e x t e n d i n g
sites of education

patterns for adaptable shared facilities
to upgrade existing schools

M. Arch. (Prof.) Dissertation
2015
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Acknowledgements

I gratefully acknowledge the financial support of the National Research Foundation (NRF) of South Africa, and thank the Department of Architecture, University of Cape Town for the award of a Departmental Scholarship. The contents of this document are my own opinions and do not necessarily reflect those of either of these bodies.

I would also like to offer my sincere thanks to the following:

Melinda Silverman, my supervisor: for your level-headed support, guidance and encouragement throughout this year.

Professor Iain Low and Fadly Isaacs, my co-supervisors: for inspiring and challenging me in my architectural endeavours, and for taking such an interest in my greater education.

Heather Martin, our administrator: for the quick chats in the hallways and encouraging smiles at assignment submissions.

The printing team: for your patience and care for our well-being beyond archi-school.

The cleaning team: for your friendly greetings and your readiness to lend a helping hand with carrying oversized models.

Architectural professionals, for offering your insights and expertise:
Nicky Irving of CCNIA, Kobus van Wyk of GAPP Architects, Jacqui Perrin of NM Associates, Clint Abrahamse previously of CS Studios, Tiaan Meyer of Meyer and Associates.

Staff at the schools, for sparing the time in your busy schedules to show me around the school campuses, answer all my questions and offer invaluable insights as to how to improve the quality of schools:
Bonteheuwel Secondary, Cedar Primary, Fairmount Secondary, Montagu's Gift Primary, Parkwood Primary, Siyazingisa Primary, Southern Suburbs Community College, Usasazo Secondary, Uvuyolwethu ECD and Wesbank No 1 Primary.

My family, friends and fiancé: for taking such an active interest in my work; for your constant love, support and encouragement.

Declaration

This dissertation is presented as part fulfillment of the degree of Master of Architecture (Professional) in the School of Architecture, Planning and Geomatics, University of Cape Town

19 October 2015

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Contents

Abstract

E x t e n d i n g sites of education
is an architectural design-research project that takes a typological approach to the upgrade of existing old-stock public schools in Cape Town. The focus is on parallel linear-block type schools built in neighbourhoods in the 1960s-80s. The defining decision was to extend existing schools, both spatially and programmatically, through a set of patterns that have relevance at multiple sites of similar condition. Rather than design a model, which may compound the problem of a-contextual school buildings, the project explores an architectural strategy that balances between the generic and the particular. Thus, although the design elements may be replicable, the architectural intervention helps to ground the school in its urban context. The new programme is intended to support and broaden the existing schools to enrich their role as places of learning and create opportunity for the campus to be shared with the community. Montagu's Gift Primary School in Grassy Park was selected as a case study to exemplify this approach.

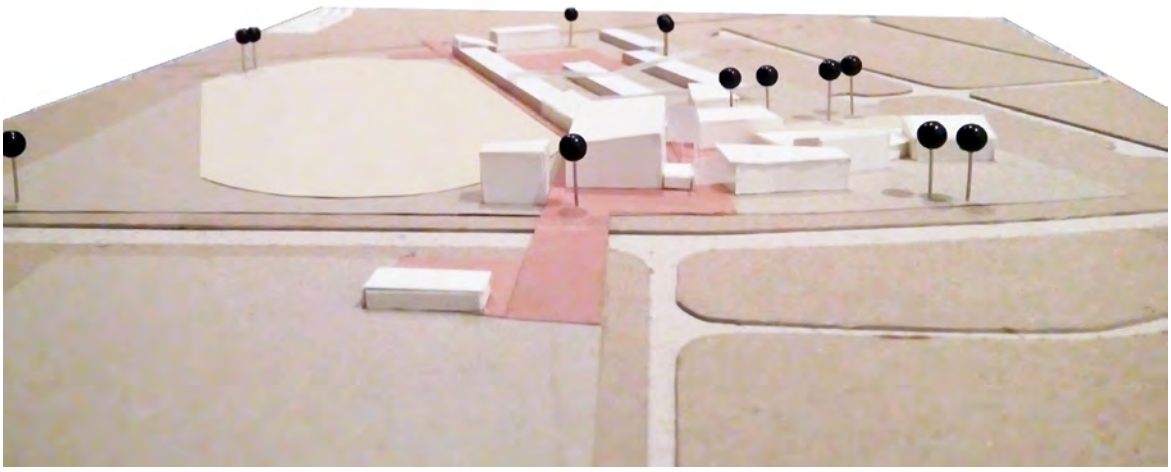

Figure 1: *photograph of 1:1000 model to show the extension of Montagu's Gift Primary*

Introduction

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Figure 2: *"All the school reforms on earth are worthless if kids have to come to school in buildings that destroy their spirits." (Lackney, 1999) This photograph, showing the impoverished experiential quality of a school in Grassy Park, seems to illustrate Lackney's statement*

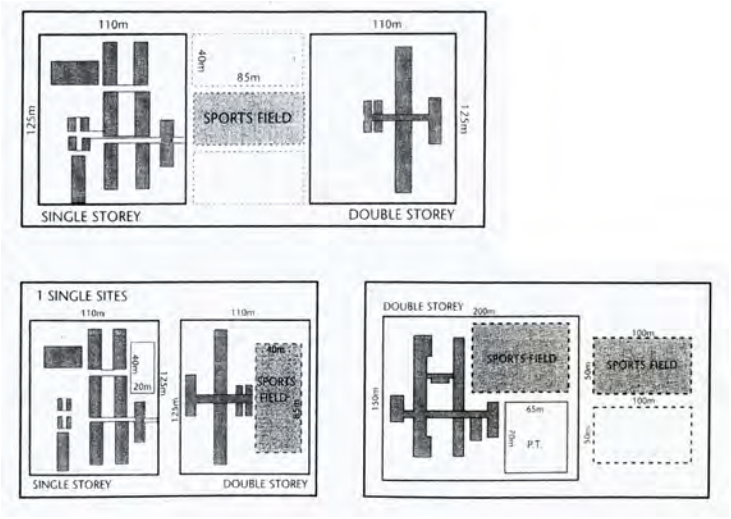


Figure 3: *Typical parallel linear-block type school plans (Perrin, 2010)*

Education and Architecture:
the importance of school design

"All the school reforms on earth are worthless if kids have to come to school in buildings that destroy their spirits." (Lackney, 1999)

Education has enormous transformative capacity but South African schools are in a crisis of quality. This statement forms the motivation for a project that addresses the problem of a widespread condition of low quality existing public schools in Cape Town through architectural strategies that create inspiring environments for learning.

Education is a fundamental role player in the pursuit of social transformation (Booyse, le Roux, Seroto & Wolhunter, 2011; Christie, 2008; Jacklin, 2004). Some theorists warn not to characterise education as 'the solution' to all problems; however, it is generally agreed that education is a necessity for any meaningful societal change to take place (Booyse, le Roux, Seroto & Wolhunter, 2011; Christie, 2008). Booyse et al (2011) capture this by saying, "Education is both dependent on and an agent of society…. It nevertheless remains a vital ingredient in any projects for progressive social change." Low (2010) notes, "The physical shape and spatial dynamics of school buildings can profoundly affect teaching, learning and the community"; this highlights the importance of considered school design. Thus the architecture of schools plays a facilitating role in the project of transformation through education.

Following on from my Honours year investigations into additions to schools, this Masters dissertation is about extending existing public schools in Cape Town - both in terms of use and facilities - to create a place for education that is shared between the school and the community.

The project started with research into the socio-spatial conditions of public schools in Cape Town. Early on in the investigations, the type of school was limited to the neighbourhood parallel linear-block spatial typology, in which the school consists of long straight banks of classrooms, orientated north on large sites. The parallel linear-block school is a very common typology due to the roll-out strategy to school building of the 1960s-80s (Perrin, 2010). This informed the decision to design to extend, rather than replace, existing schools, creating a new hybrid type. It also points to the need for an architectural proposal that has relevance across multiple sites. This makes one of the key challenges for this project to balance between the generic (programme and construction logic) and the particular (site and spatial organisation). The idea is to build a set of adaptable patterns for the extension of schools.

Typical Conditions: an overview of public schools in Cape Town

In South Africa, 'public schools' refers to schools which are controlled and owned by the government, as opposed to 'independent schools' which are privately governed (Government Gazette, 2013). Public schools can have a governing body and autonomy in their budgeting to a large extent, but must be accountable to the government. This means they are free to supplement their income with escalated fees in order to afford better facilities and teachers, which results in an extreme range of schools. For the purposes of this paper, the term 'public school' has been taken to mean those government-provided schools that do not receive significant monetary backing from parents; that is, schools that function on the minimum infrastructure government provides.

The map in Figure 4 highlights all the schools in Cape Town. A glance shows the number to be significant and fairly evenly distributed across the city. The study in Figure 6 and 7 by CSIR shows the served population in Cape Town in terms of population versus number of available places in schools in each area, as well as the distance people must travel to a school in their area, with the goal being to have all schools within walking distance. The map shows the majority of the population as served and within walking distance. This gives the impression that access to schooling is very democratic. However, these maps are slightly misleading: what they do not show is the quality of the schools, to do so would indicate a far less equitable image.

I am interested in public schools in old-stock school buildings built in the 1960s-80s. Many of these schools are in need of repair and spatially impoverished, yet the backlog in school delivery means it is not feasible to replace them, so they remain unattended to.

Visits to a number of public schools revealed physical conditions which are typical across many public schools, illustrated in Figure 9. This starts to paint a very different interpretation of Figure 4, one of a widespread series of low quality learning environments. This all points to the relevance of working with existing schools (preferably across multiple sites), rather than designing one individual school.

Figure 4: *map to show all the schools in Cape Town [schools = red; pre-schools = blue] (GIS, 2015)*

Figure 5: *Education Districts in City of Cape Town*

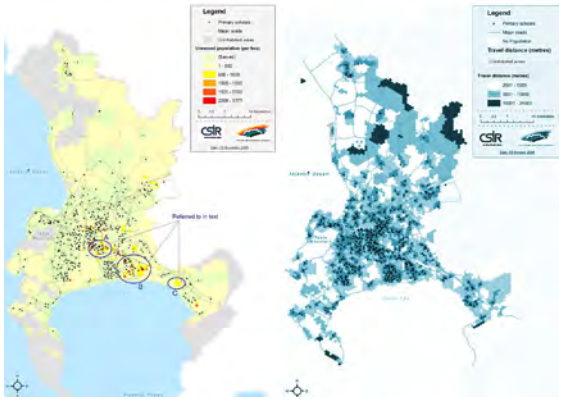


Figure 6 [left]: *map to show population in an area compared with places in primary schools in order to show where there is an unserved population [red = unserved] (Spocter, 2007)*

Figure 7 [right]: *map to show travel distance to nearest primary school [dark = near; light = far] (Spocter, 2007)*

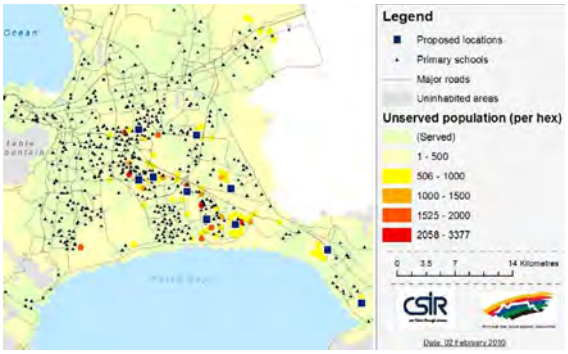


Figure 8: *map to show optimised locations for new build primary schools [blue block = proposed location] (Spocter, 2007)*

comfortable classrooms

inadequate forum space

expansive, barren site

non-activated courtyards

lack of civic presence

narrow circulation

ablutions vandalised

security problems

Figure 9: *typical conditions in old-stock public schools in Cape Town*

Typological Approach

"To raise the question of architectural typology is to raise the question of the nature of architectural work itself…. On the one hand, a work of architecture has to be considered in its own right, as an entity in itself…. On the other hand, a work of architecture can also be seen as belonging to a class of repeated objects, characterised, like a class of tools or instruments, by some general attributes…. Thus, like a basket or plate or cup, the architectural object could not only be repeated, but was also meant to be repeatable…. The essence of the architectural object lies in its repeatability." (Moneo, 1978)

'Schools as an architectural typology for places of learning' was my point of departure. To 'typify' means to think of objects in groups of similar characteristics; these characteristics can be general ('school building') or can be refined to a level of specificity that introduces types within broader types ('linear-block school buildings') until the level of particularity that results from the process of making creates a singular object ('one specific school building') (Moneo, 1978). Typologies specify a set of elements and relations between the elements.

A typological approach is a useful tool in both the description and the production of architecture (Moneo, 1978). In the research stage of the project, typology was used in a descriptive sense to categorise public schools in Cape Town into sets of spatial typology, and focussed on one of these types, namely the linear-block type. In the design stage, the concept of typology was used as a tool for production by analysing the elements of this type of school and introducing a new set of elements that could create a hybrid condition through a new set of spatial relations.

In identifying the problem of the condition of schools through typology, the architectural response was necessarily also typological, that is, it required a degree of replicability and relevance beyond a single architectural object. However, this replicability is more nuanced than the roll-out strategy of a model – the mechanical reproduction of an object (Quatremere de Quincy, 1977 cited by Tahersima, 2015; Moneo, 1978). The project develops a programmatic, spatial and construction logic for approaching the extension of a particular type of school. This can be thought of as a set of elements which can be configured and adapted in various ways according to a set of patterns.

Reading the document

This document is set out in four parts: the initial sections unpack the research; the following section interprets the research to develop an architectural brief; finally, the architectural proposal is discussed.

The research took two main directions and so is written in two parts. The first approaches the question of 'how architectural intervention can enrich the life of schools' from a theoretical perspective, searching for challenges and lessons for the architecture of schools through the lens of the education system. This takes a long-sighted view of the planning of schools at an institutional level. The second addresses the research question through a focus on the physical, material life of schools. This is a more immediate view that looks at school buildings in their day-to-day existence.

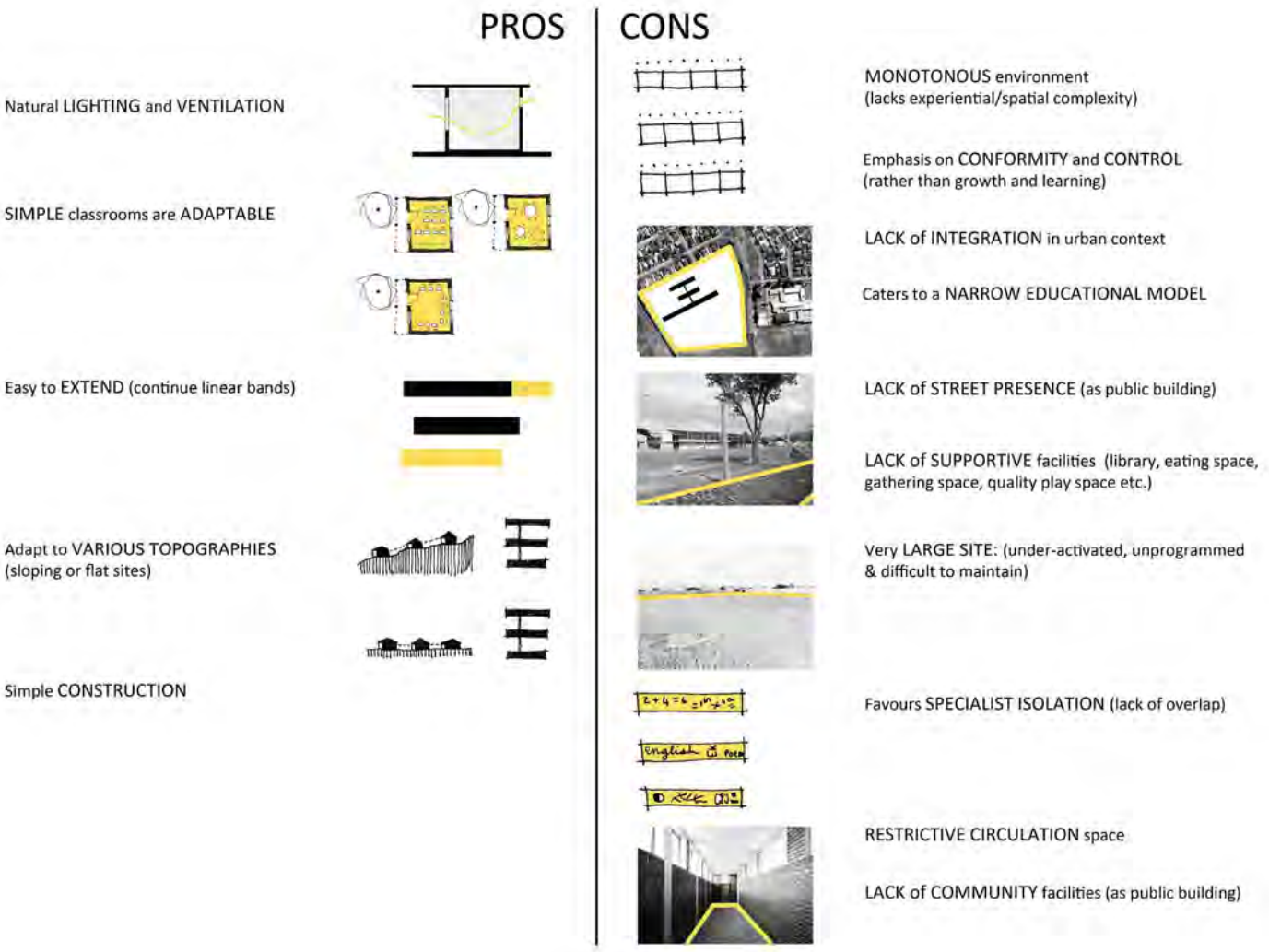


Figure 10: *evaluation of the parallel linear-block type school*

Overview:
parallel linear-block type schools and the case of Montagu's Gift Primary

As will be expanded on in *Research Part 1*, the parallel linear-block type school has been identified as a problematic model. Figure 10 shows an evaluation of the strengths and weaknesses of this type. The key problems are to do with experiential quality, civic presence and the narrow educational model. These are shown in the monotony of the spatial condition and vast empty sites; the isolation from the urban context, both physically and socially; as well as the lack of supportive educational facilities. The strength of the model is the provision of simple classroom spaces with good natural lighting and ventilation.

Figure 11 shows Montagu's Gift Primary in its urban context, revealing a number of other schools of the same spatial typology. The architectural proposal is to upgrade these sites through the addition of adaptable shared facilities that create a hybrid learning environment which serves both school and community in a way that can go beyond the traditional institutionalised model of education.

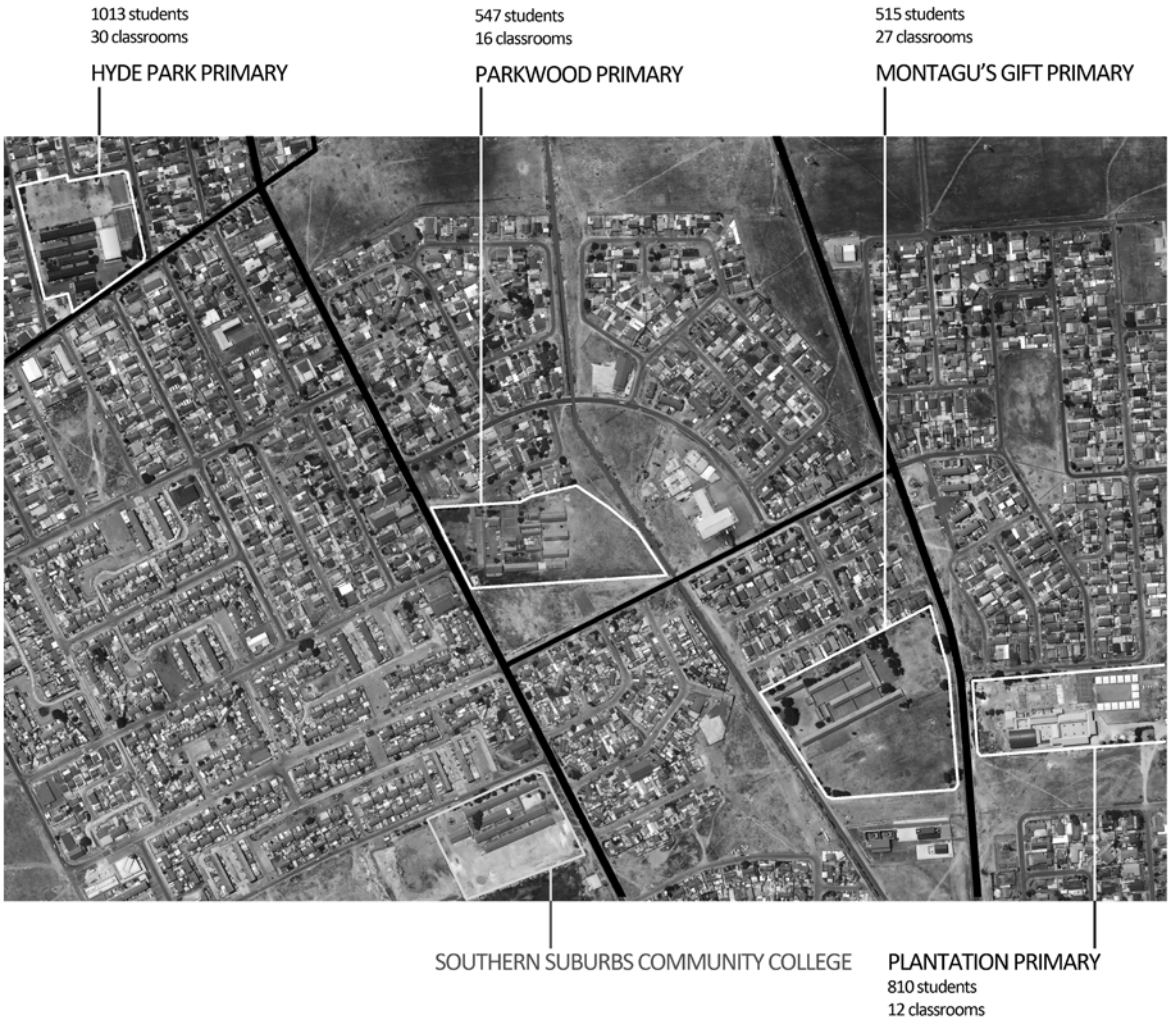


Figure 11: *aerial photo of a portion of Grassy Park to show Montagu's Gift and surrounding schools*

Research Part 1:
pedagogy, policy, practice and the architecture of schools

Introduction

Architecture and education are two fields which can be seen as reflections of the society they serve (Dudek, 2000; Jansen & Sayed, 2001; Marschall & Brian, 2000). In the words of Mark Dudek (2000), an architect who is known for his research into learning environments, "Schools are…visible symbols of the educational conceptions of their time. To plan schools then, it is necessary to become acquainted with questions of education and pedagogy."

The intention of this section is to develop an understanding of the relationship between school education systems and the architecture of schools, particularly public schools in Cape Town. The purpose is to set the theoretical context for this project and to extract from this lessons and challenges for the architecture of schools.

'School' is a well-established building typology and there are many good examples of schools that can inform a new project of school design. However, this section attempts to develop an understanding of the big picture of school design and the role and influences of education systems on the architecture of schools. The challenge is to unpack the intersection of these two fields, with the intention that this inform architectural interventions from a broader knowledge base. Due to the paucity of literature investigating this intersection, it was necessary to engage in primary research in addition to literature review. While the value of investigating international examples of schools is noted, it was necessary to limit the scope of this research; therefore the focus has been on South African education systems and their translation in public schools in Cape Town. The British education system has been used as a point of comparison.

This section is structured as a progression from the macro overarching ideas about the relationship between education and architecture to a specific understanding of the impact of this relationship on the making of schools in Cape Town. This is done through literature review and case study research.

Terminology: unpacking the keywords

Education systems have been characterised as consisting of pedagogy, policy and practice for the purpose of this document. The terms 'education' and 'schooling' are used fairly interchangeably.

