
Group of 6 Teachers	Examples- Marlatt Elementary, Beridman, Lee, TR
	Kdg/1st- need something for older kids
	Teachers use the blacktop for science- Map of the USA & NUmbers
	Teatherball- would like to see it back(6th graders/ mud is an issue)
	Garden for the senses sounds great!
	Permits for building near Bluemont Ave
	Out backdoor/ in front door
	Seating in the playground isn' in the right spot for teachers to use
	Spring/Summer- Shade Cloth(openareas it gets too hot/ kids don't wanna play in the heat)
	1 teacher - separate playarea from grass lawn/sometimes students must be restricted to a specific area
	More hills to represent the Flinthills- kids like hills
	Basketball + Kickball on Asphalt is congested
	Kids love playing under bigger trees/ hide & seek / leaves/pine cones/ more variety in the types of trees
	Games Hopskotch, Jumprope(3rd grade)
	Small Nature Trail
	Old playgrounds- Bridges/Ropes/Mix Terrain

C.5. Interview Responses: Group of 8 Para- Professionals. Recorded and transcribed by author, 2014.

	Physical Education Teacher
	Balance & Core Strength (ie City Park- Rope course)
1 Teacher	Typical soccer field size(is needed)
	Teather ball was nice, but too many injuries
	Raised Beds- 4th grade Unit with KSU Extension (early Season Veggies)
	Plantings/ Gardens- viewing the root systems of a radish would be great.
	Equipment to get students Active
	Foursquare, Maps of the US(social Studies/geography)
	Basketball lanes or shorter goals...
	Sense, tacktile use, take turns, rotate
	Native walking trail, Benches, native plants- a place to sit, relax, and read
	Noise is a huge impact on P.E. Class time- planted noise buffer?
	Field's current grading is a saftey hazard and causes flooding issues.

C.6. Interview Responses: Physical Education Teacher. Recorded and transcribed by author, 2014.

APPENDIX D

SURVEY RESULTS

Where do you prefer to play? Choose 1

Overall Totals By Age Group

	A: Kdg equipment	B: Swings	C: Large equipment	A: Play Equip.	B: Asphalt	C: Grassfield
Kindergarten- Second Grade	31	23	68			
Third - Fourth Grade				25	15	10
Fifth- Sixth Grade				11	12	21

Answers By Gender

Totals For Boys (by age group)

	A: Kdg equipment	B: Swings	C: Large equipment	A: Play Equip.	B: Asphalt	C: Grassfield
Kindergarten- Second Grade	17	11	47			
Third - Fourth Grade				10	11	4
Fifth- Sixth Grade				2	5	14

Totals for Boys (by class)

	A: Kdg equipment	B: Swings	C: Large equipment	A: Play Equip.	B: Asphalt	C: Grassfield
group 1	1	0	12			
group 2	4	1	4			
group 3	3	1	8			
group 4	2	3	4			
group 5	3	2	4			
group 6	3	0	5			
group 7	1	4	10			
group 8				4	4	0
group 9				4	4	2
group 10				2	3	2
group 11				0	2	8
group 12				2	3	6

Totals for Girls (by age group)

	A: Kdg equipment	B: Swings	C: Large equipment	A: Play Equip.	B: Asphalt	C: Grassfield
Kindergarten- Second Grade	14	12	21			
Third - Fourth Grade				15	4	6
Fifth- Sixth Grade				9	7	7

Totals for Girls (by class)

	A: Kdg equipment	B: Swings	C: Large equipment	A: Play Equip.	B: Asphalt	C: Grassfield
group 1	1	2	4			
group 2	3	4	2			
group 3	0	2	4			
group 4	4	2	2			
group 5	3	0	4			
group 6	3	0	5			
group 7	0	2	4			
group 8				4	1	4
group 9				6	1	1
group 10				5	2	1
group 11				4	5	2
group 12				5	2	5

D.1. Survey Results: Where Do You Prefer to Play? Survey and results recorded by author, 2014.

What do you like to play during recess? (Choose 3)

Overall Totals By Age Group

	Climbing	Swinging	Sliding	Tag	Playin in Sand	Monkey bars	Playing House	Basketball	Football	Kickball	Foursquare	Baseball
Kindergarten- Second Grade	26	44	37	50	26	39	43	35	41			
Third - Fourth Grade	10	14	8	12		12	10	23	15	16	28	3
Fifth- Sixth Grade	11	18	6	9		8		16	23	13	16	6

Answers By Gender

Totals For Boys (by age group)

	Climbing	Swinging	Sliding	Tag	Playin in Sand	Monkey bars	Playing House	Basketball	Football	Kickball	Foursquare	Baseball
Kindergarten- Second Grade	16	20	19	34	15	22	18	31	37			
Third - Fourth Grade	5	7	3	5		0	2	15	11	9	13	3
Fifth- Sixth Grade	5	2	5	2		3		5	14	7	7	4

Totals for Boys (by class)

	Climbing	Swinging	Sliding	Tag	Playin in Sand	Monkey bars	Playing House	Basketball	Football	Kickball	Foursquare	Baseball
group 1	4	5	4	7	4	4	3	5	3			
group 2	4	0	4	4	2	0	6	4	3			
group 3	1	3	4	1	2	8	4	6	6			
group 4	3	4	3	3	1	3	4	2	2			
group 5	2	1	1	4	2	3	0	5	4			
group 6	0	2	1	6	0	2	0	3	8			
group 7	2	5	2	9	4	2	1	6	1			
group 8	0	2	1	1		0	1	6	4	1	8	0
group 9	4	5	1	2		0	1	5	3	3	3	3
group 10	1	0	1	2		0	0	4	4	5	2	0
group 11	0	2	0	0		0		1	7	0	1	0
group 12	5	3	2	2		3		4	7	7	6	4

Totals for Girls (by age group)

	Climbing	Swinging	Sliding	Tag	Playin in Sand	Monkey bars	Playing House	Basketball	Football	Kickball	Foursquare	Baseball
Kindergarten- Second Grade	10	24	18	16	11	17	25	4	4			
Third - Fourth Grade	5	7	5	7		12	8	8	4	7	15	3
Fifth- Sixth Grade	6	13	4	7		5		11	9	6	9	4

Totals for Girls (by class)

	Climbing	Swinging	Sliding	Tag	Playin in Sand	Monkey bars	Playing House	Basketball	Football	Kickball	Foursquare	Baseball
group 1	1	3	4	2	4	2	5	0	0			
group 2	3	5	1	3	0	5	8	1	1			
group 3	0	1	3	3	0	5	1	3	2			
group 4	3	5	2	3	3	1	7	0	0			
group 5	2	1	0	2	2	5	4	0	0			
group 6	2	5	4	3	2	2	2	0	1			
group 7	1	5	4	2	2	2	2	0	0			
group 8	1	4	2	3		4	3	3	4	2	4	0
group 9	4	1	1	2		6	3	1	0	1	5	0
group 10	0	2	2	2		2	2	4	0	4	6	0
group 11	0	6	0	1		2		5	4	0	2	1
group 12	6	7	4	6		3		6	5	6	7	1

D.2. Survey Results: What do you like to play during recess? Survey and results recorded by author, 2014.

How many friends do you play with at Recess?

