

Water, Waterworks and Water Journeys in South Florida's Everglades


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Submitted to the Department of Architecture in partial fulfillment of the requirements of the degree Master of
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February 1990

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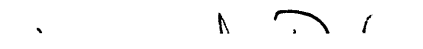
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ABSTRACT

Submitted to the Department of Architecture on January 19, 1990 in partial fulfillment of the requirements of the degree Master of Architecture.

This thesis is an exploration of how architectural form could make the movement of water through a particular landscape evident. The project is a design of a journey through a portion of South Florida's Everglades traversed by waterworks structures which protect the region's developed land from flooding. The notion is that while the marsh has been seriously damaged by flood control efforts, both the marsh and the waterworks are important. Both are awesome in extent and complexity. Because of their monumental scale and the subtlety of their ways, however, that they exist, what they do and the nature of their conflict is difficult to perceive. The more general issue may be understood as a problem of getting the scale of the Everglades -- and the scale of 2,000 miles of canals -- to make sense at the scale of a person.

The book is organized in three parts. The first describes these issues of scale and perception, and presents the idea of the landscape-size gesture to mark a small piece of it as place, site. This section describes the ways in which water behaves in the marsh and in the manmade system, introducing the notion that a construct -- a third way of ordering the water -- could make the water's behavior in both systems explicit. The second part of the book presents the proposed design by describing how one would experience such forms in a journey through the site. Here, human movement and the movement of water are described in parallel. The journey is made partly by boat, partly on foot. It is a "tour" of the waterworks, leading one through canals and levees that converge at

a pumping station on the site, and of the adjacent marsh that survives this extensive intervention. The third part is a recapitulation of the journey, linking it with the more general issues of scale and perception.

Thesis supervisor: William L. Porter

Title: Leventhal Professor of Architecture and Planning
Head, Department of Architecture

To my family -- Charms, Shelly, Ann, Ray, Marla, Meyer, Harmon --
This is for you.

To Cathy Marvez and Marjory Stoneman Douglas, who helped me to
see the Everglades after so many years of not looking.

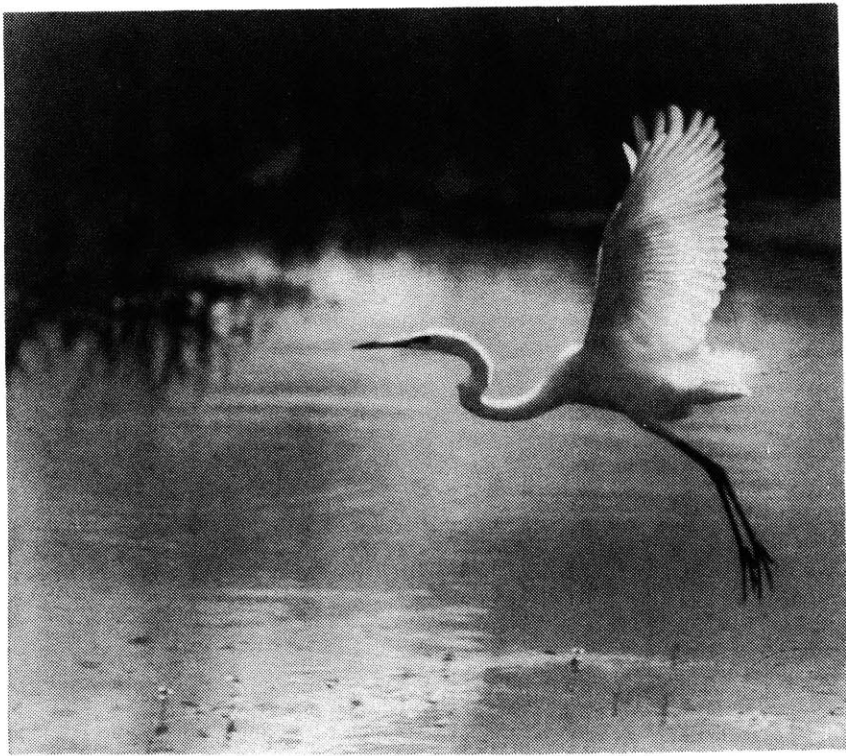
To my teachers and fellow students at MIT whose energy and rigor
have made my years here the richest ever.

To my good friends in this place, who have fed me a steady diet of
images and words and ideas. Josef, Shira, Rick, Patrick - I have taken so
much from you - I hope you see yourselves in this and know that I am
grateful.

To Michael, my best, most patient friend.

dedication

Abstract	3
Dedication	5
Contents	7
Introduction	11
Part One: This Landscape / Perception	27
A Construct for Interpretation	29
The Two Orders of Water	41
An Interpretative Order	53
Part Two: Design / Journey	61
A Water Journey: Embarking	63
: The Waterworks	75
: The Marsh	97
: Return	107
Part Three: Recapitulation / Location	117
Photo Credits	121
Bibliography	125



Common Egret, Everglades National Park





How is it that I never got word of the water, the rock, the grass or the fire?

*There are no other Everglades in
the world. . . .*

*Nothing anywhere else is like them:
their vast glittering openness, wider
than the enormous visible round of
the horizon, the racing free saltness
and sweetness of their massive
winds, under the dazzling blue
heights of space.*

--Marjory Stoneman Douglas
The Everglades: River of Grass



Birds feeding, Shark Valley Slough

How could it be that as a native of South Florida I knew nothing of the Everglades, one of the most productive, unusual and stunning landscapes of this continent that lay just 20 miles from my home? How is it that I never got word of the water, the rock, the grass or the fire? Or that the city on the coast had grown and prospered not only in ignorance of this place, but at its expense? Even right inside my city, what of the canals we drove over, stared into? They were never more than scenic, I think, never appearing as they truly are, pipes of a waterworks as big as any imaginable landscape.

Miami and the coastal cities are sprawling westward at a heady rate and have already confronted this marsh which had refused for so long to accommodate their expansion. Ironically, however, it is here, where the marsh and city meet, that the issues of water are clarified. For the past 10,000 years the rains have fallen on southern Florida, a flat, sea-formed "spoon" whose rim holds back the sea, the water swelling and overflowing and covering the ground in a great sheet for half the year. As they advance and recede, these rains support a vast freshwater marsh named the Riverglades or Everglades by English explorers who first attempted to survey them. For the past 100 years, man has undertaken to move the water, draining and building up the land, so that he might live in and profit from this sunny, humid place. With engineering feats no less impressive than nature's, the land has been cut through with canals to drain it, keep it from flooding and to provide water to the coastal cities.

Drainage Canal, Everglades



Or of engineering feats no less impressive than nature's?

As it happens my own reverence for water has always taken the form of this constant meditation upon where the water is, of an obsessive interest not in the politics of water but in the waterworks themselves, in the movement of water through aqueducts and siphons and pumps and forebays and afterbays and weirs and drains, in plumbing on the grand scale.

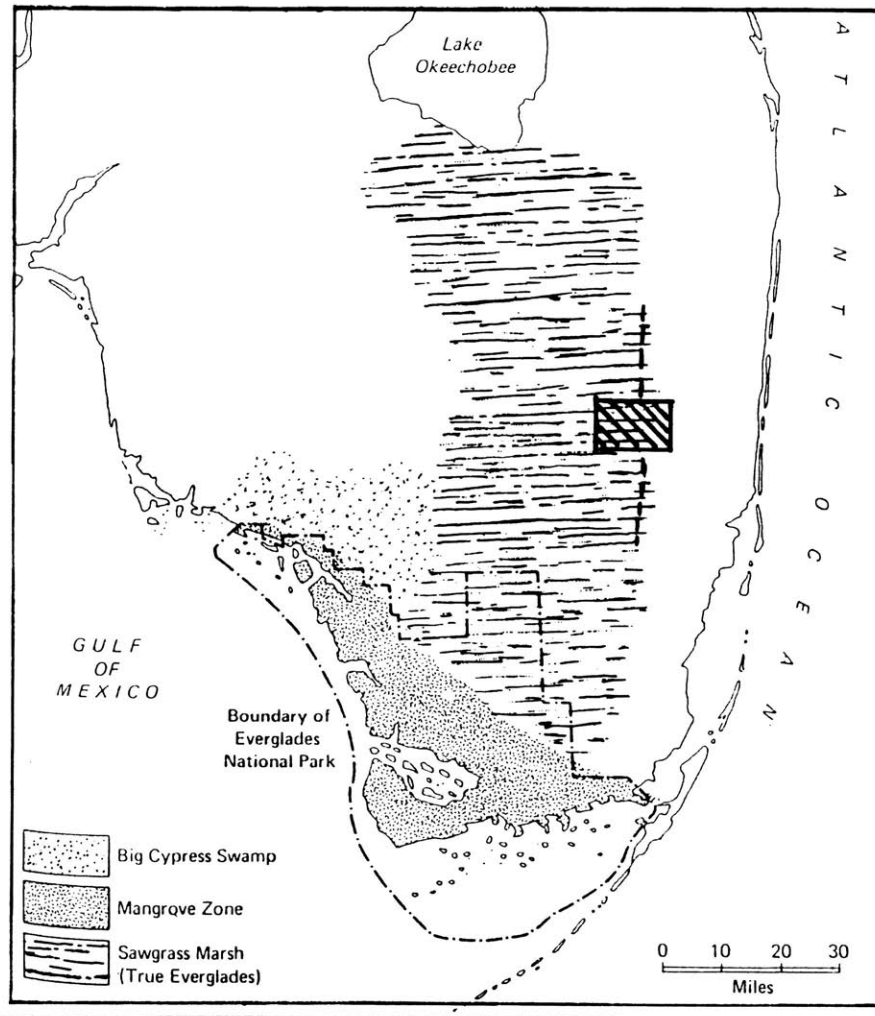
--Joan Didion,
"Holy Water" in
The White Album



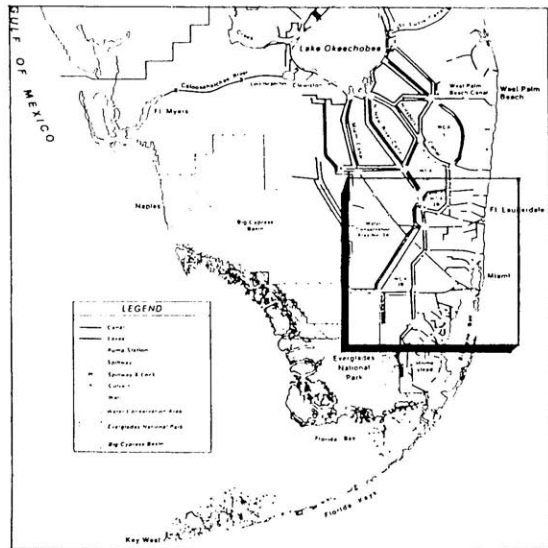
Canal, Levee through Everglades

But here, at this edge where man's and nature's grandest works meet, are choices about survival. In truth, the marsh is dying, perhaps irreversibly; man's demands for control over water threaten to obliterate the rain machine - as the Everglades has been called - that makes possible all life here. Today we find the Everglades to be some remnant, much diminished system of water, rock, plants and animals adapted to extremes of flood and drought. It once seemed ageless in its state of constant change. Today, we find canals criss-crossing the land, waterworks covering so many miles, moving so much water, controlling even the possibility of life, that the landscape may be understood to be as much a work of man as one of nature.

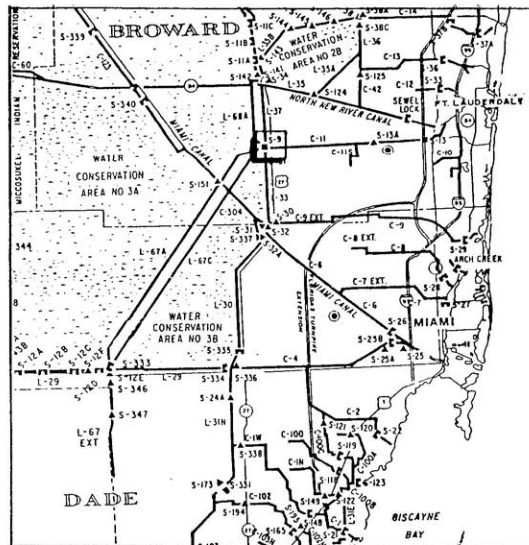
That the marsh might be soon gone is "a grief that will outlast the griever," to use Wendell Berry's words. That it might be changed forever notwithstanding, I would hold a piece of it sacred, no matter how scarred or defiled, that it might bear witness to that which is, ultimately, beyond man. For here at the edge we also find an opportunity exists for invoking, clarifying and celebrating the tremendous power of this water and how it moves over the land to sustain us.



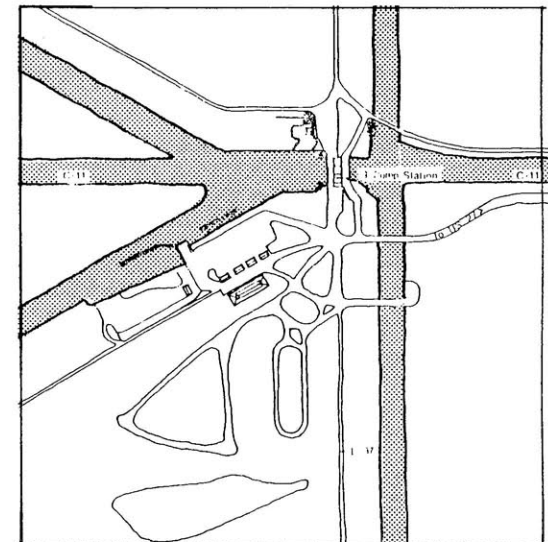
I would hold a piece of the marsh sacred, no matter how scarred or defiled, that it might bear witness to that which is, ultimately, beyond man.



Central and South Florida Flood Control District



Waterworks in Dade and Broward Counties

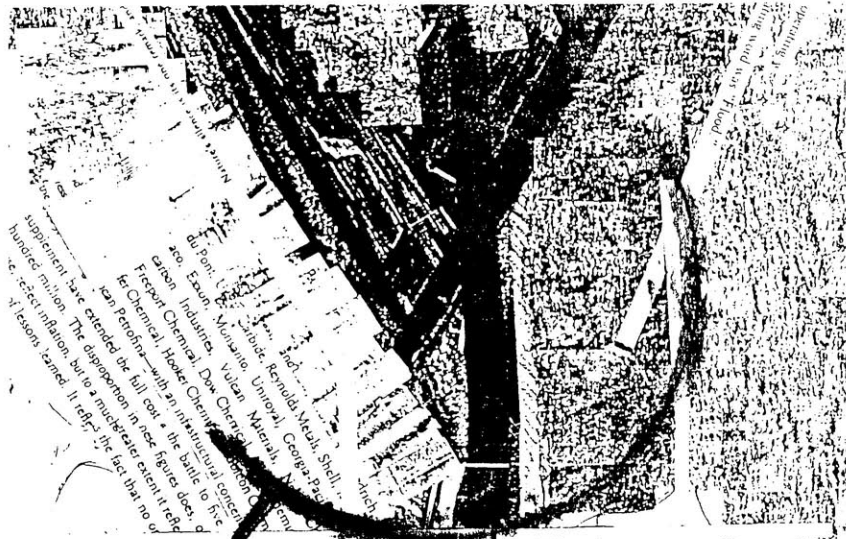


Site Map: S-9 Pump Station

Aerial photo, western edge of water conservation area



At a convergence of canals and pumps, where an edge of the Everglades meets an edge of ex-urban Ft. Lauderdale,

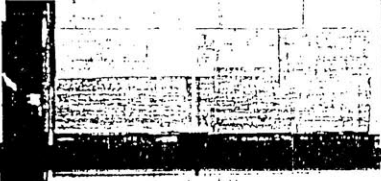


crease, magnifying the conditions for capture. The Corps would have to deal with that. The Corps would have to build something that would give the Atchafalaya a portion of the Mississippi and at the same time prevent it from taking all. In effect, the Corps would have to build a Fort Laramie: a place where the natives could buy flour and firearms but where the gates could be closed if they attacked.

greater menace than a flood of water, this inspirational gravel pit was showing what to do about it. With enough money—enough steam shovels, enough dump trucks, enough basins cupped beneath the falling hills—Los Angeles could defy the mountains and append to an already impressive list one more flout in the face of nature.

place in the annals of arrogance. His name was Oliver Houck

n, the component of human interference could a
 inter the narrative and, in complex and intricate

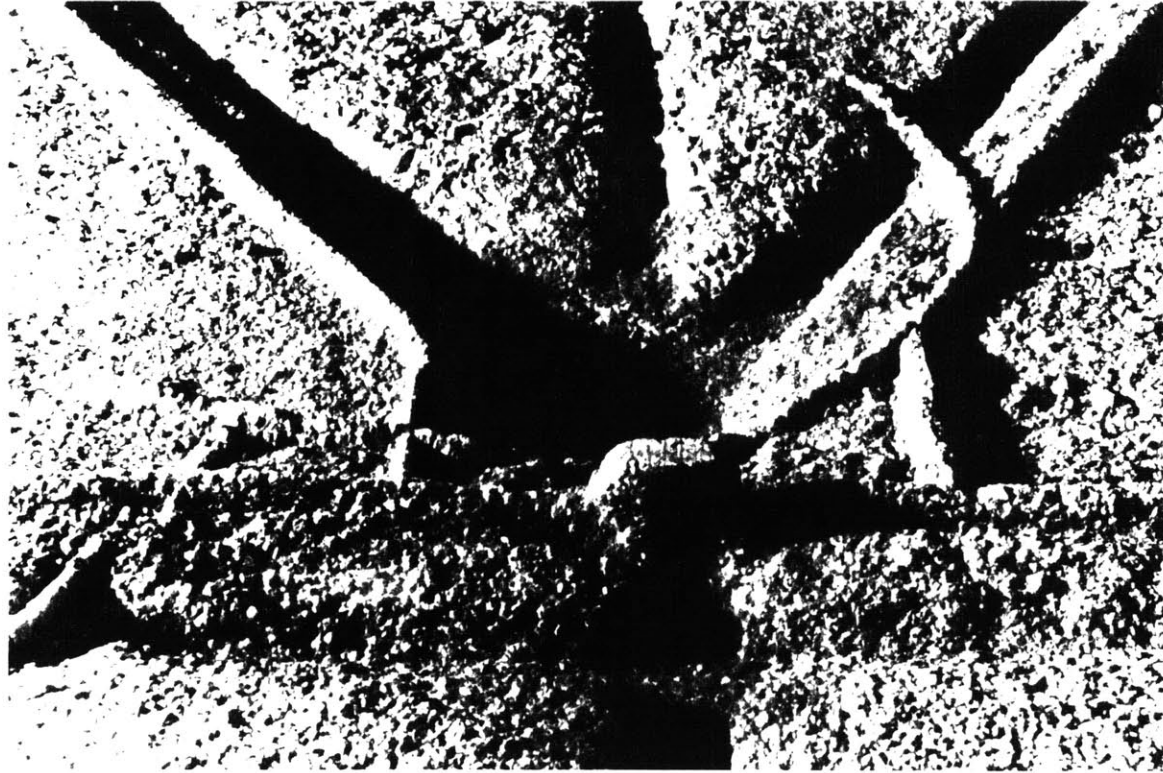


the new structure, "I hope it works."

The Old River Control Auxiliary Structure is seven towers, each with a white crown. They are on the upstream side, and they slope toward the Atchafalaya. Therefore, they resemble flying buttresses facing the upper. The towers are separated by six air-flow gates to the Mississippi, and hinged in trunnion blocks set in steel to contain the force of the river into the core of the dam. Lined by cables, these trunnion gates, at their

Paper montage of site

Site model, sand and plaster



I would make a sign on the earth, marks so large they would be perceptible only from the sky, as if people in airplanes -- or gods -- might see them,

The wilderness generation was at Sinai; it witnessed there the thick darkness where God was: "and all the people saw the thunderings, and the lightnings, and the noise of the trumpet, and the mountain smoking." It scared them witless. Then they asked Moses to beg God, please, never speak to them directly again. "Let not God speak with us, lest we die." Moses took the message. And God, pitying their self-consciousness, agreed. He agreed not to speak to the people anymore. And he added to Moses, "Go and say to them, Get into your tents again"

It is difficult to undo our own damage, and to recall to our presence that which we have asked to leave. It is hard to desecrate a grove and change your mind....We doused the burning bush and cannot rekindle it.... Did the wind use to cry, and the hills shout forth praise? Now speech has perished from among the lifeless things of earth, and living things say very little to very few. . . .

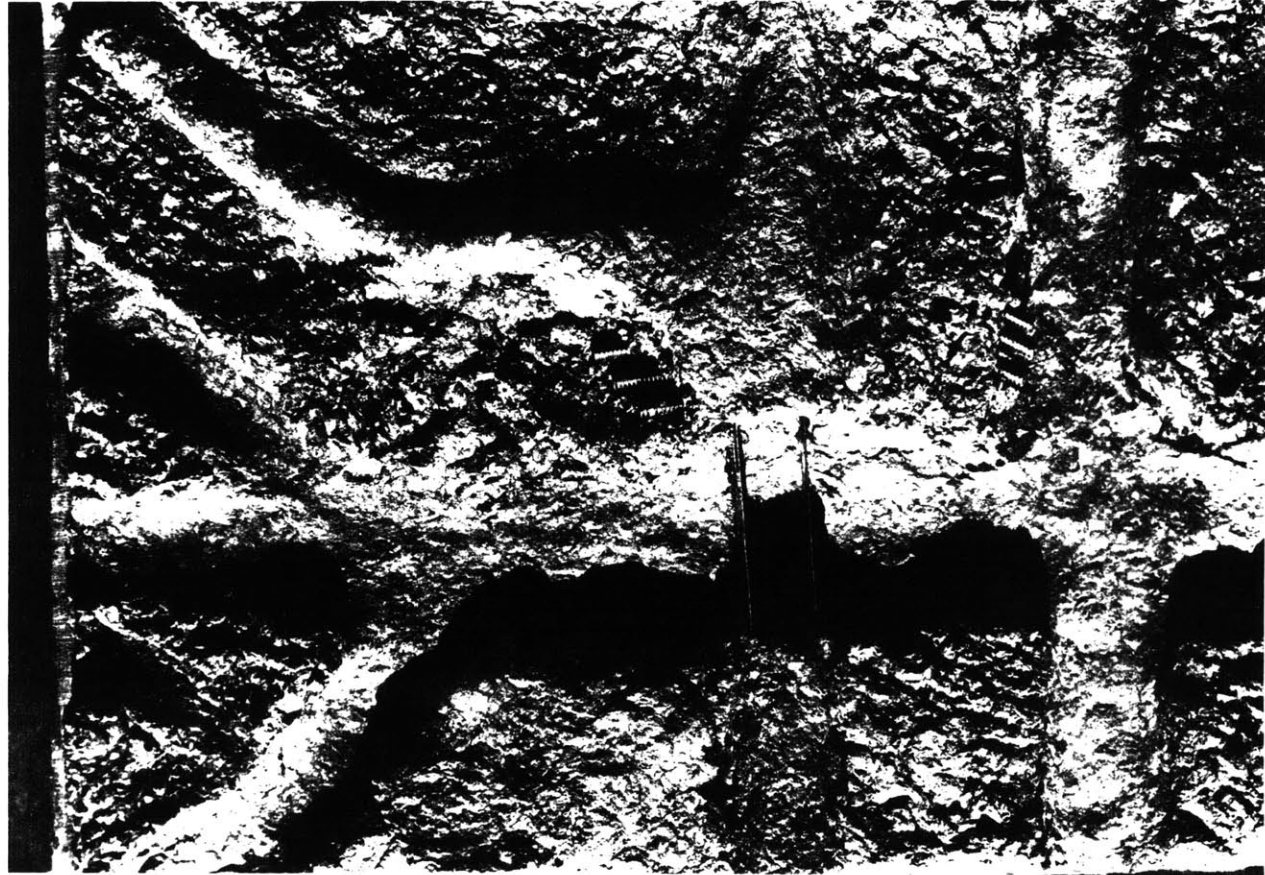
The silence is all there is. It is the alpha and the omega. It is God's brooding over the face of the waters; it is the blended note of the ten thousand things, the whine of wings. You take a step in the right direction to pray to this silence, and even to address the prayer to "World." Distinctions blur. Quit your tents. Pray without ceasing.

—Annie Dillard,
"Teaching a Stone to Talk"



Cerro Negro Volcano, near Managua, Nicaragua

Site model, papier mache



*. . . marks on this broad canvas of grasses and shallow waters as large
as the corset of canals and levees we find there now,*

"Hawaiians have lived with eruptions throughout Hawaiian history, and their primary way of dealing with these problems was through votive offerings. To this day, one sees strewn flowers at the edge of active craters, flowers in vases, offerings of tobacco, of food, and, most of all, of gin."

