BREAKWATER FARM

"AN INVESTIGATION INTO THE POTENTIAL FOR COASTAL AGRICULTURE AND RE-ENVISIONING ARCHITECTURE AS A MACHINE THAT RESPONDS TO AND PERMITS THIS MIGRATION"

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DESIGN DISSERTATION

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FORWARD

A HUNGER FOR REFINEMENT

I have always been interested in the ways things are put together and how they function.

I remember from an early age carefully dismantling my toys and tediously putting them back together again, in an attempt to see how they work. In this sense I learnt the value and time associated with craftsmanship and creating a complex and beautiful structure. The slightest slip of hand could determine the outcome of the end product and whether it would work again.

It seemed only natural that machines would interest me. The greatest interest being; machines that changed and responded to an initial stimulus for varied effect. This for me was the most beautiful thing about them, that an initial input could be converted into a totally different output through an assembly of gears, cogs. Levers or cranks.

This interest grew as I did. I would often look at the inherent complexities of the everyday objects around me, try to rationally understand how they work and then look at ways in which the process and object could be bettered upon. This is the quint essential reason I pursued architecture.

In have been fortunate enough walk the streets of Tokyo and see how technology and mechanization govern the everyday and architectural thought. I have travelled up the Eiffel Tower in a glass elevator and been in awe as the structure created another world of complexity, euphoria and escape. I witnessed a space shuttle taking off, first hand, and saw how a man-made machine lifted off from the ground and in so doing changed its surroundings from night into day.

I have seen how the machine has changed the processes of our everyday lives and even created a beauty in so doing. What I am interested in now, is how these complexities are conveyed architecturally. How buildings can adopt a mechanized approach to the processes of the everyday, even as we live in a time of rapid change. Similarly, I am interested in how a beauty can evolve from this form or architecture that looks at construction and the spirit of the machine as a design tool rather than hindrance.

The thesis document that follows is very much presented and articulated in this ethos. An idea relevant to my personal interest in machines is developed in accordance with theory and concept to a very specific site. The idea is then systematically developed through research, design and intuitive investigations until a detailed resolution of concept has been achieved.

CONTENTS

"There is no need in inventing something unless it is an improvement" - Adolf loos

1: BUCKET EXCAVATOR - A mobile machine used for excavating landscape.
Practical: as it renders the need for Human digging obsolete.
Functional: as an efficient method of excavating and simultaneously sieving debris
Beautiful: As its complexity and composition inhibit human response

INTRODUCTION

"An attack upon systematic thought is a treason against civilization...
Let us remember this when we hear the drumbeat and roll call to
return to vernacular tradition."- Berthold Lubertkin

Complexity cannot be imagined separately to building in our present times. The physiology of human beings has remained constant. However the methods by which we regulate our daily lives' are in a continuous state of change. Our contemporary patterns of work and leisure are very different to those of the past. The primal human need to survive and be secure is over shadowed by the multitude of methods by which these needs are met. Diversity in these methods has resulted in the operational requirements of buildings being more varied and of a higher complexity.

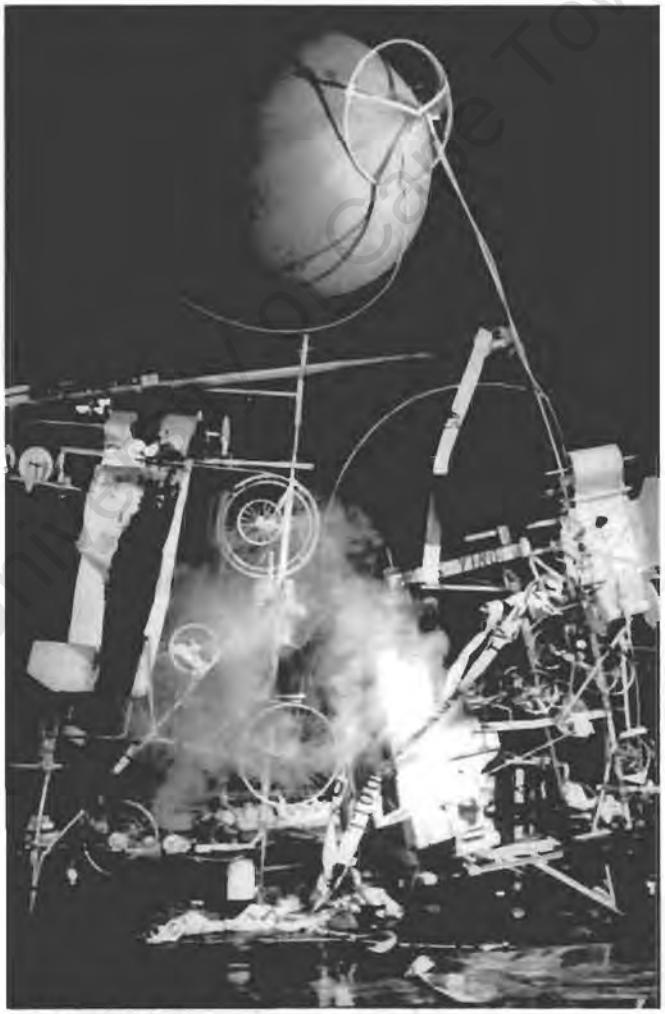
Despite the continuity of human need, it is the discontinuity in the methods of achieving these goals that has led to buildings becoming outdated and redundant. Modern buildings are expected to be flexible, responsive, sustainable and intelligent, while adhering to social and cultural obligations. It can be argued that this process of adaptation can be generated from within the spirit of the machine. Buildings and the process of construction are detached from the general principles of mechanization and so the resultant technologies in building are never truly progressive. Have you ever herd of a car company going back to their old methods of production and technology? Yet architecture finds comfort in the past and present and rarely challenges the future, as a built manifestation. This has led me to the question

"What are the mechanisms that allow machines to be integrated successfully within in the realm of architecture and human comfort? And if building and machine are both believed to be objects, how can they co-exist to promote social and functional longevity?"

It is in this architectural thesis that I aim to establish grounds for the viability of mechanization in the built environment and so validate the potential of constancy through adaptation. Constancy in this document refers to the intangible measure of time and its effect on buildings and people. Thus, the "Machine-Building" develops as a metaphor for the process through which an assemblage of spatial components can be arranged to optimize a building's immediate and long term functioning. With this comes the inherent factor of the relationship between the individual and the machine on both a physical and metaphoric level.

The machine-building is not a product that satisfies criteria, it is an environment that readily adapts to user circumstance and allows for optimum functioning. Public assimilation often proves the "Achilles heel" to this thought of architectural production. There is a stigma and challenge attached to the emergence of new technologies in the built environment, especially if the form and physical representation do not conform to conventional forms of representation. However, through careful consideration and thought in the process of design an intrinsic beauty can develop from something that is appropriate to purpose and responsive to need regardless of form. Efficiency, continuity and clarity are the attributes that make a successful building. These are then readily applicable to the machine as an inspiration for building design.

2: TIMELESS MACHINE- The time pieces evokes memory and attachment
Not specific to our own lives, yet we create a
Back story for it. A deceased granparents maybe?



3: JEAN TINGUELY-These machines capture the spectacle of movement and
Complexity. We imprint on them and so give them
Meaning

MACHINE ASSIMILATION

THE INFLUENCE OF THE MACHINE IN ARCHITECTURE

"Someone makes it, someone owns it, some oppose it, many use it and all interpret it" - David Nye

The human existence in the world is defined by complex sets of relationships between people, nature and spirituality. There also exists another relationship that often is misunderstood. The relationship people build with "objects". This at first seems to be based on the premise of materiality. However, whether we like it or not we build attachments to everyday objects in different ways. A photograph of a loved one is an example of this. Buildings too are objects we engage with on a daily basis and form relationships with.

The philosopher Martin Heidegger believed that the most important part of our "being" was to dwell and that this correlated directly with what we build. The places we build which disclose our existence and identity create the strongest senses of dwelling and so are intrinsic in our "being." (Kronenburg, 2001)

We manipulate our environment. This has become human nature. Rather than adapt to our conditions we have accepted that changing them to suit us, has been the evolutionary bench mark that has separated us from other animals. So building object and place has become important in establishing our place in the world. If this is true however, would not technology and machines fall into the same category? Technological advancement carries with it the nobility of human achievement and progressive evolution.

The answer lies in the understanding of inhabitation versus operation. The two are not the same. The attachments and relationships we create with objects differ. Although machines and buildings are both the same, being "objects", they also differ in the way human beings imprint on them.

The modernists maintained that the House was a machine for dwelling in. this implied that we operate a house the same way in which we operate an appliance. The relationship we build with machines is that of a master servant. Machines although remarkable are merely viewed as extensions of tool/servants. (Kronenburg ,2001)Their reliability and loyalty are the only mechanisms that insure their relevance in the world. However, human imprinting carries with it the relationship and identity of good performance to co-operation and inadequate performance with poor behavior. A machine need only occupy space as long as it performs a function that is of an adequate level to the user. Once this function becomes obsolete the machine is discarded or replaced.

A building is not operated in the same manner as a machine. A building is inhabited. There are activities related to operation, be they mechanical or manual. The use of a light, opening a door, these are all the operational processes displayed daily, that can vary and become more elaborate as building complexity increases. One tends to forget that we also paint, clean, mend etc. and this is the fundamental difference between building and machine. The building is thus serviced by us and us by it. This relationship becomes one of symbiosis.

This is not to say that contemporary buildings have not adopted a more mechanistic approach to function, articulation and form. Merely to illustrate that, in order to understand the role of the machine within the realm of architecture, distinction must be made as to whether the building is a purely functional space or habitable one. We take for granted the fact that many of the buildings that occupy our everyday existence are habitable and are unaware of the buildings that churn away at the everyday processes of the city such as sewage, water, waste etc. These buildings are the epitome of large scaled machines. They are never meant to be inhabited, but rather serviced and operated to perform a function within the infrastructure of the city.

A machine building is not a monument built in the machine age that expresses an attitude to machinery, but something more profound. It is an architecture that articulates functional space as an output. We are not looking for the surface architecture associated with machinery and the machine aesthetic. We are looking at how to create a building that optimizes long term inhabitation and constancy through flexible systems of construction and planning.

This thesis develops an argument that the adoption of the machine within the realms of architecture goes beyond aesthetic and its representations in popular culture. Building and machine constancy are grounded in reliance, inhabitation and the way in which human beings imprint on objects. There exists a means by which machines evoke an emotive response from human beings and this becomes a critical factor when looking at popular culture as an ever changing entity. The key to assimilation rests in the intangible connections one builds with objects, as small as these connections may be. To assess this theory and as progressive research, suitable site selection and the act of physical construction as a mode for representation were adopted very early within my design process.

MOUILLE POINT- CAPETOWN

The area for investigation was chosen intuitively, but based on very astute assumptions. These assumptions proved to be correct as will be detailed in the site analysis. For the moment being however, the site will be very much introduced in the manner in which I understood it initially.

DIAGRAM 4

The chosen site is located between Seapoint and The V&A waterfront, along the coast of Cape Town
It is an extension of the Seapoint public promenade and host to the Greenpoint lighthouse and Pump station

DIAGRAM 5

THE AREA AS DEPICTED ABOVE

A: GREENPOINT LIGHTHOUSE: A buildings that acts as a functional machine in the landscape for maritime navigation

B: GREENPOINT PUMP STATION: A socially excluding building that that regulates sewage waste from the city.

C: MARINE SEWAGE OUTFALL: The potential for water recycling? Or mechanical input?

D: OCEAN WAVES: initially the presence of the ocean was included in my investigation due to the hydro-dynamic qualities it possess and how these qualities could be conveyed mechanically.

E: MOUILLE POINTS OTHER HALF: An enclave formation indented in the land that is under utelised in comparison to the other stretches of public promenade.

F: THE NEW ECO PARK WALKWAY: hints that the site can be connected to a larger ordering system

G: MOUILLE POINT RECREATION: A Las Vegas approach to public land use that is governed by capital gain and so dictates public assimilation

DEVELOPING ATTACHMENT ON THE INANIMATE

The paradox between emotion and machinery is one that has always interested me. As mentioned, this progressive interest has grown over time and in so doing the systems and processes of analysis have become more complex. The practice of playing with Lego, Meccano sets and building models too this day proves invaluable in my exploration of architectural form and construction. This is not too say that these "kit of parts" are directly applied to architectural form and my understanding of it, but that they allow one to tackle the basic principles of structure and composition and then refine their inherent processes. I have always found that my strength lies in defining (even abstractly) an object that is appropriate to a design and then refining it based on principles of research, construction and mechanics.

It is easy to understand the principles of machine based systems of production in the architectural discipline. Standardization, ease, efficiency, speed and tested models of success speak of the industrial revolution in regards to componentry and building systems. However, how these systems relate to one another to form the complex machines that are buildings is a different story. The human being is the indeterminate factor in this process of production. The way a person interacts with a building cannot be the same way they interact with a machine or can it? We have been looking through the ages more to make the machine in our own image. Too have it mimic and respond to us. Robots and Robotic Prosthesis are a few examples of this. I feel our acceptance in the machine comes with the way we understand and respond to it on more than a purely functional basis.

I have a deep interest in machinery, whereas other people may not. One thing that cannot be argued is that everyone uses machines at some point and that these objects have evoked an emotional response in one way or another. To begin to understand these "immeasurable" qualities, I started with a process of intuitive construction based on basic machine systems of production.

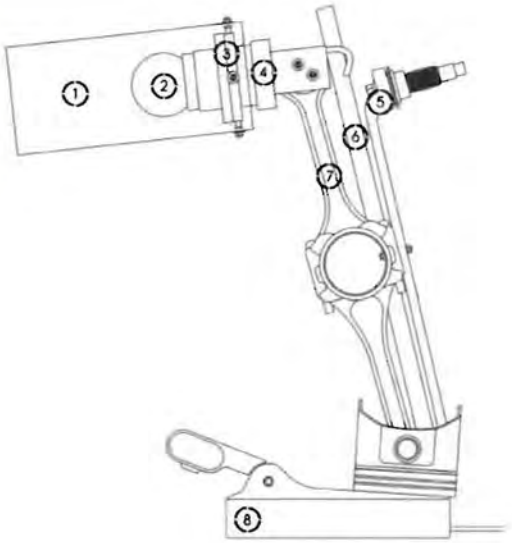
The process involved taking bespoke materials and then defining them into an inherently beautiful structure [in the case of the experiment: a lamp]. The materials had developed character through decay and although the materials appeared to be adhoc, the configuration of the elements is what defined the project.

I then looked at the qualities that defined and made the object beautiful in its composition and then refined the design based on these elements. The second stage of production truly worked in the spirit of industrialization and the machine. It looked at efficiency and materiality in structure and that although not immediately apparent, "art" comes in the form how the joints, connections and structure are articulated. There also came with it the ability for reproduction based on my chosen method of construction. My understanding of a Laser cutter, its capabilities and the material being used, allowed me to design through these criteria, rather than against them.

The two lamps when compared to each are almost identical and equally beautiful. One realizes that as long as both are efficient, our emotional response and the way we imprint on these objects is based on the way they have been articulated and not our immediate response to the machine aesthetic.

DEFINE

6: ARTICULATION OF LAMP1 STRUCTURE



KIT OF COMPONENTS

PERSPEX TUBE

LIGHTBULB

STEEL GASKET

VACUUM HEAD

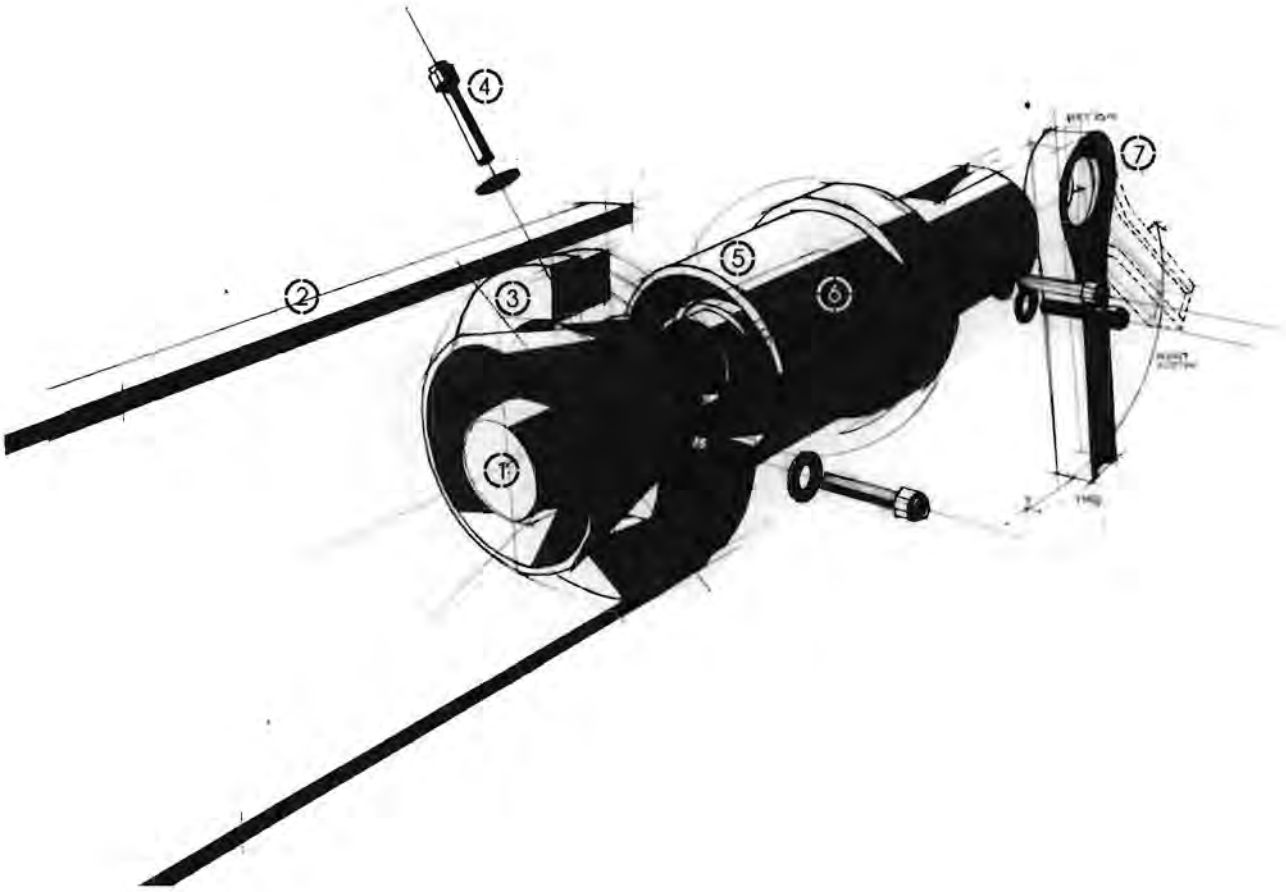
CAR DOOR MECHANISM

COPPER TUBE

STEEL PISTON

RELEASE HANDLE

- The drawing below is a detail of the head of the first lamp. Here the detail in composition becomes evident. The interlocking of joints and balance in articulation create an overriding sense of completeness.



7: EXPLODED COMPOSITION OF LAMP HEAD

1: Light bulb head fixture point
2: Lamp head: Perspex tube with drilled holes
3: Mild Steel gasket with holes drilled around perimeter for fixing
4: 4mm bolts with washer, screwed through Perspex into steel gasket
5: Plastic vacuum head
6: Light bulb electrical fitting attached in vacuum head
7: Steel piston head screwed into pre-cut vacuum head. Allows for angles of rotation




8: LAMP 1 DETAILS

REFINE

- The model below is the second lamp created. Here the lamp becomes a refined version of the first one. Key elements have been kept, but one realizes that the structure and material choose have allowed for permeability and a sense of lightness. The lamp is characteristic of any building structure in its respect to handling force. This had to be considered in the re design phase. Assessing the material to be used and creating suitable structural form.

9: CUTTING SHEET LAMP 2

- Here we have a set sheet for the product. As can be seen a complexity arises in the way the object is re-imagined in a two dimensional plane, so that it can later be assembled three dimensionally.

10: ASSEMBLED LAMP 2

11: LAMPS 2 DETAIL

THE INADVERTENT BEAUTY OF THE MACHINE- SEPERATING INTRIGUE FROM FEAR

"Let the Human mind think of shapes that the machine can produce. Such shapes, once they are logically developed in accordance with what the machine can do, we may certainly call artistic. they will satisfy, because they will no longer be imitations of handcraft, but typically machine made shapes". - Julius Posener

Architecture like Countryside are two words that suffer from a similar verbal miss use. They are general terms that allow one to express views on a specific field while at the same time remaining detached from it. Here I refer to when comment is given in regard to "the countryside" or "rural landscape", but what is actually being spoken about is the state of farming or production on the land. The word countryside steers one clear of the negative connotations related to mentioning farming and its processes. This is what farmers call the "constable syndrome". This is when general people who are not bound by agriculture make deceptively simple demands on it. The general perception of the farm is that it could look like a Famous Constable painting i.e. picturesque. (pawley,1990) There is a clear detachment from what the reality of the process of agriculture and farming is in our present age. The need for mass production has resulted in sheds filled with complex machines and assembly lines, where once presumed a barn would be. This is the reality we choose not to comment on. This notion of "constable syndrome" is one I choose to expand on, both in its applicability to machines and architecture and also conceptually as a tool for reprogramming social perceptions of place and object (as will be demonstrated in a design response later).

Incorporating technology and the machine within the built environment is the logical evolution in building design as we move progressively forward. There are methods however that architects have used to effect to make this practice more culturally acceptable. In essence although machine based methodology and systems of production are utilized within the built environment, this does not mean the creation of a culturally insensitive and isolated object. People must find and create identity with these objects and build attachments to them in order for longevity to exist. In order for this to be done however, a balance must exist in what is socially responsible to site and context, while pointing out the reality in production and form as a means to educate. It is the idea that people accept the present day farm (architecture) as it is, understanding that its method, structure and form is influenced by global forces of economy, resource depletion and supply and demand- that we all systemically have contributed too. In this same way, a machine and its composition can be evaluated as a method for emotional response too. We are not dependent on the fact that every person understands the operational parameters of a machine as a technician would, but that there is an intrinsic beauty associated with complexity and function.

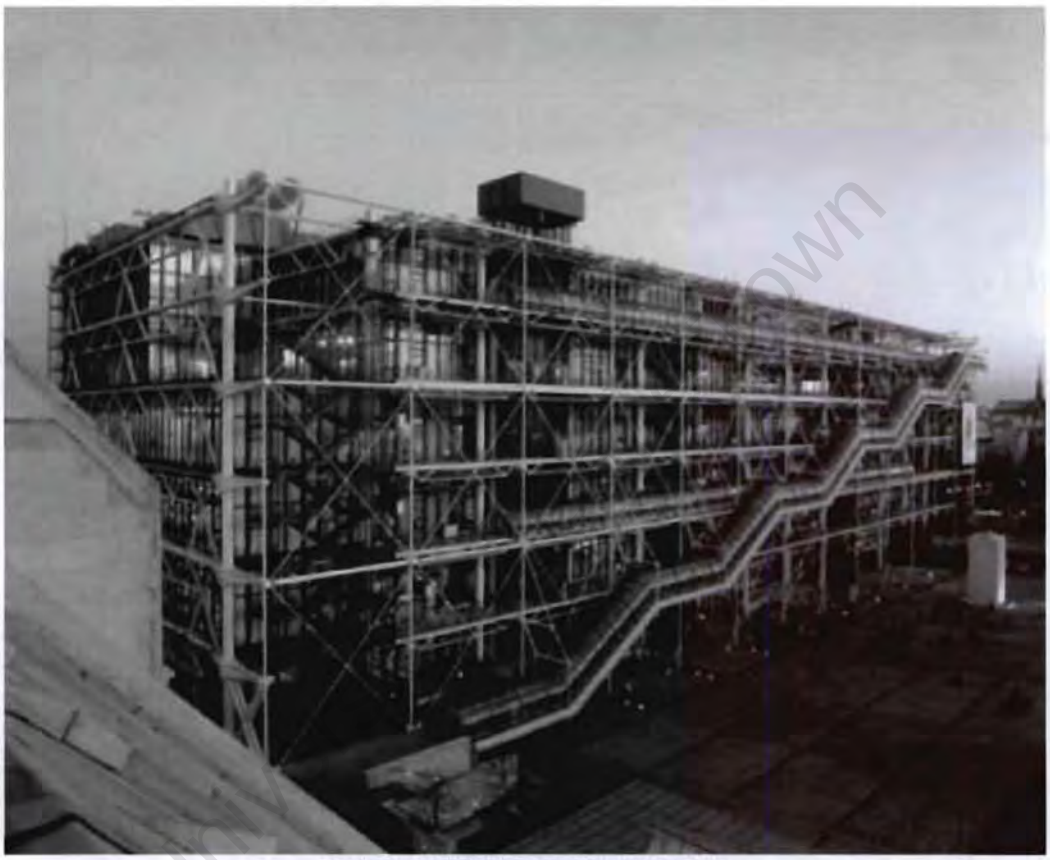
Negative associations with machines can also manifest and this is important to account for in this thesis exploration. These associations e are strongly generated by fear especially if the architecture is one that exhibits aggression or anonymity. Here I refer to the inspirations of "War Machines" and the unpredictable, mobile and mechanistic characteristics they represent. Architecture that uses the machine in this language uses technology as an expression of power not progression. (Kronenburg, 2001).

12: THE MODERN FARM

13:PAINTING: John Constable

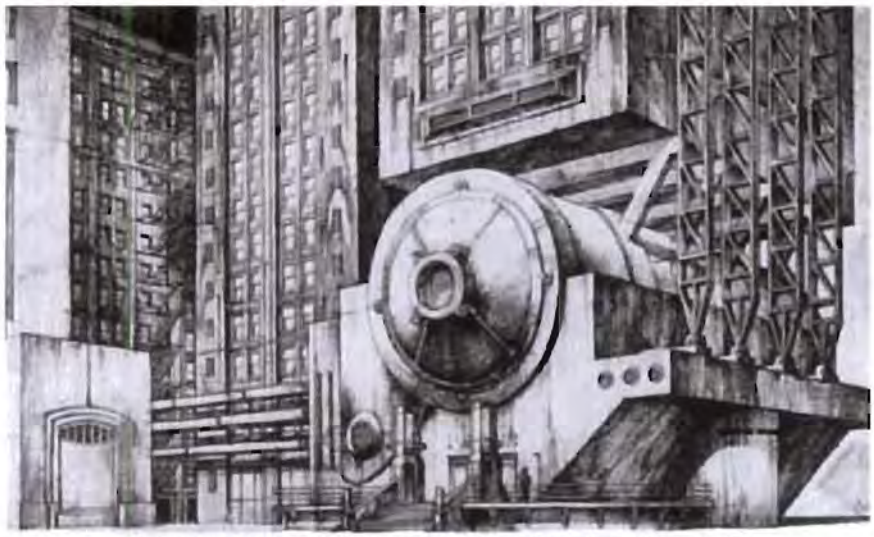
14:DISNEYLAND CASTLE: Orlando florida

15:NEUESCHWANSTEIN



16: CENTER POMPIDOU: THE ANTI-DISNEY LAND

"...monstrous, primitive and mythical machine which ultimately does not disclose any previous function. It is an unknown mechanism, an unidentifiable object..." - Anton furst



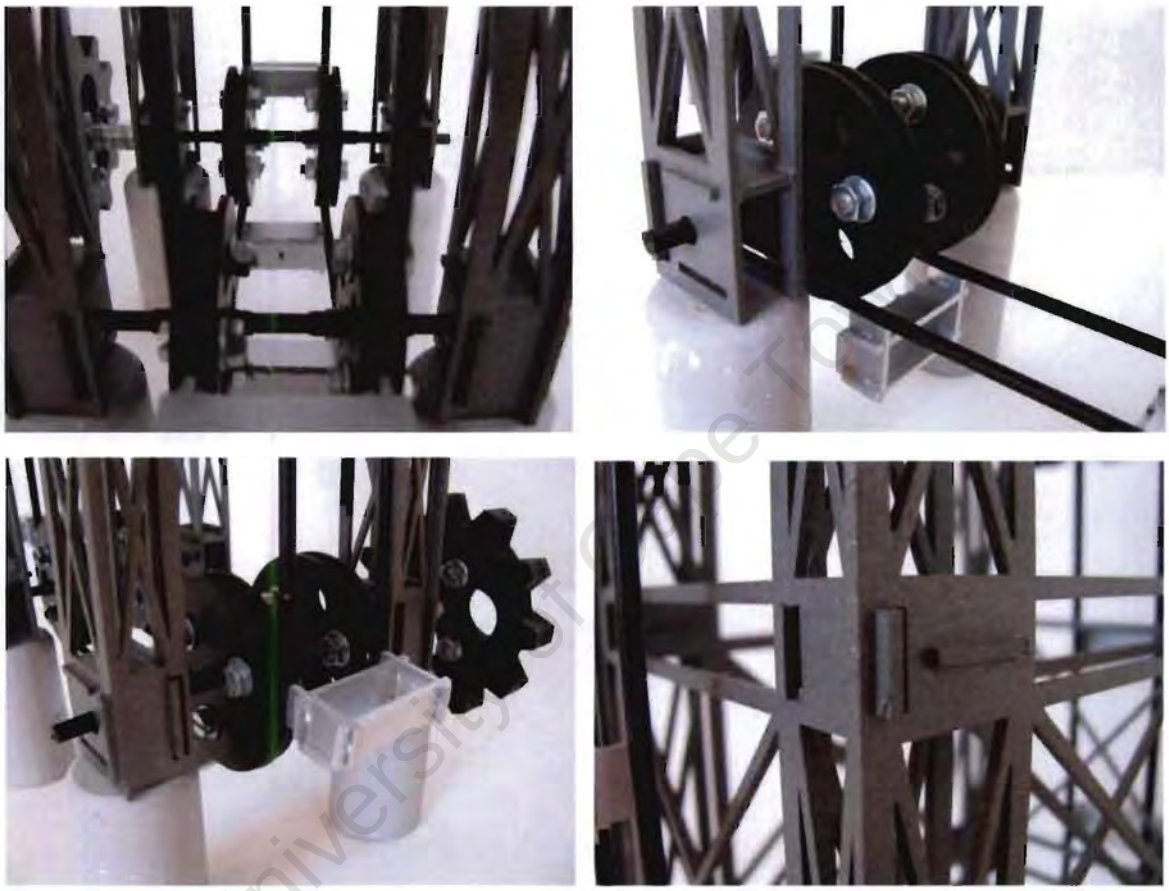
17: ANTON FURST: AUTOCRATIC SOCIETY OF GOTHAM CITY, BATMAN 1989

18: SHIN TAKAMATSU- THE ARK – fear induced by the presence of anonymity

Building forms that have been shaped by the applications of technology and in the ethos of the machine have intrinsic to them qualities not easily quantifiable. These are the qualities of complexity and mystery. Each buries itself deep with in human infatuation and is often under estimated as an architectural mechanism for creating a sense of connection.