Overall Totals By Age Group

	a) 1 - 3	b) 4 -8	c) 10 or more
Kindergarten- Second Grade	63	22	26
Third - Fourth Grade	16	17	15
Fifth- Sixth Grade	13	20	12

Answers By Gender

Totals By Age-Group(boys)

	a) 1 - 3	b) 4 -8	c) 10 or more
Kindergarten- Second Grade	28	19	21
Third - Fourth Grade	7	6	10
Fifth- Sixth Grade	5	9	6

Totals By Age-Group(Girls)

	a) 1 - 3	b) 4 -8	c) 10 or more
Kindergarten- Second Grade	35	3	5
Third - Fourth Grade	9	11	5
Fifth- Sixth Grade	8	11	6

Totals by Class (Boys)

	a) 1 - 3	b) 4 -8	c) 10 or more
group 1	6	5	2
group 2	3	2	4
group 3	8	1	2
group 4	3	2	5
group 5	4	1	3
group 6	0	6	1
group 7	4	2	7
group 8	4	1	2
group 9	2	2	5
group 10	1	3	3
group 11	1	5	4
group 12	4	4	2

Totals by Class (Girls)

	a) 1 - 3	b) 4 -8	c) 10 or more
group 1	6	0	1
group 2	9	0	0
group 3	4	1	1
group 4	6	0	1
group 5	1	2	3
group 6	7	1	0
group 7	3	1	2
group 8	4	4	1
group 9	3	4	1
group 10	2	3	3
group 11	4	6	3
group 12	4	5	3

D.3. Survey Results: How many friends do you play with at recess? Survey and results recorded by author, 2014.

Which 2 images look the most fun?(Star your favorite)

Overall Totals By Age Group

	Climbing	Imagination(blueblocks)	Soccer	Foursquare	Football	Willow Hut	Sand	Climbing Cord Eqp.	Monkey Bars	Modern Equip	Rolling down a Hill
Kindergarten- Second Grade	65	71				39	15		32		
Third - Fourth Grade	31		17	17		26			7		
Fifth- Sixth Grade	27			5	11			19		17	5

Answers By Gender

Totals By Age-Group(boys)

	Climbing	Imagination(blueblocks)	Soccer	Foursquare	Football	Willow Hut	Sand	Climbing Cord Eqp.	Monkey Bars	Modern Equip	Rolling down a Hill
Kindergarten- Second Grade	47	44				20	8		19		
Third - Fourth Grade	14		10	8		14			1		
Fifth- Sixth Grade	15			3	6			6		8	0

Totals by Class (Boys)

	Climbing	Imagination(blueblocks)	Soccer	Foursquare	Football	Willow Hut	Sand	Climbing Cord Eqp.	Monkey Bars	Modern Equip	Rolling down a Hill
group 1	9	8				6	1		2		
group 2	5	5				1	1		0		
group 3	3	10				3	2		6		
group 4	7	4				2	1		3		
group 5	5	2				3	2		4		
group 6	6	7				1	1		1		
group 7	12	8				4	0		3		
group 8	4		3	4		5			0		
group 9	7		4	2		6			0		
group 10	3		3	2		3			1		
group 11	8			2	1			3		2	0
group 12	7			1	5			3		6	0

Totals By Age-Group(Girls)

	Climbing	Imagination(blueblocks)	Soccer	Foursquare	Football	Willow Hut	Sand	Climbing Cord Eqp.	Monkey Bars	Modern Equip	Rolling down a Hill
Kindergarten- Second Grade	18	27				19	7		13		
Third - Fourth Grade	17		7	9		12			6		
Fifth- Sixth Grade	12			2	5					9	5

Totals by Class (Girls)

	Climbing	Imagination(blueblocks)	Soccer	Foursquare	Football	Willow Hut	Sand	Climbing Cord Eqp.	Monkey Bars	Modern Equip	Rolling down a Hill
group 1	2	5				3	2		2		
group 2	2	1				4	1		4		
group 3	3	3				2	0		5		
group 4	5	6				6	2		0		
group 5	5	1				2	2		4		
group 6	3	6				3	2		2		
group 7	3	6				1	0		0		
group 8	5		1	5		6			3		
group 9	7		2	1		2			2		
group 10	4		4	3		4			1		
group 11	5			2	2			6		3	2
group 12	7			0	3			7		6	3

D.4. Survey Results: Which 2 images look the most fun? Survey and results recorded by author, 2014.

APPENDIX E

EXISTING CONDITIONS



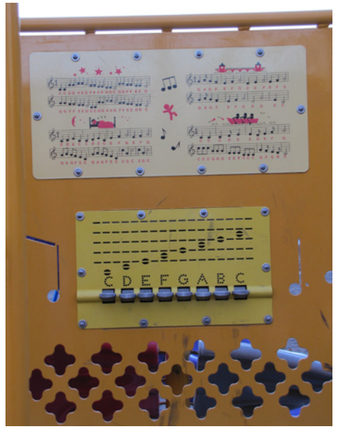






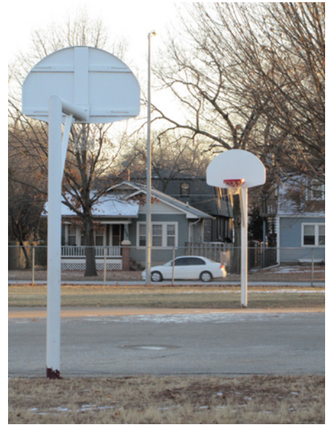


E.1. Existing Conditions: Existing Site Images. Photos by author, 2014.











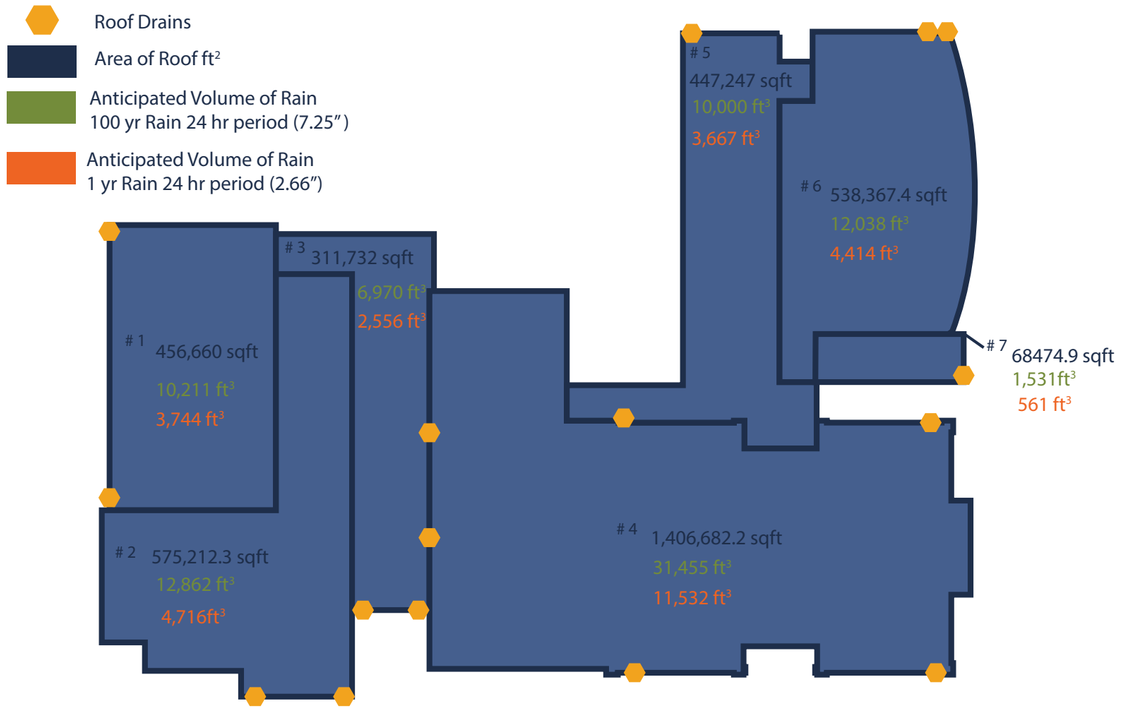


E.2. Existing Conditions: Existing Playscape Images. Photos by author, 2014.

