Designing a Playground for the Klong Toey Slum

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Abstract

Our project group worked with the Duang Prateep Foundation in using community involvement to recommend a design and maintenance plan for a playground in the Klong Toey slum in Bangkok, Thailand. Furthermore, we developed a reproducible design process intended to serve as a model for other low-income communities, empowering them to design their own low-cost playgrounds. To achieve our goals, we evaluated possible locations, identified material resources, developed a playground layout using community involvement, developed a maintenance plan, and documented a reproducible design process in the form of a manual.

Authorship Page

All members of our group contributed equally to this project.

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Executive Summary

Introduction

In slums throughout the world, children deal with many problems, including crime, violence, and a lack of funding for education. In some cases, the ever-growing presence of drugs amplifies the severity of these problems. The Klong Toey slum, located in southern Bangkok, is one area that faces these challenges. With approximately 100,000 people in a small area, the problems associated with slum life, particularly drug use and trafficking, are magnified.

Located in the Klong Toey slum, the Duang Prateep Foundation (DPF) is a community-based, charitable organization that exists to help slum communities improve their quality of life. Presently, the DPF, in conjunction with the Ministry of the Interior, is looking to combat the influence of drugs on children by establishing additional playgrounds in Klong Toey.

The primary goal of our project was to use community involvement to recommend a playground design and maintenance plan for the Klong Toey slum community. A secondary goal was to develop a reproducible design process to serve as a model for other low-income communities, empowering them to design their own low-cost playgrounds using community involvement. To achieve these goals, our group evaluated possible locations, identified material resources, developed a playground layout using community involvement, developed a maintenance plan, and documented a reproducible design process in the form of a manual that can be distributed to other communities.

Location

Our first step was to evaluate five possible locations; we chose to complete this objective first because our other design steps were dependent on the location. To do so, our group identified and prioritized a checklist of accessibility, convenience, and safety criteria to consider for potential locations. The following criteria were determined to be most important:

- Proximity to nearest community
- Size of open area
- Value added to community
- Distance from high traffic streets
- Ease of supervision

Using a rubric, we evaluated each site with respect to the criteria. We then analyzed this information by weighing the advantages and disadvantages of each site to determine which was the most appropriate. **We selected the site of a recent chemical fire as our recommended location.** The site is relatively small (approximately 315 m^2 or 3390 ft^2), but will still provide adequate space for a playground. It is bordered on three sides by community living areas and on the fourth by a billboard, which could serve as an ideal location for playground lighting.

Equipment and Play Space

Our next step was to determine the equipment and layout of the playground. To decide which equipment to include, we utilized the results from three focus group sessions and direct observations at three playgrounds to determine the play preferences of the local children. Climbing was the most popular play activity, followed by sliding, sand play, swinging, and balancing. Our group then selected the types and amount of equipment to include based on these preferences, recognizing the limitations imposed by the selected site. We referred to our background literature on playgrounds and child development to ensure that our selected layouts can satisfy the children's need for each of four main types of development — social, emotional,

intellectual, and physical. Each piece of equipment accommodated a number of activities, encouraging each of these types of development.

We then considered the feasibility of implementing each type of equipment and of obtaining the materials needed to build each structure. Since materials for certain structures could prove difficult to obtain, our group created two design layouts: one that better suits the play preferences of the area children, and one offering a slightly different layout that utilizes equipment that can be built using tires, decreasing the cost and increasing the ease of implementation. The playground layouts are shown in Figure 1 and Figure 2. In the figures, the white area is the safety zone surrounding equipment, with the colored areas being the area occupied by the equipment. In addition, we recommended that the community:

- **Employ one of the two designs depicted in Figure 1 and Figure 2**
- **Include seating and trashcans around the perimeter of the playground, plant several trees to provide shade to the area, and add lighting for night play**
- **Include a Spirit House**
- **Add public bathrooms facilities and water fountains on the site**
- **Install a perimeter fence around the area**
- **Add an additional exit be to the site, opposite from the existing exit**

Material Resources and Implementation

Once the layouts were determined, we pursued information on our primary construction and surfacing material — tires — and on implementation. We researched different manufacturers of tires and contacted the companies to inquire about their involvement in playground projects. We then compiled data on material resources and presented it to the DPF, recommending that they:

- **Utilize Michelin's playground program, requesting assistance using the cover letter that we drafted**
- **Sponsor a Playground Day to paint, build signs, and plant vegetation**
- **Obtain approximately seventy-five new or used tires for equipment, approximately 45 m^3 of shredded tires for surfacing material, approximately 5 m^3 of sand for the sandbox, chain, wooden beams, and steel beams through purchase or donation.**

Maintenance Plan

After determining the layout and materials for the playground, the next step that our group took in the completion of the Klong Toey slum playground design was to develop a maintenance plan to keep the playground safe and clean. We developed a maintenance plan, which consisted of safety and general maintenance checklists developed through the use of the U.S. Consumer Product Safety Commission's Handbook for Public Playground Safety and successful maintenance programs used in the past. Accompanying the two checklists in the maintenance plan, we produced a list of stakeholders and assignments that we recommend each carry out. We also created a timetable of how often we recommend that each task be completed. In addition to our recommendation that the community use this maintenance plan, we also recommend that the community do the following:

- **Place the community leader in charge of the playground maintenance plan that we designed**
- **Implement a modest membership fee for playground use**
- **Offer an alternative to a membership fee for children unable to pay**
- **Provide a form of security at the playground**

Other Recommendations

There were several recommendations that do not fit into a specific category, but are worth mentioning. These include our recommendation that the community:

- **Encourage street vendors to sell in the area**
- **Name the playground and include a sign which incorporates the information that the local community created this playground, identifying them as its owners**
- **Offer loose tires and sports equipment, such as badminton equipment, soccer balls, and Frisbees, that playground users could rent or borrow**

Manual

In addition to the Klong Toey slum playground design, our group created a manual for designing low-cost playgrounds. The purpose of creating the manual was to use our project as a reproducible model for other low-income communities to follow in designing their own low-cost playground. To accomplish this, we analyzed the steps followed to complete our playground design in the Klong Toey slum community, transforming the site-specific steps into general steps needed to follow while designing a playground. We documented the results of these analyses in a visual format, the *Playground Manual.* The manual is structured as follows:

- Why a Playground?
- Why Used Tires?
- How to Design and Build a Playground
    - Step 1: Identifying a Playground Planning Team
    - Step 2: Evaluating Possible Locations
        - Choosing Criteria, Based on Accessibility, Convenience, and Safety
        - Selecting a Location
    - Step 3: Developing a Playground Layout
        - Selecting a Group to Represent Future Users
        - Choosing Equipment with Community Participation
        - Considering Other Factors
        - Finalizing the Layout
    - Step 4: Obtaining Resources
    - Step 5: Creating a Maintenance Plan

Through the completion of our project, we hope that the lives of the children in the Klong Toey slum can be improved, even if only slightly, by having a safe and fun environment for them to enjoy for years to come. We have distributed copies of our manual and posted it on the Internet, making it available to other low-income communities throughout the world. Through this, we hope to make a small difference in the lives of even more children.

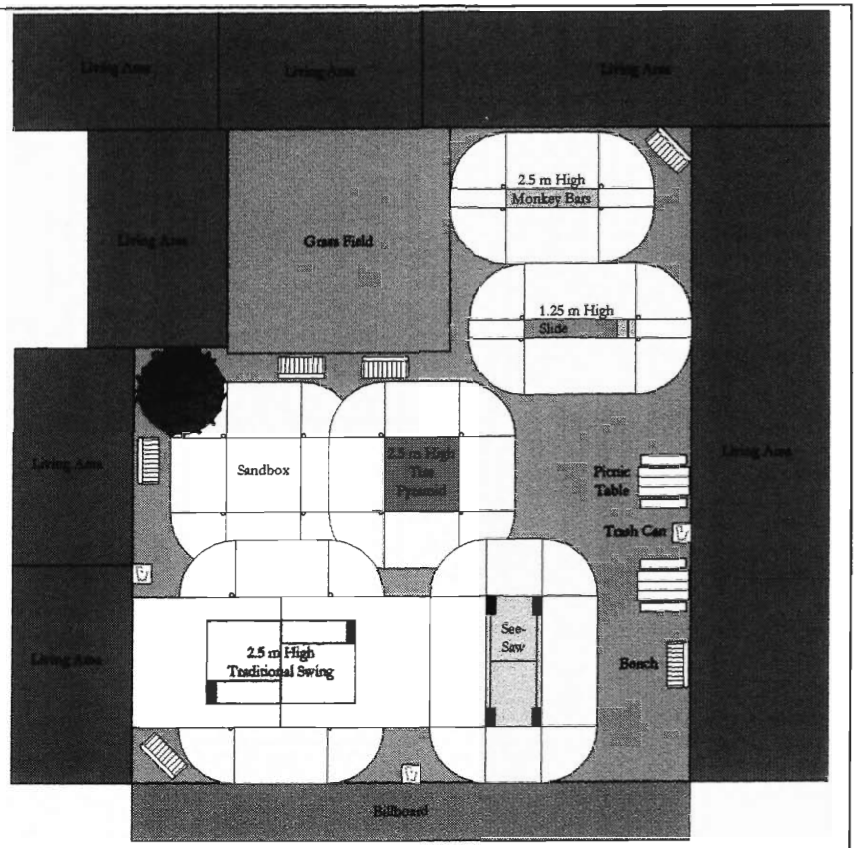

Figure 2: Playground Layout Better Satisfying Children's Play Preferences

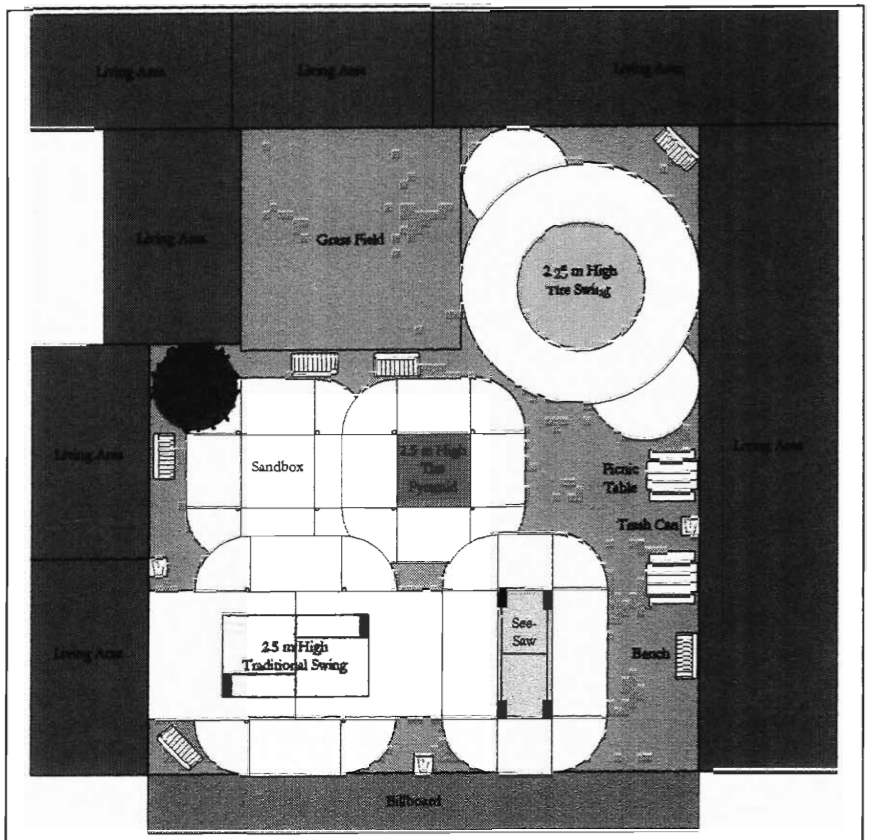

Figure 1: Playground Layout Better Using Low-Cost Material Resources

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Chapter 1. Introduction

In slums throughout the world, children deal with many problems, including crime, violence, and a lack of funding for education. In some cases, the ever-growing presence of drugs amplifies the severity of these problems.[1] Though these challenges must be met by applying a number of different strategies, additional safe recreational facilities, particularly playgrounds, can serve to steer children from criminal activity, including drug use and trafficking, by providing them with safe and healthy alternatives.

Approximately 1,000 slum communities exist in the city of Bangkok, Thailand. These slums provide homes for an estimated 15% of the population, including many of the city's low-paid workers. The Klong Toey slum, located in southern Bangkok, is one such area. Comprised of 44 communities, it is home to approximately 100,000 people. With such a large population in a confined space, the problems associated with slum life, particularly drug use and trafficking, are magnified. In response to the severe drug problems, the Minister of the Interior of Thailand has expressed a desire to provide funding for community improvement projects in the Klong Toey slum, including playgrounds and other recreational facilities. Although a few playgrounds already exist in the area, the Klong Toey slum community has inadequate recreational facilities for its inhabitants and the desire for more playgrounds has been expressed by children and parents alike.[2]

Located in the Klong Toey slum, the Duang Prateep Foundation (DPF) is a community-based, charitable organization that exists to help slum communities improve their quality of life. Through projects such as *Educational Sponsorship* and *New Life Project for Girls*, the DPF emphasizes the importance of helping children.[3] Presently, the DPF, in conjunction with the Ministry of the Interior, is looking to combat the influence of drugs on children by establishing additional playgrounds in Klong Toey.[4] The DPF Secretary General has expressed interest in a playground design process that could be easily reproduced in other low-income communities around the world. This would allow playgrounds to be designed and built with the assistance of the communities, which would both inspire pride and ensure the sustainability of the playgrounds. The use of the community in the design and implementation of a playground is known as the participatory process. Participatory playground design projects have been successful in the past and continue to be successfully completed.[5]

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[1] Joanne Burke. New Directions: Women of Thailand, Video (New York: Film and Video Workshop, Inc., 2000).
[2] Anjira Assavanonda, "Slum children state their needs," Bangkok Post, 10/07/00. <http://search.bangkokpost.co.th/bkkpost/2000/bp2000_jul/bp20000710/100700_news05.html> (13/11/02).
[3] "A window on the slums…." Informational Brochure, Duang Prateep Foundation.
[4] "Wan Nor to tackle drugs," Bangkok Post, 14/01/03.
[5] Martha Sutro, "Playgrounds by Design: Newark Students Expand Their Horizons as Part of a TPL Design Team" Land & People 14, no. 2 (2002): 15-19.

The primary goal of our project is to use community involvement to recommend a playground design and maintenance plan for the Klong Toey slum community. In addition, we will develop a reproducible design process intended to serve as a model for other low-income communities, empowering them to design their own low-cost playgrounds using community involvement. To achieve these goals, our group will evaluate possible locations, develop a playground layout using community involvement, identify material resources, develop a maintenance plan, and document a reproducible design process. The project group will consider the recreational needs of the community and the budget and human resources that are available, and will take into account good practice in playground design. A new playground can improve the quality of life and aid in the development of disadvantaged children. Such improvements in the lives of the children of today can lead to positive changes in the communities of tomorrow.

Chapter 2. Background

In this chapter, we will introduce the geographical setting for our project, as well as the area's inhabitants and some of the challenges they face. We will then introduce the sponsor of our project, the Duang Prateep Foundation (DPF), an organization that attempts to assist the community in overcoming its challenges. As a solution to some of these difficulties, the DPF has identified a need for additional playgrounds in the area. We will discuss the relationship between playgrounds and child development, and then present information on playground design and playground safety.

2.1 The Klong Toey Slum and the Work of the Duang Prateep Foundation

According to the World Bank Group, there are more than 300 million people around the world living in squatter settlements or slums, some lacking even basic living needs, such as clean drinking water, electricity, proper housing, and education.[6] Major societal problems such as disease, drugs, and violence have a magnified influence in such areas, and as a result tend to later surface as national problems.[7] In the developing country of Thailand, the Klong Toey slum in Bangkok is one area that faces these challenges. In this section, we will introduce the Klong Toey slum, which can be seen in Figure 3, and discuss the specific problems of its residents. We will then introduce the Duang Prateep Foundation and explain its efforts to aid the community in addressing these problems.

Figure 3: The Klong Toey Slum

The Klong Toey slum is the oldest and largest of Bangkok's approximately 1,000 slums. Located near the port of Bangkok, it is an area that developed through the constant use of the canals; in fact, the region's name even comes from the trees, "*toey*", that lined the canals, "*klong*." Though the canals of Bangkok have long since been filled in and replaced with roads, the Klong Toey slum remains. Within this slum, a substantial population lives on land owned by the Port

[6] "Poverty Matters." World Bank Organization. 2001. <http://www.worldbank.org/html/extdr/gc/environment/environment.htm> (10/11/02).
[7] James Stover, "Fighting for the children," Bangkok Post, 29/12/02.

Authority of Thailand,[8] a majority having moved from the countryside when farming ceased to be productive. Many wanted to pursue work and education in the city; however, they contributed to severe overpopulation, leading to competition for jobs and a decrease in wage-rate. For this reason, the majority of the inhabitants earned hardly enough money to survive. Since these people could not afford property, they settled on land owned by the Port Authority of Thailand, where they have formed a unique community.[9] In addition to the characteristic problems of slums already mentioned, the Klong Toey slum community also faces threats from eviction and drugs. The following paragraphs will focus on these issues, as well as some of the efforts that have been made in recent years to address them.

