

**DESIGN STANDARDS FOR PLAY SPACES FOR
CHILDREN WITH CEREBRAL PALSY**

by

JEANMARY ALEXANDER

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Major Professor

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CHAPTER ONE: INTRODUCTION

The Problem Area

All children love to play and they learn by playing. Unfortunately, many children have fewer opportunities to play because of their mental and/or physical limitations. Their needs for play facilities are greater than those of non-handicapped children because they cannot do as much for themselves. A well-designed play space environment is especially important to these children (Dattner, 1969). Children with special needs deserve the chance to learn basic skills, develop appropriate behavior in community facilities, develop an understanding of safety rules and regulations, and be taught the positive use of leisure time. All these needs can be gained through play in an appropriate play space.

"Because of the limited life that many severely disabled children are forced to lead, everything should be done to arouse their active interest in life, and to give them as much fun as normal children enjoy" (Allen, 1968, p. 127). In the same book, Allen also states that the sensory experience is often lacking in handicapped children partly because of their physical or emotional limitations, but also because of the lack of opportuni-

ties to explore their environment. A sensitive response to the motor needs of the handicapped is imperative to any individual who undertakes the designing of a play space for the handicapped.

Purpose of the Study/Problem Statement

This study will focus on development of design standards for play spaces to be used by children with cerebral palsy. The play space will provide for improved development of the motor skills necessary for children with cerebral palsy. The three skill areas that are emphasized in this study are fine, gross, and sensory development as indicated below.

Fine Motor Development

Fine motor skills involve the small muscles of the body and are isolated, limited activities of the body extremities. They are necessary for grasping and manipulating objects. Most self-help skills depend on fine motor ability (Staniford, 1979).

Gross Motor Development

Gross motor skills involve the large muscles, usually several muscle groups, of the entire body. Examples of gross motor use include the ability to stand upright, balance in various attitudes, walk, jump, and generally to control the arms, legs, and trunk. "Most gross motor activities require basic

components or 'factors' such as strength, agility, balance, and flexibility in varying degrees" (Zaichkowsky, Zaichkowsky, and Martinek, 1980, p. 32).

Sensory Motor Development

Sensory motor skill is the development of body awareness - concern for what the body is doing and space awareness - concern for where the body is moving (Staniford, 1979). Sensory abilities help the child learn about their own body and how to control its movements.

Through a discussion of cerebral palsy, motor skills, play, and the play space, the investigator establishes the groundwork necessary for the development of design standards that are appropriate for children with cerebral palsy. This chapter includes the background information necessary for the completion of this study. Cerebral palsy is defined and the classifications are explored as they relate to righting, equilibrium and protective extension reactions. Through the discussion of motor development, sequence, and movement, one can see the development of motor skills and how they affect cerebral palsy motor development. The importance of play and the play space is examined.

The following chapters will discuss the literature reviewed, methodology, implementation and the conclusions of the study with recommendations for further studies in the area of cerebral palsy.

Importance of the Study

Cerebral palsy presents a problem or a series of problems far more complicated than those typical of most other groups of physically disabled individuals. The characteristics of the child with cerebral palsy are paralysis, weakness, in-coordination, or any other aberration of motor function due to dysfunction of the motor centers of the brain (Cruckshank, 1966). "The resulting impairment of the coordination of muscle action with an inability to maintain postures and balance and to perform normal movements and skills is common to all cases" (Howison, Perella and Gordon, 1978, p. 502).

At the present time, precise estimates of the number of children with cerebral palsy are not available. There are sources, however, that provide sufficient information to estimate the incident rate of cerebral palsy. "Dr. Leon Sternfeld, Medical Director of United Cerebral Palsy, New York, reports an incidence rate of 3 per 1,000 live births and 2,500 cases per year acquired between the ages of 28 days and 3 years. The

prevalence is 3.5 per 1,000 of which 78% is congenitally acquired for a total population of 700,000" (Cleland and Humphreys, 1978, p. 7). Cerebral palsy is categorized into 3 clinical types. These will be defined in Chapter 2. The relative incidence of clinical types of cerebral palsy, classified on the basis of motor difficulties, is as follows:

Spastic:	65%
Athetoid:	25%
Ataxic:	10%

The child with cerebral palsy is a child first, with a handicap superimposed. Thus, the child with cerebral palsy has all the requirements of the non-handicapped child, to be supplemented by the specifics of cerebral palsy management, adapted in every means to the child's own special needs (Abbott, 1957). Children with cerebral palsy "often lead an excruciatingly passive life, with consequent retardations of all-around development; all too often they have to be watching and not participating" (Oswin, 1967, p. 12). The child's span of concentration and ability to remember are often of short duration. Cerebral palsy prevents the child from learning through play in a natural way. Unless the child with cerebral palsy has help and encouragement, that child will not be able to

learn by playing or to reach full potential (Finne, 1957). The child's progress will be slow, due to the difficulties, and the child will need considerable understanding and guidance. Children with cerebral palsy should be allowed to make their own mistakes and to reason things out independently.

Oswin (1967) states that a child with cerebral palsy is perhaps more frustrated than any other type of handicapped child. The frustration tolerance of a child with cerebral palsy is often low, and if that child does not succeed at the second or third attempt, the child gives up (Finne, 1975).

The child with cerebral palsy lacks confidence because of not being able to experimentally explore the environment, learn about it, and master it. "With the cerebral palsy child the environment may be even more important than for the normal child, because they are particularly at the mercy of their environment, being in most cases quite unable to remove themselves from an unpleasant one" (Oswin, 1967, p. 55). By reason of the handicap, the child's environment is more limited and likely to become increasingly narrower. "Whilst accepting that there is a very strong tendency for the cerebral palsy child to be difficult, we must remember

that he can often be helped by the provision of a good stable environment" (Oswin, 1967, p. 31).

Scope of the Study

This study will deal with the development of design standards for play spaces for children with cerebral palsy. This study does not deal with design implementation of a play space for children with cerebral palsy, but rather what should be included in the design of a play space for children with cerebral palsy.

Objectives of the Study

The following are objectives to be attained by the study:

1. To identify and document the various apparatus/components at existing play space sites.
2. To identify the various apparatus/components that should be in a play space according to the literature reviewed.
3. To identify the various apparatus/components that should be in a play space by interviewing experts.
4. To gain an insight to cerebral palsy, play, motor skills, and motor development.
5. To develop design standards for play spaces for children with cerebral palsy.

CHAPTER TWO: LITERATURE REVIEW

Introduction

The purpose of this chapter is to review the literature necessary for the completion of this study. Through a discussion of cerebral palsy, motor skills, motor development, and play, the investigator will establish the groundwork necessary for the development of design standards for a play space that is appropriate for children with cerebral palsy.

SECTION ONE: CEREBRAL PALSY

Introduction

This section deals primarily with the various aspects of cerebral palsy including:

- A. Cerebral palsy will be defined.
- B. Classifications of cerebral palsy will be explored as they relate to righting, equilibrium, and protective extension reactions.
- C. The clinical classifications of cerebral palsy will be discussed.

Definitions

Some authorities list cerebral palsy as a condition primarily involving paralysis, lack of coordination, or weakness of the muscular system due to pathology of the

motor centers of the brain. Russ and Soboloff (1958) state that cerebral palsy is a result, usually, of intercranial lesions which fall into three general groups:

1. those of the motor cortex
2. those of the base of the brain
3. those of the cerebellum

Still others speak of it as an aspect of brain damage which reveals itself not only in muscular dysfunction, but also in psychological dysfunction, various behavior manifestations and convulsions, all of organic origin (Jefferson, 1962). For the purpose of this study, cerebral palsy is defined as a physical disability that is a result of direct or indirect damage to the motor centers of the brain before, during, or after birth, and is outwardly manifested according to the degree and area of injury, by muscular in-coordination.

Normal motor development is dependent upon normal postural tone. "The normal postural reflex mechanism provides the foundation upon which all purposeful movement and skill are performed. Righting, equilibrium, and protective extension reactions are defined as the normal postural reflex mechanism (postural tone*)" (Howison, Perella, and Gordon, 1978, p. 503). These reactions are automatic responses which develop in a

definite sequence. Righting and equilibrium reactions interact with each other. (*investigator's addition)

Righting

Righting is the first to develop and function. It provides:

1. normal alignment of the head with the trunk and the trunk with the limbs;
2. normal position of the head in space with the mouth horizontal and the face vertical;
3. postural orientation and adjustment by vision; and
4. rotation within the body axis as influenced by the body righting reaction.

Provisions 2 and 3 remain throughout life.

Equilibrium

Equilibrium reactions are automatic responses that enable the individual to maintain or regain their balance when the center of gravity has been displaced. Vestibular (equilibrium) responses that develop in a definite sequence remain throughout life.

Protective Extension

Protective extension reactions function to protect the head and body when falling. These automatic reactions consist of extension of the extremities.

These reactions remain throughout life (Howison, Perella, and Gordon, 1978).

Classifications

Following is a description of the three main classifications of cerebral palsy and their aspects to the normal postural reflex mechanism. There are three main classifications of cerebral palsy: ataxia, athetosis, and spasticity. The classification in which a child may fall depends on which area of the brain is damaged and how extensive that damage is. Often there is a mixture of all three classifications and the child does not fit into any clear-cut classification.

Ataxia

The ataxic child has jerky movements with disturbed balance and coordination. Ataxia is characterized by the loss of postural sense and balance. The child with ataxia is jerky and unsteady, movements are poorly timed, graded and directed. There is a lack of fixation and sustained postural control. Coordination is fairly normal although primitive. Righting reflexes and equilibrium reactions are highly developed but movements are uncoordinated.

Athetosis

Athetosis means without voluntary conscious control. The child has an uncontrolled overflow of movement and lack of control over his/her whole body. There is too much motion, movements are involuntary and uncontrolled. Most athetoid children have some mobility. Many walk with difficulty, but very few are totally immobilized. Athetosis refers to the fluctuating muscle tone (spasticity) which is divided into four groups. These four groups are:

1. Athetosis with spasticity

A child will have moderate spasticity in the proximal parts (body parts closest to the spine) and athetosis in the distal parts (body parts farthest from the spine). There is a lack of selective movement and the grading of muscle action. Postural patterns are similar to those with moderate spasticity. Righting reactions are unreliable because of the intermittent influence of tonic reflexes.

2. Athetosis with tonic spasms

There is a lack of co-contraction which causes excessive extension or flexion. There is hardly any voluntary control of movements because of strong, intermittent tonic spasms.

Righting, equilibrium, and protective reactions are absent.

3. Choreoathetosis

There is no co-contraction which provides stability. Large, jerky involuntary movements seem to be more proximal than distal. Hands and fingers are weak but often coordination is good in free movement. There is a lack of selective movement and there is fixation of movement. Righting and equilibrium reactions are present to some extent but coordination is abnormal. Protective extension of the arms is abnormal and often absent.

4. Pure athetosis

There is a lack of co-contraction which provides stability. Twitches and jerks of individual muscles or even muscle fibers are seen. Slow, writhing, involuntary movements which are more distal than proximal and lack of fixation are characteristic. Righting, equilibrium, and protective extension reactions are present but involuntary movements interfere with them (Howison, Perella, and Gordon, 1978).

Spasticity

The spastic child moves with difficulty, varying from the minor occurrence, where the child may have an awkward gait, to the most extreme occurrence, where the child is completely stiff and is unable to move voluntarily. "In most cases, spasticity develops gradually as the child matures and starts to react to his development" (Bobath and Bobath, 1981, p. 17). There is a quadriplegic (paralysis of muscles in all four extremities), diplegic (paralysis of the whole body), hemiplegic (paralysis of one side of the body), and sometimes paraplegic involvement (paralysis of the lower half of the body). Spasticity refers to increased muscle tone. Spasticity shows the maximal contraction of a muscle which is put on a stretch by its antagonist (a muscle that contracts with and limits the action of an agonist with which it is paired), and is thereby unable to perform its release function (Abbott, 1957).

The moderate and severe occurrence of spasticity will be discussed, but one must remember that the range of occurrence depends greatly on the degree and area of damage to the brain.

Moderate Spasticity

Deformities may develop from the maintenance of abnormal postures. Learned skills are performed in

primitive and abnormal patterns without the selection of movement. Total movements may be in synergies (working together). A strong startle response is usually present. Positive supporting reactions are often present. Associated reactions in the form of associated movements are strong. Some righting reactions may be present, equilibrium reactions in sitting and kneeling are often developed but not in standing and walking.

Severe Spasticity

Constant co-contraction of the agonist (a muscle that is checked and controlled by the opposing simultaneous contraction of another muscle) and antagonist muscles inhibits any type of relaxation while awake or asleep, thus, resulting in being more vulnerable to developing deformities. Righting, equilibrium, and protective extension reactions are often absent (Howison, Perella, and Gordon, 1978).

"The degree of the handicap will be a guide as to the need, and as always, a basic principle is the provision of as many normal contacts and as near normal facilities as possible for each individual with cerebral palsy" (Cardwell, 1956, p. 259). Treatment of the individual with cerebral palsy involves consistent handling. This treatment should:

1. influence the amount of postural tone by reducing, increasing, or steadying the tonus;

2. inhibit abnormal patterns;
3. facilitate normal responses (Hopkins and Smith, 1978).

