IN(TER)VENTIONS IN NATURE

by Julie Chang
Bachelor of Science in Art and Design,
Massachusetts Institute of Technology, 1989

SUBMITTED TO THE DEPARTMENT OF ARCHITECTURE IN PARTIAL
FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE MASTER OF
ARCHITECTURE AT THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY
JUNE,1992.

signature of author ....
Julie Chang
Department of Architecture
8 May 1992

certified by ....
Frank C. Miller
Assistant Professor of Architecture
Thesis Supervisor

accepted by ....
John R. Myer
Chairman, Department Committee for Graduate Students

IN(TER)VENTIONS IN NATURE

by Julie Chang

Submitted to the Department of Architecture on May 8, 1992 in partial fulfillment of the requirements for the Degree of Master of Architecture.

(AN) ABSTRACT

If *abstract* means theoretical and *an abstract* is a summary of something's essence, then this is the abstract of this thesis:
This thesis is an abstract investigation which examines the duality between nature and culture in the design process.

If a *thesis* is an argument and *the thesis* is this very document, then this is the thesis's thesis:
The process of making and designing buildings in the landscape must respond directly and sensitively to the conditions of nature in terms of site, form, and material and at the same time accomodate specific human-cultural needs and criteria.

The main vehicle for this exploration is the design of two buildings in different natural contexts: one in the Arizona desert, the other on the New England coast.
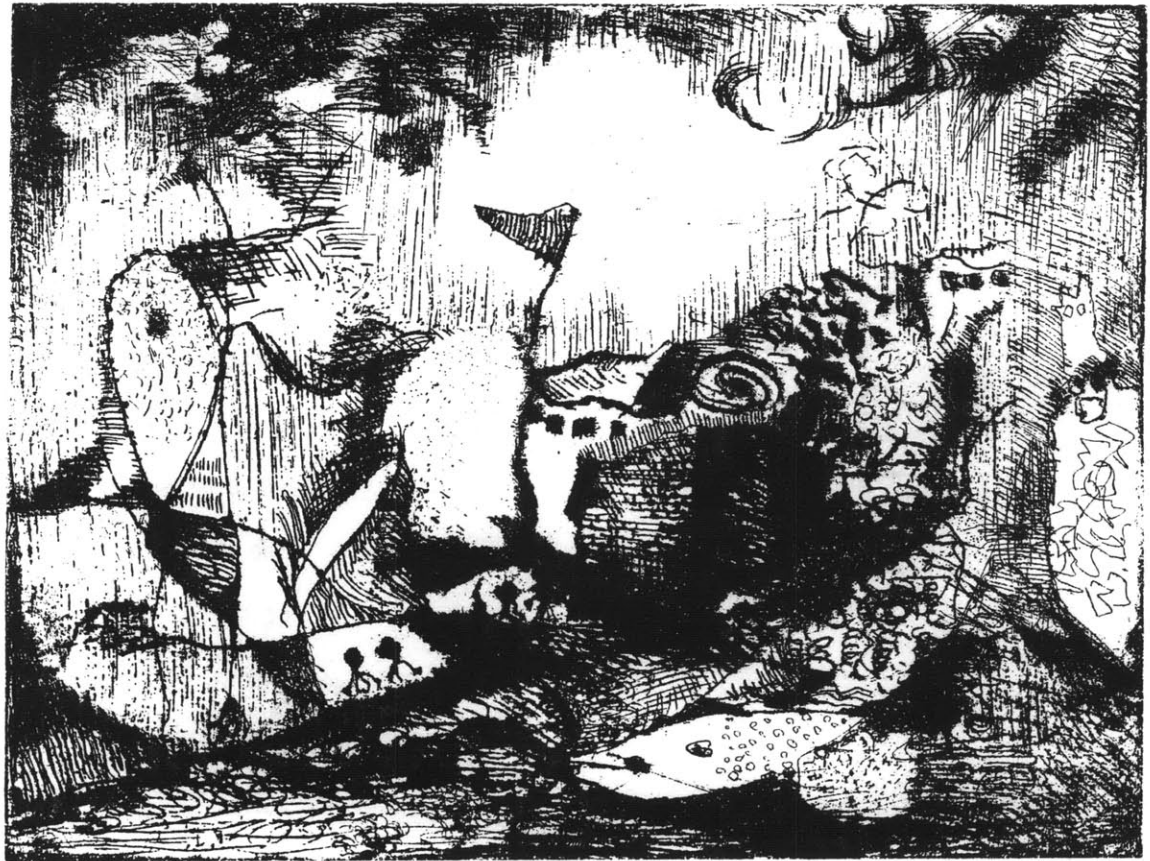
The thesis will be presented in three parts. The first part is a general discussion of nature, culture, and design and relies on references and experiences to illustrate the argument. The second part presents the evolving process of understanding and designing on the two sites. The third part is an effort to consciously and critically assess the prescribed method of design.

Thesis Supervisor: Frank C. Miller
Title: Assistant Professor of Architecture

Thesis Critics: Fernando Domeyko, Shun Kanda, Maurice Smith

003

To my mother...

Annie Chang: <u>The Place Where I come from</u>

TABLE OF CONTENTS

REFLECTION

AGENDA

009

INTRODUCTION

An important question:
To what extent should architecture be a personal and/or cultural invention, and to what extent should it be regulated by the forces of nature?

An indirect response:
As I attempt to consciously establish and clarify my own design agenda, I want to believe that the architectural decisions I make are linked to a wholistic understanding of the world and are not arbitrary or stylistic acts of personal expression. At the same time, I recognize that buildings are undeniably human inventions which provide us with a breadth of rich experiences and profound effects. While buildings should respect the processes of the natural landscape, they must simultaneously be understood as (wo)man-made objects/cultural products which are in direct tension with the environment.

It is this complex duality of invention and nature which is the focus of this thesis, to be explored through the design of two buildings in different natural contexts, one in the Arizona desert, the other on the New England coast. Two different sites have been chosen in order to study how different natural conditions may suggest different building behaviors. While the chosen places are not absent of (wo)man's presence, it should be noted that this design exploration does not directly engage the existing cultural components of the sites, but instead attempts to introduce new layers of culture which are founded in natural understandings of the places. The purpose is not to develop universal solutions/attitudes towards solving architectural problems, but as an advocate of nature, to explore a multiplicity of design approaches.

"After all anybody is as their land and air is.
Anybody is as the sky is low or high,
the air heavy or clear
and anybody is as there is wind or no wind there.
It is that which makes them and the arts they make
and the work they do and the way they eat
and the way they drink
and the way they learn and everything."

G. Stein : What Are Masterpieces, 1940

011

na·ture (NAY-cher) *n. natures.* 1. The whole
world that we live in.—We live our whole life
in *nature.*
2. Those parts of the world that have not
been changed by man, especially the out-
doors and its animal life.—Bob is fond of *na-
ture.* He likes the woods and fields, the wild
animals, the moon, the stars, and the sky.
3. All the traits that make a person or thing
do certain things or behave in a certain way.
—It is the *nature* of fish to swim.
4. Disposition or temper.—Ned has a gentle
nature.

golden book illustrated dictionary

*Culture, or civilization . . . is that
complex whole which includes knowl-
edge, belief, art, law, morals, custom,
and many other capabilities of man as
a member of society.* TYLOR[4]

*from the landscape we see
(g. eckbo)*

VOCABULARY AND INTENTION

Nature is an abstract term which we use to describe the world we live in. In addition
to encompassing physical entities such as rocks, trees, and sky, nature is the order
ot the universe, the spirit and system which animates and regulates life.

While nature embodies all things and processes not made or controlled by
(wo)man, *culture* might be defined as all the activities, inventions, and
nonphysiological products of (wo)man that are not automatic or natural.

Nature and culture reciprocally affect one another: culture would not exist without
nature, and nature changes and grows as a result of culture. In today's modern
western society, (wo)man has exerted great power on the landscape, resulting in a
diminishing role of nature on our lives.

> The symbiotic approach to the problem of the city has an extremely simple and familiar
> premise. It is that man, in addition to his spiritual identity, is part of nature. He is a biological
> organism, subject like all other creatures to the laws of nature. This implies that he is
> constantly affected by his physical environment. Each of us is dependent on it, not only for
> the material necessities of life (though that is the one relationship most of us recognize) but
> for health and for the balanced functioning of our senses, and ultimately for emotional well-
> being. The subjective relationship to the environment--how it affects our senses--is the one
> we know the least about; but we are beginning to study it and recognize its importance.

J. B. Jackson : Landscapes

Given the criteria here described, this thesis postulates that buildings are (or should
be) *in(ter)ventions,* that is, they are both (wo)man made cultural *inventions* and
natural *interventions* on the landscape. The intent of this work is to understand
and demonstrate a positive, sympathetic relationship between nature and
architecture, such that there is an comprehendable continuity and exchange
between habitation and the environment.

EXAMPLES: Sympathy between (wo)man and nature

National Geographic: march 1987

Li K'ê-jan: Spring Rain in the Southern Landscape

A machine gracefully rests with (as opposed to *on*) the landscape: the human presence does not attempt to dominate or control natural processes.

Traditional Chinese watercolor paintings depict a view of the landscape which includes elements of culture. Consistent with Taoist philosophy, (wo)man and nature exist in seamless unity.

POWERS OF NATURE

Nature alone does/can not magically generate architecture; it is the designer/builder who invents/makes/produces/gives life to a building. Moreover, nature provides constraints and suggestions which can (and I would argue should) influence an agenda towards making buildings.

Needless to say, there are many conditions which directly influence physical built form that are not dictated by nature (e.g. program and economics). But too often, designers neglect the role of natural processes in their design methods, and fail to recognize the impact of buildings on the environment, and the environment's impact on buildings.

What follows is an attempt to elucidate three "scales" or "powers" of nature which are critical in developing a building and design process; at the broadest level, the *site*, at the intermediate scale, *form and formal behaviors*, and at the smallest level, *material and structure*. These three realms are autonomous yet inherently interrelated. By examining them independently, their relationship to one another may become apparent.

In the book <u>Powers of Ten</u> (Philip and Phylis Morrison and the Office of Charles and Ray Eames), "relative sizes of things in the universe" are illustrated in "zoom lens" fashion. The notion of relativity is an important idea to consider: the thing portrayed from far away is not the same as is appears close up.

014
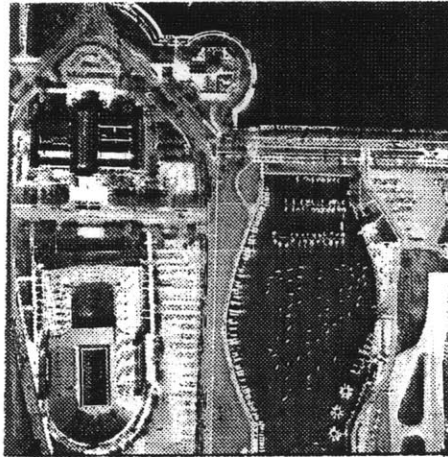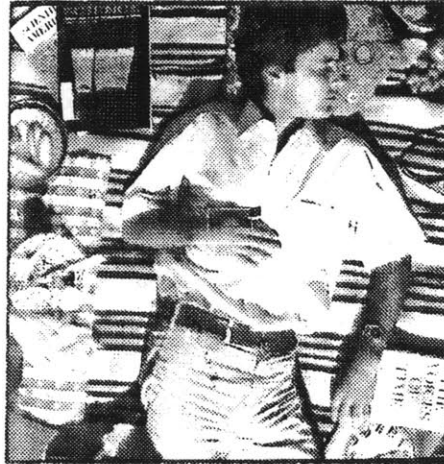
10^4 meters 10^0 meters 10^{-5} meters
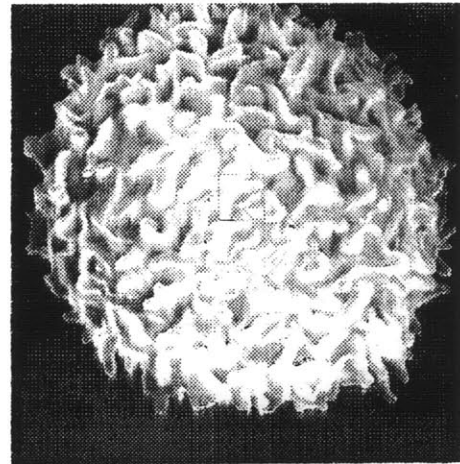
p + p morrison & the office of c. + r. eames:
powers of ten: about the relative size of things in the universe

Into the Site
From the outside.

The parts make the whole
And the whole is a part:
Movement relative to the larger,
Stability relative to the smaller,
Makes Form.

The boundaries enclose the form
And the form becomes boundary:
Seclusion towards the outside,
But openness towards the inside,
Makes Place.

The rules define the similarities
And the differences share the rules:
Sameness in time and space,
Without repetition
Makes Understanding

The site is space and material:
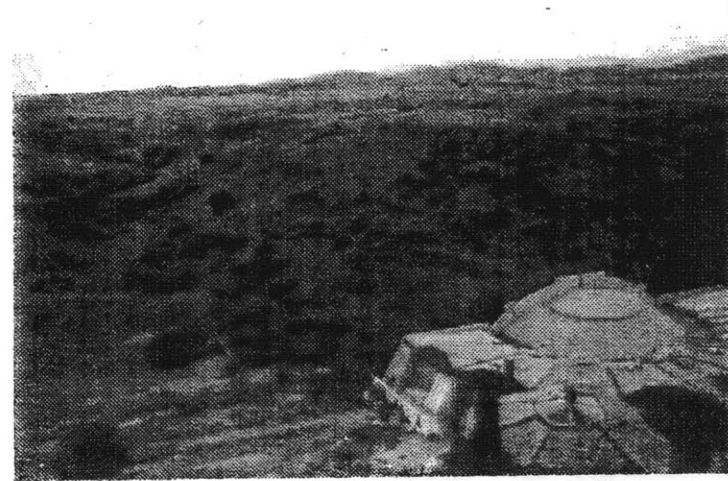Form, Place and Understanding
Make the Site

J. Habraken:
Transformations of the Site

THE SITE

The term "site" suggests that we look at the environment with the intention to act upon it, or to observe an act in it.

J. Habraken: Transformations of the Site

Habraken's statement implies that the site is not passive; it contains vital information which leads to human action. A reading of a place helps us to generate some understanding/proposition about architectural organization and form. It is important to recognize that the notion of "site" embodies more than just physical location; it includes features such as climate, topography, context, history, and other attributes which make a place unique and identifiable.

A taxonomy of site traits might be organized about three general categories: physical, phenomenological, and cultural. Physical site properties are those which are concrete and tangible, though not necessarily natural (e.g. terrain and building context). Phenomenological features are natural attributes/actions which (wo)man has no direct control over. Rain, sunshine, earthquakes, and volcano eruptions are all natural phenomena (wo)man cannot harness, and which (can) have a serious effect on the built environment. Cultural properties of the site are those features which (wo)man affects directly. Social history, program, and building technologies are all cultural attributes of a place.

The responsible designer/builder recognizes that the site has the capacity to inform the physicality of the architecture. The qualities of a specific natural or man-made landscape provide specific suggestions towards the definition of a building --its position, its form, its structure, its experience. As physical, phenomenological, and cultural conditions vary with respect to different places/times, one would expect building forms to respond to these variable characteristics.

For instance,

(katsura)

(arcosanti)

This building in the forest is directly open to the landscape, allowing the outside to move inside (and the inside outside). Like the trees around it, the building is a screen which filters light (and life) through it.

This building in the desert is defensive; it offers protection from the severe conditions (the intense light and heat) of its surroundings. Like the ground it rests on, it is a continuous solid surface which undulates freely.

In both of these examples, the quality of the architecture stems from the specificity of the site. In the desert, the severity of the climate and the sparseness of the land led to a decision to *transform* the landscape in order to make it habitable. In the temperate forest, the building serves to *intensify* the landscape, accentuating the qualities of a dense and lively site.

FORMS

The forms that appear in nature often inspire the forms of inventions. A tree behaves like a column of a building, a bird's wing teaches us how to fly. It is only natural that designers apply the forms of nature; these are the enduring efficient systems which we know well.

The differentiation must be made between plagiarizing natural forms and using natural formal principles. While a biological form might stimulate an idea about some building form/structure, literally mimicking an observed form in nature is not design. Design involves understanding and appropriately transforming natural forms and concepts.

In the work Antoni Gaudi, the predilection towards curved and irregular surfaces and structures reflects the architect's admiration of biological forms and systems. But Gaudi goes beyond using "natural" or "organic" forms as decorative or secondary elements of architecture: they are integral to the building structure. In the Guell Chapel, for instance, nature and building appear to be indivisible. The exterior masonry columns define a place which is like a dense grove of trees; the continuous curved walls suggest primitive cave-like spaces. While this building may have been inspired by the natural landscape, it is boldly original, an autonomous built landscape with sheltering qualities.
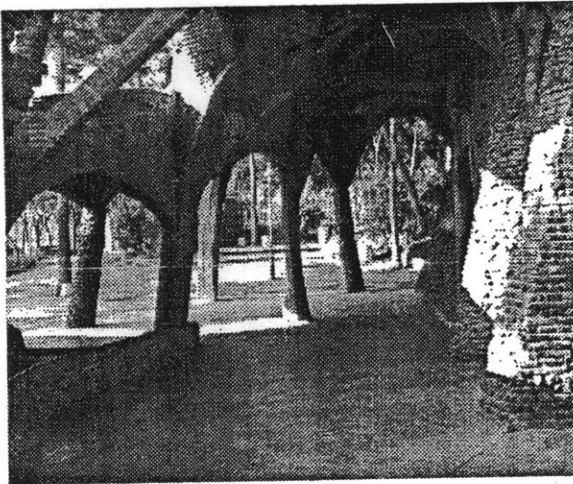
Gaudi: Guell Chapel

Look, it cannot be seen — it is beyond form.

Lac Tsu: Tao Te Ching

In addition to using concrete natural forms as design references, formal *behaviors* can be used as references. The distinction between form and formal behavior can be described as follows: form is "the shape that makes a content visible." (Arnheim, Towards a Psychology of Art, p. 355.) while formal behavior involves the action which a particular form(s) takes (M.K. Smith). Form is a noun, formal behavior suggests a verb. Just as a noun is meaningless without a verb, form is insignificant without action. As Paul Klee writes,

> Form is set by the process of giving form which is more important that form itself. Form must on no account ever be considered as something to be got over with, as a result, as an end, but rather as genesis, growth, essence. Form as semblance is an evil and dangerous spectre. What is good is form as movement, as action, as active form. What is bad is form as immobility, as an end, as something thathas been tolerated and got rid of. What is good is form-giving. What is bad is form. Form is the end, death. Form-giving is movement, action. Form-giving is life.

P. Klee: Nature of Nature

Thus, the important question designers must ask is not *What is the form?* but instead, *What is the form doing?*.

In order to use natural formal behaviors in design, a particular formal concept, organization, or system from the environment is identified and translated into a built context. In this process of abstraction, the perceived qualities of the observed natural artifact may be lost, but what is retained is a direct physical understanding of form.

EXAMPLES OF FORMAL BEHAVIORS

SCREENS
In the forest, the trees screen light, space, and life. The formal behavior involves
an alternation of light and dark, space and material. This generic behavior can be
easily extrapolated into building.

screens in the landscape
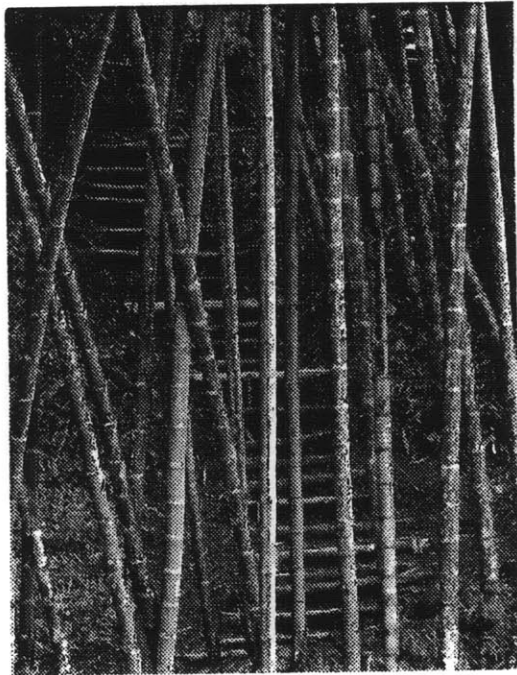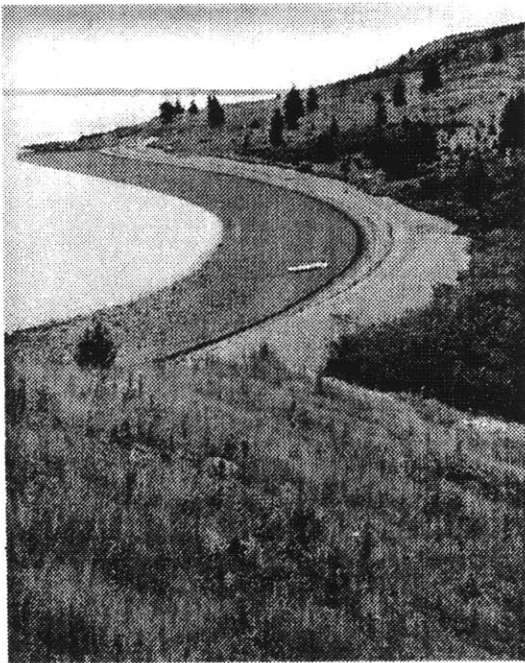

Screens in building
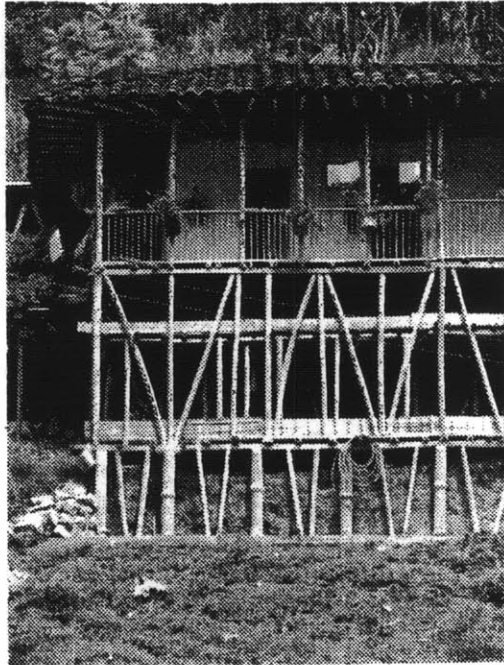
Generic screen behavior
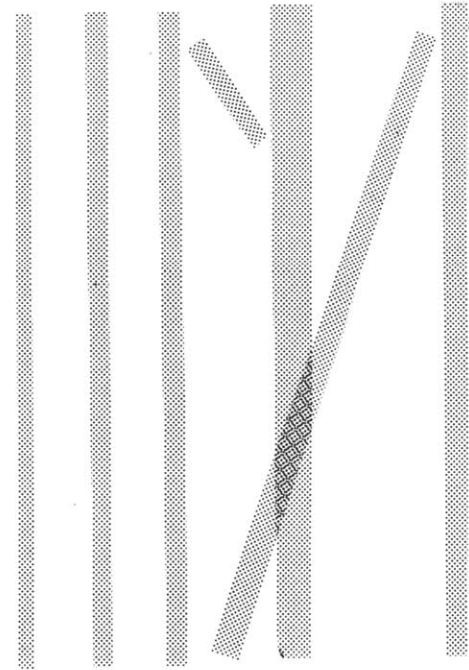
PARTIAL CONTAINMENTS

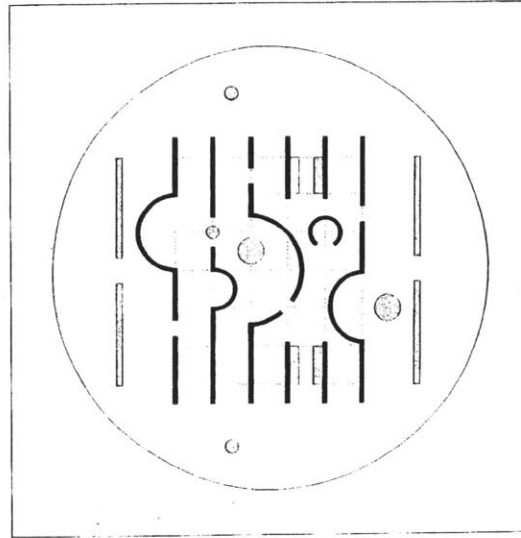A cove by the water serves to protect an area/define a place on the water's edge.
Likewise, we can (and should) use this same generic principle in making partial
containments in buildings.

partial containment in the landscape

E. Porter: Butler Island Beach

partial containment in building

a. vaneyck: Arnheim pavilion

generic behavior
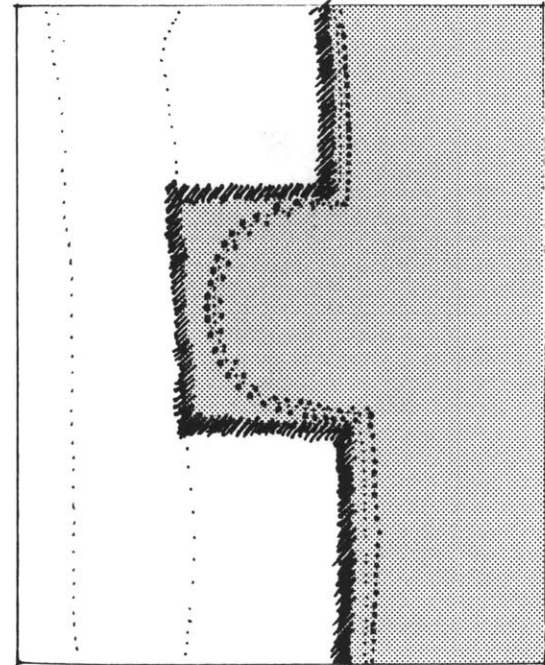
MATERIALS

The planet generously provides us with many materials to build with and from. Materials can be used in their direct raw form (e.g. earth, trees, and rocks) or they can be distilled into more manageable, conventional mediums (wood, concrete, glass).

Tectonics of materials is a misconstrued notion. To suggest that materials are limited in how they can behave severely restricts the possibilities of inventive, useful structures. While certain natural qualities make some materials ideal for specific situations, most materials have the structural capacity to act in a range of ways.

In Jaiselmer, India stone is often used in a way which is conventionally associated with wood: delicately carved sandstone balconies and porches line building edges, stone beams cantilever over walls. An insistent tectonic observer might argue that the material is utilized in an unnatural manner. But one must consider that wood is a scarcity in this environment and stone is the primary building material available. This example illustrates that there is not and should not be a one-to-one relationship between material and structural form.

What is critical in the conversion of material into structure is *material authenticity* and *structural efficiency*. Authentic material is material which is identifiable and real; when we touch or see something, we should recognize what it is. The recent emergence of fiberglass bricks made to look like clay bricks is a cultural bastardization. Materials should not pretend to be something that they are not. In the Indian example, the stone is authentic; it is not painted to look like wood.

Jaiselmer, India

022
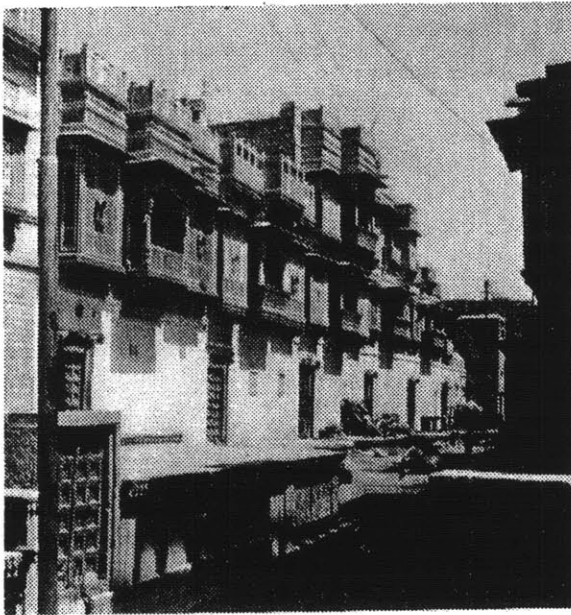
Rowe's Wharf by SOM
Architectural record: March 1988

Structural efficiency means that structure and material are working, not just appearing that they are working. Rowe's Wharf in Boston is a typical contemporary example of structural inefficiency; what appears to be a masonry load bearing arch is in fact a steel frame structure clad in concrete or stone (who can tell?). Recent technology has allowed the opportunity to engineer almost anything. However, it is because of this unlimited technical ability that much current architecture falls short of structural integrity, efficiency, and authenticity.

The difficulty of a hybrid man-made/natural material such as concrete is that its liquid quality allows it to take on any form, surface, or color. Of course, this "difficulty" is often regarded as a luxury which enables the designer to freely control forms and material qualities. In Paolo Soleri's Cosanti and Arcosanti projects, concrete is cast in a variety of ways. One of the most innovative processes is "earthcasting," a method where silt is used as formwork for the concrete. On the global scale, this procedure is environmentally efficient, and on the structural scale, it insures that forms of a man-made material take on natural qualities.

I went to the woods because I wished to live delib-
erately, to front only the essential facts of life, and see
if I could not learn what it had to teach, and not, when
I came to die, discover that I had not lived. I did not
wish to live what was not life, living is so dear; nor
did I wish to practise resignation, unless it was quite
necessary. I wanted to live deep and suck out all the
marrow of life, to live so sturdily and Spartan-like as
to put to rout all that was not life, to cut a broad swath
and shave close, to drive life into a corner, and reduce
it to its lowest terms, and, if it proved to be mean,
why then to get the whole and genuine meanness of
it, and publish its meanness to the world; or if it were
sublime, to know it by experience, and be able to give
a true account of it in my next excursion.

H. Thoreau: Walden

PROPAGANDA

In my daily life, I have very little involvement with "natural" nature. I live in an
adulterated version of nature: the trees I see are planted, the river I walk along is
(wo)man-made. Nevertheless, the trees and water are *real,* the air I breath is
natural, the insects that fly around my head are alive, and the sun that rises to wake
me in the morning is authentic.

Inspired by naturalists such as Henry Thoreau, I am using this thesis as an abstract
excursion from my man-made environment in attempts to connect myself with
nature. *(Wo)man and/versus nature* is a classic dilema which countless scholars,
writers, and artists have discussed for ages and which continues to fascinate and
plague architects. It is my opinion that we must respond to the environment directly
and compassionately. In traditional Eastern philosophy, (wo)man is generally
regarded to be a small part of a large system of nature. While this notion has
significance in my mind, these days, it is difficult if not impossible to maintain a
humble relationship with the larger world. As Garrett Eckbo writes,

> Control of our physical and social environment is one of the chief problems of life for
> all of us. We want to live in a nice home in a good neighborhood in a stable community
> in a reliable region in the greatest nation in the world. We want good workplaces,
> good schools, good centers for shopping, recreation, health care, culture, worship,
> and services. Yet in spite of these widespread and earnest desires and the
> greatest prosperity we have ever known, the American physical environment is
> deteriorating before our eyes, through new mass construction rather than blight
> and obsolescence, and the social environment is full of strange, violent, and
> demanding forces.

G. Eckbo: The Landscape We See

Regretably, I share Eckbo's cynical view of American society. While I strongly believe that urban and cultural institutions are necessary elements of modern day life, I am disturbed by (wo)man's obsession with controlling the environment rather than coexisting with it. Writer Bill McKibben argues that we have already crossed a devastating threshold of change which he describes as "the end of nature."

> By the end of nature I do not mean the end of the world. The rain will still fall and the sun shine, though differently than before. When I say "nature," I mean a certain set of human ideas about the world and our place in it. But the death of those ideas begins with concrete changes in the reality around us--changes that scientists can measure and enumerate. More and more frequently, these changes will clash with our perceptions, until, finally, our sense of nature as eternal and separate is washed away, and we will see all too clearly what we have done.

B. McKibben: The End of Nature

As McKibben indicates, commercial and selfish extravagances have seriously hampered the balance of the planet and forever changed our perception of what nature is. The process of destruction is very real: the ozone layer is depleting drastically, the tropical rain forests are dying, we make inefficient decadent buildings which hide ourselves from the world rather than engage it.

While this thesis is not intended to be a sour commentary on contemporary culture, I think that it is important to refer to the damaging effects of (wo)man's irresponsible actions. The hope is that a revived awareness towards the environment/world, as discussed here, may help us to reclaim nature and live heathily in peace. This may seem like narrow-minded trite propaganda, but it is in fact an earnest personal agenda which drives and directs my work.

THE PROJECTS

Two sites, two situations, two buildings.

Why two?

Paul Klee describes why:

A concept is not thinkable without its opposite. The concept stands apart from its opposite. No concept is effective without its opposite.

On contrasting concepts (pairs of concepts):　　Chaos————————Cosmos

　　　　　　　　　　　　　　　　　　　　　　　　Disorder　　　　Order

There is no such thing as a concept in itself; generally speaking, there are only pairs of concepts. What does 'above' mean if there is no 'below'? What does 'left' mean if there is no 'right'? What does 'behind' mean if there is no 'in front'?

Every concept has its opposite, more or less in the manner of:

Thesis ———————— Antithesis; the line between them is long or short according to the extent of the opposition.

very good
good
less good

less bad
bad
very bad

Neither good
nor bad
or 'good as much
as bad'
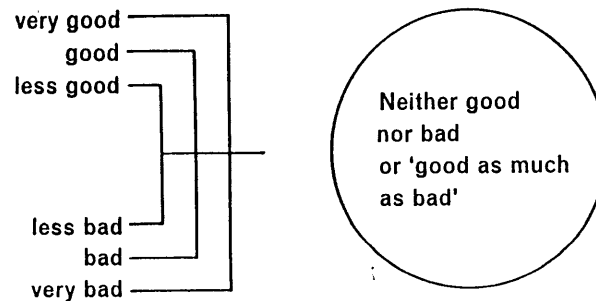
The opposing positions are not fixed; they may slip past one another. Only one point is fixed, the central point in which the concepts lie dormant.

Relatively fixed (in relation to the central point) are opposing points of equal intensity.

Paul Klee: The Thinking Eye p. 15

029

left

.west

this

desert

You can't understand one

right

east

that

ocean

without the other

(What follows is a design chronology which traces the process of exploring, thinking, and building on two different-polar sites)

031

032

United States

POLYCONIC PROJECTION

SCALE OF MILES

SCALE OF KILOMETRES

Capitals of Countries
State and Provincial Capitals
International Boundaries
State and Provincial Boundaries

NATURAL SCALE 1:12,672,000

© Copyright by HAMMOND INCORPORATED, Maplewood, N.J.

033

034

Arizona
Comparative Distance Scale

INDIAN RESERVATIONS
NATIONAL PARKS & MONUMENTS

11

12

River 3600

7

×3838
3800

8

3760

3600

Ash

×3743

3600

3600

3800

3720

3600

Water
Tank
BM
3825
orrow
Pit
14
Radio
Tower

69

Cordes
Junction

13

3720

3760

18

17

3600

3666

Mines

×

3600

3792
×

3600

3760

Corral

3720

3600

BM 3755

23

3720

24

19

20

United States Geological Survey: Cordes Junction, Arizona

Scale: 1:24,000

036
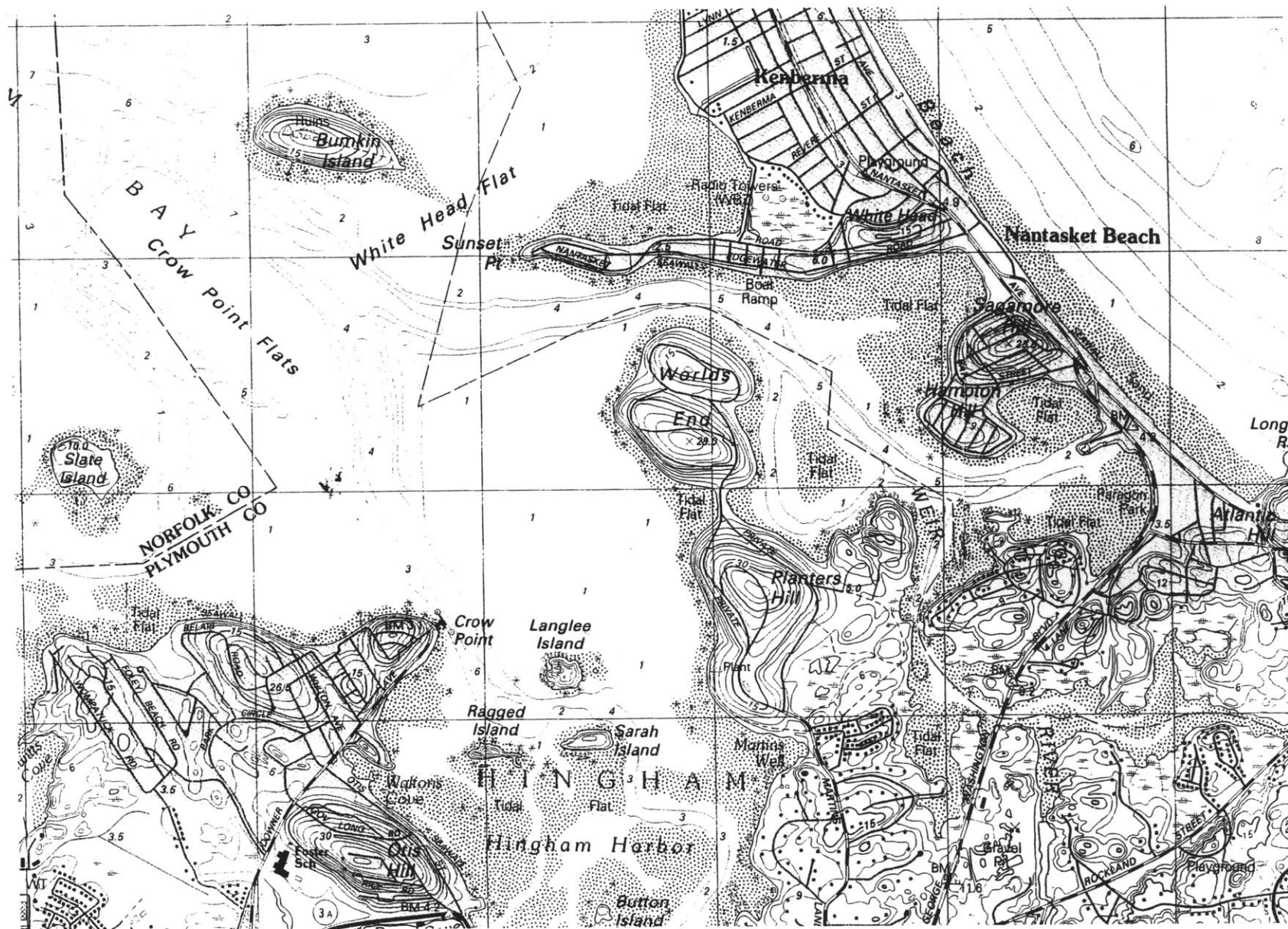
United States Geological Survey: Hingham and Hull, Mass.   Scale: 1:24,000

ARCOSANTI

Arcosanti, located in the high desert approximately seventy miles north of Phoenix, is the construction site for a small town of 5000 people. Arcosanti intends to become an Urban Laboratory where on a modest scale we will test urban design principles and the fundamental tenets of arcology.