There are frequent legal battles between the slum dwellers and the Port Authority of Thailand. Japanese author Tatsuya Hata states that the Port Authority sees the communities of the Klong Toey slum as an obstacle that they need to overcome in order to expand. He states that the inhabitants are living on land owned by the Port Authority and have no legal claim to the property, but also points out that some of the Klong Toey slum's residents have inhabited the area for generations, building a community in the wasteland. For this reason, Hata argues, the members of the slum community believe that they have rightful ownership of the land, adding that the majority of them would not be able to afford to live anywhere else. Residents strongly protest the commercial development of the Klong Toey slum because it could result in their eviction at any given time. The evictions have resulted in a sharp decrease in the population of the slum, from over 130,000 residents at its peak to around 100,000 by early 2003. As a result of the legal battles, says Hata, the slum has an atmosphere of fear and desperation.[10]

In addition to the fear of eviction, the residents of the Klong Toey slum also face constant threats from a widespread drug trade. Drugs are a serious problem for the whole community of the slum, especially the children. Young children are often used to transport amphetamine s and other drugs. Those who are active in fighting the drug trade often receive death threats and beatings. The people of the Klong Toey slum fear that even more children will begin to use drugs if they do not take action.[11]

Despite these problems, there is a "flame of hope" for the people of the slum. There are organization-sponsored projects focusing on improving the health, safety, and education of children. One such organization that assists the residents of the Klong Toey slum in improving their quality of life is the Duang Prateep Foundation. The name *Duang Prateep* literally means "flame of hope," and was chosen to honor Prateep Ungsongtham, a schoolteacher and advocate

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[8] Tatsuya Hata, Bangkok in the Balance, (Bangkok: Duang Prateep Foundation, 1996), 32-34.
[9] "Origins of the DPF," Duang Prateep Foundation, 2002, <http://www.dpf.or.th> (24/10/02).
[10] Hata, Bangkok in the Balance, 126-128.
[11] Burke, New Directions: Women of Thailand.

for the people of the Klong Toey slum. The foundation was created in 1978, when Prateep was able to establish it with money from the Magsaysay and Rockefeller Youth awards. Beginning with a staff of only five, the foundation now has over one hundred staff and twenty full time volunteers, not to mention numerous aids and assistants. The DPF organizes local volunteers, allowing the entire community to be involved in the projects. The DPF acts on behalf of the poor people of Bangkok, and recently began to extend its influence into the rural areas of Thailand. The foundation sponsors programs encouraging school assistance and AIDS awareness, and also supports programs for young women and children, including outreach programs, kindergartens, and playgrounds. Many of these programs have been made possible through the continuous dedication of Prateep.[12]

Prateep has recently expressed an interest in additional recreational facilities, particularly playgrounds, for the Klong Toey slum. She states that adequate play facilities provide children with an enjoyable and protected place to escape from the difficulties of slum life. As can be seen if Figure 4, the children of the Klong Toey slum often lack proper play areas. Prateep is not alone in her desire to introduce additional playgrounds; the Minister of the Interior shares Prateep's vision, agreeing that additional recreational facilities will provide children with healthy alternatives to drug use and trafficking. He has also pledged financial support from the government for playground projects.[13] Even children are voicing their opinions on the matter: when 60 children from various communities, including the Klong Toey slum, were recently interviewed and asked what they hoped the new governor would do for them, their reply was universal — playgrounds.[14] In addition to providing children with a fun and safe place to play, playgrounds provide other benefits, including promoting child development.

Figure 4: Children Lacking Recreational Facilities

[12] "Origins of the DPF."
[13] "Wan Nor to tackle drugs."
[14] Assavanonda, "Slum children state their needs."

2.2 Playgrounds

In this section, we will begin by discussing the importance of play environments and benefits of playgrounds in terms of child development. Next, we will introduce playground design considerations, including the relationship between types of development and the specific types of playground activities and equipment that encourage them, as well as equipment classification by age-appropriateness and by structure. We will then discuss the importance of involving communities in the playground design process. Lastly, we will introduce the topic of playground safety in design, including playground safety in the US and Thailand, and identify safety and maintenance issues to consider.

2.2.1 Benefits of Play Environments and Playgrounds

According to the findings of Swedish scholar Aase Eriksen, what children hear and observe on a daily basis can have a lasting impact on their perception of the world. For this reason, play environments have a considerable influence on child development; young children in particular benefit from the shelter and protection provided by a separate, enticing, and varied play environment.[15] The presence of a stimulating, rich, and varied environment is critical in making it possible for children to reach their maximum potential. In agreement with Eriksen, noted psychologist Jean Piaget also emphasized the importance of interactive relationships between people and their environments,[16] and other researchers agree that healthy growth and development is rooted in learning experiences, which arouse learners' curiosity, allowing them to explore it naturally.[17] One specialized type of play environment that serves to benefit children in this manner is playgrounds.

Though playgrounds are planned and established chiefly for children's play, providing children with an enjoyable place to spend time, they also benefit children and the community in a number of other ways. Playgrounds contribute to the landscape of the community, generating an inviting space for both adults and children to enjoy, and also promote physical activity in children.[18] Physical activity can benefit people of all ages by lowering the risk of heart attacks and strokes, reducing weight, and enhancing moods. The Center for Disease Control and Prevention recently explored the relationship between health care costs and physical activity. Its research found that physically active people have lower annual medical costs than inactive

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[15] Aase Eriksen, Playground Design: Outdoor Environments for Learning and Development (New York: Van Nostrand Reinhold Company, 1985), ix, 2.
[16] Eva Noren-Bjorn, The Impossible Playground (West Point, New York: Leisure Press, 1982), 19.
[17] Eriksen, Playground Design, 1.
[18] *Ibid.*, 3.

people.[19] In slum communities, where financial resources are limited, improving the general health of the children and lowering health cost is critical. A playground where children are able to be active and have fun can promote and increase physical activity and improve the general health of the community.

Another benefit of playgrounds is their encouragement of the development of children. Piaget stated that children need to be stimulated intellectually, physically, mentally, and emotionally to promote development. He asserted that intellectual, or cognitive, stimulation is important in order for children to gain skills that are needed for everyday life. He added that children are able to build up communication and teamwork skills through physically observing and overcoming obstacles. Eriksen states that the core of learning is socialization,[20] while Swedish author Eva Noren-Bjorn argues that play and socialization develop side by side.[21] Similarly, Piaget stated that children need to be stimulated socially in order to expand their understanding of emotions. He asserted that this stimulation could come from children learning to relate and interact with other children.[22]

When a playground is properly designed, providing the necessary emotional, social, intellectual, and physical stimuli that children require, it can encourage a child's development and learning.[23] For this reason, it is important to consider the effect of the equipment on children when designing a playground.

2.2.2 Playground Design Considerations

Children need different play environments and opportunities to fulfill their social, emotional, intellectual, and physical needs. In an effort to meet these needs, playgrounds are often designed to provide diverse activity spaces for structured games, creative play, play with natural elements, and quiet play. However, successful playgrounds do not depend solely on the structures, but on the organization and landscaping of the entire site as well. With proper planning, playgrounds can even allow children to create their own environment, providing opportunities for them to experience their own adventure. Playgrounds can also provide ambiguity to stimulate fantasy play, loose parts for creative and cognitive thought development, and clear accomplishment points, such as reaching the top of a ladder or making it across a balance beam, to reinforce a sense of self-confidence.[24] In the following paragraphs, we will discuss the four major types of child development, emotional, social, intellectual, and physical,

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[19] "Lower Direct Medical Costs Associated with Physical Activity," Center for Disease Control, 2002, <http://www.cdc.gov/nccdphp/dnpa/press/archieve/lower_cost.htm> (10/12/02).
[20] Eriksen, Playground Design, 2-7.
[21] Noren-Bjorn, The Impossible Playground, 37.
[22] Eriksen, Playground Design, 2-7.
[23] Noren-Bjorn, The Impossible Playground, 8.
[24] *Ibid.*

and the effect that they have on playground design. We will then show a relationship between specific playground activities and the types of child development that each promotes. Finally, we will discuss the grouping of playgrounds by age-appropriateness, structure, and space.

Research has shown that the emotional development of children is promoted by stimulation of the senses. Playground environments are filled with sights and sounds that excite emotional responses in children of all ages. Children benefit from encountering the joys and terrors of soaring on a swing, the anger of being cut in front of in a line, and the pleasure of exploring their surroundings.[25]

There is evidence that mixing children of different ages during play provides the social stimulation essential for social growth, as well as the development of interpersonal skills. Young children will communicate with and imitate the older children, which will accelerate their development. By caring for the smaller children, older children learn responsibility and leadership.[26]

In general, intellectual development is typically associated with the classroom rather than the play space. However, the literature suggests that mental stimulation is just as important on the playground as it is in the classroom. Common playground activities such as exploring, working alone, communicating with others, using new materials, and fantasizing are all important in the development of intelligence. Through mental stimulation and creative problem solving, a child's intellect is challenged and extended.[27]

In addition, research has shown that it is also important to stimulate physical development in children. Through physical stimulation, skills such as balance, coordination, strength, agility, and speed are developed and improved. As mentioned in Section 2.2.1, there is also a strong link between physical activity and a healthier person, both mentally and physically; children who are able to get regular exercise will generally be healthier and have higher self-esteem than children who do not take part in regular physical activity. In terms of physical development, playground equipment can be grouped into three general categories: physical exercise equipment, representational equipment, and sensory equipment. Equipment can stimulate sensory development as well, and provide a child with sensations such as spinning, speed, and dizziness, which can be pleasurable and thrilling for a developing child.[28]

Research indicates that it is important when designing a playground to attempt to incorporate activities and equipment that address all developmental needs.[29] A single benefit for

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[25] *Ibid.*
[26] *Ibid.*
[27] *Ibid.*
[28] *Ibid.*
[29] Sherri Arnold, "Child Playgrounds," University of Nebraska-Lincoln: Case Study, 1996, <http://www.unl.edu/casestudy/456/sherri.htm> (30/10/02).

development cannot be given to each aspect of play at a playground, as each piece of equipment serves to develop a combination of experiences. Nevertheless, certain types of playground activities are associated with certain aspects of development. In addition to the relationship between play activities and child development, there is also a clear correlation between play equipment and child development. In order to better understand this relationship, experts have grouped equipment based on different criteria, such as age, structure, and space. Table 1 outlines relationships that researcher Sherri Arnold noted between specific playground activities and the types of development that each promotes.[30]

Table 1: Activities and Types of Development Each Promotes[31]

Activities that Promote Physical Growth	Activities that Promote Emotional Growth	Activities that Promote Social Growth	Activities that Promote Intellectual Growth
Sliding	Homemaking	Cooperative Games	Listening
Swinging	Creative Self-Expression	Group Problem Solving	Problem Solving
Rocking	Solitary Play	Listening	Observing (Intergroup)
Climbing	Personal Care	Dancing	Observing (Natural Process)
Balancing	Risk Taking	Group Exploring	Using Tools
Crawling	Handling Objects	Verbal Intercourse	Making Things
Jumping	Role-Playing	Sharing	Matching/Identifying
Rolling/Tumbling	Rebuilding/Reconstruction	Copying	Spatial Orientation
Pushing/Pulling	Fantasy Play	Cooperative Projects	Drawing
Hopping/Skipping	Ordering	Planning	Exploring
Running	Music Making	Singing/Creative Noise Making	Experimenting (Socially)
Throwing/Catching	Group Participation	Obeying Rules	Experimenting (Nature)
Cooperative Games	Experimenting	Fact Learning	Creative Self-Expression
Competitive Games	Reacting to Personal Needs	Displaying/Explaining	Rhythmic Noise Making
Building/Constructing		Questioning/Investigating	Imaging/Symbolizing
Walking		Ordering/Arranging	Imagining
Collecting		Group Fantasy Play	Solitary Play
Distributing		Experimenting with Objects	Mimicking
Arranging		Interpersonal Care/Caring	Reading
Hiding		Experimenting with Games	Manipulating
Ordering			Describing
Manipulating			Writing
Molding			
Feeling/Handling			
Sitting/Passive Activity			
Observing			
Digging			
Planting			
Exploring/Seeking			
Water Play			
Sand Play			
Ball Play			
Toy Play			
Doll Play			
Drilling			
Local Games			

Playground designers must also consider the ages of the users. Both psychologically and physically, life can be divided into different stages, with each stage associated with different social and physical phenomena. The U.S. Consumer Product Safety Commission[32] utilizes these different stages to classify playground designs by age group, designating early age as the period

[30] *Ibid.*

[31] Arnold, "Child Playgrounds."

[32] Ann Brown and Committee, Handbook for Public Playground Safety (Washington, D.C.: U.S. Consumer Product Safety Commission, 2002), 2.

from birth to early adolescence, specifically 0-12 years old. Early age children require and accept more care and supervision from adults, whereas adolescents have a tendency to seek independence. For the purposes of playground design, the CPSC further divides the early age group into two groups, 2-5 years and 5-12 years. The designs for 2-5 year olds contain a large amount of space, sand and/or grass, and padded equipment; these playgrounds require careful supervision and maintenance. Children in the older age group, on the other hand, do not require as much supervision; the equipment is more challenging than for the younger age group. In addition, these playgrounds often contain less equipment, with the emphasis on stimulating creativity and fantasy, as well as including open areas for sports.[33]

In addition to being divided by age group, playgrounds can be classified by structure as well. According to Arnold, playgrounds can be divided into three categories by structure: traditional, contemporary, and adventure. Traditional playgrounds relate back to the idea that play is to improve physical growth; they contain slides, swings, and see-saws that are placed in a very open area. Contemporary playgrounds consist of equipment that is interconnected or combined to create a theme that might be specific, such as Superman or Peter Pan, or general, such as a pirate ship; they inspire dramatic play, which in some cases can help shape the child's future. Adventure/creative playgrounds emphasize child development through a more unstructured type of environment; they can contain old tires, building blocks, lumber, crates, and other materials. Adventure/creative playgrounds allow children to make their own creations as a result of flexibility in design. Whichever type of playground is utilized, children find more satisfaction and better develop if play is challenging and makes them use their skills and creativity.[34]

The last criterion to be considered in playground classification is space. Space plays a crucial role in the construction of a playground and can be divided into four types: marginal, structured, sheltered, and free. The first type of space, marginal space, includes loose non-descript items such as sand, old tires, building blocks, and pieces of wood and stone. Structured space contains organized equipment. Sheltered space is an area where children can rest and socialize, while providing an area where parents can supervise; this area could contain trees, bushes, benches, a small pond, or grass. Sheltered space also aids children in the development of a relationship with nature. The final type of space, free space, is any large open area that allows children to run and chase each other and play ball or any game that requires a large open space.[35]

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[33] *Ibid.*

[34] *Ibid.*

[35] Michael DeMagistris and Matthew Johnson, Interactive Qualifying Project: Children's Play Environments (Worcester, MA: Worcester Polytechnic Institute, 1996), 44.

2.2.3 Models for Community Involvement in Playground Design

When designing a playground, it is important to consider the future stakeholders, including both children and adults. These two groups may have a better understanding of what is needed than the designer. In general, people want an opportunity to provide their input on what takes place in their environment; according to many researchers, the involvement of community members in construction, as well as in the design process, creates a sense of pride in the finished project. The area is perceived as belonging to the community, with each community member feeling a sense of responsibility. For this reason, the users are more likely to maintain the playground and actively protect it from vandalism.[36] To use community involvement, researchers suggest the use of a participatory design process in designing the playground. In a participatory process suggested by Eriksen, the designer handles budget, safety, and some construction factors while walking the user through the design process. Similar methods for designing playgrounds have been successfully used by Eriksen in Grand Rapids, MI[37] and by the Trust for Public Land in Newark, NJ.[38]

In Eriksen's suggested participatory design process, the first design step is to identify each of the groups invested in the proposed playground. A series of sessions are needed in order to guide the users, children in this case, from the project's start to finish. These sessions usually use hands-on activities, as they are likely to produce the best results because most children have short attention spans. For this reason, these sessions need to be carefully planned out.[39]

The suggested sessions generally begin with encouraging the children to fantasize about play and play environments, jump-starting their creative thinking. Once the children are thinking creatively about play, the designer then inquires about the children's favorite and least favorite types of play activities. By classifying these activities into types of play, general themes can be identified. The designer then begins to structure the children's thinking, making them aware of a proposed play site, and asking them to draw pictures of an ideal playground. By making the children conscious of the location, landscape, and architecture surrounding the site, the designer encourages them to create more site-specific designs. A designer can look at these pictures for patterns pertaining to types of play and flow of play activities. Possible steps following the early design process involve allowing the children to design in groups and taking them to the proposed playground site to familiarize them with the area.

After analyzing the information from the children, suggests Eriksen, the designer should use this and other collected data to create a playground design. The final recommended step in

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[36] Eriksen, Playground Design, 58-59.
[37] *Ibid.*, 70-150.
[38] Sutro, "Playgrounds by Design: Newark Students Expand Their Horizons as Part of a TPL Design Team," 15-19.
[39] *Ibid.*

this participatory design process is to present the finished design to the children. By allowing them to approve the design, the designer strengthens the children's feelings of ownership and pride. The playground is now something that the children helped to create: a place that is uniquely their own.[40]

2.2.4 Playground Safety in the USA and Thailand

As discussed in previous sections, an ideal playground provides an element of risk that both benefits children and sustains their interest. The element of risk, however, must be carefully created in order to minimize actual physical danger on the playground.

In the U.S., playgrounds are the leading cause of childhood injury. In 1999, approximately 205,860 U.S. children received medical treatment in hospital emergency rooms for injuries received on playgrounds. From 1990 to 2000, the U.S. Consumer Product Safety Commission (CPSC) received reports of 147 deaths involving playground equipment. Over half of these deaths (56%) were the result of strangulation.[41]

Though these statistics are a clear cause for concern, it must be considered that 70% of the 147 deaths occurred on home playground equipment. While it is encouraged for public playgrounds to meet the guidelines set forth by the U.S. CPSC, home playgrounds do not have such extensive recommendations, and are therefore are more apt to cause serious or even fatal injuries to children. Though public playgrounds do account for 76% of injuries, most likely because of the sheer number of children using the equipment, the fact remains that a higher percentage of serious injuries occur on home playgrounds.[42]

When a public playground is implemented, the safety of the structure is of the utmost importance. The United States recommends that playground equipment conform to specific guidelines in order to ensure the safety of children. The U.S. CPSC provides a Handbook for Public Playground Safety, which outlines these guidelines, including specifications for the most common playground equipment as well as recommended materials for playground surface and structures.

Since the introduction of the Handbook for Public Playground Safety in 1981, many types of injuries have decreased. Deaths caused by swing impact have almost completely disappeared since the CPSC survey in 1988. The use of protective surfaces on public playgrounds has increased from 36% to 79%, dramatically decreasing deaths caused by head injuries. In contrast, only 9% of home playgrounds now have protective surfaces.[43]

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[40] *Ibid.*

[41] Deborah Tinsworth and Joyce E. McDonald, Special Study: Injuries and Deaths Associated with Children's Playground Equipment (Washington D.C.: U.S. Consumer Product Safety Commission, 2001), ii-iii.