--John McPhee
The Control of Nature



Indian Pictograph, Blythe, California

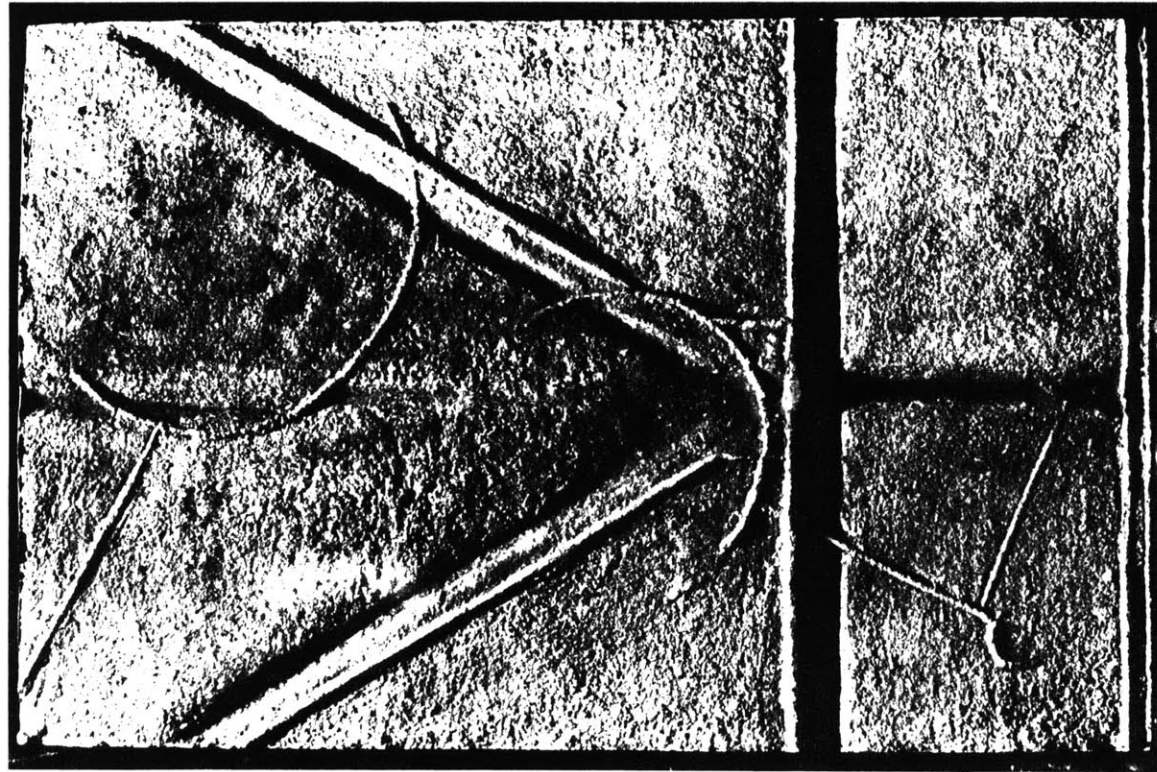
I am of a mind to listen to gods, and to speak. (I should be afraid.)

At a convergence of canals and pumps where an edge of the Everglades marsh meets an edge of ex-urban Ft. Lauderdale, I would make a sign on the earth, a sign as large as the Everglades itself, as large as the waterworks and cities that threaten it. I would make marks so large they would be perceptible only from the sky, as if gods might see them.

There are already marks on this broad canvas of grass and shallow waters, a corset of canals and levees that -- though monumental and even beautiful in their own right -- appear as scars on the land which they have altered so inexorably. As seen from the sky, the arcs I would make seem like the waterworks they transect; deliberate, geometric and figural, they are artifice, manmade. The reaching gesture of their form and the shifted direction of the linear elements that link them, however, would indicate another order: open, incomplete, reciprocal. The arcs would begin to encircle the marsh but never enclose it or restrict the free movement of water as the canals do. They would transect/displace portions of canal and levee to demonstrate the great volumes of water they move over time.

My sign would be an offering, holding within its embrace both the waterworks and the marsh as things of unique beauty and value. I would make large arcs that embrace what is of me and what is other and excludes me.

Site model, sand and plaster



*... an offering, an embrace of what is me and what is other and
excludes me.*

Approximately two hundred miles to the north is the inspiration for such a gesture. Between 1961 and 1971, the Army Corps of Engineers converted the 98-mile, meandering Kissimmee River in a perfectly straight 52-mile long, 300 foot wide, 30 foot deep canal known as the C-38. Flood control, increasing acreage for cattle farming and access for recreational boats were the rationale behind such an undertaking. Within a few years, however, 40,000 acres of wetlands along the floodplain of the river disappeared, and dissolved nutrients such as phosphorus from animal waste were hastening south unfiltered, directly into Lake Okeechobee, southeast Florida's drinking fountain.

Twelve years after the completion of the C-38, the South Florida Water Management District (SFWMD) set out to undo it. By placing steel weirs across the canal at various points, they were able to divert water over the banks and back into the river's original floodplain. This diversion method allows water flow to more closely resemble that of the natural wet and dry seasons and for the wetlands habitat to return.

What is remarkable about this undertaking is that the canal continues to operate, protecting agriculture and human settlements and allowing boat navigation while restoring the wetlands. In other words, the needs of both the natural environment and the people who live adjacent to it are met. As seen from the air, the Kissimmee River and its alter-ego, the C-38 canal, converge and diverge across the great, flat marsh, symbolizing the possibility of sharing such an enviable abundance of water with the natural systems that ultimately support us.



Steel weirs, Kissimmee River

Aerial photo, Kissimmee River Restoration Project



The Kissimmee River and its alter-ego, the C-38 canal, converge and diverge across the great, flat marsh, symbolizing the possibility of sharing such an enviable abundance of water.

PART ONE

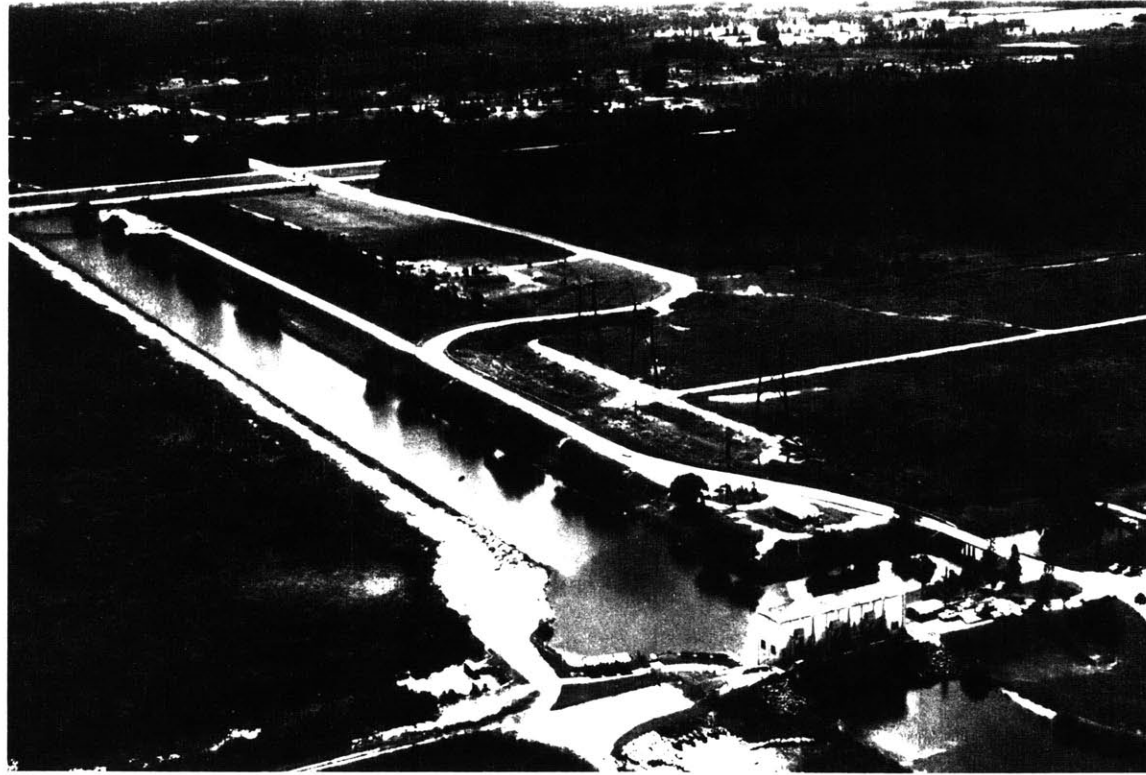
This Landscape / Perception



Climbing into a spillway

a construct for interpretation

Aerial photo, S-9 Pump Station



The problem is not knowing about the water.

It is important that these forms are more than simply a gesture to the sky but a way for people to journey into and come to understand the place. The Everglades is dying in no small part because of an acute problem of perception: people do not know what it is. It is a problem of not knowing about the water or about the conflicting need for water on the part of city dwellers, agriculture and the marsh.

*Listen: they do not say nature is sacred.
Because they distrust that word, Nature.
Nature as not including humanity, that
nature is a construct made by Man, not a
real thing. . . . Where I live as woman is to
men a wilderness. But to me it is home.*

--Ursula K. LeGuin
"Woman/Wilderness" in
Dancing at the Edge of the World

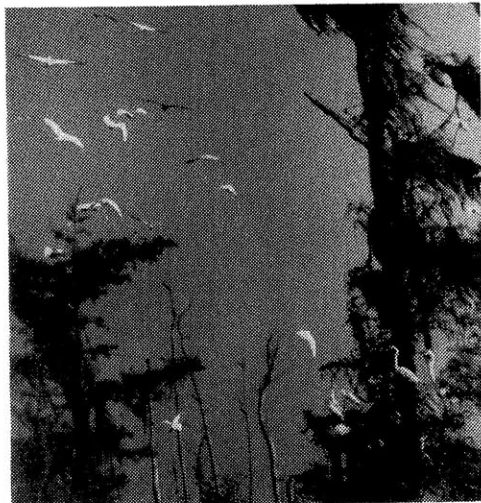
It is deteriorating, that is to say, because almost nobody cares, or cares to know, where water comes from, so long as it keeps coming. The going assumption is that people so ignorant and thoughtless and silly and greedy may simply call upon the Army Corps of Engineers in order to receive a clean and abundant supply of water

--Wendell Berry
on the demise of the Kentucky River system,
in "The Journey's End",
Recollected Essays

As verified by my own experience of not having known, the threat to the Everglades is likely related to the nature of the place itself:

. . . the Everglades is almost certain to disappoint those who see it for the first time unless they have been prepared for what they may or may not see. . . . It is an area without any single point of powerful impact. Many other national parks that are chiefly of geological interest exhibit great peaks, deep gorges, or spectacular scenes of one kind or another. This park, which is chiefly of biological interest, requires a different perspective on the part of the visitor.

--Charlton W. Tebeau
Man in the Everglades



Great Egrets, Okefenokee Swamp, Georgia

Aerial photo, water conservation area / drowned marsh



The Everglades is dying because . . . people do not know what it is.

It is partly a problem of scale, for the Everglades is vast and flat and repetitive one cannot readily orient oneself. It is partly a problem of access, for one cannot walk out into such a water-covered, saw-toothed landscape very easily. It is a partly problem of wildness/ wilderness: the Everglades does not readily accommodate us.

And what of the miles of canals and levees, the dozens of spillways that traverse the marsh? To look at them one senses little of their monumental effects on the water, or even of their own dimensions. That the canals are very straight is their only palpable feature; that they are 85-100 feet wide and 30 feet deep, and that the water in them flows, is not readily apparent. The levees are 15-20 feet tall, yet despite the flatness of the land they appear puny compared to the vastness of the sky, the breadth of the horizon. They are, curiously, hardly present.

The task at hand, then, is to develop a way for people to experience this strange and subtle place in a way that makes explicit what happens there.



Aerial photo, canal and levee through Everglades

Sign on "Alligator Alley" West, at the border of the water conservation area



It is partly a problem of scale, . . . partly a problem of access, . . . partly a problem of wildness. . . . The task is to develop a way for people to experience this place in a way that makes explicit what happens there.

What have we been doing all these centuries but trying to call God back to the mountain, or, failing that, raise a peep out of anything that isn't us? What is the difference between a cathedral and a physics lab? Are not they both saying: Hello? We spy on whales and on interstellar radio objects; we starve ourselves and pray till we're blue.

--Annie Dillard
"Teaching a Stone to Talk"

In his poem "The Idea of Order at Key West," Wallace Stevens describes a woman's voice singing the sounds of the sea. What is critical to Stevens here is to distinguish the song from the sea:

*It may be that in all her phrases stirred
The grinding water and the gasping wind;
But it was she and not the sea we heard.*

The artifice--the song--provides a way for us to understand, with respect to ourselves, something as vast and inhuman as the sea. Without the song, the sea would "never form to mind or voice", but would always be "deep air,/The heaving speech of air. . ./And sound alone." What Stevens is saying is that we know nature or that which is not human through constructs of art or myth or science that impose order on what we see.



Topographical markings, the Cerne Giant, Dorset

Stonehenge, aerial photo, 1904



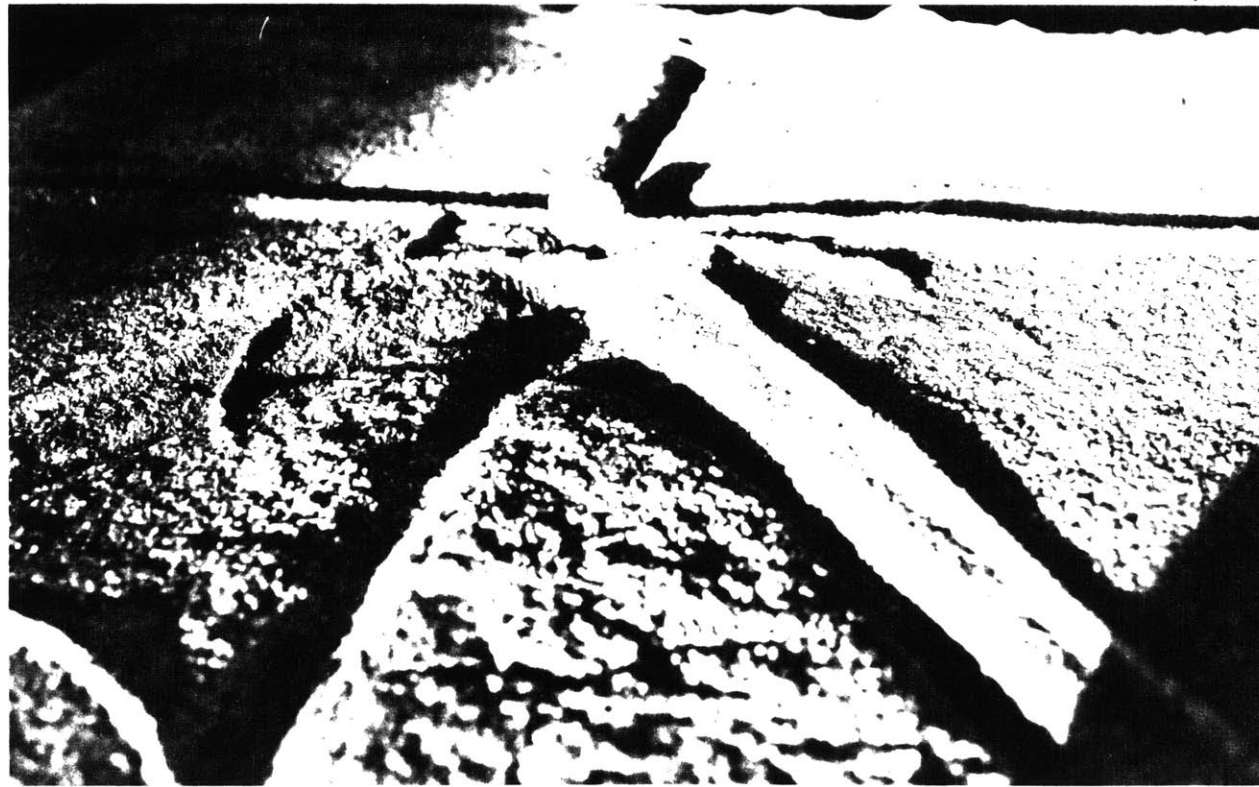
We know nature/the world through artifice, through constructs of art or myth or science that impose order on what we see.



Site model detail: levee, canal, arc

Like the voice in Stevens' poem that "made /The sky acutest at its vanishing," -- that intensified the experience of the sky -- the arcs could intensify the nature of water in both the marsh and the waterworks. They would be a third order, derived from the order of the marsh and the order of the waterworks but distinct from them, an artifice tthat allows us to make sense of what is there.

Site model, sand and plaster



The forms on the land could allow us to make sense of what is there.



the two orders of water

Wading birds, Shark River Slough, Everglades National Park



Water is the given to which every living thing in the Everglades responds.

The bromeliads (plants that anchor to trees and take their nutrients from the air) for example, support whole food chains because of their ability to concentrate water. These plants have evolved several water-conserving tricks for times of drought, including leaves shaped to hold rainwater in vase-like reservoirs at their bases. Mosquitoes and tree frogs breed in these tiny reservoirs, and in dry periods many arboreal animals seek the dew that collects here.



Bromeliad

There are two orders of water at the site of this intervention: the marsh's and man's. In nearly every respect, they are different from and in conflict with one another.

In the Everglades marsh, water is characterized by its laminar flow. Its source is rain, an average of 60 inches per year, which simply accumulates as a sheet of water over the ground. The water is not soaked into the ground due to a relatively water-impervious layer of marl that prevents this. It is not lost to the atmosphere through evaporation due to a mat of periphyton (a colony of blue-green and green algae) and a sedge called sawgrass that absorb up to 85 percent of it.

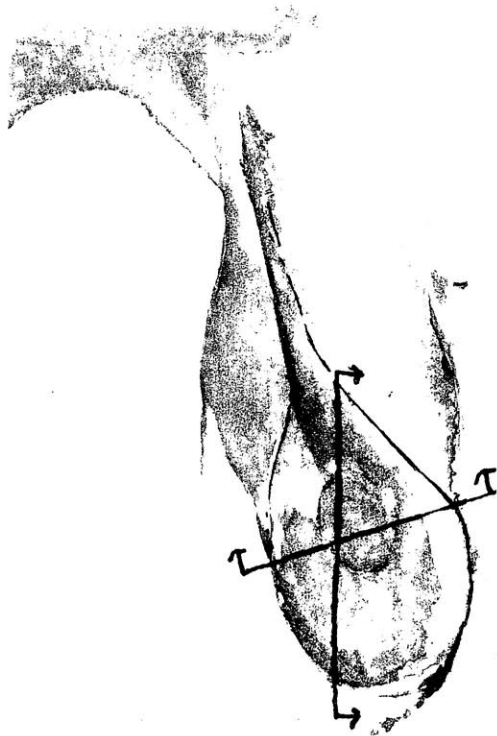
In addition to the laminar flow of water, the marsh is characterized by an extreme hydroperiod to which every living thing in the marsh has adapted itself. The rains fall mostly between May and September; water remains on the ground until December but by springtime is largely gone. The result has been described as a kind of two-cycle engine where life follows the water: in the wet season there is a tremendous growth and dispersion of aquatic life, and in the dry season the aquatic life is concentrated. The cycle of production and concentration of aquatic life in turn affects the life cycle of semiaquatic forms.

Visitor Center Mural, Everglades National Park



There exists a kind of two-cycle engine of dispersion and concentration where life follows water.

One may think of South Florida as a tilted spoon, the bowl of which is partly submerged in the ocean. Lake Okeechobee is then a drop of water in the spoon; owing to the tilt, when the drop gets larger due to rainfall, it slides. This is the action of the Lake overflowing its southern banks and sending a thin sheet of water across the flat and only slightly sloping land (one inch per mile) and out to the ocean.



In such an order, the water's movement may be charted more by time, by the seasons, rather than by velocity or direction. It is simply present and then not present, rising over long rainy months and then evaporating over more long months after the rain has stopped. In the dry season it is to be found only in spots where, by accidents of geography or by the ingenuity of species, it has been conserved in anticipation of such shortages. It is all the same, all over the place, and yet never the same at all.

The system is big, covering 3,500 square miles. It begins at shallow Lake Okeechobee, a hole in the Floridian peninsula, which overflows its banks as the rains begin, sending a sheet flow south and southwest to the sea, owing to an extremely slight declination in that direction. It is bounded by a limestone ridge at the very eastern edge of the state and by oceans whose encroachment the flow of water prevents. In the words of Marjorie Stoneman Douglas, the first and greatest publicizer and champion of the Everglades:

Saw grass reaches up both sides of that lake in great enclosing arms, so that it is correct to say that the Everglades are there also. But south, southeast and southwest, where the lake water slopped and seeped and ran over and under the rock and soil, the greatest mass of the saw grass begins. It stretches as it always has stretched, in one thick enormous curving river of grass, to the every end. This is the Everglades.

It reaches one hundred miles from Lake Okeechobee to the Gulf of Mexico, fifty, sixty, even seventy miles wide. . . . Down that almost invisible slope the water moves. The grass stands. Where the grass and the water are there is the heart, the current, the meaning of the Everglades.

Sawgrass prairie, Everglades National Park



*Down that almost invisible slope the water moves. The grass stands. . . .
There is the heart . . . of the Everglades.*

What struck me most of all as he talked was his evident and inherent conviction that a community can have a right to exist -- to rise, expand and prosper -- in the middle of one of the most theatrically innundated floodplains in the world.

--John McPhee
on attempts to control
the Mississippi River in
The Control of Nature

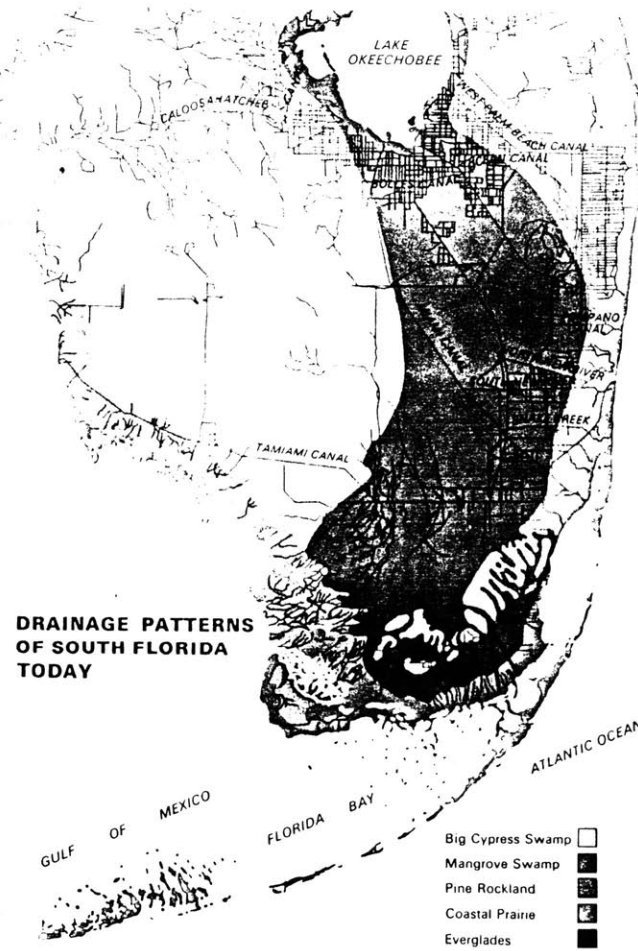


Flooding, 1926

In man's system, water is characterized by its channelized flow. Unlike the members of the Everglades community which are adapted to the climactic cycles with tremendous precision, white settlers who came to this place opted for control over adaptation. They had lost life and property to the ways of the marsh and simply required conditions they could count on, conditions they could understand.

In 1948, the same year in which they declared the Everglades a national park, Congress had the Army Corps of Engineers begin work on what was then called the Central and Southern Flood Control District. The plan reflected the desire to get the water off the land around Lake Okeechobee as quickly as possible to meet the demands of speculative development and agricultural interest. Lake Okeechobee was diked at its southern boundary and its overflow channeled out to the Atlantic and the Gulf through canals to both create and protect agricultural lands around it. A network of canals were built to supply Lake water to Dade, Broward and Palm Beach counties, and to send any overflow out to sea. In these three counties, 15,000 square miles of water conservation areas were created to impound water and protect the rapidly developing coastal cities from flooding.

Once the canals and levees were completed, the flow of water depended not on acts of nature but on decisions by engineers. Water that once was held on the surface of the ground was hastened out to sea or held back by pumps; the marsh was dried out in some places, drowned in others.



Settlers opted for control over adaptation.