ARCOLOGY, a combination of two words, architecture and ecology, points at the interdependence of the two: The human abode within the planetary abode.

ARCOLOGY addresses itself to the resources in the environment and to the evolution of the human spirit. **ARCOLOGY** is a methodology that recognizes the necessity for radical reorganization of the sprawling urban landscape into dense, integrated, three-dimensional towns and cities. Arcosanti offers an alternative to current urban dilemmas and at the same time seeks to re-establish contact between people and an undisturbed landscape. A major tenet of **ARCOLOGY** is that the city is a necessary instrument for the evolution of the human spirit (civilization).

LAB BUILDING

EAST CRESCENT

NORTH VAULT

S.O.D. UNIT

EAST HOUSING

THEATRE

WEST HOUSING

SOUTH VAULT

CERAMICS APSE

CRAFTS III

FOUNDRY APSE
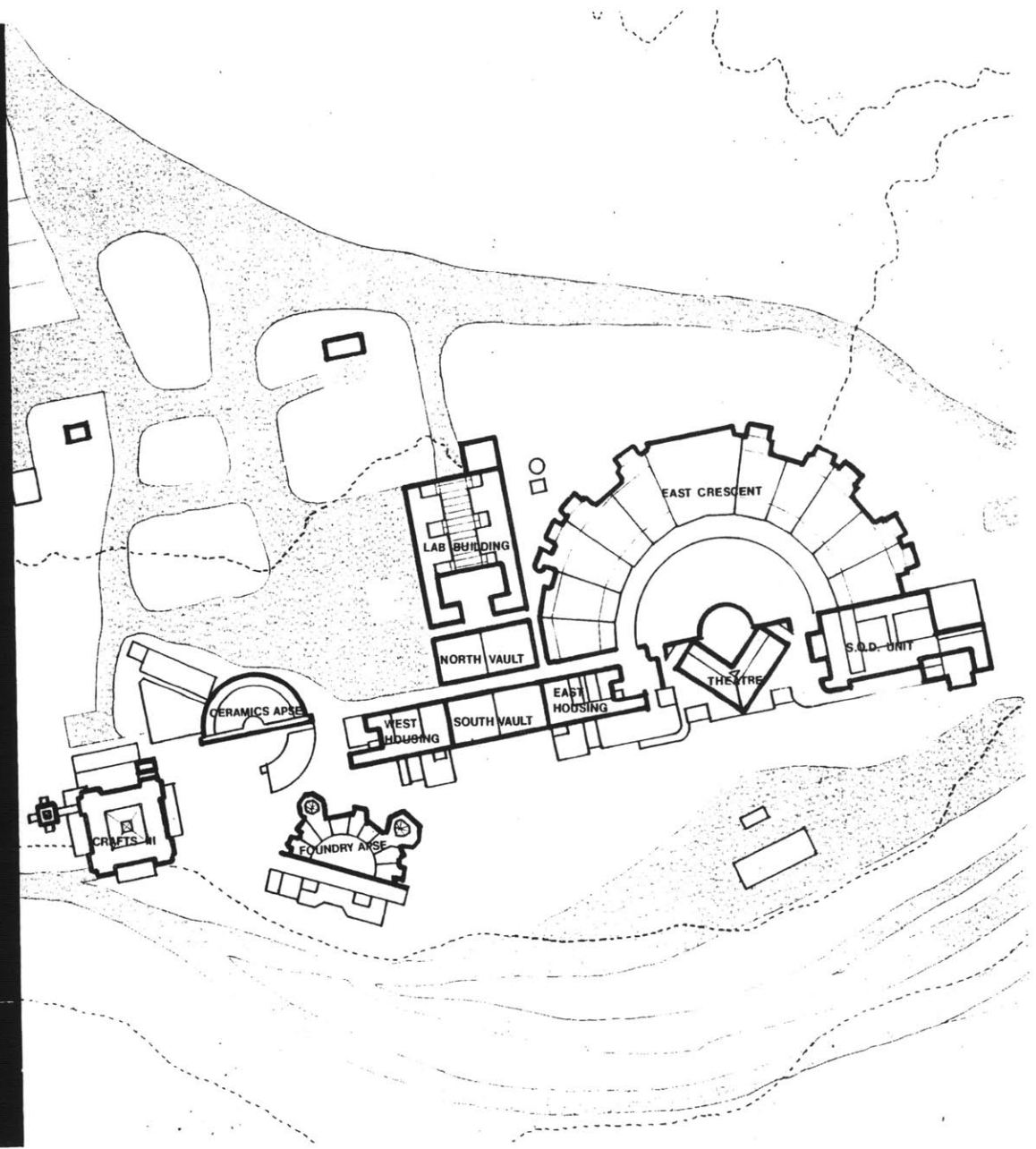
Only 14 miles from downtown Boston, it is, indeed, as Samuel Wakeman declared in his original letter as Chairman of the Committee to Preserve World's End, "an island of beauty where we can still enjoy the satisfaction of lying in a field of warm grass and looking at the sky; where we can still watch wildlife undisturbed by the noise and confusion of the city; where we can still walk on beaches washed by the sea without seawalls and hot dog concessions, and where we can turn momentarily to simple pleasures such as seeing a child explore the mysteries of the coming spring."

Gordon Abbott, Jr.
Director, The Trustees of Reservations
February, 1973
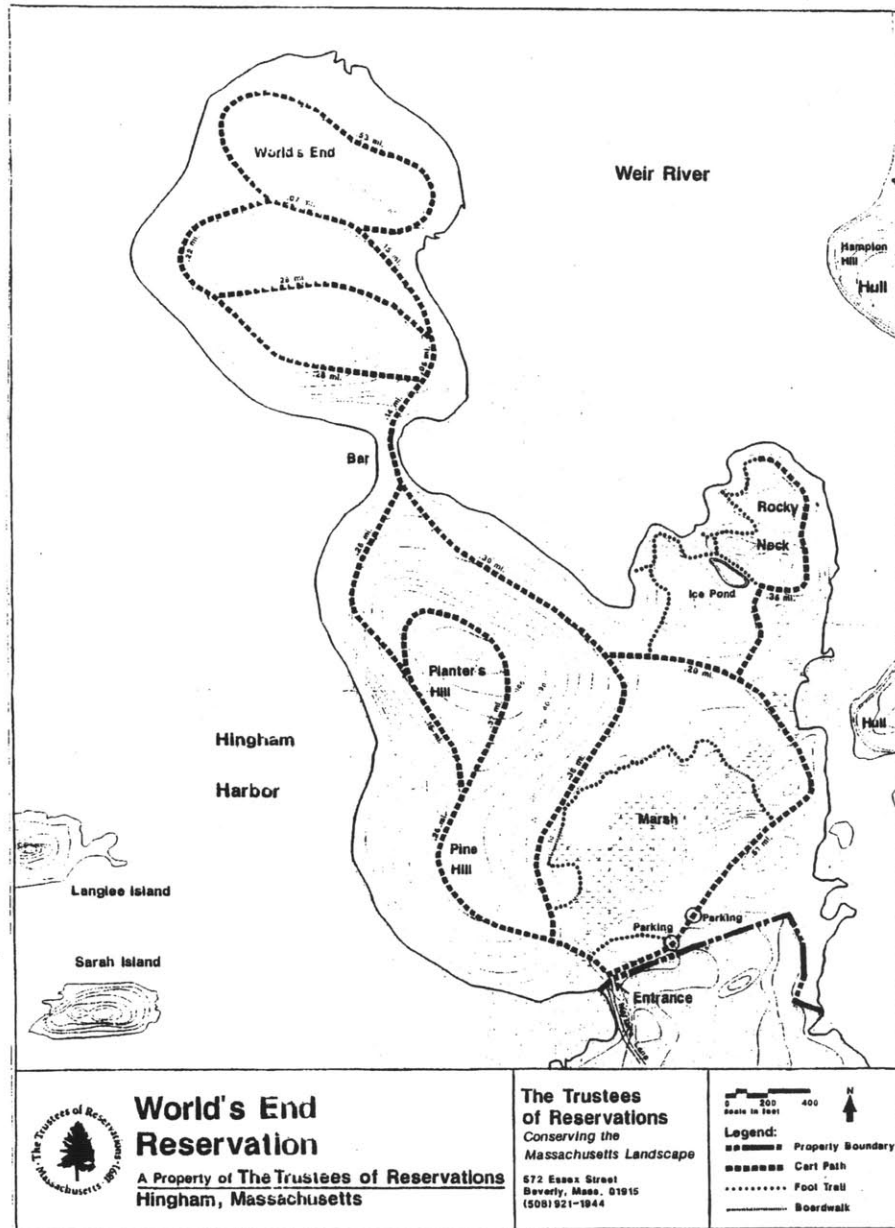
World's End Reservation
A Property of The Trustees of Reservations
Hingham, Massachusetts

The Trustees of Reservations
Conserving the Massachusetts Landscape
572 Essex Street
Beverly, Mass. 01915
(508) 921-1944

Legend:
Property Boundary
Cart Path
Foot Trail
Boardwalk
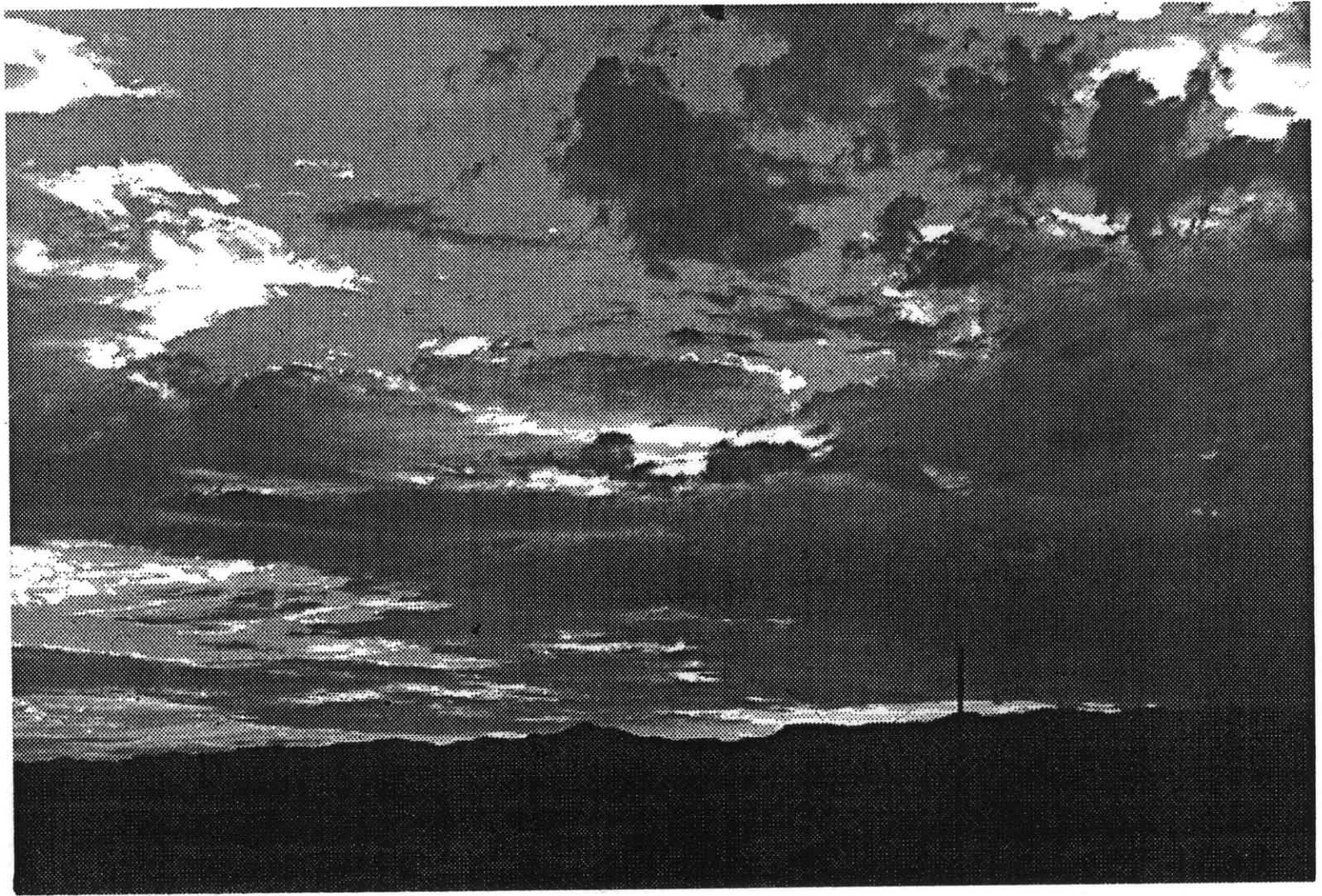
The sky

(Arcosanti)

40

The Water   (World's End)

041

The horizontality of the ground   (Arcosanti)

042

The vertical screens of trees   (World's End)

043
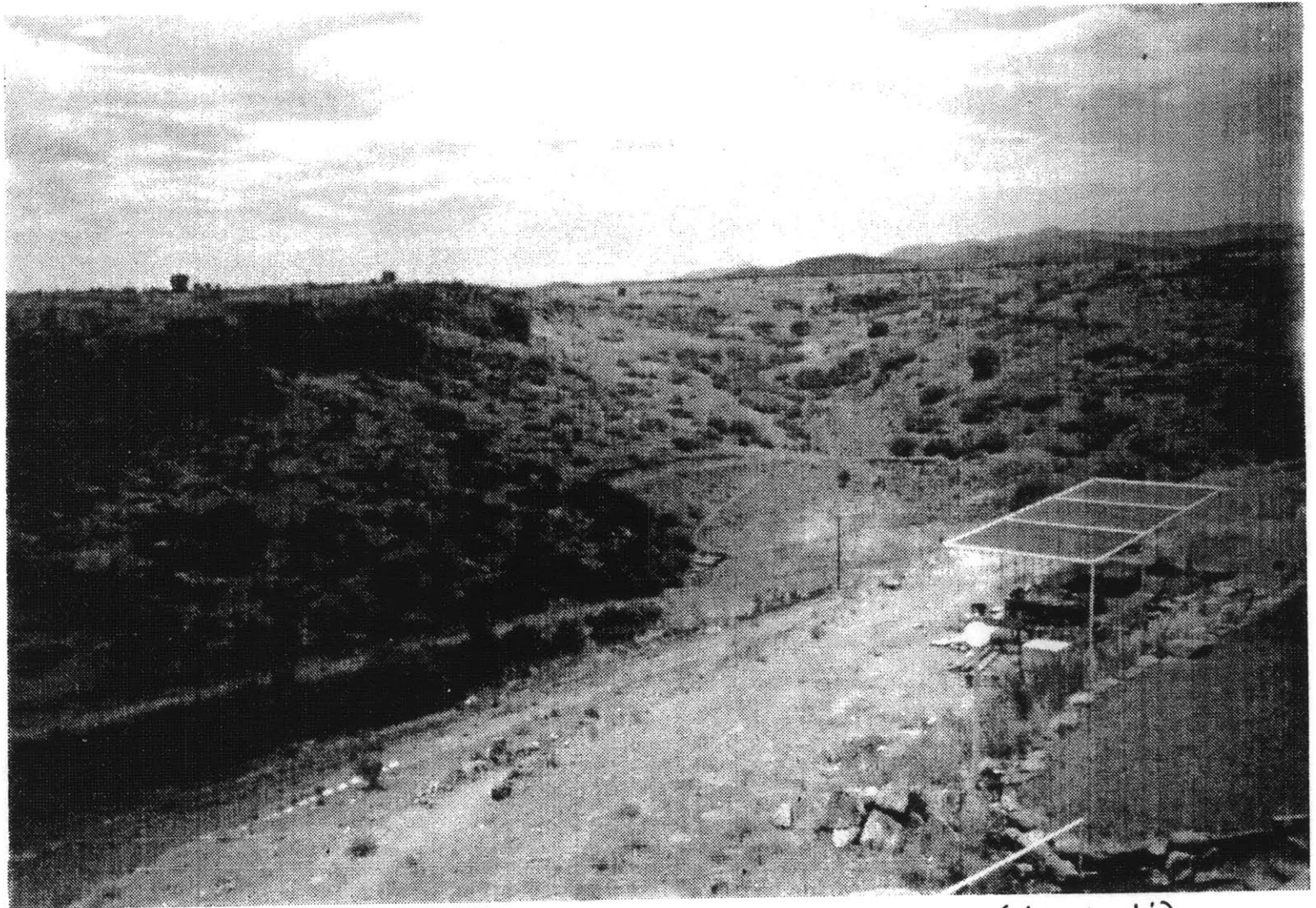
Perceiving infinite distances...   (Arcosanti)

044

Depth is foreshortened by layers of life.

(World's End)

045

Arcosanti : conceptual drawing

046
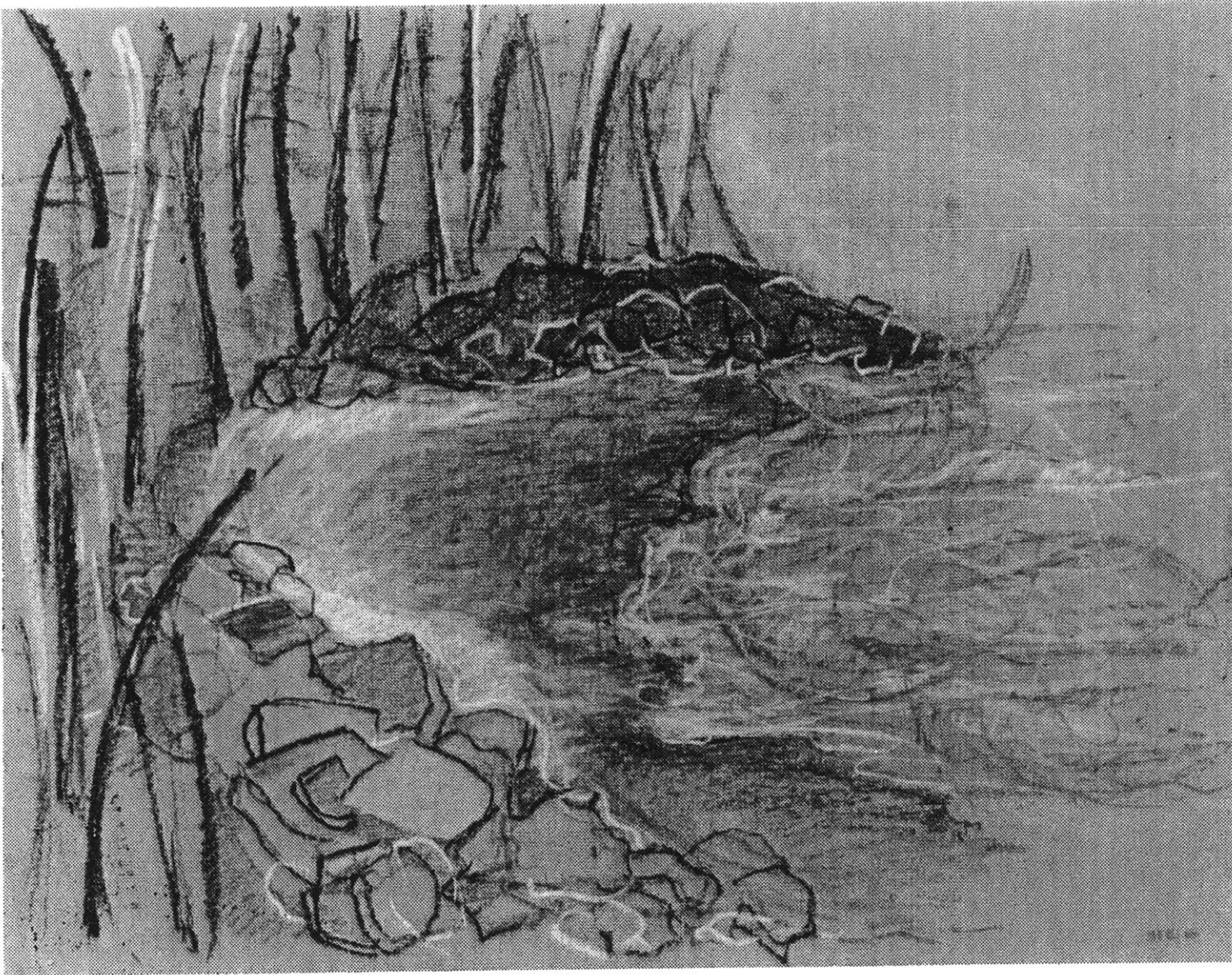
World's End: conceptual drawing

047
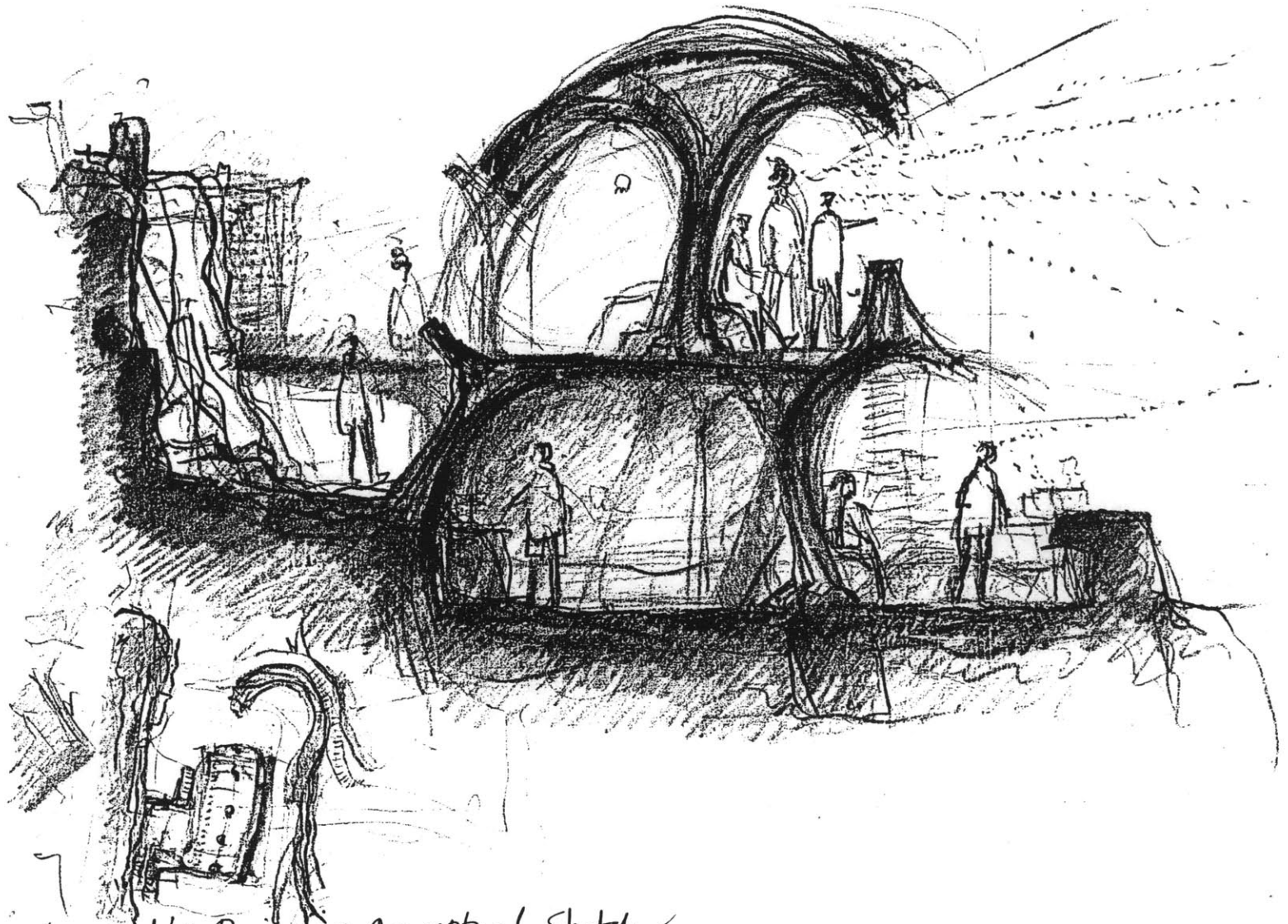
Arcosanti: Projective Conceptual Sketch

048
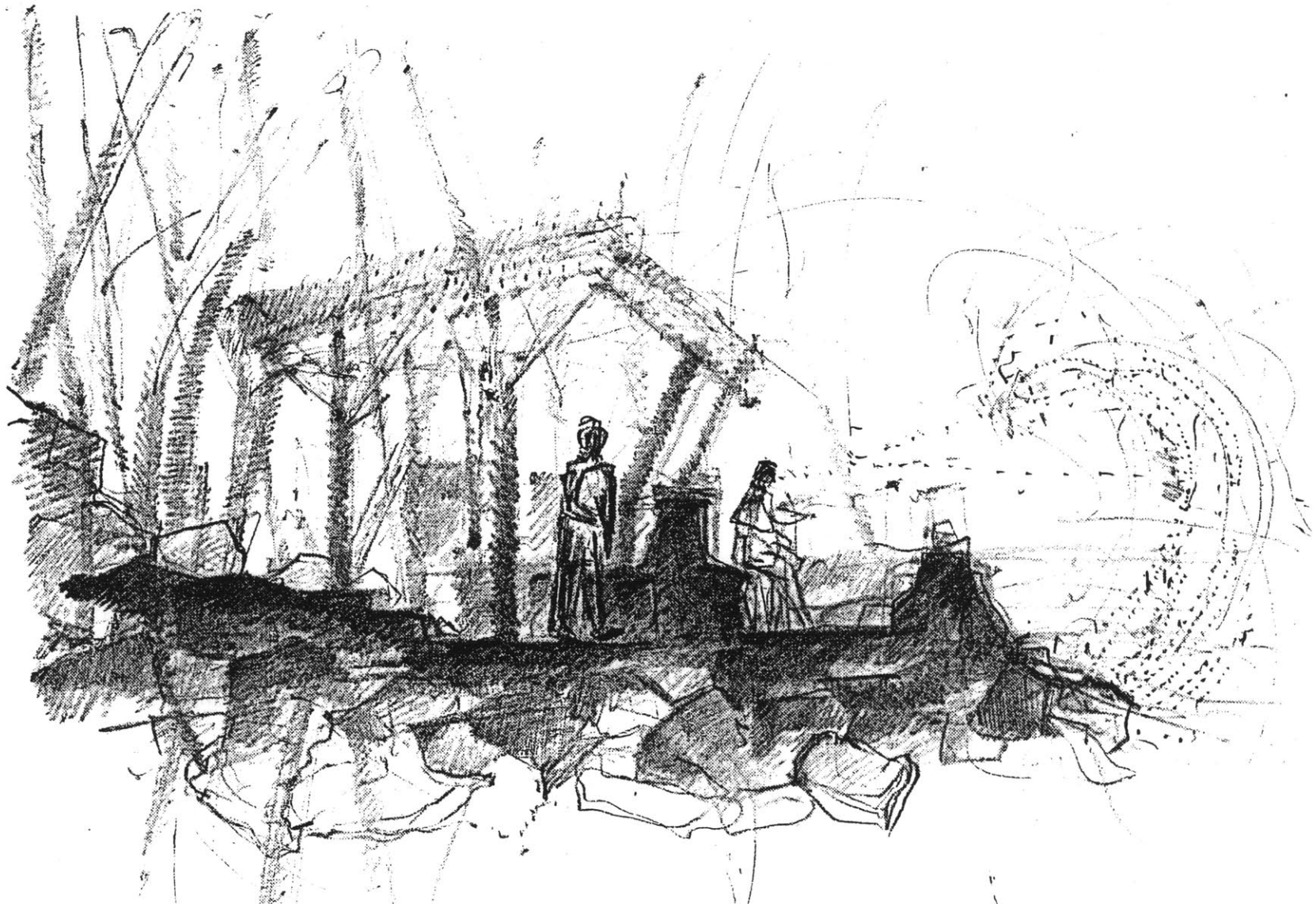
World's End: Projective: Conceptual Sketch

049

The approach to Arcosanti is not promising, a long drive north up I-17 through spectacularly rugged desert country beginning to turn toward sagebrush as one comes up to the turnoff point at Cordes Junction—a nowhere place if there ever was one: some trailer homes, a filling station, a bar and precious little else but a dirt road leading off into, apparently, nothing. That road, followed for a couple of miles, eventually leads to a parking lot by a usually not very busy building site, a few disconnected structures ranged along the side of a small canyon that deepens away into the distance, and finally opens into a broad plain a mile or more away.

The seemingly scattered buildings do, in fact, join up into a designed sequence, are joined up chiefly by cunning landscaping that makes a simple gardening of grass and trees between one fragment and the next. The fragments in themselves are magnificent—huge echoing vaults and apses looking out across the canyon, the vaults painted in strong, earthy ceramic colors, the apses gently fluted on their inner faces; with steps going processionally over the outsides of the vaults and little habitable cubicles tucked in neatly and symmetrically all around.

It has been described as "telescoping the environmental experiences of the Baths of Caracalla and Club Mediterranée" and if that was meant to be unkind, there is more than a grain of truth in it, because the general effect really is very like camping out in grand style in a great Roman ruin or the abandoned film set for an old-time movie spectacular.

reyner banham: scenes in america deserta

In any case, World's End is surrounded by water except on the south. It is, however, shielded from the open sea by the hills and connecting gravel reefs of Hull; and from the hills of World's End, particularly from the highest of these, Planter's Hill, there are spectacular views in every direction: northward to Graves Light and the North Shore, northeasterly over the Weir River and Nantasket to the Atlantic, southeasterly to the Turkey Hills and Whitney Woods, southwesterly over Hingham Harbor and its islands, westerly to the Blue Hills of Milton, and northwesterly to Bumkin Island and the Boston skyline.

World's End consists of some 248 acres and over five miles of shoreline. There are four hills, running roughly north and south, an area of cliffs and ledges, known as "Rocky Neck", running eastward from Planter's Hill, a large meadow lying south of Rocky Neck and Planter's Hill, and a strip of woods, ledges and ravines separating this meadow from Cedar Gables. This strip of woods was, in pre-colonial times, separated from the rest of World's End by salt water at high tide. The seventeenth century settlers built two dams, however, one at the Weir River end and one at the Martin's Cove end of the meadow, which connected Rocky Neck and Pine Hill to the mainland and also served to reclaim the "Damde Meddowes", as they were thenceforth called, from the sea. Another causeway, "the bar", was built, perhaps at about the same time, from the north end of Planter's Hill to the two northernmost hills, thus connecting them also to the mainland even at high tide. Still other causeways were built east of what is now Porter's Cove Road connecting a small island in Porter's Cove to Cushing's Neck at two points and reclaiming from the sea the intervening area, another Damde Meddowe, known to more recent generations as the "East Meadow". World's End, then, consists almost entirely of two islands connected to each other and to the mainland artificially by the efforts of the Puritan Fathers, just as, further north and east, the six hills of Hull were connected to each other and to the mainland by natural causes, erosion and wave action, in a far earlier time. At any rate, the hills and shores of World's End have delighted many generations of visitors who have come by foot or on horseback or in small boats, and thousands more who have inspected World's End from yachts and from the commercial boats which have plied between Boston and Nantasket since the last century.

a history of world's end p. 1

051

THE SKY (Arcosanti)

During the summer at Arcosanti, we lived like vampires, our rituals controlled by the light of the sky. We rose at dawn, beginning our work early when the sun was low and the air was crisp. As the day progressed, the burning heat and bright light became bothersome and we sought protection indoors or under hats and light shelters. Daylight was the time to focus on our work, and for many of that meant working directly with or on the ground, pouring concrete, shoveling silt, piling rocks. But as the sun went down and darkness encroached, our attention moved up towards the sky. We would lie on the roofs of the buildings to graciously greet the moon. There were nights we would stare at the sky for many hours, sometimes all night, discovering galactic constellations, searching for shooting stars, satellites, and planes. At night, we were enchanted by the vastness of the open sky.

THE EDGE (World's End)

Once on the water's edge, I jump from one rock to the next. It's like a game of hopscotch: I move forward, backward, sideways. I don't know where I'm going, but I'm going there. Each rock is different in character. There are "Pollock rocks" featuring colorful drips and fractures. There are "elephants" with wrinkly surfaces. Then there are "eggs", slippery, smooth, and clean. I pause to sit on a "chair" (a terracing flat rock); on one side of me I feel protected as I look up at the tall leafy trees, but on the other side, I am vulnerable as I watch and listen to the water gushing towards me. I forget that I am so close to the city.

053

In February I had an identity crisis ·······>

TO: Shun Kanda, Frank Miller
FROM: Julie Chang
RE: thesis **FEB 27 1992**

The original idea for this thesis came from wondering why buildings are different in different places. Initially, I proposed that the **site** directly informs architectural form, and that building decisions are phenomenologically linked to the landscape.

Later (now), I realize that the site is only one of a large array of constraints which can influence design. In the current draft of my thesis, I have categorized two types of design constraints: natural and cultural. Natural constraints are those which (wo)man has no direct control over, e.g. climate, terrain, flora. Cultural constraints are limits which (wo)man imposes on him/her-self, e.g. program, technology. Designing buildings involves developing applications which satisfy both of these orders.

I am not prescribing a purely scientific, linear, empirical approach towards my work. Intuition and serendipity are personal components of experimentation which I recognize as being crucial in the processes of thinking and designing. Nevertheless, without clear limitations and agendas, design cannot happen.

Throughout my architectural education, constraints were predetermined. My role as a student was not to develop a firm architectural position, but to **apply** a position which was imposed or suggested. In my final months as a student, I realize that I now must learn to establish my own agenda and not gullibly succumb to one which has been fed to me. As a newly "born again" architect, I want to design with a fresh mind and attitude. While I cannot and do not want to deny the baggage I have collected over the years, I do want to begin to formulate an agenda which is my own in order that I can do what I do with conviction and confidence.

ARCOSANTI SILT PAVILION

- Workshoppers come to Arcosanti to learn innovative construction and craft techniques developed and demonstrated by Paolo Soleri. The Arcosanti Silt Pavilion is a place where residents and visitors of Arcosanti can experiment in silt casting concrete and plaster pieces. In addition, facilities should include a small studio for a resident artist/sculptor.
- The location for the pavilion will be on the flat area just below the Music Center (where a temporary tent currently rests).
- The proposal must offer protection from wind and rain but at the same time include areas open to light (to facilitate quick drying of cast pieces).
- During special occasions, slide/light/shadow shows are projected on the onlooking mesa. The design should accomodate these situations.
- Should be easily accessible from the primary path system of the complex (current access is difficult).
- Water is precious: a system should be devised to save rain water so it can be used directly in the casting process (mixing concrete and plaster, diluting silt).
- The preferred, most feasible construction method for the site is poured in place concrete. Silt from the nearby river bed can be used as formwork.

WORLD'S END CANOEING PAVILION

- The facilities (will) include: a pier and landings for rental canoes, an area for canoe storage, an office for a permanent staff person, some sheltered exhibition space, restrooms, an outdoor area for picnicking.
- The location of the project is on *Rocky Neck*, a small protected cove by the water which includes habitable terracing rocks and oversees Olmstead's *Planter's Hill.*
- To preserve the quality of the place, no cars are allowed into Rocky Neck (visitors are encouraged to arrive by boat, or to park in a nearby lot). The current path system will be further developed to allow for easy pedestrian access into the site.
- Materials of the site (trees, granite) should be used. The building method should involve an assemblage of elements: posts, sticks, blocks, etc. .which are in or are easily brought into the site. Rocks may be redeployed on the landscape.

The Silt casting site. Main access level is ~ +16 feet.