[42] *Ibid.*

[43] *Ibid.*, 15, 24.

As in the US, playground safety is a major issue when considering the well-being of Thai children. Adisak Plitponkarnpim, a pediatrician and the supervisor of the drafting of Thailand's playground safety guidelines, reported that tens of thousands of children are injured each year in playground accidents. Until recently, there were no recommended guidelines or specifications for Thailand's playgrounds. Adisak also asserts that this lack of regulation has allowed unsafe playgrounds to be built, increasing the opportunity for serious injury.[44]

On November 6, 2002, it was reported in the Bangkok Post that Thailand's Consumer Protection Board had completed writing a handbook for public playground safety. The document recommends standards for equipment and rules for maintenance. For now, these guidelines will serve only as suggestions, but the Consumer Protection Board looks to seek the approval of the Education Ministry and the Thai Industrial Standards Institute before the regulations become mandatory.[45]

2.2.5 Safety and Maintenance Issues

One topic emphasized in both the U.S. and Thai public playground safety handbooks is the importance of material selection in the design of the playground. In the occurrence of a falling injury, one where a child falls from a piece of equipment to the ground, the physical properties of the materials, specifically abrasiveness and shock-absorbency, can determine the seriousness of the injury. The use of non-abrasive materials, such as shredded tires, wood chips, bark mulch, and engineered wood fibers, is recommended by the CPSC.[46]

The shock absorbency of a material is measured as critical height, defined in the CPSC Handbook for Public Playground Safety as "the fall height below which a life-threatening head injury would not be expected to occur."[47] Table 2 provides critical heights for materials that are commonly used as playground surfaces.

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[44] Anjira Assavanonda, "Bid to Better Playground Safety," 15/08/02, <http://scoop.bangkokpost.co.th/bkkpost/2002/aug2002/bp20020815/news/15Aug2002_news20.html> (12/11/02).

[45] Anjira Assavanonda, "Guidelines aim to avoid more deaths," 6/11/02, <http://search.bangkokpost.co.th/bkkpost/2002/nov2002/bp20021106/news/06nov2002_news26.html> (14/11/02).

[46] Brown and Committee, Handbook for Public Playground Safety, 38-39.

[47] *Ibid.*, 2-5.

Table 2: Critical Heights (in feet) of Tested Materials[48]

Material	Uncompressed Depth			Compressed Depth
	6 inch	9 inch	12 inch	9 inch
Wood Chips	7	10	11	10
Double Shredded Bark Mulch	6	10	11	7
Engineered Wood Fibers	6	7	>12	6
Fine Sand	5	5	9	5
Coarse Sand	5	5	6	4
Fine Gravel	6	7	10	6
Medium Gravel	5	5	6	5
Shredded Tires*	10-12	N/A	N/A	N/A

* This data is from tests conducted by independent testing laboratories on a 6 inch depth of uncompressed shredded tire samples produced by four manufacturers. The tests are reported critical heights, which varied from 10 feet to greater than 12 feet. It is recommended that persons seeking to install shredded tires as a protective surface request test data from the supplier showing the critical height of the material when it was tested in accordance with ASTM F1292.

Although shredded tires appear to be the safest surface material, providing the best combination of shock-absorbency and abrasiveness, the use of each material has benefits and drawbacks to consider. For example, the benefits and drawbacks of using shredded tires are as follows:

Advantages[49]

- Ease of installation.
- Has superior shock absorbing capability.
- Is not abrasive.
- Less likely to compact than other loose-fill materials.
- Not ideal for microbial growth.
- Does not deteriorate over time.

Disadvantages

- Is flammable.
- Unless treated, may cause soiling of clothing.
- May contain steel wires from steel belted tires.
  Note: Some manufacturers provide a wire-free guarantee.
- Depth may be reduced due to displacement by children's activities.
- May be swallowed.

For advantages and disadvantages of other surface materials, refer to the CPSC Handbook for Public Playground Safety.

In addition to the physical properties of the playground surface, the abrasiveness and shock-absorbency of the materials that make up the equipment are also important in reducing the seriousness of injuries. Many playground injuries occur when children run into stationary equipment or are struck by moving equipment. These injuries are referred to as impact injuries.

[48] *Ibid.*
[49] *Ibid.*, 39.

To minimize abrasions in these impact injuries, equipment surfaces must also be kept smooth and free from sharp points, corners, or edges. If playground equipment is properly designed and maintained, most common playground materials, such as wood, metal, plastic, and rubber, can be relatively low-risk of abrasions in impact injuries. To reduce the force of impact on these injuries, shock-absorbent building materials, such as rubber, are recommended by the CPSC for equipment.[50]

Another aspect of playground design, one that is often underemphasized, is maintenance. Proper maintenance ensures the longevity of the playground and influences the safety of the children. Figure 5 shows an example of a playground that has not been properly maintained. One study concluded that 34% of all playground injuries in the U.S. can be linked to inadequate maintenance.[51] To minimize such injuries, the area should be free of hazardous debris and all equipment problems should be identified and repaired before they pose a safety risk. For this reason, playground safety inspections should be completed regularly. Since there are no set formulas to determine the frequency and the method of playground inspection, the community usually decides the frequency of inspection, based on necessity.

One of the most effective methods to aid in playground maintenance is the documentation of the inspection sessions using safety checklists. The U.S. National Program for Playground Safety supports the usage of the checklists to inspect playgrounds. The program suggests inspections of the protective surfacing height and the equipment condition.[52] In addition, both the U.S. CPSC Handbook for Public Playground Safety[53] and Columbus State University's Department of Physical Education and Leisure Management[54] provide examples of safety checklists focusing on inspection of surfacing, general hazards, deterioration of the equipment, security of hardware, and drainage.

In addition to safety, general maintenance, which focuses on the landscaping and cleaning aspects of playground maintenance, must also be accounted for. General maintenance checklists include tasks such as cleaning the equipment, sweeping the ground, and trimming the grass, as appears in the general maintenance checklist suggested by Playground Concept Design and Manufacturing, Inc.[55] These tasks can be completed by parents, maintenance personnel, or

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[50] *Ibid.*, 29.
[51] Tinsworth and McDonald, Special Study: Injuries and Deaths Associated with Children's Playground Equipment, 15, 24.
[52] "Playground Safety Week," University of Northern Iowa, n.d. <http://www.uni.edu/playground/safety_week.html> (05/02/03).
[53] Brown and Committee, Handbook for Public Playground Safety, pp. 32.
[54] "Maintenance Checklist," Department of Physical Education and Leisure Management: Columbus State University, 2000. <http://pelm.colstate.edu/courses/pelm3226/PELM%203226-PERIODIC%20MAINTENANCE%20CHECKLIST.doc> (05/02/03).
[55] "Cleaning and Maintenance Guide," Playground Concept Design and Manufacturing, Inc., 2002. <http://www.playgroundconcepts.com/DLS/Playground%20Cleaning%20and%20Maintenance.pdf> (05/02/03).

even children, as exhibited by Maintenance Day at the Highland Park Community Playground in Pittsburgh, PA.[56]

A maintenance plan, which is comprised of a safety checklist and a general checklist, is an important factor in a playground's success and longevity, but it is limited by the time and funding required to complete it. To overcome this limitation, the designer can identify stakeholders and involve the community in different aspects of the playground maintenance plan. For example, the Goshen Community Playground Project in Indiana received help from nine community committees which were responsible for maintaining the playground, scheduling a few days throughout the year to freshen up the park and make repairs.[57]

Figure 5: Unmaintained Playground

In response to the lack of funding for maintenance, the Parks and Recreation Director of Walla-Walla, WA generated a budget for playground maintenance by implementing a fee structure, including fees for reservations for exclusive use, adult sports leagues, entrance, and use of playground for special events. This has provided affordable opportunities for all youth to be able to participate.[58]

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[56] "Maintenance Day at the Super Playground," Highland Park Community Corporation, 2002-2003. <http://www.highlandparkpa.com/20020914-superplayground.htm> (05/02/03).
[57] "Inside Tommy's Kids Castle," Kiwanis: Serving the Children of the World, 2002. <http://www.kiwanis.org/magazine/02march/inside2.html> (05/02/03).
[58] "City of Walla-Walla Council Meeting Minutes," City of Walla Walla, 2002. <http://www.ci.walla-walla.wa.us/departments/support-services/cc-council-min2.cfm?thisid=34> (05/02/03).

Chapter 3. Methodology

The goal of our project was to use community involvement to recommend a playground design and maintenance plan for the Klong Toey slum community. In addition, we developed a reproducible design process intended to serve as a model for other low-income communities, empowering them to design their own low-cost playgrounds using community involvement. To achieve our goal, we completed the following objectives:

- Evaluation of possible locations
- Collaboration with the community to develop a playground layout
- Identification of material resources
- Development of a maintenance plan
- Documentation of a playground design process

The following sections provide a description of the methods our group applied in the completion of these objectives.

3.1 Evaluation of Possible Locations

Our first objective was the evaluation of possible locations. We chose to complete this objective first because each of our other design steps was dependent on the location. To complete this objective, we performed the following tasks:

- Created a checklist of criteria to consider for potential locations
- Observed and evaluated five potential locations
- Analyzed completed checklists
- Recommended an appropriate location

We first created a checklist of criteria to consider for potential locations because it provided a uniform method for the evaluation of each site. The list included criteria focused on accessibility, convenience, and safety that are viewed by the DPF Information Service Manager as fixed aspects of a location, as each criterion deals with the geographical location of the site rather than the alterable physical properties within it. One additional, project-specific concept that was included in the checklist was the DPF's desire for the site to be free from equipment so our project would maintain its focus as a design project rather than transform into an improvement project. For each criterion, we assigned a level of importance — very important, important, or somewhat important — based on discussions with the DPF Information Service Manager.

We toured the Klong Toey slum with the DPF Information Service Manager and were shown five potential locations for playgrounds. In this walking tour, we used direct observation, which is a methodological technique used to gather qualitative information. In our use of

participatory direct observation, which requires observers to participate in the activities of the situation,[59] we asked our guide the following questions:

- Why is this a potential location for a playground?
- What facilities (schools, youth centers, medical centers, libraries, living areas, police stations, bus stops, shopping areas, other recreational facilities, etc.) are nearby?
- Are there any events in the location's recent history that we should take into consideration?

At a later date, we used non-participatory direct observation to take pictures, sketch the layout of each site and surrounding area, record the approximate dimensions of each site and information related to the accessibility, convenience, and safety criteria previously discussed. We then used the results of our non-participatory direct observation and the answers to the above questions to evaluate each location using the checklist of criteria. Each site's favorability for a given criterion was determined using a scale — favorable (+), neutral (O), or unfavorable (-) — that was decided upon by our group in conjunction with the DPF.

Next, we analyzed the completed location checklist to determine the most suitable playground location. Our group began this analysis by displaying the favorability results for each site so that they could be easily compared. We came to our recommendation by first eliminating any sites that produced unfavorable results for multiple criteria that were deemed very important. We then performed a detailed analysis of the remaining sites by comparing them in relation to their accessibility, convenience, and safety aspects. If one of the sites performed more favorably in our analysis than the others, we concluded that it was the best choice for our project. In the case that the final sites performed similarly, we considered other local factors for our recommendation.

3.2 Development of a Playground Layout Using Community Involvement

Our next objective was the development of a playground layout — meaning the specific pieces of equipment and their positioning in a site — using community involvement. Prior to making this layout, our group utilized the suggestions of Aase Eriksen,[60] identifying the equipment preferences of children in prospective area; we decided to learn this information using a dual approach. First, we determined the equipment that the children claimed to prefer; then, we compared the claims of these children with what community children actually played on. In order to complete this objective, we performed the following tasks:

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[59] Royce A. Singleton Jr. and Bruce C. Straits, Approaches to Social Research, 3rd ed. (New York: Oxford University Press, 1999), 321-328.
[60] Eriksen, Playground Design, 58-59.

- Held focus groups with children
- Created a worksheet for playground observation and observed three playgrounds
- Analyzed the collected data
- Completed a layout design for a playground

3.2.1 Involvement of Children Using Focus Groups

To involve the community in the layout design of the playground, we performed a variation of Eriksen's recommended participatory design process. We chose to use Eriksen's process because of its history of success[61] and ease of use in terms of transcending cultural and language barriers. We selected three basic aspects of Eriksen's process: encouraging the children to think creatively about play, structuring to the children's ideas, and having the children use teamwork to develop a playground layout. We then incorporated these three aspects in a participatory design process consisting of three focus group sessions. We chose to utilize focus groups because they are particularly well suited for obtaining several perspectives on the same topic. In addition, the use of focus groups allows the participants' group attitudes, feelings, beliefs, and reactions to be expressed in a way in which would not be feasible using other methods.[62] Our focus group sessions were carried out on three days, with approximately eighteen 5-12 year old children from a DPF-sponsored after-school program. This age group was representative of our playground's target users. Figure 6 is a photograph of children participating in this focus group.

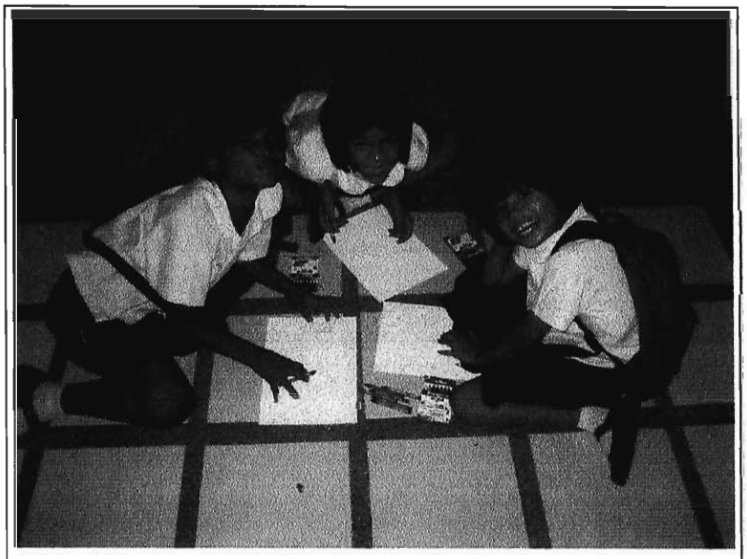

Figure 6: Children Participating in the Focus Group

The purpose of the first focus group session was to encourage the children to think creatively about play. In order to do this, we provided the children with paper and crayons and, with the help of a translator, asked each of them to draw any place that they would like to play.

The goal for the second focus group session was to take the children's thoughts from the previous day, and begin to structure their ideas. We again provided crayons and paper and utilized a translator, but this time asked each child to draw a playground. With these pictures of playgrounds, we were able to determine the children's preferred playground equipment.

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[61] *Ibid.*

[62] Anita Gibbs, "Social Research Update," 1997, <http://www.soc.surrey.ac.uk/sru/SRU19.html> (22/01/03).

For the third focus group session, our goal was to have the children use teamwork to develop a playground layout. In preparation for this session, we used a scale of 2.5 cm: 1 m to create a paper model of our recommended playground location. Using the same scale, we also prepared cutouts of standard playground equipment as well as the most frequently appearing equipment from the drawings from the second session. We used the CPSC-recommended use zone for each piece of equipment to determine the shape and area that each piece should occupy. We intentionally prepared more cutouts than could fit on the paper play area so that the children would have to decide which pieces of equipment to include. In this session, we divided the children into six groups of three children, grouping children of similar ages together. We provided each of these groups with the location model and cutouts and, with the help of a translator, asked the children to agree on an equipment arrangement on the paper play area. We then had the children glue the cutouts onto the paper play area in their agreed-upon formation. We used these playground layout models as an indication of the play equipment preferences for Klong Toey children of different ages.

3.2.2 Creation and Completion of Playground Observation Worksheets

The purpose of our second task was to observe the play patterns of children on different playgrounds. This information was used in conjunction with the play preferences discussed in the previous section to determine the equipment to include in our layout design. This task began with the creation of playground observation worksheets. These worksheets consisted of a blank page for the observer to sketch the layout of the existing playground equipment, a blank page for the observer to attach photographs of the playground to, and a data table for the observer to fill out. This table consisted of 15-minute time intervals starting at 10 a.m. and ending at 4 p.m. and corresponding columns for Equipment Popularity and Observations/Notes. These worksheets provided us with a uniform method to record playground observations, particularly equipment popularity and use patterns.

Based on the advice of the DPF Information Service Manager, we then selected three playground sites and sent two observers to spend a day observing each. We decided to send two observers to each playground so that the group was large enough to obtain multiple perspectives, but still small enough to remain somewhat discreet. The observers used non-participatory direct observation so they would not disturb the situation and could record the real play patterns of the children. Each pair arrived at 9:00 a.m. and began by photographing the playground and sketching its layout, noting equipment, surfacing, landscaping, benches, trashcans, etc. At intervals of 15 minutes, beginning at 10:00 a.m. and concluding at 4:00 p.m., the observers used the Playground Observation Data Table located in Appendix A to record the play patterns of the

children and the popularity of equipment in the Equipment Popularity column and other observations — such as security, supervision, equipment positioning, and hazards — in the Observations/Notes column.

3.2.3 Analysis of Data and Completion of Layout Design

Our group analyzed the design layout models from the third focus group session, recording the number of times that each piece of playground equipment appeared in the models. These numbers served as a representation of the popularity of equipment as claimed by the children. We also analyzed the completed Playground Observation Worksheets, which were intended to serve as a representation of the actual popularity of equipment and provide information on equipment positioning. We compared these results, recording similarities and differences. From this, we ranked the pieces of playground equipment by popularity as determined from both the focus group sessions and the direct observations. In addition, we referred to the research of Sherri Arnold, as summarized in Section 2.2.2, to ensure that all the child developmental needs could be met through the use of this equipment.

For the final design, we arranged 2.5 cm: 1 m scaled cutouts of the most popular pieces of playground equipment on a site model, using notes from our direct observations and background research to place equipment as according to best practice from our background literature.