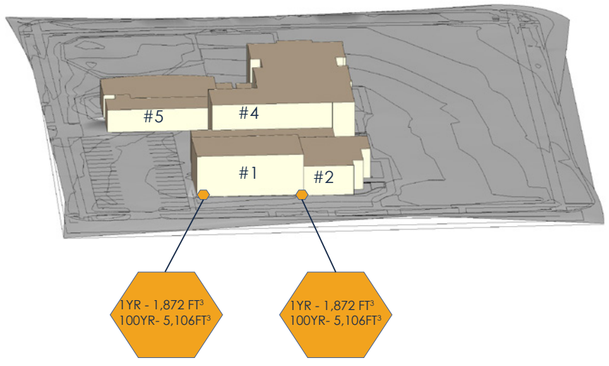
How much water drains from the Roofs of Bluemont Elemetary? During a 100 year Rain 24 hour period								
Building #	Roof Surface Area (sqft)	100 yr Rain in 24 Hrs (depth-demical ft)(7.25 inches for kansas)	Rainfall Elementary Roof (cubic ft)	Number of Drains	Volume of rain per drain (cubic ft)	# Drains to Ground	# of Drains to roof Review Note	Volume of rain per drain(cubic ft)
1	456,660	0.6038	10,211	2	5,106	2		10,211
2	575,212	0.6038	12,862	2	6,431	2		12,862
3	311,732	0.6038	6,971	2	3,485	2	2	17,456
4	1,406,682	0.6038	31,455	6	5,242	3		15,727
5	447,247	0.6038	10,001	2	5,000	2	1	15,243
6	538,367	0.6038	12,038	2	6,019	2		12,038
7	68,475	0.6038	1,531	1	1,531	1		1,531
Total Area	3,735,901		83,539	16	31,284	13	3	83,539
		*#4 - 2 Roof drains fall on #3/ 1 Falls on #5 thus adding more volume per 24 hours						

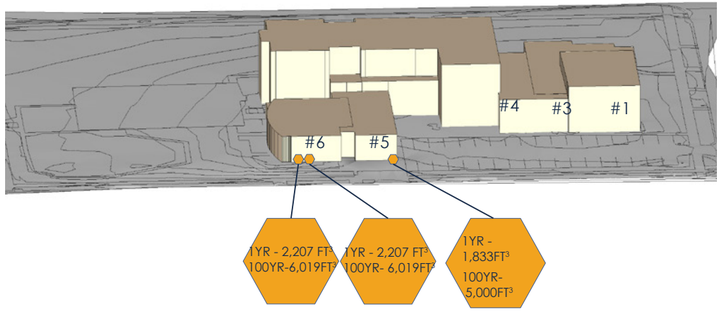
How much water drains from the Roofs of Bluemont Elemetary? During a 1 year Rain 24 hour period								
Building #	Roof Surface Area (sqft)	1 yr Rain in 24 Hrs (depth-demical ft)(inches for kansas)2.65625	Rainfall Elementary Roof (cubic ft)	Number of Drains	Volume of rain per drain (cubic ft)	# Drains to Ground	# of Drains to roof Review Note	Volume of rain per drain(cubic ft)
1	456,660	0.2214	3,744	2	1,872	2		3,744
2	575,212	0.2214	4,716	2	2,358	2		4,716
3	311,732	0.2214	2,556	2	1,278	2	2	6,400
4	1,406,682	0.2214	11,532	6	1,922	3		5,766
5	447,247	0.2214	3,667	2	1,833	2	1	5,589
6	538,367	0.2214	4,414	2	2,207	2		4,414
7	68,475	0.2214	561	1	561	1		561
Total Area	3,735,901		30,628	17		13	3	31,189

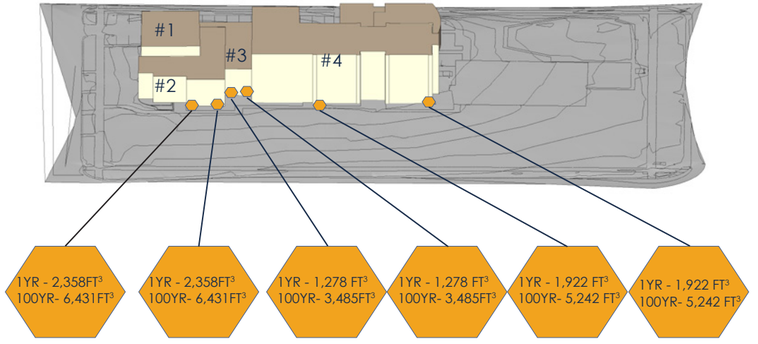
E.3. Existing Conditions: Bluemont Elementary's volume of roof drainage. Table by author 2014, Hannan 2006, Weather Bureau. Jan 1963.

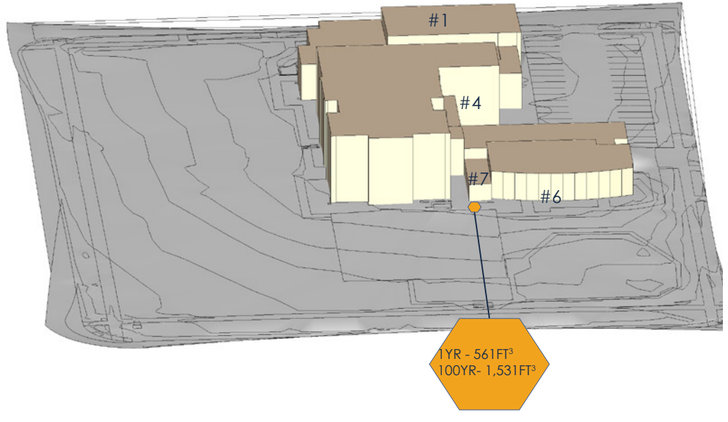


E.3. Existing Conditions: Bluemont Elementary's Roof Drainage Calculation Totals for 1 and 100 year rains in a 24 hour Period per building surface area. Calculations by author, 2014. Hannan 2006, Weather Bureau. Jan 1963.









E.4. Existing Conditions: Drainage calculations per roof drainage for 1 and 100 year rains in a 24 hour period per drain. Calculations and diagram by author, 2014, Hannan 2006, Weather Bureau. Jan 1963, and sketch up model based on BG Consulting survey data 2006.

