OSMOTION:
Balancing Gradients in the Schoolyard

by

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Abstract

Recent theory on child development suggests that environments designed for children need to provide for their physical, emotional, social and cognitive development. Elementary schoolyards are typically used by children between the ages of five and thirteen, but the spatial allocation of play opportunities provided for older versus younger children is often inequitable. The age range of elementary school children reflects a diverse level of interests and abilities. Such diversity may be accommodated in the schoolyard by providing a range of play opportunities that are appropriate for younger and older children alike, and respond to the child's need for physical, sensorial, intellectual and social engagement. The variety of play opportunities provided, the spatial requirements of each, and the flow of movement between them are all essential components of playground design. This paper reviews contemporary theory regarding child development as well as principals that guide the design of children's learning and play environments, and describes a design proposal that incorporates them.

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Acknowledgements

My mother had no idea that when she set up complex obstacle courses in our backyard, or sent us out on block-wide treasure hunts that she was instilling in me a deep-seated interest in the design of play and learning environments for children. Exploring these environments through the lens of landscape architecture has been rewarding.

I would like to thank all those who have assisted me through this project: my thesis committee members Patrick Condon, Alan Duncan and Joanna Staniszkis for taking the time to advise and guide me, my thesis chair Susan Herrington for her continued assistance, insights, encouragement and good humor, Robert Moore, the principal at Britannia Elementary School, Rick Kuriyama from the maintenance department at the Vancouver School Board, my fellow lab technicians at the CHILD project, Murray and Zeppelin Associates, and my friends and family for their patience and support.

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Overview

PART I: Theoretical Framework

Part one begins with a brief review of elementary school children's development characteristics, as they relate to play. This is followed by an outline of recent theory regarding play and child development, and then an introduction to a model of early childhood education termed "Reggio Children" from which I will draw design principles to frame my proposal for the redesign of the schoolyard. Borrowing from "Reggio Children", I explore "osmosis" as a design metaphor and its influence on materials, spatial distribution, and the integration of the site with the surrounding community. A summary of the physical, cognitive, emotional and social development needs of elementary school age children will focus on implications for playground design. This will conclude with insights regarding a child's of depth of experience in terms of range development and sense of 'place.'

PART II: Site Analysis

Part two introduces the Britannia Elementary School site with a profile of the community it is situated in, an overview of the Britannia Community Services Center it is a part of, and the history of the design and development of the site. This will be followed by an analysis of the site, synthesized into five site critiques.

PART III: Design Proposal

Each of the five critiques identified in the site analysis are addressed in the design proposal, which is guided by contemporary theory and design principles concerning children's learning environments.

PART I: Theoretical Framework

Child Profile

Middle childhood spans the years from six to eleven or twelve years of age. Children of this age range in height from 110cm to full adult height, and weigh between 22kg and adult weight (CMHC 1997, p.8). Perceptual-motor abilities develop quickly as the child matures: in infancy, a child relies on touch to gather information about the environment, whereas a toddler relies primarily on vision. As the child grows older, she is increasingly able to integrate sound with tactile and visual information (Sayre and Gallagher 2001, p.159). Children develop competence in fine motor skills and hand-eye coordination during early middle childhood, and by third or fourth grade they are able to handwrite rapidly (Davies 1999, p.296). Cognitive development is reflected in the child's progression from symbolic play (two to eight years), to the development of problem-solving abilities (seven to eleven years), to competence in abstract thought (eleven to twelve years) (Sayre and Gallagher 2001, p.30).

Children's size, strength and power increase as they age, which directly influences their level of physical ability (*ibid.*, p.30). Basic motor skills such as running, jumping, kicking, throwing and catching are well developed by early middle childhood, and continue to improve with maturation and practice (Davies 1999, p.295). These gross motor abilities provide the foundation for sports-specific activities (Sayre and Gallagher 2001, p.32). Between the age of six to nine, children are often involved in a range of organized activities and sports. Children of this age are commonly driven by a desire to master skills in sports, music, crafts etc. Their level of competence directly relates to their sense of self-esteem (Miller 1985, p.142), which underscores the need to provide a range of play opportunities, so that each child can excel at an activity.

Between the ages of six to eight, a child's interaction with other children of a similar age becomes increasingly important, and the formation of clubs and cliques is common (Miller 1985, p.143). During middle childhood, children become increasingly independent and often look to older siblings and peers as models for behaviour (Davies 1999, p. 8). A growth spurt between age ten to twelve and a change in hormones results in a higher level of activity, defiance of authority, self-centred behaviour and emotional instability (*ibid.,* 1999). By the age of eleven or twelve, the child is generally able to view a situation from various

perspectives, has many "adaptive strategies of self-regulation" and has developed skill through practice and concentrated learning (*ibid.*, p.337). In order to accommodate this mode of skill development it is important to provide opportunities that respond to the child's intellectual curiosity (CMHC 1997, p.9). The following citation from Davies (1999) summarizes development characteristics for middle childhood that relate to play:

> "•play is increasingly sublimated into a work orientation, emphasizing physical skills and intellectual competence (6-7 years +)
>
> •play continues to be an important source of pleasure and discharge, but now is increasingly ritualised into games (6 years +)
>
> •fantasy play is increasingly ritualised and rule governed (6 years +)
>
> •uses of fantasy include displacement of feelings and wishes into imaginary scenarios and imagining the self in more competent or grown-up roles (6 years +)
>
> •interest in collections and hobbies (7-8 year +)
>
> •interest in games involving planning and strategy (10 – 12 years)"
>
> (Davies 1999, p.339)

The design of outdoor play environments for elementary school-aged children should reflect their level of ability and accommodate their varied modes of learning and their diverse interests in order to promote physical, emotional, social and cognitive development. Unfortunately, schoolyards usually do not accommodate such pluralism. Grant and Littlejohn contend that "There is now mounting evidence that the typical schoolyard design, emphasizing surveillance and team sports, exacerbates discipline problems, promotes aggressive behaviour, and renders these places, in which children pass a considerable amount of time growing up, miserable and inadequate" (2001, p.6). It follows that given the extensive number of hours children must spend within the confines of the schoolyard, it should be designed in such a way that promotes the progressive development in all areas and offers a range of opportunities for exploration, learning and expression. The following is a brief review of theories on childhood development, and a summary of key

design principles for outdoor learning environments which reflect contemporary theory and research regarding child development. "Reggio Children" will be used as the primary model for the spatial design of early childhood education environments. An overview of the design proposal for the schoolyard at Britannia Elementary concludes the paper.

Theories on Play and Child Development

The original kindergarten was developed in the early 19th century by Friedrich Fröbel. Contemporary theories regarding childhood development reflect many of Fröbel's philosophies, which were attentive to the successive progression of a child's skill development. Fröbel invented a series of "gifts" corresponding to a child's growing competence (Herrington 2001, p.31). Each gift was intended to provide the appropriate level of challenge that would promote the child's development in a range of cognitive and fine motor skills. Fröbel emphasized learning through sensorial engagement and direct interaction with the surrounding physical environment. A strong relationship with the community and understanding of the local landscape and natural systems were developed through outdoor excursions and various programming activities (Herrington 2001). Gardens, cared for by the children, were central to Fröbel's design of the children's learning environment. These gardens, which included individual plots for each child as well as communal plots, promoted cognitive, sensorial and social development.

However, Fröbel's philosophies on childhood development did not reflect the predominant theories of the time. Perceptions held during the 19th century regarding child's play commonly reflected the strong influence of Darwin's theory of evolution, in that play was often viewed as a primitive, instinctual bodily impulse (Mohr 1987). The following three theories on play reflect an emphasis on genetics and evolution that is characteristic of the era: the 'surplus energy theory' proposed that humans have excess energy because civilization has improved our standard of living, and we are now able to meet our basic necessities without full physical exertion. The 'surplus energy' theory emphasizes gross motor activity as a means of expending excess energy. Alternatively, the 'instinct theory' presented play as a genetic impulse to practice and develop life skills in order to prepare for adulthood. A third theory named the 'recapitulation theory' made a direct link between play and genetics, as it suggested that children's play from infants to young children mirrors successive stages of human evolution. For example, a toddler playing in a sandbox imitates

the activities of early land animals, an older child climbing a tree reflects the primate phase, and a teen playing football is reenacting tribal rituals (Mohr 1987, p.14).

A significant shift in the perception of child's play occurred during the 1930s with the contributions of Freud and Piaget. The scope of interest that focused on children's physical development broadened with an increasing recognition of their social, emotional and cognitive development. With the application of his psychoanalytic theory, Freud asserted that children incorporate aspects of real life into their play as a means to gain control over the emotions that the events provoke. Emotional development was central to his perception of child's play. Alternatively, Piaget's research led him to emphasize cognitive development. He proposed that play was the means by which children learn new behaviour. Piaget's contributions have largely influenced contemporary theory regarding child development, which address the interrelation between emotional, cognitive, social and physical development (Mohr 1987, p.14).

Beginning in the 1990s, developmental psychologists increasingly subscribed to the belief that child development is less predictable and more complex than previously believed. It was acknowledged that children use multiple ways of learning and understanding: "Development is a social construction, and the image of the child as a continuous construction of social and cultural contexts is a difficult one to capture. Different points of view must be negotiated and socially reconstructed to get a more accurate portrait of the child" (Fu *et al.* 2002, p.41). This recognition, however, is at odds with the increasing systematisation of schools in Canada and the United States since the 1980s, and the growing obsession with standardization, measuring and testing for specific learning outcomes (Fu *et al.* 2002, p.40). Over the twentieth century, the focus of theories on childhood development has shifted from physical development to emotional, cognitive, and, most recently social development. Focal issues in childhood development over the past generation have been poverty, divorce, teen-pregnancy, violence and victimization, which reflect an emphasis on social development (*ibid.* 2002, p.40).

Reggio Children

The Reggio Emilia approach or "Reggio Children" is a term used to identify a specific model of early childhood education that originated in the region of Emilia, Italy and has developed into a popular model for early childhood education today. Shortly following WWII, new schools were built by parents who wanted their children to develop skills in critical thinking and collaboration, as a means to promote a democratic society. Reggio Emilia's first municipal pre-school opened in 1963, and quickly evolved into a system of municipal early education centers.

The Reggio Emilia approach to early childhood education acknowledges the diversity with which children express themselves, and attempts to accommodate it. This method of early childhood education is predicated on a deep respect for children, their curiosity, their potential, and their right to communicate through a variety of languages or media (Fu *et al.* 2002). These values are reflected in the spatial organization and programme of the school environment.

In the context of this paper, I will use the term "Reggio Children" as an abbreviated way of referencing the theory on the spatial design of children's learning environments developed by educators, architects and designers at the municipal preschools of Reggio Emilia and at Domus Academy during the late 1990s. Their research was presented in the publication *Children, Spaces, Relations: Metaproject for an environment for young children* (1998). This publication exhibits learning environments where children are able to explore and test theories, and seek solutions to their own questions. The design of the schoolyard, which functions as an extension of the learning environment, is likewise influenced by these principles.

An environment that fosters exploration and discovery may also accommodate the interconnected development of emotional, cognitive, social and physical skill in that the space engages intellectual curiosity and provides intellectual challenge as well as opportunities for fine motor play and social interaction. The schoolyard is of particular importance for young children for whom play is a primary means of learning. Reggio Children provides design principles for interior learning environments, the transitional zone between interior and exterior spaces, and the outdoor environment and its relation to the surrounding community. I will focus

on their principle of osmosis and the corresponding principles of permeability, malleability and spatial distribution.

Osmosis

"Osmosis" is used in *Children, Spaces, Relations* (1998) as a design metaphor to promote the integration of the school with its physical and social surroundings. Noting that a strong connection between the school and the town is fundamental, Ceppi and Zini assert that "School architecture and design should embody this principle in terms of osmosis with the surrounding aesthetics and culture as well as in the distribution of space" (1998, p.40). Furthermore, they address the need for the day to day life of the surrounding environment to "permeate" the school (Ceppi and Zini 1998, p.15).

As a design metaphor, osmosis signifies the importance of reciprocal exchange with the surrounding environment. Such exchange may occur as a transfer of materials or information and ideas. Channels of activity or dialogue are established in order to accommodate learning from and sharing with the diverse community surrounding the school. For example, Reggio Children identifies transitional zones between interior and exterior spaces as "filter zones" that are necessary to permit an exchange of information with families (Ceppi and Zini 1998, p.43). Such emphasis promotes a strong connection between the child, the learning environment, and the community.

An osmotic exchange of materials and information also occurs at the level of the physical environment, which is another critical source of learning. Physical forces are made visible when possible, such as the use of textiles to show the movement of the wind. Windows and transparent materials are identified as means to strengthen the connection between events occurring outdoors with indoor activities. This connection allows for more awareness of the daily and seasonal rhythms of the outdoors, including shifts in the weather and the schedules of the adult work environment (Ceppi and Zini 1998, p.41). Likewise, transparency allows for the legibility of interconnections between the environment, built material and technologies. One of the aims in creating such transparency is to promote the understanding of the role of each individual part in the larger process or system to which it contributes (Ceppi and Zini 1998, p.42). Transparency is also advocated as a design principle for the physical layout of the environment, so that it is possible to occupy one space and

look into another. Such visual access allows for an awareness of events occurring outside of one's immediate environment, may accommodate a greater choice of activity, and lends itself to an improved spatial comprehension of the site as a whole (Ceppi and Zini 1998, p.42).

Permeability and Malleability

The exchange of materials, information and ideas associated with osmosis as a design principle underscores the importance of connections and links to the external environment. Such linkages indicate the degree of permeability the site has in relation to its surroundings. Connection or permeation may occur at the level of connection with the physical character and aesthetics of the surrounding environment, allowing the larger community to access and be involved with the site, or making natural or physical processes occurring on site visible. Such linkages help establish the physical character of the space, and help define its programme: "The identity of a place, such as for young children, must come not from formal codes but from the quality and intensity of the links established and the experiences activated within that place: links with other fields of knowledge, other ways of thinking and other identities" (Ceppi and Zini 1998, p.12). These connections thereby expand the opportunities for children to engage with and learn from a wider diversity of sources.

The principle of permeability is associated with that of malleability in its aim to expand the range of opportunities children are presented with in the learning environment. Malleable elements and transformable spaces accommodate a greater degree of diversity, individual expression, and control of space by both children and staff. A malleable environment also provides changeability, which may sustain a longer duration of engagement in a limited amount of space, and provoke cognitive challenge and learning through exploration. The importance of malleability is stressed in Reggio Children, in its assertion that: "The school environment must lend itself to manipulation and transformation by adults and children alike, and be open to different ways of use. The school should be able to change during the day and during the year, to be continuously modeled and re-designed as a result of the experimentation of children and teachers" (Ceppi and Zini 1998, p.38). The variabilityprovided by malleable elements is associated with "range

development" and sense of 'place', both of which will be addressed subsequently.

