Design Research Report APG 5079W
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SHARDS OF AN INDUSTRIAL PAST

musealization of an Archaeological site at Glencairn

Musealization is the preservation of the ideal values of things as signs.[1]

Abstract

I consider historical sites and places that have meaning and connections with the past as being very significant in our contemporary city. They reveal human development and ambition; they carry historical and didactic value while possessing phenomenological richness. I have found myself intrigued by the study of archaeology and I seek to find its relation to phenomenology through architecture. The design thesis research led me to a site with the archaeological remains of the Cape Glass Company (1902 - 1905) in Glencairn. It is where the very first glass bottle making factory using semi-auto machinery was established on the continent. Its historical relevance seems unknown and almost forgotten, and it is currently physically neglected.

The aim of this dissertation is to seek ways to enhance such abandoned sites by way of preservation and establishing public access and awareness in order to experience their phenomenological richness in built form. The intention is to try to bring about an architectural response centered on commemoration through everyday use and create a place that becomes an artifact in the southern promontory of the city. The site has also given strong need to investigate glass and brick as materials for making and constructing architecture, leaving the exposed archaeological site open to an intervention of protection and musealization.

Preface

Referring to the words of Peter Zumthor in his book "*Thinking Architecture*" he describes the atmospheres of typical rooms from his childhood as images when thinking of architecture. He points out the ability of memories "to contain the deepest architectural experience" known to him and how these memories are "the reservoirs of the architectural atmospheres and images" that he explores in his own work as an architect. He tries to "revive that vibrant atmosphere pervaded by the simple presence of things, in which everything had its own specific place and form."
(Zumthor, 1998:10)

Early on while researching this thesis, I experienced what Zumthor describes as the atmosphere of a typical room. In my case, it was the living room of the house where I was residing at the time of writing this dissertation. There was nothing special about the room, but the image of the brick hearth and lantern above the wooden mantle piece (Fig. 1) triggered childhood memories of my own. These were memories of the times I visited my grandparents' rural homestead whenever I was back home in Zimbabwe. Their living room was dominated by a stone hearth and mantle piece adorned with lanterns and dozens of family pictures. It reminded me of a time when we would stay up late listening to my grandparents' stories seated around the fireplace in the room illuminated in a sunset yellow ambience from the kerosene lanterns. There was something about the smell of burning kerosene and the tapering string of sooty smoke rising from the lanterns that imprinted its memory indelibly on my mind, much the same way as the kitchen did for Zumthor.

Looking at the brick of the hearth and glass of the lantern as objects, they have an interesting intertwining relationship of constructed and formed; moulded and molten state by heat; modular and organic form; heavy and light; rigid and fragile. Both are made of similar silica based ingredients and when exposed to high temperatures result in very different and contrasting properties and characteristics.

I decided to use the hearth and lantern as the artifact for class exploration exercises. In the explorations I became fascinated by the way light interacted with glass, as well as capturing the air movements of rising sooty smoke from the glass lantern that formed intricate patterns on paper (Fig. 2, Fig. 3). Inverting these images also produced intriguing visual imagery.

To carry the thesis further I then decided to look at the history of glass in Cape Town and to my surprise there was not much to find, save for one article[2] small enough to miss in my haste for more substantial subject matter. Yet that small article was the very keystone that led me to research and discover the Cape Glass Company at Glencairn.

[1] Things + Ideas + Musealization = Heritage, A Museological Approach, 2008, MAST, Brazil
[2] The Cape Glass Company, Glencairn: Archaeology of an Historical Site S. J. Saitowitz, R. O. Heckroodt and Ethleen Lastovica

This document will begin by introducing the reader to the influences that led the author to the site and interest in archaeology. The history and background will be discussed, highlighting significant details and discoveries which will inform the urban strategy and design development. Theoretical approach and Precedent studies will be discussed and analyzed to reveal their architectures' ability to weave intimately with their contexts, archaeological remains and spatial phenomenology experience.

The design development will consist of the process and analyses followed by the technical investigations and detailing. This document will then draw a conclusion that will state a position on design for this dissertation as possible precedent for approaching other similar sites in the future.

Figure 1 Brick hearth and glass lantern artifact

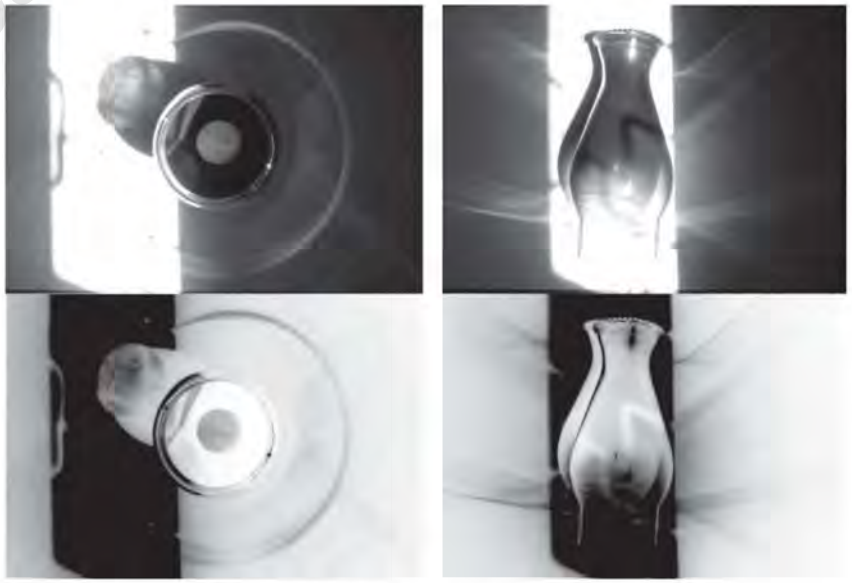


Figure 2 Light and Glass lantern explorations

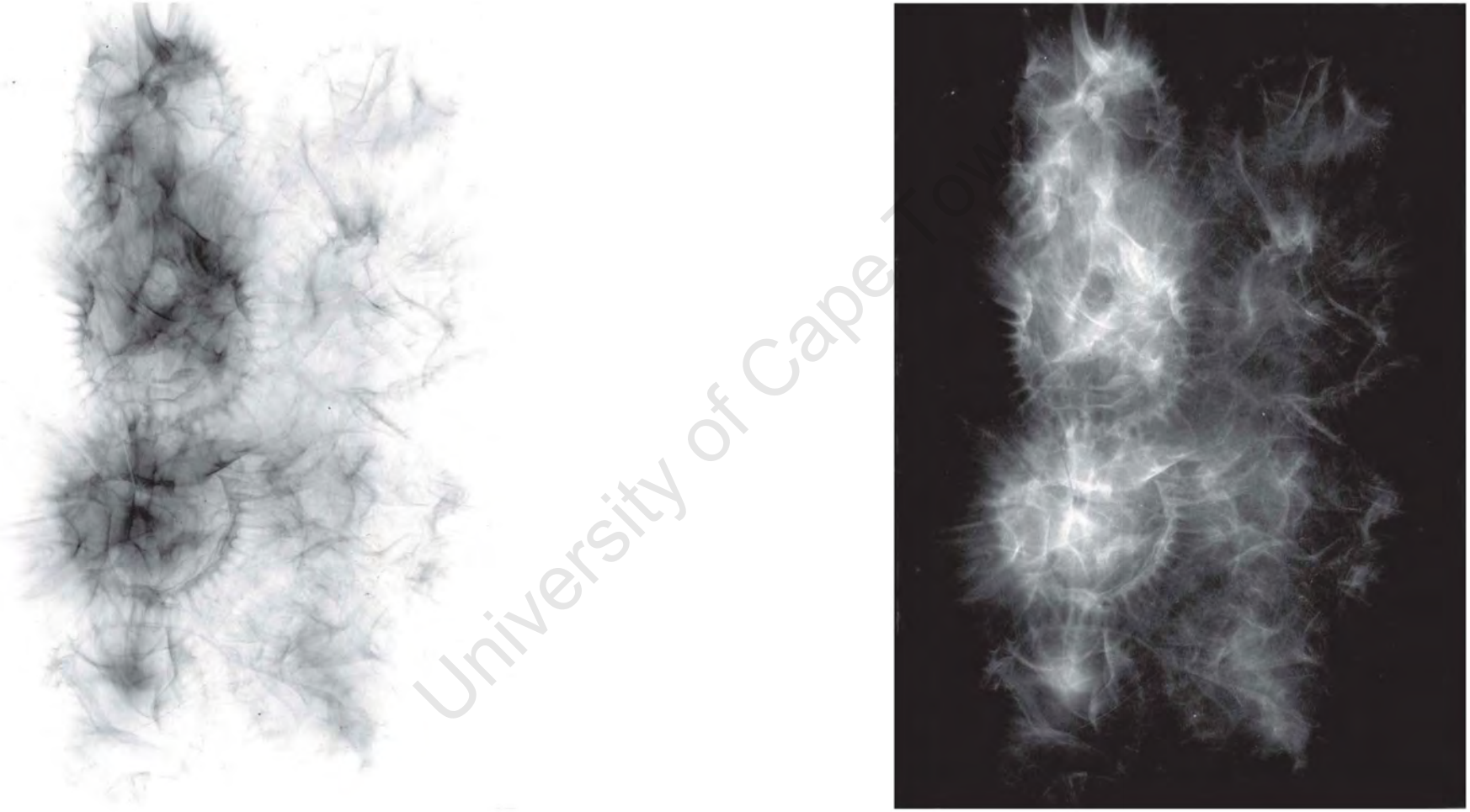
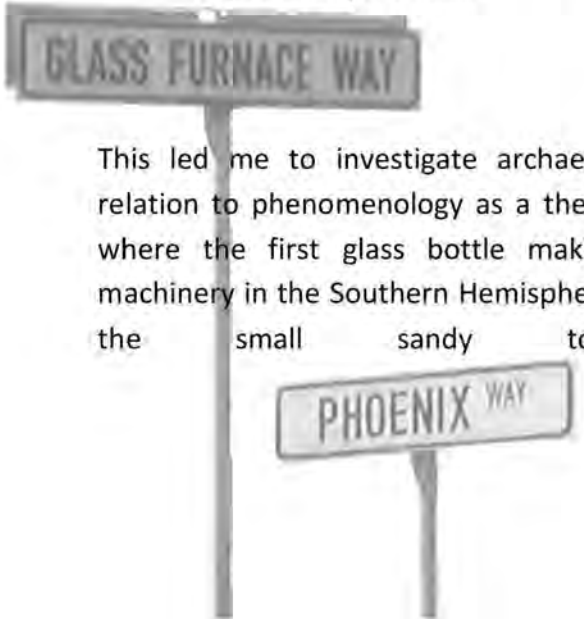


Figure 3 Smoke patterns on white paper and the inverted image

Introduction

The design thesis led the author to the site with archaeological remains of the Cape Glass Company. Today its historical relevance seems almost forgotten and its physical existence neglected. My sentiments are echoed by one individual's account on discovering the site:

> *I had not been living here long but had already been to the summit so I decided to explore the other side of the hill. My journey took me down the hill towards the Spar but being a bit of an explorer I didn't take the obvious route and ended up cutting through a small opening between some houses. So it was by complete luck that I first happened upon one of the more unusual historical sites in the area - The Cape Glass Company, or rather, what is left of it! It is unfortunate that you cannot explore this site...an almost forgotten piece of the Cape Point Peninsula's industrial past, and a reminder that we never beat nature we just slow it down for a while* (Russell Hepworth, 2011)



This led me to investigate archaeological architecture and its relation to phenomenology as a theoretical approach. The site is where the first glass bottle making factory using semi-auto machinery in the Southern Hemisphere was established, located in the small sandy town of Glencairn.

The Cape Glass Company Ltd (1902 -1905) was established with the aim of producing glass bottles by machinery as substitutes for imported ones from Europe and subsequently to manufacture glass for other purposes. Despite the latest technology and equipment available at the time, the venture failed within four years of operation due to insurmountable problems, bad management and lack of skilled workers. It is believed to have been the only one of its kind built on the African continent. They were technological pioneers and among the first glass factories in the world established to manufacture bottles solely by machines imported from Europe. After its closure and liquidation in 1906 the site was abandoned and as years passed, the factory became buried under "masses of wind-blown sand thereby creating a time capsule containing one of Southern Africa's important historic industrial sites" (Saitowitz, 1998:ix). Excavations were carried out about eighty years later by archaeologists from UCT and other specialists with the aim to "expose the buried buildings and equipment in an attempt to piece together the story of an ambitious project that had been virtually forgotten." (Saitowitz, 1998:ix)

Residential developments in the mid 1990's seized the excavations and thus annihilated the chances of rediscovering this piece of industrial past forever. Today a small portion of the archaeological site is visible. This was through the efforts an avid local who purchased the piece of land with plans to turn the site into a museum. What remains now is sealed, abandoned and almost forgotten.

Figure 4 The Cape Glass Company site [March 2013]

Architectural Problem

The specific problem is that significant discoveries of the archaeological ruins of the Cape Glass Company were partially buried and built upon by residential housing developments that encroached the historical site in the mid 90's. The exposed *in situ* glass tank ruins remain fenced off in a state of neglect and local authority plans to fill it with rubble soon, so as to be buried entirely after twenty years of lack of intervention and abuse of the site. While ownership of the site remains in the hands of the Simon's Town Museum, it has not been able to maintain the site. Most of the public and tourists to the area are unaware of the historical site and all that is known about it is in the book published in 1998 and folders at the Museum.

Fundamental interest in the site

Interest in the site developed after creative exercises led me to look at glass and thereby researching its history in South Africa. Very little information about Glencairn is available and less about its historical sites which include an old water mill (Fig. 9), an old powder house for dynamite blast storage and the quarry. A natural curiosity of the area's indefinite past in today's society begs the question of relevance and allows the opportunity for discovery, documentation and digital data records. With this in mind, such sites possess other realities that may indeed be phenomenological and rich in nature and therefore establishing my points of enquiry.

Intentions and Vision

The intention of the project is to make the site accessible to the general public and create awareness of its historical importance. The theoretical research I conducted revealed what makes archaeological architecture phenomenological, while trying to understand the delicate relationship between archaeology and architecture in the hope of finding the potential for an architectural intervention to weave a more intimate meaningful bond between the two disciplines. This was done through looking at selected architectural precedent studies that deal with archaeological sites. The research paper reflected on contemporary architecture with an archaeological nature and reviewed the typologies of museums and visitor centres which often become static manifestations in the landscape. Industrial archaeology has a bearing on important elements of everyday life and serves to remind us of the ingenuity of invention and the workers who pioneered South African commercial heritage. The aim of this dissertation is to seek ways of better preservation and establish public awareness of such historic sites and experience phenomenology in built form. This will aid in the decisions and direction for design thesis with the aim to bring about an architectural response centered on commemoration through everyday use. The site gave strong need to investigate glass and brick as materials for making and constructing architecture. The technical studies will look at these in depth.

Figure 5 Approach along Main Road

Site & Context

Glen : a secluded and narrow valley;
a depression between hills
Cairn: heap of stones as landmark

- Concise Oxford English Dictionary, University Press, 2004 -

Figure 6 a Century of development [Simon's Town Museum, 2013]

The site of interest is located in the small town of Glencairn, just before Simon's Town, on the north slope of the Glencairn River Valley (34.09S; 18.25E) about 500m west of Glencairn beach and at an elevation of about 10m above sea level (Fig. 7). Its location was chosen for the suitable sand that was readily available and supply of water. The ground was close to the railway and connected to it by a siding. The context is now largely residential spread along the hills separated by Else River Vlei, with a commercial centre and community hall on the South facing hillside (Fig. 6). Much of this development is newer with more diverse, irregular built forms in contrast to the North facing hillside with older traditional dwellings.

Figure 7 Glass Factory site highlighted red [Simon's Town Museum, 2013]

Figure 8 Cape Peninsula Satellite Maps [CMA GIS 2013]

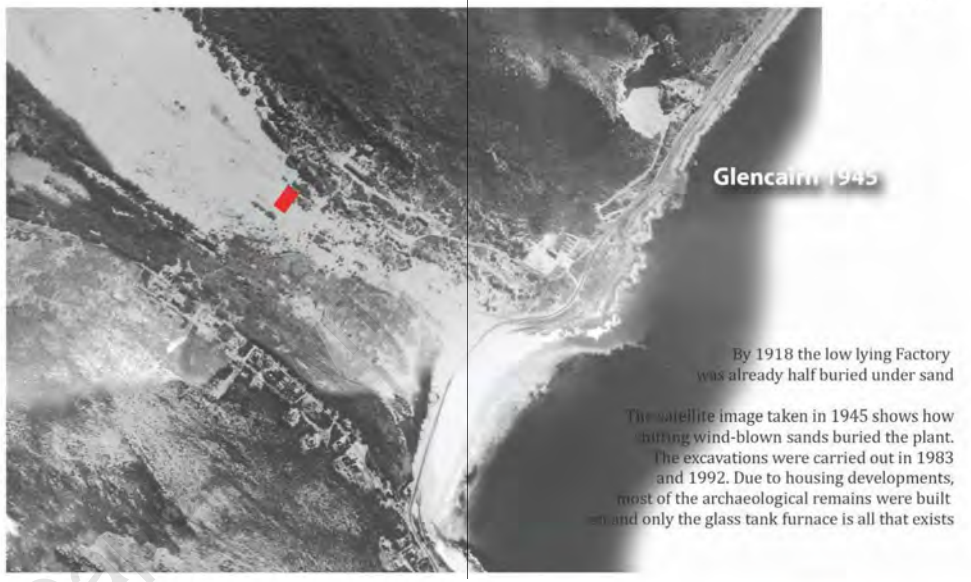


Fig 9 Glencairn Mill 1820 - 1850s [Jaques P,2013]

Fig 11 Access routes to the site

Fig 10 The Glen Lodge 1904 - Present [Jaques P,2013]

The Archaeological Site

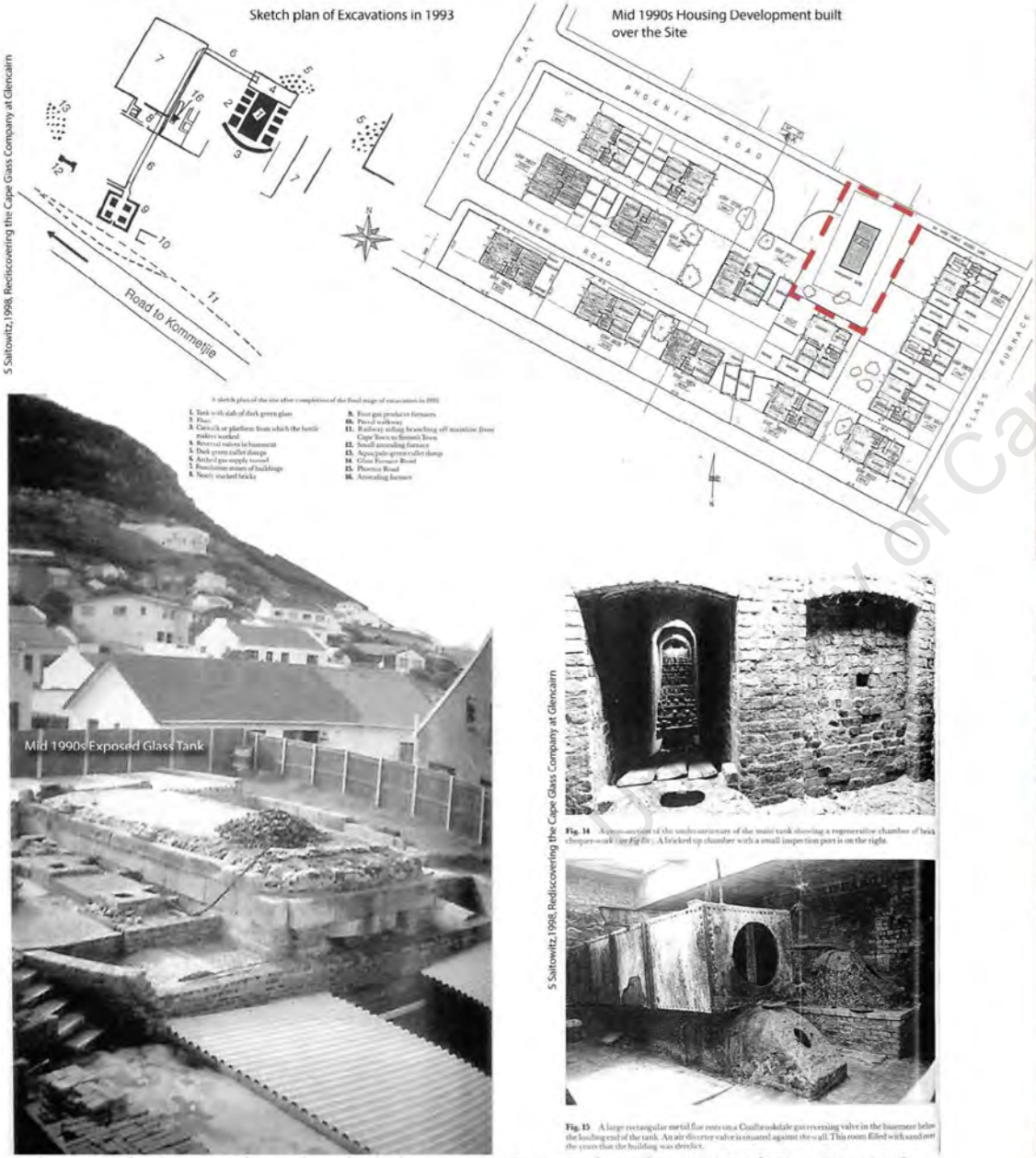


Figure 12 Thesis research : Archaeological site excavations conducted in 1992-93 [Saitowitz, 1998]

Figure 13 Context Map with access routes top, excavations overlay ,above [CMA GIS 2013]

Figure 14 Site images

The Archaeological Site, October 2013

Figure 15 Site images

Figure 16 Site image

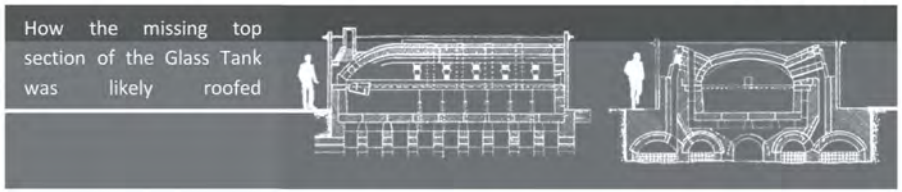


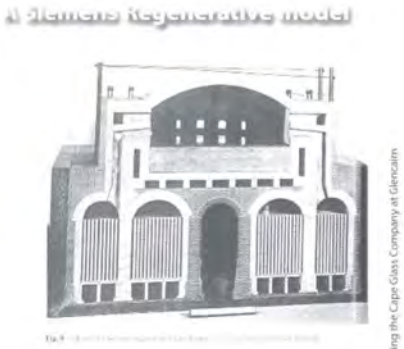
Figure 17 Site images

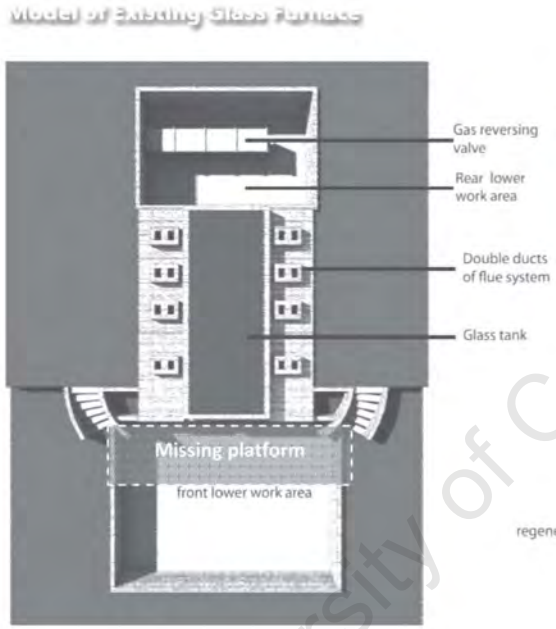


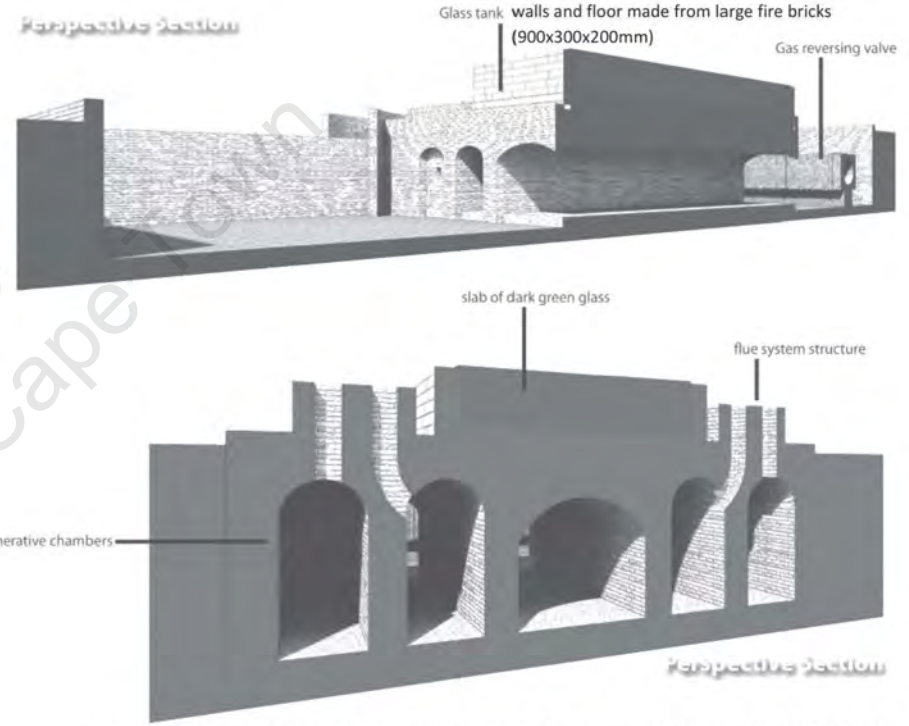
The Glass Furnace

In order to understand how the Glass Furnace worked I constructed a 3D computer model









The Furnace was designed to induce air circulation by convection currents for the gas from the Gas producers to fire up the furnace and reduce heat wastage to improve efficiency

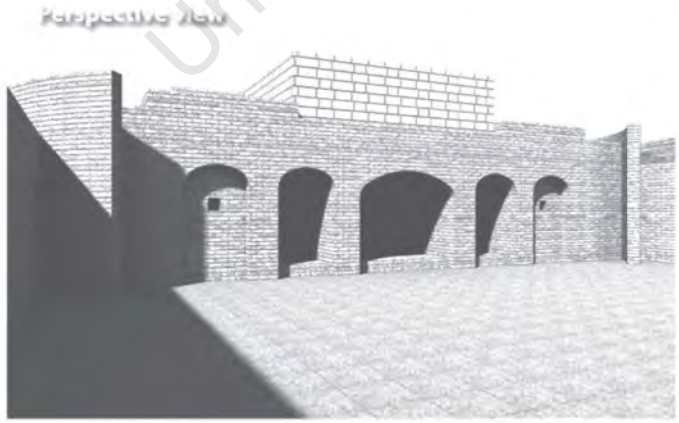


Figure 18 Cape Glass Company [Saitowitz, 1998]

Figure 19 Virtual 3D Computer Model Images [author 2013]

Fig 20 Glass manufacture at Boucher's glass factory, early 20th c. Cognac in France. Note how the machines are set at a lower level than the platform on which the gatherers stand for easy load of molten glass into machines [Sajtowitz, 1998:62]

Fig 21 Sections of a Siemens's Continuous Tank Furnace [wikisoucre.org,2013]

Glassworks Operations

The following description is taken from a Reporter's visit to the new Cape Glass Company factory

- *The South African News, 8 Jan 1904, p6* [SAHRA, 2013]

The chemicals used in the manufacture of the glass and the coal for supplying the gas for the furnaces are the only things imported from England. The limestone, clay and sand are found locally. The limestone is delivered close to a stone crusher and mill and ground to powder. The same is done for clay, after which a certain proportion of limestone, clay, salt-cake and sand are mixed together and then the mixture is ready to be put into the tanks. In the tanks the mixture is subjected to very fierce heat (2800 degrees Fahr) and reduced to a molten state. Gas, not coal, is used for the furnaces. All the coal used in the manufacture of glass at the Glencairn factory is converted into gas in an economical way that there is practically no waste. 120 to 150 thousand cubic feet of gas is obtained from every ton of coal. The gas given off from the coal passes over the mixture in the tanks. The white hot flames in the furnace give off intense heat that may cause serious injury without safety precautions. The flames are directed by currents of air and as the current is reversed once every half hour, via the gas reversing valve, this keeps the buildings in which the furnaces are situated as cool as possible and the work is thus made less trying for the workmen.

