

**THE BODY AS A SUBJECT (NOT OBJECT) OF THE BUILT FORM:  
ENGAGING ARCHITECTURE AND THE SENSES  
A PROPOSED WINERY FACILITY IN THE NATAL MIDLANDS**

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A Dissertation submitted to the Faculty of Humanities, Development and Social Sciences, University of KwaZulu-Natal, in partial-fulfilment of the requirements for the degree of Master in Architecture

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*“Writing about architecture and perception is inevitably haunted by the question: Can we see through the word into the built form? If architecture is to transcend its physical condition, its function as mere shelter, then its meaning, like interior space, must occupy an equivalent space within language. Written language might, then, assume the silent intensities of architecture.”*

**-Steven Holl-**

*“What is needed most in architecture today is the very thing that is most needed in life – Integrity. Just as it is in a human being, so integrity is the deepest quality of a building[... ]If we succeed, we will have done a great service to our moral nature – the psyche – of our democratic society[... ]Stand up for integrity in your building and you stand for integrity not only in life of those who did the building but socially a reciprocal relationship is inevitable”*

**– Frank Lloyd Wright-**

*“To my dismay, I have found that an alarming proportion of publications devoted to architecture have banished from their pages the words beauty, inspiration, magic, spellbound, enchantment, as well as the concepts of serenity, silence, intimacy and amazement. All these have nestled in my soul, and through I am fully aware that I have not done them complete justice on my work, they have never ceased to be my guiding lights.”*

**-Luis Barragan-**

*“I believe architecture today needs to reflect on the tasks and possibilities which are inherently its own. Architecture is not a vehicle or a symbol for things that do not belong to its essence. In a society that celebrates the inessential, architecture can put up a resistance, counteract the waste of humans forms and meanings, and speak with its own sensuous language.”*

**-Peter Zumthor-**

## **DECLARATION**

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A document submitted in partial fulfilment of the requirements for the degree of Masters, in the Graduate Programme in Architecture, University of KwaZulu-Natal, Durban, South Africa.

I declare that this dissertation is my own unaided work. All citations, references and borrowed ideas have been duly acknowledged. It is submitted for the degree of Masters in Architecture in the Faculty of Humanities, Development and Social Science, University of KwaZulu-Natal, Durban, South Africa. None of the work as been submitted previously for any degree or examination in any other university.

**Dieuwke Lennon Nightscales**

Student Name

**30.03.2012**

Date

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## **DEDICATION**

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This dissertation is dedicated to anyone who cares that I wrote it.

Also to my parents for enduring my year long bad mood, I am sorry for being the eternal student and robbing you of your retirement plans. Thank you endlessly for letting me realise my dreams and for your unending support.

## **PART I**

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### **DISSERTATION DOCUMENT**

## ABSTRACT

Today, our Western world faces a paradoxical situation - at the height of technological mastery, architects often misinterpret the body as an object of architecture, which considers the body an unresponsive physical entity, that does not existentially engage with space. This dissertation draws attention to a generalised problem within the realm of architectural practise; the presupposition that in our age of massive industrial production, surreal consumption, euphoric communication, and simulated digital environments is promoting objective and standardised thought patterns. Twenty-first century ideals are moving away from tangibility, physicality, and meaning towards an age of hyperreality and ethereal superficiality whereby our bodily senses are becoming objects of ceaseless commercial manipulation and exploitation. Pallasmaa (1993), a phenomenological theorist whose ideologies make a large contribution to the body of this dissertation, questions whether further technological advancements are pre-empting our growth – or our inhibition – perceptually. He believes we live our lives in constructed spaces, surrounded by physical objects. “[*but*], *born into this world of ‘things,’ are we able to experience the phenomena of their interrelation, to derive joy from our perception*” (Pallasmaa, 1993: 40).

This study was, therefore, motivated by notions of the subjective body; the body that moves, the body that feels, and the body the senses - in order to explore dialogue in architecture which is often disregarded; concepts such as beauty, essences, embodiment, and relationship (to name a few). The research, therefore, introduces an architecture which transcends fixed notions of style and emerging technologies; it emphasises the **lived** experiential realm of the built environment which places the human body and its sensations at the forefront of the design conception. Through both qualitative and quantitative research, this study focuses on the need to encourage and illustrate the pursuit of design - not as a project, imposing preconceived ideas upon a situation, but as a process evolving from the inside – from movement, sensation, surrounding, and dialogue between body and architecture.

The aim of the research was essentially to investigate the relationship between architecture and the senses. The emphasis was, therefore, placed on the human embodied experience of sensory space. Three parameters of the sensory body were identified, namely: the ‘flesh’ body which introduces the universal role of the traditional five sense modalities in architecture; the environmentally sited body, which broadens the scope and palette of the senses by introducing environmental variations; and the culturally sited body, which identifies the notion of a ‘sixth sense’ - that which is culturally conditioned in order to understand concepts of meaning, memory, and cultural identity. Overall this dissertation identifies an attitude to architecture that recognises the value of the human body not only as an inspiration for design, but as the very reason for architecture to exist at all. The principal conclusion of this dissertation realises that conceiving of the body as a subject of architecture helps architects to appreciate that they build primarily to stimulate the subjective body, and gives credence to corporeal architecture which intensifies spatial experiences.

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## DEFINITION OF TERMS

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The following terms are outlined at the start of this dissertation in order to contextualise the preceding information. For the purpose of clarity, architectural theories have been defined in order to focus their broad and multifarious application in accordance with the research content. These definitions will, however, be elaborated further, in the body of the dissertation:

**Architecture:** Is the embodiment of experience within and outside of place and space. It refers to the skill and method of constructing physical space while taking into account both internal and external values of the body, in addition to accommodating and supporting the activities to be carried out within the built form. In the case of this dissertation - the term architecture suggests a physical construct to both house and engage with the lived body.

**Culture:** Is a definition which is highly misunderstood and misused and, therefore, requires a contextual explanation. Culture, within regard to this dissertation, is the ways in which groups of people perceive, interpret, and understand the world around them as a result of a value system which has been transmitted through generations. This value system is a product of inherited ideas, beliefs, and knowledge which constitute the shared bases of social interaction. The view of culture, in relation to this study, takes on similar beliefs to those of anthropologists and other behavioural scientists whereby culture is viewed as the full range of human learned behaviour patterns. Architecture is a product of culture - it is not culture in itself and thus cultural knowledge becomes an indispensable existential commodity. This dissertation often makes mention to an 'ocularcentric' or 'mechanistic' culture which makes reference to the universal and homogenised culture outlined in the problem statement of this dissertation.

**Embodiment:** The experience or reaction of the human body which the physicality of architecture facilitates. It makes reference to notions which presuppose that conventional views of the body as 'simply biological' or 'rationally scientific' are inaccurate, and suggests that the architectural experience is moulded by how the body responds to buildings sensory capacities. The term suggests that underneath the anatomized and mechanical body dwells the body as it actually experiences things. The boundaries of the 'embodied' are open and indeterminate, more like membranes than barriers, whereby they define a surface of metamorphosis and exchange. In this context, the human body becomes the centre point of the architectural experience. It is a term used to advance the understanding of the role that sensory perception plays in the development of self, in the maintenance of psychological well-being, and in the reproduction of cultural identity. Csordas (1994) defines embodiment as the, "*indeterminate methodological field defined by perceptual experience and mode*

*of presence and engagement in the world*” (Csordas, 1994 cited in Geurts, 2002: 233) which is a relevant definition for the context of this dissertation as it outlines embodiment as an experiential whole.

- Existentialism:** Associated with Kierkegaard’s (1813 - 1855) philosophies which focuses on the condition of human existence with regards to **subjective** notions such as feelings and emotions. In context to this study existential architecture is a conscious act which creates sense of existence through weaving threads of life into a firm pattern of meaning and responsibility.
- Multisensory:** The integration of all the sense modalities including: touch, taste, smell, hearing, and sight. This dissertation, however, is not confined to only external stimuli but is also concerned with how we perceive and interpret that information. Multisensory, in the context of this dissertation, therefore, also makes reference to the senses in their cultural and environmental context, concretising the senses as part of the embodied whole. More importantly the word suggests that there is no hierarchal order of the senses, and that they cannot be viewed in a singular dimension but rather must be approached as a cohesive whole; whereby one affects and becomes an integral part of another.
- Ocularcentrism:** Within the context of this dissertation, ocularcentrism is the elevation of the sense of vision, making reference to our individualistic and materialistic age of convenience - without regard for context or further sensory stimuli. It makes reference to our age of visionary idealism and perfectionism.
- Place:** For the relevance of this document, place is understood as more than a mere abstract location. Place - in existential architectural terms, can be defined as the totality of concrete constructs having material substance, shape, texture and colour. The amalgamation of these phenomena determines an environmental character which forms the essence of place, and thus is given a character or ‘atmosphere.’ Norberg-Schulz (1991) argues that place is a qualitative, ‘total’ phenomenon, an embodied experience, which cannot be reduced to any of its properties, such as spatial relationships, without losing its concrete nature (Norberg-Schulz, 1991: 10). According to Berleant (2003) place is the setting of the events of human life. It is the locus of action and intention, and is present in all consciousness and perceptual experience (Berleant, 2003, cited in Menin, 2003: 42). Place, therefore, is defined by the author as the **location of experience**. Place applies only to a complex field of perceptual experience involving person and setting, together with the range of historical and cultural influences, and the knowledge and meaning that invariably imbue that field.

**Phenomenology:** A philosophical doctrine which is based on the study of human experience. Phenomenology has many different approaches, but for the relevance of this dissertation, it leads from conscious experience into conditions that help give experience its intentionality, with the aid of perception, thought, memory, imagination, emotional, desire and volition of bodily awareness, embodied action, and social awareness. It follows the belief of Norberg-Schulz (1991), who views phenomenology as a platform which forms the background conditions of our sensory experience in order for man to view and interpret his surroundings (Norberg-Schulz, 1991: 5). With reference to this dissertation, phenomenology can be understood as a world wherein people and their environment mutually define each other. It focuses upon nature and reality not as an absolute existing only outside us, but as a subject to human scrutiny, interaction, and creative participation. In terms of architecture it creates and facilitates the environment–person relationship. It is the ‘*science of experience*’ whereby phenomena are experienced by a multiplicity of sensing subjects.

**Sixth sense:** An individual's culturally unifying sense which consequently grounds and orientates the remaining five sense modalities. In the context of this dissertation the sixth sense makes reference to specific notions of cultural identity, meaning and memory whereby the senses are shaped by the traditions particular to a given culture. The sixth sense thus acts as a mediator or foundation to the remaining senses in order to unite individual experience.

In order to make relevant this dissertation, a distinction needs to be made between **object** and **subject** in order to make applicable the arguments posed in this study. Object - as demarcated in this study - is an unresponsive, physical entity which relies heavily on the language of nouns. Subject can be defined as an element with emotional and inspirational capacities, regarded more as adjectives which call forth qualities - drawing attention to human feelings and experiences.

Another distinction regarding **sensation** and **perception** needs to be understood. Sensations can be defined as the passive process of receiving sensory information from the outside world into the body and brain. Pallasmaa (1993) argues that the process is passive in the sense that it is an unconscious reaction to our environment; an ‘outer’ perception. Furthermore he argues that perception, on the other hand, is the active process of selecting, organizing, and interpreting the information received by the sensory receptors (Pallasmaa, 1993: 42). Sensation is, therefore, the transference from the environment to our bodies and perception is the interpretation of the sensory information; an ‘inner’ perception. Pallasmaa (1993) explains that the challenge of architecture is to: “*stimulate both inner and outer perception; to heighten phenomenal experience while simultaneously expressing meaning; and to develop this duality in repose to the particularities of site and circumstance*” (Pallasmaa, 1993: 42).

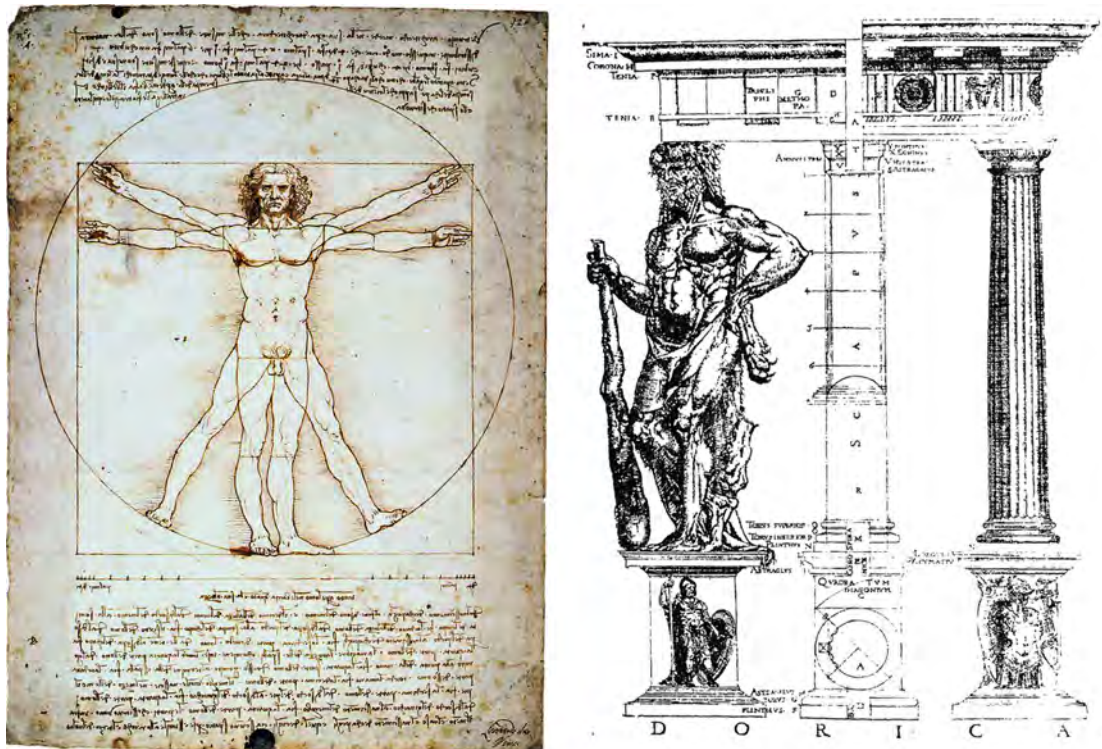
## INTRODUCTION

This Chapter deals with the research background as well as the critical questions reviewed in the investigation of this dissertation topic, furthermore it details the approach taken with regard to the research carried out. It states the research problem and the hypothesis, in addition to which, sets out the direction in which the research follows and elaborates on key issues.

### 1.1 Research Background

#### 1.1.1 An overview of the role of the body within architecture

*“The body and consciousness of the architect acts as matter or material for the process of architectural genesis”* (Hill, 2001: 162).



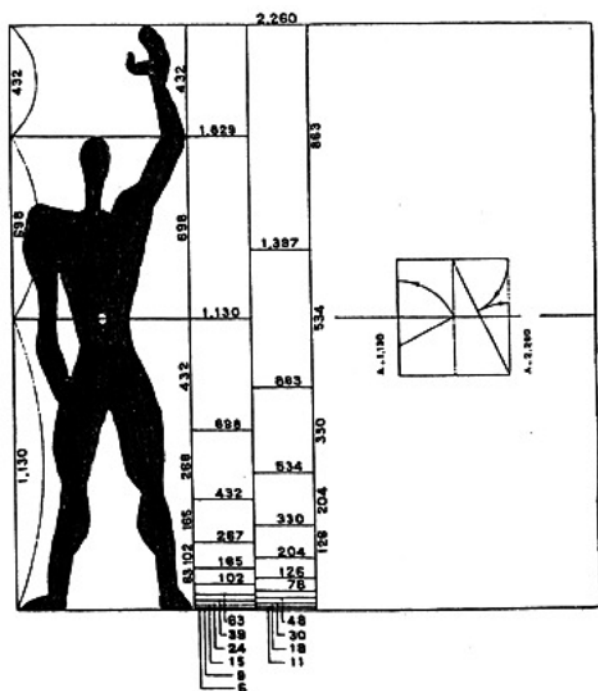
#### Classical man:

Figure 1.1 (left) - Vitruvian man by Leonardo da Vinci. Figure 1.2 (right) - Classical man understood as a system of proportions. Both figures show the body as an object of measurement rather than subject of experience.

Although architectural theorists have used different names for describing bodies throughout history, it is largely believed that there are three different paradigms of the body which are used today within the realm of architecture - namely: the Classical body, the Modern body, and the Postmodern body. The Classical body - which refers to a concept of the body held before the Age of Enlightenment and before the advent of modern science - defines the world from its experiences. For Classical bodies, the

world was understood from within the body; prime importance was attached to the perceptions of the lived body, and rational inquiry about the world was derived from human existence rather than abstract theorising (Scribner, 1997: 14–20). The classical view of the body is best exemplified in the image drawn by Leonardo da Vinci of the *Vitruvian man* (figure 1.1) - which is a figural representation of the ideal - based on the body as a whole element. The Classical body, therefore, was seen as intricately defined elements which inform the whole constituent that operates and functions in the world; created in the image of the divine. Due to the fact that the body was seen as a perfect representation of God himself (and the human form was the closest image people had to the divine) - this form was used as an ordering system on earth. Architectural theorists derived numbers from the human form, and from these proportions defined a singular Classical body which acted as the general model to influence the structuring and aesthetic of architecture. The problem with this notion is that the building *is* the body. Classical architects projected a human form onto the buildings they designed (figure 1.2), resulting in the body becoming an object of proportional and mathematical reference, whereby the emotive and sensual nature of the body was overlooked (Scribner, 1997: 15-19).

The Classical body changed form after the Age of Enlightenment and after the advent of modern science in the seventeenth century. The body began to be understood as a mechanical component of industrial productivity - an extension of the factory apparatus, whereby bodies no longer experienced a sense of being-in-the-world and connection to it (Pallasmaa, 1996: 20). This body - as a machine paradigm - carried into the classical thought that conceived of the building as a body; whereby theories of the body, that construed it as a machine, began to regard buildings as machines.



Modulus Man - Le Corbusier:

Figure 1.3 - meant as a universal system of proportions. The ambition was vast: it was devised to reconcile maths, the human form, architecture, and beauty into a single system.

Vidler (1992) reinforces this notion by stating that: “*The functional analogies of modernism theorized the buildings as a ‘machine for living in’, with the implication that a smoothly running machine, tailored to the body’s needs, was modernity’s answer to the proportional and spatial analogies of humanism*” (Vidler, 1992 cited in Scribner, 1997: 27). Functional needs of the body thus referred to a universal body of standardised measurements and movement - expected to perform tasks in the most efficient and orderly manner possible; deriving little pleasure from sensory stimulation - much like a robot or machine. This notion is reinforced by Le Corbusier’s (1943) *Modulus Man* (figure



1.3) which was an attempt to construct a proportional system that takes into account geometry (the Golden section), arithmetic (the Fibonacci series), and anthropometric factors (the height of a human body as its basis), which was intended to provide “*a harmonic measure to the human scale, universally applicable to architecture and mechanics*” (Le Corbusier, 1943 cited in Malnar & Vodvarka, 1992: 94). The *Modulor*; - the ‘mascot’ of Le Corbusier’s universal system of proportions, was a prototypical measurement from which all aspects of design - from door handles to cities - were constructed, and which, Le Corbusier believed, could be further applied to industry and to mechanics (Malnar & Vodvarka, 1992: 93). This mechanical ideal of the body is further explored in the anthropometric study found in the standardised Metric Handbook (figure 1.4), which portrays the body as a static, inanimate object might be. Architects based their designs on this body which is always stuck in one moment in time, in one position in space - an encounter few bodies experience in their everyday lives. The diagrammatic representations are robbed of life, surroundings, and relationships (which does beg the question whether this body needs architecture at all). It is argued that Modern architecture, therefore, stopped designing for the moving body, rather architects designed for an object that remained rooted in a profound anthropocentric stability - comfortably upright on flat tabular ground; blind, mute, and deaf figures - however, it is the moving body that is so essential to the experience of architecture (Scribner, 1997: 22). Pallasmaa (1996) reiterates this by stating: “*It is the possibility of action that separates*

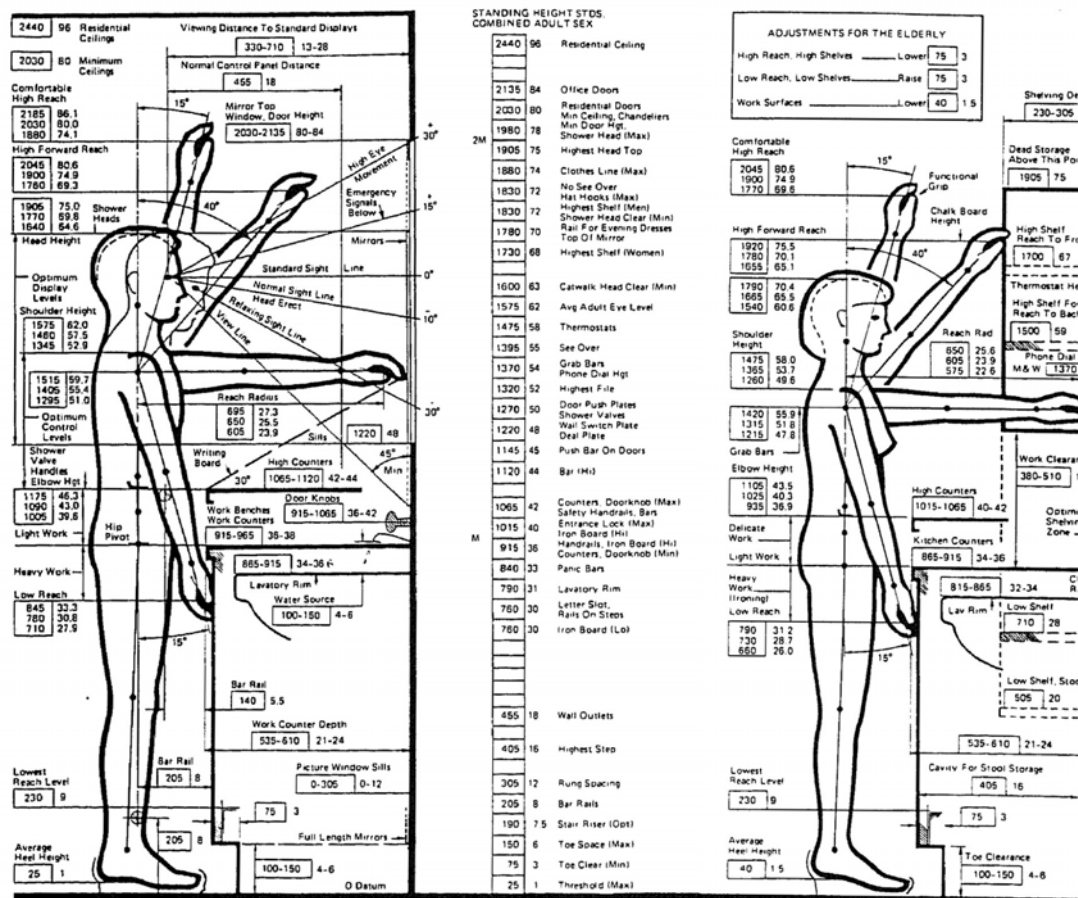


Figure 1.4 – The mechanised body - anthropometric study in the standardised Metric Handbook. The Modern body reflects the mechanised and automated movements of production.

*architecture from other forms of art. A bodily reaction is an inseparable aspect of the experience of architecture”* (Pallasmaa, 1996: 44).

The Postmodern movement focuses on the relative truths of each person, whereby reality only comes into being through interpretations of what the world means to individual bodies. Postmodernism relies on concrete experience over abstract principles - knowing that the outcome of one's own experience will necessarily be fallible and relative, rather than certain and universal. Research into the Postmodern body within the realm of architecture, however, revealed that most published authors question whether this ideology has manifested itself successfully. They argue that even after the influence of psychoanalysis, phenomenology, existentialism, and post-structuralism - which aimed to understand the 'embodied' role of the body and its being-in-the-world - architecture was still subject to objectified thought patterns, whereby the body was viewed as passive masses that hold its thoughts and ideas (Scribner, 1997: 40). Jencks (1997) reinforces this by arguing that contemporary architects “*valorise the body through anthropometric allusions and idealised, figural forms, disregarding the experiences of living, sensing bodies*” (Jencks, 1997: 38). Scribner (1997) agrees that architects are still designing buildings for a figural, abstract body by stating: “*The body we design for today remains an object, an outline, without a deeper connection to something beyond the body to provide meaning*” (Scribner, 1997: 40). This notion postulates that the Postmodern body (in architecture) is based on the **idea** of the body - not the lived experiences of the body in space. This idea of an objectified body fails to recognise a body's emotive response to space, which is a defining factor separating humans and machines and is, therefore, a fundamental aspect of architectural understanding. Architecture, thus, needs to challenge the ideals of the Postmodern body - to ensure participatory experience, in order for the subjective body to regain its identity in the contemporary world (Franck & Lepori, 2007: 5).

Architectural theorists, therefore, call for a new paradigm shift in relation to the body within architecture - that which is called the **lived body** - which recognises that interpretation of experience is dependent upon the responsive nature of human beings. This human condition of experiencing the world and learning about it through our bodies is one way of describing the lived body. Pallasmaa (1996) describes the lived body as: “*We touch, listen and measure the world with our entire bodily existence and the experiential world becomes organised and articulated around the centre of the body*” (Pallasmaa, 1996: 45). This dissertation, therefore, is centred around the idea of exploring and identifying this new paradigm of the subjective lived body within the realm of architecture

### 1.1.2 Motivation / justification of the study

*“Imagine aesthetic life on the moon; imagine a world without colour, flowers, and song. The mind would be stunted, the imagination atrophied, the senses dormant”* (Hall, 1969: 42).

*“It is through our senses that we perceive the world; it is through them that our relationship with the world is made possible”* (Pallasmaa, 2005: 15).



According to Jenks (1997), the productive attitude towards architecture and the body, has profoundly influenced the nature of creativity in the twenty-first century - reducing reality into an image structured more by our inventiveness and visions than by the given conditions of reality itself. A mechanistic world view will, in Jenk's opinion, ultimately lead to "*battery-hatch housing and concentration camp planning*" (Jenks, 1997: 33). This view has subsequently resulted in many architects and inhabitants having become virtually anaesthetised to their bodily sensations, whereby individuals are distanced from both past experiences and present sources of sensation in which - body, self, and world are obscured in the haze of an intermediate realm of logics and rationality (Sardello, 1985 cited in Franck and Lepori, 2007: 28). The combined preconceptions of the role of the body in architecture, the electronic simulation of virtually everything, and a philosophy of mechanism have, together - created a mood of nihilism. This is argued to have elevated the notion of ocularcentrism, whereby the wholeness of bodily experience is becoming antiquated resulting in a passive rather than active bodily engagement with architecture. It is further argued that the current view of the body, and its hegemonic eye, is potentially destructive to our civilization as it increasingly separates the '*self*' from the '*real*' world; the body of the flesh from the body of architecture (Pallasmaa, 2005: 3-6). Pearson (1991) further elaborates on the need for understanding the lived body (and subsequently motivates the need for this study) by arguing that the body as an object of architecture "*will render our senses outmoded*" (Pearson, 1991: 68). He claims that our senses have tried to cope with the inadequacies of our spaces - which has subsequently forced them to adapt to adverse conditions. Pearson compares this to an individual who has lost their sense of sight - their remaining senses become more acute to allow the individual the benefit of a heightened perception in the world. Pearson questions that if the body is subject to mechanized and automated environments which do not promote the stimulation of the senses to their full potential; "*what will happen to those senses? Surely they would stultify and become dulled*" (Pearson, 1991: 68). The question of mans/womans bodily existence in the world by means of his/her sensory adaption towards objectification is a key motivator of this dissertation. The way in which we experience our being-in-the-world forms the primary sensory argument since our senses have been extended by technology, but also inhibited by technology (in the sense that new technology has created a virtually new field for bodies to experience), however, the field has articulated a visual spectacle which has framed our senses as passive processes. The problem, however, lies not **with** technology but with mans/womans **misuse** of it. Architects need to realise the power of the built form and the bearing it has on the human condition. Pallasmaa (1996) argues that as the globalized and standardised view of the body increasingly enters every facet of our lives, architects need to take a step back and be reminded that architecture is primarily based on experience; that it seduces through the senses, whereby there is an appeal for a less puritanical architecture in which articulated space becomes tangible and recognises the singular, circumscribes projects within the physical, social and cultural constraints of the particular (Pallasmaa, 1996: 3). According to Pallasmaa (2007): "*It is the profound task of architecture to make visible how the world touches us*" (Pallasmaa, 2007: 13).

Space, therefore, needs to be re-envisioned as an active engagement, rather than a passive observation, whereby architects conceive and re-conceive space as an embodied experience - which is redefined as dialogical space - which focuses on the sensory interaction of space and body. Sensory realism - which negates the objective ocularcentric prioritisation - realises the necessity for the participation of all the sense modalities, and needs to be incorporated into architectural development to facilitate the users experience and sense of being-in-the-world. The full embodied experience of architecture is important if we are to pertain to the idea of humans as beings of emotion and experience.

Jenks (1997) projects that, in the next fifty years, according to conservative predictions, we will rebuild nature, or rather, second nature. We will build more architecture, cities, roads, suburbs, defence systems, and communication networks than all preceding civilizations put together (Jencks, 1997: 151). It is for this reason that architecture needs to investigate a sensory embodied design approach in our mechanistic epoch. Pallasmaa (2009) reinforces the need to recognise body-centered architecture by stating: “*Buildings are not abstract, meaningless constructions, or aesthetic compositions, they are extensions and shelters of your bodies, memories, identities, and minds. Consequently, architecture arises from existentially true confrontations, experiences, recollections, and aspirations*” (Pallasmaa, 2009: 117). Howes (1991) summarises the motivation for this dissertation by stating: “*If we do not come to our senses soon, we will have permanently forfeited the chance of constructing any meaningful alternatives to the pseudo-existence which passes for life in our current civilisation of the image*” (Howes, 1991: 4). This dissertation is, therefore, motivated by the need for twenty-first century architects to realise the importance of ‘*life-enhancing*’ architecture which accommodates all the senses in order to move away from the degradation of experience of our current superficial and fabricated design value system.

## 1.2 Definition of the problem / aim and objectives

### 1.2.1 Definition of the problem

*“The hegemonic eye seeks domination over all fields of cultural production, and it seems to weaken our capacity for empathy, compassion, and participation in the world”* (Pallasmaa, 2005: 22).

As established - the paradigm of the body used in architectural discourse has been based on the external surface of the body, whereby the body’s visible exterior is used as a model, while it’s internal, emotive elements are largely ignored. This paradigm idealizes and objectifies the body, dismissing a deeper understanding of physical and psychological sensations. By separating external and internal values - architects use a limited paradigm; neglecting potentially engaging contributions as a result of sensory embodiment. The study of this dissertation will, therefore, be concerned with delineating body centred, sensory design - focusing primarily on architecture’s role as an existential metaphor in order to democratize the senses to allow an active engagement with the built form that embraces the **lived body**.

Pallasmaa (1996) argues that the demise of our cultural, environmental, and human embodied sensory stimulation is mainly contributed by the presence of technology, and its sheer ubiquity for the manipulation of the environment into a homogenised state - in the sense that technological embodiment is void of the volatile nature of human emotion which subsequently defines our humanity. He maintains that this homogenization allows design professionals to disregard the human need of embodied experience as all produced spaces respond to the static nature of technology (Pallasmaa, 1996: 2). This is reinforced by Vesley (2004) who states: *“Increasingly, buildings come to be designed in response to mechanics of their erection, whereby architecture is concerned with design as an objective process of producing and objective environment for the body as an object”* (Vesley, 2004: 38). Frampton (1980) maintains that within this framework of thought - the body and its sensory response do not participate in the constitution and realization of architectural meaning. Furthermore he argues that instead of designing for the responsive body, *‘starchitects’* conform to the age of plasticity whereby a visual spectacle has become the sole concern - in which architecture has become something to be seen rather than embodied. (Frampton, 1980: 17-19). It is argued that what is produced through objective thought patterns has no connection or relationship with its embodied setting: it treats architecture as universal, empty containers whose form stand as frameworks that structure experience but are not themselves part of that experience. This view of architecture fails to invite bodily engagement; rather it focuses on the body’s passive construct of ‘seeing’ or ‘viewing’. Franck & Leopri (2007) reinforce this by stating: *“Coldly, really, it says look but keep your distance; observe but do not participate”* (Franck & Leopri, 2007: 27). It appears that architects are creating environments in the very image of their relationship to matter, to bodies, and to experience: observe but do not feel. This kind of building exemplifies what Pallasmaa calls *‘architecture of the eye’* which intentionally creates a sensory and mental distance between body and building, generating feelings of isolation and detachment (Pallasmaa, 2005). He states that: *“Instead of experiencing our being in the world, we behold it from the outside as spectators of images projected on the surface of the retina”* (Pallasmaa, 1996: 20). As a summary to the above arguments, the definition of the problem (with regards to the content of this dissertation) is derived from:

...the analytical, programmatic, and scientific approach to the body with regards to architecture - which outlines the body as definable, analyzable, measurable, predictable, and solvable - which subsequently renders the body a product of consumerism and mechanization and is detached from concepts of the lived body. The volatile, emotional, sensing, responsive, and relational body - which distinctly separates the visceral body (flesh body) from the anthropometric, robotic body - however, largely fails to be incorporated into contemporary architectural ideals (Scribner, 1997). This objectified view of the body, forms the centre point of the research problem whereby architecture that adopts this ideology is potentially contributing the demise of experiential embodied space, in which the mechanics of production is elevated above sensory engagement - rendering the design process detached from the very source of its conception and inspiration - the lived body.

### 1.2.2 *Aim*

The purpose of this study is to establish how architecture is experienced in the conceptual realm of sensory and spatial relations - how it is conceived in the physical and social space regarding embodied experience and how the conceptual and perceptual ideologies surrounding architecture are directly relational to culture-specific notions. This aim is directly relational to the opening sketch of figure 1.1 through which it endeavours to identify the sensory affect of the universal body by unpacking its environmental and cultural perceptions and meanings (whose parameters will be outlined later on in this chapter). It therefore aims to delineate sensuous architecture in its entirety, in order to place the physical/material body in a continuum of subjectivity, as opposed to the current objectivity it now possesses. The over-arching aim of this dissertation is to conclusively establish how individuals respond to sensory specific notions of embodiment in architectural space, and how architects can physically manifest these ethereal associations. The theories and ideas which will be drawn upon aim to develop the idea of sensory invitation and embodiment inclusive of the 'flesh' body, the environmentally sited body, and the culturally sited body in order to unify the body in its collective being.

### 1.2.3 *Objectives*

This dissertation, throughout its discourse endeavours to:

- Examine the character of objectivity and ocularcentrism that dominates in contemporary Westernised culture in order to critically understand the meaning of multisensory space; to challenge the increasingly homogenized notion of the body and its role in the perceptual field of architecture.
- Review the connection between the traditional five sense modalities - including: the aural, tactile, and olfactory dimensions in order to create a mental and physical model of sensory experience - within the realm of architecture (explored in Chapter 1).
- Broaden the palette and scope of the senses to include potential kinetic qualities of environmental sensations - relating to the sensory fields of phenomenal zones (explored in Chapter 2).
- Investigate cultural specific notions of sensation and embodiment with specific reference to cultural meaning, identity, and memory - and how these translate as physical manifestations of architecture (explored in Chapter 3).
- Recuperate the original meaning of the term sensuous 'aesthetic' in architecture, not as a form of judgment, but as the supposition to sense acutely.
- Associate the senses in their entirety in a continuum of architectural experience and to establish how architecture can blur the boundaries between interior mental space and exterior physical space in order to establish an architectural construct for the lived body.
- Explore the works of both international and local architects, in order to ground this dissertation in the practicalities and functionalities of architecture.

## 1.3 Setting out the scope

### 1.3.1 *Delimitation of the research problem*

Although the researcher acknowledges that ramifications of this dissertation will have a larger social impact - this will not be the focus of the literature. This research document aims to focus on the personal experience of the individual circumscribing to the particular of sensory enhancement in the architectural realm. It will also not be concerned with the study of divine and religious matters with regards to the theory of existentialism, but is rather focused on existential humanism whereby sensory architecture facilitates the 'reattaching' of ourselves to ourselves. There are many theories and concepts circumscribing to ideologies of human embodied experience with relation to environmental perceptions and cultural identity, however, these subjects will be analysed under the veil of multisensory architecture - meaning that all conclusions drawn will make reference to the problem statement. Chapter two of this dissertation identifies the tactile, aural, and olfactory dimensions within the built form - it does not, however, examine the gustatory modality due to the nature of this particular sense and its disconnection within the realm of architecture. Psychologists of sensation in the twentieth century have differentiated further senses to include between eight and twenty two different modalities - which include a kinetic sense; sense of pain; sense of balance; and acceleration - to name a few. The researcher acknowledges that ideologies regarding the lived body are concerned with concepts far broader than the five senses, however, in order maintain direction, the haptic, olfactory, and aural realms will be the focus. Chapter three examines perceptual understandings of place - specifically regarding environmental phenomena and thus, is not concerned with notions of regional identity with regards to place-making, but is rather focused on experiencing place through ethereal sensations such as light and shadow; materiality and time; and solidity and fluidity. Chapter four deals with concepts of engaging architecture with our '*sixth sense*' - circumscribing the particulars of identity, meaning, and memory, however, this does not involve regional architectural characteristics of identity and meaning but rather features pertaining to the cultural conditioning of the senses and their role in cultural orientation. It discusses our sense of beauty not in terms of Western thought or a purely visual appreciation, but rather beauty perceived by sensory stimulation of the whole. Only the concepts and theories relating to sensory architecture will, therefore, be deemed relevant to the main body of this dissertation.

### 1.3.2 *Stating the assumptions*

This dissertation assumes that mechanized, automated, and electronic modes of being - commonly experienced in today's everyday life - are weakening the sense of the body's physical and sensory genesis, whereby the body is subject to the adaption of this sensorially deprived society. It further assumes that this mechanized culture is manifesting itself in a society which is moving away from the connection of the spoken word, from the heat of the touch, the intimacy of smell, and the relationship

of time and space - to the point where one can question what is real and what is not (undeniably illustrated in society's obsession with digitalized reality such as facebook and twitter), in addition to which assumes that the essence or existential meaning of beauty and embodiment have been diluted by patriarchal hegemony. These assumptions have been derived from Pearson's (1991) arguments (posed in the motivation to the study) - who claims that the senses have adversely adapted to homogenous environments - which have rendered them outmoded (Pearson, 1991: 68).

### *1.3.3 Hypothesis*

This dissertation postulates that:

Architecture orders experience through perceptual relationships that interface the realm of the embodied, and the world of the senses - away from the traditional binary model of the abstract and physical, whereby architectural embodiment can be found in the morphological properties of space itself. Conscious sensory incorporation engages and subsequently intensifies experiential and psychological dimensions which has the power to transform an individual's day-to-day existence, whereby the everyday act of walking into a familiarized space can have a profound effect when encountered through sensitized consciousness. Architecture engages with the immediacy of our sensory perceptions and, therefore, with a better knowledge of how to physically manifest ethereal properties of sensation - the architect could reach a '*higher level synthesis*' which focuses on the 'unseen' architecture, whose physicalities become the subject of the senses. This notion highlights the potentiality of sensory engagement as a social system rather than a simple application of physical science which has the power to encourage or discourage an individual's moods and associations. Furthermore - sensory architecture does not only respond to the traditional five sense modalities, but also facilitates notions of time, identity, meaning and memory - through its dialogical, culturally conditioned qualities. Lastly - through responding to the subjective body - which includes the visceral (flesh) body, the environmentally sited body, and the culturally sited body - architecture will adopt sensory specific existential metaphors which express and relate to man/woman's being-in-the-world and not only accommodate for - but engage with - the volatile nature of the lived body.

### **1.3.4 Key questions**

#### *1.3.4.1 Main question*

The main question raised in this dissertation aims to respond to the intangible nature of the research topic, in which it questions:

- *How the ethereal properties of the senses - regarding human, environmental and cultural embodiment - affect the subjective bodies architectural experience? Subsequently, how do architects translate sensitized consciousness into the physicality of the built form?*



#### 1.3.4.2 Secondary questions

Subsidiary questions will be considered in this dissertation as these need to be deliberated in order to develop guidelines for multisensory design. The secondary questions are documented under the following headings:

##### **Understanding multisensory architecture within the framework of the universal body:**

- *Recognising the body as a moving, feeling, lived entity - how does this alter architects approach to design?*
- *How is each sense perception identified within the architectural realm namely: sound, touch, and smell and how do they contribute towards a meaningful experience?*

##### **Understanding the environmentally sited body:**

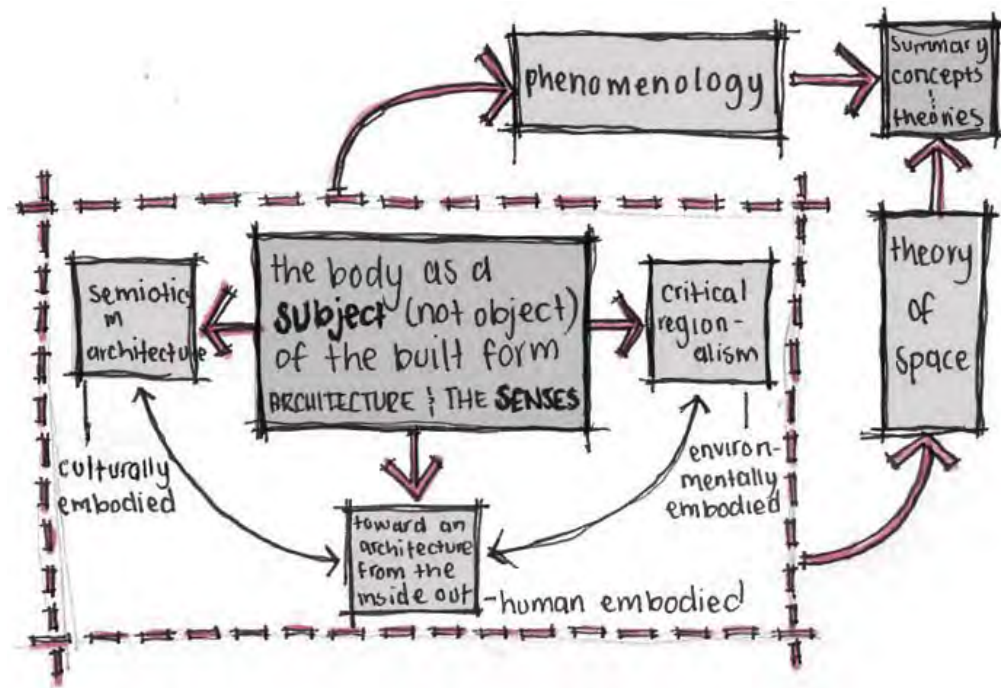
- *How do environmental sensations aid in the understanding and experience of place?*
- *Does recognition and respect of natural phenomena, and the translation into an architectural form, facilitate an embodied architectural experience?*
- *How do the perceptual overlays of place stimulate our senses and how do they transfer into the architectural experience?*

##### **Understanding the specific application of the body's 'sixth sense':**

- *What effect does cultural conditioning have on sensory perception? How is this developed and executed in the realm of the built form?*
- *How does our sensory memory communicate conceptual and perceptual meaning?*
- *How does this translate into a meaningful architectural expression which facilitates our sense of cultural identity with specific regard to the association of the senses?*
- *How can architecture of the twenty-first century 'represent' and yet aspire to retrieve its status as an architecture of 'presence' embodying authentic sensory values?*

## **1.4 Theoretical and conceptual framework**

The following section establishes the fundamental considerations underlying the concepts and theories which anchor the research in a theoretical context. By ascertaining an understanding of this theoretical and conceptual framework, key principles will be emphasised and conclusions drawn which will guide the design approach of a multisensory inspired design. The main body of this dissertation will be developed along three paradigms of the collective sensory body. Firstly - the universal body which applies generalised notions of sensory stimulation and is argued by Pallasmaa (2005), Holl (1996), and Franck & Lepori (2007) as situating the lived body and its subsequent senses at the centre point of the perceptual world. Secondly - the body is analysed in relation to its sensory engagement with



Theoretical and conceptual framework  
Figure 1.5 – Diagram identifying the concepts and theories used throughout the discourse of this dissertation and how they are specifically applied to certain ideologies.

place and is argued by Frampton (1980), and Lefaivre (2003) as relative to the kinetic association of environmental sensations. Thirdly - the idea of the sixth sense is argued by authors such as Baird (1998), and Geurts (2002) who maintain that sensory interpretation and meaning is a result of cultural conditioning. The relevant theories and concepts have thus been sub-sectioned under the headings: **Human embodied** which analyses the concept of **architecture from the inside out**; **Environmentally embodied** looks at **Critical Regionalism**; and **Culturally embodied** reviews the theory of **Semiotics** within the built form. These concepts and theories all fall under the umbrella of **Phenomenology** and **space theory** in order to maintain a common linkage, however, it must be noted that all identified concepts and theories relate to the whole - to the embodied experience of sensory architecture. As can be seen in figure 1.5, the conceptual and theoretical framework works symbiotically in order to produce a body of research which views the body as a subject of architecture. This section of the dissertation will attempt to synthesize the main observations related to the problem statement through the analysis of the following theories:

## HUMAN EMBODIED

### 1.4.1 Towards an architecture from the inside out

*“We all began inside. In the womb, intimately embraced and nurtured by warm flesh, we were contained and held. We could hear, touch, and feel, but we could see only light and shadow[...] When birth brought us outside, we were still inside: inside the room where the birth took place, inside the building that held the room, in the city or village, in the region, in the country, in the world. From birth onwards, even though we are forever inside some spaces and outside others, the primary experience remains one of being inside” (Franck & Lepori, 2007: 18).*



In order to understand the senses and their role in the built form, Franck & Lepori (2007) argue that architects need to identify not only with the exterior qualities of the body, but the body's interior values in order to mediate their connection. They maintain that the fundamental purpose of architecture is to house the human body, therefore, the genesis of the conceptual realm should be anchored in existential understanding - how to excite and stimulate the body as a whole. They argue that architecture from the inside out challenges the ocularcentric world view which approaches the built form based on its market value, abstract personal aesthetic criteria, technical standards, and the mechanical reproduction of repetitive types – an approach to design that lacks concern for human, physical, and emotional values. They maintain that architecture from the inside out is related to an idea of design as an opportunity for socio-cultural as well as personal transformation. It is based on the intention to create a body/psyche/environment-conscious design, leading to a framework which gives credence to the body, movement, and sensory experience (Franck & Lepori, 2007: 5-10). Pallasmaa, a Finish architect, philosopher and professor maintains, in his numerous publications, that what matters in architecture is not what a building *looks like* but how it is shaped to house our activities, how it engages the body, how it is built, and what materials it is made of – that is to say, what the building is *like in our experience*. Woven throughout his academic discourse, unifying them in their broad diversity, is Pallasmaa's insistence that the construction of places should invite an embodied, all-sensory, haptic experience, which he argues - is the real ethical function of architecture: *"I see a definite moral imperative in the art of architecture. Architecture frames existential experience and provides a horizon of understanding. As architects, we do condition others' lives[... ]I see the task of architecture as the defence of authenticity of human experience"* (Pallasmaa cited in McCarter, 2008: 234). Holl (1994) is another architect and theorist whose architecture is developed as a catalyst to perceptual experience - an experience which is conceptualized by the value of internal constructs and valorized in the physical constructs of architectural space - precisely to engage a sensitized consciousness in search of the intensified architectural experience. Holl - inspired by the phenomenological writings of Merleau-Ponty (1962) - designs architectural interplay between the concrete immediacy of our perception of the physical world and its abstraction as a mental construct, thus offering simultaneity of mental life (inside) and physical being (outside) which reinforces notions of sensory embodiment. Holl develops architecture as an intensification of a particular cast of mind stating that:

*"The experience of space, light, and materials as well as the socially condensing forces of architecture are the fruit of a developed idea. When the architectural realm, the realm of ideas is in balance with the experiential realm, the realm of phenomena, form is animated with meaning. In this balance, architecture has both intellectual and physical intensity, with the potential to touch mind, eye, and soul"* (Holl, 1994 cited in Temple, 2006: 256).

The architecture and subsequent theories of Pallasmaa (2005), Holl (1996) and Franck & Lepori (2007) form the basis of this dissertation and are reviewed throughout the main body of the literature review. The concept of architecture from the inside out aims to ground the body of knowledge in architectures potential ability to the boundaries between tangible and intangible, mental and physical, interior and exterior - whereby architecture responds to the collective being.

## ENVIRONMENTALLY EMBODIED

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### 1.4.2 *Critical regionalism*

*“Critical regionalism seeks to compliment our normative visual experience by readdressing the tactile range of human perceptions. In doing so, it endeavours to balance the priority accorded to the image and to counter the Western tendency to interpret the environment in exclusively perspectival terms”* (Frampton, cited in Foster, 1983: 29).

There are a number of viewpoints within the framework of Critical Regionalism; however, for the relevance of this document, Critical Regionalism can be defined as a manner of “*consciously bound architecture*” (Frampton, 1980: 327) which not only circumscribes particulars of the visual but equally expresses the possibility of architecture in a tactile and cultural manner. Critical Regionalism was introduced as an alternative to the scenographic and postmodern style - which introduces architecture to a universal formula that mindlessly imposes its principles from the top down. Lefavre (2003) agrees with Frampton (1980) by arguing that Critical Regionalism follows the principle of buildings from the bottom up, taking cognoscente of the value of identity of a physical, social, and cultural situation. She states the word ‘*regionalism*’ was given to the theory as it was an approach to design which focused on the identity of the particular with regards to place. These particularities may include the range and quality of local light, or a tectonic derived from an unusual structural mode, or the landscape of a particular place (Leavre, 2003: 24). Frampton (1980) argues that Critical Regionalism is conscious of the embodied whole of architecture whereby space, place and body become a unified continuum when experiencing the dynamic qualities of the specificities within the environment. It is conscious of the effects that illumination, temperature, air flow, floor texture, and olfaction (to name a few) can have on ones experience of space and how these can subconsciously affect ones emotions or movement through space (Frampton, 1980: 327).

Critical Regionalism therefore aims to complement the visual experience by encapsulating the tactile and palpable scope of human perceptions. It is an architecture of engagement rather than resistance, of integration rather than segregation. It restores the idea of ‘*place*’ and incorporates the ideals of embodied experience. In this way a balance in priority is achieved between appearance and experience and the Western trend to interpret surroundings in solely perspectival terms is counteracted. It is for this reason that the concept of critical regionalism is an imperative theory in this dissertation, as it incorporates cultural meaning, local identity and bodily experience as essential design generators.

## CULTURALLY EMBODIED

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### 1.4.3 *Semiotics in architecture*

In order to make relevant this theory - Semiotics first needs to be contextualised in its genesis. According to Counsell & Wolf (2001) semiotics refers to the study of signs and their meanings, and is best associated to the works of Swiss linguist Ferdinand de Saussure (1916), French historian Michael

Foucault (1970) and American philosopher Charles Peirce (1903). According to Foucault (1970) - semiotics is an ensemble of knowledge and technical skills that enables an individual to identify 'signs' - to define what constitutes signs, and to understand the relationship between signs as the laws governing them. De Saussure (1916) defines the sign as having two parts: the *signifier* and the *signified*. The *signifier* is the phenomenon which can be perceived such as the sound of a word - 'door'. The *signified*, on the other hand, is the concept invoked by the signifier - the concept that the door gives an individual the idea of entry and/or exit. In essence the signifier refers to the concept of a physical object and the signified refers to its internal meaning (Counsell & Wolf, 2001: 19). To understand this notion of Semiotics one has to understand how the character of language works. For example, a 'roof' may not necessarily have connection to the idea of a roof. It is a roof because our cultural conditioning has established it as a roof. Language works as a system because it is a structured form whereby the signified is a concept and not a referent in the world.

The theory of Semiotics, translated into architecture, elaborates the basic Structuralist insight that buildings are not simply physical supports but artefacts and events with meaning. Baird (1998) - an architectural theorist - argues that semiotics is essentially an aspect of architectural expression - that which the design *speaks of*, and is relevant to a narrative form of representation. It concerns the semantic meanings of buildings and places, and is designed to manage all cultural phenomena - including architecture - in order to contribute to its social and cultural message. Furthermore Baird (1998) argues that Semiotics incorporates the fundamental sociological insight that human experience is simultaneously collective and individual - it's the collection of meaning through the built form which encourages individual human embodied experience that is given significance through cultural orientation (Baird cited in Hays, 1998: 38-43). Geurts (2002), an anthropologist, argues that the interpretation of meaning of perceptions is what defines the characteristics of a culture which ultimately informs the experience of the lived body (Geurts, 2002: 156).

With reference to this dissertation and the culturally embodied - the theory of semiotics aims to investigate the meaning of sensory application within the realm of cultural practises. This will make reference to an individuals 'sixth sense' (their Semantic sense) which is influenced by their cultural conditioning with regards to the remaining five sense modalities. Cultures maintain a sensory hierarchy or 'sense ratio' and the theory of Semiotics aids in recognizing the underlying meaning of the senses in order for the built form to reconstruct meaning, identity, and memory through tactile application.

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## ARCHITECTURE AND THE SENSES UNDER THE UMBRELLA OF:

### 1.4.4 Theory of space

*"We treat space somewhat the way we treat sex. It is there but we don't talk about it"* (Edward T. Hall, cited in Lawson, 2001: 14).

The theory of space has been a long time concern for architects, artists, historians, and philosophers which has subsequently produced a large body of literature which focuses on how we perceive spatiality through its dialogical architectural qualities. For the relevance of this dissertation - the theory of space embraces the role of the psyche and accepts the attributes of the body in our perception of space. Our existence as human beings is always spatial; space defines our history, our culture and essentially ourselves - as space is a universal and invariable mode of communication, so it becomes an important - if not essential - medium of design. It is for this reason that the preceding concepts and theories are all incorporative of perceptual space. Vesley (2004) further reinforces that because our existence is always spatial, the nature of lived phenomenal space determines the meaning of our existence through the meditation of our senses (Vesley, 2004: 40).

According to Roth (2007) architects are the sculptors of many different kinds of space. Firstly - they are concerned with the purely **physical space** - that which can be defined as the void which is bound by the walls, floors and ceiling of a room. Secondly - architects are manipulators of **perceptual space** - that which focuses on the body and its psychological connection to space. According to Roth (2007) perceptual space recognises that our bodies and movements are in constant interaction with the environment and it reinforces the importance of the relationship between the two (Roth, 2007: 55). Porter (1997) argues that architects should never ignore the involvement of the sensory receptors as a vast amount of knowledge is required to comprehend the substance of our setting: hearing in relation to the acoustic properties of space; smell in aiding identification and orientation of space; and the immediate receptors (skin, membranes and muscles) being more subtle in their sensitivity to the ambient temperature, humidity, texture and shape of space. The combination of these varied sensory inputs reinforces, elaborates, and is argued by Porter to alter our visual perception of space to give individuals a complete image which, in turn, can be modified by our own personality and motivation (Porter, 1997: 29).

Related to perceptual space is **conceptual space** - that which is defined by Roth as the “*mental map*” (Roth, 2007: 55) individuals carry around in their heads - the plan stored in their memory. Porter (1997) argues that as opposed to the psychological dimension of perceptual space and the tactility and measurability of physical space - conceptual space is that which we perceive and visualize (Porter,

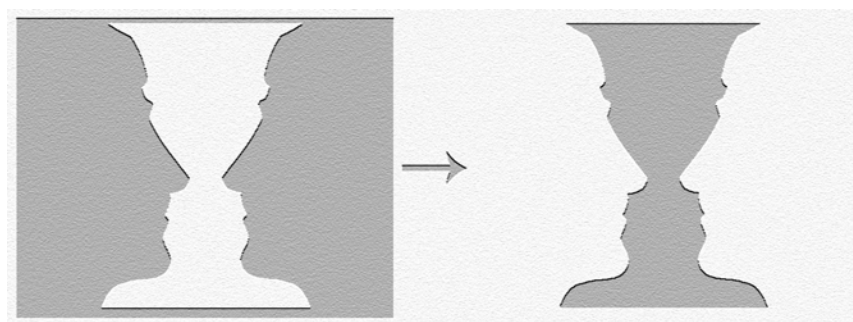


Figure ground model:  
Figure 1.6 - Conceptual space is argued as that which we perceive and visualise.

1997: 46). Form-orientated design remains an important design generator in order for space to cross the threshold from purely visible into the conceptual realm, whereby space becomes a dynamic and tangible substance. This idea is clearly represented using a simple experiment of the figure-ground model, as can be seen in figure 1.6. According to Porter (1997) by fixing our vision on the central figure of the vase, we can better understand the concept of form within space whereby the contours defining the object represent form-orientated thinking. The vase, therefore, symbolizes an architecture of containment. If we psychologically focus on the negative space surrounding the vase, we discover that it transforms into a positive space and is subsequently perceived as a completely different entity that takes on a life and meaning of its own. In our new perception, what was first void has now become tangible and reinforces the idea of the concept of space as a dynamic presence. Relating this experiment to the built form - architects are able to understand the importance of both the positive and negative elements of a building and the effect that space and the interpretation of space has on the experience of the body (Porter, 1997: 46).

Architects are also associated with **behavioural space** - that which acknowledges that the space which a body moves through that has the power to alter it's state of being. This notion is reinforced by Winston Churchill (1943), "*we shape our buildings, and afterwards our buildings shape us*" (Churchill cited in Roth, 2007: 58). According to Porter (1997) - as a means of broadening a designer's awareness of space - it is imperative that architects consciously immerse themselves in spatial diversity - for a body's sensory conditioning not only influences the formation, externalization, and development of ideas but predetermines the nature of resulting architecture, which in turn conditions the overall bodily experience of the space (Porter, 1997: 46).

## **ARCHITECTURE AND THE SENSES UNDER THE UMBRELLA OF:**

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### *1.4.5 Phenomenology*

There are a number of different theoretical stances which phenomenology incorporates, however, the writings of Leach (1997) help to ground the approach to phenomenology in this dissertation. He believes that phenomenology demands receptivity to the full ontological potential of the embodied human experience which, therefore, calls for a heightened receptivity of all the senses (Leach, 1997: 80). Phenomenological writers including: Bachelard (1994), Heidegger (1962) and Merleau Ponty (1962) argue that the essence of phenomenological space is to be perceived not as abstract, neutral space, but as the space of **lived experience**. This theoretical concept, therefore, aims to reclaim the ontological dimension of architecture - a dimension that has been eroded, according to Lefebvre (1991), since the invention of linear perspective which formalized the evolution of ocularcentric and objective thought patterns (Lefebvre, 1991: 58). Heidegger (1962) maintains phenomenology leads to a new perspective of architecture, away from the highly nihilistic and narcissistic expression through means of self-expression. Furthermore he argues that phenomenology engages our soul with the real

intimacy, materiality and tactile aspect of true architecture (Heidegger, 1962: 28). Hagan (2001) understands phenomenology as a philosophy which renews our connection to place and materials, whereby the phenomenological materiality of the world is the means by which we come to know the world - within its hermeneutic dimension - there is no understanding of the world without tangible experience of it (Hagan, 2001: 79). This concept of architecture needs to be explored in order to better understand architecture in concrete, existential terms - an architecture which is based on the experience of building materials and their sensory properties. Norberg-Schulz (1991), a theorist which follows this phenomenological approach, concludes that phenomenology ensures that a building is encountered, approached, confronted, related to, moved through and utilised, as opposed to solely viewed, whereby phenomenology encourages an active, dynamic architectural engagement rather than passive observation of physical structure (Norberg-Schulz, 1991: 10). Rasmussen (1957) agrees by stating: *“A building is not an end in itself; it frames, articulates, structures, gives significance, relates, separates and unites, facilitates and prohibits. Consequently, basic architectural experiences have a verb form rather than a noun form”* (Rasmussen, 1957: 63). Merleau-Ponty (1962) summarises the above viewpoints by arguing that phenomenology is the study of **essences** - meaning that it asks the fundamental question of what is the nature or meaning of an object or substance - in order to determine its embodied character and identity.

Vattimo (1997) maintains that the questions raised by the early phenomenologist's are more relevant today than ever before, as it offers a timely reminder that in an age of virtual reality the very corporality of the body cannot be ignored when addressing the experience of space (Vattimo cited in Leach, 1997: 80). A common understanding among all the aforementioned theorists - and applicable to this dissertation - is that phenomenology offers accounts of experienced space, time, body, and human relation which approaches architecture through the lived body; it, therefore, forms the unifying thread which grounds the concepts and theories previously mentioned in an embodied collective.

#### *1.4.6 Summary*

By investigating and studying the architectural theories thought relevant to the design of sensory embodied architecture, an understanding is reached whereby architects have the opportunity to create spaces which develop the idea of lived experience - inclusive of physical presence, environmental awareness, and cultural meaning - within embodied sensory parameters. A connection can be drawn between the aforementioned theories and concepts which emphasise an awareness of the relationship between the body and its senses; within its natural, cultural, and built environmental framework. They demonstrate an intimate sense of being-in-the-world through a respect for the body as a lived subject of the built form. Many of the points mentioned form parallels to the key ideals of multisensory design which differentiates it from the modernist view of mass produced, ocularcentric architecture and, therefore, sets the foundations for the literature review in the main body of this dissertation.



## 1.5 Research methods and materials

This section outlines the research approach and methodology applied to this dissertation. It defines the procedures for data collection and identifies the techniques and methods used to gather all information.

### 1.5.1 Research Methods

The means in which the research contained in this document is gathered is systematic and endeavours towards the collecting and analyzing of information or data in order to increase the understanding of the research problem and its subsequent issues. The methods used in the process of collecting the research data incorporate the empirical method and qualitative research methods by means of analytical and descriptive methods such as historical research, philosophical research, reviews, research synthesis, interviews, and case studies. The research approach for this dissertation consists of two sections - primary and secondary research.

The primary research necessitates personal data obtained by the author. The data is analysed and conclusions are formed and documented with the intention of circumscribing the problem statement of this dissertation - with focus on multisensory architecture which recognises design principles relevant to the body as a subject of architecture - within the specific context of South Africa. Primary research consists of empirical research and case studies (Chapter five) and includes structured interviews (found in appendix A and B of this dissertation), surveys, and site observations in the form of sketches, field notes, and photographs. Visitors interviewed onsite consciously included individuals located within differing cultural groups within South Africa in order to make relevant the results in the context of a 'rainbow nation' society. As the nature of this research is primarily based on individual, subjective experience - information gathered from interviews forms the indispensable foundation of the analysis of the case studies. In addition, many of the sketches take on a conceptual disposition in order to convey essence rather than image. The case studies endeavour to explore the way in which local architects have dealt with the challenges of ethereal associations, with design questions pertaining to the ideology of a holistic and embodied architectural response. Primary research carried out involved capturing qualitative data which was obtained during visits to relevant areas.

The secondary research constitutes the main body of the dissertation and aims to review the critical points of current knowledge including substantive findings as well as theoretical and methodological contributions - related to the body as a subject of architecture with specific reference to the senses. The main body of this dissertation deals with key topics and questions such as understanding the role of the five sense modalities in architecture, experiencing place through environmental stimulation, and understanding how architecture can facilitate the meaning and presence of our 'sixth sense'. The arguments formed pertain to the problem statement and questions raised in Chapter one of this dissertation from which conclusions are drawn in order to determine the veracity of the assumptions made in the hypothesis. Information has been gathered from published and unpublished

academic works including books, journals, articles, papers, and the like. With regard to the literature review, the information analysed is documented in the research section of this dissertation comprising of Chapters Two, Three and Four. The exploration of key international examples are incorporated in the body of the research and conclude the research of each respective Chapter - in order to make practical the arguments formed in the body of the text.

Following the analysis of the research information, key international examples and data collection, as well as investigating key concepts and theories relating to the topic of multisensory architecture; relevant architectural principles are determined and noted in the conclusions and recommendations of the study.

### *1.5.2 Research Materials*

In the process of gathering information the following five tools were used to access and collect research materials for this dissertation: libraries and their resources; the computer and its resources; techniques of measurements in the field of architecture; statistics and various means of communication. The research materials that are used as references in the study will range from books, journals, articles, papers, electronic articles and journals, international examples, raw data from interviews etc. Interviews are structured in the most effective manner to obtain accurate answers from the individuals questioned. Individuals interviewed are primarily relevant architects of the case studies. Special mention must be made of the scope of individuals interviewed onsite which included people of all ages, genders, ethnic groups, sexual orientations, and varying levels of aptitude in order to determine the most appropriate conclusions and recommendations. A sample of typical interview questions can be found in Appendix A and B of this dissertation. A wide variety of research materials are covered so as to give fair comment on the research problem. The research materials gathered is in the form of hard copies and digital copies including all images, photographs, and sketches.

## **1.6 Document outline**

This dissertation is comprised of four parts: research background and methodology (which outlines the theoretical and conceptual framework used throughout the study), literature review, empirical research, and conclusions and recommendations. The research studies relevant concepts and theories relating to **the body as a subject of architecture** focusing on the sensory dimensions of human, environmental, and cultural embodied perceptions. This is carried out by means of primary and secondary resource analysis, whereby conclusions are drawn responding to the information gathered on the specificities of the topic. The arguments formulated in this dissertation are done so to determine an understanding of what defines multisensory design, and what applicable physical manifestations could accurately embody its principles and ideologies. The unifying link which runs throughout the entire discourse of this



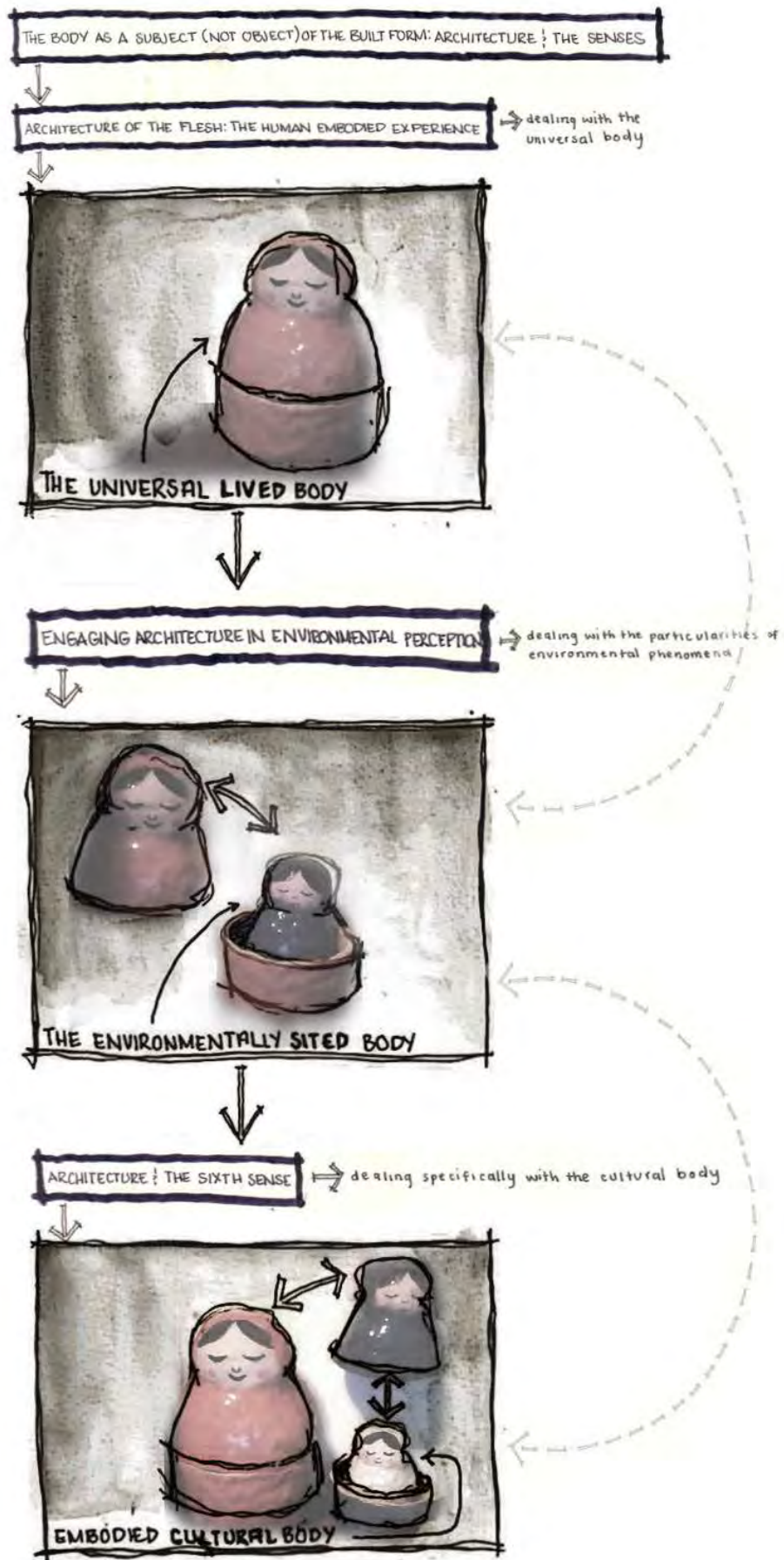


Figure 1.7 - Broad conceptual overview of dissertation content and structure

dissertation can be seen in the conceptual illustration of figure 1.7 - which reviews the perceptual itemisation of the whole. Using the analogy of matryoshka dolls the **universal body** (and its reactions to unanimous stimuli) are studied in order to place this research in a general, collective context. The focus of the study is further concentrated on the **environmentally sited body** whose scope is contained to the particulars of environmental sensations. The last notion of the sensory body identifies the core; whereby **cultural constructions** and manifestations navigate the bodies understanding of the senses. The separation and connection between the three identified layers of multisensory design is explored during the analysis of local case studies which include: Dornier Winery in Stellenbosh, Freedom Park in Pretoria, and the Apartheid Museum in Johannesburg. The information gathered from the empirical research is examined in order to establish an understanding of possible indicators and recommendations which could guide and influence architects in designing a responsive and relevant architecture which reflects the ideals of sensory design principles. This dissertation can be read in two ways: as three detailed discussions of specific categories of sensory matter or as a field of overlapping connections between chapters and different sections. The three sections or chapters reviewed all make reference to the problem statement and aid in contributing to a vast body of knowledge on multisensory architecture. The human embodied experience, which places the senses as indispensable design generators, forms the cornerstone to the research from which environmental and cultural perceptions are analysed under the umbrella of sensory awareness. The focus of this dissertation, however, is not strictly concerned with rigid planning principles, but rather the possible multisensory outcomes of **creating** space from the inside out, rather than **producing** it from the top down.

## 1.7 Conclusion

In summary, this Chapter has established (by means of the researched background and methodology) research and design guidelines for the dissertation. Techniques used by the author have been documented and the information collected has set out the theoretical and conceptual framework which is referred to and drawn upon throughout the dissertation. The primary and secondary research undertaken in Chapters Two, Three, Four, Five, and Six are constructed sources of information based on the parameters set out in this chapter which aim to inform and guide the design of future sensory spaces - focusing on the lived body as a subject of architecture.

## ARCHITECTURE OF THE FLESH: THE HUMAN EMBODIED EXPERIENCE

“Every touching experience of architecture is multisensory; qualities of space, matter, and scale are measured equally by the eye, ear, nose, skin, tongue, skeleton, and muscle. Architecture strengthens the existential experience, one’s sense of being-in-the world, and this is essentially a strengthened experience of self. Instead of mere vision, or the five classical senses, architecture involves several realms of sensory experience which interact and fuse into each other” (Pallasmaa, 2005: 41).

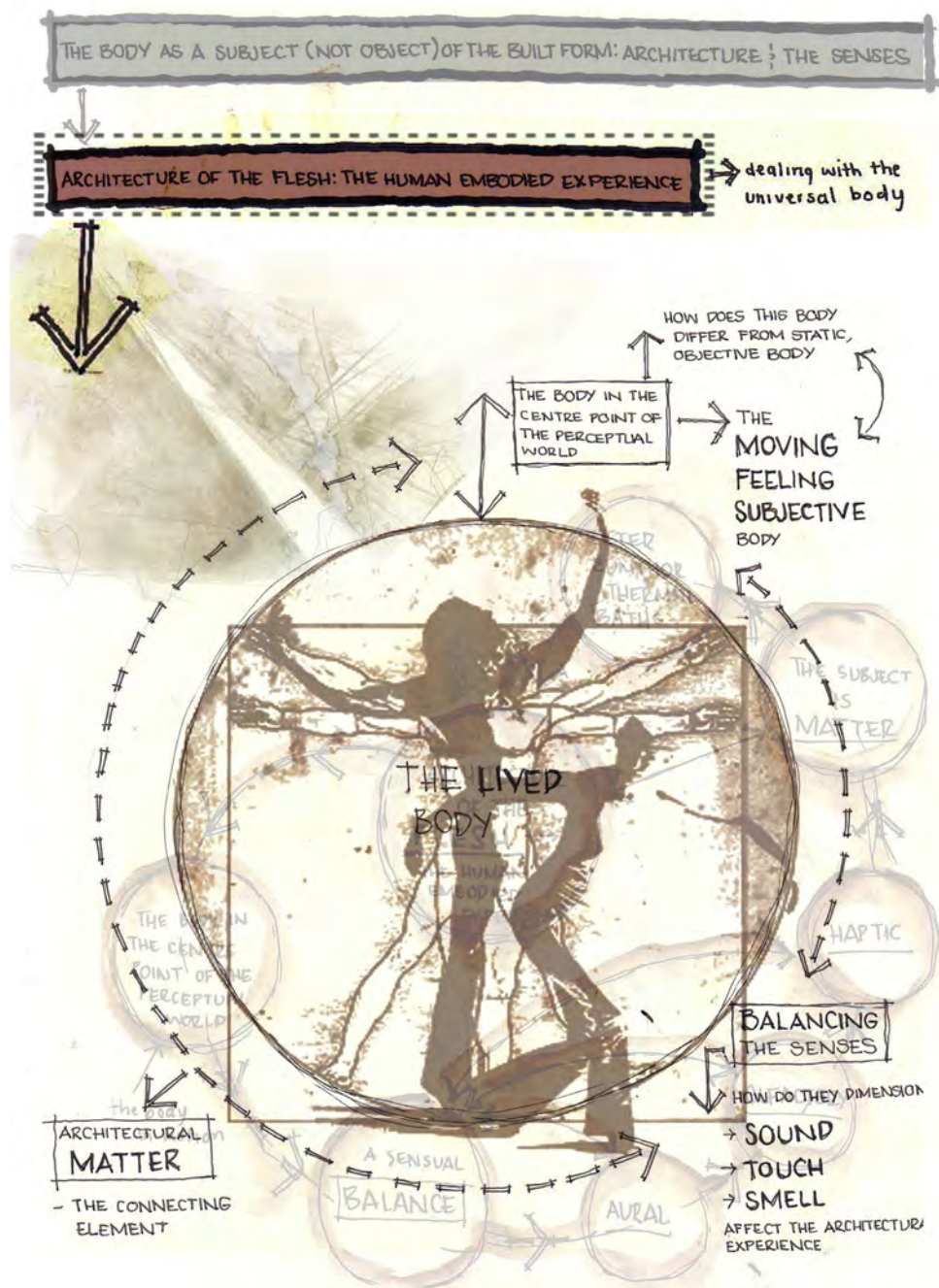


Figure 2.1 – Conceptual overview of the elements dealt with in this Chapter.



## 2.1 Introduction

*“The body of architecture: The material presence of things in a piece of architecture, its frame[...] That kind of a thing has a sensual effect on me. And that is what I would call the first and the greatest secret of architecture, that it collects different things in the world, different materials, and combines them to create a space like this. To me it’s a kind of anatomy we are talking about. Really, I mean the word <body> quite literally. It’s like our own bodies with their anatomy and things we can’t see and skin covering us – that’s what architecture means to me and that’s how I try to think about it. As a bodily mass, a membrane, a fabric, a kind of covering, cloth, velvet, silk, all around me. The body! Not the idea of the body – the body itself! A body that can touch me” (Zumthor, 2010: 22).*

According to Lawson (2001), it is not sufficient merely to see architecture; one needs to experience it in its entirety; thereby including sensations often dissociated with the physicality of the built form. He argues that the dimension of human sensation is usually omitted from the design conception, due to the fact that architects are little aware of the unique contributions that the individual senses add to our lived experience of space. In order to fully comprehend the multisensory dimension, Lawson argues, that architects need to be consciously sensitised to space and how the body becomes aware of sensual qualities (Lawson, 2001: 42). In order to further this study, the notion of architectural qualities needs to be elaborated. Zumthor (2010) first outlines that this quality is not inclusive of architectural guides or the history of architecture or “*getting work into this or that publication*” (Zumthor, 2010: 11). He states, rather, that this quality is when the built form manages to move the user on a psychological, emotional, and physical level (Zumthor, 2010: 11). Modernists argue that the dominant factor of our perception of space is largely visual, which is verified seeing as the processing of visual sensations into perceptions of the world around us involves a complex interaction of the eye and brain. Bloomer (1976) confirms this by maintaining that over two-thirds of the nerve fibres that enter our central nervous system are from the eyes (Bloomer, 1976: 36). Due to this, and the difficulties designers find in representing the intangible and ethereal, architects often overlook that space is also perceived through the sensations of sound, smell, and touch. Lawson (2001) argues that we subconsciously integrate the experience of all our senses without conscious analysis, but that architects need to be consciously aware of the body, its movements and sensations in order to extend the built form into the dimension of human subjectivity (Lawson, 2001: 43). The principles of multisensory architecture, therefore, presuppose that we use our holistic bodies as a medium of communication just as architecture uses space and the experience as an integrative and existential tool. This concept is clearly demonstrated by Bloomer (1976) who argues that the visually impaired are not unable to experience or embody space; instead they use their heightened gustatory, aural, tactile, and olfactory interpretation of space as an opportunity to communicate with the human body (Bloomer, 1976: 13). Establishing how the experience of space influences the lived body and our subsequent sense modalities is, therefore, fundamental to understanding the principles of multisensory architecture.

This Chapter will be concerned with architecture as a tool which facilitates the moving and emotive ‘universal’ body in response to the static and objective body dealt with in Chapter One of

this dissertation. Furthermore it will focus on the relationship between the lived body and architecture which uses aural, olfactory, and haptic modalities as existential mediators. This will be achieved by exploring the tangible representation of the intangible object of space, and how architecture can potentially evoke the sensations to transcend the state of mind of the person passing through it.

## 2.2 The body in the centre point of the perceptual world

*“The body is at once the most solid, the most elusive, illusory, concrete, metaphorical, ever present and distant thing – a site, an instrument, an environment, a singularity and a multiplicity”* (Turner, 1966 cited in Franck & Lepori, 2007: 26).

According to the writings of Dodds & Tavenor (2002), the body serves as the divide between the self and the world; however, the lived body also serves as the means of communication and interaction with world and, therefore, understanding the body becomes a vital architectural tool to connect the built form and the inner workings of the user (Dodds & Tavenor, 2002: 12). Pallasmaa (2009) believes that this connection to the world and to architecture is mediated by our bodily senses. He argues that *“our entire being in the world is a sensuous and embodied mode of being, and this very sense of being is the ground of existential knowledge”* (Pallasmaa, 2009: 13). Theorists argue that the concept of knowledge is grounded in words and philosophies; however, Pallasmaa argues that in human interaction alone, 80% of communication is estimated to take place outside of the verbal and conceptual spheres (Pallasmaa, 2009: 14), which reinforces the significance of understanding the ethereal associations of the body, and the role they play in our experience and embodiment of space.

Frampton (2002) recognises Tadao Ando as an architect primarily concerned with the experiencing subject that he characterises through the term *shintai*; the Japanese word for body (although it holds a stronger nuance than its English counterpart). According to Frampton, this seemingly untranslatable concept is largely understood as a receptive-reactive reflex that a building induces in the subject (Frampton cited in Dodds & Tavenor, 2002: 304). Hein (1998) explains it as: *“the interrelation of humans and the world outside”* (Hien, 1998 cited in Foggen, 2006: 4). Ando (1988) describes the concept of *shintai* as the dynamic relationship between the body and world by stating:

*“The body articulates the world. At the same time, the body is articulated by the world. When “I” perceive the concrete to be something cold and hard, “I” recognize the body as something warm and soft. In this way the body in its dynamic relationship with the world becomes the Shintai. It is only the Shintai in this sense that builds or understands architecture. The Shintai is a sentient being that responds to the world”* (Ando, 1988 cited in Foggen, 2006: 3).

According to Temple (2006), Ando achieves ‘physical intensity’ by matter of creating constructs of space, materials and light that transforms the users experience by sensitizing their consciousness to an authentic engagement in the immediacy of their sensory experience (Temple, 2006: 256). The

totality of human subjective experience would, therefore, seem to be an intimate interaction between the body, the perceptual space, and its generative source. We experience ourselves in architecture, and architecture exists through our embodied experience; meaning that architecture and our bodies supplement and define each other. According to Norberg-Schulz (1971), we dwell in architecture and architecture dwells in us. He believes that if architects take the position of designing from the ideology that the body is located at the centre of the perceptual world, it will open up an architecture which naturally stimulates all the senses (Norberg-Schulz, 1971: 15). Pallasmaa (2005) agrees with the notions of Norberg-Schulz (1971) by stating: “*The concept of the body and the image of the world turn into one single continuous existential experience; there is no body separate from its domicile in space, and there is no space unrelated to the unconscious image of the perceiving self*” (Pallasmaa, 2005: 40). Within this framework of thought, the body and its sensory experience participate in the constitution and realisation of architectural meaning.

### 2.2.1 *The body in motion*

*“A building is an incitement to action, a stage for movement and interaction. It is one partner in a dialogue with the body”* (Bloomer & Moore, 1977: 59).

According to Moran (2004), it is through movement that we perceive and discover the world. He argues that we are made aware of touch, smell, taste, and sound through our bodily movements; movements both outside and inside of the human body. He maintains that we only truly understand our surroundings and material objects when we are able to directly interact with them (Moran, 2004: 5). Howes (1991) furthers the notions of Moran (2004) by arguing that it is through bodily movement, posture, and activity that we engage the world; that we are not so much **in** space as **of** space. He argues that our primary relationship to space is not to face it as independent observers viewing objects, rather, he believes, we enact with space through a vast repertoire of movements, whereby “*as we act, both we and the space are transformed*” (Howes, 1991: 203). Zumthor (2010) articulates that this concept defines architecture as a temporal art whereby experience cannot be limited to a single second and, therefore, the dimensions of human movement have to be engaged (Zumthor, 2010: 41). Franck & Lepori (2007) further delineate that understanding the significance of movement, in the largely static realm of the built form, is vital in order to understand the relationship between the lived body and architecture. They maintain that this view appreciates that the body is changeable and constantly adapting to its environment. The body was designed to move and it is, therefore, they argue, the responsibility of architecture to accommodate and facilitate for the body in motion (Franck & Lepori, 2007: 52-57).

Franck & Lepori (2007) further maintain that architecture does not simply suggest movement; it frequently choreographs it, encouraging us to move in particular ways (Franck & Lepori, 2007: 56). According to Van Kreijl (2008) this is clearly demonstrated (albeit slightly exaggerated) in Pakour,



Plate 2.1 - The body in motion in the sport of Pakour.

an urban sport which uses architecture as its motional playground. Pakour, seen in plate 2.1, actively engages with the built form; whereby the sport uses the architecture/body relationship as a tool to manipulate and move through architectural space. The body becomes acutely aware of the intangible attributes of physical space; participators listen, touch, and smell the boundaries of space in order to understand how the body will react to it. Kreij believes that the principles of bodily awareness necessary for the sport of Pakour should be adopted by contemporary architects in order to intimately understand the body and its engaging qualities with space (Van Kreij, 2008: 29).

By understanding the body as a moving, living, and breathing subject, architecture goes further in responding to the reacting human body. Franck and Lepori (2007) believe that in doing so it extends and enhances the architectural realm (Franck & Lepori, 2007: 53). This holds with Merleau-Ponty's belief that Western scientific culture requires that we see our bodies both as physical structures and as lived experiential structures – in short as the 'outer' and 'inner'; the biological and phenomenological. Through this understanding, he believes it places the senses on an equal platform, whereby architecture is responsible for stimulating and engaging our internal and external reactions - based on the knowledge of bodies as moving subjects (Merleau-Ponty cited in Varela, 1999: xv).

### 2.3 Toward a sensual balance

*“As buildings lose their plasticity and their connection with the language and wisdom of the body, they become isolated in the cool and distant realm of vision. With the loss of tactility and measures and details crafted for the human body – and particularly for the hand – architectural structures become repulsively flat, sharp-edged, immaterial, and unreal” (Pallasmaa, 1996: 20).*

Jutte (2005) maintains in the history of Euro-American culture, sight has always been regarded as the most aristocratic of the sense modalities. He argues that the development of architectural ocularcentrism can be divided into three distinct phases, which seemingly follow the three paradigms of the architectural body posed by Scribner (1997) in the first Chapter of this dissertation. The first known recordings of this visionary debate date back to 500BC when Heraclitus, a pre-Socratic Greek philosopher and mathematician, wrote in one of his fragments: *“The eyes are more exact witnesses than the ear”* (Heraclitus, 1993 cited in Pallasmaa, 2005: 15). Since then Greek Philosophers such as Plato and Aristotle have writings that have abounded with ocular metaphors to the point where sight is regarded as the metaphor for truth; *‘I see the light’* is a common contemporary phrase which is synonymous with understanding and enlightenment. This phase can be classified as the Platonic Classical ideology, whereby a mathematical way of thinking dominated in the age of ‘first science’ (Jutte, 2005: 45), and is relational to the body of *Classical Man*. Jutte (2005) believes that the ocularcentric proliferation into the architectural field was largely a cause of the Renaissance movement and Alberti’s and Brunelleschi’s writings. He argues that they elevated the perception of architecture as a formal knowledge that required visual examination over bodily experience which seemingly detached architecture from its all encompassing sensory experience (Jutte, 2005: 12). According to Pallasmaa (2005) it was during this period that the senses were understood to form a hierarchical system from the highest sense of vision, down to touch which consequently resulted in the birth of ocularcentrism which made the eye the focal point of the perceptual world (Pallasmaa, 2005: 16).

Pallasmaa (2005) believes that this is where the current state of ocularcentric architecture is located; buildings become a visual propagation, viewed from a frontal perspective, in order to win the approval of the beholder. He reinforces this by stating: *“Instead of existentially grounded plastic and spatial experience, architecture has adopted the psychological strategy of advertising and instant persuasion; buildings have turned into image products detached from existential depth and sincerity”* (Pallasmaa, 2005: 30). He expands this argument by maintaining that our technological culture has furthered the detachment of the senses into clear and distinct categories. Vision and hearing are considered the most important in order to be socially and economically successful. Touch, taste, and smell, however, are considered archaic remnants which are attached to a more private and individualistic experience (Pallasmaa, 2005: 32). The hegemony of vision in our current contemporary culture is reinforced with a statement by Le Corbusier, *“I exist in life only if I can see[... ]I am and I remain an impenitent visual – everything is in the visual[... ]One needs to clearly see in order to understand[... ]I urge you to open your eyes”* (Le Corbusier, 1991 cited in Pallasmaa, 2005: 27). Jencks (1997) strongly disagrees with these notions of ocular favouritism by arguing that architecture cannot solely be experienced as a visual entity as the built form is concerned with the physical articulation of space; the sensory void contained and generated by buildings being as important and material a part of its existence as the substance of its fabric (Jencks, 1997: 97). The concern here is not the space that would be measured by the surveyor, geometer, or scientist, but perceived space as we experience it by



means of our moving body before objectifying it; what shall ultimately be called **lived space**. Modern architectural theory and critique have a strong predisposition to regard space as an immaterial object delineated by material surfaces, instead of understanding space in terms of dynamic interactions and interrelations between the different sense modalities. Each of our experiences affects the synthesized functioning of four senses in a variety of ways – our eyes, ears, nose and skin registers changing stimuli which generate a cataclysm of brain responses on all levels. Porter (1997) gives an example of this by describing the sensations felt when entering a Medieval Cathedral. He talks about how our perceptions are adjusted through the monitoring of our body, whereby the skin registers a reduction in temperature, the eyes accommodate both the lower levels of light and the intense coloured light from the stained-glass windows, the nose detects musty and unusual odours, and the ears pick up the echoes of isolated, reverberating sounds against the concentrated stillness of a vast, cavernous space (Porter, 1997: 27). Pallasmaa (2005) reinforces this by stating: “*Images of one sensory realm feed further imagery in another modality. Images of presence give rise to images of memory, imagination, and dream*” (Pallasmaa, 2005: 44).

The preceding arguments are not meant to discredit the sense of sight, as a holistic encounter is measured by the experience of the **whole**, which includes the ocular modality. Rather, as Bloomer (1976) maintains, the notion of sight has become a visual spectacle which has resulted in a warped perception of this particular sense, whereby it is a passive rather than active process. Bloomer further argues the need to integrate the ocular modality in order to promote an active engagement (participatory) rather than a passive engagement (observatory) (Bloomer, 1976: 56). According to Pallasmaa (2005) in order to re-sensualise architecture, our partial perceptions need to be dissected and analysed as a whole (Pallasmaa, 2005: 3). In the following study the senses are not shown as totalities, but rather as fragments, organised thematically according to distinct phenomena. As a direct perceptual experience, architecture is initially understood as a series of partial experiences, rather than as an entirety. This distinct separation is done in order to comprehend the interplay between the experiential phenomena and the intention of the architecture.

### 2.3.1 *The sound of space*

*“Sight isolates, whereas sound incorporates; vision is directional, whereas sound is omnidirectional. The sense of sight implies exteriority, but sound creates an experience of interiority. I regard an object, but sound approaches me; the eye reaches, but the ear receives. Buildings do not react to our gaze, but they do return our sounds back to our ears”* (Pallasmaa, 2005: 49) .

*“We are always at the edge of visual space looking into it with the eye, but we are always at the centre of auditory space listening out with our ear. Visual awareness is unidirectionally forward; whereas aural awareness is omnidirectionally centred”* (Schafer, 1985 cited in Seamon, 1985: 94).

Much is known in contemporary architecture about the physical acoustics of enclosed space and on perceiving acoustic parameters but there is, however, a lack of scholarly work on how people

**experience** aural space; that is, the phenomenology of aural space. Defining space by sound is very different from dominating space with sound. According to Schafer (1985), when sound articulates and denotes space the perceptual emphasis is subtly shifted into the aural modality, whereby architects are made aware of the sound of the space they are creating and the intimacy it allows within a structure (Schafer, 1985 cited in Seamon, 1985: 90). Blesser (2007), an architect concerned with the aural dimension of the built form, perceives architecture like a giant, hollowed-out sculpture, which embeds those who find themselves within it; in which, he believes - the built form is to be apprehended from within; whereby the environment responds as if in an auditory dialogue (Blesser, 2007: 18). Rasmussen (1959) poetically articulates that one “*need only to snap ones fingers, and the space responds. Whistle a note, and the space returns one or more echoes. Sing a song and the space emphasizes particular pitches. Remain silent and the space remains silent*” (Rasmussen, 1959: 231). He further argues that by responding to human presence, aural architecture is dynamic, reactive, and enveloping; “*turn off the light source and the space becomes dark; turn off the sound source, and the space continues to speak*” (Rasmussen, 1959: 232). Pallasmaa (2005) reinforces the above arguments by stating: “*Anyone who has becomes entranced by the sound of dripping water can attest to the extraordinary capacity of the ear to carve a volume into the void of darkness. The space traces by the ear[...] becomes a cavity sculpted directly in the interior of the mind*” (Pallasmaa, 2005: 50). Rasmussen (1959) contextualises the lack of aural engagement by maintaining that the biggest dispute among theorists’, regarding aural architecture, is whether or not architecture can be heard. He states that the common response would probably be that architecture does not produce sound; therefore, it cannot be heard. He disputes however that: “*neither does it radiate light yet it can be seen*” (Rasmussen, 1959: 232). Ripley (2007) maintains that sound and space form a critical couple in our every day environment; whereby no sound exists outside of space, and no space is ever truly silent. He believes that sound and space mutually reinforce one another in our perception and are inextricably linked in our experience of what it is to exist in the world (Ripley, 2007: 7).

In order to design for the stimulation of the aural sensation, an architect must understand what the **essence** of aural architecture is. According to Blesser (2007), it refers to the properties of space that can be experienced by listening. Blesser argues that an *aural architect*, acts as both an artist and social engineer, and is therefore someone who selects specific aural attributes of a space based on what is desirable in a particular cultural framework (further explained in Chapter Four of this dissertation) or social circumstance. He states that an aural architect has the ability to create space that can induce emotion such as contemplation, tranquillity, and exhilaration - through understanding the aural properties of architectural materials as well as the sound of sculptured form (Blesser, 2007: 5). This notion is furthered by Zumthor (2010) who maintains that interiors are like large instruments, collecting sound, amplifying it, and transmitting it elsewhere. He shares the beliefs of Blesser (2007) by arguing that our aural navigation has to do with the shape peculiar to each room and with the surface of its materials they contain, and the way in which those materials have been applied in order

to engage in dialogical aural qualities (Zumthor, 2010: 29). The focus, therefore, is not acoustical parameters but rather the way the listeners **experience** or **embody** the aural space. An explanation is required as to how one can hear a passive object which itself does not omit a sound. Blesser (2007) asks his readers to consider a flat wall located at some distance; when the sound wave from a hand clap is reflected from the distant wall, we hear the reflection as a discernible echo. The distance from the wall determines the delay for the arrival of the echo, the area of the wall determines the intensity, and the material of the wall's surface determines the frequency content. The echo is the aural means by which the wall conveys its size, location, and surface materials. He maintains that the wall, therefore, becomes audible, or rather, the wall has an audible manifestation even though it is not itself the original source of sound energy (Blesser, 2007: 2). Pallasmaa (2005) reinforces this by stating: "*Sound measures space and makes it scale comprehensible, we stroke the boundaries of space with our ears*" (Pallasmaa, 2005: 51). It is for this reason that human beings are able to navigate space without the use of sight; our ability to decode spatial attributes means we can readily visualize objects and spatial geometry: we can thus 'see' with our ears.

Not only does aural architecture provide users with a cognitive map of their surroundings, it can also influence their moods, associations, and behaviour (examples to follow) and, therefore becomes a social system rather than a simple application of physical science to spatial design. For example, Blesser (2007) argues the sound of a space can be cold or warm independent of its actual temperature; welcoming or foreboding independent of its actual appearance. In order to reinforce the idea that sound has power over our imaginations as hearing structures which articulate our experience of space - Blesser uses as example of bare marble floors and walls of an office lobby which loudly announces the arrival of visitors by the resounding echoes of their footsteps. In contrast, thick carpeting, upholstered furniture, and heavy draperies, all suppress incident or reflected sounds, thereby muting that announcement; determining whether entering the lobby is a public or private event. Furthermore Blesser maintains that hearing, together with its reinforcing complement, listening, allows a person to react to aural stimulus as it creates an intimate connection to the dynamic activities of life; both human and natural. He maintains that this phenomenological approach to architecture and sound allows people to aurally visualize spatial geometry, propagate cultural symbols, stimulate emotions, communicate aural information, experience the movement of time, build social relationships, and retain a memory of experience (Blesser, 2007: 3-4).

In accordance with Blesser's (2007) concepts of auditory spatial awareness, in the realm of experiential and embodied space, the aural modality has the potential to add personality, texture, and richness to a space, however, it remains a fragile and perishable instrument. Yet, however difficult to recognize, describe, reproduce, or even study, aural architecture can elevate or depress our affective responses – it bears directly on our sense of: privacy, intimacy, security, warmth, socialization, and territoriality. It changes our behaviour as individuals and influences our social structure of our groups

(Blesser, 2007: 18). Beyond physical acoustics, the phenomenology of aural architecture helps the user to reconstruct space and interact with their surroundings; ultimately influencing the overall experience of the space.

### 2.3.2 *The shape of touch*

*“[The skin] is the oldest and the most sensitive of our organs, our first medium of communication, and our most efficient protector...Even the transparent cornea of the eye is overlain by a layer of modified skin[...]Touch is the parent of our eyes, ears nose, and mouth. It is the sense which became differentiated into the others, a fact that seems to be recognized in the age-old tradition of touch as the ‘mother of the senses” (Montagu, cited in Pallasmaa, 2005: 11).*

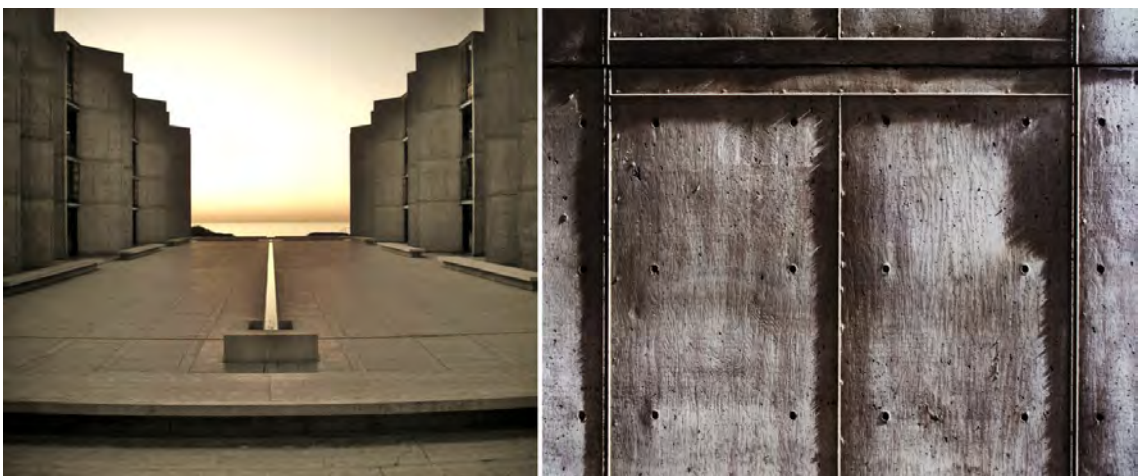
*“While images of architecture can be rapidly consumed, haptic architecture savours plasticity, materiality, tactility and intimacy[...]is appreciated and comprehended gradually, detail by detail[...]Focused vision makes us mere observers; tactile perception transforms retinal images into spatial and bodily experiences, encouraging participation” (Pallasmaa, cited in McCater, 2008: 235).*

Deprived of our sight and ability to hear, bodies can nevertheless tell the difference between plastic, metal, or wood by feeling its surface texture and tapping into its perceptive memory. This enables individuals to operate with a high degree of efficiency in the world due to the nature of our tactile sense. Tuan (1990) reinforces this by arguing that touch is the direct experience of resistance; the direct experience of the world as a system of resistances and pressures that persuade individuals of the existence of reality independent of their imaginings. He emphasises his argument by stating (Tuan, 1990: 8): *“To see is not to believe: hence Christ offered himself to be **touched** by the doubting apostle”* (authors own emphasis). Essentially all the senses, including vision, are extensions of the sense of touch, as stated in the opening quote by Montagu (cited in Pallasmaa, 2005: 11). Pallasmaa (2005) furthers this notion by maintaining that because all the senses are essentially specializations of the skin; all sensory experiences are thus related to tactility. Haptic architecture, therefore, is more intimate and should be appreciated architecturally as it is: *“appreciated and comprehended gradually as the body and skin move through a space. The architecture of the eye detaches, dominates, and manipulates whereas haptic architecture engages and unifies through the use of materiality and personalized and intimate space”* (Pallasmaa, 2005: 11). Holl (1994) personifies these notions by stating that the total perception of architectural spaces depends as much on the material and detail of the haptic realm as the taste of a meal depends on the flavours of authentic ingredients. Being stripped of the authenticity of engaging materiality is compared, by Holl, to eating only artificially flavoured foods – so in architecture the spectre of artificiality constituted surroundings imposes itself (Holl, 1994: 91).

Research into the subject has revealed that not many contemporary designers are aware of the active psychological and social importance of tactility within architecture. According to Pallasmaa (2005), Alvar Aalto was an architect greatly concerned with facilitating the stimulation of all the senses within his architecture, whereby much of his success as an architect was due to the recognition in the

way people experience and **touch** space. Pallasmaa explains that Aalto was interested more in the encounter of the object and the body of the user, than in mere visual aesthetics; whereby his architecture demonstrates muscular and haptic presence as well as sensory realism. Pallasmaa (2005) describes the tactility of Aalto's architecture by stating, *"It incorporates dislocations, skew confrontations, irregularities and plyrhythms in order to arise bodily, muscular and haptic experiences"* (Pallasmaa, 2005: 71). His use of surface textures and details, invite the use of the hand and touch to create a sense of intimacy and warmth. Pallasmaa (2009) further recognises the work of Louis Kahn at the *Salk Institute* (1959–1965) in La Jolla, California, which forces the users ocular sense to engage with their sensations to the point where they stroke the textures, edges and contours of the building to evoke an unconscious tactile experience. Pallasmaa (2009) describes his experience when entering the space of the marble-paved courtyard (plate 2.2): *"Delineated by two rows of buildings, with the sky as its sublime ceiling and the horizon of the Pacific Ocean as its hypnotizing back wall, I felt immediately compelled to walk to the nearest concrete wall surface and sense its temperature; the suggestion of silk and live skin was overpowering"* (Pallasmaa, 2009: 103). He maintains that the concept behind this tactile infused surface material was that of 'the wings of a moth', whereby Louis Kahn added volcanic ash to the concrete mix (plate 2.3) in order to achieve this *"extraordinary inviting matt softness"* (Pallasmaa, 2009: 104), which forces a physical and subsequent emotional engagement with the built form at the Salk Institute.

According to Holl (1994) the totality of haptic architecture succeeds in marrying the infinity of space with the intimacy of the touch of the hand into a single embodied experience. He argues that when the materiality of the details forming an architectural space become evident, the haptic realm is opened up, sensory experience is intensified and psychological dimensions are engaged (Holl, 1994: 35). Aforementioned arguments would suggest that by inviting the hand the user is subject to an intimate physical encounter with the architecture whereby space and body are entered into a honest interaction, through which the truth and nature of the built form is revealed.



Salk Institute – Louis Kahn  
Plate 2.2 (left) – marble paved courtyard. Plate 2.3 (right) – concrete work which made use of volcanic ash to increase its tactile dimension.



### 2.3.3 *The scent of space*

*“We need only eight molecules of substance to trigger an impulse of smell in a nerve ending, and we can detect more than 10, 000 different odours”* (Pallasmaa, 2005: 54).

Research into the discipline of olfaction within the realm of architecture revealed notions that they are seemingly divorced from one another. General studies regarding the modality of smell, however, made known that each space evokes a scent that is unique; every space in which life unfolds has a particular and unique olfactory signature however furtive it may be. Given the olfactory reality of any space, however, there is no recognition as such, and certainly no conscious attempt to integrate sense of smell with created space. In accordance with the philosophies of Hall (1969), Western ethos is culturally underdeveloped in the acceptance and expression of olfaction. He believes that the extensive use of deodorants and the suppression of odour in public places are resulting in a land of olfactory blandness and sameness. He argues that this blandness makes for undifferentiated spaces and deprives us of richness and variety in our experiences (Hall, 1969: 45). Howes (1991) believes the lack of architectural association with olfaction is due to the fact that smells are formless, therefore, they resist all attempts at classification, or articulation (Howes, 1991: 140); which is ultimately what makes this modality so hard to compartmentalise and represent in the visual nature of the architectural realm.

