

Questioning Commonplace Ecological Design: a study of waterfront design practices and the ecological well-being of development in the harbor of Oyster, Virginia



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Thesis for Master of Landscape Architecture Degree

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**Thesis for partial fulfillment of Master of Landscape Architecture Degree at Virginia Polytechnic Institute and State University
Alexandria, Virginia**

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Key words: ecotone, estuary, micro and macro environments, levees, lagoons, platforms, fulcrum, terminus, threshold, filtration, event inspired space, azimuth, tidal shelf

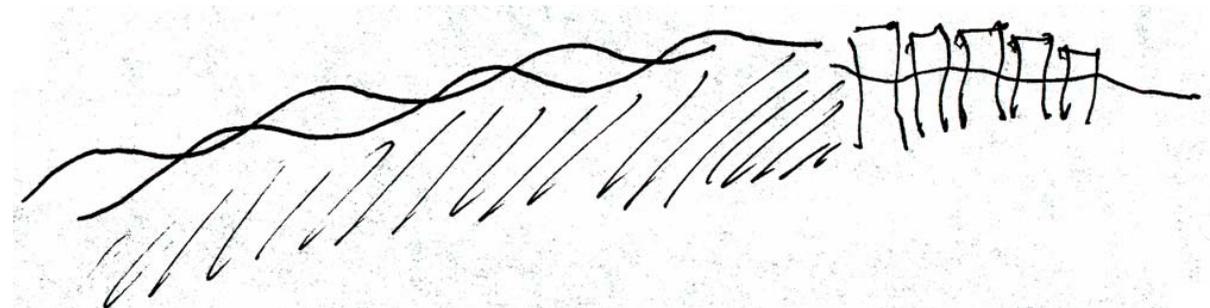
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ABSTRACT

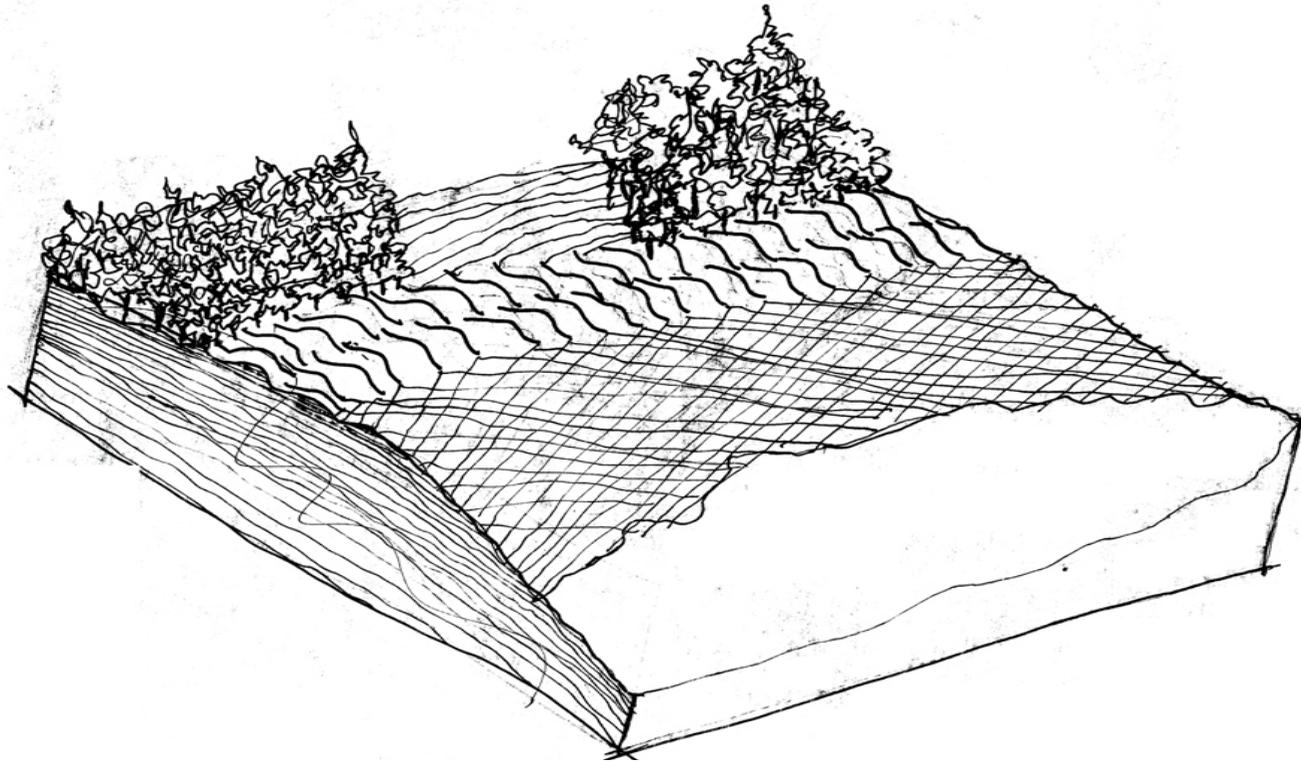
The purpose of this investigation is to examine how landscape architecture can create a different kind of threshold between land and water without controlling the edge between the two entities, but merely guiding the natural process of exchange. The design of Oyster Harbor on the Eastern Shore of Virginia is in contrast to normative development of waterfront sites. The hard edge of common practices of waterfront development stands in tension to the more natural evolving edge of many harbors.

When creating a dialogue between land and water, the solution has always been to create a sea wall separating the two entities. It becomes the hard dividing line between a solid surface and liquid life. Is there a way to create a threshold that does not divide? How can landscape architecture create an exchange of qualities with land and water? Does the sea wall become the precedent to all concerns of tide and sea usurping lands edge? The edge between land and water is ever changing, so why not celebrate and personify that edge through creating a natural exchange between water and land.



In order to create such an exchange, we must first look at the nature of water and land. Water is a free element that is composed of hydrogen and oxygen. It is inclined to motion, reflection, rise and fall. It holds a unique quality independent of man-induced control. Land is a more solid entity created by layers of stone and elements broken down by water. Land capacity is gauged by water, as in the water table. Throughout history, man has maintained a controlling relationship with land. However this is the opposite with water. Man has an inherent fear of water, the representative of both life and death. Though man tries, he cannot control water, he must work within the bounds set by water. How does one understand the evolutionary relationship of land and water without trying to control the elements that allow the relationship to occur? Through research, it is revealed that land actually usurps water through both a push and pull method of tides and water run off from land. Through time and tide, land builds up and infringes upon the natural edge of land and water. The plains move down, the vegetative roll moves forward, the beach ridges reconfigure, and the tidal flats create a shelf that extends out into the ocean floor.

This evolution of land continually cycles on moon and sun paths that dictate the change in light, shade, wind, tides, motion, and human cycles. Whether recognizable or not recognizable, these macro and micro environmental cycles become a dance in the realm of landscape architecture. How does one reveal macro and micro environmental aspects through design with human interaction at the edge between land and water?



To my conscience, confidant, and the one I walk beside in life. I am truly grateful for your motivation and friendship truer than no other.

Jay Barber.

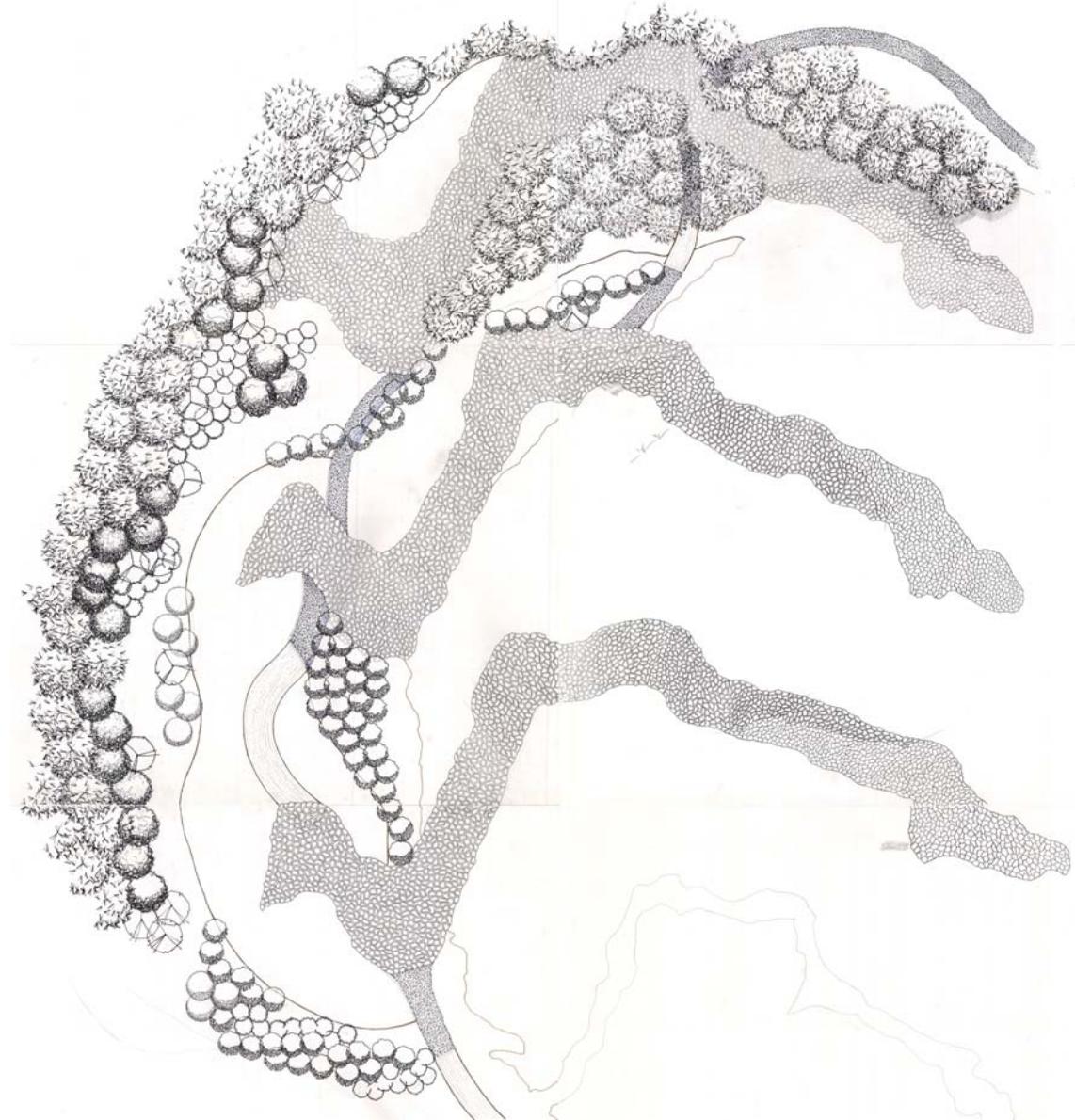
There are so many to whom I owe sincere thanks. My fellow students and classmates at the Consortium have given me so much support and guidance. They have taught me to grow and expand this sometimes feeble mind. Marco Frascari never failed to see the potential in my exercises and has given me the gift of always delving deeper than what the eye sees. Paul Emmons has shown me that patience and questioning will open new truths. Benjamin Johnson has taught me to understand the folly in changing the earth, but how serious and real those actions can be. Jeremy Foster has challenged me to think beyond the standard norms of Architecture to always find the underlying meaning of the built object. Every day, I am reminded to strive to give nothing less than my best efforts and to never settle to creating just good architecture, thanks to Jim Ritter. Thanks to Charles Birnbaum of the National Park Service for his enthusiastic support of all my wild ideas that never find a place to rest. Without Ron Kagawa and Patrick Miller, I would have not had the legs to pursue my degree and passion.

Finally, my true and everlasting respect and friendship to Kelli Franklin, Brad Meyerhoff, and Pam Daniel, who never let me believe that what I was doing was not worth the effort. And to my family and friends whose constant and strong support have always made me believe that no endeavor is beyond reach.

Special dedication to my father, Jimmy H. Klutz, FASLA. Your talent and dedication to this profession are inspiring.

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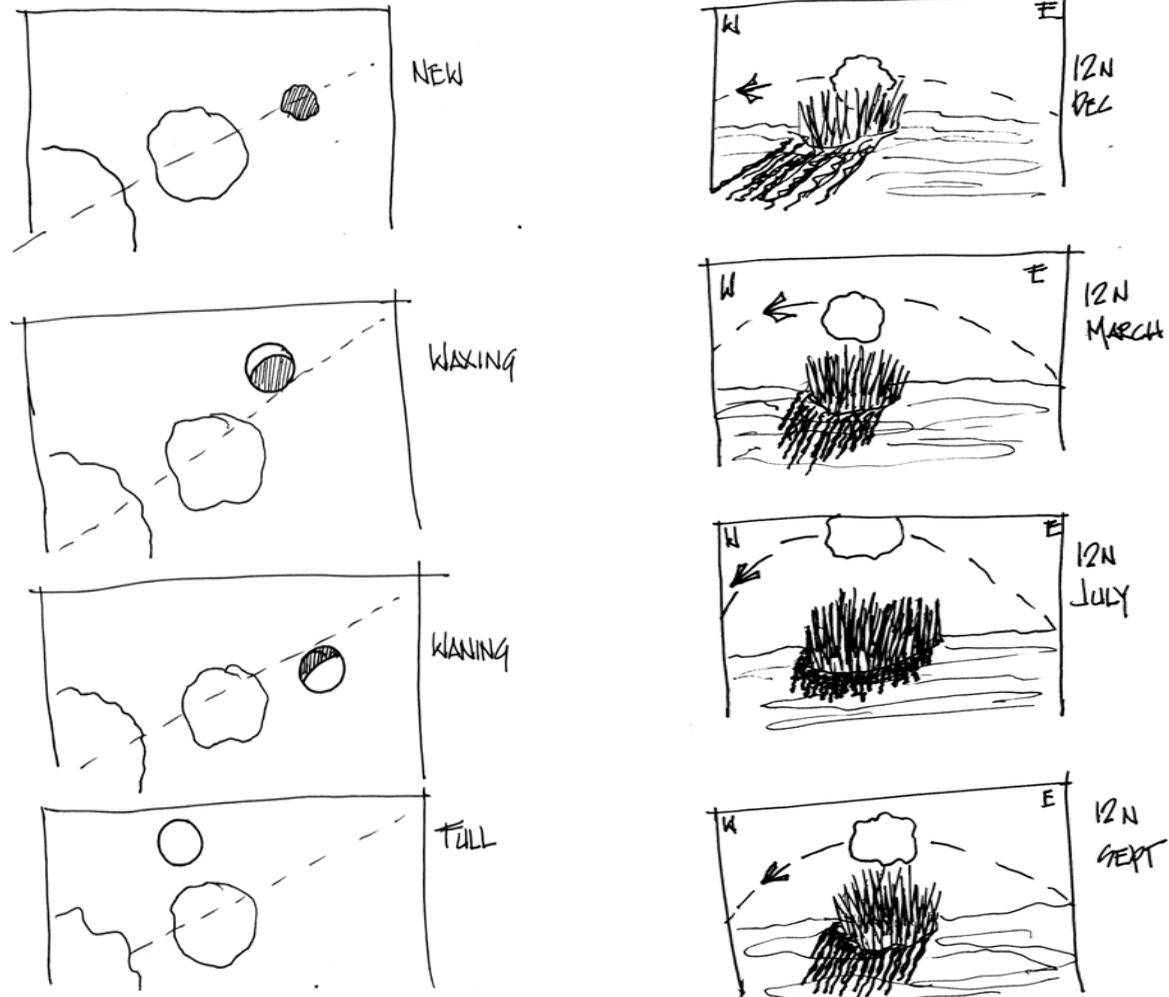
Thesis Statement:

Making the macro and the micro become present in the patterns of our daily life through the examination of the transition between land and water.