Spatial Distribution

Osmosis hinges on spatial distribution. Reggio Children highlights the "distribution of space" in its definition of osmosis as a design principle for children's learning environments, as osmosis describes the movement of water to establish equilibrium between areas of unequal concentration (Ceppi and Zini 1998, p.40). Spatial distribution is a key limiting factor in the provision of a diversity of play opportunities and activities. Certain activities such as ball play involve a large spatial area, sometimes over 150 square meters, and generate higher noise levels than most fine motor activities such as sand play or painting. The spatial distribution required of various activities must take into account not only the physical space requirements, but also user groups, spatial adjacencies, and flow between activities.

Design guidelines for playgrounds often advise allocating separate play zones in order to accommodate various types of activities. For example, in the design guidelines for outdoor playgrounds Olds advocates having separate play zones that are linked to allow for easy transition between various zones. A playground for school-age children should include the following spatial divisions: private places easily "owned" by a single child, places for small groups of one to four children, places for large muscle activity involving groups of up to ten children, places for games and sports involving more than ten children, and plenty of free space for children to gather spontaneously (Olds 2001, p.416). These zones should be linked physically and visually, to facilitate children's movement between various zones, and allow them to engage in various activities or disengage from them without being made to feel like they are quitting (Olds 2001, p.417). This approach to schoolyard design which is based on the creation of distinct yet connected zones reflects the metaphor of osmosis, in that it establishes defined areas with selectively permeable 'membranes' in order to accommodate movement across the boundary. Reggio Children refers to "the fluidisation of functional zones", with an emphasis on the relationships enabled through adjacent, integrated spaces (Ceppi and Zini 1998, p. 12). The boundaries of the place are therefore important in that they determine the area of space to be occupied, they regulate access to the space, and they may allow for territorial control and privacy.

Emotional, Cognitive, Social and Physical Development

Biased Play Environments

Ever since playgrounds were initially developed in America in the 19th century, they have typically been designed with an emphasis on a child's physical skill over his or her social, emotional, or cognitive ability (Herrington, 1997). This bias was revealed in research on outdoor play environments conducted by Herrington and Studtmann at child care centres in California and Iowa during the 1990s. It was found that altering the play environment from one that prioritised physical skill to include social and cognitive ability resulted in a change in the social hierarchy among children. In one study 'vegetative rooms', made by an encircling configuration of shrubs, were introduced into the outdoor play environment at a child care center. This new spatial configuration resulted in a shift in emphasis on physical skill to social, emotional, and cognitive ability through socialization and fantasy play. The social hierarchy among the children transferred from those with superior physical ability demonstrated on the play equipment, to those who excelled in their language skills, creativity and imagination (Herrington and Studtmann 1998). An awareness of such biases is necessary in order to establish more inclusive playgrounds that offer children a wider range of activities among which they are able to demonstrate adeptness.

Interconnected Skill Development

A diversity of play opportunities not only deflects biases, it also promotes healthy child development. Recent research underscores the interconnection of physical, emotional, cognitive, and social development in outdoor play environments. For example, studies conclude that access to varied outdoor environments enhances both physical and cognitive development. As a result of studying outdoor daycare playgrounds in Sweden, Grahn found that play in varied outdoor environments improves health, power of concentration, and motor skills including balance, flexibility, speed and strength (1996). Documented cognitive improvements include the ability to work without interruption, the ability to understand the context of an ongoing activity, comprehension without the need for repetition, and reduced restlessness (Grahn 1996). Furthermore, he reports that 'wilder nature' results in more imaginative and more varied play. His findings are supported by related research that recognizes that a diversity of sensory and intellectual stimuli, including

music and kinaesthetic-physical activity, are key to increasing one's learning capacity (Westley 2003, p.32).

The benefits of varied outdoor environments on cognitive development has also been researched by Ulrich, who reports that being active in certain natural settings may enhance high-order cognitive functioning, which "involves integrating diverse material or associating in a flexible way previously unrelated information or concepts" (1993, p.110). This in turn enhances creativity. By extension, playgrounds that offer a range of play opportunities in natural settings or with varied topography and vegetative material may enhance children's cognitive and creative development. Ulrich has also demonstrated that exposure to certain natural environments promotes psychological well-being (1993).

Cognitive Development

Sensorial richness and intellectual engagement are key to a child's development. Sensorial development reaches maturation in childhood, and children gather information about the world through direct physical experience (Sebba 1991). As a child grows older, his or her surroundings are increasingly interpreted through a cognitive lens of analytical perception and assumption. The transition from a direct bodily experience of the world to an analytical perspective results in both a physical and a psychological separation of self from the environment. This underscores the importance of the bodily experience of the playground.

> "Children are born with an immense genetic capacity that enables them to explore, discriminate, and interpret reality through their senses. Neurobiological research has clearly demonstrated the co-protagonism of the senses in the construction and processing of knowledge and individual and group memory. It follows that an unstimulating environment tends to dull and deafen our perceptions. Studies have shown that this is true for even very young children, and therefore schools must be capable of supporting and nourishing the sensory perceptions in order to develop and refine them" (Ceppi and Zini 1998, p.16).

In order to engage multiple senses, opportunities to explore sound, taste, texture, and smell, as well as visual qualities of playgrounds should be

incorporated into their design. Non-toxic vegetation selected for its fragrance, tactile interest, edibility or its usefulness as "play props" provide sensorial richness. According to Moore, "Plants add a critical dimension of change and diversity to children's environments. They greatly extend the range of sensory stimulation beyond that which can be provided by synthetic, manufactured objects" (1993, p.10). In his publication *Plants for Play* (1993), Moore presents lists of plants suited to various types of play and activities, such as 'play props' to stimulate dramatic play and imagination.

Physical Development

Gross Motor activity and physical play that involves risk-taking and physical challenge are also fundamental elements in playground design. 'Graduated challenge' is a necessary consideration because it fosters progressive development, is beneficial psychologically and physically, and allows for risk-taking, which is an essential component of maturation (Marcus 2001, p.71). Furthermore, the provision of a range of challenges responds to the fact that a child's level of ability is varied across any age group, and therefore represents more inclusive design.

Often risk-taking within the playground is compromised by the aim to establish environments that eliminate injury. Standardized playground equipment meets most safety regulations and gives adults a greater sense of security. Play environments that are more ambiguous and do not clearly define the play activity that might occur, such as series of boulders configured on a grass mound, are more difficult to set clear safety standards for. There is a growing tendency in playground design to fill the play environment with standardized, fixed equipment. Although the underlying intent may be to promote safety, critics claim that it results in a degraded play environment. Helle Nebelong, a contemporary landscape architect and playground designer, believes that "Standardisation is dangerous because play becomes simplified and the child does not have to worry about his movements" (2002). Her philosophy is that children who learn to function proficiently in non-standardized play environments may be more adept in manoeuvring in environments beyond the pre-fabricated playground, which may ultimately result in a decreased risk of injury.

Range Development The territorial range of children in the city is often limited to urban parks and playgrounds. This restriction lowers their options for outdoor play. The increase in vehicular traffic likewise reduces access to outdoor play spaces, and public space itself is increasingly structured, regulated and commercialised. Child access to natural landscapes for play has been neglected in open-space design in urban planning, and there has been no history of designating natural play areas for children (Freeman 1995).

Child development in outdoor environments has been researched through studies on the evolution of territorial range. Range evolution is made of two components: range extension, which is an intermittent process of gaining access to new territories, such as when a child begins schooling, and range development, which is the continuous process of experiencing an acquired territory. Range development is a key factor in playground design, because it reflects the need for children to be continually stimulated within a familiar environment. School playgrounds are environments where children spend approximately 200 days each school year, and up to two hours per day. If a kindergarten child spends half that time in the schoolyard, it is possible that a child attending the same school from kindergarten to grade seven might spend up to 3000 hours in the school's outdoor play environment. Coffin and Williams (1989) report that children on average stay at a traditional, fixed-equipment playground for twenty-one minutes (Freeman 1995, p.386). This potentially conflicts with the hundreds of hours spent by children in their school playgrounds. It is likely that the static nature of fixed play equipment cannot meet a child's need for range development. In order to sustain long-term engagement in a single spatial setting, an unpredictable and malleable environment is necessary, and such changeability is provided foremost by nature (Moore and Young 1977, p.93).

Playground designers need to evaluate the breadth and depth of environmental experience they provide. Moore and Young use the term 'territorial range' to represent breadth of experience, and 'place' to refer to depth of experience. Pathways are the connective network joining place and territory, "emphasizing mobility and experiential continuity" (*ibid.,* p.90). This simplified model of environmental experience may be applied to the playground in two ways; either considering the playground as the territorial range containing pathways and smaller 'places', or treating the playground itself as a 'place' connected by pathways to its context in the larger landscape.

Place-making

Adults create a sense of 'place' by modifying their environment. Children, likewise, create places by transforming their surroundings, often making only minor physical adjustments. For example, Moore and Young describe children under eight years old finding 'houses' in the outdoors with minimal transformation of the physical landscape (1977, p.120). However, fixed play equipment generally offers little or no opportunity for a child to intervene or manipulate elements in order to establish a sense of 'place'. Moreover, standardized play equipment typically neither reflects nor enhances the local qualities of place, such as the vegetation, topography, or views the site may offer. Herrington differentiates between play equipment as a product, made of processed materials that do not relate to the landscape, and the integration of landscape with play structures that creates a *place* (1997). Rejecting the typical configuration of fixed play equipment set on a flat ground plane, Herrington and Studtmann advocate a 'landscape-based' design approach to create a sense of 'place' in playgrounds (1998). They promote the use of landscape to create a variety of spatial configurations, reflect local geography, plant materials, and provide varied topography with which play equipment is well integrated.

Summary

Contemporary playground design should reflect recent research and current theories in child development, and accommodate the need for physical, cognitive, emotional and social development. Using osmosis as a design metaphor, the degree of permeability between the site and its surroundings may increase the strength of connections to the external environment and the surrounding community, and provide children with a wider range of sources for learning. The following is a summary of guidelines for playground design, extracted from the preceding overview:

•Social and emotional skill may be enhanced by establishing defined spaces for individual children, pairs or small groups.

•Establishing a flow between defined spatial areas and various play zones will help determine the spatial distribution of these zones, as a range of play activities are diffused throughout the site.

•A diversity of learning modes and interests may be accommodated through the provision of a range of play activities and a rich sensorial environment in recognition of the fact that young children relate to their surroundings in a primarily physical way.

•Malleable elements and transformable environments stimulate intellectual curiosity, allow for self-expression, and may increase the duration of sustained interest, thereby expanding range development and enhancing the experience of place.

PART II: Site Analysis
(refer to Appendix C: i, site introduction)

Grandview-Woodlands

The community of Grandview-Woodlands includes an area of 448 hectares, with a population of 29,085 (2001). Its population has slightly declined (0.4% decrease between 1996 – 2001), though it has a higher percentage of young adults (age 20 – 39) than average for the city of Vancouver. There are approximately 5150 individuals 19 years old and under in the community. A total of nine schools in the area are represented by five public elementary schools, two public secondary schools, one private school and one alternative school. There are twelve childcare facilities, including preschool, daycare and out of school care. The thirteen parks located in Grandview-Woodlands range in size from 0.17 hectares to 1.93 hectares. Grandview Park, which borders the south edge of the site, is 0.89 hectares and includes a playground, a water park, tennis courts and a small stage.

Grandview-Woodlands is an ethnically diverse community, and has a relatively high representation of Italians and Vietnamese. The community is stabilizing over time as mobility rates in the area are declining, and the average age is slightly increasing.

Compared to the City of Vancouver, residents in this community earn nearly one third less income, and over one third more residents live in low income housing. With 32 dwellings per hectare, Grandview-Woodlands is significantly more dense than average for the city of Vancouver, 20.6 dwellings per hectare, and has nearly twice as many low-rise apartment buildings and nearly half as many single-detached homes. Apartments under five stories represent the vast majority of

housing types, at 63.8% (Statistics Canada 2001). This density supports a mixture of retail, local jobs, community services and transit access. The community has many character homes, and more than a quarter of its residences were built before 1946.

Transit and bicycle use is significantly higher in this community than average for the City of Vancouver.

The Britannia Community Services Centre

Situated in the community of Grandview-Woodland, this eighteen acre site is tucked behind Commercial Drive in East Vancouver. Numerous public amenities are clustered on the site including a community center, an elementary school and a secondary school. The formal service boundaries for the center includes Grandview-Woodland and Strathcona, located immediately to the west, although the centre regularly draws members of the general public from beyond these regions.

The clustering and integration of services on the site is impressive. With community buildings that serve the needs of children to seniors, there are usually between thirty to thirty-five activities occurring during a regular programming day at Britannia. The facilities and services currently offered at Britannia are:

An information center
Child-care services, including pre-school and out-of-school care
Community Education
A library that serves the students and the general public
Community recreation programmes for all ages
An elementary school
A secondary school
4 gyms
1 racquetball court
Retired citizens' drop-in center
Teen center
Swimming pool
Fitness center
Ice arena
Track and Sports fields
Tennis courts
Concession stand in arena
Numerous meeting spaces
Various social services agencies
(source: current Britannia Centre brochure, no date)

The Britannia Community Services Centre has the following vision statement: "To be recognized as a leader in building community, promoting partnerships, celebrating diversity and enhancing the life and well-being of everyone who lives, works and plays in our community" (Annual Report 2001, Revised Jan.2004). Unfortunately, the center today is struggling with budget cuts and aging facilities, which are now over 25 years old. To date there have been few additions to the site since its completion in 1976. The first addition to the site was the Grandview Woodland Community Place, built in 2003. Owned by the City of Vancouver and shared with Eastside Family Place, the center provides child care services for toddlers and three to five year olds.

Two public schools are located on the site: Britannia Elementary and Britannia Secondary. Britannia Secondary School is Vancouver's oldest high school, established in 1911. Currently it serves approximately 900 students, from grades eight to twelve. Britannia Elementary School serves over 200 students, from kindergarten to grade seven. The students of these two "inner city" schools represent diverse cultures, needs and interests. The catchment area of each has the highest concentration of First Nations Peoples in Vancouver, and nearly thirty-two percent of its students live in households that receive income assistance.

Over the past two years, the number of students attending Britannia Elementary has been between 207 and 220. Currently they use one classroom in a portable located to the west of the elementary school building, on the lower play field. The school is currently undergoing renovations to eliminate the need for the portable classroom, and will expand the school capacity to 250 children by 2005 (Moore 2004, personal communication).