058

The canoeing site. Pines, maples, oaks, rocks, water.
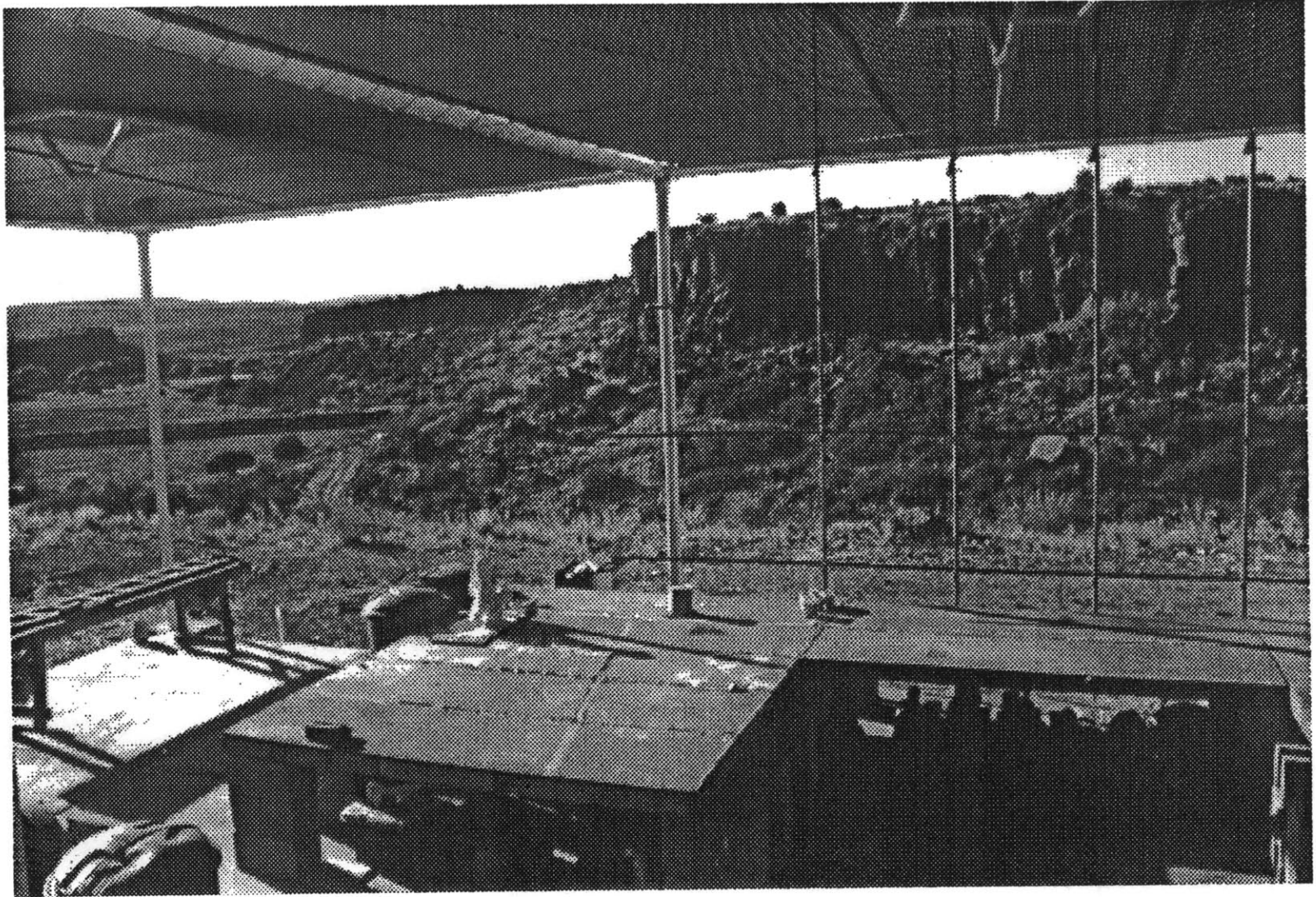
Arcosanti: view from inside the existing pavilion

60
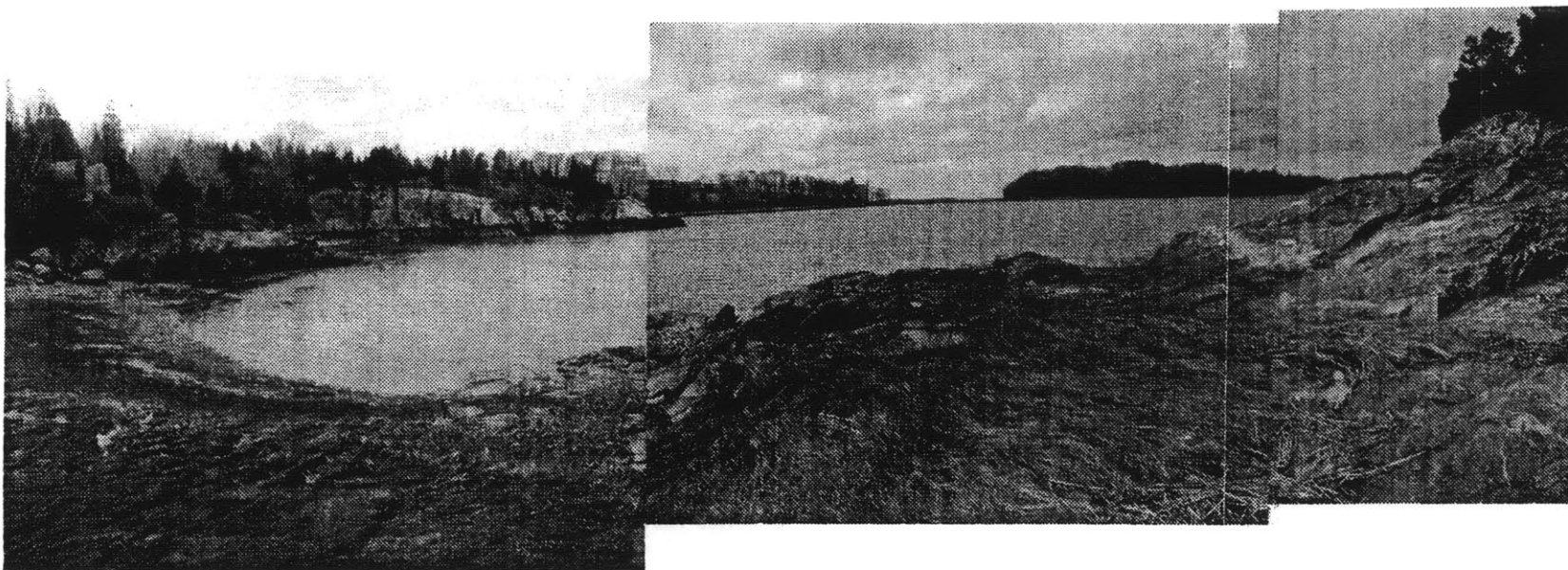
World's End: view from the site

Silt casting at Arcosanti
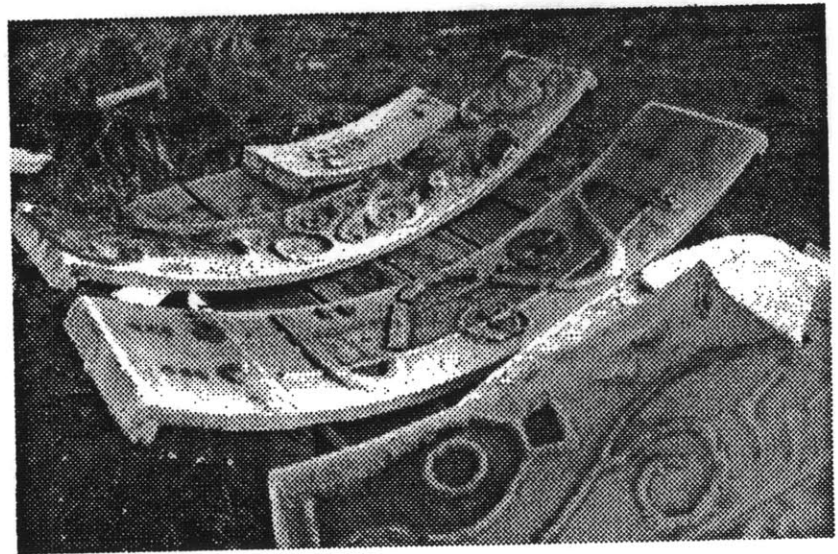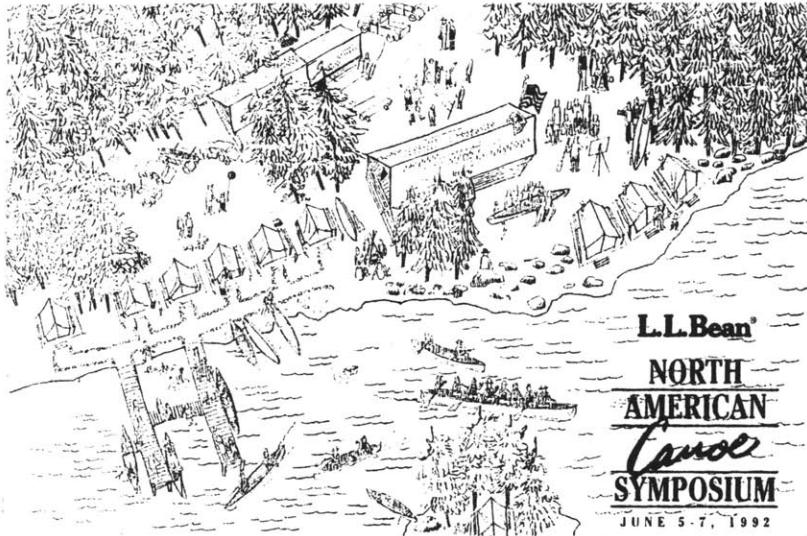
canoeing...

Old Town Discovery Canoes

Our best canoes for family recreation, general touring and running whitewater. Popular with many professional guides and outfitters. Made of Cross Link 3™, a stiff rotomolded 3-layer polyethylene that withstands abuse season after season. Tough, durable and maintenance-free.

Each model has a high bow that cuts through waves for efficient paddling. Built-in carry yoke for portaging. Tough vinyl gunwales. Made in Old Town, Maine.

Most models offered with contoured, maintenance-free molded seats with built-in flotation or traditional cane seats. All models include Old Town's video cassette "Introduction to Canoeing."

Model 119 Solo model goes where other canoes can't. Exceptionally light and easy to carry from car top to water. V-entry hull with keel for easy paddling and steering. Length: 11'9". Depth: 13½". Width at waterline: 31". Bow ht.: 19". Capacity: 475 lbs. Wt.: 43 lbs. Colors: Red, Green. Available with cane seats only.
Q451KE $425.00 plus shipping

Model 146 Built for two, but easy to handle when "going solo." Built-in keel reduces drifting on flatwater and improves tracking. Length 14'6". Depth 14". Width at waterline: 35¼". Bow ht. 21". Capacity 700 lbs. Wt. 72 lbs. Colors: Green, Red.
G238KE With Cane Seats $529.00 plus shipping
H046KE With Molded Seats $499.00 plus shipping

Model 158 Flat bottomed, easy handling family canoe for rivers, lakes and ponds. Takes punishment and bounces back for more. Length 15'8". Depth 13½". Width at waterline: 35⅜". Bow ht. 21½". Capacity 980 lbs. Wt. 80 lbs. Colors: Green, Red.
6300KE With Molded Seats $549.00 plus shipping
6200KE With Cane Seats $579.00 plus shipping

Model 169 Shallow arch bottom for enhanced speed and steering in fast water. Dependable, maneuverable and highly predictable when conditions are not. Length 16'9". Depth 15". Width at waterline: 35". Bow ht. 23". Capacity 1,000 lbs. Wt. 85 lbs. Colors: Green, Red.
B563KE With Molded Seats $589.00 plus shipping
B562KE With Cane Seats $639.00 plus shipping
For Canoe Shipping Information, call 1-800-221-4221.
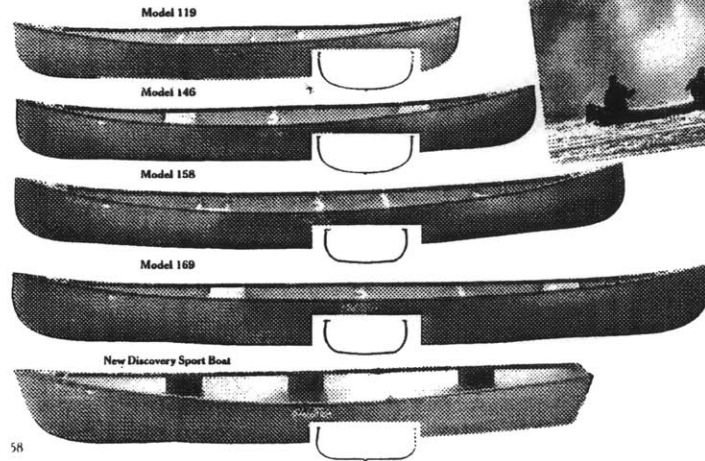
New Discovery Sport Boat

Combines the durable construction of Cross Link 3 polyethylene with a versatile square stern design to create a remarkably stable craft for fishing and exploring lakes and ponds with the family. Can be rowed or motored. Easily transported on car top or in back of a full-size pick-up. Varnished fine grain wood seats, vinyl gunwales and oarlocks (oars sold separately, opposite). Accepts outboard motor up to 3 horsepower. Made in Old Town, Maine. Length 13'. Depth 15". Width at waterline: 42½". Bow ht. 22¾". Capacity 650 lbs. Wt. 92 lbs. Colors: Olive Drab, Red.
Q144KE $725.00 plus shipping

1992 North American Canoe Symposium
Sponsored by L.L. Bean

The canoe is a simple, graceful craft of ageless design. It can take you to scenes of wonderment and solitude, of relaxation and renewal. A long, flatwater stretch on a Saturday morning that dispels the demands of everyday life. A set of rips that gets your adrenalin pumping. A weeklong trip on the St. John or Yukon that starts lifelong friendships.

Our 7th Annual North American Canoe Symposium captures the tradition and spirit of paddling for canoeists of all abilities. Whether you eagerly look forward to the spring thaw or have never been in a canoe before, we offer an exciting and rewarding experience.

The NACS features hourly seminars on all aspects of canoeing and the latest canoes for you to try out. Structure your own rejuvenating weekend by combining time on land and time on water. It's a great opportunity to develop new skills and share the enthusiasm of fellow paddlers in a beautiful Maine setting.

The symposium will be held on June 5 - 7, 1992. Advance registration is required. To receive a brochure and registration form, please call 1-800-341-4341, ext. 7800.

Model 119

Model 146

Model 158

Model 169

New Discovery Sport Boat

58

Arcosanti Site Plan

064

World's End

Arcosanti: FIRST PASS

066

World's End: FIRST PASS
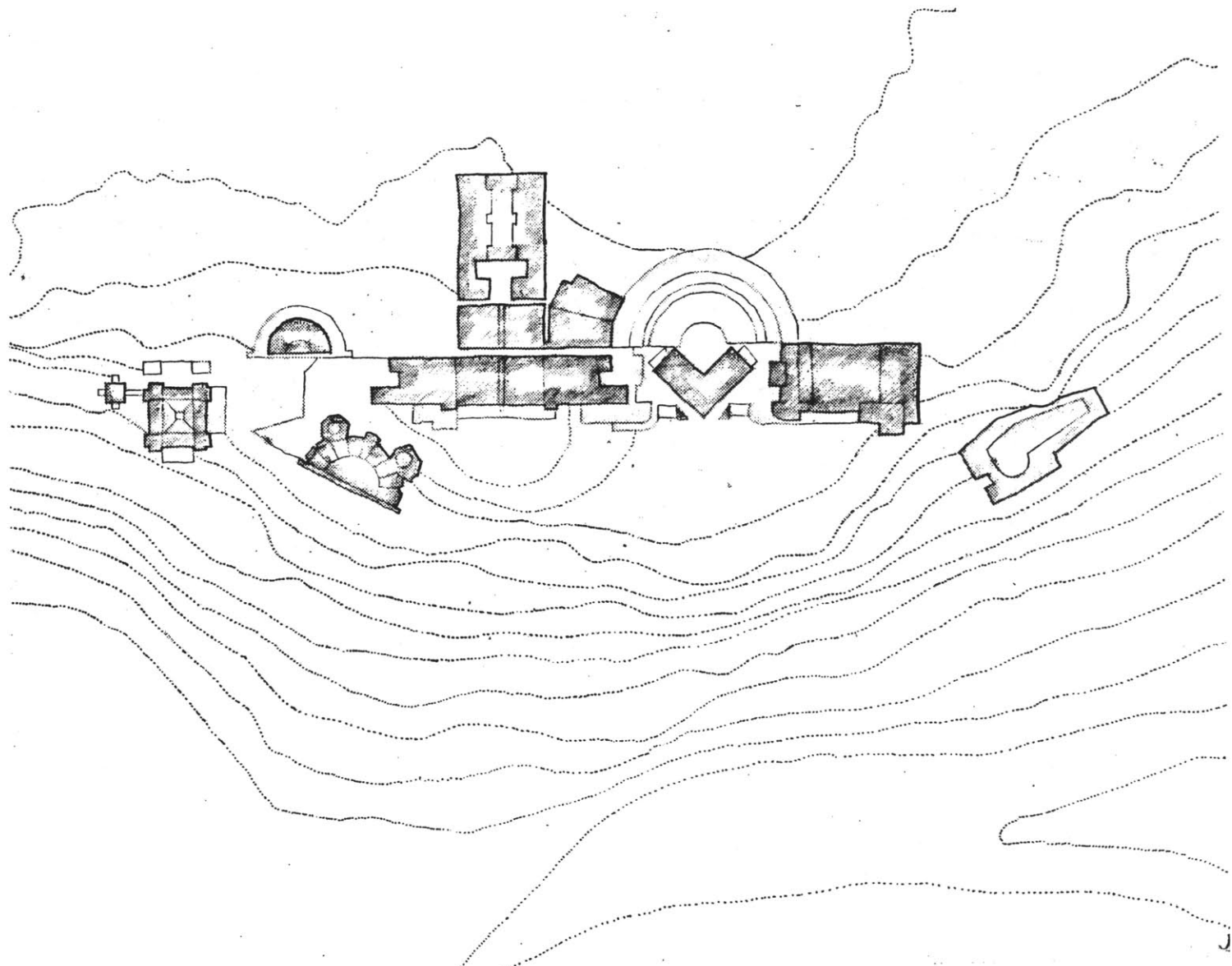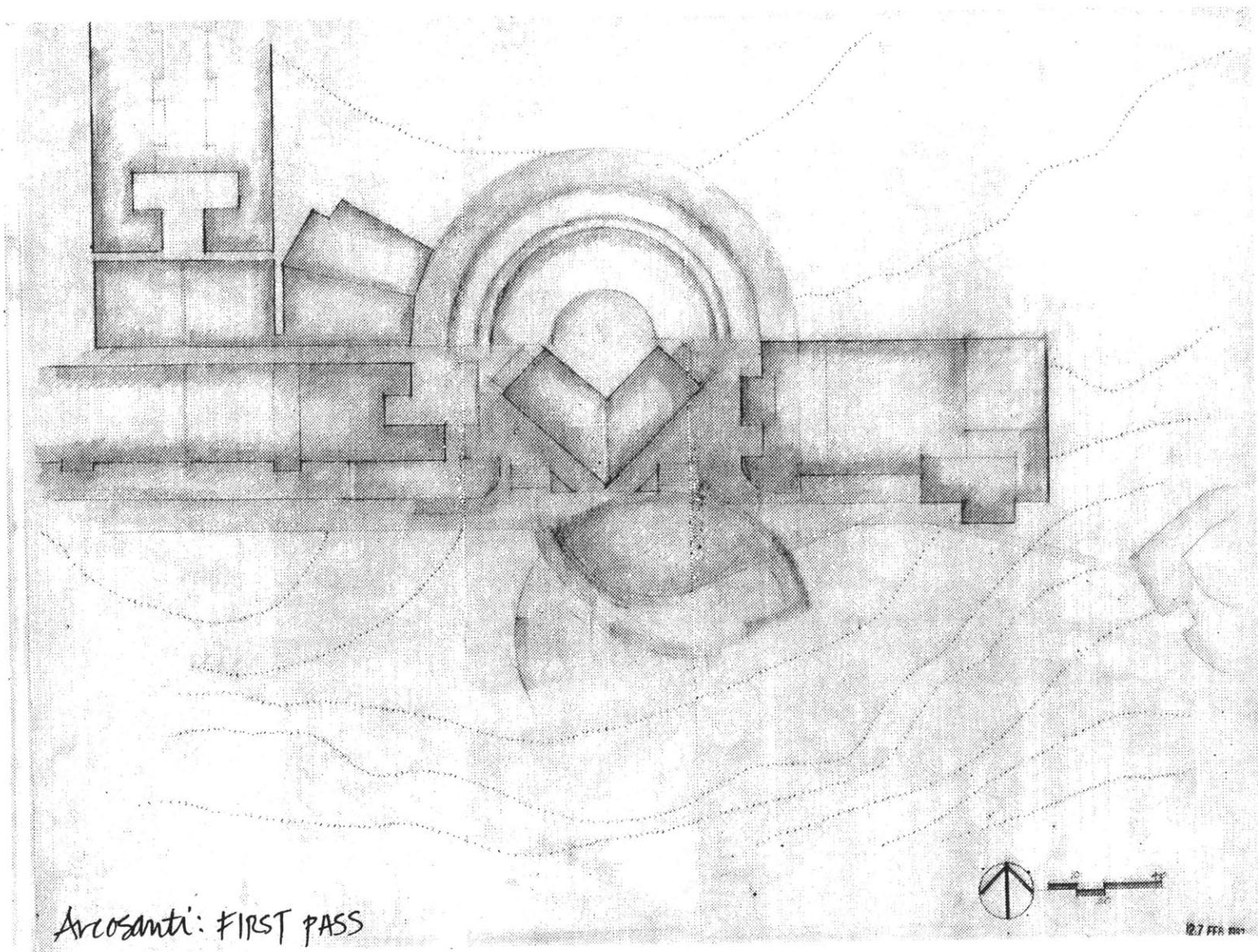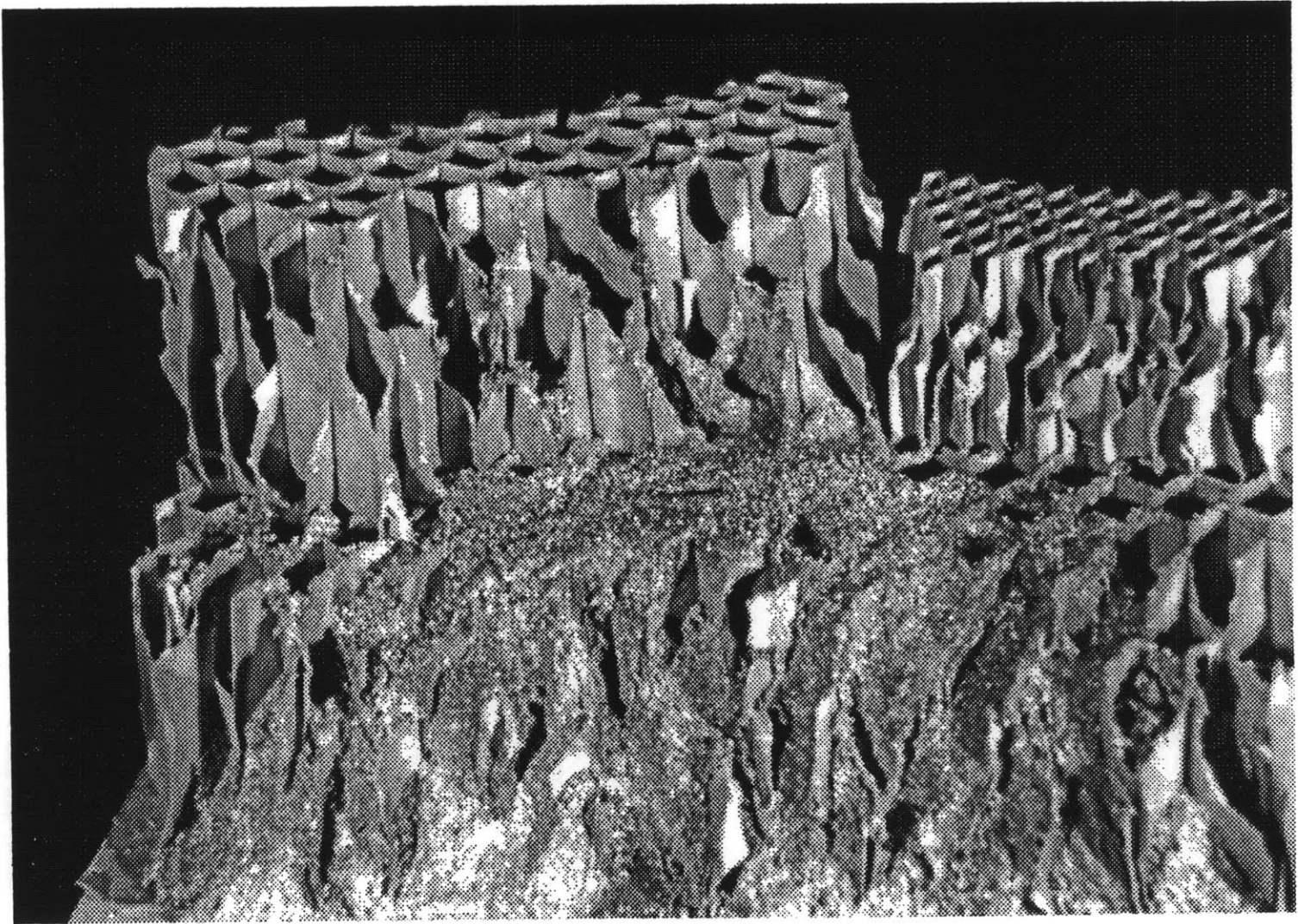
Arcosanti Geology model: the ground is composed of hexagonal columns of basalt which have eroded over time.

068

Geography is life's limiting factor. Speciation—life itself—is ultimately a matter of warm and cool currents, rich and bare soils, deserts and forests, fresh and salt waters, deltas and jungles and plains. Species arise in isolation. A plaster cast is as intricate as its mold; life is a gloss on geography. And if you dig your fists into the earth and crumble geography, you strike geology. Climate is the wind of the mineral earth's rondure, tilt, and orbit modified by local geological conditions. The Pacific Ocean, the Negev Desert, and the rain forest in Brazil are local geological conditions. So are the slow carp pools and splashing trout riffles of any backyard creek. It is all, God help us, a matter of rocks.

Annie Dillard: Teaching a Stone to Talk

World's End Geology model:
Beneath a layer of flora, the ground is a massive slab of granite shaped by the Glacier.

WORLD'S END: some ideas about roofs,
staring boats, the ground

- ->

070

canoes 12' 35'
racket
storage for
paddles:
4'.0" - 6.0"

0 6 MAR 1992

0   1   4
   2

071
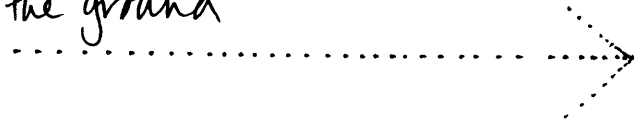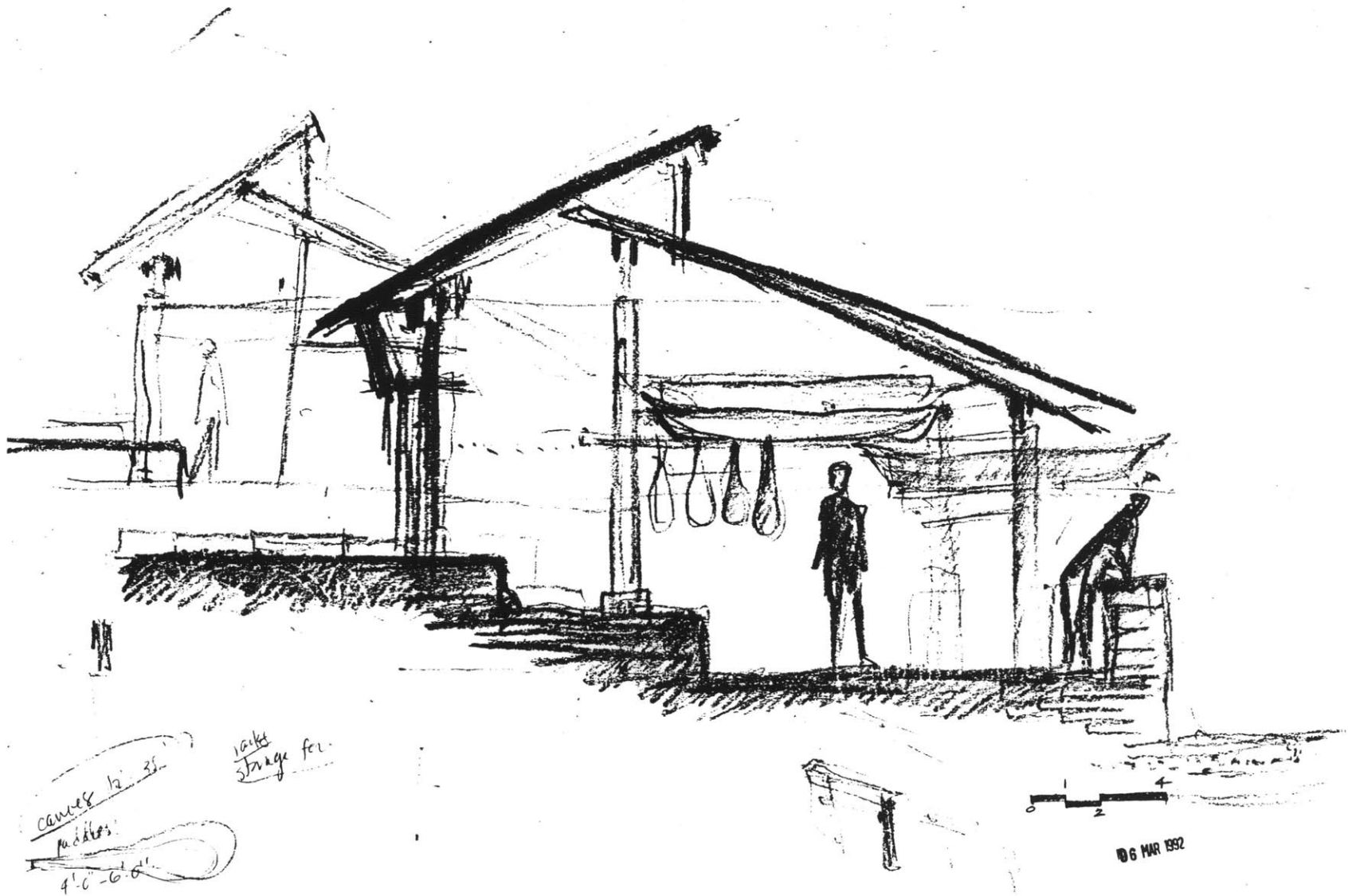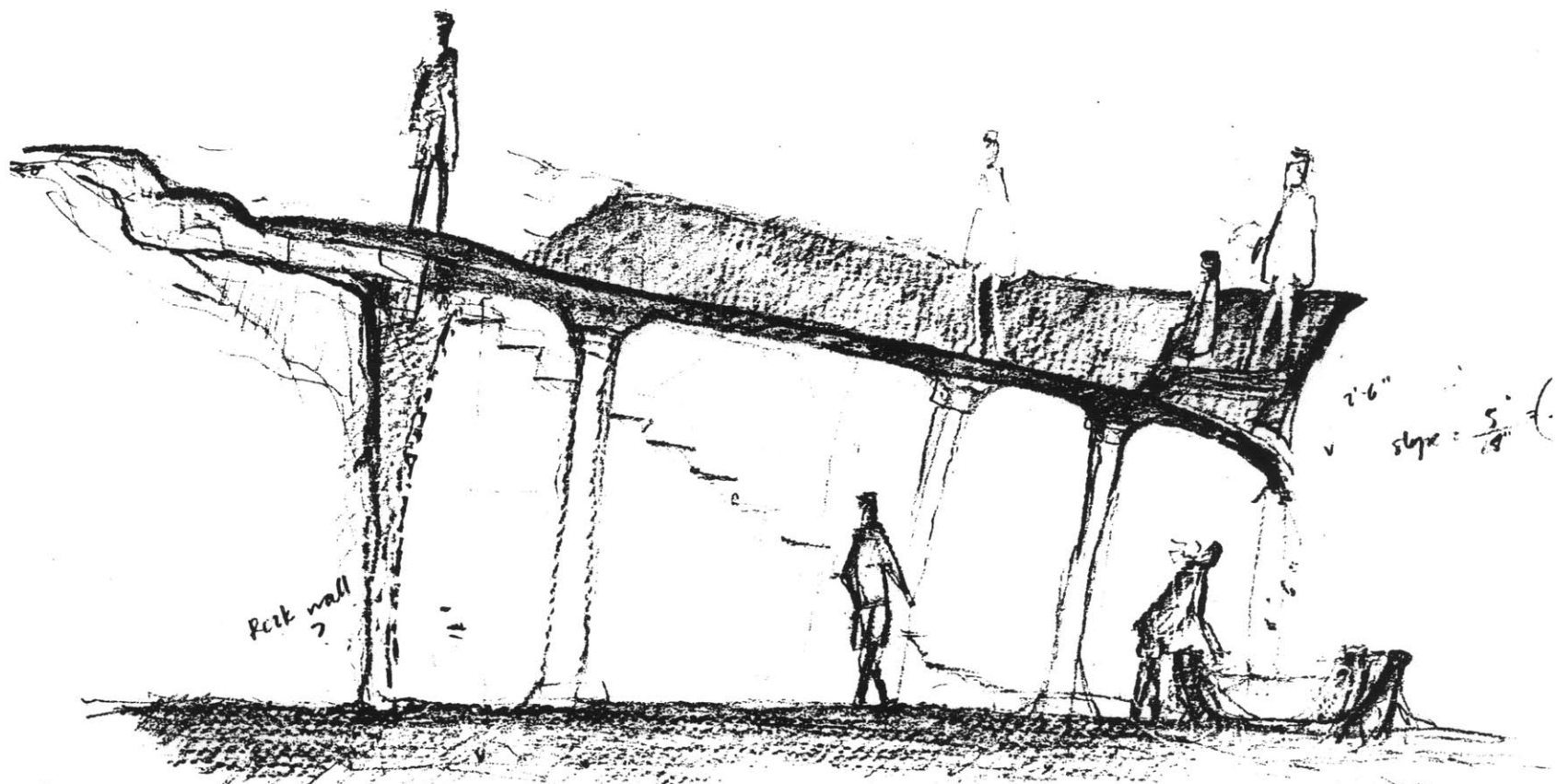
$\frac{1}{2}" = 1'-0"$

Rock wall ?

2'-6"

slope = $\frac{5}{8}$:

29'

$\frac{1}{0} \quad \frac{1}{1} \quad \frac{1}{2} \quad \frac{4}{}$
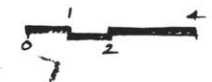
072

ARCOSANTI:
Sloping a habitable roof in order to collect water.
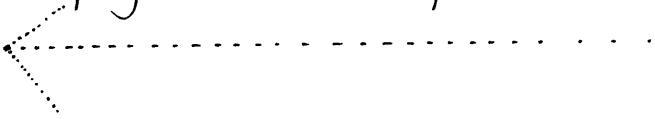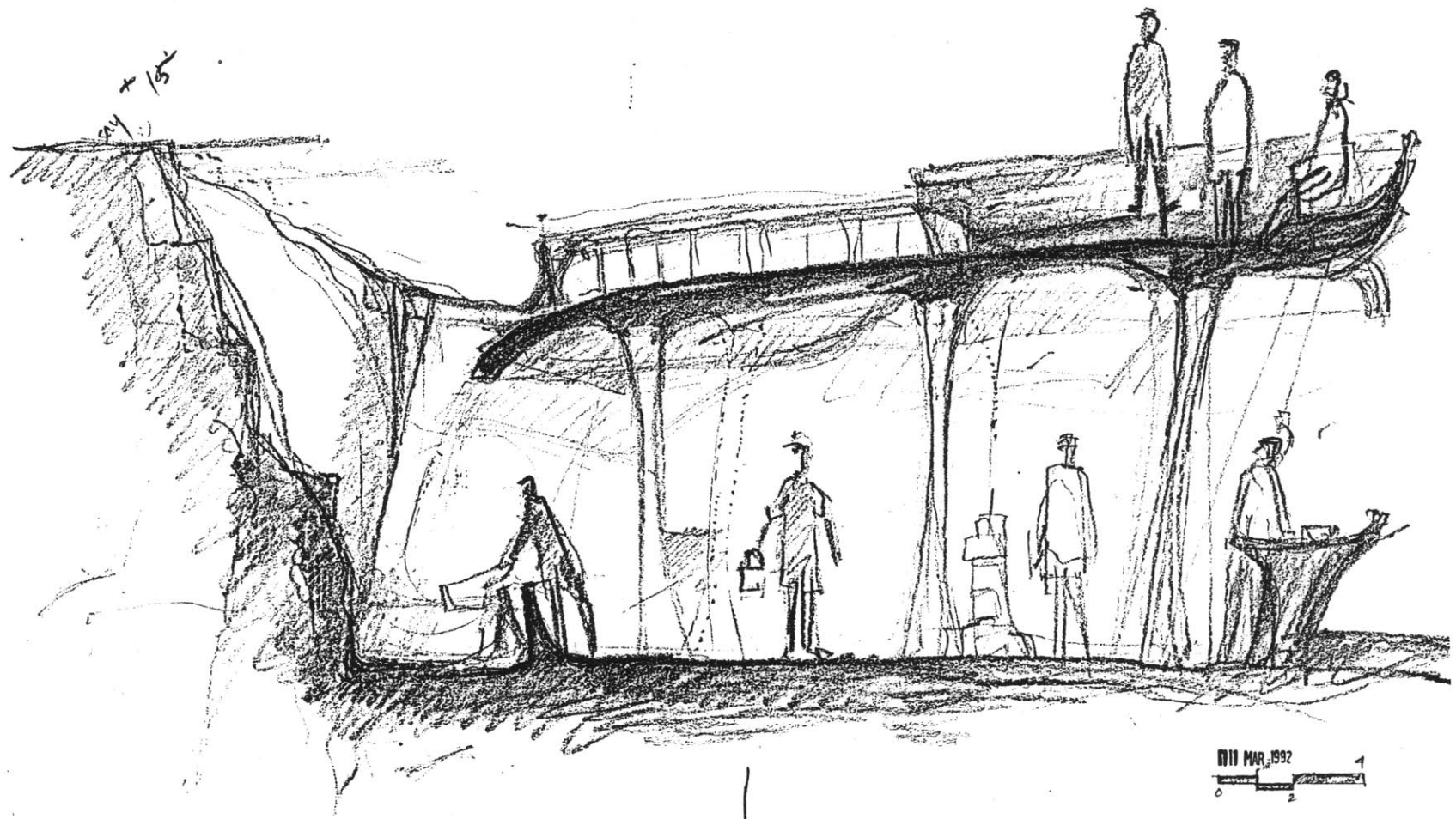
ARCOSANTI: Introducing water inside the building

074
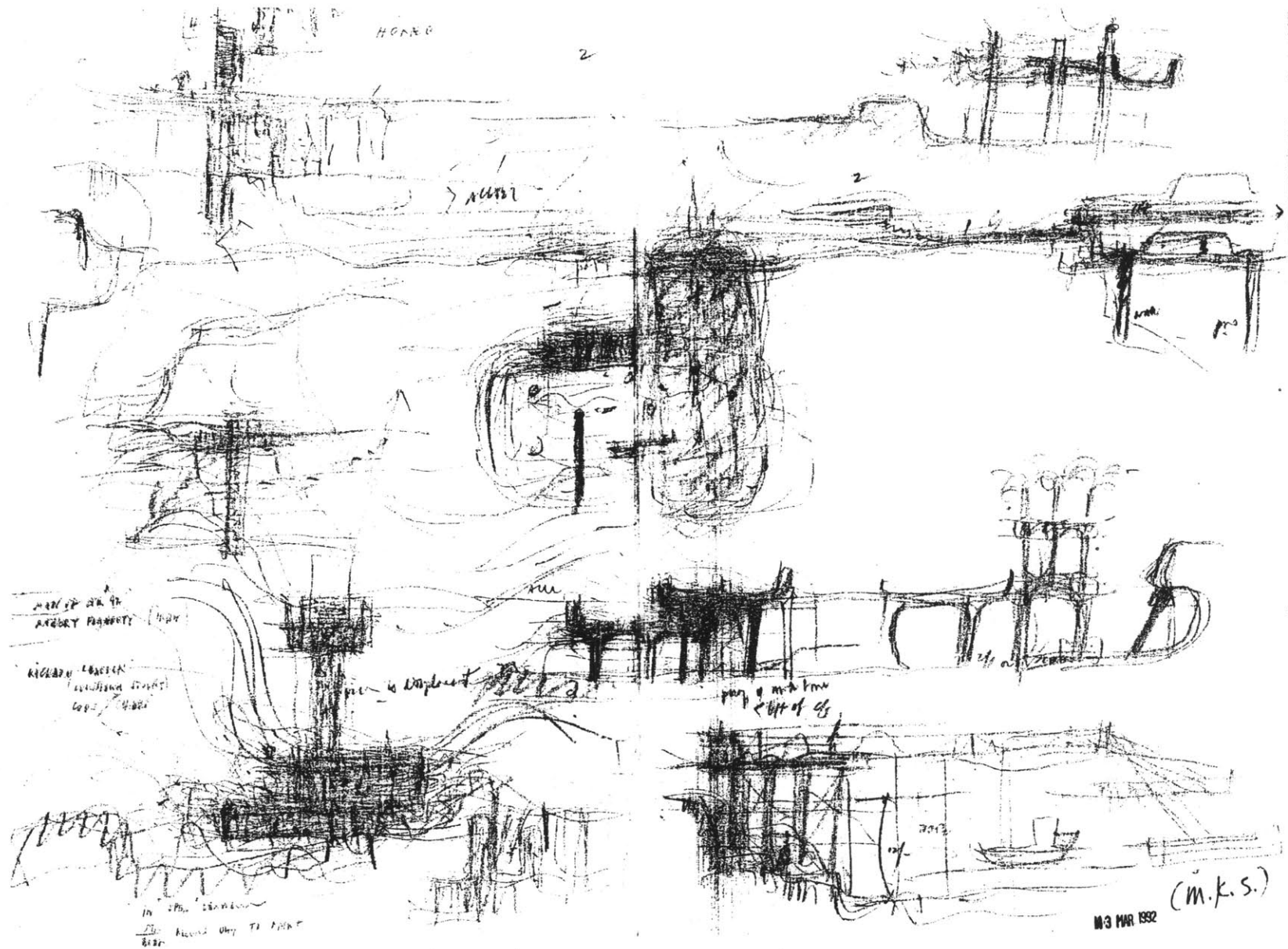
Scribbles from a desk crit with Maurice Smith