The edge between land and water is representative of night and day, light and darkness, airy and thickness. Night and day being the driving forces of this exchange between land and water through the tides. This give and take is driven by the sun and moon's gravitational forces, thus controlling not only the natural cycles, but the human cycles as well. The design intent is to make these macro and micro environmental effects present and personify them in the visual and non-visual human event inspired landscape, focused on the edge condition between land and water.

Human cycles, not unlike the natural processes of the environment, are hinged upon the phases of the moon. Tides, seasons, time, and life patterns are driven by moon cycles.

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The macro and micro environments are the gauges for human interaction and patterns. Thus all interaction is personified at the edge between land and water. There is an exchange of processes at this threshold that cannot be found anywhere else. This unique set of circumstances has held us at bay for many generations. Man relies upon the tides for livelihood, nourishment, protection, and the recognition of time. The sun rises and sets over the ocean, thus being the origination and destination point of all solar and lunar effects. At this edge, light, shade, visibility, sound, and climatic effects reach a different crescendo. These effects become a layered event at the edge of the ocean. Not only does the change occur moving between land and water, it also is present moving up into the topography and down to the surface of the water.



When one tugs at a single thing in nature, he finds it attached to the rest of the world. John Muir

Questions

How do the moon and sun drive all environmental and human processes? The moon is a terrestrial body that circles the earth every 27.5 days. The earth, also being a terrestrial planet, circles the sun every 363.5 days. These cycles are a measure for days, months, and years... the calendar. The speed at which these cycles occur, and the relative rotation of the sun and moon set up a gravitational pull on the earth. This pull creates torque, which forces the tides in and out. As the earth tilts on its axis the sun moves north and south, creating seasons; another measure of time. The daily changes in tides and the seasonal changes in the environment dictate human cycles. Agricultural practices rely on the seasons; fishing and maritime trades rely on the tides; and the human psyche follows these traditions and cycles. Galileo spent the majority of his life proving the rhythms of life based on the change in tidal force twice daily.

How can piers, platforms and promenades engage human interaction with the site? Piers extend a hard surface out over the water without changing the existing edge. Thus fingers of land bring human interaction out into the water through perceivable means. Piers create that connection with the water from the land for pedestrians and connect the water with the land for boats and swimmers. Platforms allow change in grade between land and water. Platforms can become viewing decks as well as thresholds between two layers. Promenades are connectors from one area to another. Promenades transition between open and closed space, and higher ground and lower levels. Piers, platforms and promenades are the vehicle for human interaction with the many layers on the site.

What is it about the site that warrants intervention? This site has several distinct factors of human intervention. The residential/commercial aspect includes oystermen, farmers and their homes. The research aspect entails ecological research about the marshes and the shellfish populations around the site. And the recreation aspect includes fishing and boating, a form of recreation in this community as well as livelihood and transportation. These three factors are categorized as use, need and desire zones. Unfortunately, it is too simple to zone these programmatic aspects. All three overlap and impede upon the others, so there has got to be a way to design to accommodate all three within the same site.

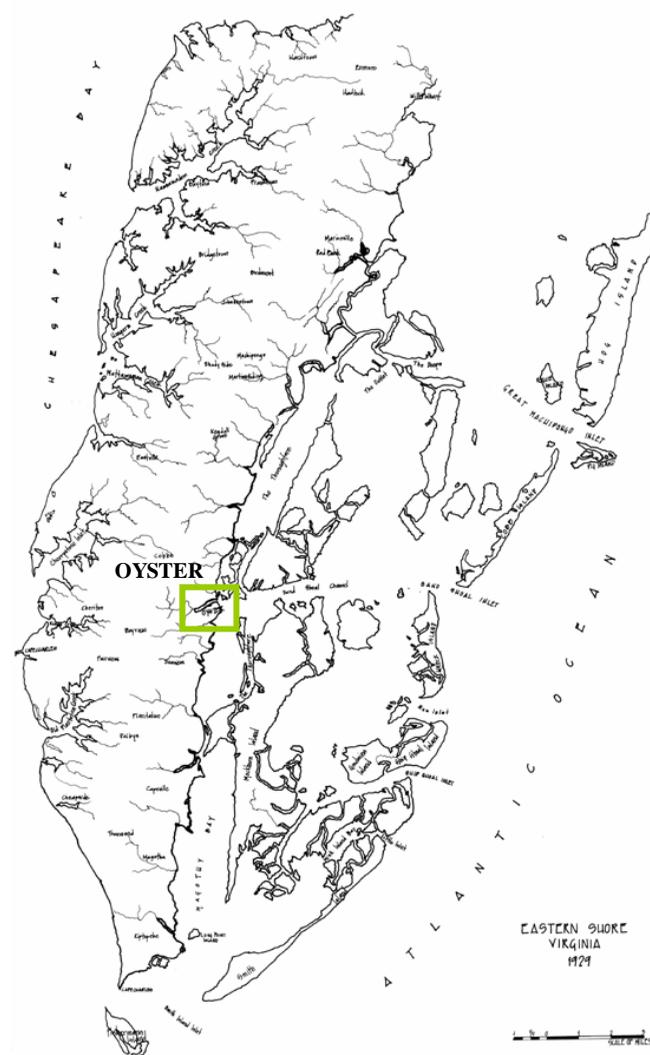
How can the ecological aspects of the site be maintained while supporting human activity? The designation of zones of use can greatly aid the preservation of the estuarine shelf, but these zones must do more than just preserve, they must enhance ecological health while maintaining the shellfish industry. Every intervention must address many issues and accommodate each issue. It is not enough to merely ward off human danger in the ecological zones and make these areas off limits. The proactive route is to educate users about the fragile nature of these areas, and incorporate their awareness in the restoration of habitats. Research is not the only tool that will encourage ecological health in Oyster, action and preservation can certainly enhance the longevity of the estuarine shelf. Conscious building practices will maintain these efforts. Designating walking areas within the research areas guides one through the park without harming the ecology of the site.

What makes this design intent unique from all other waterfront designs? The intent of this design is to investigate the dichotomy between naturalistic waterfront design that maintains the ecological health of the edge between land and water and the traditional approach to waterfront development that creates a static division between these two entities. With the development of festival marketplaces and boardwalks created solely for the recreation of users and the economic gain of the vested developers, there is no interaction with the water other than for vistas and entertainment value. Using hardscape materials and native plants as the backdrop to the harbor, rather than boutique shopping and street performers, allows the historical and cultural uniqueness of the site to guide the users' enjoyment. It becomes a unique waterfront experience and leaves shopping to the malls and other sites without the natural amenities of a harbor still viable for fishermen. The user becomes aware of the systemic occurrences in harbors through larger than life design of these systems. Human interaction within these designs allows understanding of the processes that are so necessary for the health and the continuance of the harbor. Not only does the site become the subject of geological evolution, it also reveals the cultural forces that have driven this site for four centuries.

The Site

The Delmarva Peninsula runs approximately 88 miles in length shared by the states of Delaware, Maryland and Virginia. The territory in the state of Virginia, otherwise known as the Eastern Shore is bounded to the east by the Atlantic Ocean and to the West by the Chesapeake Bay. The Eastern Shore of Virginia is comprised of approximately 696 square miles in land mass and spans 6 miles at its widest point. The elevation of the peninsula is almost even with the average sea level, and any upward slope is only a few meters towards its central spine.

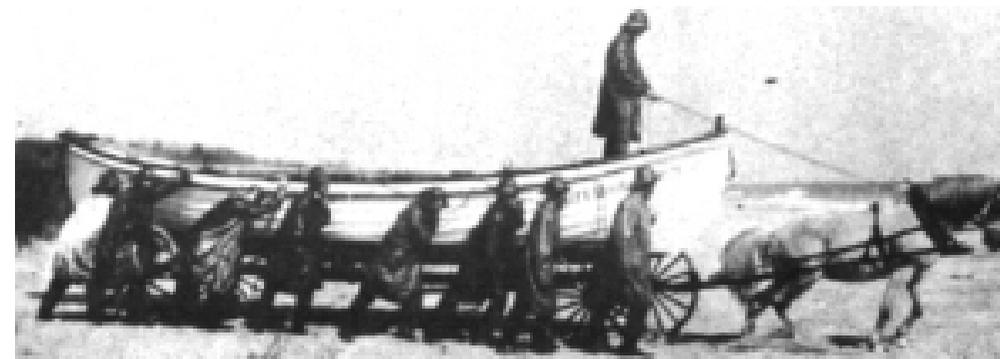
The town of Oyster, Virginia is located on the southeastern side of the Delmarva Peninsula. It is a small tidal harbor protected by the Barrier Islands, Ship Shoal and Cobb. The main tidal feed for the harbor is the Machipongo Inlet and the Cherrystone and Little Cobb Tidal Creeks. The main source of income is commercial shellfish harvesting using the same techniques that have been used for 300 years. Oyster is purely a fishing village. However, due to natural coastal hazards and human encroachment, it is losing its source of survival, namely its keystone species, the oyster. Many of the watermen are moving inland to work in agriculture.



Regional History

The Eastern Shore of Virginia began as an area populated by American Indians. The peninsula was used for both agriculture and hunting. The waters were fished and harvested of shellfish. English settlement of the Eastern Shore was documented as early as the 1600's. Vast English style estates and plantations sprung up around agricultural plots. Slowly, a caste system developed between the educated, wealthy landowners and the poorer, sometimes exiled criminal fishermen. Explorations of the barrier islands led to vacation spots and hunt clubs for visitors from the northern states. With the large variety of wildlife came sport hunting and fishing. Ferry sites and public docks were set up along the little harbors scattered along the east coast of the peninsula. Many of those convicted of crimes served out their duties as ferrymen and guides for the visitors. Oyster harvesting was a prosperous endeavor to feed the demand of hungry visitors. A standing police navy was established to protect the oystermen from poaching by the more aggressive, larger northern fishing fleets.

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Adapt or perish, now as ever, is nature's inexorable imperative. H.G. Wells

Site History

Oyster, Virginia was one of the small harbors that prospered from the increasing demand of shellfish and transportation to the barrier island clubs. A small community of oystermen developed on the flat south side of the harbor and has remained there since the 1700's. The majority of this community resides on the shallow spit of land in the South Harbor. A Church and Post Office share the waterfront with many weathered commercial shellfish buildings.

The higher terraced plains on the northern side of the harbor became the site for larger agricultural practices and the estuary shelf where the oyster beds grow. The harbor was also the outpost from which the Coast Guard operated the Cobb Island Coast Guard Station for protection of Oyster and the neighboring barrier islands.

Accessibility to the site has always remained the same, a single loop road that accommodates the residents and workers alike.



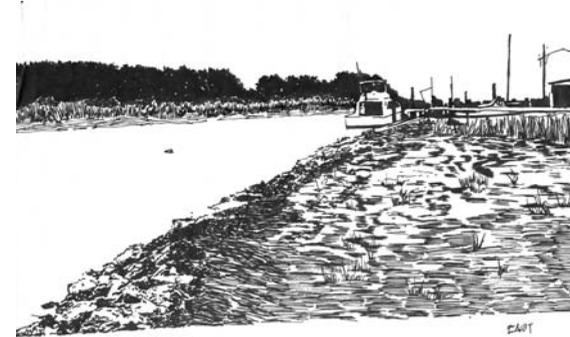
Introduction

The site for this investigation is located around the harbor of Oyster on the Eastern Shore of Virginia. The northern half of the harbor is a natural ribbon like edge that houses the estuarine shelf of grasses and various marsh and sea life. The southern half of the harbor is a varying hard commercial marine edge comprised of riprap and concrete bulkhead. The population of Oyster is low density and the main sources of livelihood are commercial fishing and farming.

The south harbor comprises the majority of the commercial fishing trade and residential areas. The north harbor houses mostly agricultural endeavors and some research facilities. A public boat launch sits on the northeastern center of the harbor. This boat launch serves as the only public access point to the water for the southern half of the Eastern Shore of Virginia. The topography of the site is relatively flat and typical of the Atlantic Ocean beach ridge. With the renovation of the Cobb Island Station and the addition of several research facilities, The harbor fits many needs within the region.

A substantial estuary shelf extends from the north shore and encompasses most of the shallow basin of the north harbor. Oyster shelves and industry remnants reveal the history and future of the site. This shelf becomes the focal point for the investigation.

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Program

The program includes need, want and use-based demands. The local residents use this harbor as a form of transportation and livelihood. The recreational boaters want more than just a boat ramp. They want places to picnic and dock and walk dogs and enjoy the harbor. Both of these groups need the harbor to remain a healthy and viable body of water, thus research is an integral part of the program. The ecological and atmospheric research is needed to maintain the ecological health of Oyster to provide the public and private users a place to pursue their activities. There must be accommodation for the conservation of the existing estuarine shelf through which many universities and organizations base their ecological research. The commercial side of the harbor hosts commercial shellfish fisherman and an aquaculture station. The increase of recreational use around the harbor has severely threatened both the research and commercial capabilities in Oyster. How can all three entities co exist without threatening the ecological health of the harbor and create a balance that is profitable for all?



Aerial view of Oyster Harbor-low tide

Design Proposal

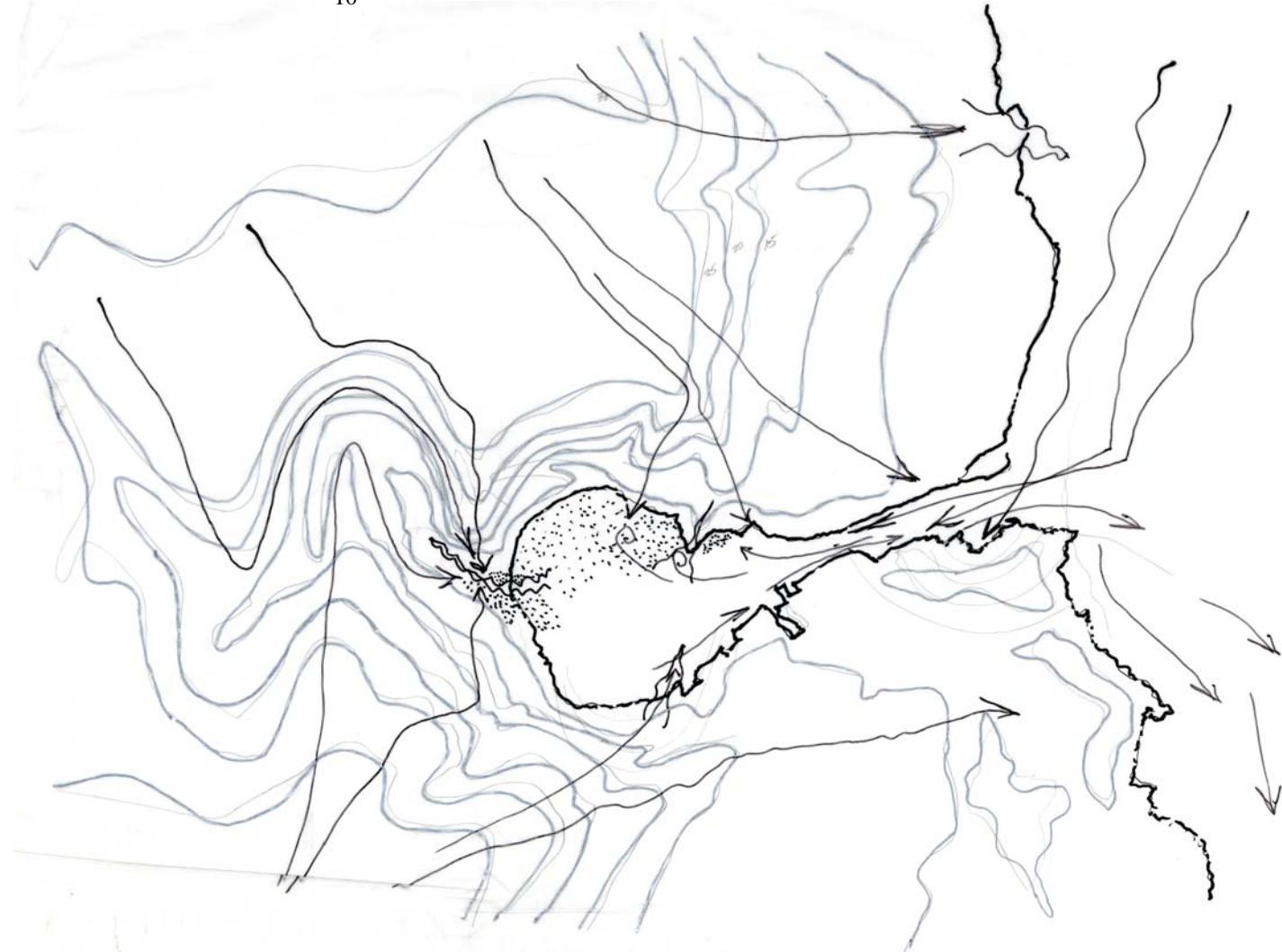
The goal is to intervene on the land in a way that is suitable for human use and enjoyment. “The urban waterfront remains an exciting frontier, an opportunity for the architectural profession to take the lead in making a public case for reinventing our city centers as environmentally necessary, socially responsible, and culturally imperative places (Breen and Rigby, p.67, col. 2).” Nicholas Falk describes the incorporation of site history into the development through renovation, architectural styles, and even cultural attractions such as site-specific museums and community renewal centers.

