NATURE IN PLAY: MEASURING THE RELATIONSHIP OF NATURE AND UNSTRUCTURED PLAY THROUGH CASE STUDIES

A Senior Scholars Thesis

by

LISA CHRISTINE MCCLEARY

Submitted to the Office of Undergraduate Research
Texas A&M University
in partial fulfillment of the requirements for the designation as

UNDERGRADUATE RESEARCH SCHOLAR

April 2009

Major: Landscape Architecture

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Approved by:

Research Advisor:	Jody Rosenblatt Naderi
Associate Dean for Undergraduate Research:	Robert C. Webb

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ABSTRACT

Nature in Play: Measuring the Relationship of Nature and Unstructured Play through
Case Studies. (April 2009)

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A strong link has been established between children playing in nature and improved

physical and emotional health. The intriguing biophilia hypothesis suggests that humans

are hardwired with an innate love of nature and that spending time in it is vital for well-

being. As we understand nature's ability to enhance health and alleviate behavioral

disorders, the question is what factors of nature optimize this connection and can be

incorporated into children's everyday environments through design guidelines.

Case studies are given for three play spaces containing little nature, some nature, and

complete nature in Bonn, Germany. The city has a rich environment and culture with a

historic dedication to caring for the environment that made it ideal for a comparison of

the presence of nature in play spaces. Methods of research included standard case study

procedures as given by Clare Cooper Marcus, Carolyn Francis, and Francis Mark. The

narrow time frame of two weeks in October for data collection posed a limitation to the

research. Three case studies document play spaces with little nature, some nature, and

complete nature. The Auerberg neighborhood playground (little nature) was not well maintained in a space located near apartments for a low socioeconomic class. The Hofgarten urban playground (some nature) contained a well-maintained playground in an urban forest. The Naturpark Rheinland (complete nature) involved a trailhead connecting the neighborhood to the forest where children would gather and play.

The results showed that the percentage of natural play compared to all play that occurred in the Auerberg neighborhood playground (12.0%) and the Hofgarten urban playground (11.1%) were nearly equal while the hypothesis suggested the Hofgarten playground would have more natural play. One reason for the unanticipated result is that the maintenance level was high so that the ground plane was cleared of attractive elements of nature, such as leaves and fallen branches. The case studies suggest that topography and the ground plane may have a greater influence on natural play than the presence of overhead tree canopy.

DEDICATION

To Jenny, my sister

ACKNOWLEDGMENTS

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CHAPTER I

INTRODUCTION

"Living where I did allowed me to be outside building forts from age five to fourteen. And to jump to a large conclusion, it influenced the way in which I saw the built world. I am a landscape architecture major because of the pressing need in this world for the reintroduction of the natural landscape into the unwelcoming built environment."

-Erin Lau, undergraduate student [Louv 2008: 84]

The initial attraction to landscape architecture is often a love of the outdoors and nature. Each landscape architect has a different story of discovering this unique profession, but a love for the outdoors is a frequent thread running through most stories. A similar group of people also show a connection between a love of the outdoors fostered in childhood and their chosen profession and passion. Environmental activists surveyed in Kentucky and in Norway state that the two strongest reasons for their dedication to preserving and protecting nature were constructive experiences with nature in childhood and an adult relative who modeled a love of nature [Chawla 2006: 59]. Although no direct correlation can be made to landscape architects specifically, the study indicates that a childhood affinity for nature can lead to the protection of it later.

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This thesis follows the style of *Journal of Landscape Architecture*.

As demonstrated when the American Society of Landscape Architects (ASLA) launched the Sustainable Sites Initiative in 2006, the landscape architecture profession ranks sustainable practices as a high priority. Sustainability, or the combination of the environment, economy, and social equality in a way of life that does not remove resources from future generations, rests on the hope that future generations will have a similar appreciation for sustainability [de Haan 2007: 6]. Yet, if children are increasingly estranged from nature, which can result in either biophobia, the fear of nature, or indifference to the natural world, why would these individuals as adults develop an interest in protecting resources that they neither personally know nor love? [White 2008]. The relationships among children, nature, and the future of sustainability are complex, but it is our professional responsibility to deepen these connections through sensitive and appropriate design.

A central concept of landscape architecture asserts that the built environment can be designed to support specific behaviors. For example, a direct relationship exists between a play environment's design and complexity and children's level of physical activity [Cosco 2007: 127]. Additional research would provide more precise measuring tools of how the built environment impacts certain behaviors such as contact with nature [Moore and Marcus 2008: 160]. Resulting design guidelines would direct how the built environment can optimize children's contact with nature.

The following research draws upon the rich environment and culture of the Rhine River Valley in western Germany. The Germans are known for their dedication and environmental leadership in Europe as shown with the founding of the UN Decade of Education for Sustainable Development in Germany. The city of Bonn has attained an international presence with a UN campus, UNESCO headquarters, and a world conference center in which a conference on UNCESCO Education for Sustainable Development (ESD) occurred in late March of 2009. Particular to this area of research, Germans are at the forefront with forest kindergartens, or schools in which children usually three to six years old are accompanied with an adult supervisor or guide to spend four-hour sessions outside regardless of the weather or time of year [Moore and Marcus 2008: 165].

This research piece examined three public play spaces across a continuum of nature from little or no nature to some nature to primarily natural settings. The objective is to compare the presence of nature in each play space to see if there are indications of key natural factors that attribute to greater duration and frequency of unstructured play. The remainder of the introductory chapter clarifies key concepts on nature, contact with nature, nature and child development, and play. A deeper understanding of current thought on these concepts is key to interpreting the study's results.

Nature defined

Two researchers asked to define nature would undoubtedly give two unique or even conflicting answers. As with most everyday phenomenon, recognition of its components or qualities is easier than defining precisely what it is. One crucial consideration to this research, however, is the child's point of view instead of the diverse definitions of adults. For a child nature is found in a variety of places or objects such as a pet, a tree, a dandelion, a seashore, or a vacant lot [Louv 2008: 7]. With consideration of this component, the following section identifies current definitions in the field and proposes a specific and practical one for the research.

In the past we could have restricted nature to the current definition of wilderness put forth in The Wilderness Act of 1964 as a place where "the earth and its community of life are untrammeled by man and where man himself is a visitor who does not remain" [Wilderness Act of 1964: Sec.1c]. However, as no patch of earth, from forests damaged by acid rain to the Antarctica glaciers melting with climate change, seems uninfluenced by man and as such pristine nature would be beyond the daily range of most children, this definition does not meet our purpose. At the other end of the spectrum, New York City, which has flora and fauna living in parks, skyscraper ledges, and the underground subways, could be considered natural [Louv 2008: 8]. Moreover, all of the city's materials were ultimately derived from natural resources so that nature could be considered all things material. As a balance between these two extremes, Louv quotes the nature poet Gary Synder, who considers Milton's definition of nature as a

"wilderness of sweets," to capture the poetry of abundance found in nature [Louv 2008: 8]. The definition captures the spirit of diversity found in a natural world teeming with a variety of forms and functions including dandelions, rainstorms, beetles, and decomposing wood.

The eminent environmental psychologist Stephen Kaplan defines nature as a place that has primarily vegetation [Kaplan 1989: 2]. It would usually be considered green, but could include places where brown, white, or red are also the predominate colors. Human intervention may occur, so its absence is not a crucial piece of the definition [Kaplan 1989: 2]. Accordingly, examples include the virgin forest and national parks as well as parks, playgrounds, vacant lots, backyards, and even street trees [Kaplan 1989: 2]. Kaplan's working definition places nature within reach of the children's everyday world.

Acknowledging the spirit of abundance that should be present in a study considering children's contact with nature, this research will consider nature to be any place containing comparatively abundant vegetation and is typically green in keeping with Kaplan's definition. Materials near or on the playground that are considered natural include dirt, sand, grass, shrubs, trees, and fauna while manufactured objects such as playground equipment are not.

Built environment defined

A built environment can have nature, or abundant vegetation with varying degrees and treatments. A complete hardscape would be a concrete courtyard surrounded by brick buildings without any soft vegetation or trees while a softscape contains shrubs, trees, water, flower beds, and so forth. Most built environments have some amount of softscape or natural material used to provide a calming background or fill up empty space. However, its treatment and use as a tree-lined allele or a butterfly garden does not consider the vegetation as an ecological or conservation resource.

Contact with nature

With a clearer definition of nature established, the concept of children's contact with nature also requires clarification. Such contact can be direct, indirect, or vicarious [Kellert 2005: 65]. Direct contact occurs in unkempt wild places such as vacant lots, the edge of a forest, or even a backyard. It is a space where children can climb, holler, throw stones in a creek, and get wet and muddy [Kellert 2005: 65]. Indirect contact takes place in museums, nature centers, parks, zoos, vegetable gardens and such places where man controls the setting. Vicarious contact involves connection through an image or symbolic presentation of nature such as would occur from watching an *Animal Planet* documentary on bison, playing with a teddy bear, or hearing a story about "Goldilocks and the Three Bears" [Kellert 2005: 66]. A disturbing aspect of vicarious contact observed by Louv is abstraction. In numerous discussions with students from middle school to college, he noticed a disconnect between the senses and nature. For most

students "nature is so abstract—the ozone layer, a faraway rain forest—that it exists beyond the senses" [Louv 2008: 68].

Public playgrounds, which are the focus of the study, would primarily fall into the category of indirect nature contact from Kellert's definition although sections of the playground could allow direct contact. A sterile plastic playground surrounded by mown grass and covered with a canvas tent to shield out the bright sun and sky would not offer substantial direct contact with nature. However, some of the playgrounds surveyed in Bonn had a more substantial relationship with nature, which would shift it into a direct contact category as is explained in greater detail in later chapters.

Nature's role in children's development

When a child's connection to nature leads to interest in protecting nature as an adult, nature benefits. Research of the other side of the relationship suggests that children themselves benefit substantially from nature contact in intellectual, emotive, and physical development [Kellert 2005: 66]. Phases include early childhood, in which the home is the center of a child's universe, to the broadening circles of exploration in middle childhood to the shift to social concerns and interests in early teenage years. Within these stages, a specific window of time for connection with nature opens in middle childhood, which Kellert calls the "earth" period [Tai, et al. 2006: 15]. This period occurs from ages six to twelve in which, as David Sobel notes, "the *sense of wonder* of early childhood gets transmuted in middle childhood to a *sense of*

exploration." [Kellert 2005: 77]. Accordingly, the study focused on children within this age range although the intellectual, emotive, and physical benefits of nature clearly are present throughout all stages.

Intellectual or cognitive development occurs in the six stages established by the psychologist Benjamin Bloom and include knowledge, comprehension, application, analysis, synthesis, and evaluation [Kellert 2005: 68]. Nature with its complexity and abundance of materials, flora, and fauna offers rich opportunities for naming, counting, and learning basic facts of knowledge in the early stages. Numerous processes of nature such as weather, the seasons, the hydrological cycle, the life processes of flora and fauna allow children to consider individual experiences and how they relate to larger concepts [Kellert 2005: 68]. Play in nature also allows children to think creatively and solve problems [Burdette and Whitaker 2005: 48].

Emotional development occurs in five stages as recorded by David Krathwohl and colleagues and includes receiving, responding, valuing, organizing, and characterizing by a value or value complex [Kellert 2005: 70]. The first two stages of receiving and responding are particularly relevant to nature since nature offers an array of experiences stimulating a wide range of emotional responses such as "like, dislike, attraction, aversion, doubt, joy, sorrow, fear, wonder, and more" [Kellert 2005: 71]. As many as 96.5% adults in a study by psychologist Rachel Sebba noted that outdoor experiences were emotionally critical parts of childhood [Kellert 2005: 71]. Additionally, nature

helps children cope with stressful situations as demonstrated in a study by Cornell University in which children living with nature near their homes were found to suffer fewer cases of behavioral conduct disorders or depression [Louv 2008: 51]. One of the most prevalent behavioral conduct disorders, ADHD, was specifically studied in relation to nature with the conclusion that children had less severe symptoms after playing or completing activities such as fishing or playing soccer in "green" settings [Faber Taylor, et. al. 2001: 64].

Finally, nature offers an opportunity for physical activity in a society where children are increasingly sedentary. The Center for Disease Control found that 18% of the children under 19 are considered overweight or at risk for it in the United States [Moore and Marcus 2008: 156]. Time spent outdoors results in fewer illnesses with more rapid recovery [White 2008]. Moreover, play in an unstructured natural environment improves children's motor skills [Fjørtoft 2001: 111].

Most of the current research has focused on quantifying precisely how nature benefits children. As the research has become more compelling that this connection between children and nature exists and has verifiable benefits, the question for landscape architects becomes how much nature and what type of nature will optimize the benefits.

Theories on play

Without considering the nuances of the definitions on play beyond the scope of

landscape architecture and this research, a brief exploration into an aspect of play—

unstructured and structured play—is useful. The medical field defines play as "the

spontaneous activity in which children engage to amuse and to occupy themselves"

[Burdette and Whitaker 2005: 46]. This general definition is used for the research with

the key word being *spontaneous*.

Children's lives have become increasingly scheduled over the past few years with more

structured activities from music lessons to ballet practice taking an increasingly

dominant role [Burdette and Whitaker 2005: 46]. Over a six year period from 1997 to

2003, Sandra Hofferth at the University of Maryland recorded a fifty percent reduction

in the number of children from ages 9 to 12 spending time in outdoor activities [Louv

2008: 34]. Children's free time is in decline while what free time does exist can be spent

in passive activities such as watching television or playing computer games [Burdette

and Whitaker 2005: 46]. In unstructured outdoor play the child is required to determine

the duration and type of play, which in conjunction with nature yields the benefits

detailed in the previously discussed studies. Accordingly, unstructured play was a key

research point for activity use of playgrounds.

Unstructured play in nature, or natural play, consists of self-initiated and self-directed

play among a small group of children or a single child. The play can involve direct

physical contact with natural objects such as climbing a tree, breaking a twig from a shrub, or throwing leaves. Play can also be creative or dramatic such as acting out a story and using natural objects as props such as tree trunks being the corners of a castle with imaginary walls and doors. As the child communicates with other children or engages in self-directed thinking, connection with nature on a deeper level may occur. Such experiences cannot be documented when happening, but only through research of adults relating their childhood connections to nature. Games or parent-directed activities in nature may also have benefits in creating contact with nature at another level. However, since the literature review emphasized unstructured play, the research is limited to considering unstructured natural play.

Note on interdisciplinary research

The study of the relationship between children and nature is at the edge of many fields of research with input from environmental psychologists, education psychologists, social scientists, ecologists, landscape architects, and pediatricians. Each field offers its own contribution, but as Kellert notes, it has also allowed this area to be somewhat overlooked as, for instance, environmental psychologists consider how children could learn about nature more often than what they benefit from it [Kellert 2005: 64-65]. There is a notable absence of research that establishes the relationship between the environment and behavior to produce guidelines for more informed design practice to connect children with nature [Moore and Marcus 2008: 196]. Landscape architecture

with its understanding that environment influences behavior is a field that can contribute

to resolving this issue.

CHAPTER II

METHODS

Research question

The methods resolve the research question within the given limitations of resources and time. The general objective is to understand the built environment's role in connecting children with nature. The specific research question is: Does the duration and frequency of unstructured play increase in an environment with a higher nature index, which generally can be detected through analysis of site observations and panoramic photographs? The method includes detailed case studies with methodology established by Clare Cooper Marcus for students at the University of California at Berkeley. The results identify potential patterns or trends that could strongly increase connection with nature.

Research Assumptions

The research question implies four assumptions supported by previous research discussed in the introduction. The assumptions are:

1. Unstructured play is beneficial. (Burdette and Whitaker 2005)

2. Nature (green vegetation) is beneficial. (Faber Taylor, et. al. 2001)

3. The environment influences behavior. (Cosco 2007 and Moore and Marcus 2008)

4. Time spent in nature in unstructured play usually induces a connection with nature. (Chawla 2002, Kellert 2005, and Moore and Marcus 2008)

As Chawla notes, Assumption Four's idea of children's connection with nature for emotive experiences cannot be directly studied. In a study of childhood experiences, a researcher had originally intended to interview children, but later changed to asking adults about childhood memories since the children could not yet articulate what they had experienced into words [Chawla 2002:215]. Therefore, based on the previous research that 96.5% adults found the outdoors to be a key component of their emotional childhood experiences, Assumption Four holds that children spending time in nature are having meaningful experiences of some kind or degree although they cannot be immediately studied [Kellert 2005: 71].