APPENDIX F

DETAILED DESIGN

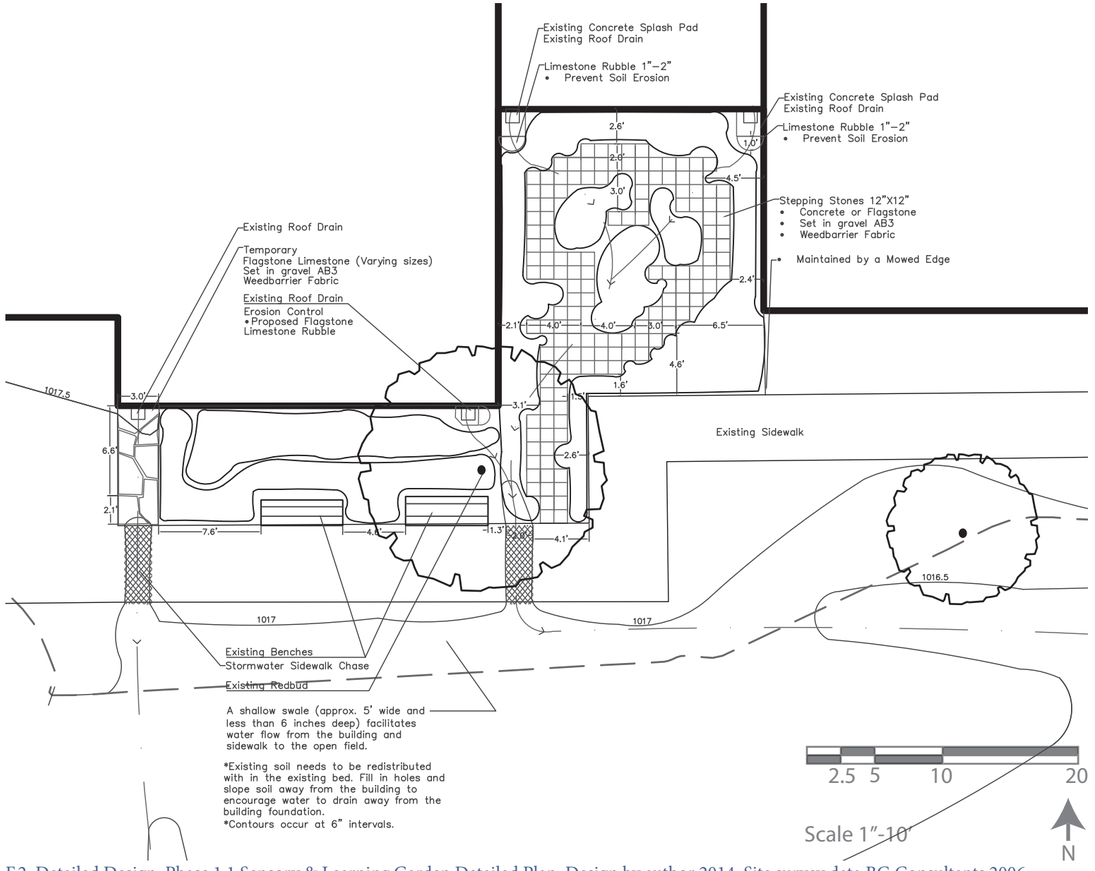
Sensory & Learning Garden

Stormwater from the school building's roof drains causes erosion.

Potential foundation damage caused by erosion and pooling.

Recurring sidewalk flooding is a potential schoolyard liability.

F.1. Detailed Design: Existing Stormwater Conditions. Images by author, 2014.



F.2. Detailed Design: Phase 1.1 Sensory & Learning Garden Detailed Plan. Design by author 2014, Site survey data BG Consultants 2006.

	Common Name	Botanical Name	Cultivation Condition	Ecosystem	Potential Learning	Seasonality

	Bergamot
	
	Photo courtesy of Caleb Melchior.
		Monarda didyma 'Rasberry Wine'	• Dead head flowers to prolong summer blooms
			• Self-seeding
			• Thining stems increases air ciruclation
			• Can be divide spring/fall every3-4 years.
				• Full Sun to Part shade
				• Mesic Conditions
				• Tolerates poor soils and drought
					• Pollinators
					  • Humming birds
					  • Butterflies
					• Perennial vs Annual Plant Life Cycle
					• Sensory: Smell
						• Rose/ Red
						• June-September

	Plains coreopsis	Coreopsis tinctoria	• Deadheading spent flowers may encourage additional bloom. • Self-seeding	• Full Sun to Part shade • Mesic Conditions • Tolerates light shade, sandy , or rocky soil. • Tolerates heat, humidity; drought	• Plant Life Cycle • Pollinators • Butterflies	• Yellow w/ Reddish Brown Bloom • June - September
	Wild oats	Chasmanthium latifolium	• Self-seeding • Spreads aggressively, select location carefully. • Leave foliage in place over winter to add interest. • Cut back to the ground early spring	• Full Sun to Part Shade • Wet Conditions • Shade tolerant • Tolerant of poor soils	• Sensory: Texture • Plant Life Cycle	• Green Bloom • Aug. - September • Fall Color • Winter Interest
	Blue false indigo	Baptisia australis	• Slowly expanding clumps w/ extensive root system, do not disturb once established. • Dead head flowers to prolong blooms • Self-seeding	• Full Sun to Part Shade • Mesic Conditions	• Sensory: Smell • Pollinators • Plant Life Cycle	• Indigo Blue Bloom • May- June

F.3. Detailed Design: Sensory & Learning Garden Pant Palette. Table adapted by author 2014, Plant information and Images courtesy of Missouri Botanical Garden.

INTERACTIVE ROOF DRAIN*1	Size	Quantity	Estimated Cost
Weed Barrier Fabric	3' x 9'	27 sq ft	$4
Gravel	AB3	0.5 cu ft	$40
Flagstone Limestone	1.5-2" Thick	27 sq ft	$120
ROOF DRAIN EROSION CONTROL			
Lateral Rock	6 ft sq 1.5"-2" (3" Depth)	1.5 cu ft (bucket)	$5
SENSORY PATH *2			
Weed Barrier Fabric	147 sq st(56 linear ft)	60 ft x 3 ft	$20
Gravel	AB3	1.3 cu ft	$110
Concrete Stepper	12x12"	147 steppers	$222
Stone Stepper (Mega-Bergerac)	12x12" or 14x14"	147 steppers	$1, 470
PLANTS *3			
Bergamot 'Rasberry Wine'	Plug	80	$220
Plains Coreopsis	Sharp Seed	300 sq ft	$20
Wild Oats	Plug	160	$440
Blue False Indigo	Plug	80	$220
Compost, Cotton burr	2 cu ft Bag (2" depth)	28 bags	$168
Mulch, Natural or Cypress	3 cu ft Bag (2" depth)	20 bags	$125
		Approximate Total*4	$3258.2

*1Flagstone is a temporary solution, until permanent flow form, sidewalk chase, and regrading south of sidewalk can be accomplished.