The development of an aquatic research park can suit all these needs. It will engage man in the communication between land and water through the macro and micro environments. Piers, platforms and promenades will carry man from high to low, personifying all ethereal aspects of the edge as well as engaging him in the dialogue between land and water and the cycles of the moon and sun. This park will transcend day and night, seasons, and human use through bringing the physical aspects of the site into the forefront. North/south axes will allow for the maximum light aspect, open up views, and set up a connection between land and water that can be revealed randomly cycling around the site. The land connectors will not only offer experience sequences through changes in topography, but introduce guests to various ecological aspects as well.



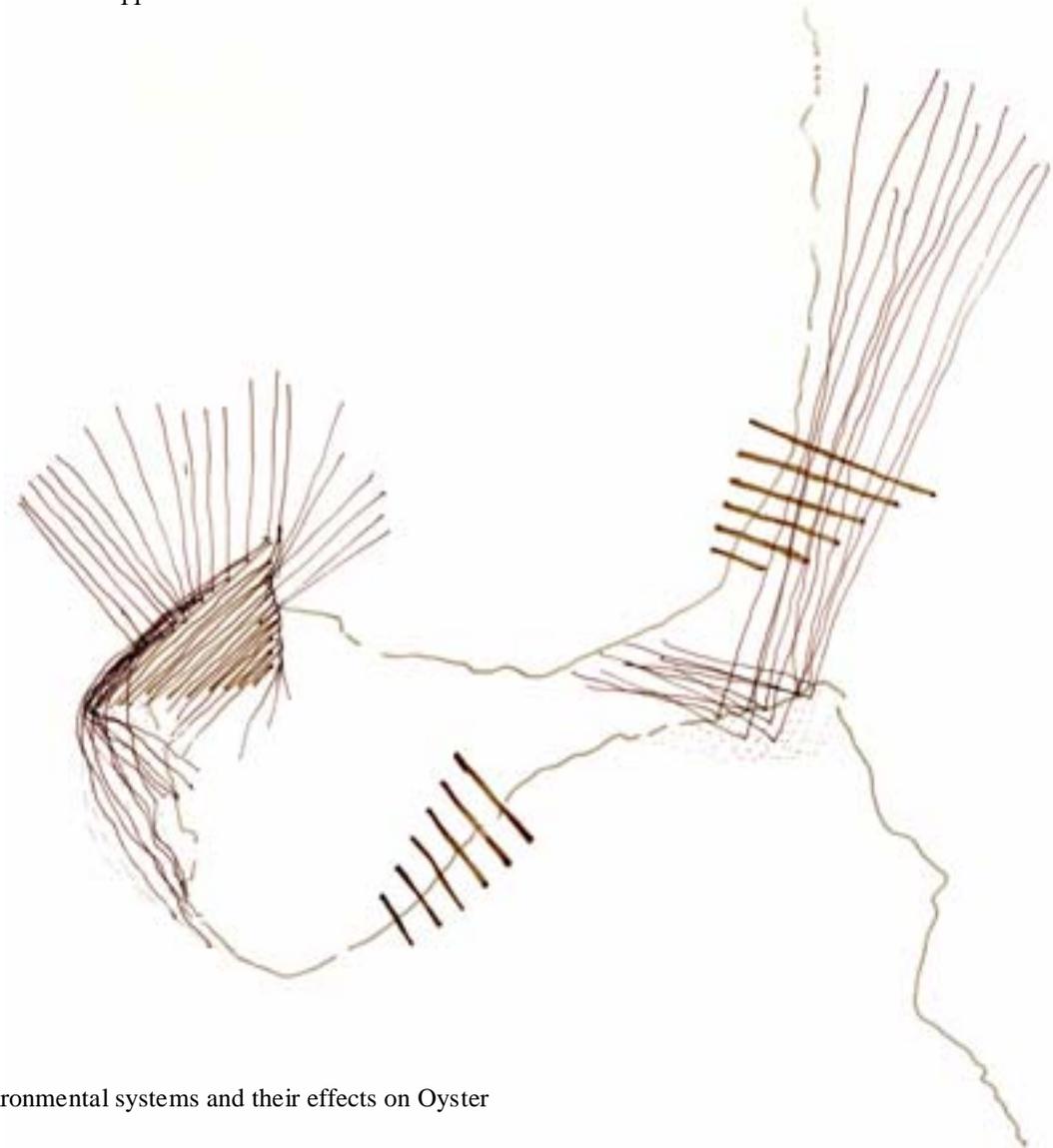
Conceptual plan of Oyster's North Harbor

The proposed design incorporates the use of plant material and hardscape to designate zones of use through environmental cycles and seasonal variation. The intent is to accommodate all aspects of the program without completely redeveloping Oyster into something the harbor cannot support financially or ecologically. “Striking a balance between both the existing and new communities...the Balanced Incremental Development (or BID) is a process that starts by making use of the existing resources of an area, such as empty buildings and water areas, then develops an area in phases, with initial elements that are relevant to local people, and finally that sets up financial aid and organizational mechanisms such as development trusts that bridge the gap between the public and private realms, and to ensure that local people share in the benefit from development (Nicholas Falk).” No waterfront development can be successful by ignoring the local community within the context of the site. Thus, the center of the harbor becomes the core around which many different activities take place. Boaters and visitors appreciate the site despite its natural sloppiness. Researchers adhere to this sloppiness to maintain a healthy site. And the residents exist as they have for centuries, for their mark on Oyster is intrinsic to the tone of the development.



Zones of use for the development of Oyster

There is a designation of the edge between land and water, maintaining the natural ribbon like qualities in the north harbor and the straight geometric bulkhead of the south harbor. All of these edge zones mesh together to create a cyclical type of master plan. The journey does not originate or terminate in any designated spot, it is dictated by the user and the event. The main suggestive guidelines are set, but the user is the one who dictates what the design becomes to them. For some, it could be a systemic show and tell, for others it could be a place of work or refuge. The main ideal is to suggest a human interaction with both land and water and their guiding forces right at the edge between the two. The design shows how daily life can be revealed through the macro and micro environments. Human systems very closely mimic the natural environment and it's systems because they are so closely hinged upon one another. Like a system of weights and balances, the macro environment affects the micro environment. Also with the design, the harbor itself is the fulcrum point for the tension between the north and south harbor. This system is personified at that edge between land and water, the ecotone.



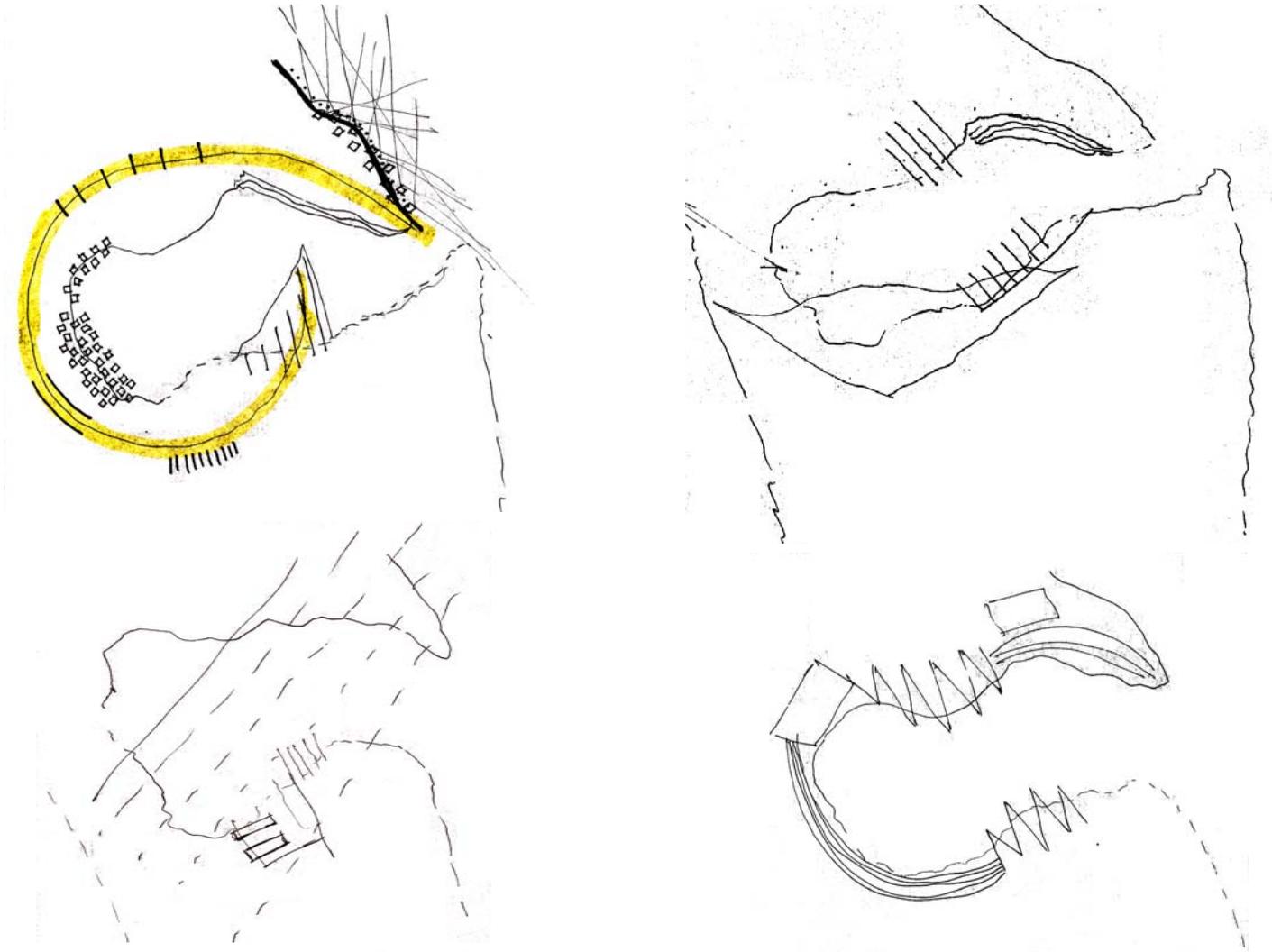
Environmental systems and their effects on Oyster

Site Evaluation

The initial investigation only looked at the tides and how they affect the physical changes in the edge between land and water, but after further exploring the complexities of the site, research revealed programmatic aspects as well as physical and natural aspects. Agricultural run off into the estuarine shelf is inhibiting the commercial prosperity of Oyster through habitat fragmentation. The water test stations and marine ecology studies are directly benefiting the health of the harbor as well as the commercial traditions of the site. The majority of agricultural run off is occurring at the northwestern corner of Oyster. Phosphates and nitrite levels increase over the summer months, when farming production is high. This is the growing period for many different aquatic species, such as the oyster and other mussels. The runoff collects on the estuarine shelf and creates algae that suffocates the *Spartina* grasses on the shelf, and in turn the habitat for the shellfish and other aquatic organisms.

On the other hand, the channels in and around the harbor are borrowing land and depositing it elsewhere. This further compounds the evolutionary face of Oyster. Larger boats, such as the commercial variety and ocean going recreational boats create a wake that causes severe erosion to the sides of the harbor.

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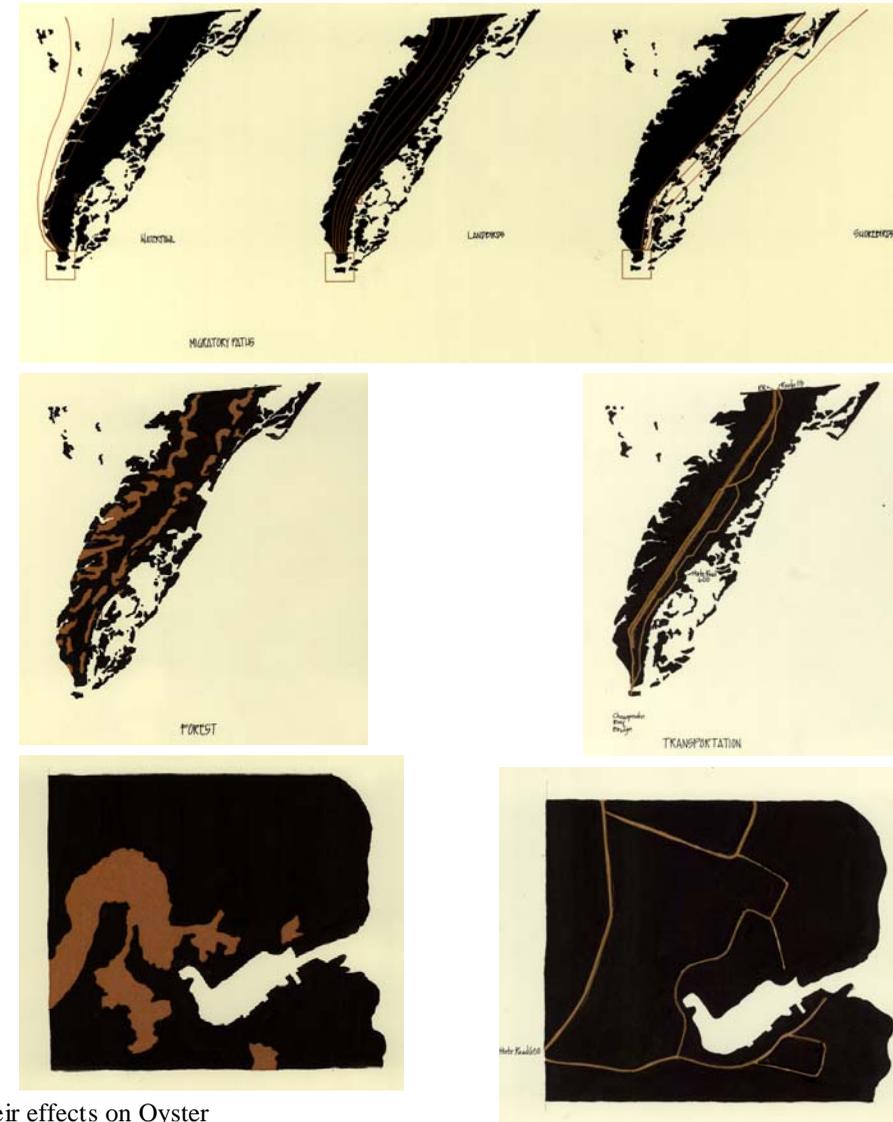


Natural systems and their effects on Oyster

Site Analysis

Oyster is located at 17N and 57E in terms of mapping reference. It is a light bulb-shaped inlet running Northwest/Southeast against the Machipongo Inlet. There are three barrier islands that separate Oyster from the Atlantic Ocean and act as a buffer to the storm surges, winds, and surf. These three islands are named Cobb, Ship Shoal, and Smith.