076

15. MAR 1992

077
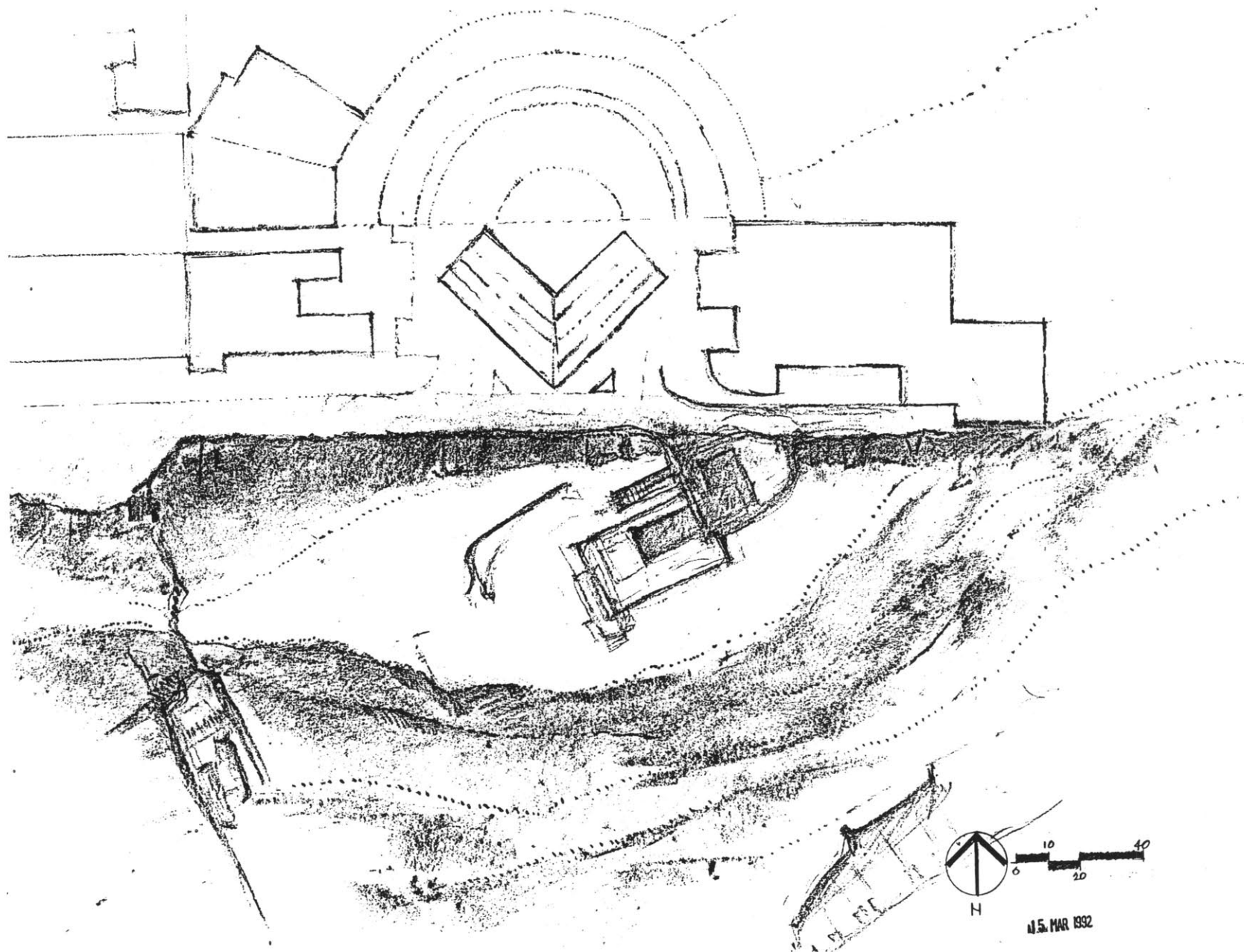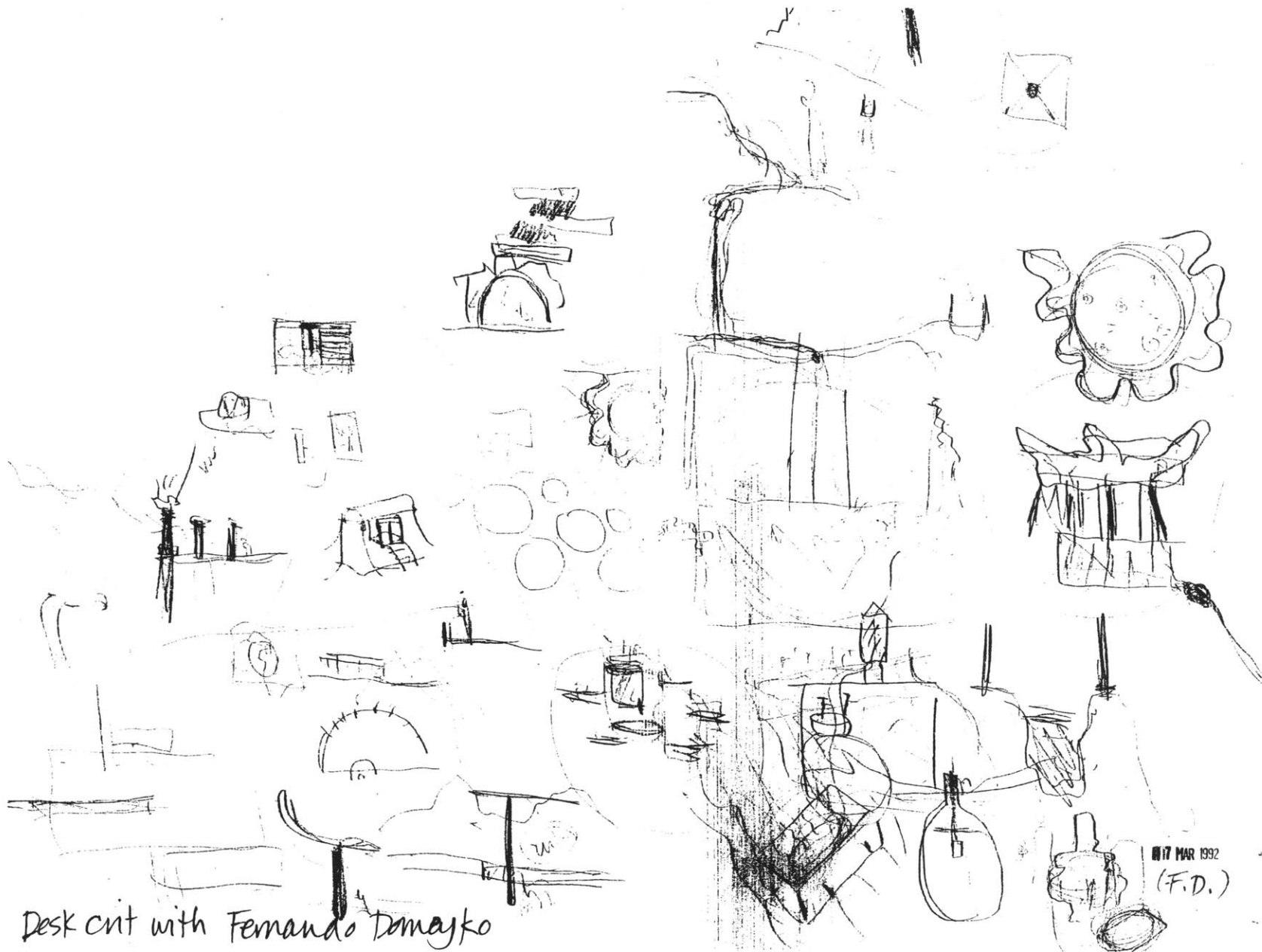
Desk crit with Fernando Domayko

17 MAR 1992
(F.D.)

079
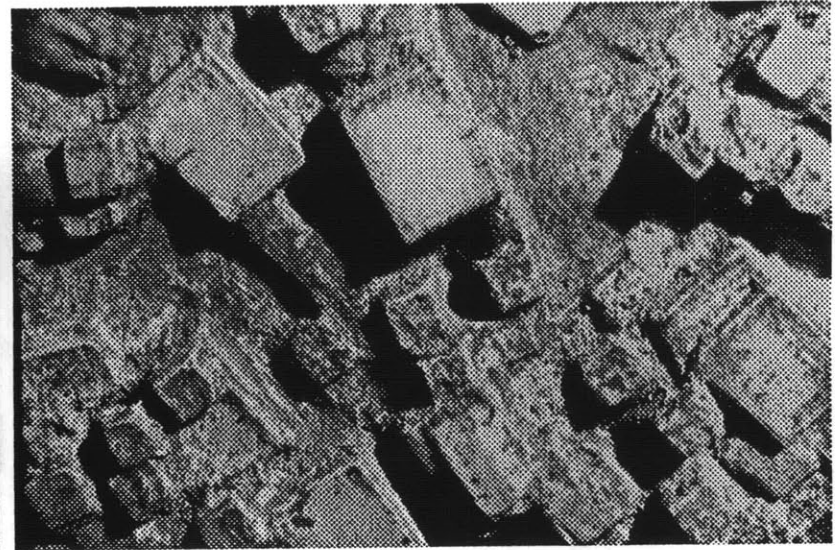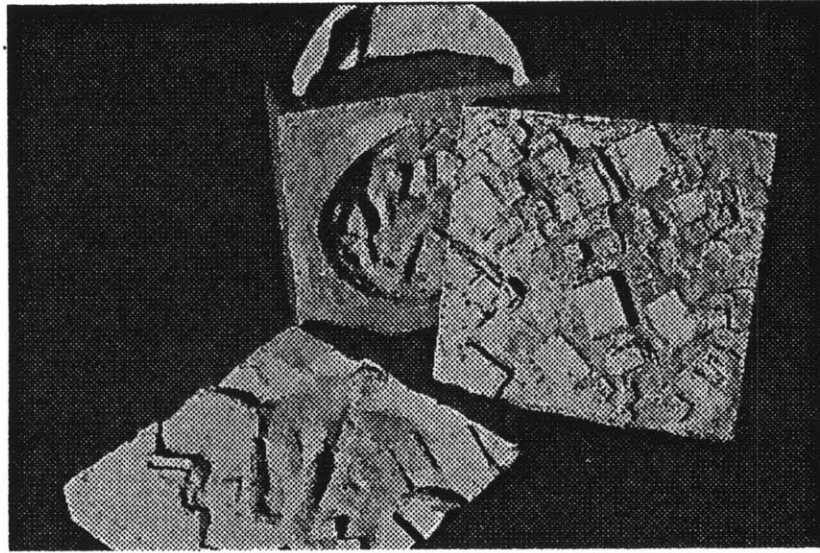
Silt casting exercises.
At right: surface details

082

N°8 MAR 1992

083

084
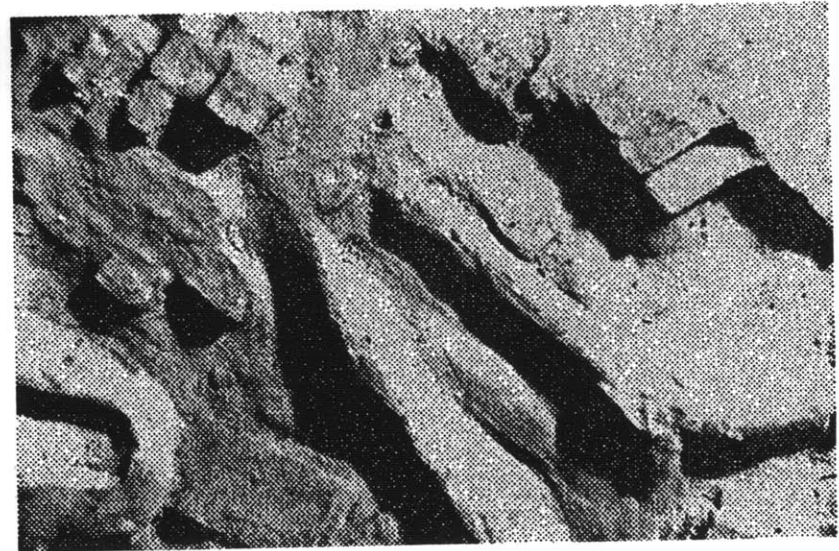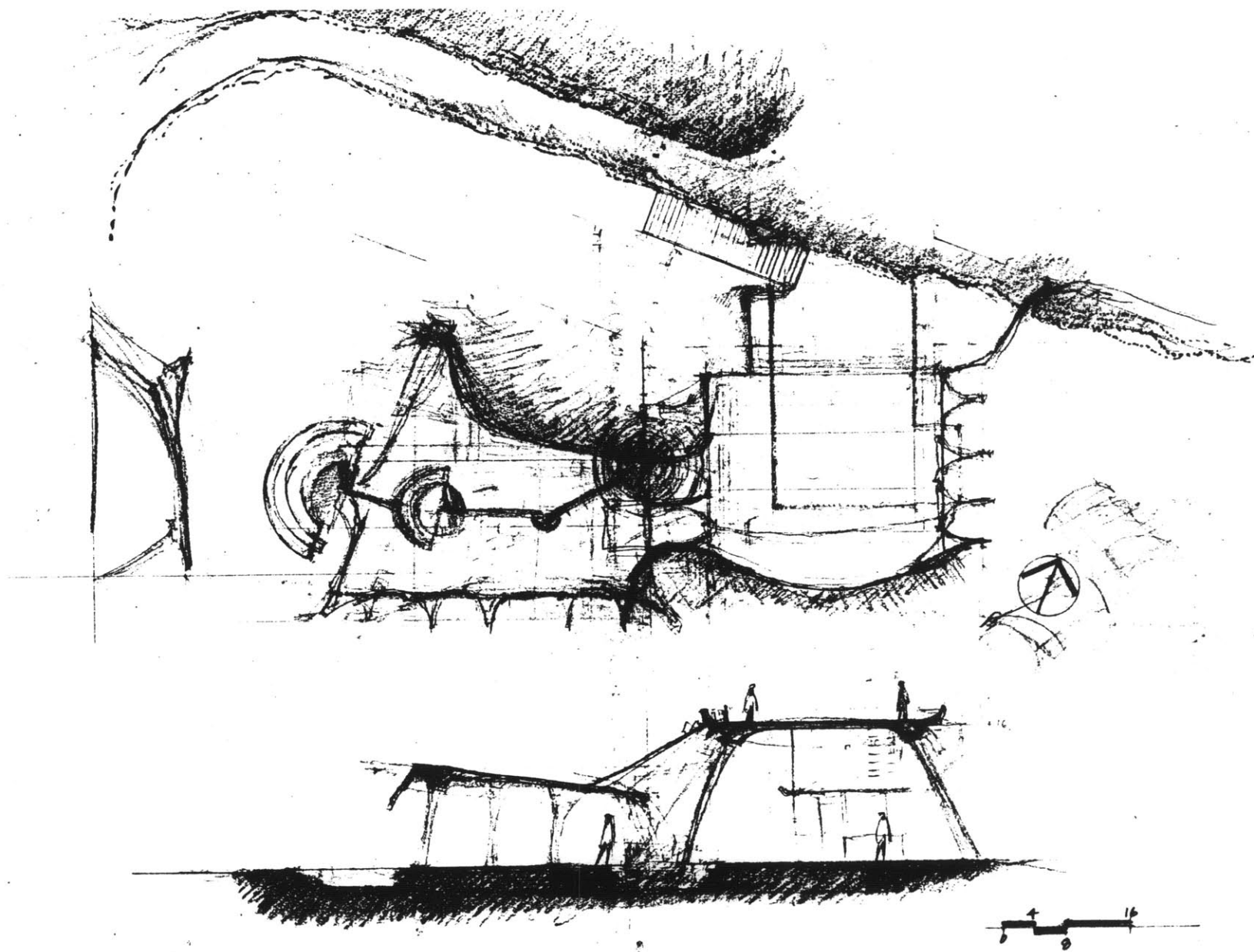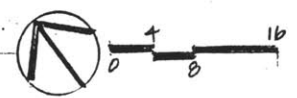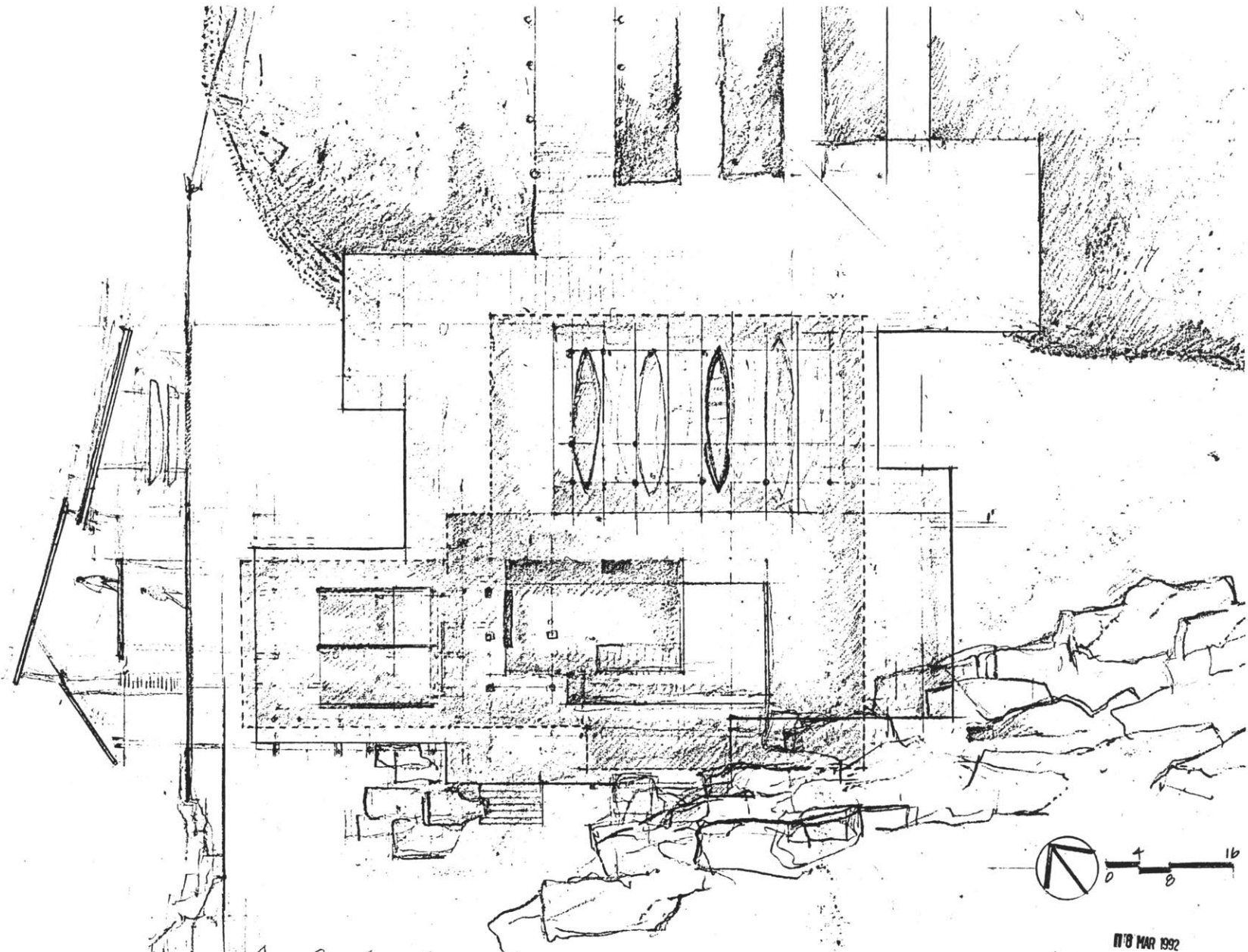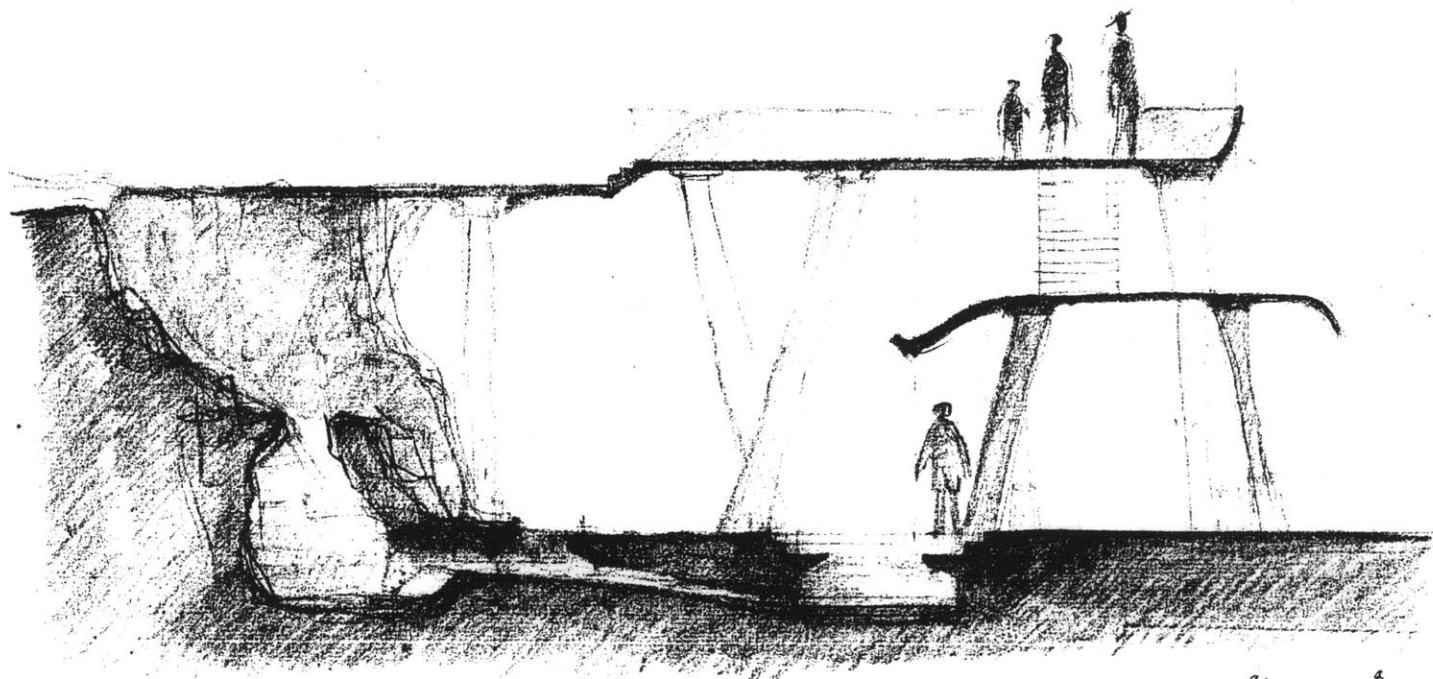
ARCOSANTI: cisterns and canals
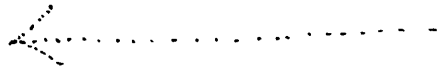
kupka: DISKS of Newton - Study for Fugue
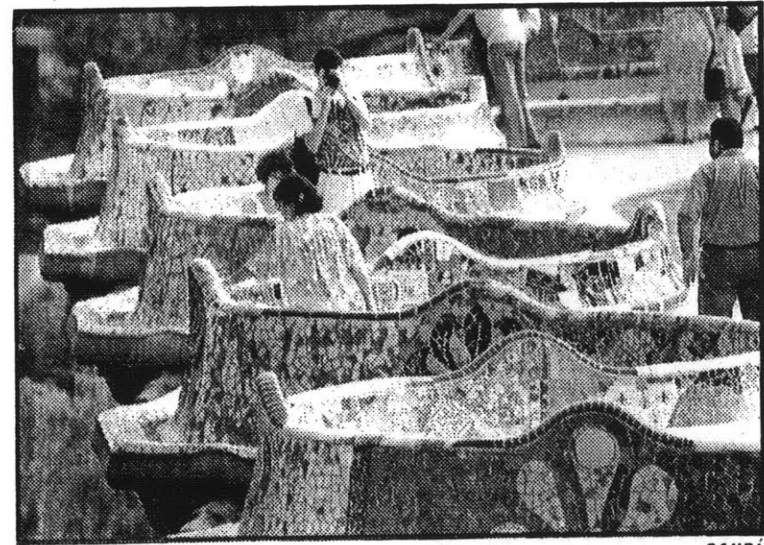
BARCELONA   GAUDÍ

Park Guell

"Serpentine behavior" references
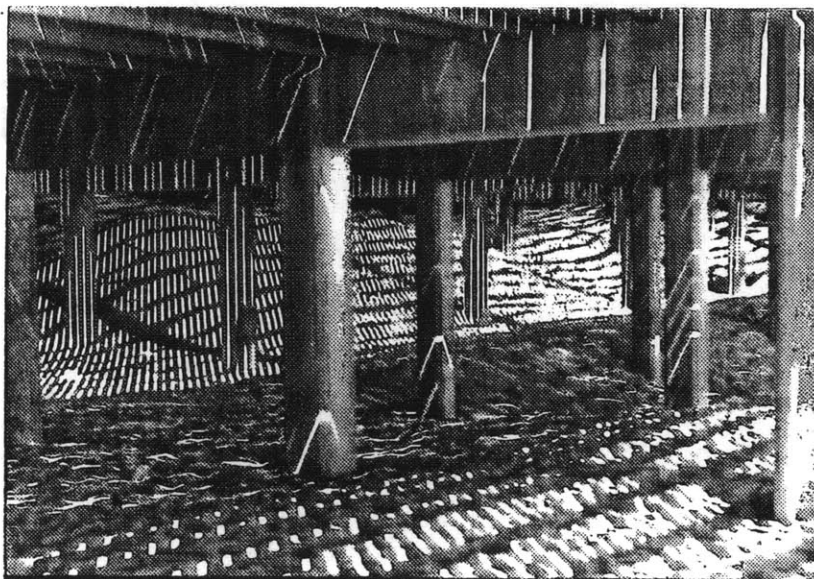
coney island boardwalk

Pier references...................
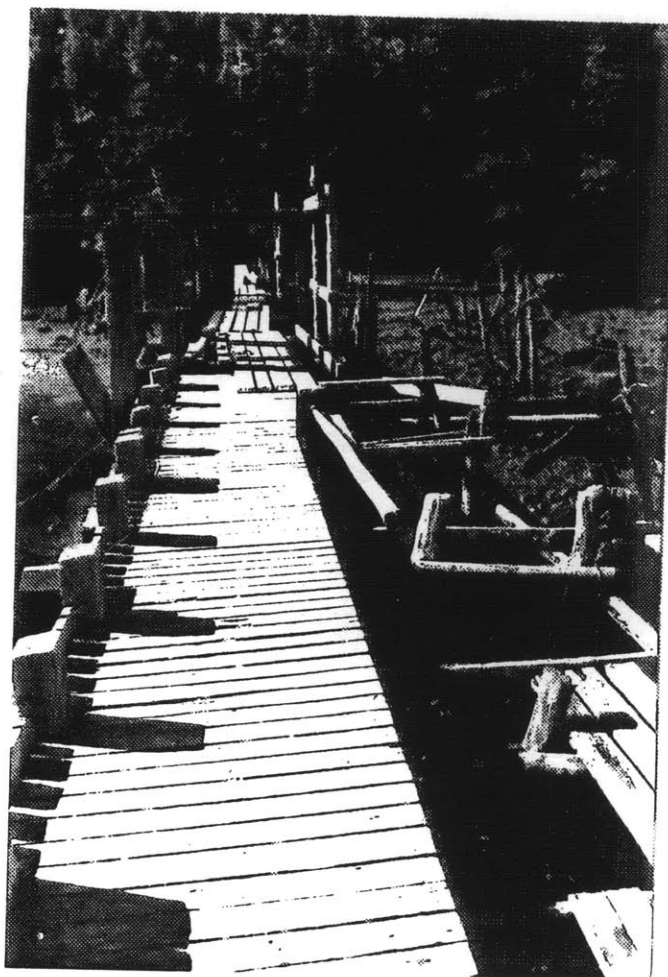
beals island, maine

087
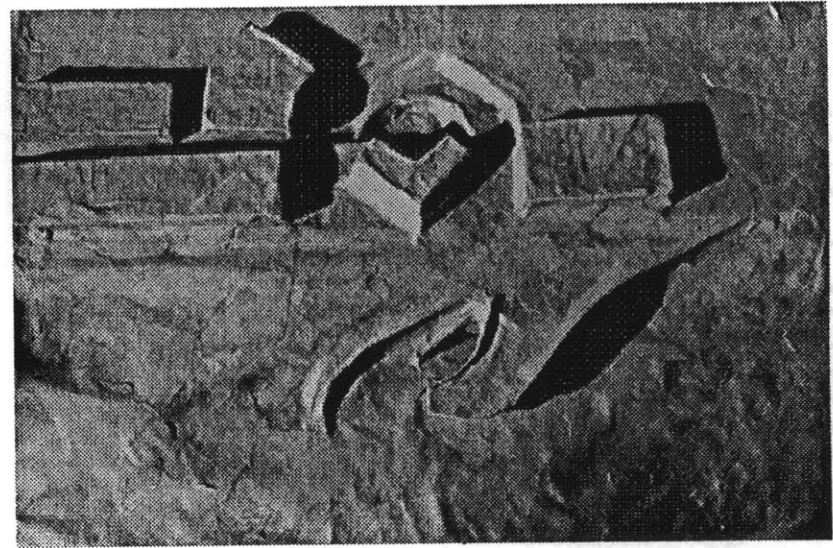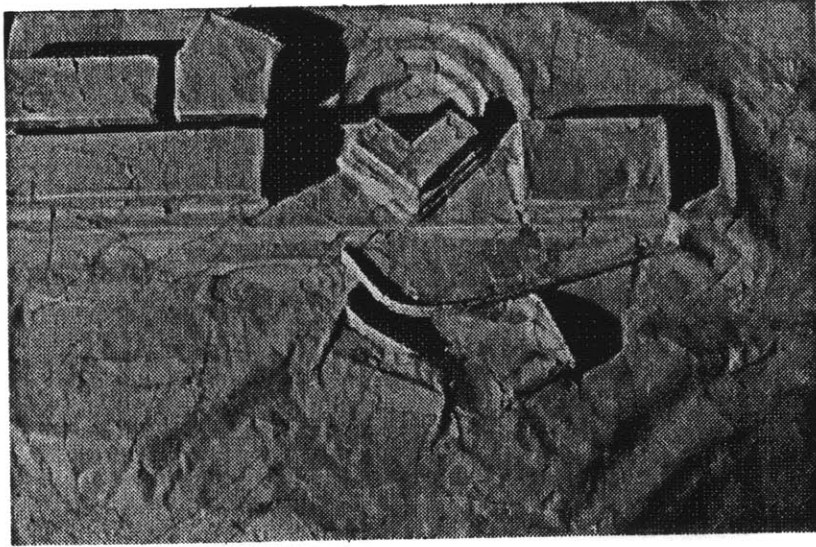
ARCOSANTI: STUDY MODELS
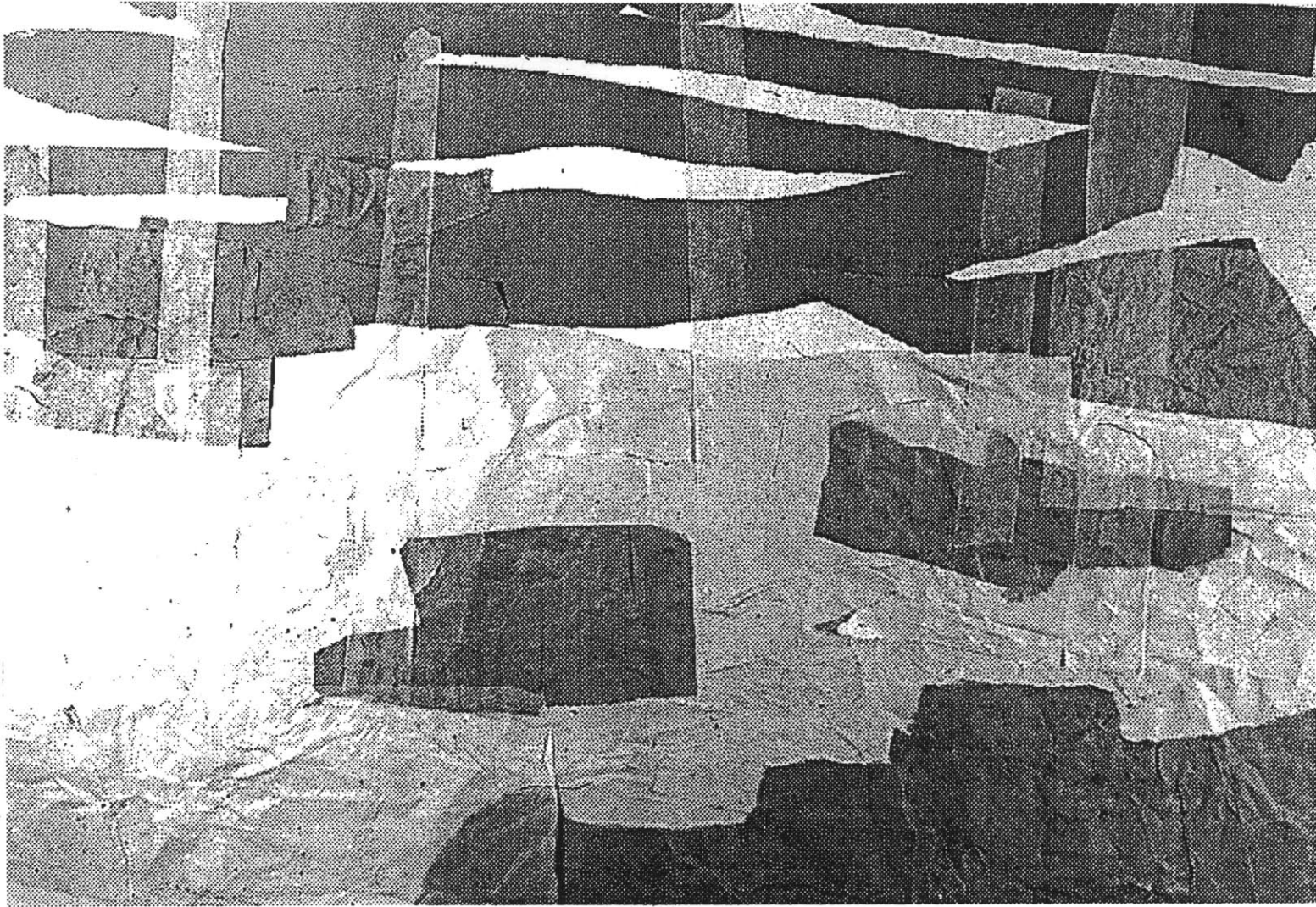
WORLD'S END MONTAGE: framing views, building an exchange between elements

WORLD'S END: containments and
"rocks" within a system of screens
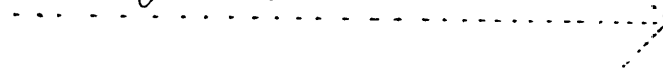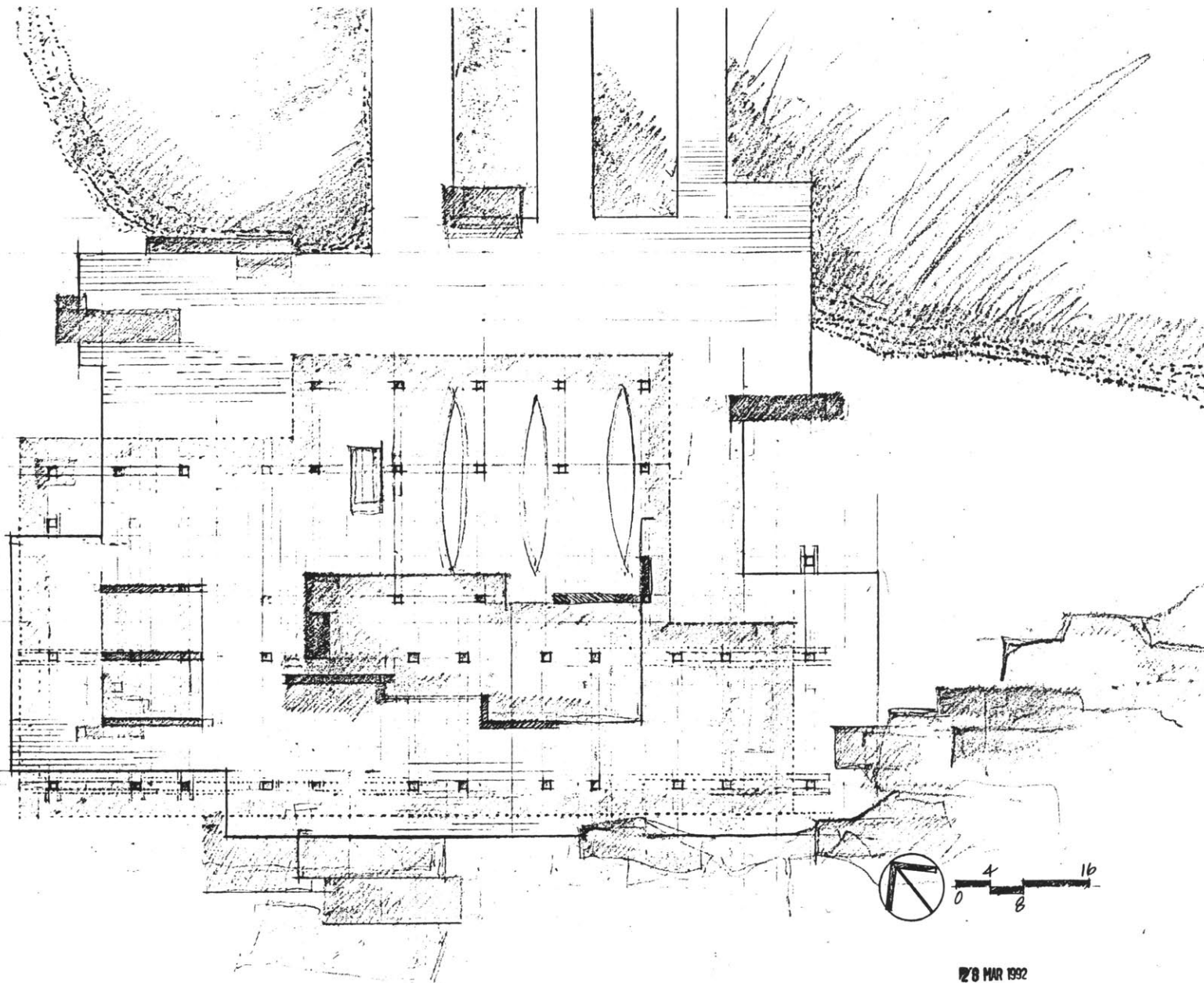
090

0   4   8   16

128 MAR 1992

091

MAR 3 1 1992

092

lockers
changing rms.

sliding deck.