Figure 22 Man-operated Boucher bottle making machines in early 20th c. Lancashire likely to be similar to Glencairn [Saitowitz, 1998:5]

The molten material when ready for glass-making was taken out of the tanks by "gatherers" at the end of long steel rods. Each gatherer had two machines to feed and these produced a bottle a minute by an "operator" who pulled a lever. The bottle was partially blown by compressed air. The bottle was then placed in a mould and the blowing process was completed. The bottles while still hot were placed on a "lehr" or lear and conveyed down to the warehouse, where they were sorted ready for the market. Machines for the larger tank produced dark beer, lager and wine bottles, while machines for the other smaller tank produced pale medicine and mineral water bottles (Fig. 23). Mineral bottles had a second procedure to insert a small marble stopper that was slipped in while the neck is wide enough. The neck of the bottle is then re-heated and made smaller (see Fig. 24 below).

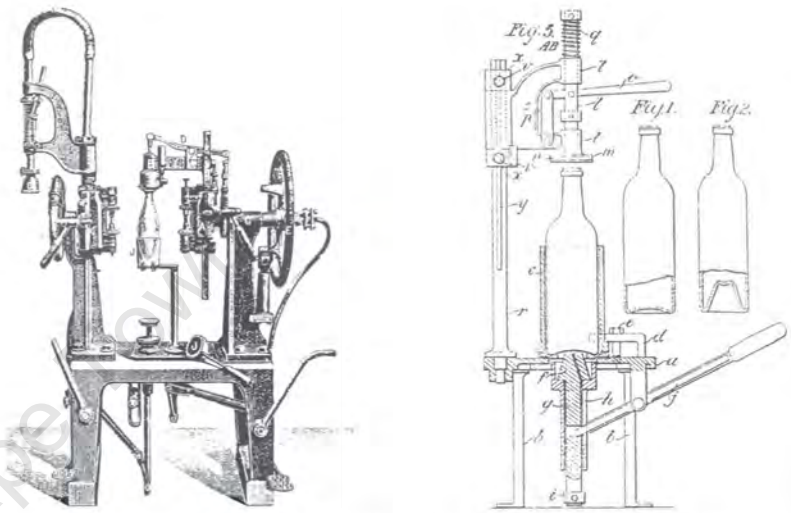


Figure 23 Man-operated Boucher bottle making machines similar to those used at Glencairn which were imported from Europe [Saitowitz, 1998:62]

Figure 24 Bottles found at the Cape Glass Company site; aqua bottle & marble stopper; clear pen ink container; green liquor bottle shard found on Liesbeeck riverbank dump near SA Breweries Newlands with mould pressed insignia " The Property of Ohlsson's Cape Breweries Ltd"

Theoretical Approach

> *To enter into a dialogue with the past, one has to build the present .If you chase after the past, you will never catch up with it. Only by manifesting the present can you make the past speak* - Sverre Fehn (a+u, 1999:45)

The quote from Fehn seems to suggest a way of engaging with a historical site with a story to tell.
One may ask "Why do we need the past? What do we want it for? What burdens and risks does regard for the past entail?" At times the tangible feel of native soil and mere traces of the past suffice to keep others in touch with their own development. Lynch writes "Many symbolic and historic locations in a city are rarely visited by its inhabitants". This may be because of lack of knowledge, little dispersed information about the place or lack of records and data. Making the public aware of such places is important.

All human beings recognize and, to some degree, respect history. There is an almost universal curiosity or respect for things or places that are obviously historic. They are further imbued with special meaning when they are the oldest, or the last of their kind, or have special historical associations. Nearly every settlement older than a few generations has at least one structure or site recognized as being the oldest place. Similar respect is afforded to the oldest part of town, the oldest tree, or even the oldest living person, because he or she may have the oldest memory of a place. (Stubbs: 56)

Phenomenology and "Spirit of Place"

Genius loci is a concept of Roman origin that means the spirit of the place. It is the belief that man experiences his environment as if it consists of definite characters. It is here that he recognized that "it is of great existential importance to come to terms with the *genius loci* if the locality where his life takes place." (Nesbitt, 1996:422)

Christian Norberg-Schulz theory on *genius loci* states that the concrete things which constitute our given world are interrelated in complex and contradictory ways. Some of the phenomena may consist of others. The forest consists of trees, and the town is made up of houses. "Landscape" is an "environment" to others. A concrete term for environment is *place*. Place is evidence of an integral part of existence. A place is therefore a qualitative, "total" phenomenon, which we cannot reduce to any of its properties, such as spatial relationships, without losing its concrete nature out of sight. (Nesbitt, 1996:414)
It is believed that in the past, survival depended on a good relationship to the place in a physical as well as a psychic sense. In ancient Egypt, the structure of the landscape served as a model for the layout of the public buildings. This orientation would give a man sense of security by symbolizing an eternal environmental order.

According to Finnish architect Juhani Pallasmaa (1936) the phenomenology of architecture is "looking at" architecture from within the consciousness of experiencing it, through architectural feeling. This is in contrast to analysis of the physical proportions and properties of the building or a stylistic frame of reference. In a sense the phenomenology of the architecture seeks the inner language of feeling. The inner architecture of the mind emerging out of feelings and memory images is built on different principles from the architecture developed out of professional approaches. Architectural effect is based on primary feelings that form the genuine "basic vocabulary" of architecture. By working through them one can then assess works of architecture. Architecture is a direct expression of existence, of human presence in the world (Nesbitt, 1996:450)

Theorist Alois Riegl distinguishes among three kinds of response to artistic works of the past. They are interpreted as being *intentional* or *unintentional monuments* or ones possessing *age-value*.
Late nineteenth century regarded artifacts and landscapes to be "pictorial" as embodied in ruins. Time and weather made old trees and buildings picturesque and rough, while "moss, lichen and other encrustations" added tonal richness to the surface. Decay yields valuable information about the past, which states evidently that architectural ruin portrays a "story" of the past and the richness in memory it possesses for the observer. The attractions of decay are seldom solely aesthetic. Riegl defines age value as that which "is rooted purely in its value as memory ... [which] springs from our appreciation of the time which has elapsed since [the work] was made and which has burdened it with traces of age" (Colquhoun, 2009:230) Figure 25 shows the Cape Glass Company ruins burdened with age, time and nature.

Figure 25 Neglected ruins of Cape Glass Company site [March 2013]

One could assume that the role of the built environment is to create a series of rooms which the user can inhabit. Theorists such as Jonathan Hill and Juhani Pallasmaa have suggested that, contemporary lifestyles tend to be largely image conscious, cites the ocular-centric nature of contemporary life as one of the main departures from architecture of sensuality and meaning. He breaks down the experience of architecture and space into two categories; that of the peripheral unfocused vision, which allows one to become submerged in the world around us, and a more tactile experience, a "hapticity" (Pallasmaa, 2005:15) which in his opinion is paramount to the true architectural experience.

Pallasmaa further defines architecture as being able to be measured in sense and scale by the eye, ear, nose, tongue, skeleton and muscle (2005:70), the latter of which have become secondary thus resulting in an architecture of the eye, a strong image-based product which becomes consistent in form and therefore limited in terms of future adaptability.

A theorist, Gianni Vattimo, with holistic approaches to ecological thinking, proposes the idea of "fragile architecture" (2005:63). This architecture is one of weak image which is largely contextual and responsive in nature. Vattimo suggests that the architectural image can further be weakened by means of weathering and ruination. This allows for the ability for the architecture to engage with time and memory in a way in which it is argued that architecture of the image cannot. It suggests the architecture which complements the memory of place by having a background role, not to compete with the physical ruins of the place. The phenomenological qualities of architectural ruins are rooted in its physicality; it is real, site specific and relevant. Such sites serve as anchors in the contemporary city, therefore the Cape Glass Factory should be seen as an artifact in its context that possesses memories of a pioneering industrial past. This may explain the motivation behind the actions of Mr. Gordon Wilson who purchased the plot with the exposed glass furnace with the intention of saving the ruins and turning it into a museum. The theoretical inquiry is "What approach can be taken in order to musealize an archaeological site? Why do we visit museums? Amusement? To be educated or inspired? Is it a way for us to experience another reality; to tap into the past?"

> *A traditional museum works to visualize lost objects. Today we feel it necessary for museums to make visible the invisible.* Sverre Fehn (a+u, 1999:75)

The author's opinion is that the museum and visitor centre typologies seek to address phenomenology directly and indirectly. This will be investigated by looking at a few selected examples with the aim of finding out how phenomenology is manifested in built form, how architecture captures "spirit of place" and how the examples establish dialogue with the past.

It must be noted that the use of the word museum has evolved in recent times to describe various kinds of places. Originally museums were places to house art works and collections with "cabinets of curiosities intended to entertain and amuse" (Newhouse, 1998). Today museums vary from memorials of historic importance and events such as the Jewish Holocaust Museum by Daniel Liebeskind, the Hector Peterson Museum in South Africa, to the natural, scientific and geographical such as the Glacier Museum in Norway by Sverre Fehn and Hans Hollein's Vulcania, a museum about volcanoes in France's Auvergne Region. The museums here are specifically chosen for their connection with archaeological remains and preservation of site. These include

New Acropolis Museum (2009) in Athens, Greece by Bernard Tshumi Architects

Kolumba Art Museum (2008) in Cologne, Germany by Peter Zumthor

Hedmark Museum (1999) in Hamar, Norway by Sverre Fehn

South African Breweries Heritage Centre in Newlands, Cape Town by Gawie Fagan Architects

The New Acropolis Museum, 2009 Athens, Greece by Bernard Tshumi Architects

One finds the sense of timelessness as a recurring theme with the display of sculptures, carvings, statues and fragments from the Acropolis and Elgin marble.The historical city not only provides a setting for the museum, but also gives it the atmosphere. The building dominates the landscape(Fig. 26; Fig. 27) therefore competing with the historic Acropolis. It sits as a set of stacked boxes above the archaeological site. Inside the museum, the visitor is given glimpses of the archaeological ruins through glass ramped sections and voids in the floor (Fig. 29) on which the museum stands elevated above on pilotis. The ruins remain as exhibits, away from the visitor's reach.

The author assumes that perhaps the visitor is denied an experiential part of the phenomenological richness of the ruins and space as they are lead through the building via a predetermined route (Fig. 28). However this strategy serves as a way for the building to tell the story and memory of the site in chronological order and arranged exhibition.

Figure 26 View of the museum and the Acropolis in background [AR, 2009:76]

Figure 27 Context view [AR, 2009:79]

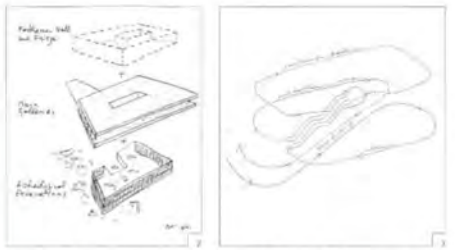


Figure 28 Program and Circulation diagrams [AR, 2009:81]

Figure 29 Interior view [AR, 2009:83]

Kolumba Art Museum, 2008 Cologne, Germany by Peter Zumthor

The Museum form is a tall urban box, whose architecture is in direct contact with the archaeology. In the front the church ruins are "inserted" in the new walls (Fig. 30). Inside, the visitor is offered a walk through the ruins by means of a walkway that traverses through them on the ground floor (Fig. 31; Fig. 32). The natural light enters the archaeological space through perforated walls built from a special pale type of brick creating an atmospheric light quality.

Zumthor professes his desire to design buildings that become part of their surroundings, buildings that "in time, grow naturally into being a part of the form and history of their place." He states that every new work of architecture intervenes in a specific historical situation. Zumthor points out that the quality of this intervention must be its ability to embrace and enter into meaningful dialogue with the existing situation (Zumthor, 1999:18) According to Zumthor, "buildings can only be accepted by their surroundings if they have the ability to appeal to our emotions and minds. Since our feelings and understanding are rooted in the past, our sensuous connections with a building must respect the process of remembering" (ibid). He does this quite successfully in the Kolumba Museum. The visitor is afforded an experiential route through the remnants.

Figure 30 The museum street facade [a+u, 2008:58]

Figure 31 Interior of walkway through the archaeological area [a+u, 2008:44]

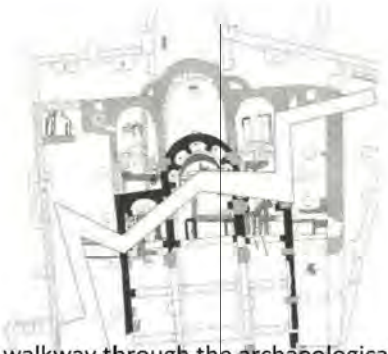


Figure 32 Plan of walkway through the archaeological area [a+u, 2008:42]

Hedmark Museum, 1979 in Hamar, Norway by Sverre Fehn

The main concept of Hedmark museum in Hamar, was to create a museum which preserves the existing remains of Hamar Bispergard and Storhamar barn and make it possible for the archaeological excavations to function as an important part of the actual museum, in line with the exhibits. The construction in connection with the building of the new museum does not at any point touch the medieval walls and ruins. (a+u, 1999: p45)

Sensibility to the landscape and context creates the sense of place. By poetic means, the building construction relates intimately with the archaeological site allowing the architecture to spatialize time, thus telling a story and revealing the layers of history contained within. (Fig. 33)

> *Architecture reveals what is hidden, and that happens through spatialization of time. Architecture translates time into space, and the concrete space which results, we call place.* (Norberg-Schulz, a+u 1999)

It would seem the reference to concrete here may suggest the kind of permanence which Rafael Moneo regards as highly valuable, one that is worth fighting for, and a reality of the building being sought after in its tangible presence. Norberg –Schuluz explains

> *Qualitative time implies that history makes the interplay of constancy and change manifest. Throughout history runs a "polyphonic" web of lines that meet, interact and separate. To understand this web we have to become part of it, and act. That is, we must add something that makes the web intelligible. Thus Fehn says: "To enter into dialogue with the past, one has to build the present.* (a+u, 1999:p170)

The Hedmark museum is a story and path through time, as "an architect must move into the past, as he must move into nature". This opportunity is given by the route that one takes. (Fig. 33; 34)

> *New ramps and plateaus together with the* ruins *from a varied spatial sequence. The old structures remain untouched with the clear intention of allowing all paths and marks in this "landscape" to continue their now slowed decay* – (Fjeld,2009:112) (Fig. 35; Fig. 36)

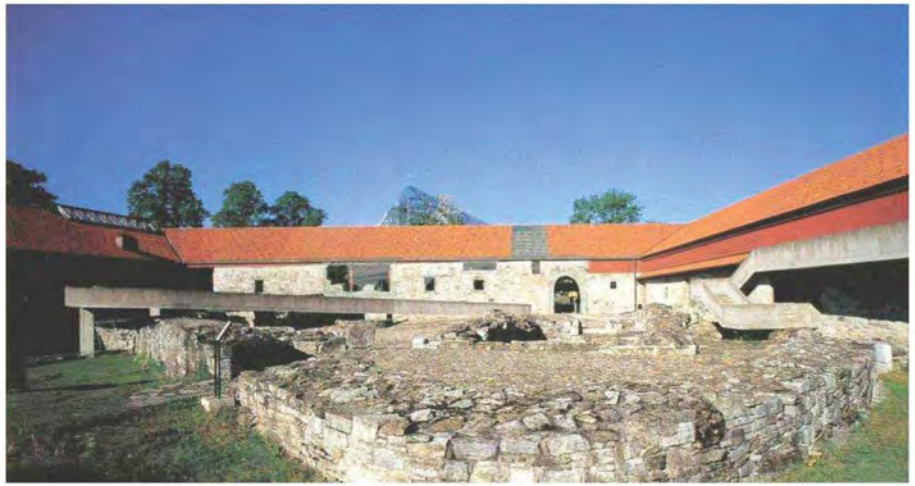


Figure 33 Courtyard with the Hamar Fortress ruins [a+u, 1999:46]

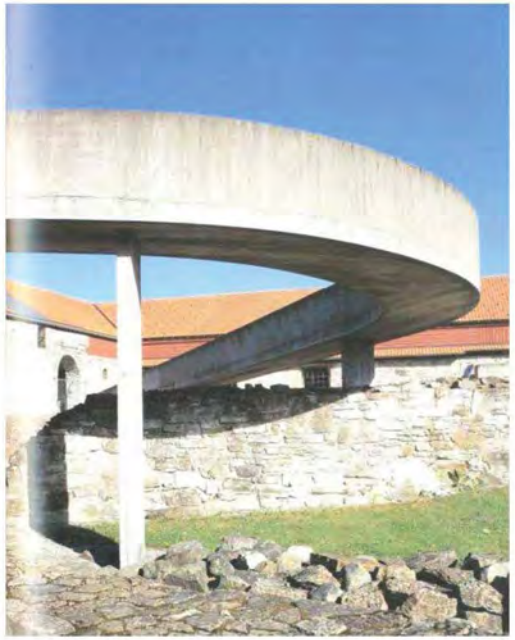


Figure 34 A concrete curved slope passes over the ruins and into the building [a+u, 1999:47]

Figure 35 The raised concrete corridor running through a section [Mings, 2011]

> *The unhurried time of nature. Architecture has the ability to make this natural time visible. Through Fehn's architecture, we ourselves gain the ability to see this natural time.* (a+u, 1999:p4)

This is an effort that the architect strives to achieve in his work. According to the French architect, Laurent Beaudoin,

> *Architecture takes form in the rigorous frameworks of the laws of nature. It is inscribed in space and time. Natural space and time are not the same as human space and time. Both spaces and both times superimpose one another, but they are not synchronous. The time of nature is the time it takes for clouds to change shape, for the sea to cover a beach, or for dawn to break.*
> *Human time is an accelerated time with regard to natural time. Man and nature do not move at the same speed. Architecture is a machine for slowing time down*
> (a+u, 1999:p4)

Figure 36 The concrete corridor pierces a glass wall [a+u, 1999:57]

How does this architecture become a machine for slowing time down? What possible solutions are revealed in response to the remark in the introduction where we are reminded that "...we never beat nature we just slow it down for a while..."?

> *Today we need to slow accelerated human time and recover the human time that man once possessed. Architecture may make this recovery possible. Architecture that caters to accelerated time may have its moment of brilliance, but it does not last. Fehn's architecture does not resist nature. It is an attempt to bring human space even a little closer to natural time. There is no easy pursuit of a style, but rather an architecture that wants to accept the rigor of nature. For this reason there is something unpolished about it, but the use of materials and the poetic story told by each work exert a strong appeal.* (a+u, 1999:p4)

Christian Norberg-Schulz while speaking about Fehn's work states that "Architecture functions perfectly when it works in a timeless space. Its signature is anonymous, since it embodies nature itself". According to his own words, Fehn discovered that the

> *basic architectural phenomena are "timeless" and as such perfect. The concept of perfection does not imply an ideal, permanent form, but the revelation of the timeless within time. In this sense, architecture is anonymous because it is not invented by anybody, but discovered as something that remains. To be alive means to discover, and to express what is discovered.* (a+u, 1999:167)

The concept of "discovery" here is not the scientific sense as measurable facts, but in qualitative properties which cannot be conceptualized but have to be revealed by means of art. What is discovered is a world of essentials, a world of concrete phenomena that is our "daily life-world." (Fig. 37)

Figure 37 Walkway through an exhibition section [Mings, 2011]

The South African Breweries Heritage Centre, Cape Town, SA
Is built around the 19th century relics of the Breweries. The architecture "slows down nature" while providing physical protection and sense of permanence. There is clear distinction between old and new, with significant contrasts in materiality and lightness (Fig. 39). A modern glass lift offers vertical circulation alongside the brick chimney (Fig. 38) while a glass skylight punctures through the ground for light into underground spaces (Fig. 40; 41)

The visitor has an opportunity to experience the archaeology of the old breweries as they once stood by walking through tunnels and furnaces (Fig. 42). In some sections the natural decay of the walls is visible while the immersive atmosphere of underground passages and spaces is present in the smell of damp air and low natural light. The cold feeling of emptiness is offset by the scorched walls that tell a story of the industrial processes that once occurred there.

Figure 38 Brick chimney and glass elevator shaft [author 2013]

Figure 39 The bottom section of the chimney covered by a glass skylight [author 2013]

Figure 40 Glass skylight in the ground [author 2013]

Figure 41 Glass skylight above an excavated section [author 2013]

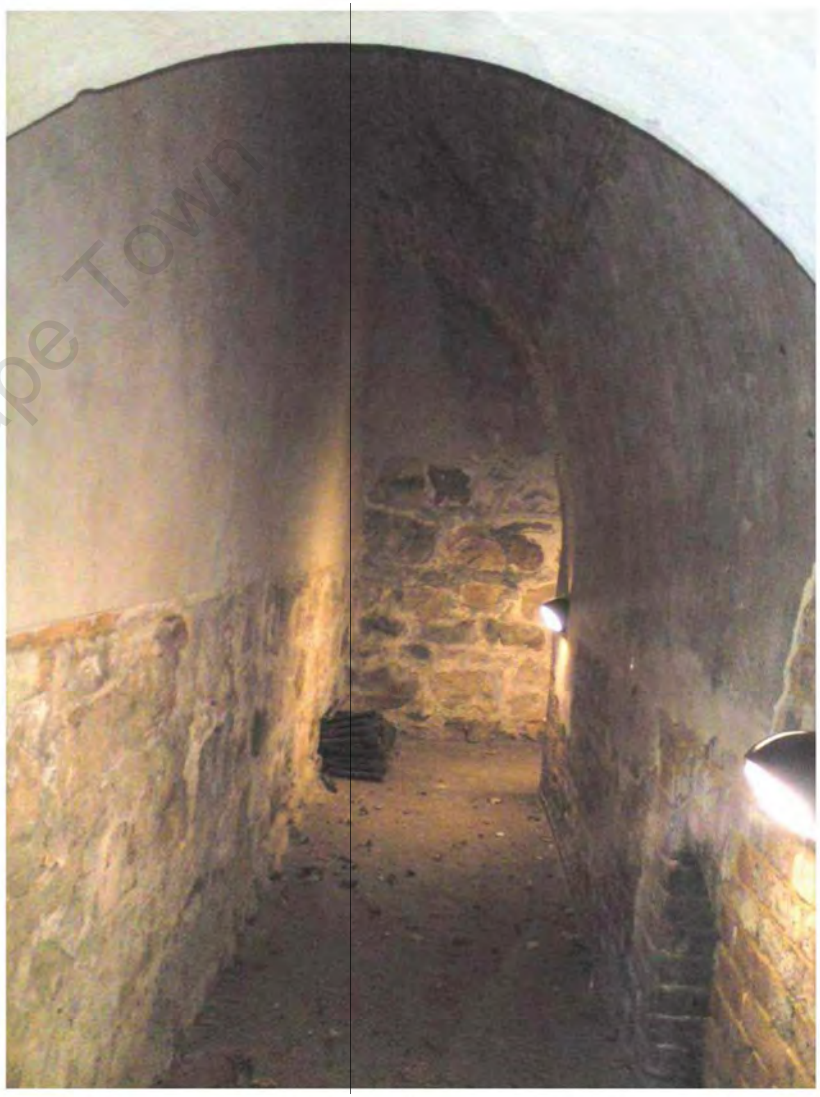


Figure 42 An underground tunnel of the furnace [author 2013]

The above examples exhibit different approaches to archaeological remains and levels of contact with the ruins.