Site Development -An Experiment in Social Planning

The development of the Britannia Community Services Centre was conceived in the 1960s, and constructed during the following decade. A landmark in urban planning, the site was a joint project by the City of Vancouver and Vancouver School Board to integrate community, civic, and school facilities, using the existing secondary school as a focal point. The Britannia neighbourhood had a large number of families, as reflected by the mid-1970s statistic that the Grandview-Woodland region had the highest number of children per family in Vancouver (Davitt and Martin 2001, p.5), and the neighbourhood strongly supported the development.

Remarkably, the project was co-operatively planned and operated by citizens and civic agencies. The community participated in the process of site planning and design by working in organized citizens groups alongside school and civic officials. A questionnaire was delivered to surrounding households, students conducted in-depth surveys, and focus-group questionnaires were sent out. At that time, the neighbourhood was motivated to take on the project due to recent political success in its struggle against the demolition of houses in Strathcona and against a freeway development through the area (*ibid.*, p.6). The high optimism that came from their successful protests heightened the idealism and activism of the community, and strengthened their resolve to enact social planning at the neighbourhood level. It was also during the late 1960s that the REACH community health center was established on Commercial Drive, Strathcona Property Owners and Tenants Association (SPOTA) was formed, and the playground was developed at Grandview Park, located adjacent to the site on its southern edge. These developments further contributed to the strong neighbourhood sense of community and optimism (*ibid.*, p.7).

Site Design – A Pattern Language

In 1971, Britannia Design (architects Ronald Walkey, Byron Olson, Michael Owen and Robert Dill) was asked to design the Britannia Community Service Centre. They chose to apply a "pattern language" approach as a tool for community involvement in order to aid citizens in translating their concepts into reality (The Canadian Architect 1972, p.35).

Ron Walkey had been a member of The Centre for Environmental Structure in Berkeley, California at the time the Center was developing the "pattern language" design methodology. At that time, Walkey was working with Christopher Alexander, Denny Abrams, Shlomo Angel, Sara Ishikawa, Max Jacobson, Mary Louise Rogers, Barbara Alexander, Murray Silverstein (*ibid.* p.35). This same group, with one exception, co-authored the book *A Pattern Language* which was published in 1977, six years after Britannia Design was implementing the "pattern language" design methodology. There is discrepancy between the patterns applied at Britannia and those listed in the publication, though they share many commonalities. In general, the design of the Britannia Community Services Center can be viewed as a prototypical application of "pattern language," reflecting the methodology in its infancy.

Site Critiques

Christopher Alexander and his colleagues put forward many recommendations regarding the design of schools in *A Pattern Language* (1977). It would be not be possible for a public elementary school to meet some of their design criteria, as Alexander suggests establishing tiny, independent schools. However, Britannia Elementary School does meet several design guidelines promoted in the book, including the fact that it is located in a public part of the community, it is placed on a pedestrian street, and is located within walking distance of a park (*ibid.*, p.425). On the other hand, the school fails to meet the criteria for wayfinding, in that it is neither an identifiable part of the building it is part of, nor has a strong connection with the street (*ibid.*, p.425).

Existing Conditions:
The school has a compromised street front because the Britannia complex does not face the street. When the building complex was designed in the 1970s, the decision was made to have it address the laneways, rather than the street front. As a result, the site turns in on itself, while turning its back towards the surrounding community. *A Pattern Language* promotes a selectively permeable boundary surrounding a neighbourhood, like a cell wall. It recommends detaching at least half of the neighbourhood corridors from the city street grid in order to create a unique and identifiable neighbourhood with less car use (Alexander *et al.* 1977, p.90) In fact, this pattern advocates turning the backs of buildings to the surrounding community. The 1970s Britannia development pushes the volume of the buildings to the periphery, in accordance with this design guideline. Building facades at the periphery of the site are characterized by high cement block walls with few or no windows. The decision to face the laneway rather than the street was made as a reflection of the perceived importance of laneways on the east side of the city. Enzo Guerriero was directly involved in the design process, and currently works at the Britannia Center. He describes the decision to remove the building complex from the street as follows:

> "From the patterns, we were able to look at where the boundaries alleys? Here, on the East Side, the back alleys became the path of the communication, not the front." (Davitt and Martin 2001, p.24).

Within the Britannia complex, the city street is replaced with a few pedestrian corridors. The main corridor is an extension of Napier Street, which runs east-west and connects the site with Commercial Drive. In

the mid 1990s a pedestrian plaza was established at the junction between Commercial Drive and the pedestrian extension of Napier Street into the site. The plaza has street furniture including chairs and benches, two of which were hand-carved on site, and gardens. It is an attractive and well used site, and currently functions as the strongest street relationship extending from the complex.

Summary Statement:
Critique 1: Street lacks a streetface and relates to laneways (1990s plaza development attempts to remedy connection to Commercial Drive)

(refer to Appendix C: *iii, critique 1)*

Existing Conditions:
The identification of individual buildings within the Britannia complex is difficult, as building materials and architectural style are rather uniform throughout the buildings built in 1974. The elementary school main entrance is not located in the pedestrian square off Napier Street, which would comply with Alexander's recommendation to have a "family of entrances" so that each is visible as one enters the building complex. Rather, the main entrance is tucked into the building facade. This conflicts with the pattern to distinguish main entrances by extending them from the building, giving them a "bold, visible shape" and making them visible from the main access route (Alexander *et al.* 1977, p.541). Furthermore, the elementary school has six additional entrance ways, the majority of which are commonly used.

The secondary school also lacks an identifiable entrance. The school was established in 1911, as is recognized as a heritage building today. Its original entrance, located along the west façade of the school building, was oriented towards the view of the city skyline. A covered corridor, linking the school building to the new gym and cafeteria, was barnacled onto the school in the mid 1950s. These additions blocked sightlines and left the school without a clear main entrance.

As one travels west along the pedestrian Napier Street extension through the site, traffic declines as services are clustered at the east end adjacent to Commercial Drive. Visually, the corridor terminates at the west end of the elementary school, at a one meter high cement retaining wall. This wall screens a flight of stairs that provides access to the playing fields and high school buildings beyond, descending a nearly four meter grade

change. The wall blocks the view to facilities on the lower field. Neither entrance to the elementary school or the secondary school is clearly visible from this route, which functions as the primary travel route to the school.

Summary Statement:

Critique 2: Blocked sightlines and maze-like open spaces

(refer to Appendix C: *iv, critique 2)*

Existing Conditions:
One of the key landscape features of the site is the extended view it offers of the downtown skyline. Unfortunately, the buildings on the site are not oriented to take advantage of either the view to the west of the downtown skyline or to the north of the mountains. The view is most impressive from the southwest corner of the site, as one approaches from the adjacent park, appropriately named "Grandview Park". The leveled playing fields visually function as a stage, with the view serving as a scenic backdrop. However, the area on the site that affords the most direct and expansive views of the city skyline to the west and is currently occupied by a fourteen stall parking lot, rather than incorporated into the play environment.

Summary Statement:
Critique 3: Ignores views from site as a spatial organizing element

(refer to Appendix C: *v, critique 3)*

Existing Conditions:
A mass / void diagram of the site clearly indicates the divided nature of the spatial distribution of the site (refer to Appendix C: ii, concept introduction). Buildings are tightly clustered to the north and east, which creates an area of blocked sightlines and maze-like open spaces, previously addressed. The south and west area of the site is occupied by leveled playing fields. The flat open space lies in stark contrast to the developed area. The division between these two areas is amplified by a nearly four meter grade change. Buildings clustered at the eastern edge of the site are separated from the open playing fields to the west by high cement retaining walls. These walls not only block visual access, they drastically limit wheelchair access on site. Currently, in order to travel

from the elementary school to the lower playing field, an individual using a wheelchair would have to enter the secondary school, use an elevator, and exit the school to reach the field, or exit the site entirely and travel down the sidewalks along the periphery of the site to the lower field entrance. There is no direct route for wheel travel in an east-west direction across the site. This dramatic grade change is concentrated in the area that offers the most direct and expansive views of the city skyline (as mentioned above), and is situated along the seam between the elementary school and the playing fields the elementary students use. The grade change offers much potential as a means of accentuating views and enhancing play opportunities.

Summary Statement:
Critique 4: Doesn't take advantage of topography and in fact limits accessibility

(refer to Appendix C: *vi, critique 4)*

Existing Conditions:
The existing allocation of play space is inequitable. Approximately 80% of the space is dedicated to organized sports and ball games that accommodate the play needs of older children and adults, and the play needs of young children on the site are inadequate. A fixed, pre-fabricated climbing structure appropriate for children in the approximate range of five to nine years old occupies 140 square meters. This is an insufficient fraction of the 11300 square meters of space occupied by playing fields for ball sports, which are sized for older children, youth and adults.

The predominant materials in the outdoor play environment for the elementary school restrict opportunities for engagement. The schoolyard is dominated by static impervious materials, primarily cement block and asphalt. The open field is pervious, but is a monotonous covering of pea gravel. Vegetation is not integrated into play areas, covering slopes that are separated from the leveled play spaces by cement retaining walls.

Summary Statement:
Critique 5: Majority of open space dedicated to secondary school and community use, while the play needs of elementary school children are not accommodated spatially or content wise.

(refer to Appendix C: *vii, critique 5)*

These five site critiques will be addressed in the proposal for the redesign of the outdoor play environment for the elementary school.

Design Proposals: Then and Now

The original plans developed for the site by Walkey and Olsen earned the Canadian Architect Yearbook Award in 1973. The use of the "pattern language" design methodology, the community approach to design and the unique integration of facilities at a large scale were all cited as the success of the design. However, it is interesting to note that the majority of designs laid out but never actualized relate particularly to the landscape. The designs included in the 1973 submission but never realized include outdoor seating areas for small public gatherings, a treed playground along the south edge of the elementary school, and an adventure playground adjacent to Grandview Park with an outdoor classroom.

The site design was acclaimed as a demonstration of social values over architectural values (The Canadian Architect Yearbook 1973, p.31). Such integration of facilities and shared use was applied to the elementary school grounds, with the result that the public has unrestricted access to the outdoor play spaces. The elementary school students rely on symbolic boundaries to their play area, beyond which is public space where they are not allowed to go without permission: they cannot pass the stairs in the Napier Street extension that lead to Commercial Drive, they cannot pass the planters on the north edge of the Napier Street extension, beyond which the teen centre and ice rink are located, and they cannot play beyond the low retaining wall that runs along the west edge of the pathway leading to Grandview Park. They also have to stay within the boundaries of the gravel play field, except at lunch when they are allowed to enter the cafeteria building of the secondary school to eat. Within the boundaries of their outdoor play space, there is little refinement of activity zones. For example, there are no private places that a child can easily "own", and few secluded areas with controlled access where children can gather in small groups to play or tell secrets. The site offers a limited range of lay opportunities, and the design of the

play areas do not accommodate children's need for physical, cognitive, emotional and social development.

This is an opportunity to redesign the outdoor play space for Britannia Elementary School, in a way that reflects contemporary theory on childhood development and successful outdoor play environments.

PART III: Design Proposal

Statement of Intent

The current outdoor play environment at Britannia Elementary School does not reflect theory developed after the 1970s regarding the design of children's learning environments, and it offers limited opportunities for diverse play by elementary school children. My intent is to redesign the outdoor play spaces for children six to fourteen years old by addressing the issues identified in the site critiques and recent research on play environments, particularly influenced by "Reggio Children" and Anita Olds.

Concept Introduction

(refer to Appendix C: ii, concept introduction)

Osmosis is defined as the movement of water across a selectively permeable membrane, between two areas of unequal concentration. The direction of movement follows a concentration gradient from high concentration to low concentration, in order to establish equilibrium between the two divergent areas.

Reggio Children proposes the use of osmosis as a metaphor to help guide the design of children's learning environments. According to Reggio Children, the school should embody osmosis in terms of its relation to the surrounding physical and cultural environment as well as in terms of spatial distribution (Ceppi and Zini 1998, p.40). Osmosis also implies the presence of boundaries, which are necessary to the play environment as they are to the biological cell. My design proposal explores the movement of people and materials throughout the site, the linkages between the site and its setting and the boundaries of play spaces. The title of the project, 'osmotion,' is a combination of osmosis and motion, and reflects the underlying design concept.

The current distribution of space on the site is a stark contrast between two distinct areas: 1) to the north and east, buildings are tightly clustered and views are restricted. This is an internally oriented space. 2) To the south and west, expansive, levelled playing fields create an undifferentiated open space with long views to the city skyline and the mountains. This is an externally oriented space. The spatial

concentration gradient sifts from a dense area to an area of low concentration.

A balance between these two extremes would ameliorate each area. In the built up zone, it would be optimal to diffuse elements from the site out into the surrounding area, and diffuse elements from the community into the site, thereby strengthening the connection between the site and its context, and improving legibility and wayfinding. In the open space, it would be beneficial to introduce a varied topography in order to expand play opportunities, and establish a public gathering area for the community to enjoy the long views the site offers.

At recess, lunch and after school children exit the school building and spread out among the various activities available. Activity areas are spatially distributed along the following concentration gradients: group size, activity level, noise level and age group. For example, fine motor activities oriented towards younger elementary school children, such as sand play, are located in close proximity to the school building to facilitate monitoring, and away from ball play areas for large groups of older children, which could potential be disruptive.

Creating such nodes of attraction in the open space would draw children and adults alike out from the knot of buildings and diffuse them out into the landscape. This would help establish a balance of gradients and alleviate the pressure potentially felt in the dense and restricted built environment, as one moves out into the open space where it is possible to locate oneself in the site and in the geography of the city.

Increasing Permeability

The exchange of materials, information and ideas associated with osmosis as a design metaphor underscores the importance of connections and links to the external environment. Such linkages indicate the degree of permeability the site has in relation to its surroundings. My aim is to strengthen the connections between the site and its physical context, and improve legibility and wayfinding. Site Critiques 1,2 and 3 will be addressed under the heading "Increasing Permeability".

Design Response:
•extend ground plane surface treatment (10cm square pavers) from Napier Street plaza along north and east face of elementary school
•extend sidewalk with street trees from Cotton Street along west face of elementary school.

Influential Quote: "Place the school on a pedestrian street... and give it a good strong opening at the front so that it is connected with the street" (Alexander *et al.* 1997, p. 425).