Pedagogy refers to the thinking and structures of education systems, encompassing both the theory and practice of education. Shifts in education paradigms – such as the shift from teacher-centred practice to learner-centred practice or Outcomes-Based Education (OBE) – fall into the realm of pedagogy. The term 'policy' refers to "an official statement of intent" (Jansen & Sayed, 2001). In the field of education, policy is usually informed by pedagogy and implemented to affect practice. In this paper, the term has been used fairly loosely to describe official statements for a specific course of action. In this paper, the term 'practice' is synonymous with 'everyday practice' and refers to the ordinary routines and actions of people in the school community as they go about their usual business; rather than being associated with architectural practice. Everyday practice can reveal priorities and ways of working that usually focus on the day-to-day reality of 'getting the job done' without over-theorising the task at hand.

It is difficult to disaggregate these three terms as they are closely linked to one another. Although the existence of a relationship between these ideas is clear, the causality is difficult to establish. The following section uses a timeline as a tool to locate these terms in relation to one another and school architecture.

In this document, the term 'community' simply means a group of people living in the same place or having a particular characteristic (i.e. attendance of the same school) in common. It does not necessarily imply shared values or interests. The term 'school community' is used to encompass all the people directly involved in the life of the school – learners, staff, parents, alumni, etc.

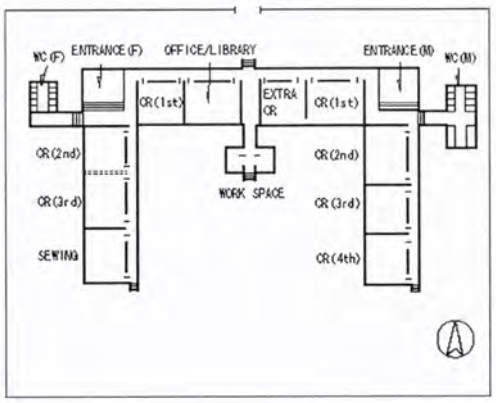


Figure 12: *Plan to show the traditional corridor-and-classroom model (Walden, 2009)*

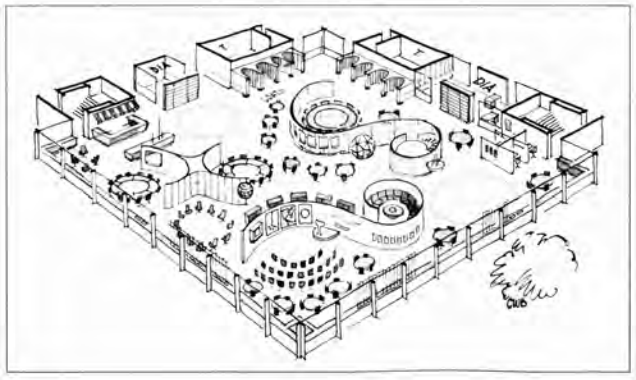


Figure 13: *Concept diagram to show an 'open plan school' by C. William Brubaker (Walden, 2009)*

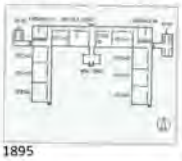
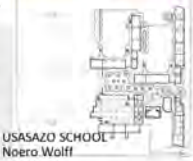
Timeline: locating schooling systems in relation to school architecture

The practice of mass education and schools per se, originates from the Industrial Revolution and was geared towards feeding a 'machine-age economy' (Robinson, 2006, 2010; Walden, 2009). This concept of mass education was, like so many products of Modernism, built around the idea of a factory – a machine for learning (Robinson, 2006; Walden, 2009). In England, this pedagogy followed an Enlightenment Age view of intelligence that promoted deductive reasoning and a study of the classics; highly controlled, teacher-centred learning environments; separate development (especially of girls and boys, but also of race groups and religions in many countries); and specialisation of subject areas (Robinson, 2010). This has its translation in the architectural design of schools – schools were designed for efficiency and economy. The predominant model for schools was the corridor-and-classroom type, as shown in Figure 12; and standardisation, control and conformity were paramount (Cleveland, 2011).

Some alternative pedagogic models were developed parallel to this. Among these was the Montessori model which promoted self-guided activity, a child-centred approach and a concern for the child's whole being (Walden, 2009). However, it was not until the 1960s that there was widespread school reform in England (Cleveland, 2011; Dudek, 2000; Kühn, 2012). The reforms focussed on greater individualism and more interactive learning (Cleveland, 2011; Kühn, 2012). During this period, various architects responded to this shift and the 'open plan school' became a phenomenon in the years that followed (Cleveland, 2011). However, many teachers were not trained to take on this new typology and struggled to use the new spaces for old teaching styles (Cleveland, 2011). The result was noisy spaces that did not make productive learning environments. There was a stark mismatch between the spatial configuration and the teaching practices (Cleveland, 2011). Due to this, the open plan school model was deemed a failure (Cleveland, 2011) and the 1980s saw a return to the traditional classroom model in England (Cleveland, 2011).

BEYOND SOUTH AFRICA
[United Kingdom Case Study]

SOUTH AFRICA
[focus on Western Cape]

pedagogy	alt. ped.	education policy	architecture of schools		pedagogy	context	education policy	architecture of schools
INDUSTRIAL REVOLUTION | FACTORY ECONOMY Enlightment view of intelligence; highly controlled; teacher-centred; separate development & specialisation	MONTESSORI MODEL self-guided activity; child-centred; "whole being"		CLASSROOM & CORRIDOR MODEL CONFORMITY & STANDARDISATION  1895		pre-			MISSIONARY & CHURCH SCHOOLS
					1940			 representation of school buildings differentiated according to race
					1950	1948: National Party comes to power	1951: Differentiated programme for primary schools	STANDARDISED SCHOOLS
							1953: BANTU EDUCTAION ACT 47 formalised segregation of secondary schools	 C. L. WILMOT PRIMARY. Uniq 535 learners A. Z. BERMAN PRIMARY, Mitchells Plain 1 364 learners HEATHFIELD PRIMARY, Heathfield 930 learners R1 850 p.a.
SCHOOLS REFORM greater individualism and interaction between teacher and learner			OPEN PLAN SCHOOLS 		1960	1955: ANC-led school boycotts in various townships	1963: THE COLOURED PEOPLE'S EDUCATION ACT	
							1965: INDIAN EDUCATION ACT	
						1968: New primary school syllabus for black children	1967: THE NATIONAL EDUCATION POLICY Bantu Education Act replaced by Dpmt of Education and Training	
					1970	1976: Soweto Riots		
						1978: PW Botha is prime minister	1979: EDUCATION & TRAINING ACT 90	
			RETURN TO TRADITIONAL CLASSROOM MODEL  Hannah Hertzberger School 1993 Alan Robin's Middle School, Bhein		1980		1984: NATIONAL POLICY FOR GENERAL EDUCATION AFFAIRS ACT 76 Dpmt of national education established	
						1986: State of emergency		
						1989: De Klerk is executive president	1990: NATIONAL EDUCATION POLICY INVESTIGATION (NEPI)	
					1990			
KNOWLEDGE-BASED ECONOMY						1994: SOUTH AFRICAN DEMOCRACY	1993: EDUCATION RENEWAL STRATEGY	SIGNATURE SCHOOLS
						O.B.E. critical thinking learner-centred skills training	1996: SOUTH AFRICAN SCHOOLS ACT	  WESBANK NO1 PRIMARY 2000 CS Studios
		'BUILDING SCHOOLS FOR THE FUTURE' (BSF)	SIGNATURE SCHOOLS 		2000	1997: Dpmt of Public Works emphasize community consultation & participation, poverty relief, training, and skills transfer	1998: NATIONAL NORMS & STNDS FOR SCHOOL FUNDING Quintile system introduced	 
						BACK-TO-BASICS literacy & numeracy 'core subjects'	2008: REVISED NEW CURRICULUM STATEMENTS (RNCS)	 INKWENKWEZI SCHOOL 2004 Noero Wolff
		PRIORITY SCHOOL BUILDING PROGRAMME (PSBP)	STANDARDISATION		2010			retrofitting of schools to accomodate policy-shifts  USASAZO SCHOOL Noero Wolff

More recently, there has been a drive to re-think school architecture again (Dunton, 2015; Hawkins, 2015b; Olcayto, 2015). There has been a move away from the "cells and bells" model of the Industrial Age to a pedagogic model that feeds a 'Knowledge Economy' (Robinson, 2006). In the 2000s, the British government invested in a programme called Building Schools for the Future (BSF). This was an architect-led programme that explored ways to improve environments for education (Dudek, 2000; Mirchandani & Wright, 2015). Each school designed for the programme responded to highly specific local conditions and explored the capacity for design to impact the learning environment (Walden, 2009). Common characteristics of new schools are: flexibility; common core; clustering; and connectivity (Kühn, 2012). Unfortunately, this was a highly expensive endeavour and the economic climate, as well as a shift in British government from Labour Party to Conservative Party, has seen a move away from this highly individualised approach to a more generic response (Dudek, 2015; Dunton, 2015). The new Priority Schools Building Programme (PSBP) focusses on efficiency and economy and has moved back to the more Modernist ideas of a single design that can be rolled-out en mass (Dudek, 2015; Mirchandani & Wright, 2015).

This pattern of school reform implies a cyclic nature regarding these shifts, both in pedagogic thinking and the architecture of schools, and in response to changing policy. Both the 1960's reform followed by 1980's return to conformity, and the 2000's reform followed by the 2010's return to standardisation in England have been mirrored to some extent in the pattern of school reform in South Africa in the transition from Apartheid. This is highlighted on the timeline in Figure 14.

Figure 14 [left]: *Timeline to locate changes in pedagogy, policy and the architecture of schools in relation to one another. The left side focusses on England, while the right side focusses on South Africa. This timeline notes events of relevance to this paper, rather than being an exhaustive historical account. (image with adaption and synthesis from Booyse et al., 2011; Cleveland, 2011; Dunton, 2015; Jansen & Sayed, 2001; Kallaway, 2002; Kühn, 2012; Low, 2010; Robinson, 2006)*

Wesbank No1 Primary
CS Studios

Masibambane Secondary
Design Studio (Perrin, 2011)

Usasazo Secondary
Noero Wolff

Bongolethu Primary
Revel Fox (Fox, 2011)

Figure 15: *Photographs to show some of the range of new public schools or 'signature schools' built in Cape Town, designed by local architects*

The New South Africa: schools as a vehicle of transformation

In order to develop an understanding of government provided schooling systems in South Africa, it is important to review South Africa's recent history regarding schooling, as well as current pedagogic models and policy. Once there is a basis of knowledge in these fields, a relationship can be proposed between these and the built fabric of schools.

Under the Apartheid system, schools were segregated and standards of education differentiated according to race (Booyse et al., 2011; Jansen & Sayed, 2001; Kallaway, 2002). This was formalised under the Bantu Education Act of 1953 and supported by subsequent acts in the years that followed (Booyse et al., 2011; Kallaway, 2002; Kros, 2010; Low, 2010). School was an institution of control and disempowerment for most South African learners (Kros, 2010).

In the process of moving from a radical Apartheid state to a modern democracy post-1994, the transformation of the school education system was prioritised (Christie, 2008; Jansen & Sayed, 2001; Mouton et al, 2012). The ambition of the new system was to enable access to equal opportunities for education so that people could be active agents of change in their own lives (Christie, 2008).

The 1990s brought sweeping school reform embodied in a plethora of optimistic pedagogy and policy changes which had South African education policy acclaimed internationally (Jansen & Sayed, 2001). The Constitution (1996) declared basic education a human right. The new principles for education system were: democratisation, equal educational opportunities, decentralisation, desegregation and multi-cultural educations (Booyse et al., 2011). For real transformation to take place, shifts in the approach to education need to find ways to translate these acclaimed policies and effective education practices to the everyday reality of schools.

There was a pedagogic shift from content-based education to outcomes-based education (OBE) (Booyse et al., 2011; Cynthia Kros, 2010), made

official in a series of policies for education and schooling (Booyse et al., 2011). Of particular relevance to architects, was the South African Schools Act of 1996 (Government Gazette, 2013) which stipulated how new schools should be planned and maintained, as well as how existing schools are to be upgraded and maintained. It set up a framework of norms and standards for school buildings. In this new approach, the Western Cape Provincial Government approached local architects to propose creative architectural responses that spatialize these shifts towards redressing schools (Low, 2010).

A number of new schools were built across Cape Town, particularly in previously marginalised areas, designed by leading local architects such as CS Studios, Design Studio, Noero Wolff and Revel Fox. These schools can be termed 'signature schools' (Low, 2010) as they tend to be highly individualistic and context specific and do not conform to a single form or spatial typology in their attempt to spatialize the shift from the deterministic Apartheid ideology to democratised education. Figure 15 shows some of these school designs.

Unfortunately, implementation of the new pedagogic model and policies has not been straight-forward and time has shown a disparity between their intentions and implementation (Jansen & Sayed, 2001). Despite education being allocated the largest portion of government budget, school results and the quality of schooling environments have been low – among the worst in Africa (Christie, 2008; Jansen & Sayed, 2001; Mouton et al., 2012). The OBE model in particular has been deemed problematic, with many teachers untrained to cope with the new pedagogy. Although the intention was to create equal opportunities, the shift unwittingly perpetuated the pattern of advantage and disadvantage as many of the old model-c schools were better equipped for the OBE model (Christie, 2008; Mouton et al., 2012). This is highlighted in the 2010 statistic that 80% of university entrants come from only 20% of South Africa's schools (Jansen & Blank, 2014; Mouton et al., 2012; Wilkinson, 2015). This problem of continued differentiation between schools as well as poor schooling results has received serious criticism and resulted in yet another pedagogic and policy shift 'back-to-basics' in 2008 (Kros, 2010; Mouton et al., 2012) which focusses on the basics of literacy and numeracy.

The timeline has shown that there is a relationship between pedagogy, policy, practice and school architecture, as there are clear associations between shifts in education systems and school architecture. However, this relationship is complex and cannot be understood in terms of a simple pattern of cause and effect. Establishing the relationship is still a useful tool to understand what influenced the design of existing schools and to create awareness of the broad set of influences on school design. In particular, the cyclic nature of pedagogic and policy changes should alert architects to the need to question existing typologies and be wary of basing new typologies too narrowly in one pedagogic model.

SPATIAL TYPOLOGY: FIGURE-GROUND

compact footprint | single linear form | parallel linear-block | corridor-courtyard hybrid | courtyard

TIME LINE: ASSOCIATED EDUCATION PARADIGM

missionary & church schools

1950

differentiated education

1990

democratised education

HOLY CROSS PRIMARY, District Six
291 learners
R1 250 p.a

IMMACULATA SECONDARY (RC), Wittebome
494 learners
R3 800 p.a

RAHMANIYEH PRIMARY, Zonnebloem
520 learners
R650 p.a

CHAPEL STREET PRIMARY, District Six
579 learners
R1 100 p.a

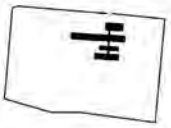
WALMER ESTATE PRIMARY, District Six
300 learners
R1000 p.a

C. L. WILMOT PRIMARY, Uitsig
535 learners

ELSTEENFONTEIN PRIMARY
314 learners

A. Z. BERMAN PRIMARY, Mitchells Plain
1 364 learners

BONTEHEUWEL SECONDARY
737 learners



HEATHFIELD PRIMARY, Heathfield
630 learners
R1 850 p.a

BOUNDARY PRIMARY, Bonteheuwel
482 learners

ROSEWOOD PRIMARY, Bonteheuwel
572 learners

KALKFONTEIN, Kuilsrivier
1208 learners

VNE NO 1 PRIMARY, Delft
30 learners

USASAZO SECONDARY, Khayelitsha
1 867

KWEZI SECONDARY, De Noon
16 learners

Spatial Translations of Policy: spatial typologies of public schools in Cape Town

This section investigates the potential of a link between policy and spatial typology of schools in Cape Town. In order to do this, a random selection of public schools in Cape Town (see Appendix A for selection process) were categorised according to their spatial typology, using figure-ground diagrams, and then stratified according to the period in which they were built. This time period can be related to an education or political paradigm which gives some indication of the kind of policy that was acting at the time. This exercise is shown in Figure 16.

Although the results of this exercise are not exhaustive or conclusive, it is possible to extract some patterns in terms of spatial typology. The key difference is between the highly-controlled, rectilinear layout of the schools built during the period of differentiated education and the more individualistic layout of the schools built post-1994. Perrin (2010) describes the rectilinear spatial type saying, "[these] are immediately recognisable by their characteristically finger-like arrangement of building masses. The blocks of accomodation are strings of teaching rooms served by open or enclosed access corridors." However, the change in spatial typology cannot be attributed solely to the shift in pedagogy and education policy. Other factors, such as the shift in the role of the architect – from being viewed as agents of the state, to being characterised as agents of change in a new democracy – must be taken into consideration. According to Keath (1987), in the 1950s - 1980s the Department of Education strongly advocated the design of linear-block type schools such that it was "mandatory" for architects comissioned by the state at that time.

What the diagram shows is that pedagogy and policy are shifting continually and that there appears to be some association between these shifts and the architecture of schools, but that there is a delay in the translation from policy to architecture. In addition, when there is such a shift, new school designs may address the change but the old schools still exist simultaneously in their out-dated state. Therefore, architecture for schools cannot be based too narrowly in current conceptions of pedagogy as buildings tend to have a greater longevity than policy and pedagogy which tend to fluctuate and cycle relatively often. Rather, the project of school architecture needs to think broadly about aspects of school architecture that can continue to contribute positively to the school environment even as policies and specifics of school practice change.

Hertzberger (2008) states, "As an architect, it is imperative to resist being swept up in any specific view of education and to use it as a point of departure for your design. Architects... should create spatial conditions that will benefit learning in a general sense.... [Schools] must remain usable and capable of responding to new views about education without needing to undergo any fundamental change."

Figure 16 [left]: *A selection of figure-grounds of public schools in Cape Town categorised according to spatial typology and stratified according to the time period/ education paradigm in which they were built.*

Figure 17: *Bonteheuwel Secondary: Aerial photograph to show site and urban condition - note the expansive, barren site and lack of connection to the street (Google Maps, 2015)*

Figure 18: *Siyazingisa Primary: Aerial photograph to show site and urban condition - note the large, open site and linear arrangement of classrooms (Google Maps, 2015)*

Figure 19: *Bonteheuwel Secondary: Photograph to show the character of courtyard spaces: neglected, left-over spaces*

Figure 20: *Siyazingisa Primary: Photograph to show the character of courtyard spaces: active, cared-for places*

Figure 21: *Bonteheuwel Secondary: Photograph to show street view of main entrance, note lack of architectural representation of entrance (Google Maps, 2015)*

Figure 22: *Siyazingisa Primary: Photograph to show street view of main entrance, note lack of architectural gesture to denote entrance*

Pedagogy, Policy and Architecture of Schools: case studies

Pedagogy and policy are examined together in one section to avoid repetition because they are intimately linked – policy is the official statement of pedagogic models and shifts in policy affect pedagogy. This section looks at four case studies of public schools in Cape Town to investigate the architectural implications of different political paradigms, the intentions of the designers, as well as to highlight some changes in their post-occupancy functioning. The selected schools are Bonteheuwel Secondary in Bonteheuwel; Siyazingisa Primary in Gugulethu; Usasazo Secondary in Khayelitsha; and Wesbank No 1 Primary, in Delft. All of these schools are public schools in Cape Town, typical of the time period in which they were built. The first two case studies were built during the differentiated education system of Apartheid; while the latter two were constructed post-1994 as part of the drive towards democratised education. All of these schools now function under a different policy and pedagogic model to that under which they were designed.

Bonteheuwel Secondary and Siyazingisa Primary

Bonteheuwel Secondary was built in the 1960s, while Siyazingisa Primary was built in 1970 (pers. comm. at site visits, 2014 & 2015 respectively). Both were built in townships during the Apartheid regime. As per the practice of that time, the schools were designed using a generic set of spaces that the architect arranged on the site (Keith, 1987; Low, 2010; Perrin, 2010). The schools catered for the minimal classroom and administration requirements with few, if any, specialist spaces and no indoor gathering space (Low, 2010; pers. comm. Siyazingisa, 2015). Aerial photographs of the schools are shown in Figure 17 and 18.

The spatial configuration of both of these schools is a kind of hybrid between the 'parallel linear-block' and the 'courtyard' spatial typology. These courtyard spaces have potential to be activated as positive spaces but were not explicitly designed for this; rather, in the case of most of the schools, the nature of the courtyard is that of 'left-over' space. Despite the similarity in their spatial configuration, Bonteheuwel Secondary and Siyazingisa Primary's courtyard spaces are opposite in terms of character. In one, the courtyards are characterised as left-over space between buildings, in the other the courtyards are carefully maintained and used as spaces for play, assembly and other activities. One of the ways in which these two very different characters can be explained from an architectural point of view is the role of the corridor as a mediator between the classrooms and the courtyard. The corridors along the classrooms at Bonteheuwel Secondary are enclosed – there are windows that overlook the courtyards but access is limited to gated doorways which are often locked. This contributes to the lack of activity in the courtyard. On the other hand, the corridors at Siyazingisa Primary are arcades open to the courtyards and so activate the courtyards directly. Figure 19 and 20 give an impression of their character through photographs. Another key difference is the use of soft and hard finishes; the softer finish creates a more friendly atmosphere.

The material palette of both schools is typical of institutional buildings in townships built during Apartheid. The materials are robust but do not inspire a distinctive sense of identity of place. This can be problematic in the context of a school where building a sense of personal and group identity that can be linked to a sense of self-worth is important for child development (Cleveland, 2011; Walden, 2009). In the post-Apartheid move to redress education environments, these notions of identity and school as public symbol of transformation are emphasized. In particular, the articulation of entrance and sense of urban presence have been noted as opportunities to represent the school to the public, which were not prioritised in the typical Apartheid-type school. This is true of both Bonteheuwel Secondary and Siyazingisa Primary, as shown in Figure 21 and 22. The following two case studies illustrate some ways in which architects have addressed this in new schools.

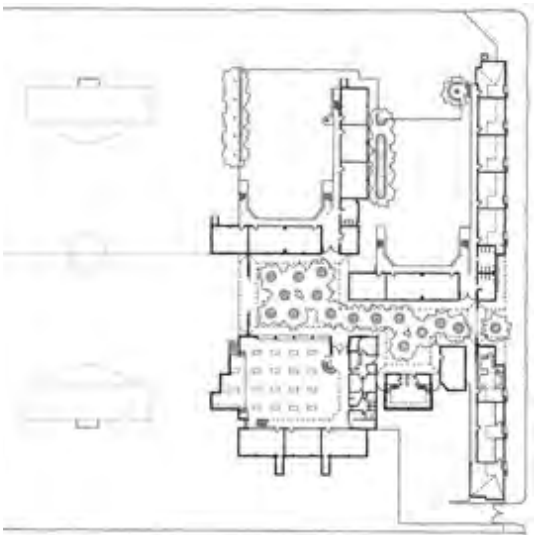


Figure 23: *Usasazo Secondary: Plan to show spatial configuration (Noero Wolff, 2003)*

Figure 24: *Wesbank No1 Primary: Plan to show spatial configuration (Smuts, 2000)*

Figure 25: *Usasazo Secondary: Photograph to illustrate courtyard (Noero Wolff, 2003)*

Figure 26: *Wesbank No1 Primary: Photograph to illustrate courtyard*

Figure 27: *Usasazo Secondary: Photograph to show stairs and walkways as places for social interaction (still frame from documentray by Southwood, 2010)*

Figure 28: *Wesbank No1 Primary: Photograph to show stairs and walkways as places for social interaction*

Usasazo Secondary and Wesbank No1 Primary

Usasazo Secondary in Khayelitsha was designed by Noero Wolff Architects and built in 2001. Wesbank No1 Primary was designed by CS Studios and built in 1999 – 2000. These are examples of schools built under the new education system that, in their design, challenge the typical school layout and representation. They have different spatial typologies, yet both deliberately integrate outdoor space in the plan through the use of carefully designed courtyard spaces. This contrasts with the 'left-over' outdoor space of the old typology. These schools show different approaches to creating a public presence on the street.