According to Barbara (2006), people can close their eyes to beauty, to unpleasantness; and their ears to melodies or deceiving words. She argues, however, that people cannot escape scent. For scent was the brother of breath. *“The LORD God formed the man from the dust of the ground and breathed into his nostrils the breath of life, and the man now became a living being”* (Genesis 2: 7 cited in Barbara, 2006: 3). She maintains that the sense of smell is the first sense we use to explore the world and remains the most persistent memory to a place or even a person (Barbara, 2006: 140). Interviews revealed that people do not remember the exact details of their travels, with the visual images of different places becoming blurred into a cultural montage. It was found, however, that the majority of those interviewed, when confronted with a particular scent, the wafting of a noteworthy olfaction; made comment regarding the power of smell to transport them back to an exact moment in time where every element and emotion of that particular moment is transcribed in perfect detail (see appendix B for sample interview questions). Pallasmaa (1993) articulates this notion by stating: *“A particular smell may make us secretly re-enter a space that has been completely erased from the retinal memory; the nostrils project a forgotten image and we are enticed to enter a vivid daydream”* (Pallasmaa, 1993: 32).

Barbara (2006) argues that odour is our vehicle for rendering space more enveloping and memorable. She believes that designing with the consideration of olfaction is not as simple as merely deodorizing spaces. In order to understand this intangible architectural constituent, she urges architects to recognize materials as dynamic and interactive components. She argues that materials do not merely visually represent the overall aesthetic of the building; they also have the potential to absorb,

transude, emit, and thus modify the microclimate of a place and the quality of the air. Furthermore she establishes that every material has its own odour which is dependent on a series of factors such as humidity, porosity, temperature, and composition. She argues that the relationship between space and odour is also dependent on the orientation of the space; the humidity of the air; and the persistence, saturation, timing, and nature of odours (Barbara, 2006: 110). In addition she maintains that modifying the odour of a space means having an impact on the emotional sphere that drives our choices. She describes that an individual, conditioned by Western olfactory values, entering a space smelling of lavender - will immediately have the feeling that it is an aerated and clean place, even if it is in reality - closed and dirty. This exemplifies how smell can be much more powerful than sight. Here, even if our sense of smell is in conflict to what we see, we instinctively put more credence in what we smell (Barbara, 2006: 90). In sum, Barbara argues that it is the result of a plethora of elements that constitute the perception of olfaction within the built form, which further adds to the complexities of its representation.

The olfactory modality thus has the ability to communicate and exalt the experience of a place and enhance its memorability. According to Sainsbury & George (2006), because of this intrinsic link between our sense of smell and the immediacy of memory, the olfactory aesthetic is indispensable in the achievement of human identity (Sainsbury & George, 2006: 411). Olfaction would seem mostly extraneous to the formulation of spaces, and yet a careful reading of cognitive, perceptive, cultural, social, planning, and anthropological phenomena would seem to indicate that odours are not only profoundly inherent components of place, but at times are actually essential in defining them.

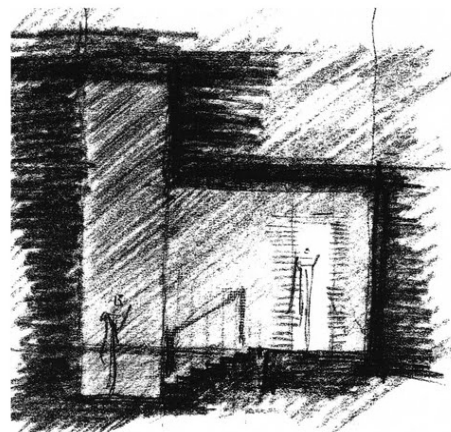
## 2.4 Architecture – the subject is matter

A common thread linking the arguments of sound, touch, and smell is the sensual and ethereal associations of the physicality of architectural matter. Through the qualities of shape and material architecture speaks; but according to Franck & Lepori (2007), we also resonate with these qualities according to our individual field and to the collective code rooted in each of us (further discussions regarding this found in Chapter Four of this dissertation). They argue that each universal material whether it be wood, brick, metal, glass, aluminium, etc., each has its own archetypal qualities and distinctive character. Furthermore they maintain that each has its own peculiar field that can influence our physical, emotional, and sensory experience, which is in accordance with the opening quote in the introduction of the Chapter by Zumthor (2010), which states: “*The material presence of things in a piece of architecture, its frame[...]That kind of a thing has a sensual effect on me. And that is what I would call the first and the greatest secret of architecture, that it collects different things in the world, different materials, and combines them to create a space like this*” (Zumthor, 2010: 22). Franck & Lepori compare this notion of ‘*differing things*’ with the concept of eating with a stainless steel, silver, plastic or wooden fork; they weigh, sound, smell, and feel different and therefore, they



interact differently with the taste of food - just as the properties of architectural materials affect our sensory experience of space (Franck & Lepori, 2007: 90). *“How does the material feel? What does it suggest? How does it affect the user of the space”* (Franck & Lepori, 2007: 88). These are some questions posed by Franck & Lepori in order for architecture to respond to the potential sensual qualities in architectural matter. They suggest that the answers to these basic questions illustrate how materials, objects, buildings, and the human body create fields whose pulsations are in constant exchange, whereby fields of materials are in constant change with the fields we encounter; in which it is not so much a matter of the likes and dislikes of an ‘I’: that is, the feeling subject over ‘felt’ objects and people. It is instead the relationship between fields, without boundaries, that attract or do not attract sensory invitation. They further this concept by maintaining that there is movement and change within fields, particularly within the unpredictable and personal nature of the human field. The concept of altering sensory fields acknowledges the autonomous existence of the material world, of its qualities, which are not the result of passive accidents, but of **active**, interrelating forces. By considering preferences as dependent on the fields of people and the fields of matter, Franck & Lepori suggest architects can gain an understanding of how people experience the aural, haptic, and olfactory realm (Franck & Lepori, 2007: 88). Hill (2001) expands this notion by maintaining that architectural matter is not always physical: *“[...]it is whatever architecture is made of, whether words, bricks, blood cells, sounds, or pixels”* (Hill, 2001: 3). Hill pleads that architecture needs to go beyond the familiar boundaries of the discipline and argues that the body is a site of architectural design whereby the body and consciousness of the architect acts as matter or material in the architectural genesis (Hill, 2001: 162). The combination of the attributes of the physical entity of matter argued by Franck & Lepori (2007) with the belief of Hill (2001), who argues the body and its sensations as an ethereal entity of architectural matter, suggest that both the intangible and tangible; the physical and ethereal, play an important role in how we perceive and experience sensory space.

## 2.5 An example using Peter Zumthor’s thermal Baths



Peter Zumthor – Thermal Baths

Plate 2.4 (left) – The integrative approach of the Thermals Baths. Figure 2.2 (right) – Simplistic yet emotive sketch of section through an interior bath.

This building is used as an example due to its numerous mention in publications regarding architecture and the senses; in which authors collectively argue its responsive nature toward the human embodied experience. Peter Zumthor, a phenomenological writer whose theories have been comparatively analysed throughout this dissertation, designed the Thermal Baths (completed in 1996) which is argued as being an architecture which is intimately aware of human's reactions to external stimuli whilst still maintaining a meaningful aesthetic which encourages a participatory engagement (Murray, 2007: 362) and, therefore, encapsulates the majority of the research gathered in this Chapter.

### **An overview of the architect**

*"I imagine a certain building being remembered by someone in 25 years' time. Perhaps that was where he kissed his first girlfriend[...]To put that into perspective: that quality is far more important to me that the idea that the building will still be mentioned in architectural reference works in 35 years. That is the first transcendent level in my work: the attempt to conceive of architecture as human environments" (Zumthor, 2010: 65).*

Labs-Ehlert (2005) outlines the architectural beliefs of Zumthor by maintaining that he believes the ethereal qualities of architecture (those which do not possess physical entities) exponentially contribute towards the aesthetic character of the built form. She argues that Zumthor's approach to design is a convoluted process which does not follow a straightforward, linear path, rendering the end result - attentive and enriched, in which there is an exchange, a give-and-take between Zumthor's buildings and their surroundings (Labs-Ehlert, 2005 cited in Zumthor, 2010: 7). Murray (2007) states that in general Zumthor tries to expose the very essence of his materials which goes beyond all culturally conveyed meaning. He maintains that Zumthor believes materials can assume a poetic quality in the context of an architectural object, although only if the architect is able to generate a meaningful situation for them, since materials in themselves are not poetic. The sense that he tries to instil into a material is beyond all rules of composition, and their tangibility, smell and acoustic qualities are merely elements of the language that he believes we are obliged to use (Murray, 2007: 362). This is reinforced by Zumthor who states: *"Sense emerges when I succeed in bringing out specific meanings of certain materials in my buildings, meanings that can only be perceived in just this way in this one building"* (Zumthor, 1999: 11). Ryan (1997) argues that Zumthor's oeuvre is not characterized by a signature style. Rather each of his projects represents an opportunity for him (the architect) to explore the circumstances particular to each building including its site and intended use, with the intention to design a sensory experience that is both inventive and appropriate (Ryan, 1997: 94). According to Murray (2007), each of Zumthor's buildings emphasise minimalist detailing in which one can sense the importance of architectural materials such as concrete, wood, glass and stone, in shaping the interaction between buildings and its occupants (Murray, 2007: 363). Zumthor reinforces the notions of Murray (2007) and Ryan (1997) by stating: *"All design work starts from the premise of the physical, objective sensuousness of architecture, of its materials. To experience architecture in a concrete way means to touch, see, hear, and smell it"* (Zumthor, 2006: 66). This statement defines

Zumthor's approach to design reinforcing his dual fascination with materials and the body's direct sensory experience of architecture, reinforcing the holistic notion of the body in the centre point of the perceptual world.

### The architecture of the Thermal Baths

According to Murray (2007), the thermal baths at Vals, located in Switzerland, is particularly notable for its use of materials and attention to sensory experience. Completed in 1996, the building is located in a small farming village on a steep hillside site, 1200m above sea level, adjacent to natural hot springs which have been utilized for therapeutic bathing since the late nineteenth century. Murray explains that when one visits the building, the architecture does not immediately announce itself from the exterior, as a result of Zumthor's decision to engage the building with the land such that it is built partially underground. Covered by a planted roof of wild grasses that appear as an extension of the hillside above; the architecture is almost invisible upon entry (plate 2.5–2.7). This is the first clue that in this design Zumthor subverts the notion of architecture as a primarily visual medium – an object to be seen – in favour of a multisensory approach, creating a series of experiences revealed to the individual through use in space and time (Murray, 2007: 364).



Peter Zumthor – Thermal Baths

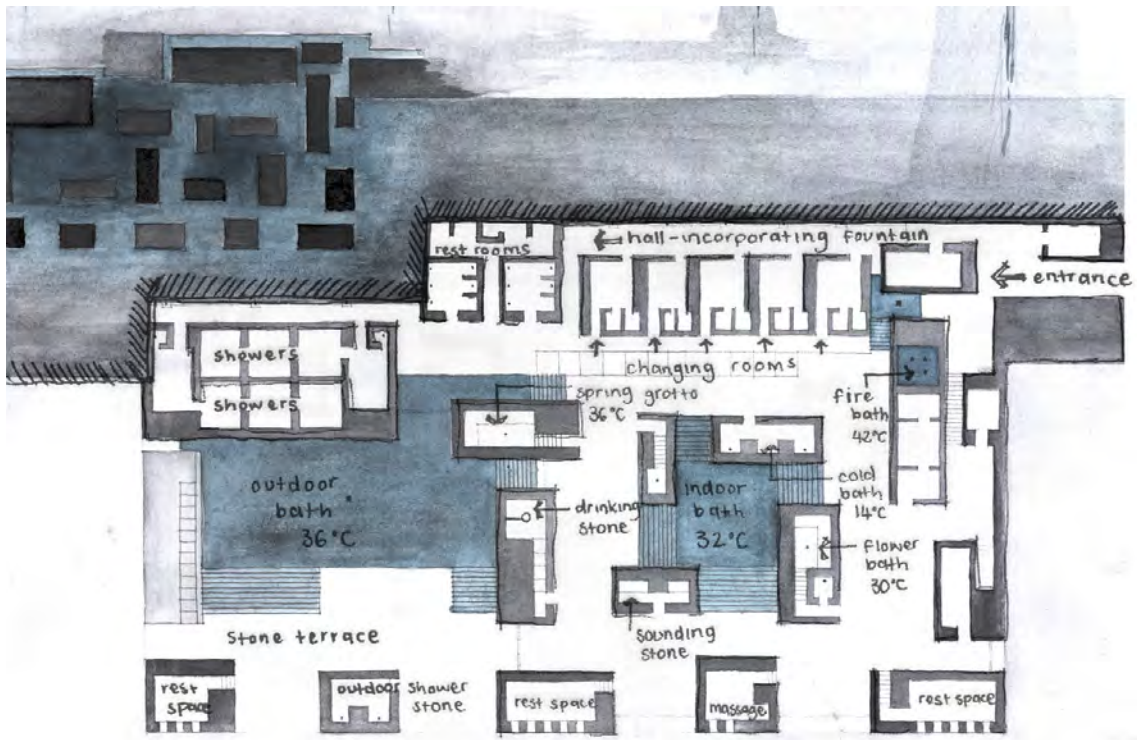
Plate 2.5 (left), plate 2.6 (middle) and plate 2.7 (above) - show the integrated approach to the thermal baths.

### Movement through the space

Zumthor (2010) maintains that in the thermal baths freedom of movement was an essential part to the design whereby movement was thought of as a process of seduction rather than direction. He compares the notions applied to the spatial layout (figure 2.3) of the thermal baths to that of designing a stage; in which separate parts of the building are brought together so as to form their own attachments in order to facilitate the organic nature of movement (Zumthor, 2010: 41). He describes the experience as a result of this application:

*“These were spaces you would enter and begin to feel you could stay there – that you were not just passing through. I’d be standing there and might as well stay a while, but then something would be drawing me round the corner – it was the way the light falls, over here, over there: and so I saunter on – and I must say I find that a great source of pleasure. The feeling that I am not being directed but can stroll at will”* (Zumthor, 2010: 43).





Peter Zumthor – Thermal Baths

Figure 2.3 - Main plan of thermal baths in which Zumthor has created separated yet connected blocks which containerize a specific sensory engagement.

Murray (2006) describes the fluid and freedom of movement of the body which the architecture facilitates and encourages. He maintains that through the kinetic use of light and shadow (plate 2.8 & 2.9), the subtle variations of the ramps, and separated yet connected elements of the building Zumthor achieves unimpeded movement through the space which reinforces the architecture's response to the subjective body (Murray, 2006: 365).

### Toward a sensual balance

Ryan (1997) describes the entrance sequence into the Baths which entails descending from ground level to a lower level, walking through a dark, subterranean passage to reach the entry halls of the baths (plate 2.8 & 2.9), dislocating the individual from the outside world. Underground, devoid of natural light and surrounded by stone, Ryan describes the hall as having a feel of a dark cave regardless of its right angles and refined modernist detailing. The sound of trickling spring water emanates from a series of bronze faucets along the right-hand wall, designed as drinking fountains to give visitors their first introduction (literally their first taste) of the architecture as it springs from the earth behind the wall, whilst always maintaining visual linkages to the main internal pool and valley beyond. This wall, which runs the length of the building, connects the various sensory elements of the architecture by incorporating square fountain heads which subsequently drips water into a continuous gap between the wall and the floor. Ryan maintains that the incessant sound produced by the water is further enhanced by the limited embellishments of the palette and nature of the materials. He argues



Peter Zumthor – Thermal Baths

Plate 2.8 (above left), plate 2.9 (below left) - show the entry halls to the baths and the use of sensuous materials and light and shadow. Plate 2.10 (right) - view of indoor pool.

that the sound which emanates throughout the cavernous space highlights the buildings function and forces the user to engage in the architectures sensual qualities. This wall continues towards the pool and subsequently becomes a flank of horizontally-laid stone broken in five identical places which are used as the changing booths. Ryan describes that these booths diverge from Zumthor's basic palette of concrete and stone as they are panelled in highly polished red mahogany (plate 2.13) and contrasted against curtains of black leather which Ryan describes as "*inviting to the naked touch of the bathers skin*" (Ryan, 1997: 94). Murray (2006) further recognises the very narrow, linear skylights which slice through the roof above to allow natural controlled light to penetrate the austere lit interiors which dramatically grazes the uneven surface of the stone walls (plate 2.11). The main space of the building is a labyrinth world of solid and void (as can be seen in figure 2.2 and 2.3) within which contains one large pool with 32°C water, around and within which several large stone-clad volumes are arranged. Each volume contains an opening that leads to a room-sized space within (plate 2.10), each designed for a different sensory experience and marked by a sense of discovery. Murray describes that these spaces feel as if they have been carved out of a solid stone block, just as the building itself seems to be carved out of the mountain. One volume contains a fire bath (42°C), which can be seen in plate 2.12, while another is an ice bath (12°C). The flower bath contains 30°C water, the surface of which is covered with floating flower petals, creating an intense aroma and tactile experience. One volume contains a well from which spring water can be tasted, while yet another is a completely dark space





Peter Zumthor – Thermal Baths

Plate 2.11 (above) - the use of stone and its application as a tactile material. Plate 2.12 (below left) - view from the fire bath. Plate 2.13 (below right) - view from the changing room.

called the *sounding stone*, with benches and hidden speakers through which recorded sound art by composer Fritz Hauser is played (Murray, 2006: 365). Ryan (1997) maintains that the body must be trusted to find its own way through the baths in Vals, responding to the varying degrees of temperature, tactility, sound, and flow of water by following the bands of stonework through the labyrinth, and stopping in the spaces where it finds comfort (Ryan, 1997: 95).

### Summary

Any built work of architecture can be read as a study of the materials used in construction. In the process of design, such materials are typically evaluated for their structural properties, their aesthetic appearance, and their suitability in relation to a variety of functional performance criteria. In the case of the above study, however, the materials of the building contribute more than mere functionality, as they physically embody the ideas of sensory experience; whereby the materials take on conceptual importance. Zumthor reinforces this notion by stating: “*Material is stronger than idea; it’s stronger than an image because it’s really there, and it’s there in its own right*” (Zumthor, cited in Murray, 2007: 367). Zumthor’s Thermal Bath at Vals is a poetic example in which the selection, deployment and detailing of architectural materials, particularly stone and water, are as important as form-marking

or shaping of space and are in fact integral to one's experience of the architecture. According to Ryan (1997) Zumthor's deceptively simple architecture cannot be appropriately captured in photographs; whereby their true essence only becomes apparent from the experience of tactile textures, the play of light, the celebration of craft, and the kinaesthesia of their resulting spaces. Furthermore Ryan maintains that Zumthor has developed an architecture of complex spatial interpretation whereby the architecture is not only concerned with style, image, or beautiful materiality, but resonant with atavistic memories of weight; contiguity and enclosure; and of sound enticing illumination. He reinforces this by stating: "*New spatial experiences and physical sensations are the theme; it demands direct sensuality in our encounter with the elements*" (Ryan, 1997: 48). Zumthor continuously emphasises the sensory aspects of the architectural experience. To him, the physicality of materials can involve an individual with the world, evoking experiences and texturing horizons of place through memory. Furthermore Ryan (1997) maintains that Zumthor recalls places he once measured out at his aunt's house through their sensual qualities rather than their geometric dimensions. He argues that Zumthor's Thermal Baths recounts this thinking, whereby the space appeals to all the senses by choreographing materials according to their evocative qualities. Flamed and polished stone, chrome, brass, leather, and velvet are deployed with care to enhance the inhabitant's sense of embodiment when clothed and naked. The touch, smell, and perhaps even taste of these materials are orchestrated obsessively. Ryan articulates that the materials are crafted and joined to enhance or suppress their apparent mass through which their sensory potential is relentlessly exploited, and as a result Zumthor is able to create an architecture which responds and stimulates the human embodied experience (Ryan, 1997: 49).

## 2.6 Conclusion

*"Architecture is the art of reconciliation between ourselves and the world, and this meditation takes place through the senses."* (Pallasmaa, 2005: 55)

The aim of this Chapter was to investigate the role of architecture that incorporates the moving and sensing body; the body that Lawson (2002) states is often disregarded or accounted for as a passive process in contemporary architecture (Lawson, 2002: 42). The information gathered from various authors realises that sensory realism needs to be incorporated into architectural development in order to facilitate the user's experience and sense of being-in-the-world. It is noted through the writing of Pallasmaa (2005), Franck & Leopri (2007), Holl (1996) and through the example of Zumthor's Thermal Baths, that the built environment enables us to perceive and understand reality and self-identity and that the full embodied experience of architecture is important if we are to pertain to the idea of the lived body as beings of emotion. By re-visiting, re-visioning, and rethinking space and place with a sensitized consciousness, the body as a subject of architecture suggests that the built form has the ability to balance the emotional and physical needs of the users. Jencks (1997) furthers this conclusion by maintaining that a meaningful architectural appreciation of both interior and exterior space cannot



just be taken as a formal appreciation of the facadcal treatment; architecture needs to be encountered, confronted, and interacted with in order for it to engage in a human dimension (Jencks, 1997: 97). This means that the authenticity of architectural experience is comprehended by our entire bodies and thus our experiences are articulated through the sensations evoked when moving through space. Pallasmaa (2005), through his writings, urges architects to view the body as the centre point of the perceptual world in order for architecture to respond to our sensory needs. In order for this to happen the five sense modalities need to be considered equal to create and permit an embodied experience. Blesser (2007) argued the importance of auditory awareness through architects acknowledging the phenomenology of sound; the experience of the sound rather than the science of physical acoustics. Barbara (2006) outlined the significance of olfaction through identifying the realm of smell through its pertinent relationship with memory and human identity. Holl (1994) and Pallasmaa (2006) confirmed the meaning of touch within the architectural realm by arguing that when the haptic realm is opened up, sensory experience is intensified, and psychological dimensions are engaged. The unifying sensory element revealed was that of architectural matter, which was argued by Franck & Lepori (2007) and Zumthor (2010) as the physical and emotional mediator and that which defines the dialogue between the lived body and the built form.

Discussions and arguments in this Chapter conclude the human body is thus, our most fundamental three-dimensional possession and it should be considered as the core concern as to how we perceive architectural space. This study, which dissects the totality of sensory experience, thus develops a clear understanding of the responsibility of architecture to respond to the body as a subject; in this particular case, the subject of the traditional and universal sense modalities. This insight should enhance and inform the design and construction choices facing future multisensory developments.

## ENGAGING ARCHITECTURE IN ENVIRONMENTAL PERCEPTIONS

*“All the senses have their parts to play – in ugliness or in beauty – but all too often each is considered in isolation. When together, giving the same message, they start to speak of the underlying essence of a place” (Day, 2004: 18).*

*“We may define the ideal outcome of architecture as being that a building should serve as an instrument which mediates all the positive influences and intercepts all the negative influences affecting man[...]A building cannot carry this task unless it is itself finely nuanced as the surrounding in which it stands” (Aalto, 1982 cited in Weston, 1995: 122).*

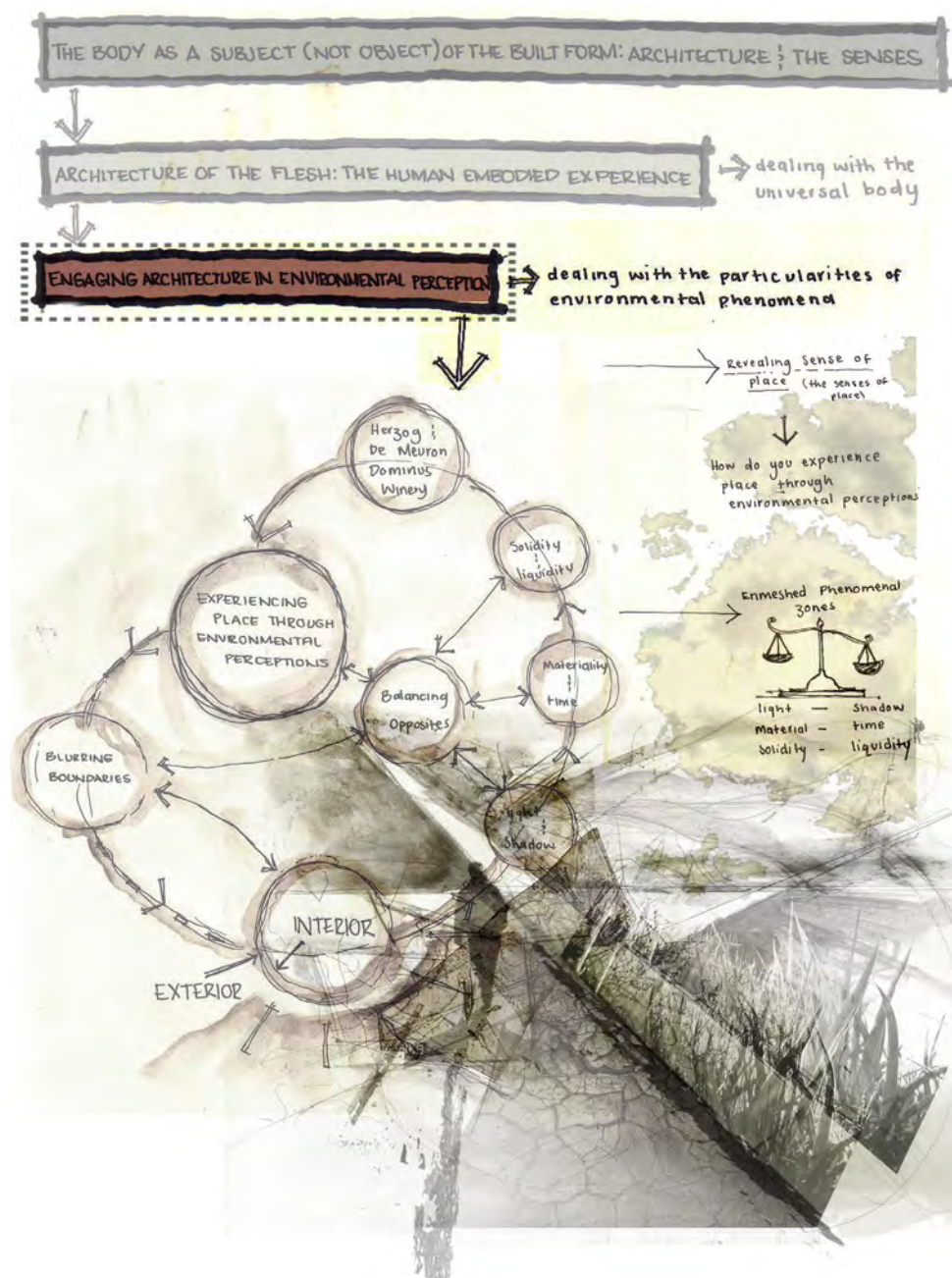


Figure 3.1 – Conceptual overview of the elements dealt with in this Chapter.

### 3.1 Introduction

'Place' has become a fashionable word. Berleant (2003) believes the over-exposed ideology of place is a result of the mass media travel industry. He argues that travel documentaries, cinematic film, national geographic magazines, and architecture journals allow people to experience the visual interpretation of places but fail to include the hidden value, essence or embodied experience of place (Berleant cited in Menin, 2003: 42). According to Lefebvre (1991) this ideology of place is resulting in the slow disappearance of physical and natural perceptions. He argues that natural space, instead of being viewed as the common point of departure, is seen rather as a mere backdrop or décor to stand-alone structures (Lefebvre, 1991: 30). Bloomer & Moore (1977) elaborates on the notions of Lefebvre (1991) by maintaining that contemporary architecture is missing the potential transactions between the active body and the dynamic environment. They believe that in our age of expected comfort - the normality of architecture has manifested itself into a view of architecture as 'inside' - that which is predictable and controlled; and 'outside' - that which is considered volatile and unstable. Bloomer & Moore suggest that this view creates homogenous environments which demand little from us, and consequently gives little in return besides the shelter of a "*cubical cocoon*" (Bloomer and Moore, 1977: 105). Our senses thus become blanketed, or rather they become passive processes as a result of artificial environments as they are not subject to conflicting conditions. In modern culture the 'hostility' of the outside presents itself from within a comfortable, 'untouchable' man-made environment. Our relation with our environment; the very ethos of our being, is therefore, recreational rather than vocational. Tuan (1990) offers an alternative approach to the body and the environment by maintaining the most important existential knowledge does not dwell in theories and vocabulary; it is rather a silent knowledge, that architecture is experienced at the blurred boundary between world and self; interior and exterior. He argues that sensory architecture has the potential to soften this existential boundary so that object and subject experience meaning and embodiment in a place (Tuan, 1990: 38). Place thus refers to more than just a physical location. Relph (1990) reinforces this by stating that: "*Place involves an integration of elements of nature and culture in which each place has its own order and special ensemble which disguises it from the next place*" (Relph, 1990: 3). Berleant (2003) urges architects to consider the human dimension; as it is in the interaction of the subjective body with an engaging environment that place acquires its distinctive meaning and sensual properties (Berleant cited in Menin, 2003: 43).

This Chapter will, therefore, aim to explore the interconnected visual and haptic phenomena which constitute our perceptual understanding of place within architecture by extending sensation from the body to the environment. It will investigate the modes of perception, in which a more concentrated view of the body communicates and derives meaning through intensive, full-sensory encounters with environmental phenomenal zones. It deals, therefore, with the reactions of the body to place, regarding sensations evoked through environmental overlays. The following study will begin by investigating the overall perception of place and examine the specifics of certain phenomena which help in concretising our sensory awareness of place.

### 3.2 Revealing sense of place: Blurring the boundaries

*“The human mind is not some otherworldly essence that comes to house itself inside our physiology. Rather, it is instilled and provoked by the sensorial field itself, induced by the tensions and participations between the human body and the animate earth[...]By acknowledging such links between the inner, psychological world and the perceptual terrain that surrounds us, we begin to turn inside-out, loosening in the psyche from its confinement within a strictly human sphere, freeing sentience to return to the sensible world that contains us”* (Abram, 1996 cited in Franck & Lepori, 2007: 35).

*“A boundary is not that at which something stops, but as the Greeks recognised, the boundary is that, from which something begins its presencing”* (Heidegger, cited in Norberg-Schulz, 1971: 13).

According to Perez-Gomez (1994) the richness of environmental and perceptual diversity is our very existence, it relentlessly envelops us whether in the natural world or the built environment, and often the relationship between the two *“has the power to exhilarate the human organism”* (Perez-Gomez, 1994: 14). Hall (1996) argues that the natural and built world is often viewed as oppositional ‘inside’ and ‘outside’. He articulates that inside refers to a physical location that is somehow separated, physically or symbolically, from another physical location that is exterior to it - outside. The locations of inside and outside, clearly represented in the biology of the body itself - manifested in the ideologies of mental and physical, suggests different psychological orientations toward the world (Hall, 1996 cited in Franck & Lepori, 2007: 19). Johnson (1987) believes that we use spatial and experiential distinction between inside and outside to help structure our understanding of the sense of place (Johnson, 1987: 32). Franck & Lepori (2007) argue this notion posed by Johnson (1987) by questioning the limited perspective a user adopts toward the enclosure that architecture makes when adopting such a defined threshold. They argue that by viewing the inside and outside as a physical boundary, architects restrict the palette of architecture and its potential kinetic influences from the environment. They expand on the views of such a separated and contained ideology, whereby inside is designed for the needs of **occupants** and outside is designed for the needs of **spectators**. Franck & Lepori suggest that a sensuous architecture is not one which so clearly defines the physicality’s of inside and outside; rather it encourages the perceptual merging of both fields in order to broaden the palette and embodied experience of architecture (Franck & Lepori, 2007: 19). This notion is furthered by Zumthor (2010) who maintains that the tension between exterior and interior is a sensuous architectural tool whereby architecture uses materials given to us by the earth and constructs *“a tiny box of it”* (Zumthor, 2010: 45). He states that: *“This threshold, crossing, the tiny loop-hole door, the almost imperceptible transition between inside and outside reveals an incredible sense of place”* (Zumthor, 2010: 45&47).

Leatherbarrow (2002) states that in the first years of the twentieth century, no other architect interconnected the interior setting and the environmental conditioning, of both body and building, more insistently than Frank Lloyd Wright, and no building of his more evoked this language than *The Natural House* (plate 3.1). He considered the notion of a wall not to be a barrier between internal and external forces but rather that the wall allowed an opportunity for spatial extension. This permitted





Frank Lloyd Wright – Natural House

Figure 3.2 (above left) and 3.3 (below left) – sketch showing the extension from interior to exterior and visa versa.  
Plate 3.1 (above) – the integrated approach as a result of recognising the blurred, existential boundary.

an ambiguous barrier between the interior and exterior of the architecture of *The Natural House*. The milieu into which the interior was extended, or with which it was now connected, expanded the architectural realm and allowed Wright a broader spectrum of experiential overlays and environmental materials (Leatherbarrow, 2002 cited in Dodds & Tavenor, 2002: 71). This unclear boundary that Wright established meant that his architecture was no longer restricted to the design of the purely physical built form; the architecture now included the voids outside of built space, forming a relationship between that which was built, and that which was not (represented in figure 3.2 & 3.3). Leatherbarrow (2002) argues that the incorporation of space as an unidentified entity became as important as the fabric of the built form, so that Wright's architecture became a weave of integrated experiences. Leatherbarrow believes that the most striking aspect of Wright's argument about such an enmeshed fabric is the blurred boundary at which he viewed architecture, whereby Wright composed the built form as if in an interior and exterior dialogue, which manifested itself in both an internal and external sensory experience. Leatherbarrow maintains that Wright's architecture has reinforced the concept that spatial ensemble - encapsulating architectural experience - should not be stitched together as separate entities but rather woven, to form a holistic cultural and environmental montage (Leatherbarrow cited in Dodds & Tavenor, 2002: 71).

Davids (2007) argues that Post-Modern and Existential theory has always strongly affirmed the significance of context in achieving a meaningful architectural expression of place. She believes, like Wright, that architecture cannot avoid the product of its place, however, the built form should

reflect more than its contextual identity, it should also be appropriate to, and determined by, its environmental perceptions. She argues that the notion of 'context' cannot be viewed solely as the physical, man-made environment. She reinforces this by stating: "*Context is a dynamic, active, and living entity; it is composed of various layers, people, place, and meaning and forms a lattice of its surroundings*" (Davids, 2007: 48). Berleant (2003) maintains that people are embedded in their world – their life-world (to use an important phenomenological term), whereby a constant exchange takes place between place, body and environment, and he argues that these are so intimately connected that to austere separate them would hinder architectures potential kinetic and engaging characteristics. He reinforces this by stating that we readily speak of an interaction of person and object or person and place, but the term interaction presupposes an initial division that is then bridged. Yet, according to Berleant, in the most basic sense of existence, there is no separation but rather a **fusion** of things usually thought of as discrete entities, such as body and consciousness, culture and organism, inner thought and external world (Berleant cited in Menin, 2003: 272). We may, therefore, understand the setting and role of human life as an integration of embodied person and their embodied environment. Karjalainen (1998) agrees by stating that: "*places provide human beings with a framework for environmental involvement*" (Karjalainen, 1998: 95). He believes that both people and places need to make a contribution in order to render any meaning, whereby "*palpable landscapes and impalpable mindscapes continually intermingle and form internal relations with one another*" (Karjalainen, 1998: 105).

Whether designing in lush and naturally responsive settings or the unsympathetic and grey mass of the cityscape, Wright believed that sense of place is thus revealed in the harmony of the different environmental forces. Furthermore he argued that the relationship between body, architecture, and environment was dependant on how those forces harmonise to create a humanistic embodied experience. Wright maintained that this harmony could be observed in nature, as "*all things harmonize with the whole*" (Wright cited in Dodds & Tavenor, 2002: 272). Places need to be viewed by architects as potential sensory stimulants, or rather that the boundary between inside and outside needs to be blurred, which requires architecture to be looked at through a phenomenological lens that combines intangible phenomenological components of environmental experiences. Franck & Lepori (2007) conclude that senses of place fuse with our sense of being, so much so, that place and human beings are enmeshed, forming a fabric that is particular, concrete, and dense. Connections between the interior and exterior, and the physical and mental, are thus key elements in sensory architecture as they determine the kinetic and engaging experience of the space (Franck & Lepori, 2007: 105).

### 3.2.1 *Experience of place through environmental perceptions*

*"To know a place is to experience that environment. What, then, is it to experience place? What is distinctive about the aesthetic experience of place"* (Berleant, cited in Menin, 2003: 46).



**Blur Building – Diller Scofidio & Renfro**

**Plate 3.2 (above) and 3.3 (below) - show fog as an architectural form-generator, making users of the space physically conscious of their sensations.**

We are inescapably part of a world that incorporates our physical bodies, our personal and communal histories, our social education and practises and, not least, our cultural ethos. Berleant (2003) believes that environmental perception is an integral part to our experience of the aforementioned world, which means that our sensory experience is “*grounded in the very conditions of the natural environment*” (Berleant cited in Menin, 2003: 45). The experience of environmental perception, therefore, needs to be understood as a synaesthetic (involving more than one sense) process, since all the senses are engaged in a homogenous fashion. Porteous (2003), a geographic author, states that environmental experience involves ‘*intimate sensing*’ which includes the haptic sensory system, which not only necessitates the sense of touch but also the subcutaneous perception of surface texture, contour, pressure, temperature, humidity, and visceral sensation (Porteous cited in Menin, 2003: 45) - reinforcing its synaesthetic character. Experience of environmental perception, therefore, engages our full capacity for sensory perception in an interpretation of body and context.



The blur building, designed by Elizabeth Diller and Ricardo Scofidio (also called *'the cloud'*), is an extreme example of using environmental perceptions as an architectural experience as well as a form-generator (plate 3.2), which turns an environmental perception into an aesthetic medium. Barbara (2006) describes the design as an atmosphere whereby water is taken from the lake, filtered and distributed through a high pressure fog system of 32 000 nozzles. The water is atomized into the air forming a 'blurred' inhabitable space (Barbara, 2006: 135). Hill (2003) describes the building as a dynamic play on technological and environmental forces whereby the environment has a direct relation to the architectures changing form. Diller (2003) describes the kinaesthetic and unpredictable nature of the form: On a windy day, the blur building will have a long tail, on a hot and humid day, the mist will expand outwards; while on a day with low humidity, the fog will fall and drift in the direction of the wind; and on a cool day with low humidity, the fog will tend to rise upwards and evaporate. In addition, if the air temperature falls below lake temperature, a convection current will lift the fog (Diller cited in Hill, 2003: 159). Diller and Scofield's vision was to materialise the intangible, making certain things palpable that are usually invisible; constituting an architecture of sensation by stating: "*We wanted to delve into the aesthetics of nothing and engage in a substance without form*" (Diller cited in Hill, 2003: 160). The blur building combines natural and artificial materials but it is made, principally, of an unpredictable and immaterial architectural matter; weather affected by the weather. According to Hill (2003) this forms a consensual dialogue between defined boundaries of interior and exterior; tangible and intangible. The environment created is that of blurred sounds and sights forming sensual and semantic gaps which are dependent on the variable conditions of 'place specific' environment (plate 3.3). He argues this by stating: "*The blur building has two architects, one is the firm of Diller and Scofidio, the other is weather*" (Hill, 2003: 164).

According to Frampton (2002) this drive toward some kind of phenomenological exposure, in part a physical manifestation, in part a metaphysical manifestation, is a constant thread which unites all environmentally sensuous architecture. Seen in this light, architecture becomes a space within which the ubiquitous void may be rendered perceivable, partly through changes of light and climate and partly through the changing percept of space itself (Frampton cited in Dodds and Tavenor, 2002: 306). Hill (2003) concludes by arguing that if architects are conscious of environmental perceptions of place, the architecture is forced to respond, adapt, and stimulate its surroundings as well as actively engage with the users of the space (Hill, 2003: 69).

### 3.3 The enmeshing of phenomenal zones – balancing opposites

*"[...]Our life, this 'intertwining,' is a network of reciprocities (I only know myself through the 'other'); moreover, reality is not reducible to the conventional poles of objectivity and subjectivity, it is a gift to a non-dualistic, embodied consciousness – the whole, experiencing the human body as a synaesthetic receptor"* (Perez-Gomez, 1996: 9).

*“Like every spider with its web, so every subject weaves relationships between itself and particular properties of objects; the many strands are then woven together and finally form the basis the subject’s very existence”* (Jakob von Uexkull, cited in Norberg-Shulz, 1971: 9).

According to Day (2004) architecture which fails to recognise and incorporate the kinetic qualities of environmental perceptions is subject to monotonous and lacklustre environments, whereby users are not made conscious of the sensory and haptic realm. He argues that we become immune to the negative forces in our environment, *“and that is when architecture does the most harm”* (Day, 2004: 17). Our senses thus become dulled and our language and unconscious approach to daily life begins to reflect our surroundings. Franck & Lepori (2007) believe that in order to realise a stimulating and engaging environment our senses need contrast and variety, whereby the user of the space becomes consciously aware of an intangible sense when its ethereal properties are in contradiction. For example, we notice warmth when we come into a warm room from the cold; we notice the intensity of light against the interplay of darkness (Franck & Lepori, 2007: 154). Day (2004) reinforces this notion by maintaining that if sensory qualities are to bring about a stimulating reaction, they need variety – not endlessly the exact room temperature, lighting level, the same view, space or even movement through space (Day, 2004: 83). The notion of interacting environmental perceptions allows the built form to participate in animistic qualities, which injects breath and life into the static nature of architecture.

The next section will thus attempt to dissect the perceptual experience of oppositional segregated phenomena, reinforcing the importance of environmental stimulation and integration. It will aim to highlight how architects can use phenomenological overlays to derive rich and natural embellishments which engage the lived body with environmental sensations.

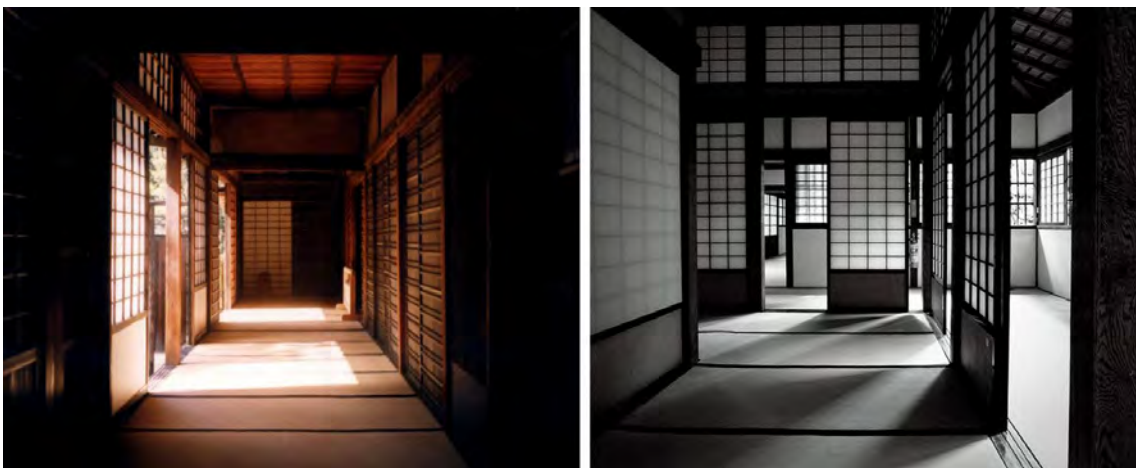
### 3.3.1 *Light and shadow*

*“The perceptual spirit and metaphysical strength of architecture are driven by the quality of light and shadow shaped by solids and voids, by opacities, transparencies and translucencies[...]. What the eye sees and the senses feel in questions of architecture are formed according to conditions of light and shadow”* (Holl, 1996: 63).

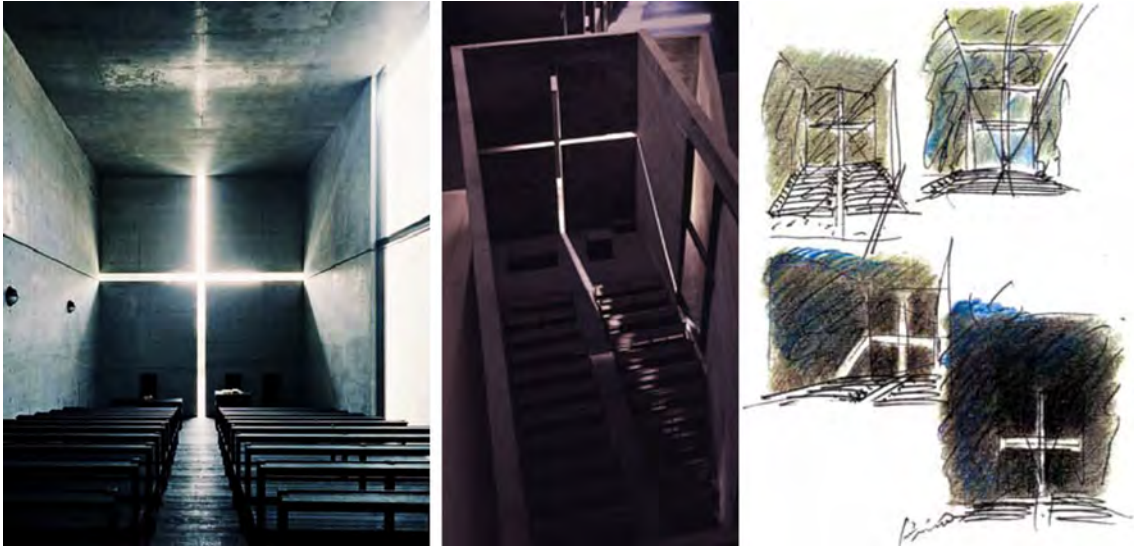
Pallasmaa (2005) argues that our mechanistic culture (outlined in Chapter One of this dissertation), with its production of curtain wall glass facades, has turned light into a mere quantitative matter. He believes the relationship between open and closed, interiority and exteriority, private and public, shadow and light, has lost its ontological meaning, depriving contemporary buildings of intimacy and atmosphere (Pallasmaa, 2005: 47). He states that: *“A culture that seeks to control its citizens is likely to promote the opposite direction of interaction, away from intimate individuality and identification towards public and distant detachment. A society of surveillance is necessarily a society of the voyeuristic and sadistic eye”* (Pallasmaa, 2005: 49). According to Pallasmaa (2005) light is to an architect what colour is to a painter, whereby shadow gives shape and life to an object in light. He poetically describes that in great architectural spaces, *“there is a constant, deep breathing of shadow*

*and light; shadow inhales and illumination exhales the light*” (Pallasmaa, 2005: 46). The absence or suppression of light or darkness is essential to environmental sensory stimulation due to the fact that visual sensitivity weakens, making depth and distance ambiguous. Zumthor (2010) contextualises the above ideas in the practicality of sensory architecture by arguing that light and shadow are to be considered at the genesis of the design conception. He argues that light cannot be seen as an electrical commodity; an afterthought of the design, rather, he proposes two methods of conceiving the materiality of light and shadow. First, he encourages architects to plan the built form as a pure mass of shadow and then, sculpt the light as if one was hollowing out the darkness; *“as if the light were new mass seeping in”* (Zumthor, 2010: 59). Second, he urges architects to pragmatically understand the reflective qualities of materials and surfaces. In other words, to choose materials in the knowledge of the way they reflect and absorb light and to compose enlivened space based on that knowledge (Zumthor, 2010: 59).

Japanese author Tanizaki (1977) compares the participation of all the senses in traditional Japanese architecture to that of Western, ocularcentric architecture. He maintains that Western culture has focused on the extensive use of strong light due to the philosophy that light is a symbolic representation of truth. He argues that in Japanese architecture (plate 3.4 & 3.5), however, darkness lessens the familiarity of space and gives an inhabitant a sense of innocence within that space. Furthermore, he maintains, that as this familiarity weakens, it activates the other senses and increases their sensitivity to participate in the spatial experience, reinforcing the importance of understanding the role perceptions play in engaging with architectural and embodied space. (Tanizaki, 1977 cited in Vesley, 2004: 105). Franck & Lepori (2007) describe Japanese architecture as understanding that light and shadow are not oppositional forces by stating: *“It is not so much the opposite qualities of day and night or the opposing fields of darkness and sunlight that are important, rather it is the sensuous qualities which are revealed through their interplay”* (Franck & Lepori, 2007: 94). Through this relationship architecture becomes animated whereby the lived body and nature participate directly in this animism.



**Traditional Japanese architecture**  
**Plate 3.4 (left) and 3.5 (right) - the intimate use of light and shadow which increases sensory participation.**



Church of the Light – Tadao Ando

Plate 3.6 (left) and 3.7 (middle) - the accentuated meaning and presence achieved through the sculptured use of light and shadow. Figure 3.4 (right) – figure-ground play of the quality of light and shadow.

Tadao Ando's *Church of the Light*, is an example of the phenomenological and sensory use of light and shadow resulting in a symbolic spatial experience. Intense light penetrates the profound darkness of the concrete box (plate 3.6 & 3.7), as the only element of nature in the building; the light is rendered in exceedingly abstract form. According to Foggin (2006), *Church of the Light* is an example of an architect using natural phenomena to enhance the experience of the space whereby light and shadow become form-givers which accentuates its meaning and presence. In essence Foggin argues that light and shadow become a figure-ground play (figure 3.4) where two different oscillating perceptions have equal and opposite weight (Foggin, 2006: 18); which practically articulates the first point made by Zumthor (2010), in which light is encouraged as a sculptural tool. According to Frampton (2002) this basic ambiguity achieved is further activated and diffused by the constantly changing patterns of the sun's rays as they are cast through the cruciform aperture; assuming a kinaesthetic character which places the user in the continuum of time. Frampton maintains that Ando's hypersensitive awareness of the perceptual qualities of place is revealed through his interplay of the dynamic qualities of light as it affects the subjective body (Frampton cited in Dodds & Tavenor, 2002: 307). Ando (2002) comments on the ethereal materiality of Church of the Light by stating: "*I believe that the architectural materials do not end in wood and concrete that have tangible forms, but go beyond to include light and wind which appeal to the senses*" (Ando cited in Dodds & Tavenor, 2002: 307). The use of light and shadow, therefore, enhances the character and meaning of this building and allow an exchange to take place between the body and the built form as the body is made conscious of the kinetic interplay between light and shadow.

Pallasmaa (2007) elaborates the point highlighted by *Church of the Light* by articulating that light tends to be experientially and emotionally absent until it is contained by space, concretised by matter that illuminates it, reinforcing the second point noted by Zumthor (2010) which encourages the



application of light through the properties of physical matter. He encourages architects to use light as a tool which emotionally intensifies a space and which gives light an experiential plasticity, materiality, and heightened presence (Pallasmaa, 2007: 13). Franck & Lepori (2007) conclude the preceding arguments by articulating that viewing light and shadow in dialogue rather than confrontation, and communicating it as a physical substance, will subsequently enliven space with pattern and movement and 'drape' the architecture in sensual qualities (Franck & Lepori, 2007: 95). The phenomenological aspect of light should, therefore, be used as a transparent and embodied substance which brings life and movement and which allows the architecture to be rooted in time.

### 3.3.2 *Materiality and time*

*"Stone used to be more than just stone: it also had meaning. Stone spoke and helped architecture to speak[...]We no longer understand the symbolism of architectural forms. On a Greek or Christian building everything originally had a meaning, gesturing towards a higher order of things"* (Harries, 1997 cited in Hagan, 2001: 80).

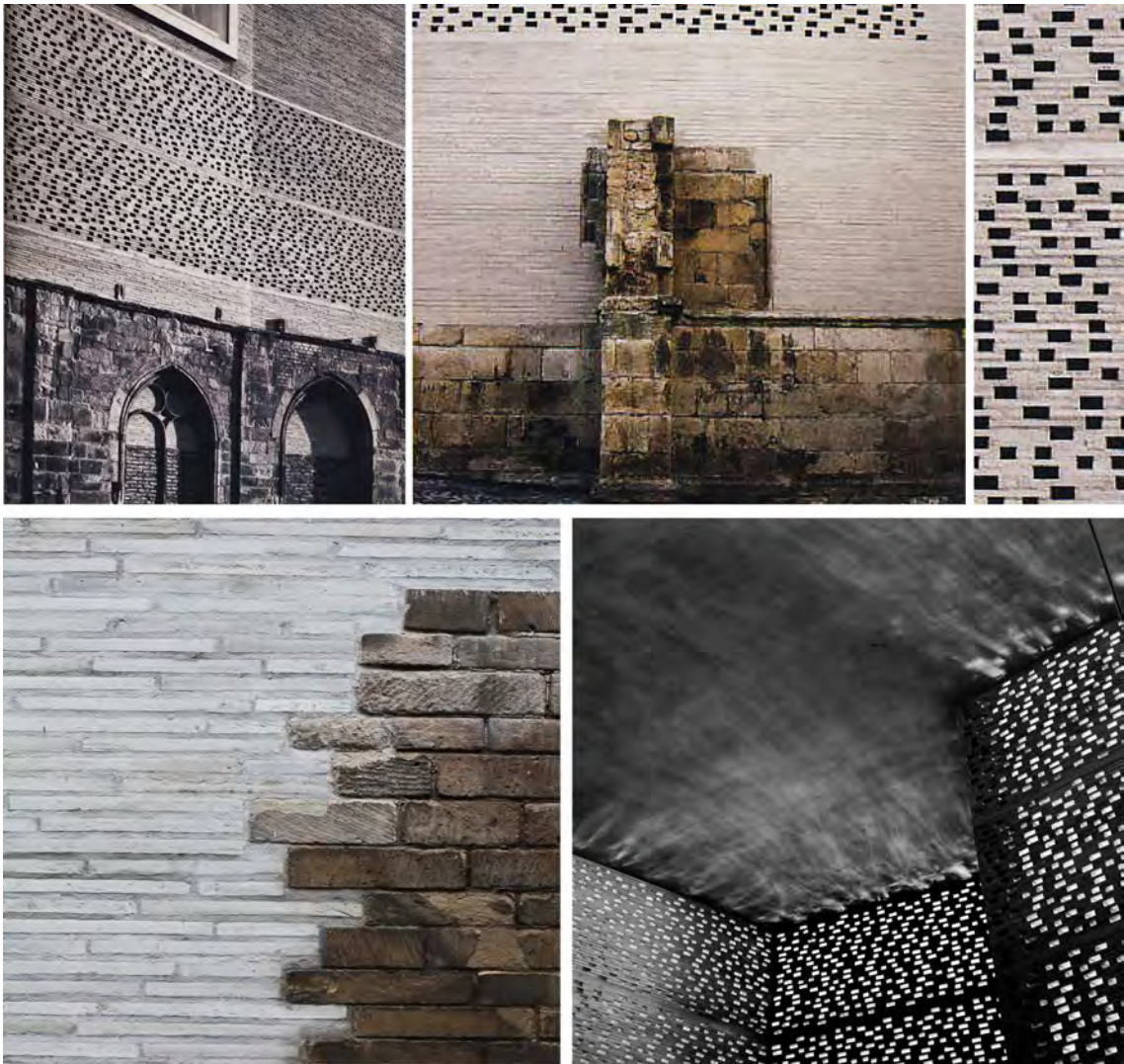
*"The experience of material in architecture is not just visual but tactile, aural, olfactory; it is all of these intertwined within space and our bodily trajectory in time. Perhaps no other realm more directly engages multiple phenomena and sensory experience than the haptic realm"* (Holl, 1996: 16).

Rasmussen (1959) argues that by a variety of sensory experiences man instinctively learns to judge materials according to their weight, solidity, texture, taste, and smell. He maintains that the physicality of architecture enables us to see the passage of tradition and history; however, he believes the materials trapped in the immortality of technology and the utopian view of timeless perfection, leave contemporary buildings devoid of sensory character; without the ability of the material to convey essence or age (Rasmussen, 1959: 15). Pallasmaa (2005) agrees with Rasmussen (1959) by maintaining that materials and surfaces have a language of their own which speak of the specific notions of culture, time, and essence. Furthermore he argues that they serve an important role in the phenomenology of sensory architecture as they have the ability to invoke emotions and unconscious thought. He reinforces this by stating: *"The tactile sense connects us with time and tradition; through marks of touch we shake the hands of countless generations"* (Pallasmaa, 2005: 16). Research into the haptic realm, found in the preceding Chapter of this dissertation, revealed that the skin has the ability to comprehend the nature of the texture, weight, density, and temperature of matter. Holl (1996) argues that unprocessed, natural materials augment this comprehension as they have the ability to express their age and history as well as their anecdote of their birth and human use. He maintains that the use of stone, for example, speaks of its distant geological origins, its durability, and its innate symbolism of permanence; brick has the connotations of earth and fire, and the ageless traditions of construction; bronze is associated with the extreme heat of its manufacture, the ancient processes of casting and the passage of time. Wood has an implication of growth and nature and Holl considers it the material

which is most closely connected to the environment (Holl, 1996: 4). Pallasmaa (2005) agrees with Holl (1996) by maintaining that natural materials speak pleurably of time and allow the user of the space to be subjected to the continuum of time itself as there is no synthetic boundary between material and hand. Natural materials invite sensory stimulation as they allow the hand to penetrate their surfaces and enable the user to become aware of the veracity of matter. He states: “*Sensuous material and the sense of tradition evoke a benevolent experience of natural duration and temporal continuum*” (Pallasmaa, 2005: 17). Holl (1996) furthers this thinking, by claiming the psychic field of time meshed with the attributes of materiality, together with sensory experience presents an architecture of continuous open flux – open to the distant past, to a future that envelopes the past, while the past envelops the future. He refers to time in as the fourth dimension in architecture in which space can be viewed as a continuously altering field (Holl, 1996: 14).

Franck & Lepori (2007) present a point of contention as they maintain that although the use of materials refers to history, to the evolution of tools and technology, their language goes beyond specific periods of time. They believe the qualities that specific materials embody relate to collective ways of feeling, perceiving and responding - irrespective of their production processes. They argue that through their nature, materials send out messages that affect the environment and our embodied experience of it. They state that: “*Materials, rather than just being functional to the creation of goods, buildings, and environments, act upon the quality of our perceptions and experience each with its own particular character and voice*” (Franck & Lepori, 2007: 76). Zumthor (2010) maintains the belief that the composition of material that technology has allowed, gives rise to unique qualities of architecture; whereby the possibility of creating new sensory experiences are endless (Zumthor, 2010: 25). Hagan (2001), however, agrees with the ideas presented by Pallasmaa (2005) and Holl (1996) by arguing that contemporary architecture, through the use of synthetic materials, is struggling against time, seeking to impress rather than accommodate, evoke admiration and awe rather than domesticity and comfort. Hagan maintains that the industrial and commercial forces at work on the ‘products’ for architecture tend towards artificial materials which present an impenetrable boundary between material and the hand. He reinforces this by stating that metals are ‘anodized’ or coated with a synthetic outer finishes, tiles are glazed with coloured synthetic outer polishes, stone, and wood grain is simulated by moulds. He claims that natural materials are losing their essence and honest texture resulting in the removal of reality and the dampening of the senses. He states that: “*Mechanistic materials of today are metamorphosised which makes it less possible to maintain continuity between building, nature, and time*” (Hagan, 2001: 92). Franck & Lepori (2007) again, counter-argue this concept by claiming that contemporary architecture has a powerful ability to transform, adapt, and interchange materials, which has evolved from a world of craft into one of engineering and technology, which does not prevent materials being true to themselves: “*On the contrary, they seem to stretch their original attitudes, sometimes with irony, other times with submission and courage*” (Franck & Lepori, 2007: 77). Franck & Lepori reinforce their beliefs through the demonstration of materiality in the *Cologne Museum*





Peter Zumthor – Cologne Museum

Plate 3.8 (above) - the materiality of the ruins atop which the Museum was built. Plate 3.9 (below left) and 3.10 (below right) - the contemporary use of traditional materials allow the architecture to speak of time and place.

designed by Peter Zumthor (plate 3.8–3.10). The building was designed and built on top of ruins, which incorporates the essence of natural materials with the aid of contemporary science. Carrington (2008) describes the contemporary use of materials as: “*sensuous and enigmatic*” (Carrington, 2008: 80). Davey (2007) argues that Zumthor has managed to capture the essence, or rather, embodiment of the ruins through a tactile application of modified materials. He describes that what appears to be delicate, ceramic tile work - are in fact - unusually long thin bricks, each measuring 36mm thick and varying in length. To ensure a colour, format, bond, and relationship that would be compatible with the existing, traditional materials onsite, Zumthor commissioned new bricks that were hand-made over a two year period. Davey explains that the bricks were burnt in charcoal kilns to produce gentle variations of honey-coloured pale grey to complement the existing structure. The horizontal joints are thick and resemble the construction used in Roman masonry, the era during which the ruins were constructed. The pointing is not quite flush with the mortar, slightly recessed, producing a soft, almost textile-like surface that Davey (2008) states: “*Demands to be touched*” (Davey, 2008: 37). According

to Franck & Lepori (2007) the *Cologne Museum*, and Zumthor's inventiveness in handling materials, showcases the ability of new technology to place materiality in the continuum of time through tactile application. They believe that although the industry is changing the traditional use of materials with plastics that have the transparencies of glass, glass walls that have the strength of brick, and metals that may look like fabric, each material carries an original character that places it in a sensual era of time (Franck & Lepori, 2007: 77).

Materiality in architecture is thus a physical manifestation of the embodiment of time and aids in contributing to a responsive and sensory environment in this evolving world of matter and form. Contemporary sciences and technological advancements cannot be prevented and architecture needs to respond, however, it remains the responsibility of the architect to acknowledge the essence of materiality in accordance with the beliefs of Pallasmaa (2005) and Holl (1996) and apply them in the embodied manner posed by Franck & Lepori (2007) and Zumthor (2010).

### 3.3.3 *Solidity and fluidity*

*"If one is justified in construing Heidegger's notion of dwelling as a metaphor for ability and settlement in space, then one can surely construe water symbols as metaphors for adventure and journey, for an element which lubricates, emancipates, renews and recreates human existence through time"* (Buttimer, 1985 cited in Seamon, 1985: 260).

Water has been mentioned consistently as one of the most potent archetypal mediums as its oppositional constituents are able to complement and, in many ways, enhance the built form. In the view of Smith (2003), water can be experienced as a monochromatic material, seemingly coloured yet colourless yet, he argues, that water remains one of the most universally resonant partnerships with architecture due to its ability to directly influence the dialogue between the built form, the environment, and the body (Smith, 2003: 205). According to Buttimer (1985), at the basic level of sensory experience, water appeals to the whole: it can be seen, felt, smelt, touched, and tasted. He believes that water functions as a magnet and shrine, in whose presence all kinds of communication barriers seem to dissolve (Buttimer, 1985 cited in Seamon, 1985: 263). Holl (1994) agrees with the notions of Smith (2003) and Buttimer (1985) by comparing water to that of a '*phenomenal lens*' due to its transformative properties of reflection, spatial reverse, refraction, and the transformation of rays of light (Holl, 1994: 80).

Luis Barragan is an architect well known for his exploration of the sensuous relationship between the solidarity and rigidity of the built form and the movement and unpredictable nature of water. According to Burri (2000), Barragan's architecture is immediately evident in the ripples of the water and the effect is in constant flux due to the changing environmental conditions. He states that: *"One becomes physically aware of the manifestations of the senses when experiencing Barragan's architecture"* (Burri, 2000: 42). Burri further argues that Barragan achieves this by using the environmental phenomena of water as a form of building material; and that he incorporated a



Luis Barragan – San Cristobal stables  
Plate 3.11 (above) and 3.12 (below) - the interplay of kinetic form achieved through the use of water.

‘physical’ material so intimately into his architecture that the boundary between man-made and natural becomes blurred. He states that often Barragan’s architecture is more beautiful and prominent when seen in the reflection of the water, as can be seen at the *San Cristobal stables* (plate 3.11 & 3.12). Its constantly changing form makes the building interplay with its context and “*come to life*” (Burri, 2002: 44).

Holl (1994) urges architects to consider water as an important architectural material for its ability to provide soft, vibrating, reflecting, moving, and signing volumes and surfaces (Holl, 1994: 83). Patterns of moving water on the built form, as well as its complimentary reflection, should be viewed as an environmental and architectural aesthetic which has the ability to exhilarate the human senses. Architecture is thus not limited to ‘solid’ materials; sensitivity to the possibilities inherent in waters unique features will help architects to design distinctive, authentic, and stimulating spaces.

### 3.4 Animistic nature of environmental variations

Architecture is given life by all the qualities that touch and affect the human senses; incorporation of environmental sensations increase the built form’s sensory palette and potential active encounters. Franck & Lepori (2007) articulate this by stating: “*If the functional nourishes our physical needs, the poetic nourishes our soul. If the former relates to people and objects as machines, the latter relates to living human beings*” (Franck & Lepori, 2007: 74). They further argue that kinetic environmental qualities such as light and shadow; materiality and time; and solidity and fluidity - within the realm of architecture, engage with the body that feels through its senses, and that, through experiences, reconnects the body to nature and the collective whole to which it belongs (Franck & Lepori, 2007: 75). Day (2004) argues that in every aspect of life there are two extreme ways of meeting: conversation or confrontation. Environmental variations, therefore, need to be able to adapt without compromising their essential nature in order to remain in a state of consensual sensory dialogue with one another (Day, 2004: 84). Holl (1996) claims that if architecture recognises this balance then it promises intimate contact with shifting, changing, merging materials, textures, colours, and light in an enmeshed continuum of space, time and unique sensory experiences (Holl, 1996: 48).



### 3.5 An example using Herzog & de Meuron Dominus Winery

*“The Dominus Winery serves as the ultimate endorsement of affirming appropriate materials as architectures vehicle of expression which roots the building upon the earth from which it is built”* (Ursprung, 2002: 137).

This building was chosen to be reviewed due to its mention by various authors included in this Chapter who accumulatively argue its responsive nature toward environmental perceptions, and its integrative disposition of interior and exterior. It was designed by Herzog & de Meuron who have been cognitive of the substance of nature’s senses in order to create a meaningful response to the site and the body. Betsky (1998) maintains that the architecture of Dominus Winery is respectful of its surrounding natural materials, climatic conditions, and phenomenal zones whilst still maintaining a meaningful modern front (Betsky, 1998: 24), and therefore encapsulates the majority of the research gathered in this Chapter.



Plate 3.13 – Dominus Winery: Herzog and de Meuron

#### The architecture of Dominus Winery

The Dominus Estate is located east of San Francisco in Yountville, California which is part of the infamous Napa Valley region, renowned for its wine industry. According to Betsky (1998) many of the Californian vineyards pander to the public with extravagant roadside buildings which merely put on an unconvincing facade to evoke an ‘olde worlde’. She argues that the Dominus Winery, however, assumes a different posture, whereby the simple rectangular form is designed to disappear into the landscape and not to compete with the local natural beauty. Betsky maintains that the primary intention of the architecture was to extend the boundaries between interior and exterior and use the natural phenomena as design generators to enhance the kinetic experience of the space. She further argues that in doing so the architecture responds to the animistic nature of the human embodied disposition, which has been achieved through Herzog & de Meuron acknowledging that human experience is not a static or passive process. They have, therefore, **created** a dynamic and enlivened space which subsequently invites and intensifies sensory engagement (Betsky. 1998: 24).

### An overview of the architects

According to Moueix (2004), the owner of the Estate, the winery appears as it is: almost invisible, absorbed into the soil and the surrounding hills (plate 3.13), but nonetheless very present. Moueix decided on Herzog & de Meuron as the project architects due to their intimate and physical approach with the relationship between environmental associations and the built form; whereby the body, architecture, and the environment engage in a symbiotic and dialogical interaction. He reinforces this by stating: *“The building is in a constant dialogue with the environment, and it is this dialogue that gives meaning to the construction”* (Moueix cited in Moneo, 2004: 396). Moueix further rationalises his choice of architects by arguing that Herzog & de Meuron understood the phenomenological essence of the functional aspect of a winery; whereby they concluded that the architecture should incorporate natural phenomena as its source of materials just as wine relies on these same phenomena for its growth, and ultimately – its taste. With this understanding the architects further recognised the need to respect and interpret the land into the built form, hence the basalt stones used for construction, which was brought from a neighbouring valley as they wanted the architecture to birth from the same soil used to produce the wines. Most of all, Moueix argues, that Herzog & de Meuron understood how important experiential sensory space was; just as wine is dependent on the reaction of all the senses, the architecture of Dominus Winery incorporates and expresses this philosophy by actively engaging with the body, the environment, and the architecture (Moueix cited in Ursprung, 2002: 138 & 139).



Dominus Winery - Herzog and de Meuron

Figure 3.5 - Ground floor plan showing integrative approach between ‘inside’ and ‘outside’.



### Blurring the boundaries

Jacques Herzog, one of the partners of Herzog & de Meuron - and principal agent of the project - describes an old path which stretches through the vineyard, creating a void where the Californian concepts of interior and exterior are confused or rather; blurred. This 'site specific' idea subsequently provided the conceptual basis for the design, and is clearly represented in the ground floor plan (figure 3.5), which illustrates the concept of extending architectural matter to include environmental perceptions. This notion is translated into the wall construction whereby the transparency of the caged rock allows the building to 'breathe', and remains in a state of continuous open flux with the environment (plate 3.16). Herzog argues that throughout the building one can not only see - but interact with the landscape and thus the boundaries between interior and exterior become impalpable resulting in a phenomenological spatial experience. This, again, is clearly represented in the ground



Dominus Winery - Herzog and de Meuron

Figure 3.6 – Section through basalt stone wall, showing its method of construction in order to achieve an ethereal boundary.

floor plan (figure 3.5) whereby the building is designed as an extension of its natural context. Herzog argues that the boundaries of built space are commonly known as floor, wall and ceiling. Similarly the boundaries of landscape consist of ground, horizon, and sky. The enclosing properties of the Dominus Winery, therefore, are determined by its infinite openings and the meaning of movement through these transitional spaces is dependent on the enmeshing of the phenomenal zones (plate 3.15). Herzog describes that the embodied experience of the building is, therefore, encountered as a progression of environmental forces which intertwine to create a holistic encounter; the inside is thus experienced as a compliment of the outside (Herzog cited in Moneo, 2004: 397).

### Enmeshed phenomenal zones

According to Ursprung (2002) the full animistic dimensions of the building can only be wholly appreciated when the sunlight filters in, producing a vivid and changing plane of shadows and light (plate 3.14 & 3.15). He argues that the building is a “*cosmic clock inside which we witness the passage of time and learn to appreciate the moment*” (Ursprung, 2002: 137). This intention of Herzog & de Meuron is revealed in the differing size of stones used in the construction of the basalt wall, which produces a variation of light effects that playfully enhance the character of the building and allow an exchange to take place between building, the environmental perceptions, and the body. This embodied exchange is achieved through the differing size of the mesh and stones it restrains which becomes



Dominus Winery - Herzog and de Meuron  
Plate 3.14 (above left and right) - kinetic use of light and shadow as a result of stone wall. Plate 3.15 (below left) - corridor space open to environmental phenomena. Plate 3.16 (below right) - construction of basalt stone wall.



larger further up the basalt stone wall (figure 3.6), and intensifies the active nature of the irregular patterns of light as it is constantly changing depending on the time of day and season of the year. Ursprung argues that the overall aesthetic and embodied experience of the space is reliant upon the unpredictable nature of environmental materials whereby the predetermined character of architectural experience is reduced (Ursprung, 2002: 139). Herzog (2004) describes the sensual aspects of the basalt stone used throughout the building, as achieving not only a sense of contextual identity but also a strong olfactory and tactile dimension, concretising the architecture in the vital components of wine-making. The choice of basalt stone, according to Herzog, was pivotal, as it allows the building to age without becoming outmoded, which furthermore incorporates the beliefs of the wine-making industry (Herzog cited in Moneo, 2004: 398). The use of natural materials in a contemporary assembly coupled with the kinetic use of light and shadow is an example of the intimate relationship achieved through blending the intangible elements of environmental perceptions and the concrete nature of architecture, which actively engages with body as the senses are subject to variety and contrast.

### Summary

According to Moneo (2004) the Dominus Winery remains a unique interpretation of blending the materials of the environment and architecture to create a heterogeneous building fabric that allows for a broader experiential sensory palette. Moueix, the owner of the winery, believes that wine-making is informed by the particulars of place: Herzog & de Meuron seem to have adapted the sensory principles of wine to reflect in the experience of the architecture through understanding the qualities of both physical and ethereal architectural matter. Moueix maintains that the Dominus Winery manages to blur the boundary between interior and exterior by using the natural phenomena to define and enhance the experience of the space. The architectural encounter is, therefore, dependent upon the dynamic qualities of the environment which allows users to experience the essence or variable specificities of place. Moneo maintains that like the transformative process of wine-making Herzog & de Meuron have appeared to elevate the most unassuming of raw materials into an architecture which is both functional and experiential, robust and delicate, tactile and highly abstract. He describes the building, like the wine it houses: a refined blend of science and art. While highly rational, efficient, and intelligent, Dominus Winery is also a sensuous fusion of nature and the man-made (Moneo, 2004: 398). Moueix reinforces this by concluding: *“They [Herzog and de Meuron] created, within the visible block, a complex and elegant structure, which allows itself to be discovered, like a wine”* (cited in Ursprung, 2002: 139).

### 3.6 Conclusion

Lefebvre (1991) initiated the need for the research of this Chapter by highlighting that contemporary, homogenised architecture fails to incorporate the essence of place, resulting in predictable environments

whereby the spatial and sensory experience remains static and disengaging (Lefebvre, 1991: 30). The proceeding arguments, which have been critically analysed throughout this Chapter, have counter-argued the principles of sensorially inhibited architecture and have given light to a kinetic way of incorporating environmental sensations through overlapping opposing phenomena. Holl (1994), a large contributor to this research, argued that by weaving environmental inconsistencies such as light and materials - architecture can elevate the sensory experience of daily life through various phenomena that emerge from our surroundings. He argued that intertwining the fabrication of architectural and environmental schemata negates us to move through space, as the mysteries of unfolding fields of overlapping perspectives are charged with a range of sensory qualities, which imbue the experience in variety and animism.

Discussions and arguments presented in this Chapter, as well as the example of Herzog & de Meuron's Dominus Winery, conclude that the kinetic characteristics of environmental perceptions can be shaped, contrasted, and combined to make buildings which enliven and sensitize space. The oppositional forces of inside and outside; light and shadow; materiality and time; and solidity and fluidity are complementary; whereby each exists by virtue of the other. Franck & Lepori (2007) argued the importance of understanding contradictory environmental forces, and what they stand for, so as not to be treated as oppositional, but as mutually defining. They argued that in doing so the built form transforms and extends the traditional five sense modalities to include those of the environment in order to embody architecture in both place and body (Franck & Lepori, 2007: 14 & 15). This allows for a more sensuous approach as it treats environmental phenomena as animate materials in architecture, evoking a sensory and kinaesthetic experience. Holl (1994) reinforces this ideology by stating that we experience architectural spaces as a *"kaleidoscope of kinetics teeming with varying degree of light and dark, the rise and fall of colour saturation, vibrations of growth and decay and, the essential ingredient and possibly the most diverse; human beings living out their daily existence"* (Holl, 1994: 35). This notion encourages architects to understand that while the body engages in inner mental phenomena as an inward awareness, the body simultaneously engages in outward physical phenomena, which is reinforced by Holl (1996) who states: *"Contemporary architecture has the power to be both artistic and humanistic. This humanism fuses the subjective and objective lives, intertwining inner and outer feelings, inner and outer thought, into a phenomena-inspired reformation of vision through building"* (Holl, 1996: 48). Phenomenology, as has been established, concerns the study of essences; it is thus ascertained through the research that by acknowledging environmental phenomena as an architectural material, the built form has the potential to put essences back into existence, whereby the architecture becomes embodied by its sensorially enlivened environmental context. The infusion of the sensory materiality of the built form fused with the kinetic qualities of environmental sensations, can reintroduce essential, intrinsic meanings and values to the sensory and embodied experiences of body and place.

## THE PRESENCE AND MEANING OF OUR SIXTH SENSE IN ARCHITECTURE

*“Mans sensory perceptions are abundant and overwhelming. He cannot attend to them all at once. In great part a given culture teaches him one way or another way of productive specialization. It brings him to organize his sensorium by attending to some types of perception more than others, by making an issue of certain ones while relatively neglecting others. Given sufficient knowledge of the sensorium exploited within a specific culture, one could probably define the culture as a whole in virtually all its aspects” (Howes, 1991: 28).*

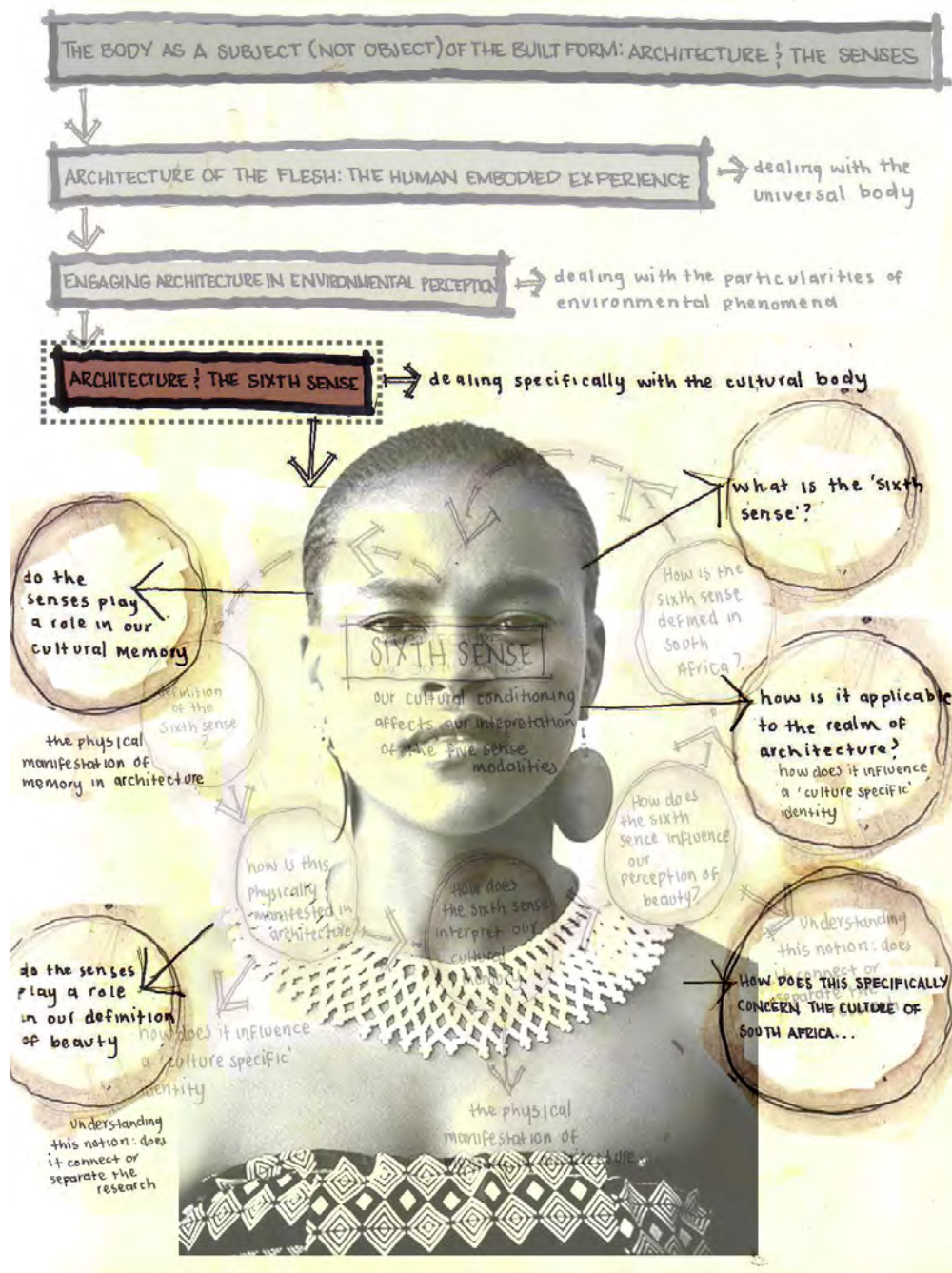


Figure 4.1 – Conceptual overview of the elements dealt with in this Chapter.



## 4.1 Introduction

*“The perceptual is cultural[...]and not simply (as psychologists and neuroscientists would have it) a matter of cognitive processes or neurological mechanisms located in the individual subject”* (Howes, 2005: 1).

In contemporary Western cultures (or at least in a Euro-American context), the five senses are usually considered to mean the five modalities of sight, hearing, taste, touch, and smell. Our taxonomy of the senses is predominantly organ based resulting in the act of perception directly correlating to how we apprehend external stimuli; whereby we treat the domain of sensation and perception as definitively pre-cultural and eminently natural. In-depth research into the discipline of sensory studies postulates a similar sensory response between humans and other mammals, assuming then, that any development of cultural conditioning (whereby individuals ascertain specific internal values), would be inconsequential. Pallasmaa (2007) argues this world view of ‘naive realism’ takes for granted that the human senses are biologically determined and automatic functions that *“mediate a predefined perception of an objectified world”* (Pallasmaa, 2007: 9). Yet, he believes, that reality itself, as well as the way we perceive, interpret, and prioritise our perceptions, are all products of our cultural identity, whereby specific cultural attributes, which have been associated with that culture as a result of tradition and history, orientate the manner in which we individually perceive the world (Pallasmaa, 2007: 9). Geurts (2002), who works in the field of anthropology, builds on the notions of Pallasmaa (2007) by maintaining that the distinctive nature of a given cultures sensory order is one of the first and most basic elements of making ourselves human and - the emotive response to meaning and memory, as a result of perception - is a defining factor between humans and mammals and is, therefore, a fundamental aspect of humanistic principles and sensory studies (Geurts, 2002: 5). This concept is furthered by Roth (2007) who argues that the most basic concept of the human mind is that it is programmed to seek meaning and significance in all sensory information that is sent to it in order to interpret all information received into a meaningful pattern. He maintains that the mind does not interpret incoming data as signifying nothing; therefore our perception is based on how we identify and interpret the meaning of certain sensations (Roth, 2007: 67). This presupposes that to view the universal reactions of the ‘flesh’ body as a subject of architecture (dealt with in Chapter Two of this dissertation), is not an adequate representation of the senses; a notion which encourages architects to further understand the body’s social and cultural sensory conditioning, which delineates the universal body according to the particulars of a given culture. Franck & Lepori (2007) elaborate on this ideology by describing their view of the ‘flesh’ or biological body as mutually defined and intrinsically intertwined with the cultural body - a synergetic double helix. They argue that before birth, our parents anticipate what we shall be like, what we shall do and they are part of a culture which shapes those expectations. When we are born we are immediately dressed, held, washed, and fed in a way that is particular to our cultural orientation, historical period and material objects. As we grow up, our culture continues to shape our bodies to the point where our needs, movements and sensations are as much a cultural

as a natural phenomena (Franck & Lepori, 2007: 49). Howes (1991) argues that now, more than ever, architects need to be made aware of a cultures sensory orientation - the way a specific culture interprets and organises their human embodied and environmental perceptions - in order for architects to understand the sensory apparatus as an operational complex. He maintains that failure to recognise the complex nature of sensory doctrine will further dilute our cultural characteristics, as individuals adopt principles of a globalized culture, resulting in the loss of markers of identity (Howes, 1991: 28). Franck & Lepori (2007) further the need of this study by setting the framework of our current contemporary thinking: *“We are encouraged to forsake the values of our own cultures in order to adopt those of the transitional culture of architecture, which is largely Western with its allegiance to the objectified model of knowledge and principles of design that are expected to be universal in their application”* (Franck & Lepori, 2007: 29).

In order to contextualise the content of this study, a reintroduction of the term ‘culture’ needs to be established. The ‘cultural body’ is understood, or rather, framed through socio-cultural and political practises and is, therefore, interpreted according to the belief system of different bodies of society - resulting in the body as a marker of identity. The term is broadly applied, and refers to the core orientation system specific to a group of individuals. This concept is illustrated clearly in figure 1.1 located in Chapter One of this dissertation, which outlines the paradigms of the body in the form of Matryoshka dolls, whereby the cultural body is viewed as the nucleus, or rather the heart, of the universal body. This Chapter, therefore, will be concerned with some of the constructed generalisations about the nature and boundaries of what we refer to as ‘the senses’, while simultaneously depicting how sensation functions in relation to perception, meaning, memory, identity, beauty, and lastly – how they relate to the whole.

## 4.2 Understanding our sixth sense

*“The senses interact with each other first, before they give us access to the world; hence, the first step, the indispensable starting point, is to discover what sorts of relations between the senses a culture considers proper”* (Sharon, 1978 cited in Howes, 1991: 258).

Geurts (2002) believes that the Westernised notion of the five ‘branded’ senses is a folk ideology. In her view cultural meaning and identity cannot be removed from the basic layering of perceptions, as she believes, it forms the indispensable foundation upon which we retain sensory memory and upon which we navigate our sense of beauty. She argues that more than one hundred years of research, regarding anthropological perception, has provided an understanding that cultural perception need to be considered the ‘sixth sense’ as the preceding five senses are made to be shaped by culture and the meanings it pertains (Geurts, 2002: 231-234). Serres (2008), a French philosopher who studies the writings of ancient Greeks, Descartes, and Leibniz and other substantial apparitions - identifies that this notion of an authoritative and culturally determined sense was first outlined by Aristotle who

suggested the necessity for a kind of sixth, quasi-sense, the *sensus communis*, the function of which was to mediate between the other five senses. This '*metasense*' which, as Serres observes, was heavily debated by Scholastic philosophers of the Middle Ages who argued that the combination of the senses and the cultural body is the principal means whereby the body merges with the world and with itself (Serres, 2008: 3). Pallasmaa (2007) identifies that this Medieval philosophy defined this unifying sense as the sense of *selfhood* (Pallasmaa, 2007: 10), which is reinforced by Merleau-Ponty's (1962) belief that perception begins in the body and ends in the object rather than the other way around - reinforcing the "*behavioural environment of self*" (Merleau-Ponty 1962 cited in Geurts, 2002: 15). Howes (1991) affirms the notion that senses are culturally determined by establishing the concept of a 'sense hierarchy' or 'sense ratio' which outlines that the senses, which are elevated or emphasised by one culture may not be considered culturally definable by another, as every culture strikes its own balance among the senses, through centuries of cultural tradition. Furthermore he maintains that when we examine the meanings associated with various sensory faculties and sensations particular to each culture we find the **essence** or valued identity of that culture (Howes, 1991: 258). He further delineates that together, these sensory meanings and values form the sensory model espoused by a society, according to which the members of that society '*make sense*' of the world, or translate their sensory perceptions and concepts into a particular 'worldview.' (Howes, 2005: 1). Geurts (2002) reinforces this by arguing that the sensory orientation in which one is conditioned, continues to sustain a feeling, an idea, or a sense of belonging to that particular culture, whereby ways of perceiving and apprehending the material world are formed through "*the symbolic mediation of experience*" (Geurts, 2002: 8). Furthermore she argues that they "*are so deeply inscribed, so durably instilled, that they are unconscious, habitual, and literally 'made body'*" (Geurts, 2002: 9). We are, in some way, a product of our mothers and fathers in the same way that we are a product of our cultural heritage and identity which is culturally, socially, and politically inscribed.

This idea directly relates to the concept of cultural phenomenology which focuses on how embodied sensory experience; thought, feeling, and psychological orientation all interrelate to imbue cultural meaning into an architectural encounter. Geurts (2002) encourages us to think about the sixth sense as a term that unites individual sensory experience with perception, thought, cultural meaning, and social interaction. She states: "*I am therefore suggesting that a sensibility is a field where habituated bodily sensations link to individual feelings, attitudes, orientations, and perceptions and finally to cultural themes, motifs, and ethos*" (Geurts, 2002: 17). It is, therefore, imperative that the sixth, unifying sense be recognised as an establish sense modality which guides our interpretation of the built form and allows the users to associate orientation and meaning to the physicality and sensory nature of architecture.

### 4.3 The sixth sense and its cultural meaning in architecture

*“Dwelling in an existential sense, is the purpose of architecture. Man dwells when he can orientate himself within and identify himself with an environment, or, in short, when he experiences the environment as meaningful”* (Norberg-Shulz, 1991: 5).

Bloomer & Moore (1977) contextualise the concept of a culturally determined sense in architecture by suggesting that architects should not only concern themselves with outer-directed senses - as this would encourage the notion that the outside world is superior to the inside world - a notion, which they believe, is quantitatively correct but experientially incorrect. They reinforce this by stating:

*“The personal world of the body is a redoubt, a place to turn toward. If it is suppressed or emptied of meaning and memory in architecture, how can it effectively react to external stimuli? To diminish the importance of the body’s internal values is to diminish our opportunity to make responses that remind us of our personal identity”* (Bloomer & Moore, 1977: 49).

Howes (1991) maintains that in order for architecture to affirm its values in cultural perceptions the designer needs to intimately understand how the patterning of sense experience transfers from one culture to the next, in accordance with the meaning and emphasis attached to each modality of perception (Howes, 1991: 27). According to Hall (1966), human activities and cultural perceptions need not be a burden as the modern phrase ‘function’ suggests. Instead, he believes, that patterns of human actions and experience should help to inspire the creation of form, space and aesthetic. He argues that architects should recognize and celebrate the connection between the belief system of our cultural body’s, the sensory and physical attributes of surroundings, and our individual perceptions in order to gain cultural and sensory values, whereby the architecture is made not only particular to the site, but the biological and cultural bodies that use and associate with the space (Hall, 1966: 38-39).

According to Psarra (2009), the experience of architectural form and space expresses meaning (whether intended or not), and therefore, the utilization of culturally determined architectural form and space becomes essential when creating a meaningful sensory experience for the user. Provoking insight and reflection that collates the senses, prevents architecture from becoming homogenized, and allows the building to become ‘culturally embodied’ rather than a prototype of regional identity (Psarra, 2009: 233). Geurts (2002) outlines this notion by concluding that the embodied form of cultural meaning constitutes a vital aspect of people’s sense of identity which is imperative in creating spaces which exude existential and cultural metaphors (Geurts, 2002: 7). Our sixth sense is, therefore, that which concretises the way we internally perceive external stimuli and allows architecture to further accommodate the specificities of the ‘universal’ body.

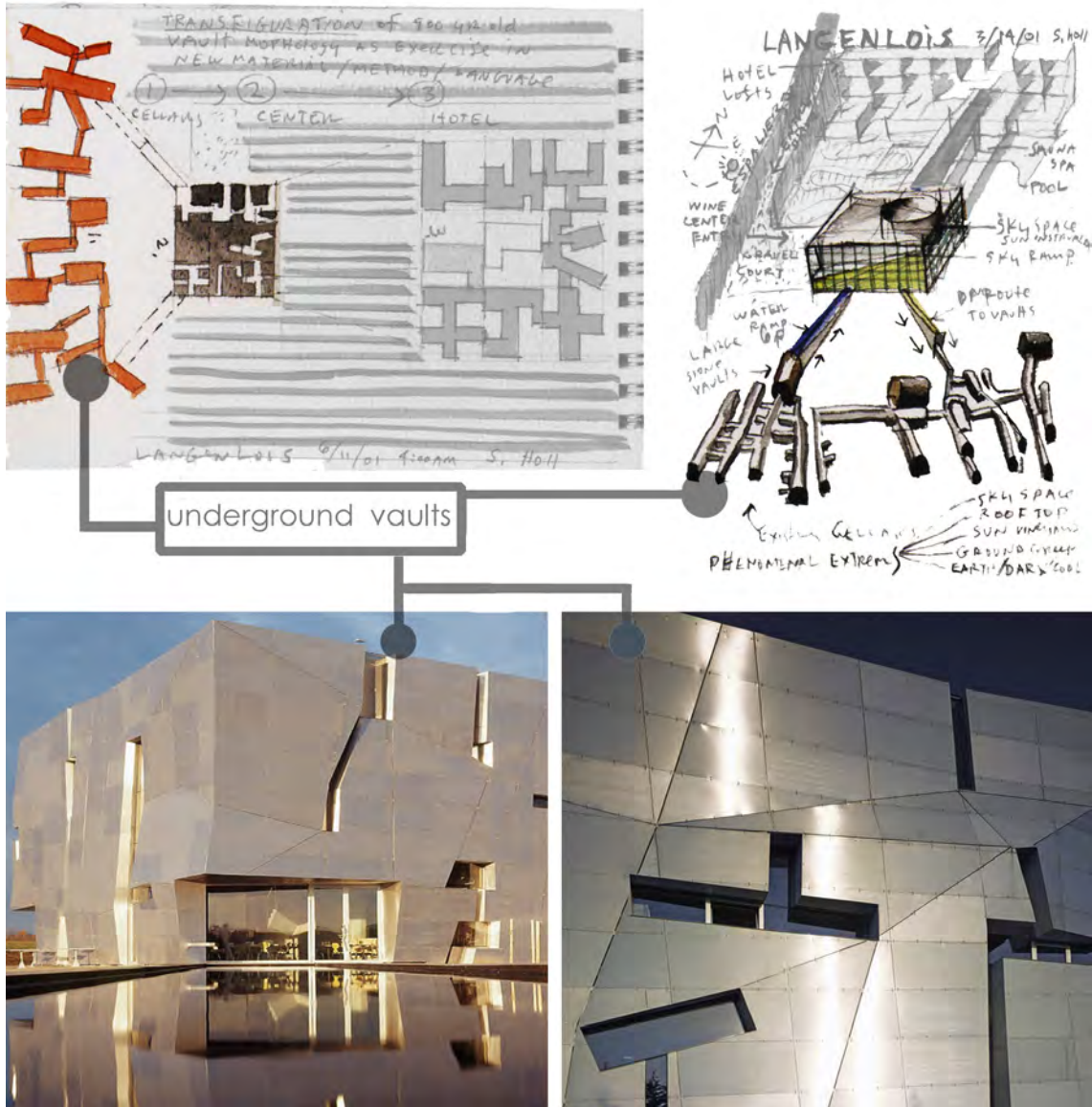
#### 4.3.1 Our ‘sense’ of identity in architecture

The word ‘sense’ has notably been put in inverted commas in order to acknowledge that sense does not merely refer to a general conscious awareness, but rather that it forms part of the physical manifestation

of our sixth sense. Norberg-Schulz (1986) argues that human life has always been related to things and places and that human beings possess a sense of belonging to and identity with these places (Norber-Schulz, 1986: 12). Jencks (1995) agrees with this notion by arguing that: “*Architecture is ‘built meaning’. We may speak or write our thoughts[...]but architecture reveals what we believe, how we want to live[...]It fatefully expresses who we are*” (Jencks, 1995: 13). These ideologies, however, pertain to a generalized theory of identity - not withholding any specific relations to sensory acknowledgement. Rapoport (1969) contextualizes the beliefs of both Norberg-Schulz (1986) and Jencks (1995) in sensory principles by highlighting the inconsistency produced by vague concepts of identity. He argues that regional and local identities are often thought to be defined by climate, topography and buildings materials. Rapoport argues, however, that many regions with the same climate, topography and building materials produce an architectural identity of a very different nature. He claims that there are other, more important, forces to consider such as social, cultural and religious influences - which all in turn define our sensory understanding (Rapoport, 1969 cited in Davids, 2007: 47). Geurts (2002) again reinforces the importance of the study of the ‘*extrasensory perception*’ (sixth sense) within a cultural framework in order to frame a cultural identity of a material reality. She argues that this cultural identity - based on perception - is a vital aspect of an individual’s sense of identity, as the notion of the sixth sense includes ideas and experiences of being-in-the-world (Geurts, 2002: 13).

This concept is clearly represented in Steven Holl’s *Loisium Winery* which, according to Hart (2005), is often mistaken for a cultural institution as the building is embedded in ‘sensory specific’ notions of identity. Hart maintains that the challenge of developing an architectural vocabulary, which was specific to the culture in which it was located, inspired Holl and his team to immerse themselves in understanding the context of cultural identity and meaning through evaluating the ‘sensory orientation’ of the main users of the space. The result of which, according to Hart, is a building which ‘*makes sense*’, a building which recognises cultural, environmental and humanistic design principles in which Hart describes as: “*intimately bonded to its surroundings in every sense of the word*” (Hart, 2005: 143). Holl identified - through interviews with the locals and through research into the town’s history - that the site was located atop underground vaults, where for 900 years wine had been laid down (figure 4.2 & 4.3). The network of underground vaults and passageways runs 100 meters to the edge of the town, and their layout and meaning generated Holl’s central design concept (Stungo, 2003: 38). The idea was to develop a didactic approach which explored the visual as well as experiential representation of their findings. This involved the participation of all the senses, to make this ‘cellar world’ (which was largely part of the towns cultural context) accessible to the architectural formation. The result is a shiny metal-clad box (plate 4.1 and 4.2) whose irregular facades are not directly inspired by the local vernacular, but rather are imbued with a narrative to the town’s identity, which allows the building to respond to its cultural perceptions (McGuirk, 2003: 21). The architecture’s genesis is as a result of understanding the specific conditions of the culture, whereby, sited anywhere else, this building would not, as Hart (2005) describes, “*make sense*”.





Loisium Winery – Steven Holl

Figure 4.2 (above left) and 4.3 (above right) - the preliminary sketches showing the underground vaults with which the culture of this town identified with. Plate 4.1 (left) and 4.2 (right) - the translation of the cultural understanding in the treatment of the facades.

The architectural expression (both visual and experiential) of identity - which is ground in, and navigated by cultures sensory principles - narrates what the design *speaks of*; that which is made relevant through materials, representational forms, and expressive spaces (factors which have been considered in Chapters One and Two of this dissertation). Psarra (2009) reinforces that our ‘sense’ of cultural identity concerns the semantic meaning of the built form and places, and the contribution of architecture to the expression of social and cultural messages. Furthermore, Psarra suggests that architecture participates in meaning and identity through the ordering of spaces and social relationships, whereby abstract layers of cultural meaning and memory allow architects to arrange conceptual and perceptual layers of identity (Psarra, 2009: 2). Lawson (2001) summarizes the above by stating that space - and consequently that which encloses it - are much more central to all of us in our everyday lives than purely technical, aesthetic or even semiotic interpretation would suggest. He

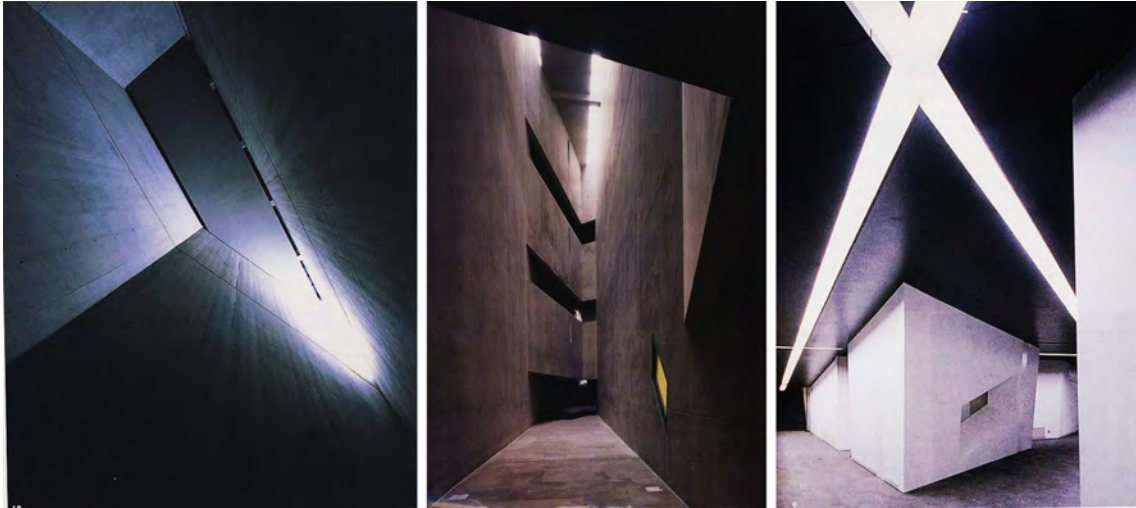
believes that the formation of sensory architectural identity is the very fundamental, universal form of communication. He defines this as “*the human language of space*” (Lawson, 2001: 6) and argues that whilst it has its cultural variations; architecture has the ability to make people aware of those cultural variations through responding to their cultural perceptions based on memory. Architectural identity, with reference to the senses, is thus based on the understanding of our sixth sense which is activated through our cultural and tactile memory.

#### 4.3.2 *Reconstructing a ‘sense’ of memory in architecture*

*“I believe that buildings are only accepted by their surroundings if they have the ability to appeal to our emotions and minds in various ways. Since our feelings and understanding are rooted in the past, our sensuous connections with a building must respect the process of remembering. Various possibilities lead to and meet in the act of remembering. Images, moods, forms, words, signs or comparisons open up possibilities of approach. We must consider a radial system of approach that enables us to see the work of architecture as a focal point from different angles simultaneously: historically, aesthetically, functionally, personally, perceptually and passionately”* (Zumthor, 1999: 18).

Benjamin (1968), a German cultural critic, strongly believes that architecture has the ability to evoke memory through internal and external sensory stimulation with meaning of form and materiality. He believes that architecture itself acts as a storyteller, whereby there is an **exchange of experience** rather than information (Benjamin, 1968 cited in Hannah, 2005: 28). According to Pallasmaa (2005), much of our understanding of the world comes from the haptic memory we develop from memorizing the physical attributes of cultural objects and applying this knowledge, unconsciously, to space. He further maintains that these small tests - which we subconsciously put all objects through - are stored as part of our sensory memory so that they become part of our subconscious thought pattern and existential foothold (Pallasmaa, 2005: 11). Bloomer & Moore (1977) elaborate on this argument by proposing that while we cannot see into the interior of our bodies, we develop memories of an inside world that include a panorama of experiences taken from the environment and etched into our subconscious over a lifetime of personal encounters with the world. They argue that these experiences have the potential to enrich the embodied relationship between body and space - that don't necessarily stem from a visual memory - but of a plethora of sensory stimuli. Furthermore they note that it is the responsibility of architecture to conceptualize this subconscious act in order to create a dialogue between body, environment, and architectural meaning (Bloomer & Moore, 1977: 57).

This concept of manifesting the intangible material of perception into physical space to seduce memory in the built form is unmistakably evident in the *Berlin Jewish Museum* design by Daniel Libeskind. According to Libeskind (2004) the concept behind the experience of space intended to create a setting for the projection of memory - through sensory stimulation - providing a linkage or relationship between memory and space. The building, its spatial formation, and its intangible properties becomes a narrative exhibition in itself, imbued with cultural meaning and memory.



Jewish Museum – Daniel Libeskind  
Plate 4.3 (left) and 4.4 (middle) and 4.5 (right) – ‘Holocaust void’ - uses the sensual properties of light and shadow to evoke memory and meaning in the built form.

Libeskind describes that he was tempted to build a room with no light; a hopeless volume to represent all that was lost in the Holocaust. After which, he reviewed the book *Hasidic Tales of the Holocaust* by survivor Yaffa Eliach in which she recalls being transported by train to the Stutthof concentration camp - and just as she was abandoning all hope - she managed to catch a glimpse of sky through the slats of the boxcar and saw it as a sign that she would prevail. Libeskind writes that the significance of the woman’s vision was obscure and enigmatic, and yet, had such a transforming power that he decided to incorporate it in his design, into what would become known as ‘The Holocaust Void’ (plate 4.3–4.5). This is set apart from the rest of the museum, empty and forbidding, neither heated nor cooled nor entirely dark. High in the ceiling, and angled so acutely as to visually obscure it, is a slit that lets in a line of light, which is then reflected on the concrete walls and floor of the void (Libeskind, 2004: 55 & 56). Libeskind manages to use the embodied concepts of light and shadow - posed by Zumthor (2010) in Chapter Three of this dissertation, whereby the sensory memory of light and dark actively engages with the users of the space and materializes the ethereal recollection of Jewish history circumscribing Yaffa Eliach’s personal account. Shelton (2009) argues that the sensory deprivation - through the process of passive observation - found in many contemporary museums visual displays is detrimental to personal memory, however, the structure of the *Berlin Jewish Museum* and the emotions it lends, become the exhibition, whereby the embodied memory evoked through tactile and intangible application is said, by Shelton, to suffer by the presence of visual graphics. Furthermore, he maintains that the *Berlin Jewish Museum*, through including sensations beyond a visual account, transforms the experience of the user from a spectator into an active participator (Shelton, 2009: 108). Architecture, therefore, has the ability to facilitate the psychological connections between body and memory through sensory application.

