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**TRANSFORMATION OF MUSEUM ARCHITECTURE IN SOUTH
AFRICA:**

Towards the Design of a Children's Museum for the City of Durban

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DECLARATION

IMOHAMMAD BILAL HAQ.....declare that

- (i) The research reported in this dissertation/thesis, except where otherwise indicated, is my original research.
- (ii) This dissertation/thesis has not been submitted for any degree or examination at any other university.
- (iii) This dissertation/thesis does not contain other persons' data, pictures, graphs or other information, unless specifically acknowledged as being sourced from other persons.
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Abstract

For the most part learning in museums was by inert looking and listening and not by doing. For a long time traditional ideas of museums were conceptualized on an adult audience and children were expected to enjoy the museum going experience like they were adults. Museum architecture and planning responded more to grown-ups whilst children's needs and their engagement at a museum experience were never considered (see Macdonald, 1996: 2; Fyfe, 2006:5). Museums are at a very exciting juncture in their history and this study has examined these intricate relationships both internationally and locally. The findings is that museums, especially in some developing nations like South Africa have been rather slow to keep abreast with new emerging trends which focus on child education and how children learn in and from museums. This study puts forward the notion of a new museum archetype for Durban, a Children's Museum, re-interpreting conventional ideas of museums to one which places children and the community at the centre instead of the artifacts. In other words "*museums are about somebody rather than about something*" (Cleaver, 1992:21). Without a doubt children learn through play (Harris et al, 2003). Children view their spatial and social environments as a playground of knowledge, a place to see, touch, feel, taste, listen to, socialize with and learn from. They see the big world very differently as compared to adults and attach and take different meanings and experiences from and to people, to forms, places, spaces and things. Very important is the symbiotic relationship between children and the natural environment. Nature provides children with countless of natural toys interesting textures in the form of stones, leaves and twigs and sensory stimuli in sounds and sensations. This means that the way children learn through play the methods of facilitating this process and the built and natural environments where learning may take place needs to be interconnected.

The position taken in responding through design is that there needs to be a holistic approach in responding to the social, cognitive and multi-intelligences in the development of children. This then suggests that the architecture and the landscape need to be integrated. Considering the close knit relationship **children have** with nature, the concept for the design of the museum draws from traditional African culture and spatial planning. The concept is based on the idea of PALAVER which in African culture is a traditional place of gathering in the shade of a prominent tree canopy somewhere in the village where villagers get to be heard, where they are able to express themselves freely without prejudice on life and on village problems. The design concept builds on this idea drawing from context interpreting this idea of a Palaver Tree to mean a roof of a building under which freedom of expression and exchange of ideas can take place. Hence the form of the building draws on clues from the majestic baobab of Africa, the **elegance** of the *tenere* tree and the qualities of a forest canopy.

Considering the close link between children and nature and the ways in which children learn from the environment, teaching children about saving the planet, the symbolic imagery and qualities of a tree is an appropriate response in creating a place meant for kids. Moreover, the changing qualities of light through the leaves of trees are a subtle but most effective sensory experience which the design of the new children's museum tries to emulate. In parts of Africa, unlike western ideologies the museum is richly connected to the people and to the communities in which they exist. In fact it is safe to say that the museum experience was part of everyday life.

CHAPTER 1

1.0 INTRODUCTION

1.1.1 Background

Museums hold a very contradictory position globally. Whilst its legitimacy, sustainability and history worldwide is being questioned they are still growing in numbers rapidly (see Macdonald, 1996; 2; Fyfe, 2006:5). This growth does not mean that the museum is escaping extinction but result from museums re-examining whose needs they are satisfying and what their role in society really is (Macdonald et al, 1996:2). There seems to be a paradigm shift in the thinking behind museums. Its traditional function has changed and is changing continuously. Learning in traditional museums was by inert looking and listening and not by doing. In fact museums were specifically designed to respond to grown-ups and children were obligated to use them like they were adults. Nowhere before 1899 was there any extraordinary place that was made for children. This dissertation examines these intricate relationships in the evolution of museums and attempts to define an appropriate architectural response that relates to communities, culture, climate and context.

1.1.2 Motivation for this study

In the inner-city of Durban there are very few distinguishable public buildings and urban places that are designed with children and families in mind. The increasing number of shopping malls, theatres, restaurants and gaming centres dotting the city of Durban are hardly the places for children and families in search of a unique experience which allows joyful interaction, self exploration, creativity, bonding with nature and positive social and cultural exchange. This study is motivated by the need to define an appropriate museum that addresses this gap in contemporary society. It focuses specifically on responding to emerging demands in the fields of education, entertainment and culture in young children. This study is prompted by the need for South African cities to be more inclusive in responding to children and family needs in its architecture design and planning.

1.2 Definition of the Problem

The importance of group education for children from a very young age in South Africa has not been fully realized. Awareness on key issues on caring for the world for example should be imparted to offspring at a young age so that they would grow up loving and caring for their environment. Similarly interests in subject matter in the arts, sciences, maths and technology (lacking in South Africa) need to be nurtured early on in a child's development. If this type of learning is to take place together with parental involvement the benefits are immense. In other words kids learn **pertinent** issues and so do their parents. Such needs have been met globally by a re-interpretation of the **traditional** museum from a library of the past to a mixed-use of activities catering for a wide spectrum of users.

Generally speaking there is a considerable lack of facilities available locally to engage young minds and stimulate their individual interests and foster local talents. Apart from schools which focus on a rigid curriculum, the city lacks a facility where learning is flexible and children could be themselves. In other words learning happens in a stress free environment at any time through hands-on activities. The current local museums, art galleries and amusement parks are inadequately designed and equipped to allow for interactive and multi-sensory learning focusing on childhood development. It is for this reason that such facilities are poor destinations. For example the traditional art gallery would allow visitors to appreciate a Van Gogh passively. But imagine the educational value being thought to look at the painting in a new way, feel the brush strokes and then be lead into a studio to paint with real brushes, paint and canvases. That is the type and level of interaction and education that is nowadays attractive to parents and their children - which is in the city of Durban unfortunately missing.

1.2.1 Aims and Objectives

The aim of this study is to explore the architectural, social and cultural changes in Museums over time to try and find out how they have evolved and what the current trends may be. It also examines how children learn through play and how this could be interpreted into architecture. The research looks at designing spaces for children, what the critical issues may be and the design decisions that need to be made. The study aims to create a more inclusive architectural response for the City of Durban which is climatically and culturally sensitive

whilst been edutaining, attractive, safe, environmentally friendly, sustainable and easily accessible to everyone. It also looks at how a Children's Museum proposed in this study could revitalize an urban neighbourhood. This dissertation attempts to re-define the traditional role, form and content of the traditional museum in response to current societal demands. From the research an appropriate architectural response will be the end result.

1.3 Setting out the scope

1.3.1 Definition of Concepts

- Children's Museum

According to the Association of Children's Museums (ACM), a Children's Museum refers to a place where children learn through play and discovery in a safe environment designed for all of them including their parents. The International Council of Museums (ICOM) acknowledges "Children's Museums" as museums because they are non-profit organisations, serve an educational role, make use of objects, maintain a professional staff compliment and are available to the public on a regular schedule (ACM, 2010 – www.childrensmuseums.org). Even though Children's Museum may not have permanent collections their exhibitions and programs motivate learning, stimulate curiosity and satisfy the interests of children and families (ICOM, 2010 – www.childrensmuseum.org). This definition is adopted for the purposes of this investigation.

- Interactive

For the purposes of this study, the meaning of interactive refers to 'hands on activities' carried out individually or in a group. It also makes reference to the type of exhibitions making use of technology, science, art and culture.

- Children

In this study children refer to toddlers from the age groups of 3 years and upward.

1.3.2 Stating the assumptions

It is assumed that the ways in which the built environment has been planned and architecturally designed has not taken cognizance of the needs and desirability's of children and families. It is also assumed that people in Durban are in search of such facilities that are both entertaining and educational for their children. It is also assumed that there is a considerable lack of facilities which respond to this need to be found in the city. In addition it is assumed that the current museums and cultural facilities which do exist are not effectively responding to current societal trends.

1.3.3 Key Questions

- *What is an appropriate architectural response for a contextually suitable Children's Museum?*
- *Where is an appropriate location for a 'Childrens' Museum?*
- *What kinds of facilities will need to be catered for in this typology of building?*
- *What kinds of exhibits will be on display?*
- *How will cognitive learning and learning through play be interpreted into architecture?*
- *What are the design considerations that will need to be taken when designing for children and parents?*
- *How does the urban design integrate with the architecture of the childrens museum?*

1.3.4 Hypothesis

The main argument made in this dissertation is that the traditional museum - as a container of history - has predominantly focussed on responding to an adult audience in its conceptualisation, form and content. In other words museum architecture and planning responded to grown-ups. The needs of children and how they engaged with a museum experience was never considered. Museums in especially developing nations have been slow to keep abreast with new trends in children education. This study will attempt to prove this shortcoming whilst at the same time putting forward a new archetype re-interpreting the idea

of the museum which is responsive to a wider spectrum of the community it serves, its culture and climate. It is also argued that this typology of museum is integral to society to inculcate early learning in children who inevitably are the leaders of the future. A Children's Museum which is culturally and climatically sensitive for the city of Durban is an appropriate response in filling the missing link for an educational and entertainment centre outside the school environment socially including communities.

1.3.5 Concepts and theories

The concepts and theories discussed in this study draws on a wide range of theories and concepts in the fields of social sciences, museology and architecture. The study examines the evolution of the museum in history, from its early beginnings and tries to understand the social climate and context in which these have taken place internationally and locally. This exploration is intended to inform contemporary ideas of museum in terms of its design, siting, its users and their needs and the form of its architecture in today's society. It also examines the changing roles of museums from libraries and containers of history to a more socially responsive one in response to changing demands. Collectively the research is intended to inform an architecturally appropriate design of a children's museum.

1.4 Research Methodology

1.4.1 Research Methods

This study will make use of primary and secondary sources of information, observations, interviews and fieldwork.

- Primary sources

Primary sources of information will make use of data collected through interviews with key experts in the field of museology and education. It also involves data that will be extracted from interviews with staff of local examples of education centres, museums, art galleries, exhibition centres and facilities designed for group learning. Finally information will be gathered from fieldwork techniques and observations of users and activities within similar types of buildings. These will be analysed. The objective is to understand the problems

associated with museums and how this will inform the new design and avoid duplicating the same problems. It also will help learn from experts on what is lacking in terms of facilities and accommodation and approach to learning which may be critical in informing the schedule of accommodation.

- Secondary Sources

Secondary sources of information will be extracted from a comprehensive literature review sourced from books and journals and internet journals and papers. Precedent studies of similar types of buildings both locally and internationally will be researched and analysed. The studies will inform the types and sizes of the facilities and types of accommodation found in local and international examples. It will also inform certain problems that may be experienced in the specific design and the lessons they may offer in the design of a new Children's Museum.

1.5 Conclusion

This chapter outlines the background and the research problem, questions and hypothesis that will be tested. It highlights the research methodology that will be employed and the different sources of information. Chapter two discusses the evolution of museum architecture in developing and developed regions in respect of its built form, content and social responsibility through the ages leading up to the present. It concludes with a synopsis of important developments in museum culture. Chapter three discusses how children learn through play and how these theoretical constructs can be interpreted into Architecture. Chapter four is an international precedent study and Chapter five discusses a local case study and concludes with recommendations

CHAPTER 2 – MUSEUMS

2.1 Museum Architecture: A Brief History

Collections in the beginning were housed in religious sites such as temples, sanctuaries and tombs and often in the homes of **elite and** were not for public viewing (McLean, 1997). By the 18th century a number of royal selection of works were been made accessible to the public but were housed in castles and palaces (Giebelhausen cited in Macdonald, 2006).

The first building was the British Museum designed to showcase the collection of Sir Hans Sloane. Others included the Museum Fridericianum (Figure 1) and Prado in Madrid, and the most influential at the time the Museo Pio Clementinoin in the Vatican. The galleries were modeled on Rome's antique baths. Key architectural features that spread across Europe at this time were the grand



staircase and the domed rotunda

Figure 1 – Image of Museum Fridericianum 1769 (Kassel culture: Museum Fridericianum / Hall of Art, undated)

(Giebelhausen cited in Macdonald, 2006). These were referred to as the ‘public museum’ in response to a period of enlightenment and equal opportunity to learning. However, in contrast the ‘public museum’ remained far from accessible to all (Hudson, 1975). There were rules such as restricted opening times; an application to visit, referrals from friends or aristocrats and a screening process by the librarian upon entry which excluded the lower-class, poor and uneducated. This entrenched the tradition that visiting was a privilege not a civic right (McLean, 1997). Clearly this early start of museology was riddled with contradictions resulting in more trepidation than learning. The move to house exhibits in grand buildings at the time did little to encourage public participation or benefited the public in any way.

The idea of museum as monument is expressed by the notion of museum as a space to display, to study and enjoy works of art (Pevsner, 1976). In a contemporary setting Pevsner's (1976) idea is actually referring to the museum as a place for education and entertainment. His thinking placed art museums central to the history of the building type over and above science or history. The articulation of the museum centered on the relationship between container and content. The first half of the 19th century was characterized by a building boom. During this time, the cultural relevance of Museums were entrenched in emblematic examples, exemplifying the idea of urban monuments in classical architecture - rooted in 18th century traditions of the Greek Temple, the dome of the Roman Pantheon, Palladio's Villas and



Figure 2 – Image of Glyptothek in Munich designed by Leo von Klenze 1815-1830 (Inside-Munich, undated)



Figure 3 - View of the Façade of Alte Pinakothek 1826-1836 (Alte Pinakothek, 2009)



Figure 4 - View of the Kunsthistorisches Museum in Vienna showing the Roman influences (The Black Von Scrolls, 2010)

Renaissance architectural styles (Schaer, 1993:78, Giebelhausen cited in Macdonald, 2008). Four buildings stand out around this time, the Munich Glyptothek (Leo Van Klenze, 1815-

1830) (Figure 2) for the display of sculpture; the Alte Pinakothek (1826-1836) (Figure 3) for paintings a museum called the Neue Pinakothek (1846-1853) and the Kunsthistorisches (Figure 4) Museum in Vienna (Gottfried Semper and Carl 1872-1889). These buildings expressed very early ideas of container and content and museums as monuments. In other words the symbolic language of the architecture correlated with the collections on exhibit.

Traditionally museum buildings and collections evolved in relation to each other, as in the Glyptothek (Image 2)- or there was a need to house existing collections as in the Alte Pinakothek (Image 3). Effectively collections and buildings were both envisaged as monuments allowing limited possibilities for adaptability or opportunities for expansion (Giebelhausen cited in Macdonald, 2006).

The 19th century exhibited a museum architecture that aimed to make a symbolic statement either civic or educational. The turning point around this time was a succession of world fairs and exhibitions in Hyde Park London (1851). The significance of these added important characteristics to the architecture of display, which were flexibility, impermanence and adaptability (McLean, 1997). The Crystal Palace (Figure 5) was an example, an enormous glass and iron structure that could be dismantled, moved and re-erected



Figure 5 - Great Crystal Palace in London Hyde Park 1851 (On the Futbol, 2011)

anywhere else (Giebelhausen cited in Macdonald, 2006). This resulted in a chain of international fairs in Paris 1855-1900, London 1862 and Chicago 1893. Being flexible and adaptable meant museums were contributing to society by being more accessible to a wider audience. This made Government realize the potential of museums to exude social utility and control. Museums had the power to educate and instill civilization and promote National pride (McLean, 1997:12).

More characteristics of museum change were evident in the philosophy of the modern movement reflected in the ideas of 'form follows function' and the transparency of materials and spatial edges (Kaynar undated paper). Effectively the museum was re-introduced as an interior



Figure 6 - Museum of Unlimited Growth, Le Corbusier 1939 (Museum Experience, 2010)

volume defined by circulation space (form follows function) or a rectangular form segmented by a few partitions (transparency) (Kaynar, undated paper). This is well illustrated by Le Corbusier's idea of the Museum of Unlimited Growth (1939) and Ludwig Mies van de Rohes National Art Gallery (1942). Le Corbusier's Museum prototype (Figure 6 and 7) was a modern re-interpretation of classical museum design of the 19th century, but with controlled circulation. The Museum of Unlimited Growth extended the idea of flexibility, expansion and temporary exhibits



Figure 7 -, Image of National Art Gallery designed by Mies van de Rohe 1942 (Gorner R, 2009)

exemplifying the notion of 'museum' as a continuum of humanities triumphs (Giebelhausen cited in Macdonald, 2006). Elevated on pilotis the museums spatial organization promoted a continuous circulation in the form of a square spiral allowing the building to expand with new collections. The main entrance was at the centre and the gallery spaces grew from here allowing for extended growth (Giebelhausen cited in Macdonald, 2006, Kaynar, undated paper). In contrast, Mies van de Rohes building suggests a large rectangular volume as a museum environment. The spatial arrangement hardly suggests any circulation paths and gallery spaces are defined with very few partitions (transparency) (Kaynar, undated paper). Effectively, the volume of the building has little influence on the circulation possibilities for visitors. Researchers posit that there may be a need for additional limitations possibly created by exhibition layouts (Searing, 1986, Kaynar, undated paper). Architectural historian's pin-

point Mies van de Rohes National Art Gallery as a comprehensive move away from traditional museum design towards a more modernist interpretation of flexibility of movement patterns and more open planned spaces (Kaynar, undated paper). From the work of Le Corbusier and Mies van de Rohe two attitudes and logic to museum design emerge: (1) *restricted circulation patterns* and (2) *open planned organization*. The former places restrictions on the visitor's accessibility and movement through the various spaces resulting in fewer choices in exploration and discovery (Kayna, undated paper). In other words the user's viewing in the museum follows a rigid sequence. On the other hand the latter open planned arrangement results in a more changeable circulatory pattern suggesting the need for a variegated organization of functions.

In contrast to traditional museums - where artwork was displayed in heavily adorned ornamented interiors, the characteristics of 'museum as instrument' was to be flexible and neutral and to let art take precedence (Giebelhausen cited in Macdonald, 2008).



Figure 8 – Museum of Modern Art, Edward Durrell Stone and Philip Goodwin 1939 (NYPI, 2010)

The Museum of Modern Art in New York (MoMA,

1939) (Figure 8) was the originator of the 'white cube' aesthetic introducing a new conception of public buildings. Typically conforming to international style principles the MoMA discarded the grandiose columns and ceremonial staircase of classical architecture. Instead the building's façade is flat butting up against the street edge from where it is directly accessed (Barranha, 2008). The main glassed entrance doors curve to allow for an easy transition from off the street into the building (Barranha, 2008). The interior was characterized by functional and unobtrusive spaces where the emphasis was on the artwork or objects on display without any distractions. The display of art was on plain white walls, floors were unornamented, ceilings functional and interior spaces monochrome in color (Giebelhausen cited in Macdonald, 2008). The 'white cube' aesthetic popularized the

museums of the second half of the 20th century and this was a significant paradigm shift from historical approaches in museum design (O'Doherty et al, 1999).

Following the end of modernism, art rejected the aesthetic of the 'white-cube'. Artists were opting for alternative spaces to display their works of art. Artist and art were no longer self contained pieces to be exhibited in neutral spaces. Artists were breaking boundaries and making the exhibition spaces part of their artwork (Giebelhausen cited in Macdonald, 2006). Hence the



Figure 9 - Guggenheim New York designed by Frank Lloyd Wright 1959 (Short W. H, 2000)

museum after modernism took on a wide array of forms. Although very much modernist, the Guggenheim Museum (Figure 9) is a classic example challenging the architectural aesthetic of the 'white-cube'. Frank Lloyd Wright articulated the museum as a domed rotunda that housed a spiraling ramp around a central atrium which was sky-lit. The journey through the space along the ramp overlooked bays for the display of artwork. It offered a spatial viewing experience that was unlike anything elsewhere at the time. Effectively the museum space was redefined as sculpture (Giebelhausen cited in Macdonald, 2008). In this example, the architecture attracts visitors and not always the art on display. In other words the architecture is more a protagonist than subservient (Magnago, 1999). Nonetheless the architect was successful in creating a sculptural iconic building against the skyline of urban New York. What these two examples point to is an impasse of the modern movement whereby some architects embraced the minimal aspects of the international style in their architecture whilst others were more explorative with forms and materials such as concrete to produce more unique buildings.

Some buildings being produced around this time responded to the public places surrounding the museum – effectively illustrated by the Art Museum (MASP) (Figure 10) in Brazil (1957-1968). The philosophy adopted in the conceptualization of the MASP was to integrate the social responsibility of public buildings with improving urban life of the city by retaining open spaces between museums and street (Barranha, 2008). The result was a double storey portico over a large square in one of the most prominent districts of Sao Paulo – the famous Avenida Paulista. The gesture



Figure 10 – Image of the Brazil Art Museum MASP in Sao Paulo 1957 (Andreas K, undated)



Figure 11 – Image of façade of Staatsgalerie Stuttgart, James Stirling 1977 (Kroll A, 2011)

made by the architecture is influential giving back to the

city space it has taken from it (Eyck, cited in Barranha, 2008). The openness of space at the centre of the city has spectacular views whilst at the same time providing a multi-functional square for rock concerts, street markets and demonstrations to happen (Barranha, 2008). This is a good example of how architecture of museums can contribute to the social responsibility within cities.

The museum of the post modern era was characterized by the ‘museum of ruins’. The extension to the Staatsgalerie in Stuttgart by James Stirling (1977-84) is referenced as one example of post modern expression of museum architecture (Figure 11). The layout is adapted from the plan of Schinkel’s Altes Museum with certain areas remodeled. It is

characterized by sky lit galleries encircling a central rotunda on three sides (Giebelhausen cited in Macdonald, 2006). The building moves away from the monumentality and symmetry of the Altes Museum. Instead its main façade is a fragmented framed glassed wall in bright green which is intended to reflect the landscape.

Approaching the museum is via a sloping ramp which almost seems processional except that the traditional arrangement has been deviated from with the entrance to the building set at an angle (Giebelhausen cited in Macdonald, 2006). The central rotunda inaccessible from the galleries serves as the sculpture **court** and is a significant architectural feature. It is deliberately exposed and covered with ivy symbolizing the idea of ruin and the history of the building type (Giebelhausen cited in Macdonald, 2006). Part of the external wall of the museum has blocks which have **been purposely broken** to reveal the thin cladding and mundane car park beyond. The architecture is playful and is reflected in the color scheme. The oversized railings to the ramp have been painted a bright pink and blue, doors are a stark red; window frames and the floor in the main lobby are a brilliant green. Even the elevator to the permanent galleries are multicolored (Giebelhausen cited in Macdonald, 2006). Essentially Stirling combined the enfilade of sky-lit processional galleries of classical architecture with the modernist white interiors. A hint of playfulness in the galleries was introduced with subtle use of architrave shaped light fittings (Giebelhausen cited in Macdonald, 2006). On the whole the building reflects the architectural history of the museum from the classical style of the 19th century to the modernist aesthetic of the 'white cube'.

Contemporary architecture around this time was searching for urban relevance (Barranha, 2008). Accordingly much of the contemporary architecture during the second half of the 20th century was related to the concept of 'landmarks'. According to Lynch (1960) a landmark has a singular characteristic that is unique and memorable within its context. Landmarks become more readable, distinct, identifiable and significant by virtue of its form against the background of its spatial location (Lynch, 1960). Moreover, the spatial prominence of a buildings location contributes to its landmark characteristic (Lynch, 1960). It follows then that background contrast is the determining factor to becoming a landmark. Hence the distinctiveness of the architectonic form determines the impact of museum architecture on a given context. This resulted in many museums of the latter 20th century being conceptualized on this notion as opposed to old ideas of monumentality.

As such, Renzo Piano and Richard Rogers (1977) redefined the traditional idea of museum with their design for the Centre George Pompidou (Davis, 1990). The building was a cultural centre with a host of ancillary uses to the Musée



Figure 12 – Image of Centre George Pompidou, Renzo Piano and Richard Rogers 1977 (Glynn S, 2001)

National 'Art Moderne' such as: exhibition spaces, a library with a bookshop, cafes and restaurants, a videotheque and cinema (Giebelhausen cited in Macdonald, 2006). The conceptualization of the Centre Pompidou was based on promoting and democratizing different cultures.

Its bright colors, playfulness, high tech language, contextual contrast and mixed use of functions conflict the image of the traditional museum as an austere monument. Furthermore it expressed a new attitude and vocabulary towards architecture in direct opposite to organic forms of the Guggenheim, favoring a more technological expressionism. The museum became a fashionable, informal and flexible place (Barranha, undated paper). By placing ducts for the different services and escalators on the exterior of the building the architects not only freed up internal space or flow of spatial movement but managed to create a hi-tech modern image of a museum (Barranha, undated paper). A grand piazza is positioned at street level for all kinds of outdoor performances and also services the main entrance into the building. The entire composition of the building symbolizes the blurring of lines between high end and popular culture and between the inside and outside of the building (Giebelhausen cited in Macdonald, 2006). Although some argue that the building resembles an oil refinery more than a museum, the building remains a popular tourist attraction. Visitors come to experience the panoramic views over the city of Paris from its escalator accessed top floor. This introduced a new idea of museum as a viewing pavilion in response to people's allure and fascination with the images and spectacle of the city (Barranha, undated paper). The aesthetic of the Pompidou centre is one of a technological stage production symbolizing cultural work which it does not actually perform. Nonetheless the architectonic form of the

Centre Pompidou sparked off significant discussions and debate around individual expressionism and the implications of museum architecture in the creation of landmark buildings. These ideas formed the basis for much of the contemporary museum architecture going into the 21st century.

The idea of playful meditation on the building type continued to inform museum architecture well into the 1980's (Giebelhausen cited in Macdonald, 2006). Experimentation with fragmentation and architectural metaphors were strongly characterized in museum architecture just like the Groninger Museum (1995)



Figure 13 –Image of Groninger Museum Alessandro Mendini, Coop Himmelb(l)au and Philippe Starck 1995 (Achten H, undated)

(Figure 13) in the Netherlands designed by Alessandro Mendini, Coop Himmelb(l)au and Philippe Starck (Figure 13). The building is an ensemble of diverse, controversial but interconnected pavilions, each reflecting the distinct architectural style of its creator and providing visitors with a unique museum experience (Marstine, 2006:58). Clearly the deconstructivism of Coop Himmelblau is visibly apparent against the cool chic of Starck. In this example the museum was no longer envisaged as a universal, unified institution of culture. Instead culture was being reflected as a patchwork of architectural expressions intended to symbolically represent the variety of exhibitions (such as: fine-arts, decorative arts and local history) to be accommodated. This meant that the museum had to provide different types of display spaces including temporary and flexible ones in response to a wide audience and range of work (Giebelhausen cited in Macdonald, 2006, Marstine, 2006).

More recently museums are becoming important in facilitating urban regeneration projects and taking on formal and conceptual expressions (Marstine, 2006). In Frankfurt, following World War II the museum was pivotal in rebuilding the city by promoting

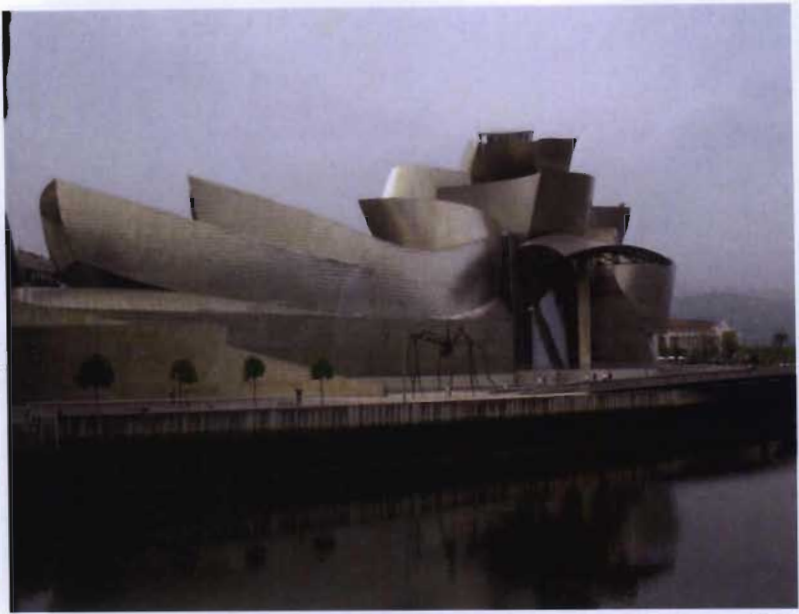


Figure 14 – Image of Guggenheim Bilbao Spain, Frank O' Gehry 1997 (Hernandez J, 2007)

strategies for urban and cultural regeneration. One symbolic example is Frank O' Gehry's Bilbao Guggenheim (1997) (Figure 14) which is an urban landmark and global indicator (Marstines, 2006). The project was an anchor to a new cultural precinct and to a much wider vision to rejuvenate the industrial Basque capital. Considered one of the most emblematic constructions of the millennium (Fernandez-Giliano: 1998:5) Frank Gehry's (1991-1997) building is an indicator of the dominance of form in museum architecture. The building drew on new digital and building technologies to create innovative built forms. More importantly it highlighted the potential of museums to impact on new media through the scale of the project, visual characteristics and the materials employed in its construction (Baharanna, 2006). The building through its iconic sculptural shape of titanium, stone and glass imposed itself on the cities landscape altering Basque's image and taking its position as a global cultural landmark and tourist destination (Giebelhausen cited in Macdonald, 2006, Barahanna, undated paper). The Bilbao Guggenheim became a worldwide phenomenon appearing in countless architectural journals and featuring in a recent James Bond film placing the museum on a global cultural and tourist pedestal. What emerges from the Bilbao effect is the ability for museums to catalyze new city dynamics and centralities transforming cities and economies. Similarly in London the Tate Modern designed by Herzog and de Meuron (2000) (Figure 15) was heralded as part of a broader urban regeneration scheme to revitalize the degenerating borough of Southwark. The project involved the recycling of a redundant power station into a new art gallery. To be a successful landmark and tourist destination the building needed to be integrated into the

urban fabric. As such the building is linked to the city and to St. Pauls Cathedral including the nearby underground stop via Norman Foster's processional pedestrian bridge. The architects retained much of the industrial character of the building by carefully juxtaposing a contemporary



Figure 15 – Image of the Tate Modern London, Herzog de Meuron 2000 (Elliott B, 2010)

two storey glassed intervention above the existing old sub-station. The combination of old and new materials, light and solid transformed the building's horizontal elevation and provided a transparent backdrop to the dark vertical mass of the chimney (Craig-Martin, 2000).

The interior space of the old sub-station has an industrial feel and look to it and takes cognizance of the 'white-cube' aesthetic. The galleries vary in size and are divided using movable walls instead of temporary structures giving the appearance of permanence. Whilst displays and layouts to galleries change regularly the interior of the museum appears to construct the museum as a monument (Giebelhausen cited in Macdonald, 2006). In comparison, the Bilbao Guggenheim depicts an interior gallery arrangement favoring variety over uniformity. Gallery spaces at the Bilbao radiate from the central lobby ranging in sizes from huge to cavernous to the



Figure 16 – Aerial view of the Jewish Museum, Daniel Libeskind 2001 (Schneider G, 2008)

traditional enfilade of top lit display areas (Giebelhausen cited in Macdonald, 2006). The variety in gallery spaces in the Bilbao acknowledges the multiplicity of artists and forms of art and rebuts the modernist view of neutral spaces (Giebelhausen cited in Macdonald, 2006).

The history of museum architecture illustrates a shift from monument to instrument with postmodernism straddling between the two (Pevsner, 1970). Recent examples of museum architecture lean more towards a monumental approach refuting the ideas of 'less is more'. For example Daniel Libeskind's Jewish Museum in Berlin (2001) is both symbolic and emotive representations of the museums historical displays and objects. According to Marstine (2006) the architecture is evocative and resonant of the museums themes. In the Jewish museum voids are etched into the architecture symbolizing the dreadful emptiness created by the Holocaust. The memorial tower is a dark and cold place of meditation symbolic of the period of the Holocaust contributing to the visitors experience (Marstine, 2006). The architecture frames the narratives of the exhibits provoking physical, emotional or intellectual reactions from the audience (Giebelhausen cited in Macdonald, 2006). In more recent trends there appears to be a growing need for interactivity of a different kind in museums. In the Phaeno Science Centre in Wolfsburg Germany designed by Zaha Hadid (2005) (Figure 17), learning takes place through a hands-on approach and through interactive exhibitions. The building

by Hadid is characterized as a place for exploration, with plateaus, craters and caves. Visitors create their own journey exploring the experimental landscape. The building is elevated, supported by angled cones housing conventional uses



Figure 17 – Street view of Phaeno Science Centre Wolfsburg, Zaha Hadid 2005 (BBC, 2009)

such as an auditorium, shops, cafes and a restaurant. The building resembles a more complex high tech organic interpretation of the Art Museum, the MASP in Brazil (1957-1968). The underside of Hadid's building functions as a public space. The form of the building has made it difficult for critics to describe it architecturally. Descriptions have ranged from an alien space ship to a giant centipede making reference to its organic high tech qualities (Pearsons, 2004). Hadid's contribution is indicative of the wide variety of responses of museum

architecture. However museum architectural responses overlap between monument and instrument falling within classic post modernism (Pevsner, 1970) which resulted in multifarious, conflicting and exciting buildings. Moreover the museum as instrument has broadened its scope from just serving a function of container of exhibits to include urban re-imaging, urban renewal and cultural tourism on an international plane.

So far the discussion on museums focused on its evolution through the decades and how the archetype had evolved both architecturally and socially. Now the focus shifts to consider children and families in the design of museums. Children's museums have been on the rise since its conception in the 19th century, and more so in the past 35 years than ever before. This has been attributed to limited options in communities for safe, accessible and stimulating play areas for children (Association of Children's Museum, 2001).

2.2 History and Evolution of Children's Museums In the West

The first Children's Museum in the world was the Brooklyn Children's Museum founded in 1899 (New York Times, 1905; Kotler and Kotler, 1998) by Franklin William Hooper (Din, 1998). It evolved when the Brooklyn Institute of Arts relocated leaving behind a few exhibits, to which books were added and the Children's Museum was born. It was dedicated to educating children in the Natural Sciences (Din, 1998). The Museum was located on a separate site away from the main Museum and its sole existence was to quell the eagerness of children (Schofield-Bodt, 1987).

The 'progressive era' was a time of new educational theories advocating the importance of childhood in the life stage of humankind. Considering this social climate back then, the concept of a Children's Museum where objects served as a teaching tool for children was really a revolutionary idea. With labor laws been introduced during the 1900's, a growing middle class provided an audience which made Children's Museums very popular (Schofield-Bodt, 1987). The fame of the Brooklyn Museum grew quickly and very soon through a collaborative effort of children and community, Indianapolis managed to establish its own Children's Museum which became the largest in the country (Carey, 1925 cited in Schofield-Bodt, 1987, Din, 1998). The Indianapolis Children's Museum was a good example of social culture because it was born out of the community in which it was located. Children from ethnic neighborhoods determined the nature of their own Museum by contributing a

widespread of their own cultural artifacts which became the Museum's collections (Carey, 1925 cited in Schofield-Bodt, 1987). This points to the early evolution in Museums from traditional roles of controlling and disseminating of information to more encompassing and inclusive educational roles.