Precedent for case studies in landscape architecture

Through the 1990s, landscape architecture recognized case studies as a useful method to build the discipline's body of knowledge. Case studies use words and images to describe, analyze, and critique landscape architectural projects. Mark Francis created case study guidelines in research commissioned by the Landscape Architecture Foundation. The three following case studies of playgrounds in Bonn reference his guiding principles [Francis 1999]. However, a key difference is that Francis's case studies are for highly-designed spaces while those of this research are for vernacular public playgrounds. Clare Cooper Marcus developed methods to the case study framework as she had college students use progressively detailed observation tools to

create case studies of public spaces [Marcus and Francis 1998: 345-356].[1] Her

guidelines for undergraduates at the University of Berkeley are especially suited to this

research. Therefore, within the theoretical framework of Francis that validates case

studies as a useful method for research in the field of landscape architecture, the

following case studies primarily references specific methods of Marcus particularly for

behavior traces and activity use.

Selection of sites

Sites are selected based on several factors. A key criteria is that it agree with the points

given in a note on ethics since playgrounds are a sensitive area of study. Another factor

is that the playground has enough density of activity use for its location and size to merit

study. Its relationship to nature, such as an obvious location in nature or a notable

absence of nature, should be clear. The sites should be reasonably accessible to the

researcher. Finally, it is preferable that each site studied represent a different

relationship to nature in a play space. For example, this study selected three sites with

the different relationships of little nature in a manmade space, some nature in a

manmade space, and a primarily natural space.

Case study format

The case study for this research contained the following components, although not every

case study included each: project facts, context, city policy, original design, functional

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[1] Note that Francis here refers to Carolyn Francis and not to Mark Francis referred to earlier in the
paragraph.

subareas, behavior traces, activity use, and site significance and impact. Project facts gives the name, location, date designed, cost, and size of the site. Cost is given in historical currency and modern equivalents for easy comparison across projects. Context provides any pertinent information on population, public transportation, road systems, neighboring land use, pedestrian traffic near the site, and other notable features. City policy addresses general policy, finances, maintenance, planning strategy, future developments. If information is available, the original design section describes the intent of the original designer. Functional subareas identifies the different spaces within the playground from a thorough understanding of the site and explains the relationships between them. Behavior traces records signs of accretion, or accumulation of material, and erosion that indicate usage patterns of the playground. Activity use involves an analysis of use from direct, unobtrusive observation. Site significance and impact allows the researcher to give a perspective on the value of the site, synthesize information from different categories, and record any aspects of the site that the previous categories may have overlooked. Specific categories including context, behavior traces, and activity use require more detailed explanation on method procedure.

Context

Context necessitates a survey of the area surrounding the site. A recommended method for data gathering is to study a Google Earth Map for orientation and complete a walking survey and record observations of landmarks and land uses with a notepad, pencil, and camera. This process allows a familiarity with the character of the surrounding

neighborhood and answers question such as: is it primarily residential? is it commercial? are there schools nearby? The survey may lead to more insightful observations or research questions.

A context map is developed with the data collected during the walking survey. The scale of the map both depends on the scale of the site studied and the inclusion of any surrounding spaces that could impact the use of the playground such as surrounding schools, churches, and housing. A ¼ mile (or ½ kilometer) or smaller radius around the site is usually appropriate. The context map should provide at least the hierarchy of roads, surrounding land uses, and public transportation stops. Emphasize the flow of vehicular and pedestrian traffic through the area and note entrances and vistas that connect the spaces.

Information that cannot be gained on a walking survey includes population information and an understanding of the regional context. Targeted population statistics are available through the US Census Bureau although as in the case of German population statistics, the information is not as readily available and more general population data is used. Key aspects to consider are the size of the population, percentage of children to the overall population, age groups of children, education, and income to determine if there are population trends that could influence the site. Regional context can be recorded with a Google Earth map and an outline of the municipality boundary.

Functional areas and subareas

The researcher will determine the boundaries of the area of study and divide these into functional subareas after becoming familiar with the site. There may be multiple defensible ways to divide a space into subareas based on a consideration of physical factors such as edges or changes in ground materials or social factors such as the domination of one age group in a particular part of the playground. Draw a site plan of the area from onsite measurements and aerial images. A CAD framework was used for the creation of site plans in this research with a .05, .1, .2, and .8 black pen for the sketch. For graphic standards, reference drawings in "Child Care Outdoor Spaces" [Marcus and Francis 1998: 295-304].

Behavior traces

A survey of behavioral traces indicates usage that may be long-term, such as the wearing of grass to create a path, or behavior that may occur when the observer is away from the site, such as the littering of candy wrappers in the late evening. A record of these traces on one or more visits gives a more complete understanding of the site's usage. Traces include litter, worn paint on benches and play equipment, worn earth or grass, and graffiti. Marcus notes that trash on the ground could have blown out of a full trashcan instead of being a sign of littering [Marcus and Francis 1998: 351]. Absence of any behavior traces could indicate a lack of use. Record the location of each trace with a photograph. Create a map with all the traces keyed into the site plan by graphic symbols.

Activity use

Activity mapping records individuals' use of the space. Often this is done on a site plan noting the location of individuals, age, gender, and activity type. For public parks, Marcus and Francis recommends walking through the space and recording what each observed person is doing and where on a site plan [Marcus and Francis 1998: 351]. If a person such as a jogger appears several times, record it each time since there may be other moving individuals who are not recorded. Minor adjustments were made to the activity use method for the playground as detailed below.

One way to record activity use is a table, which is preferably used in conjunction with a site plan. Due to time constraints, clarity concerns, and limitations of one observer, a site plan could not be used. The Observation Table as shown in Table 1 is a graphic made in an Excel spreadsheet. The categories for play are *Not Child-directed, Child-directed, Unengaged,* and *Ambiguous*. Unstructured play assumes that the child has the ability to determine the duration and intensity of the play while structured play limits the child's choice. For example, a parent may direct and determine the activity or a game with set rules may structure the play. The reviewed research indicates that important benefits occur in unstructured play, which takes place as the child or a small group of children direct play among themselves. Children can be unengaged by sitting on a bench near a parent without any interaction or by sitting in the playground without having any apparent contact with the environment or other children. Sometimes, however, it is

difficult to determine the precise nature of an activity for which the *Ambiguous* category

is provided. Each type of play takes place in a natural or manmade environment.

Observation Table								
Play								
	Not child-directed		Child-directed		Unengaged		Ambiguous	
Time	*Natural*	*Man-made*	*Natural*	*Man-made*	*Natural*	*Man-made*	*Natural*	*Man-made*
1								
2								
3								
4								
5+								

Table 1: Observation Table from Excel

The number of minutes of play are recorded. If a child is engaged in play, a check mark

is placed in the one minute box. If after one minute, the child is still completing the

same activity, another check mark is placed in the next minute box until the 5+ minute

box is checked. At this point, the particular activity is given a short note such as "sand'

or "interaction with mom" underneath the table and the activity is no longer recorded.

At the end of the session, the number of check marks in the 4 minute row indicates the

number of children that played for *at least* four minutes at a certain activity. However,

the children that played for 5+ minutes are also included in that the number. To

determine the number that played for just four minutes and no longer, subtract the 5+

group from the 4 minute group. The justification for this system of recording is that it

allows swift recording of up to about thirty children on a playground with a reasonable

degree of accuracy. The observer does not time each child, but records all activity

sustained over each minute. Also, while not ideal in noting the location of children on the playground or other data, the table ensures total anonymity.

Final information for the chart includes environmental details and other data. It is important to record the time of the observation session, the weather and approximate cloud cover, and the temperature. The temperature can be noted by referring to a weather web site such as Weather.com, which has an hour-by-hour record of the temperature for the current day. Finally, also note the number of parents, toddlers, and children in the target age range of six to twelve.

Observation sessions ideally should be completed within the same one or two hour windows on both the weekdays and weekends. For example, since previous observation indicated that playtime did not occur in the morning or after sunset, the observation times were set between 1:00-3:00, 3:00-5:00 and 5:00-6:00. The duration of a session was thirty minutes as both a minimum for collecting meaningful data and as a maximum for ensuring accurate recording during a busy time at the playground. The location of the recorder was in a place in the playground such as a bench that had been noted as conducive of unobtrusive observation.

From the observation tables, a map is created for the noted 5+ minute activities to observe any additional patterns for activities of longer duration. Different symbols distinguish parents from children of ages six to twelve. Letters indicate non-obvious

activities shown on the site plan. For example, a circle representing a child next to a tree would need a "C" beside it, which would key into a legend as "Climbing a tree."

Limitations

Although the location of the study provided significant opportunities, it also had several limitations. First, the study's completion at the end of fall limited the timeframe for collection of meaningful data. With approval for the project received on October 14, 2008, I had a seventeen day period for collection of activity use data with the final date on October 31 2008. Any data collected beyond that point, after which the weather deteriorated significantly with cold temperatures and increased rainfall, lacked density to be meaningful. Another restriction to the location was the cultural barrier since I had no previous experience or understanding of German or Turkish culture.[2]

Limited resources were also restrictive to the study. Within the given timeframe limitations, six observations at each of the three selected sites was a challenge for one observer. Furthermore, although the first neighborhood playground site was immediately selected, the selection of the other sites required more time and consultation from Professor Naderi and Germans familiar with the area. Also, the Naturpark Rheinland site, which was a forest used by children for play, could not accommodate the activity use analysis that the other two had because of the site's character. There was no bench or other place where people would sit passively and people watch, which limited

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[2] The Turkish population is a leading minority group in the region.

the ability to complete the activity use observation. As a result, I followed the Marcus model of walking through a larger space as an alternate method. Finally, the forest was one hour away by public transportation from my place of residence, which restricted the number of site visits.

A note on ethics

The points below clarify any concerns on determining if the research is considered to involve human participants, which it is not for the following reasons:

1. The project focuses on the attributes of the physical environment rather than the psychology of play or individual behavior; the objective is to determine the physical characteristics of the site that support play with optimal exposure to nature.

2. There is no intervention with individuals or manipulation of the environment.

3. Observation is limited to recording physical dimensions of sites, entrances and egresses, movement through site, gathering places, and the structured or unstructured types of play. All of these physical characteristics will be noted on hand drawn maps and tables while the human component is recorded with check marks that give total anonymity to any individual.

4. No photographs of any human subjects were used.

5. Observation took place in public places that are accessible and visible to the general public at all times.

6. Due to the reasons listed above (in addition to a language barrier that prevents interaction during field observation), there is no collection of private or identifiable data of any kind.

CHAPTER III

CASE STUDY 1: AUERBERG NEIGHBORHOOD PLAYGROUND

Project facts

Name: Auerburg Neighborhood Playground (Luxemburger Str. Playground)

Location: Luxemburger Str., Auerburg, 53117 Bonn

Date designed: 1969

Cost: 53,066.88 DM in 1969 (€55,897.47 or $76,485.96 in 2007)[3]

Size: approximately 1,790 square meters (19,250 square feet)

Context

The playground is located in Auerberg, a small town with a population of 8,765 people that is in the northern part of Bonn, which has a population of 314,645 (Fig. 1). The neighborhood contains multifamily housing so that Auerberg functions as a suburb of Bonn without its own downtown center. Public transit reaches into the area along Pariser Str. with two tram stops and bus stops (Fig. 2). The multifamily housing includes two high-rise apartment complexes of government housing, one high-rise apartment of student housing, garden apartments from the 1960s, townhouses from the 1980s, fourplexes built within the past five years, and newly constructed townhouses.

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[3] According to the Measuring Worth web site, $1 was worth 3.9320 Deutsche Mark in 1969. Consequently, it would be $13,527.12 in 1969. With an adjustment by the Consumer Price Index through the same source, the cost in 2007 would be $76,485.96. According to the U.S. Embassy of France web site, the average exchange rate in 2007 from the US dollar to Euro was .73082, which would make the cost €55,897.47 in 2007.
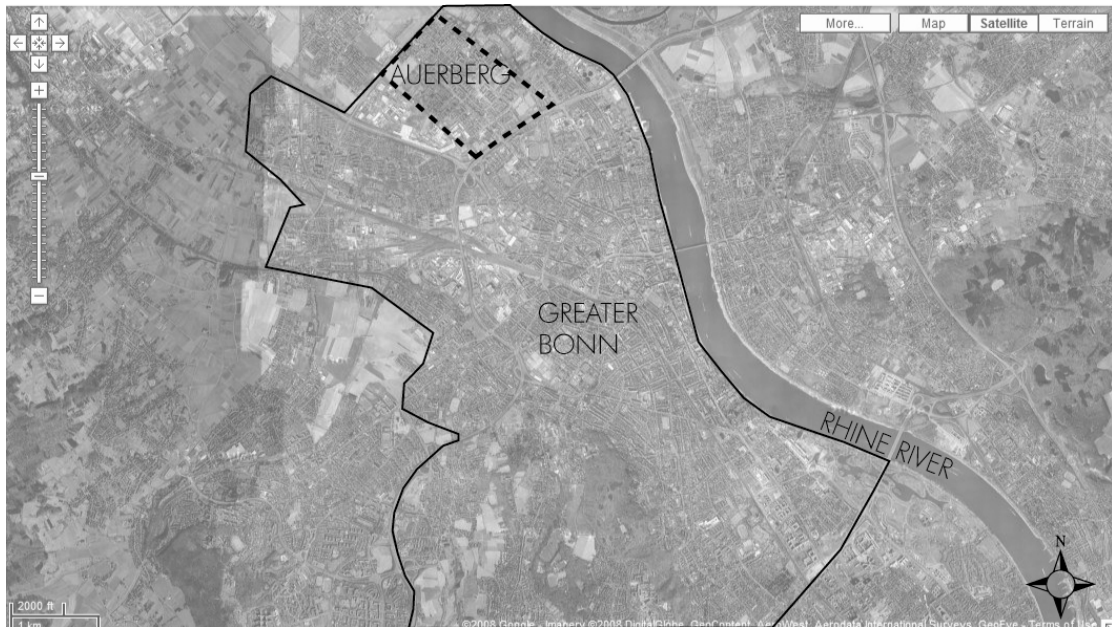
Figure 1 Regional Map of Auerberg, a Small Village North of Bonn

Commercial and retail development is limited to a few shops along Pariser Str. and a recently opened mixed-use center with two grocery stores of Penny Markt and REWE and apartment lofts overhead. The institutional land uses adjacent to the playground include the Evangelisches Gemeindeforum, a neighborhood Lutheran church, and a kindergarten. The vacant lots near the playground are open for development, but there are plans to convert the vacant lot near the supermarket complex into a park.

The playground is not adjacent to through streets so vehicular traffic is limited although a considerable amount of pedestrian and bicycle traffic moves through the playground. The traffic level on Pariser Str. is comparatively moderate and Köln Str., a busy regional road, is sufficiently distant and visually blocked to not affect the playground.

LEGEND · BUILT ENIVRONMENT · VACANT LOT · STREET
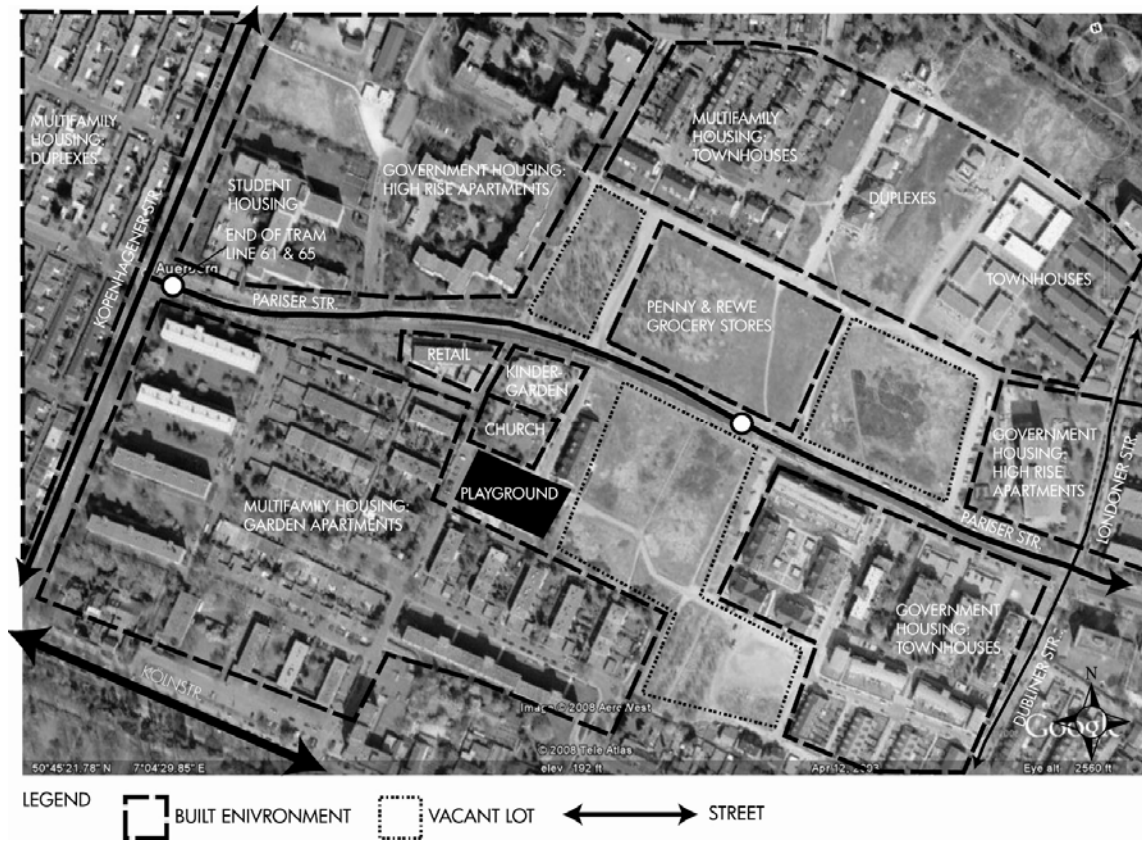
Figure 2 Context Map of Auerberg Neighborhood for Luxemburger Str. Playground

City policy

As with most of Bonn's playgrounds, the city owns and maintains it as explained by

Bernd Grießbach, a city clerk with the Office of Playground Planning (Grießbach 2008).

