The World According To Graaff.

Design Dissertation Report
Robert Bowen

"Garp always said that the question he most hated to be asked, about his work, was how much of this was true ... the worst reason for anything being part of a novel was that it really happened"

(Irving, 1976)

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Abstract

This design dissertation report describes the narrative approach to the design of a district cooling facility for the Cape Town foreshore. The project attempts to grapple with architectural ideas around the re-scripting of buildings. The role buildings play in the constructing of narratives and particularly the fictionalisation of ruins is a central theme to the investigation. The project also experiments with cross-programming, Neil Leach's theories on assimilation and Victorian industry. The building is situated at the Cape Town waterfront and occupies the site once held by the Amsterdam Battery.

Key Words

Amsterdam Battery :	Original fortification which defended table harbour at the foot of signal hill.
Graaff Cold Wet Works :	Building which made use of the cold from ocean water to chill cold storage chambers.
Mimesis:	A philosophical term carrying a range of meanings including imitation, represenatation or mimicry, the act of resembling.
Asssimilate:	To take in and understand fully (information or ideas) or to regard as similar
Combrincks & Co. :	Cape Town Butchery where David Graaff and his brother learned the meat trade during the Victorian Era.

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Supplymentary images if not listed were sourced from HiltonT Flikr Archive, viewed 15 October 2015 flikr.com/photos/hilton-t

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Much of the research and investigation held within this paper is thanks to Global Intelligent Energy Capitalists (GEIC). The company provided both direction and funding for the project.

Introduction

This paper both tells a story and is a story. It is the story of a design dissertation report, the processes of exploration, discovery and design but it also tells the story of Sir David Graaff. Stories and histories are very much the same. A history tells the story of a true event, but no two 'truths' are ever identical. As Churchill once supposedly said 'History will be written by the victors'. Those in power have the last say. What of buildings? Buildings are evidence of a true event, their foundations are irrefutable, for they are there, holding up a narrative. Or not- perhaps they are supporting forgotten ruins upon which any history can be written and declared true, the building deemed as proof thereof. The architect as writer of countless stories.

In Re-Thinking History Jenkins lays out this problem for historians by drawing a clear distinction between history and the past. The past is what has been and gone, history is its recording. When architects create buildings that too is a recording. While there is only one past there are multiple histories. Each history or truth represents an ideological position held by someone with the power to make it so. In 1984, George Orwell wrote 'Those who control the present control the past, those who control the past control the future'. Of course this power is limited, in the same way an historian cannot guarantee that each reading of his text will produce the same result, or that the intended interpretation of the history will be understood. And so it is with the architect-historian, whose building may escape its intended use, or have its metaphor forever unnoticed. There is no harm in this, in fact it is liberating to be free of the burden of attempting to record the un-recordable. As Jenkins says "Even the most empirical chronicler has to invent narrative structures to give shape to time and space."(Jenkins, 1991)

The document opens by introducing the client, renewable energy giant G.I.E.C. The introduction provides background to this large but little known company and illustrates why their interest in South Africa exists. It also gives a description of some of the programmatic requirements for the company's plant and local regional head office. This is followed with a narrative about Graaff. *Graaff* tells the story of the man and his Victorian context. He is left behind as we follow one of his buildings and its narrative through time to the present. The Victorian period, Graaff and his cold storage industry were precursors to much of the design process by providing historical context and theory. This formed the basis of the first stage of design development and the chapter, *Invoking the Ghost of Graaff*.

The design process is augmented with an investigation into the mechanical means man has used to keep warm temperatures at bay. Graaff's Victorian spirit of invention enabled him to monopolise the cold industry. His technical investigations provided the programme as well as the guiding spirit in which the technical aspects of the project were explored.
Analysis of Graaff's building also leaves clues as to how one might design in order to encourage acceptance and appreciation of a building by the general public. Various strategies used by Graaff in the development of the Graaff Industrial Cold Watert Works illustrate the theory outlined by Neil Leach in his work Camouflage. Leach's theory is applied to the design of the final building.

G.I.E.C

fig. 1.

3.

Global Intelligent Energy Capitalists or G.I.E.C. is a prize winning renewable energy company founded in California in 1993 (formerly Intelligent Energy). They remained a small enterprise researching the potential of photovoltaics until fairly recently. Thanks to the global 'environmental awakening' of recent years the company has expanded globally. They now research, provide clean energy solutions and improve energy efficiency around the world. G.I.E.C. have provided input on many projects including wind turbines in Holland, solar thermal plants in Spain and district cooling plants in Dubai. All the while showing the profitability of sustainable energy solutions (GIEC, 2011).
G.I.E.C have a powerful research department at their disposal. It has identified the South African market as having the potential for generating substantial profits, initially through the development and operation of a district cooling facility. G.I.E.C expect the large scale and expensive power plants being implemented by the South African government to grow the local market for energy efficiency and small renewable energy solutions. One such solution being a district cooling facility in Cape Town, the best of its class.
I was not granted access to their research and documentation, however by analysing global air- conditioning trends, the South African energy market and Cape Town's geography, a clear argument for the construction of such a facility becomes evident.
In 1992 Gwyn Prins, a Cambridge University professor, called "physical addiction" to cooled air America's "most pervasive and least noticed epidemic". Traditional air

conditioning remains highly inefficient with nearly 40% of the electrical input being returned as heat. According to Stan Cox, the author of Losing our Cool, the amount of energy used to cool American homes has doubled in the last 12 years and accounts for approximately 20% of electrical usage (Rosenthal, 2012).

The air conditioned lifestyle as popularised by the U.S. Is becoming an aspiration for developing nations in much the same way as that of the car, but at a fraction of the price for the purchaser. The New York Times reported that growth in A/C unit sales increased annually by 20% in both China and India as their middle class populations surge. Availability of air conditioning in Chinese cities rose from 8% to 70% between 1995 and 2004 according to The Economist. Worryingly, many of the cities expected to boom in coming years lie in hot climes. These are not limited to China and India as growth in Africa and South America are forecast to further increase demand for A/C units (Rosenthal, 2012).

