UNIVERSITY OF KWAZULU-NATAL
INYUVESI YAKWAZULU-NATALI

Understanding how people with acquired blindness experience and interact with higher educational institutions: A proposed TVET College for the Pietermaritzburg CBD

By

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Image 1:

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ABSTRACT

This dissertation document describes the research conducted so as to establish guiding principles that will eliminate the segregation and isolation of blind people, through the design of a universally accessible building. The collection, analysis and interpretation of primary and secondary data are used to determine the above-mentioned principles.

It will investigate how people who have lost their sight interact and experience public higher educational institutions that are not designed to cater for them. Furthermore exploring the barriers they encounter in these institutions, as well as how they cope in these harsh environments.

Approximately 15% of the world's population has a disability (Statistics South Africa, 2011). According to the 2011 Census just under three (3) million South Africans were reported to be disabled. Therefore 7.5% of the country's population is disabled. Blindness is the most prevalent disability (Statistics South Africa, 2011).

Blind people were one of the groups which were discriminated against during the apartheid era. Since the birth of the democratic South Africa, the laws of South Africa have transformed to correct the wrongs of the past and to allow all disable people the same rights that other citizens enjoy. However the biggest challenge is that these laws and legislations have not been implemented successfully (South Africa. Office of the President, 1997).

One of the sectors that have not sufficiently transformed is the Department of Higher Education and Training. Most, if not all the South African Higher Education Institutions are still not accessible to blind people. The number of blind students enrolling into Higher Educational Institutions is growing, however this does not necessarily indicate that these institutions are transformed. This inaccessibility is mostly seen through the infrastructure.

People who lose their sight during the course of their lives are forced to adjust to not relying on their sight in conducting their daily lives, like cooking, cleaning, working, travelling, and so forth. The unfortunate fact about the built environment is that it is mostly inaccessible to people with disabilities.

The most critical part of this dissertation is the interpretive study that transforms the information gathered into practical design principle which can be implemented in the future design of more inclusive buildings, which are universally accessible. The main principles that were the outcomes of this research were: accessibility into public buildings and the usability of the buildings once entered into. The usability of a building is heavily based on the ease of circulation through the building, the provision of the holistic sensory experience and the elimination of all barriers and obstructions.

DECLARATION

I, Nikiwe Babongile Mvuyana declare that

1. The research reported in this thesis, except where otherwise indicated, is my original research.

2. This thesis has not been submitted for any degree or examination at any other university.

3. This thesis does not contain other persons' data, pictures, graphs or other information, unless specifically acknowledged as being sourced from other persons.

4. This thesis does not contain other persons' writing, unless specifically acknowledged as being sourced from other researchers. Where other written sources have been quoted, then:

a. Their words have been re-written but the general information attributed to them has been referenced

b. Where their exact words have been used, then their writing has been placed in italics and inside quotation marks, and referenced.

5. This thesis does not contain text, graphics or tables copied and pasted from the Internet, unless specifically acknowledged, and the source being detailed in the thesis and in the References sections.

Signed

……

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- My loving and supportive parents, for the sacrifices they made for me to be where I am
- The Department of Public works for funding my Masters level studies

DEDICATION

This dissertation is dedicated to my late father.

For your faith in my ability. For your interest in my success and studies. You read and approved this dissertation before it even reached the hands of the examiners, I don't know how many people can say their parents read their research from cover to conclusion. You approval meant more than any stamp of approval I could receive. I wish you could be here physically to see me receive my degree.

May your soul rest in peace, you will forever be in our heart.

LIST OF ILLUSTRATIONS

COVER PAGE
Image 1: (Bleeding cool; 2015)

CHAPTER THREE
Image 2: Graph showing the prevalence of disability per province, South Africa (Author 2015)……pg21

Image 3: Graph showing the prevalence of disability per disability type, South Africa (Author 2015)……..pg22

Image 4: (Coroflot 2014)……pg24

Image 5: Ray Charles (bjazz 1999)……..pg30

Image 6: An example of a tree that is encroaching onto the footpath. Obstacles at head height may not always be detected by a person's guide dog, and cannot be detected by a white cane (Author 2015)……..pg32

Image 7: Image showing an example of how street furniture can be placed, away from the movement path (Author 2015)……..pg33

CHAPTER FOUR
Image 8: Range of the senses and the possible interactions with the environment (Hall 2008) ……pg 12

Image 9: Diagram showing the transfer and interpretation of information through our senses from the world and back into the world transformed (Author 2015)…….pg13

Image 10: Chris Downey using his cane to navigate his way through the city (Downey 2015)……..pg14

Image 11: The bell tower of the church of the Immaculate conception (The church of the immaculate conception, 2012)……..pg16

Image 12: Diagram showing an example of a concept of a well-structured path (Author 2015)……pg16

Image 13: Diagram showing how one defined route can assist in more accurate navigation (Author 2015)……..pg17

Image 14: "David Rubinger, Blind child 'discovering' Israel with his fingers, 1960" (Gad 2012)……..pg17

Image 15: FSU blind student learns campus with a Braille map (www.floridamemory.com n.d)……..pg18

Image 16: Image showing how echolocation works (Author 2015)……pg19

CHAPTER FIVE

Image 17: World map, locating the precedent studies that will be explored (www.clipgid.com)……pg36

Image 18: Locality map, showing Hazelwood school and major transport routes and access to the site edited by (Author 2015)……pg37

Image 19: Site plan of Hazelwood School for the blind, depicting the main circulation and classrooms (Author 2015)……..pg38

Image 20: Views of the central corridor showing the sensory wall (www.architizer.com : 2015 edited by (Author 2015)……..pg39

Image 21: Views of the central corridor showing the sensory wall (www.architizer.com : 2015 edited by (Author 2015)……..pg39

Image 22: Play area- highlighting the range of materials used edited by (Author 2015)……..pg40

Image 23: Play area- highlighting the main external pathway edited by (Author 2015)……..pg40

Image 24: Image of the nursery with clearstory windows edited by (Author 2015)pg40

Image 25: Image 23: Ariel view of Hazelwood school edited by (Author 2015)…..pg41

Image 26: Locality map, showing the polytrauma and blind rehabilitation centre and major transport routes and access to the site edited by (Author 2015)……pg42

Image 27: Ground floor plan, NTS of the Centre (The design partnership, 2010)…pg43

Image 28: Axonometric view up to level 2 (The design partnership, 2010)……pg43

Image 29: Phasing plan for the polytrauma centre, showing the access routes (The design partnership, 2010)……pg44

Image 30: Drop-off zone (Follow et al.,2013)……pg44

Image 31: View of the main entrance and inpatient and outpatient wings (Follow et al., 2013)……pg45

Image 32: Ground floor lobby staircase (Follow et al,. 2013)……pg45

Image 33: Corridor along the inpatient wing (Follow et al., 2013)……..pg45

Image 34: Waiting area edited by (Author 2015)……pg46

Image 35: Nurse's station edited by (Author 2015)……..pg46

Image 36: Upper level vaulted ceiling, installed to add an acoustic character to the space (Follow et al,. 2013)……..pg46

Image 37: Sensory garden in the inpatient wing (Follow et al., 2013)……pg47

Image 38: Main centre lobby (Follow et al., 2013)……...pg47

CHAPTER SIX
Image 39: Map of Africa, South Africa and KwaZulu- Natal, locating the case studies that will be explored (Author 2015)……...pg49

Image 40: Collage of signage for some of the different spaces found in the school (Author 2015)……pg50

Image 41: Locality map showing Arthur Blaxall and the connecting transport routes edited by (Author 2015)……pg50

Image 42: View of the main gate to the school (Author 2015)……pg51

Image 43: Main entrance into the administration block (Author 2015)……..pg51

Image 44: Path leading to main entrance (Author 2015)……..pg51

Image 45: Site plan of Arthur Blaxall (Author 2015)……..pg52

Image 46: Standard design of the staircases found in the school (Author 2015)…pg52

Image 47: Classroom corridor (Author 2015)……..pg53

Image 48: Showing railing that runs along the length of the first floor corridor (Author 2015)……...pg53

Image 49: Path from the pedestrian gate/parking to the main entrance (Author 2015)……...pg54

Image 50: Outdoor play area with a small gathering space (Author 2015)…….pg54

Image 51: External walkway that has broken surfaces (Author 2015)……pg55

Image 52: Walkway to the hostels, encroached by shrubs (Author 2015)……pg55

Image 53: Door signage (Author 2015)……pg55

Image 54: Staircase, showing the colour coding done to indicate the first and last step (Author 2015)

Image 55: Locality map showing Midlands FET College and the connecting transportation routes (Author 2015)……..pg57

Image 56: External view from the street of the pedestrian gate (Author 2015)…...pg58

Image 57: View of staircase leading from the pedestrian gate (Author 2015)……pg58

Image 58: View of the entrance into the reception and administration block (Author 2015)……..pg58

Image 59: Image showing stairs leading up from the courtyard to the administration block (Author 2015)……pg59

Image 60: View of walkway leading from the parking to the reception (Author 2015)……pg59

Image 61: Staff kitchen (Author 2015)……..pg59

Image 62: Main campus courtyard space (Author 2015)……..pg59

Image 63: Technical drawing classroom (Author 2015)……..pg60

Image 64: Uneven path leading to an outside seating area (Author 2015)…….pg60

Image 65: View of the platform ledge- outside seating area (Author 2015)……pg60

Image 66: Locality map of Univeristy of Kwazulu-Natal, Howard College Campus, Durban (Author 2015)……pg62

Image 67: View of an entrance into a lecture hall which is obstructed by a column (Author 2015)……pg63

Image 68: Schematic plan of an entry point of a lecture hall which is obstructed by a column, along with a column which is not flush to the wall. (Author 2015)……..pg63

Image 69: Showing grating infront of entry points of lecture Halls - Shepstone building (Author 2015)……pg63

Image 70: A notice board fixed parallel to the main circulation (Author 2015)…..pg63

Image 71: MTB building- Sketch showing a double door which only has one half closed (Author 2015)……pg64

Image 72: Schematic drawing showing the danger of having windows that open onto corridors (Author 2015)……pg64

Image 73: MTB building - Sketch showing a side hung window opened out onto a corridor (Author 2015)……pg64

Image 74: T.B Davis Parking lot, showing blind students attempting to navigate around cars (Author 2015)……..pg65

Image 75: Staircase leading down to the student union building (Author 2015)…pg65

CHAPTER EIGHT
Image 76: (Author 2015)……..pg73

Image 77: Directional tactile surface tile (Alpelt et al. 2007)……pg76

Image 78: Warning tactile surface tile (Alpelt et al. 2007)……..pg76

Image 79: Tactile wayfinding trail at Brisbane Square, North Quay
(Alpelt et al. 2007)……..pg76

Image 80: Windows along circulation routes need to be sliding instead of side hung
(Author 2015)……pg77

Image 81: Outward-opening window prevented from projecting into circulation
path by planter (www.ncbi.ie)……...pg77

Image 82: Hedges and trees should be cut back to leave circulation route free and
to allow for clear headroom of 2200mm……pg77

TABLE OF CONTENT

ABSTRACT……...ii
DECLARATION……iii
ACKNOWLEDGEMENT……iv
DEDICATION……v
LIST OF ILLUSTRATIONS……..vi
TABLE OF CONTENTS……xi

CHAPTER ONE: INTRODUCTION
1.1. INTRODUCTION……1
1.1.1. Background……1
1.1.2. Motivation/ Justification……..1
1.2. DEFINITION OF THE PROBLEM, AIMS AND OBJECTIVES……..2
1.2.1. Research Problem……2
1.2.2. Definition of the Problem……2
1.2.3. Key Problem……2
1.2.4. Aim……2
1.2.5. Objectives……2
1.3. SETTING OUT THE SCOPE……3
1.3.1. Delimitation of Research……3
1.3.2. Definition of terms……..3
1.3.3. Stating the Assumptions……4
1.3.4. Key Question……4
1.3.5. Sub Questions……4

DISSERTATION STRUCTURE……..5

CHAPTER TWO: RESEARCH METHODOLOGY
2.1 INTRODUCTION……6
2.2 PRIMARY RESEARCH……...6
2.2.1. Sampling Method……6
2.2.2. Interviews……..7
2.2.3. Observations……8
2.2.4. Case Studies……8
2.3 SECONDARY RESEARCH……8
2.3.1. Literature Review……8
2.3.2. Precedent Studies……8
2.4 RESEARCH MATERIALS……9
2.5 CONCLUSION……9

CHAPTER THREE: LITERATURE REVIEW
3.1. INTRODUCTION……10
3.2. THE PREVALENCE OF DISABILITY IN SOUTH AFRICA……10
3.3. THE APPROACH TO BLINDNESS: DISABILITY MODELS……12
3.3.1. Medical model……..12
3.3.2. Social model……12
3.4. THE IMPLICATIONS OF THE LOSS OF SIGHT……..……13
3.5. SOUTH AFRICAN DISABILITY LAWS AND LEGISLATION……..……14
3.5.1. The Constitution……14
3.5.2. Legislation……14

3.5.3. Policies and programmes……15
3.5.4. SANS and NBR……15
3.5.5. Civil Society……15
3.6. ACCESSIBILITY IN SOUTH AFRICAN HIGHER EDUCATION INSTITUTIONS….16
3.7. NAVIGATION……18
3.7.1. Orientation……18
3.7.2. Senses [non- visual communication] ……19
3.7.3. Memory……20
3.7.4. The use of a Cane……21
3.7.5. Barriers……21
3.8. UNIVERSAL DESIGN……23
3.9. CONCLUSION……24

CHAPTER FOUR: THEORIES AND CONCEPTS
4.1. INTRODUCTION……25
4.2. THEORIES……25
4.2.1. Phenomenology……25
4.2.2. Perceptual Theory……27
4.2.3. Ecological Theory……28
4.2.4. Wayfinding Theory……29
4.3. CONCEPTS
4.3.1. Echolocation……33
4.3.2. Symbiosis……34
4.4. CONCLUSION……34

CHAPTER FIVE: KEY PRECEDENT STUDIES
5.1. INTRODUCTION……35
5.2. Hazelwood School for the blind- Glasgow……36
5.2.1. Introduction……36
5.2.2. Accessibility……36
5.2.3. Circulation……37
5.2.4. Sensory quality……38
5.2.5. Conclusion……40
5.3. Polytrauma and blind rehabilitation Centre……41
5.3.1. Introduction……41
5.3.2. Accessibility……41
5.3.3. Circulation……44
5.3.4. Sensory quality……45
5.3.5. Barriers……46
5.3.6. Conclusion……47

CHAPTER SIX: KEY CASE STUDIES
6.1. INTRODUCTION……48
6.2. Arthur Blaxall School for the blind- Pietermaritzburg…… …49
6.2.1 Introduction……49
6.2.2 Accessibility…… 50
6.2.3 Circulation…… …51
6.2.4 Sensory quality……53
6.2.5 Barriers……54

6.2.6 Conclusion ……55

6.3. Midlands TVET (FET) College- Pietermaritzburg
6.3.1 Introduction……56
6.3.2 Accessibility……56
6.3.3 Circulation……58
6.3.4 Sensory quality……58
6.3.5 Barriers……..59
6.3.6 Conclusion……60
6.4. University of KwaZulu- Natal (Howard College)- Durban
6.4.1 Introduction……..61
6.4.2 Accessibility……..61
6.4.3 Circulation……62
6.4.4 Barriers……62
6.4.5 Sensory quality……64
6.4.6 Conclusion……65

CHAPTER SEVEN: PRESENTATION AND ANALYSIS OF FINDINGS
7.1. Introduction……66
7.2. Accessibility……66
7.3. Circulation……..66
7.4. Sensory Experience……..67
7.5. Memory……67
7.6. The implications of loss of sight……67
7.7. Training……68
7.8. Barriers……..68

CHAPTER EIGHT: CONCLUSIONS AND RECOMMENDATIONS
8.1. Conclusion……..71
8.2. Recommendation……72
8.3. Closing statement……..77

APPENDICES
I. Sample of Consent form
II. Sample of interview schedule

BIBLIOGRAPHY

INDEX

CHAPTER ONE: INTRODUCTION

1.1. INTRODUCTION

In this chapter the discussion will focus on highlighting the topic under study, as well as elaborating on the purpose and motivation of the study. This chapter will continue to explain the problem that was identified, which led to the study. In an attempt to move towards a solution to the problem identified, this chapter will look at some research questions, aims and objectives of the study generated from the research problem.

1.1.1. Background

This study will focus on people with acquired blindness, not those who were born blind. Those with acquired blindness have to learn a new way of living including a new way of navigating through the built environment. It will tackle the difficulties blind individuals encounter when attempting to utilise inaccessible buildings, more specifically public educational institutions.

In the past century there has been a move away from the concept of institutionalisation, yet the new alternatives are not significantly different from the institutions. The majority of buildings being designed cater for sighted people. The few buildings that are designed to cater for blind people are strictly for their use only. These two typologies have resulted in the separation and segregation of these groups of people.

1.1.2. Motivation/ Justification

Many people rely on their eyesight to conduct their daily activities. Some people who lose their sight resort to career changes (Walden 2008). "Blindness changes and completely re-organises the entire life of the individual" (Steele 1959).

A vast majority of the existing public buildings seem to be occupied by sighted individuals only, partly due to the lack of consideration for blind people in the design. The architect is not a replacement for medical professionals, who deal WITH the repercussions of sight loss, however the architect can be seen as an enabler that designs the setting that promotes this rehabilitation and reintegration (Steele 1959).

The design for disabled people in general is not a new phenomenon. However the focus has largely been at the domestic level. This strategy results in blind people's homes becoming prisons, because these are the only buildings which are user friendly and they become confined in them. This lack of inclusion results in the isolation of blind people from society, which can prevent them from living full lives.

There is a gap in literature and knowledge when it comes to universal design. Where buildings are designed to inclusively cater for sighted and blind people. The exploration of this subject can facilitate the reintegration of people with acquired blindness, giving them the opportunity to experience the places they used before they lost their sight, and be able to continue with their lives.

1.2. DEFINITION OF THE PROBLEM, AIMS AND OBJECTIVES

1.2.1. Research problem

The research problem is the segregation and isolation of blind people, due to the lack of consideration of the blind population in the design process of public buildings.

1.2.2. Definition of the problem

There is evidently a lack of higher educational facilities in the Pietermaritzburg Central Business District (CBD) that cater for both blind and sighted individuals. There are buildings designed specifically for blind individuals as well as buildings for sighted individuals. There is a need for an intervention that will allow for both blind and sighted individuals to equally occupy the same building, and gain access to the same facilities.

1.2.3. Key Problem

There is a lack of public buildings in the Pietermaritzburg CBD which are universally designed to cater for both sighted and blind people.

There are a number of architects who have taken on the task to design buildings for blind people, however the issue with these buildings is that they are designed solely for blind people, in isolated locations.

The majority of higher educational institutions are not designed with the blind in mind resulting in buildings which are not user friendly for them. These buildings are not accessible by them, they are located far from public transport routes, in those few that are accessible it is difficult to navigate through them and they are not user friendly.

1.2.4. Aim

The aim of the study is to investigate what defines an inclusive building that caters for both sighted and blind individuals. Furthermore, how these inclusive public buildings can be designed.

1.2.5. Objectives

1. To investigate the currently existing public buildings and spaces in terms of their design consideration for blind people
2. To understand the role that the other senses play in the experience of a blind person
3. To understand the change in perception from the time individuals could see to after they lose their sight
4. To discover how to incorporate the other senses and memory in the design of public buildings
5. To develop guiding principles for designing inclusive architecture, that serves both the sighted and blind people.

1.3. SETTING OUT THE SCOPE

1.3.1. Delimitation of Research Problem

This study will only be investigating people with acquired blindness, not those who are born blind. This study will be looking at blind students in higher educational institutions, not children and the working class.

Unfortunately the majority of the literature and research available concerning blind people is grouped under the bracket of disabled people. Even the South African constitution makes reference to disabled people as a whole, not specifically blind people. In this study when the word disabled is used it will be inclusive of all disabled people but with a main focus on blind people.

1.3.2. Definition of terms

- Students: a person who is studying at a tertiary institution
- Space: place cleared or freed for settlement and lodging, with a boundary.
- Place: the concrete manifestation of human's dwelling
- Cultural landscape: "an environment where man found his meaningful place within the totality"
- Concretize: to make the general "visible" as a concrete, local situation.
- Boundary: that from which something begins its essential unfolding
- Location: determined by a thing that gathers the fourfold and allows a site for it
- Fourfold: earth, sky, divinities, mortals. Representation of man as part of nature
- Genius loci: the spirit of the place
- Dwelling: purpose of life, guarding and nurturing the fourfold
- Building: giving form to dwelling and thus letting the fourfold unfold, creates localities by bounding space
- TVET: an abbreviation for Technical Vocational Education and Training.
- Haptic: The term haptic is used to cover all the different modes of touch regarding the experience of the built environment
- UKZN: University of KwaZulu- Natal
- NBR: National building regulations
- SANS: South African National Standards

1.3.3. Stating the assumptions

It is assumed:

- That the current public higher educational facilities found in Pietermaritzburg are not designed with the blind in mind.
- That the educational facilities in Pietermaritzburg, which have blind students, do not have any sighted students.
- That this segregation at a schooling level could result in difficulty in adjusting when blind people have to insert themselves into a working environment dominated by sighted people.
- That people with acquired blindness have the memory of being able to see.
- That the participants will remain truthful to their normal routine while they are being observed.
- That the architects, blind participants, their family members and friends that will be interviewed will answer the interview questions truthfully and to the best of their ability.

1.3.4. Key Question

Are the designs of the existing public buildings in the Pietermaritzburg CBD sensitive and inclusive to blind users?

1.3.5. Sub questions

1 How do the designs of the existing public building impact the experience of a blind user
2 What means do blind individuals use to adjust their experiential lives when they lose their sight
3 What role do the other senses play and how can their stimulation be incorporated in the design of inclusive buildings
4 How can the design of a building facilitate better usage amongst blind people

DISSERTATION STRUCTURE

Chapter one: Introduction

Chapter two: Research Methodology

Chapter three: Literature Review

Chapter four: Theories and Concepts

Chapter five: Key Precedent Studies

Chapter six: Key Case Studies

Chapter seven: Presentation and analysis of findings

Chapter eight: Conclusions and Recommendations

CHAPTER TWO: RESEARCH METHODOLOGY

2.1. INTRODUCTION

The research methodology that was used in this dissertation comprises of primary research as well as secondary research. The primary research involved the conducting of interviews, the observation of the main participants and case studies. The approach that was employed for this study was qualitative. This approach has the ability to add a vast body of knowledge to the subject matter, due to the fact that it is based on people's unique experiences. The experiences cannot be quantified.

2.2. PRIMARY RESEARCH

The primary research is threefold: Blind students were observed while navigating through a preselected route. With the possibility that blind people, especially those with acquired blindness may use navigational cues that they might not be consciously aware of. The blind student's families and friends were also interviewed.

2.1.1. Sampling Method

The sampling method that was used to select the main blind participants was selective. The three blind participants were selected using a purposive sampling method/ stratified sampling. The main criteria for the sample were that the participants must be blind students who have lost their sight in the course of their lives. They must be enrolled with UKZN, and studying in Howard College, where the proposed observation was to be done. They were to be either English or isiZulu speakers, who are able to communicate their thoughts efficiently.

The interviewees:
Student A – Is an undergraduate student studying Industrial Organizational and Labour studies, and staying at an on campus residence.

Student B – Is an undergraduate student studying Sociology, and staying at an on campus residence.

Student C – Is an undergraduate student studying Law and Management, and staying at an on campus residence.

The family members and friends were selected through a snowballing sampling method. Where the blind participants referred them for the study.

The interviewees:
Friend A – PhD student and volunteer at the UKZN Howard College Disability Unit

Friend B - PhD student and volunteer at the UKZN Howard College Disability Unit

Friend C – Students at UKZN Howard College, staying in the same residence as the blind participants.

The architects that were interviewed were selected through an expert sampling method.

The interviewees:
Architect A – Durban based, currently practicing, specializes in hospital design, was involved with the Disability committee in UKZN Howard College

Architect B – Pietermaritzburg based, Currently practicing and lecturing, was appointed to design hostels for Arthur Blaxall School for the blind, has designed numerous schools for the Department of Public Works, and is very familiar with the challenges with government standards and building regulations.

Architect C – Durban based, currently practicing, has designed numerous public buildings in the Durban CBD, and is mildly visually impaired

The professionals and experts that participated in the study were selected through an expert sampling method.

The interviewees:
Expert A – Coordinator of the UKZN Howard College Disability Unit.

Expert B – Independence and Mobility instructor at the UKZN Howard College disability unit

Expert C- Social worker at the UKZN Howard College Disability Unit

Expert D – Student Assistant at the UKZN Howard College Disability Unit

2.2.2. Interviews

The blind student's family and friends were interviewed in order to gain insight on any observations that they may have made of how these students navigate through spaces and cope with the transition from being able to see, to being completely blind.

Semi- structured interviews were conducted with practicing architects that had either attempted to design inclusive buildings that cater for sighted and blind people, or they had insight on the challenges that architects might have resulting in the design of inaccessible buildings.

Semi- structured interviews were also conducted with professionals and specialists who work with blind students. The purpose of this set of interviews was to gain a broader understanding of the needs of blind students at higher education levels. The challenges that they face as well as how many of those are caused by bad infrastructure.

2.2.3. Observations

The blind participants were filmed while walking through their campus- with their consent. The routes that the blind students walked were on the Howard College, UKZN campus. The blind students participating in the study chose the routes. The purpose of the observations was to investigate the physical barrier and challenges that blind students encounter while using and navigating through spaces that were never design for their use. Furthermore, the aim was to test the role that memory and the other senses play when blind people navigate through familiar buildings. The observations are documented as part of the case studies - analyses of the University of KwaZulu-Natal, Howard College.

2.2.4. Case Studies

Three case studies were visited, photographed and critically analysed to explore the different kinds of public educational buildings that are in existence. The studies were limited to Pietermaritzburg and Durban.

Buildings studied:
Arthur Blaxall School, Pietermaritzburg, 1982, S.N. Tonkin Hanson & Partners.
This building was designed and caters only for blind and visually impaired pupils.

Midlands FET College, Pietermaritzburg.
The Student community at this institution comprises of only sighted students, it is the most inaccessible one out of the three.

University of KwaZulu-Natal, Howard College, Durban
This campus is has an increasing number of enrollments of blind students, but is still lacking to some degree in usability.

2.3. SECONDARY RESEARCH

The secondary data involved the analysis of existing literature. It provides the foundation of the outcomes of the study. The literature provides the criteria required for the analysis of the case studies and precedent studies. The literature starts to define what a universal building should be.

2.3.1. Literature Review

The first part of the secondary research is the analysis of existing literature, including books, journals, online articles, government documents and unpublished theses.

2.3.2. Precedent Studies

The second part of the secondary research is the analysis of the chosen international precedent studies. Two precedent studies were analysed, using the criteria extracted from the theories and literature review. This is to establish what has been tried, failed or succeeded.