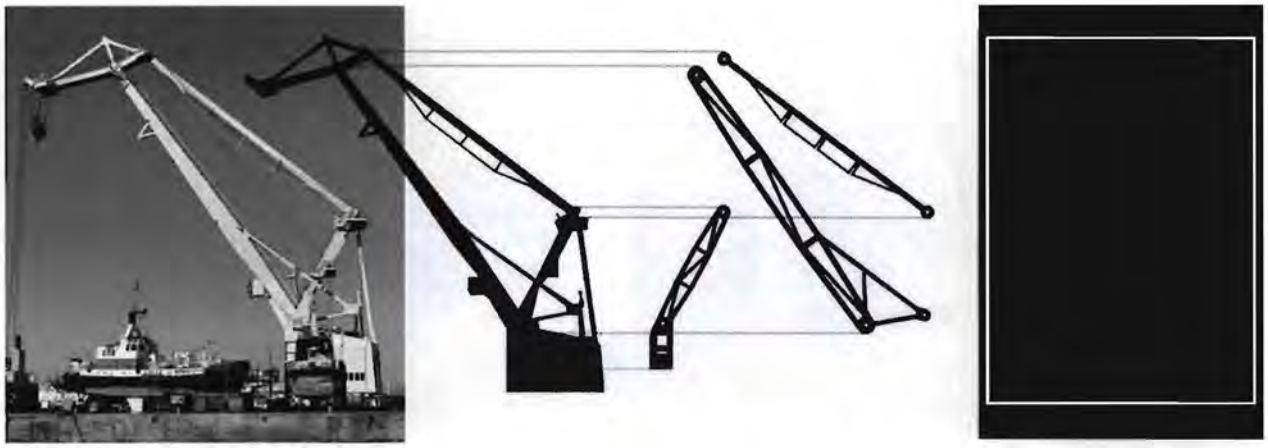
- To understand this principle better of how connection could be achieved through complexity and resultantly intrigue I began to create machines that were an intuitive response to "what could be applied" at Mouille Point. These machines look at movement, scale and function. The model below has been constructed in a manner that it could resemble a toy, large scale building or machine. Similarly this static image of the machine allows one to understand through its composition that it has an ability to move rhythmically while performing a function. This already proves the point I have been trying to make. Our brains associate certain components and structures in the model with movement and so although we do not fully understand what it is capable of doing or where it is too be applied we have a general sense that it performs a function in a rhythmic manner and this intrigues us.

19: WATER COLLECTOR



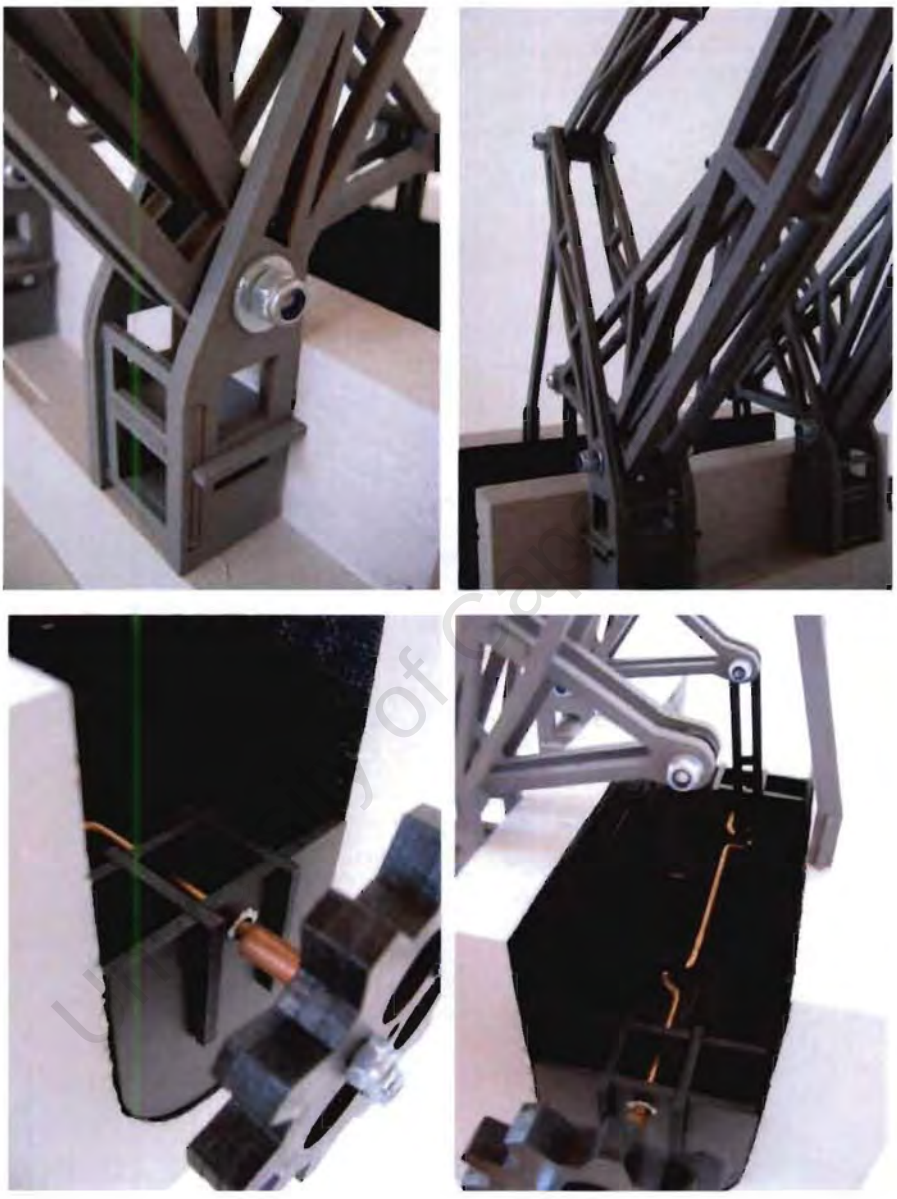
20: WATER COLLECTOR DETAILS

- Here is a similar exploration of complexity and mystery related to structure and form. I took a photograph of an cargo crane at the V&A waterfront, Cape Town. I then broke the machine apart into its key components, to understand both the structural principles behind it and the way in which it functioned. The result was an articulation of structure that similarly could be applied to a variety of sites or even act as a toy through its ability to generate movement and rhythm. Here once again the complete object becomes one we can imprint apon. We can either relate it back to its roots being part of the "crane" family, or enjoy on its ability to fascinate us through function, form and rythm.



21: CRANE ABSTRACTION

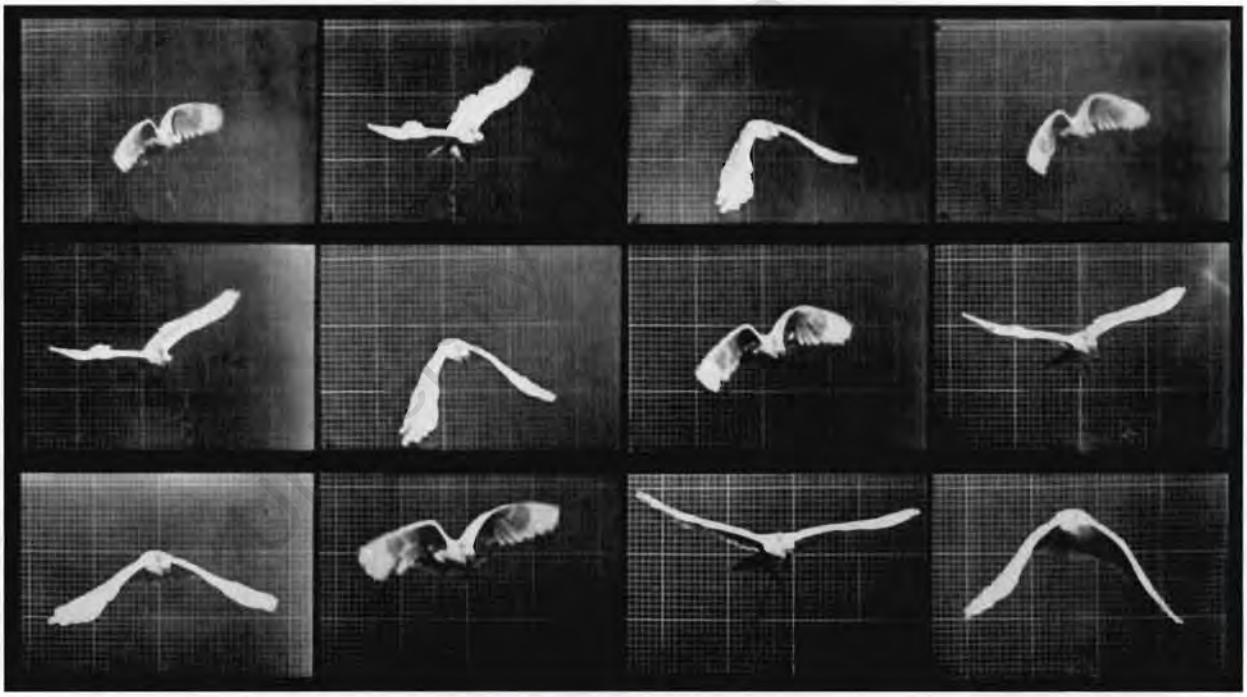
22: CRANE MACHINE



23: CRANE MACHINE DETAILS

24: CRANE MACHINE IN FLIGHT

- Here we see how the movement of the crane machine can be paralleled to that of the movement of a bird flying. It is this rhythmic movement and even form that allows us to build associations with machines to more natural objects. Machines similarly in this way, like architecture, can be associated with the human form and body



27: BIRD IN FLIGHT

The Complexity delivered by structure, comes from the understanding that beside space, structure and construction are in fact architecture and can inhibit emotion. There is a realization that a relationship between science and art can co-exist in structure. One can see that the designer's intention to create a coherent object with a specific image, must factor in governing principles of science, and this in turn warrants appreciation. Similarly, Structures have evolved to incorporate complexity in their physical composition.

Prior to the industrial revolution reference to "elementilism" in design dealt with plutonic volumes and the articulation of these volumes in creating space. However as design shifted to factory based methods of production and Fordism, one found that larger orders of structure were being assembled by components, each with a very specific function. Think of the assembly of any machine. A collection of inter-related parts each with a specific function used in the performance of some kind of work. Closer examination of this new found "Elementalism" and building elements show that two closely inter woven issues came together: The sense of visual abstraction from the De Stijl and movement and expression, as explored by the constructivists.

"It is the mental separation of each part of the construction which makes each part into an abstract, non-representational element."-James Strike

If this is true however, more consideration should be taken by the architect in developing these elements for a residing sense of cohesion. The construction methods and machines available to the architect are as vital to the production of a "beautiful" object, as the pen is vital in the production of a drawing. It comes to be that Structure, technology and machines need not be garnished by art and decoration, if they themselves are meticulously thought through and designed for the eye. This examination of structure and composition can lead to a sense of constancy, unobstructed by popular cultures current trends in thought. People imprint on the structure, by their understanding of its composition and workings and so create an internalized identity for it.

25: EIFFEL TOWER: Gustave Eiffel

26: MONUMENT TO THE THIRD: Vladimir Tatlin

27: GRAVEYARD: The piled up bodies of machines

28: GRAVEYARD: The Piled Up bodies of Man (US Civil War soldiers)

THE HUMANITY IN DECAY

"The elementary phenomenon is this- that two totally different architectural effects are produced according to whether we are obliged to perceive the Architectural form as something definite, solid, enduring or as something over which, for all its stability, there plays an apparent, constant movement that is change."-Wolfflin

Architecture has become the art of establishing space by creating the boundaries for it. This suggests that architecture is divided into both the art of space and then the art of time. Architecture heightens ones sense of body awareness by changing perspective. The play of light as the day progresses, changing view and position, these time base factors create different lenses to view the architectural object. Each lens creates new and exciting perceptions. In architecture point of view and our ability to change perspective is crucial. In the same manner when we begin to link architecture to time we perceive it very differently as an object. Rust stains on concrete, Discolored and corroded steel, these are the elements that begin to render architecture as mortal to time as the human body. (Quantrill,1991) Even the directness of light as a means to create solidity or dematerialization shows that architecture, through construction and materiality, can aspire to mortality.

The nature of building is letting dwell. Building accomplishes its essential nature in the raising of locations by the jointing of their spaces. Only if we are capable of dwelling then can we build. Let us think for a while of a farm house in the Black Forest which was built some two hundred years ago by the dwelling peasants. Here the power to let the earth and the heaven, the divinities and mortals enter in simple oneness into things. . . It made room in its chambers for the hallowed places of Childbed and the "tree of the dead. . ."- Martin Heidegger

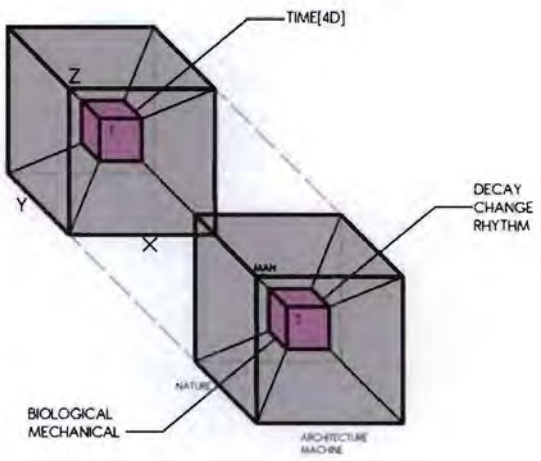
According to Heidegger if a building is to let us dwell it should respond to and embrace time specifically in regards to rhythm of the season, of passing generations of birth and of death. We can only in this sense then reach a complete sense of "being" through time. It is human nature to be scared of death. That as time progresses our bodies, lives and state of being change and inevitably will reach a conclusion. Human beings need to locate themselves in space and to do this they have to discover and place themselves in a relationship with time. If there is to be a genuine sense of dwelling, a building must be able to deter the fear associated with time, without doing damage to the essential temporality of the human being. (Quantrill,1991)

In terms of Architectural form however this is exemplified through the built ruin. We become aware of Natures cycle of growth, decay and rebirth and see that building has impermanence in this regard. (Quantrill,1991) I think this is important in our understanding of the built and adaptation in architecture, that we begin to see what is the essence of a building and then also what decays, weathers, gets replaced and changes over time. This can be used as a mechanism to convey a mortality in technology and machinery that is often not associated. Our natural understanding of technology is that unlike us and our relationship in the world, it can be replaced once obsolete. However what we can look at is a building that takes charge of time through adaptation and the cycle of birth, life, death and then rebirth. Is a building able to be open both to the past and the future. Brueghel's painting of the Tower of Babylon illustrates this point of a building that is progressively added on at the same time as it is decaying. This becomes a key in understanding the type of machine-building this thesis has begun to hint at. Always in a state of change based on its environment, but as a constant element through the progression of time.

29: AGED SHIP: A Machine that aged and with it exudes mortality

30: TOWERS OF BABYLON

31: AGED MACHINERY IN CORN FIELD A FIELD- Reminiscent of a grandparent. Having worked, contributed to the landscape in some small way over time. Then slowly crept into a state of retirement, where now it sits in the landscape reminding us of times past.



32: SPECIAL RELATIVITY: The fourth dimension/ time as defined by Albert Einstein

- The concepts that have been covered thus far in terms of machine assimilation all lend themselves beyond conventional design along the three dimensional co-ordinates(X,Y&Z). As illustrated above time as represented by Einstein constitutes a fourth dimension. In my thesis decay, change and rhythm represent this dimension when nature, architecture, machine and man are overlapped. These qualities thus can be measured through biological and mechanical means.

ASSIMILATING THE CITYS WASTED RESOURCES

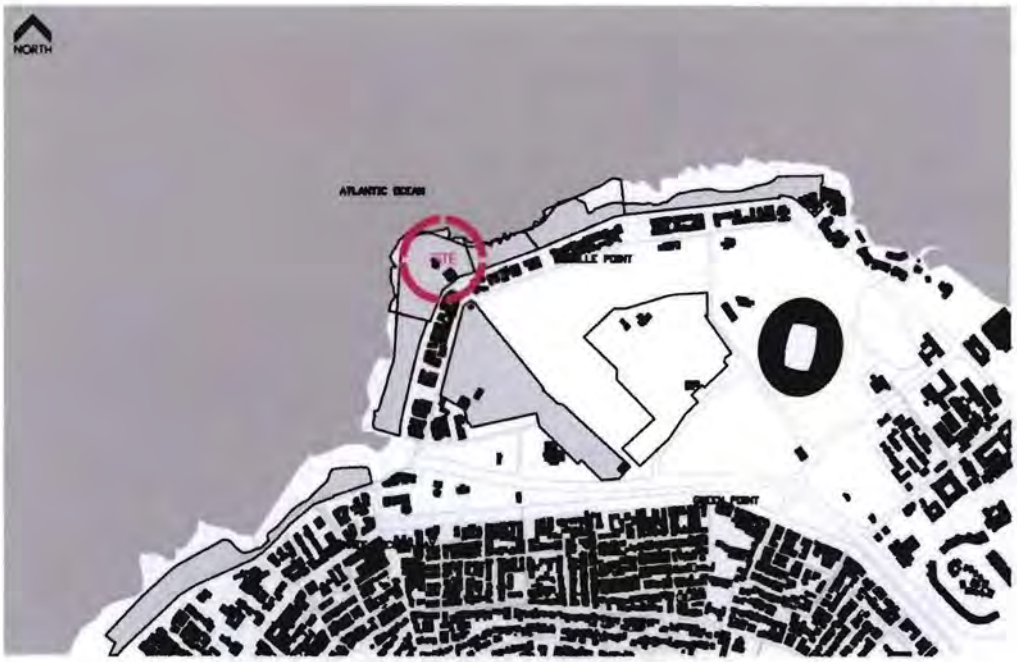
Mouille Point, Cape Town as discussed earlier has been the chosen site for investigation. One must reflect on the theory covered thus far as it has directly influenced site choose and analysis. We have already so far realized that assimilation of the machine within the realm of architecture moves beyond pure function. It is identity that changes ones perception of the machine as being an object in space, to an object that is part of the space. This ability to imprint on object too is created by the intangible qualities of mystery, intrigue, complexity, rhythm, and most importantly time. It is these qualities that were looked at to be enhanced at Mouille Point.

MACRO URBAN CONDITIONS

DIAGRAM 33

MISSING LINK: The site has greater urban potential than it currently realizes. The chosen site at Mouille Point falls within A string of public threshold spaces that link the sea to Table Mountain. The site too forms a hinge to the connection that is Seapoint to the V&A waterfront.

DIAGRAM 34

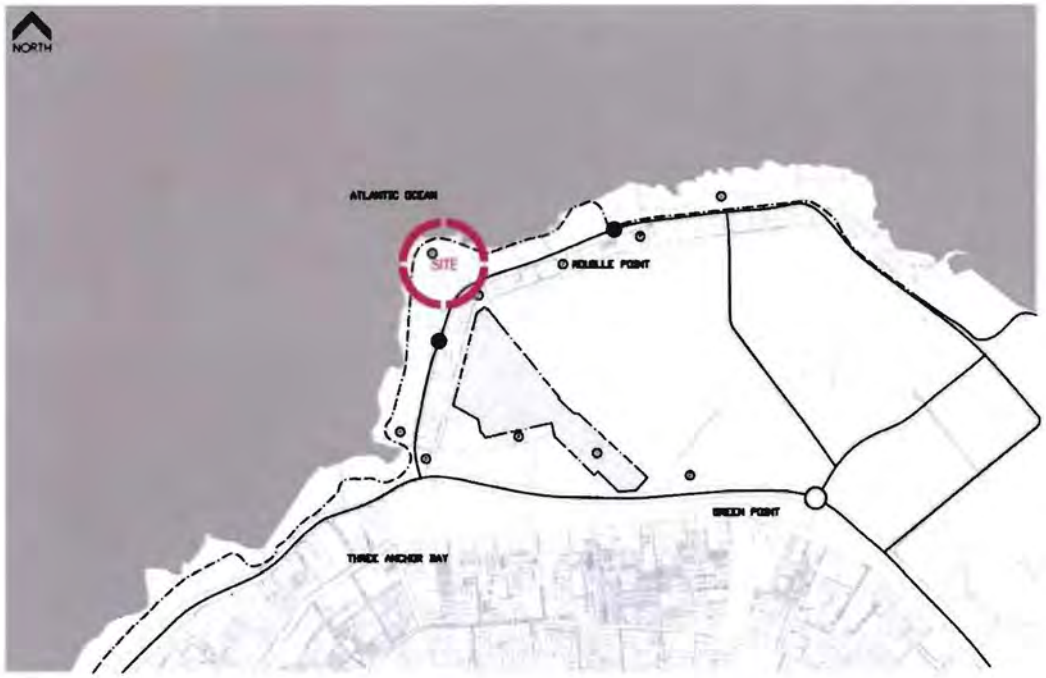


The chosen site falls along a band of zoned public recreation spaces for the city. Although building on this land is limited to facilities that serve for public recreation, there exist two heritage buildings that had been erected on the site before the zoning law had been applied.

DIAGRAM 35

Present on the site is Greenpoint Lighthouse (The oldest lighthouse in South Africa) and Greenpoint pump station and Marine sewage Outfall. These buildings although the only presence of construction on the site, hinder rather than facilitate public activity. They create a disconnect along the promenade and the link between Seapoint and the V&A waterfront.

DIAGRAM 36



This chosen site is the only area within the promenade that contains a route for vehicular access and parking. It also has a public walkway/ as one boundary and a scenic vehicular route as the other. There is also parking adjacent to the site and along the Southern boundary

DIAGRAM 37

The site has direct feeders from both a public/ pedestrian and vehicular perspective.

DIAGRAM 38

Although part of a public promenade and public recreation space, the buildings present create anonymity and fear as they conceal their functions. They create negative boundaries within a public space. One can note the villas and views are more prominent adjacent to the site on the East and West.

DIAGRAM 39

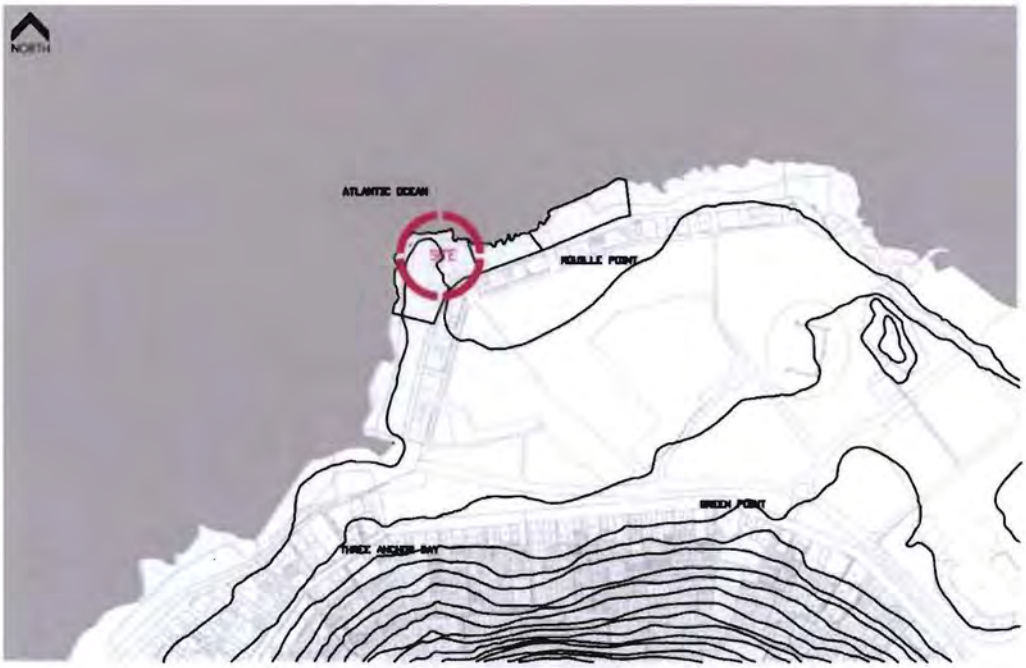
DIAGRAM 40

Volatile machines and structure inhabit the landscape and create negative perceptions of space

DIAGRAM 41

The ocean to the north of the site has greater intensity and potential than the land it borders. There is however, a disconnect created by the promenade at the site, as it indents within the landscape and so emphasizes the sea as an estranged object

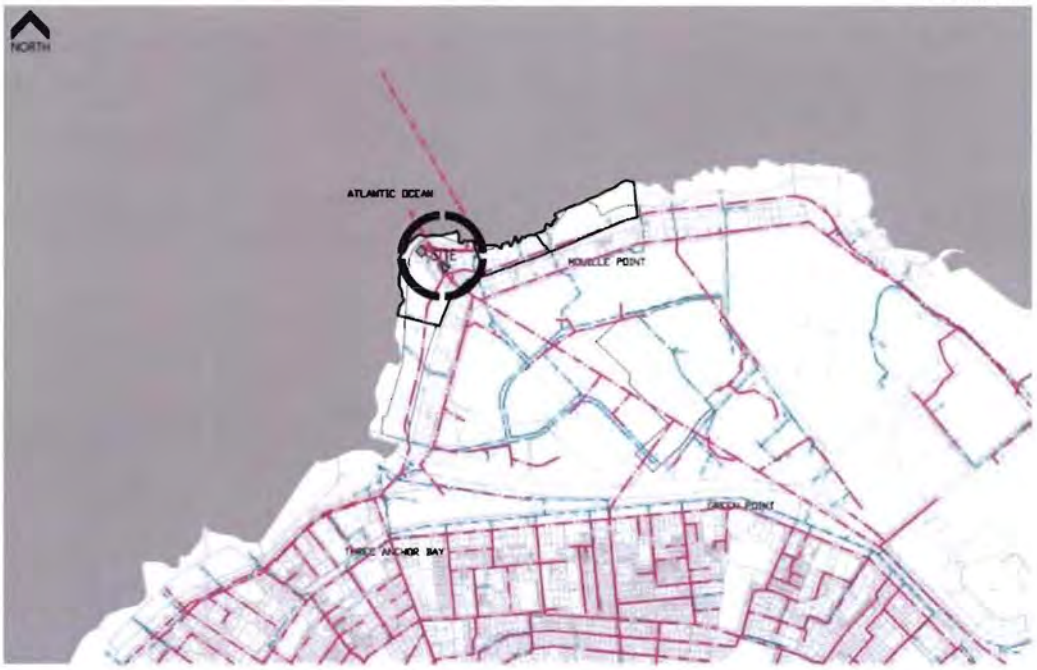
DIAGRAM 42



There is little to no topographic significance on the site. It is land that has been reclaimed and leveled out. The site has lost character and experience due to this reclamation. As noted the bordering sea captures more excitement and experience through its inherent brutal nature and dynamic.

DIAGRAM 43

DIAGRAM 44



An aspect that is inherent to the site that is not readily apparent when physically on it, is the articulation of the city's water systems. The site acts as a management plant for waste water removal. This aspect is one that will be greatly elaborated on in this thesis document.