*2 The stone above are example of stoneware, many other option available. Approximate Total Includes cost of Stone Stepper. The Preferred sensory path utilizes a stepper the enhances the design, yet is not overly textured(reduce tripping hazards). Preferred 12X12' dimensions.

*318" on center= 121 plants; 12" on center=296 plants at $2.75 per plug

*4 Cost Estimate Utilizes primarily the Blueville nursery catalogue and price list.

F.4. Detailed Design: Sensory & Learning Garden Cost Estimate. Table and calculations by author 2014, Blueville Nursery Catalog, 2011.

APPENDIX G

PLANTING PALETTE

PLANTING ZONE

Plants for Sunny, Wet Conditions	A	WINTER	
Plants for Sunny, Mesic Conditions	B	SPRING	=SUM(6
Plants for Sunny, Dry Conditions	C	SUMMER	
Plants for Shady, Mesic Conditions	D	FALL	

Common Name	Botanical Name	Plant Zone	Hardiness Zones	Bloom Time	Bloom Description	Height	Spread	Sun	Water	Maintenance	Flower	Attracts	Fruit	Tolerate
Perennnials														
Trumpet Honeysuckle	Lonicera Sempervirens	B	4-9	May to Jun	Scarlet/orange with yellow	8 - 15 '	3 - 6'	FS	Med	Low	Showy	Birds, Hummingbirds, Butterflies	Showy	Dear, Clay soil, Blackwalnuts
Asters	Symphyotrichum species													
Beardtongue	Penstemon digitalis		3-8	Apr to June	White	3-5'	1.50-2.0'	FS	Dry- Med	Medium	Showy, Good Cut	Birds, Butterflies		Deer, Drought, Clay soil, drysoil
Bee Balm	Monarda didyma		4-9	Jul to Aug	Red	2-4'	2-3'	FS- Pt Shd	Med to Wet	Medium	Showy, Good Cut, Fragrant	Hummingbirds, Butterflies,		Rabbit, Deer, Clay soil, Wet soil, black walnut
Wild Bergamot	Monarda Fistulosa	B	3-9	Jul to Sep	Pink/Lavendar	2-4'	2-3'	FS- Pt Shd	Dry- Med	Medium	Showy,Fragrant, Good Cut, Dried	Hummingbirds, Butterflies,		Deer, Drought, Clay soil, drysoil, Shallow -rockysoil, black walnut
Black-eyed susan	Rudbeckia fulgida		3-9	Jun to Oct	Orange/Yellow	2-3'	2-2.5'	FS	Dry- Med	Low	Showy, Good Cut, Dried	Butterflies		Deer, Drought, Clay Soil, Dry soil, Shallow-Rocky Soil, Air Pollution
Black-eyed susan	Rudbeckia hirta		3-7	Jun to Sep	Yellow to Orange-yellow rays, dark brown center	2-3 '	1-2'	FS	Med	Low	Showy	Butterflies		Deer, Drought, Clay soil
Blue lobelia	Lobelia siphilitica		4-9	Jul to Sep	Blue	2-3'	1-1.5'	FS- Pt Shd	Med to Wet	Low	Showy			Deer, Heavy shade, wet soil
Bracted spiderwort	Tradescantia bractea													
Large beardtongue	Penstemon Grandiflorus		3-9	May to Jun	Lavender blue	2-4'	1-1.5'	FS	Dry to Med	Low	Showy			Deer
brown-eyed susan	Rudebeckia triloba		4 -8	Jul to Oct	Yellow rays w/ brown-purple center disk	2-3'	1-1.5'	FS	Med	Low	Showy	Butterflies		Deer, Drought
Bugbane,black cohosh, black banberry, black snakeroot	Actaea racemosa		3 -8	Jun to Jul	White	4-6'	2-4'	Ptshd-Fshd	Med	Low	Showy, Fragrant			Rabbit
butterfly milkweed	Asclepias tuberosa		3- 9	Jun to Aug	Yellow/orange	1-2.5'	1-1.5'	FS	Dry to Med	Low	Showy	Butterflies		Deer, Drought, Erosion, Dry Soil, Shallow-Rocky Soil
canadian anemone	Anemone candadensis		3-9	Apr to Jun	White	1-2'	2-2.5'	FS- Pt Shd	Med to wet	Low	Showy, good cut			Deer, Clay Soil
Cardinal Flower	Lobelia Cardinalis		3-9	Jul to Sep	Scarlet red, white or Rose light pink, yellow,	2-4'	1-2'	FS- Pt Shd	Med to Wet	Low	Showy	Hummingbirds, Butterflies		Rabbits, Deer, Wet Soil
columbines	Aquilegia canadensis		3-8	Apr to May	red	2-3'	1-1.5'	FS- Pt Shd	Med	Med	Showy, good cut	Hummingbirds		Rabbit, Deer, Drought, Dry soil
Hardy Hibiscus	Hibiscus moscheutos 'Disco Belle Pink'		4-9	Jul to Sep	Pink with red eye	2-2.5'	1.5-2'	FS	Med to Wet	Low	Showy	Butterflies		Deer, Wet Soil
Cream False Indigo	Baptisia australis	B	3-9	May to Jun	Indigo Blue	3-4'	3-4'	FS- Pt Shd	Dry to Med	Low	Showy	Butterflies	Showy	Rabbit, Drought, Erosions, Clay Soil, Dry Soil, Shallow-Rocky Soil
Creeping phlox	Phlox stolonifera		5-9	Jul to Sep	Purple/violet	.5-1'	.75 - 1.5'	FS- Pt Shd	Med	Low	Showy			Rabbit, Deer, Drought, Air Pollution
Crested iris	Iris cristata		3-9	Apr	Pale blue w/gold-crested fall	.5-.75'	.5 to 1.0'	FS- Pt Shd	Med	Med	Showy			Deer, Drought
Culver's root	Veronicastrum virginicum		3-8	May to Aug	White to pale blue	4-7'	2-4'	FS	Med- Wet	Low	Showy	Butterflies		Wet Soil
Cutleaf coneflower	Rudbeckia Laciniata		3-9	Jul to Sep	yellow rays, green center	2-9'	1.50-3'	FS- Pt Shd	Med	Med	Showy	Butterflies		Deer
Dense blazing star	Liatris Spicata		3-8	Jul to Aug	Red-purple	2-4'	.75-1.5'	FS	Med	Low	Show, Good cut,dried	Birds, Butterflies		Drought, Clay soil

G.1. Bluemont Elementary Plant Palette. Adapted by author 2014 and Plant information Courtesy of Missouri Botanical Garden.