(refer to Appendix C: *iii, critique 1)*

Critique 2: Blocked sightlines and maze-like open spaces

Design Response:
•modify library and elementary school buildings to clear sightlines extending from Napier St.
•remove covered play area structure and relocate
•accent main building entrances, restoring original 1911 façade

Influential Quote: "Place the main entrance of the building at a point where it can be seen immediately from the main avenues of approach and give it bold, visible shape which stands out in front of the building" (Alexander *et al.* 1977, p.544).

(refer to Appendix C: *iv, critique 2)*

Critique 3: Ignores views from site as a spatial organizing element

Design Response:
•relocate parking (14 stalls)
•establish a view corridor with clear sightlines to city skyline
•establish an area for the community to occupy and enjoy views

Influential Quote: "I would first like to make a bold definition that good playgrounds are those where people gather and second, they must at the same time be beautiful parks" (Senda 1992, p.89).
(refer to Appendix C: *v, critique 3)*

Expanding Opportunities

Movement in osmosis follows concentration gradients. There are many gradients the design of a children's play space should take into account, including the range of interests and abilities children have. The design of a play space should respond to children's physical, social, emotional and cognitive development needs. Osmotic movement is a means of achieving a balanced spatial distribution. The spatial distribution of various play activities will be addressed, in addition to maintaining a flow between activity zones.
Site critiques 4 and 5 will be addressed under the heading 'Expanding Opportunities'.

Critique 4: Doesn't take advantage of topography and in fact limits accessibility

Design Response:
•remove retaining wall along east edge of lower play field
•ramped pathways for wheelchair accessibility integrated into terrain

Influential Quote: "Varied elevation is of prime importance to play spaces" (Olds 2001, p.412). "To climb and play on uneven ground or to play only on flat ground without trees –this appears to have a pronounced influence on children" (Grahn 1996, p.18).

(refer to Appendix C: *vi, critique 4)*

Critique 5: Majority of open space dedicated to secondary school and community use, while the play needs of elementary school children are not accommodated

Design response:
•use of landscape elements to create a playscape that offers a range of play opportunities for elementary school children

Influential Quote: "The outdoor space needs to provide: - private places easily "owned" by a single child -places for small groups of 1-4 children - places for large muscle activity involving groups of up to 10 children -

-plenty of free space for children to gather spontaneously" (Olds 2001, p.416).

(refer to Appendix C: *vii, critique 5)*

Summary of the Schoolyard Design Proposal
(refer to Appendix A: Play Opportunities)

The interconnected nature of child development, the need to establish distinct areas of various sizes that accommodate a diversity of play opportunities and the need to establish a flow between them are key elements of successful playground design. I have organized play opportunities into the following six categories: wild play, ball play, gross and fine motor play, dramatic play, social play and sensory play. The first three categories emphasize physical development, while the latter three respond to cognitive, social and emotional developmental needs (refer to Appendix C: *x, play zones map*)

In addition, the design proposal addresses age appropriate spaces. Areas for younger children, in the approximate range of kindergarten to grade four, are established in closer proximity to the school building to facilitate monitoring. Supervision is also facilitated by the topography and general layout of the site, which slopes down from the school building.

'Wild play'
(refer to Appendix C: *ix, site sections, D-D'* and *xi, fort axon)*

The 'wild play' area is oriented towards older elementary school children, in the approximate range of grade five to seven. It responds to Grahn's identification of the benefits of 'wild' play, characterized by running, climbing and engaging in fantasy games in areas of 'wilder nature.' Rather than establishing a thickly wooded area in this inner city schoolyard, I have proposed a bamboo grove with varied topography as a space that offers hiding possibilities without being too dense to monitor. The bamboo can be harvested by the children to use as play props or as a building material, and it creates sound and textural effects. Adjacent to the bamboo grove are two forts that face each other, which offers a potential for interactive group games between the two 'camps'. This area is accessed by a long metal chute leading directly from the school entrance, so that the entrance into this highly active play zone is signified by a metallic echo as one runs down the chute and into the space. The

southern edge of this zone is a grass mound with climbing trees. The trees provide an opportunity for physical challenge yet promotes a less activate form of play, creating a transition to rest, observation and sensorial engagement.

Ball play
(refer to Appendix C: *ix, site sections, C-C'*)

A basketball court and a ball hockey court provide opportunities for ball play. These courts are oriented towards older elementary school children, and may be used by highschool students and adults outside of school hours. The courts replace the existing basketball and ball hockey facilities. The sports surfacing of the ball courts and performance stage fold up an approximate two meter grade change, and anchor into the sidewalk that extends from Cotton Street. This creates a set of seating steps along the eastern edge of the courts and stage, providing a seating area for sports and performance spectators. At the toe of the slope, the topography levels and transitions into a flat play field. A junior soccer field is established here.

Gross motor corridor
(refer to Appendix C: *ix, site sections, E-E'*, and *xvii, conclusion*)

A gross motor corridor named the 'zip strip' is created by a string of sequential physical play opportunities. Moving north-south across the site, a child can play on climbing bars, climb down a log staircase then up a rope ladder to the zip line, swing across the cable and then jump across stepping stones to reach a moving sidewalk, balance on the 'moving sidewalk' (a series of suspended platforms and rubber sheeting), and finally end at a large, stage-like boulder. The moving sidewalk also offers opportunities for acoustic exploration: the hollow metal planks have an opening at the top and the bottom, so that one could drop an object into the plank, and listen to the sounds created as it swings laterally. These openings are covered by removable rubber plugs to prevent finger entrapment.

Dramatic play
(refer to Appendix C: *ix, site sections, A-A', xii, drama den axon and xv, corridor details*)

The gross motor corridor transitions into the dramatic play area at the 'big rock stage'. The open stage adjacent is located to take advantage of the long views toward the downtown skyline, and can comfortably seat sixty individuals. It provides an opportunity for community performances outside of school hours. Two dramatic play 'rooms' are surrounded by a planting bed filled with 'play props' (refer to Appendix B: Plant List). Scaled to create a room-like space, the platform edges of these enclosures may be used for climbing, seating, or as a table or stage. The dramatic play area is located along the south edge of the schoolyard in order to minimize potential interference from other play activities. The covered play area along the south edge of the school also provides opportunities for dramatic play. Vertical posts supporting the gutters and canvas roof are lined with eyehooks, so that children can take sheets of fabric from the storage cupboards provided and hang them as scrims, suspended between the posts. They would be able to create a variety of configurations, thereby subdividing the space into 'rooms' of various sizes, or creating maze-like spaces to navigate through. The vertical wooden posts are cuffed with sheets of copper and steel, which allow for sound experimentation, and will show the effects of weathering over time.

Social play
(refer to Appendix C: *xiv, corridor axon* and *xvi, vegetation map*)

These spaces include small group spaces such as the nest swings, as well as fine motor play areas such as the sand box, the berry patch, and the covered play area along the south edge of the school. They accommodate the play needs of the younger elementary school children in their proximity to the school building and their physical distance from the 'wild play' area and ball courts. The covered play area includes transitional zones at the school entrances which buffer the interior/exterior space, and provide meeting points for drop off and pick up.

Water (sensory) play
(refer to Appendix C: *ix, site sections, B-B', xii and xv, corridor details*)

Gutters collect rainwater from the school roof, and feed it onto the top of a 'vertical green' wall planted with ferns and mosses. In this way, children do not come into direct contact with the rainwater, yet the stone-

filled gully linking the 'vertical green' to the water pump helps make the cycle of water legible. The hand pump provides children with the opportunity to sculpt their environment, using the water in combination with the pea gravel and stone 'digging grounds.' They may also direct the pumped water into the adjacent water garden, or transport it to irrigate the vegetation on the site.

Conclusion: Balancing Gradients
(refer to Appendix C: *vii, critique 5, x, play zones map* and *xvii, conclusion)*

Reggio Children refers to "the fluidisation of functional zones," and Olds recommends establishing a flow between play zones (Ceppi and Zini 1998, p. 12). This emphasis on fluidity underscores the importance of how adjacent spaces are integrated, and 'Osmotion' reflects the importance of the movement of elements throughout the site. As a design metaphor, osmosis helps guide spatial distribution in the playground, with an aim to establish equilibrium between areas of divergent concentration. Numerous gradients were considered in my design proposal, including age range, level of physical activity, level of noise, spatial requirements, and degree of malleability.

As a shared play space between various age groups using the site, the amount of space allocated for younger children is inequitable. My design proposal establishes an equitable balance of play areas for the various age groups sharing the space.

I have increased the permeability of the site at the following levels: connection with the physical character and aesthetics of the surrounding environment, physical accessibility to the site, and the connection between the site and "natural" elements such as rain water. I have addressed the site's relationship to the street, improved wayfinding, and capitalized on the views the site offers.

Drawing on contemporary theory regarding child development, I have expanded the variety of opportunities for play on the site by designing spaces that address physical, emotional, cognitive and social development needs. The variety of spatial areas designated throughout the site corresponds to the range of spatial needs from individual use to

large group. Topography, vegetation and malleable elements are integrated to enhance the variety of play opportunities.

Osmosis is defined as the movement of water across a selectively permeable membrane, between two areas of unequal concentration, in order to establish equilibrium between the two divergent areas. 'Osmotion' has focused on the movement of people and materials on site, with the aim to establish equilibrium in terms of spatial distribution and range of opportunities for engagement.

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Appendix A: Play Opportunities

1 filter zones: covered areas at main entrances to school building, creating a transition zone between interior and exterior space, and establishing an area for drop-off and pick-up

2 vertical green (living wall): rain water from elementary school roof collected in gutters empties onto the top surface of the 'vertical green', a north-facing living wall of ferns and mosses. A stone-filled trough and water pump are part of the irrigation center.

3 seating steps: the sports surfacing of the stage and ball courts folds down the a two-meter grade change, creating amphitheatre-like seating to watch the sports, performances or take in the view.

4 sand box: located in close proximity to the school building, and oriented towards kindergarten and young elementary school children. The southwest corner of the sandbox is wheelchair accessible.

5 nest swings: based on a European swing model, these base of these swings spread one meter in diameter, and hold up to 4 children each. Check precedent image for details.

6 gathering square: a shaded grass area approximately 25meters square, to function as a small gathering space.

7 berry patches: a patchwork of 1meter square edible berry boxes.

8 stone gully: a stone-filled trench for storm-water infiltration, connected to the infiltration trench at the base of the 'vertical green' and the stone swale along the west edge of Cotton Street.

9 water pump: Water from the city water lines is pumped via a one-way valve by a hand-operated water pump.

10 water garden: Water from the hand pump can be diverted to the water garden for irrigation, or to the digging area for sand play. Water garden is a cement-lined, irrigated basin. Check species list for plantings.

11 digging grounds: a large area filled with pea gravel and another filled with stone, located adjacent to hand water pump for water play.

12 basketball court: enclosed by semi-transparent fencing. Check precedent image for details.

13 ball hockey court: net goals can be removed, and post-holes covered with a plate to transform the court into an equipment-free surface.

14 junior soccer field: The grass area surrounding this turf field is planted with spring bulbs, as a programming element for elementary school children.

15 the chute: a metal rampway (17% slope) with traction grips, that leads from sound play. Unmown grass with boulders for climbing lines either side of chute.

16 forts: Two forts that face one another, each with a circulation system that involves climbing and sliding. The positioning of the two forts creates an opportunity for dueling group fantasy play. The slope of the south fort slide is approx. 38% (a maximum 40% slope is recommended for slides), and the north fort slide accommodates a different level of ability, with a 30% slope.

17 bamboo grove: part of the 'wild play' zone, the grove is an area of more dense vegetation, suitable for hiding. The bamboo can be harvested by the children and used as play props.

18 climbing trees: A group of *Sophera japonica*, selected for their suitability as climbing trees. The trees are located on the crest of a 2meter high mound, and provide an area of prospect and refuge. They provide an opportunity to create a wind installation.

19 unmown mound: An area of unmown grass that diffuses into the 'Berry Patch' area, for sitting, rolling and game play.

20 'play props' plant bed: Located in the dramatic play area, these perennial beds are planted with species identified by Robin Moore in his publication *Plants for Play* (1993) as being suitable as 'props' in dramatic play. Check species list for plantings.

21 dramatic play 'rooms': two cement enclosures with angled, platform-like edges that may be used for climbing, used as a stage or as a table.

22 'big rock' stage: a large artificial boulder, used as a stage or as a part of the gross motor corridor, for climbing and jumping.

23 suspended sidewalk: A series of hollow metal plates with removable plugs, so that they may be filled with various objects to explore sound. The plates are suspended on cables in the same manner as a suspension bridge. There is also a rubber mat surface hung between cement posts, which moves and creates a balance challenge. Check precedent images for details.

24 'zip line' cable run: Part of the gross motor corridor, this cable line is suspended between two platforms, elevated .75 meters above the ground surface. Check precedent images for details.

25 climbing bars: Part of the gross motor corridor, this is a climbing structure with angled climbing bars, to provide graduated physical challenge.

Appendix B: Plant List

The following species have been selected from Robin C. Moore's publication *Plants for Play* (1993), and Susan *Herrington's Schoolyard Park: 13-acres International Design Competition* (2002).

Play Props Patch
Lambs Ears *Stachys byzantina*
Mexican Feather Grass *Stipa tenuissima*
Sunflowers *Helianthus annuus*
Cotton Grass *Eriphorum chamissonis*
Japanese Blood Grass *Imperata cylindrica*
Pineapple Guava *Acca sellowiana*
Money Plant *Lunaria annua*

Berry Boxes
Wild Strawberry *Fragarua vesca*
Kinnikinnick *Arctostaphylos uva-ursi*
Crowberry *Empetrum nigrum*
Dwarf Blueberry *Vaccinium caespitosum*
Evergreen Huckleberry *Vaccinium ovatum*
Salal *Gaultheria shallon*
Thimbleberry *Rubus parviflorus*

Gathering Square
Southern Magnolia *Magnolia grandiflora*

Water Garden
Dwarf Japanese Cattail *Typha minima*
Rushes *Juncus sp.*
Yellow Pond Lily *Nuphar polysepalum*
Watershield *Brasenia schreberi*

Bamboo Grove
Black Bamboo *Phyllostachys nigra*
Timber Bamboo 'alata' *Phyllostachy aureosulcata f. alata*

Community Corridor
Flowering Crabapple *Malus floribunda*
Hedging: Skimmia Japonica

Climbing Trees
Japanese Scholar Tree *Sophera japonica*

Street Trees
Golden Rain Tree *Kolreuteria japonica*

Orchard Seating Area
a selection of heritage apple trees, accented with cherry, pear and apricot trees

osmotion

balancing gradients in the schoolyard

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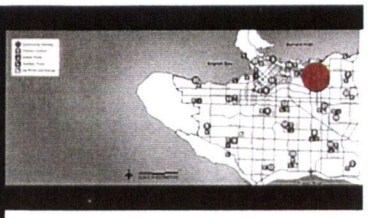
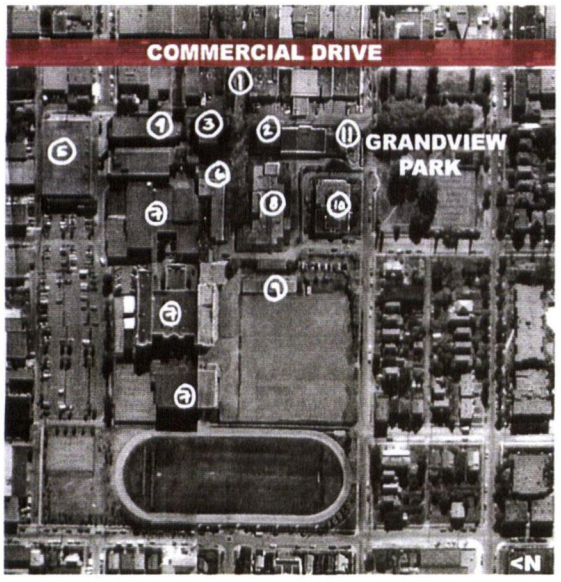


site introduction

clustered facilities



Situated in the community of Grandview-Woodlands, this eighteen acre site is tucked behind Commercial Drive in East Vancouver. Numerous public amenities are clustered on the site including a community center, an elementary school and a secondary school. The formal service boundaries for the center includes the Strathcona community located to the west, although the centre regularly draws members of the general public from beyond these regions.