SECTION TWO: MOTOR SKILLS

Introduction

Following is a discussion of movement and sequence and how they influence the development of motor skills, and how they affect children with cerebral palsy.

Movement

Movement plays an important role in every facet of human development. Young children develop skills, emotional control, and cooperation with others through movement. "Human movement provides the basic psychomotor framework for development, for through movement all children discover critical elements about their bodies, their environment, and their social interactions" (Bunker, 1978, p. 180). All children need to learn how to run, jump, skip, and throw -- to learn muscle coordination and body control (Daquila, 1980). "Movement pattern development is not specifically concerned with developing high degrees of skill in a limited number of movement situations, but rather with developing acceptable levels of proficiency and efficient body mechanics in a wide variety of movement situations" (Gallahue, 1982, p. 177).

The child with cerebral palsy "is limited to a few and inadequate movements, movements that become stereotyped and on which he will base whatever skills he may acquire later" (Finne, 1975, p. 32). By having the child with cerebral palsy move in various ways, the child will make use of new patterns of movement, acquiring new experiences and skills.

Motor skills are fundamental to the child's learning to move effectively and efficiently within their environment. Zaichkowsky, Zaichkowsky and Martinek (1980) found that maturation and learning are intricately interwoven and thus interact in the development of basic fundamental motor skills. They also state that as a young child acquires various fundamental motor skills, that child will probably learn them. However, the child's level of maturation sets limits on what can be performed and that maturation will dictate whether certain skills can be learned at any point in a child's development of motor skills.

Young (1977) evaluated and compared the development of specific concepts in cerebral palsy and non-handicapped children. His investigation also examined the relationship between those specific concepts and motor performance, age and IQ. Young concluded that motor skills in children with cerebral palsy should be

comparable, but slower, than that in non-handicapped children. "Whereas the changes in the development of a normal child's motor patterns are most rapid and significant up to about 5 years of age, changes in the activities of a child with cerebral palsy are slowed down but may continue into adolescence or even adult life" (Bobath and Bobath, 1981, p. 2). Regardless of intelligence and the degree of involvement, children with cerebral palsy will reach their motor skill milestones, even though they may achieve them later than non-handicapped children (Bobath and Bobath, 1981).

Fundamental movement skills involve the basic elements of that particular movement only. The basic elements of a fundamental movement should be the same for all children (Gallahue, 1982). "Fundamental movement skills are dependent upon a functional level of body management abilities; without these fundamental abilities, skill development would be impossible" (Bunker, 1978, p. 180). Staniford (1979) found that encouragement in control of the way movements flow together could be a vital factor in enhancing natural skilled movement. "Performance of these movements must be sufficiently flexible so that they can be altered as the requirements of the environment demand without deflecting attention from the purpose of the act. The

child must be able to (1) use any one of a number of types of movement to reach the goal; (2) shift from one type of movement to another when the situation demands it; and (3) alter each movement as the conditions of the environment change" (Gallahue, 1982, p. 179-180).

Sequence

Motor development is a sequential process, starting out with simple reflex skills and ending with complex coordinated motor skills. The sequence of motor development is predictable, but the number of individual variations is unlimited. "The milestones and abnormal patterns of the child with cerebral palsy, as in the case of normal babies, are also fairly predictable, but they are different in the various types of cerebral palsy and not so well known" (Bobath and Bobath, 1981, p. 10).

Motor control develops in a cephalocaudal direction (from head to feet) and also in a proximodistal direction (from midline of the body to the extremities).

Motor skills develop not only from rudimentary to specialized, but also from gross to fine (Zaichkowsky, Zaichkowsky, and Martinek, 1980). The four principles governing growth that Hopkins and Smith (1978) set forth are not static but are continuously influencing motor development. These principles are independent of

environmental influences. These four principles are:

1. Cephalocaudal Pattern of Development

Muscular development, control, and coordination progress from the head to the feet of the body. Head control precedes that of the trunk and lower extremities. A child must have good head control if s/he is to develop other effective motor skills.

2. Proximal-Distal and Medial (rostral) - Lateral Patterns of Development

Parts of the body closest (proximal) to the spine tend to be controlled in a coordinated manner before the parts farthest (distal) away from it. Muscle coordination also follows a medial-lateral course of development. It proceeds from the midpoint of the body outward (anatomical position).

3. Mass to Specific Pattern of Development

Initially much of the motor activity of the infant consists of whole body movement. With maturity, these undifferentiated and generalized mass response become more specific.

4. Gross Motor to Fine Motor Pattern of Development

Mastery of the larger muscles precedes mastery of the smaller muscles. This mastery must then become even more refined and definitive to allow for the acquisition of skills.

"Motor development is a gradual process of continuing modification of movement patterns based upon the individual's genetic potential, the residual effects of prior experiences, and the new environment experience per se" (Malina, 1980, p. 199). All people follow a progressive developmental pattern although the rate of progress through each stage of development varies with each individual.

While the rate of development of basic movement abilities in children with cerebral palsy is usually slower than that of non-handicapped children, the sequence and pattern of motor development is basically the same for "much depends upon the severity of the individual child's involvement and on his intelligence" (Bobath and Bobath, 1981, p. 19). Sometimes many of the essential and primary patterns of motor development, which emerge in a non-handicapped child at certain stages of growth, are missing in the child with cerebral palsy.

In the sequence of motor development children progress through various levels of performance. Stewart and DeOreo (1980) found that the child first makes beginning attempts at the motor skill, followed by an immature performance (elementary level) to a more advanced (mature level) performance. Refinement of the motor performance begins from the very first time the child attempts to do the skill. "This increase in complexity of patterns of performance is defined by most investigators of sequential motor patterning in terms of stages of development, and seems to be more interrelated with physiological maturation than with chronological age" (Espenschade and Eckert, 1967, p. 135).

So it is with the child with cerebral palsy. These stages of abnormal development in the child with cerebral palsy should not be regarded as "milestones" to be seen at certain chronological ages. It may take years for the child with cerebral palsy to progress from one stage to the next; some may never get beyond the first or second stage and some stages may be skipped altogether (Bobath and Bobath, 1981).

SECTION THREE: MOTOR DEVELOPMENT

Introduction

This study emphasizes fine, gross, and sensory motor development. A definition of motor development by

Gallahue will be used for this study: "Motor development is that aspect of motor behavior and motor control that is primarily concerned with the study of changes in motor performance throughout the entire life span" (Gallahue, 1982, p. 15). Motor development is a continuous process which starts before birth and continues until death. "All people follow a progressive developmental pattern although the rate of progress through each stage of development varies with each individual" (Corbin, 1980, p. 4). The process of motor development is viewed in stages of infancy, childhood, adolescence, adulthood, and old age. This study focuses on the stages of childhood and adolescence. Understanding of motor development in the non-handicapped child is of the utmost importance to understanding the motor development in the child with cerebral palsy. Therefore, motor development in the non-handicapped child is discussed first, followed by a discussion of cerebral palsy development.

Non-Handicapped Motor Development

Zaichkowsky, Zaichkowsky, and Martinek (1980) concluded that there were four stages of motor development for non-handicapped children. These include:

1. Reflexive and Rudimentary Abilities

Reflexive and rudimentary abilities include sitting, crawling, creeping, standing, and walking. They form the foundation for the development of other fundamental abilities.

2. General Fundamental Skills

General fundamental skills include running, jumping, balancing, catching, and throwing. They are common to all children and are necessary for ordinary survival.

3. Specific Movement Skills

Early general fundamental skills become further refined and appear more fluid and more automatic. There is an emphasis on form, accuracy, and adaptability.

4. Specialized Skills

Specific movement skills develop sufficiently, but this depends on the amount of practice an individual has with the specific abilities.

There will be large individual differences among children in their ability to perform these fundamental movement skills. The order in which these skills normally develop will be the same for all children; only the rate at which these skills develop will vary. "Most children have some degree of proficiency in the funda-

mental motor skills by the time they enter school. The degree to which these skills have been refined depends in part on the enrichment programs or experiences to which the child has been exposed" (Stewart and DeOreo, 1980, p. 42).

Gallahue (1982) states that the development of fundamental movement abilities is basic to the motor development of children. Also, the various movement experiences provide children with a wealth of information on which to base their perceptions of themselves and the environment which surrounds them. With the mastery of the motor skills, children will more easily learn the activities of their choice. "If a child is allowed to set the pace, is encouraged, and if motor learning is left as play, the child will want to develop skills" (Lockhart, 1980, p. 247).

McClenaghan (1976) developed the following stages of development which he calls fundamental phases. These phases are the basis used in viewing the various motor behaviors. The reader must understand that a child may be at the initial phase in some of his/her motor skills, elementary in others, and the mature phase in still others. Children do not progress at an even rate. The rate will vary, depending upon both environmental and hereditary factors. The sequence of progression through

the phases is the same for most children. These phases are:

1. Initial Phase

The initial phase "represents the child's first goal-oriented attempts at performing a fundamental skill. Movement itself is characterized by missing or improperly sequenced parts, markedly restricted or exaggerated use of the body, and poor rhythmical flow and coordination. Spatial integration of movement is poor during this phase.

2. Elementary Phase

The elementary phase "involves greater control and better rhythmical coordination of fundamental movements. The temporal (muscle*) and spatial elements of movement are better coordinated, but patterns of movement at this stage are still generally restricted or exaggerated, although better coordinated.

3. Mature Stage

The mature stage is characterized by mechanically efficient, coordinated, and controlled performances" (Gallahue, 1982, p. 46).

(*investigator's addition)

Cerebral Palsy Motor Development

Motor development of children with handicaps follows essentially the same sequence as non-handicapped children, although the rate of development for some handicapped children may be somewhat slower. The variability of motor skill performance of the handicapped child is as great or greater than that among other children (Bunker, 1978).

The child with cerebral palsy develops at a slower rate and often follows an abnormal course. "As the cerebral palsied child becomes more active, abnormal postures and movements develop and will change as the child adapts them to functional activities. This development and increase of abnormal activity interferes with, and make impossible, normal motor development" (Bobath and Bobath, 1981, p. 13 and p. 3). There may be little or no change for a long time and development may become arrested altogether at an early stage. Much depends upon the severity of the individual child. "The child will start by using the abilities he has, however abnormal they may be, resulting in an 'uneven' development as many of the stages of normal development will be left out" (Finne, 1975, p. 33).

Normal motor development is dependent upon normal postural tone. Abnormal increased postural tone will

prevent the developing of righting, equilibrium, and protective extension reactions, so necessary for normal growth and development. With the child with cerebral palsy as spasticity, athetosis, or ataxia appear and they become more pronounced in time, the abnormality of the child's postural and movement patterns become increasingly obvious.

Bobath and Bobath (1981) state that the development of the child with cerebral palsy should be assessed in terms of modification of coordination, in terms of the interplay of developing normal and abnormal reactions, rather than by milestones as non-handicapped children are assessed. "The investment is in 'competence' as a criterion, not in 'normality' per se--in 'normalization' of the child's behavior, or his environment, as a means to individual fulfillment and competence and not an end unto itself" (Robinson, 1987, p. 104).

SECTION FOUR: PLAY

Introduction

Play is a rich natural environment in which children do their best learning (Cliatt, 1980). Play is a voluntary undertaking. "Play can only occur in a condition of freedom, because it is above all doing what you want to do, when and where you want to do it" (Dattner, 1969, p. 7). Play is a child's way of learn-

ing. Austin (1974) classifies play as either passive or active, although there are activities that are both. Passive play is unrestricted and uncontrolled, and a child usually plays alone using their individual abilities in each play experience. Active play is structured and brings the child into contact with other children in a specific recreation experience. Play, therefore, may be defined as any behavior in which the criteria is used to help assimilate, comprehend and master experiences. The criteria of play may be inherent in the child, while the process and objectives are learned.

Play provides for environmental learning, the opportunity of mastery, leading to discovery and reason. Play is one of the ways in which children develop intelligence. "Play is the acquisition of information related to the potentials around and with the self" (Weininger, 1979, p. 8). Play is basically a tool to teach children to learn to live with themselves and with others (Abernethy, 1974).

Children are given a chance to be in control, to be masters, when playing. Virginia Axline's book, Play Therapy, is based on the principle that play is the child's natural medium of self-expression. "Play not only allows children to express their ideas but also

enables them to test these ideas through interacting with one another" (Burt and Myrick, 1980, p. 14). Play is at the service of helping the child understand the many potentials of their own body, of their body's space, the ways in which stimuli impinges upon their bodies, and how their bodies must organize and/or adjust in relationship to those incoming stimuli (Weininger, 1979). Play is essential "for the child in his increasing search for orientation to the world and for self-discovery" (Frank, 1974, p. 19).

Children enjoy chaos and make their own order out of it. "Through play the child continually rehearses, practices, and endlessly explores and manipulates whatever he can manage to transform imaginatively into equivalents of the adult world" (Frank, 1974, p. 18). The child is given a choice of materials and activities while playing. "Further, the opportunity to play enhances one's own ability to initiate independent activity -- activity which is crucial to the exploration and construction of one's autonomy, identity, and self-image as a constructive force" (Beasley, Hayward, and Rothenberg, 1974, p. 131).