There is a typical plain to estuary layout on the north harbor of oyster. The spine of the eastern shore contains roads and railroad. Most of the larger residential and commercial development exists on this peak. There is a vegetative roll that follows the topography and consists mainly of hardwoods and under story scrub. Extending out from the first vegetative roll is the plain. This is a shelf that consists of farms and most of the original residences on the eastern shore. The second vegetative roll follows, but it is very different in nature. The hardwoods make way for pine and other salt tolerant plant material. This topographical roll opens onto the beach ridge and estuarine shelf.



Physical systems and their effects on Oyster

Tides

The harbor has a tidal range that averages 3.8 feet. It is a slow rolling tide, but the current still matches that of an area fronting the Atlantic. Twice daily the estuary shelf is revealed to show the grass crowns and the mud flats in which it sits.

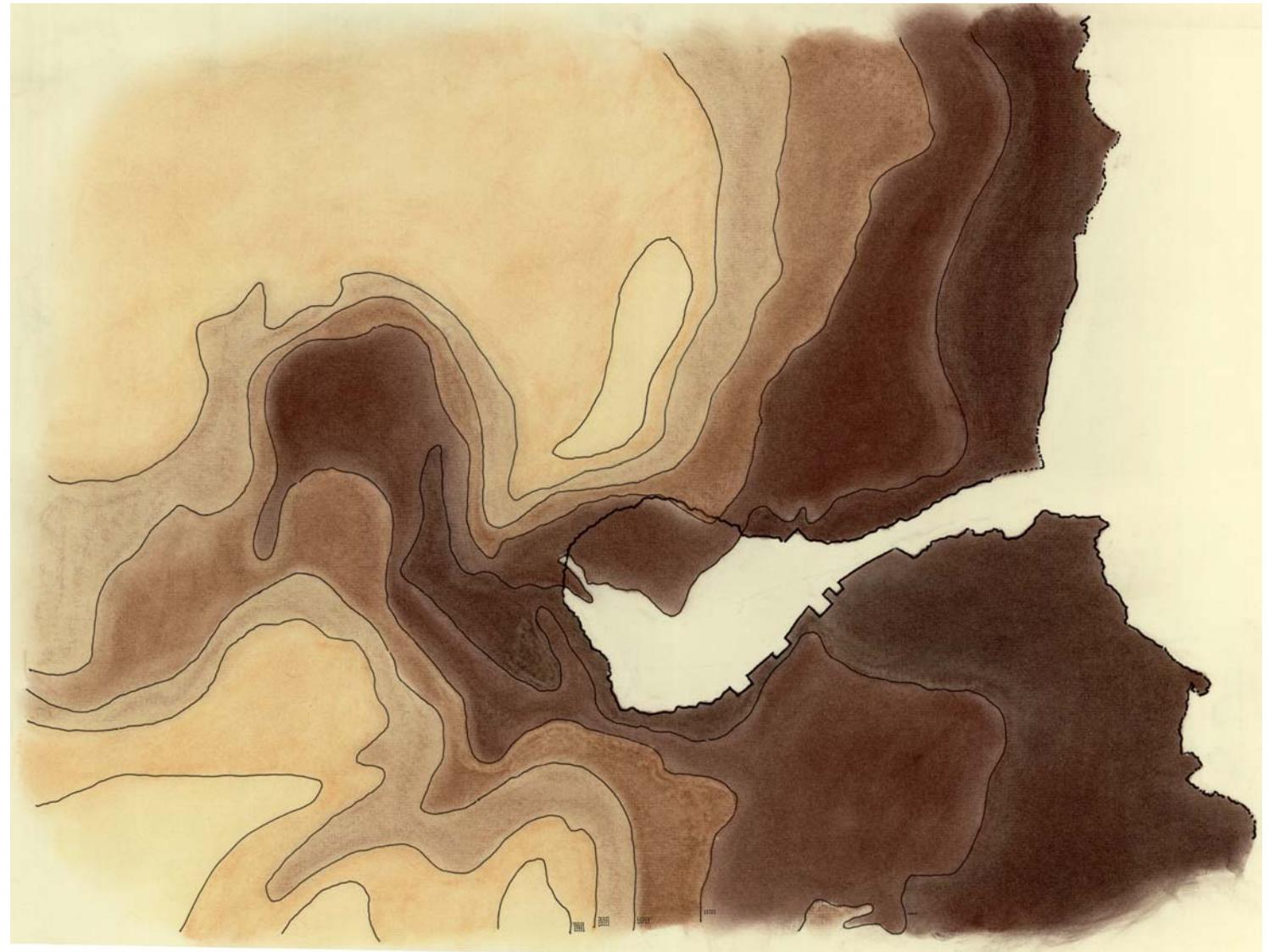
The harbor becomes a very different place at the opposing tides. Low tide reveals the driving force of industry, the ecological attributes of the site, and the power of a tidal based community. High tide encourages activity in many different ways. Recreation primes industry with the boat launch, light and wind are present, and the barren landscape is hidden by water.



Tidal force in Oyster Harbor

Topography

The topography is relatively flat, climbing 40' over a ½ mile run. There is more of a grade change on the northern end of the harbor. The flat, agricultural terraces overlook the vegetative roll and estuarine shelf. The south harbor rises 7', moving away from the harbor, resting at a plateau which houses the residential area of Oyster.



Vegetation

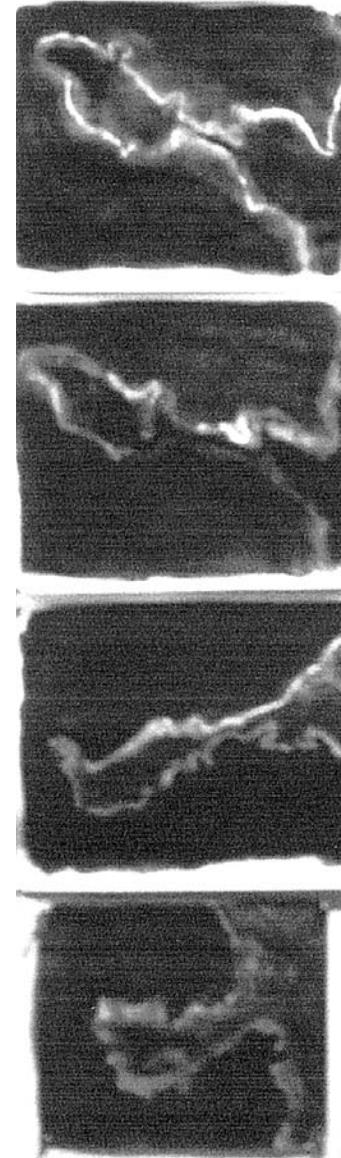
The vegetation of Oyster consists of varying tidal grasses to hardwood forests. Most of the vegetation occurs on the topographical changes between the plains and the beach ridge, the beach ridge and the estuarine shelf, and on the estuarine shelf. It delineates where natural water swale or land platforms exist.

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Patterns of daily life have surely dictated channels of movement on the land as well as in the water. Streets appear where carts and later cars have traveled. The residential community has maintained its location without much variance based on the accessibility to sources of livelihood, such as the water and channel. The channel is maintained by boat traffic coming and going where land encroachment has been kept at bay by erosion. Not much change has occurred on the site relevant to human patterns. The only change occurring here is reaction to environmental sinks and swells that occur naturally over time and are accelerated by human use.

Over several decades, the Corps of Engineers dredged the channel into the Oyster harbor. Climatic incidents and the increase of boat use in the harbor have maintained the channel and made further dredging unnecessary. These site maps depict the evolutionary changes of the harbor over many decades; 1942, 1959, 1968, and 1986. The latter represents the harbor after protection laws discontinued dredging and allowed natural occurrences, such as hurricanes to guide the evolution.



Site changes from 1942 to 1986

Wetlands

Approximately 50% of Oyster's land mass is comprised of wetlands. Wetlands occurring on the site include tidal salt marshes and non-tidal salt wetlands, both vegetated. The unique quality of both types of wetland occurring in Oyster is the variety of habitats they support, ranging from sea life to endangered migratory birds. Agricultural wastewater runoff is the largest threat to the submerged aquatic vegetation living in these wetlands. The high nitrites and phosphates in agricultural fertilizers leach into the groundwater and excesses run off directly into wetlands, which become the holding beds for waste. Nitrites and phosphates encourage the invasive growth of algae. The algae that is not consumed by higher life forms creates a bacterial matrix at the crowns of the *Spartina* grasses and shades out the sun necessary to maintain root health. *Spartina* grass decline is the main cause of population losses in several endangered species with habitats in Oyster.

Development and fill is another indirect threat to several animal and aquatic species within the wetland ecosystems. Improper grading for development of recreational facilities causes siltation and erosion within the wetlands. This fill suffocates the grasses and limits the viability of the submerged aquatic vegetation. Golf courses and marinas are springing up all around Oyster and the threats to wetlands are ever increasing. It is a federal offense to alter or tamper with wetlands, but so much of it is overlooked when development for financial benefit is the culprit.



Micro Environmental Factors

Wind is a climatic and seasonal effect in Oyster. There is not a constant coastal breeze due to protection from the barrier islands to the east and vegetation to the north, south and west. However, the stillness in the air allows for the experience of many sounds. Oyster, like most of the Eastern Shore is a migratory flyway for several birds. Due to its location, Oyster hosts many species of coastal birds, many who nest in the hardwood ridges and the estuary shelf. There is also a continuous hum of marine vessels moving in and out of the harbor. This is a great reminder of the fishing and harvesting traditions of Oyster.

Transportation on the eastern shore and within Oyster is a network of small roads, none larger than two lane highways. The entire peninsula is served by rail and shipping traffic. The major access points are via ferry service across the Chesapeake Bay, toll tunnel/bridge service in the southern tip from Virginia Beach, and through the north from Maryland.

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Macro Environmental Factors

The light in the harbor is white. The reflection of light off of the water and the countless oyster shell piles makes the light a hazy white. Since the edge of the harbor is almost defunct of shade and ornamental trees, the light is a long constant for all seasons. The sun rises at the mouth of the harbor and sets at the estuary shelf.

Because Oyster is a water dependant community, there is much activity during the day and it becomes a dark silent stretch at night. With the exception of the full moon, there is little lighting around the harbor at night.

Sensory factors have an important role in Oyster. There is much opportunity for view in the harbor. Of course the view over water can be deceiving, but with the right combination of foreground, hidden, expansive and framed views, Oyster is a beautiful place. The immediate sights are of abandoned boats and the area littered with crab traps, buoys, and commercial boating equipment, but that is what makes Oyster unique. This is not some quaint developed scheme for the fishing village of yesteryear, this truly is a home and workplace for generations of oystermen.

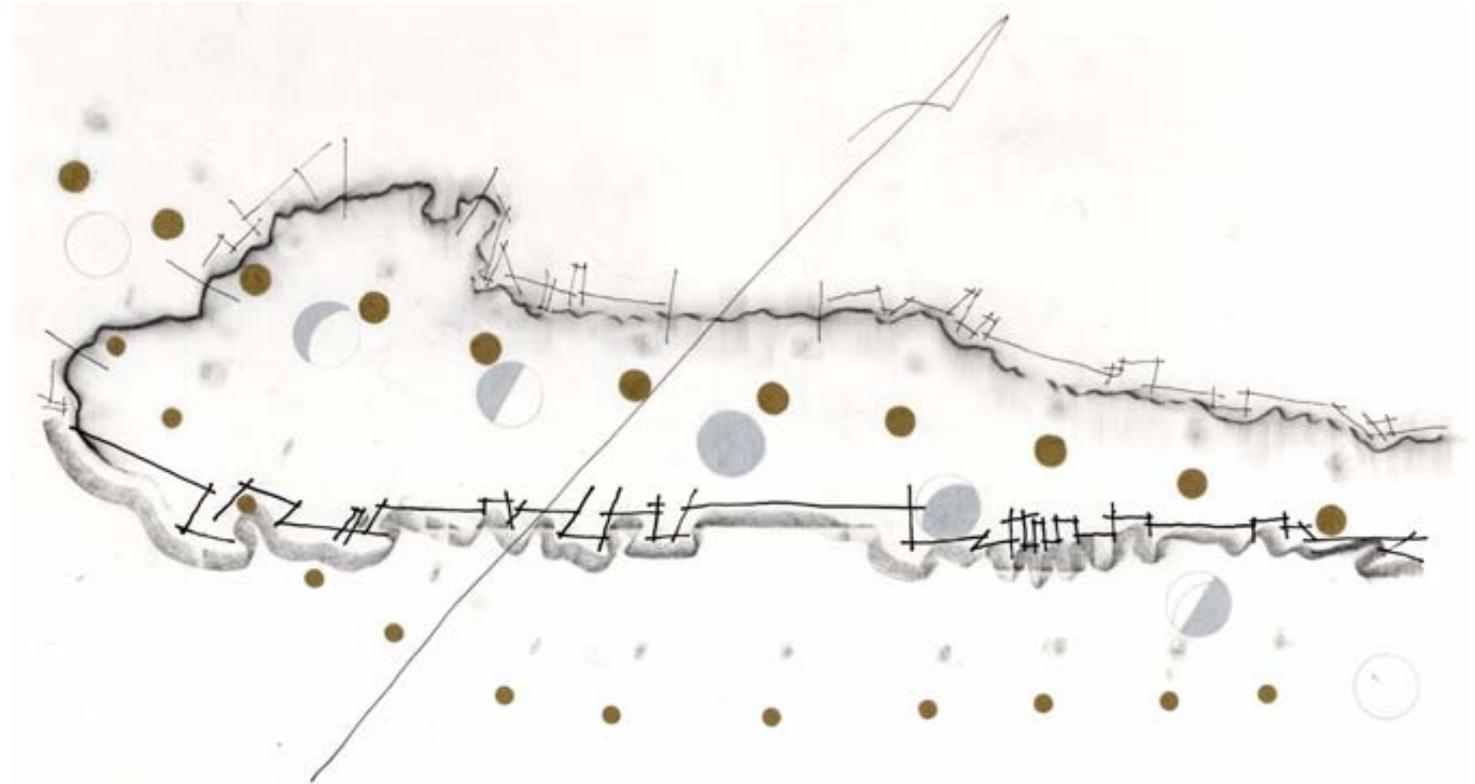


Process

The azimuth is a basis for understanding the light, shade aspects of the site. It is one of the underlying foundations of the design. By studying the sun's movement across the site at every hour of the day for the equinox and for the peak of each season, a different space is revealed from the same design.

Moon cycles do not necessarily become the negative of the azimuth. Moon cycles define gravitational forces in the macro environment, thus directing seasons, the azimuth and tides. In essence, the cycles of full, waxing, waning and new moons dictate cycles on land and in the water. Historically, full moons defined planting and harvesting times in agriculture, peaks and lulls in fish migration, and seasons of life for animals and humans.