In one important respect, however, the natural and man-made orders are similar: in both, high ground, or *terra firma*, is essential. In the Everglades, hardwood hammocks have formed where the ground is slightly higher and enough peat has managed to accumulate to support tree growth. It is in these hammocks and pine stands where many birds and mammals find cover in an otherwise featureless landscape. They also play a critical role in the marsh's cycle of fire, serving as green "stops" that control burning to some extent. Because water is actually flowing across the land, the mounds tend to be linear, often with a north-south orientation. The flow produces depressions just to the south of mounds which concentrate water and therefore food for tree-nesting birds

Like many Everglades species, man requires high ground for a habitat. The most basic human intervention has been to scoop out muck from one spot to build high ground adjacent to it. The depression is, for man, at least navigable if not also -- like the gator hole -- a source of food. In the waterworks we understand the same relationship of mound to well, where the levees are built up ground and the canals are the linear wells from which such ground was taken.

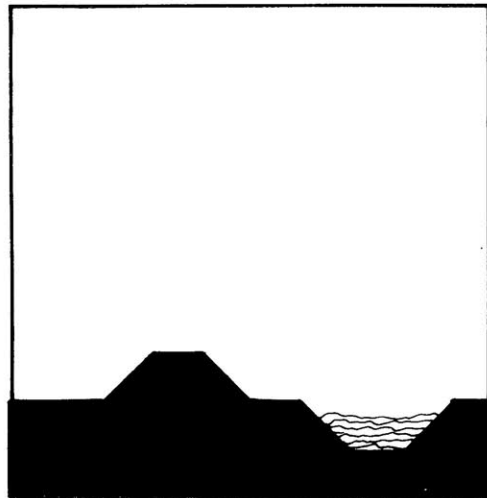
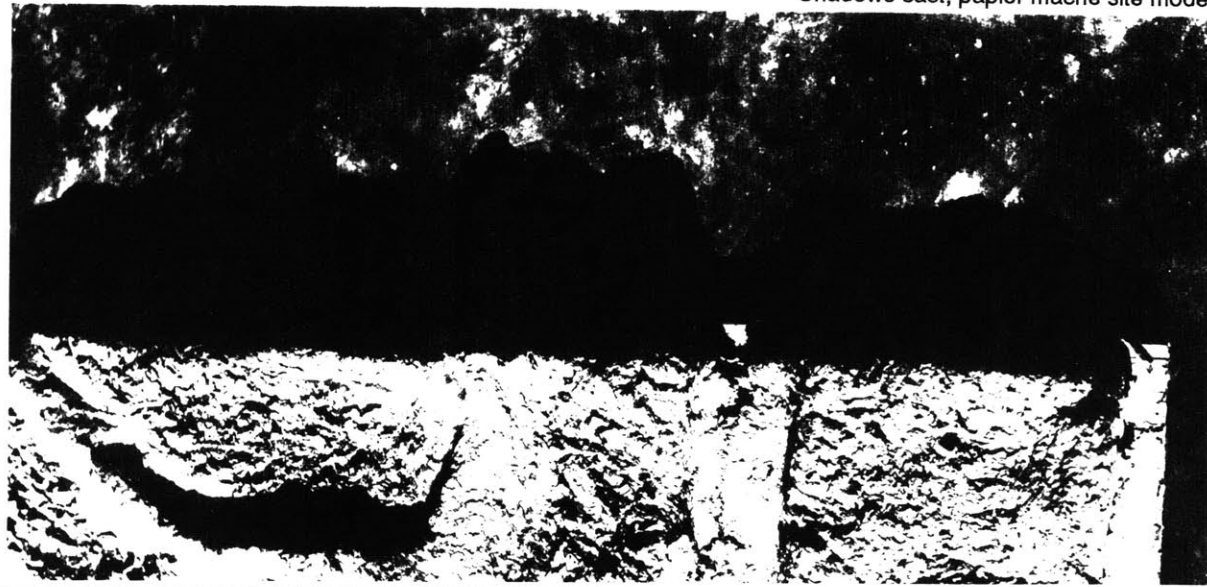


Diagram of section

Shadows cast, papier mache site model



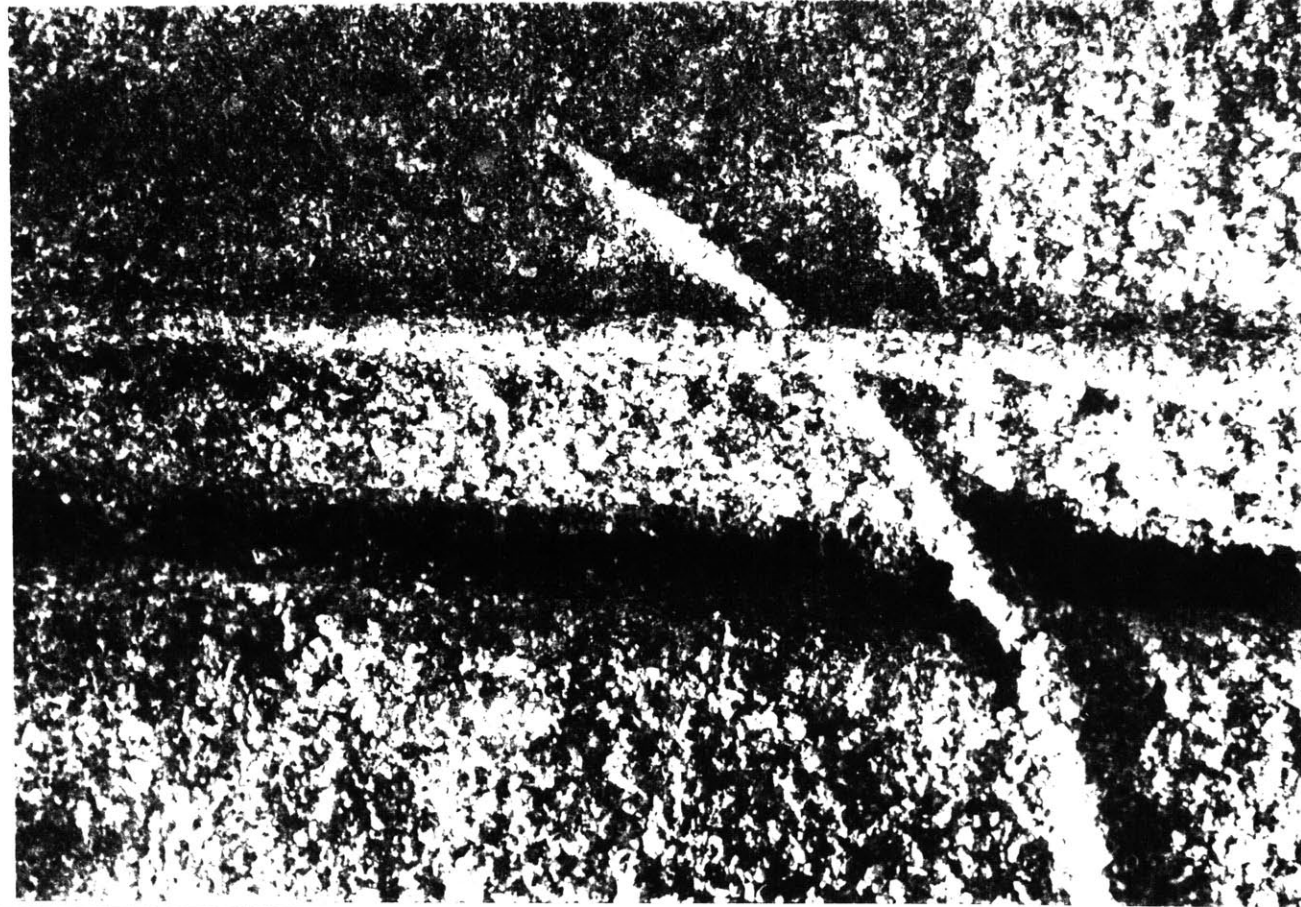
In both the natural and man-made orders, however, high ground is essential.





an interpretive order

Site model detail



The third order is the order of interpretation and of movement through the place, . . .

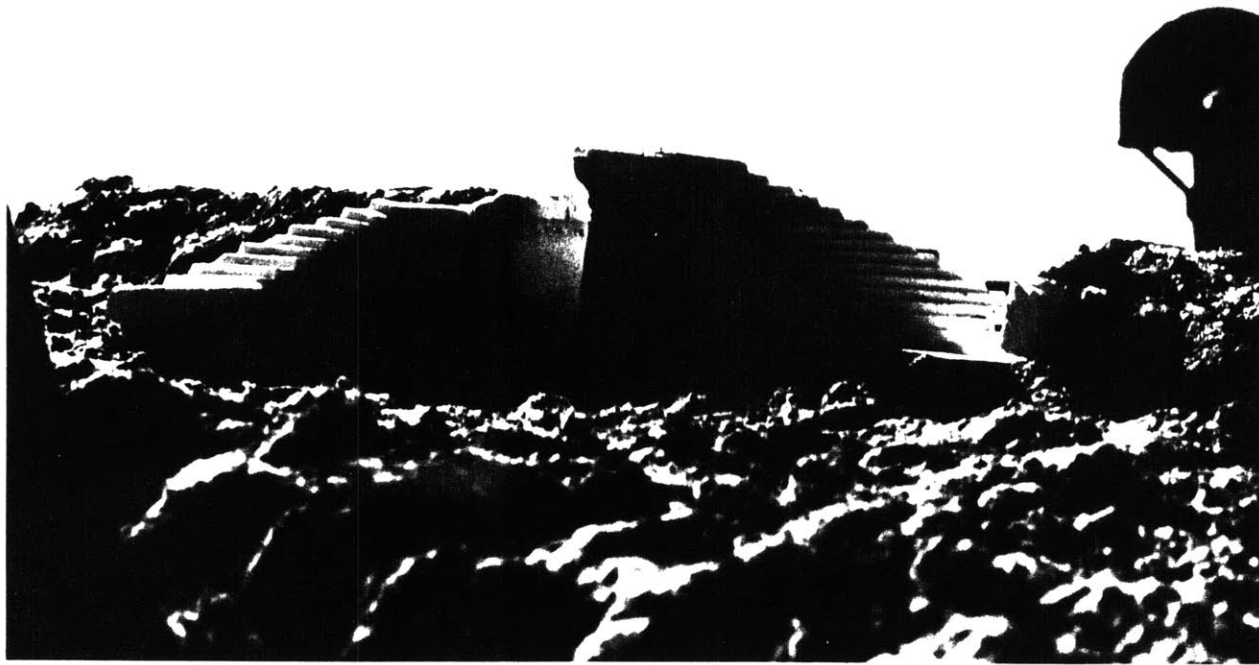


Site Photo, levee at pump station

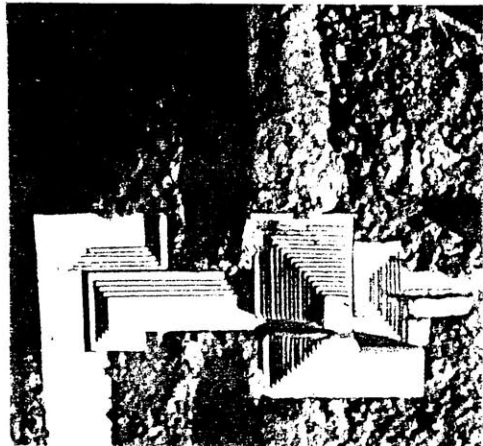
The third order of water as represented by the arc forms on the land is an interpretive order. Although it is another manmade order, it does not control but rather records the actions of water both in the marsh and the canals. Its form is based on the section of well and mound ('gator hole and hammock, canal and levee) that is found in both systems.

At its most basic, the third order is the order of human movement through the site. The arc forms are built ground, mounds not unlike the levees we find already, enabling one to walk out into the marsh and across and through canals and levees. On the ground, the curving form of the arcs would be slight but perceptible and, unlike the unyieldingly linear levees, would enable one to travel a narrower, more ritualized path through the landscape.

Diagrammatic model, stepped well and mound, plaster and papier mache



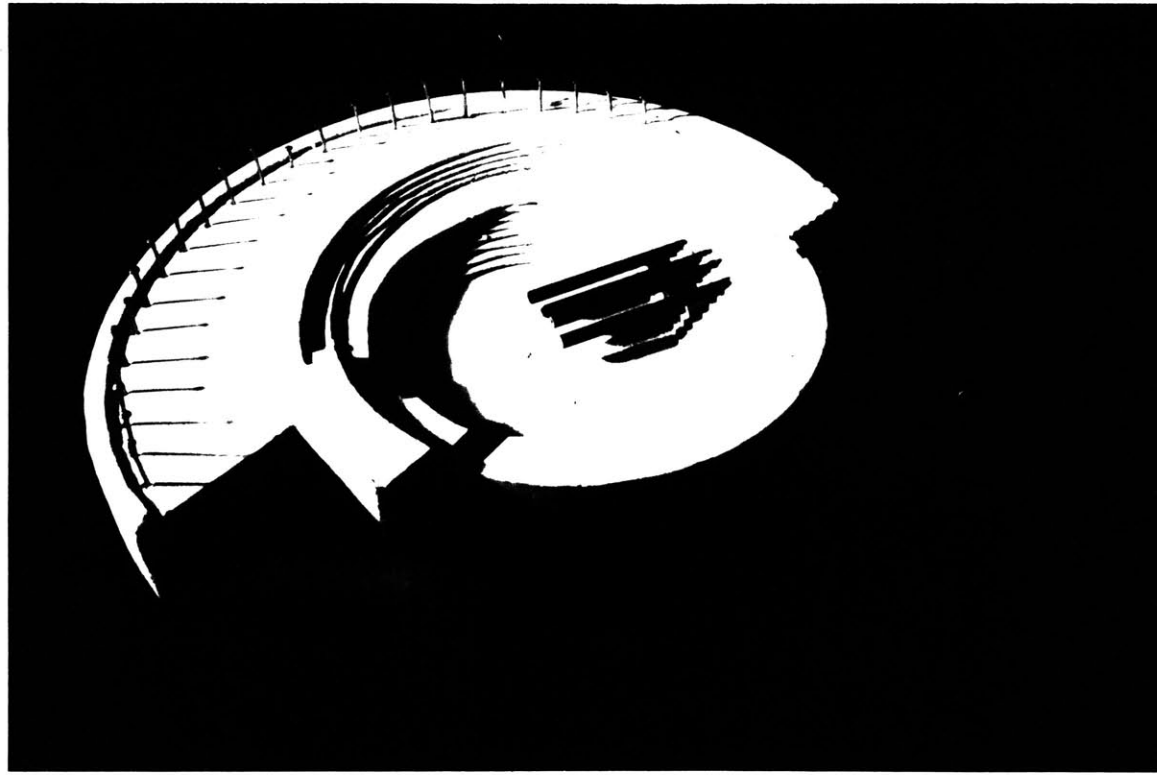
*... derived from the order of the marsh and the order of the waterworks
but distinct from them, helping us to make sense of what is there.*



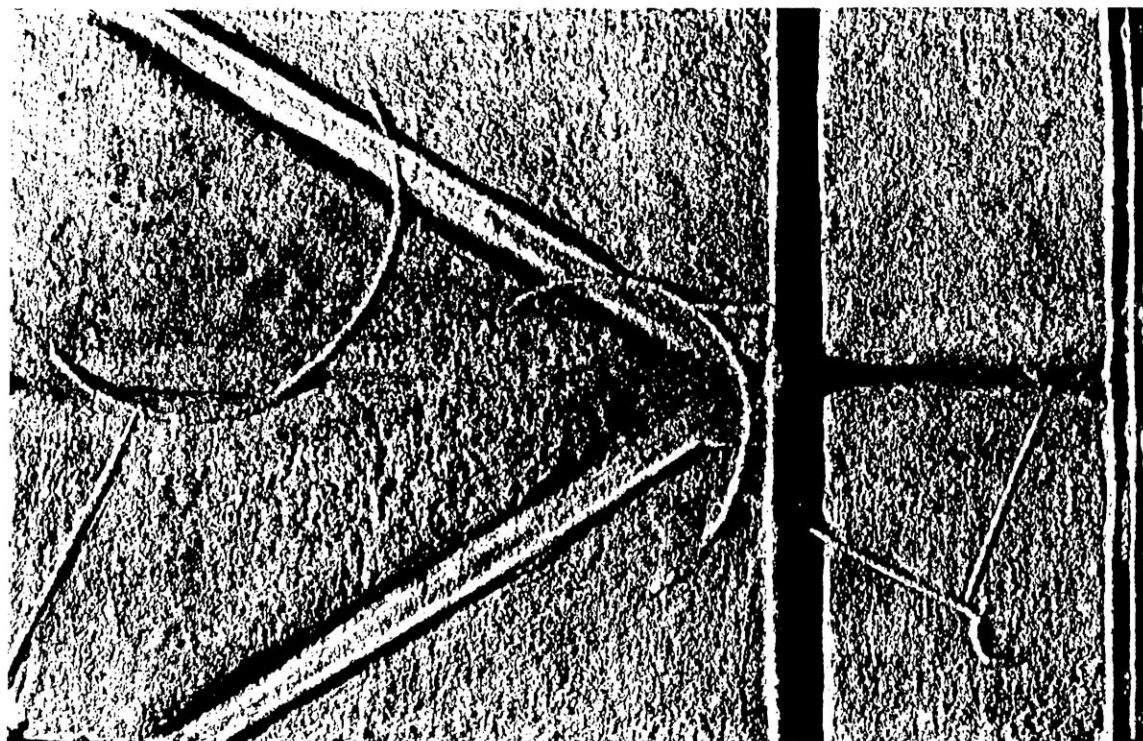
Model detail

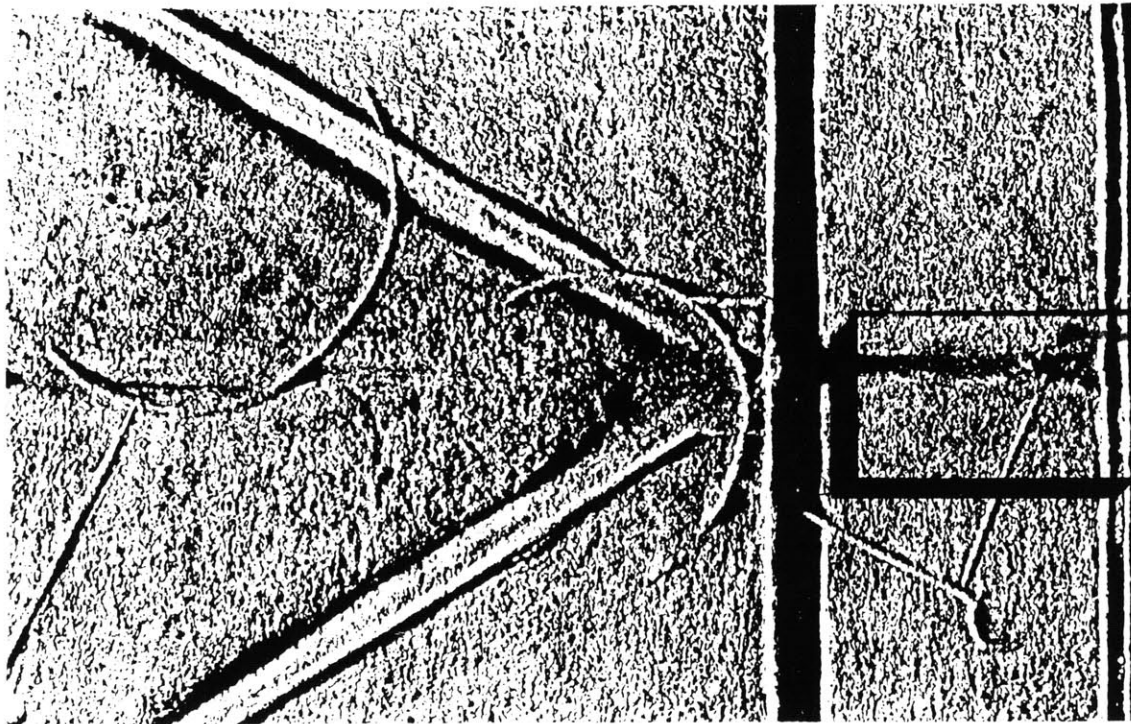
In addition to providing access, the arc forms would make apparent the ways water moves in the marsh and through the canals. The arcs are made of a series of vessels designed to receive water as it falls from the sky and makes its way over the land. Such vessels would be stepped, enabling one to measure and hence perceive the water's behavior along various points of the arc and over hours, days and seasons. They would open into the canals, at times in ways that quicken the flow of water or cause the canals to flood their banks, intensifying one's understanding of how water is moving through them. They would allow water from the marsh to flow in. The arc's vessels would be incomplete, open, not trapping water but taking it up to let us see it, and allow it continue on. They would be full, perhaps impassable, in times of high water, empty in times of drought. They would serve as a canvas upon which the water marks, making its movement apparent to us as we move from one to the next.

Model, stepped well at auxillary pump outlet pipes



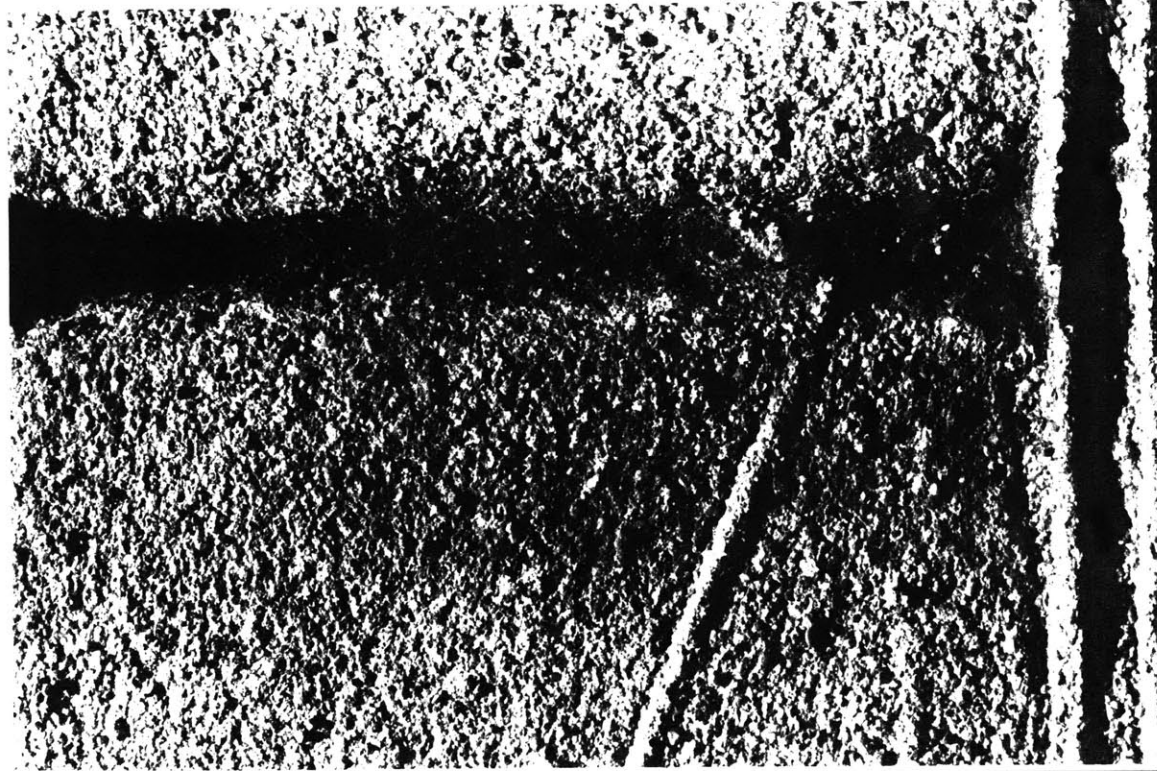
The stepped forms would serve as canvases upon which the water marks, making its movement apparent to us as we move from one to the next, and as theaters where we can view the movement.