Handicapped Play

"Though children with handicapping conditions have the same needs and desires for play as able-bodied

peers, opportunities to engage in successful play experiences are few" (Grosse, 1980, p. 3). Handicapped children, partly because of their physical and/or emotional limitations, lack the opportunities to explore their environment. "Public Law 94-142, the Education for the Handicapped Act, mandates accessibility for handicapped students in both academic and non-academic settings. The Rehabilitation Act of 1973 further requires accessibility for handicapped persons to all public facilities" (Bowers, 1979, p. 52). The play space is a public facility, thus should be accessible to handicapped children. Yet most of these children are found in an institutional setting. "Their needs are greater than those of normal children because they cannot do as much for themselves, and a well-designed play environment is especially important to them" (Dattner, 1969, p. 109). These children have special needs which must be accommodated in the play space. Because of their physical and/or mental impairments, these children often do not demonstrate those performance levels equal to their chronological ages, thus, a mixture of children with differing ages, physical size, and fundamental movement skills. Allen (1968) says that everything possible should be done to arouse the handicapped child's active interest in life, and to give them as much fun as non-handicapped children

enjoy. The play space should enable the handicapped child to know themselves and their body in relation to the environment and how to move efficiently within their environment.

The Play Space

The play space should have a friendly, stable and welcoming atmosphere, plus an arrangement that makes each child feel that the play space is their territory. The environment should present a series of challenges to be mastered gradually. "The environment for play must be rich in experience, and it must be, to a significant extent, under the control of the child. It must allow each child to exercise choice and to grow, safely, at his own rate" (Dattner, 1969, p. 137). There are three types of play spaces:

1. Traditional

Generally part of schools, housing projects, or neighborhood parks and usually contains swings, slides, seesaws, and climbing bars.

2. Contemporary

Novel forms, textures, and different heights in aesthetically pleasing arrangements, frequently based on sand or concrete forms, usually containing tunnels under walls or mounds, platforms above the ground, and may also contain some traditional apparatus.

3. Adventure or Junk

Adults supply the play materials and site and the children build their own play space with the arrangement constantly changing (Beasley, Hayward, and Rothenberg, 1974).

"The natural play of all children, which is characterized by exploration, creativity, and gaining mastery over new physical challenges, is in direct conflict with the limited ways traditional play equipment can be used" (Bowers, 1979, p. 51). He also made the assumption that a play space environment with a high degree of complexity would result in greater amounts of use by children playing than by a simple play space environment. Bowers (1979) provides seven principles of designing play spaces, they are:

1. be accessible to all children
2. provide a safe distance between levels
3. incorporate a variety of inclines for children to move at their own level of ability
4. provide partially-closed spaces through which children can safely move
5. be complex and stimulating
6. use interconnected play areas to produce higher levels of continuous play

7. combine sound design with strong materials and quality construction.

The most important contribution to the complexity of a play space is the variation in the size and shape of the arrangement of the various apparatus. The apparatus must both be easily accessible and safe for the child to play on independently. "Additional natural stimuli and environmental conditions that will encourage the healthy activities of running, jumping, rolling, climbing, digging, lifting, swinging, sliding, pulling, pushing, crawling, creeping, skipping, balancing, walking, throwing, riding, reaching, and bending should be provided" (Walston, 1974, p. 10).

SECTION FIVE: SUMMARY

The play space designer must consider that play must reflect the sequential developmental stages that encompass sensory and motor skill learning. The child, from age three on, is beginning to differentiate between up/down, over/under, out/in, go/stop, low/high, front/back, and so on. The designer can illustrate these directional and positional concepts within the play space so that children, handicapped and non-handicapped, will not only discover and see the difference, but also feel the difference.

Every child, handicapped and non-handicapped, is an individual and develops at a different pace. Thus, it is extremely important to provide a stimulating play space environment in which the child may develop at their own pace.

Bowers (1977) reports that when accessible and safe play equipment is provided, handicapped children select play activities similar to those of a group of non-handicapped children matched for age and sex as they engage in play in the same play environment. The designer must be able to justify the apparatus with the way it relates to the child, and not resort to including the apparatus simply for ease of design. The best assessment of any play equipment would be the amount and quality of continued play freely engaged in by children for whom it was developed" (Bowers, 1979, p. 52). Some useful goals in designing play spaces for the school-aged child is provided by Walston (1974). These goals are beneficial to both non-handicapped children and handicapped children. They are:

1. The play space promotes the optimum physical development of each child.
2. It develops the motor skill abilities of each child in terms of performance, adaptability, ingenuity, and efficiency in coping with new and varied situations.

3. The play space should develop physical as well as mental coordination.
4. The play space should provide situations where each child can feel a sense of achievement through their own efforts and perseverance.
5. It provides opportunities for experiences as wide and expansive as is possible in all types of movement.
6. The play space should provide situations where the child exerts inquiry, expression, creativity, and self-control in movement.

Walston (1974) also states the educationalist's many stipulations for play. Because of Public Law 94-142 and the Rehabilitation Act of 1973, these stipulations affect both the handicapped and non-handicapped child during their play in a play space environment. These stipulations are:

1. The play spaces must always be designed and equipped with their function for play foremost in mind.
2. Architects, landscape architects, and educators must work together to produce good solutions to the many problems in the play space. The child and the child's play, and not the design, is the decisive factor in successful play spaces.

3. The play space must encourage active, spontaneous and creative play.
4. The various apparatus of a play space should conform to the particular age group for which the play space is intended.
5. The play space must offer a variety of possibilities for play.

The many play activities that a child may engage in provides the momentum through which the child makes a balanced thrust towards maturation. Through master of their own body, the child develops a concept of themselves as an individual who does many things and a person who can cope with the surrounding environment.

The more physically handicapped a child is, the more limited is their knowledge of the environment likely to be, due to the lack of practical experiences. "The fact that an individual does not display the usual sort of autonomous development must not be taken as evidence that such growth cannot be stimulated" (Robinson, 1978, p. 102). While the nature of learning remains theoretical, all theories agree that the child must interact with the environment to learn.

Learning environments should progress from simple to complex to facilitate optimal learning. The child with cerebral palsy will often have had little

opportunity for the normal play experiences which are of vital importance for the child's all-around development. Opportunities should be provided for unrestricted active play in an environment free from hazards. Provision for natural activities such as climbing, hanging, swinging, and balancing, as well as adequate room to move freely and exuberantly on the ground should be provided in the play space environment (Staniford, 1979). "The major emphasis should be on allowing the child to find his or her own way of moving over, under, around, and through playground environments in his/her own time and space" (Staniford, 1979, p. 47).

Lockhart (1980) says that young children need a good environment, an environment that provides them with the chance to develop many motor skills. "If a child is allowed to set the pace, is encouraged, and if motor learning is left as play, the child will want to develop skills" (Lockhart, 1980, p. 247). Through play, children with cerebral palsy may gain some of the basic needs to achieve motor development skills. Gallahue (1982) states that play and instructional experiences will greatly influence the rate of development of locomotor, manipulative, and stability abilities. By moving around during play, the child with cerebral palsy will make use of new patterns of movement, acquire new

experiences and new skills. Play can motivate the child with cerebral palsy to use these motor skills. "Play activities provide the momentum through which a child can make a balanced thrust towards maturation. Through mastery of his body, he develops a concept of himself as a person who can do things and who can cope with his environment" (Moffitt and Swedlow, 1974, p. 40).

The child's progress will be slow, owing to the cerebral palsy difficulties, and will need considerable understanding and guidance. "Learning motor skills requires that two important conditions be present: (1) feedback regarding the adequacy of the movement behavior and (2) practice of the task" (Zaichkowsky, Zaichkowsky, and Martinek, 1980, p. 34). As the child with cerebral palsy grows older, increasing amounts of energy will be available and much of this energy is directed into motor activity. That child will need a safe and, when possible, spacious place to play.

CHAPTER THREE: METHODOLOGY

Introduction

As discussed in Chapters One and Two, the child with cerebral palsy is a child first, with a handicap superimposed. Thus, the child has all the requirements of the non-handicapped child, yet, adapting in every means to the child's cerebral palsy management. Children with cerebral palsy lead passive lives. They are the ones that are often watching and not participating. They need and want a safe place to play.

Children with cerebral palsy can often be helped by a stimulating play space environment. It is important to have a stable environment in which the child with cerebral palsy may develop at their own pace. The play space designer must primarily consider the apparatus as it relates to the child with cerebral palsy.

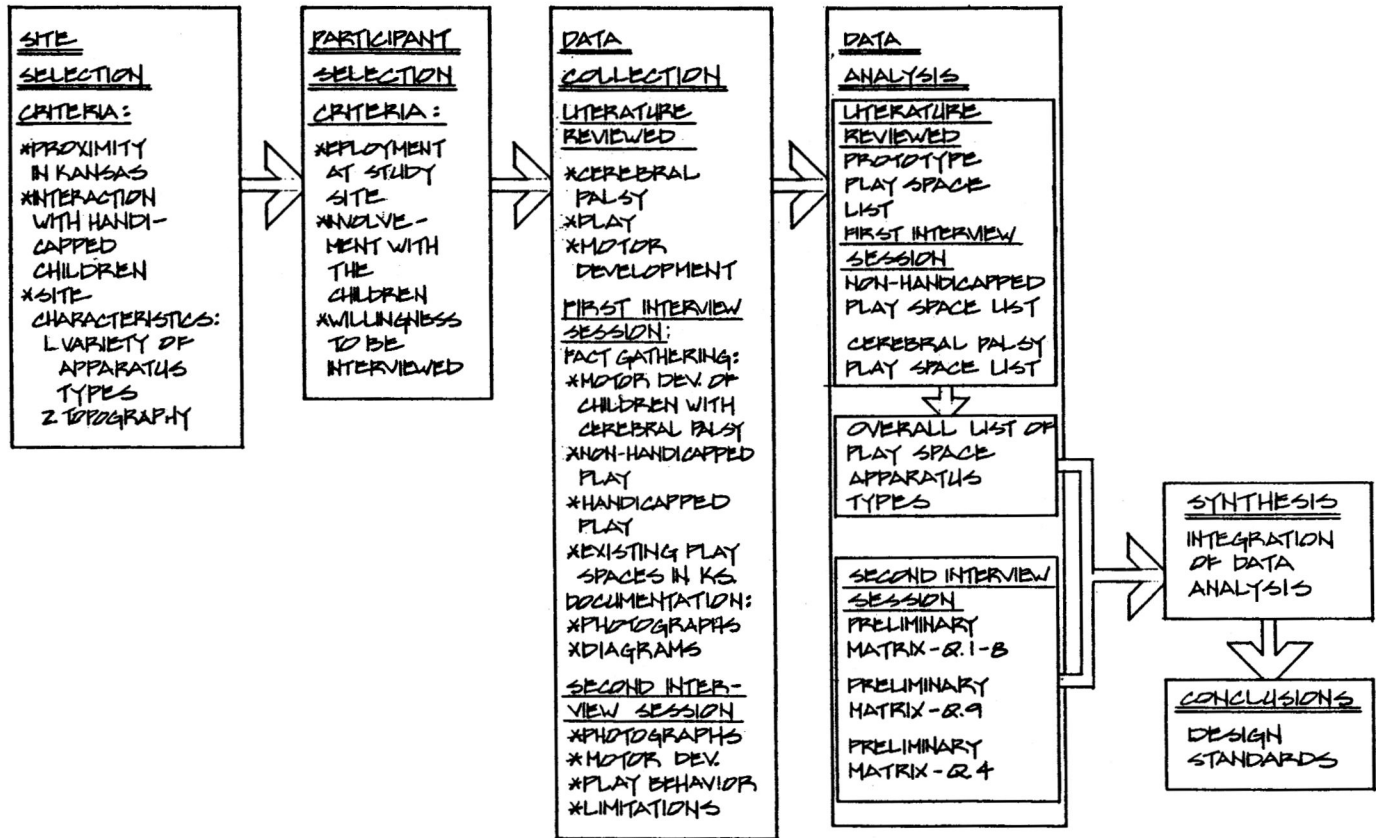
Unrestricted active play in a hazard-free environment will help and encourage a child with cerebral palsy. Architects, landscape architects, and educators must work together to provide good solutions for such an environment. Through the analysis of cerebral palsy, motor development, play and the play space, the investigator can then develop design standards that are appropriate for a play space for children with cerebral palsy.

The purpose of this chapter is to describe a methodology for the development of design standards for play spaces for children with cerebral palsy. The design standards will be examples of apparatus types that should be included in the design of a play space for children with cerebral palsy. Professionals may use the design standards as a tool to provide their client with a more supportive environment in which to play. In addition, the design standards may help educate the general public as to the needs of the physically handicapped populations and help define the importance of providing an appropriate play space environment. The methodology of this study will include the following steps:

- A. Site selection
- B. Participant selection
- C. Data collection
- D. Data analysis
- E. Synthesis
- F. Conclusions - Design Standards

The relationships between these steps are illustrated in Figure 3.1, page 44. These steps will provide the investigator the opportunity to better understand the uses of the play spaces and the various types of apparatus in those play spaces. Each of these steps

Figure 3.1 - Flow Chart of Methodology



will be described in this chapter and the process followed in Chapters Four and Five.

A. Site Selection

Study sites will be selected for the purpose of this investigation. There are three steps involved in the site selections. The first step is to determine where play spaces for handicapped children may exist in the state of Kansas. The next step is to select those study sites within cities that interact with handicapped children. The third and last step is that the study sites should have the following site characteristics:

1. A variety of apparatus types within a play space, and
2. The topography of the play space appropriate for the physically handicapped population.