The genesis of the project is undetermined, but the City of Bonn likely constructed it

concurrently or shortly after the construction of adjacent apartment complexes built in

the late 1960s (Fig. 2). The designer's name, which is in illegible handwriting on the

original site plan, is something akin to Brinch Hieuke. The City of Bonn has an architect

on staff to complete some design work, but when this individual is unavailable for

playground design, a private firm does the work. After construction is completed, all maintenance and changes to the playground equipment are made by the Office of Playground Planning, which consists of two city administrators, Kristine Onodi and Bernd Grießbach, who provided the information on the history, policy, financial resources, and original design for this playground. Actual playground construction is usually done in conjunction with the Office of Urban Green or through a private company.

Updates to playground equipment depend on the limited financial budget, which is annually €80,000. Recently, it was increased to €100,000 and in 2006, a sum of €500,000 was dispensed for two years to implement changes suggested by a city-wide playground planning document. Most equipment is expected to last ten years before requiring replacement or renovation, but the additional financial resources allow many needed updates.

As part of the new playground plan, an in-depth survey was completed for the playgrounds of Bonn with an inventory and recommendations for each one. The playground of Luxemburger was recommended to have some improvements to repair some fences nearby and allow for proper drainage at one of the playground entrances.

Original design

The original site plan for the Luxemburger Str. playground from 1969 shows a few changes from its original construction to its current state. The original playground equipment had primarily wooden structures that functioned as a whole piece unlike the current equipment, which is fragmented as shown in the site plan (Fig. 3). The overall design included numerous shrubs and trees, which are still on the site. Although the original design included only a few pathways and informal footpaths have now been worn into the site, the overall intent of the design is intact.

Functional subareas of site

There are four primary subareas to the site with a main playground, sand playground, grass open space, and a fenced soccer area (Fig. 3-11).

Main playground

The main playground contains four pieces of play equipment—a feather seesaw for younger children, a regular wooden seesaw, a six-sided climbing piece, and a swing set with two seats (Fig. 4). Each piece is disconnected from the other and appropriately spaced for safety. In September, new wood chips were added to older wood chips on the ground. The edging of wood beams and stumps creates a clearly defined playground border on which children frequently walked (Fig. 5). All the play equipment seems worn, but is generally in good condition and comparatively new.
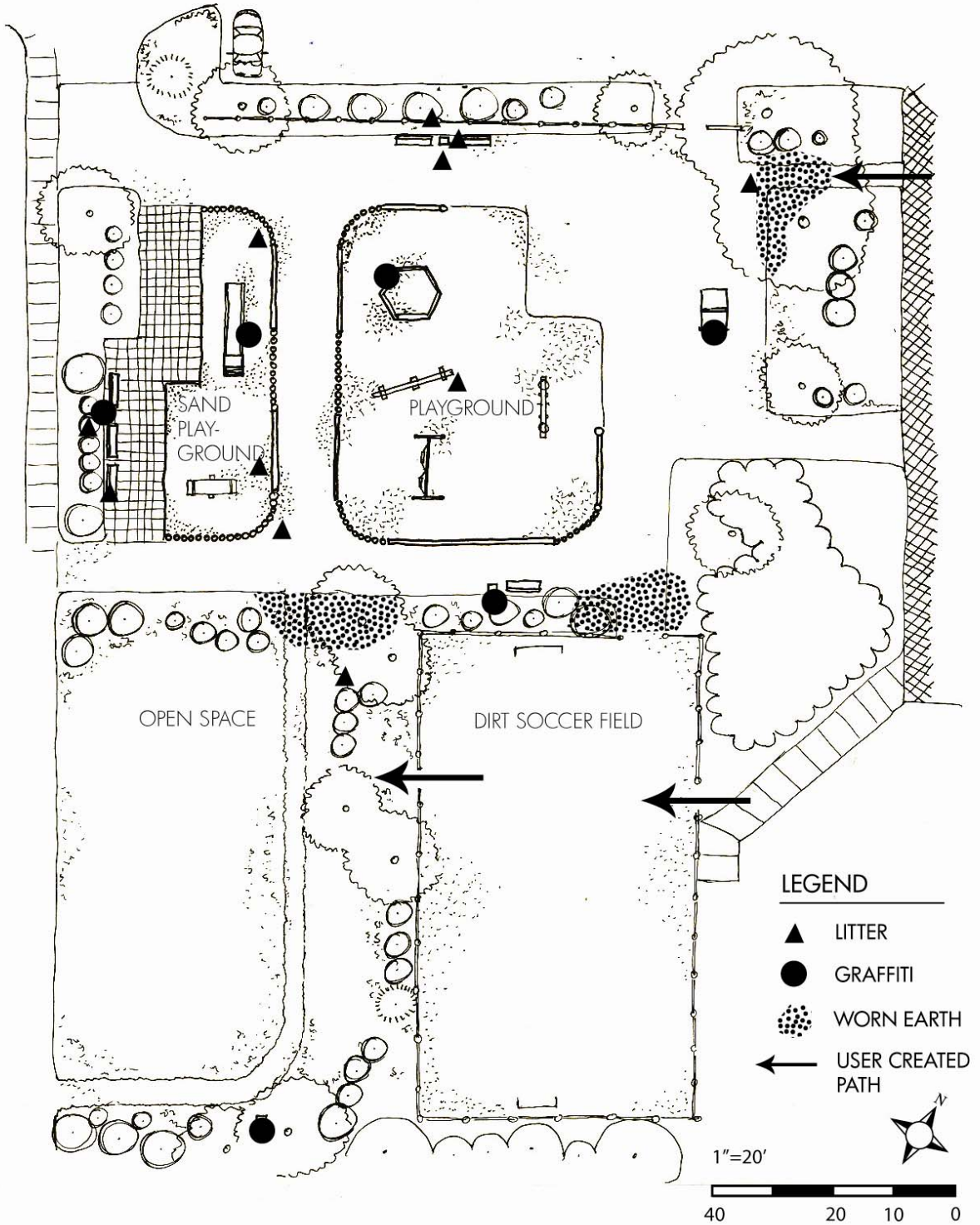
Figure 3 Four Subspaces of the Luxemburger Str. Playground. Litter and Graffiti are Moderate.

Figure 4 Main Playground

Figure 5 Wooden Edging & Litter

Figure 6 Sand Playground

Figure 7 Pavers

Figure 8 Benches on Pavers

Figure 9 Grassy Open Space

Sand playground

The sand playground contains two pieces of play equipment—a new modified seesaw

for younger children and a worn slide with chipped paint (Fig. 6). The sand playground

is smaller than the main playground. The western side of the playground abuts a

walkway with concrete pavers that prevents dirt from mixing with sand (Fig. 7). This

pathway also has three benches, which makes it easier for mothers to sit near their

younger children (Fig. 8). The age group using the sand playground is younger with the

average age at five years old.

Open grass space

Although this space was originally designed to be part of the playground, it currently has an ambiguous relationship to the rest of the site. Several clumps of shrubs obstruct the view into it from the playground benches so that parents cannot maintain visual supervision of their children in that area and so discourage its use. A hard packed path runs through the site and allows access to passersby (Fig. 9). At one point, three adult males with bicycles were observed spending time there and possibly carrying on illicit activities. Only a few older children use the open space for playing and climbing the nearby trees.

Fenced soccer field

The soccer field, which is fenced by a six foot wire fence, consists of hard packed earth and two goals. Overgrown shrubs surround a portion of the field that gives it visual privacy. The fence has two holes that are sometimes used as a shortcut by young passersby. The space is primarily used by Turkish boys ages six to twelve to play soccer.

Behavior traces

The aggregate behavior traces suggested typical playground uses. The trash cans were often full or overflowing due to limited maintenance, which accounts for most of the litter on the site (Fig. 3). The litter included plastic water bottles, food wrappers, and a price tag for a piece of clothing. The sand box was not raked and had some litter in it.

Cigarette butts were present near all of the benches, which corresponds with the observed behavior that a limited number of the mothers smoke while supervising their children. The hole through the wire fence in the soccer play area indicates the use of the area as a shortcut possibly during play.

Graffiti as noted with the circle symbol was present on nearly every smooth surface including the climbing wall, slide, all trash cans, and the top of the ping pong table (Fig. 3). Graffiti in which groups try to spray paint their logo or name such as INF on objects in competition with other graffiti groups is common in Bonn and most of Germany. Accordingly, the level of graffiti, although high, is not disproportionate to that of the surrounding area. It would indicate activity from teenagers and youths, but the playground does not seem to be particularly targeted more than any other public area.

Activity use analysis

The activity mapping shows use for periods of five minutes or more (Fig. 10). Children of ages five to eight often used the slide for long periods of time with creative modifications of play such as climbing up the slide, going down the slide two at a time, rolling toy cars down the slide, and so forth. The sand playground shows a set of parents congregated in the eastern corner, which denotes a particular instance in which several women and one man of Middle Eastern or Turkish descent gathered with their toddlers in close proximity. Finally, the soccer field was occupied during three of the five observation sessions by boys from ages seven to twelve playing soccer for long periods

LUXEMBURGER STR. PLAYGROUND

DATE: OCTOBER 17, 19, 30, 24   TEMPERATURE: 55 F   CHILDREN: (77) AVERAGE (13) IIIII IIIII III
TIME: 30 MINUTE SESSIONS   CLOUD COVER: 52%   PARENTS: (55) AVERAGE (11) IIIII IIIII I

LEGEND

● CHILD
○ CHILD IN NATURE
■ PARENT

1"=20'

40   20   10   0

PLAY WITH MAN-MADE ELEMENTS

B   BIKING

R   ROLLING BALL IN DIRT

PLAY WITH NATURAL ELEMENTS

S   SAND
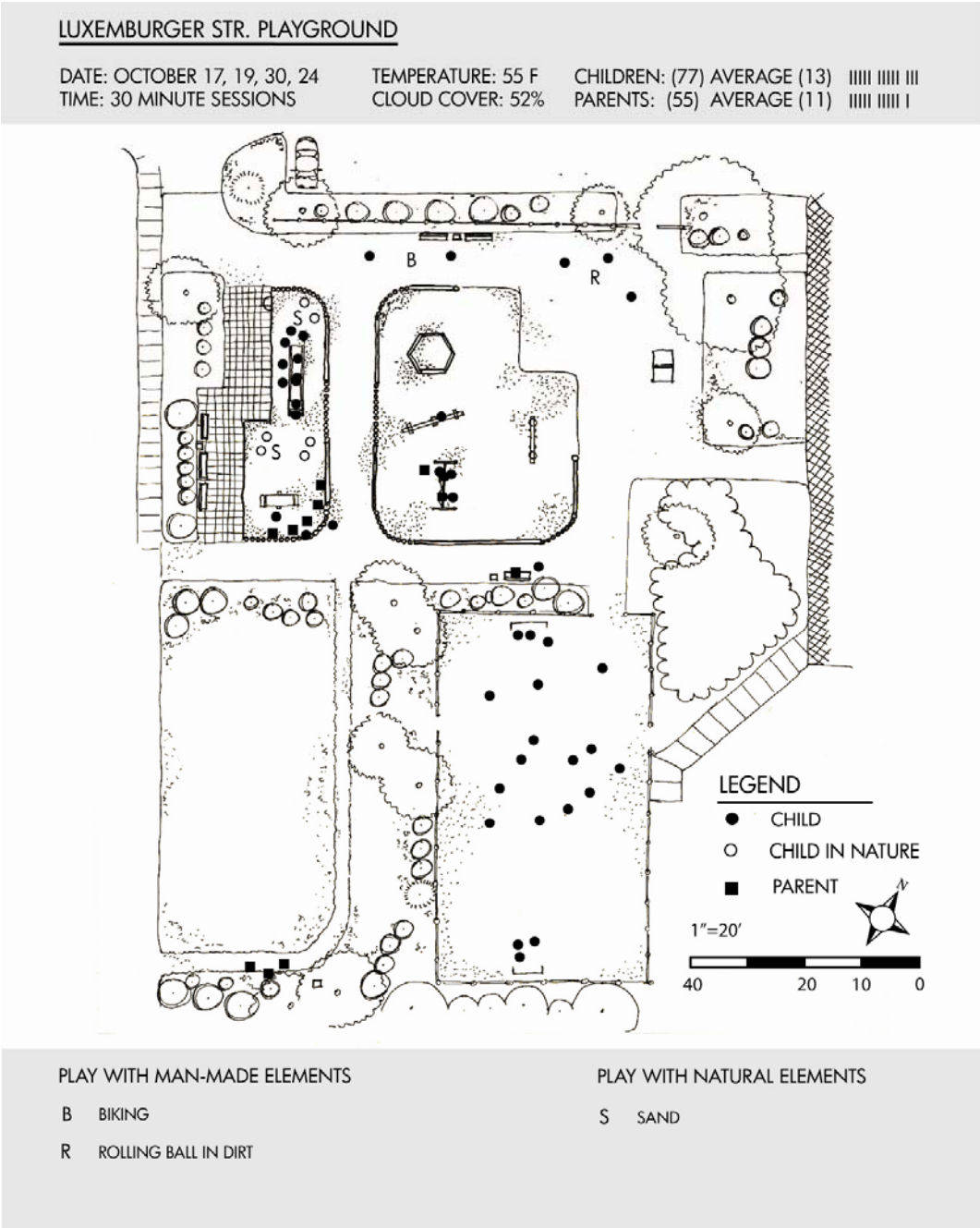
Figure 10 Activity Use for Periods of Five Minutes or More

of time. The swing in the main playground also resulted in extended play periods particularly when a parent was pushing a child, in which case the play activity became more social. The only natural play element that attracted attention for any length of time was sand.

Adult activity through the site involved two roles as passersby or denizens, which are passive users of the space, since the children were always the kibitzers, or active users of the space. The passersby were on foot or bicycle and most likely did not enjoy having their path run directly through the playground. Bicyclists were cautious, however, and no actual user conflict between a toddler and bicyclist was recorded. For some passersby, such as a few elderly women, who were known members of the community, exchanges were made with denizens in passing. In this case, the path through the playground had a positive effect of reinforcing a sense of community and increasing safety with more people overseeing the playground. The denizens were primarily women supervising the children's play. The women would either sit alone or with a toddler, converse with one another, or smoke.

A brief word on nature connection

Although nature connection was not reflected on the five-minute activity use map, it did in fact occur in events of shorter duration with vegetation at the perimeter of the playground (Fig. 10 and Appendix). From sitting at a bench within the playground, I recorded ten healthy trees and forty-five shrubs of several varieties. As the panorama

photographs shows, there is considerable variety of tree canopy width, tree height, and

tree type (Fig. 11 and 12). Nature-oriented activities included climbing trees, selecting

twigs from various shrubs, poking shrubs with sticks, picking up leafs, throwing leaves

into the air, and so forth. A total of 26 child-directed nature-oriented events were

recorded compared to a total of 207 child-directed manmade environment events. The

nature connection was at about 12.0% for the site and usually consisted of solitary

children or children in groups of two or three.

Figure 11 Panorama of Sand Playground

Figure 12 Panorama of Playground

Site significance and impact

The site demonstrates the long-term viability of a simple playground design that meets

existing needs. The provision of playgrounds with simple equipment and a soccer play

space would not meet an adult's aesthetic expectations for an optimal playground experience. However, with limited financial resources, the city has maintained essentials elements for the playground, such as the addition of new wood chips. The children demonstrate a preference for the sand playground for longer periods of play, which is most likely due to the increased elasticity of the materials such as sand or the slide. The playground's placement along a major walking and biking path for the surrounding apartment complexes enhances safety in that there are more eyes watching the space and it provides a meeting place for the community. Also, a lack of aesthetics does not equate a failed design or reduced use. The space is surprisingly resilient to continue in the same functional use for which it was designed nearly forty years ago.