Zumthor (1999) suggests that every new work of architecture intervenes in a specific historical and cultural situation, which requires it to embrace certain qualities so that it can enter into a meaningful

dialogue with the existing situation. He argues that in order for the intervention to find its place, it must make the user of the space see what already exists in a new light. He poetically articulates the necessity for sensory architecture to recognize the ‘spirit of memory’ by stating: “*We throw a stone into the water. The sand swirls up and settles again. The stir was necessary. The stone has found its place. But the pond is no longer the same*” (Zumthor, 1999: 18). Bastea (2004) concludes by maintaining that architects are in a constantly open dialogue between form and culture, space and memory, sensations and the psyche, and it is the task of the architecture to facilitate this active dialogue. She shares the belief of Zumthor (1999) in stating that memory creates an intimate relationship with space, holding on to the essence of it, transforming intangible thoughts and feelings into tangible, emotive buildings which are portrayed through the kinetic and engaging qualities of environmental perceptions and tactile applications (Bastea, 2004: i).

#### 4.3.3 *Our ‘sense’ of beauty in architecture*

*“Beauty is that reasoned harmony of all the parts within a body, so that nothing may be added, taken away, or altered, but for the worse”* (Alberti, 1999 cited in Mallgrave, 2010: 14).

Any attempt to define beauty appears difficult, as it must consider the diverse experiences and individualistic nature of the cultural body. Malnar & Vodvarka (1992) argue that conceptions of architectural beauty are bound by cultural identity and time, as well as the mechanisms that allow its experience, which emphasises the notion that any definition of beauty - and its constituent parts - is culturally derived (Malnar & Vodvarka, 1992: 11). Winter (2007) argues that the notion of beauty - within the realm of architecture - more often than not, makes reference to a system of formal aesthetics, as it concerns an appreciation of physical shapes and structures of a formal order, which is subsequently relatively easy to delineate as it relates to proportion, rhythm, repetition, formal cohesion, scales, and degrees of complexities, amongst others. Winter maintains that this notion of rigid concern guides architects in making decisions about the geometric structure of the environment for its own sake rather than for any other instrumental purpose it may serve. Aesthetic sensibility, according to Berleant (2003), is rather derived from a phenomenological approach incorporating an intense awareness of the actual direct experience of the senses and learning to convert this into an architectural sensitivity which is conscious of bodily reaction to space (Berleant cited in Menin, 2003: 52).

Malnar & Vodvarka (1992) argue that our perception of beauty is often thought of as the qualities contained in an object; or rather we believe that our sensations emanate from a source, rather than recognizing ourselves and our cultural conditioning as the source, however, they maintain that we impart preconditioned qualities onto an object (an extension of the sixth sense) in order to determine an archetypal aesthetic opinion (Malnar & Vodvarka, 1992: 11). Bloomer & Moore (1977) suggest that this source of beauty - with reference to the built form - attempts to describe the role of the body and its sensory apparatus, as the word ‘aesthetics’ comes from the Greek word *aesthetikos* meaning



'sense perception' (Bloomer & Moore, 1977: 23). Berleant (2003) believes this concept carried through into Baumgarten's reappraisal of the philosophy of aesthetics in 1750, which identified it as a distinct discipline, and defined it as the science of sensory knowledge is; "*the perfection of sensory awareness*" (Berleant cited in Menin, 2003: 44). Aesthetic perception - as an opinion amongst others - therefore, does not become a purely conscious act or a merely subjective occurrence; rather it is argued to be grounded in the human body and the existential conditions of cultural orientation. Berleant (2003) reinforces this by arguing that for a place to be aesthetically pleasing, designers must develop their perceptual capacities, "*including kinaesthetic consciousness, somatic spatial awareness, the sensory recognition of volume and textures, auditory acuteness, and the richly complex sensibility of synaesthetic perception*" (Berleant cited in Menin, 2003: 52). The sense of beauty surrounding architecture is thus concerned with the interwoven experience, where the dialogical qualities of architectural sensory elements are in conversation rather than conflict. According to Day (2004) architecture becomes pleasing when it is grounded in a harmonious enmeshed experience of perceptual overlays rather than imposing confrontational formal facades (Day, 2004: 35). Le Corbusier (1927) understood that the built form does not impose beauty on a user, rather he states:

*"The architect, by his arrangement of forms, realizes an order which is a pure creation of his spirit; by forms and shapes, he affects our senses to an actuate degree and provokes plastic emotions; by the relationships which he creates he wakes profound echoes in us, he gives us the measure of an order which we feel to be in accordance with that of our world, he determines the various movements of our heart and or our understanding; it is then that we experience the sense of beauty"* (Le Corbusier, 1927 cited in Malnar & Vodvarka, 1992: 11).

According to Malnar & Vodvarka (1992), sensory aesthetics is concerned with the associational qualities of the environment and body that individuals find meaningful. They argue that formal aesthetics is not cognoscente of cultural variations, which Le Corbusier (1927) has noted in the above quote as being pertinent to perceptual beauty (Malnar & Vodvarka, 1992: 12-13). It would appear then, that no matter how hard beauty is to separate and connect; its underlying interpretation is based on principles of cultural specific notions. This, rather broad and variable concept, highlights the relevance of this entire study, whereby beautiful and embodied architecture constitutes more than a visual appreciation. The challenge remains; however, to view the body which perceives beauty, and its environmental and cultural constituents, as not separate entities but rather connected phenomena which define an individual embodied experience.

#### **4.4 Separated and connected**

According to Franck & Lepori (2007) the world is given to us through perception, as a multitude of visibly and tactilely separated items. Their ethereal boundaries are apparent to the traditional five sense modalities and are further delineated by a cultures sixth sense - which includes notions of identity,



memory, and beauty. They argue that our perceptual distinctions are categorised and containerised in order for contemporary man/woman to name and scientifically classify certain phenomenon: They state: *“The tradition of separation and independence between individual parts is characteristic of a mechanistic worldview, arising from the seventeenth revolution in science and philosophy”* (Franck & Lepori, 2007: 164). Serres (2008), however, highlights that the senses cannot be construed as islands, or channels, that keep categorically bounded to themselves as, he maintains, they are connected through the nature of the lived body, which experiences sensations as an environmentally and culturally embodied, active process (Serres, 2008: 7-15). The importance of separation and connection in the architectural realm of the sixth sense is captured in Sheery Ahrentzen and Linga Groats metaphor for conceptualising architecture as a *“tapestry of cultural intervention”* (1992, cited in Franck & Lepori, 2007: 168). Howes (1991) agrees with this notion by maintaining that such a model acknowledges the entire sensory apparatus as an operational complex which in turn defines our classification of identity, memory, and beauty (Howes, 1991: 170). Franck & Lepori (2007) believe that while our manner of seeing is fixed by the nature of human vision and our interpretation of ‘beautiful’ is disconnected from anything other than what we see, our manner of separating and connecting the senses is shaped by language, culture, and history (Franck & Lepori, 2007: 164). This concept defines the role of the sixth sense in blurring boundaries between separated and connected, whereby the senses are viewed as an ‘interwoven tapestry’ which connects us to our ‘flesh’ bodies, to our environmental bodies and to our cultural bodies. The particularities of how certain cultures connect and separate sensory phenomena thus become a vital architectural component when rendering the physical manifestations of ethereal associations of the senses.

#### 4.4.1 *The sixth sense as a mediator*

Rasmussen (1959) identifies that the sixth sense, although an ethereal association, physically manifests itself the sensory properties of architectural materials, which he argues, recognises the unifying rather than universal qualities of culture (Rasmussen, 1959: 5-16). A material object should, therefore, communicate to the human-as-embodied - to the cultural body that learns about the physical world - and itself, through direct sensory experience of that world. If there is no ‘higher’ order, there is still, and always will be, this ontological one on which to ground architectural design. Zumthor (1999) reinforces this notion by stating:

*“Painters have their colours; musicians have their sounds, writers their words – thousands of them. Although we can design buildings in our heads, the tools of architects are less easy to ensemble. These are my tools: stone, steel, concrete, wood, glass. And the challenge before me is to design expressive buildings – buildings that tell human stories – with these mute substances”* (Zumthor, 1999: 18).

Libeskind (2004) offers a similar belief to Zumthor (1991) in which he believes each physical material has its own language, poetry, and cultural reference, the cadence of which shifts when put alongside

other materials. Zumthors 'tools' are Libeskind's humble ingredients which can be used for a higher purpose; to express the ideas and emotions, separations and connections, and to engage in reconstructing memories and charting histories (Libeskind, 2004: 216 & 217). Geurts (2002) concludes by arguing that our haptic sense is essentially imbued with cultural nuances, whereby, she believes that one cannot evoke the sensation of identity, memory, or beauty without understanding how to physically manifest the cultural setting (Geurts, 2002: 56). Architects thus need to be sensitive to the understanding of how to tactilely transform a culture's history and memory in order to induce sensory implication.

#### 4.6 Conclusion

The aim of this Chapter was to investigate the role and credence our cultural conditioning plays in our perception of the sensorium and their subsequent meaning. The need for this study was highlighted by Howes (1991) who argued that the worldwide trend toward ocular Western ethos is resulting in a loss of cultural identity maintained through the characteristics of a culture's 'sixth sense' (Howes, 1991: 258). Through the arguments posed throughout this Chapter - it has been established that there is a need to recognise cultural sensory understanding as a sixth sense which governs and gives meaning to the lived body. Vesley (2004) argued that this ideology is essential in order to create meaningful spaces that are sensitized to the specificities of a given culture. To 'create' (rather than produce) culturally acclimatised spaces means to understand the true identity of that culture which, subsequently, can be used as a tool which enhances the existential experience of the space. Zumthor (1999) and Libeskind (2004) elaborated on this notion by appropriating that the structuring of space is emptied of meaning if not synchronized with tangible materials which invite the user to engage with the essence and memory of a culture. The senses are all-encompassing and defining, and thus, are fundamental, if not essential, to our experience of cultural identity, memory, and beauty in the realm of the built form. Lived space, which essentially should be regarded as architectural space, is a combination of external space and internal mental space, actuality and mental projection. In the view of Pallasmaa (2010): "*Experiencing lived space, memory and dream, fear and desire, value and meaning, fuse with the actual perception*" (Pallasmaa, 2010: 3). He believes that lived space is space which is wholly integrated with the user's concurrent life situation, whereby we cannot separate our mental and material worlds, as these psychological and architectural dimensions are fully intertwined. The built form, therefore, becomes a mediator between the experiential realm of the architect and the mental world of the observer.

This Chapter has explored ways of combining and emphasising the sensory order perceived by different cultures - which has revealed the notion that the senses are 'windows' of the world whereby cultural perception cannot be viewed as value-neutral; as everywhere the sensory order is bound up with a cultural order in intimate ways. Howes (1991) concludes that architects cannot approach the senses through a universal or Western order of sensory preferences as: "*Only by developing the capacity to dilate (or contrast) our sensory modalities consciously and indefinitely, and to combine*

*them in new ways (in accordance with the preferences of our interlocutors) we can hope to really 'make sense' of how life is experienced in other cultures”* (Howes, 1991: 185 & 186). He further maintains that sensation is not just a matter of physiological response and personal experience, it is the most fundamental domain of cultural expression; the medium through which all the values and practises of society are enacted (Howes, 2003: xi). By envisioning the body as the subject, architects are forced to understand that human perception and action extend outward from the materiality of flesh to items and sources of sensation that exist outside the boundaries of the skin, in this case – the psychological influence of our culturally imbued sensory conditioning.

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## EMPIRICAL RESEARCH

### 5.1 Introduction

This Chapter presents an empirical research study which explores the three identified layers of sensory design; namely: human embodied, environmentally embodied, and culturally embodied ideologies, within the specific context of South Africa. This study will mirror the previous three Chapters, with each case study being chosen with specific reference to the key points highlighted in the literature review. These empirical studies comprise of information gathered from site visits by means of observation, field notes, photographs, interviews and questionnaires (found in appendix A & B), as well as secondary research carried out analysing existing literature on each of the case studies which is examined and assessed critically to draw conclusions. The first case study, Dornier Winery in Stellenbosch, was chosen for its incorporation of the sensory process of wine-making and its translation of these processes into the architectural experience. The second case study, Freedom Park in Pretoria, was chosen for its specific environmental attributes, whereby the specificities of place are experienced as a result of overlaying environmental phenomena. The third, and last case study, the Apartheid Museum in Johannesburg, was selected for analysis due to its cultural narrative and potential cultural embodiment - whereby the architecture is responsible for the translation of meaning, identity, and memory, with specific reference to South African history. All three case studies are critically analysed according to criterion established from the conclusions drawn in literature review.

The case studies will be investigated with particular attention to specific indicators deemed most relevant for the purpose of this dissertation, namely:

#### **SENSUAL BALANCE**

- Bodily movement through space
- The architecture of sound, touch and smell

#### **PERCEPTUAL EXPERIENCE OF PLACE**

- A phenomenological approach
- The use or misuse of environmental perceptions

#### **IDENTIFICATION OF THE SIXTH SENSE**

- 'Sense' of cultural identity
- Reasons for selected building materials

## DORNIER WINERY - STELLENBOSCH

Architects: **Malherbe Rust Architects**

*“The building is a factory at heart, yet it cannot appear to be a factory. Nor can it be Cape Dutch, as they did not make factories. At its heart it is reflective, responsive, and contextual”* (Malherbe cited in Frasier, 2010: 114).



**Dornier Winery - Malherbe Rust Architects**  
**Figure 5.1 - Located in Stellenbosch, Western Cape, South Africa.**

### 5.2.1 Background

*“The heart and soul of a great wine is formed through vines with their roots deep down in the soil. Great wines need to grow up in the wineries that have a heart and soul”* (Johan Malherbe (interview, March 2011)).

Dornier Winery, located in the heart of the Stellenbosch wine route, was carefully selected with specific reference for its embodiment of sensory experience. Its location and function suggests an architectural response to the regional identity of the Cape Dutch style, however, Dornier Winery draws on the smells and sounds of the surrounding vineyard and its manufacturing processes; facilitating and expressing these sensations as part of the architectural experience. According to the wine-maker onsite, JC Steyn, the style of the architecture is not only a visual translation of the wines produced at Dornier, rather he states: *“The design of the building respects the values of wine-making by enhancing the sensory experience naturally found onsite”* (interview, March 2011). It is described by Frasier (2010) as one of the best wineries in the country due to its dramatic and sensuous aesthetic which is anchored in and embraced by the sensory environment in which it is rooted (Frasier, 2010: 87). Johan Malherbe, the principle architect involved in the project, acknowledges that the sensory experience of



the architecture was of prime importance to the client, in order to enhance the visitors experience of the wine-making process (interview, March 2011). The aesthetic and detailing of the building appears to be rooted in simplicity; all the surfaces are kept as neutral and undisturbed as possible, with minimal visual embellishments in order to create a body-centred experience dominated by sensory stimulation.

### 5.2.2 *Architecture and the senses - empirical analysis*

#### **Design approach**

Malherbe maintains that the origin of the design conception was to create unity which - visually as well as tactilely, aurally, and olfactory - would bring together the heterogeneous existing environment. He describes the building as an unassuming structure, whose principal aim is to facilitate and augment the experience naturally found onsite. Malherbe states that the architectural character of the building was shaped by the wine region in which it is located, by the architecture of the farm to which it belongs and by its location within a unique natural landscape. The priority, however, was to create experiential spaces for the user, as this is essentially a functioning factory whose genesis is often consumed with the aspect of production rather than creation. Malherbe avoided the mechanised, 'conveyor belt' mindset by adopting sensory interplay in order to form a relationship between the user, the architecture, and the building function (interview, March 2011). The architects pursued thoughtful and detailed research regarding sensory design and contextual expression prior to, and during, the design process. This assiduous method of approach appears to translate into an architecture which considers programme, materials, space, light, movement, and the body as equal generators. While designing so fully for subjectivity, Malherbe manages to utilize a range of what are traditionally considered 'objective methods' which has resulted in a building - while sensorially stimulating - also makes programmatic and spatial sense.

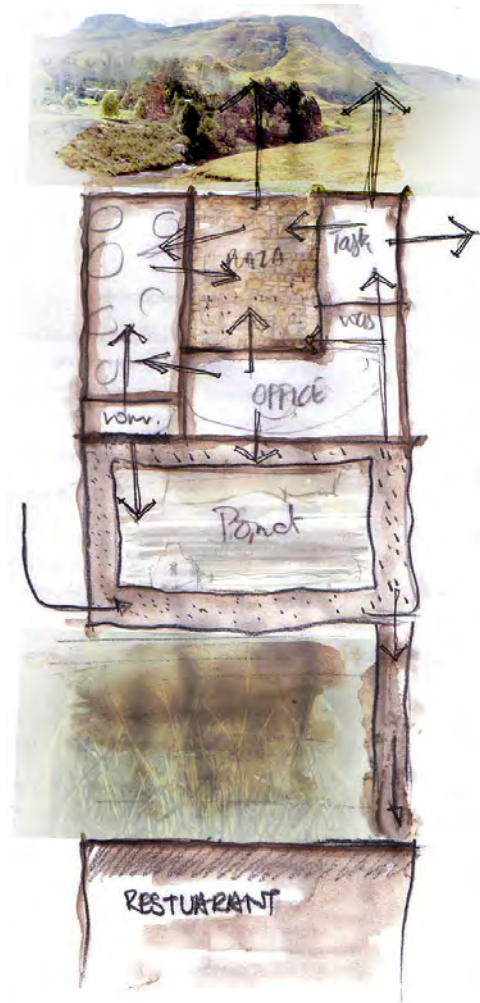


**Dornier Winery - Malherbe Rust Architects  
Plate 5.1 - Main elevation of Dornier.**

## SENSUAL BALANCE

### Bodily movement through space

Due to the nature and function of a winery, standardised block dimensions are usually adopted in order to accommodate for the accessibility of the large, static machinery. Dornier Winery, however, manages to achieve human scale and flowing spaces whilst still accommodating for ease of manufacture, whereby careful attention was given by the architects to fulfilling the programme while also considering the dynamic spatial experience of the user. This was made easier by the sequential nature of the factory typology whereby the architect could predetermine the movement through space and thus could calculate layers of experiential encounters. The human dimension of movement, which can be seen in figure 5.2, was achieved through open-plan spaces which makes use of glass and open courtyards and allows for an undefined separation between the realms. This brings to the solidity of construction, the quality of impermanence and constant kinetic change, which directly respond to the living body that absorbs and filters sensations.



Dornier Winery - Malherbe Rust Architects  
Figure 5.2 - Ground floor plan - showing unimpeded movement through space.

### The architecture of sound, touch, and smell

The winery includes a conscious experience of all the sense modalities as the majority of visitors interviewed onsite made clear comment on the experience of one sense or another (see appendix B for sample questions). The most memorable sensation - according to the traditional model of the five senses with relation to the 'flesh' body - determined by interviews, was the olfactory experience. An intense and pleasant aroma of processing grapes is immediately present when arriving at Dornier Winery which fuses with the earthy scent of bespoke clay bricks. According to Malherbe, harnessing the natural smells, as a result of the building function, intensifies the overall architectural experience. Its incorporation was considered important due to the significant role that smell plays in the role of wine-tasting. He states: *"Smell was used to exalt the experience of place and enhance its memorableness. Just as smell is more an exact witness of the eyes in the art of wine tasting, Dornier prioritizes the senses in order to respond to the function of the building"* (interview, March 2011). Malherbe understood the unpredictable nature of the olfactory realm and used spatial layout and materials, which embodied distinctive sensory qualities, as architectural tools to express and enhance this ethereal modality. Large,

open plan spaces, which allow for cross ventilation, as well as the porous nature of the clay bricks - manufactured to Malherbe Rust's specifications - allow the smell produced onsite to be both confined and released, whereby the whole site is embodied by this heightened modality. The clay bricks, which contribute toward an olfaction of earthy tones - to compliment the site as well as the buildings function - also contribute towards the overall tactile experience of the architecture. The unpredictable nature of the heterogeneous brickwork, as well as its strong associations with the earth, invite the hand of the user and allows for the subjective body to engage with the physicality of sensory architecture. Visitors to the Dornier Winery, to a certain extent, are physically involved in the process of the wine-making, whereby they are able to de-husk the stems before taking off their shoes to stamp on the grapes; heightening the overall perceptual experience of the architecture. During the wine-tasting visitors are able to explore the sensory garden (figure 5.3) - through which they are educated on the colours, aromas, textures, and flavours characteristically used to describe wines, which in turn, further enhances the overall embodied experience. In order to accommodate the intimate nature of sensory engagement, the architecture has assumed an unpretentious role, much like the architecture of Peter Zumthor's Thermal Baths reviewed in Chapter Two of this dissertation, in which experiential space is the nucleus of the conceptual genesis. The focus of this building is the experience of wine-making and thus the materials and details employed are simply a canvas from which to enjoy the physicality and spatiality of the architecture. This notion of sensory engagement - which is augmented through the physical manifestation of materiality - reinforces the ideology whereby architectural matter is the primary tool through which sensory enhancement is achieved.



Dornier Winery - Malherbe Rust Architects

Figure 5.3 – Sensory garden whereby visitors are educated on the colours, aromas, textures, and flavours characteristically used to describe wines.



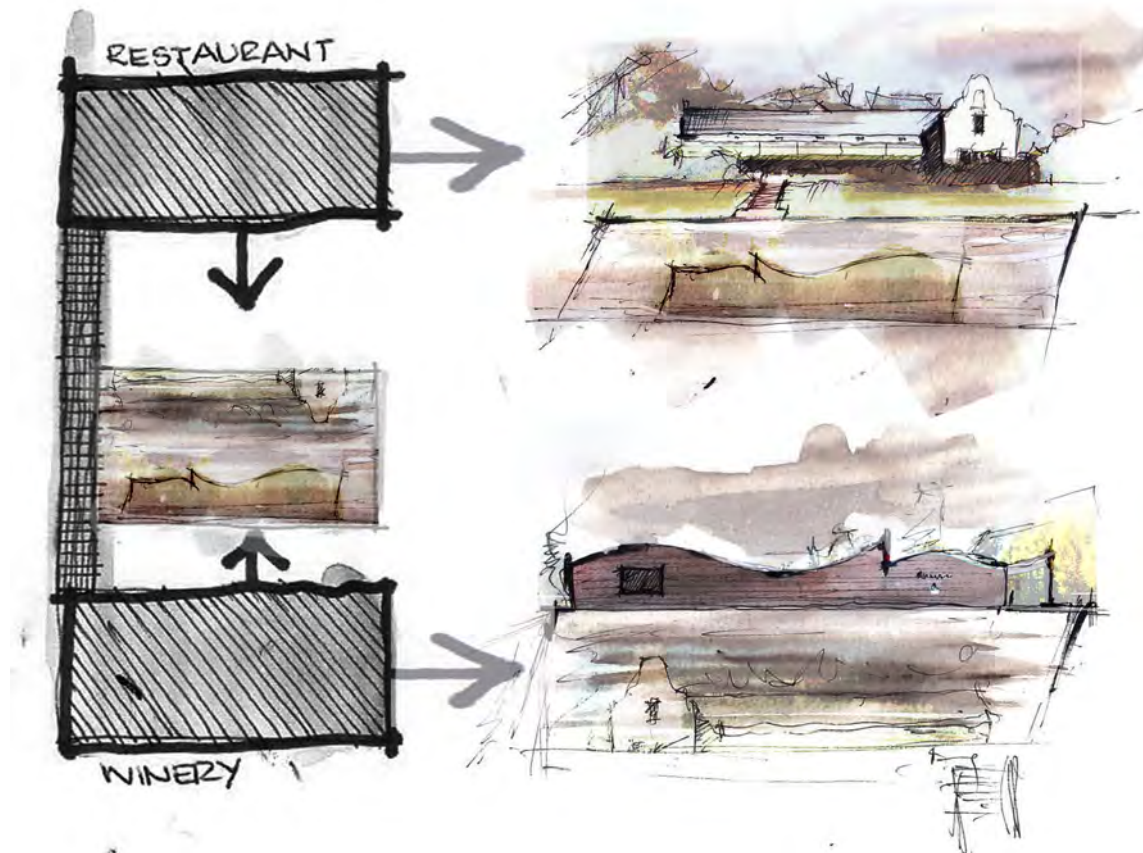
## SENSE OF PLACE

### A phenomenological approach

Dornier Winery is not a visual spectacle in competition with its surroundings, but rather, it is inspired by the tangible and intangible materiality of its context and function to create an architecture which is rooted in the properties of place and experience. Malherbe reinforces this by stating: *“The winery is a contemporary incarnation of the Cape Werf: a place held by the buildings, rather than the building dominating the place. The building is part of this place, flowing with the process of making wine and connecting with the farm, the views, and the natural surroundings”* (Malherbe, cited in Fraser, 2010: 98). As mentioned before, the aim of the architecture was to express and refine the natural experience of the site, whereby the building makes appropriate and coexisting use of opposing environmental forces to create an architecture which is imbued with animistic qualities.

### The use or misuse of environmental perceptions

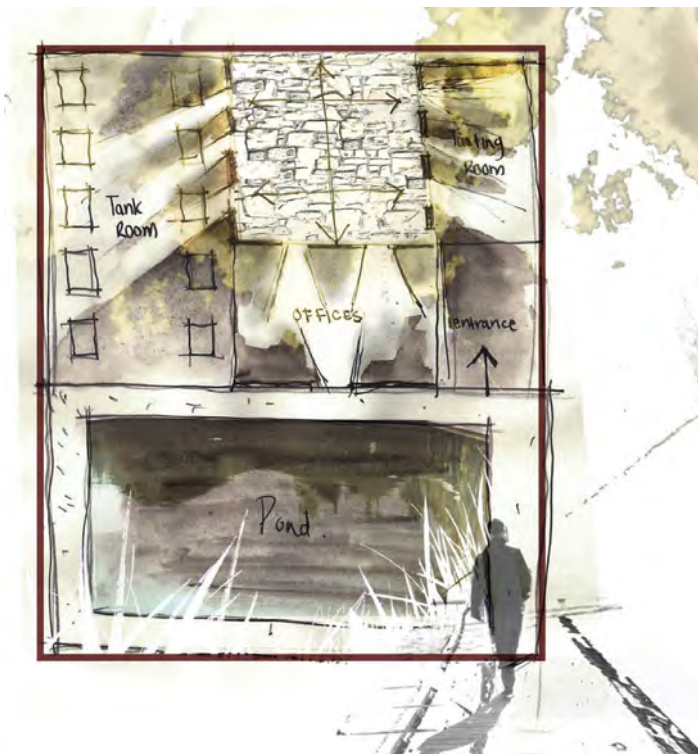
Due to the idyllic location of Dornier Winery, the architecture benefits from unimpeded light and views, and therefore, the architecture assumes a responsibility to physically manifest this phenomenological exposure, whereby the building is embodied by specific attributes of place. Dornier Winery encompasses the arguments posed in Chapter Three of this dissertation in that it adds variety to the experience, due to the interplay and contrasting nature of the environmental perceptions, namely: light and shadow;



Dornier Winery - Malherbe Rust Architects

Figure 5.4 – Left sketch: Water is used as a communication tool between the Winery and the restaurant. Top right sketch: View from winery. Bottom right sketch: View from restaurant

materiality and time; and solidity and fluidity; whereby users of the space become consciously aware of ethereal properties due to their conflicting yet dialogical qualities. For example, as can be seen in figure 5.4, the pond is used as an environmental mediator which connects the pre-existing traditional Cape Dutch restaurant with the contemporary architecture of Dornier Winery. According to Malherbe, it was specifically designed so that when a visitor was facing Dornier, a kinetic reflection of the traditional restaurant could be seen in the rippling water and vice versa. This was done to ensure that the opposing architectural aesthetics, of both winery and restaurant, speak to one another in the distorted medium of the water (interview, March 2011). The kinetic nature of the water makes certain that the simple aesthetic, with its neutral materiality, is in a constant state of flux depending on the time of day, season of the year, and the volatile weather conditions resulting in the overall experience being dependant on the dynamic qualities of the environment.



**Dornier Winery - Malherbe Rust Architects**  
Figure 5.5 – Left sketch: Conceptual light and shadow study of ground floor, whereby light has been used as a sculptural tool.

With regards to the sculptural properties of light and shadow, the architect has made use of light as one would a tangible material, whereby light and shadow have been used as a figure-ground play in order to articulate the space. As can be seen in figure 5.5, the architect has conceptualised the space as a mass of shadow, through which light is filtered as a result of hollowed-out openings; placing the user in a continuum of time. Surrounding trees contribute towards the animism of the architecture as they have been planted adjacent to areas containing large expanses of glass.

The reflection of their movement and changing light patterns in the glass further enliven the experience and permit a direct animistic exchange to take place between inside and outside whereby one mutually defines the other. The use of water; light and shadow; and haptic materiality allows the building to engage, and be defined by, the specificities of place and consequently it permits an exchange between body, environment, and architecture. The principles of interacting environmental phenomena, adopted by Dornier Winery, allow the body and the architecture to participate in animistic qualities, which results in a kinetic and engaging sensory experience for the visitor.



## IDENTIFICATION OF THE SIXTH SENSE

### 'Sense' of cultural identity



Dornier Winery - Malherbe Rust Architects  
Figure 5.6 - The contemporary form of Dornier Winery (right) inspired by the identity of Cape Dutch architecture (left).

As established previously, Dornier Winery is located in the Cape - which is locally, as well as internationally - associated with the architecture of the Cape Dutch style. According to Malherbe, the architecture of Dornier, made a conscious attempt to depart from the well-established Cape Winery vernacular of white walls and green roofs as, he felt, architecture of this style is built from the top-down rather than adopting the

Critical Regionalist approach of 'bottom-up' - which in his opinion, is encompassing, rather than foreboding (interview, March 2011). Dornier is a contemporary interpretation of local Cape building traditions and forms, whereby the regional identity is expressed in the exaggerated and organic form of the roof; creating a building with a unique Cape flavour that achieves harmony with its historical surroundings as a result of its associative character. The curvilinear roof of the building - which is Dornier's most vocal feature - was directly influenced by the curved forms of the Cape Dutch gables (figure 5.6), concretising the architecture in its regional cultural identity of traditional Cape wineries; thereby maintaining a link between its historical context and its contemporary inhabitants. Besides the architecture responding to its contextual expression, the built form furthermore responds to and identifies with the olfactory dimensions as a marker of identity specific to the culture of wine-making. As established, the olfactory modality is considered pertinent due to its ability to ascertain properties which determine the success of the wine. Dornier Winery has managed to express the essence, or rather, the valued identity of the culture of wine-making in order to orientate the building and the users in its function.

### Reasons for selected building materials

According to Malherbe, it is a common misconception that the more materials combined, the more their field will visually vibrate (interview, March 2011). Dornier is an example of using a minimal palette which adopts contrasting qualities in order to achieve an embodied intensity. The opposing properties of variegated brickwork combined with smooth off-shutter concrete (figure 5.7) is used



Dornier Winery - Malherbe Rust Architects

Figure 5.7 (left) - Concrete and rusticated brickwork. Figure 5.8 (top right) view from guest plaza in tank room. Figure 5.9 (bottom right) concrete and complementary surroundings.

throughout to dialogically engage all the senses. The minimum of applied finishes reflect an honest and authentic method of construction, in which Malherbe states: “*Rather, we wanted the natural materials to be expressed: warts and all*” (interview, March 2011). The contradictory and complementary nature of the concrete and facebrick add a tactile, as well as a visually, stimulating element to the construction as both make reference to the other as well as to the whole (figure 5.7 & 5.9). The traditional use of facebrick is rusticated in a contemporary way in order to visually ‘break’ the facade as well as increase its haptic qualities. This vernacular approach makes reference to the Colonial manner of construction, which is appropriate due to the historical background of the building function. The use of glass throughout the building contrasts with the solidity of the previously mentioned materials and allows for spaces and movement to be both separated and connected due to its translucent qualities. In addition the large panels of glass reflect the changing patterns of adjacent trees and result in a kinetic artwork which adds intense colour to the unassuming palette (figure 5.8 & 5.9). The choice of brickwork, concrete, and glass was derived from a phenomenological approach of ‘bottom up’ which allows the ethereal boundaries of the building to blur into the landscape. The materials and detailing used are applied with thought of how they would engage with the body, the environment, and with the architecture, which is reinforced by interviews held onsite in which the majority of people commented on how the materials ‘felt to the touch’.

### 5.2.3 Summary

As with good wine, the Dornier Winery emerges from the fusion of craftsmanship, natural materials, and modern technology. This building embodies sensory stimulation through relying on the sensory processes of wine-making as well as the sensuous detailing of the architecture. The architect has

consciously fused the experience of wine-making and the built form to create an architecture which responds to the operational complexities of sensory design - namely; human embodied, environmentally embodied, and culturally embodied experience. The architecture could have adopted the pre-determined Cape Dutch style, but has rather created an identity which is unique to its region, unique to its site and a unique experience to the visitor. The sensory experience, with special reference to the incorporation of the tactile and olfactory dimension, has enhanced the overall architectural experience through understanding the sensory properties of materials and has, therefore, succeeded in achieving a balance between sensation and thought. This notion reinforces the statement made by Holl (1993) in which he states: *“When the intellectual realm, the realm of ideas, is in the balance with the experiential realm, the realm of phenomena, form is animated with meaning. In this balance, architecture has both intellectual and physical intensity with the potential to touch mind, eye and soul”* (Holl, 1993: 26). It appears that the architect has recognised the intertwining of mind and body, of body and world, and restores value to the body’s needs and experience and to the spatial and material qualities of this world. The concepts behind the Dornier Winery, established in an interview with Malherbe, have translated into an animate architectural experience of colour, texture, human scale, light, and shadow to enhance the sensory encounter. Above all, the architect has considered the pre-existing natural phenomena as a source of stimulation whereby the possibilities for design to evoke sensory and kinaesthetic experiences have been seized.



## FREEDOM PARK - PRETORIA

Architects: **GAPP Architects & Urban Designers, Mashabane Rose Architects, MMA and Newtown Landscape Architects**

*“As South Africans we are the custodians of the rocks, the fossils and the remains of our ancestors and through the Freedom Park we reclaim this material evidence for future generations and we share it with the world”* (Kroese, cited in interview: March, 2011).

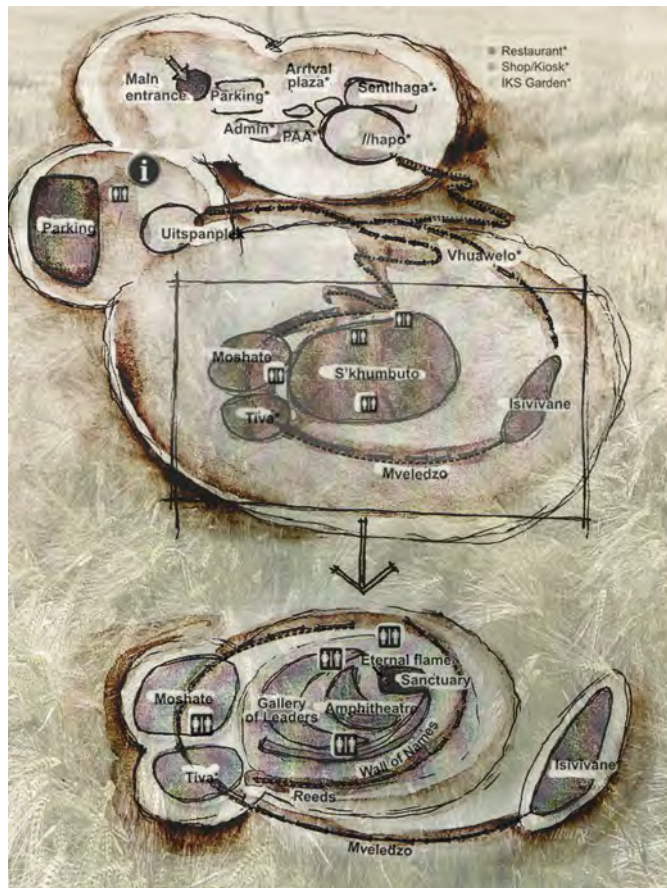


**Freedom Park - Architectural collaboration**  
Figure 5.10 - Located on Salvokop hill in Pretoria, Gauteng, South Africa.

### 5.3.1 Background

The National Heritage site of Freedom Park is located on Salvokop hill, a 128.5 acre (52 ha) site immediately south of Pretoria. The site is situated at the interface between urban areas to its north and natural areas to its south, and was specifically chosen for its atypical approach to exhibiting national memory, whereby environmental forces are used to actively engage in the narrative content of the site, rather than adopting a passive visual approach. The location of Freedom Park in relation to the Voortrekker Monument, which lies to the southwest, was intentional - to juxtapose history with the process of moving forward as a united nation. The crest of Salvokop also offers open views to Church Square, the Union Buildings, the neighbouring hills of Klapperkop and Skanskop, and locally to Salvokop Village which lies at its northern base. These sight lines function as important connectors to the past and the future and have been emphasised in the development framework. According to Chris Kroese (a project architect of GAPP), the project was informed by the Truth and Reconciliation Commission, and its vision is structured around four key ideas: reconciliation, nation building, freedom of people, and humanity. The making of the landscape and architecture seeks to recognise the spiritual





**Overview of elements:**

- Isivivane** - A resting place for the spirits of those who died in the struggle for humanity and freedom
- S'khumbuto** - A memorial that commemorates the major conflicts that shaped South Africa
- Moshate** - Hospitality suite, used for presidential and diplomatic functions
- Mveledzo** - A spiritual path which links all the elements of Freedom Park together
- Uitspanplek** - Place of peace and reflection
- Hapo** - Interactive exhibition space
- Tiva** - A large body of water symbolising peace, tranquility and serenity

**Freedom Park - Architectural collaboration**

**Figure 5.11 - Overview of elements found within Freedom Park (used for referential purposes).**

origins of these ideas and manifest them symbolically in physical form (interview, March 2011). The cultural embodiment of the site is, therefore, largely due to the site's environmental embodiment attributable to its nature as an 'outdoor exhibition'. The concern of this study, therefore, is not with the particularities of the architecture of Freedom Park, but rather, how the development of the site has responded to enhancing pre-existing phenomenal zones in order to produce a kinetic and sensory response.

*5.3.2 Architecture and the senses - empirical analysis*

**Design approach**

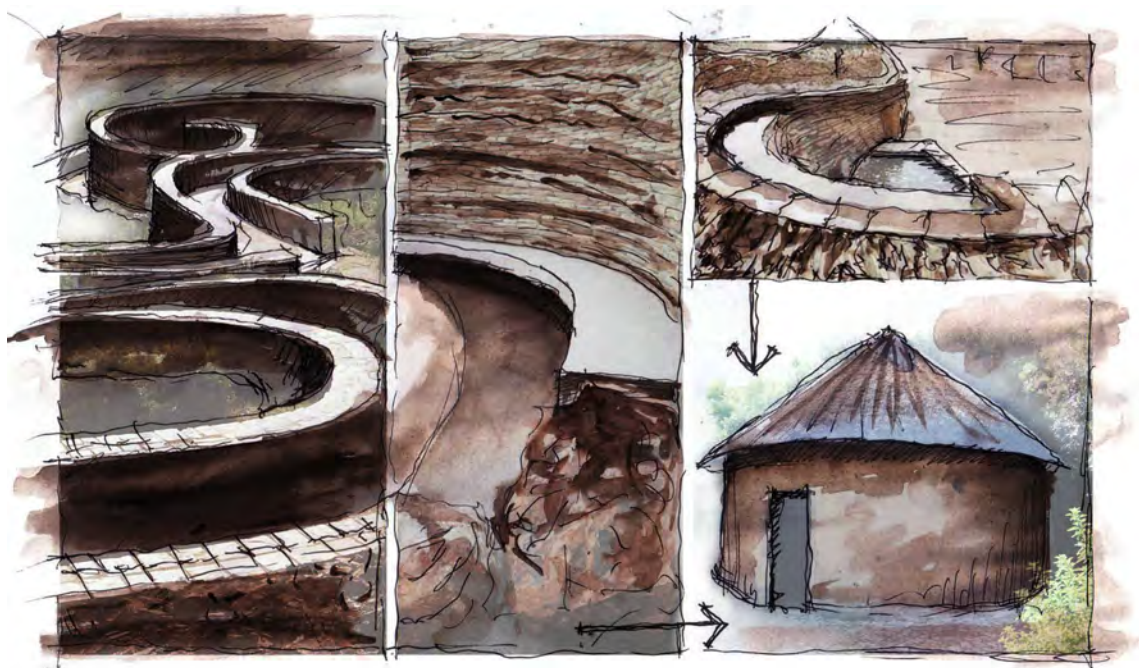
The guiding notion behind the design of Freedom Park was that of liberation, healing, and inspiration through ongoing dialogues and interpretations of past and future. Both design, and experience of the site, stands as a memorial which showcases South Africa's achievements as a nation and aims to instil feelings of understanding and compassion in order to reach the agreement of our past. The concept of the site highlights the significance of traditional environmental views within African culture through its location on high ground and its incorporation of natural elements. "Essentially the rock is our home[...]in the mountains African people listen to the voice of silence" (Documentation issued by

Freedom Park cited in Young, 2004: 19). The making of the landscape and architecture, therefore, seeks to recognise the spiritual origins of these ideas and manifest them symbolically in physical form. The approach to design subsequently incorporates cultural African perceptions, in order to enhance its contextual memory and identity. Due to the nature of Freedom Park - as both a memorial and celebration of human life - emphasis is placed on the process of discovery and growth as well as transformation. Freedom Park, as established, does not rely on visual graphics as a conventional museum would, therefore, embodied experience is largely based on the cultural and environmental sensory embodiment of the site.

## SENSUAL BALANCE

### **Bodily movement through space**

The concept of movement through the site was adopted on principles most associated with traditional African homesteads, as seen in figure 5.15, whereby movement is organically orientated. In order to concretise the experience in a South African identity, the architects drew inspiration from the organic forms perceived by numerous African cultures, in which both traditional dwellings and villages are organically formulated and orientated. This notion is best exemplified in the *Mveledzo path* (which can be identified in figure 5.11). It was discovered by the architects, through research regarding the concept of movement, that the majority of traditional South African cultures adopt curvilinear principles due to its ease of construction with the materials that were/are available to them; a tradition that dates back hundreds of years. Furthermore, it was established that individuals who are culturally conditioned to orientate themselves in a world of organic lines, find it difficult to apprehend straight contours and



Freedom Park - Architectural collaboration  
Figure 5.12 (left), 5.13 (middle) and 5.14 (top right) - *Mveledzo pathway* which adopts the organic principles of movement of traditional African homesteads. Figure 5.15 - Curvilinear form of traditional African homestead.



sharp angles - it is for this reason that movement through Freedom Park is organically articulated (figure 5.12-5.14) (interview, March 2011). Even though South Africa is a largely contemporary society - detached from traditional values (principally as a result of Colonial influence), in which most cultures function in the mechanised world - Freedom Park manages to maintain and express an identity and perception of South African culture by encouraging people to move in a pattern which is rooted in history and memory.

### The architecture of sound, touch and smell

When questioning individuals about their embodied sensory experience of Freedom Park - the majority of visitors commented on the aural dimension, which is unusual considering that the site is bounded by three main highways. This, however, is not the contributing sound that visitors make mention of. One individual commented: *“There is no sound; it’s almost as if the silence of the site demands respect”* (interview, March 2011). When questioning the principle architect involved, if this was a conscious design decision, Kroese explained that the architects were not necessarily concerned with stimulating or suppressing specific sensations (with reference to the traditional five sense modalities). Rather, the story of Freedom Park is told through experience - experience of engaging environmental perceptions, which naturally embody sensory qualities. He maintains that if the experience of the space concerned benefitted from the suppression or expression of a particular sense then it was designed accordingly, however, stimulating the five sense modalities was not the main focus of the design (interview, March 2011). The aural dimension, however, was notably considered at the *Wall of Names* (figure 5.16), in order to engage the users in a time of reflection and contemplation. This space makes use of staggered walls which prevents incoming noise pollution from the surrounding highways and manages to channel the sound of contemplative silence. The aural dimension, whether consciously applied



Freedom Park - Architectural collaboration

Figure 5.16 - Conceptual sketch of the dampened aural modality through the staggered walls as the *Wall of Names*.

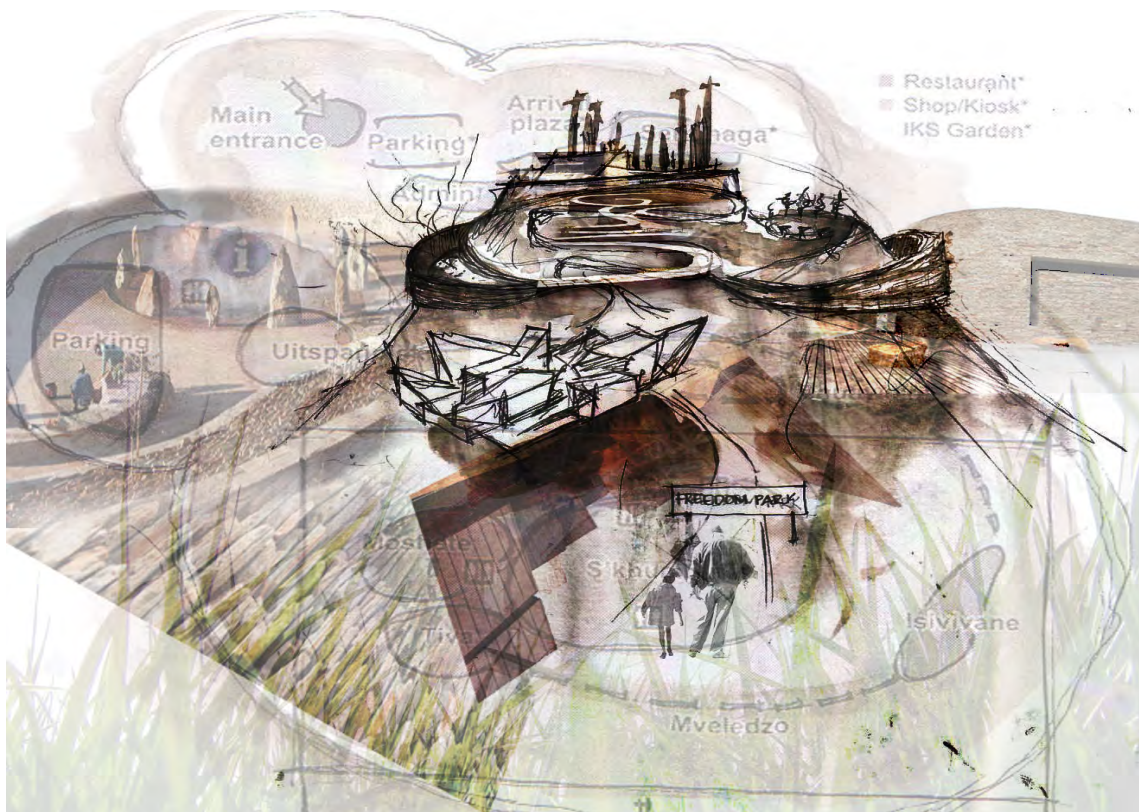
by the architect or not, is further encountered in the indigenous African shrubs and reeds which are planted alongside the architecture and walkways to heighten ones awareness of being-in-the-world, as the sound and smell produced by the rustling plants forces visitors to be aware of their surrounding space. Sensory stimulation is again achieved in the tactility and

olfactory experience of the rough stone used throughout the site. Even though the architects involved were not consciously aware of sensory stimulation, the principal aim was to achieve an emotional experience whereby the senses are automatically engaged.

## PERCEPTUAL EXPERIENCE OF PLACE

### A phenomenological approach

The design of Freedom Park is intended to touch the earth lightly and to subtly enhance the land upon which it is sited. The way the architects have chosen to mould and refine the site - as a historical and cultural narrative - is the main experience of the exhibition. The placement of buildings and pathways are sympathetic to the landscape and are sculpted in a manner which embodies the hill on which it is sited. Kroese states that the intention of Freedom Park, when fully completed, will appear as if emerging from the landscape rather than superimposed on it (interview, March 2011). As can be seen in figure 5.17, the points of interest are deeply influenced by - almost an extension of - the lay of the land. According to Kroese, this idea of the differing complexes 'emerging' from the landscape is derived from the rocky outcrops which materialize at the base of Salvokop Hill (interview, March 2011). The way the site unfolds and appears is, therefore, a conceptual replication of the natural topography of the site. The interior and exterior boundaries between the different architectural elements, discussed in Chapter Three of this dissertation, however, are not only visually distinct - but experientially

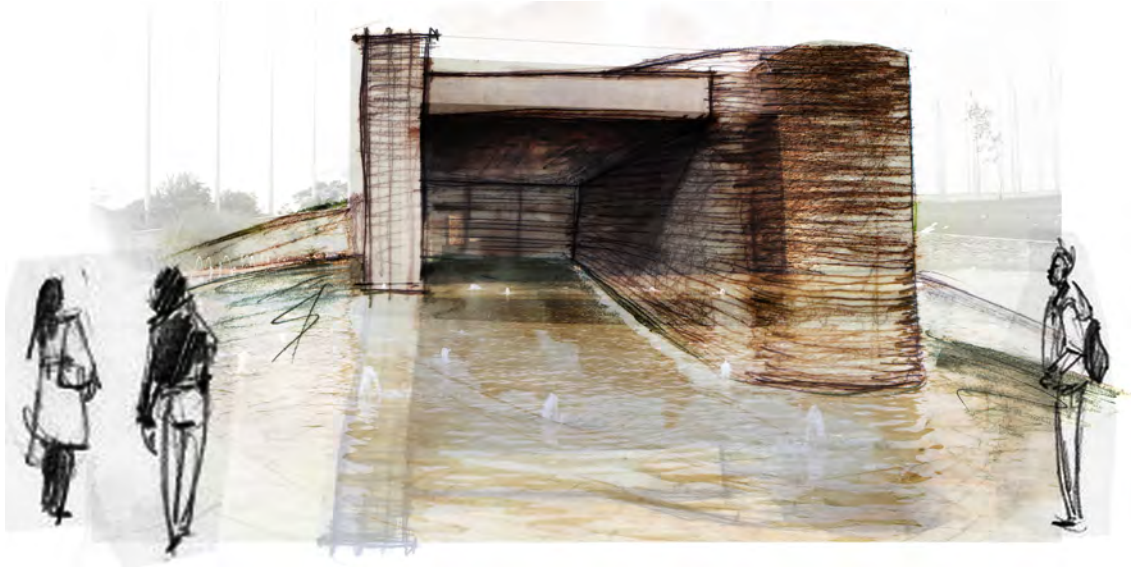


Freedom Park - Architectural collaboration  
Figure 5.17 - Conceptual sketch to the phenomenological and sculptural approach to the site.



defined. Visitors are never subject to an intermediate realm between the interior of the architecture and the exterior nature of the site. As established, the built form is intended to 'emerge' from the site, however, its phenomenological boundaries seem as impenetrable as the rocky outcrops from which it was inspired. Freedom Park, although not complete, manages to sculpt the architecture from site, however, fails to seamlessly connect the segregated elements, resulting in an isolated interior and exterior embodied experience.

### The use or misuse of environmental perceptions



Freedom Park - Architectural collaboration  
Figure 5.18 - The use of water at the *Gallery of Leaders*.

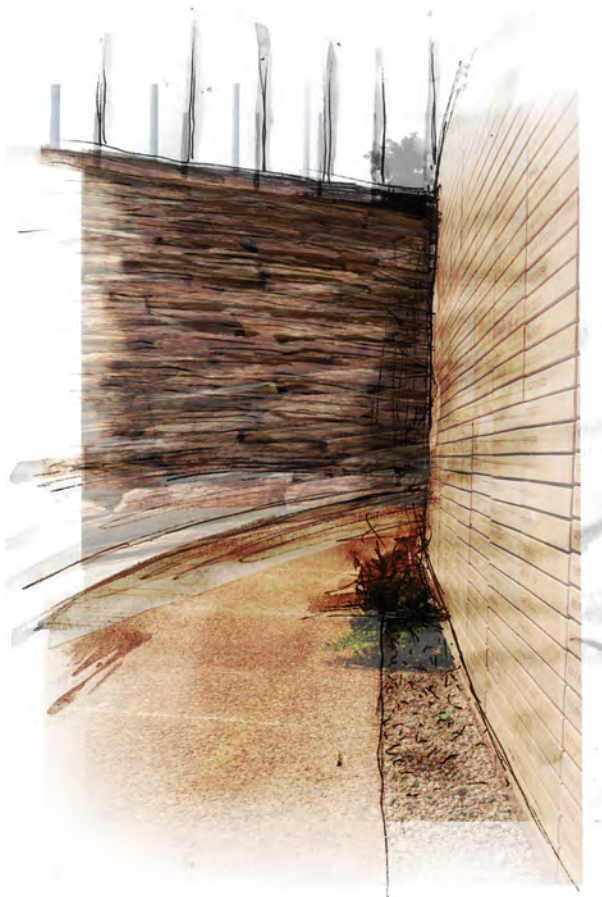
The analysis regarding the incorporation of environmental phenomena is not strictly concerned with the architecture's response per se, but rather the engagement of environmental authenticity of the site and how it has used natural perception to connect with both architecture and body. The debate regarding essential qualities and interconnections of human environmental experience remains connected through the similar treatment of both intangible and tangible materials throughout the design. The use of stonework, however, has been used to such an extent, whereby its sensory qualities become normalized. This in comparison to the basalt stone wall of the Dominus Winery by Herzog & de Meuron - examined in Chapter Three of this dissertation - whereby the stone was consciously used to **heighten** sensory principles. Herzog & de Meuron used the stone as a structural element from which to enhance light and shadow and tactility, which further allowed the architecture and the environment to enmesh in an embodied experience. Freedom Park, however, appears to have adopted the use of stone in order to 'drape' the experience in an 'African aesthetic'. The problem with this notion is that the architects have not used the materiality according to its structural properties and as a result the stonework appears to be an aesthetic afterthought rather than an honest reflection of its response to the site and to the body.

The use of water, however, successfully enhances the architecture's connection to its context as it is used with purpose to create contemplative areas of calmness (as can be seen in the *Gallery of Leaders* in figure 5.18). It appears to adopt similar principles to that of Dornier Winery, however, its reflective properties are not used to engage in dialogue between two opposing architectural forms, rather, the water acts as a mediator between the embodiment memory and the site, architecture, and body in which all three elements are kinetically enmeshed.

## IDENTIFICATION OF THE SIXTH SENSE

### 'Sense' of cultural identity

According to an article by Eicker (2008), the philosophical underpinning of the design pertains to 'Indigenous Knowledge Systems' (IKS), which acknowledges and conceptually applies cultural and traditional African thought to the physicality of the site as well as the architecture. This ideology, explored by the architects, makes the site's response unique to the multi-cultured nature of South Africa and contrasts it with the international stigma of what African aesthetic relates to. This idea is explored through the themes of *ubuntu*, creation, and healing, and has informed the layout of the site as well as the selection of materials including plants, minerals, water, and rocks (Eicker, 2008: 18).



Freedom Park - Architectural collaboration  
Figure 5.19 - The combination of rough stonework, smooth marble, gravel and polished concrete used throughout the site.

These notions, which have been established in preceding arguments, are apparent in elements such as the *Mveledzo Pathway* which adopts organic principles of formation specific to traditional South African cultures. The cultural references, used throughout Freedom Park, certainly identify with perceptions of an 'African' aesthetic; however, their application seems unnecessarily accentuated which results in the detail of meaning being lost in the scope of attempting to achieve a unifying aesthetic.

### Reasons for selected building materials

According to Kroese, the materials chosen throughout the Freedom Park development are symbolic to South Africa's culture, history, and sensory engagement; not in a literal sense but rather used in a way to evoke a sense of meaning and memory. He

states that: “*If this could be achieved, it was felt that the ensuing aesthetic would be powerful, and evoke strong emotions and a sense of the reverence of the place. Stone, water and carefully chosen plant materials thus formed the basic design elements*” (interview, March 2011). Concepts of South African identity are assumed through the use of ‘African’ materials such as stone, wood, and polished concrete (to name a few). As seen in figure 5.19 the materials found onsite notably evoke a strong sense of haptic engagement, whereby opposing qualities of rough and smooth are juxtaposed in order to further engage their tactility. As previously established, however, their over-exposure tends to numb the historical narrative of the site, whereby users are de-sensitized to their cultural and sensory meaning. This was noted by interviews with visitors who, at large, failed to comment on Freedom Park’s most vocal feature - its materiality.

### 5.3.3 Summary

Freedom Park attempts to use the emotive qualities of environmental and cultural perceptions in order to actively engage visitors in the identity and memory of South Africa. It further endeavours to evoke notions of healing, inspiration, and unity, not through passive visual communication, but rather through markers of environmental identity and memory. The collaboration of architects involved in the project, are undoubtedly aware of the sensitive nature of South Africa’s history and the distinctive character of our multi-cultural society - as Freedom Park does evoke a level of emotional response. The overall formation of the site and its elements has been sculpted from the cultural knowledge of the land, resulting in an embodied landscape. Complexes within the site, however, are disconnected from a phenomenological relationship, resulting in the points of interest appearing to be designed as isolated islands which are bound environmentally and experientially to themselves. Arguments posed throughout the literary review of this dissertation, point to an enmeshed approach, whereby boundaries between interior and exterior are blurred in order to create a ‘*tapestry of cultural intervention*’. As segregated elements the buildings respond to the embodiment of site and cultural, however, this was not the focus of the study. The journey between the differing elements does not receive the same detailed attention as invariable light and shadow, and materiality characterize a homogeneous sensory experience whereby the narrative of the site is ‘silenced’ - so to speak. Freedom Park is an ordered presentation with concentrated areas which relate their meaning to a pattern of underlying structures and interconnections. The multidimensional nature of environmental perceptions which have been adopted have, therefore, been segregated with the intention of connecting them through the medium of materiality, however, its uniform application has resulted in a disengaging overall experience.



## THE APARTHEID MUSEUM - JOHANNESBURG

Architects: **GAPP Architects & Urban Desingers, Mashabane Rose Architects, The BRitz Roodt Partnership and Linda Mvusi Architecture & Design**

*“The buildings success as a memorial to our cultural and historical identity lies in the ability of its very structure to express and excite feelings”* (Bauer, 2001 cited in Bremmer, 2002: 38).



Apartheid Museum - Architectural collaboration  
Figure 5.20 - Located in Ormonde, Johannesburg, Gauteng, South Africa.

### 5.4.1 Background

The Apartheid Museum, located south of Johannesburg, presents a narrative of apartheid's history through a range of didactic media including: photography, film, text, testimony, and artefact. The focus of this study, however, will not concern the emotional response owing to its visual content, but rather, the architectures embodied response as a container of memory - both individual and collective. The Apartheid Museum is essentially a narrative of the dispossession of land and the displacement and ultimate segregation of racial groups. Apartheid, however, was not only an abstract political and administration system - it was also one that worked on the human body as the prime object and target of its power, whereby, it used a racialized body as the basis of social classification and political order. Legislation aimed at disqualification of certain bodies from certain areas. Bodies that failed to submit to its discipline were subject to violent forms of humiliation, torture, mutilation, and often death. The architecture of the Apartheid Museum, therefore, holds an obligation to the memory of those who fought in apartheid; whereby the properties of space are experienced as tangibly as the artefacts it contains, in order to achieve a higher level synthesis which focuses on the 'unseen' dimensions of architecture.





**Apartheid Museum - Architectural collaboration  
Plate 5.2- Entrance to Apartheid Museum.**

It is specifically located between the Johannesburg CBD and Soweto, in a semi-industrial zone that accommodates offices, retail and recreational facilities, as well as a range of residential typologies. It is sited in complete juxtaposition to the indulgent triviality of the adjacent casino and theme park known as *Gold Reef City* - while considered by some as inappropriate place-making, Kroese (the principal architect of GAPP architects) believes that in effect it reinforces the notion of separate realities that was at the core of the apartheid system. Furthermore he maintains that its location accentuates the seriousness of the museum and adds a quality of reflection in the newly built complex (interview, March 2011). The principle aim of the Apartheid Museum is a site which not only responds to memorialisation - but also acts an instrument for the invention of a new political identity, the post-apartheid nation, where the idea of shared nationhood can be being invented and expressed.

#### 5.4.2 *Architecture and the senses - empirical analysis*

##### **Design approach**

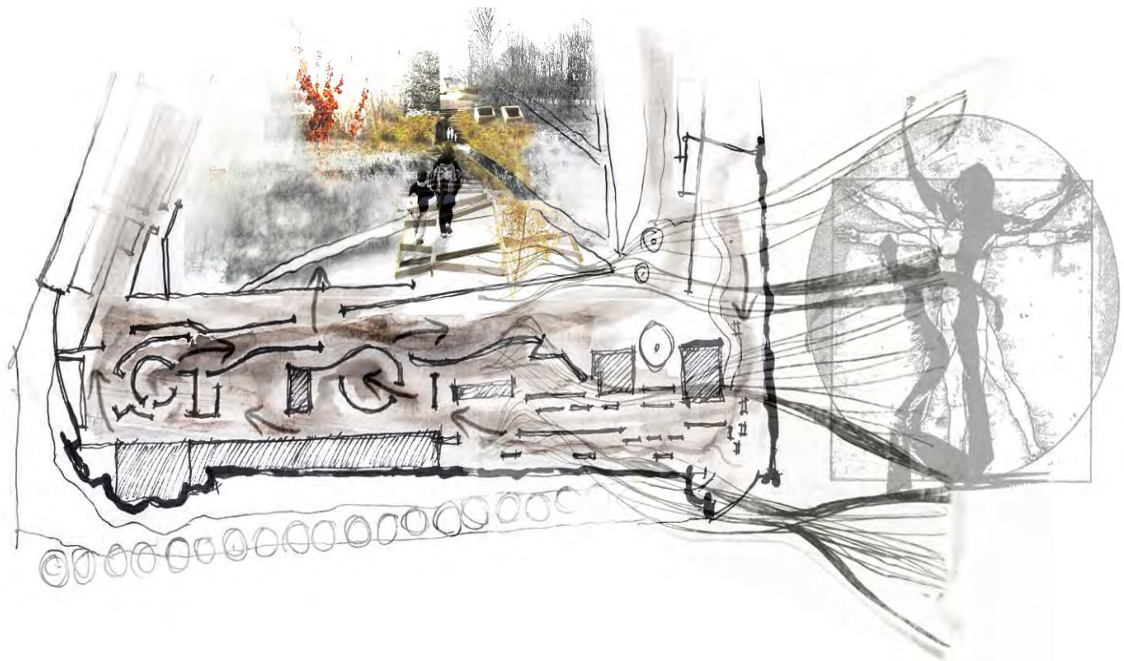
The architectural expression of the Apartheid Museum was decided on only after a trip to Washington DC by the architects and developers involved, who visited and experienced the narrative structure James Ingo's *Holocaust Museum* which re-enacts Hitler's rise to power, the internment of victims in camps and ghettos, and their final liberation. According to Bremmer (2002) The *Holocaust Museum* demonstrates the manifestation of sensory narrative, whereby active engagement of perception is used as the Museum's most powerful tool in order to evoke an emotional response (Bremmer, 2002: 35). Both the Holocaust Museum and the Apartheid Museum, therefore, are conceptually rooted in the intersection of two discourses - those of the collective memory of the traumatic events, and that of the poetics in architecture. The interpretation and realisation of this dialogue in the *Holocaust Museum*, prompted the development of the Apartheid Museum, whereby the narrative of oppression, struggle, and violence was developed through the anecdotes of spatial arrangement and material application. Through the physical structure and the layering of spaces, the architects involved designed spaces to engage in sensations alternating from shock and horror to triumph and hope – and, in the end, peace, and tranquillity. Kroese also maintains that the architecture was to exude an African aesthetic but at the same time be “*of a quality and character that would reverberate not only locally but also*

*internationally*” (Kroese cited in Bremmer, 2002: 39). He goes on to acknowledge that while trying to achieve a true African vernacular, it was of vital importance to avoid over literal African tokenism - and so the more obvious African embellishments were thus evaded. He states: “*Instead the design reverberates with the past and the future, juxtaposing, the era of apartheid on to the freedom of rural veld and the democracy of urban industrialism in an international architectural vernacular*” (Kroese cited in Bremmer, 2002: 42).

## SENSUAL BALANCE

### **Bodily movement through space**

As established, spatial navigation was to incorporate narrative principles of apartheid which engaged with feelings of segregation, anticipation, and foreboding (but to name a few). As can be seen in figure 5.21 - which conceptually illustrates the flow of movement through the main exhibition space - the museum dialogically engages with notions of separation and connection, whereby methods have been adopted to allow visitors visual access to spaces without allowing them physical access. Seldom do solid walls separate spaces; rather, the architects make use of mesh cages, glass, and semi-translucent visual depictions in order to emulate concepts of restricted access and isolation. Maze-like movement, again seen in figure 5.21, allows users to move around and through the exhibition whereby they become ‘claustrophobically engaged’ in the exhibition itself. This notion of imprisonment weaves the journey of apartheid whereby as one moves through the intertwining spaces one experiences the environment becoming less cold and less dark until the surroundings eventually become warm and light, so that one becomes aware of the transitional process taking place. This idea of embodied movement, however, requires further active engagement in order to enhance the emotional narrative of spatial orientation.



**Apartheid Museum - Architectural collaboration**  
Figure 5.21 - Conceptual notions of separated and connected movement through the main exhibition space.

### The architecture of sound, touch and smell

According to Kroese, the architecture is a metaphorical sculpture - in which the building is intended to be an exhibition in itself - that narrates the oppression of South Africa's history through ethereal sensations, tactile application, and perceptual overlays (interview, March 2011). During the course of the interview, however, Kroese failed to mention an individual's bodily response to space but rather focused on how the architecture, and its content, **visually** espoused the memories of apartheid (see appendix A for interview questions). As a result the architecture is largely dependent on the exhibition of visual graphics contained within the space, which subsequently engages with the passive processes of the human body; detaching visitors from associative feelings and experiences

of apartheid. This is reinforced by individuals interviewed onsite, whose responses pertained to the sensitive nature of the visual content rather than any mention of further stimulation (see appendix B for sample questions). It must be noted, at this stage, that the function of the Apartheid Museum is primarily one of an exhibitory nature which is dependent upon illustrative material in order to truthfully and chronologically represent images of the past. This, however, should not detract from the utilization of architectural forms and matter to convey a more embodied and raw experience of notions of memory and identity. This concept is highlighted in light of Daniel Libeskind's *Jewish Museum* in Berlin, examined in Chapter Four of this dissertation; whereby Libeskind made a conscious attempt to connect memory and space through tactile and intangible applications. The architecture of the *Jewish Museum* facilitates the psychological connection between body, memory, and architecture through sensory application. Shelton (2009) argues that the sensory deprivation found in many contemporary museums visual displays is detrimental to personal memory, as qualities of space have no 'emotional mediator' in which to communicate sensations of past events (Shelton, 2009: 108). This emphasises notions of 'passive observation' which has been adopted at the Apartheid Museum and is further reinforced by the 'DO NOT TOUCH' signs (plate 5.3) littered throughout the exhibition (note that photographs are not permitted in the interior spaces, therefore, plate 5.3 is used for illustrative purposes). Understandably the content is historically valuable; however, the lack of aural, tactile, and olfactory embellishments throughout the interior spaces results in a reserved encounter with the architecture, which furthermore dilutes the **emotional** experience of apartheid.



Apartheid Museum - Architectural collaboration  
Plate 5.3 - Signs which reinforce passive engagement.

## PERCEPTUAL EXPERIENCE OF PLACE

### A phenomenological approach

The siting of the museum does not mark any significant apartheid event or struggle. It has no specific locational or historical reference; neither is it associated with any particular community. Rather, it is sited in a landscape otherwise entirely devoted to fun – roller coaster's, slot machines, and themed mining towns (to name a few). This notion is reinforced by Bremmer (2002) who states: “[*The Apartheid Museum's*] existence appears little to do with the honouring of apartheid's victims or reconfiguring its meanings, but rather with securing a stake in a competitive gambling industry” (Bremmer, 2002: 43). This contradicts Kroese's notion in which he argued that it's juxtaposed siting reinforced concepts of 'separate realities'. Regardless of the museums inconsequential siting, its detachment from site and context results in a space whereby memory floats in the realm of pure narrative. As a result, the building negates any conversation with its context through its use of high, stark walls which township residents refer to as “*Alcatraz*” (cited in Bremmer, 2002: 36). Some argue that this is relevant to the symbolism of isolation and segregation that the apartheid regime embraced. According to interviews conducted onsite, the overwhelming and intimidating perimeter walls, reconstruct the conditions of imprisonment, whereby any sensory engagement is confined by a bounded perimeter.

### The use or misuse of environmental perceptions

The architecture's exterior makes use of stimulating environmental perceptions through the use of light and shadow; tactile materiality; and the kinetic qualities of water (figure 5.22 & 5.23). According to Kroese, water has also been used symbolically to: “*Both reinforce the idea of visual connection yet physical separation and emphasise the vision necessary to create a new democratic South Africa*”



Apartheid Museum - Architectural collaboration  
Figure 5.22 (left) and 5.23 (right) - The use of water is used to its full phenomenological capabilities; for its reflective, opposing, and dialogical qualities.



(Kroese cited in Giesen, 2002: 6). He also maintains that the oppositional forces of light and shadow, rough and smooth finishes, as well as the solidity of the built form and the fluidity of the water have been used in stark and palpable contrast in order to subtly showcase the principles of opposites adopted during apartheid (interview, March 2011). The interior spaces of the museum, however, are largely devoid of natural light, and contrasting qualities making the interiors dull and sombre in comparison to the enlivened experience of the exterior. Artificial lighting has mainly been used in order to maintain control over the illumination levels required to view the graphical content, however, it fails to adopt any further phenomenological meaning, in which light is used as a tool which emotionally intensifies space and which gives the notion of memory an experiential plasticity, materiality, and heightened presence. The interior spaces are devoid of the kinetic interplay used on the building's exterior to enhance the character and meaning of the architecture. This disengaging interior environment fragments the architecture, body, and historical content into separate commodities which constructs new kind of post-apartheid encounter. This is reinforced by Bremmer (2002) who states: "*The museum seems designed for those who never really experienced the dehumanising repression of apartheid*" (Bremmer, 2002: 43). It appears to construct a staged narrative, recalling apartheid at a distance whereby it is primarily narrated through recommissioned representational material. "*This effectively objectifies apartheid, thereby making it more easily consumable*" (Bremmer, 2002: 43).

## IDENTIFICATION OF THE SIXTH SENSE

### 'Sense' of cultural identity

According to Bremmer (2002) the identity of the museum was articulated in global terms. Its objective was to design a museum to 'take its place in the family of great museums of the world'. While its scope was global, its brief was developed in consultation with all 13 different cultural groupings in



Apartheid Museum - Architectural collaboration

Figure 5.24 - Conceptual elevation of main road which illustrates both its impenetrable exterior boundary wall and its form which embodies an identity of a mining landscape - regionally associated with Johannesburg.

South Africa who were flown to Johannesburg and asked about their contribution to the new nation. Bremmer argues that its architecture, however, adopts a neutral, international, modernist aesthetic, eschewing any reference to these traditions (Bremmer, 2002: 40). This concept of a globalised aesthetic as well as its distant relationship between memory and site manifests itself in a seemingly superfluous architectural response which reflects the surrounding mining landscape considered to be the ‘genius loci’ of Johannesburg (figure 5.24). Rock filled gabion baskets in rusting steel frames evoke the essence of nearby mining structures while the partly submerged building reflects the planted mine dumps. The architecture is deliberately turned in on itself, in order to distance itself from the context in which it does not associate. To do this, the architects have partly submerged it underground and artificially constructed a mound of earth and surrounded it in a packed stone wall. The result is a building which responds to South Africa’s goldmines as a marker of identity for apartheid, however, it is Johannesburg which is renowned for its mining regions, which presupposes that apartheid was confined to - or most affiliated with - the area of Johannesburg or the activity of mining. The result is a building devoid of elevations, resembling a regional identity that it can only be read in sections and more accurately through experience (or lack thereof). The architecture, therefore, has been successful in moulding an appropriate **regional** response to form (albeit it from a pre-existing flat site), however, fails to enhance the emotive content through negating the consideration of the 13 different cultural groups who were approached at the genesis of the design conception.

### Reasons for selected building materials

*“The starkness of aesthetics, the restrained palette of materials and colours, the severity of stone and rusted steel, concrete, raw plaster and red brick, reflect the gravity of what the building is about” (Darroll, 2001: 27).*

The architecture of the Apartheid Museum utilises unrefined, hard, neutral materials – red brick (figure 5.27), steel, raw concrete, and intentionally crude detailing. It is institutional, industrial, and un-domestic and is both symbolic to the narrative of apartheid and sympathetic to its memory in its detailing of segregation. The museum achieves this narrative of ‘distinct separation’ through the use of materials such as: galvanised gates in rusting frames (figure 5.26); dry-stack stone (figure 5.25) adjacent to off-shutter concrete; and large surfaces of gravel beds set against smooth concrete elements. Kroese explains the significance of materiality in the design conception by describing the different material and their subsequent tactile associations. Metal, for example, is exhibited using rusted metal and wall sections formed by galvanised gabion baskets filled with crush rock - which is used to depict the influence of the mines on the past and future of South Africa. Off-shutter concrete has been used effectively to generate a dramatic effect, creating a starkness that accentuates the brutality of the apartheid state (interview, March 2011). Another material, which is successful in its tactile application, is the non-standardised brick which was chosen for its inherent attitude. *“By using a non-standard brick for certain walls, a definite feeling of tension has been summoned. The dry stack*



**Apartheid Museum - Architectural collaboration**  
Figure 5.25 (left) - dry-stack stone. Figure 5.26 (top right) - dry stack stone in galvanised metal cages held within a rusted steel frame. Figure 5.27 (bottom right) - non-standardised brickwork.

*appearance of these walls also reflects certain indigenous African construction methods”* (Kroese cited in Giesen, 2002: 5). This symbolism of unadorned natural materials, more powerfully found on the exterior spaces, conveys the harsh reality of our history and sends a formidable message to our senses. According to Kroese: *“It is the honesty of the raw concrete, and other natural materials used throughout the complex, that contributes to this emotional response. These materials convey such strength and energy that no decoration or ornamentation is needed to reinforce the emotions that they generate”* (Kroese cited in Giesen, 2002: 4). This concept is clearly experienced in the materiality of the outdoor spaces whereby the architects have fabricated architectural physicality that is imbued with meaning and identity pertaining to the memory of apartheid. Materials used on the interior, however, are less obvious in their contrast and the experience of their symbolism is somewhat dulled under the invariable nature of homogenous lighting. The sensitive and symbolic use of materials, however, remains a successful contributor to the narrative of the building and concretises the building in the memory which it materially exhibits.

#### 5.4.3 Summary

The Apartheid Museum in Johannesburg is a site where many of the contested themes and metaphors of post-apartheid cultural discourse are rehearsed. Interior spaces are rhetorically organised around the narratives of racism, discrimination, struggle, and liberation pertinent to the current moment. As can be seen in the preceding arguments, however, its mode of memory-making is inconsistent - whereby

disconnected fragments of the building have been successful in sensory application, such as restriction and flow of movement, and the narrative and tactile materiality of the exterior spaces. The memory and experiences of apartheid fail to be enacted in the architecture's sensory presence as spaces are not enmeshed in an intertwining narrative. This disconnected embodied experience detaches emotion of the 'flesh' body of the visitor and that of the racialized body of apartheid, discussed in the background to this study - whereby apartheid is recalled at a distance. This is reinforced by Bremmer (2002) who states: "*It constructs a voyeuristic spectacle[...]The mode of memory-making is theatrical and propagandistic, bringing together historical records and entertainment*" (Bremmer, 2002: 42). Chapter Four of this dissertation established that architects are in a constantly open dialogue between form, culture, space, and memory, sensations and psyche, and it is the task of architecture to facilitate this active dialogue (Bastea, 2004: i). As an opinion (among many), the lack of dialogical sensory spaces in the Apartheid Museum, however, fails to transform the essence of memory into a tangible and emotive experience, whereby the opportunity to create a holistic, intimate, and honest encounter with the past, has been overlooked.



## 5.5 Conclusion

Subsequent to the analysis of each of the case studies including: Dornier Winery in Stellenbosch, Freedom Park in Pretoria and the Apartheid Museum in Johannesburg - conclusions and comparisons have been derived centred around the criteria upon which the case studies were analysed.

### **Sensual balance**

With regard to the authenticity of the architectural experience - which is comprehended by the flesh body and its traditional five sense modalities - Dornier Winery consciously prioritized the articulation of the sensory experience and as a result achieved an embodied relationship between architecture and the mental and physical constructs of the body. The architects involved with the conceptual development were cognitively aware that the body needs to be viewed as the centre point of the perceptual world - and as such used sensory properties of physical materials and environmental perceptions to create evocative spaces. This particular case study explored the realms of touch, sound, and most notably - smell to heighten the architectural experience which subsequently allowed the architectural aesthetic to adopt kinetic and dialogical qualities which furthered the user's active engagement with the built form. This is compared to the more puritanical ocular experience of the Apartheid Museum which consequently detached the users from the fullness of experience due to the muted and passive nature of the space, whereby the applied materiality did not communicate qualities past its physical presence. This notion of 'active' sensory engagement as opposed to 'passive' ocular engagement was ascertained from onsite interviews with individuals - as the arguments posed with regard to embodied experience is largely subject to personal interpretation. It was revealed, however, that visitors to Dornier Winery could recount architectural qualities in far more detail. It was also noted that visitors used words such as essence, beauty, engaging, and intimate (to name a few) to describe their experience of the space. The Apartheid Museum, however, failed to facilitate an embodied consciousness, as the architectural materiality does not invite bodily engagement. This reinforces notions postulated in the hypothesis, which presupposes that architecture orders experience through perceptual relationships that interface the realm of the embodied and the world of the senses. The different approach to architecture and the senses in both Dornier Winery and the Apartheid Museum has revealed that the built form engages with the immediacy of the sensory realm, and - if manifested - has the ability to heighten the architectural embodied experience.

### **Perceptual experience of place**

To a certain extent both Freedom Park and Dornier Winery share an inextricable link in which the meaning of place is experienced as a perceptual progression of environmental forces which intertwine to create a holistic encounter. Architects involved in both projects have understood and incorporated environmental sensations as an architectural tool in order to enliven and sensitize space. The movement through - and the experience of - the transitional spaces of both these case studies is dependent on the

enmeshing of the phenomenal zones, which facilitates embodiment of the collective being where the senses are extended by the particularities of the site. Both examples have considered environmental properties as physical entities – the success of this approach, however, is dependent upon their honest engagement with the body. Apartheid Museum, however, is used as an example of contention whereby the architecture does not kinetically engage with the particularities of the site - so rather than the building responding to the site, the site is a response to the building. The exclusion of the potentiality to weave body, architecture, and environment results in an isolated appreciation of the architecture as dialogical embellishments between the whole - are ‘muted’. Interviews onsite revealed that the users of both Freedom Park and Dornier Winery were consciously sensitized to the properties of space and material due to their mutually defining oppositional qualities. As a result visitors actively engaged more with the architecture of Freedom Park and Dornier Winery than the Apartheid Museum as a result of the intensifying qualities of environmental associations.

### **Identification of the sixth sense**

All three case studies were guided, in some way or another, by understanding the identity markers of specific notions of cultural perceptions (in the case of the Apartheid Museum and Freedom Park, this included a South African context - and Dornier Winery focused specifically on the culturally identity of the Cape). Issues of meaning and identity, however, pertained largely to a visual connection to regional or national identity and failed to further extend cultural constructs beyond the boundaries of the skin. Notions of cultural sensory manifestations at Dornier Winery, however, were notably easier to achieve as the scope of the building function catered to a contained region and was largely visited by a pre-determined cultural group - whose sensory hierarchies follow European values due to Colonial influence imposed on both body and architecture. Freedom Park and the Apartheid Museum, however, are responsible for interpreting and manifesting a broad range of different cultures within the borders of South Africa. These ‘sub-cultures’ differ in terms of their cultural orientation - meaning that to postulate one general sensory model is almost impossible as the sensory hierarchy’s carried within a specific South African cultural society vary greatly. Architects in both case studies approached the notion of encoded cultural constructions as value neutral, which highlighted ‘globalized’ markers of identity - resulting in an ‘African token’ aesthetic that is not true to the memory contained by each case study. This was derived from interviews onsite which consciously included individuals located within differing cultural groups, whereby there was no specific mention made - or reference to (especially with regard to the Apartheid Museum) cultural metaphors or sensory values. The result is a detached experience from both architecture and the memory of apartheid which reinforces that notions of the sixth sense are imperative in creating space rather than producing it, in order to engage concepts of meaning, memory, and identity.

### Challenges and design lessons

The overall challenge of sensory architecture, which has been confirmed through the analysis of the case studies, is the manifestation of ethereal constructs into physical and practical architectural applications. The most noticeable challenge with regards to sensory application, in the context of South Africa, however, remains the difficulty of manifesting the unifying quality of the sixth sense in a 'rainbow nation' country. It has been suggested that South Africa has undergone a process of *creolization*, whereby individuals of different cultures, languages, and religions are 'thrown together' to invent a new language, Creole, a new culture, and a new social organization - which makes more visible the fluidities that characterize all South African societies (Nuttal, 2000: 5). This idea of a 'creolized' 'rainbow nation' society has been coined on the basis and adoption of multicultural politics and policies associated with the 'New South Africa' through the implementation of democracy. The acceptance of multiculturalism in the 'New South Africa' has been assumed into a so-called *simunye* culture, which effectively homogenises the many cultures of South Africa under one multicultural umbrella through the slogan: *Simunye, we are one!* This mind-set, however, is argued as not being recognised in the reality of South African social practises - as South Africa is still a culture largely identified with racial differences. This ideology is reinforced by Bremmer (2002) – who comments on the Apartheid Museum:

*“The problem with museological apartheid is that it obscures the fact that apartheid is not dead; that it is still written on the bodies of many whose lives bear its traces – of those still subject to the entrenched racialized inequity persisting in South Africa today. It obscures the fact that apartheid is encountered daily on the city’s streets, in schools and hospitals[...]in the different life expectations of citizens[...]Apartheid is far from over”* (Bremmer, 2002: 43).

It must be noted – with reference to South Africa's sixth, unifying sense – that meanings and values particular to our culture are widely segregated by European and traditional African thought patterns - whereby markers of cultural identity have changed considerably since Colonial influence. Fanon (1986) reinforces this by stating: “[colonialism] has filtered into spheres of cultural production with the impact being that colonial value systems have been adopted as the yard-stick through which and by which all colonised bodies and cultures measure and come to be measured” (Fanon, 1986 cited in Craighead, 2006: 22). This notion of colonisation in the development of South Africa, as well as the notion of Westernization in contemporary development, has tended to 'whitewash' our value system resulting in an 'adapted' body which measures African culture through the constructs of a 'foreign' body. This has filtered into our ideas of cultural identity and iconographies which has in turn influenced our (contemporary) cultural production. This notion makes designing for a unified body - which basis sensory values on one cultural ideology - difficult, as South Africa is orientated and defined by a variety of opposing cultural values - some of which are defined by segregation and oppression.

**Additional observations**

Much of the discussion, up to this point, has focused on the body – and its sensory orientation and embodiment in architecture. A common thread uniting arguments posed throughout this study is Merleau-Ponty (1962) belief that the body is the prime means of being-in-the-world and thus our best reference for understanding it. What is relevant to the South African body - that subsequently affects sensory interpretation - is the powerful and all pervasive discourse of race and racial oppression. Racial identity embodies the flesh and is thus ever present, even if an attempt is made to assume neutrality. South African architecture thus needs to acknowledge this notion of body and culturally segregated identity in order to design spaces that connect and contribute towards the *simunye* culture - to embody the democratic body of South Africa.



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## CONCLUSIONS AND RECOMMENDATIONS

*“The ultimate meaning of any building is beyond architecture; it directs our consciousness back to the world and towards our own sense of self and being. Significant sensory architecture makes us experience ourselves as complete embodied and spiritual beings”* (Pallasmaa, cited in Renshaw, 2009: 248).

### 6.1 Introduction

In order to make relevant the conclusions drawn from the research carried out in the literature review and case studies - the hypothesis laid out in the first Chapter of this dissertation needs to be reiterated:

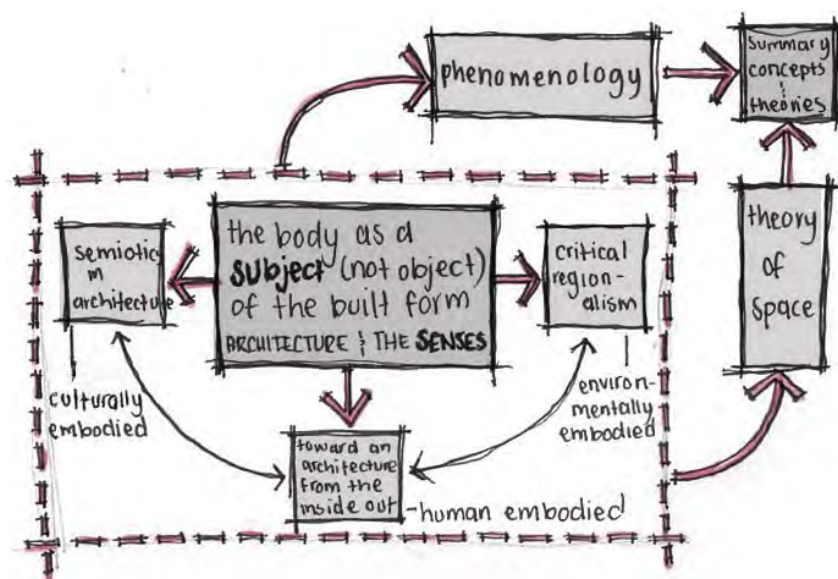
*Architecture orders experience through perceptual relationships that interface the realm of the embodied and the world of the senses - away from the traditional binary model of the abstract and physical, whereby architectural embodiment can be found in the morphological properties of space itself. Conscious sensory incorporation engages and subsequently intensifies experiential and psychological dimensions which has the power to transform an individual's day-to-day existence, whereby the everyday act of walking into a familiarized space can have a profound effect when encountered through sensitized consciousness. Architecture engages with the immediacy of our sensory perceptions and, therefore, with a better knowledge of how to physically manifest ethereal properties of sensation - the architect could reach a 'higher level synthesis' which focuses on the 'unseen' architecture whose physicalities become the subject of the senses. This notion highlights the potentiality of sensory engagement as a social system rather than a simple application of physical science which has the power to encourage or discourage and individual's moods and associations. Furthermore - sensory architecture does not only respond to the traditional five sense modalities, but also facilitates notions of time, identity, meaning and memory - through its dialogical, culturally conditioned qualities. Lastly - through responding to the subjective body - which includes the visceral (flesh) body, the environmentally sited body, and the culturally sited body - architecture will adopt sensory specific existential metaphors which express and relate to man/woman's being-in-the-world and not only accommodate for - but engage with - the volatile nature of the lived body.*

Arguments formulated throughout this dissertation have been analysed with the intention of drawing conclusions and recommendations that are relevant to the research problem. As stated in the first Chapter of this dissertation, the problem is essentially derived from the analytical, programmatic, and scientific approach to the body with regards to architecture - which outlines the body as definable, analyzable, measurable, predictable, and solvable - which subsequently renders the body a product of consumerism and mechanization and is detached from concepts of the lived body. The volatile, emotional, sensing, responsive, and relational body - which distinctly separates the visceral body (flesh body) from the anthropometric, robotic body - however, largely fails to be incorporated into contemporary architectural ideals (Scribner, 1997). Research into the subject of the body made clear that failure to stimulate the lived body, through active engagement with regards to an embodied sensory encounter, is detrimental to the adaptation of the human senses (Pearson, 1991). Puritanical

and ocularcentric thought patterns - as a result of mass-media globalisation and digitally stimulated environments - further contribute to our sensory demise as a result of passive stimulation of the ocular modality. Discussion surrounding the different paradigms of the body in architecture, and the role ethereal associations play in the built form, and their capacity to emotionally embody and intensify space, therefore, are relevant to the current state of mechanised and ocularcentric thought. Salient points are drawn out of the preceding arguments and interpretations of the arguments posed throughout this dissertation are collected in this Chapter.

## 6.2 Summary of findings and analysis

It is essential that the architectural theories and concepts outlined in the first Chapter of this dissertation are reviewed in order to ground the proceeding analysis in a clear conceptual and theoretical framework of multisensory design. As can be seen in the reintroduction of figure 1.5 - the body as a subject of architecture incorporates: the general concept of architecture from the inside out - which focuses on the 'universal' human embodied experience; Critical Regionalism - which pertains to the sensory and embodied experience of place and environmental sensations; and semiotics - which locates sensory understanding and orientation in the specificities of cultural values. These interconnected concepts and theories were all comparatively analysed under the veil of perceptual space and phenomenology in order to interweave the research into one common thread - that which pertains to an architecture which concretises existential metaphors and an individual's sense being-in-the-world through the overlays of sensory experience. Each theory outlined is intrinsically enmeshed with the relationship between the human embodiment of man/woman and his/her built, natural, and cultural sensory environment. These concepts and theories emphasise the need for sensory realism in the development of architectural



Theoretical and conceptual framework

Figure 1.5 – Diagram identifying the concepts and theories used throughout the discourse of this dissertation and how they are specifically applied to certain ideologies.

genesis and outline the body's interpretation as well as physical and emotional response to embodied space. What essentially makes these concepts and theories, discussed in Chapter One, relevant to multisensory architecture - is their integral response to the lived, feeling, moving, sensing, and emotive body; the body as a subject of architecture.

The literature review - comprising of Chapters Two, Three, and Four - present essential bodies of knowledge which are relevant to the points raised in the research problem. The points dealt with in this dissertation - as a background to identifying the intended contribution to the research - aimed to investigate how architecture is experienced in the conceptual realm of sensory and spatial relations; how it is conceived in the physical and social space regarding embodied experience and how the conceptual and perceptual ideologies surrounding architecture are directly relational to culture-specific notions. It subsequently endeavoured to delineate sensuous architecture in its entirety in order to place the physical and material body in a continuum of subjectivity as opposed to the current objectivity the body currently possesses. In sum - the research aimed to explore the physical and emotional affects of sensory manifestation - relational to the experience of architecture. The research achieved this by highlighting and elaborating on three main interconnected strands of sensory architecture, namely; architecture of the flesh – which dealt with the universal principles of sensory identification associated with the visceral body; architecture of environmental perceptions – which focused on more detailed notions of the body and its sensory and kinetic experience of place; and architecture of the sixth sense – which deliberated the sensory nucleus of the body as culturally conditioned. The following interpretations of the findings will aim to satisfy the questions raised in Chapter One of this study.

The word 'flesh' was adopted to the title of Chapter Two in order to reinforce the fundamental activity of the human body: to feel the world and house the environment in its being. Flesh speaks of the living and inscribes itself in its sensuous contribution to the world. The research carried out in this chapter - through the analysis of quantitative research and the example of Peter Zumthor's Thermal Baths - has established that designing for the traditional five sense modalities, known to the flesh body, enhances the human embodied experience of space, as mental constructs of the body actively engage with the architecture's ethereal properties. Architects including: Steven Holl, Peter Zumthor, Tadao Ando, and Alvar Aalto were critically analysed with regard to their sensory principles, as well their material works, in order to epitomise the physical manifestation of designing with an awareness of the body in the centre point of the perceptual world. A critical review of the aforementioned architects, in addition to existing literature, revealed that our 'flesh' bodies are porous and permeable whereby the boundaries of the body and the 'skin' of the built form are existentially blurred, providing an opportunity for architecture to engage in physical and psychological dimensions. It was established that we take in sensations, matter, and information - whether conscious of it or not - in order to derive meaning from a spatial encounter (as the most fundamental concept of the human mind is that it is programmed to seek meaning and significance in all sensory information that is sent to it) – sensations of the human

body and of the built form, therefore, are dialogically inscribed, whereby architectural matter naturally acts as a mediator that connects physical and mental constructs of the body. Although architecture has been, and continues to be regarded primarily as a visual discipline, the built form and its surrounding environmental and cultural context are habitually encountered as multisensory experiences - as the senses are biologically determined by the body and the body is biologically designed to interact with its environment. Pallasmaa (2007), the theorist who inspired this dissertation, argues that instead of seeing architecture merely as a visual projection, we unconsciously confront it with all our senses at once, and we live it as part of our world - not as an object outside ourselves - whereby: *“The building occupies the same ‘flesh of the world’ as our bodies. Every building has an auditive, haptic, olfactory and even gustatory qualities that give the visual perception its sense of fullness and life in the very same way that a masterful painting projects sensations of full sensual life”* (Pallasmaa, 2007: 13). Notions of aural, olfactory, and tactile dimensions were therefore reviewed in order to determine their contribution toward a heightened experience. It was established that utilization of the senses negate a linear, puritanical approach, and rather contribute toward an architecture which recognises the body as a lived construct of space. It was determined that recognising these sensations in the built form, in addition to the visual dimension, contribute to an embodied aesthetic which is derived from a phenomenological approach incorporating an intense awareness of the actual direct and active experience of the senses. It was further noted that architects need to invest in converting architectural sensitivity that incorporates attributes of ‘unseen’ materiality which is conscious of bodily reaction to space, in order to achieve this ‘high level synthesis’ - which elevates the meaning of architecture past the notions of purely physical structures. This idea of stimulating the recognised five sense modalities thus forms the foundation of this dissertation and sets the framework for the proceeding two chapters.

The arguments formed in Chapter Three - as well as the analysis of Herzog & de Meuron’s Dominus Winery - aimed to broaden the scope of the traditional five senses, posed in the preceding chapter, and subsequently increase the potential sensory palette of both body and architecture. Discussions, therefore, pertained to the development of an architecture which reflects a ‘sense of place’ - not through regional identity - but rather through creating heterogeneous, kinetic environments which sculpt sensations given to us by the earth - in which the **architecture is embodied by the sensory experience of place**. Architects and theorists including: Frank Lloyd Wright, Frampton (1980), and Perez-Gomez (1994) identified that this concept materializes the man-made realm as an extension of the properties of nature - which allows architects to manifest intangible and variable materials as physical constructs of space. Huxtable (1990) reinforces this concept by commenting on architecture which uses the ethereal palette of environmental sensations: *“I had no idea[...]that architects dealt in such sublime stagesets for human drama, that space could move one to such strong emotions, that architecture could make men so much larger than life”* (Huxtable, cited in Tuan, 1990: xiv). The embodiment of the built form - as a result of dynamic environmental forces - imbeds the experience of space in animistic qualities, further enhancing the body’s active and vibrant engagement



with architectural matter. Research revealed that in order to enhance these fluctuating animistic qualities - architects need to promote the perceptual merging of opposing attributes whereby the senses are exposed to variations and contradictions. This was explored through concepts such as light and shadow; materiality and time; and solidity and fluidity which established that architects need to consider space, light, material, and detail as an experiential continuum and physical material which can be moulded and contrasted in order to define its kinaesthetic qualities. Through the symbiotic and dialogical use of opposing environmental phenomena - architecture is subjected to animistic and sensory qualities in subtle and diverse ways - from the movement of the wind to the fluctuation of water, from the sensuous pressure of the subject, to the constant modification of space under the impact of luminosity. In experiencing the interplay of the phenomenal zones within architecture - and the subsequent animism it promotes - the body is subject to variable conditions in which the senses are actively engaged. It was concluded that architectural animism as a result of incorporating sensory properties of place - offers an alternative to objectification and distance as it gives significance to our bodily sensations and its gives interior life back to objects and surroundings. It was further noted that architects need to be aware of the potentially engaging complexities of the environment - complexities that transform the object of architecture into a dynamic experience for the body as a subject.

Chapter Four of this dissertation argues that the senses cannot be viewed as universal entities and that the information gathered in Chapters Two and Three need to be analysed through the '*phenomenological lens*' of the sixth sense - which locates the meaning of the senses in the value system particular to a given culture. Contributing authors including Geurts (2002) and Howes (1991) - who work in the field of anthropology - determine that this understanding alludes to a cultural construction of the sensorium which further delineates the scope of sensory understanding. The research defined the notion of the sixth sense as that which recognises cultural conditioning and orientation as the indispensable foundation upon which individuals retain their sense of memory and which influences their sense of identity. Main contributors of this section included Geurts (2002), Roth (2007), Libeskind (2001), and Holl (1996) - who all shared a common belief that architecture is a matter of embodied materiality whereby notions of meaning, identity, and memory are manifested by engaging in the particularities of a cultures 'sense ratio', through which space penetrates the boundaries of the skin in order to engage with internal psychological dimensions. This is reinforced by Pallasmaa (2005) who states: "*Architecture is the art of reconciliation between ourselves and the world, and this meditation takes place through the senses*" (Pallasmaa, 2005: 233). It was, therefore, established that in order to further sensory engagement - past normalised notions of sensory stimulation - architects need to be made aware of the specific interpretations of the senses, in order for architecture to intimately connect not only with the exterior body - but with the interior of the mind. This concludes that sensation is not just a matter of physiological response and personal experience; it is the most fundamental domain of cultural expression through which all values and practises of a society are enacted. The research gathered in this Chapter could not have been realised without the foundation set by the previous two

Chapters. In order for architecture to identify with the sixth sense, the established five senses as well as our sensory experience of place need to be understood in order for the built form to appropriately manifest the senses.

Chapter Five focused on the empirical case studies of Dornier Winery in Stellenbosch, Freedom Park in Pretoria and the Apartheid Museum in Johannesburg - with specific reference to the practical application of sensory embodiment. The criterion for analysis was set up in the framework of the literature review with each section pertaining to the main points highlighted in the body of the Chapter Two, Three, and Four. In order to avoid repetition of the points already mentioned, this summary shall only review the key points which contribute towards the conclusions of this dissertation. With regards to the visceral body - Dornier Winery prioritized the articulation of the sensory experience which was compared to the Apartheid Museum which relied upon visual depictions of apartheid in order to emotionally engage users. This allowed the research - through onsite interviews - to establish the different embodied experience (pertaining to the built form) as a result of 'active engagement' verse 'passive engagement'. The result of which confirmed that active sensory engagement facilitates an embodied consciousness in which the architecture orders experience through perceptual relationships that interface the realm of the sensory body and embodied architecture. With regard to the environmentally sited body - all three case studies - to a certain extent - embodied principles of harnessing environmental sensations as part of the architectural sensory experience. Dornier Winery furthered the concepts of contrasting and enmeshing environmental zones by using water as a physical, existential, and sensory tool to actively engage the body, the architecture, and the environment in a dynamic dialogue - intensifying the experience of the whole. In relation to notions of the sixth sense - it was discovered that South Africa, as a country which is home to a multitude of diverse cultures, faces the challenge of designing markers of sensory identity which incorporate values specific to more than one culture. It was established that South Africa's cultural orientation is largely associated with Colonial European values and traditional African values - in which the senses hold very different significances - whose influence is imposed on both body and architecture. The influence of apartheid cannot be avoided as the focus of this study is centred around notions of the body, and within the context of South Africa - racial identity embodies the flesh. Local architects need to be conscious of the cultural sensitivity of South Africa's history and current democracy in order to create rather than produce space that engages with sensory concepts of meaning, memory, and identity.

Overall the study reveals the need for intimately understanding sensory embodiment in the field of architecture by outlining the current state of ocularcentric and mechanised thought - and the impact it has on the physical and emotional dimensions of the body. It established that in order for architecture to digress from the ocular to the embodied - architects need to distance themselves from the extremes of absolutism and nihilism and adopt a mindful, open-ended stance toward human existence, which is not instantaneously apparent but requires understanding and uncovering. The research

established the foundation of sensory architecture as requiring an understanding of the subjective body: the body that feels; the body that moves; the body that senses; and the body that is affected by environmental and cultural space. It further requires architects to project this view of the body and its movements through space so as to elaborate metaphysical and existential thought in order to physically manifest ethereal associations. This notion is reinforced by Pallasmaa (2005) who states: “*A work of architecture incorporates and infuses both physical and mental structures. The visual frontality of the architectural drawing is lost in the real experience of architecture*” (Pallasmaa, 2005: 44). Through this understanding of the body as a subject of the built form; architecture is given life and spirit by all the qualities that touch the human senses: by light and shadow, sound and texture, by the enmeshing of interior and exterior - whereby the animism of architecture is expressed and active engagement is encouraged in order to facilitate an embodied dialogical encounter. With this approach our bodies are open to dynamic participation between objects, people, and surroundings - revealing that within the act of perception (the whole) - participation between the various sensory systems within the body occur. This intertwining of bodies, architecture, and environmental sensations indicates that every phenomenon is potentially expressive and has the power to influence our daily lives. A common thread which interwove all five chapters was the sensory exchange apparent in architectural matter, whereby - if used successfully - materiality embodies all three principles of sensory design. To restore importance to the lived body, to materiality, and to experience depends on a reconciliation of tangible/intangible, objective/subjective, and reason/emotion. As architecture is an art of constructing and physical making - its ethereal sensory processes and origins are essential ingredients of its very expression, making the enveloping dimensions of multisensory principles expressed in our architectural, poetic, and affective spaces relevant. Successful sensory architecture offers the user with shapes and textures which please the touch of the eye and unconsciously invites and excites the remaining senses to create fullness of experience. This is done through engaging in purposeful formation of embodied ethereal environmental and cultural materials, which provides precise cultural properties to the perceptual structure of our physical surroundings in order to make relevant the sixth sense in architecture. These properties endow the perception of objects with what Merleau-Ponty (1962) calls a ‘*form-giving*’ power that inherently relates to our embodiment by affording a way of knowing the world directly through its sensual nature. This understanding is gained from the intimate knowledge we experience as we dwell within our bodies. Sensory design, then, is the materialization of the artifice of architecture - in a living connection between the mental and sensual content. For Holl, a key contributor in this dissertation, acts of making purposefully configure the world to realise the presence of sensory perception, he states that: “*The experiential immediacy in perception intensifies relations between our body immersed in its experience of the world and the interpretive world of mental concepts. One searches perception for meaning*” (Holl, cited in Temple, 2006: 258). The built environment needs to thus engage in the intertwined experience of sensory design to challenge a unique architectural expression and perception of the body in the architectural realm. To conceive the body as a subject in the architectural realm

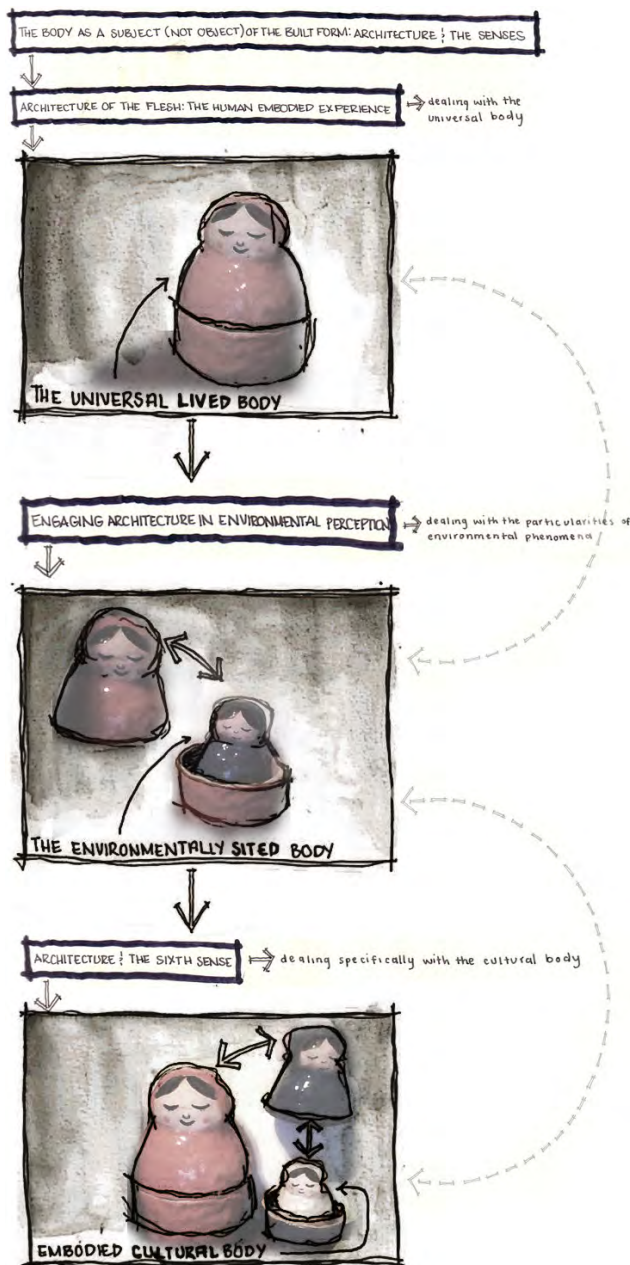


Figure 1.7 - Broad conceptual overview of dissertation content and structure.

is to recognise it as the necessary and animate condition for human life which helps us to realise that we build primarily to connect with the body - which gives credence to corporeal architecture that stimulates our senses. With the body, and its external and internal reactions, at the centre point of the perceptual world, embodiment and materiality are embraced and movement, activities, and sensations become sources of design ideas. Architecture then becomes a rich source for creating qualities that affect the senses of touching, hearing, smelling as well as seeing. Due to the nature of the topic there is no single truth regarding architecture and the senses. Research has revealed that the human embodied and our environmental and cultural perceptions are continuously shaped by conditions and circumstances particular to the time. Enlightenment science and Modernism based their ideologies on a universal truth which resulted in an 'international style' which transcended the particularities of specific bodies, specific context, and specific cultures. Multisensory architecture, however, is subject to

multiple, contradictory conditions which exist simultaneously, suggesting that there is no cohesive and dependable answer. This dissertation has attempted to understand the role of the senses in their entirety - within the realm of architectural experience - which illustrated the body (and subsequently this dissertation), as three sensory domiciles. This is clearly represented by the Matryoshka dolls (figure 1.7) which circumnavigates the study and reinforces that the sensory experience is disbanded for the purpose of understanding; however, they are enmeshed into one holistic encounter which is connected by the flesh of both body and architecture. This dissertation, therefore, has attempted to draw attention to the general model of sensory awareness concerning the universal body down to the distinctive individual sensory experience.