Buildings studied:
Hazelwood School for the blind, Scotland, 2007, Architect: Alan Dunlop Architects
This building engages with the user to create a multisensory experience that in turn gives the students more independence in their use of the building.

Polytrauma and Blind Rehabilitation Centre, Palo Alto, 2015 , Architect: Chris Downey
This building caters mainly for users with acquired blindness, who have not yet made a full adjustment to being blind. As a result the architect, who also has acquired blindness has designed every aspect of the building to be legible and user friendly for blind people.

2.4. RESEARCH MATERIALS

All interviews were semi- structured. There were guiding questions, but the interviewee was given a chance to make additional comments regarding the topic, but not necessarily answers to the questions.

2.5. CONCLUSION

Both the primary and secondary data was used to formulate a brief and schedule of accommodation, which will guide the design of a TVET College for the Pietermaritzburg CBD. The design principles and guidelines that were attained from this research will ensure that the design of the College addresses and resolves the challenges that were identified in the study. Furthermore the design needs to concretise the guiding principles outlined in the conclusions and recommendations.

CHAPTER THREE: LITERATURE REVIEW

3.1 INTRODUCTION

The literature that will be reviewed will be documented in a thematic structure. The literature will look at the relationship between blind people and the built environment. This analysis will be threefold, looking at the issues blind people currently face while trying to navigate through public buildings, secondly how blind people use other senses and memory to navigate through different spaces and thirdly how these navigational cues can be integrated within the initial stages of the design of public buildings. The themes that will make up the review will be: The Prevalence of Disability, the Approach to Blindness, the Implications of the Loss of Sight, South African Disability Laws and Legislation, SANS and NBR, Accessibility in South African Higher Education Institutions, Navigation and Universal Design.

The implications of the loss of sight, the different perceptions of blindness- using the disability models, what the South African laws and legislation say about disability rights, whether our laws are being implemented in our higher educational institutions, how architects are guided by the building standards- in regards to designing for blind people, how blind people navigate through space, the role that memory place in the navigation process, the roles that our different senses play in navigation and ultimately the design of buildings occupied by blind people.

3.2 THE PREVALENCE OF DISABLITY IN SOUTH AFRICA

A disability is defined as "any restriction or lack of ability to perform an activity in the manner considered normal for a human being" as defined by the World health Organisation (Moabelo, 2012).

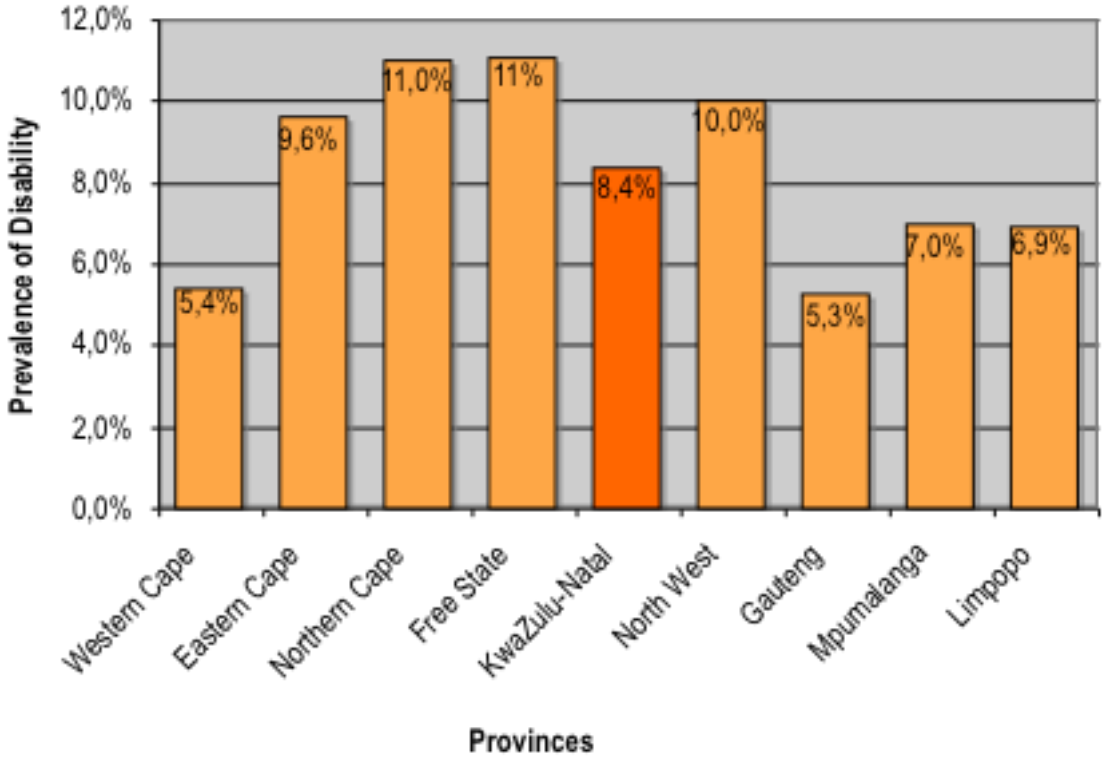


Image 2: Graph showing the prevalence of disability per province, South Africa (Author 2015)

An estimated 15% of the world's population is disabled (Statistics South Africa, 2011). Approximately 2.9 million South Africans were reported to be disabled, in the 2011 Census. Disabled people therefore form 7,5 per cent of the South African population. Seven point five percent (7,5%) of people between the ages 15-29 were reported as having a disability. This is roughly the age group that you would find in higher education institutions (Statistics South Africa, 2011). The majority of youth between the ages of 20-24 years with severe disabilities were reported as not attending tertiary (Statistics South Africa, 2011).
People with visual impairments form 11,1 percent of the disabled population. (Grobbler-du Plesis and Grobler, 2013)

Unfortunately there is no available data on the prevalence of disability in higher education institutions (South Africa. Department of Higher Education and training. 2013: 45). Only 5,3% of people with disabilities have attained a higher education.

There seems to be a shift when looking at employment. Blind people have a higher rate of employment as compared to people with other disabilities (Statistics South Africa, 2011). The discovery that there is a higher employment rate among people with a sight disability makes the issue of accessibility into higher educational institutions more critical. There is a wider job market for blind people, however they cannot fill these positions if they cannot get the chance to be trained in those particular fields.

Provincially, Eastern Cape and KwaZulu-Natal have the lowest rate of employment amongst people with disabilities (Statistics South Africa, 2011).

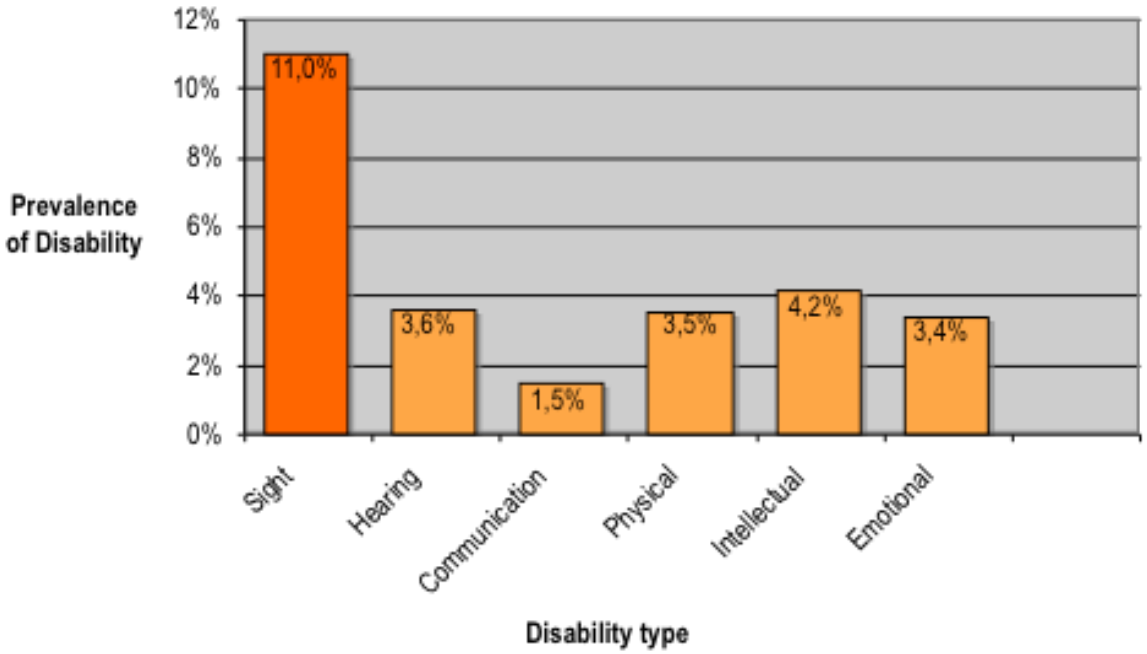


Image 3: Graph showing the prevalence of disability per disability type, South Africa (Author 2015)

3.3 THE APPROACH TO BLINDNESS: DISABILITY MODELS

People view disability differently. Which determines how they treat people with disablities. These different views are defined as disability models. These disablity models aim to pin point where the problem lies in the issue of disabled people not being able to access the same affordances as abled people.

3.3.1. Medical

The medical model views a disabled person as the entity that needs to be fixed. It emphasises on the diagnosis and possible cure (Devlieger, 2003). People that have a sensory disability can feel that they are a burden to people around them (Fitzgerald and Parkes, 1998, p. 1161)

If a person is unable to access or use certain facilities, it is concluded that the reason for the predicament is the disabled person.

3.3.2. Social

In the social model the disabled person is not considered the setback; but the unaccomodating environment is the barrier (Goldsmith, 2001). Disability is a human rights issue (Moabelo, 2012: p. 2). An unaccomodating environment can create barriers for its users (Van Doren, 2011). In a situation where a blind person is unable to navigate through a building, the barrier is the building design not the person's impairment (Van Doren, 2011). The ultimate aim of the social model is to remove barriers in society and our environment, instead of attempting to cure the disabled person- like in the medical model (Van Doren, 2011).

The social model was established as a measure to counteract the medical model, which express the experiences of disabled people. The medical model has no agenda to create inclusive environments (Devlieger, 2003). With the democratisation of South Africa, there has been a move away from the medical model, towards the social model. People have started to accept that people with disabilities can play an active role in society and in transforming their own lives (South Africa. Department of Higher Education and training. 2013: 44).

The shift, from the medical model to the social model, is largely because of the growth of Disabled People's Organisations (DPOs). The core of the social model is the principle of self-representation by people with disabilities through these organizations (Grobbler-du Plesis and Grobler, 2013)

Image4:
(Coroflot 2014)

3.4 THE IMPLICATIONS OF THE LOSS OF SIGHT

The majority of blind people were not born blind, but became blind during the course of their lives. They have gone through their lives relying on their sight as a mediator between them and the world. Following their loss of sight, they then had to radically amend their relationship with their environment (Fitzgerald and Parkes, 1998, p. 1161). People with acquired blindness also suffer an indirect loss of mobility, as they now find it difficult to navigate through space (Neu, 1975, p. 2163).

Losing ones sight does not only affect an individual's vision, but also their holistic wellbeing. It could also have an effect on the individual's confidence levels. A person's confidence in their sense of direction has a direct influence on their wayfinding abilities (Cornell, Sorenson and Mio 2003).

Some people have lost their jobs due to their loss of sight. Of course this also depends on the kind of career path they are following. For instance, with some training a secretary can return to their job, as opposed to a taxi driver (Neu, 1975, p. 2161). One of the major reasons for this devastating loss is due to their environment no longer being accessible to them, as well as the skills that they have acquired no longer being relevant. The loss of sight can also result in social isolation (Fitzgerald and Parkes, 1998, p. 1161)

Therefore to reduce the repercussions of the loss of sight we need to create environments that cater for a diverse user profile, meaning that if someone loses their sight they can easily adjust and continue with their lives.

3.5. SOUTH AFRICAN DISABILITY LAWS AND LEGISLATION

During the apartheid era, people with disabilities were one of the groups that were denied basic human rights. Regardless of the great strides that South Africa has taken towards being a democratic country, people with disabilities still face discrimination. According to the constitution disabled people are entitled to the benefits of affirmative action, as an effort to correct the past (South Africa. Office of the President, 1997).

In 2001 the Department of Education published a White Paper on building an inclusive education and training system. The implementation of these laws and policies has proved to be a hurdle. Civil society continues to actively fight for the implementation of these laws. One of the main barriers is infrastructure that is suitable for everyone, including students with disabilities. The lack of proper implementation has resulted in students being admitted into the educational system but not being fully integrated and still being segregated (McClain, 2002).

The issue pertaining to the discrimination of people with disabilities in higher education is tackled in the *Higher Education Act*(1997) (Wong-Hernandez, 2001).

The integrated National Disability Strategy outlines the agenda concerning the integration of disability issues into all programmes in the country. (South Africa. Department of Higher Education and training. 2013: 44).

3.5.1. The Constitution

The South African Constitution rebukes any form of discrimination against blind people (South Africa. Department of Higher Education and training. 2013: 44).

Section 9 of the South African Constitution protects people with disabilities from direct and indirect discrimination. This section can be applied vertically between the state and the individual, as well as horizontally between citizens. (Grobbler-du Plesis and Grobler, 2013)

3.5.2. Legislation

South Africa's legislation does not fully deal with issues pertaining to disabled people. People with disabilities are mentioned in certain parts of the legislation (Grobbler-du Plesis and Grobler, 2013)

According to the National Building Regulations and Building Standards Act 103 of 1977 people with disabilities should be able to access a building safely. Above and beyond being able to access a building, people with disabilities need to be able to use the facilities accommodated in the building (Grobbler-du Plesis and Grobler, 2013)

The Higher Education Act 101 of 1997 aims to ensure that everyone has an equal opportunity to receive education, to the maximum of his or her capability as a result of their disability (South Africa. Department of Higher Education and training. 2013: 44). The South African Library for the Blind Act 91 of 1998 is very poorly implemented.

This act is intended to ensure the provision for library and information services to blind and print-handicapped readers (Grobbler-du Plesis and Grobler, 2013)

3.5.3. Policies and programmes

The National Disability Strategy of 1997 is intended to assist in the promotion and protection of the rights of people with disabilities. (South Africa. Office of the President, 1997) (Grobbler-du Plesis and Grobler, 2013)

Some of the initiatives that have been brought forward include accessibility. The National School Infrastructure Norms include specifications for universal design regarding new school buildings. However, these norms do not extend to higher education facilities. The National Accessibility Programme is a research and innovation project that deals with the segregation of people with disabilities, and facilitating their inclusion into society (Grobbler-du Plesis and Grobler, 2013)

3.5.4. SANS and NBR

Part S of the SABS 0400 refers to the design requirements of facilities for disabled persons. According to the South African law the definition of disabled people includes blind people. However the entire section describes the design requirements for people with physical disabilitiess, specifically those in wheelchairs (SANS 10400 204, 2011).

The SANS 10400 however does make some reference to design considerations for people with visual impairments. It sets out guidelines in reference to the section on signage, barriers along travel routes as well as audible warnings in the lift. The standards make an emphasis on the fact that the blind population is a minority. Furthermore stating its main issue of enabling this group "to make the most of the sight that he does have". The design consideration of people with sensory impairments is vastly overpowered by the consideration for those with physical impairments (SANS 10400 204, 2011).

3.5.5. Civil Society

The Disability Rights Movement is the movement that aims to secure equal opportunities and rights for people with disabilities. The aims and objectives of the movement are: accessibility and safety in transportation, the architectural infrastructure, the physical environment; for everyone to have equal opportunities, education and employment (Vaughn: 2003)

Effective civil rights legislation is still needed in order to secure the above-mentioned opportunities and rights. There are many civil society groups who are actively fighting for this. For people with physical disabilities accessibility and safety are the primary issues that this movement works to rectify. (http://www.miseast.org: 2014)

Inclusion is a term used by disability rights advocates to explain the idea that all people should accommodate any person with a disability. The concept of inclusion emphasizes universal design for physical accessibility issues, such as the usability of physical structures and the elimination of barriers (http://www.miseast.org: 2014)

The inclusion disability rights advocates encourage disabled people to involve themselves in activities that give them an audience, such as becoming professional dancers, or even being political activists. This idea is a reaction to the social response of abled people. They have a fear of becoming disabled because they think they will no longer be able to live active lives, and as a result show pity towards disabled people, and therefore isolating them from society. This integration has led to the idea of mainstreaming.

Mainstreaming is when a person with a disability is placed next to a person who is able, hoping that they will adapt to and learn about each other. However many inclusion disability rights advocates like Alex Szele acknowledge the value of mainstreaming as a tool, but argue that it is not enough. Society's social attitudes should have universal design in mind, which in turn will eliminate the idea that a body that is different is incapable of self-management (Alex Szele: 2000)

Disabled people are expected to change to suit their environment, instead of the environment being designed in such a way that it suits them and abled people, inclusively.

The movement fights for disabled individuals to be looked at and valued by society, and be viewed as being "normal" people who just have a couple of differences. This movement aims to encourage others in the world to start accepting people with disabilities.

3.6. ACCESSIBILITY IN SOUTH AFRICAN HIGHER EDUCATION INSTITUTIONS

Blindness is not a new phenomenon. There is existing evidence dating back to (c. 2040-1640 BCE). There are Egyptian tomb walls that have depictions of blind harpists. Yet society is still struggling to intergrate blind people, as though it is a new phenomenon. (Allen, 2010)

Thousands of years ago blind people used to be institutionalised in asylums. In the 18th century authorities started to erect schools for the blind. This was a step in the right direction, but this still meant that they were segregated from society, as they were in the asylums. There used to be a strong belief that deaf and blind people could not be educated. Having access to higher education can reassure blind students that they are being educated towards a career like other students. (Finegan, 1920). Higher education has an incomparable influence on a person's employment opportunities, and subsequently their quality of life (Disability Studies Quarterly, Sachs, and Schreuer, 2011)

With the democratisation of South Africa, people with disabilities were at the front line for transformation. The setting out of TVET colleges still resonates the apartheid era, especially in terms of the infrastructure (South Africa. Department of Higher Education and training. 2013: 1). Blind students struggle to access some of the buildings around their campuses (Moabelo, 2012: p. 3). This results in poor attendance and low pass rate among blind students. Blind students still experience discrimination regarding access to higher educational institutions. The institutions as a whole are inaccessible even in terms of the facilities provided (South Africa. Department of Higher Education and training. 2013: 44)

A total of 5807 students with disabilities were enrolled into 22 of the 23 public universities in 2011, this is only 1% of the total number of students enrolled. This ratio is not in proportion to the national ratio of people with disabilities. These numbers exhibit the existence of barriers that prevent disabled people from enrolling into higher educational institutions. (South Africa. Department of Higher Education and training. 2013: 45)

The enrollment into TVET Colleges has increased by almost 50% over the past few years. The number of disabled people who are enrolled into higher education institutions is growing, despite the issues of accessibility to public transport, buildings and other services (Wong-Hernandez, 2001). The concept of work-integrated learning assists the blind students to transition easily from schooling to their respective careers (South Africa. Department of Higher Education and training. 2013:xii)

The main objective of the TVET colleges is to equip students for the workplace and/or to become self-employed. To achieve this the colleges also offer support services, such as academic support, career guidance, and social support as well assistance with getting bursaries (South Africa. Department of Higher Education and training. 2013: xii)

Some of the key objectives of the Department of Higher Education are: to develop the quality of teaching and learning, improving student support services as well as developing the infrastructure. These elements are essential for the accessibility of the Colleges for blind students. (South Africa. Department of Higher Education and training. 2013: xii)

There is provision of funding for all universities to conduct infrastructure audits, with the intention to improve accessibility and ensuring that all new buildings are accessible. The allocation of these funds is based on whether that institution prioritizes disability needs. Unfortunately there is no specific funding allocated for TVET Colleges to improve accessibility of existing and new buildings (South Africa. Department of Higher Education and training. 2013: 46)

In countries like Germany if the disability laws are not implemented or sufficiently supported, it could result in a lawsuit on the basis of discrimination (Roth, Rains and Naaz 2011). In South Africa there are no concrete consequences for not abiding by these laws. The consequences are only realised by the blind people who are unable to receive a higher education.

3.7. NAVIGATION

People use modern signs and architectural elements to navigate through different kinds of spaces. There is a wide body of knowledge on visual navigational cues, but the literature written on non-visual navigational cues is limited. People with acquired blindness have a different method of following directions to those who were born blind. They remember the location of objects relative to each other. Visual experience early in a person's life allows the brain to create visual perspectives and a frame of reference. (www.medicalxpress.com, 2013)

Our sensory and cognitive functions afford us the ability to orientate ourselves in our environments. These very functions are responsible for alerting us of danger, they are the source of pleasure and pain. Furthermore they form the process in which we communicate with others (Fitzgerald and Parkes, 1998, p. 1160).

3.7.1. Orientation

A person's confidence in their sense of direction has a direct influence on their wayfinding abilities (Cornell, Sorenson and Mio 2003).

A sense of direction also relies on known landmarks and landscape as we move through our environments (Gibson 1979). Landmarks are not the only tools used in wayfinding, people have the ability to indicate the bearings of "nonvisible" locations (Tolman 1948). "Imagined scenes are used to estimate bearings" in situations when the route being taken cannot be seen (Cornell, Heth, and skoczylas 1999). The ability to navigate through space is especially difficult when the environmental cues are not obvious. Visual cues are irrelevant in the navigation process of a blind person (Cornell, Sorenson, and Mio, 2003, p. 400).

Developing a good sense of direction has been connected to the ability to isolate the environmental cues, a strategy for learning a route, memories of a particular location as well as mentally aligning yourself within an imagined framework (Cornell, Sorenson, and Mio, 2003, p.399). A sense of direction can also be gained through the perception of landmarks (Cornell, Sorenson, and Mio, 2003).

People have the capability of utilizing various methods of wayfinding, not just sight, depending on the modes of information available to them (Golledge 1999). People that have a good sense of direction are able to imagine spatial relationships beyond their immediate context (Cornell, Sorenson, and Mio, 2003, p.401). People have the capability of adopting a number of various methods of wayfinding, depending on the information available. Wayfinding skills can be improved through the memory of challenges and achievements during good or bad wayfinding experiences (Cornell, Sorenson, and Mio, 2003, p. 402).

3.7.2. Senses [non-visual communication]

Multisensory Architecture

Buildings are multi-sensory in experience; they do not just cater for the visual aesthetics. There has been some debate and revolt against this biased visual priority of architecture. Blind individuals experience buildings differently, they pay more attention to the haptic, tactile, auditory and olfactory aspects of the building (Vermeersch and Heylighen). Passini, Shiels 1987; Peieira ,2009, focus on the role that our senses play in how we navigate through buildings.

Every experience of the built environment is multi-sensory. Blind people might be more conscience of it than sighted people (Pallasmaa, 2006). Seeing an object involves more than just the eye. When we look at an object, our knowledge taken from previous experiences of it contribute to the holistic conclusions we make of it. This previous experience may include the other senses, not just sight. (Gregory 1990).

Our senses are not isolated from each other, they work together to form an image, whether new or memory triggered (Pereira 2009). The experience of a space does not only depend on its visual appeal, but its sound, smell and feel also contribute to how it is experienced (Herssens and Heylighen, 2012, p. 100). The majority of people with acquired blindness often rely on non-visual cues in the environment, p. 101.

Touch

The haptic sense is the most essential sense that is active for the experience of movement. Haptic perception involves active and passive engagement, where it is either one actively makes a connection through movement or alternately when external objects like wind touch the body. (Herssens and Heylighen, 2012, p.100). Part of the passive engagement involves temperature.

Often when an architect designs for blind people they transition from hard surfaces to soft surfaces to signify a functional change. This transition to soft surfaces removes the ability for blind users to use sound to navigate (Tigerman1978, p. 6)

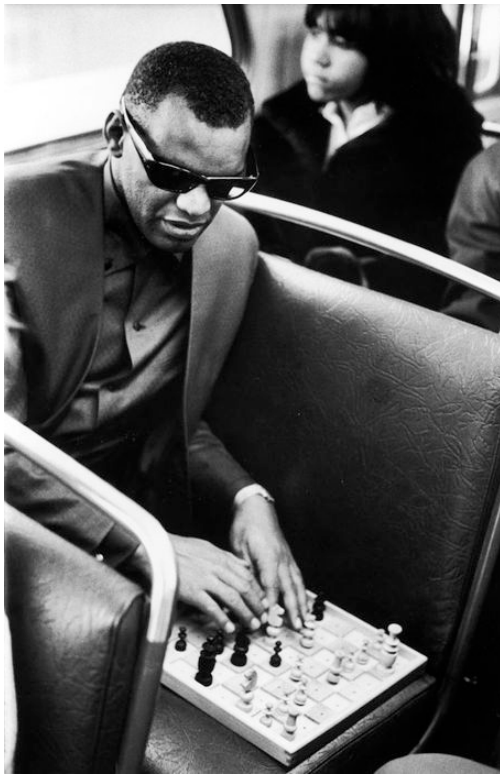


Image 5: Ray Charles (bjazz 1999)

Sound and smell

Smell and sound along a route can assist with navigation. Sound can assist a blind person to configure themselves in that present moment. Sound can also be a trigger of a memory of a previous experience of the space, (Herssens and Heylighen, 2012, p. 110). Humans are able to perceive different sounds that are produced by their movements, with the assistance of various floor textures (Van Doren, 2011). There are two types of acoustic location, active and passive. Active acoustic location is when the blind user creates a sound so as to create an echo, which they

analyse in order to establish the location of surrounding objects. Passive acoustic location is more indirect, the blind user identifies the sounds and vibrations that are created by the surrounding objects, the user then analyses the sounds received to establish the location of surrounding objects (Gutenberg, 2015).

There are numerous ways in which we can tangibly interact with a space. Tangible stimuli can be categorised into material properties and geometric properties. The geometric and spatial properties make reference to the structure and layout of the space. (Herssens and Heylighen, 2012).

Cues such as direction of shadows and wind are not available to assist in navigation within a building (Passini and Shiels 1987), so people use other cues. Touching a wall becomes so much more than just that action, but the temperature, the texture the shape starts to transform the object into a communication tool (Peieira 2009).

The world is full of different sensory stimuli. When we are born, all our senses are continually challenged by our environment. As we grow older we learn to interpret and respond to the information we receive through our senses. Our brains interpret the information which we receive through our senses which result in our responses to different situations. Our reactions to these situations become organized, automatic and efficient (Multi-sensory stimulation area - institute for the blind, 2015).

3.7.3. Memory

Memory plays a big role in the transition from being sighted to being blind. Blind people have been proven to have more accurate memories than those with sight (www.dailymail.co.uk 2013). People do not need to have knowledge of the route they are taking; being able to pay attention and also use their memorial abilities can assist in navigating through spaces (Kozlowski and Bryant 1977). It is not only about the memories of known objects, but also memories of past experiences of different spaces. People with acquired blindness most likely cannot read braille, therefore need to remember routes and obstructions.