Part of the problem is that A/C sits in a positive feedback loop. The warmer it becomes the more likely people are to turn up their air conditioning. The hot air exhausted creates a heat island effect in cities which in turn results in people turning their A/C up higher. This results in increasing pressure being placed on electrical grids; in the US, for example, peak demand occurs in midsummer. This dramatic increase in electrical demand impacts system stability and prices, and has emissions implications - especially in those countries where electricity production is heavily reliant on coal (Rosenthal, 2012, Fergusson, 2006).

One such country is South Africa. It seems apt then that the building requested by G.I.E.C. (who are looking to enhance their public image) is a hydrothermal district cooling plant. Such plants cycle the cold water of the ocean in order to save the vast amounts of energy required for compression in mechanical cooling. (See Appendix A) G.I.E.C have identified Cape Town as a market for such a service. As a major city in the developing world and with a large youth population its current growth rate of 4.06% is expected to increase (Fleming, 2012). It is expected that the expanding middle class will follow trends similar to that of fellow BRICS countries India and China. In such a case, electrical demand for air conditioning on the already strained South African electricity grid will be pushed to the limit (DoE, 2011a)(DoE, 2012b).

All this while demand for P-Grade (Previously known as AAA) office space as well as A and B grade continues to increase in the city centre (Fermer, 2013). Air conditioning plays a major role in the grading system of spaces, and as the market shifts, demand for 'greener' buildings is likely to increase (SOAPA, 2012).

This demand for space in the city centre could be sharply curbed as the historically low cost of energy in South Africa is set to rise dramatically in the short to medium term (Eskom, 2012). The result is that inefficient and dated air-conditioning units become liabilities to those wishing to let. This condition is compounded by the lack of energy security the grid currently offers (DoE, 2011a; DoE, 2011b; Eskom, 2012).

G.I.E.C. understands the conflict in rental demand versus high energy costs. Their strategy is profitable by providing an energy reduction service (through district cooling) to buildings at a premium that is less than the cost of running traditional cooling systems on the local electricity grid. This is also favourable for local authorities since it reduces demand on an already strained network and reduces their utility costs (G.I.E.C, 2012).

With many opportunities revealing themselves locally (natural gas included) G.I.E.C expressed interest in setting up a regional head office within the district cooling plant. The building would be required to favourably introduce the company to South Africa. To this end the building required must function as a district cooling plant, office and public facility in order to win local hearts. As a capitalist enterprise the Graaff legacy seems an appropriate marketing tool from which to spring- board a positive public image. As a newcomer to the South African market, it is important that an idea of history and legacy be associated with the company and incorporating the ruins achieves this (G.I.E.C, 2012).

Fig. 2 Interior Cornell Lake Source Cooling Plant,interior of prize winning project awarded 'best in class' for sustainable engineering 2009

Graaff

Few periods in history granted any person the opportunity to rise above their lot as the Victorian Era did. Hence, a fortuitous time for the birth of Sir David Pieter de Villiers Graaff, 1st Baronet, who lived from 1859 to 1931, during the glory days of the Victorian era. Fortuitous since his given lot was to be born to a very poor family in Villiersdorp. At the age of 11, Graaff left for Cape Town to work at his great-uncle's butchery Combrinck & Co, (Simons, 2000; Dommisse, 2011).

Cape Town must have been a wonder to behold. The discovery of diamonds in the hinterland just three years earlier had resulted in a boom. Unprecedented economic and population growth had set the city ablaze with life (Simons, 2000). By 1869 news of the diamond fields had spread across the globe. Investors and prospectors poured into the city hoping to make their fortune, with Cape Town forming the logistical nerve centre for all operations (Simons, 2000; Dommisse, 2011).

It was within this euphoric hub of activity that Graaff and his younger brother were educated in the ways of business. In order to pursue colony politics the aspirational Combrinck left the running of the butchery to Graaff, aged 22, and his younger brother, a mere 11 years after their arrival (Simons, 2000; Dommisse, 2011).

The butchery itself was well located on lower Strand Street, wedged between Grand Parade and the water's edge towards Dock road. This was the Shambles, the site of designated animal slaughter within the city. Its location was an attempt to cleanse the city from the offensive results of unlicensed slaughtering which had previously seen the city strewn with animal remains. All licensed butcheries were to be positioned along the beach front such that the incoming tide could wash away the blood and unwanted entrails could be buried in the sand. As one would expect, this solution was not ideal and swarms of flies were still attracted to carcasses hanging on display for potential customers (Simons, 2000; Dommisse, 2011).

One year after being appointed to run Combrinck & Co., Graaff witnessed the arrival of The Dunedin. This ship held within its hold the first commercially successful shipment of refrigerated meat. Graaff, being both forward thinking and instilled with business savvy, realised the potential of the development and set himself to investigating its workings and application. Leaving the Cape, Graaff travelled around the world during the 1880s inspecting and learning from meat packers, abattoirs and refrigeration engineers. Upon his return he spent a great deal of his time finding ways to implement these innovations into his business. All the while learning the lessons taught by his great uncle in both the meat trade and politics (Simons, 2000; Dommisse, 2011).

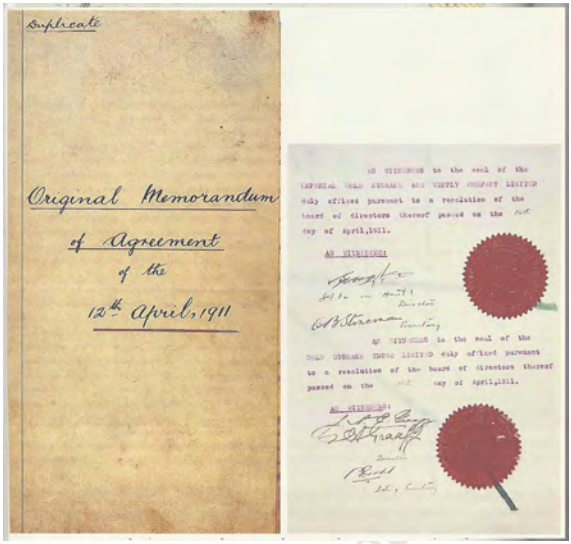

Fig. 3 Documentation originating from sale of Combrinck's & Co. to newly floated Imperial Cold