DIAGRAM 45

MICRO URBAN CONDITIONS

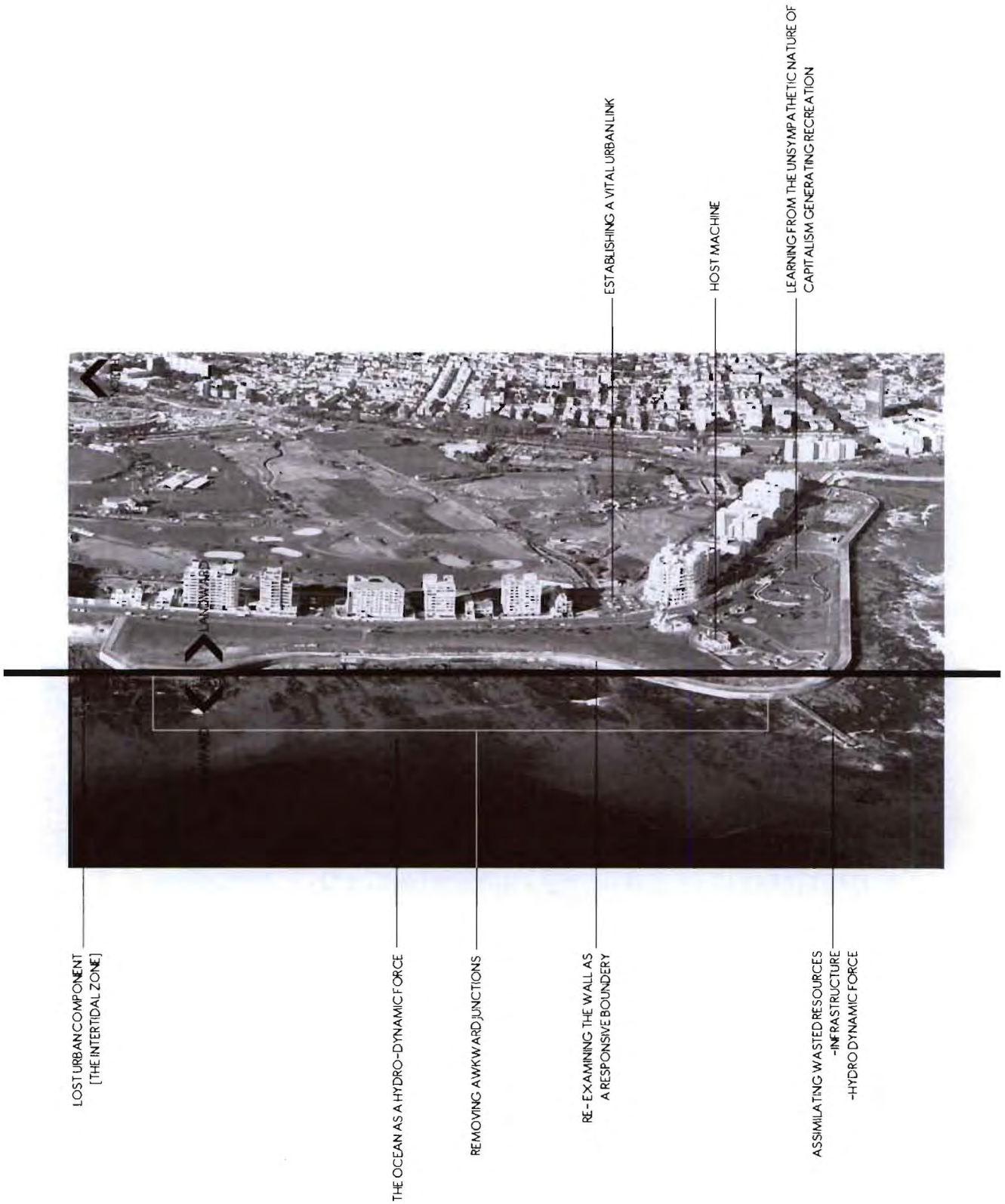
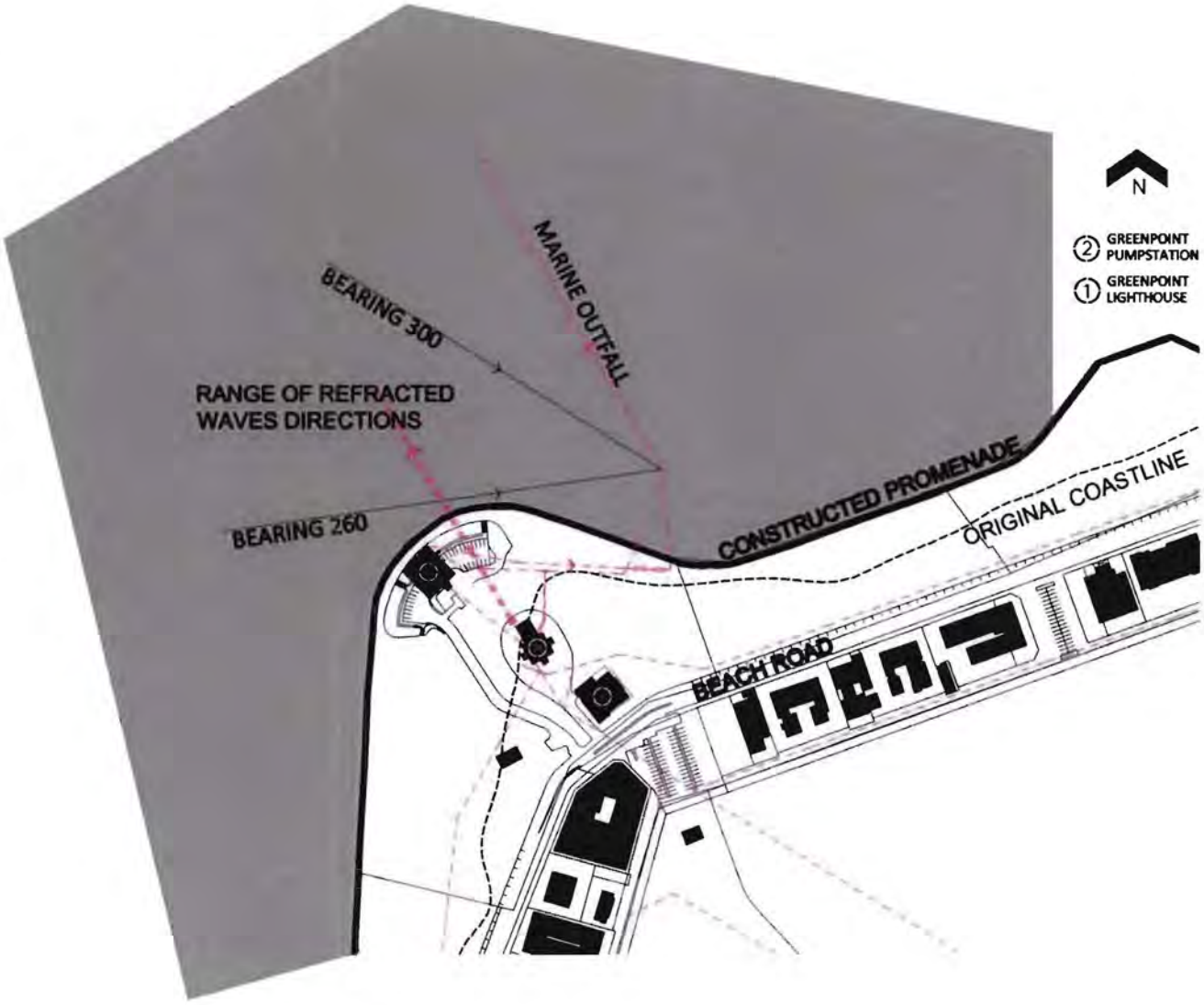


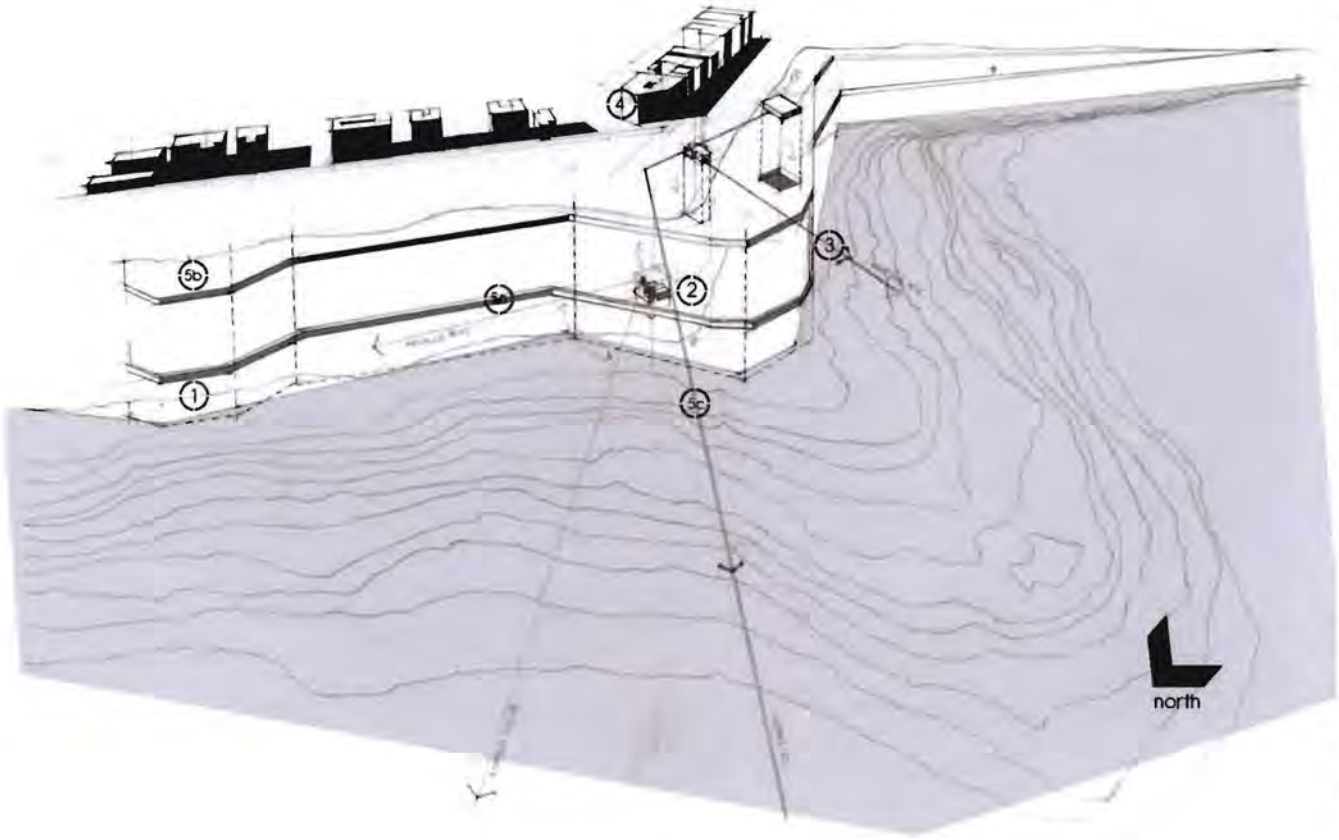
DIAGRAM 46 -Illustrated above are the primary conditions that were designed for and that will methodically be explored.

- As previously mentioned, this document focuses on the role of the machine abstractly in architecture, but also with specific reference to a chosen site. The site in this case is Mouille Point, Cape Town. The reason for this choice comes from the understanding that the site contains buildings on it that where created in the city to purely serve a function. They act in the same manner as machines, operated rather than inhabited. The site includes: The Green point Lighthouse and the Green point Pump Station.



47: MOUILLE POINT CONTEXT

- The diagram below shows the changes experienced by the site over time. This is important to note as it shows that a sensitivity towards the landscape has been removed as the city required the space for its "machines".



48: EXPLODED DIAGRAMATIC EVOLUTION OF SITE

1: The landscape in its natural form. The contour marked the high water level.
2: In 1824 a lighthouse was situated on the landscape and acted as a beacon along the coastline
3: In 1895 the original Sewage pump station was erected adjacent to Green Point Light house.
4: The extension to the Pump station resulted in the creation of another building tucked into the landscape, with a new marine sewage outfall
5a: The creation of a promenade was the result of the reclamation of land for the marine sewage outfall extension
5b: An infill layer was added behind the newly created promenade. This extended the land into the sea
5c: Development along the Promenade increased and in so doing over shadowed the original lighthouse

- As noted the Lighthouse and pump station situated at Mouille Point do not exhibit complexity or a refinement in design as machines. Their anonymity is not to be confused with mystery and intrigue. They do not make one look at their structures for a deeper understanding in how they work and what is behind the curtain that is the façade. Instead one is repelled by the fact that such function is disclosed and cannot be comprehended.

49: GREENPOINT LIGHTHOUSE

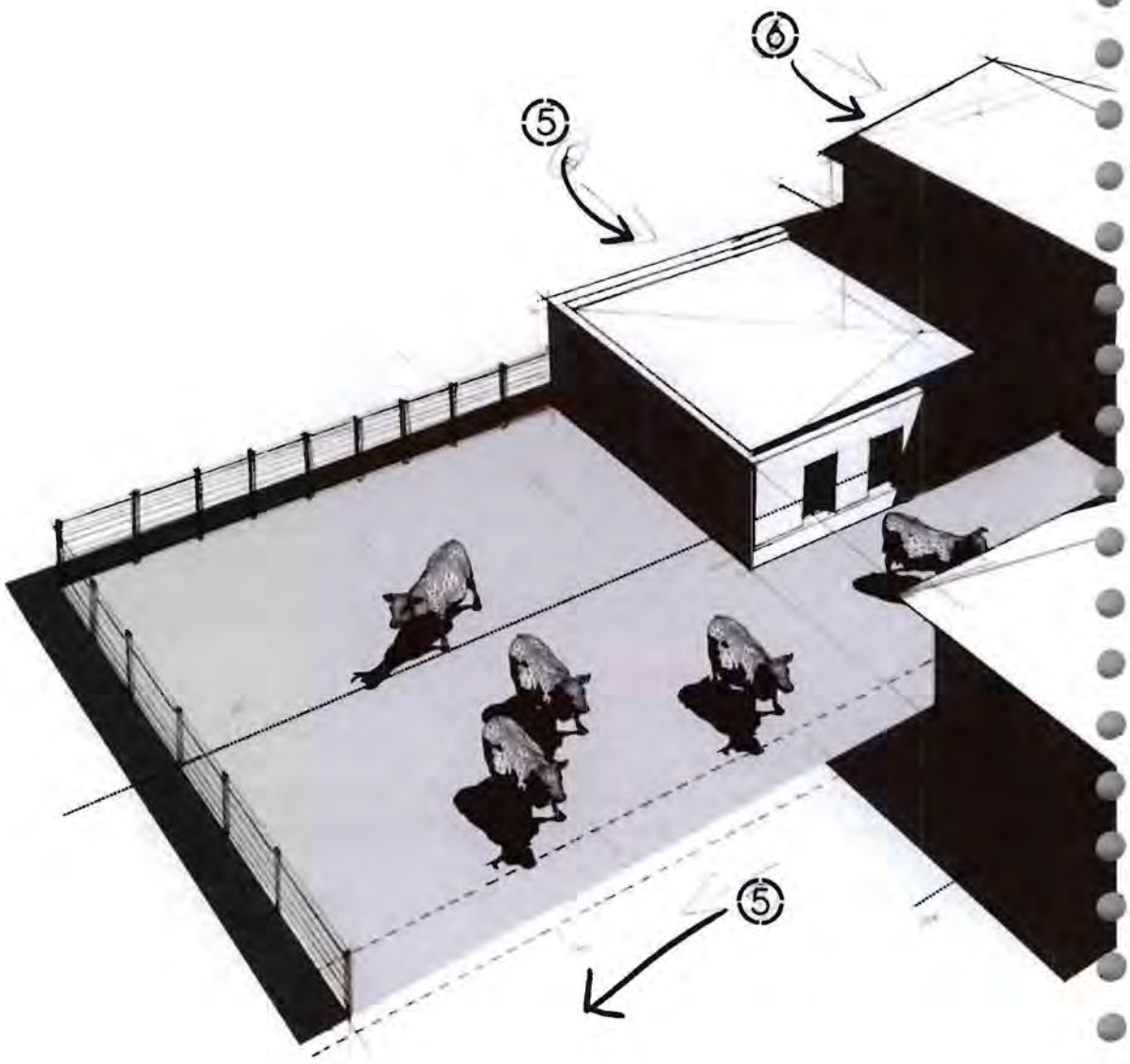
50: GREENPOINT PUMP STATION

- Here we see that both the Lighthouse and Pump station present on the Mouille Point site develop anonymity. The lighthouse has buildings attached to it that create a detachment between the structure and the surrounding urban fabric. The buildings also do not hint to what their functions are and whether they are related to the lighthouse or not. The pump station also creates detachment to its surroundings through the articulation of its form. This building can appear as some ones house or something more sinister. Its form does not indicate its function. The fact that the buildings have an anonymity associated with them is the reason the area becomes unsuccessful in place making.

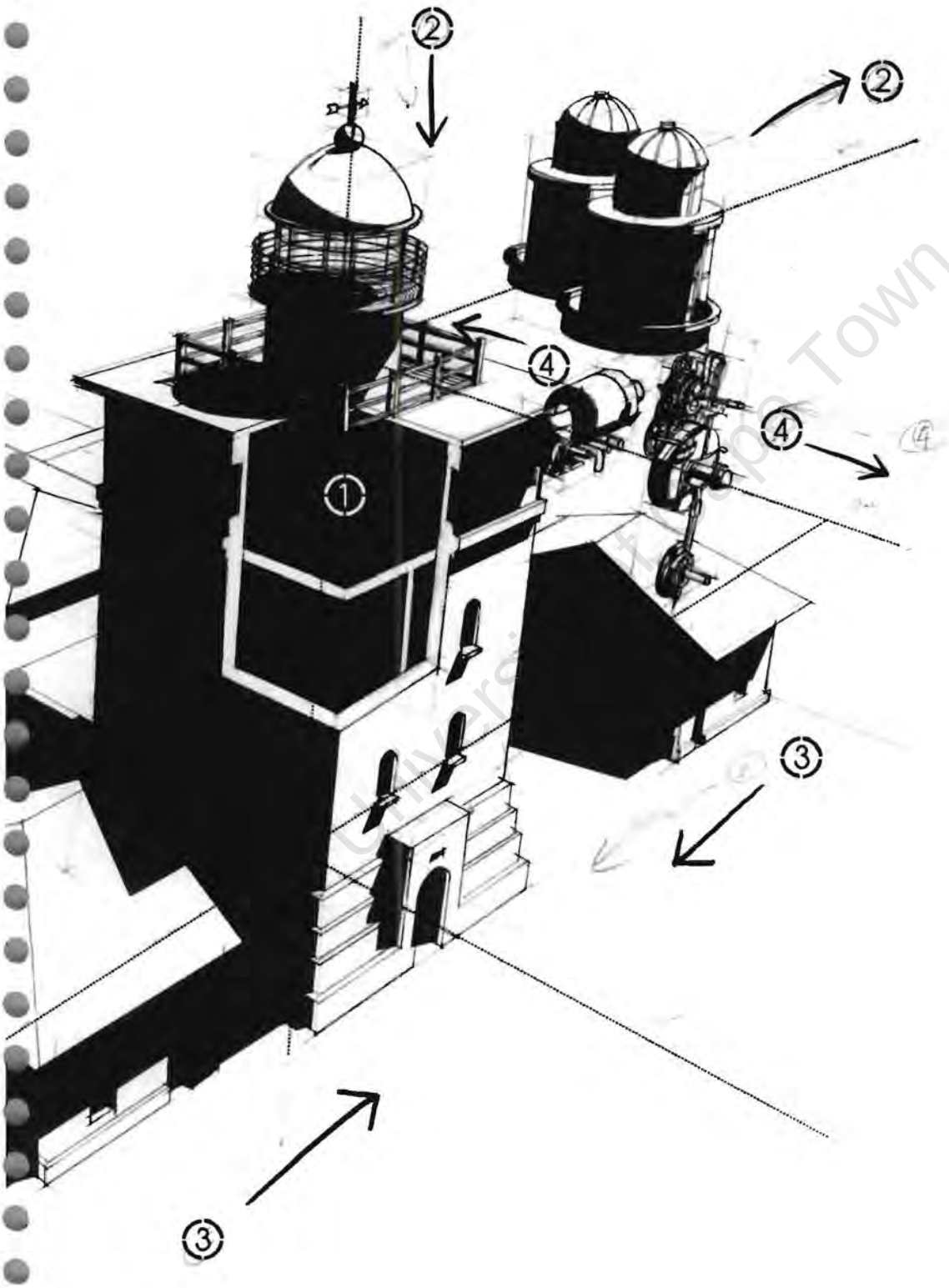
- This diagram of GreenPoint Lighthouse serves as a technical analysis of its history on site. The reason for this investigation is to assess what mechanism have allowed the building to progressively adapt through time and so remain functional within the context of the site and city

51: EXPLODED VIEW OF GREENPOINT LIGHTHOUSE HISTORY

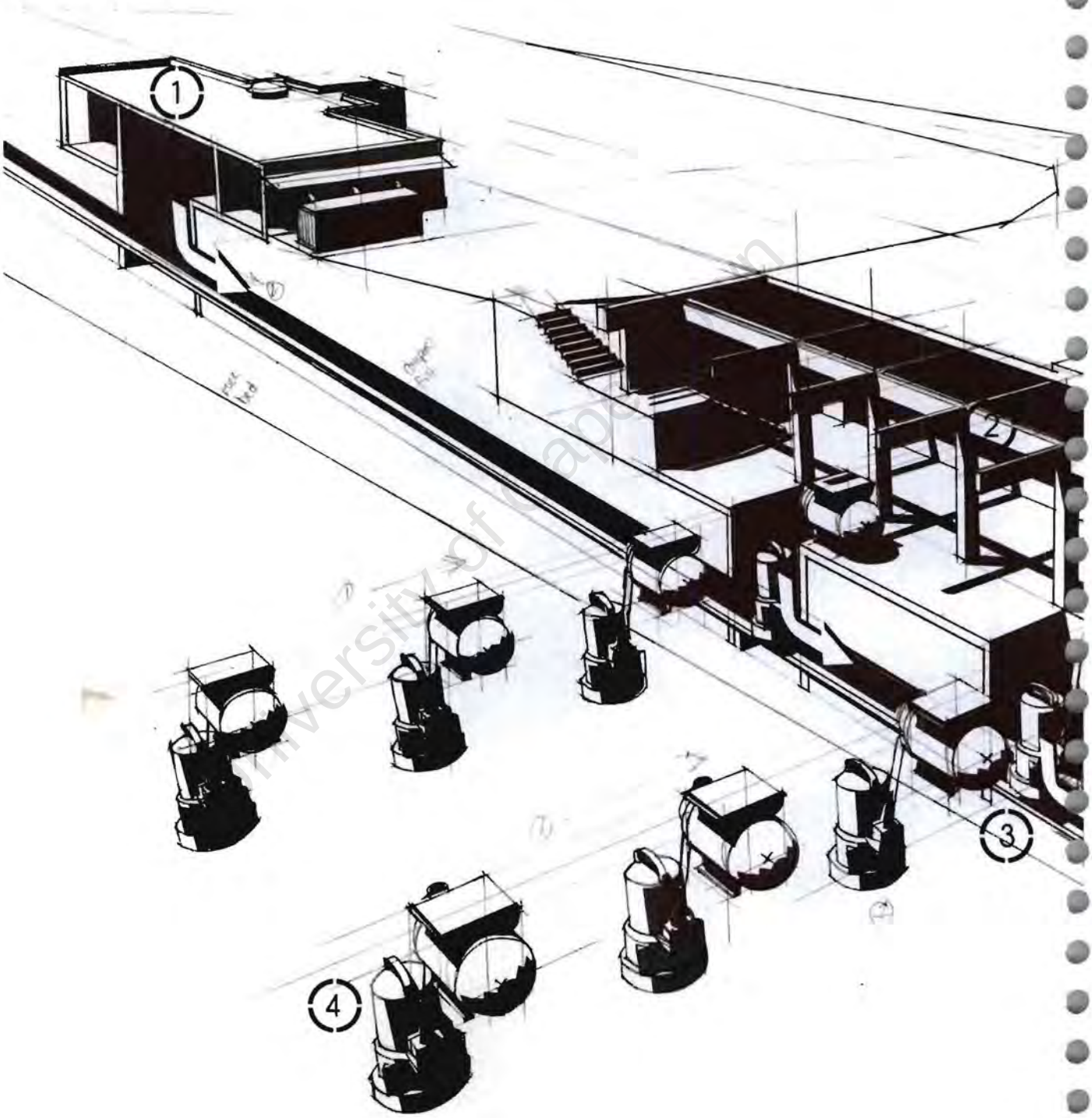
1: On completion of the working drawings for the building in 1824, it was decided to add a residence internally
2: The introduction of electricity meant that the original dual oil lanterns became redundant .They were replaced with an electric lamp
3: A second family moved onto the premises and additional space was required in the form of a common room.
4: Improvements in mechanization allowed for the removal of a clock mechanism (for lens rotation) from the tower and an electric motor replacing it
5: A maintenance room was required at the expense of the families living in the lighthouse losing what land they had available for farming.
6: Additional facilities were added presently for offices for the Lighthouse Business unit



- What we can see is that the Original Lighthouse building acted as a base to which things were attached and removed. Technological adaptation proved easy, as many of the processes were internalized. Inhabitation however proved to be the problem. The building provided little infrastructure for future development and so became overshadowed by development over time. This however has not impeded its ability to remain functional.



This diagram shows the Sewage Pump Station, in its active state at Mouille Point. I have chosen to illustrate the Pump station as an exploded element, to investigate the potential for maximizing its use at Mouille Point. The building is regarded as heritage and so cannot be altered; However the machines and infrastructure in the building offer opportunity for design. What we see below is effluent sewage waste pumped down a marine Outfall Pipe and the role the two parts of the Pump station have in this process. Through feeding off this process, opportunity to re-introduce the pump station within the landscape becomes viable. It can act as a cog within the functioning of a larger organization of buildings at Mouille point



52: EXPLODED VIEWOF GREEN POINT PUMP STATION

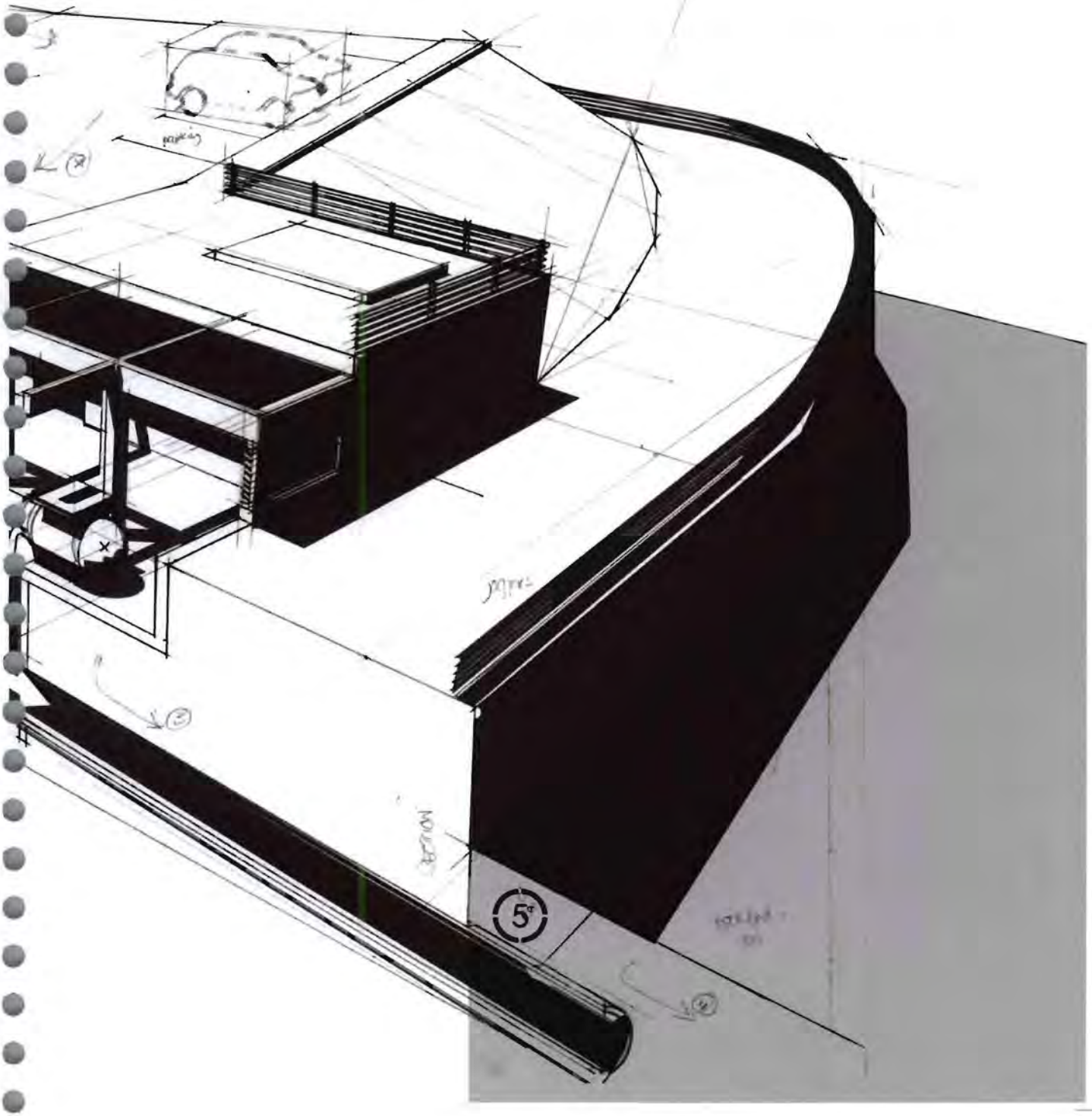
1: The original pump station at Mouille Point screens sewage though a 12mm screen

2: The Sewage Pump Station extension is hidden below the surface of Mouille Ponit. It is an area serviced and not inhabited. Its only inhabitants- machines

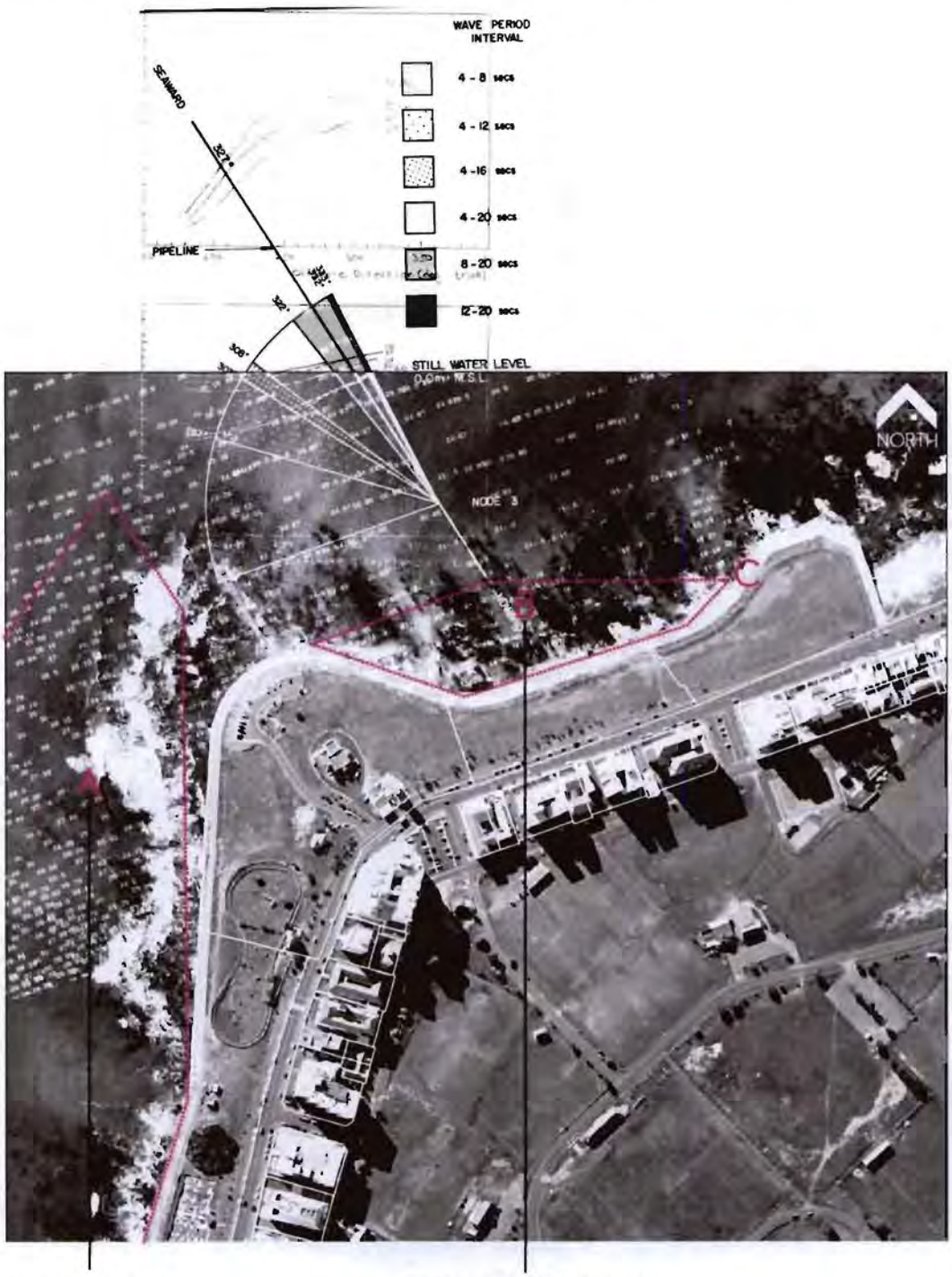
3: The Marine Sewage Outfall pipe contains pressurized water. This water is forced deep into the sea to be naturally treated.