3.3 Identification of Material Resources

The third objective was the identification of material resources necessary to build a playground. For this design step, our group intended to obtain information related to low-cost playground materials, as well as the people to contact and the procedure to follow to obtain them. To complete this objective we performed the following tasks:

- Identified types of low-cost materials
- Researched sources for materials
- Contacted companies for information on the materials
- Compiled the gathered information

Since our project was designated for a low-income area, the resources set boundaries for our design and determined the feasibility of the playground. As summarized in Section 2.2.5, the CPSC indicated that tires are an inexpensive and safe resource to use in playgrounds. For this reason, we researched sources for used tires by searching the Internet for places that accumulate recycled material in Thailand, as well as their usage as playground materials. We recorded the contact information of the sources and contacted them to obtain information on prices and the

procedures to follow to get used tires. We conducted phone interviews with these companies, asking the following questions:

- Are you interested in providing materials for a community playground project?
- What is the procedure followed to obtain the materials?
- Do you prepare shredded tires for protective surfacing, and if so, do you have a wire-free guarantee?
- What is the price of the shredded tires and the regular used tires?

The information gathered from the research and the phone interviews was compiled into a format that displays company contact information, available materials, prices, and the applications for each material.

3.4 Development of a Maintenance Plan

A maintenance plan is arguably the most important aspect of a playground's design, as it determines the longevity of the playground. In the development of a maintenance plan, we sought information related to past successful maintenance plans and how they were performed. We completed the following tasks:

- Identified maintenance providers
- Developed a safety maintenance checklist
- Developed a general maintenance checklist
- Presented this plan for approval to the sponsoring body

First, we identified maintenance providers for the playground by determining the major stakeholders, the possible services each could provide, and how each stakeholder would benefit. We developed a Safety Maintenance Checklist based on guidelines given in the U.S. CPSC Handbook for Public Playground Safety. The checklist addresses topics including surfacing, general hazards, deterioration of equipment, security of hardware, and drainage.

Since guidelines for general maintenance were undefined in the Handbook, we developed a plan specific to our recommended site. We first compiled a list of tasks to upkeep the playground by referring to the maintenance information provided by the CPSC, as summarized in Section 2.2.5. We then created a table including all the tasks to be accomplished for general maintenance of the recommended site — including equipment aesthetics, trash removal, and landscaping — as well as how often each task should be completed and who might carry out each task. We completed our maintenance plan by adding recommendations and further explanations of tasks to the General and the Safety Maintenance checklists.

We then took the cost of each task into consideration. To reduce the cost involved with implementing our maintenance plan, we brainstormed low-cost solutions in addition to ideas from research, and developed suggestions intended to make the use of the checklists feasible.

3.5 Creation of a Reproducible Design Process

The last objective that we completed was the creation of a reproducible design process intended to serve as a model for other low-income communities, empowering them to design their own low-cost playgrounds using community involvement. To construct this reproducible design process, we first analyzed the steps that we followed to complete our playground design in the Klong Toey slum, transforming the site-specific steps into general steps. We documented the results of these analyses in a visual and easy to translate form, the playground manual.

First, we designed the basis of the manual by deciding on its necessary content. Since the purpose of the manual is to guide any community on designing and building playgrounds, we included information from some of the methodological sections of our project, along with some of our background research to support our suggestions. In the process of planning the manual content as well as making it available for low-income communities around the world, we completed the following tasks:

- Explained the benefits of playgrounds
- Justified the use of community involvement and tires in playground design
- Recommended methods to identify a playground committee
- Explained how to identify a playground location
- Explained methods and analysis to develop a community participatory design
- Suggested methods to develop a maintenance plan
- Posted our manual on the Internet

To complete the first task, we explained how a playground could improve community life. We referred to the research on the benefits of playgrounds, which is summarized in Section 2.2.1, extracting a list of benefits. To create this list, we classified the benefits based on importance and categories concerning the benefits in terms of child development, health, safety and community pride. Finally, we listed them in a bulleted form using simple English terminology.

To complete the second task, we justified the use of community involvement in the playground design process and the use of tires as a main building material. We referred to the reasons that various researchers offered to justify using community involvement in the design process. We summarized the key points of that section and wrote them in an easy to follow form.

To complete the third task, we researched methods on selecting a playground committee to oversee the playground project. We first explained the idea of stakeholders, and then analyzed some examples of stakeholders used by other communities in the past. We used this information to create guidelines for identifying stakeholders.

The fourth task was to explain how to select an appropriate playground location. First, we referred to the criteria (located in Table 3) focusing on safety, accessibility, and convenience that we used to select our playground location, noting those that applied to playground selection in general, rather than to our specific site selection process. We then suggested that the user add more site-specific criteria for each of the three categories. In addition, we summarized the data collection and analysis in bulleted form, as well as attached Table 3 along with instructions on how to complete it.

Next, we determined a method of developing a playground design based on the procedure that we followed. We first analyzed the methods that we used to collect the data needed to develop our design. Through this analysis, we decided on approaches likely to be effective for other low-income communities to apply in designing a playground. Along with the explanation of the data collection method, we incorporated research information for playground design into guidelines outlining the interpretation of the collected data.

To complete our sixth task, we explained how to develop a maintenance plan. We analyzed the steps we followed (detailed in Section 3.4) for the development of a maintenance plan. We then summarized the steps in bulleted form and included the checklists shown in the Safety Maintenance Checklist and the General Maintenance Checklist, along with instructions on how to complete each. Lastly, we used our research on successful maintenance plans implemented by other communities and an interview with the DPF Information Service Manager to identify the financial, human, and material resources that can be used to carry out playground maintenance.

We next explained how to obtain the financial, human, and material resources needed to construct the playground.

The final step in the creation of our manual was its publication. We first printed copies of the manual, then distributed these copies via mail to several charitable organizations around the world, as well as posted the manual on the Internet to make it available more broadly.

Chapter 4. Proposed Design for a Playground in Klong Toey

In this chapter, our group will discuss the analysis of the collected data and the use of this data in the completion of the playground design process. We will explain the results of the site evaluation, the results of the participatory design process, and the development of safety and general maintenance checklists. We will also discuss the subsequent site selection, playground equipment and layout, material resources, playground implementation, and maintenance plan. Finally, we will discuss additional steps for the DPF to take to complete the implementation process, as well as our recommendations offered for consideration.

4.1 Site Analysis and Selection

In our direct observations, we visited each of the five potential locations identified by the DPF and collected information that was used to evaluate them using predetermined criteria. Drawings and descriptions of each site are shown in Figures 7-11.

Using the completed criteria checklist located in Table 3, we chose one location from the five potential locations using a two-step process. The process utilized criteria developed from the DPF input and our background research regarding site selection. In the first step, we eliminated any locations that produced unfavorable results multiple times for the criteria deemed very important. In this step, Sites 2, 4, and 5 were eliminated because both produced unfavorable results for more than one of the very important criteria. One specific criterion that these three sites produced unfavorable results for concerned the development of the site. Each of the three sites were well developed recreational facilities; the DPF has expressed a desire to develop an undeveloped site, focusing its efforts on introducing a new playground rather than improving an existing one.

For the second step of our selection process, we closely compared Sites 1 and 3 through use of the checklist of criteria. In terms of accessibility, Site 1 was the better choice, as it is located closer to a youth center and is easier to find. Site 1 again appeared to be the better choice when comparing the two sites with regard to convenience, since it is a larger area and is only inferior in its proximity to drink and snack areas, which is only a somewhat important criterion and can be addressed by encouraging area street vendors to sell to playground-goers. The two sites produced nearly identical results for the criteria concerning safety, with the only differences being that Site 1 is more visible from other areas, whereas Site 3 has more exits.

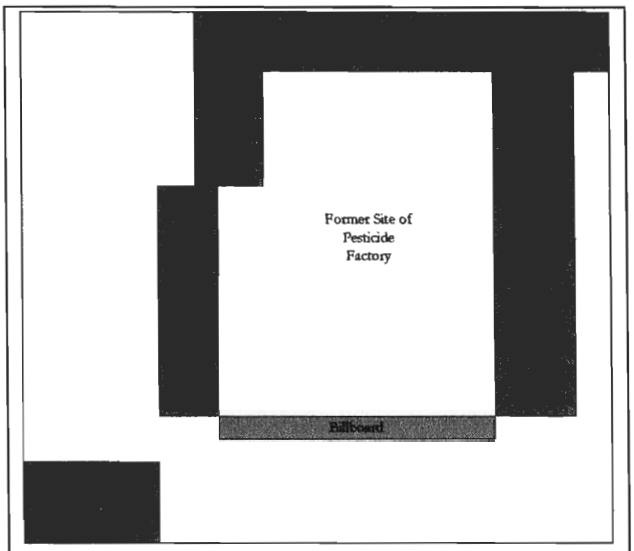


Figure 7: Site 1 (Chemical Fire Site)

Site 1:

This potential location is the site of the recent chemical fire that struck the residents of the Klong Toey slum. Its approximate dimensions are 13-15 meters wide by 22.5 meters long.

Pros:

- Bordered on all sides by living areas
- Youth center very close by

Cons:

- Not very large — approximately 315 m^2

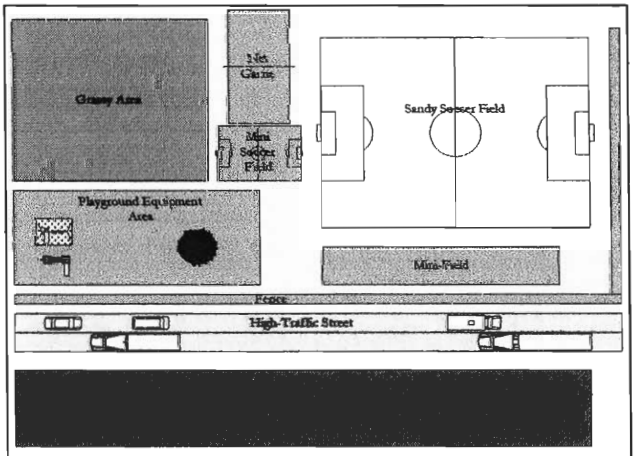


Figure 8: Site 2 (Highway Site)

Site 2:

This site is a very large area with many different opportunities for play, including a soccer field, a small asphalt field, a net-game area, playground equipment, and a grassy field.

Pros:

- Very large area

Cons:

- Close to a high-traffic street
- Existing playground equipment in the area

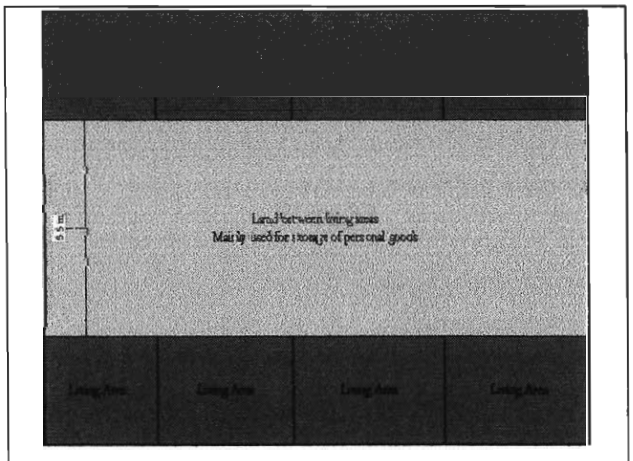


Figure 9: Site 3 (Areas between Rows of Residences)

Site 3:

This is a type of site that occurs frequently in the Klong Toey slum. These sites are located between two rows of living areas. They are approximately 5.5 meters wide with varying lengths.

Pros:

- Close to living areas
- No equipment on the site

Cons:

- Very small areas

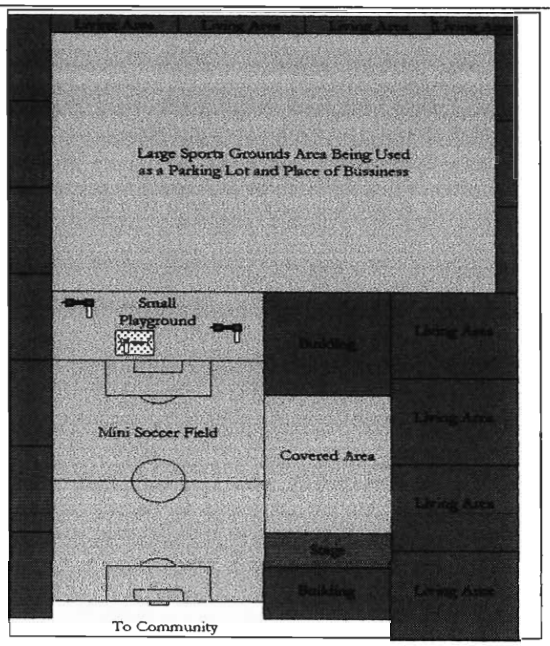


Figure 10: Site 4 (Misused Sports Ground Site)

Site 4:

This site is a large area being misused by older residents. It has a small soccer field, a small playground, a stage, and a large asphalt area intended for sports, but used as a parking lot and place of business.

Pros:

- Very large area
- Contained a shaded area with a stage

Cons:

- Existing playground equipment

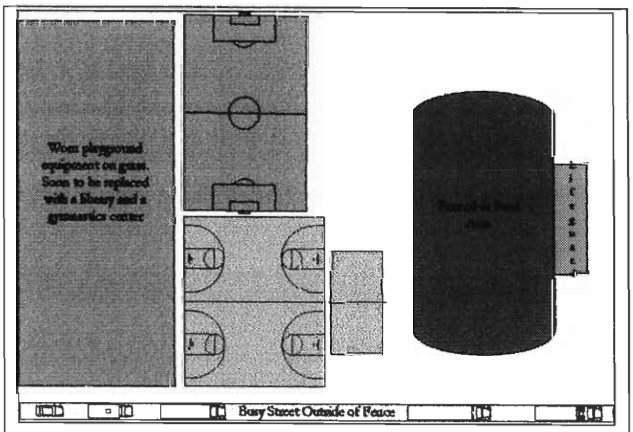


Figure 11: Site 5 (Future Library Site)

Site 5:

This site is a recreational area constructed approximately 3 years ago. It is very large, consisting of a poorly maintained playground, a soccer field, basketball courts, and a pool. A new library and gymnastics center will be added in the near future.

Pros:

- Very large open area

Cons:

- Very close to a high-traffic street
- Already a developed recreational area

Additional considerations for Site 1 included the revitalization efforts made in the area and the potential for health hazards due to chemical residue from the burned down pesticide plant. We were assured by the DPF that the residue would not be a factor, as a thorough cleanup of the area has been carried out. Through comparison of the sites using the checklist and these additional considerations, the result of the process was that Site 1 was chosen.

Table 3: Checklist of Criteria for Evaluation of Potential Locations

Criteria	Importance	Favorability (+, O, -)				
		Site 1	Site 2	Site 3	Site 4	Site 5
Accessibility:						
Proximity to nearest community	Very Important	+	O	+	O	O
Proximity to school, kindergarten, or youth center	Important	+	O	O	O	O
Proximity to public transportation†	Important	O	O	O	-	O
Proximity to other recreational facilities††	Somewhat Important	-	+	-	+	+
Popularity of area†††	Somewhat Important	+	+	-	+	O
Convenience:						
Size of open area	Very Important	O	+	-	+	+
No existing playground equipment on site/ Value added to community	Very Important	+	-	+	-	-
Proximity to public bathroom facilities	Important	-	+	-	-	-
Proximity to drink and snack areas	Somewhat Important	O	O	+	+	O
Space for parking nearby	Somewhat Important	O	+	-	+	O
Safety:						
Distance from high traffic streets	Very Important	+	-	+	+	-
Ease of supervision	Very Important	+	O	+	-	O
Proximity to medical center or first aid facility	Important	-	-	-	-	-
Proximity to secure areas (police department, government building, etc.)	Important	-	-	-	-	-
Number of exits from area	Important	-	+	O	+	+
Visibility from other places	Important	+	+	O	+	+

† A close proximity to public transportation has both positive and negative aspects. The sponsor of the project should determine whether a close proximity is favorable or unfavorable. The sponsor of our project believed that a close proximity was favorable.

†† A close proximity to other recreational facilities has both positive and negative aspects. The sponsor of the project should determine whether a close proximity is favorable or unfavorable. The sponsor of our project believed that a close proximity was favorable.

††† A popular area has both positive and negative aspects. The sponsor of the project should determine whether a popular area is favorable or unfavorable. The sponsor of our project felt that an ideal playground location would be well known to members of the community, but not so popular as to attract patrons from other areas. For this reason, the DPF believed that an area that is somewhat popular area was favorable, but that an area that was either too popular or not popular at all was unfavorable.

One limitation to our selected site is the fact that there is only one available exit to the area, which could provide a hazard in the event of an emergency requiring the evacuation of the site. We will recommend that this issue be addressed by introducing an additional exit, preferably on the opposite end as the existing exit, though this may not be a feasible solution due to the densely constructed residences bordering that area. An additional limitation for Site 1 is the size; the area is not large enough to accommodate more than six or seven pieces of equipment. However, as long as the equipment is well organized, the space should be adequate.

4.2 Playground Equipment and Layout

After selecting a site, our next step was to determine the equipment and layout of the playground. To decide which pieces of equipment to include, we utilized the results from the focus group sessions and compared them with our direct observations in order to develop a representation of the play preferences of the local children. Our group was then able to decide on the types and amount of equipment to include, referring to our background literature on playgrounds and child development to make informed decisions. We recognized the limitations imposed both by the selected site and by the availability of resources.

The first focus group session resulted in the children thinking creatively about play, producing drawings of play activities. The second session resulted in drawings of playgrounds by the children. From these pictures, we observed that organized games such as soccer were included the most, appearing 67 times out of 91 activities. We selected the most popular activities from these results, which included games, climbing, swinging, balancing, sand play, and sliding, to use as equipment cutouts in the third session. The complete list of cutouts included one 7 m x 7 m grass field, four 3 m x 3 m grass fields, one 3 m x 9.25 m grass field, a 2.5 m high swing-set, a 2.25 m high tire-swing, two 1.25 m high slides, one 1.75 m high slide, a 2.5 m high tire pyramid (see Figure 12), two 1.75 m x 1.75 m sandboxes, a seesaw (see Figure 13), and a set of 2.25 m high monkey bars. During the third session, we placed the children into groups of three. Each group then designed a playground by using the cutouts provided and a paper representation of our site. The children learned that their designs would aid in the development of a new playground in the community.