In 1890 Graaff was elected as Mayor, a position he held for two terms. In order to fully focus his energies he left the running of his business to his brother. Once again he travelled abroad securing city loans and learning how the best cities of the world were organised and run. He set about modernising Cape Town upon his return. His efforts resulted in the completion of a large reservoir upon the summit of Table Mountain (Woodhead Dam) and the tunnel which led water to Molteno Reservoir. This was the location of the first hydroelectric power plant of the city, The Graaff Electric Light Works. The Works powered new electric lighting which illuminated areas previously plagued with crime. Roads were paved and proper sanitation installed. A new pier at the foot of Adderly Street was built and plans for a new city hall had been drawn. Worn out from the heavy responsibility of two terms, Graaff returned to his business which was about to experience more than one challenge (Simons, 2000; Dommisse, 2011)

In order to expand the railway the government attempted to expropriate the Shambles property from Combrincks & Co. They misunderstood the value of the location for the meat industry, Combrincks & Co. were offered £8000, a sum they considered an outrage. This they challenged, arguing that its location - favourably close to the railway and docks, was invaluable to their business and that they would settle for no less than £77 000. The struggles of negotiation went on for a long time, until eventually the matter went to arbitration. The arbitration awarded a sum of £55 000 to Combrincks

& Co. for the expropriation of their premises. The award was considered 'monstrous' by the Colonial government who challenged the matter in the Cape Supreme Court (now the South African Cultural History Museum). However, the documentation signed by parties was binding and the court ruled in favour of Combrincks & Co. This is said to have infuriated Rhodes, Prime Minister at the time who was already no friend of Graaff[1] (Simons, 2000; Dommisse, 2011) .

The expropriation had left Combrincks & Co. in a difficult position since no location with similar logistical advantages was available in the city. However, anticipating this, Graaff had thought out a solution inspired by the sea wall he had built during his tenure as mayor. And so it was that Combrincks & Co, approached the Table Bay Harbour Board on November 8th 1894 with a proposal to reclaim the land between two existing jetties and bounded by the sea wall at Dock Road. This proposal it seems was well received by the board and four years later Combrinck & Co. took occupation in their new head offices built upon reclaimed land (Simons, 2000; Dommisse, 2011).

During this time the rinderpest had spread from the North and ravaged local meat supplies. The disaster had, however, worked in Graaff's favour. While many butchers were out of business Graaff had at his disposal a large fleet of refrigeration carriages which he had been experimenting with some years earlier. This fleet, combined with the strong international relations Graaff had with meat exporters in Australia, New Zealand and Argentina, enabled him to transport frozen produce deep into the

1.Rhodes attempted to enter the cold storage industry but was foiled on multiple occasions by Graaff. They were also in opposing political camps.

Fig. 4 Shopping list for meats ordered from Combrincks & Co.

mineral-rich interior; an interior now filled with optimistic prospectors. The competitive advantage afforded by cold works technology, combined with the devastating result of the rinderpest had indeed vaulted Graaff into a fortuitous position and the cries of 'Monopolist' rang out soon after (Simons, 2000; Dommisse, 2011).

The Graaffs were buoyed by their recent success, but envisioned a greater empire still. In order to raise the capital to expand, they made the decision to launch on the stock market. Graaff brothers floated South African Supply & Cold Storage Co. Ltd on 4 May 1899 and Combrincks and Co. was sold to the company. In May of the same year a last ditch meeting was held with the purpose of diffusing the tensions between the British Cape colonies and the Boer republics of the Transvaal and Orange Free State. Kruger and Milner failed to settle disagreements and war was inevitable (Simons, 2000; Dommisse, 2011).

Graaff foresaw the requirements of an army marching inland and began setting up cold storage chambers strategically along the route. When inevitably Colonel Sir W D Richardson approached the South African Supply & Cold Storage Company (later Imperial Cold Storage) they were well prepared to tender for the contract. The British accepted a sales price of 9d per pound of meat which represented a tidy profit for the Graaff brothers for whom the cost price was a little over 3d (Simons, 2000; Dommisse, 2011).

Combatting the cries of 'monopoly', Graaff began to find subtle ways of altering public

Fig.5 Collection of artefacts including photograph of opening ceremony, letter offering installation of machinery for cold storage chambers and personal swimming bath reference.

perception while maintaining his capitalist enterprises. The most powerful of these was a grand gesture which afforded him the opportunity to experiment with various ideas he had studied during his travels. Having only a few years prior reclaimed land towards the expanding harbour Graaff followed the progression of industry along the coast into the Amsterdam Battery. It's location closer to the expanding harbour and its existing stone structure provided the ideal framework upon which to build an image for the company as well as a cold wet works- a plant for the production of cooling. Fortunately for Graaff the Amsterdam Battery had recently been decommissioned (Simons, 2000) (Dommisse, 2011).

Initially built in 1784, this fortification of earth and stone contained vaults, magazines and casements. Armed with 22 guns, the fort, nearly half the size of the castle, accommodated 200 soldiers. The battery dominated the foot of signal hill, where it held visual communication with the peak of signal hill. This network provided advanced warning of ships entering Table Bay harbour which the battery was commissioned to defend. After peace was declared between England and France the battery became a prison and was later reinforced with stone from the breakwater quarry. Despite this, by the time Graaff was looking to expand it had been decided that the 17th century fortification would not be able to withstand the forces of modern artillery and it was thus permanently disbanded by the military (Seemann, 1989).