New Acropolis Museum is a series of rectilinear boxes over the ruins which can be seen but cannot be touched by visitors. The building dominates the site and context. Its strong style of construction competes with the archaeology therefore not effectively connecting with the spirit of the place. At **Kolumba Art Museum,** the remnants inserted into the new construction and pale brick surface express the materiality of these walls slowly evolving and changing over time as a living material and memory. The visitor comes into close proximity with the ruins, heightening the sense of archaeological phenomenology. At **Hedmark Museum** the visitor is afforded the opportunity to engage with the past through the spatialization of time and journey through the place resulting in a phenomenological experience while the building's "unpolished" style of construction is integrated into the remains of the Fortress walls, referring back to the idea of a "fragile architecture" . This architecture is one of weak image which is largely contextual and responsive in nature, open to weathering and ruination. It expresses a sensitivity and intimacy between the architecture and archaeology. **The SAB Heritage Centre** is a successful integration of old and new. Its didactic journey through the establishment gives the visitor a chance to be in direct contact with its relics in an immersive atmosphere where one is part of the memory of the place.

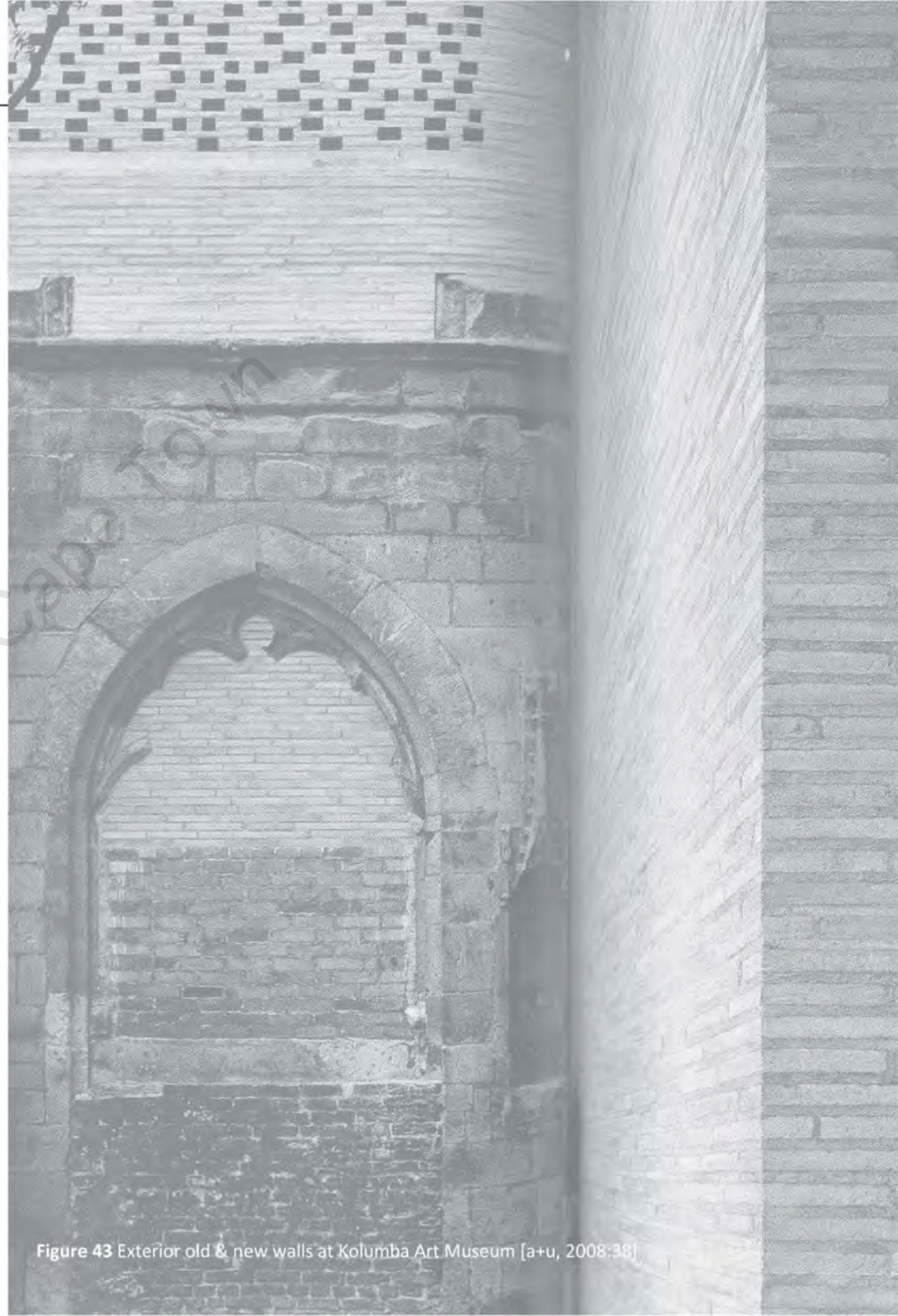


Figure 43 Exterior old & new walls at Kolumba Art Museum [a+u, 2008:38]

Theoretical Framework – Dialogue with the past

The above projects briefly presented here all deal with sensitive sites. They offer different approaches in how they tell a story of their historical aspects and reveal phenomenological qualities for the visitor to experience.

The first approach is to create a suspended museum that allows the "marks of the landscape" the slow natural decay. The next approach in establishing dialogue with the past is to let the visitor be part of the archaeological discoveries in order to be in a position to understand the history – not with the aid of pages of a book – but as it appears in the world of archaeology. By manifesting the present through building it, we are able to establish dialogue with the past and revealing different layers of history in the architecture that captures the spirit of place.

From these ideas, architecture has the ability not only to preserve physical nature, but to weave an intimate relationship with archaeology and reveal its phenomenological qualities through the layering of time. Time is spatialized by the site and archaeological remains. The architecture becomes the construct of the present allowing us to understand the history and the story of the past by being part of it through phenomenology. The museum or visitor centre of this nature becomes a place where one experiences "another reality".

How shall we respond to man and his objects affixed to the surface of the earth? Everything we build must be adjusted in relation to the ground, thus the horizon becomes an important aspect of architecture.
The moment you lose the horizon, your desire is always to reinstate it. It is trapped somewhere between the cave and the tower, and at the same time, the earth reveals its limitations. The architect becomes the surgeon who cuts open the earth and is unafraid to tear the sail that has moved the horizon and defended the unlimited. He can establish places under the ground and these become the new way to travel into the past, as the horizon faces a new journey – Sverre Fehn, *The pattern of thoughts*
(Fjeld, 2009:108)

What remains is a different impression, a deeper feeling – a consciousness of time passing and an awareness of the human lives that have been acted out in these places and rooms and charged them with a special aura. At these moments, architecture's aesthetic and practical values, stylistic and historical significance are of secondary importance. What matters now is only the feeling of deep melancholy. Architecture is exposed to life. If its body is sensitive enough, it can assume a quality that bears witness to the reality of past life. (Zumthor, 1999:24)

Design Development

The proposed program is centered around the archaeological findings (Fig. 44) in addition to a cafe and exhibition space. The program also introduces Glassblowing as an everyday commemorative creative activity as opposed to mass production by machine in the past. It will be an opportunity for visitors to see and learn the creative skill of forming glass artifacts which makes part of the exhibition and retail function. The intervention aims to transform the site into an interpretation centre that becomes an instrument of dialogue, very direct and quick, with the audience and the existing archaeological remnants. The intention is to combine different requirements for use: to study, to preserve, disseminate and promote the knowledge while creating a public space within a suburban context. The diagrams in Fig. 45 show early ideas on accessibility for the site as well as creating an intervention mass volume - open linear light pavilion and stepped closed box.

Site Analysis

The design development begins with an analysis of the site in order to understand the topography, climatic conditions, land use and zoning, movement and accessibility, then formulate an urban strategy to uncover significant archaeological discoveries and finally propose a conceptual intervention on the site.

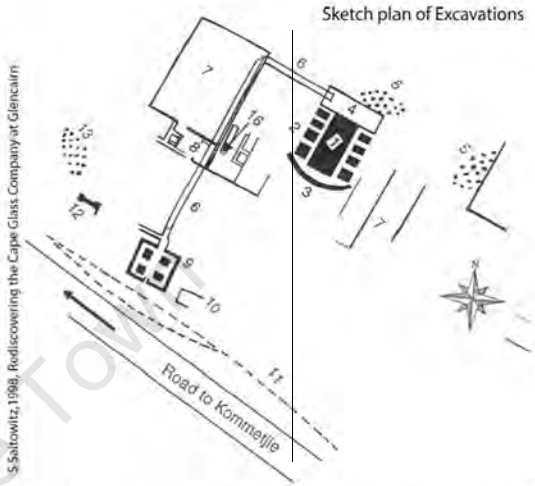


Figure 44 Significant Excavations - (1,2,3)Glass furnace, (6)Arched Gas Supply Tunnels, (9)Four gas producers, (16)Annealing furnace [Saitowitz, 1998:21]

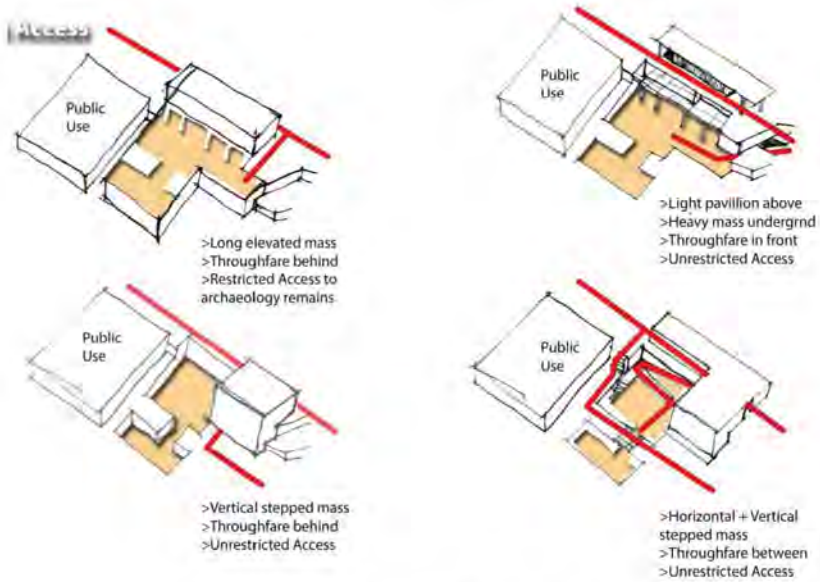


Figure 45 Accessibility and Massing

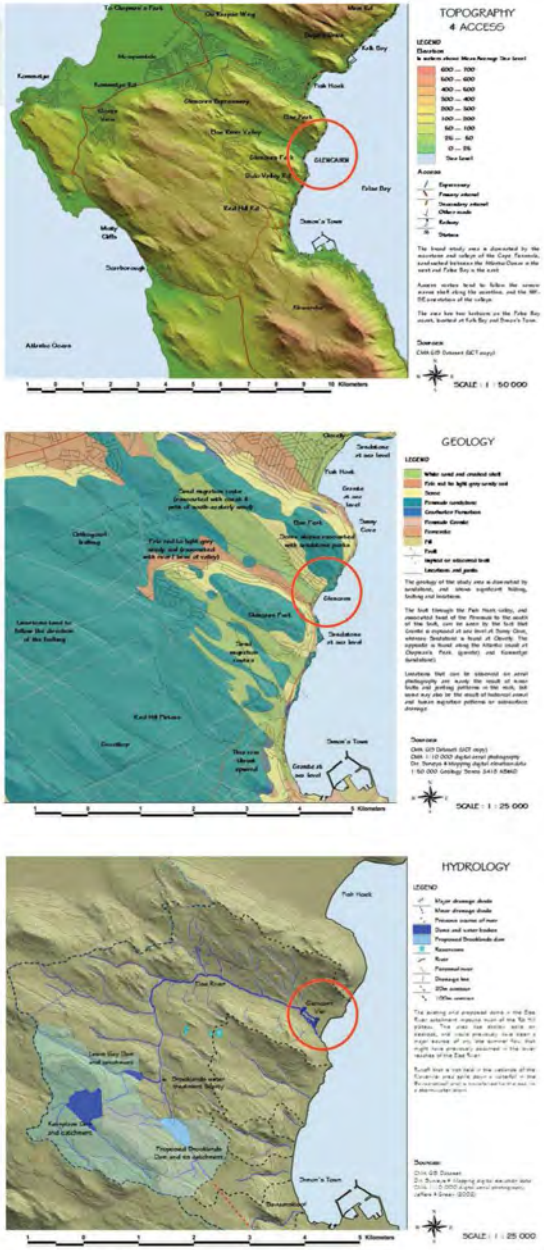


Figure 46 Mappings Topography, Geology, Hydrology [CMA GIS 2013]

Figure 47 Context and Site highlighted [CMA GIS 2013]

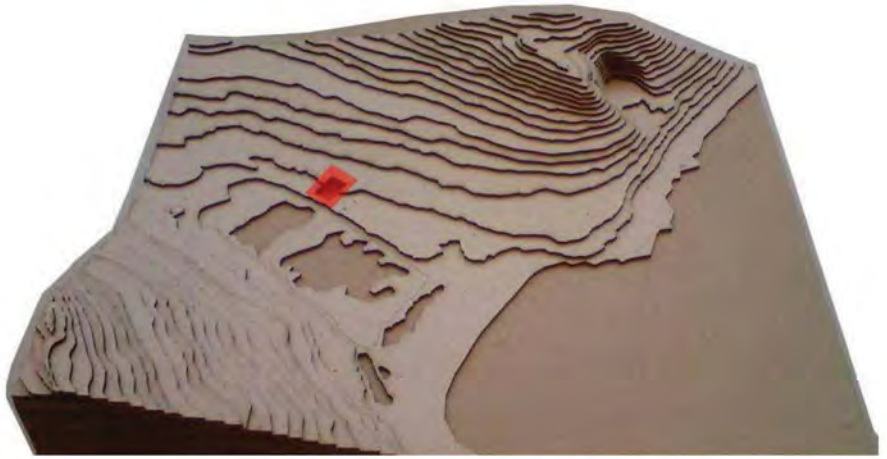
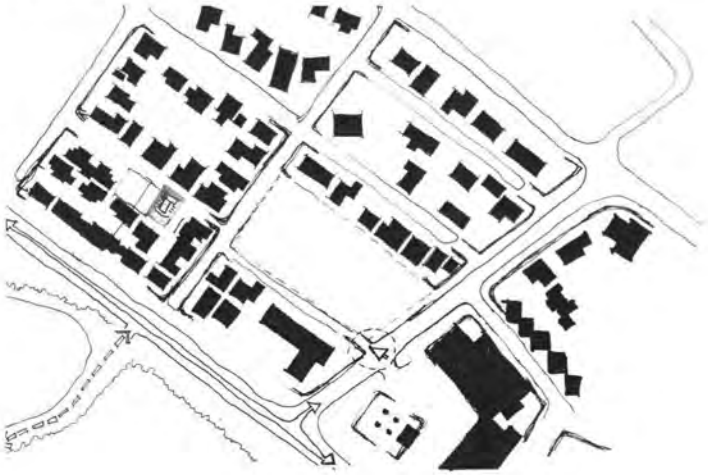


Fig 48 Context Contour Model - Site highlighted [author 2013]

Site analysis

Figure 49 Context Aerial view [CMA GIS 2013]

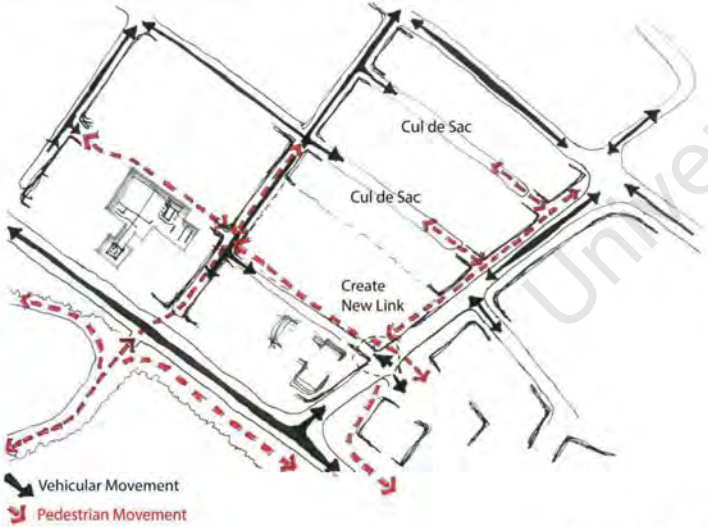
Figure Ground



Zoning

The reprogram of the site allows the archaeological excavations to be accessible to the general public. Public uses around the site link with other community spaces while the removed houses will be integrated into a denser restructured housing scheme above the site

Movement & Access



New movement opportunities and access to the archaeological site

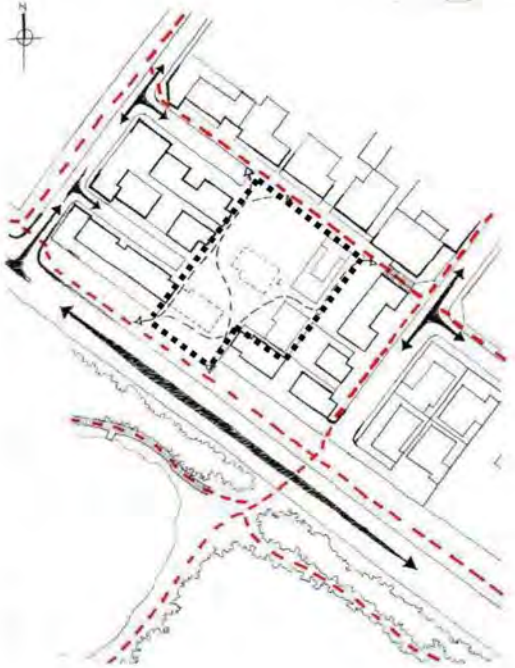


Figure 50 Site Analysis - Figure ground, Zoning, Movement Routes

Urban Strategy

Figure 51 Urban Strategy

Edges - proposal to improve the wide desolate urban edges of the site with new paving and trees along the highway and Community Hall which establishes an uniform identity for the site.

Movement - a safe pedestrians crossing to link the existing Causeway for pedestrian movement across the Vlei [1]. A new node for vehicle access to Phoenix Way is proposed [2] This allows access to the parking area around the Community Hall [3]

Phase I & II - this design dissertation proposes Phase I of a Visitor Centre on the Cape Glass Company Archaeological site [4]. Phase II is proposed on the vacant land [5] for a Museum of Glass and Urban park with galleries, a library and workshop facilities for glass artists, students & groups.

Site Strategy

From the analysis the site has potential for a public function by reconfiguring the existing facilities; creating a pedestrian route along the highway with parking in front of the site; using the open space around the Community Hall as parking and paving the paths around the site to guide visitors to the Archaeological site (Fig. 51).

The site strategy involves "recovering" the Cape Glass Company site (Fig. 53 orange) from the suburban occupation by consolidating ERF 3797, 3798 and 3804 with key archaeological findings and reveal these by removing the two dwellings built on top of them (Fig. 53) above the small Annealing furnace adjacent to the exposed glass tank (1) and by the gas producers by the highway (2) reducing and reusing the houses' bricks for paving around the site as a layer palimpsest. Dwelling (3) will be used to support the project's program. The Tunnels from the gas producers will be unearthed and rehabilitated. The site becomes an accessible thoroughfare, allowing new movement paths across the site and creating an open public space within a tight suburban context.

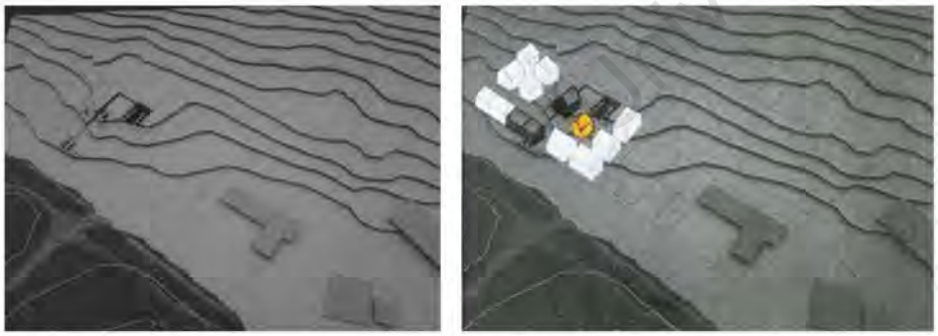


Figure 52 Site contour model - Shaded dwellings to be removed, reuse bricks for paving; Yellow house to remain and reprogrammed for the intervention

Figure 53 Recovering the Glass Company site Tunnels, Annealing furnace[1] Gas prodcers [2]

Site Analysis

Solar Orientation, Prevailing Wind and Views

Figure 54 Site Analysis - Solar Orientation, Prevailing Wind

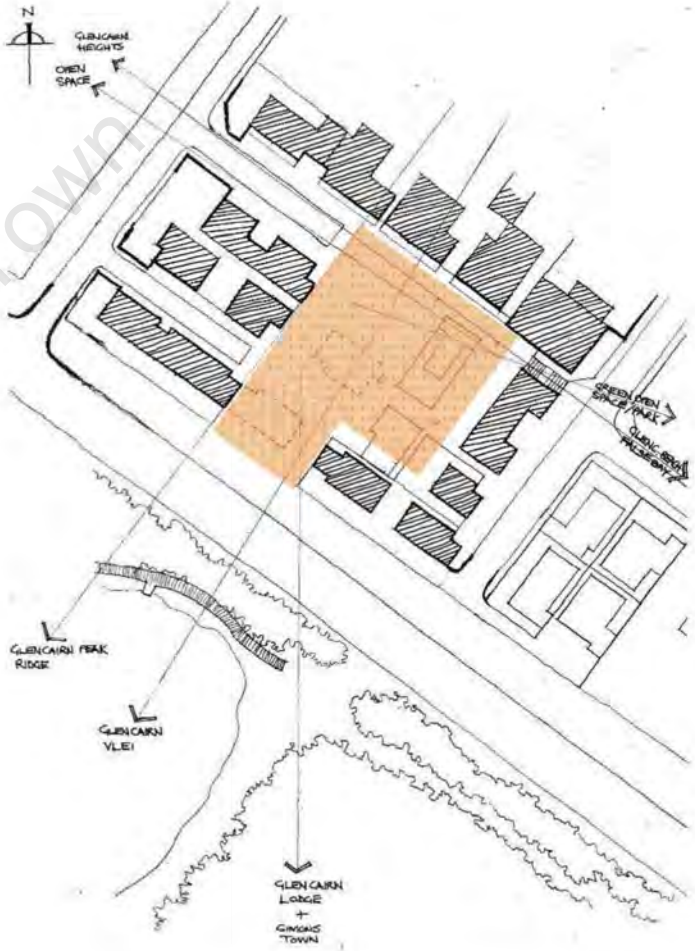


Figure 55 Site Analysis - Views. Note: dashed lines - houses to be removed

Site Constraints and parameters

Erf Consolidation

By consolidating the 3 residential Erven together with the Glass Furnace site and the small adjacent parking space the total area comes to 1900m^2

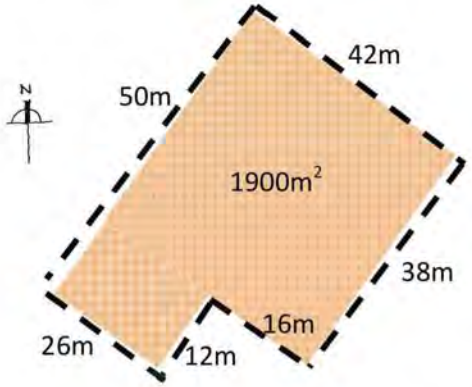


Figure 56 Site dimensions and area

Set backs

The front set back facing the highway has a of 12m. The north-east set back of the site is 3m - 5m with proposed widening of the existing pedestrian route along the front of the houses. The rest of the boundary lines are defined by the existing property lines (Fig 57)