CHAPTER IV

CASE STUDY 2: HOFGARTEN URBAN PLAYGROUND

Project facts

Name: Hofgarten Playground

Location: Near Academic Art Museum (Am Hofgarten 21 53113 Bonn, Germany)

Date designed: 1974

Cost: 115,000 DM in 1974 (€136,813 or $187,205 in 2007)[4]

Size: approximately 1,310 square meters (14,102 square feet)

Context

The playground is located in the Hofgarten, a public park maintained on the private

property of the University of Bonn, in the downtown area of Bonn (Fig. 13). The

University was founded in 1818 and now contains 28,000 students ("Univeristät Bonn").

The former palace near Hofgarten is one of the many university buildings spread across

the city. The building visually links the city from the Rhine River to a plaza at the edge

of the downtown's pedestrian zone. The park's open lawn framed by trees and

proximity to a main university building make it popular with students as a place to meet,

eat lunch on the grass, and play soccer. The eastern end of the park contains the

---

[4] According to the Measuring Worth web site, $1 was worth 2.5820 Deutsche Mark in 1974.
Consequently, it would be worth $44,539.12 in 1974. With an adjustment by the Consumer Price Index
through the same source, the cost in 2007 would be $187,205.15. According to the U.S. Embassy of
France web site, the average exchange rate in 2007 from the US dollar to Euro was .73082, which would
make the cost €136,813.27 in 2007.
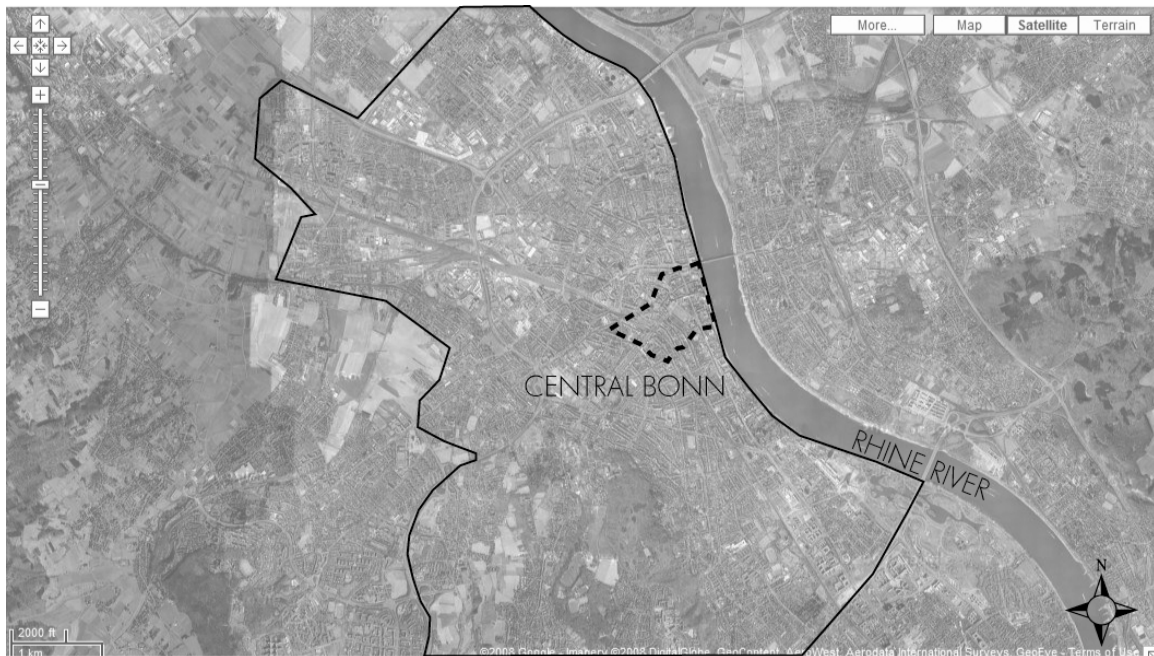
Figure 13 Regional Map of Bonn

Academic Art Museum (Fig. 14). East of the park the neighborhood consists of

townhouses with residences on the quieter streets and mixed uses of commercial and

retail near the busy Adenauerallee. The area also has a school with a fenced playground.

The Hofgarten playground is underneath a canopy of trees adjacent to the soccer field

and is a few hundred yards off the main path. A few cars use the road next to the

playground, but the busy Adenauerallee is far enough away to not have a negative

impact on the playground. Because there are only a few residences near the playground,

most visitors are from other places in Bonn and do not know one another. Often the

playground seems to be used as a place for children to play perhaps after parents have

finished shopping in the pedestrian zone. One of the U-Bonn stops and an underground
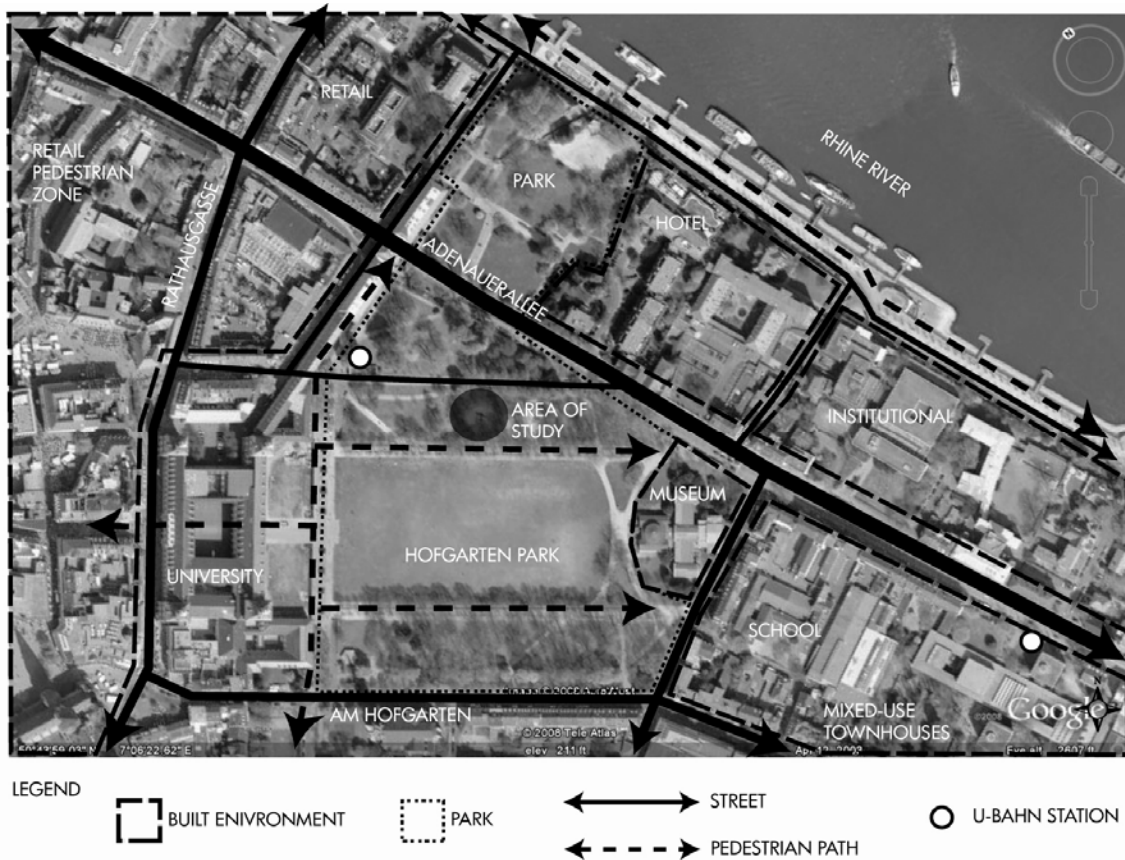
Figure 14 Context Map of Central Bonn for Hofgarten Playground
The Primary Land Use is Institutional and Retail with the University and Retail Pedestrian Zone.

parking garage are near the playground so that it is easy to visit the playground before

returning home.

City policy

The city maintains, but does not own the playground as explained by Bernd Grießbach, a

city clerk with the Office of Playground Planning (Grießbach 2008). The genesis of the

project was in 1973 by Brinch Hieuke, who also did the Luxemburger Str. playground.

The city wanted to place a playground on the site due to its ideal location and requested

permission to build and maintain it although the University owns the property. The
University agreed. A total of 65,000 DM for playground equipment and 45,000 DM for
other preparatory work was provided. Some donations were given from other
organizations. There was a concern about provision of restrooms by the city or through
the University, which did not wish to provide restrooms. Later, a playground for older
children was added. The current playground was added in 1995. More details on the
general management of the playgrounds in the City of Bonn is provided in the "City
Policy" section of Chapter 3.

As part of the new playground plan, an in-depth survey was completed for the
playgrounds of Bonn with an inventory and recommendations for each one. The
playground of Hofgarten was recommended to maintain its current form with no
changes.

Original design

The history of the original design is ambiguous and intriguing. The city documents of
the design show the presence of a circular area from a previous date. The university is a
little over two hundred years old so it could have built the circle as a gathering space or
perhaps, it was a fragment from the original Baroque design when the building was
originally constructed as a palace. Regardless of its origin, the circle was converted into
a playground with the university's permission in 1973. The original design as gathered
from photographs of newspaper articles in the 1974 to 1978 was a wood construction.
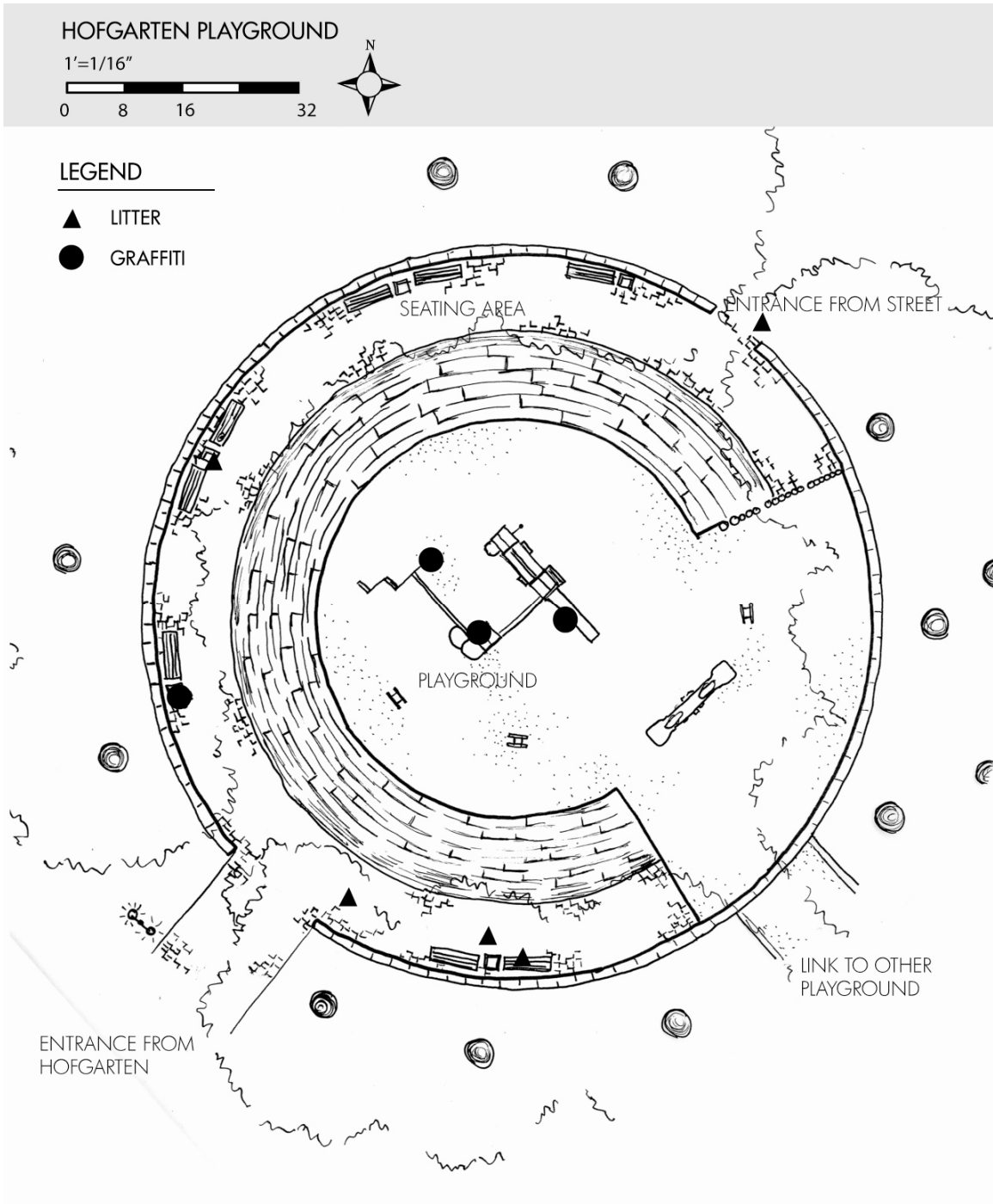
Figure 15 Two Subspaces of the Playground with the Seating Area and Sand Playground. Litter is Low and Graffiti is Moderate.

This type of playground is now often considered hazardous for play and would have had a short lifespan with wood as the main material. It may have been replaced in 1983, but was certainly replaced for the current playground in 1995. The playground placed in the sand does not respond to the circle design. Ten mature trees ring the playground and create a canopy cover overhead.

Functional subareas of site

There are no distinctive subareas to the playground studied although it can be divided into the seating area and sand playground (Fig. 15).

Seating area

The seating area is edged by a forty centimeter (fifteen inch) retaining wall/seating wall that places the playground at a lower grade than the surrounding park (Fig. 16). In combination with the surrounding mature trees, it creates an experience of being enclosed within a distinctive geometric space (Fig. 17). There are eight benches and when these are full, parents sit on the wall as well. The benches are often in use because there are usually more parents than children. The stone paving is raised slightly next to the sand of the playground to keep the sand contained within the playground area.

Sand playground

The playground contains a large piece of play equipment with a slide, pole, spider web net, bridge, two rope ladders, bars, and several look-out towers (Fig. 17, 18 and 19).

Figure 16 Seating Area

Figure 17 Main Playground

Figure 18 Steps to Look-out Tower

Figure 19 Panorama of Hofgarten Playground

Figure 20 Panorama of Hofgarten Ride-on Spring Animal and Seesaw

Figure 21 Ride-on Spring Animal

Figure 22 Spring Seesaw

There are three ride-on spring animals and one spring seesaw (Fig. 20, 21 and 22). The children also liked to play in the sand, which was well-maintained by the city.

Behavior traces

The aggregate behavior traces revealed little because of the high maintenance of the site

(Fig. 15). The trash cans were regularly emptied and some litter was recorded only on a

weekend. A maintenance truck with a single worker blowing leaves and raking sand

could be found nearly each weekday early in the morning. Graffiti, which is a

ubiquitous cultural expression in this region, was present on the playground equipment

and trash cans, but not in any amount higher than the rest of the surrounding area. The

design has two clear entrances and a seating wall that keeps most visitors within the

paved area so that no informal paths exist.