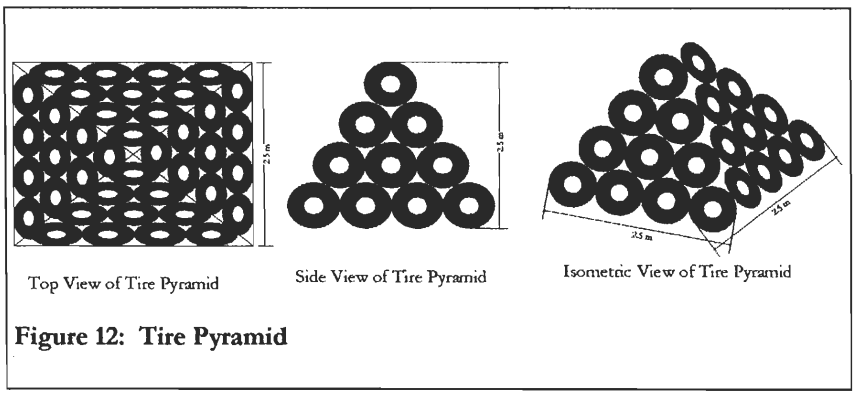


Figure 12: Tire Pyramid

From the third focus group, our group collected six group designs for a playground layout. We then counted the number of times each cutout was included; these results are located in Figure 14. Each piece was included in at least one of the six playground layouts, but certain pieces appeared more frequently than others. As can be seen from this figure, the sand box was included 10 times, making it the most popular activity. The 3 m x 9.25 m field and the 2.25 m high tire swing were the two least popular structures. The results of the various field placements were difficult to determine, as some of the groups placed the equipment on top of the fields, while others placed the fields anywhere that was bare. From these observations, we perceived that the children considered a grassy area important to include in the playground. The tire swing was included only a few times, although traditional swings were included often. This may have been due to the lack of tire swings in the community, or perhaps the children misunderstood what the cutout represented. In general, it appeared that the groups attempted to include as many pieces as possible, choosing the smaller cutouts more often than the larger ones; the two smallest cutouts were also the two most popular.

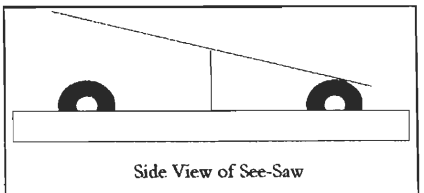


Figure 13: See-Saw

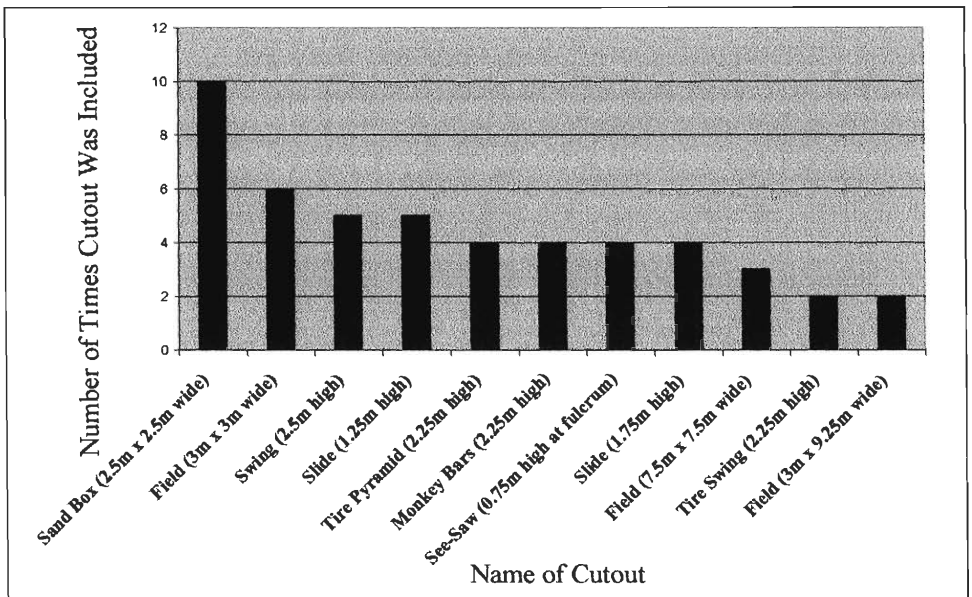


Figure 14: Popularity of Cutouts in Focus Group 3

From the information gathered in the third focus group session, our group established a list of what equipment we would include in our playground design. It should be noted that this list was limited by the selection of cutouts we provided. First on the list was a sand box, followed by a field, a traditional swing set, a slide, a tire pyramid, a set of monkey bars, a seesaw,

and a tire swing. To verify our findings, we then considered equipment popularity in local community playgrounds.

We began by looking at the various tendencies that we noted during our direct observations of three area playgrounds, which included Lumpini Park Site 1, Lumpini Park Site 2, and the DPF playground. We reviewed the results from the Playground Observation Worksheets, found in Appendix A, noting the following trends:

- The most popular play activities were climbing and balancing.
- When more than one child was present at a playground, children tended to play in groups.
- Children tended to play on the equipment in shaded areas; however, running and sports activities tended to take place the most in the open and sunny areas.
- Adults tended to sit along the perimeter of the playground where there was shade, and observe the activities of the children or talk amongst themselves.
- At the DPF playground, the wooden slide went unused.
- Children tended to avoid playing in areas near supervising adults.
- At the Lumpini Park Site 1 playground, both children and adults avoided certain areas. This could have been because a number of people were sleeping on the playground equipment in these areas.

In addition to these noticeable trends, we were also able to realize the limitations of our observations, noting the following:

- When analyzing these results, we could only use our interpretation of the literature on playgrounds and child development, since no member of our group is a trained expert in that particular field.
- Activities that the children choose depend on what is available.
- Equipment that is in the shade may be more popular than equipment that is not.
- Equipment that could function for both solitary and group play might be more popular overall.
- Play preferences may differ with the age group of the children.

We intended to compare the results from the third focus group session with the direct observations, but we were unable to do this because of the limitations listed above. We were, however, able to observe some differences between them. The greatest difference observed was the amount and types of activities that the children chose. Due to the nature of the third focus group session, the variety of activities was limited, and did not include numerous activities that took place during our direct observations.

Finally, we incorporated our background research, the results of our focus group sessions, and the information from direct observations into a playground design. The size of our selected location limited the amount of equipment that could be safely included. Although the majority of the equipment could be constructed using tires, some of the pieces — the slide and the monkey bars — could not. The inclusion of these pieces depended on the ability of the DPF

to purchase them or receive them as a donation. For this reason, we developed two final layouts, one including a slide and a set of monkey bars, and the other utilizing tires as its primary material.

Our final layouts included a variety of equipment and fields. We chose the equipment placement to reduce the total area that would need rubber surfacing, increasing the ease of confining it to one area and increasing the size of open grass areas. The white areas surrounding the structures are "safety zones," which should be covered by protective surfacing. The CPSC provides a list of suggested dimensions (usually 1.75 m from the outer edge of the equipment) for these areas in the Handbook for Public Playground Safety, which we used to develop our layouts. These safety areas are permitted to overlap to a certain extent, as can be seen in Figures 15 and 16. In addition, we separated structures with similar functions in order to enhance the developmental effects in each area. Our final layouts were not designed according to the new playground guidelines of Thailand, which were drafted in November of 2002, since we were unable to obtain these guidelines or contact the committee that drafted them.

In the first proposed layout, which is shown in Figure 15, a 7.5 m x 7.5 m grass field and six pieces of equipment were included in the final layout. The equipment included a 2.5 m high traditional swing set with two swings, a 2.5 m high tire pyramid, a pair of seesaws, a 2.5 m x 2.5 m sand box, a 1.25 m high slide, and a 2.25 m high set of monkey bars. The 1.25 m high slide and the set of monkey bars were two pieces of equipment that could not be built using tires.

In our second proposed layout, which is shown in Figure 16, we replaced the 1.25 m high slide and the 2.25 m high set of monkey bars with a tire swing, which could be constructed from used tires.

4.3 Materials and Implementation

This section describes possible options for obtaining materials and implementing the new playground. We will present information on sources for the playground materials, discuss some options for implementation, and state our recommendation for implementation.

We contacted various companies that may have playground materials for sale or donation. Our inquiries were limited by the language barrier that existed, as well as the policies of the various companies. We compiled the gathered information into Table 4 for the DPF and the other stakeholders with the hope that it would enable them to gather all the necessary materials. They can contact the various companies by sending letters requesting materials, each of which could include our Executive Summary as well as a cover letter. A sample cover letter that they can translate and modify is located in Appendix B. In addition, our group identified a way for community members to collect used tires. Not only would this provide a safe playground material, but it would also help clean up the community.

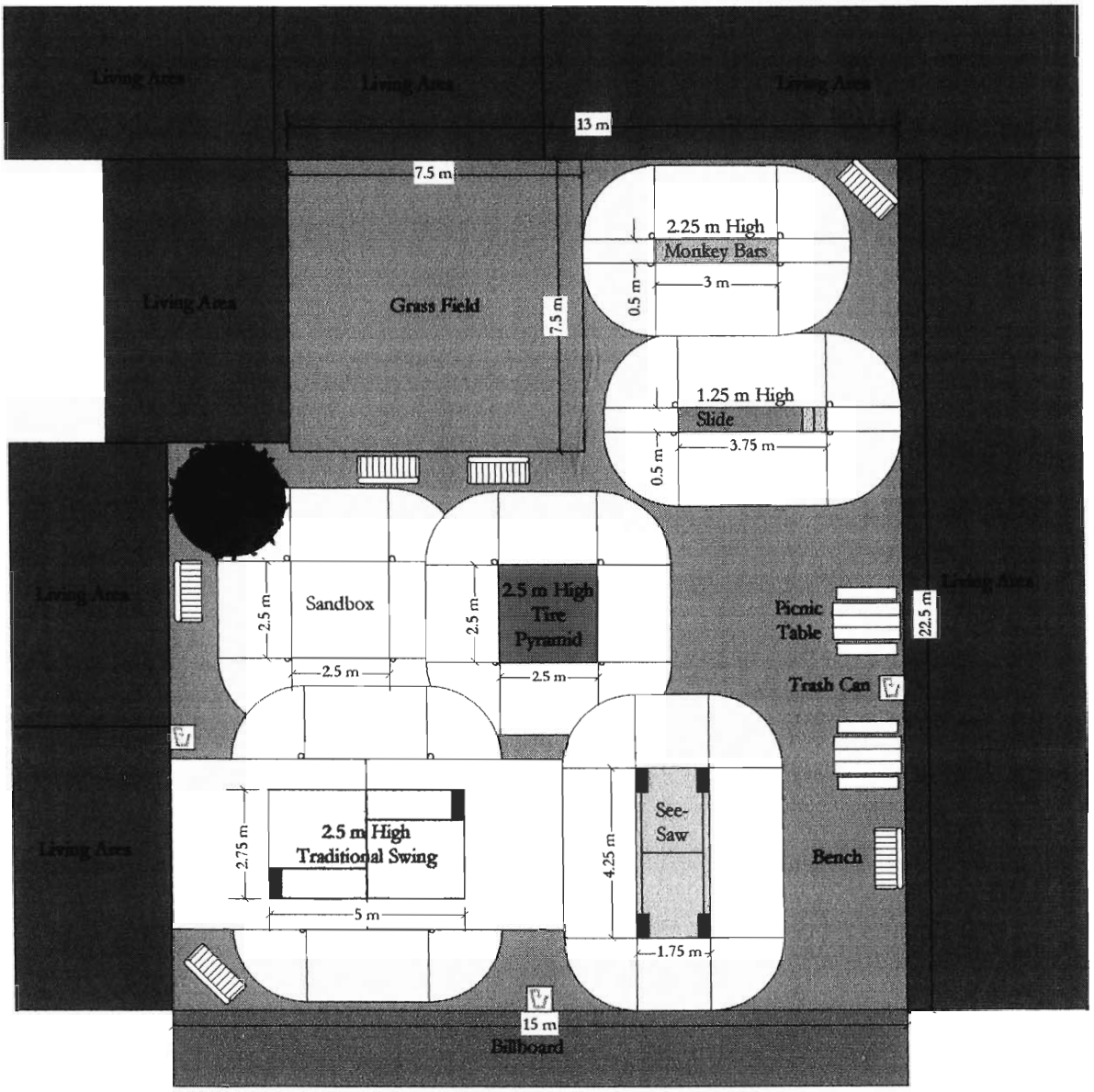


Figure 15: Playground Layout Better Satisfying Children's Play Preferences

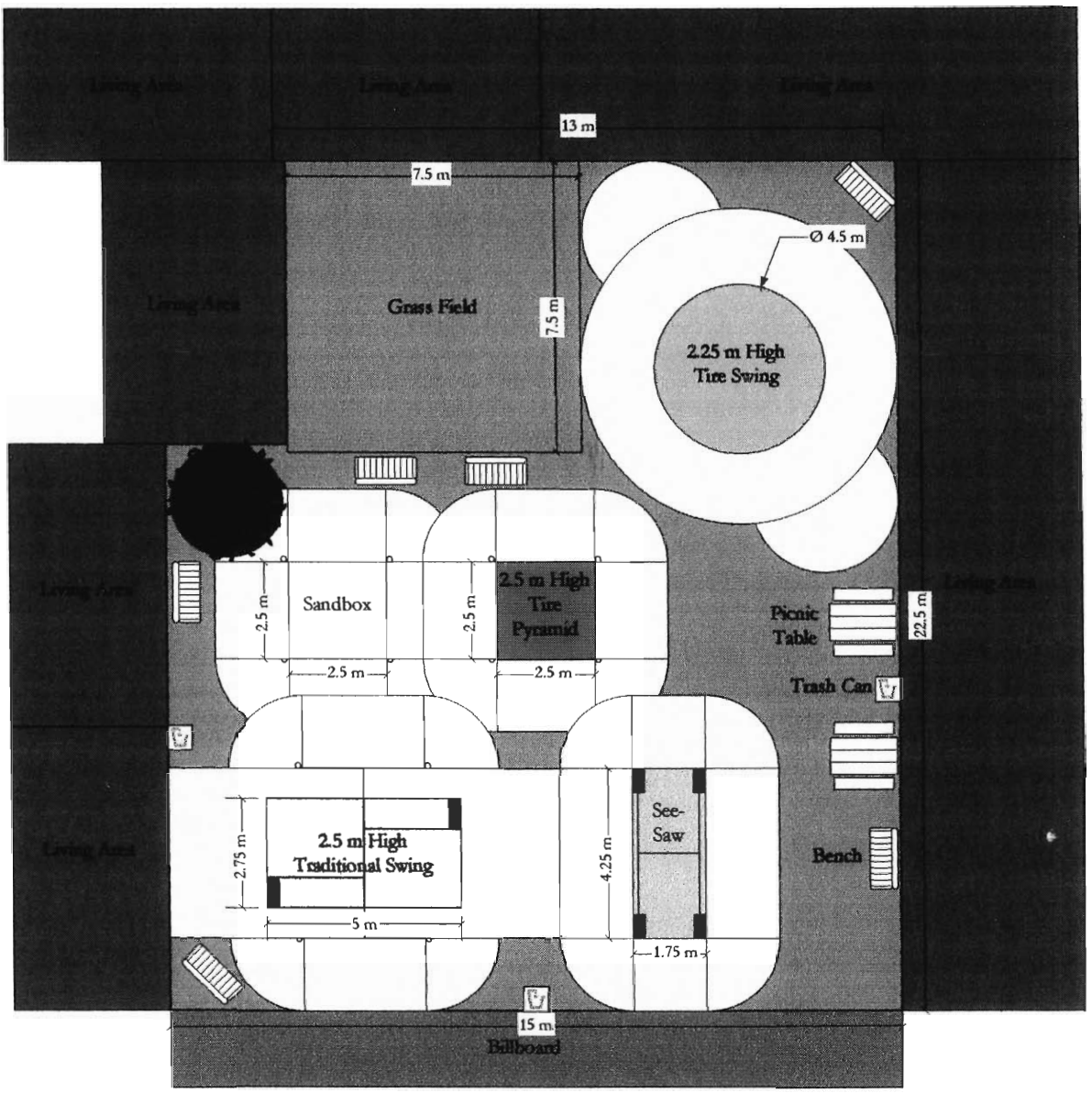


Figure 16: Playground Layout Better Using Low-Cost Material Resources

Table 4: Contact Information for Playground Materials

Company Name	Address	Information	Notes
Bridgestone Sales (Thailand) Company, Ltd.	Head Office 16th Fl., Aubdulrahim Bldg. 990 Rama IV Rd., Silom, Bangrak, Bangkok 10500	**Phone:** (02) 516 0440 **Fax:** (02) 516 8038 **Contact Individual:** Mr. Kamnuan	Is interested in donating used tires as well as cut tires for surfacing.
Goodyear (Thailand) Public Company, Ltd.	Sukhumvit 21, Klong Toey, Wattana 66 Q-House Bldg., Asoke Road Bangkok 10110	**Phone:** (02) 264 2700 **Fax:** **Contact Individual:**	A resource for obtaining used tires.
Michelin Tire Corporation (Thailand)		**Phone:** (02) 619 3240 **Fax:** (02) 619 3309 **Contact Individual:**	Encourages community to collect tires and assists with implementing playgrounds.
Lifesaver International Company, Ltd.	146-148 Mangkorn Rd., Pompab, Bangkok 10100	**Phone:** (02) 226-6000 **Fax:** (02) 225-4647 **Contact Individual:**	A resource for obtaining used tires.

Through research, our group identified two possible implementation methods for the DPF and the community. For one, Michelin Tire of Thailand sponsors a program that encourages communities to collect used tires and design playground equipment. We contacted Michelin for further information, but due to the language barrier, we were unable to obtain all the specific details of Michelin's playground program. However, we did learn that the Michelin Company encourages community members to collect used tires and to develop their own playground layouts and designs. It is our understanding that Michelin then implements the equipment and layout to ensure the safety of the structures.

The other implementation method that we identified is to have local community members construct the playground equipment. This method would require the DPF and the community to identify skilled laborers who could safely develop and build the various pieces of equipment for the playground. This approach could inspire a sense of community pride and ownership; however, it would be limited by the building skills of the local community.