### 6.3 Conclusions and recommendations

The research undertaken in this dissertation has been particularly widespread in nature due to its ambition of researching the intangible properties of multisensory design - which is difficult to articulate in a document of this nature. In addition, the search for sensory architecture is a multifaceted methodology due to the unique quality of each project. In order to establish boundaries for the research, the scope was delimited to three main levels of multisensory design, namely: our human (Chapter One), environmental (Chapter Two) and cultural (Chapter Three) perceptions; however the issues to be dealt with remained broad even so. For pragmatic reasons some generalizations were made regarding the multifaceted topic for the sake of maintaining a clear focus on the research problem. Much literature has been produced regarding the need for sensory design, and the recurring theme found throughout published academic discourse is the tiresome repetition of the problem with modernist, mechanised architecture rather than a tangible solution. Research into the subject regarding architecture and the senses identified that there is a large gap in the academic writing of the subject and its physical manifestation in the built form. Theorists, from a varied field, elaborate on the final outcome by arguing the effects of the senses, however, fail to illustrate practical means to achieve such ends. This does not discredit the role of the senses in the built form but rather highlights an area of further research that is necessary in the field of sensory design. Research regarding the specificities of cultural interpretation of the senses is particularly underdeveloped with much of the reviewed literature being sourced from anthropologic studies. The subject of the senses, therefore, remains broad and further research into the particulars of architecture and the sixth sense would contribute to the collective understanding of the research topic. This dissertation consequently realises a degree of clarity regarding the nature of responsive architecture and meaningful experience of space yet at the cost of practical detail.

Overall this dissertation, through primary and secondary research, has established that we have simultaneously three domiciles: our human embodied sensory experience; the physical world of matter; and our world of culture inspired by memory and meaning. The mental world and the physical world constitute a continuum, and existential singularity. It is paradigmatic of the sensory order of our own culture that this dissertation has approached the variety of sensory experience through the visual medium of a written document. The researcher, however, hopes that the medium will not be the message, and that the content contained in this study will provide a basis and an impetus for an exploration of sensory patterns and combinations that go far beyond any of the reigning paradigms of textuality. Although for the purpose of this dissertation, the sensory elements have been disbanded, one must be aware that they merge to form an experience as a whole. Perez-Gomez (1996) concludes this research by stating: *“Our life, this ‘intertwining’ is a network of reciprocities; moreover, reality is not reducible to the conventional poles of objectivity and subjectivity, it is a gift to non-dualistic embodied consciousness – the whole, experiencing the human body as a synaesthetic receptor”* (Perez-Gomez, 1996: 9). Architectural synthesis of changing the physicality of the built form with all subjective environmental qualities of material and light forms the basis for an embodied and holistic

experience. Ultimately one cannot separate perception into geometries, activities, and sensations as has been done in this dissertation, rather, the merging of object and field interlock to create a whole cinematic encounter of fusing, yielding, interwoven, and animistic embodied experiences.

The research engaged with in this dissertation has been relevant in the suggestion of an appropriate response to the design of a responsive architecture which facilitates the body as a subject by identifying the intertwining nature of sensory design.

#### **6.4 Suggested design guidelines**

The points raised in this section of the dissertation aim to extract relevant criteria from the research which will provide a valuable and insightful foundation from which to ground an architectural response. The conclusions of this dissertation will only be made relevant if they are translated into tangible design principles. It is noted that much of the research is based on the study of essences which is at the discretion of the architect and the subsequent interpretation of the user. It is crucial for the successful design of a multisensory architecture that designers exercise a design approach which is inherently steered by cultural, environmental and human embodied sensitivity.

The research and analysis carried out in this dissertation has determined that there are a range of significant principles and concepts which should be applied appropriately in order to successfully overlap the meaning of multisensory design. Based on the outcomes of the research, with particular reference to the analysis of the case studies, the following general recommendations are made to architects who wish to respond to the lived body, and which will be implemented in Part II of this study:

**The most salient point raised in this dissertation guides architects to recognise the body as a subject of architecture. As established the human body biologically and psychologically interacts and subsequently reacts to tangible and intangible spaces; therefore, architects need to be aware of the embodied sensory realm of architecture by:**

- *Acknowledging the realm of sound through auditory spatial awareness which is achieved through understanding the aural properties of materiality in order for the users of the space to aurally visualize spatial geometry, propagate cultural symbols, stimulate emotions, communicate aural information, experience the movement of time, build social relationships and retain a memory of experience.*
- *Facilitating the haptic dimension through tactile application and physical active engagement, which consequently intensifies the sensory elements and engages with the psychological dimensions of the building.*
- *Physically manifesting the olfactory modality through acknowledging that architectural matter has the potential to absorb, transude, emit, and thus modify individual experience.*

*Smell has the ability to communicate and exalt the sense of place and enhance its memorability and is thus indispensable in the achievement of human identity.*

**Architecture needs to adopt a phenomenological and embodied approach to the specificities of place so as to broaden the scope and palette of the senses to include those of environmental perceptions. This includes the blurring of man-made and natural; mental and physical; tangible and ethereal boundaries in order to concretise the notions of place in active sensory engagement. This is achieved by:**

- *Exploring and contrasting the kinetic qualities of environmental perceptions in order to make users consciously aware of their being-in-the-world. The use of opposing and dialogical virtues of phenomenal zones including: light and shadow; materiality and time; and solidity and fluidity enhance the experience of place thereby transforming architectural encounters from passive experiences into active engagements.*

**Every effort should be made to relate sensory application to the particulars of a culture's concurrent 'sixth sense', as cultural conditioning is indispensable to achieving notions of meaning, memory, and identity by:**

- *Transcribing the principles of sensory design, with relation to the universal and environmental body, with the aid of physical and mental constructs of space which contribute and manifest sensations which are particular to the culture in which the building is located.*
- *Engaging in the reconstruction of meaning and memory through tactile application and navigation. Architects need to be made aware of the materials they engage with as this architectural element is the physical manifestation of a building's being and transcribes the intangible sensory intention.*

**Lastly, the architecture should actively engage with all three levels of multisensory design as their nature is intrinsically intertwined. This is achieved by understanding the senses as an operational complex which architecturally translates into an enmeshed fabric which weaves the flesh body, the environmental body, and the cultural body into an embodied sensory tapestry which is cognitive of enlivened experience.**

These guidelines and recommendations can be used as a foundation in the design process of an embodied, sensuous architecture in order to achieve a heightened engagement between body and space. By considering the aforementioned guidelines, architecture could be inspired to create spaces which have a profound effect on the emotional and physical response of the lived body and, therefore, these parameters serve to enhance the experiential realm of architecture, away from puritanical and objective design patterns.

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## APPENDICES

### Appendix A

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The following is a list of questions - derived from the arguments posed in the literature review regarding human embodied, environmentally embodied, and culturally embodied sensations - in order to establish a foundation for the analysis of each case study. Questions were directed at project architects involved in each of the projects analysed in the empirical research, namely: Dornier Winery in Stellenbosch, Freedom Park in Pretoria, and the Apartheid Museum in Johannesburg. Interviews were conducted at the offices of the architects questioned which included:

**Chris Kroese** (Johannesburg) – part of the team that led a consortium of four architectural firms who designed the Apartheid Museum in Johannesburg as well as part of the architectural team involved in Freedom Park.

**Johan Malherbe** (Paarl) – principle architect involved at Dornier Winery and is partner of Malherbe Rust Architects.

The questions asked acted merely as a guideline in order to prompt responses in relation to the topic. Below is a sample list of topics covered and questions asked in the interviews:

#### INTRODUCTION

1. **What does architecture mean to you? What are the principles that you judiciously apply to a conceptual architectural development?**
2. **What would you describe as the principle aim of contemporary architecture?** Discuss the dissertations founding principles with reference to the research problem which inscribes ocularcentric and mechanised thought patterns.
3. **What do you believe is the role of the body in architecture, or rather, the role of architecture with regards to the body?**
4. **If you had to postulate a sensory hierarchy, within the realm of architecture, what would it be?**
5. **What does ‘multisensory design’ mean to you? What do you believe is its role in the built form?** Discuss the different layers of sensory stimulation, including environmental and cultural embodied sensations.
6. **Have you incorporated these beliefs or principles in [case study]? If so, how have you manifested or transformed the realm of sensation into architectural matter?**

#### SENSUAL BALANCE

7. **With reference to the traditional five sense modalities, namely: the aural, olfactory, and tactile dimensions - have you been consciously aware of their embodied role in space?**
8. **Do you believe in the value of the relationship between architecture and smell, touch, and sound?** Discuss the relevance of sensory stimulation with regards to architectural experience

and how it affects physical and mental constructs of space.

9. **How have you incorporated these elements into [case study]?** Discuss the physical manifestations of these ethereal associations.

#### PERCEPTUAL EXPERIENCE OF PLACE

10. **What does the concept of phenomenology mean to you?** Discuss the approach to phenomenology this study has evolved, namely the embodiment of place through sculpting environmental sensations
11. **How have you applied this to [case study]?** Make special mention of existential boundaries between interior and exterior.
12. **What do you understand about the qualities of environmental perceptions? How has this been incorporated or manifested into the experience of [case study]?** Discuss the concept of interplaying and contrasting opposing phenomenal zones.
13. **How does the interplay of opposing environmental phenomena in [case study] influence the embodied experience of the user?**

#### IDENTIFICATION OF THE SIXTH SENSE

14. **Given the nature of preceding questions, how would you define a ‘sixth sense’?** Discuss in detail the cultural conditioning of the senses and its contribution in notions of meaning, identity, and memory.
15. **How have you derived a sense of identity and memory into [case study]?**
16. **What do you understand about aesthetics or beauty in architecture?**
17. **With regards to Freedom Park and the Apartheid Museum: How have you managed to separate and connect tangible and intangible spaces in a multi-cultural society whereby notions of identity and memory conflict?**

#### SUMMARY

18. **Having discussed the role of the senses in the architectural development and embodied experience, do you believe its an important aspect of design which should be given more credence?**
19. **What would you describe as the opportunities and challenges which face the development of multisensory design?**
20. **Would you like to make any further comment pertaining to [case study]?**

**NB:** Participation in this interview is voluntary. Participants are informed of the nature and purpose of the research and institution with which the research is associated with. All information gathered from the interview is solely for the purpose of this research study. Participants are free to withdraw from the research at any time should they wish to do so.

## Appendix B

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The following is a list of questions directed at visitors who actively and physically engaged with either Dornier Winery, Freedom Park, or the Apartheid Museum. The information gathered from these interviews are judiciously incorporated into the analysis of the case studies as they account for personal experiences which allows for a more honest reflection of the case study.

Sample list of topics covered and questions asked in the interviews:

<b>ARCHITECTURE AND THE SENSES</b>
------------------------------------

- 1. What do you believe is the role of architecture, beyond notions of physical structure? What is the most important aspect to you when experiencing architectural space?**
- 2. What do you understand about an embodied architectural experience?**
3. Give a brief overview of a the contents of the study. **Do you believe the realms of architecture and sensation coexist? If so, how?**
- 4. Having completed you experience of [case study] and having discussed the role the senses play in the built form, are there any aspects of the design that held any particular meaning to you?**
- 5. Did the role of touch, sound, and/or smell play a noticeable part in your experience of [case study]? How?**
- 6. What do you understand about how we perceive beauty? How would you apply that understanding to architecture?**
- 7. Having previously discussed the notion of embodiment, what was your overall experience of [case study]?**
- 8. Are there any further comments to wish to make about the architectural experience of [case study]?**

**NB:** Participation in this interview is voluntary. Participants are informed of the nature and purpose of the research and institution with which the research is associated with. All information gathered from the interview is solely for the purpose of this research study. Participants are free to withdraw from the research at any time should they wish to do so.



## **PART II**

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### DESIGN REPORT

## **ABSTRACT**

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This dissertation is presented in two parts - Part I dealt with the theoretical issues of the body as a subject of architecture. The purpose of Part II of this dissertation was to determine a relevant, responsible, and appropriate architecture for the design of a Winery facility in the KwaZulu-Natal Midlands Meander region. Part II, therefore, reviews the technical requirements for the selected building typology in order to ground the theoretical principles (set up in Part I) in practical parameters. The nature of this architecture was generated through investigation of current literature; precedent and case studies; and personally conducted interviews, with a number of informed professionals.

The purpose of this report was to investigate the technical resolution of an operating winery facility in order to inform the brief and site selection. Through this study, specific characteristics of winery design were investigated. These characteristics include (but are not limited to): wine branding and identity; winery location (including orientation); spatial requirements for winemaking; appropriate construction materials (including sustainable design considerations); energy requirements; and sanitation and waste-management. Conclusions are drawn in order to inform the analysis of appropriate precedent and case studies.

Due to the fact that a winery facility is essentially a factory typology, an opportunity presents itself to combine the humanistic and sensory principles established in Part I of this dissertation with the technical resolutions presented in this report – to inform the design as a whole. The finalised design is an amalgamation of the information gathered in parts I and II of this dissertation.

## INTRODUCTION

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The purpose of this dissertation is twofold. Part One investigated the theoretical framework of the design which included: *'The Body as a Subject (not Object) of the Built Form: Engaging Architecture and the Senses'* - which will ultimately govern the conceptual development of the winery facility. This report – Part Two – reviews the process and requirements of designing: *'A Proposed Winery in the KwaZulu-Natal Midlands Region'*. Following on from the theoretical framework set up in Part I of this dissertation, the design report will analyse how the recommendations and design guidelines can be practically and technically applied to the chosen building typology. Furthermore, Part II of this dissertation will document the technical design requirements needed to establish an operating winery facility. From the analysis of generalised winery design considerations, a list of criteria will be outlined which will aid in the analysis of key precedent and case studies. Due to the nature and structure of this dissertation, it is essential to research further precedent and case studies which will be examined according to their technical design resolutions rather than their theoretical principles. The accumulation of the aforementioned research will endeavour to inform the brief – including the schedule of accommodation and site selection.

The fundamental purpose of this report is to demonstrate the application of the research findings into a practical and functional architectural design. The reviewed conclusions of Part I was necessary in order to concretise the design report (Part II) in the theoretical research. All the information gathered in both Part I and Part II of this dissertation will facilitate the theoretical and technical resolution of the design, toward a building which is grounded in both principles – the tangible and the intangible.

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## JUSTIFICATION OF THE BUILDING TYPOLOGY

### 7.1 Introduction

Due to the nature of the research topic and the intended focus on multisensory design, the selected building typology needs to reflect the theoretical discourse set up in Part I of this dissertation. It, therefore, requires a strong connection to experiential space whereby bodily interaction and reaction is a key design generator; an understanding of place - whereby environmental sensations could be used as architectural form givers; in addition to its ability in encapsulating and manifesting the presence and meaning of the sixth sense. Through analysis of key international examples and local case studies, interviews, and an intensive literature review - certain criteria have been established based on the aforementioned research which will be applied to the selected building typology. The objective of this Chapter, therefore, is to ascertain certain principles of multisensory design which can be generated to form an appropriate multisensory response to the chosen building typology. The principles directly correlate to issues reviewed in the case study and have subsequently been applied to the chosen building typology in order to determine its suitability. They include:

- **The universal / lived body** - architecture of the ‘flesh’
- **The environmentally sited body** - sensorial manifestation of place
- **The culturally sited body** - presence and meaning of the sixth sense

### 7.2 The project description

The case study carried out on Dornier Winery by Malherbe Rust Architects, as well as key international examples used throughout the literature review including: Loisiium Winery by Steven Holl and Dominus Winery by Herzog and de Meuron - managed to address the key problem statement and responded to the hypothesis laid out in Chapter One of this dissertation. It is also noted that the design aspects critical to the success of a winery closely follow the beliefs of Pallasmaa (2005), Holl (1996) and Zumthor (2010) key theoretical contributors throughout this dissertation) - as the building is essentially seen to be a factory typology which lends itself to sensory design through the winemaking process (figure 7.1). Through the criterion raised throughout the course of the literature review, as well as the successful results of the analysis of the case study - Dornier Winery - it has been noted that a winery, embodying the principles of its making, would be the most suitable building typology for the following reasons:



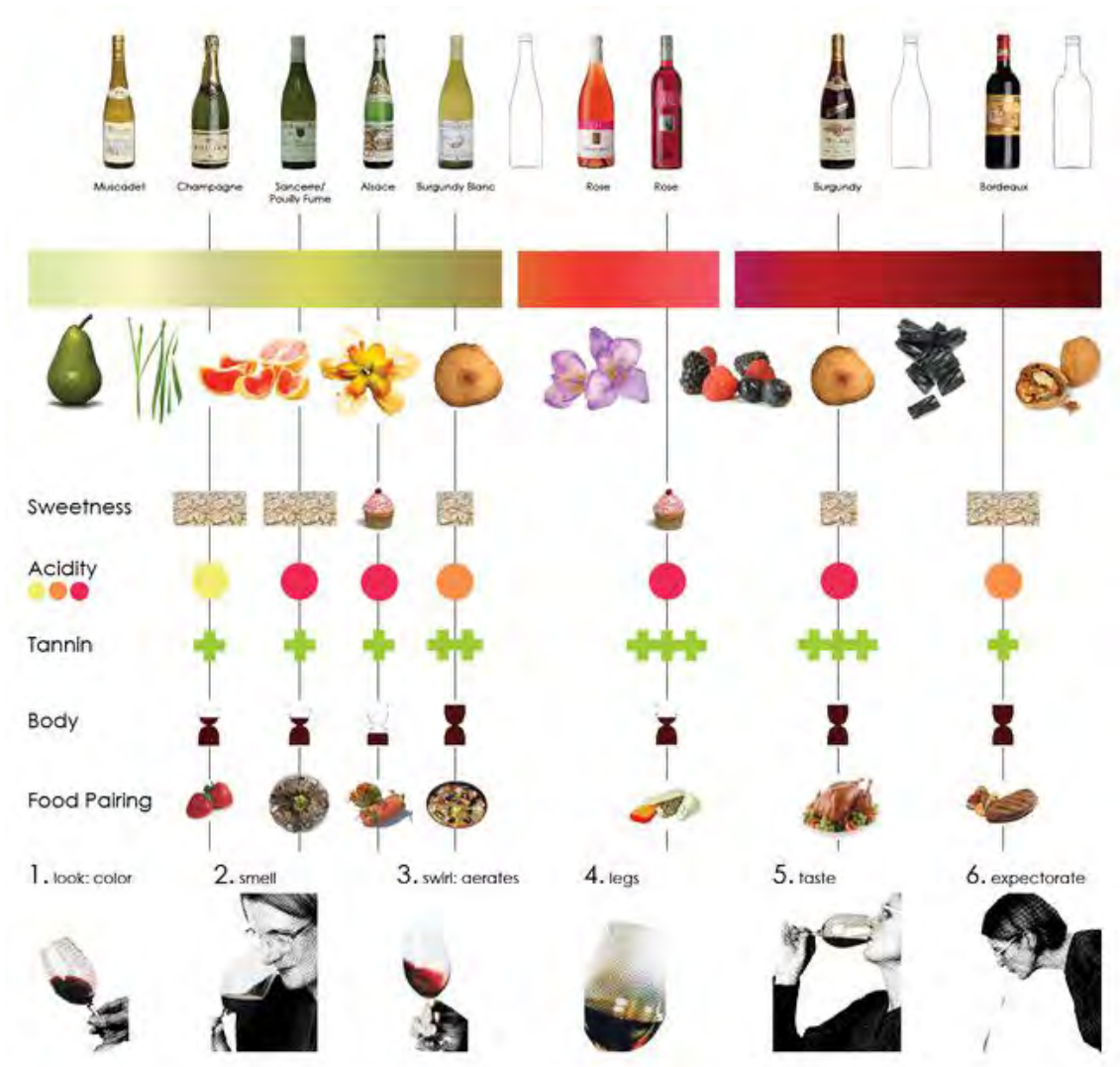


Figure 7.1 - The sensory experience of wine.

### 7.2.1 *The universal / lived body - architecture of the 'flesh'*

In normal life no one goes around tasting, listening, touching, and smelling space; rather bodies experience space as an integrated whole - a winery illustrates the integrative nature of perception and allows for design opportunities to express and stimulate certain sensations. As established in the literature review, space is viewed as a predominantly visual experience of the atmosphere - of the emptiness or void contained within a structure, however, a winery accommodates an environment for life contained within its walls - an environment that is naturally stimulating to the senses. According to Malherbe (2011) the function of a winery is one that responds to the visceral body, its processes, and ultimate manufacture, aim to please the bodily senses - the realms of touch, smell, sound, taste, and sight are an important part of successful winemaking - it, therefore, becomes the responsibility of the architecture to manifest these ethereal properties, whereby function, architecture, and body are enmeshed. Quality wine is based on its holistic sensory experience (in accordance to the body), the architectural response is thus encouraged to reflect this belief (interview, March 2011).

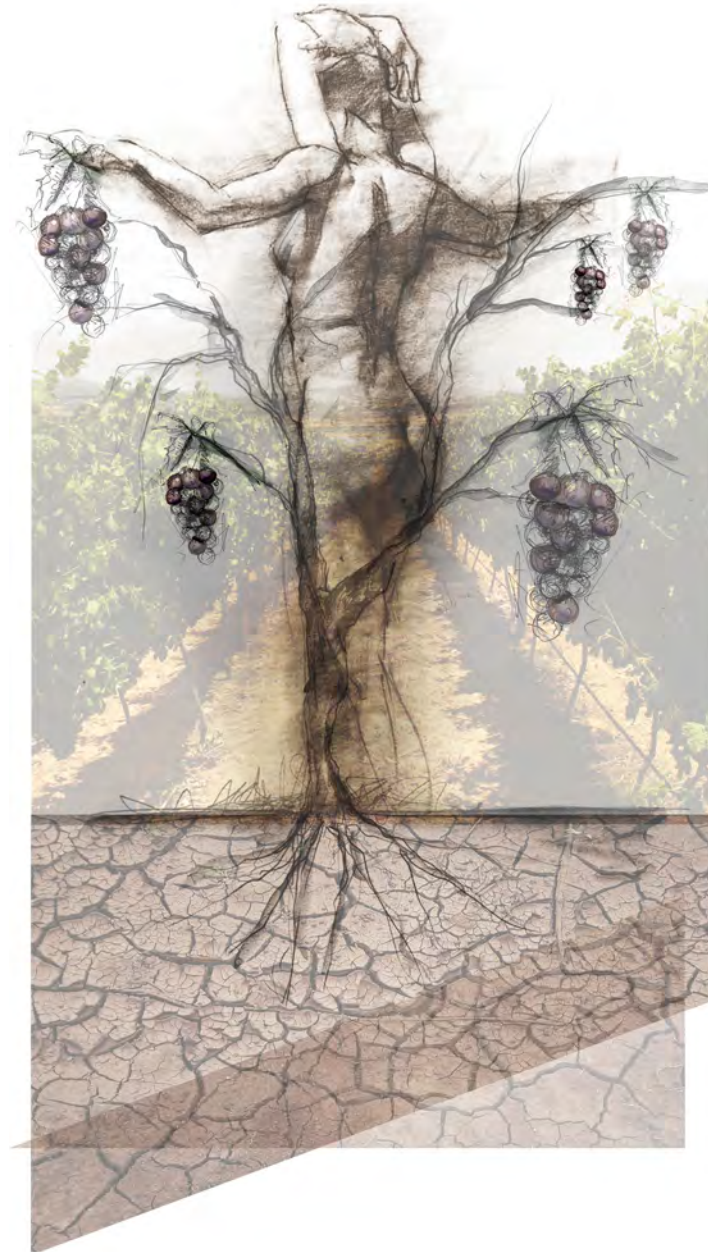


Figure 7.2 - The 'body' at the centre point of viticultural practises.

### 7.2.2 *The environmentally sited body - sensorial manifestation of place*

Many wine-makers say that the process of winemaking is simply a tool for extracting the flavours of the earth - a process commonly referred to as *terroir* (interview: Steyn, March 2011). Essentially this encompasses the belief that specific wine produced from specific grapes is a reflection of the specificities of place, whereby the character of the wine made from a single identifiable patch of ground reflects not only what one can see but also reveals the deep history of the place (figure 7.2), and the dynamic mix of forces and events which form its geological and geographic heritage. All of these forces including: sun, topography, bedrock, sediments and soil, temperatures, and rainfall combine to create a plot of land which produces grapes of a truly unique character. According to Hamilton (2006) over the centuries, French wine-makers developed the concept of *terroir* by observing the differences

in wines from different regions, vineyards, and even different sections of the same vineyard. The French began to crystallize the concept of *terroir* as a way of describing the unique aspects of a place that influence and shape the wine made from it (Hamilton, 2006: 45). This provides an opportunity to apply the same ideology to the built form whereby the architecture is a reflection of the specificities of its surrounding environmental qualities. This chosen building typology relies on the processes of light and shadow, water, wind, temperature, sun, properties of the soil, etc, for its product to be successful and, therefore, an integration of these elements into the design would be embraced if not essential. A winery allows for a distinctive identity and coherence with the memorable character of place within a particular perceptual environment, with which bodies actively engage their attention or action.

### 7.2.3 *The culturally sited body - presence and meaning of the sixth sense*

A winery essentially involves an isomorphic relationship between the existential and the architectural space, whereby the building typology is able to integrate its structure into a personal representation - as well as translate its existential representation into a concrete architectural structure. A winery is a space and place people come to experience and apply to a field of perceptual experience involving person and setting, together with the range of historical and cultural influence, knowledge and meaning that invariably imbue the field of the winemaking. The method of winemaking is essentially a process involving a narrative from plantation to production - this same ideology of narrative is experienced in the chronology of culture and history and its interpretation into architectural meaning. Just as wine is a product of the earth, the subsequent architecture lends itself towards being a product of its cultural perceptions. A winery usually stands in isolation, as an icon of man with no surrounding distractions - it becomes the sole focus of mans' creation and thus it needs to speak of mans' intention, mans' ability to **create** rather than produce an architecture of production.

## 7.3 Summary

A winery facility allows for the integration of the research through acknowledging the three identified layers of sensory experience. In addition, it allows the user of the space to follow Merleau-Ponty's (1962) belief of perceiving in a total way - with our whole being which speaks to all our senses at once. This chosen building typology gives an opportunity to use the theoretical framework of the literature review as a design generator which will ultimately influence the form, materiality, movement, and embodied experience of the space.

The proceeding Chapters will thus be concerned with the technical and practical aspects regarding winery design in order to set up a brief, influencing the schedule of accommodation which, coupled with the criteria set up in Part I, will inform the site selection.

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## WINERY DESIGN CONSIDERATIONS

### 8.1 Introduction

In designing a winery for the twenty-first century, architects need to understand that while the fundamentals of the processes of winemaking have not changed over the centuries, the design of a functional winery has changed dramatically. Due to the increasing number of esteemed international architects designing architecturally merited facilities - they have become more than a processing plant. According to Zoecklein (2008) optimal winery design combines traditional winemaking philosophies, such as minimal fruit and wine handling, with modern engineering and aesthetics. The differences in winery design (which need to be determined in order to inform the schedule of accommodation), are a result of (Zoecklein, 2008: 2-3):

- **Cultivars used**
- **Processing equipment**
- **Yield per ton**
- **Product mix and wine quality**
- **Temperature and length of fermentation**
- **Percentage of barrel versus stainless steel fermentation and storage**
- **Degree of labour and capital intensity**
- **Bulk aging time**
- **Bottle aging time**
- **Visitor involvement**

These parameters need to be established, by the client/owner, at the beginning of the project in order to help inform the design and layout of the winery. According to Morrison (2008) in order to help maximize the potential success of the winery, it is essential that a qualified wine-maker collaborate with the architect - the wine-maker/winery consultant should be involved in the quantity and quality aspects of winery design. Ideally, this person works with the owner to determine, from market research and other data, what wine types and styles should be produced, and in what volume. Once the aforementioned outlines have been ascertained, the architect can ensure the winery has appropriate space and layout to reach the desired quality, volume, and stylistic goals (Morrison, 2008: 7).

The aim of this chapter is to explore the key components which influence the design of an operating winery facility – to provide information about the requirements, procedures, and equipment necessary for the production of wine. The information gathered is by means of secondary research, and interviews with local architects as well as winemakers (in order to provide first hand information with regards to winery design). Conclusions will be drawn which will aid in determining the criteria from which to analyse key precedent and case studies.



## 8.2 Wine branding and identity

We live in an age of the ‘brand-conscious’ consumer, whereby stamping a brand is a means of claiming an iconic, globally recognised identity. According to Stanwick & Fowlow (2006) consumers choose a brand that most closely matches their own values and ideals, and today the consumer can be a Museum or a University, just as easily as it is an individual. Public and private institutions and corporations are commonly utilizing architecture as a tool to forge their identities - in order to create a ‘signature’ image. Furthermore - for the winery industry - this trend is using architecture as a tourism conduit, referred to as the ‘Bilbao effect’ - after the tremendous effects of the Guggenheim Museum in Bilbao, Spain by architect Frank Gehry - which exponentially increased the town’s revenue due to the architecture’s iconic status (Stanwick & Fowlow, 2006: 5).

According to Zoecklein (2008) the identity of the wine is inextricably linked to the image of the architecture. This direct association between the making of wine and the building that manufactures it dates back to the 18th century, when winemakers in the Bordeaux region of France began using the word ‘chateau’ on the labels themselves. The representation of the winery through label design today has progressed beyond merely using the word ‘chateau’ to using the image of the building itself. This can be seen in figure 8.1 which shows Frank Gehry’s Marques de Riscal Winery in Spain – and the resulting wine label which uses the iconic architecture as a marketing tool. The significance of branding for the wine industry is increasingly related to the sales of the product. As wine sales move out from speciality retail outlets into supermarkets in many parts of the world, the ability of the consumer to identify wine choices is challenging. It is, therefore, an expectation of the consumers’ that there will be compatibility - a parallel imagery - between the branding of the wine, the quality of the wine, and the experience that they will have at the winery itself. Creating a great wine and an appealing environment in which to produce and house that wine, is considered a form of art. To a certain extent, consumers relate to a brand in terms of its perceived image and lifestyle. As such,



Marques de Riscal Winery - Frank Gehry  
Plate 8.1 - The translation of the architecture into the wine’s image and brand identification.

winery design and expansions should consider this interrelationship in the very early planning stages. A successful and internationally recognised wine, therefore, is largely dependent upon the ‘branding’ of the architecture. Wine and architecture are both creative industries: creating an architecture which compliments and expresses the wine which it produces, is critical in establishing the wine’s image and brand identification (Zoecklein, 2008: 1&2).

### 8.3 Functions and users

According to Morrison (2008) an early determination in winery design is to establish what types of products and services will be offered by the winery itself. Factors to consider in this determination include: What is the primary function of the winery (operational or more tourism based), and who are the primary end users (employee or customer based)? The first production concern, regarding winery design, is determining the initial level of production to undertake with some idea about subsequent increases in production. The next major consideration is establishing which varieties of grapes will be used (which will, in turn, determine the site selection) and how these grapes will be obtained. Morrison explains that full production from a new vineyard could take up to five years to produce mature grapes ready for processing - alternatively grapes could be purchased from neighbouring vineyards, which again, will influence the site selection (Morrison, 2008: 12&13). There are different levels of involvement in the production of wine which can be adopted and which ultimately influence the overall design of the winery itself. These levels are described briefly below:

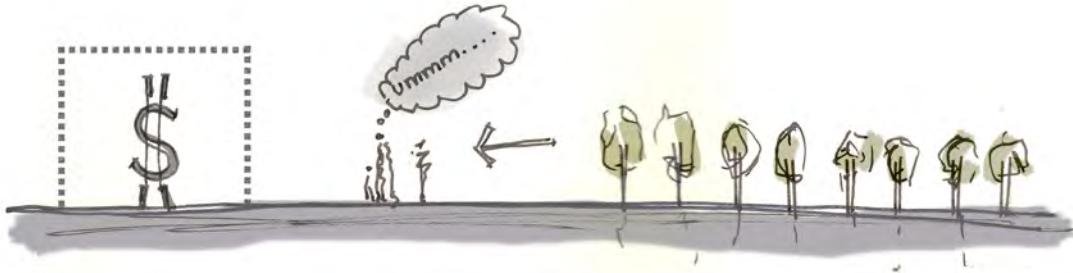
**Bonded Winery:** (Figure 8.1) - when a company qualifies as a stand-alone winery, it is responsible for all production activities that take place on the bonded premises. The owner of the winery has the expense for all necessary winemaking equipment, costs of operation, and buying or renting the property (Morrison, 2008: 13).



Winery functions  
Figure 8.1 - Bonded winery.

**Alternating Proprietor:** (Figure 8.2) - when individuals would like to make wine for commercial purposes, but neither have the interest, nor the financial ability to build or buy a winery of their own. By sharing a bonded winery facility with another company (or companies) on an alternating basis, they are able to produce

their wine and qualify with the SAWI (South African Wine Industry) as an Alternating Proprietor winery. This allows existing wineries to use excess space and capacity and gives new entrants to the wine business, an opportunity to begin on a small scale without investing in a winery building and all of the necessary winemaking equipment (Morrison, 2008: 13&14).



Winery functions  
Figure 8.2 - Alternating proprietor.

#### Custom Crush:

(Figure 8.3) - aimed at those just entering the wine business who may decide they would prefer to focus their energy and capital on establishing their vineyards and developing markets for their wines, rather than doing the actual winemaking. Another situation may exist when a person has grapes or other winemaking materials that they would like to have made into wine, but would prefer that someone else make the wine for them. In both situations, a Custom Crush Winery may be the best approach to getting the wine produced. In this arrangement, a bonded Custom Crush winery supplies the space, equipment, and trained personnel to make the wine. The person or companies with the raw materials are known as the Custom Crush Clients and qualify with the SAWI as Wholesalers (Morrison, 2008: 14).



Winery functions  
Figure 8.3 - Custom crush.

## 8.4 Winery location

A winery is considered more than a simple production facility; therefore, the public component and visitors' experience must be conceptualised in determining its appropriate location. According to Zoeklein (2008) tourism is now such a large factor in winery design that the locations for new wineries are often chosen as much for their proximity to other tourist attractions, as for the quality



Winery location

Figure 8.4 - Accessibility, visibility and proximity to mature vineyards are key considerations in siting a successful winery.

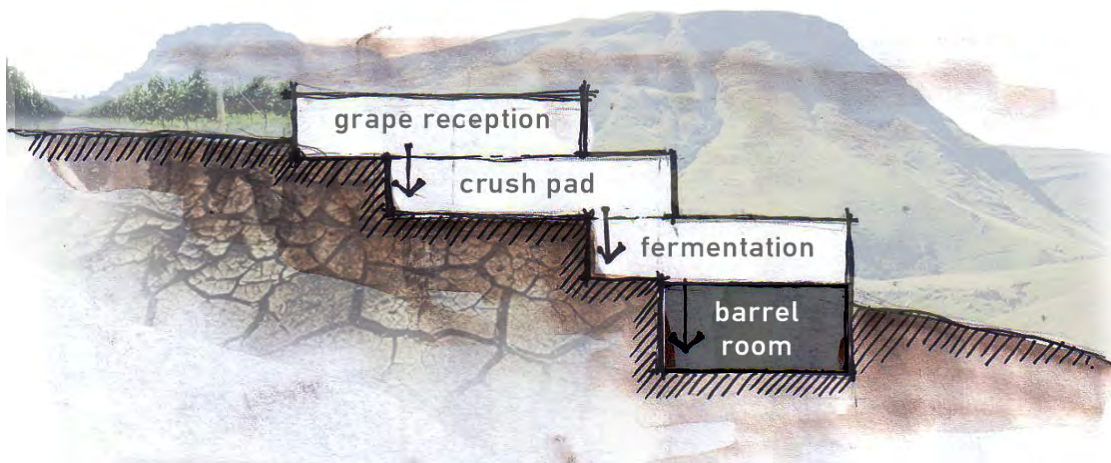
of the sites soil, climate, and overall growing conditions. Winery designs must, therefore, not only integrate the dual marketing advantage of coupling branding and architecture with winery tourism but it must also optimize the tourist experience (Zoecklein, 2008: 5). Morrison (2008) maintains that in order to establish the winery as a touristic venture, one of the most important aspects of the site's location is its visibility and accessibility from a major road and its allowance for future expansion of production – should it be a successful destination. In addition, the winery needs to be located near a vineyard, or with ready access to a source of grapes (figure 8.4). Grape quality begins to deteriorate quickly once the grapes are harvested so the faster they can be moved from the vineyard to the winery, the better. Due to the fact that the winery will need to receive frequent deliveries of grapes, bottling supplies, and other materials, and to ship the product for distribution - the location should be easily accessible by larger vehicles. Easy access to the winery is also important to ensure a sufficient pool of employees and to allow service personnel, like electricians, plumbers, mechanics, and refrigeration technicians, to reach the facility in a timely fashion (Morrison, 2008: 7&8). According to Swaffar (2007 cited in Zoecklein, 2008: 4) the following components should be evaluated when selecting an appropriate site location:

- **Public accessibility and visibility from roadways**
- **Aspect, orientation, mesoclimate and soil composition (further detailed in appendix B)**
- **Building site suitability (site grading, geotechnical, etc.)**
- **Zoning and general plan conformity**
- **Neighbourhood compatibility**
- **Power and utilities**
- **Water supply and treatment**
- **Water storage**
- **Wastewater treatment, storage, and disposal**
- **Utility availability (underground piping, electricity, etc.)**



### 8.4.1 Winery orientation

According to Grainger & Tattersall (2005) once the site has been selected - orientation of the winery is vitally important, as keeping the building cool considerably reduces energy costs. In hot climates, the building should be sited on a north-south axis, with the shorter walls to the midday sun. It can also be beneficial not to have windows on the western side - facing the hot afternoon sun (in order to maintain adequate internal temperatures of 20°C). It is also beneficial to orientate the winery on a slope, if possible, in order to implement gravity flow design and minimize ambient temperatures. As can be seen in figure 8.5 – wineries have four basic levels of production, namely; the grape reception, the crushing/de-stemming, the fermentation, and barrel storage (elaborated in appendix C). By adopting a gravity flow design, the architecture responds to the processing flow and suppresses the need for mechanical pumps (Grainger & Tattersall, 2005: 24&25).

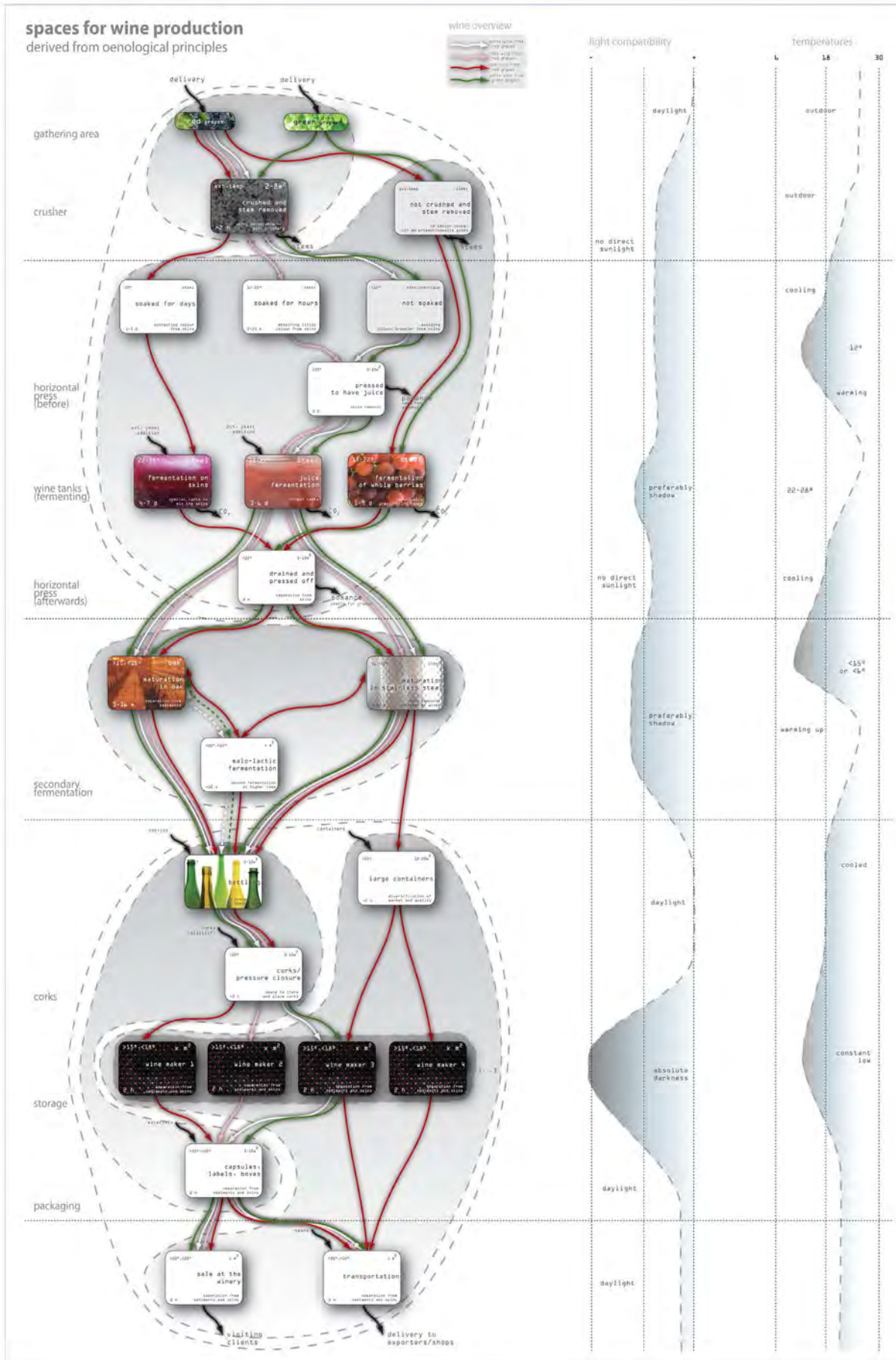


Winery orientation

Figure 8.5 - By orientating the building on a slope - architects can adopt gravity flow design to reduce energy costs.

## 8.5 Spatial requirements for winemaking

The essential operations of a winery are consistent and unchanging (figure 8.6). Grapes are sorted and loaded into fermentation tanks; the fermented juice is aged in oak barrels, then bottled and shipped (a detailed version of the production process and equipment requirements can be found in appendix C). The variations come in the scale of production and the wine-maker's unique way of working. According to Zoecklein (2009) creating an efficient, functional, and expandable design is vital to the success of the winery and, therefore, should be considered by architects as an essential design generator. Wineries usually have a design plan that includes areas for the various stages of winemaking (receiving, fermentation, and bottling); sales and tasting rooms; office space; rest rooms; laboratory; separate storage areas for glass, bottling supplies, and chemicals; and a bonded area (for storing the wine while under a SAWI bond) (Zoecklein, 2009: 2). According to Morrison (2008) a spatial arrangement that is considerate of the processes will make wine production easier and enhance the winery experience for guests. Regardless of whether the winery will be in a newly constructed building



Spatial requirements for winemaking  
 Figure 8.6 - Diagram showing the winemaking process and subsequent spatial needs.

or a renovated existing facility; equipment layout, and workflow are critical factors - considerations include efficient workflow; the specific requirements of the wine style(s) being produced; access to production equipment for operation and maintenance; lighting; energy efficiency; and forklift access. Safety of personnel and visitors must always be a key consideration in preparing layout and design plans. The complexity of winery layout and design – including equipment integration and energy and water use calculations – can be divided into smaller components to enhance the planning process. While many wineries do not have these areas as distinctly separate spaces, it may be easier to review them as such for design and planning purposes. Each should be considered with an understanding of size, equipment, energy, water, waste, and overall integration. Winery layout can be broken down into the following general use areas (Morrison, 2008: 8&9):

- **Raw product handling**
- **Fermentation**
- **Storage**
- **Laboratory**
- **Bottling**
- **Warehousing**
- **Tourism / administration**

## **8.6 Construction materials**

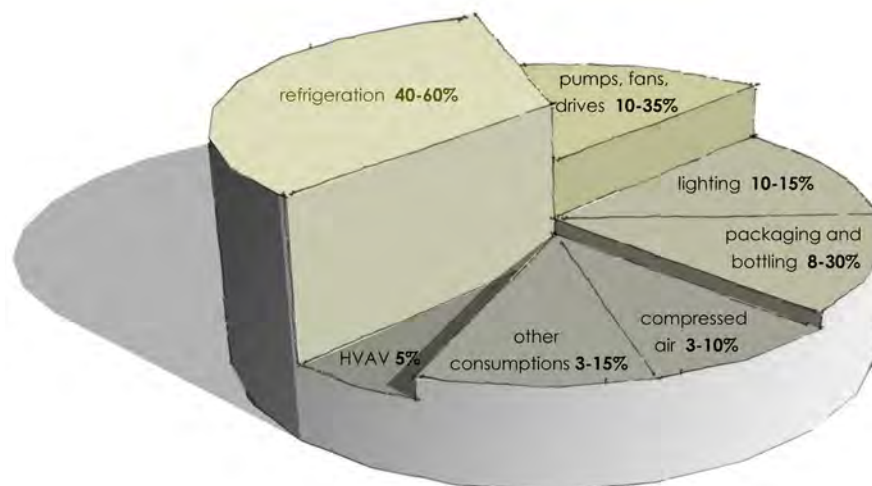
According to Ian Smothwaite (a local wine-maker in the KZN Midlands Meander region) low construction costs of a winery depend on the efficient equipment layout of each area, and its functional arrangement with respect to process efficiency. Construction materials of the building should be chosen for their structural strength, low maintenance cost, insulation value, and cleanable, sanitary finishes. An important consideration in the choice of materials includes the architecture's agricultural character; incorporating the landscape so that the winery blends into its environmental context (interview, June 2011). According to Zoecklein (2008) stone, plaster, and wood are common materials used to achieve a winery 'aesthetic'; while steel allows for flexibility, and concrete, which is durable and allows for 'thick-mass construction' - widely used for the buildings structure. Materials which are resistant to water and humidity are important for the winemaking areas - inside walls may be constructed of concrete block, with the walls in the production areas painted with an epoxy-based paint (to allow for easy maintenance). Outside walls require a higher insulation value to prevent condensation and mold growth, in addition to conserving heating and cooling costs. Good insulation is important, regardless of the climate. If the diurnal temperature variation is large, good insulation becomes even more important. Thermomass-type insulated panels can help to create a controlled interior environment by taking advantage of thermal lag (ability to release heat slowly). This may help to maintain relatively uniform interior temperatures. Some outside walls may require a higher grade or artistic finish, to enhance the appearance of the building (Zoecklein, 2008: 12). In summary, the materiality of a winery is vital, not only for aesthetic reasons, but for sanitation purposes and energy costs.



### 8.6.1 Winery flooring

The reason for singling out this aspect of winery construction is because, according to Smothwaite, proper flooring is a vital component in winery design. Winery flooring must have long-term durability, slip resistance, chemical resistance, impact protection, and be able to handle temperature stress. Different parts of the winery may have different flooring to match the service conditions (interview, June 2011). According to Zoecklein (2008) floors in the production areas, and possibly the laboratory, where spillage will occur, should be finished with a seamless floor finish such as aggregate epoxy (which may contain anti-skid grit), for easy cleaning and sanitation. Furthermore, its structure should consist of properly reinforced concrete (machine-steel troweled), covered with a smooth waterproof finish resistant to the properties of wine - strong enough to bear the compression and vibrations of the required load. All floors in the production areas should be adequately drained with full-length floor drains in order to dispel liquid as quickly as possible to prevent contamination and accidents. Untreated concrete can degrade quickly when exposed to the high acids and low pH of juices and wines. Many architects use water-based epoxies, some of which have the advantage of low release VOC's (volatile organic compounds), this allows for touch-ups in cellars which contain wine, without the risk of wine taint (Zoecklein, 2008: 13). The most vital component of winery flooring is hygiene – its ability to reduce areas where dirt and mold can collect in order to ensure a clean and productive environment.

## 8.7 Energy requirements



Typical energy use in wine production  
Figure 8.7 - Diagram showing approximate percentages for energy useage in the production of wine.

The quantity of energy used depends on several factors, including the percentage of red versus white wines, the extent of cooling, stabilisation procedures, winery equipment, winery size, and energy conservation (such as insulation, caves, etc). Naturally, the highest consumption is during harvest, when refrigeration and cooling units are frequently operating at maximum load. Radiant heating and cooling systems have been the tradition in the winemaking industry. Such systems are based on thermal storage and radiant heat exchange and include both active and passive (cave) systems. Embedding



plastic pipes in the slabs and walls and installing chilled beams or panels under the ceiling can be used to create radiant cooling. Such systems can be energy efficient because higher cooling water temperatures require less power input than most air-conditioning systems. Thermal storage effects, achieved by engaging the building fabric, can maintain fairly stable temperatures and can prove very useful in optimizing the energy efficiency of the winery - both in terms of the production and storage of wine. As a result of temperature control the relative humidity is naturally maintained at high levels with minimal need for artificial control. One important question to resolve early in the planning process is to determine which of the winery areas will be fully enclosed. Outside tanks that are not insulated can be subject to considerable heat gain from solar radiation, which must be removed with the use of a winery refrigeration system. Naturally, prediction of the solar heat load has implications for winery design. The justification for enclosing all or most of the winery is founded on the desire to manage temperature fluxes and save energy costs; enclosed wineries have less surface area exposed to ambient conditions. The specific advantages or disadvantages, including energy savings, are naturally dependent upon such factors as the climatic environment and the building insulation (Zoecklein, 2008: 7-9). Some considerations, in terms of energy requirements (figure 8.7), include:

- **Impact on the working environment**
- **Exhausting CO<sub>2</sub>**
- **Cleaning the air in the building**
- **Controlling humidity and radiant heat transfer between vessels**
- **Potential loss of control in maintaining tanks at different temperatures**
- **Sanitation**

### 8.7.1 *Wine caves*

Wine caves are passive thermal systems used traditionally in the wine industry in order to optimize energy usage. There are several different types, including tunnelling and/or excavation caves, air form, and cover caves. Caves can provide a natural; constantly cool and humid environment; while expending little energy. Unfortunately, the energy savings can be somewhat dwarfed by the establishment costs. As outlined by Fuchs (2006) for standard caves, the nature of geology is the largest cost variable - geological information determines the required support, the difficulty of cutting into rock and, therefore, the general economics. Certainly, not all sites are viable from a geological perspective. One of the main disadvantages with cut caves is that the true geology can only be best determined after the excavation has begun, therefore, unlike buildings, a limited percentage of the necessary information is known before construction of a cut cave. As such, evaluations are usually done concurrently with excavations, rather than entirely before construction. The advantages to adopting the use of caves, however, results in substantial energy savings as caves naturally cool the building where required (barrel room). As can be seen in figure 8.8 they take advantage of the earth's constant temperature – which can reduce, or even eliminate, the need for cooling. Barrel rooms which make use of mechanical

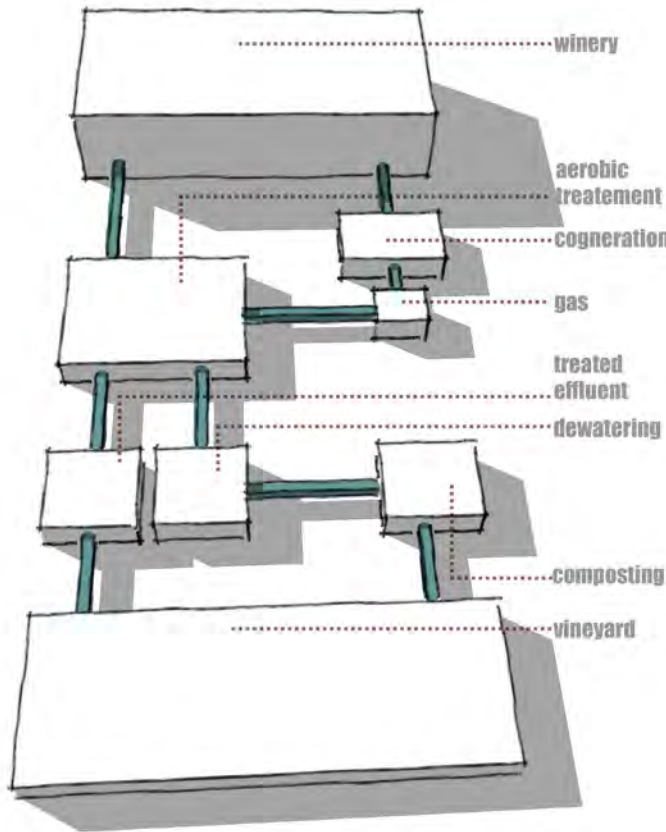


Spatial requirements for winemaking  
Figure 8.8 - Sketch showing natural cooling potential of winery caves.

cooling – dries out the barrels and increases evaporation. To help control this problem, winemakers humidify the space, adding cost, and some additional potential problems. Barrel rooms that do not need cooling will promote less evaporation. Caves can provide a natural, constantly cool, and humid environment, while expending little energy. In addition caves can impress people and, as such, they are not simply a natural thermal system, but a marketing tool to enhance visitation and image. Caves are widely used as entertainment centres for a host of winery functions. Due to their multi-functional nature, it is essential to determine (in the initial planning stage) how much emphasis will be on the wine processing/storage, versus entertainment and general tourism (Zoecklein, 2009: 4&5).

## 8.8 Sanitation and waste management

Regardless of the size of the winery, producing and maintaining high quality wine requires sound sanitation and waste-management programs. Although making wine involves the action of micro-organisms - controlling which organisms are present and their levels throughout processing, filling and packaging is essential. In addition, by its very nature, the winemaking process results in the production of a lot of waste material which, if not handled properly, can become a problem due to quantity, aesthetics, and environmental issues. Reliable sanitation and waste-management programs: maximize shelf-life and quality of the product; extend the life of processing equipment; enhance employee productivity, efficiency, and morale; and help assure regulatory compliance. Depending on the quality of the water and the treatments it receives, it is sometimes possible to recycle water so that water that was initially used in the later steps of sanitation is re-used for initial cleaning steps (figure 8.9). Although water requirements vary with the winemaking plan, on the average **it takes 10 litres of water to produce 1 litre of wine**. If the winery is located in a vineyard, treated wastewater can often be recycled for irrigation. Due to the volume of effluent, special permission may be required before using municipal sewage systems for winery waste water disposal. Steam has become especially popular for cleaning and sanitizing wineries since it evaporates as it is used. This greatly reduces the amount of water for disposal.



Water waste-management

Figure 8.9 - Sketch showing sustainable processes of proper waste-water management.

Many winemakers now use steam to clean and hydrate barrels, clean and sanitize tanks, clean equipment and walls, and sterilize bottling lines. Some advantages of steam for these functions include: the 100°C temperature effectively kills almost all juice and wine microorganisms; it leaves no residues; and it is non-corrosive and relatively inexpensive. Major disadvantages of steam, as a sanitizer, are that the generators to produce it require a large amount of power and, when steam is not handled properly, it can be hazardous to workers. Wineries also produce a great deal of solid

waste in the form of pomace - the skins and seeds remaining after the

grapes are crushed. Some wineries dispose of this material by composting it, then using the compost on their own land or selling it to local landscapers. Unfortunately, in many locations, the market for this material is limited and wineries have to find other methods of pomace disposal. Understanding the processes of winemaking will aid the architect in designing an effective waste-management program in order to concretise the building in sustainable principles (Morrison, 2008: 43-45).

## 8.9 Sustainable design considerations

While the wine industry likes to promote a natural and 'green' image and has traditionally considered itself as 'environmentally friendly', a California study conducted several years ago, reported that the industry was the largest energy user in the food industry sector (Zoecklein, 2008: 3). Sources of energy consumption in the winery (from: *A Guide to Energy Efficiency Innovation in Australian Wineries*) include (refer to figure 8.7):

- **Refrigeration: 40-60%**
- **Pumps, fans, drives: 10-35%**
- **Lighting: 8-20%**
- **Compressed air: 3-10%**
- **Packaging and bottling: 8-30%**
- **Other consumptions: 3-15%**

This realisation, coupled with the desire to sustain success, has promoted changes. As sustainable viticultural practises have spread, so has the interest in sustainable winery construction. Sustainability is the concept of blending economic prosperity, social responsibility, and environmental quality based on the belief that the confluence of these enhances the quality of life for present and future generations (Zoecklein, 2008: 5). Green construction has become a trend, as it is obvious that Mother Nature's resources have been stretched beyond the limits of sustainability, and that there is no dichotomy between sound environmental practises and economic enrichment; they are supplemental. It is now obvious that it will be cheaper to preserve fossil fuels than continue to buy them. The long-term operational savings from sustainable designs and expansions may help to offset some of the initial costs. Additionally, sustainable or green designs can be very important in establishing an image and brand identification (Morrison, 2008: 20-23). According to Chauncy (2006) green or sustainable construction involves site planning; design and construction (including the sustainability of the site); water usage; energy usage; environmental quality; and materials. Wine is getting more and more expensive to produce, largely because of spiralling energy and material costs. Both new and existing wineries that follow sustainable principles in their design and operation can, therefore, return greater profits because of reduced operating costs and lower energy bills. Some practical steps to consider, adapted, in part, from Chauncy (2006: 30-35) are:

- **Use cool-build materials:** Cool roofs can reduce heat absorption and cooling costs by as much as 13%.
- **Use regional materials and local fabrications:** This helps to reduce transportation impacts and stimulates the local economy.
- **Use building and construction materials with a high percentage of recycled content**
- **Reduce heat loss/gain:** Portions of the building should be built underground or partially underground in order to take advantage of the earth's constant temperature (often referred to as 'caves'). The barrel storage area should be located in areas that have contact with the earth – which can reduce, or even eliminate, the need for cooling. Barrel rooms which make use of mechanical cooling, dries out the barrels and increases evaporation. To help control this problem, winemakers humidify the space, adding cost, and some additional potential problems. Barrel rooms that do not need cooling will promote less evaporation. Caves can provide a natural, constantly cool, and humid environment, while expending little energy (detailed later on in this chapter).
- **Consider geothermal heating and cooling:** Water circulates in a sealed loop that extends well into the earth. In winter, the water absorbs heat from the earth and carries it to the compressor, which raises the temperature. In summer, the water takes heat away from the building and transfers it to the earth. Furthermore, buildings should be orientated and insulated in order to optimise energy.
- **Optimise the use of shading:** Blocking sunlight that would fall on the building's surfaces



can dramatically reduce cooling loads. Trees planted along the north and west facades of the building can also aid in eliminating heat gain.

- **Low emissive insulation on windows:** Metal oxide glazing can allow the sun's heat and light to pass through the glass while blocking the heat from leaving the building, thus reducing heat loss.
- **Increase daylight levels:** Adding skylights or upper windows (clerestories), while avoiding direct sunlight on barrels or tanks, will permit the winemaking staff to work in processing and storage areas without the need for artificial light. The obvious benefit, being reduced electricity bill. Wineries that adopt natural lighting can reduce lighting watts by as much as 66%.
- **Maximise views:** As above, by designing additional windows - using glass in roll-up doors and placing skylights in subterranean spaces - to expand views to the outdoors from regularly occupied spaces will increase workers well-being and productivity.
- **Design natural ventilation:** Ventilation is vital - every litre of grape juice, when fermented, produces about 40 litres of carbon dioxide. By designing windows or louvres at, or near the floor level of the winery, to bring cool night air that blankets the ground and by opening a louvre in the upper part of the winery - a passive ventilation system is created. Hot air that has been accumulated during the day can be exhausted through a louvre in the clerestory area. The hot air leaving the winery pulls cool night air in the lower louvre. This is called 'night-time cooling' or 'purging,' and can be done without mechanical equipment. This process reduces the need for mechanical ventilation and reduces energy usage.
- **Reduce water usage:** During harvest, a 30 000-case winery can use as much as 3000 gallons of water per day. Reduced water use can be achieved by collecting wash-down water, settling/ filtering it, adjusting its pH levels, and using it for irrigation of winery grounds. Covering the winery allows for better control of spills and external washdown run-off. Segregating stormwater may be worthwhile in the interests of keeping this potentially low contamination water separate for suitable uses. Mixing all water streams together and including stormwater reduces the value of much of the waste water and increases energy-use in the treatment before re-use or disposal. Rainwater collection systems should be considered for landscape irrigation, etc. The use of evapotranspiration irrigation systems, that irrigate based on current weather conditions, is another consideration in reducing water usage.
- **Sustainable site planning:** Using native, adaptive plants, and landscaping will require minimum irrigation and help to promote biodiversity.
- **Construct buildings with mass:** A thin-wall building with a metal skin and batt insulation allows heat (and cold) to penetrate more quickly than a thick-wall building. By building with concrete, masonry, or stone, and sandwich insulation - thick-walled buildings will absorb heat all day long, and release it at night with little impact on the interior temperature.
- **Solar energy:** Panels transform light into direct current, which is converted to alternating

current that can go directly to power winery needs. Solar can pay for itself within 3-5 years, with panels lasting up to 30 years.

- **Gravity flow design:** True gravity flow (which allows wine to flow naturally) can reduce the use of pumps and motors and thus reduce energy consumption and running costs.
- **Establish a recycling program:** Wineries should strive to create a zero-waste philosophy if possible.
- **Favourable working conditions:** Natural daylight and views in regularly occupied working spaces, is known to improve the health and attitudes of the occupants. *“When the winemaking staff is healthier and happier, they will most certainly make better wine”* (Franson, 2008: 66).

### 8.7 Conclusions: creating a functional winery

There are many vital aspects which need to be considered by the architect in order to create a successful winery – both in terms of efficiency, productivity, and experience. The challenge is to integrate all the elements in a whole that is greater than the sum of the parts, providing flexibility for change and growth, and straddling shifts of scale - from tank room to tasting room. Through energy use, a green image, and impact are all considerations in designing new wineries, because making great wine is still paramount for the owners of the establishment. Fortunately, there is no conflict between these issues, and through some of the steps taken to realise all of them can be expensive, they need not compromise each other. The research carried out in this chapter has aimed at summarising the important considerations of the winery production that affects the architectural creation. It is noted that creating a functional and efficient winery involves the following:

- **Establishing the primary function and users of the building**
- **Appropriate site location and building orientation**
- **Adequate space for operation, maintenance, and experience**
- **Most efficient layout which follows the processes of the grape**
- **Effective use of construction materials in order to reduce energy requirements**
- **An understanding of utilities requirements**
- **Reliable sanitation and waste-management programs**
- **Sustainable design practices**
- **Deliberate simplicity**

Most important design considerations:

- **Efficiency and flexibility**
- **Location**
- **EXPERIENCE**

These key considerations form the basis from which the precedent and case studies shall be analysed in order to determine the most appropriate response to a winery facility in the Midlands Meander region.

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## WINERIES - INTERNATIONAL AND LOCAL EXAMPLES

### 9.1 Introduction

The popular image of the winery remains the picturesque European chateau, but a growing number of winemakers around the world are seeking a fresh approach. Architects are being challenged to rethink the winery as a bold contemporary expression of tradition and innovation, agriculture and technology, production and hospitality. Over the past decade, there has been an explosion of activity. Frank Gehry, Zaha Hadid, Renzo Piano, Steven Holl, Herzog & de Meuron, Santiago Calatrava, Rafael Moreno, Glenn Murcutt, Richard Rodgers, and Norman Foster are among the acclaimed architects who have been commissioned to build new wineries or visitors' centres in California, Canada, and Australia, as well as the traditional wine-growing areas of Italy, Austria, and Spain. Some of these buildings are designed to establish brand identity and excite public attention in a fiercely competitive market; others blend into the landscape or abstract the local vernacular. A unique feature of the wine industry is that each winery, regardless of size - is a specialised operation. One particular winery may place more importance on the production of whites versus reds, or more on tourism and aesthetics. As such, design, construction costs, equipment, and operation of a premium winery can be quite variable. Typically, a winery consists of several crucial elements which comprise of the spaces required for the production of wine (see appendix C for detailed processes of winemaking), and the more commercial public spaces. The proceeding study will be concerned with both international and local key examples which examine the building's program and it's technical resolution - specific to the function of winemaking in order to inform the brief. The precedent and case studies will be analysed according to criteria deemed relevant from the information gathered in the preceding study, including:

- **Design concept**
- **Siting and entrance**
- **Spatial accommodation and organisation**
- **Building fabric and structure**
  - Materials
  - Construction process
  - Maintenance
- **Sustainable response**
- **Specialist design aspects**

The intention of this study is to gain insight into the working components of a winery facility and subsequently how the components relate to the whole and to the public. From this research, conclusions will be drawn which will assist in the establishment of a satisfactory design programme for a locally sited winery.

## 9.2 Precedent studies

Three international examples have been selected for analysis in order to review their technical resolutions, which will aid in both establishing the criteria for site selection, as well as the schedule of accommodation. The following wineries have specifically been chosen due to their varying functionality; they include:

**Dominus Winery** : Herzog & de Meuron (California) - The sole focus of this winery is based purely on the production of wine, and as such the building function does not incorporate touristic facilities.

**Loisium Winery** : Steven Holl (Austria) - This building is positioned as a visitors' centre which exhibits the processes of winemaking, found in the towns historical underground tunnels, but does not, itself, facilitate the production of wine.

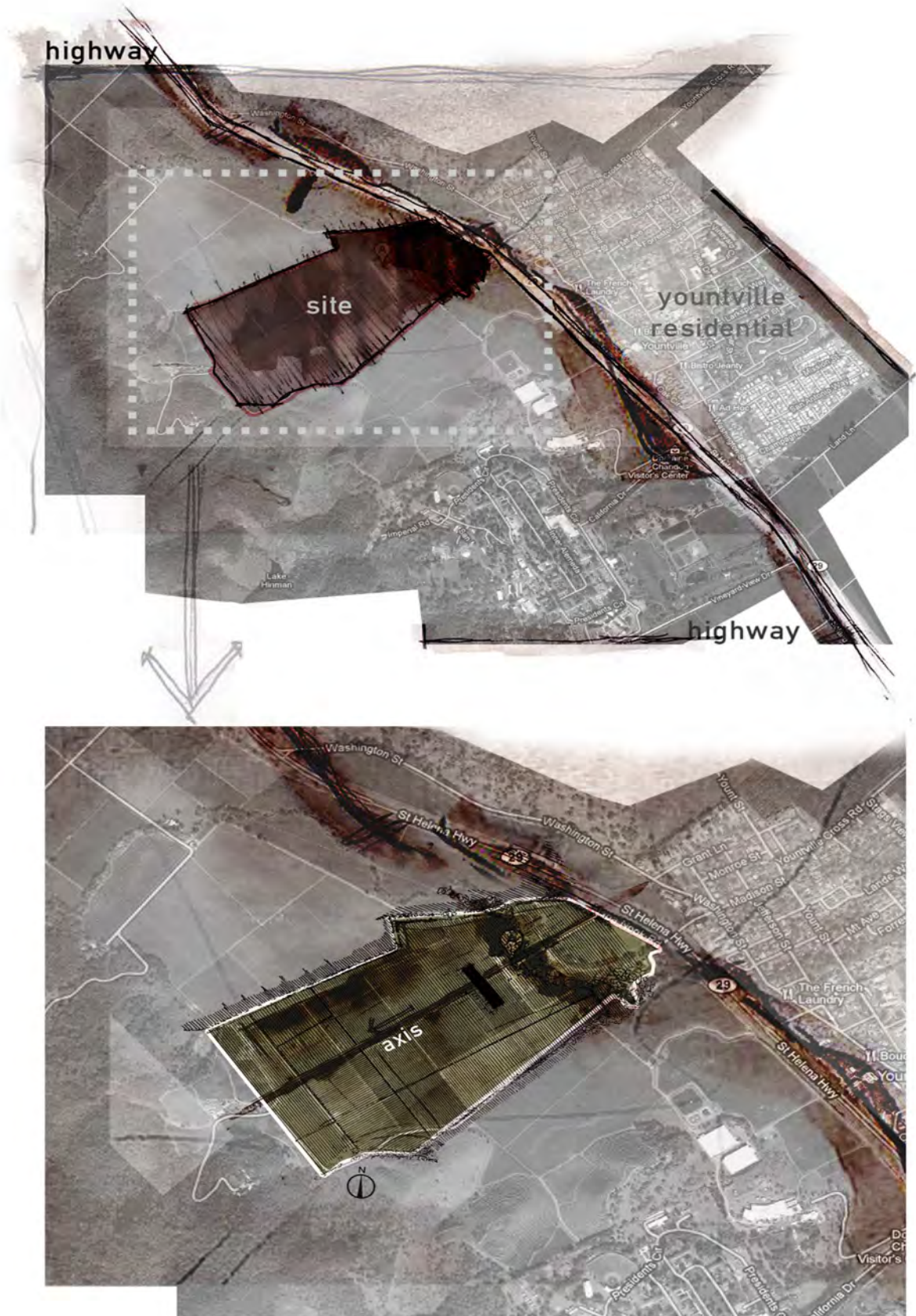
**Peregrine Winery** : Architecture Workshop (New Zealand) - This winery caters to both the production of quality wine and to visitors' who can tour the operating facility to experience the active processes of winemaking.

Both The Dominus Winery and the Loisium Winery have been reviewed in Part I of this dissertation, however, the focus of this study will be of a more practical nature so as to analyse the whole: both the theoretical (Part I) and the practical (Part II).



## 9.2.1 DOMINUS WINERY (1995 - 1998)

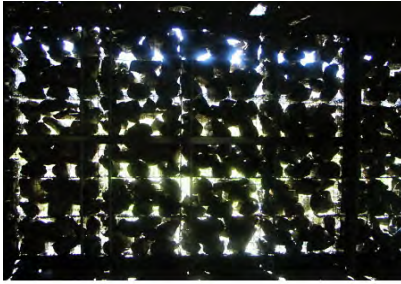
Architects: Herzog & de Meuron



Dominus Winery - Herzog & de Meuron

Figure 9.1 (top) - Aerial view of Dominus Winery in context. Figure 9.2 (below) - Site plan of Dominus Winery.





## Background

*“Elevating unassuming raw materials and basic industrial construction Herzog and de Meuron’s winery in the Napa Valley elegantly fuses the rational with the sensuous to make poetry out of economy” (Lecuyer, 1998: 44).*

The Dominus Winery is sited in the Napanook Vineyard in California - located near the residential town of Yountville (figure 9.1), 80 kilometres north of San Francisco - it covers an area of 125 acres (50.5 ha) and has been cultivated since 1866. The wine produced by this establishment attracted such international acclaim that it was decided to build an architecture of equal quality - that which captured the beliefs and integrity of the wine (Lecuyer, 1995: 44). The clients of this project - Christian Moueix and Cherise Chen-Moueix - are descendants of a well-established winemaking family near Bordeaux in France. From the beginning of the commission, the architects were faced with the dilemma of converting a purely functional building type into architecture of high artistic merit. Since the clients view winemaking as the highest form of agriculture, they both desired an architecture that would be a monument to winemaking - an architecture that understands the art and functionality of a winery (Wilson, 2000: 2-3).

## Design Concept

The theoretical concept of blurring interior and exterior boundaries and enmeshing environmental sensations has been covered in Chapter Three of this dissertation – the proceeding concepts encapsulate Herzog & de Meuron’s practical and technical aspirations for the Dominus Winery. The structural notion behind this building is the concept of a ‘box-within-a-box’ which proposes an inner structural box (containing different functional programs) and an outer masonry skin, which acts a thermal regulator for the functions within. Herzog & de Meuron prioritised the concept of ecological integration by focusing the architecture’s technical resolution around the building’s response to climatic and thermal changes. This negated the use of conventional curtain wall systems or steel

**Dominus Winery - Herzog & de Meuron**  
**Plate 9.1 - Dominus Winery in context.**

and glass structures during the schematic design stages. The concept of the self-supporting stonewall fulfilled their three main design objectives (Wilson, 2000: 7):

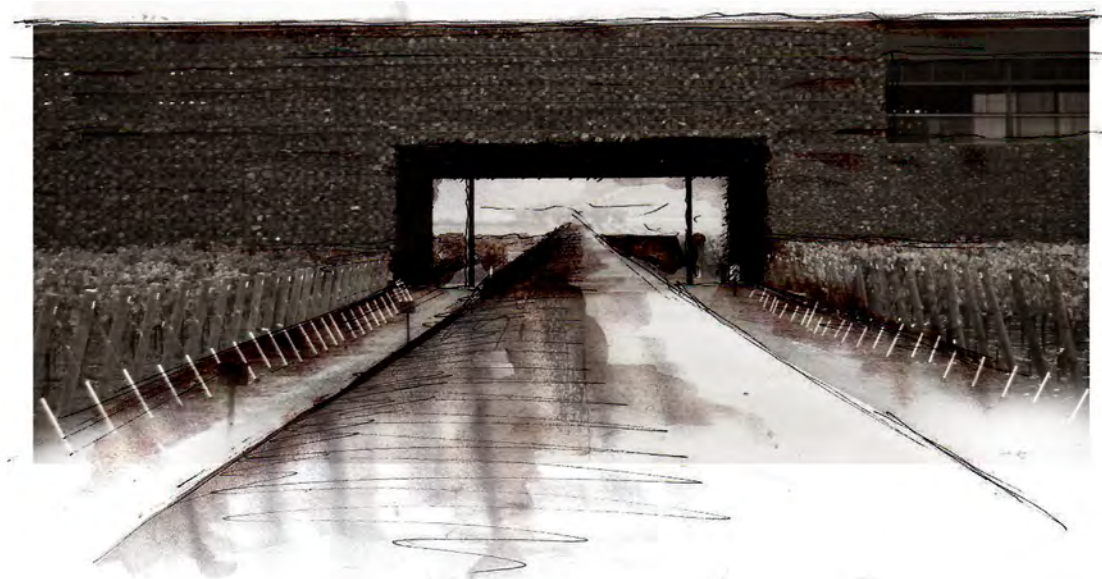
- Ecological integration of the building and the surrounding context.
- Economical use of materials by suppressing the need for mechanical systems.
- Sustainable use of materials due to their ability to mediate the climate and act as thermal regulators.

### Siting and entrance

*“By heightening this tension between contextualism and abstraction, the architects elevated the shed into an art form. From a distance the singularity of the form is seen as an interruption in the natural landscape. This obtrusiveness makes the building a monument, yet it is ambiguous as a statement because of its abstractness. The winery exists somewhere between a factory and a monument. It is an invention born out of the tension between two contradictory typologies”* (Wilson, 2000: 4).

As can be seen in figure 9.2 the building spans the main thoroughfare of the estate - situated at the intersection of the slightly sloped terrain and the foothills of the Mayacama Hills to the west. According to the owner, Moueix, siting adjacent the highway was vital due to service access for delivery and maintenance purposes. Long and rectangular in plan, the architecture is a simple two-storey box - 140 meters long by 25 meters wide - with its long axis running north to south. The elongated structure takes advantage of the site and helps to preserve the maximum amount of land for growing grapes. The monolithic form materialises a boundary between two different types of vineyards – it marks a transition between the lot designated for less expensive grapes, which are planted near the highway, and the more elite *Grands Crus* which are planted on the upper slopes (Betsky, 1998: 127).

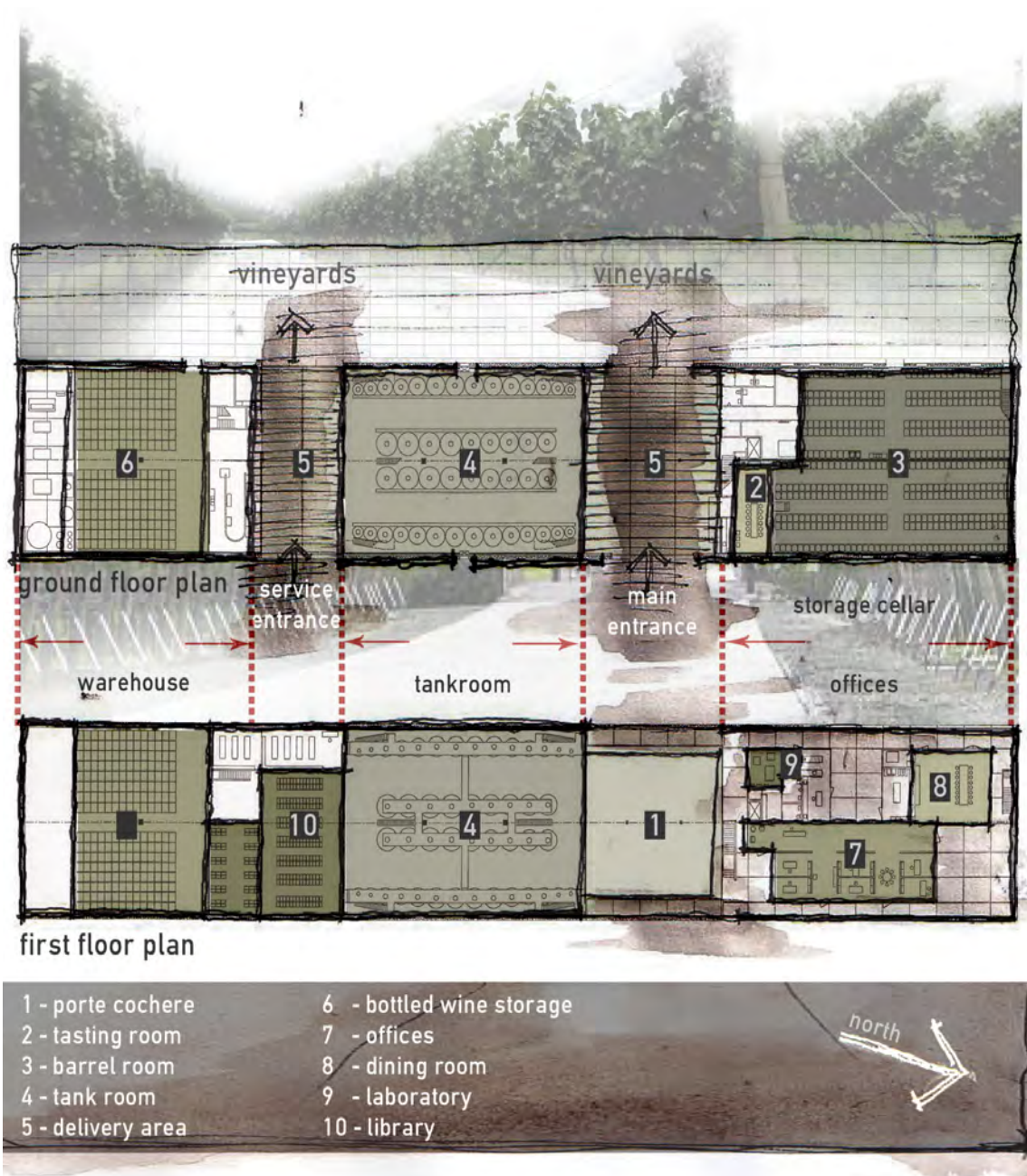
The entrance to the winery is noticeably identified by the archways formed through the punctured holes of the otherwise solid box – each at approximately one-third points of the span. The



**Dominus Winery - Herzog & de Meuron**  
Figure 9.3 - *Porte cochere* formed by the main entrance which is scaled to measure the landscape.



main entrance (located on the north side) aligns with the major east-west access road and functions as a *porte cochere* which passes through the building and continues on into the vineyard (figure 9.3) – creating a simple yet strong and definable sense of entrance which is scaled to measure the landscape. The southern portal provides a form of ‘service’ entrance and is used primarily as an access for pickup and delivery (Lecuyer, 1995: 44). Traditionally, the Chateaux of Bordeaux have two distinct sides of entry separating the ceremonial front entry from the back-of-house service entry. The architects of the Dominus Winery contested this traditional scheme by placing both types of entry on the same side, blurring the distinction between service and front entry – allowing the voids to break the formal symmetry of the monolithic structure (Wilson, 2000: 4).



Dominus Winery - Herzog & de Meuron  
 Figure 9.4 (above) - Ground floor plan. Figure 9.5 (below) First floor plan.



## Spatial accommodation and organisation

*“The elongated form also allows for a loose fitting function within the box. From the outside, one cannot sense the interior winemaking processes. From within, the building evokes the atmosphere of old European wine cellars in an unorthodox way” (Wilson, 2000: 5).*

As established, the concept behind the structure of the building was a ‘box-within-a-box’ which allows for flexible and seamless spatial planning. The outer structural box is punctured by two covered passageways to reveal the inner functional box, which is further segregated into the different components necessary for the production of wine (Wilson, 2000: 5). The spaces located on the ground floor are functionally separated by the northern and southern portals: the main open-air portico houses entrances to each of the major spaces of the winery including the tasting room, cask cellar, offices, and the tank room. The southern portal provides a covered outdoor space between the tank room and warehouse which serves as a bottling and boxing area, and loading bay. The ground floor (figure 9.4) facilitates the production spaces due to its ease of access from the vineyard. The layout of these spaces follow the production processes of winemaking and thus the planning follows the logical sequence of the building function. Many of the production spaces on the ground floor are double volume as to accommodate the machinery, resulting in the upper floor plan (figure 9.5) responding to the more private functions including the library, offices, and dining room. The program is, therefore, essentially divided into two separate zones: the ground floor which contains the production processes of the wine, and the first floor which holds the administrative functions and spaces for invited guests to come and sample the wine (Lecuyer, 1998: 44-46). According to Lecuyer (1998) *“Much of the beauty of this building lies in its simple yet effective planning, grouping of functions, and overall movement through the building”* (Lecuyer, 1998: 46). According to Moueix, the planning arrangement has increased the efficiency of production, but not at the cost of an enjoyable working environment. He argues that these two design elements - efficient layout and content staff members - are the key to the wineries success (Wilson, 2000: 6).

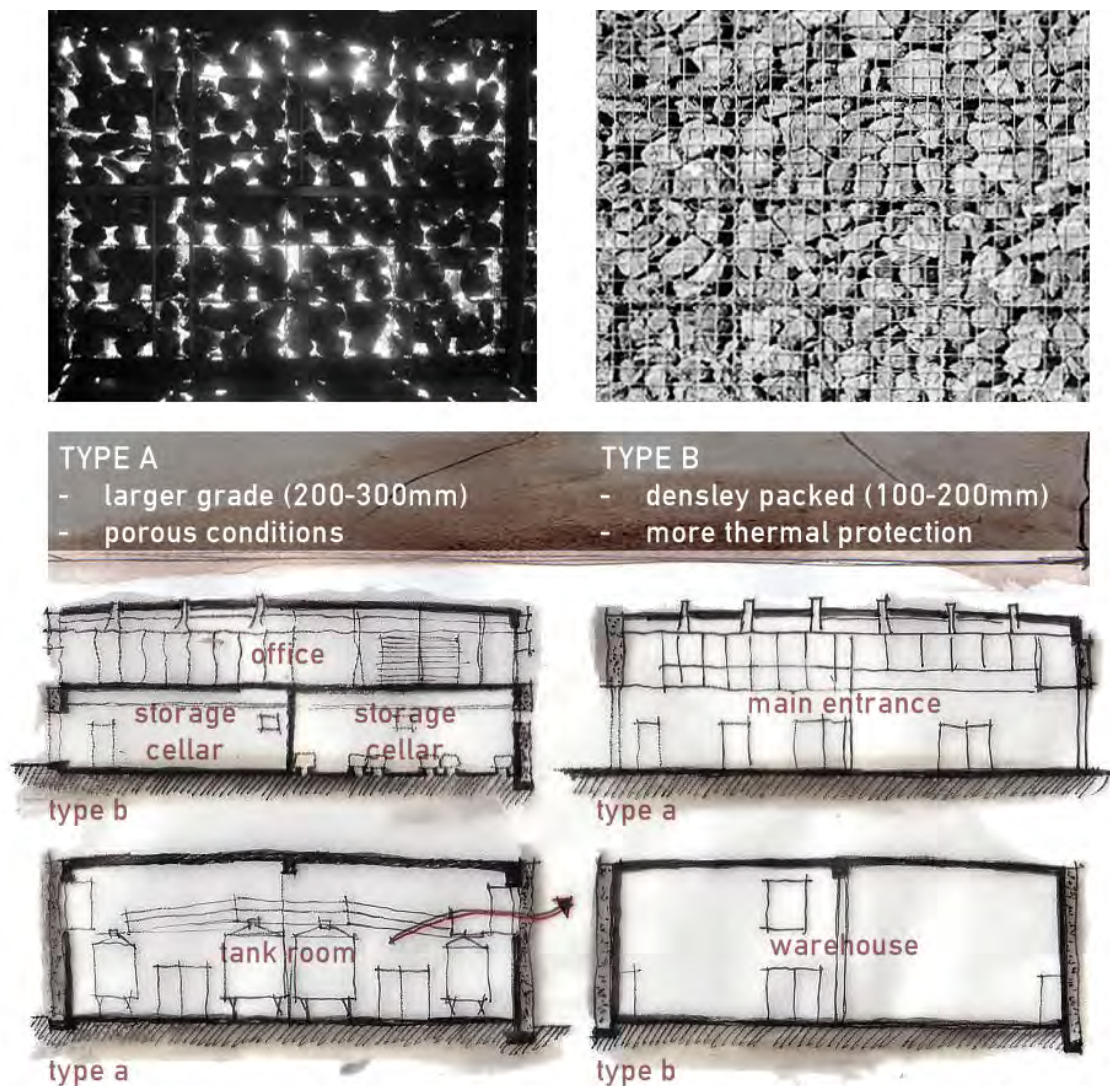
## Building fabric and structure



Dominus Winery - Herzog & de Meuron  
Plate 9.2 - Basal stone wall construction showing wire mesh and the Galfon wire.

## Materials

While the box is conventional, the cladding is not. The construction of the leading basalt stone wall incorporates the use of galvanised steel gabion's – a method which is widely adopted in river and highway engineering as retaining structures – which are filled with loose crushed basalt typically used as the sub-base for road construction. Here, the caged stone takes a new role as a rain-screen and through the modulation of both light and heat; tempers the interior environment of the building (Lecuyer, 1998: 48). The composition of different stone grades (used within the wall construction) was designed to manipulate the transparency of light and ventilation according to the program and functionality within the building. Two grades of the basalt stone are used in the wall construction, type A (figure 9.6) – uses the larger grade (200mm – 350mm in diameter), which creates a more porous condition when stacked (more permeable to light and ventilation). It is incorporated in the walls of covered outdoor areas and the tank room where the fermentation tanks themselves are insulated and



Dominus Winery - Herzog & de Meuron  
Relationship between internal usages and composition of exterior gabion wall. Figure 9.6 (above left) - Type A basalt construction. Figure 9.7 (above right) - Type B basalt construction.



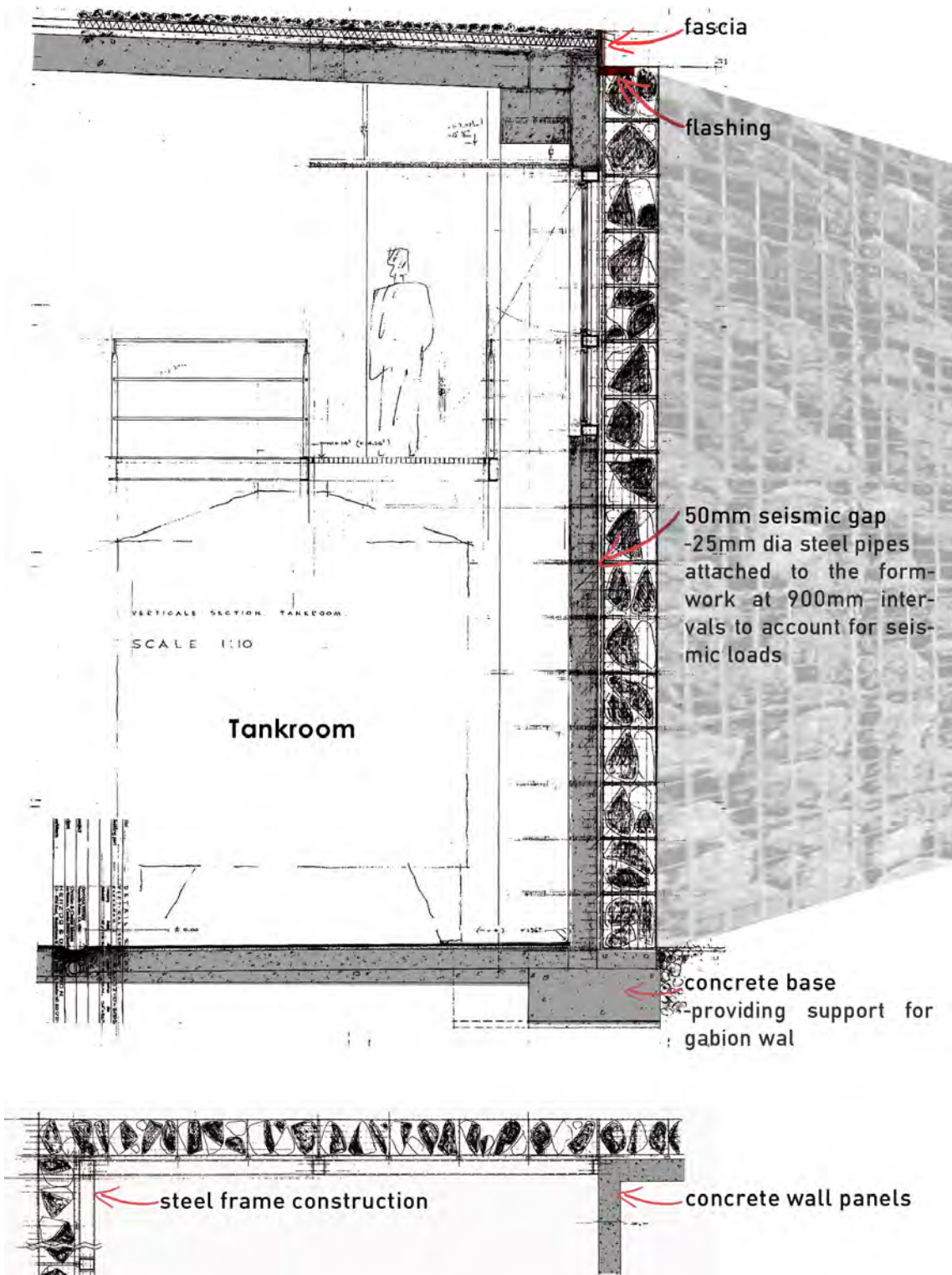
fitted with sophisticated temperature controls. Type B (figure 9.7) – uses smaller and more densely compacted basalt stone (100mm – 200mm), which is distributed in areas that require more shading, thermal protection and enclosure, such as the cask cellar and warehouse where the opacity to light and fluctuation in temperature change, is crucial to the wine aging process. In order to compliment the two differing grades of stone, Herzog & de Meuron incorporated two different size meshes (plate 9.2). The larger 75mm grid mesh surrounds the entire building envelope. The finer mesh was then added to prevent mice (which attracts the rattlesnakes) from nesting in amongst the rocks. Due to the sulphite in agricultural processes, the acidity in the Napa Valley soil tends to be stronger than most environments. The architects were concerned that heightened carbonisation would facilitate the premature ageing and rusting of the wires. A special gauge of the steel wire – *Galfon* – was therefore chosen to tie the gabion cages. *Galfon* (plate 9.2) – a Swiss export – was coated with aluminium zinc to provide resistance, five to six times longer than the normal galvanized steel wire (Wilson, 2000: 9-11).

### Construction process

As can be seen in figure 9.8 - the Dominus Winery is of a conventional warehouse construction which makes use of a concrete ground slab, site-cast concrete columns, beams, tilt-up walls, and a precast concrete plan roof. This solid introverted construction method gives way to a light steel frame construction (plate 9.3) on the upper level at the north end of the building where the offices are located (Lecuyer, 1998: 47). The connection details of the concrete wall and the steel structure to the gabion cages are simple and ‘rough’ in character. The concrete wall panels were constructed using the ‘tilt-up’ method – which consisted of workers using a crane to tilt the pre-cast wall panels in place, after which they secured them with cast-in-place columns or pilasters. For precision of the courses, two gabion cages – one at each corner – were filled and stacked first which acted as a guide to inform the rest of the coursing on a perfectly horizontal line. To ensure further precision of the construction, the masons filled the gabion cages with loose crushed basalt onsite. Had the cages been filled individually before construction, they would not have been able to retain their original shape during transportation – resulting in irregular units. Two groups – a total of 15-20 people – worked simultaneously, one starting on the west facade, the other on the east. They worked horizontally, assembling two cages consecutively for both practical



Dominus Winery - Herzog & de Meuron  
Plate 9.3 - Lightweight steel construction used on the upper floor.



**Dominus Winery - Herzog & de Meuron**  
 Typical warehouse construction Figure 9.8 (above) - technical section through tank room and (below) plan of concrete and steel construction.

and economical reasons. Each cage was placed in position and restrained by ties to stainless steel pipes pre-cast into the concrete wall panels (Wilson, 2000: 12-15). In areas with steel frame (on the upper northern section) – brackets were used to anchor the gabion stone wall. Herzog & de Meuron used a single module throughout the entire building of 900 x 450 x 450mm which achieved both “*spatial and transparent variety by very frugal means*” (Lecuyer, 1998: 44). The size and thickness



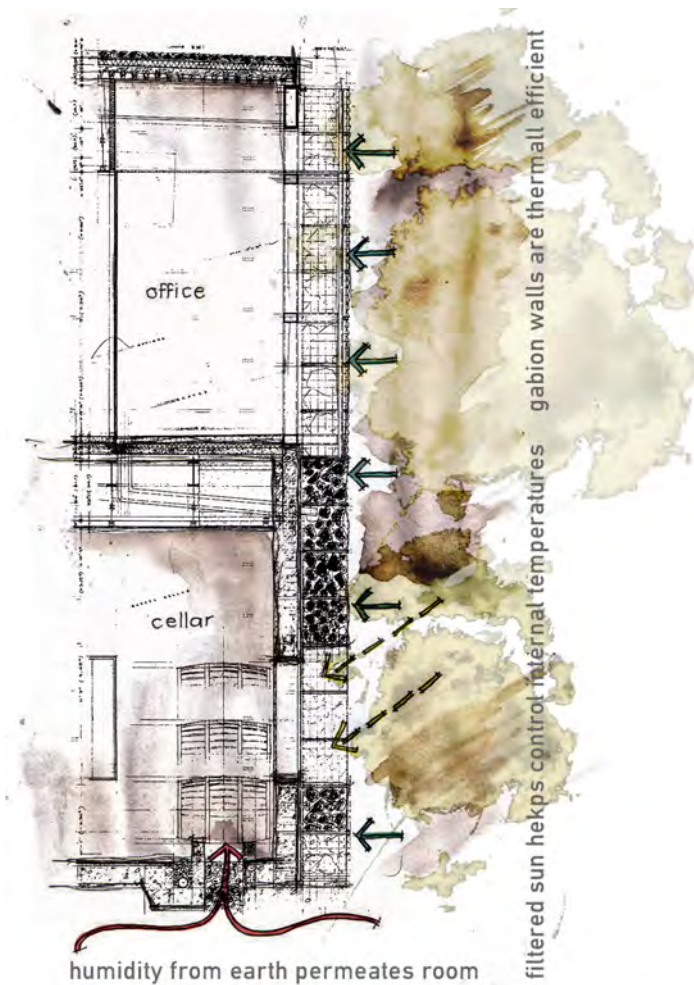
of the gabion cages was calculated with consideration to structural feasibility, light penetration, and aesthetics. At a distance one is able to see the separation of the skin from the structure as the top row of gabion cages stops short of the roof – revealing the fascia. On closer inspection, however, the fascia disappears behind the 600mm depth of the wall – setting the edge of the gabion cage against the sky. This quality was achieved by covering only half the top row cages with flashing. The resulting detail permitted water from precipitation to run directly onto the stone inside the cages as well as hindered precipitation along the concrete wall. This economic solution minimised the cost and number of pipes by reducing the volume of water flowing from the roof. Wilson emphasises the power of the simple water drainage details which accentuates the dark hue of the basalt. Gutters for drainage would have damaged the overall aesthetic of the wall; “*any mechanical appendages would interrupt the monolithic quality of construction*” (Wilson, 2000: 15). The gravel roof was tenuously sloped three degrees with the highest point at the mid-point of the short section to accommodate the flow of water. Herzog & de Meuron wished for the water of the roof to run solely onto the stones and into the ground, however, the mechanical engineer advised against it - arguing that the run-off water from the roof would be too much for the land to handle. The architects, therefore, settled for the placement of drainage pipes within the building which sit within the steel frame – alleviating the topsoil of excess dampness. Before commencement of construction, Herzog & de Meuron built two mock-ups, one small scale, and one partially full scale. The gabion wall construction took roughly three months to complete and the result is a unique interpretation of ‘thick-mass’ construction, which tempers the interior environment absorbing heat during the day and releasing it at night (Wilson, 2000: 15&16).

### **Maintenance**

The infestation of mice and other pests as a result of nesting in the rock is a common concern in the cavity filled construction in the agricultural setting of Napa Valley. As a result, once a year a maintenance crew inspects for such infestations to prevent the likes of rattlesnakes from being attracted to the rock cavities. Herzog & de Meuron delighted in seeing the colour of the stones deepen after a rainfall and the expressive and organic nature of the visually unpredictable facade. Other considerations may be the accumulation of dirt and vegetation (resulting in an unhygienic environment for winemaking); however, Herzog & de Meuron have confidence in their thoughtful design process that took great measure in forethought such as the protective base mesh and the *Galfon* wires. They even suggest that perhaps the best maintenance for this unique structure “*is to let nature run its course*” (Herzog cited in Wilson, 2000: 16).

### **Sustainable response**

The Dominus Winery’s most vocal material, is the variegated basalt stone which was chosen for its indigenous existence in the Napa Valley region. The quarry site was located roughly 16 kilometres away meaning that trucks could transport the stones directly to site - making the construction method more



Dominus Winery - Herzog & de Meuron  
Figure 9.9 - Climatic section showing buildings thermal response.

economical and sustainable. Herzog & de Meuron clearly understood the extreme climatic conditions of California – its hot and humid days and cold evenings. As can be seen in figure 9.9 the translucent gabion walls acts as a thermal buffer which insulates the building that traps and retains cool air during the night, which is then used to regulate the hot temperature during the day. A crucial part of the process of installing a passive thermal control system, as opposed to a modern and machine-controlled system, was proving the validity and feasibility of ‘free-cooling’ and ‘energy-saving’ to the clients. Herzog & de Meuron pursued the smart skin wall system which regulates light, transparency, and ventilation while simultaneously retains the sensibilities of a

traditional masonry wall construction. The solution was simple yet inventive, aesthetically rewarding yet practical (Wilson, 2000: 7&8). Only the offices – a small area of this large structure – adopts mechanical heating and cooling. The environmental strategy for this building, therefore, is dominantly passive rather than mechanical, and more importantly – in the realm of architecture rather than services – *“a radical approach in the land where air-conditioning is king”* (Lecuyer, 1998: 46). The remainder of the spaces are permanently vented at high level; by the course stone screen combined with the window screen in the back-up wall. *“By day, filtered sunlight is allowed into the spaces and by night, the facade glows like the embers of a dying fire”* (Lecuyer, 1998: 47).

### Specialist design aspects

As can be seen in figure 9.9 within the cask cellar - in lieu of the slab - oak barrels rest on concrete sleepers which lie on top of crushed basalt so that humidity from the earth can permeate the room to assist in maturing the wine - which is an ancient traditional French method for aging wine. The exposure of the barrels to the earth is crucial as the bacterium in the ground is essential for the fermentation process (Wilson, 2000: 12).



**Dominus Winery - Herzog & de Meuron**

**Plate 9.4 - The wine-tasting room is considered the most important for all extraneous influences have been edited away to focus one's attention on the wine**

Although the Winery building does not resemble a specific vernacular building type, and appears as a strange new invention by avant-garde architects, the layout of the program references the long tradition of French winemaking. In the tasting room (plate 9.4), a warehouse becomes a treasure house. A Spartan wine-tasting room overlooks rows of barrels in storage room. The heart of the building is the tasting room, which is accessible from the *porte cochere* through a set of green glass doors that part to reveal a monastic concrete room, adorned only by a single wooden table. Flip a switch and a sea of light bulbs hovering from above illuminates the barrel room that stretches north beyond a partially frosted glass wall. There, the wine ages in row after row of French oak casks. Viewing this treasury of viticulture from the minimal tasting room is a revelation for all extraneous influences have been edited away to focus one's attention on the wine. *"The contrast between this dark heart and the translucent stone skin of the Dominus Winery could not be any stronger"* (Wilson, 2000: 7).