Between the creation of the Children's Museums in Brooklyn and Indianapolis, several others were mushrooming in other parts of cities around America, one in Boston (1913) and one in Detroit (1917). There was one in Hartford (1927), Jacksonville (1935), Charlotte (1947), and



Figure 18 - The kind of mansions that existed in Brooklyn (Rupolo, 2010)

Duluth (1930) and they were increasing in numbers rapidly (Din, 1998). All of these institutions aimed to educate children through hands-on interaction with actual things - to increase children's knowledge about faraway places and new ideas. This was the early beginning of adult - child learning partnerships fostered early on in Children's Museums (adapted from Schofield-Bodt, 1987).

Commonalities were found across all of these institutions because they were founded by people who were inspired by their first visit to the Brooklyn Children's Museum and more so by its curator Anna Billings Gallup (1939). Hence the physical arrangements of spaces were similar in all institutions and all were converted old Victorian and carriage houses. Historically the Brooklyn Children Museum's open planned spaces were converted into exhibition halls, whilst upstairs the bedrooms made way for workshops, club rooms and libraries. The thirteen rooms in the Museum housed various stuffed animals and reptiles. A lecture hall was set aside for daily talks after school on different subjects. The library was most impressive boasting an admiral collection of books in the natural sciences and history. It was freely accessible to all children. The curator Gallup (1905) noted that an African American boy was frequenting the Brooklyn Children's Museum since he was a toddler and

he was able to gather enough '*education honey there to enter Columbia College*' (New York Times, November 12 1905). Other significant spaces in the Brooklyn Children's Museum were the 'Zoological Type' room which presented the evolution of mankind in a simple way with simple labels for children to understand. The 'History Room' laden with costumes and military arms told the story of the **discovery** of America and **the** wars that were fought. There was an art-room intended to arouse appreciation of the architectural sciences through a collection of high quality images. Included in the mix was a botanical room telling the story of plant-life, a bird room documenting the different species of bird-life and perhaps the most comprehensive collection of insects and butterflies (adapted from the New York Times, November 12 1905).

Even in its early beginnings, the Children's Museum was never considered an inferior organization in comparison to the more **established** institutions frequented by the adults at the time. In fact the philosophy between **the** two branches of Museums was no different and so too was the act of collecting artifacts for cultural and environmental preservation. Whilst this was the case the difference was that Children's Museum's **prioritized its educational** role and used its collections as a resource for teaching and learning. On the same token, Children's Museums that were springing up before 1940 showcased the similar quality of objects as 'adult' institutions. Exhibits were not **ina a sense juvenile** but differed in the way in which they were exhibited and presented to promote the philosophy of '*learning by doing*' (Schofield-Bodt, 1987).

It was not long after opening its doors to eager children that these institutions outlasted their converted Victorian mansions and Carriage houses (Schofield-Bodt, 1987). In 1926 the Brooklyn Children's Museum expanded into the mansion next door. The Museum outgrew these quickly and decided that to effectively achieve its mission both the existing buildings need to be demolished and be replaced by a purpose made facility (Morrone and Iska, 2001). Hence, a new technologically advanced Children's Museum was built on the original site, Brower Park. The demolition of the two mansions took place in 1967 but due to financial limitations at the time the new Children's Museum was only opened ten years later. The building was described as a complex structure, designed by well known Manhattan Architects Hardy, Holzman and Pfeiffer. The Architects conceived that ever since the Museum began in 1899, it took almost 80 years later to establish flexible spaces which responded to its many programs. (Mildred F Schmertz. Hardy Holtzman Pfeiffer Associates: Buildings and Projects.

246). The Brooklyn Children's Museum was the first building specifically designed with children in mind, combining traditional and participatory exhibition spaces (Schofield-Bodt, 1987; Morrone and Iska, 2001). Instead of replacing the demolished buildings the Architects took a more subtle, subterranean approach in the new design. In this way Brower Park was allowed to spill-over the roof of the new Children's Museum. Below ground, the Museum was an open planned four level facility with access ramps to each level and multi-sensory exhibitions and activities (Vinoly, 2007). Many years later, in 2001 the Brooklyn Museum once again underwent extensive renovations to increase its capacity and update its public presence into the 21st century (Vinoly, 2007). Similarly the Boston, Indianapolis and Detroit Children Museums due to their immense success and popularity over the decades relocated to larger premises and into newer facilities (Schofield-Bodt, 1987).

By the 1950's and 60's there were significant paradigm shifts in education from interests in history and the natural environment to the sciences and engineering. This was more prolific because children were preparing for new career paths in a growing technology sector. Moreover big organizations were funding workshops and programs in anthropology and archeology in Children's Museums favoring its explorative learning approach (Schofield-Bodt, 1987). The Children's Museums at the time became wrapped up with the technological movement and children's science took centre stage.

By the 60's and 70's there were significant growth and landmark changes taking place in Children's Museums. Of importance was the deviation away from the conventional definition of Museums in that Institutions were establishing without collections (Pohle cited in Schofield-Bodt, 1987). These new museums were planned around interactive experiences around contemporary objects as opposed to existing historical pieces. Another landmark change was an increased focus on the needs of children. As such most Museum displays and activities were aimed at elementary through to high school learners and soon after preschoolers joined in. The change in focus away from an adult audience to children saw the introduction of pre-school play areas which grew to include parent-children workshops focused on teaching learning concepts in kids (Schofield-Bodt, 1987). One such Institution was the "Please Touch Me" Museum in Philadelphia purposely designed for children seven years old and younger. Just as the name suggests exhibits and objects were designed to be experienced interactively (adapted from Schofield, 1987).

So began the viewpoint from the 1980's onwards that function was not reliant on collections. Even the older established Children's Museums whilst committed to their collected works soon realized that their activities and programs were not dependent on objects but could be influenced by societal concerns (adapted from Schofield, 1987).

More recently a new focus has been 'family learning' where adults, parents and children learn together, each contributing something special to the learning experience and leaving with a sense of self (adapted from Schofield, 1987). This has led to the philosophy adopted by all Children's Museums which follows that the "*Museum is for somebody rather than about something*" (Cleaver, 1992). Essentially this statement places people at the centre of the museum instead of its exhibits. Clearly Children Museums were breaking new ground and gaining momentum in new areas of education in the first world. Whilst slow to gain pace, Children's Museums in developing countries were also starting to establish. This is taken up further in the next section.

2.3 Perspective on Children's Museum's in Developing Countries

Whilst Children's Museums advanced rapidly in the developed World, very similar ideas were surfacing in developing nations. Like first world citizens, societies in many third world regions influenced the image of their museums from once quiet places to integrated, publicized hives of cultural activities. (Marcouse cited in Unesco, 1973). Whilst this has happened in some developing nations like in parts of India and Nigeria many parts of Africa tell a very different story. In sections of Africa, the importance of museums is not well understood. Apart from limited resources and materials the general feeling amongst indigenous people is that there are much more pressing developmental and economic issues to consider. Hence museum projects were afforded little or no attention (Toucet cited in Unesco, 1979; Olofsson et al, 1979). The people of Mali Africa for example since colonialism did not trust Museums. Museums were seen as representing foreign ideas, reserved for foreigners, affluent nationals and tourists - portraying African culture as art from a traditional perspective (Konare cited in Olofsson, 1979:16). Hence in such places culture and national identity have been fundamental in the development of education in order to redress the effects of colonialism (Arinze cited in Unesco, 1979:108).

In India the situation differs slightly. Despite it's independence, for a long time Museums were concerned more with the colonial ideas of prestige, scholarship and research (Marcouse cited in Unesco, 1973:17). Only in the past half century or so has there been some changes taking place where specific contributions to education



Figure 19 - Birla Industrial and Technological Museum, Calcutta 1959 (Kolkata, undated)

are noted. In the Birla Industrial and Technological Museum in Calcutta (1959) (Figure 19) and the Bhal Bhavan Children's Centre (1956) (Figure 20) in New Delhi there are deviations from traditional approaches to learning in favor of a more collective and interactive models.

In the former, works are prepared collectively by children, the public and adults. This personal participation allows a better understanding of the objects on display including an awareness of how museums work. In addition, no longer is children lead around in large school groups by a museum expert. Instead learning takes place in smaller groups and is managed by children by 'looking and doing'. Children of all ages and stages of development get to distinguish for themselves the different styles of art, the characteristics attributed to periods in history or to the specific countries or the artwork of exact artists etc. Essentially, the emphasis is



Figure 20 - Bhal Bhavan Childrens Museum, New Delhi, 1956 (Delhi for Kids – Part 1, 2009)

on an open-ended approach to education through interactive activities (Marcouse cited in Unesco, 1973:17).

Bhal Bhavan is a children's museum modeled on the Muse – an innovative children's facility in Boston - running workshops such as *Fun with Words (ages 6-8)*; *Writers Workshops (ages 9-12)*; *Anthropology Workshop (ages 10-14)*; *Photography Workshop (ages 17 plus)*; *Dance and Aviation Workshop (ages 15 plus)*. The lesson from the Bhal Bhavan experience shows how difficult it is to adapt Western ideas to work within some developing contexts. Whilst learning in the West encourages children to discover creatively and interactively, in India's culture this is a very suspicious concept very much opposed by parents. Parents believe that creative learning is not valuable whereas if their children were employed they will be more beneficial economically to the family (Marcouse cited in Unesco, 1973:20). Hence a basic education in India is the expected norm but introducing new creative interactive ideas of learning is considered to be extravagant, lavish and unnecessary. In this social context it is a challenge for the Children's Museum to be able to grow creativity and individuality in children when they are at an early age bound by economic responsibilities to their families (Marcouse cited in Unesco, 1973:20). Whilst this is the case in India the experience in Indonesia is quite the opposite. The Children's Centre focusing on dance, music and painting in Bali is supported by parents and community. Here cultural background is strictly adhered to where Balinese traditional music and dance has both economic and educational advantages (Marcouse cited in Unesco, 1973:20).

In places like South Africa the transformation of museums developed strongly along the ideologies of society and the political changes taking place in the country. The South African Museum (Figure 21) was the first



(SAM, 1825), a zoological showcase premised on the idea that

Figure 21 - South African Museum S.A.M 1825 (South African, Museum Cape Town, 1999).

a museum should have “something for everybody” and focused on the display of artifacts (Naud and Brown, 1977:63). The focus later shifted to research with the establishment of the

second oldest, the Albany Museum in Grahamstown which emphasized South Africa's rich natural science history (Levitz, 1996). In contrast to the philosophy of accessibility and transparency none of the museums considered children or took cognizance of the art, culture or traditions of its indigenous people. Museums in South Africa were Eurocentric in architecture, depicting a history which promoted 'white' supremacy and 'Afrikaner' nationalism which continued vigorously throughout the apartheid era. The Voortrekker and Simonstown Tempostorie Museum (1970's) and similar others shunned black history because it went against the dogma at the time. The culture and traditions of other race groups and genders were reserved for ethnographic and anthropology museums. However the objects displayed deliberately reflected other cultures in a primitive light further reinforcing racial stereotyping (Webb, 1994, Levitz, 1996). Such prejudices continued throughout the apartheid years and were entrenched by the colonial styled architecture, the siting of such places, the language and style of the exhibits and by old apartheid driven policies (Mathers, 1994, Levitz, 1996). These factors made museums very unpopular places amongst the majority of the population.

The end of apartheid was a beginning of radical transformations throughout South Africa. Apart from confronting inequities of the past in museums, they were now being challenged over their accountability and relevance to communities (Levitz, 1996). Like the rest of the World, South Africa is starting to re-examine the traditional roles and responsibilities of its museums in society. Over the past fifteen year's museum growth in the country mainly focused on telling the stories of the previously disadvantaged under apartheid.



Figure 22 - Street View of District 6 Museum 1996 (Cape Town Only District Six Museum, 2010)

The District Six Museums (Figure 22) housed in a colonial

style building took the lead in re-instating the community before Group Areas, through the memory of place (Witz, 2010). The space is a collection of vivid and emotional images, old recordings, signs of past road names and things that reminded people of the place back then.

Laid out on the floor is a map of the residential neighborhood where ex-residents are encouraged to mark out where they lived or places they remembered. A memory cloth is available for people to write suggestions but more importantly to leave behind a recollection of place (Figure 23). The process of 4visiting, looking, listening and recording is described as a community of memories and a means to re-remember the political struggles of South Africa's people (Levits, 1996).



Figure 23 - Interior of District Six Museum showing memory map (Cape Town Only District Six Museum, 2010)

Robben Island in Cape Town is another place commemorating the political hardships of black people leading up to democracy in South Africa. The Island was primarily a prison but also served



Figure 24 – Entrance to the Robben Island prison 2004 (Rüdiger Wölk, Münster, 2004)

as a defense station in World War II and a hospital for leprosy and mental illness. It was a place where Muslim leaders from the East Indies, Dutch and British soldiers, numerous civilians, anti-apartheid activists, along with former democratic President, Nelson Rolihlahla Mandela and Pan Africanist Congress leader Robert Mangaliso Sobukwe were detained for decades on end (www.robbenisland.org). Transformed from Island prison to a museum in 1996 and to a world heritage site in 1997 the imaging of the museum is through narrating the story of these political prisoners. The old prison buildings (Figure 24), cell blocks, isolation houses and open yards are all places which echo the adversities prisoners endured and the efforts they made to survive and to maintain their humanity whilst being imprisoned there. The Museum consists of a tour of the Island where visitors are shown shipwrecks along the

coastline, the flora and fauna found on the Island, the World War II exhibit, the lime quarry where prisoners toiled at work, the graveyard and the place where political leaders were held in solitary (Levits, 1996). This is followed by a prison tour and the famous Cell no 5 in B Block which used to be where Nelson Mandela was confined. Whilst Nelson Mandela is the nexus of Robben Island, the museum is far more complex symbolizing inequality and oppression. This is evidently represented by the *Cell Stories Exhibition and Archives (1999)* characterized by single solitary cells containing objects that were revered by prisoners. Each item was accompanied by a biography about the prisoner including a summary as to why the item was so significant (Levits et al, 1996). Part of the exhibit is interactive where visitors by pressing an intercom button could hear real prisoners speak about their life and experiences on Robben Island. Effectively the cells in Block A became an interactive model of multimedia, sensory and memory spaces. Inevitably the *Cell Stories* became a very powerful exhibit in post apartheid South Africa (Levits, 1996). Apart from exhibiting, the museum administers various educational programs targeting schools, the youth, children and adults. It is also actively involved in developing tourism, performs a collecting function and undertakes research related to the Island (www.robbenisland.org).

In 2001 The Apartheid Museum was opened in Johannesburg, the first of its kind in the world specifically designed and created to document the consequences of South Africa's apartheid past leading to its triumphant end. The building - designed by a consortium of professionals,

GAPP Architects and Urban

Designers, Mashabane Rose Architects, Linda Mvusi Architecture and Design - is described by its director as "*a superb integration of design, space and landscape*" making it a most popular tourist destination (Till, 2003 cited in www.gapp.net, Davie, 2003).

The greatest challenge for the Architects was to re-create the feeling of a township atmosphere of the 1970's and 80's characterized at the time by people "*dodging police bullets or teargas canisters; marching and toy-toying with thousands of school children and tragically*

carrying the body of a comrade into a nearby house (GAPP

Architects www.gapp.net, Davie, 2003). The Architects response was a 6000m² building sited on a seven hectare natural veld with a rich indigenous habitat, a lake and pathways



Figure 25 - View of the Apartheid Museum from the parking lot. (Apartheid Museum – Johannesburg, undated)

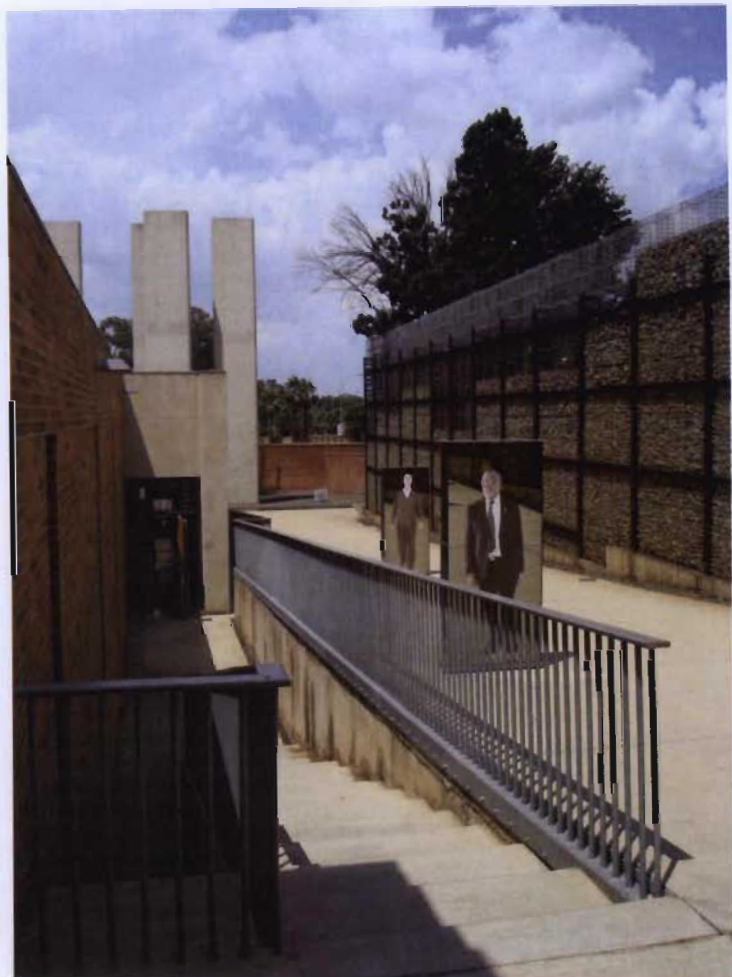


Figure 26 - Shows the textured gabion walls and exit out of the museum. (Apartheid Museum – Johannesburg, undated)

alongside the bare but bold building. What gallantly stands out on approaching the building is a group of concrete columns each representing a principle of the Constitution and effectively defining the entranceway to the museum (Davie et al, 2003) (Figure 25). The rest of the building is virtually hidden (GAPP Architects, www.gapp.net, Davie, 2003). The Architects employed the use of

constriction and release, engagement and disengagement to coincide with the emotional and sensory experience of the various exhibits on display. The deliberate choice of rough textured finishes such as rock filled gabions, off shutter concrete, dry stone stacked walls, rough plaster, rusticated galvanized steel and red face brick works in synergy with the surrounding context (Davie, 2003) (Figure 26). A reflecting pond on the fringe to the east of the building creates a solemn contemplation place for visitors following their dreadful, fearful and more often overwhelming journey through the apartheid space (Gapp, www.gapp.net). Entrance to the

building is past a bench with a 'Europeans Only' sign leading up to

swinging turnstiles marked with a sign in English and Afrikaans dividing 'whites-blankes'



Figure 27 - Shows the main entrance into the Apartheid museum (Carruthers V, 2007)



Figure 28 - The yellow and blue Caspir exhibit plays film footage taken whilst driving through the townships. (Apartheid Museum, 2009)



Figure 29 - The symbolic representation of the 121 activists that died during apartheid. (Apartheid Museum, 2009)

and 'non-whites-nie blankes' (Figure 27). This is a powerful reminder to people of the racial segregation at the time. It tells people what to expect and signals the beginning of the rest of the visitor's journey through the space. Once inside visitors encounter a series of cages displaying blown up copies of racially tagged identity and passbooks which were historically detested (Davie, 2003). This sets the graphic tone for the rest of the trip through the museums space characterized by flickering powerful images and overwhelming sights and sounds of apartheid. The audience is lead through a series of zigzag shaped rooms, one with 121 nooses symbolizing the 121 political prisoners who were hanged during apartheid (Figure 29). Some volumetric spaces are filled with dreadful weapons used by the security forces and in another a military vehicle (yellow and blue caspir) (Figure 28) plays film footages taken whilst driving through the townships (Davie, 2003). Few of the spaces are dark and gloomy showing images in cages and behind bars and some playing video recordings of the June 16th massacre. The senses are evoked and with the exhibits on display visitors get a strong emotional sense of the adversity and cruelty of apartheid. Once the senses are overloaded by this bombardment and visitors find it intolerable they are lead into a tranquil space with a glass book case containing the post-apartheid constitution and pebbles on the floor. The intention of the pebble is that visitors can symbolically show their solidarity to the many victims of apartheid by placing their own pebble with the rest on a pile. (Davie et al, 2003). The Apartheid museum is a good example of a building that symbolically captures the essence of apartheid and represents an architectural language that is climatically sensitive and contextually appropriate. Whilst this is the case the building does however respond to a predominantly adult audience through its spatial design and conceptualization. Children for example, growing up in a democracy might not be able to fully relate to the content or concept of apartheid. Put in another way the realities of the past as exhibited in the apartheid museum is not appropriately displayed to a level that may be comprehensible to a child. Whilst the museum has endeavored to be a reminder to society, the museum has inadvertently excluded the most important section of the population. The argument made here is that following the demise of the past Government, museums in South Africa placed much emphasis on its political history from an adult point of view to the detriment of other significant issues such as art, science, technology

Following the Apartheid Museum, there seemed to be for a while a concerted drive by new establishing museums throughout South Africa to memorialize political leaders and the effects of apartheid on society. Red Location Museum is another example located in a place of struggle in a former black township in Port Elizabeth (Figure 30). Not to go into too much detail, the museum designed by Noero Wolff Architects (2005) was conceptualized on the concept of memory and history (based on the writings of Andreas Huyssen) and forms part of a broader vision to develop a cultural precinct at its location. According to the Architects the museum moves away from conventional ideas of what a museum should be and makes the visitor an active participant in a non sequenced holistic experience. This is achieved by juxtaposing a series of unmarked rusted boxes (12m high by 6m squared) in the main exhibition



Figure 30 - Museum at Red Location, Joe Noero Wolff Architects (Duplessis A, 2007)



Figure 31 - Shows the memory boxes juxtaposed in the gallery space (Wolff and Southwood, undated)

hall representing an open interpretation of visitors personal memories of past political hardships (www.noerowolff.com, 2005) (Figure 31). The boxes were inspired by those used by migrant workers to store their valuable possessions when away from home. The spaces in between these symbolic gestures are referred to as spaces of reflection – and are filled with light. Adding to the mix of functions the museum has a library, an auditorium, an art gallery, a series of offices and a memorial tomb for fallen political heroes (adapted from www.noerowolff.com, 2005).

Similar political ideologies are found in the Kwa-Muhle (Place of the good one) Museum established in a converted 1928 (Figure 31) Union styled building located in Durban. The historical building functioned as the head office of the Native Administration Department responsible for administering pass books to permit black migrant workers to work in the city (Figure 32). The museums exhibitions showcase an accurate



Figure 32 - Kwa-Muhle Museum in Durban (Durban, 2009)

reflection of African- city life during the apartheid years. Exhibitions include temporary displays of photographic prints of township life and African beadwork. The more permanent exhibitions include a life size display of a typical shack scene showing the living conditions and the lifestyle of black migrant workers during apartheid and a narrative showing workers at lunch (www.durban.gov.za) (Figure 33).



Figure 33- Shows a typical narrative at Kwa-muhle museum depicting the struggle (Durban, 2009)

Moving away from the subject of political history in museums to focus on issues related to the earth, biodiversity, conservation and ecology is the Durban Natural Science Museum. Located on the first floor in City Hall, the museum founded in 1887 is one of the smallest in the country – measuring 2200m² in extent. Nonetheless it is the most visited - averaging at 295000 visitors annually (Museum Curator). On the ground floor of the building is the popular Durban Library whilst the second floor is home to the Durban Art Gallery (DAG). Here local artists have a platform to show their work and some



Figure 34 - Elephant exhibit at Durban Natural Science Museum (Author, 2010)

historical pieces, sculptures and tapestries can be viewed. The Art exhibits however is more appealing and aimed at a mature audience and is not frequented by children so much. What are popular amongst the kids is the dioramas (habitat groups) on display. These consist of stuffed wild animals ranging from a wide collection of birds to a life size elephant rhinoceros and giraffe to numerous reptiles, rodents, amphibians, aquatics and insects (Figure 34, 35, 36). Almost all the exhibits are behind glass displays to maintain a controlled environment for the taxidermies. Whilst this is necessary, it prevented children from fully engaging with subjects. From observations children lost interest very quickly. To create a level of interaction, some of the displays allowed visitors to press a button on its side which played a recorded narrative on the natural habits of a specific species of bird or reptile or even the roar of a lion could be heard. Children found this feature to be exciting. In the central volumetric skylit space a gigantic tyrannosaurus rex stands poised over the glass



Figure 35 - The bird exhibits at the museum behind glass cases which cannot be touched (Author, 2010)



Figure 36 - Reptile exhibit, can be 'seen' but cannot be 'touched' (Author, 2010)



Figure 37 - The Dinosaur - larger than life exhibit at Durban (Author, 2010)

display cabinets creating an interest of scale and curiosity (Figure 37). Overall observations indicate that the museum is a wealth of natural knowledge. However its greatest criticism is that it is too small in scale, limited on subject matter, low on interaction levels and not

flexible enough to satisfy children's growing curiosities or education needs. Whilst this may be the case the Durban Science Museum remains a very popular destination because it is the only place offering 'something different' in comparison to other institutions. The subject and method of displays were easily understandable hence appealing to a much younger audience.

Transformation has been a buzz word in the realms of museums and recently these have extended into 'Museum Parks'. The establishment of 'Freedom Park' is a national legacy project. Its intended purpose is to become a national and international landmark, representing 'humanity and freedom'. Located on a prime koppie perched



Figure 38 - Shows the Gardens of Remembrance comprising of boulders. (Digest African Architecture, 2008)

overlooking Tshwane the park is a centre of knowledge creating a deeper understanding of South Africa and its inhabitants through the narratives of 'geological, pre-colonial, apartheid and post-apartheid history' (Freedom Park, 2004). The project is symbolic in its design and form, comprising of features such as the Gardens of Remembrance, commemorating those that died for freedom. This feature comprises of boulders that have been dedicated in the nine provinces and from abroad, indicating traditional practices of commemoration (Freedom Park, 2004). Another symbolic gesture is the place of remembrance comprising of a wall of names. The most outstanding feature is the collection of steel rods that rise up to the sky representing reeds which in African tradition signifies a medium between the ancestors and the people on earth. It also symbolizes new life (Freedom Park, 2004). Whilst the park is ambitious, the question arises whether the park was designed with children in mind. The rich symbolism that is reflected in Freedom Park can only be appreciated if you are well versed in African traditions and culture. However for children of all ages, races and places engaging with the park in a way which is comfortable and which makes sense may be a difficult task. This example comes back to a recurring problem in South Africa whereby children are often excluded in the design process of public places and buildings which indirectly contributes to the slow decline in the transference of culture and history to children.

Clearly this shows that in developing nations it is critical to consider the socio-cultural, political and economic background when planning and designing places for children's learning. As the literature suggests every children's museum should exist in its own environment and relate to its socio-economic, political and local context. In other words the museum does what the current situation demands. At the same time the Children's Museum needs to be flexible so it can adequately respond to contextual, social, economic and cultural pressures / changes that may take place over time. The importance of relating to context and placing people at the centre of museums is a recurring theme throughout the literature. The next section talks more about this by citing an exciting example in Africa.

2.4 The National Museum of Niamey – An African Perspective

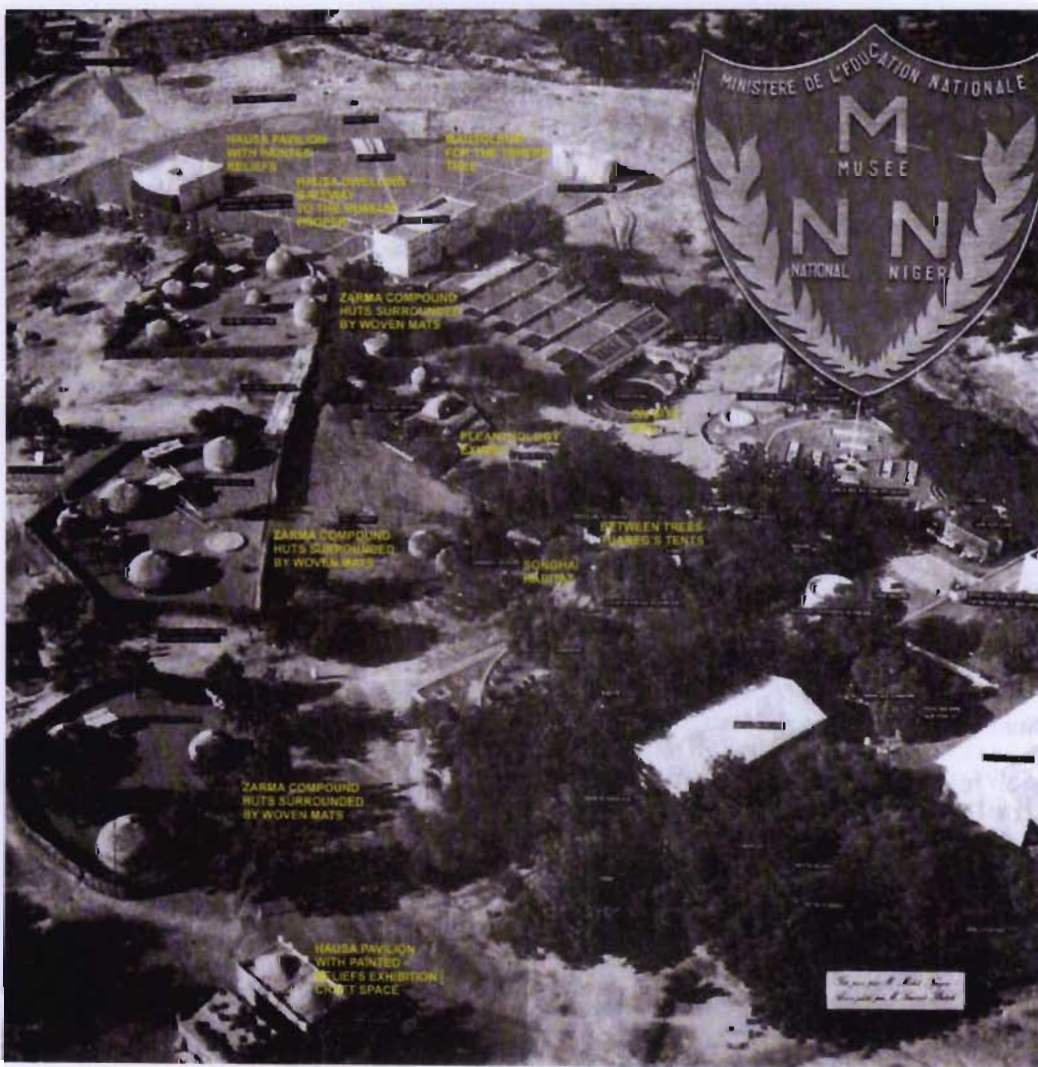


Figure 39 - General view of the National Museum of Niger. UNESCO, 1973

Perhaps a most distinctive Museum which responds to its African context and offering unique lessons for other establishing institutions is the National Museum of Niger. Set out in a twenty four hectare park in the centre of Niamey the capital of Niger, the Museum is described by researchers as a really exceptional example of a multi-use institution (Varine et al, 2008) (Figure 39, 40). It aimed at increasing Niger's feeling of national identity - following its independence from France in the 1960's - through natural history, archaeology, regional ethnography, traditional habitats and socio-cultural activities. Part of the Museum, is a zoo, an arts and crafts village, a disabled artist pavilion, a youth pavilion, kiosks for selling, admin offices, a place for folklore shows, a space for temporary displays, a 'palaver tree' and a mausoleum for the Ténéré Tree (Toucet cited in Unesco, 1973:31 and Joudain cited in Unesco 1990:27, Varine et al, 2008) (Figure 41 and 42).

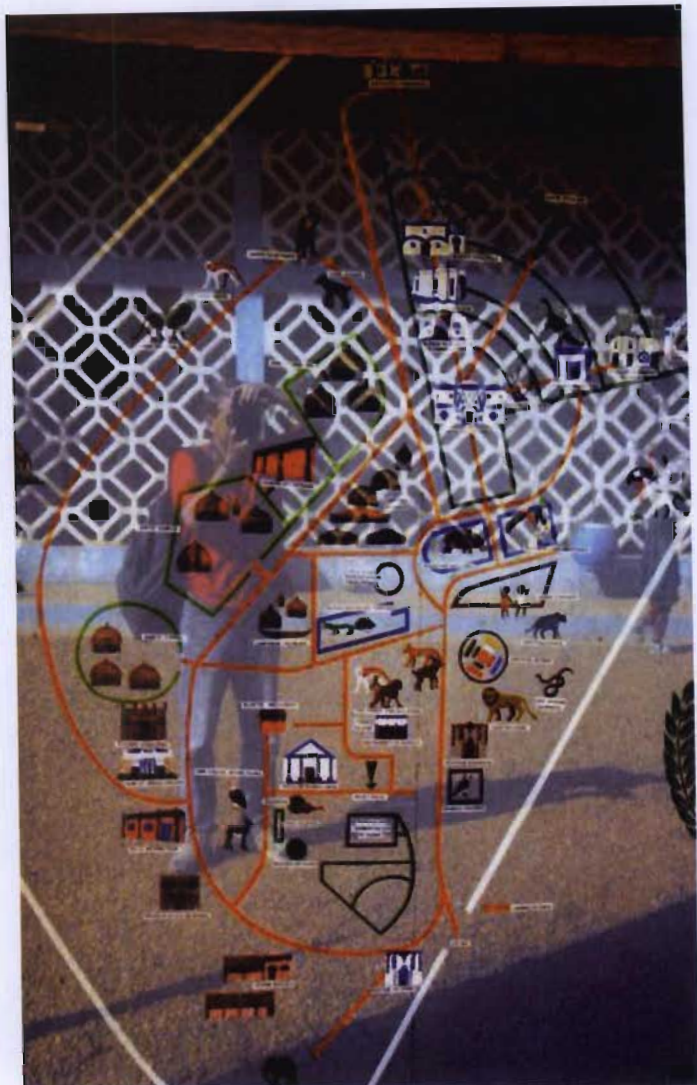


Figure 40 - Shows a most recent schematic map of the Museum of Niger (Bonobo, 2005)



Figure 41- Shows the traditional Hausa architecture of Nigers people (Bonobo, 2005)

The Museum plays a significant economic role in two vital ways, firstly as a tourist destination and secondly by empowering indigenous artisans. To capitalize on Tourism in Africa, African museums are designed to

provide tourists - who don't have enough time to venture inland - with a wide and complete idea of the country. Hence the Niamey Museum tried to do this by juxtaposing a comprehensive idea of Niger's Ethnic groups - their ancestral lifestyle and how they live still today - in the Museums Park. This comprises of vernacular groups of buildings detailed in traditional methods of construction representing the styles of its many tribesmen and women (Toucet cited in Unesco, 1973:36).