The recommendation of our group is that the DPF and the community use a combination of these methods for the implementation of their playground. We recommend working with Michelin for the implementation of our proposed playground, as it will ensure the

safety of the equipment. To encourage community involvement, we recommend having the community members assist in the implementation. Any citizens with appropriate skills could assist in construction, and all community members could complete tasks that do not require skilled labor, including applying paint or sealant to the tires, benches, and trashcans. These volunteers could also be involved with the landscaping and planting of grass and trees. Although the community members would not be directly involved with building the playground structures, they would be involved with turning the playground into an area that is uniquely their own.

4.4 Maintenance Plan

After determining the layout of the playground, the next step we took was to develop a maintenance plan to keep the playground safe and clean. Our first step towards developing a maintenance plan was to determine the stakeholders in the playground. After a group brainstorming session, we had a list of seven possible stakeholders: local children, the community leader, a group of community members, parents, the local youth center, the DPF, and the Interior Minister of Thailand.

We considered the benefits that each stakeholder could gain from a well-maintained playground. The children would benefit by having a safe and fun place to spend their time. The community leader, a community group, parents of the local children, and the local youth center would all benefit by knowing that the local children would have a fun and safe place to play. The DPF would benefit as well, as it is their mission to improve the quality of life for the residents of the Klong Toey slum, particularly the children. In addition, a playground would provide children with a healthy alternative to drug use, which would be a benefit for the DPF, as well as the Interior Minister of Thailand, who has taken a strong public stance against drugs.

Through consultation with the DPF Information Service Manager, we determined the extent to which we would rely on each stakeholder in our recommended maintenance plan. The DPF Information Service Manager informed us that the most important stakeholder to involve is the community leader, as she is an activist and has been able to rally strong community support in the past. In addition, we were encouraged to include the local community members as another stakeholder because they are enthusiastic and reliable. As for our other identified stakeholders, the DPF Information Service Manager stated that the children, parents, the local youth center, and the DPF could be relied on for small maintenance tasks, but thought that the Interior Minister of Thailand should not be relied on for contributions to maintenance. The information related to stakeholders, the possible services they could provide, and how they would benefit from a well-maintained playground, is displayed in Table 5.

Table 5: Table of Stakeholder Information

Stakeholder	Possible Services Provided	How They Would Benefit
Children	Basic landscaping	Provides them with a safe and fun place to spend their time.
Community Group	Safety maintenance Security	Knowledge that they are helping protect the children.
Community Leader	Organize committee for playground maintenance	The children would have a safe place to play.
DPF	Basic landscaping and equipment upkeep Possibility to find sources for funds	A safe fun area for children to play would follow their organization's mission. It would provide the children with an alternative to drugs.
Interior Minister of Thailand	Government support for playgrounds	This playground, if well maintained, would provide the children in the area with a healthy alternative to drug use. It would only help this area though, leaving many recreational facilities still to be built.
Local Youth Center	Basic landscaping Supervision and security	The children would have a safe place to play nearby.
Parents	Basic landscaping Supervision and security	Their children would have a safe place to play.

As is suggested in the table, we concluded that although the Interior Minister of Thailand would benefit from a well-maintained playground, there would still be the need to introduce more recreational facilities that could help a number of different areas and communities, which could take his focus off playgrounds that have already been built. This information, along with the opinion of the DPF Information Service Manager, helped us conclude that the Interior Minister of Thailand was not a realistic stakeholder to rely on for our maintenance plan. As for the other six stakeholders, we recommend that they all be involved in maintenance, whether they play a major role or not.

After we identified the stakeholders that would be involved in the maintenance of the playground, the next step was to develop a maintenance plan for our design. We split the maintenance responsibilities into two categories: safety and general maintenance.

Safety Maintenance:

Our group used the research discussed in Section 2.2.5 on maintenance plans, in addition to our own experiences and observations, to compile a list of twenty-three safety-related tasks. The categories covered were *General Hazards and Equipment Deterioration*, *Specific Equipment Hazards*, and *Surrounding Area and Protective Surfacing around Equipment.* For a complete list of tasks within each category, refer to Table 6. It is our recommendation that these tasks be performed at least once every three months to ensure the continued safety of the children. In addition, we recommend that the community leader select a small group of people to take charge of the safety maintenance. We concluded that it would be wise to give this task to one group, not only because the safety checklist is specific and could be difficult to complete, but also because of the need for consistent safety evaluations.

Table 6: Safety Maintenance Checklist

ITEM TO BE CHECKED*	OK	REPAIRS REQUIRED	DATE REPAIRED
General Hazards and Equipment Deterioration			
Equipment footings are not exposed, cracked, or loose			
No broken or missing parts			
No sharp edges or unsafe protrusion (check metal corners, bolts, etc.)			
No exposed mechanisms, junctions of moving parts, or component posing possible pinch or crush points			
Clamps have no sign of slippage, cracking, or failure and the screws and/or pins holding them are secure			
The bolts, screws, nuts etc are not missing and are tightly connected.			
Connectors are not broken or cracked			
All joints are secure (check tire pyramid and monkey bar)			
The steel is not rusted, cracked, bended, warped, or broken			
All moving parts are well lubricated and not excessively worn (check tire swing, traditional swings, and see-saws)			
No splintered, cracked, or otherwise deteriorated wood (check areas where chains or rails thread through the wood and where wood contacts the ground)			
The equipment paint is not damaged, peeled or cracked.			
Specific Equipment Hazards			
All slide supports/anchors are intact and secure			
No potential clothing entanglement such as open S-hooks or protruding bolts			
There is no exposed metal on swing seats			
The seats in the see-saw have no sharp edges and are tightly connected.			
The rubber sleeves around the chains are in place and not excessively worn. (check tire pyramid and tire swing)			
Swing and tire pyramid chain is in good condition and not excessively worn, especially at connection points			
Connectors and chain have free movement			
The steel in the monkey bars has no cracks, not bent, and not rusted.			
The sandbox is securely bounded and clean (check carefully for dangerous materials such as broken glass, nails, sharp or rusted metal, etc.)			
Surrounding Area and Protective Surfacing around Equipment			
Protective surfacing material is adequately deep and has not deteriorated (check the area at the end of slides and under tire swing)			
Bordering fences around playground are in good condition, have not come loose, and do not have holes.			
No roots, rocks, or other objects are causing a tripping or injury hazard			

*** Safety inspections should be carried out a minimum of once every three months.**

General Maintenance:

Next, we compiled a general maintenance plan in the same manner used for the safety maintenance. We developed a list of twelve tasks for the community to complete to maintain the condition of the playground. The tasks included the following: watering grass and plants, picking up trash, disposing of trash, raking leaves, cleaning the sand box, cleaning equipment, washing benches, refinishing tires, painting tires, mowing grass, and removing graffiti. We then recommended how often each activity should take place and provided a timetable for the stakeholders, who can adjust the schedule as they see suitable. To determine which stakeholders might be responsible for completing each task, we compared the task with the services that each stakeholder could be expected to provide. We then took into consideration the benefits each stakeholder held in the playground and the time that we thought each stakeholder would have available. From this information, we divided responsibility for the tasks among the stakeholders. We compiled this information into Table 7, making note of any circumstances that may cause the task to vary throughout the year.

In addition to those already mentioned, more maintenance recommendations are made in the following section (Section 4.5).

Throughout the development of the maintenance plan, our group faced some limitations. One of the limitations was an incomplete knowledge of the interest and willingness of the stakeholders to be involved in our maintenance plan. Although we did consult with the DPF Information Service Manager, we cannot assume the information he provided was representative of the community opinion. Another limitation in the development of our maintenance plan was our lack of knowledge of other local maintenance issues as well as factors we may be unaware of due to language and cultural barriers.

Table 7: General Maintenance Checklist

Task	Completed How Often	Recommend Completion by:	Notes
Watering Grass/Plants	Daily	Community volunteer organized by community leader and/or community group	Varies depending on season
Picking up Litter	Daily	Children, parents, and/or youth center	
Cleaning Sandbox Area	Daily	Children, parents, and/or youth center	
Disposing of Trash	Weekly	Community group	Varies depending on method of disposing
Raking Leaves	Weekly	Local community volunteer organized by the community leader and/or community group	May vary depending on season
Cleaning Equipment	Monthly	Children, parents, and/or youth center	
Washing Benches	Monthly	Children, parents, and/or youth center	
Refinishing Tires†	Yearly	Local community group	See Section 4.5 for recommendations on the usage of funds
Painting Tires††	Yearly	Children, parents, and/or youth center	
Mowing Grass†††	As Needed	Community volunteer organized by the DPF or the community group	
Removing Graffiti	As Needed	Children, parents, and/or youth center	See Section 4.5 for recommendations on the usage of funds

† This task requires the application of sealant to tires to prevent weathering and the soiling of clothing
†† This task requires painting supplies which could be attained with the help of the Duang Prateep Foundation
††† A lawnmower is required to carryout this task, if one is unavailable see recommendations for usage of funding in Section 4.5

4.5 Summary of Recommendations for the Duang Prateep Foundation

Thus far, we have discussed site selection, development of a playground layout, material resources, implementation, and development of a maintenance plan for a playground in the Klong Toey slum. In this next section, we will review and explain our recommendations for the DPF to consider in the implementation of the proposed playground.

Location

We recommend that the DPF situate a playground at the site of the recent chemical fire. This site was chosen according to the process detailed in Section 4.1. The site is relatively small (approximately 315 m^2), but will still provide adequate space for a playground. It is bordered on three sides by community living areas and on the fourth by a billboard, which could serve as an ideal location for playground lighting.

Playground Equipment and Layout

We recommend that the DPF employ one of the two designs depicted in Figure 15 and Figure 16. The first layout better suits the play preferences of the area children, while the second offers a slightly different layout that utilizes equipment that can be built using tires, decreasing the cost and increasing the ease of implementation. In the figures, the white area is the safety zone surrounding equipment, and the colored areas would be occupied by equipment.

We recommend including seating and trashcans around the perimeter of the playground, planting several trees to provide shade to the area, and adding lighting for night play. Each of these additions would make the playground easier to supervise, as they would encourage adults to spend time in the playground, monitoring the children.

We recommend that the community members consider including a Spirit House, which we observed in several of the existing playgrounds. This traditional Thai structure would add culturally to the playground.

We recommend that public bathrooms facilities and water fountains be installed on the site. These would add convenience to the playground.

We recommend that an additional exit be added to the site, opposite from the existing exit. Multiple exits would increase the safety of the playground in the event of an emergency.

We recommend that a perimeter fence be installed around the area. This fence would provide protection from vandals, as well as limiting the number of entrances to those that could be monitored by security.

Materials and Implementation

We recommend utilizing Michelin Tire's playground program. This program would require the community members to acquire used tires, but would eliminate the need to build the actual equipment. The DPF could send out a request for assistance, adapting the cover letter found in Appendix B. Approximately seventy-five new or used tires would be required for use as equipment material.

We recommend that the community sponsor a Playground Day. This day could include painting, building signs, and planting of vegetation. This could serve to allow the community to contribute to the implementation process, which could in turn generate pride in the new playground.

We recommend that approximately 5 m^3 of sand for the sand box be obtained through donation or purchase, as well as chain, wooden beams, and steel beams for several pieces of equipment.

We recommend using shredded tires as a surfacing material. This would provide additional safety to the children. Approximately 45 m^3 of shredded tires would be required for use as surfacing material.

Maintenance Plan

We recommend that the community leader be placed in charge of a group of community members dedicated to the playground, as well as the maintenance plan that we created. This will provide a committee that can assume the responsibility of assigning maintenance tasks from the maintenance plan to the different groups of people. The responsibilities that we believe the committee should hold are as follows:

- Select the people who will perform the general maintenance tasks
- Set schedules for the completion of each task
- Check to make sure they are done

We recommend that the local children, parents, and youth center receive the majority of the responsibilities for the general maintenance plan. This would promote community involvement and pride in the playground and could help the general maintenance plan succeed.

We recommend that the community charge a modest membership fee for the playground. Membership fees could financially support improvements and upkeep at the playground. Community members might be more apt to keep the playground in good condition if they have to pay to use it.

We also recommend that the community offer an alternative to a membership fee for children unable to pay. For example, if a family cannot pay the fee, they could volunteer their time for improvements and upkeep to the playground. This plan would allow for the collection of revenue and volunteers to pay for playground security and maintenance expenses.

We recommend offering a form of security at the playground. Having someone monitoring the playground could discourage vandalism and drug trafficking. A community member could volunteer or be paid to act as a security guard. The resources to provide a security guard could come from the membership fees. Another option, which would not cost any money, is to request the local police to monitor the area to prevent criminal activity. The constant presence of police could help to keep criminals at bay. The addition of any of these forms of security could also increase the use of the playground, as parents and children alike could feel safer going there.

Other Recommendations

We recommend that the community encourage street vendors to sell in the area. These vendors would serve as a source of snacks and refreshments for the playground patrons.

We recommend that the community name the playground and include a sign indicating that the local community created this playground and identifying them as its owners. This sign would contribute to the community's sense of ownership, since they would have a constant reminder that they helped create it.

We recommend offering loose tires and sports equipment, such as badminton equipment, soccer balls, and Frisbees, that playground users could rent or borrow. This equipment could be lent out by the youth center next to the playground or a local community member. This would allow the children to participate in a variety of sports activities.

In conclusion to this portion of our project, we hope that the playground design and recommendations we made for the Klong Toey slum will one day be implemented and, in doing so, will make a small difference in the lives of the children.

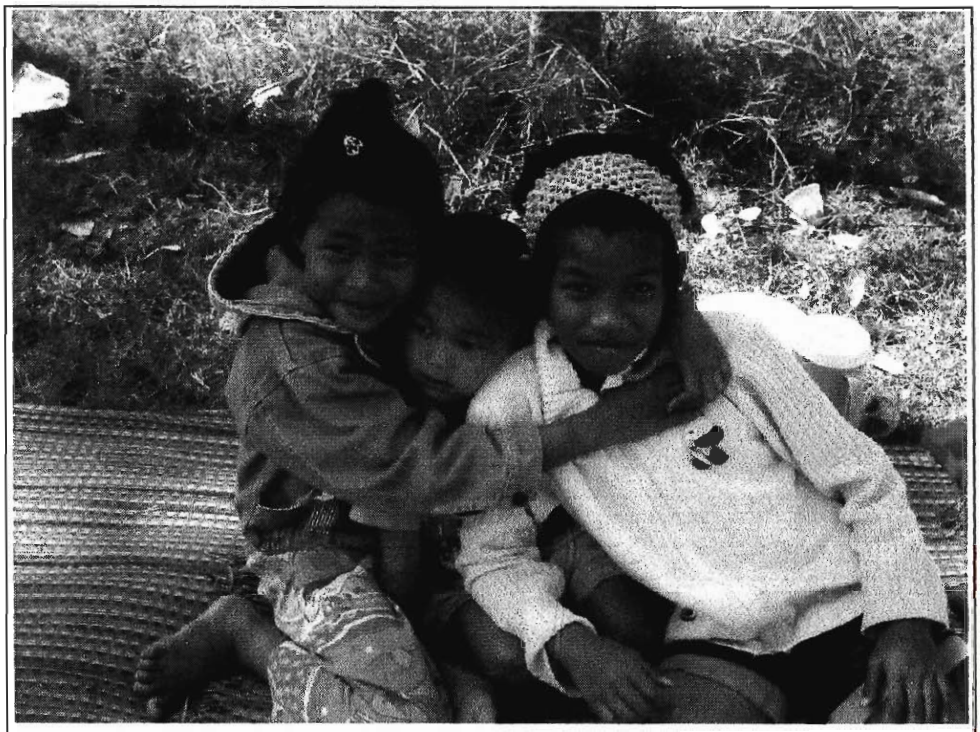


Figure 17: Children of the Klong Toey Slum

Chapter 5. Low-Cost Playgrounds: A Manual for Design through Community Involvement

The secondary goal of our project was to create a manual, copies of which were distributed to low-income communities around the world that we intended to help in designing and building their own low-cost playgrounds. In addition, the manual was posted on the DPF's website. The manual contains guidelines for designing a playground. We organized the manual similarly to the process we followed to complete our own project, placing the steps in chronological order.

LOW-COST COMMUNITY PLAYGROUNDS:
A Manual for Design through Community Involvement





by

Oljeta Bida

Luke Boucher

Matthew Byrne

Jessica Sexton

Duang Prateep Foundation

WPI

Table of Contents

Introduction

This manual was created as part of a project completed by four students from Worcester Polytechnic Institute located in U.S.A. in cooperation with the Duang Prateep Foundation in Bangkok, Thailand. This project was intended to assist a low-income Bangkok community in designing their own low-cost playground, and this manual intends to encourage and guide other communities in a similar process. This manual provides general steps that apply to all playgrounds and also points out areas where each community will need to make changes to fit the steps to their own needs.

To promote interest and ownership in the playground, the steps outlined are suggested to be completed by the community. In addition, used tires are encouraged as the primary building material to keep the playground cost as low as possible. The hope is that this manual will help in the development of playgrounds and will make a small improvement in the lives of children around the world.

Note: The examples of design layouts, material, evaluation tables and inspection checklists suggested to be used by your community in this manual, are written according to the U.S. Consumer Product Safety Commission's (U.S. CPSC) Handbook for Public Playground Safety. We suggest that before making any additions, changes, or even deciding on your playground design and implementation, consult with your nation's playground safety regulations or if they do not exist, consult with the U.S. CPSC's Handbook.

Why a Playground?

Playgrounds…

- Promote healthy growth and development
- Provide children with opportunities to express themselves
- Allow children more familiar with reality
- Allow children connect experiences with the physical world
- Allow children to observe and overcome obstacles
- Help children develop communication and team work skills
- Awaken children's imaginations and teach them about being creative
- Encourage physical activity
- Contribute to the landscape of the community
- Generate an inviting space for both parents and children alike
- Promote interactive relationships between people and their environments
- If properly maintained, provide a safe alternative to risky activities such as drug use.

Why Used Tires?