Activity use analysis

The activity mapping shows use for periods of five minutes or more (Fig. 23). Children

of ages seven or younger often used the playground while older siblings were at the

other playground. Very young children often played in the sand for extended periods of

time. Possibly due to the number of children or to the variety of play opportunities,

children rarely devoted five minutes to any single play activity. On some periods, the

activity almost seemed frenzied with once as many as twenty-two children playing in the

space. On that particular day, one small child was hanging off the roof of one of the

overlook towers, but the intensity of the activity masked the action from being perceived

as a concern by any parents. Most of the activities that were sustained for five minutes

and recorded on the activity use map were directed by parents trying to watch several

children at once. Turkish and German parents were recorded and parents watched their
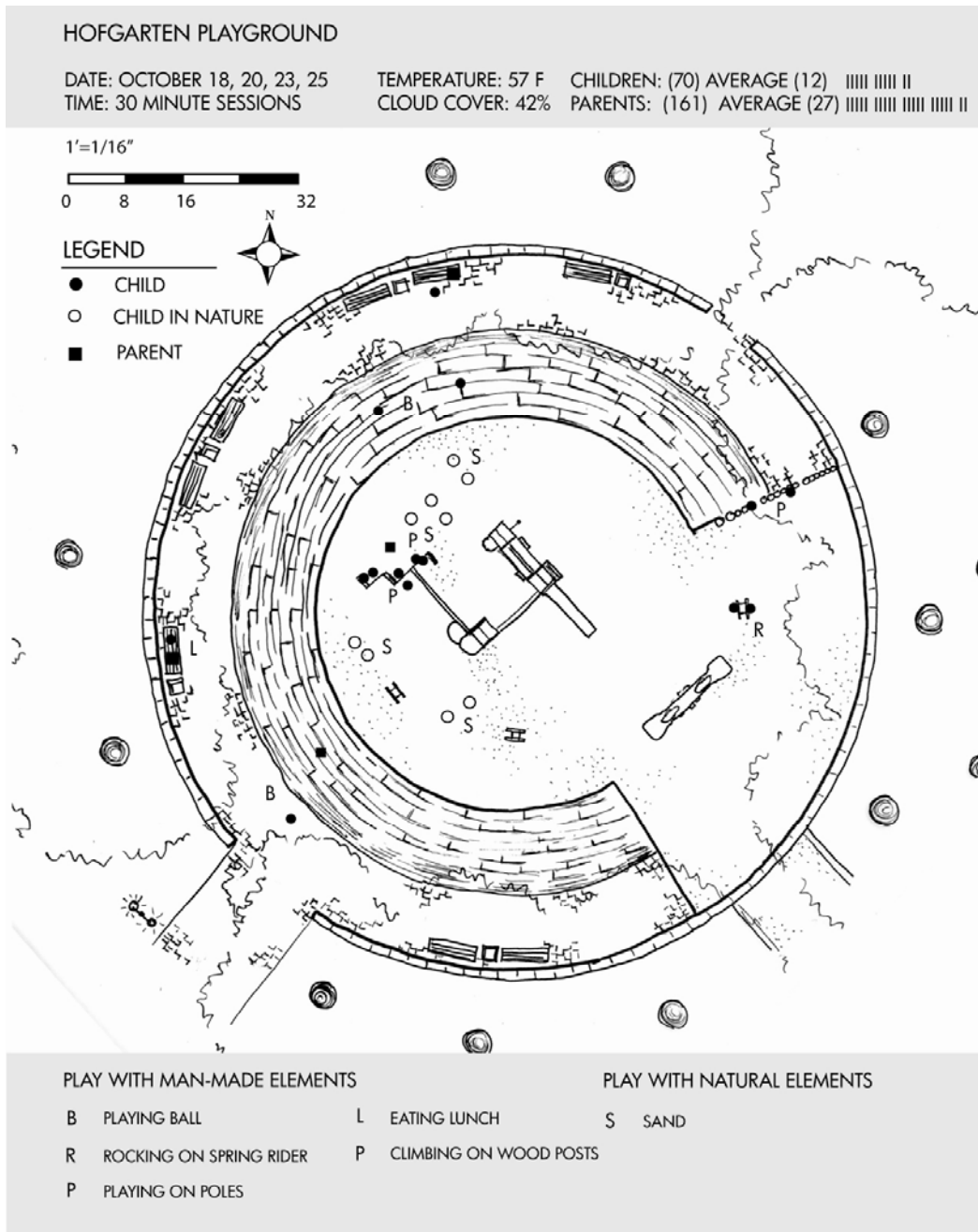
Figure 23 Activity Use for Periods of Five Minutes or More

children closely since they were not in their own neighborhood and did not know the other people. Some children left the circle to connect with nature in chasing a bird or looking up at a tree trunk and they were usually accompanied or watched closely by a parent.

A brief word on nature connection

Although nature connection was not reflected on the five-minute activity use map excepting the natural experience of sand, it did occur in a few incidents (Fig. 23 and Appendix). The original selection of the site as a semi-natural space was justified by its location underneath mature tree canopy that was an urban forest. However, the high level of maintenance and the seating wall created an inwardly focused space that did not allow the children to reach to the nature near them. The proximity of natural materials at the ground level may be more critical than the overhead tree canopy. Nature-oriented activities included looking at a tree trunk, playing in mud, playing with a leaf and a glass bottle, and collecting leaves. The nature connection was at 11.1% for the site, or 41 out of 369 play incidents, which was lower than was anticipated for a site surrounded by so many trees. Also, of that 11.1%, the majority of the connection was with sand on the playground.

Site significance and impact

The site demonstrates the success of an urban playground that meets a need of parents to have a safe place to let their children play. The use of mature trees creates a forest-like

impression from a distance and the slight grade change with the seating wall gives a feeling of enclosure while maintaining visibility. Parents were easily able to supervise their children on the playground. The only drawback from the high maintenance was that it removed a lot of the elements through which children can connect with nature such as twigs, branches, and leaves.

CHAPTER V

CASE STUDY 3: NATURPARK RHEINLAND

Project facts

Name: Area of study in Naturpark Kottenforest-Ville

Location: Next to a Kindergarten (Heinrich-Schneiders-Str.11 53129 Bonn, Germany)

Date designed: Not applicable

Cost: Not applicable

Size: approximately 5,594 square meters (60,210 square feet)

Context

The area of study is located in Dottendorf, a small village with a population of 5,670 people that is in southern Bonn and about 2 kilometers (1.25 miles) west of the Rhine River (Fig. 24). It is now politically incorporated into Bonn, which has a population of 314, 645. Although Dottendorf is essentially a wealthy suburb to Bonn, it has an inwardly focused form with its own town center, which gives it a strong identity. *Dorf* means *village* in German and history traces the village's existence to the 800s with a castle built in the 1400s (Gästehaus Burg Dottendorf 2009). Buildings dating from the 1600s and 1700s fill the winding Medieval streets and are still used as residences. A school, a church, the castle, and the end of the line for one of Bonn's trams are all within .15 kilometers (.1 miles) of each other.
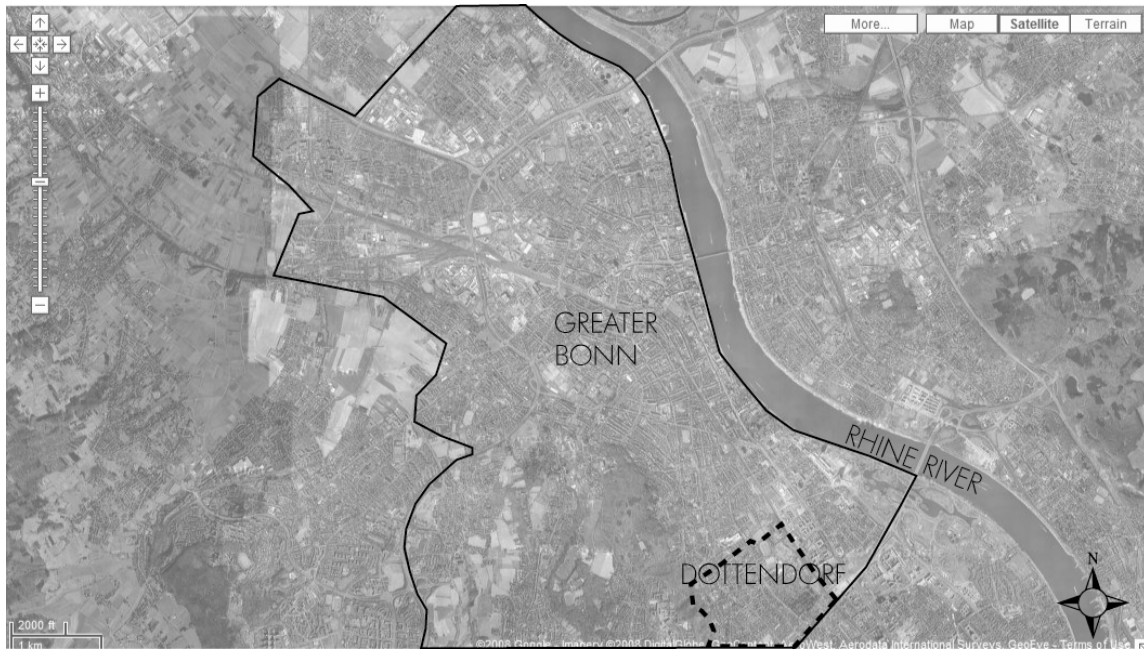
Figure 24 Regional Map of Dottendorf, a Small Village South of Bonn

This core of Dottendorf gives it an identity and suggests a sense of community. The primary land use is single-family residential with some retail and commercial in the Medieval core and a Kaiser-Markt supermarket along a busy road. The public transportation system has lower ridership in Dottendorf than in Auerberg as evidenced by the reduced frequency of trains. Multi-family housing is limited and large apartment complexes are absent. Most residences appeared to have at least one car, which suggests a more automobile dependent society.

The area of study was identified by a local resident as a place commonly used for children to play. It is at a point where a fringe of the large Naturpark Rheinland nestles into the community (Fig. 25). The Naturpark is southeast of Bonn and Cologne

containing 1,045 square kilometers (403.5 square miles) of protected forests, nature

preserves, castles, and a few villages and sustainably maintains the German culture,

heritage, and ecosystems (Naturpark Rheinland 2009). As the area of study, it reaches

into the neighborhood as a local informal trailhead taking joggers, mountain bikers, and

dog walkers up the hills and into the park. Although there are several trailheads in the

community and others in the Bonn area, this particular one is located next to a

kindergarten and a sports field, which is likely its reason for popularity with children.
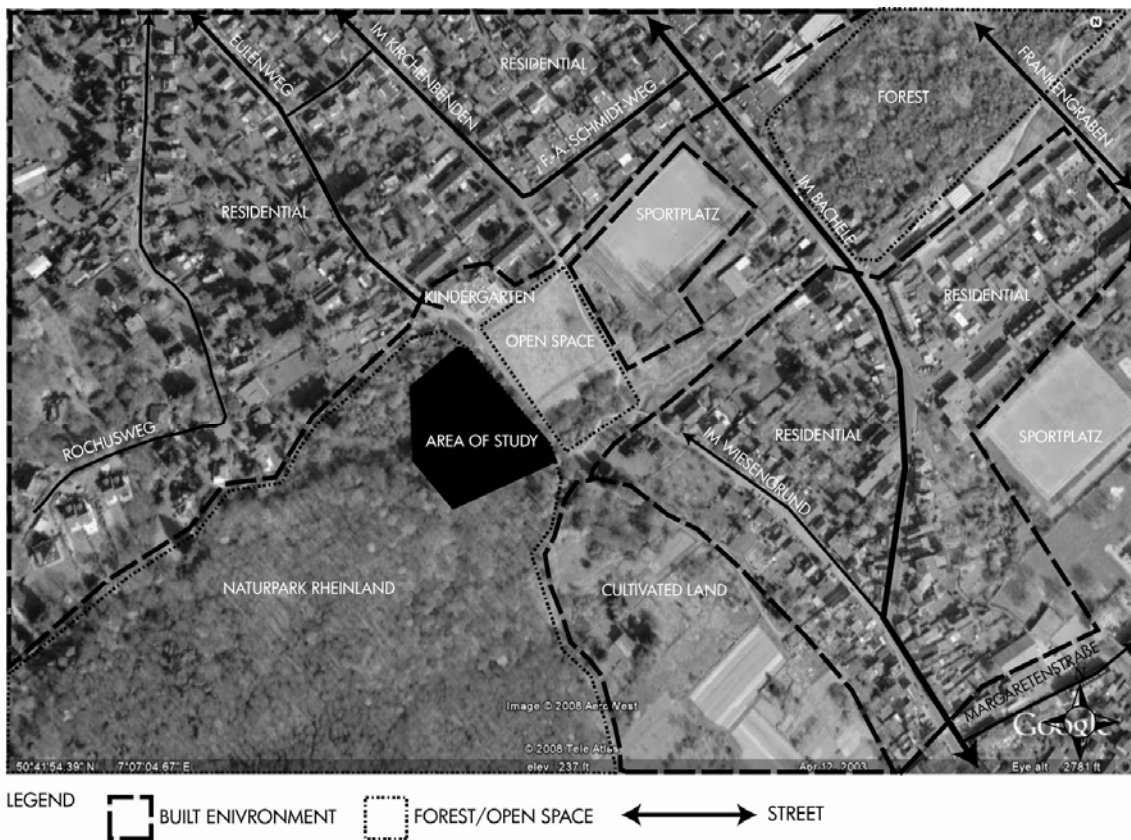
Figure 25 Context Map of Dottendorf Neighborhood for Area of Study in Naturpark Rheinland. The Primary Land Use around the Area of Study is Single-Family Residential Housing.

LEGEND

▲ LITTER
● CHALK MARKING
★ WOOD FORTS
⬤ WORN EARTH
← USER CREATED PATH

1"=50'

0   25   50   100

FOREST

SWALE
& PATH
SYSTEM

ENTRY ←

FOREST

HIKING PATH

TREE CLEARING

FALLEN
TREE &
SLIDING
HILL

BUILDING RUINS

DETENTION
POND

← ENTRY
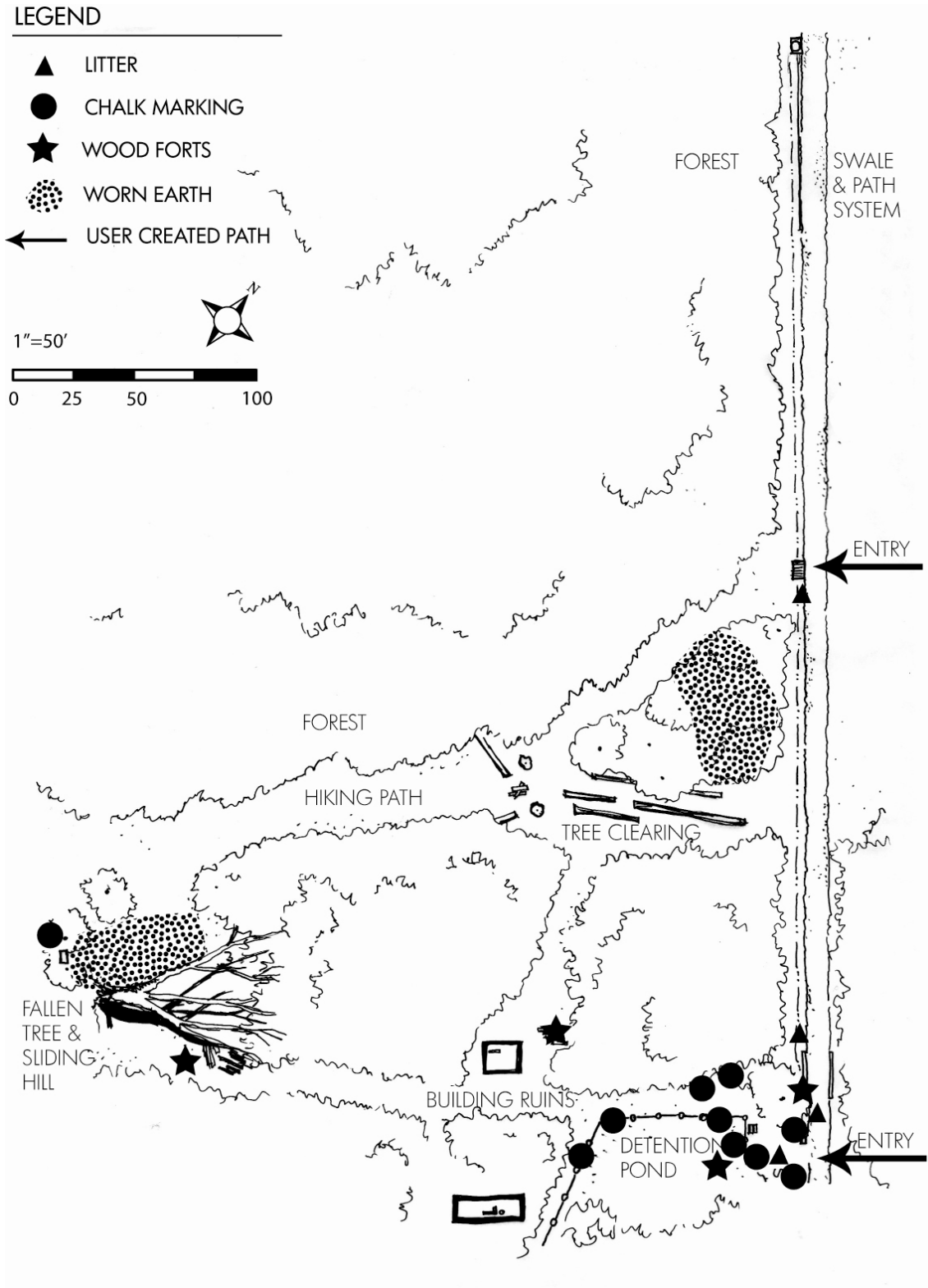
Figure 26 Four Subspaces to Area of Study. Higher Litter was Present near the Major Path.

Functional subareas of site

There are four primary subareas, which are named the tree clearing, detention ponds, building ruins, and sliding hill with fallen tree. The major path is adjacent to the site and provides two entrances into the area of study. Informal hiking paths within the site link one subarea to another. These spaces are loosely defined by openings in the tree canopy or changes on the ground plane (Fig. 26).

Primary path

The path along the edge of the forest and developed land is 10 feet wide (3 meters) and consists of dirt and gravel that are muddy after a rainstorm (Fig. 27). Pedestrians and bicyclists move along the path from one neighborhood to another. There are no nearby through streets creating a quiet natural space.

Tree clearing

The purpose for the cutting of the trees in the forest is unclear, but the trimmed trunks were left in the space (Fig. 28). Children could walk along the fallen trunks and there were other signs of play. Two children were observed sweeping their legs through the leaves to expose the soil and create curved "paths."