Usasazo Secondary is arranged as a series of L-shaped classroom-wings that edge courtyard spaces. This responds to the context-specific need to mitigate strong winds as well as creating positive outdoor space. Wesbank No1 Primary is arranged around a single large courtyard space. One building juts into this courtyard, implying the separation of junior and senior phases. CS Studios designed a variety of outdoor spaces – from the large central courtyard to small break-out spaces between the classrooms. In both schools, stairways are used as more than circulation space, becoming stage-like places for social interaction. These conditions show a concern for the school environment as a whole, and are illustrated in the following images.

Figure 29: *Usasazo Secondary: Photograph to show multi-purpose hall*

Figure 30: *Wesbank No1 Primary: Photograph to show multi-purpose hall*

One of the strong features of the new schools, post-1994, is the inclusion specialist spaces for programme beyond the classroom. This may be related to shifts in policy and pedagogy. Perhaps the most significant of these is gathering space, which has tended to take the form of a multi-purpose hall. Figure 29 and 30 show the halls in Usasazo Secondary and Wesbank No1 Primary. These spaces are useful for both the school and the broader community. The design of these gathering spaces is challenging in terms of scale, natural light and ventilation, and acoustics, as well as the challenge of limited budget. One of the ways in which CS Studios and Noero Wolff have tried to maximise the functionality of the halls is making them open out to an outdoor space in increase capacity when necessary.

As mentioned previously, the urban presence and sense of identity of the schools are important design considerations. Usasazo Secondary has been designed to respond to and reinforce the street through its spatial configuration. This is a strong urban move that was lacking in the site making of typical linear-block schools analysed earlier. Figure 31 shows how the spatial configuration of the school contributes to the street scape. The entrance moment is articulated as a large pedestrian gateway with a heavy security gate that is closed during school hours; this is shown in Figure 32. In the post-occupancy evaluation, it was noted that this gateway is not used on a daily basis as it is difficult to manage two points of entry (vehicular and pedestrian) in terms of security.

Wesbank No1 Primary uses a different approach. The school is set back from the street, placing some distance between the classrooms and the harsh social conditions of the street. The entrance moment is emphasized with a double volume foyer that pulls back from the carpark, and a large canopy that juts towards the street, as shown Figure 34. Recently, the principal raised funds to have the school name mounted on the wall adjacent to this entry point (pers comm Wesbank), reinforcing this architectural gesture.

The material palette of these schools has more variety than the previous two case studies; mixing timber, steel, concrete blocks and brightly coloured painted and plastered surfaces with the more conventional face brick. This adds to the sense of identity of place and differentiates the new schools from the old stock schools in an aesthetic sense.

Figure 31 [top]**:** *Usasazo Secondary: Photograph to show street view of school (still frame from documentary by Southwood, 2010)*

Figure 32 [bottom]**:** *Usasazo Secondary: Photograph to show articulation of pedestrian gateway to school (Baan, 2003)*

Figure 33 [top]**:** Wesbank No1 Primary: Photograph to show addition of school name lettering to wall adjacent to entrance

Figure 34 [bottom]**:** Wesbank No1 Primary: Photograph to show street view of school (Smuts, 2000)

Conclusion: case studies

These case studies have shown some translation of policy and pedagogic changes, such as the inclusion of specialist spaces. However, other important shifts in the architectural resolution - such as different spatial configuration, identifiable representation and urban presence - go beyond the direct influence of education policy. Although this indicates a somewhat weak relationship between the education system and school architecture, this discovery is useful as it implies that it would be beneficial to focus actively on designing aspects of schools that can transfer across policy and pedagogy, such as programme beyond classroom spaces. It also suggests eliminating focus on aspects over which architecture has little influence, such as the arrangement of desks within a classroom that respond to shifts in pedagogy or personal teaching style. Ways in which the built fabric of schools is adapted to change is discussed in the section called 'shifting systems'.

Practice: the everyday life of schools

Though in many cases conditions are far from ideal, there are schools that succeed through sheer human will and consistent effort of the school community. In a South African study on Schools that Work, Jansen and Blank conducted case studies of a number of schools across the country which show high results regardless of challenging circumstances. Masipumelele High in Masipumelele and Mondale High in Mitchells Plain are public schools in Cape Town which exemplify practices for effective schools. These two schools have been selected for case study to highlight effective practices in order to extract informants for architectural intervention in schools that could benefit or facilitate these kinds of practices.

Through literature review, case studies, interviews and site visits on practices of effective or 'resilient' schools in South Africa, four key themes have been extracted, namely, active agency; the importance of strong leadership and management; a caring ethos; and getting the basics right. Each of these themes is elaborated in this section.

Figure 35: *Masipumelele Secondary: Still-frames from 'Schools that Work' documentary to show the contrast in spatial quality between the crowded, noisy home environment of most learners and the comparatively luxurious quiet of the school environment (Jansen & Blank, 2014)*

Figure 36 [top]**:** *Tetelo Secondary: Still-frame from 'Schools that Work' documentary to show student-run matric study group after school. Because the school does not have facilities available after hours, the students make do, using the side of a containor as a chalk board (Jansen & Blank, 2014)*

Figure 37 [middle]**:** *Mondale High: Still-frame from 'Schools that Work' documentary to show the school in use early in the morning and late into the evening (Jansen & Blank, 2014)*

Figure 38: *Wesbank No1 Primary: Plan to show facilities that are available to the community afterhours and how these can be isolated from the rest of the school (adapted from Smuts, 2000)*

Agency

The most powerful characteristic of effective schools was the willingness of the school community to act and to take responsibility for these actions. By contrast to the passivity of schools which are overcome by their circumstance, these school communities actively engage in their own improvement. They look to exterior forces, such as the Department of Education, for guidance but do not depend on them (Christie & Potterton, 1997). As active agents, they also seek support elsewhere – in NGOs, the community and local professionals.

One of the most productive actions is to extend school's opening hours (Jansen & Blank, 2014). Masipumelele High School is an outstanding testament to this. When new principal, Nelson Ma'Afrika, started work at Masipumelele High, the pass rate was 28% (Blank, 2012). Ma'Afrika recognised that learners were not managing to study in their home environments. Figure 35 gives an impression of the home context for many learners. In response, he made the school campus available for use by learners until 8pm. Ma'Afrika describes his justifies his decision to keep the school open afterhours saying, "because if they stay next to a shebeen then the music plays so loud that they can't study". In 7 years, the pass rate shot up to 85% (Blank, 2012). Figure 37 shows Mondale High functioning afterhours. Mondale High School reports the success of extra classes before and after school; and learning opportunities beyond the classroom such as sport and taking Grade 11 learners to university and technikon open days.

Agency cannot be designed, so the scope of architecture to facilitate this practice is limited. However, one can draw architectural clues from the kinds of actions that have been effective, for example, the need for schools to have extended hours as a safe place for study and recreation before and after school prompts architects to explore the potential of programme and spaces, beyond the set curriculum, that can be active for more hours in a day. It may be that it is possible to separate these after school places from the main school so that people beyond the immediate school community can make use of them. In Figure 38, Wesbank No1 Primary illustrates how shared facilities (hall, library and computer lab) can open to the public after hours without compromising the security of the closed school. While architecture cannot be solely responsible for effective practice – that requires human agency – it can go a long way in facilitating these practices. The hope is that if these effective practices are better facilitated through architectural intervention and thus easier for people to implement, they will become the norm, rather than the exception.

Western Cape Provincial Government launched a programme called Mass Participation, Opportunity and Access, Development and Growth (MOD) for Cape schools in 2010. This programme entails the creation of 'MOD Centres' at schools. The aim is to create a safe and positive place for holistic education through the "daily transformation of a child's academic-based facility to a recreation and/or sports-based facility" after school hours (Sanders, 2012) with the added benefit of keeping children off the streets (DCAS, 2014). Key in the success of the programme is the incorporation of a feeding scheme (DCAS, 2014; Sanders, 2012; pers. comm. Montagu's Gift Primary). The MOD Centres serve the local community, not just the specific school at which they are located. Schools with MOD Centres are intended as "community hub" (Sanders, 2012).

An evaluation of MOD in 2014, shows very positive feedback about the MOD centres, including "improved performance of learners at school and in sports activities;… positive behaviour change; improved discipline; more responsive learners in class and a more positive outlook on life" (DCAS, 2014) The evaluation noted that the biggest stumbling block for MOD centres is "poor, insufficient or no facilities at schools" (DCAS, 2014). This gives very clear direction in terms of how architecture can facilitate effective practices.

Figure 39 [top]: *Usasazo Secondary: section to show rooflights as a robust means of natural daylighting and ventilation (Wolff, 2007)*

Figure 40 [bottom]: *Mpumelelo Secondary: still-frame from 'Schools that Work' documentary to show a lack of basic requirements for school, and a determination to 'make-do' (Jansen & Blank, 2014)*

Basics

Obvious though it may seem, getting the basics right is at the heart of successful schools and cannot be taken as a given. That this point is worth mentioning is an alert to the dire state of schools. The principal of the Centre of Science and Technology (COSAT), Khayelitsha captures this need for basics "What COSAT does is to do the basics properly. We have the kids in class when they are supposed to be in class, we have the teachers in class when they are supposed to be in class and teaching and learning is happening during this time" (Jansen & Blank, 2014). This point is reiterated in the case studies. Classes must be well-organised with established routines and well-prepared teachers and learners. Lateness and absenteeism are not tolerated of learners or staff (Jansen & Blank, 2014).

Again, getting teachers and learners to be on time is beyond the scope of architecture. However, there is another important prompt with a direct architectural translation. 'Getting the basics right' in the built fabric of the school is crucial to create enabling learning environments. This can be difficult in the challenging contexts of many of the schools, especially when most of the schools are unable to sustain an intensive maintenance programme, so extra consideration must be given to robustness and longevity. In architecture for schools, the basics include natural light and ventilation, acoustic quality, adequate space and circulation areas. Noero Wolff's school designs are a good example of architectural strategies for natural light and ventilation that are designed explicitly to cope with intense use and low-maintenance, as shown in Figure 39.

Leadership and Management

Figure 41: *still-frame from 'Schools that Work' documentary to show school principal working in a visible way (Jansen & Blank, 2014)*

Jansen (2014) states that effective schools have principals who are "visible in their leadership." This requires skills in leadership and management – a principal is not just a promoted teacher. Christie (2008) notes the importance of dialogue between management and teachers. This is embodied in the relationship between the principal of Masipumelele High and his teachers. One teacher said of Ma'Afrika, "He has been allowing the educators to invent whatever they want to invent so long as it is going to assist the learners." It is important that teachers are accountable to management (Christie & Potterton, 1997; Jansen & Blank, 2014).

Architecture cannot design strong leaders; however, architecture can facilitate strong leadership by making their environment conducive to effective practices. In this case, there is fairly literal architectural translation of the effective practice noted above. Visible leadership implies an architectural strategy that places the principal's work space in a visible and active part of the school. This may also help to facilitate a culture of accountability with the teachers. The principal of Wesbank No1 Primary noted that the classrooms are out of sight of the principal's work space and that this does not facilitate easy communication with his staff.

Figure 42: *Phumlani Secondary: still-frames from 'Schools that Work' documentary to show feeding scheme in action and children taking cleaning their work space, both of which illustrate a caring ethos (Jansen & Blank, 2014)*

Caring Ethos

Very important in the life of effective schools is an ethos that allows learners to feel safe and valued. This ethos is about caring for the learner's whole being, not just their academic goals. There are many factors in creating this type of environment. In Blank (2012), Christie et al (1997) and Jansen et al (2014)'s interviews with South African school communities, the word that is repeated consistently is 'respect'. Effective schools impart a sense of respect for all of the school community. Ma'Afrika of Masipumelele said, "We give them hope, confidence and feel value about themselves…. Respect makes them feel human."

One of the ways in which schools can engender respect is in their physical form – a clean and well-maintained environment gives an impression of being cared-for and implies that the people within the space are cared-for too. This gives clues for architectural design strategies. The school environment should be designed to be robust and require minimal maintenance.

Another factor in creating a caring ethos is to have high expectations of the learners and teachers. The case study schools had the message of expectations of success represented throughout the school – in signs and banners, in speeches at assembly, and in the trophies at the reception area. The principal of Mondale High states "People want to be identified with success." The learners are taught that they have the opportunity for success, that they are the masters of their own futures. In the design of the school, this sense of pride and association with success can be thought through in the representation of the school – the kind of identity of place it promotes.

In successful schools, teachers have a personal relationship with the learners. This is important as it reduces the chance of learners dropping out unnoticed. Many of the schools mentioned a sense of family in which learners are loved and respected. Christie speaks of this as a 'culture of concern'. This culture is not limited to the emotional support of learners. The case studies revealed the importance of having a feeding scheme as many children do not receive adequate nutrition at home. Figure 42 shows lunch time at Phumlani Secondary. The provision of a kitchen, which must be large enough to serve all the children and secure, as well as a place for eating should be considered in design interventions in schools. Small, quiet spaces for personal conversation and counselling, as well as large open spaces that contrast to the cramped living conditions on many learners could inform an architectural response to the need to create an ethos of care.

Figure 43: *Usasazo Secondary: Photograph to show streetscape with workshops that open onto the street for trade (Baan, 2003)*

Figure 44: *Usasazo Secondary: Photograph to show streetscape with workshops bricked-up*

Shifting Systems: retrofitting and adaptability

Part of the complexity of the relationship between school systems and school architecture is that the physical buildings often outlast pedagogy and education policy which are constantly being updated and revised. This has been shown and discussed through the timelines in the previous sections of this paper. This section examines how those buildings whose original design intentions do not align with current pedagogic thinking, policy and practice are adapted architecturally. The focus is on changes to the built fabric of the schools, as well as programmatic shifts and spaces being appropriated for uses other than the initial intentions.

The intention is that this act as a red flag for future designs for school spaces – that the designer should think beyond the current pedagogy/policy of schools as these are very likely to shift within the lifetime of the school. Therefore, it would be responsible to design not only highly specific spaces, but also for adaptability of spaces. Everyday practices of schools can be a useful indicator for this, as shifts in practice generally take longer to implement.

Often the built fabric is retrofitted, for highly pragmatic reasons, without a professional spatial practitioner. This can result in compromise of the quality of the environment. For example, the current Schools Act (1996) states that all schools should have burglar bars on ground floor windows for security reasons. This has resulted of retrofitting of schools with a generic 'cage-like' burglar bar system that is not integrated with the building fabric. This is an example of a policy shift that has direct consequences for the built fabric, as shown in Figure 45.

Shifts in pedagogy also have repercussions. Usasazo Secondary was designed to work for a 'further training' curriculum (FET) that teaches skills, such as appliance repair and food trade ("Usasazo Secondary School," 2005). The architects accommodated these activities in specifically designed workshop spaces with a direct connection to the street via an openable hatch, shown in Figure 43. Wolff (2007) described this saying, "The street façade was transformed by facilitating the new education policy that calls for entrepreneurial training and therefore interaction with the public through a series of trading hatches". When the curriculum shifted 'back-to-basics', these workshops were used as classrooms. However, their long narrow layout makes them awkwardly proportioned classrooms and the hatches were found to be problematic as they allowed the noise of the street into the classroom, so these were bricked up, as illustrated in Figure 44. This is an example of a thoughtfully designed space being underutilised due to a shift in pedagogy.

Figure 45: *Photographs to show retrofitting of windows with cage-like security bars at Siyazingisa Primary and Bonteheuwel Secondary*

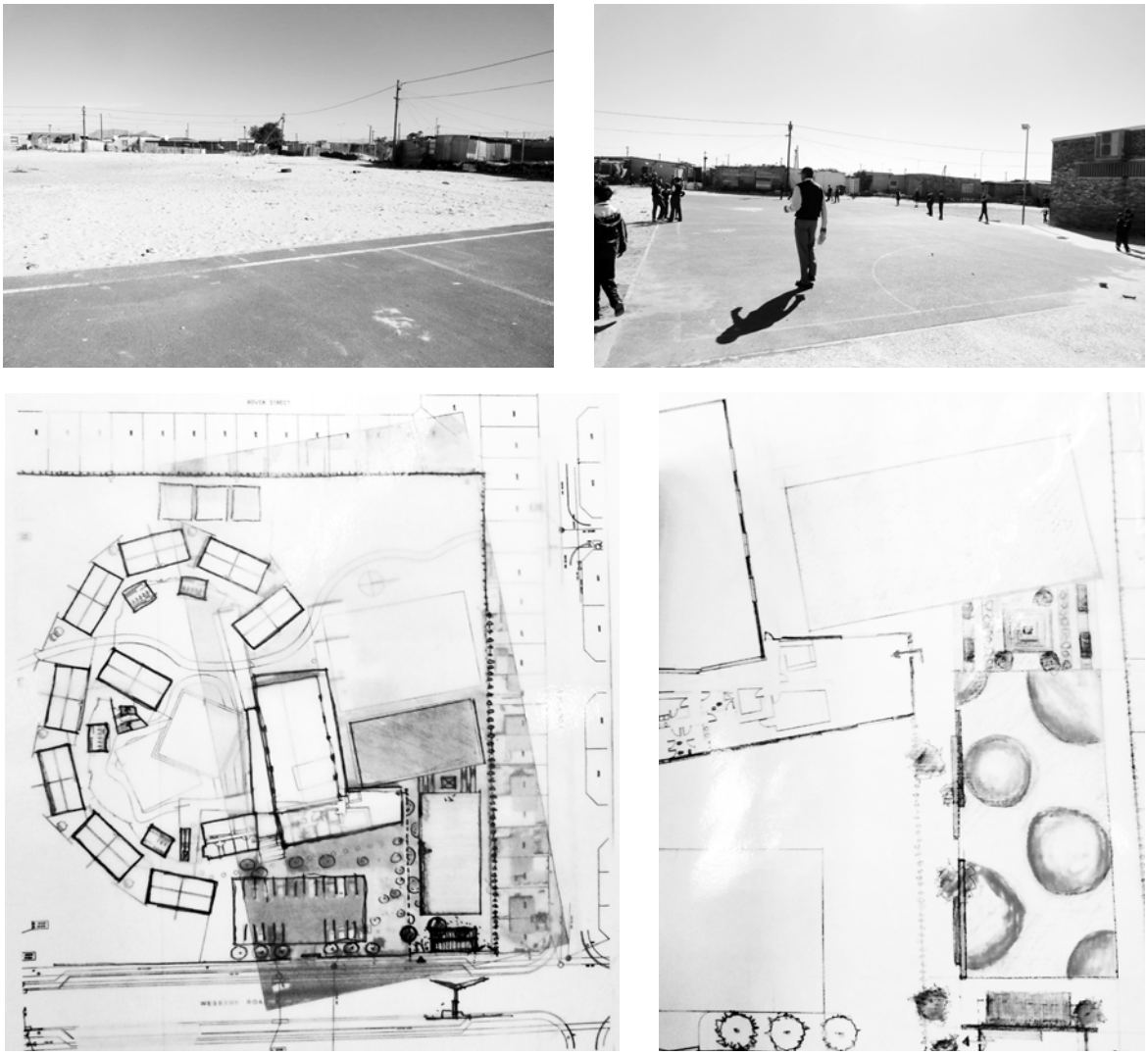


Figure 46: *Wesbank No1 Primary: Photographs to show outdoor sports area as it it now and photographs of drawings proposing "a concept for developing our school playground"*

At Siyazingisa Primary, new kinds of practice have informed appropriation of classroom spaces for a diverse range of programme. At the end of the formal school day, desks are pushed against the walls of classrooms which are transformed into make-shift music rooms, dance studios, assembly spaces, churches etc. The simple spatial layout of the classroom allows this adaptability, as shown in Figure 47. This is an example of spaces being used for purposes other than the original intentions without changing permanent features of the space. In some rooms, architectural devices have been used to make the space more adaptable. For example, a roller shutter door the width of the room has been placed between two classrooms and this temporary large space is known as 'the multi-purpose hall'.

Another strategy is to leave the design open-ended for future development. Wesbank No1 Primary School was built on a constrained budget, so the designers had to prioritise facilities to be provided. However, they left the site open for future development when funds become available. Open outdoor space was left for sports facilities, but was not developed. Fifteen years after it first opened, the school has a determined leader and is in a financial position to investigate formalising this space to create a playground and five-a-side soccer pitch (pers. comm.).

Another challenge which many schools face is overcrowding. Many of the schools function with numbers far beyond their capacity (Jansen & Blank, 2014). This is often a particular challenge for effective schools as their culture of success attracts more learners (Jansen & Blank, 2014). Siyazingisa Primary, Wesbank No1 Primary and Usasazo Secondary all have more learners that they can accommodate optimally (pers. comm. at site visits, 2015). Overcrowding is as much a spatial issue as a social one. When designing school spaces, architects should be aware that numbers of students fluctuate and, where possible, this should be addressed through design.

Figure 47: *Siyazingisa Primary: Photographs to show how simple classroom spaces can adapt to various scenarios: multipurpose hall mode (note roller shutter door), teaching mode, after school activity mode*

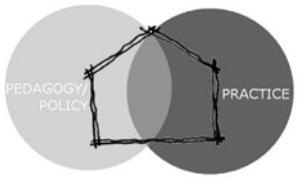


Figure 48: *Diagram to show architecture framing the intersection of pedagogy/policy and practice*

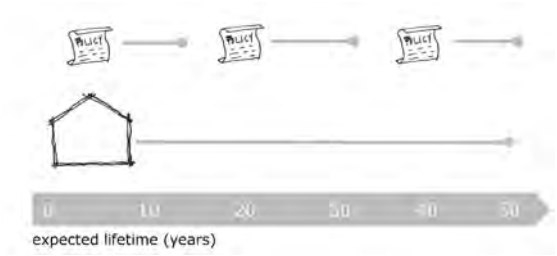


Figure 49: *Diagram to show the longevity of a school building compared to the relative transience of pedagogy/policy*

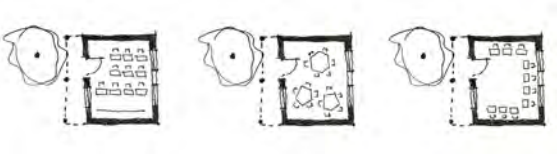


Figure 50: *Diagram to show the adaptability of a simple classroom to shifts in pedagogy*

Architecture of Schools: nine lessons and challenges

This section has raised lessons and challenges for the design of architectural interventions in schools. These are extracted and set out in the nine points below.

1. Architecture as a mediator

Architecture can act as a mediator between social systems and everyday practice. In doing this, it has the potential to influence teaching and learning, as well as the experience of the school community.

2. Getting the basics right

Due to the challenging environments of many of the schools, the basics of the architecture of schools, such as windows for natural ventilation, need to be rethought in creative ways to ensure that they are not compromised. The study of Cape Town schools has raised in particular the importance of security, robustness and minimal maintenance, and the importance of achieving these without compromising the quality of place.

3. Human considerations

In the challenging contexts of many public schools, the architecture should respond in a way that is both robust enough to survive harsh forces, such as overuse and vandalism, yet simultaneously consider the more human dimensions of comfort, identity and pride. Schools are ultimately places for learning and so the architecture should create places that are inspiring and that reduce external stresses on their inhabitants.

4. School as a public institution

Schools are public symbols in their urban environment. As such, the representation and image of the school is important. This also impacts the way in which learners, staff and the greater school community associate with the school – the positive effect of identifying with an institution of excellence was discussed earlier in the paper.

5. Longevity of buildings

In order to design school spaces, architects need to have a longsighted understanding of schools. The danger is that school design is situated too narrowly in a single pedagogy/policy or typology and does not acknowledge the longevity of a building compared to the relative transience of current policy.

6. Broaden response to project of education

This research has illustrated the need for a broader conception of the project of education – one that looks beyond classrooms to the full life of the school. One of the ways in which this can be addressed is in the programming of spaces – spaces for eating; afterhours activity; and personal interactions were noted as important. In addition to the programmatic considerations, spatial arrangement can also respond to the broad needs of schools. For example, visible leadership and enabling easy communication with staff were noted as effective strategies.