Tires…

- Help to recycle
- Are inexpensive and easy to obtain
- Are easy to decorate.
- Are easy and cheap to maintain
- Can be used to build a variety of equipment.
- Provide safer protective surfaces as seen from the table below:

Critical Heights (in feet) of Tested Materials

(Brown, Ann, and Committee. Handbook for Public Playground Safety. Washington, D.C.: U.S. Consumer Product Safety Commission, 2002. < http://www.cpsc.gov >)

MATERIAL	Uncompressed Depth			Compressed Depth
	6 inch	9 inch	12 inch	9 inch
Wood Chips	7	10	11	10
Double Shredded Bark Mulch	6	10	11	7
Engineered Wood Fibers	6	7	>12	6
Fine Sand	5	5	9	5
Coarse Sand	5	5	6	4
Fine Gravel	6	7	10	6
Medium Gravel	5	5	6	5
Shredded Tires*	**10-12**	**N/A**	**N/A**	**N/A**

* This data is from tests conducted by independent testing laboratories on a 6 inch depth of uncompressed shredded tire samples produced by four manufacturers. The tests are reported critical heights, which varied from 10 feet to greater than 12 feet. It is recommended that persons seeking to install shredded tires as a protective surface request test data from the supplier showing the critical height of the material when it was tested in accordance with ASTM F1292.

How to Design and Build a Playground

- ## The Use of a Participatory Design Process

  When designing a playground, it is important to consider the future stakeholders, including both children and adults. The involvement of community members in construction, as well as in the design process, creates a sense of pride in the finished project. The area is perceived as belonging to the community, with each community member feeling a sense of responsibility. For this reason, the users are more likely to maintain the playground and actively protect it from vandalism.

- ## Five Steps to Playground Design

  - **Step 1:** Identifying a Playground Planning Team
  - **Step 2**: Evaluating Possible Locations
  - **Step 3**: Developing a Playground Layout
  - **Step 4:** Obtaining Resources
  - **Step 5:** Creating a Maintenance Plan

Step 1: Identifying a Playground Planning Team

The playground planning team should be:

- A representation of all the various stakeholders and interested parties.
- Responsible for identifying other stakeholders and how they would benefit from a new playground.
- Responsible for supervising the development of the playground project.
- Responsible for assigning tasks to the people working on the project.

Who are the stakeholders and what do they do?

- The stakeholders are groups of people or individuals invested in the playground project. They can be …
    - A school
    - Parents
    - Children
    - Community leaders
    - A foundation
    - Playground or tire manufacturing companies
- The stakeholders contribute to the project by…
    - Organizing fundraising activities
    - Providing building materials
    - Helping in the design process
    - Maintaining the playground

Step 2: Evaluating Possible Locations

- A location for the playground should be **safe, accessible and convenient.** Ask the following types of questions for each one of the sites being evaluated:*

  - **Is the location safe?**

    Is it far from high traffic streets?
    Is it easy to supervise?
    Is it near any medical centers or first aid facilities?
    Is it near secure areas such as police department or government buildings?
    Is there more than one exit from the area?
    Is it visible from other sites?

  - **Is the location easy to access?**

    Is it near the living areas?
    Is it near any school, kindergarten, or youth center?
    Is it near public transportation?
    Is it near any other recreational facility?
    Is the area popular and easy to find?

  - **Is the location convenient?**

    Is it a large open area?
    Are there any public bathroom facilities nearby?
    Are there drinks and snack areas nearby?
    Is there space for parking nearby?

* Note: This list is a general example. Add more criteria if needed and ignore the criteria that do not apply to your community.

- Determine if each criteria has **a Positive (+), Negative (-),** or **Neutral (o)** influence on your decision.
- Determine how important is each criteria to your community. Assign the levels: **Very important, Important,** and **Somewhat Important** to each of the criteria.
- Place the criteria, their level of the importance, and type of influence on a table for comparing all the possible sites. An example of this type of table is shown below:
- Determine which site has the most positive influences for the very important and important criteria.

Example of Completed Site Evaluation Table

Criteria	Importance	Site 1	Site 2	Site 3
Safety:				
Distance from high traffic streets	Very Important	O	-	-
Ease of supervision	Very Important	+	+	-
Proximity to secure areas (police department, government building, etc.)	Important	O	O	+
Number of exits from area	Important	-	-	O
Accessibility:				
Proximity to nearest community	Very Important	-	+	O
Proximity to school, kindergarten, or youth center	Important	+	-	+
Proximity to public transportation	Important	O	O	-
Convenience:				
Size of open area	Very Important	-	+	O
Proximity to public bathroom facilities	Important	-	+	-

Step 3: Developing a Playground Layout

Why should children be involved in the design process?

This step involves working with the children to create a playground layout. This type of design method has been successfully used by other designers in the past for the following reasons:

- It generates excitement among the children for the new playground
- The design ideas from the children can be very creative
- It assures that the children will like, use, and be proud of the new built playground.
- It generates a feeling of ownership, which prevents vandalism once the playground is built.
- It encourages team work and decision making among the children

How to involve children in the design process?

- Start the process by selecting a group of children to represent the users of the playground and use them to do all the following activities:*
- **First Session: Fantasy Playground and Play Activities**
  - Purpose: This session is intended to get the children thinking creatively about play.
  - Instructions

    During the Session:

    - Ask the children to draw a place they like to play. Make sure to use the word "*place to play*" instead of "*playground*".
    - Ask children to work individually and be as creative as possible.
    - Ask the children to say their favorite play activities.

* Suggestion: Select approximately 20 children - both girls and boys - ranging from 5-12 year olds in age, living in the area around the playground location.

- List the activities on the board and have the children vote for their favorite.

After the Session:

- Record the ranked activities and collect the drawings

- **Second Session: Structured Playground**
  - Purpose: This session is intended to get ideas about structured playgrounds.
  - Instructions

During the Session:

- Ask the children to draw a playground.
- Collect the drawings.

After the Session:

- Record the occurrence of different play activities.
- Use the information from the task above to determine the types of the structure cutouts to include in the third session

- **Third Session: Playground Layout**
  - Purpose: This session is intended to let the children develop a playground layout.
  - Instructions

Before the Session:

- Prepare a scaled paper area to represent the potential playground location. Be sure to prepare one paper for each group of 3-6 children.
- Cut equipment shapes* in scale with the real sizes and in different colors to represent playground equipment.

---

* A safety zone is the area around a piece of equipment that should be covered with protective surfacing to minimize injuries. The shapes of the equipment and the size of safety zones surrounding each of them are taken from the U..S. CPSC Handbook for Public Playground Safety and are attached in the Appendix. To develop safety zones for other pieces of equipment, refer to your nation's safety regulations or the U.S. CPSC Handbook, which can be located at the web address listed in the Additional Resources section.

- Draw the equipment configurations on each of the cutouts representing them.

During the Session:

- Separate the children into groups of equal size. It is suggested to mix the different genders, but keep the age the same within a group.
- Ask the children to work together and design a playground layout.
- Distribute glue sticks and the paper cutouts asking the children to place the equipment in the decided layout.
- Ask them not to have the equipment cutouts overlap each other.
- Collect the design layouts at the end.

After the Session:

- Count the occurrence of each piece of equipment in order to determine the most popular structures.

Design the playground layout.

These tasks can be completed by the playground planning team in your community.

- Start by putting together the playground layout based only on the children's preferences.
- Analyze the created layout by making the necessary additions and eliminations. In addition to the committee decisions,
  - Consider…
    - The distance between equipment in terms of safety zones, which in some cases should not overlap.
    - The size of the selected site.

        - The cost of implementing various types of equipment. For example, equipment made out of tires can be built by the community, whereas the other equipment has to be purchased or donated.
        - Arranging the equipment such that structures promoting similar activities are not next to each other. For example, do not place traditional swings and a tire swing next to each other, since they both promote swinging.
    - Add structures such as…
        - Benches for parents to supervise and children to rest.
        - Trashcans to keep the area clean.
        - Lighting for night and evening use of the playground.
        - Bathroom facilities and water fountains if not already existing nearby.
        - Trees, shrubs, and other plantings for aesthetics and shade.

- **Fourth Session: Playground Layout Approval**
    - Purpose: In order to finalize a playground layout, bring it back to the children that were involved in the process, asking for approval.
    - Instructions
        - Show the playground layout to the same children that worked on the previous sessions and discuss with them and record their suggestions and comments.

    After the session:

        - Review the suggestions and make the changes if they are reasonable.

The final playground layout is a result of the **children's preferences from the three sessions, playground planning team decisions, safety, cost, aesthetics** and **convenience** considerations as suggested.

Step 4: Obtaining Resources

What is needed?

- Begin by determining what is needed to build the playground.
- Separate these needs into categories such as material, financial, and human resources.
- Brainstorm ways to obtain these resources. Below are examples for each category.

Suggestions for obtaining what is needed:

- **Financial Resources can be gained by…**
  - Donations from…
    - Tire Companies
    - Playground Companies
    - Charitable Foundations
  - Fund Raising from…
    - Sales of Merchandise
    - Auctions
    - Membership Fees
- **Human Resources can be gained through…**
  - Volunteers from the Stakeholders
  - Paid Employees
  - Government or City Officials
- **Material Resources can be gained from…**
  - Local Community
  - Tire Companies
  - Rubber Manufacturers
  - Donation or Purchase

Step 5: Creating a Maintenance Plan

- Make an inventory of the structures existing in the playground
- Determine what needs to be checked and how often for safety and general upkeep purposes based on your nation's playground safety regulations or the U.S. Consumer Product Safety Commission Handbook for Public Playground Safety.
- Assign inspection and repairing responsibilities to the stakeholders
- Organize the above information into two checklists: one for safety and one for general maintenance. On the next pages, there are examples of the two checklists mentioned.

While using the examples of the checklists, consider…

- Performing the **safety inspection at least once every three months**.
- Occasionally, observing* the playground conditions and the use of each of the equipment.
- Using this information to determine the frequency that each of the tasks needs to be completed.
- Modifying the general maintenance checklist timeline

* The observation or the quick inspection can be done by the playground security. The purpose of this observation is to determine how often each piece of equipment needs to be checked and repaired between two inspections.

Example of Safety Maintenance Checklist*

ITEM TO BE CHECKED	OK	REPAIRS REQUIRED
General Hazards and Equipment Deterioration		
Equipment footings are not exposed, cracked, or loose		
No sharp edges or unsafe protrusion (check metal corners, bolts, etc.)		
No exposed mechanisms, junctions of moving parts, or component posing possible pinch or crush points		
Clamps have no sign of slippage, cracking, or failure and the screws and/or pins holding them are secure		
The bolts, screws, nuts etc are not missing and are tightly connected.		
Connectors are not broken or cracked		
All joints are secure (check tire pyramid and monkey bar)		
The steel is not rusted, cracked, bended, warped, or broken		
All moving parts are well lubricated and not excessively worn (check tire swing, traditional swings, and see-saws)		
No splintered, cracked, or otherwise deteriorated wood (check areas where chains or rails thread through the wood and where contacts the ground)		
The equipment paint is not damaged, peeled or cracked.		
Specific Equipment Hazards		
All slide supports/anchors are intact and secure		
No potential clothing entanglement such as open S-hooks or protruding bolts		
There is no exposed metal on swing seats		
The seats in the see-saw have no sharp edges and tightly connected.		
The rubber sleeves around the chains are in place and not excessively worn.		
Connectors and chain have free movement		
The sandbox is securely bounded and clean (check carefully for dangerous materials such as broken glass, nails, sharp or rusted metal etc)		
Surrounding Area and Protective Surfacing around Equipment		
Protective surfacing material is adequately deep and have not deteriorated (check the area at the end of slides and under tire swing)		
Bordering fences around playground is in good condition and has not come loose or does not have holes.		
No roots, rocks, or other objects are causing a tripping or injury hazard		

* Modify the checklist to be appropriate for your playground and consider checking each item at least once every three months.

Example of General Maintenance Checklist*

Task	Completed How Often	Recommend Completion by:	Notes
Watering Grass/Plants	Daily	Community volunteer organized by community leader and/or community group	Varies depending on season
Picking up Litter	Daily	Children, parents, and/or youth center	
Cleaning Sandbox Area	Daily	Children, parents, and/or youth center	
Disposing of Trash	Weekly	Community group	Varies depending on method of disposing
Raking Leaves	Weekly	Local community volunteer organized by the community leader and/or community group	May vary depending on season
Cleaning Equipment	Monthly	Children, parents, and/or youth center	
Washing Benches	Monthly	Children, parents, and/or youth center	
Refinishing Tires**	Yearly	Local community group	
Painting Tires	Yearly	Children, parents, and/or youth center	
Mowing Grass	As Needed	Community volunteer or the community team	
Removing Graffiti	As Needed	Children, parents, and/or youth center	

* Consider changing the task completion time frame based on the playground needs.

** This process involves applying sealant to the tires for protection.

Additional Resources

Brown, Ann, and Committee. Handbook for Public Playground Safety. Washington, D.C.: U.S. Consumer Product Safety Commission, 2002. < http://www.cpsc.gov >

"Cleaning and Maintenance Guide." Playground Concept Design and Manufacturing, Inc.. 2002. <http://www.playgroundconcepts.com/DLS/Playground%20Cleaning%20and%20Maintenance.pdf> (5 February 2003).

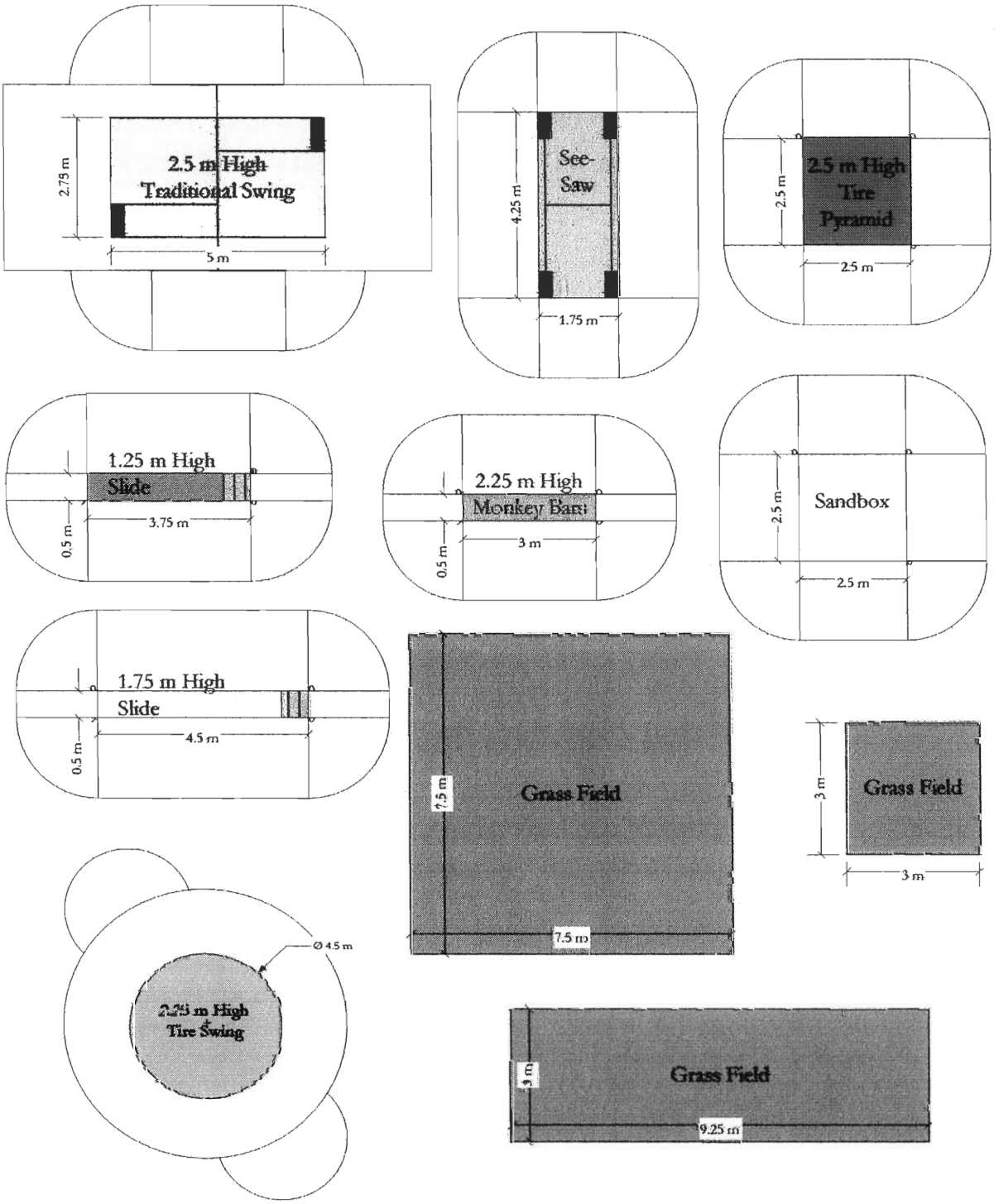
Eriksen, Aase. Playground Design: Outdoor Environments for Learning and Development. New York: Van Nostrand Reinhold Company, 1985.

"Lower Direct Medical Costs Associated with Physical Activity." Center for Disease Control. 2002. <http://www.cdc.gov/nccdphp/dnpa/press/archive/lower_cost.htm> (10 December 2002).

"Maintenance Checklist." Department of Physical Education and Leisure Management: Colorado State University. 2000. <http://pelm.colstate.edu/courses/pelm3226/PELM%203226-PERIODIC%20MAINTENANCE%20CHECKLIST.doc> (5 February 2003).

Noren-Bjorn, Eva. The Impossible Playground. West Point, New York: Leisure Press, 1982.

Appendix: Playground Structure Cutouts



Scale: 1 cm=2.5 m

Bibliography

"A window on the slums…." Informational Brochure. Duang Prateep Foundation.

Arnold, Sherri. "Child Playgrounds." University of Nebraska-Lincoln: Case Study. 1996. <http://www.unl.edu/casestudy/456/sherri.htm> (30 October 2002).

Assavanonda, Anjira. "Bid to Better Playground Safety." Bangkok Post, 15 Aug 2002. <http://scoop.bangkokpost.co.th/bkkpost/2002/aug2002/bp20020815/news/15Aug2002_news20.html> (10 November 2002).

Assavanonda, Anjira. "Guidelines aim to avoid more deaths." Bangkok Post, 6 Nov 2002. <http://search.bangkokpost.co.th/bkkpost/2002/nov2002/bp20021106/news/06nov2002_news26.html> (14 November 2002).