PLANTING ZONE

Plants for Sunny, Wet Conditions	A	WINTER	
Plants for Sunny, Mesic Conditions	B	SPRING	=SUM(6
Plants for Sunny, Dry Conditions	C	SUMMER	
Plants for Shady, Mesic Conditions	D	FALL	

Common Name	Botanical Name	Plant Zone	Hardiness Zones	Bloom Time	Bloom Description	Height	Spread	Sun	Water	Maintenance	Flower	Attracts	Fruit	Tolerate
Perennnials														
Doll's daisy	Boltonia asteroides		3-10	Aug to Sep	white,pink, lilac, purple, yellow center	5-6'	2-4'	FS	Med	Med	Showy, Good cut	Butterflies		Clay soil
Dotted Gayfeather	Liatris Punctata													
Downy Phlox	Prairie Phlox		4-9	May to Jul	Rose	1-2'	1-1.5'	FS	Med	Med	Show, Fragrant, Good cut	Humming Birds, Butterflies		Deer, Drought Tolerant, Clay soil
Eastern bluestart	Amsonia tabernaemontana		3-9	May	Blue	2-3'	2-3'	FS- Pt Shd	Med	Low	Showy, Goodcut		Good fall	Deer, Drought, Clay Soil
Foamflower	Tiarella coridifolia		4-9	May	White, pink	.75-1'	1-2'	Ptshd-Fshd	Med	Low	Showy, Goodcut		Good fall	Rabbit, Deer
Fox Sege	Carex vulpinoidea		3-7	May to Jul	Green	1 -3'	.5-2'	FS- Pt Shd	Wet	Low	Insignificant			Deer
Fragrant Sumac	Rhus Aromatica		3-9	Apr to May	Yellowish	1.5-2'	6-8'	FS- Pt Shd	Dry to Med	Low	Insignificant	Birds, Butterflies	Showy	Rabbit, Drought, Erosion, Clay soil, Dry soil, Shallow-Rocky soil
Goat's beard	Aruncus dioicus		4-8	Apr to May	cream	4-6'	2-4'	FS- Pt Shd	Med to Wet	Low	Showy			Rabbit
Golden alexander	Ziza aurea		3-8	May to Jun	Yellowish	1.5-3'	1.5'	FS- Pt Shd	Med	Med	Showy, Goodcut	Butterflies		
Rough Goldenrod	Solidago rugosa 'Fireworks'		4-8	Sep-Oct	Yellow	2.5-3'	2.5-3'	FS	Med to Wet	Low	Showy	Butterflies		Deer, Clay Soil, Wet Soil
gray-headed condeflower	Ratibida pinnata		3-8	Jun to Aug	Yellow	3-5'	1.5-2'	FS	Med	Med	Showy	Butterflies		Drought, Clay Soil
Blue cardinal flower	Lobelia siphilitica		4-9	Jul to Sep	Blue	2-3'	1-1.5'	FS- Pt Shd	Med to Wet	Low	Showy			Deer, Heavy shade, Wet Soil
Hydrangeas	hydrangea species		3-9	Jun to Sep	White	3-5'	4-6"	Ptshd	Med	Low	Showy, Good cut,dried			Rabbit, Erosion, Clay Soil, Dry Soil, Wet soil, Shallow-rock soil
Southern blue flag	Iris virginica		5-9	Jun	Violet bluew/yellow&white	1-3'	1-3'	FS	Med to Wet	Low	Showy			Deer, Wet soil
Ironweeds	vernonia species													
Jacob's ladder	polemonium reptans		3-8	Apr to Jun	Blue	1-1.5'	1-1.5'	FS- Pt Shd	Med	Med	Showy			Deer
Joe Pye weed	Eupatoriatorium 'Little Joe'		3-9	Jul to Sep	Mauve purple	3-4'	2-3'	FS- Pt Shd	Med	Low	Showy, Fragrant	Butterflies		Deer, Clay soil, Wet soil
Lead plant	Amorpha canescens		2-9	Jul to Sep	Puple, blue	2-3'	2-2.5'	FS	Dry to Med	Low	Showy	Butterflies		Drought, Erosion, Dry Soil
Marsh Phlox														
paririe blazing star	Liatris pycnostachya		3-9	Jul to Aug	Lilac-purple	2-5'	1-2'	FS	Dry to Med	Low	Showy, good Cut	Birds, Humming Birds, Butterflies		Drought, Clay Soil, dry Soil
meadow phlox	phlox maculata													
Missiouri evening primrose	oenothera macrocarpa		3-7	May to August	Yellow	.75-1'	1- .1.5'	FS	Dry to Med	Low	Showy, Fragrant		showy	Drought, clay soil, dry soil, Shallow-rocky soil
New England aster	Smphyotrichum novae-angliae		4-8	Aug to sep	Deep pink-purple	3-6'	2-3'	FS	Med	Med	Showy, good cut	Butterflies		Clay Soils
New Jersey Tea	Ceanothus americanus		4-8	May to July	white	3-4'	3-5'	FS- Pt Shd	Dry to Med	Low	Showy, Fragrant, goodcut	Hummingbirds, Butterflies		Drought, Dry soil, Shallow-rocky soil
ostrich fern	Matteuccia struthiopteris		3-7	no flower		3-6'	5-8'	Ptshd-Fshd	Med to Wet	med				Rabbit, Heavy shade, Erosion, Clay soil, wet soil
oxeye	heliopsis helianthoides		3-9	Jun to Aug	Orange-Yellow brown disks	3-6'	2-4'	FS	Dry to Med	Low	Showy, good cut	Butterflies		Drought, Erosion, Clay soil, dry soil, shallow-rocky soil
Pale Coneflower	Echinacea pallida		3-10	Jun to Jul	pale purple	2-3'	1-1.5	Ptshd-Fshd	Dry to Med	Low	Showy, Fragrant, goodcut	Butterflies		Deer, Drought, Clay Soil, Dry soil, Shallow- Rocky soil
Prairie phlox	Phloxpilosa		4-9	May to Jul	pink to pale purple	1-1.5'	1-1.5'	FS	Med	med	Showy, Fragrant	Hummingbirds, Butterflies		Deer, Drought, Claysoil
Purple coneflower	Echinacea purpurea		3-8	Jun to Aug	purplish pink	2-5'	1.5-2'	FS- Pt Shd	Dry to Med	Low	Showy, good cut	Birds, Butterflies		Deer, Drought, Clay Soil, Dry soil, Shallow- Rocky soil
Purple Prairie Clover	Dalea purpurea		3-8	Jun to Aug	Rose/ Purple	1-3'	1-1.5'	FS	Med	Low	Showy	Butterflies		Drought

G.2. Bluemont Elementary Plant Palette. Adapted by author 2014 andPlant information Courtesy of Missouri Botanical Garden.

PLANTING ZONE

Plants for Sunny, Wet Conditions	A	WINTER
Plants for Sunny, Mesic Conditions	B	SPRING
Plants for Sunny, Dry Conditions	C	SUMMER
Plants for Shady, Mesic Conditions	D	FALL