B. Participant Selection

Interviews with physical and occupational therapists and instructors will be used to provide understanding of the child with cerebral palsy, the play of both the non-handicapped child and the child with cerebral palsy. Those participants interviewed will be selected on the basis of:

1. employment at study site,
2. involvement with the children at study site,
and

3. willingness to be interviewed.

C. Data Collection

The third step in the methodology is collecting information and data. There will be four categories of data:

1. review of literature,
2. an initial interview,
3. site documentation, and
4. a final follow-up interview session.

The literature reviewed will establish the groundwork necessary for the investigator to carry out this study. An in-depth review of cerebral palsy, motor development of both non-handicapped children and children with cerebral palsy, and play of both non-handicapped children and children with cerebral palsy will be done. The information gathered will be used in the two interviews.

Two interviews will be necessary since the first interview session will be a fact gathering session. Also, documentation of the study sites will be done at the first interview session. The second interview session will deal exclusively with the data gathered from the documentation of the study sites.

The first interview session will consist of a series of general questions. The investigator will

explain the scope of the study, the methodology, and the two stage process of the interview sessions to each participant. Each interview will last no more than one hour and take place at a location convenient to the participant. The investigator will ask the questions verbally and write down the responses. The first interview session will cover:

1. motor development of the child with cerebral palsy,
2. non-handicapped play,
3. handicapped play, and
4. existing play spaces in Kansas for the handicapped.

The questions will be asked in the same order to each participant. A list of the questions asked can be found in Appendix One.

The method of documenting the existing play spaces will be through a series of photographs of the various types of apparatus in each of the study site play spaces. This will allow the investigator to use the photographs in the interviews as a starting point in collecting samples of the various types of apparatus that might be used in a play space.

One color photograph of every apparatus in each study site play space will be taken from a straight-on

position whenever possible. When not possible, the apparatus will be shown at its best angle. Color photographs will be used because of the detail and more realistic depiction of the apparatus. The function of the photographs will be to show a single apparatus, when possible, which will become the focal point in the second interview session. The photographs will be taken with a 35mm camera, using color print, 100ASA film.

A diagram of the layout of the play space of each study site will also be done at the time the photographs are taken. The diagrams will be used to document the specific location of each photograph. The diagrams and photographs can be found in Appendix Two.

There will be certain factors that will determine the occurrence of documenting the play spaces. Weather will be a factor because the play spaces should be free of snow so the various apparatus can be clearly seen to produce the diagrams and make photographic documentation. Time will be a factor because the photographs should be taken when the children are not present in the play spaces. The photographs will be used in the second interview session, and should not show the children's manipulation of the various apparatus which might influence the responses.

An interview regarding the photographs will be conducted at the second interview session. The interview should last no longer than forty-five minutes. Each interview will take place at a location convenient to the participant. The investigator will hand the participant a laminated color photograph and the participant will be given fifteen seconds to examine the photograph before the questions will be asked. Questions will deal with the particular apparatus found in existing play spaces in relation to:

1. motor development skills,
2. the expected and/or observed play behavior in the manipulation of the apparatus,
3. the relative likelihood of its use by children with cerebral palsy, and
4. any climatic limitations.

No distinction will be made between particular apparatus on which the participant has watched children with cerebral palsy and non-handicapped children at their play space and apparatus at the other study sites. The same questions will be asked about each photograph. The questions and the order of photographs will be in the same sequence at each interview. A list of the questions can be found in Appendix Three.

D. Data Analysis

The fourth step of the methodology is analysis of the data gathered. The function of analyzing the data is to obtain a better understanding of play spaces and the various apparatus in those play spaces for development of design standards for play spaces for children with cerebral palsy. Only existing apparatus will be used for evaluation. Three sources will be used in the analysis process:

1. the literature reviewed,
2. the first interview session, and
3. the second interview session.

A review of certain information derived from the literature - information directly related to cerebral palsy, motor skills, motor development, and play - will establish a list of various apparatus which might be found in a prototype play space. In analyzing this information, the identified list of various apparatus types in the prototype play space will be compared with the information gathered at the first interview session. To analyze the importance of the prototype play space, and the various apparatus types, information from the literature will be compiled and organized in each respective category.

The first interview session responses will be analyzed with the formulation of two lists. The first will list the various apparatus types that the interview participants will recommend for a non-handicapped play space. The second will list the various apparatus types the interview participants will recommend for a play space for children with cerebral palsy. When both these lists are combined with the information analyzed from the literature reviewed, an overall list of play space apparatus types will be compiled.

Analysis of the responses from the second interview session will be used to formulate three preliminary matrices. The first preliminary matrix will illustrate the interview participants responses to questions one through eight as they relate to the interview photographs. Question nine of the interview will produce the results for the second matrix. The third matrix will illustrate the relationships between the various existing play space apparatus types and motor development skills. Responses from question four will result in the third matrix. Examples of the preliminary matrices are shown in Figure 3.2, page 52, Figure 3.3, page 52, and Figure 3.4., page 52. Comparison of the responses from the second interview session and the resulting factors from combining the literature reviewed

INTERVIEW QUESTION	APPARATUS PHOTO 1 2 3 4 5 6 ...
1 THROUGH 8	PARTICIPANT'S RESPONSES

Figure 3.2 - Example of Preliminary Apparatus Matrix - Question 1

LIST OF DISABILITIES	APPARATUS PHOTO 1 2 3 4 5 6 ...
a THROUGH m	PARTICIPANT'S RESPONSES

Figure 3.3 - Example of Preliminary Apparatus Matrix - Question 9

PHOTO # & APPARATUS	MOTOR DEV. SKILL FINE GROSS SENSORY
1 THROUGH 20	PARTICIPANT'S RESPONSES

Figure 3.4 - Example of Preliminary Apparatus Matrix - Question 4

and the first interview session will provide a checklist to insure that a wide variety of apparatus types will be examined. The final process of analysis of the data will be the synthesis of this information.

E. Synthesis

The findings from the data analysis process will be used in the next step. This step integrates the findings. Information acquired through this process will form the basis for the development of design standards for play spaces for children with cerebral palsy.

F. Conclusions - Design Standards

Design standards will be short statements dealing with the specific apparatus. It is the investigator's objective that the design standards will help those who undertake the design of a play space for children with cerebral palsy.

CHAPTER FOUR: IMPLEMENTATION

Introduction

The purpose of this chapter is to implement the application of the discussed methodology to the development of design standards for play spaces for children with cerebral palsy. This chapter will cover all the steps in methodology, and will only address motor development.

Site Selection

As mentioned in the methodology, there are three steps involved in the site selection. The first step is to determine where play spaces for handicapped children may exist in Kansas. The eastern section of the state is the dominant region of the state's population. Three cities were chosen for this study, including Manhattan, Topeka, and Wichita. These metropolitan areas allowed for relatively easy accessibility and collection of data in a short period of time.

The next step was to select those study sites within the three cities that interact with handicapped children. A study site was chosen in each city. The study sites are referred to as Site A, Site B, and Site C.

The third and last step in site selection is that the study sites should have the following site characteristics:

1. A variety of apparatus types within the play space, and
2. The topography of the play space is appropriate for the physically handicapped.

All three study sites have a variety of apparatus types within their play space. Topography is the character of the landform of the play space. The topographic features of the three study sites were appropriate for the physically handicapped. Site A is a commercial one-piece play apparatus structure. The play space apparatus is in an area of sand with lawn defining the limits. Site B is under a roof structure with a concrete floor. Many of the apparatus can be, and are, moved about within the play space. Site C is a combination of Site A and Site B. This study site consists of moveable and stationary commercial apparatus located on lawn and sand areas.

Participant Selection

A series of phone calls were made to determine potential interview participants. These calls were first made to the directors of the three study sites who, in turn, provided referrals to physical and

occupational therapists and instructors. The selected participants met the selection criteria of:

1. employment at the study site,
2. involvement with the children at the study site, and
3. willingness to be interviewed.

Those selected represented a cross section of professionals and included:

- 2 occupational therapists,
- 2 physical therapists, and
- 2 instructors.

Data Collection

The next step after the site selection and participant selection is the gathering of information and data as described in Chapter 3. A computer search was conducted to insure that the most modern material would be available to the investigator. An in-depth review of the computer search literature was then done. The literature reviewed involved topics on cerebral palsy, motor development of both non-handicapped children and children with cerebral palsy, and play of both non-handicapped children and children with cerebral palsy.

The first interview session consisted of a series of general questions. Interview questions were developed out of the literature reviewed. Through a series of

revisions done in thesis committee meetings, final questions were decided upon. All interviews lasted no more than ninety minutes, and were conducted at each participant's office. Participant responses to the questions were written down by the investigator. Following is a discussion of each question - first the question and then the participant's responses. The following responses are paraphrased from the six interview participant's responses.

Question One: What are the basic stages of motor development for children with cerebral palsy between the ages of four and six?

Responses: Motor development is extremely individualized and depends on the child. Development can range from zero to near appropriate. The stages of development are the same for children with cerebral palsy as they are for non-handicapped children, though at a slower rate of achievement. Certain stages may never be achieved, or are skipped, and children with cerebral palsy seem to reach their maximum sooner.

Question Two: What are the motor development differences between children with cerebral palsy and non-handicapped children?

Responses: Again it depends entirely upon the child. Often chronological age will not correspond to the development age of the child with cerebral palsy. Thus, the child with cerebral palsy will be developmentally delayed in achieving motor skills. It depends greatly on the degree of disability. Often a child with cerebral palsy may skip developmental skills and substitute muscle work to achieve a skill he feels pressure - self pressure or parental pressure - to achieve. Endurance and strength are major differences.

Question Three: What are the motor development similarities between children with cerebral palsy and non-handicapped children?

Responses: Both follow the same developmental sequence. All ideally should achieve an earlier skill before achieving a later skill. Both develop proximal to distal skills.

Question Four: How important is play in motor development?

Responses: Play activities have a meaning in mind based on the child's problem when playing. Play is very important! A child learns about his body, his environment, and spatial relationships through play. The child also experiences movement in different directions and

different planes which is stimulatory to the vestibular system, sense of balance, and relationship with gravity. Play not only builds muscle strength, endurance, but sharpens reflexes, balance, etc. Play is that much more important for the handicapped. Children with cerebral palsy miss it, yet playgrounds are not suitable.

Question Five: What elements should one find in a play space that encourages motor development for non-handicapped children?

Responses: (Participants responses can be found illustrated in Figure 4.1, page 60.)

Question Six: What are the differences between children with cerebral palsy and non-handicapped children's play?

Responses: It depends on the child, but a child with cerebral palsy may find many of the playground equipment inaccessible. A child with cerebral palsy may not have good postural stability or balance to use some of the playground equipment. The child with cerebral palsy may be verbally/physically limited in understanding rules and following directions. A child with cerebral palsy may not have as refined (integrated) reflexes to allow some types of activity. Children with cerebral palsy are often lacking in experience of the equipment,

ACCESS TO EQUIPMENT TAKEN OUT
BICYCLES
HILLS - UP/DOWN
JUNGLE GYMS
MERRY-GO-ROUND
OBSTACLE COURSE
ROLLERS - CYLINDERS
SANDBOX
SANDTABLE
SLIDES
STABLE TOYS THAT ROCK
SUSPENDED TOYS
SWINGING BRIDGE
SWINGS
TEETER-TOTTERS
TETHERBALL
THINGS TO CLIMB IN OR OUT
TRAPEEZE
TRICYCLES - "HOT WHEELS"
WADING POOL
WATER TABLE

Figure 4.1 - Non-handicapped Play Space List of Apparatus Types

independence, motivation, and time. There is less group play and little interaction among peers. The child with cerebral palsy may often fall and/or stumble. The child is not in symmetry, s/he is asymmetrical. Movement about the play area can be slow or can be deliberate, sharp, quick, fast, or jerky.

Question Seven: What are the similarities between children with cerebral palsy and non-handicapped children's play?

Responses: They are children. Their wants and needs are the same. Cooperation and team spirit while playing a game are necessary. They strive to achieve some type of motion. There is interaction with others and peer imitation. Stimulation of the vestibular system.

Question Eight: What elements should one find in a play space that encourages motor development for children with cerebral palsy?

Responses: (Participants responses can be found illustrated in Figure 4.2, page 62.)

Question Nine: Are there any existing playgrounds in Kansas for the handicapped?

Responses: Yes.

ACCESSIBLE MERRY-GO-ROUND
ADAPTED TRICYCLE - HANDGRIPS, STRAPS
ON PEDALS, SEATBELT
BARS AT DIFFERENT HEIGHTS
BOLSTER SEATS ON MERRY-GO-ROUND
CARPETED AREAS
FOAM
GRASSY INCLINE TO ROLL DOWN
GROUP ACTIVITIES
HAMMOCK
LADDERS
LARGE SIT-N-SPIN
MATS UNDER BARS
MODIFICATIONS/ADAPTATIONS TO
NON-HANDICAPPED APPARATUS TYPES
MOONWALK
OBSTACLE COURSE
OPEN SPACES
PAVED/NONPAVED AREAS
PORCHSWING
RAISED SANDBOX
RAMP TO SLIPPERY SLIDE
RAMPS FOR SCOOTER ACTIVITY
ROLLOUT CARPETS
SAND
SCOOTER BOARDS
SEATBELT ON MANY APPARATUS TYPES
SPECIAL ACTIVITIES
SWING FOR DIPLEGIC
TEETER - TOTTER
TUNNELS
WHEELCHAIR ACCESSIBLE

Figure 4.2 - Cerebral Palsy Play Space List of Apparatus Types

Question Ten: Where are they located, if they exist?