a water journey: embarking

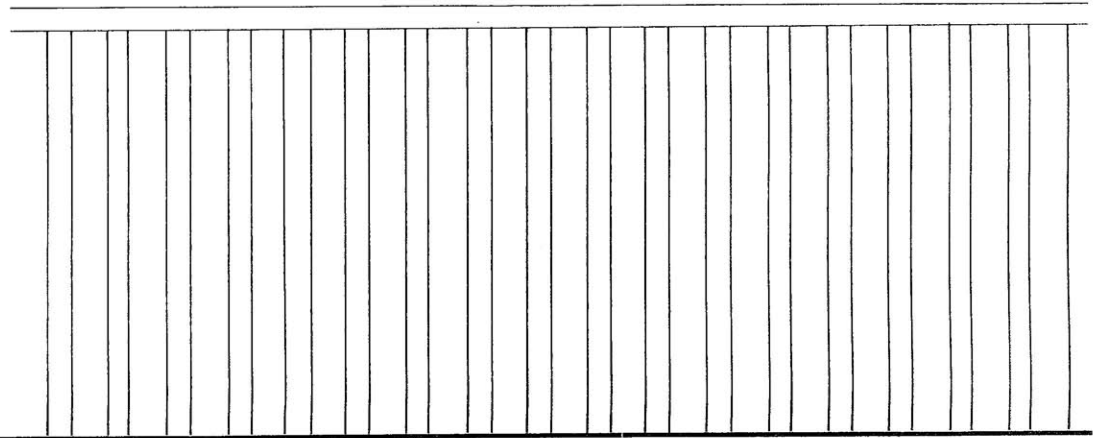
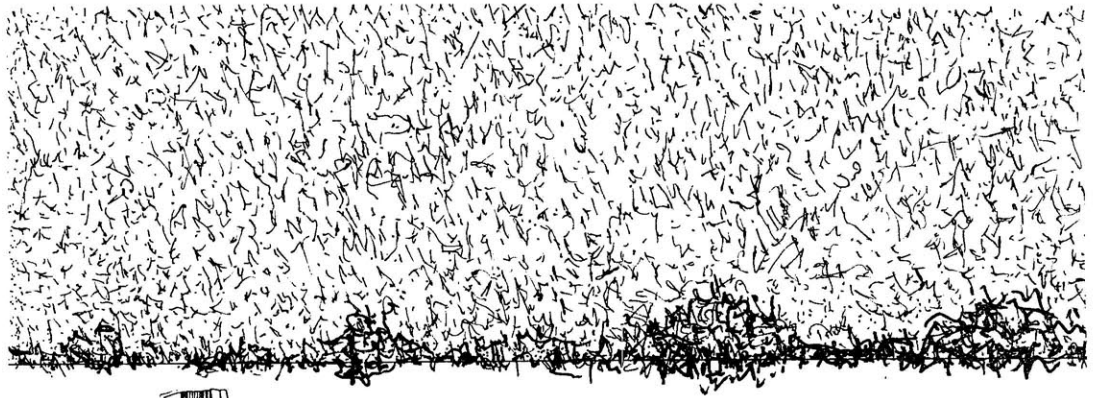
Site model detail

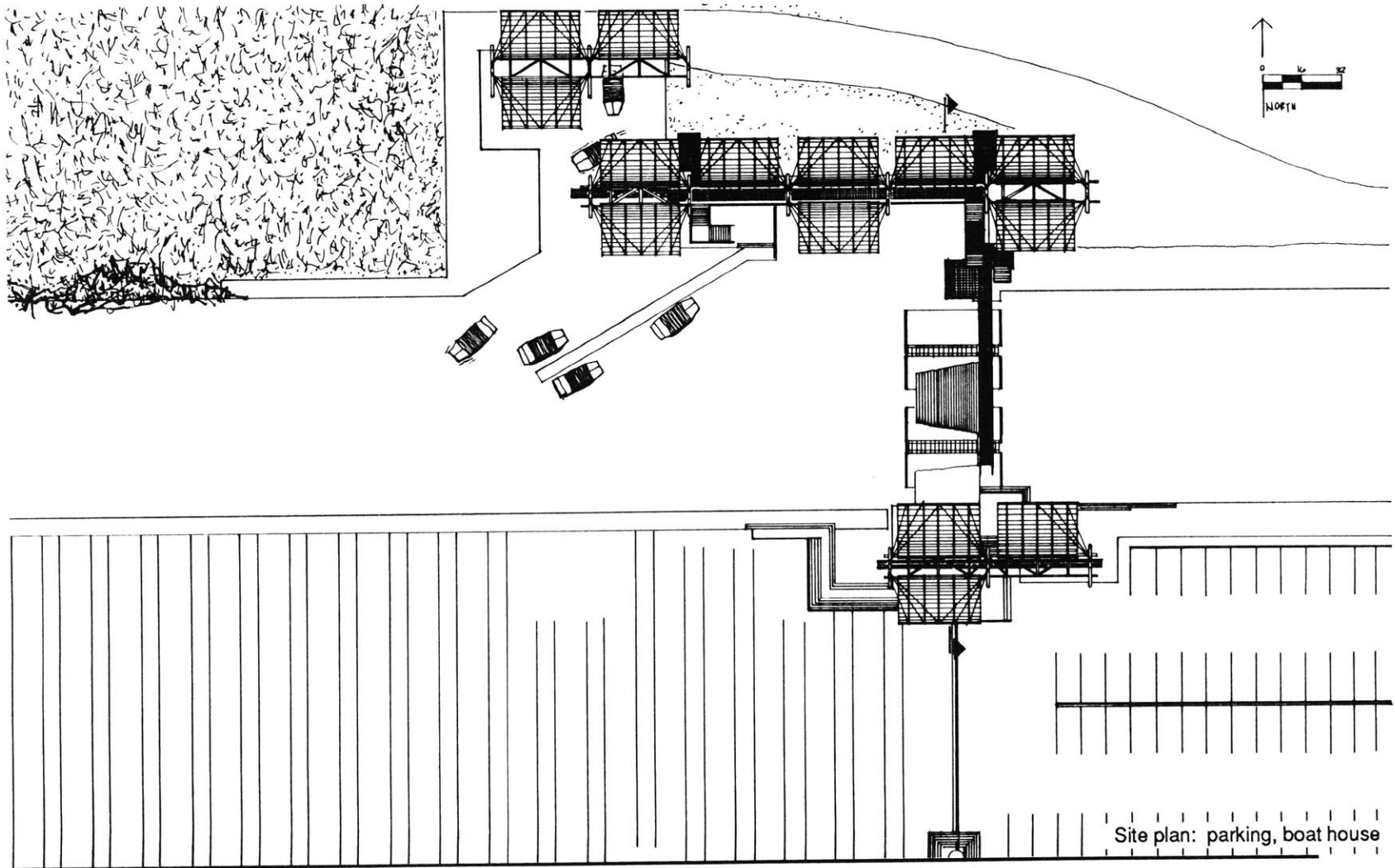


We can begin a journey into this place. What more fitting way to experience the water than to begin by travelling on it? In this way our movement would parallel the water's, slow and ritual, as it is carried west by the action of the pumps.



Ram Bag, pavillions lining Jumna River

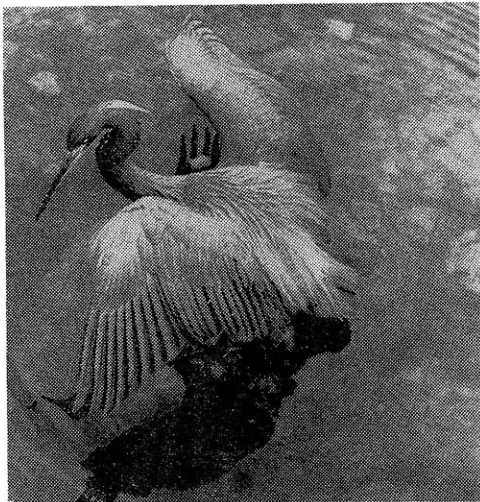


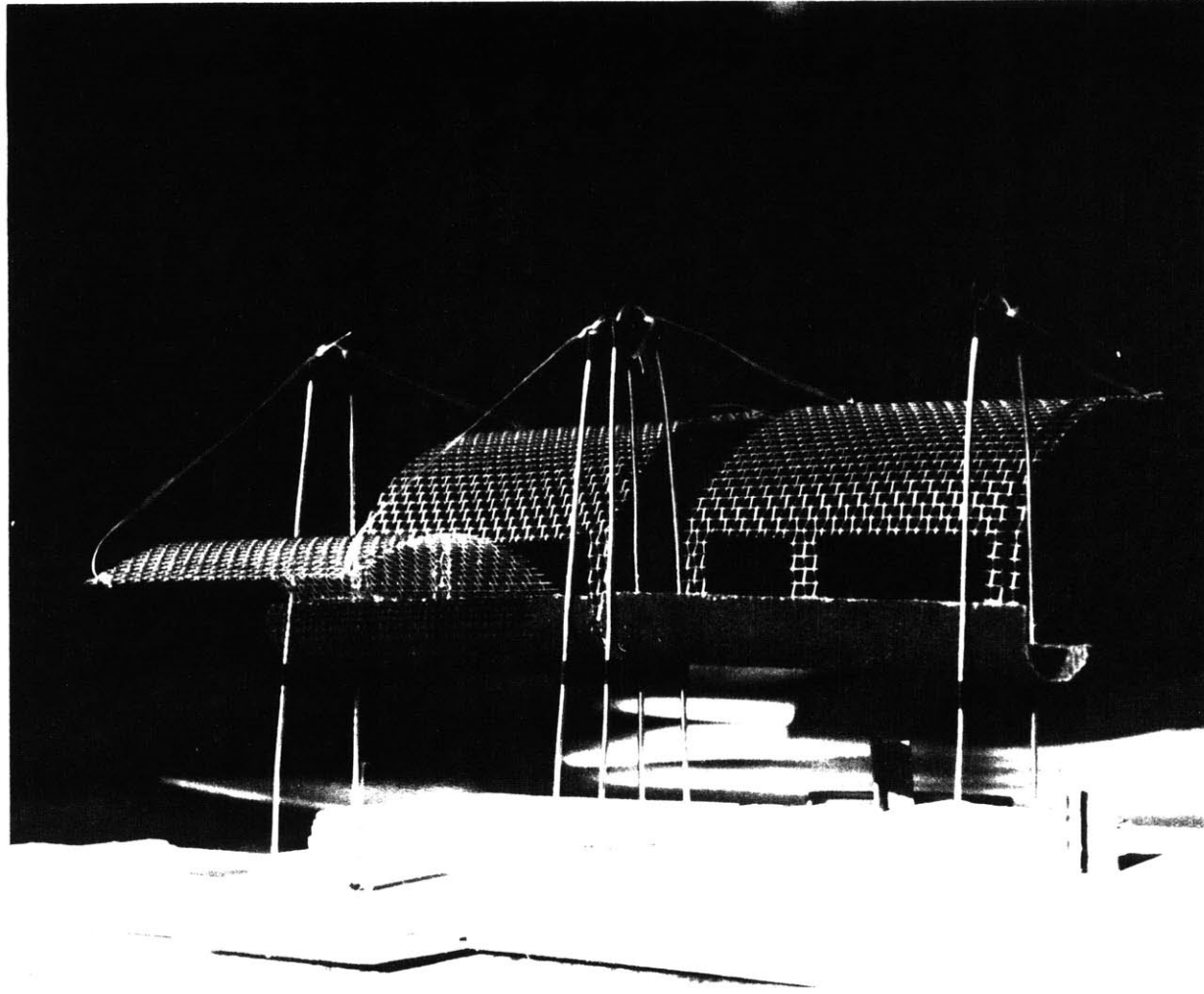


The road into the site leads to an orange grove where we leave the car and follow a narrow channel of water to the canal's edge.

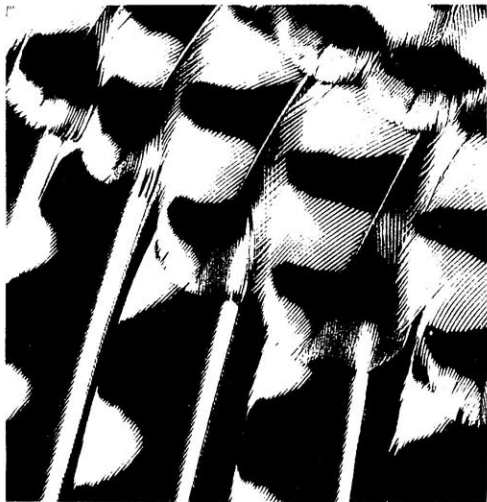
A Tricolored Heron raises its wings to cast a shadow on the water. This style of fishing may attract prey to the shadow or reduces surface glare, making it easier for the bird to see its victims.

--National Geographic's
The Wonder of Birds



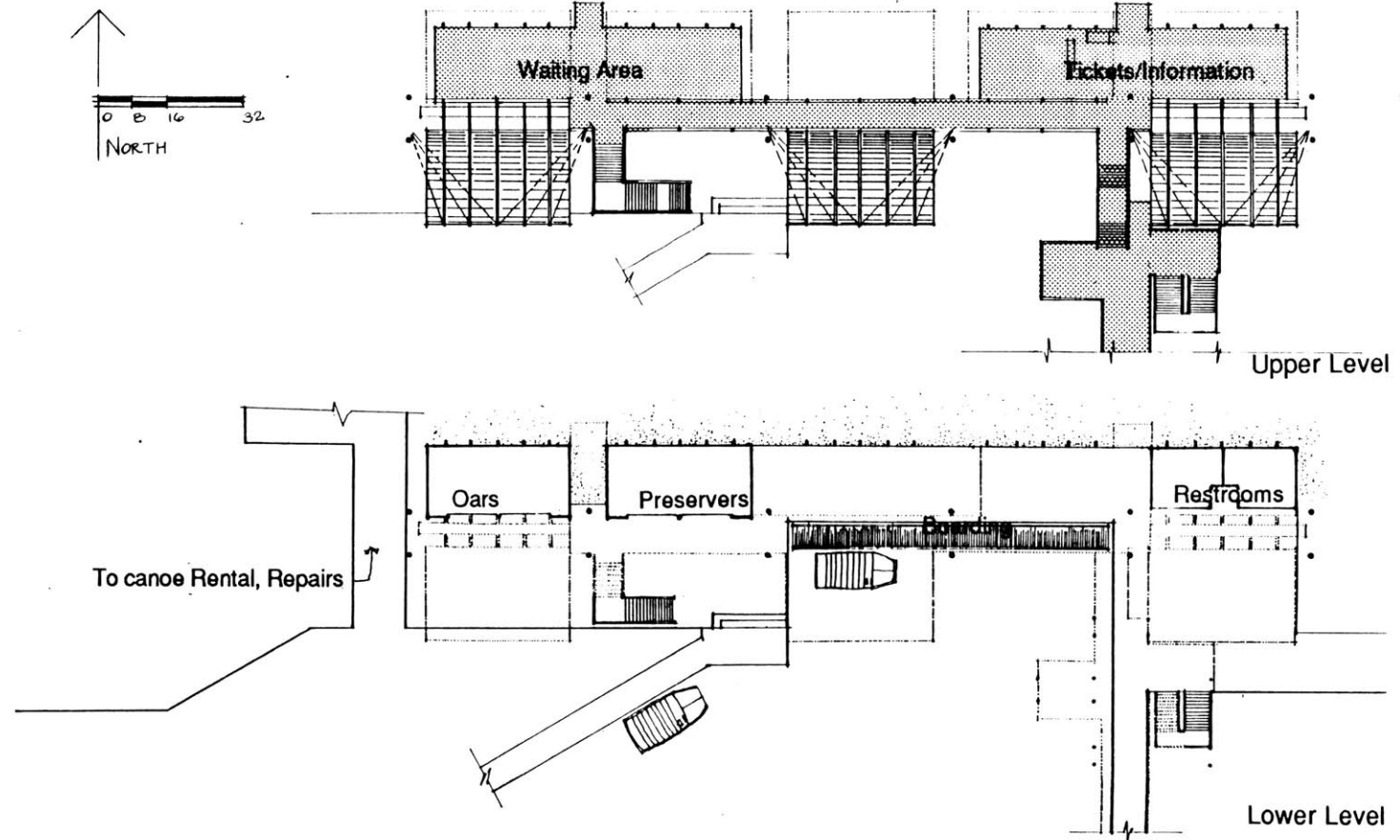


We are met by an open pavillion, its roof covering a large area of the ground and water with cool shade. It is slatted, its louvers tilted to block sun but catch the breeze. The truss that supports the roof holds a gutter that directs rainfall from the roof down into pools, like a canal in the air.

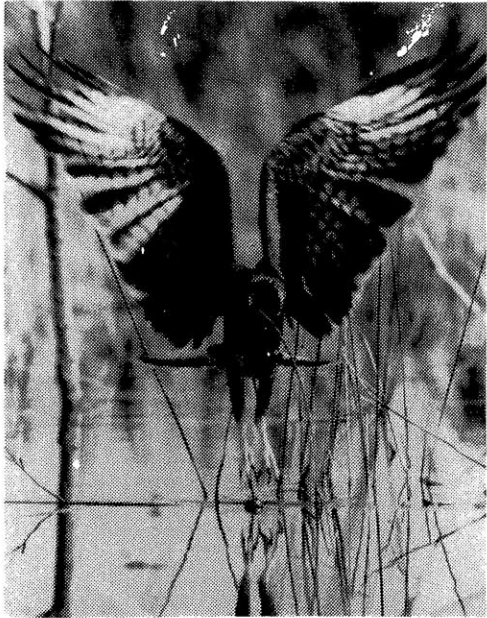


Feather details. Northern Flicker

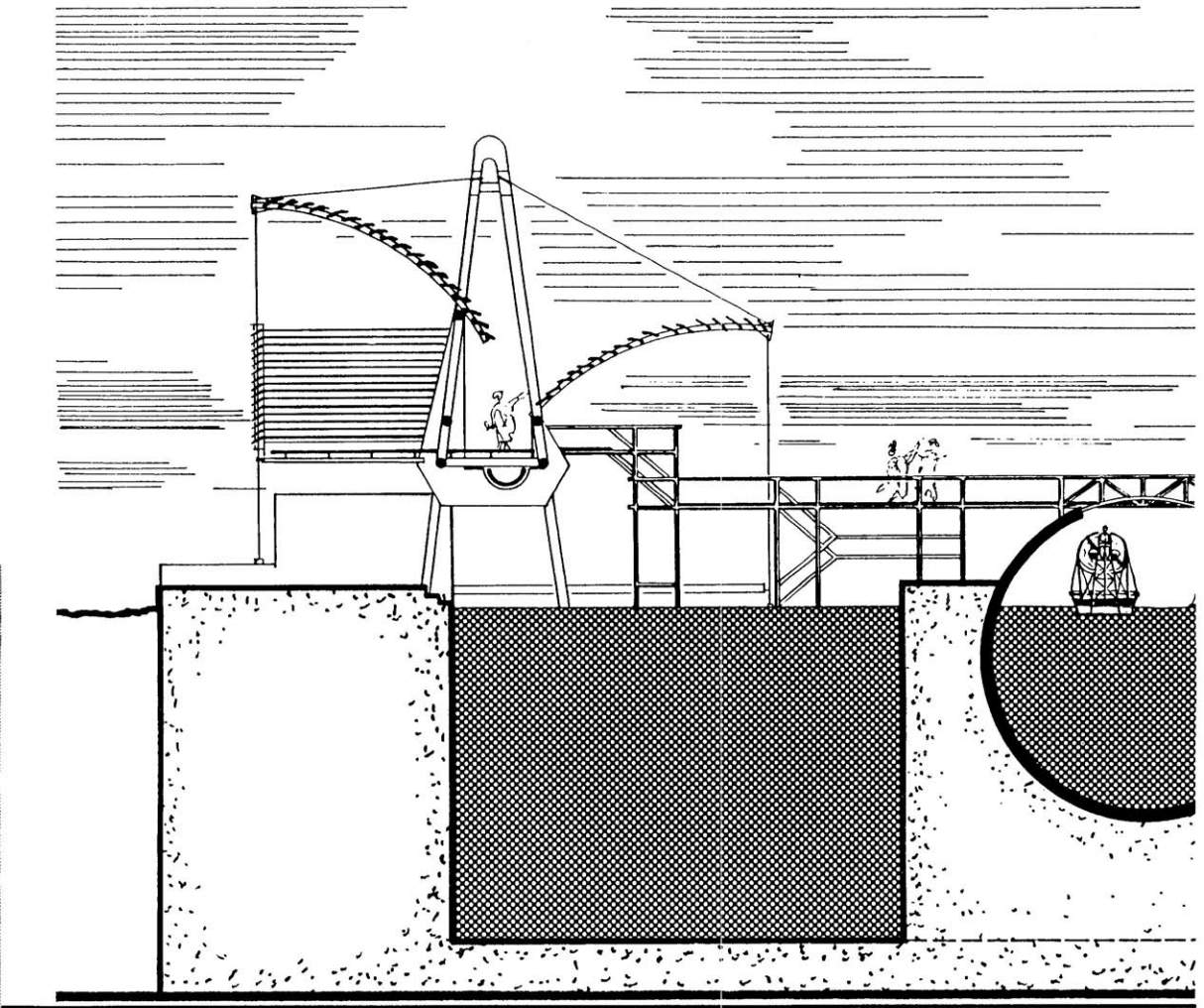
Plan: boat house



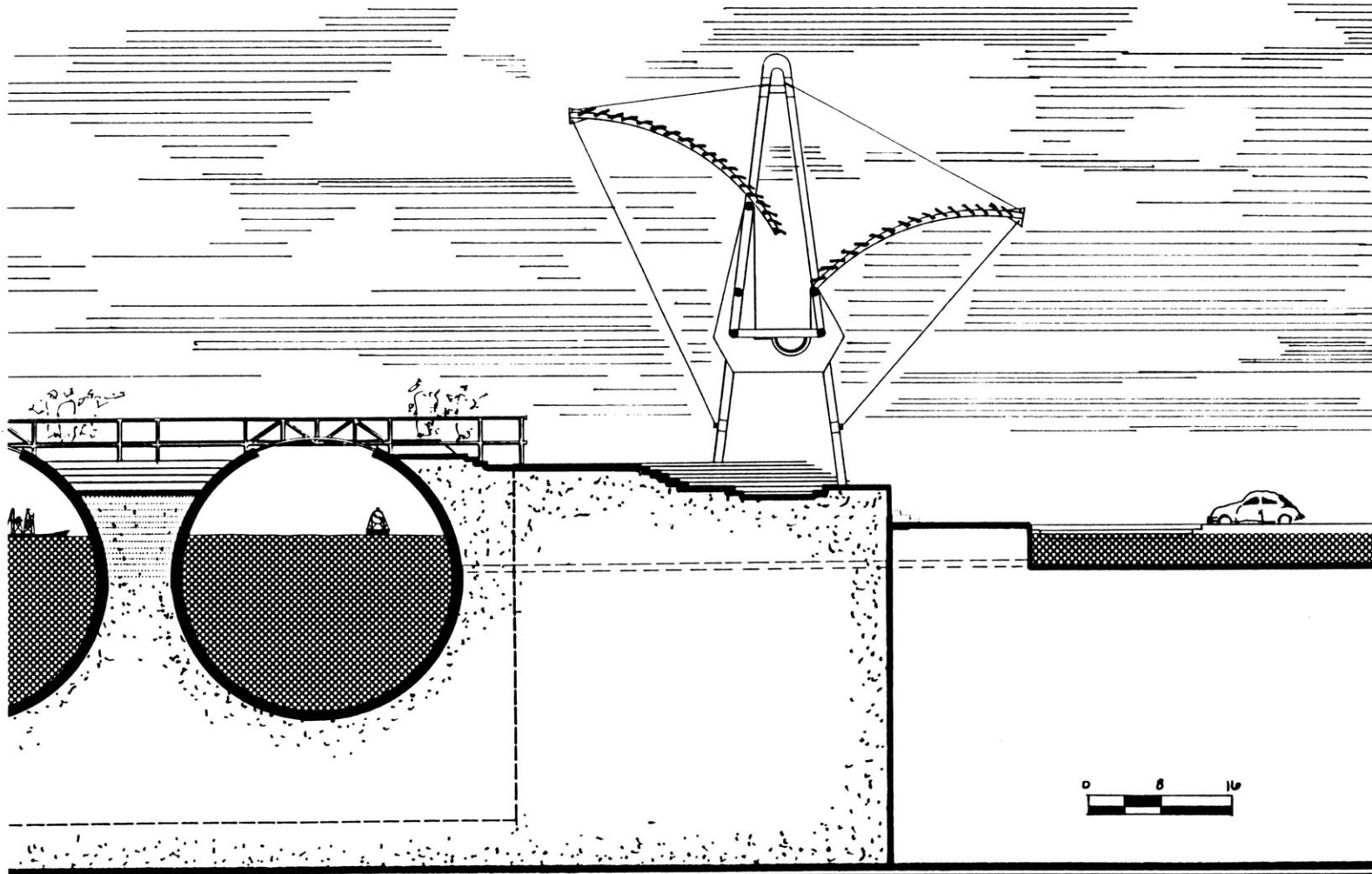
From here we cross a bridge to the other side where more pavillions form a boat house. We arrive at the level of the truss and gutter which, here, is for our passage; the structure channels our movement as well as the water's.