Visitors get to see the traditional Hausa (Figure 41 and 42) characterized by its striking reddish ochre or blue painted relief's throughout the park – serving as spaces for paleontology, pre-history, frescos and ancient fossil exhibits. Another popular display for children is a large fossilized dinosaur very well presented in a sand filled pit that can be looked down onto (Joudain cited in Unesco

1990:27) (Figure 45). Other pavilions showcase musical

instruments of the Niger, its national dress and extravagant garbs, jewels and accessories of its main ethnic population (Varine et al, 2008). This pavilion attracts the most attention.



Figure 42 - Shows a close-up of the mausoleum for the Ténéré tree (Reineccius H, 2005).



Figure 43 - Shows the matted domed huts in the compound (Bonobo, 2005)



Figure 44- The famous Ténéré tree that stood in the desert for centuries (Mazeau, 2007).

Forming part of the museum's collections is the Zarma compound characterized by huts all round enclosed by a woven mat fence. Not far away is the traditional habitat of the Songhai tribe and behind a cluster of trees the Tuareg's tents dot the landscape. Tents are skins stitched together and stretched over wooden stakes, whilst inside the space is divided using woven mats (Figure 43). In contrast the Tents of the Peuls – another Niamey tribe – are made from mats placed over arched



Figure 45 - Shows the Dinosaur exhibit under a sheltered structure (Greene G, 2010)

hoops. All of these structures house collections of furniture, objects and tools used by Niamey's tribal men and women. Even in the outdoors traditional dugout canoes and fishing nets adorn the grounds hinting to the work carried out by tribesman (Toucet cited in Unesco, 1973:36 and Joudain cited in Unesco 1990:27). Following the ethnographic



Figure 46 - The on-site zoo at the Niger Museum. (Greene G, 2010)

experience tourists can see the local wildlife in the on-site zoo (Figure 43). In

about 8 hectares of wild countryside visitors can catch a glimpse of giraffes, buffaloes, antelopes and ostriches. There is even an aquarium showcasing some of the local aquatic life. The zoo whilst depressed in many senses still is a popular destination for visitors to engage close-up with real-life animals (Toucet cited in Unesco, 1973:37).

Perhaps a testament to the reverent relationship that the people of Niger shared with nature and the desert is captured by the Mausoleum for possibly the most famous tree in the world – the 350 year old Ténéré Tree (Figure 40 and 44). This tree stood all alone in the vast expanse

of the Sahara Desert and was legendary amongst travelers - appearing on countless maps and in many stories told by explorers of this part of Africa. It was the first and last landmark for



Figure 47 - The master smith with his apprentices and another ethnic tribal member (UNESCO, 1973)

travelers leaving the city of Algadez en –route to Bilma. The tree an Acacia was the last standing from a group that remained in a path of an aged watercourse that fluctuated seasonally. Nearby, French Soldiers managed to create a well to tap into the watercourse feeding the tree. Hence it was a significant rest stop for natives. Unfortunately the tree was fatally knocked down by a drunken lorry driver in 1959. In 1973 the tree remains were transported to the National Museum in Niamey where it is on display still today. Its landmark place in the desert has been replaced with a metal tree sculpture as a monument to the legendary Acacia (Joudain cited in Unesco 1990:27, 28).

What makes the museum come alive are the different ethnic craftsmen who work and live in these buildings sharing traditional techniques of making such things as dwellings and cultural things and costumes etc. Their first introduction to the Museum was meant to be ethnographical – to conserve traditional ways for people to see them (Joudain cited in Unesco 1990:27). However to make the idea sustainable the things that were made had to be sold. A year after inception in 1969, the number of craftsmen grew from fifteen to eighty members whilst local and international sales doubled to 20 million francs. So began what grew to

become a significant contributor to economic development for both museum and craftsmen. More importantly traditional skills were preserved through stringent controls. Whilst craftsmen freelanced, the Museum insisted on only the best crafters chosen on merit. All work needed to be ethnographically correct and bad workmanship was rejected (Toucet cited in Unesco, 1973:37) (Figure 47).

As part of the Museums social commitment an apprenticeship program was introduced as a model solution to the growing illiterate population and high unemployment rate. The purpose of the program was to channel boys and girls that were anxious to study a skill and who achieved a primary education into arts and crafts. Courses were arranged and funded by the Museum, whilst Master craftsmen mentored and passed on traditional ways to those fortunate enough to be part of the program. Unfortunately not everybody could be absorbed into this initiative due to financial limitations. Nonetheless the Museum endeavored to broaden this opportunity to children each year since its inception (Toucet cited in Unesco, 1973:41)

The Museum is outstanding for a number of reasons. It brought together the many tribes- *Zarma, Tuareg, Songhay, Hausa, Beri-Beri* and *Peul*- of the Niger not only to contribute to the preservation of traditions but to promote National unity and brotherhood amongst its people. These groups were working hand-in-hand and side by side showing that the long standing barriers of ancestral rivalry were disintegrating. It was a testament that national unity amongst the people was favored and achievable (Toucet cited in Unesco 1973:36). In addition the Museum was a place promoting broad based education which was accessible to all kinds and age-groups of people. The Museums exhibitions were in no way academic and could be understood by the educated and the majority illiterate population. It was a museum created by everyday people for an everyday community and funded as such (Varine, 2008).

In essence, the Museum is the community, in the sense that people of any ethnicity, social standing, and level of education or age can freely enter the Museum and experience, learn, listen and to see how it works. People may be walking through the Museum's Park en-route to Kennedy Bridge - or to get to the market- or be returning home from doing some activity. They would stop to watch a crocodile or hippo basking in the sun or wallowing in the mud or take time to admire the extravagant traditional dresses or jewelry exhibits. People can speak their minds here and it's a place where children are allowed to play freely, to meet a Tuareg – the legendary blue men elegantly dressed in his ancestral outfit, or see the many

ethnographical goods for sale or enjoy ancestral songs, dances and stories. Under the shade of the 'palaver tree' there is always some discussions taking place and it reminds people of the traditional village way of life. In short the National Museum of Niger is a social gathering place for everybody – where people learn without realizing it (adapted from Joudain cited in Unesco 1990:27, 28).

A major problem facing the Museum is financial constraints resulting from extreme poverty. Another problem is the hot arid climate which makes preservation of collections problematic. Nonetheless the Museum remains a valuable contribution to Niger as a vehicle for education, socio cultural preservation and economic development (Joudain et al cited in Unesco 1990:28).

2.5 Definition of a Children's Museum

One of the critical issues emerging from the literature focuses on the definition of 'museums' versus 'interactive centres'. The traditional definition of Museum is a place that "collected, preserved and exhibited objects" (Schofield, 1987:6:38). Defining a Children's Museum however is as varied as the many types that exist. What is common however is that it is no longer a traditional Victorian styled museum with glass cases that cannot be touched. In fact Children's Museums are all about "*touching, running, smelling, jumping, tasting, listening and making a noise*" (Exley and Exley, 1999). An ongoing debate focuses on what makes a Children's museum a museum? After all a museum has collections and a Children's museum does not hence many scholars argue that it cannot be considered a museum (Spencer, 2002; Mayfield, 2005). Another debate looks at what a Children's Museum should be? The common denominator across all Children's Museums is that they were made for children to learn about their surroundings through active involvements. This dissertation contributes to this debate to try and define what a Children's Museum should be in a developing context. This is the one of the aims of this dissertation.

2.6 Museums, Community and Culture

2.6.1 The Changing Roles of Museum

Throughout the literature there is much argument and uncertainty on what constitutes a museum and its role in society. Nonetheless debates on the principles of museums continue unabated. Questions on whether humanity really needs them? why they have increased? and how they could serve development? have been raised and answered. Sola (1997) affirms positively the need for museums, because they preserve identity and collective memory and their increase in numbers is when 'identity' is threatened. On serving development, Sola (1997) criticize traditional museums arguing that they are inadequate in the era of globalization because they are too static to change. From the literature it is clear that the 'old' museology focused more on the methods of collection, education and preservation to the detriment of its real intended purpose and to societal needs.

The new museology movement during the 1980's saw a radical reassessment of the museums role (Davis, 1990:55). Such a model based on this new mode of thinking redefined the museum as a 'contact zone' (Clifford, 1997 cited in Macdonald 2008). This thought suggested an interactive relationship between communities, stakeholders and museums (Clifford, 1997 cited in Macdonald 2008). In other words the museum functions as a permeable space where various cultures and communities collide and are influenced by this interaction instead of an impenetrable place focused on filtering information and knowledge to users. This contribution in the literature is useful because it accounts for the diversity of museums in response to an ever changing contextual climate.

2.6.2 Redefining the Social Responsibility of Museums

More and more it becomes clear that the relationship with the contemporary museum and the public is an interactive one. It is expected that the museum meets the demands of people instead of simply telling them what they need to know (Crooke, 2005). Elizabeth Crooke (2005) posits that more recently the 'audience', the 'public' and the 'visitor' to museums has been replaced by the 'community'. As such there has been an effort to combine museums with key social policy issues such as combating social exclusion, emphasizing the need to build cohesive communities and contributing to urban and community regeneration. Specific

outcomes could be the enhanced communities, self determination, and public participation, self representation of history of communities, providing a platform for those formerly excluded. Sandell (2002) makes the point that social and cultural issues are inextricably linked and museums have the potential to effect social, economic and political change. Another view by Sola (1997:54) suggests that museums are not a generator of culture, if anything they ensure culture survives. Whilst there are strong connections between communities, social and cultural dynamics surrounding museums theorists argue that very few museums have been able to impact on social issues in communities. This is especially the case in developing contexts. The main point emerging from this is that by engaging with the concept of community it introduces a cultural dimension to the design and execution of museums. This is prompting the museum sector to revisit its identity, its design of its spaces and exhibitions, and to re-affirm its role and responsibility.

Recently museums are adopting educational roles. The shift in economy from an industrial to information and knowledge base has had implications on museums of all types. Knowledge, ideas and information is fast becoming the product of society. The literature refers to the concept of learning communities outside formal education facilities shifting the spotlight onto learning into museums (Hilton, 1981). Oloffson (1979) like other writers point out that museums are regarding themselves less as contained institutions and more as cultural centres within communities in which they are found. This statement is correct considering that museums have the potential to become a powerful tool in education in the broadest sense (Olofsson, 1979).

The contemporary views on learning in museums emphasises the importance of play in the development of children. Broadhead (2004:89) suggests that play in children's activities helps in their self-discovery and assists them in learning about themselves and what they may become. Language is perhaps the most important cultural tool which children use to change themselves. The literature points out that learning and childhood development is for the most part determined by the teacher and the adults with which children are in constant contact with (Broadhead, 2004). To facilitate this type of interaction the literature, for decades, emphasised the value of a learning teaching environment where young children could learn, interact, play and take responsibility for their own learning and development (Broadhead, 2004).

The broader literature on education makes reference to the idea of ‘free-choice’ learning which is learning that one wants to do and not because they have to. These include activities such as watching television, reading a magazine or visiting a natural science museum. Essentially these activities are motivated by the desire to gain information (Falk et al cited in Macdonald, 2008). Another theory is based on behaviourist teaching strategies which describe the instructor / museum as disseminating information and the student / public learning. Finally a constructivist process of learning suggests that learning is a continuous personal process. In other words learners build on different frameworks of understanding to create their own individual thoughts and ideas (Falk et al cited in Macdonald, 2008). The behaviourist model does not add value to the museum experience. Designed by museum professionals and staff visitors leave the museum having learnt what the museum intended. A constructivist approach is more favoured because it allows the user to choose and to engage with prior knowledge, experience and interest collectively in space and time in the learning process (Falk et al cited in Macdonald, 2008). In other words learning focuses on not what the museum teaches but what meaning the visitor makes of the museum experience (Falk et al cited in Macdonald, 2008). The constructivist theory closely resembles Hein’s (1998) concepts of a continuum from ‘passive’ to ‘active’ learning. At the passive end, the mind observes, classifies and learns, whereas active learning is gaining knowledge by thinking and acting on the external world through stimuli (Hein, 1998).

2.7 CONCLUSION

Museum architecture underwent radical changes from the classical styles of greek and roman architecture to the aesthetic white cube and to postmodern ideas of building as art. Recently museum architecture appears to favor monumental ideas striving for urban relevance and making a mark on the landscape. Museums have gone from libraries of history serving a subservient role of displaying art to aristocrats to great urban strategies for rejuvenation of cities and economies. The recent Bilbao sensation stands testimony to this and proves the turnaround effect a cultural building of scale and magnitude can have on a fledgling economy. As a result museums have taken centre stage as catalysts for development, redevelopment and promoting cultural tourism.

The museum has reinvented itself constantly and continues to do so with new emerging demands from contemporary society. Traditional ideas about museums as passive containers of the past are being replaced by the notion that they are active contact zones. In other words the museum is the community. With the global shift in economy from industrial to information and knowledge based economies the focus is now on museums as places of education outside formal institutions. Hence museums are regarding themselves less as self contained facilities and more as community and cultural centers. Whilst this is considered a recent phenomenon what emerges from the research is that in some developing countries like Niger in Africa this concept is not new. The Niamey museum in Niger was never viewed as separate from the community. In fact it was the heart and soul of village life. All social activities and networking took place on the museum grounds. People of different tribes interacted with exhibits and learned without even knowing it. It was a place that was accessible to everyone and it was the hub for cultural tourism in the country. These kind of ideas are now becoming popular in contemporary museum culture and the relationship between the museum and the people is fast becoming more interactive. With a renewed focus on education museums are becoming more interactive exploring new ways of disseminating information to the public. Whilst it is not a new concept, children's museums have since become very popular in developed nations. Started in 1889 they were born out of a need for museums to engage with children. For a long time, and even today museums are been designed and built without considering children. Questions on how they learn and what their needs are were never asked. Instead children were expected to participate in environments

designed by adults for adults. Whilst this is taken up in the next chapter what is important is that the traditional ideas surrounding museum architecture are being eroded by new emerging demands for education and entertainment in contemporary society.

CHAPTER 3 – THEORIES OF PLAY AND ITS IMPLICATIONS ON ARCHITECTURE AND GREEN SPACES

3.0 Introduction

Theories of play provide an insight into the characteristics of play and how children develop meaning through play. These in turn inform the types and levels of services that are desirable plus how to plan and design the built environment to respond to children's needs. Relevant theories are referenced below.

3.1 Playtime as Learning in Childhood Development

A popular perception amongst many is that play is a downtime for children in between more formal educational activities. Without a doubt however, children learn through play (Piaget 1972; Vygotsky et al 1976; Harris et al 2003; Hamilton et al, 2005 and Menon et al, undated). Countless theorists account for the importance of playtime not only as an



Figure 48 - What looks like playing is actually learning (Kids in Prague, 2008)

entertaining activity but as contributing greatly to a child's physical and psychological development (Harris et al, 2003). Playing in children is often viewed as 'just something children do'. However it is proven that play is actually learning in childhood development (Figure 48). The act of play is defined as a spontaneous experience initiated and managed by children without any specific outcome (Garvey, 1991; Harris et al, 2003). Hence the process of play is viewed as more important than its purpose because it is within the progression of play in which learning takes place (Pellegrini and Smith, 2008). This suggests a paradigm shift away from traditional approaches in designing learning environments for children. Hence it is important to understand how and what children learn through play in order to respond to their needs. The proceeding discussion carries this forward.

3.2 Contemporary Theories of Play

Piaget (1977) believed that throughout the act of play children develop an understanding of their world. Accordingly they create their own knowledge by giving their own meaning to people, places and things (Piaget, 1972, 1977). In other words children will take something and fit it into something familiar to them (existing knowledge) - like a rolled paper to represent a sword (make-belief) (Cowie and Smith et al, 1991; Harris et al, 2003:3). Piaget's (1977) idea of 'assimilation' and 'accommodation' is a repetitive process which allows a child to learn and grow and interact with the world. In other words learning is an individualist repetitive action through play which over time prepares the child for adulthood.

Piaget (1977) identified four cognitive characteristics that must be achieved before moving to the next level of growth (Cowie and Smith, 1991)

- (1) The sensory motor stage (0-2 years), is a time when children learn about their surroundings using movement and their five senses.
- (2) Pre-operational stage (2-7 years), the child's motor skills advances and they begin to engage in fantasy play. They can think symbolically but still believe that everybody has the same knowledge as they have (ego-centric).
- (3) Concrete operational stage (8-11 years) is when the child can now think logically to solve problems with practical aids and reasoning. They are able to participate in group play activities.
- (4) The adolescence and adulthood phase (11 years +) is marked by abstract thoughts and the ability to speculate possible outcomes and to devise and test assumptions (adapted from Cowie and Smith, 1991 and Kuther, 2001).

According to Piaget's children were assumed to grow in stages and there were clear divisions of characteristics between each level. In addition he viewed the child as an individual learning about the world through concrete interaction and adaptive processes void of any social interaction. However recent research has found that children displayed the ability to learn skills much earlier than Piaget had predicted (see Donaldson, 1978 and Jahoda, et al, 1983). The point made here is that Piaget had not fully accounted for the context and social influences in which cognitive learning takes place (Cowie and Smith et al, 1991).

Vygotsky (1976) contradicted Piaget's individualist theory supporting the idea that children construct knowledge within a cultural framework through societal contacts with other children, adults and educated peers (Reynolds et al, 1992; Harris et al, 2003). Through such social interactions with older members of the community children are able to learn about their culture, acquire language skills to express meaning, and are capable of adapting to their surroundings (Reynolds et al, 1992). In effect what Vygotsky is emphasizing is instructor, instruction and contact as pivotal in the learning process (Smith and Cowie, 1991; Broadhead et al, 2004). Certainly childhood development was not as rigid as predicted and undoubtedly children did not learn about their world in isolation. In this regard the contribution of socio-cultural theorists to notions of play in childhood development is most significant.

This then suggests that environments that encourage 'play-learning' should be designed to avoid placing children in 'boxes of activities' according to their age. Instead they should facilitate interaction between different ages, adults and educated peers. There are many ways to achieve this. For example in the Children's Museum of National Harbour Maryland, large



Figure 49 - View of courtyard space at the National Harbour Maryland Museum, uses as a interactive learning zone (Worldarchitecturenews, 2009)

glass facades overlook open courtyard green spaces have been created not only as meeting spaces but as spill-over hands-on activity zones which foster passive and interactive learning amongst all of its users (Figure 49). Learning from others takes place unknowingly. In Greenville Children Museum activities that respond to different interests are ordered such

that there is a free transitioning of space. The divisions between each activity are transparent allowing children to learn by watching others (Figure 50).

Perhaps one of the most critical dimensions of play in childhood is 'make belief'. (Figure 51). Researchers posit that 'pretend play' is socially and culturally determined. It allows children to stimulate their imagination and to use substitution to detach meanings from objects of play. For example riding a stick like a horse, separates the factual meaning of the stick from what the child imagined it to be

(Vygotsky, 1976). From a social perspective, role playing of real characters (such as a mom or dad, doctor, nurse or teacher) helps children in developing mental descriptions of social responsibilities and how they function in real society (Vygotsky, 1976; Reynolds et al, 1991; Harris et al, 2003). In other words make-believe play helps young children understand the rules of the world.

Other writers on cognitive functions of 'make-belief' play speculate that there exist multiple intelligences in children's 'pretend play' (Gardner et al, 1983). The various mediums such as objects and toys (blocks, dolls words etc) used in the act of play create the opportunity to foster unwritten spatial or other intelligences. Whilst parallels cannot be clearly drawn all the time between the activities of Lego house building as a child for example and becoming an architect as an

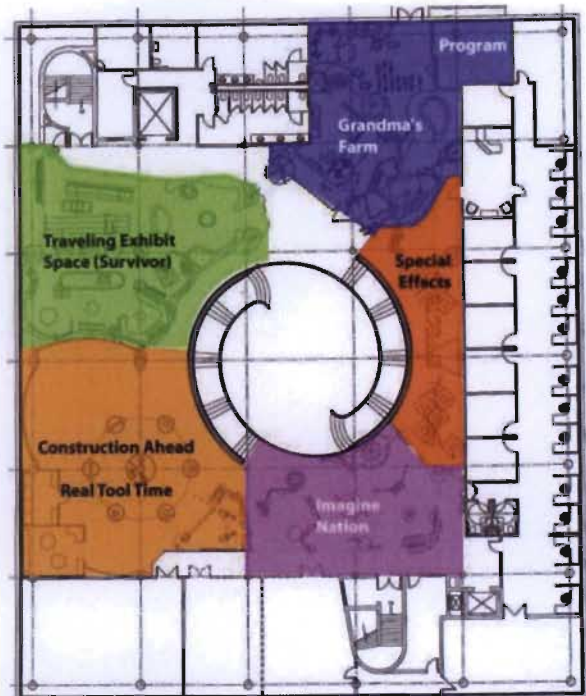


Figure 50 - Plan of Greenville Children's Centre (Greenville Children Centre, 2004)



Figure 51 - Children engaged in pretend play, learning about what firemen do (Imageshack.com, 2009)

adult, researchers argue that characteristics of early child's play can be seen in qualities found in grown-ups. Interestingly enough Frank Lloyd Wright attributes his career choice as an architect to playing with blocks as a child (Gardner, 1983).

From what has been said so far, two distinct environments for learning emerge. The one emphasizes a child centered approach (Piaget, 1977), whilst the other promotes joint learning experiences (Vygotsky, 1976). The position taken in this study is a collaboration of both these philosophies, characteristics and attributes. Consequently children spaces must take cognizance of *physical, cognitive and socio-cultural* functions.

Spaces must be designed to accommodate *physical* behavior such as *sitting, swaying, crawling, bouncing, tumbling, running, skipping, jumping* and *rolling fluidly* (Olds et al 1987, Said, 2006). In this way, along with interacting with their surroundings, indoor and outdoor spaces and features, such as climbing apparatuses, jungle gyms, green open



Figure 52 - Outdoor climbing apparatus, Providence. (Providence childrens museum, 2010)

spaces and gardens etc. children mature and grow their bodily functions (Olds, 1987). For example in Providence children's museum the outdoor space is animated with a climbing apparatus (Figure 52) that children can physically engage with. They manipulate their bodies to climb up and fit through the different levels whilst using the equipment. In so doing they exercise their bodies and better their motor functions.

Spaces must be designed to facilitate easy and free flowing movements within safe tolerances and must take into account that all children move differently in their own worlds (White, 2004). This goes to show that there needs to be a broad array of features and elements to accommodate wide movement patterns. If movement is too limited, children tend to become bored and aggravated and try to enter into restricted spaces (White et al, 2004). For example in the Science Museum in Porto Alegre (Figure 53), the space has a number of smaller intimate activities however they vary so children tend to move around to engage with the various exhibits. The animated aerial space is also fascinating for children. This example shows that activities need not be large but variety is significant.



Figure 53 - Science Museum in Porto Alegre, shows a number of smaller activities that keep children's attention (Daniela.C, 2006)



Figure 54 - Shows a playscape at Brooklyn Children's Museum that responds to children's perception and cognition (Vinoly Architects, 2004).

To accommodate *cognitive* learning, spaces and built form need to respond to children's perceptions. In this regard, spaces should be designed to accommodate visual and tactile stimuli (Said, 2006). Through their senses of sight and perception children recognize different forms and colors in their environment (Olds, 1987; Exely, 2007). Hence the articulation of the

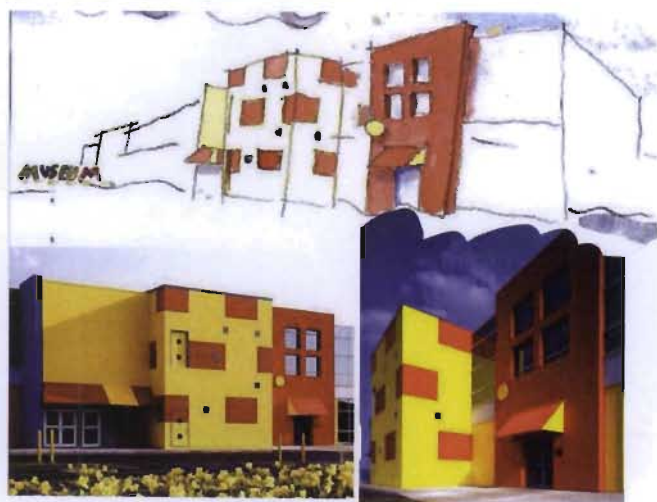


Figure 55 - Dupage Museum, showing the bright colored exterior and form. Source: Exley, 2007

exterior form and texture of buildings designed for children becomes significant. For example

in the Dupage Museum in Illinois the first element that grabs passerbies and especially children's attentions is the vibrant colors, the next thing visitors are greeted by is an 11 meter high striking red door (Figure 55). The buildings color and form has been conceptualized on the concept of 'opening doors to play learning' hence this metaphor creates the language for the rest of the architecture. Whilst the building may appear childish it responds to a high level of psychological and cognitive development needs so important in childhood. For the developers it was critical that the architecture provided stimulation whilst kindling curiosity and creativity. The architects employed the use of textures, forms and materials to create flow and excitement (Exley, 2007).

Olds (1987:122) and others suggest that touch is the most decisive from all the five senses because the skin is the largest human organ and is the most sensitive to stimulation. Thus textured and patterned elements on walls, floors, furnishings and play materials are significant contributors to childhood exploration and learning. Adding to the learning experience is the use of different types of materials to create texture, feel and contrast (Olds et al, 1987).

Apart from touching, visual and perceptual stimuli consist off the quality of light and the choice of colors used in children's spaces (White, 2004). Figure 54 and 56 and 57 shows the vibrant colors and various textures of the play-scape at Brooklyn Children's Museum and the interior at Dupage Museum which responds to children's perception and cognition.

In terms of socio-cultural functions, spaces need to be safe, open and large enough to allow socio-dramatic play pretend -play and free



Figure 56- Interior use of texture and color. Source: Exley, 2007



Figure 57 - Shows the interior use of color, also the columns were designed based on children with outstretched arms. Source Exlev, 2007

flow of play to take place (Vygotsky, 1976 and Bruce, 1997). Spaces also need to be designed large enough to accommodate group activities. Elder members of the community, parents and children of all ages, races and cultural backgrounds must be encouraged to interact with each other. In this way children can learn from their peers and elders (Vygotsky, 1978).

Play tutoring is the provision of props (such as play houses, costumes for role-playing etc.) in order to engage children's fantasies and imaginations (Olds, 1987). For example in Sci-Bono Science centre (Figure 49) the volumetric space allows for role play activities using props. The children in the figure (58) are imaginary construction workers operating a crane on a building site. The activities teach children about real-life jobs.

Haider (cited in Bauer, 1997) on the other hand posits that it is all about the 'box' meaning that children can find so many innovative uses for something so plain and simple (Figure 59). They can spend hours

manipulating and interacting with 'boxes' conjuring up fantastic and magical ideas in their minds of what such boxes could be in their world of play. In this way children learn about the real world and about real things. Moreover spaces should facilitate the interaction and transaction of children with adults, peers, community members and other children of different



Figure 58 - Role playing and imaginative play in a large volumetric space. Source: Author, 2010



Figure 59 - 'Its all about the box' Children engaged in pretend play. (Donnydaycare , undated)

age groups (Said, 2006) so that they can learn from others easily. This also allows for cultural transference between children and peers to take place.

Some writers have placed much emphasis on structured play and activities as opposed to imaginative exploration and creativity arguing that the **latter** lacks organization and depth. (Menon, undated; Cowie and Smith, 1991). However recent ideas by Tina Bruce (1997) have discounted this (see Kramer, 1976) view in favour of chaos theory as a model for play. Bruce (1997) postulates that playing is most **productive when** it is 'free flowing'. In other words when children are able to resolve issues and make symbolic gestures which are imaginative and highly intellectual. Bruce (1991, 1997) argues that there must be enough space, opportunity and safety to support this high order of play and learning.

The free play method allows children to learn in accordance with their own aptitude levels, abilities or disabilities as opposed to traditional school systems (Menon, undated). Moreover, learning focuses on the overall development of the child - is closer to real life, pertinent issues and is more interactive (Menon, **undated**). **What** this means is that the play way method is socially inclusive by virtue that learning is left to the individual, even disabled children have equal opportunities to engage in the different activities based on 'what they can do' unlike traditional school where learning is more academically inclined (Menon et al, undated). Froebel (cited in Menon, undated) agrees with this concept 'free play' as significant in contributing to childhood development. He promoted the philosophy of 'learning by doing' and believed strongly that the natural environment and activities like gardening was significant to learning. Hence he pioneered Kindergarten and a series of games, songs and constructive activities to promote education (Menon et al, undated).

3.2 Designing for Flexibility in Children's Play Spaces

It is vital that environments be designed to allow children to be able to exert their own sense of control, to explore and transform their own environments (White, 2004). If children do not have the flexibility to use or negotiate their own way they tend to become bored, withdrawn and aggravated (White, 2004). In addition, spaces should take cognizance of the distinct differences in play way and activities between boys and girls. Research shows that girls prefer a quieter setting - creating drawings or making tiny things around a play table whilst boys prefer being sprawled on the floor playing with construction kits and making a noise

(Browne and Ross, 1995). Hence spaces must be created to allow for easy manipulation (White, 2004 and Said, 2006) -like loose parts or pieces of furniture, fixtures and elements which can be moved about and re-arranged by children to take on new meanings and functions easily and effectively. It also needs to be designed to accommodate a wide range of activities in response to multiple intelligences and genders (White, 2004).

Spaces for privacy for children to be able to play in their own little worlds of pretend needs to be created (Bauer, 1997). An important fact to consider is that children's physical, intellectual and social skills are continuously advancing as they age (White, 2004). They enjoy their experiences much more if their abilities are synchronized

with the activities that are presented in front of them (White, 2004).

Consequently environments must be designed, planned and equipped to provide graduated challenges in accordance with children's skills and potential growth (White, 2004). This is important to overcome and prevent children from becoming bored. Numerous researchers have proven

that children tend to seek out play spaces which are more challenging, diverse and complex (White, 2004) (Figure 60 and 61).



Figure 60 - Shows a child freely manipulating his environment (Brooklyn Childrens Museum, 2004)



Figure 61 - Shows an example of private spaces and furniture that children can manipulate (St. Petersburg Childrens Museum, 2008)

Whilst children are enjoying free mobility they must also feel comfortable and competent in manipulating and exploring their own surroundings. Comfort is linked to diverse sensory stimulation which results in optimized behavior (White, 2004). Too much sensory input like loud noises for example is overpowering resulting in withdrawal symptoms and erratic behaviour . Sensory sensitivity is also prevalent in spaces having very bright colors, overly

textured walls and disconcerting smells. In such spaces children react by flight, fright or fight (White, 2004). In other words children may hide to get away from the disturbing stimuli or day-dream to escape the chaotic background or become aggressive to exert control. This is detrimental to child cognition. Hence it is important to design spaces which have the right mix of sensory loads. Introducing white noise such as flowing water and natural elements in design assists in creating calm. Reducing sounds further is achieved through the use of subtle barriers and careful selection of materials and acoustics. Moreover using curved, fluid and angular lines in creating spaces which flow easily into other areas not only contribute to visual attractiveness but soften its visual impact on the senses encouraging childhood discovery (White, 2004).

3.3 Indoor Versus Outdoor Dimensions of Play

The way Kindergarten operates in contemporary society however is viewed by some modern theorists as defeating its intended purpose (Said et al, 2006). Such places are designed and planned by adults where children are expected to play indoors for most of the day and allowed occasionally to experience the natural environment. It is well known that childhood is a time for exploration and perhaps the most life-altering discoveries that children may make is to be found in nature (Verbeek and de Waal, 2002, Tai, 2006). The middle childhood (6-12 years) is the time in which children are genetically inclined to bond with their natural surroundings. It is when humans instinctly develop survival skills (Chawla, 1988). While indoors however, children interact with plastic furnishings and toys within a controlled climate - in terms of lighting, temperature and humidity (Said et al, 2006). Hence children's cognitive learning is in a confined space becoming tedious and unexciting. Soon children realize that the architecture leaves very little room for adaptation (Said, 2006). Clearly the architecture does not respond to - or accommodates Piaget's (1977) view that children are lively and enthusiastic learners.

In contrast, the outdoor space is airy and more spacious than inside the building – children get to move more freely and get to learn about their surroundings using all their senses and motor skills (Said, 2006). The flora and fauna is ever-changing and provides kids with further variable stimulation (Said, 2006). Moreover the climate outside is natural and energetic as compared to indoors. Fluctuations in temperature and winds, the presence of rain and even snow including other natural features such as babbling brooks and natural smells allow

children and adults to feel and connect with their surroundings - contributing significantly to cognitive learning and rejuvenation (Said, 2006). Researchers point out that these modest changes in the environment helps to foster mental alertness, comfort and playfulness in children (Said et al, 2006). More recent research shows that the natural environment as the primary playscape also results in increased levels of intelligence in children (Tai et al, 2006:11).

Unlike indoors, the outdoor space has different things to offer, to look at and manipulate presenting children with many exciting choices. In the open children get to freely engage in 'pretend play' and their surroundings could take on so many different meanings. Eventually they are able to differentiate between the experiences of indoor and outdoor spaces - the one being man made and the other natural and full of life (Said, 2006). In essence children begin to see the architecture as independent from the landscape and associate this notion with spaces designed by adults. Clearly the relationship between children and nature contributes significantly to childhood development. At the same time the environment also benefits from such childhood bonds. Researchers found that it is during upbringing that adults develop ethics and principals towards nature. Eventually they may end up pursuing careers in conservation or perhaps may live environmentally responsible lives (Tai et al, 2006:2).

Grown-ups tend to place much more emphasis on aesthetics, form and color in the design of children's indoor and outdoor places (Matthews, 1992 cited in Said 2006), whilst the young value the functioning of a given space and its elements much more than its aesthetics (Christensen, 2003 and Said, 2006). For example, adults view a bench in a public building and will understand its purpose which is to sit on (White, 2004). A child not old enough to understand this social excepted use - sees the bench as a chance to jump onto it, spread out on it, climb and jump over it and maybe hide under it (White, 2004). What this means is that children see their surroundings comprehensively and asses how they can control and engage with it (White, 2004). They look for opportunities presented by their surroundings to do different things – preferring possible functions over form (White, 2004). Similarly, as White (2004) points out, a long narrow passageway in a building provides the opportunity for a child to run along its length just as how a half a meter high wall is perfect for climbing and balancing. White (2004) suggests that the child is not misbehaving but is actually reacting to the affordances presented by their environment in accordance with their developmental age. In practice children's environments are designed in accordance with standards and local

authority requirements without considering the views of children. Children have no say in the design and planning process of the architecture, or the natural environment which shapes their own cognitive development. Instead they are expected to exert a sense of control and to be able to move and manipulate these places designed exclusively by adults (Said, 2006). Hence many children spaces are being designed in a vacuum resulting in very unsatisfying children environments.