Responses: Good examples include the Capper Foundation in Topeka and three parks in Newton.

Question Eleven: Do the playgrounds encourage motor development?

Responses: The three parks in Newton do not. The Capper Foundation has more adaptations for wheelchairs but do allow movement and social interaction.

Question Twelve: What are the problems with existing playgrounds?

Responses: They are non-adaptable to children with motor handicaps. A child may require one-on-one supervision if usable at all. Surfaces are unsuitable, yet they are either all dirt or grass. There are on/off problems and balance problems.

Question Thirteen: What are the strong points of existing playgrounds?

Responses: Stimulation of the vestibular system, encouraging muscle strengthening, balance, etc. Bars that lead from one activity to another.

Question Fourteen: Are there climatic (weather) limitations?

Responses: Climatic limitations depend upon the adaptations to the apparatus types. Cold and heat seem to effect the movements of a child with cerebral palsy.

As mentioned in the methodology, documentation of the study site play spaces involved photographs of the various types of apparatus and a diagram of the layout of the play space. Twenty color photographs were taken of the study site play spaces after the first interview session. A single apparatus, whenever possible, was the focal point of each photograph. The layouts of each of the three study sites was also done after the photographs were taken. The photographs and diagrams can be found in Appendix Two.

The second interview session took place four weeks after the first interview session. The twenty color photographs were used during the second interview session. Questions were drawn up through a series of revisions done during thesis committee meetings. All interviews lasted no more than sixty minutes, and were conducted at each participant's office. The second interview sessions were tape recorded to insure thorough and accurate transcription of responses. (This process of data collection is different from the data collection of the first interview sessions because this option of tape recording was not known to the investigator at the

time of the first interview sessions.) A list of the questions can be found in Appendix Three. Participants responses can be found in Figure 4.3, page 66, Figure 4.4, page 67, and Figure 4.5, page 68.

Data Analysis

The function of analyzing the data was to obtain knowledge of the study site play spaces and the various apparatus in those play spaces, along with the interviews, so that development of design standards for play spaces for children with cerebral palsy could be accomplished. Three sources of data were used in the analysis process, they were:

1. the literature reviewed,
2. the first interview session, and
3. the second interview session.

The relationships between these three sources are shown in Figure 4.6, page 70.

The following preliminary conclusions are based on a comparison and the synthesis of the analysis of the gathered data and concerns the development of the design standards. Because the collection of data occurred in Kansas only, the preliminary conclusions are somewhat limited. Data from other areas of the country could change and/or modify the results and the conclusions.

INTERVIEW QUESTION:	APPARATUS			PHOTOGRAPH:																
	1. JUNGLE GYM	2. MULTI-PURPOSE COURT	3. SWING (TYPE A)	4. ELEVATED SANDBOX (TYPE B)	5. CHIN-UP BARS JUNGLE GYM	6. SLIDE	7. SWINGS (TYPE B)	8. PLAY-HOUSE	9. ELEVATED SANDBOX (TYPE A)	10. SWINGS (TYPE C)	11. MERRY-GO-ROUND (TYPE A)	12. MULTI-USE APPARATUS LEVELS	13. SWINGS (TYPES C & D)	14. SAND-BOX	15. TUNNEL	16. SWINGS (TYPE E)	17. MOVEABLE BACKBOARD	18. MULTI-LEVELS	19. MERRY-GO-ROUND (TYPE B)	20. TEETER-TOTTER
1	YES 4 NO 1 MAYBE 1	YES 5 NO 0 MAYBE 1	YES 6 NO 0 MAYBE 0	YES 6 NO 0 MAYBE 0	YES 6 NO 0 MAYBE 0	YES 2 NO 3 MAYBE 1	YES 4 NO 1 MAYBE 1	YES 6 NO 0 MAYBE 0	YES 6 NO 0 MAYBE 0	YES 6 NO 0 MAYBE 0	YES 6 NO 0 MAYBE 0	YES 5 NO 0 MAYBE 1	YES 4 NO 0 MAYBE 2	YES 6 NO 0 MAYBE 0	YES 4 NO 0 MAYBE 2	YES 5 NO 0 MAYBE 1	YES 4 NO 0 MAYBE 2	YES 5 NO 0 MAYBE 1	YES 6 NO 0 MAYBE 0	YES 6 NO 0 MAYBE 0
2	H M L 4 1 1	H M L 4 2 0	H M L 4 2 0	H M L 6 0 0	H M L 4 2 0	H M L 0 4 2	H M L 1 4 1	H M L 6 0 0	H M L 6 0 0	H M L 5 1 0	H M L 4 2 0	H M L 5 1 0	H M L 4 2 0	H M L 6 0 0	H M L 3 2 1	H M L 4 2 0	H M L 5 1 0	H M L 5 1 0	H M L 4 2 0	H M L 6 0 0
3	YES 4 NO 2	YES 6 NO 0	YES 6 NO 0	YES 6 NO 0	YES 6 NO 0	YES 5 NO 1	YES 4 NO 2	YES 6 NO 0	YES 6 NO 0	YES 6 NO 0	YES 6 NO 0	YES 6 NO 0	YES 6 NO 0	YES 6 NO 0	YES 6 NO 0	YES 6 NO 0	YES 6 NO 0	YES 6 NO 0	YES 6 NO 0	YES 6 NO 0
5	USE THE OUTSIDE BARS; SLIDE UNDERNEATH; HOIST OVER THE BARS	N.A.	SAME WAY A NON-HANDICAPPED CHILD; TRANSFERRED WITH HELP	N.A.	INDEPENDENTLY; USE THE BARS	CARRIED; SCOOT UP STEPS; WALK	SIT DOWN; LIFTED ON/OFF	N.A.	N.A.	LIFTED ON/OFF	WALK UP RAMP	RAMP; CLIMB	SIT ON TIRE; SWING UP LEGS; LIFTED ON/OFF	SCOOTING IN	N.A.	LIFTED ON/OFF	N.A.	RAMP; STAIRS; CLIMB	STEPS; SWING LEGS OVER; CLIMB	PLACED ON; HELPED ON; CLIMB OVER
6	USE THEIR ARMS; CRAWL UNDER; WALK IN CIRCLE; LEAN OVER IT	EXPLORATION OF SPACE; RUNNING	NEED TO BE PUSHED; SITTING	HANDS ONLY; FINGER MOVEMENT; BEING CREATIVE	WALK BETWEEN BARS; CRAWL ON KNEES; CLIMBING; SWINGING; PUSHING UP; HANGING	CLIMB STEPS UP; SLIDE DOWN; SLIDE DOWN ON STOMACH	PUSHED; USE LEGS; SWINGING; SITTING; FALLING OUT	PLAY HOUSE; HIDE-N-SEEK	STAND; DIG; BUILD THINGS	SWING; SIT; BEING PUSHED	PUSHED AROUND; SIT; GET DIZZY	SLIDING; JUMPING; EXPLORING; SWINGING; CRAWL	PUSH WITH LEGS; LAY ACROSS WITH BELLY; USING ARMS; SWING; SIT	DIG; BUILD THINGS; ROLL AROUND IN IT; STAND	CRAWL; WALK; WHEEL THRU; SIT IN IT AS A HIDEOUT	PUSHED; PROPELLED BY LEGS; SWING; SIT	THROWING BALL INTO BASKET	SLIDE DOWN; EXPLORING; CRAWL	BEING PUSHED; SIT; GET DIZZY	ROCK BACK AND FORTH; SIT
7	RAIN, SNOW	COLD; RAIN; SNOW	RAIN; SNOW	SNOW; RAIN	COLD; RAIN; SNOW	COLD; RAIN; SNOW	SNOW; RAIN	N.A.	RAIN	SNOW; RAIN	N.A.	SNOW; RAIN	SNOW; RAIN	RAIN	RAIN	RAIN; SNOW	N.A.	RAIN; SNOW	N.A.	N.A.
8	BOTH 2 INDEP. 1 SOME 4	BOTH 4 INDEP. 4 SOME 2	BOTH 4 INDEP. 4 SOME 2	BOTH 3 INDEP. 2 SOME 1	BOTH 3 INDEP. 2 SOME 1	BOTH 3 INDEP. 1 SOME 2	BOTH 4 INDEP. 1 SOME 1	BOTH 3 INDEP. 2 SOME 1	BOTH 3 INDEP. 2 SOME 1	BOTH 4 INDEP. 1 SOME 1	BOTH 3 INDEP. 2 SOME 1	BOTH 3 INDEP. 2 SOME 1	BOTH 3 INDEP. 2 SOME 1	BOTH 4 INDEP. 2 SOME 0	BOTH 3 INDEP. 2 SOME 1	BOTH 4 INDEP. 2 SOME 0	BOTH 3 INDEP. 2 SOME 1	BOTH 4 INDEP. 1 SOME 1	BOTH 3 INDEP. 2 SOME 1	BOTH 3 INDEP. 1 SOME 2

FIGURE 4.3 PRELIMINARY APPARATUS MATRIX - QUESTIONS 1-8

Figure 4.4 - Preliminary Apparatus Matrix - Question 9

WILL A CHILD WITH CEREBRAL PALSY HAVE DIFFICULTY WITH THIS APPARATUS IF THE CHILD HAS:	APPARATUS PHOTOGRAPH																																									
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20																						
a. DIFFICULTY IN INTERPRETING INFORMATION	4	2	2	4	1	5	2	4	2	4	1	5	2	4	0	6	2	4	0	6	1	5	2	4	2	4	1	5	0	6	0	6	0	6	2	4	0	6	0	6		
b. IMPAIRMENT OF SIGHT	2	4	0	6	2	4	0	6	1	5	2	4	2	4	0	6	0	6	0	6	0	6	0	6	2	4	1	5	0	6	0	6	0	6	2	4	2	4	0	6	0	6
c. IMPAIRMENT OF HEARING	0	6	0	6	0	6	0	6	0	6	0	6	0	6	0	6	0	6	0	6	0	6	0	6	0	6	0	6	0	6	0	6	0	6	0	6	0	6	0	6	0	6
d. LOSS OF AGILITY, REACTION TIME AND PAINTING, DIZZINESS OR PROP. BALANCE	0	6	0	6	6	0	2	4	6	0	2	4	2	4	0	6	0	6	2	4	1	5	2	4	6	0	0	6	2	4	6	0	0	6	2	4	1	5	6	0		
e. INCOORDINATION	6	0	0	6	1	5	1	5	2	4	0	6	2	4	0	6	0	6	0	6	0	6	0	6	2	4	1	5	0	6	6	0	0	6	2	4	2	4	0	6	0	6
f. LIMITATIONS OF STAMINA (ENDURANCE)	2	4	0	6	0	6	0	6	2	4	0	6	1	5	0	6	0	6	0	6	0	6	0	6	0	6	0	6	0	6	0	6	0	6	0	6	0	6	0	6	0	6
g. DIFFICULTY IN MOVING HEAD	6	0	2	4	6	0	0	6	6	0	2	4	6	0	0	6	0	6	0	2	4	6	0	0	6	0	0	6	1	5	4	2	2	4	6	0	0	6	0	6		
h. DIFFICULTY IN LIFTING AND REACHING; INABILITY TO USE ARMS AND SHOULDERS	6	0	0	6	6	0	6	0	6	0	2	4	6	0	0	6	6	0	4	2	2	4	1	5	6	0	0	6	0	6	4	2	6	0	1	5	0	6	6	0		
i. DIFFICULTY IN HANDLING/FINGERING	2	4	0	6	2	4	2	4	2	4	0	6	1	5	0	6	1	5	0	6	2	4	2	4	2	4	2	4	0	6	0	6	2	4	0	6	0	6	0	6		
j. DIFFICULTY IN USING LEGS, FEET	6	0	0	6	1	5	0	6	6	0	0	6	2	4	0	6	0	6	1	5	2	4	2	4	0	6	0	6	2	4	2	4	0	6	1	5	0	6	0	6		
k. INABILITY TO USE LEGS, FEET	6	0	0	6	2	4	0	6	1	5	0	6	1	5	0	6	0	6	2	4	0	6	0	6	6	0	0	6	0	6	2	4	2	4	0	6	6	0	0	6	0	6
l. SENSORY LOSS (HYPERESTHESIA)	2	4	0	6	1	5	0	6	2	4	0	6	0	6	0	6	2	4	0	6	0	6	2	4	0	6	2	4	2	4	0	6	0	6	0	6	0	6	0	6	0	6
m. DIMENSIONAL EXTREMES	1	5	0	6	6	0	0	6	0	6	4	2	5	1	0	6	0	6	6	0	0	6	6	0	4	2	0	6	1	5	6	0	0	6	5	1	0	6	6	0		
Y= YES N= NO	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N		
YES-CHILD WITH CEREBRAL PALSY WOULD HAVE DIFFICULTY USING THE APPARATUS											NO-CHILD WITH CEREBRAL PALSY WOULD NOT HAVE DIFFICULTY USING THE APPARATUS																															

Figure 4.5 - Preliminary Apparatus Matrix - Question 4

PHOTO NUMBER AND APPARATUS TYPE	MOTOR FINE	DEVELOPMENT GROSS	SKILL SENSORY
1 JUNGLE GYM			
2 MULTI-PURPOSE COURT			
3 SWING (TYPE A)			
4 ELEVATED SANDBOX (TYPE B)			
5 CHIN-UP BARS/JUNGLE GYM			
6 SLIDE			
7 SWINGS (TYPE B)			
8 PLAYHOUSE			
9 ELEVATED SANDBOX (TYPE A)			
10 SWINGS (TYPE C)			
11 MERRY-GO-ROUND (TYPE A)			
12 MULTI-USE APPARATUS/LEVELS			
13 SWINGS (TYPE C & TYPE D)			
14 SANDBOX			
15 TUNNEL			
16 SWINGS (TYPE E)			
17 MOVEABLE BACKBOARD			
18 MULTI-LEVELS			
19 MERRY-GO-ROUND (TYPE B)			
20 TEETER-TOTTER			

As mentioned in the methodology, a review of certain information derived from the literature established a list of various apparatus which might be found in a prototype play space. This list is illustrated in Figure 4.7, page 70. In analyzing this list of various apparatus, the identified apparatus were compared to information gathered from the first interview session.