Our experiences are continuous and are being captured into our memories (Gibson, 1986, p. 63). Perception can change due to knowledge gained and the memory of past experiences (Gibson, 1986, p. 74). Blindness stimulates the memory of the order of objects, allowing them to differentiate between similar items that only differ visually (Hitti, 2007)

A person's ability to navigate through space could also involve memories of the challenges, anxiety and successes experienced during a previous visit to a place (Cornell, Sorenson and Mio 2003). "People with a good sense of direction are good at imagining spatial relationships beyond their immediate position and surroundings." (Sholl 1988). Blind people can also rely on their memory because they are less likely to create false memories (www.dailymail.co.uk 2013).

Even sighted individuals use memory when navigating through a space especially if they come across a detour or an obstruction. They may remember the distance they travelled, the angle of travel and time traveled to reenact their way forward or back to the beginning (Cornell and Heth, 2003)

3.7.4. The use of a cane

Most blind people are likely to use a white cane to navigate through spaces. Some even use guide dogs to guide them. The use of a cane as a navigational tool is very instrumental. A blind user can tell when they have passed a building or object by the change in sound. Sound can start to be concentrated on a certain point assisting the user to locate an entrance. The blind user does not only focus on the sound emitted through the relationship between the cane and the surfaces but also through the vibrations that are transmitted on to the palm of his hand when he taps on a surface (Downey and Kleege, 2014)

There is a misconception about the function of a cane: that it is only for protection. Detecting barriers is one of the functions, but that is not the only function. The cane is also used to navigate through space by listening to the sound that it makes when it is tapped on different surfaces. When the user taps on surfaces such as walls and the ground the sound comes back to them, then they can interpret that sound (Downey and Kleege, 2014)

Objects that are located above the waist line or that are overhanging, as well as windows that open onto walkways, will not be detected by a cane (*SANS 10400 204*, 2011). Objects should not be fixed 300mm from the ground, where a cane cannot detect them, blind people can walk into them and cause injury.

3.7.5. Barriers

Some of the barriers that blind people encounter include: wrongly placed street furniture, obstacles placed on circulation routes, inadequate tactile information as well as insufficient navigational cues (O'Doherty and Kinsella with NCBI, 2011)

Image 6: An example of a tree that is encroaching onto the footpath. Obstacles at head height may not always be detected by a person's guide dog, and cannot be detected by a white cane (Author 2015)

There is a thin line between an object being an obstruction, and providing navigational guidance. The placement of street furniture is very crucial in aiding the circulation of blind people along pathways. If they are placed correctly the objects can be used as shorelines. (O'Doherty and Kinsella with NCBI, 2011)

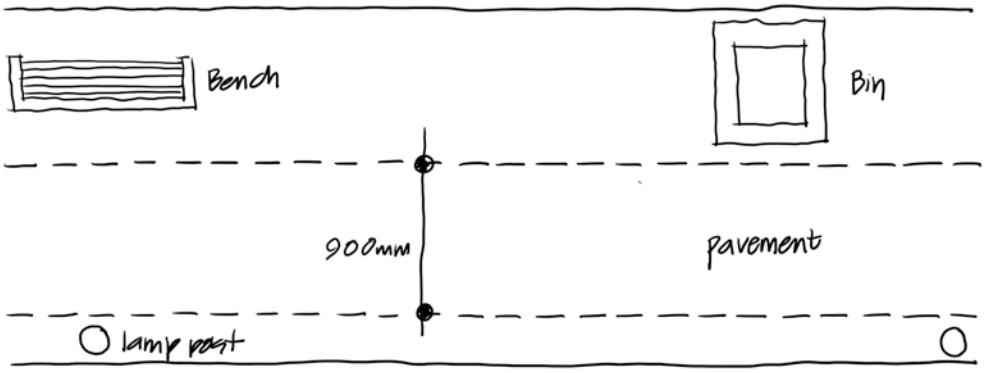


Image 7: Image showing an example of how street furniture can be placed, away from the movement path (Author 2015)

Some items that can be physical and psychological barriers in the built environment for blind people are:

1. The placement of pavement furniture
2. Cars that are parked on the pavement
3. The inability to read visual cues
4. Construction and repairs that occur near or on circulation routes
5. Irregular or broken surfaces
6. A big crowd of people
7. Stairs
8. Traffic lights that do not have an audible output
9. The absence of railings
10. Imperceptible curb edges and cuts
11. Elevators that do not have an audible output or braille signage and buttons
12. The location of doors and entrances
13. Fixtures that are not standard design
14. High volumes of traffic
15. The lack of surface textures
16. Overhead obstructions
17. Lack of navigational cues
18. Change in gradient

adapted from Golledge and Stimpson,
1997, p. 493).

3.8. UNIVERSAL DESIGN

Designing for the disabled is beneficial to broader range of users. Some libraries have started making audiobooks available to blind people, these are also beneficial to sighted people who might be commuting (Ranney, 2003).

Universal design refers to "an approach to design that incorporates products as well as building features which, to the greatest extent possible, can be used by everyone." (Mace, 1998). Universal design is also referred to as design-for-all (Roth, Rains and Naaz 2011).

" A wise architect works with his/her entire body and sense of self" (Pallasmaa 2005). Architects like Pereira live by the notion of designing inclusive architecture for the benefit of sighted and blind individuals. The three central themes he works by are: "inclusion, sustainability and the senses" (Pereira 2009). These themes are found resonating in majority of the projects he has worked on.

Simple things like choice of location for an object can have an impact on how the space is perceived and experienced. Placing a wall in a certain orientation can change the direction of the wind that hits it, which in turn can completely alter the experience of a space. Both sides of the wall might look the same but the experiences on either side are very different. (Pereira 2009).

The existing body of knowledge comprises of architects who have designed buildings that cater solely for sighted individuals and then there are those architects who have designed with the blind in mind, but soley for the blind not for both. Designing the in-between means that the same design element needs to cater for the whole community. Not that certain elements such as signage, are for the navigation of sighted people and others are for the navigation of blind individuals. The same building elements need to cater for all the users.

There is a misconception that blind people have no power of visualisation. This is especially untrue for people with acquired blindness. (Neu, 1975, p. 2161)
There is also a lack of consideration for blind people even on an urban design scale. Even before entering a building, navigating around the city is not easy.

Research shows that inclusive learning results in enhanced social development (Roth, Rains and Naaz 2011). The involvement of the clients and potential users in the design process is very important (Seamon 2015)

The seven principles of universal Design are:

1. Equitable use
2. Flexibility in use
3. Simple and intuitive use
4. Perceptible information
5. Tolerance for error
6. Low physical effort
7. Size and space for approach

3.9. CONCLUSION

The architect is not a replacement of medical professionals that deal with the repercussions of sight loss. However the architect can be seen as an enabler that designs the setting that promotes this rehabilitation and reintegration (Steele 1959).

Architects like Pereira live by the notion of designing inclusive architecture for the benefit of sighted and blind individuals. The three central themes he works by are: "inclusion, sustainability and the senses" (Pereira 2009). These themes are found resonating in a majority of the projects he has worked on.

The general use of the word disabled is usually linked to people with mobility restrictions. However this definition is not limited to those with mobility restrictions, but extends even to people with sensory restrictions, for example blind people. Any person who endures the complete and permanent loss of sight of both eyes is considered to be disabled ("Insurance. "Complete and permanent Loss of the sight of both Eyes". Colour-Blindness', 1918, p. 365).

Accessibility and inclusion are not the same thing. Accessibility is passive, if an entrance is left open people can access the building. Inclusion is more active, a person needs to be invited to use the spaces beyond the entrance (Roth, Rains and Naaz 2011).

CHAPTER FOUR: THEORIES AND CONCEPTS

4.1. INTRODUCTION

The purpose of this chapter is to review theories and concepts that could address the research questions as well as provide a precedent for the framework that universally accessible buildings should follow or consider.

The first theory that will be explored in this section will be Phenomenology, which is the architecture of the sense. Taking a look at the possible steps that can be taken in order to move away from an ocular centric mode of design. The exploration of perceptual theory is essential for the understanding of how different people experience the same space. Ecological Theory further investigates the intimate relationship between people and the environment. The Wayfinding Theory explores the requirements that need to be fulfilled through the environment in order to make independent navigation possible.

The concepts that will be explored include Echolocation, which is a concept that is widely associated with animals, where they use sound to navigate themselves. This concept has now been proven effective with blind people. Lastly this chapter will explore the concept of Symbiosis, which focuses on the interaction between different people. From the analysis of these theories and concepts a list of criteria will be extracted for the purposes of analyzing the precedent and case studies.

4.2. THEORIES

4.2.1. Phenomenology

Phenomenology is the interpretive study of human experience. The aim is to examine and clarify human situations, events, meanings, and experiences "as they spontaneously occur in the course of daily life" (von Eckartsberg, 1998, p. 3). It is both a design medium in contemporary architecture based on building materials and their sensory properties. Phenomenology is associated with the individual experience of a space through its sensational qualities of light, sound, texture, colour, and perspective. The exploration does not look at the experience of the senses in isolation, but in conjunction.

Our senses do not work in isolation; they are co-dependent. Instead of looking at the five senses in isolation they could be looked at within their systems, as categorised by James Gibson, which are the taste-smell system, the basic orienting system and the haptic system (Odom, 2010). We use our whole body to perceive buildings; it is not just about how it looks but also about the tactile characteristics and how the space smells (Mellaerts 2006).

Even though we presently reside in an ocular centric society, which prioritises the sense of sight, when you look at history touch is seen as the oldest sense. The skin is perceived as the root organ of the sensory system, the eyes are layers of skin. The skin concretises the other senses by forming the organs that aid their being (Odom, 2010). Sound is a more reliable navigational cue than sight. A person needs to actively view the object, however sounds gravitate towards the user without their

participation (Van Doren, 2011). The use of the senses in conjunction can enhance the user's experience.

When approaching an object from a distance, more often than not our first interaction with it is visual. After seeing the object we start to create an assumed reality, where we start to imagine the characteristics associated with the other senses (Odom, 2010). This association is mainly based on memory, when we see a material we can assume how it might smell, sound or feel, based on our past experiences with that material.

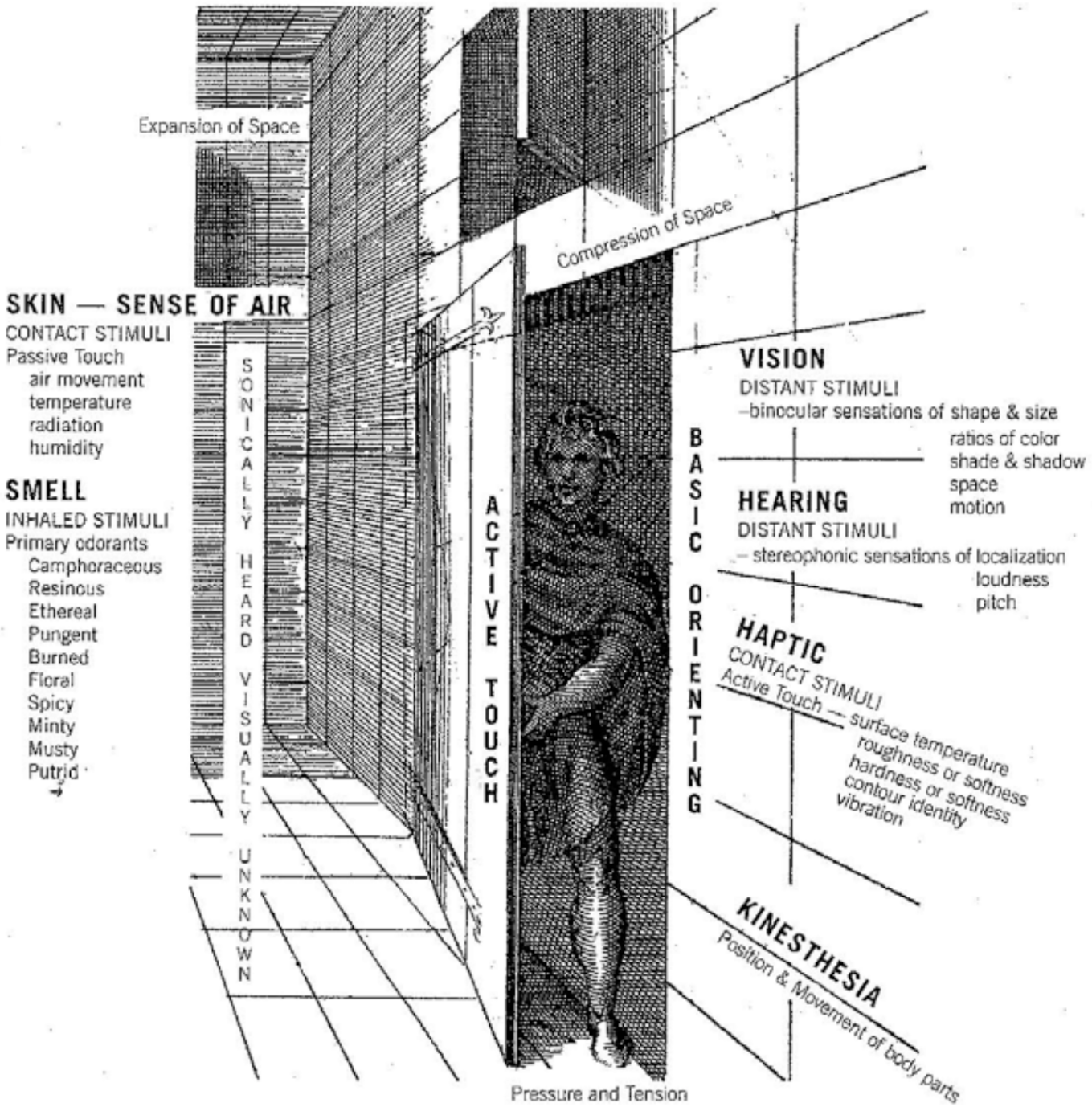


Image 8: Range of the senses and the possible interactions with the environment (Hall 2008)

4.2.2. Perceptual Theory

The historical belief regarding perception was that it is a passive ingestion of information from the world, and that the brain had little to do with it. To the contrary the brain has a lot to do with perception it is just less consciences than the five senses Gregory 1990). Being unable to see your surroundings can be a huge contributing factor to how one perceives a space.

As much as we have free will and can choose how to conduct ourselves, however we are also subject to unpredictable reactions to our environment (Seamon, 1990, p. 283). For example a blind person walking through a familiar space that is suddenly confronted by an obstruction that has never been there before. After this new experience his perception of the space could be altered. Our experiences are not limited to a particular moment, but are also linked to the past (through memory) or the future (through an anticipation of things to come) (Seamon, 1990, p. 293)

Perception is an instant experience; there is no prior thought or analysis involved (Gibson, 1986, p. 68). Our perceptual systems consist of our five senses (Gibson, 1986, p. 66). Our senses are not stimulated in isolation, and not all of them are stimulated at every given moment. Perception may occur regardless of a lack of information (Gibson,1986, p. 67).

There are numerous factors that contribute to how we perceive a space. A number of people could stand in the same space, at the same time, but perceive it differently. Their past experiences of the space might not be the same. Their memories of the space might also be different. In reference to this research, their abilities and methods of perception might be different.

Our emotional reactions can also determine whether our sensory experiences are pleasant or unpleasant. A person who perhaps has had a previously traumatic experience associated with the space would perceive it differently to a person who has had a joyous experience in the very same space (Seamon, 1990, p. 291).

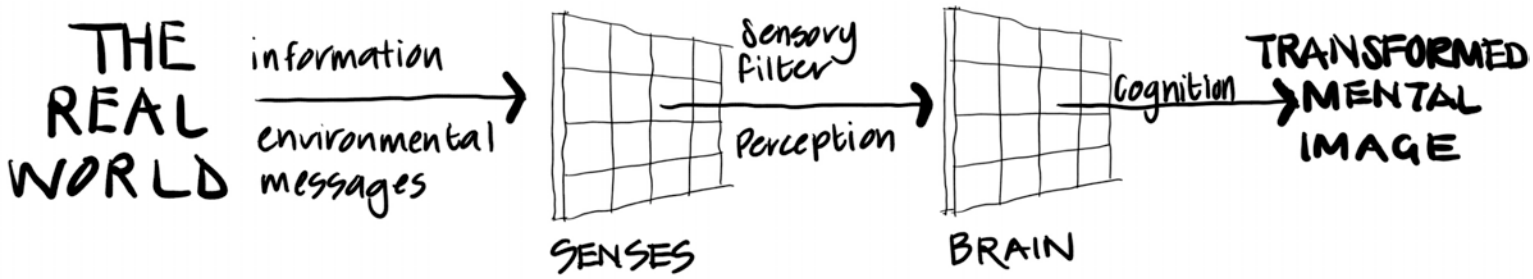


Image 9: Diagram showing the transfer and interpretation of information through our senses from the world and back into the world transformed (Author 2015)

Perception is unique to the individual; it is not an exact science (Gibson, 1986, p. 67). Our relationship with the environment is largely based on the affordances it grants us. Water affords breathing to a fish, but not to humans (Gibson, 1986, p. 69). Affordances for blind people and sighted people are different. An object might benefit sighted people but be an obstruction to blind people. The affordances of an environment are directly perceivable; you do not need any prior learning (Gibson, 1986, p. 69).

The objects around us passively play a vital role in how we perceive space. Some objects play a more integral active role, like a blind man using a cane (Seamon 2010). Objects become more then just disconnected elements, but are now extensions of the body.

Perception is the fundamental basis of human experience. However it is not easily explained or compared due to it mainly being a subconscious experience (Seamon 2010). Humans can theoretically perceive either passively through senses, or actively through our actions. We ordinarily experience our surroundings without requiring any movement within a space. Typically these cannot be experienced separately (Seamon 2010). Sensory perception is associated with materials and aesthetics, in our immediate environment.

Image 10: Chris Downey using his cane to navigate his way through the city (Downey 2015)

4.2.3. Ecological Theory

Perception is anchored on an individual relation and response to the environment (Gibson, 1986, p. 65). There is a very fundamental relationship between people and the environment (Gibson, 1986, pg 64). The environment allows for smell sound and light to flow through it, the flow of these sensory stimulators is what we perceive (Gibson, 1986, p. 66). When we experience a space this entails paying attention to every material and form (Gibson, 1986, p. 63). Blind people can perceive a space differently to a sighted people, because they cannot pick up the visual cues. Their relationship with the environment is different from that of a sighted person.

People are not separate from the environment that they experience-they are interdependent. An environment needs to be supportive towards the optimum experiences of its users. It is an architect's responsibility to create a built environment that is concussive towards the experience of its users (Seamon 2010).

The optimum relationship between people and the environment is one that is mutually beneficial. The environment gives us an experience; alternatively the user reacts to it and gives something back. The user also makes a contribution to the process of place making (Seamon 2010). People regularly occupying and utilizing a space, which gives the place its character (Seamon, 2012)

Architecture is more than just a design of a disconnected shelter structure. Design requires a higher involvement with the site and its potential users, to ensure a positive relationship between the two (Seamon 2015). A relationship that promotes the feeling of belonging is required (Alexander 2004).

4.2.4. Wayfinding Theory

This theory focuses on the modern systems of signs (graphic, written or audible), and architectural elements to convey location. It explores how we as humans learn a route through the surrounding environment. For this learning process to occur the environment needs to be legible. This legibility is not only focused on the visual legibility but as well as sound and touch (K. Lynch: 1960). The elements of the built environment are placed in a particular organisation that allows us to navigate through complex spaces (Passini, 1984)

Wayfinding is a four-step process that starts with orientation, establishing ones location in relation to their surroundings. This is then followed by route decision, deciding which route to take. The following step is route monitoring, where one continually checks that the route that they have chosen is navigating them toward the desired destination. The final step is destination recognition, when one can identify their destination (Holden, Lidwell an Butler, 2003, p.260)

In order for the navigational process to occur successfully, the environment needs to be designed in such away that this process can occur. The following eight principles are guidelines towards achieving a successful wayfinding strategy. However, in regards to this study only the first six will be explored:

1. *Creating a distinguished identity at each location, different from others*
2. *The use of landmarks to provide orientation cues and locations which are memorable*
3. *Creating well-structured paths*
4. *Not giving the user too many choices in navigation*
5. *Availing vistas or maps to the navigator*
6. *Providing signs at decision points, to assist in making wayfinding decisions*
7. *Creating regions of differing visual character*
8. *Utilising sight lines to show what is ahead*

(5. Design Principles for wayfinding, 1997)

The main purpose of these principles is to make the information in a space legible and conducive to successful independent navigation.

1. Creating a distinguished identity at each location, different from others

Every space needs to have a distinctive perceptual identity, so that the user can easily identify the space. Every space should ideally bare similar characteristics to a landmark.

2. The use of landmarks to provide orientation cues and locations which are memorable

Landmarks are useful for navigation as well as orientating the user in terms of their location, in relation to their destination. Most landmarks are described according to their visual quality and dominance. However a landmark can be described using its other sensory quality. A large object can have a tremendous affect on the noise quality of a space; it can have an effect on the thermal comfort of a space or even a textural quality. Landmarks can be very affective when placed in locations where the user needs to make a choice in a path to follow (5. Design Principles for wayfinding, 1997)

A church bell is an example of a landmark. It is usually fixed to tall tower structures which can be seen from many vantage points. Most importantly the sound that is made by a bell provides an audible cue that can be sensed from far. The sound can assist a user in orientating themselves by analyzing the noise level to determine their proximity to the bell. The ringing of the bell also transfers vibrations to its adjoined and adjacent structures. The intensity of the vibrations can be used as a navigational cue.

Image 11: The bell tower of the church of the immaculate conception (The church of the immaculate conception, 2012)

3. Creating well-structured paths

A well-structured path is continuous and has a clear beginning and an end. A path needs to reaffirm the users' progress and distance to their destination. The user also needs to be able to determine which direction he/she is moving along the path. (5. Design Principles for wayfinding, 1997)

The beginning and end point are just as important as the intermediate points which connect the path to its context (5. Design Principles for wayfinding, 1997)

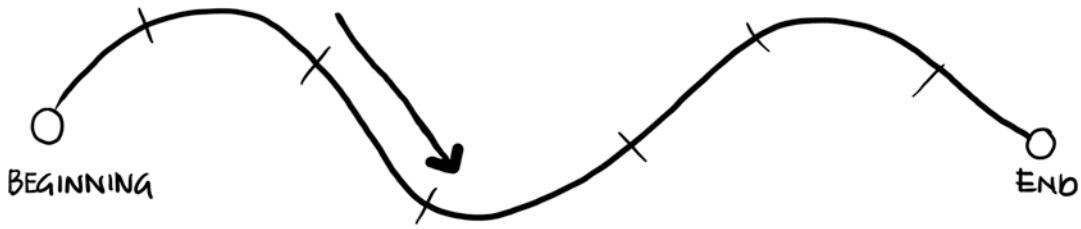


Image 12: Diagram showing an example of a concept of a well-structured path (Author 2015)

4. Not giving the user too many choices in navigation

When a user leaves the starting point the route design needs to ensure that they experience it no matter what (5. Design Principles for wayfinding, 1997). All secondary spaces need to branch off the main path.

Having too many routes to choose from can be very disorientating, especially for a blind person. The user needs to be able to concur a route, and use his/her memory to navigate through the space the next time they use it.

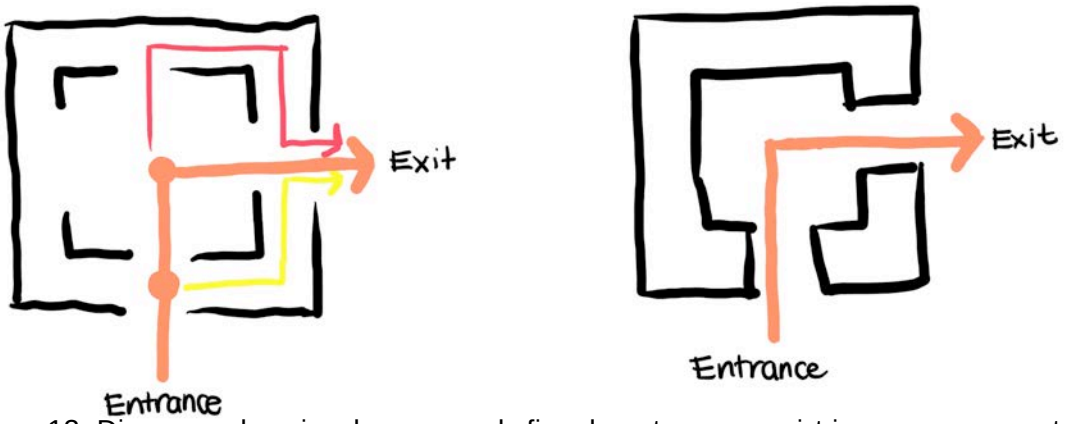


Image 13: Diagram showing how one defined route can assist in more accurate navigation (Author 2015)

5. Availing vistas or maps to the navigator

A map gives a user an image of the whole building before the start they journey (5. Design Principles for wayfinding, 1997). This allows the user to make easier navigational decisions when they reach a place of intersection. It can grant, especially a first time user a more anxious free experience, because they can already anticipate the experience. The map orientates and places the user, in relation to his/her immediate surroundings (5. Design Principles for wayfinding, 1997).

The user is now able to understand the relationship between spaces, not just discovering individual isolated spaces as he/she navigates through them (5. Design Principles for wayfinding, 1997).

Image 14: "David Rubinger, Blind child 'discovering' Israel with his fingers, 1960" (Gad 2012)

Image 15: FSU blind student learns campus with a Braille map (www.floridamemory.com n.d)

6. Providing signs at decision points, to assist in making wayfinding decisions

Decision points are where the user needs to choose where to go and what to do from that point. These points are predominantly found at the intersection of routes. Repeat users require a collaboration between navigation cues and memory to make a decision. This requirement reiterates the importance of memorable landmarks, braille maps, and not giving the user too many possible routes to one destination (5. Design Principles for wayfinding, 1997).

Successful wayfinding is defined by the ability of a user of a space to move from one position to any destination using the information given to them. The most reliable sense for sighted people is their sight, which means that a lot of emphasis is placed on ensuring that visual cues are properly communicated. For blind people visual information is not beneficial. When designing for a diverse user group that includes blind people, the other non-visual cues need to be well communicated.

4.3 CONCEPTS

4.3.1. Echolocation

The concept of echolocation stems from biomimicry, where humans look to imitate nature for solutions. Bats and dolphins echolocate by radiating sounds and then listening to the echoes that bounce back to detect objects. Through research that has been conducted it has been proven that people can also echolocate (Thaler et al.2011).