0 4 8 16

093
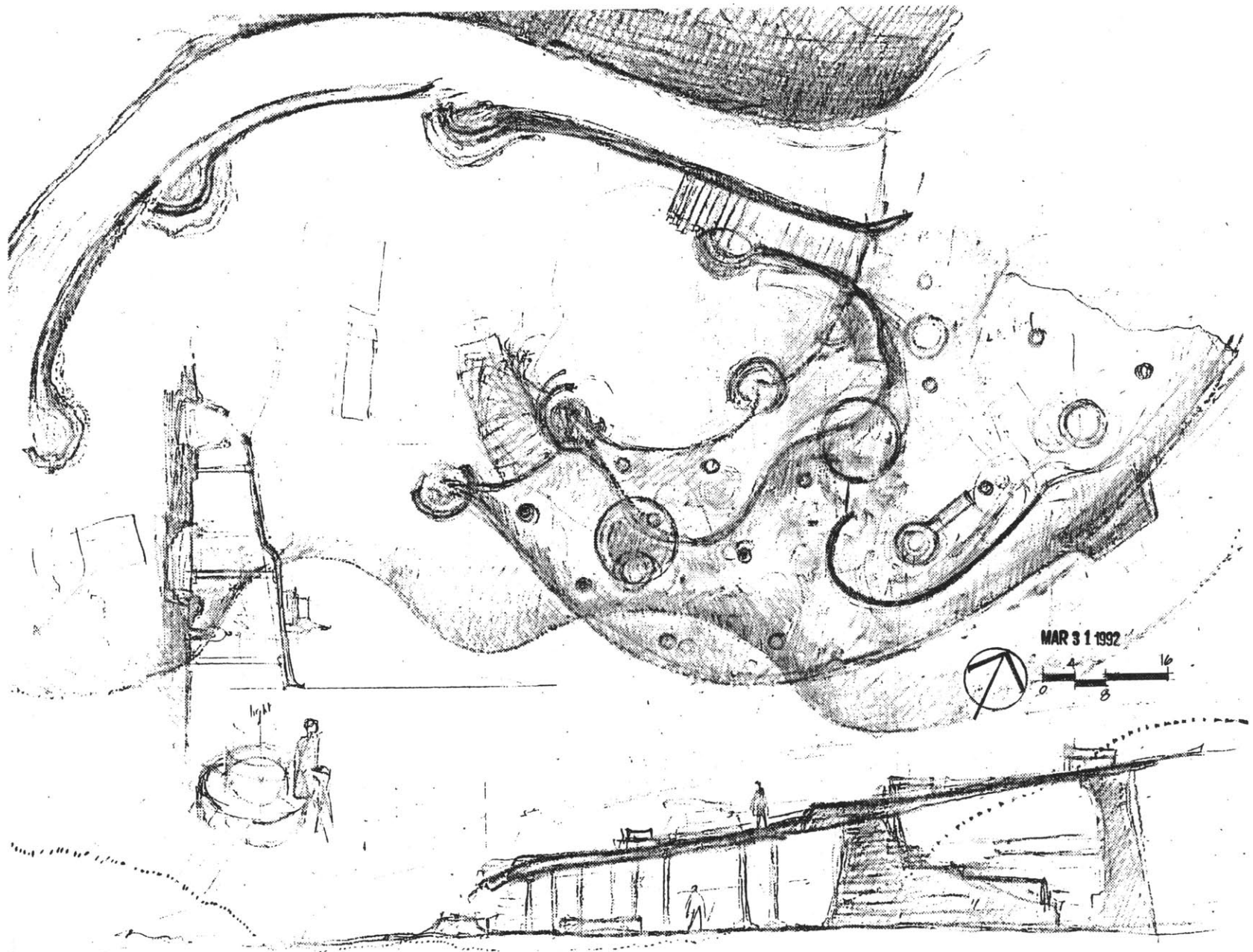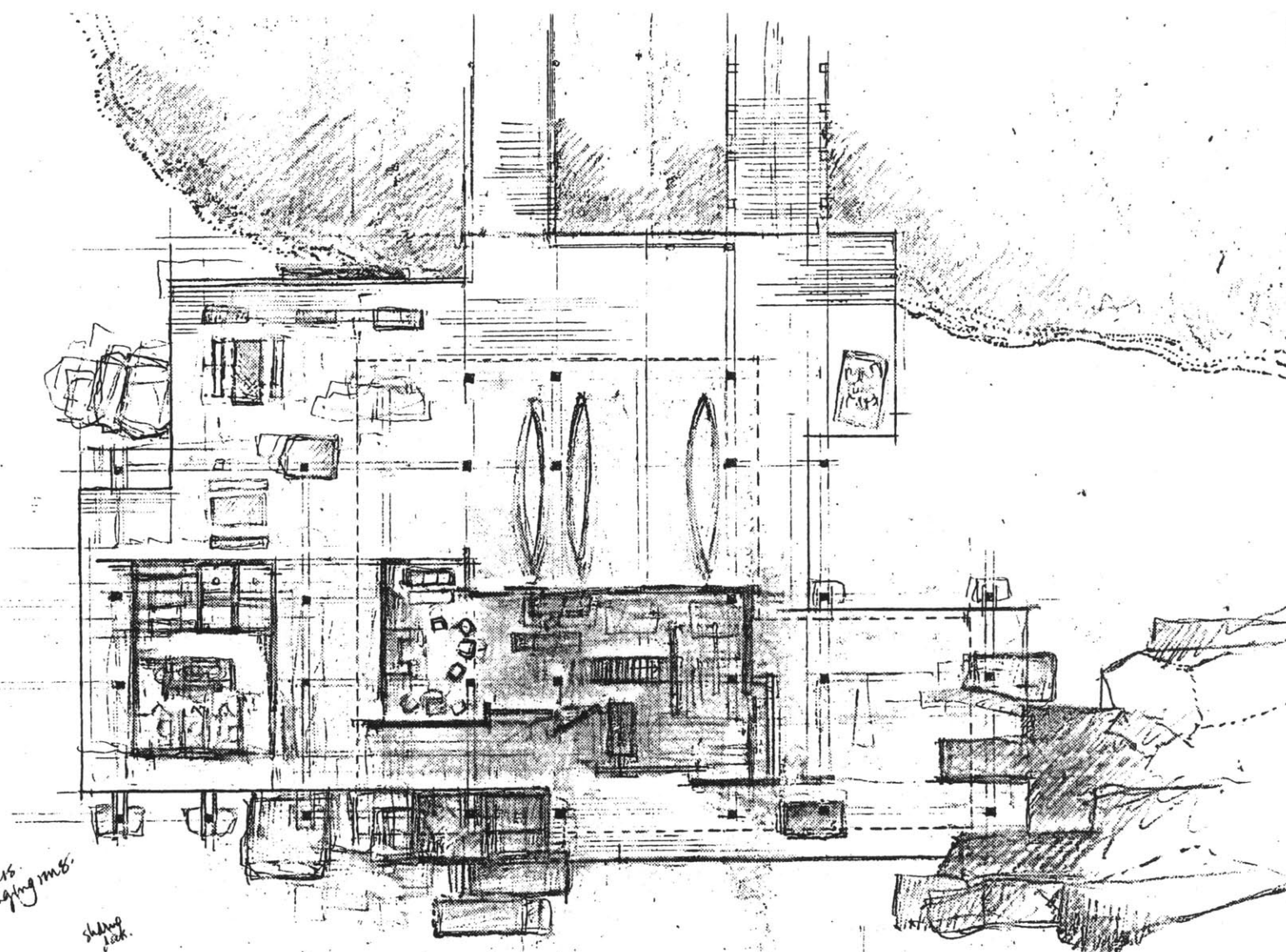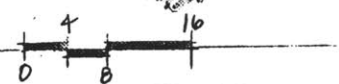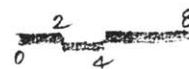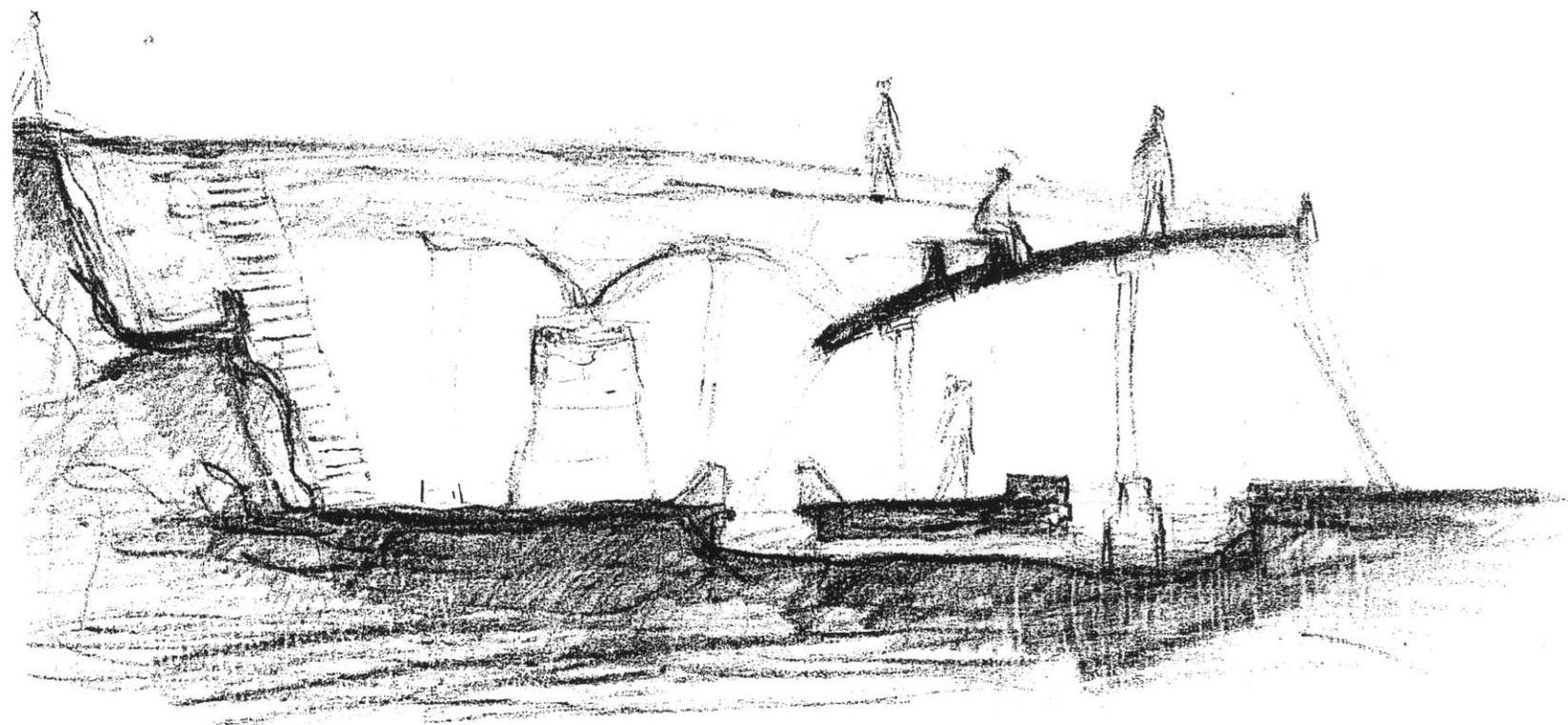
094

APR 0 1 1992

0 2 4 8

'095

096
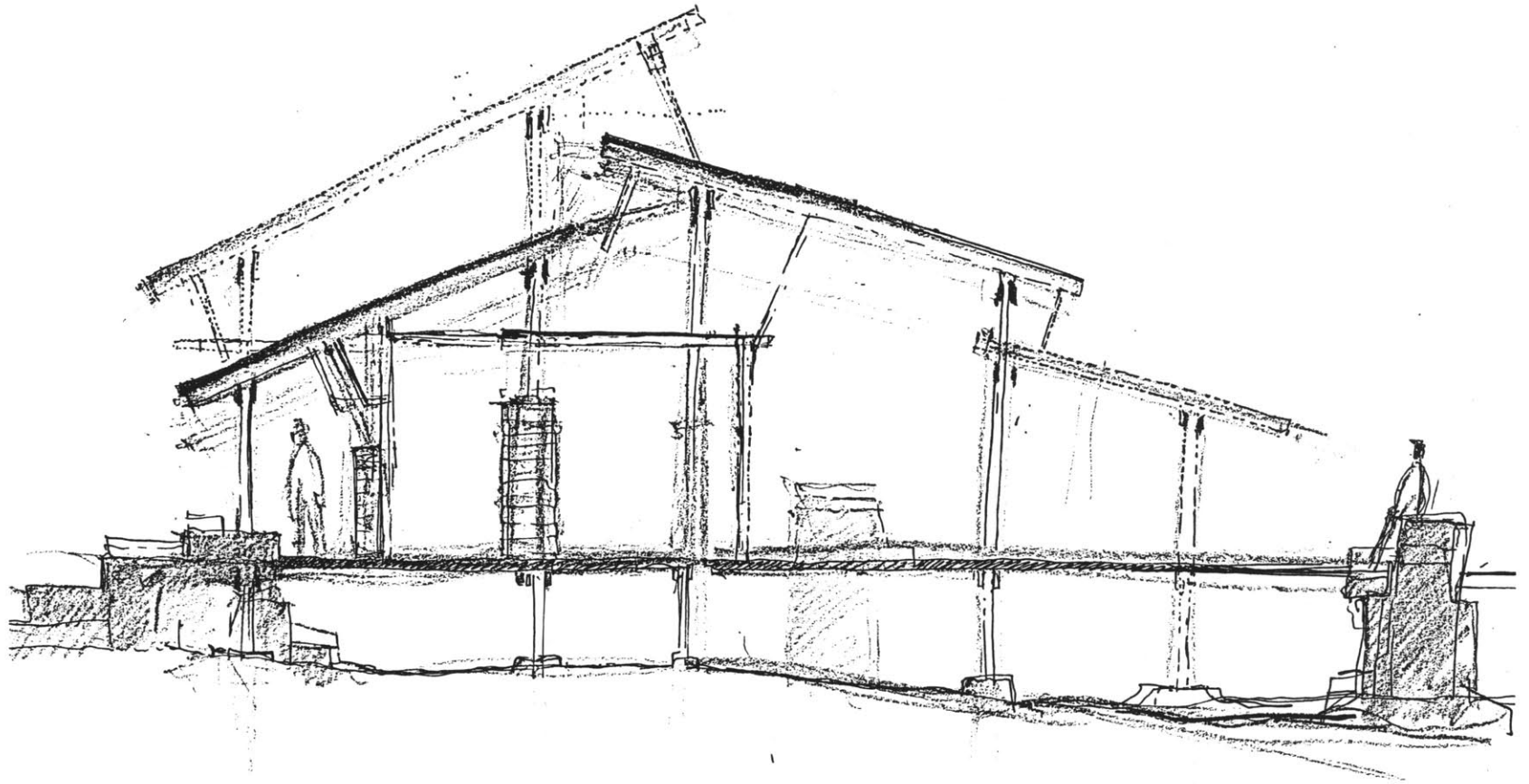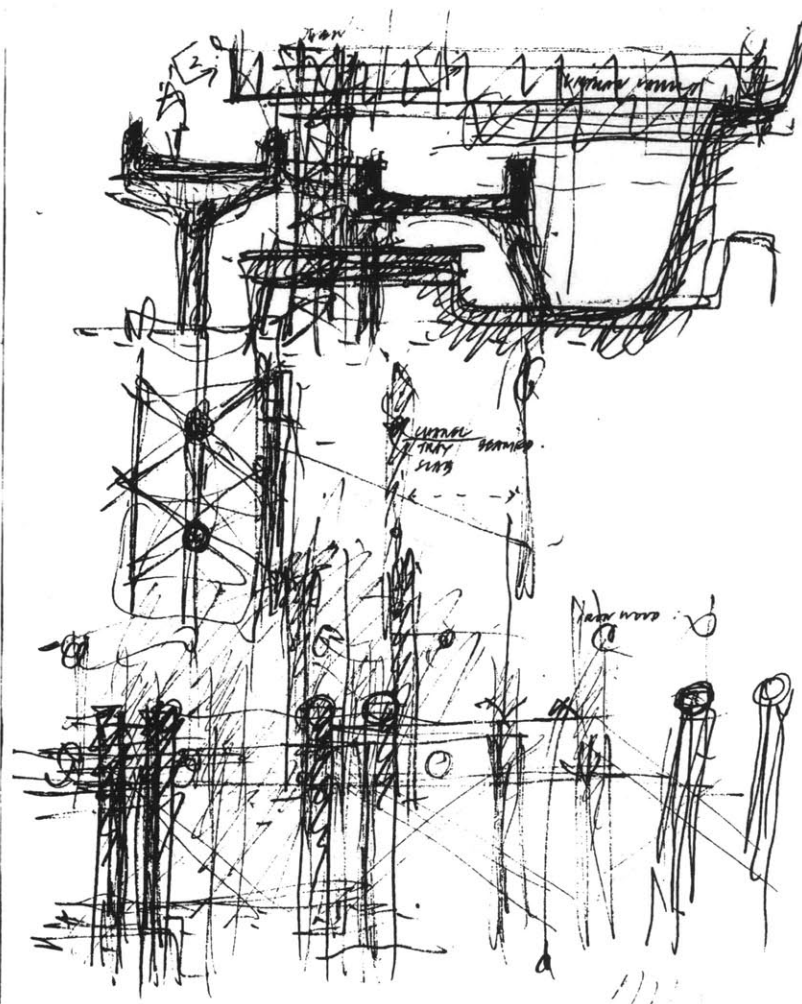
CONTENT REVIEW: Fernando Domeyko, Maurice Smith

097
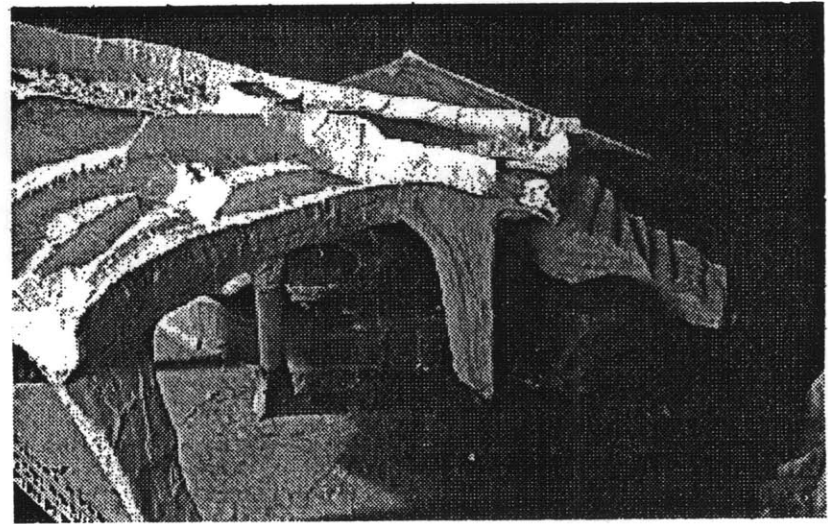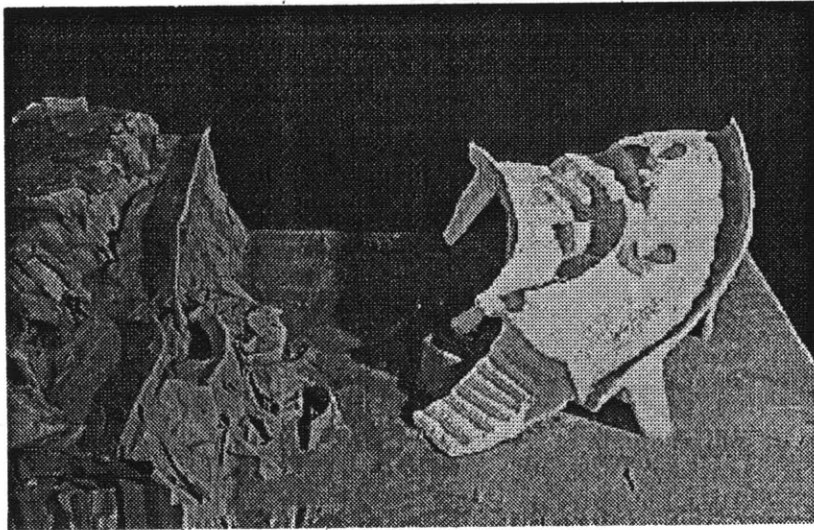
ARCOSANTI: SECTION MODEL
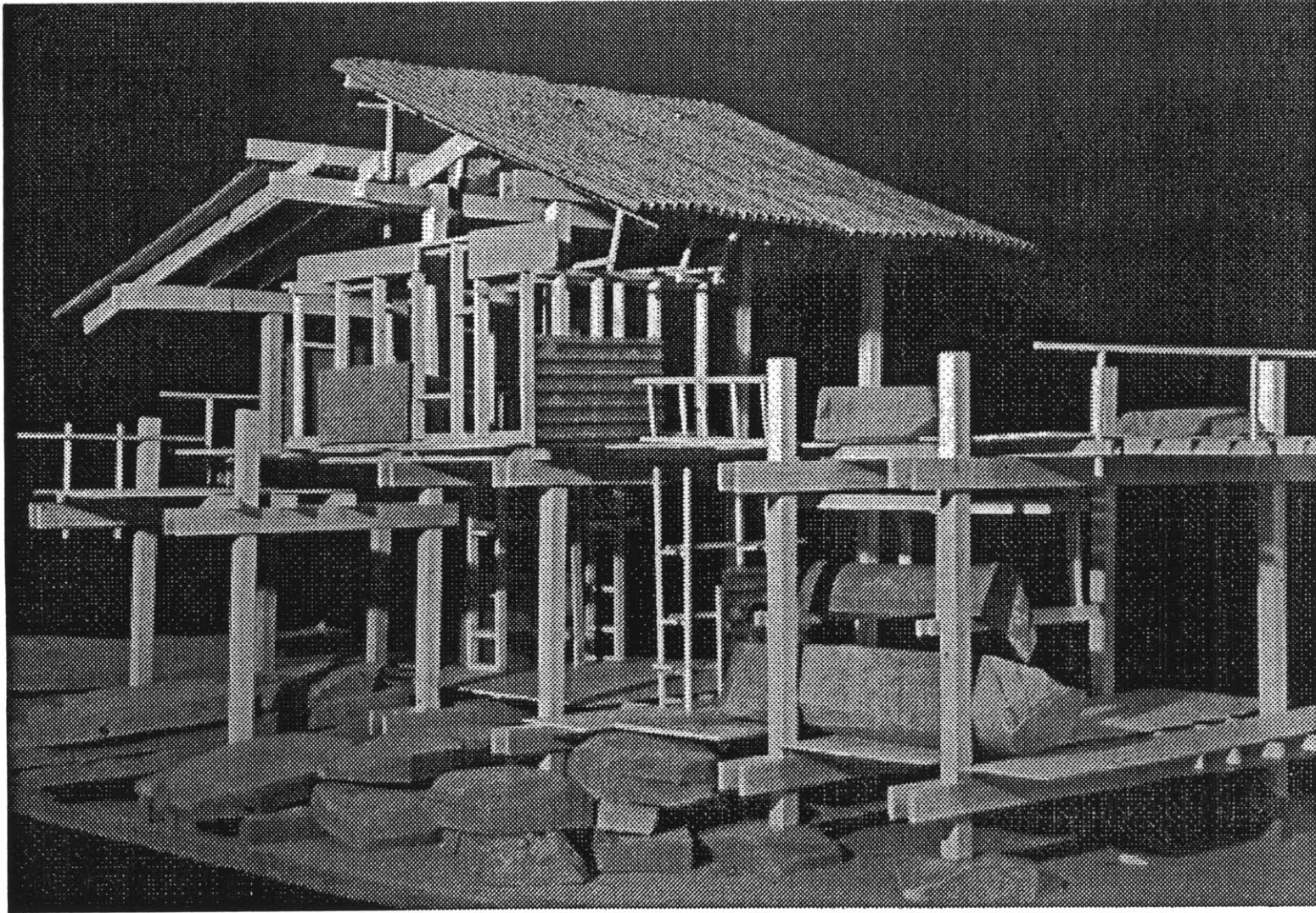
WORLD'S END: SECTION MODEL

What is it made of, this pleasure?—Principally of this: the pine woods is *a piece of nature*, made of trees all of a clearly defined species; a well delimited piece, generally quite deserted, where one finds shelter from the sun, from wind, from visibility; but no absolute shelter, nor one completely isolated. No! It is a relative shelter. Not a sneaky shelter, nor a measly one, but a noble shelter.

It's a place too (this is particular to *pine* woods) where development is gradual, natural, without coppicing, without man-high branches, where sprawling out simply occurs, without slackness, but quite comfortably.

F. Ponge: "Notebook of the Pine Woods"

100
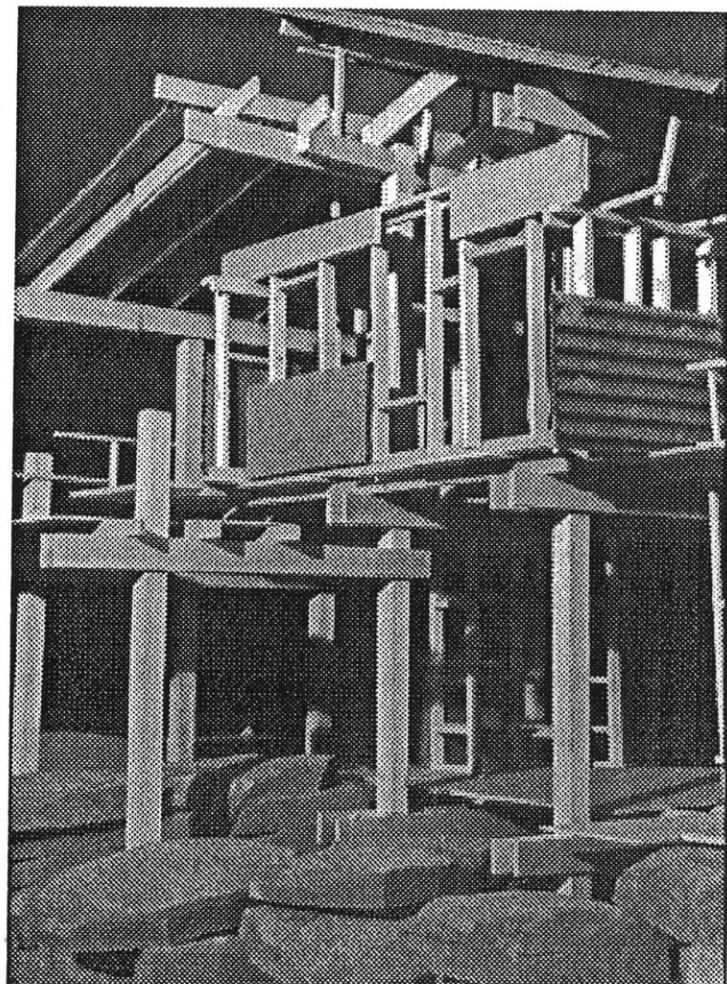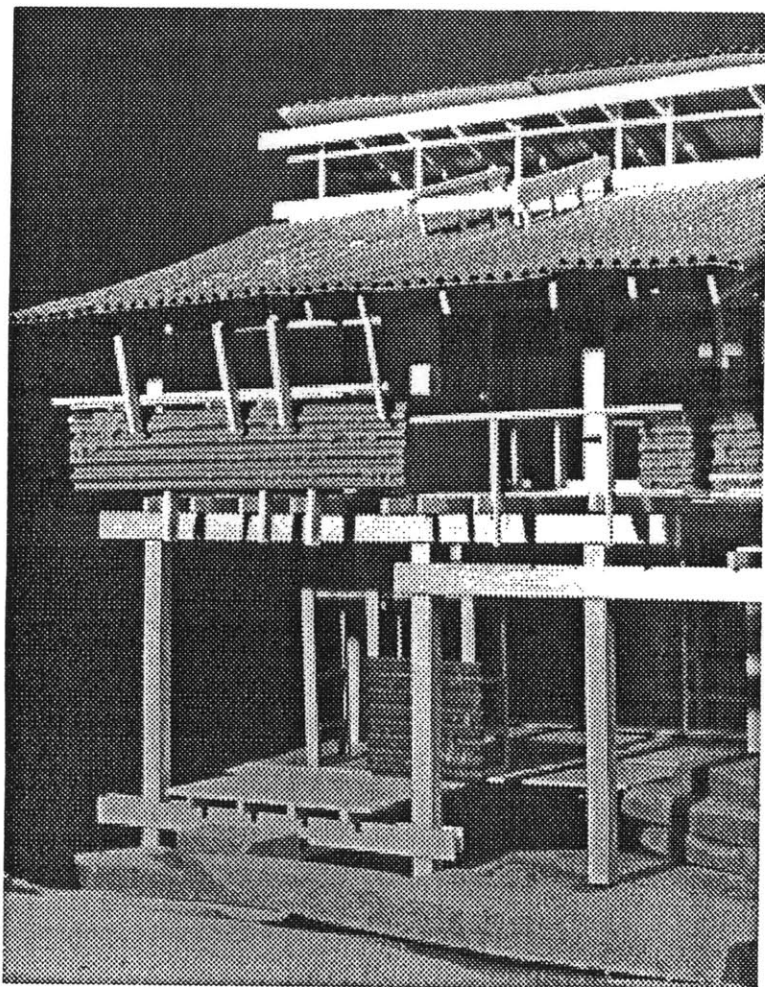
It shapes itself, grows up and thickens incessantly in much the same way in numerous parts of the world, with structures more or less vast whose model I'm going to try to describe:

They are composed of a ground-floor with a very high ceiling (though this last term may be incorrect), and above that an infinity of floors, or rather an extremely complicated framework that constitutes the upper storeys, ceiling and roofing.

No more walls than roof properly speaking: they are rather more like a hall or a courtyard.

An infinity of columns support this absence of roofing.

F. Ponge: "Notebook of the Pine Woods"

103
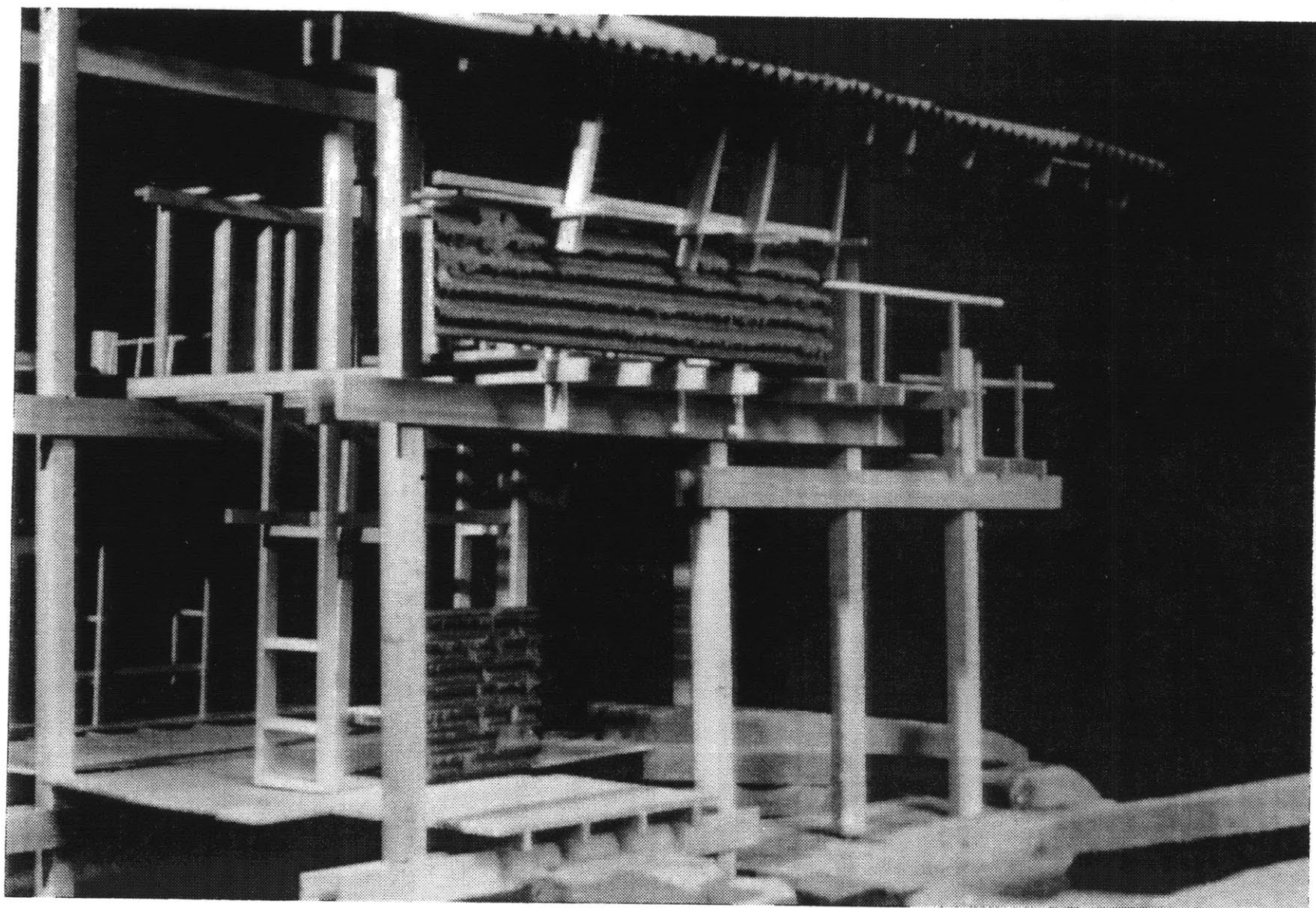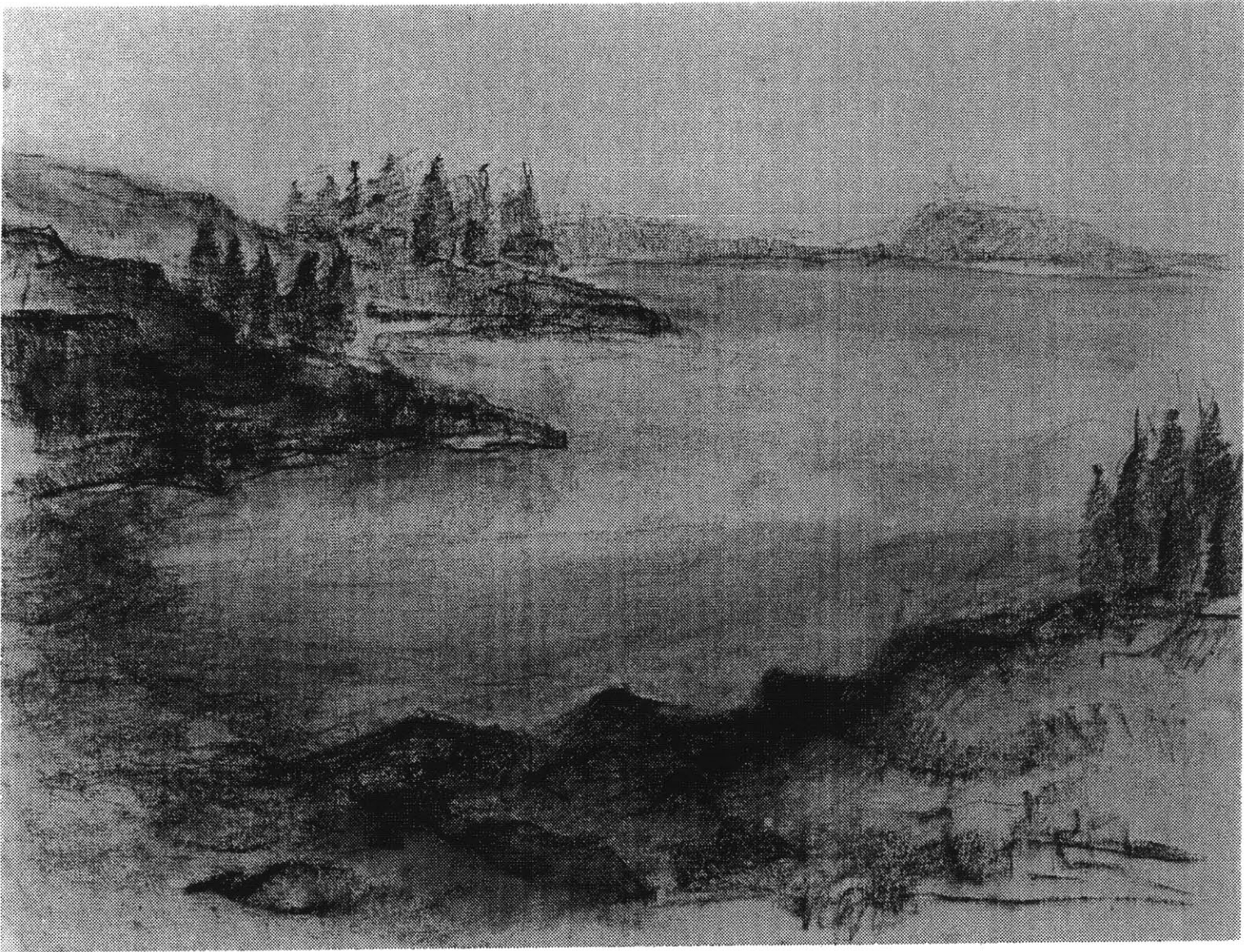
WORLD'S END SITE SKETCH
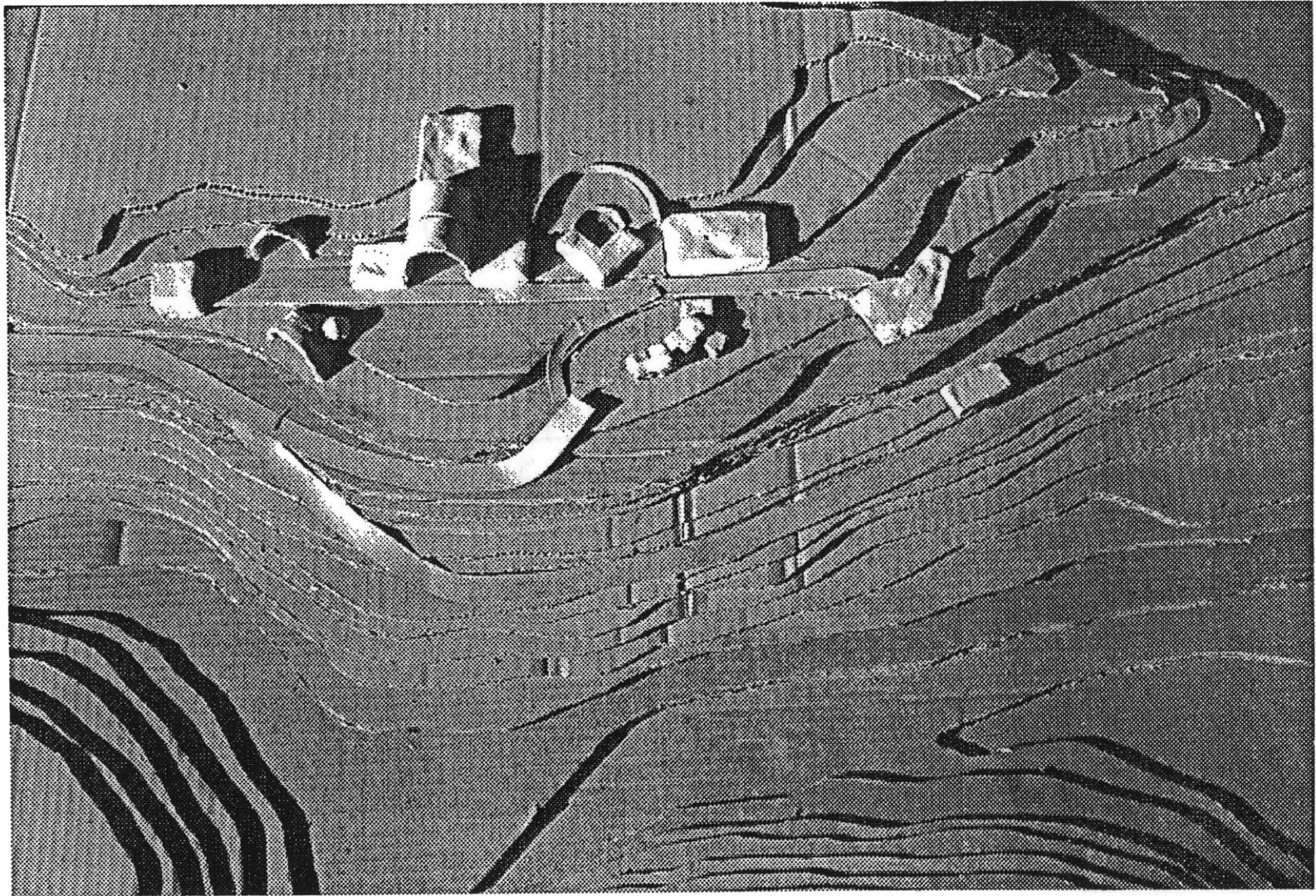
Arcosanti : SITE MODEL