Assavanonda, Anjira. "Slum children state their needs." Bangkok Post, 10 July 2002. <http://search.bangkokpost.co.th/bkkpost/2000/bp2000_jul/bp20000710/100700_news05.html> (13 November 2002).

Brown, Ann, and Committee. Handbook for Public Playground Safety. Washington, D.C.: U.S. Consumer Product Safety Commission, 2002.

Burke, Joanne. New Directions: Women of Thailand. Video. New York: Film and Video Workshop, Inc., 2000.

"City of Walla-Walla Council Meeting Minutes." City of Walla Walla. 2002. <http://www.ci.walla-walla.wa.us/departments/support-services/cc-council-min2.cfm?thisid=34> (5 February 2003).

"Cleaning and Maintenance Guide." Playground Concept Design and Manufacturing, Inc.. 2002. <http://www.playgroundconcepts.com/DLS/Playground%20Cleaning%20and%20Maintenance.pdf> (5 February 2003).

Cooper, Robert, and Nanthapa Cooper. Culture Shock! Thailand. Portland, OR: Graphics Arts Center Publishing Company, 2000.

DeMagistris, Michael, and Matthew Johnson. Interactive Qualifying Project: Children's Play Environments. Worcester, MA: Worcester Polytechnic Institute, 1996.

Eriksen, Aase. Playground Design: Outdoor Environments for Learning and Development. New York: Van Nostrand Reinhold Company, 1985.

"Gateway to Children's Environmental Health, The." World Health Organization. 11 October 2001. <http://www.who.int/peh/ceh/index.htm> (15 November 2002).

Gibbs, Anita. "Social Research Update." 1997. <http://www.soc.surrey.ac.uk/sru/SRU19.html> (22 January 2003).

Hata, Tatsuya. Bangkok in the Balance. Bangkok: Duang Prateep Foundation, 1996.

"Inside Tommy's Kids Castle." Kiwanis: Serving the Children of the World. 2000. <http://www.kiwanis.org/magazine/02march/inside2.html> (5 February 2003).

Khun John. "Duang Prateep Foundation, Klong Toey Slum Bangkok: Playground of the Duang Prateep Kindergarten." Thai Life, January 2002. <http://www.thailife.de/tl_articles/dpfjan2002/gallery/gallery-e/gallery_dpfjan2002_e-6.htm> (27 October 2002).

"Lower Direct Medical Costs Associated with Physical Activity." Center for Disease Control. 2002. <http://www.cdc.gov/nccdphp/dnpa/press/archive/lower_cost.htm> (10 December 2002).

"Maintenance Checklist." Department of Physical Education and Leisure Management: Columbus State University. 2000. <http://pelm.colstate.edu/courses/pelm3226/PELM%203226-PERIODIC%20MAINTENANCE%20CHECKLIST.doc> (5 February 2003).

"Maintenance Day at the Super Playground." Highland Park Community Corporation. 2002-2003. <http://www.highlandparkpa.com/20020914-superplayground.htm> (5 February 2003).

Maxwell, Joseph A. Qualitative Research Design: An Interactive Approach. Thousand Oaks, CA: SAGE Publications Inc., 1996.

Noren-Bjorn, Eva. The Impossible Playground. West Point, New York: Leisure Press, 1982.

O'Reilly, James, and Larry Habegger. Travelers' Tales Thailand: True Stories. San Francisco: Travelers' Tales Inc., 2002.

"Origins of the DPF." Duang Prateep Foundation. 2002. <http://www.dpf.or.th> (24 October 2002).

"Playground Safety Week." University of Northern Iowa. n.d. <http://www.uni.edu/playground/safety_week.html> (5 February 2003).

"Poverty Matters." World Bank Organization. 2001. <http://www.worldbank.org/html/extdr/gc/environment/environment.htm> (10 November 2002).

"Reacting to Playground Safety Concerns – How Can Agencies Determine Their Own Needs and Applications." Illinois Periodicals Online. 1989. <http://www.lib.niu.edu/ipo/ip890712.html> (5 February 2003).

Singleton, Royce A. Jr., and Bruce C. Straits. Approaches to Social Research. 3rd ed. New York: Oxford University Press, 1999.

Stover, James. "Fighting for the children." Bangkok Post, 29 December 2002.

Sukrung, Karnjariya. "Lost innocence." Bangkok Post, 1 March 2000. <http://search.bangkokpost.co.th/bkkpost/2000/bp2000_mar/bp20000301/010300_outlook01.html> (9 November 2002).

Sutro, Martha. "Playgrounds by Design: Newark Students Expand Their Horizons as Part of a TPL Design Team." Land & People 14, no. 2 (2002): 15-19.

Tinsworth, Deborah, and Joyce E. McDonald. Special Study: Injuries and Deaths Associated with Children's Playground Equipment. Washington D.C.: U.S. Consumer Product Safety Commission, 2001.

"Wan Nor to tackle drugs." Bangkok Post, 14 January 2003.

Appendix A: Playground Observation Worksheets

Observers:
Oljeta Bida
Jessica Sexton

Date:
Friday, January 24, 2003

Location:
Lumpini Park Playground Site 1
Bangkok, Thailand

Observation Data Table:

TIME	EQUIPMENT POPULARITY	OBSERVATIONS/NOTES
10:00 a.m.	Pushing/pulling- 1 Swinging- 1 Climbing- 1	There was one child on the playground and all of his play activities were brief. The boy seemed to be with the maintenance worker present and followed her around.
10:15 a.m.	Swinging- 3	Three teenage children came into the playground and sat on the swings. They stay for about 10 minutes.
10:30 a.m.	No play activity.	The fountain in the pond was shut off.
10:45 a.m.	No play activity.	The maintenance women left. Some of the adults present began bathing in the pond. Various adults walk in and out of the playground. Across the street, two girls were playing badminton in the fields.
11:00 a.m.	No play activity.	The playground is now completely shaded.
11:15 a.m.	Climbing- 3 Sliding- 1 Running- 1 Exploring/seeking- 1 Balancing- 1	A child and an adult came into the playground. The child played for 12 minutes. The adult went on the see-saws with the child.
11:30 a.m.	No play activity.	Another maintenance person comes to the playground and sweeps the grounds. Groups of adults come into the playground and sit and eat lunch and sleep.
11:45 a.m.	No play activity.	Adults continue to come into the playground, eating and sleeping.
12:00 p.m.	Swinging- 1 Pushing/pulling- 1 Balancing- 1	A young girl and adult male come into the playground. More adults entering the playground.
12:15 p.m.	No play activity.	The adult male picks up the young girl and takes her out of the playground. There is a group of adults kicking a ball on the street outside the playground.
12:30 p.m.	Swinging- 3	Teenage students enter the playground and swing briefly. The fountain in the pond is turned back on. More adults enter the playground with large pieces of cardboard and lay down to sleep.
12:45 p.m.	No play activity.	There was now about 30 adults sitting and sleeping in the playground. The entire area is shaded.
1:00 p.m.	No play activity.	The activity of the adults is unchanged.

1:15 p.m.	No play activity.	Most of the adults on the playground have finished eating and are now sleeping and talking amongst themselves.
1:30 p.m.	No play activity.	The activity of the adults is unchanged. Some of the adults present focused there attention on us and are watching our activity.
1:45 p.m.	No play activity.	The activity of the adults is unchanged.
2:00 p.m.	No play activity.	One adult male is reading a pornographic magazine and holding up the pictures.
2:15 p.m.	No play activity.	The activity of the adults is unchanged.
2:30 p.m.	No play activity.	A group of men who have been at the playground for most of the day talk amongst themselves and then approach us. The observation is ended early for safety reasons.
2:45 p.m.	No data available.	No data available.
3:00 p.m.	No data available.	No data available.
3:15 p.m.	No data available.	No data available.
3:30 p.m.	No data available.	No data available.
3:45 p.m.	No data available.	No data available.
4:00 p.m.	No data available.	No data available.

Additional Notes:

Upon our arrival at the playground, we observed 9 people sleeping or near the various pieces of playground equipment. There was more shade in the playground than in the rest of the park. There was adequate sitting area in the playground. This area was popular amongst the adults. Around noon, there was a movement of adults next door to the youth center, where they got food. We moved our observation location 4 times for safety reasons, once even moving across the street. After leaving the playground, we took an unplanned walk through the park and located another playground, but there were no children present. The children which we did observe were with their families and tended to be in shaded areas near the various ponds.

Observers:
Oljeta Bida
Jessica Sexton

Date:
Monday, January 27, 2003

Location:
DPF Playground
Bangkok, Thailand

Observation Data Table:

TIME	EQUIPMENT POPULARITY	OBSERVATIONS/NOTES
10:00 a.m.	Solitary play- 1 Swinging- 3 Pushing/pulling- 10 Sand Play- 8 Climbing- 13 Arranging- 5 Observing (inter-group)- 4 Risk taking- 3 Sliding- 2	When we arrived, half of the children were running around playing and the other half of the group was being led in physical exercise by a supervisor. The entire play area was shaded by trees. Some of the play equipment appeared unstable. The equipment wobbled and was not secured to the ground.
10:15 a.m.	Solitary play- 1 Pushing/pulling- 1	The children went inside for class and the only child on the playground had left class because he was crying.
10:30 a.m.	No play activity	The children were in class. The left side of the playground was still in the shade, but the right side is uncovered.
10:45 a.m.	No play activity	The children were in class.
11:00 a.m.	No play activity	The children were in class.
11:15 a.m.	Solitary play- 2 Sand play- 1 Sitting/passive activity- 1 Cooperative games- 4 Pushing/pulling- 6 Group fantasy play- 2 Climbing- 4 Arranging- 4	The children were arranging the loose tires and placing them on various pieces of equipment. The children were physically aggressive, hitting and kicking each other. The playground was supervised by the teachers, but they did not interfere with the children's play.
11:30 a.m.	Climbing- 14 Sand play- 6 Running- 5 Cooperative games- 5 Risk taking- 10 Ball play- 6 Sliding- 2 Fantasy play- 10	The children could be classified into two groups- those who participated in one type of play and those that ran around from activity to activity.
11:45 a.m.	Balancing- 6 Running- 3 Cooperative games- 5 Dancing- 1 Group exploring- 2 Sand play- 4	A group of children began sliding down the see-saws. A piece of climbing equipment came apart as the children were playing, but they continued to play with the broken piece, using it in a new manner. The children were being called back in school at this time.
12:00 p.m.	No play activity.	The children were inside at lunch.
12:15 p.m.	No play activity	The children were having nap time.

12:30 p.m.	No play activity	The children were having nap time.
12:45 p.m.	No play activity	The children were having nap time.
1:00 p.m.	No play activity	The children were having nap time.
1:15 p.m.	No play activity	The children were having nap time.
1:30 p.m.	No play activity	The children were having nap time.
1:45 p.m.	No play activity	The children were having nap time.
2:00 p.m.	No play activity	The children were having nap time.
2:15 p.m.	No play activity	The children were having nap time.
2:30 p.m.	No play activity	The children were getting ready for school to be over as adults began to arrive. The adults waited for the children in the sitting area in the right hand side of the playground.
2:45 p.m.	Pushing/pulling- 5 Sitting/passive activity- 9 Running- 5 Swinging- 2 Sliding- 3 Local game- 3 Balancing- 3	The local game the children were playing resembled muay thai kickboxing. The children were mainly sitting on the equipment and talking.
3:00 p.m.	Sand play- 4 Group fantasy play- 10 Climbing- 6 Solitary play- 1 Ball play- 3 Balancing- 6 Sitting/passive activity- 2 Running- 5	The group of children involved in the fantasy play had toy guns and they were shooting at other children and a bee hive. The adults were talking amongst themselves in the sitting area. Children not from the school were coming into the playground to play.
3:15 p.m.	Water play- 4 Group fantasy play- 12 Climbing- 5 Sand play- 3 Pushing/pulling- 3 Swinging- 3	The children were using water from the pond to make mud in the sand. The groups of boys with the guns were fighting over who would hold the guns.
3:30 p.m.	Pushing/pulling- 4 Balancing- 8 Swinging- 3 Solitary play- 2 Running- 6 Group fantasy play- 8 Arranging- 5 Climbing- 4 Group exploring- 2	The younger children were following the older children's play activities. A group of children played with the loose tires, moving them and bouncing on them.
3:45 p.m.	Swinging- 2 Climbing- 9 Balancing- 8 Solitary play- 1 Sand play- 2 Dancing- 2 Fantasy play- 1 Group fantasy play- 6	A boy walking by threw a plastic bottle in at the children. One boy picked up the bottle and used it like a drum. The children were climbing on the trees and balancing across the connecting branches.

4:00 p.m.	Toy play- 2 Sand play- 2 Ball play- 2 Climbing- 2 Sliding- 3 Arranging- 3 Group fantasy play- 3	Many of the children had gone home by now and only a few children remained.

Additional Notes:

Around 3 P.M., a group of children came by and sat down around us and played near us. They were curious as to what we were doing as well as interested in our appearance. They tried to ask us questions and tell us stories, but we were unable to understand them due to the language barrier.

Observers:
Oljeta Bida
Jessica Sexton

Date:
February 5, 2003

Location:
Lumpini Park Playground Site 2
Bangkok, Thailand

Observation Data Table:

TIME	EQUIPMENT POPULARITY	OBSERVATIONS/NOTES
10:00 a.m.	Climbing- 2 Running- 1 Balancing- 1 Dancing- 1 Sliding- 1 Exploring - 1 Manipulating- 1	There are two adults observing as they sit by the playground.
10:15 a.m.	Running- 1	No change in activity
10:30 a.m.	No Activity	No change in activity
10:45 a.m.	No Activity	The groups of children participating in the school activity are running around the exterior of the playground.
11:00 a.m.	Sliding- 1 Observing- 1	Maintenance workers are watering the grass and emptying the trash containers.
11:15 a.m.	No Activity	No Activity
11:30 a.m.	No Activity	No Activity
11:45 a.m.	Arranging- 1 Solitary Play- 1	There is little shade around the play equipment. There is a maintenance worker watering the grass and trees. In a nearby field, children are running. What appears to be a school fieldtrip is taking place adjacent to the playground.
12:00 p.m.	Climbing- 2 Sliding- 3 Arranging- 1 Sitting/Passive Activity- 1	The adult female accompning the child is sitting in the shade of one of the play structures.
12:15 p.m.	Sliding- 4 Climbing- 5 Manipulating- 2 Balancing- 5 Observing- 1	A group of children are sitting in one of the building structures and eating. A child stops playing and observes a plane passing above.
12:30 p.m.	Climbing- 7 Running- 2 Sliding- 3 Balancing- 6 Pushing/pulling- 2	The children in the school group are eating lunch. There is an adult male using the parallel bars as gym equipment.

12:45 p.m.	Balancing- 12 Climbing- 22 Arranging- 7 Sliding- 16 Dancing- 2 Observing- 12 Cooperative games- 4 Sitting/Passive Play- 20 Running- 15	The children from the school group came over to the playground after appearing to finish lunch; there was no adult supervision present.
1:00 p.m.	Sitting/Passive Play- 7 Local Game- 4 Arranging- 3 Observing- 3 Dancing- 1 Jumping- 9 Ball game- 1	The children from the school group returned to the area adjacent to the playground shortly after 1:00 PM.
1:15 p.m.	No Activity	No Activity
1:30 p.m.	No Activity	No Activity
1:45 p.m.	No Activity	No Activity
2:00 p.m.	Observing- 3 Sliding- 4 Climbing- 5 Sitting/Passive Play- 1	A group of children arrived at the playground accompanied by 2 adults.
2:15 p.m.	Observing- 3 Sliding- 7 Balancing- 4 Climbing- 7 Manipulating- 2	The groups of school children located adjacent to the playground were singing. The children playing often stopped to watch the group of school children.
2:30 p.m.	Climbing- 4 Exploring- 2 Sliding- 2 Observing- 1	No change in activity
2:45 p.m.	Climbing- 2 Sliding- 1 Running- 1 Observing- 2 Balancing- 1 Manipulating- 2	No change in activity
3:00 p.m.	Climbing- 3 Observing- 1 Sitting/Passive play- 2 Arranging- 2 Running- 1	No change in activity
3:15 p.m.	Climbing- 5 Exploring- 1 Sliding- 2 Running- 2	The groups of school children adjacent to the playground have moved to another area.
3:30 p.m.	Climbing- 6 Sliding- 5 Crawling- 2 Exploring- 1 Sitting/Passive Play- 3	No change in activity
3:45 p.m.	Observing- 1 Ball Play- 2 Balancing- 2 Climbing- 10 Sliding- 1	No change in activity

4:00 p.m.	Observing- 4 Climbing- 2 Ball Play- 4 Sitting/Passive Play- 8	The groups of school children are packing to leave the area. The ages of the children on the playground, range from toddler to elementary-school aged.

Additional Notes:

Throughout the day, it was sunny with a slight breeze. There were numerous trees around the playground, although they appeared newly planted and provided little to no shade. Adjacent to the playground, was a grassy area and a dirt area. The dirt area appeared to be the site of future construction.

Appendix B: Sample Cover Letter

Dear Mr./Mrs./Ms _____ ,

This letter is directed to you from the Duang Prateep Foundation, a charitable, non-profit, non-governmental organization located in Klong Toey slum, Bangkok, Thailand. Our mission is to help low-income communities to overcome social and economic problems and to better their lives. We have developed an interest in building a playground for the Klong Toey slum community.

The design of the playground has been suggested by a group of student researchers from Worcester Polytechnic Institute in Worcester, MA (USA). Their project group worked with the Duang Prateep Foundation in using community involvement to recommend a design and maintenance plan for a playground in the Klong Toey slum. Part of their suggestion was the following list of materials that their playground design requires to be implemented:

- Approximately 45 m^3 of Shredded Tires
- Approximately 75 New or Used Tires
- Approximately 5 m^3 of Sand
- Chain
- Wooden Beams and Planks
- Steel Beams

Please refer to the attached executive summary for more information on the project. Please contact us if you are able to help by contributing materials or other support for this playground.

We would like to thank you in advance for your assistance and give our contact information, encouraging you to contact us for any further questions or responses regarding this request.

Our sincere regards,

Duang Prateep Foundation