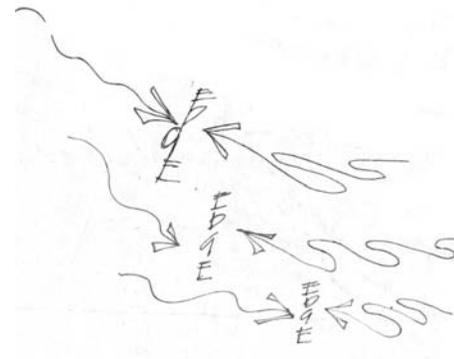
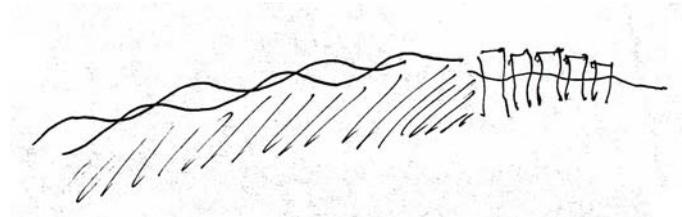
Through looking at sun and moon cycles at peak seasons for Oyster, it is revealed that the concepts for intervention on the site follow the axis of the azimuth.



Seasonal sun and moon movement across Oyster Harbor

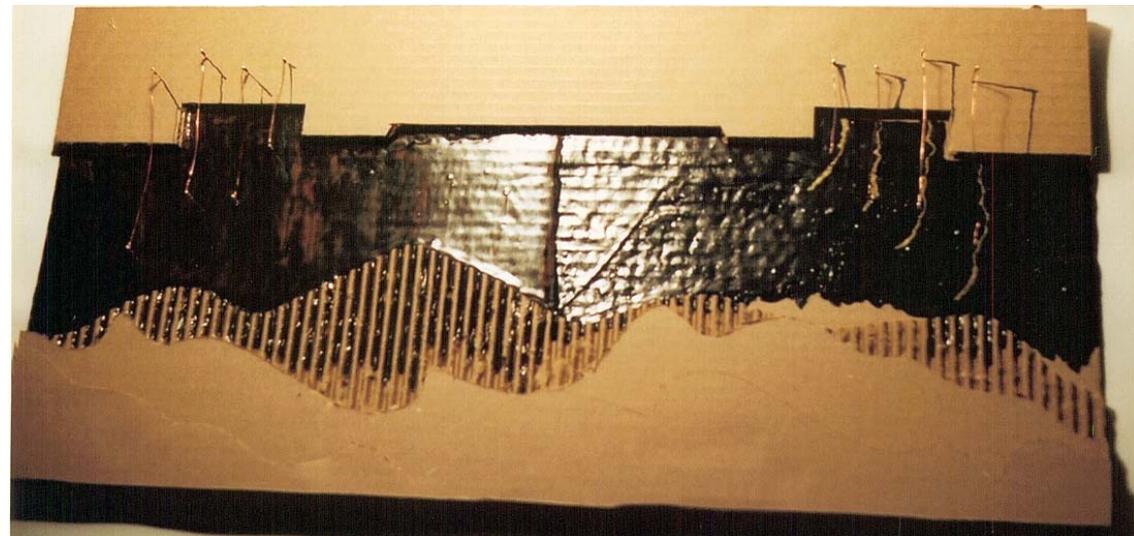
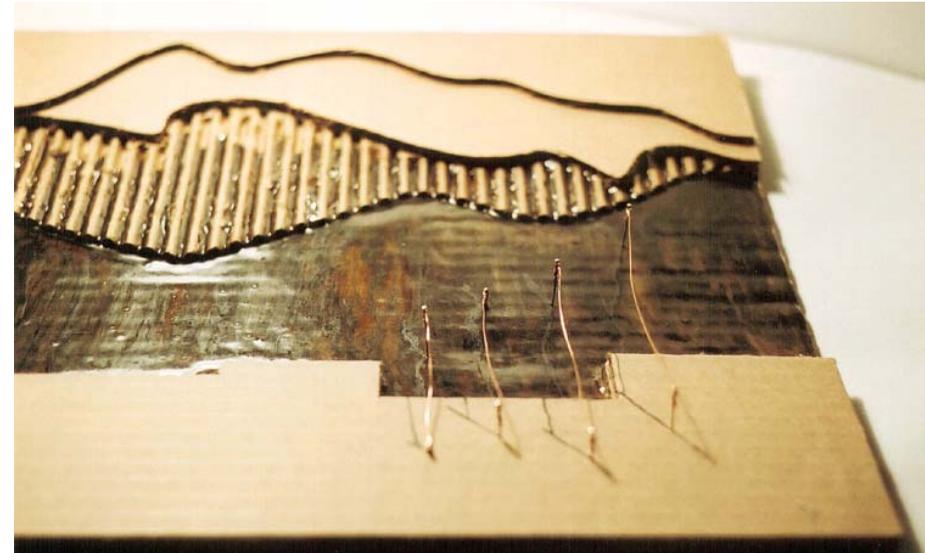
Study

Several initial studies were undertaken in order to understand many of the physiographic and elemental qualities at the water's edge. The first was an investigation of water and how it moves. Using ink and canvas, 4 different methods show how water creates friction or recession against land. The first shows water veining out and taking the least path of resistance. Like the formation of rivers or creeks, this painting follows natural crevasses in the canvas. The second shows the viscosity of water against land. Like a flood water has the power to move land and create it's own route. The third painting shows the cyclical force of water. Like tides, water rises, falls and circles within the bounds of the surface of land. The topography of land can guide the force of water. The last is water contained. Like a pool or bulkhead wall, water reacts against the nature of the containment and how the wind, motion or grade cause the water to move within these walls. These factors are both macro and micro environmentally driven.



Models

The light/shade models show the power of reflection and shadow on land and water. Naturally, based on the texture of land and water, shadow and light refraction are skewed, leaving a different interpretation of depth and field of vision. Colors are perceived differently moving from bright light to dappled shade to darkness. The perception is further skewed when intermingled with water. Distortion from texture and light and reflection create a completely different feeling within the same design when experienced at night as opposed to the daytime.



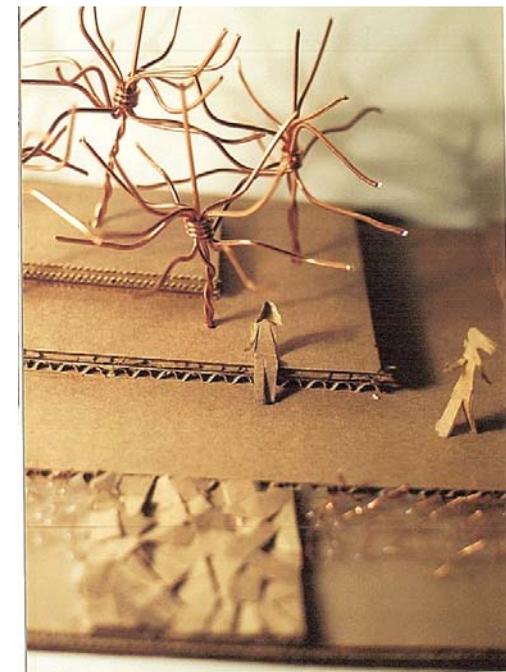
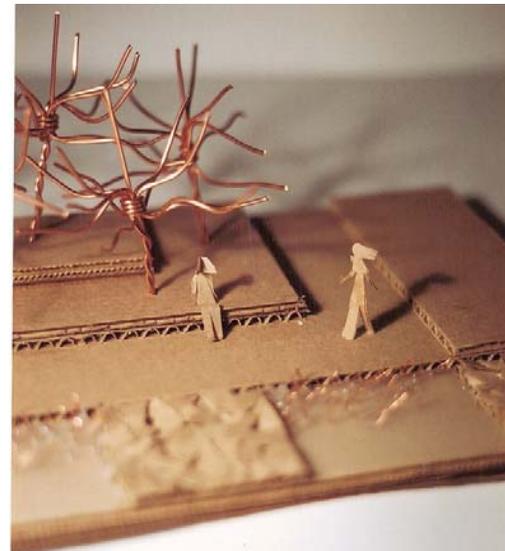
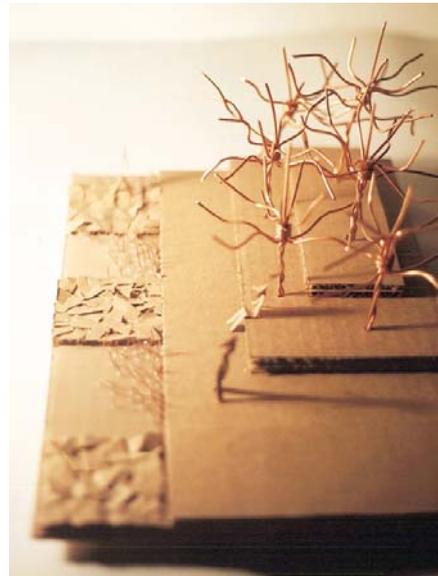
The next study deals with shade, light and wind on a micro environmental level. This small model shows how the built and landscaped environment can affect events and human perception of a site.

Walls and trees react to light and wind in several ways. They can create comfort zones by blocking winds and shading paths, or they can control and channel light and wind to create a sense of prospect.

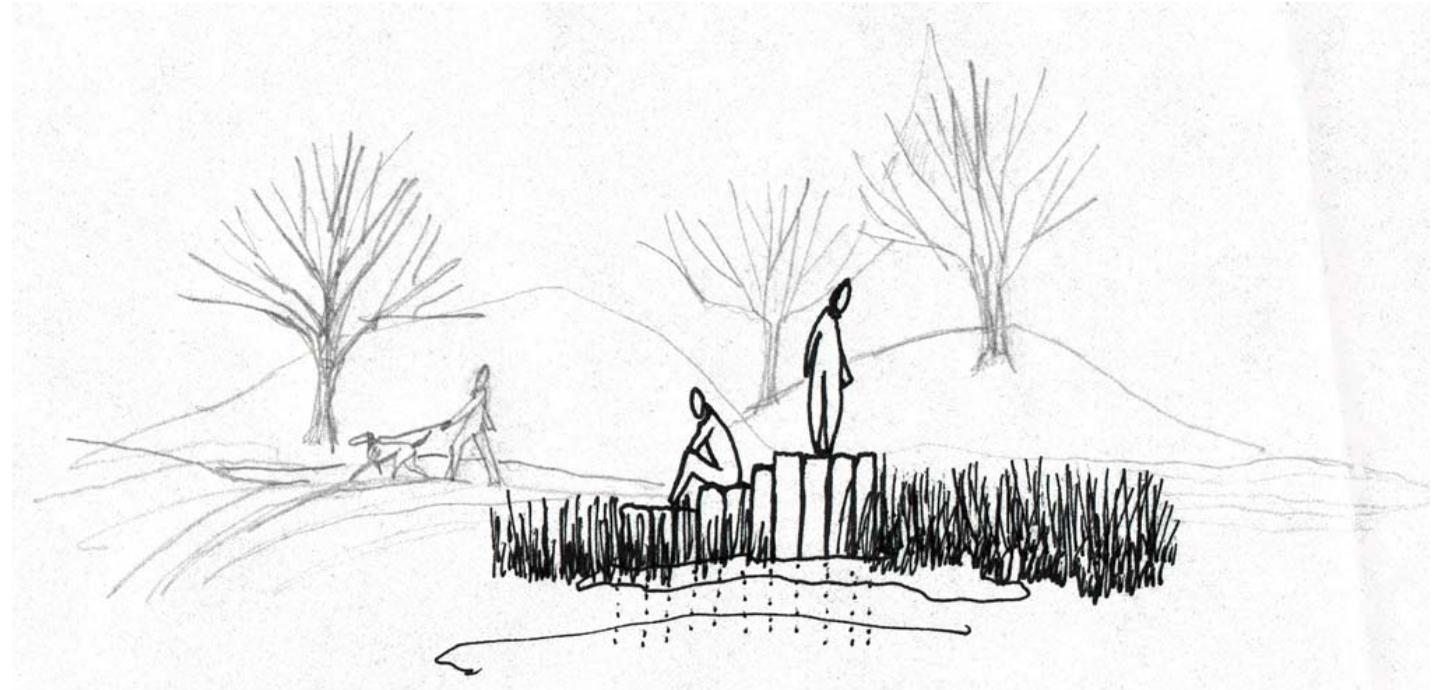
Working with the existing topography in the north harbor opens a great opportunity to exploit the ideas of prospect and refuge on a sensual and micro environmental level. Berms create a walled effect that protects, and breaks in this wall open up vistas and allow the wind to sweep across the pedestrian plain.

When walkways move out from the tree cover and over the estuary shelf, the light, sound, and air changes. The user becomes more aware of the coastal effects of Oyster; the smell of salt marshes, the white light of reflection, the muffled sounds.

The third study involves the deceptive and clarity powers of water. Again, the human user is involved based upon perception. The model shows how light can be skewed across water at night. During the day, shadow can distort the perception of depth, length, or physical qualities like the depth of color, of the sensation of heat or cold. Coupled with the physiographic properties of the water's edge, these studies have led to the understanding of the many different aspects revealed by the edge between land and water.

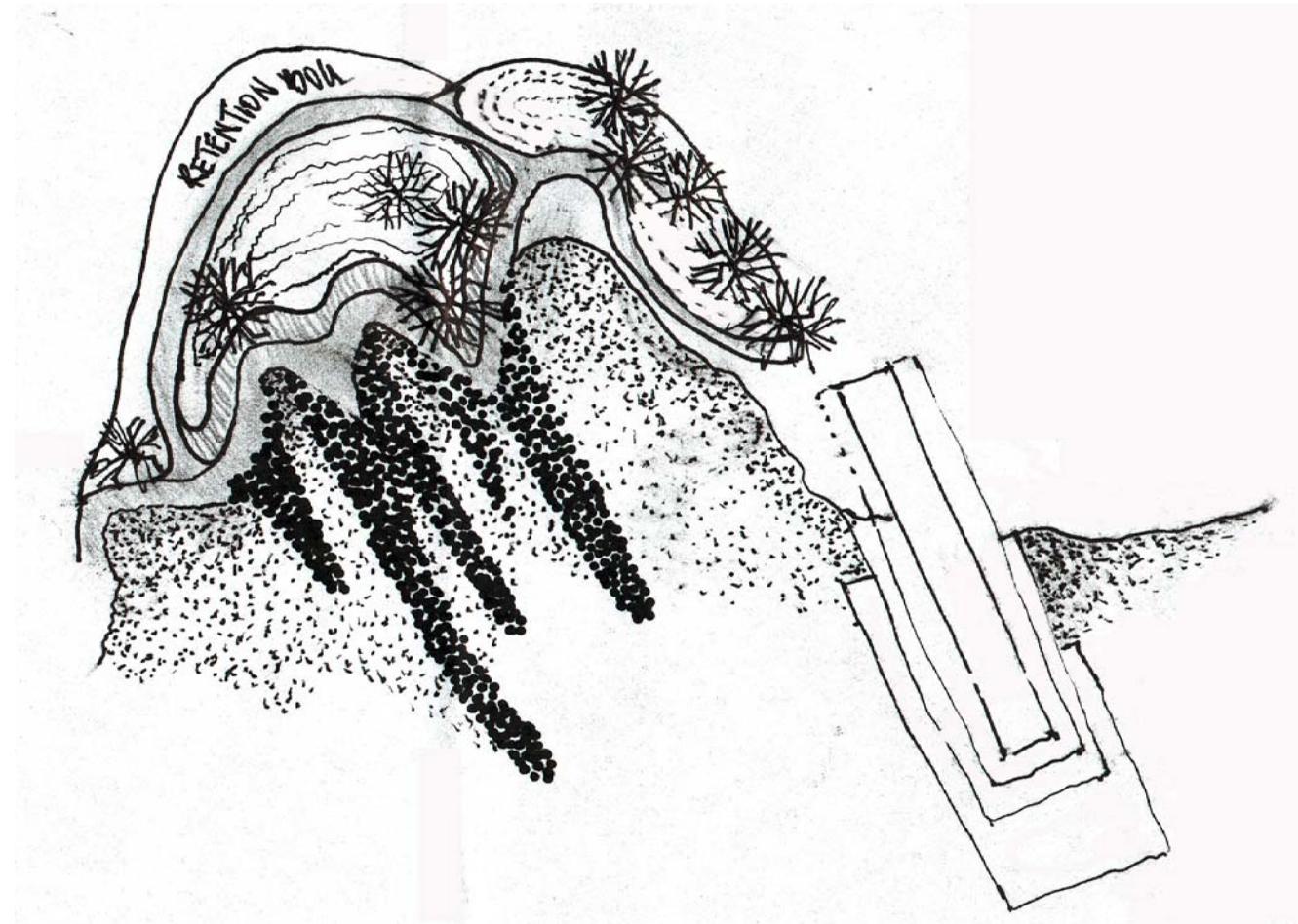


Bringing users down to water level evokes a different sensual experience from hovering high above the water. “And then there is the most palpable presence of the body’s own momentum, gait, and weight as it passes from threshold to enclosure to horizon,” (James Corner, “The Landscape Project,” *Designed Landscape Forum 1*, p.34). Using the macro and micro environmental effects to influence user perception builds many different layers to just one location. Landscape materials also play a hand in this; the sureness of wood or earth under foot changes the spectrum of vision and sound, as opposed to the giving nature of crushed stone or sand. The rustling of trees or tall walls add a different cast of life particularly against the reflective nature of water. Sound is personified over water and is absorbed by land as is light. In opposition, color is absorbed by water and personified when held in opposition to texture and other color on land.