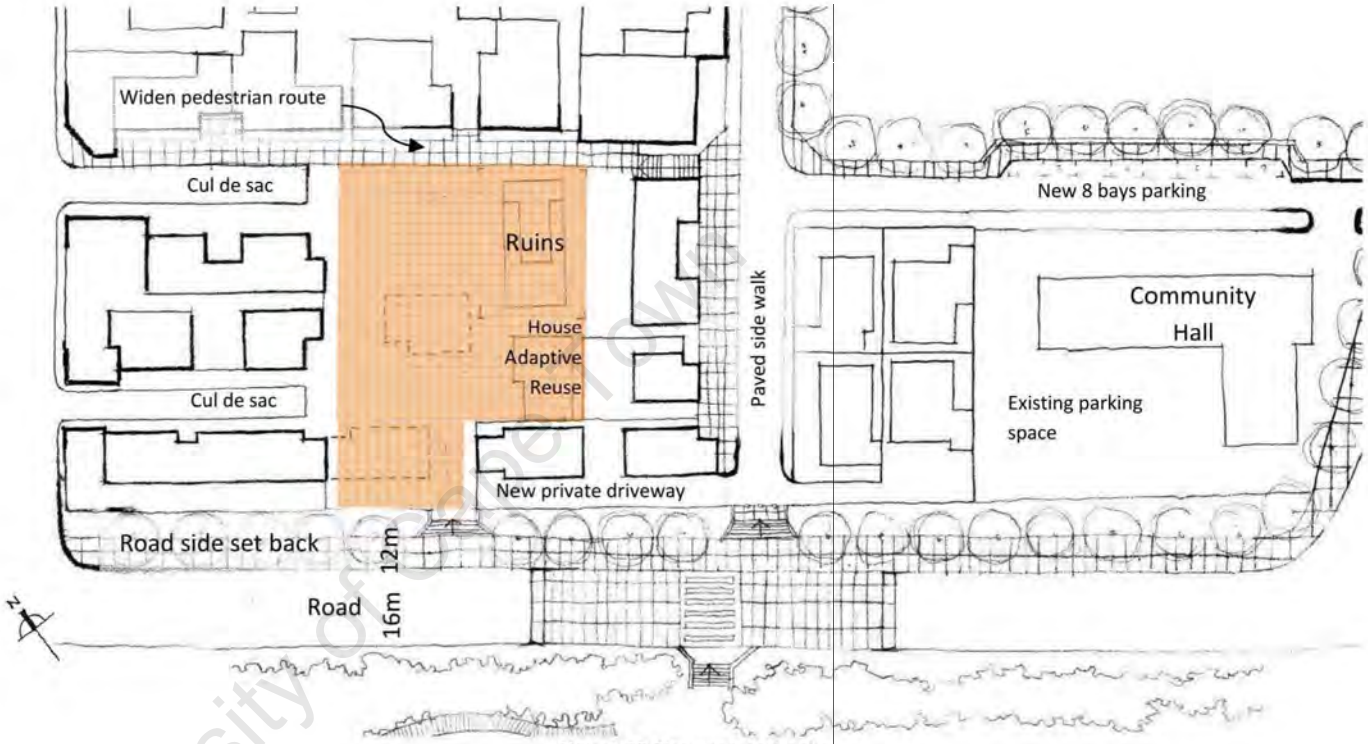


Figure 57 Site area setbacks

Slope gradient

The site has a average gradient slope

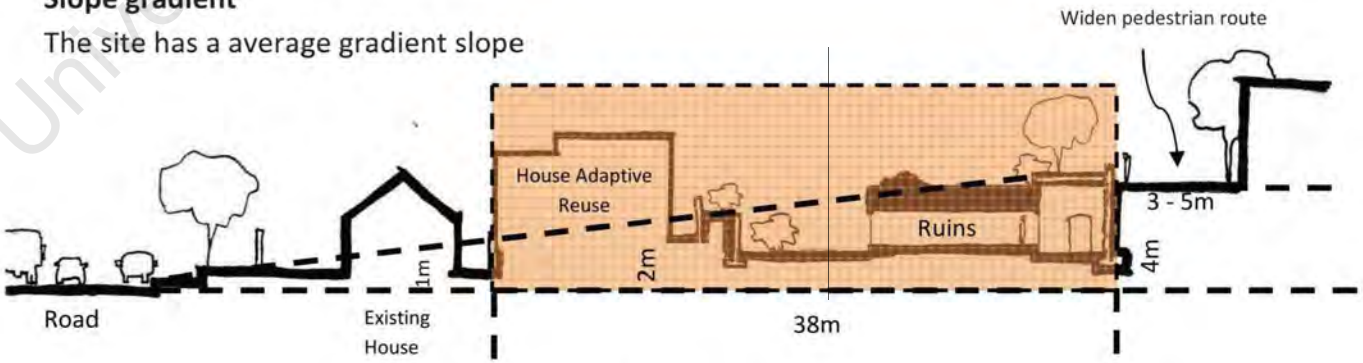


Figure 58 Site area slope gradient

Program for Phase 1: Archaeological Visitor Centre

Primary Space	**Secondary Space**
Archaeological Ruins	Reception
Exhibition Space	Curator Office
Cafe & Wc's	Storage
Glass Art Studio	Wc's

Concept Generators

Natural Processes: Time and Weathering

Design Processes: Incision _ Insertion _ Intervention

Sverre Fehn states the importance of *the horizon in architecture* and the architect to be *the surgeon who cuts open the earth*. The intervention is inserted into the incision from excavating the ground plane, placed along the perimeter walls of the pre-existing structures. Excavations will expose buried walls, underground tunnels and reveal the four subterranean gas producers; vertical "chimneys" are inserted as a landmark of an industrial past. Positive covered spaces are provided with roofs and ramps to allow visitors to engage with the ruins. The concept is envisioned as interlinked pavilions. Roof planes setup an horizon that frames the landscape. The flat horizontal planes sit juxtaposed to the pitched roofs of the suburban context, setting up a new language for a public architecture. Construction explores aspects of light and heavy structures, materiality in brick and glass to establish dialogue between present and past. The future proposal for Phase 2 of a Museum of Glass Centre would follow this same language.

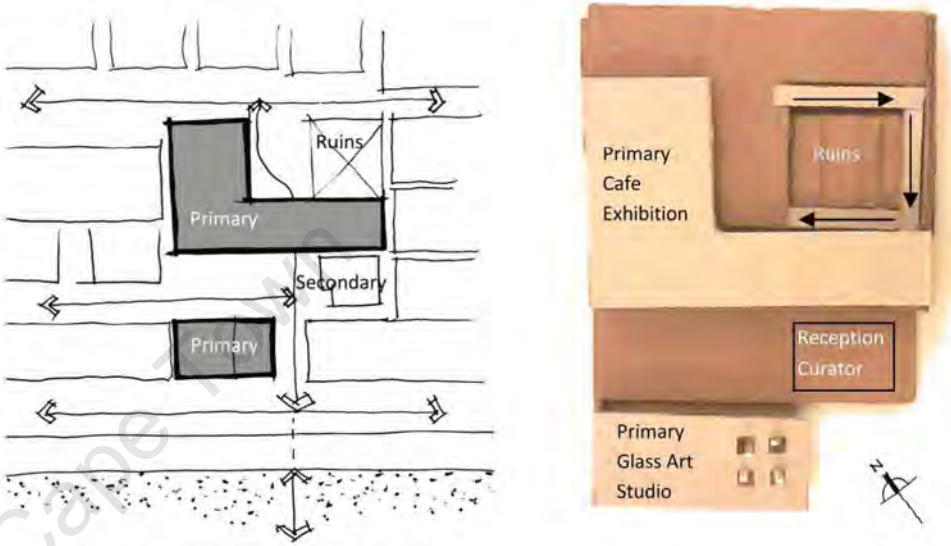


Figure 59 Proposed program diagram

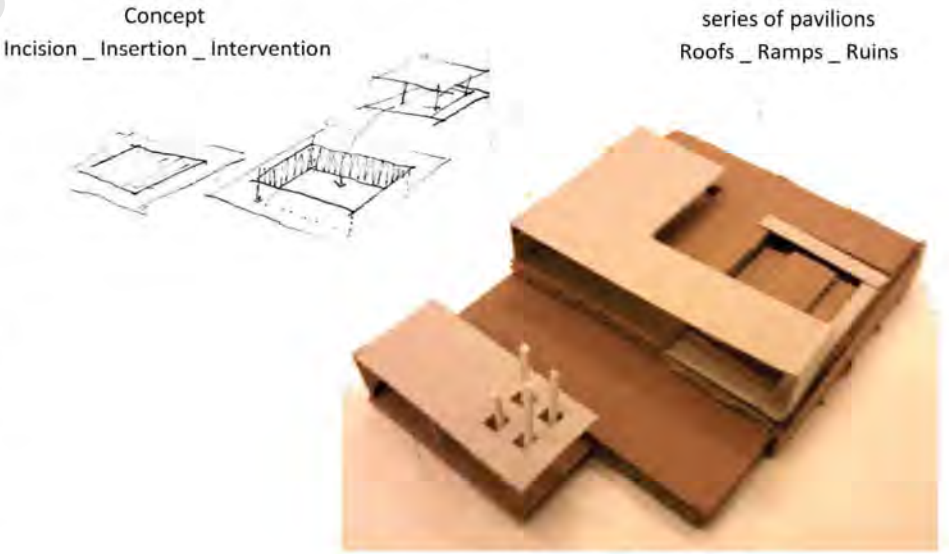
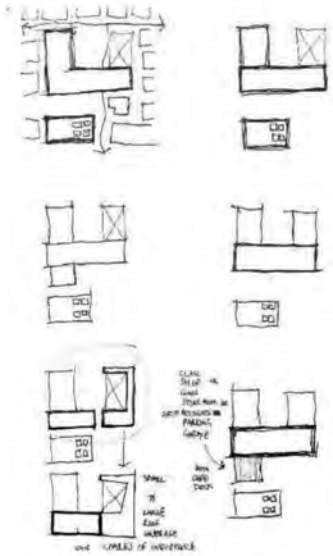
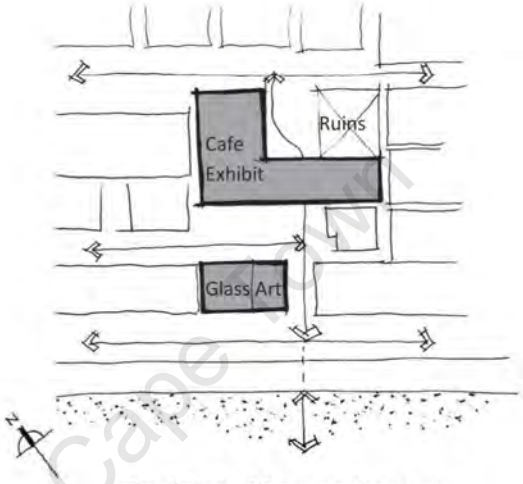


Figure 60 Concept model

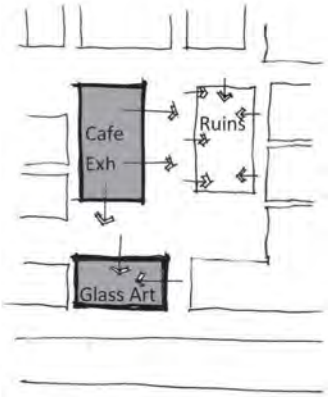
Conceptual Design Sketches



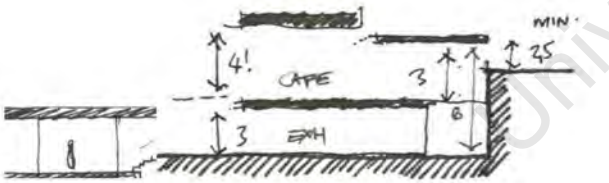
Plan configurations exploration



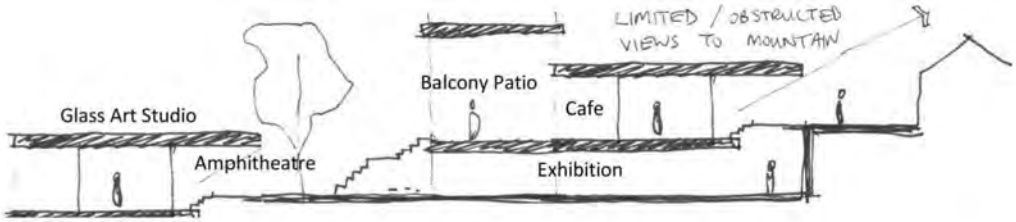
Roof plan - Movement routes



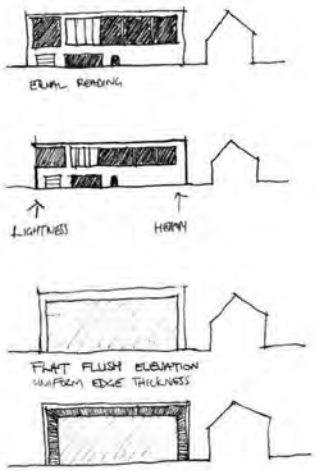
Main spaces relationships



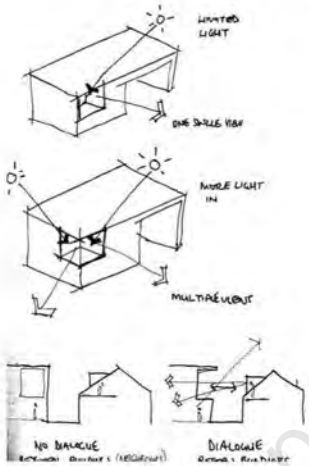
Concept Section - Horizontal planes float above new spaces inserted into a new excavated ground plane



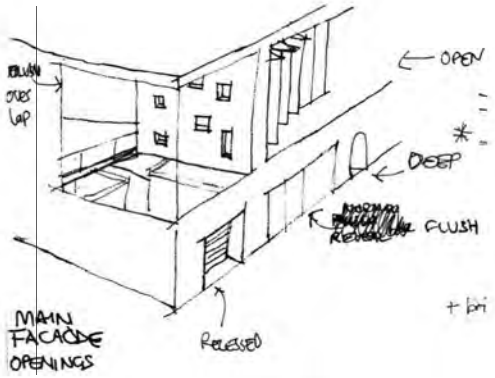
Section of horizontal planes create a series of pavilions cascading down the slope



Main elevation fenestrations
flush vs bevel edge horizon Frame

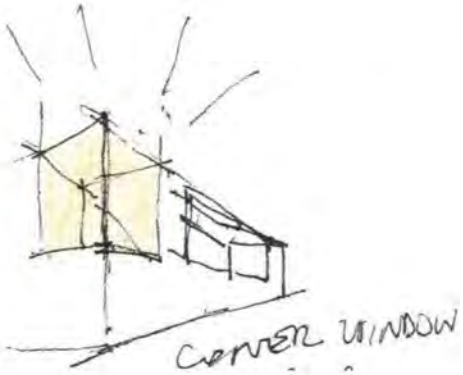


South-west corner edge condition

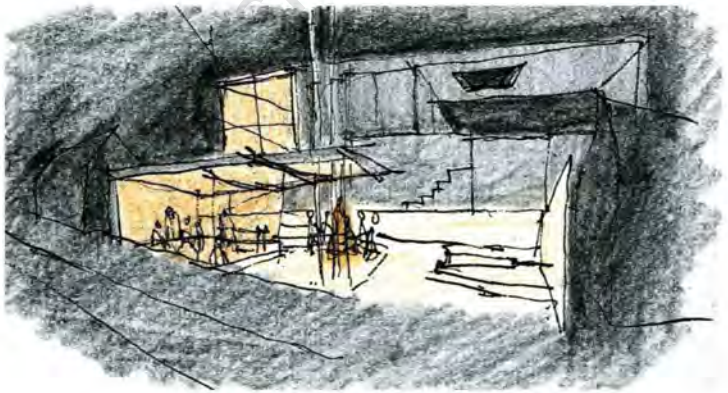


Facade glazing and recess

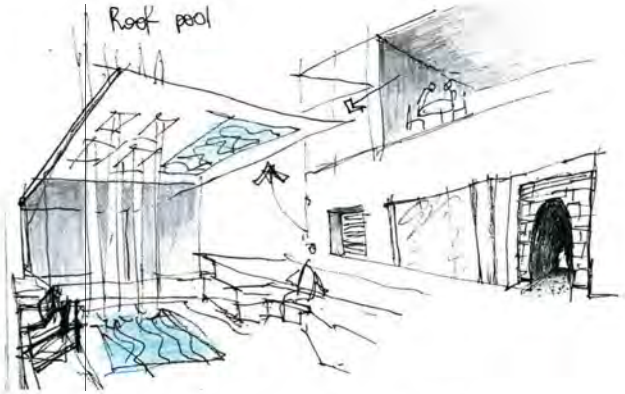
Conceptual design sketches
Glass Art Studio pavilion - Elemental use of Fire & Water



Corn window becomes a Lantern beacon at night visible in the landscape



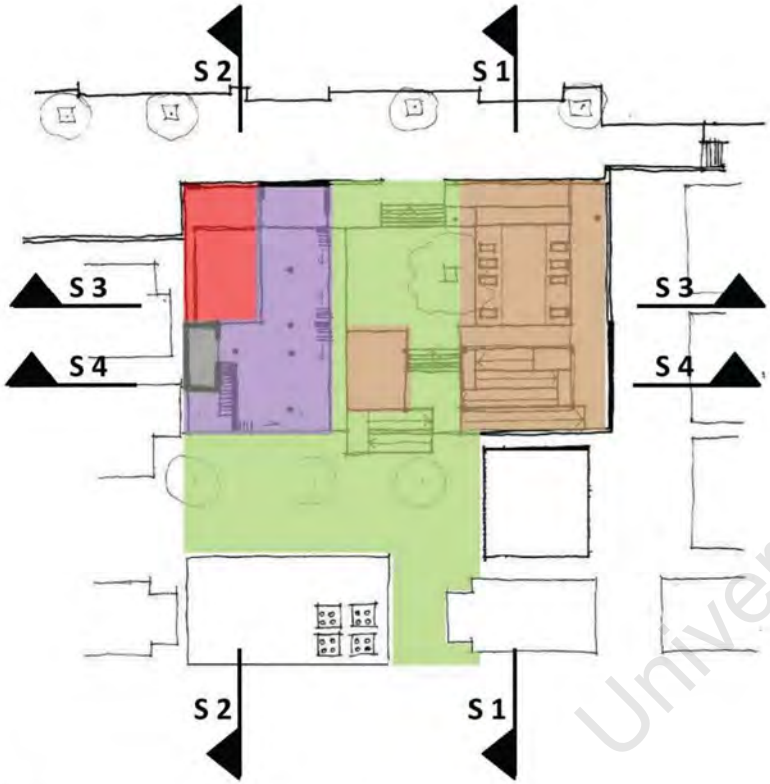
Glass blowing Heat, Fire & Light at night



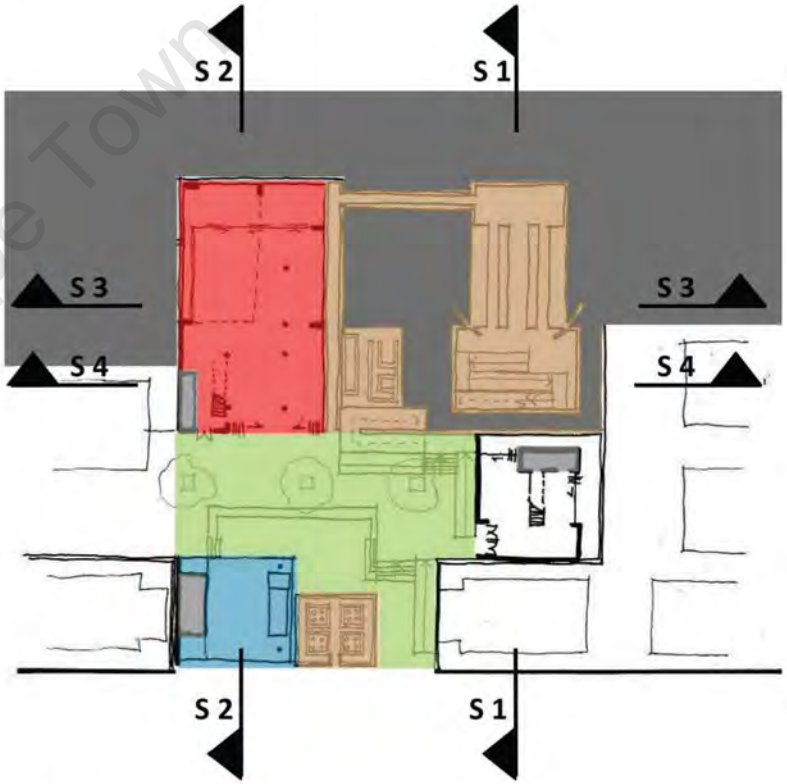
Evaporation & Reflection pools cool by day

Programming - Plans

Archaeological
Exhibition
Cafe
Glass Art Studio
Courtyard
Service Utility



Ground Floor Plan

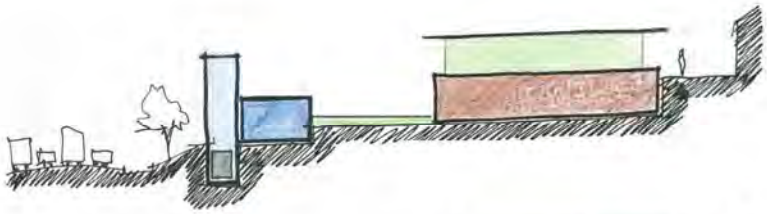


Lower Ground Floor Plan

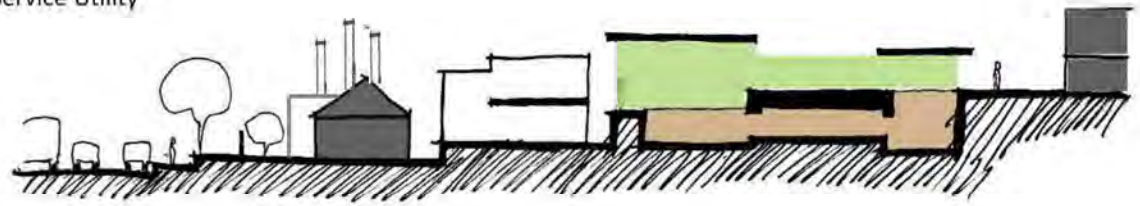
Programming - Sections

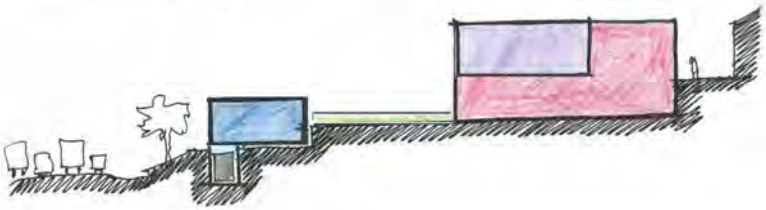
Archaeological
Exhibition
Cafe
Glass Art Studio
Courtyard
Service Utility

Concept section 1



Design section 1





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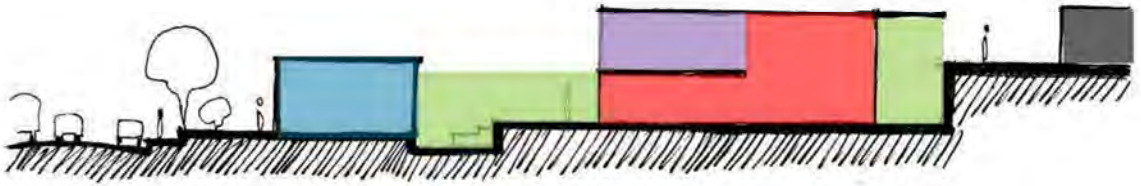
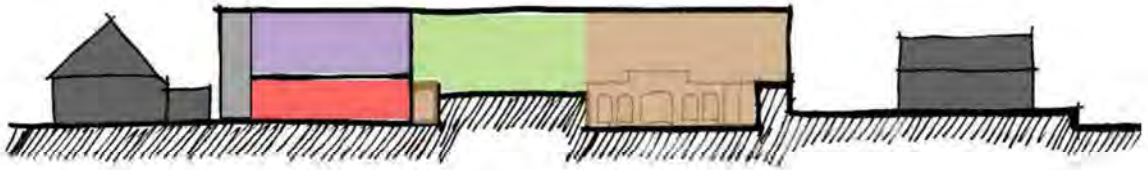


Design section 2

Programming - Sections

Archaeological
Exhibition
Cafe
Glass Art Studio
Courtyard
Service Utility

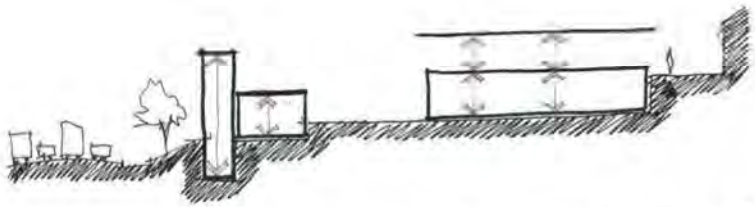
Design section 3



Design section 4

Building Volume Spaces

Concept section 1



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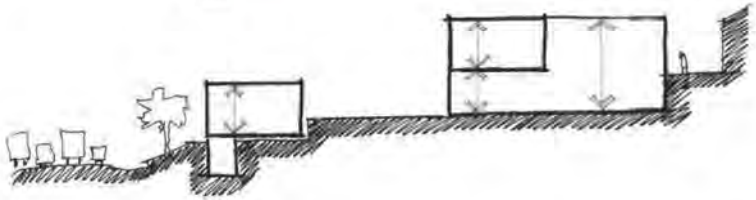

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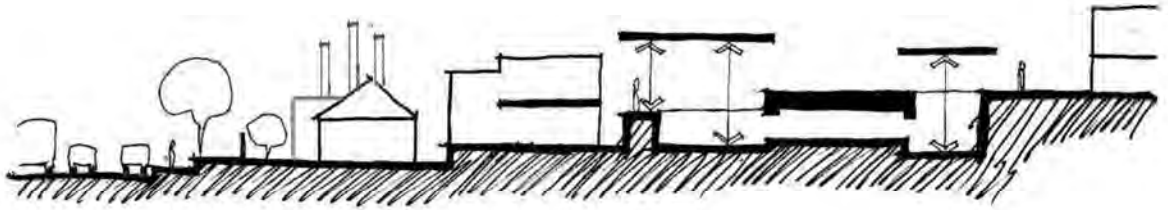