4: The building contains 9 industrial sewage pumps. 5 wet pumps and 4 dry. These pumps have the capacity to pump water between 265L/s to 700 L/s each.

5: The Concrete Marine Outfall passes through the Promenade wall and rests on the sea surface bed.



- Here we see that Mouille point experiences very specific wave conditions. The diagram below captures the wave strengths at specific points. One can see that the points differentiate strong from weak wave activity. The tip of Mouille Point Promenade acts as a break water barrier to where the Marine Sewage Outfall leaves the landscape. The deflection of wave activity creates a protected enclave[B] within the promenade structure.



53: MOUILLE POINT WAVE PATTERNS

DIAGRAM 54

The adjacent side of the promenade [A] experiences much greater wave activity, be it low or high tide, than the side of the chosen site. This is due to the angle at which waves hit the promenade and that no barrier serves to minimize this impact. The waves approach the promenade almost perpendicular to it as noted above.

DIAGRAM 55

Overtopping occurs greatly along this area and can reach in excess of the path width. Overtopping refers to the water/wave as it crashes and passes onto the promenade level above

DIAGRAM 56

The prominent wave direction is from the NW. Due to the convex breakwater formed by the promenade itself. These approaching waves to the site are deflected by nature. They recompose themselves as they approach the Eastern quadrant of the site, but this force is not close to that experience by the adjacent side of the promenade [A].

DIAGRAM 57

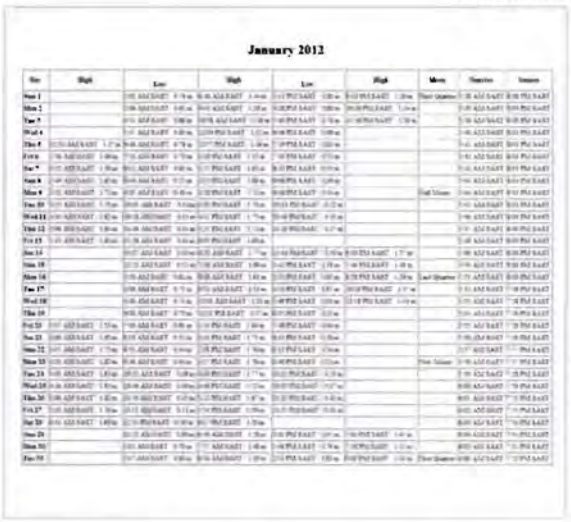
Here is an indication that although the same wave direction is experienced on a segment of the site, overtopping is severely reduced when compared to overtopping of the adjacent promenade side.

- THE PHOTOS OF BOTH THE SITE AND ADJACENT SIDE WHERE TAKEN AT THE SAME TIME FOR AN ACCURATE COMPARITIVE ANALYSIS.

DIAGRAM 58

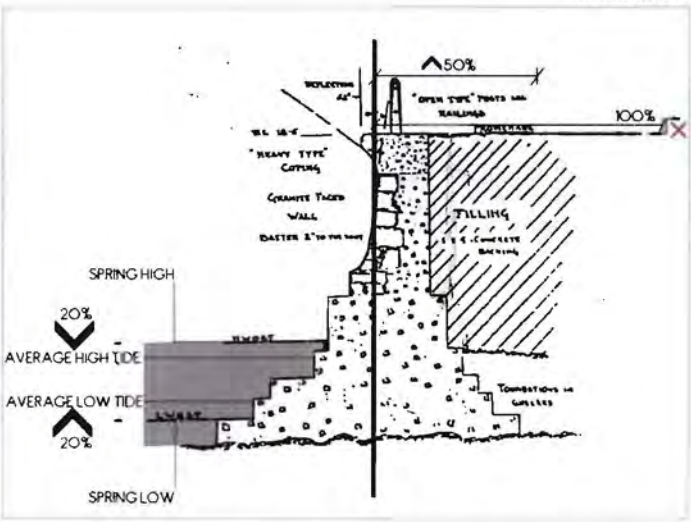
Here as indicated, overtopping along the seawall of the site increases to almost 50% percent of the public path width as waves approach the Eastern quadrant [C] and collide. Majority of the path remains unaffected by overtopping. The adjacent side [A] can range between 60-80% were actual overtopping is measure. The promenade path bordering the site however does experience high levels of swash.

DIAGRAM 59



January 2012

DIAGRAM 60

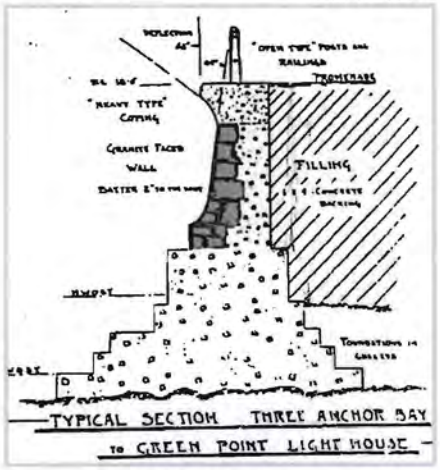


The water height for the seawall has been calculated based on the annual range of high and low tides for the area. The average High and low tide fall 20% percent above and below the respective spring high and low tides.

DIAGRAM 61

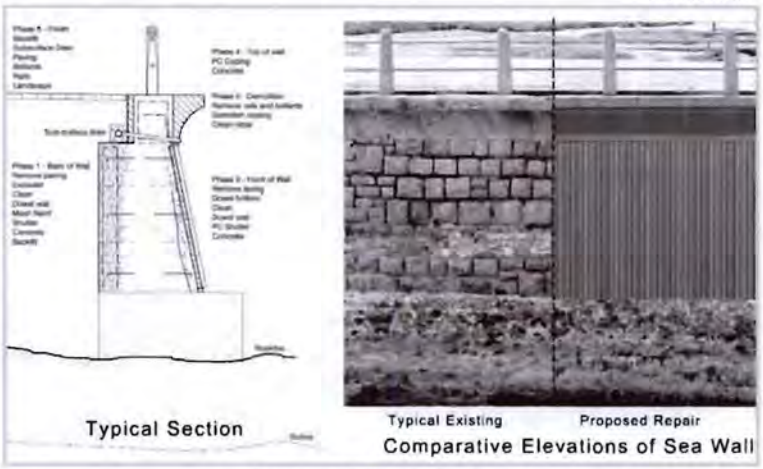
Opportunity arises for development| re-interpretation of Mouille Point seawall as it has currently reached a critical state of decay. Investigations into siting are further re-enforced also. The primary directions of strong waves are evident based on the rate and severity of decay experienced by the wall. Any sympathetic attempt to retain qualities of the existing wall can be disregarded. As indicated below the wall experiencing the highest rate of decay [adjacent to the site] will be replaced and refurbished with new concrete work. The alterations and reconstruction of the wall are proposed to go ahead within the next 5years.

DIAGRAM 62



Existing seawall

DIAGRAM 63



New seawall I[2 year development]

RE-INTRODUCING A LOST COASTAL COMPONENT

Historically the site acted as a productive landscape. Initially it acted as a vlei for grazing cattle. Later it accumulated small farm allotments. However presently, the site lacks character as a successful recreational space due to the nature of the "machines" on it. More importantly the connections between larger ordering systems of the city are disconnected. It is within this thesis that machines will be manifested as a positive in the production of landscape identity.

The theoretical material discussed thus far, demonstrates that through rhythm change and decay identity to objects and place can be created. It is then fitting that through the re- introduction of life through landscape, we can begin to build a better sense of place for the area and minimize the damage and negative perceptions of the present buildings and space. The landscape through careful consideration and design can become an extended "home garden" to the numerous apartment blocks and hotels in the area. The introduction of aspects such as smell all factor into how space and identity is then created in the context of the site. The site also acts as a coastal niche, where the act of nurturing can occur.

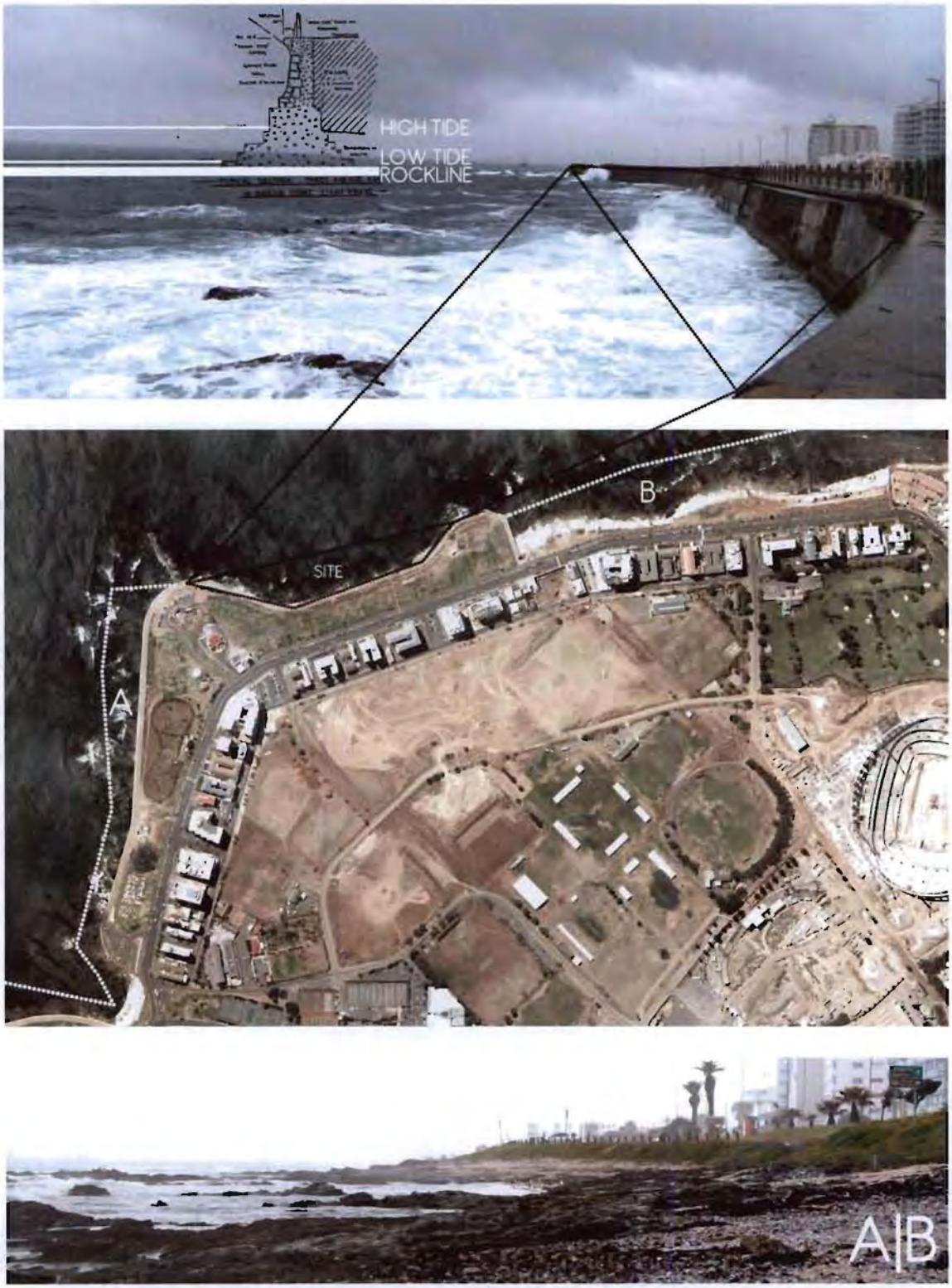
64: FARMS- The allotments adjacent to the lighthouse indicate small farm holdings

65: FARMS- The promenade populated by cows grazing

- The Lighthouse and adjacent quarters all had plots of land for agricultural use as noted in the diagram above. The land had value to the people using it, as well as being recreational.

This notion of a ***PRODUCTIVE LANDSCAPE*** is one that interests me. Re-introducing agriculture may induce public interaction and create a sense of place and "being". This notion too carries with it complexity, on both cultural and technological grounds. A dichotomy exists in what agriculture is today versus its production in the past. Agriculture is no longer an act of nurture and time, but a commodity devoid of these processes. In this light the intrinsic quality of nurturing and cultivation has been replaced with mass production and efficiency. The two methods of production speak of Mouille Point's landscape in its past, present and even future state. A dramatic shift occurred from predominantly natural occupation to mechanical. The tower of Babylon (The living ruin) illustrated man's self-assertion in the world and how nature was a measure of man's mortality. Through this analogy one gets an understanding of how agriculture and the act of growing can become a measure of time and mortality. This becomes ever more important in creating identity and moments of reflection in agricultural space, when now agriculture is more synonymous with machines than nature.

DIAGRAM 66



- The site chosen clearly lacks an intertidal zone. Both high and low tide fall against the promenade wall. One can see that the adjacent areas A&B have retained this quality of revealing and concealing rock formation with the tides and creating playful and mysterious terrains.

DIAGRAM 67

- If agriculture is too be grown at Mouille Point it requires a unique growing bed for production. The availability of water hints at hydroponics as the primary method for cultivation. The qualities inherent of the intertidal zone are not to be dismissed. A transfer of these qualities can occur when the infill [used to level out the promenade] is removed and so the original coastline below revealed. Simultaneously and more powerful is the notion of using an alternate, unaccommodating landscape and "terraforming" it. The sea as a landscape for agricultural production has far greater urban, cultural and social potential than its land based counterpart.

- The landscape below uses rock beds for agricultural growth. The chosen site for this thesis investigation lacks this zone, but this proves to be to its advantage. What is apparent is the need for a mediating boundary to protect crops during growth cycles from strong ocean waves. The introduction of a new boundary at the site comes with it the ability to reclaim land that can then represent itself as shown below. A seawall can act as a mediator that allows mimicry of the landscape below (where it once was not present) opposed to destruction of the intertidal zone along another location.

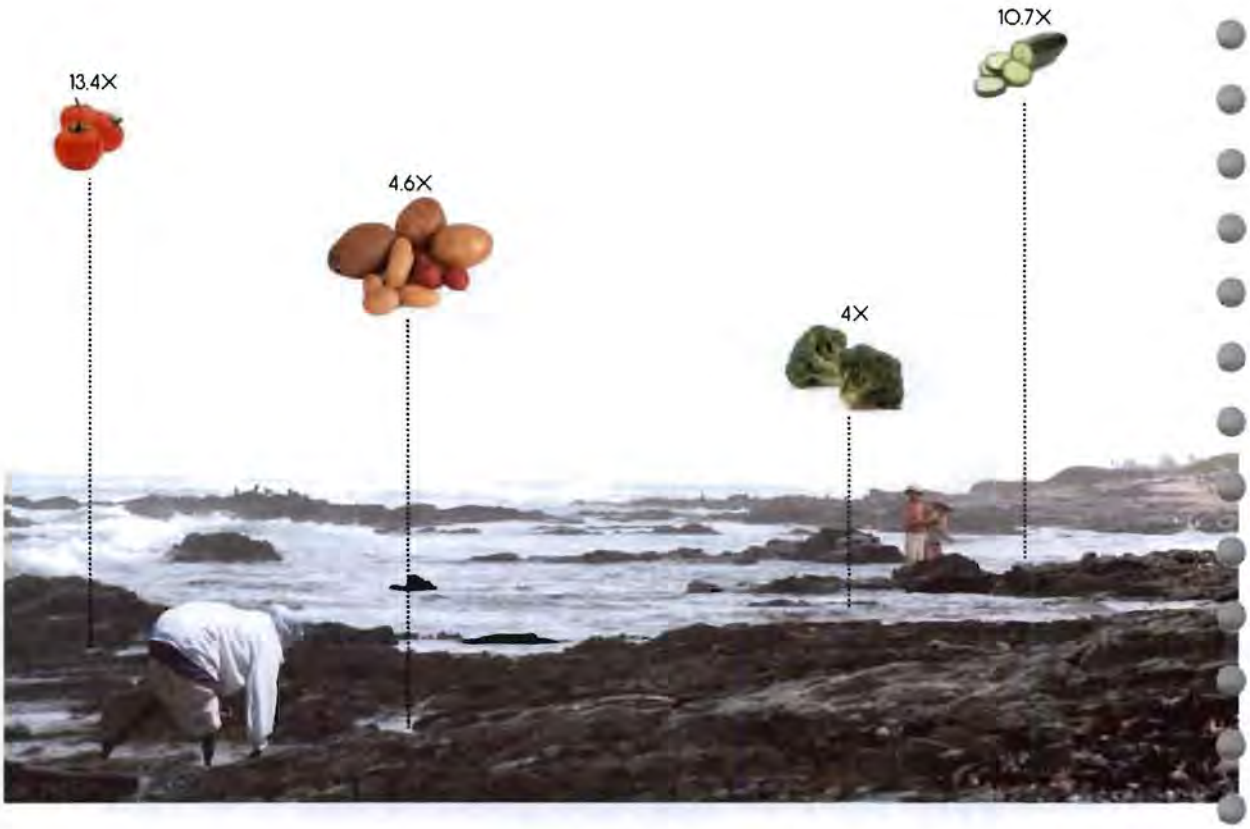


DIAGRAM 68: The values above indicate the ratio increase in production of each crop by the migrartion from land to water based methods of production

1: A boundary wall for protection against ocean waves

2: Desalination as a production method for freshwater, as it will be required in large amounts (initially).

3: Salt tolerant crop use/ or expansion in this field of crop production and research

4: Crop type by this method of cultivation can have a spatial impact on land availability

"We can evade reality, but we cannot evade the consequences of evading reality" -Ayn Rand

69: ALTERNATE FOOD GEOGRAPHY-PUBLIC FARM| PUBLIC SPACE

REFASHIONING NATURE

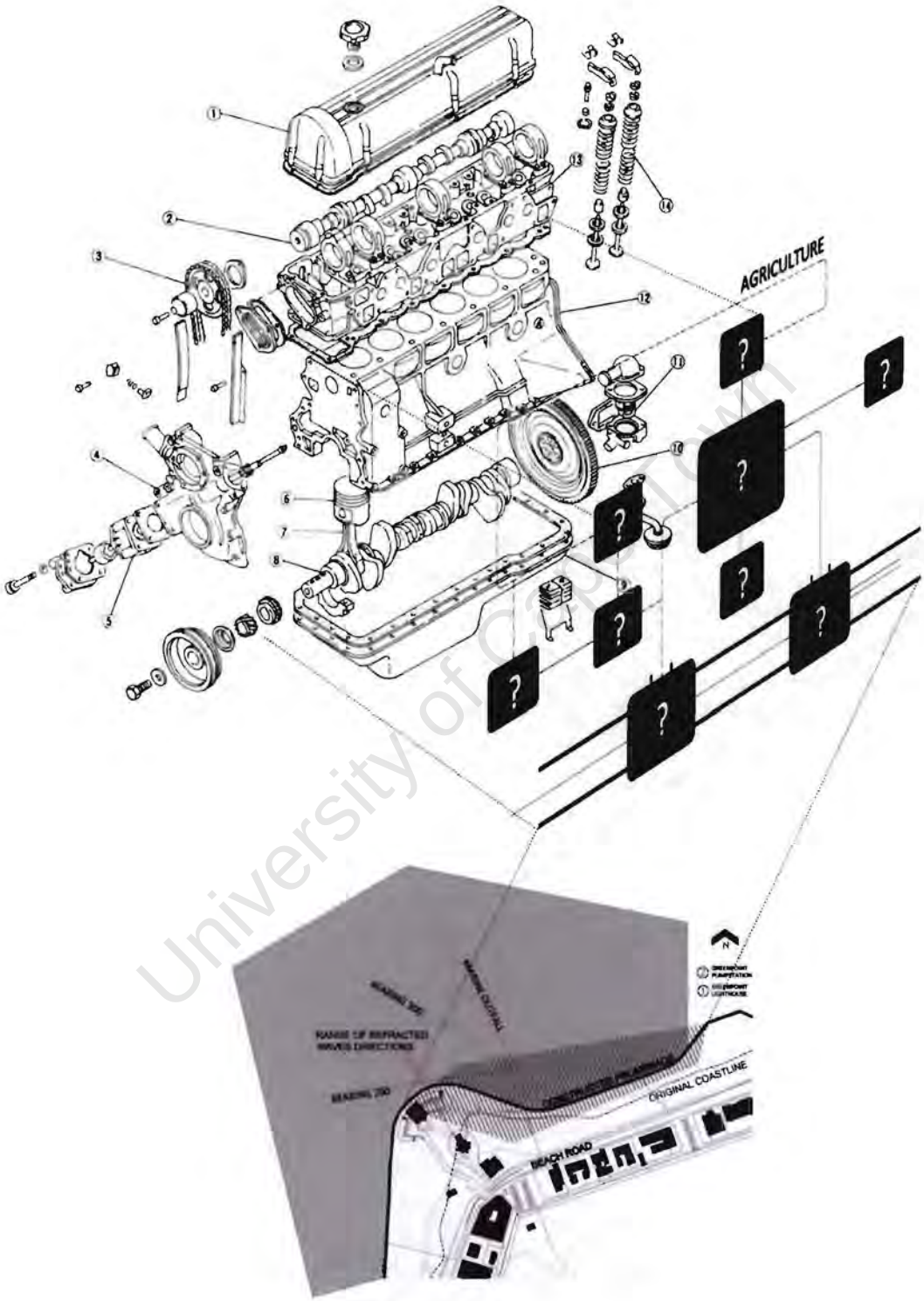
"We owe a cornfield respect, not because of itself,
but because it is food for mankind"- Simone Weil

The reality of the present human condition is that we delude ourselves over what resources we have available to us. Yes- technology has rendered almost every aspect of our lives easier and more convenient, but at the same time this very technology masks the truth from us. Nature no longer constitutes a staple part of our lifestyles. It has become a luxury in every sense of the word. Technology has fooled us into believing that our supply and demand needs can always be met. This is because we always look at the production of goods or refinement of resources objectively from a distance. We rarely consider the implications our choices have on the "bigger picture" in regards to nature's ability to constantly satisfy our needs. The most critical realities of late, do not center on production methods. They stem into the simple fact that we are outgrowing our environment. The excessive demand put on the land, by exponentially increasing populations, is far over reaching what can often be supplied.

The human physiology is unlikely to change and so our needs for nourishment in the form of food and water will always be a factor to consider. This is where my interest in agriculture and production expands on the concept of re-introducing a productive landscape at Mouille point, Cape Town. It is the central idea that we are biologically hard wired to need nature for nourishment, but also that nature demands respect in itself because it provides us with nourishment. The social responsibility we should have towards agriculture is that of taking and putting back into the land. A symbiosis should exist for good methods of production and sustainability. What we have come to realize is that this is not common practice. We take but do not nurture or give back equally. This I feel can be attributed to the fact that we are detached from the actual process of agriculture and so build up a picture in our minds of what a farm is and how it functions without really understanding it. We view farms and agricultural production in a picturesque manner. This however, is quickly juxtaposed against the demands we make on the landscape in a mechanistic fashion. It is this juxtaposition that has rendered nature a victim to deterioration.

I think it is important to note that this document looks at the ability for land to be productive on more than simply a supply and demand need. It looks at how, as an architect, a response to this current system of production can be improved upon and in so doing create a stronger sense of the symbiosis between man nature and machine. We are at a point where we have to refashion nature realistically to meet the needs of population growth. However, this does not mean the creation of socially, economically or culturally exclusive places. The use of technology can be used to manifest a better sense of place, while at the same time having an overriding function. In this case specifically, it is that of agricultural growth.

Following, the various roles involved with agriculture will be evaluated and were overlaps, asses how these factors can be implemented on a specific site for optimum functioning.



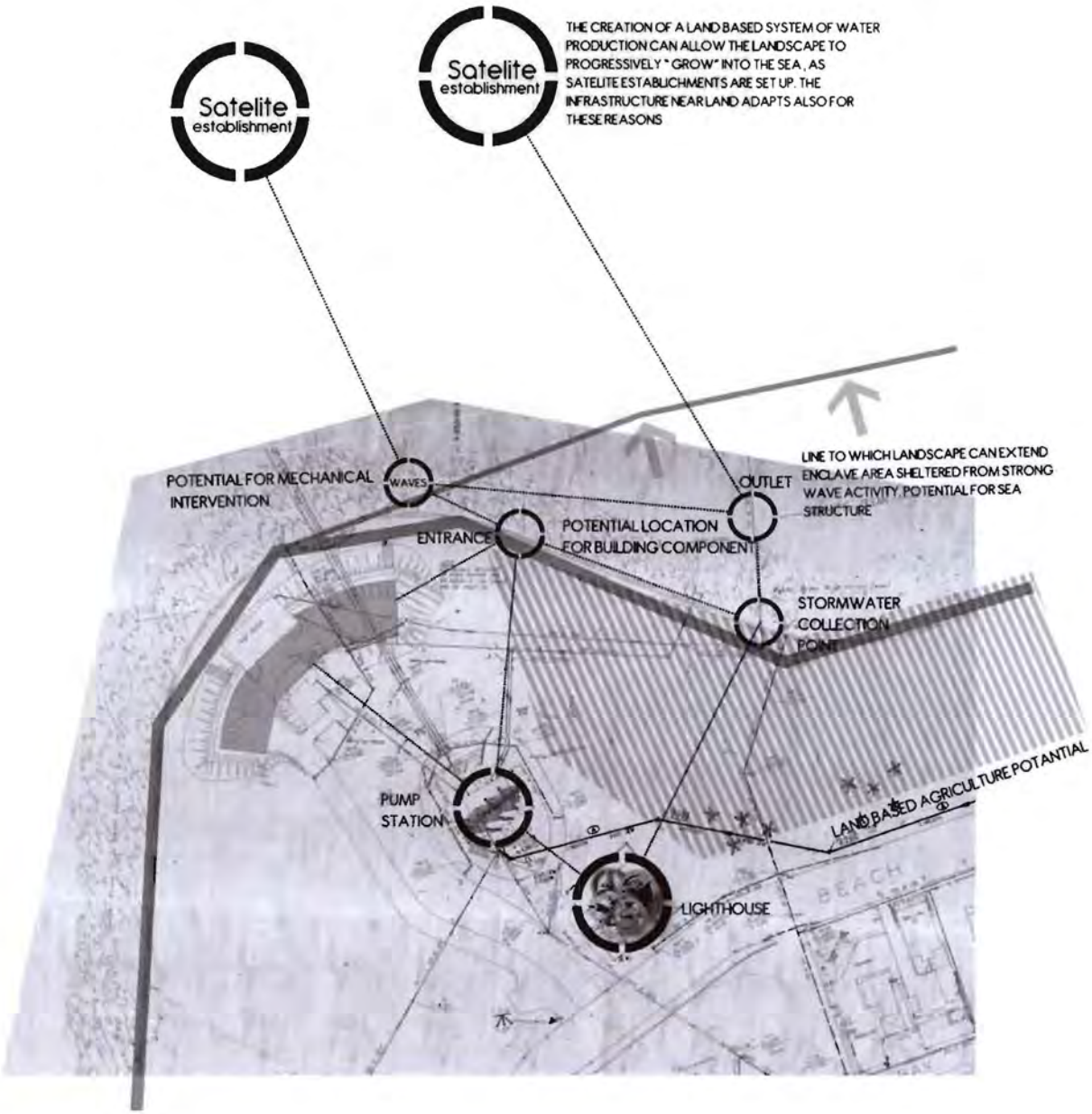
70: APPLICATIONS OF ENGINE DESIGN TO SITE A MOUILLE POINT, CAPE TOWN

NATURES NEW ENGINE

One rarely finds the words nature and engine in close proximity to each other. But as explained, the adoption of mechanization and mass production into agriculture is changing this view. The farm as we "imagine" it to be is far from what the reality of farming and crop production is. The need for resource quantity has pillaged the earth and this process will only continue as human need grows. The mechanistic approach to production is not what I am arguing against. Instead I am looking for the best solutions that will create ***SOCIALLY INCLUSIVE AND ALTERNATE FOOD GEOGRAPHIES***. The premise for this is that; as the resources that drive agriculture presently decrease, how do we begin to find different solutions to crop production?

This report is the schematic for an approach to agriculture located within a specific context. Here I am not looking for a building, but a process for which agricultural production can be maximized though the symbiosis of building, construction and nature. This process then manifests itself as a building component that actively facilitates the act of growing crops.

This document also highlights and focuses on the importance of water in agriculture. The Site at Mouille point, as will be illustrated, offers developmental infrastructure that can be utilized for better methods of water management. As noted, the depletion in resources is putting strain on agriculture and agricultural production. It is therefore important then firstly to consider the role and importance of water in agriculture and alternatives for water management in this specific field



71: TECHNICAL MAPPING OF SITE| WITH RESPONSE TO PROCESSES AVAILABLE

CRITICAL COMPONENTS FOR THE COMING FAMINE

THE LOGIC OF WATER REUSE

There is a worldwide concern about water scarcity. Fresh water has to be shared for both human consumption and agriculture. One realizes that this becomes very problematic, when the resource trying to be improved upon (agriculture) is dependent on another equally important and scarce resource (water). To fully understand how water could be managed better for the production of agriculture in Cape Town one first has to understand what these systems in place are. The analysis of the water management systems worked off the principles that fresh water for human consumption took priority over that for agriculture and industrial use. The processes that re-used or allow for water re-use become lucrative for the production of crops as what we are trying to establish is what the most efficient, cheapest and effective method of acquiring water for agricultural growth can be.