3.4 Design of Natural Landscape as Playscape for Children

Moore (2003) maintains that green spaces should be designed in full collaboration with children responding to their own needs. Children like adults are fond of trees. Sullivan (1997 cited in Tai, 2004:18) observed from his study of Chicago's spaces that much more children were found playing in places having more abundant trees than others. More importantly the nature of play in such treed landscapes where a great deal more creative (Chawla, 1988) and parents were found to be better alert and engaged with children's play (Tai, 2006:18).

Simply put a 'green space' is not sufficient enough for children's play. It is essential that green spaces are designed to be more memorable and to make a lasting impression. Children must want to return. In this way they can discover new intriguing things through repetition. In other words children's gardens must have a variety of things to see and interact with. It is all about the process of discovery which contributes to childhood memory and learning and not the outcome (Moore et al, 2003). Whilst the focus is predominantly on responding to children's needs it is vital that adults are not entirely excluded in the design process. Adults whilst viewing the environment from a much broader perspective can also benefit from experiencing the world like children (Nabhan, 1994).

A natural landscape designed for children must be a place of constant discovery presenting many experiences of the earth for children to interact with and so learn from (Moore et al, 2003). Its attractiveness to children is biological. Children find nature exciting because of its ever changing diversity the fact that it is not made by adults and that the trees, rivers and landscapes spoken about in stories and legends still exist in today (White et al, 1998) Plants, the soil, sand, rocks, water are all earthy elements that can be manipulated by children naturally. The opportunities afforded by nature, for example digging a trench in the sand or building a dam from rocks or making a shelter from sticks and leaves are all exciting and endless – as opposed to a jungle gym which merely allows children to climb up and hang on

(White et al, 1998). Inculcating a sense of control through design allows the opportunity for constructive play to take place (Tai, 2006). Essentially the landscape must invoke all the senses even introducing wildlife if possible into the mix is crucial because animals form an integral part of a Childs development (Moore et al, 2003). Plants respond to all the sensors in children naturally prompting the need for discovery, pretend play and imagination (White et al, 1998).

Planned effectively with the right amount of color, sunshine, shade, smells, textures and settings - plants can create a peaceful atmosphere (White et al, 1998). This is so important in reducing stress and aggressive behaviour in children. Researchers posit that environments created in this way is relaxing and exciting but more importantly results in children loving nature which may lead to them becoming champions of their environments (Tai et al, 2006).

Clearly nature and children go hand-in-hand. According to Chawla (1988) most children prefer the outdoors than being inside. There are many ways to design children's landscapes, whatever the approach Molly Dannenmaier (1998) in her book *A Child's Garden* recommends nine fundamentals that makes for a child appropriate garden. They are: *discovery, water, loose elements, plants, wildlife, heights, enclosure, movement, and make believe* (Dannenmaier 1998:12).

The following narrative is adapted from Dannenmaier, (1998): *discovery* is the process in which children play and construct activities.

Water is perhaps the most enjoyable discovery experience for children but it is the least created shrouded with safety and liability issues. Twigs, leaves, pine cones and dirt are just some of the *loose elements* that children use to build and create. Principles as basic as: wet sand can be molded and water washes away things, are important spatial intelligence concepts for children. *Heights* refer to well designed towers and tree houses which provide children with a unique escape mechanism and experience. *Movement* is how children learn and negotiate their environments. What is essential is that physical play and movement must be easy, enjoyable and comfortable. *Make believe* or creative play is the most important and prominent exercise in childhood. Children fill in the details of their spaces and games through pretend-play requiring very elementary or no tools. There is no better environment to encourage such creativity than in nature. Nature provides children minds with the loose parts (such as acorn caps, stones, twigs, leaves etc.) which they for example, pretend and fashion

into cutlery or food for a dinner-party. In nature the possibilities of pretend play is endless. *Enclosure* refers to private areas for children to engage in creative play away from the constant supervision of adults. It is also essential for developing a sense of autonomy in children. Spaces must be private without adult invasion but be close to grown-ups to ensure children safety. These may be built-up structures such as tree houses or plastic tubes or simply a cave created with woven branches and twigs or an arbor created from vines. The choice of *plants* for a children's garden needs careful consideration. There are a few pointers to remember when choosing them. **Plants** must be hardy, interesting and safe for the environment. Dangers to guard against: the one is plants that are poisonous and the other is plants with barbs, thorns or sharp blades. Children love observing *wildlife* and it is beneficial in teaching children about the wonders of nature and different animals. Whilst plants are a source of beauty and stimulation in a children's garden they also attract an abundance of insects and birdlife. There are ways to attract a wide variety of animals in children's gardens but this is dependent on available space and the natural setting (adapted from Dannenmaier, 1998).

The literature review has so far painted a comprehensive picture of the nature of play as an integral tool in childhood development and learning. It highlights some of the important features of educational spaces emphasizing the significance of green spaces in the holistic development of children. It is clear by now that young children have specific needs and perceive and react to their world very differently as compared to grown-ups (Cowie and Smith, 1991). Accordingly, the way children learn through play, the methods of facilitating this process and the built and natural environments where learning may take place needs to be interconnected. In addition the involvement of children in the design and planning of their own environments is vital for its success. Drawing from the research thus far the proceeding discussions focus on significant elements integral in the design of children spaces.

3.5 Significant Design Elements in Children's Spaces

Next to movement, natural light is considered as an important sensory stimulus often neglected and poorly designed for in children's environments. According to Olds (1987), the fact that natural light changes throughout the day allows users to experience diverse

perceptions of time, space, features and elements under different lighting conditions. This in itself creates valuable sensory stimulus and learning in children as they experience altering conditions of light in their play scapes, the effects of light and heat on their bodies and surroundings, the resulting shadows and the creation of light and dark spaces. Not only

does natural light contribute to illumination, temperature and humidity but also adds to the health benefits of young children (Olds et al, 1987). Studies have shown that the wide spectrum of sunlight light has healing qualities – used to cure neonatal jaundice and psoriasis. Sunlight also kills bacteria and germs, enhances the immune system and is a significant source of vitamin D - which is essential to the strengthening of bones in small children (Olds, 1987). Hence it is no surprise that the literature stresses the point that no children spaces should be designed without natural lighting (Figure 62 and 63).

Color theory is another important element when responding to children. Its relevance in this study relates to its psychological implications on children. Color and texture is inextricably linked and is experienced through senses of sight and touch (Child Care Design Guide, 2003: 9.2). Researchers found that certain colors and textures influenced the health, ethics, feelings,



Figure 62 - Shows quality of natural light and volumes in Sandiego Childsplay Centre (think play create, undated)



Figure 63 - Shows a child designed space with a balanced use of colour. (Exley S, 2002)

behaviour and learning in people relative to stage of growth, gender and culture (Daggett et al, 2008). The general perception is that young children gravitate towards warm, bright colors in early years gradually favoring darker hues as they mature into high school years and beyond (Gale, 1993 and Daggett et al, 2008).

The popular belief is that in children bright colors bring forth positive emotions whilst black (and brown or darker colors) conjures up negative feelings. Boyatzis and Varghese (1993) argued that whilst this may be the general case those specific emotions were certainly not universal in all children. Their study proved that personal experiences associated with certain colors influenced the emotions children felt. For example Boyatzis and Varghese's (1993) found that whilst mostly female children likened the color 'black' and dark colors to negative connotations several boys found that 'black' made them feel 'excited' because they wore black in karate - school where they have a lot of fun (Boyatzis and Varghese 1993:83). In other children, their color-emotion experience stems from a single tangible event or image – for example a little girl commented that she was told that “*she does not look good in yellow*”, therefore the color 'yellow' made her feel very sad (Boyatzis and Varghese 1993:83).

Similarly colors in different cultures have different meanings and expectations. This is particularly the case in African and Indian cultures where color has symbolic meanings. Broadly speaking thou in Egypt the color 'red' symbolizes 'death' whilst in India and Japan it means 'anger' and 'happiness' respectively (Daggett et al, 2008). Whilst it is generally accepted that in early year's children are attracted to primary colors it is important to consider the social and cultural context in which colors are to be used. Clearly the literature shows that as children interact with the world, society, cultural artifacts and norms they start to develop their own feelings, thoughts and ideas about color.

In learning environments the purpose of color is to create a friendly space that facilitates visual stimulation, limit stress and develop brain functions. Visual stimulation in turn encourages creativity and problem solving (Simmons, 1995 cited in Daggett, 2008). The use of an acceptable range of colors goes a long way to reduce boredom and improve attention spans (Daggett et al, 2008:2). Cool colors such as blues, greens and violets have a calming effect whilst warm colors such as red, orange and yellow create excitement (Daggett et al, 2008:3).

However studies have cautioned against excessive use of color – using more than six colors in a space used by children goes against cognitive development (Child Care Design Guide, 2003: 9.2 and Daggett et al, 2008:2). Apart from its advantages in learning spaces color is functional in architecture. In children spaces, warm colors effectively make areas intimate by reducing its appearance of scale, ceiling heights, widths and lengths of passageways etc. in response to anthropometrics of children whilst cool colors create the illusion of openness (Daggett et al, 2008:3). Moreover color is useful in wayfinding in children's environments by accentuating entrances and exits, identifying focal areas, flagging different activity zones and creating a sense of place for users (Daggett et al, 2008:3).



Figure 64 - Shows the larger than life scale quality in the nature exhibit at Philadelphia's Zoo (Cohen, 1987)

Perhaps one of the most vital characteristics of kid's spaces is scale – contributing significantly to children's perceptions and behaviour. Essentially children estimate the space they take-up by the size of their bodies (Haider cited in Bauer, 1997:3). Haider (cited in Bauer, 1997:3) explains that children experience their surroundings in three different scales: “*miniature scale*”, “*child scale*” and “*larger than life scale*”. For example in the Philadelphia Zoo's tree house exhibit children squeeze into a giant bee hives honeycomb whilst a model - bee double their size hangs above their heads (Bauer, 1997). Squeezing into such small spaces, boxes, crawling into nooks and crannies, discovering, touching, banging fidgeting or whatever interactive is what children do (Bauer, 1997) (Figure 64). This is how they learn through physical interaction about their body's relationship with space and how to negotiate their environments (Bauer, 1997). In other words children are perceptually, visually and physically engaging with the different scales of their surroundings. What is often forgotten is that due to children's physical size they view and interact with their worlds very differently as compared to adults. For example, Gary Nabhan the co-author of *The Geography of Childhood* (Nabhan and Trimble, 1994) made a very interesting discovery whilst comparing subjects of photographs taken by himself and his son whilst visiting a few National Parks (Nabhan cited in Tai et al, 2006). Whilst his own photos captured breathtaking views his son was more intrigued by small branches and twigs, rocks, lizards and other tactile objects that

he could discover and interact with at his own sight level and concentration (Tai et al, 2006). What this shows is that children, because of their dimensions find interest in the much smaller niceties of objects whilst adults overlook the minor details favoring a wider view of the world (Nabhan, 1994 and Tai et al, 2006). This fact is crucial to bear in mind when designing for children and when designing for adults the challenge lies in getting grown-ups to appreciate the world's minute intricacies (Tai et al, 2006). The squat physique and the inability to read signs at a very young age make wayfinding through space very challenging for children. Therefore the environment in itself needs to be designed to allow children to negotiate and orientate their way **without** language. This is known as transitioning and is characterized by free flowing and transparency between spaces (White et al, 2004).

Research undeniably shows that responding to the anthropometrics of children is necessary on so many levels. Perhaps the **foremost** reason is that child-scaled environments create a sense of belonging and ownership of place and space amongst children Windows that are easily looked out off and door knobs that are easily accessible are just some of the many things that show a space is responding to children's requirements (Ruth, 2000 and White et al, 2004). In other words in child-scaled spaces children feel more comfortable, relaxed and in control instead of being obligated to adjust themselves to adult orientated places. Apart from this, scaled places ensure a higher level of safety - by eliminating the need for children to climb onto things to reach shelves, wash troughs or tables or to open doors or to see out windows (Ruth, 2000 and White, 2004). Studies found that spaces designed to be child-scaled resulted in a higher quality and complexity of play, improved concentration in children and longer play times (White, 2004). In other words children were more engrossed in learning through playing and did not get bored so easily.

Scholars on this subject observed that in large spaces children needed to be lead through their environments from one playscape to the next whilst in small confined areas children seemed to be more attentive (White et al, 2004). Similarly researchers also discovered that children felt intimidated and unwelcome by over scaled buildings, entrances and landscapes (White, 2004). Therefore the consensus amongst theorists is that children were much more at 'home' in residential scaled buildings as opposed to large institutional feeling types (Olds et al, 1987; White et al 2004 and Tai et al, 2006). Linked to ideas of scale is the concept of anthropometrics and ergonomics – essentially referring to the design of everything to correspond to the size of children and their capabilities. These include stature, grasp and line

of sight so that children are able to carry out activities with less difficulty achieving utmost satisfaction and safety (Ruth et al, 2000 and White et al 2004).

3.6 CONCLUSION

Without doubt children learn through play. What adults often interpret as been naughty is actually a child learning about his or her environment. Children learn differently to adults. Their learning process is through physical and cognitive mechanics. In other words children learn through their senses and as they mature they make use of cognitive and multiple intelligences. The literature is vast on play-learning theories but what is clear is that learning does not take place in a vacuum. Hence this study supports a holistic approach when responding to children based on the fact that all children learn differently. What emerges strongly from the literature is that children require very limited and simple things to play with. Their ability to engage in make belief and pretend-play is perhaps one of their most powerful learning tools growing-up. Hence they re-interpret the places they see the people they meet and the things they come in contact with into countless appearances and meanings. In theory children go through different stages in the learning process. This means that when designing learning environments it is critical to take cognizance of multiple intelligences. In other words activities, spaces, programs, exhibits etc. need to respond to the different age levels of learning and understanding in a child.

There is no better play apparatus in the world than first-hand experiences with nature. The literature review has so far painted a comprehensive picture of the nature of play as an integral tool in childhood development and learning. It highlights some of the important features of educational spaces emphasizing the significance of green scapes in the holistic development of children. It is clear by now that young children have specific needs and perceive and react to their world very differently as compared to grown-ups (Cowie and Smith, 1991). Accordingly, the way children learn through play, the methods of facilitating this process and the built and natural environments where learning may take place needs to be interconnected. In addition the involvement of children in the design and planning of their own environments is vital for its success.

Drawing from the research thus far the proceeding discussions focus on the interplay of these relationships and its implications they have on planning and designing of children spaces. Nature for the early part of children's lives presents endless opportunities for learning. Whilst

this is the case children at various stages growing up seek out diverse and multifaceted experiences that cannot necessarily be found in nature. For example learning how a jet engine works or finding out about different cultures. These ideas can only be expressed within controlled environments. The position taken in this study is that there needs to be a holistic approach in responding to the social and cognitive development in children. This simply means that the landscape needs to be integrated into the architecture and vice versa. It also means that there needs to be strong input by users in the design of their own spaces.

CHAPTER 4 – PRECEDENT STUDY

4.1 ANALYSIS BROOKLYN'S CHILDREN'S MUSEUM - NEW YORK CITY

The Brooklyn Children's Museum (1899 - 2008) is the first planned and executed museum of its kind in the world. It has a lengthy history spanning more than a century long in which time the museum underwent radical transformations. The experience and knowledge gained by the institution in this time makes it and its affiliated professionals experts in the field of 'learning by doing' focusing on children, and in responding to their needs through architectural design and spatial organization. Hence the choice of this building / facility has unique lessons to offer. Pertinent issues relating to this dissertation topic is discussed.

4.1.1 Contextual Integration



Figure 65 - Aerial photo showing the location of the old Brooklyn Childrens Museum submerged in Brower Park Crown Heights 1977-1997. Source: Google Earth, 1997

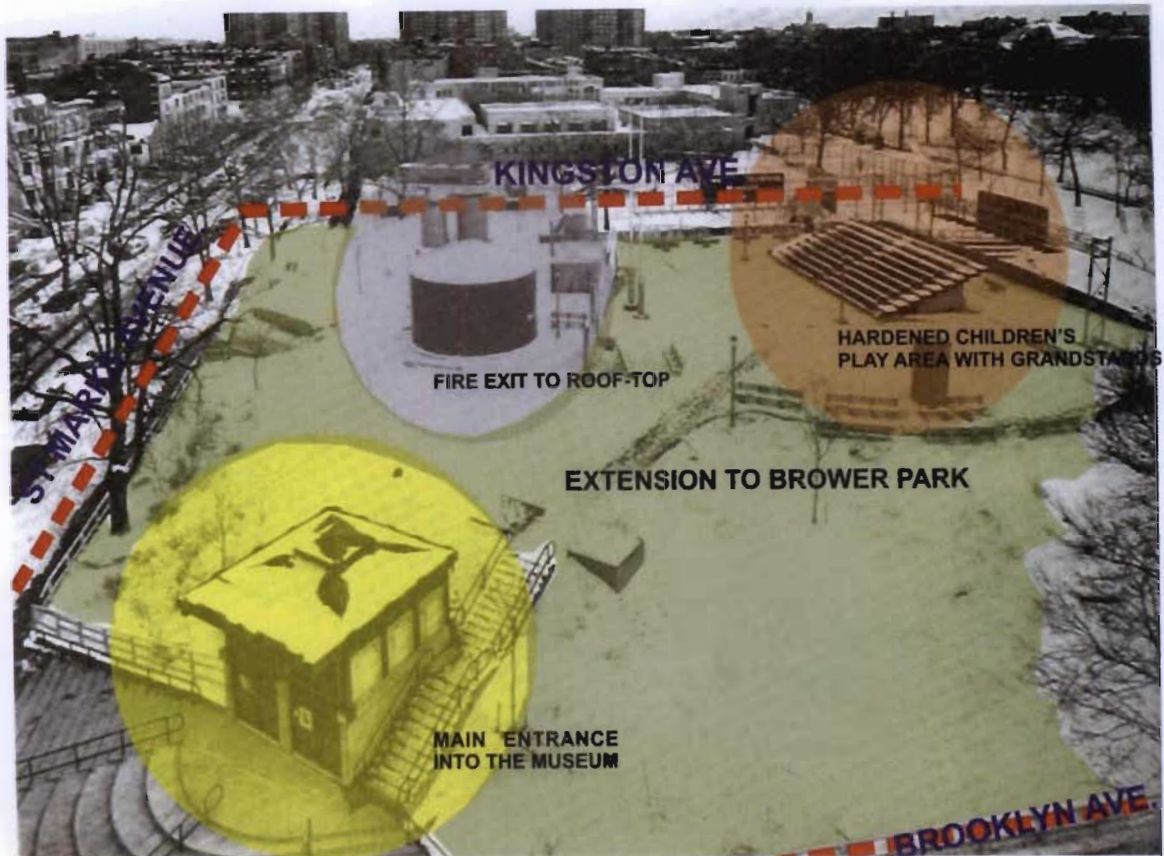


Figure 66 - Showing the extension of Brower Park over the roof of the sub-terranean Museum before the building was renovated (Progressive Architecture, 1978).

The location of Brooklyn's Children's Museum is noteworthy to its success. The Museum is positioned on its original site since 1899, fronting two prominent roads in the heart of Brooklyn - St. Marks and Brooklyn Avenue. Hence the building's main entrance is easily accessible and highly visible (Figure 65 and 66). The site overlooks Brower Park, a significant and only major open space in Brooklyn. The neighborhood is characterized by a high density of multi-storey residential units arranged in a uniform grid. The original concept for the Children's Museum in 1977 was to preserve the sanctity of the park by submerging the entire museum below ground to the public open space (Hardy, Holzman and Pfeiffer 1977). This design move extended Brower Park over the roof of the museum (Morton, 1978) whilst at the same time integrating the building with its green context (Hardy, Holzman and Pfeiffer 1977).

Whilst this approach was ambitious maintaining and enhancing views to the park and surrounding neighborhood, the presence of the children's museum was never really apparent. Essentially this approach favored preservation of the ceremonial site and green open space over the potential of celebrating a place designed for children (Form follows function).

4.1.2 Acontextual Form of Relevance



Figure 67 - Aerial photo showing the New Brooklyn Museum after its renovations 1997-2008 (Google Earth 2010).

Although heralded a world tourist attraction, the presence of the old Brooklyn Children museum was lost in totality within its place. Hence the institution underwent major renovations (1998). The brief called for *“a new public presence that would contribute to the vitality of the surrounding community”* (Vinoly, 2007:2:4). The response was a distinct linear building rising seamlessly above the old (submerged museum) hugging the corners of St Marks and Brooklyn Avenue (Figure 67). By enveloping the edges of the site with a singular structure the Architects kept the footprint of the building to a minimum. In this way the new building maintained its sensitivity to the existing green open space.

Raising the building up two floors (Figure 68) allowed the Architects to assert the visual presence of the Museum in its



Figure 68 - Shows the bright organic yellow from of the museum (Vinoly Architects, 2007)

context (Gibbs cited in Vinoly, 2007:2). This was in direct contrast to the passive bunker designed during the 1970's. Adding to the Museum's assertiveness is the use of curvaceous, playful, lean organic physical forms combined with a bright bold and 'fun' yellow exterior (Figure 4). All these characteristics combined with its prominent spatial location work well in tandem to create a stark contrast against the dense, rigid forms and monotone backdrop of the residential fabric of Crown Heights (Figure 54) (Vinoly, 2007).

The deliberate acontextual architecture of the building is successful not only in responding to the client's brief but making the museum an outstanding landmark and a compelling and inviting place for children and visitors to the area (Carson, 2007 and Vinoly, 2007) (Figure 69 and 70). Effectively the Brooklyn Children's Museum had undergone two significant architectural approaches with regards to its siting and built form in a 100 year span. Both models respond to different needs within a socio-political and economic context relative to its timing. Hence the desire to become a landmark conforms to 21st century museum ideals such as cultural tourism,

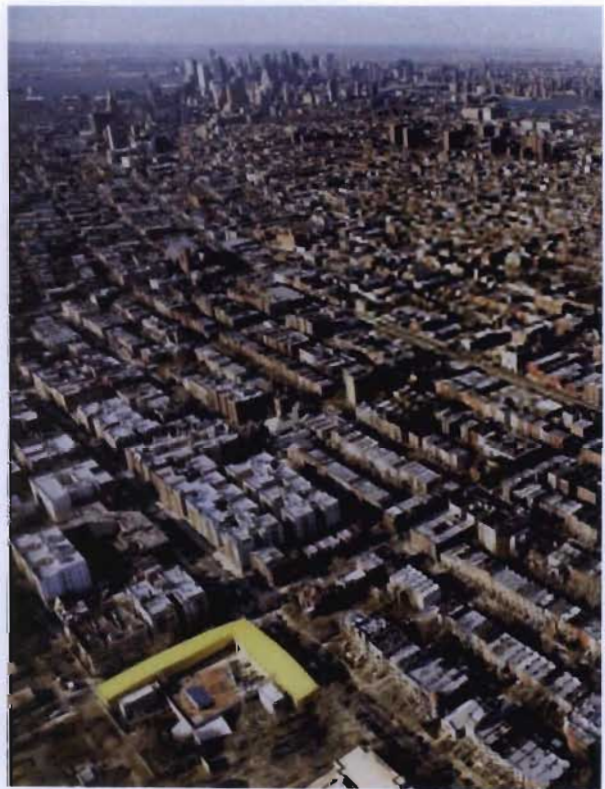


Figure 69 - Shows the acontextual design and form of the new Brooklyn Children's Museum (Rafael Vinoly Architects, 2007).



Figure 70 - Shows the impact / contrast of the building in its surrounding (Rafael Vinoly Architects, 2007).

iconism, urban re-imaging, and urban rejuvenation brought about by the ‘Bilbao’ phenomenon. Moreover it was necessary for places like Brooklyn Children’s Museum to adapt to change in order to be sustainable and moreover to maintain competitiveness on a global stage.

4.1.3 Engaging with the Street

One of the critical design challenges apparent in Brooklyn Children’s Museum was the engagement with movement and activities along two high street corners (Figure 71). Equally challenging was defining the main entrance to the building (Figure 72). The Architects decided to continue the introverted approach of the old museum in planning the new space



Figure 71 - Architects conceptual sketch showing edge treatment and back of site. Source – Vinoly Architects, 2007.



Figure 72 - Ground floor plan showing main activity corridors and spaces. Source - Vinoly Architects, 2007

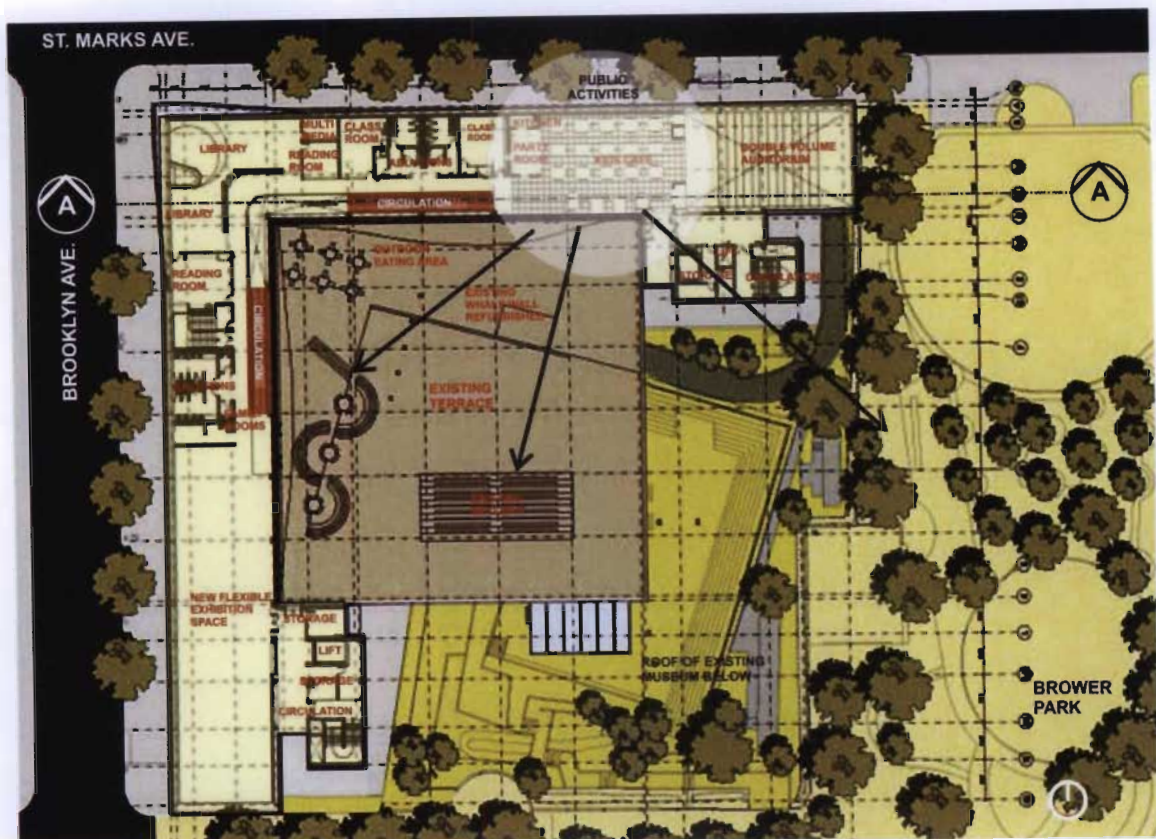


Figure 73 - First floor plan, note the cafe is located on the first floor (Vinoly Architects, 2007).



Figure 74 - Facade of the building facing public street (Travel with Frank O' Gehry, 2004).

whilst engaging with the street passively. Hence the Architects arranged functions on the ground floor which did not directly interface with the street, such as administrative offices, ablution facilities, the inward looking museum shop and early childhood galleries (Figure 73 and 74) (Vinoly, 2007). Other public galleries were located on the first floor hovering above a punctuated curtained glassed facade facilitating the passive visual communication with the street edge (Vinoly, 2007:2). At street level inert interaction was achieved through reflections of the immediate context against the mirrored glassed façade of the building. The monotony

along these articulated north and east edges were broken-up by planters and brightly colored boxes interrupting the glass elevation on approaches to the main entrance (Vinoly, 2007) (Figure 74). The main entrance into the museum is set back from the corner of St. Marks and Brooklyn Avenue up a few stairs and paraplegic ramp stating its presence. The entrance is subtly indicated by glass sliding doors and it is argued that the entrance could have been much more defined by emphasizing the volumetric lobby and introducing the facility to the neighbourhood as a place made specifically for children.



Figure 75 - Shows first floor cafe behind glass sliding doors opening onto roof terrace (Travel with Frank O' Gehry, 2004)

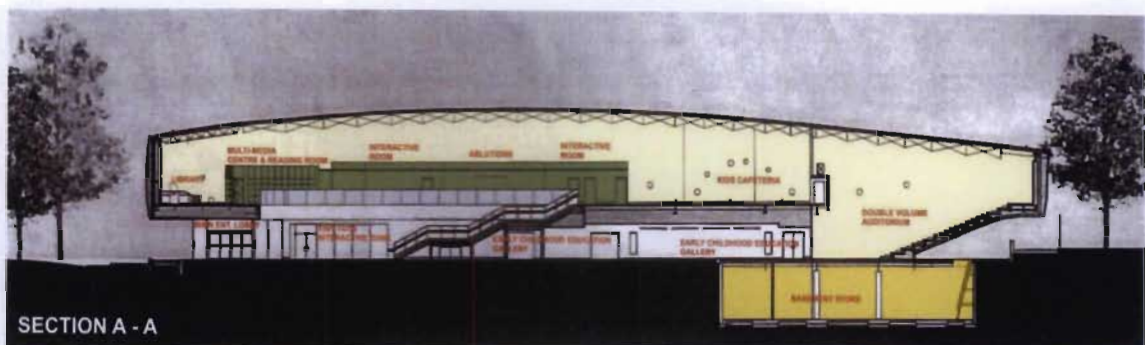


Figure 76 - Shows a section through the main entrance, Cafeteria and gallery spaces (Vinoly Architects, 2007).

Activities such as cafes, restaurants, book shops or curios have been reclusive unlike the approach taken in the Boston Children's Museum discussed in. For example the kid's café has been located on the first floor engaging with the existing roof terrace and visually communicating with Brower Park found at the back of the building (Figure 60 and 61). All

public activities have been introverted in the design of the museum (Figure 12). The thinking behind this deliberate approach was to maintain a sense of safety and security for children (Vinoly, 2007) visiting the institution. Whilst this may be the case it is at odds with a lost opportunity to use the sidewalk to animate and activate street edges hence promoting the facility as a safe public place. Activities such as restaurants, shops, curios and book shops and even some outdoor exhibitions engaging with the street **would have** resulted in more passive and active urban surveillance which would have contributed more to safety for all users and residents visiting and living in Brooklyn.

4.1.4 Responding to Children – Constriction and Release

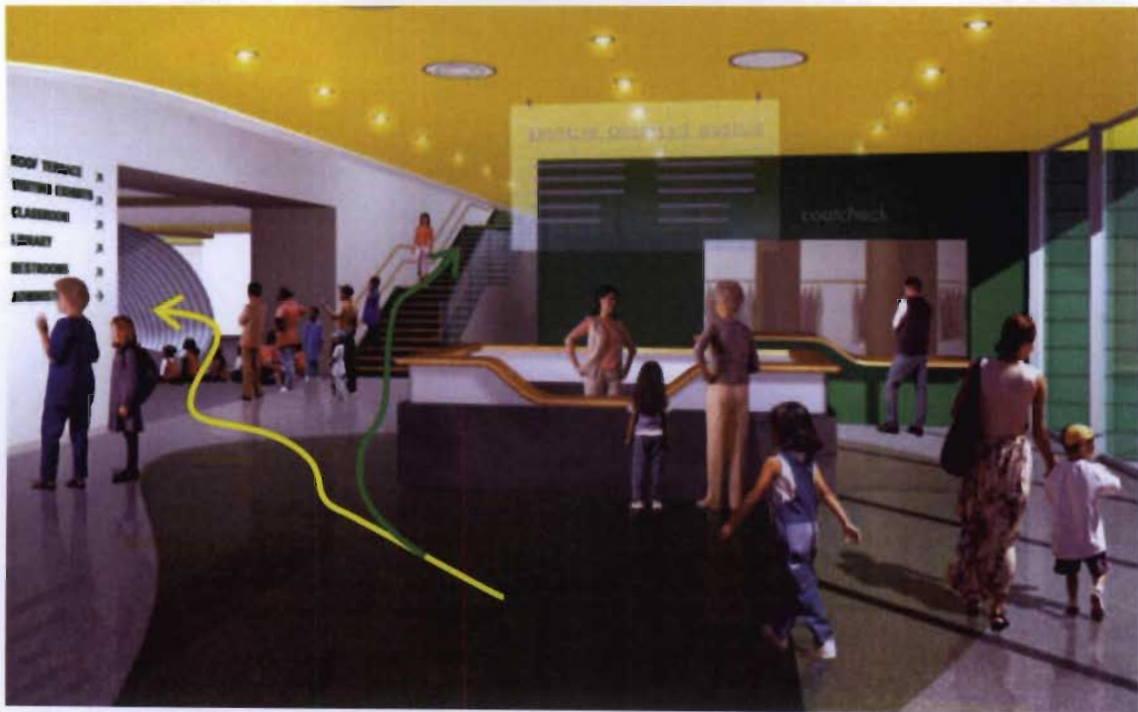


Figure 77 - Main entrance lobby and access to underground portal (Vinoly Architects, 2007).