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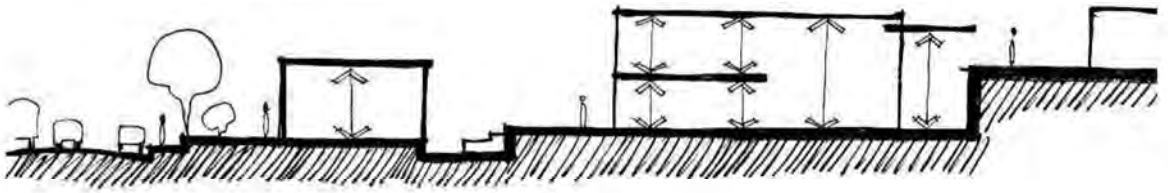
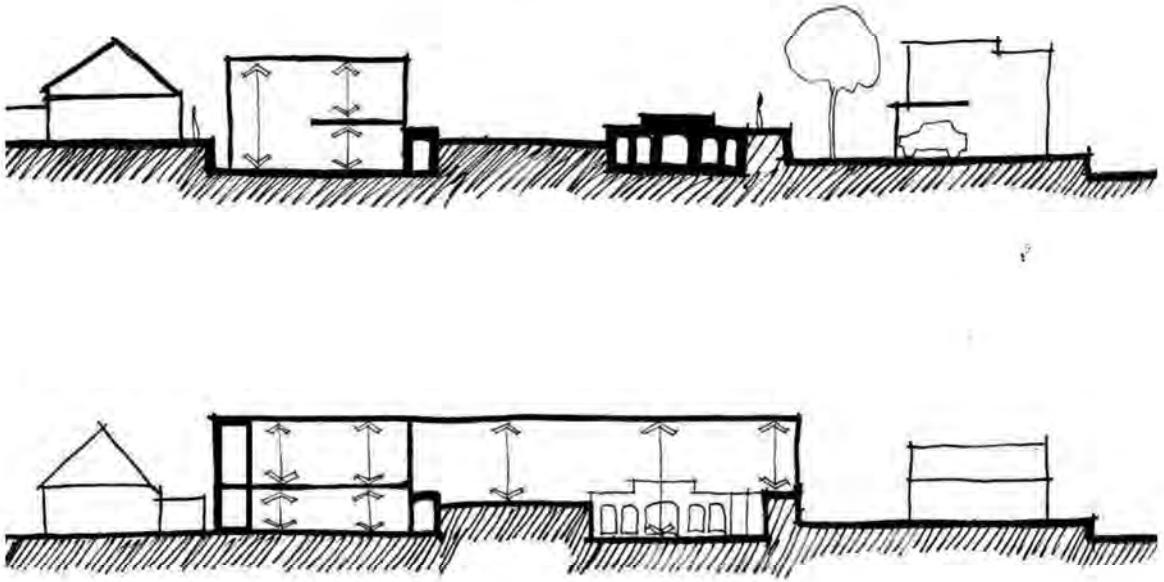


Building Volume Spaces

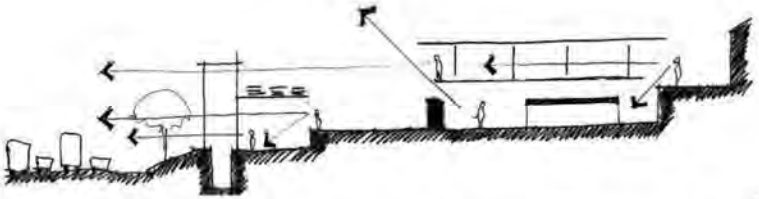
Design section 3



Design section 4

Visual & Spatial links

Concept section 1



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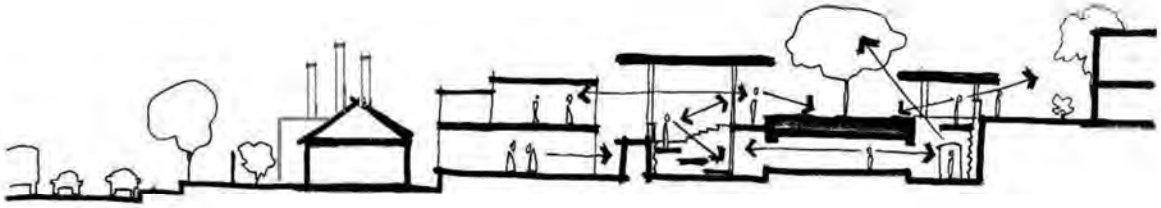

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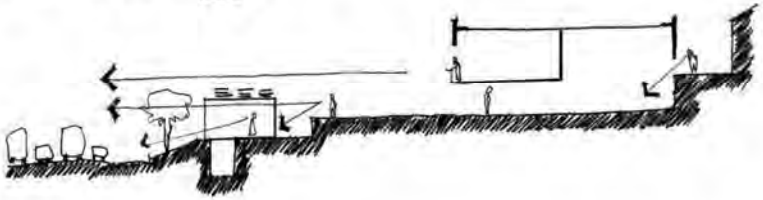

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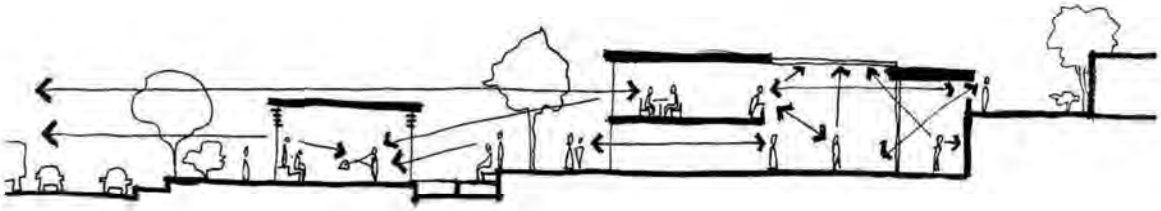

Visual & Spatial links

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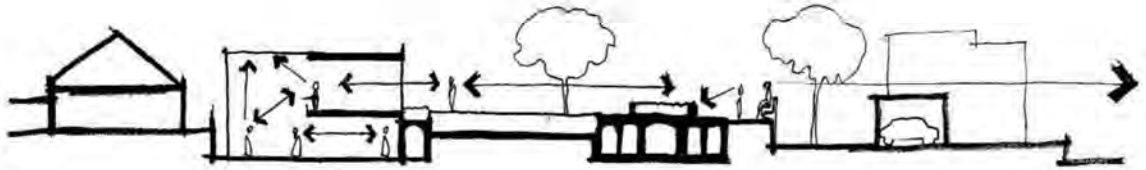
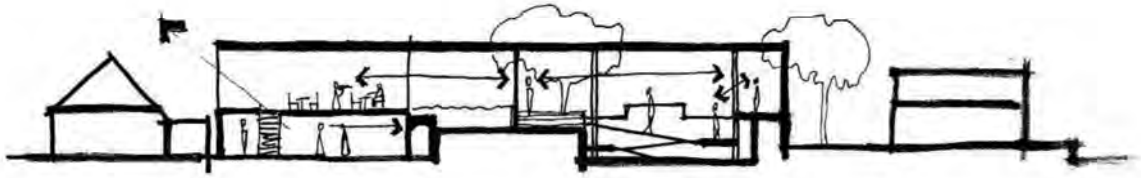


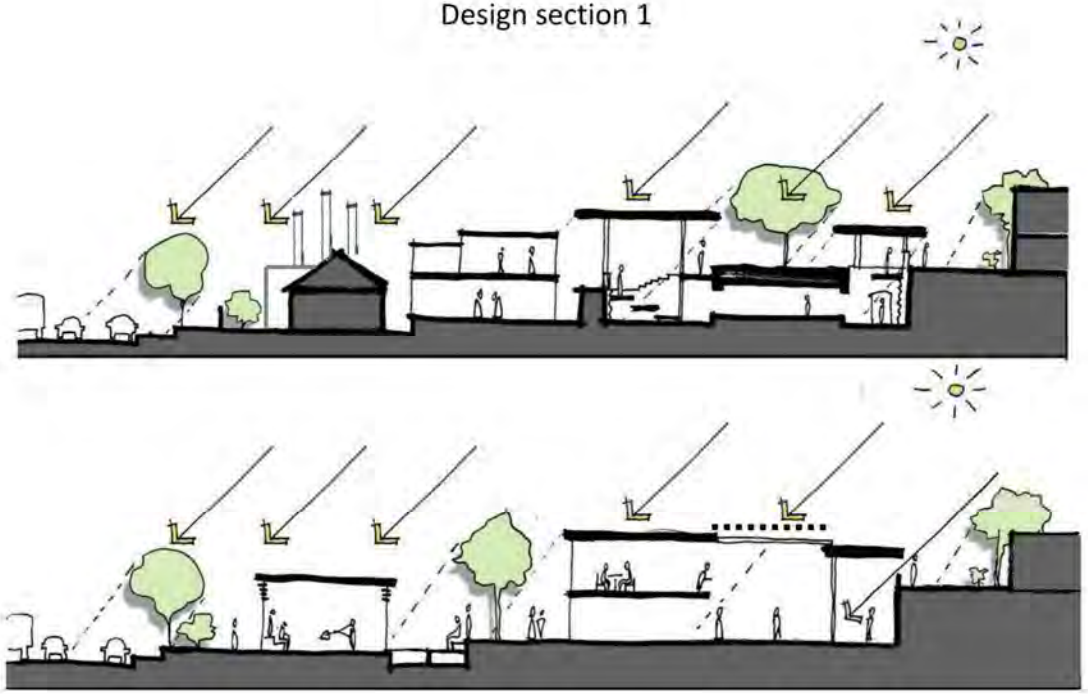


Design section 4

Climatic Responsive Strategies

Solar Control & Shading

Design section 1

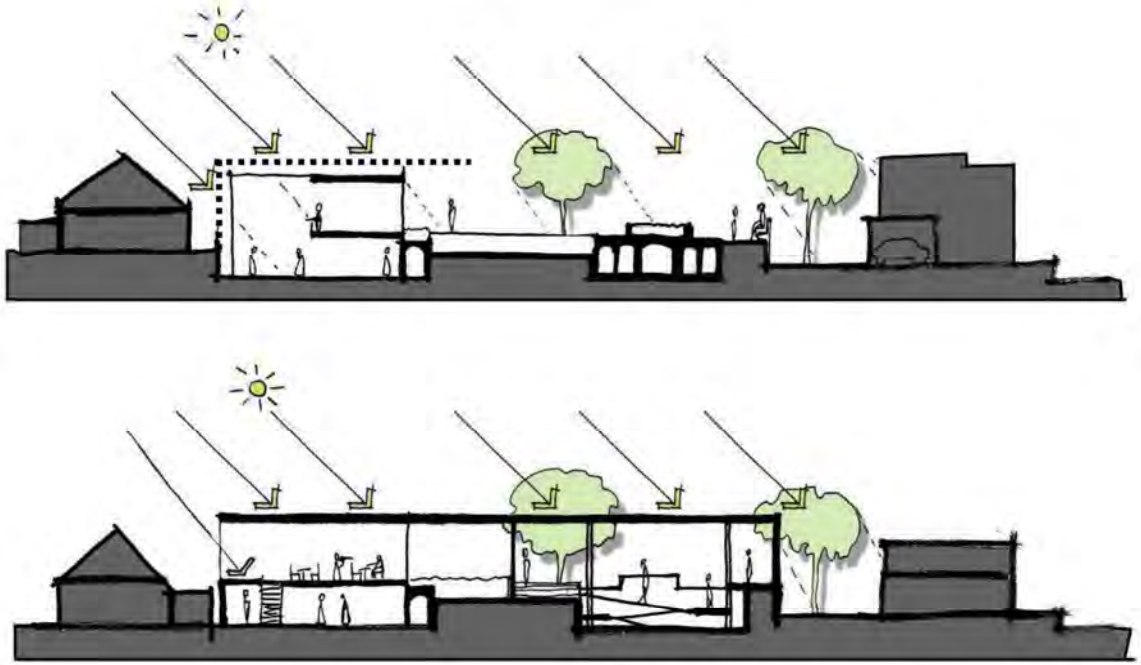


Design section 2

Climatic Responsive Strategies

Solar Control & Shading

Design section 3

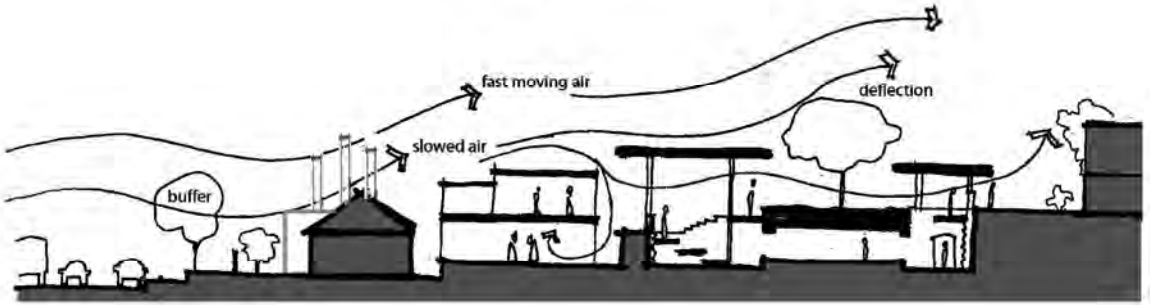


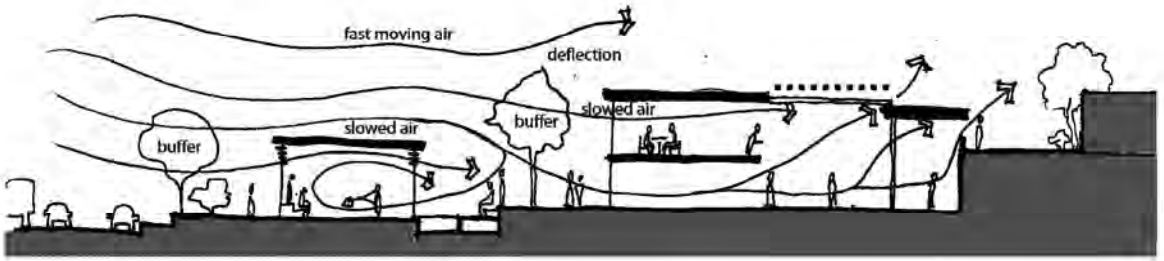
Design section 4

Climatic Responsive Strategies

Prevailing South - Eastern Wind & Air Movement

Design section 1



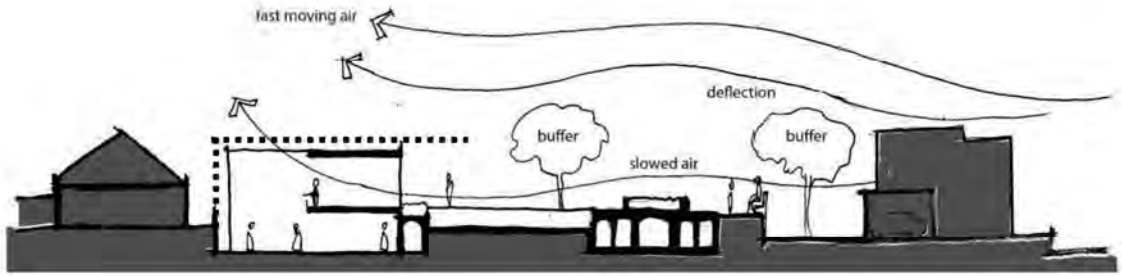


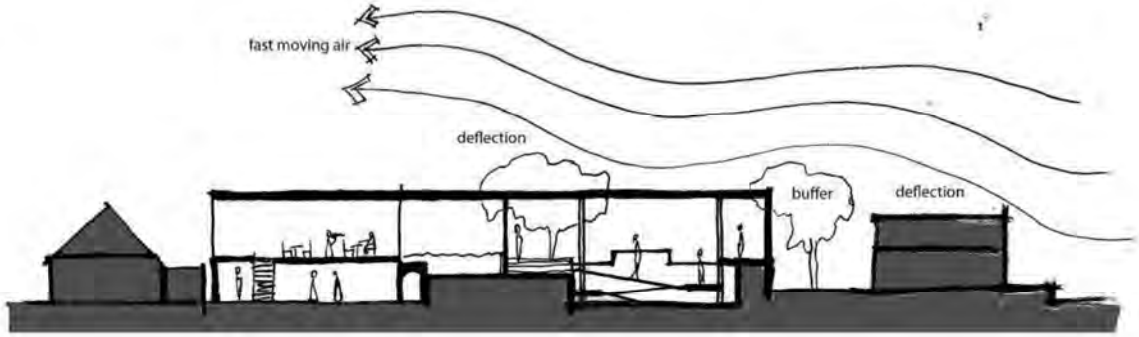
Design section 2

Climatic Responsive Strategies

Prevailing South - Eastern Wind & Air Movement

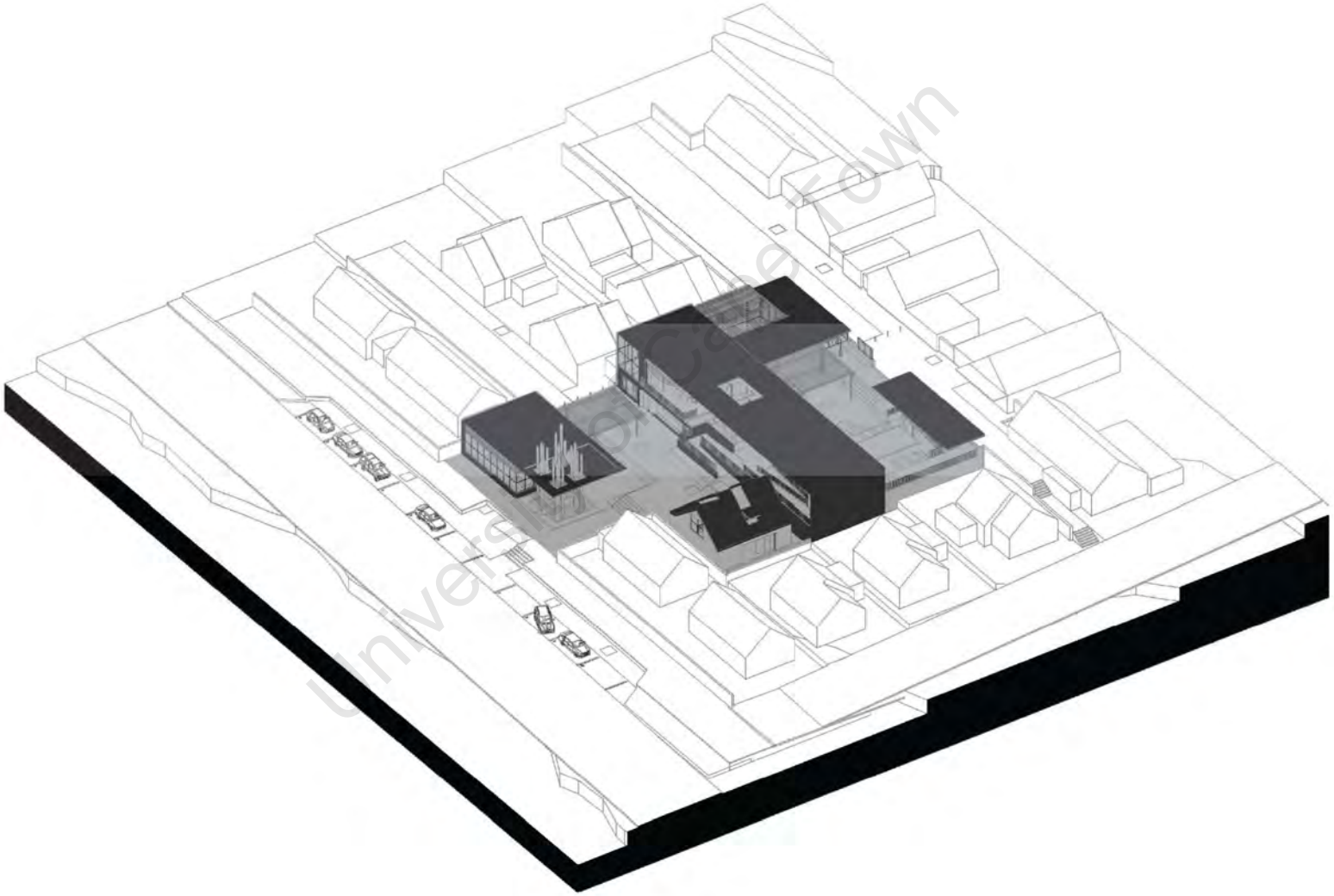
Design section 3





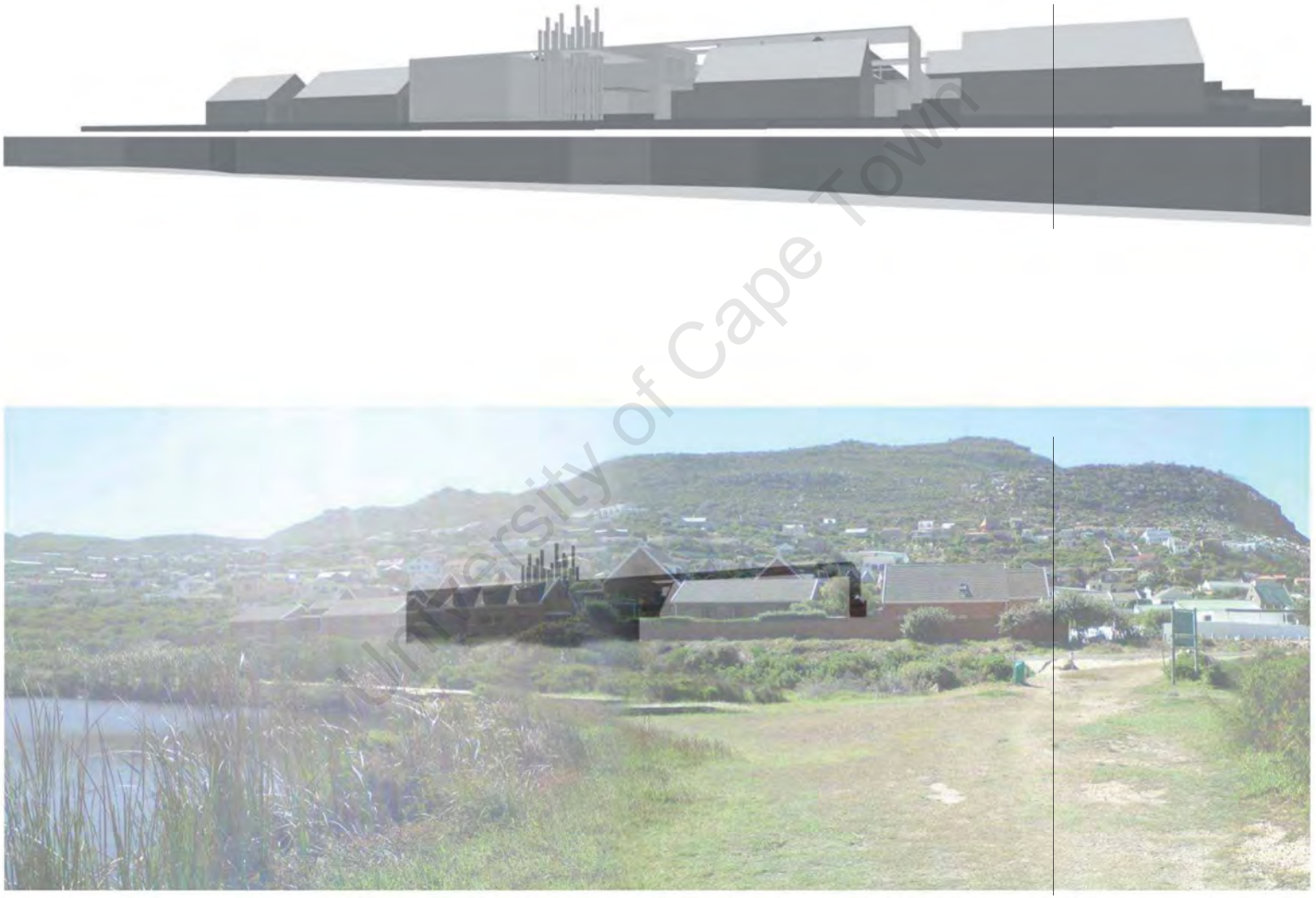
Design section 4

Design Development



Design Development

3D Mass Model - Main Perspective View



Conceptual 3D mass model and context overlay view from the Causeway Vlei [author 2013]

Technical Investigation

The site showed a need to investigate glass and brick and the connection of materials to place, time and memory, with a focus on making and constructing.

Materiality of heavy and light is demonstrated in contemporary architectural examples that are archaeological in nature and function as museums. The enquiry into architectural materials is to investigate how the meanings of materials are determined in order to fashion out a technical approach to design.

Place, time and memory through Materiality

Contemporary architectural theorists suggest that one can look at wood, concrete, glass, steel and plastic and observe the specific feelings or values communicated by each. There can be warmth, openness or oppression. It is often difficult to determine these meanings as they may be instinctive or acquired. The issue of atmosphere comes to mind where the effects can be analyzed through mood and observation. One may also wonder if materials have the ability to also provoke, memory and time in place.

Steven Holl suggests that the potential of materials lies in their power to evoke rather than to dictate meaning. This would prove that material meaning is one of architecture's most powerful tools. Meanings may be cultural, social and economic. The meanings even go as far as political in the case of the Reichstag building (1999) where critics "hailed the new glass dome as a symbol of the transparency of democracy" (Tshumi, 2003:25)

Holl associates place and material through experience where "the transparency of a membrane, the chalky dullness of a wall, the glossy reflection of opaque glass – intermesh in reciprocal relationships that form the particular experience of a place." (Tshumi, 2003:26) He further states his interest in light as a material, where space remains in oblivion without it.
So we find that materials and their use in architecture carry meaning. How is this meaning further represented and expressed in making and constructing architecture?

Glass in Architecture

In architecture, glass is a material known for its ability to transmit light. It is hard, brittle, usually transparent and composed of earthen elements that have been transformed by fire at very high temperatures. The process of making glass involves heating the raw materials - silica, kaolin/ China clay, lime and limestone - until they are fused entirely. Colouration is achieved by adding small amounts of iron or chrome for brown and green glass respectively. The mixture is cooled quickly and become rigid without completely crystallizing. The product is a material containing properties of both crystals and liquids (this is in relation to their rigidity or random molecular arrangements respectively)

There are various ways of forming glass, most common being cast, blown, rolled, extruded and pressed. Because glass has the inherent qualities of transmitting and filtering light, it is often used for poetic metaphor and spiritual symbolism. Some modernists hailed it as the material of modernity in support of their ideologies. (Bell, 2006)

Lightness: Dematerialization and Layering

Glass is a fascinating building material with diverse, sometimes contrasting qualities: transparent, reflective or frosted, tough yet fragile. The Glass Pavilion at Toledo, Ohio, USA by SANAA is a study in dematerialization (Fig. 61). It houses glass art of note and workshops. It has a fully glazed envelope with a series of cellular-shaped spaces with transparent glass walls. The roof hovers above the space on slim columns and other non glass walls. The envelope consists of panels of cut, rounded and sealed glass fixed on steel profiles that sit flush against the floor (Fig. 63).