=SUM(6

Common Name	Botanical Name	Plant Zone	Hardiness Zones	Bloom Time	Bloom Description	Height	Spread	Sun	Water	Maintenance	Flower	Attracts	Fruit	Tolerate
Perennnials														
Rocky Mountian blazing star	Liatris ligulistylis		3-8	Jul to Sep	Rose/ Purple	1-3'	.5-2'	FS	Dry to Med	Low	Showy	Birds, Hummingbirds, Butterflies		Drought, Dry soil, Shallow-rocky soil
Rose Vervain	Glandularia canadensis		5-9	May to Aug	Rose-pink to rose purple	.5-1.5	1-2'	FS	Dry to Med	Low	Showy			Drought, Dry soil, Shallow-rocky soil
rough blazing star	liatris aspera		3-8	Aug to Oct	purple	2-3'	1-1.5'	FS	Dry to Med	Med	Showy, good cut	Birds, Hummingbirds, Butterflies		Drought, Dry soil, Shallow-rocky soil
Showy Goldenrod														
silphiums	silphium species		4-8	Jul to Sep	Yellow	3-10'	1-3'	FS	Med	Low	Showy			Clay soil
Sky Blue Aster	symphyotrichum oolentagiense		3-8	Sep - Oct	Bluerays with yellow center	2-3'	1.5-2'	FS	Dry to Med	Low	Showy	Butterflies		Drought, Erosion, Dry soil, Shallow-rocky soil.
Smooth Blue Aster	Symphyotrichum laeve		3-8	Sep-Oct	Violet to purple rays yellow center	2-4'	1-2'	FS	Dry to Med	Low	Showy	Butterflies		Drought, Erosion, Dry soil, Shallow-rocky soil.
Smooth/ prairie milkweed	Asclepias sullivantii		3-7	Jun to July	Pink	2-3'	1-1.5'	FS	Med to Wet	Low	Showy, Fragrant	Butterflies		Deer
smooth phlox	Phlox glaberrima		3-8	Apr to May	Reddish purple to pink yellow rays, dull	2-4'	2-2.5'	FS- Pt Shd	med	Med	Showy , fragrant, good cut	Humming birds, Butterflies		Deer
Sneezeweed	Helenium autumnale		3-8	Aug- Oct	yellow disk	3-5'	2-3'	FS	Med to Wet	Med	Showy	Butterflies		Deer, Clay soils, wet Soil
solomons seal	Polygonatum biflorum		3-8	Apr to May	Greenish white	1-3'	1-1.5'	Pt-FShd	Med to Wet	Low	Showy		good fall leaf	Erosion, wet soil
spiderworts	Tradescantia													
Stiff goldenrod	Solidago rigida		3-9	Aug to Sep	Yellow	3-5'	1.5-2.5'	FS	Med	Med	Showy	Butterflies		deer, claysoil
summersweet	Clethra alnifolia		3-9	Jul to Aug	White	3-8'	4-6'	FS- Pt Shd	Med to wet	Low	Showy, fragrant	Butterflies	Showy	Heavy shade, Erosion, Clay soil, Wet soil
sweet coneflower	Rudebeckia subtomenetosa		4-8	Jul to Oct	Yellow rays and brownish purple centers	3-5'	1-2'	FS- Pt Shd	Med	Low	Showy, Fragrant, Good cut			Deer, Drought, Clay soil
Tall Goldenrod	Solidago canadensis		3-9	Aug to Oct	Yellow	4-5'	4-5'	FS	Med	Low	Showy	Butterflies		
Tall tickseed	Coreopsis tripteris		3-8	Jul to Sept	Brown disk ith yellow rays	2-8'	2-8'	FS	Dry-Med	Low	Show, Good Cut	Butterflies		Deer, Drought, Clay Soil, dry soil, Shallow-rocky soil
thread leaf coreopsis	coreopsis verticillata		3-9	Jun to Aug	Creamy yellow	1.5-2'	1.5-2'	FS	Dry-Med	Low	Showy	Butterflies		Deer, Drought, Clay Soil, dry soil, Shallow-rocky soil
turtle heads	chelone species		3-8	Aug to Oct	White w/ pink tinge	2-3'	1.5-2.5'	PtShd	Med to Wet	Low	Showy	Butterflies		Erosion, Wet Soil
virginia sweetspire	itea virginica		5-9	May to Jun	white	3-4'	4-6'	FS-ptshd	Med to wet	Low	Showy, Fragrant			Heavy Shade, Erosion, Clay soil, Wet Soil
Western Sunflower	Helianthus occidentalis		4-8	Aug to Sep	Orange/yellow rays/ yellow disk	4-8'	2-4'	FS	Dry to Med	Med	Showy Good cut	Birds, Butterflies		Deer, Drought, Clay Soil, dry soil, Shallow-rocky soil
wild ginger	Asarum candaense		4-6	Apr-May	Purplish brown	.5-1.0'	1.0-1.5'	Pt -FS shd	Med to wet	Low	Insignificant			Deer, heavy shade, erosion, wet soil,
wild indigos	baptisia species		4-8	May to Jun	Yellow	2-3'	2-3	FS-ptshd	Dry to Med	Low	Showy	Butterflies	Showy	Drought, erosion, Dry soil
Wild petunia	Ruellia humilis		4-8	May to Oct	Lavender/lilac-blue	1.5-2'	1.5-2'	FS- Pt Shd	Dry to Med	Med	Showy	Butterflies		Drought, Dry Soil, Shallow-Rocky soil
winterberry, hollies	Ilex species		5-9	May	Creamy white	15-30'	10-20'	FS- Pt Shd	Med	Low	Insignificant	Birds	showy,winter interest, thorns	Deer, Claysoil, air poultion
Wild sweet William	Phlox divaricata		3-8	Apr to May	Rose, lavender, violet/blue	.75-1'	.75 - 1'	Pt -FS shd	Med	Med	Show, Fragrant	Hummingbirds, butterflies		Deer, Drought, Clay soil, Dry soil,
Wooly Verbena	Verbena stricta		4-7	May to Sep	Blue-purple	2-4'	1.5-2'	FS	Dry to Med	Low	Showy	Butterflies		Drought, Erosion, Dry soil, Shallow-rocky soil.

G.3. Bluemont Elementary Plant Palette. Adapted by author 2014 and Plant Information courtesy of Missouri Botanical Garden.

PLANTING ZONE

Plants for Sunny, Wet Conditions	A	WINTER
Plants for Sunny, Mesic Conditions	B	SPRING
Plants for Sunny, Dry Conditions	C	SUMMER
Plants for Shady, Mesic Conditions	D	FALL

=SUM(6

Common Name	Botanical Name	Plant Zone	Hardiness Zones	Bloom Time	Bloom Description	Height	Spread	Sun	Water	Maintenance	Flower	Attracts	Fruit	Tolerate
Perennnials														
Side Oats grama	Bouteloua curtipendula		4-9	Jul to Aug	Purplish	1.5-2.5'	1.5-2'	FS	Dry to Med	Low	Showy, good cut, good dried	Birds	good fall	Drought, Erosion, Dry soil, Shallow-rocky soil. Black walnut, Air Pollution
Sedges	Carex species													
Big Bluestem	Andropogon gerardii													
Wild Oats	Chasmanthium Latifolium													
Blue oat grass	helictotrichon sempervirens													
Switch grass	panicum virgatum													
little bluestem	Schizachyrium scoparium													
Indian grass	Sorghastrum nutans													
Prairie Dropseed	Sporobulus heterolepus													
Canada Wild Rye	Elymus Canadensis													
pennsylvania sedge	Carex pensylvanica		3-8	May	Greenish	.5-1.'	.5-1'	Pt-FS Shd	Dry to Med	Low	Insignificant			Heavy shade, Wet soil
Palm sedge	Carex muskingumensis		4-9	May to Sep	Yellow	2-3'	2-3'	FS- Pt Shd	Med to Wet	Low	Insignificant			deer, drought
Soft-stem Bulrush	Schoenoplectus tabernaemontani		4-9	May to Sep	Brown	4-8'	3-6'	FS	Wet	Low	Insignificant			Black Walnut, Air pollution
Common rush	juncus effusus		4 - 9	Jun to Aug	Yellow-green	2-4'	2-4'	FS	Wet	Low	Showy			Erosion, Wet Soil
tuffed hairgrass	Deschampsia caespitosa													
	Shrubs													
Spicebush	Lindera benxion													
Witchhazels	hamamelis species													
Ninebarks	Physocarpus specis													
Viburnums	Viburnum species													
	Trees													
Eastern redbud	Cercis canadensis													
Dogwoods	cornus species													
Magnolia?														
Serviceberries	Amelanchier species													
Black gum	nyssa sylvatic													
Chokeberries	photinia species													
American hornbeam	Carpinus caroliniana													
oaks	quercus species													

G.4. Bluemont Elementary Plant Palette. Adapted by author 2014 and Plant information Courtesy of Missouri Botanical Garden.