7. Adaptability

The shifting nature of pedagogy and policy highlighted the need for schools to be adaptable to change while maintaining a level of robustness. Simplicity can be a useful strategy for adaptability in spaces that are affected directly by these shifts – primarily the classrooms. One can make use of architectural devices, such as temporary dividers between rooms, to maximise the adaptability of spaces without significantly compromising the immediate requirements of the space. The design should account for potential future growth of the school and future development and addition of facilities.

8. Didactic design

The timeline study revealed a number of instances when there was a mismatch between space and practice, for example, teachers were not trained to use the open plan spaces optimally in the 1960's school reform in England. One response to this is to design didactic spaces that, in their design, explain their use.

9. The role of the architect

Another response to the mismatch between space and practice is to involve the school community in the design process. This participation may aid effective use of the spaces, and it is within the role of the architect to facilitate this interaction.

The role of architect in the design of schools has shifted in time. The architect has the responsibility to inform themselves of why school typologies have emerged and to question these and their influences before entering into the design project. Where there is community participation and consultation, it is the role of the architect to communicate this information, such that informed decisions can be made.

Conclusion

This section set out to explore the relationship between pedagogy, policy and practice and the architecture of schools in order to contextualise school design within broader notions of education systems and to extract lessons and challenges from this for the architecture of schools. The focus was on public schools in Cape Town. The first key finding was that this relationship is complex and that direct patterns of causality are difficult to establish. However, this in itself can be an informant for designers as it highlights which aspects are beyond the realm of architecture and which aspects hold potential for architectural intervention to have a profound influence.

In the transformation of South Africa to a democratic state, redress of the education system was prioritised. Architects were challenged to spatialize shifts in education thinking in the making of new schools. This is seen in the shift from a highly-controlled rectilinear spatial typology of schools to a more individualistic layout (though the influence of other factors is acknowledged), as well as the inclusion of specialist spaces for programme beyond the classroom and the awareness of representation of the school and its contribution to its urban environment. Thus, the second key finding was that the architecture of schools can be seen to have a facilitating role in the transformation of schools.

Third, was the acknowledgement of the longevity of a building in contrast to the relative transience of policy. The timeline study implied that pedagogy and policy trends are cyclic in nature. Of the four main case studies, all of the schools now function under a different policy and pedagogy to that under which they were built, as little as 15 years ago in some cases. This alerts architects to avoid locating new school designs too narrowly in a single pedagogic model or policy. This, and the study of effective everyday practice of schools, pointed to focussing on aspects of school design that can exist across shifts in policy or pedagogy. This suggests an approach that addresses classrooms as simple, adaptable spaces and focusses on areas beyond the classroom.

It was suggested that designers should endeavour to allow room for future growth and development in a way that does not compromise the quality of the school environment.

These findings are useful in exploring the larger question of how to improve the quality of school environments through architectural intervention, as they highlight those aspects in the life of a school on which architecture can have a meaningful effect, as well as acknowledging the influences of education systems; the limits of architecture in the project of education; and the need for the project of architecture to explore school spaces beyond the immediate requirements of classrooms. The potential for the architecture to facilitate effective practices in schools in a broad sense was discussed and noted a key informant for the project of school architecture.

Research Part 2
design strategies for robustness in schools

Figure 51: *Images of some of the design strategies for robustness explored in this section (Menocal, 2013; Wigglesworth, 2011; Design Studio, 2010)*

Introduction

Working from the premise that Cape Town schools need to be robust in order to be successful in the long term, this research explored a series of architectural strategies for robustness in the design of school buildings through a selection of international and local precedent studies, to inform and inspire a speculative architectural design proposal, taking into account realistic technical solutions that have been used elsewhere.

The intention was to focus on a number of aspects that are important for schools in Cape Town and how these could be addressed through architectural strategies that have been successful in other schools, in order to give an idea of some of the range of architectural strategies for robustness. The challenge for this research was not to focus analysing on the problem of the lack of robustness in Cape Town public schools, but rather to focus on a series of potential solutions or alternatives and interrogate their technical resolution in terms of how they achieve a desirable level of robustness combined with positive place-making.

This section summarizes the key findings of the research into strategies for robustness that have held traction for the architectural design proposal.

Figure 52: *Bonteheuwel Secondary School: Photograph to show kitchen window which has been bricked-up due to theft problems*

Figure 53: *Usasazo Secondary School: Photograph to show barbed wire on downpipe to prevent people climbing the pipe to gain access to the upper level*

Figure 54: *Wesbank No1 Primary School: The architects designed security screens over windows on the street facing façade only. Photograph to show how internal façades have been retrofitted with generic cage-like bars due to being perceived as vulnerable.*

A case for robustness in schools

In a recent article written for the Architects' Journal, Roger Hawkins (2015) outlines ten guidelines for architects in the making of "great schools". Guideline #4 on his list is the importance of "robust, low-maintenance architecture" in the design of school buildings (Hawkins, 2015b). Robustness refers to the capacity of a building to withstand the forces of use without breaking or losing its integrity. That is, that the built fabric is strong and secure enough to take a great amount of wear-and-tear without losing its ability to fulfil the purpose for which it was originally intended. In the words of Hawkins (2015) "School buildings need to be like solid toys that can stand some tough love. Ongoing regular maintenance is rare in schools." Many public schools in Cape Town have the additional pressures of being in areas with high crime rates; limited culture of caretaking for the built environment; and restricted budget or capacity for maintenance (Jansen & Blank, 2014), these conditions heighten the need for robust and low-maintenance design.

The typical public school in Cape Town is not sufficiently robust in its physical form. This is revealed in the widespread 'super-robust' retrofitting of schools with features such as cage-like burglar bars and security gates on all doors (including internal doors); as well as the features which are conspicuous in their absence, revealed by glass-less window frames, missing downpipes and bulb-less light fittings (Bonteheuwel, Siyazingisa, Cedar, Wesbank, pers. comm. 2014/5). Graffiti and vandalism can also be indicators of the need for robustness (Lackney, 1999).

The challenge for school design, however, it not just to achieve robustness in its purity – military bunkers and prisons do that – but to find ways of achieving robustness without compromising the spatial quality of the learning environment (Dudek, 2015; Lackney, 1994, 1999). However, despite the spatial quality being a crucial aspect of school design, neither can robustness be neglected in its favour – post-occupancy evaluation of several public schools in Cape Town has demonstrated that if an

aspect of the building is perceived as vulnerable it will be retrofitted to be tougher (Usasazo, pers. comm. 2014), often without regard for the original design intentions, thus compromising the spatial quality. Figure 52 - 54 show three such instances. This highlights the importance for architects to integrate robustness into the design from the outset. Low (2010) writes of architects of schools "whatever the other agendas, we must always accept government's long-term responsibility to ensure security, robustness and absolute ease of maintenance".

Aspects of Robust Design: a selection of elements

Almost every aspect of a building can be analysed as to how robust it is. However, in order to limit the scope of this research, a small selection of particularly vulnerable aspects that are of relevance to public schools in Cape Town has been made. These aspects were prioritised through a process post-occupancy evaluation of typical public schools in Cape Town, as requiring urgent attention in the design of school spaces.

The research explored aspects of the following:

- spatial robustness
- security envelope
  - roof
  - walls
  - screens
- moving parts
  - rooflights
  - windows
  - doors
- components and products
  - ironmongery and downpipes
  - light fittings

It is easy to become overwhelmed by the magnitude of this problem and the result of that can be the design of highly defensive architecture (Miller, 2008). This section demonstrates examples of aspects from thoughtfully-made, inspirational learning spaces that also have an appropriate level of robustness. Only a small selection of these is discussed for the purpose of this document.

Figure 55: *Bonteheuwel Secondary School: Aerial photograph to show site configuration. Note the disused sports fields which have since been fenced off from the school as they were too difficult to maintain and too vast to be kept secure. (Google Maps, 2014)*

Figure 56: *Wesbank No1 Primary School: Plan to show 'moat-like' spatial configuration (Smuts, 2000)*

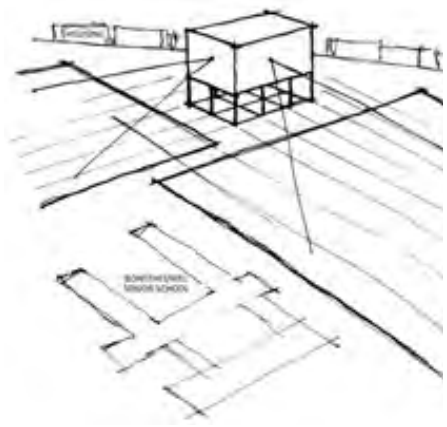


Figure 57: *+ one, proposal for addition to Bonteheuwel Secondary School: Conceptual sketch to show spatial configuration*

Spatial Robustness

'Spatial robustness' refers to strategies that of themselves limit the need for material robustness. The spatial arrangement of buildings can make them weak or strong – from how a building sits on its site to how security measures are considered.

The way in which the building is conceived on the site has a profound influence on how robust the building will be. Schools often have large open sites, with space for sports and play. Low (2010) describes the typical school built during Apartheid as "open and exposed within the expanse of its ample site". The key word here is "exposed" as it suggests a lack of robustness. This is illustrated clearly in Figure 55. There are multiple approaches to site making that address this problem. One example is Wesbank No1 Primary School in Delft by CS Studios. Delft is a township area in Cape Town which struggles with a cycle of poverty and violence – when the architects were commissioned to design the school, it was reported that "crime statistics were the highest in the Western Cape" (Smuts, 2000). In order to create a sheltered environment for the school, CS Studios used the concept of medieval fortress "with a moat around it to keep unfavourable elements out" (Smuts, 2000). The buildings are set back from the site boundaries and form a protective ring around the main courtyard. A different approach is seen in the student design proposal for an addition to Bonteheuwel Secondary school, '+ one' (Harrison, Botha, & Windapo, 2014). Bonteheuwel is another area in Cape Town that is caught in a cycle of gang warfare. This proposal places the building as a tower at a strategic point in the site, such that it can survey the surrounding open land to discourage misuse. The building is raised off the ground on columns, removing it from immediate harm, and there is only one point of access to the building at ground level.

More detailed aspects of the building can also be thought through spatially in terms of their robustness. For example, the downpipes at Usasazo Secondary in Khayelitsha have been retrofitted with barbed wire, as shown in Figure 58, to discourage people from climbing the downpipes to gain access to the upper level. Placing the downpipe further back, such that climbing it does not gain access to the upper level, would have been a spatial solution to avoid this retrofitting.

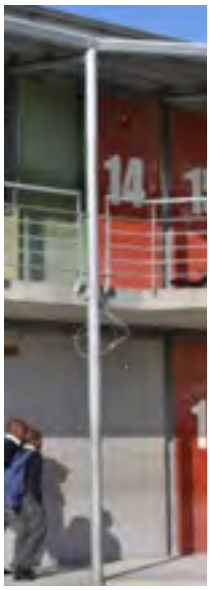


Figure 58: *Usasazo Secondary School: Photograph to show downpipe retrofitted with barbed wire to prevent climbing*

Security Envelope

Walls

Visits to number of typical 1960s and 1970s public schools in Cape Town revealed that the use of robust materials, such as facebrick, has stood the test of time. In many cases, the original facebrick school buildings are in a better state of repair than the more recent "quick-fix" additions (Siyazingisa, pers. comm. 2015). Figure 60 shows the caretaker at Masipumelele School scrubbing down the walls. This demonstrates the toughness of the material, suggesting that it is appropriate for architectural inventions in public schools. However, standard application of facebrick is strongly associated with old stock institutional buildings (Low, 2010). Thus, in the move to redress educational environments, post-Apartheid, the challenge is to take advantage of the robustness of this material but to represent it in a creative way that contributes to making inspiring, life-affirming places for learning.

Sandal Magna School in Wakefield by Sarah Wigglesworth Architects is an example of creative reinterpretation of an old material. The building is constructed on the site of an old Victorian school (Simpson, 2011; Wigglesworth, 2011) and the new building is partially constructed from reclaimed bricks salvaged from the demolition of the old school in combination with new materials (Wigglesworth, 2011). This is a powerful gesture that both remembers the old and brings new meaning to it. The design makes use of an array of different bonding types giving what might have been viewed as a 'boring' material a playful aesthetic. This is shown in Figure 59.

Figure 59 [left]: *Sandal Magna Primary School, Wakefield: photograph to show creative use of recycled facebrick (Wigglesworth, 2011)*

Figure 60 [below]: *Masipumelele Secondary School: Still-frames from 'Schools that Work' documentary to show facebrick walls being scrubbed down by the caretaker (Jansen & Blank, 2014)*

Figure 61 [top and left]: *Park View Secondary School, Birmingham: Photographs to show timber screen (Menocal, 2013)*

Figure 62 [bottom right]: *Park View Secondary School, Birmingham: Drawing to show timber screen addition in relation to the original brick building (Menocal, 2013)*

Screens

As is clear in the widespread retrofitting of schools in Cape Town with heavy-duty burglar bars, openings are perceived as vulnerable. However, as shown in Figure 63, these bars often compromise the spatial quality, making the schools feel very harsh and unwelcoming. The following selection of precedent studies shows alternatives to conventional burglar bars that are robust and can protect vulnerable openings while still being beautiful objects. A sense of safety and enclosure contributes to the positive spatial quality of school spaces; however, this is very different from a feeling of imprisonment that results from overly defensive strategies (Miller, 2008).

The addition to Park View Secondary School in Birmingham by Haworth Tompkins architects is wrapped in a beautiful yet robust timber screen (Menocal, 2013), as illustrated in Figure 61 and 62. The site is in one of the most poverty stricken areas in Birmingham and so required an architectural intervention that is robust, low-maintenance and economically efficient (Menocal, 2013).

In contrast to the existing 1960's school building, the architects wanted to create a high level of transparency in the new addition, allowing plenty of natural light into the spaces and creating a sense of natural surveillance (Haworth Tompkins, 2012). The screen element protects the large areas of glass from external penetration – acting as massive burglar bars. However, because the material quality of the timber is attractive and warm, the screen softens the appearance of the building and provides a sense of enclosure without creating the overly tough impression of conventional burglar bars.

The choice of material was important in the design of this screen. Often timber is a material associated with high maintenance. However, the selected timber, Siberian Larch, is a very durable, low-maintenance soft wood (Russwood, 2015a). This is due to it being highly dense, approximately 628kg/m2 with an 18% moisture content, as well as consisting predominantly of heartwood, 75 – 90%, and having resin and natural extracts that make it resistant to decay (Russwood, 2015a). If fixed correctly, this timber does not require maintenance and has an expected life-span of 50 – 100 years in average outdoor conditions (Russwood, 2015a). Russwood states that larch is "not easily damaged and therefore is ideal for highly exposed elevations, or applications where there is the likelihood of physical damage such as knocks or scrapes (e.g. schools)".

Figure 63 [right]: *Siyazingisa Primary School, Gugulethu: Photograph to show retrofitting of windows with cage-like security bars*

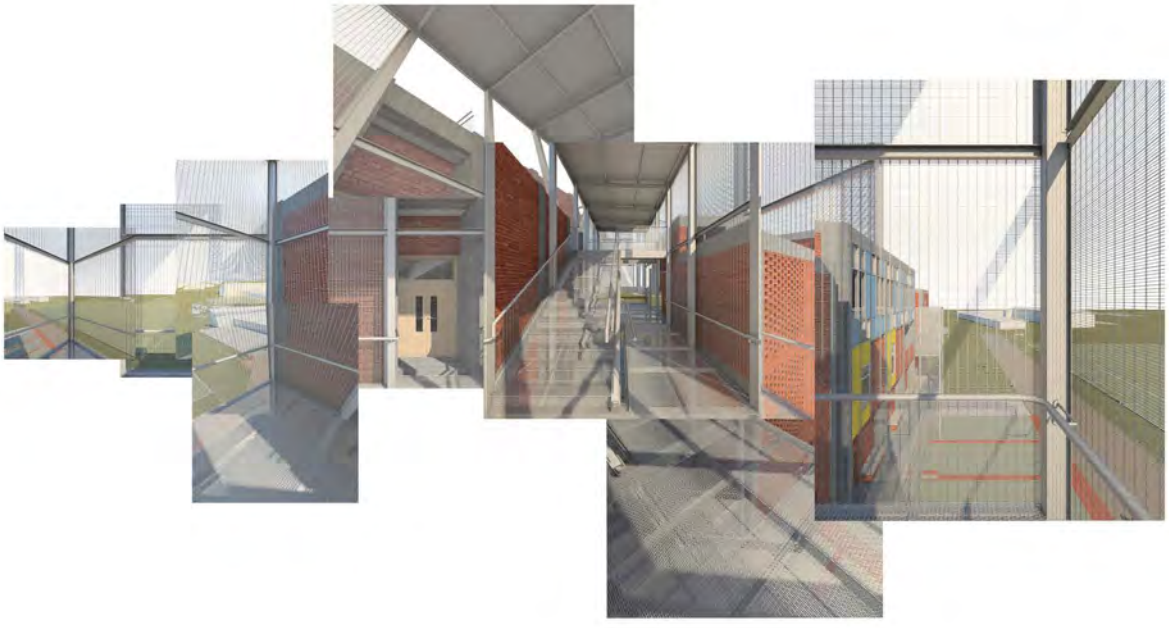
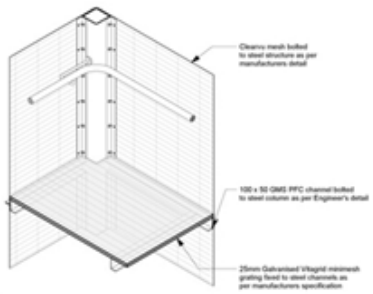


Figure 64 [top]: *+ one: Perspective render to show external stairway wrapped in mesh screen (Harrison et al., 2014)*

Figure 65 [bottom]: *+ one: Montage of perspective renders to show spatial quality in external stairway with mesh screen (Harrison et al., 2014)*

Another approach to screening was taken in the student design proposal, + one, for additions to Bonteheuwel Secondary School. The external staircases, which act as the only points of access to the building, were wrapped in an architectural wire mesh (Harrison et al., 2014) as illustrated in Figure 64 and 65. The product used is called 'Clearvu Mesh' and is a durable, steel material with a high level of transparency. The detailing was designed to be robust and tamper-proof from the exterior. Figure 66 shows details for fixing the mesh to the primary structure: all of the nuts and bolts are fixed from the inside, securing the stairway from unauthorised access. This solution requires a specialised product; in the design of Masibambane Secondary School Design Studio made screens from standard off-the-shelf products.

The screens at Masibambane Secondary School double as sun shade and security bars. They are made from standard GMS angles sections, welded to vertical supports (Perrin, pers. comm. 2015). This simple design was cost effective and easily replicable. As the school has grown, they have reused this design on other windows without needing input from the architect (Perrin, pers. comm. 2015).



3 Corner Condition - Internal

4 Corner Condition - External

Figure 66 [bottom left]: *+ one: Details to show architectural mesh screen and how it is fixed to the primary structure (Harrison et al., 2014)*

Figure 67 [top right]: *Masibambane Secondary School, Bloekombos: photographs to show dual purpose sun shade and security screen made from standard steel angle sections (Design Studio, 2010)*

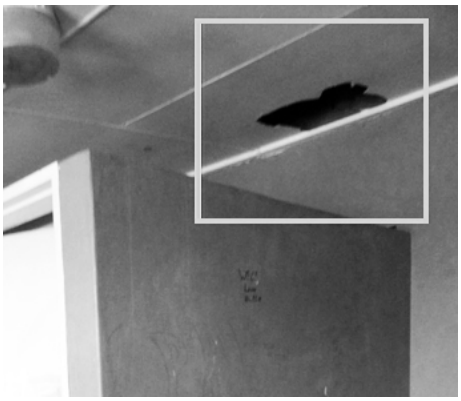


Figure 68: *Siyazingisa Primary School, Gugulethu: photograph to show break-in through roof and ceiling*

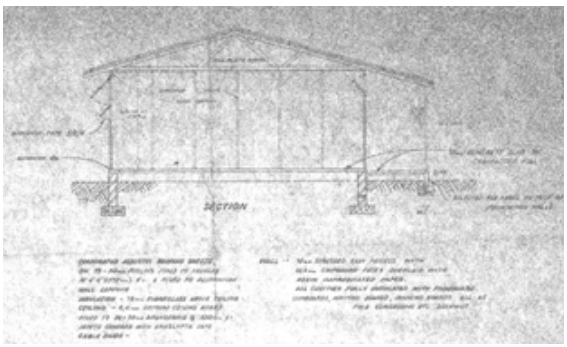


Figure 69: *Bonteheuwel Secondary School: Section to show 'Class A' roof on typical public school built in 1960s (Bruply 1974)*

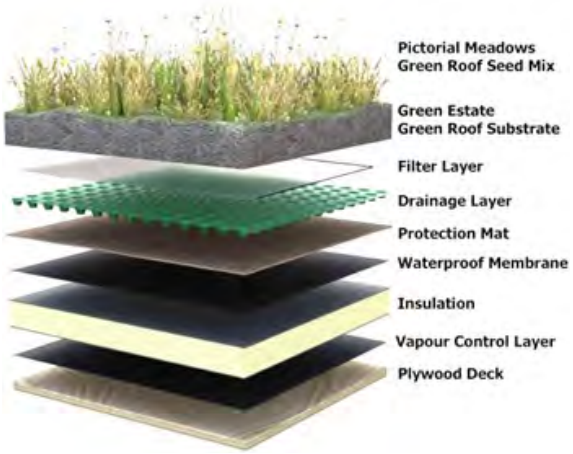


Figure 70: *Green roof: Exploded axonometric to show layers for green roof construction (Website: greenestate.co.uk)*

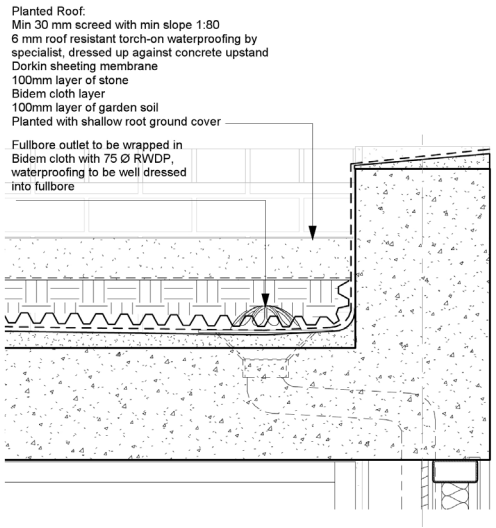


Figure 71: *Green roof: Detailed section to show layering of green roof construction*

Roof

In this study of public schools in Cape Town, it was noted that the roof is a vulnerable point in many school buildings (Siyazingisa, pers. comm. 2015). Windows have largely been secured through retrofitted burglar bars, but the roof has been left undefended. The typical Cape Town public school roof have usually been 'Class A' roof structures made from corrugated metal sheeting or cement fibre profile sheets on a lightweight frame structure (Wegelin, 2009), as shown in Figure 69. The image in Figure 68 shows how the bathrooms in Siyazingisa Primary School in Gugulethu were broken into via the roof. This research examined some alternatives to this lightweight roof structure that are solid and more robust in their nature. Of these, the study of green roofs held the most relevance to this architectural design proposal.

Green roof

Green roofs are a robust alternative to a conventional lightweight roof system. Typically, green roofs are constructed as a series of layers: a waterproofing layer, a drainage system, a root barrier, soil and vegetation all on top of the roof layer (Schmidt, 2013). Figure 70 and 71 show this. This layered system protects and insulates the roof surface (Schmidt, 2013), and makes breaking in via the roof difficult. In addition, the roof layer is often, though not necessarily, a concrete slab.