## Summary

*"Like the wine produced inside, Herzog & de Meuron's Dominus Winery is both very basic and a delicacy, a structure that fits its context of geology, texture and colour, yet sparkles, fascinates and surprises when experienced close up"* (Lecuyer, 1998: 44).

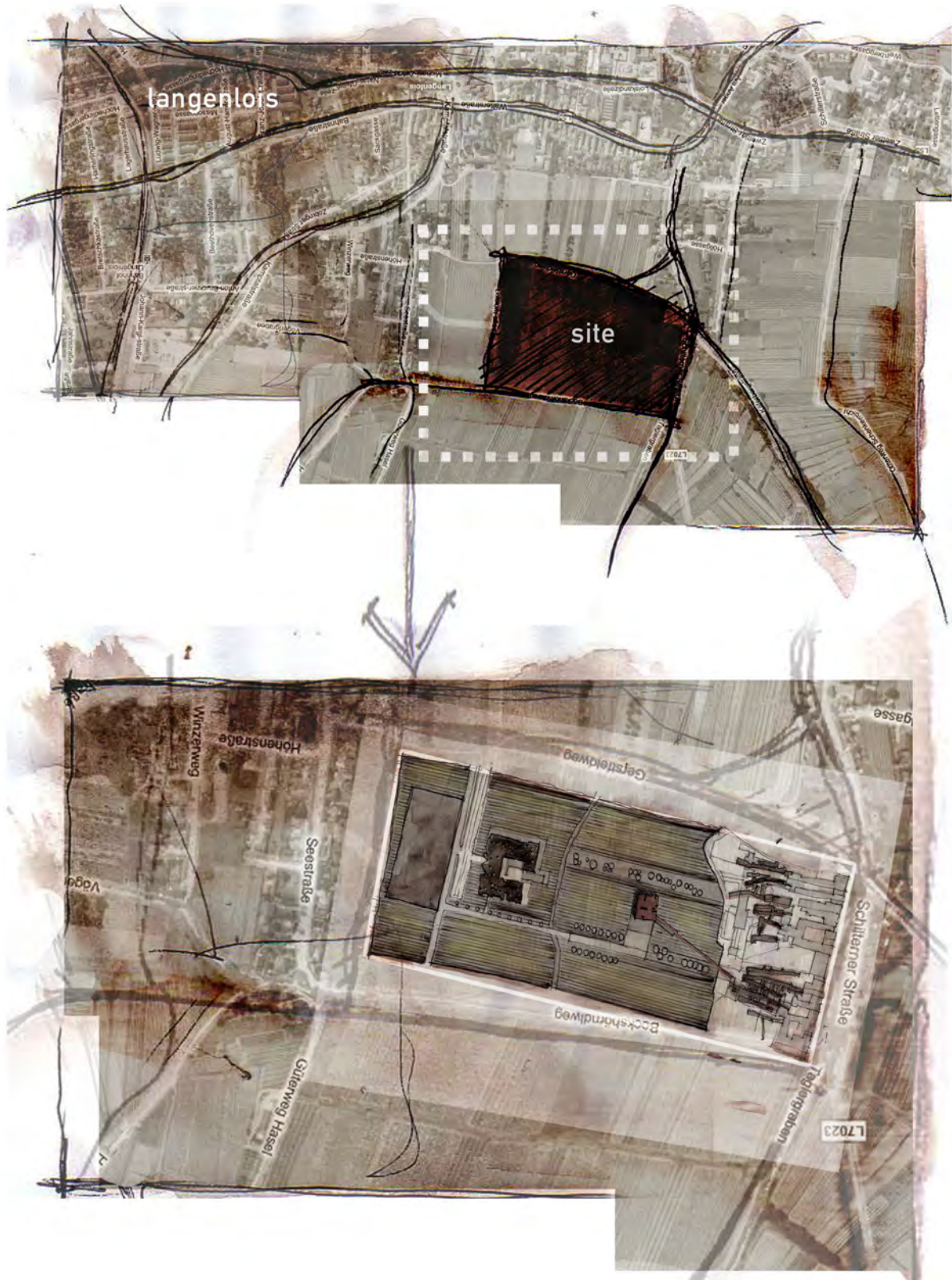
The simplistic building is free of doorways, fire escapes, windows, and technical apparatus. The envelope which clads the building is warped like fabric, has no visible support, and is never entirely uniform. Here, the outer porous skin becomes the crucial elements, covering a very basic concrete shell. Not unlike the screen porches of the surrounding vernacular buildings, the rocks protect the

interior from the strong California sun. The wall is simultaneously transparent and solid, traditional and innovative, contextual and a-contextual. The basalt stone was quarried from a nearby canyon which is held together by a unique gabion system. Common in both the Swiss Alps and the California Sierras, this steel mesh has been used for some time in the construction of infrastructures. The architects appropriated and reconfigured this technique to suit their programmatic needs. By varying the size of the mesh and the stones at different places on the wall, they were able to control levels of light that would reach the interiors. While appearing to be solid from a distance, it is a diaphanous wall that merely surrounds a secondary wall system. The Dominus winery (started in 1995 and completed in 1998) achieved this 'monument to winemaking' and went on to win the esteemed Pritzker Prize in 2001 - considered by many as the highest honour in architecture. Above aesthetic, however, the building responds to the rigidity of its function, it allows for efficient production which is attributed toward its logical planning sequence. In addition, Herzog & de Meuron have understood that favourable working environments further increase productivity, therefore, the human dimension has not only been considered but has been enhanced.



## 9.2.2 LOISIUM WINERY AND VISITORS CENTRE (2000 - 2003)

Architect: **Steven Holl**



Loisium Winery - Steven Holl

Figure 9.10 (top) - Aerial view of Loisium Winery in context. Figure 9.11 (below) - Site plan of Loisium Winery.

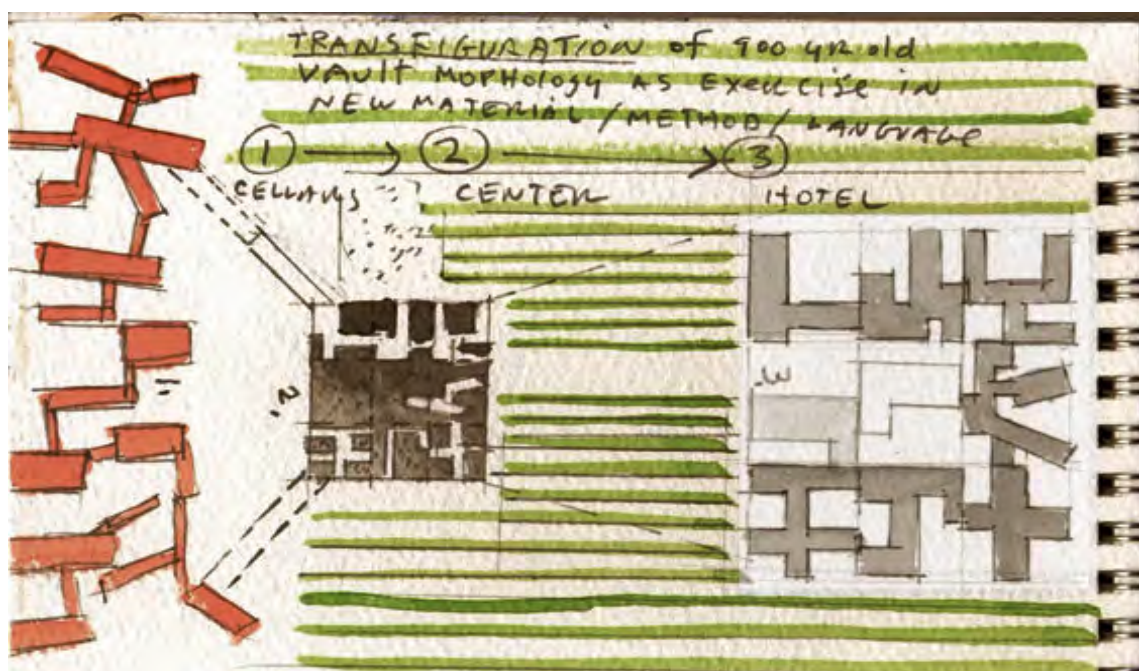
## Background

*“Its picture book perfect: wood smoke curls lazily from chimneys, the houses are picturesque in pastel render, the vines step up the terraced landscape. Into this scene, that’s remained undisturbed for years, Holl has placed a shiny metal-clad box whose wonky facades make you feel giddy just looking at them”* (Stungo, 2003:38).

The Loisium vineyards are located in the Austrian town of Langenlois (the largest wine growing region in Austria) - an hour west of Vienna. Three neighbours – Karl Steininger, the local winemaker; Gerhard and Tuula Nidetzky, the tax lawyer and his wife who lived next door; and the wine bottling factory owner, Herr Heimerl, decided that the sleepy Austrian village of Langenlois needed a ‘Bilbao’ intervention in order to put the town on the map. They decided to build a visitor’s centre which would make an attraction of the vineyards underground vaults, where for 900 years wine has been laid down. The function of the Loisium Winery, therefore, is not to produce the wine but rather to celebrate the rich local winemaking traditions and offer a warm welcome to the areas many visitors (Stungo, 2003: 38). The Loisium offers guests the opportunity to learn about wine while sampling local wine products - its function, therefore, becomes a cross between a museum, tasting bar, and retail outlet – extending the experience of wine beyond the winery itself.

## Design concept

Figure 9.12 shows Holl’s linear pattern for the Loisium inspired by the historical underground network of tunnels (traditionally used to produce wine); he writes on the sketch: *“Transfiguration of the 900-year-old vault morphology as exercise in new materials / method / language”* (refer to sketch). This conceptual sketch by Holl was conceived during the early stages of the project and remained the



Loisium Winery - Steven Holl

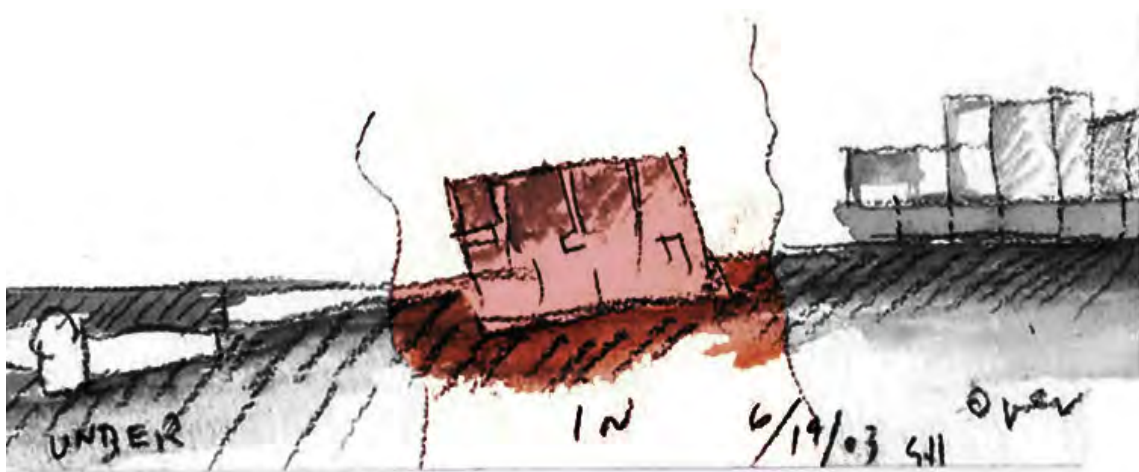
Figure 9.12 - Holl’s initial sketch which remained the central design concept throughout the project.



central design conception for the entire development. The buildings found onsite subsequently follow a three-stage concept, with its origin in Holl's first presentation, namely 'under the ground – on the ground – over the ground'. Stage 1 – comprises of the pre-existing historical subterranean system of cellars, which leads Holl to the shape of the openings in the facade of stage 2 – the visitors' centre – which forms the exit of the cellar corridors. In this impressive system of cellars, a grotto-like wine-experience world has been staged, though not designed by Holl. His building forms the welcome start and finish of a tour which more than 90 000 visitors have undertaken since its opening in September 2003. As a result of its five-degree inclination, the building constitutes a transition between the below-ground and the ground-level sections of the whole. Stage 3 – consists of the hotel, which unites and extends this thematic and architectural ensemble. The history and culture of the town of Langenlois is centred on the traditions of winemaking - it was therefore Holl's intention to evolve the concept of the building from a creative interpretation of the cultural context: the idea of giving the new stereo-metric volume 'inscriptions' based on the geometry of the old vaults develops the central theme and unifying thread for the development as a whole (Capezutto, 2004: 26).

### Siting and entrance

The Loisium is centrally sited amongst yielding vines; however, none of the buildings onsite accommodates the necessary functions needed to produce wine. Karl Steininger – the local winemaker and contributor to the projects genesis – owns a winery sited adjacent to the Loisium. All harvested grapes, therefore, are processed offsite in this neighbouring winery and sold at the visitors centre as the Loisium's 'home brand.' The underground vaults are open to the public and remain the sites number one attraction. Holl, therefore, had to avoid the new volumes acting as a substitute structure, making a visit to the underground vaults superfluous. He achieved this by tilting the Loisium 'into the ground' so both elements are in continuous conversation (figure 9.13). This contributed towards finding a way to keep the new intervention undecipherable, so to speak, within the terms of an obvious



Loisium Winery - Steven Holl

Figure 9.13 - 'under-ground - in-ground - over-ground' concept. Loisium sited in middle and acts as a public mediator between the underground vaults and the hotel.



**Loisium Winery - Steven Holl**

**Figure 9.14 - Footpath to the underground vaults. Entrance is emphasised by the linear planting in the vineyard.**

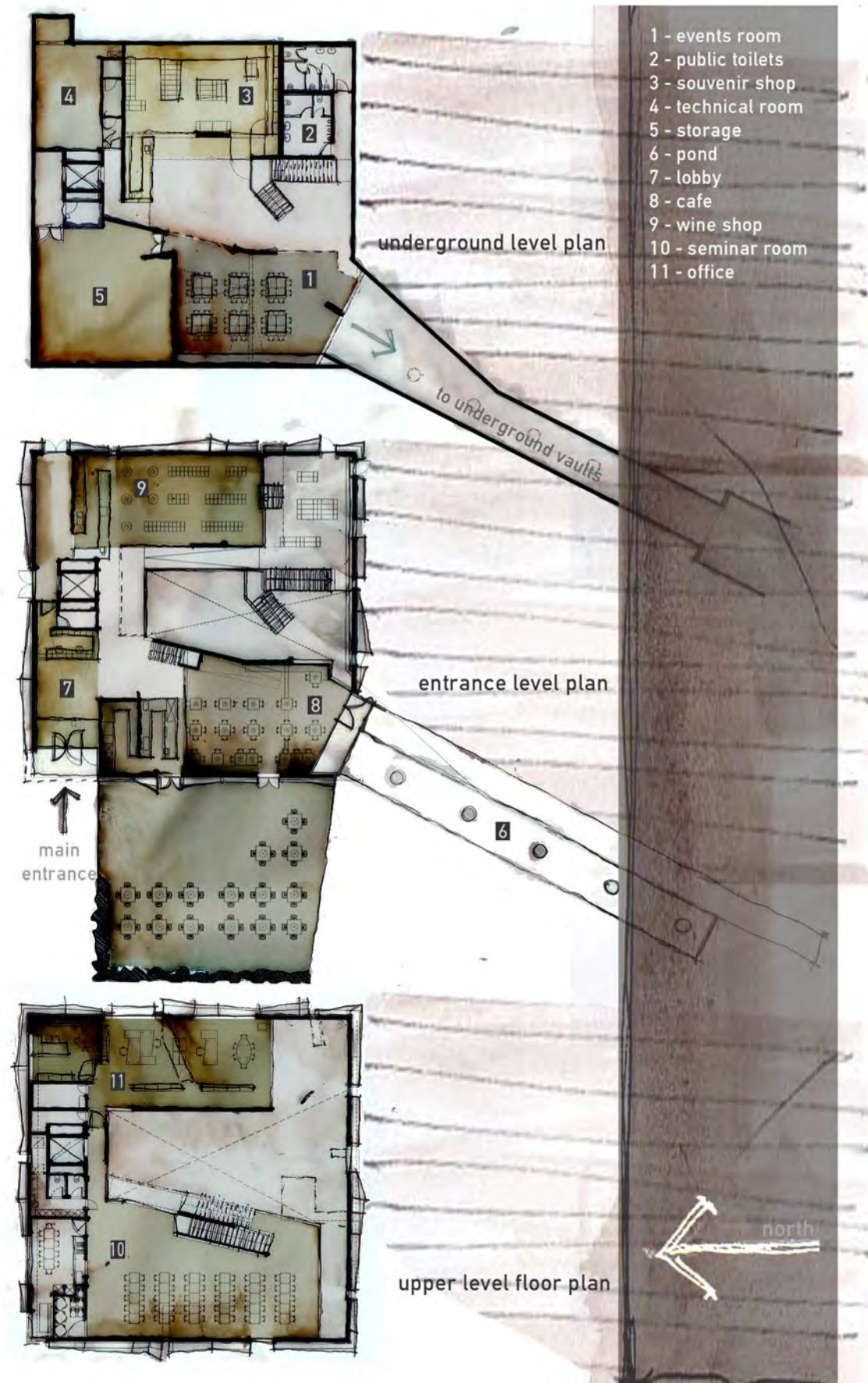
architectural code. Secured to the countryside and to the vineyard, with a mission to represent the colonial appearance of the architecture with its geological order - the new building seeks to represent a state of nature entrusting itself to a telluric image that preceded the introduction of this order (Capezzutto, 2004: 28). The visitors' initial entrance to the Loisium is, therefore, not the building's most vocal feature. Its focal access is directed towards the underground vaults. Holl achieves a strong connection between these two elements by demarcating a clear axis which is occupied by a footpath which cuts through the vineyard and is further emphasised by the planted geometric vines of the actual vineyard (figure 9.14).

### **Spatial accommodation and organisation**

The vault system's geometry is transformed into an abstract three dimensional spatial language, which engages individual qualities of space, materials, light, and experience. The Loisium visitor's centre is a simple 24 meter x 24 meter plan by a 17 meter volume which is cut and sliced to create a rich geometry. It measures a total of 1200m<sup>2</sup> in floor area and consists of three floors - of which much is occupied by a triple void and central atrium. The 'square box' form that the Loisium adopts gives rise to simplistic spatial planning whereby the central atrium is seen as the 'core' from which functioning spaces are merely an extension. Spaces consist of the underground level floor plan (figure 9.15) – semi-public, the entrance level floor plan (figure 9.16) – considered the more public of the three floors, and the upper level floor plan (figure 9.17) – semi-private.

Upon entering (ground floor) the visitor is confronted with the triple-volume and is directed to the vineyard past the cafe and wine shop. A footpath leads down to the entrance of the vault system which functions as a 'wine museum' – where visitors can discover the 900-year old cellars and learn





Loisiium Winery - Steven Holl  
Figure 9.15 (top) - Underground level plan. Figure 9.16 (middle) - Entrance level plan. Figure 9.17 (below) - Upper level floor plan.

about traditional winemaking and the development of viticulture (Stungo, 2003: 40). The return journey is made through a ramped 90 meter-long passage dappled with the light refracted through the reflecting pool (located above). This directional body of water guides visitors through the cave-like passageways, from which the visitor arrives on the lowest level of the building which houses the mechanical rooms, storage, souvenir shop (with local products and books), and spaces for events. Stairs and ramps connect the ground level with the generous wine shop and the upper floor with administration functions such as seminar rooms and offices. The roof terrace - with spectacular views over the surrounding landscape and town can be made accessible on special occasions. The architecture, therefore, creates a link between basement, ground, and upper levels that reinforces the subterranean aspects of the wine cellar network (Capezutto, 2004: 27).

## Building fabric and structure

### Materials

Built mostly of reinforced concrete - one-third of the centre is sunken below grade. The visible sections are clad in 100mm thick 'Marine' aluminium – a special alloy with extremely good resistance properties. Many people warned Holl against the use of this material cautioning him of its aging properties. *“Ah I told them, but that’s what I want: I appreciate that it’s a modest material; I appreciate that it slowly oxidizes, and sort of disappears. I’m not looking for a stainless steel that stays shiny forever. I want the building to blend into its context. I want to see how the windows, with their sharp angles and slashing effects, become even more empathetic as the building softens”* (Holl cited in Stungo, 2003: 38). When Holl received a sample of the aluminium sheets that were to be used to clad the façade he complained of it being *“too perfect”*. He argued, *“I don’t ask human beings to behave like machines. I don’t want them to. I like human beings to behave like human beings[... ]I don’t want*



Loisium Winery - Steven Holl

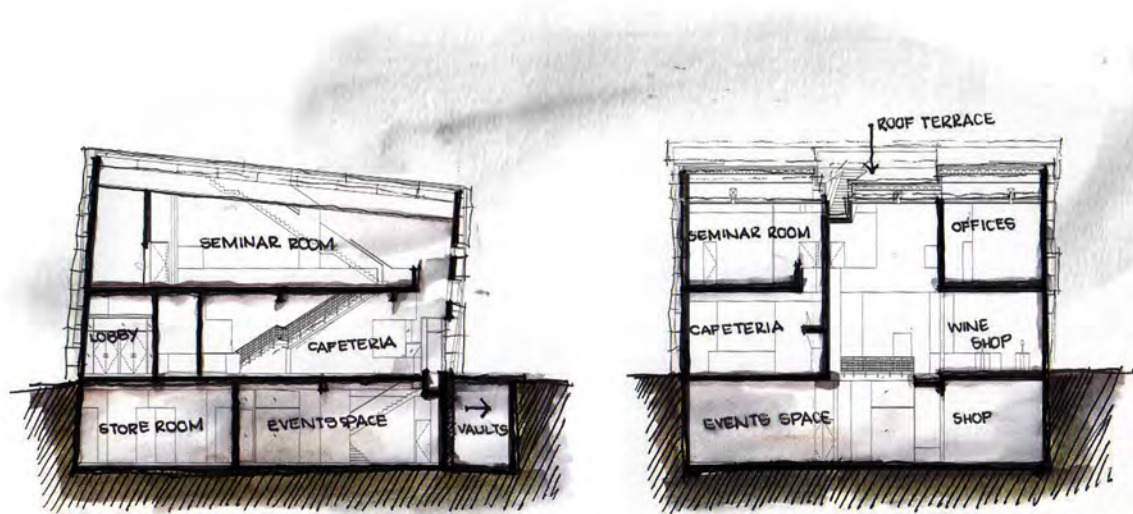
Materials inspired by the winemaking process. Plate 9.5 (left) - Marine aluminium cladding. Plate 9.6 (middle) - Green 'bottle' glass windows. Plate 9.7 (right) - Cork interior panels.



*perfect, I just want it with human imperfections*” (Holl cited in Stungo, 2003: 38). The workers consequently ‘imperfected’ the perfect sheeting, evoking a tangible and tactile nature to the undulating façade. Due to the function of the building and its cultural and historical setting – Holl chose to relate the materials to the winemaking process. The skin of the box is clad with the thin aluminium panels, cut and assembled at irregular angles – the result is a multi- faceted reflective surface that responds to the variations of light (plate 9.5). The buildings shiny exterior makes reference to the aluminium caps on the wine bottles, and the occasional green window pane looks as though they have been constructed out of melted wine bottles (plate 9.6), and the thin cork panels on the interior walls (plate 9.7) is an obvious association (McGuirk, 2003: 21).

### Construction process

According to McGuirk (2003) the Loisiium’s structure is spiritually related to Daniel Libeskind’s Jewish Museum in Berlin in terms of its material ‘slits’ and rakish angles (McGuirk, 2003: 21). Holl took the idea of an abstract ‘tilted’ block and developed an absolutely minimal exposed concrete box – 250mm thick (which posed enormous challenges for the structural engineers). As can be seen in the sections (figure 9.18 & 9.19) – the concrete structure remains straightforward with its simply constructed load-bearing walls, it is the outer cladding – comprised of the thin aluminium sheeting -



Loisiium Winery - Steven Holl

Figure 9.18 (left) - North-South section. Figure 9.19 (right) - East-West section.

however, which contributes towards the irregularity of the form.

### Maintenance

As established, the marine aluminium cladding is susceptible to weathering; however, Holl embraces this idea by acknowledging and expressing the mortality of architecture through this material. He notes that the inevitable aging of the building reflects the processes of winemaking: *“Just as a good wine must age – so the building must reflect this cultural practise”* (Holl cited in Stungo, 2003: 38). Due to the building not being subject to the winemaking process - maintenance of surfaces is not of

great concern.

### Sustainable response

The village of Langenlois experiences hot and dry summers, and cold and wet winters. The Loisium, however, does not make a sustainable concession for this environment. Despite the concrete structure's thermal capacities - the aluminium cladding is thin, which means that heat transference is quick resulting in the building requiring a mechanically ventilated heating and cooling system which is employed year-round (McGurik, 2003: 21). Lack of published information regarding the buildings sustainable response in terms of materiality, carbon emissions, construction methods, etc, highlights the fact that this was not Holl, nor the client's, main priority. It would appear that this project had access to a large amount of funding, whereby every expense was aesthetically utilized rather than employed to investigate sustainable methods of construction.



Loisium Winery - Steven Holl  
Figure 9.20 - Light required for the visual judgement of wines.

### Specialist design aspects

This building does not function as a manufacturing winery, and as such – it does not adopt specialist functions specific to operational wineries. As a visitors centre, however - which documents and expresses the winemaking culture - this building focuses its public functions on heightening the 'wine experience'. For example, the tasting room (located on the ground floor) – is designed specifically to allow sun's rays to directly penetrate this space which is necessary for the visual judgement of the wine (figure 9.20). In addition - the cuisine offered at the ground floor cafe is an interesting interpretation of regional products and recipes, thereby forming the ideal complement to the wine (Nidetsky, 2007:



227).

### **Summary**

Holl has created a building which is intrinsically linked with the memory of its cultural context, so much so that the memory is inscribed into the building; spatially locating knowledge in the architecture itself. The form has directly been conceived from the maze that presents itself in the underground tunnels, the windows that slash through the aluminium shell map the passages - giving them a visible form above. The study of this winery / visitors centre has made apparent that architectural texture, viscosity, transparency, and bouquet are just as important for the architecture as for an outstanding wine. The design of stage 3 of this project (the hotel) was conceived on the basis of the Loisiium's success as a touristic venture - it proved so popular that original plans for the hotel had to be adjusted in order to accommodate for the increased number of visitors' to the town of Langenlois. This reiterates the function of a winery as a public venture, which presents an opportunity to provide experiential spaces based on the exhibits of winemaking.

### 9.2.3 PEREGRINE WINERY (2002 - 2004)

Architect: **Architecture Workshop**



Peregrine Winery - Architecture Workshop

Figure 9.21 (top) - Aerial view of Peregrine Winery. Figure 9.22 (below) - Site plan of Peregrine Winery.



Peregrine Winery - Architecture Workshop  
Plate 9.8 - The simplistic form of the Peregrine Winery.

## Background

*“Peregrine Winery creates an irresistible and poetic vision of civilisation in the world natural setting. It is no longer a question of form follows function because the function itself is subordinated to compatibility with the natural surroundings, which, still not satisfied, dictate the form they find most congenial”* (Morrison, 2004: 46).

The Peregrine Winery is situated in New Zealand amidst the Gibbston valley, on the famous Central Otago Wine Road (the southernmost wine region in the world) – 20 minutes outside of central Queensland. The Peregrine estate adopts a viticultural approach to winemaking in response to recent growth in grape planting, and increasing international demand for regional New Zealand wine. Viticulture is the science, production, and study of grapes which deals with

the series of events that occur in the vineyard – long before the grapes have developed on the vines. The beneficial and detrimental aspects of soil, topography, microclimate, and macroclimate form the basis for choosing favourable grape-growing sites, as well as the appropriate varieties for the site. A majority of the wine’s properties are determined by the specific grape variety and its response to the nature of the site, such as wind, moisture, sun, exposure, and soil characteristics. The winemaking approach, according to the client, has always been and will always be along traditional and sustainable lines, with minimal intervention to allow the wines to adopt the truly unique fruit flavours of Central Otago. The clients brief to Architecture Workshop, therefore, was to keep the building simplistic and highly efficient in order to focus all efforts on the quality of the wine, but not at the expense of aesthetics, as the architecture materializes a form of ‘branding’ for the wine, nor at the expense of experience, as a large focus of the buildings function is directed at tourism (Morrison, 2004: 48).

## Design concept

*“The detail and the main idea proceed hand-in-hand”*(Christopher Kelly (principal architect) cited in Barle, 2004: 57).

The core design conception centred around the buildings seamless integration into its natural surroundings in order to reduce it’s visual impact on the landscape. According to Kelly (the principal





Peregrine Winery - Architecture Workshop  
Figure 9.23 - Native Peregrine falcon - the central design concept for the iconic roof structure.

architect), Architecture Workshop did not want to detract from the sites pre-existing iconic environment - as such the building uses the natural topography of the site to hide the work of man, with only the roof being visible from the road (Kelly cited in Barle, 2004: 57). The iconic canopy roof can be interpreted on a number of levels: a transformation or metamorphosis reflecting the refining process the grapes are subject to - as the roof rises from its low slope at the river (northern) end to the 25 degree slope at its southern end. On a more literal level, some see it aligned with and becoming one of the uprising rock reefs. For the architects, however, the changing roof gradient was inspired by old still images freezing the kinetic rotation of a bird in flight. Architecture Workshop developed the straightforward brief set out by the client by sketching a simple line drawing which formed the basis in establishing the Peregrine wine brand. This form was taken from the curved line present in the wingspan of the native Peregrine hawk (figure 9.23) as it hovers and glides on the thermal uplifts off the heated land.

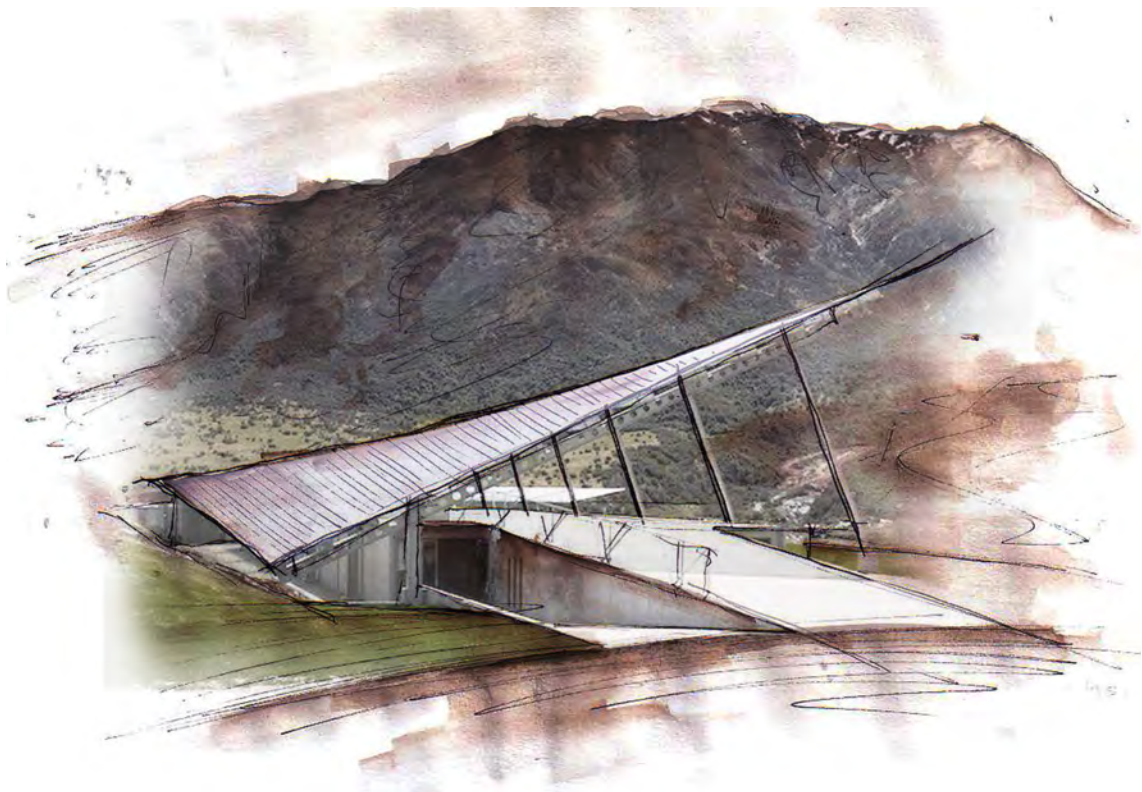


This basic unadorned illustration formed the foundation of the simplistic, linear design – all decisions were centred on creating a clean, crisp form to compliment the natural setting (Morrison, 2004: 46). Beyond the wing roof’s pragmatic role - the striking presence it has in the landscape was intended to transform the building into both a landmark and a symbol of the winery (figure 9.23).

### Siting and entrance

*“It is an island of human-made beauty in the middle of the natural sublime landscape”* (Barle, 2004: 57).

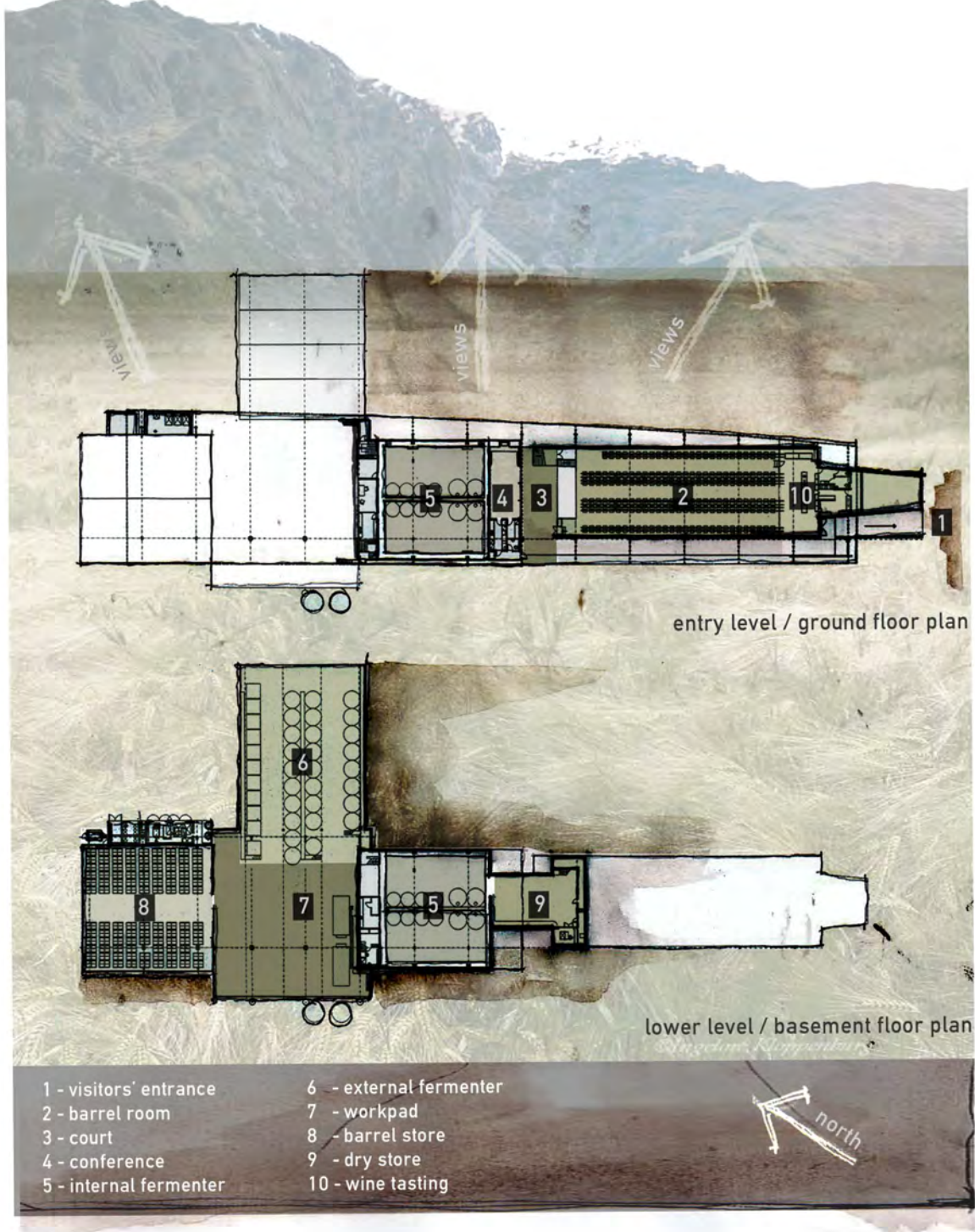
One the terraced floor of the Gibbston Vallley, below the often snow-capped mountains, the site is bounded to the north by the Kawera Gorge - one of the most dramatic sceneries in the country. In contrast the winery is calm, smooth, and ordered so as to not distract from its dramatic context. As can be seen in figure 9.22 – the elongated structure gives rise to separated entrances - one for services and the other for the public. Visitors approach from the south (figure 9.24), and are introduced down a ramp to the final stages of production. The building as a whole responds to its extraordinary surroundings at several different scales. Seen against the massive mountainsides of the Gibbston Valley, the building’s palette of neutral colours and the wings translucence harmonises with the landscapes vivid and constantly changing colours – lush summer greens, autumn yellows and ochre’s, and icy-winter whites. Seen close up, reflecting pools arranged beside the pedestrian approach, further unify the hovering winery with its dramatic landscape backdrop. Beneath the wing, the building has been



Peregrine Winery - Architecture Workshop  
Figure 9.24 - Public entrance.

carefully positioned between the rock 'reefs' that emerge out of the valley floor and partially cut into the gently sloping site. The building mass and ground plane have been carefully handled that even the large outdoor processing areas are discreetly screened from the public zones (Barle, 2004: 57).

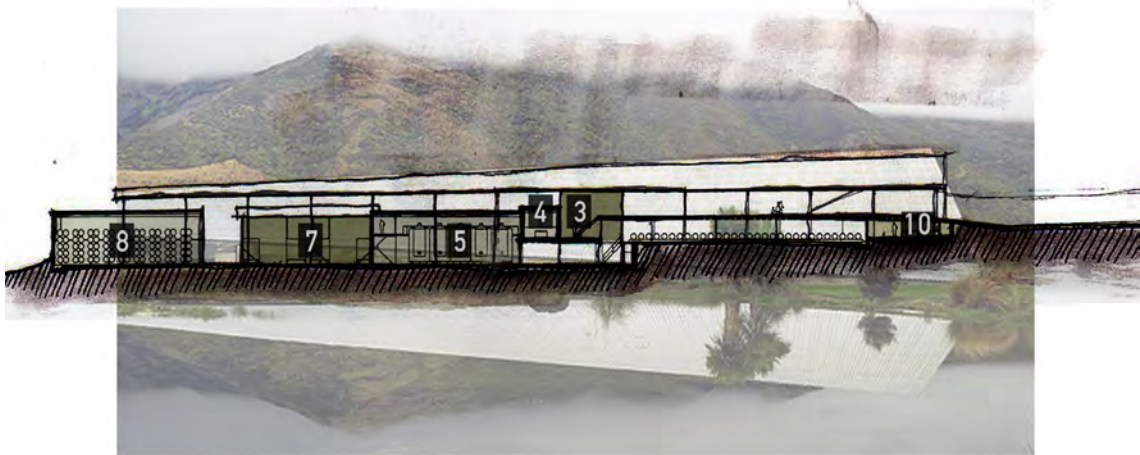
### Spatial accommodation and organisation



Peregrine Winery - Architecture Workshop  
 Figure 9.25 (above) - Ground floor plan. Figure 9.26 (below) - Lower ground level floor plan.



The Peregrine Winery processes up to 650 tonnes of grapes per annum – which is the sole focus of this building – as such the architects prioritized efficient and well-lit work spaces in order to maximise quality production. The one, elongated structure houses the winery’s entire production facilities – as well as a tasting room and shop front - it contains barrel halls, fermentation areas, plant rooms, and work spaces where the grapes and barrels are handled. The architecture is organised in accordance with the linear winemaking process, these functions are unified by a soaring, translucent canopy. Apart from being a tourist destination, the building is essentially a processing plant, focused on producing quality wine, therefore, much of its design flows directly from the rigorous functional demands of winemaking (Barle, 2004: 54). The plan of the winery is divided into the ground floor (figure 9.25) which accommodates the more public functions such as the wine tasting room, where visitors’ can taste the products in the barrel room where the wine is stored before dispatch, a 40 meter long modern version of the traditional viticultural cave, in which oak barrels stretch into the distance. After this introduction, visitors are encouraged to stroll on the terraced roof, where views of the Kawera Gorge are framed under the translucent canopy floating overhead. The lower ground floor plan (figure 9.26) accommodates an external fermentation area which extends to the east of the main linear route under separate canopies, and at the junction of the two axes is the work-pad, where grapes and barrels are manipulated. According to Barle (2004) the success of Peregrine Winery is largely accredited to its simplistic layout which allows for future extension, should the establishment require it (Barle, 2004: 54).



Peregrine Winery - Architecture Workshop  
Figure 9.27 - Long section showing spatial arrangement.

## Building fabric and structure

### Materials

Architecture Workshop prioritized materials which were well insulated (given the often sub-zero temperatures) and easily cleanable. The basic colour palette of steel and concrete allowed for simplistic yet efficient materials which are structurally sound, aesthetically compatible, and can be subject to heavy loads and robust cleaning. The iconic roof structure is comprised of deeply corrugated

composite glass-fibre sheeting supported on galvanised purlins, which themselves bear on propped frames made of universal beams with their webs drilled out. This translucent roof allows for functions to be protected by increment weather conditions, however, it allows sunlight to penetrate through to the majority of spaces, negating the need for artificial lighting (Lund, 2004: 48).

### **Construction process**

The building's construction skilfully combines custom-made elements with off-the-shelf systems. The roof structure (plate 9.9) is a typical example – it combines steel I-beams (which the ribs have been cut out) with a pre-formed galvanised steel purlin system, normally used in warehouse construction. The building makes use of progressively fewer custom-made elements the further it moves away from the public areas – while the tasting room (plate 9.10) is an elaborate construction of precast and in situ concrete, the double-height barrel hall at the opposite end of the building is assembled from the standardised elements normally used in constructing cool-store sheds. The slow twist of the roof not only represents the transformation of grapes into wine, but reflects numerous other gradations in the composition of the building itself – spatial, material, structural, and functional. The winery draws on the simple utilitarian materials and approach of neighbouring rural buildings: the barrel and tank modules determine the dimension of the roof spans; the propped frames are constructed from steel Universal Beam sections; and a translucent deep profiled Durolite GC cladding is fixed directly to galvanised steel roof purlins to create a long canopy that unifies the different parts of the winery and gives the building a lighter and more ephemeral presence in the landscape (Barle, 2004: 57).

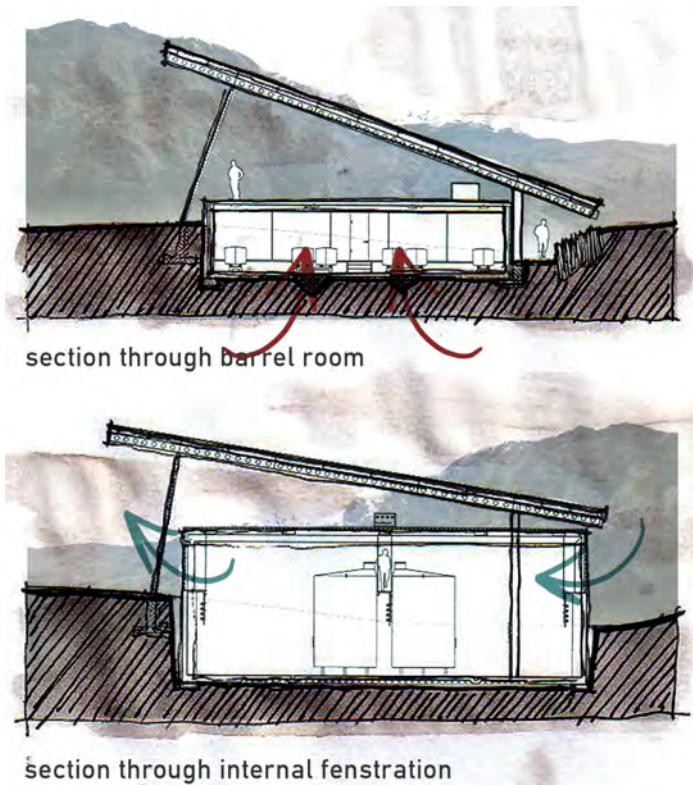


**Peregrine Winery - Architecture Workshop**  
**Plate 9.9 (left) - Steel and Durolite roof construction. Plate 9.10 (right) - The tasting room.**

### **Maintenance**

As mentioned previously, materials were chosen on the basis of their ability to withstand heavy-duty cleaning. This includes an aggregate epoxy floor which is slip resistant, chemical resistant, and its seamless finish is able to dispel of excess liquid timeously (Lund, 2004: 46).





Peregrine Winery - Architecture Workshop  
Figure 9.28 (top) - Section through barrel room. Figure 9.29 (bottom) -  
Section through internal fenestration.

### Sustainable response

The region has a continental climate of hot dry summers and crisp winters - and experiences snowfall during this season. This 140 meter long roof is not just a picturesque feature: it obviates the need to allow for snow loads on the building below, and removes most of the solar heat gain from the production rooms - where stable temperatures are important. In addition it's structure is partly submerged in order to maximise the barrel room's exposure to the earth - taking advantage of the earth's constant temperature. This method provides a natural, constantly cool, and humid environment, while

expending little energy. Natural ventilation has also been prioritized in order to expel the carbon dioxide produced by the fermenting grapes (figure 9.29) - through the use of a passive thermal system. The winery collects all waste water, prescreens and pond-aerates it for BOD reduction. This water is ultimately used for vineyard irrigation and serves dual duty as the facility's fire protection pond. Pomace is collected and stored on site, where it is composted and added back to the vineyards as part of the farming operation (Lund, 2004: 48).

### Specialist design aspects

Due to the buildings viticultural and sustainable approach, the architects (together with the knowledge of the client and winemaker) designed a building which minimises man's handling of the grapes, thus protecting the grapes integrity. They have achieved this through thoughtful spatial layout and the use of gravity-flow processes, which the client believes improves the quality of the end product.

### Summary

*"An elegant blade of light [that] contrasts with the rugged and sublime natural landscape. The age-old process of making wine has been radically reinterpreted for our time"* (Jury Citation, Winner, ar+d emerging architecture awards, London, England).

Architecture Workshop's vision was to maintain and enhance quality, without losing high production-rate capabilities. They have achieved this by understanding the needs of wines production and working in partnership with both the client and the winemaker to further maximise efficiency. Due to the regions weather conditions, which consist of snow capped mountains which dominate the landscape for at least eight months of the year – Central Otago is a challenging climate in which to produce quality wines. In order to maintain consistent temperature and humidity levels for the barrels, passive climate controls are a key factor in winery design. The 140 meter long wing roof plays a key part, serving to reduce both solar and snow loads on the buildings functional spaces, thus integrating poetic form-making and functional logic. At Peregrine, the result of this skillfull alignment of numerous factors is a building that, despite its complexity, seems remarkably simple.

### 9.3 Case studies

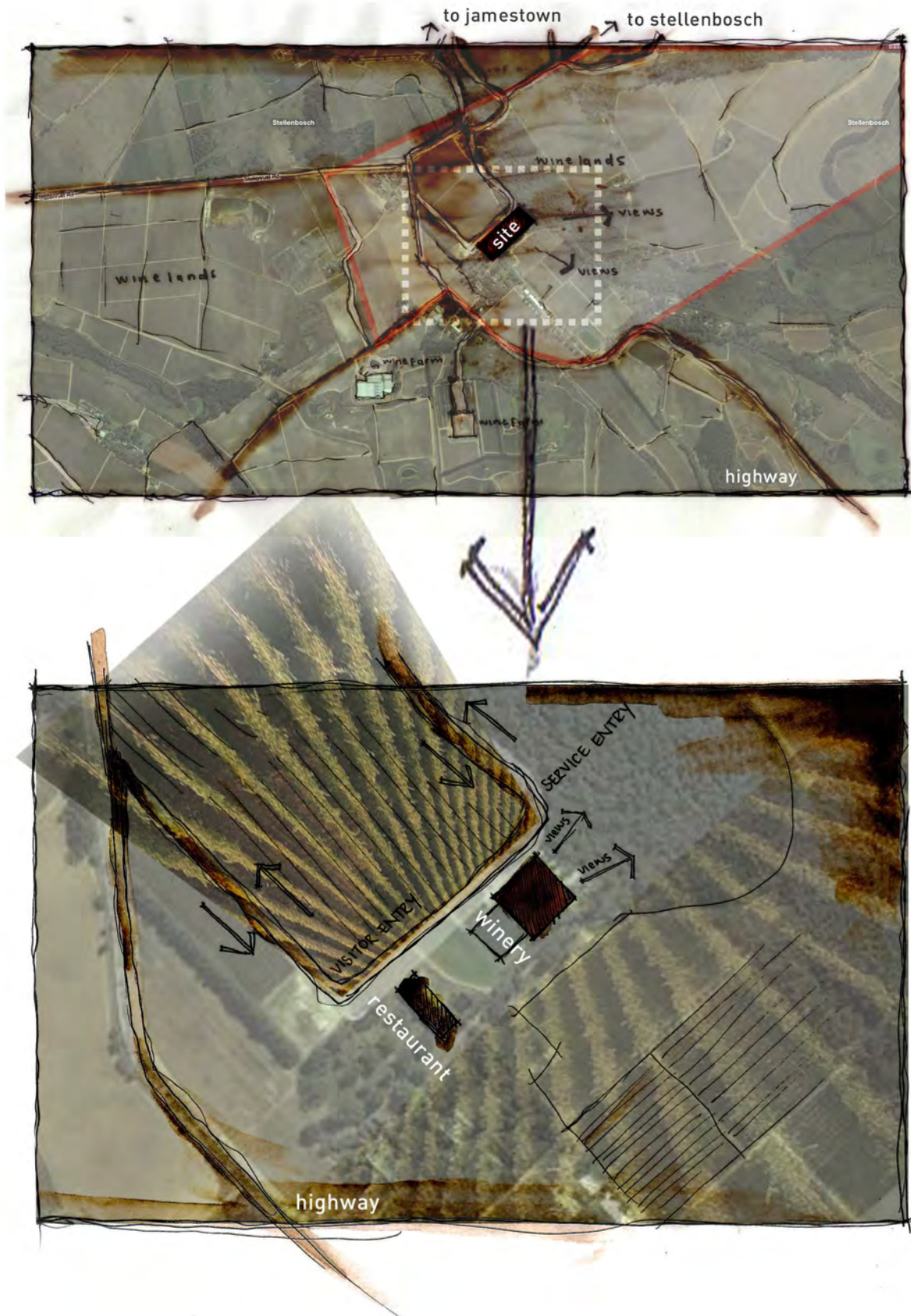
Only one local case study has been selected for analysis, due to the extensive research already undertaken. This winery was reviewed in Part I of this dissertation, however, the focus in this study will be of a more practical nature so as to analyse the whole: both the theoretical (Part I) and the practical (Part II), and includes:

**Dornier Winery** : Malherbe Rust Architects (Stellenbosch, Western Cape, South Africa) - This winery caters to both the production of quality wine and to visitors' who can tour the operating facility to experience the active processes of winemaking.

The focus of this study will aim to locate the requirements of a winery facility within the specific context of South Africa. As established, the architectural response, particular to its immediate context, is vital in order to maximise efficiency and reduce energy costs. All information gathered in this study is a result of indepth interviews with both the architect - Johan Malherbe and the winemaker - JC Steyn. The analysis of Dornier Winery endeavours to highlight key considerations, particular to the context of South Africa, in order to determine the most appropriate architectural response.

### 9.3.1 DORNIER WINERY (2001 - 2003)

Architect: Malherbe Rust Architects



Dornier Winery - Malherbe Rust Architects  
Figure 9.30 (top) - Aerial view of Dornier Winery. Figure 9.31 (below) - Site plan of Dornier Winery.



## Background

*“To stand out we needed to create something unique[...]When it comes to winemaking, by blending you can combine the best wines, filling with one varietal where another is lacking to produce something really exceptional, harmonious and balanced. In the same way, we wanted to showcase our individual style – which is synonymous with complexity, rich texture, and a multi-layering based on a sense of creative exploration – in the design of the winery” (Dornier (owner) cited in Nell, 2006: 34).*



**Dornier Winery - Malherbe Rust Architects  
Plate 9.11 - Dornier Winery in context.**

The Dornier Estate is located on two estates – Stellenrust and Keerweder - both with long traditions. The history of Keerweder goes back to 1694, when it was acquired by Jac van Dyk. The Homestead farm includes a historic Sir Herbert Baker homestead and one of the oldest wine cellars in the area. The Dornier family bought the first farm in 1995, planted most of the vineyards and opened the new cellar in 2003. As part of the brief to the architects, the site was to be treated as a whole which reflected both the old and the new. Representing the masterful synthesis of contrasting, complementary elements, Dornier’s character is clearly visible in the design of the buildings; a contemporary, industrial 55-ton winery, and one of the Cape’s oldest cellars placed in juxtaposition highlights Dornier’s heritage. The brief to Malherbe Rust Architects included creating much more than just a site for wine production. The architecture, therefore, unites two basic elements: the production and presentation of high-quality Dornier wines, and a touristic venture which accommodates for a unique experience of the winemaking processes, that not only offers visitors’ a complete wine experience, but also represents an architectural work of art. Furthermore, the brief included creating a memorable building that was readily identifiable as part of the Cape geography and Cape-Dutch style – by including elements of the Cape’s traditional vernacular, but with a contemporary interpretation. The surrounding area is characterised by sharp mountain peaks – Malherbe Rust sought to design a building that would respect the landscape and be strong enough to hold its own in this dominant setting (Nel, 2006: 35-36). It is described by Fraser (2010) as one of the best wineries in the country due to its dramatic and sensuous aesthetic which is anchored in and embraced by the environment in which it is rooted (Fraser, 2010: 87).



**Dornier Winery - Malherbe Rust Architects**  
**Plate 9.12 - Artwork of Christoph Dornier (owner) who inspired the buildings curvilinear form.**

### **Design concept**

Christoph Dornier was the original owner of the winery as well as a renowned Swiss artist. Before deciding on the architect for the project, he conceptualised the building in his unique style of drawing (plate 9.12). He wanted to create an atypical Cape-Dutch style winery that would blend into the landscape, and its context, rather than dominate and replicate it. Through Christoph Dornier's organic style of painting, and his desire to reinterpret the Cape-Dutch style, he conceptualised the building as an undulating form which mimics the topography of the land, as well as the Cape gables which are synonymous with the architectural character of the region. He visited several wineries across South Africa and Europe before deciding on Johan Malherbe (principal architect of Malherbe Rust Architects) to interpret his artwork into a three-dimensional reality. Malherbe translated Dornier's central idea into the building's iconic curved roof – which is shaped by the wine region in which it is located, by the architecture of the farm to which it belongs, and by its location within a unique natural landscape (interview, March 2011). Dornier Winery is a contemporary interpretation of local Cape building traditions and forms, whereby the regional identity is expressed in the exaggerated and organic form of the roof; creating a building with a unique Cape flavour that achieves harmony with its historical surroundings as a result of its associative character. The curvilinear roof of the building, which is Dornier's most vocal feature, was directly influenced by the curved forms of the Cape Dutch gables (figure 9.32), concretising the architecture in its regional cultural identity of traditional Cape wineries; thereby maintaining a link between its historical context and its contemporary inhabitants. *“The finished product is truly unique, and depending on your vantage point, it can look hard and functional, or elegant and sophisticated. From some angles it blends in, and from others it starkly stands out”* (Dornier, cited in Nel, 2006: 35).



Dornier Winery - Malherbe Rust Architects

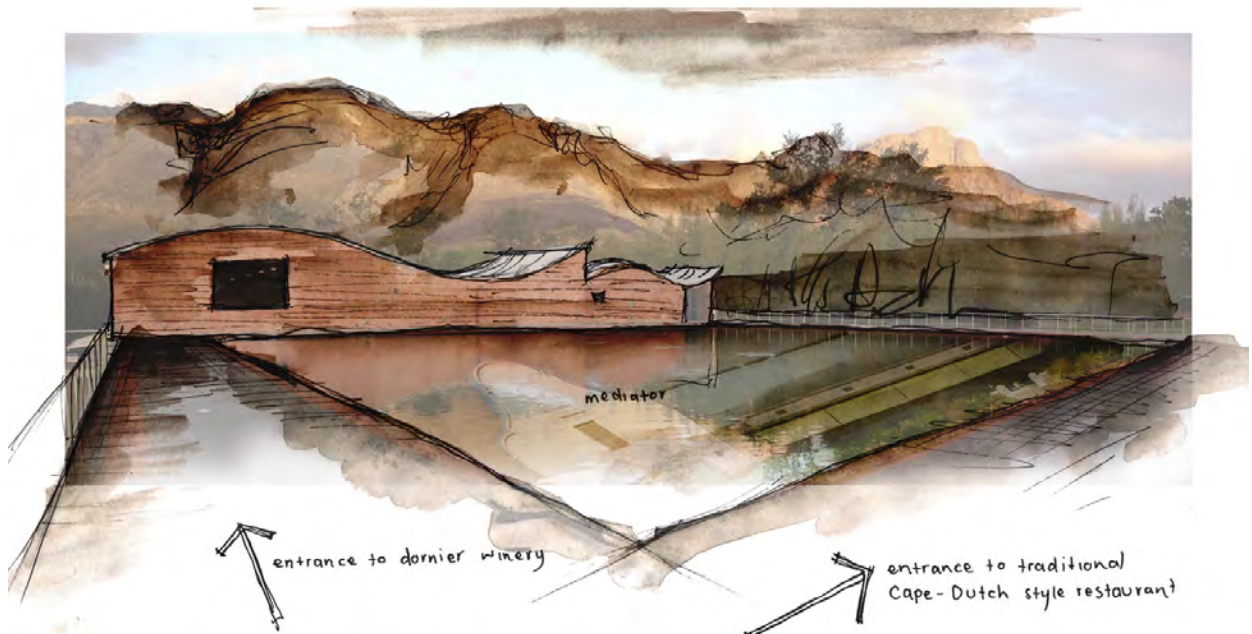
Figure 9.32 - Reinterpretation of the Cape-Dutch style into the contemporary form of the iconic roof structure.

### Siting and entrance

The Dornier Winery is sited on 167 hectares of prime viticultural land, within the heart of the Stellenbosch ‘golden triangle’ (figure 9.30). The wine estate benefits from an excellent climate and perfect soil conditions. Nearby False Bay cools the vineyards and provides a moist microclimate, resulting in a constantly high quality crop. The soil composition is principally weathered red and yellow granite with a high proportion of clay. It lies between 100 and 200 metres above sea level. After eleven years of building up the wine farm, 100 hectares is currently covered with vines. Seven grape varieties are cultivated and include: Cabernet Sauvignon, Cabernet Franc, Merlot, Shiraz, Pinotage, Chenin Blanc, Semillon und Sauvignon Blanc (JC Steyn: interview, March 2011).

With regards to the buildings architectural siting - Dornier Winery is not a visual spectacle in competition with its surroundings, but rather, it is inspired by the tangible and intangible materiality of its context and function to create an architecture which is rooted in the properties of place and experience. Malherbe reinforces this by stating: *“The winery is a contemporary incarnation of the Cape Werf: a place held by the buildings, rather than the building dominating the place. The building is part of this place, flowing with the process of making wine and connecting with the farm, the views, and the natural surroundings”* (Malherbe, cited in Fraser, 2010: 98). With regards to the building’s entrance - Dornier has made use of two separate entrances (figure 9.31) – one for touristic purposes





**Dornier Winery - Malherbe Rust Architects**  
**Figure 9.33 - Public entrance: water acts as a mediator between the old Cape Dutch-style restaurant and the contemporary winery.**

and the other for servicing. The service entrance is located on the lower ground floor and as such it does not visually impede Dornier's main façade. The pond provides a democratic public entry point, creating a harmonious balance between the contemporary winery and the historical restaurant. As established, the brief included blending the old with the new – Malherbe achieved this with the use of the pond which acts as a mediator connecting the pre-existing traditional Cape Dutch restaurant with the contemporary architecture of Dornier Winery – reflecting each other in a unique juxtaposition. According to Malherbe, it was specifically designed so that when a visitor was facing Dornier, a reflection of the traditional restaurant could be seen in the rippling water and vice versa (figure 9.33). This was done to ensure that the opposing architectural aesthetics, of both winery and restaurant, speak to one another in the distorted medium of the water (interview, March 2011).

### **Spatial accommodation and organisation**

*“Operationally, [Dornier] is a masterpiece that has been described as one of the best wineries in South Africa because of its simplicity” (Nel, 2006: 35).*

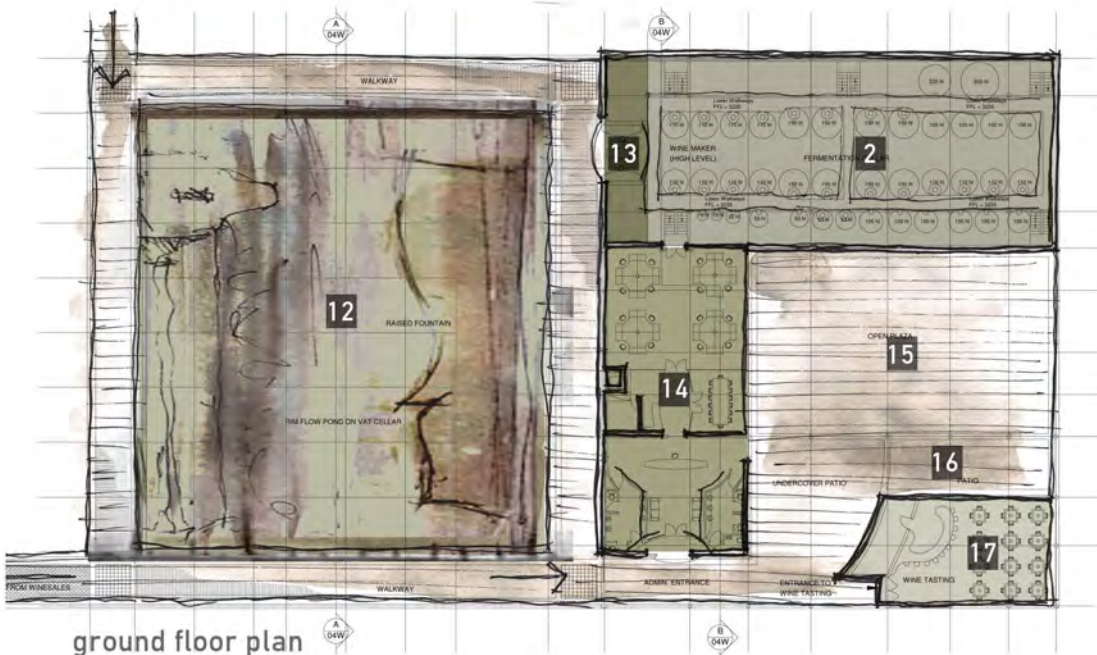
Malherbe maintains that in addition to concretising the building in a regional identity, the curvilinear roof serves an additional purpose - the idea being that the larger wave accommodates the production spaces and the smaller wave houses the offices and other touristic functions. From the power machine room and the wine-makers laboratory, down to the 800-ton wine cellar, the building's interior had to function as a high-tech winemaking centre. Apart from functioning as a 'factory', the building's interior had to offer a pleasant environment for workers and tourists. Dornier Winery manages to achieve human scale and flowing spaces, whilst still accommodating for the ease of manufacture. This



THE BODY AS A SUBJECT (NOT OBJECT) OF THE BUILT FORM: ENGAGING ARCHITECTURE AND THE SENSES  
 A proposed Winery Facility in the Natal Midlands



lower ground floor plan



ground floor plan

1 - barrel room	8 - service / loading	15 - open plaze
2 - fermentation room	9 - off-loading	16 - undercover patio
3 - servicing area	10 - winestore	17 - wine tasting room
4 - private tasting room	11 - machine room	
5 - laboratory	12 - raised fountain	
6 - dry store (227 pallets)	13 - wine-maker office	
7 - bottling area / store	14 - administration	

Dornier Winery - Malherbe Rust Architects  
 Figure 9.34 (above) - Lower ground floor plan. Figure 9.35 (below) - Ground floor plan.



	Accommodation	Space description	Quantity	Size	Total area
<b>Public facilities</b>					
<b>General</b>	<b>Entrance / reception area</b>	Central reception area which opens up onto the various functions of the winery	1	70m <sup>2</sup>	<b>70m<sup>2</sup></b>
	<b>Wine tasting room</b>	An isolated space which maximises views of the landscape and winemaking process	1	130m <sup>2</sup>	<b>130m<sup>2</sup></b>
	<b>Open plaza</b>	Outdoor space which connects all the various functions (not included in total area)	1	420m <sup>2</sup>	<b>420m<sup>2</sup></b>
	<b>circulation space</b>	/	1	90m <sup>2</sup>	<b>90m<sup>2</sup></b>
			<b>WC's</b>	<b>WHB</b>	
	<b>Public ablutions (female)</b>	A per the National Building Regulations (SAB0400) requirements for population of general and restaurant activities	2	3	<b>15m<sup>2</sup></b>
	<b>Public ablutions (male)</b>		2 / 2 urinals	3	<b>15m<sup>2</sup></b>
	<b>Public ablutions (disabled)</b>		1	1	<b>5m<sup>2</sup></b>
<b>Total area of 'general' spaces</b>					<b>325m<sup>2</sup></b>
<b>Semi-public facilities</b>					
<b>Admin areas</b>	<b>Open plan offices</b>	Administration offices including: marketing director, financial director, and general manager	1	105m <sup>2</sup>	<b>105m<sup>2</sup></b>
	<b>Private wine tasting</b>	Room located with view over the barrel room for invited guests to sample the wine	1	90m <sup>2</sup>	<b>90m<sup>2</sup></b>
	<b>Wine-makers office</b>	Positioned to look over the winemaking process (also includes library)	1	30m <sup>2</sup>	<b>30m<sup>2</sup></b>
<b>Total area of 'administration' spaces</b>					<b>225m<sup>2</sup></b>
<b>Semi-private facilities</b>					
<b>Winemaking areas</b>	<b>Fermentation cellar</b>	10 metre high volume which spans both the lower ground and ground floor to accommodate for the fermentation tanks. Extensive catwalk system allows for easy access to machinery.	1	500m <sup>2</sup>	<b>500m<sup>2</sup></b>
	<b>Barrel cellar</b>	Constructed below ground to reduce heat gain. The above pond acts as a passive cooling system, keeping the barrel room at a constantly low temperature	1	1200m <sup>2</sup>	<b>1200m<sup>2</sup></b>
	<b>Dry store</b>	/	1	165m <sup>2</sup>	<b>165m<sup>2</sup></b>
	<b>Wine store</b>	/	1	400m <sup>2</sup>	<b>400m<sup>2</sup></b>
	<b>Bottling area / store</b>	Located in close proximity to service area for easy loading/off-loading	1	220m <sup>2</sup>	<b>220m<sup>2</sup></b>
<b>Total area of winemaking spaces</b>					<b>2485m<sup>2</sup></b>

Accommodation	Space description	Quantity	Size	Total area	
<b>Private facilities</b>					
<b>Service areas</b>	<b>Machine room</b>	Housing the refrigeration systems, pumps, air-conditioning units, etc.	1	90m <sup>2</sup>	<b>90m<sup>2</sup></b>
	<b>Electrical room</b>	Opening up onto the service yard for easy access	1	15m <sup>2</sup>	<b>15m<sup>2</sup></b>
	<b>Water treatment</b>	Including raw water storage and fresh water storage	1	25m <sup>2</sup>	<b>25m<sup>2</sup></b>
	<b>Cold room</b>	/	1	22m <sup>2</sup>	<b>20m<sup>2</sup></b>
	<b>Tool room</b>	/	1	10m <sup>2</sup>	<b>10m<sup>2</sup></b>
	<b>Chemical storage</b>	Must be lockable	1	15m <sup>2</sup>	<b>15m<sup>2</sup></b>
	<b>Laboratory</b>	Contains refrigerator and freezer, has optimal lighting, good ventilation, adequate countertop material and counter space, adequate reagent and glassware storage space, good temperature control, adequate water temperature and volume, and room to house safety equipment	1	25m <sup>2</sup>	<b>25m<sup>2</sup></b>
	<b>Staff room</b>	Contains seating and small kitchen area	1	15m <sup>2</sup>	<b>15m<sup>2</sup></b>
			<b>WC's</b>	<b>WHB</b>	
	<b>Staff ablutions</b>	Unisex ablutions including one shower	2	2	<b>15m<sup>2</sup></b>
<b>Total area of service spaces</b>				<b>230m<sup>2</sup></b>	
<b>Total areas</b>					
<b>Total area (including minor circulation)</b>				<b>3265m<sup>2</sup></b>	
Service yard	Space for the manoeuvre of the delivery trucks (MIN) Area of general waste of facility to await collection	1	150m <sup>2</sup>	<b>150m<sup>2</sup></b>	
Loading area		1			
Refuse area		1	30m <sup>2</sup>	<b>30m<sup>2</sup></b>	

Dornier Winery - Malherbe Rust Architects  
 Figure 9.36 - Schedule of accommodation.

was achieved by seamlessly integrating all spaces, and applying the same principles and standards of design to both the manufacturing and public elements. The planning has essentially been split into two levels – all functional and operational facilities are constructed underground while the ‘public’ section was created above ground. The lower ground floor plan (constructed below-ground – figure 9.34) accommodates the building’s semi-public and private functions (manufacturing processes) – which essentially hides the service areas from public viewing. In the maturation cellar, stainless steel fermentation tanks are suspended and walkways have been widened to prevent a cramped working environment. The ground floor plan (figure 9.35) houses the administration and public functions and makes use of natural light which filters through from the expansive windows on the guest plaza – maximizing the views of the winemaking process and the serene landscape (see figure 9.36 for



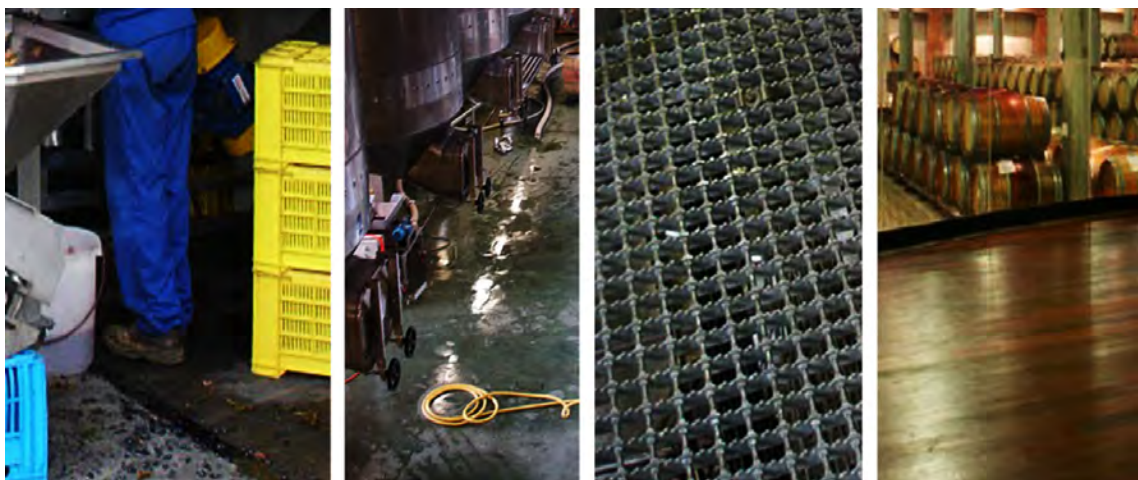
detailed schedule of accommodation). The Dornier Winery is perfectly integrated into the landscape, as the complex echoes the shape of the dip in the ground. Below ground, the architects have created an efficient, productive space with a constant climate created by solid walls sunk deep into the earth. Above ground, Malherbe has created a space designed for light and public access.

## Building fabric and structure

### Materials

*“Materials had to be pedantically practical – concrete brick, steel, and glass were used to emphasise the strong form”* (Malherbe: interview, March 2011).

According to Malherbe, it is a common misconception that the more materials combined - the more their field will visually vibrate (interview, March 2011). Dornier is an example of using a minimal palette which adopts contrasting qualities to achieve an embodied aesthetic and a practical competency. The minimum of applied finishes reflect an honest and authentic method of construction, in which Malherbe states: *“We wanted the natural materials to be expressed: warts and all”* (interview, March 2011). This vernacular approach makes reference to the Colonial manner of construction, which is appropriate due to the historical background of the building function. The brief stipulated that the building should blend in with its surroundings and cause minimal visual disruption - as a result the aesthetic and detailing of the building is rooted in simplicity; all the surfaces are kept as neutral and as undisturbed as possible, with minimal visual embellishments in order to ensure the architecture blends in with its surrounding environment as much as possible. The material palette consists of mainly glass, stainless steel, anodised aluminium, and wood – in order to achieve an ‘agricultural’ character - maintaining a level of durability. The choice of these materials was derived from a phenomenological approach of ‘bottom up’ which allows the ethereal boundaries of the building to blur into the landscape. A high degree of transparency is achieved with the use of the glass which gives light to the building and integrates different spaces such as the office, production, and tourism areas. Materials were also



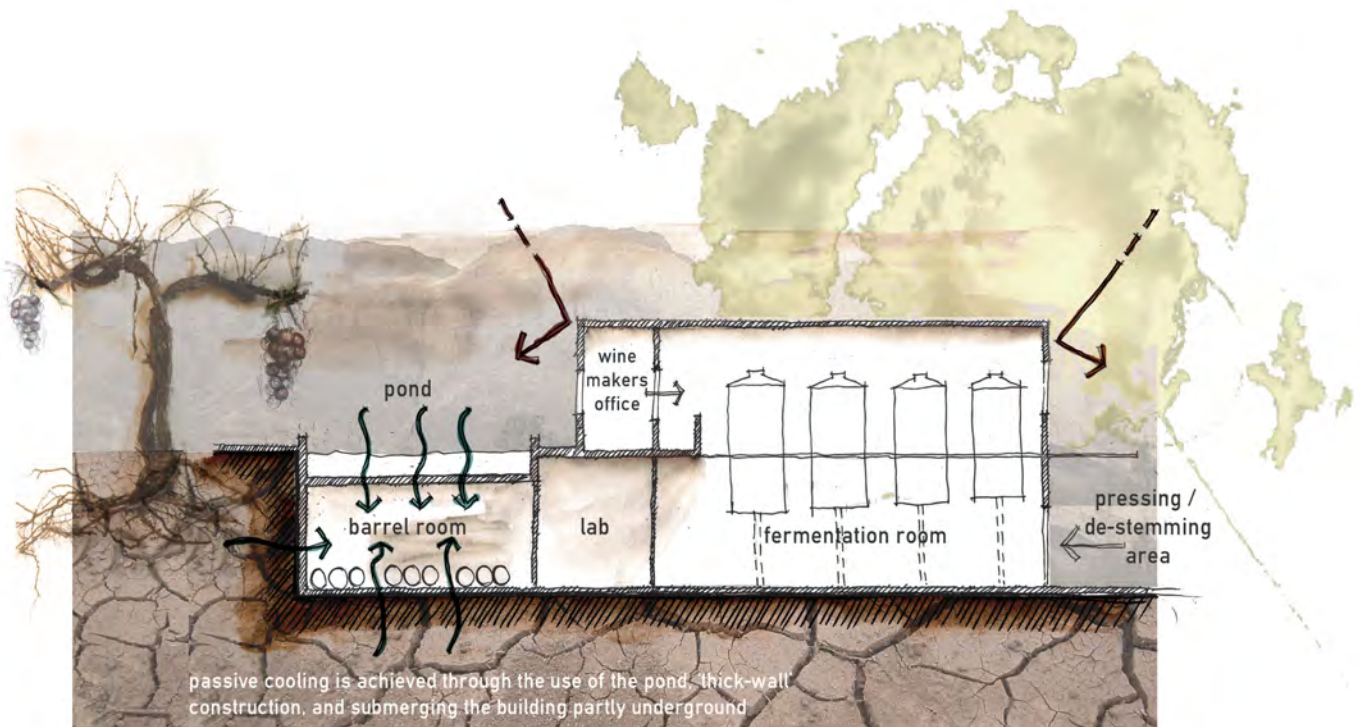
Dornier Winery - Malherbe Rust Architects  
Plate 9.13 - Showing the different materials used for the production spaces (three from left) and the public spaces (far right).



chosen for their passive cooling function - Zinc alime was used for maximum reflection and cooling, and openings are kept to a minimum in order to reduce temperature fluctuations in areas such as the barrel room and wine store rooms (Malherbe: interview, March 2011).

### Construction process

As can be seen in figure 9.37 - the structure of the building prioritizes energy conservation through reducing heating gain. This is achieved by submerging a portion of the building underground so as to take advantage of the earth's constant temperature. According to Malherbe only about a third of the building can actually be seen; the bulk of the structure (11 meters from floor to apex) is hidden from sight. The structure is essentially built using solid concrete on top of a brick-concrete frame with facebrick and glass infill. Malherbe conceptualised the buildings structure like the roots of the vine – the public areas (the fruit of the building) are located above ground, and the production spaces (the roots responsible for growth) are buried in the ground. This provides a natural; constantly cool and humid environment to the spaces that require it (barrel room); while expending little energy. The construction of the pond, while acting as a mediator between old and new, also forms a functional purpose; the barrel room is located directly beneath. This subsequently allows for further passive cooling of the barrel room, allowing for a less intensive mechanical ventilation system. The use of concrete, block-work, and brick results in a building of mass which allows the structure to absorb heat during the day and release it at night – maintaining a relatively constant interior temperature. This construction method (submerging the building and 'thick-wall' construction) allows the building to maintain excellent thermal performance which meets stringent ISO standards.



Dornier Winery - Malherbe Rust Architects

Figure 9.37 - Section through barrel and fermentation room showing structures resulting energy costs through passive cooling methods.

## Maintenance

Like all the preceding studies in this Chapter, Dornier prioritized materials that were durable to intensive cleaning regimes. In addition the building's structure was minimized - roof support columns, cat-walk support columns, and pipe supports were reduced in order to improve ease of sanitation. Concrete floors are treated with seamless cementitious to cope with constantly wet conditions making them durable to relatively heavy traffic. Furthermore, floors in the fermentation cellar (subject to the largest amounts of water) slope to continuous floor drains at sufficient gradient, in order to avoid pooling and standing water. All working areas of the winery are no more than 15 metres from a source of hot and cold water-mixing ash stations, to ensure the equipment is constantly and thoroughly cleaned. All platforms and catwalks, in the production areas, are of aluminium construction to avoid corrosion, and the building's steel surfaces are painted with an epoxy paint system (Malherbe: interview, March 2011).

## Sustainable response



Dornier Winery - Malherbe Rust Architects  
Figure 9.38 - The integrity and sustainability seal.

In 1998 South Africa was one of the first countries worldwide which adopted criteria for sustainable wine cultivation. These include: the minimal use of pesticides and fungicides; employee health and safety standards; treatment of waste water; and conservation of biodiversity amongst others. The goal is to promote the protection of the unique flora and fauna of the Cape Peninsula World Heritage Site. Sustainable Wine South Africa (SWSA) is the alliance between the Wine and Spirit

Board (WSB), the Integrated Production of Wine (IPW) scheme, the Biodiversity & Wine Initiative (BWI), and Wines of South Africa (WOSA). The South Africa wine industry has launched the world's first sustainability seal as a guarantee of eco-friendly production. Issued by the Wine and Spirit Board, the seal, is backed by a sophisticated tracking system in which bottled contents can be traced back to its source at every stage of the supply chain to confirm the integrity of its production. Every seal carries a unique number, through which the wine's provenance can be tracked from vine to bottle. It became effective in 2010, and is available to those wineries who have passed the accreditation of the Integrated Production of Wine (IPW) set of sustainable principles at farm, winery, and bottling levels. IPW covers a range of issues such as, integrated pest management, the health of workers, the conservation of biodiversity, and the reduction of greenhouse gas emissions ([www.swsa.co.za](http://www.swsa.co.za)). As of 2010 Dornier became part of the initiative and uses the 'Integrity & Sustainability Seal' due to the cultivation of Dornier's wines being a sustainable and environmentally friendly practise.

### Waste water treatment

Dornier Winery is one of 30 wineries in the country to install a wastewater treatment plant in order to concretise the architecture and the winery practise in sustainable principles. Dornier Wine Estate winemaker, JC Steyn, explains that because the estate is in an ecologically sensitive area, it tries to employ an integrated system for wine production. Dornier's current cellar capacity is as much as 500 t/y and the adjacent restaurant processes 10 000 l/d of water, while the overall peak effluent water release can exceed 50 000 l/d. Dornier installed a low-energy biological treatment process for both the wine cellar and domestic sewage. After the flow has been balanced and the fine solids removed, the screened outflow is treated in batches in a single activated sludge biological reactor. The addition of simple nutrients and lime helps to save on the use of inorganic chemicals. Using the old overflow dam as a departure point, the clean wastewater is revitalised in a circular fynbos reed bed for final polishing and water revitalisation. The reed bed releases cleaned water to an already existing irrigation dam for reuse on the estate. The treated waste water can then be used for irrigation throughout the vineyards (Steyn: interview, March 2011).

### Specialist design aspects

Both on the vineyards and in the modern cellar, traditional craftsmanship is prized, with each and every area of the vineyard individually harvested, pressed, and aged – allowing for quality wines. In



Dornier Winery - Malherbe Rust Architects  
Plate 9.14 (above) - Private tasting room. Plate 9.15 (below) - Sculptural lighting effect at night.



addition, a large emphasis was placed on the quality of design in the private tasting room, which uses the barrel room's underground construction as a backdrop aesthetic (plate 9.14). Malherbe argues the importance of heightening the visitors' experience in the tasting room: *"This is ultimately the climax of the whole process; this is where the visitor perceives both architecture and wine as a whole"* (interview, March 2011). Due to the building function as a primarily daytime activity - the lighting effect on the building was also marked as a design priority. Outside light is placed to transform the building at night into a sculptural piece of art (plate 9.15) - to be enjoyed by visitors' at the restaurant.

## Summary

*"Like its wines, the winery combines traditional materials and age-old concepts with pioneering and modern twists to create a functional, yet stylish, structure"* (Nell, 2006: 35).



Dornier Winery - Malherbe Rust Architects

Figure 9.39 - Dornier Winery has won numerous awards for its new and innovative approach to design.

Dornier Winery was named one of the best wine cellars worldwide in a wine and tourism competition of big wine cities in 2009, and has won numerous local awards. With minimalist, curved lines, it stands like a sculpture against the dramatic backdrop of the Stellenbosch mountains. The winery's distinctive roofline denotes the perfect balance between the owner's iconic ideas and the construction needed for high-tech wine production. As with good wine, the Dornier Winery emerges from the fusion of craftsmanship, natural materials, and modern technology. The structure not only seamlessly integrates into its surrounding context, but it provides a thoughtful, practical, and sustainable space which accommodates for both production and experience. *"The building is a factory at heart, yet it cannot appear to be a factory[...it is reflective, responsive, and contextual"* (Malherbe: interview, March 2011). Malherbe manages to utilize a range of what are traditionally considered objective methods' which has resulted in a building, while experientially stimulating, also making programmatic and spatial sense.



#### **9.4 Conclusions: towards a development of a design brief**

The following aims to form a summary of the fundamental design considerations gathered through the analysis of Herzog & de Meuron's Dominus Winery, Steven Holl's Loisiium Winery/Visitors centre, Architecture Workshop's Peregrine Winery, and Malherbe Rust Architect's Dornier Winery. They include:

##### **Siting and entrance**

It is noted that in all the above studies, the site's location is noticeably visible and accessible from a major road - allowing for ease of visitor and servicing access. It is further noted that in the study of operating winery facilities (excluding Steven Holl's Losium Winery) the architects differentiated between public and service entrances – so as not to impose the industrial aspect of the design on the experience of the visitor. With regards to the building orientation – it is noted that the buildings thermal regulation benefits from minimizing the area of production spaces that are exposed to, or orientated north, in order to reduce solar heat gain. This is best illustrated in Dornier Winery which orientates its production spaces east-west and allows the public functions such as the wine tasting room and open guest plaza to be orientated north. All the buildings which were analysed, prioritised and maximized the views of its surrounding context.

##### **Spatial accommodation and organisation**

It is noted that careful consideration must be given to the layout of the spaces in order to maximise efficiency. The most successful wineries were those which adopted a successive spatial layout – that which followed the logical sequence of the winemaking process. The proposed winery should, therefore, adopt an efficient layout suitable to both production and experience, and be built to accommodate expansion, when it is needed. Key considerations include:

- The wine-makers office should be positioned where operations like receiving and processing can be easily overseen.
- The general tasting room should be designed away from the processing area, to ensure that visitors are not bothered by the noise of the machinery, in addition to being safely removed from equipment hazards.
- Private tasting rooms (such as in Dominus Winery and Dornier Winery) benefit from being located with a view of the barrel fermentation area.
- Public / visitor spaces should be located in view of the winemaking process in order to maximise the experience of the whole.

Key elements to consider in terms of spatial accommodation and organisation include: efficient work-flow spaces, ease of access to production and equipment for operation and maintenance, safety of personnel and visitors, and experiential public spaces.

## **Building fabric and structure**

### **Materials**

It is noted that the architects tended to prioritize the buildings agricultural character when it comes to material selection – in order to integrate the architecture into the landscape. Other important considerations included: the materials structural strength, low maintenance cost, insulation value, resistance to water and humidity, and cleanable, sanitary finishes. Stone, plaster, and wood were common materials used to achieve the agricultural ‘aesthetic’; while steel allowed for flexibility (Dominus Winery), and concrete (which is durable and allows for ‘thick-mass construction’), was widely used for the buildings structure. Both the Dominus Winery and Dornier winery adopted a ‘thick-mass’ construction which resulted in reduced heat gain and subsequent energy optimization. The analysis of both precedent and case studies concluded that the material choice is vital, not only for aesthetic reasons, but for sanitation purposes, sustainability practices, and reduced heat gain/loss.

### **Construction process**

The most vital consideration, through the analysis of the precedent and case studies, included construction methods which adopted principles of gravity-flow design, which concluded with the barrel room being partly submerged underground. Both Peregrine Winery and Dornier Winery constructed part of the building (spaces requiring a cool environment) underground in order to optimize energy usage. Not only does this method of construction supply a natural thermal system but also adds a unique aesthetical character, to enhance the visitor’s experience.

### **Maintenance**

It is noted that a vital consideration in winery design is ease of sanitation and durability of surfaces. Layout of spaces, treatment of materials, and the equipment’s proximity to clean water (to ensure they are cleaned constantly and thoroughly) – is key to maintaining a hygienic environment for the production of wine.

### **Sustainable response**

The following is a summary of key sustainable construction methods adopted by the wineries in this study (applicable to South Africa’s climate):

**Reduction of heat loss:** Thick-mass construction (such as concrete and masonry) allows the building to absorb heat during the day and release it at night – providing a relatively constant interior temperature. Portions of the building (including the barrel room) should be built underground or partially underground in order to take advantage of the earth’s constant temperature – which can reduce the need for cooling. Dornier Winery, in addition to submerging the building underground, located the barrel cave below a large body of water to further reduce the interior temperature. These methods of approach ensure the architecture optimises energy usage by reducing the need to mechanically cool

the interior environment.

**Natural lighting:** It is noted that in areas that are not affected by temperature fluctuations (administration and public areas) – large openings ensure the building further reduces energy costs by reducing the need for artificial lighting.

**Natural ventilation:** This was best achieved at Peregrine Winery which made use of windows near the floor level to bring cool night air that blankets the ground and is released during the day. Furthermore, by opening a window in the upper part of the winery - hot air that has been accumulated during the day is exhausted - creating a passive ventilation system. The process of natural ventilation reduces the need for mechanical ventilation which subsequently reduces energy usage.

**Water usage:** An indepth study of waste-water treatment at Dornier Winery highlighted that reduced water use can be achieved by collecting wash-down water, settling/filtering it, adjusting its pH levels, and using it for irrigation of winery grounds.

It is important to note that South Africa places a large emphasis on sustainable wine cultivation, which include: minimal use of pesticides and fungicides; employee health and safety standards; treatment of waste water; and conservation of biodiversity amongst others. The South Africa wine industry has launched the world's first sustainability seal as a guarantee of eco-friendly production - known as the 'Integrity & Sustainability Seal'. It should, therefore, be a priority of the proposed winery to follow the principles set out by Sustainable Wine South Africa (SWSA) and Wine and Spirit Board (WSB), in order to allow the architecture and the processes to be grounded in sustainable practises.

### **Specialist design aspects:**

The architects involved in all the above studies, focused considerable efforts on the aesthetic and views from the tasting room. As established by Malherbe, this room functions as the culmination point (for both the wine and the visitor) – and as such, it should speak of the quality and value of both the architecture and the wine.

Other key considerations in terms of the winemaking processing areas include:

#### **Pressing area**

- Used intensively during the harvest season
- Floors should be durable (non-slip) and well drained
- Lighting and ventilation are important considerations. Natural, indirect lighting is desirable as well as natural, cross ventilation to avoid the build up of heat.
- Public viewing and access of this area is important but it should not interfere with the winemaking process.
- Ideally the floor space should be flexible and uninterrupted by structural elements
- Should be designed in close proximity to the fermentation cellar to allow for a sequential design – to increase efficiency in production

**Fermentation area**

- Access to the top and the bottom of the tanks is essential (ceiling height should be no less than 10.5 metres to accommodate for this)
- Adequate workspace between the tanks must be provided
- Water points must be provided for rinsing tanks, and other equipment, in addition – the floors should be well drained
- Lighting and ventilation are important considerations as well as public viewing and open, flexible floor space

**Barrel fermentation area:**

- Floors should be durable and well drained
- Temperature and humidity control is important as well as fresh air to prevent mildew developing.
- Ideally located underground – where temperature and humidity are nearly constant. Allows for lower temperatures for fermentation, as well as providing ample moisture to keep the oak barrels moist to avoid cracking or leaking
- Public access and view from private tasting room is desirable
- Sufficient space for moving and stacking

From the analysis of Herzog & de Meuron's Dominus Winery, Steven Holl's Loisiium Winery/Visitors centre, Architecture Workshop's Peregrine Winery, and Malherbe Rust Architect's Dornier Winery – conclusions have been drawn in order to inform the brief, including: the proposed building's function, design objectives, schedule of accommodation, and site selection. The above summary highlights key principals which should be adopted to the proposed facility in order to ground the design in functionality, practicality, efficiency, durability, and experience.



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## BAREFOOT WINERY

### 10.1 Introduction

There is currently a popular misconception that the Western Cape is the only South African region capable of successfully producing wines due to its favourable climatic conditions. Following an interview with Rob Osbourne, a horticulturalist at the KwaZulu-Natal Department of Agriculture and Environmental Affairs (KZN DAE) at Cedara; KwaZulu-Natal (KZN) provides a very different climate and soil type - which in turn produces a very different taste to that of the Cape wines. Osborne maintains that due to the nature of vineyards - the climatic conditions and altitude they require; and the cultural and social conditions in which wineries thrive - the siting of the winery would benefit from being restricted to the Natal Midlands region. In addition, Osborne believes that the winery would further profit from the Midlands Meander's location as it attracts visitors from all over the country, due to its idyllic accommodation and other recreational activities. "A winery located in this area would not only increase its attraction but also augment the midlands recreational variation thereby appealing to a wider range of visitors" (interview, June 2011). According to Osborne, the unique conditions and character of the KwaZulu-Natal Midlands region provides an opportunity to expand the South African Wine Industry and increase the variety of wine produced by South African soil to be exported internationally.

In 2001, vineyards were planted in KwaZulu-Natal in what was described as a 'trial run' to investigate the plausibility of growing and making wine in the region. Approximately 4000 vines were distributed among prospective growers in an experiment led by Dr Clive Kaiser, a horticulturist for the KwaZulu-Natal Department of Agriculture at Cedara. Eleven participating farms were cited as growers and ambitions included rural development projects, in which to further expand vineyards and subsequent wine production. The results of this experiment failed largely due to the lack of local knowledge with regards to proper maintenance of the vineyards, and lack of unskilled labour with regards to the production of wine. In 2002, Rob Osbourne took over responsibilities from Dr Kaiser, continuing to promote the wine-growing industry in KZN with trial plantings of grapes in various pockets scattered across the Midlands. The possibility of establishing the Midlands Meander as a wine-growing region acted as a catalyst which attracted other interested parties to the area. KwaZulu-Natal was designated as a *Wine of Origin* under the classification scheme of South African Wine in August 2005, this saw privately funded individuals who started to explore the viability of making and producing wine in a former non-demarcated *Wine of Origin* region. In 2010 there were a handful of growers in KwaZulu-Natal, but two producers were recognised as major players: Abingdon Wine Estate and The Stables Wine Estate. The first ever KwaZulu-Natal *Wine of Origin* wine was released

by The Stables Wine Estate on 28 July 2006. It has, however, been confirmed that The Stables hasn't always made use of locally sourced grapes (even though labels in their range might suggest otherwise), which has resulted in Abingdon Wine Estate pioneering the KZN Winery route (for a more detailed history of winemaking in South Africa and KwaZulu-Natal see appendix A). As such, the production of wine is a relatively new development in KwaZulu-Natal; however, the present growing number of new vineyards in the Midlands region is successfully producing quality wines, which are currently being exported both locally and internationally. As a result the Natal Midlands region is beginning to emerge as a premier wine route in the country, following in the footsteps of the renowned Cape Wine Route. Most of the estates in the Midlands region, however, import their grapes from surrounding areas due to the time and effort required to establish a mature vineyard – turning their function into a mere bottling and labelling facility – offering the visitor a limited experience of the winemaking process. Osborne is currently conducting further surveys to establish suitable areas in the KZN Midlands region whereby quality vineyards could be inaugurated. This provides an opportunity for the establishment of a new winery facility to act as a landmark for the Midlands wine route and a catalyst for future winery development in the area.

The aim of this chapter, therefore, is to establish the scope of development that is needed in order to establish the Natal Midlands Meander as a premier wine route in South Africa. The information gathered in Chapters Eight and Nine will be applied to the requirements set out by the KwaZulu-Natal Department of Agriculture and Environmental Affairs and local winemakers in order to determine the primary function of the building. This, in turn, will influence the design objectives and the particulars of the schedule of accommodation. All information gathered in this Chapter has, therefore, been sourced by local winemakers in the Midlands Meander region, as well as horticulturists and members of the KwaZulu-Natal Department of Agriculture and Environmental Affairs, in order to concretise the authenticity of the development.

## **10.2 Brief derivation**

The following section aims to set out the general parameters of the design by introducing the notional client; the primary functions and users of the building; and the overall design objectives.

### *10.2.1 The notional client*

Ian Smothwaite is the private owner of Abingdon Wine Estate – a successfully operating vineyard in Lions River, located in the KZN Midlands Meander region. This winery is a unique pioneering estate which has positioned itself as a serious single vineyard boutique wine producer. Smothwaite, who is in communication with Rob Osborne at the KwaZulu-Natal Department of Agriculture and Environmental Affairs, is looking to expand the winery 'phenomena' that exists in the Cape – in order to establish the Midlands Meander as a premier wine route in the country. Smothwaite strongly believes



Figure 10.1 - Abingdon Wine Estate - Owner: Ian Smothwaite.

in the value of the Midlands as a wine-growing region and the quality of wine which is produced by its soil. Furthermore, he opposes the philosophy of other vineyards in the region which import their grapes, by maintaining that part of the winery experience is being exposed to its production and being part of its process. His philosophies of winemaking are centred on its sensory characteristics and as such wishes that the architecture respond to this central aspect of winemaking. He has a vision which is atypical of most of the wine estates in Southern Africa - he believes that wineries should not be an exclusive establishment, catering to only high class wine connoisseurs, but rather it should be open to all cultures to provide a platform for education and skills development. Smothwaite's vision is to incorporate local communities, holding workshops and employment opportunities, making the establishment economically and socially sustainable. *"We have an opportunity to bridge a historical, cultural and social gap through education and sustainable relationships, to provide a facility which not only benefits the marketability of the Midlands Meander but also benefits the growth of local communities"* (interview, June 2011). He maintains that this philosophy of education and skills development will ensure the success of the vineyard and the wine production, resulting in the upliftment of local communities and the region at large.

The notional client of this project, Ian Smothwaite, therefore, is relying on private funding for a largely public venture. His dream is to provide a facility which engages in the multilayer's of sensory design in order to provide experiential spaces, which are heightened by both the architecture and the winemaking process. Furthermore, he wishes to provide a sustainable development – both in terms of construction and local community development to benefit the visitors' and residents of the KZN Midlands Meander.

### 10.2.2 Functions / users

The primary function of this winery is to expose and involve visitors in the sensory processors of winemaking. The main function, however, remains not only with the end user but also incorporates the surrounding communities which could benefit from the facilities employment and skills development opportunities in order to help establish the region as a quality wine producing area. The architecture,

therefore, needs to respond to these functional, experiential, and educational aspects in order provide a landmark which is embedded in humanistic and sustainable practices. The main users of this building will therefore consist of visitors to the Midlands Meander region - those who are interested in the experience of winemaking and subsequently to promote the culture of winemaking to those who have had previous limited exposure. The function of the winery will thus endeavor to bridge the gap between the preconceived idea of a winery as an exclusive establishment, by integrating itself in local and sustainable needs.

Due to the fact that this winery will be the largest of its kind in this region - aiming to act as a catalyst for further development - the function of it will be to incorporate and help develop local surrounding wineries. It, therefore, will act not only as a bonded winery (a stand-alone facility responsible for its own production) but will also function as a custom crush winery, which supplies equipment and trained personnel to surrounding vineyards to help establish and support local vineyards. Establishing a winery requires a large amount of capital, so the adoption of a custom crush will not only promote the practice of viticulture but it will also provide the resources to help develop local vineyards.

### 10.2.3 Design objectives



Figure 10.2 - Winery to act as a catalyst for further development of surrounding vineyards.



The main objective of the winery is to be more than a processing facility - it aims to provide an embodied sensory experience which is grounded by the buildings functional, educational, and touristic facilities. It, therefore, aims to not only provide efficiency in terms of spatial layout, energy, and resources but it endeavours to prioritize environmental responsibility and architectural merit in order to achieve a higher-level synthesis in terms of its sensory experience. The architectural response to both its technical and experiential resolution aims to provide the Midlands Meander with a unique facility that is culturally responsive, environmentally responsive, and responsive to the embodied experience of the user, in order to create an engaging and meaningful architectural encounter that redefines the preconceived idea of the 'winery experience'. Lastly, it aims to be a social and sustainable building that addresses the current problems and reflects the future positions of the community by bringing together people of different backgrounds through a common means of expression.

### 10.3 Detailed client brief

The following is a summary of information gathered in order to provide clear parameters and guidelines for the design of Barefoot Winery.

#### 10.3.1 Building Functions

The function of Barefoot Winery, established by the client – Ian Smothwaite – can be largely separated into three general categories:

- Public:** Those functions which are open to and concerning the people as a whole. Due to this facility being located in one of the main tourist destinations in South Africa, it is inevitable that its core responsibility should respond to its needs of being a destination location. The functions of the building which are open to the public, include spaces such as a visitors' centre, restaurant, wine shop, and tasting room, as well as workshop and community development spaces.
- Semi-Public:** The functions which are open to the public under the supervision of an employer of Barefoot Winery. This facility provides a platform for experiencing the winemaking process as well as functions for education opportunities. These will include: offices for the winery facility, as well as a conference centre available for hire which includes seminar rooms and a small auditorium. Rooms such as the barrel room, fermentation room, bottled wine storage, and library are mainly used by the staff members but are open to the public under the guidance of one of the employers, to facilitate the experience of the certain processes.
- Private:** The functions which are exclusively for the use of the employers and not open to public participation or viewing. This includes spaces such as storage, delivery, and service areas, as well the laboratory - which will be used exclusively by the employers of the estate.

### 10.3.2 The clients brief

#### Project overview

- Select an appropriate site for the successful growing of quality vines (see appendix B for climatic requirements) and for its ideal location with regards to public appeal and accessibility.
- Prioritise an architectural response that is conscious of the human body as a subject, in addition to an awareness of its environmental aesthetic and sensitivity, and its cultural context.
- Provide a functional and efficient operating winery facility with a 500 tonne capacity cellar (similar in production size to Dornier Winery).
- Ground both wine and architectural practises in sustainable principles.
- The architecture should endeavour to facilitate education, skills development, and community upliftment.
- Provide more than just a processing plant by providing both employees and visitors with an unique embodied sensory experience.

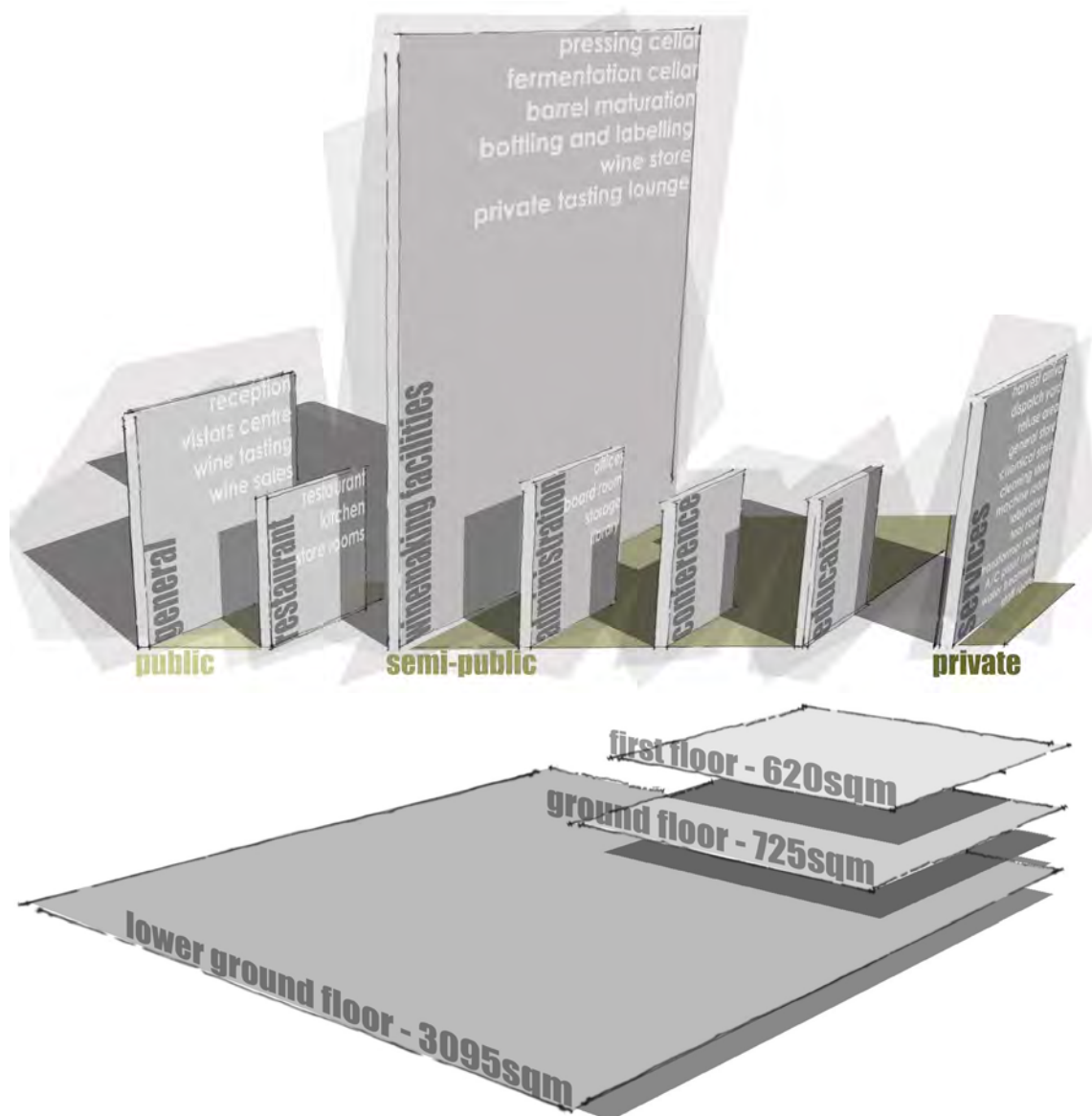


Figure 10.3 - Breakdown of area's - derived from schedule of accommodation.