THE ROLE OF WATER RE- USE IN THE CITY OF CAPE TOWN

Within the city of Cape Town 95% of waste water is treated and re-used within the District. That constitutes the areas ranging from Hottentots Holland to Paarl. There is an average of 800 megalitres of waste water per day generated by the city that is then recycled by controlled methods in land based water treatment plants. However of this, 5% goes to limited treatment plants such as the Greenpoint Marine sewage outfall (on site).

Sewage water enters the Pump station from the greater Bantry Bay area and Woodstock. The water is then filtered through various filters (12mm-3mm screens) before being pumped into the sea. The filters remove organic solids, but do not eradicate many of the phosphates, nitrogen etc. needed for water purification. In this state the water cannot be used for irrigation, or drinking. Further processing is required to make the water usable. The waste water that is pumped into the sea has to reach a certain depth before it can properly dissipate. The natural bacteria in the sea then remove the nitrates, phosphates etc. (in a less controlled manner to that at the land based treatment plants)

Based on the understanding of the two processes of water treatment we have to consider which offers the better alternatives for water supply and why: The land based system as briefly discussed is Cape Town's primary method of water retrieval, but the marine sewage outfall is a curious case, as it does not purify the water, but offers a strong alternative to do so. Here I briefly explain the negative and positive impacts associated with the two systems. These will act as a guideline in deciding what system is relevant to the site at Mouille Point for agricultural production.

Land based Water treatment plants

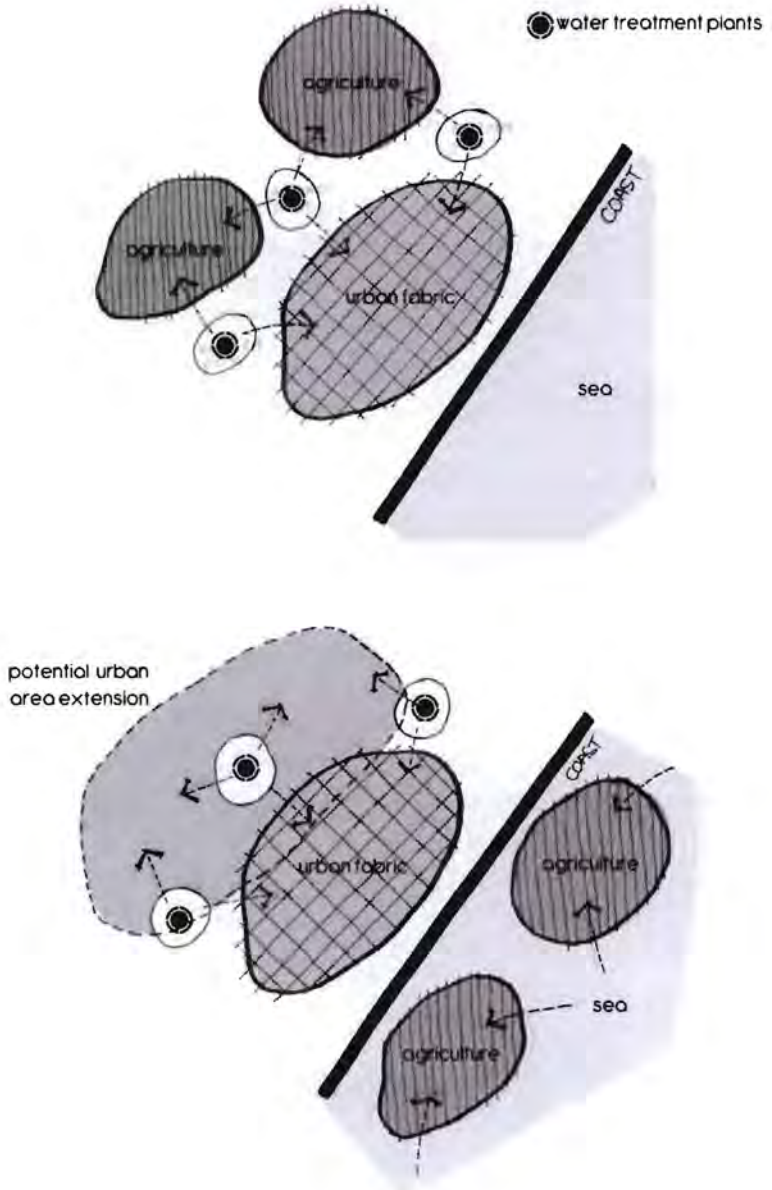
- Water is treated more effectively, than at that of a Marine Sewage Outfall, as the process is controlled through bacteria cultures.
- The infrastructure is already in place within Cape town

The Marine sewage out fall although not a processing plant, rather a screening facility is located along the coast.as a result a process by which freshwater is acquired from sea water can be used:

Desalination plants: (removal of fresh water from the sea)

- Water source is not limited; sea water constitutes 97.5% of the water on the earth's surface.
- Desalination can be performed more passively for plant growth, as in the case of Sea water greenhouses and so is more economically viable in the production of crops as less stages of filtration are required than for consumption.

What these two systems illustrate is that in conjunction, they can make for a more efficient use of water within the city of Cape Town. Careful assessment and consideration could allow the systems to create positive spin-off effects for each other and resultantly the city.



72:MIGRATION- "SPIN OFF" EFFECTS OF DESALINATION IN AGRICULTURE PROCESS.

DESALINATION

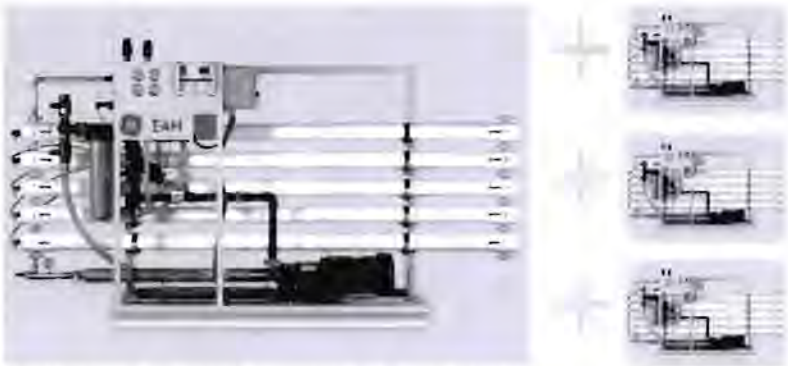
OUR FUTURE RESOURCEMADE PRESENT

"Almost no country has achieved a rapid ascent from hunger and poverty without raising agricultural productivity"- Bill Gates

Desalination is a technical process that can increase the availability of fresh water in coastal areas and in areas where brackish water exists. This is done by the removal of fresh water from saline water sources. Water desalination is a well-established technology, however there are both positive and negative associations to its implementation. One must understand that this document highlights the process on the grounds of how the technology has developed thus far, where its applications are applicable in agriculture and the systemic improvements expected in the technology, for future use. The proposal developed is one that allows site specific conditions to factor in to decrease the social and economic cost of production. The chosen site at Mouille point proves very important in the initial establishment of this type of technology. Essentially, the site has the potential to act as a catalyst for this technology in agricultural production. The infrastructure and systems in place create a ***VERY SPECIFIC NICHE*** unlike any other in the city of Cape Town. Water resources at present are based on the climate and conditions faced by a specific area and so face variation. Implementing this technology creates agricultural security.

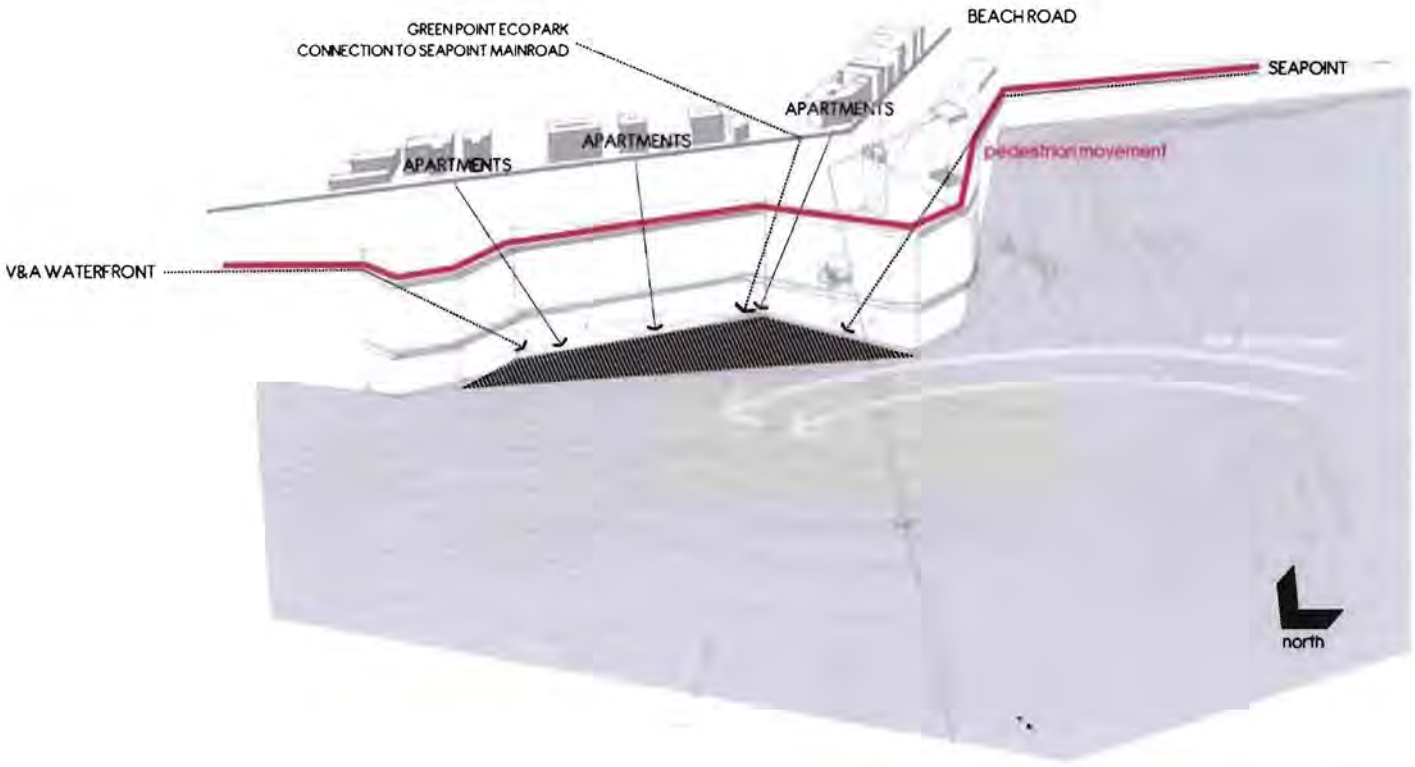
THE PROCESS OF DESALINATION

Distillation and Membrane technologies are the main driving force in the Process of Desalination. Multistage Flash (MSF), Reverse Osmosis (RO) and Electro Dialysis Reversal (EDR) are the three most common preferred methods of this. The RO method of desalination is the most flexible system in terms of the technology and proves the most viable for the role of desalination in agriculture. (Martinez Beltran,J &Koo-Oshima,S ,2004) The membrane processes for desalination include: Electro Dialysis (ED) and reverse osmosis (RO).) The ED method removes salt from water by means of an electric load application. Whereas the RO method uses pressure to force water through a semi permeable membrane that then removes the salt content. The membrane acts as a sieve. The more times the water is passed through the membrane, the higher the quality of the fresh water product.



73:ADDITIONS: The Reverse Osmosis method allows for addition units to be added at a later date

- In the past the high cost of desalinating and the energy required have been the main factors governing the "accessibility" of the technology. These constraints however are becoming less restrictive, as the price of desalination is progressively decreasing and the price of ground and surface water increasing to meet population demands. One must note that the price of desalination still remains too high to be fully implemented as a resource in agricultural growth. There does exist an economic opportunity to subsidize the process within a specific site or context. This is done when desalination is applied for the production of cash crops. These included fruit and vegetables etc. This is important as a component of the landscape at Mouille Point can then be used for crop production to generate income and so subsidize the process. The area proves to have a target market of apartment households, restaurants and hotels that readily feed into the market of this type of production.



74: AVAILABLE MARKETS FOR SITE

The RO method as mentioned is the preferred method for agriculture, as it comes with it rapidly transforming technology. Membrane technology is gaining wider use in water/ waste water treatment fields across the board, and not only specific to desalination. Technological trends have thus shown increase and development in: membrane solutions, increased energy efficiency and increased recovery ratio for seawater. This is important when considering the future expansion of the landscape in accordance to production and technology, as would be explored at Mouille point. (Martinez Beltran,J &Koo-Oshima,S ,2004)

One can see how this type of rapid transformation in regards to this specific area, links back to agricultural growth and production along coastal areas. What has been noted thus far is that the viability of Reverse Osmosis Desalination rests on the costs associated with energy consumption. The more treatment stages, i.e. times the water passes through the membranes, and the higher the salt content of the water, the higher the energy cost. This is where the site at Mouille Point becomes very specific in its ability to combat these expenses. The site offers the ability to collect storm water and so this fresh water supply can be stored and then mixed with sea water to decrease its salinity, when freshwater is to be produced. What will happen is that the water dilution reduces salinity and so the membranes need use less pressure and energy to remove fresh water. Secondly water used for irrigation purposes require less stages of filtration than that from water consumed by people. This immediately decreases cost as to the number of stages the water has to undergo for the site and to be used for irrigation.

Another important factor that must be considered by the reverse osmosis production method is that modular creation of units exists. This means the production of the systems, when implemented in specific context can grow as the demand for water increases. ". Modularity is favored as a desalination plant can start off small and grow as the cost of energy decreases and the need for water increases. In regards to the architectural field, the size of desalination plants can vary by this method

This technology I believe can be applicable in the use of an urban coastal condition because of flexibility, size and potential growth. However, an understanding of the other influences on this specific technology and field must be accounted for. They respectively are represented in economy of production. This includes energy consumption and production as well as the infrastructure need in construction. Environment is also one to be evaluated on, for applicability.

Three aspects must be considered to obtain an average cost for desalinated water in a design process:

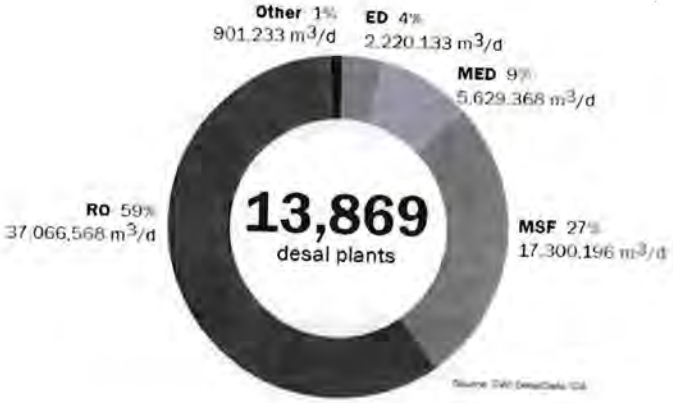
- The technology to be used for desalination
- The quality of the feed water to be desalinated
- The required water of the product water.

(Martinez Beltran,J &Koo-Oshima,S ,2004)

Agriculture tends to lean towards the lower spectrum of cost in this process, meaning lower quality of water needed to be produced, as well as cheapest method of desalination production needed. The product may have a salinity factor higher than that for human consumption. This can be used in dual with saltwater tolerant crops. The more carefully the systems and method of production of crops is looked at on the whole, the more effective desalination will prove as a viable alternative for water production. We are not looking for perfection in water clarity; we are looking for the best method for growing agriculture and the production of crops.

TABLE 2
Installation and operational and maintenance costs of various desalination plants

Desalination plants	Installation costs	Product water costs
	(US$/m³)	
Multistage flash distillation	1 200–1 500	1.10–1.25
Multistage flash distillation (Singapore)	2 300	1.50
Multiple-effect distillation	900–1 000	0.75–0.85
Multiple-effect distillation (Metropolitan Water District, California, USA)	660	0.46
Vapour compression distillation	950–1 000	0.87–0.95
Reverse osmosis	700–900	0.68–0.92



75: COST: PREFERERENTIAL CHOICE OF REVERSE OSMOSIS UNIT
(Martinez Beltran,J &Koo-Oshima,S ,2004)

TABLE 3
Energy consumption and seawater desalination costs in Spain

Year	Energy requirements (kWh/m³)	Costs (Euro/m³)
1970	22.0	2.103
1980	18.0	1.803
1985	15.0	1.112
1988	13.0	1.102
1990	8.5	0.961
1992	7.8	0.871
1994	6.2	0.751
1996	5.3	0.661
1998	4.8	0.528
1999	4.5	0.521
2000	4.0	0.504
2001	3.7	0.492
2002	3.5	0.428

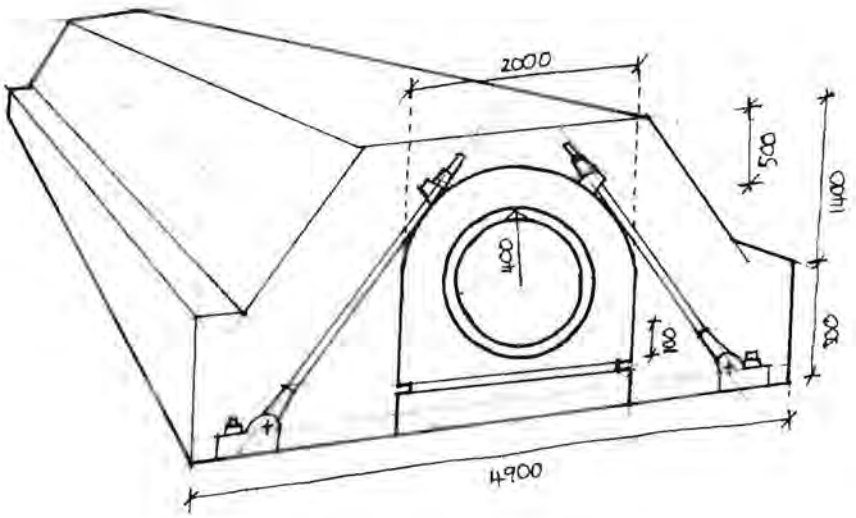
Note: US$1 = Euro0.83 as at 27 April 2004.
Source: FAO, 2003b.

76: DECREASE: NOTED DECREAS IN THE COST OF WATER PRODUCED BY DESALINATION METHODS OVER THE SPAN OF 30 YEARS
(Martinez Beltran,J &Koo-Oshima,S ,2004)

ENVIRONMENTAL CONSTRAINTS

The process of Desalination brings with it the production of Brine waste. Brine waste is a composition of both salt and waste that is removed from seawater in the filtration process. This byproduct cannot be used and so must be disposed of. This is where location becomes very important in determining economy. The closer the location of the plant to the sea, the fewer infrastructures required to pump the Brine waste into it. An outfall is needed so that the brine can be pumped a sufficient depth into the sea and so that the waste solution dissolves into the ocean without causing damage to the natural marine eco system. The Brine water should also if possible be mixed with a water source with a lower salt content, to make it less concentrated. A Desalination plant or the use of the desalination process near a marine sewer outfall is a good alternative for this, as the infrastructure for marine based water disposal is in already in place. This means that a marine sewage outfall has the potential to dispose and simultaneously dilute the concentration of the brine, as it passes through the pipe. This process becomes symbiotic between that of the marine outfall and the desalination process resultantly. The waste is removed from the process and this brine waste at the same time, when mixing with the effluent water waste from the sewage outfall increases the waters density. The increased density results in the pipe experiencing less buoyancy then and so structurally becomes sounder. The sewage pump station thus can be fed off of in terms of infrastructure

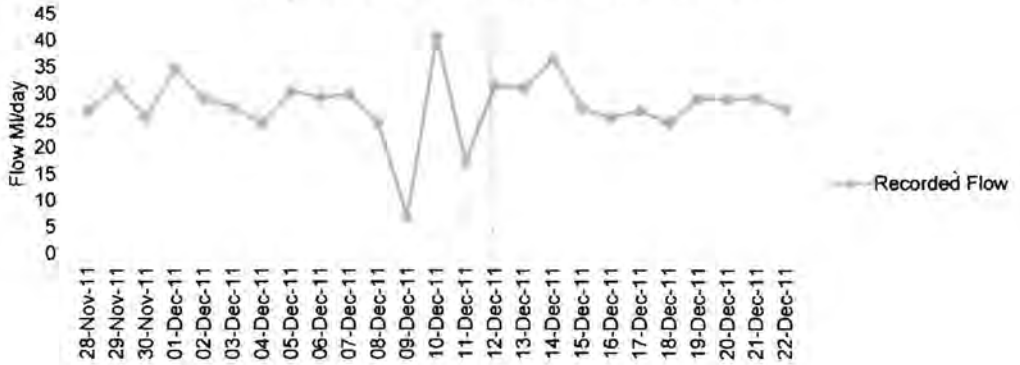
Inland Desalination plants become substantially more expensive in the regards to brine disposal. Provision must be made to discharge the brine down to the sea via pipes, or the brine must be processed by means of evaporation ponds. The use of piping is dependent on the distance of the plants from the sea and so increases incrementally with this factor. Evaporative ponds often serve as a better solution, as the brine is then dried and collected for disposal. (Martinez Beltran,J &Koo-Oshima,S ,2004)



77: DETAIL SECTION THOUGH MARINE OUTFALL PIPE

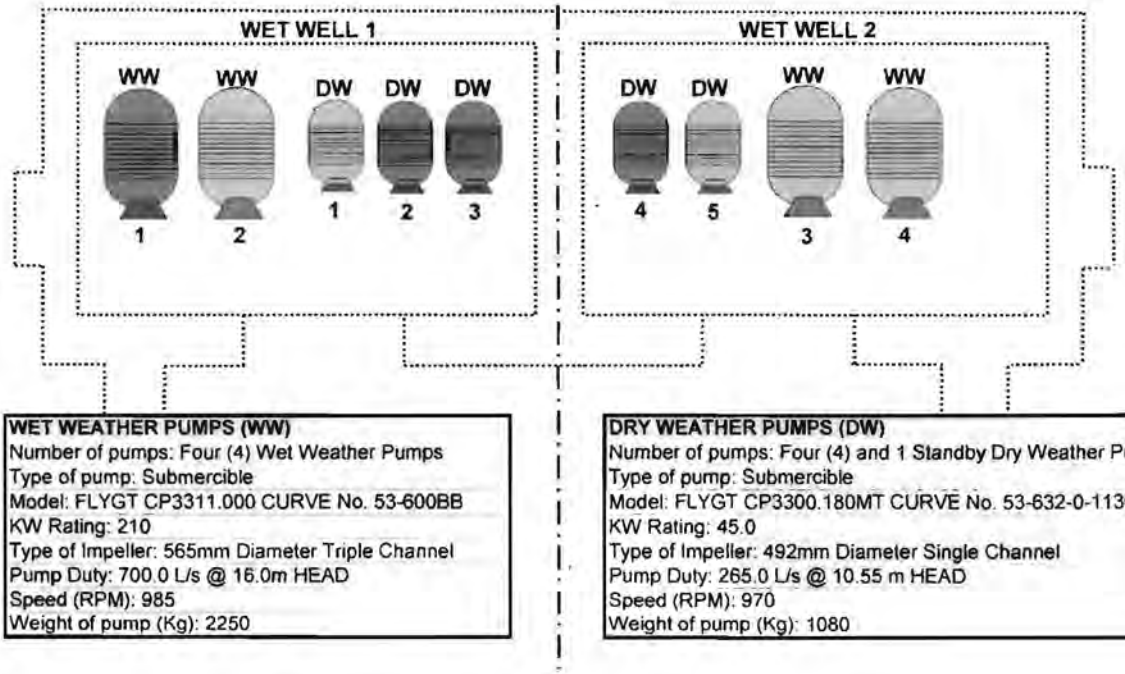
GREENPOINT PUMP STATION REPORT

Daily Flow Chart from 28 Nov - 18 December 2011



Pump is running or healthy

Pump is faulty or removed for repairs.



WET WEATHER PUMPS (WW)
Number of pumps: Four (4) Wet Weather Pumps
Type of pump: Submercible
Model: FLYGT CP3311.000 CURVE No. 53-600BB
KW Rating: 210
Type of Impeller: 565mm Diameter Triple Channel
Pump Duty: 700.0 L/s @ 16.0m HEAD
Speed (RPM): 985
Weight of pump (Kg): 2250

DRY WEATHER PUMPS (DW)
Number of pumps: Four (4) and 1 Standby Dry Weather Pumps
Type of pump: Submercible
Model: FLYGT CP3300.180MT CURVE No. 53-632-0-1130
KW Rating: 45.0
Type of Impeller: 492mm Diameter Single Channel
Pump Duty: 265.0 L/s @ 10.55 m HEAD
Speed (RPM): 970
Weight of pump (Kg): 1080

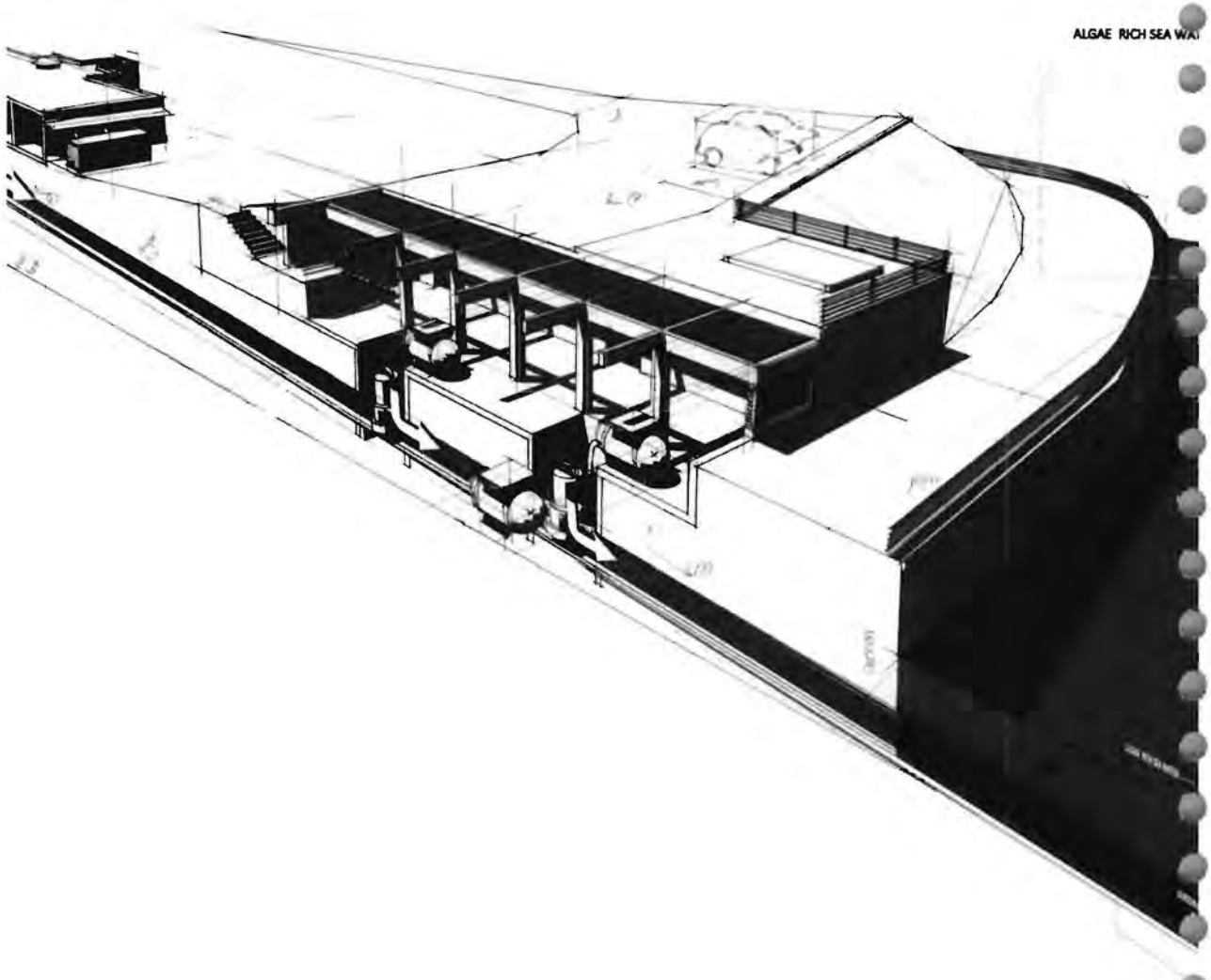
78: VIABILITY OF PUMP STRENGTH FOR ENERGY RECOVERY

THE ECONOMY OF DESALINATION: THE SEARCH FOR RENEWABLE ENERGIES

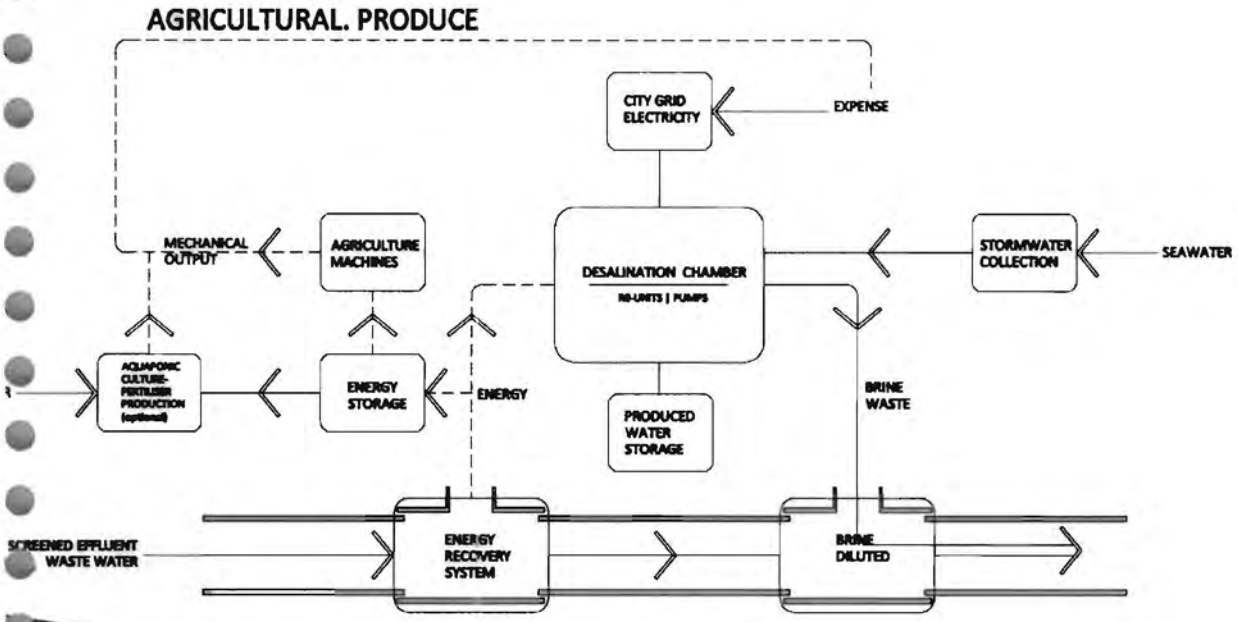
The implementation of desalination globally is not due to distrust in the methods of production and technology, but one of economy. This technology is no longer viewed as "futuristic", but why then does it elude us? Energy cost is the simple explanation for this.The use of renewable technologies explores the potential for physical expansion as well as cost reductions in the future. What we find is that creating an independent source of energy for the site at Mouille Point at present is not viable. So, we look towards a renewable energy source that can be implemented with the growth of the desalination technology and physical scale of the site. It is also more viable to implement a technology that decreases the total cost of energy consumption, through generating power and storing it.