106

WORLD'S END: SITE MODEL

10
40
20

N

APR 19 1992

108
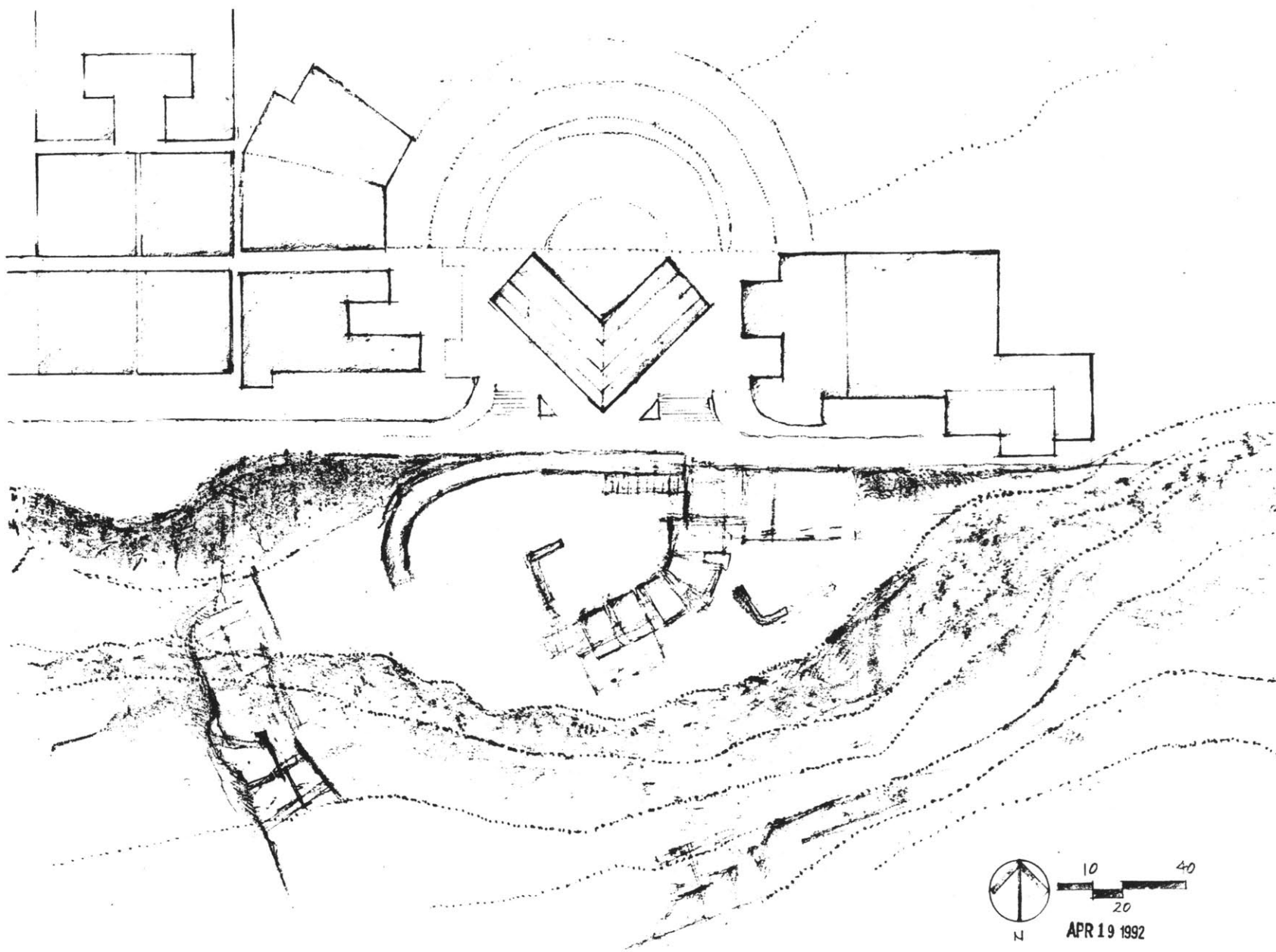
ARCOSANTI: Rethinking the structure --instead of
a single cast-in-place roof, an assemblage of precast
elements

110

111

112
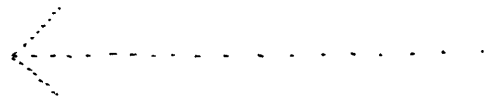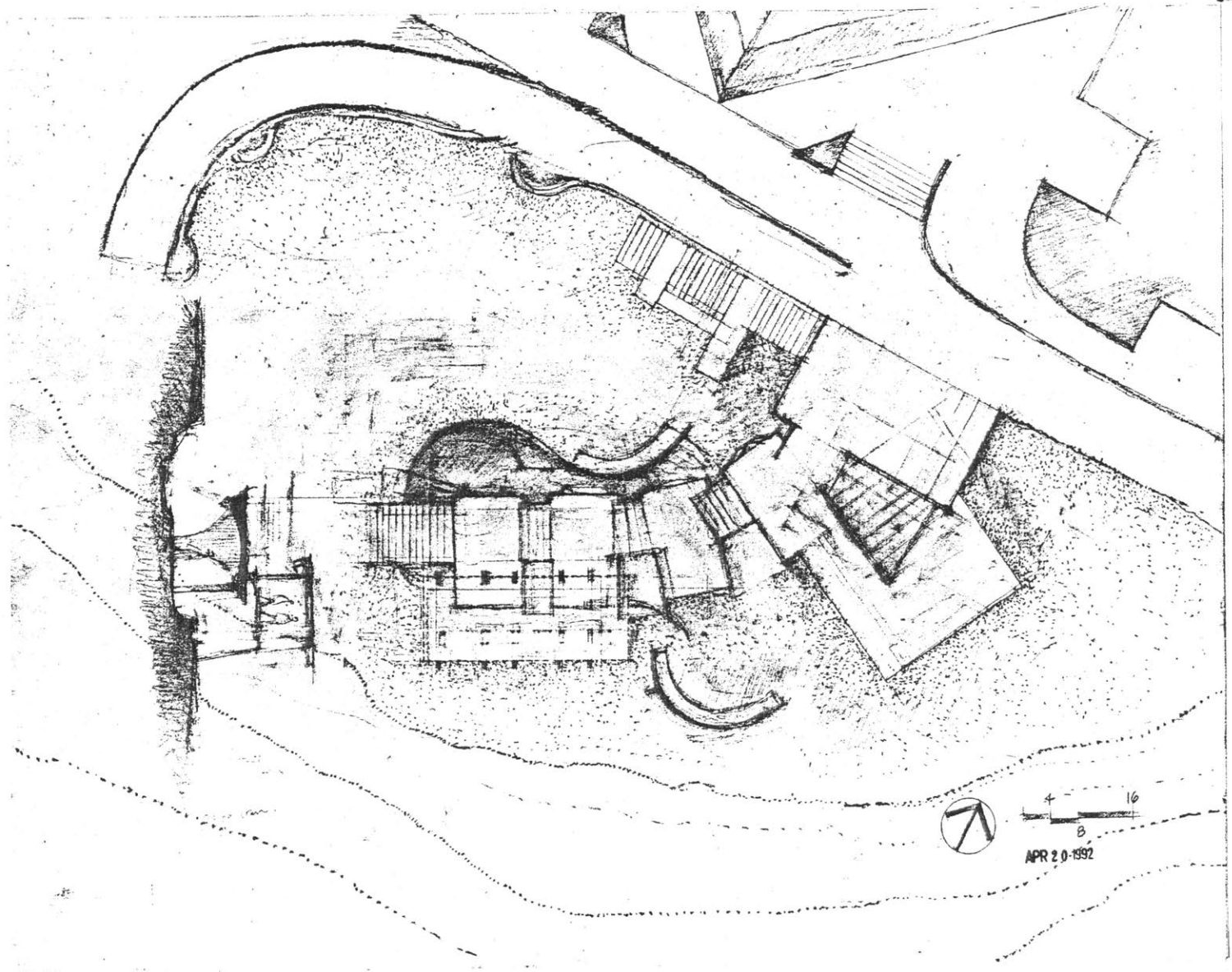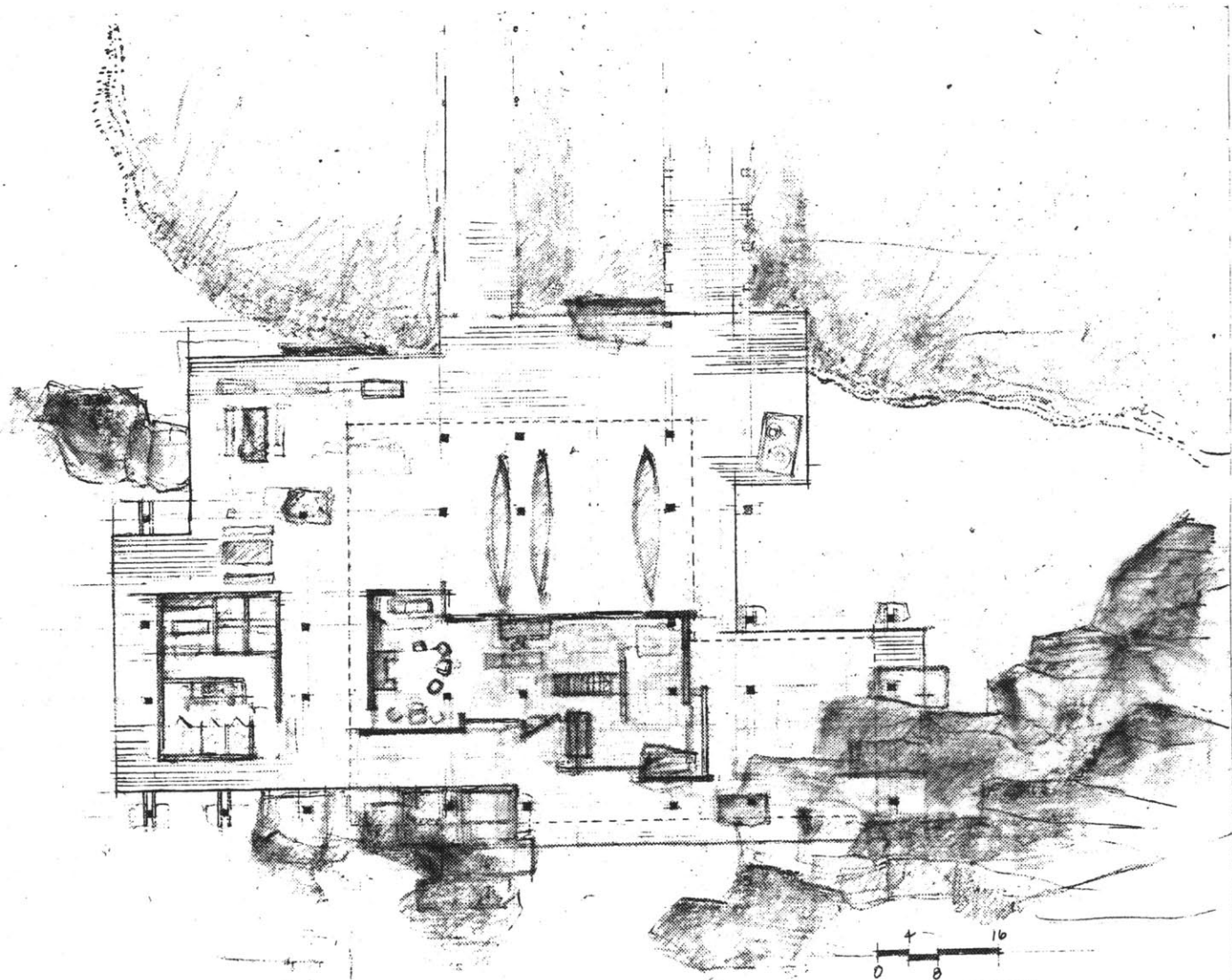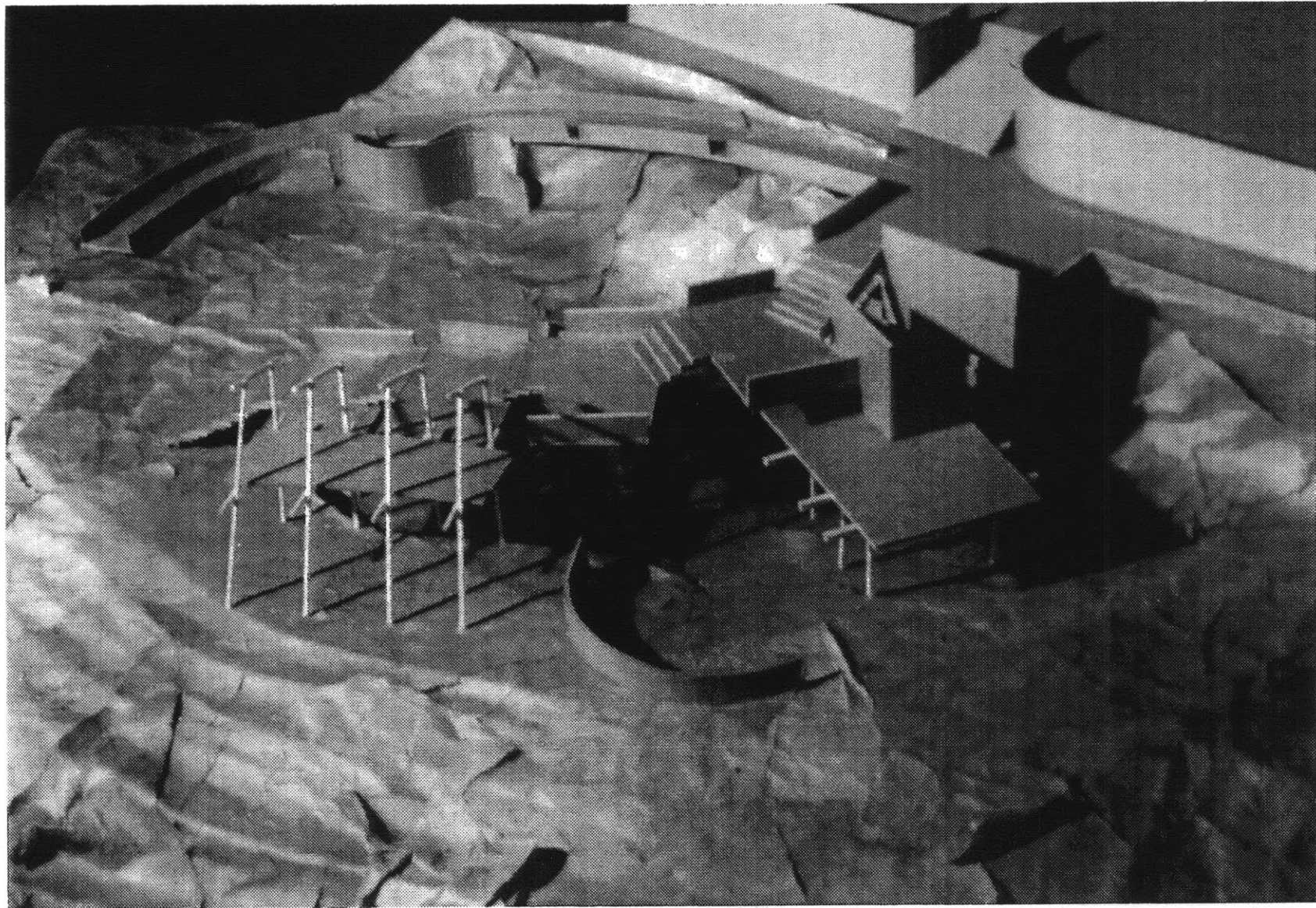
ARCOSANTI: Revised building system
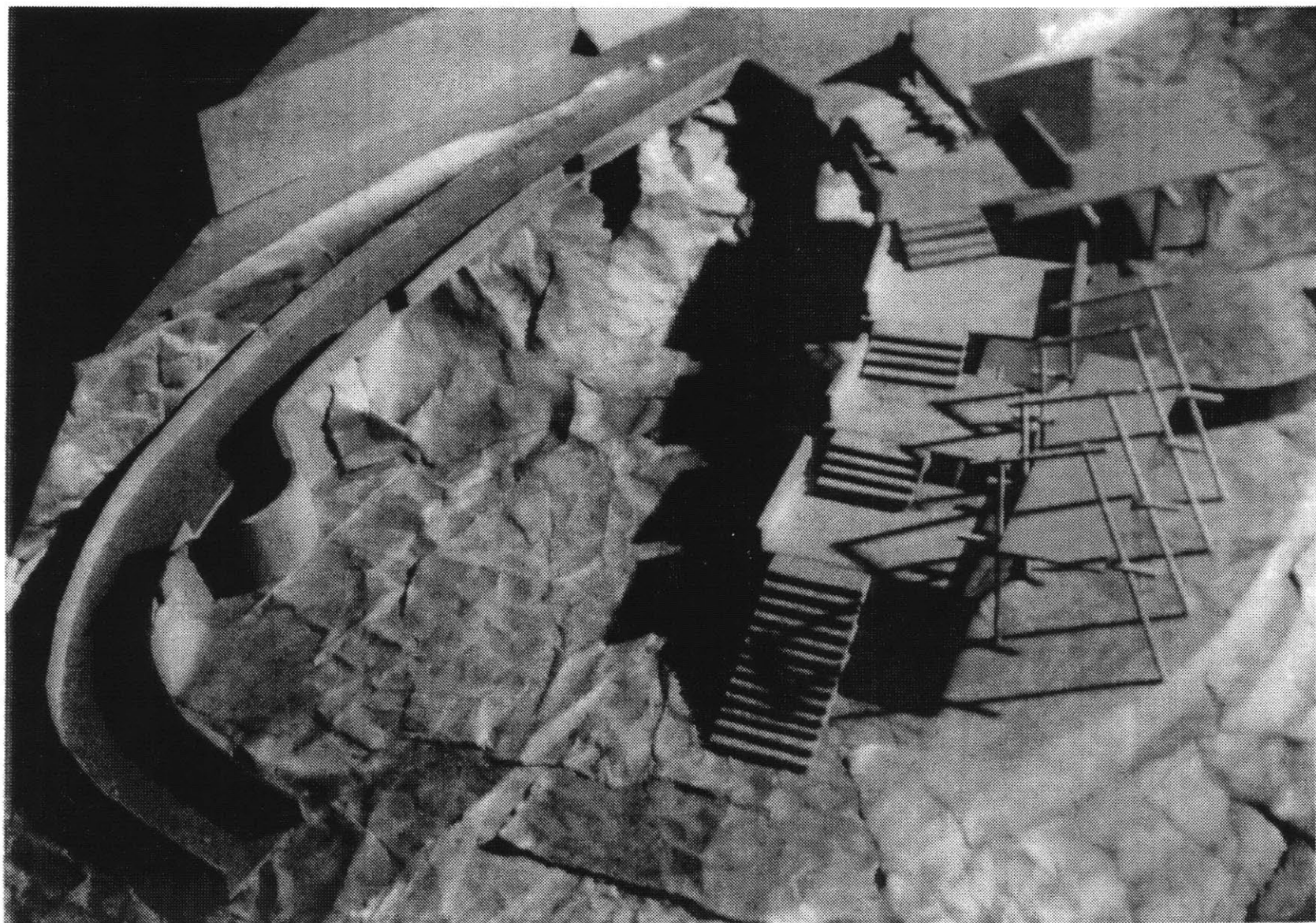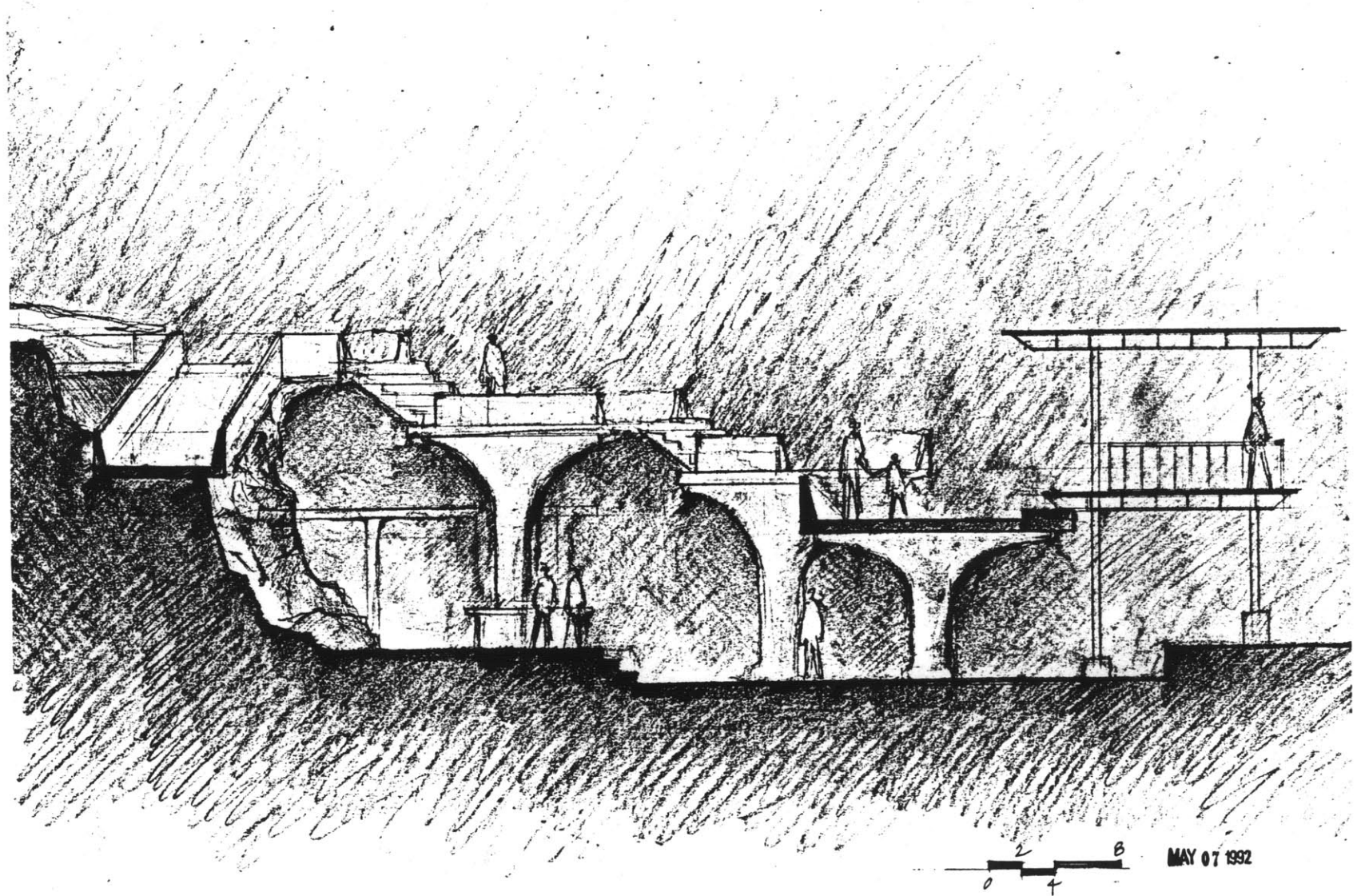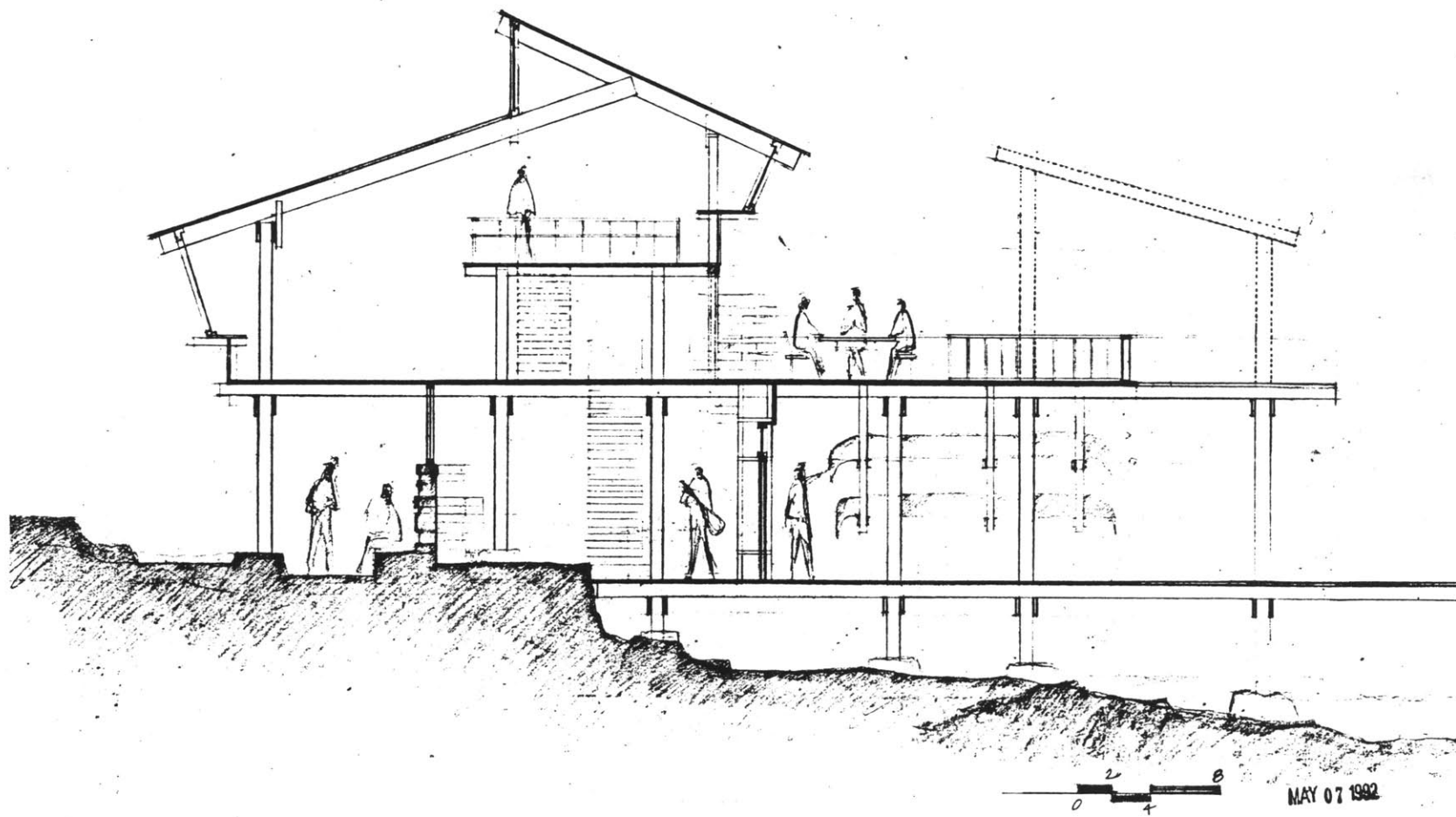
←·············· · · · · · · · · · ·

114

MAY 07 1992

116

MAY 07 1992

117

The notion of discovering an underlying order in matter is man's basic concept for exploring nature. The architecture of things reveals a structure below the surface, a hidden grain which, when it is laid bare, makes it possible to take natural formations apart and assemble them in new arrangements. For me this is the step in the ascent of man at which theoretical science begins. And it is as native to the way man conceives his own communities as it is to his conception of nature.
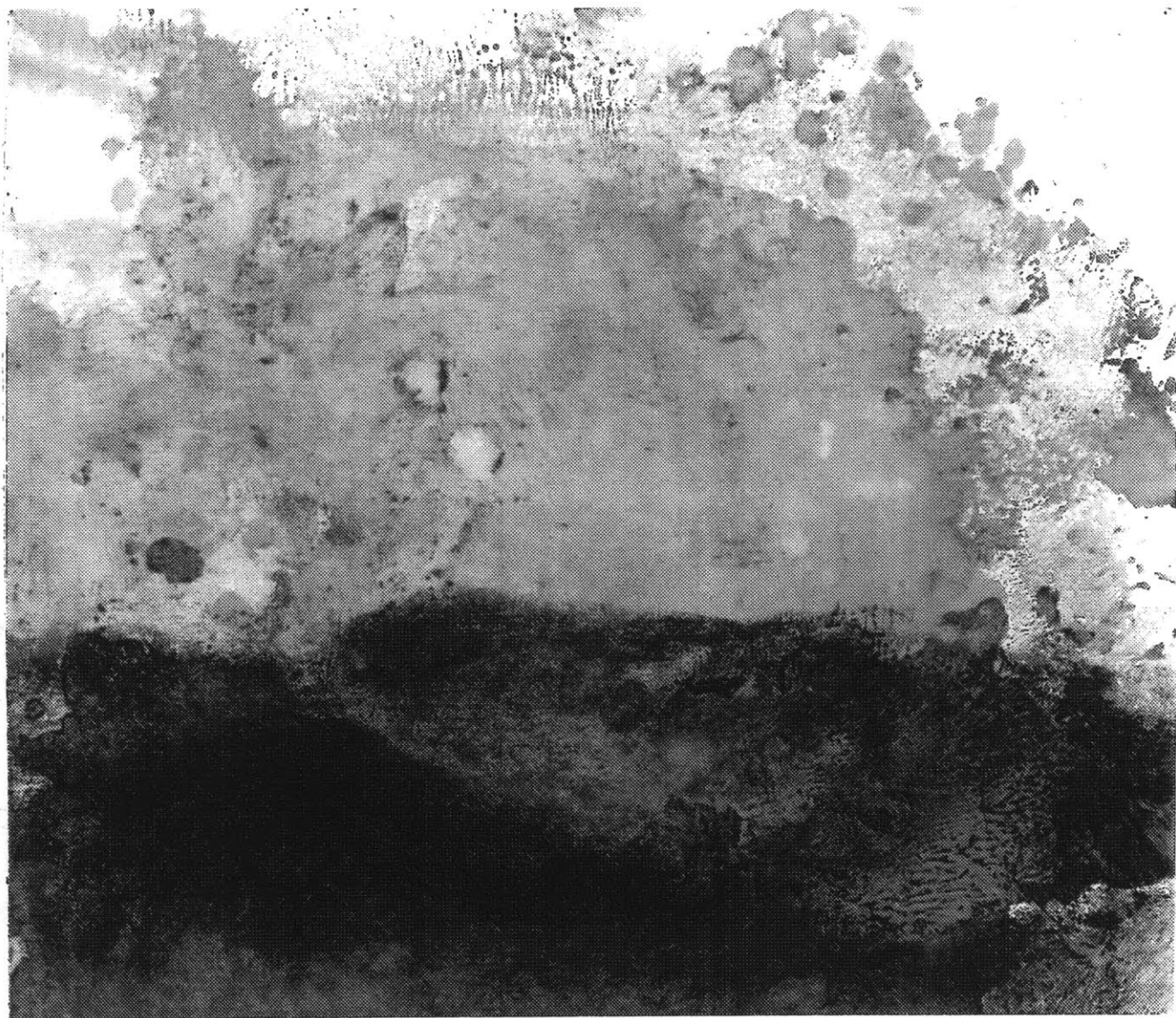
J. Bronowski: The Ascent of Man

Landscape #1: the Desert

Landscape #2 : The Edge

Landscape #1: The Desert

Landscape #2 : The Edge

121 B

REFLECTION

123

SOME NOTES ON PROCESS AND DIAGRAMMING

Do you feel that nature has any serious relation to your own work?
"Everything is natural. If you can imagine it, you can make it. . . ."
If so, is it a conscious or a predominantly subconscious one on your part?
"I just don't think about it."
Presuming that you as an abstract artist are drawn to nature by certain eternal qualities or forces sensed there, would you say that your work is a predominantly subjective expression of your personal relation to these qualities and forces?
"I just do the best I can."

A. Calder: *Calder's Universe*

The two design projects of this thesis (were to) demonstrate how architecture could react directly to ecological issues. The hope was (and is) that a conscious agenda towards nature would lead one (me) to develop architectural forms, systems, and structures which satisfied defined constraints. But while the agenda of this thesis is explicit and premeditated, the design process which ultimately resulted from it is not.

In assessing and criticizing the designs of others, one must respect the criteria of the designer and the constraints (s)he faced. "Artistic license" is an unjustifiable defense of architectural design. Designers, particularly architects, must be able to explain the decisions that they make, even if they were the outcome of random outbursts of intuition. The distinction between architecture and art is that architecture must go beyond satisfying personal criteria. Architecture, by (my) definition, must fulfill needs which are often supplied by an external source. Unlike art, building is dependent on constraints which the architect/artist cannot directly control.

124

My education at MIT has convinced me that process is more crucial than product, that a lucid understanding of how one works and makes decisions is ultimately more valuable and enduring than any highly refined design. At the outset of this thesis, I wanted to believe that my design decisions were not personal acts, and had some relationship with the natural environment. Now, as I attempt to close this thesis and my education, I believe it is important to make sense of my design process, to depersonalize my work such that I am able to appropriately defend and transform the decisions put forth.

What follows in this section is an effort to come to terms with the development of the two building designs, to understand how a prescribed agenda led to specific decisions about site positioning, building form, and material construction. Hopefully, it is possible to extract some generic understandings concerning building and propose some design criteria which may be applied to other work. The method to do this will be through a series of diagrams which attempt to abstract information about the two sites and buildings designs. When diagraming, one must consciously editorialize what is observed or perceived, and in this process, obvious and esoteric concepts may be discovered. Through a diagram, perhaps clarity can be retrieved from chaos. As Gertrude Stein writes,

You make a diagram or a discovery, which is to discover by a coincidence. Oh yes a diagram I say a diagram to discover by coincidence, that's not what a diagram is but let it be. I say let it be. You make a discovery, it is a coincidence, of course yes a coincidence, not an accent but an access, yes a coincidence which tells you yes. Yes it makes it possible to make the discovery. And after that, yes after that, a great deal that has perplexed you about sound in connection with sense is suddenly clear.

G. Stein: Four in America

ABSTRACTING THE SITE

In the middle of the desert. On the edge of the ocean. The geological and
geographical differences seem obvious. By studying specific physical
attributes of the two sites, it is possible to perceive how the natural features of
these places contribute to the resulting cultural layers.

The adjoining drawingss isolate topographical and cultural site attributes. The
diagrams suggest that in Arcosanti, there is a sparseness of physical definition;
systems of roads tend to be independent of topography. In World's End, the
intensity of the topography and natural features directly inform the (wo)man
made street systems.