Upon this structure Graaff built the 'Graaff Industrial Cold Water Works', a building

Fig.6 Collection of artefacts including photograph of wet works fire damage, newspaper clipping reporting heavy losses to the company and opening day programme.

which used cold water pumped from the ocean into a reservoir to cool a separate circuit of water. This subsequently cooled the cold storage chambers. The plant was also open to the public who were welcomed to swim in its cold and warmed pools, sip tea at the parlour or walk the grounds. While the plant functioned primarily to serve Graaff's industrial requirements it endeared itself to the public who enjoyed its facilities. Towards the end of Graaff's life his gift to the city was wrecked by a fire which reportedly started in the boiler room. Graaff now elderly and having retired from the I.C.S board of trustees was in no position to argue for its reconstruction. Few men on the board understood the value of the facility as a means of communicating the positive values of the company within the public consciousness. Instead it was perceived as a folly with expensive mechanisms unlikely to ever repay their installation costs - particularly when measured against the cheap and readily available supplies of coal. And so it was that Graaff's experimental cold water works was mothballed both as a means of cooling operations and as a public facility. The building was abandoned and left to decay for some years.

11.

Fig. 7 Drawing of Wet Works ruins by unknown artist.

Fig.8 Containing old note, photographs of Graaff, Dunedin Ship and refrigeration machinery. News clipping of army tender notice.

After Graaff's death, and in the interest of company shareholders, the facility was sold to the Table Bay Harbour Board. The machinery was sold off and the ready supply of stone close at hand was quickly used for waterfront maintenance and expansion. By the end of the 20th century, only the back end of the Amsterdam Battery and part of the main façades of the cold water works remained.

Graaff lived a significant life, which ended on April 13th 1931. This, however, was not the end of the story of the Cold Water Works. The narrative continues. The site - ideally located close to the waterfront and with proximity to the now reclaimed foreshore - is ideally situated for a potential G.I.E.C district cooling plant. The location acts as gateway between the city and the Waterfront. Furthermore, should the proposed cruise terminal at the E- berth site be built, the former Wet Works will act as a hinge to the rest of the city.

13.

Fig. 9 Documented remains from original Amsterdam Battery.

Victorian Theory

In order to better understand the significance of the design of Graaff's Industrial Cold Water Works it is worth investigating the approach to the design of buildings from the start of the industrial revolution to the present. In brief, architecture failed to reinvent itself to fulfil the needs of the industrial revolution. Instead engineering emerged as a response to the primacy of the machine.

The mill emerged as its own type at the beginning of the industrial era. Despite the proliferation of mills across the industrialising countryside, the design of these building was ignored almost entirely by architects. Instead the appearance was dictated by millwrights who had as their primary concern the mechanisms which the mills had to support. This design for the machine was a trend which would become the norm as the industrial revolution set off and engineering began to emerge as a trade (Jones, 1985).

In 1851 Crystal Palace celebrated mass production in the Great Exhibition of Works

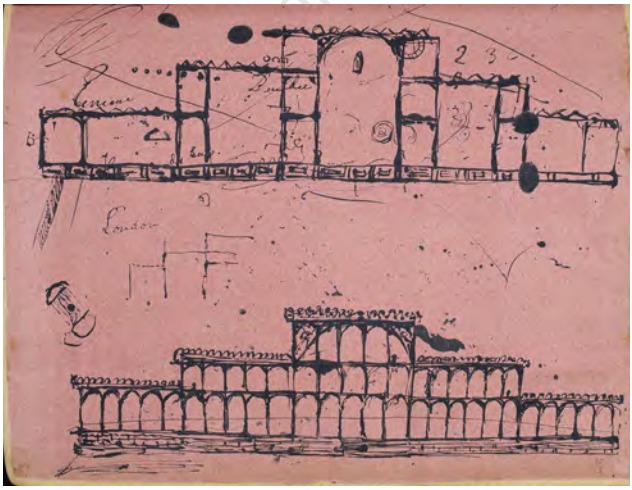

Fig. 10 Early sketch of Crystal Palace by Joseph Paxton.

of Industry of all nations. Crystal Palace contained within its very fabric the means of its own production. Hailed as the father of modern construction, the building was of prefabricated elements and designed with permanent features which assisted in its construction (Brockman, 1956).

Despite the break-through, architects were slow to pick up on its advantages largely due to the writing and opinions of influential public figures. Pugin appreciated the qualities of space it produced but concluded that it was 'not architecture, it is engineering of the highest merit and excellence...', and Ruskin declared it a 'glass monster' and 'cucumber frame' (Jones, 1985). Pugin, through his work Contrasts, did much to denigrate industrialisation, while John Ruskin furthered Pugin's analysis by critiquing the loss of craft. Ruskin advocated morality in buildings through structure, material and construction. For him the architect became an agent of social engagement through good design (Jones, 1985).

Though incapable of designing a modern architecture himself, Eugene-Emmanuel Viollet-le-Duc inspired the next generation of architects who would bring a formality to the period we know as Modernism (Sorenson, 2000). Le-Duc was greatly inspired by 'honesty to materials' as described by Ruskin. He also advocated that style should emanate from the use of rational methods.

Rational thinking began to permeate the work and writings of architects. While opposed to Crystal Palace, both Ruskin and Pugin, through their respective positions, promoted

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Fig. 11
Illustration depicting scenes before and after Industrial Revolution by Pugin in his work Contrasts

the thinking explored by Viollet-Le-Duc. Eventually architects found and accepted that these values of efficiency, honesty and prefabrication were embodied by Crystal Palace. Reconciling rational thinking with the preoccupation with style was proving to be difficult for architecture, which longed for the legitimacy and clarity of engineering and science of the period. This desire to be a scientific trade is alluded to by Adrian Forty in his essay Spatial Mechanics: Science Metaphors in Architecture (1999). Forty approaches the relationship between architecture and science through the written and spoken word.

Forty opens with “circulation” which today in architectural jargon refers to the movement of people through buildings. This metaphor drawn from physiology is nearly indispensable in contemporary practice. Forty identifies his earliest known use of “circulation” to describe the movement of people in Viollet-Le-Duc’s second volume of Lectures. “The appropriation of “circulation” as an architectural term coincides closely with the adoption of other scientific metaphors which have become commonplace in architectural vocabulary, terms such as “function”, “structure”...” (Forty, 1999).