10.3.3 Schedule of accommodation

	Accommodation	Space description	Quantity	Size	Total area
<b>Public facilities</b>					
<b>General</b>	<b>Entrance / reception area</b>	Central reception area including temporary exhibition space	1	120m <sup>2</sup>	<b>120m<sup>2</sup></b>
	<b>Midlands Meander visitors centre</b>	A space which allows for the education of the Midlands Meander and the processes and history of winemaking (including bookstore and small crafts shop)	1	200m <sup>2</sup>	<b>200m<sup>2</sup></b>
	<b>Wine tasting room</b>	Indoor /outdoor area where the public can sample the wine from the facility as well as the surrounding vineyards	1	130m <sup>2</sup>	<b>130m<sup>2</sup></b>
	<b>Wine sales</b>	Selling wines produced onsite as well as sines produced by surrounding vineyards	1	60m <sup>2</sup>	<b>60m<sup>2</sup></b>
			<b>WC'S</b>	<b>WHB</b>	
	<b>Public ablutions (female)</b>	As per National Building Regulations (SAB0400) requirements for population of general and restaurant activities	5	5	<b>25m<sup>2</sup></b>
	<b>Public ablutions (male)</b>		2/4 urinals	5	<b>25m<sup>2</sup></b>
	<b>Public ablutions (disabled)</b>		1	1	<b>5m<sup>2</sup></b>
<b>Total area without minor circulation</b>					<b>565m<sup>2</sup></b>
<b>Restaurant</b>	<b>Restaurant area</b>	Catering for guests visiting the winery as well as guests travelling along the Midlands Meander route (view of fermentation room preferred)	1	130m <sup>2</sup>	<b>130m<sup>2</sup></b>
	<b>Kitchen</b>	Fully equipped kitchen to cater for the restaurant as well as the conference facility (including preparation area)	1	35m <sup>2</sup>	<b>35m<sup>2</sup></b>
	<b>Cold store</b>	Storeroom for all goods which require refrigeration for the main kitchen as well as the staff kitchen	1	10m <sup>2</sup>	<b>10m<sup>2</sup></b>
	<b>Dry store</b>	For all products which do not require refrigeration	1	10m <sup>2</sup>	<b>10m<sup>2</sup></b>
	<b>General store</b>	Lockable storage for various amenities	1	15m <sup>2</sup>	<b>15m<sup>2</sup></b>
	<b>Gas store</b>	Outdoor storage of gas equipment used in restaurant	1	10m <sup>2</sup>	<b>10m<sup>2</sup></b>
	<b>Refuge area</b>	Area for general waste collection (not included in area calculation)	1	30m <sup>2</sup>	<b>30m<sup>2</sup></b>
	<b>Delivery yard</b>	Area for the delivery of good to the restaurant as well as the removal of waste (not included in area calculation)	1	50m <sup>2</sup>	<b>50m<sup>2</sup></b>
<b>Total area without minor circulation</b>					<b>210m<sup>2</sup></b>
<b>Conference</b>	<b>Miscellaneous space</b>	A large, structurally uninterrupted space. Can be rented out as a conference facility, wedding venue, or for other public gatherings alike.	1	170m <sup>2</sup>	<b>170m<sup>2</sup></b>
	<b>General storeroom</b>	For miscellaneous items such as chairs etc	1	30m <sup>2</sup>	<b>30m<sup>2</sup></b>
<b>Total area without minor circulation</b>					<b>200m<sup>2</sup></b>

	Accommodation	Space description	Quantity	Size	Total area
<b>Semi - public facilities</b>					
<b>Administration</b>	<b>Entologists office (winemaker)</b>	Located in close proximity to the winemaking process, preferably with direct access and view of fermentation room	1	20m <sup>2</sup>	<b>20m<sup>2</sup></b>
	<b>Administration offices</b>	Open plan offices (including: director of marketing, director of finance, and general manager of winery)	1	100m <sup>2</sup>	<b>100m<sup>2</sup></b>
	<b>Boardroom</b>	Seminar facility for the winery complex	1	45m <sup>2</sup>	<b>45m<sup>2</sup></b>
	<b>General storage</b>	Lockable storage for various amenities	2	10m <sup>2</sup>	<b>20m<sup>2</sup></b>
	<b>Kitchenette</b>	Small kitchen facility for the use of staff members	1	15m <sup>2</sup>	<b>15m<sup>2</sup></b>
	<b>Wine library</b>	Located close to winemakers office	1	20m <sup>2</sup>	<b>20m<sup>2</sup></b>
			<b>WC'S</b>	<b>WHB</b>	
	<b>Staff ablutions (female)</b>	As per National Building Regulations (SAB0400) requirements for population of personnel over 100 people during peak time	2	2	<b>10m<sup>2</sup></b>
	<b>Staff ablutions (male)</b>		1/1 urinals	2	<b>10m<sup>2</sup></b>
	<b>Staff ablutions (disabled)</b>		1	1	<b>5m<sup>2</sup></b>
<b>Total area without minor circulation</b>					<b>245m<sup>2</sup></b>
<b>Skills development</b>	<b>Seminar room</b>	Lecture hall-type facility for the development of skills with regards to winemaking. For the benefit of surrounding communities and local winemakers	1	70m <sup>2</sup>	<b>70m<sup>2</sup></b>
	<b>Workshop spaces</b>	Spaces which focus on the education of viticultural practises and quality winemaking. Used to develop skills to promote quality winemaking in the Midlands Meander	3	40m <sup>2</sup>	<b>120m<sup>2</sup></b>
			<b>WC'S</b>	<b>WHB</b>	
	<b>Ablutions (female)</b>	As per National Building Regulations (SAB0400) requirements for population of personnel over 100 people during peak time	2	2	<b>10m<sup>2</sup></b>
	<b>Ablutions (male)</b>		1/1 urinals	2	<b>10m<sup>2</sup></b>
	<b>Ablutions (disabled)</b>		1	1	<b>5m<sup>2</sup></b>
<b>Total area without minor circulation</b>					<b>215m<sup>2</sup></b>
<b>Semi - private facilities</b>					
<b>Winemaking processes</b>	<b>Harvest arrival</b>	Space for the manoeuvre of the harvester to deliver grapes to the pressing area (not included in area calculation)	1	100m <sup>2</sup>	<b>100m<sup>2</sup></b>
	<b>Pressing area</b>	Large, uninterrupted floor space to house machinery for the pressing and de-stemming of the grapes	1	200m <sup>2</sup>	<b>200m<sup>2</sup></b>
	<b>Fermentation cellar</b>	Large uninterrupted space housing stainless steel fermentation vats (minimum 10.5 meters floor to ceiling height)	1	500m <sup>2</sup>	<b>500m<sup>2</sup></b>
	<b>Laboratory</b>	Located near fermentation room, for the analysis of fermenting wine	1	25m <sup>2</sup>	<b>25m<sup>2</sup></b>
	<b>Chemical store</b>	Lockable area for the storage of potentially dangerous chemicals	1	15m <sup>2</sup>	<b>15m<sup>2</sup></b>



	Accommodation	Space description	Quantity	Size	Total area
Winemaking processes	Cleaning store	Located near the fermentation room for the storage of cleaning products	1	15m <sup>2</sup>	15m <sup>2</sup>
	Barrel room	Large space housing oak maturation barrels, preferably located underground in order to control temperature and humidity	1	1000m <sup>2</sup>	1000m <sup>2</sup>
	Analysis lab	For the analysis of wine after maturation and before bottling	1	25m <sup>2</sup>	25m <sup>2</sup>
	Barrel room cleaning deck	For the cleaning of the oak barrel, direct outdoor access required	1	40m <sup>2</sup>	40m <sup>2</sup>
	Bottling and labelling plantroom	Large, uninterrupted space for bottling and labelling machinery	1	200m <sup>2</sup>	200m <sup>2</sup>
	Bottle storeroom	For the storage of bottles and wooden pallets	1	30m <sup>2</sup>	30m <sup>2</sup>
	Wine storeroom	For the storage of maturing bottled wine and packaged wine ready for distribution (including dry store)	1	450m <sup>2</sup>	450m <sup>2</sup>
	Finish product warehouse	For the storage of goods ready for export	1	70m <sup>2</sup>	70m <sup>2</sup>
	General store	For the storage of various amenities required during the winemaking process	2	25m <sup>2</sup>	50m <sup>2</sup>
	Dispatch yard	Space for the manoeuvre of the large vehicles to export wine from the winery (not included in area calculation)	1	100m <sup>2</sup>	100m <sup>2</sup>
	Private tasting lounge	By appointment only or for invited guests, access to barrel room and offices	1	50m <sup>2</sup>	50m <sup>2</sup>
	Staff room	For the use of staff members working in the winery, includes kitchenette	1	30m <sup>2</sup>	30m <sup>2</sup>
				<b>WC'S</b>	<b>WHB</b>
	Staff ablutions (unisex)	As per National Building Regulations (SAB0400), including shower facilities	3	3	25m <sup>2</sup>
<b>Total area without minor circulation</b>					<b>2695m<sup>2</sup></b>

Private facilities					
services specific to winemaking	Machine room	Houses the refrigeration systems and the mechanical pumps	1	80m <sup>2</sup>	80m <sup>2</sup>
	Tool room / workshop	An area for the maintenance and repair of winery machinery	1	50m <sup>2</sup>	50m <sup>2</sup>
	Transformer room		1	20m <sup>2</sup>	20m <sup>2</sup>
	A/C plant room	Accessible from municipal road	1	30m <sup>2</sup>	30m <sup>2</sup>
	Compressor and generator room		1	20m <sup>2</sup>	20m <sup>2</sup>
	Waste water treatment plant	Including raw water storage and fresh water storage	1	30m <sup>2</sup>	30m <sup>2</sup>
	Refuse area	For the collection of waste (pomace) during the winemaking process (not included in area calculation)	1	50m <sup>2</sup>	50m <sup>2</sup>
<b>Total area without minor circulation</b>					<b>230m<sup>2</sup></b>

Accommodation	Space description	Quantity	Size	Total area
<b>Parking</b>				
<b>Staff Parking</b>	Largely informal parking spaces provided, however, general number is calculated according to SAB0400	15	-	-
<b>Visitor Parking</b>		50	-	-
<b>TOTAL AREA CALCULATION</b>				
<b>Total area (excluding minor circulation)</b>				<b>4360m<sup>2</sup></b>
<b>Total area (including minor circulation)</b>				<b>5000m<sup>2</sup></b>

CONTEXT, SITE ANALYSIS AND SELECTION

11.1 Introduction

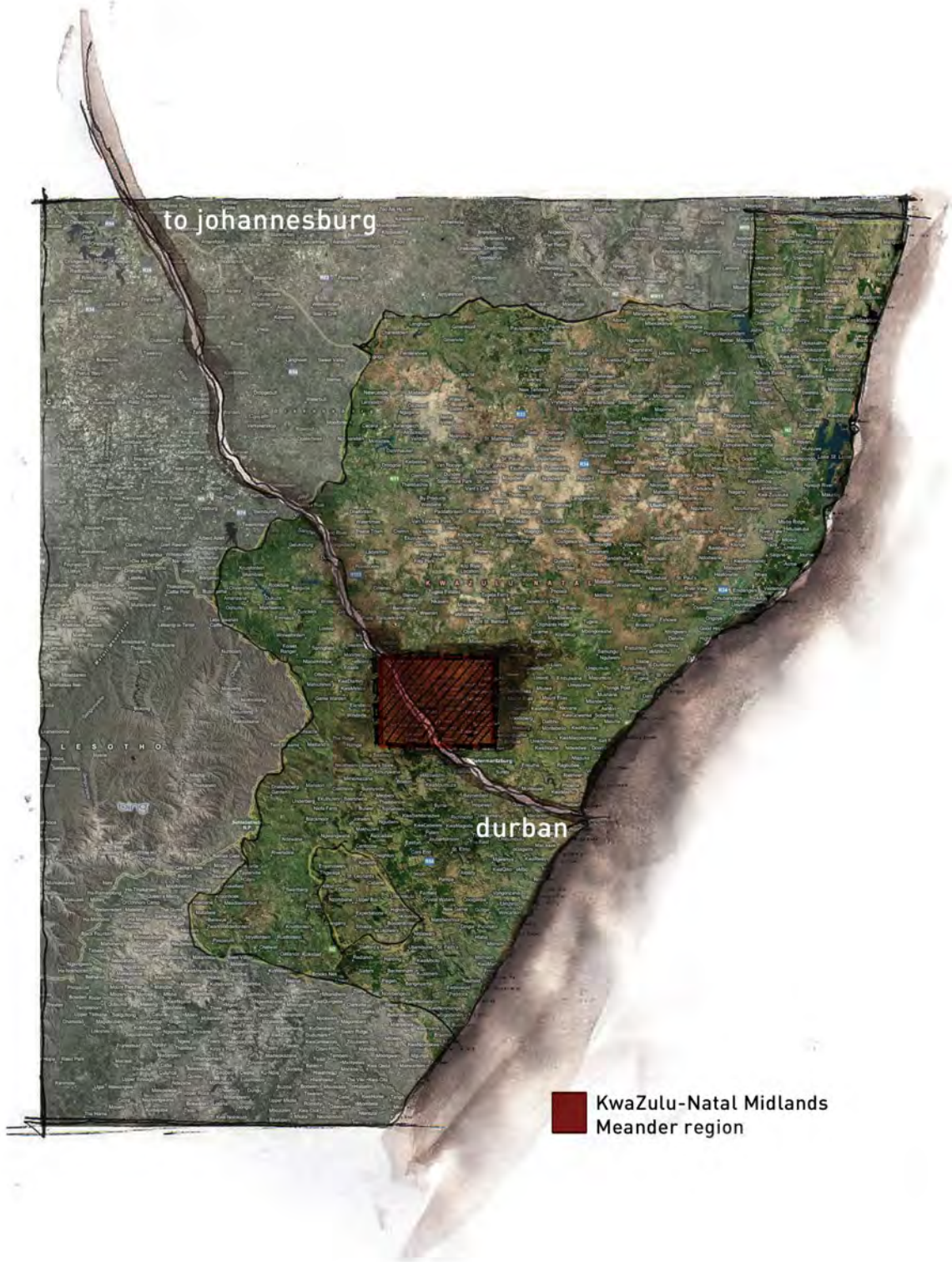


Figure 11.1 – Macro context of the KwaZulu-Natal Midlands Meander region.

The Midlands Meander is South Africa's first, largest, and most popular crafts route in the country - with over 210 enterprises spanning over 80 kilometres roughly between Pietermaritzburg and Mooi River. It has a reputation as the leading tourism route in South Africa, known for its hospitality; undeniable and varied scenic beauty; arts and crafts; and is known affectionately as: *'The Good Place'* ([www.midlandsmeander.com](http://www.midlandsmeander.com)). The Midlands Meander is strategically placed in terms of contemporary national tourism - it straddles the N3 national route and the main highway which links Gauteng (the industrial and financial heartland of South Africa) to Durban (the country's busiest port and second largest urban / industrial complex). The N3 is recognised as KwaZulu-Natal's primary corridor which is anchored by the location of Pietermaritzburg (the regional capital) - which is defined in terms of its location with respect to the towns of Howick and Mooi River. Together these three towns string the Meander together, enveloping roughly 75% of enterprises on the route (Mathfeild, 2000: 6).

As can be seen in figure 11.2, the area covered by the Midlands Meander is more specifically restricted to an area extending from Hilton (a town north of Pietermaritzburg) to Hidcote (a farming area outside of Mooi River); and from Rietvlei and Karkloof in the east, to the Dargle valley and Fort Nottingham in the west. The central part of the Meander is less than 20 minutes away from Pietermaritzburg and just over an hours drive to Durban. This area also provides the eastern entrance into the Drakensburg (Giants Castle and Kamber) and the northern end (Mooi River) serves as a gateway to the Southern Drakensburg, particular to tourists from Free State, Gauteng, Mpumpalanga, and the Northern Provinces heading for the coastal resorts of KwaZulu-Natal ([www.midlandsmeander.com](http://www.midlandsmeander.com)).



Figure 11.2 – Boundary of KwaZulu-Natal Midlands Meander region - identifying possible sites a, b, and c.





Figure 11.3 - Site selection based on its ability to act as the heart of the Midlands Meander premier wine route.

## 11.2 The KwaZulu-Natal Midlands Meander

### 11.2.1 *A brief history of the KwaZulu-Natal Midlands region*

Findings reveal that the first recorded settlers in the uMngeni region consisted of the clan belonging to chief Ngwnya who settled and built stone enclosures for his cattle, of which the ruins are still evident today. In the 1800s European settlers crossed the river above the Falls at Allermans Drift and built homesteads with the technology, skill, and aesthetic preferences acquired from their homelands. They shot the last recorded lion in 1856 and endeavoured to demarcate farmlands due to the regions fertile soil. The arrival of the railway line from the coast to Johannesburg passed through Curry's Post and Howick, which quickly became centres of activity for the district, and remain significant nodal points on the Midlands Meander today (Mathfield, 2000: 8).

During the 1970s artists were drawn to the area due to its central location and idyllic landscapes. The actual Midlands Meander's genesis stems from two renowned potters - Walters and Glenny - they were working in the Midlands but selling their work to Johannesburg-based galleries, who marked the crafter's artwork up by 200 – 300%. In order to make a living, Walters and Glenny decided to sell directly to the public, joining up with three others (two painter-artists and the Shuttleworth Weavers) in their endeavour to create a craft hub, in order to sell their creations locally. They began in the early 1980s by hosting joint shows at the studio of an individual crafter, inviting friends, clients, and potential customers. With the help of publicity by word of mouth, and coverage in the print media, the shows grew in popularity and subsequently developed into the 'rolling exhibitions' - where visitors were encouraged to travel to each of the five venues with the aid of a hand-drawn map. An arts and craft route through the Midlands subsequently began to take form. In this initial phase the Midlands Meander was strictly a crafter's route whereby members were expected to produce or sell fine art and craft of quality, accepted by the standards set out by members of the arts and craft route (Mathfield, 2000: 9). This began the onset of the Midlands Meander Association which began, and has remained, a voluntary association. The Midlands Meander has thus grown exponentially in membership, turnover and public visibility since its initial amalgamation in 1992 (Mathfield, 2000: 9). At the time of study it comprised of 210 enterprises (and 800 000 annual visitors), with a number of businesses locally producing merchandise onsite. The Midlands Meander enterprise covers a diverse range of activities from some of South Africa's leading hotels and catering establishments, to herb and flower gardens, cheese, chocolate and candle makers, tea gardens, potters and weavers and many more ([www.midlandsmeaner.com](http://www.midlandsmeaner.com)). Apart from the joining fee, a standards committee ensures that members meet agreed criteria which, committee members regard as essential to preserving the routes character and international and local allure (Mathfield, 2000: 9). The Howick-Mooi River corridor is set to be further developed as an agro-tourism development corridor. The area, with its high degree of accessibility along the main Durban-Johannesburg route (N3), as well as its fine landscapes and architectural qualities, rich soil and good climate - makes this area well placed in the competitive arena



for investment for agriculture and tourism, and is thus, perfectly suited for the location of a winery facility.

### 11.3 Site selection criteria

Following an interview with Rob Osbourne, a horticulturalist at the KwaZulu-Natal Department of Agriculture and Environmental Affairs (KZN DAE) at Cedara, it was discovered that there is currently a development plan to encourage the plantation of vineyards in the KwaZulu-Natal Midlands region (for more information regarding this see appendix A). The KZN DAE has allocated certain farms, which possess favourable climatic conditions, for the experimental planting of vines in order to encourage a wine route to develop. Site selection has thus been restricted to this area in order to help promote a body of vineyards.

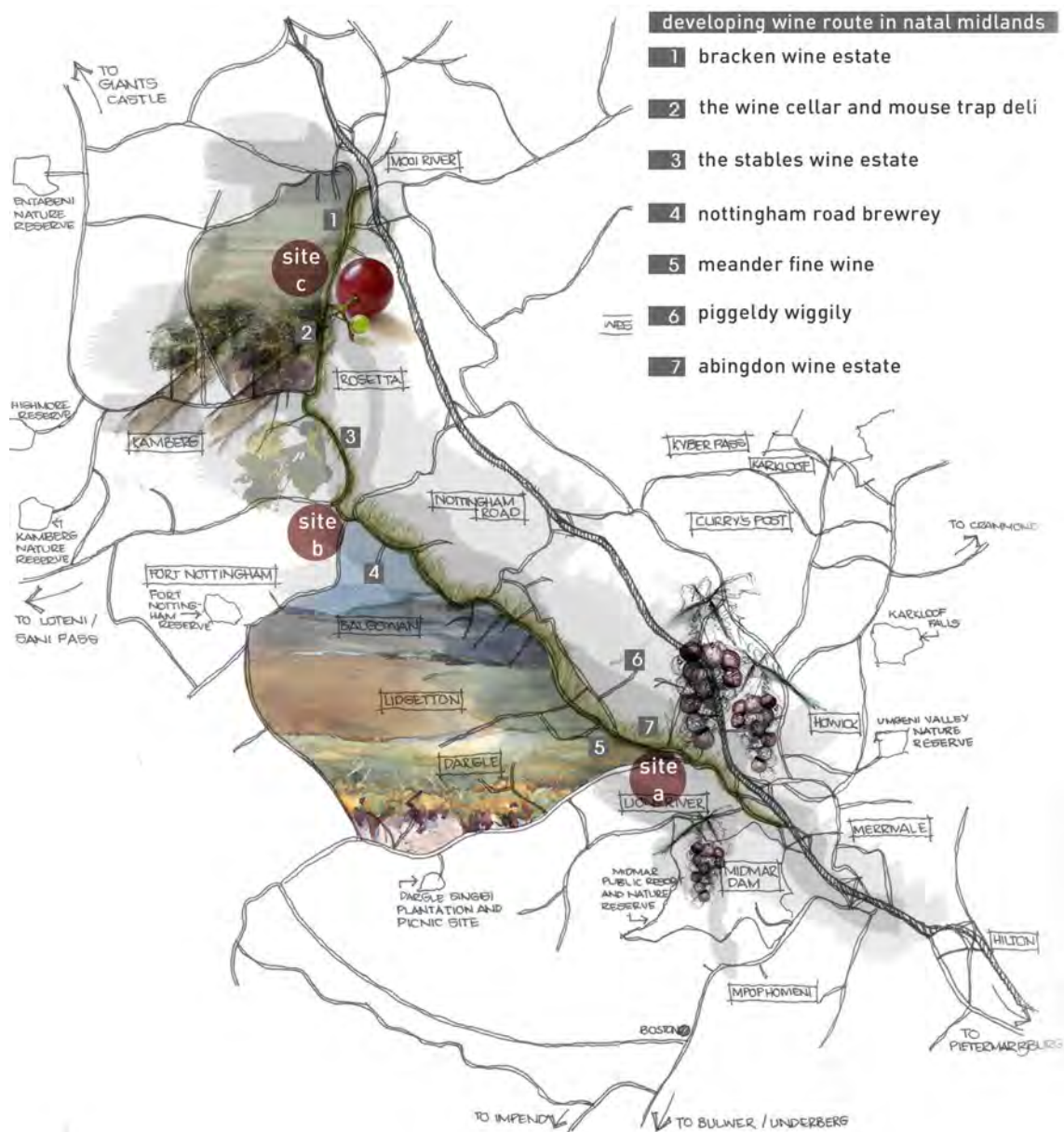


Figure 11.4 – The developing wine route of the Midlands Meander showing potential development at site a, b and c.

The criteria for the analysis of site selection is derived from various sources including interviews with various stakeholders in the Midlands wine industry, the conclusions drawn from the analysis of precedent and case studies, as well as the theoretical framework set up in Part I of this dissertation. In order to establish which site is more suitable to the design of a fully functioning winery facility, each criterion used, responds in some manner to the overall functioning and appeal of wineries in general. The criteria are as follows:

- **Cultural and historical linkages**
- **Climatic restrictions and opportunities**
- **Key linkages to surrounding attractions**
- **Accessibility of site**
- **The phenomenological experience of the site**
- **Over assessment / summary**

From the information gathered from the KwaZulu-Natal Department of Agriculture and Environmental Affairs (KZN DAE) at Cedara, three sites have been deemed suitable for the location of Barefoot Winery (in accordance with the brief outlined in the previous chapter). The following sites will be analysed according to the above mentioned criteria in order to determine the sites overall suitability. As can be seen in figure 11.4 - they include:

**SITE A:** Located within the historic Lions River / Howick region - in close proximity to Pietermaritzburg.

**SITE B:** Located in the Balgowan / Nottingham Road region - in the heart of the Midlands Meander.

**SITE C:** Located in the region of Rosetta - sited closest to the town of Mooi River.



### Cultural and historical linkages:

The proximity of the site in relation to other cultural and historical landmarks should be investigated, as integration within the existing cultural and historical fabric would facilitate the buildings contextual meaning and identity. It would also benefit from the number of visitors' which are attracted to these iconic, historical, and cultural landmarks. Establishing these connections would aid in concretising the conceptual framework in order to generate meaning of form and tactile material used to create a meaningful and memorable experience of the greater contextual fabric. Identifying these connections could assist in the indispensable foundation from which the architecture can conceptually evolve. The nature of the Midlands Meander promotes the exploration of its historical and cultural sites and they are, therefore, accessible from sites a, b and c (figure 11.5), however, their proximity and influence of their historical and cultural references to the site needs to be assessed.



Figure 11.5 – Cultural and historical linkages in relation to sites a, b and c.

### Climatic restrictions and opportunities :

Climate is a decisive factor for successful wine cultivation. According to Hamilton (2006) the elements of sun, rain, frost, hail, wind, macroclimate and mesoclimate, water, altitude, aspect, and surrounding vegetation - can be calculated fairly objectively in order to determine the most appropriate siting for a vineyard (Hamilton, 2006: 44). Grape vines, although grown most favourably in Mediterranean climates, are capable of cultivation in a wide variety of climatic zones from relatively cold climates through to humid, tropical areas to arid, semi desert type environments. The type of climate will play a major role in the vine growth which will subsequently the character and quality of the wine. Climate is universally accepted as being one of the most influential factors in relation to wine quality (Weaver, 2006: 16). The KZN DAE have conducted a climatic study in this region to determine the quality of wine that would be produced by the Midlands as a result of climatic differences (figure 11.6). They have broken the Midlands Meander up into three main categories, namely:

- Areas which are deemed suitable for good quality wines
- Areas which are deemed suitable for standard quality wines and ports
- Areas which are deemed suitable for dessert wines and sherry

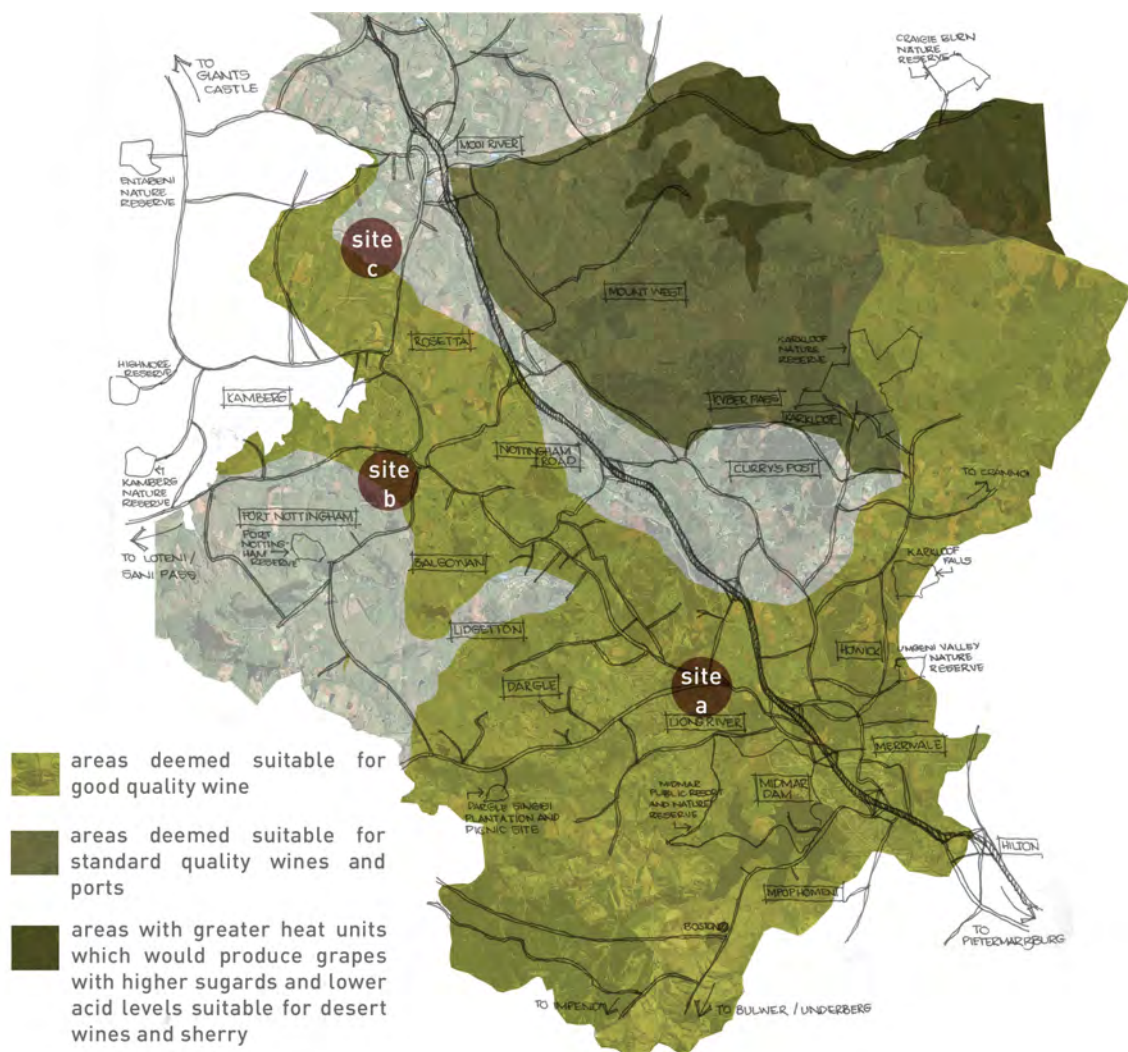


Figure 11.6 – Suitable grape-growing regions in relation to sites a, b and c.



### Key linkages to surrounding attractions:

The Midlands Meander relies on the close proximity of differing recreational activities in order to increase its popularity and financial revenue. The proximity of these surrounding attractions is an integral component, as the winery facility could form a symbiotic relationship with a number of accommodation types that the Midlands Meander has to offer. A winery benefits from being able to operate in isolation, but it is essentially a public building which relies substantially on visitors and popularity for its livelihood. The location of the site will benefit from close proximity to differing types of overnight accommodation - as, according to the clients brief, the Barefoot Winery does not offer this provision. Due to the scope of the area covered by the Midlands Meander, and the travelling required by visitors', overnight accommodation is essential in order for visitors to experience all that the Midlands has to offer. Figure 11.7 and 11.8 shows the differing types of recreation, and their location, offered by the Midlands Meander.

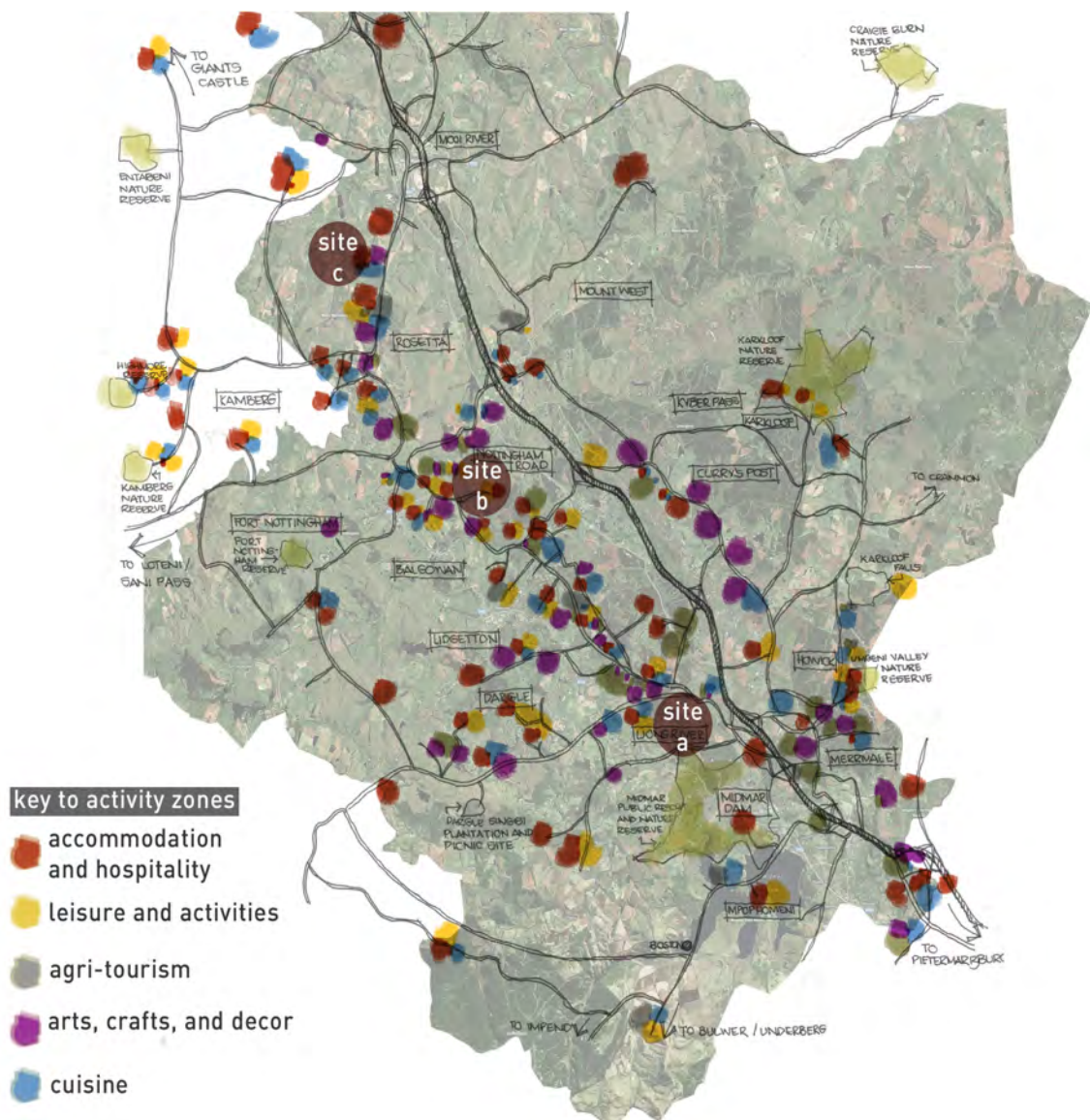


Figure 11.7 – Various activities throughout the Midlands Meander showing sites a, b and c.



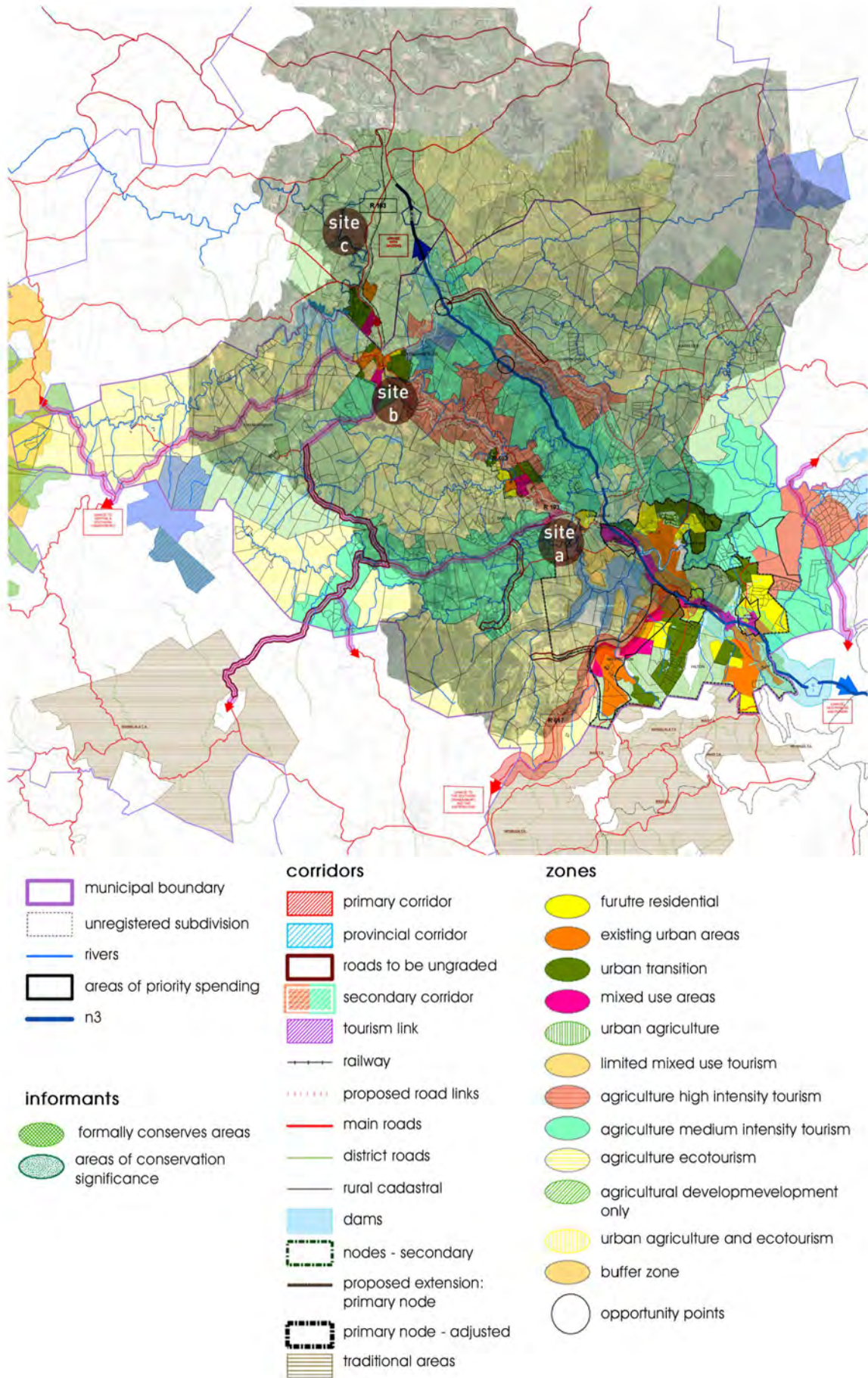


Figure 11.8 – Zoning throughout the Midlands Meander showing sites a, b and c.



### Accessibility of site:

Due to the nature of the Midlands Meander, pedestrian access is not a major concern for visiting tourists. However, in order to facilitate community development and local skills upliftment, the sites location necessitates a close proximity to a local, underdeveloped town or informal settlement. The winery would provide transport to and from work, however, access is still an important consideration. A vital component to the successful development of Barefoot Winery - is vehicular access for a range of vehicles - as this is the dominant mode of transport for accessing the variety of recreational activities within the Midlands. Proximity to the N3 should be considered in order to attract day visitors travelling along this main corridor. The Meander itself is divided into 5 different day routes (figure 11.9) of which most activities, and more specifically wine related activities, are found along route 4. Siting along or near this route is therefore essential to maintain the development of the Midlands Meander wine route.

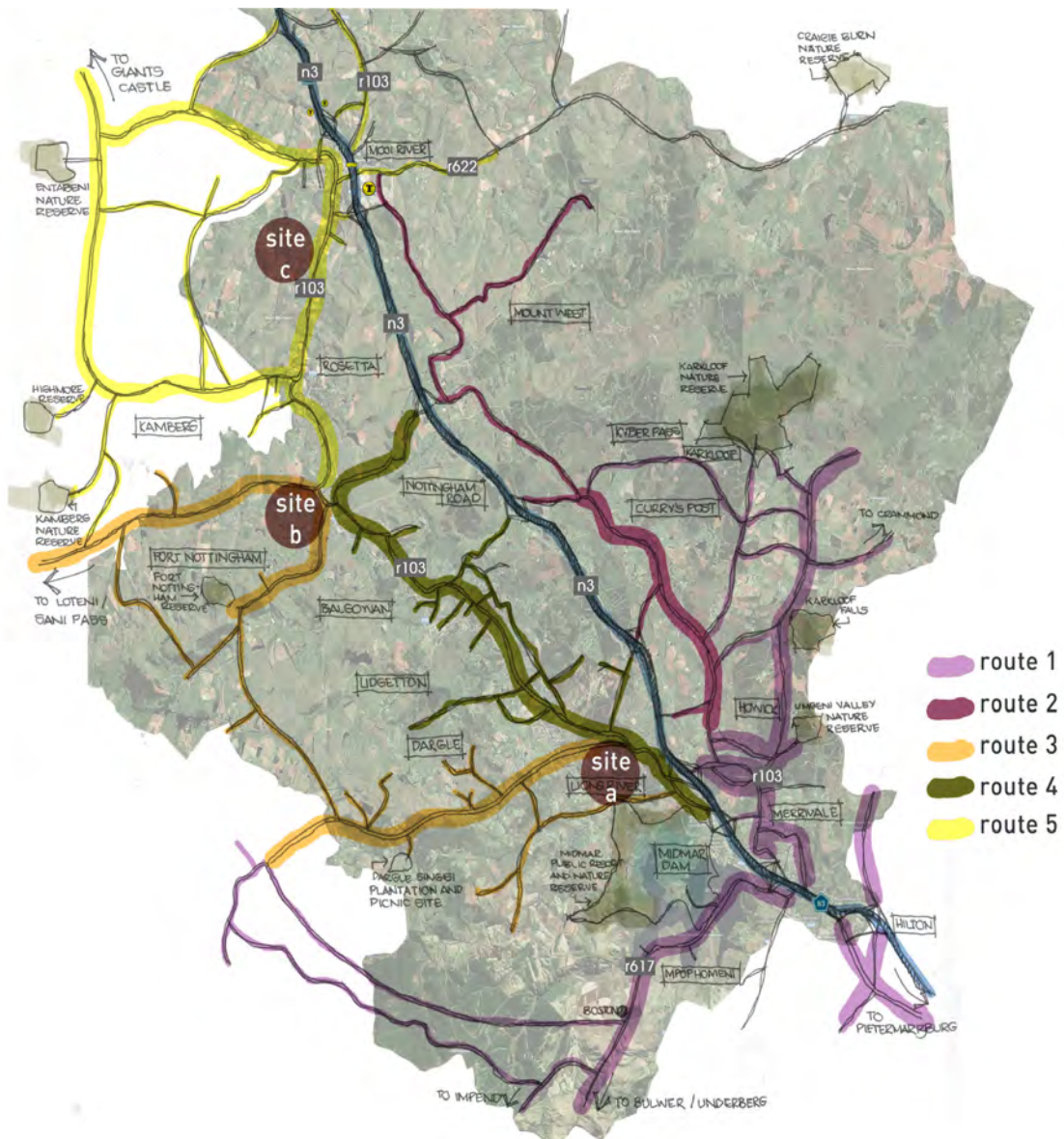


Figure 11.9 – Different transport routes throughout the Midlands Meander showing sites a, b and c.

**The phenomenological experience:**

Views from the site are an important (plate 11.1), if not vital, consideration - not only to ensure a theatrical backdrop, but also to provide an opportunity for the building to compliment and be inspired by its setting. The availability to maximise on environmental perceptions needs to be considered. The site needs to be analysed in terms of its enmeshed phenomenological experience including quality of light and the sites potential to blur the boundaries between the built and natural form. The hard task of analysing the human embodied experience needs to be assessed to ascertain whether the architecture can appropriate dialogue within the natural environment.



Plate 11.1 – The Midlands Meander is known for its spectacular views. The location of the site with regards to views is an important consideration.

**Overall assessment / summary:**

An overall assessment of each site will be made according to the conclusions drawn from the criteria mentioned above. Each site will conclude the assessment with a table (figure 11.10) which rates each criterion from 1 (least favourable) to 5 (most favourable). The final site selection will be concluded by the sites ability to respond successfully to each condition considered important to the siting of a multisensory winery facility.

From least favourable to most favourable conditions

	1	2	3	4	5
cultural and historical linkages					
site restrictions and opportunities					
key linkages to surrounding attractions					
accessibility of the site					
the phenomenological experience					

Figure 11.10 - Overall assessment of the site - in order to gauge it's response to the criteria as a whole.



## 11.4 Site selection

### 11.4.1 Site a – Lions River

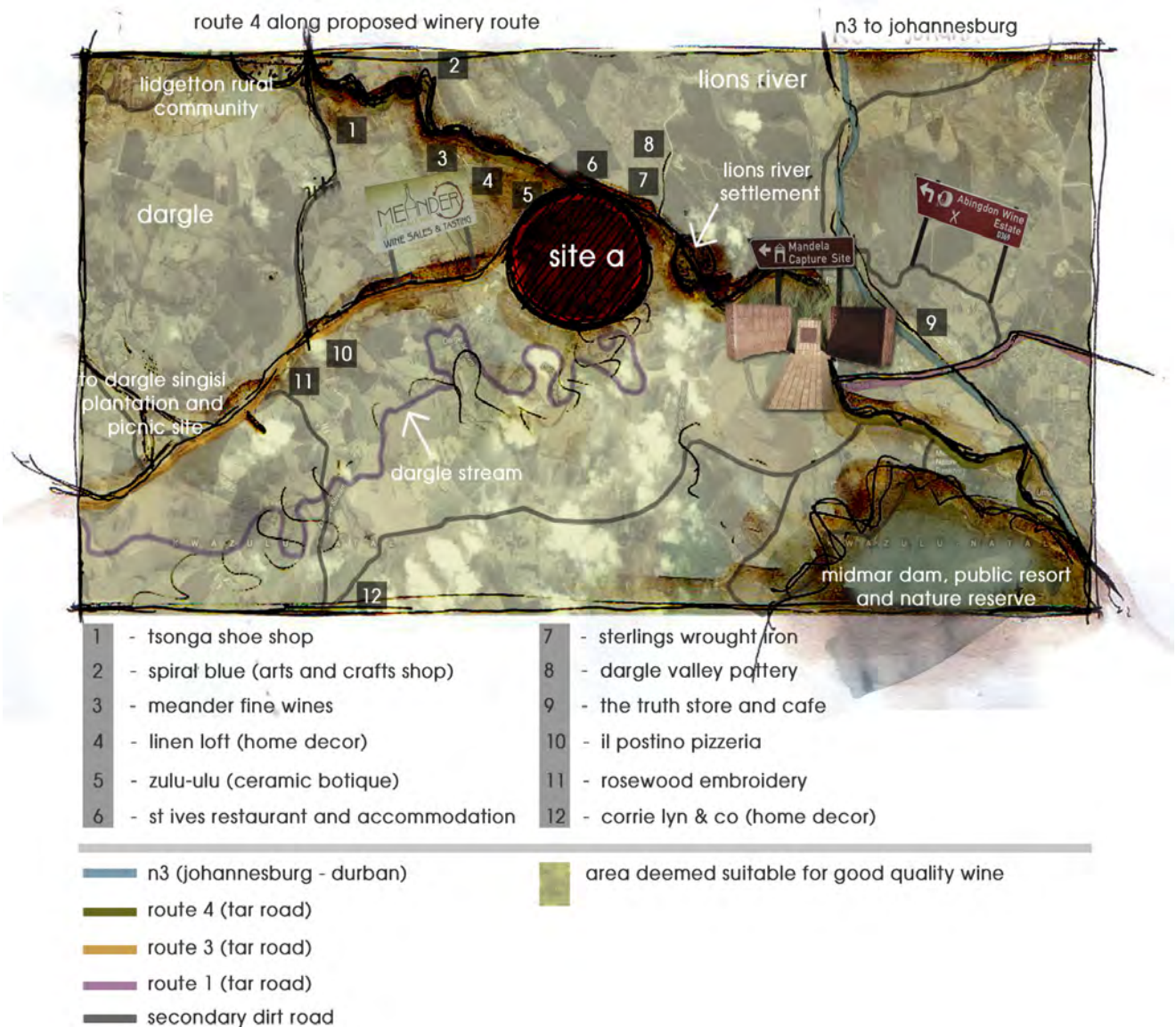


Figure 11.11 - Location of site and surrounding activities in Lions River region.

#### Cultural and historical linkages:

Site a is located within the historic Lions River / Howick region, known for its conception by Dutch settlers during the Great Trek into the interior of South Africa. Both towns formed (around 1850) from a need to provide supplies to men trying to cross the Umgeni River. The major historical linkage to this site, however, is its close proximity to the Mandela Monument which has been identified as the site where Nelson Mandela lost his freedom for 27 years. On the 5th of August, 1962, Mandela was travelling along the R103 from Durban to Johannesburg where he had been on the run from Security Police for seventeen months. This significant and historical landmark indicates the capture site of Nelson Mandela and subsequently forms a large part of South Africa's history. The site could draw on the area's historic presence as part of South Africa's apartheid chronology, in order to create a

responsive architecture imbed with meaning and memory. In addition, site a is also located within close range of the Midmar Dam public resort and nature reserve, which draws a number of people for weekend getaways due to its recreational and camping facilities. Site a's location and consequent revenue would therefore benefit from the popularity of Midmar dam and could help to concretise this area as a landmark site.

**Site restrictions and opportunities:**

This site is located within the area deemed suitable for good quality wine by the KwaZulu-Natal Department of Agricultural and Environmental Affairs (see appendix e). Climatic conditions are favourable in this region due to its mild temperatures and its minimal experience of frost during the winter season. More specifically, however, site a is located within close proximity of the Dargle stream - which experiences large amounts of water, often water-logging surrounding areas. Waterlogged soil is not conducive to successful vineyards as this affects the sugar and PH content of the grapes, ultimately affecting the quality of the wine.

**Key linkages to surrounding attractions:**

Site a is located along route 4 of the Midlands Meander and is mainly surrounded by arts, crafts, home decor, and boutique-style shops. It is also located close to the leading wine estate in the Midlands Meander region: Abingdon Wine Estate (the owner Ian Smothwaite is the client of Barefoot Winery). Surrounding accommodation (listed as members with the Midlands Meander Association) is minimal, requiring visitors to travel further through the meander if they require overnight accommodation.



Figure 11.12 - View from site a.



**Accessibility of the site:**

Site a is located 7 kilometres from Midmar dam, 10 kilometres from Howick, and 20 minutes from Pietermaritzburg. The site benefits from close proximity to both the R103 and the main N3 and its propinquity to the latter suggests that the site could benefit from a higher increase in visitors. People travelling along the Durban – Johannesburg route, not intending to travel along the Midlands Meander route, can still explore the winery as the detour required to visit the site is minimal. The closest community settlement is the Lion’s River settlement, located 2 kilometres from site a, along the R103. Transportation to and from this settlement or surrounding settlements to the site is largely direct and relatively frequent as most commuters travel via passing vehicle.

**The phenomenological experience of the site:**

As can be seen in figure 11.12 the site is located within close proximity to an Eskom power station which visibly pollutes the scenery. Large pylon’s run directly through the site which creates an uncomfortable contrast between the natural and man-made. The position of these pylons contaminates the sites natural environmental perceptions and inhibits the potential architecture from blurring the boundaries between interior and exterior. These pylons negatively affect the phenomenological experience of the site and could ultimately impact the users overall experience of the winery.

**Overall assessment / summary:**

In terms of location, site a meets with the criteria which stipulates the importance of cultural and historical linkages - which could increase the number of visitors. The site also performs well with regard to its accessibility and key linkages to surrounding attractions. The site falls short in terms of its geographic location and suitability to successful winegrowing. Together with these unfavourable conditions the phenomenological experience of the site, which is crucial to reinforce the main body of this dissertation, suffers from its exposure to an industrial landscape, which could prove problematic when framing views and drawing inspiration from the landscape.

From least favourable to most favourable conditions

	1	2	3	4	5
cultural and historical linkages					●
site restrictions and opportunities		●			
key linkages to surrounding attractions				●	
accessibility of the site					●
the phenomenological experience		●			

Figure 11.13 - Overall assessment / summary of site a.

11.4.1 Site b – Balgowan

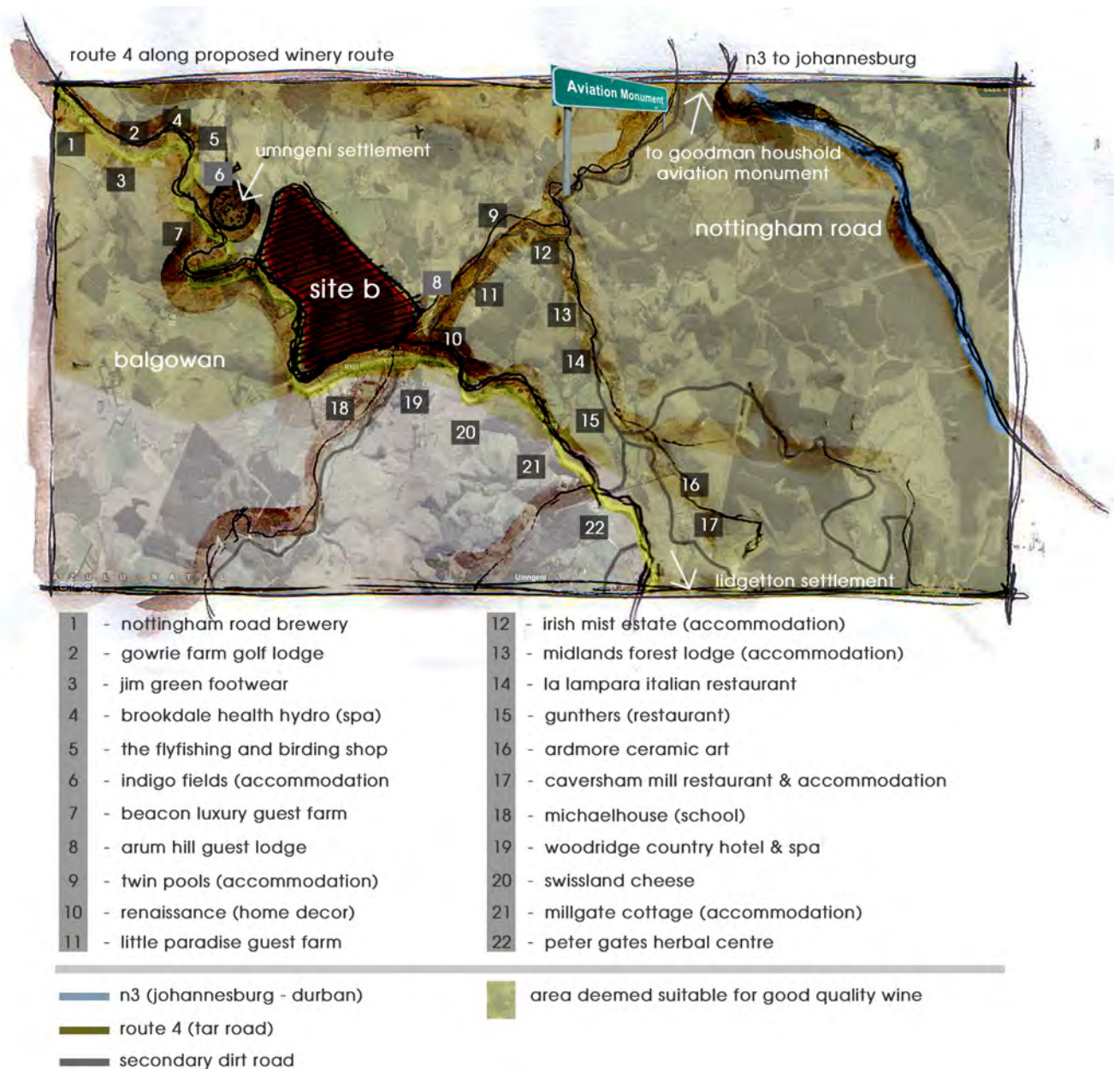


Figure 11.14 - Location of site and surrounding activities in the Balgowan region.

**Cultural and historical linkages:**

Site b is located in the Balgowan region of the Natal Midlands. The town began its existence as an old trading store and train station, where local timber was received for the surrounding farms. A landmark synonymous with the area is Michaelhouse School, a reputable boarding school for boys, which includes English gothic-style architecture and a chapel that is open to the public. The site also intercepts the route which goes to the Goodman Household Aviation Monument, which marks the site where John Goodman became the first South African to fly in 1875.

**Site restrictions and opportunities:**

The site is located within the area deemed suitable for good quality wine by the KwaZulu-Natal Department of Agricultural and Environmental Affairs (see appendix e). More specifically - site b is located on the leeward side of the sites fronting mounting - creating perfect conditions for thriving vineyards. This, coupled with the sites favourable topography (slightly sloped allowing for the architecture to respond to gravity-flow design), provides complimentary conditions toward a sustainable architectural response, in addition to growing successful vines.

**Key linkages to surrounding attractions:**

Site b is located along route 4 of the Midlands Meander and is largely surrounded by a variety of accommodation types; this is crucial in the development of the winery as the proposed facility does not accommodate for overnight visitors. Site b also benefits from its position in the heart of the Midlands Meander, thus profiting from the diverse range and proximity of surrounding attractions. It also benefits from its location in-between the two established competing vineyards in the Midlands, namely; the Stables Estate and Abingdon Wine Estate.

**Accessibility of site:**

The site is located 12 kilometres from Lions River, 16 kilometres from Mooi River and is 30 minutes from Pietermaritzburg. The site is located directly off the R103 and benefits from being in the centre of two direct routes to the N3, located no more than 2 kilometres from the site. From this point a visitor



Figure 11.15 - View from site b.



can easily explore routes 3 and 5 of the Midlands Meander and thus the site profits from its central connection to transportation linkages. The closest community settlement is the Umegni settlement, located within walking distance of the site. It was conceived out of need for labour at Michaelhouse and is continuing to grow, however, the settlement suffers from lack of skilled labour, as well as a lack of surrounding employment opportunities.

**The phenomenological experience of the site:**

As can be seen in figure 11.15 the panoramic views from the site, in any direction, are magnificently framed. The surrounding scenery is dramatic - undulating hills in contrasting colours and the vivid play of light and shadow extend as far as the eye can see. The senses are engaged in the natural phenomena which are played out onsite and are in a constant state of flux.

**Over assessment / summary:**

Site b manages to successfully meet the criteria set out for site selection. It is sited in the heart of the Midlands Meander, surrounded by a variety of recreational activities and accommodation types. The site is delimited by a number of different access points, allowing for ease of access from visitors travelling along the R103 as well as the N3. A fundamental criterion with regards to this site selection is the phenomenological experience, in order to reinforce the main body of this dissertation. Site b naturally encapsulates many of the phenomenal zones discussed in Chapter Two of this dissertation, which encourages a responsive architecture; an architecture which grows instead of imposes.

	From least favourable to most favourable conditions				
	1	2	3	4	5
cultural and historical linkages				●	
site restrictions and opportunities					●
key linkages to surrounding attractions					●
accessibility of the site				●	
the phenomenological experience					●

**Figure 11.16 - Overall assessment / summary of site b.**



### 11.4.3 Site c - Rosetta

route 5 along proposed winery route

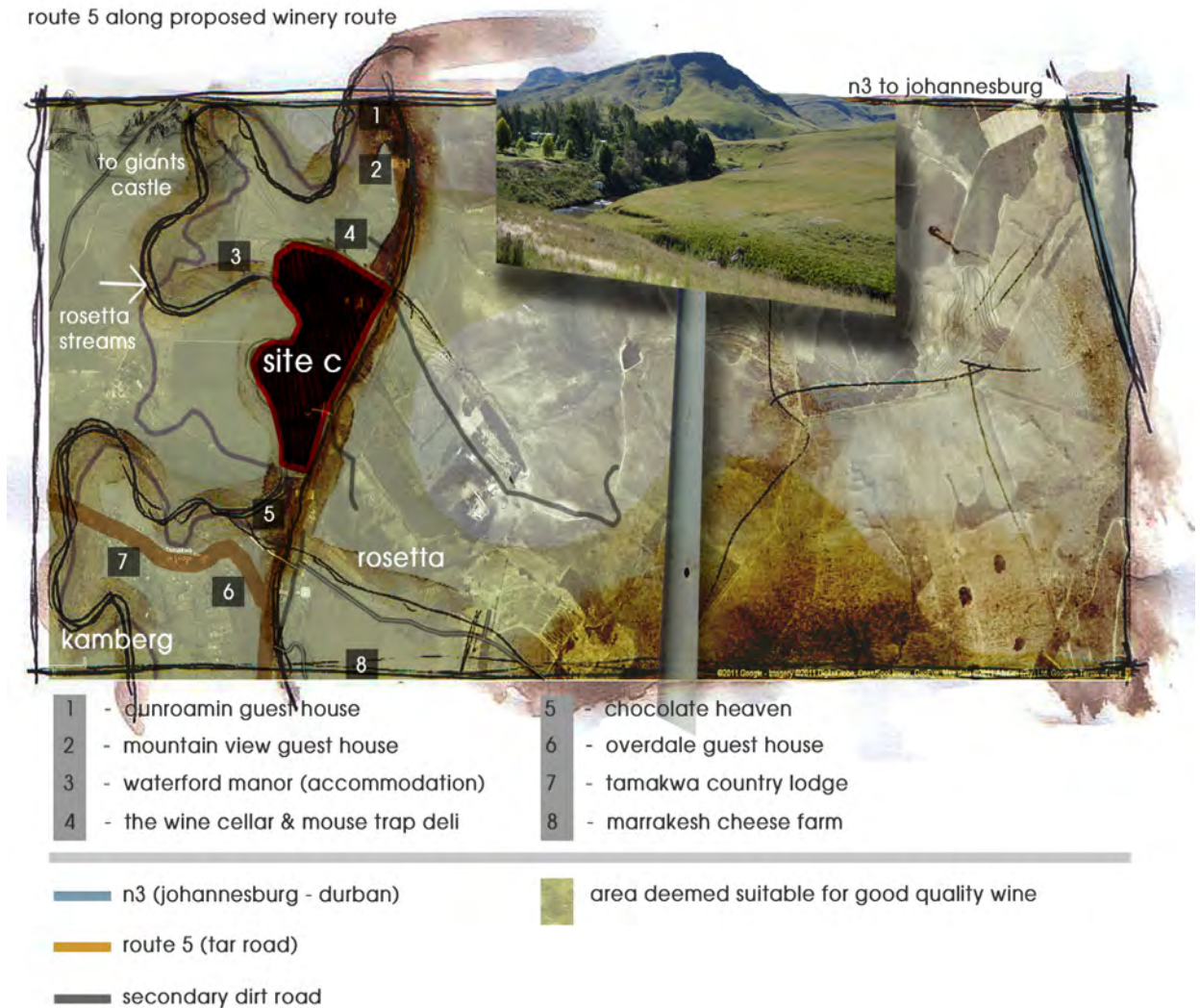


Figure 11.17 - Location of site and surrounding activities in the Rosetta region.

#### Cultural and historical linkages:

Site c is located in the region of Rosetta in the Natal Midlands. Originally the area was dominated by the Rosetta Farm, granted by the Crown in 1861, and the village was the result of the colonial farm pioneering boom that took place at that time in Natal. The site is situated on route to Entabeni Education Centre which focuses on catchment and wetland education for school excursions and leadership camps.

#### Site restrictions and opportunities:

The site is located within the area deemed suitable for good quality wine by the KwaZulu-Natal Department of Agricultural and Environmental Affairs (see appendix e). Site c, specifically, is located within close proximity to the Rosetta streams, which experiences large amounts of water, often water-logging surrounding areas. The site benefits from being slightly elevated from the river, however, water-logged soil is still a risk which could negatively affect the quality of the wine.

**Key linkages to surrounding attractions:**

Site c is located along route 5 of the Midlands Meander which is to be found near the end of the meander route, in the vicinity of the main town of Mooi River. The site, therefore, lies on the periphery of the meander which subsequently is not exposed to the variety of activities which site a and b are both surrounded by. The popularity of the winery could suffer from lack of exposure due to the number of recreational activities found on route 5 as opposed to route 4.

**Accessibility of site:**

Site c is located 6 kilometres from Mooi River and is a 45 minute drive from Pietermaritzburg. It is positioned along the R103, however, remains some distance away from the N3 in either direction, meaning the position of the site is only relative to the Midlands Meander, and is not directly accessible to those travelling along the N3. The closest community settlement is to be found in an area just outside of the town of Rosetta, 1,5 kilometres away from the site. According to Greg Stokes, at the Umgeni Municipality, the settlement does not suffer from high unemployment rates due to its close proximity to the large town of Mooi River (interview, March 2011).

**The phenomenological experience of the site:**

As can be seen in figure 11.18 the site is located in the most mountainous region of the Midlands Meander and therefore, views from the site are breathtaking. The undulating topography creates a

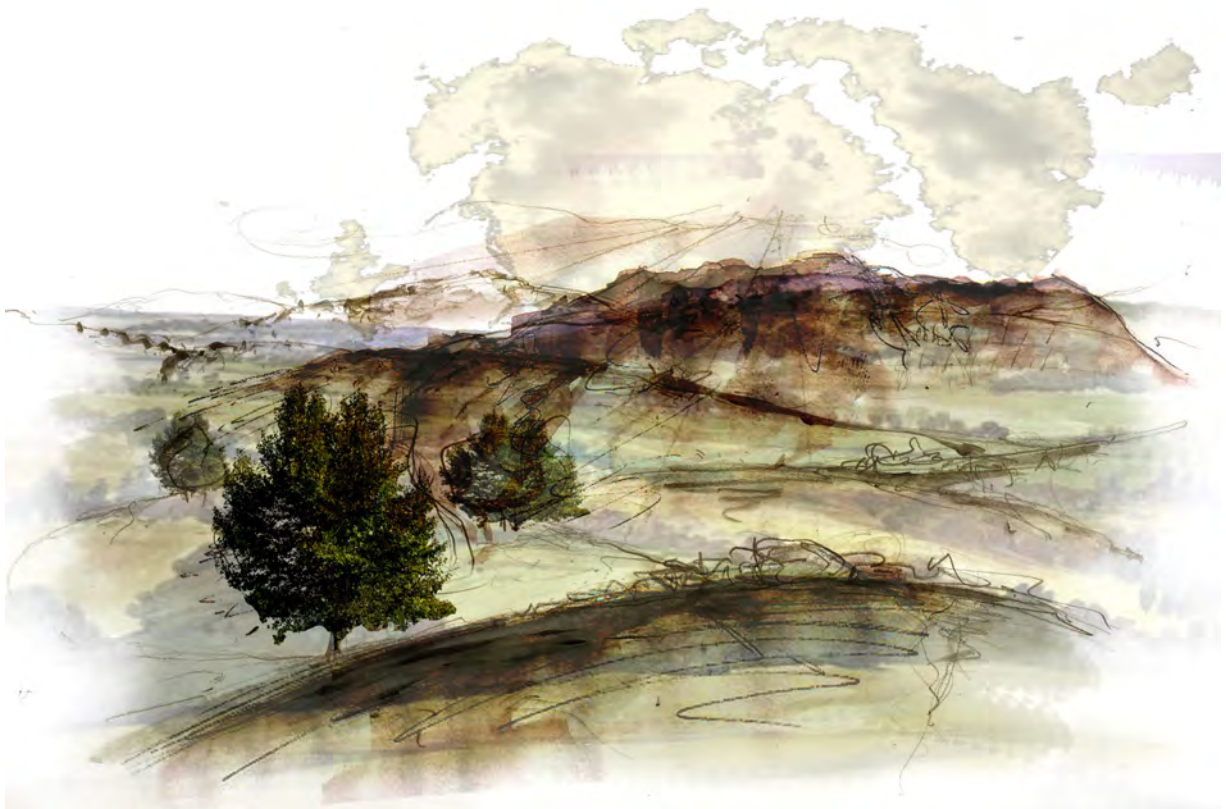


Figure 11.18 - View from site c.

storybook landscape which is constantly in motion. Light and shadow result in perpetual movement and the visible and audible Rosetta streams allows for the framing of a sensory engagement with the site. The performance of the landscape demands an architecture of response and respect.

**Over assessment / summary:**

In terms of the sites phenomenological expression, it naturally encapsulates the elements of multisensory design therefore necessitating a responsive architecture. The sites magnificent scenery, however, cannot mask poor relation to a cultural and historical linkage as well its ability to connect to alternative transport routes. The site is ultimately located on the border of the Midlands Meander and suffers from a lack of exposure by not being surrounded by a broad range of activities, attracting a high volume of visitors.

From least favourable to most favourable conditions

	1	2	3	4	5
cultural and historical linkages		●			
site restrictions and opportunities			●		
key linkages to surrounding attractions			●		
accessibility of the site		●			
the phenomenological experience					●

Figure 11.19 - Overall assessment / summary of site c.



## 11.5 Selected site

### Site b – Balgowan

By analysing each site according to the criteria set out at the commencement of this Chapter, certain contrasting elements have been established. The research has shown that the Balgowan site is the most suitable for the development of a winery facility; this is due to its satisfactory location with regards to cultural and historical linkages. The history of the area, coupled with the history of winemaking (see appendix a) provides a platform to concretise the architecture in our cultures 'sixth sense', in order to create an identifiable structure for all users. The site also benefits from being positioned in the heart of the Midlands Meander, surrounded by a variety of recreational activities and accommodation types. Site b is more than satisfactory when critically analysed for its phenomenological experience; a criteria which is arguably the most important in order to ground the research gathered in Part I of this dissertation.

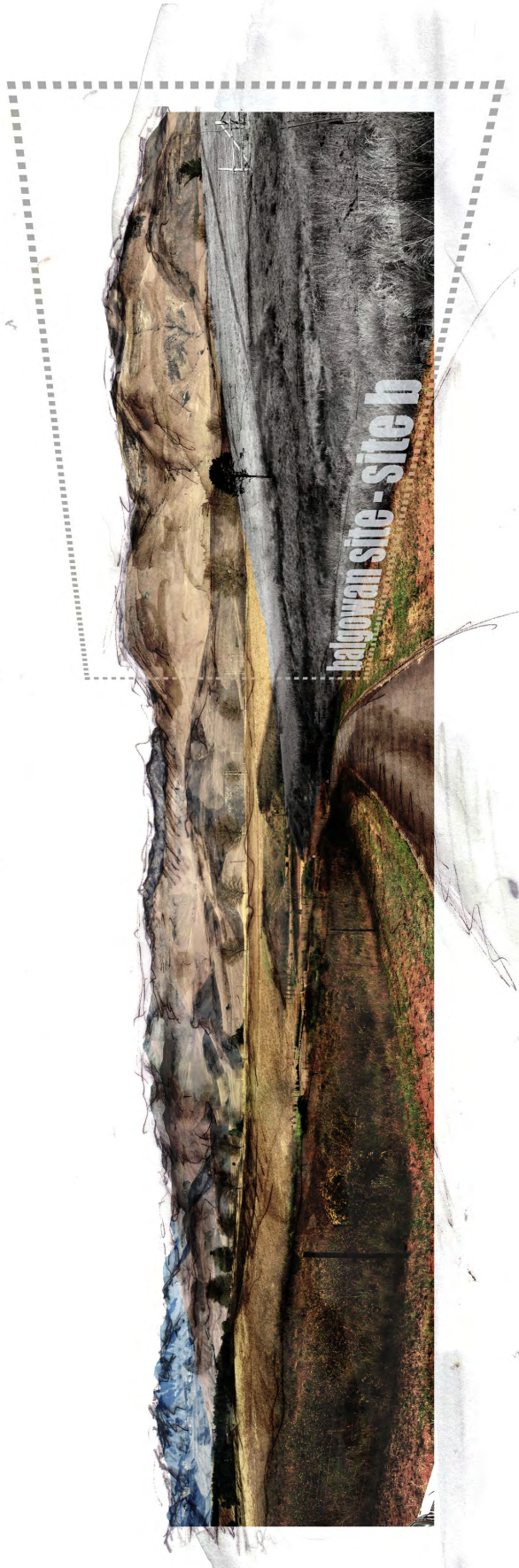


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## APPENDIX A

### *A brief history of winemaking*

#### A BRIEF HISTORY OF WINEMAKING

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Primitive man, during the Palaeolithic era, was probably the first to become familiar with wine, purely by accidental ‘spoilage’ of stored, or over-ripe grapes. Due to the fact that our Stone Age forebearers did not dwell in permanent, year-round settlements, they had no opportunity to investigate what was actually happening when grapes/grape juice spoiled (fermented), and they were unable to learn about and perfect the process. It was not until man adopted a sedentary way of life, and had developed a need for a continuous supply of wine, that he put his mind to a rudimentary form of viticulture. According to studies, the Neolithic period in the Near East, somewhere between 8500 and 4000 BC would seem to provide all the prerequisites for the international manufacture of wine. Not only was mankind flirting with agriculture and beginning to lead a settled existence, but was starting to manufacture items such as pottery vessels which were essential items if liquids were to be stored for any period of time (Hornsey, 2007: 11).

Evidence of the first vineyards appear in Egyptian tomb paintings showing detailed records of winemaking (Hamlington, 1993: 2). The Egyptians grew grapes in the Nile Delta, maintaining prized vineyards there. They quickly learned that breaking open the skins and releasing the sweet juice inside initiated the process of turning fruit into a liquid which they considered to be a gift from the god Osiris. Since the whole process was entirely natural, it was easy for them to achieve relatively consistent results. The wine they made was a sweet white wine from grapes native to the Nile Delta. They eventually fermented in wooden vats, similar to the ones still used in traditional European processes today. Wine was of great value to the people of the Nile, eventually becoming part of their sacred funeral rites. The Persians, located at the other end of the Fertile Crescent near the Tigris and Euphrates Rivers, began established vineyards around this same time - 3000 B.C. They produced wine from grapes originating in the Caucus foothills to the North. Like the Egyptians, they considered wine to be a gift from the gods, and rightfully so. The grape variety found in the region at that time is a precursor to the *vitis vinifera* species grown all over the world today. The Phoenicians, who set sail into the Mediterranean from present-day Syria, travelled to Greece, Sicily, and N. Central Italy, where they spread their knowledge of grape growing and winemaking. The Etruscans in North Italy began what will become a long tradition of producing fine wines in the region now known as Tuscany.

The true explosion of wine in the Mediterranean region, however, and ultimately into most of Western Europe, came as a result of the far-reaching Roman Empire. The Romans found grapes already under cultivation by the earlier Phoenicians and Greeks and developed sophisticated cultivating and processing techniques that wouldn’t be unsurpassed until the eighteenth century. In A.D. 92 Emperor Domitian ordered that the established vineyards of France be uprooted. The order was not fully realized, and by the time the Roman Empire fell in A.D. 476, most of France, Germany, and Italy was

sprinkled with fine grape vines (Hamilton, 2006: 66). At the same time as the art of winemaking was becoming refined in Western Europe, the wine culture in the Middle East was diminishing due to the rise of Islam. In 634 the prophet Mohammed conquered the Meccans in the first jihad. The Islamic code of law forbade the consumption of alcohol in any form, and all wine production eventually ceased in this region. The Romans taught their advanced cultivation techniques to the native Gauls of France. Monastic monks owned considerable quantities of grapevines throughout France and Germany by around A.D. 1000. Around this same time period, Christian soldiers were bringing new grape varieties back from the Holy Land, adding to their list of *Vitis Vinifera* strains to choose from. The monks' meticulous recording of rainfall, crop yields, and grape species led to a better understanding of how specific varieties respond to climatic conditions. This body of knowledge eventually contributed to the high quality of wines produced by these bordering countries. Bordeaux and Burgundy started to gain widespread demand across Europe, with England's taste for the exotics of France leading the way. By 1350 the city of Bordeaux was shipping out over a million cases of wine per year. 27 Wine productions in France thrived until the French Revolution, when vineyards were seized from the churches and distributed to the people, losing much of their tradition and therefore reputation. In the meantime, to make matters worse, American grape varieties being tested in France introduced a plague of disease called phylloxera during the mid 1800s which attacked and destroyed the roots of the grapevine. Before anyone knew what was causing the blight, this tiny louse had devastated over ninety percent of the vineyards in France, forcing French winemakers to migrate into other regions, including Spain and Italy. France eventually recovered by grafting French vines onto the rootstocks of native American grape varieties, which were resistant to the disease (Hamlington, 1993: 3).

European exploration spread the art and knowledge of winemaking, as well as the tested European varieties of grapes, to the most acceptable temperate climates among the Spanish, French, and British settlements. Following the voyagers of Columbus, grape culture and winemaking were transported from the Old World to the New. Winemaking soon developed in Mexico, South America, California and (with the arrival of Jan van Riebeeck) South Africa.

### **A BRIEF HISTORY OF WINEMAKING IN SOUTH AFRICA**

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The first reference made to wine in the recorded history of South Africa was made by the traveller Cornelis Houtman, who stopped at Mossel Bay in 1595 en route to the East. Houtman records that he bartered Spanish wine for meat with the local Khoi herders. (Wine was kept on board during long voyages to prevent scurvy and act as an adjunct to food). Although European travellers had ongoing contact with the Khoi from 1488, this contact was limited to trading and to intermittent conflict over European attempts to get fresh water and food from the Khoi, and the Khoi's wariness of any attempts at permanent European settlement on their land. It was not until 1652 that the Dutch permanently colonised the area around Table Bay. Jan Van Riebeeck, the Dutch Commander of this colony, knew



the value of wine, and he realised that conditions were ripe to make wine at this halfway settlement; the Cape, in order to maintain the health of the crew and all vessels touching at this point. Vine cuttings, sewn up in sailcloth, were sent to Van Riebeeck and he successfully planted grapevines in the newly established Company's Garden in 1655. On the 2nd day of February, 1659 he wrote in his diary: "*Today, praise be to God, wine was made for the first time from Cape grapes...*" (Hamlington, 1993: 2).

Van Riebeeck then established a large vineyard on his private farm of Bosheuvalm in Wynberg (Wine Mountain) and encouraged the growing of grapes by distributing vines to the free burghers, who at first used the vines to provide shade to the front of their dwellings. However, they soon realised the potential of the vine, and the development of South African viticulture had thus begun. While European soldiers would have supplied the vineyard labour during the first years of Dutch colonisation, wine farmers subsequently relied on slavery and other forms of forced labour. Slavery played a major role in ensuring the availability of labour for local wine production, and slaves were central to the success of the South African wine industry.

Simon van der Stel succeeded Jan Van Riebeeck as Dutch commander of the Cape in 1679. Van der Stel was both enthusiastic and knowledgeable about viticulture and winemaking and in 1695 he set out the model Constantia Estate with its historic Cape Dutch-style homestead, planting the vineyards according to the established norms of Europe as an example for other wineries at the Cape to follow. Van der Stel purchased a large 1,850 acres (750 ha) estate just outside Cape Town, establishing the Constantia wine estate. After Van der Stel's death, the estate fell into disrepair but was revived in 1778 when it was purchased by Hendrik Cloete.

Under Cloete, Constantia soon earned a reputation across Europe for the quality of its Muscat based dessert wines. The reputation of Constantia positively affected perception of other Cape wines and when the area fell under British rule, large quantities of Cape wine were exported to Great Britain. By 1859 more than 1 million gallons (45,000 hl) of South African wine were exported to Britain. The region experienced a period of prosperity that lasted until the 1860s when the Cobden-Chevalier Treaty signed by the Gladstone government and France reduced the preferential tariffs that benefited South African wine to the detriment of French wine exports. By 1865, exports dried up to less than 150,600 gallons (5,700 hl). In 1866 the phylloxera epidemic reached South Africa, causing widespread devastation to the industry and vineyards that would take more than 20 years to recover.

While many growers gave up on winemaking, choosing instead to plant orchards and alfalfa fields to feed the growing ostrich feather industry. The growers that did replant with grapevines, chose high yielding grape varieties such as Cinsaut. By the early 1900s more than 80 million vines had been replanted, creating a wine lake. Some producers would pour unsaleable wine into local rivers and streams. The depressed price caused by the imbalance between supply and demand prompted the South African government to fund the formation of the Koöperatieve Wijnbouwers Vereniging

van Zuid-Afrika Bpkt (KWV) in 1918. Initially started as a co-operative, the KWV soon grew in power and prominence to where it set policies and prices for the entire South African wine industry. To deal with the wine glut, the KWV restricted yields and set minimum prices that encouraged the production of brandy and fortified wines. In the 1930s they set up the South African Wine Farmers Association (SAWFA) as a 50:50 joint venture with their British agents, Vine Products, taking full control after the Second World War. Restrictions on the sale of “whites man’s liquor” to black South Africans were lifted in the 1960s. Restrictions were never placed on Coloured South African laborers for fear of collapsing the wine farm labour force. Production quotas were abolished in the 1990s, and KWV relinquished its regulatory functions to the South African Wine Industry Trust and its producing interests to the Wijngaard Co-operative, leaving a publicly quoted marketing company.

For much of the 20th century, the wine industry of South Africa received very little attention on the world stage. Its isolation was exacerbated by the boycotts of South African products in protest against the country’s system of Apartheid. It was not till the late 1980s and 1990s when Apartheid was ended and the world’s export market opened up that South African wines began to experience a renaissance. Many producers in South Africa quickly adopted new viticultural and winemaking technologies. The presence of flying winemakers from abroad brought international influences and focus on well known varieties such as Shiraz, Cabernet Sauvignon and Chardonnay. The reorganization of the powerful KWV co-operative into a private business further sparked innovation and improvement in quality, as vineyard owners and wineries who had previously relied on the price-fixing structure that bought their excess grapes for distillation, were forced to become more competitive by shifting their focus to the production of quality wine. In 1990, less than 30% of all the grapes harvested were used for wine production meant for the consumer market with the remaining 70% being discarded, distilled into brandy or sold as table grapes and juice. By 2003 the numbers had been reversed with more than 70% of the grapes harvested that year reaching the consumer market as wine.

## **A BRIEF HISTORY OF WINEMAKING IN KWAZULU-NATAL**

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In 2001, vineyards were planted in KZN in what was described as a “trial run” to investigate the plausibility of growing and making wine in the region. Approximately 4000 vines were distributed among prospective growers in an experiment led by Dr Clive Kaiser, a horticulturalist for the KwaZulu-Natal Department of Agriculture at Cedara. Eleven participating farms were cited as growers and ambitions were of rural development projects, further expansion of vineyards and subsequent wine production. Success proved dismal, and under the guidance of Kaiser, new trial vines were established at Bracken, a farm in Greytown.

In 2002, Rob Osbourne took over responsibilities from Dr Kaiser, continuing to promote the wine-growing industry in KZN with trial plantings of grapes in various pockets scattered across the

Midlands. The possibility of establishing KZN as a wine-growing region attracted other interested parties to the Midlands who individually started to explore the viability of making and producing wine in a former non-demarcated Wine of Origin region. In 2010 there are a handful of growers in KZN, but two producers are recognised as major players: Abingdon Wine Estate and The Stables Wine Estate.

KwaZulu-Natal was designated as a Wine of Origin under the classification scheme of South African Wine in August 2005. The first ever KwaZulu-Natal Wine of Origin wine was released by The Stables Wine Estate on 28 July 2006. It has, however, been confirmed that The Stables hasn't always made use of locally sourced grapes (even though labels in their range might suggest otherwise), which has resulted in Abingdon Wine Estate pioneering the KwaZulu-Natal Winery route.

## APPENDIX B

### *Climatic factors with regard to successful site selection*

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#### **Climatic requirements of the grape vine**

No other agricultural product has as strong a relationship with the soil, as does wine. The link is immediately perceptible in the label, as most wines bear the name of the place of their origin. In a multitude of locations, each with particular characteristics with regard to soil and climate, a myriad of wines are produced, all differing in taste and quality. Some conditions are particularly favourable to wine growing and allow the production of wines of exquisite quality. The market acknowledges these differences in quality and accepts that some wines are worth tenfold, or even hundredfold, the price of those grown in less favourable environments. The hierarchy of wines has become more and more sophisticated over the years, resulting in the delimitation of production areas and the classification of famous growths. The most striking example is found in the Burgundy region, where selling prices vary from one to tenfold depending on the location of the vineyard plot, although viticultural practices and winemaking process are basically identical across plots belonging to the same grower. As a result, value can be attributed to wine production in terms of quality rather than quantity, which is a unique situation among agricultural products. In most wine growing areas, productivity is three to five times lower than possible attainable yields. Vines are often grown under environmental stress, which reduces yield but enhances grape quality potential. In wine production, the effect of the environment on wine quality is referred to as ‘the terroir effect’. Although ‘terroir’ has similarities with the French word ‘terre’, it has a broader meaning than the influence of the soil on the taste of wine. Terroir is concerned with the relationship between the characteristics of an agricultural product (generally wine) and its geographic origin, which might influence these characteristics. It can be defined as an interactive ecosystem, in a given place, including climate, soil and the vine. To understand the way terroir functions, it is essential to take into account the interactions among the factors that contribute to terroir. While very high quality wines are grown in various climates, it is impossible to define the ideal climate for fine wines in terms of temperature, rainfall (amount and distribution), or solar radiation. Nor can one define the best possible soil for growing high-quality wines in terms of pebble-, clay- or lime-content, soil depth, or organic matter content. These factors of the natural environment have to be considered in terms of their interaction with the vine. Human factors, such as history, socioeconomics, as well as viticultural (vine growing) and oenological (winemaking) techniques, are also part of terroir. Viticulture is a human activity. The history of the socioeconomic environment may be important in understanding why a given vineyard has emerged in a given site, and why it has prospered.

#### **Factors of the Natural Environment**

##### **Macroclimate and vine-climate interaction**

The vine is a perennial plant adapted to a wide range of climatic conditions. The main cultivated vine species for quality wine making is *Vitis vinifera*, which can survive temperatures as low as  $-15^{\circ}\text{C}$  to  $-20^{\circ}\text{C}$  (depending on the cultivar) in winter. The temperatures needed for grapes to attain full ripeness are highly variable among cultivars. At high latitudes, temperatures can be too low to ripen the grapes, even for early ripening varieties. In equatorial regions, vine vegetation is continuous, and all the



reproductive stages exist simultaneously in the same plot. Although viticulture is possible in equatorial regions, especially for table grape production, fruit grown under these conditions does not have a high oenological potential. Taking into account these limitations, it appears that the zone most suited to growing high-quality grapes is between the 35th and the 50th parallel of latitude in the Northern hemisphere, and between the 32nd and 45th parallel in the Southern hemisphere. In some cases, high altitude can compensate for low latitude. Precociousness for fruit ripening is a genetically determined property that is highly variable from one cultivar to another. When a wide range of cultivars is grown in the same vineyard, it is common to observe a two-month time lag between the moment of ripeness of the earliest and the latest ripening varieties. At high latitudes, the limiting factor for producing high-quality wines is the level of ripeness of the grapes. Unripe grapes give green, acidic wines, with low alcohol levels, as a result of insufficient sugar accumulation in the fruit. For this reason, early ripening varieties such as Pinot noir, Chardonnay and Gewürztraminer are grown at high latitudes, to optimise the chances of attaining correct ripeness. At lower latitudes, where the climate is warmer, grapes might attain ripeness early in the summer. Quick ripening of the grapes reduces aromatic expression in the wines produced: *“The best wines are produced with cultivars that just achieve ripeness under the local climatic conditions, as if quick ripening of the grapes burned the essences that makes the finesse of great wines”* (Ribéreau-Gayon & Peynaud 1960).

## **Climate**

### **Sunshine**

Ideally, the vine needs a minimum of 1400 hours of sunshine per year, with a minimum average of 6 to 7 hours per day during the growing season (October to April in South Africa). Regions with too much sunshine and heat tend to yield wines that are coarse with high levels of alcohol. Too little sunshine leads to unripe grapes, which in turn result in wines that are high in acidity but light in alcohol. The vine produces its food by the biological process of photosynthesis, using light. However, for grape growing, the vine needs sunshine more for its heat than light.

### **Warmth**

Growth only takes place at temperatures above 10 °C. For the vine to flower successfully in early summer, a temperature of 15°C is needed. The period from flowering to harvesting averages 100 days, but could be as short as 80 or as long as 150 days.

### **Cold winter**

The vine needs a rest so that its growth is inhibited. Without a winter rest, the vine might yield twice a year and its life would be shortened. Winter frost can be beneficial for hardening wood, and perhaps kills fungal diseases and insect pests. There are, however, vineyards in Brazil where five crops are obtained in a two year period – the climate is hot all year round, and the growing seasons are simulated by turning the irrigation on and off. The vines grown in this way quickly become exhausted and need replacement.

### **Rainfall**

Obviously, vines need water to grow. An annual rainfall of between 500 mm and 700mm is perhaps ideal; otherwise irrigation will be necessary. Ideally, rain should fall mainly in winter to build up water reserves underground. Rain in early spring helps the vine's growth; in summer and early autumn it swells the fruit. In Europe, nature normally provides sufficient rainfall, but in New World countries irrigation is commonplace. For example, the largest wine producing region in South America is Mendoza in Argentina, parts of which have just 10 mm of rain a year. The area is technically a desert, but the vine flourishes by the use of flood, furrow, or drip irrigation. Just before harvest, a little rain can help increase the yield, but needs to be followed by warm sun and a gentle drying breeze if undesirable rot is to be prevented. Heavy rain will usually split berries, causing severe damage and diluting juice.

### **Climatic enemies of the grape vine**

#### **Frost**

Severe winter frosts can damage vines. Temperatures below  $-16^{\circ}\text{C}$  can kill the vine by freezing the sap, resulting in roots splitting. Frost at budding time, can destroy the young buds and shoots; in cases of great severity, an entire crop can be wiped out as a result. Known areas for frost (frost pockets) are best avoided for planting. However, protection can be given in various ways. In winter, the base of the vine's trunk can be earthed up to prevent damage to the graft. Various measures can be used to mitigate the effects of spring frosts. Traditionally, oil burners were widely used in the vineyard at budding time to circulate air, but these are now considered primitive. Wind machines that circulate air can prove effective. Many producers choose to use an 'aspersions system' for frost protection. This involves installing a sprinkler system which sprays water onto the buds before the temperature falls below  $0^{\circ}\text{C}$ . The theory is simple: water contains heat, and when the water freezes much of this heat will go into the bud, which will then be protected in its own igloo of an ice pellet. No frost prevention system is always or completely effective.

#### **Hail**

Hail can do immense damage over relatively small, localised areas, resulting in direct physical damage to both vines and fruit. This can range from scarring of leaves, bruising or breaking of young shoots (the effects of which can carry on to the following season), to the splitting of berries. Split or smashed berries are susceptible to rot or may start to ferment on the vine, resulting in whole bunches being unusable. Various forms of protection include fine netting, either as an overhead canopy or vertical nets against the trellis system. More controversially, the firing of rockets carrying silver nitrate into clouds may cause the ice to fall as rain. For growers in affected areas, insurance is an expensive option.

#### **Strong winds**

These can have a dramatic effect by damaging canes, breaking shoots and removing leaves. Spring sun and severe wind can be a devastating combination for young shoots and leaves or very young vines. If prevalent when the vine is flowering, then poor pollination and a reduced crop can result. The detrimental effect of strong winds may be a particular problem in valleys, which can act as funnels. For example, on the steeply terraced hillsides in the northern Rhône valley, vines have to be individually

staked, whilst in the flatter southern Rhône, rows of conifer trees have been planted to break the destructive force of the Mistral wind. In other areas, forests and mountain ranges offer some measure of protection.

### **Excessive heat**

Heat stress can be harmful to the vine. When there is excessive sun and temperatures exceed 40 °C, the vine can shut down and photosynthesis ceases. Thus no more sugars are formed and ripening stops. Grapes can be sunburnt and scarred in the hot afternoon sun.

## **Mesoclimate and microclimate**

### **Mesoclimate and topoclimate**

Climatic variability within a wine growing region can be described as mesoclimatic variability. When it is the result of relief (altitude, aspect, slope), it is called topoclimatic variability. Especially in cool regions, where it is difficult to achieve grape ripeness, topoclimate can be a major terroir factor. In the Mosel Valley in Germany, quality wines can only be produced on steep, south-facing slopes. In Burgundy, the best wines are produced in the Côte d'Or, at approximately 250 metres above sea level. In the Hautes-Côtes, where the altitude is higher, it is harder for grapes to reach complete ripeness. Picking is delayed by ten days, and wine quality is generally good, but rarely outstanding, despite the fact that fine soils for vine growing can be found in this part of Burgundy.

### **Microclimate**

Microclimatic variation in the fruit zone can be induced by the soil type and through canopy management. It can have a great impact on the quality performance of a vineyard. Dry soils (for instance, stony soils) warm up more quickly than wet soils do, inducing early ripening. This is an essential quality parameter in cool climate viticulture. Soils inducing low vine vigour (for instance, because of low water and/or nitrogen availability for the vines) improve light penetration inside the canopy and on the fruit zone, which is essential for growing high quality fruit. Leaf removal in the fruit zones increases fruit exposure to sunlight and enhances grape ripening.

### **Water**

Nearness to water, whether rivers, seas or lakes, can bring the vines the benefit of reflected heat. Water can act as a heat reservoir, releasing the heat stored by day during the night. This has the double advantage of moderating temperature and reducing risk of frost. Water also encourages mists and high humidity which can lead to mildews (always unwelcome) or rot (occasionally sought if the production of sweet white wines is the object).

### **Altitude**

For every 100 metres of altitude the mean air temperature decreases by approximately 0.6 °C. Thus a grower may choose to plant varieties that prefer cooler climates at higher altitudes, e.g. Sauvignon Blanc.

### **Aspect**

Where a vineyard is not completely flat, the direction, angle and height of the slope are important and could, for example, provide protection from prevailing winds. Frost at budding time, is less likely to be a problem since it tends to roll down slopes. It is perhaps worth reflecting on some basic botany: the vine sucks in carbon dioxide (CO<sub>2</sub>) from the atmosphere and combines it with water (H<sub>2</sub>O) from the soil to create carbohydrate (C<sub>6</sub>H<sub>12</sub>O<sub>6</sub>) in the form of grape sugars. This process is known as assimilation – there is spare oxygen (O<sub>2</sub>) left over which is transpired to the atmosphere. The vines are inclined to the morning sun when carbon dioxide in the atmosphere is at its highest level, resulting in the manufacture of more sugars.

### **Woods and trees**

Groups of trees can also protect vines from strong winds, but can have the unwelcome effect of encouraging high humidity. They also decrease the diurnal temperature range and can reduce air temperature.

### **Soil**

Vines can be grown on a huge variety of soils. In deep, rich soils, vines are vigorous and highly productive, but better wines are generally produced when the vines are cultivated in poor soils. The effect of the soil on vine behaviour and grape composition is complex, because the soil influences not only vine mineral nutrition and water uptake conditions, but also rooting depth and temperature in the root zone. Soils can be studied from a geological, a pedological, or an agronomic perspective.

### **Summary**

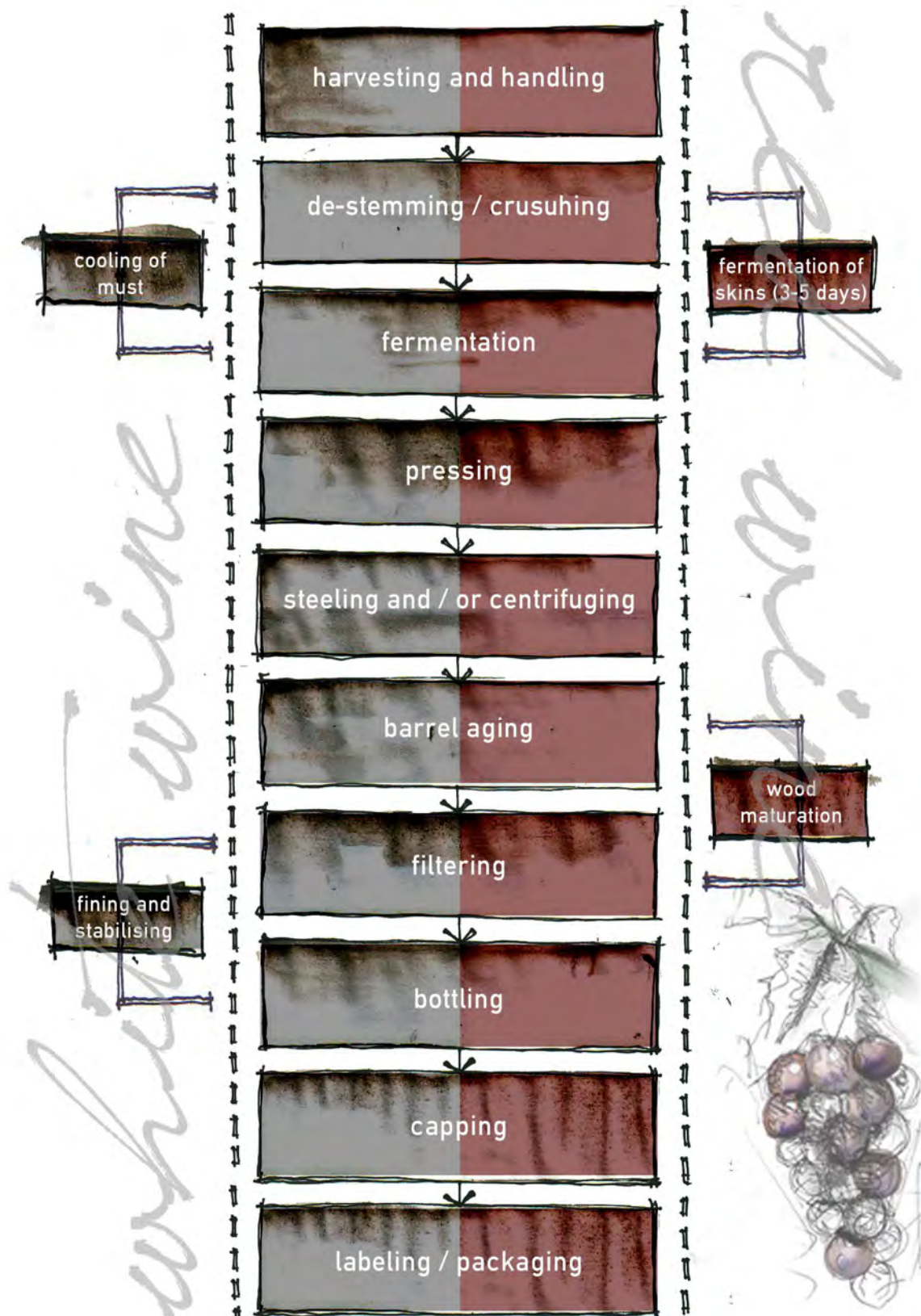
Climate can be both friend and enemy to the vine. Vines perform at their best where there is a dormant period of about 5 months and a growing and fruit-ripening period of about 7 months. Essentially, sufficient warmth and moisture are required to be able to grow, produce and ripen grapes. It is, however, important that these conditions come at the right time in the vine's annual growth cycle. Whereas climate is determined by geographical location and measured in long-term averages, weather is the result of day-to-day variation of those averages. In the end, however, it is the annual weather conditions that can make or break a vintage. Weather does not only influence the quality and style of wine produced in any given year, but can also account for considerable variations in the quantity of production.

\* All information was gathered from Grainger & Tattersall, 2005: 12 - 20



APPENDIX C

*The winemaking process (equipment and requirements)*



Appendix C  
Summary of the winemaking process highlighting the differences between white and red wine production.

The first requirement for wine making is a suitable grape species. Red wines are made from red or dark-skin grapes while white wines are made from white drapes. Sometimes, white and blush wines are made by pressing red grapes rather than fermenting the juice with the skins. If both a vineyard and a winery are being established, decisions must be made about the type of grapes to be grown in the vineyard. There are several factors that determine where various species and cultivars of grapes can be grown. These include but are not limited to: site, soil, climate, and disease. The character and quality of the wine is determined by:

- The chemical composition of the grapes, which depends to a large extent on cultivar, site, season, grape cultural conditions, canopy-management and fruit maturity.
- The fermentation style and method.
- The changes that occur naturally, or are made to occur, during the post-fermentation and aging period.

The best wineries are designed to transform the grapes into must or juice in a minimum amount of time to prevent oxidation. Making wine from any grape cultivar involves the process of fermentation, which is converting the sugar (glucose and fructose) in the grape juice into alcohol and carbon dioxide. While there is no single, all-inclusive process for winemaking, there are a series of steps or stages that are generally followed (Morris, 2008: 20&21). The following step-by-step process is inclusive of both white and red wine production.

## **HARVESTING AND HANDLING**

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Harvesting can be done by hand whereby the worker's cut bunches of grapes, placing them into baskets or lug-baskets, which, when full, are emptied into a trailer. This method allows for bunch selection (i.e - whether ripe, healthy or botrytised), and does not cause significant damage to the fruit, nor does it ever outpace the ability of the winery to process the yield. Preferred harvesting, nowadays, is mechanical in order to reduce depreciation, so that the grapes make it to the fermentation tanks in the quickest time possible. Mechanical harvesting is considerably quicker and can be carried out at night, which is a considerable bonus in warmer regions. It is generally cheaper than hand-picking (allowing for machinery costs) and delivers only grapes (no stems) to the winery. On the downside, a harvester cannot differentiate between a ripe and unripe bunch as well as causing damage to the grapes and vines. The method of harvesting is largely dependent on the size of the vineyard and the preference of the owner (Hamlington, 1993: 55). Once harvested, it is critical that the fruit is handled in a manner that will prevent quality deterioration. Juice from damaged fruit is subject to change due to enzymatic oxidation and spoilage that could cause poor wine colour and produce off flavours. One factor that affects the rate of fruit breakdown is the temperature of the fruit at harvest. The higher the fruit temperature at harvest, the faster undesirable reactions occur. Since most of the wine grapes are machine harvested, the ideal situation is for vineyards to be located near the winery so that processing



Appendix C  
Left - machine harvesting. Above and below right - harvesting done by hand.

of the grapes can begin as quickly as possible. Delivery of the grapes from the vineyard is through the receive bin or hopper at the delivery yard. This would benefit from being at a lower level to the method of delivery so that the winery can take advantage of gravity and use it to aid in the movement of the grapes within the building, maximising efficiency, and minimising damage to the grapes. The receive bin is mounted on a load cell which weighs the grapes as they are delivered. After being weighed, a screw conveyor in the bottom of the receive bin transports the berries to the de-stalker / crusher (Morris, 2008: 21).