126

ARCOSANTI
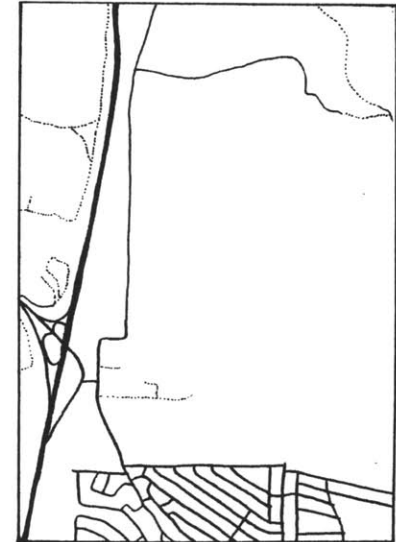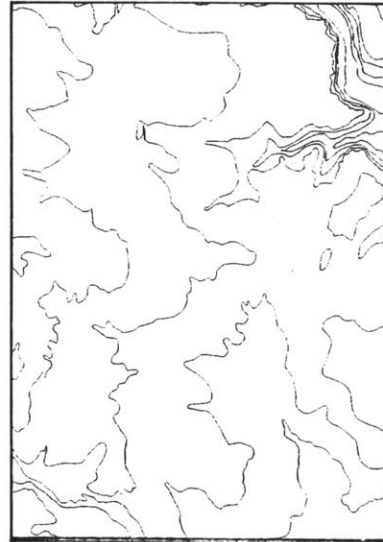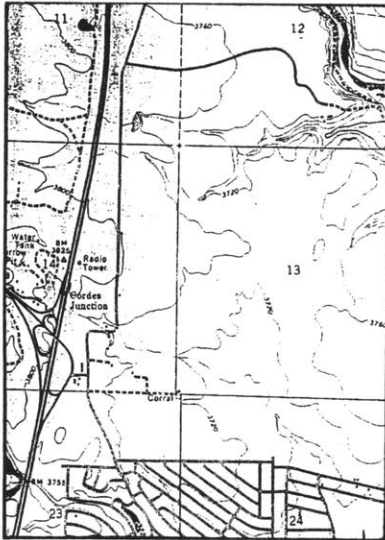

NATURAL INTENSIFICATIONS   TOPOGRAPHY   ROADS
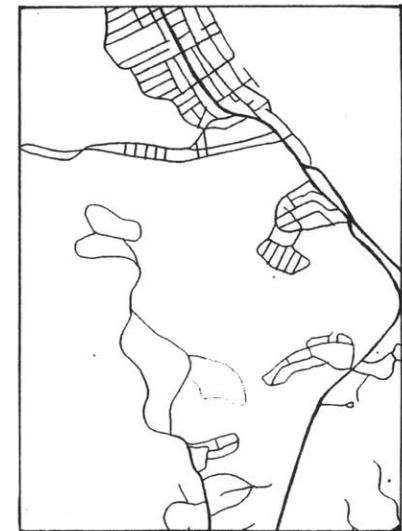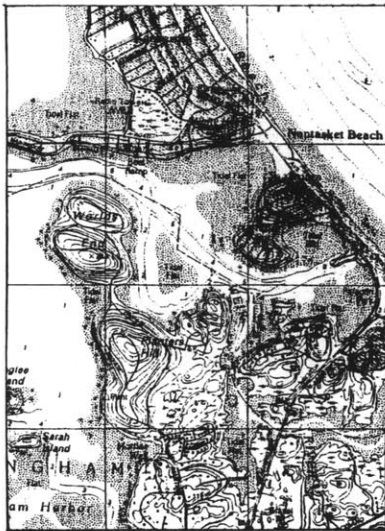
WORLD'S END

UNDERSTANDING PLACES

Moving from the power of the larger site to that of the immediate site, the topography continues to prevail. But as we zoom down in scale, we move from the general landscape to the particular landscape. *Places* become defined.
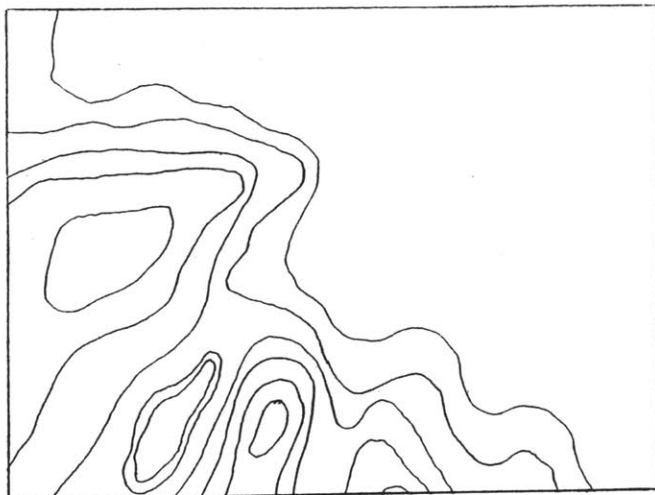
In both Arcosanti and World's End, the directionality of the contours is clear. Independent elements such as buildings and trees tend to reinforce the behavior of the natural topography.
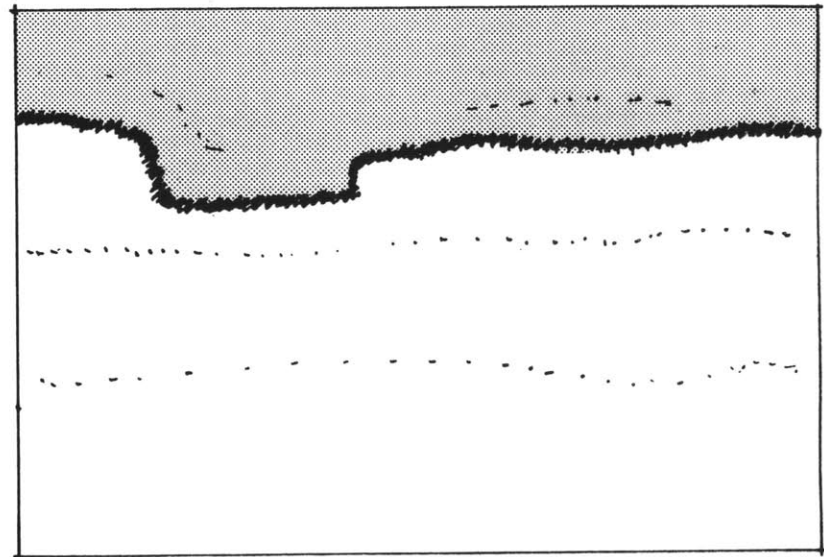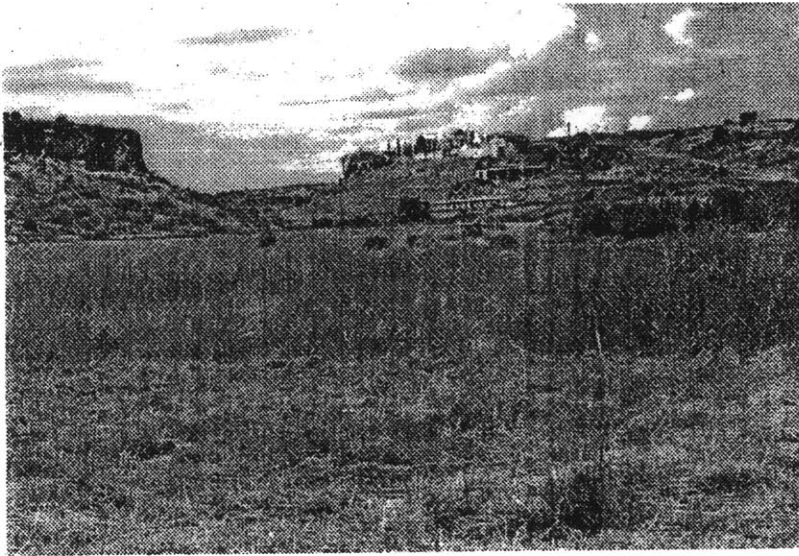
ARCOSANTI
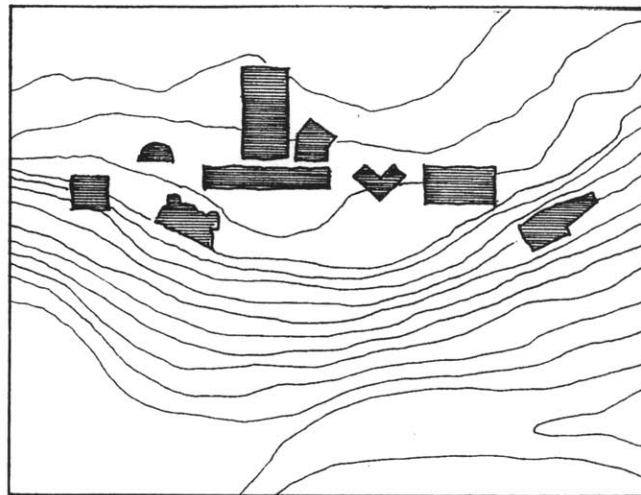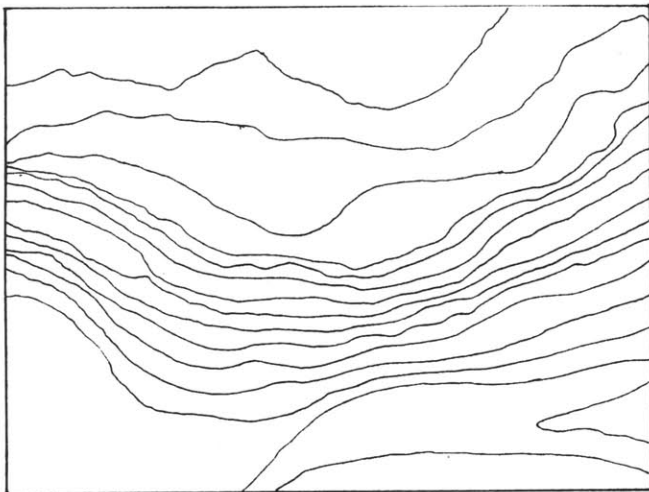
CONTOURS

ELEMENTS REINFORCING TOPOGRAPHY


WORLD'S END

ARCOSANTI

PARTIAL CONTAINMENT/EXCHANGE in SECTION

One of the features which distinguishes these two sites is the manner in which contained places are defined: at Arcosanti, containment is defined in section, between ground and sky, at World's End, containments are defined in plan between water, rocks, and trees. Because of the sparseness of physical elements, one perceives the desert as a cosmic place. The rich natural definition on the wooded cove leads to the perception of a picturesque, idyllic landscape.

WORLD'S END
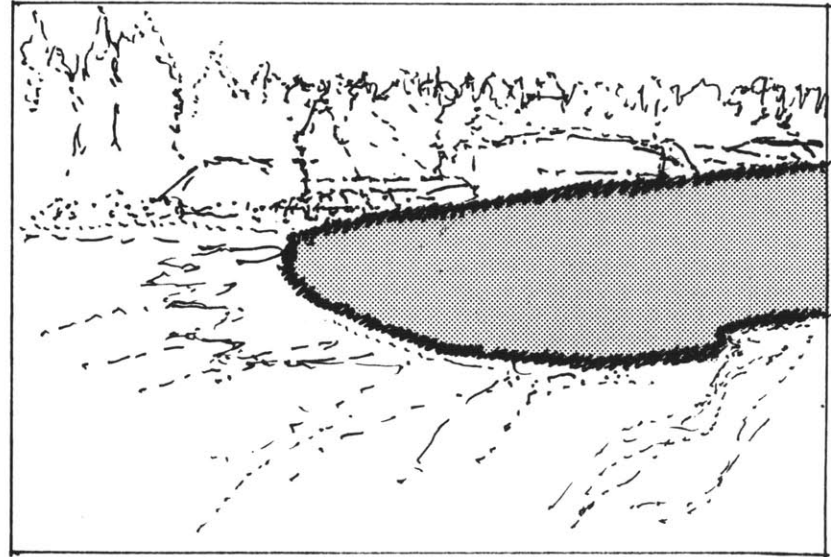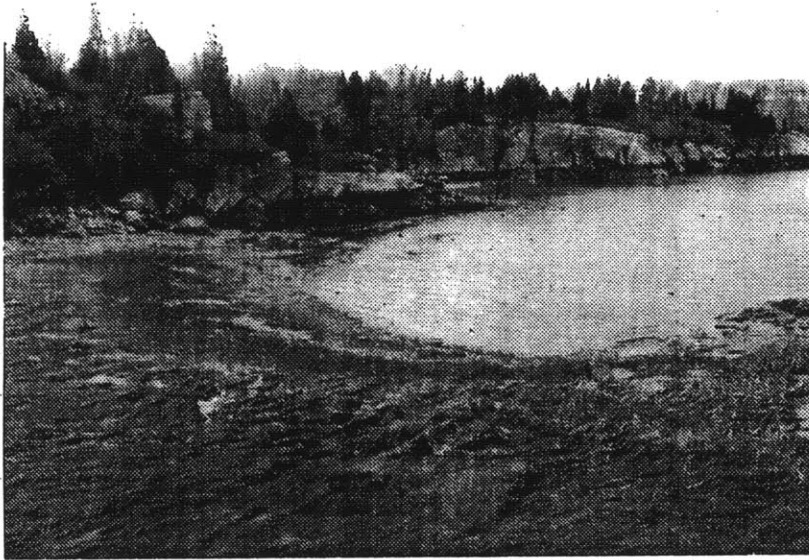
PARTIAL CONTAINMENT/EXCHANGE in PLAN

131

DIAGRAMING BUILDING CONCEPTS

In addition to being influenced by the external natural forces of the site,
buildings have an internal logic of space, light, and structure which can exist
independently from its surroundings. Afterall, architecture does not effortlessly
emerge from clues on the site, it is contrived or invented by carefully
negotiating natural and cultural constraints. The tension between the
inventive-interventive qualities of building is rooted in the always debatable
relationship between (wo)man and the environment.

Many ideas for the design projections of this thesis were drawn from analyses of
several buildings in different landscapes and cultures. Through diagrams and
explicit recognitions, it is possible to understand how *specific* buildings exhibit
generic behaviors which can be applied to one's own design process. To
appreciate the work of another architect is not enough; one must be able to
explain why (s)he finds the work laudable. The attitude taken here is that
transfering the concepts found in references to one's own work is not an act of
immoral plagiarism, but a way of clarifying building behaviors, and exposing
broader generalities of design.

I shall begin with a brief clarification of concepts. First, the meaning of analysis. The term is most frequently applied to chemical analysis. A certain compound, for example, is widely sold because of its excellent effects. The manufacturer's commercial success arouses the curiosity of other manufacturers and they send a sample of the product to a chemist for analysis. He must proceed methodically in order to break the product into its ingredients. To solve the riddle.

In another case a food or beverage is harmful to the health. Again the chemist is called in to disclose the harmful ingredients. In both cases the given is a whole consisting of various unknown parts; the problem is to find the ingredients.

In our business the motives for analysis are naturally different. We do not undertake analyses of works because we want to copy them or because we suspect them. We investigate the methods by which another has created his work, in order to set ourselves in motion. This approach should save us from regarding a work of art as something rigid, something fixed and unchanging. Exercises of this kind will guard us against creeping up to a finished product hoping to pick off what is most striking, and to make off with it.

One particular kind of analysis is the examination of a work with a view to the stages of its coming-into-being.[1] This kind I call the analysis of 'genesis'. The first book of Moses, concerned with the creation of the world, is called Genesis. It tells what God created on the first day, on the second day, etc. The total world that surrounds us is articulated in terms of history.

We are artists, practical craftsmen, and it is only natural that in this discussion we should give priority to matters of form. But we should not forget that before the formal beginning, or to put it more simply, before the first line is drawn, there lies a whole prehistory: not only man's longing, his desire to express himself, his outward need, but also a general state of mind (whose direction we call philosophy), which drives him from inside to manifest his spirit in one place or another.

I emphasise this point to avoid the misconception that a work consists only of form. But what must be stressed even more at this point is that the most exact scientific knowledge of nature, of plants, animals, the earth and its history, or of the stars, is of no use to us unless we have acquired the necessary equipment for representing it; that the most penetrating understanding of the way these things work together in the universe is useless to us unless we are equipped with the appropriate forms; that the profoundest mind, the most beautiful soul, are of no use to us unless we have the corresponding forms to hand.

paul klee : the thinking eye. p. 99

133

FALLINGWATER

Frank Lloyd Wright
Bear Run, Pennsylvania
1935-7

The Fallingwater house is one of the finest examples which comes to mind of a building which demonstrates a direct and convincing continuity between architecture and landscape.

This continuity is built by:

- Applying behaviors and systems found in the immediate landscape to the building.
- Utilizing natural materials (rocks) from the site in a direct way.
- Building a formal exchange between inside and outside in the building's plan and section.
- Reinforcing the directionality of the site.
- Using recurrent spatial dimensions.
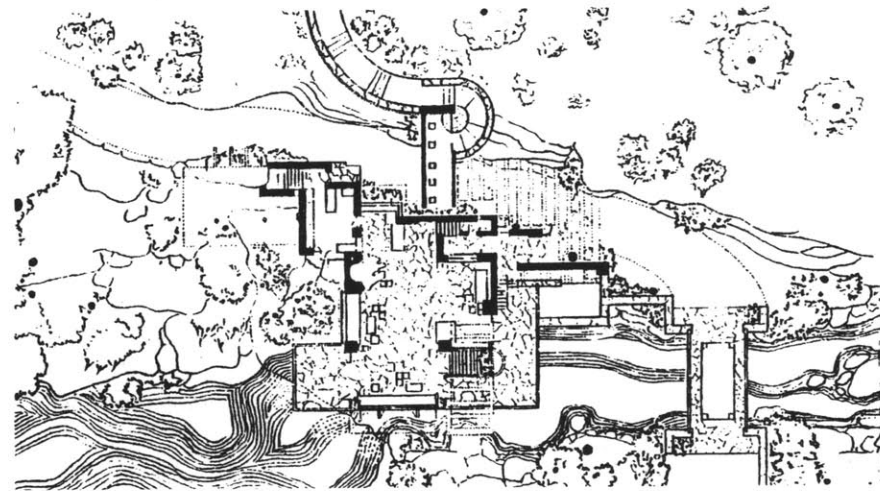
photos from 1992 Fallingwater
Calendar. Abbeville Press.
(C. Little, photographer)

135
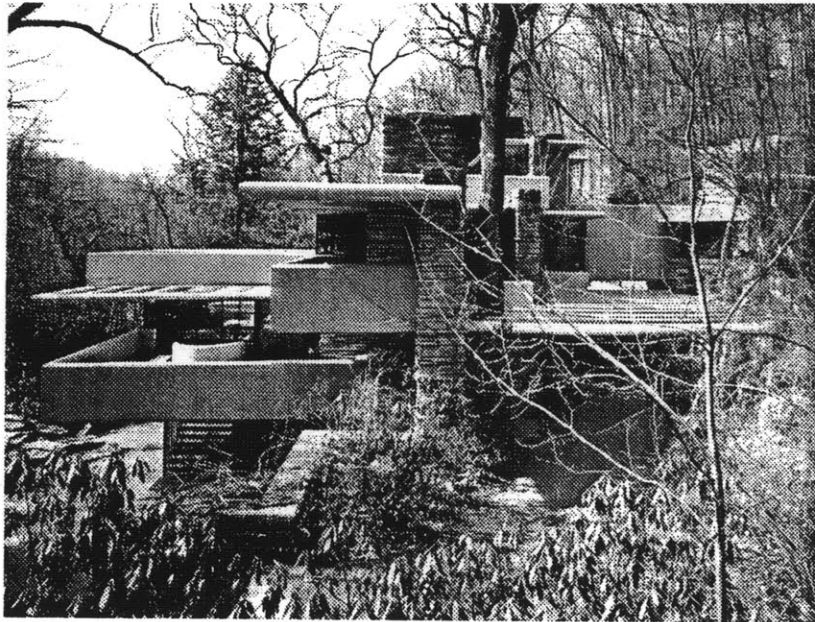
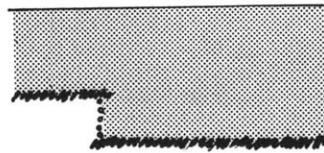# FALLINGWATER
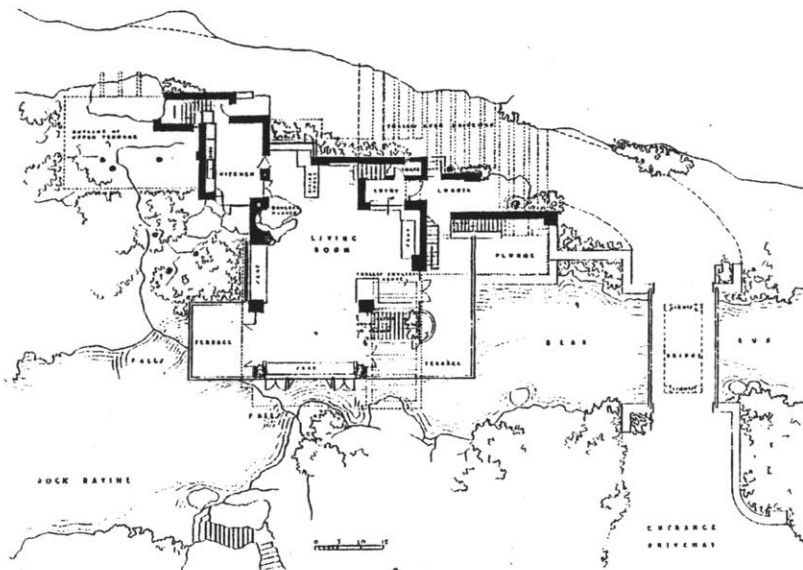
ABOVE: 14. Plan of first floor. BELOW:
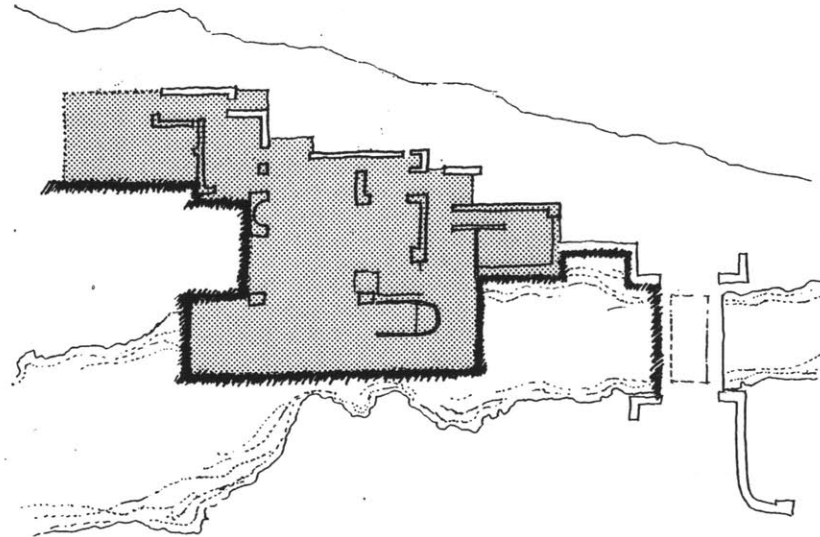
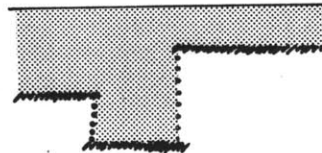RECIPROCAL EXCHANGE in PLAN

between landscape and building

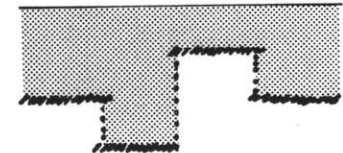GENERIC DIAGRAM SEQUENCE: EXCHANGE BETWEEN TWO TERRITORIES
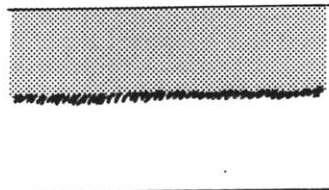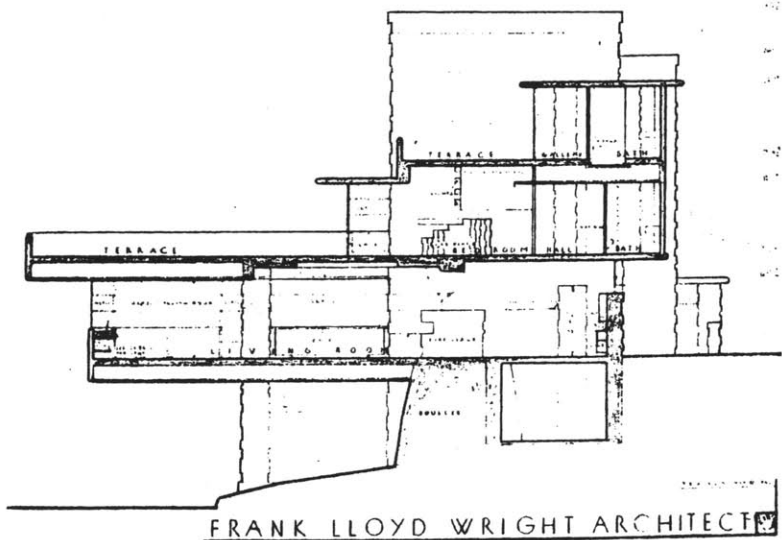

2 territories:
NO EXCHANGE

lateral displacement

double lateral displacement:
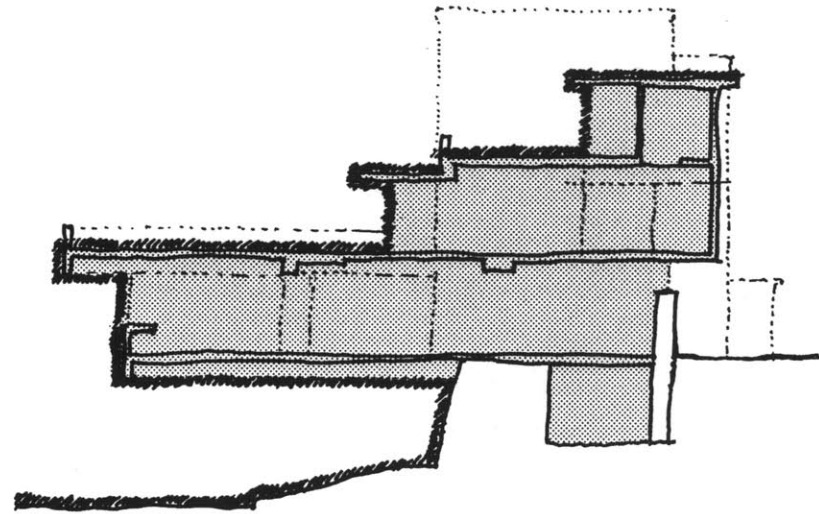PARTIAL CONTAINMENT
and EXCHANGE defined

extended lateral
displacement:
RECIPROCAL EXCHANGE
between 2 territories

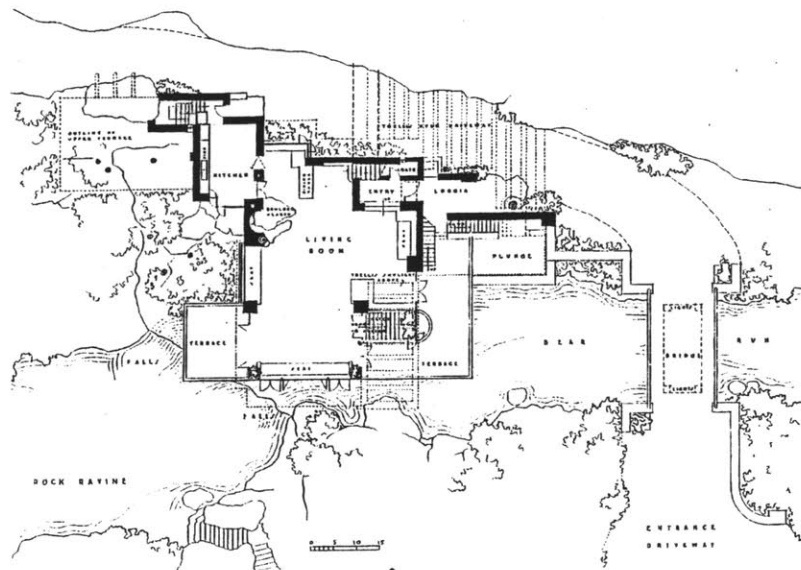136

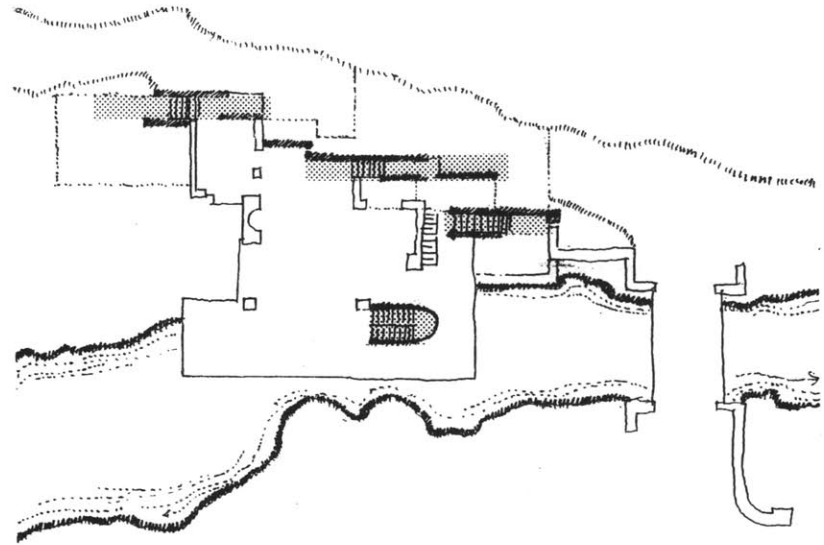FRANK LLOYD WRIGHT ARCHITECT

22. Section of house, looking west.

RECIPROCAL EXCHANGE in SECTION

between landscape and building

FALLINGWATER

ABOVE: 14. Plan of first floor.

DIRECTIONALITY of the landscape (the river, the road, the contours) is reinforced by the building access system. Most of the stairs and entries in the house are oriented in the direction of the site; access and directionality are further intensified by masonry walls.
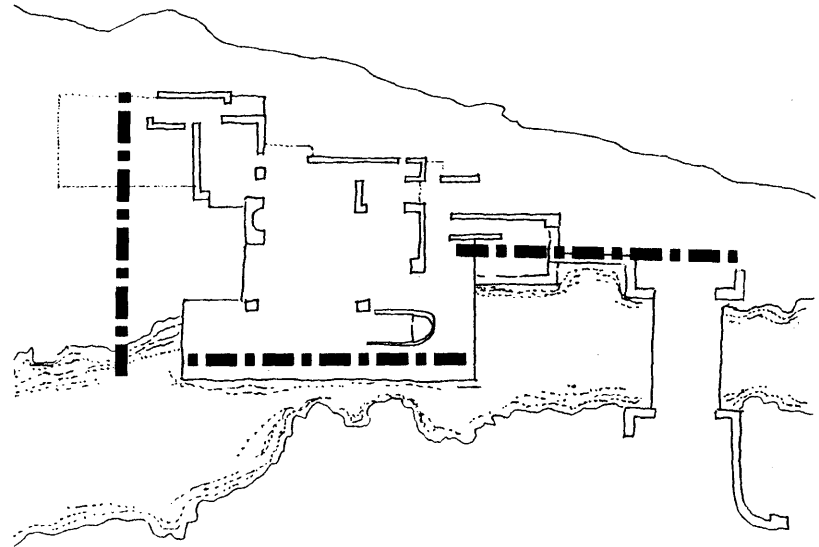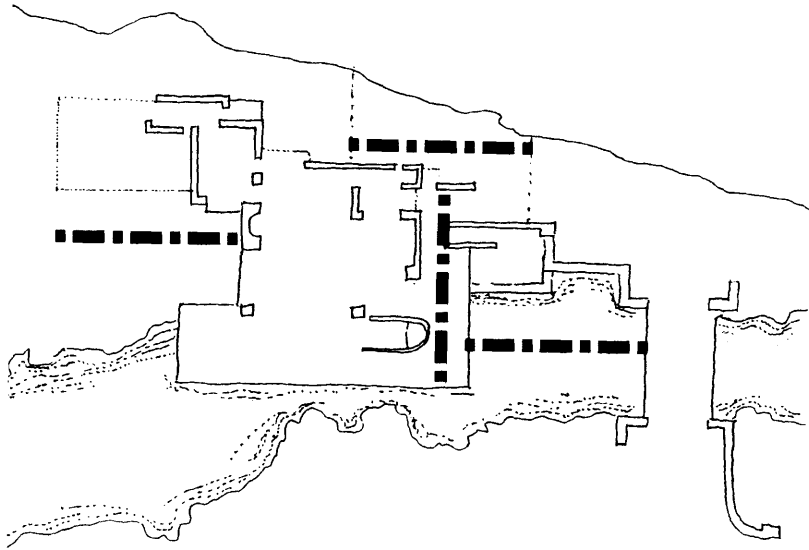
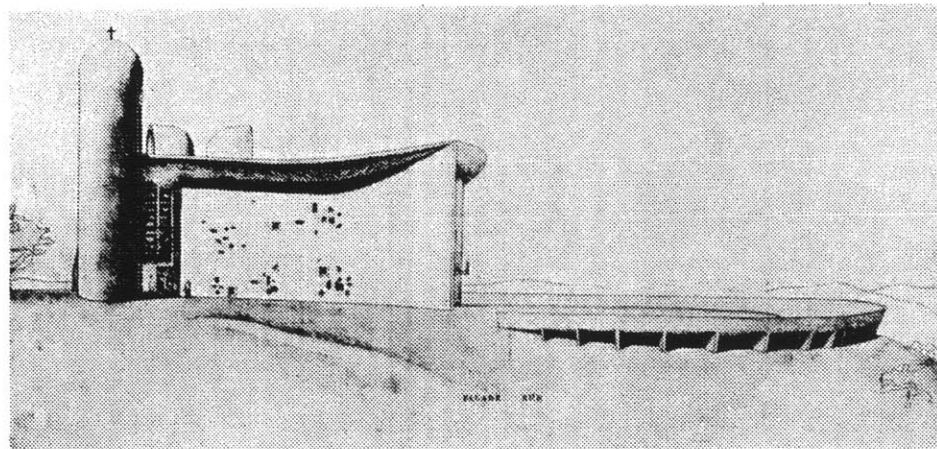DIMENSIONS inside of the building recur as spatial landscapes outside of the
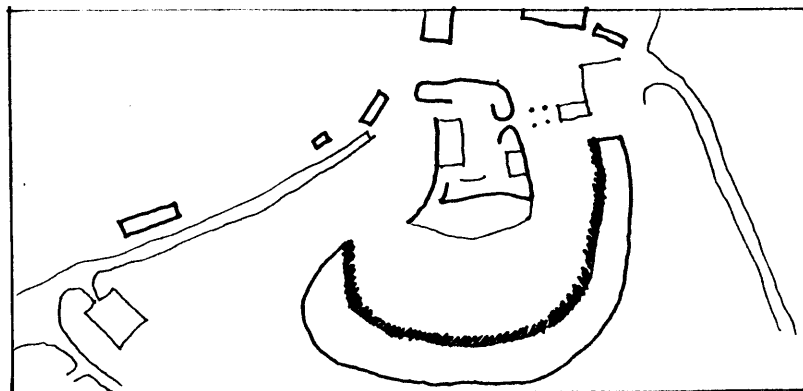building.

140

THE CHAPEL OF RONCHAMP
Le Corbusier
1950-3

Ronchamp's presence on the landscape is undeniably domineering: it is on top of a barren hillside and its plastic spaceship form screams for attention. However, despite its unusual form and object-like existence, the siting and behavior of the architectural elements are extremely sensitive to the particularities of the landscape.

RONCHAMP
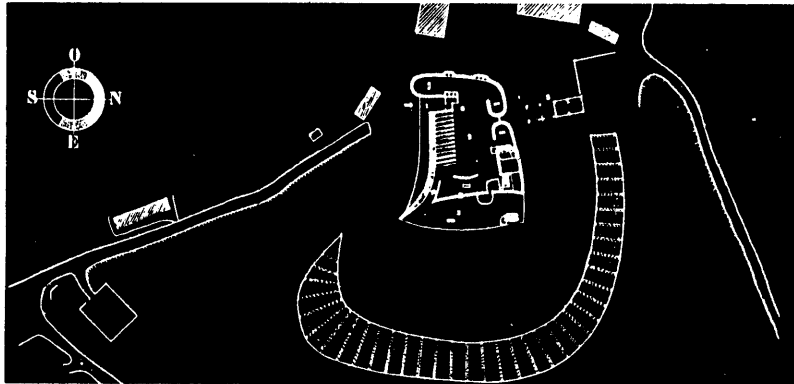
The curved outdoor wall/platform serves to contain the building in an open, exposed landscape.
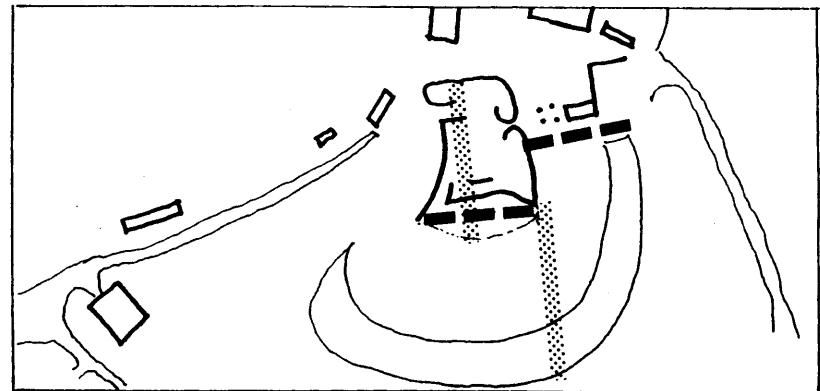
DIMENSIONAL STABILITY: dimensions of the building recur as dimensions of the landscape.