Detention pond

The detention pond is a manmade depression just within the forest (Fig. 29 and 30). A natural fence composed of large and small branches separates it from a passing trail. No

Figure 27 Major Path with Bridge
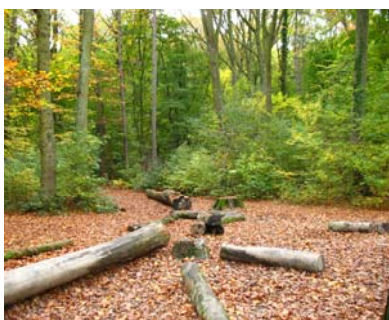
Figure 28 Tree Clearing

Figure 29 Detention Pond with Fence Made of Natural Materials

Figure 30 Panorama of Detention Pond and Trail

Figure 31 Building Ruins

Figure 32 Branches of Fallen Tree

Figure 33 Vantage Point on Top of Hill

Figure 34 Panorama of Fallen Tree and Sliding Hill

large trees are in the depression, but some small trees and plants have entered. A guide

or teacher of a forest kindergarten used the space for eight children to play a game.

Building ruins

The building ruins, which are reduced to stone outlines of where the walls once were, are

on either side of the hiking path (Fig. 31). Presumably children introduced the branches

and log stubs to the site. It could serve as a reference point for imaginary play as a

house or a castle. An old brick column where a gate once stood near one of the

entrances suggests that this space used to be a residence in decades past.

Sliding hill with fallen tree

A large fallen tree rests at the base of an exposed hill (Fig. 32, 33, and 34). One of my

fellow students, Pam Humphrey, said that the children in her host family and other

children would often slide down the hill in the summer. At the top of the hill, two trees

have grown together creating a prospect-refuge power point, or a place where an

individual feels safely enclosed, but can look on a prospect below.
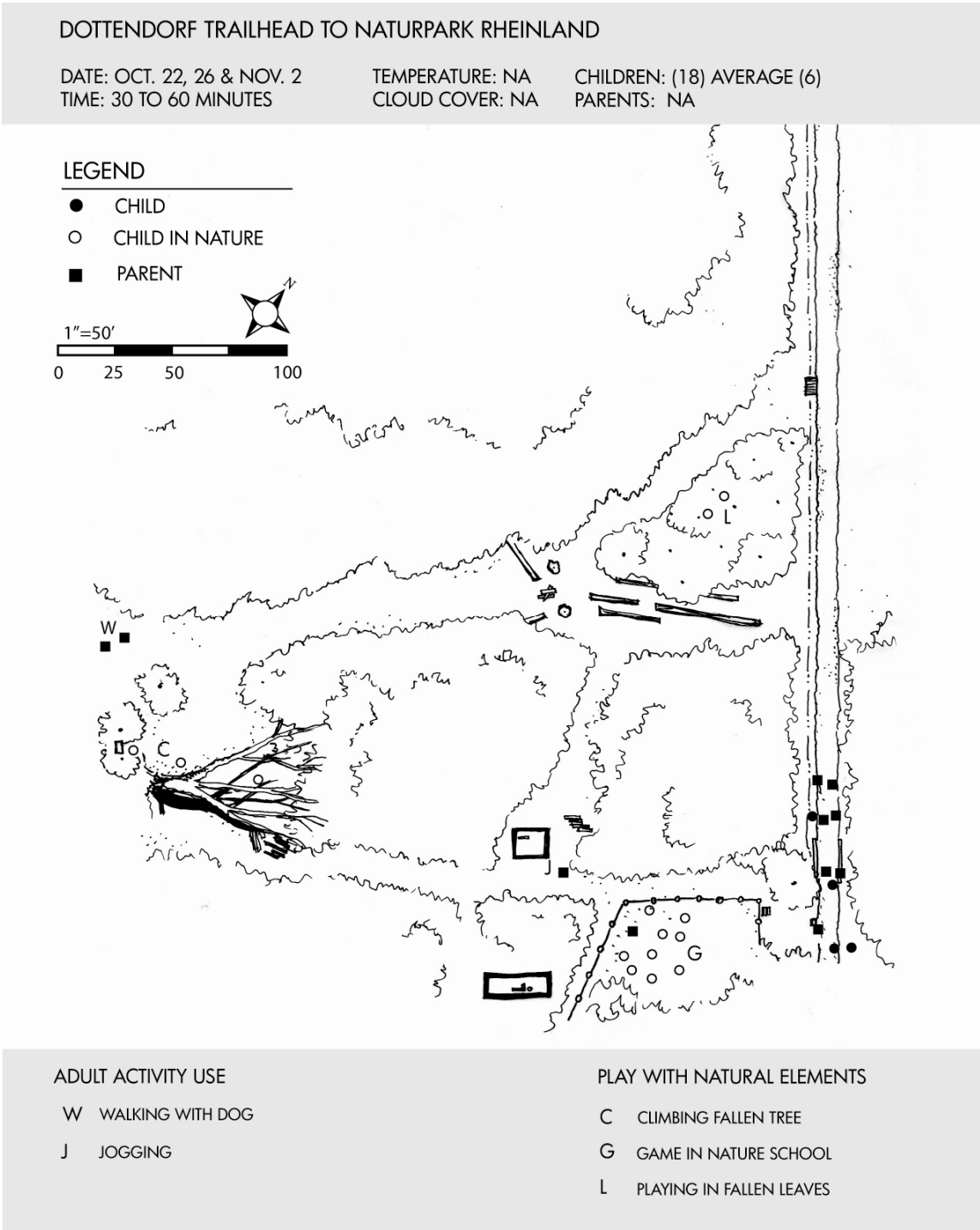
Figure 35 Activity Use for Periods of Five Minutes or More

Behavior traces

The aggregate behavior traces suggested heavier use near the entrances (Fig. 35). Worn

patches of earth indicate heavier levels of activity near both the tree clearing and the

sliding hill. Chalk markings were considerable near the secondary entrance (Fig. 36).

Several wood forts throughout the space suggested children that spent a considerable

amount of time (Fig. 37). An interesting cultural aspect is that adults and other children

left these tree forts undisturbed. Some small pieces of litter were left along the path, but

this behavior could be because there were no trash cans in the area.

Figure 36 Chalk Markings on Tree

Figure 37 Fort Made of Branches

Activity use analysis

The activity mapping shows a sample of activities from three walking tours of varying

time duration on October 22 and 26 and November 2 (Fig. 35). Children were the

kibitzers, or active users of the space, and were observed playing in the leaves, climbing

trees, and participating in nature with in a forest kindergarten. Several joggers and a

couple with a dog were the passersby on the site. The presence of dogs and children

could create a user conflict as an observed dog was off-leash. The major path had

several adults with children on bicycles, adults with dogs, and couples walking along it

at fairly frequent intervals.

Site significance and impact

The site presents an interesting phenomenon where a vernacular space has grown to

function as a designed area with separate subareas. The neighborhood children identify

the area primarily by the sliding hill and parents like to bring their children here in the

summer to play in the woods. The site shows that several subareas (the ruins, sliding

hill, and tree clearing) function together to strengthen the attractiveness of the play

space. The ruins and the tree clearing were minimal and unintentional design

interventions that nevertheless created variety in the space and could be a guide to create

similar natural spaces with more intentionality.

CHAPTER VI

QUANTITATIVE RESULTS

The qualitative results of the data set are described in the case studies presented in

Chapters III, IV, and V, but there is additional quantitative data that is better included as

a separate chapter for direct comparison. As explained in Methods, I recorded play

events at the first two playgrounds to determine the pattern of natural play and play with

manmade objects. The number of sessions is not completely even with four for

Luxemburger and six for Hofgarten and additional limitations are described in Methods.

Also, there is no quantitative data for the Naturpark Rheinland area of study due to the

limitations of the site. The data challenges the original assumption that the Hofgarten

would create more nature connection opportunities than the Luxemburger Str.

playground and gives a possible trend discussed in the conclusion. The data covers the

categories of length of play, number of play events per child, and the comparison of

natural play and play with manmade objects.

The charts shows far fewer incidences of natural play than play with manmade objects

(Fig. 38-41). The highest number of recorded incidents was 271 play events with

manmade objects for 1 minutes or less at the Hofgarten playground (Table 2). For

natural events at Hofgarten, the highest number of recorded incidents was 18 play events

for 1 minute or less (Fig. 38). Since the playground is oriented around manmade objects

and nature is, at best, peripheral to the playground, this finding was expected. The

Luxemburger Str. playground showed similar results in that the number of natural play

events was considerably less than the number of plant events with manmade objects

(Fig. 39 and Table 3).

The trend lines for both playgrounds suggest a major decline in play events from the first

minute to the second minute. For the Luxemburger Str. playground, the trend line,

which was produced in Excel and has not undergone regression, suggests a general

decrease in the number of play events for longer duration (Fig. 40). An increase occurs

between the 4 minute category and the 5+ minute category, but this factor could be

explained by the presence of the nearby soccer area, which was included in the data and

in which the children usually played for more than five minutes. If this data was

removed, it would show a general decrease in play. The trend line is even more marked

for the Hofgarten playground where there was no soccer field for children (Fig. 41). The

play incidences drop sharply from the 1 minute category to the 2 minute category.

Although there is a slight increase from the 4 minute category to the 5+ minute category,

but it is not significant and the general trend line shows a decrease in the number of play

events of longer duration.

Although there are fewer incidences of natural play, the trend lines in the charts suggest

that there is sustained interest in natural play after the third or fourth minute. Instead of

becoming increasingly flat and reduced, the trend line for natural play shows a rise in the

5+ minute category for the Luxembourger Str. playground and in the 4 minute and 5+
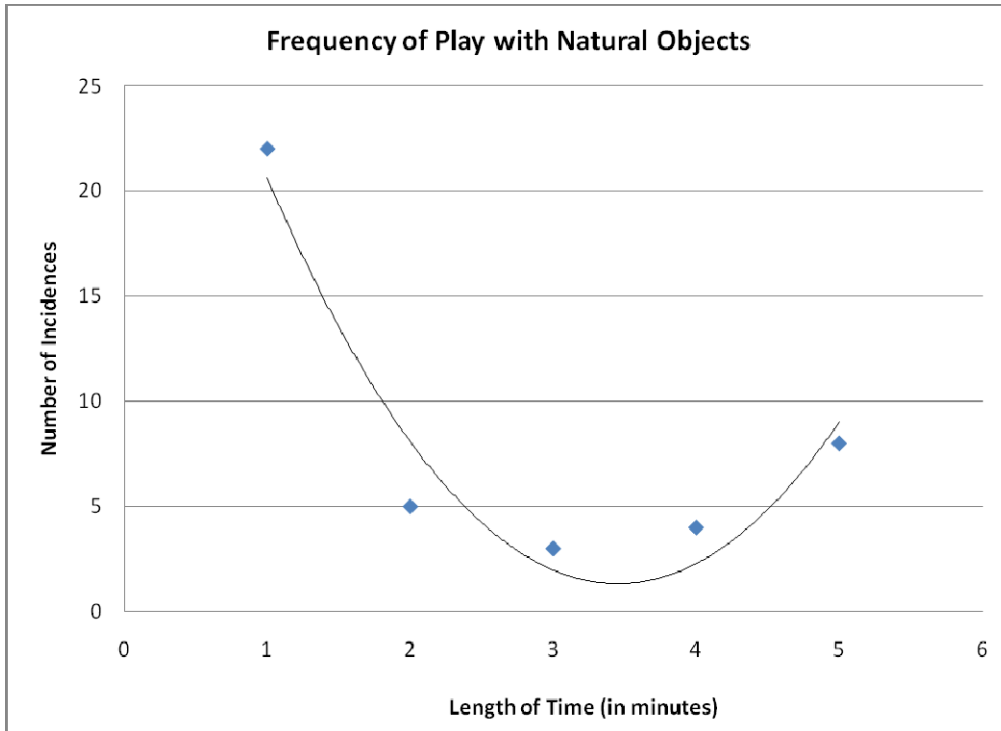
Figure 38 Chart of Frequency of Play with Natural Objects at Hofgarten Playground
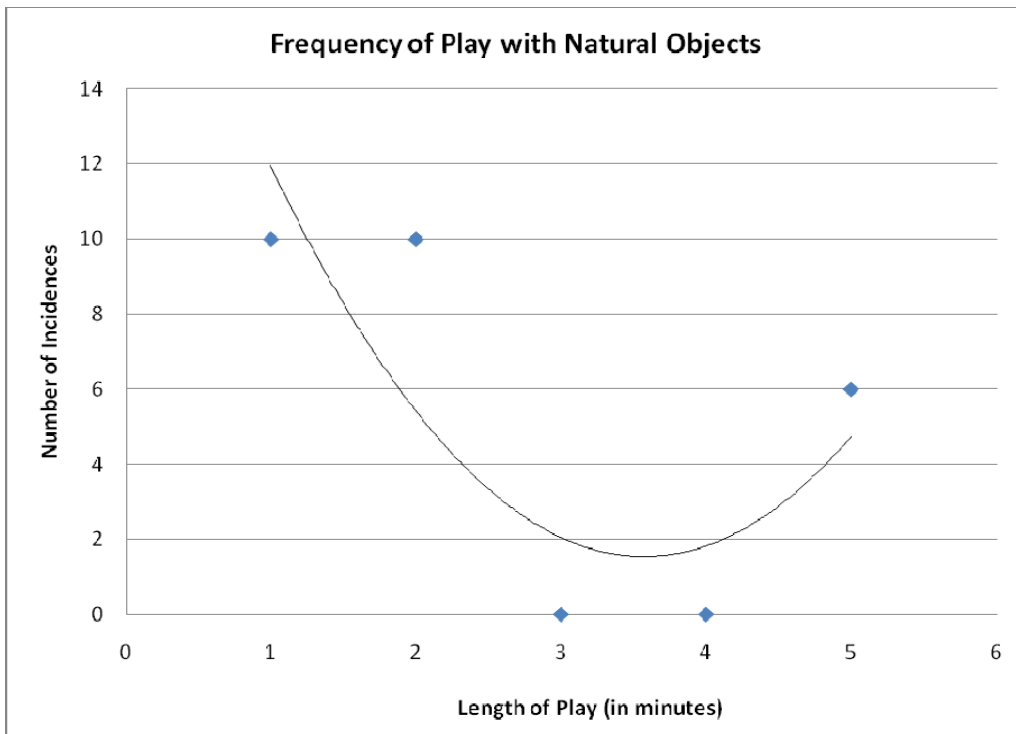