There are primarily two types of green roof: intensive and extensive (Carpenter, 2011; Schmidt, 2013). As the name suggests, intensive green roof systems have deeper soil layers, can house bigger plants and are higher in maintenance (Schmidt, 2013). Because this research focussed on robust alternatives that are not high in maintenance, the extensive system was the studied. Extensive green roof systems have shallow soil layers – usually around 60 – 200 mm depth (Carpenter, 2011) – therefore the vegetation must have shallow root systems. Common types of vegetation for extensive green roofs are mosses, sedums, cacti, herbs and some grasses (Carpenter, 2011). In the Cape context, water-wise plants such as low growing fynbos varieties and succulents, are appropriate (Schmidt, 2013). The extensive system requires minimal maintenance which entails irrigation only during the establishment phase and in the case of a drought (Carpenter, 2011).

Conclusion

This section has shown that is possible to design for robustness while still creating a positive spatial quality. This has been demonstrated through the investigation a selection of architectural strategies for robustness in schools through a number of precedent studies. Particular aspects of design are more crucial to robustness than others; the selection of aspects to be explored was made based on the most pressing requirements of schools in Cape Town. The emphasis was on architectural strategies that are durable and low-maintenance without compromising the quality of the learning environment.

In the discussion on spatial robustness, site-making was identified as a crucial process in the making of robust schools. The two precedent studies showed opposite approaches, both of which improve the spatial robustness of the school: the first conceptualised the school buildings as a moat protecting the inner courtyard from exterior forces; the second focussed on maximising natural surveillance and controlled access to the building by massing the building as a tower raised above the ground plane.

Three aspects of the security envelope were discussed. The section on walls briefly looked at success of facebrick as a long-lasting material in the context of a school and explored the potential of brick to be used in creative ways to challenge norms regarding its representation in institutional buildings.

The importance of a sense of safety and enclosure versus the discomfort of feeling imprisoned was explored through precedent studies that employ alternatives to conventional burglar bars. Two of the precedent studies showed instances were whole portions of the building are wrapped in a screen that is made in such a way that it allows transparency and is low-maintenance while being resilient. Another example showed a sun shading device, made from standard components, that doubles as a security screen. These examples all showed that conceiving of the screen as multi-purpose, rather than limiting its function to burglar bars, freed it of its negative connotations regarding a sense of imprisonment. The examples also demonstrated that the success of the screens was in their material quality and detailing.

The roof was identified as a particularly vulnerable point in many public schools in Cape Town. Extensive green roof design was studied as an alternative to lightweight roofing.

These studies serve as examples of realistic architectural strategies that address the problem of robustness in schools while creating inspirational learning spaces. These strategies hold clues for architectural design work in the context of Cape Town's public schools.

Siting and Programming:
developing the brief

Programme: *extended school*
Siting

Programming: extended school

The research into the relationship between school policy, pedagogy, practice and the architecture of schools has shown the need for projects for school architecture to take a broad view of the needs of a learning environment, rather than being too narrowly rooted in a single pedagogy or policy. This has pointed to programme that supplements the existing school, such as places for eating, gathering, studying etc.

This decision to focus on the broader, higher order spaces is seconded by the existing conditions of the schools: adequate classrooms but a lack of specialist spaces. The linear-block type schools were built with a narrow focus on teacher-directed, classroom-based pedagogy, as such, supplementary spaces were not provided. The classroom blocks were designed as highly rational, utilitarian spaces that are optimised to physical conditions. Their value lies in their North-facing orientation; good natural light and passive ventilation; as well as a simple rectangular form which through its simplicity offers flexibility in that many possible layouts may be achieved without re-designing the classrooms. This builds the argument for the extensions of the schools to focus on higher order spaces beyond the classroom first, and to leave replacement of the classrooms as a separate project at a later stage.

Having established that the existing classrooms are adequate and that the real problems are to do with broadening the scope of what is meant by 'education' and creating variation in experience, the brief is to extend the existing school rather than to replace it. This is also justified economically, as it is more efficient to upgrade and extend multiple schools than to replace a single school. The current backlog in school delivery supports the need for economy. Because the chosen typology is generally adequate in a utilitarian sense but far from inspiring spaces for learning, they fall between the gaps – neither urgent enough to replace nor acceptable to leave untouched. This project looks at finding a way to transform these schools: creating a hybrid type.
The specific programme was informed by a reading

of the research into the effective practices of schools, as well as through post-occupancy interviews with staff at various public schools in Cape Town. Interestingly, teachers did not speak of ways to improve the classroom as a learning environment: without exception, they were more concerned with issues at the scale of the whole school, such as gathering space and ablutions.

The following paragraphs outline and justify the programming of this project. The need for schools to have extended hours as safe places for study and recreation before and after school prompts architects to explore the potential of programme and spaces, beyond the set curriculum, that can be active for more hours in a day. Extended hours of use also contribute to security. MOD centres pick up on this need for after-hours school programme. They also extend the user group beyond the students of a particular school – all children are invited to join the activities. In addition to this, the project should be designed to allow for non-school events to make use of the premises after hours. To ensure that the school is active 24/7, a caretaker's flat should be sited on the premises. External functions, such as a school shop, create another point of activity.

Schools are public buildings, expanding the user group even further to include members of the public supports this. However, this can be disruptive. The spatial arrangement of the shared programmatic elements should account for this.

The *effective practices* section highlighted the importance of 'visible leadership'. This points to an architectural strategy that places the principal's work space in a visible and active part of the school. This may also help to facilitate a culture of accountability amongst the teachers. However, one should be cautious of creating a panopticon-like environment in which the school children feel they are surveilled in an oppressive way. This raises the idea of making a place for student leadership that is foregrounded over staff leadership spatially. Spaces such as a student-run tuckshop and common room allow the children to take ownership of spaces beyond the classroom, which may create a positive association with visible leadership.

The *effective practices* section further noted the importance of a feeding scheme. The provision of a kitchen, which must be large enough to serve all the children and be secure, as well as a place for eating should be considered in design interventions in schools. The kitchen should be related to the hall so that it can also service events. Where space is available on school sites, a food garden should be created. This has many benefits: it is educational; it greens the campus; it can supplement the feeding scheme; and the maintenance can be a positive way to involve the community in the life of the school.

Many schools noted the efficacy of providing space for afterhours study. This should take the form of a resource centre which can be used during school and after hours, and has place for both group work and quiet study.

Small, quiet spaces for personal conversation and counselling, as well as large, open spaces that contrast to the cramped living conditions are important in creating a range of scales of space to complement existing classrooms, which are of a uniform scale. The multi-purpose hall is the biggest of these. It opens the possibility of indoor gathering, sports, dance and drama, as well as events.

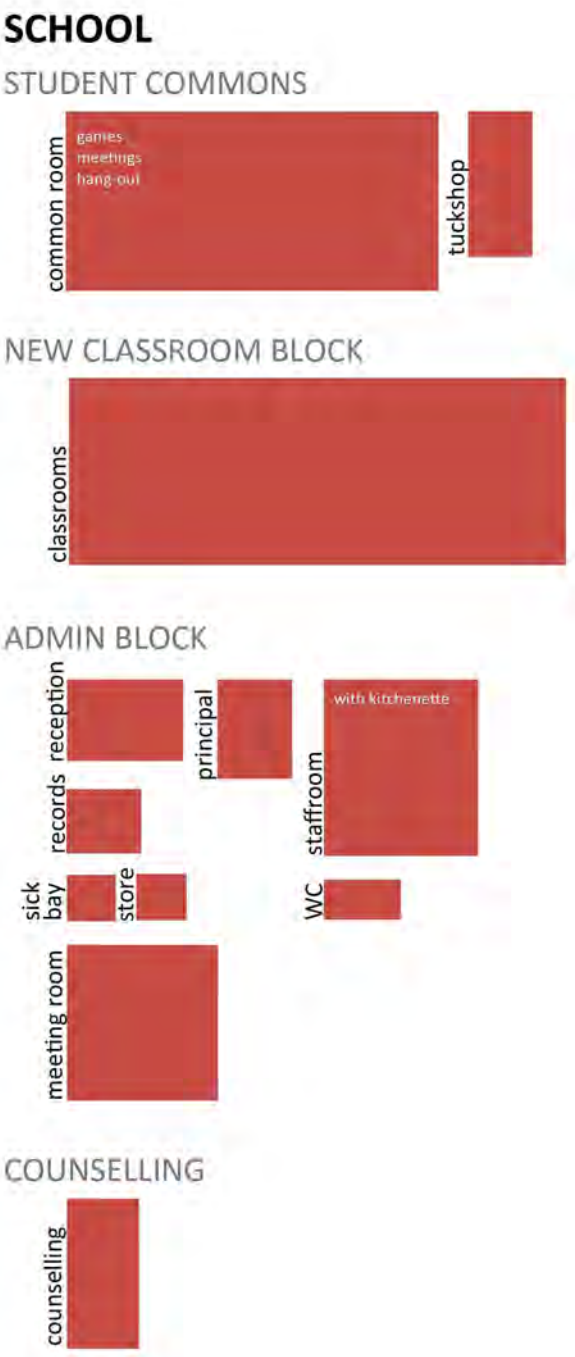
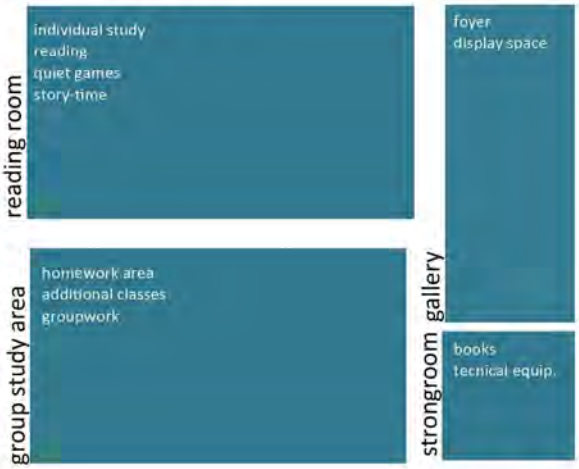


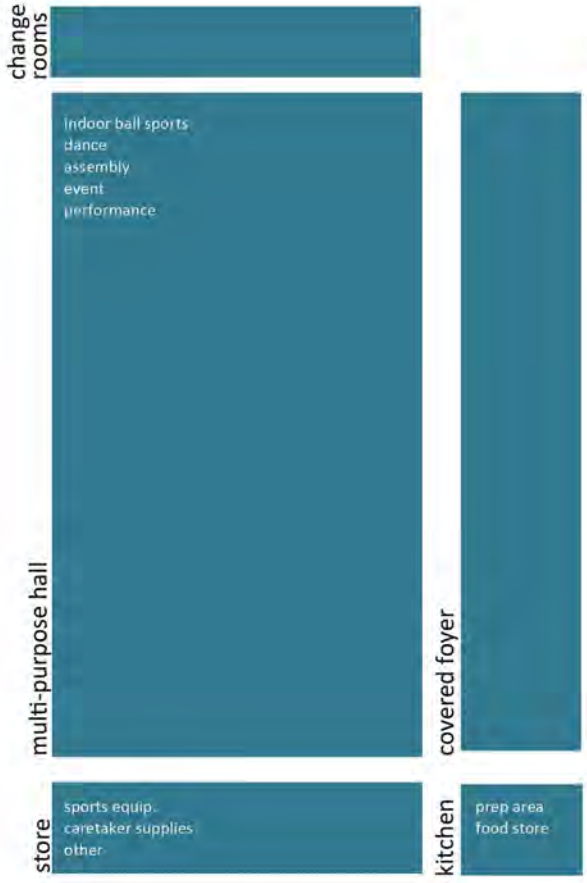
Figure 72: *Schedule of Accomodation: blocks represent relative areas of the rooms and colour indicates users (school, shared or public). The assembly of rooms creates a campus that is active throughout the school day, after-hours and in the holidays. The schedule of accommodation is as follows – simply put, everything beyond the classroom.*

SHARED

RESOURCE CENTRE



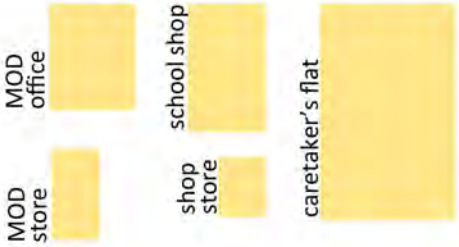
FORUM



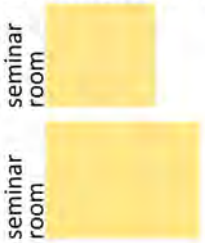
MAINTENANCE

PUBLIC

SHOP-HOUSE



COMMUNITY MEETINGS



OUTDOOR

food garden

forecourt

courtyards

playground

gathering square

sports court

garden court

sports fields

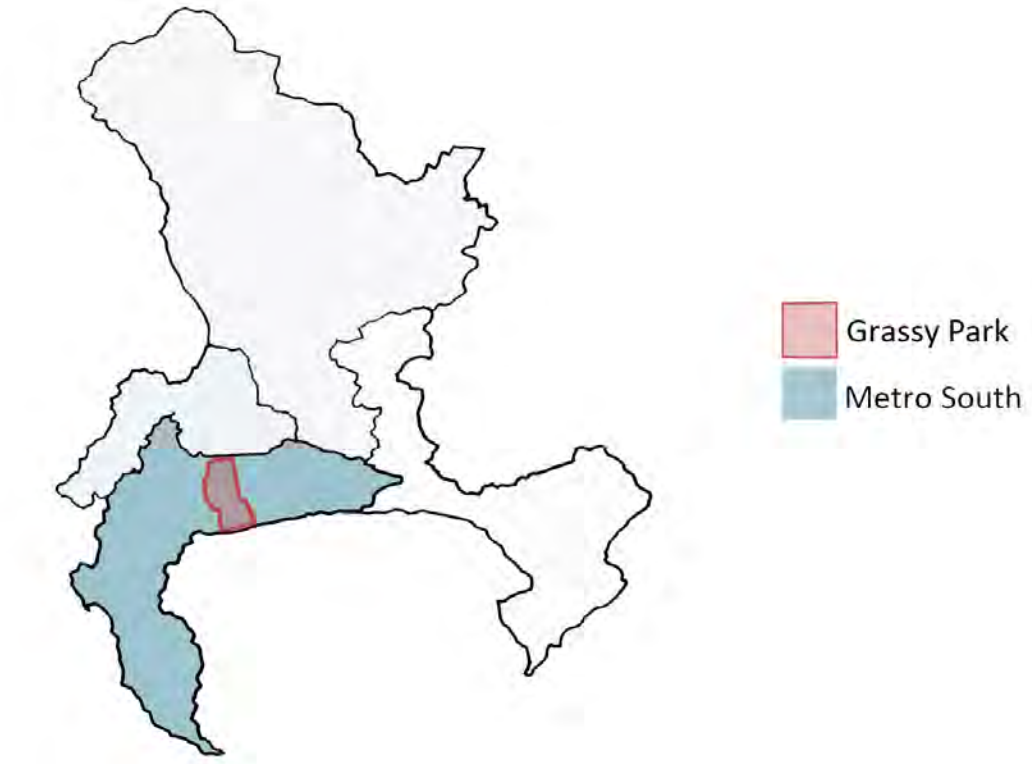


Figure 73: *Map to show location of Grassy Park in Cape Town's Education Districts*

Siting

Siting was initially informed by the research into spatial typologies of public schools in Cape Town and the resulting type-line that highlighted the linear-block type school of the 1960s-80s; as well as the decision to work with an existing school. The type was further limited to neighbourhood schools as these have the common condition of expansive and under-utilised sites. Thus, any existing linear-block type neighbourhood school could be an appropriate site.

It was necessary to limit the scope of the work due to time constraints of a Masters project; therefore the area was limited to a single neighbourhood that provided a number of schools of this type in close proximity to one another. Grassy Park became a useful case study as an area with many linear-block type schools which are in need of renewal but do not qualify for urgent replacement. These tend to fall through the gaps and are left without proper attention to the built fabric. This makes them very suitable for a project that looks at upgrading without replacing.

Grassy Park is an area in the South West corner of the Cape Flats. The Cape Flats is a low-lying area east of the City Centre. Grassy Park was initially developed as part of Montagu's Gift Estate. Under Apartheid, it was ghettoized as a 'non-white' area. The urban model is that of the enclave. This has the positive impact of reducing traffic speeds near homes and schools but also has the oppressive effect of reducing connectivity to the rest of the city. The enclaves are surrounded by major roads. The hub of Grassy Park, "Busy Corner", is at the intersection of two of these major roads. Montagu's Gift Road is another of these.

Grassy Park has many schools, the problem being not that there are not enough schools, but that they are largely of a poor quality. According to the 2011 Census (South Africa Census, 2011), 50% of adults over the age of 20 in Grassy Park have completed a Matric or higher. The residential fabric is predominantly (98%) formal housing with access to basic amenities (South Africa Census, 2011).

Figure 74: *Photographs of street scenes in Grassy Park to give an impression of the character of place*

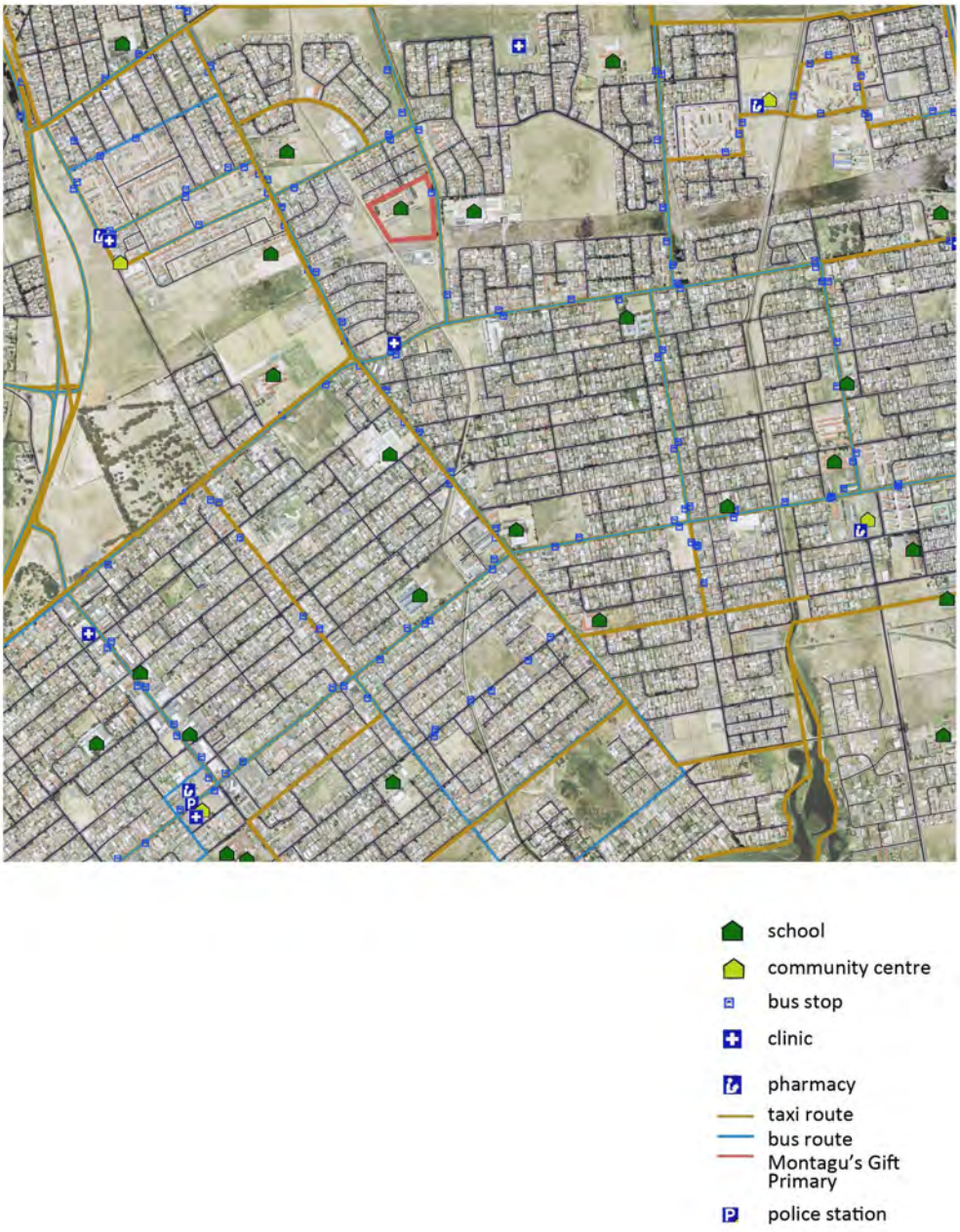


Figure 75: *Map of Grassy Park highlighting the public amenities (GIS, 2015)*

Figure 76: *Aerial photograph to show the schools in their urban context and in relation to one another*

547 students
16 classrooms

PARKWOOD PRIMARY

515 students
27 classrooms

MONTAGU'S GIFT PRIMARY

SOUTHERN SUBURBS COMMUNITY COLLEGE

PLANTATION PRIMARY
810 students
12 classrooms

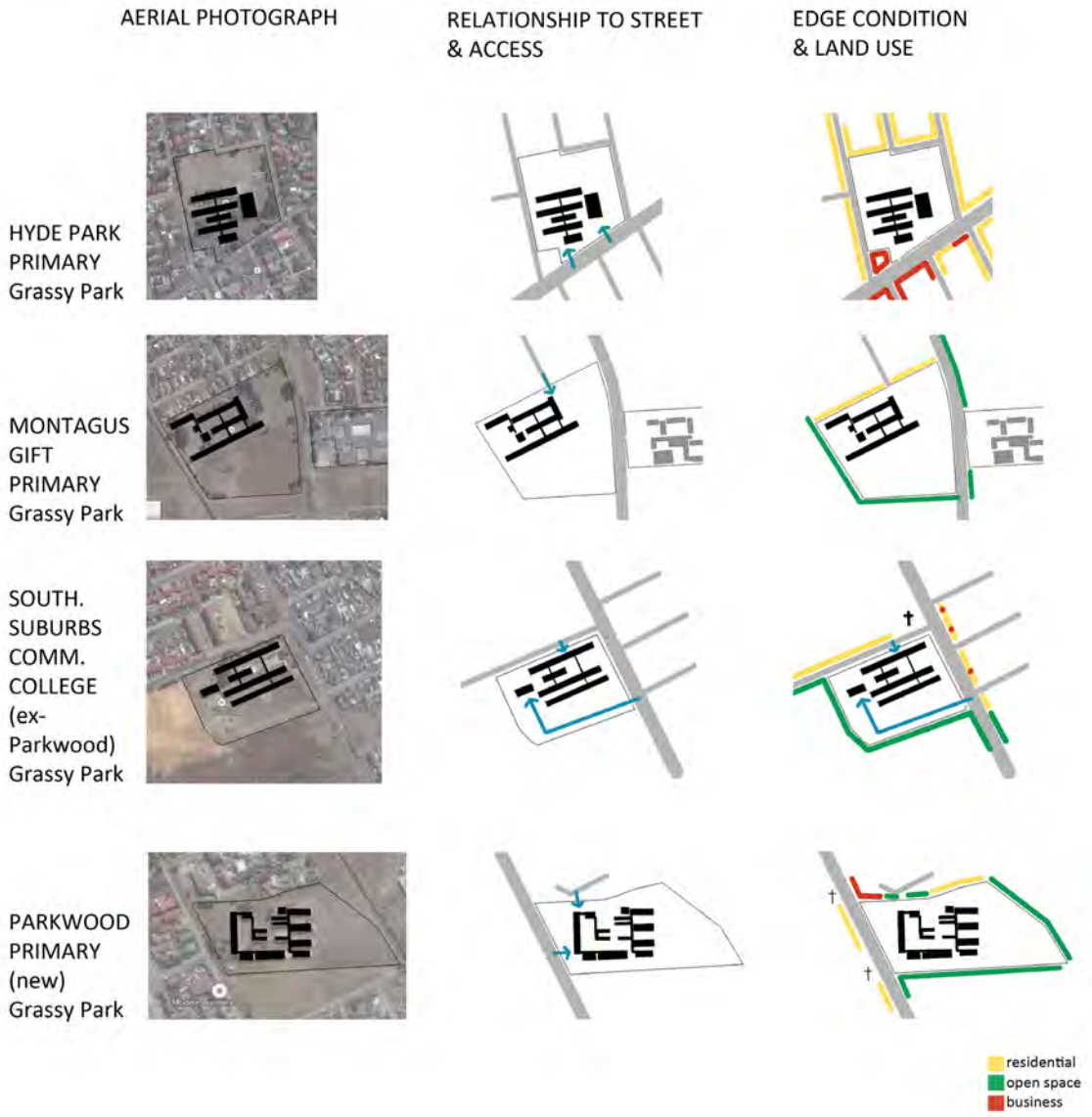


Figure 77: *Figure-ground study to explore the spatial arrangements of the four schools*

After reviewing the spatial typologies, school fees, age group and number of students for the public schools in Grassy Park, four schools were selected for further study. The map in Figure 76 shows the schools in their urban context and in relation to one another. The study in Figure 77 shows the schools as aerial photograph, figure-ground and street condition to establish the pattern and difference in their spatial arrangement. I visited each of these schools and interviewed various members of staff, including admin, teaching, grounds and sports staff, to gain more insight into the life of the school.