This metaphor provided a means of talking about a building beyond its physical materiality, in effect it provided a discrete system of architectural description. “...its introduction must be seen as a symptom of the desire to bring scientific method into architecture”(Forty, 1999). Engineering had emerged as a separate field of study. Yet architects were left creating metaphors in order to justify their rationality and ‘scientific’

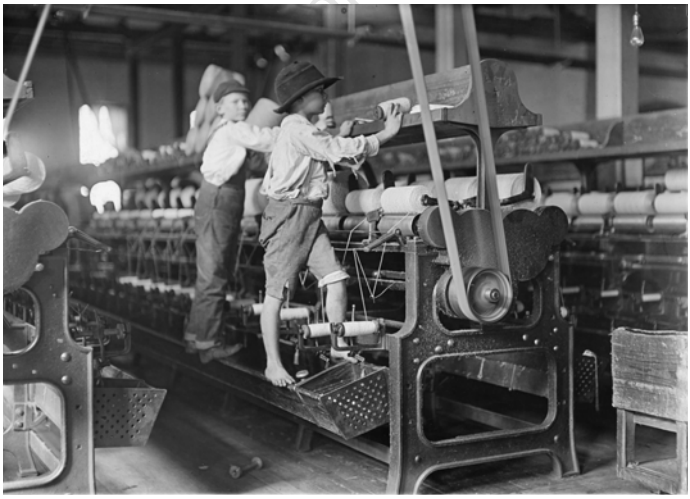

Fig. 12 Brutal conditions for children in cotton mills, photograph by Hine, L.

approach to design.
As explained by Brockman (1974):
"The whole background to the modern architecture of the period was thus in considerable confusion, dominated first for the 'battle of the styles' and secondly by the search among all variations of both styles for the style which should meet the functional and aesthetic requirements of an age which had, since the eighteenth century, made greater technical advances than had ever been seen."
Architecture as Brockman describes above, had, styles aside, advanced little in comparison to other trades. The lessons of Crystal Palace had been resisted and slowly learned. Those advances which had been made were primarily made by engineers who experimented with new materials and means of their construction.
Some beautiful buildings of an industrial nature were built during the period in various styles. However, industrial buildings on the whole were never a celebrated architectural type, too often falling into the realm of young inexperienced architects who concerned themselves only with appearance. On the other hand, rational thinking applied to industry placed the needs of the machine above those of people, and engineers were concerned with, primarily, the design of shelter for their machines (Brockman, 1974). Poor lighting, ventilation and temperature extremes were the built embodiment of harsh conditions laid upon the labourer. Though these were later to improve, the machine and that which housed it had begun to leave its unfavourable mark upon the

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Fig. 13 Brutal conditions for children in cotton mills, photograph by Hine, L.

common man's psyche.
In Towards a New Architecture, Le Corbusier identified, with no small amount of envy, the rational purity engineering had produced, "Our engineers are healthy and virile, active, useful, balanced and happy in their work. Our architects are disillusioned and unemployed, boastful or peevish" (Le Corbusier, 1923). Like those thinkers before him, he wished the field of architecture would join the ranks of science and engineering.
While architects recognised that mere ornamentation was to miss the advances the world had made, modernism brought no great revolution. Purism developed by Le Corbusier and Amedéé promoted a sleek, refined and simplified design free of ornamentation. It desired an architecture as efficient as the factory line.
The famous quote "The house is a machine for living in..." clearly illustrates Le Corbusier's intentions for architecture. Despite this, the house did not become a machine in which we live. Rather Le Corbusier employed the aesthetic of the machine through a knowledge transfer from engineering. Architects still looked to decorate but it was now a 'mass produced aesthetic' which they produced.
During the 1930s after economists had been forced to abandon their beliefs in a self-regulating mechanism, governments began to use industry as a means of positive action. This inevitably led to questions of industrial locations and birthed a relation between industry and planning. As outlined by Brockman (1974), "The question of erecting houses in factory areas, a matter always taken for granted in the days of the

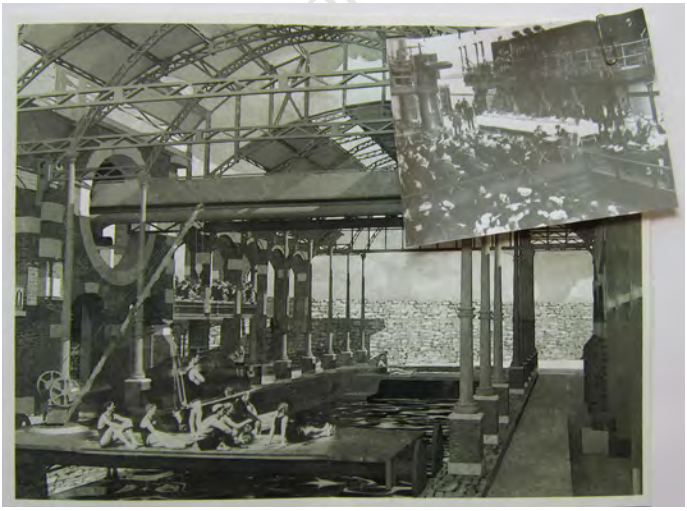


Fig. 14 Personal photograph of Graaff Industrial Cold Water Works by unknown.

first industrial revolution, was later considered to be entirely wrong in principle, noise and pollution being the deciding factor against such action".

While examples of well thought out new towns, such as Welwyn and Letchworth provided useful studies the architect still played no major roll. As late as March 1960, it was written in THE MANAGER, "Whilst the annual value of new industrial building in the United Kingdom is second only to housing, it is estimated that architects are responsible for no more than 50 per cent of it" (Brockman, 1974). Today this would be considered a favourably high percentage.

The modern movement remained on the periphery looking in towards engineers and industrialists who were generating form at a rate similar to that of the machinery it served to shelter. Architects in the design of industrial buildings resigned themselves mainly to little more than decoration.

Conditions for labourers in factories had also improved little. The division of labour had reduced people to servants of basic task, mere cogs in productive machines. Giedion in 1948 traced the history of the assembly line. In it he notes the emergence of Unions which sought to defend labourers from the harsh conditions in which they were expected to work. Giedion's paper illustrates a strong division between the "production at any cost" attitude of the period and its negative repercussions on people. By its very nature industry strove to find efficiency and often this was at the expense of people. Cleary the social conscious still very much despised the machine whilst also becoming dependent on that which it produced.