Figure 39 Chart of Frequency of Play with Natural Objects at Luxemburger Str. Playground
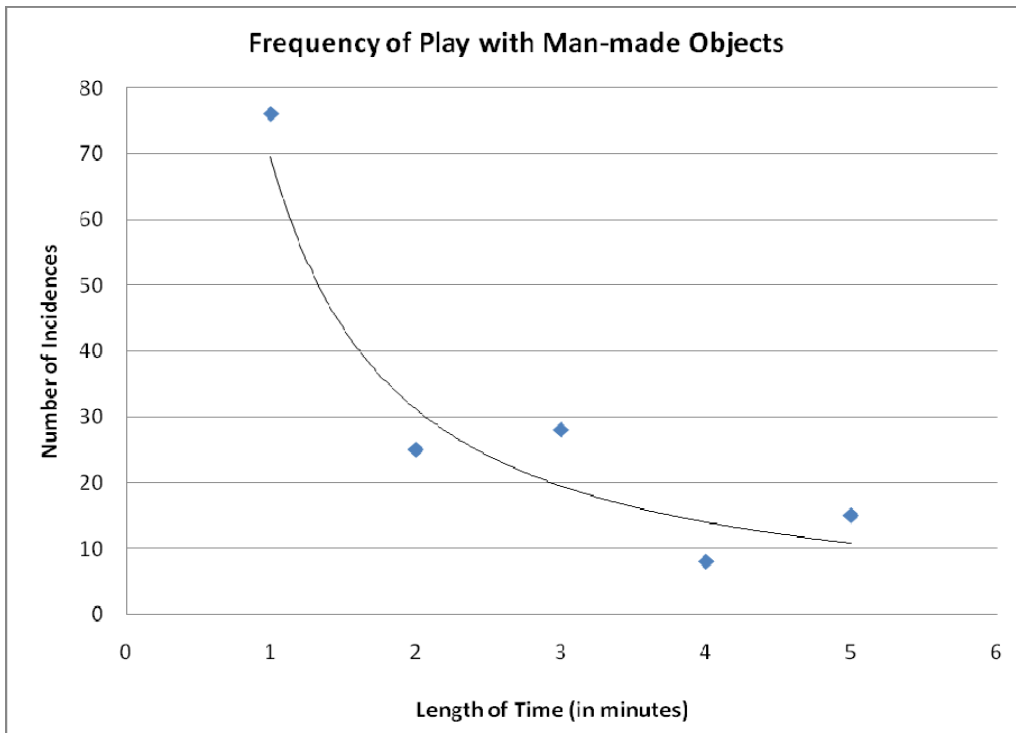
Figure 40 Chart of Frequency of Play with Manmade Objects at Luxemburger Str. Playground
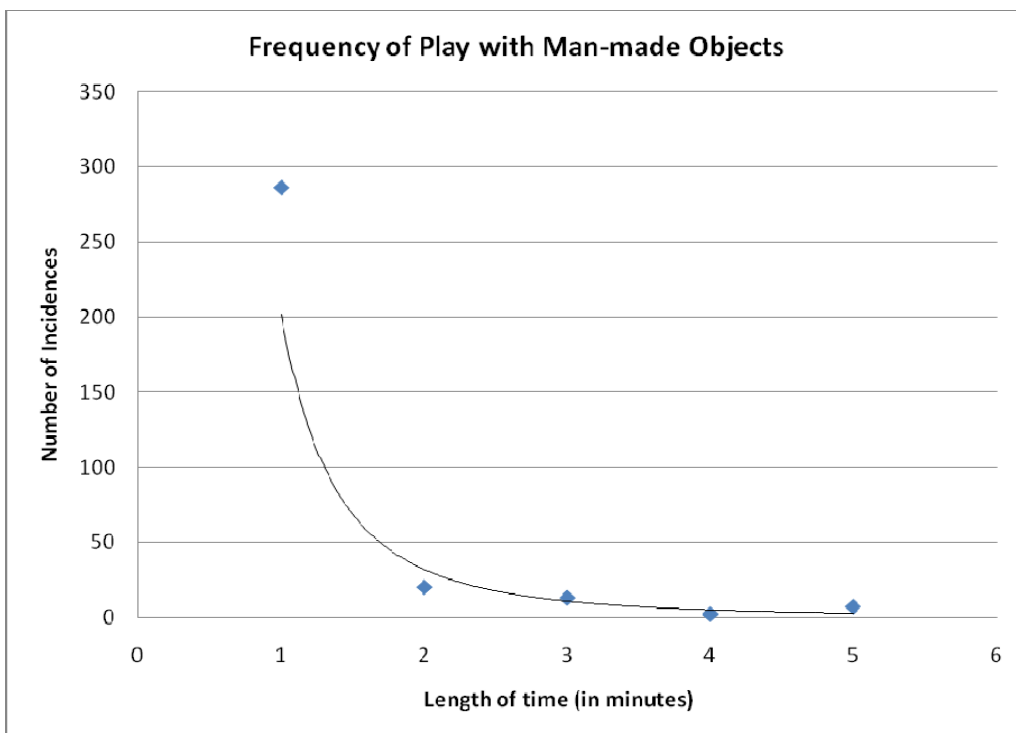
Figure 41 Chart of Frequency of Play with Manmade Objects at Hofgarten Playground

Observation Table								
Play								
	Not child-directed		**Child-directed**		**Unengaged**		**Ambiguous**	
Time	*Natural*	*Man-made*	*Natural*	*Man-made*	*Natural*	*Man-made*	*Natural*	*Man-made*
1	7	35	18	271		11		24
2		7	5	17				2
3		1	3	10				
4		1	4	2		1		2
5+		4	8	7				3

Table 2 Aggregate Observation Table for Hofgarten Playground

Observation Table								
Play								
	Not child-directed		**Child-directed**		**Unengaged**		**Ambiguous**	
Time	*Natural*	*Man-made*	*Natural*	*Man-made*	*Natural*	*Man-made*	*Natural*	*Man-made*
1	1	12	10	108		4		11
2		6	10	27				10
3		9		33		3		3
4		5		16				1
5+		23	6	23		2		3

Table 3 Aggregate Observation Table for Luxemburger Str. Playground

minute category for the Hofgarten playground (Fig. 38 and 41). A note of caution is that

the numbers for the natural play are low and may not have statistical value.

The anticipated results for comparing the data of the two playgrounds is that the

Hofgarten would have more natural play. Luxemburger Str. playground was originally

selected as a playground that had little or no nature in an older neighborhood while the

Hofgarten playground was selected as an urban playground placed under mature tree

canopy that created a forest-like atmosphere and so provided some natural experience.

However, the number of natural incidences was slightly higher for Luxemburger Str.

playground (12.0%) than that of Hofgarten playground (11.1%). Also, the majority of the natural play recorded at Hofgarten was with the sand in the playground. The original understanding of Luxemburger as not offering nature and of Hofgarten offering some nature was, therefore, incorrect. Reasons for this assumption and explanations for why the data disproves it are discussed in the conclusion.

As a final note, the level of activity at Hofgarten was greater. The number of children averaged 12 at Hofgarten and 13 at Luxemburger (Fig. 10 and 24) . However, the average number of play events per child at Hofgarten was 7.260 while that of the child at Luxemburger was 4.188. This phenomenon is most readily explained by the fact that Hofgarten playground has a greater number of pieces of play equipment than Luxemburger (Fig. 12 and 19). Also, with slightly fewer children on average, there would have been greater opportunity to play at the Hofgarten playground.

CHAPTER VII

CONCLUSIONS

The general objective of the research was to add to the body of knowledge regarding the role of the built environment in connecting children and nature so that landscape architects can create more responsive designs. Germany with its environmental heritage and history of bringing children into nature with forest kindergartens was an ideal testing ground to examine play spaces for nature connection. The specific question of the research addressed if the duration and frequency of unstructured play, as defined in the literature review, increase in an environment with a higher presence of nature. The research was successfully completed over three areas of play within narrow time constraints of two weeks in late October and logistical limitations of one researcher visiting multiple sites.

The results and conclusions differed from original expectations. The factors that influenced natural play were not immediately obvious and even contradicted commonly held perceptions of the areas of study. Identification of these factors, such as maintenance level or planting diversity, came from systematic analysis of the sites. Also, the results indicate that the ground plane and topography influence natural play while tree canopy has less substantial impact on natural play.

The unanticipated result was that two playgrounds with different levels of equipment complexity, presence of trees, maintenance, socioeconomic context, and relation to the surrounding neighborhood had nearly identical levels of natural play at 12.0% for Luxemburger Str. playground and 11.1% for Hofgarten playground. This result needs a brief consideration of the variables that would have made Luxemburger Str. playground more nature-oriented and the Hofgarten playground less than expected.

For Luxemburger Str. playground natural play was most likely higher due to the complexity of natural materials near the playground, limitations of the play equipment, and a playground design that integrated it into the neighborhood. The natural materials surrounding the edge of the playground included ten healthy trees and forty five shrubs of various types and heights. As is shown in the panorama, some trees were broad oaks that provided deep shape while others were well-branched ornamental trees and still others were evergreens (Fig. 11 and 12). The variety created trees under which to play and trees to climb while shrubs of various heights providing play material for children of different heights and ages. The low number of play events per child (4.188) compared to the Hofgarten playground (7.260) indicate that the playground may not have been as stimulating and so encouraged the children to use other resources for play. Finally, the playground's design integrated it into the community. For example, pedestrians and bicyclists used the path through the playground en route to the grocery store. Children were comfortable moving from one designed space to another across this flow of traffic. The movement from one distinct area to another may have encouraged them to consider

their surrounding environment as a whole and consider the trees and shrubs as part of it

and, consequently, socially acceptable items with which to play.

Factors for the lower percentage of natural play at the Hofgarten playground could be

the monotony of the natural space, the complexity of the play equipment, the high level

of maintenance, and the distinctive boundary of the playground created by the seating

wall. The natural space consisted of several deciduous trees around the playground with

no shrubs (Fig. 20). The trees were limbed above the height of a child. Also, the

maintenance level was high, which had positive aspects such as the daily sweeping of

the sand and removal of trash. However, this cleanliness extended to the removal of the

leaves and fallen branches so that there were few natural objects for children to collect.

The natural resources were limited and the playground equipment was complex, which

focused children's attention towards the playground. Furthermore, the design of the

seating wall created a barrier to running between the trees. The children on the

playground were also separated from the trees by the parents sitting on the benches,

which created a social barrier. Parents could consider the seating wall to be a boundary

between a safe children's play space and the exterior adult world, which would socially

reinforce the seating wall as an edge.

Another conclusion is that the tree canopy may have limited influence on natural play.

Adults equated the Hofgarten with natural space as shown by anecdotal evidence. Prof.

Naderi initially thought it would feel natural until she entered the space. I mentioned to

my host mom that the Hofgarten might be less natural than it seemed, but she initially questioned the suggestion since the playground was in the trees. The tree canopy makes the space attractive and interesting for adults, which is supported by a greater number of parents on the benches (average 27) than the children on the playground (average 12). Also, the tree canopy has considerable value in the provision of shade in the summer months. There is definitely value to the tree canopy, but it may not relate as much to the encouragement of natural play. Trees with lower limbs and natural twig and leaf drop may stimulate natural play, but the canopy alone did not appear to do it since Hofgarten had full canopy coverage and the Luxemburger Str. playground had very little.

Topography and the ground plane may influence natural play. All of the panorama photographs were taken at the approximate height of children of age seven and show a greater percentage of ground plane than is perceived by an adult. The height of the seating wall at Hofgarten created a barrier that may have kept children from playing in the natural space near the playground as frequently. At the Naturpark Rheinland, the most distinctive feature was the sliding hill with the fallen tree. It has dramatic topography change that allows the children to slide down the hill. Although other play areas were noted, the sliding hill seems to be the play feature that gave the entire space its identity in the community.

Future research would need to explore several factors such as sand, topography changes, and tree canopy in greater depth to create a finer grain of information for design

guidelines. Sand needs more study to determine if it is providing contact with nature.

The best method for determining this would be to review the literature on nature

experiences described by adults reflecting on their childhood experiences with nature

and isolate any references to sand. Topography changes could be explored further with

case studies of playgrounds that have gradual topography changes between playground

equipment and natural material. Hofgarten provides a good example of an abrupt

topography change. Finally, another case study of a playground surrounded by tree

canopy with lower limbs and lower maintenance on a flatter topography would help

determine if nature available closer to the ground creates a significant increase in natural

play.

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APPENDIX

LUXEMBURGER STR. PLAYGROUND

DATE: OCT.24,2008, FRIDAY TEMPERATURE: 54 F CHILDREN: (8) IIIII III
TIME: 2:05 TO 2:35 CLOUD COVER: 90% PARENTS: (3) III

LEGEND
● CHILD
○ CHILD IN NATURE
■ PARENT

1"=20'

0   10   20   40

PLAY WITH MAN-MADE ELEMENTS   PLAY WITH NATURAL ELEMENTS

S   SAND

Figure A-1 Weekday 1:00 to 3:00 (Luxemburger Str. Playground)

Figure A-2 Weekday 5:00 to 6:00 (Luxemburger Str. Playground)

LUXEMBURGER STR. PLAYGROUND

DATE: OCT.20,2008, MONDAY TEMPERATURE: 48 F CHILDREN: (19) IIIII IIIII IIIII IIII
TIME: 5:30 TO 6:00 CLOUD COVER: 20% PARENTS: (13) IIIII IIIII III

LEGEND
● CHILD
○ CHILD IN NATURE
■ PARENT

1"=20'

40   20   10   0

PLAY WITH MAN-MADE ELEMENTS

C   CLIMBING UP SLIDE

SS   STANDING ON SEESAW

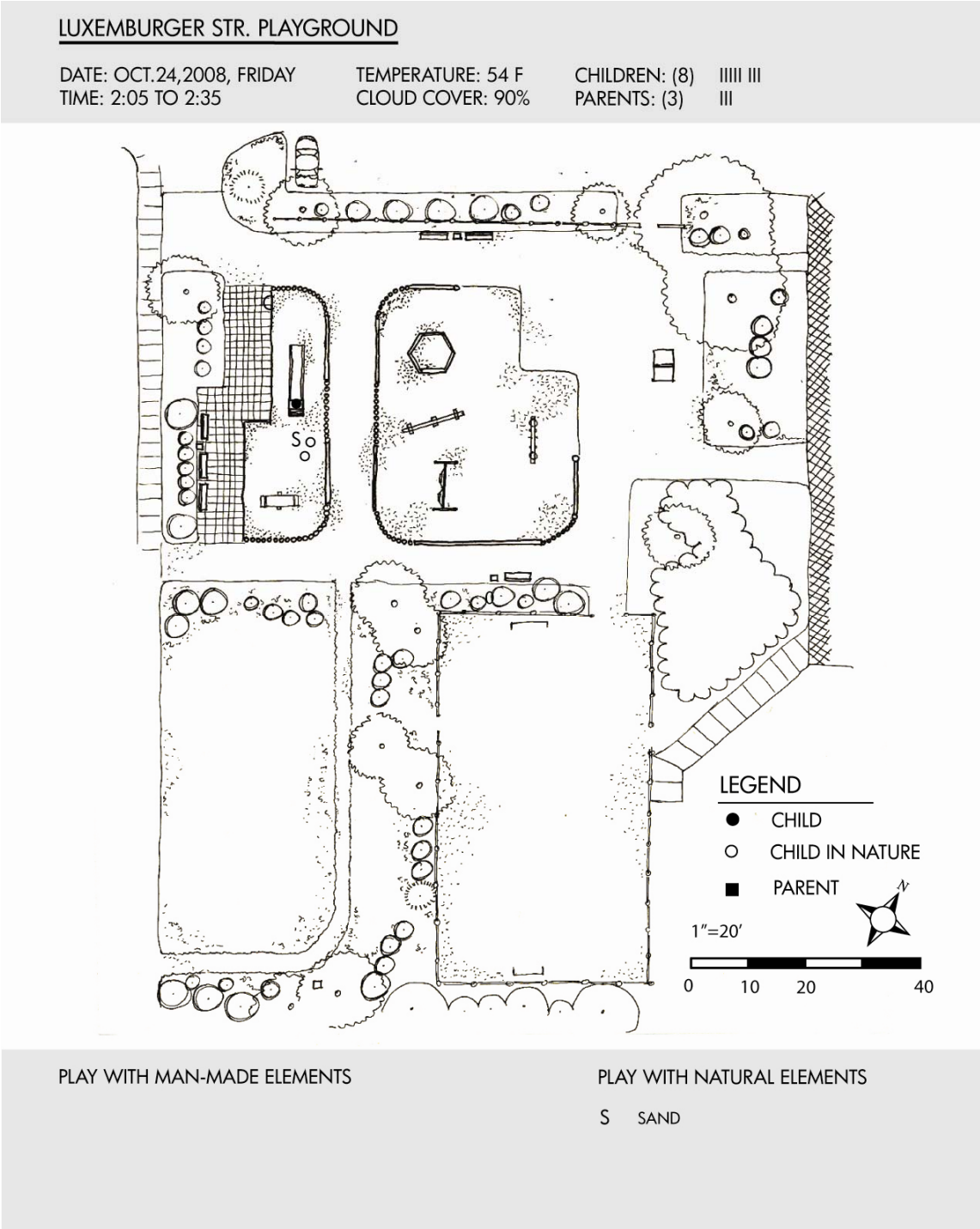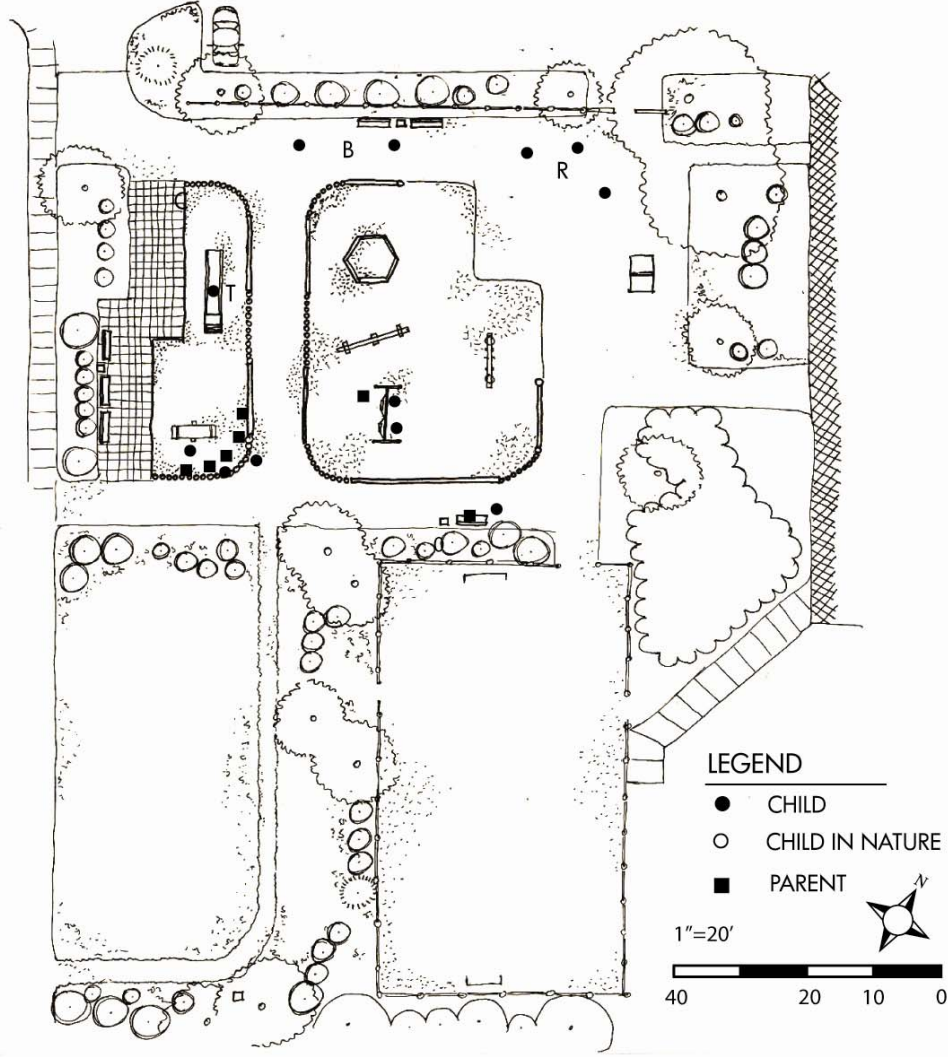PLAY WITH NATURAL ELEMENTS