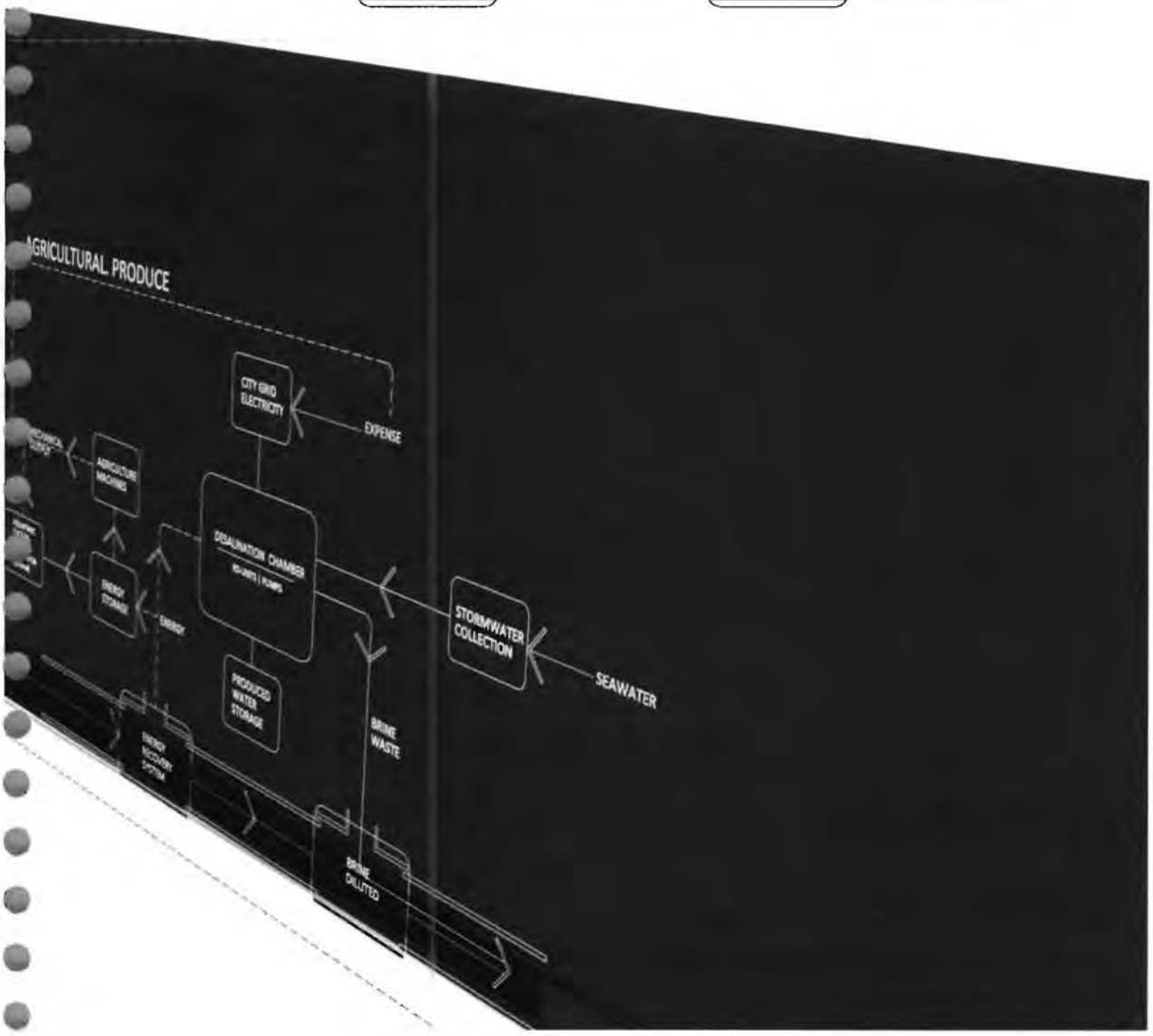
The most apparent source for energy specific to the site at Mouille Point is that of energy recovered using a water pipe turbine. This means that water that is pumped through the marine Sewage outfall is then re used to create energy for another system. This system specifically refers to the process of desalination. This type of energy recovery has been implemented at marine sewage outfalls in San Diego, America.
The core principle is that the city and government are already paying for the use of pumps to force effluent screened water into the marine sewage outfall and then deep into the sea. The pumps are needed and essential in the process, as the water pumped into the pipe has a lower density to that of the sea. So we find that if not pumped, the water would push back up into the system and backup into the pump station. It is then natural to use this high velocity water discharge to create energy. A segment of the original Sewage water pipe is adapted to fit a turbine. As water then passes through the pipe in generates energy that can then be used immediately or stored. The advantage of this system to the site is that, the outfall is in operation 24/7. Surplus energy can be stored for the operation of light machinery specific to agricultural production and for reducing the cost of water desalination.

Peaks and lows in usage and operation will occur naturally for using desalination and energy in the production of agriculture. Unlike with desalination for drinking water and on a large scale, this process need only supply energy and converts water when crops are to be irrigated etc. So we find peaks in operation and dormancy, while the sewage pump station continuously creates an energy source. Here I am not saying the process is self-sufficient on the a water pipe turbine for energy, but that through careful storage of energy, the total operational cost of desalination can be greatly reduced on occasion of a peak. Marine Sewage Outfalls in San Diego have shown to recover as much as 40% of the energy required to operate the pumps that provide the initial input.



79: SCHEMATIC DIAGRAM OF ALL THE PROCESSES DISCUSSED IN THE PAPER WORKING COHESIVELY TOGETHER.


AGRICULTURAL. PRODUCE
CITY GRID ELECTRICITY
EXPENSE
MECHANICAL OUTPUT
AGRICULTURE MACHINES
DESALINATION CHAMBER
RO-UNITS | PUMPS
STORMWATER COLLECTION
SEAWATER
AQUAPONIC CULTURE-FERTILISER PRODUCTION (optional)
ENERGY STORAGE
ENERGY
PRODUCED WATER STORAGE
BRINE WASTE
SCREENED EFFLUENT WASTE WATER
ENERGY RECOVERY SYSTEM
BRINE DILUTED


AGRICULTURAL PRODUCE
CITY GRID ELECTRICITY
EXPENSE
AGRICULTURE MACHINES
DESALINATION CHAMBER
STORMWATER COLLECTION
SEAWATER
PRODUCED WATER STORAGE
BRINE WASTE
BRINE DILUTED

GENERATING PROGRAM - THE HYDROPONIC SOLUTION

Hydroponics refers to the system whereby plants are grown within a growth media, other than soil. Nutrients are dissolved in irrigation water and so supplied to the plants. As discussed in the thesis so far, desalination becomes a very viable alternative on site, opposed to the establishment of a water treatment plant. This is due to the modularity of desalination units and that water quantity will not be dependent on external factors of availability and climate. Hydroponics can also bridge the gap between water source and crop production, where plant tolerance is built up for saline solutions. Be this the case, then the sea can act as the actual growing media for crops and not merely as a production method of freshwater for them.

SOIL VESUS SOILESS CROPS

Hydroponics increases the production capacity of marginal and arable land. One is not saying that soil is inferior in its produce, merely that water based systems of agriculture have the benefit of higher productive yields. This is critical when human demographic increases exponentially over time. Agricultural demand is then directly proportional to this growth. Labour is one of the biggest differences in the two production methods. Soil requires high amounts of labour for processes such as irrigation, fertilization and rotation merely to remain at an acceptable standard for production. Hydroponics reduces all this effort and variability into a mechanically regulated and highly controlled system. (Calder M.J, 1956)

ADVANTAGES| DISADVANTAGES

ADVANTAGES:

- Unsuitable land can be used for production
- Soil weeding and irrigation is eliminated.
- High productive yields can be acquired on small allotments of land
- Water use becomes very efficient.1/20 of the water used for conventional farming is used in hydroponic tanks for the same yield
- There is no erosion or drowning of crops as surplus water can be drained away.
- Complete mechanical systems can be regulated for nutrient /water feeds
- Labour for practical crop maintenance is dramatically reduced.
- Vegetable quality is of a higher standard(Calder M.J, 1956)

DISADVANTAGES:

- The cost of building tanks for growth. This however must be weighed up against the cost of farm machinery required for soil based farming.
- Higher levels of technical control are required opposed to the conventional method of farming

110: ANCIENT WATER GARDEN: Crops grown in water by the aztecs

111: CONTEMPORARY HYDROPONICS: same principal| refined method appropriate to context

VIABLE CROP PRODUCTION AND SPATIAL IMPLICATIONS

COMPARISON OF SELECTED VEGETABLE YIELDS

VEGETABLE	SOIL Yield	WATER hydroponic yield	
	T/A/C	T/A/C	SALT TOLERANCE
Artichoke	3.5	4.4	
Asparagus	1.2	2.6	HIGH
Beans,	2.4	31.4	
Beets	6.25	65.3	
Broccoli	3.75	14.5	
Brussel-sprouts	6.0	8.7	
Cabbage	10.8	43.6	MODERATE
Carrots	6.25	98.0	
Cauliflower	9.0	34.8	
Collards	5.0	21.8	
Cucumbers	5.4	58.1	
Iceburg lettuce	10.8	31.4	
Leaf lettuce 7.5	43.6	101.2	
Onions,-green	48.0	65.3	
Onions,-white	35.0	65.3	
Parsnips	4.0	65.3	
Peas	2.4	41.8	
Peppers,-green	9.6	49.0	
Potatoes	13.5	62.7	MODERATE
Potatoes,-sweet	7.0	52.3	MODERATE
Squash,-summer	4.0	145.2	
Squash,-winter	8.75	193.7	
Spinach	3.6	6.5	HIGH
Cherry Tomatoes	4.0	72.6	MODERATE
Regular tomatoes	10.8	145.2	MODERATE
Turnips	10.0	65.3	

(http://www.androidworld.com/prod26.htm)

- Illustrated above one can see the dramatic increase in productive yields for given crops- hydroponically

NUTRIENT VALUE OF VEGETABLES

VEGETABLE	Cost	water %	E cal	Prot gm	Carb gm	Na mg	K mg	P mg	Ca mg	Fe mg
Artichoke	67	87	104	6	23	149	597	136	89	3.0
Asparagus	149	92	57	8	11	8	703	140	53	1.5
Beans,sprouts	133	90	65	7	13	13	338	122	31	2.0
Beets	-20	91	68	7	16	111	708	70	25	1.4
Potatoes	28	71	247	6	57	18	948	129	22	3.0
Snow peas	169	89	92	7	16	9	544	125	95	4.5
Spinach	79	92	41	8	8	177	1266	111	223	6.2

(http://www.androidworld.com/prod26.htm)

- The above vegetables have been chosen for production based on their high iron and protein content. In countries experiencing famine these would be the most effective yields to combat fatigue and starvation. Focusing on the coming food strain these cross over vegetables can in some sense substitute meat.

SALT TOLERANT PLANTS

Listed above, I have indicated the crops that have the strongest tolerance for saline solutions. These would most likely be the crops to successfully branch the gap between freshwater to seawater as a growing media and resource. There saline tolerance indicates that the ability to perform osmosis within these solutions is higher than other plants.

EXAMPLE SPINACH| 2X GREATER HYDROPONIC YIELD ON SITE

DIAGRAM 80

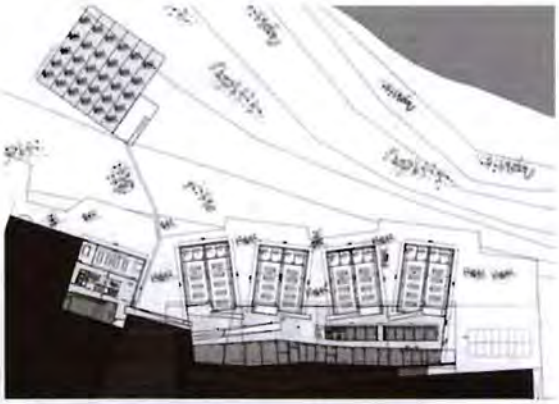
- Different crops provide for varied urban potential. The analysis above shows how a specific crop occupying the site would open a significantly larger piece of land where its urban counterpart would be. This land can then be used for housing etc.

EXAMPLE TOMATOES| 14.5X GREATER HYDROPONIC YIELD ON SITE

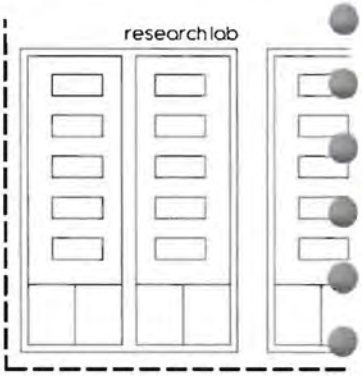
DIAGRAM 81

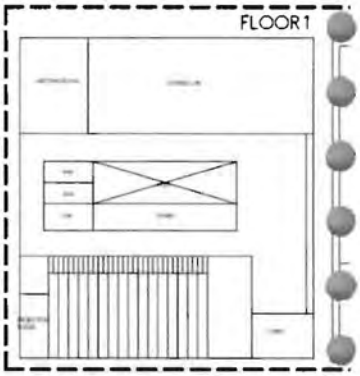
EXAMPLE SQUASH| 36.3X GREATER HYDROPONIC YIELD ON SITE

DIAGRAM 82



PRECEDENT: CIALE-CANVAS ARQUITECTOS



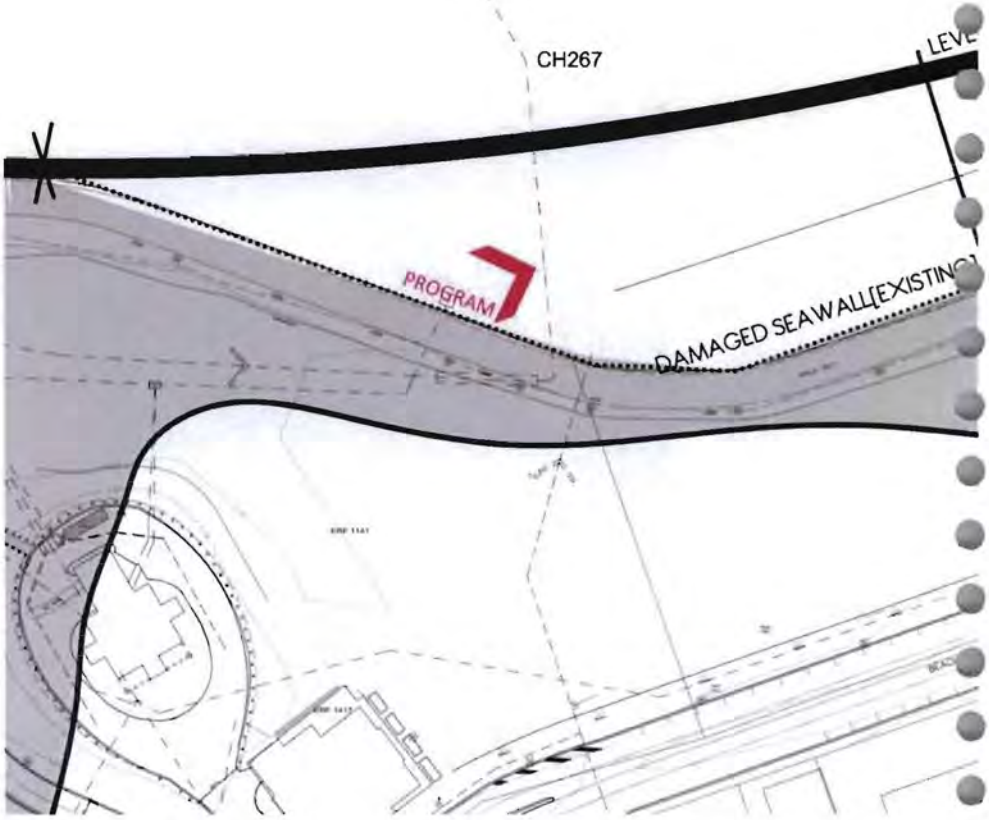


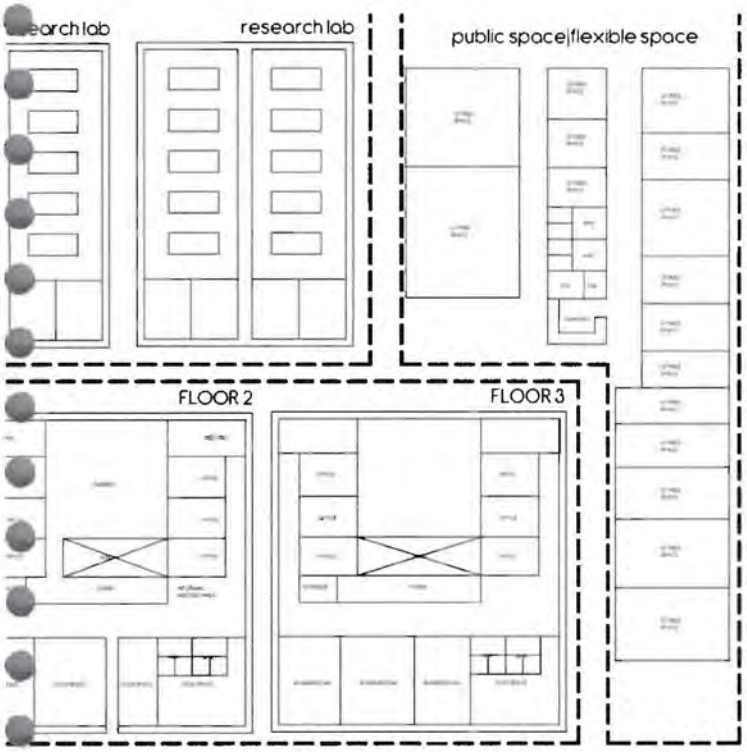
AGRICULTURAL RESEARCH FACILITY

PROGRAM | AGRO BIOTECHNOLOGY-RESEARCH
FOCUS | SALINE TOLERANT CROPS

SPATIAL REQUIREMENTS: Non views for adjacent residents and hotel erected barrier and existing seawall

ATLANTIC OCEAN





spaces , however quantity of spaces must not conflict with
bove the promenade. Spaces are to maximise potential of new
furbished.

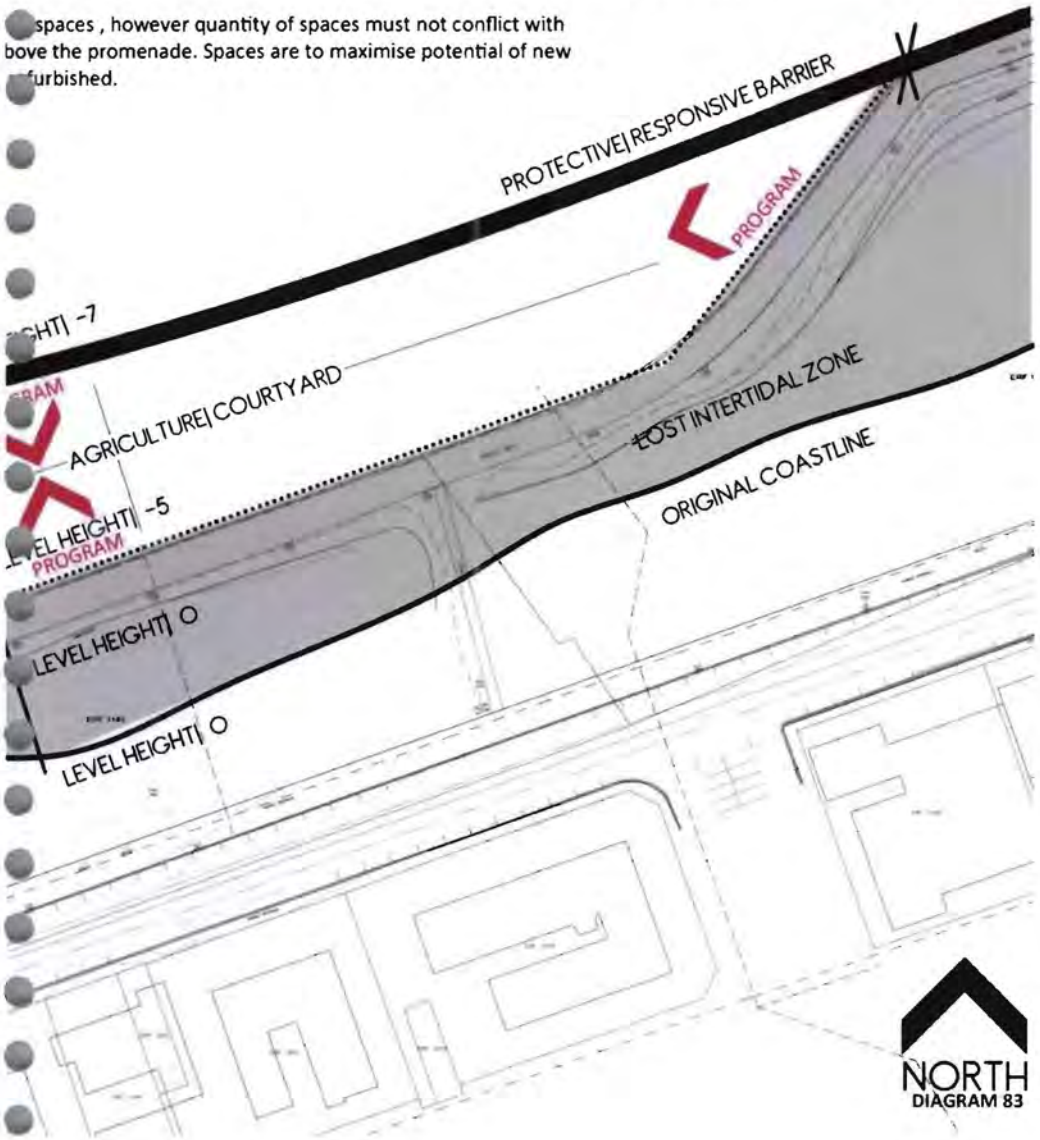


DIAGRAM 83

OPERATIONAL PARAMETERS

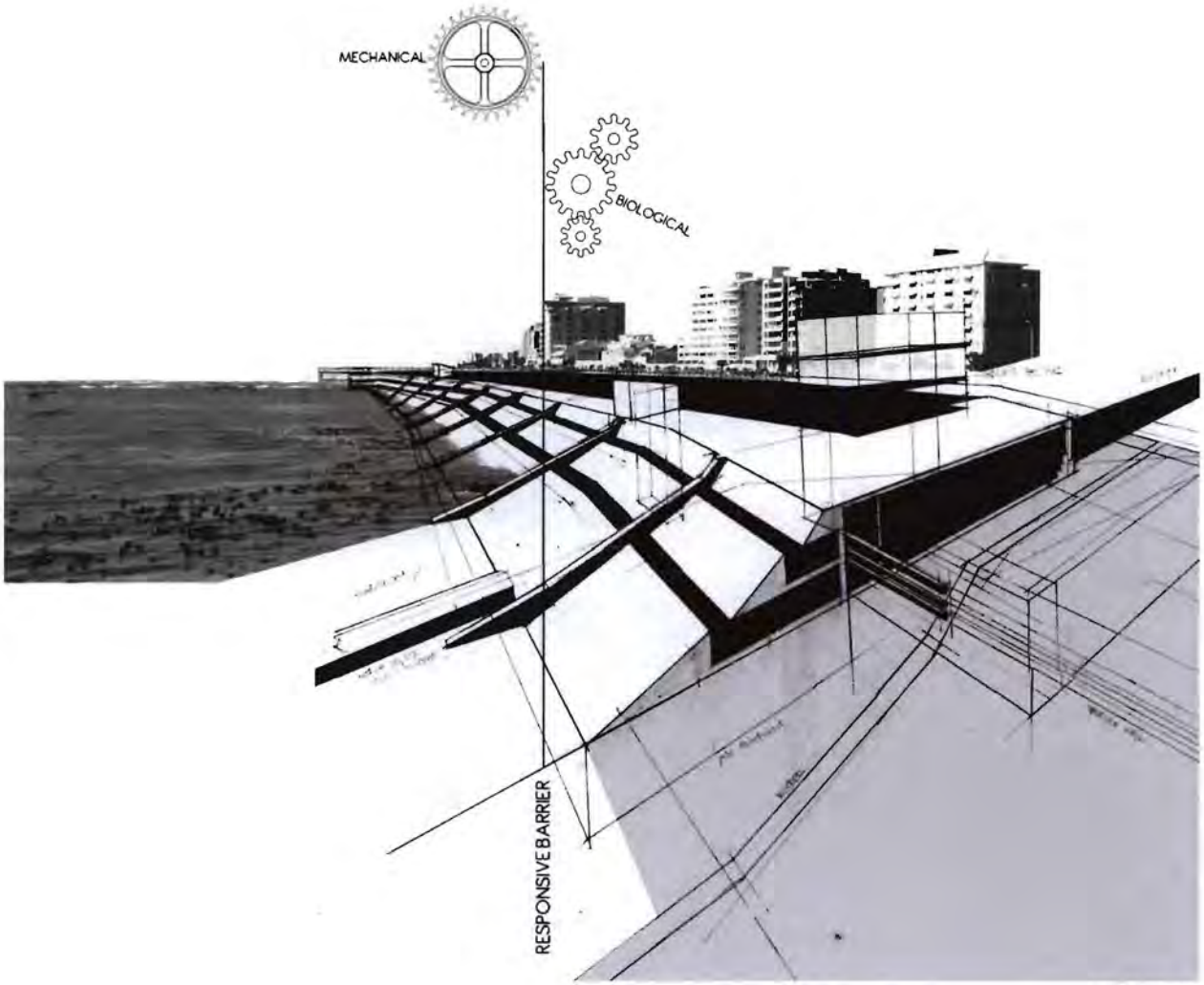


DIAGRAM 84

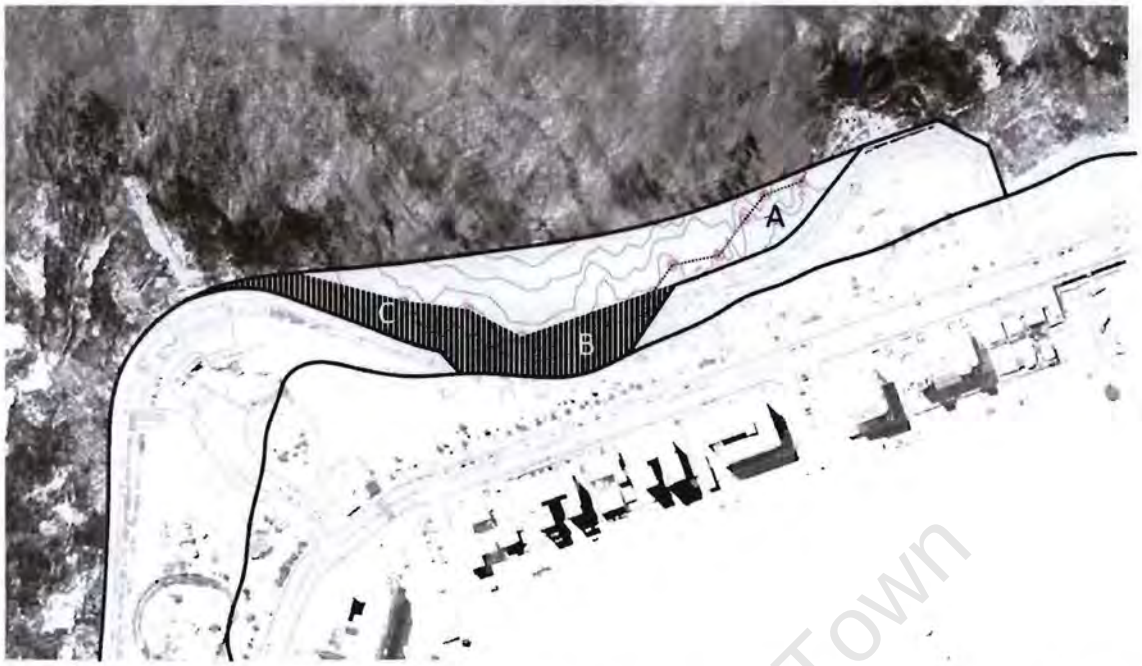
- CONCEPTUAL FORM AS INITIALLY CONCEIVED. A SEAWALL THAT MEDIATES| RESPONDS| PROTECTS ACTING AS BOTH A MEASURE OF BIOLOGICAL AND MECHANICAL TIME. A BAROMETER THAT INHIBITS SPECTACLE THROUGH SUBTLETY IN RESPONSE TO PRODUCION AND CLIMATE

DIAGRAM 85

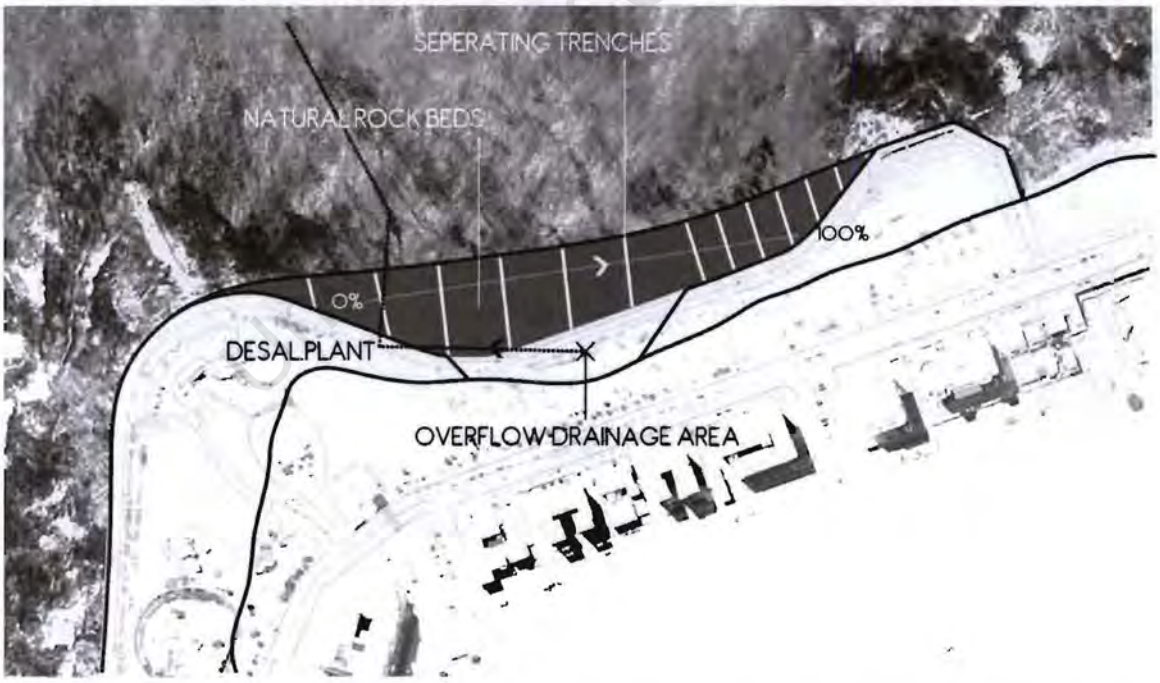
introduction of transitional public space by removal of land fill.Height difference between promenade and agricultural growing beds better articulated. Destroyed inter tidal zone re-introduced as public recreational| reflection space.