Fig 61 Toledo Art Museum Glass pavilion exterior [Detail, 2007:35]

Fig 62 Toledo Art Museum Glass pavilion interior views and plans [Detail, 2007:37]

Fig 63 Toledo Art Museum glass pavilion interior & courtyard [Detail, 2007:36]

This dematerialization shows the versatility of glass which blurs the envelope for a seamless transition between interior and exterior. Glass is best used in its laminated form for structural strength.

Layering of glass gives the material a potentially greater value. The Corning Museum of Glass (Fig. 64) houses and displays the world's best collection of art and historical glass. Glass is used throughout the extensions by Smith-Miller + Hawkinson in a variety of ways. The monumental frameless glass facades supported by a complex steel structure are angled off 90 degrees to offset the visitor and make them aware. The material's versatility, strength and functionality are also highlighted by the inclusion, throughout the building, of glass stairs, freestanding glass walls and glass walkways through layered glass.

Fig 64 Corning Museum of Glass exterior glazing [www.cmog.org, 2013]

Vertical layering of glass sheets is another experimental technique for achieving structural glass walls. This can be achieved by stacking glass strips horizontally. Figure 65 shows this technique used for the walls of a Mausoleum in Murica, Spain by Manuel Clavel Rojo. Here the irregular glass strip edges compliment the slate. Laminata House completed in 2002 by Kruunenberg Van der Erve Architects in The Netherlands, uses 10mm thick laminated glass, stacked vertically as 10,000 seperate sheets individually cut and glued on site with a silicon-based sealant (Fig. 66). The solid glass walls create an unexpected rich pattern that ripples across the surface. This pattern is accentuated by the play of light and moving human figures. Openings for fenestrations are framed and operable windows inserted into the walls (Fig. 66). These examples use the light glass material poetically to express heaviness resulting in surprising enigmatically charged spaces. This will be used for the visitor centre exhibition space.

Fig 65 Stacked glass strips and slate, Mausoleum in Spain [Detail, 2004:362]

Fig 66 Laminata House exterior has vertical stacked glass sheet structural walls, Interior quality of light, vertically stacked glass sheet walls [Richards, 2006:194]

Heaviness: Made by Mould _ Modular by design

Through Prouvé, Fehn became acquainted with the poetic potential of materials and learned how meaningless architecture is without construction. The story of architecture is realized through construction (a+u, 1999:p4).

> *The rationalism of modern architecture is always in danger of forgetting construction. But without construction, architecture is meaningless. We continually find ourselves in the midst of this insolvable dilemma.* (a+u, 1999:p4)

Modernism brought along with it ideas about the grid, standardization and modular construction. Looking at the unit module, we see materiality used as being diverse and expressive in nature by Rafael Moneo in the Museum of Roman Art at Merida. The tectonics of the single material and volumetric spaces gives it a monumental presence. He takes on the means of the craft as his guide – the constructional technique and the properties of the material with the aim of making legible public architecture. Natural daylight enters through glass skylights in the roof that then fills the gallery spaces below (Fig. 67).

> *I see the buildings of the past conveying another reality which I would like to reach. I am pushing to think about what this reality is as the first theoretical question of today.*
> - Rafael Moneo (Robert, 2004:p624)

Fig 67 Museum of Roman Art elongated modular brick arches with concrete structure [Rafael Moneo, opposing forces PDF,2013]

Fig 68 Main central Furnace Chamber brick arches supporting the tank at Glencairn [author, 2013]

The reality Moneo refers to is a consistency that buildings of the past convey that those of today do not possess. It is not conveying consistency by imitation of types but, as seen in buildings of the past, the act of construction itself conveying or implying the form and image of the building as one, thus providing a sense of authenticity, as Fig. 68 at Glencairn. This may be in the expression of the materiality and craftsmanship embedded in the building that is often covered, disguised and lost in today's practices.

On materiality, Moneo expresses his acceptance that architecture can become something different from what it has been in history. He states his impression that buildings are going to "last less well than they have in the past" but not because of lack of solidity. He points out how architecture is now prepared for being an ephemeral art. He points out why "architecture today frequently appeals to the superficial image of its predecessors" and how today's society "does not believe in the lasting condition of its own creations." He gives the United States as an example, where this is evident in a society that is so sensitive to changes and advancements in building technology. He goes on to say that "the initial impact of the building is what counts, not its long life." (Robert 2004:p626)

In response to this condition, Moneo gives his point of view saying that durability and the condition of being built to last is very powerful, which one must still fight for. He is fully aware that this position goes against "mainstream" but argues that it would result in more stable cities, more stable architecture, more durable and less ephemeral constructions.

Moneo states that by defining a project one provides life to a building, "creating this new being that is going to be itself" and offers the idea of lasting where this being must support itself. This would mean that you are "connecting the idea of permanence with the idea of architecture. If you believe that you are providing life to something that did not exist before, you are naturally trying to provide the longest life." He believes the idea of permanence has value. He goes on to say that

> *Architecture is not simply the brilliant expression of an idea. After the architect has finished his work, the idea which motivated it is somehow dead, and at the same time, kept alive by the reality of the building...this reality of the building idea transcends into a new thing that should be sustained by itself.* (Robert 2004:p627)

In a concluding note Moneo states "the reality of the building will be sought in its lasting tangible presence, which speaks about the architectural principles behind its construction." (Robert, 2004:p627) It is at this point one finds the connection between the tangible constructed physical reality and the phenomenology.

In *The pattern of Thoughts* Sverre Fehn states that

> *As you get older, it is what you wear, the clothes closest to your body, that are the most important. The material that touches your skin feels like a mask, a construction that you add to your body, and it becomes part of you. This is the way it is with architecture, too.*
> (Fjeld, 2009)

In Fehn's work, materials tell a story and set up dialogues with the place and surroundings. The Norsk Arkitekturmuseet in Oslo (Fig. 70) is a story and dialogue between eras using similar materials in different and somewhat unexpected ways. Glass is used on the facades of the pavilion extension suggesting a thin layer between inside and outside while concrete is used for a heavy wall that encompasses the building(Fig. 71). The exterior creates a protective layer for the light "fragile" interior.

Fig 69 National Museum Oslo - Pavilion square floor plan [a+u 2009:85]

Fig 70 National Museum Oslo street elevation [a+u 2009:82]

Fig 71 National Museum Oslo - Pavilion extension [a+u 2009:82]

The old building 19th century bank building by Christian Grosch stands as the heavy, solid mass while the pavilion extension by Fehn provides a light, elevated, transparent structure (Fig. 72).

Fig 72 Glass Pavilion becomes a lantern at night [a+u, 2009:85]

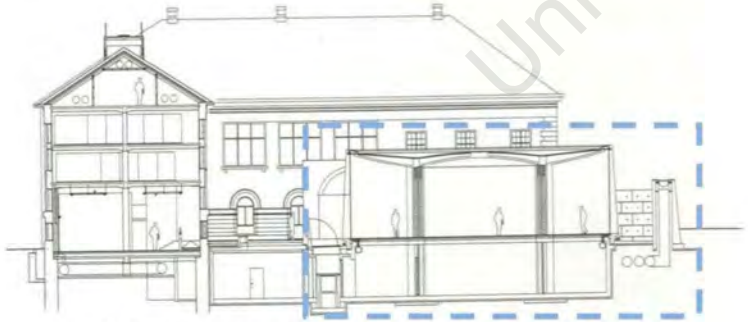


Fig 73 National Museum Oslo - Pavilion section [a+u, 2009:85]

Fig 74 Glass Pavilion glazed facade detail [a+u, 2009:84]

Fehn developed an intimate relationship to each intended objects' material. To revitalize a forgotten artifact or lift a mundane object into the light intrigued and fascinated him. The simplest everyday item or the most fragile has its place. Fig 68 shows the author's investigation of the glass lantern and brick hearth as stimuli for design materiality and construction.

Poetic potential of Materials

Glass provides lightness in material quality and often attaches itself gently to other materials, yet it conveys a certain "coldness" and "purity" that is always in a constant fragile state. Despite recent advances, its true potential still continues to be veiled, waiting to be tapped. The lantern glass (Fig. 76) shows masking effect of soot which gives it a feeling of warmth & mystery when viewed closely.

While Moneo speaks about permanence, Zumthor suggests that a good building must be "capable of absorbing the traces of human life and thus of taking on a specific richness." (Zumthor, 1999:24) Zumthor speaks of the patina of age on materials, where surfaces become scratched; varnishes growing dull and brittle; and edges polished by constant use. The image of timber comes to mind; this age old natural material has an intimate bond with man which will be used in the design for components exposed to human touch.

How do other materials such as brick "absorb or expressing traces of human life"? The poetic potential of these materials lies within their making and construction. Heavy materials such as brick or stone or concrete age slowly with time, and they are ever so slightly affected visibly by human activity. The traces of human life lie in their construction by means of craftsmanship. No brick coarse is ever exactly the same as the other; no stone block sits the same as another on mortar while concrete is imprinted with patina by the formwork. The results of craftsmanship are pleasant imperfections that often surprise and become embodied in the structure, thus revealing traces of human life. These imperfections give life to the material. This will be the technical framework for approaching the design construction and materiality.

Figure 75 Perforated walls at Kolumba Art Museum [a+u, 2008:41]

Fig 76 Material montage of the glass lantern and brick hearth artifact [author 2013]

Materials found on the Archaeological site at Glencairn

Glass Tank lined with large refactory blocks

Imported fire-bricks 900x300x200 mm "Harper & Moore Stourbridge" insignia

Brickwork, Standard, Common Hard burn and Clay brick walls

Furnace Chambers and Flue ducts lined with solid bricks "KB Co" insignia

Flue ducts lined with imported bricks "Stephens & Co Castlecary,Glasgow" insignia

Various types of brick masonry at the Glencairn Glassworks site

Heap of loose dark green & aqua glass shards on the Glass Tank slab

Slab of solidified dark green glass of the *in situ* Glass Tank

Glass

Heavily rusted Steel beam support by the Glass Tank

Steel

Main Central brick vaulted Furnace Chamber

Brick

Cast Iron and Steel grating above all 8 flue duct openings

Cast Iron Grating

Concrete platforms with corroded *in situ* steel base plate studs

Reinforced Concrete

Fig 77 Material montage of the Glass Furnace artifact and site [author 2013]

Ideas on craftsmanship and making

Interest in the archaeological site of the Cape Glass Company led the author to investigate the relationship between making and constructing, focusing on glass and brick as materials found on the site. Physical evidence shows brick arches and walls for the furnaces and flues, while glass bottles shards lie above what remains of the glass molten tank. These two materials are of similar composition but different properties, appearance and function in architecture; heavy and light. Their transformation lies within the process of making – by heat. The process of making glass bottles in the past involved mouth blown and semi auto machine production (Fig. 78) of which the company used to manufacture glass bottles.

Fig 78 Glassmaking 1800's mouth blown process and 19th c. machine process [sha.org 2013]

The Japanese word shokunin is defined as 'craftsman' or 'artisan', but with deeper meaning, "not only as having technical skill, but also implies an attitude and social consciousness." The full description goes as far as the shokunin having a social obligation to "work his best for the general welfare of the people. This obligation is both spiritual and material, in that no matter what it is, if society requires it, the shokunin's responsibility is to fulfill the requirement" - Notes on a theory of making in a Time of Necessity – Guiseppe Zambonini (Robert, 2004:p615)

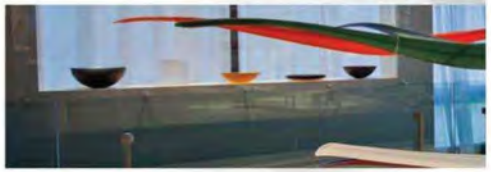
Zambonini suggest that any production activity involves the transformation of matter for a purpose clearly defined somewhere between society and the individual. The maker and the object to be created are tied together by an intimate relationship which does not disappear at the conclusion of the production process. This relationship is one that exists between two very similar yet different materials; glass and brick and their meaning together carries a poetic potential of light and heavy.

The above ideas imply that every man-made form and every architectural form does not exist solely as "static consequence to an otherwise irrelevant act of production, but conversely that the nature of form is inlaid in the process of making" (Robert, 2004:p615). From this point we learn of the importance placed on the process of making, thus a Glass Art program is included in the project, for creative art rather than mass production of the past.

Fig 79 Glass making program montage [author 2013]

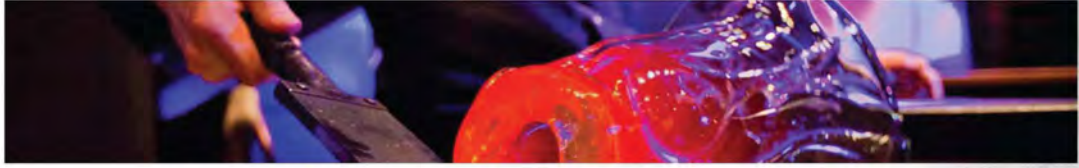
walk thru the archaeological site

"see feel smell what remains and experience the heritage"



gallery collections

"eperience the art and learn about the history of the artefacts"



"it demands to push the boundary between fluid and solid state"

glass making

"attempting to make order out of chaos...like taking a snapshot of something that is in constant change"

glass blowing

"manipulating glass in its fluid form"

hot glass show

"master glassmakers take glowing gobs of molten glass on the end of a pipe andskillfully shape them into vases, bowls , or sculptures..."

hot glass show stage

"watch and be amazed by the maters in the live demonstrations"

early pioneer in glass

Marinot (painter) visited the glass factory of brothers Eugène and Gabriel Viard in Bar-sur-Seine, France and was at once captured by the possibilities of glass

glass blowing studio

"learn to create artefacts and take your artefact with you as a memory"

Technical Precedent

Glass Art Studio

There is a wide variety of techniques used in glass art. The limited space on the design site will only accommodate a demonstration hot shop. A larger workshop facility is proposed in Phase II on the adjacent vacant land in the urban strategy that will include a hot shop and cold shop, torchwork studio, kiln casting and fusing and metal shop based on the Toledo Glass Museum (Fig. 81).
The Hot Shop is a place of constant activity and high heat where the process of "glassblowing" occurs as well as molten glass manipulation and appropriate cooling (annealing). The Glass Art Studio will be equipped with two molten glass furnaces stocked with Spectrum Premium Nuggets, two annealers, two work stations, and a variety of hand tools.

Design Guidelines
Safety and efficient use of space is are high priority in the design.
The hot zone areas include the glassblower workstations where the hot working or forming of glass takes place. Work surfaces are a fiber/cement composition that withstand exposure to gas/hydrogen oxygen flames and hot glass. Painted flat black, the background aids in determining subtle differences in flame and glass color during the glassblowing process. Storage is provided for glass working tools and related equipment. Compressed gas, vacuum, electricity and other services need to be delivered to the glassblower's lathe. In this facility, all service feeds are overhead. The sink area features a 1.5m stainless steel sink that can accommodate the 1.2m lengths of tubing commonly used.

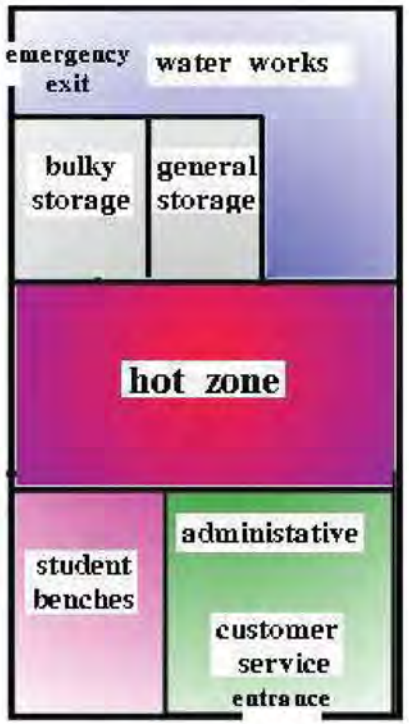


Fig 80 Generic Glassblowing Shop planning [ilpi.com 2013]

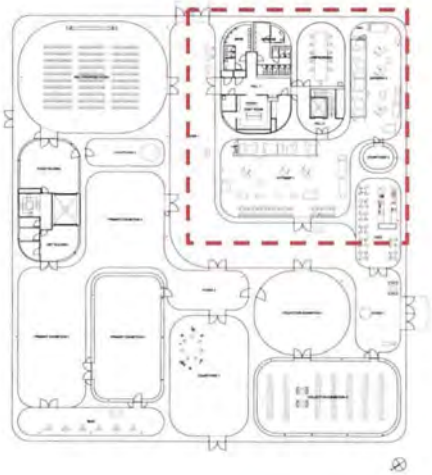


Fig 82 Interior views of Hot Shop work area; observation area [Detail, 2007]

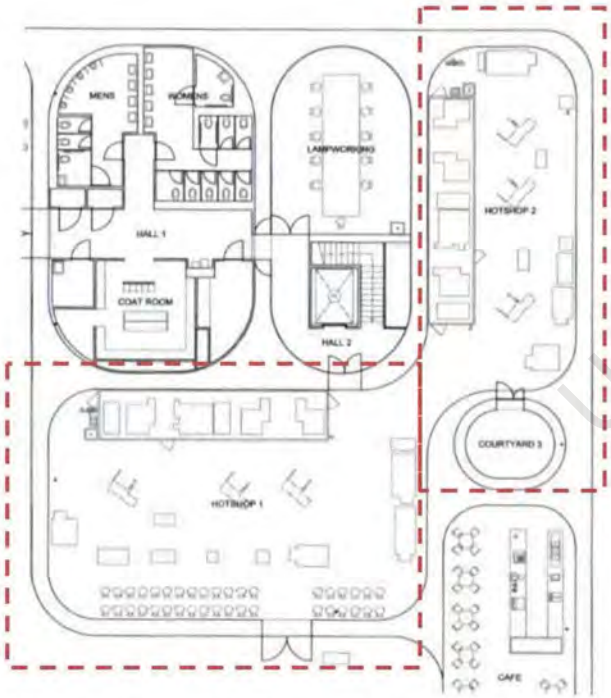


Fig 81 Toledo Glass Pavilion plan showing Hot Shop zone [Detail, 2007]

At Toledo, the observation and work areas share the same interior space. The limited space on the Glencairn site will accommodate a Glass Art Studio and an outdoor observation area in the form of an amphitheatre which extends the space out into a courtyard (fig 83)

Fig 83 Floor plan of the proposed visitor centre Glass Art Studio

Sustainable Systems

Given that this is a contemporary project based on the energy of burning coal used in the past at the Cape Glass Company, the proposed Glass Art Studio design is the driving force for energy efficiency. The design deals with heat extraction and cooling given the nature of the space which will have gas/electric furnaces that produce high temperatures.

Part of the efforts to become more energy efficient is focused on glassmaking space. The centerpiece of any hot glass shop is the glass melting furnace. These furnaces are not very energy efficient. To offset some energy use, we recuperate heat from the furnace, which incorporates the use of waste heat and reduces energy consumption. Figure 86 shows a glass melting furnaces. Across the top is a recuperator. It is a device which looks like an automotive muffler. Cool combustion air enters from below behind the furnace. The combustion air travels through a pipe in the center of the recuperator. This pipe is jacketed by a larger pipe through which the exhaust gasses from the furnace travel. The flue gasses exit the furnace through a pipe on the top right of the furnace and exit the recuperator on the top left. The combustion air is mixed with fuel (either natural gas or propane) at the burner which is the green device on the right side of the furnace. The flue gas leaves the furnace around 2000 degrees F. The combustion air is heated from ambient temperature to about 550 degrees F using this waste heat. This reduces the amount the air has to be heated and decreases overall gas consumption.

Figure 84 Corning Museum of Glass Demo Stage [www.cmog.org, 2013]

Figure 85 Urban Glass New York 3D render [www.urbanglass.org, 2013]

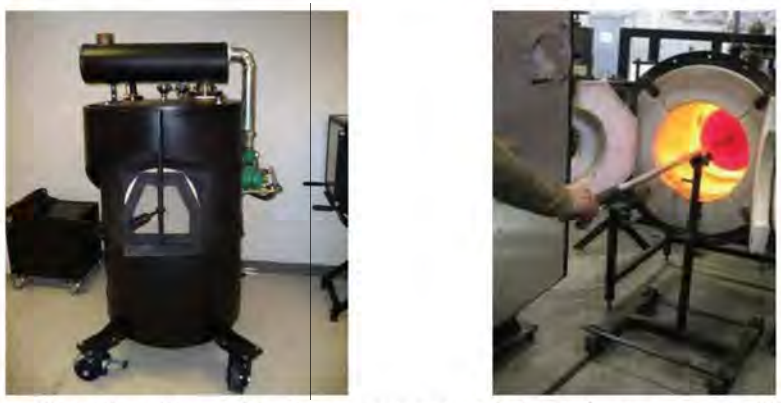
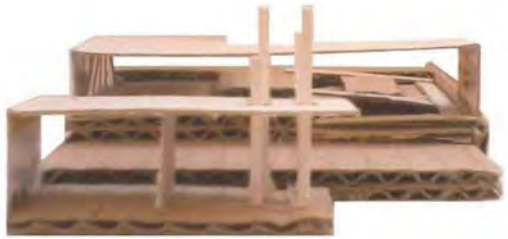


Figure 86 Modern Glass Melting furnaces use gas or electricity [www.cmog.org, 2013]

Detailing - Concrete

Large span concrete roof Pavilions



Concept model - South west facade

Fig 87 Structure precedent montage - large span concrete planes; column support structures and ramps
[Bell, 2006:99 Yamaguchi Prefecture Pavilion; El Croquis 142:156 Beluso Harbour Facilities]

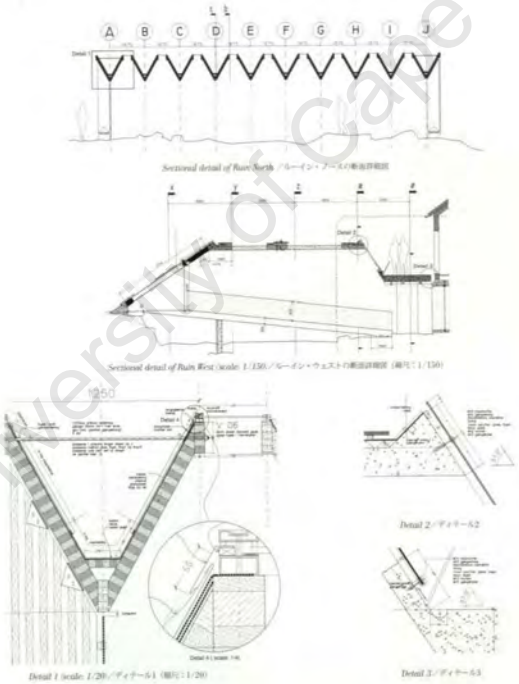
Detailing - Timber

Asked about his ideas on details Fehn states that

detailing is the story of the meeting point between materials
(a+u, 1999:p19)

Solar Screening

Concept model - North west facade solar screen



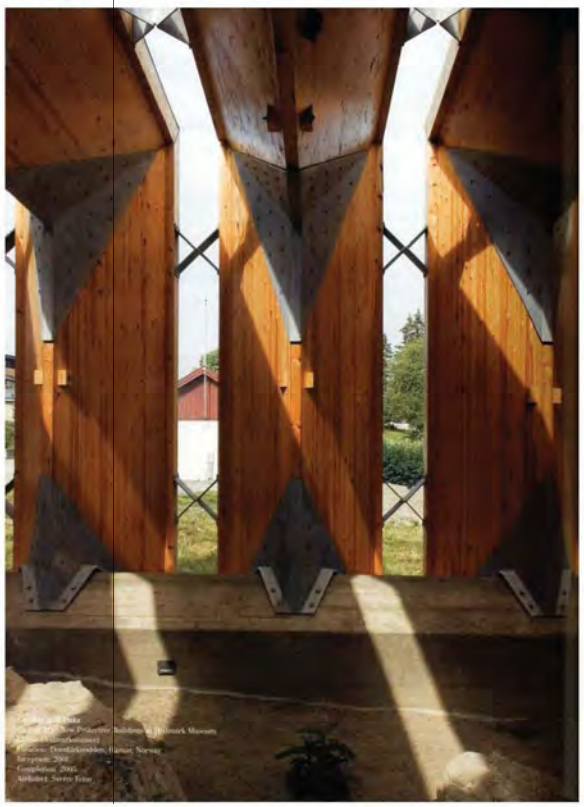
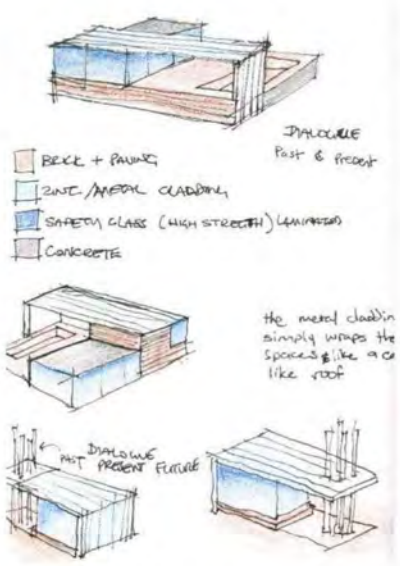


Fig 88 Hedmark Museum laminated timber structure & detail drawings [a+u 2009:79]

Detailing - Glass

Corner Curtain wall Conditions

Concept model - South west facade



Concept model materiality sketch

Figure 89 Corner glazing and detail drawing [El Croquis 160:130]