Montagu's Gift Primary was selected as the site for case study because it is fairly centrally located in a cluster of schools; it has the largest area of open site in that cluster, making it a good example to showcase all aspects of programme; and it has a pilot MOD centre with dedicated staff and after-school activities but without suitable facilities to support this.

Within this cluster of schools, Montagu's Gift Primary has the lowest number of students and the highest number of classrooms. This suggests great capacity for densification, another point that supports this site as appropriate for the architectural intervention.

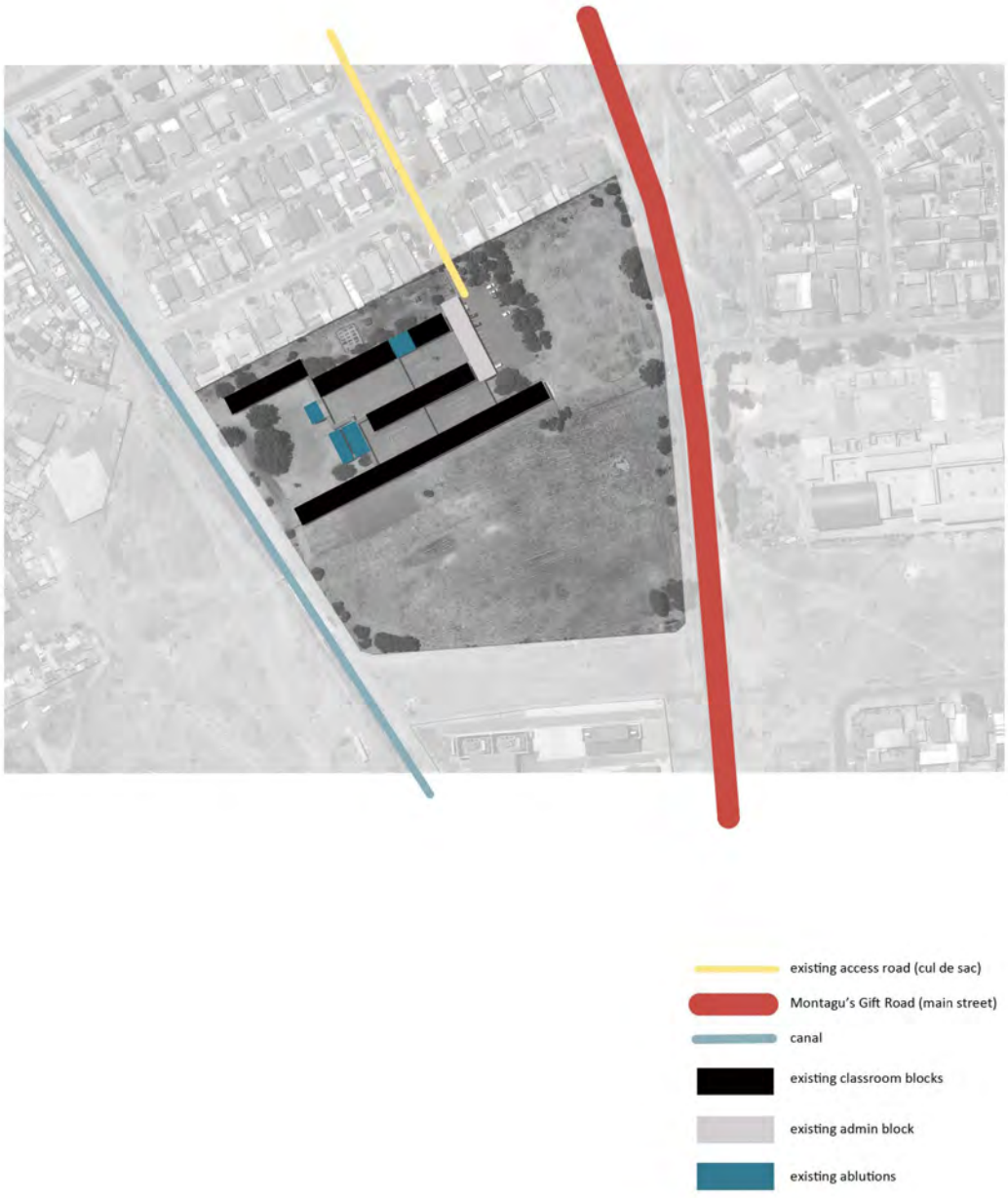


Figure 78: *Diagram to show Montagu's Gift Primary as it exists. Note the access point via cul de sac despite proxity to a main road*

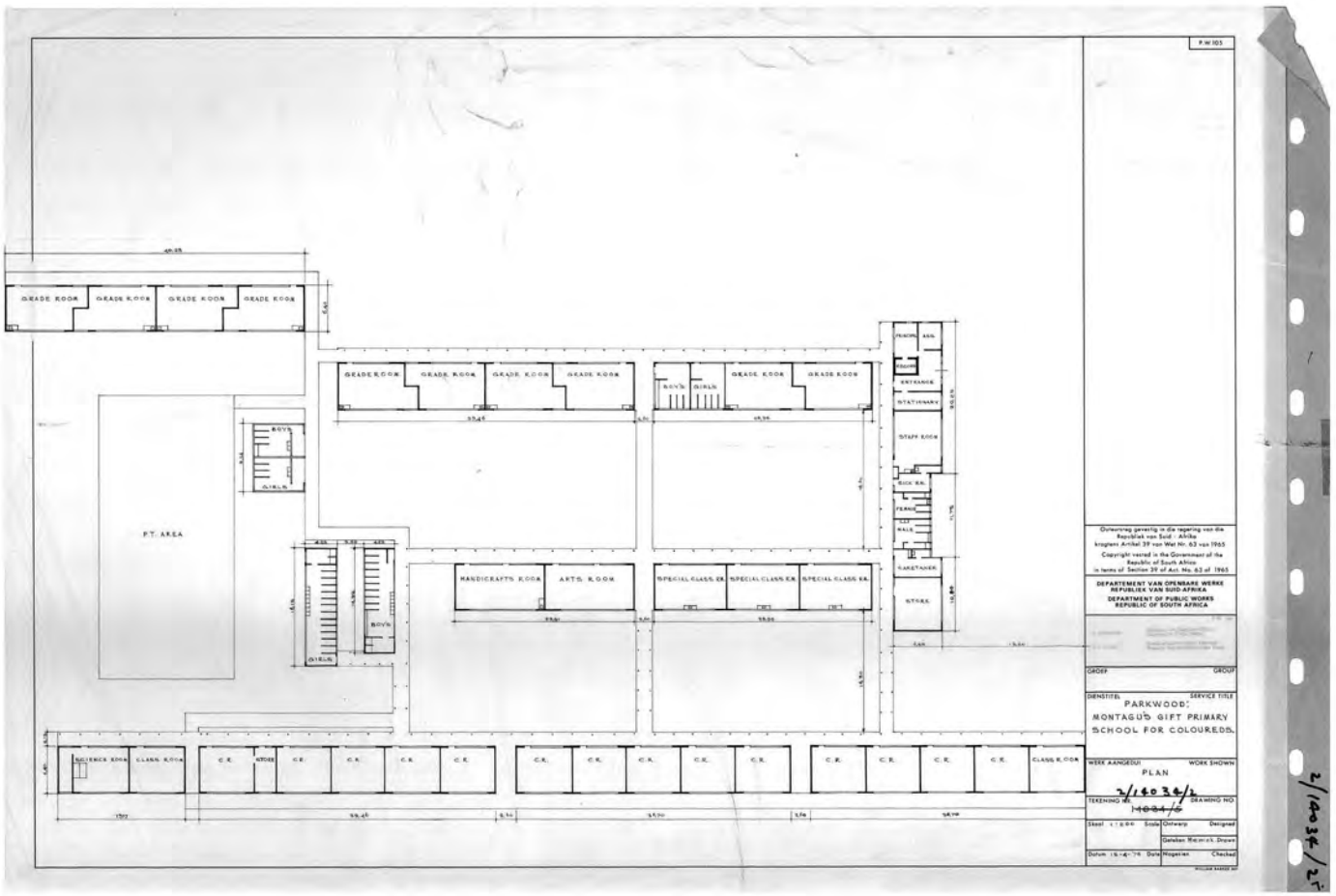


Figure 79 [top]: *Photomontage to show lack of connection between Montagu's Gift Primary and the main road*

Figure 80 [bottom]: *Plan of Montagu's Gift from 1975. The buildings are the same to this day.*

Figure 81 [top left]: *Montagu's Gift Primary: Photograph to show condition of the sports field. The sports field is under-used due to sub-optimal conditions*

Figure 82 [bottom left]: *Montagu's Gift Primary: Photograph to show a MOD centre dance class taking place in one corner of the courtyard while social basket ball is played in the same courtyard simultaneously, resulting in neither functioning optimally*

Figure 83 [top right]: *Montagu's Gift Primary: Photograph to show the well-used playground which is overlooked by both classrooms and houses*

Figure 84 [bottom right]: *Montagu's Gift Primary: Photograph to show the houses bordering directly into the school property which create a sense of natural surveillance of the playground*

Upon arrival at Montagu's Gift Primary, one is struck first by the utter disconnect between the school and the street. Despite being on a local main road with another primary school directly opposite, suggesting the opportunity for a strong civic presence, Montagu's Gift Primary classroom blocks are as far removed from this street as they can be and, in fact, there is currently no access to the school via this main road. The only access is via a cul de sac surrounded by residential single dwelling units. This reinforces the enclave model and negates the potential for the school to be a public landmark.

The majority of the vast site is empty, apparently kept aside for sports fields, yet there is no articulated connection between the school and the fields, so they stand un-activated unless they are directly in use. They are not marked for sports and stand sandy and barren, as if forgotten. Interviews with the sports coaches of the MOD centre revealed that the fields are in fact used for school sports, but their dilapidated state and lack of supportive facilities, such as changing rooms, means that they operate in a sub-optimal way, only suitable for casual play and not competetive sport. Other after-school activities organised by the MOD centre, such as dance classes, have no real place and so happen in the in-between spaces or in empty classrooms, which many teachers find disruptive.

In contrast to the barren-looking sports fields, the playground looks lively and well-used. The neighbouring houses back onto the playground and many of their security fences have a degree of transparency that allows natural surveillance of the playground.

Figure 85: *Montagu's Gift Primary: Photograph to show existing main entrance to the school*

Extended School:
architectural proposal

Pattern Language
- *Extend*
- *Replicable. Adaptable*
- *Clustering*
- *Shared Domains*
- *Types of Rooms*
- *Patterns for Tectonic Expression*
- *Social Circulation*
- *Ground Plane*
- *Scale and Civic Presence*

Walk-through
Precedent studies
Closing summary

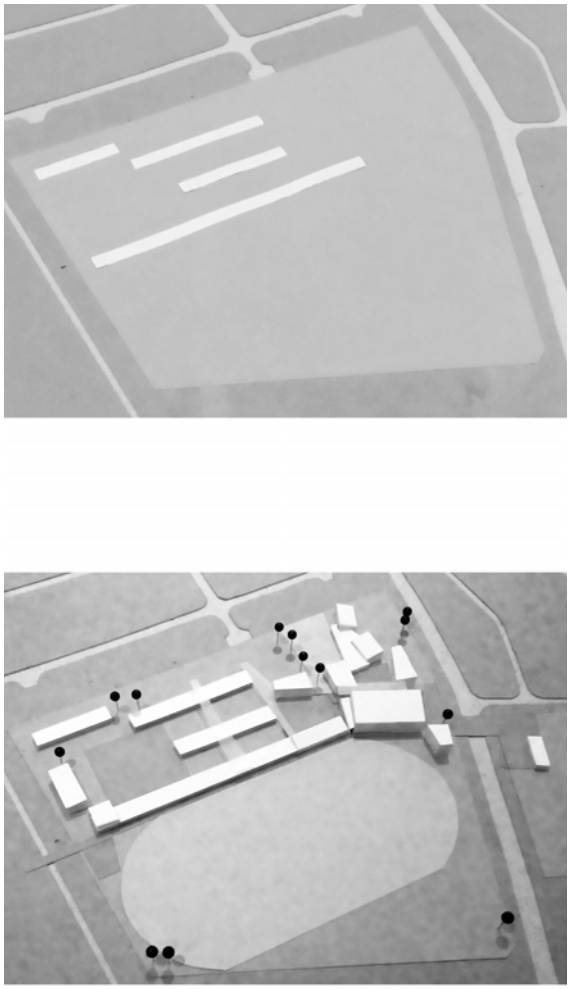


Figure 86: *Model photographs to show Montagu's Gift Primary before and after the extension*

Pattern Language

Because of the typological nature of the project, the architectural proposal is best understood as a set of strategies or adaptable patterns for elements and their relation to one another, the existing and the urban. The need to respond in a way that holds relevance for multiple sites while still being grounded in context, calls for a proposal that balances between the generic and the particular. This section unpacks the key strategies for extending sites of education. The strategies should not be read as a list of equal and autonomous items, rather they grow out of one another.

1. Extend
2. Replicable. Adaptable
3. Clustering
4. Shared domains
5. Types of rooms
6. Patterns for tectonic
7. Social Circulation
8. Ground plane
9. Scale and civic presence

The case of Montagu's Gift Primary is used to exemplify these patterns. Figure 86 gives an overview of the intervention at Montagu's Gift Primary as a preview in order to contextualise the patterns.

Extend

The extended school as a complete learning environment is the over-arching idea. The prudence of classrooms as simple rooms for learning and the importance of creating spaces that are complementary to this instead of devising a new type of classroom, is supported by the longevity of buildings contrasted to the transcience of policy. The idea of accepting the existing classrooms as a fix and focussing on supportive programme is especially relevant to the parallel linear-block type schools, which tend to have comfortable classrooms but lack other types of spaces.

One response to this need would be the careful reconfiguration of the existing schools on a case-by-case basis. This approach was ruled out for two main reasons. Firstly, the time and cost of starting from scratch at each school is not the most effective way to deal with a very widespread condition. Secondly, as in the case of replacing the school entirely, reconfiguration within the existing requires phasing and temporary classrooms during the construction period that would prolong the construction period, making this a more costly option, as well as being highly disruptive to the life of the school.

In the extension, the existing school acts as an anchor to the intervention, then the school exists as an extended type or hybrid. Eventually the intervention can act as an anchor for the replacement of the school. This provision for future upgrades responds to the need for adaptability noted in Part 1.

The existing classrooms are left to function as usual. The intervention is placed as a new anchor on the site that can function autonomously. This simplifies the phasing during the construction process. The premise is that school can continue without disruption while the construction site is fenced off for the majority of the building process. In the final stages, when the point of overlap between the school and intervention is constructed, there is the potential for some disruption. However, tectonic language that facilitates speedy construction within a few weeks means that this can feasibly be restricted to a school holiday, thus negating this disruption.

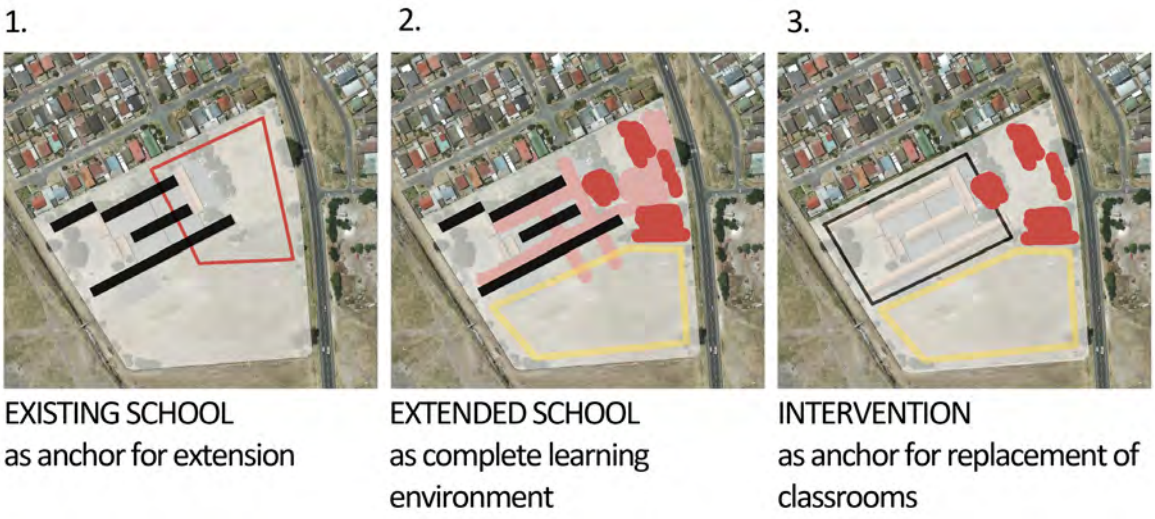


Figure 87: *Diagram to illustrate the concept of a phased process that creates a hybrid condition*

Figure 88: *Plans of sketch design, showing three sites of a similar spatial condition but different relationships to the street, all extended using a set programme. The arrangement of programme is adapted to each site.*

Replicable. Adaptable

The impoverished spatial condition of the linear-block type school has been established as typical to the majority of public neighbourhood schools built in the 1960s-80s. As such, the architectural proposal that addresses this should have relevance beyond a single site. However, as revealed in the widespread occurrence of this condition, a roll-out solution may only compound the existing problem – especially the lack of integration in urban context. Therefore, rather than develop a model or kit-of-parts that is reproduced mechanically in the same way across various sites without cognisance for setting, the approach has been to develop a typological response, that is, a set of elements with adaptable patterns for their relation to one another and the site.

The sketch design proposal explored the possibility of creating a set programme, each aspect of which found form as a separate and complete room, which is adapted to three different sites. The sites are all existing linear-block type schools in Grassy Park, however, their spatial arrangements differ in their relationship to the street. Hyde Park presented a corner condition; Southern Suburbs Community College School was parallel to the street, while Montagu's Gift Primary was perpendicular to and far removed from the street. The arrangement of the set programme on the site served to better integrate the schools into their context and to enhance the civic presence of the schools as public buildings.

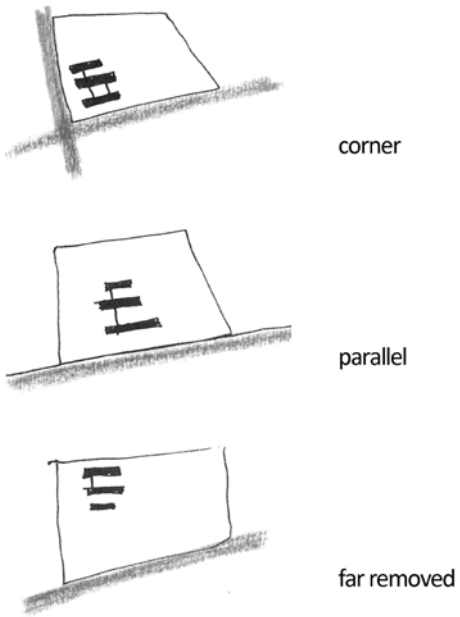


Figure 89: *Diagrams to show the relationship of the school buildings to the street*

Clustering

A key shift in thinking from the sketch design to the design development phase was to move away from necessarily having the same set programme added to each school, as this would result in much uneconomical duplication that reduces the feasibility of the proposal. Rather, it is useful to think of small clusters of schools that share facilities. Thus, while there is still a set programme of rooms, it is not necessary to add all of the rooms to each site. According to the needs and capacity of individual schools, the project may get one or more elements.

Montagu's Gift Primary's central location in a cluster of schools and very large site lends itself to being a case study of a site where the whole set of elements of the programme is proposed.

Figure 90: *Aerial photograph to show the potential for clustering of schools. The entrance to each street and routes between schools are highlighted. There is a particularly strong connection between Montagu's Gift and Plantation Primary*

Shared Domains

One aspect of extending the life of the school is to increase the hours it operates, as well as increasing the pool of users. This is addressed programmatically through the sharing of after-hours facilities with other schools, facilitated by a MOD Centre and other clubs that the schools may initiate; the introduction of a shop-house to the site (an on-site caretaker's flat and school shop); provision for the facilities to be used for local events or meetings by other residents, as arranged with the school management. Spatially, this mixture of users and uses has specific requirements. In order that the school property remains secure and the daily routines of teachers and learners are not disrupted by external users, it is important to design clear domains.

The strategy is to allow for a series of domains that can overlap or be locked down and function autonomously as required. To achieve this, the rooms are grouped according to how public they are, with clearly defined thresholds between zones. In the case of Montagu's Gift, courtyards become spatial organisers, with points of control, "locks", at the transition from one courtyard to the next.

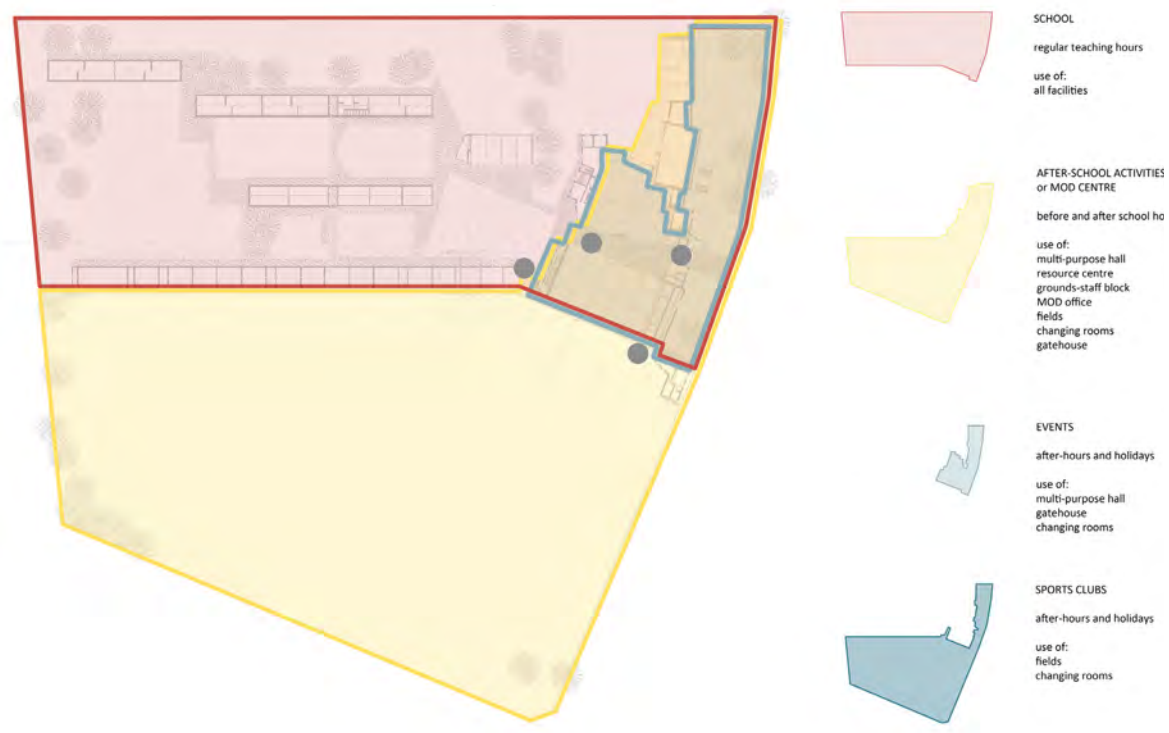


Figure 91: *Diagram to show the school site as a series of domains which overlap in shared domains but which can be locked down to function autonomously. The "locks" are highlighted in grey.*

Types of Rooms

The notion explored in the sketch design, of each programmed room having a set form which is arranged according to site, was shifted in the design development phase as it was too prescriptive formally. Alternatively, the rooms were conceived of as having two types.