## DE-STEMMING / CRUSHING

The first piece of machinery to be used in most wineries is the crusher - an invention of the late 19th century - and is essential in assuring quality wine. Crushing was traditionally performed by simply 'treading the grapes', a process currently known as *pigeage*. The aim of crushing is to split the skins and release the juice ready for the onset of fermentation. It is usually the decision of the winemaker whether to incorporate stems into the vinification, or whether to de-stem prior to fermentation. However, if the stems are crushed, phenolic compounds can be released into the must, so, for some higher quality wines, de-stemming before crushing is preferred. Most crushers first pass the grape bunches through a series of rollers, which crushes them and then subjects them to beaters, which removes the stalks (the crushed berries falling through a slotted floor). The traditional method of mechanically de-stemming consists of having the crushing rollers located before the de-stemmer. In most equipment the space between the crushing rollers can be adjusted and some equipment allows the rollers to be removed if crushing is not desired for the wine style. The crushing rollers should be designed and spaced to allow for crushing without chopping or flattening the skins, cracking the seeds





Appendix C

De-stemming / crushing equipment removes the grapes from their stems and crushes the fruit to release the juice.  
Left - de-stemming / crushing machine. Middle - must. Right - stems.

or breaking an excessive amount of stem tissue. In white wine production, minimum damage to the skins is especially important to prevent the release of phenolic compounds from the skins. Maceration of the skins during the crushing may also cause changes in the chemical composition of the juice which can have undesirable effects. If the outer shells of the seeds are broken during crushing, high levels of phenolic materials from the seeds may impart a bitterness or astringency to the wine. The mixture of seeds, skins, and juice, called 'must', is then taken to the fermentation tanks. The empty stalks are then taken to a compost heap and eventually used as compost in the vineyard (Morris, 2008: 23&24).

## FERMENTATION

Fermentation tanks can be of many different sizes and shapes and may be made of a variety of materials. In most modern wineries, stainless steel has become the material of choice for these tanks because it is durable, easily cleaned, and relatively unreactive to sulfur dioxide (SO<sub>2</sub>) and high acid levels. The most favourable temperature for most yeast used in juice fermentation is 21° to 26°C. To stay as close as possible to this optimum, the temperature of the fermenting liquid or pulp should be kept between 23° and 26°C. Since the conversion of sugar to alcohol during fermentation results in the production of heat which causes the temperature of the juice to rise, temperature control is an important consideration for fermentation tanks. Temperature control is especially important for tanks over 200 litres. Some wineries accomplish this control by placing the tanks in a cold room. However, most modern wineries ferment in stainless steel tanks that are jacketed so that glycol circulation can be used to control the temperature of the tank's contents. Tall tanks should have two jackets, one for the top and one for the lower portion of the tank. This will allow efficient cooling of the tank's contents even if the tank is only half full. Many temperature-controlled, stainless-steel tanks are designed so that the tank bottom is sloped and has openings that allow easy removal of pomace. Tanks generally are equipped for automatic pumping of juice over the fermentation cap for red wine production. This pumping-over process is extremely important during primary fermentation when crushed grapes are allowed to ferment on the skins to extract colour from the skins of the grapes. After 4 to 5 days of





Appendix C

**Modern wineries ferment in stainless steel tanks that are jacketed so that glycol circulation can be used to control temperature.**

fermentation, the free-run wine or fermented juice is drawn off and the drained solids pressed. The free-run juice/wine and the pressed liquid are combined and pumped to a storage tank for completion of fermentation. When locating tanks, it is important to leave passages between them for pumps and hoses, room at the top for accessing the fermentation cap, and room underneath to allow draining and easy cleaning under and around the tank. Tanks are sometimes placed outdoors; however, when considering this, it is important to assure that it is not prohibited by local zoning regulations (Morris, 2008: 24&25).

## **PRESSING**

In white wine production pressing is done before fermentation, as the skins of white grapes offer nothing positive to the wine. In the production of reds, the skins are left with the juice during part of the fermentation, allowing the colour compounds, flavours, and tannins (bittering components found in the seeds, skins, and stems that are desirable in moderate amounts) from the skins to be absorbed into the liquid. The pressing is done once the desired levels of colour and tannin have been recognized, usually no longer than about 14 days. The must will continue to ferment for several days after pressing in red wines. Pink or rose wines are made by allowing only minimal contact between the red skins and the juice, which usually requires only 2 or 3 days to impart a pink hue. Whether it occurs before or after fermentation, however, at some point the skins and seeds need to be separated from the liquid. Before the separation of seeds and skins, the grapes are squeezed to salvage every last drop of liquid - the juice that drains out under the weight of the berries is called 'free-run' juice, and is collected and kept separate. The remaining juice is then pressed out of the must, which, up until about 150 years ago - was done with the manual vertical screw-type presses. Inventions in pneumatic inflation presses and hydraulic vertical and horizontal presses revolutionized pressing by their ability to extract more juice with less pressure, resulting in a better quality juice. Most modern medium-sized and large wineries use what is known as a bladder press. This consists of a pneumatic batch press that uses compressed air to inflate an internal bag made of thick rubber. The bag crushes the must against an outer perforated, cylindrical stainless steel cage that acts as a sieve. In some presses, the juice or wine is collected

through internal draining pipes. The breaking up of the press cake for harder and more complete pressing is accomplished by releasing the pressure on the bladder and rotating the horizontal cage. The quality of the pressed wine or juice and the production method or wine style selected is determined by analyses of the various press fractions. Press fractions range from free-run juice, i.e - juice that flows freely from grapes without the use of external pressure, to hard press juice obtained by applying pressure to the grapes. Generally, hard press juice is high in phenolic compounds and other materials that can have a significant effect on pH, bitterness, and astringency. The remaining cake of seeds and skins, known as *pomace*, and is usually discarded off site. The winemaker blends the various press fractions to produce wine of the desired style. As a general rule, the highest quality wine is obtained by recombining the free-run juice with juice from the first press cycle (Morrison, 2008: 26&27).

### STEELING AND / OR CENTRIFUGING

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The look of a wine is as much of the sensory experience as the taste. The crystal-clear transparencies of both red and white wines do not occur naturally. The wine is usually clouded with dead yeast cells and fine particulate matter from the pressing. Removing the insoluble solids in white juice allows production of fruitier wines and reduces the proteins that cause stability problems. The settling of the insoluble solids can be accomplished either by cold temperature and gravity or by centrifugation. Some wineries use cold temperature settling of juice from white wine grape cultivars prior to fermentation and only centrifuge after fermentation. The centrifuge can also be used after fermentation of red wines. Small wineries may choose to rely on settling because of the cost involved in purchasing a centrifuge. Following fermentation, the yeast settles rapidly to form compact sediment in the fermentation tank. When the fermentation is completed and the yeast has settled, the fermented liquid should be separated from the yeast sediment (lees) as completely as possible, because this sediment tends to undergo decomposition, potentially resulting in the formation of undesirable flavours. The process of separating liquid from sediment is known as racking (Morrison, 2008: 27).

### FINING

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Fining is a process of clarification or stabilization whereby a fining agent is added to the juice or wine to coagulate or adsorb and quickly precipitate an undesirable component. Fining agents are used to remove colloidal compounds and proteins that cause cloudiness, to improve wine colour, aroma, and/or flavour, and to remove compounds associated with bitterness or astringency. Fining greatly speeds the clarification and stabilization process, making wine production more economical. Fining agents may be organic compounds such as egg white, casein, isinglass, carrageenan, alginate and activated carbon or may be non-organic compounds like bentonite, copper sulphate, colloidal silica and polyvinylpyrrolidone. Fining agents are selected based on the mode of action and result desired. They are used at the minimum effective dosage, based on fining trials, as desirable

compounds may also be removed from the wines. Winemakers must make use of filtering techniques judiciously to prevent subjecting the wine to harsh treatments that can compromise the flavour, in exchange for a more desirable appearance. Advanced centrifuging, filtering, and fining are all effective techniques used to remove particles suspended in the wine, but can also remove desirable flavours and characteristics if overused (Morrison, 2008: 27&28).

## **BARREL AGING**

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During barrel aging, wines undergo a series of subtle yet fundamental changes in colour and develop bouquet as the grape aroma of the young wine gradually fades. During this aging, the wine also clarifies and becomes stable. The wood of the barrel imparts tannins and flavours that add to the complexity and taste of the mature wine. The length of time required for barrel aging depends on the wine, the desired wine style, the wood of the barrel, and other factors. Each winemaker has their own unique procedure or style for barrel aging. Barrels may be made from various species of white oak. French oak barrels are mainly made from Limousin or Nevers oaks. These tend to impart a ‘vanilla’ character to the wine and are preferred by some premium winemakers. American white oak barrels cost about half as much as French oak barrels and, when used properly, are as acceptable for some wines and styles. Barrels should be made from wood with uniform grain and should have no insect damage or other defects. Ideally, the wood should be handsplit, air dried, shaped over a wood fire and toasted over an oak fire. For flavour and consistency, the life of a barrel is four to six years. After this the barrel must be rejuvenated by shaving, which extends its life for another four to six years, or it must be replaced. Barrels can usually be shaved once or twice before needing to be replaced. There are several alternatives to barrels that will impart similar characteristics to the wine. Examples of these include placing sawdust or wood staves inside the tanks. In determining if barrels or some alternative will be used, it is important to weigh the pros and cons of the procedure being considered and to consider the unique management strategies that will be required to obtain the desired results (Morrison, 2008: 28&29).



**Appendix C**  
**Oak barrel maturation imparts tannins and flavours that add to the complexity and taste of the wine.**

## FILTERING

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Proper filtration results in the removal of insoluble solids and removal of microorganisms, assuring a microbiologically stable, bottled product. Considerations in selecting a filter include the pore size of the filter, ease of maintaining sterile conditions, rate of flow, and the total amount of wine that can be put through the cartridge before it must be replaced. It increases wine yields and, depending on the volume of wine produced, may pay for itself quickly (Morrison, 2008: 29).

## BOTTLING

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Bottling is often the most mechanized part of the entire process. The primary concerns are to avoid bacterial contamination and excessive aeration of the wine. Gravity fillers are the simplest and most effective systems. Regardless of size, they should be constructed of stainless steel and should be able to be cleaned in place with steam and sprouts. The bottles are often washed and sterilized just prior to filling, and the air in the bottle is sometimes purged using carbon dioxide or inert gas, leaving a buffer against oxidation in the unfilled portion of the bottle. Bottle rinses should be made entirely of stainless steel so they can be easily cleaned and do not become an additional source of contamination. The design of the bottling area should focus on the sanitation and efficiency of the bottling process itself (Morrison, 2008: 30&31).



Appendix C

Fully automated bottling lines fill and cork the bottles before moving them directly to the labelling machines.

## MATURATION / AGING

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Some wines, specifically dark reds such as Cabernet Sauvignon, Nebbiolo, and Pinot Noir, and whites such as Chardonnay, benefit from some aging in the bottle before being distributed to the consumers. It is often advantageous for the wines to rest for one, two or even up to five years. During this period, the tannins smooth out and become mellow, and the flavours tend to meld together. While this is an investment in winery space and time, as the wine may greatly increase in shelf value during its aging; it is the winemaker's choice whether or not to age the product before sales, as it is often not in their best interest financially. Because of this, many wines are sold before they should be, and consequently most wine is consumed before it reaches its full potential (Hamlington, 1993: 20).



## CAPPING AND LABELLING

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A capsule, or thin cap, is often placed over the top of the bottle to protect the closure, improve the appearance of the wine bottle, and maintain the image of quality. Modern wineries use capsules made from materials like tin/aluminium, heavy duty plastic and heat-shrink plastic. One of the major differences in capsule types is their cost. Tin capsules are the most expensive and are often used on premium or reserve wines. Heavy duty plastic capsules are moderately priced while the heat-shrink plastic units are the least expensive. Cappings can be applied by hand using a motorized, bench-mounted, hand-fed spinner. Capsules can also be applied automatically – whereby an automatic capsule distributor is installed when labour for hand application becomes less economical. When the speed of a small bottling line reaches about 50 bottles per minute, an accumulator table should be provided at the end of the bottling line before labelling. This ensures bottling will not be held up if labelling does not keep pace with the bottling operation. Once the bottled wine is ready to be released, they are labelled. This is not done prior to storage in the maturation cellar to prevent damage or decay to the labels. Again, labelling can be done mechanically or by-hand depending upon the output of wine. The bottles are then ready to be packaged ready for distribution to retailers, or sold on the estate (Morrison, 2008: 31-32).

## APPENDIX D

### *Definition of the terms*

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<b>Bacteria</b>	Microscopic, single-celled organisms that live in soil, water, plants, organic matter, or the live bodies of animals or people. Depending on the organism present and the conditions, bacteria can be useful or may cause harm, such as product spoilage or worker illness.
<b>Batch press</b>	A press that presses one lot of grapes at a time as opposed to a continuous process.
<b>Blending</b>	Combining two or more wines for the purpose of adjusting the flavour, aroma, or other components to produce a more desirable wine.
<b>Cap</b>	The floating mass of skins and pulp that occurs at the top of the fermentation vessel during fermentation.
<b>Carbohydrate</b>	Chemical term for compounds made of carbon, hydrogen, and oxygen. The most common carbohydrates are sugars and starches.
<b>Clarify</b>	The addition of agents to wine in order to settle insoluble solids or suspended materials. Wine will also clarify during cold stabilization.
<b>Cleaning</b>	The removal of soil or other unwanted material such as fruit residues, dirt, and grease.
<b>Enology</b>	The science or study of wine and winemaking.
<b>Fermentation</b>	Converting the sugar in grape juice (glucose) into alcohol and carbon dioxide.
<b>Filtration</b>	The act of passing wine through a filter medium to remove suspended solids, yeast, and/or bacteria.
<b>Fining</b>	A method of clarifying wine by adding a coagulant to the wine and allowing it to settle to the bottom, carrying absorbed particles with it.
<b>Free-run juice</b>	Juice that flows freely from grapes without the use of external pressure such as that applied by a press.
<b>Lees</b>	The spent yeast cells that accumulate on the bottom of winemaking vessels after the fermentation is complete and the yeast has settled. Wine is usually racked (siphoned) off the lees to make it more presentable and to exclude any undesirable sensory effects that extended lees contact might impart.
<b>Microorganisms</b>	Organisms too small to be seen with the naked eye; includes bacteria, viruses, yeast, and algae. Some microorganisms are beneficial and play key roles in the production of wine and other fermented products. Other undesirable organisms may be responsible for poor product characteristics, spoilage and other undesirable outcomes.
<b>Must</b>	Grape skins, pulp, seeds, and juice that is the end product of crushing grapes.
<b>pH</b>	A measure of the acidity or alkalinity of a material. pH is measured on a scale of

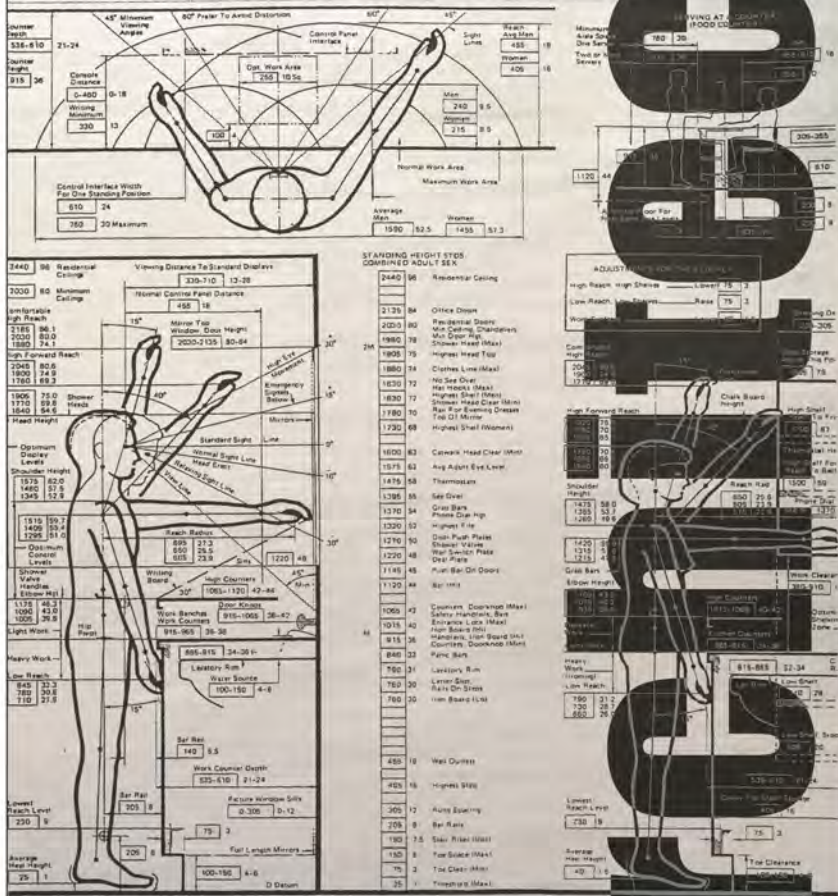
1 to 14 with 7 being neutral. The lower the number, the more acidic; increasing numbers indicate increased alkalinity.

<b>Phenolics</b>	Chemicals occurring naturally in grapes that can affect such wine characteristics as colour, flavour, and texture. Assuring the presence of the appropriate phenolics in the proper proportions is one of the challenges of winemaking.
<b>Pomace</b>	Those portions of the grapes, including seeds, pulp, and skins, left after the juice is removed.
<b>Potable water</b>	Water that is free from impurities and considered safe for drinking.
<b>Press juice</b>	Juice that requires pressure to remove. This juice usually comes from areas of the grape berry near the seeds and skins and often contains higher levels of phenols and proteins than free-run juice. Hard-press juice usually comes from the last press cycle.
<b>Pumping over</b>	Pumping wine out from the bottom of a fermenting tank and over onto the top of the fermenting mass keeps the 'cap' of skins wet. This process is usually done during fermentation of red wine in order to achieve complete extraction of the colour and flavour.
<b>Racking</b>	Moving wine from one container to another, usually for the purpose of ridding the wine of sediment.
<b>Sanitizing</b>	Treatment of clean surfaces to reduce the number of potentially harmful microorganisms present to safe levels.
<b>Sediment</b>	Solid materials that settle to the bottom of tanks or bottles when juice or wine is allowed to stand undisturbed. These materials may be removed by filtering or by allowing them to settle and then racking off the liquid.
<b>Sulphur dioxide</b>	(SO <sub>2</sub> ) A preservative used in both must and finished wine since it serves to preserve aroma, flavour, and colour. SO <sub>2</sub> also helps to inhibit the growth of microorganisms in wine. In recent years, there has been a trend to limit the amount of sulphur products used in winemaking because some consumers have experienced health issues when consuming sulphites. In addition, large amounts of sulphites can have a negative effect on wine flavour and pH.
<b>Tannins</b>	A group of phenolic compounds found in grape stems, seeds, and skins. The presence of these compounds contributes to astringency and bitterness in wine.



Today, our Western world faces a paradoxical situation - at the height of technological mastery, architects often misinterpret the body as an object of architecture, which considers the body an unresponsive physical entity, that does not existentially engage with space. "Increasingly, buildings come to be designed in response to mechanics of their erection, whereby architecture is concerned with design as an objective process of producing an objective environment for the body as an object".

Healey 2004: 20



Part I of this dissertation, the academic research document, was inspired by a general architectural problem - architecture which is derived from the analytical, programmatic, and scientific approach to the body - that which outlines the body as definable, analyzable, measurable, predictable, and solvable - which subsequently renders the body a product of consumerism and mechanization and is detached from concepts of the lived body. The volatile, emotional, sensing, responsive, and relational body largely fails to be incorporated into contemporary architectural ideals. The study was, therefore, motivated by notions of the subjective body; the body that moves, the body that feels, and the body the senses - in order to explore dialogue in architecture which is often disregarded; concepts such as beauty, essences, embodiment, and relationship. The research, therefore, introduced an architecture which transcends fixed notions of style and emerging technologies; it emphasized the lived experiential realm of the built environment which focused on the need to encourage and illustrate the pursuit of design - not as a project, imposing preconceived ideas upon a situation, but as a process evolving from the inside - from movement, sensation, surrounding, and dialogue between body and architecture. The focus of the research was placed on the human embodied experience of sensory space. Three parameters of the sensory body were identified, namely:

the 'flesh' body which introduces the universal role of the traditional five sense modalities in architecture;

the environmentally sited body, which broadens the scope and palette of the senses by introducing environmental variations; and

the culturally sited body, which identifies the notion of a 'sixth sense' - that which is culturally conditioned in order to understand concepts of meaning, memory, and cultural identity.

Overall this dissertation identified an attitude to architecture that recognises the value of the human body not only as an inspiration for design, but as the very reason for architecture to exist at all.

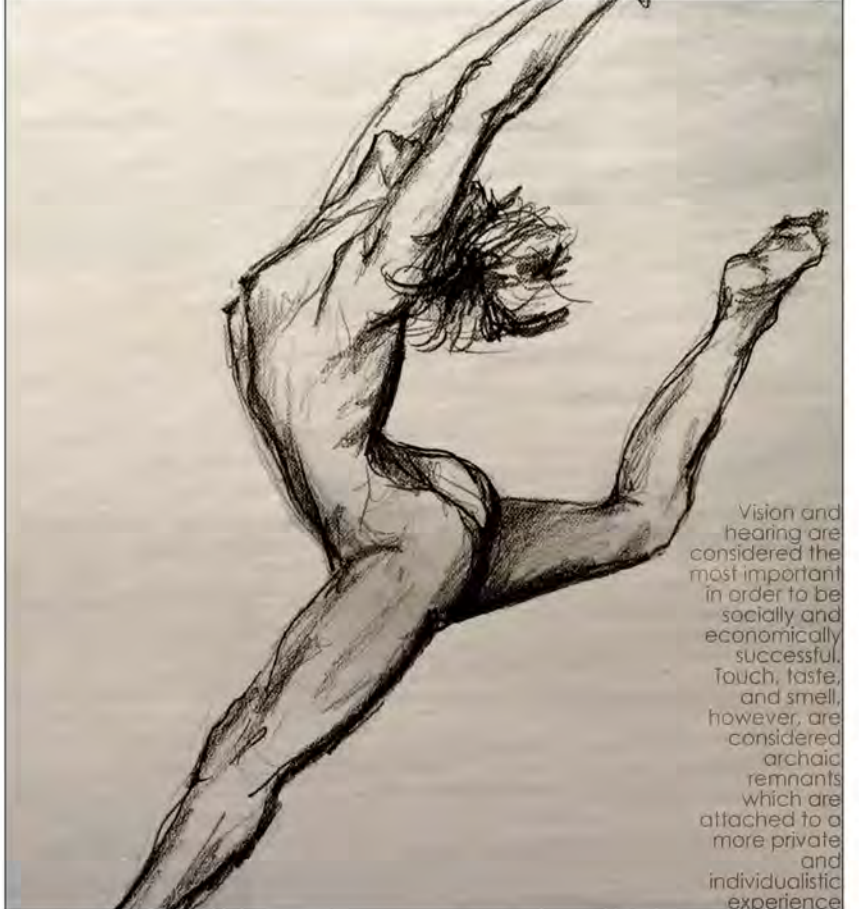


# the body as an subject of the built form

# SENSORY architecture

"The body is at once the most solid, the most elusive, illusory, concrete, metaphorical, ever present and distant thing - a site, an instrument, an environment, a singularity and a multiplicity" (Palasmaa, 1993: 26).

The first part of the dissertation dealt with the investigation of the role of architecture that incorporates the moving and sensing body; the body that is often disregarded or accounted for as a passive process in contemporary architecture. It is noted that the built environment enables us to perceive and understand reality and self-identity and that the full embodied experience of architecture is important if we are to perform the idea of the lived body as beings of emotion. By re-visiting, re-visioning, and rethinking space and place with a sensitized consciousness, the body as a subject of architecture suggests that the built form has the ability to balance the emotional and physical needs of the users. A meaningful architectural appreciation of both interior and exterior space cannot just be taken as a formal appreciation of the facadad treatment; architecture needs to be encountered, confronted, and interacted with in order for it to engage in a human dimension. This means that the authenticity of architectural experience is comprehended by our entire bodies and thus our experiences are articulated through the sensations evoked when moving through space. The body needs to be viewed as the centre point of the perceptual world in order for architecture to respond to our sensory needs. In order for this to happen the five sense modalities need to be considered equal to create and permit an embodied experience. The unifying sensory element is that of architectural matter - the physical and emotional mediator and that which defines the dialogue between the lived body and the built form. The human body is thus, our most fundamental three-dimensional possession and it should be considered as the core concern as to how we perceive architectural space. This portion of the study, which dissected the totality of sensory experience, thus revealed a clear understanding of the responsibility of architecture to respond to the body as a subject; in this particular case, the subject of the traditional and universal sense modalities.



Vision and hearing are considered the most important in order to be socially and economically successful. Touch, taste, and smell, however, are considered archaic remnants which are attached to a more private and individualistic experience.

**sight** The hegemony of vision in our current contemporary culture is reinforced with a statement by Le Corbusier, "I exist in life only if I can see[...] I am and I remain an impenitent visual - everything is in the visual[...] One needs to clearly see in order to understand[...] I urge you to open your eyes" (Le Corbusier, 1991 cited in Pallasmaa, 2005: 27).

**sound** "Sight isolates, whereas sound incorporates; vision is directional, whereas sound is omni-directional. The sense of sight implies exteriority, but sound creates an experience of interiority. I regard an object, but sound approaches me; the eye reaches, but the ear receives. Buildings do not react to our gaze, but they do return our sounds back to our ears" (Pallasmaa, 2005: 49).

**touch** "While images of architecture can be rapidly consumed, haptic architecture savours, plasticity, materiality, tactility and intimacy[...] is appreciated and comprehended gradually, detail by detail [...] Focused vision makes us mere observers; tactile perception transforms retinal images into spatial and bodily experiences, encouraging participation" (Pallasmaa, cited in McCarter, 2008: 235).

**smell** "A particular smell may make us secretly re-enter a space that has been completely 'erased' from the retinal memory; the nostrils project a forgotten image and we are enticed to enter a vivid daydream" (Pallasmaa, 1993: 32).

**the visceral body at the centre point of the perceptual world**

# architecture of the flesh



This section of the dissertation highlighted that contemporary, homogenised architecture fails to incorporate the essence of place resulting in predictable environments whereby the spatial and sensory experience remains static and disengaging. The principles of sensorially inhibited architecture gives light to a kinetic way of incorporating environmental sensations through overlapping opposing phenomena. By weaving environmental inconsistencies such as light and materials - architecture can elevate the sensory experience of daily life through various phenomena that emerge from our surroundings. **By intertwining the fabrication of architectural and environmental schemata negates us to move through space as the mysteries of unfolding fields of overlapping perspectives are charged with a range of sensory qualities, which imbue the experience in variety and animism.** Kinetic characteristics of environmental perceptions can be shaped, contrasted, and combined to make buildings which enliven and sensitize space. **The oppositional forces of inside and outside; light and shadow; materiality and time; and solidity and fluidity are complementary; whereby each exists by virtue of the other and should not to be treated as oppositional, but as mutually defining.** In doing so the **built form transforms and extends the traditional five sense modalities to include those of the environment in order to embody architecture in both place and body.** This allows for a more sensorious approach as it treats environmental phenomena as animate materials in architecture, evoking a sensory and kin-aesthetic experience. We experience architectural spaces as a "kaleidoscope of kinetics teeming with varying degree of light and dark, the rise and fall of colour saturation, vibrations of growth and decay and, the essential ingredient and possibly the most diverse; human beings living out their daily existence" (Holl, 1994: 35). This notion encourages architects to understand that while the body engages in inner mental phenomena as an inward awareness, the body simultaneously engages in outward physical phenomena. Phenomenology, concerns the study of essences; it is thus ascertained that **by acknowledging environmental phenomena as an architectural material, the built form has the potential to put essences back into existence, whereby the architecture becomes embodied by its sensorially enlivened environmental context.** The infusion of the sensory materiality of the built form fused with the kinetic qualities of environmental sensations, can reintroduce essential, intrinsic meanings and values to the sensory and embodied experiences of body and place.

"The human mind is not some otherworldly essence that comes to house itself inside our physiology. Rather, it is instilled and provoked by the sensorial field itself, induced by the tensions and participations between the human body and the animate earth[...]By acknowledging such links between the inner, psychological world and the perceptual terrain that surrounds us, we begin to turn inside-out, loosening in the psyche from its confinement within a strictly human sphere, freeing sentience to return to the sensible world that contains us" (Abram, 1996 cited in Franck & Lepori, 2007: 35).



contemporary architecture is missing the potential transactions between the active body and the dynamic environment which creates homogenous environments that demand little from us, and consequently gives little in return besides the shelter of a 'cubical cocoon'.

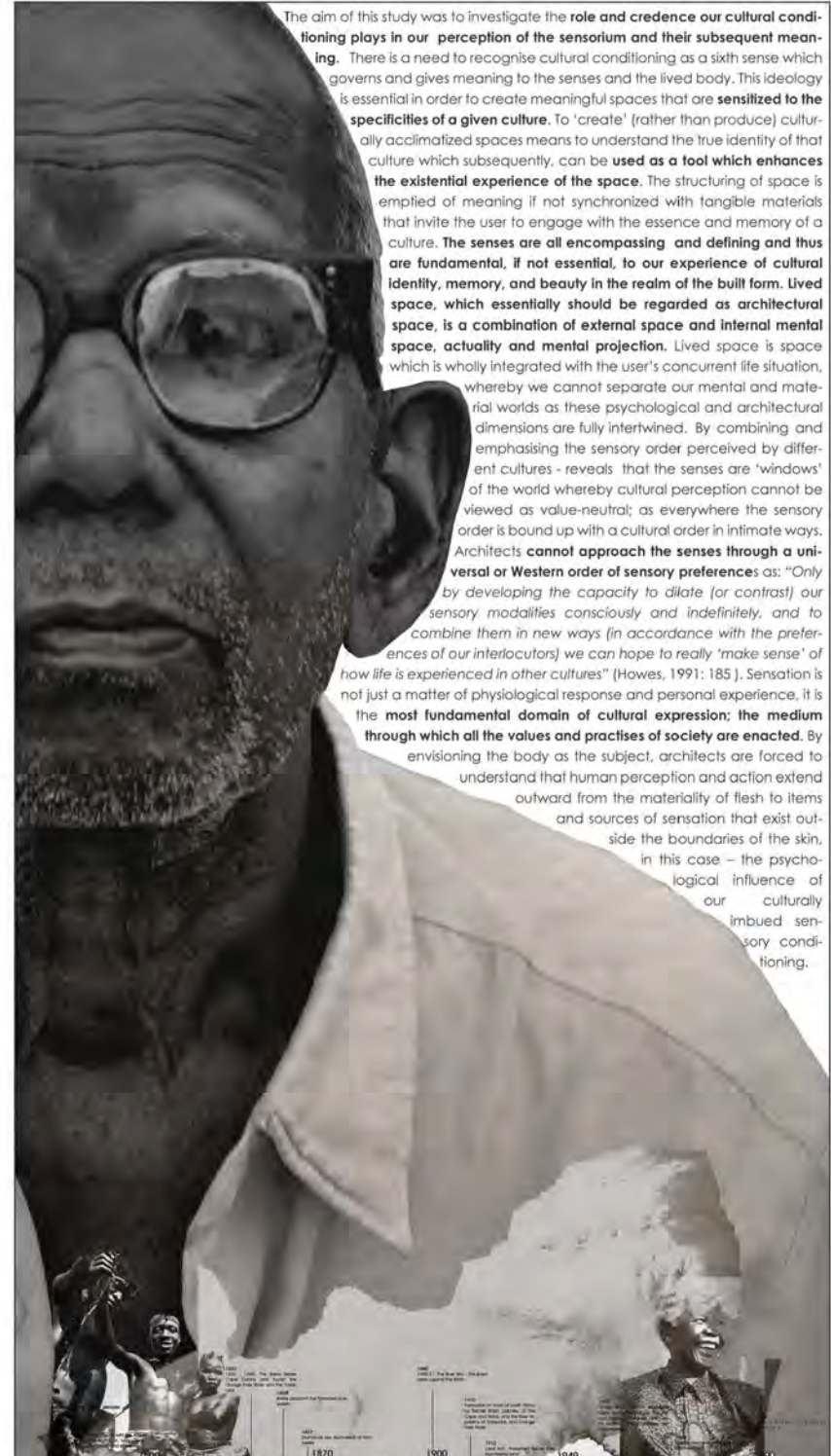
places need to be viewed by architects as potential sensory stimulants, or rather that the boundary between inside and outside needs to be blurred, which requires architecture to be looked at through a phenomenological lens that combines intangible phenomenological components of environmental experiences.

experience of place through environmental perceptions  
enmeshing phenomenal zones - balancing opposites such as:

- light and shadow
- materiality and time
- solidity and fluidity

Animistic nature of environmental variations  
Architecture is given life by all the qualities that touch and affect the human senses; incorporation of environmental sensations increase the built form's sensory palette and potential active encounters.

# animistic architecture - engaging kinetic qualities of place environmental sensations



The aim of this study was to investigate the role and credence our cultural conditioning plays in our perception of the sensorium and their subsequent meaning. There is a need to recognise cultural conditioning as a sixth sense which governs and gives meaning to the senses and the lived body. This ideology is essential in order to create meaningful spaces that are sensitized to the specificities of a given culture. To 'create' (rather than produce) culturally acclimatized spaces means to understand the true identity of that culture which subsequently, can be used as a tool which enhances the existential experience of the space. The structuring of space is emptied of meaning if not synchronized with tangible materials that invite the user to engage with the essence and memory of a culture. **The senses are all encompassing and defining and thus are fundamental, if not essential, to our experience of cultural identity, memory, and beauty in the realm of the built form.** Lived space, which essentially should be regarded as architectural space, is a combination of external space and internal mental space, actuality and mental projection. Lived space is space which is wholly integrated with the user's concurrent life situation, whereby we cannot separate our mental and material worlds as these psychological and architectural dimensions are fully intertwined. By combining and emphasising the sensory order perceived by different cultures - reveals that the senses are 'windows' of the world whereby cultural perception cannot be viewed as value-neutral; as everywhere the sensory order is bound up with a cultural order in intimate ways. **Architects cannot approach the senses through a universal or Western order of sensory preferences as: "Only by developing the capacity to dilate (or contrast) our sensory modalities consciously and indefinitely, and to combine them in new ways (in accordance with the preferences of our interlocutors) we can hope to really "make sense" of how life is experienced in other cultures"** (Howes, 1991: 185). Sensation is not just a matter of physiological response and personal experience, it is the most fundamental domain of cultural expression; the medium through which all the values and practices of society are enacted. By envisioning the body as the subject, architects are forced to understand that human perception and action extend outward from the materiality of flesh to items and sources of sensation that exist outside the boundaries of the skin. In this case - the psychological influence of our culturally imbued sensory conditioning.

"Mans sensory perceptions are abundant and overwhelming, He cannot attend to them all at once. In great part a given culture teaches him one way or another way of productive specialization. It brings him to organize his sensorium by attending to some types of perception more than others, by making an issue of certain ones while relatively neglecting others. Given sufficient knowledge of the sensorium exploited within a specific culture, one could probably define the culture as a whole in virtually all its aspects" (Howes).

cultural identity one	cultural identity two	cultural identity three	identity
			i'm lovin' it
			memory
			beauty

# the presence and meaning of our sensory conditioning the sixth sense - cultural



universal senses

architecture of the flesh: the human embodied experience...

the body in the centre point of the perceptual world  
the body in motion

toward a sensual balance  
the sound of space  
the shape of touch  
the scent of space

architecture - the subject is matter



thermal baths  
peter zumthor  
[switzerland, 1996]



saik institute  
louis kahn  
[california, 1965]

environmental senses

engaging architecture in environmental perceptions ...

revealing sense of place: blurring the boundaries  
experiencing place through environmental perceptions

enmeshing of phenomenal zones - balances opposites  
light and shadow  
materiality and time  
solidity and fluidity

animistic nature of environmental variations



blur building  
diller scofidio & renfro  
[switzerland, 2002]



cologne museum  
peter zumthor  
[germany, 2007]



dominus  
herzog & de meuron  
[california, 1998]



cristobal stabies  
luis barragan  
[mexico, 1968]

cultural senses

the meaning and presence of our sixth sense in architecture...

understanding our sixth sense

the sixth sense and its cultural meaning in architecture  
our 'sense' of identity  
reconstructing a 'sense' of memory in architecture  
our 'sense' of beauty in architecture

separated and connected  
the sixth sense as a physical mediator



loislum winery  
seteven holl  
[austria, 2003]



berlin jewish museum  
daniel libeskind  
[germany, 1999]

johannesburg

apartheid museum

The focus of this study did not concern the buildings emotional response owing to its visual content, but rather, the architectures embodied response as a container of memory - both individual and collective. Its mode of memory-making is inconsistent - whereby disconnected fragments of the building have been successful in sensory application, such as restriction and flow of movement, and the narrative and tactile materiality of the exterior spaces. The memory and experiences of apartheid fail to be enacted in the architectures sensory presence as spaces are not enmeshed in an intertwining narrative. This disconnected embodied experience detaches emotion of the "flesh" body of the visitor and that of the racialized body of apartheid - whereby apartheid is recalled at a distance. It constructs a voyeuristic spectacle [...] The mode of memory-making is theatrical and propagandistic, bringing together historical records and entertainment. The lack of dialogical sensory spaces in the Apartheid Museum, however, fails to transform the essence of memory into a tangible and emotive experience, whereby the opportunity to create a holistic, intimate, and honest encounter with the past, has been overlooked.

pretoria

freedom park

The concern of this study was not with the particularities of the architecture, but rather, how the development of the site has responded to enhancing pre-existing phenomenal zones in order to produce a kinetic and sensory response. Freedom Park attempts to use the emotive qualities of environmental and cultural perceptions in order to actively engage visitors in the identity and memory of South Africa. It further endeavours to evoke notions of healing, inspiration, and unity through markers of environmental identity and memory. Arguments posed in the research document, point to an enmeshed approach, whereby boundaries between interior and exterior are blurred in order to create a 'tapestry of cultural intervention'. The journey between the differing elements of Freedom Park, however, does not receive the same detailed attention as invariable light and shadow, and materially characterize a homogeneous sensory experience whereby the narrative of the site is 'silenced' - so to speak. Freedom Park is an ordered presentation with concentrated areas which relate their meaning to a pattern of underlying structures and interconnections.

stellenbosch

dornier winery

Dornier Winery in Stellenbosch, was chosen for its incorporation of the sensory process of wine-making and its translation of these processes into the architectural experience.

"Smell was used to excite the experience of place and enhance its memorableness. Just as smell is more an exact witness of the eyes in the art of wine tasting, Dornier prioritizes the senses in order to respond to the function of the building" - J Malherbe.

The sensory experience of the architecture enhances the visitors overall experience of the wine-making process. The aesthetic and detailing of the building is rooted in simplicity; all surfaces are kept as neutral and undisturbed as possible, with minimal visual embellishments in order to create a body-centred experience dominated by sensory stimulation. The origin of the design conception was to create unity which - visually as well as tactilely, aurally, and olfactory - would bring together the heterogeneous existing environment. The architecture's unassuming structure facilitates and augments the experience naturally found onsite. The concepts behind the Dornier Winery, have translated into an animate architectural experience of colour, texture, human scale, light, and shadow which enhances the sensory encounter. Above all, the architect has considered the pre-existing natural phenomena as a source of stimulation whereby the possibilities for design to evoke sensory and kinaesthetic experiences have been seized.

sensual balance

Bodily movement through space  
The architecture of sound, touch and smell

perceptual experience of place

A phenomenological approach  
The use or misuse of environmental perceptions

identification of the sixth sense

'Sense' of cultural identity  
Reasons for selected building materials

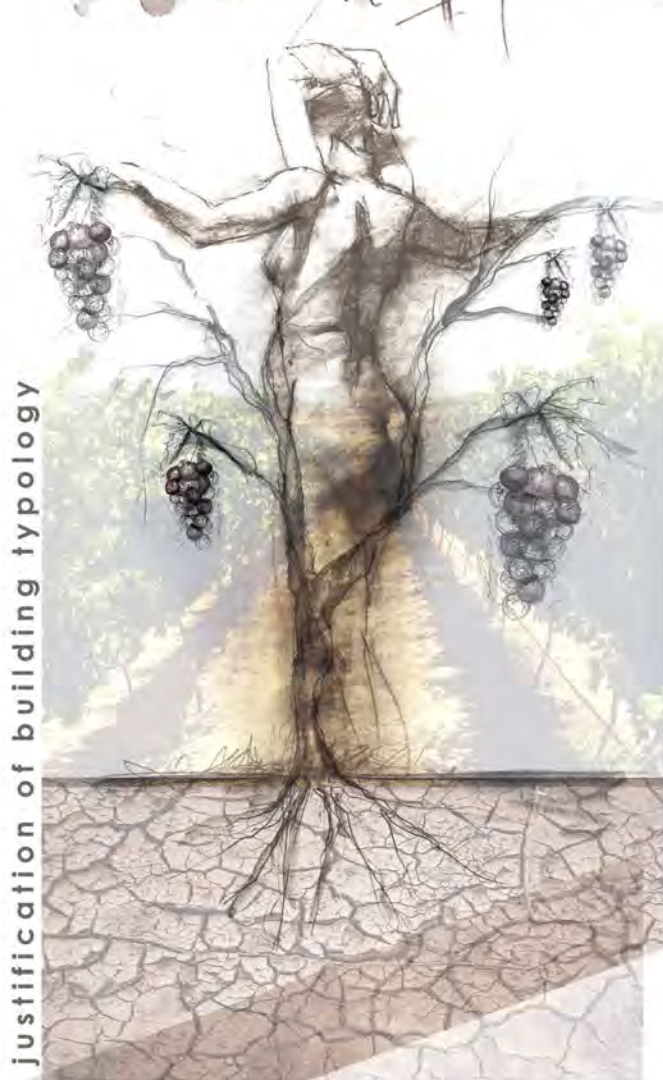
# the universal, the environmental, and the cultural body precedents and case studies



In normal life no one goes around tasting, listening, touching, and smelling space; rather bodies experience space as an integrated whole - a winery illustrates the integrative nature of perception and allows for design opportunities to express and stimulate certain sensations. Space is viewed as a predominantly visual experience of the atmosphere - of the emptiness or void contained within a structure, however, a winery accommodates an environment for life contained within its walls - an environment that is naturally stimulating to the senses. The function of a winery is one that responds to the visceral body, its processes, and ultimate manufacture aim to please the bodily senses - the realms of touch, smell, sound, taste, and sight are an important part of successful winemaking - it, therefore, becomes the responsibility of the architecture to manifest these ethereal properties, whereby function, architecture, and body are enmeshed.



sensory garden - dornier winery, stellenbosch



justification of building typology

Many wine-makers say that the process of winemaking is simply a tool for extracting the flavours of the earth - a process commonly referred to as terroir. Essentially this encompasses the belief that specific wine produced from specific grapes is a reflection of the specificities of place, whereby the character of the wine made from a single identifiable patch of ground reflects not only what one can see but also reveals the deep history of the place, and the dynamic mix of forces and events which form its geological and geographic heritage. All of these forces including: sun, topography, bedrock, sediments and soil, temperatures, and rainfall combine to create a plot of land which produces grapes of a truly unique character. Over the centuries, French wine-makers developed the concept of terroir by observing the differences in wines from different regions, vineyards, and even different sections of the same vineyard. The French began to crystallize the concept of terroir as a way of describing the unique aspects of a place that influence and shape the wine made from it. This provides an opportunity to apply the same ideology to the built form whereby the architecture is a reflection of the specificities of its surrounding environmental qualities. This chosen building typology relies on the processes of light and shadow, water, wind, temperature, sun, properties of the soil, etcetera, for its product to be successful and, therefore, an integration of these elements into the design would be embraced if not essential.

A winery essentially involves an isomorphic relationship between the existential and the architectural space, whereby the building typology is able to integrate its structure into a personal representation - as well as translate its existential representation into a concrete architectural structure. A winery is a space and place people come to experience and apply to a field of perceptual experience involving person and setting, together with the range of historical and cultural influence, knowledge and meaning that invariably imbue the field of the winemaking. The method of winemaking is essentially a process involving a narrative from plantation to production - this same ideology of narrative is experienced in the chronology of culture and history and its interpretation into architectural meaning. Just as wine is a product of the earth, the subsequent architecture lends itself towards being a product of its cultural perceptions.

- 1 - look: colour 
- 2 - smell 
- 3 - swirl: aerate 
- 4 - legs 
- 5 - taste 

# the concept of the body in the winemaking process sensory experience of wine



Below maps provided by the KwaZulu-Natal Department of Agriculture and Environmental Affairs. Factors considered in the determination of suitable areas included:

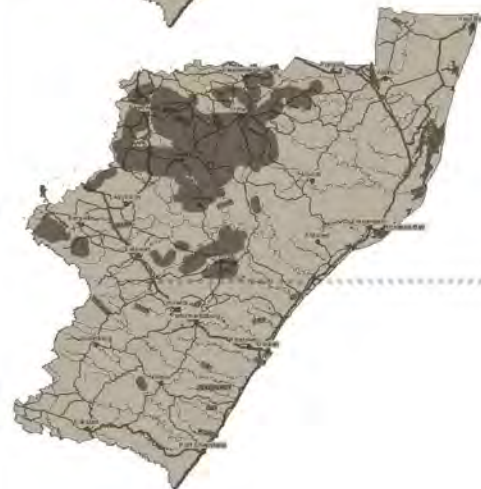
- chill units
- temperature
- frost
- soil conditions



areas deemed suitable for good quality wine

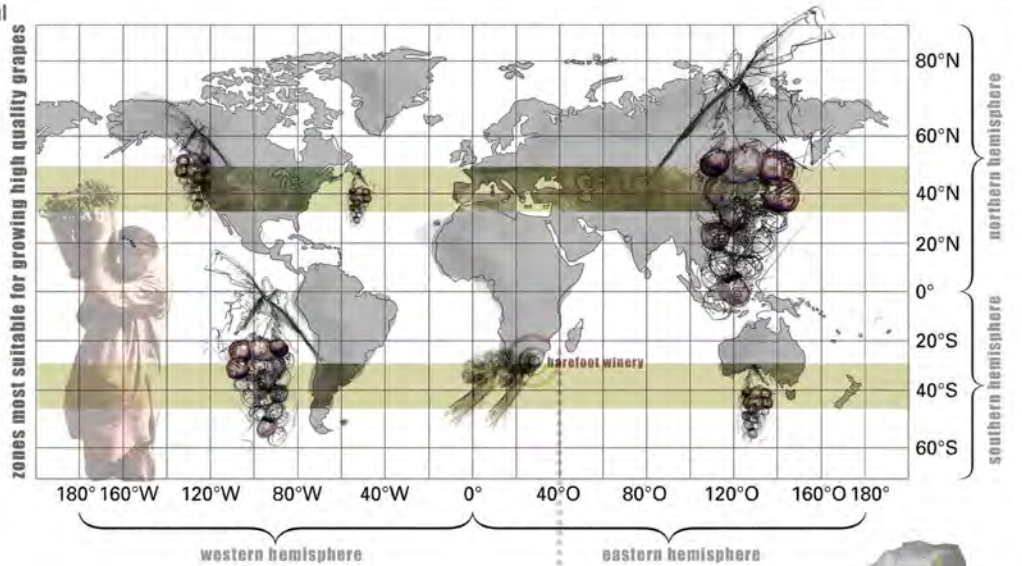


areas deemed suitable for standard quality wines and ports



areas with greater heat units which would produce grapes with higher sugars and lower acid levels suitable for desert wines and sherry

### kwazulu-natal



### south africa

There is currently a popular misconception that the Western Cape is the only South African region capable of successfully producing wines due to its favourable climatic conditions. Following an interview with Rob Osborne, a horticulturalist at the KwaZulu-Natal Department of Agriculture and Environmental Affairs (KZN DAE) at Cedara; KwaZulu-Natal (KZN) provides a very different climate and soil type - which in turn produces a very different taste to that of the Cape wines.

### midlands meander

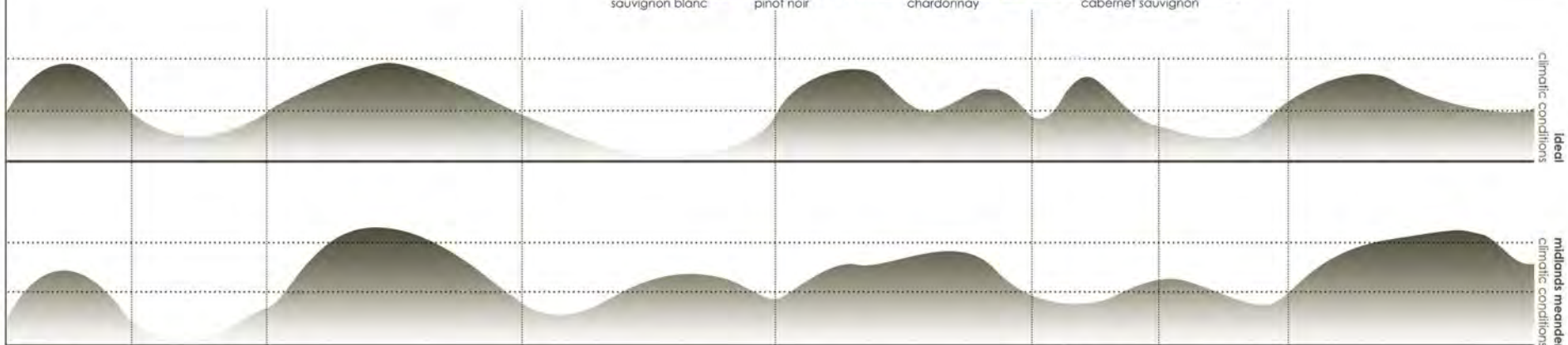
Osborne maintains that due to the nature of vineyards - the climatic conditions and altitude they require; and the cultural and social conditions in which wineries thrive - the siting of the winery would benefit from being restricted to the Natal Midlands region. According to Osborne, the unique conditions and character of the KwaZulu-Natal Midlands region provides an opportunity to expand the South African Wine Industry and increase the variety of wine produced by South African soil to be exported internationally.

### balgowan site

site demarcated by KZN department of agriculture and environmental affairs  
grapes varieties recommended to grow onsite...



sauvignon blanc pinot noir chardonnay cabernet sauvignon



ideal climatic conditions  
midlands meander climatic conditions

#### TEMPERATURE

To fully ripen, grapes need a sufficient amount of heat during the growing season. Many of the vine's metabolic processes will stop below 10 degrees Celsius. At the same time, winter temperatures must be cold enough to encourage the vine to go dormant. Like so many aspects of quality grape growing regions, moderation is crucial. Throughout the world, high quality wine regions experience relatively similar temperatures. Most of these regions are between the 30th and 50th parallels in either hemisphere. Because temperature has such a profound impact on acidity in grapes, viticulturalists must match the variety to the temperature of the region. Fuller bodied grapes generally like warmer temperatures. These include Syrah, Zinfandel, Cabernet Sauvignon and Vignier. Wines made from these varieties have assertive flavors and complex textures on the palate. Lighter bodied grapes thrive in cooler temperatures. These grapes include Pinot Noir, Riesling and Gewurztraminer. Varietal clarity and finesse are paramount with these varieties.

#### SUN EXPOSURE

Sun exposure is crucial not only for photosynthesis, but also for the heat it provides. Grapes will not ripen in a region that has an average annual temperature of less than 10 degrees Celsius and equals 2,500 degree days. Without enough sun exposure, grapes will not develop sufficient sugar and will be too acidic. This fruit will produce thin, astringent wines with low alcohol. At the same time too much direct sun exposure can burn the fruit and will lead to excessive sugar development. The result is unbalanced wines with a lack of acidity and too much alcohol. It is important that temperatures are relatively cool during harvest. Excessive heat can upset the acidity/sugar balance before grapes reach the Winery. Fuller bodied varieties generally enjoy more sun and heat. Grapes known for their forward characteristics, like Zinfandel and Vignier, thrive in warmer, inland climates. Warm temperatures are essential for tannin and pigment development.

#### FOG EXPOSURE

An exception is extremely cold temperatures. Fog is first and foremost a moderating influence, and KwaZulu-Natal's warm temperatures are usually moderated by being cooled down. These climates usually make lighter-bodied wines that are tart and refreshing. Grapes known for their refined characteristics including Pinot Noir and Muscadet thrive in cooler, often coastal climates that experience a lot of cloud cover. Climate is the generalized weather patterns of a geographic location. While the climate of a region guides many decisions during the grape growing process, actual weather patterns can vary significantly. In KZN Wine Country, it seems that unpredictable weather is the norm. The weather patterns of a particular growing season affect that vintage's characteristics. Anomalous fog can throw off growers who base their decisions on a region's general climate.

#### WIND EXPOSURE

Wind moderates warm and cool temperatures in the vineyard. It will cool temperatures on a warm summer day, but will warm temperatures on a cold spring morning. Because most of the regions in KZN Wine Country are quite warm during most of the year, wind usually cools temperatures. This slows down the maturation process of grapes. Moderate wind is good, but too much will stop the metabolic processes in grapevines. Wind can help prevent humidity, mildew and other mold. Vineyard managers can prune the leaves right around grape bunches to increase wind exposure. Grapevines grown on hillsides and slopes are usually exposed to more wind.

#### RAINFALL

Rainfall brings cloud cover and moderates the temperature. One of the reasons that KZN produces such quality grapes is that the area generally has dry weather in late spring and summer. Too much rain during these months can cause grey rot and other diseases. A rainy summer can also push back the harvest date. But some rain is necessary during these months. There are specific times during the growing season that rain can be disastrous. Rainfall right before fruit set can cause millerandage or coulure. Both occur when the grapes are not properly fertilized due to cold weather or excessive rain. Precipitation right before harvest is also bad news. The vines eagerly suck up the water and the sugar/acidity balance is thrown off. Delicate varieties such as Riesling and Pinot Noir are particularly susceptible.

#### HUMIDITY

Humidity is often the culprit of diseases caused by mold and mildew. On the other, the right amount of humidity at the right time can cause one of the natural wonders of grape growing: botrytis cinerea. In Sauternes and Barsac, Sauvignon Blanc and Semillon are used to produce the great botrytis cinerea wines of the world. "Noble rot" develops after veraison when rain and humidity are followed by sunny weather. However, if botrytis cinerea strikes a vineyard before veraison, it is no longer noble and is called grey rot instead. This disease also forms when the sun does not followed extended periods of humidity. If they are constantly moist, the grapes will eventually spoil. But when noble rot sets properly, it results in very sweet wines with complex aromas and concentrated flavors.

midlands meander with its mild summer temperatures boasts South Africa's coolest vineyards. According to the above study the following varieties of wine are best suited to the climatic conditions found onsite...



sauvignon blanc

pinot noir

chardonnay

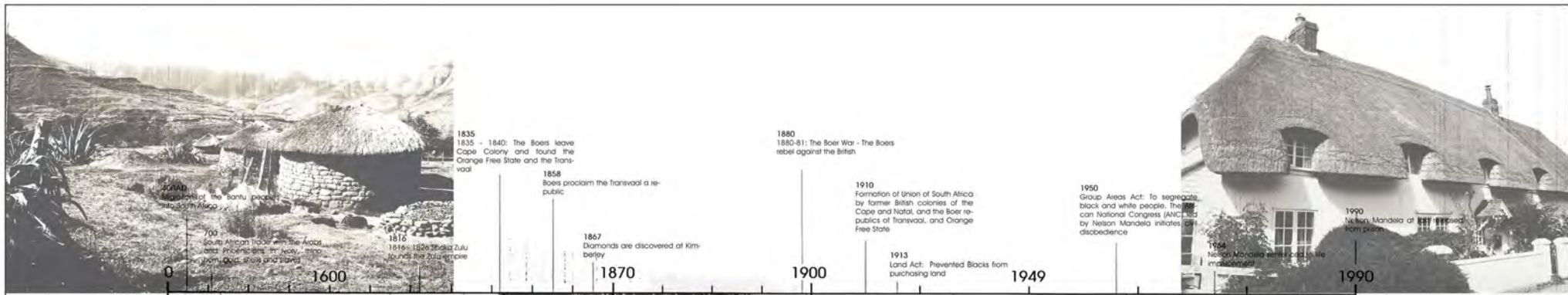
pinotage

cabernet sauvignon

# midlands meander suitability of region

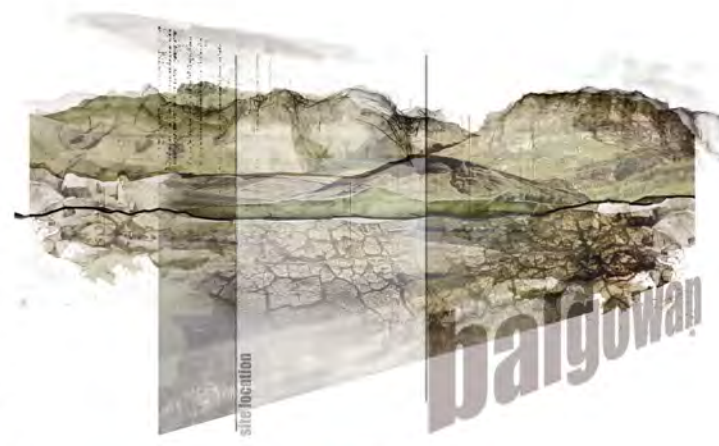
areas deemed suitable for successful quality wine-growing (globally, south africa, kwazulu-natal, midlands meander, balgowan)



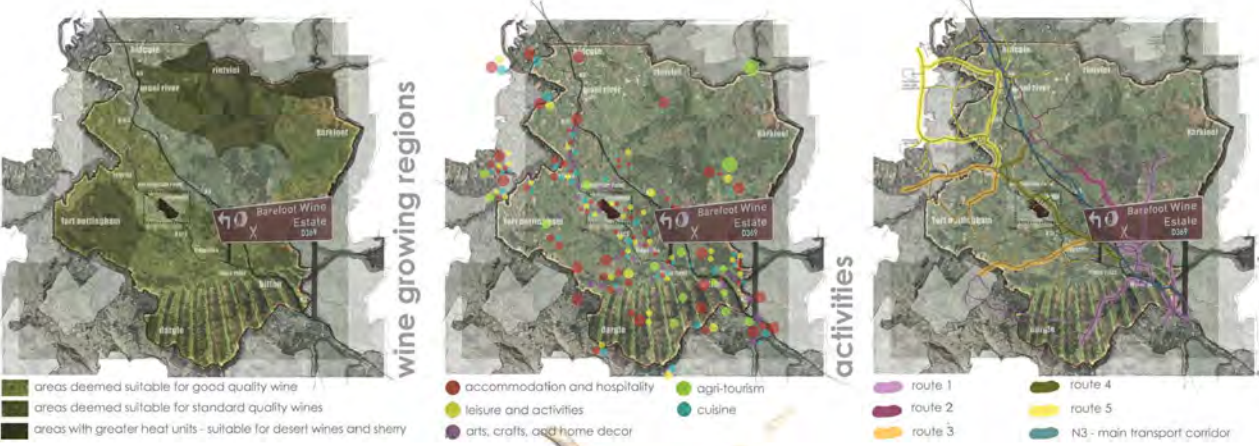


brief history of wine-growing in KwaZulu-Natal midlands meander region

In 2001, vineyards were planted in KZN as a 'trial run' to investigate the plausibility of growing and making wine in the region. Approximately 4000 vines were distributed among prospective growers in an experiment led by the KZN Department of Agriculture. Eleven participating farms were cited as growers and ambitions included rural development projects, in which to further expand vineyards and subsequent wine production. The results of this experiment failed largely due to the lack of local knowledge with regards to proper maintenance of the vineyards, and lack of unskilled labour with regards to the production of wine. In 2002, to further promote the wine-growing industry in KZN, trial plantings of grapes continued in various pockets scattered across the Midlands. The possibility of establishing the Midlands Meander as a wine-growing region acted as a catalyst which attracted other interested parties to the area. KZN was designated as a Wine of Origin under the classification scheme of South African Wine in August 2005. This saw privately funded individuals who started to explore the viability of making and producing wine in a former non-demarcated Wine of Origin region. As such the production of wine is a relatively new development in KZN; however, the present growing number of new vineyards in the Midlands region is successfully producing quality wines which are currently being exported both locally and internationally. As a result the Natal Midlands region is beginning to emerge as a premier wine route in the country, following in the footsteps of the renowned Cape Wine Route. Most of the estates in the Midlands region, however, import their grapes from surrounding areas due to the time and effort required to establish a mature vineyard - turning their function into a mere bottling and labelling facility - offering the visitor a limited experience of the winemaking process. This provides an opportunity for the establishment of a new winery facility to act as a landmark for the Midlands wine route and a catalyst for future winery development in the area.



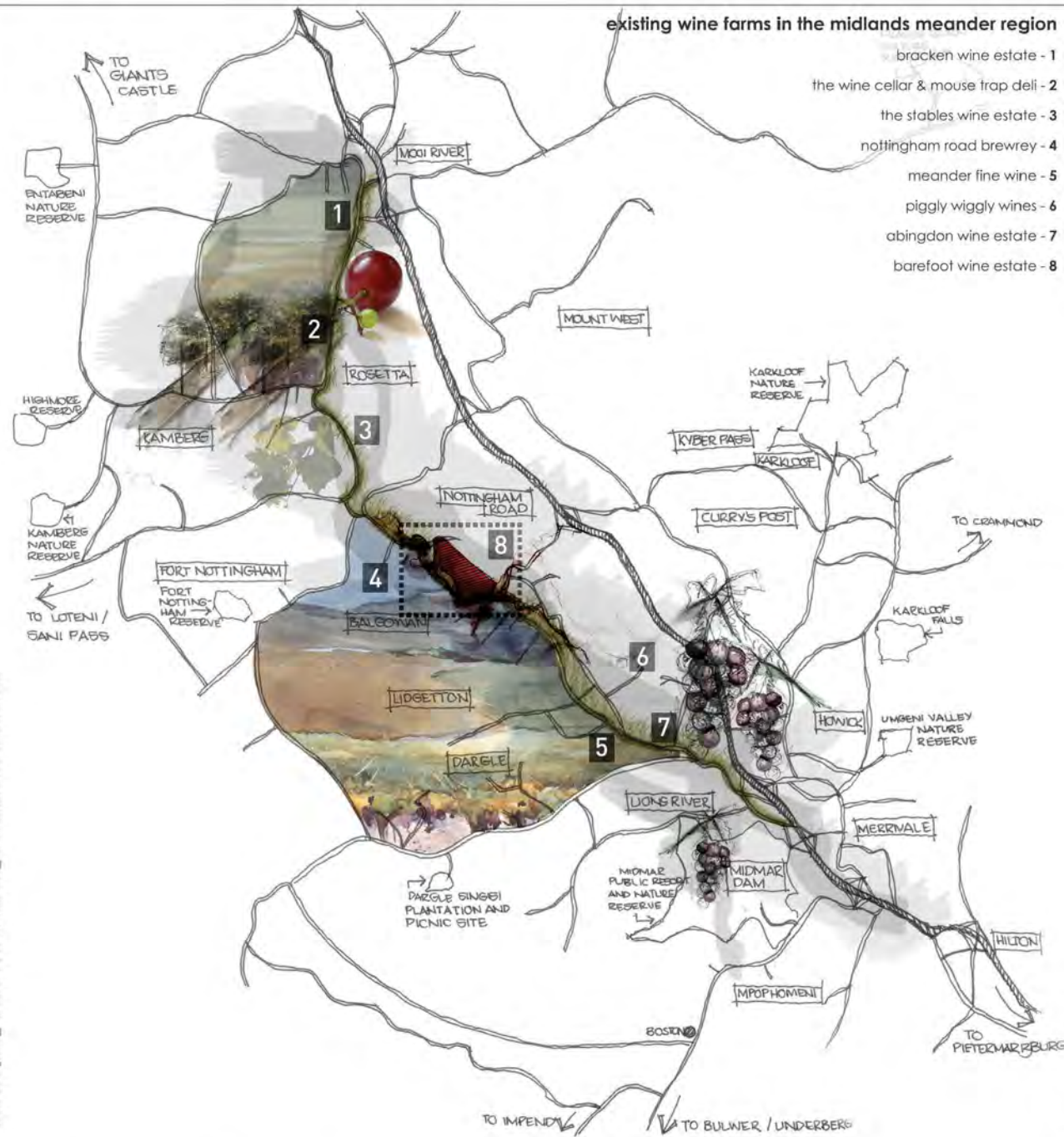
- |                                     |  |
|-------------------------------------|--|
| 1 - nottingham road brewery         | 12 - irish mist estate (accommodation)         |
| 2 - gowie farm golf lodge           | 13 - midlands forest lodge (accommodation)     |
| 3 - jim green footwear              | 14 - la lampara italian restaurant             |
| 4 - brookdale health hydro (spa)    | 15 - gunthers (restaurant)                     |
| 5 - the flyfishing and birding shop | 16 - ardmore ceramic art                       |
| 6 - indigo fields (accommodation)   | 17 - caversham mill restaurant & accommodation |
| 7 - beacon luxury guest farm        | 18 - michaelhouse (school)                     |
| 8 - arum hill guest lodge           | 19 - woodridge country hotel & spa             |
| 9 - twin pools (accommodation)      | 20 - swissland cheese                          |
| 10 - renaissance (home decor)       | 21 - millgate cottage (accommodation)          |
| 11 - little paradise guest farm     | 22 - peter gates herbal centre                 |
- area deemed suitable for good quality wine



macro analysis - midlands meander

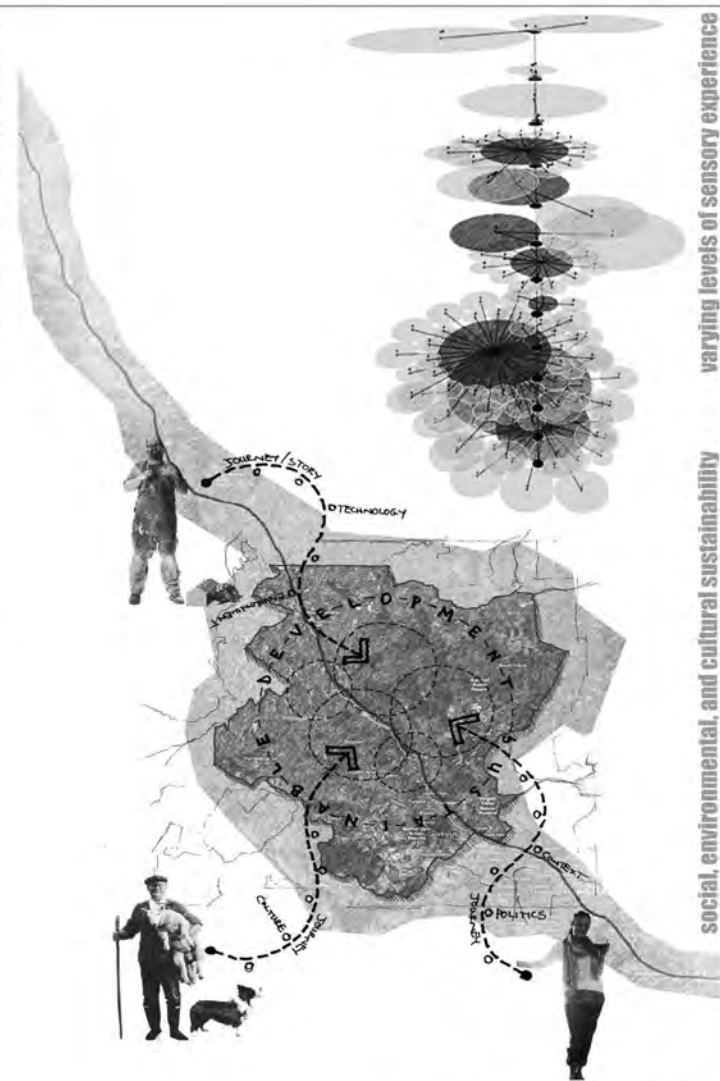
macro site analysis context





existing wine farms in the midlands meander region

- bracken wine estate - 1
- the wine cellar & mouse trap deli - 2
- the stables wine estate - 3
- nottingham road brewrey - 4
- meander fine wine - 5
- piggly wiggly wines - 6
- abingdon wine estate - 7
- barefoot wine estate - 8



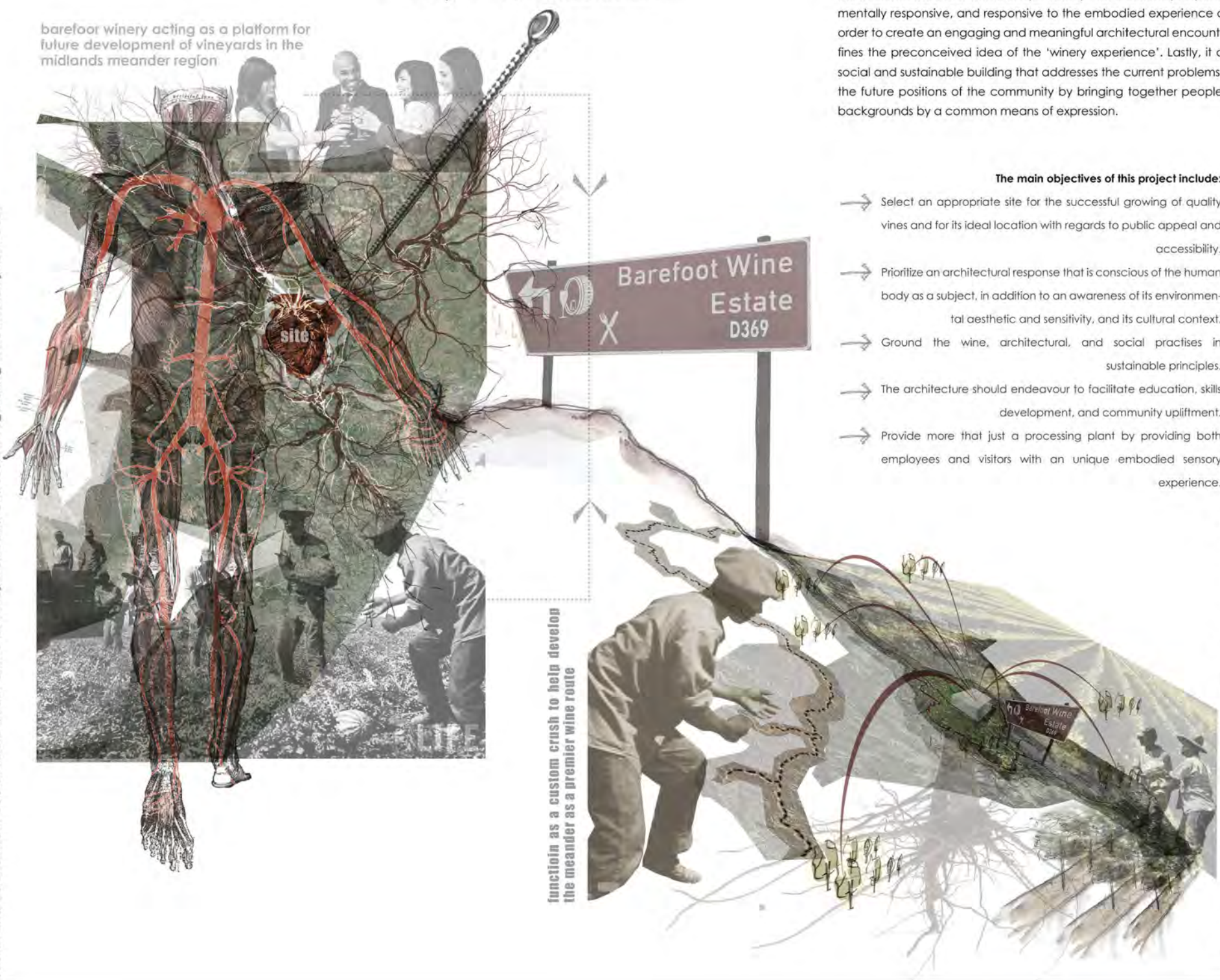
design objectives

The main objective of the winery is to be more than a processing facility - it aims to provide an **embodied sensory experience** which is grounded by the buildings functional, educational, and touristic facilities. It, therefore, aims to not only provide efficiency in terms of spatial layout, energy, and resources but it endeavours to prioritize environmental responsibility and architectural merit in order to achieve a higher-level synthesis in terms of its sensory experience. The architectural response to both its technical and experiential resolution aims to provide the Midlands Meander with a unique facility that is culturally responsive, environmentally responsive, and responsive to the embodied experience of the user in order to create an engaging and meaningful architectural encounter that redefines the preconceived idea of the 'winery experience'. Lastly, it aims to be a social and sustainable building that addresses the current problems and reflects the future positions of the community by bringing together people of different backgrounds by a common means of expression.

The main objectives of this project include:

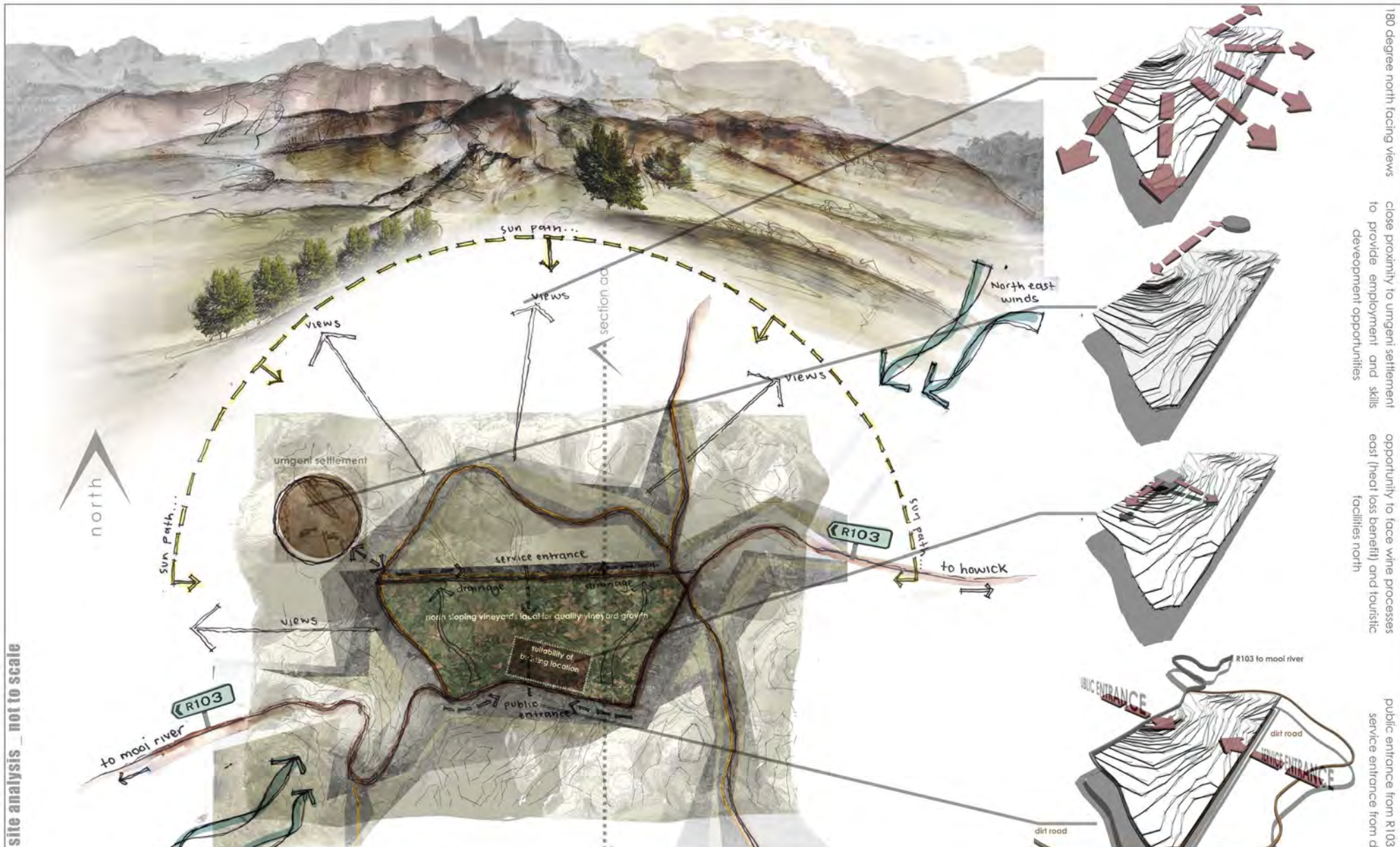
- Select an appropriate site for the successful growing of quality vines and for its ideal location with regards to public appeal and accessibility.
- Prioritize an architectural response that is conscious of the human body as a subject, in addition to an awareness of its environmental aesthetic and sensitivity, and its cultural context.
- Ground the wine, architectural, and social practises in sustainable principles.
- The architecture should endeavour to facilitate education, skills development, and community upliftment.
- Provide more than just a processing plant by providing both employees and visitors with an unique embodied sensory experience.

barefoot winery acting as a platform for future development of vineyards in the midlands meander region



function as a custom crush to help develop the meander as a premier wine route

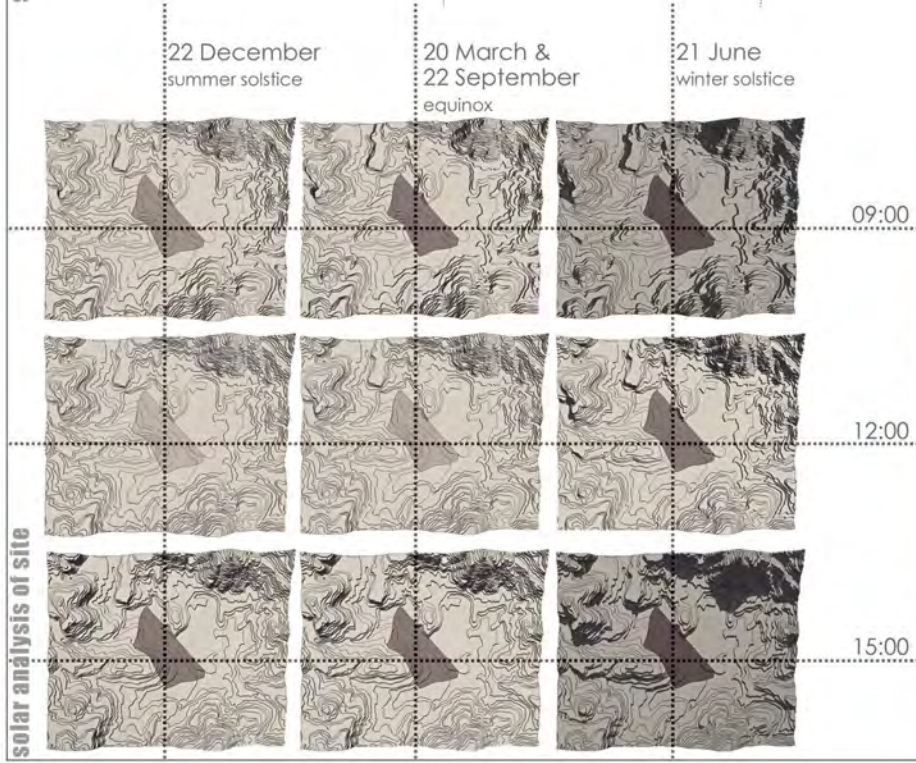




site analysis\_ not to scale

site analysis\_ 1:5000 (plan and section)

solar analysis of site

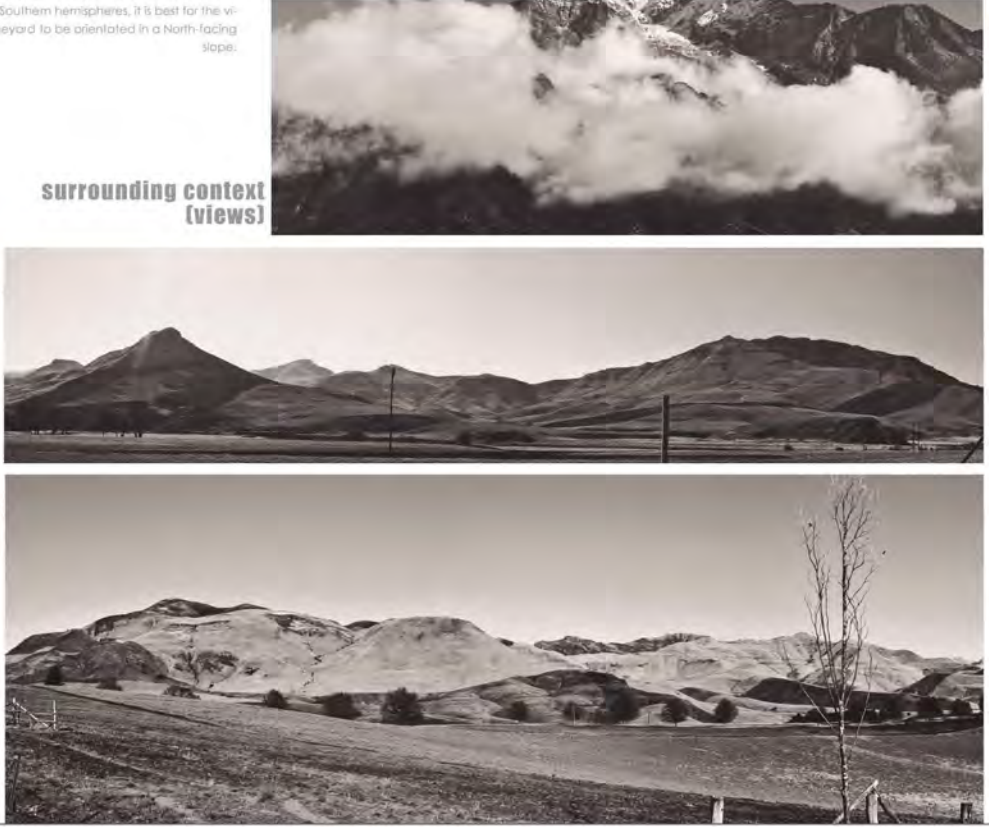
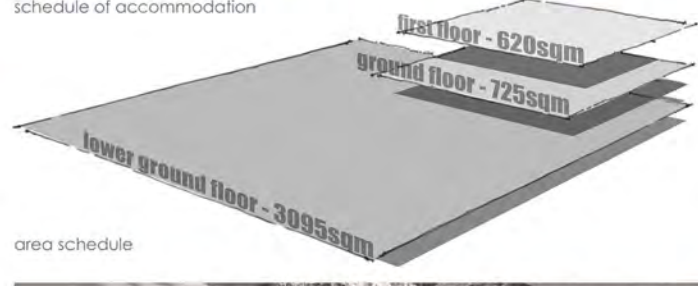
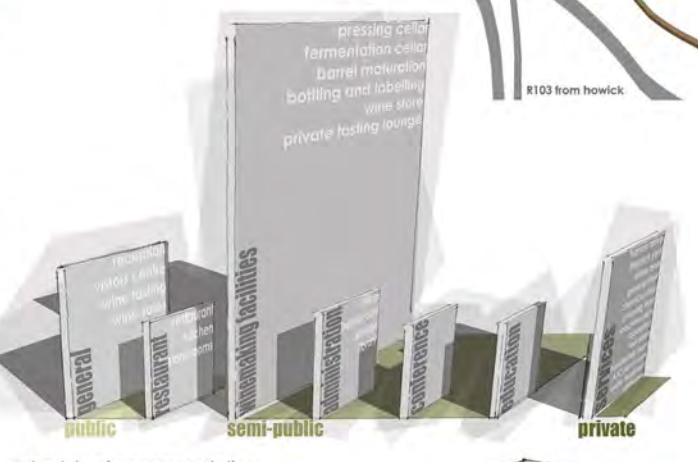


- total site area 50 hectares
- total building area
- public areas:
  - general
  - entrance/reception
  - midlands meander villas centre
  - wine tasting
  - wine sales
  - restaurant
  - conference facilities
  - 100-seater auditorium
  - skills development
  - seminar room
  - workshops rooms
- semi-public areas:
  - wine processing facilities
  - pressing cellar
  - barrel maturation
  - bottling and labelling plant
  - wine store
  - private tasting room
  - administration
- private areas:
  - servicing areas

total building area 5100sqm

**Gradient**  
The vineyard is not completely flat, the direction, angle and height of the slope are important and provide protection from prevailing winds. Frost at budding time is less likely to be a problem since it tends to roll down slopes.

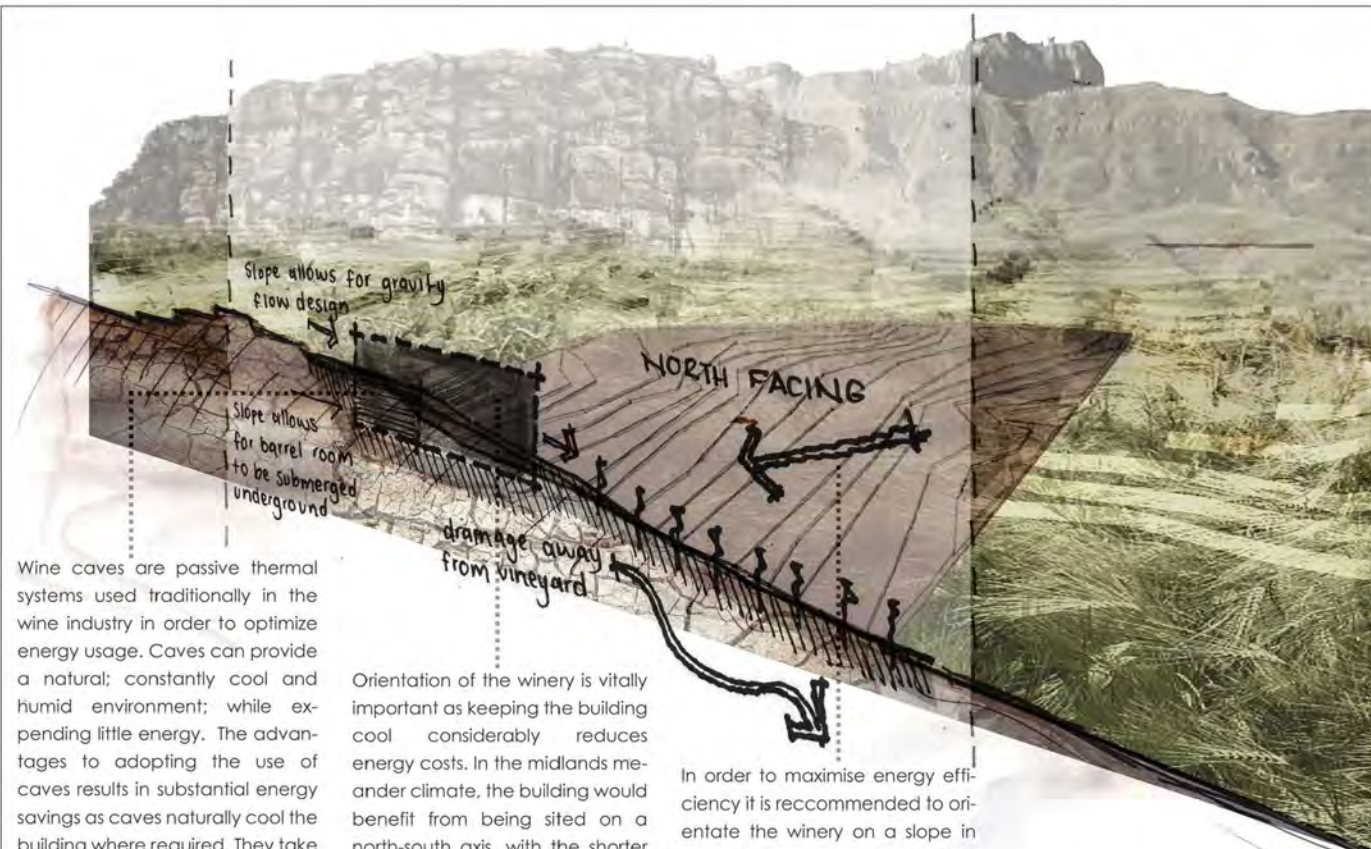
**Orientation**  
In order to receive maximum sunshine, in Southern hemisphere, it is best for the vineyard to be orientated in a North-facing slope.



micro site analysis midlands meander

180 degree north facing views  
close proximity to urgent settlement to provide employment and skills development opportunities  
opportunity to face wine processes east (heat loss benefit) and touristic facilities north  
public entrance from R103 - tar road  
service entrance from dirt road

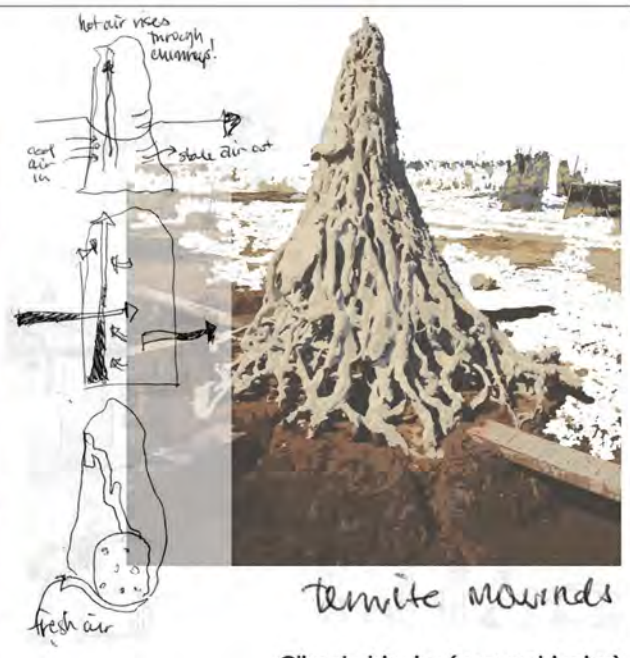




Wine caves are passive thermal systems used traditionally in the wine industry in order to optimize energy usage. Caves can provide a natural, constantly cool and humid environment; while expending little energy. The advantages to adopting the use of caves results in substantial energy savings as caves naturally cool the building where required. They take advantage of the earth's constant temperature - which can reduce, or even eliminate, the need for cooling.

Orientation of the winery is vitally important as keeping the building cool considerably reduces energy costs. In the midlands meander climate, the building would benefit from being sited on a north-south axis, with the shorter walls to the midday sun. It is also beneficial not to have windows on the western side - facing the hot afternoon sun (in order to reach adequate internal temperatures of 20°C).

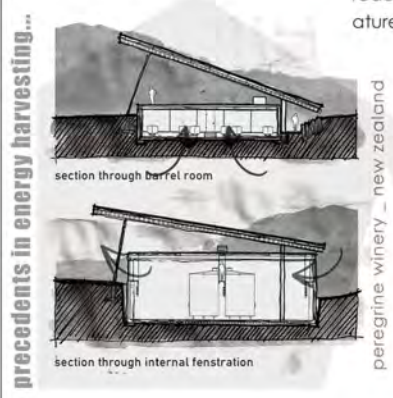
In order to maximise energy efficiency it is recommended to orientate the winery on a slope in order to implement gravity flow design and minimize ambient temperature. By adopting a gravity flow design, the architecture responds the processing flow and suppresses the need for mechanical pumps.



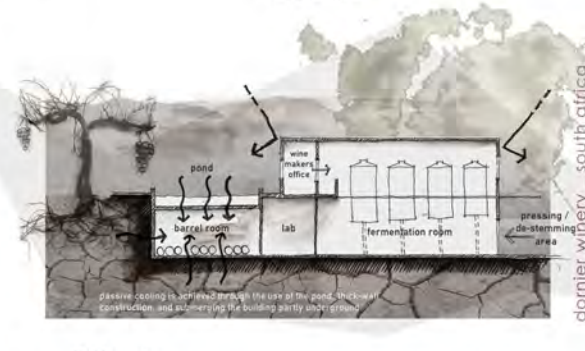
termite mounds

**Climate bionics (energy bionics)**

The buildings of termites have adapted to hot climate by relocating their main living space underground, into kilometre long subterranean pathway systems. The channels connect the building above ground with locations where food can be found. The form and construction of termite mounds differs with species, but all possess a sophisticated climatization system. The mound above ground consists of a porous but very hard material, with a system of channels responsible for ventilation. Different control mechanisms are active, depending on the environmental temperature. Cool air is sucked upwards from subterranean channels, cooling the mushroom shaped nest below the mound. During the night the air stream is reversed and regenerates the reservoir of cool air. Particular systems use deep channels to the ground water to gain additional cooling energy through evaporation. Compass termites even orient their asymmetrical flat shaped mound with the long axis from east to west, to avoid the hot summer sun. The reason for this is to control humidity and temperature, in order to provide a stable environment for the termites and their offspring in the nest, and for some species also for their symbiotic fungi. The termite mounds serve as a role model for an effective passive ventilation system for the control of the internal climate.



precedents in energy harvesting...



perregine winery - new zealand

dormier winery - south africa



dominus winery - california

**Light energy**

Input of solar light, the main source of light in buildings, has to be controlled to avoid overheating and unwanted reflection and glare. Solar radiation carries a large range of frequencies of light energy as well as heat.

**Material bound energy**

Building materials (as all other materials) contain so-called embodied energy. Heavy material should be sourced locally, as much more energy for transportation is needed than for lightweight material.

**Kinetic energy**

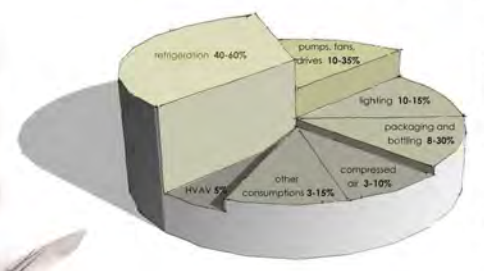
Sound and wind are manifestations of kinetic energy, and represent another continuous input source for energy harvesting in architecture. Sound is most important for spatial orientation, in the interior of buildings influenced by the flexibility and surface characteristics of building materials. Ventilation is a precondition for the availability of fresh air. Passive systems for natural ventilation rely on temperature differences created by differences in height, material etc., or the exploitation of wind energy.

**Heat energy**

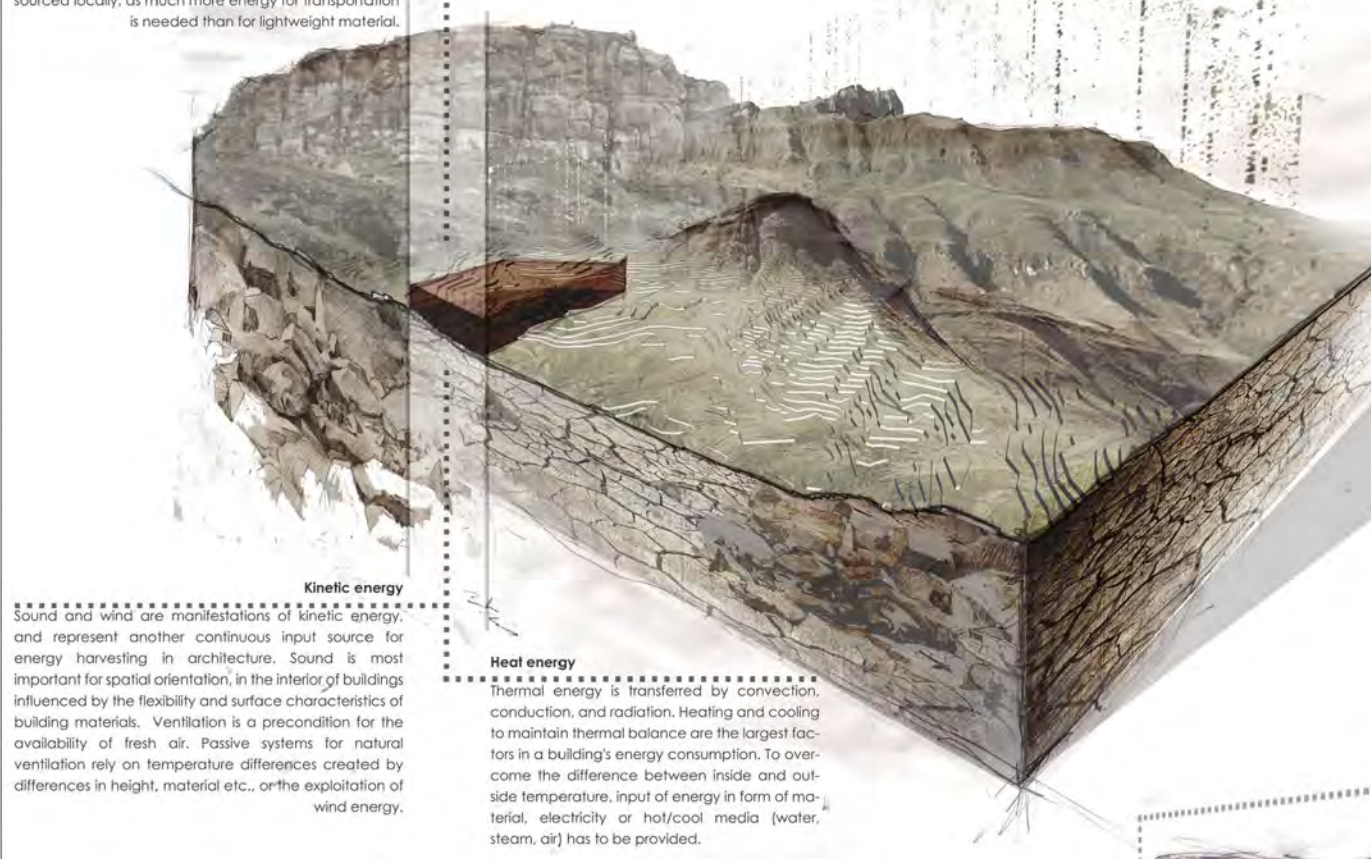
Thermal energy is transferred by convection, conduction, and radiation. Heating and cooling to maintain thermal balance are the largest factors in a building's energy consumption. To overcome the difference between inside and outside temperature, input of energy in form of material, electricity or hot/cool media (water, steam, air) has to be provided.

**Forms of energy**

Forms of energy affecting the built environment are: material bound energy, which - apart from fuels - is not available to perform work; kinetic energy; light; heat, and electricity.

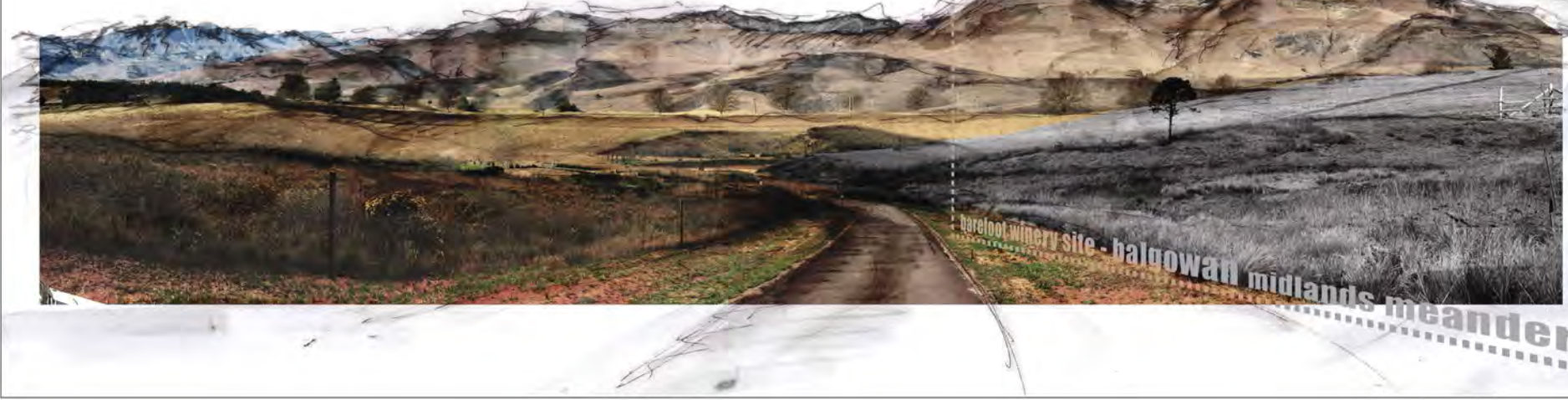


typical winery energy use



Principles	Measures	Buildings	Open spaces	Supply and disposal
Adaptation to natural and social location characteristics	<ul style="list-style-type: none"> <li>Integration into ecosystem depending on sun and wind</li> <li>Zoning of ground plans</li> <li>Minimum area consumption</li> </ul>	<ul style="list-style-type: none"> <li>Minimal sealing</li> <li>Few topographical changes</li> <li>Maintain existing vegetation</li> <li>Compact buildings</li> </ul>	<ul style="list-style-type: none"> <li>Proximity to home, services and culture</li> <li>Reduced personal traffic</li> <li>Link to public transportation</li> <li>Link to low-emission energy carriers</li> </ul>	
Energy saving	<ul style="list-style-type: none"> <li>Passive use of solar energy</li> <li>Heat conservation</li> <li>Heat recovery</li> <li>Winter gardens + solar energy use</li> </ul>	<ul style="list-style-type: none"> <li>Harvesting climate-regulating effects of vegetation and water surfaces</li> </ul>	<ul style="list-style-type: none"> <li>Create closed cycles when possible</li> <li>Waste-free material</li> <li>Rainwater</li> <li>Grey- and cooling water</li> <li>Waste heat-energy</li> </ul>	
Protection of resources and material	<ul style="list-style-type: none"> <li>Using environmentally friendly materials</li> <li>Avoid toxicity</li> <li>Low-energy production and processing</li> </ul>	<ul style="list-style-type: none"> <li>Create green belt</li> <li>Integrate parking into green area</li> </ul>	<ul style="list-style-type: none"> <li>Substitute potable water when possible</li> <li>Avoid waste</li> <li>Heat-power coupling</li> <li>Minimise emissions</li> </ul>	
Creation of a high quality internal and external human environment	<ul style="list-style-type: none"> <li>Influence micro climate with building surface</li> <li>Planted façades and roofs</li> <li>Sun protection</li> <li>Interior design</li> <li>Ergonomic workplace design</li> </ul>	<ul style="list-style-type: none"> <li>Enrich green area with plants and trees compatible with location</li> <li>Create 'relaxation' areas</li> <li>Stimulating environment</li> </ul>	<ul style="list-style-type: none"> <li>Utilise surface water (rainwater)</li> <li>Compost organic waste to improve soil</li> </ul>	

energy harnessing objectives



barefoot winery site - baldowan midlands meander

**harnessing energy from site**



# conceptual site analysis [sensory]



the best way to preserve heritage is to increase it, this project seeks to conserve the site, and also create a new architectural landmark that will attract culture, tourism, and economic activity

*light and shadow*



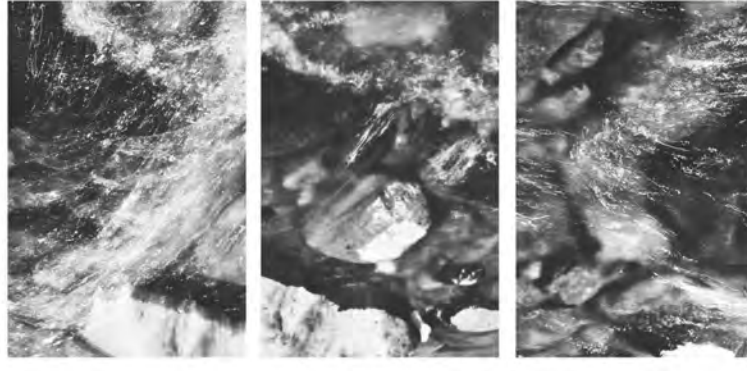
*materiality*



light and shadow analysis



materiality analysis

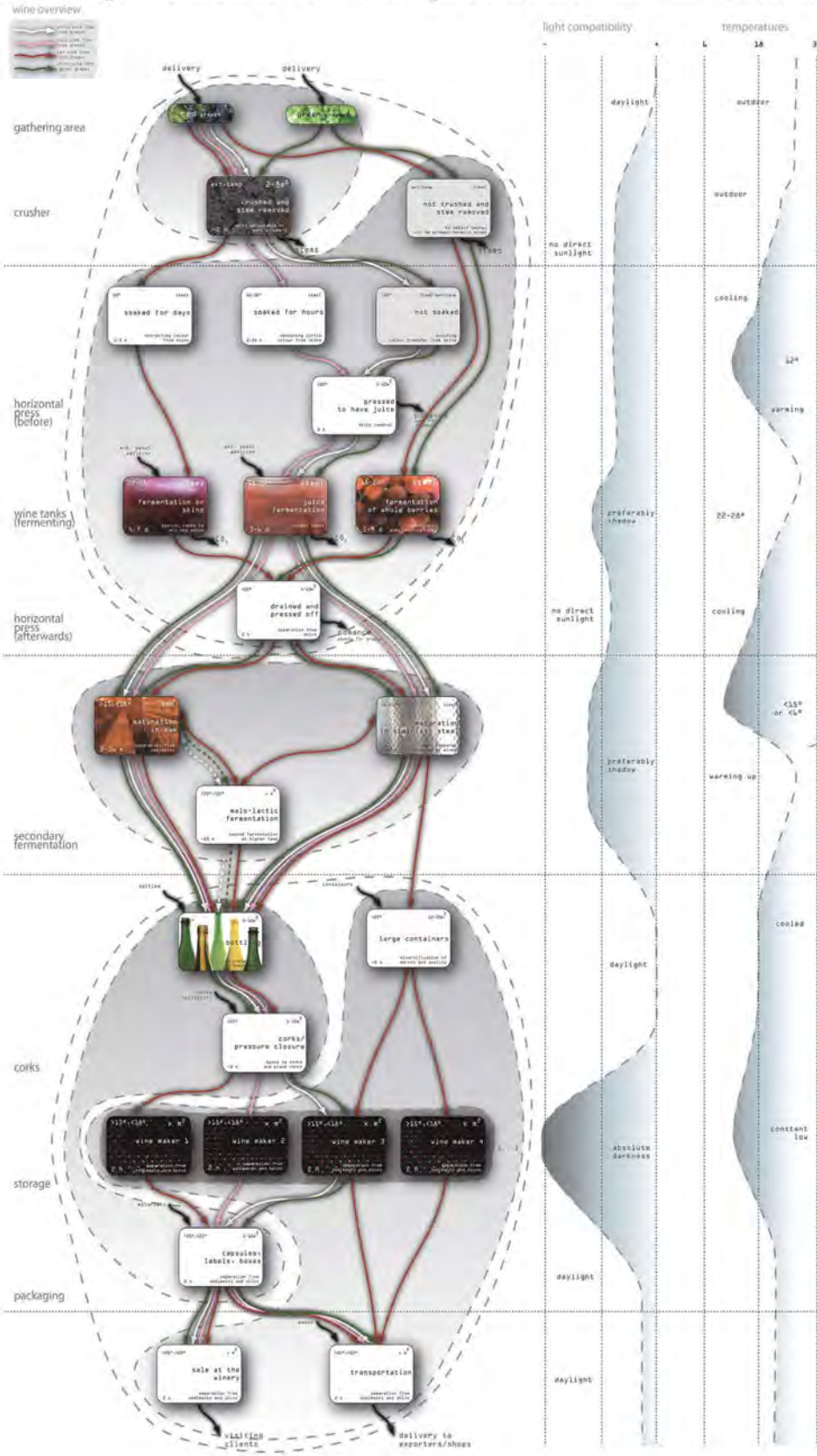


sensory analysis





## space requirements for wine production



precedent studies...