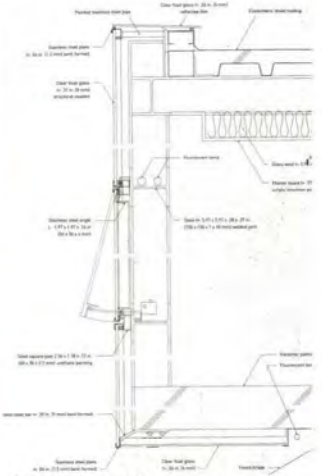
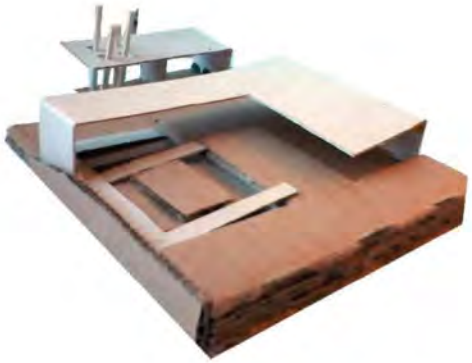


Figure 90 Corner glazing and detail drawing [Bell,2006:36]

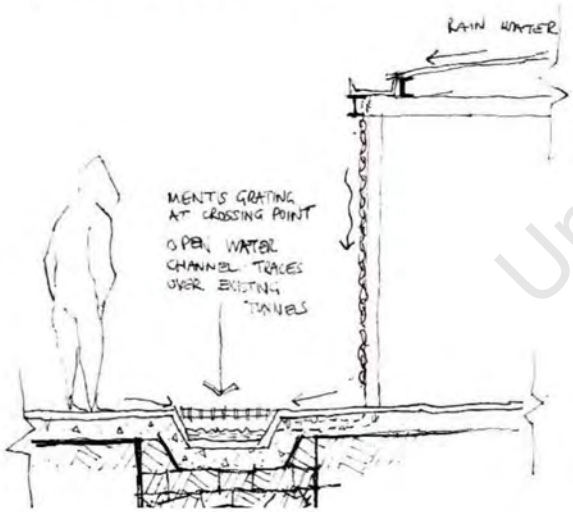
Figure 91 Glazing structure [Bell 2006:32]

Detailing - Steel Elements

Chimneys, Ramps and Balustrades



Concept model - North east facade



Concept sketch - mentis grating over water channel

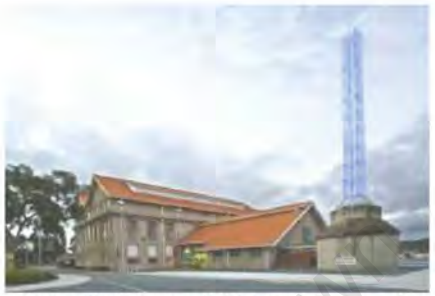


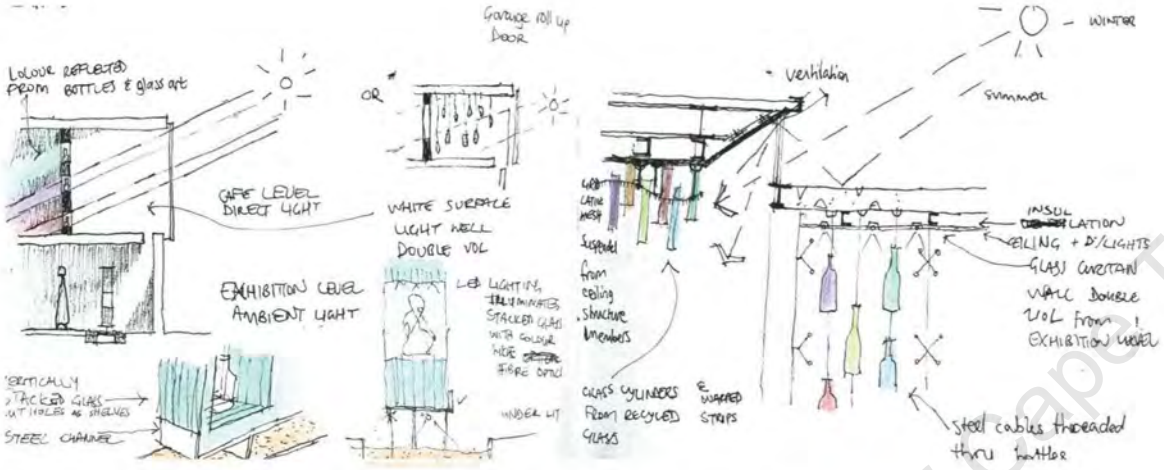
Figure 92 Chimney light tower feature day & night [www.canberraglasworks.com 2013]

Figure 93 Sprouting water fountain cylinders [Arc Review, 2003]

Figure 94 Steel grated platform [A Ferre, 2007:143]

Figure 95 Pergola facade [A Ferre, 2007:118]

Exhibition Space elements & Details



Conceptual detail sketches of glass exhibition display elements

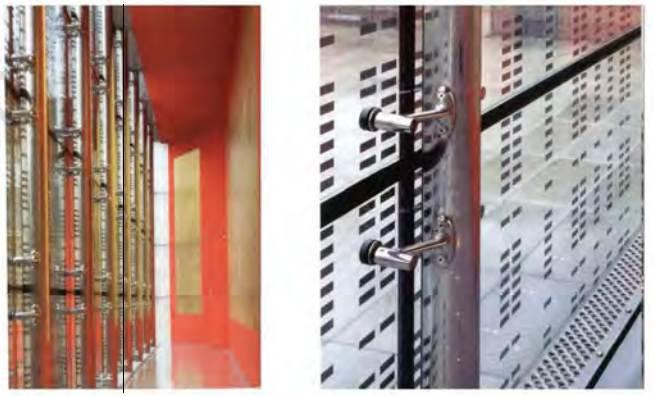


Fig 97 Curtain wall & supporting structure detail [Richards 2006:76]

Fig 96 Laminated glass sheets vertically stacked walls [Richards 2006:197]

Fig 98 Glass skylight suspended exhibition panels & Glass facade exhibition wall [museumofglass.org 2013]

Conclusion

Urban

The abandoned archaeological site of the Cape Glass Company is of historic, social and cultural importance. This design proposal allows the site to be accessible to the general public, creates a public space thoroughfare within a suburban context and establishes public interest and awareness of the historic artifact.

Intervention

The proposed Visitor Centre is an intervention in the landscape that connects intimately with the memory and spirit of the place, allowing visitors to engage, discover and experience the phenomenological richness of the site in built form. It sets up a dialogue with the archaeological ruins by revealing the site's physical remnants through excavating the ground plane.

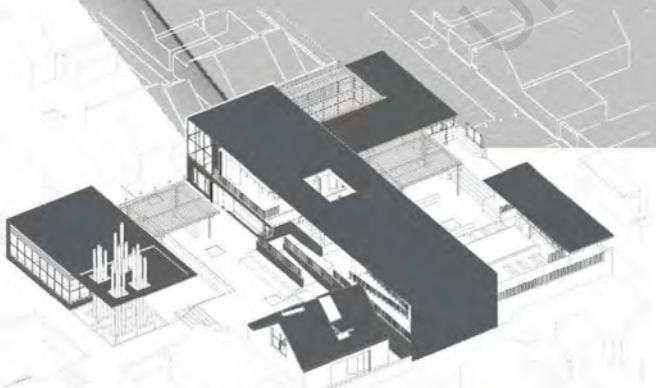
Construction

The architectural language is a contemporary balanced composition of lightness and heaviness that compliments the ruins through the expression of material ruination and aging to give it a fragile image. This results in a continuous aesthetic state of incompleteness. The building's materiality is inspired by those found on site. The building explores the four elements of water, fire, earth(sand) and air as materials present in the making of glass and manifests these elements in built form. These transcend the visitors' experience to reveal the ethereal nature of the site.

Social

The Glass Art program turns the industrial process of glassmaking into a social activity of creating art by age-old techniques of glass blowing which will be introduced to the area in this Phase 1, and later learnt and mastered at the proposed Phase 2 facility in future.

Proposed Visitor Centre

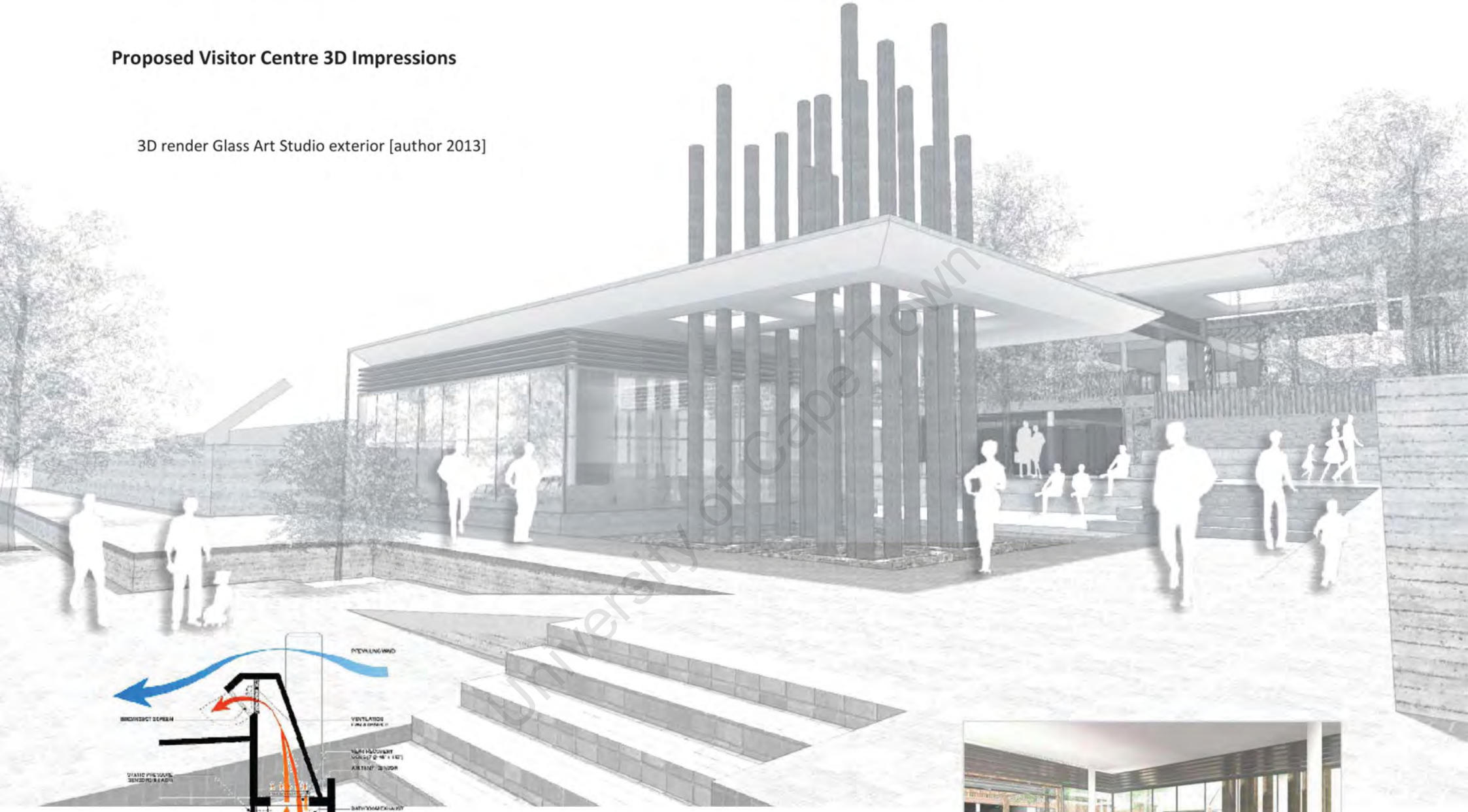


Axonometric 3D model [author 2013]

3D render overlay view from the vlei [author 2013]

Proposed Visitor Centre 3D Impressions

3D render Glass Art Studio exterior [author 2013]



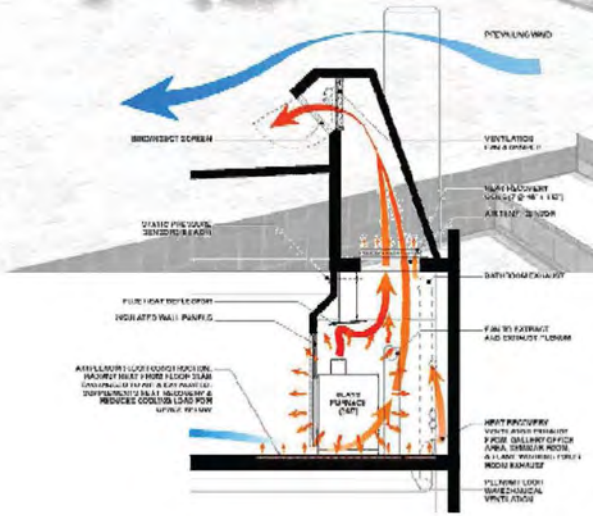


Fig 102 Heat collection and extraction [aiatopten.org 2013]

3D render Glass Art Studio interior [author 2013]

3D Render view from the Glass Furnace ruins [author 2013]

Axonometric 3D model roof system and structure sketch [author 2013]

3D section through furnace, large span roof & steel grated ramps [author 2013]

3D Render North West view of the Exhibition pavilion exterior [author 2013]

3D Renders - interior views of the double volume Exhibition space [author 2013]

Clippings, Captions and Quotes

THE TWO GLASS MELTING TANKS AND BRICK TUNNELS WHICH WERE USED TO HEAT THE GLASS ARE BEING UNCOVERED

EXCAVATION SHOULD BE COMPLETE BY SEPTEMBER ... WILL GIVE THE LAND TO A CARING INSTITUTION

Glencairn

CAPE/NATIONAL

Old glass factory is being 'raised from the dead'

ESANN van RENSBURG
Staff Reporter

THE old Cape Glass Company factory at Glencairn is being excavated and could soon be a national monument — thanks to the efforts of Simon's Town historian Mr Gordon Wilson.

An alderman and fourth generation resident of Simon's Town, Mr Wilson has always been interested in the ruins of the factory built by Anders Ohlsson of Ohlsson's Brewery in 1902.

"I've always known where the site of the old factory is and managed to buy the land in 1980 to save it from development. It is now being excavated at my expense and should soon be declared a national monument."

The excavation was the only industrial archaeological site in Simon's Town and the first glass factory in the southern hemisphere which made bottles by machine, Mr Wilson said.

'Ohlsson's Breweries built the glass works 90 years ago to compete with German beer in South Africa. "Ohlsson's first made use of reject bottles which the company had imported from England. But these were expensive and couldn't stand the pressure from the beer."

Mr Ohlsson imported all the bricks, refractory blocks and other materials from England and built both green and aqua (white) glass melting tanks at Glencairn.

But the factory was badly managed and closed down in 1905 after being liquidated, Mr Wilson said.

"The roof structures were smashed and collapsed and the factory was left to the mercy of the sea sand for more than 87 years."

Three weeks ago Mr Wilson started excavation of the site with the help of archaeology students from the University of Cape Town.

Bottles of all shapes and sizes have been discovered, including whisky flasks, medicine bottles and beer bottles. The ruins are starting to take the shape of the original factory.

The two glass melting tanks and the brick tunnels which were used to heat the glass are being uncovered.

Excavation should be complete by September and Mr Wilson will give the land to "a caring institution" such as the Simon's Town Museum or the municipality.

Picture: BRENTON GEACH, The Argus.

Picture top right: **1902 BEER BOTTLES:** Mr Gordon Wilson at the solidified green glass melting tank. He holds two beer bottles which were found at the site.

Picture left: **MELTING TANK:** A model of a late 19th century glass melting tank. The one at Glencairn looked very similar.

Picture right: **CLAY PIPES:** Mr Michael Sithiella, a worker at the site, shows pieces of clay pipes which were inserted into the molten glass to extract the pure glass from the bottom of the tank.

Figure 100 The Argus 19/05/1992 [UCT 2013]

Glencairn

Plans to excavate the ruins of sand-buried Glencairn glass works

By CLAUDIA CAVANAGH

SIMON'S TOWN alderman Gordon Wilson is planning to excavate the ruins of the old Glencairn glass works and expose them for the first time since they were buried by sand in 1905.

Excavation would mark the culmination of a 13-year battle by Mr Wilson to have the site, described as a "historical treasure", preserved.

Mr Wilson, a historian, became concerned about the future of the glass monument, built by Ohlsson's Brewery in 1902, in the Seventies when development in the area began taking place.

He said: "This is the only industrial archaeological site in Simon's Town and was likely to become a casualty of housing development and road-building, becoming lost forever."

In 1980, after negotiations with the owners of the property, Mr Wilson and Mr Don Dilley bought the land, although the remains of the glass melting tank furnace remained.

Once bought, the ruin excited much interest from other historians and academics who have since written the history of the ill-fated venture. It closed after only three years as a result of what appears to be bad management.

Papers were presented by investigating teams which included Professor R G Herbert of the University of Cape Town and Miss Sharma Sithiwitz of the Department of Materials Engineering, and these and glass specimens have been presented to Simon's Town Museum.

Financial aid

Financial aid was provided by the Human Sciences Research Council and the Consolidated Glass Company.

Work on the melting vat and plans to build Phoenix Way were under way. Mr Wilson says again stepped in and, through discussion, saved the remaining furnace by suggesting that the road become a cul-de-sac.

A turning wheel was taken from Mr Wilson's land and it is hoped that in time this may serve as an exchange for the piece of land containing the furnace, which has been damaged by earthmovers.

Landscaping

Mr Wilson said: "I intend, with expert advice, to hire a labour force to excavate and expose the ruin.

"Afterwards the surrounds will be landscaped and exposed areas planted with buffalo grass and indigenous shrubs.

"The ruin should prove to be an attraction for visitors and tourists and there will be an exhibition area."

When this is completed — at Mr Wilson's expense — he intends to approach the National Monuments Council to have the ruins proclaimed, before donating it to a "caring institution of perpetual existence" such as the Simon's Town Museum or municipality.

Figure 99 The Cape Times 27/02/1992 [UCT 2013]

Glencairn

Weekend Argus, Saturday October 3 1992 11

Historic site to be buried

■ One of the Western Cape's early industrial sites, recently uncovered by UCT archeologists, is set to be buried — again.

DI CAELERS
Weekend Argus Reporter

AN integral part of Glencairn's history — the ruins of the old Cape Glass Company factory — is destined to disappear forever despite months of painstaking excavations by the University of Cape Town's archaeology department.

New beams, gantries and roofs are slowly encroaching on the remains of the factory as the "rescue" team works feverishly to collect as much data as they can before development swallows the site.

The ruins of the 1888 furnace will disappear underground again almost as quickly as they were uncovered — it has been only a short five months since students and staff of UCT and a team of historians started the tedious dig.

Only a small section brought and restored by St-mon's Town historian Mr Gordon Wilson, will be saved and retained as a museum, says Ms Sharma Sathiwitz, the UCT scientific research officer who has headed operations.

But the heart of the factory, the gas producer that created combustion gas to heat the furnace and melt the glass, will be buried again.

"There's so much still under here that we haven't managed to get to in the short time available. We're been racing the developers who want to fill in the road directly over the gas producer, and just have to accept that we won't be able to finish up," said a despondent Ms Sathiwitz.

She was however grateful to have been able to "just the information" so far recovered.

The factory, built by Anders Ohlsson of Ohlsson's Breweries in 1888 to compete with German beer in South Africa, was the first in the southern hemisphere to make bottles by machine.

Mr Ohlsson imported the bricks, refractory blocks and other materials from England and built both green and aqua (white) glass melting tanks at Glencairn.

But the factory was apparently badly managed and closed in 1905 after being liquidated.

Professor Peter Sparge, head of science education at UCT, has slammed the "crass and insensitive" development that would mean burying the factory ruins again.

"This is one of only a handful of early industrial sites in the Western Cape which include the Jonkheer Mill, Mostert's Mill at Mowbray and the Tin Mine at Vredenburg. This is the biggest and best of them all and we're destroying it.

Educationally "it has huge value".

When approached for comment this week, the owner of developers Magnaprop, Mr Nigel Wagner, said his company had done "everything possible" to co-operate with the archaeologists but that the land was valuable "and we have no alternative but to develop it".

He claimed Ms Sathiwitz made it clear to him from the start that once the site had been opened up, there was no point in keeping it that way.

"Anyway the plots, which are valued at over R30 000, have been sold so they don't actually belong to us any more," Mr Wagner said.

Picture: BRENTON GEACH, Weekend Argus

RACING TIME: UCT scientific research officer Sharma Sathiwitz at the site of the gas producer used by Glencairn's historic Cape Glass Company factory.

Fig 101 The Weekend Argus 03/10/1992 [UCT 2013]

Rocks, Sand and Precious Metals - Gleancairn's Lost Geology

The history of Glencairn Valley can be found in the book published in 2003 entitled *Glencairn Gleanings* by John Clifford. The book is a collection of articles from various sources in celebration of a century of development in Glencairn. It covers the history of the area, from issues of the name origins, sale of land and early residents to the flora and fauna Rocks, Sand and Precious metals found in the area. The latter is the main focus for this part of the document as the reader will again a brief understanding of the geology and influences for locating the Cape Glass Company in Glencairn Valley.
Before the railway construction through the valley (1890) and wetland vlei formation, quicksand proved crossing the bay treacherous.

PEOPLE AND HORSES HAVE BEEN DROWNED AND BURIED IN THE QUICKSAND

Rocks were formed by rivers and deltas becoming hardened over millions of years. Light grey coarse Penisula Formation Quartzites are well bedded while Quatemary outcrops are loosely consolidated white sands, which contain crushed shells from ancient snails. These sands were formed by prevailing southeasterly winds depositing the quartzites across the region

The sands were eroded, the river valley was formed and the sea weathering action resulted in the bays' formation. It became a freshwater wetland due to the railway embankment that stopped the sea's ingress in the 1890's

Stone, sand kaolin, lime and precious metals were mined in the Glencairn area at numerous quarries. The Quartzites were ideal for concrete aggregates, building stone, road and railway embankment due to their homogenous unreactive properties.
The quarry on Elsies Peak (1890) was closed in 1978 due to environmental concerns.

Light grey Glass Sand can still found at the bottom of the valley where the Cape Glass Company was situated. They are exceptionally pure with 99.5% silica, ideal for clear glass production. Small amounts of iron cause brown colouration while chrome results in green colourtion

THESE SANDS ARE EXCEPTIONALLY PURE...IDEAL FOR THE PRODUCTION OF CLEAR GLASS

Kaolin is China clay, quarried in numerous locations around Glencairn, essential for glass production. The Glass factory procured china clay from Sun Valley quarry nearby.

Lime & Limestone is an essential ingredient in making glass that was readily available locally. Deposits are said to have been exhausted, resulting in the factory closure along with unfavourable economic expenses.