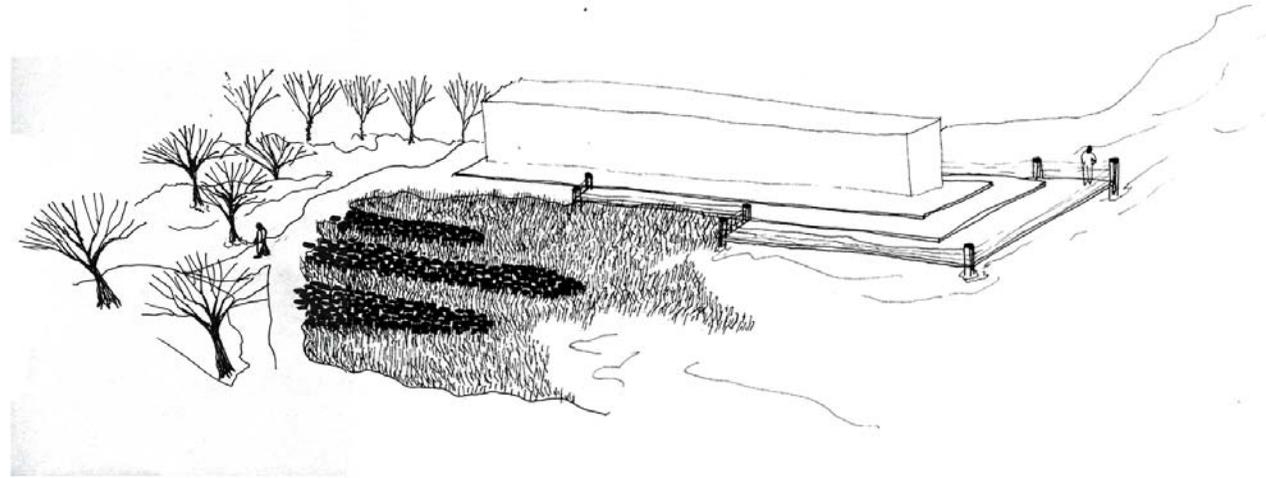
“Practices...Must communicate ontologically, throughout the spatial and tactile senses,” (James Corner, “The Landscape Project,” *Designed Landscape Forum 1*, p. 34).

The material models are collages of varying transition between simple materials and the complexities their uses create. Not only do materials have a visual and sensual effect, they also have a function in the landscape based on reaction with different elements. Materials are a key to the success or failure of an outdoor public site. Wise choice of materials can evoke as much of an emotional response as they do a viability and longevity of a design. The materials chosen for this site reflect the natural surroundings and blend into the naturalistic design rather than dictate the geometry of the scheme. As a matter of fact, the materials are chosen based on their function rather than aesthetics, sometimes in opposition to the normal working parameters set by technological norms. The intent is to push the limits of perceived material constraints and create a geometry for the site that is more a play on understood practices. Wooden promenades snake, concrete platforms shatter, and gravel paths climb and channel water. Now, the real question is how to make these materials behave in a way that they were not designed to behave, but maintain their safety and longevity.



Design Concept

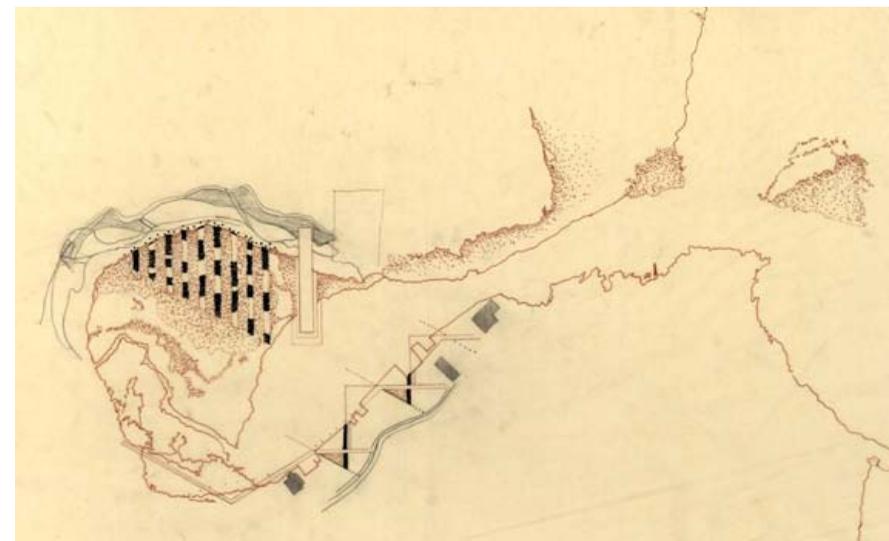
The initial concept for the harbor of Oyster was to create a board-walk type perimeter without using a hard edged bulkhead. This perimeter aimed to move up and down the land and into and over the water, like the spines of foam left on the shore after the waves retreat. Parts of the platforms would disappear into the tide and others would be revealed with the retreat of the tide. Again, the difficulty comes in the safety and maintenance of materials, and the wise choice in these materials used in water and on land. The intent was to show the push and pull of water and land in a physical, useable design. Some ideas had to be honed down to a physical entity rather than a concept that worked on paper. Dividing the site up into zones based on the program is the best way to respond to the varying levels of truth in the intent.



The Throne of God resides on Water...The Qur'an

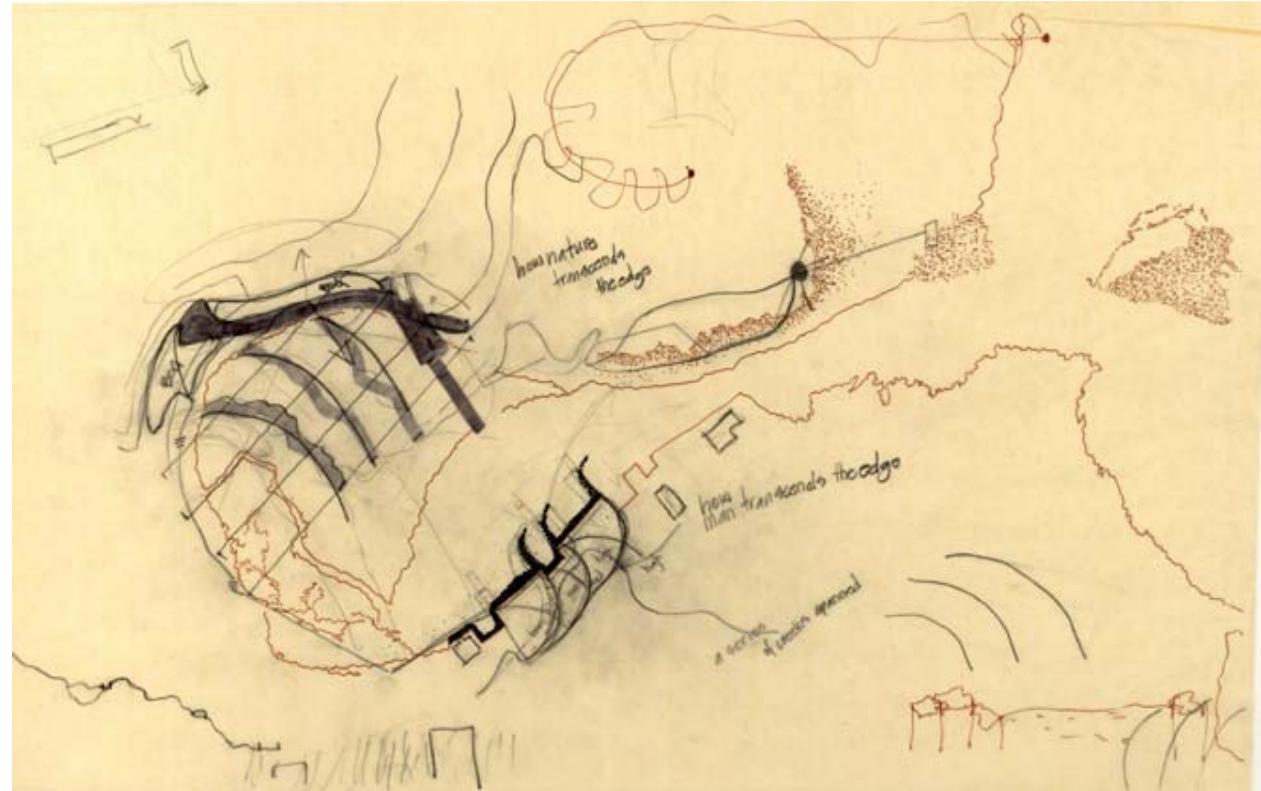
Once the concept is further divided into zones, tension between the zones shows the dichotomy between hard edge and natural edge. This hard edge of the south harbor is a response to the stereotypical waterfront development; boardwalks, parks, festival marketplaces, museums, and dense residential areas. It stands in opposition to the North Harbor, which reflects the differences in space created by the response to a more naturalistic edge. Fingerlike extensions transcend land, extending out into the water rather than following the edge between land and water created by a hard bulkhead. With further investigation, both sides in tension creates a masterplan that is complementary to the whole. This opposition creates a harmony of design ideas, the program and materials. The north harbor, a place where ecological health is the prime concern, hosts a variety of marine life as well as human spectators. The south harbor, a place for more commercial use and human interaction, limits boat travel and access to the water in any way other than view. It creates a play between reflection and sight and sound and human anticipation of being on the water. The places where water is more enticing are accessible only by view and imagination. The less desirable areas of human interaction with water are accessible, and create a different approach to understanding the power of water.

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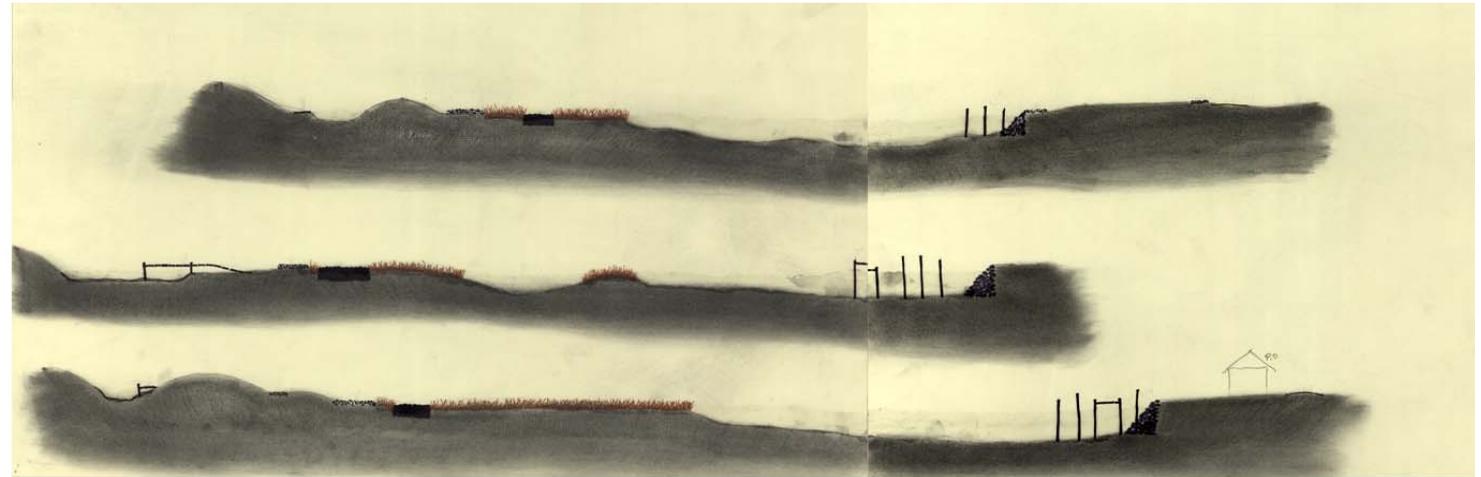
Site Diagrams

Diagrammatic drawings helped to identify all the underlying layers of the site. Understanding the physical opportunities and the human limitations of the site further defined the extent to which the push and pull concept could be taken in a design while maintaining a functional harbor for all. Changes needed to be made to the site and all its zones, but with limited earth moving and construction to maintain the ecological integrity of the harbor. The diagrams of soils, vegetation and topography on land and water were a necessary study to understand where these limitations and opportunities lie.

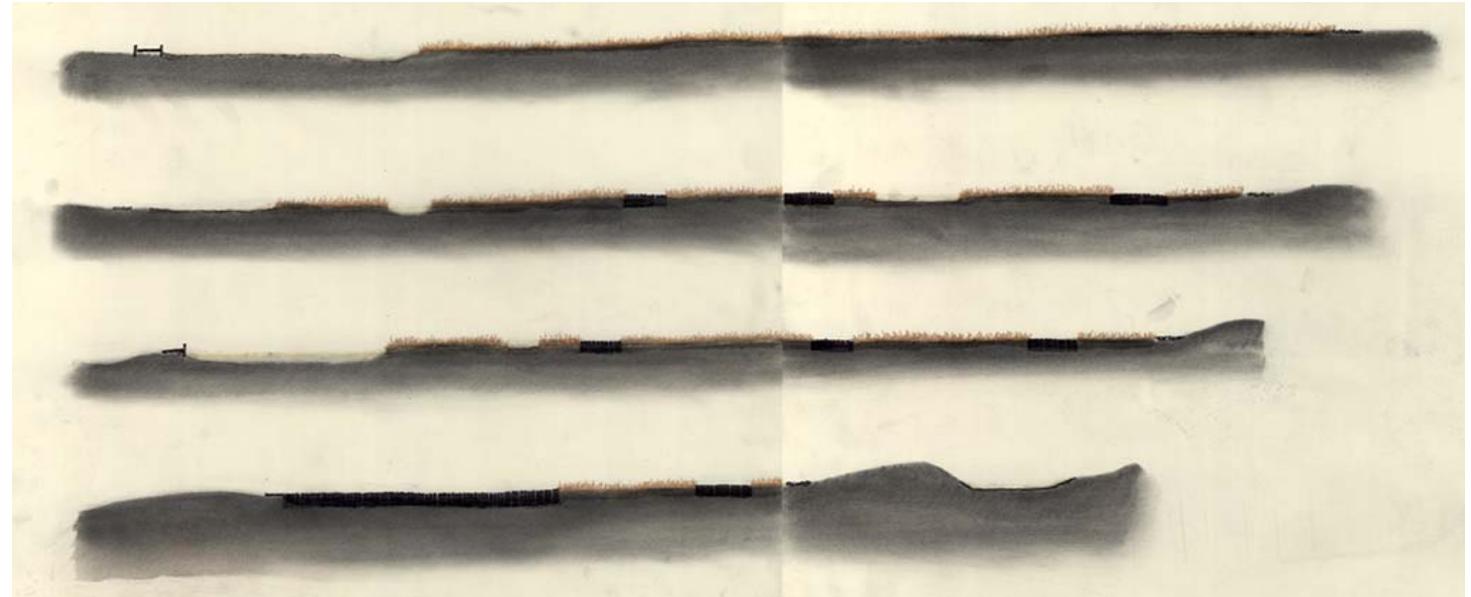


Sections

The first series of sections represent site conditions as the harbor exists today. The section line follows a true north to south cut of the harbor and the outer lying topography. This series of sections are necessary to illustrate and fully understand the existing relationship between the topography of the land as it meets the water and the depth of the channel for boat travel and



The second series of sections represents the early investigation of how the north and south harbors would take on their new design approaches. Note on the North harbor, pilings connected to make platforms that extend out over the estuary shelf. The berms and retention bogs work their way through the natural topography as a lagoon and levee system.