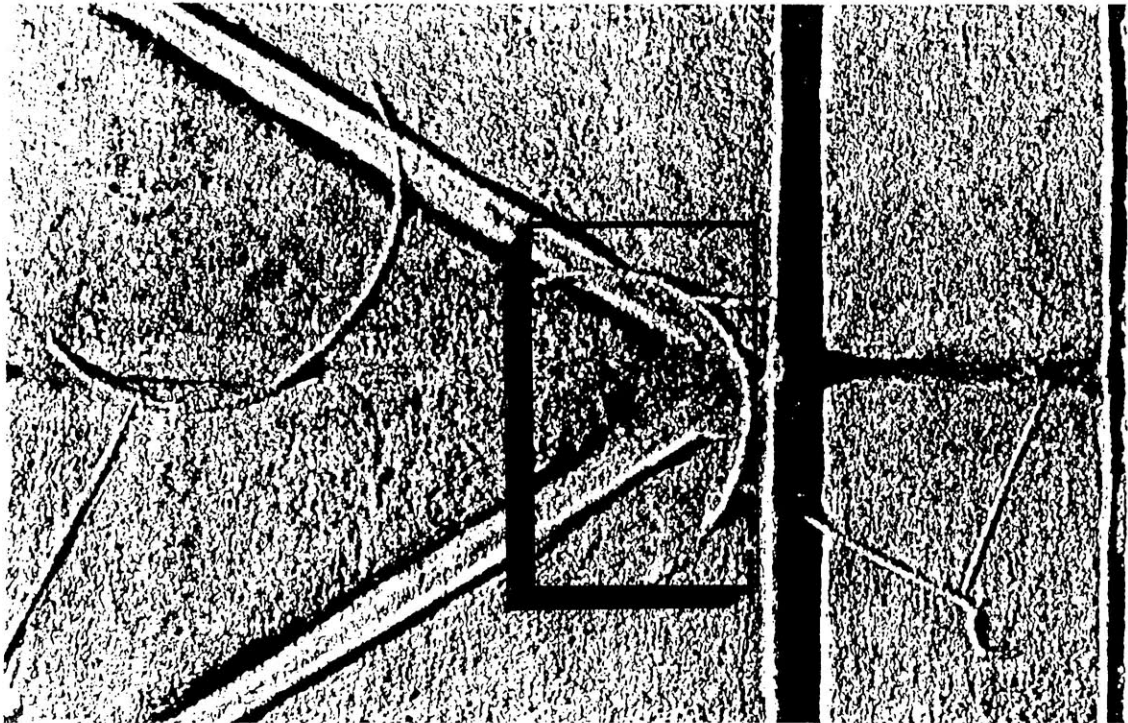
Everglades (Snail) Kite



Section through boat house, bridge and entry pavillion



As our boat begins its westward journey down the canal, we look back to the pavillions that, from the water, seem like enormous fishing birds, perfectly still, with eyes trained on glints of movement below.



a water journey: the waterworks

Site model detail



We may then experience the action of the waterworks directly.

A work of engineering such as a Maillart bridge or a bridge by Christian Menn can outdo some other works of art, because it is not only a gift to the imagination but also a structural matrix of the world. The auxiliary structure at Old River contains too many working components to be classed with such a bridge, but in grandeur and in profile it would not shame a pharaoh.

--John McPhee
on Mississippi River waterworks, in
The Control of Nature

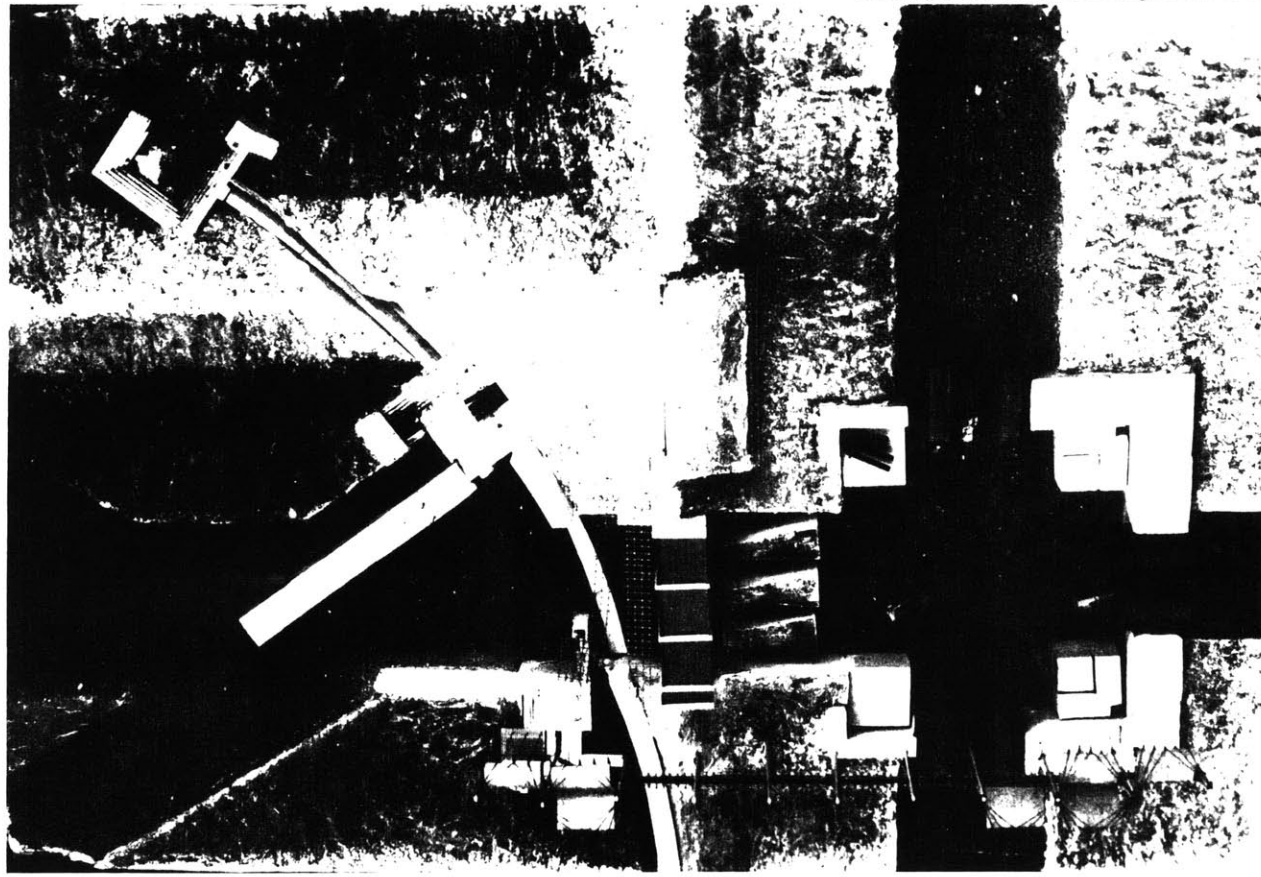


S-9 Pump Station, aerial view

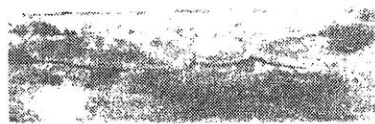
After one quarter mile, the westward journey of water and of boats on the water reaches the C-38 canal; where the canals cross is a critical point, marking the divide between developable land to the east and water conservation area to the west. It is here that excess rainwater is pumped west by the S-9 station.

On this segment of the journey, we experience the action of the waterworks directly, travelling into the crossing of the canals, and then getting sent through the levee at a single point.

Model photo, canal crossing at the S-9

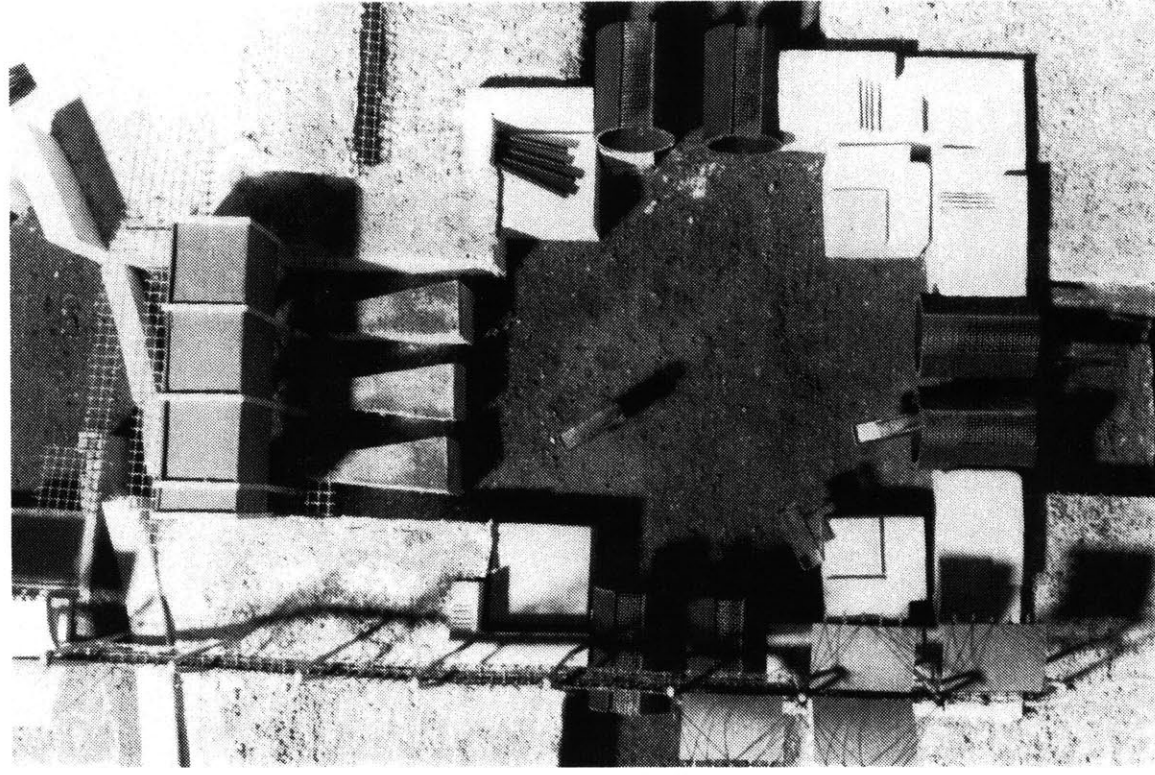


Here we move as the water is moved, travelling into the crossing of the canals and then getting sent west through the levee at a single point.

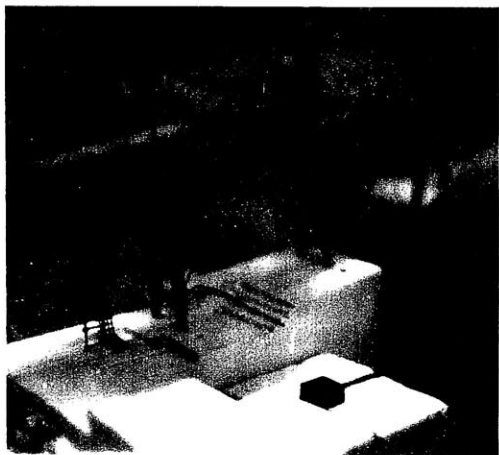
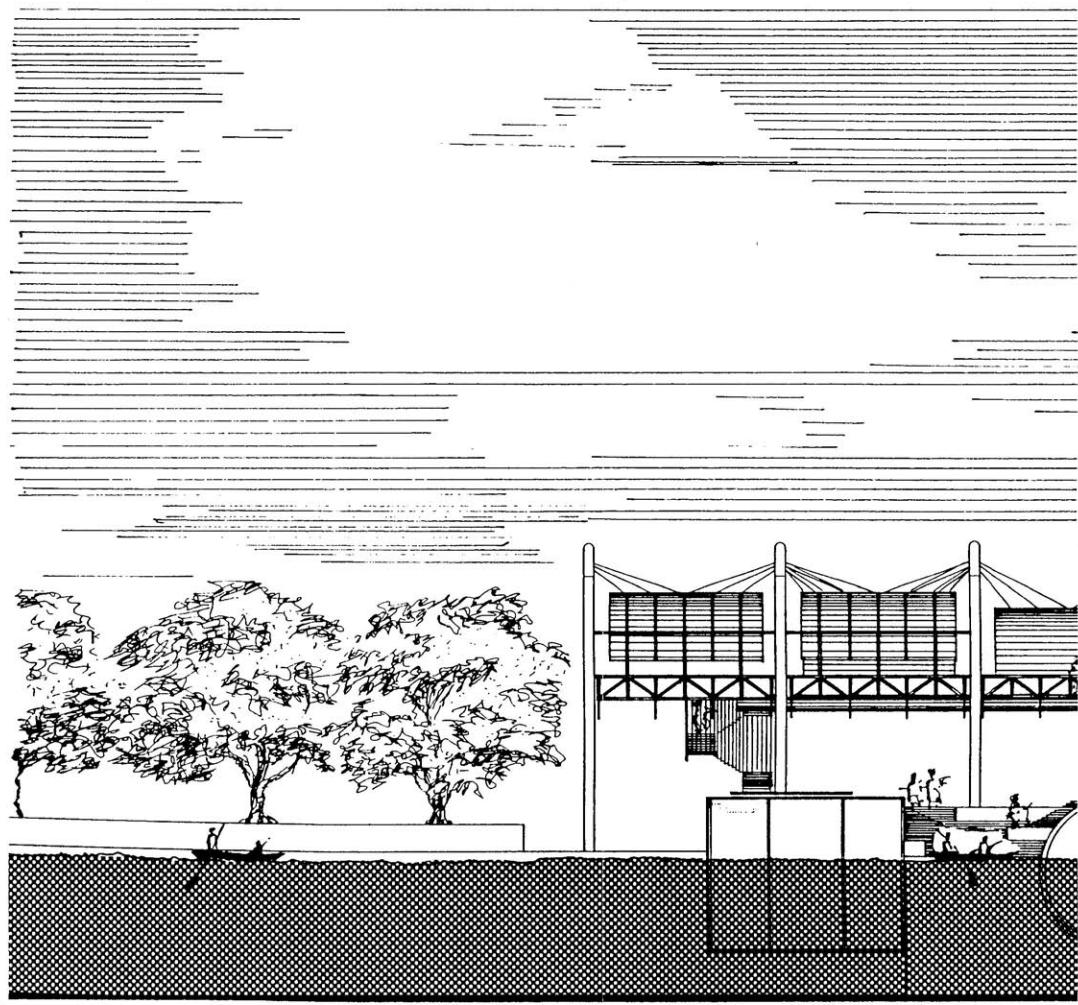


Octagonal water room, Vernag, Kashmir

Model detail, "Water Room" at canal crossing

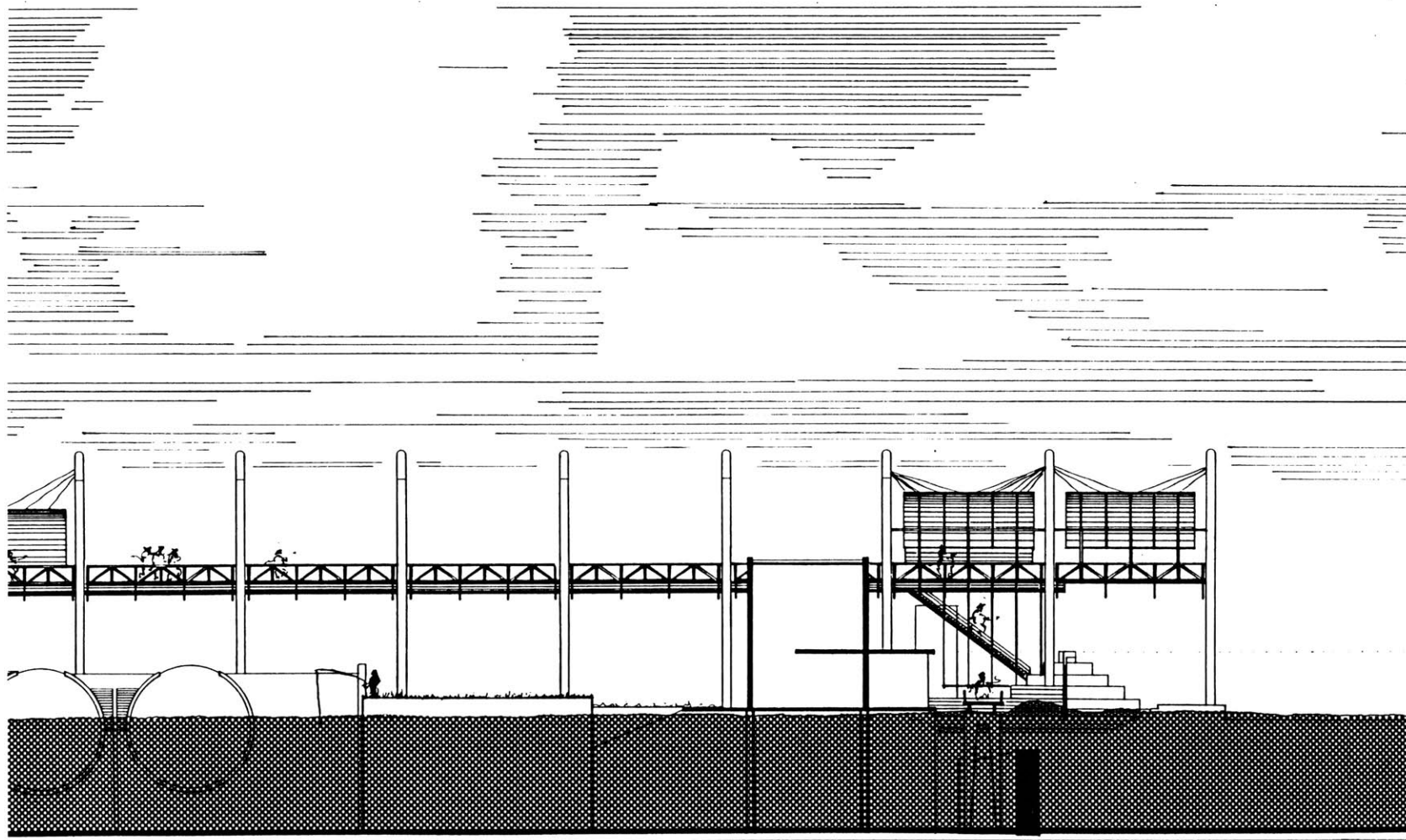


We are, literally, taken up in pipes: enormous culverts channel the boats through. Open at the top, these concrete structures are like the canals that pipe and direct water flow. When we pass through one of them, we find ourselves in a wide water room.

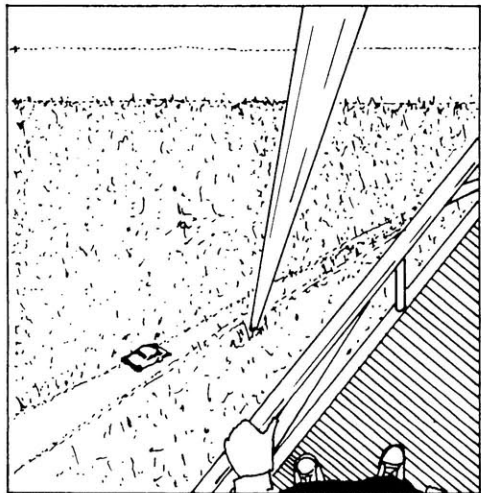


Model detail, boat landing

Elevation of walkway across canal and levee

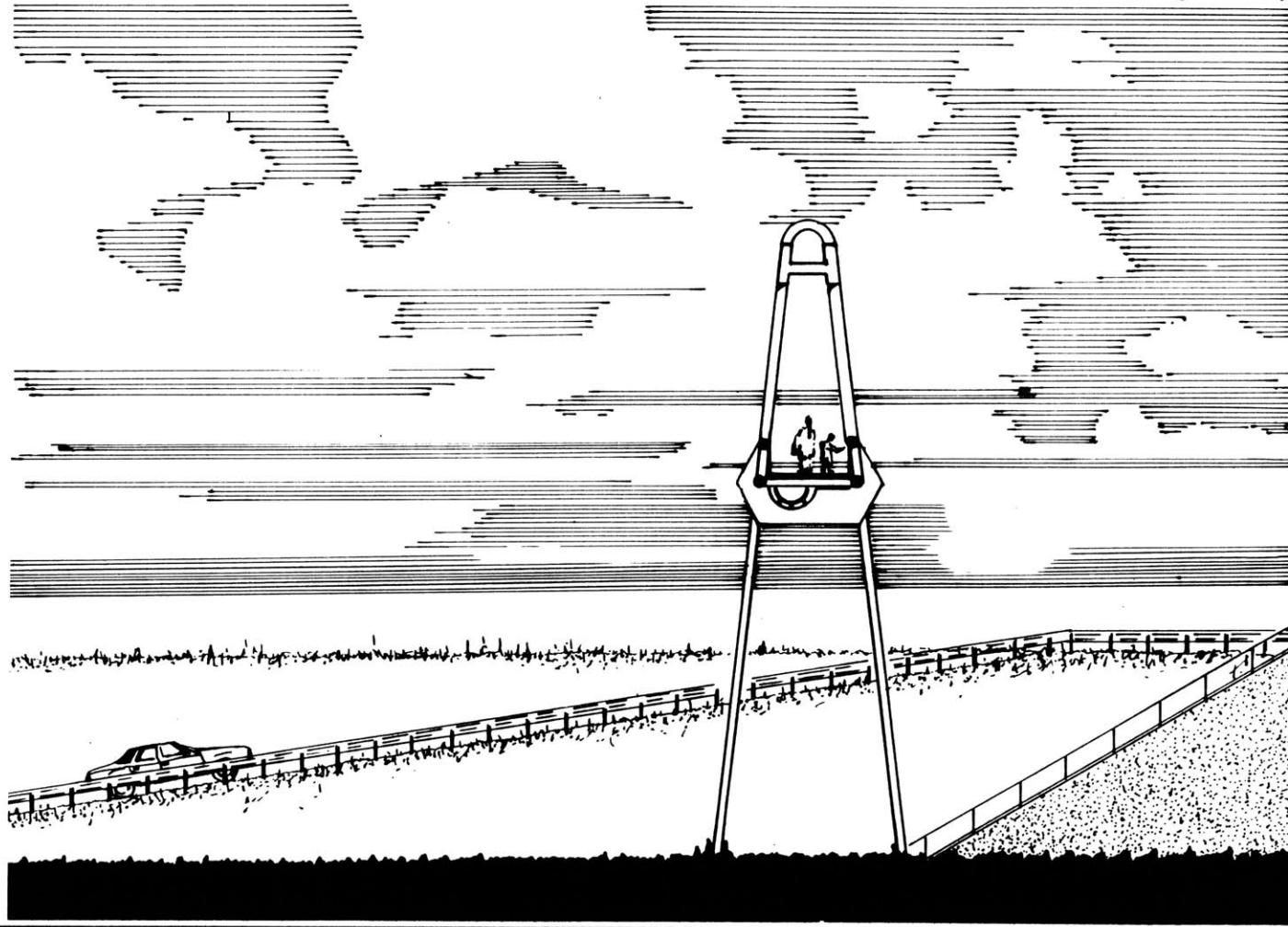


To the left is a boat landing where we disembark and climb up to a walkway that will take us to the other side of the levee. As in the boat house, the walkway along which we travel is also a gutter, a symbolic waterway across the levee below .



View from the walkway, half-way across

Section through walkway

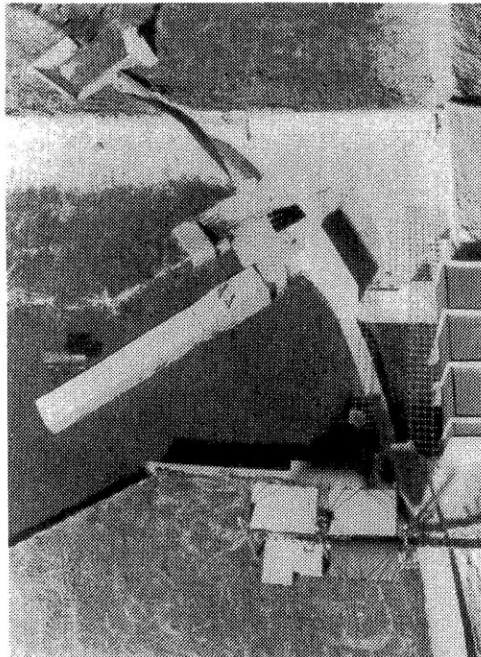


As we move along the walkway, the roofs present at the outset disappear and we become aware of the expanse of the landscape. With the ground 35 feet below, our senses must adjust to another, larger order.

The view on the other side is worth the heady climb across. From 35 feet above ground, we can see the configuration of the outtake canals, the uninterrupted flat expanse of marsh, and the large arcing walkway along which to travel once we step down off the walkway.