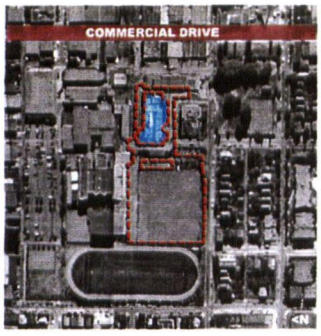
BUILDING DIRECTORY

1. NAPIER ST. PLAZA
2. SENIORS CENTER
3. INFO CENTER
4. TEEN CENTER
5. SKATING RINK
6. SWIMMING POOL
7. LIBRARY
8. SECONDARY SCHOOL
9. ELEMENTARY SCHOOL
10. PORTABLES (to be removed)
11. APARTMENT BLDGS. (3.5 fl.)
12. DAYCARE

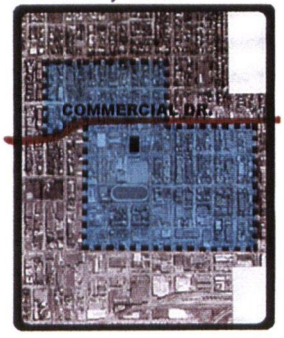
SITE DEVELOPMENT

In 1971, Britannia Design (architects Ronald Walkey, Byron Olson, Michael Owen and Robert Dill) was asked to design the Britannia Community Service Centre. They chose to apply a "pattern language" approach as a tool for community involvement in order to aid citizens in translating their concepts into reality (The Canadian Architect 1972, p.35).

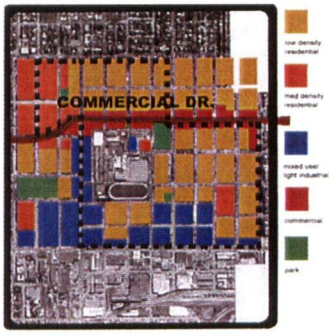
SCHOOLYARD BOUNDARY



CATCHMENT BOUNDARY elementary school



SURROUNDING LAND USE



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balancing gradients in the schoolyard

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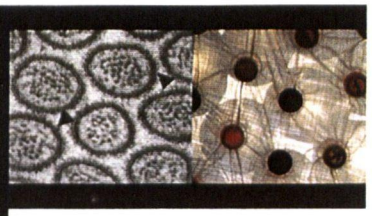
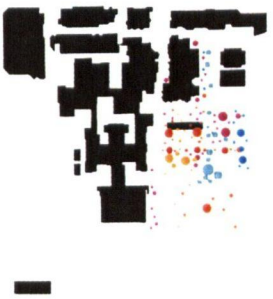
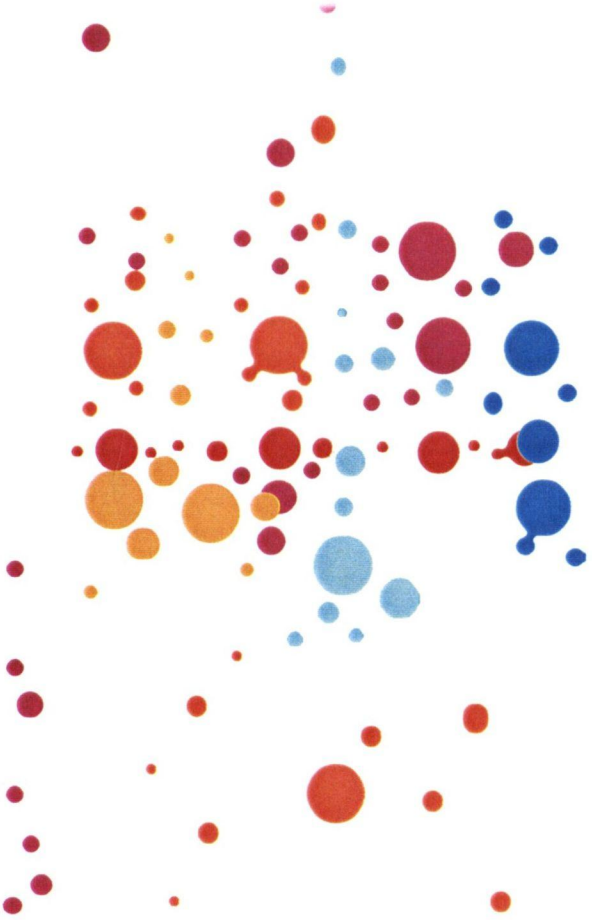


concept introduction

osmosis: the movement of water across a selectively permeable membrane, between two areas of unequal concentration. The direction of movement follows a concentration gradient from high concentration to low concentration, in order to establish equilibrium between the two divergent areas.



A conceptual diagram of the play zones to be introduced, overlayed on a mass/void diagram of the existing site.



"The close relationship between the school and the town is a fundamental concept of [Reggio Children]. School architecture and design should embody this principle in terms of osmosis with the surrounding aesthetics and culture as well as in the distribution of space."

(Ceppi and Zini 1998, p.40)

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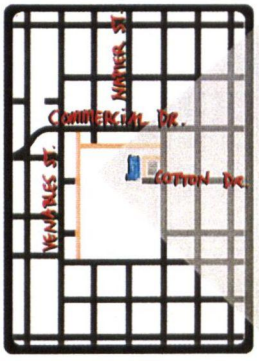
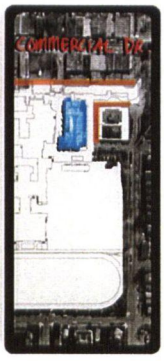
increasing permeability

critique 1

site lacks a streetface and relates to laneways (1990s plaza development attempts to remedy connection to Commercial Drive)

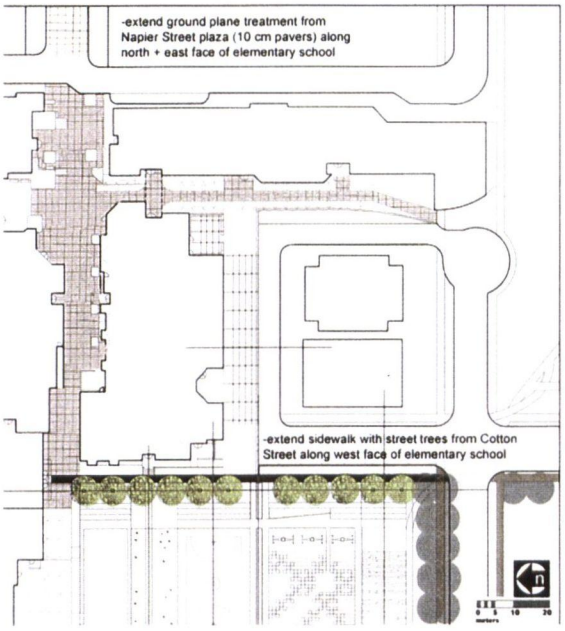




existing street grid shown in plan view, with laneways highlighted in orange

Cotton Street and Napier Street lead to the school, yet it currently lacks a street face...

proposal



"Place the school on a pedestrian street...and give it a good strong opening at the front, so that it is connected with the street..."

(Alexander *et al.* 1977, p.425)

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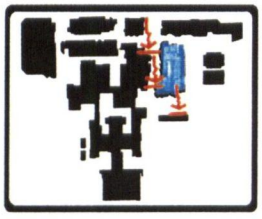
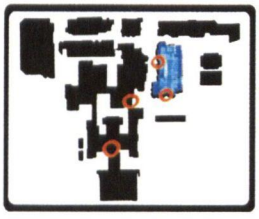
increasing permeability

critique 2

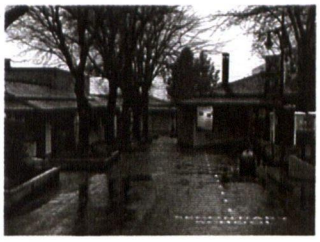
Blocked sightlines and maze-like open spaces

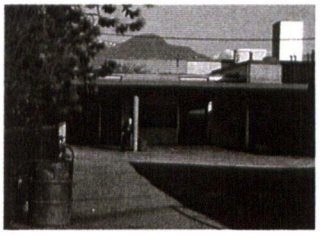


Blocked sightlines ...to be cleared



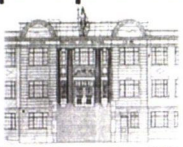
Main entrances ...to be accented





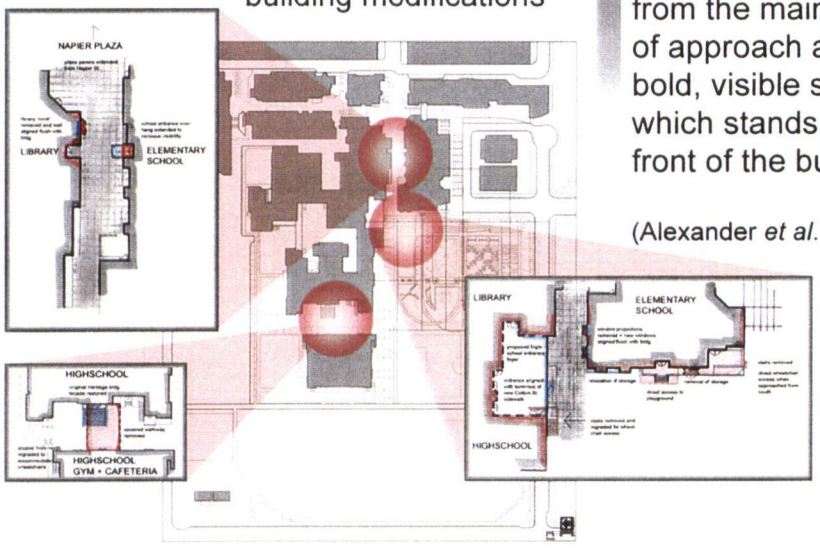
Sightlines are often blocked, and main building entrances are poorly identified..

proposal



Britannia Secondary (est. 1911)
Original west elevation façade

building modifications



"Place the main entrance of the building at a point where it can be seen immediately from the main avenues of approach and give it bold, visible shape which stands out in front of the building."

(Alexander *et al.* 1977, p.544)

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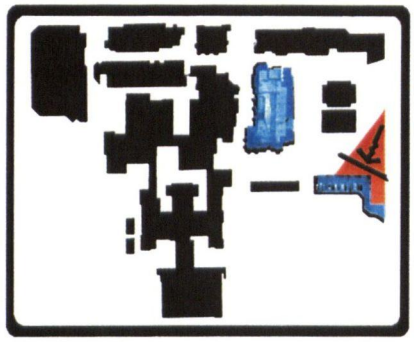
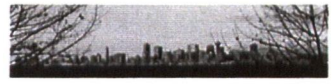
increasing permeability

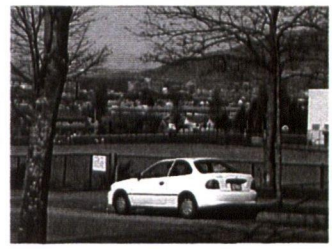
critique 3

Ignores views from site as a spatial organizing element



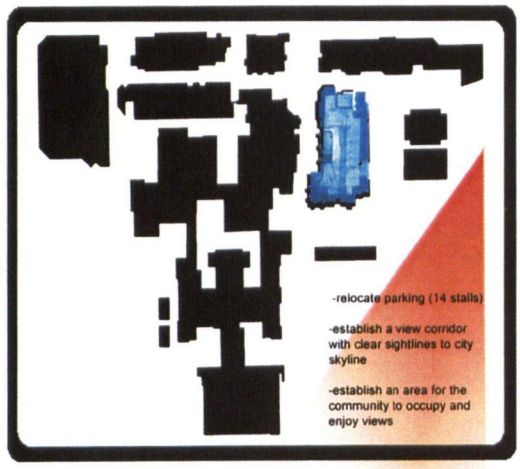
The view is most impressive from the southwest corner of the site, as one approaches from the adjacent park appropriately named "Grandview Park".





A parking lot currently occupies the area that offers the best views on site...

proposal



"I would first like to make a bold definition that good playgrounds are those where people gather and second, they must at the same time be beautiful parks."

(Senda 1992, p.89)

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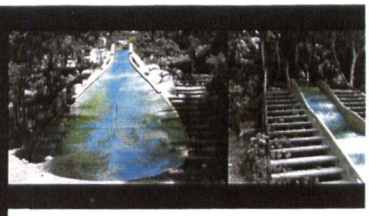
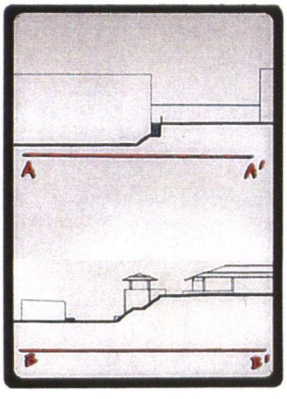
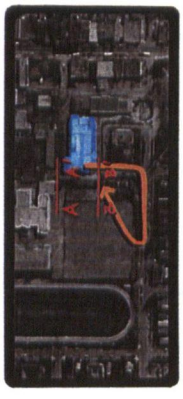


expanding opportunities

critique 4

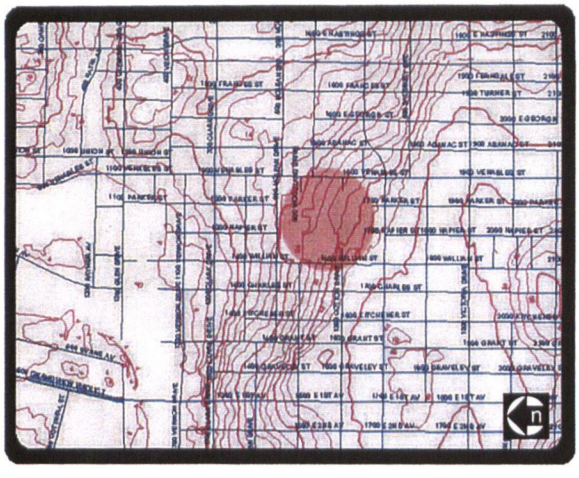
Doesn't take advantage of topography and in fact limits accessibility





There is no direct route for wheelchair travel in an east-west direction across the site.