Much of the richness and learning through play takes place inside the building (Vinoly, 2007). Off the main lobby visitors are immediately drawn to the entrance portal (Figure 77 – yellow arrow). The portal looks like a huge metal city drain pipe retrofit with swirling neon lights (Bauer, 1997). Called ‘the people tube’ it



Figure 78 - The 'people's tube' main circulatory spine (Progressive Architecture, 1978)



Figure 79 - Children's fascination with the people's tube. (Progressive Architecture, 1978).

immediately takes visitors down a constricted 55m long processional journey underground to exciting open planned exhibition halls (Figure 78 and 79). Once inside the confines of the tube, the senses and curiosities of children and grown-ups are immediately evoked by the sounds of flowing water, the visual stimulation

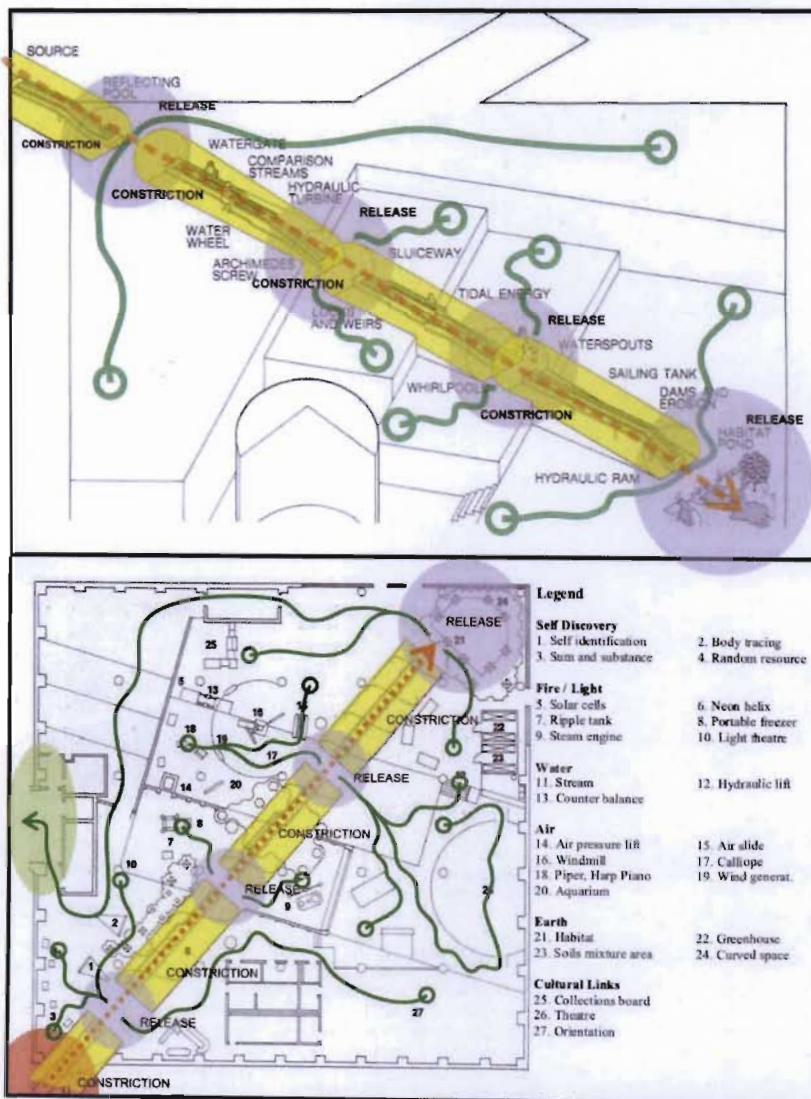


Figure 80 – Shows an axonometric view and plan of the main circulation spine and use of 'constriction and release'. (Progressive Architecture, 1978: P 67)

of the neon lights as well as the interactive exhibits running along to one-side of it (Figure 80). The 'bright light' at the end of the tunnel immediately attracts children's attention urging investigation. The essence of the quality of space that the Architects and Curators tried to create is effectively captured by Moorton's (1978:62) description likening the space as a place conjuring up memories of childhood encounters with 'long lost forgotten places' or abandoned houses and attics which remained unopened for years' and how

exhilarating a feeling it was to explore these spaces, looking around behind every nook and cranny to discover its secrets. The Brooklyn Children's Museum, Morton (1978:62) explains



Figure 81 - Glassed stained windows in the volumetric galleries. (Progressive Architecture, 1978)

is just like those special childhood places, encouraging visitors and children to explore till they are satisfied. Hence clever design tools such as 'constriction and release' have been employed to create

a mystical place. The constriction inside the tube prevents visual connection to the rest of the museum and the senses of visitor's are heightened with logic and feelings of expectation. Hence the tube prepares visitors especially children for the element of 'surprise and delight', discovery and exploration' by releasing them at strategic points along the ramp into light filled volumetric spaces characterized by colorful stained glass windows (Figure 81).

These breaks in the journey along the ramp are the main entry points into the various galleries. This approach of constriction and release cleverly responds to how children learn about the spaces around them through their natural senses, movement, investigation and inquisitiveness. The tube firstly constricts children so they are not suddenly overwhelmed by the big volumes. Children are permitted to first engage at their scale and anthropometric level and thereafter gradually allowed to experience the variations in spatial dimensions evoking curiosities and discovery. At the same time the museum successfully responded to the needs of grown-ups by virtue that all children's spaces could be enjoyed by them (Moorton, 1978).

This approach is not without shortcomings. There are significant difficulties experienced at the junction of the three main access points (Figure 80 and 82) into the main galleries. Children tend to overlook these diagonal entry portals because they are not very well defined. This may not necessarily be a disadvantage because the journey through the museum is circulatory, but perhaps it is something adults find more disorientating than children do (Wright, 1989 and Bauer, 1997).

4.1.5 Movement, Exploration and Discovery

Brooklyn Children's Museum

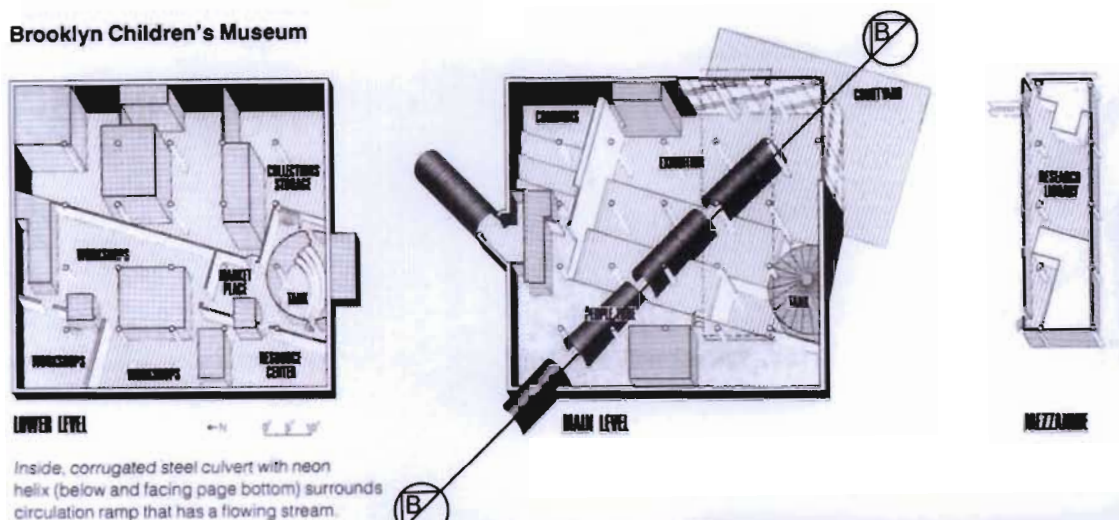


Figure 82 - Axonometric views of the terraced galleries located in the centre of the museum in Figure 8 and 9.
Source: Progressive Architecture, 1978 P 67

Children tend to explore their world more physically through (sight, sound, movement, touch and smell) as opposed to adults. Hence the ramp used in the museum provides them this opportunity to 'run freely' and interact physically. To further enhance this quality, each gallery space is characterized by uninterrupted juxtaposition of different forms, constricted and volumetric spatial experiences, innovative materials and textures and flexible open planned galleries (Holtzman Pfeiffer Architects, undated). Each space is also multi-leveled filled with diverse temporary and permanent interactive learning exhibits especially designed for children of various age groups (Figure 82, 83 and 84). There are certain cultural artifacts that have historical value and cannot be touched and these are housed in glass cabinets dotted all around the museum (Figure 19). The concept is that at different

levels of the terraced platforms the viewing experience affords users a wide range of spatial perceptions of their surroundings (Moorton, 1978) (Figure 86). It is expected that children



Figure 83 - Permanent pottery exhibit.
(Brooklynkids, 2007).



Figure 84 - Toddlers exhibit, teaching kids about their bodies in space.
(Brooklynkids, 2007).



Figure 85 - Bus exhibit teaching children about road safety.
(Brooklynkids, 2007).

and parents have a holistic view of all the gallery spaces in their environs. In this way they can visually experience the transitioning of spaces more easily and can negotiate their way through the museum effortlessly (Bauer, 1997). This is important for way finding without language especially in children due to their small physique and their inability to see or read signs. At time parents and caregivers have a perched view with clear sightlines to watch over

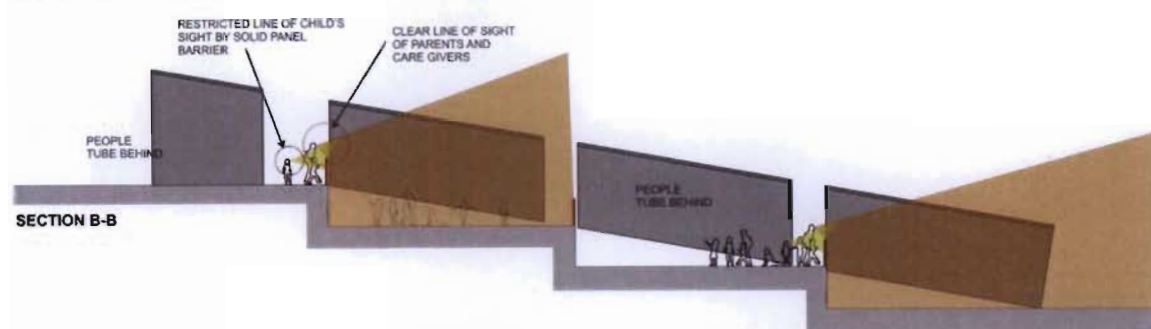


Figure 86 - Analytical sketch of terraced galleries at Section B-B showing sight lines (Author 2010).

their kids whilst they engage in activities (Figure 87). Unlike traditional museums where the audience is taken on a sequential narrated journey through the museum and back, in the Brooklyn Children's Museum the child becomes the narrative. In other words children are encouraged to move around and explore their environment in no rigid framework and to use their imaginations to interact with exhibits to create their own narratives (adapted from Moorton, 1978). The various hands-on activities have been strategically positioned to

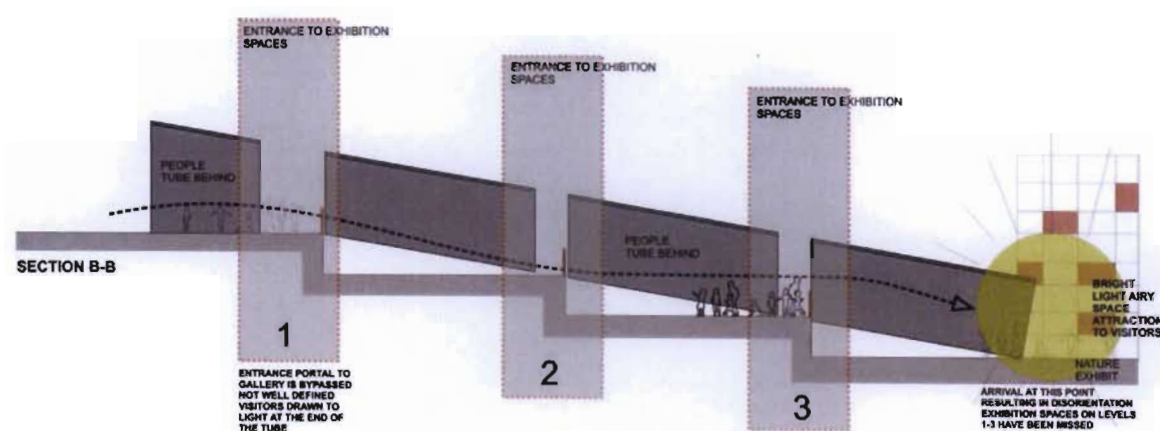


Figure 87 - Analytical sketch showing movement bypassing galleries (Author, 2010)

facilitate a rational free-flow of movement from one exhibit to the next to facilitate exploration in kids (see figure 80) (Wright, 1989 and Bauer, 1997). All of these design decisions contribute towards a combined approach of learning through a structured and free flow approach to play (Kramer, 1976 and Bruce 1997). Whilst a terraced design decision facilitates movement through sight, a major problem experienced is that children often bypass the exhibitions on the first three levels. Not any fault of their own, they are drawn to the

bright light and airy nature exhibit at the end of the tunnel becoming disorientated. The main reason for this is that they do not have an overall view of 'what there is to see' because of the use of solid panel walls (Bauer, 1997). Due to children having a small stature their line of sight is limited (Haider, cited in Bauer, 1997). Hence many children find it difficult to look beyond some of the protection barriers separating the different terraced levels (Haider cited in Bauer, 1997) (Figure 71). The walls reach up to the waist height of an average size man much higher than a little child (Bauer, 1997). Of course it is a minimum requirement by the authorities that a protection barrier be installed where there is a level change however this barrier could have been perforated to give children a glimpse of the exhibition spaces below. Nevertheless Brooklyn's Children Museum for the most part has been quiet proficient in other areas to correspond with the anatomy, and ergonomics of children.

The exhibition spaces have a 'homelike' cozy feeling to them deliberately created to ensure familiarity to 'home' so children felt relaxed and engaging in the different spaces (Olds, 2001). This was enhanced by the use of sky-lit volumes, warm friendly materials and colors such as laminated timber beams, wooden floors and a gradient of reddish hues (Moorton, 1978) (Figure 73). The detailing of the building itself was intended to be about education through interaction appealing to children's sense of discovery. A disused oil storage tank has been retrofitted to serve as the children's theatre teaching kids about recycling and sustainability. Inside the theatre children's attention is drawn to the rustic finishes, the change of materials at the base of the enclosure and the fan



Figure 88 - Shows the inside of the theatre. (Progressive Architecture, 1978)



Figure 89 - Shows the materials used in the exhibition spaces (Progressive Architecture, 1978)

shaped detailing of the ceiling. Enhancing the playfulness of the space children sit on bean bags on a stepped platform (Morton, 1978). Once outside, the viewer's attention is drawn to some of the unfinished structural work of the building. Concrete beams, columns and services in

huge pipes painted in bright primary colors remain bare and exposed. A wall dividing an exhibition space next to the museums auditorium stands out unfinished with its knotted planks for all to see. Even the outside of the people's tube is made from crude unfinished rough steel (Bauer, 1997). This was purposely done so children could respond to the different textures of the building (Haider cited in Bauer, 1997).

Considering that children experienced their surroundings in different scales: such as "*miniature scale*", "*child scale*" and "*larger than life scale*" (Haider cited in Bauer, 1997:3) much emphasis was placed on finding a balance between responding to the anthropometrics of children and adults (Vinoly Architects, 2007). Gallery spaces varied in sizes (Figure 80) as opposed to one large open planned hall much like the rooms found at home (Olds, 2001). Each space was characterized by a wide range of exhibitions and activities designed and executed with a variation of scale in mind. For example located in the corner facing the sunken courtyard is a 'larger than life' (Figure, 90) transparent protein module exhibit teaching children about cellular particles. The sheer size of the exhibit in its volumetric setting adds that element of surprise and delight for children whilst at the same time appealing to their sense of

discovery. Hence children cannot resist interacting with the display and would often be found climbing inside and onto the structure (Moorton, 1978). A similar effect has been created by life size skeletal remains of a pre-historic mammoth sitting in another part of the museum's space (Figure 91). Without knowing it children are learning about their bodies' relationship with space not to mention gaining an insight into protein particles and learning something about pre-historic animals.



Figure 90 - Large scaled protein module located in volumetric space (Progressive Architecture, 1978)



Figure 91 - Skeleton of a mammoth in the volumetric exhibition hall (Brooklyn Childrens Museum, 2008).

Responding to the ergonomics of children, furniture and fittings located in the museums ‘hands on activity spaces’, reading rooms, computer labs ablutions and exhibition areas have all been scaled to respond to a child’s anthropometrics. Even the exhibits have been presented to respond to the physical nature of kids (Figure 93, 94). Details such as punctured internal walls with portals visually connecting related spaces are created at a height which is easily readable and visible to children (Figure 92, 95). Even door handles, shelves, bookcases and windows overlooking the street edge have been positioned within children’s reach and at their eye levels (adapted from Vinoly Architects, 2007). The overwhelming volumes of some of the spaces have been reduced by the installation of self contained interactive exhibits with lowered ceilings and equipment resized to respond to children but flexible enough to be used by parents. This not only creates a comfortable and usable space especially made for kids but adds to the safety factor preventing them from climbing onto chairs to look out of windows, to reach countertops, to open doors or access wash troughs or even grasp onto things (Haider cited in Bauer, 1997). More importantly, responding appropriately to ergonomics and anthropometrics of children contribute towards

positive behavior and perceptions in children. In other words children would not have to change their behavior to utilize the space. Instead they feel a sense of control and ownership which contributes towards improved concentration and qualitative learning through play.



Figure 92 - Punctured internal wall with child scale portal (Brooklyn Kids, 2008)



Figure 93 - Pizzeria exhibit scaled for children and also responding to adults. (Brooklyn Kids, 2008)



Figure 94 - Scale of furniture in the Art Studio (Brooklyn Kids, 2008)



Figure 95- Child scaled portal windows on exterior facade facing Main Street (Vinoly Architects, 2007).

Apart from scale, color plays a significant role in Brooklyn Children's Museum. The building's acontextual character is created by its organic form combined with its striking outer appearance against the subdued colors of the neighborhood. According to color theorists yellow induces a feeling of excitement hence it was an obvious choice for a place designed specifically for children. The bright yellow ceramic tiled envelope is broken up by an articulated elevation of aluminous boxed hues of greens and red cladding (Vinoly Architects, 2007) (Figure 96).

Whilst the outstanding exterior color of the building is an attraction for visitors the museums interior is just as appealing. Warm colors (red, oranges and yellows) combined with different textures and materials have been used to create intimate spaces reducing the appearance of its scale whilst at the same time responding to children's perceptions. Cool colours such as blues, greens and violets were used in confined areas to give the impression of openness in some of the play areas (Vinoly Architects, 2007), (Figure 97 and 98)

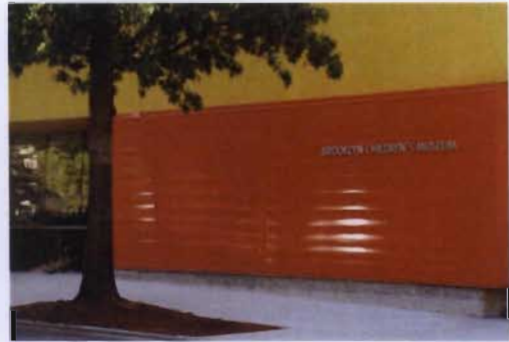


Figure 96 – Articulation of bright red cladding to break-up the yellow facade. (Vinoly Architects, 2007)



Figure 97 - Colourful playscape on the ground floor (Brooklyn Kids, 2008)



Figure 98 - Use of colour in the play equipments (Brooklyn Kids, 2008).

4.2 ANALYSIS OF BOSTON'S CHILDREN'S MUSEUMS



Figure 99 - View of Boston's Children Museum on its waterfront site (Van Valkenburgh M - Pine & Swallow Environmental, undated)

The Boston Children's Museum (BCM) is located in Fort Point a prominent waterfront site overlooking Boston's main Harbour. The Museum is an integral building block forming part of a broader vision to strengthen what is slowly developing into an urban cultural precinct for Boston (Carlock, 2008). The significant lessons that BCM has to offer this study is the importance of visual place making, edge treatments, human activity pockets and simple but effective environmental design.



Figure 100 - Iconic Milk Bottle, Landscape Architect, 2008

The physical location of Boston's Children's Museum is pin-pointed by an iconic 12, 2 meter high milk bottle which was historically an advertising gimmick by the Hood Milk Company, and the structure since then rooted itself on-site. The

folly has since grown so popular that it has become synonymous with the imagery of the museum. Repositioned by the architects in a hardened plaza away from the main entrance, the out of context over-scaled object immediately hints to visitors that the building behind it is not a place for storage (Figure 99 and 100). Instead it indirectly suggests the disposition of the museum as a playful place for children: in other words a “place for the unexpected” (Cohen, 1987). Children are fascinated by the ‘larger than life’ object and this has become a visual place maker and an effective draw card for the museum.

Perhaps one of the most important areas in which BCM differs in comparison to Brooklyn Children’s Museum is its design and philosophical approach in engaging with its street edges. Whilst Brooklyn (4.1) is more introverted the

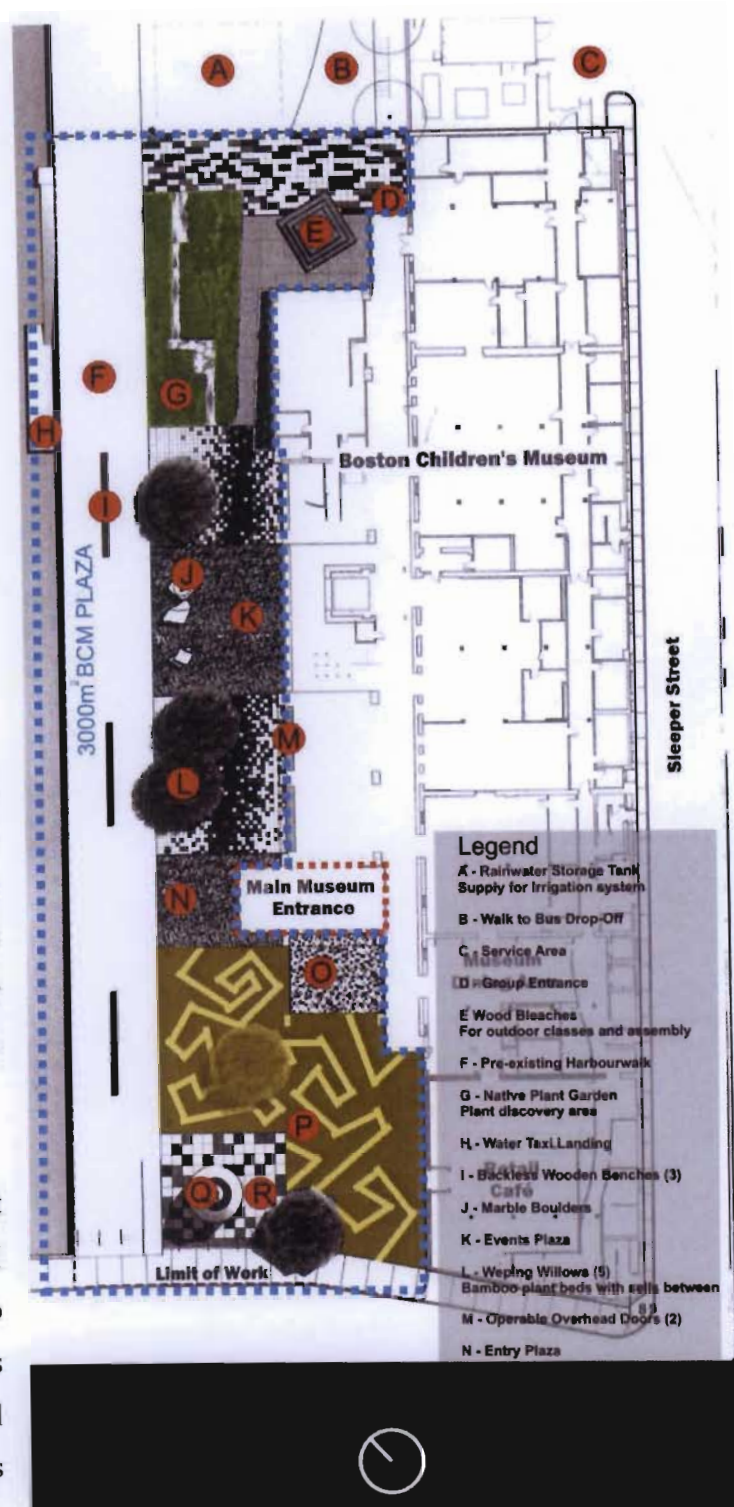


Figure 101 - Plan of Boston Childrens Museum showing the animated plaza and harbour walk. Source:Carlock, 2008

BCM’s philosophy is to extend the ‘inside’ of the building to interact with the ‘outside’. According to Cohen (1987) a most powerful preview to any space involves people engaged in work, play or just at rest. An outdoor public place, where activities from inside a museum

spills over into streets or squares attracting the attention of bystanders is a very effective strategy (Cohen, 1987).

Human activity pockets outside the museum signals the public in far reach places that the facility is active (Cohen, 1987). The BCM recognizes the numerous benefits of designing 'human activity pockets' not only as a means of urban surveillance but as a catalyst for people activity to attract others and create a locus for more action to be generated (Cohen, 1987 and Carlock, 2008) (Figure 101).

The BCM's objective was to produce more awareness around the work and facilities of the museum. Essentially it was an effective way in which to market the museum to the public and make it a popular destination (Cohen, 1987). The ways in which the BCM was effective in achieving this was by externalizing the museums shop and restaurant from the museum

proper to overlook the newly created plaza filled with all kinds of attractions. Moreover the milk bottle is more than a symbolic gesture – being visible from great distances it attracts passer bys whilst very close – up it is a hive of activity selling refreshments and gifts in the public plaza (Cohen, 1987).

The planning and design of the large open space fronting the main entrance and the edges around the museum was critical to its attitude of extending play and learning onto the street.



Figure 102 - Shows the group plaza entrance and native gardens (Landscape Architect, 2008)



Figure 103 - Shows the mazy pathway leading to the entrance. (Landscape Architect, 2008)

Hence the large open space was animated with activity through the landscape when it was re-developed to respond to children (Carlock, 2008). The brief called for a place for 'play-learning' which Michael Van Valkenburgh (MVV, 2008) created. The landscape architect turned the 3000 square meter fragmented parking lot into a 'flickering pavement' with objects to jump on, indigenous landscaping, sloping kerbs, in and around trees, bleachers and a maze pathway leading up to the museums main entrance (Carlock, 2008) (Figure 35). The greatest challenge facing the designers was scaling down the 'big space' to the level of children who are closer to the ground thereby making the plaza a more welcoming place for everyone (Carlock, 2008). The design approach involved a layering of key elements comprising of social zones, natural play essentials and integration with the existing urban fabric (MVV, 2008).

The shared spaces were designed as meeting places related to dining, entertainment and sponsored events. It consisted of: the paved plaza around the gigantic milk bottle, the outdoor café complete with table and chairs, the tents used for special events, benches positioned along the promenade and bleachers at the group entry point (Carlock, 2008). The natural zone was characterized by indigenous plants, weeping willows and five large marble boulders, articulated to respond primarily to children's play whilst not excluding adult interaction. The widely visible 'milk bottle', textured pathways, pavements and the maze connects the museum to the neighbourhood. Visitors from the surrounding area are drawn to the relocated bottle which acts like a beacon from all directions (Figure.

The pathway and playful maze lead visitors from various arrival points to the main entrance to the building (Carlock, 2008). The boulders were purposely designed not to be climbed but were planned to be interactive, appealing to touch, sight and perception. The learning experience was not only physical but spatial and environmental. The marble boulders exhibited scale, geology and gravity. Observations made by the architects found that children and parents reacted to the rock area as a place to play around like hide-and-seek. In addition it made a sculptural contribution to the harbor walk. The planters were designed using stone which varied in height from 150 to 450 millimeters to serve as informal seating for all sizes of children whilst toddlers found it to be an effective balance beam (Carlock, 2008). MVV (2008) put in place new integrated wooden benches, waste receptacles and raised planter boxes in the new plaza. Perhaps the most useful input was the addition of large doors to one

side of the museum to facilitate movement and communication with the open space (MVVA, 2008).

From the outset MVV (2008) had the idea to brighten and animate the spatial environment through design that was enduring instead of overly serious or cartoonish (Carlock, 2008). The winding path is characterized by outstanding white paving blocks set in red brick which then transitions into a checkerboard pavement distilling into a random arrangement of patterns (Carlock, 2008). Similarly the textures vary from very rough quarry stone in places to highly polished marble in others. The huge boulders

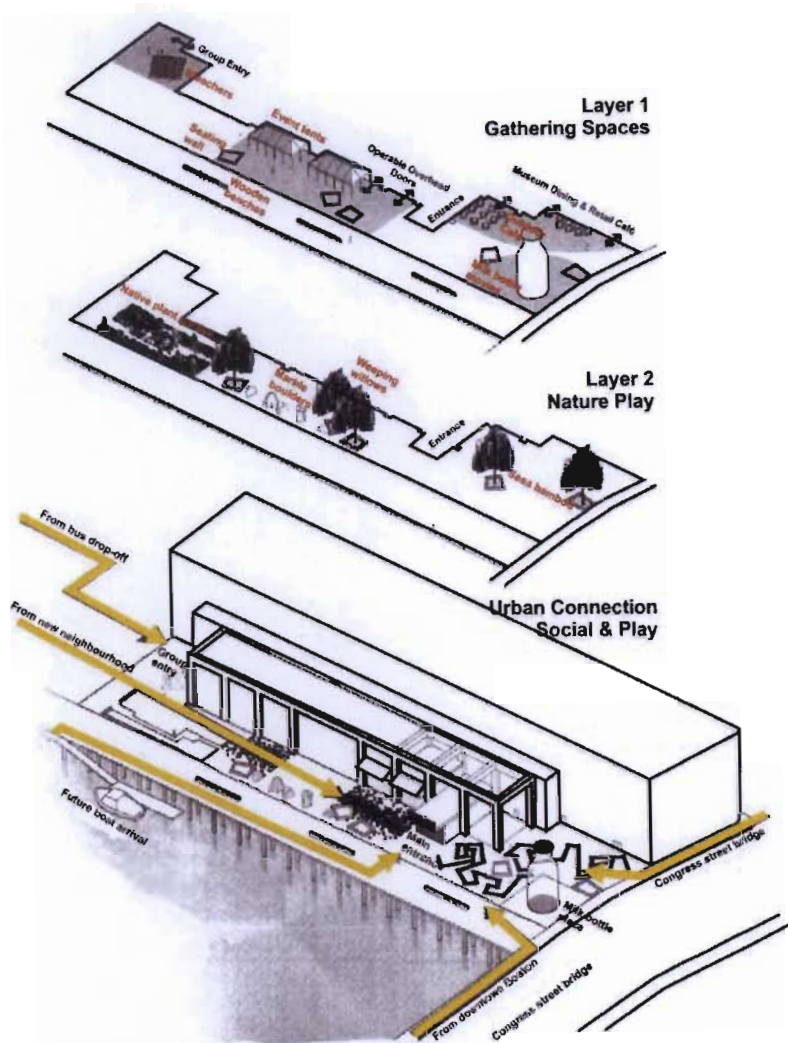


Figure 104 - Shows the layering of the spaces to respond to context. (Landscape Architect, 2008)

the overall composition of colors, textures and paving patterns assist in breaking up the overwhelming size of the space (Carlock, 2008). The plaza is a hive of action. The mazy path is normally an individual activity encouraging children to follow it to the main entrance. However combined with the museums program called 'drive-by' which teaches children about road safety and understanding of traffic signs - so important in an urban area - the mazy space becomes a street classroom. Wheeling around on scooters children propel themselves down the meandering path lined with cardboard 'stop' and 'yield' signs lead by Kuross who heads up the program. According to Kuross, children may be playing but they are also learning at the

same time (Carlock, 2008:86). Apart from this activity the open space plays host to a number of the museums smaller games such as Chinese badminton and mini-soccer.

Apart from these activities there are educational programs consisting of 'live exhibits' which spillover into the square through the large double doors luring parents and children to participate. For example, the one summer the museum hosted a boat builder in the plaza who together with a new family every week built row-boats. Children got to learn about measuring, drawing up plans and using wood carving tools (adapted from Carlock, 2008). During the summer the museum has two staff members in the public open space hosting and organizing free activities to the public. Each day was a different theme in accordance with events that may be taking place locally or internationally (Carlock, 2008). Again this conforms to the idea of human activity pockets and extending the inside of the museum to the outside in order to signalize and generate activity and to provide clues to the public as to what the museum is all about (Cohen, 1987 and Carlock, 2008). These kinds of activities were never envisaged by the architects and it is also an indication of the flexibility of the space to accommodate a wide range of uses as the need arises. The overall composition of the plaza lends itself to the imaginative way in which children learn through interactive engagement with their environments. Due to the location of the museum on the edge of a waterfront and the technicalities around the site the designers were mindful of making the place environmentally sensitive. Hence the Architects designed the new addition to the building with three roof gardens, planted with indigenous shrubs and a few low growing flowering plants. The roof garden achieves some significant sustainable and social responsibility outcomes. Environmentally, the green roofs reduced solar heat gains to the building whilst rainwater runoffs were collected and stored in storage tanks. This grey water supply serviced toilets and was used to irrigate all the plant material in the plaza. Socially the green roof contributed to education and awareness to parents and children around environmental sustainability. Children became part of the project when they together with their parents planted a tree on the roof garden and were encouraged to adopt the tree and watch it grow (Carlock, 2008).

4.3 CONCLUSION

What comes across from the Brooklyn Children's Museum study is the importance of being visible as a children's museum as opposed to being subtle. Historically its presence was never felt and with the new addition with its organic form and bright exterior, raising the building above the ground contributed greatly towards the building becoming a landmark in its context. A landmark status has great advantages for a Children's Museum because it not only becomes identifiable within its context but allows the institution to market itself on an international platform. This allows the institution to broaden its audience base and foster new partnerships. It also contributes to regenerating declining neighborhoods. Where the Brooklyn Children's museum differs from the Boston example is the approach in dealing with its public edges. Boston celebrates the public plaza and street extending its interactive exhibitions to engage with people passing by. Brooklyn on the other hand turns it back on the street preferring to engage with views across the park. It is argued that the Brooklyn Children's Museum has lost a great opportunity to animate the street and create passive surveillance and enhancing its current status in the neighbourhood.

CHAPTER 5 – CASE STUDY

5.1 SCI-BONO DISCOVERY CENTRE – NEWTOWN, JOHANNESBURG

5.1.1 Introduction

Sci-bono is a “learn by doing” facility forming part of a collection of creative institutions in the cultural precinct of Newtown in Johannesburg. It is the closest example in South Africa of an interactive facility focused on learning through play in children. It is for this reason it has been chosen as a case study. ‘Sci-Bono’ comes from the abbreviation for ‘science’ and ‘Bono’ the TshiVenda word meaning ‘Vision’, hence the centre *“strives to promote awareness, interest and understanding in respect of math’s science and technology”* through a hands-on approach responding to children of all ages (Sci-Bono, 2009). Hence it has unique lessons to offer this thesis topic in terms of architecture, design and planning for interactive learning in children within a South African context. Relevant issues to this study are referenced.

5.1.2 Analysis of the Sci-Bono Discovery Centre

Initiated by the Gauteng Department of Education Sci-Bono is positioned as the largest interactive place for children in Southern Africa - performing a supportive role to teachers and schools based curriculums. In other words, linking all spheres of learning in schools to the world outside the classroom (Sci-Bono Manager, 2010). Math’s, science and technology (MST) has been pin-pointed as weak areas in schools locally hence it is the primary focus at Sci-Bono. There are innovative out-reach programs taking interactive learning to disadvantaged schools nationally such as the mobile physics and chemistry trailer which teaches hands on science in 30 schools (Sci-Bono, 2009). The in-reach programs consist of a wide ensemble of hands-on MST exhibits which is easily accessible at the facility in central Johannesburg (Sci-Bono Manager, 2010). Parents are constantly in search of new educational experiences benefitting their children. This is one reason why Sci-Bono is so successful and popular (Sci-Bono Manager, 2010). The other reason is that it is filling a missing link for new and innovative ways in teaching and learning which is attractive for parents and children of all ages (Sci-Bono Manager, 2010). It responds to contemporary ideas in the realms of child

psychology and cognitive development - focusing on learning through play and multiple intelligences (Sci-Bono, Psychologist, 2010). The place promotes group activities where parents and children play-learn together. Exhibits are flexible and adaptable with ambitious and progressive programs concerned with all aspects of learning right from the toddler stage to adulthood providing career counseling, life skills development and free access to psychologists (Sci-Bono Manager, 2010). To maintain sustainability the facility has an established operations strategy which is based on strong partnerships between Sci-Bono's board of directors with the Department of Education, Local and National Government and numerous Private Sector partners (Sci-Bono Manager, 2010).