The first interview session responses formulated two lists. Figure 4.1 lists the various apparatus types that the interview participants recommended for a non-handicapped play space. Figure 4.2 lists the various apparatus types that the interview participants recommended for a play space for children with cerebral palsy. When both these lists were combined with the information from Figure 4.7, an overall list of play space apparatus types was compiled. This overall list can be seen in Figure 4.8, page 71.

Analysis of the responses from the second interview session formulated three preliminary matrixes. These matrixes are illustrated in Figure 4.3, Figure 4.4, and Figure 4.5.

Figure 4.3 illustrates the interview participant's responses to questions one through eight as they relate

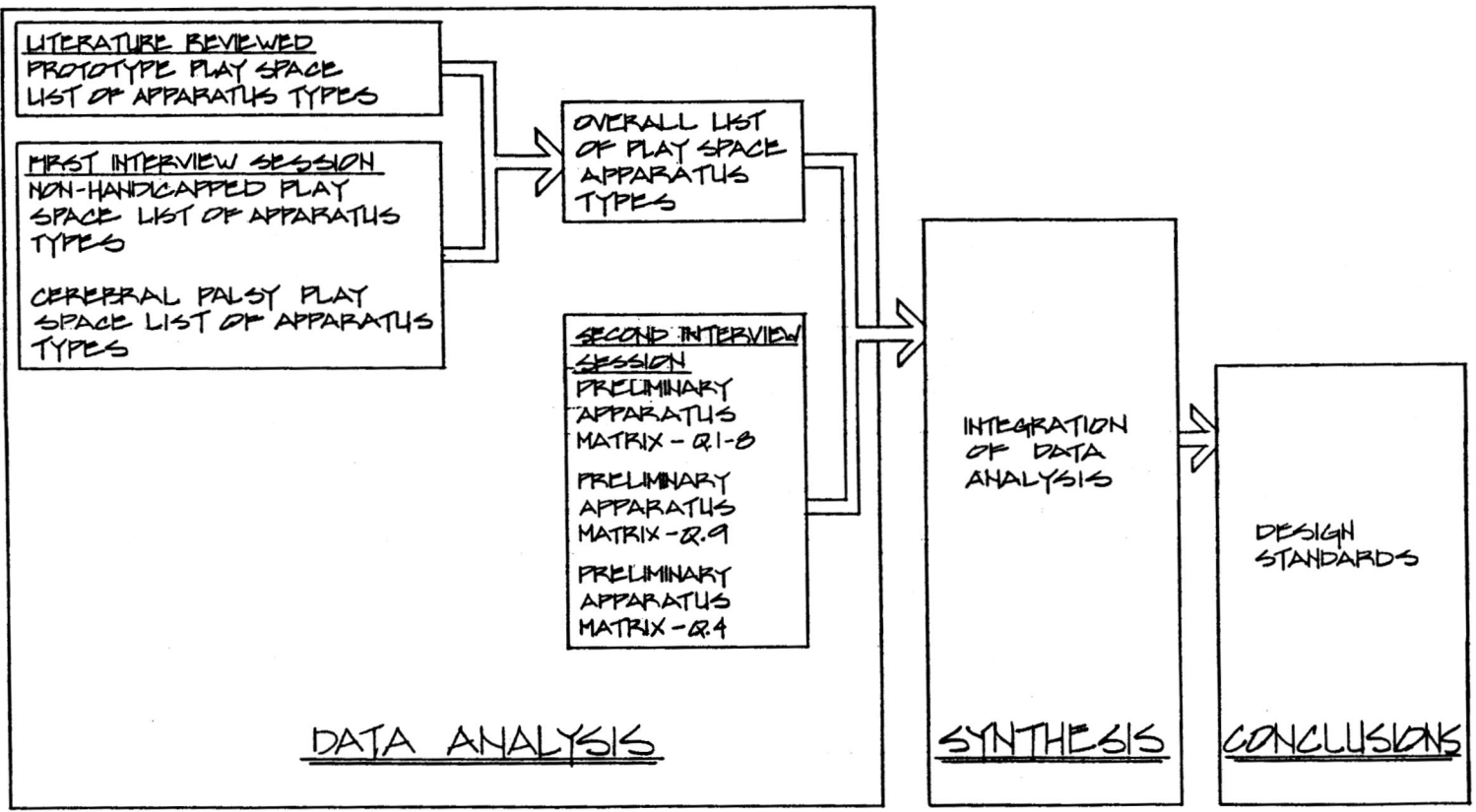


Figure 4.6 - Data Analysis Flow Chart

Figure 4.7 - Prototype Play Space List of Apparatus Types

BALANCE BOARDS
BALLS
BEANBAGS
BICYCLE
BOUNCING HORSE
CARGO NETS
CLIMBING APPARATUS
CLIMBING TOWER
CRAWL THRU, UNDER, OVER
HOOPS
HORIZONTAL LADDER
JUMP ROPES
KNOTTED ROPE
PADDLE WITH BALL ATTACHED
POGO STICK
PUNCHING BAG
PUSH-N-PULL APPARATUS
RAMPS
RING TOSS
ROPE LADDER

SAND
SCOOTER BOARDS
SKATES
SLEDS
SLIDES
STEPPING STONES
TETHERBALL
TEXTURES
TIRE SWING
TOP FEATURES
TRAMPOLINE
TRAPEEZE
TRICYCLE
TUMBLING MAT
TUNNELS
TURNING BARS
WAGON
WATERBED
WATER PLAY
WORKBENCH WITH REAL TOOLS

ACCESS TO EQUIPMENT TAKEN OUT - BALLS, SCOOTER BOARDS,
BEANBAGS, TEN PINS, HOOPS, JUMP ROPES, PADDLES WITH
BALLS ATTACHED, POG STICKS, RING TOSS, SKATES, SLEDS,
TUMBLING MATS

BALANCE BOARDS

BICYCLE

CARGO NETS

CRAWL THRU, UNDER, OVER

JUNGLE GYMS

HAMOC

LADDERS

MERRY-GO-ROUND

MOONWALK

OBSTACLE COURSE

PUNCHING BAG

PUSH-N-PULL APPARATUS

RAMPS

ROCKING APPARATUS

SAND

SANDTABLE

SIT-N-SPIN

SLIDES

SLIPPERY SLIDE

STEPPING STONES

SWINGING BRIDGE

SWINGS

TEETER-TOTTERS

TETHERBALL

TEXTURES

TIRE SWING

TRAMPOLINE

TRAPEEZE

TRICYCLE

TUNNELS

TURNING BARS

WAGON

WATERBED

WATER PLAY

WORKBENCH WITH REAL TOOLS

to the twenty photographs of the second interview session. The following preliminary conclusions concerning Figure 4.3 are discussed by each question.

Question One: What is the relative likelihood of this equipment's use by child with cerebral palsy?

Conclusions: All the apparatus types except one, photo number six, slide, can be used by a child with cerebral palsy. The importance of providing apparatus photo number six was acknowledged by the interview participants.

Question Two: What would this equipment's frequency use be by a child with cerebral palsy?

Conclusions: The frequency of use of the apparatus types photographed were high except for photo number six and seven, swings (Type B). Interview participants thought apparatus types six and seven were moderately used.

Question Three: Is this apparatus valuable to a child with cerebral palsy for motor development?

Conclusions: All apparatus types, except photo number eight, play house, are valuable to a child with cerebral palsy for motor development. Interview participants felt that photo number eight encouraged socialization which is not addressed in this study.

Question Four: What is the motor development type (fine, gross, sensory) of the apparatus?

Conclusions: Responses were illustrated in Figure 4.5.

Question Five: How would a child with cerebral palsy get on/off this apparatus?

Conclusions: Getting on/off the apparatus by a child with cerebral palsy is often the same as a non-handicapped child.

Question Six: What would be the expected and/or observed behavior of a child with cerebral palsy in the manipulation of this apparatus?

Conclusions: The manipulation of the apparatus types by a child with cerebral palsy depends greatly on the degree of disability. Most often the child with cerebral palsy uses the apparatus much like that of a non-handicapped child.

Question Seven: What are the climatic (weather) limitations of this apparatus?

Conclusions: Rain and snow were mentioned frequently. The rain makes many of the apparatus types slippery. The cold limits a child with cerebral palsy due to the bulky clothing that must be worn, making it much more difficult for the child with cerebral palsy to be

mobile. If a child with cerebral palsy is on medication, the sun becomes a limitation.

Question Eight: Could a child with cerebral palsy use this apparatus independently or must the child have some assistance?

Conclusions: All but two, photo numbers one, jungle gym, and two, multipurpose court, of the apparatus types could be used independently and/or with some assistance by a child with cerebral palsy. A child with cerebral palsy would need some assistance in using apparatus photo number one. A child with cerebral palsy could use apparatus photo number two independently.

Figure 4.4 is based on question nine of the second interview session. This matrix illustrates whether a child with cerebral palsy could or could not use any of the photographed apparatus types based on a list of disabilities a child with cerebral palsy might have. The following conclusions concerning Figure 4.4 are discussed by each disability.

Question Nine: Will a child with cerebral palsy have difficulty with this apparatus if the child has:

a. **Difficulty in interpreting information**

Conclusions: All photographed apparatus types could be used by a child with cerebral palsy.

b. Impairment of Sight

Conclusions: All photographed apparatus types could be used by a child with cerebral palsy.

c. Impairment of hearing

Conclusions: All photographed apparatus types could be used by a child with cerebral palsy.

d. Loss of agility, reaction time and fainting, dizziness, or poor balance

Conclusions: All apparatus types except photo numbers three, swing (type A); five, chin-up bars/jungle gym; thirteen, swings (types C and D); and twenty, teeter totter, could be used by a child with cerebral palsy. Poor balance is of biggest concern for a child with cerebral palsy in using apparatus photo numbers three, five, thirteen, and twenty.

e. Incoordination

Conclusions: Apparatus photo number one, jungle gym, would be difficult for a child with cerebral palsy. Many children with cerebral palsy have mobility problems. All other photographed apparatus types could be used by a child with cerebral palsy.

f. Limitations of stamina (endurance)

Conclusions: A child with cerebral palsy may tire easily, have shortness of breath due to exertion while trying to use apparatus photo number one. All other

photographed apparatus types could be used by a child with cerebral palsy.

g. Difficulty in moving head

Conclusions: Many children with cerebral palsy do not have good head control. Apparatus photo numbers three, swing (type A); five, chin-up bars/jungle gym; seven, swings (type B); ten, swings (type C); twelve, multi-use apparatus/levels; thirteen, swings (type C and type D); fifteen, tunnel; sixteen, swings (type E); and eighteen, multi-levels, would be difficult for a child with cerebral palsy. All other photographed apparatus types could be used by a child with cerebral palsy.

h. Difficulty in lifting and reaching and inability to use arms and shoulders

Conclusions: Depending upon the severity of upper extremity impairment, a child with cerebral palsy would have difficulty using apparatus photo numbers one, jungle gym; three, swing (type A); four, elevated sandbox (type B); five, chin-up bars/jungle gym; seven, swings (type B); nine, elevated sandbox (type A); ten, swings (type C); thirteen, swings (type C and type D); sixteen, swings (type E); seventeen, moveable backboard; and twenty, teeter-totter. All other photographed apparatus types could be used by a child with cerebral palsy.

i. Difficulty in handling or fingering

Conclusions: Some children with cerebral palsy cannot perform fine hand and/or finger movements. Therefore, a child with cerebral palsy with this disability would have difficulty using apparatus photo number one, jungle gym. All other photographed apparatus types could be used by a child with cerebral palsy.

j. Difficulty in using legs, feet

Conclusions: Children with cerebral palsy who walk with mobility aids and/or have difficulty sitting, bending, and kneeling would most likely have difficulties in using apparatus photo numbers one, jungle gym; five, chin-up bars/jungle gym; and fifteen, tunnel. All other photographed apparatus types could be used by a child with cerebral palsy.

k. Inability to use legs, feet

Conclusions: Children with cerebral palsy with this disability will most likely find apparatus photo numbers one, jungle gym; twelve, multi-use apparatus/levels; fifteen, tunnels; and eighteen, multi-levels, difficult to manipulate. All other photographed apparatus types could be used by a child with cerebral palsy.

l. Sensory loss (hypesthesia)

Conclusions: All photographed apparatus types could be used by a child with cerebral palsy.

m. Dimensional extremes

Conclusions: If a child with cerebral palsy is too short, too tall, or is obese, that child will have difficulty with apparatus photo numbers three, swing (type A); four, elevated sandbox (type B); six, slide; seven, swings (type B); ten, swings (type C); twelve, multi-use apparatus/levels; thirteen, swings (type C and type D); fifteen, tunnel; sixteen, swings (type E); eighteen, multi-levels; and twenty, teeter-totter. All other photographed apparatus types could be used by a child with cerebral palsy.