Echolocation is a form of active acoustic location. Blind people have learnt to make clicks with their mouth, which create echoes that bounce back to them. Echolocation enables blind people to do things otherwise thought to be impossible without vision and can allow blind people to be more independence (Thaler et al.2011). They can then use this skill to navigate through unknown environments. Research shows that blind echolocation experts use what is usually the 'visual' part of their brain to process the clicks and echoes. (Thaler et al.2011)

Human echolocation has had a remarkable impact on the opportunities available to blind people. Individuals such as Daniel Kish have participated in activities such as hiking, mountain biking, basketball and even playing football (Kish, 2015)

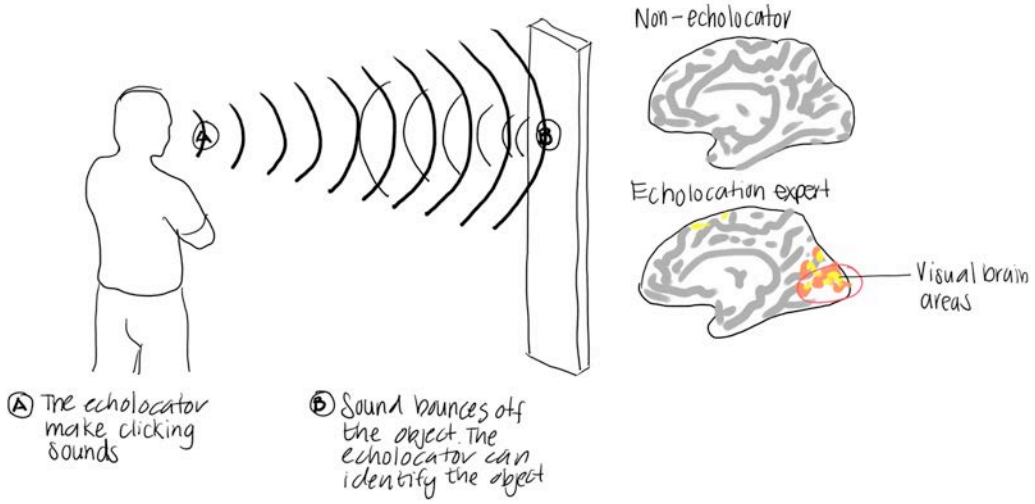


Image 16: Image showing how echolocation works (Author 2015)

4.3.2. Symbiosis

The concept of symbiosis is taken from the biological phenomenon of how different species cohabitate. When different species live together for a long period of time, they ultimately evolve into new species. This concept has been translated as an inspiration for human behavior. People with major differences cooperating with each other in spite of their differences. This cooperation can result in the elimination of boundaries (Adema 2015)

Symbiosis addresses the issue of discrimination. Blind people in South Africa have been victims of discrimination, even post apartheid. The majority of sighted people isolate blind people mainly because they are different from them. Being different is not a valid reason for isolation (Adema 2015).

4.4. CONCLUSION

According to the theories covered, a successful building needs to be accessible to everyone at every scale. Buildings need to cater for a diverse user group. People perceive spaces differently; a space cannot purely be designed for the disadvantage, as a means to correct the issue of discrimination. Designing a building that is isolated for a particular disadvantaged group is another form of discrimination. Integration involves designing spaces that can be used simultaneously by a diversity of people.

Beyond the accessibility into the building, the building needs to be usable by everyone. The circulation into different spaces needs to be legible. Furthermore users need to be able to navigate through a space successfully. The communication between the user and the built environment needs to be clear.

Good architecture needs to be multisensory, and move away from the popular ocular centric approach. This ensures that even users with a certain sensory disability can still read the building using the other senses.
The building needs to be barrier free; nothing should prevent a user from using the building for its intended use.

The above mentioned guiding principles will be used as the criteria for analyzing the precedent and case studies, in the chapters to follow.

CHAPTER FIVE: KEY PRECEDENT STUDIES

5.1. INTRODUCTION

The purpose of this chapter is to examine existing building which have attempted to or have succeeded in being universally accessible.

The buildings will each be analysed according the criteria which were extracted from the theoretical framework and literature. These criteria being: accessibility to the site and into the building, external and internal circulation, the overall sensory experience of the building as well as the barriers that exist in the building that could render the building unusable or hazardous in certain parts.

Image 17 : World map, locating the precedent studies that will be explored (www.clipgid.com)

1 Hazelwood School for the blind, Scotland, 2007, Architect: Alan Dunlop Architects
This building engages with the user to create a multisensory experience that in turn gives the students more independence in their use of the building.
2 Polytrauma and blind rehabilitation centre, Palo Alto, 2015, Architect: Chris Downey
This building caters mainly for users with acquired blindness, who have not yet made a full adjustment to being blind. As a result the architect- who also has acquired blindness, designed every aspect of the building to be legible and user friendly for blind people.

5.2. HAZELWOOD SCHOOL FOR THE BLIND – GLASGOW

5.2.1. Introduction

The school is located in the city of Glasgow, Scotland. It was design by Alan Dunlop in 2007, The Hazelwood School was designed for children who are both blind and deaf, ages 2-18. The school enrolls a maximum of 60 pupils. The stimulation of touch was crucial in this school, to facilitate the pupil's orientation around the building. (www.architizer.com, 2015)

The school sits adjacent to a public park. The building meanders around the existing landscape. It curves around the three existing beech trees.

Image 18: Locality map, showing Hazelwood school and major transport routes and access to the site edited by (Author 2015)

5.2.2. Accessibility

The school premises are entered through a small tertiary road. When driving in one encounters the parking which loops towards the building. There is a taxi drop-off zone in front of the main entrance, and a secondary minibus drop-off zone on the west of the taxi drop-off. The pedestrian gate is located adjacent to the driveway. There is one main, clearly defined entry, which is directly adjacent to the entrance foyer and administration. The secondary entry points are also clearly demarcated and legible.

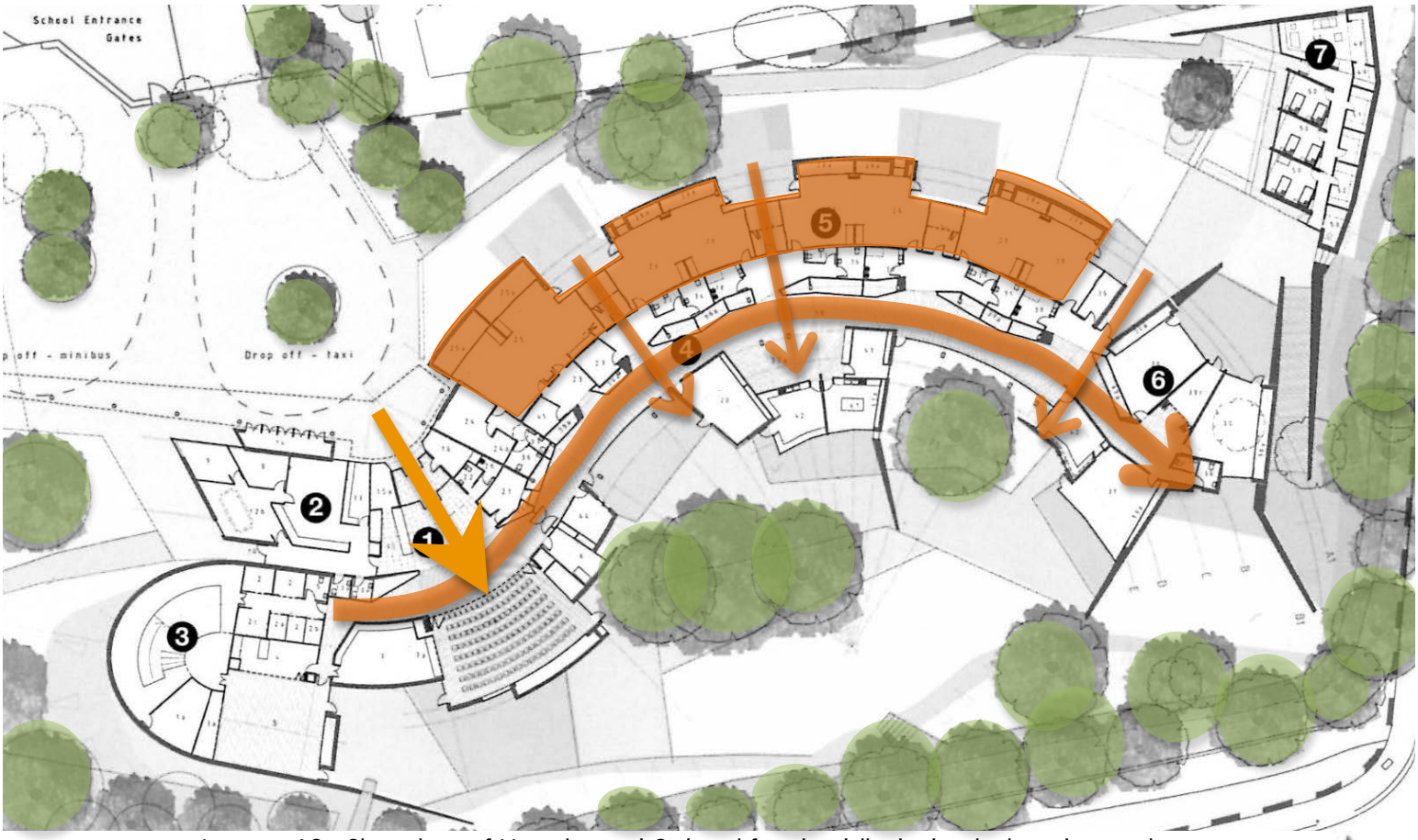
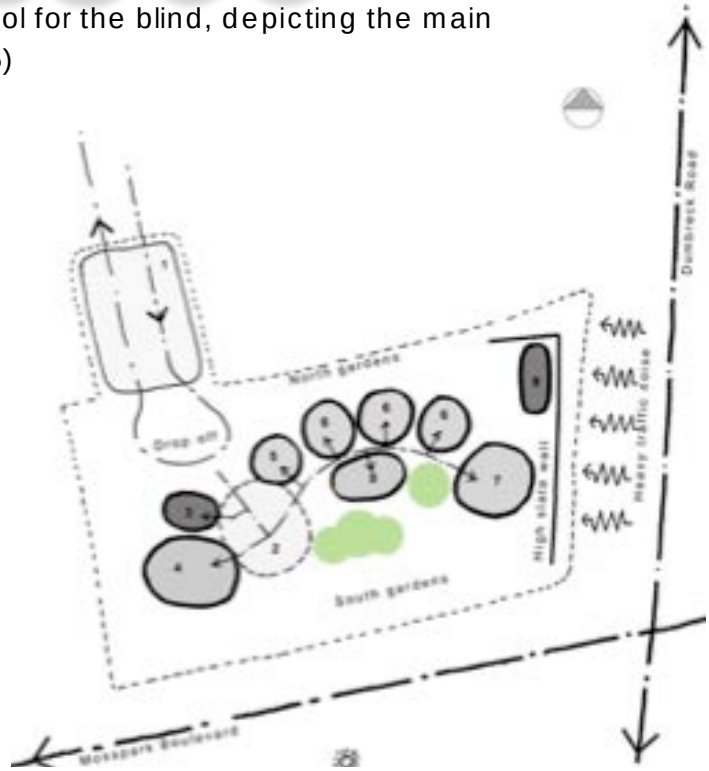


Image 19 : Site plan of Hazelwood School for the blind, depicting the main circulation and classrooms (Author 2015)

KEY

1. Entrance
2. Administration
3. Pool and gym
4. Sensory wall
5. Classrooms
6. Senior school
7. Life skills House

Circulation



5.2.3. Circulation

There is a central circulation route that feeds into all the main spaces. The departure point of this main route is made legible through the assistive sensory wall which defines the circulation space. This main corridor is wide and clearly defined, this allows for a clear flow of traffic.

The school comprises only of a single storey, there are no ramps or staircases. Navigating through a single storey building is definitely easier than a multi-storey building, however it can pose a problem when these learners encounter staircases in other buildings, outside of their schooling environment.

5.2.4. Sensory quality

The school starts teaching the learners how to read braille from the primary stage. However the school has used other tactile stimulant so as to cater also for those pupils who have not started to read braille. The architect's aim was to provide a multisensory building that would allow the learners to navigate through the school easily on their own.

The overall materials that were chosen by the architect are natural and highly textured. These materials stimulate the sense of touch and smell. The stimulation of touch was crucial in this school, to facilitate the learner's orientation around the building (Designshare, 2008)

Interior walls running along the main circulation are not just storage , but are also used as tactile guides. The wall is cladded in cork, which pupils touch to gauge their location and orientation. They can independently navigate from one space to the next, with minimal assistance.

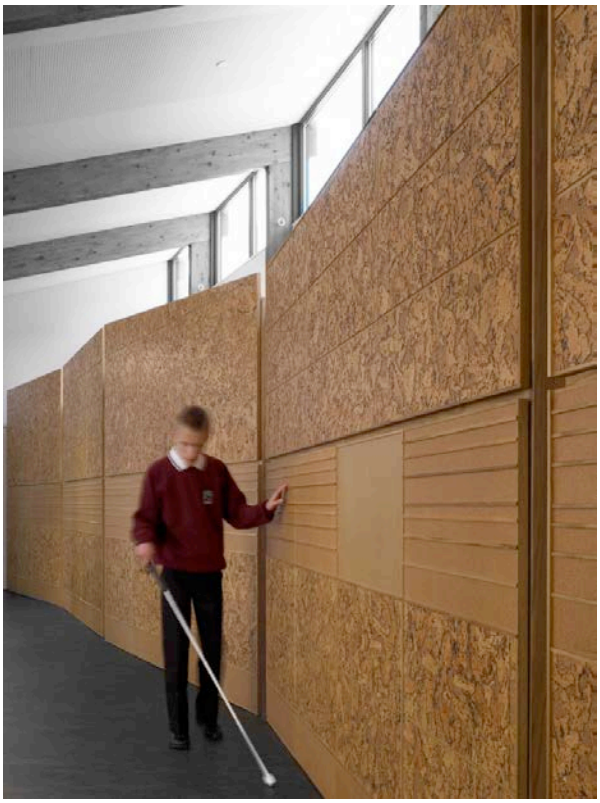


Image 20: Views of the central corridor showing the sensory wall (www.architizer.com : 2015 edited by (Author 2015)

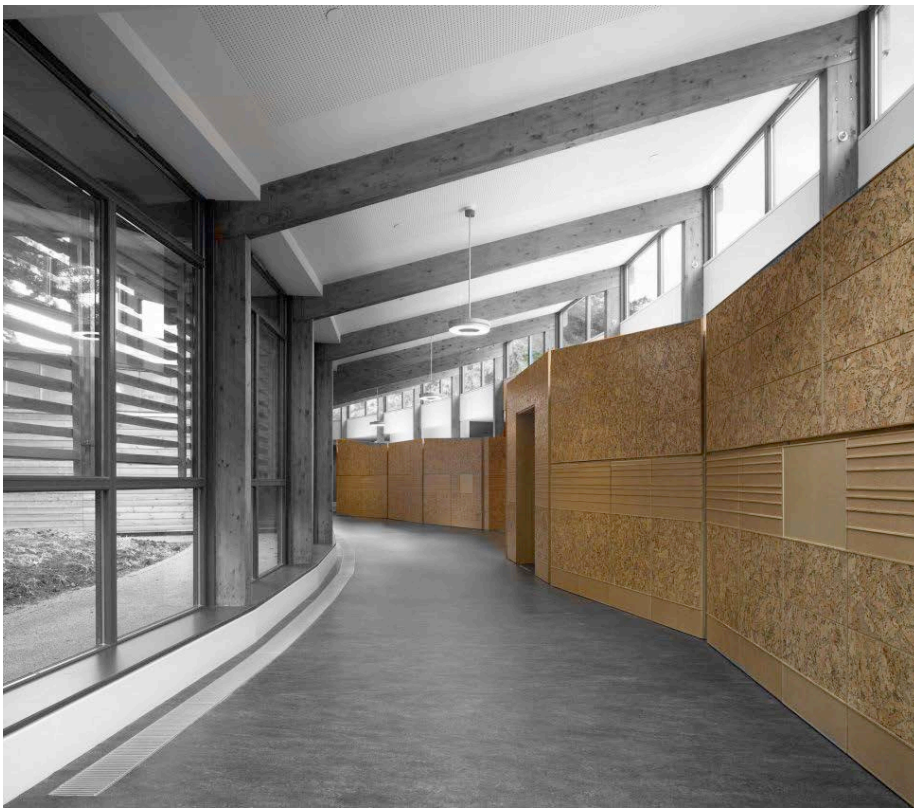


Image 21 : Views of the central corridor showing the sensory wall (www.architizer.com : 2015 edited by (Author 2015)

The life skills house, with walls extending beyond occupied space, acts as a barrier to the noisy street. Music is a huge part of the school's sylubus, it is theraputic and it helps the learner to enhance their sensitivity to sound.

The pathways around the school are clear and well defined. They also have a good tactile quality. The edges are perceivable to alert the user of a change in function or direction. The building aesthetics is far from being monotonous. The architect chose to use a collage of materials, all with high tactile quality, to create an opportunity for learners to connect with the building through touch.

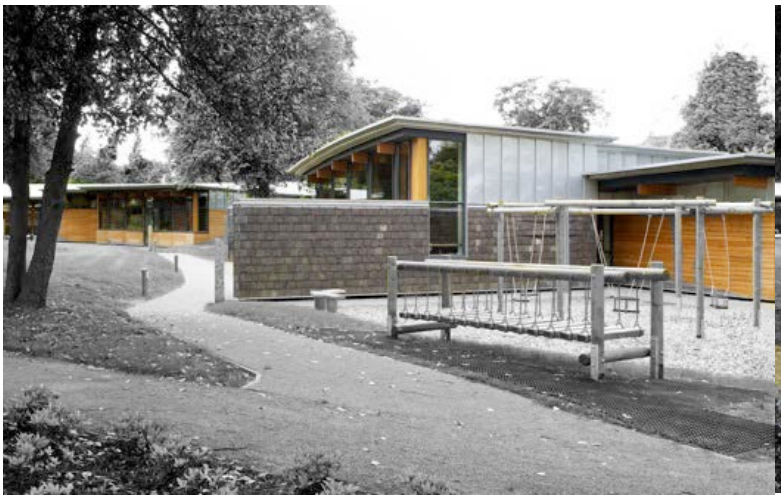


Image 22: Play area- highlighting the range of materials used edited by (Author 2015)

Image 23: Play area- highlighting the main external pathway edited by (Author 2015)

Image 24: Image of the nursery with clearstory windows edited by (Author 2015)

There is an abundance of ambient light coming into all the spaces through clearstory windows. This is not only beneficial to the visually impaired but also the completely blind learners. The sun does not only bring in light, but it also brings warmth and its penetration through a space can determine the comfort of that space.

Thermal comfort can also be associated with the sense of touch; we perceive it mainly through our skin. The thermal comfort of a room can give it an identity and distinguish it from others.

The roofs of the building are at different height in order to let in light into all the spaces

Image 25: Ariel view of Hazelwood school edited by (Author 2015)

5.2.5. Conclusion

The design of the school was purpose made. It is unprecedented. It focuses on the safety of the learners as well as providing a stimulating environment for the staff and learners. The school is accessible in all spheres; it has a drop-off zone for taxis, minibuses as well as a pedestrian friendly route. Once the blind student is in the premises, they can easily find the main entrance. The circulation is very direct and legible. The user is not given too many choices in the routes they can take. The internal and external paths are well structured. The school provides the users with a multi-sensory experience. It successfully displays the characteristics of a universal building.

5.3. POLYTRAUMA AND BLIND REHABILITATION CENTRE

5.3.1. Introduction

The VA Palo Alto Polytrauma & Blind Centre is located in California. It forms part of a six projects on the campus. Chris Downey, an architect with acquired blindness, designed the centre. Having lost his sight in 2008 at the age of forty-five. He understands the challenges that are associated with navigating through the built environment after losing one's sight. The centre not only admits patients with visual impairments, but also those who are completely blind. The centre offers a wide range of services; these include support, developmental programs, practical skills, orientation as well as mobility. (The design partnership,2010)

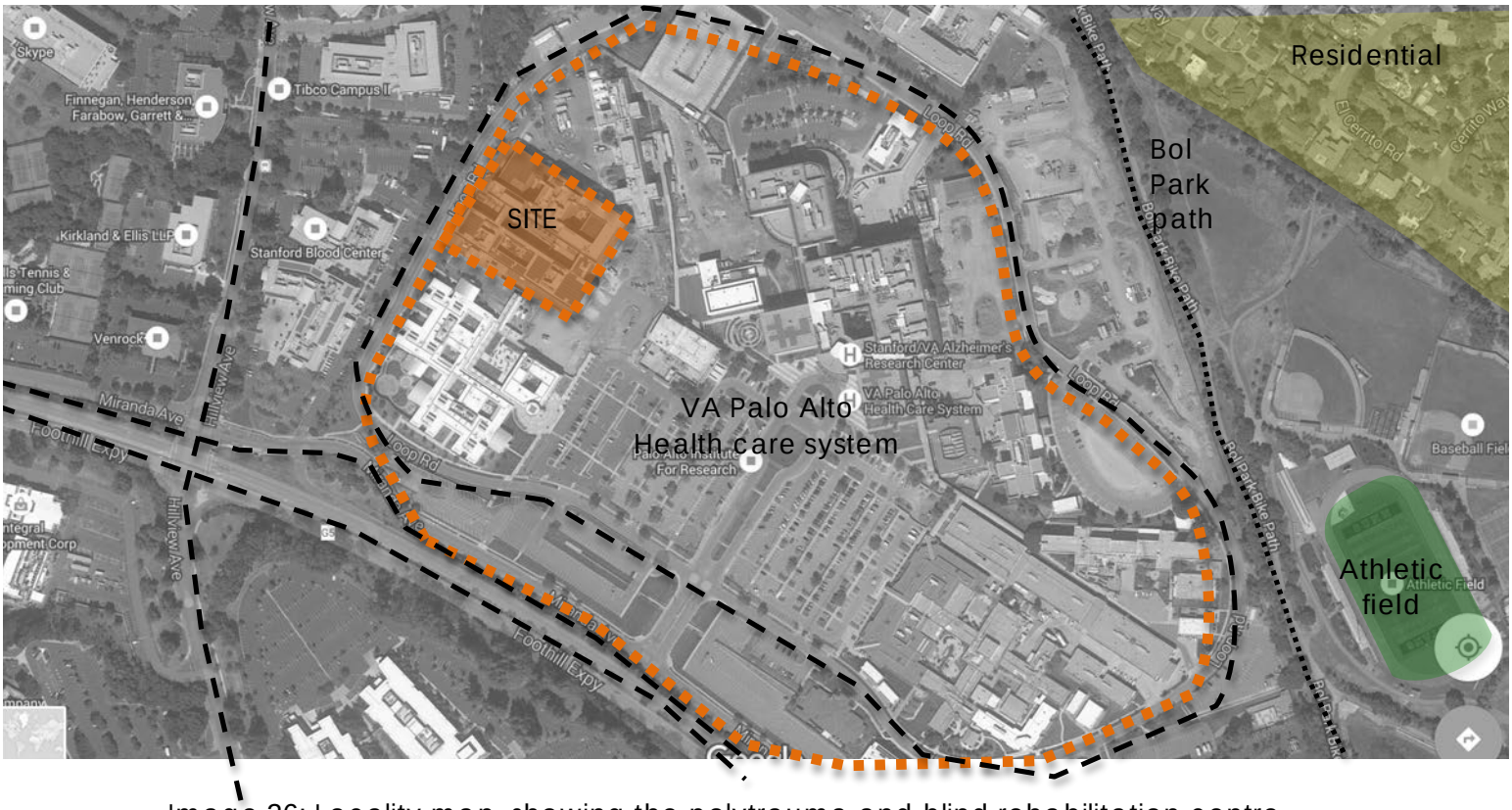


Image 26: Locality map, showing the polytrauma and blind rehabilitation centre and major transport routes and access to the site edited by (Author 2015)

5.3.2. Accessibility

The campus can be accessed through many routes. The main entrance to the parking is along a main road. The Polytrauma centre can directly be accessed off a looping road that runs along the perimeter of the campus. There is a four storey car par, with a capacity for 600 cars adjacent to the building, as well as ample parking off the main campus entry. There is a bicycle route runs along the boundary of the site. There is a drop-off zone which is located directly in front of the main entry point of the building for patients who are admitted or discharged from the centre.