The location of the facility contributes significantly to its success. The building overlooks a hardened plaza fronting a grand parking lot servicing a market and several cultural activities such as the Moyo Market Theatre, Museum Africa and Mary Fitzgerald Square Fan Park. A series of interconnected pathways link pockets of hardened and green open spaces in a north-south and east west axis facilitating pedestrian movements from public transport nodes. Hence the facility is highly visible and easily accessible.

The Centre is part of a three phased development comprising of the main exhibition block in the middle, the new extension to Sci-Bono Discovery Centre to the left and the third phase the BHP Billiton Career Centre to the right. For the purposes of this study the focus has been limited to



Figure 105 - Shows Phase 1 and 2 of the development (Author, 2009)



Figure 106 - Main facade of Sci-Bono Discovery Centre overlooking the open plaza (Author, 2009).

Phase 1 and a little on phase 2. Phase 1 is the science centre focusing on hands-on activities. It comprises of various displays, cafeteria, workshops, classrooms and administrative offices. Phase 2 serves a primarily administrative function (Figure 105).

On visiting the facility for the first time, the poor interaction of the building with its edges is visibly apparent. In the first instance, there was considerable uncertainty as to whether the place was open. The outdoor area was void of any people or activity resulting in a feeling of vulnerability and conjuring up feelings of fear for one's safety. In the immediate frontages of the building there were no Centre activities spilling over into the street or passive communication through transparent walls with the plaza. In addition the plaza was void of any trees, benches, meeting places or sculptural elements to animate the space and reduce its scale in relation to children.

Apart from signage, observations showed that there was nothing spectacular in terms of street activity, architectural articulation, form, color, landscaping, artwork or urban design to suggest to pedestrians and passersby's what the function of the building might be. Even color was not evident on the elevations or reflected in the choice of paving to provide clues that the building was a place made for children. Instead buildings were subdued earthy tones and plain concrete. There was no use of vibrant exciting colors or forms to attract the attention of visitors especially children. Whilst it may be argued that the building has historical merit preventing alteration to its exterior facade, there were no restrictions placed on creating activities in the open plaza or engaging with the green open space in front of the building.

From observations the public spaces of the Centre, such as the cafeteria and shop have been planned to interface inwardly instead of engaging with the public plaza. At the same token there were no shop fronts at ground floor level that gave audiences a preview of the going-ons inside the Centre. Essentially the building does not interact with its edges and is designed as a defensible space. This may be a lost opportunity not only to generate activity and market the centre to a wider audience but to contribute towards urban surveillance - considering the high crime in the area (Sci-Bona Manager, 2010) (Figure 106).

The facility reveals its function as a playful learning place immediately upon entry into the main entrance lobby. Apart from the exhibits on display, visitor's attentions were drawn to the impressive ramp (Figure 107, 108 & Plans -118-120) that filled the central volume going up four levels. The ramp constructed from steel is the main access spine to elevated galleries that overlap each other providing astonishing framed views to all gallery spaces and light filled volumes (see plans 118, 119 & 120). The ramp is a significant installation. Not only does it provide paraplegic access to all the facilities but it also takes cognizance of children's movement and how they learn about their environment physically. At the Centre, children were observed running along the ramps long length as they explored the many exhibits. The ramp allows an overall view of all there is to see making maneuvering the space effortless. However the installation does suffer similar problems to Brooklyn Children's Museum in that the safety balustrading overlooked the small size of children (Figure 109). Children are unable to fully appreciate views, or the transitioning



Figure 107 - Shows the impressive steel ramp in the central volume (Author, 2009)



Figure 108 Shows the ramps, and impermeable balustrading. (Author, 2009)



Figure 109 - View from the ramp to exhibitions below (Author, 2009)

of space or the experience of engaging with the different exhibits from a high vantage point. Nonetheless the ramp provides an unobstructed view of the different galleries so they can keep a watchful eye over their children.

Clearly the Centre is introverted in its design. Housed in a renovated 1905 Electric Workshop, the interior space has been gutted and innovatively transformed into a light filled volumetric space divided into numerous exhibition halls and display areas. This approach is commendable contributing towards the sustainable reuse of an existing building to create a space that is adding much value in the spheres of education (Figure 110 and 111).

The structural elements such as the inverted 'Y' concrete supports, the bright red steel girders and sections of exposed massed concrete walls were retained and kept unfinished to remind visitors of the past use of the building. More importantly these qualities add a unique character to the building that creates interest for children and adults (Figure 112).



Figure 110 - Shows the texture of the building and its industrious look (Author, 2009)



Figure 111 - Shows the quality of the light in the space and the kind of exhibits (Author, 2009)

The overall internal composition of the building has a deliberate industrious but playful feel to it. The outside of the building does not prepare the visitor for the internal experience. The interior is characterized by a wide range of expressive colors, exposed detailing, materials, grains, textures and numerous exhibits that evoke children's senses of sight and touch prompting exploration and inquiry. A real-life size fighter jet and a replica of the first airplane built by the Wright Brothers are strung from steel girders from above and hovers in the main entrance lobby. Adding to the paraphernalia of large things on exhibit is a salvaged electric turbine which hints to the past use of the building (Figure 113). From observations, all of these 'real-life' objects combined heightened the sense of drama in children capturing their attentions, evoking their imaginations and prompting fantastical role-playing within the safety of the centre. These objects may seem whimsical but are in fact significant tools in the psychological and cognitive development in children (Cohen, 1987).



Figure 112 - View of the main lobby with large scaled exhibits (Author, 2009)



Figure 113 - View of the large scale turbine on exhibit. (Author, 2009)



Figure 114 - A popular exhibit construction. Kid's role-play being contractors (Author, 2009)

Children engage with their environment physically and the Centre has successfully created an easy transitioning of spaces that is easy to negotiate. The exhibits do not follow any specific order but are arranged in different categories related to science and technology. The open planned galleries are a combination of permanent and flexible spaces which are adaptable to suite purpose made exhibits designed and created right at the Science Centre (Figure 115). From observations, children enjoyed engaging with the exhibits randomly. Younger children were fascinated by the ramp and what was waiting at the end of it. Equally popular was the Murray and Roberts installation where children engaged in role playing taking on the persona of construction workers on a building site. The exhibit is a scaled down version of the different equipment, materials, scaffolding and processes



Figure 115 - Example of one of the flexible gallery spaces. (Author, 2009).

found on a real construction site (Figure 114).

Without going into too much detail, Phase 2 (Figure 116 and 117) extension provides support to Sci-Bono Discovery Centre focusing more on adult and some child related activities. The building is not fully operational as yet but is mentioned here to illustrate its lack of interaction with prominent street edges, the kind of ancillary functions it performs and its deliberate contrasting architecture to its neighbor. Whilst appearing as a separate entity the building is linked to the Science centre via internally



Figure 116 - View of Adminstrative building on the left - Phase 2. (Author, 2009)



Figure 117 - View of New building from Miriam Makaba Street (Author, 2009)

controlled-access glass doors. Its ancillary uses consist of basement parking facilities, ground floor lettable retail space, upper floor lecture halls, I.T facilities, a resource centre, workshops, a canteen, restaurant, art gallery and a rooftop viewing deck. All of these functions are introverted with the building designed as a defensible space. For example, the building presents a blank façade along prominent edges of Miriam Makeba and Jeppe Street (Figure 98). The playful forms along this cannot be appreciated at pedestrian level because there are no public activities to activate this edge. Whilst it appears that security is a major concern reflected in the design of both the buildings, it is argued that without ‘eyes on the street’ it makes the urban environment more conducive for criminal activities to take place. From interviews with the manager, architect and project managers involved with the project and managing the facility a few critical issues

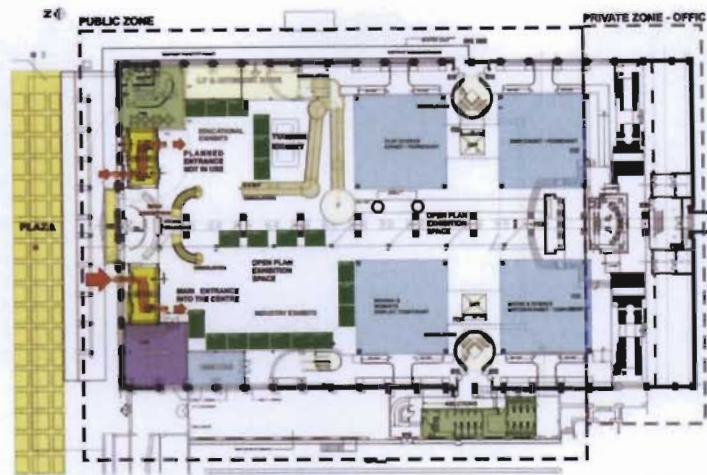


Figure 118 Groundfloor plan of Sci-bono science centre exhibition space shown in blue & circulation in yellow (Albonica & Sachs, 2006)

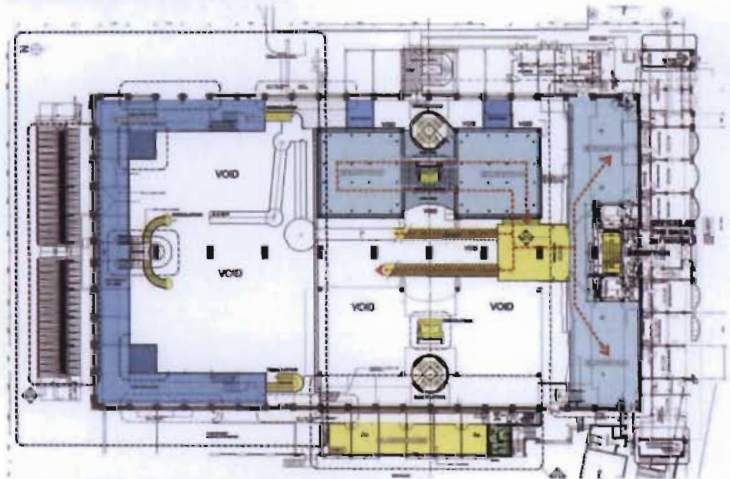


Figure 119 Level 1 exhibition spaces and circulation (Albonica & Sachs, 2006)

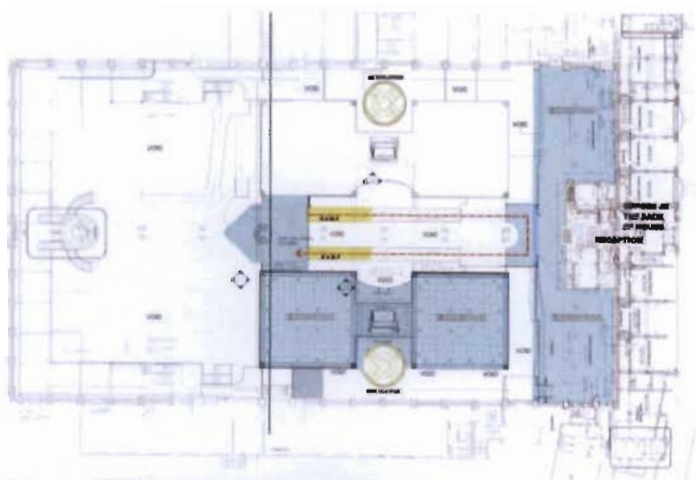


Figure 120 Level 2 exhibition spaces, circulation and overlapping spaces (Albonica & Sachs, 2006)

emerge. A major problem facing Johannesburg's central business district is the high crime rate in the area, hence many of the buildings whilst overlooking significant corridors of pedestrian movements face their 'backs' to the street. The Sci-Bono Center clearly demonstrates this approach in its

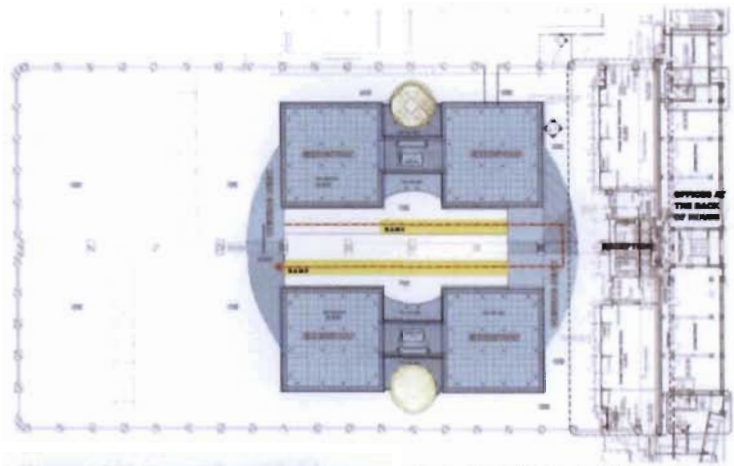


Figure 121 Level 3 exhibition spaces & circulation (Albonica & Sachs, 2006)

defensible design. It could be argued that the issue of crime could have been handled much more effectively by introducing a mixed used approach with activities engaging with the street edges. The surveillance of people along these edges will contribute to public safety within the Sci-Bono precinct.

5.2 CONCLUSIONS and RECOMMENDATIONS

"Museum is for somebody rather than about something" (Cleaver 1992). This statement by Cleaver (1992) aptly captures the essence of changes surrounding museums. From the literature review, precedent and case studies it is clear that interactive learning through play in children is the mode of the future in museums. The path museums have taken over its long journey clearly shows that it is at its most pivotal and exciting time in its history regardless of the barrage of controversy and debate surrounding them. Numerous questions are being asked as to what constitutes a museum in contemporary society? Are Children's Museums actually considered Museums? What exhibits are considered museum-worthy? All of these questions are in response to new ideas that are challenging the traditional role and idea of museums as container and disseminator of knowledge.

The research shows that museums themselves are already starting to respond to these questions re-examining themselves in terms of their own roles and responsibilities in society. Whilst some have embraced change in response to current trends there are other institutions that have been slow to keep pace with change. This is especially the case in many developing regions where the potential of museums as contributors, supporters and partners to education has not been fully realized. In many developing countries museums are viewed negatively, reminding people of oppression under colonialism. Other third world countries are grappling with far pressing issues such as poverty and unemployment.

In South Africa the situation is slightly different. Museums in South Africa have placed much focus on its political history which **evidently** is reflected in the numerous institutions that were built as monuments to its political past, and those that entrenched the memory of apartheid including parks and open spaces that **documented** the way to freedom. Whilst these institutions are powerful reminders of the countries political **struggle** the question that needs to be asked is: have children been considered in the conceptualization of such places? From the research it can be deduced that the local **cultural move** in South Africa have focused on a more adult audience in its design, presentation and **organization** of its content. It is argued that these places whilst ambitious in their conceptualization have excluded the most important section of the community and that is the children of the future. The point made here is that the conceptualization of many of South Africa's prominent cultural institutions

have been conceptualized and premised from an adult perspective to be enjoyed by adults. There are no facilities that have been built specifically to respond to the way children see the world and to react to their educational and entertainment needs. The argument made here is that South Africa is slowly losing its cultural heritage, identity and traditional languages are slowly disappearing as more and more children are regressing away from transgenerational interaction. Children have been placed in boxes in institutions where their communication and learning is within confined limits through formal means. Moreover pertinent issues regarding the environment, flora and fauna and scarce resources need to be instilled in children from a young age so they will grow up taking care of their world. Whilst responding to children has advanced internationally clearly the local museums have been slow to keep apace. Whilst there are commendable institutions such as the Sci-Bono Discovery Centre highlighted in this study, it is argued that these have not been designed and executed to its full potential. Moreover such facilities have overlooked the importance of culture, history art and the environment in favor of technology and the sciences.

Whilst the Sci-Bono centre is an example of a local hands-on activity space, children are left to their own devices. It is argued that for effective hands-on learning by doing there needs to be an instructor and instruction to show children the concepts and this is where the facility does not work. In addition there are no facilities to cater for parents or proper engagement on a personal level. Qualities that are apparent in international Children's Museum (mentioned in this study) are missing. In Durban the situation is of concern mainly because the only local Natural Science Museum has still to latch onto the concepts of 'learning by doing'. The Durban museum has not changed its approach with exhibitions being passively engaged with through glass cases. Whilst some effort has been made to animate exhibits it is argued that the core of learning through play is through hands-on stimuli. The potential of a museum as a place that fosters learning through play has yet to be realized. Hence this study recommends that a Children's Museum be proposed for the city of Durban that involves a participatory approach with children and families in its conceptualization. In this way the Museum will address the specific needs of society. The museum should be a collaboration of hands on activities combined with trained professionals to mentor children through various exhibits. It should have a partnership with local schools and businesses and focus on art, and culture the environment including science and technology. The form of the building should reflect society after all the museum is the community.

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8.0 APPENDIX – DESIGN REPORT



A Children's Museum in Durban
IN THE SHADE OF THE PALAVER TREE

DESIGN REPORT

TRANSFORMATION OF MUSEUM ARCHITECTURE IN
SOUTH AFRICA:



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1.0 Introduction

Throughout the world there is a paradigm shift in the field of museums. Its historical function as a container of the past has changed and is changing continuously. For the most part learning in museums was by inert looking and listening and not by doing. Museums were conceptualized on an adult audience and children were expected to enjoy the museum going experience like they were adults. In other words museum architecture and planning responded more to grown-ups whilst children's needs and their engagement at a museum experience were never considered (see Macdonald, 1996; 2; Fyfe, 2006:5). Museums are at a very exciting juncture in their history and this treatise has examined these intricate relationships both internationally and locally. The findings is that museums, especially in some developing nations like South Africa have been rather slow to keep abreast with new emerging trends which focus on social interactive child education and how children learn through play in and from museums. The design of public buildings and spaces in the city of Durban focused predominantly on the adult audience and the motor vehicle overlooking how children perceived their environments. Based on the research thus far this study puts forward the notion of a new museum archetype for Durban, a Children's Museum, re-interpreting conventional ideas of public museums to one which places children and the community at the centre instead of the artifacts. In other words *"museums are about somebody rather than about something"* (Cleaver, 1992).

This report builds on the research topic which focused on the transformation of museum architecture which excluded children in its conceptualization. It makes the point that children learn through play and museums should be responsive to this way of learning in its form, content, spatial organization and urban design. The report explains how the numerous theories of play and learning inform the design decisions made from site selection to conceptualizing the proposed Children's Museum. The report identifies the site followed by an in depth site analysis. It highlights the direct and indirect forces that impact on the site and its relationship with its broader urban context. These provide a

better understanding of the relationships and synergies existing between the various edges, nodes, landmarks, paths, squares land uses and activities taking place in the vicinity of the site. The site itself provided clues to developing the concept underpinning the design of the building which is discussed in detail. The investigation of precedents of similar projects locally and internationally have informed and influenced this project significantly. These findings helped understand the relationship between children and architecture. These are interpreted in space, form and content. The report then talks about the move from concept to design development which entails - formulating the brief and the schedules of accommodation, space planning, movement and circulation and three dimensional form of the building. The environmental performance and choice of materials for the building is discussed, followed by the technical resolution. The report concludes with design drawings and details.

2.0 Theoretical

2.1 Site Selection – Criteria

The research carried out thus far informs the criteria for site selection. From the research it becomes clear that there is a strong symbiotic relationship between children and the natural environment. Numerous researchers have pin pointed that there is no better learning apparatus than 'mother nature' 'herself' (see Harris et al, 2003). It was found that children tended to relate much easier to their natural surroundings than manmade things, buildings or spaces. Moreover nature provided children with countless of 'natural toys', interesting textures in the form of stones, leaves and twigs and sensory stimuli in sounds and sensations. It is through this interaction with the natural environment that children learn using their senses (see Cowie and Smith, 1991). This means that the way children learn through play, the methods of facilitating this process and the built and natural environments where learning may take place needs to be interconnected. Research has also shown that children are more responsive and interactive within a given space in which they feel safe, comfortable and are able to manipulate easily. Researchers refer to this as a 'home-like' feeling (Cowie, 1991).

Whilst this is the case children at various stages growing up seek out diverse and multifaceted experiences not necessarily found in nature. For example learning how a jet engine works or finding out about different cultures. These ideas can only be expressed within controlled environments. Hence the position taken in responding through design is that there needs to be a holistic approach in responding to the social, cognitive and multi-intelligences in the development of children. Bearing the above in mind it was important that the site meets the following criteria:

- a) be easily accessible to a wide homogenous audience
- b) be located in a pedestrian safe neighborhood.
- c) has existing linkages to green spaces or has the potential to create landscaped activity zones that can be experienced at various scales
- d) Is positioned in an area with mutually beneficial land uses.
- e) Is highly visible within its neighborhood.
- f) has the potential of becoming a catalyst for improving existing and creating new activities



Figure 1 shows the macro context of the site, (Author, 2011)

2.2 Site – Old BMX Track in Glenwood



Figure 2 shows the location of the site in its broader context, (Author, 2011)

The site that meets the above identified criteria is a unique piece of underutilised land amidst a potentially vibrant neighbourhood that lends it becoming a popular edutainment, art, leisure and culture precinct in the city of

Durban (Figure 1 and 2). The site is

positioned within an important hub in Glenwood forming part of a few existing parcels of vacant land in the Bulwer Park precinct.

The site is easily accessible off major arterial road networks, is on a public transport route and is within pedestrian access of those arriving by railway, specifically the Dalton train Station (see figure 1). This means that the site has the potential to attract wider catchments beyond its immediate residential neighbourhood hence pointing to an iconic type of development. Another significant characteristic of the site is that it is peri-urban in nature. This suggests that the site enjoys the infrastructure of the CBD whilst at the same time maintaining its suburban character. This is advantageous because the neighbourhood has retained its residential and 'home-like' feeling which is important and appealing to children. In addition the site sits in an area that has a number of schools and children homes so a children's museum developed on this site has the opportunity to forge comparative linkages with the existing education system and child like facilities. Also the site can be seen as a catalyst for further comparative development taking place such as offices for pediatricians', child psychologists and child related commercial activities.

A Children's Museum on this site has the greatest potential to contribute to the revitalization of Bulwer Park which at the moment is an underutilized and deteriorating green open space. Furthermore, the positioning of the KZNSA gallery next door to this site presents the unique opportunity for spatial linkages and activities to be formed. At the same time it could result in KZNSA re-examining its potential and developing itself further reinstating its presence in the neighbourhood.

2.3 Land Uses

The dominant land use in the area is medium to high density residential comprising of single storey medium to high rise buildings. Along Bulwer Road fronting the site is a mixed use corridor of business activities, mainly offices and service providers (Figure 2).



Figure 3 shows the land-uses in the vicinity of the site, (Author, 2011)

There are also low impact commercial businesses emerging and growing rapidly. Forming part of the mix of land uses is Addington hospital and a major shopping node Davenport Centre. Other uses include an orphanage and Sports club on the corners of Bulwer and Helen Joseph Road. Off significant importance to the site to be developed is the high number of schools and educational institutions within a 15 minute walking radius from the development site.

2.4 Site Analysis

The site is +- 4000 square meters and has a fall of +- 4m on a South Westerly axis across its surface. The abundant trees in Bulwer Park provide considerable climatic control in terms of North Easterly winds and rain whilst the South Westerly edge is exposed to wind and rain. The tall trees in Bulwer Park provide some sun shading to the



Figure 4 shows the site analysis, (Author, 2011)

site. The site is bordered by Bath Road in the North, Bulwer Road in the south, Ebor Ave. On the west and is flanked by the KZNSA on the East and Glenwood High on the West. The site overlooks the prominent Bulwer Park which is one of the very few green open spaces in Durban. According to the Child Friendly City Campaign Report (2010) the 'Bulwer Park district, intersects an economically diverse suburb, which includes lower income areas epitomized by urban decay with few green spaces for children to play and middle and upper income homes with private gardens'. The KZNSA and KZNIA are immediate neighbours to the right of the proposed site and the entire district

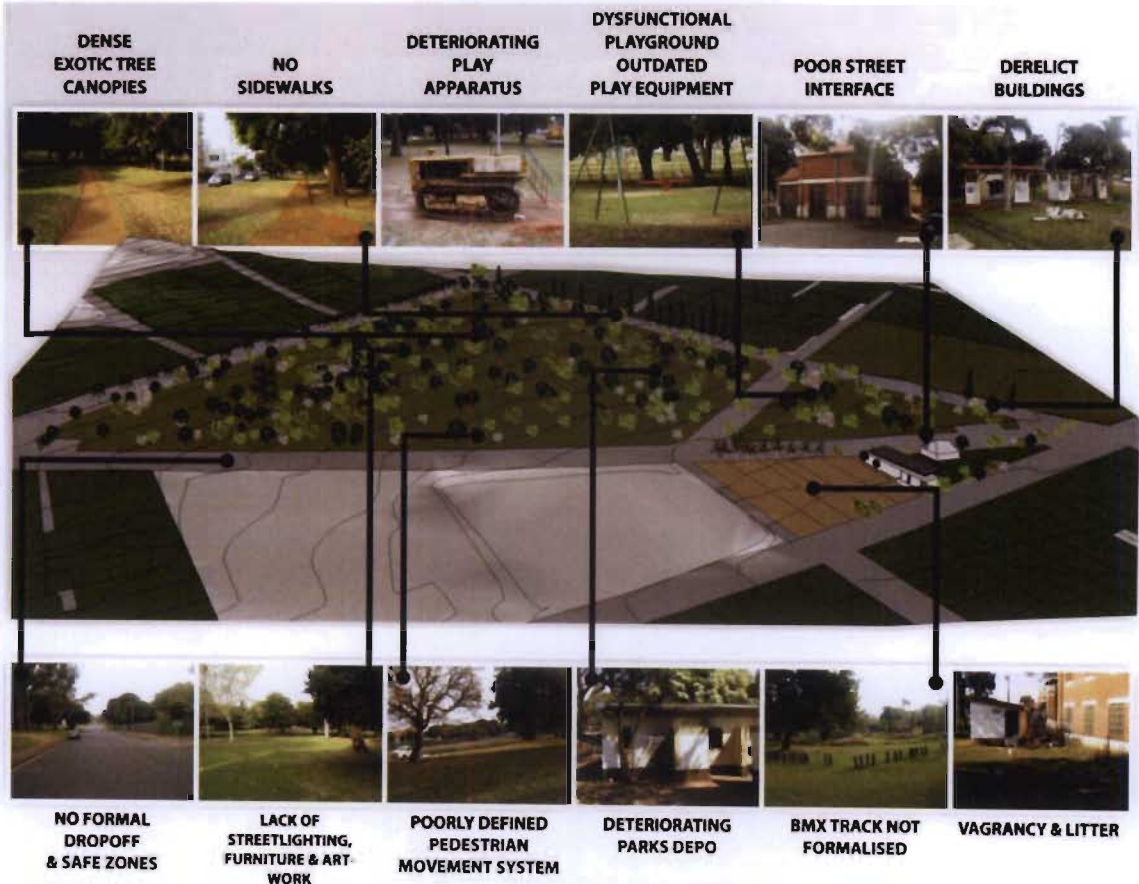


Figure 5 Shows existing status-quo of the context around the site, (Author, 2011)

has the beginnings of becoming an important art and cultural node in Durban. Whilst this is the case the entire Bulwer Park precinct is experiencing distress. The Park and its surrounds, ablution blocks and old parks department depot have deteriorated considerably over the years resulting in undesirable activities taking place (see Fig 4).

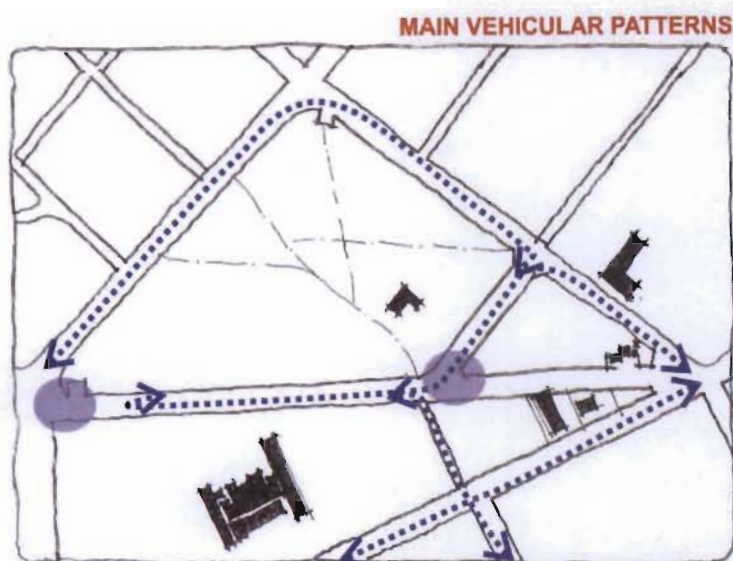


Figure 6 shows existing vehicular patterns,
Source: (Author, 2011)

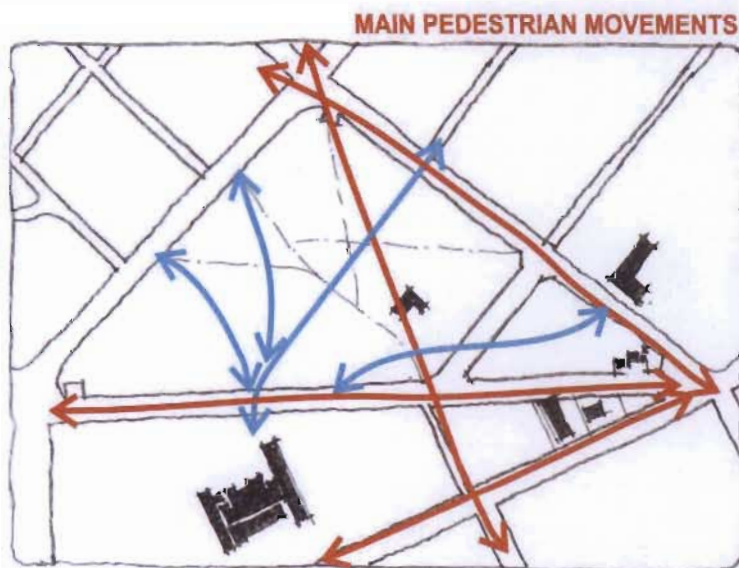


Figure 7 Shows existing pedestrian movements,
(Author, 2011)

The existing outdated play equipment has lost its appeal and the lack of proper ablution facilities has further added to the overall downward spiral of the Park. The lack of planning of parking facilities and clearly defined pedestrian movement paths has also contributed to the haphazard and inefficient design of the park. The situation is such that the nearby schools including parents do not allow their children to play in the Park. The very popular KZNSA gallery has also turned its back to Bulwer Park introverting its hub of activities. The overall result has been lesser visual security and policing of activities in the park making the precinct a very unsafe place for pedestrians and

general park goers. This negative status quo has implications on the future development of the site chosen for this project. Clearly the development site has the potential of adding a positive impact to the existing urban system solving a myriad of problems plaguing the area simply by attracting visitors. More people mean numerous activities resulting in improved visual security. Therefore it's imperative that the Children's Museum forms part of a broader urban design framework plan that integrates the various layers of movements, spaces, activities, opportunities and land uses. Figure 5 maps out the existing vehicular patterns in the area. The majority of the traffic generators are the school and the KZNSA gallery. The road networks immediate to the school are inadequate to respond to children. There is a lack of traffic calming interventions within the precinct taking cognizance of kid's movements. Moreover there is no demarcated drop off zones for parents or bus lay bys. In addition pedestrian

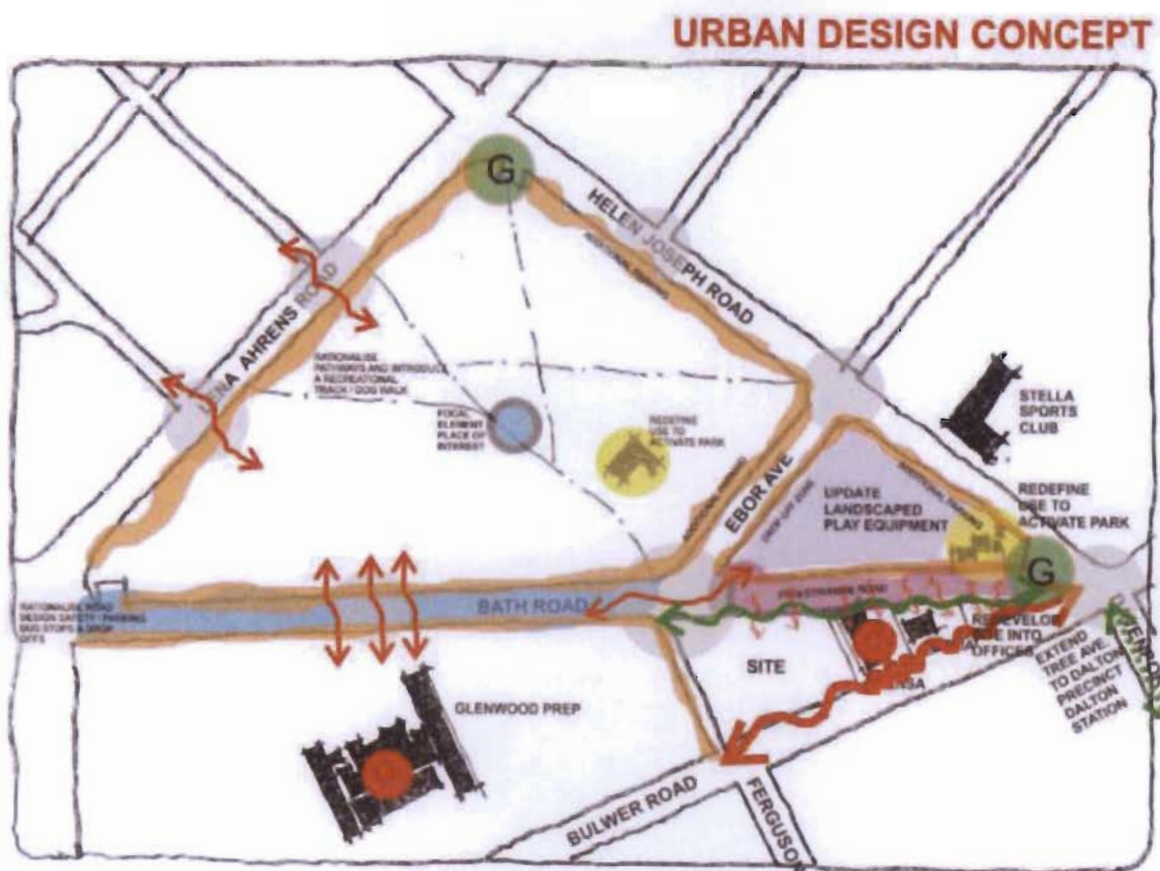


Figure 8 shows the Urban Design Framework Concept Plan, (Author, 2011)

movements are not clearly defined with apparent wear paths across Bulwer Park

remaining informal and dangerous. There are strong desire lines across Bulwer Park of school goers and people who travel on foot work in the surrounding neighbourhood (Figure 6). Overall the precinct falls short in responding to these patterns of movements. There are no proper sidewalks or safe zones for people to cross. Overall the precinct lacks a language and cohesion that responds to its most prominent users which are children. There is a visual lack of design of the public space that allows children to interactively engage with. Figure 7 shows the urban design framework concept proposed for the precinct and a more detailed urban design plan appears at the end of this document. The urban design concept emphasizes children responding to their needs being the most prominent users in the precinct. Firstly the framework plan suggests a realignment of the road network to facilitate a much smoother movement of traffic. Traffic calming measures are introduced at the major intersections in the form of textured road patterns in bright colors (Shown in grey in figure 7). This is complimented by similar paved areas at identified points of pedestrian crossings and movements. Bath road has been narrowed to slow down traffic and parking has been introduced on both sides of the road fronting the school, Glenwood Prep. A central median provides a safe zone for children crossing the busy road. The informal wear paths are to be formalised and connect important entry and destination points from the residential neighbourhood across the park. Additional parking and a bus lay bye to service the school and the proposed children's museum have been introduced. The gateway entrances indicated with a 'G' in figure 7 at the various entry points to the park have been clearly demarcated using special paving, lighting and landscaping.