Architecture from the early days of the industrial revolution, due to concerns of style and other distractions has found itself on the periphery of industrial design. The application of rational thinking was late to permeate the realm of architecture, and when it did it was very much the same stylistic processes under a new veil. All the while the industrial building evolved to become less humane serving primarily the needs of the machines housed within. Pollution, noise and modern planning saw factories and people removed from each other alienating the machine ever more. Contemporary planning schemes have seen to it that for the most part people and industry remain divided.

Graaff's Industrial Cold Water Works though a product of the revolution was in many ways an exception to this rule. Thanks to the intuition of Graaff and in no small part luck, Graaff's building despite being industrial, endeared itself to the public. It is easy in retrospect to distort the facts of history to suite our desires, and at the risk of so doing, I believe the Graaff Industrial Cold Water Works employed many of the strategies outlined by Neil Leach in his book Camouflage.

The need to relate to place, to connect to the physical and cultural environment is a crucial aspect of good architecture. Identity, Leach argues is "no longer a fixed condition but an ever re-negotiable site of individual expression" (Leach, 2006). The fluid condition of identity can potentially be manipulated in order to construct a place-identity culture within the industrialised condition.

We define ourselves by the communities, jobs, or fashions we subscribe to. This, argues Leach, is governed by a deep desire to feel connected to a place. Leach calls upon diverse fields of academia to investigate the architectural implications of such behaviour. *Camouflage* describes a set of visual and strategic operations. Many of these strategic operations were employed by Graaff in his Industrial Cold works. Through mimesis users were assisted in forming a place-identity relationship with a building of industry and the perceived estrangement caused by technology was alleviated.

Leach negotiates the processes by which we identify with the world through the work of Walter Benjamin and Theodor W Adorno. Leach's interpretation is not mimesis as the simple 'imitation' of Plato. Rather it is Benjamin's mimesis, which should be understood as the creative reinterpretation of an original. This 'creative reinterpretation' is then overlaid with Adorno's expansion, which inspects aspects of the sensual. Assimilation is a key aspect of mimesis. As Leach reminds us, mimesis is a form of assimilation and is not to be confused with imitation. He quotes Adorno, who argued that "mimetic behaviour does not imitate something but assimilates itself to that something".

In order for this mimesis to occur it is required that a process of identification take place within the user. When one stares at a painting one enters that painting, either figuratively or metaphorically. It is a regression to a childlike open mindedness. Mimesis then is reliant on an activation of the imagination (Leach, 1996).

Fig. 15 Travel advert poster depicting Graaff's cold water works, note emphasis on public function in title.

Imagination is at work in mimesis and is responsible for the reconciliation between object and subject which operates between fantasy and reality. The fantasy we create is not an escape. It is easily done by children and daydreaming adults. Absorbed by an image is to be transported into another place and in this way to relate to it. It is a "creative engagement with an object" which fuels a process of symbolic identification that allows us to assimilate and feel comfortable with said object (Leach, 1996). Graaff engaged the imagination of the visitors to his building by turning traditional ideas on their head. By allowing visitors to engage in recreational activities within a type conventionally associated with negatively by the public.

This creative moment on the part of the subject identifies with the object so that the object, industrial machinery or not, is charged with symbolic significance and is according to Leach "appropriated as part of the symbolic background through which individuals constitute their identity" (Leach, 2005).

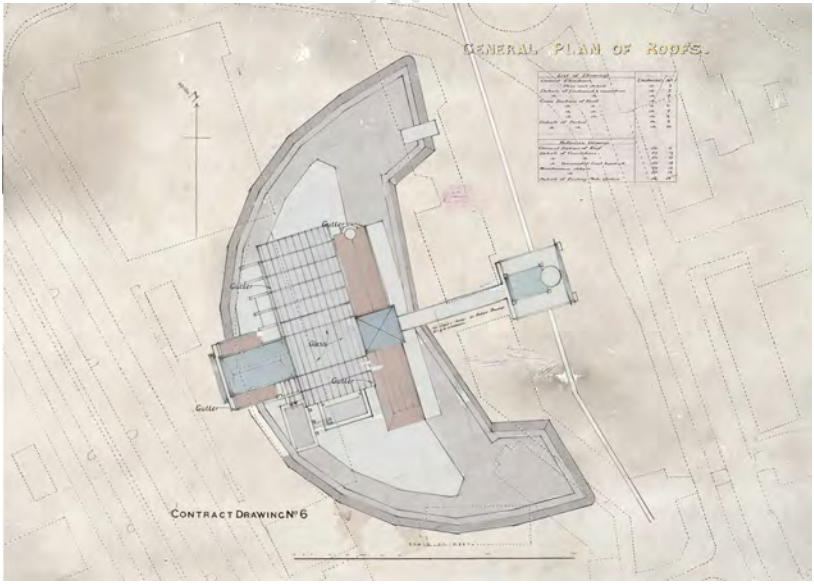
This symbolic attachment does not instantly occur but is instead gradually engendered through the 'mimetic impulse'. Leach implores us to consider the question of temporality, for symbolic significance often shifts over time. The way we engage with buildings is not a static condition; we are constantly assimilating to our built environment. Little has been written on the question of our reception to buildings over time, but it is fair to say our attitudes towards specific buildings are constantly evolving. The mechanisms of Graaff's plant were of a temporal nature. The windmill turned when the wind was blowing, fog off the warmed water filled the glassed vault in winter and the plant operated at a reduced capacity (since the need for cooling was reduced in the winter months). This symbolic significance was observable by the public, better allowing them to assimilate with the building. Mimesis allows us to read ourselves onto our environments without being fully conscious of doing so. It requires an imaginative moment on the part of the subject who identifies with the object and in so doing invests in it a symbolic importance. Thus, according to Leach the object becomes part of the symbolic and is embedded within our constructions of our own identity(ies).

Over time the positive interaction with the plant started to constitute in the identity of its users and their association with Graaff's brand. The plant formed part of what it meant to be a Capetonian; people began to describe themselves in relation to the plant, living near to, or a life guard at, and the like. Although perhaps not clearly articulated as a connection to the building itself, the object (the Wet Works), through a process of mimesis, became a symbolic space in the minds of the Cape Town public; people's symbolic association with the idea of the Cold Works formed part of their identities.