- dominus winery - herzog and de meuron
- domier winery - malherbe rust architects
- perregine winery - architecture workshop
- lolsium winery - steven hall

## sustainable construction methods for winery design

**cool-build materials:** Cool roofs can reduce heat absorption and cooling costs by as much as 13%.

**regional materials and local fabrications:** This helps to reduce transportation impacts and stimulates the local economy.

**building and construction materials with a high percentage of recycled content**

**reduce heat loss/gain:** Portions of the building should be built underground or partially underground in order to take advantage of the earth's constant temperature. Barrel storage area should be located in areas that have contact with the earth - which can reduce, or even eliminate, the need for cooling. Barrel rooms which make use of mechanical cooling - dries out the barrels and increases evaporation. To help control this problem, winemakers humidify the space, adding cost, and some additional potential problems. Barrel rooms that do not need cooling will promote less evaporation. Caves can provide a natural, constantly cool, and humid environment, while expending little energy.

**geothermal heating and cooling:** Water circulates in a sealed loop that extends well into the earth. In winter, the water absorbs heat from the earth and carries it to the compressor, which raises the temperature. In summer, the water takes heat away from the building and transfers it to the earth.

**Optimize the use of shading:** Blocking sunlight that would fall on the building's surfaces can dramatically reduce cooling loads. Trees planted along the north and west facades of the building can also aid in eliminating heat gain.

**Increase daylight levels:** Adding skylights or upper windows (clerestories), while avoiding direct sunlight on barrels or tanks, will permit the winemaking staff to work in processing and storage areas without the need for artificial light. The obvious benefit being reduced electricity bill. Wineries that adopt natural lighting can reduce lighting watts by as much as 66%.

**Maximise views:** As above, by designing additional windows - using glass in roll-up doors and placing skylights in subterranean spaces - to expand views to the outdoors from regularly occupied spaces will increase workers well-being and productivity.

**Establish a recycling program:** Wineries should strive to create a zero-waste philosophy if possible.

**natural ventilation:** Ventilation is vital - every litre of grape juice, when fermented, produces about 40 litres of carbon dioxide. By designing windows or louvres at or near the floor level of the winery to bring cool night air that blankets the ground and by opening a louvre in the upper part of the winery - a passive ventilation system is created. Hot air that has been accumulated during the day can be exhausted through a louvre in the clerestory area. The hot air leaving the winery pulls cool night air in the lower louvre. This process reduces the need for mechanical ventilation and reduces energy usage.

**Reduce water usage:** During harvest, a 30 000-case winery can use as much as 3000 gallons of water per day. Reduced water use can be achieved by collecting wash-down water, settling/filtering it, adjusting its pH levels, and using it for irrigation of winery grounds. Segregating stormwater may be worthwhile in the interests of keeping this potentially low contamination water separate for suitable uses. Mixing all water streams together and including stormwater reduces the value of much of the waste water and increases energy use in the treatment before re-use or disposal. Rainwater collection systems should be considered for landscape irrigation, etc. The use of evapotranspiration irrigation systems, that irrigate based on current weather conditions, is another consideration in reducing water usage.

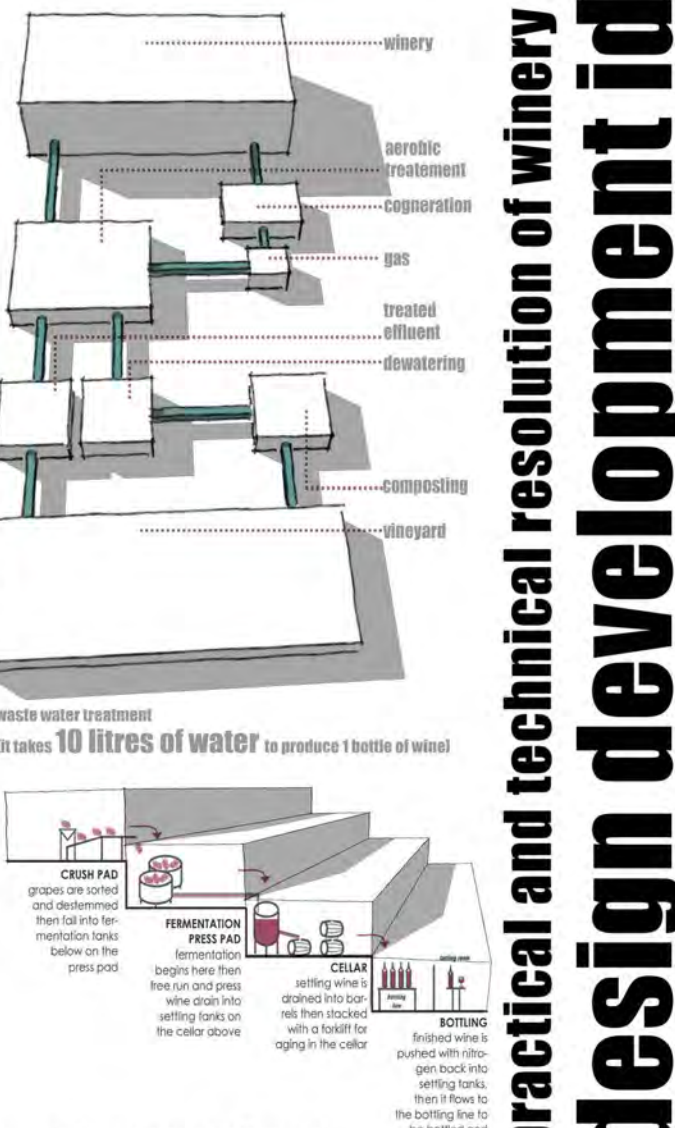
**Sustainable site planning:** Using native, adaptive plants, and landscaping will require minimum irrigation and help to promote biodiversity.

**Construct buildings with mass:** A thin-wall building with a metal skin and batt insulation allows heat (and cold) to penetrate more quickly than a thick-wall building. By building with concrete, masonry, or stone, and sandwich insulation - thick-walled buildings will absorb heat all day long, and release it at night with little impact on the interior temperature.

**Solar energy:** Panels transform light into direct current, which is converted to alternating current that can go directly to power winery needs. Solar can pay for itself within 3-5 years, with panels lasting up to 30 years.

**Gravity flow design:** True gravity flow (which allows wine to flow naturally) can reduce the use of pumps and motors and thus reduce energy consumption and running costs.

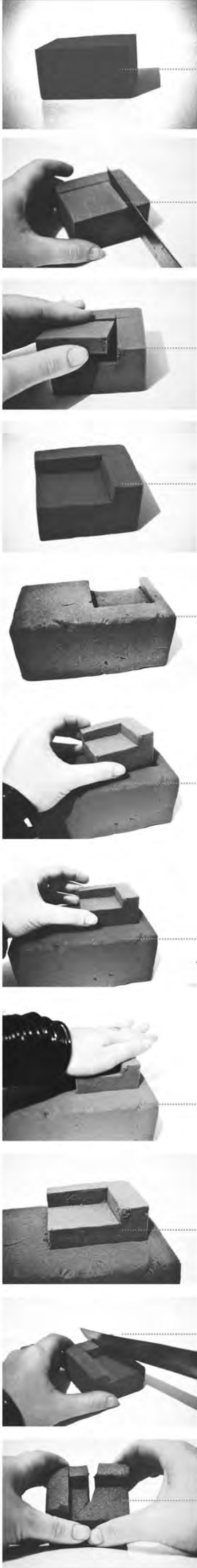
**Favourable working conditions:** Natural daylighting and views in regularly occupied working spaces is known to improve the health and attitudes of the occupants. "When the winemaking staff is healthier and happier, they will most certainly make better wine" (Franson, 2008: 66).



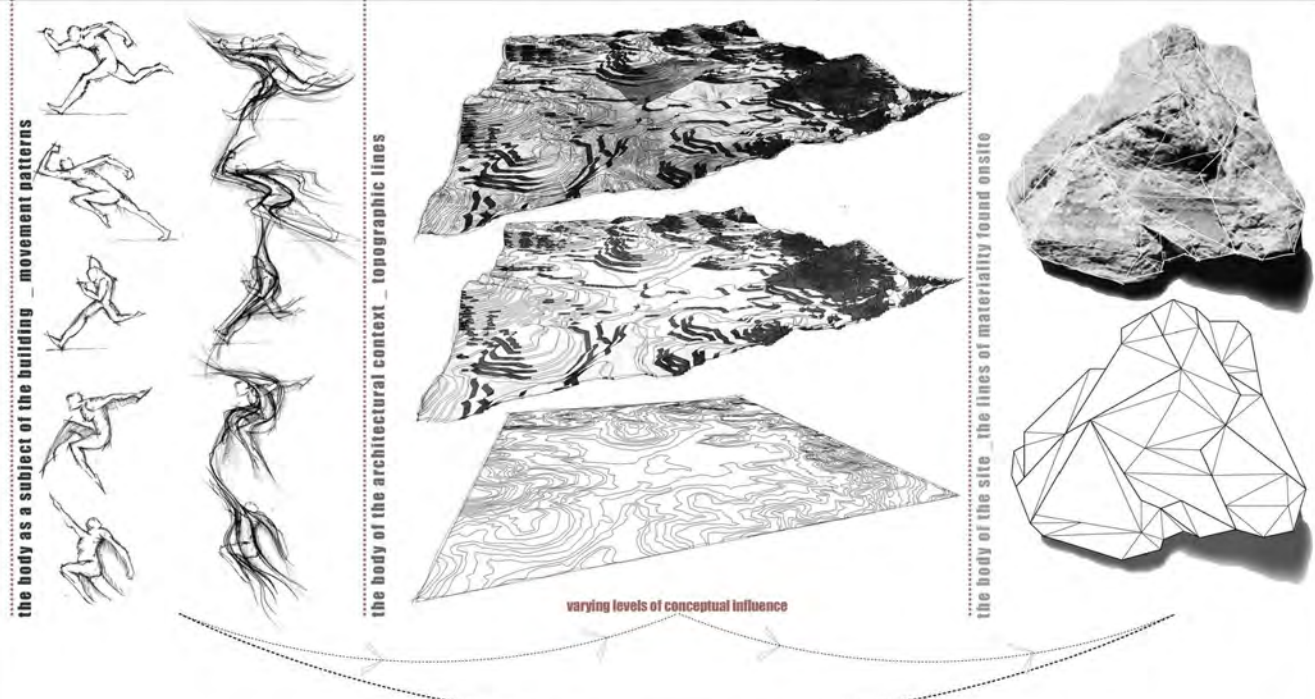
# practical and technical resolution of winery design design development ideas



conceptual manifestation of the evolution of the buildings form (building works from the basis of a simple block)



conceptual manifestation of the experiential and emotive levels of winery design



The lines and surfaces of architecture must give way to gradients if we are to look to alternative design methods and strategies for articulating and operating upon this broader spectrum of materiality. Thresholds exist not only as lines and surfaces, but also as intensities, accumulations, and gradients – the inherent properties of the spatial distribution of temperature, scent, and light. Such thresholds engage a broader vocabulary within our sensory system, one beyond that of eyesight. By shifting our conceptualising of boundaries away from surfaces and lines, we see how such gradient boundaries newly inform and shape our spatial definition and organisation.



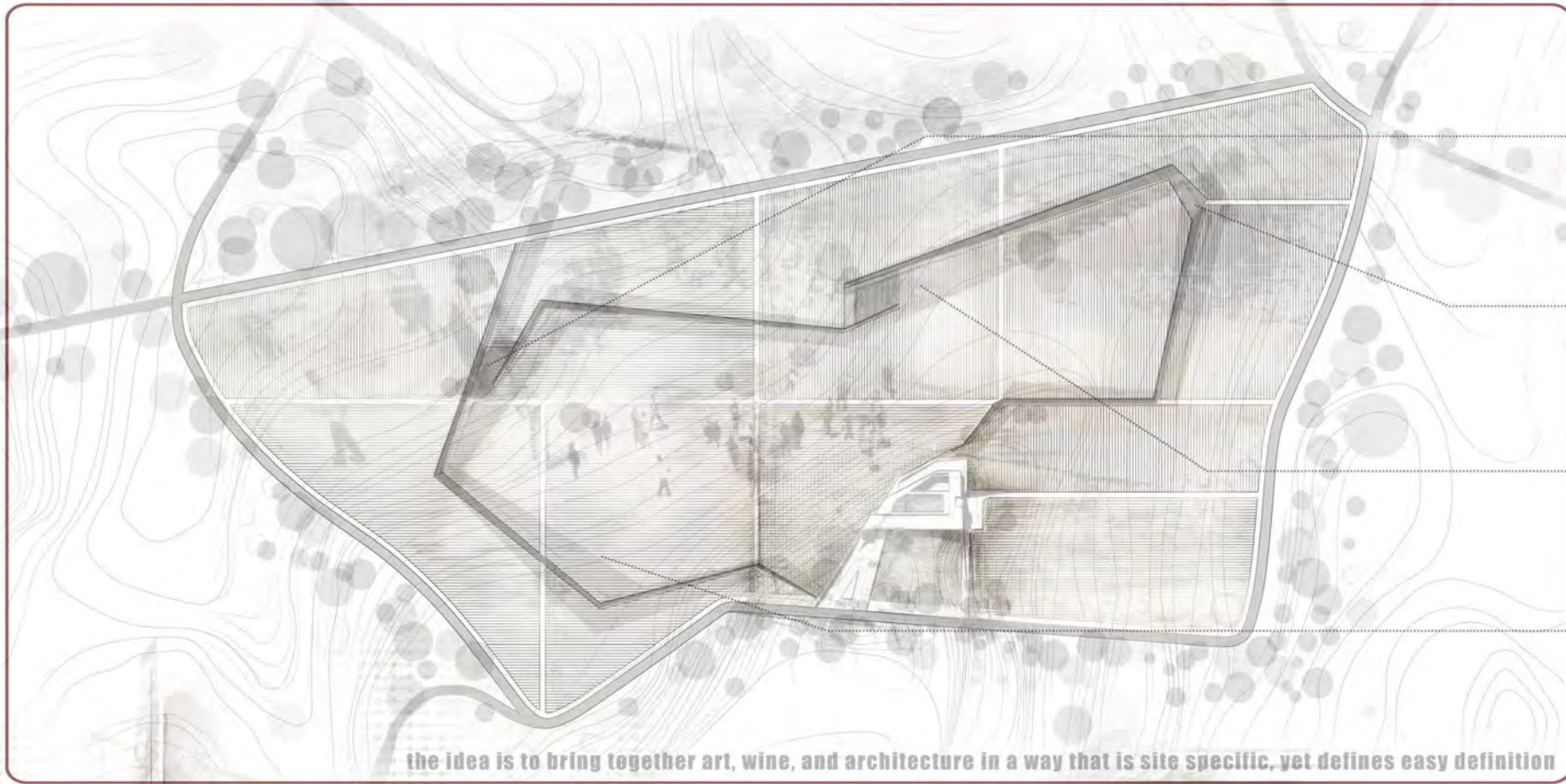
experiential program situations	entrance	transition	winemaking process	wine tasting	education
sequential narrative events	the beginning	the searching	the growth	the desire	the knowledge
symbols/poetics for design	-the creation -the separation	-the ascent -the choice	-the threshold -the continuation	-the absence -the depths	-the gift -the memory
parametric and phenomenological imperatives	-weight and weightlessness -subterranean -temperature	-defying gravity -blurred boundaries -natural/built	-contrast of light and shadow -enclosure and expansion	-significance of shadow -patina and imperfection	-significance of shadow -penetration of light
emotional encounters	-reality and illusion -connection and solidarity	-sense of liberation -sense of anticipation	-engaging -freedom and grounding	-secrecy and anticipation -absence and solitude	-waves of contemplation -community and individuality

conceptual manifestation identification of experiential situations

design development [conceptual]

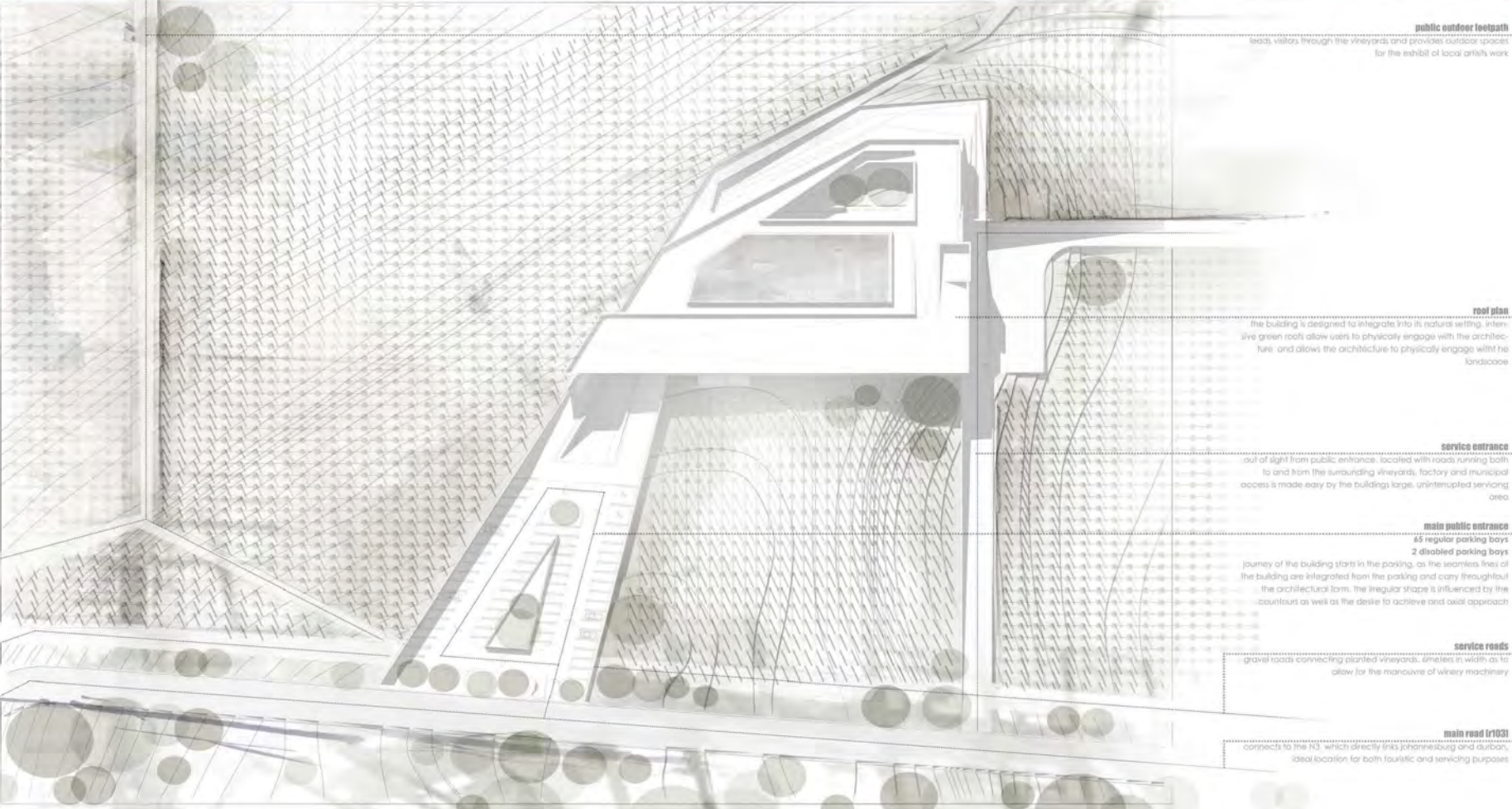


site plan 1 - 2500 (showing public and vineyard pathways)



the idea is to bring together art, wine, and architecture in a way that is site specific, yet defines easy definition

roof plan 1 - 500 (showing public and service entrances)



**public outdoor footpath**  
leads visitors through the vineyards and provides outdoor spaces for the exhibit of local artists work

**roof plan**  
the building is designed to integrate into its natural setting, where live green roofs allow users to physically engage with the architecture and allow the architecture to physically engage with the landscape

**service entrance**  
out of sight from public entrance, located with roads running both to and from the surrounding vineyards, factory and municipal access is made easy by the building's large, uninterrupted servicing area

**main public entrance**  
45 regular parking bays  
2 disabled parking bays  
Journey of the building starts in the parking, as the seamless lines of the building are integrated from the parking and carry throughout the architectural form, the irregular shape is influenced by the contours as well as the desire to activate and axial approach

**service roads**  
gravel roads connecting planted vineyards, drives in width as to allow for the manoeuvre of winery machinery

**main road (A63)**  
connects to the A3, which directly links to the surrounding area and offers ideal location for both tourist and servicing purposes

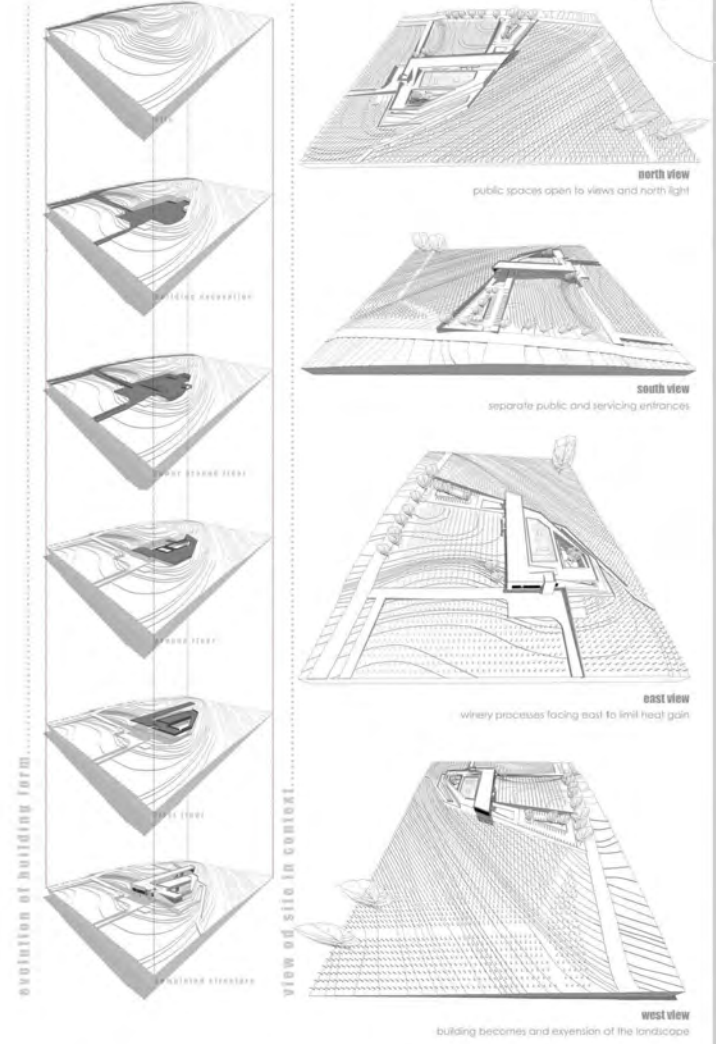


**site selection**  
the research, carried out in Part II of the dissertation document, revealed that this site is the most suitable for the development of a winery facility; this is due to its satisfactory location with regards to cultural and historical linkages. The history of the area, coupled with the history of winemaking provides a platform to concretise the architecture in our cultures 'sixth sense', in order to create an identifiable structure for all users. The site also benefits from being positioned in the heart of the Midlands Meander, surrounded by a variety of recreational activities and accommodation types, the site is more than satisfactory when critically analysed for its phenomenological experience; a criteria which is arguably the most important in order to ground the research gathered in Part I of this dissertation.

**vineyard design**  
designed to achieve the following:  
develop maximum bearing potential per acre in a minimum amount of time  
optimize vine performance  
prevent soil erosion  
facilitate management of vine canopies  
facilitate equipment operation

**vine direction**  
factors important in deciding direction of rows include:  
optimum light exposure (north to south)  
slope of the land (natural drainage)  
wind speed and direction

**outdoor art installations**  
midlands meander is best known for its arts and crafts, by providing open spaces for the exhibition of outdoor art, it draws the visitor into the vineyard, in addition to providing a platform for showcasing local works of art, found of every open gallery space is a picnic area to cater for guests who wish to purchase wine and drink it amongst the vineyards, or for those who purely wish to enjoy the views



evolution of building form

view of site in context

**north view**  
public spaces open to views and north light

**south view**  
separate public and servicing entrances

**east view**  
winery processes facing east to limit heat gain

**west view**  
building becomes an extension of the landscape



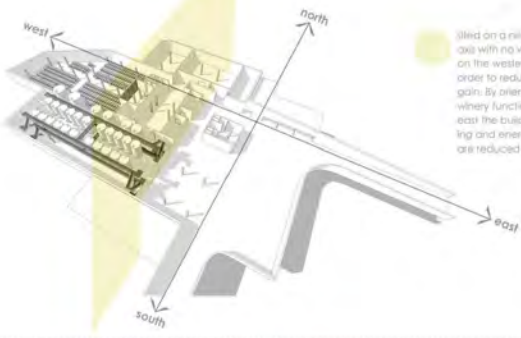
Site 1:1:2500 - context & roof 1:5000 plan



Journey from grape to finished product through the building

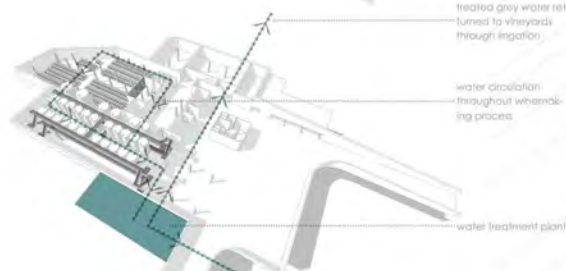


orientation



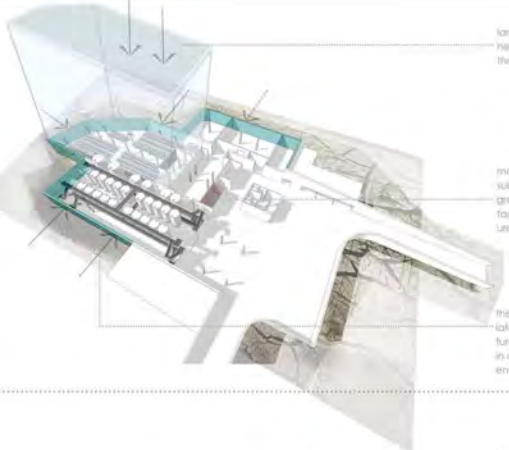
filled on a north-south axis with no windows on the western side in order to reduce heat gain. By orientating the winery functions to the east the buildings cooling and energy costs are reduced.

water treatment



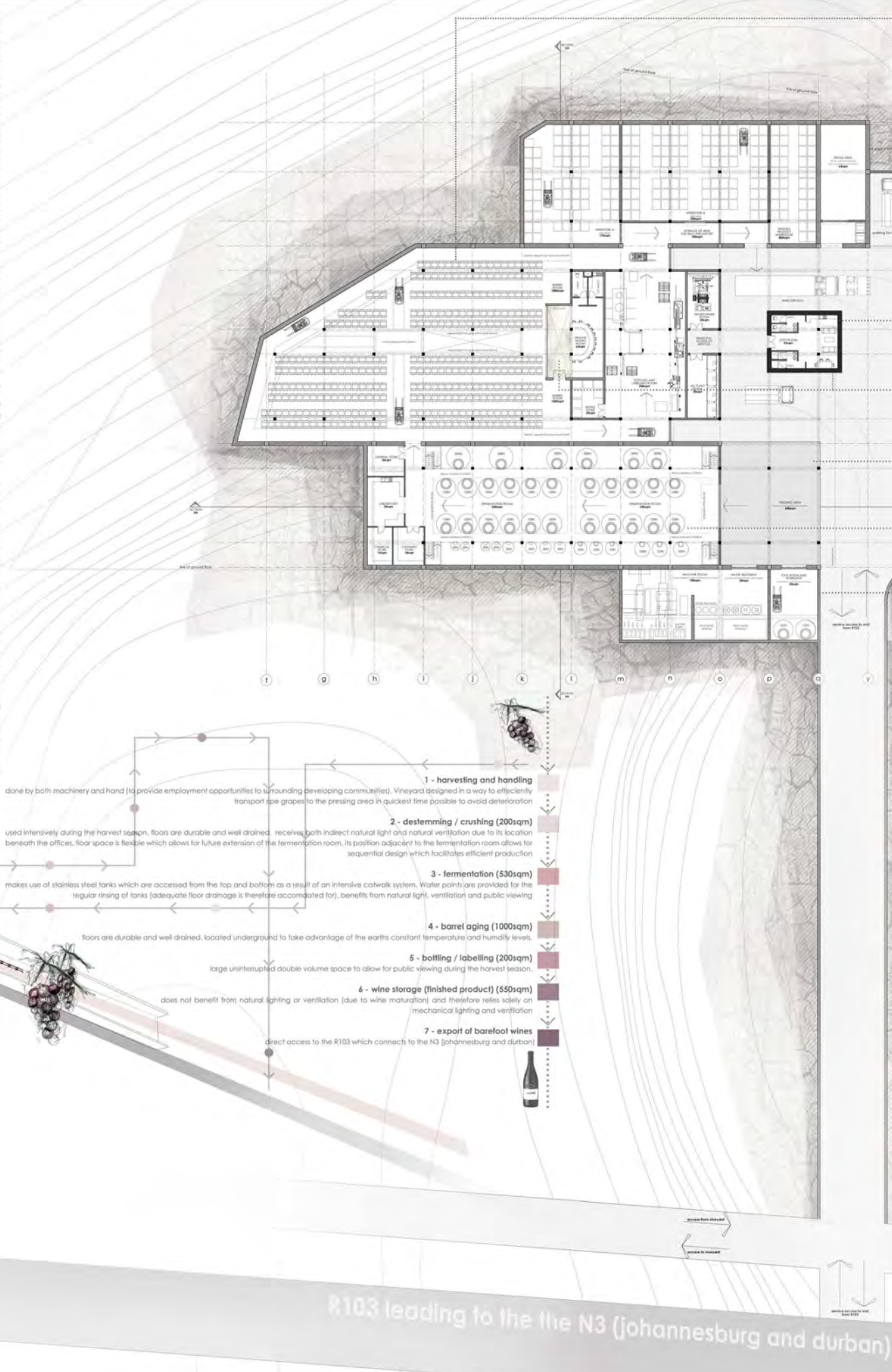
treated grey water returned to vineyards through irrigation  
water circulation throughout winemaking process  
water treatment plant  
treated grey water returned to vineyards through irrigation

natural and mechanical cooling



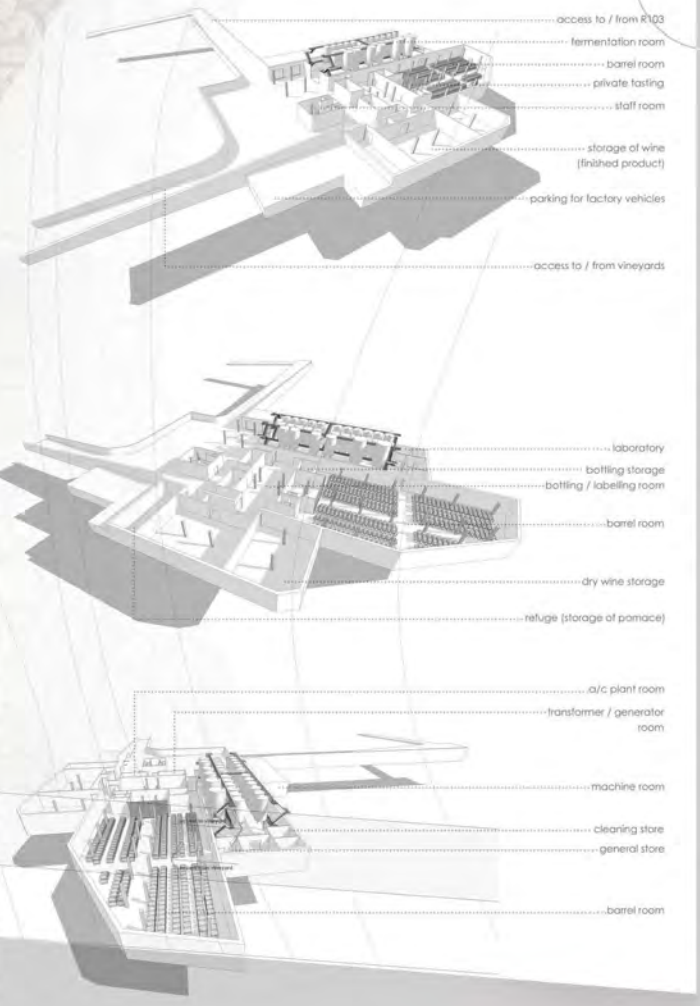
large body of water helps to naturally cool the barrel room below  
mass wall construction submerged underground takes advantage of the earth's natural cooling properties  
thermostat helps regulate internal temperatures and humidity levels in order to keep both elements constant

orientation, water, and cooling mechanisms



- 1 - harvesting and handling**  
done by both machinery and hand (to provide employment opportunities to surrounding developing communities). Vineyard designed in a way to efficiently transport ripe grapes to the pressing area in quickest time possible to avoid deterioration
- 2 - destemming / crushing (200sqm)**  
used intensively during the harvest season, floors are durable and well drained, receives both indirect natural light and natural ventilation due to its location beneath the offices, floor space is flexible which allows for future extension of the fermentation room, its position adjacent to the fermentation room allows for sequential design which facilitates efficient production
- 3 - fermentation (530sqm)**  
makes use of stainless steel tanks which are accessed from the top and bottom as a result of an intensive catwalk system. Water points are provided for the regular rinsing of tanks (adequate floor drainage is therefore accommodated for), benefits from natural light, ventilation and public viewing
- 4 - barrel aging (1000sqm)**  
floors are durable and well drained, located underground to take advantage of the earth's constant temperature and humidity levels.
- 5 - bottling / labelling (200sqm)**  
large uninterrupted double volume space to allow for public viewing during the harvest season.
- 6 - wine storage (finished product) (550sqm)**  
does not benefit from natural lighting or ventilation (due to wine maturation) and therefore relies solely on mechanical lighting and ventilation
- 7 - export of barefoot wines**  
direct access to the R103 which connects to the N3 (Johannesburg and Durban)

perspective views of lower ground floor showing the arrangement of spaces



- access to / from R103
- fermentation room
- barrel room
- private tasting
- staff room
- storage of wine (finished product)
- parking for factory vehicles
- access to / from vineyards
- laboratory
- bottling storage
- bottling / labelling room
- barrel room
- dry wine storage
- refuge (storage of pomace)
- a/c plant room
- transformer / generator room
- machine room
- clearing store
- general store
- barrel room

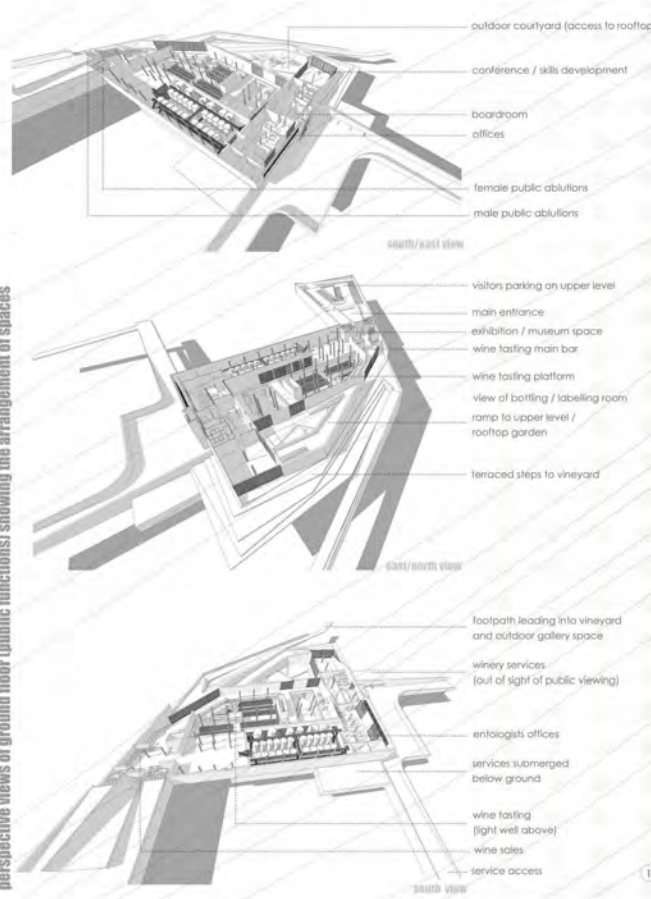
- barrel room**  
the temperature and humidity of this space are crucial to the wine maturation. Both elements are kept constant by natural mechanical processes, energy demands are lessened by the surrounding earth and its natural cooling properties and by the large body of water found above the barrel room
- wine storage area**  
the ideal conditions for storing wine require a space which does not benefit from natural light or ventilation, as such, this space is completely submerged underground to take advantage of the earth's constant temperature
- staff room**  
gabion wall construction to provide a temperate condition provided by the beneficial thermo-dynamic properties of the stone quarried from the site
- private tasting room**  
illuminated by dappled light that is reflected through the water above, which showcases the clarity of wine
- pressing area**  
located underneath the offices, which provides protection from the elements, has direct access to the fermentation room and the vineyards beyond.
- fermentation room**  
lighting, ventilation, public viewing, efficiency, and future expansion were key considerations in the design of this space
- machine room**  
submerged underground allowing the negative sound energy created to be absorbed into the surrounding earth, benefits from direct access to the fermentation room and direct municipal access

The barefoot winery is a place held by the buildings, rather than the buildings dominating the place. The building is part of the place, flowing with the process of making wine and connecting with the vineyard, the view, and the natural surroundings. At its heart it is restorative, responsive, and contextual.

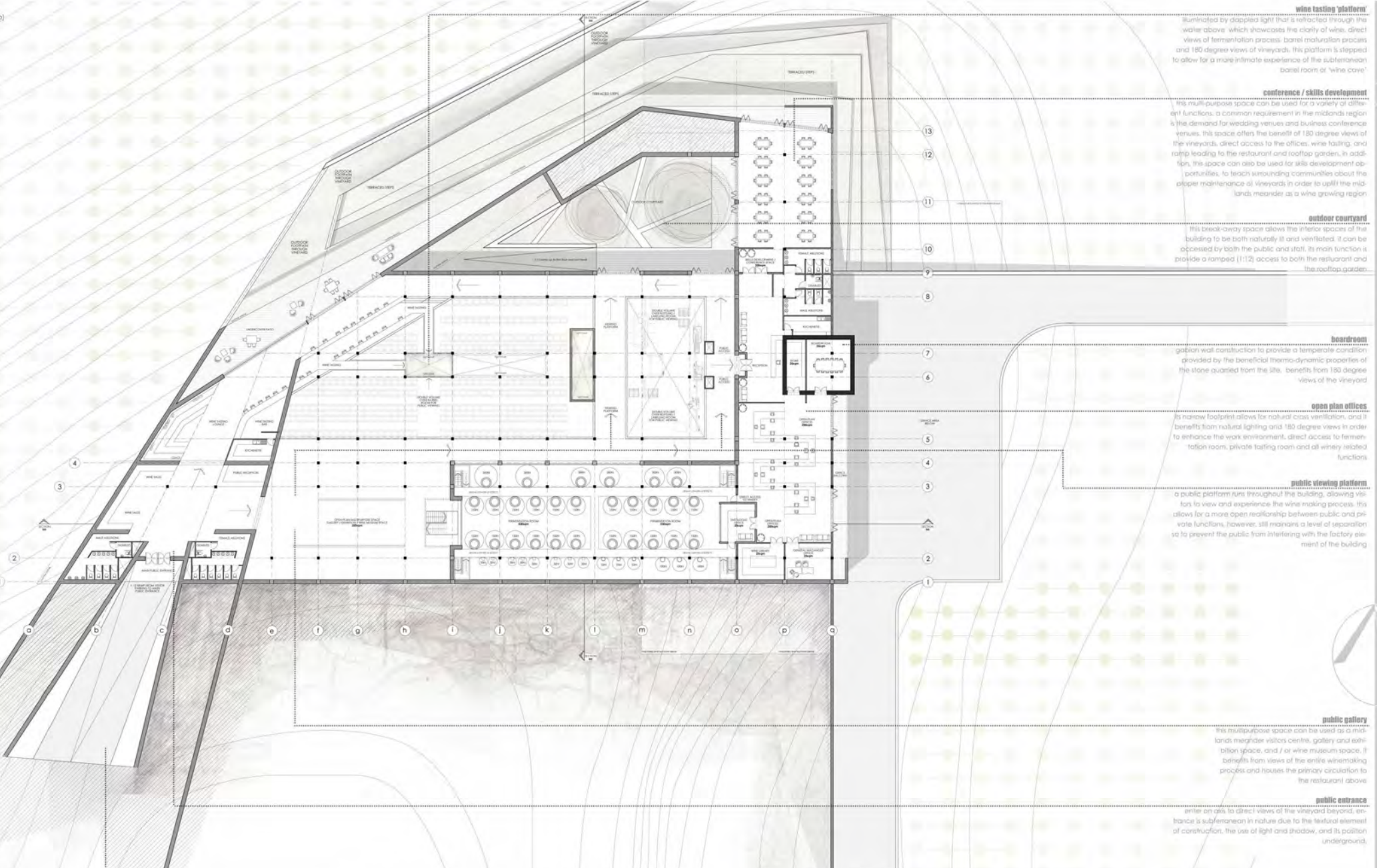
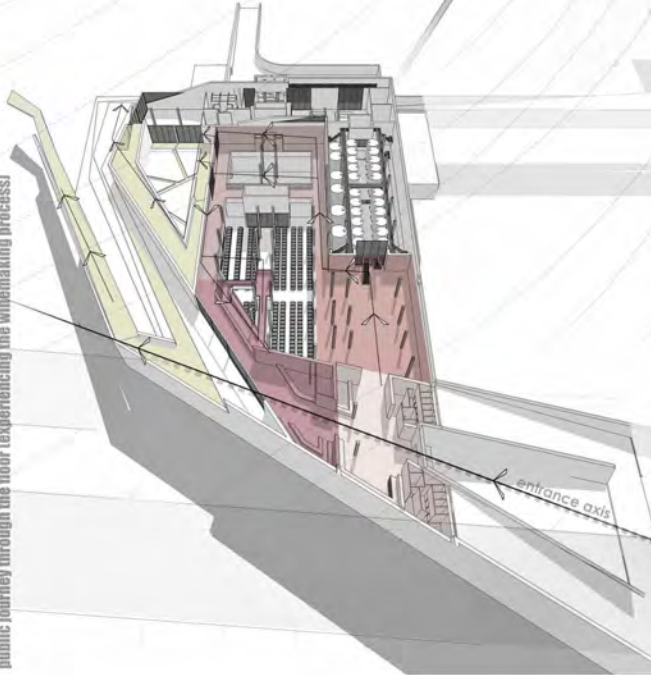
lower ground floor plan 1:1:2001



perspective views of ground floor (public functions) showing the arrangement of spaces



public journey through the floor (experiencing the winemaking process)



**wine tasting platform**  
illuminated by dappled light that is refracted through the water above which showcases the clarity of wine. direct views of fermentation process, barrel maturation process and 180 degree views of vineyards. the platform is stepped to allow for a more intimate experience of the subterranean barrel room or "wine cave"

**conference / skills development**  
this multi-purpose space can be used for a variety of different functions. a common requirement in the midlands region is the demand for wedding venues and business conference venues. this space offers the benefit of 180 degree views of the vineyards, direct access to the offices, wine tasting, and ramp leading to the restaurant and rooftop garden. in addition, the space can also be used for skills development opportunities, to teach surrounding communities about the proper maintenance of vineyards in order to uplift the midlands wine sector as a wine growing region

**outdoor courtyard**  
this break-out space above the entrance spaces of the building to be both naturally lit and ventilated. it can be accessed by both the public and staff. its main function is to provide a ramped (1:12) access to both the restaurant and the rooftop garden

**boardroom**  
gabian wall construction to provide a temperate condition provided by the beneficial thermo-dynamic properties of the stone quarried from the site. benefits from 180 degree views of the vineyard

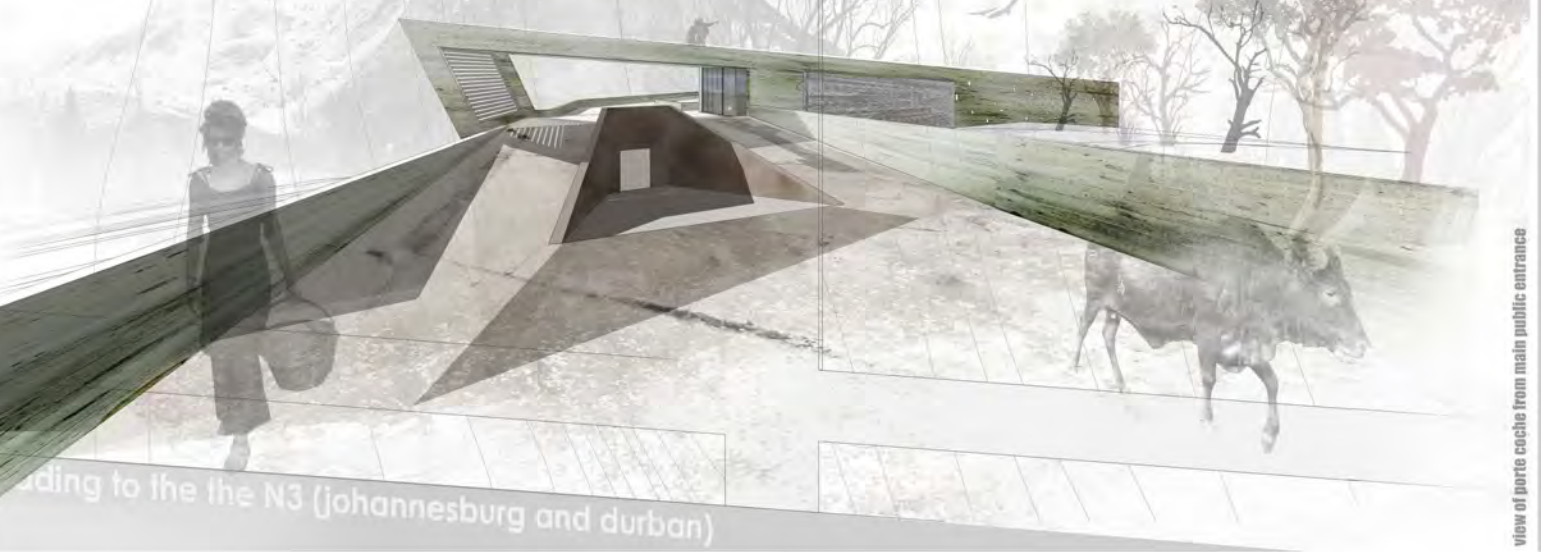
**open plan offices**  
its narrow footprint allows for natural cross ventilation, and it benefits from natural lighting and 180 degree views in order to enhance the work environment. direct access to fermentation rooms, private tasting room and all winery related functions

**public viewing platform**  
a public platform runs throughout the building, allowing visitors to view and experience the wine making process. this allows for a more open relationship between public and private functions, however, still maintains a level of separation so to prevent the public from interfering with the factory element of the building

**public gallery**  
this multi-purpose space can be used as a midlands mezzanine visitors centre, gallery and exhibition space, and / or wine museum space. it benefits from views of the entire winemaking process and houses the primary circulation to the restaurant above

**public entrance**  
entrance on axis to direct views of the vineyard beyond. entrance is subterranean in nature due to the textural element of construction, the use of light and shadow, and its position underground

**public entrance**  
entrance allows to direct views of the vineyard beyond, shadows form a part of the architectural materiality and overall historic form does not focus on the occupant's aspect of architecture, but rather uses the building as a tool to enhance the natural landscape. referentiality becomes an extension of the context



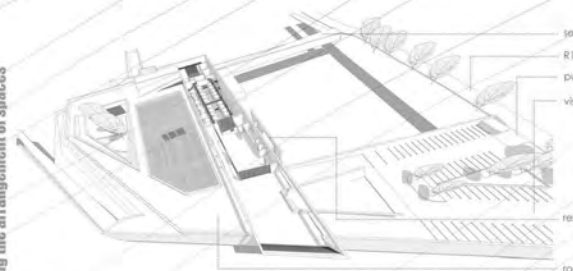


perspective views of first floor (public functions) showing the arrangement of spaces



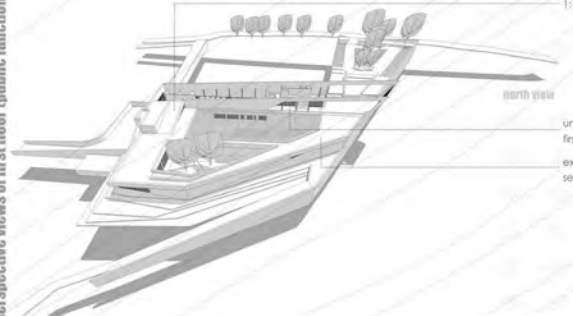
entrance porte cochée frames the view of the midlands restaurant  
 water (contains light boxes for wine tasting areas)  
 footpath to vineyard and outdoor gallery space  
 ramp from ground to first floor  
 gabion stone wall (staff room and boardroom)  
 louvers constructed of reclaimed wine oak barrels

east view



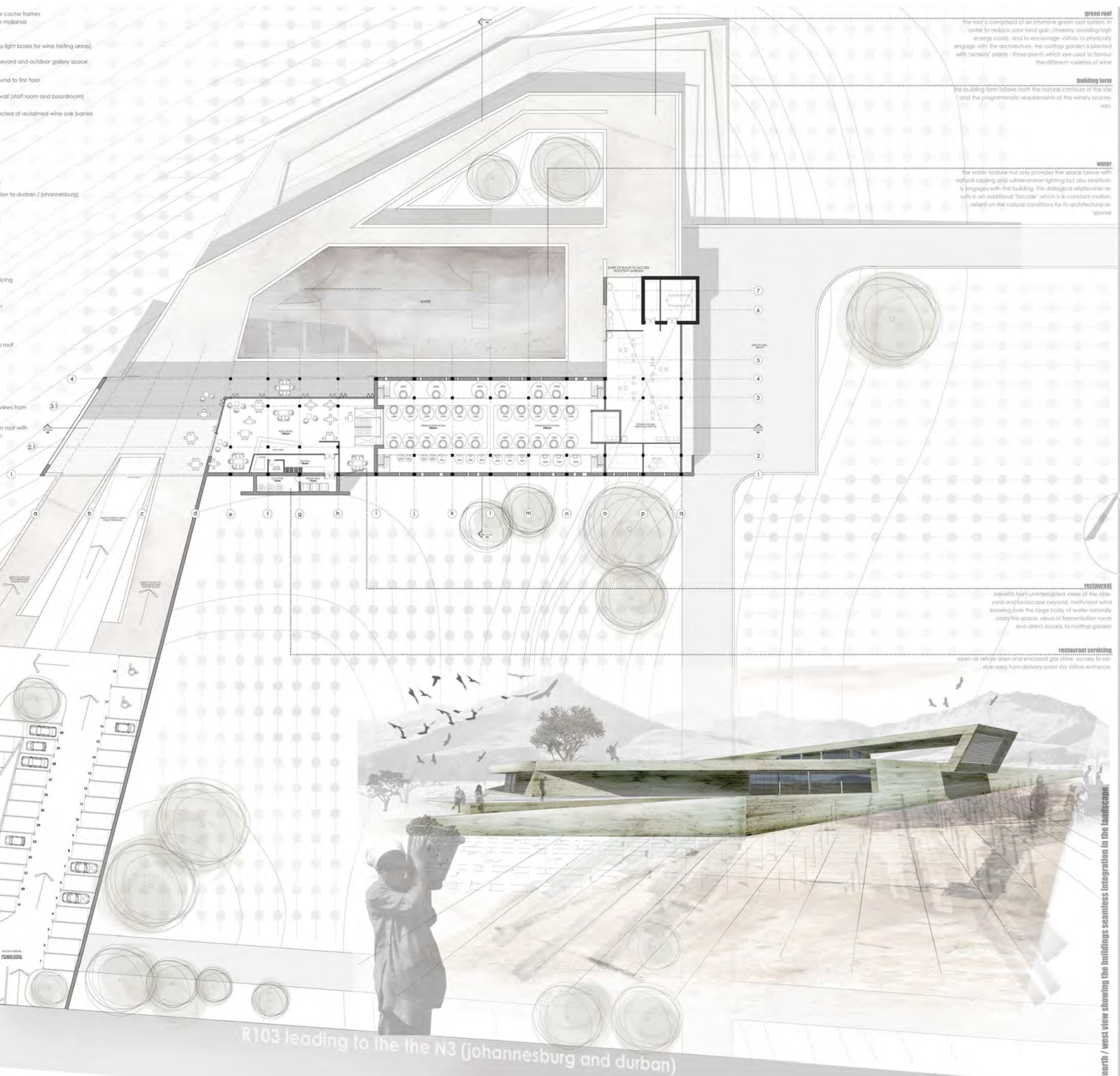
service access  
 R103 (connection to durban / johannesburg)  
 public access  
 visitors parking  
 restaurant servicing  
 rooftop garden

west view



1:10 ramp onto roof  
 uninterrupted views from first floor  
 extensive green roof with sensory garden

north view



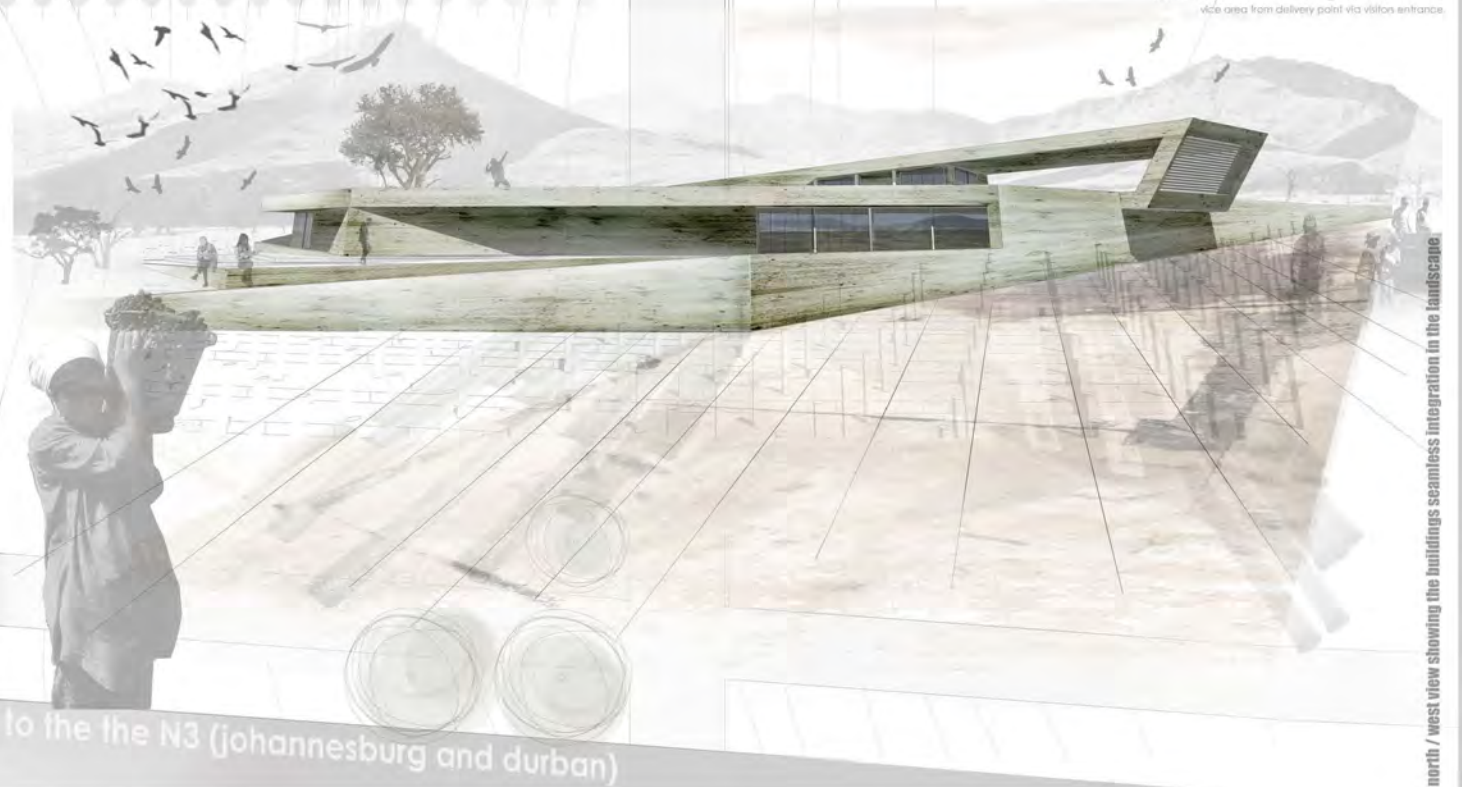
**green roof**  
 The roof is comprised of an intensive green roof system, in order to reduce solar heat gain (thereby avoiding high energy costs), and to encourage visitors to physically engage with the architecture. The rooftop garden is planted with 'sensory plants' - those plants which are used to flavour the different varieties of wine.

**building form**  
 The building form follows both the natural contours of the site and the programmatic requirements of the winery process.

**water**  
 The water feature not only provides the space below with natural cooling and subterranean lighting but also artistically engages with the building. This dialogical relationship results in an additional 'facade' which is in constant motion, reliant on the natural conditions for its architectural response.

**restaurant**  
 benefits from uninterrupted views of the vineyard and landscape beyond. north/west wind blowing over the large body of water naturally cools this space. views of fermentation room and direct access to rooftop garden.

**restaurant servicing**  
 open air refuse area and enclosed gas store. access to service area from delivery point via visitors entrance.



R103 leading to the the N3 (johannesburg and durban)

north / west view showing the buildings seamless integration in the landscape

The barotse winery is a place held by the buildings, rather than the buildings dominating the place. The building is part of this place, flowing with the process of making wine and connecting with the vineyard, the views, and the natural surroundings. At its heart it is reflective, responsive, and contextual.

**first floor plan - public - r1:2001**



**intensive green roof**  
allows visitors to physically engage with the building envelope, and gives back to the landscape which it has taken, allowing the building to be an extension of the landscape.

**fermentation room**  
punctured holes in reinforced concrete walls allow for natural light and ventilation, it also provides an engaging environment with the users of the space. (for technical resolution of this portion of the building refer to 1:20 technical section)

**water**  
provides natural light and cooling to spaces below and dialogically engages with the facade of the building to form a kinetic relationship.

**public walkway**  
located above winery processes to allow visitors to learn and experience the art of winemaking.

**private tasting room**  
benefits from full view of barrel fermentation, light box located above, which provides dappled light in order to view the clarity of the wine.

**courtyard**  
provides light to interior spaces and 1:1.2 ramp up to first floor.

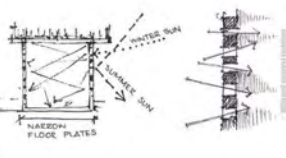
**winery storage space (including dry store)**  
wine maturation does not benefit from natural light or ventilation, so benefits from being fully submerged underground.

section aa (short section) (for technical resolution of fermentation room construction refer to technical details)

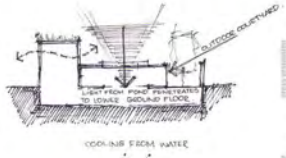


interior view of wine tasting platform (skylight within water provides a natural 'lightbox' to view the clarity of the wine)

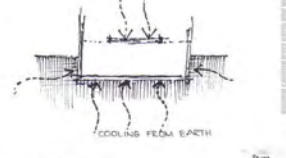
**natural light**  
natural light is key to good energy performance, as well as occupant satisfaction, productivity and health. punctured concrete allows diffused light to be distributed across large areas of the building, and requires less complex lighting controls, narrow floor plates throughout the building, as well as the outdoor courtyard allows natural light to penetrate deep into the interior spaces. in addition, overhangs are designed to shade interior spaces in summer and allow light in during winter, further enhancing the building energy savings. the unconventional lighting system provides dappled lighting to interior spaces which heightens the subterranean feeling of the architecture. diffused light from the light boxes within the water provide kinetic lighting to the lower ground floor with minimum amount of heat transfer. the combination of the highly textured concrete wall and the subterranean lighting highlights the texture and tactile plane of the architecture.



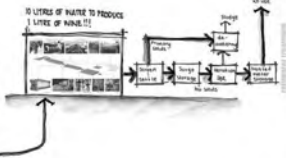
**natural ventilation**  
building is designed to take advantage of natural ventilation in the public spaces. the lower ground floor (winery processing) does not benefit from natural ventilation as wine maturation requires constant temperature and humidity levels and as such the building takes advantage of the earth's natural cooling mechanism. the fermentation room, however, needs to be heavily ventilated due to the CO2 building up which takes place during the fermentation process. as such the punctured concrete provides an unobstructed ventilation system. its lower ground and high level openings contribute toward a stack effect ventilation system, to readily expel the CO2 buildup.



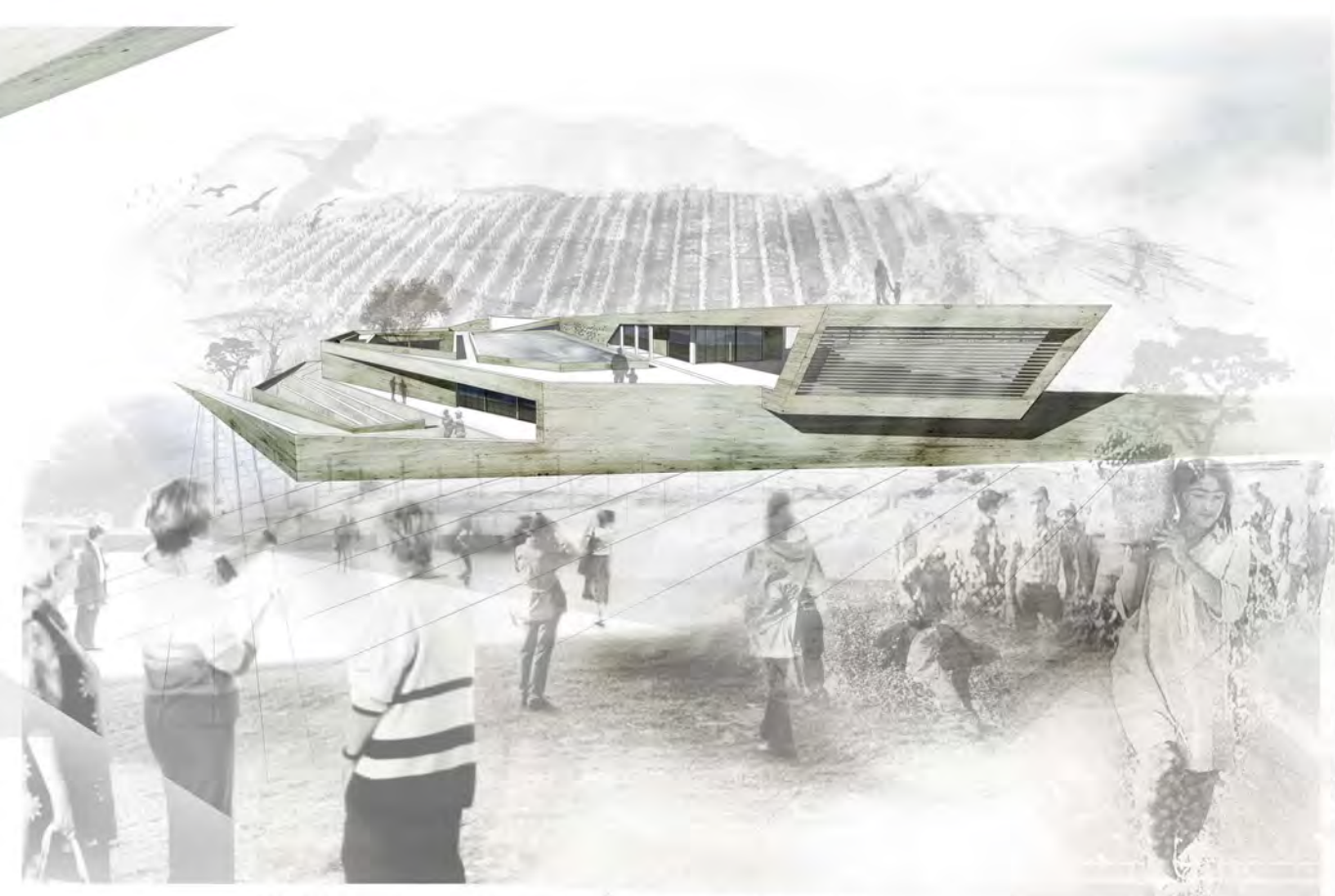
**earth cooling**  
the building capitalizes upon the inherent climate control capabilities of the subterranean environment. earth sheltering is essentially a passive implementation of the principle underlying ground source heat pumps. deep soil provides a warmer environment in the winter and a cooler environment in the summer than the atmospheric environment above ground. this substantially reduces winter heat losses and reduce summer cooling loads. by providing a very stable exterior environment, building climate control becomes more energy efficient and cost effective - and the prospect for passive strategies is improved. heating and cooling loads and costs can be reduced by 50% or more with effective earth sheltered design, and the need for active backup climate control systems is greatly reduced.



**waste water treatment**  
greywater, kitchen and second floor sewage leads to waste water treatment plant located on lower processing floor. however it is especially useful for irrigating the vineyards due to its high mineral content grey water processing takes place through biological and mechanical processes. the parties are filtered out and afterward the water is cleaned in the geo-biological stage and disinfected through UV radiation.



conceptual relationship between levels (ideological spaces)



WEST VIEW (showing the buildings varying levels of integration within the landscape)

section aa and interior view



**intensive green roof**  
allows visitors to physically engage with the building envelope, and gives back to the site from which it has taken, allowing the building to be an extension of the landscape

**porte cache**  
frames entrance view and provides an undercover area for restaurant patrons

**wine sales**  
view of vineyards and oil winemaking process

**entrance axis**  
direct view of vineyards from public entrance, focus is on the natural beauty of the context rather than oculocentric aspect of the architecture

**restaurant**  
benefits from uninterrupted views of context and direct views of the fermentation room

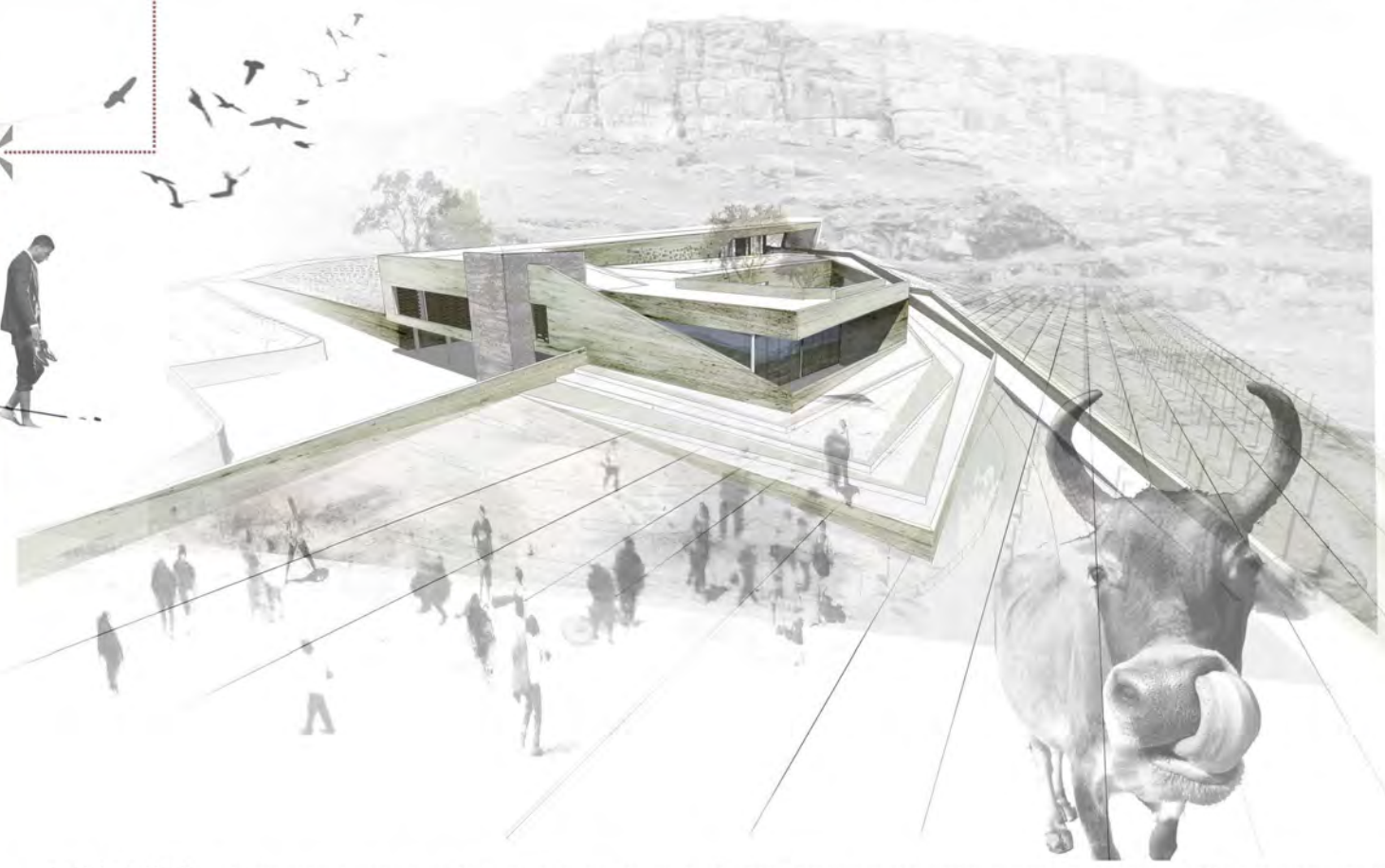
**fermentation room**  
punctured holes in reinforced concrete wall allow for natural light and ventilation, in addition it provides an engaging environment with the users of the space

**offices**  
direct views of the vineyard and direct access to all winery processes, narrow floorplate allows natural lighting and cross ventilation (for technical resolution of this portion of the building refer to 1:20 technical section)

**section bh (long section) (for technical resolution of office construction refer to technical details)**



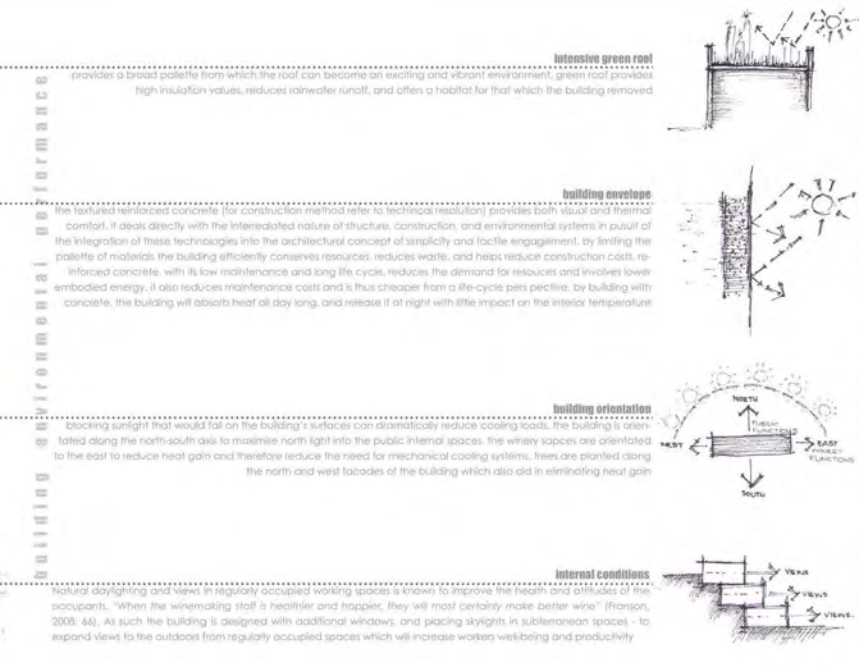
**interior view of fermentation room** (punctured concrete creates subterranean lighting which emphasises the architecture's textural and tactile plane)



**east / north view** (the architecture is based on the idea of continuity, seamless surfaces and smooth transitions between spaces - a concept that is geared to develop a continuous flow within building while providing a subtle blending between inside and outside)



**conceptual relationship between levels** (dialogical spaces)



**intensive green roof**  
provides a broad palette from which the roof can become an exciting and vibrant environment, green roof provides high insulation values, reduces rainwater runoff, and offers a habitat for that which the building removed

**building envelope**  
the textured reinforced concrete (for construction method refer to technical resolution) provides both visual and thermal comfort, it deals directly with the interrelated nature of structure, construction, and environmental systems in pursuit of the integration of these technologies into the architectural concept of simplicity and tactile engagement, by limiting the palette of materials the building efficiently conserves resources, reduces waste, and helps reduce construction costs, reinforced concrete, with its low maintenance and long life cycle, reduces the demand for resources and involves lower embodied energy, it also reduces maintenance costs and is thus cheaper from a life-cycle perspective, by building with concrete, the building will absorb heat all day long, and release it at night with little impact on the interior temperature

**building orientation**  
blocking sunlight that would fall on the building's surfaces can dramatically reduce cooling loads, the building is orientated along the north-south axis to maximise north light into the public internal spaces, the winery spaces are orientated to the east to reduce heat gain and therefore reduce the need for mechanical cooling systems, trees are planted along the north and west facades of the building which also aid in eliminating heat gain

**internal conditions**  
"natural daylighting and views in regularly occupied working spaces is known to improve the health and attitudes of the occupants, 'When the winemaking staff is healthier and happier, they will most certainly make better wine'" (Franssen, 2008: 64). As such the building is designed with additional windows, and placing skylights in subterranean spaces - to expand views to the outdoors from regularly occupied spaces which will increase workers wellbeing and productivity

**section bh and interior view**



**ROOF TERRACE**

**Intensive green roof**

Derbigum waterproofing system comprising:  
 - One layer derbigum SP 4mm thick applied to primed surface fully sealed to concrete slab, side walls and parapets.  
 - Min 75mm side laps, 100mm end laps to be sealed together by torching on fusion.  
 - Waterproofing to be dressed up beams and tops with tilting fillets where necessary.  
 - Form deck joint isolation strips using Isoceck 310 or 2 ply roofing felt with sand finish spot bonded on one side only.  
 - Bond derbigum to centre section of boards leaving it free over joint to prevent cutting, tearing or pinching.  
 - Treatment to be finished with two coats bituminous aluminium paint applied in accordance with manufacturer's specification.  
 NOTE: WATER PROOFING TO BE UNDERTAKEN BY DERBIGUM APPROVED APPLICATOR AND 10 YEAR GUARANTEE TO BE SEED TO OWNER

FFL +11.800  
 TOS +10.900

450 deep intensive green roof to specialist detail - Derbigum spot fully sealed - screed to fall at minimum of 1:100

1700  
 700

soffit to be off-shutter concrete

**FERMENTATION ROOM**

20mm polished granolithic screed floor finish  
 FFL +0.325  
 TOS +0.100

**CATWALK**

men's grating  
 FFL +7.00

300mm reinforced concrete column with smooth off-shutter finish, pre-drilled and bolted to pile cap, to engineers specification

gms balustrade - 1100mm high - 100mm dia gms handrail fixed to stanchions with 16mm dia round bar at 150mm centres - custom formed gms plates at 1300mm centres with steel cables

**CATWALK**

men's grating  
 FFL +3.500

stainless steel fermentation vat supported by galvanised steel strut to specialist detail

galvanised mild steel tube truf bracketed to reinforced concrete column to specialist detail

galvanised mild steel 20mm base plate bolted to reinforced concrete column

20mm polished granolithic screed to fall @ 1:50 toward sump

200 reinforced concrete slab with power trowled surface and 5mm sawn joints a quarter depth in panels of 4m max

polyurethane epoxy floor coating to be applied to factory floor, thickness as per suppliers details and specification

mafic gap sealant at movement joint

250 micron DPM with minimum 200mm side and end laps

compacted sand bedding

2

1



300 x 2000 inverts RS 40 steel grating panel - 90-12mm diameter stones laid on top of outlet - 400 x 400 SP4 dressed into outlet - 130 x 130 steel box gutter - fillets to be isolated by Derbigum - 1700 concrete upstand to act as balustrade effective height = 1000

expressed puccled reinforced concrete, for natural light and ventilation purposes, to 1:100 fall

concrete surface channel runoff to water treatment system located in machinery room

compacted fill in accordance with engineers detail, soil poisoned in accordance with NBR'S and SABS specification

300mm reinforced concrete wall: no fins or with weep holes at 150mm, (fill material application and method of construction refer to sketch).

bituminous paint to be applied to outside skin of wall  
 0.45mm pilefin damp proof membrane (block)  
 20mm soft board

50mm granular bedding Type A, W40 free from stones in excess of 40mm above 100mm Ø perforated vitrified clay pipes to be laid off falls with perforations to the underside of pipe above 50mm granular bedding Type A, W12

urethane caulk and sealant movement gap to be placed around column and positioned into shuttering for concrete slab and screed as permanent movement gap  
 sump with cast iron galling to engineers details and design

agricultural drain consisting of 110mm dia slotted pvc pipe with 300mm cross section stone surround protected with bitum granolithic river sand in 300mm wide trench above drain

200mm perforated subsoil drain

375 micron DPM

hardcore compacted fill as 0.13, 0.33

450 x 850mm reinforced concrete ring beam, for reinforcing diagrams and details please refer to engineers details

450mm Ø short piles to engineers details

**LOWER GROUND FLOOR**  
 +11.600

**ROOF SLAB**  
 +10.900

**LOWER TERRACE BEAM SOFFIT**  
 +10.600

**SECOND LEVEL CATWALK**  
 +7.100

**NGL**  
 +6.145

**FIRST LEVEL CATWALK**  
 +5.400

**FIRST LEVEL CATWALK**  
 +3.600

**FIRST LEVEL CATWALK**  
 +1.800

**LOWER GROUND FLOOR**  
 +0.100

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 - THE SITE IS TO BE TREATED IN ACCORDANCE WITH S.A.B.S CODE OF PRACTISE N.0124-1977 WITH 'SHIELDRITE' TERMITEPRE SOIL POISONER, TOP OF FOUNDATIONS TO BE A MINIMUM OF 300mm BELOW NATURAL GROUND LEVEL. TOP OF 75<6 CONCRETE SURFACE BED TO BE A MINIMUM OF 150mm ABOVE FINISHED GROUND LEVEL.

**FOUNDATIONS**  
 - ALL FOUNDATIONS, FOUNDATION WALLS, STRUCTURAL CONCRETE WORK AND SUBSOIL STORMWATER DRAINAGE TO ENGINEERS SPECIFICATION.  
 - COMPACTED FILL IN ACCORDANCE WITH ENG DETAIL, SOIL POISONED IN ACCORDANCE WITH NBR'S AND SABS SPEC.

**ROOFS**  
 - 300 RC SLAB WITH DRIPS AND RECESSES WHERE REQUIRED TO ARCH AND ENG DETAIL. NOTE: ALL EXPOSED FACES AND EDGES TO BE SMOOTH OFF SHUTTER CONCRETE.  
 - DERBIGUM WATERPROOFING SYSTEM COMPRISING: ONE LAYER DERBIGUM SP 4mm THICK APPLIED TO PRIMED SURFACE FULLY SEALED TO CONCRETE SLAB, SIDE WALLS AND PARAPETS. MIN 75mm SIDE LAPS 100mm END LAPS TO BE SEALED TOGETHER BY TORCHED ON FUSION. WATER PROOFING TO BE DRESSED UP BEAM SIDES AND TOPS WITH TILTING FILLETS WHERE NECESSARY. FORM DECK JOINT ISOLATION STRIPS USING ISOCECK 310 OR 2 PLY ROOFING FELT WITH SAND FINISH SPOT BONDED ON ONE SIDE ONLY. BOND DERBIGUM TO CENTRE SECTION OF BOARDS LEAVING IT FREE OVER JOINTS TO PREVENT CUTTING, TEARING OR PINCHING. TREATMENT TO BE FINISHED WITH TWO COATS BITUMINOUS ALUMINIUM PAINT APPLIED IN ACCORDANCE WITH MNR'S SPECIFICATION. NOTE: WATER PROOFING TO BE UNDERTAKEN BY DERBIGUM APPROVED APPLICATOR AND 10 YEAR GUARANTEE TO BE SEED TO OWNER.  
 - IPE 200 BEAMS AT CENTRES INDICATED, WITH ALL CLEATS AND BASE PLATES TO ENG DETAIL.

**FLOORS**  
 - 75 TO 50mm GRANO SCREED TO FALLS TO OUTLETS. ALL CORRECT BUILDING PROCEDURES TO BE IMPLEMENTED TO AVOID DELAMINATION AND HOLES APPEARING.  
 - ALL SURFACES TO BE CLEAN, SOUND, LAITANCE AND DUST FREE WITH A MAXIMUM MOISTURE CONTENT OF 5%. PRIME SURFACE WITH ONE COAT FLOWPRIME. SOLVENT FREE EPOXY PRIMER AND BASE COAT (SPREAD RATE - 5-6m<sup>2</sup>/LITRE) WITH A MAXIMUM OVERCOATING TIME OF 24 HOURS. APPLY ONE COAT LIGHT GREY FLOWTEX HT TO A MINIMUM 7mm THICKNESS WITH A MAXIMUM OVERCOATING TIME OF 48 HOURS. APPLIED IN ACCORDANCE WITH APPROVED FLOWCRETE SPECIFICATIONS BY APPROVED APPLICATORS.  
 - DPM-GUNLDE USM GREEN 250MICRON DAMP PROOF MEMBRANE UNDER CONCRETE SURFACE BEDS TO SABS MARK 952-1985 TYPE C LAID WITH MINIMUM 150mm OVERLAPS AND SEALED WITH GUNPLAS PRESSURE SENSITIVE TAPE.  
 - 80mm PIGMENTED GRANO SCREED WITH POLISHED STEEL TROWEL FINISH. REFER TO FINISH SCHEDULE.

**DRAINAGE**  
 - 100DIA U.P.V.C SEWER PIPE DRAIN WITH A MIN. FALL OF 1:60  
 - 100DIA OVP AY HEAD OF DRAIN PIPE  
 - RODDING EYES AT HEAD OF DRAIN, AT ALL CHANGES OF DIRECTION & AT MAX OF 25000mm INTERVALS.  
 - INSPECTION EYES AT ALL JUNCTIONS OF DRAIN, & TO HAVE MARKED COVERS AT GROUND LEVEL.  
 - DRAIN PIPES UNDER BUILDING TO BE PROTECTED AGAINST LOAD.  
 - ALL WASTE PIPES UNDER FLOOR SLABS TO BE SLEEVED.  
 - ALL WASTE PIPES TO HAVE 65mm RE-SEAL TRAPS. ALL WASTE PIPES TO BE ACCESSIBLE OVER ENTIRE LENGTH FOR CLEANING AND REPAIRS.  
 - ALL SOIL FITTINGS WITH VERTICAL DISCHARGE GREATER THAN 1220 TO HAVE ANTISYPHON VENTPIPES.  
 - ALL DRAINAGE WORK TO BE CARRIED OUT IN ACCORDANCE WITH LOCAL AUTHORITIES DRAINAGE BY-LAWS AND REGULATIONS.

**ELECTRICAL**  
 - DISTRIBUTION BOARD TO BE BY HIEMANN TO MANUFACTURERS SPECIFICATION.  
 - ALL ELECTRICAL WORK TO BE CARRIED OUT BY TRAINED PROFESSIONALS.  
 - ELECTRICAL CERTIFICATED TO BE ISSUED AFTER COMPLETION OF JOB.

**WINDOWS**  
 - ALL WINDOWS TO BE ALUMINIUM.  
 - ALL WINDOWS TO BE DARK CHAROAL EPOXY COATED.  
 - SIZE OF OPENINGS TO BE VERIFIED BY CONTRACTOR PRIOR TO FITMENT, ANY DISCREPANCIES TO BE BROUGHT TO THE ATTENTION OF THE ARCHITECT IMMEDIATELY.  
 - THICKNESS OF PANE OF GLASS IN RELATION TO THEIR AREA SHALL BE IN ACCORDANCE TO SABS 0400.  
 - FOR ALL WINDOW DETAILS REFER TO ARCH SCHEDULES.

**DOORS**  
 - DOOR FRAME-ZIKZA JOINERY 67 X 67mm MERANTI FLAT DOOR FRAME WITH SINGLE REBATE MOULDED, GROOVED AN WEATHER GROOVED FRAME FOR SINGLE DOOR, SIZE 813 X 2032mm HIGH/H  
 - ALL INTERNAL DOORS TO BE SUPPLIED BY ZIKZA JOINERY AND TO BE 813 X 2032mm ACCORDING TO MANUFACTURERS DETAIL AND SPECIFICATION.  
 - ALL DOOR OPENINGS TO BE VERIFIED BY CONTRACTOR PRIOR TO FITMENT, ANY DISCREPANCIES TO BE BROUGHT TO THE ATTENTION OF THE ARCHITECT IMMEDIATELY.  
 - FOR ALL DOOR DETAILS REFER TO ARCH SCHEDULES

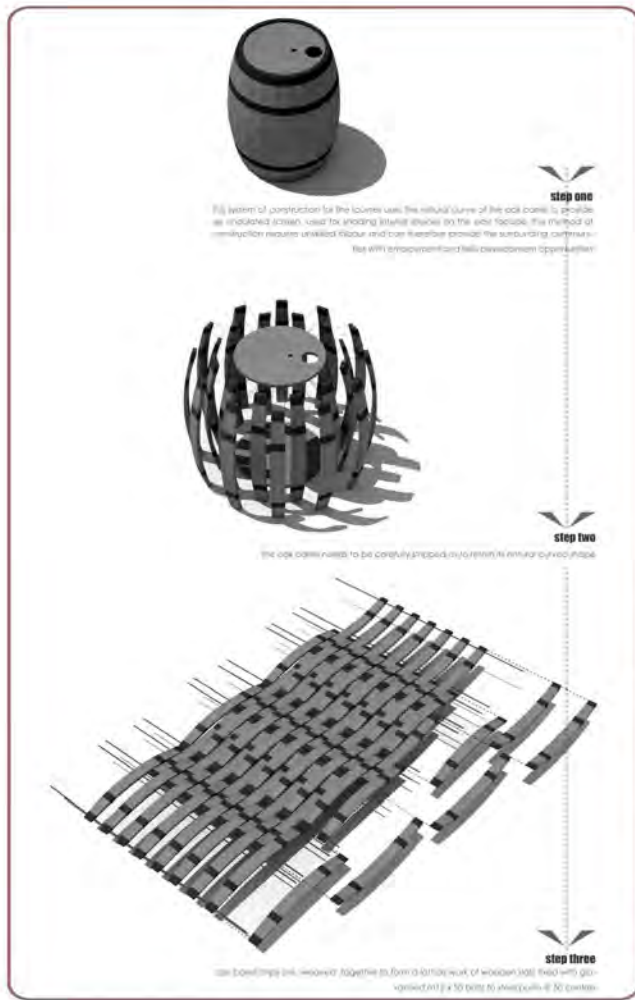
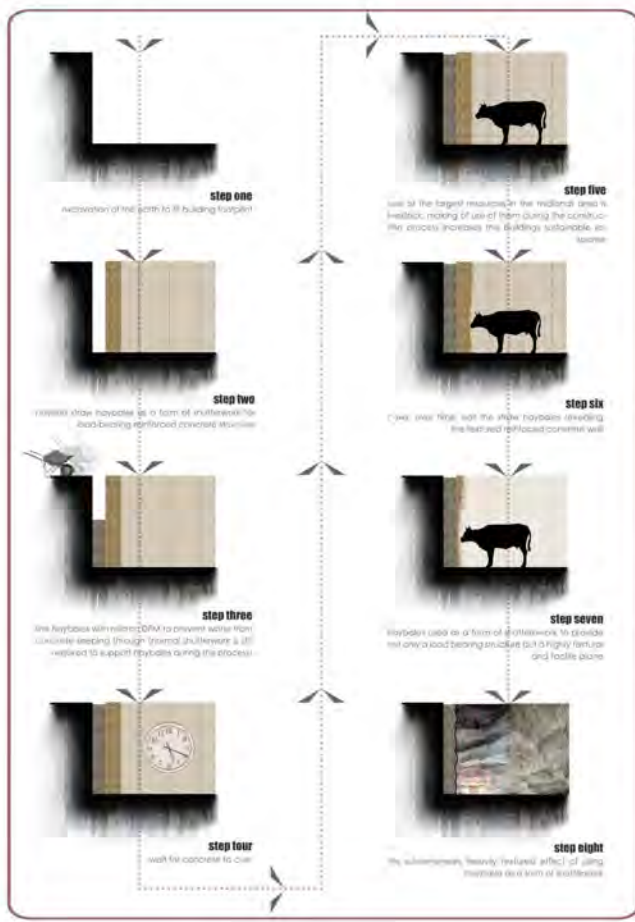
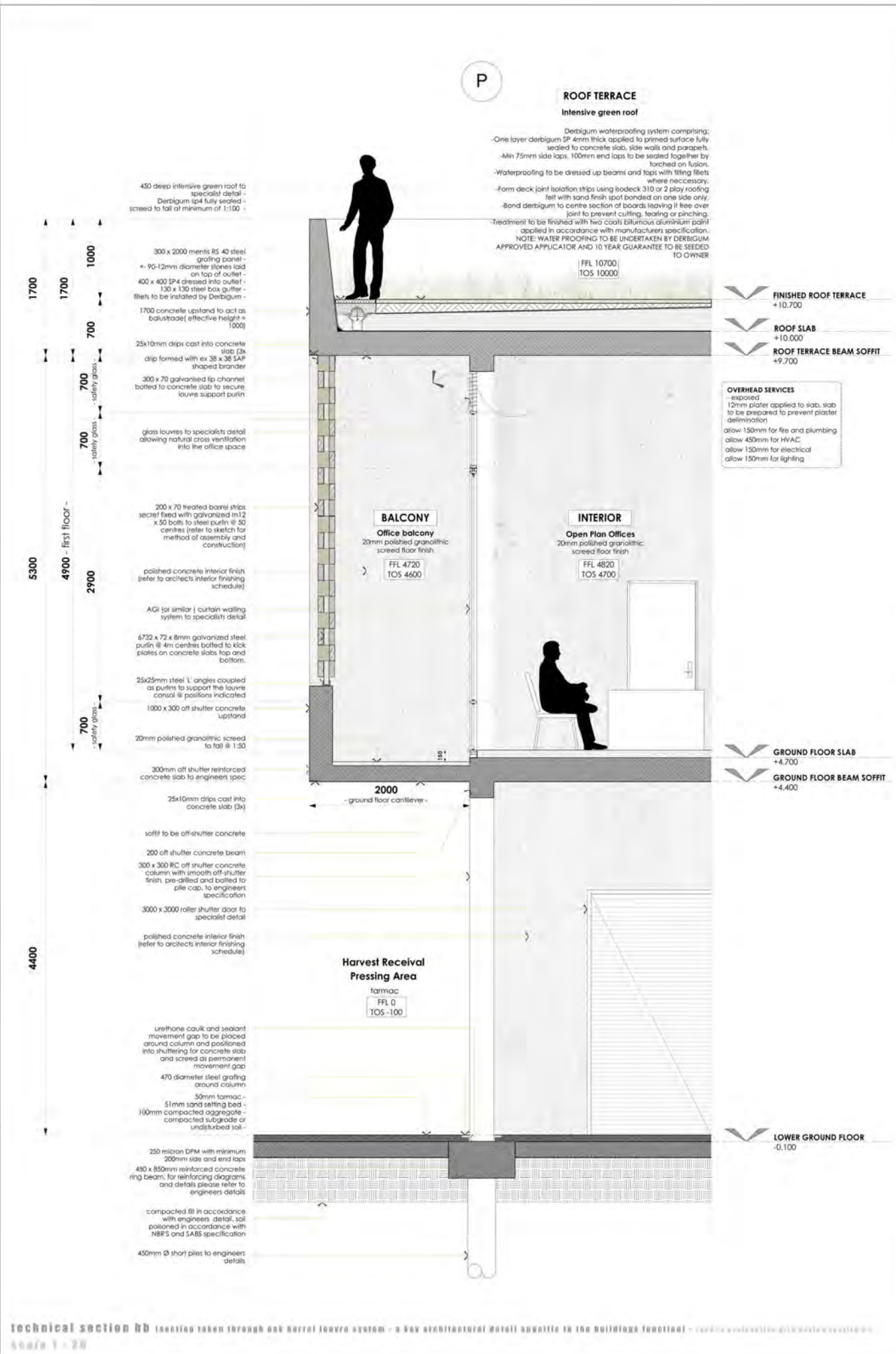
**STORM WATER**  
 - ALL STORM WATER GOODS PURCHASED TO BE SABS APPROVED.  
 - STORMWATER SOAKPIT TO BE TO ENGINEERS DETAIL AND SPECIFICATION.  
 - STORMWATER LAYOUT TO ENGINEERS APPROVAL PRIOR TO COMMENCEMENT OF CONSTRUCTION.  
 - RAINWATER DOWNPIPES TO DISCHARGE AT MIN OF 2400mm FROM ANY OPEN GULLY.



VIEW AT TOP LEFT: FROM VIEW SECTION aa-1:20

**technical resolution of reinforced concrete structure**  
**technical section aa -- 1:20**





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**FLOORS**

- 75 TO 50mm GRANO SCREED TO FALLS TO OUTLETS. ALL CORRECT BUILDING PROCEDURES TO BE IMPLEMENTED TO AVOID DELAMINATION AND HOLES APPEARING.

- ALL SURFACES TO BE CLEAN, SOUND, LAITANCE AND DUST FREE WITH A MAXIMUM MOISTURE CONTENT OF 5%. PRIME SURFACE WITH ONE COAT FLOWPRIME. SOLVENT FREE EPOXY PRIMER AND BASE COAT (SPREAD RATE - 5-6mm<sup>2</sup>/LITRE) WITH A MAXIMUM OVERCOATING TIME OF 24 HOURS. APPLY ONE COAT LIGHT GREY FLOWTEX HT TO A MINIMUM 7mm THICKNESS WITH A MAXIMUM OVERCOATING TIME OF 48 HOURS. APPLIED IN ACCORDANCE WITH APPROVED FLOWCRETE SPECIFICATIONS BY APPROVED APPLICATORS.

- DPM-GUNDLÉ USM GREEN 250MICRON DAMP PROOF MEMBRANE UNDER CONCRETE SURFACE BEDS TO SABS MARK 952-1985 TYPE C LAID WITH MINIMUM 150mm OVERLAPS AND SEALED WITH GUNPLAS PRESSURE SENSITIVE TAPE. 80mm PIGMENTED GRANO SCREED WITH POLISHED STEEL TROWEL FINISH. REFER TO FINISH SCHEDULE.

**DRAINAGE**

- 100DIA U.P.V.C SEWER PIPE DRAIN WITH A MIN. FALL OF 1:60

- 100DIA OVP AY HEAD OF DRAIN PIPE

- RODDING EYES AT HEAD OF DRAIN, AT ALL CHANGES OF DIRECTION & AT MAX OF 25000mm INTERVALS.

- INSPECTION EYES AT ALL JUNCTIONS OF DRAIN, & TO HAVE MARKED COVERS AT GROUND LEVEL.

- DRAIN PIPES UNDER BUILDING TO BE PROTECTED AGAINST LOAD.

- ALL WASTE PIPES UNDER FLOOR SLABS TO BE SLEEVED.

- ALL WASTE PIPES TO HAVE 65mm RE-SEAL TRAPS. ALL WASTE PIPES TO BE ACCESSIBLE OVER ENTIRE LENGTH FOR CLEANING AND REPAIRS.

- ALL SOIL FITTINGS WITH VERTICAL DISCHARGE GREATER THAN 1220 TO HAVE ANTISYPHON VENTPIPPES.

- ALL DRAINAGE WORK TO BE CARRIED OUT IN ACCORDANCE WITH LOCAL AUTHORITIES DRAINAGE BY-LAWS AND REGULATIONS.

**ELECTRICAL**

- DISTRIBUTION BOARD TO BE BY HIEMEMANN TO MANUFACTURERS SPECIFICATION.

- ALL ELECTRICAL WORK TO BE CARRIED OUT BY TRAINED PROFESSIONALS.

- ELECTRICAL CERTIFICATE TO BE ISSUED AFTER COMPLETION OF JOB.

**WINDOWS**

- ALL WINDOWS TO BE ALUMINIUM.

- ALL WINDOWS TO BE DARK CHARCOAL EPOXY COATED.

- SIZE OF OPENINGS TO BE VERIFIED BY CONTRACTOR PRIOR TO FITMENT, ANY DISCREPANCIES TO BE BROUGHT TO THE ATTENTION OF THE ARCHITECT IMMEDIATELY.

- THICKNESS OF PANE OF GLASS IN RELATION TO THEIR AREA SHALL BE IN ACCORDANCE TO SABS 0400.

- FOR ALL WINDOW DETAILS REFER TO ARCH SCHEDULES.

**DOORS**

- DOOR FRAME-ZIKZA JOINERY 67 X 67mm MERANTI FLAT DOOR FRAME WITH SINGLE REBATE MOULDED, GROOVED AN WEATHER GROOVED FRAME FOR SINGLE DOOR. SIZE 813 X 2032mm (HIGH)

- ALL INTERNAL DOORS TO BE SUPPLIED BY ZIKZA JOINERY AND TO BE 813 X 2032mm ACCORDING TO MANUFACTURERS DETAIL AND SPECIFICATION.

- ALL DOOR OPENINGS TO BE VERIFIED BY CONTRACTOR PRIOR TO FITMENT. ANY DISCREPANCIES TO BE BROUGHT TO THE ATTENTION OF THE ARCHITECT IMMEDIATELY.

- FOR ALL DOOR DETAILS REFER TO ARCH SCHEDULES

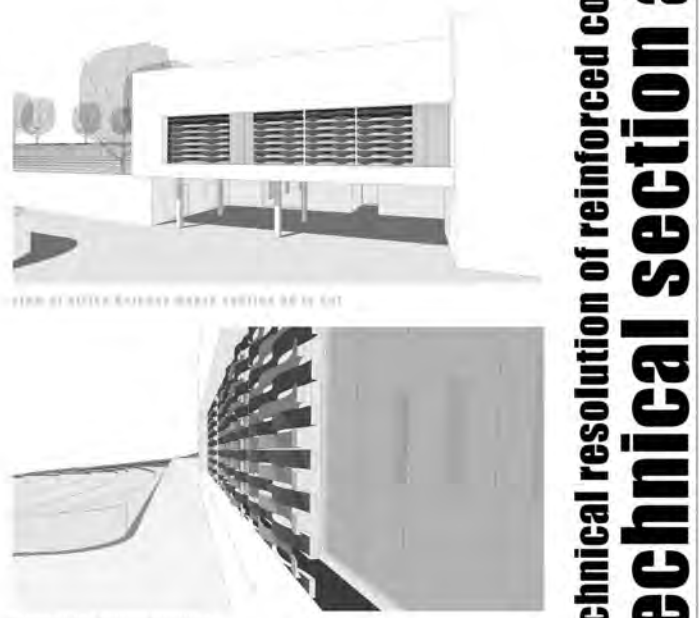
**STORM WATER**

- ALL STORM WATER GOODS PURCHASED TO BE SABS APPROVED.

- STORMWATER SOAKPIT TO BE TO ENGINEERS DETAIL AND SPECIFICATION.

- STORMWATER LAYOUT TO ENGINEERS APPROVAL PRIOR TO COMMENCEMENT OF CONSTRUCTION.

- RAINWATER DOWNPIPES TO DISCHARGE AT MIN OF 2400mm FROM ANY OPEN GULLY.



technical resolution of reinforced concrete structure  
technical section aa -- 1:20