THE GLASS WORKS BOUGHT THE RAILWAY SIDING ... AND A NARROW - GAUGE COCOPAN RAIL

Precious metals that were found proved to be pyrite (Iron Sulphide) known as Fool's Gold leading to "the Glencairn Gold Rush of 1886"

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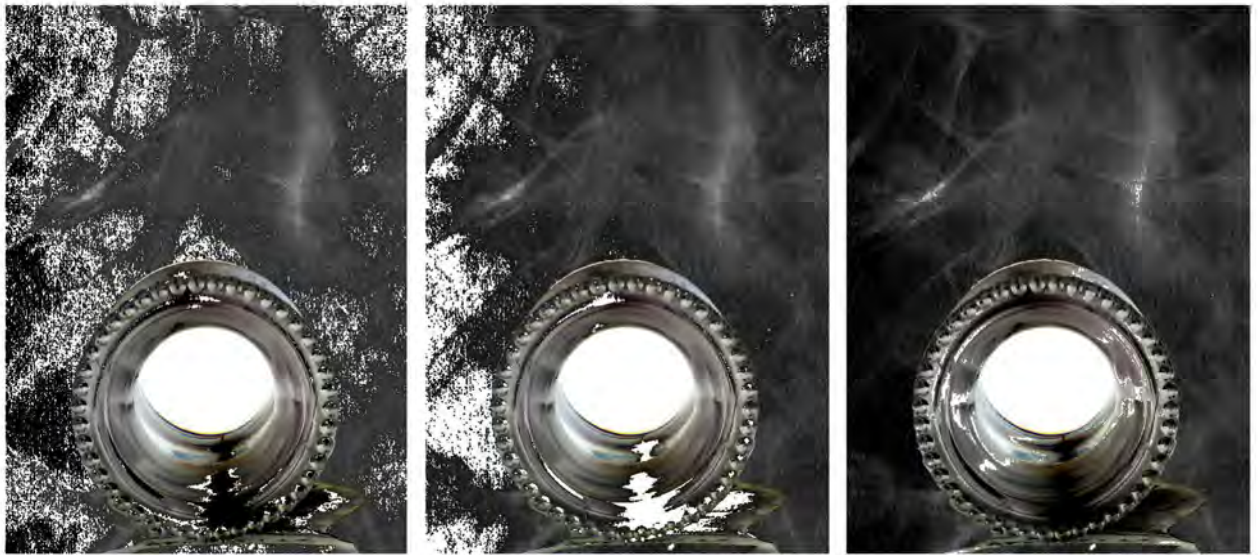
The South African News, 8 Jan 1904, p6, SA Heritage Resources Agency archive
Jaques Paul, image source Glencairn Mill &The Glen Lodge, 2013

(all images, unless otherwise stated, are the authors own)
GIS data courtesy of Cape Town City Council

Appendix




PERSPECTIVE VIEW OF THE FORECOURT AT NIGHT

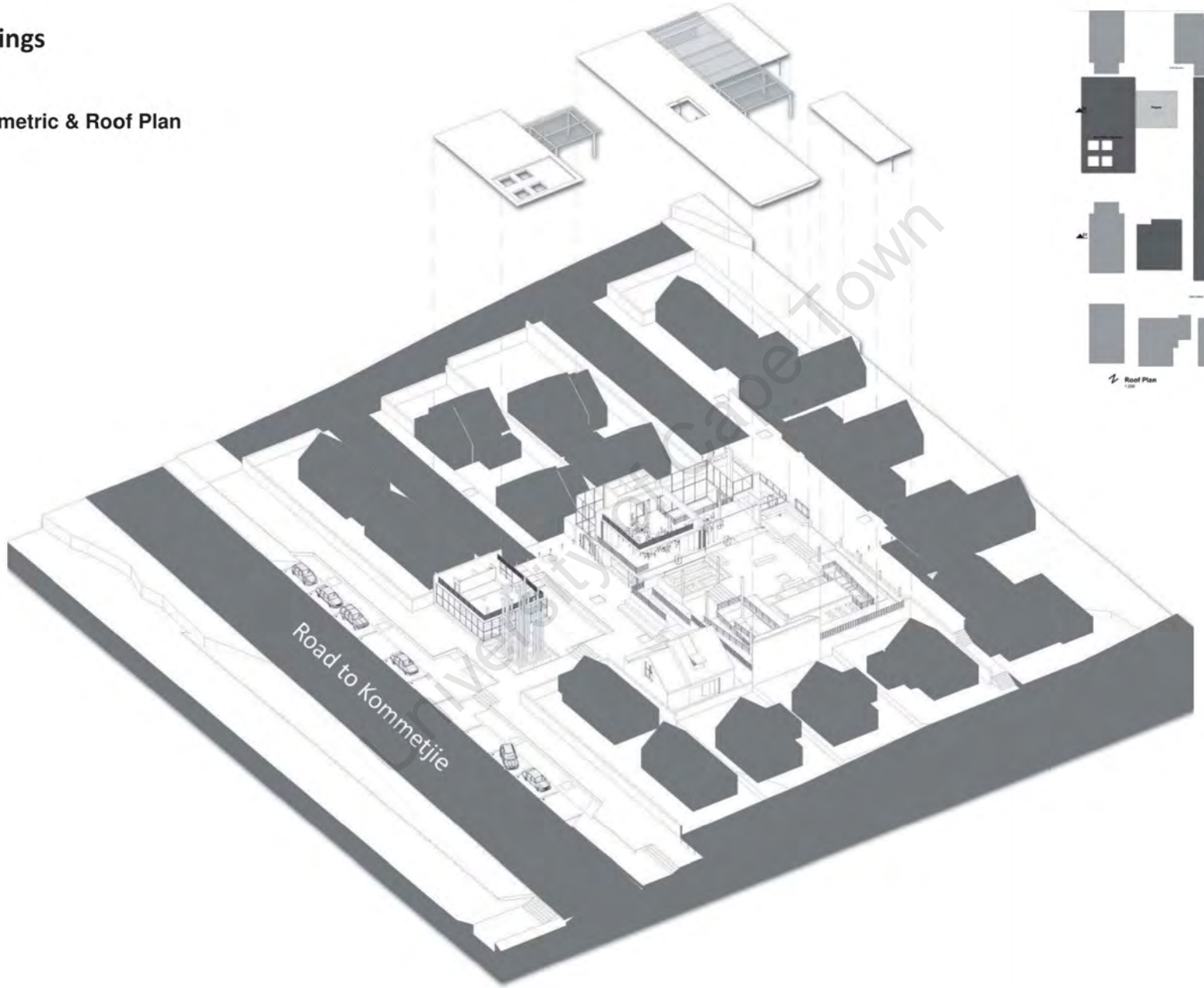
VIEWS OF THE GLASS FURNACE REMAINS

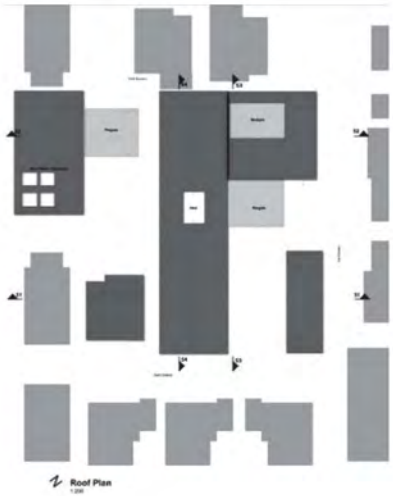
PROPOSED RAMPS AND ROOFS AROUND THE RUINS

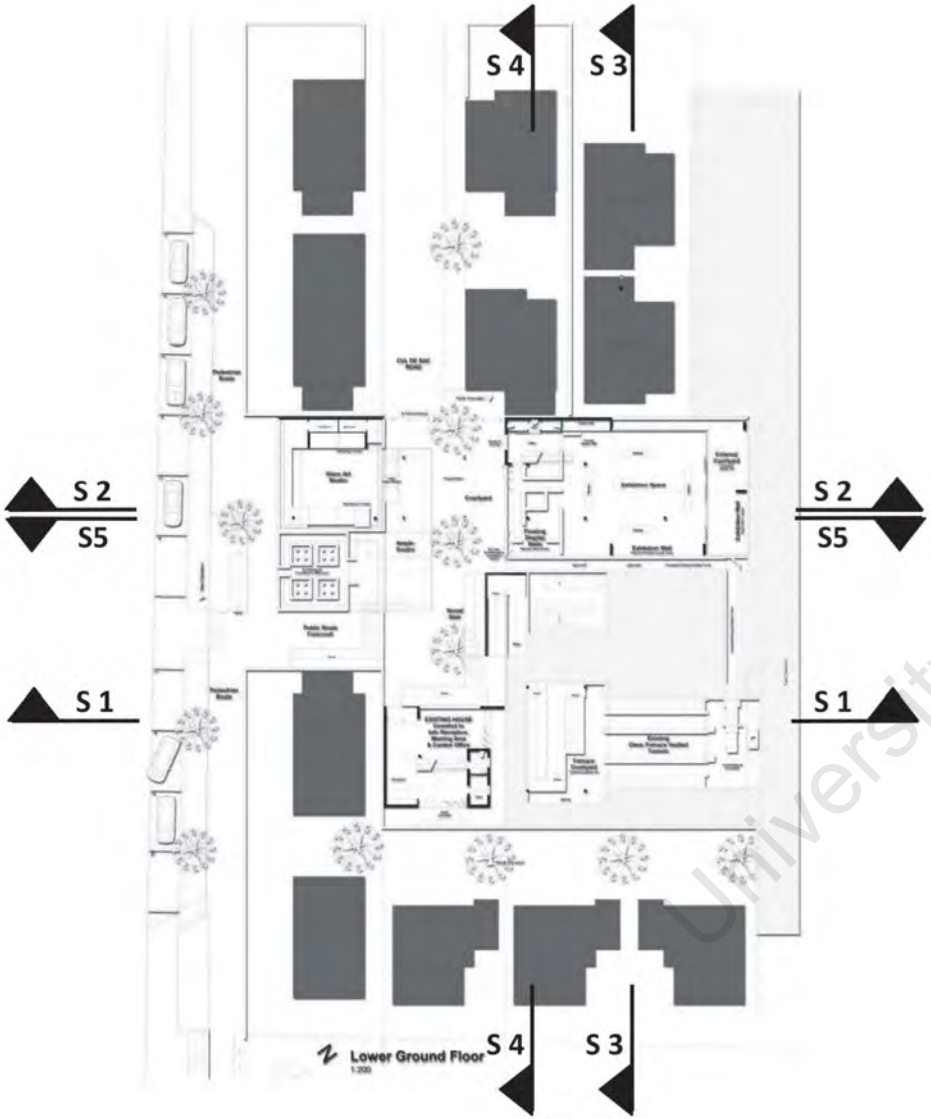

Road to Kommetjie
Glass
Art Studio
Amphitheatre
Forecourt
Exhibition
Cafe
Ruins
Courtyard
Pedestrian
route
Reception
& Curators Office
Ruins

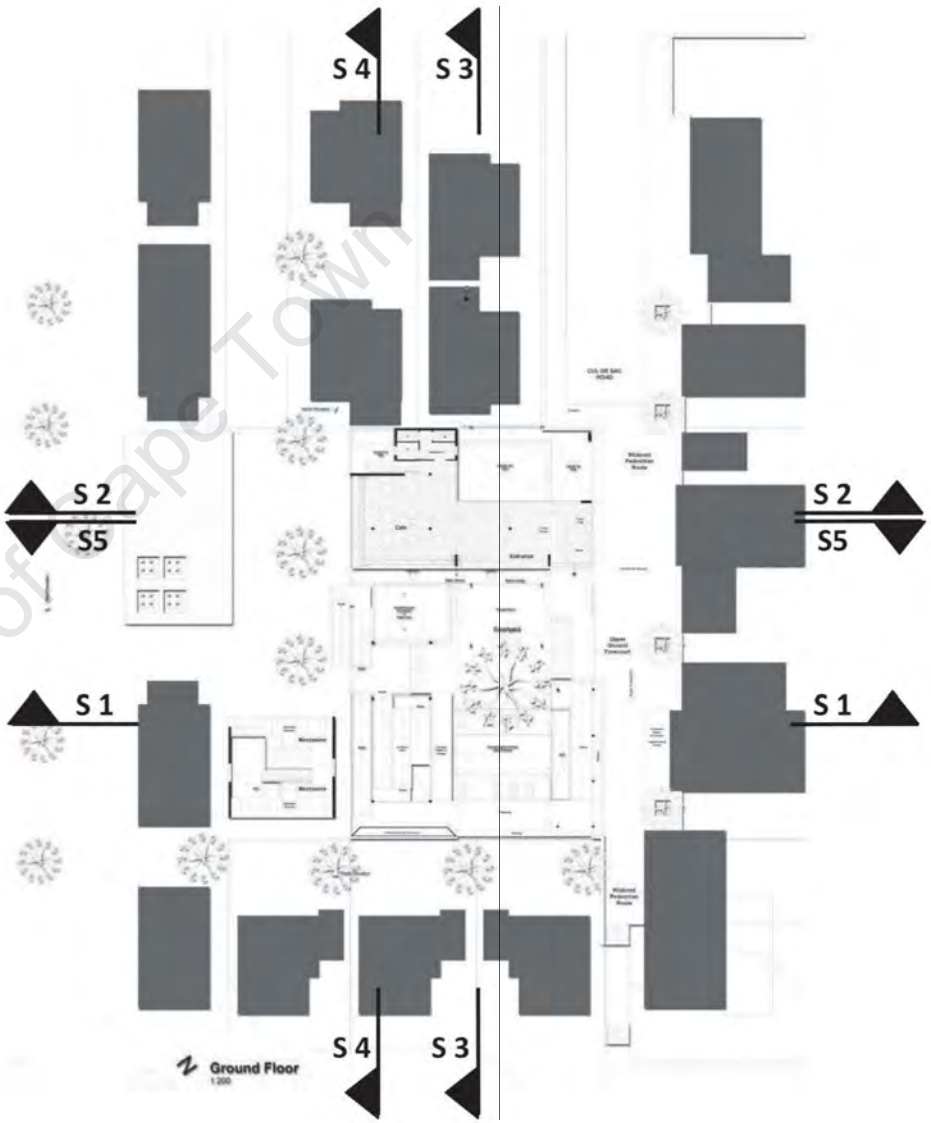
Drawings

Axonometric & Roof Plan



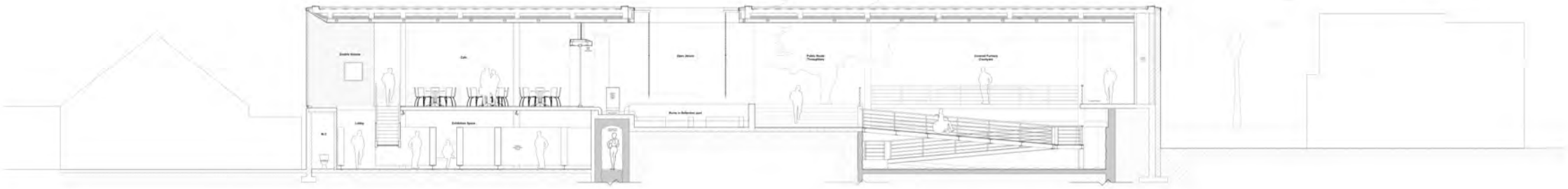






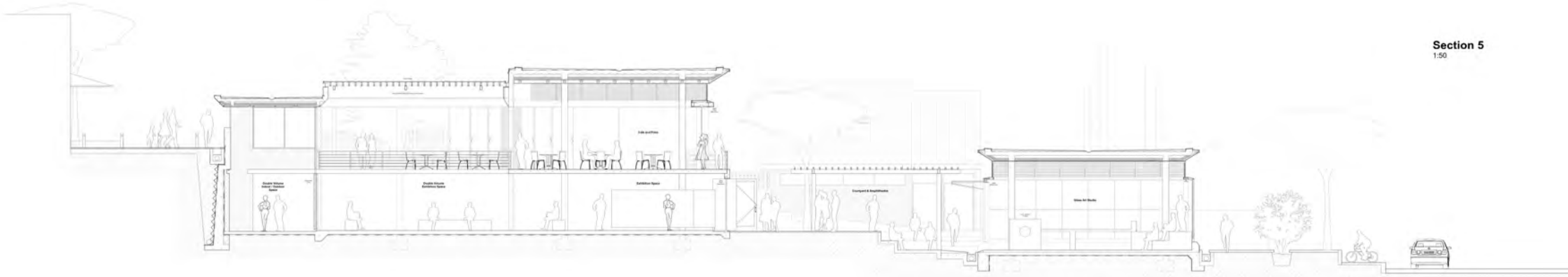
GRAPHISOFT

Section 4
1:50

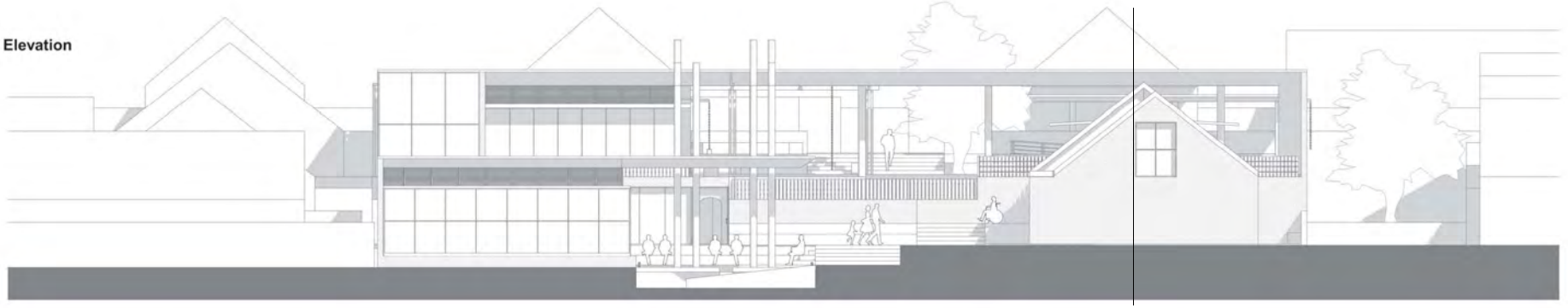


Section 1
1:50

Section 5
1:50

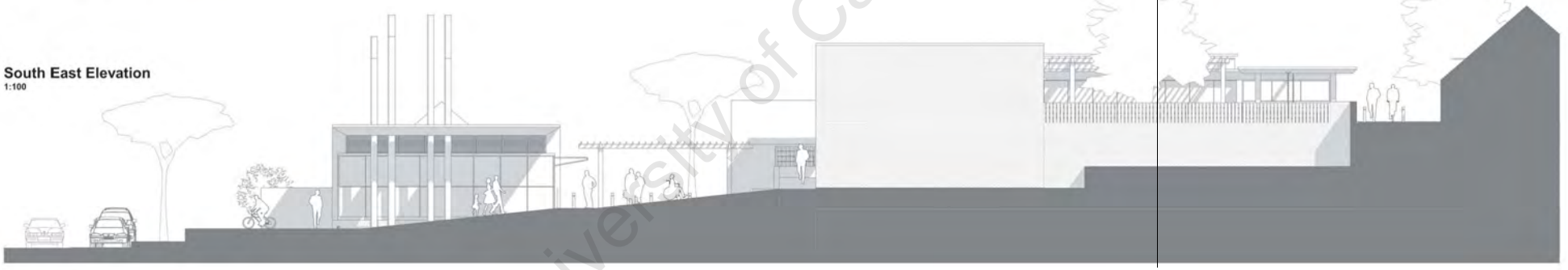


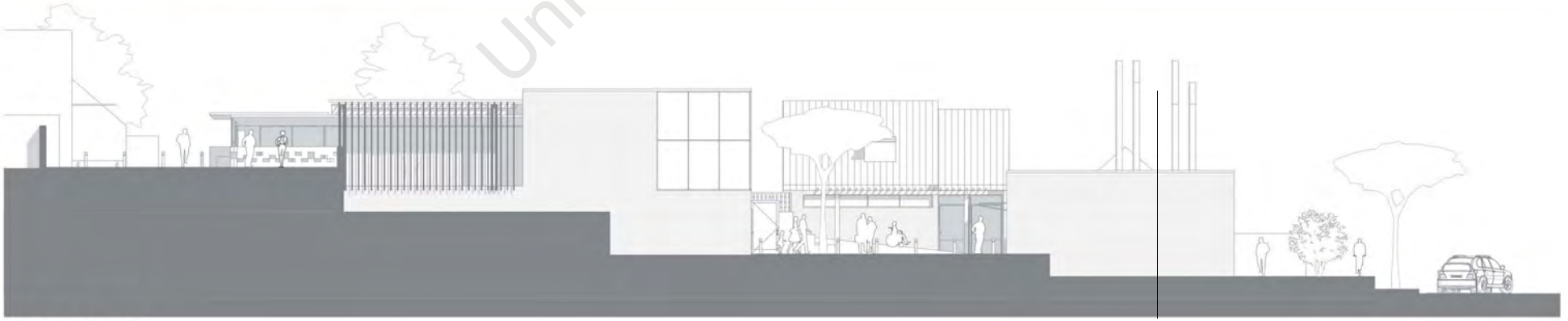
South West Elevation
1:100



North East Elevation
1:200

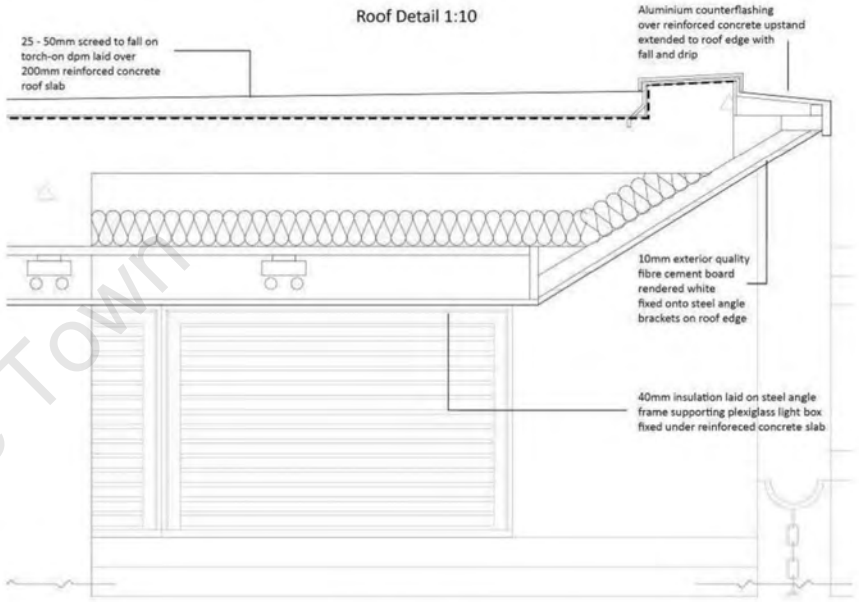
South East Elevation
1:100

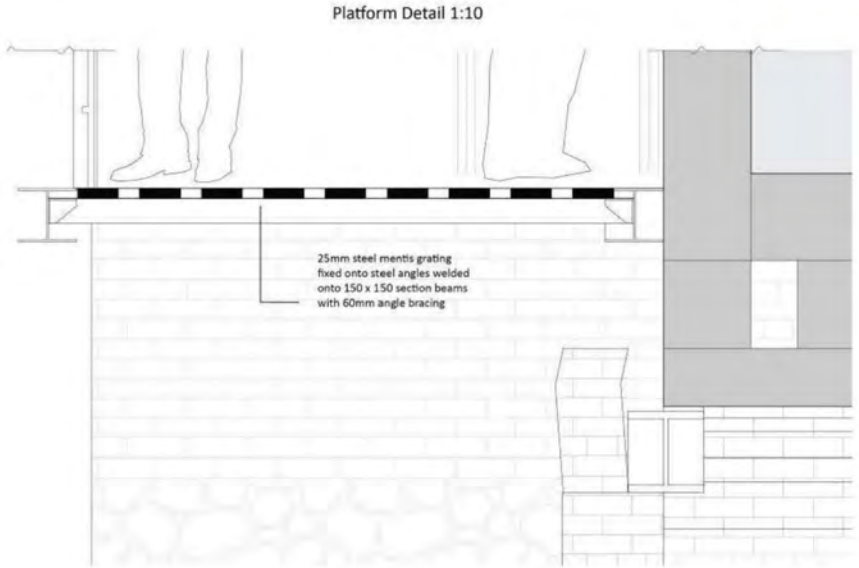




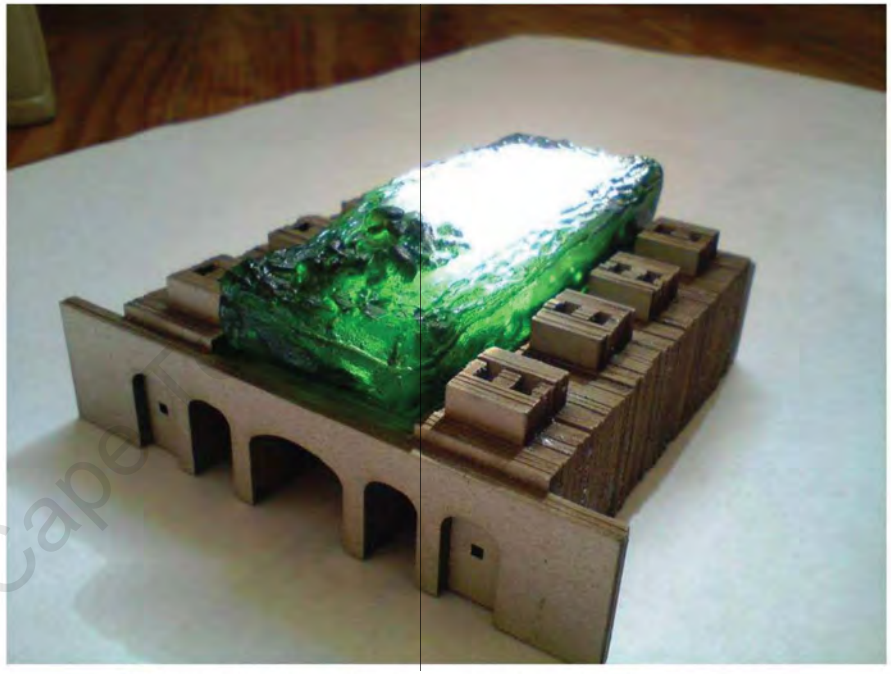
North West Elevation
1:200

INTERIOR VIEW OF THE GLASS ART STUDIO

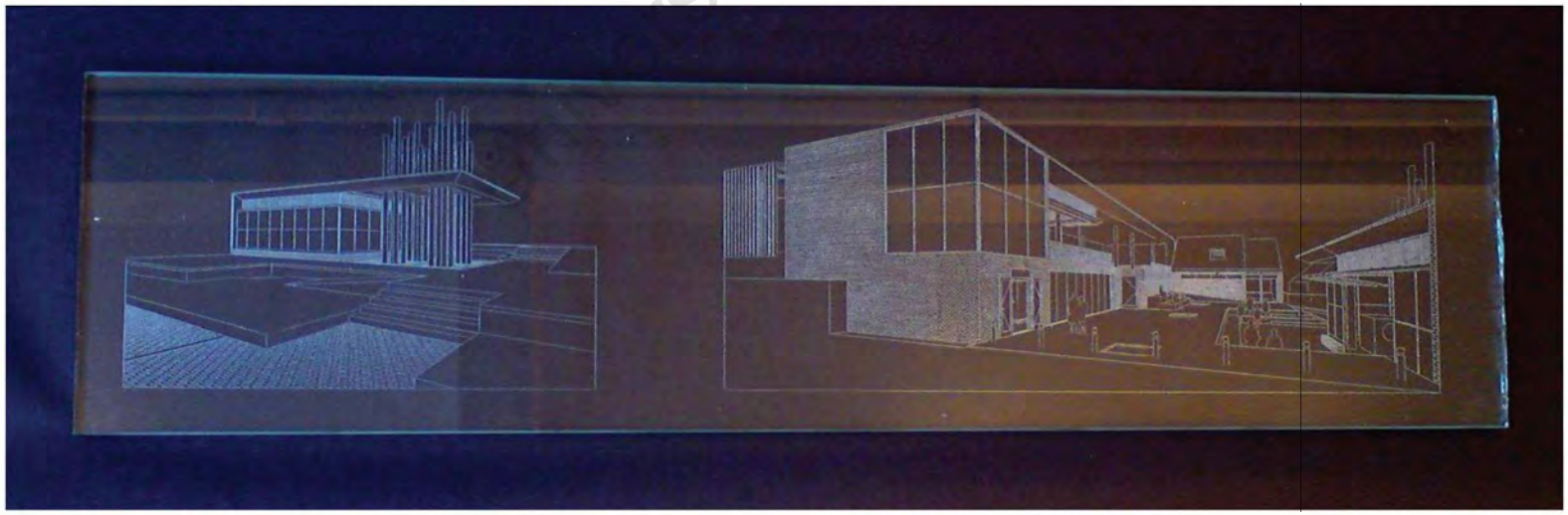




Final model - [author 2013]



Final model molten glass furnace artifact - [author 2013]



Final presentation 3D drawings laser cut on glass panels - [author 2013]

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