Image 27: Ground floor plan, NTS of the Centre (The design partnership, 2010)

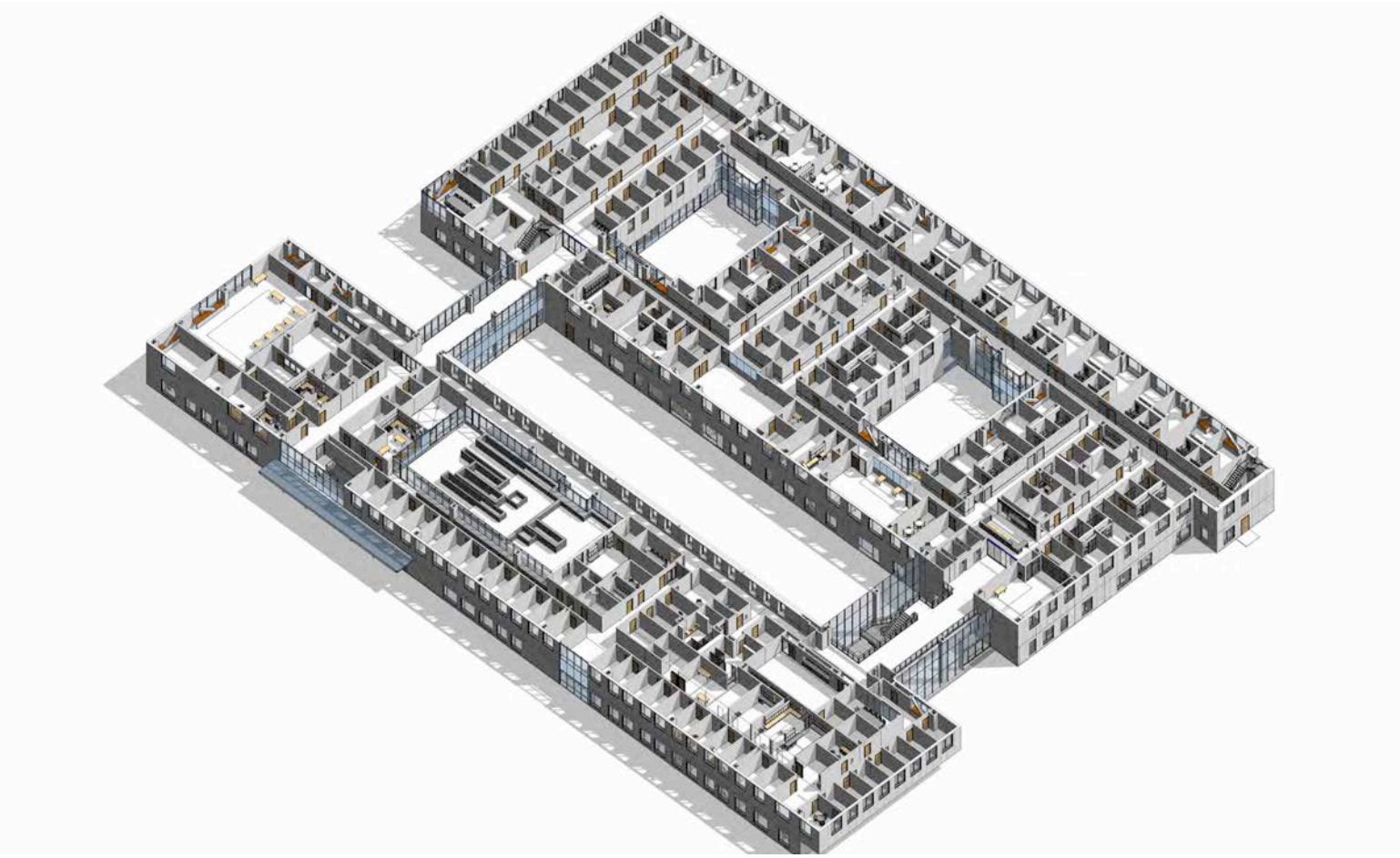


Image 28: Axonometric view up to level 2 (The design partnership, 2010)

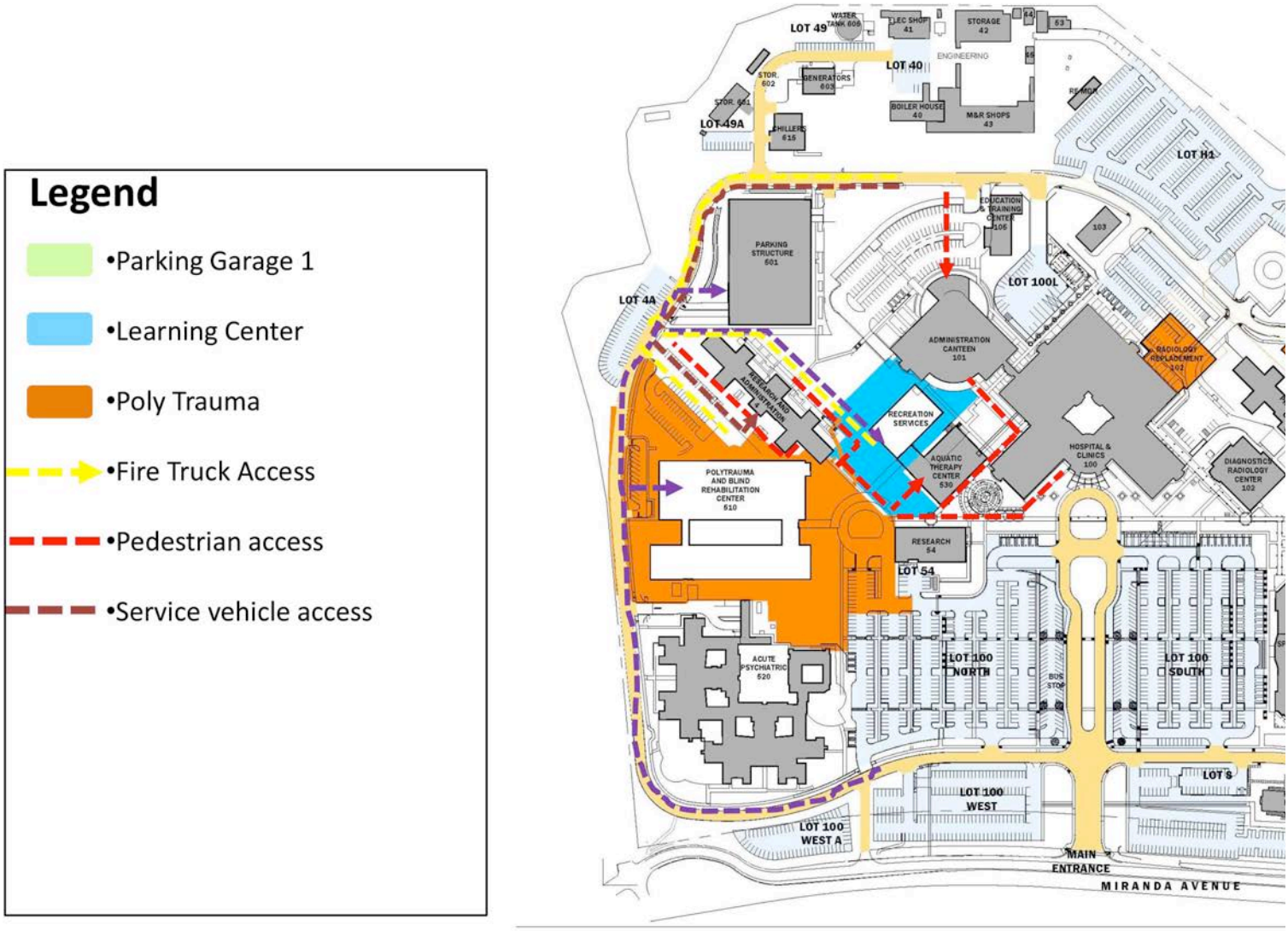


Image 29: Phasing plan for the polytrauma centre, showing the access routes (The design partnership, 2010)

Image 30: Drop-off zone (Follow et al.,2013)

5.3.3. Circulation

The external pavements are textured to reinforce the user's sense of direction. The entrance of the building is clearly defined and recessed from the external pathway. As a user enters the building they are greeted by a large lobby, which immediately gives the user a sense of orientation and navigational cues. From this point the user has a choice of two routes, either left towards the outpatient wing, or right to the inpatient wing. From the lobby you are directed towards your desired destination, there is no ambiguity.

Image 31: View of the main entrance and inpatient and outpatient wings (Follow et al., 2013)

The handrails for the staircases stretch beyond the first and the last step as an indication or pre-warning to the user that they are about to exit the staircase. The extended handrail is also put as a safety measure that allows the user to gain their balance as they end the incline or decline, and start to walk on a level surface.

There are handrails which are fixed onto walls along the corridors, that users can utilise in order to gauge their sense of direction as well as to be know where doors are located. The corridors are clear of any obstructions, and are legible.

Image 32: Ground floor lobby staircase (Follow et al,. 2013)

Image 33: Corridor along the inpatient wing (Follow et al., 2013)

5.3.4. Sensory quality

One of the main orientation strategies to reinforce landmarks within the building is to change the space's identity through changing the textures and acoustics. The change in textures is used to indicate key nodes within the building.

The flooring and wall materials change based on the room type, to give each space a unique identity. The different materials and finishes can be used to change acoustics. Changes in floor coverings are used as a tool for transitioning from one area to another.

Image 34: Waiting area edited by (Author 2015)

Image 35: Nurse's station edited by (Author 2015)

The rehabilitation unit of the centre trains patients in mobility, orientation, skills necessary to continue their lives, recreation, computer access training and cognitive therapies.

Sound is also used as a navigational cue. The architect has opted to finish the floors using hard materials that can produce a unique sound when tapped on using a cane.

The tapping of a cane on a hard floor surface produces radar-like echoes along vaulted forms. This strategy assists the blind user in wayfinding and in orientating themselves

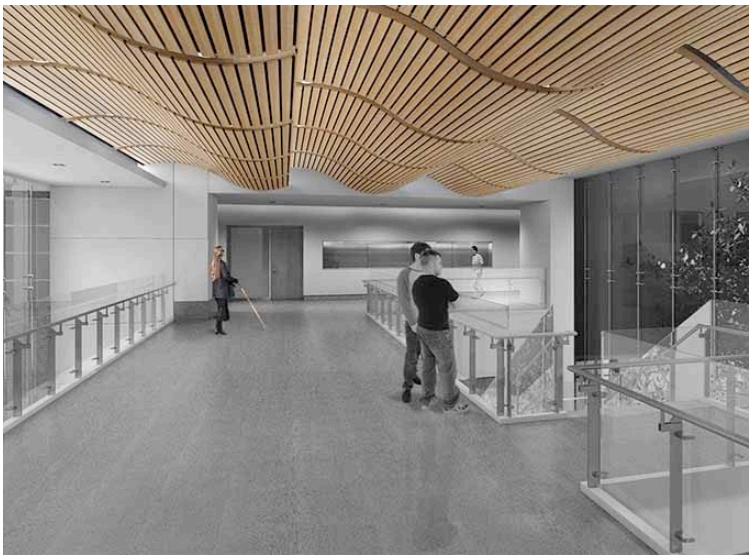


Image 36: Upper level vaulted ceiling, installed to ad an acoustic character to the space (Follow et al,. 2013)

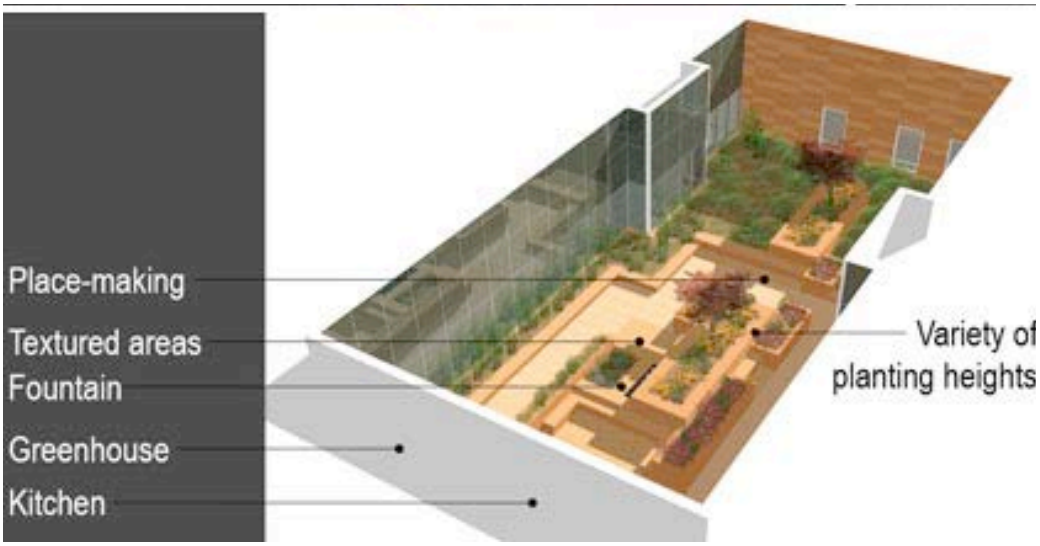


Image 37: Sensory garden in the inpatient wing (Follow et al., 2013)

The inpatient wing has two sensory gardens. These gardens have numerous components that give it a landmark characteristic. There are water fountains that stimulate the sense of hearing. The whole garden is highly tectonic wuth strategized changes in floor texture. The garden is surrounded by walls, therefore at different times of the day different areas have a different thermal comfort.

5.3.5. Barriers

The only notable barrier in the building is the haphazard placement of sculptural elements in the circulation lobby. These can be hazardous for blind users; especially because of their haphazard placement, the user would have difficulty memorizing their placement in order to avoid them.

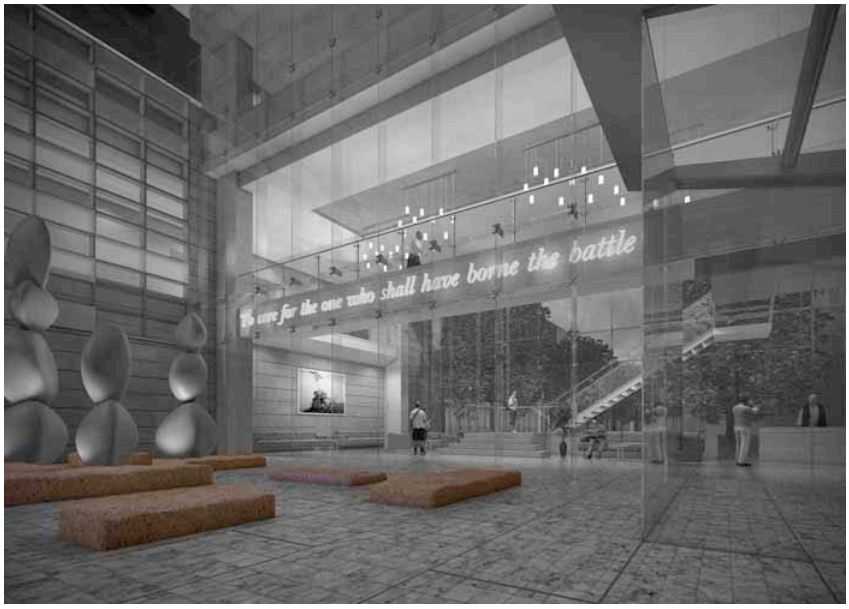


Image 38: Main centre lobby (Follow et al., 2013)

5.3.6. Conclusion

Architects are gradually using the bottom-up approach of designing buildings, but it is still not a standard practice. Consultation with the potential user can give greater design assistance than the input of the client. It is difficult for an architect to design a building when they cannot fully grasp the needs of the user. This is especially true when designing for blind users. A sighted architect can never fully comprehend what it is like to use a building as a blind person. Navigating through an unfamiliar space is especially difficult for those with acquired blindness.

This building is set apart from any universally designed building mainly based on the fact that a completely blind architect, more especially one that has acquired blindness, designed it. He does not only comprehend the challenges blind people face while navigating through building, but he experiences it first hand. He designed this building in great detail with the aim to make it as universally accessible and usable as possible.

CHAPTER SIX: KEY CASE STUDIES

6.1. INTRODUCTION

The purpose of this chapter is to show the type of architecture that exists. The three case studies that will be analysed are on completely different positions when it comes to universal design. The first building is one that was designed for the sole use of blind people, with the exception of the support staff. The second case study is a building that solely caters for sighted people. The third and final Building is the closest exhibit to universal design, however it does not qualify as being a universally designed building. These buildings will be analysed according to the criteria extracted from the theoretical framework.

Image 39: Map of Africa, South Africa and Kwazulu- Natal, locating the case studies that will be explored (Author 2015)

Arthur Blaxall School, Pietermaritzburg, 1982, S.N. Tonkin Hanson & Partners.
This building was designed and caters only for blind and visually impaired pupils.
Midlands FET College, Pietermaritzburg
The Student community at this institution comprises of only sighted students, it is the most inaccessible one out of the three.
University of KwaZulu-Natal, Howard College, Durban
This campus has an increasing number of enrollments of blind students, but is still lacking to some degree in usability

6.2. ARTHUR BLAXALL SCHOOL FOR THE BLIND – PIETERMARITZBURG

6.2.1. Introduction

Arthur Blaxall School for the blind relocated to Pietermaritzburg, from Durban in 1968. Its currently located in the suburb of Mountain Rise, in Pietermaritzburg. The school admits blind pupils and pupils with a visual impairment. A third of the pupils are completely blind. The school's mandate is not only academic, but more holistic. The pupils get taught fundamental skills that can assist them to adjust to their condition and cope in any environment they find themselves in. The school recently added boarding facilities.

Image 40: Collage of signage for some of the different spaces found in the school (Author 2015)

Image 41: Locality map showing Arthur Blaxall and the connecting transport routes edited by (Author 2015)

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6.2.2. Accessibility

The majority of the students stay in the boarding establishment, however there is a substantial number of students who stay in close proximity to the school. These students either get dropped off in the school parking, or walk to school. The site is located along a very quiet street with no heavy traffic and has speed humps on either side of the main gate. These two factors increase the safety of all blind students who walk to school. However, for the minority that stays further away from the school, access to the school is more difficult. The school is located along a Tertiary road which feeds off a national road, and is also connected to secondary city-to-city routes. However, public transport to the school can prove to be a hurdle. There are no taxis that frequent the proximity of the school. The nearest taxi route is over two kilometres away. The route from the bus stop is not conducive to successful wayfinding.

The path leading to the main entrance of the building is well structured and direct. The path is linear and leads directly towards the entrance.

The floor textures change before reaching the door. This is a useful navigational cue. However the texture change is not seamless, creating a hazardous condition. In addition there is a threshold at the entryway, which could cause users to trip. The double doors open outward onto the circulation, creating a barrier for users navigating from the hall, perpendicular to the entrance.

The reception is announced only through a visual sign, with no accompanying braille signage, or tactile map.

The access into the building and administration part of the building is the most important criterion to meet for a universal design. If a user is unable to enter the premises, moving from public to private, the other requirements are redundant. It does not matter if the internal spaces are usable, if they cannot be accessed.

Image 42: View of the main gate to the schoo
(Author 2015)

Image 43: Main entrance into the administration block (Author 2015)

Image 44: Path leading to main entrance
(Author 2015)

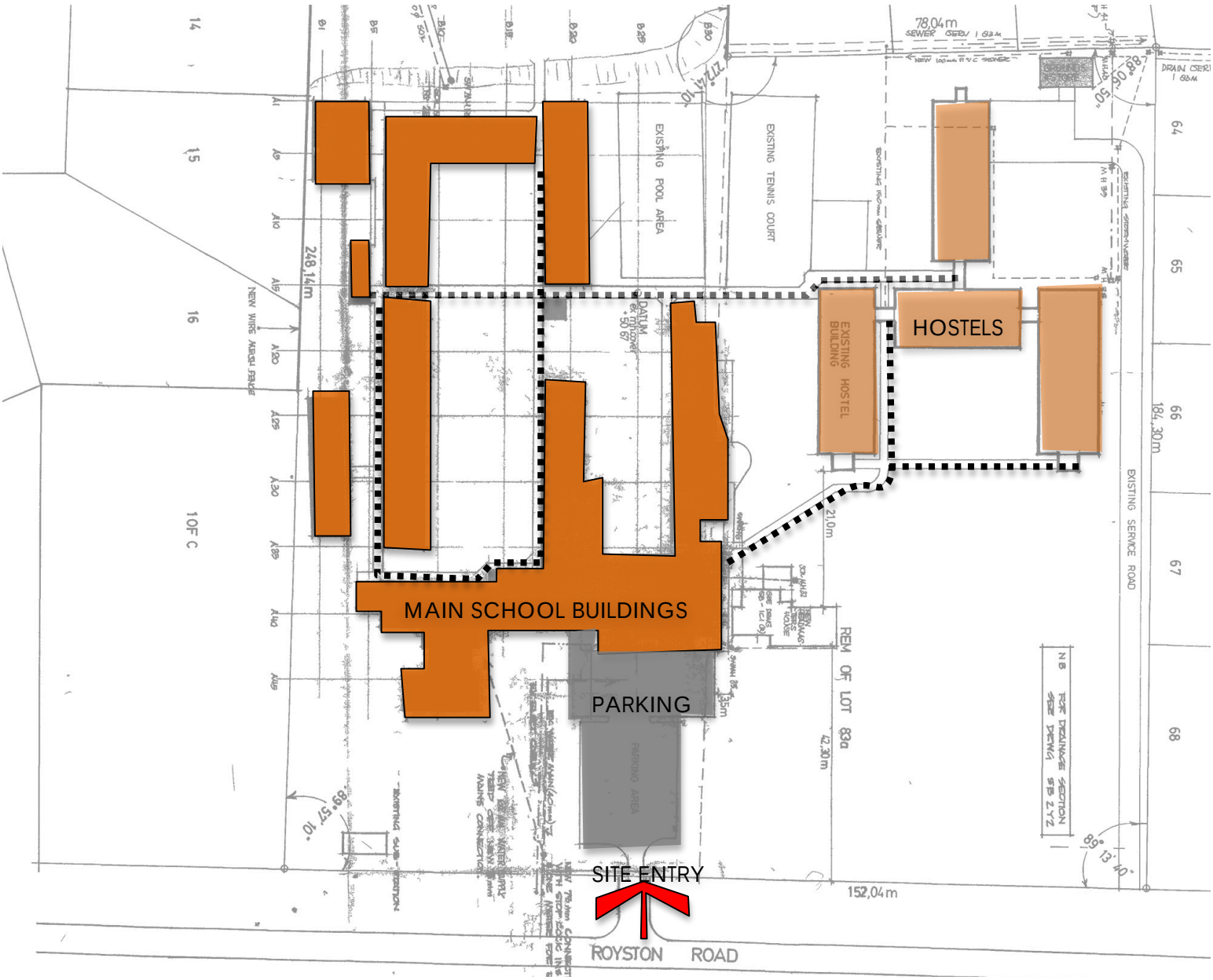

Image 45: Site plan of Arthur Blaxall (Author 2015)

The school consists of classrooms for all the grades, specialized classrooms, a school hall, an administration block, a gymnasium and hostels.

6.2.3. Circulation

The building is arranged around outdoor play areas, where the entry to spaces is directly fed off the main circulation route.

The school is two stories high, with classrooms on both the ground and the first floor. The users circulate vertically through staircases only. The handrails start before the first step and they continue beyond the last step. This extension to the handrail acts as an advance warning, to avoid any hazards. The handrails also play a huge role in the safety of the user.

Image 46: Standard design of the staircases found in the school (Author 2015)

The staircases do not have any nosing, which protects the users from tripping when moving up the stairs.

There is only one legible corridor per block where all the spaces feed off. There are not many possible routes to get to a destination. Once the one route is learnt and memorized, each time the user uses that route it becomes easier.

In a quest to locate a classroom or any space along the corridor, the users have a choice between two navigational guides. Some prefer to run their hands along the wall until they reach a door opening, which could be disruptive if there are other learners attempting to enter that space. Once they reach an opening, its either they have to ask if the space is the intended destination or memorise its exact location. The signage indicating the function of the spaces is only written in text, there is no accompanying braille signage.

The other alternative is to run the hand along the top of the balustrade. This method is less accurate, because it uses relativity. There is no exact indication on the rail affirming a location of a certain space. The floor texture does not change along the length of the corridor, to give signs at decision points.

The identity of the spaces is not unique or distinguished. The ceiling is uniform in shape, height and material, not assisting with any audible cue for navigation. The other senses are not stimulated at all.

Image 47: Classroom corridor (Author 2015)

Image 48: Showing railing that runs along the length of the first floor corridor (Author 2015)

Image 49: Path from the pedestrian gate/parking to the main entrance (Author 2015)

6.2.4. Sensory quality

The external walkways are textured. The main walkways are brick paving, where the paving blocks are placed in the direction of movement. The arrangement of the paving leads the user towards a certain decision point. The edges of the walkways are curbed with a more rustic type of brick paving which is aligned towards the opposite direction of movement.

Different spaces have a distinguished perceptual identity, which is created through the change of floor textures. This change is affective, however in the gathering space, it is not done seamlessly, which is hazardous to the users of the space.

Image 50: Outdoor play area with a small gathering space (Author 2015)

6.2.5. Barriers

One of the physical barriers that the blind pupils encounter is undetectable hazards. Some of the external walkways have broken surfaces which create a hazard that could cause injury to a blind person.

The first and the last step of all staircases are colour coded as a warning sign for pupils with impaired vision. This visual cue is a barrier for completely blind pupils who cannot see the warning. There are no advance tactile warnings.

The walkway to the hostels from the administration block is very narrow, and is encroached by shrubs.
All signage, including those on doors, is visual. There is no braille signage.

Image 51: External walkway that has broken surfaces (Author 2015)

Image 52: Walkway to the hostels, encroached by shrubs (Author 2015)

Image 53: Door signage (Author 2015)

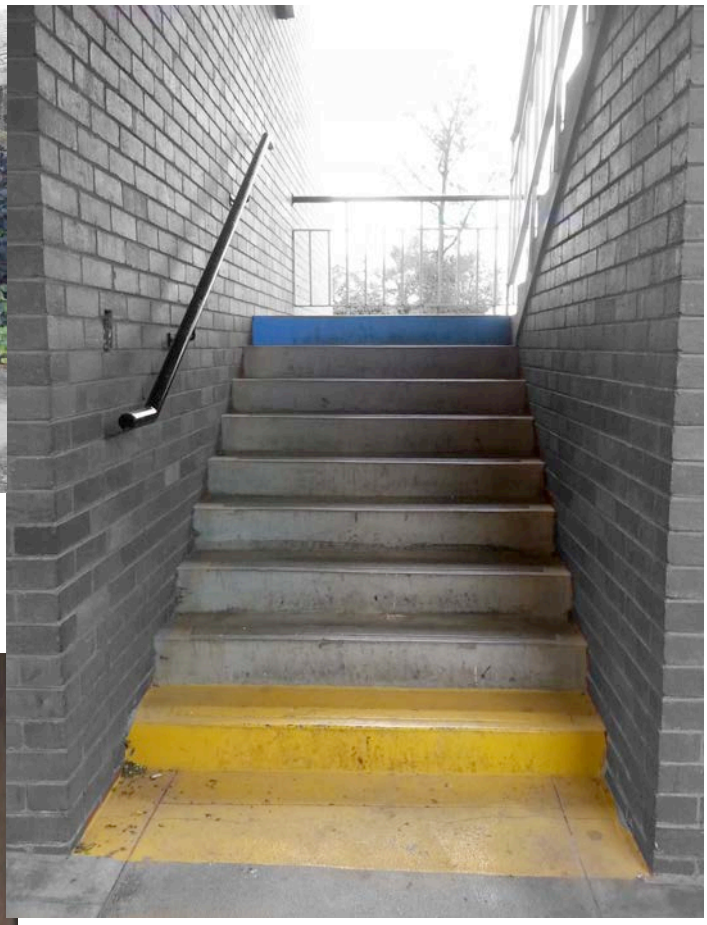

Image 54: Staircase, showing the colour coding done to indicate the first and last step (Author 2015)

6.2.6. Conclusion

The Arthur Blaxall school was originally located in Durban. When the relocation was pertinent an architect was commissioned to design the new school in Pietermaritzburg. This was to be a new building, not a relocation to existing premises. Ideally this school should have been one hundred percent universal. The architect travelled internationally, in the hopes of finding some inspiration. The building has achieved some of the criteria for wayfinding, however not all. Universal design cannot be half done, a building needs to be completely accessible and usable. Many changes have been made to the school over the years, in an attempt to make it more usable.

With all its failures and flaws, this school is still much more accessible then any other public building found in Pietermaritzburg. Retrofitting a building is not ideal, but this school has the potential to be improved in order to meet all the requirements for a successful universal design

6.3. MIDLANDS FET COLLEGE

6.3.1. Introduction

The Midlands FET College is a campus of Mgungundlovu FET College. The campus specialises in Engineering Theoretical Programmes, Information Technology, PLC Training as well as Electronics. The campus also offers Grade Twelve Mathematics and Physical Science.

The campus was not a new building, designed for its purpose. As one of the campuses expanded the college acquired the premises, and altered them to fit their desired purpose. The campus has an enrollment of eight hundred students. The campus is located in the Pietermaritzburg CBD, and is a classic example of the kind of buildings found in the city, which are inaccessible and unusable. This fact is the leading reason why there are no blind students enrolled in the school. The number of blind applicants is also almost non-existent.

Image 55: Locality map showing Midlands FET College and the connecting transportation routes (Author 2015)

6.3.2. Accessibility

The site is located along a secondary route that leads out of the city. The traffic is very light during the day, and get heavier in the afternoon during peak hours. The site is perpendicular to a public transport route, with two taxi ranks within a two kilometer radius.