Currently, to travel from the elementary school to the lower playing field, an individual using a wheelchair would have to leave the site and travel down the sidewalks along the periphery to the field entrance.



Topography treatment limits access and restricts play opportunities.

proposal

-remove retaining wall along east edge of lower play field

-ramped pathways for wheelchair accessibility integrated into terrain

"Varied elevation is of prime importance to play spaces."

(Olds 2001, p.412)

"To climb and play on uneven ground or to play only on flat ground without trees –this appears to have a pronounced influence on children."

(Grahn 1996, p.18)

APPENDIX C Final Presentation Boards

vi critique 4

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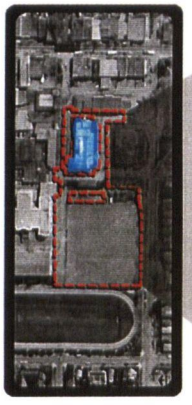
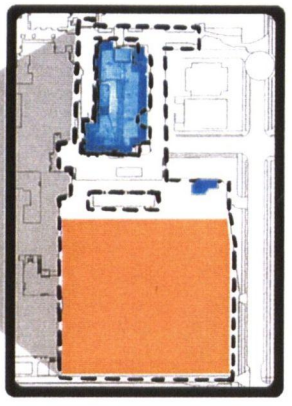
expanding opportunities

critique 5

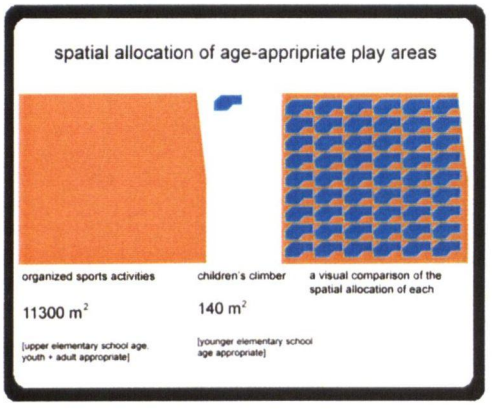
Majority of open space dedicated to secondary school and community use, while the play needs of elementary school children are not accommodated spatially or content wise.



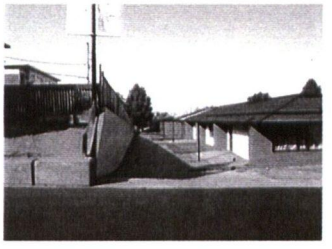


Boundary of elementary school play space outlined in red.

Existing allocation of K-4 play space, highlighted in orange.



The area allocated for younger children's play is a small fraction of the area allocated for older children and youth



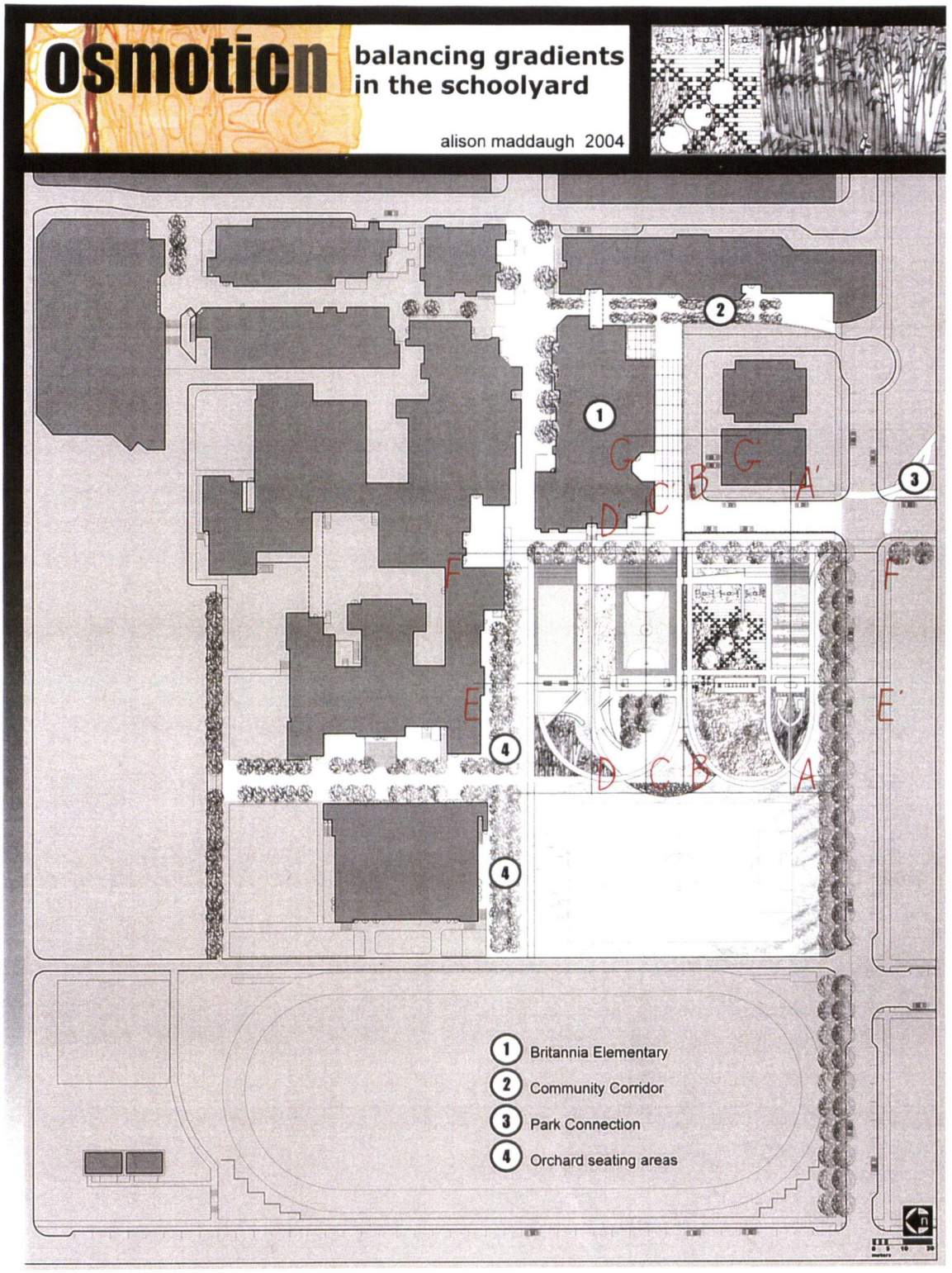
Play needs of elementary school children are not accommodated...

proposal

-use of landscape elements to create a playscape that offers a range of play opportunities for elementary school children

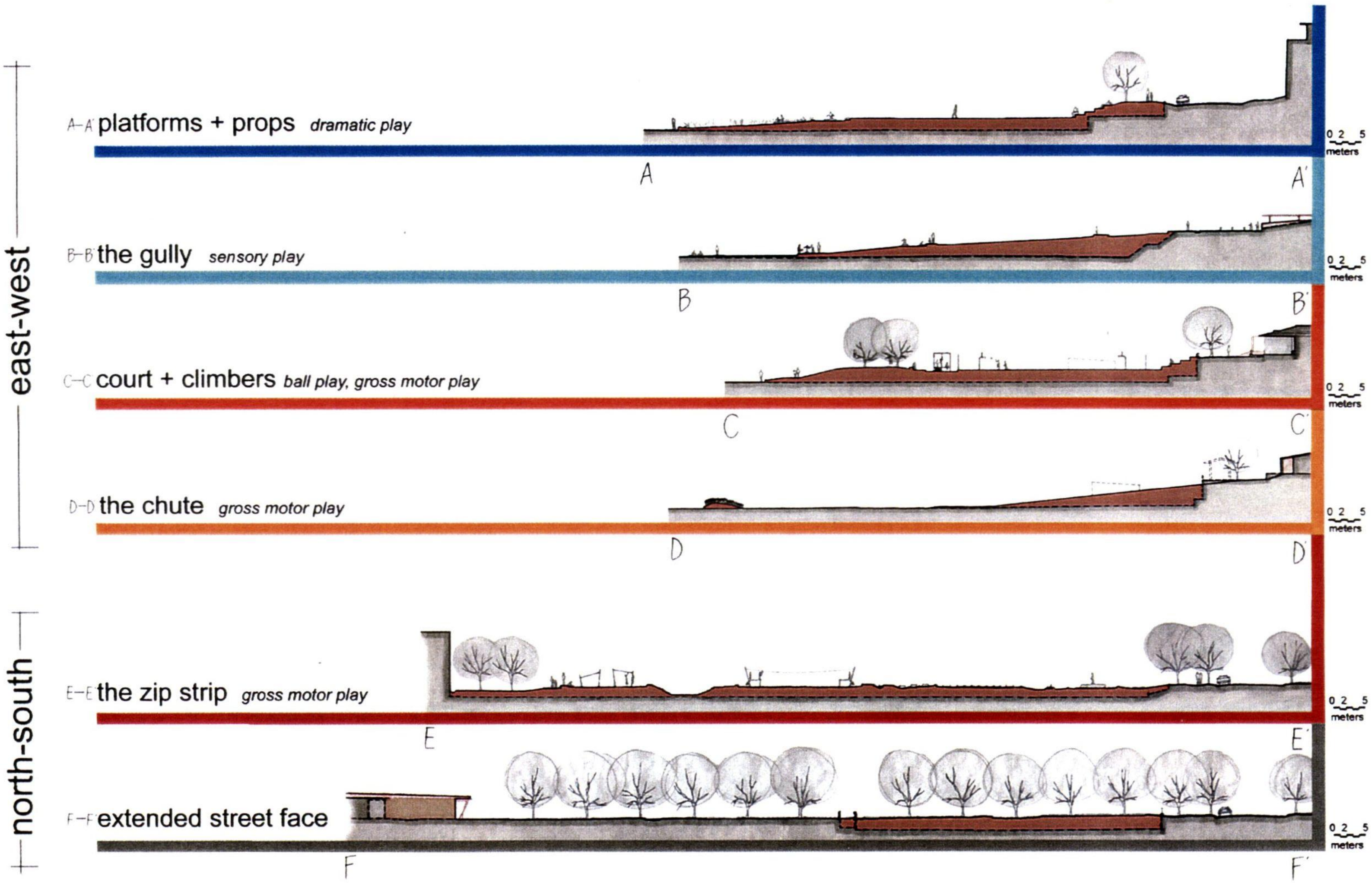
The outdoor space needs to provide private places easily "owned" by a single child, places for small groups of 1-4 children, places for large muscle activity involving groups of up to 10 children, places for games and sports involving more than 10 children, and plenty of free space for children to gather spontaneously."

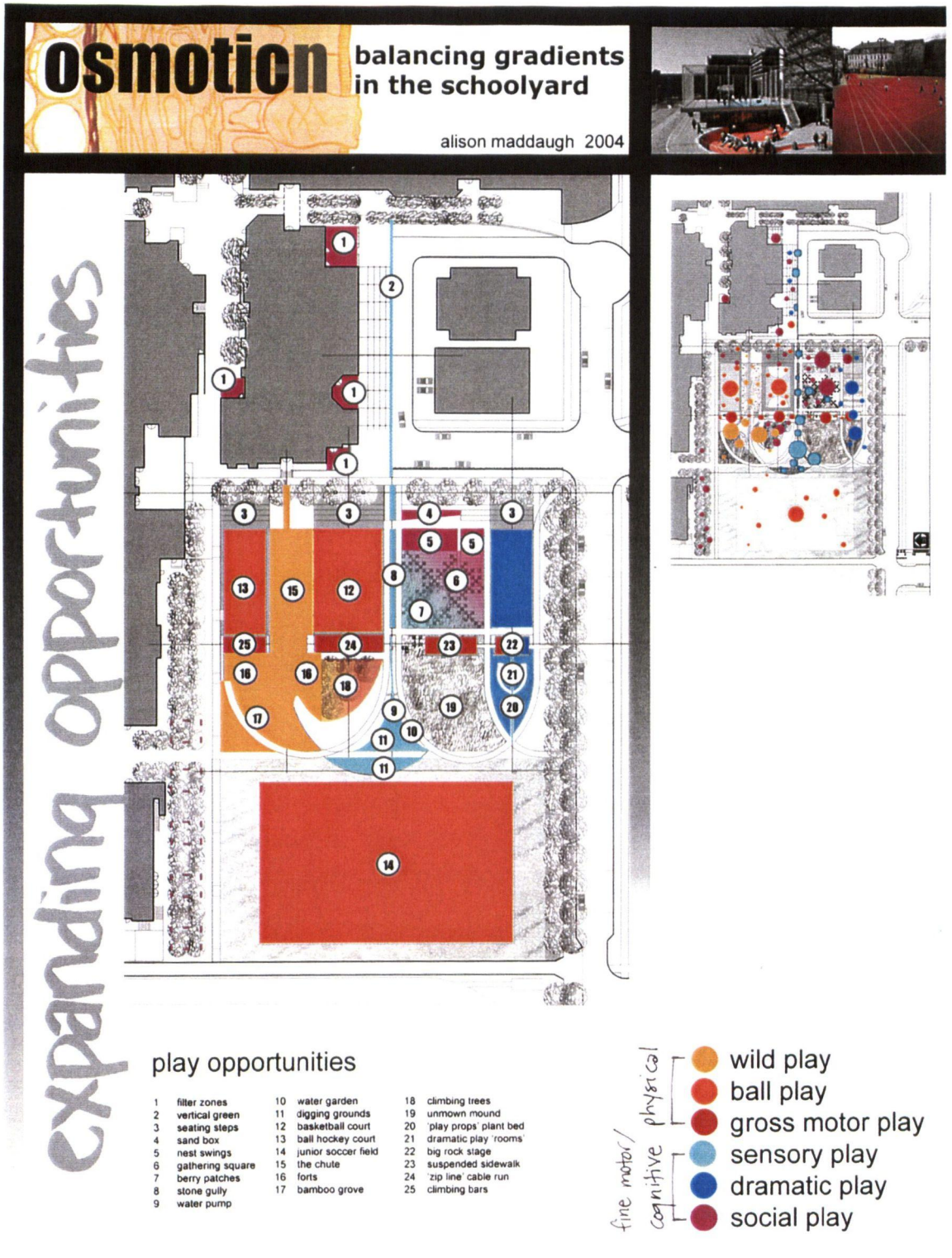
(Olds 2001, p.416)