In the design of Graaff's building the spirit of invention at the time was reflected back by inviting the use of the industrial plant for pleasurable recreational activities. This produced a mechanism by which people were able to feel at home. This unintentional

use of mimesis allowed the building to accelerate the natural inscribing of people into place by acting as a form of mediation(Leach, 1996).
The principle by which insects and other creatures blend into nature is notable. The inverse of blending in is standing out. As an analogy to human behaviour we apply a process of identification whereby the architecture becomes the background from which we form an identity through a process of blending in, standing out or oscillating between the two (Leach, 1996).
Not unlike the chameleon, suiting our moods we blend in or stand out from buildings and the social situations in which we find ourselves. Whether through appearance or actions this chameleon-like urge occurs not only on a physical level but also a psychological one. As Leach states "It is necessary to absorb visual material within a psychic framework, and to invest it with symbolic significance in order to identify with it. This process then operates beyond the level of surface effects". This urge to assimilate or differentiate, argues Leach, "is grounded in questions of personal identity".
A fine example of this might be experienced when one enters into a night club in a foreign country. The music playing is your favourite type of music and you feel right at home despite being from a distant land. Graaff enabled a reading into the 'foreignness' of his building by exposing it all, eradicating the fear of the unknown. He relied on the knowledge that even the most outrageous over time becomes accepted as it becomes familiar. Leach argues that those who hold the position that "technology is the the novel and unusual within their symbolic framework" (Leach, 2000).
Graaff, by providing room for sensuous engagement conventionally neglected in factories, ensured people did not become the servant of the machine. This approach to design did not seek to find an 'identity' formed through architecture but rather served to build a connection between people, place and consequentially brand. These mimetic devices positively augmented a place-identity relationship between the Cape Town populace and a building of industry. It seems appropriate that G.I.E.C make use of similar principles in their building.


MAP OF
CAPE TOWN


GENERAL PLAN OF ROOFS.
CONTRACT DRAWING Nº 6

Invoking the Ghost of Graaff

Graaff realised his building could serve a use beyond its primary function, that being the cooling of cold storage chambers. It could act as a public facility and marketing tool too. It was designed such that he could oversee all activities by walking an elevated catwalk from his office through the plant to the train depot at the very end. His building was sustainably innovative too. Pumping cold ocean water for cooling, harnessing the wind for electrical generation and transferring excess heat from chimney stacks to swimming baths.

These features which today would be labelled as 'green' or sustainable must have seemed ridiculous at a time where fossil fuels appeared both endless and harmless. G.I.E.C find them inspirational and intend to use many of today's equivalent to communicate their message of sustainable innovation to the public. The primary purpose of the G.I.E.C plant is to provide a profitable district cooling facility for the city of Cape Town. Like Graaff's cold wet works it too will pump cold ocean water sending it through a heat exchange in order to chill a separate circuit of water which services climate control units within buildings of the Cape Town CBD. It will also act as G.I.E.C's head office and a public urban park.

Fig. 16 (opp above), Map of Cape Town prior to harbour expansion, origional Shambles location is opposite the goods station and fish market. Graaff outlet and offices migrated along coast towards the expanding harbour. Amsterdam Battery along shore line bacame final site.

Fig. 17 (opp below), One of only two remaining drawings of Graaff Industrial Cold Wet Works. Roof and site plan. Note railway depot accessed by brisge outside of Battery walls and roof canopy over reservoir.

Visitors are invited to discover the history of the site by visiting the information centre or inspecting the plant machinery. A public walkway is proposed which would cut through the plant along the route of Graaff's catwalk and provides a visual axis between Signal Hill and the ocean, while contemplating place and history. More importantly it would provide a long absent stitch to the urban fabric, knitting together disconnected city regions.

The Graaff Industrial Wet Works allowed the public views of its operation but it still subscribed to the traditional architectural approach to façade. Architects were allocated only the façade to design which they employed to hide what the 'unsightly' and 'intimidating' machinery within the factory.

In the spirit of our age the G.I.E.C plant challenges these traditional ideas of façade by making the facade itself operational machinery. The facade structure of the building plays a game of reveal with the building's interior and the Graaff ruins. It achieves this effect through the repetition of a steel octahedron which due to the shape of plays optical effects on the viewer based on their position.

Graaff's spirit of invention is further invoked in each octahedrons operation. Depending on the components location it is equipped with useful additions. These may be photovoltaic cells on North faces or wind belts equipped on those units which receive South Easterly wind. Those equipped with Wind Belts (a small scale generator of electrical energy, see appendix B) are also equipped with LED lights which when activated briefly illuminate sections of the façade. In this way the movement of the wind is made visible. Inscribing the teporality of the site upon the building.

The geometric shape itself is inspired by one of the core elements of the plants operation- salt. The molecular groupings of salt particles at times form the octahedron shape which in turn is capable of forming a 3 dimensional tessellation that is structurally sound. This is poetic full circle; the literal return to the pre-refrigeration origins of Graaff's youth and meat preservation is metaphorically represented through the building structure.

Meanwhile the ruins of Graaff's building are also made structurally sound through the use of concrete. Where old abuts new a shadow line remains, but the heaviness of the Victorian structure is enforced. The ruins can be touched and in some cases are used to support the contemporary structure. This approach is contrasted by a minimalist lightweight steel design for the boxy insertions which communicate a contemporary language of sophistication. New insertions which trace the past are treated with a core ten steel surface. On the ground plane the location of the old Battery wall is made evident through a low plinth and differentiating paving finish.

Conclusion

Narrative is a formidable design tool. The past provided me with Sir David Graaff, his history provided me with a ready supply of design indicators. My work this year has in part made me a historian (albeit a poor one). I have engaged and added to the history of Cape Town and Graaff, but have in no way altered the past. Through the design process I have written myself into the Graaff story and used it to set design parameters in the same way that the Graaff Industrial Wet Works and Amsterdam Battery ruins set parameters upon my site. I have extended the cold storage trail stomped by Graaff and used it to provide a programme. The programme lead me to seek a potential client. The client, G.I.E.C brought with them their own additional programmatic requirements.