The relationships between the various existing play space apparatus types and motor development skills are illustrated in Figure 4.5. Responses from question four of the second interview session resulted in Figure 4.5. Most all of the apparatus types in the existing study sites play spaces promote fine, gross, and sensory motor development, giving a child with cerebral palsy a variety of apparatus types to choose from in the play space. Apparatus photo number eight does not promote motor development.

Synthesis

The findings from the synthesis of the responses from the second interview session, Figure 4.3, Figure 4.4, Figure 4.5, and the resulting factors of the

overall list of play space apparatus types, Figure 4.8, were integrated. Out of this process of synthesis design standards for play spaces for children with cerebral palsy were developed.

CHAPTER FIVE: CONCLUSIONS AND FURTHER STUDY

Utilization of Study

This study is of value to anyone wanting to provide an appropriate play space for the physically handicapped. Professionals may use the design standards as a tool to provide their client group with a more supportive environment in which to learn (play). In addition, these design standards can help educate the general public as to the needs of the physically handicapped populations and help define the importance of providing an appropriate play space environment.

Conclusions/Design Standards

Design standards may be applied to existing sites or used as a building block for a new facility. Apparatus selections presented are general enough to be applicable to the physically handicapped population as a whole but are directed towards children with cerebral palsy. Figure 4.5 lists the various apparatus types that children with cerebral palsy can manipulate. This list does not mean other apparatus types could not be included in the play space. Nor does it mean that all the apparatus types have to be included in the play space.

There are climatic (weather) limitations to be considered when designing a play space for children with cerebral palsy. Rain may make many of the apparatus types wet and slippery. The bulky clothing that must be worn when it is cold outside makes it much more difficult for children with cerebral palsy to move freely. The sun and heat become limitations when a child with cerebral palsy is on certain medication. Some kind of shade should be provided, whether it is shade by trees or by shade structures.

Depending upon the degree of disability of a child with cerebral palsy, many of the apparatus types could be used independently and/or with some assistance. Supervision of children with cerebral palsy as they interact with the various apparatus types is often recommended.

As stated in Chapter 2, Walston (1974) provided some useful goals in designing play spaces for the school-aged child. They are:

1. The play space promotes the optimum physical development of each child.
2. It develops the motor skill abilities of each child in terms of performance, adaptability, ingenuity, and efficiency in coping with new and varied situations.

3. The play space should develop physical as well as mental coordination.
4. The play space should provide situations where each child can feel a sense of achievement through their own efforts and perseverance.
5. It should provide opportunities for experiences as wide and expansive as is possible in all types of movement.
6. The play space should provide situations where the child exerts inquiry, expression, creativity, and self-control in movement.

Following is a discussion of each design standard and how it relates to Walston's goals. Because many of the apparatus types in Figure 4.5 promote fine, gross, and sensory motor skills, the optimum physical development is provided for children with cerebral palsy.

The elevated sandbox promotes fine and sensory motor development. A multi-level elevated sandbox would be accessible to the child with cerebral palsy and a range of other disabilities. Playing with sand would provide situations to exert creativity, expression, ingenuity, and mental coordination for a child with cerebral palsy.

The jungle gym promotes fine, gross and sensory motor development. Bars at varying heights and widths would best meet the needs of the child with cerebral palsy. The jungle gym would provide self-control of movement, varied experiences of movement, and many opportunities for movement. Thus, giving a child with cerebral palsy a sense of achievement through his/her own efforts and perseverance.

A merry-go-round promotes fine, gross and sensory motor development. Straps and/or seat belts to confine and support the child with cerebral palsy should be provided. Also, ramps should be provided to make the merry-go-round more accessible to the child. A merry-go-round provides situations where the child with cerebral palsy can exert expression and self-control while experiencing a type of movement.

A moveable backboard promotes fine, gross, and sensory motor development. Children with cerebral palsy who have varying degrees of disabilities would be able to manipulate the backboard if it was able to be moved to various heights and distances. A moveable backboard would provide situations where each child with cerebral palsy could feel a sense of achievement.

Multi-levels/apparatus types promotes fine, gross, and sensory motor development. Accessibility for

children with cerebral palsy who have varying degrees of disabilities need to be addressed by providing ramps, seat belts, straps, etc. to the various levels and apparatus types. Multi-levels/apparatus types provide development in terms of performance, adaptability, ingenuity, and efficiency in coping with new and varied situations for children with cerebral palsy. Also, multi-levels/apparatus types provide many types of movements so that the child with cerebral palsy can exert self-control in movement. Thus, providing situations where children with cerebral palsy can achieve through their own efforts and perseverance.

A multi-purpose court promotes gross motor development. Equipment that can be used on the multi-purpose court would also promote fine and sensory motor development. A multi-purpose court would provide new and varied movement so that a child could adapt to multiple experiences and feel the sense of achievement.

A sandbox promotes fine, gross, and sensory motor development. Playing with sand would provide children with cerebral palsy the opportunity to experience a sense of achievement for their efforts while exerting creativity, expression, ingenuity, and mental coordination.

Slides promote fine, gross, and sensory motor development. The disabilities of the child with cerebral palsy will dictate the type of slide the child will be able to manipulate. Easy accessibility and degree of slope are also factors in determining the type of slide. Slides provide opportunities for a child with cerebral palsy to exert expression and self-control in movement.

Swings promote fine, gross, and sensory motor development. The varying degrees of disabilities of a child with cerebral palsy will dictate the type of swing she/he will be able to manipulate and will also dictate motor development. Straps and/or seat belts to confine and support the child should be provided. Swings provide situations and experiences for expression and self-control in movement.

Teeter-totters promote fine, gross, and sensory motor development. Straps and/or seat belts that confine and support the child with cerebral palsy should be provided. Teeter-totters would provide the child with a chance to exert and experience self-control in movement.

Tunnels promote fine, gross, and sensory motor development. Widths and heights of tunnels should be large enough to easily maneuver through for children

with cerebral palsy who have varying degrees of disabilities. Tunnels provide these children a range of opportunities to experience movement through their own efforts.

Recommendations for Further Study

As the needs of the physically handicapped become increasingly apparent to professionals and the public, further research should be undertaken. The topic of this study can be re-examined in a variety of ways and perhaps should be.

Case studies of play spaces using these design standards can be further researched to determine specific apparatus types for specific handicapped populations.

This study was limited to three metropolitan cities, thus, information from other cities and regions of the country may result in varying conclusions concerning the design standards. Additional investigations could be undertaken involving actual case studies of play spaces for children with cerebral palsy and could also include studies of other handicapped populations.

This study was limited to fine, gross, and sensory motor development. Other areas of development, such as social growth, could be studied to determine how they interact with the design standards.

A prototype play space using the design standards could be researched to determine the success and failure of fine, gross, and sensory motor development.

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APPENDIX ONE

First Interview Session Questions

1. What are the basic stages of motor development for children with cerebral palsy between the ages of four and six?
2. What are the motor development differences between children with cerebral palsy and non-handicapped children?
3. What are the motor development similarities between children with cerebral palsy and non-handicapped children?
4. How important is play in motor development?
5. What elements should one find in a play space that encourages motor development for non-handicapped children?
6. What are the differences between children with cerebral palsy and non-handicapped children's play?
7. What are the similarities between children with cerebral palsy and non-handicapped children's play?
8. What elements should one find in a play space that encourages motor development for children with cerebral palsy?
9. Are there any existing playgrounds in Kansas for the handicapped?

10. Where are they located, if they exist?
11. Do the playgrounds encourage motor development?
12. What are the problems with existing playgrounds?
13. What are the strong points of existing playgrounds?
14. Are there climatic (weather) limitations?

APPENDIX TWO
Site Documentation



Photo #1: Jungle Gym



Photo #2: Multi-purpose Court



Photo #3: Swing (Type A)



Photo #4: Elevated Sandbox (Type B)



Photo #5: Chin-up Bars/Jungle Gym



Photo #6: Slide



Photo #7: Swings (Type B)



Photo #8: Playhouse



Photo #9: Elevated Sandbox (Type A)



Photo #10: Swings (Type C)



Photo #11: Merry-go-round (Type A)



Photo #12: Multi-use (Apparatus/Levels)



Photo #13: Swings (Types C and D)



Photo #14: Sandbox



Photo #15: Tunnel



Photo #16: Swings (Type E)