APPENDIX C Final Presentation Boards viii base plan

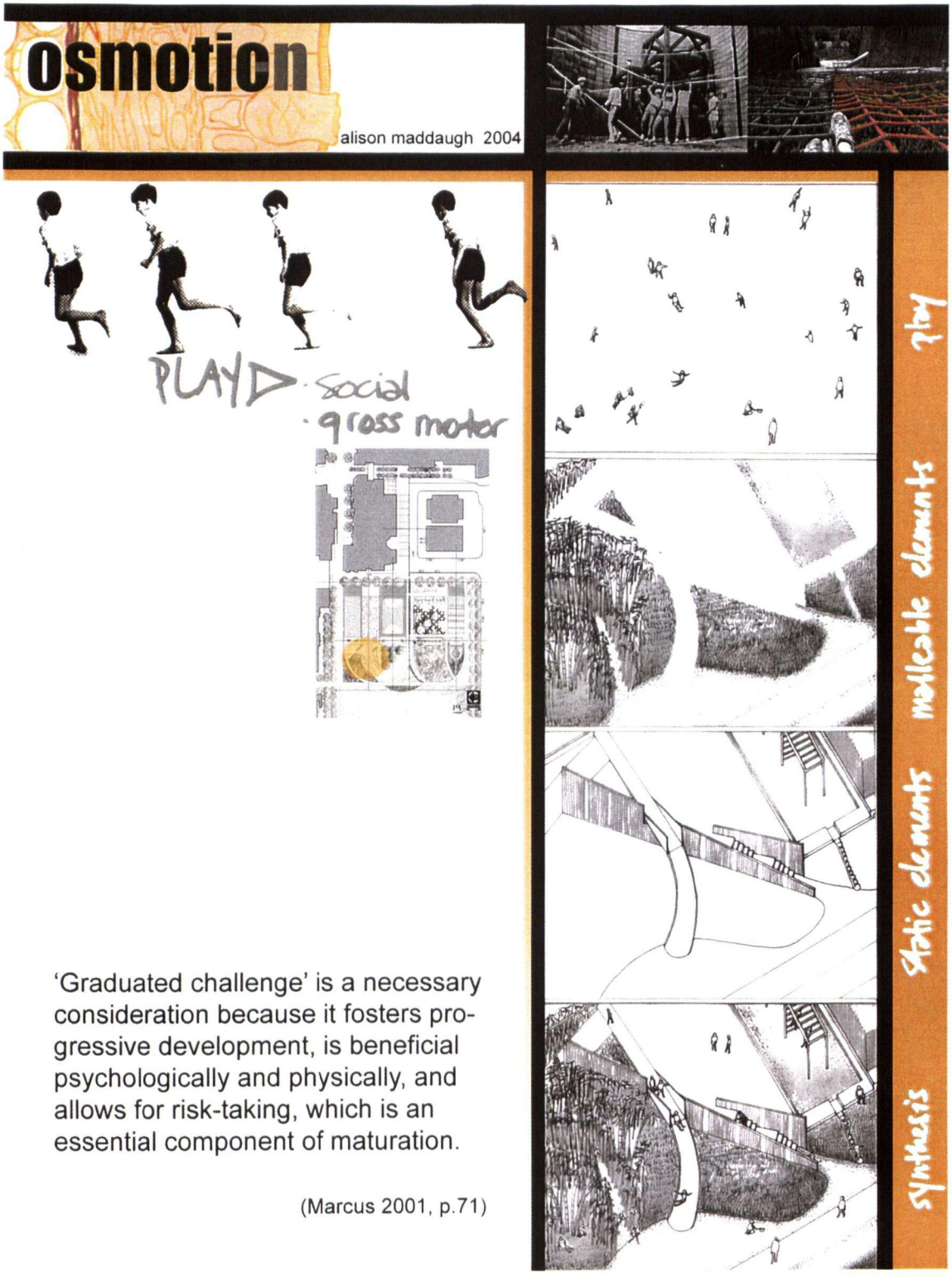
expanding opportunities



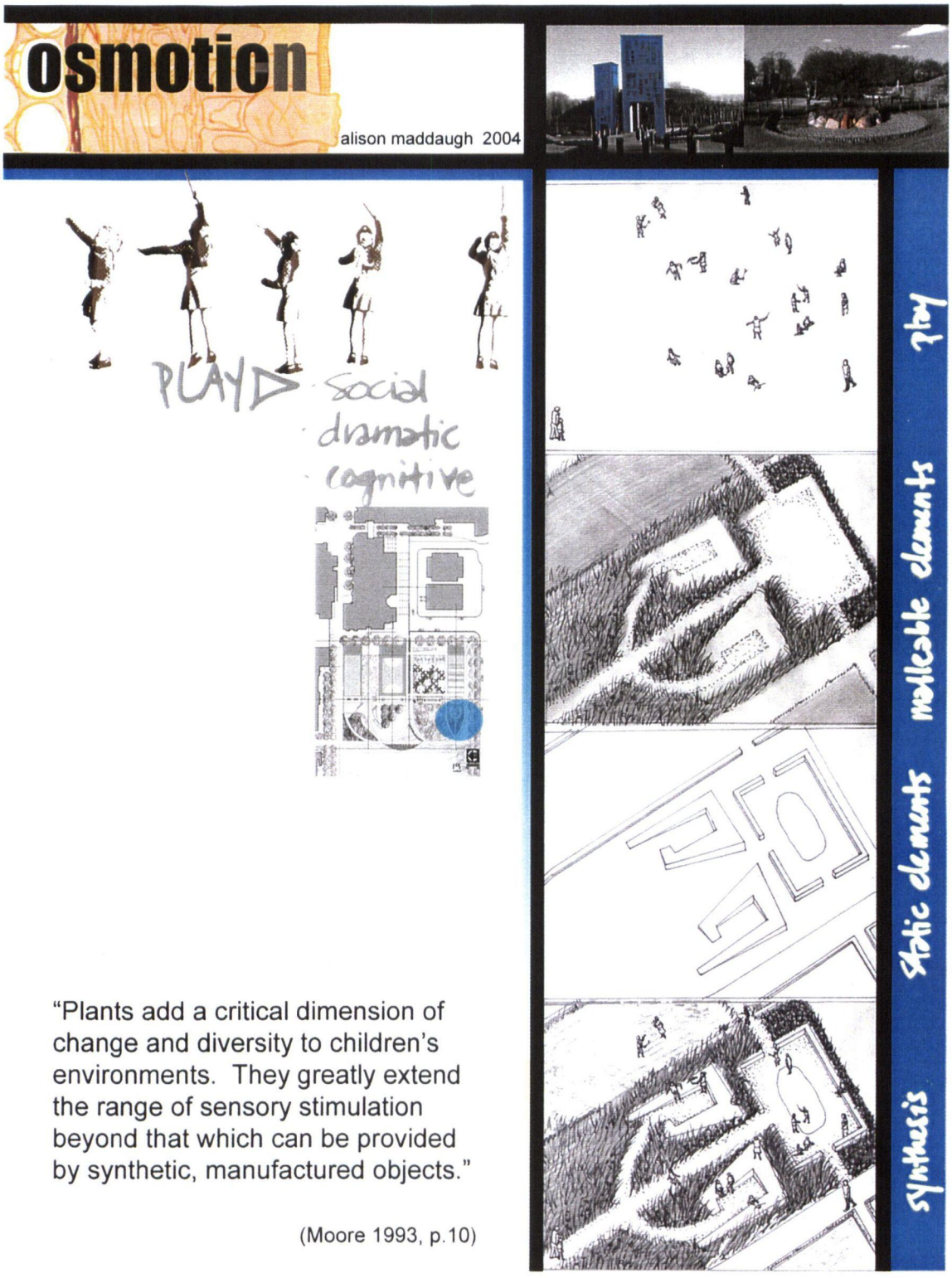


APPENDIX C Final Presentation Boards

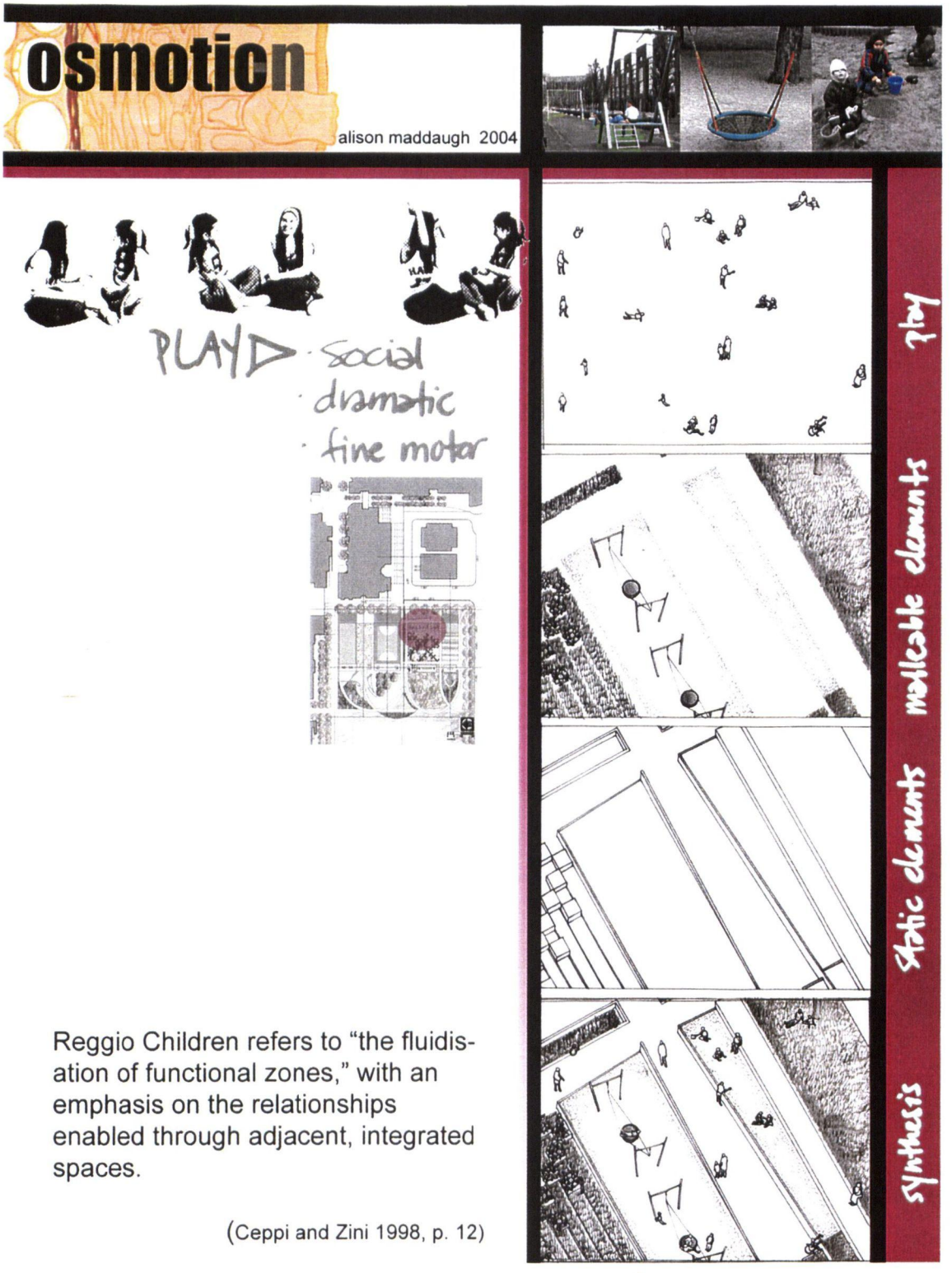
x play zones map



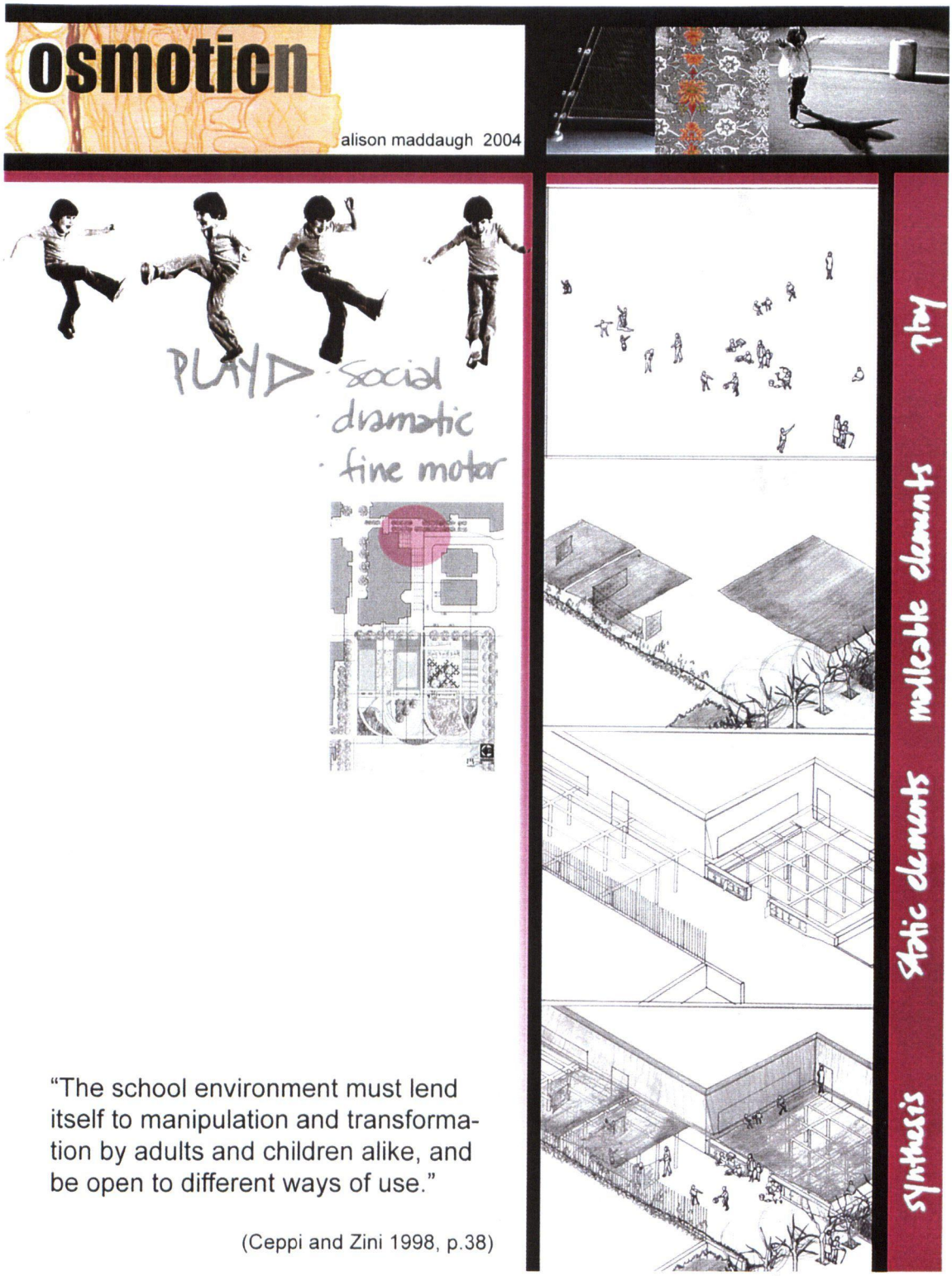
APPENDIX C Final Presentation Boards xi fort axon