Initially, the idea of creating two types of rooms came from the need for robustness: by concentrating the valuable items in one type and open space in the other, one can achieve robustness at crucial points while still having a variety of spatial and tectonic conditions. This idea was developed into a way of balancing between the generic and the particular, with one type being more rigid and the other being more adaptable.

The two types have been characterised as 'celebrated' spaces (portal frame type), that is, the bigger programmatic elements; and 'background' spaces (masonry type), that is, those spaces which have a smaller scale and are strongholds for valuable items.

The frame buildings have formal constraints due to their structure while the masonry buildings are not limited to the same extent. This results in the frame type being a more generic element while the masonry type can act as a junction and take up the geometries of the site in a way which is particular to a specific site. This is shown in Figure 92.

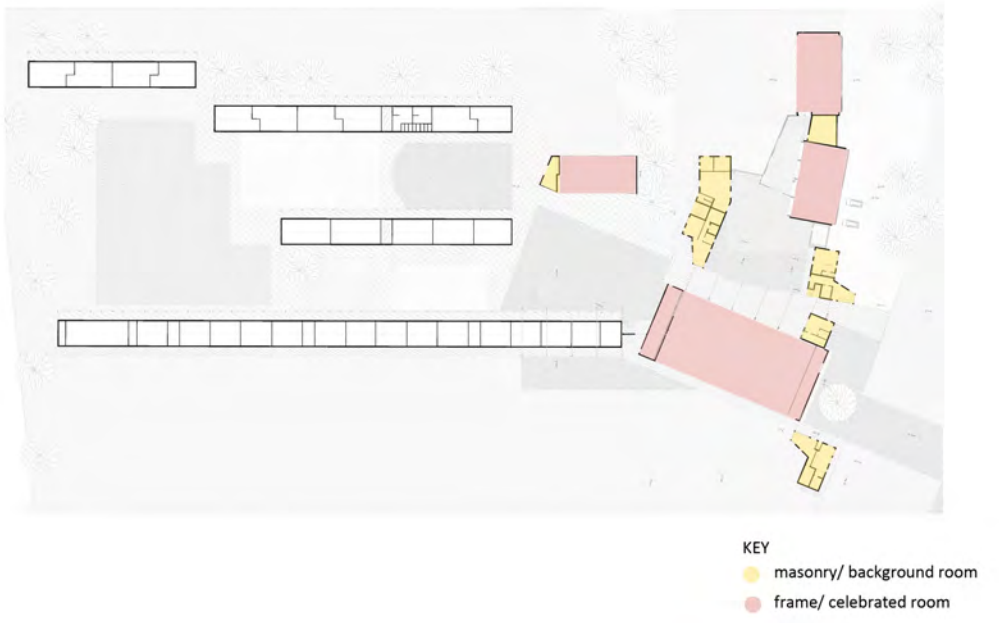


Figure 92: *Plan to show the two types of rooms*

Patterns for tectonic

The idea of two types of room was taken further in the technical resolution: each 'type' of room has its own structural and tectonic expression.

The celebrated spaces are larger scale rooms that have a light airy quality. This requires large spans, implying the need for a frame structure. This, plus the importance of speedy construction to minimise disruption of school life, pointed to the suitability of a steel portal frame. Figure 93 shows the portal frame type. The background spaces do not have large spans and need to be sturdy strongholds for valuable items. This resulted in the use of load-bearing masonry construction. Figure 94 shows the masonry type

In keeping with the typological approach of the project as a whole, a set of patterns has been developed for the surface treatment of these two types. Figure 95 illustrates patterns for tectonics of the portal frame type.

The celebrated type houses the larger spaces and so expresses verticality and lightness, while the background type is grounded in the site and read as more horizontal elements.

The portal frame structure has a lightweight skin that is free to pull away from the structure as per the spatial condition. Above head height, the frame is wrapped in polycarbonate sheeting creating a lantern with the steel structure exposed internally. The gable ends are thick walls that can thicken to accommodate services.

In contrast to the frame and skin tectonic, the surface of the masonry type is expressed as solid wall with punctured openings. Because the masonry type acts as junctions, taking up the geometries of the site, as well as the need to create robust secure spaces, the masonry type have concrete roofs. Although concrete is a more expensive roofing option, the background buildings are a relatively small portion of the whole and the long-term security and maintenance benefits serve to justify the initial expense.

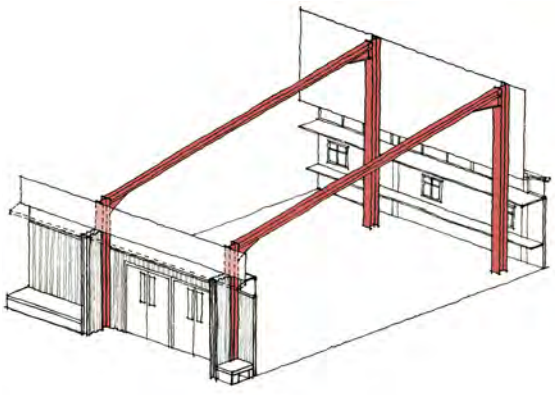


Figure 93: *Axonometric of a portal frame type room. The skin is free of the frame and pulls in or away from it as required*

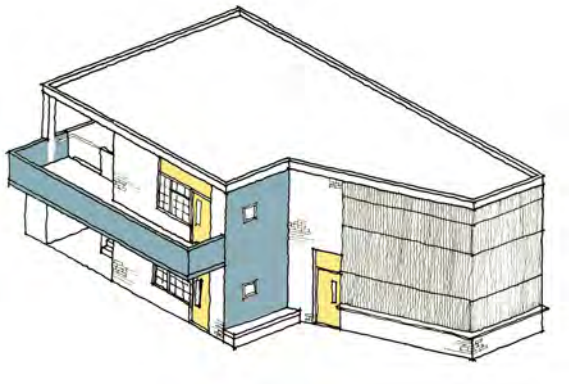


Figure 94: *Axonometric of a masonry room. The walls are predominantly facebrick with highlights of plaster work. The bay window is articulated with a large screen.*

Figure 95 [right]: *Chart to show patterns for tectonic language of the portal frame rooms.*

PORTAL FRAME AND SKIN

GABLE END

solid

service space

wall

thick wall

HABITABLE HEIGHT

free skin

secondary structural member to increase depth

threshold

scale in response to open space

habitable skin towards exterior

break down scale (stoep, activate)

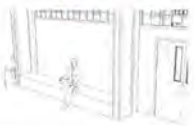
read scale of whole

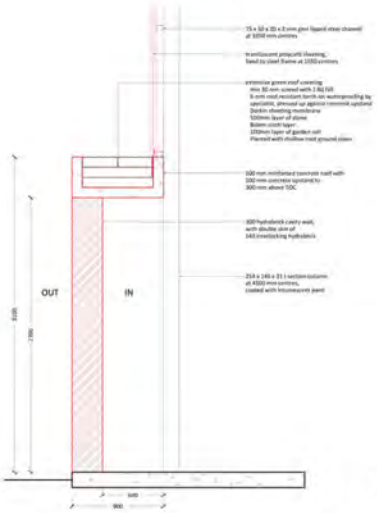
habitable skin towards interior

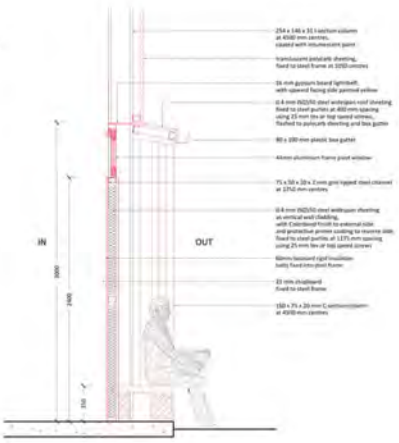
ABOVE HABITABLE HEIGHT

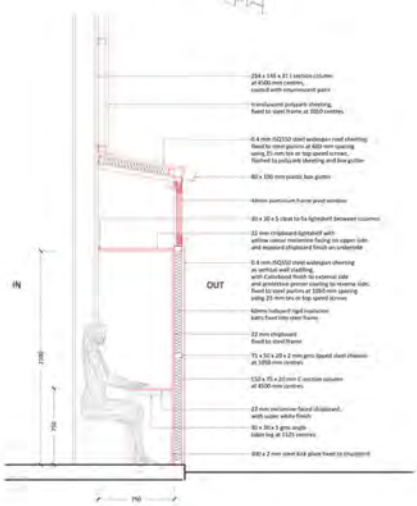
structure exposed towards interior with natural light

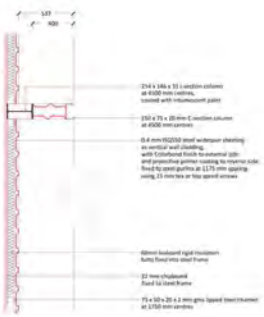
frame wrapped in polycarb sheeting

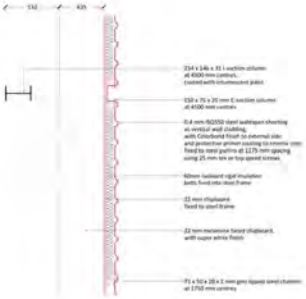












Social Circulation

The circulation space is also conceived of as two types: the 'link walkway' and the 'stoep'. The link walkway is the primary circulation system, forming an arcaded connection between rooms. The stoeps are threshold spaces at the 'celebrated' rooms. They overlap with link walkways and are ambiguous in their function, serving as entrance space, spill-out space or independent teaching or play spaces. The stoep at the resource centre is enclosed and so can be used as a display gallery.

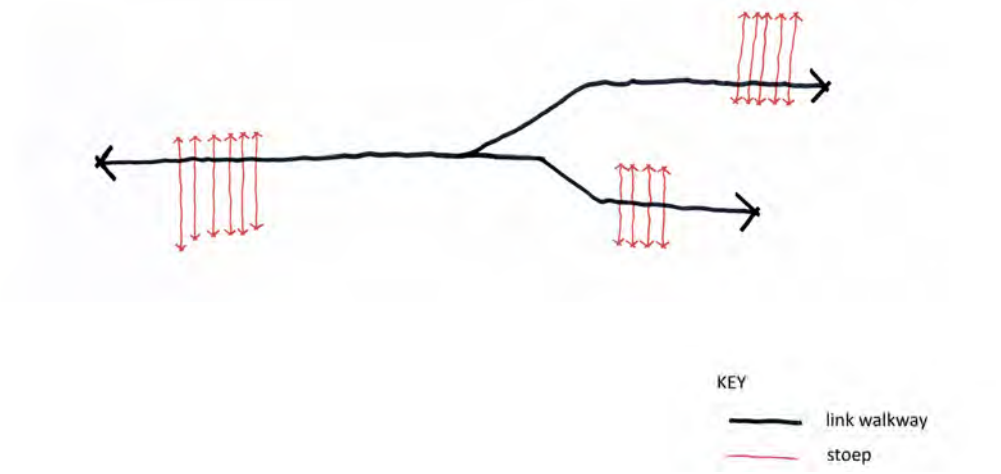


Figure 96: *Diagram to show the two types of circulation space*

Ground plane

The way in which the ground plane is formed and surfaced to receive the complex of rooms is particular to each site. In the case of Montagu's Gift, the existing trees were a strong informant of spatial arrangement. The notion of path, generated from the urban framework, is taken through the site as a series of linked courtyards each with their own character. The continuity of the paving material of this path pulls the intervention through into the existing school, creating a strong link between the classrooms and the shared facilities.

Scale and civic presence

In contrast to the flatness of the existing, the new intervention creates a hierarchy of scale, particularly through the variation in height of the various rooms. At Montagu's Gift Primary, the largest element, the multi-purpose hall, is positioned directly onto the forecourt so that it becomes a landmark along the street as well as opening onto the shared courtyard and addressing the vast open field. The study room, which faces the street has its highest point along the street edge to address the civic scale of the street, but lowers its roof towards the stoep where children access it. The reading room pulls away from the street and so does not have extra height towards the street, but rather the roof jumps up to edge the school food garden.

Figure 97: *Model photograph to show the civic scale created on the street edge, as well as variation of scale across the project*

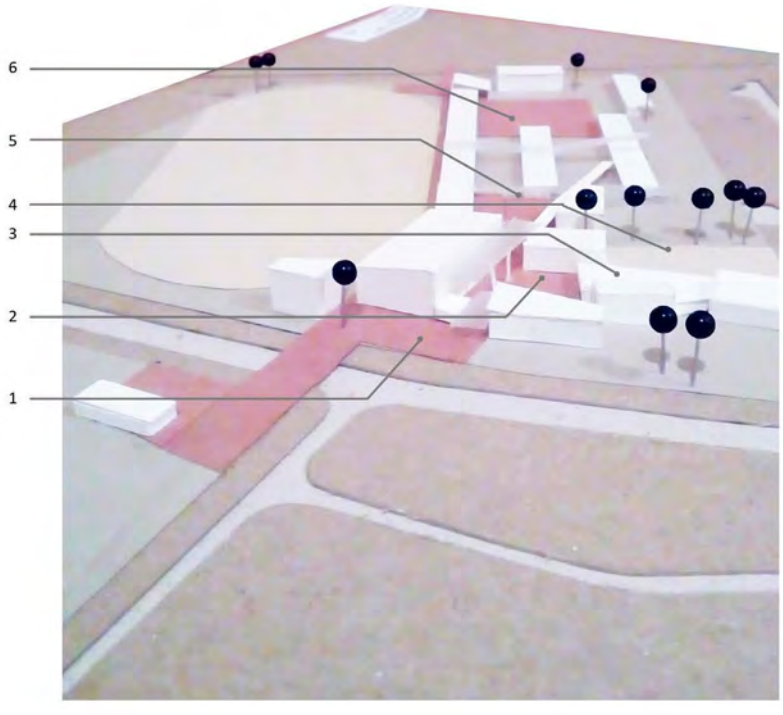


Figure 98: *Model photograph to locate walk-through*

Walk-through

Forecourt (1)

The main entrance is celebrated as a public square which extends across the road to Plantation Primary School. The use of a raised paved crossing and the proposal of a traffic light serve to slow traffic. The forecourt is overlooked by the gatehouse, the MOD office, the school shop, the kitchen and the caretaker's flat. A large existing gum tree creates a focal point and a shady place to sit. The canopy over the main entrance extends into the square to signify the point of entry into the school and create a sheltered waiting place.

Shared Semi-Public Courtyard (2)

The shared courtyard is edged by facilities that serve the school, MOD centre and other community functions. From the main entrance, one arrives on the covered 'stoep' or spill-out space of the multipurpose hall. The kitchen also opens onto this space, with the stoep acting as a covered space for serving. The hall has large tilting doors so that it can open right out into the courtyard or to the field. The tilting doors create a threshold space at the entrance to the hall as they form a low roof when open. The school administration office or reception is immediately visible on entry into this courtyard and acts as a 'lock' where the courtyard could be closed off from the rest of the school if being used by a third party or after hours.

Resource Centre (3)

The resource centre opens off the shared courtyard and is comprised of four key parts: a stoep, the group study room, the reading room and the strongroom. Each of these has its own purpose and character. The stoep is a social circulation space that overlooks the courtyard and the school farm. It is a flexible space which could be used for exhibitions or break-out space. The group study room is a large open space in which students can work together. It overlooks the street. The reading room is also a large space but it is broken up into smaller portions for individual inhabitation or small groups. It is a quiet space overlooking the garden and set back from the street, with place for story-time, private reading or quiet games.

Commons Courtyard (4)

This courtyard is activated primarily by the common room and outdoor stage. It is also overlooked by the staff block. This is a place for students to take ownership of – perhaps the common room will be used by the student leadership or it might serve as a games room, perhaps the stage will be a place for dance classes or performance… A small garden creates a relief space before the staff block. This allows visual connection to the staff rooms, especially reception and the principal's office, but still leaves the impression that this is a student space. This courtyard is the fulcrum between the shared domain, sports field, staff rooms and classrooms

Food Garden (5)

The food garden is a portion of land kept aside for growing food. The garden is overlooked by the resource centre and so acts as a didactic space, teaching children about food production. It is bordered by a long avenue of existing trees, creating a boundary between the productive land and the playground which should protect the plants.

Large Gatherings Courtyard (6)

The courtyard at the end of the school is large enough for the whole school to gather for outdoor assemblies. The court is surrounded by classrooms and large existing gum trees and can be a place for games, break-times and large gatherings.

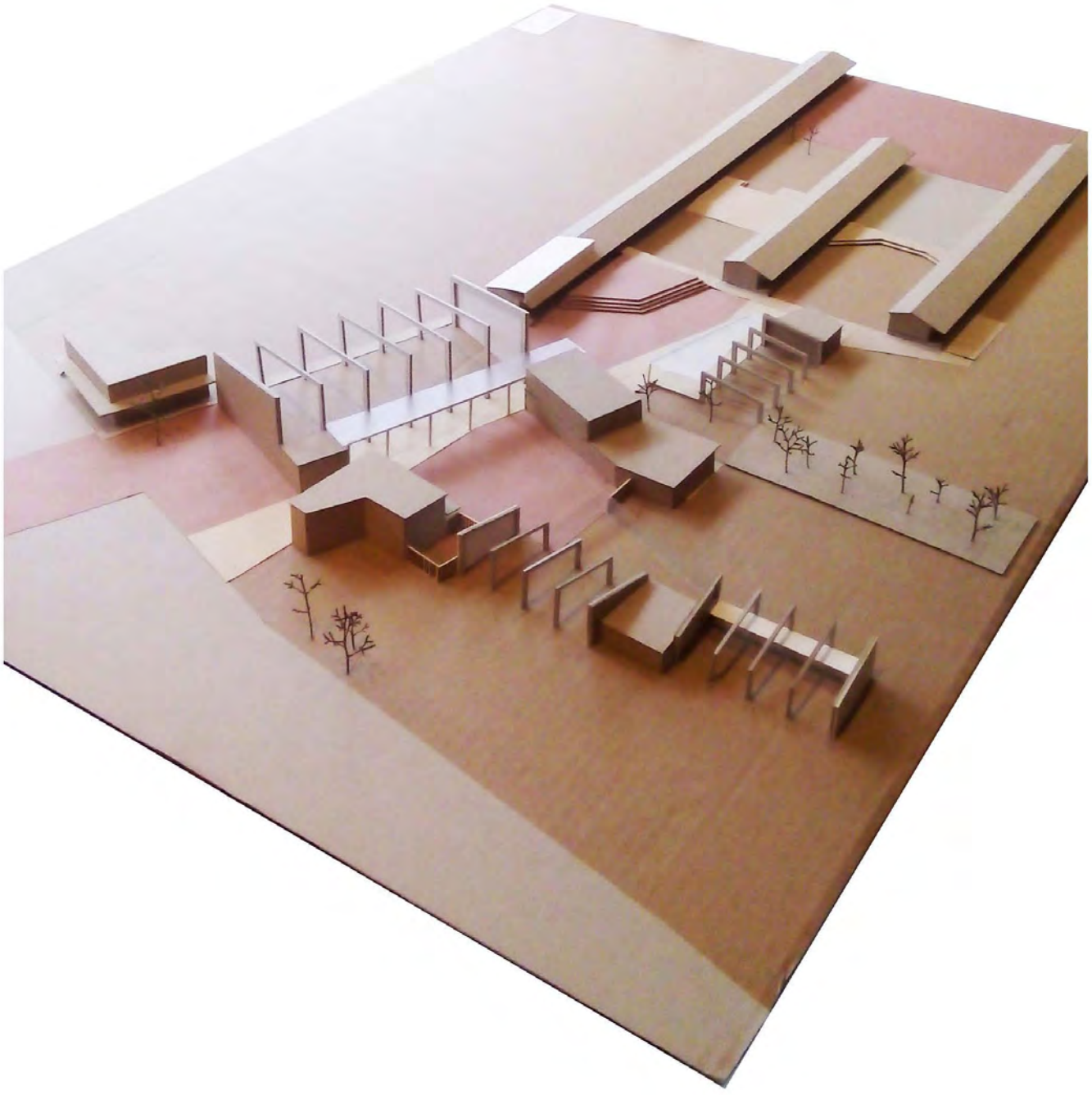


Figure 99: *Photograph of working model to show the whole extended school*

Figure 100: *Delft Daycare Centres by Jo Noero, note the adaption of a set programme to suit two different sites (Noero, 2003)*

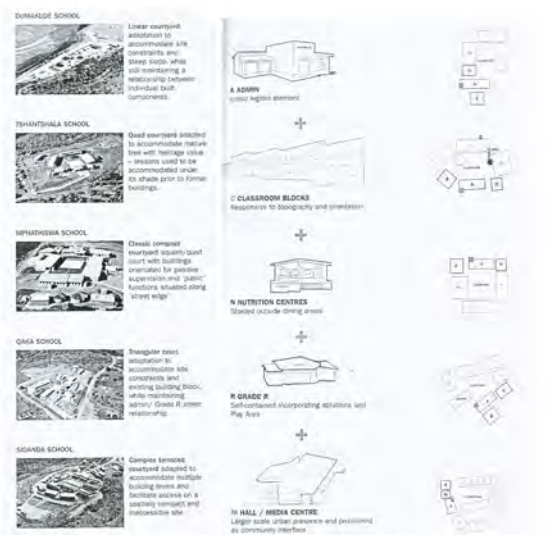


Figure 101: *DBSA ASIDI Schools Building Programme by Ruben Reddy et al, note the kit-of-parts arranged on different sites according to a courtyard typology (Reddy et al, 2010)*

Precedent studies

The following precedent studies were of particular significance in the design-research process. The first precedent studies are grouped according to the theme that made them relevant to this project and the last two studies stand alone as more thorough case studies.

Kit-of-Parts

The Delft Day-care Centres by Jo Noero and the DBSA ASIDI Schools Building Programme by Ruben Reddy *et al* demonstrate two different approaches to the notion of replicable design. Noero's Day-care Centres consist of a set of components (buildings) which are adapted to two different sites in the same area. The programme and relationships between the components stay the same at the two sites, but the form and configuration are shifted to accommodate the different site geometries.

The DBSA ASIDI project consists of a kit-of-parts (defined buildings) which are configured on various sites as a roll-out strategy. The notion of a courtyard typology is used to guide this arrangement on site. These ideas of a set of components with guidelines for spatial arrangements were very influential in the design project. In this design proposal, the idea of pairing adaptability with replicability in order to create schools that are well grounded in their context has been explored – more similarly to Noero's approach than the roll-out nature of the ASIDI programme.

Reconfiguration

Heideveld Primary School by Meyer and Associates is the total replacement of the existing primary school on the same site. This involved careful phasing and the use of rotating temporary classrooms. This project is one of a number of schools done by Meyer and Associates in which each site is treated individually, but the construction details are standardised across the projects for efficiency.

In order to create robust, low-maintenance spaces, there is a rather tough material palette, softened only by use of colour. This toughness is shown in the image below. Another school by Meyer and Associates is Northpine High School. This school is an interesting case study because, in contrast to the starkness of many similar school courtyards, the courtyards seem more alive. One can speculate that this is due to the material palette – a mixture of brick paving, concrete slab and greenery creates a more human quality in the space – and the programming of the courtyards with specific functions and qualities.