Photo #17: Moveable Backboard



Photo #18: Multi-levels

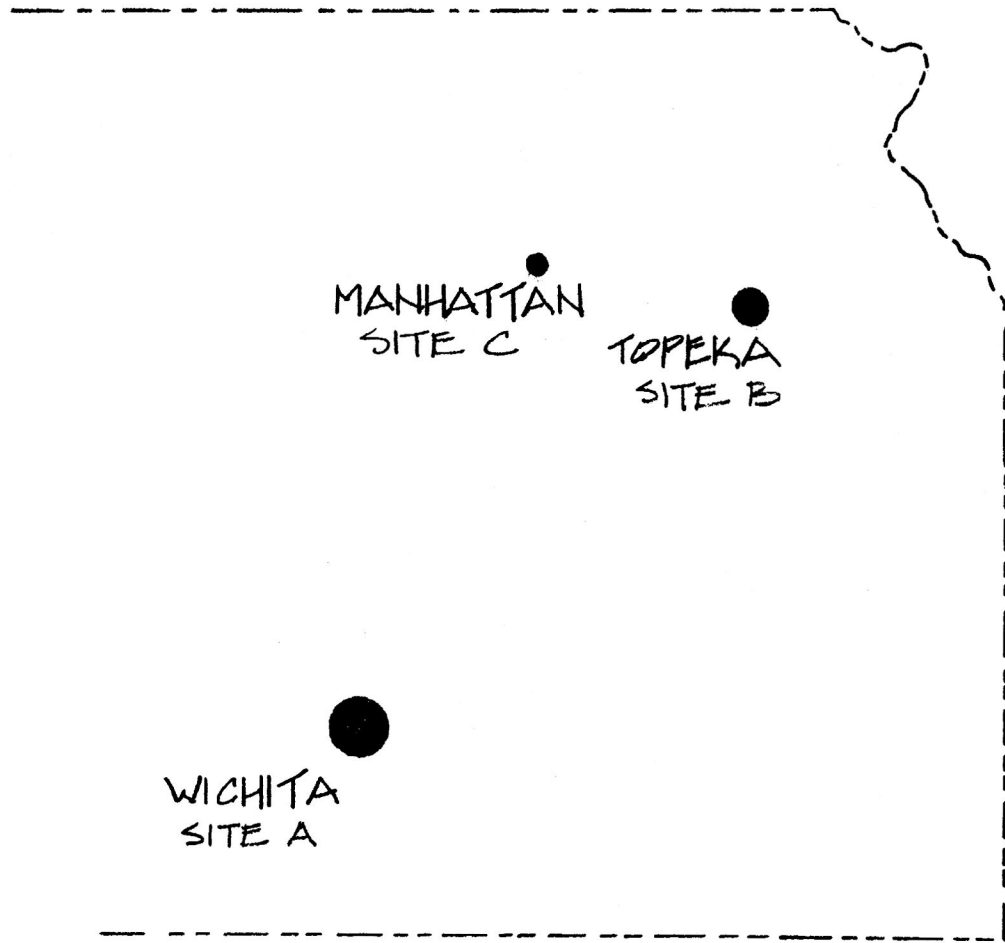


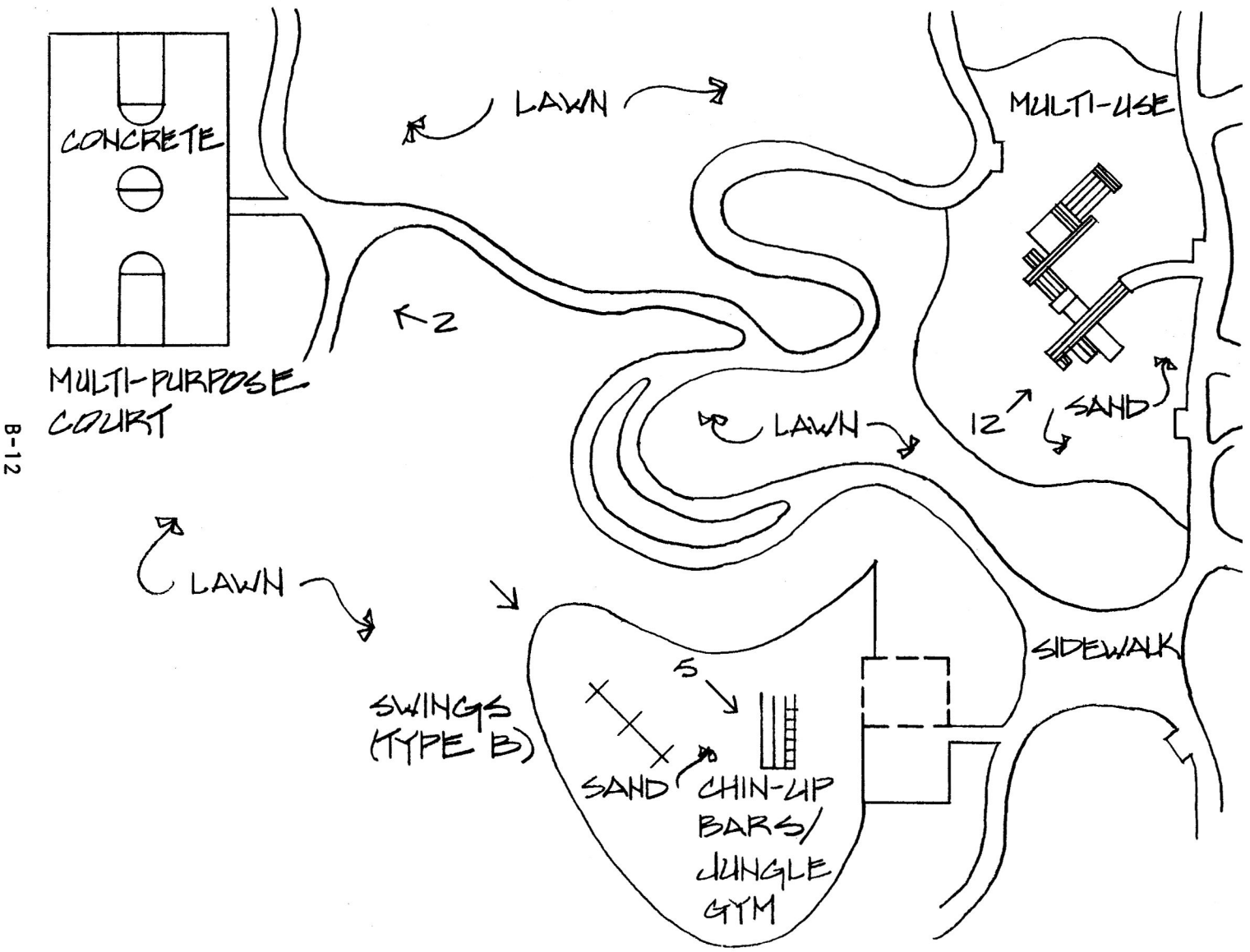
Photo #19: Merry-go-round (Type B)



Photo #20: Teeter-totter

Site Location Map
Not to Scale

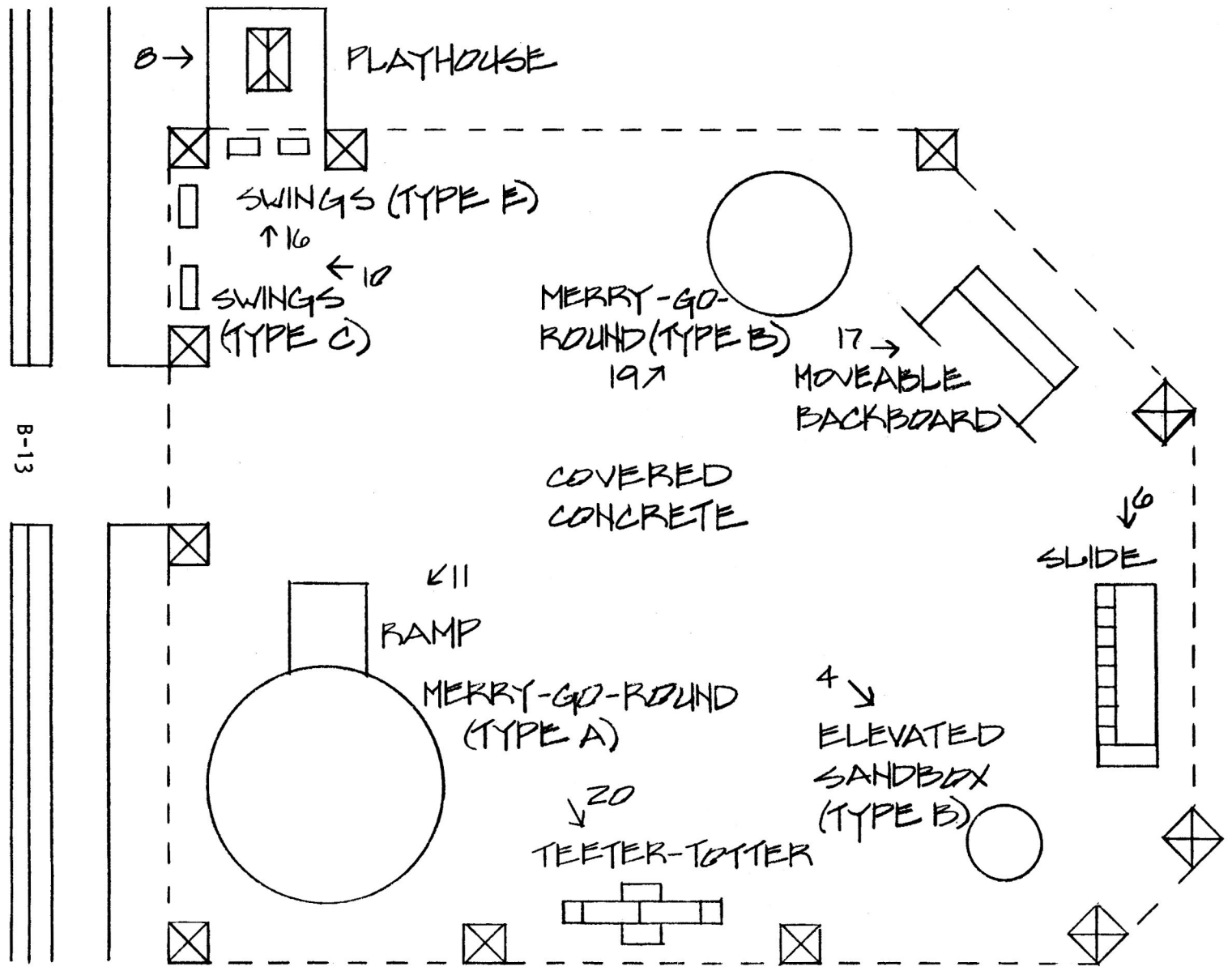


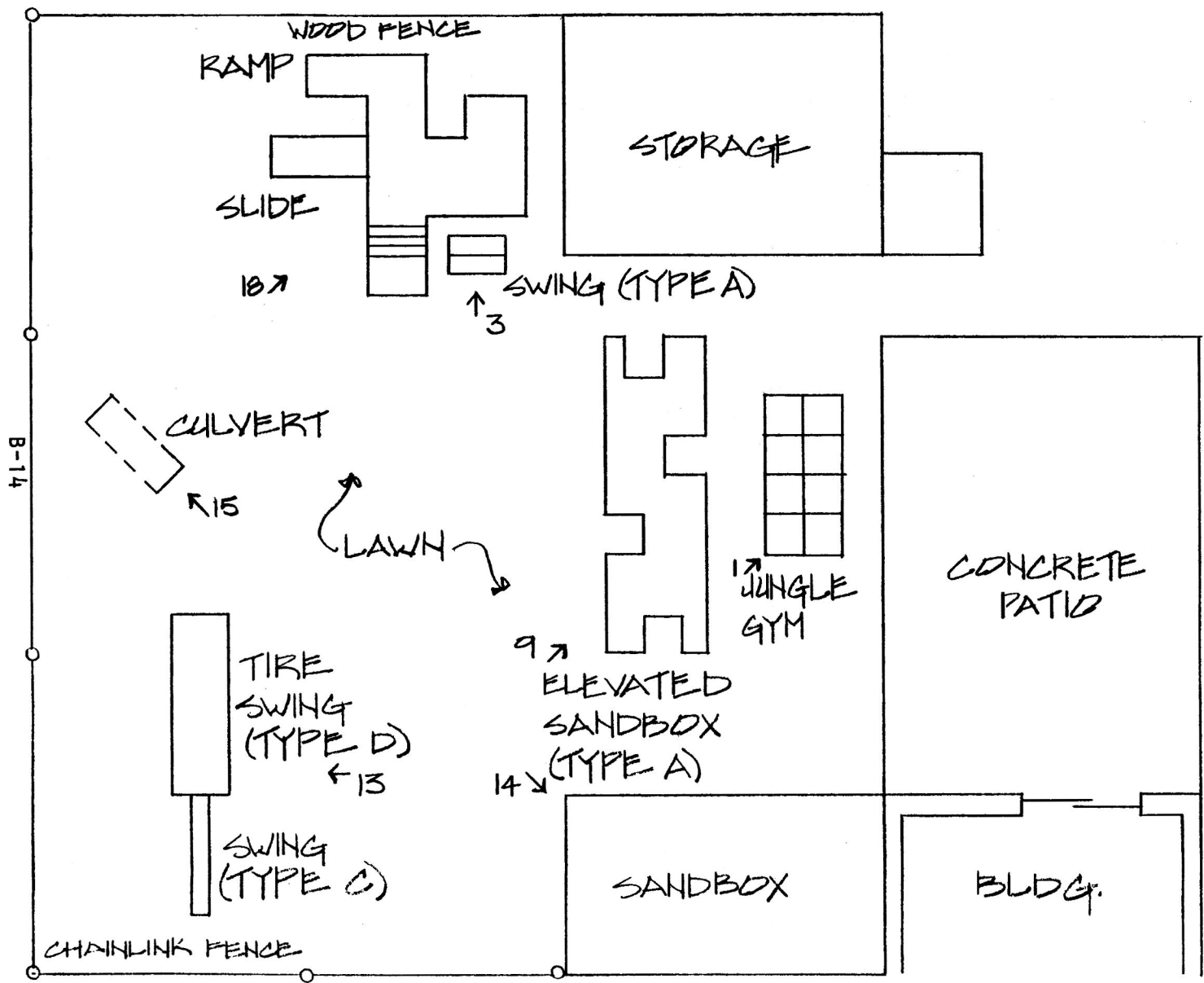


B-12

SITE A
 Not to scale
 Arrows designate photo direction and photo number

SITE B
Not to scale
Arrows designate photo angle and photo number





SITE C
 Not to scale
 Arrows designate photo angle and photo number

APPENDIX THREE

Second Interview Session Questions

1. What is the relative likelihood of its use by a child with cerebral palsy?
2. What would its frequency of use be by a child with cerebral palsy?
3. Is this apparatus valuable to a child with cerebral palsy for motor development?
4. What is the motor development type (fine, gross, sensory) of the apparatus?
5. How would a child with cerebral palsy get on/off this apparatus?
6. What would be the expected and/or observed behavior of a child with cerebral palsy in the manipulation of this apparatus?
7. What are the climatic (weather) limitations of this apparatus?
8. Could a child with cerebral palsy use this apparatus independently or must the child have some assistance?
9. Will a child with cerebral palsy have difficulty with this apparatus if the child has:
 - a. difficulty in interpreting information
 - b. impairment of sight
 - c. impairment of hearing

- d. loss of agility, reaction time and fainting, dizziness, or poor balance
- e. incoordination
- f. limitations of stamina (endurance)
- g. difficulty in moving head
- h. difficulty in lifting and reaching and inability to use arms and shoulders
- i. difficulty in handling or fingering
- j. difficulty in using legs, feet
- k. inability to use legs, feet
- l. sensory loss (hypesthesia)
- m. dimensional extremes

**DESIGN STANDARDS FOR PLAY SPACES FOR
CHILDREN WITH CEREBRAL PALSY**

by

JEANMARY ALEXANDER

B.S., Wichita State University, 1980

AN ABSTRACT OF A MASTER'S THESIS

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ABSTRACT

While all children love to play, some children have fewer opportunities to do so because of their mental and/or physical limitations. This study focused on children with cerebral palsy. A well-designed play space is important to these children to help develop their motor skills.

The purpose of this study is to develop Design Standards for play spaces for children with cerebral palsy. The play space will provide for improved development of fine, gross, and sensory motor skills necessary for these children. This study does not deal with design implementation of a play space but rather the design of a play space for children with cerebral palsy. The Design Standards will be examples of apparatus types that should be included in the play space design. Professionals may use the Design Standards as a tool to provide the children with a more supportive environment in which to play.

Three study sites were chosen as a basis for investigation. All three sites have a variety of apparatus types within their play space. The topographic features of the three study sites were appropriate for the physically handicapped. The six interview participants represented a cross-section of

physical and occupational therapists and instructors. Four categories of information and data were gathered.

The function of analyzing the data was to obtain knowledge of the study site's various apparatus types to develop Design Standards for play spaces for children with cerebral palsy.

The study shows that twenty-two apparatus types can be manipulated by children with cerebral palsy. The analysis of the data suggests that most of the apparatus types in existing play spaces promote fine, gross and sensory motor development. A child with cerebral palsy has a variety of apparatus types to choose from in the play space. Eight Design Standards are illustrated to reveal how they can be integrated into existing sites or used as building blocks for a new facility.