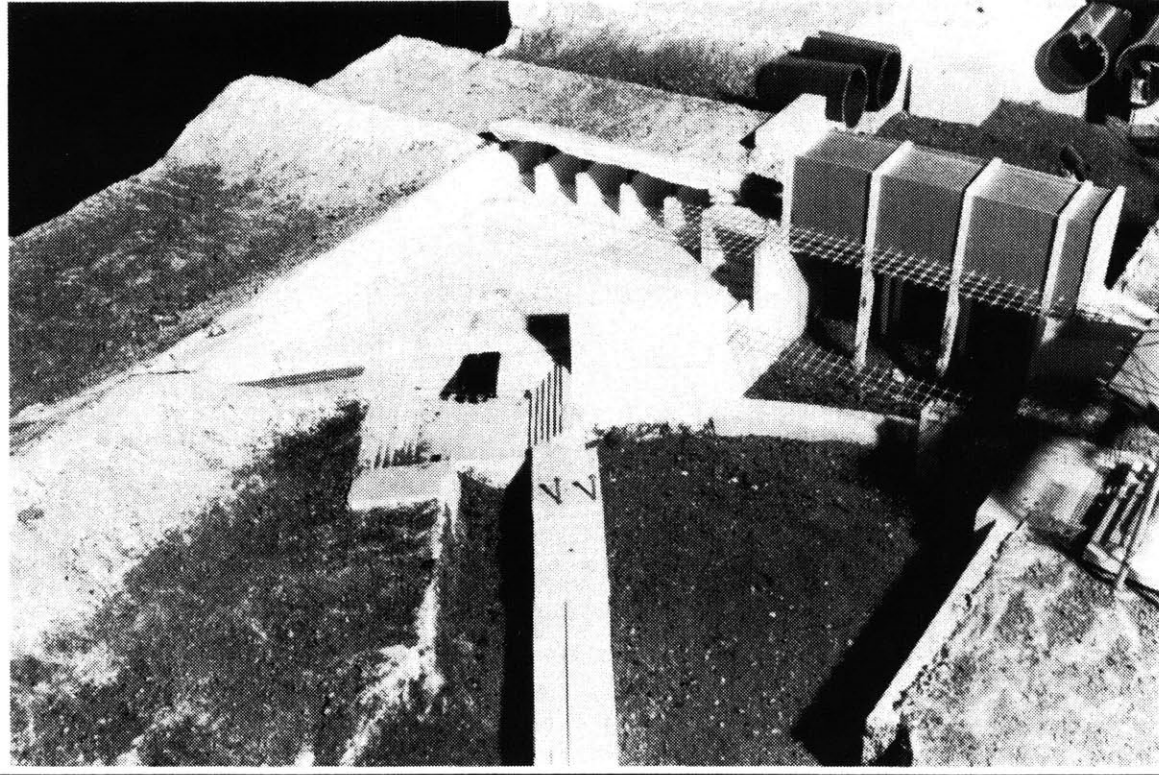
We then move down around a stepped mound, which channels water from the gutter into a well, and across a bridge to the other side of the canal. As we cross, we find we no longer travel directly on the arc (the bridge makes a straight line across) but see its form in the water below where water pumped out of the S-9 passes across a low barrier placed below the surface.

On the other side of the canal, the drama of the waterworks unfolds; a stepped well makes an amphitheater for pipes of auxiliary pumps to discharge their water. We move across and around these pipes to the levee which has been carved out and cut away. In times of high water, we might have to wade across shallow pools between the walkway and the levees, as the water can move quite freely across the ground here.

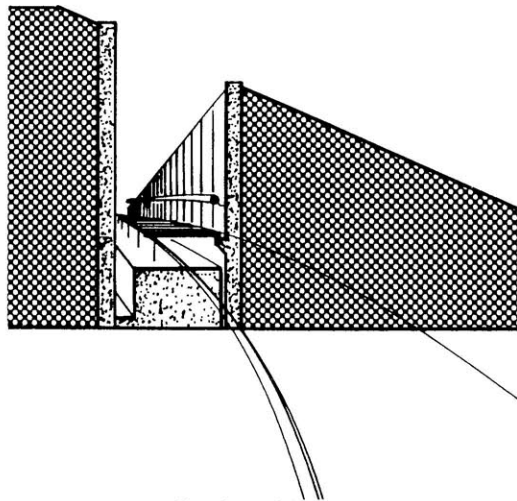


Model detail: view of arc below

Model detail: pump station



On the other side, the drama of the waterworks unfolds.

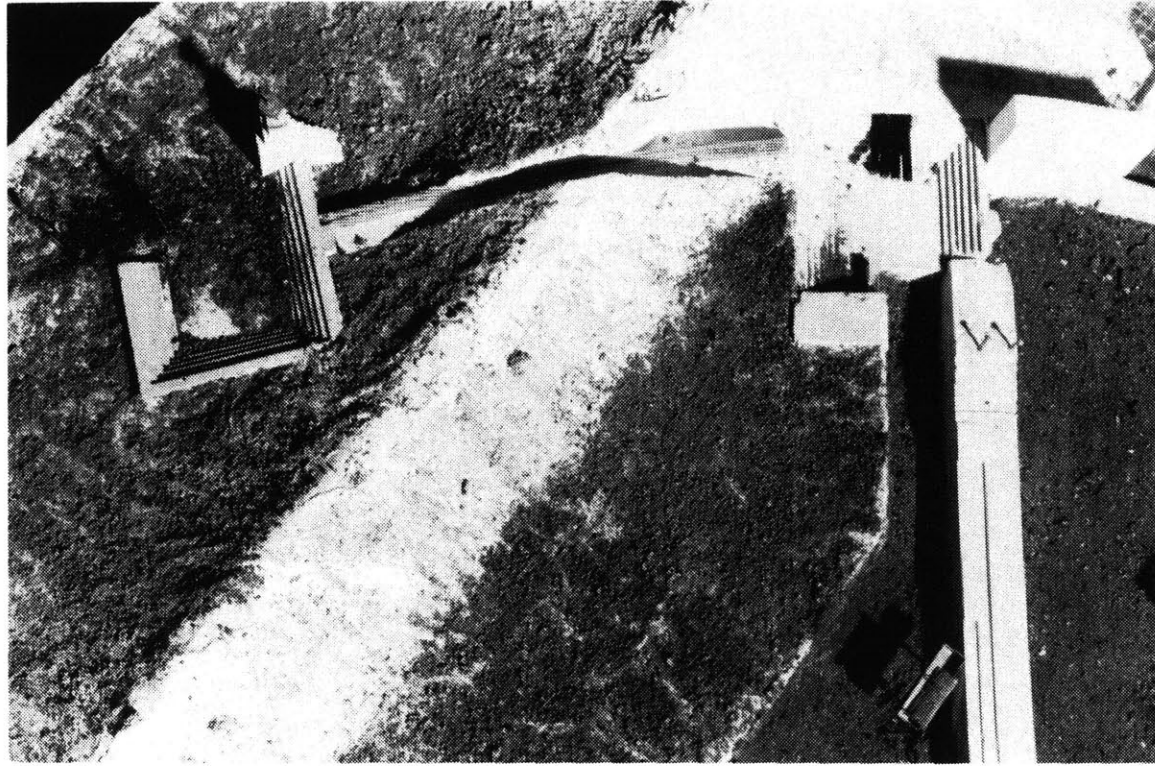


Section of the cut through levee

We then follow along the arc out past the waterworks and into the marsh.

To pass through this divide between the waterworks and the marsh, the levee has been cut. Moving along the narrow passage through it, we feel we are sneaking through a chink in the armor; the tightness of the opening intensifies our understanding of its height and section.

Model, levee cut

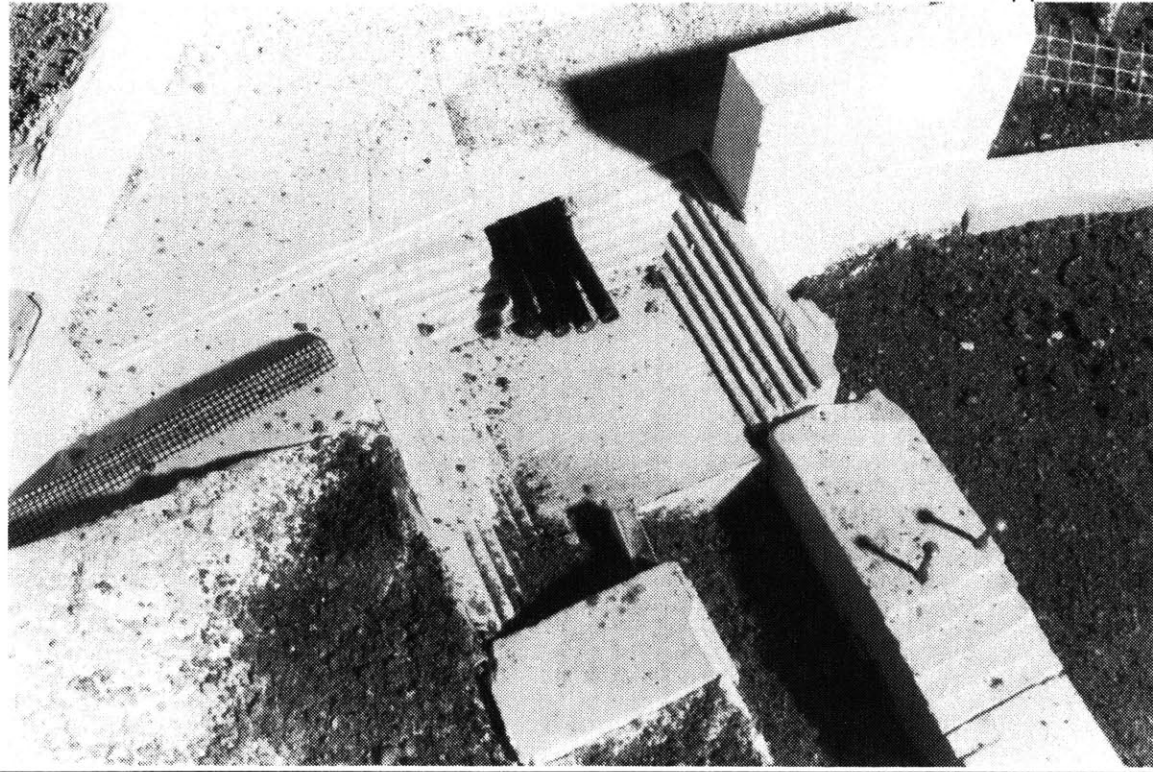


We are sneaking through a chink in the armor.

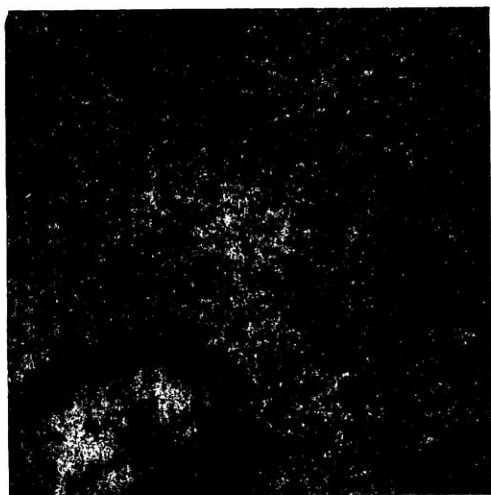


Site photo: auxilliary pumps at work

Model, outtake pipes and well

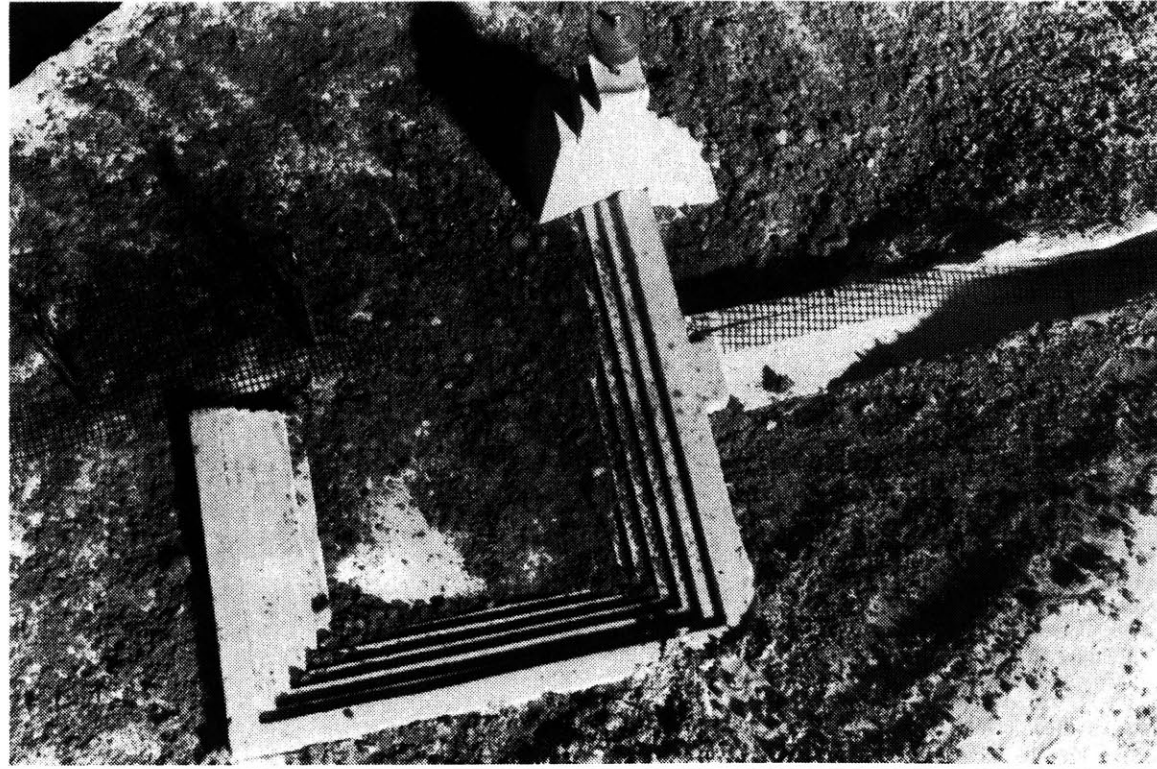


This first vessel works like an amphitheater from which we can watch the pulse of water discharged by the auxilliary pumps.



Aerial photo: pool of water in sawgrass

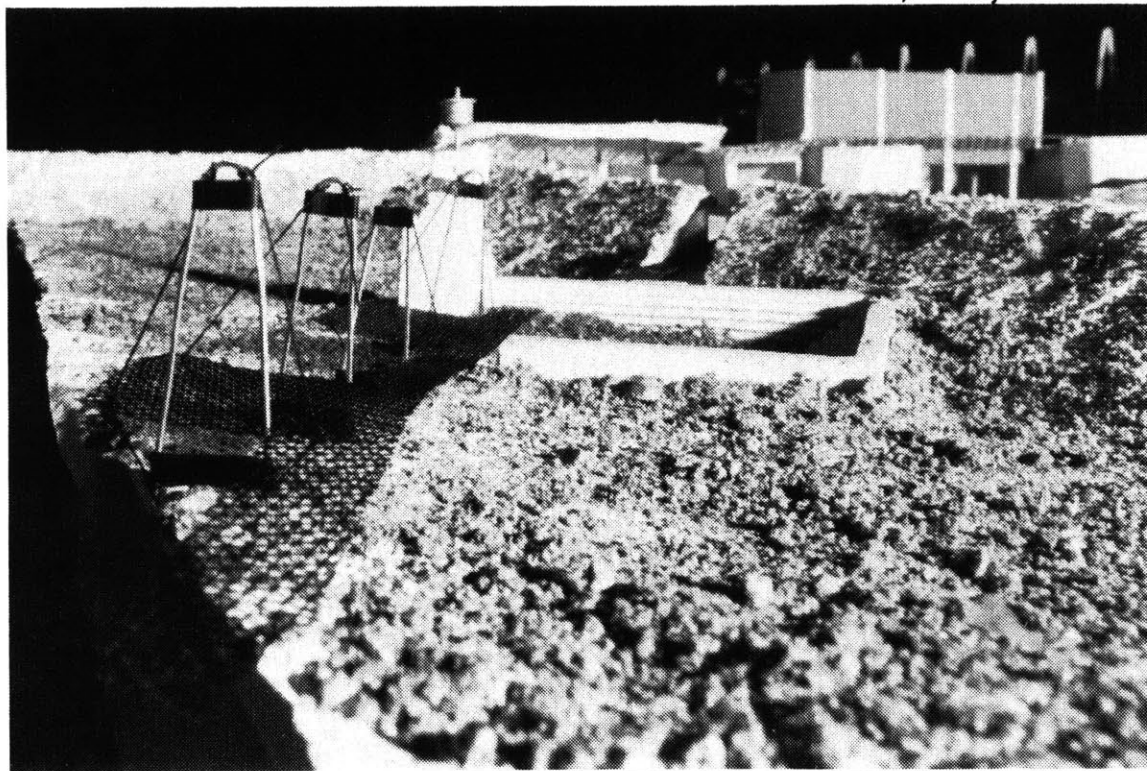
Model, the marsh well



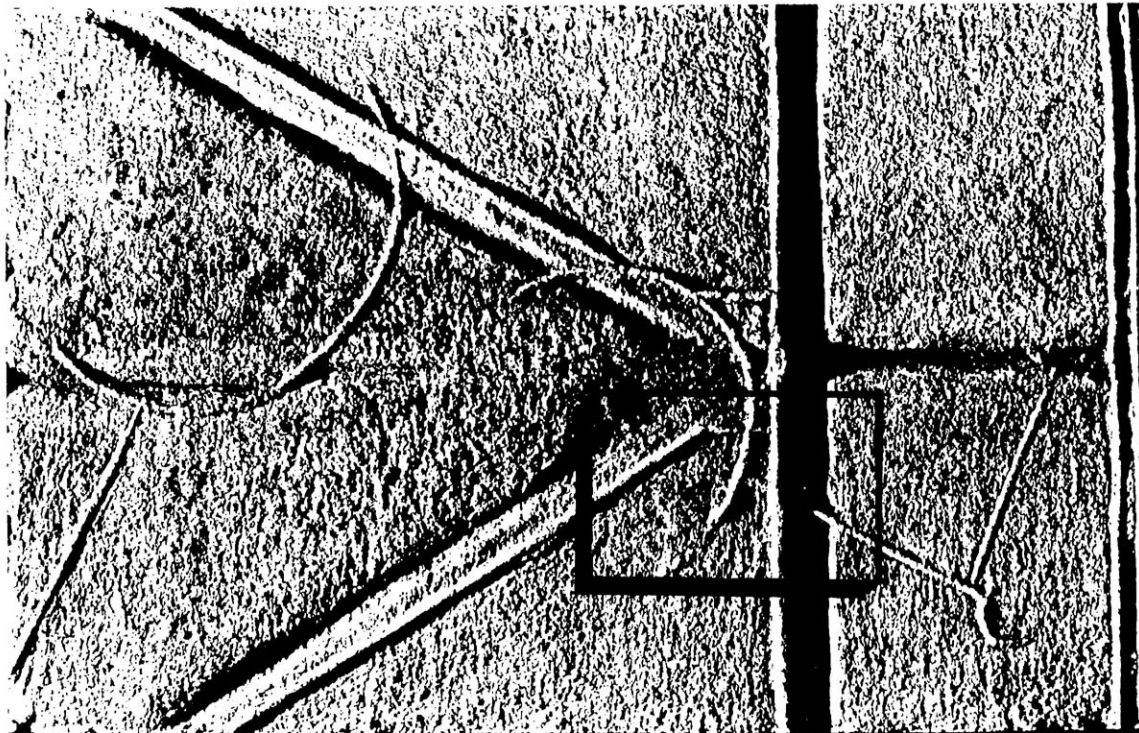
Its sister well in the marsh is also an amphitheater, but to a more subtle drama, allowing the marsh to move into it as water levels vary. In times of low water, it would be a kind of gator hole that traps what water is left, attracting birds to fish here. In times of high water, it could be impassable.



Model, walkway into the marsh



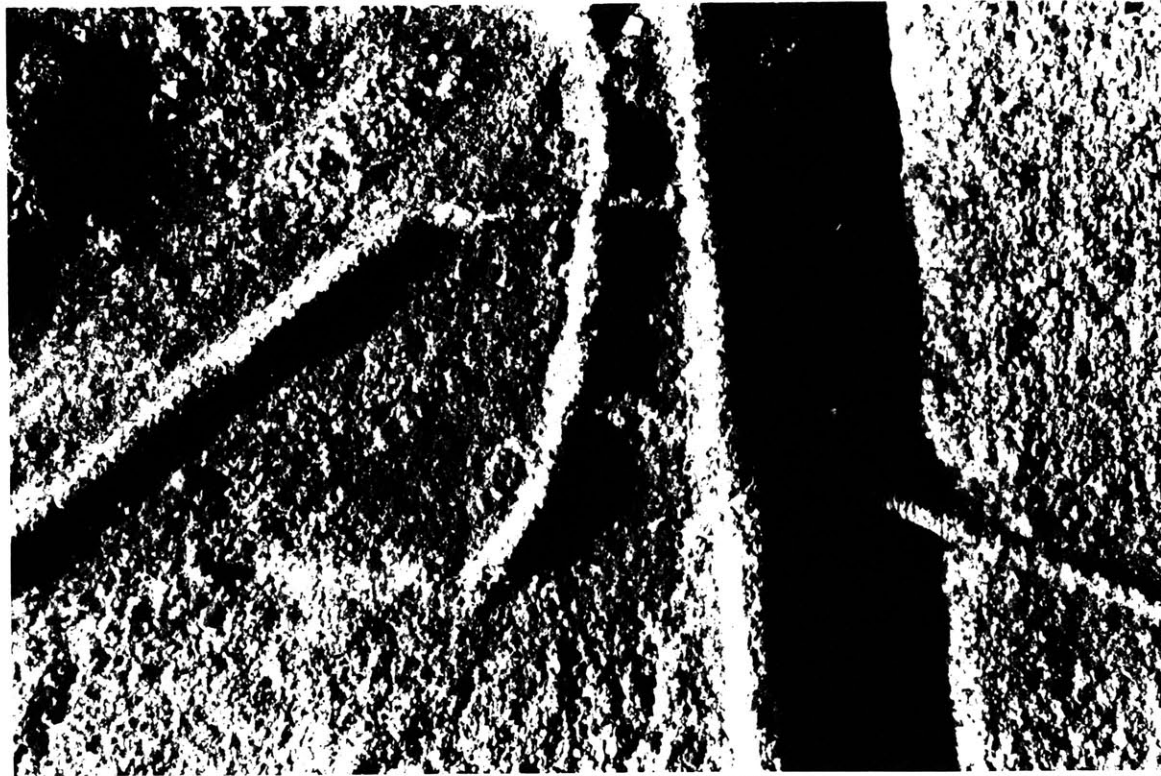
We can continue out into the marsh along a lightly-stepping structure to get to look-out platforms. We likely share these spots with fishing birds who come to dry their wings.