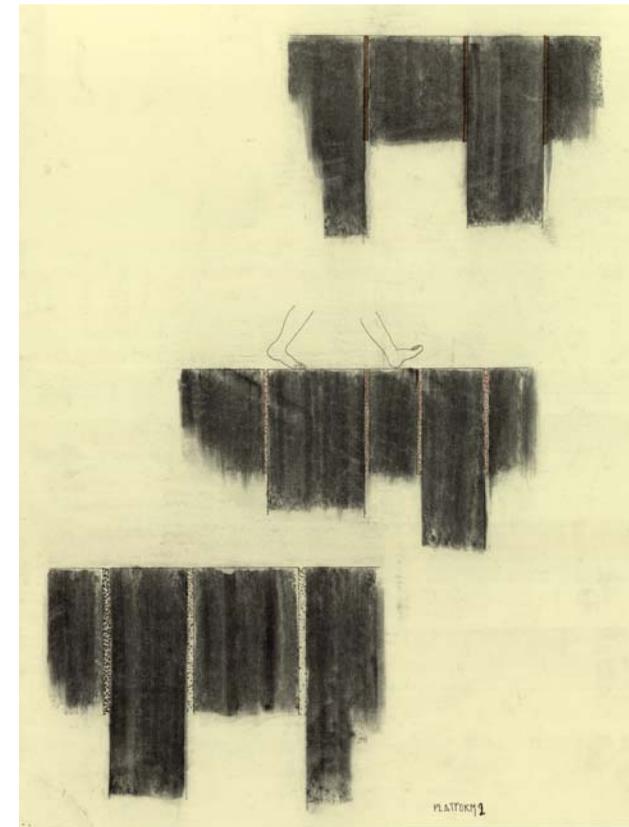
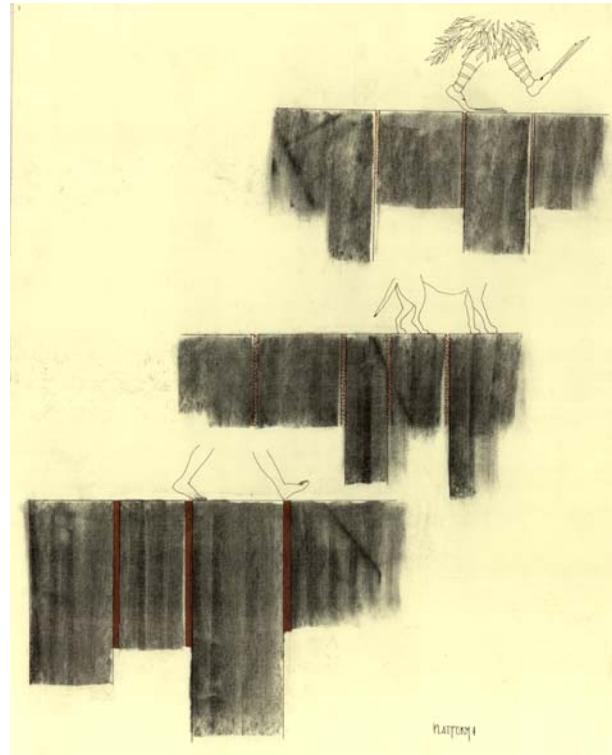
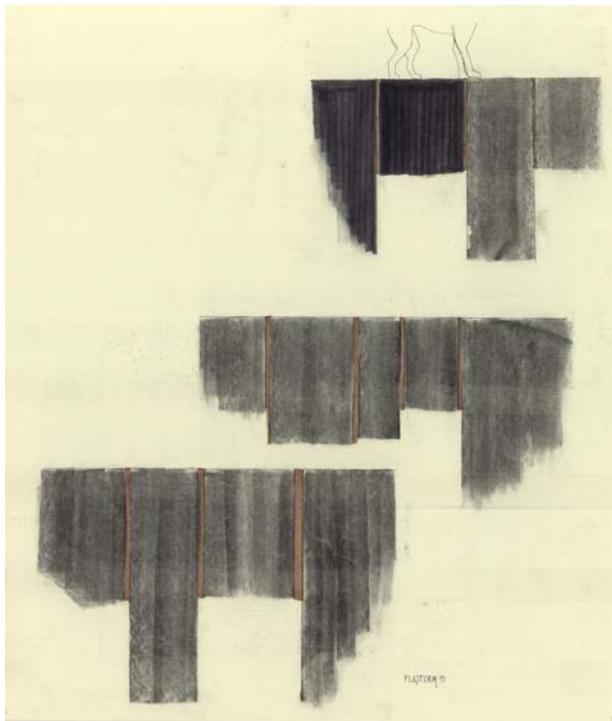
The final section represents further investigation of how the north and south harbors would take on their new design approaches. Note on the North harbor, pilings support the platforms that extend out over the estuary shelf. These platforms play a different role as they roll back into the land. Once over land, they retain the same aesthetic, however the hardscape materials become sieves for transport of water. The berms and retention bogs work their way through the natural topography as a lagoon and levee system. These systems then channel or retain water and alleviate the erosion and toxins encroaching the *Spartina* grass and oyster beds.



The system of pilings that extend over the estuary shelf act as both an aesthetic quality of the design as well as a functional entity.

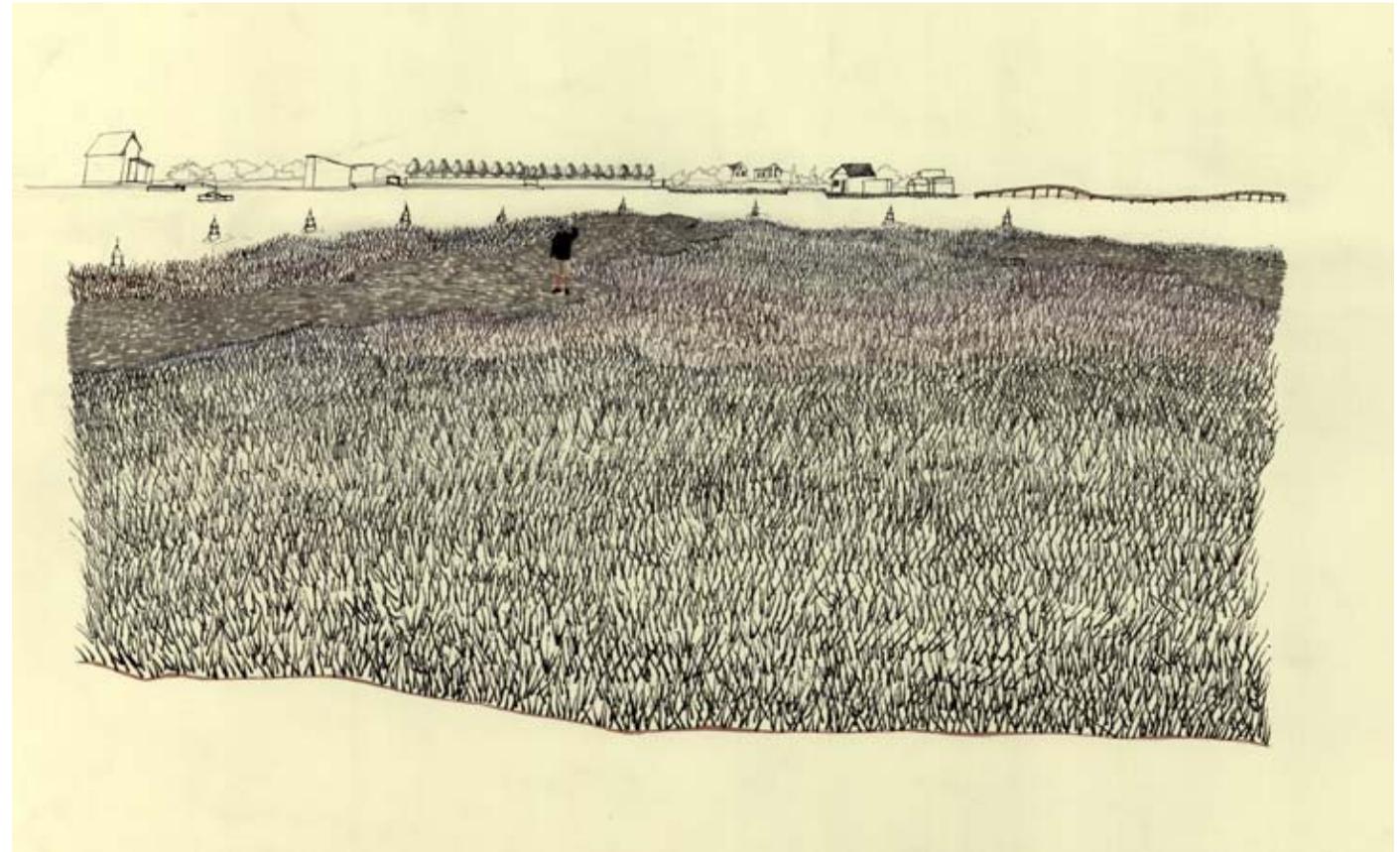
Looking idealistically at this design, the pilings hold varying sizes of sediment based on their location in the shelf and how far apart the pilings are driven. As water is directed through these platforms, the trapped sediment filters the water through oxygenation.

If pilings could be driven in this manner, water recharging could become a more natural process.



Design

The final design addresses the systemic and aesthetic aspects of Oyster. Following the master plan diagram of zones of use, the north harbor remains a more natural looking landscape with fingers extending into the marsh. These fingers initially were designed as a dual entity within the estuarine shelf. The fingers allow visitors to walk down into the marsh without damaging the fragile ecosystem and experience the microclimatic changes that occur when leaving the beach ridge. Also, these fingers act as a systematic filtration barrier for the siltation that occurs due to agriculture on the higher plains above the harbor. Considering the edge condition in the north harbor, the design maintains the natural evolutionary process of the edge. The beach ridges are reflected through the design of a series of berms or levees, and the vegetation remains mostly native species. The occurrence of retention ponds among these berms collect water that runs off of the adjacent farms and are located in sinks in the existing topography. These retention ponds are reminiscent of the irrigation ditches in the farm fields prior to modern irrigation practices. Once the water fills these ponds, it is recharged through phytoremediation and released again into the ground water.



“A landscape doesn’t have to look natural to be E.C. (ecologically correct).” anonymous

The paths on the north harbor wind around the ponds and berms and extend over the water and into the marsh to bring people into every aspect of the edge condition. Not only do these walkways carry people, they also control water runoff; they perk, absorb, channel and direct water, based on the material, location and rise. Many of the paths act as agricultural tiles and absorb water. They are made of a porous crushed oyster shell that wicks water off of the surface of the land. Other paths do not impede the land at all. They are raised walkways made of wood planking so that water can channel under them into the retention ponds and planted areas. Other paths extend out over the water and are made of stone or concrete pilings and collect silt. Water then is oxidized and cleansed by passing through the layers of silt. “We would now look at the systemic workings of these ecological systems as instigators of the perceived world, used by designers not as a free for all, but as a landscape esthetically and socially conceived,” (Marc Treib, *Modern Landscape Architecture, A Critical Review*).

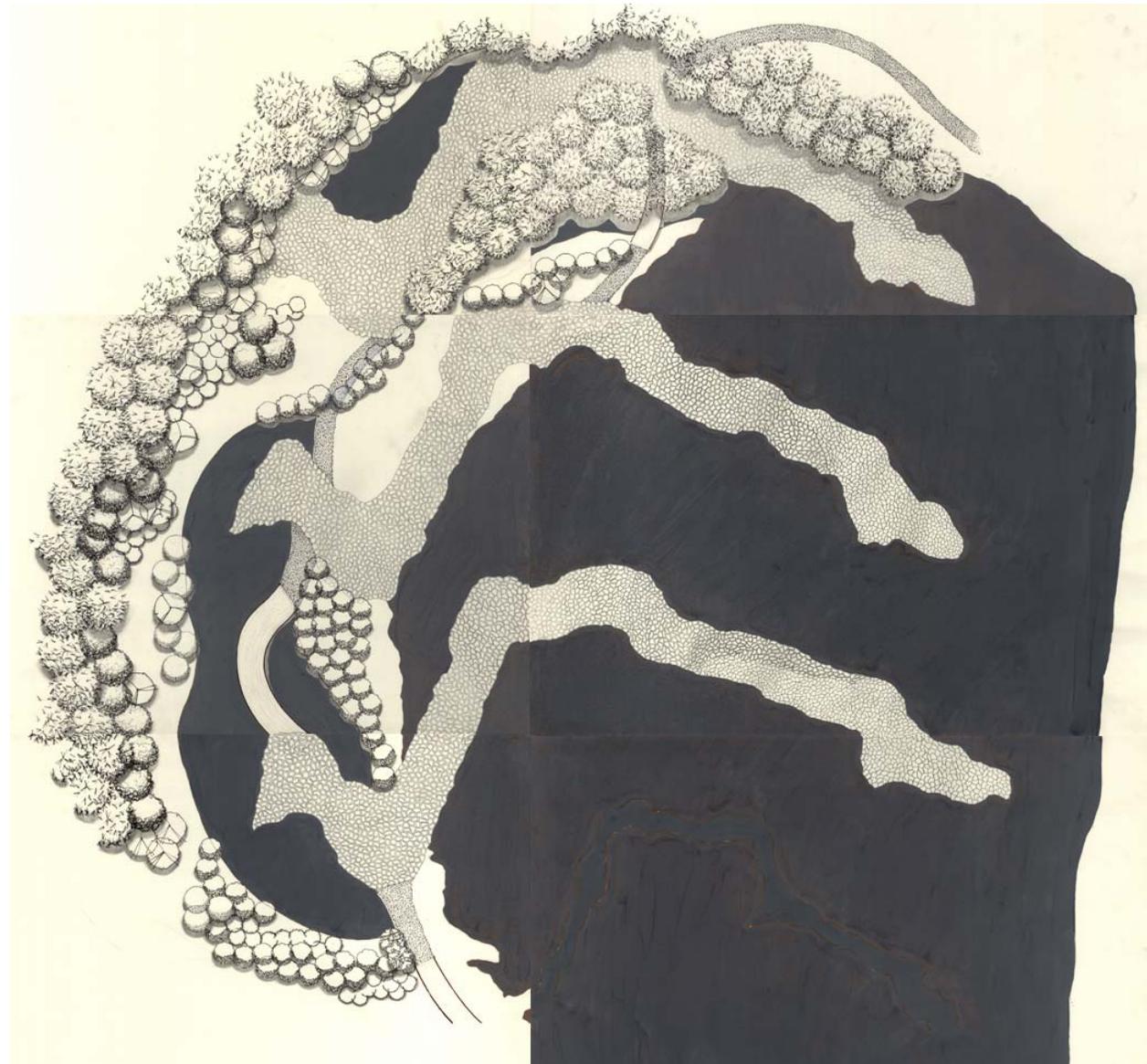


A garden is a complex of aesthetic and plastic intentions; and the plant is, to a landscape artist, not only a plant—rare, unusual, ordinary or doomed to disappearance—but it is also a color, a shape, a volume or an arabesque in itself. (Roberto Burle Marx)

The North Harbor

The north harbor design of Oyster reacts more to the natural, ribbon like existing edge between land and water. This side houses more of the frail ecological habitats that are currently under restrictive laws enforced by many state and federal agencies. The three finger-like platforms extending into the estuary shelf play two roles. They act as a filtration device for the ever encroaching erosion from the adjoining agricultural plots. As silt moves down into the shelf, it is collected in the various crevices of the platform, saving the grasses from suffocation. As well, as water is channeled through the various systems of walkways, berms, and swales, it is oxygenated and stripped of devastating sulfites and nitrites and can recharge the estuary with healthy drink.