Image 56: External view from the street of the pedestrian gate (Author 2015)

The pedestrian entrance is not well defined; it does not have a distinguished identity from the rest of the boundary. After entering the pedestrian gate the user is confronted by stairs which lead towards the reception. The stairs are not well structured and direct. The user moves down the first set of steps and is then given a choice to step down towards the right or towards the left. Giving the user too many choices of routes makes it difficult for them to memorise a route. The handrails end before the last step, which is a potential for a hazard. There are no advance surface texture warnings before the steps, to prepare the user for the climb.

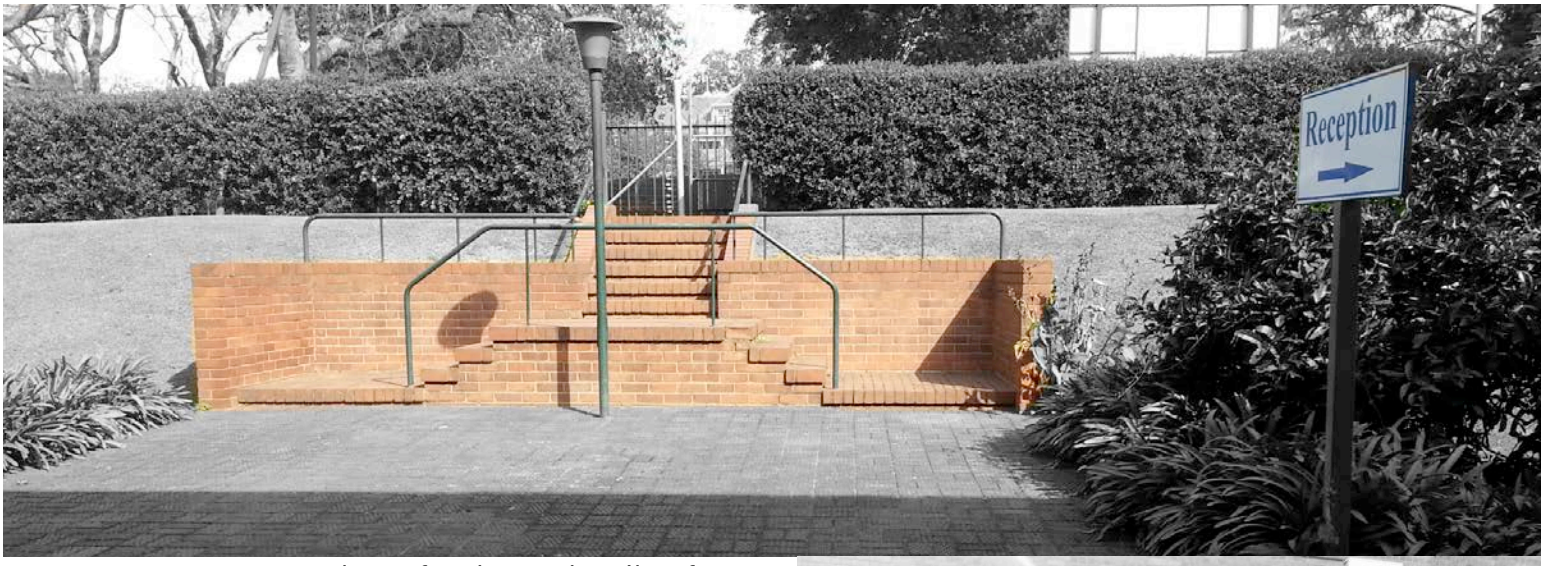

Image 57: View of staircase leading from the pedestrian gate (Author 2015)

The entrance to the reception and administration block is raised from the pathway. There is no advance surface texture to indicate the change in level. The texture of the floor is uniform from the pedestrian entry to the reception entrance. The signage to indicate the location of the reception is only visual; there is no accompanying braille signage or braille map.

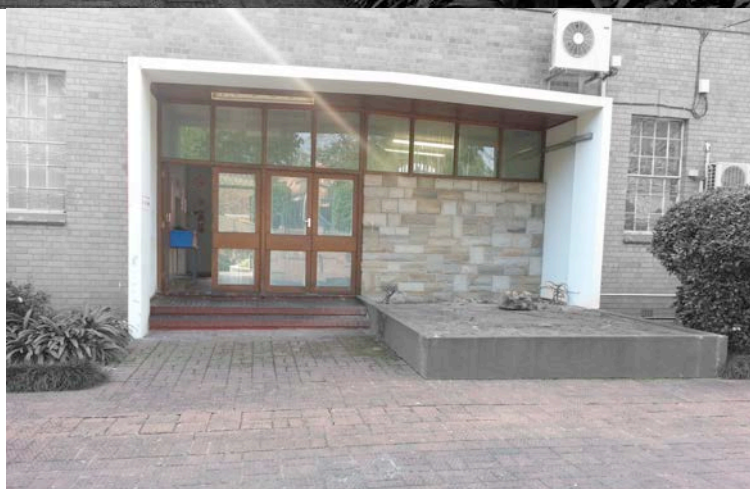

Image 58: View of the entrance into the reception and administration block (Author 2015)

6.3.3. Circulation

The building is two stories high but only has staircases for vertical circulation. Every building is raised from the courtyard. There are stairs placed at intervals to accommodate for the change in level. However there are no balustrades or rails to prevent users from falling over the edge.

The vehicular zone and the pedestrian zones are clear defined and distinguished texturally. There are no undetectable curb edges. A physical separation would be more effective to ensure the safety of the pedestrians moving from the parking area to the main campus buildings.

Commendably some fixed items in certain spaces, which run along a circulation route have rounded edges to prevent injury.

6.3.4. Sensory quality

The floor texture in the classrooms is monotonous. There is no guide to lead a user from one space to another. The classroom shape is very linear, meaning there are students who will be sitting very far from the front. This seating arrangement is problematic especially due to the lack of acoustic treatment of the spaces. The spaces need to enhance the acoustics, to ensure that blind students who cannot see the lecturer or board can hear him/her clearly.

The pathways in the courtyard are well- structured and direct. They have a textural quality, which gives them a distinguished identity. The paving is edged with a slightly different paving block to indicate a transition.

There is a lot of vegetation planted around the school, but the chosen plants do not necessarily have a distinct smell that can distinguish a certain space

The acoustic quality of the spaces is very monotonous. The volumes and materials have not been treated to add acoustic value to spaces.

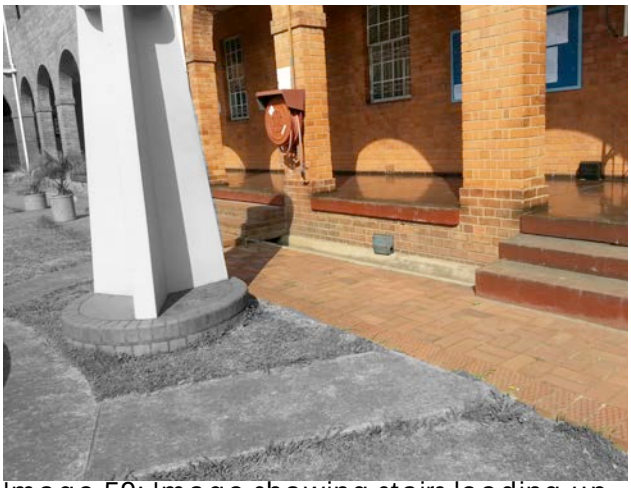

Image 59: Image showing stairs leading up from the courtyard to the administration block (Author 2015)

Image 60: View of walkway leading from the parking to the reception (Author 2015)

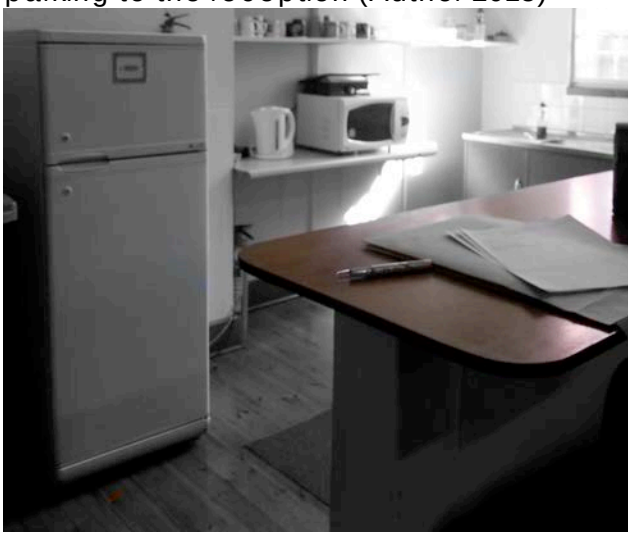

Image 61: Staff kitchen (Author 2015)

Image 62: Main campus courtyard space (Author 2015)

6.3.5. Barriers

The furniture in the classrooms is not fixed, and is not ordered in any particular way. Movable furniture is hazardous to blind students. Spaces which are too flexible and continually change are detrimental to a user's ability to navigate that particular space. A user should be able to use the space once, be familiar with the location of certain items in the space, be aware of the special identity of that space, so that the next time they ustilise that space they can use their memory of the last experience to navigate more efficiently.

Image 63: Technical drawing classroom (Author 2015)

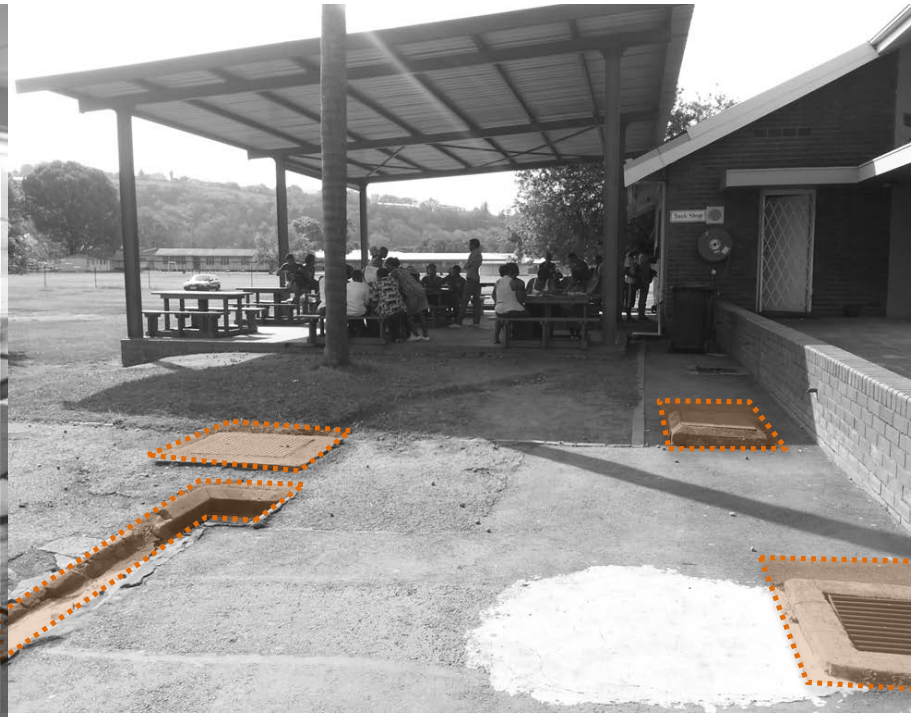

Image 64: Uneven path leading to an outside seating area (Author 2015)

The pathway leading to the student gathering space, outside the hall, is not well structure and defined. The surfaces are uneven, and some broken. There are undetectable manhole covers that protrude from the pathway, these can cause a blind user to trip. The storm water channel is not edged. The channel is flush onto the pathway. These barriers on the path render the gathering space inaccessible.

The seating area is on a raised platform. However there are no balustrades or railing around the space. This level change might seem minor to a sighted person, however if a blind person were to mistakenly step over that ledge it could cause them a lot of harm to them.

Image 65: View of the platform ledge- outside seating area (Author 2015)

6.3.6. Conclusion

As stated in the assumption and research problem, the majority, if not all public buildings (more especially educational institution) are not universally design or accessible. The Midlands FET College is one of the biggest FET colleges in Pietermaritzburg. With the huge number of student not qualifying to attend University, but still seeking quality, and practical training, these facilities are very important.

Blind matriculants want to have the same opportunities as sighted students. They also want to be financially independent and prosperous. The first step towards achieving this is getting a higher education. This is however near impossible if the facilities available do not even allow for a blind student to step through the gate.

6.4. UNIVERSITY OF KWAZULU-NATAL – HOWARD COLLEGE

6.4.1. Introduction

Howard College is one of University of KwaZulu- Natal's (UKZN) five campuses, which were officially formed in 2004, when University of Durban-Westville and the University of Natal merged. The Howard College building was opened in 1931 (www.ukzn.ac.za). The campus is made up of many buildings, including on-campus residences. The buildings and routes that will be covered in this section are those that were used by the three blind student participants.

The University of KwaZulu- Natal has one of the highest number of totally blind students enrolled than at any of the South African universities. It has just over three hundred disabled students, one hundred of which are blind (Mbadi 2012). Each campus has a disability unit, which is there to administer and support all disable students.

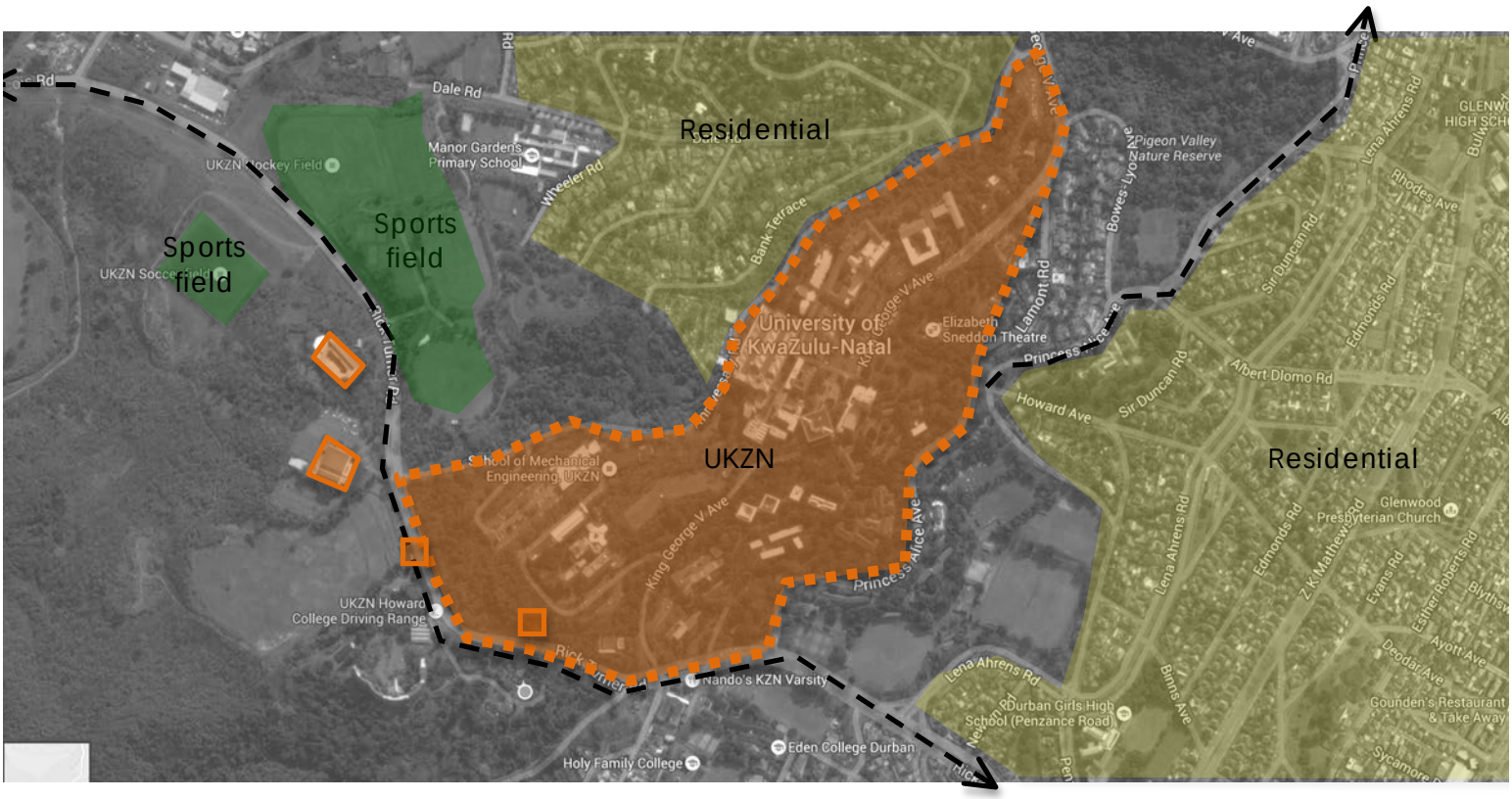

Image 66: Locality map of Univeristy of Kwazulu-Natal, Howard College Campus, Durban (Author 2015)

6.4.2. Accessibility

The southern part of the campus is located along a major public transport route. The campus does not only draw from an existing public transport route, but has also attracted a route to be created towards the site. There are two bus stops located next to the main gate, where there are taxi's that rank there specifically to transport students and staff. Howard College also has a shuttle system that transports students to and from campus and off-campus residences

The Shepstone Building houses most of the administrative offices lecture halls and rooms. The majority, if not all, students enrolled at Howard College will access this building before they complete their studies. Therefore the accessibility and usability of this building is imperative.

Image 67: View of an entrance into a lecture hall which is obstructed by a column (Author 2015)

6.4.3. Circulation

The Shepstone building is nine stories in height. It has one main ramp that leads to the seventh level numerous staircases and lifts. However the lifts only start on the third level and reach up to the eighth level. The lifts do not have any audible output; neither do they have any braille signage. The staircases leading up from the sixth level are located in the centre of the main pathway, disrupting the clear flow. Their haphazard arrangement makes it difficult for a user to familiarise themselves with the space.

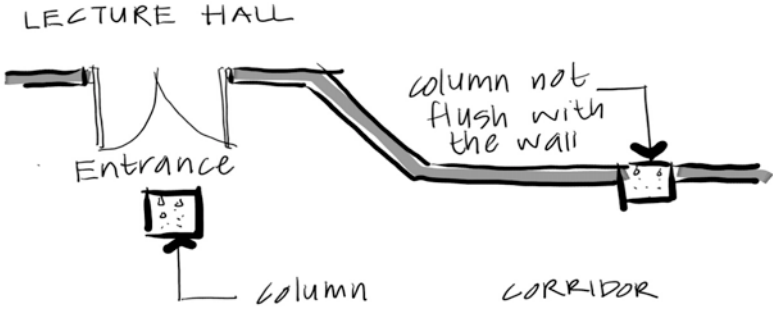

Image 68: Schematic plan of an entry point of a lecture hall which is obstructed by a column, along with a column which is not flush to the wall. (Author 2015)

6.4.4. Barriers

There is a long strip of steel grating along the western corridor of the lecture hall level. The grating covers an opening that is over three meters deep.The perforated nature of the grating can result in loss and injury. A blind person's cane could easily fall through the openings as they move it along the grating. This grating is an obstacle for blind students who attempt to utilise the lecture halls beyond it.

Image 69: Showing grating infront of entry points of lecture Halls - Shepstone building (Author 2015)

Image 70: A notice board fixed parallel to the main circulation (Author 2015)

The pinning boards on the sixth level are placed in the centre of the main circulation of the building. A blind person travelling towards the notice board, with a cane, will not be able to detect its presence because the board starts above 300mm over the ground.

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There are numerous windows through out the campus which are side hung and open out onto corridors. There are also numerous doors and security gates that open out into corridor. These create a huge safety hazard for blind users, who could walk into them.

Obstructions such as open windows and doors are worse than fixed obstructions. With fixed obstruction, a user will encounter a problem the first time they navigate through that particular space. After encountering that obstacle the user will make a mental note of it. The next time the user is moving through the space, they are not solely using their senses and perception to navigate, they also use memory. They will remember that the last time they walked through this space they encountered an obstacle, and therefore attempt to avoid contact.

Windows and doors are unpredictable. The user could have used the space numerous times without encountering any obstacles; on one occasion he could boldly walk through that space with minimum caution, only to walk into an open window that had never been open before when they had used the space.
All pathways need to be clear of any obstructions

Image 71: MTB building- Sketch showing a double door which only has one half closed (Author 2015)

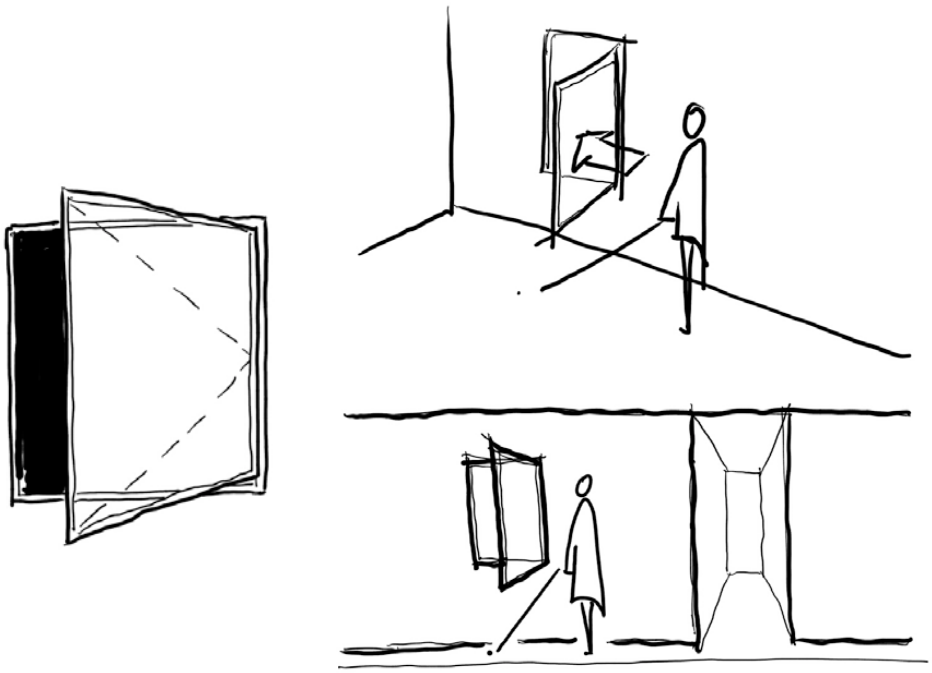

Image 72: Schematic drawing showing the danger of having windows that open onto corridors (Author 2015)

Image 73: MTB building - Sketch showing a side hung window opened out onto a corridor (Author 2015)

A common feature around the Howard College campus is 'shared streets', where cars and pedestrians use the same path. There is no separation at all. The floor material and levels are the same. Navigating through a space like this is difficult for blind people. The texture is monotonous and the location of the cars is not predictable. Blind people also see the need to be cautious with the use of their canes, so as to not damage any vehicles. Some of these driveway paths are very narrow, making it impossible for both the pedestrian and a car to pass through at the same time.

Nature conservation is a huge part of the campus' identity. This means that almost every corner you turn there are huge luscious trees and shrubs, which could prevent a driver from seeing a blind person approaching.

Image 74: T.B Davis Parking lot, showing blind students attempting t navigate around cars (Author 2015)

There is a lot of construction happening on the campus. All the warning signs are in text and pictorial format. There are no non-visual warnings for the benefit of blind people.

6.4.5. Sensory quality

The stairs descending into the Student Union Building are very wide but only have one railing right in the centre. There are no advance tactile warnings at the top, or at the bottom. However the path leading to the doors of the building has a high tactile quality, where the grains of the material channel the user towards the door. There is a texture change as well before the door is reached. There is no threshold, and the user is slightly ramped up as they enter the building.

The lecture halls have a good acoustic quality and in some of the larger lecture halls have microphones and speakers installed for optimum teaching. Most of the buildings have varying volumes and materials giving them a unique acoustic quality.

There is a lot of vegetation around the campus, but most of it does not have any distinguishable scent that could assist in orientating a user of a space. There is a lot of signage placed around the campus, however all of it is visual there is no braille signage. Blind student need to rely on their memory and other senses to navigate around the campus.

Image 75: Staircase leading down to the student union building (Author 2015)

6.4.6. CONCLUSION

The University of KwaZulu- Natal has a large number of blind students enrolled. Moreover this number has been increasing over the years. These numbers however do not translate to accessibility. The campus has many old buildings that were built during the apartheid era. During this time disable people were still discriminated against, they were not given opportunities to pursue higher education. It has been over 20 years since apartheid ended, now people with disability have an equal right to education as every other person. This is not a new reality. The campus has huge potential for becoming universally accessible. In 20 years a lot more should have been done to make the campus more accessible and usable.

CHAPTER SEVEN: PRESENTATION AND ANALYSIS OF FINDINGS

7.1. INTRODUCTION

The purpose of this chapter is to present and analyse the primary data which was collected during the course of study. The participants of the study included blind (undergrad/postgrad) university students who had a chosen starting point and several destination points they were to reach around their campus. Their friends and families gave insight on the kind of barriers these students face, the impact they have, as well as how they cope irrespective of them. The specialists had the greatest knowledge of the kind of barriers that exist around certain buildings. The mobility instructor's task in training new blind students to navigate around campus required an in-depth understanding of the environment and the blind users. Architects are responsible for ensuring that the built environment is not only accessible, but also usable. The Architects who participated in the study have experience in universal design, and understand the challenges and requirements in creating universal architecture.

7.2. ACCESSIBILITY

It was never in the plan and design of any South African higher educational institution to have people that did not conform to the 'normal' body shape and form. They are considered non-traditional to South African higher education. Therefore the factoring in of support for these students is very limited.

There are approximately 200 disabled students in the Howard College campus alone. 23 of these students are totally blind. Not all of these student live on-campus. One student takes the bus from Umlazi to the university. The university needs to be accessible even to those blind students. There needs to a consideration of when the bus would drop the off and the route they take from the bus stop to the lectures.

7.3. CIRCULATION

7.3.1. Route choice

Initially when students register with the university, the mobility instructor outlines the location of all the facilities that are on the campus and advices them on the best routes that will get them there. These routes are not precisely the most direct but the safest and most legible.

After some time when the blind students become more familiar with the campus they begin to explore more options. This is when the process of independence begins. There were commonalities that were found in the criteria that blind students use to chose a route.

1. The routes need to be free of any vehicular movement
2. Routes that are along a shore line that they can follow, whether it is on the ground, which they will follow with a cane, or at waist height which they follow with their hands
3. It must not be excessively noisy

4. A route that has no obstructions
5. A path that has hard surfaces

7.3.2. Vertical circulation

The majority of the blind participants preferred to use staircase as opposed to ramps. The staircases are easier to familiarise themselves with, ramps are harder to perceive unless if there are warning strips at the start and the end. The number of steps will not change, but the amount of steps it takes a user to reach the top of a ramp depends on the size of their stride. A person's stride could change depending on many factors, like if they are in a rush they will reach the top of the ramp sooner than usual.
The staircases are also a quicker and more direct way to change levels.

Lifts are the first choice, if it has audible output. The second choice is staircases and thirdly ramps.