The way I have written myself into the Graaff narrative is not too dissimilar to the way many brands associate themselves with the past in order to project an image of legacy onto their consumers. When that legacy is a great man whose ideals mirror those of the contemporary organisation, the reasoning is all the more obvious. The linking of Graaff and G.I.E.C seems an appropriate proposal for a company (often in a protested industry) looking to gain a good reputation in South Africa (Jenkins 1991).

It was not sufficient for Graaff then nor would it be sufficient for G.I.E.C now to simply construct an industrial plant in the heart of the city. The building, in order to avoid public outcry, would need to be welcoming. Graaff employed many strategies which are similar to those identified by Neil Leach to encourage assimilation in the user. The design I propose for G.I.E.C employs these strategies in order to better mix the public and industrial programme and encourage users to feel comfortable with the building. Eventually the formation of a positive relationship between the public and the building becomes a positive relationship between the client and the public, ensuring that the project is the best in its class.

This process was guided very nearly primarily by the narrative constructed. That a story existed meant that it could be extended. For each person, every building carries multiple stories, histories and truths. Sometimes these are more accurate histories of significant events, while at other times they are constructions of narrative. As architects we are free to manipulate our designs and design processes in order to tell tall tales. Narrative can enrich our buildings and enable them to better work their way into the hearts of their users by engaging their imagination. We can choose to embrace this narrative nature of design or ignore it but either way every building we design will tell a story.

Fig. 18 Potrait of Graaff in his oofice above entrance to Graaff Industrial cold Wet Works.

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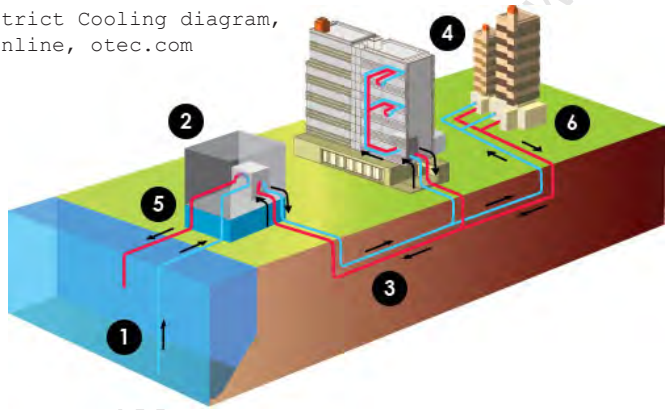
Appendix

A: The process of hydrothermal cooling is fairly straightforward and logical. A cold natural body of water is circulated and used to absorb heat from a separate circulation of water, this separate circulation is used to provide the cooling required in regular commercial building A/C units. This is further described by the process below which is illustrated by Ocean Thermal Energy Corporation for potential customers.
The natural cold body(lake or ocean) is tapped from a depthwhich corresponds to year-round ideal chill temperatures (i.e., 5 – 8 deg C). This depth can be dependent on a range of variables from salinity to nearby industry.

Fig. 1, District Cooling diagram, available online, otec.com



1. At the district cooling plant the heat is transferred from the circuit which services the A/C units of the city to cold water which is pumped and circulated from lake or ocean. This heat transfer usually takes place in a large reservoir. The seawater flows into the reservoir counter-current to the fresh chill water loop which circulates the buildings. Once the building loop is completethe warmed water is returned to the ocean.
Very importantly, the fresh chill water loop never comes in direct contact with the sea or lake water. This removes concerns of contamination or silting. The circuit which serves the buildings is fresh water which can pass safely through the serviced buildings' central air systems without harm to existing systems or air handling units/coils.
2. The blue and red lines underground represent the circuit which serves the buildings. It absorbs heat from typical central air conditioning systems through the existing air handling coils/units.

The blue line enters the building to a small heat exchange type unit called an air handler (conventional central air conditioning system). The red line represents the chill water after it has extracted the heat from the building and returns to the chill water system back to the heat exchange facility to “dump” the heat. Once cooled it is returned to the buildings which it serves to absorb more heat.

3.These buildings represent the serviced buildings. The cold water (blue lines) travel through the typical building’s central air conditioning system, extracting heat from the rooms via the air handling units and then return to the district cooling plant as warmed water via the return distribution lines (red).

4.The red pipeline coming out of the district cooling building is the seawater or lake water return which has been modestly raised in temperature to typically 12 degrees Celsius. (OTEC, 2013)

Typically, this method of air conditioning will save approximately 80 – 90 % of the energy normally consumed for conventional air conditioning. Seawater District Cooling requires power only to operate the pumps. It does not consume electrical power to chill, which is a substantial cost-driver, making traditional air conditioning much more expensive and energy intensive. Overall, there are significant cost, energy and environmental benefits to sea water district cooling as compared to conventional air conditioning systems.

B: Windbelt

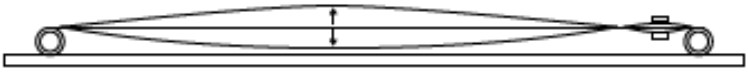


Fig. 2, Windbelt diagram available online accessed 15th October, Humdinger.com

B: Windbelt

A windbelt is a device which offers a linear means of extracting energy from the wind. As opposed to rotating airfoils a windbelt makes use of aeroelastic flutter. Aeroelastic flutter is the oscillation one might note on a loose strap on a car, or the vibration required on wind instruments. Unlike wind turbines, this does not require heavy or steady wind and can be scaled down.

The wind belt works by extracting the kinetic energy of the ‘flutter’ and through the use of magnetic induction transforming it into electrical energy. The principle is similar to that used in some torches. When a magnet is shaken up and down along a copper coil a current is induced. The wind belt uses the ‘flutter’ to move a pair of magnets in and out of a copper coil. (Humdinger, 2013)

Notes

Invention, my dear friends,
is 93% perspiration, 6% electricity,
4% evaporation, and 2% butterscotch ripple. -

Willy Wonka