These fingers also act as accessory platforms for research technicians and the curious public. As the shelves surface from the receding tide, scientific collections can be made to test the viability of the shelf's plant and animal life as well as the health of the silt and water cycling through the area. The fingers are not restricted to public use. It is a terrific route for recreation, education, and experiencing areas not usually traversed by the public.



From a design aspect, these fingers are necessarily interwoven with the rest of the North Harbor. They cross different aspects of the site relative to their siting within the edge. They also act as connectors to the water, land, other parts of the design plan, and the native plant swaths. In conjunction with the plank and aggregate paths, the berms, the retention bogs, and the planted ridges, these platforms allow the user to understand all of the aesthetic and systemic aspects of a harbor. This is a design that incorporates the macro and micro environments and the human reaction to the edge between land and water.

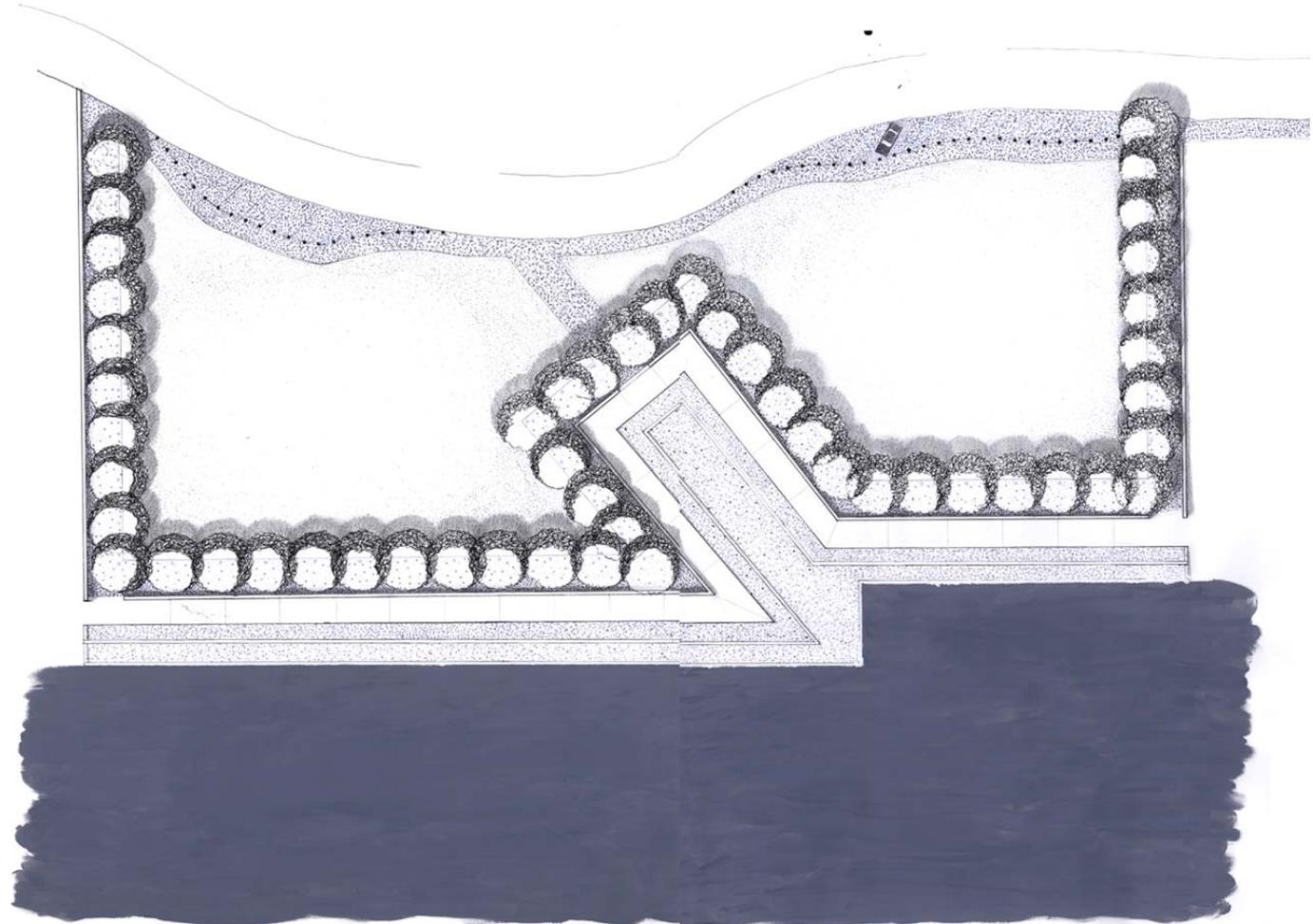


The South Harbor

The angles that define the water shelves on the south harbor are representative of many aspects of the masterplan. Theoretically, it represents a ship's prow, extended out over the water, cutting the way into waters for man to experience. Formally, it extends the residential street pattern to the water's edge and invites the user to come out to the edge. It also sets up views to the rest of the changing landscape around the harbor and allows onlookers to experience the commercial fishing trade without interfering. Functionally, the angles on the south harbor set a boundary of use for boat traffic, keeping them in the deeper channel area and helping to curb the siltation of the estuary shelf.

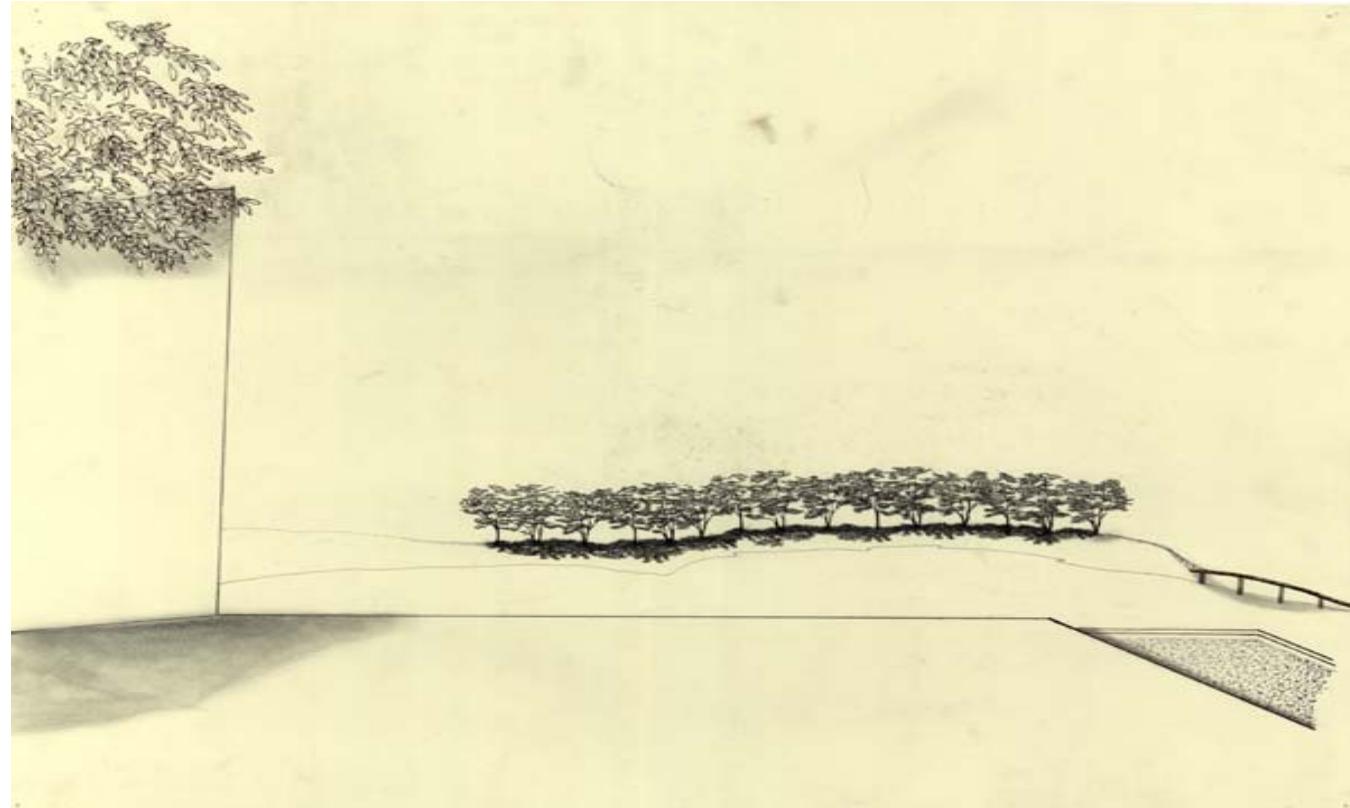
The tidal shelves themselves are a type of educational show and tell. These two graded shelves show the passage of time by collecting the tides. As the tide retreats, the remainder is left behind in the troughs of water. Various sea life will collect in these shelves and reveal what the ocean leaves behind. Depending upon the season, the water level will vary, as well as the time the water will remain. This shows the seasonal impact on the tides.

The water aspect and the land aspect are further divided on the south harbor. A large seat wall abutted by trees allows the visitor to enjoy the land aspect of the site. False topography has been created through a rising ridge, encompassing the visitor with land. This refuge creates a false sense of protection until introduced to the water and expanding vistas. The materials throw back to the vernacular of the site and aid in the registration of sound on the site.



Understanding the natural state of the Eastern Shore and barrier islands allows tribute to the history and the culture of this place...ES resident

The south harbor is more of a design that reflects the hard bulkhead approach to the edge between land and water. The series of platforms reflect the tidal change in the harbor, and shows how entirely different the edge becomes when deeper water is abutted to land. The approach from the land raises the topography to open up views and to eliminate flooding over the sea wall. This side of the harbor places a more even balance to land and water with a park like area and a waterfront platform separated by a raised seat wall for interaction between the two.



Perspective view from tidal platform across Oyster Harbor focusing on connector walks.

Final Design

Through environmental studies, bringing historical aspects to the modern site, and human understanding, the investigation of the edge between land and water has led to a design intervention that suits all aspects of the site and program. The zones originally set out to designate use now unify the site and transcend the recreational, ecological and commercial designations that should be separated. Oysters history is celebrated in the current design through functional parts of the master plan. Like Solana, several parts of the design throw back to the vernacular landscape of the Eastern Shore. The planted zones, particularly in the North harbor, are representative of a native garden that recreates natural ecosystems found in the beach ridge of the Eastern Shore. Again, toxin buildup from drainage off the river walks and harbor development spoils the water. Public involvement in these aspects means a big gain for the development.

The constructed berms on the North and South harbor plans reflect the beach ridges that are inherent to all coastal sites on the Atlantic Ocean. The systems of retention bogs on the North Harbor plan represent the irrigation ditches found on the agricultural plots throughout the Eastern Shore of Virginia.

The forms of both the North and South harbor react to the program and studies of the site; utilizing it's orientation, elevation, and the macro and micro environmental factors.



“Beyond merely addressing the logic of drainage, erosion, growth, sunlight and orientation, prevailing breezes, and horticultural suitability, one may find in the m the generators of landscape form,” (Marc Treib, *Settings and Stray Paths*,” *Designed Landscape Forum*1, p. 137).

Suggested planting list for the North Harbor of Oyster

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Trees

Cotinus coggygria—Smoke Tree

Cupressocyparuss leylandii—Leyland Cypress

Pinus taeda—Loblolly Pine

Pinus virginiana—Scrub Pine

Vitex agnus castus—Chaste Tree



Cupressocyparuss leylandii —

Leyland Cypress



Pinus virginiana — Scrub Pine



Pinus taeda— Loblolly Pine



Vitex agnus castus— Chastetree



Rhus aromatica — Fragrant Sumac

Shrubs/Native Perennials

Callicarpa dichotoma—Beautyberry

Caspia sp.—Sea Lavendar

Cat Tail sp.

Cephalanthus occidentalis—Buttonbush

Rhus aromatica—Fragrant Sumac

Solidago 'Fireworks'



Cephalanthus occidentalis — Buttonbush



Cotinus coggygria — Smoke Tree



Solidago 'Fireworks'



Callicarpa dichotoma—
Beautyberry



Cat Tails



Caspia sp.— Sea Lavendar

Suggested planting list for the North Harbor of Oyster

Trees

Acer rubrum—October Glory Maple

Betula nigra—Heritage River Birch

Cercis Canadensis—Redbud

Fagus sylvatica—European Weeping Beech

Ilex opaca—American Holly

Lagerstroemia faureii—Natchez Crape Myrtle

Prunus cerifera—Thundercloud Plum

Shrubs/Native Perennials

Achillea—Yarrow

Ilex vomitoria—Weeping Yaupon Holly

Juniperus horizontalis—Bar Harbor Juniper

Myrica cerifera—Southern Wax Myrtle



Lagerstroemia faureii—
Natchez Crepe Myrtle



Ilex vomitoria—
Weeping Yaupon Holly



Myrica cerifera—
Southern Wax Myrtle



Prunus cerifera—Thundercloud Plum



Achillea—Yarrow



Acer rubrum—October Glory Maple



Juniperus horizontalis—Bar Harbor Juniper



Cercis canadensis—Redbud



Ilex opaca—American Holly



Fagus sylvatica—European Beech



Betula Nigra—River Birch

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Heather Barber

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Vita

Education

- | | | |
|------|--|---|
| 2005 | Master of Landscape Architecture | Virginia Polytechnical Institute and State University |
| 2000 | Landscape Design/Woody Plants Certificate | The George Washington University |
| 1990 | BA French/Political Science (with honors) | Clemson University |
- Baccalaureate studies at University of Strasbourg-School of language and political demographics, Strasbourg, France

Employment

- | | |
|-----------|--|
| present | Koontz-Bryant, PC, Project Manager -commercial and residential development |
| present | University of Richmond School of Continuing Education, Landscape Design Program, Teacher -site engineering, design I, site analysis |
| 2002—2003 | Barthol Design Associates, Project Manager -commercial and residential development and site design |
| 1998-2000 | Giving Tree Site Management Services, Ltd., Project Manager -design /build services |

Professional Interests and Awards

- 2002 National Sustainable Design Award**– Wildlife Education Center and Children’s Garden, Dupont-Teijin Films
- FRUA-Virginia**-Executive Board Member
- VA-ASLA**-Centennial Lecture Series Steering Committee Chair
- VT ASLA**- Student Chapter Secretary/Treasurer