7.3.3. Legibility

Blind people can use any space that sight people can. They can also use any routes that sighted people use. As long as a route is legible, blind people can use it. It involves creating spaces that are predictable for different people, and giving users a choice, by making everything accessible.

7.4. SENSESORY EXPERIENCE

7.4.1. Sound

Sound is a helpful tool especially if it is consistent. It should be the same sound at the same location everyday. However noisy spaces can be disorientating.

7.5. MEMORY

Experts
The legibility of a building is very important, in enabling users to be familiar with it. Once they are familiar with it they can use their memory to navigate through it more efficiently the next time. Some blind people have a very good sense of direction because they do not just move through a space in that moment; they record their experiences for future use. The blind students on campus can give you very accurate direction in a very narrative manner.

7.6. THE IMPLICATIONS OF LOSS OF SIGHT

The loss of sight narrows certain avenues for individuals. It is either one is forced to change careers, or if they lose sight before receiving their tertiary education, they are limited in the career paths they can take. There seems to be a pattern in the type of courses that the blind students are enrolled into. Most of the courses are socially based, and political which has a component of activism; there are also a few who have enrolled for law and management.

The students are engaged with the university culture. They attend activities, a lot of them enjoy attending music concerts or going to poetry sessions. This reiterates the need for accessible and usable spaces throughout the whole campus.

7.7. TRAINING

Most tertiary institutions were built during the apartheid era, when blind people were still not given an opportunity to receive a tertiary education. This means that no existing facilities were designed with them in mind. Inserting them into this hostile environment with no support is catastrophic.

The presence and support of a disability unit in every public building is critical in giving independence to blind people. The disability unit at UKZN Howard College offers support to students with every type of disability, even some that have not been labeled, as long as you are unable to engage in certain activities due to a characteristic that makes you different, they accommodate you. They offer support academically from giving students equal opportunities to the application process, teaching process, as well as the assessment process. At assessment student are given choices of how they would like to be examined, whether having access to braille script or even having a scribe who will read the questions out to the student and will also transcribe the answers.

Each UKZN campus has an independence or mobility instructor, who trains students and provides them with coping mechanisms to deal with the unaccommodating environment. The instructor teaches the blind students life skills. None of UKZN's residences offer catering, which means students either go out and buy food or they cook for themselves. Working with a stove is obviously a dangerous activity for blind student. However many of them do cook on their own, as an output of the training they receive. The independence instructor trains them in how to use their sense of touch - hovering their hand over the stove plate to gauge when the desired temperature is reached, using smell to know when the food is ready. The instructor also teaches them how to sweep their residence room.

The trainer is still important in the initial stages even if the building is designed to be accessible. They play the role of a tactile map. They will lay out all your options of navigation as well as briefing the user on the available facilities and their location.

7.8. BARRIERS

7.8.1. Segregation

Universities are spaces which are meant to engage in on particular way. For example the course packs were never provided in braille. Different modes of communication were never part of the agenda of the university.

Jaws is a screen reading application which can be installed onto a computer. Students with acquired blindness opt to use this software, because most of them would have never learnt how to read braille due to their loss of sight coming later on in life. There are braille machines on campus and jaws, but only in the disability student computer labs.

The main university computer labs are not usable by blind students. Having their facilities separate from sighted people's promotes the isolation of blind student. Signs like "lift for disabled only" which is found in the Memorial tower building, are also discriminatory.

All human beings want to be involved in their society. The moment someone has to do the same thing, but in a different space because he might have a different body form, that is exclusion. Disabled students at UKZN are not happy that they have to walk to a separate computer lab to achieve their objectives like every other student. Disabled students would like to learn in the space as any other student. However the challenge is the spaces.

7.8.2. Physical

The current university infrastructure is discriminatory.
The issues that came up both through interviews and the observation study were that the biggest navigation problem was concerning physical barriers. This is mainly because it is accompanied by huge safety concerns. Some of the physical barriers that were noted were:

1. Shared streets: where cars and people use the same path, and there is no clear distinction of zones.
2. Construction close to or along walkways.
3. Narrow passages leading into busy spaces where blind people need to avoid colliding with other users.
4. Doors and windows that open onto a pathway. Especially windows because they cannot be detected by a cane.
5. Not all staircases have handrails

7.8.3. Legal

According to Architect B, there seems to be a huge encroachment with the spheres of government, that govern the built environment. The municipality has the responsibility to translate the law into applicable bylaws that must be followed in their jurisdiction. For architecture they are the buildings regulations (SANS). The Department of Public Works has 'standards' that architects need to follow when designing public government facilities, these also include schools. However these standards are meant to take into consideration the building regulations. The SANS is far advanced in addressing accessibility, than the government standards. These 'standards' are meant to be guidelines, not strict standards. The architect needs to be given more freedom to design public buildings, where he/she can use his expertise to find the best solution for that particular project, in that particular site.

The government stipulates strictly how they wish these buildings should be, however they are not the end user. The government needs to create a relationship with civil society groups and institutes like The KwaZulu- Natal Society of the Blind. These groups would be able to give valuable input on the requirements that accessible buildings should meet. Currently the approach to the design of public buildings is very top-down, there needs to be a transformation towards a bottom-up approach.

All three architects that participated in the study are in consensus regarding the efficiency of the building regulations. The new regulations have improved greatly concerning the design for disabled people, especially blind people. However there is still more that could be covered.

The other challenge which was noted by Architect A was that most architects aim to “tick-the-boxes’ when it comes to accessibility. Architects only include what is required by the municipality in order for the plans to be passed, they do not go beyond that benchmark.

CHAPTER EIGHT: CONCLUSIONS AND RECOMMENDATIONS

8.1. Conclusion

The aim of the study was to investigate what defines an inclusive building that caters for both sighted and blind individuals. Furthermore, how these inclusive public buildings can be designed. The theories and literature review outlined clearly the requirements of an inclusive/ universal building. These requirements were outlined in terms of the seven universal design principles as well as the criteria that were extracted from the theories

The first objective of the study was to investigate the existing public buildings and spaces in terms of their design consideration for blind people. This investigation was done through the case and precedent studies. The public buildings in KwaZulu-Natal, South Africa are not sufficiently accessible to blind people. The laws and legislations of the country stipulate that disabled people need to have the same opportunities as abled people, however these laws have not been successfully implemented. The international buildings that were analysed were far superior to those found locally, in terms of universal design.

The second objective was to understand the role that the other senses play in the experience of a blind person. The majority of buildings which exist rely highly on visual communication, this is a huge challenge for blind people. Buildings need to be multisensory and stimulate all the senses simultaneously. The application of this concept is displayed through the theories which were analysed as well as the literature which was reviewed. There is a codependent relationship between the environment and the user. The communication between the two is achieved through the senses. Perception is not a choice, it is automatic. The responsibility lies with the architect to ensure that this relationship is achieved through the senses in a positive way.

The third objective was to understand the change in perception from the time individuals could see to after they lose their sight. The way sighted people perceive space is completely different from the way blind people perceive it. However, also the way people with congenital blindness and the way people with acquired blindness perceive it, is very different. The aim is not to attempt to mimic the way people with congenital blindness navigate. However it is to find the best suitable way for people with acquired blindness to navigate, and thus design based on those requirements.

The discovery of how to incorporate the other senses and memory in the design of public buildings was done mainly through the primary research. The secondary data mainly outlines the principles and guidelines to be followed. However the precedent studies and fieldwork display practical ways of how these principles can be applied.

The guiding principles for designing of inclusive architecture, that serves both the sighted and blind people, were outlined in the secondary data, the recommendations of how they can be applied will be covered in this chapter.

8.2. Recommendations

8.2.1. Typology

A TVET College.

Education has a huge impact on the path and quality of a person's life. Access to higher education provides people with the opportunity for independence and financial freedom. The inaccessibility of higher education institutions is more debilitating than the inaccessibility of other buildings. All higher education facilities need to be accessible and usable by everyone.

8.2.2. Client

The client would be the department of Higher Education and training

8.2.3. The User

The building will cater for a diverse user group. It will not be discriminatory to any group of people.

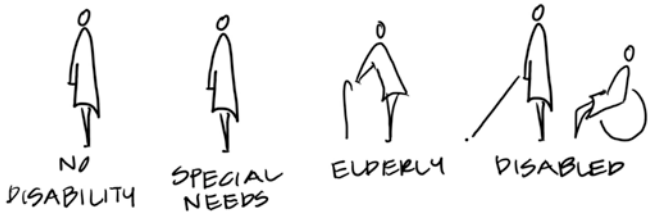

Image 76: (Author 2015)

8.2.4. Brief/ schedule of accommodation

ACCOMODATION SCHEDULE

A. Retail/Commercial
B. Administration
C. Teaching
D. Resource Centre/ Library
E. Disability unit
F. Gymnasium
G. Residences
H. Multipurpose hall
I. Guide dog care

A. <u>RETAIL/ COMMERCIAL</u>

Restaurant: cold room dry store, main kitchen, prep, wash area, ablutions, bin area

Stationary shop
Book shop
Post office
Pharmacy
Beauty and hair salon
Computer repair shop
Internet Café
Curio shop
Retail (to let)

B. ADMINISTRATION

Entrance foyer
Info desk
Main waiting area
Reception
Boardroom
Printing
Staffroom
Campus manager
Department head

C. TEACHING SPACES

Computer rooms
Lecture rooms
Gathering spaces
Workshop
Ics office:
    Help desk
    Store room
    Office
    Waiting area
Lecture rooms

D. RESOURCE CENTRE/ LIBRARY

Student support services
Cashiers
Health Services
Audio and visual
Listening booths
Issue desk
Listening and reading lounge
Braille card catalogue
Book drop off
Digital research
Journals and newspapers
Group lounge
Group study
Printing
Binding and unpacking

E. DISABILITY UNIT

Enquiries
Advocacy
Stenographer
Sign language interpreter
Mobility instructor

F. GYMNASIUM
Pool
Change rooms
Physiotherapy

G. RESIDENCES
Dining Hall
Female Residences
Male Residences
Laundry
Cleaning store
Activity room
TV room
Residence Assistant flat
Matron flat

H. MULTIPURPOSE HALL
I. GUIDE DOG CARE
Enclosures
Play care lounge
Grooming
Food prep
Exam and treatment

8.2.5. Site requirements

This building needs to be located in the CBD. The urban environment is the most eclectic space, where you find different types of people. Moving away from the urban setting to residential areas, you find that certain groups of people stay in that area. In the CBD is where we find most of our public buildings. This environment is in need of inclusive design more than any other area in the city.

The main requirements that the chosen site needs to meet are

- It needs to be in close proximity to public transport routes.
- There needs to be a hospital or other health facilities in close proximity, preferably within walking distance
- It needs to be in close proximity to other amenities that students might require eg Food outlets etc

8.2.6. Design

The seven universal design principles that need to guide the design are:

1. Equitable use
2. Flexibility in use
3. Simple and intuitive use

4. Perceptible information
5. Tolerance for error
6. Low physical effort
7. Size and space for approach

Accessibility

- The building needs to be accessible to people using different modes of transport: walking, using mobility devices, taxis, public transport or a private car.
- Public buildings need to be in close proximity to public transport routes, have drop- off zones for those being drop-off with private cars.
- There must be no obstructions, preventing people from accessing the building: trees, shrubs, raised planters, vehicles, people buildings
- Entrances and exits need to be clear and legible

Circulation

Paths:

- The use of texture as a navigational tool
- Changes in texture to indicate changes in direction
- Advance surface texture warnings at the beginning and end of a level change
- Only hard surfaces can be used to give an auditory navigational cue
- There needs to be a gradual ramping up from the circulation path instead of a threshold, to prevent people from tripping

Tactile ground surface indicators, provide the user with the direction of travel as well as a warning of a change in the environment (Alpelt et al. 2007).

Image 77: Directional tactile surface tile (Alpelt et al. 2007)

Image 78: Warning tactile surface tile (Alpelt et al. 2007)

Image 79: Tactile wayfinding trail at Brisbane Square, North Quay (Alpelt et al. 2007)

- All paths need be clear of any obstructions. Windows along paths need to be sliding windows instead of side hung, or there needs to be a separation using elements like planter boxes

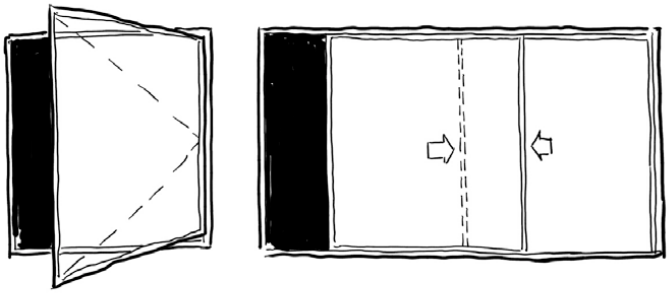

Image 80: Windows along circulation routes need to be sliding instead of side hung (Author 2015)

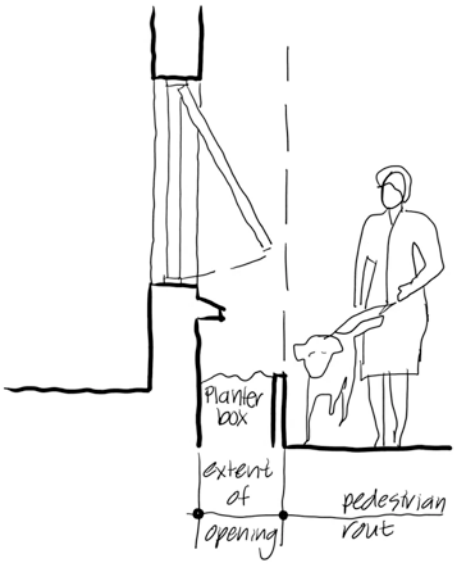

Image 81: Outward-opening window prevented from projecting into circulation path by planter (Author 2015)

- Street furniture needs to be carefully and consistently placed so as not to obstruct walking routes, but to provide navigational guidance.
- Street furniture should always be located either close to or recessed into the shoreline for example a wall of a fence, leaving the centre of the circulation path clear
- Street furniture needs to be kept to a minimum on narrow pavements.
- Objects need to be detectable at low level to assist blind people who use canes
- Objects along the circulation paths need to have rounded edges instead of sharp edges
- Temporary obstacles like construction sites need to be sufficiently guarded and have clear warnings

Image 82: Hedges and trees should be cut back to leave circulation route free and to allow for clear headroom of 2200mm (Author 2015)

- Routes need to be distinct with clearly defined edges
- Large open spaces need to be avoided
- Routes must be kept clear of obstacles to avoid safety hazards.
- A Clear headroom of 2 200mm must be kept
- Gratings and grilles should not be used in walkways.
- Tress and hedges must not encroach on circulation paths.

(O'Doherty and Kinsella with NCBI, 2011)

Vertical circulation

- Lifts need to have both audible outputs and braille signage and buttons

Signage

- All signage needs to be both visual and non- visual, braille or auditory

Sensory quality

- All rooms especially teaching spaces need to prioritise the acoustic quality of the spaces and arrangement instead of the visual

8.3. Concluding statements

Accurate data needs to be collected on the prevalence of disability in our higher educational institutions, the numbers and type, so they can be designed for. Having this data will assist in planning process. This information is critical, whether minority or not, they need to be catered for. The opportunity to gain education like sighted people allows them to get a career and be financially independent, make a contribution to society and improve the country's economy, decrease poverty.

Most of the existing literature groups all blind people; there is a limited body of knowledge regarding blind people in particular.

Loss of sight changes the spectrum of career choices available to blind people. A investigation on whether courses that are being offered are appropriate for blind people as well needs to done, as well as how the current courses could be restructured in order for blind people to also enroll in them.

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Appendix 1

Appendix 2

GATE KEEPER'S LETTER – Case study

Information Sheet

Project title: Understanding how blind people, who have lost their sight, experience and navigate through public buildings in the Durban CBD: A proposed FET College for Durban

Background: Many people rely on their eyesight to conduct their daily activities, including navigating through buildings and public spaces. A vast majority of the existing public buildings seem to be occupied by sighted individuals only, partly due to the lack of consideration for blind people in the design. The architect is not a replacement of medical professionals that deal with the repercussions of sight loss. However the architect can be seen as an enabler that designs the setting that promotes this rehabilitation and reintegration (Steele 1959).

The Aim: of the study is to investigate what defines an inclusive building that caters for both sighted and blind individuals. Furthermore how these inclusive public buildings can be designed.

Data collection instruments: Participants will also be requested to participate in some tasks where they will be observed and documented through the use of film- whilst navigating through a selected public building. The participants will be observed while navigating through preselected public buildings, in order to test the role that memory plays when blind people navigate through a familiar public building, and also the role that the other senses play whilst navigating through an unfamiliar environment.

Your building is one of the preselected buildings for the study.

Time frame: You are hereby requested to make the premises available to us for 3 non-consecutive days, for maximum 2 hours, over 2weeks, between the months of March and November.

HSSREC contact details:

Supervisor details: Mr Lawerence Ogunsanya
Institute: University of KwaZulu- Natal (Howard College Campus)
School of Built Environment and Development Studies
Architecture programme

Student details: Miss Nikiwe Mvuyana
Institute: University of KwaZulu- Natal (Howard College Campus)
School of Built Environment and Development Studies
Architecture programme
Student number: 207501690
Qualification registered for: Masters in Architecture
Email: nikiwemvuyana@yahoo.com
nikiwemvuyana@gmail.com

Declaration of Consent

I.....(full names of participant), as representative of ……..(name of institution) hereby confirm that I understand the contents of this document and the nature of the research project, and I consent to the researcher using our premises for the above mentioned study.

SIGNATURE OF GATEKEEPER DATE

....

NOTE: Potential subjects should be given time to read, understand and question the information given before giving consent. This should include time out of the presence of the investigator and time to consult friends and/or family.

Architecture Department
School of Built Environment and
Development Studies
College of Humanities
University of KwaZulu-Natal,
Pietermaritzburg Campus,

Dear Participant

INFORMED CONSENT LETTER

My name is Nikiwe Mvuyana, I am a Masters of Architecture student studying at the University of KwaZulu-Natal, Howard College campus, South Africa.
I am interested in Understanding how people with acquired blindness experience and interact with higher educational institutions. I am studying cases in Pietermaritzburg and Durban. The University of KwaZulu-Natal, Howard College is one of my case studies. To gather the information, I am interested in asking you some questions.
Please note that:

- Your confidentiality is guaranteed as your inputs will not be attributed to you in person, but reported only as a population member opinion.
- The interview may last for about 1 hour and may be split depending on your preference.
- Any information given by you cannot be used against you, and the collected data will be used for purposes of this research only.
- Data will be stored in secure storage and destroyed after 5 years.
- You have a choice to participate, not participate or stop participating in the research. You will not be penalized for taking such an action.
- The research aims to investigate what defines an inclusive building that caters for both sighted and blind individuals. Furthermore how these inclusive public buildings can be designed.
- Your involvement is purely for academic purposes only, and there are no financial benefits involved.
- If you are willing to be interviewed, please indicate (by ticking as applicable) whether or not you are willing to allow the interview to be recorded by the following equipment:

	willing	Not willing
Audio equipment		
Photographic equipment		
Video equipment		

I can be contacted at:
Email: nikiwemvuyana@yahoo.com
Cell: 083 9525 093

My supervisor is Mr Lawrence Ogunsanya who is located at the Architecture Department, Howard College campus of the University of KwaZulu-Natal.

Contact details: email: ogunsanya@ukzn.ac.za Phone number: 031 260 2050

You may also contact the Research Office through:
P. Mohun
HSSREC Research Office,
Tel: 031 260 4557 E-mail: mohunp@ukzn.ac.za

Thank you for your contribution to this research.

DECLARATION

I…… (full names of participant) hereby confirm that I understand the contents of this document and the nature of the research project, and I consent to participating in the research project.

I understand that I am at liberty to withdraw from the project at any time, should I so desire.

SIGNATURE OF PARTICIPANT DATE

…… ……

INTERVIEW SCHEDULE FOR FAMILY MEMBERS & FRIENDS

Research question: Understanding how people with acquired blindness experience and interact with higher educational institutions: A proposed TVET College for the Pietermaritzburg CBD

The Aims and objectives of this interview are to find out what is like for a blind person to navigate through the existing public buildings in Durban. Whether these buildings are user friendly for blind people as well or only just for the sighted. With the buildings that are not user friendly what are the obstructions that make them unusable. To establish the role the other senses play when blind individuals move through space; also the role that memory plays when blind individuals who were born with sight move through buildings. Ultimately the other aim is to investigate how these two tools (senses and memory) can be incorporated in the design of public buildings that can inclusively be used by blind and sighted individuals.

This interview is designed for the family members and friend of the blind participants.

INTERVIEW

Hi my name is Nikiwe I am an Architecture Masters student from UKZN. Thank you so much for availing yourself to me for this interview. The aim of my research is to investigate public buildings can be designed to inclusively cater for both sighted and blind individuals. I have just a couple of questions that I would like to ask you that we can just talk through. If at any point during the interview there is a question you don't quite understand or don't feel comfortable to answer feel free to let me know, and we can move on.

For the purposes of documentation I would like to request to record our conversation. I guarantee that any recordings taken will not be distributed or shared. After the study is completed the information will be disposed of accordingly. Which name would you prefer me to use in my document, your real name or a nickname or alias.

A copy of this interview was sent to …….. (Participants name) to read through and approve the questions to be asked. No questions that will be ask were rejected by the participant.

1. Ice breaker: Firstly could you tell me a bit about how you know ……(participant's name)
   Note: The following questions will be directed at how ……. (participants name) uses public buildings. Please try to answers as best as you can. If there are any questions that you do not know the answer to, please feel free to let me know. It will carry no disadvantage to the interview.
2. Do they ever go into the city centre
   2.1. If not, why?
   2.2. If so, who do they go with?
   2.3. If so, which buildings do they normally go to?
   2.4. If so how often do they go
3. Do you think that the public buildings in the CBD are easy to use or move around for blind individuals? (Wayfinding)
   3.1. If yes, what makes them easy to use
   3.2. If not, what makes it difficult to use them
4. What role do you think the other senses play in how ……..(Participants name) moves through public spaces and buildings?

4.1. Do they pay attention to the sounds they hear when they walk through a building
4.2. Do they touch the different surfaces when they walk past them
4.3. Do you think they pay attention to the textures on their feet
4.4. Do you think they pay attention to the smell of the places they walk through
4.5. Do you think they notice changes in temperature when they walk through a room

5. Were they born sighted?
   5.1. If yes, when did they lose their sight?
   5.2. If yes, are you aware of whether they still have memories of what they could see
6. What role does memory play when they are moving through public spaces and buildings?
   6.1. Do you they use the memory of materials and surfaces they've seen before to move through a building
   6.2. Do they recall past experiences of the space in order to move through it when they revisit it
   6.3. Is it easier to move around a building once they have been there before, assuming there are no new obstacles placed in their way
7. What other tools do they use to navigate through buildings
   7.1. How do these tools works

Thank you, so much for you time. You participation is greatly appreciated.

INTERVIEW SCHEDULE FOR EXPERTS

Research question: Understanding how people with acquired blindness experience and interact with higher educational institutions: A proposed TVET College for the Pietermaritzburg CBD

The Aims and objectives of this interview are to find out what is like for a blind person to navigate through the existing public buildings in Durban. Whether these buildings are user friendly for blind people as well or only just for the sighted. With the buildings that are not user friendly what are the obstructions that make them unusable. To establish the role the other senses play when blind individuals move through space; also the role that memory plays when blind individuals who were born with sight move through buildings. Ultimately the other aim is to investigate how these two tools (senses and memory) can be incorporated in the design of public buildings that can inclusively be used by blind and sighted individuals.

This interview is designed for the family members and friend of the blind participants.

INTERVIEW

Hi my name is Nikiwe I am an Architecture Masters student from UKZN. Thank you so much for availing yourself to me for this interview. The aim of my research is to investigate public buildings can be designed to inclusively cater for both sighted and blind individuals. I have just a couple of questions that I would like to ask you that we can just talk through. If at any point during the interview there is a question you don't quite understand or don't feel comfortable to answer feel free to let me know, and we can move on.

For the purpose of documentation I would like to request to record our conversation. I guarantee that any recordings taken will not be distributed or shared. After the study is completed the information will be disposed of accordingly. Which name would you prefer me to use in my document, your real name or a nickname or alias.

A copy of this interview was sent to …….. (Participants name) to read through and approve the questions to be asked. No questions that will be ask were rejected by the participant.

1. Ice breaker: Firstly what is the role of the disability unit
2. Could you tell me a bit about how and when you started doing the kind of job you're doing
3. How long have you been working at UKZN?
4. What does your job entail?
   4.1. Is the training done in groups or individually?
5. Do you think that the buildings at the University of KwaZulu-Natal are easy to use or move around for blind individuals? (Wayfinding)
   5.1. If yes, what makes them easy to use
   5.2. If not, what makes it difficult to use them
6. What role do you think the other senses play in how ……..(Participants name) moves through public spaces and buildings?
   6.1. Do they pay attention to the sounds they hear when they walk through a building
   6.2. Do they touch the different surfaces when they walk past them
   6.3. Do you think they pay attention to the textures on their feet
   6.4. Do you think they pay attention to the smell of the places they walk through

6.5. Do you think they notice changes in temperature when they walk through a room

7. Were they born sighted?
   7.1. If yes, when did they lose their sight?
   7.2. If yes, are you aware of whether they still have memories of what they could see
8. What role does memory play when they are moving through public spaces and buildings?
   8.1. Do you they use the memory of materials and surfaces they've seen before to move through a building
   8.2. Do they recall past experiences of the space in order to move through it when they revisit it
   8.3. Is it easier to move around a building once they have been there before, assuming there are no new obstacles placed in their way
9. What other tools do they use to navigate through buildings
   9.1. How do these tools work

Thank you, so much for you time. You participation is greatly appreciated.

INTERVIEW SCHEDULE FOR ARCHITECTS

Research question: Understanding how people with acquired blindness experience and interact with higher educational institutions: A proposed TVET College for the Pietermaritzburg CBD

The Aims and objectives of this interview are to find out what defines a inclusive public building which caters for both blind and sighted people. To establish the role the other senses play when blind individuals move through space; also the role that memory plays when blind individuals who were born with sight move through buildings. Ultimately to investigate how these two tools (senses and memory) can be incorporated in the design of public buildings that can inclusively be used by blind and sighted individuals.

This interview is designed for the architects who have designed buildings, which either caters for blind people, or also inclusively cater for blind individuals and sighted individuals.

INTERVIEW
Hi my name is Nikiwe I am an Architecture Masters student from UKZN. Thank you so much for availing yourself to me for this interview. The aim of my research is to investigate public buildings can be designed to inclusively cater for both sighted and blind individuals. I have just a couple of questions that I would like to ask you that we can just talk through. If at any point during the interview there is a question you don't quite understand or don't feel comfortable to answer feel free to let me know, and we can move on.

For the purposes of documentation I would like to request to record our conversation. I guarantee that any recordings taken will not be distributed or shared. After the study is completed the information will be disposed of accordingly. Which name would you prefer me to use in my document, your real name or a nickname or alias.