APPENDIX C Final Presentation Boards xii drama den axon



APPENDIX C Final Presentation Boards xiii nest swing axon



APPENDIX C Final Presentation Boards xiv corridor axon

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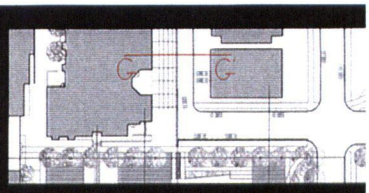
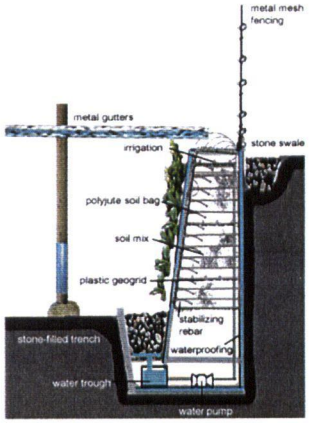


expanding opportunities

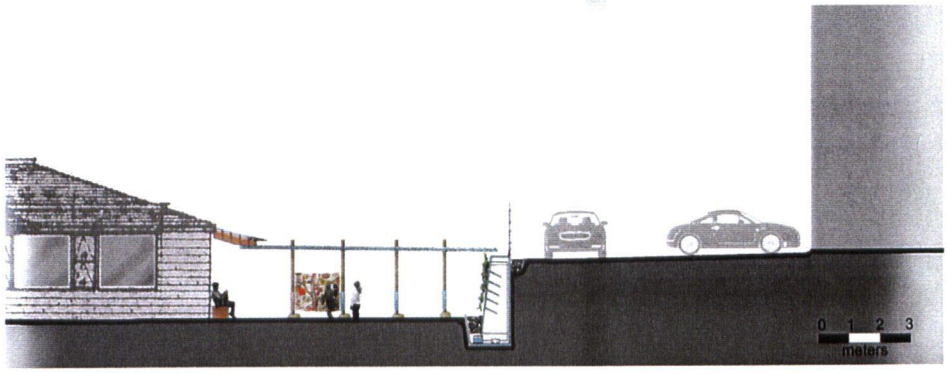
scrim city

Vertical posts supporting the gutters and canvas roof provide an opportunity for children to shape their own space. The children may suspend sheets of fabric between the wooden posts in a variety of configuations to create 'rooms,' mazes and shadow screens. A selection of fabric scrims are easily accessed from storage cupboards located on site, and are attached to eye-hooks that line the posts. The base of each post is cuffed with steel or copper, which provides an opportunity for sound exploration. As the metal corrodes over time, children may compare the qualities of various metals and wood and how each material weathers.



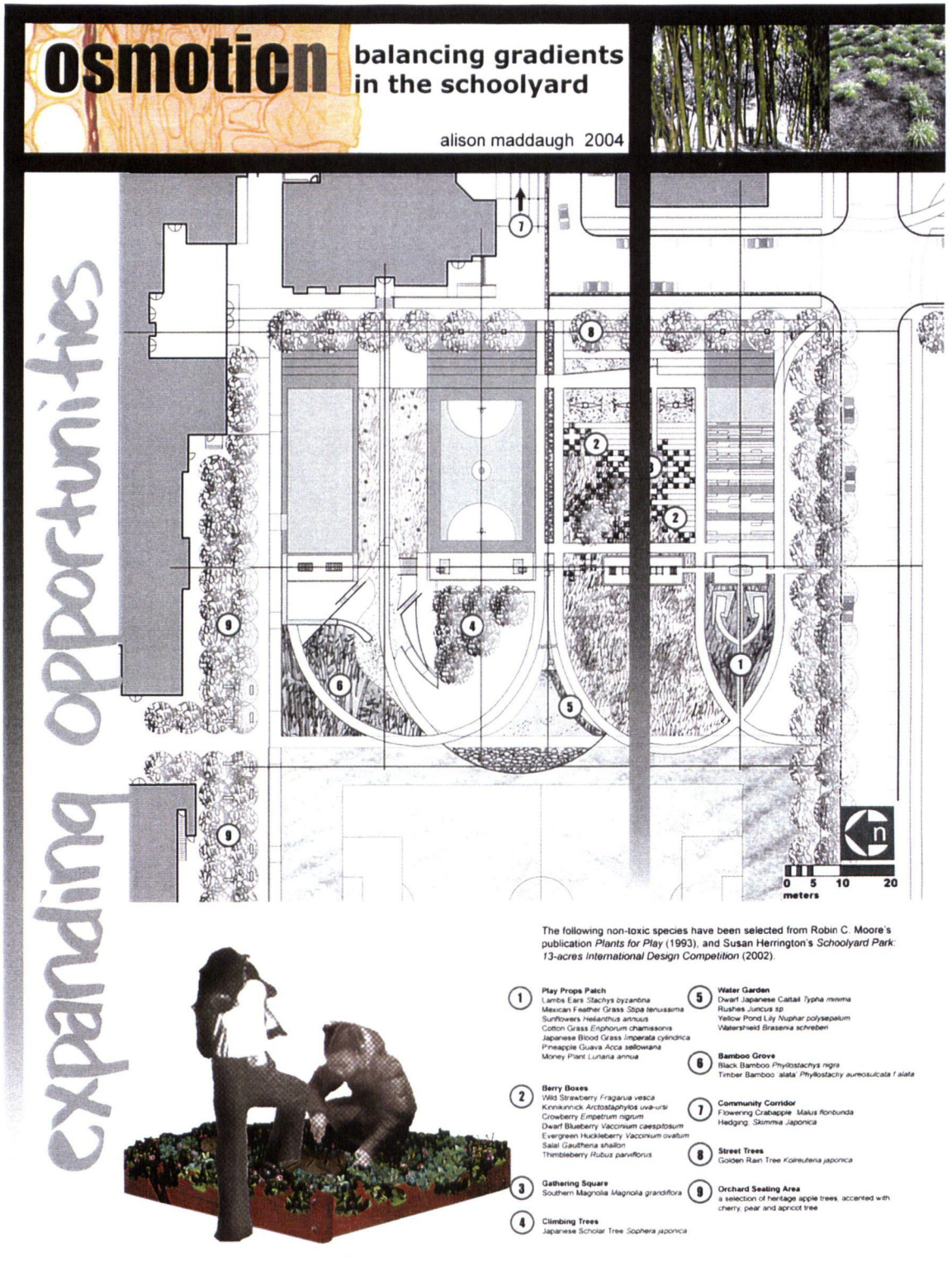
'vertical green'

Rainwater is collected from the school roof and directed along metal gutters to drain onto the 'vertical green.' Planted with ferns and mosses, this north-facing wall is irrigated during the dry season. Water drains from the system via a water trough located under a stone-filled trench, and is directed west below a stone swale to the pea gravel 'digging grounds' at the base of the slope. Children are never in direct contact with the rainwater, but are able to make a visual connection between the various elements of the water system revealed on the site.



G G'

APPENDIX C Final Presentation Boards xv corridor details



APPENDIX C Final Presentation Boards xvi vegetation map

osmotion balancing gradients in the schoolyard

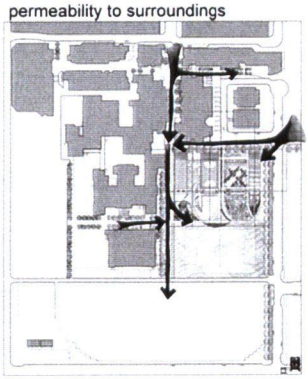
alison maddaugh 2004

Osmosis is defined as the movement of water across a selectively permeable membrane, between two areas of unequal concentration, in order to establish equilibrium. 'Osmotion' has focused on the movement of people and materials, with the aim to establish equilibrium in terms of spatial allocation and range of play opportunities.

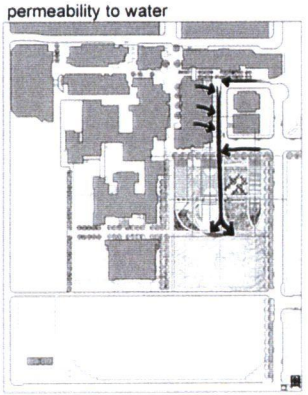
'moving sidewalk'

Part of the 'gross motor corridor', the three-piece moving sidewalk provides a balancing challenge. The central piece is made of sheets of rubber matting suspended between metal frames. This is flanked by two low suspension bridges, each made of a series of hollow metal planks anchored with chain link to a metal frame. Removable plugs cover openings on the top and bottom surface of the planks. Children are able to experiment with sound by introducing various objects such as small stones and cones, and listening to the sound effects as the objects shake inside with the lateral movement of the planks.

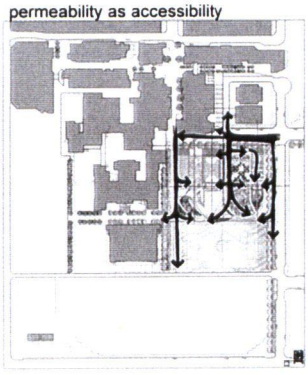
permeability to surroundings



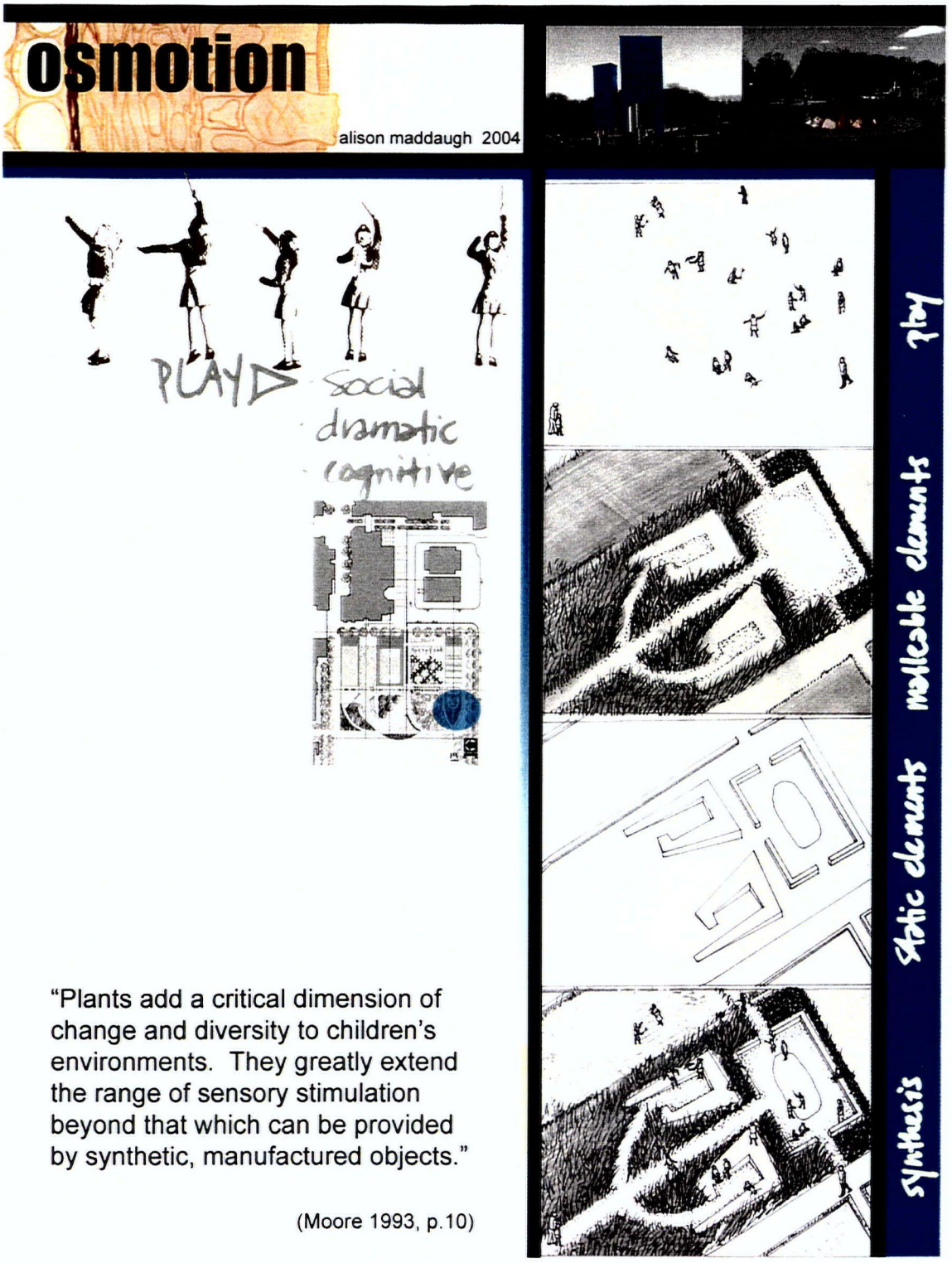
permeability to water



permeability as accessibility



Diagrams mapping the movement of people and water show the increased permeability of the site as a result of implementing the design proposal.



APPENDIX C Final Presentation Boards xii drama den axon