S   SAND

Figure A-3 Weekday 5:00 to 6:00 (Luxemburger Str. Playground)

LUXEMBURGER STR. PLAYGROUND

DATE: OCT.19,2008, SUNDAY   TEMPERATURE: 55 F   CHILDREN: (19)   IIIII IIIII IIIII III
TIME: 4:15 TO 4:45   CLOUD COVER: 40%   PARENTS: (13)   IIIII III

LEGEND
●   CHILD
○   CHILD IN NATURE
■   PARENT

1″=20′

40   20   10   0

PLAY WITH MAN-MADE ELEMENTS   PLAY WITH NATURAL ELEMENTS

S   SWINGING

Figure A-4 Weekend 3:00 to 5:00 (Luxemburger Str. Playground)

HOFGARTEN PLAYGROUND

DATE: OCT.20,2008, MONDAY   TEMPERATURE: 67 F   CHILDREN: (7)   IIIII II
TIME: 1:45 TO 2:15   CLOUD COVER: 0%   PARENTS: (10)   IIIII IIIII

1'=1/16"

0   8   16   32

LEGEND
● CHILD
○ CHILD IN NATURE
■ PARENT

N

PLAY WITH MAN-MADE ELEMENTS   PLAY WITH NATURAL ELEMENTS

L   EATING LUNCH   S   SAND

Figure A-5 Weekday 1:00 to 3:00 (Hofgarten Playground)

HOFGARTEN PLAYGROUND

DATE: OCT.20,2008, MONDAY   TEMPERATURE: 52 F   CHILDREN: (22) IIIII IIIII IIIII IIIII II
TIME: 3:50 TO 4:20   CLOUD COVER: 10%   PARENTS: (36) IIIII IIIII IIIII IIIII IIIII I

1'=1/16"

0   8   16   32

N

LEGEND
●   CHILD
○   CHILD IN NATURE
■   PARENT

PLAY WITH MAN-MADE ELEMENTS

P   PLAYING ON POLES

R   ROCKING ON SPRING RIDER

PLAY WITH NATURAL ELEMENTS

S   SAND

Figure A-6 Weekday 3:00 to 5:00 (Hofgarten Playground)

HOFGARTEN PLAYGROUND

DATE: OCT.17,2008, FRIDAY	TEMPERATURE: 52 F	CHILDREN: (11) IIIII IIIII I
TIME: 5:35 TO 6:05	CLOUD COVER: 10%	PARENTS: (19) IIIII IIIII IIIII IIII

1'=1/16"

0   8   16   32

N

LEGEND
● CHILD
○ CHILD IN NATURE
■ PARENT

PLAY WITH MAN-MADE ELEMENTS   PLAY WITH NATURAL ELEMENTS

P   PLAYING WITH POLES

Figure A-7 Weekday 5:00 to 6:00 (Hofgarten Playground)
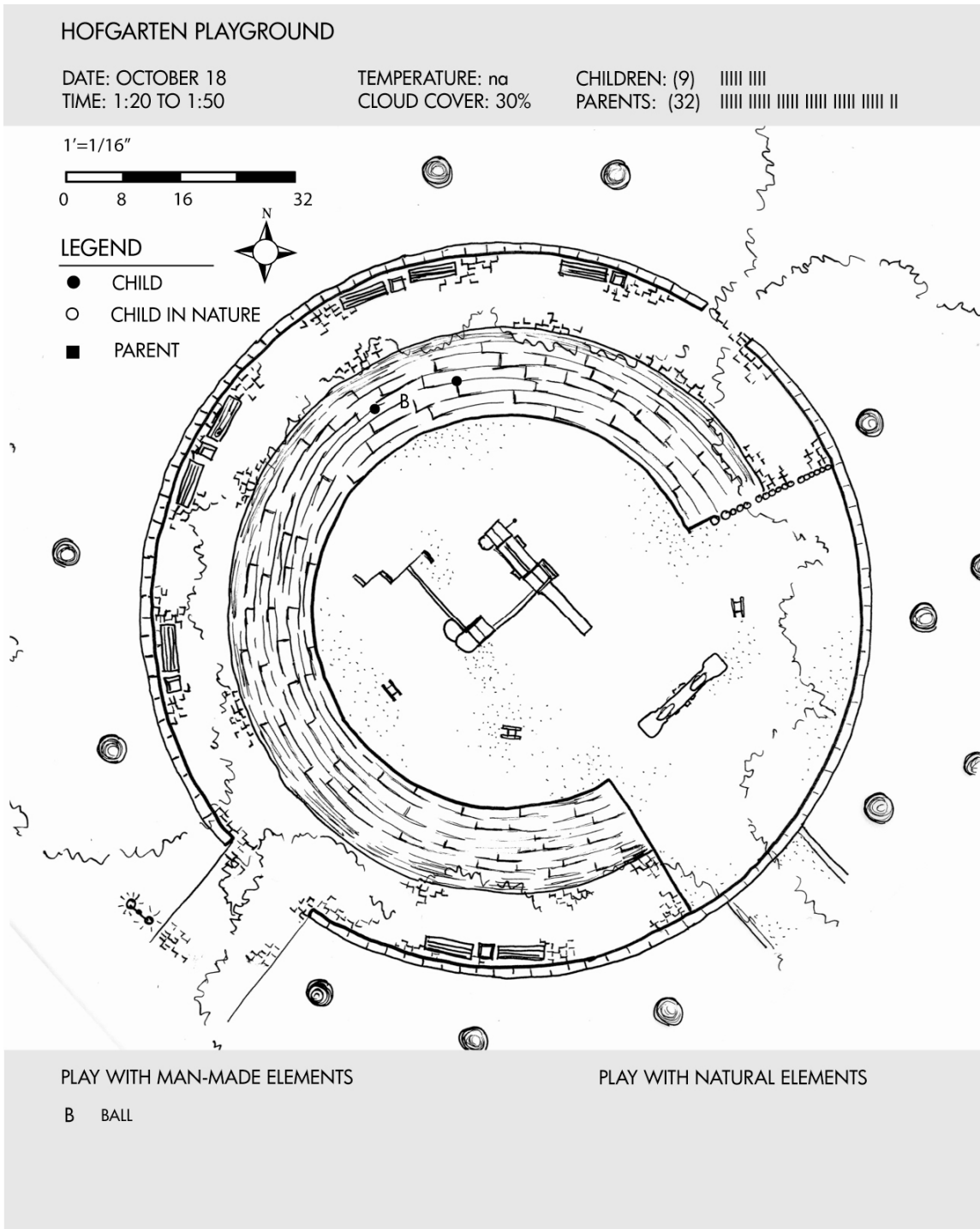
Figure A-8 Weekend 1:00 to 3:00 (Hofgarten Playground)

HOFGARTEN PLAYGROUND

DATE: OCT.25,2008, MONDAY   TEMPERATURE: 56 F   CHILDREN: (14) IIIII IIIII IIII
TIME: 4:35 TO 5:05   CLOUD COVER: 90%   PARENTS: (35)   IIIII IIIII IIIII IIIII IIIII IIIII IIIII

1'=1/16"

0   8   16   32

LEGEND
● CHILD
○ CHILD IN NATURE
■ PARENT

PLAY WITH MAN-MADE ELEMENTS

P   CLIMBING ON WOOD POSTS

PLAY WITH NATURAL ELEMENTS

S   SAND
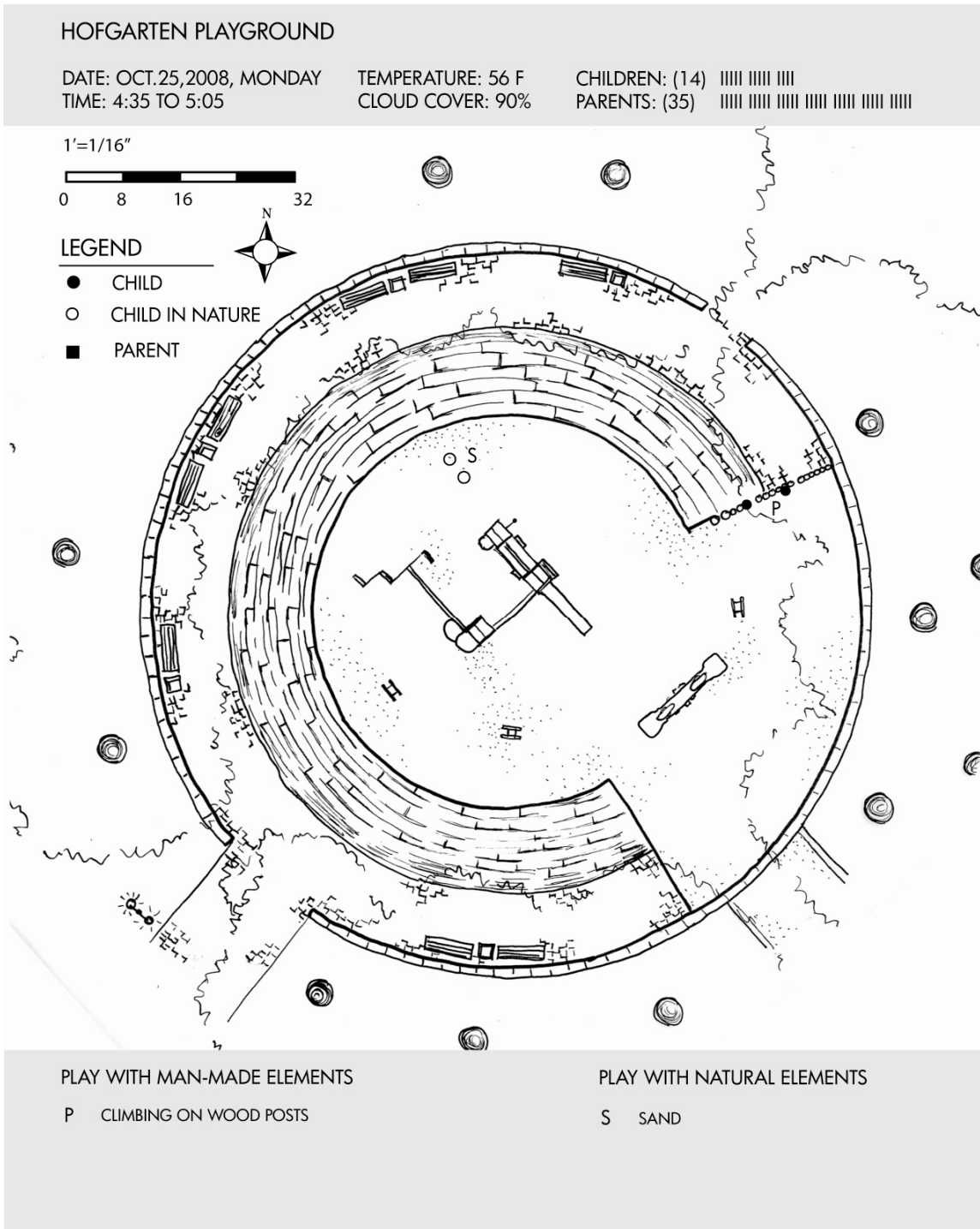
Figure A-9 Weekend 3:00 to 5:00 (Hofgarten Playground)

HOFGARTEN PLAYGROUND

DATE: OCT.25,2008, MONDAY TEMPERATURE: 54 F CHILDREN: (7) IIIII II
TIME: 5:35 TO 6:05 CLOUD COVER: 80% PARENTS: (18) IIIII IIIII IIIII III

1'=1/16"

0   8   16   32

LEGEND
● CHILD
○ CHILD IN NATURE
■ PARENT

N

B

PLAY WITH MAN-MADE ELEMENTS   PLAY WITH NATURAL ELEMENTS

B   PLAYING BALL WITH FATHER
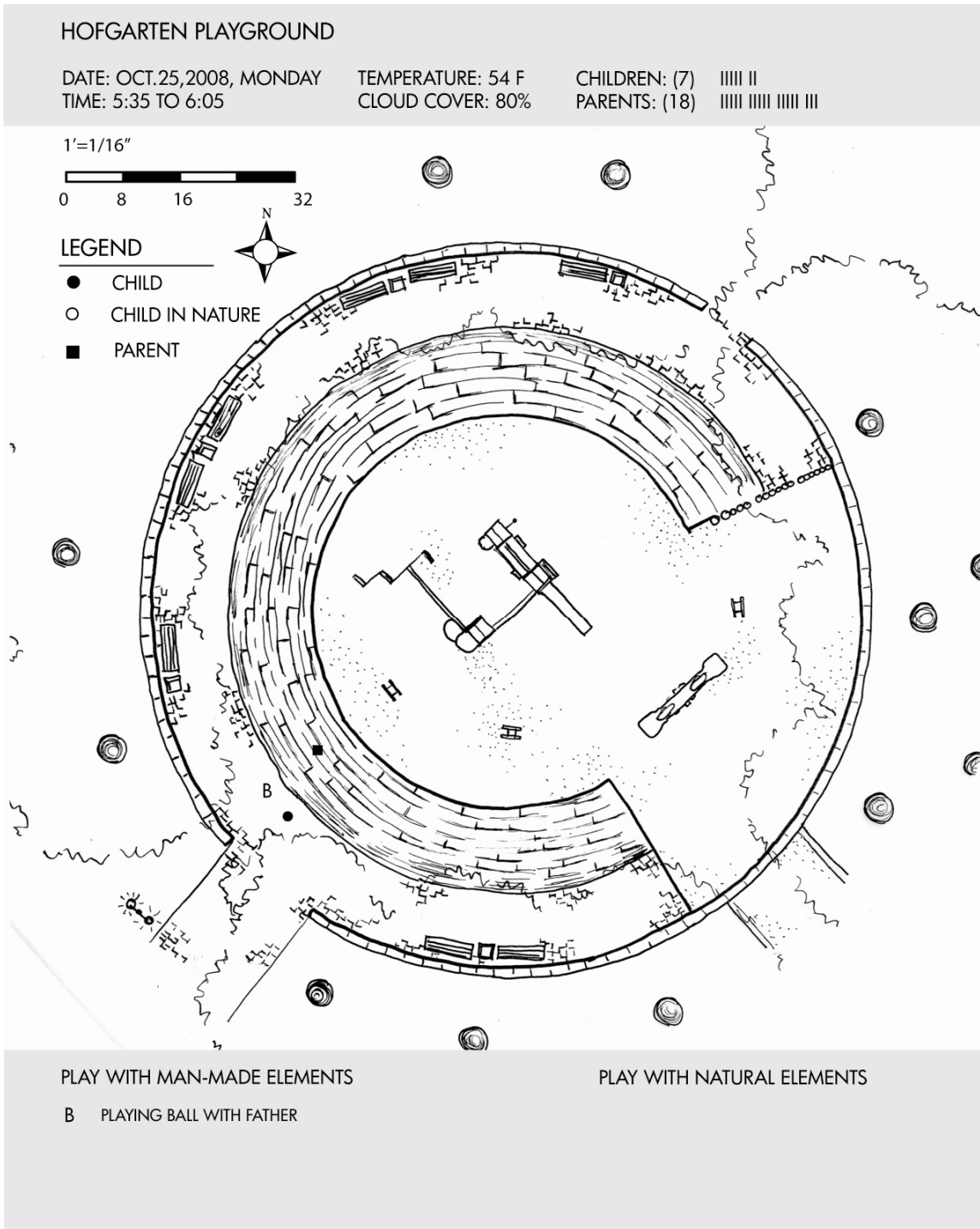
Figure A-10 Weekend 5:00 to 6:00 (Hofgarten Playground)

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