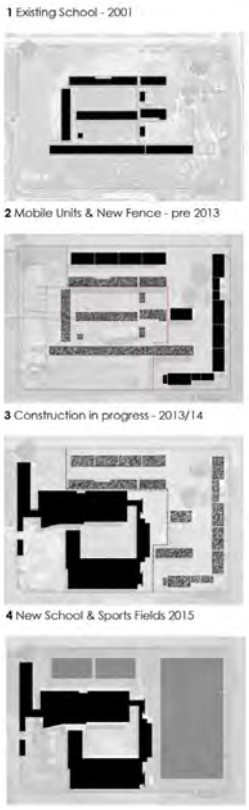


Figure 102 [top]: *Heideveld Primary by Meyer and Associates: phasing diagram to show replacement of existing school (Meyer, 2015)*

Figure 103 [middle]: *Heideveld Primary by Meyer and Associates: photograph to show the toughness of robust materials in the courtyard spaces(Meyer, 2015)*

Figure 104 [bottom]: *Northpine Secondary by Meyer and Associates: photograph to show the quality of a courtyard with a varied material palette (Meyer, 2015)*

Figure 105: *Springfield Pre-primary by CCNIA: outdoor circulation creates a 'street' through the school*

Figure 106: *School in the Woods by Visser and Thomas: broad multi-purpose circulation space*

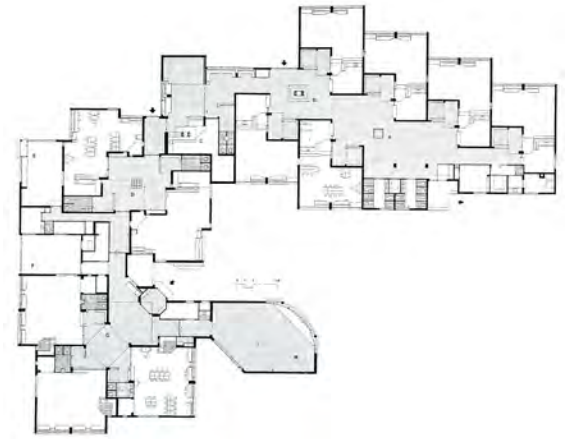


Figure 107: *Montessori School in Delft by Hertzberger: plan shows articulated circulation space for social encounters (Hertzberger, 2008)*

Social Circulation

Three schools have been selected as examples of social circulation space. These are Springfield Pre-primary School in Wynberg by Charlotte Chamberlain and Nicola Irving Architects; St Cyprian's School in the Woods in Oranjezicht by Jane Visser and Mark Thomas; and the Montessori School in Delft by Herman Hertzberger.

Springfield pre-primary shows an outdoor linear circulation space, conceived as a 'street'. St Cyprian's pre-primary school shows wide multi-purpose circulation areas that double as play spaces. Hertzberger's school shows the circulation space foregrounded in the plans as a continuous space of varying scale that is meant to encourage social encounter.

Wesbank Primary School, Delft

Wesbank Primary by CS Studios has been a highly influential case study. Only two of the key ideas are noted for the purpose of this document. Firstly, the idea of creating a shared domain for community and school use that can be locked down and function autonomously from the school is significant. Secondly, the dual function of the main staircase as circulation as well as a stage or social space gave strong clues as to how 'luxury' components, such as a stage, can be incorporated into necessities, such as circulation space, in order to maximise the value of each move – both spatially and in terms of material.

Figure 108: *Wesbank No 1 Primary by CS Studios: stairway becomes an outdoor stage and seating area*

Usasazo Secondary School, Khayelitsha

Usasazo Secondary by Noero Wolff Architects was also an influential case study. Again, two of the key ideas are mentioned here. Firstly, the manipulation of natural light and the relationship of structure to light are strong in this project. The exposed steel structure of the rooflights informed the tectonic of the portal frame buildings with polycarbonate 'lanterns' above head height. Secondly, the school is massed along the street, contributing to the urban edge, with the entrance articulated as a massive sliding gate. This was an interesting study in the design of the 'locks' between domains in the extended schools projects.

Figure 109: *Usasazo Secondary by Noero Wolff: natural light at roof level, articulated by exposed structure (Baan, 2003)*

Closing summary

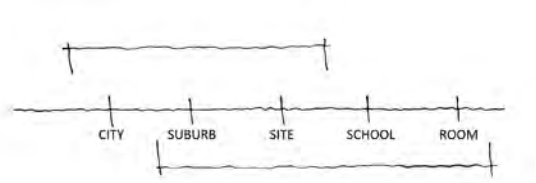


Figure 110: *Diagram to locate the research and project from the scale of the city to the room. The upper line represents the research, while the lower line represents the proposal.*

A notion of the capacity of education as a positive social force, paired with the impoverished spatial quality of many public schools fuelled this inquiry. The research phase explored the question at an institutional scale and the design proposal responds to this at the level of an architectural intervention. The following diagram locates the research and proposal in relation to one another, showing how both the research and design process took a typological approach which aimed to create a response that has relevance to the problem of low quality learning environments beyond a single site. The decision to extend the existing school as well as provide for both school and community uses makes a new hybrid condition.

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List of Figures

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Interviews and Personal Communications

Bonteheuwel Secondary School, interview with principal, 2014

Cedar Primary School, interview with principal, 2014

Heideveld Primary School, interview with architect, Tiaan Meyer, 2015

Masibambane Secondary School, interview with architect, Jacqui Perrin, 2015

Montagu's Gift Primary School, interview with principal, MOD Centre staff and kitchen staff, 2015

Parkwood Primary School, interview with caretaker and teacher, 2015

School in the Woods, interview with teacher, 2014

Siyazingisa Primary School, interview with teacher, 2015

Southern Suburbs Community College, interview with caretaker and sports coach, 2015

Springfield Pre-primary School, pers. comm. with architect, Nicky Irving and Charlotte Chamberlain, 2014

Usasazo Secondary School, interview with principal, 2014

Uvuyolwethu Educare Centre, interview with principal, 2015

Wesbank No1 Primary School, interview with principal (a) and member of architectural design team (b), 2015

Schools Audit, interview with PGWC consultant Kobus van Wyk of GAPP Architects, 2015

Appendix A

Ethics in Research: *clearance and consent forms*
Selection Process

EBE Faculty: Assessment of Ethics in Research Projects (Rev2)

Any person planning to undertake research in the Faculty of Engineering and the Built Environment at the University of Cape Town is required to complete this form before collecting or analysing data. When completed it should be submitted to the supervisor (where applicable) and from there to the Head of Department. If any of the questions below have been answered YES, and the applicant is NOT a fourth year student, the Head should forward this form for approval by the Faculty EIR committee: submit to Ms Zulpha Geyer (Zulpha.Geyer@uct.ac.za; Chem Eng Building, Ph 021 650 4791).

NB: A copy of this signed form must be included with the thesis/dissertation/report when it is submitted for examination

This form must only be completed once the most recent revision EBE EiR Handbook has been read.

Name of Principal Researcher/Student: *Juliet Anne Therese Harrison* Department: *School of Architecture*

Preferred email address of the applicant: *juliet.anne.harrison@gmail.com*

If a Student: Degree: *Masters of Architecture* Supervisor: *Melinda Silverman*

If a Research Contract indicate source of funding/sponsorship:
UCT Departmental Scholarship, in association with Western Cape Provincial Government: Education

Research Project Title:
Education Space: an architectural design-research project exploring the socio-spatial conditions of public schools in Cape Town

Overview of ethics issues in your research project:

Question 1: Is there a possibility that your research could cause harm to a third party (i.e. a person not involved in your project)?		**NO**
Question 2: Is your research making use of human subjects as sources of data? If your answer is YES, please complete Addendum 2.	**YES**	
Question 3: Does your research involve the participation of or provision of services to communities? If your answer is YES, please complete Addendum 3.		**NO**
Question 4: If your research is sponsored, is there any potential for conflicts of interest? If your answer is YES, please complete Addendum 4.		**NO**

If you have answered YES to any of the above questions, please append a copy of your research proposal, as well as any interview schedules or questionnaires (Addendum 1) and please complete further addenda as appropriate. Ensure that you refer to the EiR Handbook to assist you in completing the documentation requirements for this form.

I hereby undertake to carry out my research in such a way that

- there is no apparent legal objection to the nature or the method of research; and
- the research will not compromise staff or students or the other responsibilities of the University;
- the stated objective will be achieved, and the findings will have a high degree of validity;
- limitations and alternative interpretations will be considered;
- the findings could be subject to peer review and publicly available; and
- I will comply with the conventions of copyright and avoid any practice that would constitute plagiarism.

Signed by:

	Full name and signature	Date
Principal Researcher/Student:	*Juliet Anne Therese Harrison*	*24-03-2015*

This application is approved by:

Supervisor (if applicable):		*25-03-2015*
HOD (or delegated nominee): *Final authority for all assessments with NO to all questions and for all undergraduate research.*		
Chair : Faculty EIR Committee **For applicants other than undergraduate students who have answered YES to any of the above questions.**		13/04/2015

Informed consent document as per EiR Handbook guidelines Appendix D

INFORMATION SHEET & CONSENT FORM – Members of the School Community

Education Space: an architectural design-research project exploring the socio-spatial conditions of public schools in Cape Town

Hello, my name is Juliet. I am a student of Architecture at the University of Cape Town and I am working on a research project as part of my Masters degree. I am researching the socio-spatial conditions of some public schools in Cape Town in order to inform a *speculative* architectural design project and would like to invite you to participate in the project.

I am interested in finding out about how the school runs and how well the school buildings/facilities serve the school in day-to-day activities. I am particularly interested in what aspects of the existing school fabric are problematic or successful – especially whether there are places which have problems of robustness or a disconnect between policy and the lived experience. I would like to understand your perceptions about how the space influences the experience of people who use it.

Please note that you do not have to participate in this research project and that there is no negative consequence if you choose not to take part. If you decide to take part, you are free to withdraw at any time without any negative consequence. However, I would be grateful if you would assist me by allowing me to interview you.

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Many thanks,
Juliet
Department of Architecture
University of Cape Town

I am satisfied with the conditions above and have voluntarily consented to take part in this research project	Signature of participant	Date 01/04/2015

SIYAZINGISA PRIMARY SCHOOL, GUGULETHU

Informed consent document as per EiR Handbook guidelines Appendix D

INFORMATION SHEET & CONSENT FORM – Members of the School Community

Education Space: an architectural design-research project exploring the socio-spatial conditions of public schools in Cape Town

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Many thanks,
Juliet
Department of Architecture
University of Cape Town

I am satisfied with the conditions above and have voluntarily consented to take part in this research project	Signature of participant	Date 17/04/15

Informed consent document as per EiR Handbook guidelines Appendix D

INFORMATION SHEET & CONSENT FORM – Members of the School Community

Education Space: an architectural design-research project exploring the socio-spatial conditions of public schools in Cape Town

Hello, my name is Juliet. I am a student of Architecture at the University of Cape Town and I am working on a research project as part of my Masters degree. I am researching the socio-spatial conditions of some public schools in Cape Town in order to inform a *speculative* architectural design project and would like to invite you to participate in the project.

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Many thanks,
Juliet
Department of Architecture
University of Cape Town

I am satisfied with the conditions above and have voluntarily consented to take part in this research project	Signature of participant :	Date 17-04-2015

PRINCIPAL OF
WESBANK NO 1 PRIMARY

Schools Research UCT Masters of Architecture 2015 Juliet Harrison

INFORMATION SHEET & CONSENT FORM – Members of the School Community

Education Space: an architectural design-research project exploring the socio-spatial conditions of public schools in Cape Town

Dear Shirley Feris

I am a student of Architecture at the University of Cape Town and I am working on a research project as part of my Masters degree. I am researching the socio-spatial conditions of some public schools in Cape Town in order to inform a *speculative* architectural design project and would like to invite you to participate in the project.

I am interested in finding out about *how the school runs and how well the school buildings/facilities serve the school in day-to-day activities*. I am particularly interested in what aspects of the existing school fabric are problematic or successful – especially whether there are places which have problems of robustness or a disconnect between policy and the lived experience. I would like to understand *your perceptions about how the space influences the experience of people who use it*.

Please note that you do not have to participate in this research project and that there is no negative consequence if you choose not to take part. If you decide to take part, you are free to withdraw at any time without any negative consequence. However, I would be grateful if you would assist me by allowing me to interview you.

I would like to ask you a few questions and see the spaces in which you work. I will not use your name in any of my research outputs, so your information will be kept anonymous. I may print some of the things you say in this interview, but I will change your name so that it will not be associated with you in any way. This is to protect your privacy. This research will be used in my Masters dissertation. There might be some scope for future research, but this is unlikely to require your further participation. In the case of further research, are you happy for the information from this interview to be re-used?

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Thank you in advance for your time and cooperation, it is very much appreciated.

Many thanks,
Juliet
Department of Architecture
University of Cape Town

I am satisfied with the conditions above and have voluntarily consented to take part in this research project	Shirley R. Feris	Date 07/05/15

INFORMATION SHEET & CONSENT FORM – Members/ Consultants of Governmental Department

Education Space: an architectural design-research project exploring the socio-spatial conditions of public schools in Cape Town

Hello, my name is Juliet. I am a student of Architecture at the University of Cape Town and I am working on a research project as part of my Masters degree. I am researching the socio-spatial conditions of some public schools in Cape Town in order to inform a *speculative* architectural design project and would like to invite you to participate in the project.

I am interested in finding out about how schools run and how well the school buildings/facilities serve the schools. I am particularly interested in what aspects of the existing school fabric are problematic or successful – especially whether there are places which have problems of robustness or a disconnect between policy and the lived experience. I would like to understand your perceptions about how the space influences the experience of people who use it. I would like to learn about the procedures for upgrading existing schools and designing school schools.

Please note that you do not have to participate in this research project and that there is no negative consequence if you choose not to take part. If you decide to take part, you are free to withdraw at any time without any negative consequence. However, I would be grateful if you would assist me by allowing me to interview you.

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Many thanks,
Juliet
Department of Architecture
University of Cape Town

I am satisfied with the conditions above and have voluntarily consented to take part in this research project	Signature of participant	Date 18/05/2015

LUBUS VAN WYK,
GAPP ARCHITECTS
CONSULTANT W/ DTPW

Schools Research UCT Masters of Architecture 2015 Juliet Harrison

INFORMATION SHEET & CONSENT FORM – Members of the School Community

Education Space: an architectural design-research project exploring the socio-spatial conditions of public schools in Cape Town

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Department of Architecture
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I am satisfied with the conditions above and have voluntarily consented to take part in this research project	Name & signature of participant	Date 19/05/15

Schools Research UCT Masters of Architecture 2015 Juliet Harrison

INFORMATION SHEET & CONSENT FORM – Members of the School Community

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Many thanks,
Juliet
Department of Architecture
University of Cape Town

I am satisfied with the conditions above and have voluntarily consented to take part in this research project	Signature of participant	Date 4/9/15

MONTAGU'S GIFT PRIMARY

INTERVIEW WITH
- PRINCIPAL
- MOD CENTRE STAFF
- FEEDING SCHEME STAFF.

Initial selection process

This map shows all the schools in Cape Town, each as a tiny black dot. The larger black dots with labels are all the schools I know. This step allowed me to focus on a more manageable sample of schools in terms of numbers. I proceeded to research each of the schools highlighted here in terms of their fees, number of students, pass rates and spatial typology. Of these, I selected those with no school fees to study further.

EXPANSIVE BARREN SITE
Parkwood Primary

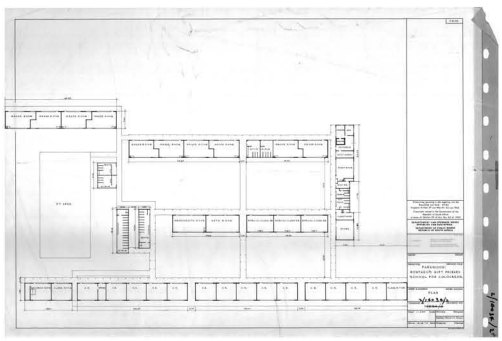
LACK OF CIVIC PRESENCE
Montagu's Gift Primary

NARROW CIRCULATION
Fairmount Secondary

COMFORTABLE CLASSROOMS
Parkwood Primary

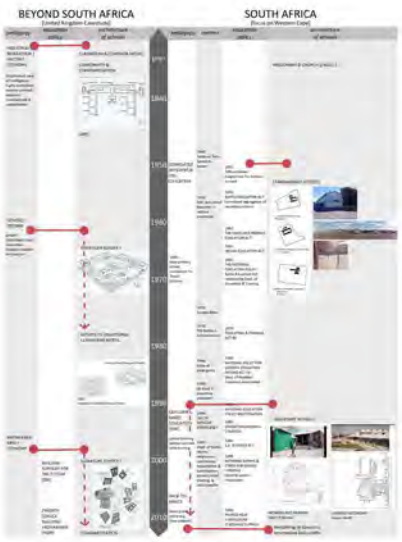
NON-ACTIVATED COURTYARDS
Montagu's Gift Primary

INADEQUATE FORUM SPACE
Siyazingisa Primary

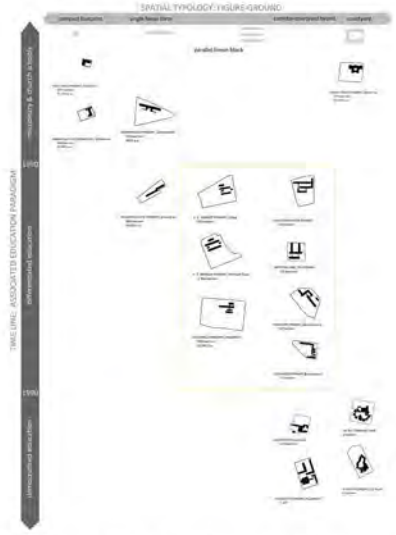


MONTAGU'S GIFT PRIMARY: existing plan

SECURITY ISSUES
Bontebeuwel Secondary

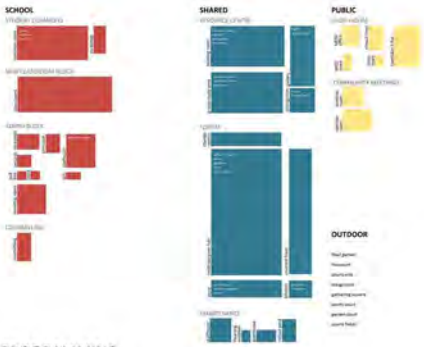


TIMELINE: education system + school architecture



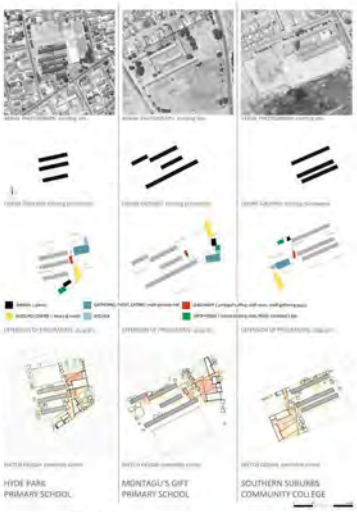
TYPE-LINE: spatial typology + education paradigm over time

TYPOLOGY EVALUATION: parallel linear-block schools



PROGRAMMING

EXTEND



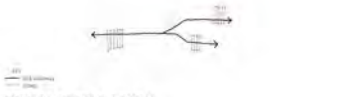
REPLICABLE. ADAPTABLE

CLUSTERING

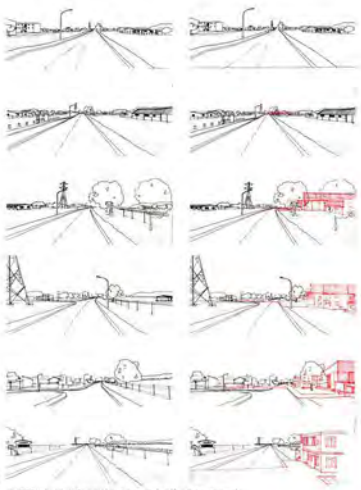
DIAGRAMMATIC PLAN: domains and locks

SHARED DOMAINS

GROUND PLANE



SOCIAL CIRCULATION



STREET VIEW PROGRESSION: Montagu's Gift Rd, southwards

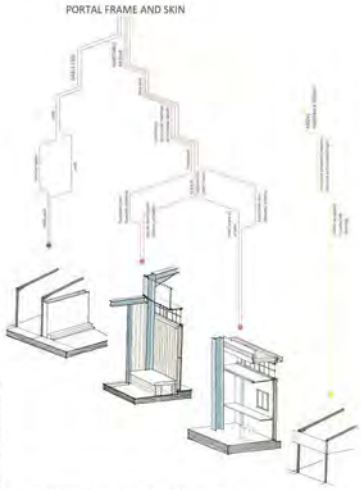
SCALE AND CIVIC PRESENCE

DIAGRAMMATIC PLAN: types of rooms

AXONOMETRIC: portal frame type

AXONOMETRIC: masonry type

TYPES OF ROOM

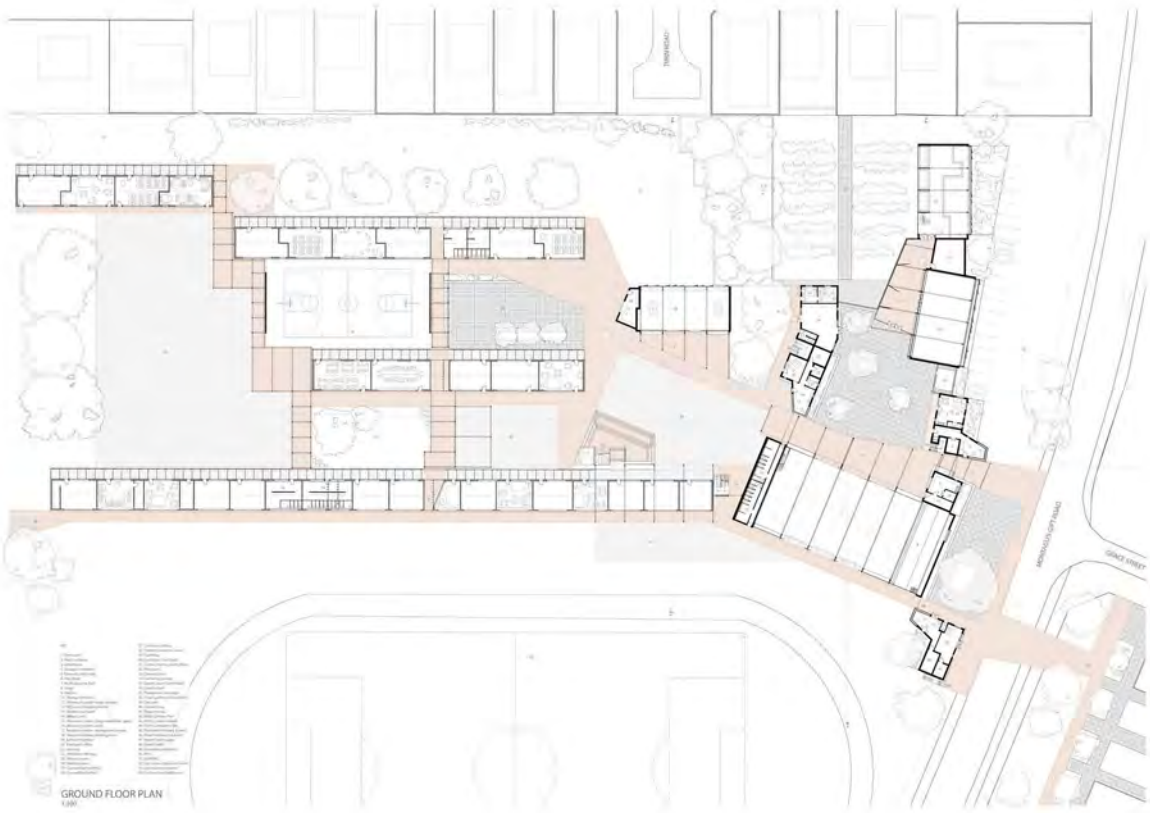


PATTERN FOR SKIN CONDITION OF PORTAL FRAME TYPE

PATTERNS FOR TECTONIC

DIAGRAMMATIC PLAN: density of visual connection

NATURAL SURVEILLANCE




SECTION AA


SECTION BB


SECTION CC


DIAGRAMMATIC SECTION DD