a water journey: the marsh



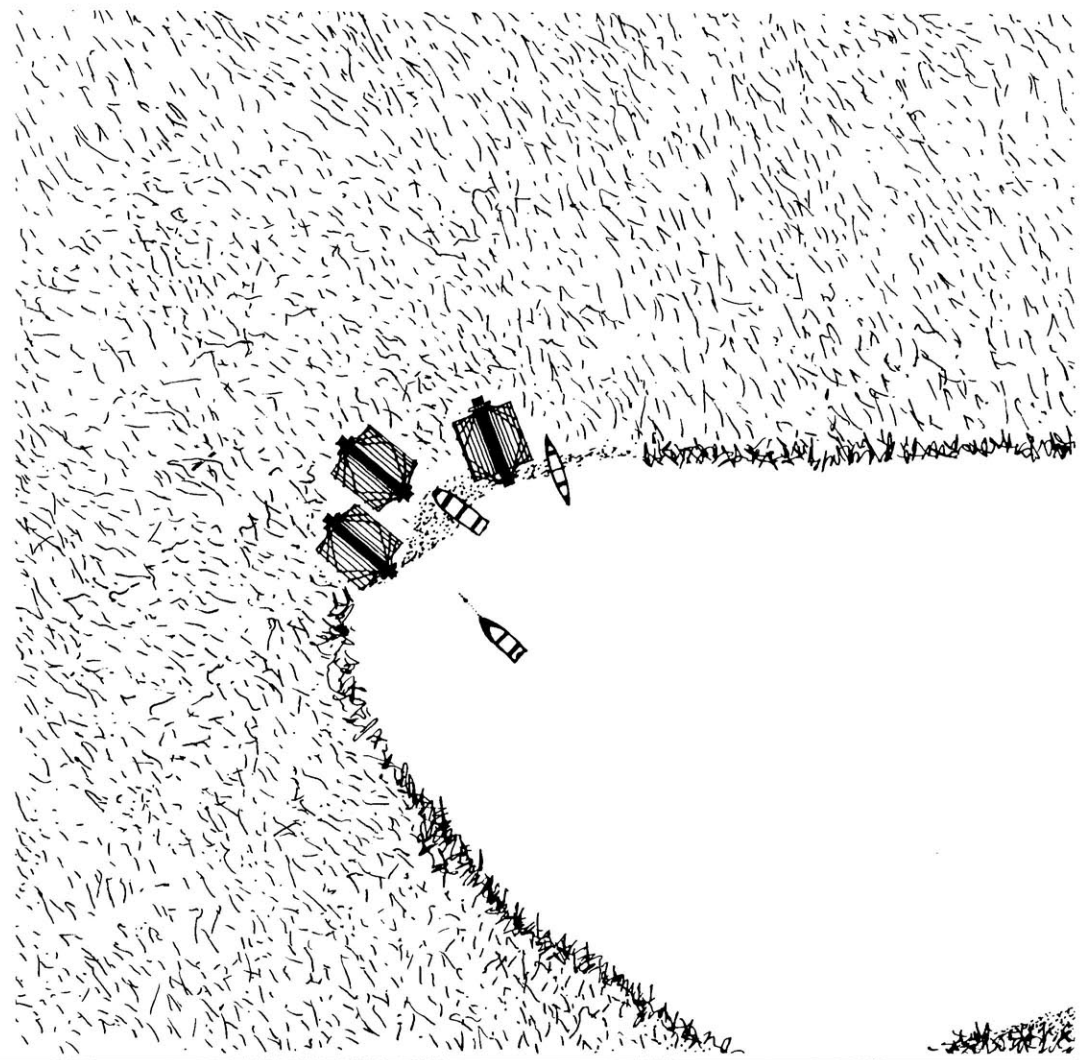
Site model detail



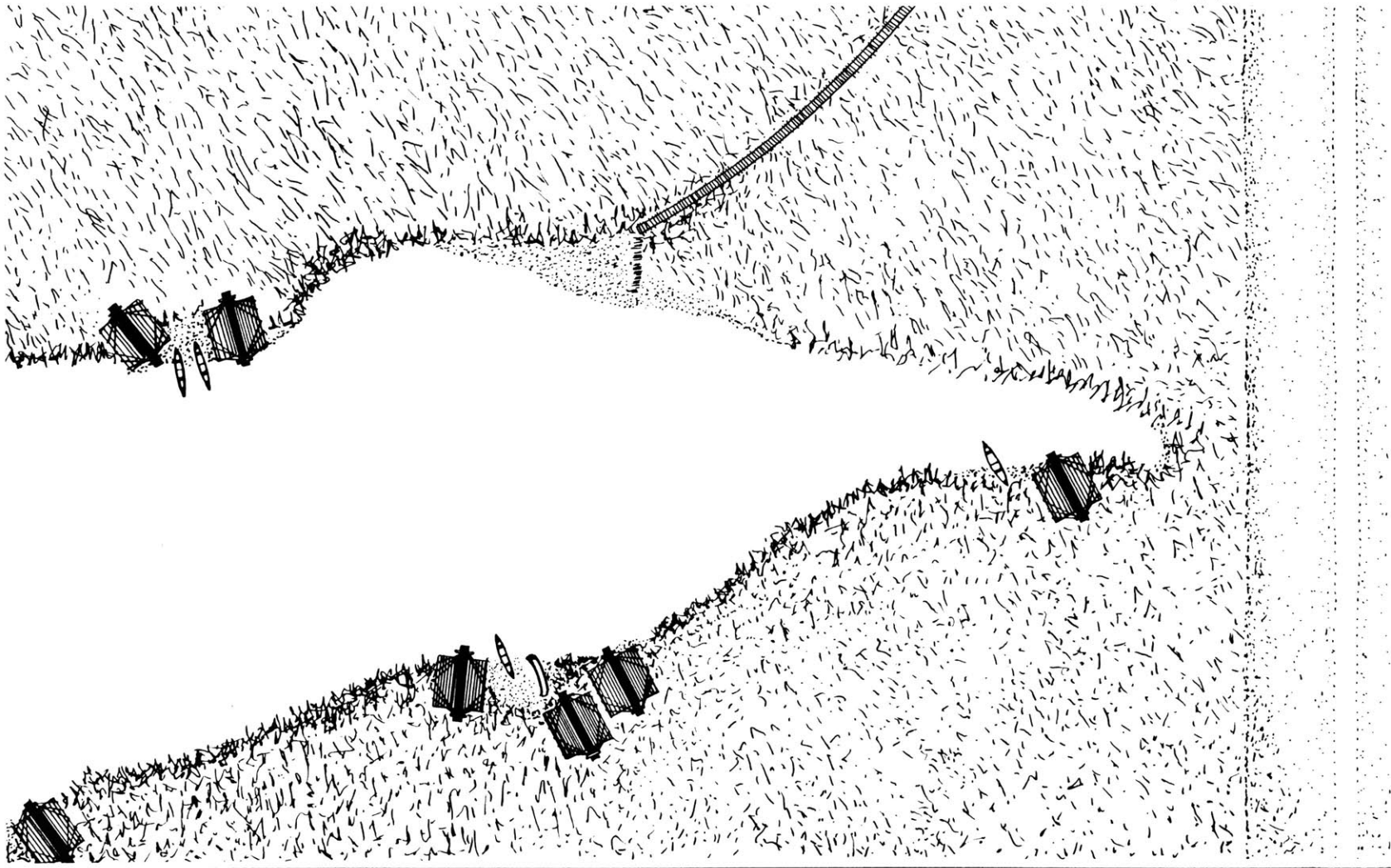
Following the same large arc in the southward direction, we cross back through into the marsh on the south side of the C-11.

*It is the expansion of transport
without a corresponding growth of
perception that threatens us with
qualitative bankruptcy of the recreational
process. Recreational development is a
job not of building roads into lovely
country, but of building receptivity into
the still unlovely human mind.*

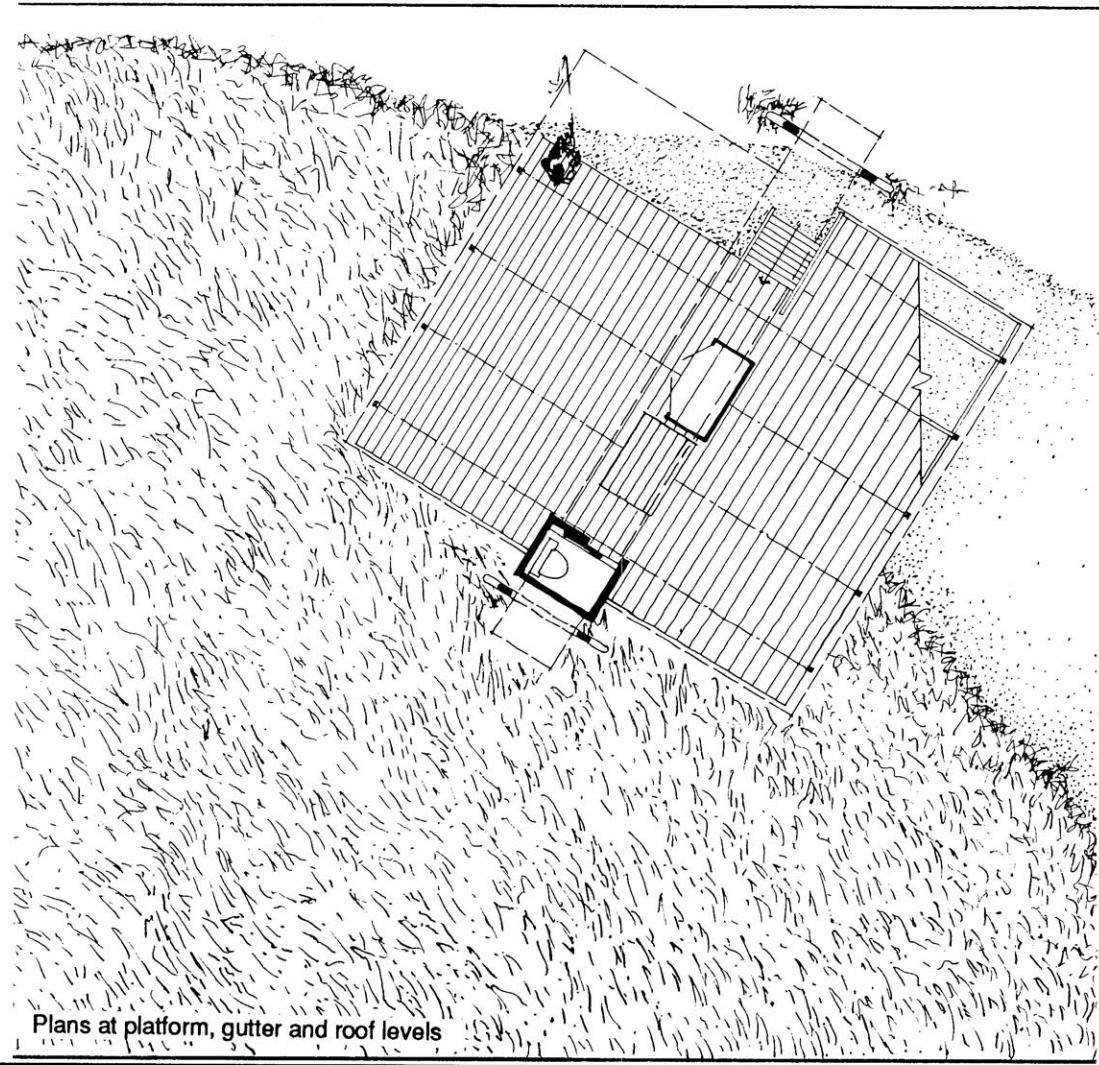
--Aldo Leopold,
"Sketches Here and There"
The Sand County Almanac



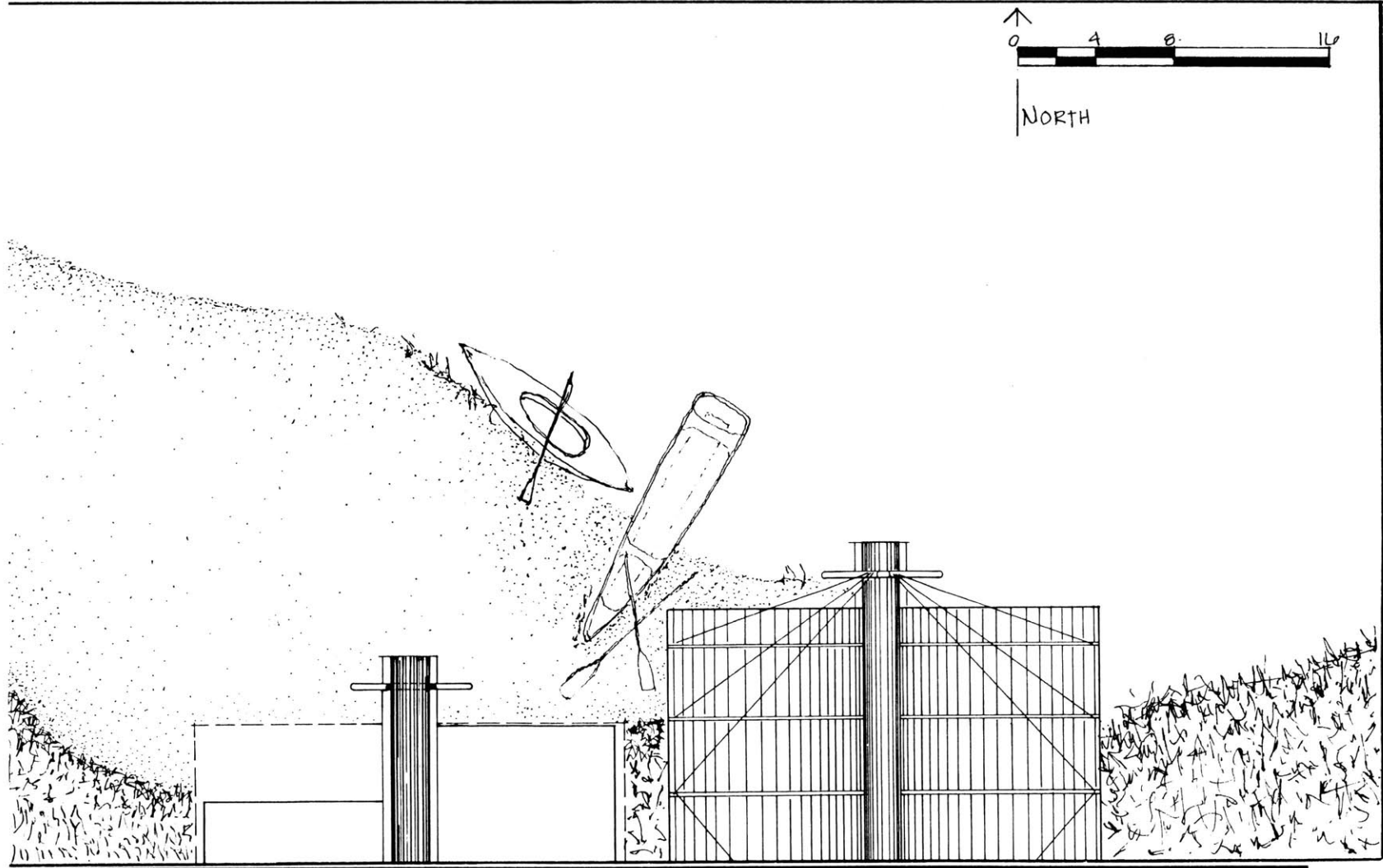
Site plan: camping platforms at the lake



The arc ends here at a small shallow lake, the "borrow pit" from which earth had been taken to build up an old campground on this site. To travel further into the marsh would be done on the marsh's terms, which might mean not at all.



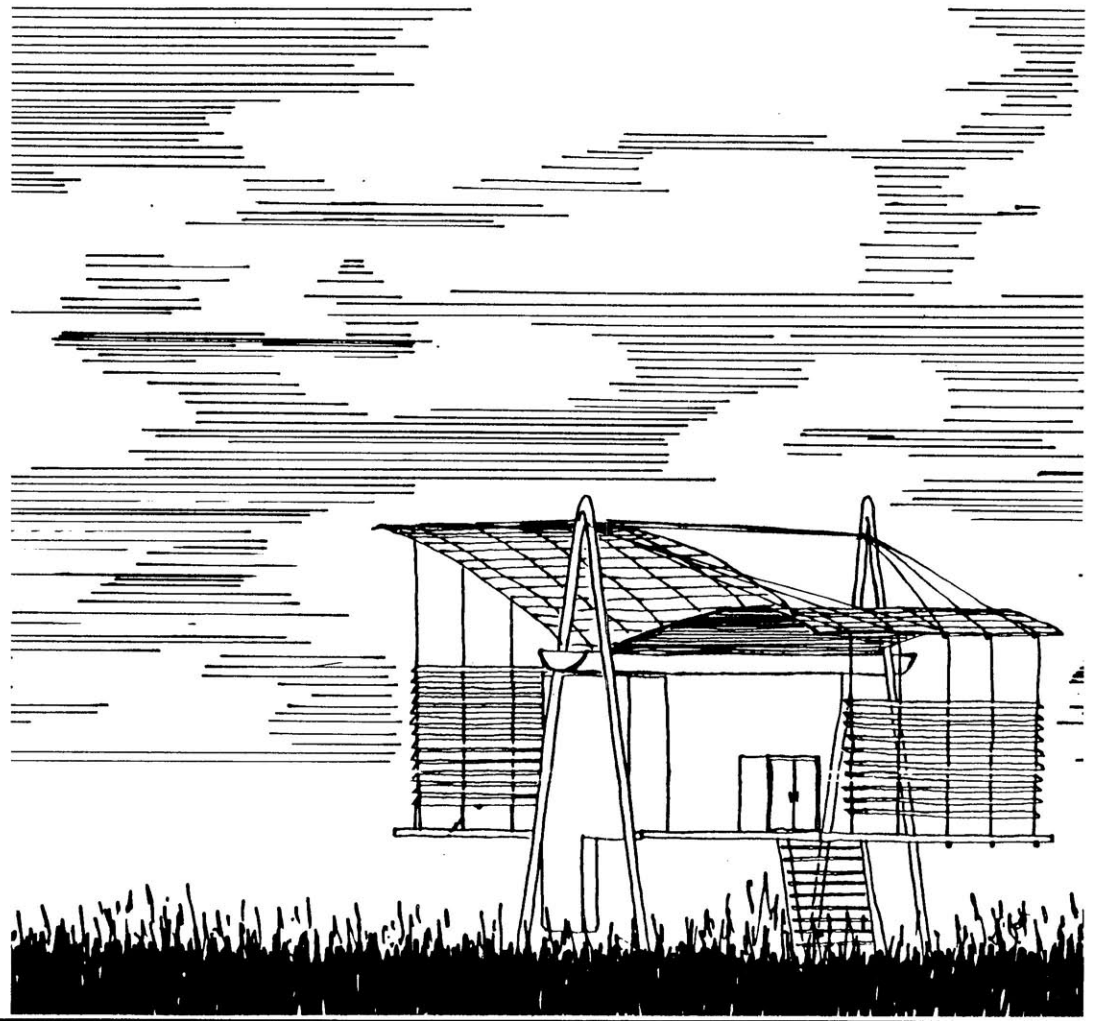
Plans at platform, gutter and roof levels



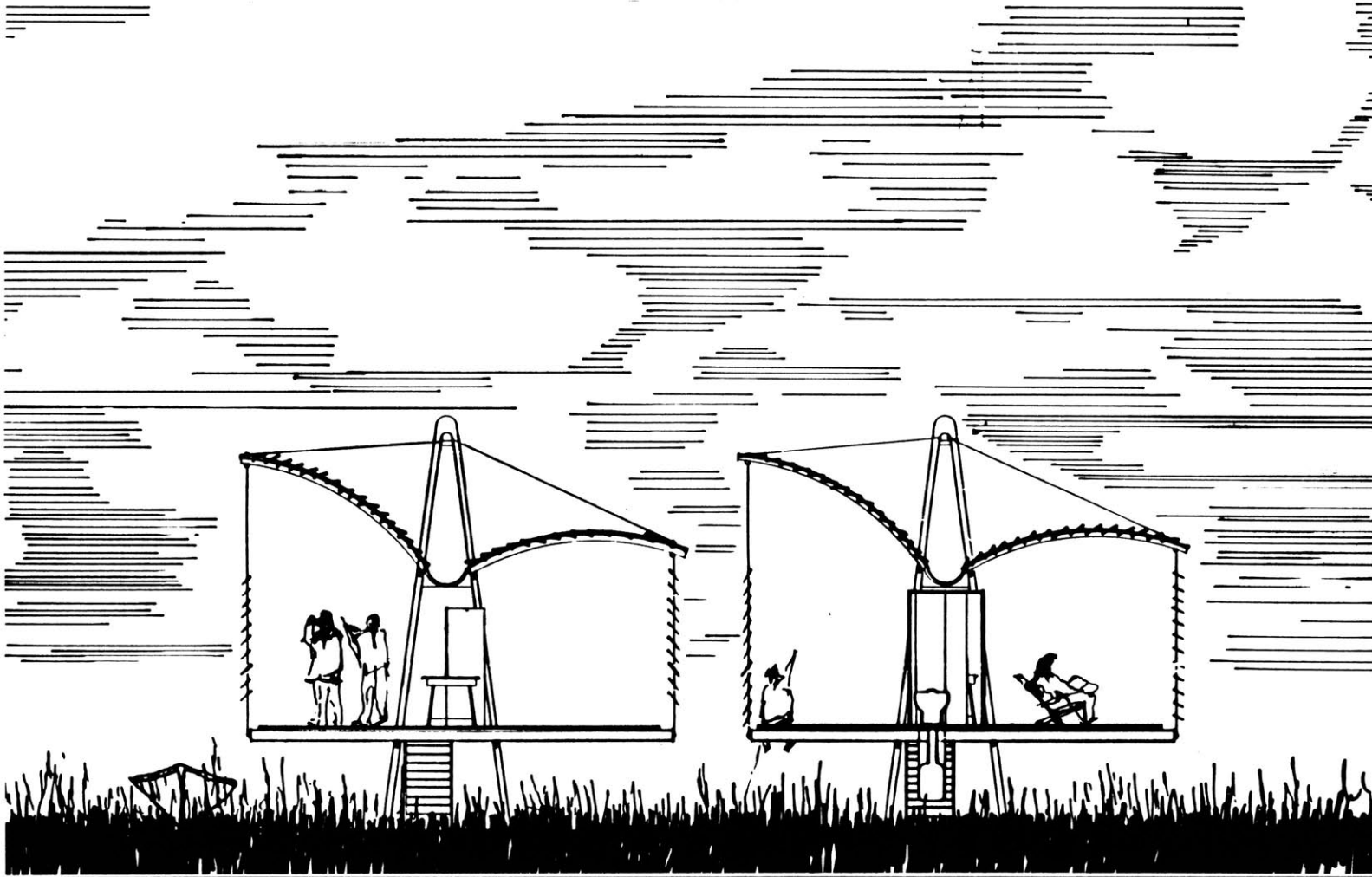
The platforms are reached by canoes that would be left on the lake for shuttling people back and forth from the walkway. Like the other structures seen so far, these would provide a platform over the grass, a gutter that sends the rain into the lake, and a roof.