Three conditons of water use are captured in the new scheme. Each conditon is very specific to a function

DIAGRAM 86

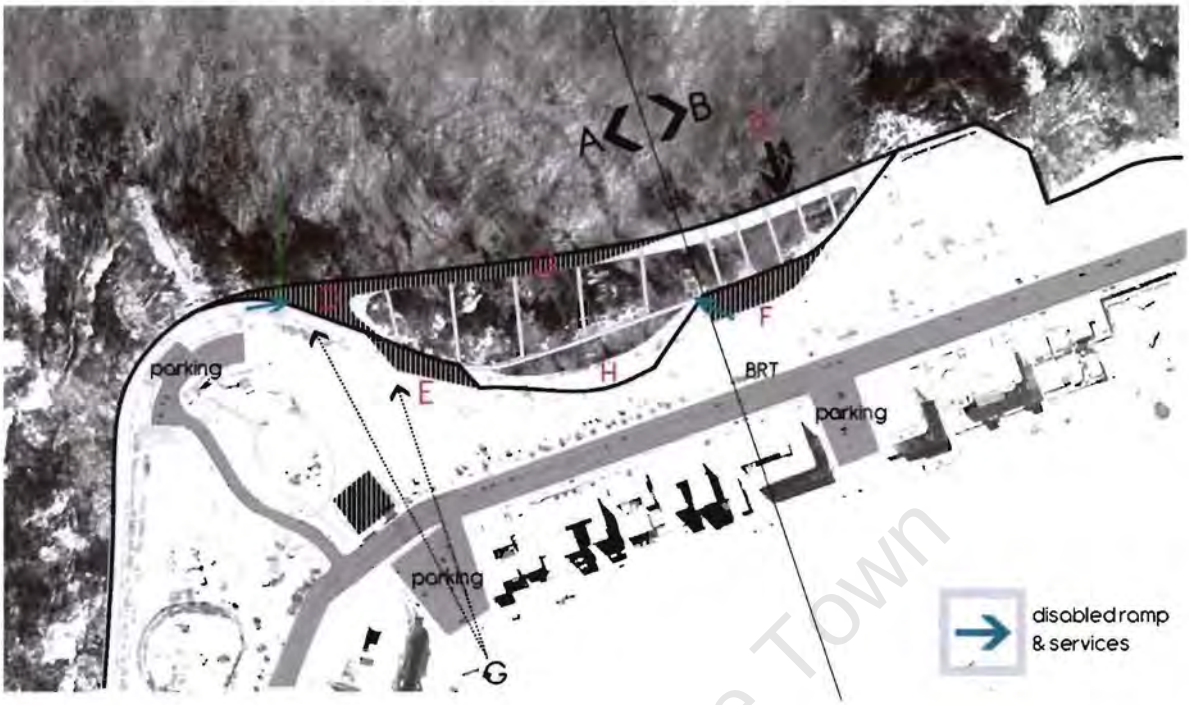


A: DOCUMENTED ROUGH ROCK CONTOURS| B: INTERPOLATED SMOOTH ROCK CONTOURS| C: DOCUMENTED SMOOTH ROCK CONTOURS
The rock types A+B allow for structure and even foundation to be added as they are relatively flat. The area marked A cannot serve for public nor growing bed space. This is as the rock has been carved to form jagged striations. Building on this side of the promenade concealing function in the existing promenade wall.



The creation of water deployment trenches both allows the natural rock strata to be kept as the growing bed as well as act as separators for various crop salinities. The diagram above shows crop salinity increases from the Western axis of the site, to the Eastern quadrant. The allotments also decrease in size and move from public to private space in the same manner. This is intentional. There is an increase in water overtopping as we migrate closer to the Eastern quadrant, and the water that passes over the structure in severe circumstance should not contaminate the most productive cycles of crops on the site. These would be freshwater by default.

DIAGRAM 87

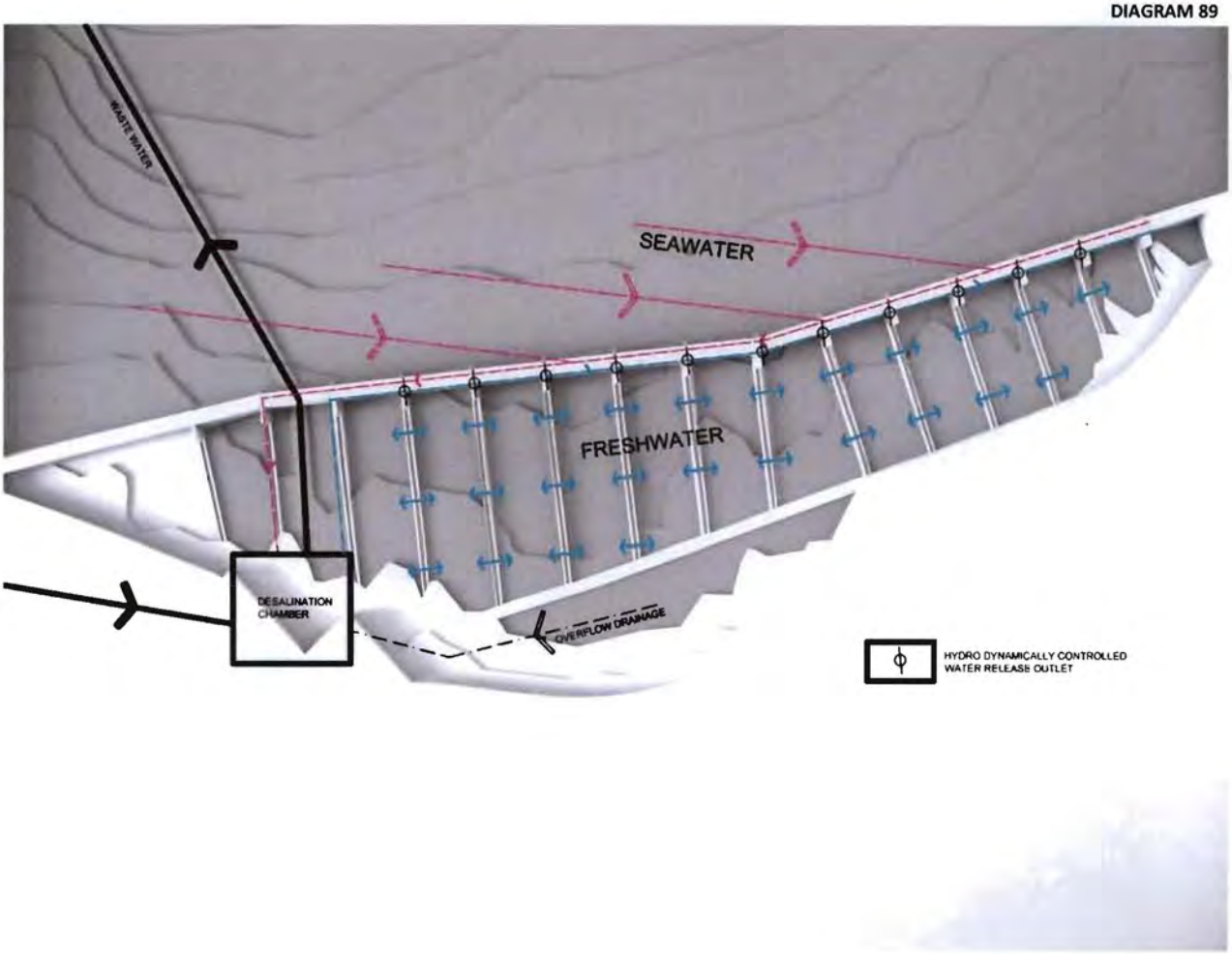


A: Public zone, **B:** Private research and controlled crop specimen zone/ area of highest salinity. **C:** Highest rate of overtopping at saline crop solution allotments to minimize chance of culture contamination. **D:** public entrance and beacon for site| visual connection from the city to the promenade. Reception and agriculture café etc. established at this point, **E:** desalination chamber, **F:** private research labs concealed in promenade due to rock strata. **G:** linear arrangement of repetitive spaces –offices etc.

DIAGRAM 88

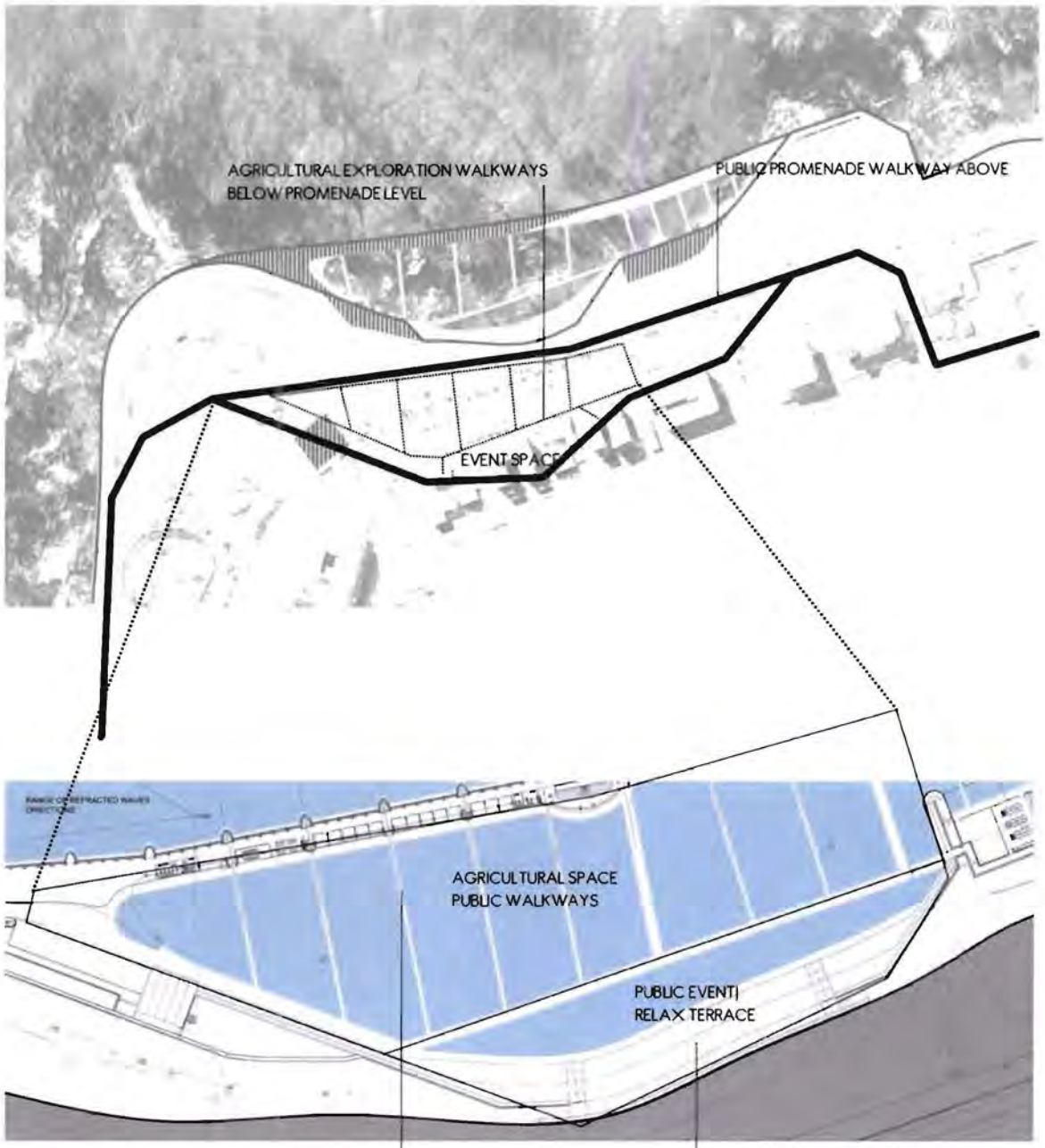
Visual connection between public entrance of site and city. Establishes better connection between city and promenade axis

DIAGRAM 89



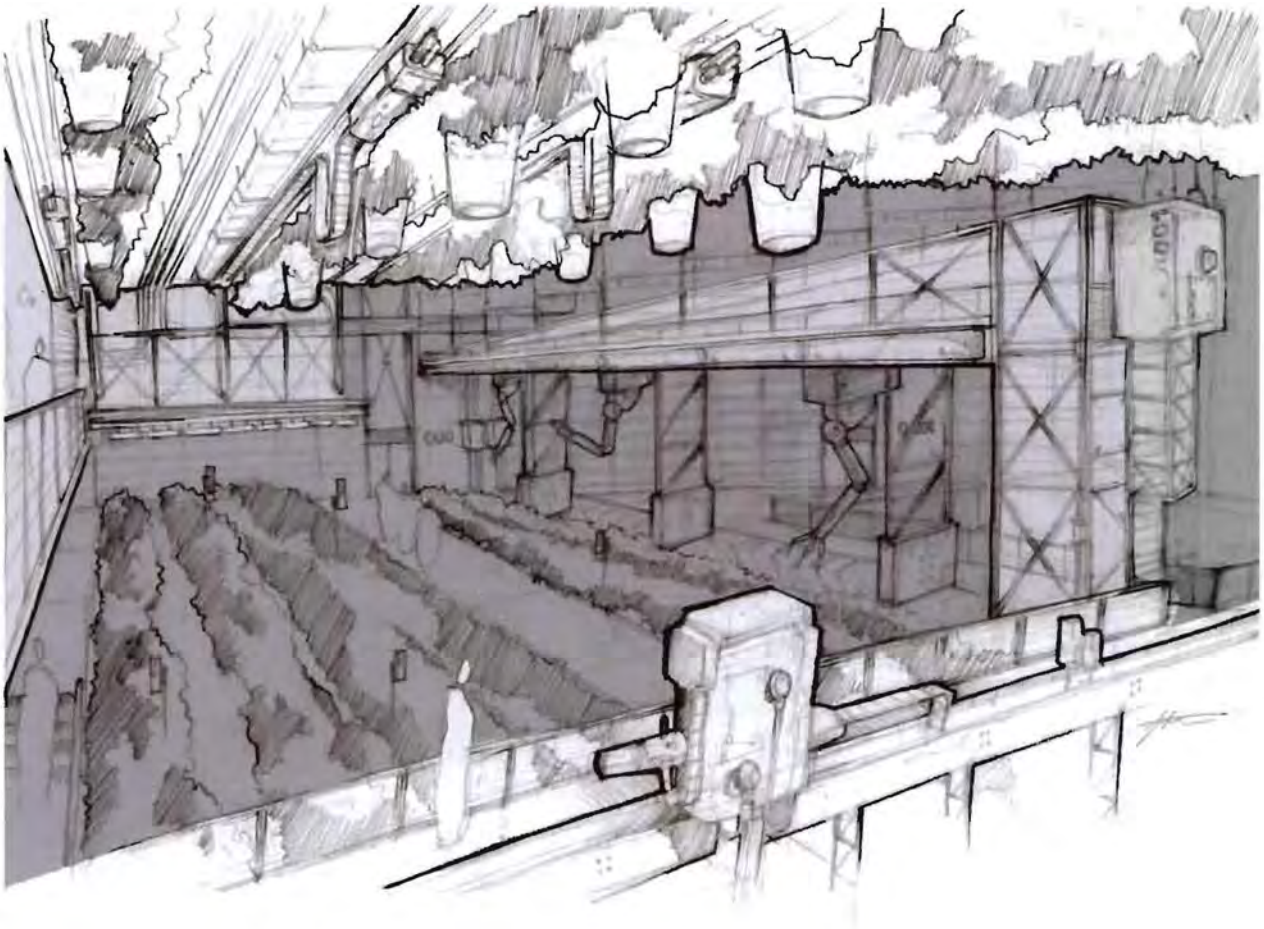
- Operation, maintenance and deployment of water resource.

DIAGRAM 90



THE WATER DEPLOYMENT TRENCHES ARE SEMI-PERMIABLE STRUCTURES. THEY CAN BE WALKED ON AND USED FOR CROSS AXIAL MOVEMENT FROM ONE PROMENADE SIDE TO THE OTHER. THESE WALKWAYS ALLOW ONE TO EXPERIENCE, VIEW, LEARN ABOUT THE AGRICULTURE PRESENT IN THAT SPECIFIC SALINITY GROW BED.THE WALKWAYS HOWEVER DO NOT ALLOW LOITTERING AS THEIR MAIN REASON IS FOR PRODUCTION AND THIS IS NOT TO BE COMPROMISED

THE WATER OVERFLOW AREA USES SUBTLETY OF BARRIER TO BREAK APART THE SEMI PUBLIC AGRICULTURAL [REFLECTION SPACE] FROM THE TERRACE USED TO RELAX.AS THE OVERFLOW AREA CONTAINS A LARGE DRAIN FEEDING TO THE DESALINATION PLANT WATER REGULATION IN THIS SPACE CAN BE CONTROLLED. SUMMER, THE SPACE MAY ACT AS AN INFORMAL SHALLOW SPLASH POOL. WHEREAS WINTER| OR WEEKENDS THE SPACE CAN BE DRAINED FOR AN AGRICULTURAL MARKET OR HOST CONCERTS ETC.



91: FUTURE CIRCUMSTANCE: AGRICULTURE BELONGS MORE TO THE MACHINE WORLD THAN NATURE

- There is no room for public place making. This is strong contrast to the environment and building created in this thesis. Exclusivity is replaced by public inclusion

DIAGRAM 92

- Creating growing beds from the rock strata minimizes the damage of the building as it is imposed on the landscape. So too, rock protrusion etc. allow for a unique terrain for the act of growing. The asymmetry and unpredictability combat the modularity imposed by the water deployment trenches and spatial allotments.

DIAGRAM 93

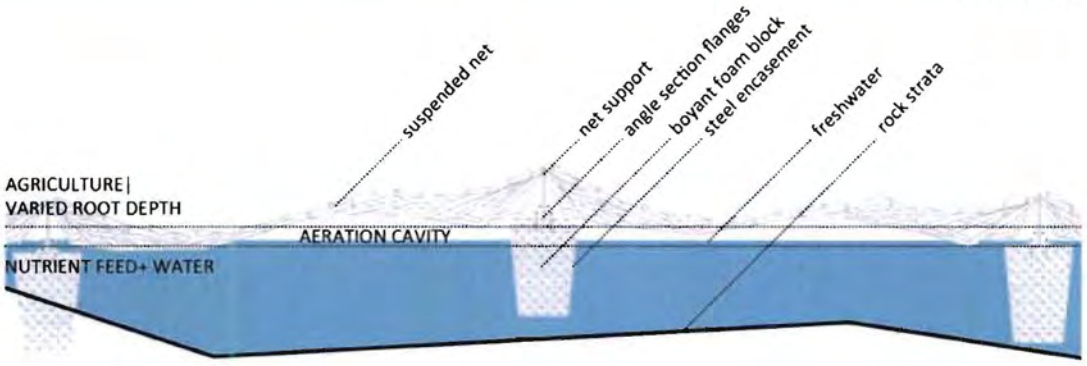


DIAGRAM 94

DIAGRAM 95

- The terrain offers one perspective and moments for reflection in nature.
  The reflective surface of the water becomes one in strong contrast to its soil counterpart as a growing media.
  The growing beds inhibit a pensive state for user.

DEFINE

DIAGRAM 96: Hydroelectric wave energy pump.
"The oyster" Collision based wave fin.

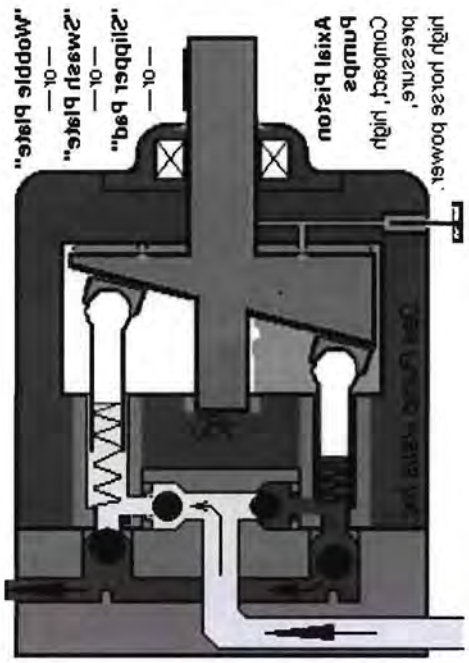
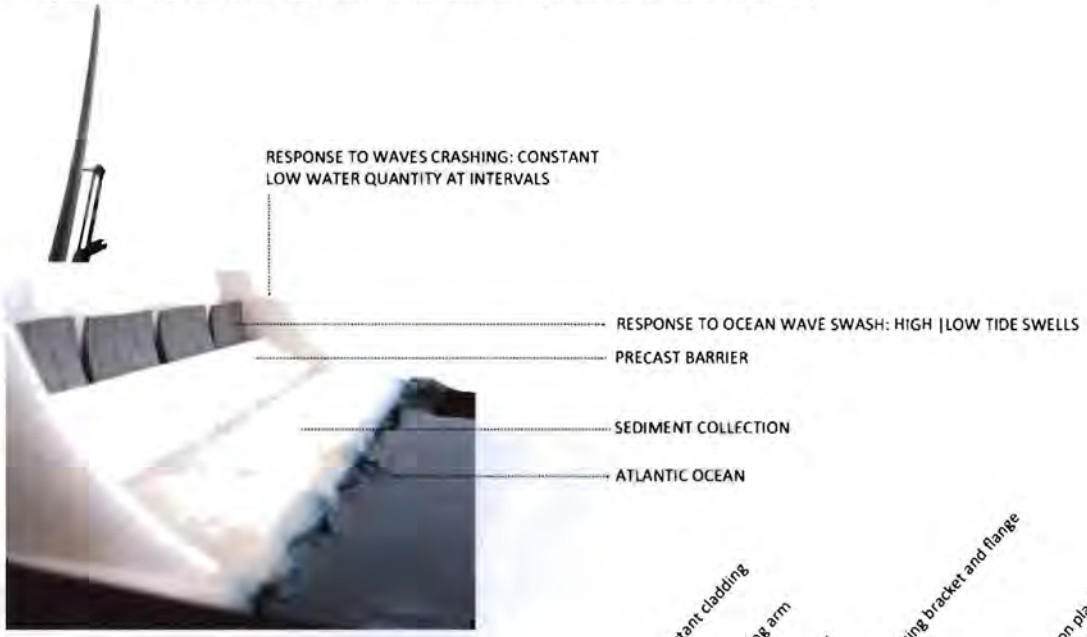


DIAGRAM 97: Axial piston pump mechanism for
Pumping water manually.

REFINE

- Water can be pumped to the desalination plant via hydro dynamic force. This will greatly reduce the buildings operational cost. Also hydro dynamic force can be used to induce a permanent pressurized water system. This is important, as when a release valve is pressure activated regardless of what time of the day, water will be automatically released from it and water crops



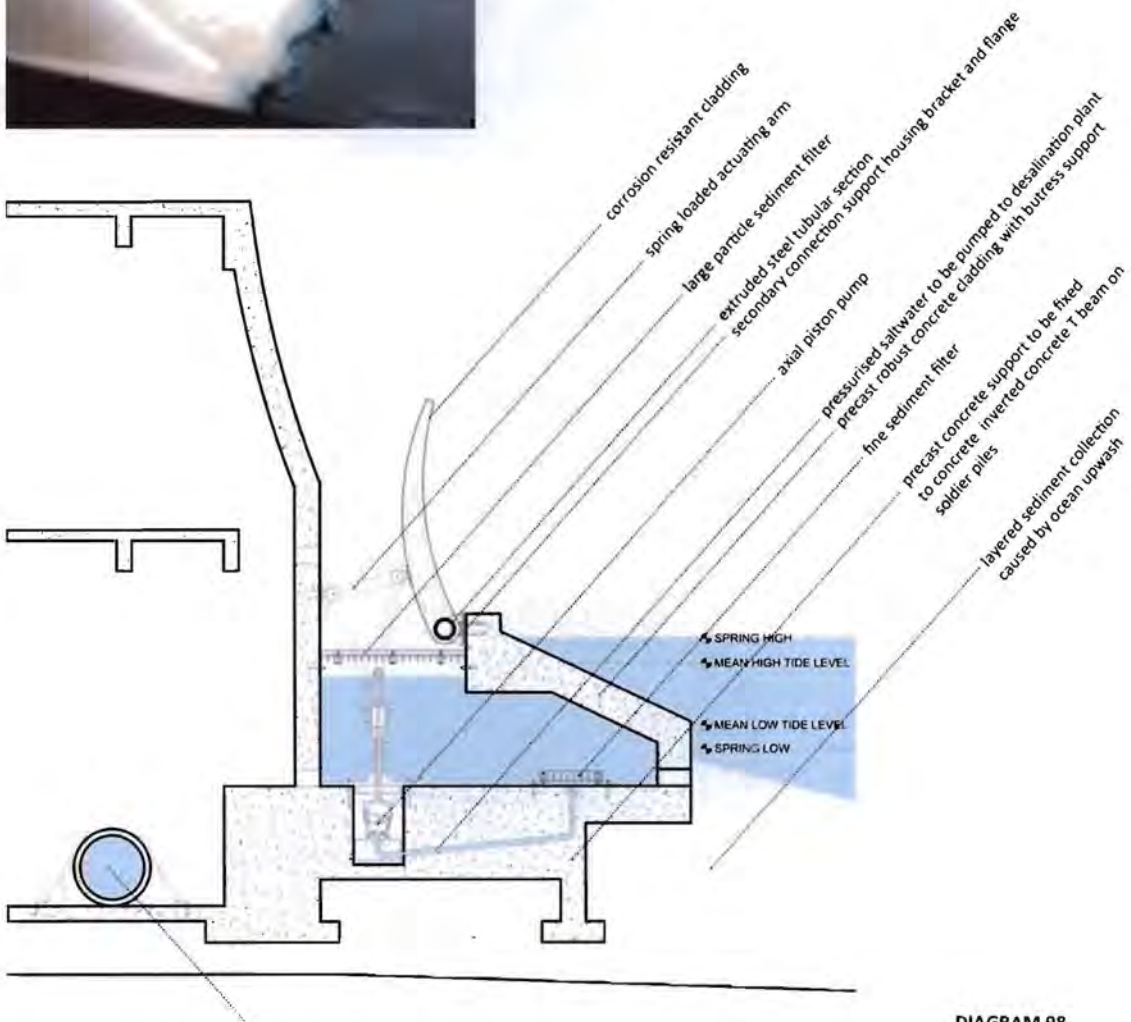


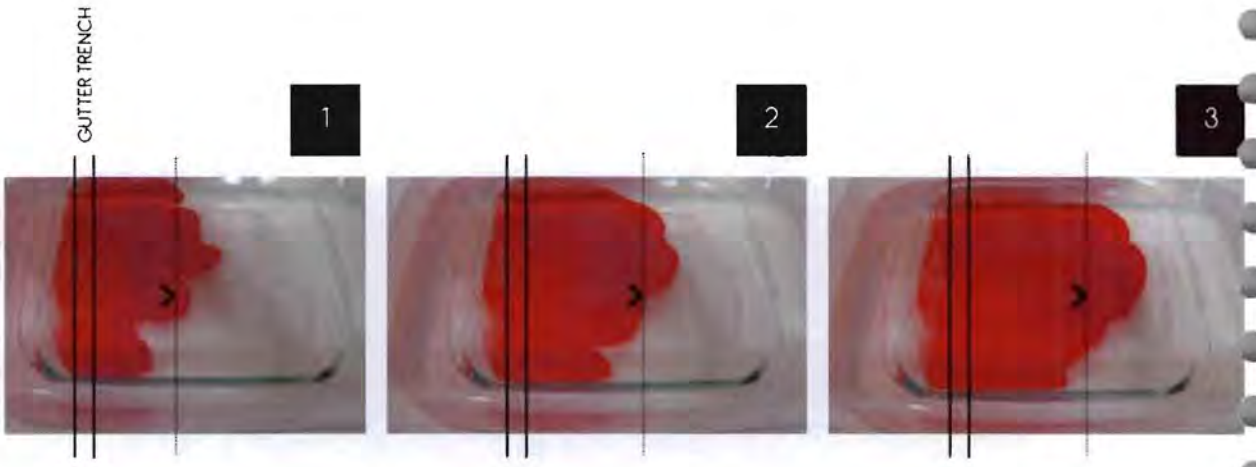
DIAGRAM 98

DEFINE

99: Conventional method of deploying water over large expanses of agricultural land.