APPENDIX H

GLOSSARY

- In the process of continuing research, the glossary grows as relevant terms become prevalent in the literature review.
- Play - The combination of thoughts and movement in response to the interaction with the environment (CMHC 1976, 6). Play is intrinsically motivated, free of externally imposed rules, carried out as if the activity was real, it's about the process not the product, dominated by the players, and requires the player's involvement (Rogers and Sawyers 2002).
- Playground Environment - The playground environment is an area that contains equipment that affords children the ability to play. The environment may include Playground equipment and structures (swings and slides), a physical boundary (fence), and a grass lawn. Although a physical boundary exists, the visual boundary is determined by an individual's imagination.
- Playground Categories- The following three categories are defined by Lee's study of children's play experience in response to their playground environment in 1999 (Hussein 2012).
- Traditional Playground- "comprised of traditional equipment including swings, slides, seesaws, merry-go-rounds, sand pools, and monkey bar" (cited in Hussein 2012).
- Designed Contemporary Playground- "includes novel forms with different heights and textures; the aesthetically pleasing arrangements designed by Landscape Architects and Landscape Architects" (cited in Hussein 2012).
- Designed Natural Playground- "provides wild, natural, row and composite structures using materials of wood and rope, thus supplying natural play materials expanding the range of play opportunities available to children"(Lee 1999, 6-7.)
- Landscape Affordance Theory- The activity or action performed during the interaction between an object, surface, or environment and a child (Hussein 2005).
- Experiential Learning theory- "the process whereby knowledge is created through the transformation of experience"(cited in Kolb and Kolb 2005;Kolb, Stumpf and Freedman 1981). Two modes to gain and understand experience is through feeling and thinking, another two modes relating to the transformation of experience is through watching and doing. The four modes listed below can be utilized either as a cycle or as a spiral set of methods for transforming experience into knowledge.
- Concrete Experience (feeling)
- Reflective Observation (watching)
- Abstract Conceptualization (thinking)
- Active Experimentation (doing)
- Childhood Development and Learning (Addo- Atuah 2012, Mooney 2000, Piaget 1970, Vygotsky 1978)
- Jean Piaget Philosophy- Individuals learn through constructing their own knowledge from the experiences through the physical environment (Addo- Atuah 2012).
- Vygotsky's Philosophy- A collaborative environment supporting the social interaction between fellow classmates and teachers (Addo-Atuah 2012).
- Development Stages- Piaget identified four stages of development during his research to establish the relationship between age, child development, and learning (Piaget 1970).
- Sensorimotor- (Birth to 18 months) A baby is reacts reflexively, as it relies on his senses and physical activity in order experience and acquire knowledge of his surroundings (Mooney 2000, 64.).

- Preoperational-(2-7) A young child begins to think of everything as it relates to their body (egocentric). During the preoperational stage, focus is limited to one object or person at once, information is overgeneralized and gathered through experiences (Mooney 2000, 69).
- Concrete Operational- (6-12) Children begin using reason to form ideas; however, thinking is limited to objects and familiar events. They are able to use reversibility or reverse their direction of thought (Mooney 2000, 64, 78).
- Social Interactions- play requires complete participation; however, the intensity and number of interactions during play can vary when a child is among peers. The variances in the level of participation have be broken into the following categories (Parten 1970, 249-251):
- Unoccupied- Child apparently is not playing, but occupies himself with watching anything that happens to be of momentary interest (W249).
- Onlooker- A child spends most of his time watching the other children play (249).
- Solitary Independent Play- The child plays alone and independently with toys that are different from those used by children within speaking distance (250)
- Parallel Activity-The child plays independently, but the activity he chooses naturally brings him among other children. Using similar toys to play beside other children instead of with or influencing the other children (250).
- Associative Play- The child plays with other children in a common activity through borrowing and loaning play materials; there is a lack of labor division and organization. The focus is on the process and not the product (251).
- Cooperative Play/Organized Supplementary Play- The child feels or displays a sense of belonging to a group, which is driven the product or goal. This type of interaction often includes games with a competitive goal, a dramatized situation, or a formal game. Labor is divided among the group and follows the lead of one or two members (251).
- Landscape Affordance Taxonomy- Fundamental pieces with in the landscape that enable children to perform an action or be acted upon. The functional possibilities of environmental features once perceived may alter or cease to exist as children mature. However as children develop and mature new affordances emerge as an individual's experience facilitates the expansion of his behavioral range (Heft 1988, 37).
- Flat, Smooth Surfaces- affords walking, running, cycling, skating, and skateboarding
- Smooth Slope- affords coasting down, rolling, sliding, and running down, rolling objects down
- Graspable/ Detached Objects- affords drawing, scratching, throwing, hammering, batting, spearing, skewering, digging, cutting, tearing, crumpling, squashing, building of structures.
- Attached Objects- sitting-on, jumping-on, over, down-from
- Non Rigid/ Detached Objects- swinging-on
- Climbable Feature-exercise/mastery, looking out from, passage from one place to another (ex. Stairs and ladders)
- Aperture- locomotion from one place to another, looking and listening to adjacent place
- Shelter- microclimate, prospect/refuge, privacy
- Moldable Material (dirt, sand) – construction of objects, pouring, modifications of its surface features.

- Water- splashing, pouring, floating objects, swimming, diving, boating, fishing, mixing with other materials to modify their consistency.
- Types of Play- Piaget's study in 1970 depicts the relationship between development in and the types of interactions children have with the surrounds. The following types of play are displayed as children interact with their surroundings. As children mature their interactions evolve aiding in the creation of knowledge and experience that contributes the overall development (Piaget 1970).
- Practice Play- the use of sensorimotor skills such as throwing, reaching, skating, biking, and mountain climbing. The development of a skill through assimilation and accommodation can result in a more playful disposition following the master of a task eg. swimming (Rogers and Sawyers 2002, 13).
- Symbolic Play- The substitution of objects or actions during the representational thought process also known as pretending or imagination. Symbolic play is used by every one of all ages in mature people it is labeled as day dreaming (Rogers and Sawyers 2002, 13,17).
- Games with Rules- Play regulated by temporary agreements or a code passed down. Games include sensory-motor combinations or intellectual combinations that spur competition between individuals. Examples include but are not limited to basketball, soccer, chess, checkers (Rogers and Sawyers 2002, 20)