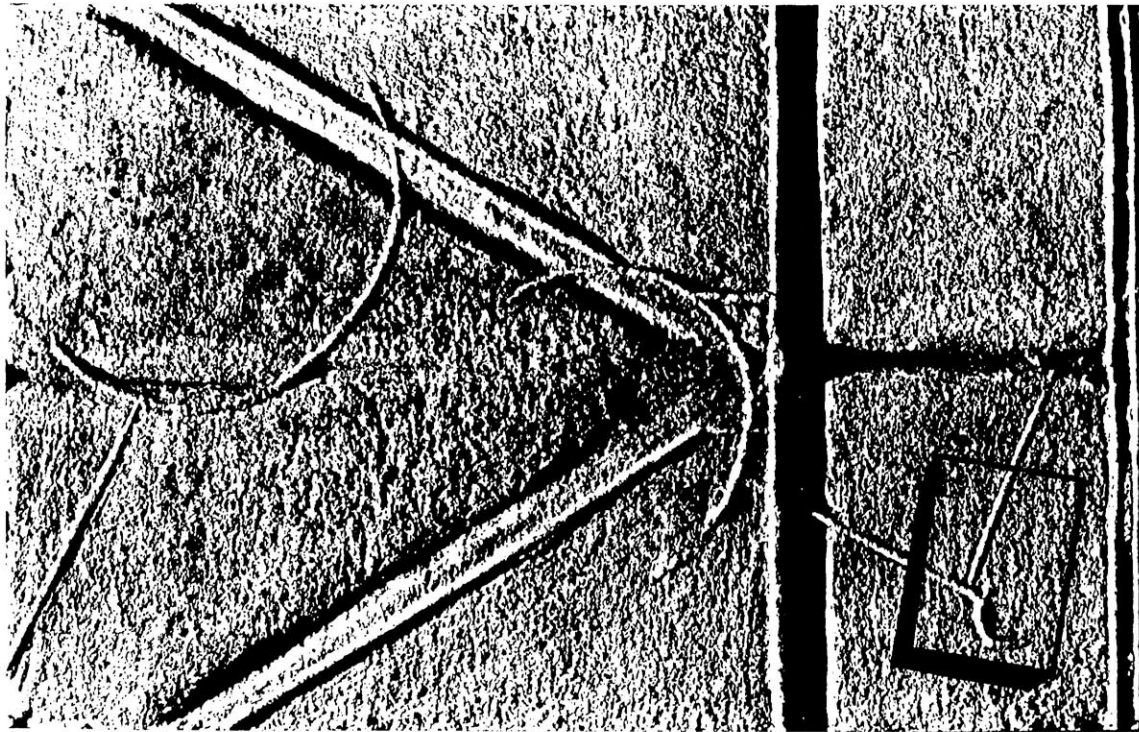
Wood Storks



Section through camping platforms

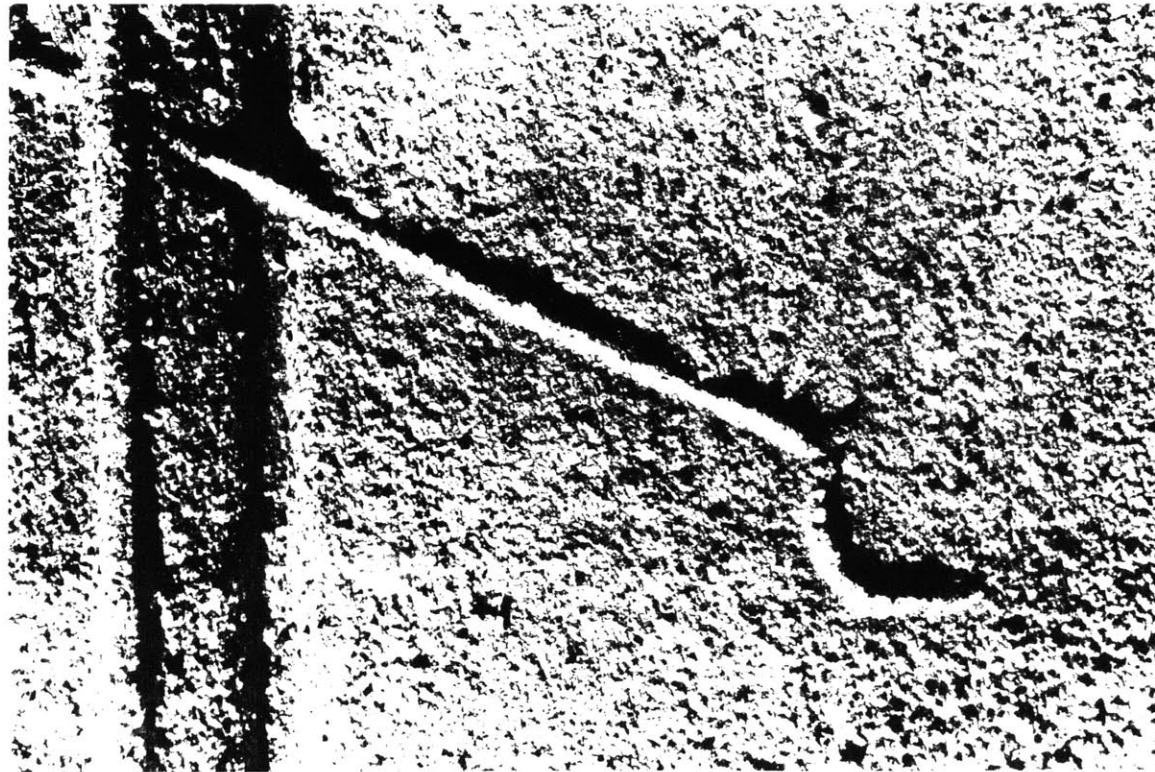


Only a minimum of closure in the form of louvers supported by the cables would be necessary, along with a lockable storage cabinet and w/c.



return

Site model detail

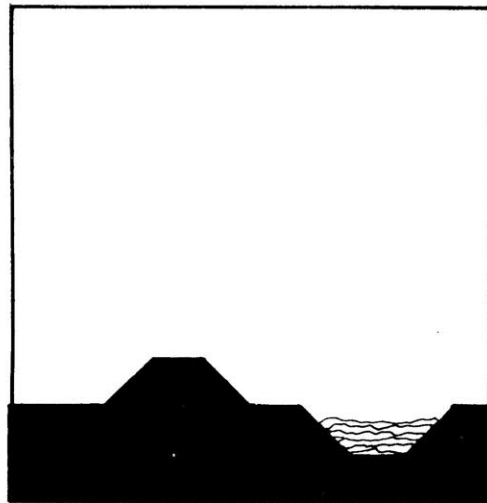
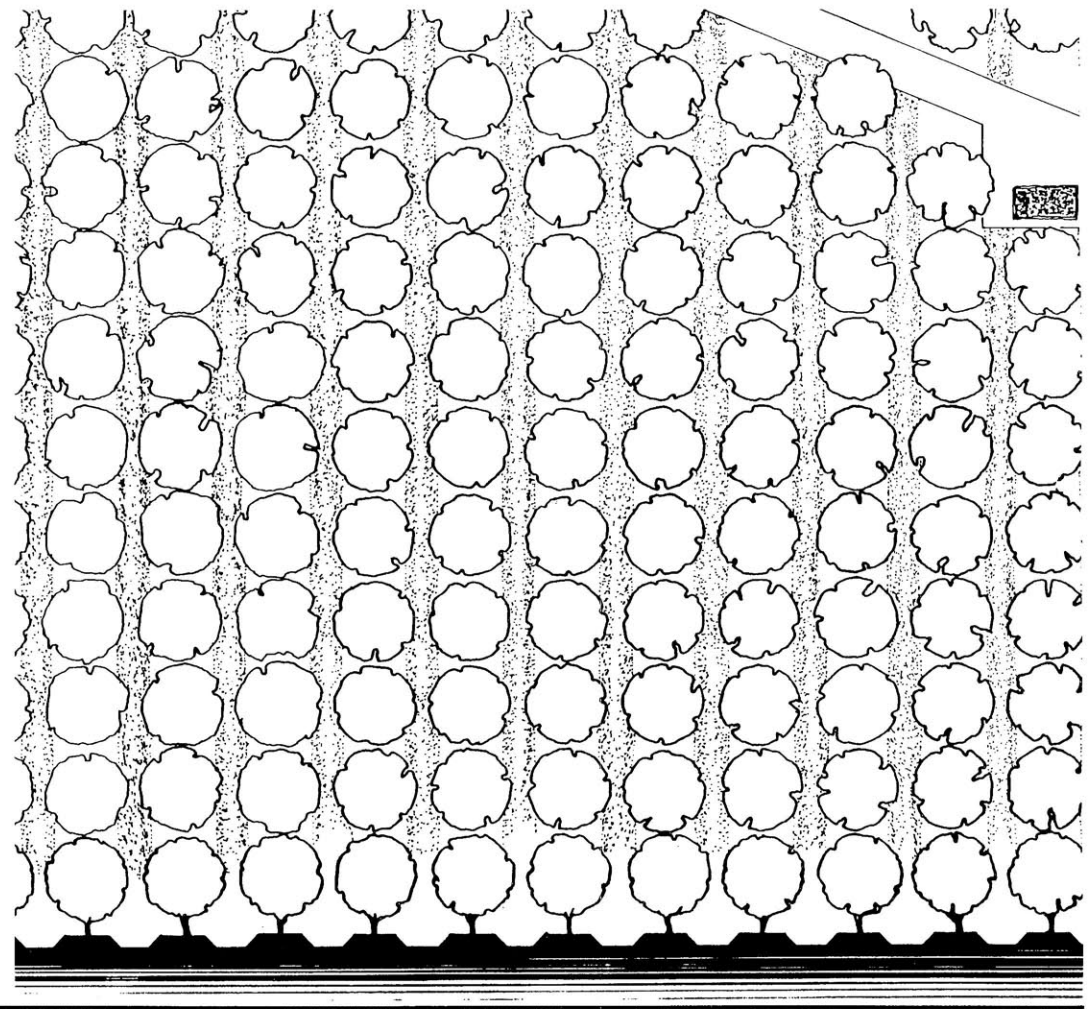


We have travelled a good distance through increasingly strange and wonderful landscapes. The journey has been exhilarating, frightening, engaging, meditative.

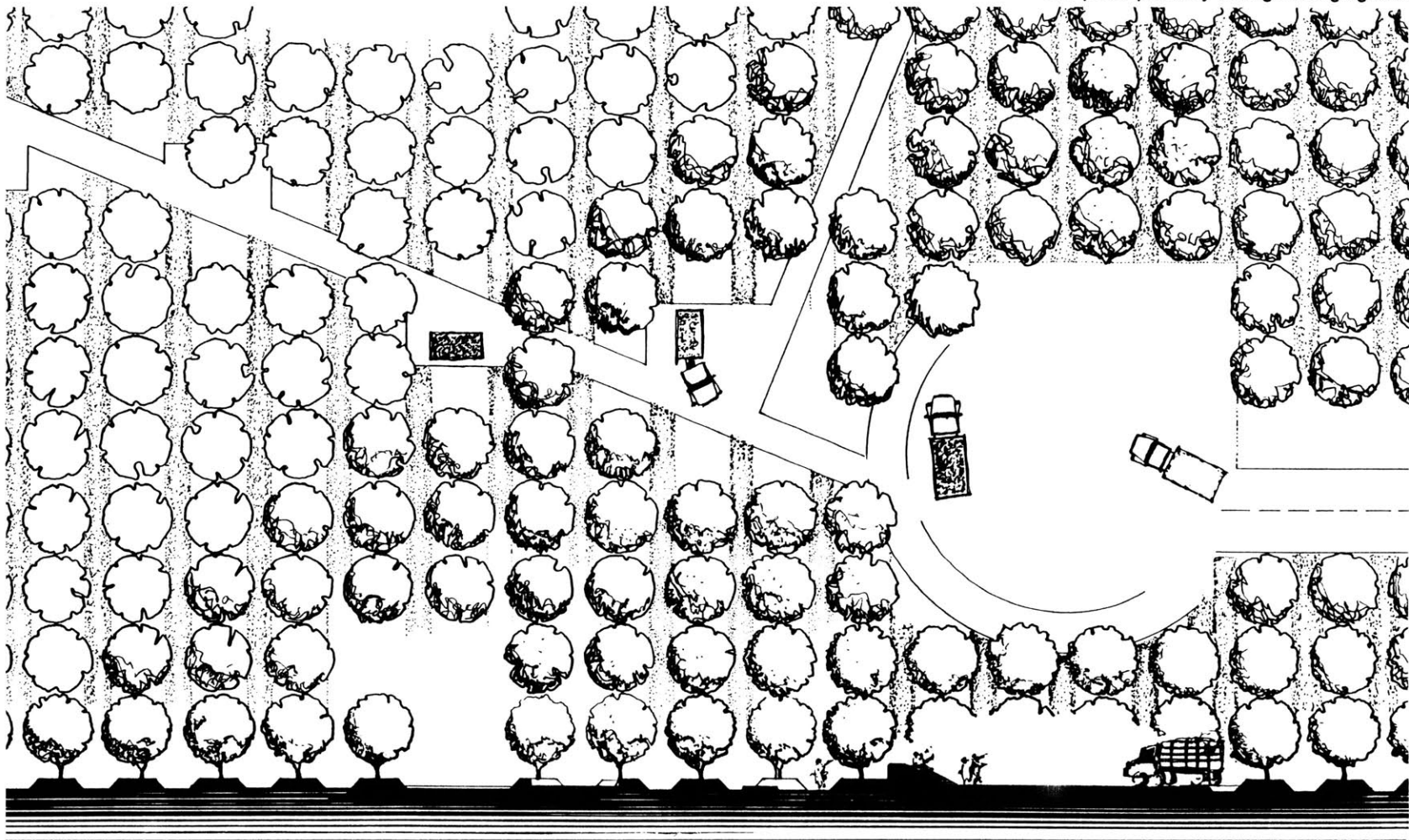
Too much is different now. We do not return the way we came.

The ground had been engineered and sculpted so that rainwater would run into furrows in the middles, then through swales and ditches into a perimeter canal, running all the way around the grove, inside the dike.

--John McPhee
on Florida's Indian River orange groves,
in Oranges



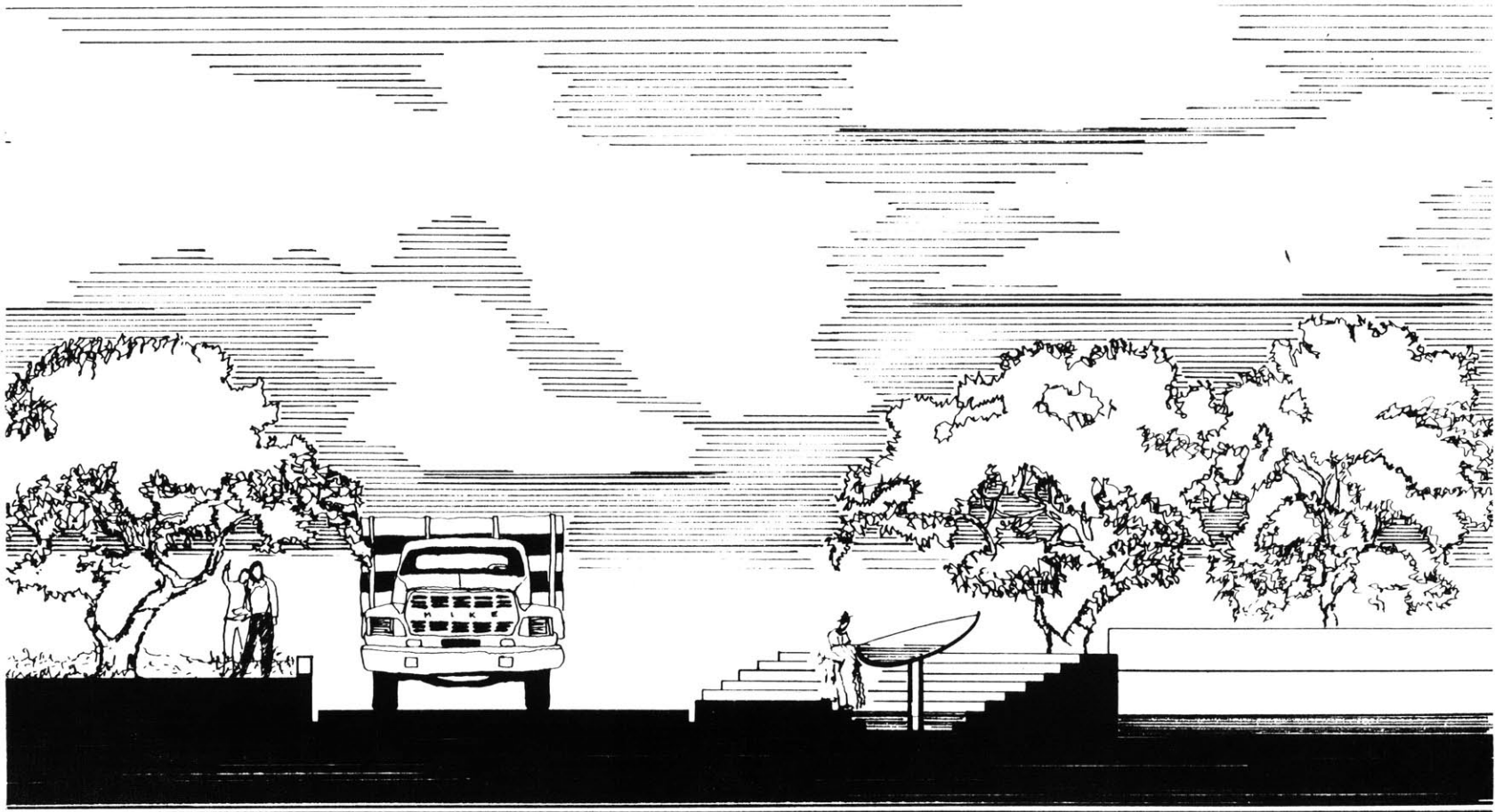
Site plan: pathway through orange grove



The last leg of the journey is an oblique pathway cut through the grid of an orange grove, requiring us to cross irrigation channels between rows. This is a working landscape; it has been transformed, organized to produce food. Our path is the same one used by pickers and trucks hauling crates.

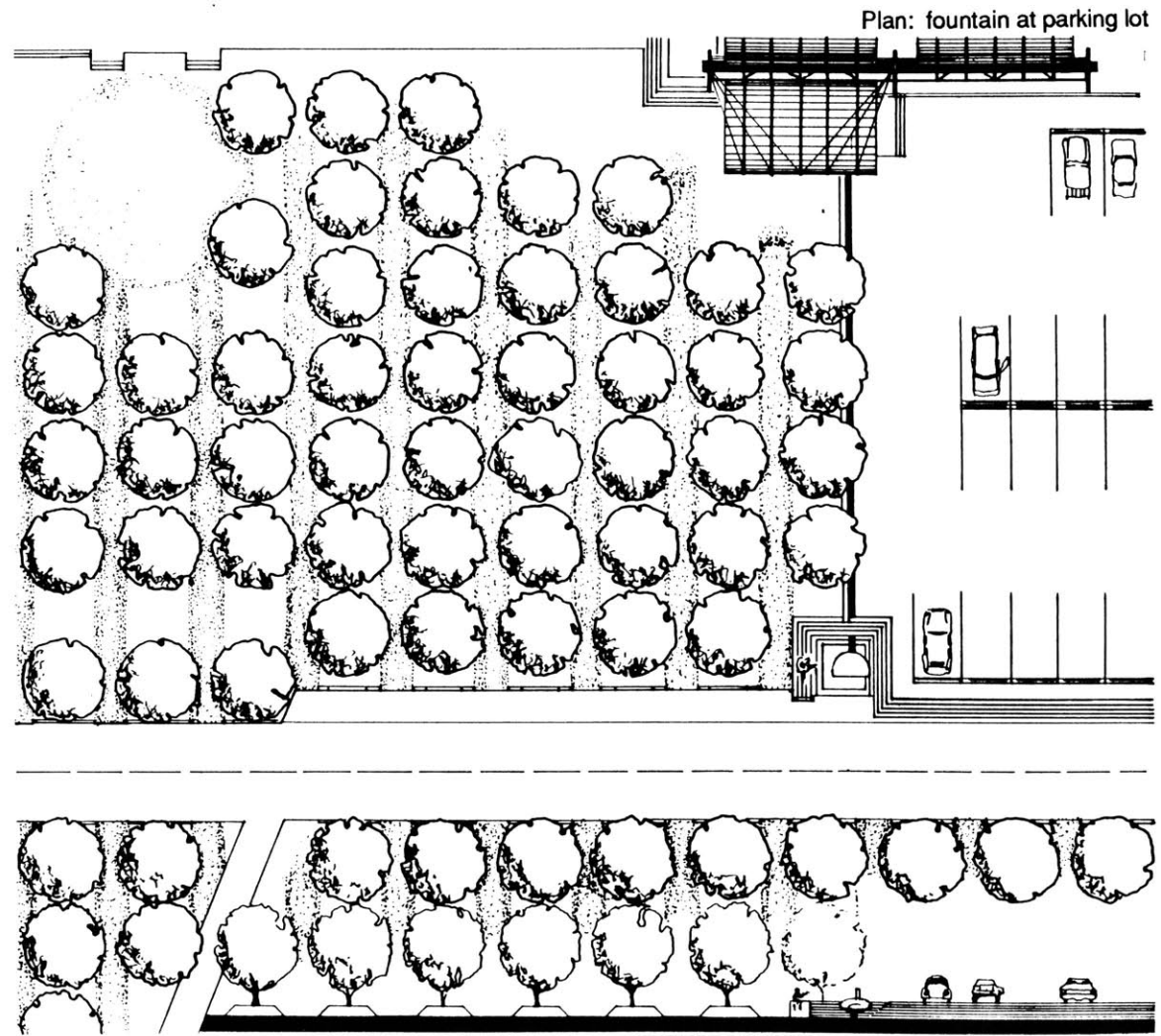


Section through orange grove, road

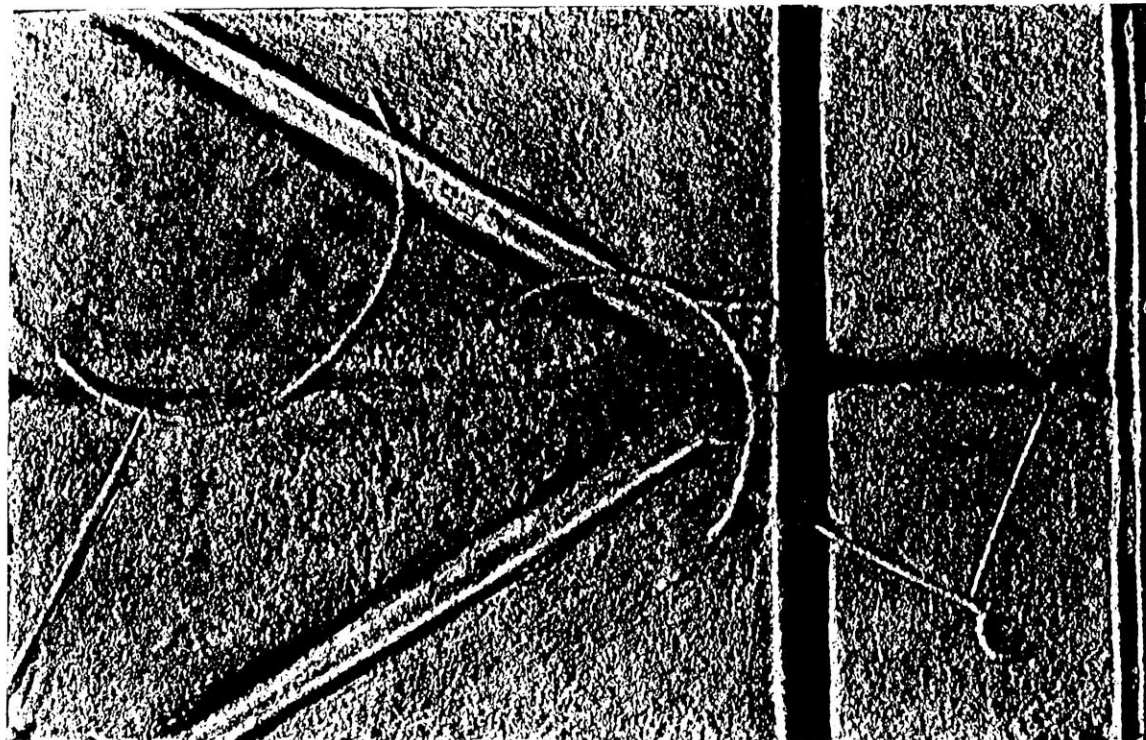


This path leads to the road we drove in on; when we reach it we see how the grove is planted: trees are grown on mounded rows with low channels that run parallel between them. They are the order of the canal and levee, only at a smaller scale.





Just before we reach the parking lot, we find a fountain, water for our pleasure, inside a stepped well. Perhaps we will remember, as we pause here, the water we watched on another such well.



This exploration / journey has sought to make explicit the water's behavior in the altered Everglades landscape. The more essential intention, however, has had to do with location, with locating the place and locating myself within the immeasurably complex processes which give that place shape.

I have considered the design of a journey through a landscape that would exclude humans in every respect. It is silent, indifferent, saying little, hostile even. Its strangeness, its otherness is not mitigated but heightened by having travelled through it. It seems bigger rather than smaller. My mind turns to Wendell Berry, who describes this so eloquently:

*But if it has become familiar, if we have begun to feel at home in it, that is not because it has become comfortable or predictable or in any way prejudiced in our favor. (It is prejudiced in favor of **life**, leaving it up to us to qualify if we can.) It has not even become less fearful. But the nature of our fear has changed. We no longer fear it as we fear an enemy or as we fear malevolence. . . . it has begun to be the fear that accompanies awe, that comes with the understanding of our smallness in the presence of wonder. . . . And it is a fear that is accompanied by love.*

--Wendell Berry
"The Unforeseen Wilderness:
An Essay on Kentucky's Red River Gorge":

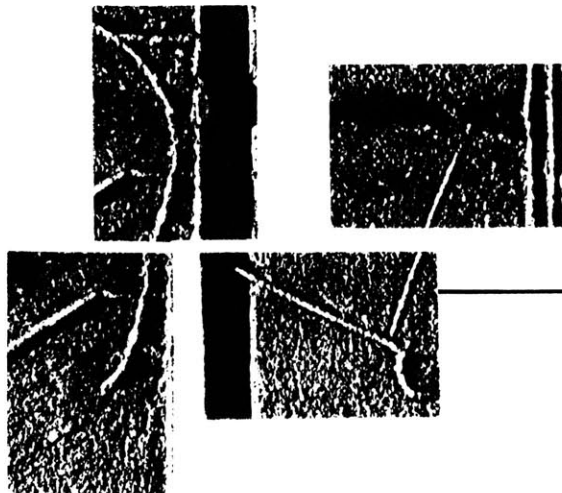




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19	Smithsonian Institution, as printed in <u>Sacred Circles</u> , Ralph T. Coe, p. 51.
22, 23	South Florida Water Management District, "A Closer Look: The Kissimmee River Restoration Project."
28	South Florida Water Management District, "A Closer Look: The Rainfall Plan."
32	<u>The Wonder of Birds</u> , National Geographic Society, pp. 84- 85.
35	A group effort: Kerry O'Brien, Phyllis O'Brien, Vivian Weitzman, Marla Weitzman. (Thanks!)
36	<u>The Patterns of the Past</u> , Guy Underwood, p. 150.
44	Josef Yul Chalat.
48	South Florida Water Management District, "In Depth Report: The Challenge of Water Management."
49	<u>Everglades Wildguide</u> , National Park Service, pp. 2-3.
66	<u>The Gardens of Mughul India</u> , p. 65.
68	<u>The Wonder of Birds</u> , p. 135.
70	David Cavagnaro, end paper in <u>The Wonder of Birds</u> .

- 72 The Wonder of Birds, p. 132.
- 80 The Gardens of Mughul India, p. 110.
- 94 The Wonder of Birds, p. 34.
- 104 The Wonder of Birds, p. 62.



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