Figure 9 shows the kinds of forms, street furniture and apparatus responsive to kids, (Landscape Architecture, 2006)



Figure 10 shows the urban design proposal for the development, (Author, 2011)



Figure 11 Form of the 'African Air Tree' identity for the park, social meeting space, (Author, 2011)

Similarly the language and design of the street furniture, artwork and paving responds to children (see figure 9). The existing play equipment found in the park has been updated and a landscaped playground replaces the existing haphazard arrangement. New landmark elements such as the 'African air tree' (see figure 10, 11), which not only gives the precinct an identity but responds to kids with child scaled seats and traditional games been introduced at its base. Children get to meet, socialize and play

on their way to and from school in the vegetated shade of the air tree. The air tree is a steel framed and meshed structure which facilitates the growth of vegetation around its canopy (see figure detailed plans at the back). The existing deteriorated depot building is to be replaced with a new facility that

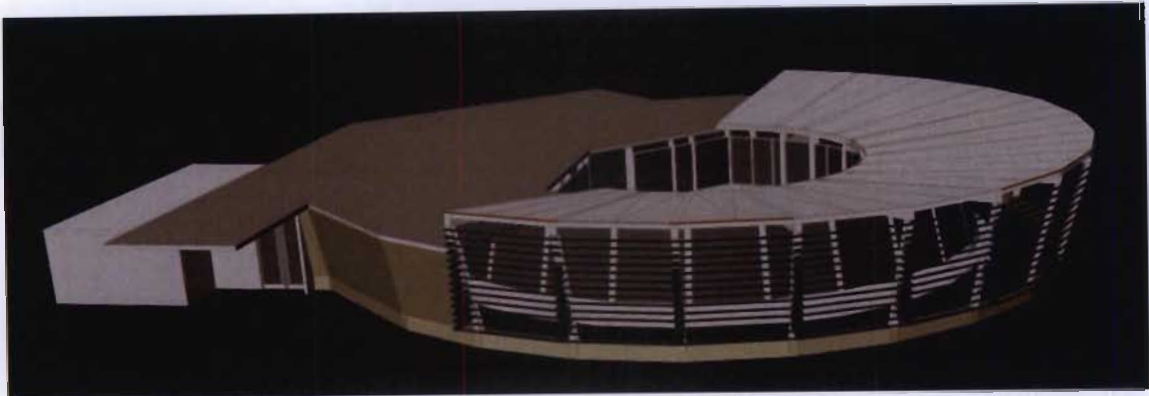


Figure 12 Shows the architectural form envisaged for the proposed reptile sanctuary, (Author, 2011)



Figure 13 Shows the plans of the proposed herb nursery, coffee shop and ablutions, (Author, 2011)

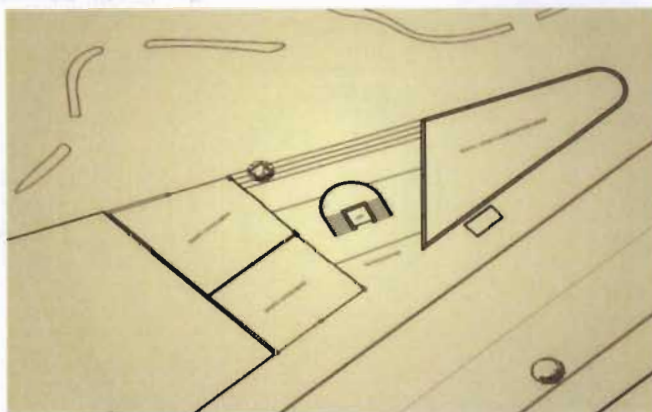


Figure 14 Shows the mixed use development on the greenfields site, (Author, 2011)

will appeal to the natural curiosity of children encouraging more and more visitors to frequent the park. The type of facility envisaged is a reptile sanctuary (figure 10, 12 detailed plans at the back) which from the research, children find fascinating. The scale of small reptiles and insects that can be touched and held in tiny hands

allows for a level of interaction that children find interesting. The left over parcels of vacant land are to be developed into mixed use activities that complement the children's museum and promote the precinct as an urban space that places children at the centre of development. The type of mixed use activities include a small

nursery as a stop-over for children whilst parents visit an organic nursery or while they

enjoy coffee in a converted historic building. The left over vacant parcels makes way for a mixed use building comprising of ground floor shops and first floor offices which respond to the needs of children (figure 14)

2.5 Design Concept

The concept for the design of the children's museum is based on the idea of 'PALAVER' which in African culture is a traditional place of gathering in the shade of a prominent tree canopy somewhere in the village where villagers get to be heard, wherethey are able to express themselves freely without prejudice on life and on village problems. This



Figure 15 Palaver tree in a traditional African village, Source: Google images, 2009



Figure 16 Socialising under a tree in the African landscape

concept is not a new idea and goes back to ancient African traditional life whereby in every village there stood the "Palaver Tree". The following quote aptly captures the essence of the concept of Palaver which is the underpinning design generator for the Children's Museum proposed for Durban –

"Since Kwasi was a child and his father and grandfather and, yes, great- great-grandfather Kwasi and all his village lived collective communication in the cool shade of the sacred boabab or mango trees in their villages. Beneath the palaver tree misunderstandings were resolved and critical community issues were discussed under the direction of the village elders. Villagers explained points of view and together, through group consensus, reached a final decision. But the palaver tree stood for more than group discussions and problem solving: it

was the place of the festivals, the harvest celebrations and where the traveling storyteller would set up his camp in the evening to spin the tales of a place & time far off and free from the worries of rural farming Michael Land, 1992(Source: www.cc.gatech.edu/elc/at/quote.html)

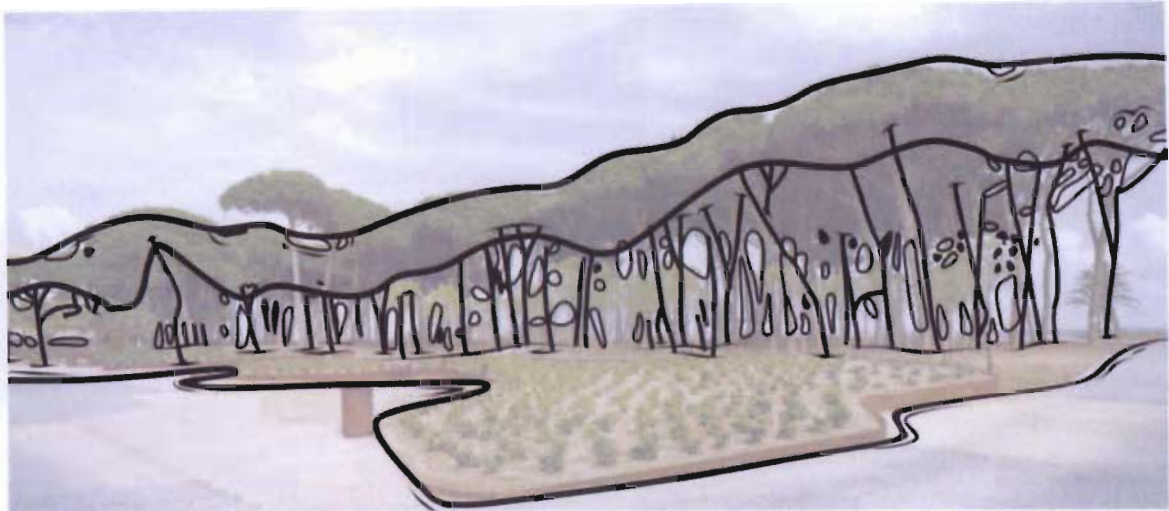


Figure 17 Conceptual sketch showing the exploration of form of a tree canopy with dappled light filtering through, (Author, 2011)

The concept builds on this idea drawing from the existing context of the site specifically Bulwer Park which fronts the site for the children's museum. The Park is a dense abundance of tree canopies, similar to the image, such that the trees have almost roofed the entire park. It is amidst this dappled light that people enjoy the park, walking, exercising, socializing and it is where children play and learn and people recreate. The concept underpinning the design for the children's museum interprets this idea of a Palaver Tree to mean a roof of a building under which freedom of expression and exchange of ideas can take place. Hence the form of the building draws on clues from the majestic baobab of Africa, the elegance of the *tenere* tree and the qualities of a forest canopy. Considering the close link between children and nature and the ways in which children learn from the environment, the imagery and qualities of a tree is an appropriate response in creating a place meant for children. Moreover, the changing qualities of light through the leaves of trees are a subtle but most effective sensory experience which the design of the new children's museum tries to capture. Figure 17 is a conceptual sketch exploring the idea of dappled light filtering through a tree canopy

and an expression of the organic form which inspired the roof of the proposed children's museum.

In parts of Africa, unlike western ideologies the museum is richly connected to the people and to the communities in which they exist. In fact it's safe to say that the museum experience was part of everyday life and this is clearly demonstrated in the Niamey Museum in Niger. In this example people interact with the museum and its exhibit in the course of their daily lives. Located in central Niamey, people have to pass through the museum on their way to work or to town or down to the local market. On their way they interact with the proud Taureg Tribesman dressed in traditional garb and take time to look at their artwork, beads and traditional weapons. Along the route daily pedestrians get to listen to traditional songs been sung and to see how traditional things are made, and get the opportunity to purchase them. Even the buildings in the museum have been built in the ways of the ancestors re-creating a sense of the traditional village way of life. Of course this scene is incomplete without the 'Palaver Tree' where there is always some discussion taking place. (Toucet in Unesco, 1973:36).

This idea 'PALAVER', effectively resonates Cleaver's (1992) view that *"museums are about somebody and not about something"*. Building on this idea of PALAVER it became clear that the tree was an appropriate design generator for the form of the proposed children's museum. Designing for children is highly complex because the designer needs to respond to different age groups and multiple intelligences (White, 2004) in a Children's Museum. The concept is also informed by the way in which children learn. From the research it has also been established that without a doubt children learn through play (Harris et al, 2003). What many perceive as children being naughty is actually children learning about the environment around them. Researchers have found that children responded positively to fluid soft curvilinear forms as opposed to angular forms or lines (White, 2004).. Whilst the focus is primarily on meeting the desired needs of children adults should not be excluded. One of the critical ways in which children learn is by watching others. Therefore activities and places of interest to an adult audience must be included in the design. Also important is the way spaces are

planned. It is important that the transition of the various spaces and activities is seamless and children can navigate through their environment with much ease.

3.1 Brief

The Brief is to provide the community of Durban with a museum that places children and community at the centre instead of artifacts. It must be a space that is in keeping with current trends in the field of museums globally and provide the community with a fresh new experience whilst at the same time be a contextual response. The facility should respond to how children envisage their world and how children learn through play and how this could be interpreted into architecture and spaces. The building should add value to the community and inject a fresh image that promotes new ideas and ways of interacting and socializing with one and other.

It should be a place for everyone a meeting place of different people and children under the canopy of one roof. In other words the product should not just be a museum but a place that is the community. It is important that the building is sensitive to the environment and makes use of alternate materials and methods of construction in its conceptualization. The museum should focus relevant issues of humankind and caring for the environment. Most importantly the kinds of spaces envisaged should take cognizance of multiple intelligences catering for a broad spectrum of users and especially to the different growth stages in children.

3.2 Accommodation Schedule

Groundfloor

- Visitors Waiting Area 12 sqm
- Entry Temporary Display Area 27 sqm
- Reception 6 sqm
- Permanent Display 12.5 sqm
- Paleontology Display permanent 88 sqm
- Temporary exhibit in Foyer 40 sqm
- Ball Pen play area for children – 16 sqm
- Mega Book Zone – 80 sqm
- Free play and Reading Space – 80 sqm
- Storytelling 36 sqm
- Diorama – 60 sqm
- Internal free zone landscaped courtyard 116 sqm
- Flexible exhibit / Public Interaction 100 sqm
- Flexible exhibiton space 35 sqm
- Coffee Shop, kitchen and public eatery 85 sqm
- Museum Shop 80 sqm
- Museum Administration Wing 84 sqm
- Parents Lounge 36 sqm
- Open Planned flexible exhibition space for younger children 150 sqm
- On Site Medics Office 6 sqm
- Flexible Display – Sensory Zone 15sqm
- Nature Exhibit Volumetric Space 380 sqm
- Organic Kitchen and Eating Space 90 sqm
- Outside Restaurant 110 sqm

Firstfloor

- Computer Stations 60sqm
- Open planned classroom 60 sqm
- Magazines and Comic Books 50sqm
- Library older children 130sqm
- Imaginary and Pretend Play Zone 200sqm Open Planned Divided as Needed
- Earth Exhibit 300 sqm
- Science and Technology Exhibit 200sqm

Second floor

- a) Exhibition Space for Mature Audience 300sqm
- b) Kids Party Venue 100 sqm
- c) Auditorium 150sqm
- d) Feature Exhibition Space
- e) Arts and Culture Hands on Activities Pottery etc. 280 sqm
- f) Cultural Exhibition Space 140sqm
- g) Peoples Exhibit 200sqm

- Ablutions on all floors 75sqm
- Storage in Basement 220sqm
- Landscaped Courtyards 350sqm

3.3 Space Planning, Circulation and Form

The space planning responds to the way children navigate through their world using their senses and most importantly responds to the need for safety and comfort. It also responds to the contextual location of the site and builds on the idea that the museum is the community. Therefore the museum is designed such that the transition between the different activities is seamless through an open planned arrangement of flexible spaces. The building is designed on an axis of two entrances, capturing people from across Bulwer Park and the street edge overlooking Bulwer Road. In this way the building responds to its context by allowing its core to be penetrated exposing the museum to

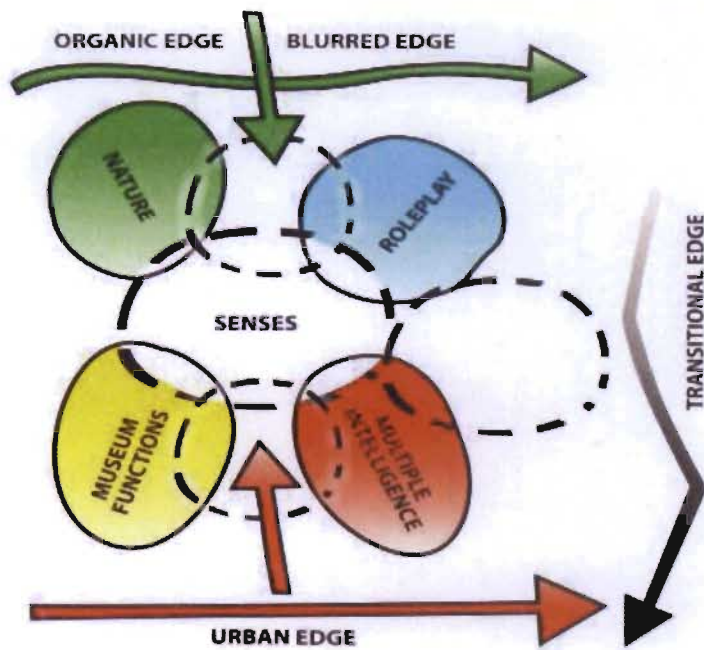


Figure 18 shows the design generator for the childrens museum

the everyday pedestrian. In this way the Museum responds to its community making it part of everyday life. Public spaces that activate edges have been located on the street facing Bulwer road and spilling into the internal courtyard spaces.

Within then central core public activities take place in the form of a coffee shop and an

interactive zone encouraging children to explore their surroundings. This axis is penetrated by a circulation pattern that divides the building creating four main zones of activities which are the galleries, Roleplaying, Multiple Intelligences, Functional Zone and Nature Exhibit. These galleries are structured to respond to the different types of activities that children engage in when they learn through play. The spaces in between

become landscaped courtyards and zones of expression and freedom of activities. Children are free to manipulate these spaces and to choose the activities that interest them the most. This is facilitated by an open planned transition of spaces with clear

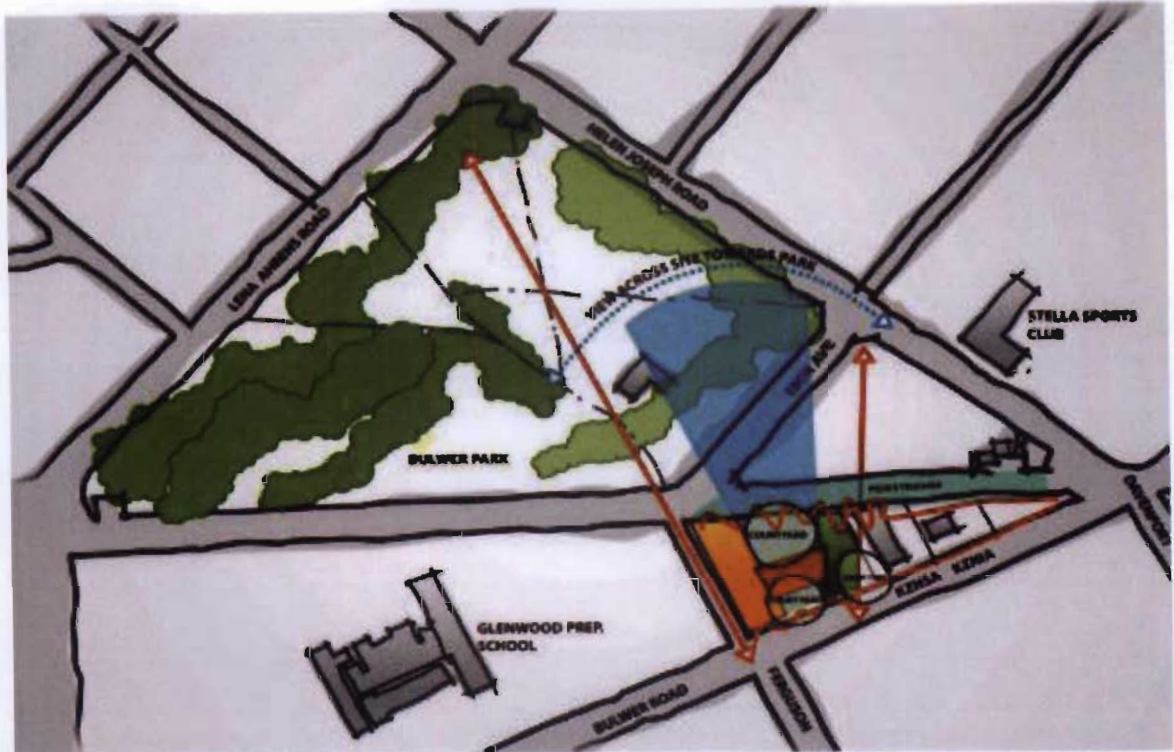


Figure 19 Shows the way the building responds to its site and context, (Author, 2011)

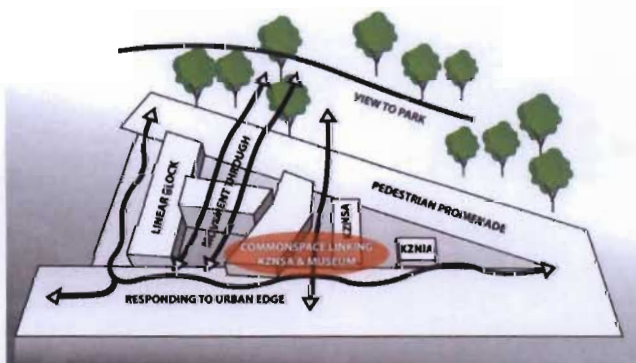


Figure 20 Shows the conceptual development in response to its context and the form of the building , (Author, 2011)

sight lines between the various activities. This arrangement takes place horizontally as well as vertically with the upper floor being penetrated with volumes that overlap and overlook activities below. So at any point children have a clear view of all the various activities taking place around them including the outside world. The form of the building is curvilinear with rounded edges to respond to children as opposed to sharp angular

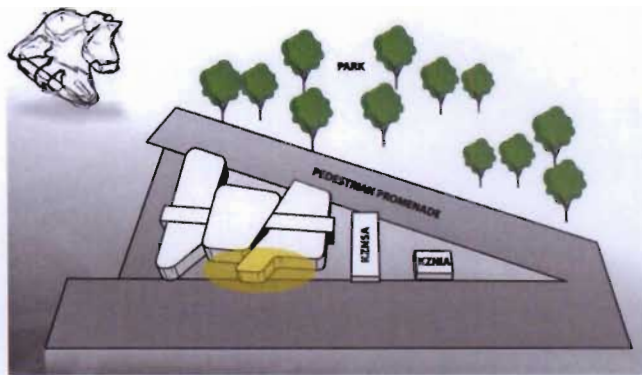


Figure 21 Conceptual development showing the rounded and curvilinear forms and circulation, (Author, 2011)

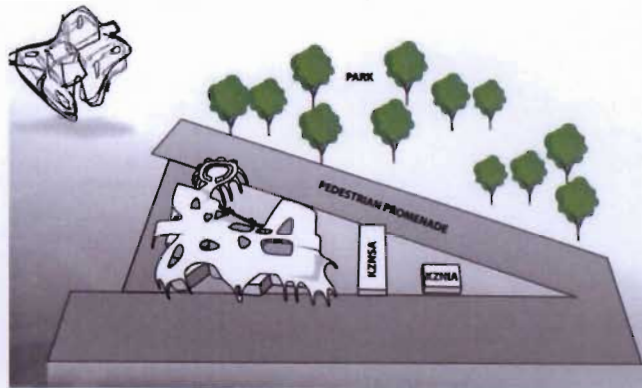


Figure 22 Showing the conceptual form of the roof inspired by the canopy of trees found in Bulwer Park opposite the site, (Author, 2011)

forms. Moreover the building responds to the natural rounded forms of an African context. Their shape represents the trunks of the majestic trees found in Africa and responds to the existing trees in Bulwer Park. The roof canopy has been formed to emulate the idea of a tree canopy (see Figure 20), with portals to allow light penetration of organic shapes similar to those created by trees in nature. These light wells filter light through the portals on each floor. The organic shapes of these light wells were inspired by the shapes created by dappled light and shadows as it filters through the leaves and branches of trees.



Figure 23 & 24 Computer model exploring organic roof canopy, (Author, 2011)



4.0 Environmental Performance

The building responds to Durban's hot climate in a number of ways. It is orientated on a slanted North South Axis so it enjoys good climatic conditions throughout the day. There are two major volumetric courtyards which are landscaped with indigenous tree inviting the green around it into the building. These courtyards act as climate modifiers cooling down any hot air entering into the building. In addition the East and West elevations have deep overhangs that protect the sides of the building any heat gains. On top of the roof are four protruding ventilated skylights that allow an escape for hot air. These also allow cool breezes into the building. The idea is to use simple methods to create a building that responds to its climate which goes back to looking at the way our ancestors responded to their climatic conditions. The scale of the building is in harmony with the majestic trees of the major green space which it fronts. These trees also act as climatic modifiers reducing the heat on the building itself. In fact the building compliments the park by virtue of its articulated elevations to represent tree like structures. Elevations on the West and East have small windows and those on the North and South have expansive glass. The climatic response of the building is based on the notion of simplicity in responding to the environment. This is the kind of knowledge that is important to impart to children, that good climatic design could be achieved through clever use of courtyards, ventilation stacks, volumetric spaces and orientation.

5.0 Technical Resolution

The building employs traditional methods of construction which is durable and has been used effectively for many years. The **roof is a Ferro** cement material that was used to construct boats and sub-marines and due to its higher steel to concrete ratio is 100 per cent waterproof. The reason for this choice of material is that its method of construction allows freedom in creating organic forms such as the one envisaged for the design of the childrens museum. It allows the material to be sculptured to create free forms without the need for formwork or shuttering. The method of building with Ferro cement

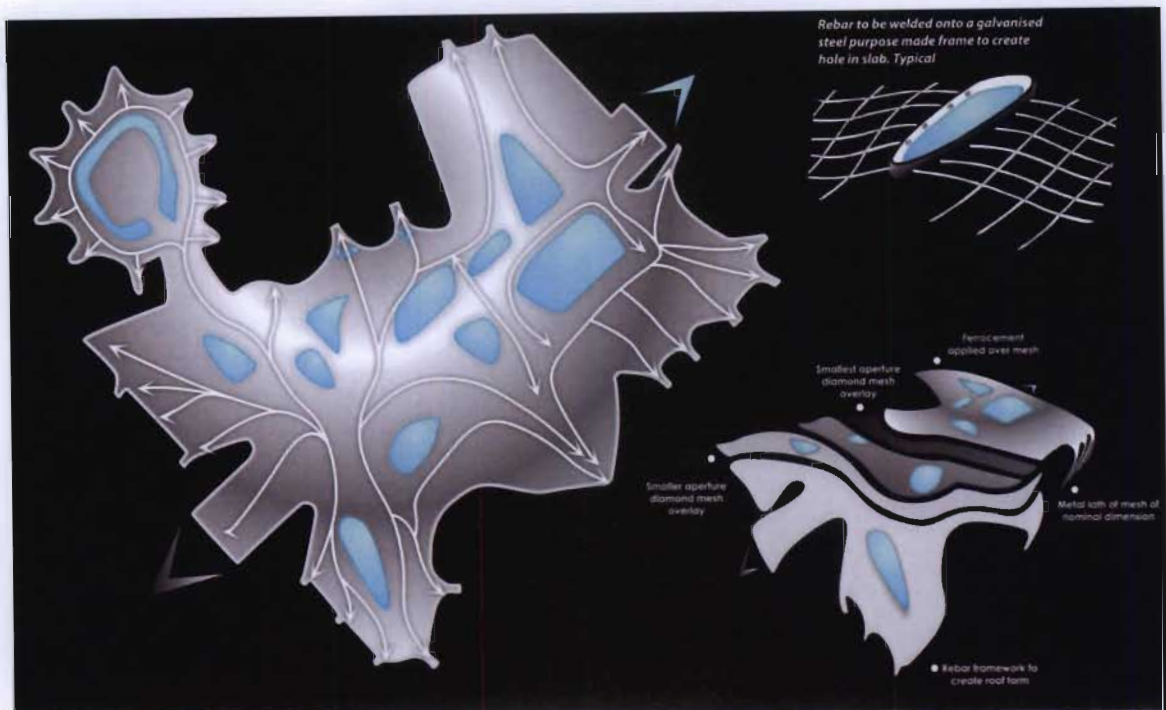


Figure 25 Shows the ferro-cement method of construction, (Author, 2011)

is labour intensive but it is a sustainable technology requiring almost no maintenance at all if constructed correctly. The method of construction is very simple utilizing a layering of different dimensions of re-enforced steel bars combined with wire meshes to create the shape of the roof. This network of steel and mesh is then cemented over with a concrete and volcanic ash mixture to give it strength. The nature of the material and method of construction allows for very little support in terms of load bearing walls or columns. The exterior walls of the building are conventional brickwork with ruled joints and a diamond pattern over.

6.0 DESIGN DRAWINGS



Architect: Bilal Haq
 Date: 2017
 Location: Doha, Qatar
 Project: Urban Design Concept
 Scale: 1:1000



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 Date: 2017
 Location: Doha, Qatar
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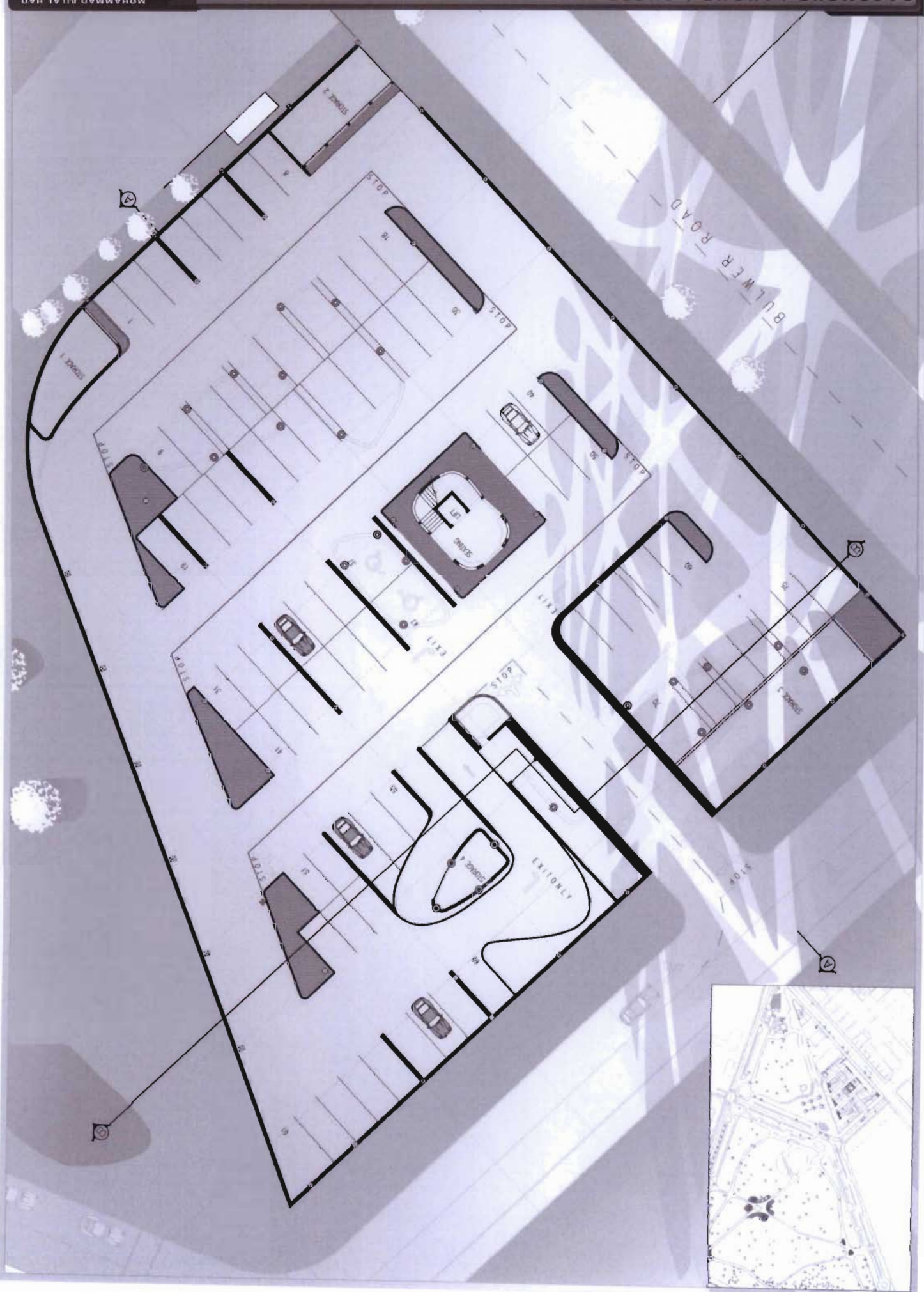


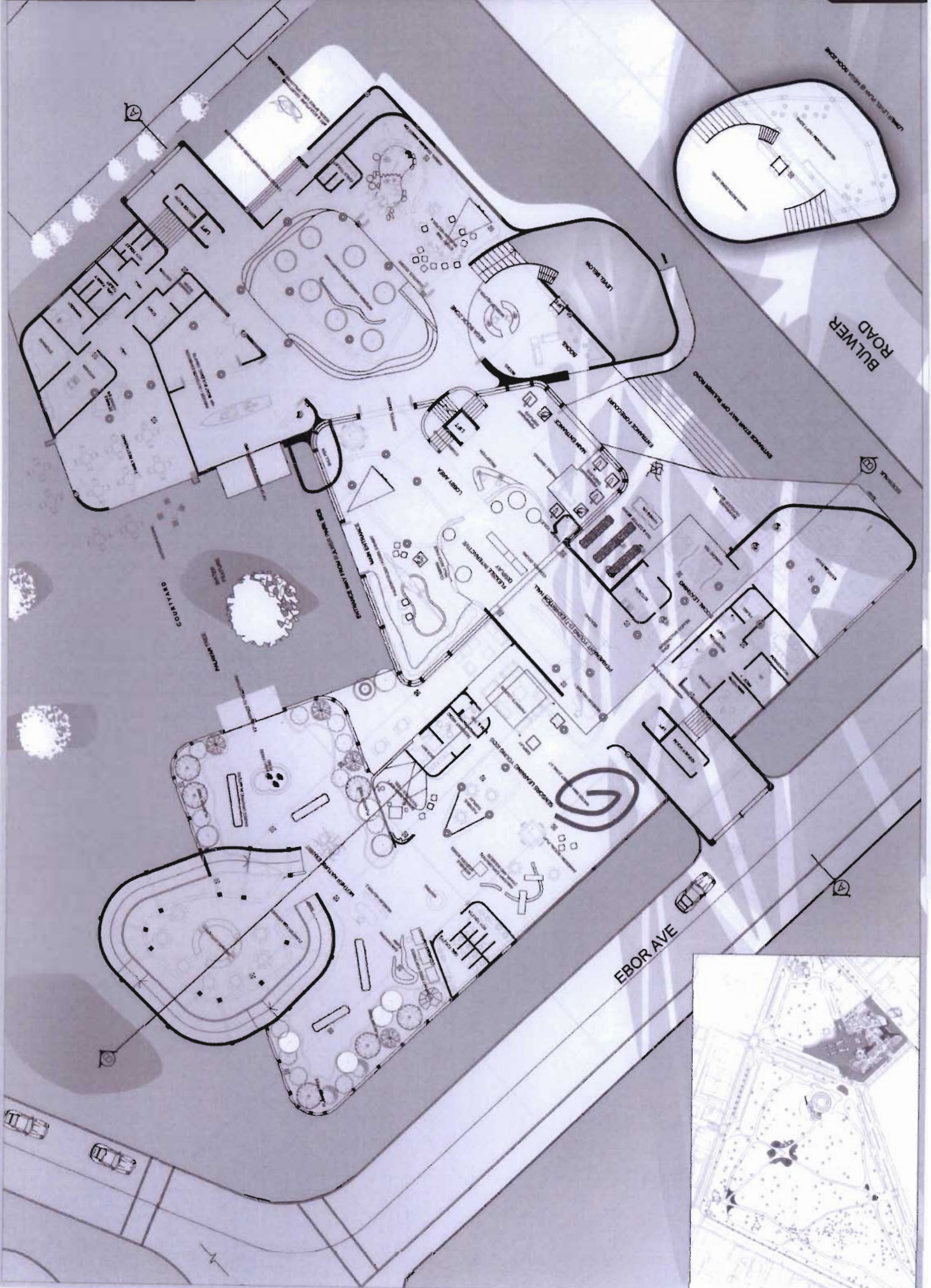
Architect: Bilal Haq
 Date: 2017
 Location: Doha, Qatar
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 Scale: 1:1000