1. Ice breaker: Firstly could you tell me a bit about your journey to becoming an Architect, and how you came about to designing the type of buildings you do?
2. Have you ever designed a building that caters for blind individuals?
   2.1. If so, was it solely for blind people or also for the use of sighted individuals
   2.2. If not, is there a building that you have designed which you consider to be usable by blind people
3. What is the typology of the building?
4. When was it designed and built?
5. Please tell me more about the design
   5.1. The materials
   5.2. The climatic and environmental components of the building
   5.3. The intended spatial experience
6. Does the design incorporate the use of the other senses
   6.1. If so, how?

7. Does the design enhance the use of memory of the users
   7.1. If so, how?
8. What other navigational cues are used to make it easier for blind individuals to use the building?
   8.1. If there are, how do they work?
9. As far as you know, is the building being successfully used by the intended users?
   9.1. If so what has contributed to this success
   9.2. If not, what are the main causes of this?
10. What were the constraints and opportunities that you identified with this project
11. Looking back now, what would you have done differently and why?
12. What would you say defines a universally design building

Thank you, so much for you time. You participation is greatly appreciated.

[students] who have [lost their sight]

in [Universities & Colleges]

Understanding how people with acquired blindness experience and interact with higher educational institutions:

A proposed TVET College for the Pietermaritzburg CBD

[Technical Vocational Education & Training]

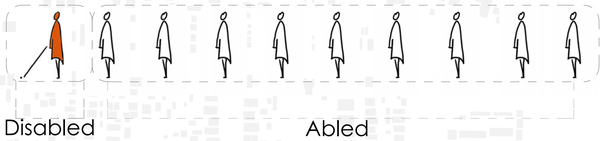
[BLINDNESS IS THE MOST PREVALENT DISABILITY]

ABSTRACT

The research was an investigation of how people who have lost their sight interact and experience public higher educational institutions that were **not designed to cater for them**.

Furthermore exploring the **barriers they encounter** in these institutions, as well as how they cope in these harsh environments.

Approximately 15% of the world's population has a disability. According to the 2011 Census just under **3 million South Africans were reported to be disabled**. Therefore 7.5% of the country's population is disabled.



People who lose their sight during the course of their lives are forced to adjust to not relying on their sight in conducting their daily lives, like cooking, cleaning, working, travelling, and so forth. The unfortunate fact about the built environment is that it is mostly inaccessible to people with disabilities.

RESEARCH

PROBLEM STATEMENT:

The **Segregation and isolation** of blind people, due to the lack of consideration of the blind population in the design process of public buildings.

RESEARCH QUESTION:

Are the building designs of the existing **public** educational institutions sensitive to and **inclusive** of blind people ?

AIM:

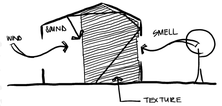
To investigate what defines an inclusive building that caters for both sighted and blind individuals. Furthermore how these inclusive public buildings can be designed.

OBJECTIVES:

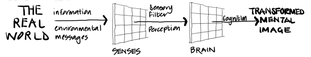
To understand the role that the other senses &memory play in the experience of a blind person. To discover how to incorporate the other senses and memory in the design of public buildings. To develop guiding principles for designing inclusive architecture, that serves both the sighted and the blind.

THEORETICAL FRAMEWORK:

Phenomenology: The architecture of the **senses.** Moving away from an ocular centric mode of design



Perceptual theory : **experiences** are unique to the individual. A number of people could stand in the same space, at the same time, but **perceive it differently**



Ecological theory : our **relationship** with our environment, how this shapes our experiences

Wayfinding theory:

CLIENT BRIEF

CLIENT:

Department of Higher Education and training

higher education & training
Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

Blind people were one of the groups which were **discriminated against** during the apartheid era. Since the birth of the democratic South Africa, the laws of South Africa have transformed to correct the wrongs of the past and to allow all disable people the same rights that other citizens enjoy. However the biggest challenge is that these **laws and legislations have not been implemented successfully**.

One of the sectors that have not sufficiently transformed is the Department of Higher Education and training. Most, if not all the South African **Higher Education Institutions are still not accessible to blind people.** The number of blind students enrolling into Higher Educational Institutions is growing, however this does not necessarily indicate that these institutions are transformed. This inaccessibility is mostly seen through the infrastructure.

TYPOLOGY:

TVET [FET] COLLEGE
Technical Vocational Education Training

WHO:

Students. With careful consideration towards those with acquired blindness

WHAT:

A TVET College- with specific focus on universal accessibility and in particular

WHY:

To create architecture for a diverse user profile.

HOW:

By positioning the institution in an urban centre where public transport is easily accessible, and where the building is **legible,connected, and integrated**, with focus on navigation systems for blind people

PRECEDENT STUDIES

HAZELWOOD SCHOOL FOR THE BLIND

The stimulation of touch was crucial in this school, to facilitate the pupil's orientation around the building

-Well structured paths
-One main circulation route, with secondary routes feeding off it
-There are no ramps or staircases, making navigation through the building easier

-Sensory wall, used as a tactile guide to navigate and orientate the user

-Collage of materials, which creates a unique identity of each space

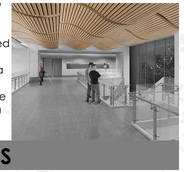
POLYTRAUMA AND BLIND REHABILITATION CENTRE

The centre was designed by an architect with acquired blindness. It mainly caters for people who have recently lost their sight.

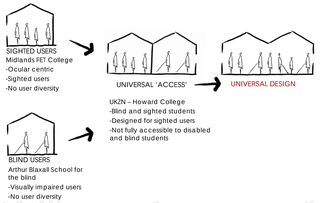
-Navigational assistance: the handrails for the staircases stretch beyond the first and last step as a pre- warning
-The handrails fixed on to the walls are used to gage the user's orientation

-Change in floor textures to indicate a nodes within the building

-Vaulted ceiling, installed to add an acoustic character to the space, as a tool to orientate users. Sound is used as a navigational cue.
The floors are finished with a hard surfaces, this adds a acoustic character for those who use cane tapping as a navigational tool.



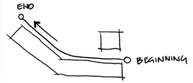
CASE STUDIES



DESIGN PRINCIPLES

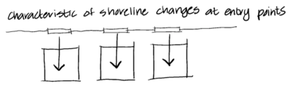
CREATING WELL STRUCTURED PATHS

-Well structured
-Continous
-Clear beginning and an end
-Intermediate points which connect the path to its context



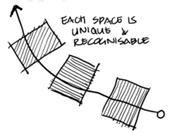
SENSORY DESIGN

-Textures, to indicate direction, nodes, warning signs
-Shorelines, an edge that is used to determine direction with a cane
-Sound and Smell

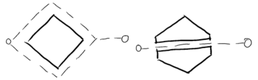


CREATING A UNIQUE IDENTITY AT EACH LOCATION

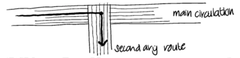
- Making a space memorable, allowing easy use of the spaces the more the user uses the building



NOT GIVING THE USER TO MANY CHOICES IN NAVIGATION



PROVIDING NAVIGATIONAL ASSISTANCE AT DECISION POINTS



Floor textures change where routes intersect

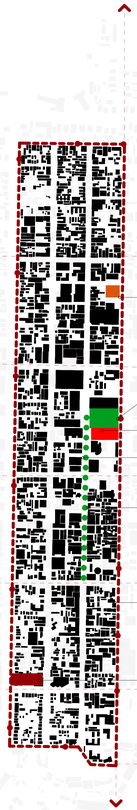
ASSISTANCE IN ROUTE NAVIGATION

This is done using floor and wall textures, keeping routes clear of any obstacles

Open green spaces and river

Boundary & blocks

Figure ground



Proposed new taxi crossings.
There is a high traffic of taxis in the CBD which make the city unfriendly for pedestrians to use, This taxi route limitation will ensure that control of movement and the roads will prioritise pedestrians and make it safe for blind people to use

Proposed new police station. There is only one police station in the city. This station is overloaded. The street of the proposed station is known for being the street where prostitutes get picked up

Existing park- fenced. To be open to the public

PROPOSED SITE

Proposed extension of pedestrian street

Existing pedestrian street

Proposed new municipal bus route
To provide more accessibility to the site and the CBD as a whole

Proposed new bus and taxi rank

1:30 000 **URBAN FRAMEWORK & PROPOSAL**

SITE SELECTION

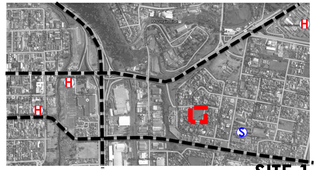
CRITERIA:
-Located within the CBD

The urban environment is the most eclectic space, where you find different types of people. Moving away from the urban setting to residential areas, you find that certain groups of people stay in that area. In the CBD is where we find most of our public buildings. This environment is in need of inclusive design more than any.

-Access to:
transport
Health Facilities
Government support services: Department of Social Development, Department of Labour

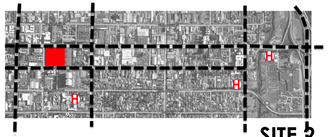
First Floor Plan 1:200

3 hospitals within a 2km radius
In close proximity to secondary routes, national route
Direct link to major public transport routes
Close to a feeder school for the blind



SITE 1

3 hospitals within a 2km radius
Closest hospital is 500m from the site
Site is along a major public transport route
Site is along a major pedestrian route
In close proximity to secondary routes
Has a direct link to major public transport route
Adjacent to a major taxi rank
Adjacent to municipal library
Food outlets in close proximity



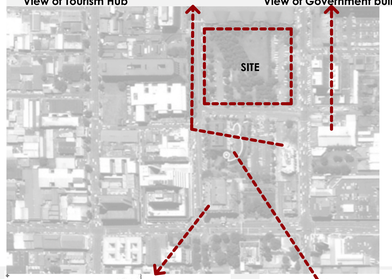
SITE 2

Less than a km away from a hospital
Along a tertiary route – inner city
Has a direct link to major public transport route

SITE 3

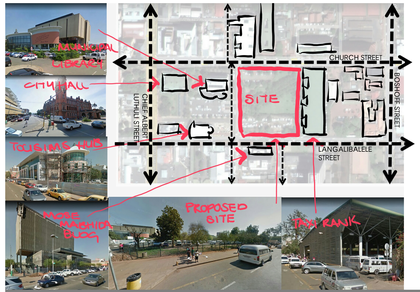
View of Tourism Hub

View of Government building

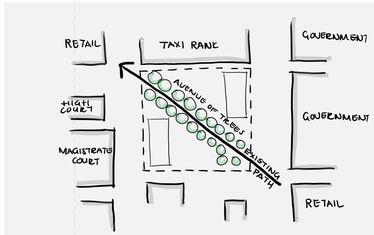


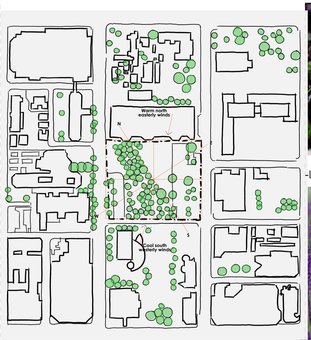
View of City Hall

View of City Hall



SITE ANALYSIS





SMELL

FLOWERS
Fragrant flowers, which bloom all year round. These are used to distinguish different spaces in the building. They assist a blind person to orientate themsleves. These are planted along the main circulation routes, in between 2 decision points.

-Jasminum multipartitum

-Carissa macrocarpa

-Budleja buzz

-Lavender

TOUCH

ACTIVE
Floor textures:
-Main circulation
-Change in direction
-Entry point

The groves of the floor texture of the main circulation run in the same direction as the direction of movement. At an intersection the the groves of the floor run in the direction of the path.

Wall textures:
-Shorelines
-Balustrade
-Braille signage

Before reaching an entry point the texture changes to indicate the entry point.

All balustrades are fixed to a concrete up stand which provides a shoreline. The material of the shoreline changes to timber when there is an entry point adjacent to it

PASSIVE
Thermal comfort:
Sun - Shadow
Wind
Heat control

SOUND

Water feature:
that runs through all floors.
The lobby is a major decision point. The route changes direction on a horizontal level. The ramp stair and lift allow you to navigate vertically

Classroom arrangement:
The classroom tables are arranged in a C shape for a more intimate interaction that focuses on acoustics instead of visuals

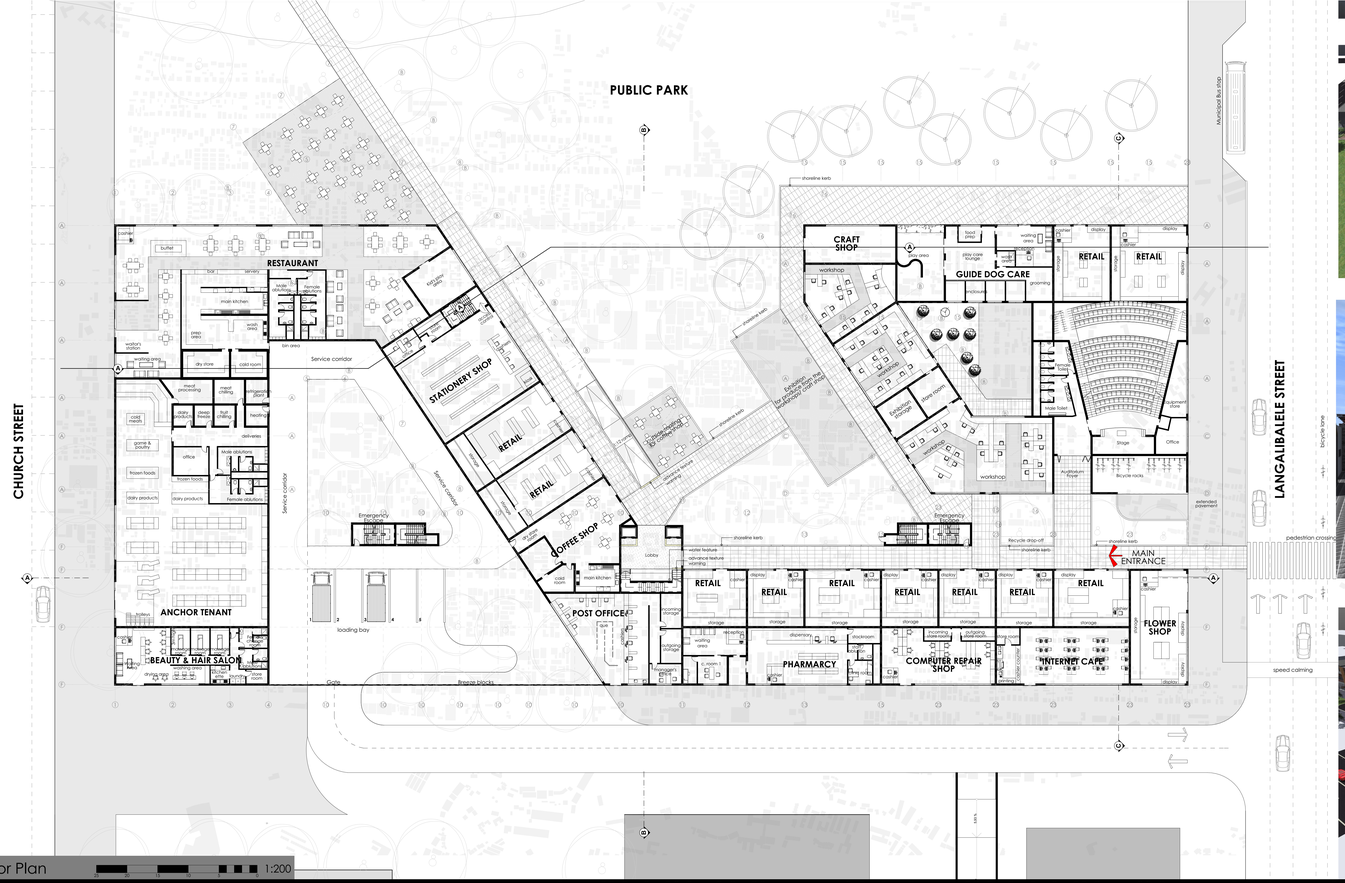
Wind pipes:
On the residential level there are wind pipes fixed to the balustrade upstand beam, at decision points. They face the prevailing winds

1:100 Part Plan

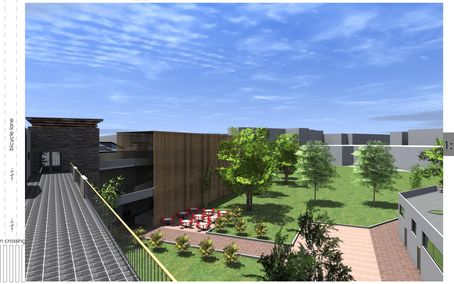
SCHEDULE OF ACCOMMODATION

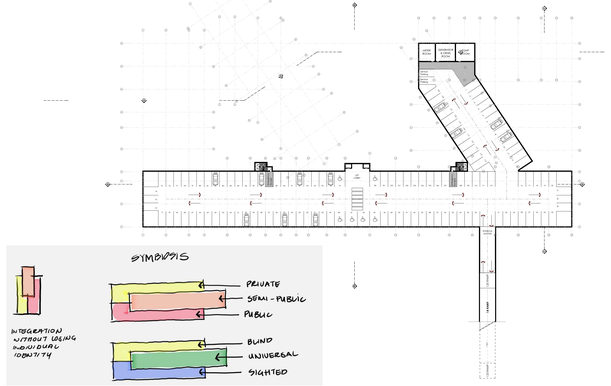
	QUANTITY	M^2	TOTAL M^2
GROUND FLOOR PLAN			
Auditorium	1	$326M^2$	
Anchor tenant	1	$597M^2$	
Beauty & Hair salon	1	$158M^2$	
Restaurant	1	$691M^2$	
Stationery shop	1	$157M^2$	
Retail	11	$79M^2$	
Coffee shop	1	$159M^2$	
Post-Office	1	$72M^2$	
Pharmarcy	1	$204M^2$	
Computer Repair Shop	1	$115M^2$	
Internet Cafe	1	$134M^2$	
Flower shop	1	$116M^2$	
Craft Shop	1	$503M^2$	
Guide Dog Care	1	$211M^2$	
Restaurant	1	$644M^2$	
Abloutions	3	$64M^2$	
Circulation Space	-	$1005M^2$	
FIRST FLOOR PLAN			
Auditorium	1	$648M^2$	
Libarary	1	$1012M^2$	
Gymnasium	1	$242M^2$	
Disability Unit	1	$301M^2$	
Student Support Services	1	$553M^2$	
Adminstration	1	$334M^2$	
Cafeteria	1	$309M^2$	
Lecture rooms	12	$514M^2$	
Computer rooms	2	$256M^2$	
Roof Garden	-	$72M^2$	
Abloutions	1	$134M^2$	
Circulation Space	-	$899M^2$	
SECOND FLOOR PLAN			
Male Residences Rooms	13	$20,12M^2$	
Female Residences Rooms	15	$19M^2$	
Bathroom	1	$23\ M^2$	
R.A Room	1	$26M^2$	
Cleaning Store	1	$553M^2$	
Tv Room	2	$8M^2$	
Activity Room	2	$36M^2$	
Dinning Room	1	$281M^2$	
Laundry	2	$8M^2$	
Matron	1	$35M^2$	
Roof Terrance	8	$63M^2$	
Circulation Space	-	$834M^2$	
TOTAL DESIGNED AREA		20, 000M^2	

DESIGN RATIONALE

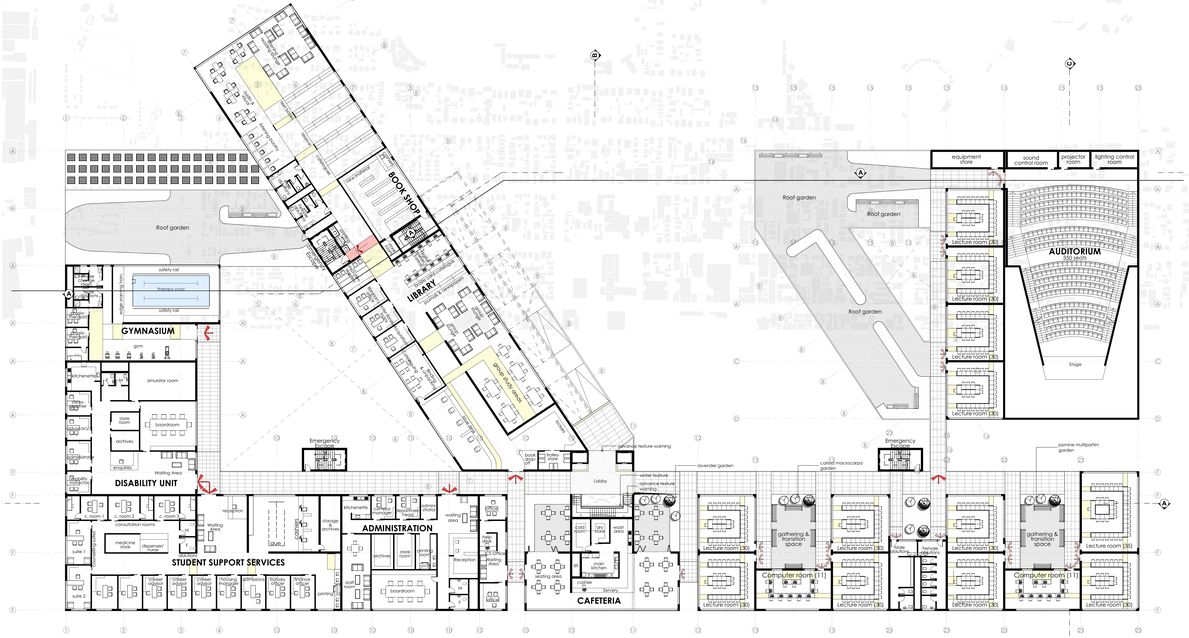


Ground Floor Plan 1:200

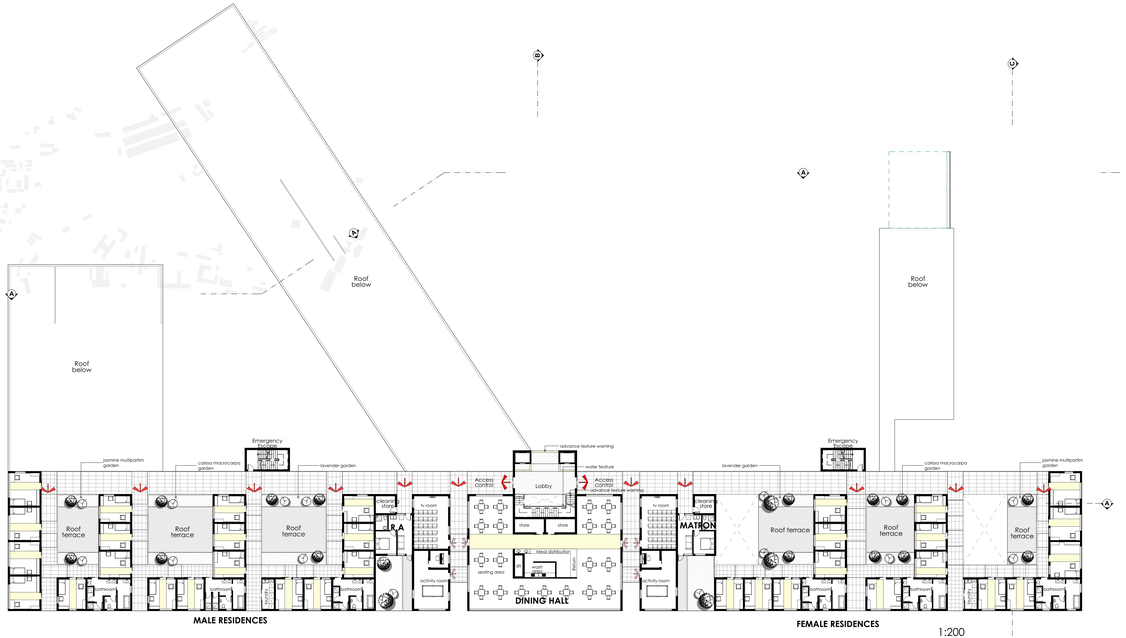




Basement Floor Plan



First Floor Plan



1:200

Second floor plan

South West Elevation 1:200

1:200 South East Elevation

A proposed TVET College for the Pietermaritzburg CBD

Nikiwe Mvuyana – 207501690

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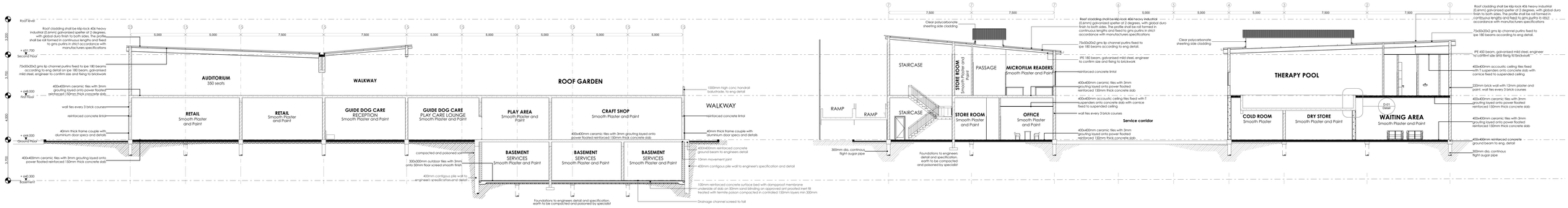
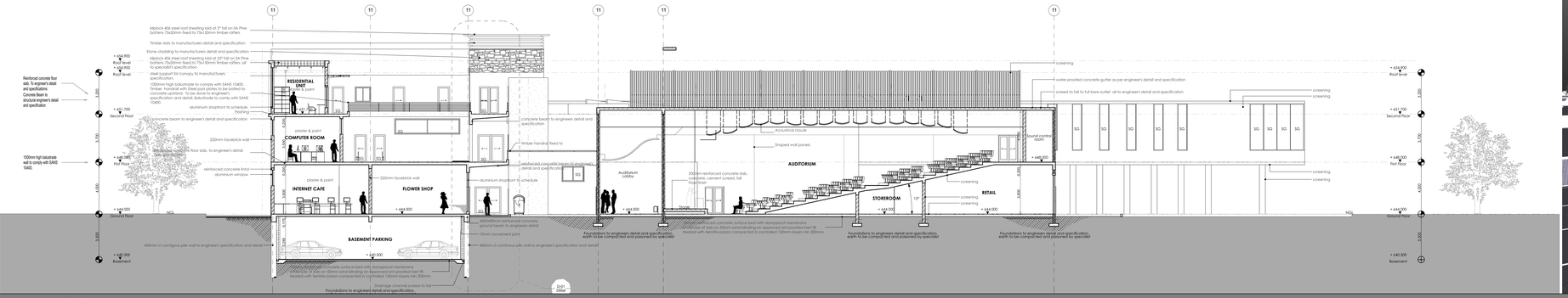


Section A-A 1:100



Section C-C 1:100

View from Langalibalele