REFINE

- The advantage of water as a growing media is that the rules for water deployment are not regulated by the same principle as they are for soil. Large expanses of land can be fed with nutrients through the act of dissipation as the experiment below illustrates. This allows "water machines" to be at a fixed place and so not visually distract from the landscape.



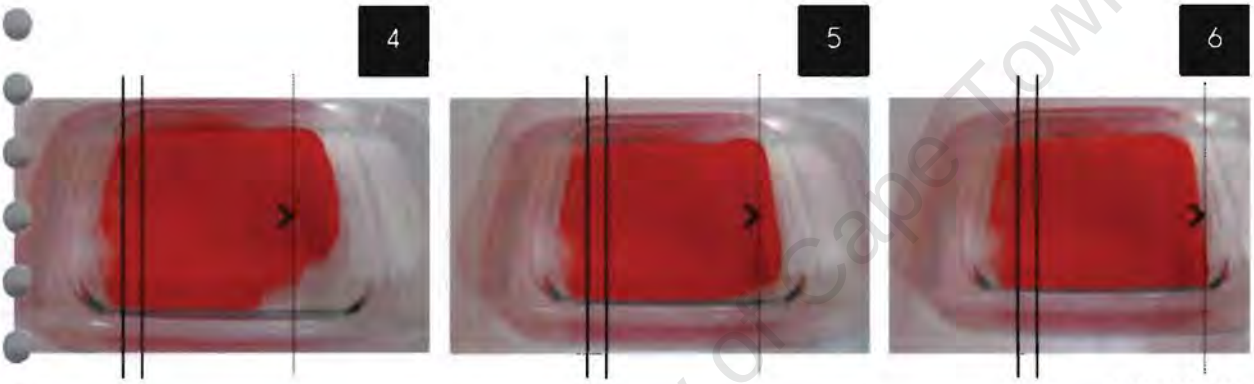


DIAGRAM 100

NUTRIENTS ARE SPREAD VIA A GUTTER TRENCH SPANNING BETWEEN THE TWO PROMENADES [NEW+OLD]. THE GUTTERS ARE COMPOSED OF TWO CONCRETE FOOTINGS LAID DIRECTLY ON THE ROCK AND THEN BRICK LEVELLED, UNTIL EVEN AND ABOVE THE WATER LEVEL [TO FILL THE BED]. A MENTIS GRATING FLOOR IS THEN SUSPENDED WITHIN THIS CAVITY. THE CAVITY THEN ACTS AS A DEPLOYMENT MECHANISM , AS WELL AS A PATHWAY.

DEFINE

101: Mechanical composition for monitoring time

REFINE

- Here, building module and section meet and form a cavity that deploys water based on hydro dynamic load. The model below was a 2month development that applies the articulation of gears in clock making, with the physics of hydrodynamic load changes and simple machines. The model is a working prototype. As water from sea waves enter a chamber they fill would fill a tank that then applies a load as an initial input for a ratchet to rotate. This is the same principal applied to when a pendulum weight acts in facilitating a clocks "ticking".

DIAGRAM 102

DIAGRAM 103

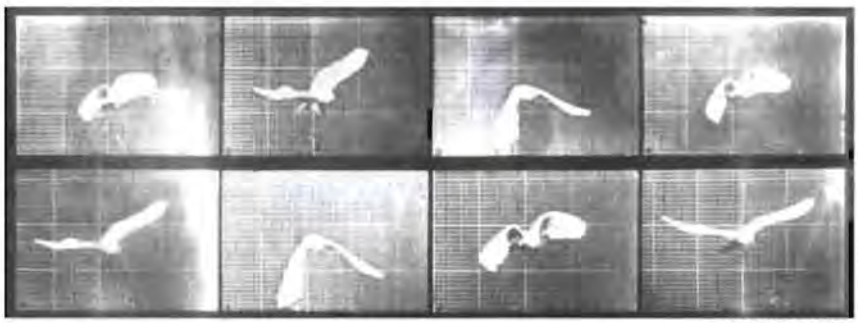


DIAGRAM 104

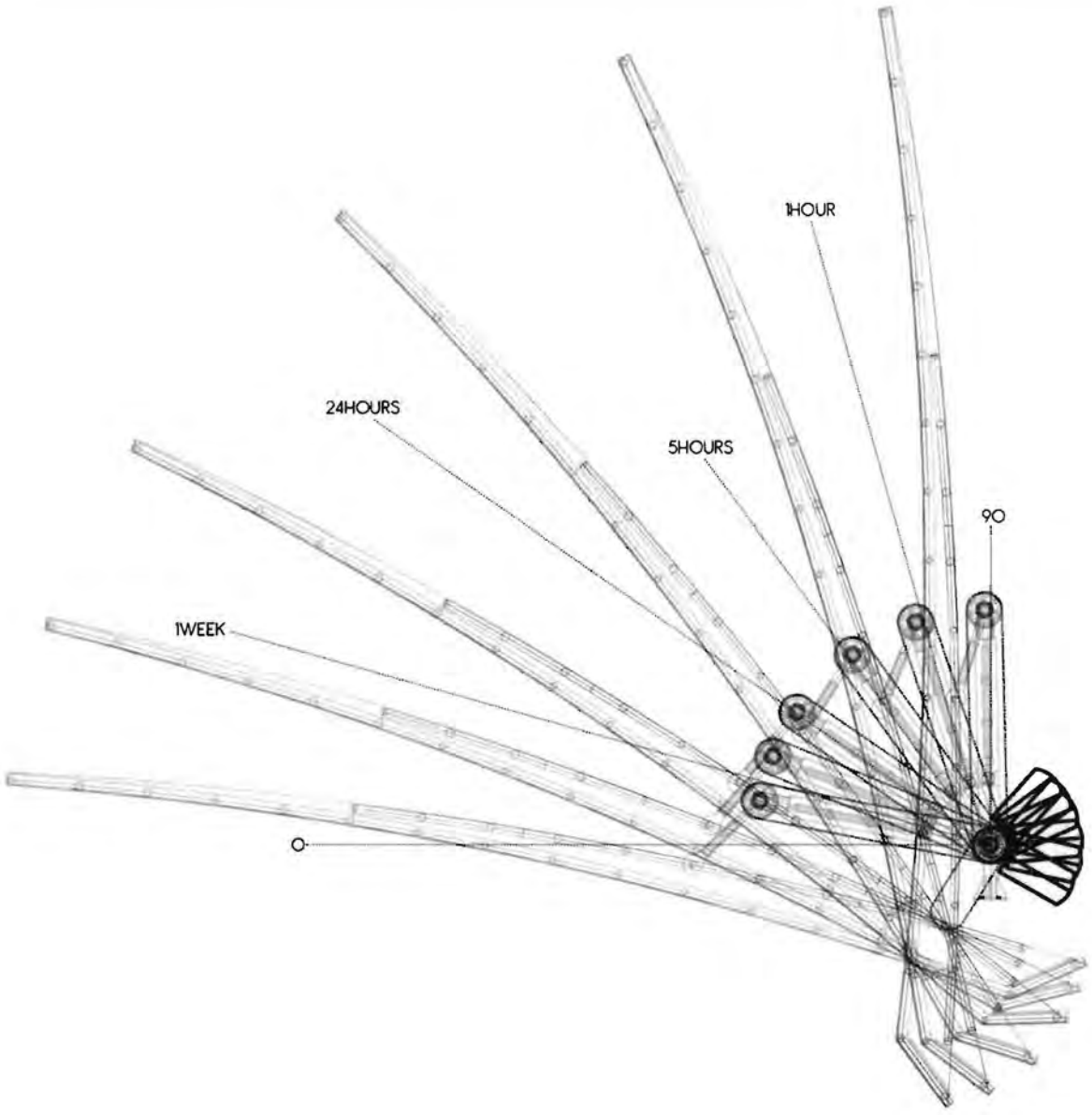
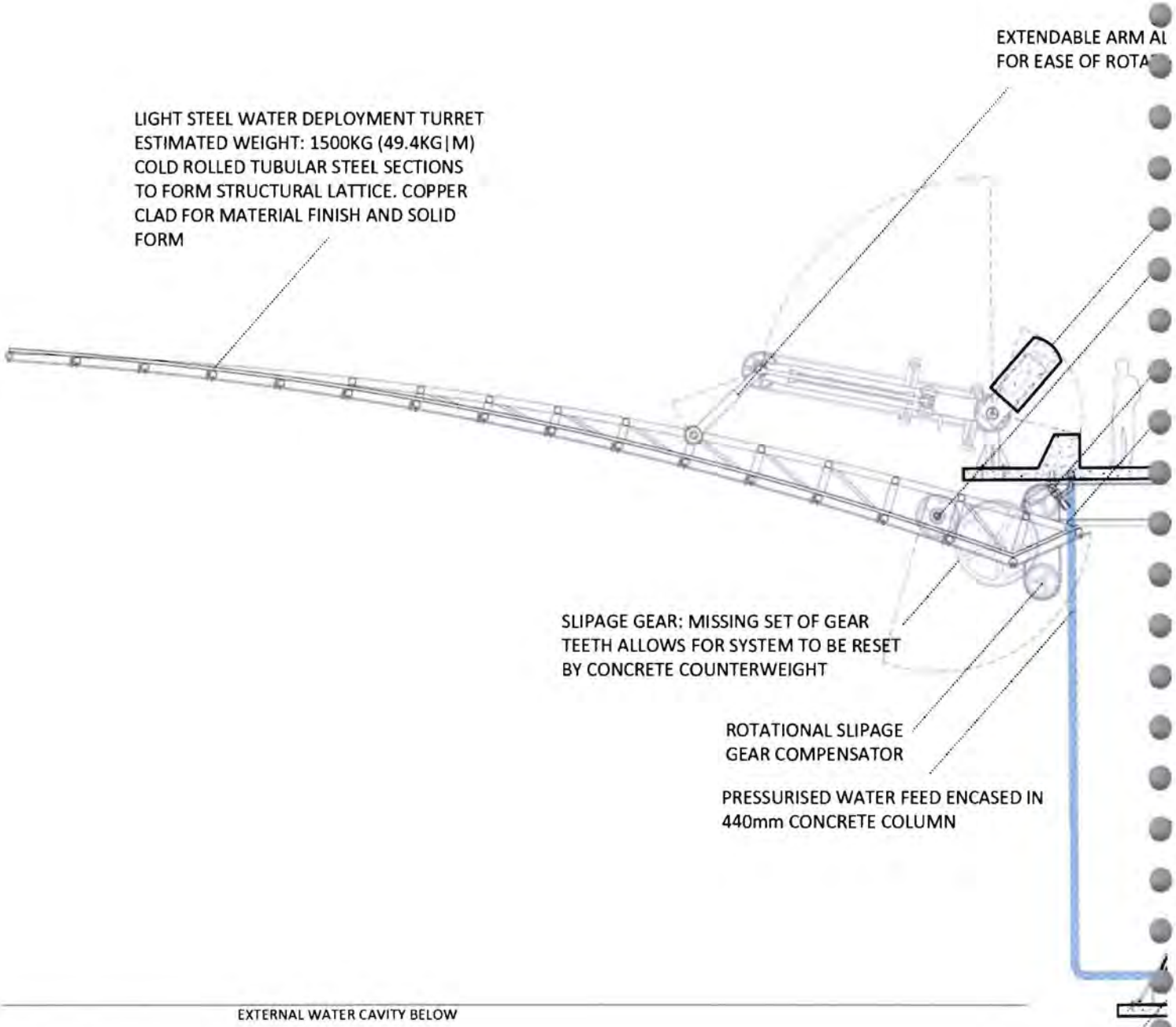


DIAGRAM 105

The water deployment turrets hint at bio mimicry.
Their positions change based on the requirements of the crop and time of day.
A rhythm and changing order in structure create identity and spectacle.

DIAGRAM 106


EXTENDABLE ARM AL
FOR EASE OF ROTA
LIGHT STEEL WATER DEPLOYMENT TURRET
ESTIMATED WEIGHT: 1500KG (49.4KG|M)
COLD ROLLED TUBULAR STEEL SECTIONS
TO FORM STRUCTURAL LATTICE. COPPER
CLAD FOR MATERIAL FINISH AND SOLID
FORM
SLIPAGE GEAR: MISSING SET OF GEAR
TEETH ALLOWS FOR SYSTEM TO BE RESET
BY CONCRETE COUNTERWEIGHT
ROTATIONAL SLIPAGE
GEAR COMPENSATOR
PRESSURISED WATER FEED ENCASED IN
440mm CONCRETE COLUMN
EXTERNAL WATER CAVITY BELOW
FRESHWATER

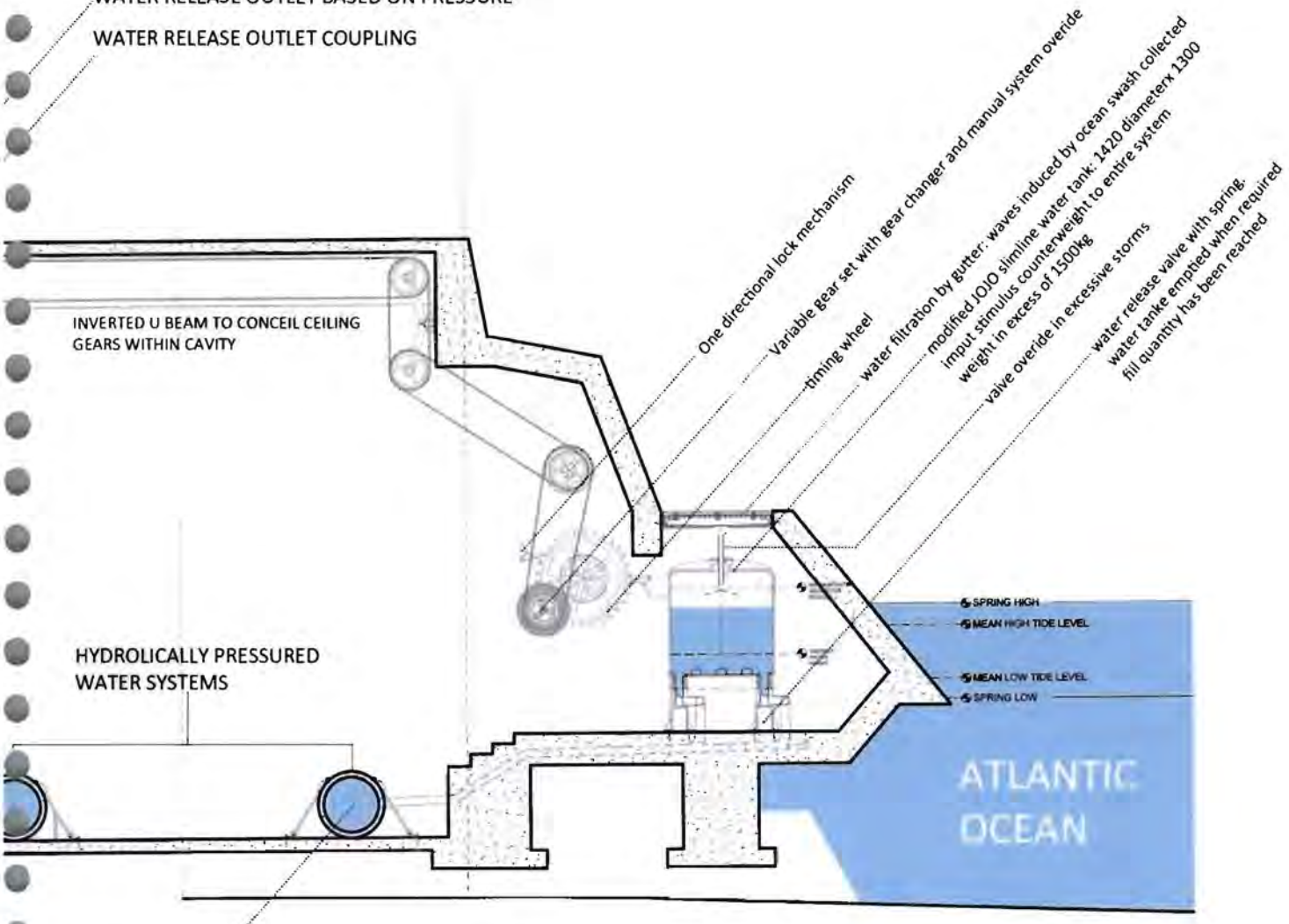
OWS

CONCRETE COUNTERWEIGHT TO SURPASS BENDING MOMENT AND WEIGHT INDUCED BY WATER TURRET ROTATION[2.5 TONS PER M²]

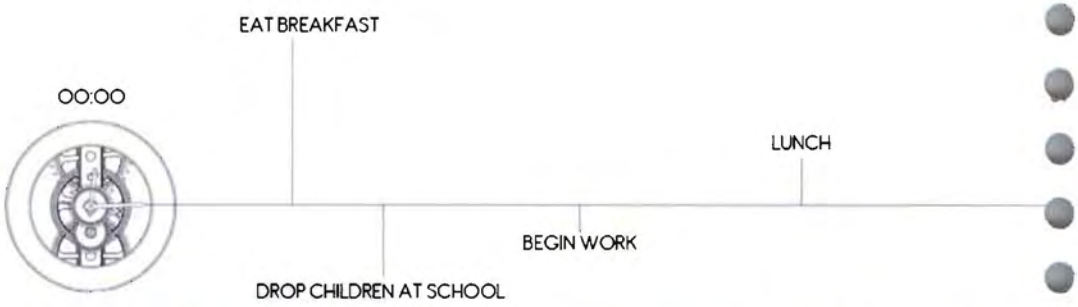
CROSS BAR SUPPORT FOR WATER TURRET ARM. LOAD TRANSFERRED INTO CONCRETE SUPPORTING STRUCTURE

WATER RELEASE OUTLET BASED ON PRESSURE

WATER RELEASE OUTLET COUPLING



SEAWATER


EAT BREAKFAST
00:00
LUNCH
BEGIN WORK
DROP CHILDREN AT SCHOOL

PICK UP CHILDREN FROM SCHOOL

P ACCOUNTS

SLEEP

00:00 RESET

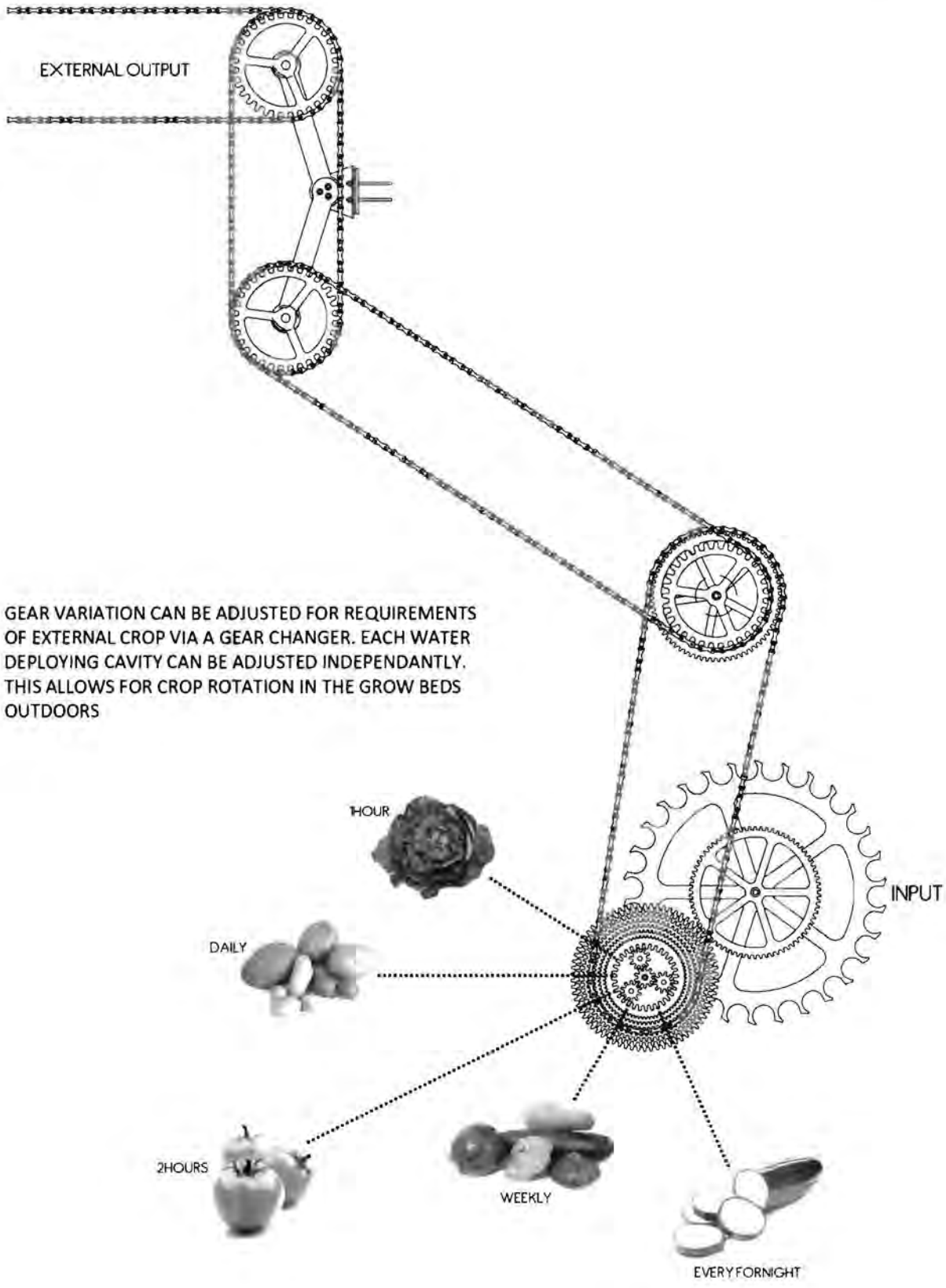
SUPPER

REMEMBER GROCERIES

DEPLOY NUTRIENT/ WATER SOLUTION

DIAGRAM 108

Although concrete modules act as the base for the seawall construction, it is nature that molds, adds and removes and so creates relatable identity for it. Decay is embraced as a material finish.


EXTERNAL OUTPUT
GEAR VARIATION CAN BE ADJUSTED FOR REQUIREMENTS OF EXTERNAL CROP VIA A GEAR CHANGER. EACH WATER DEPLOYING CAVITY CAN BE ADJUSTED INDEPENDANTLY. THIS ALLOWS FOR CROP ROTATION IN THE GROW BEDS OUTDOORS
1HOUR
DAILY
2HOURS
WEEKLY
EVERY FORNIGHT
INPUT

CONCLUSION

"Nature will bruise it, batter it, wear it down-
but in so doing a re-emergence of life will occur.
A birthing process whereby agriculture is introduced
and the building is reborn through decay.
Man, building and machine will coexist
In the realization that they are all subject to times grace"

-tariq hassen

Careful consideration to structure and composition can integrate machines both metaphorically and physically into the built environment and architecture. However, in regards to human comfort and social assimilation, even when in the realm of architecture, something more than these aspects is needed. It is the fundamental paradox that machines to do age and are hyper functional that make them estranged to us. In this thesis I have looked at the machine as a compositional element, but more importantly realized the importance of the machine as an assembly of interrelated parts each with specific function working together to perform a singular action. This has been the basis for my design. Assembly and articulation of aspects such as infrastructure, environment all present within a site working together for a united action. In this specific case the re- introduction of agriculture in place making. Most importantly it is through the assertion of nature and time that we find identity in these beautiful objects and also a paralleled mortality.

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- Exploded clock http://www.google.co.za/imgres?imgurl=http://3.bp.blogspot.com/-vmKLjerb6Qk/Tto4uhIQ_CI/AAAAAAAAG6k/l7ETFGZA8ww/s1600/Apart_WindUpClock.jpg&imgrefurl=http://rustyknuckles.blogspot.com/2011/12/todd-mclellans-photos-in-motion.html&usg=__Y9lhsPSDqoAcykq8Z9Inyb3FLq4=&h=1200&w=901&sz=412&hl=en&start=20&zoom=1&tbnid=7qXgUgrCqdis7M:&tbnh=150&tbnw=113&ei=VhZ-UJDiAsrKhAebq4ClCw&prev=/search%3Fq%3Dcool%2Bexploded%2Bclock%26um%3D1%26hl%3Den%26sa%3DN%26biw%3D1920%26bih%3D887%26tbm%3Disch&um=1&itbs=1
- Watering plants: http://4.bp.blogspot.com/-3s0x6jxfy0w/TvAz-VV7SFI/AAAAAAAAAsw/pZvM2-WI9V8/s1600/watering+technique.jpg

COURSE CODE.....5079W.....

COVER SHEET

STUDENT NAME:.....TARIQ HASSEN.....

STUDENT NUMBER:.....HSSTAR002.....

SUPERVISOR:.....JOE NCEBO.....

PLAGIARISM DECLARATION

1. I know that plagiarism is wrong. Plagiarism is to use another's work and pretend that it is one's own.
2. I have used the Harvard convention for citation and referencing. Each contribution to and quotation in, this essay/report/project/paper.....REPORT..... from the work(s) of other people has been attributed, and has been cited and referenced.
3. This essay/report/project/paper.....REPORT.....is my own work.
4. I have not allowed, and will not allow, anyone to copy my work.

Signature: Signature removed

Date:.....17/10/2012.....

ESSAY WRITING REQUIREMENTS

This sheet is an overview of the minimum requirements for any essay or written work you submit for all courses in the School. As this is only a brief summary, use the recommended resources for further direction.

Essay Structure

Thesis: No matter the purpose of the essay, you must have a thesis and build your paper so to explicate that thesis.
Outline: Your essay must have a clear and organized structure. Start by developing an outline. Break the essay down into the following categories:

Introduction: At least one paragraph which introduces the essay topic. It includes the thesis statement, usually as the last sentence in the first paragraph.
Body: Develop the themes and points that explicate your thesis in the body of the essay.
Conclusion: A final paragraph(s) that re-states your thesis and contextualizes or summarizes the body of the essay. Never add a new topic or point of explication in your conclusion.

Paragraphs: It is very important that you develop well-structured paragraphs. The rule-of-thumb is that each topic or theme is developed in a single paragraph. However, that rule may be modified if a paragraph becomes too long (which can be tiresome to read) or you have too many brief paragraphs (which are also tiresome). Include transitions at the end and beginning of paragraphs so that they flow together well.
Writing style: Your essay must be clear, concise, and flow smoothly. Academic essays require a certain degree of formality, but do not complicate the writing style or word choice unnecessarily. Utilize punctuation correctly! Check your grammar (pay particular attention that subject and verbs, pronouns and antecedent nouns agree)! Read your essay out loud to yourself to check for flow and clarity! **Proof-read and spell check!**
For further reading or assistance, see:
http://startup.curtin.edu.au/study_skills/writing.html, or http://www.lib.uct.ac.za/infolit/report.htm, or The Humanities Library at UCT has a large collection of writing skills reference books, or visit The UCT Writing Centre (http://www.ched.uct.ac.za/adp/writing/), which offers writing assistance to all students.

Referencing

All academic writing requires you to cite all the sources that you have read and consulted in the preparation of your work. Not citing all of your sources is an act of plagiarism: essentially the stealing of others' words, thoughts and ideas, and is treated as fraud. Students found guilty could at best fail their course, at worst face expulsion. Every single instance of using phrases and ideas that are not your own must be acknowledged.
Quoting: When you quote someone's words directly, you *have to place these words in quotation marks.*
Longer quotations, which you should use sparingly, should be "blocked" to make them stand out clearly. This means indenting and single-spacing the entire quotation, also possibly using a smaller typeface.
Referencing: You must choose one method of referencing (or citation) and use it consistently throughout your essay: either the Harvard system or the footnote (Chicago or Oxford) system. No matter which system you choose to use, the information you must ascertain and include is:

- **Name** of the originator(s) of the document or the part of a document you are using as a source.
- **Date** of publication (some citation styles give the date immediately after the author; otherwise after the name of the publisher). For an electronic resource, look for the date on which the document was produced or updated.
- **Title** of the publication (and, if it is part of a larger work, e.g. an article in a journal, or one paper in an edited collection, also the **title of the whole** publication).
- For an electronic resource only, the **medium**, which may be given as "Online" or "CD-Rom" in square brackets, or you may use "Electronic" if you are not sure whether the source is online or networked CD-Rom.
- **Publication details**: Place of publication and Publisher if the item is a book; Volume and/or issue number if the item is a journal. For an electronic resource give the **uniform resource locator** (URL) which may sometimes be given between angle brackets (< >). If the URL is very long, it may be written on two lines, but try to break a line only where a punctuation mark occurs and do not *add* a hyphen, as this will alter the URL.
- Inclusive **page numbers** if the reference is to an item smaller than a whole book.
- For an electronic resource, the **date** on which the document was last **accessed**, often in square brackets.

Harvard System

In the Harvard system, referencing is done by inserting the author surname and publication date in parenthesis within the main body of the text. For a complete guide to the Harvard system, see http://www.lib.uct.ac.za/infolit/bibharvard.htm.

Footnote System

In the footnote system, a reference in the text to another source is signalled by a numeral giving the number of the citation. This numeral corresponds to a numbered note at the bottom of the page (a footnote), or at the end of the paper. For a complete list and discussion of footnoting, see http://www.lib.uct.ac.za/infolit/bibchicago.htm or Turabian, K. 1996. *A manual for writers of research papers, theses and dissertations.* 6th ed. Revised by John Grossman and Alice Bennet. Chicago: University of Chicago Press.