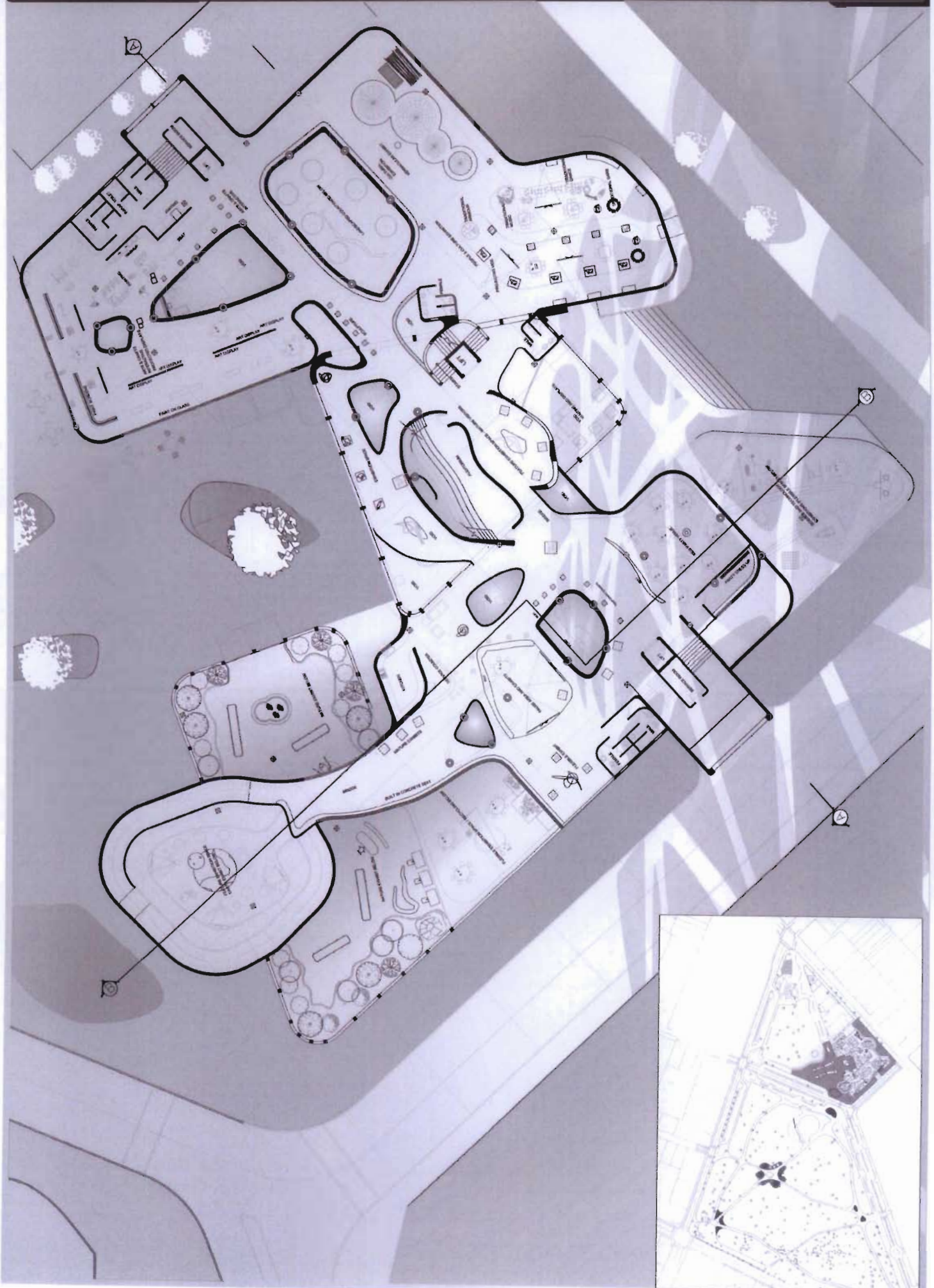
URBAN DESIGN CONCEPT 1:750

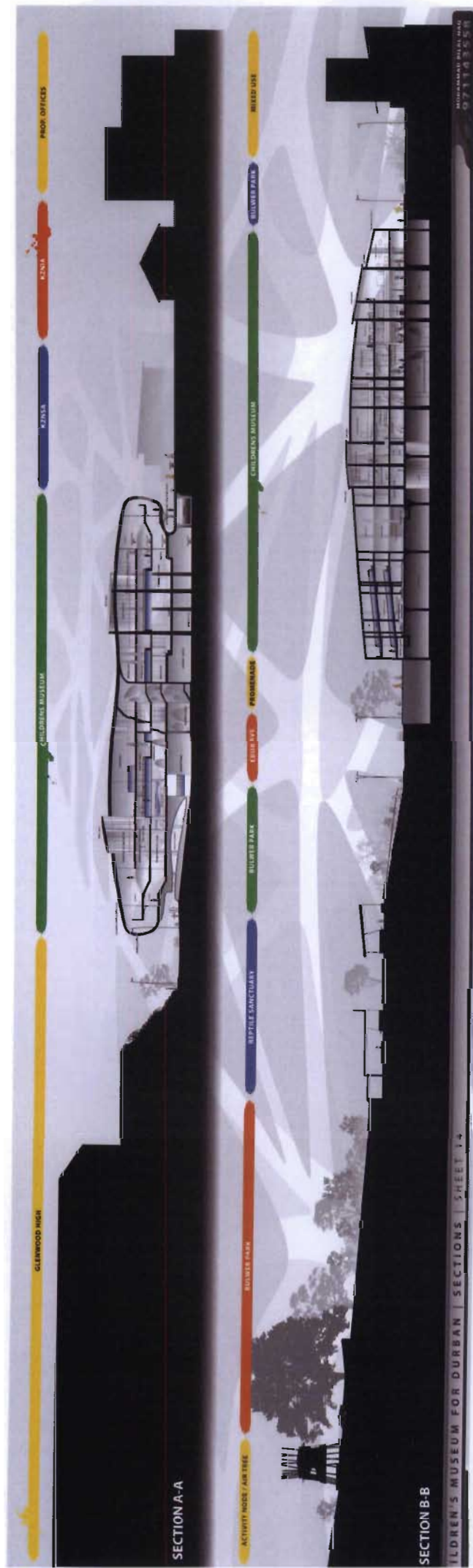












BULWER PARK MIXED USE BULWER ROAD CHILDRENS MUSEUM PROMENADE ERDOR AVE PROMENADE

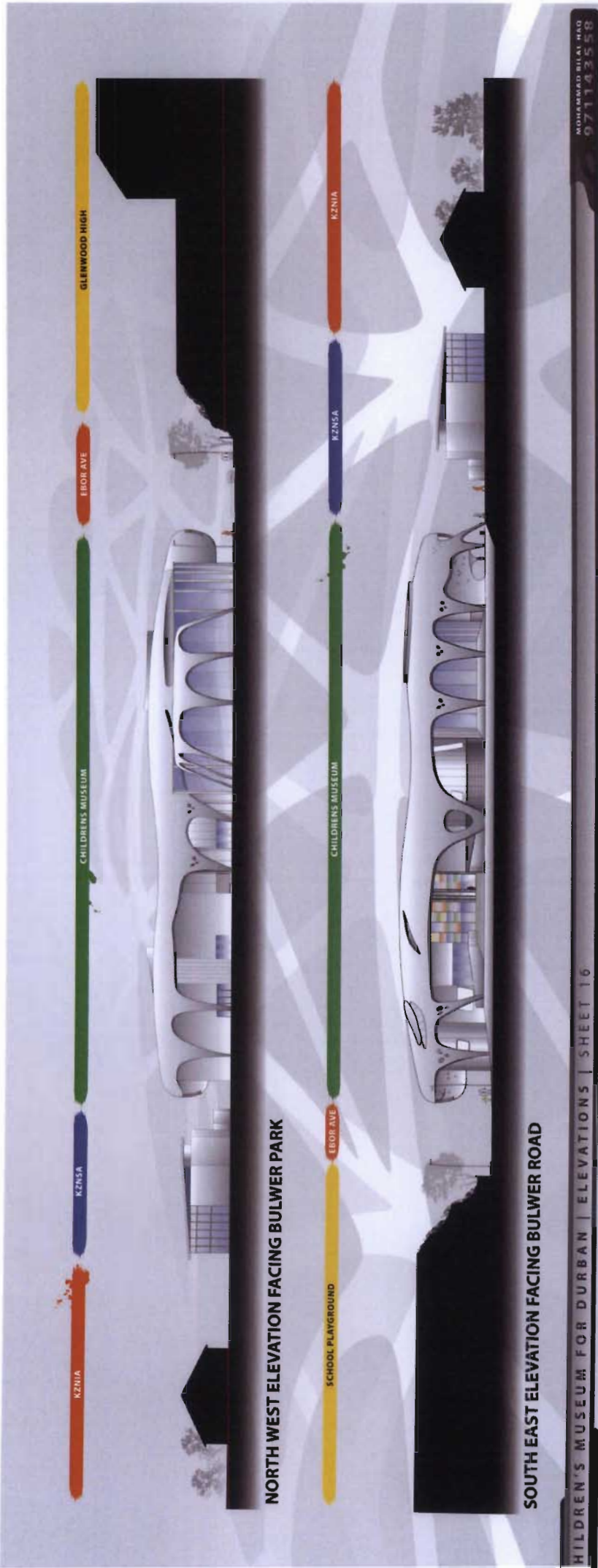


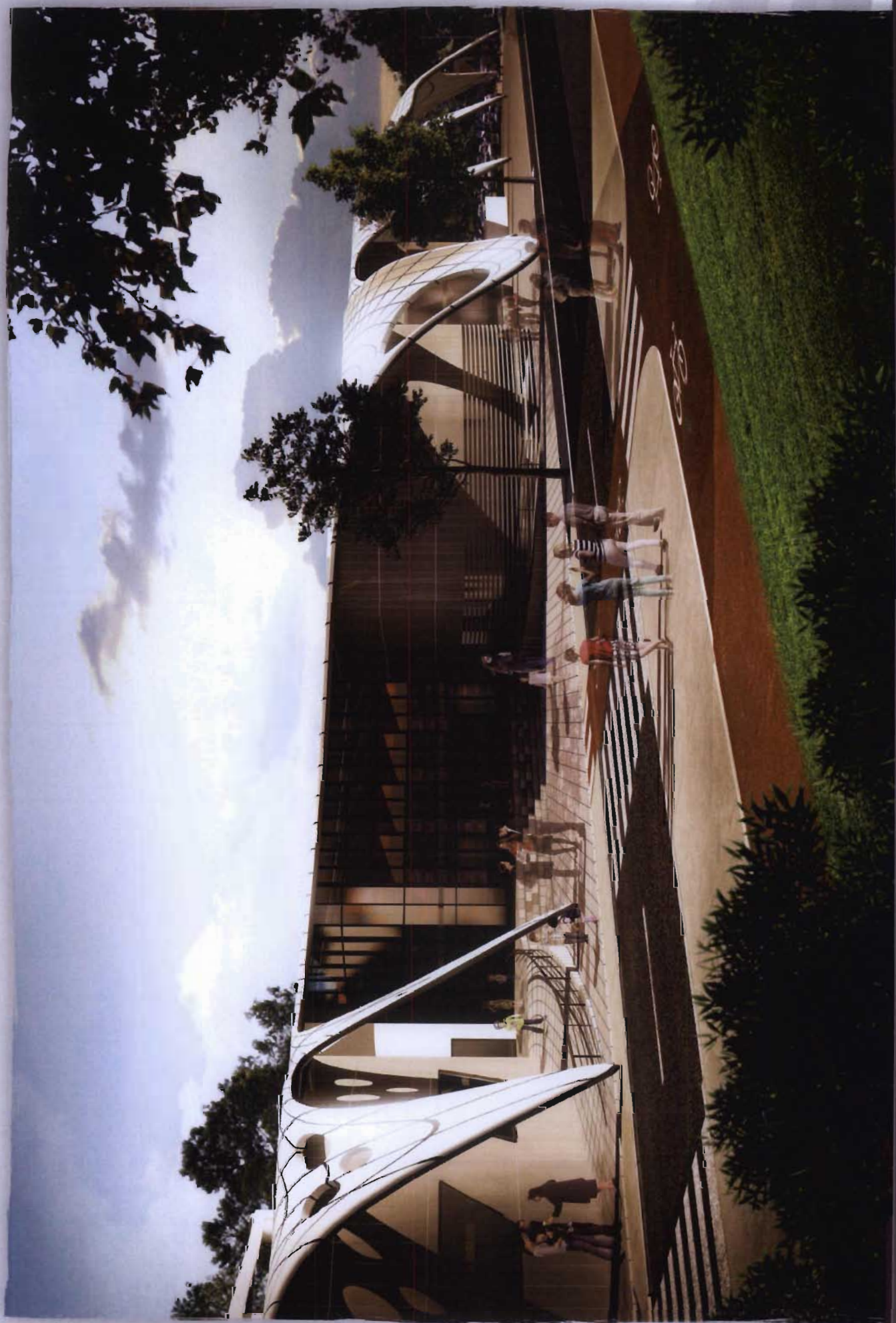
SOUTH WEST ELEVATION FACING BATH ROAD

MIXED USE BULWER ROAD CHILDRENS MUSEUM PROMENADE BULWER PARK REPTILE SANCTUARY



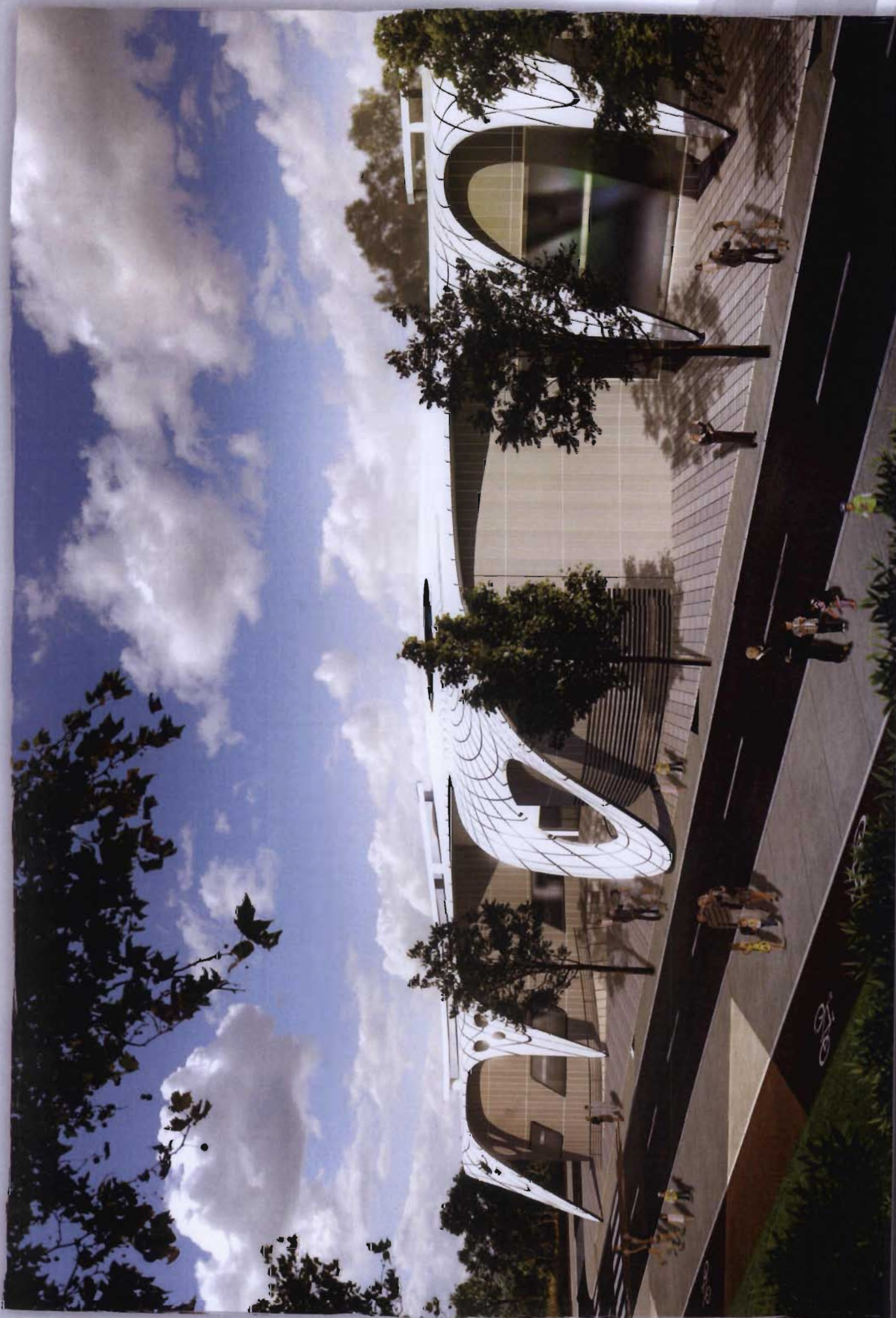
NORTH EAST ELEVATION FACING KZNSA

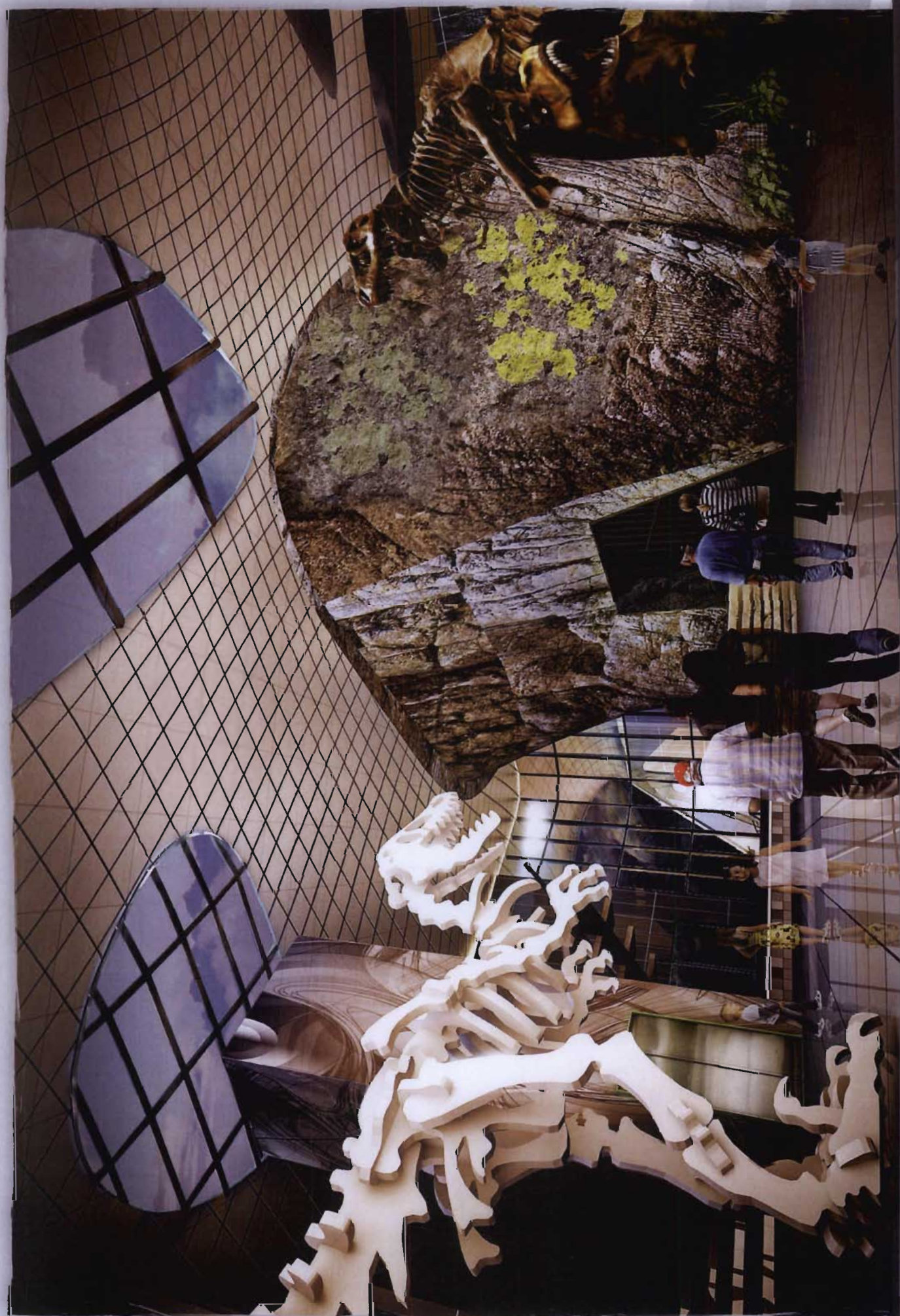








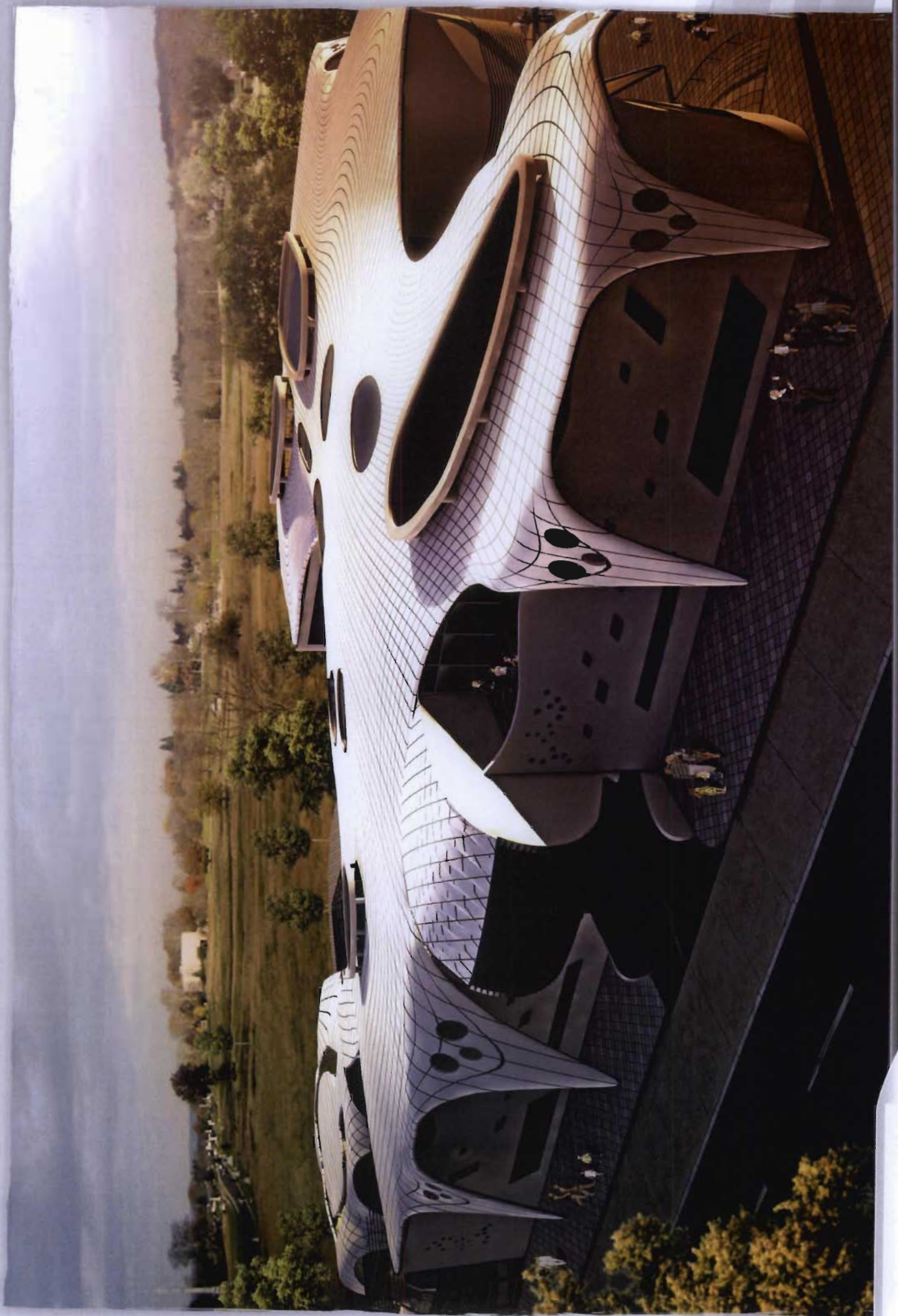




MOHAMMAD BILAL HAQ
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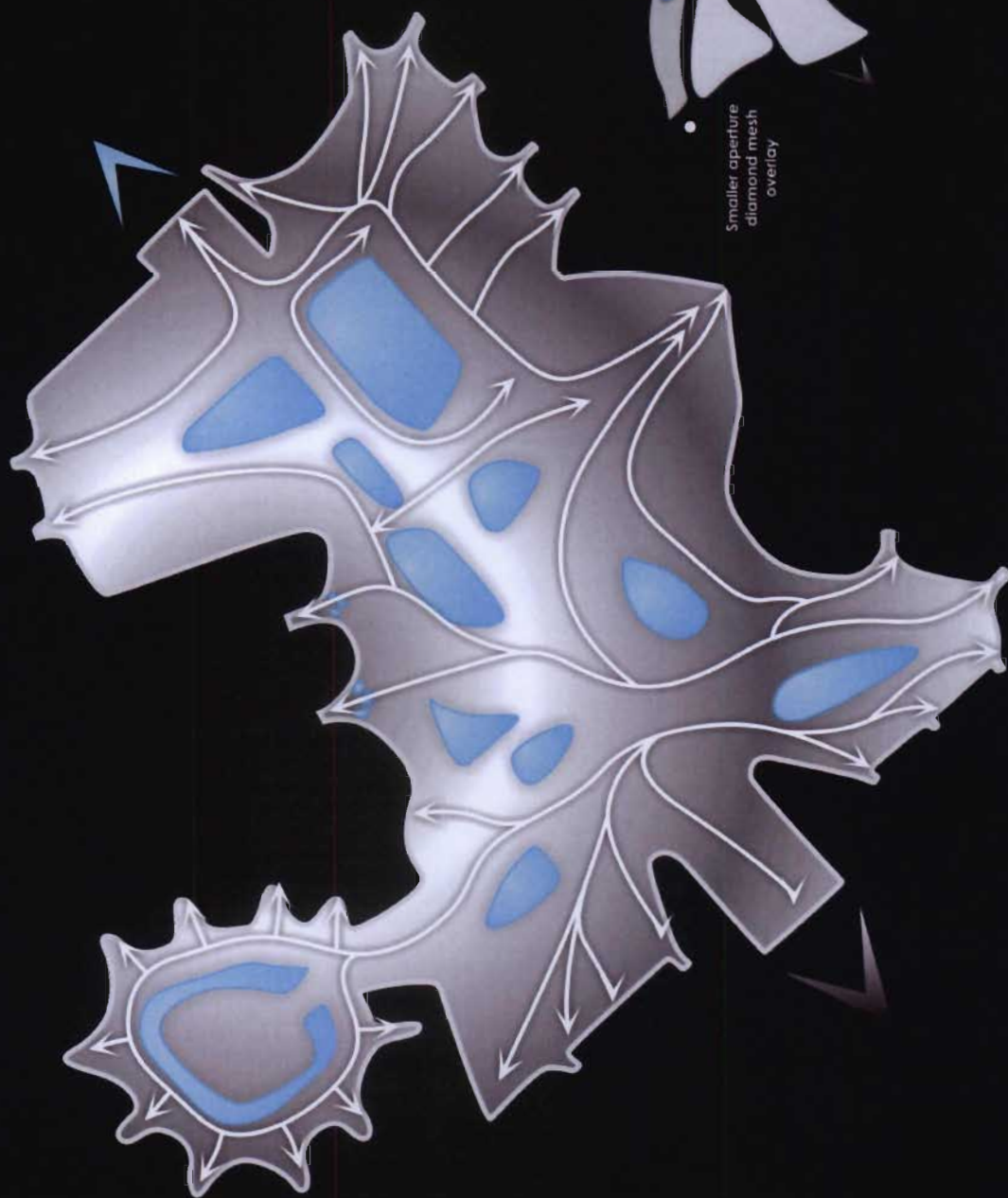


3D RENDER | Transformation of Museum Architecture in South Africa : "A Childrens Museum for Durban"



3D RENDER | Transformation of Museum Architecture in South Africa: "A Children's Museum for Durban"

Rebar to be welded onto a galvanised steel purpose made frame to create hole in slab. Typical



Ferrocement applied over mesh

Smallest aperture diamond mesh overlay



Metal lath of mesh of nominal dimension

Smaller aperture diamond mesh overlay

• Rebar framework to create roof form

Ferrocement is a thin material in strength of construction and has been used for centuries. Since the 1800s French architect Joseph Monier was experimenting with concrete as a framework for glass walls and simultaneously the technology and method of construction was becoming popular in France (Adams, 1977). Interestingly the technology was first used by a farmer named Joseph Monier and Jean Louis Lambert both working independently, were experimenting with ferro cement. Monier used the material to produce flower pots and sturdy garden furniture, whilst Lambert was building ferrocement bridges which he patented (Adams, 1977). Lambert's method of construction has not changed which shows he pioneered it in the 1800s. He distinctly used two different thicknesses of wire which was woven together and embedded in mortar (Image 1 (Adams, 1977)). At the time ferrocement was used as a cover for applications ranging from building of cargo ships, water storage tanks, bridges, walls, roofs, and roads. It was used in Italy and even submarines. Ferrocement is 15 feet long with thickness of 34" have proved themselves popular and successfully worldwide. A boat made from ferrocement in 1887 still floats today in the Amsterdam Zoo attesting to the durability of this material.

WHAT IS FERRO CEMENT?

Ferrocement is a super reinforced concrete. It differs from conventional concrete in that there is a higher ratio of steel to cement mortar. By strength the cemented steel mesh is actually stronger than the concrete itself, which exhibits properties superior to either steel or cement separately. Ferrocementing uses many of the properties of steel and yet it is not as strong as steel. Although it looks and feels like concrete it can flex without cracking. The typical strength of closely spaced structural ferrocement is that creates a composite that differs greatly from conventional concrete. Due to the close spacing between 25-50mm and the small size of the reinforcing it is possible to create very thin sections. The nature of the reinforcement in this method of construction requires mostly very fine mesh and rather than forming the ability to create complicated shapes (American Concrete Institute, 1977). The many ferrocement buildings and have been used with use as a result of experience in the field and not based on theoretical analysis, having seen such countries such as Australia, New Zealand and the United Kingdom have existing ferrocement construction as part of their building codes. In developing countries ferrocement has been very important in the building of low cost houses and making of steel wood. Rice, bamboo and bulk stock have been used in ferrocement. An important characteristic of ferrocement structures is constructed correctly is 100% waterproof and can withstand natural disasters such as earthquakes and cyclones (Structural Faults and Repair Conference, 2006).

BUILDING PERMITS FOR FERRO CEMENT STRUCTURES

As mentioned above many first world countries have accepted some cement buildings but in many developing countries like India, Philippines, Malaysia, Brazil and the Pacific, ferro cement engineers and architects in a part of the norm. This is because since ferro cement is considered groundbreaking achieving thin sections and chemical settings. It is sometimes referred to as applied concrete and it exhibits the strength and durability superior to that of standard concrete or steel. Obtaining permits for such structures is not impossible. There are a number of engineering firms that specialise in ferro cement construction, such as Ferro cement structures dedicated to research and development in making the technology better (see www.ferrocementindia.com).

WHAT ARE THE MIXING PROPORTIONS

Depending on the type of the building to be built, mixtures may differ accordingly due the following proportions have been used and tested as achieving best results (Source: www.ferrocement.com). The dry measure proportions are three parts of cement, 1 part of sand, 1 part of 1/2 inch to 1/4 inch in size with 1/2 inch of water. The mixture requires a consistency that is like dough when the surface with the wire from only settles slightly. To test for strength, a slump test needs to be carried out. The speed at which a line drawn 2-3cm down the surface collapses is a good indicator of how much of water to cement ratio is in the mixture. Spaced widely pictures are ultimate strength of the concrete. Adding more dry materials in proportion to water can really thin (Source: www.ferrocement.com). Ferro cement gets its name because there is more steel than concrete. In some countries due to rising costs in steel other materials such as cotton, flax, hemp and jute replace steel in the construction. Due to the small fiber spacing the overall strength increases.

Just as in conventional concrete construction ferro cement takes 28 days to cure chemically. In wetter climates acrylic is added to the ferro cement mixture to give it better waterproofing qualities. Other materials that are sometimes used are volcanic ash and gravel.

ADVANTAGES OF FERROCEMENT

Ferrocement structures have several advantages over those constructed of timber or standard reinforced concrete. Strength and flexibility are most obvious. Great strength contributes to the following three: 1) Reduction of maintenance, to almost zero; 2) Redundancy for structural insurance; and 3) Multi-element longevity. All these advantages are totally dependent upon good methods and materials. A qualitative advantage is increased design freedom gained by easy use of curvature as well as straight lines. The artistic spontaneity of Javier Senosiain's bioarchitecture illustrates a type of design freedom and zest for life which only ferrocement can provide. Here is his design known as "Blondie" (sharp). Source: www.ferrocement.com.

FERRO CEMENT SECTION

Image 6 shows a gnd of reinforcing steel bars surrounded by two layers of welded wire. Metal lath is in grey of 1.25 cm, also chicken wire could achieve the same effect. The outer layers hold the wet plaster and provides the strength.



Image 1 - Lambert Construction Method. Source: Ferrocement Building with Cement, Sand, and Wire Mesh.



Image 2 - Ferrocement Roof Construction. Source: www.google.com.



Image 3 - Ferro cement structure. Source: www.ferrocement.com.



Image 4 - Plaster grid prepared for ferro cement to be applied. Source: www.ferrocement.com.



Image 5 - Javier Senosiain's bioarchitecture. Source: www.ferrocement.com.

Smallest aperture diamond mesh overlay

Smaller aperture diamond mesh overlay

Metal lath of mesh of nominal dimension

Rebar framework to create roof form

Rebar to be welded onto a galvanised steel purpose made frame to create hole in slab. Typical