142

COUPE NORD SUD
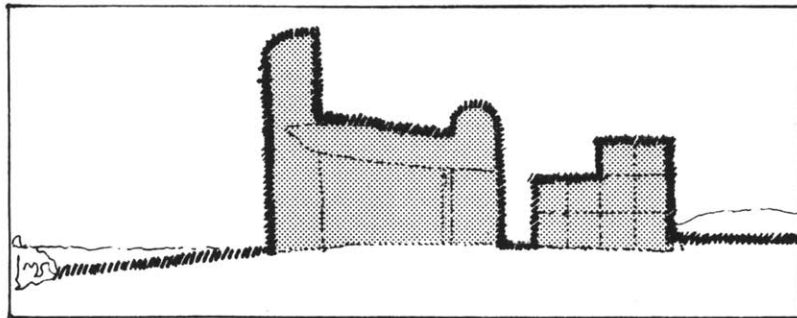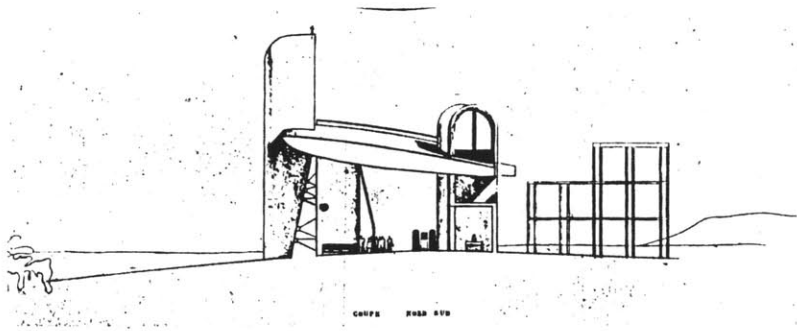
EXCHANGE between ground and sky in SECTION.
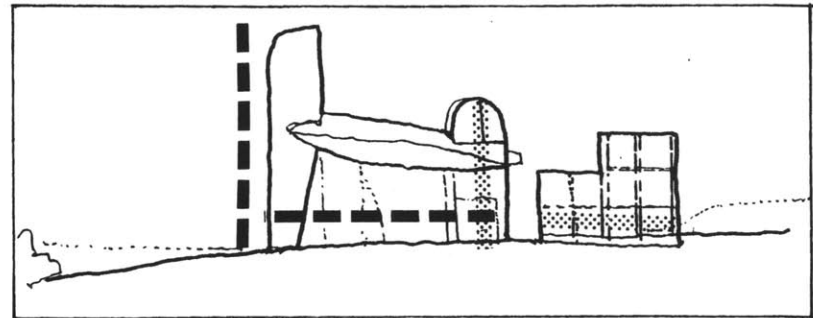
DIMENSIONS IN SECTION are related to DIMENSIONS IN PLAN.

143

RONCHAMP
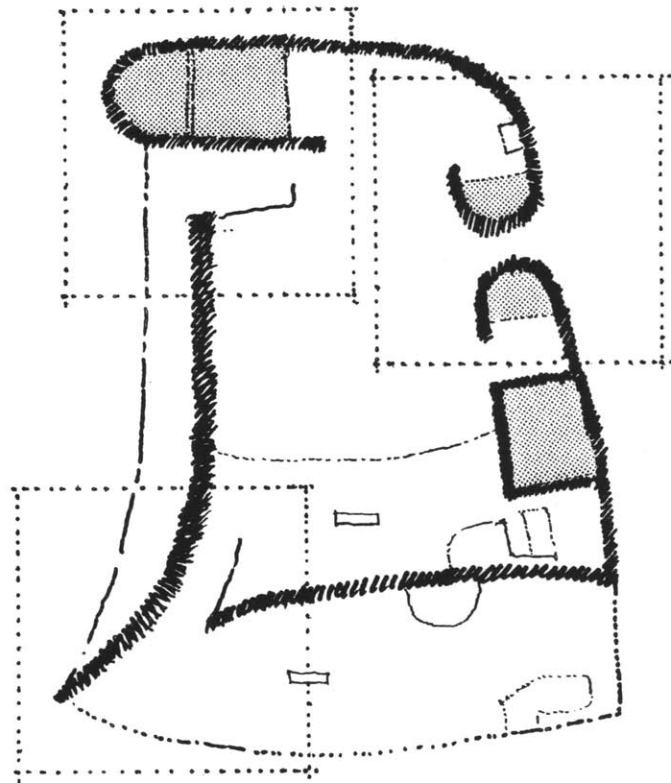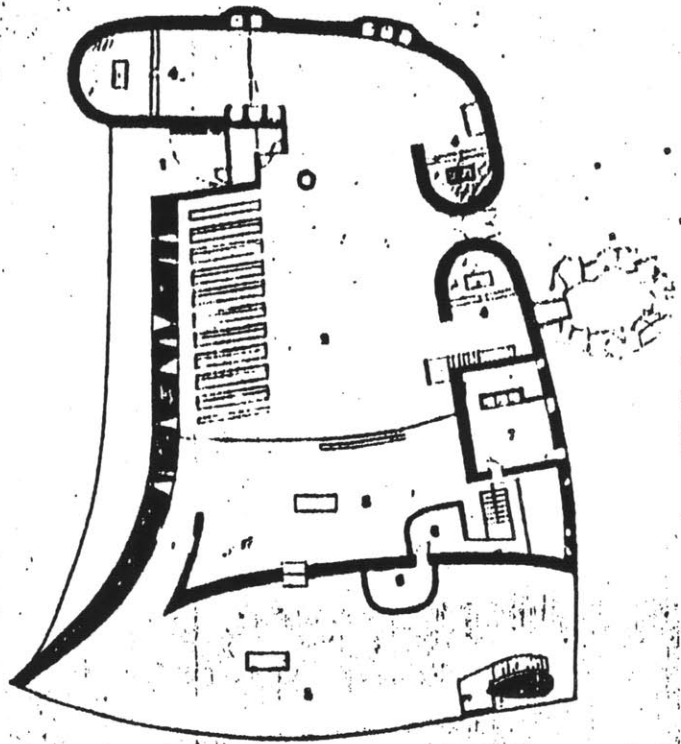
PARTIAL CONTAINMENTS defined in plan.

144

ENTRANCES and OPENINGS
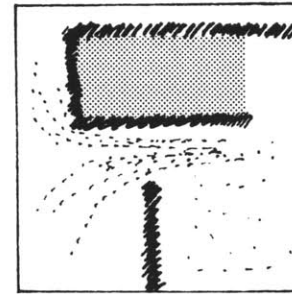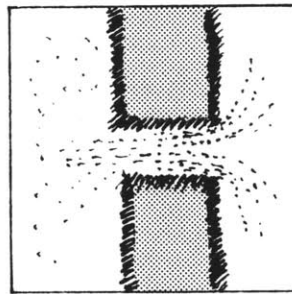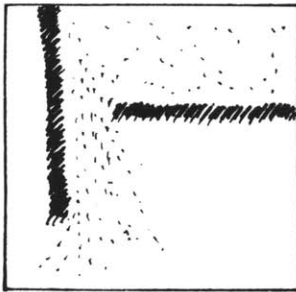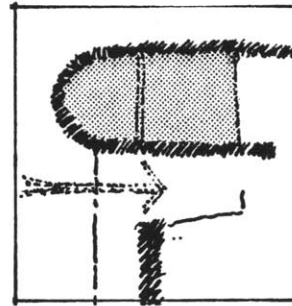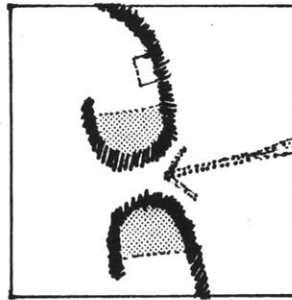
Entry into the public space marked by change in direction.

Opening built between two partial containments.

Entry defined by a partial containment displaced from continuous edge.

SCREENS AND CONTAINMENTS

Several buildings were studied which used systems of screens and walls. Screens of columns are often designate areas open to access; walls are generally used to define places intended to be contained. There are many variations of these two systems: screens can be built inside and in between contained areas (Gaudi's Guell Chapel) or containments may be deployed inside a system of screens (Atelier Zo's Nakijin Community Center). Note that the behavior of screens and surfaces is not dependent on material. Screens could be built from sticks of wood or pieces of stone (Gaudi); walls could be made from heavy masonry or light steel.
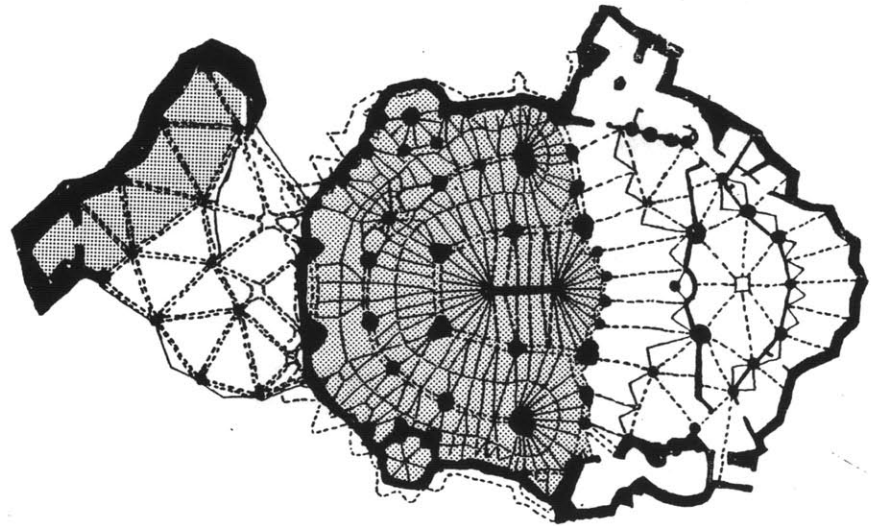
Gaudi: Guell Chapel
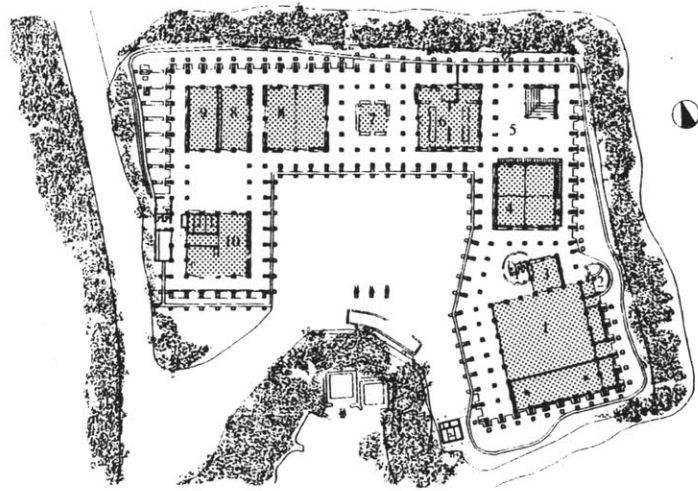
Floor plan   S = 1:800

Atelier Zo: Nakijin Community Center
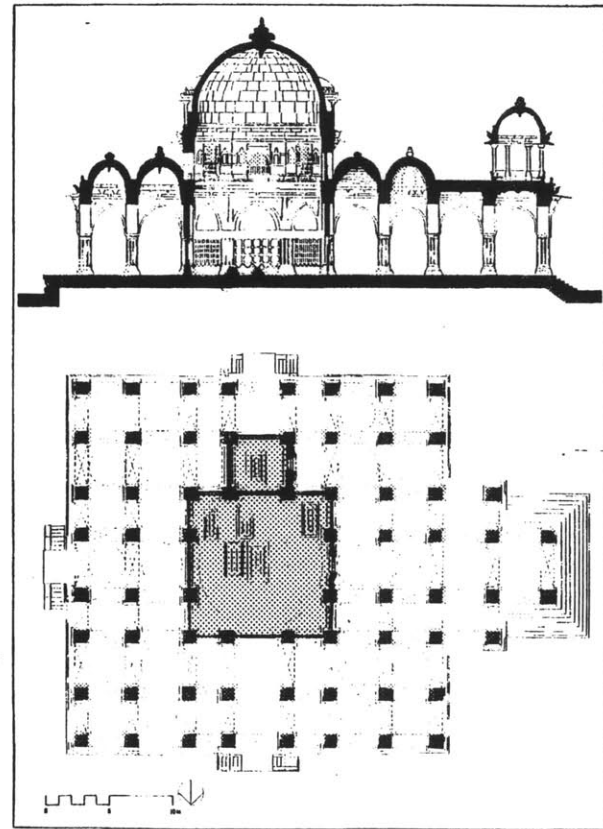
Mehmedabad. Sayyid Mubarak Bukhari's tomb, ground floor plan and section [37].

148

DIAGRAMING THE DESIGNS

The proceeding diagrams attempt to evaluate and clarify the content of the two
design projects. While the analysis of other buildings consciously and
unconsciously influenced decisions I made, it is not my desire to compare my
design with the references I have studied. Such a comparison would be
demoralizing and unnecessary. Admittedly, certain behaviors and features of
my work may be directly associated with that of other architects. However, the
general intention is not to blindly mimick and praise the buildings I see and
study, but to critically assess designs which are not my own and confidently
apply them to my own work.

ARCOSANTI SILT PAVILION
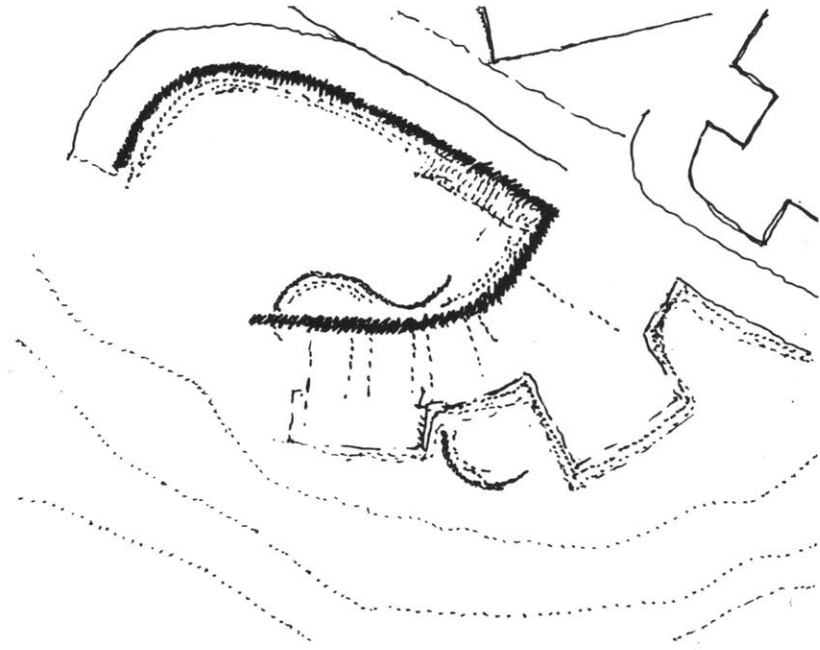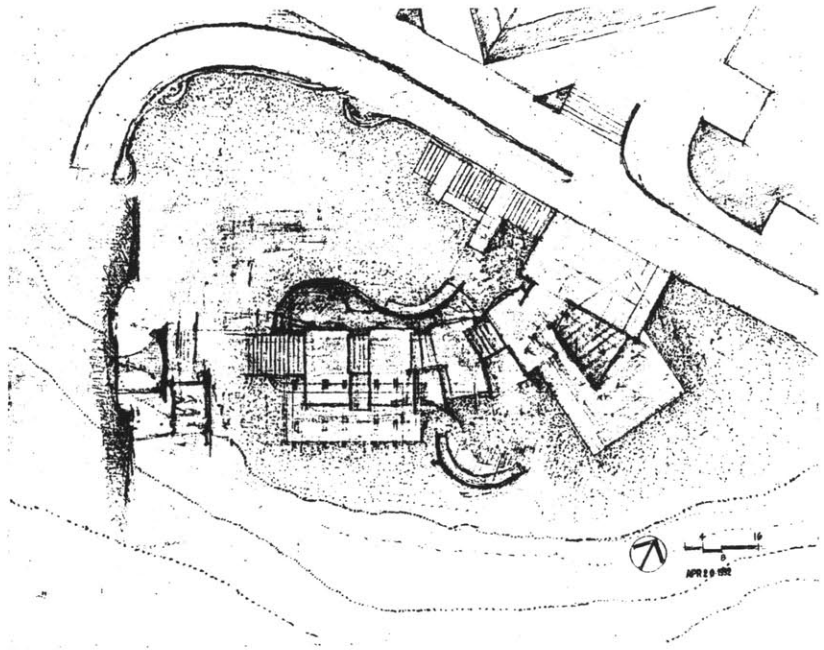
SERPENTINE behavior of ramp and building PARTIALLY CONTAIN a piece of the landscape.

150
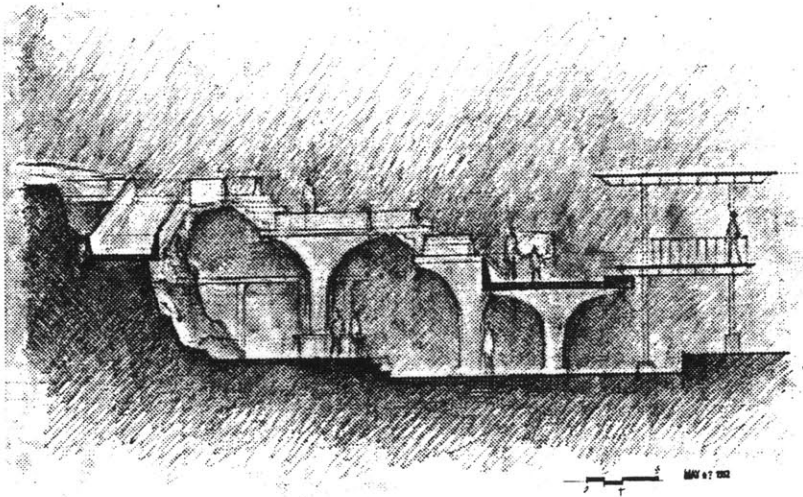
CONTINUOUS SURFACE SCREENS.

EXCHANGE in section.

151

152

ARCOSANTI SILT PAVILION

DIMENSIONAL STABILITY.

155
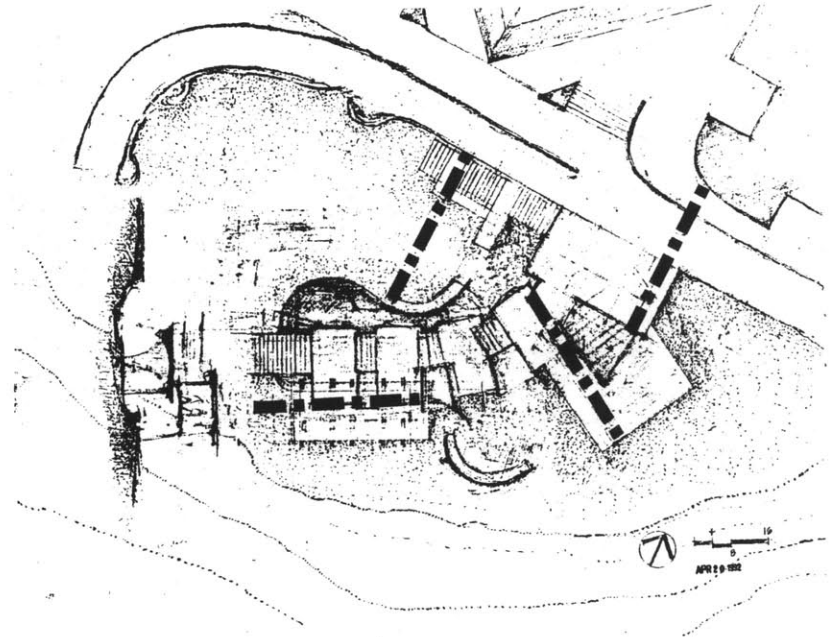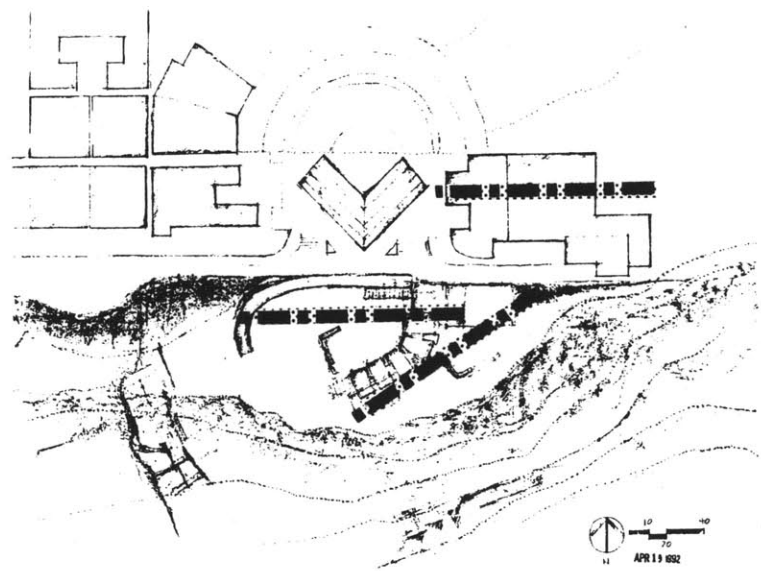
WORLD'S END CANOEING PAVILION
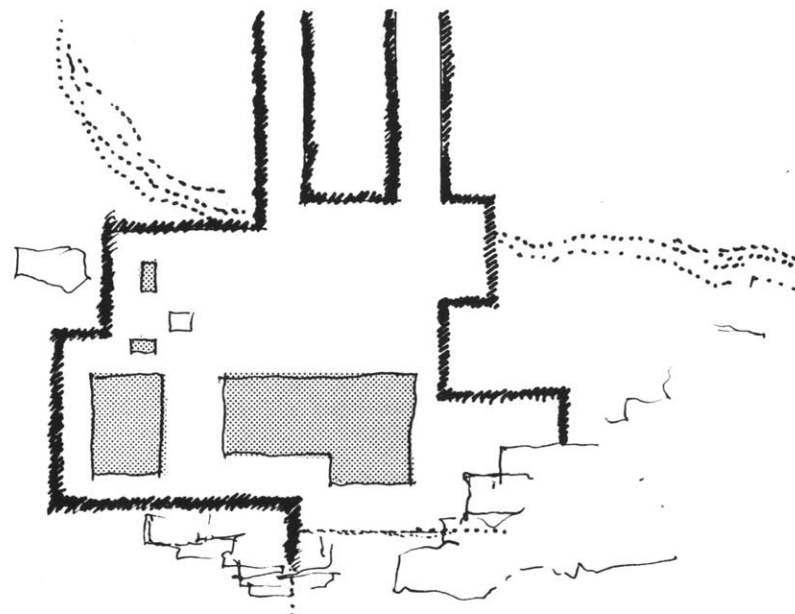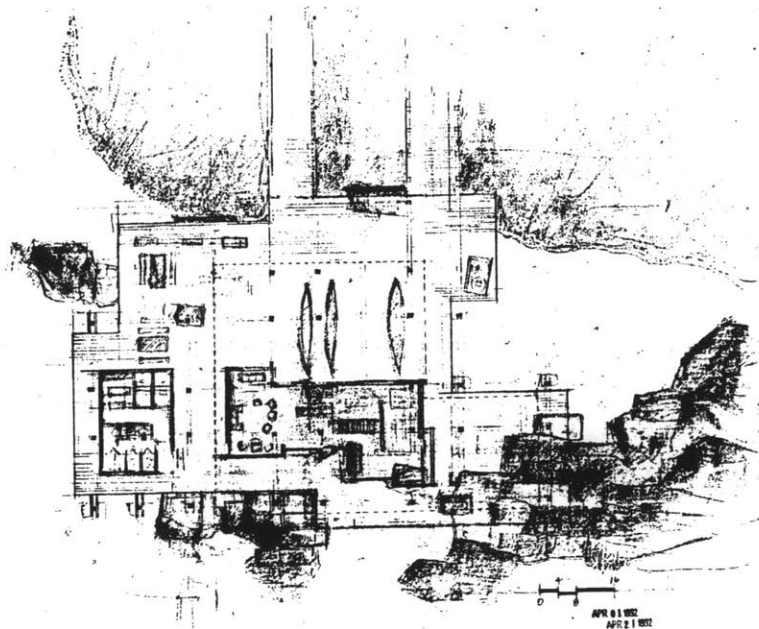
BUILT EXCHANGE with the landscape in plan.
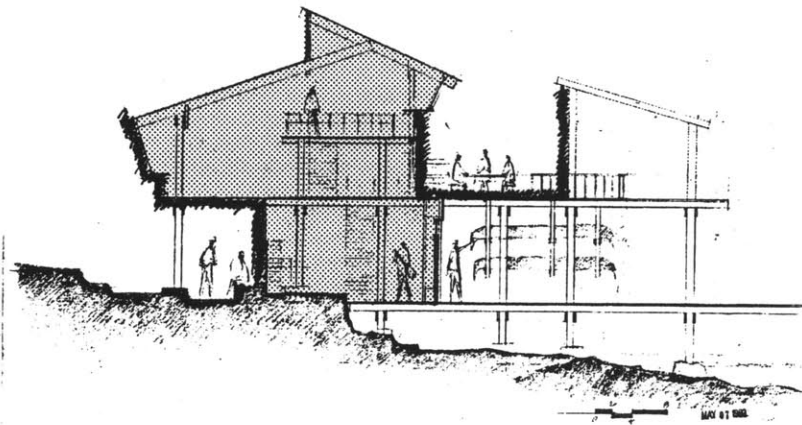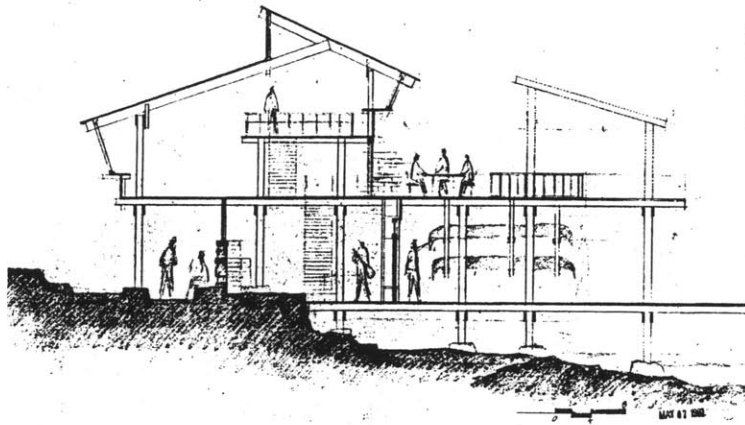
BUILT EXCHANGE with the landscape in section.

ASSESSING THE METHOD

The architectural design process might be dissected into four essential
component actions: conceptualizing, formalizing, systematizing, and
synthesis.

1. CONCEPTUALIZING

    Establishing some clear set of intentions regarding the project and site.

2. FORMALIZING

    Developing specific architectural forms and formal behaviors. Includes not
    only an understanding of what is physically built, but the *space* being built,
    in terms of access, light, etc.

3. SYSTEMATIZING

    Determining how the building will be made in terms of systems of structure,
    closure, mechanical, etc.

4. SYNTHESIS

    Finally, concept, form, and systems must assimilate into architecture.

While all of these ingredients are necessary to design, the ordering of them is
not necessarily hierarchical. An effective exploratory design method is not
completely predetermined and rationalized: there must be room for the
designer to make changes, question decisions, and "play." It is not a blind,
arbitrary process, but a deliberately variable one.

156

Charles Olson, in his essay, "Projective Verse," writes exactly of such a working method:

> Now (3) the *process* of the thing, how the principle can be
> made so to shape the energies that the form is accomplished.
> And I think it can be boiled down to one statement (first
> pounded into my head by Edward Dahlberg): ONE PERCEP-
> TION MUST IMMEDIATELY AND DIRECTLY LEAD
> TO A FURTHER PERCEPTION. It means exactly what it
> says, is a matter of, at *all* points (even, I should say, of our man-
> agement of daily reality as of the daily work) get on with it,
> keep moving, keep in, speed, the nerves, their speed, the per-
> ceptions, theirs, the acts, the split second acts, the whole busi-
> ness, keep it moving as fast as you can, citizen. And if you also
> set up as a poet, USE USE USE the process at all points, in
> any given poem always, always one perception must must must
> MOVE, INSTANTER, ON ANOTHER!

C. Olson: Selected Writings

The point is this: design is an open-ended process of thinking, doing, and most importantly, learning.

A young man in Japan arranged his circumstances so that he was able to travel to a distant island to study Zen with a certain Master for a three-year period. At the end of the three years, feeling no sense of accomplishment, he presented himself to the Master and announced his departure. The Master said, "You've been here three years. Why don't you stay three months more?" The student agreed, but at the end of the three months he still felt that he had made no advance. When he told the Master again that he was leaving, the Master said, "Look now, you've been here three years and three months. Stay three weeks longer." The student did, but with no success. When he told the Master that absolutely nothing had happened, the Master said, "You've been here three years, three months, and three weeks. Stay three more days, and if, at the end of that time, you have not attained enlightenment, commit suicide." Towards the end of the second day, the student was enlightened.

J. Cage: Silence

SOME NON-FINAL NOTES

> Everybody gets so much information all day long that they lose
> their common sense. They listen so much that they forget to be
> natural. This is a nice story.

Gertrude Stein: "Reflection on the Atomic Bomb"

This thesis has attempted to investigate a number of independent but
overlaping issues: the role of nature in design, duality, cross-cultural/cross-
natural design attitudes, and the conscious understanding of one's design
process. As I try to make sense of this work, I am reluctant to formulate
premature conclusions. At this writing, it is difficult to assess the
consequences of what I have done because the process and synthesis of
working and thinking continue to be active.

Nevertheless, here are some non-final notes:

- This study knowingly overlooks important cultural aspects of the two chosen
  sites. Most notably, there has been no elaboration on the theories and
  projections of Paolo Soleri in Arcosanti and Frederick Olmstead in World's
  End. In Arcosanti, Soleri plans to build a high density urban community;
  Olmstead's goal at World's End was to develop and parcel the landscape for
  individual houses. These are polar positions towards the environment: one
  attitude involves the concentration of human activity in the land so as to to
  minimize interference with nature, the other position proposes to spread
  cultural presence throughout landscape. To extrapolate on these issues
  would have been (and could be) another thesis. However, this exploration is
  limited to the order of a single building or in(ter)vention within a predominantly
  natural setting. In theory, one should be able to use the concepts learned
  from this work in order to study architecture at the size of the settlement or
  community.

paolo soleri's vision for arcosanti

GENERAL PLAN
FOR THE SUBDIVISION OF
PLANTERS HILL AND WORLDS END
HINGHAM, MASS
THE PROPERTY OF JOHN R BREWER ESQ
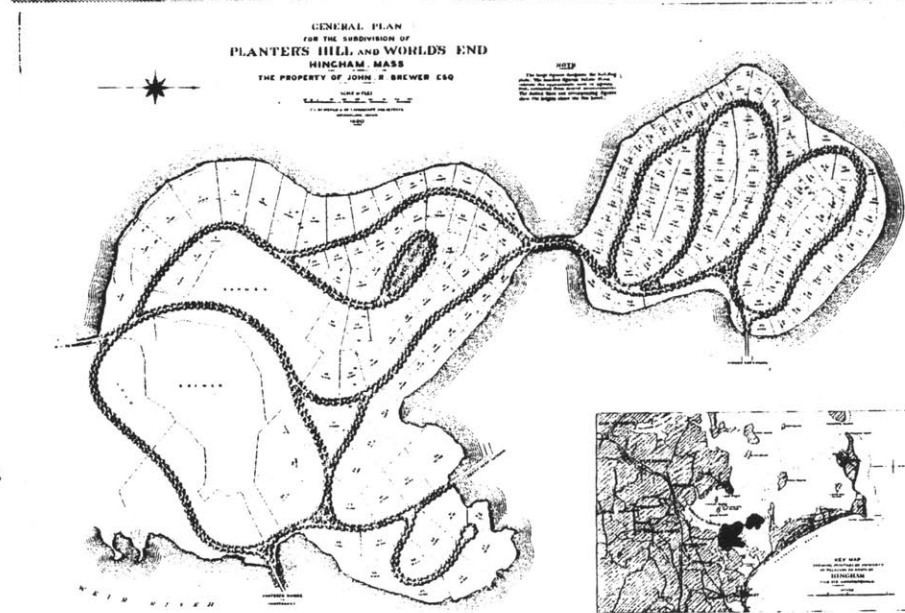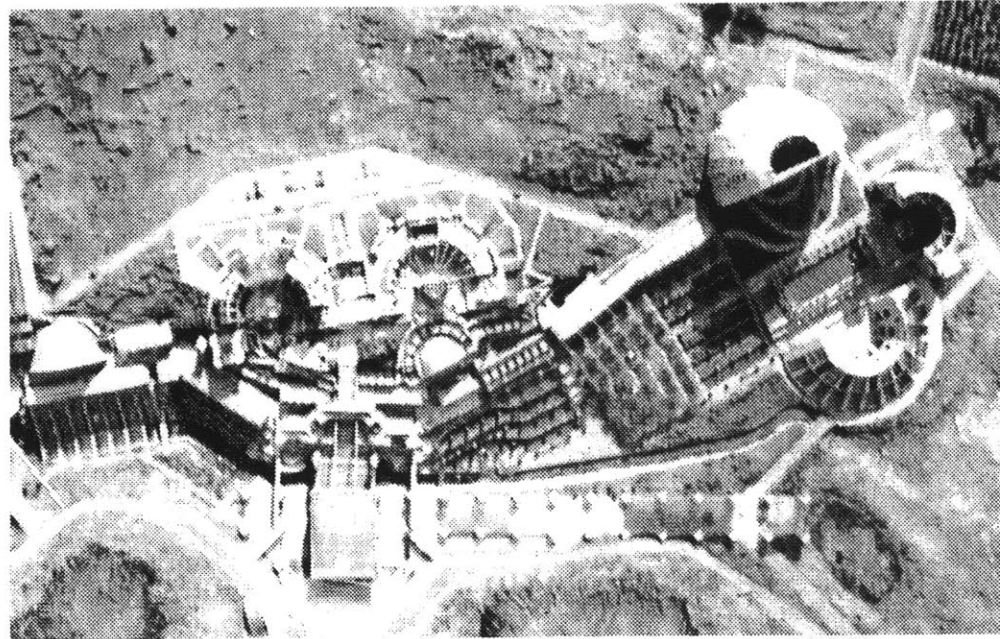
olmstead's plan for world's end

Ando: Ueda residence

- While the physical and metaphysical differences between the desert and the ocean cove are describable, how these differences suggest different buildings is less clear. Why does a continuous surface concrete dome seem appropriate in the desert but not on the water's edge? Why is a wooden screen building a sensible solution in one landscape but not another? Our preconceptions regarding how and what to build on a particular site is often directly informed by local technology, traditions, and materials. For instance, there are very few buildings in the desert made of wood because quite simply, there are no (or very few) trees in the landscape. While designers are often persuaded to respect "regional" standards, these recognized norms are by no means absolute. Yes, a building should respond to the particularities of a place, but it must also transcend "context" and "regionalism" in order that it may be understood autonomously.

- The interest of working simultaneously on two sites is not only to elaborate on their similarities and differences, but to effectively have the two affect one another. Though we may understand the desert to be the opposite of the ocean, we can bring something which is discovered from the desert into the ocean. Designers can and should not be confined to singular, minimal understandings of places and cultures; often times, the most compelling architecture is generated by translating an understanding from one culture and place to another. An example of such a cross-cultural, cross-regional architecture is the work of Tadao Ando. In Japan, there has been a long, treasured tradition of post and beam screen structures. Within this strong building culture, Ando has introduced concrete continuous surface building techniques familiar in European modern architecture. Despite using a foreign building technology, Ando is still able to retain rich qualities in his work which are often associated with Japanese traditional architecture, most notably, the careful articulation of light and darkness.
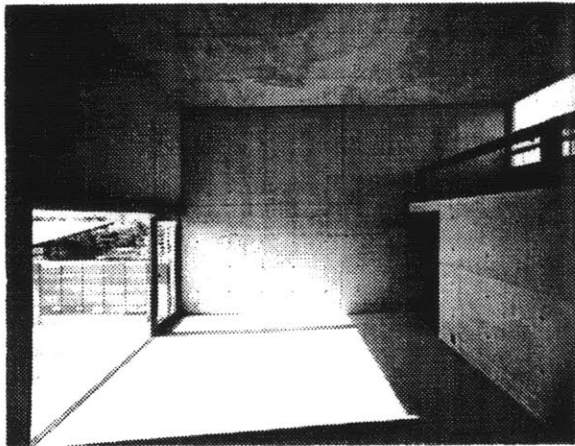
- The original ideas for this thesis stem from an admiration of the natural landscape and personal experiences in both the Northeast and Southwest regions of the United States. The two chosen sites share a strong quality: they are places dominated by the presence of nature, where cultural influences have been sensitive and subtle. The tendency in the modern age has been to live in large artifical settlements packed with materialistic amenities; this style of living has led us to disregard nature in our lives. One of the reasons for choosing to do a thesis which deals with the landscape is to propose that the natural landscape should be an integral, not exceptional, part of our everyday lives.

- There is no question that the ecological balance of the environment is in severe danger. I believe that in order to survive on this planet, we must not only learn to appreciate the landscape, but we must work to inhabit it responsibly.

> The problem is that nature, the independent force that has surrounded us since our earliest days, cannot support our numbers and our habits. We may well be able to create a world that can support our numbers and our habits, but it will be an artificial world, a space station. Or just possibly, we could change our habits.
>
> B. McKibben: The End of Nature

In other words, we need to realistically redefine our position in nature.

> Our perception of nature is relative to the quality of mind or attention that serves as our instrument of cognition. We see only things, entities, events; we do not directly experience the forces and laws that govern nature and the cosmos.
>
> J. Needleman: Introduction, Tao Te Ching

- The premise of this thesis has been that design is a process of exploration rather than problem solving. The complex journey of discovery in design never ends, it only stops. It is through this work that I have realized that architecture is not a discipline of rules and predetermined ideas, it is a pursuit which relies on experience, knowledge, intense observation, and patience.

One last reference:

> We shall not cease from exploration
> And at the end of all our exploring
> Will be to arrive where we started
> And know the place for the first time.
> Through the unknown remembered gate
> When the last of earth left to discover
> is that which was the beginning.

T.S. Eliot: "Little Gidding," Four Quartets

So finally, here this thesis stops but does not end.

ACKNOWLEDGEMENTS

ILLUSTRATIONS SOURCES

p. 13   (right)
      Chinese Watercolors. New York: WH Smith, 1978.

p. 20   (left, center) Villegas, Marcelo. Tropical Bamboo. New York:
      Rizzoli, 1990.

p. 21   (left)
      Elliot Porter. Summer Island.
      (middle)
      A. van Eyck: Projeckten 1962-76. Uitgave: Johan van de
      Beek, 1983.

p. 22   Herdeg, Klaus. Formal Structure in Indian Architecture.
      New York: Rizzoli, 1990.

p. 38   La Loggia: Arcosanti Guest Program. Courtesy of Arcosanti.

p. 63   L.L. Bean Spring 1992 Outdoor Catalog.

p. 134-37 Hoffman, Donald. Frank Lloyd Wright's Fallingwater. New York:
      Dover Publications, Inc., 1978.

p. 141-4 Le Corbusier: Complete Works Volume 5. Zurich, Verlag dur
      Architecktur, 1976.

p. 147   Team Zoo: Buildings and Projects 1971-90. New York: Rizzoli
      International Publications, 1991.

Unless otherwise indicated, all other illustrations provided by author.

164

BIBLIOGRAPHY

(MIT Library call numbers indicated where applicable)

site/landscape/nature

Eckbo, Garrett. The Landscape We See. New York: McGraw-Hill Book Company, 1969. (SB472.E195)

Ferguson, Alfred R. , general editor. The Collected Works of Ralph Waldo Emerson I: Nature, Addresses, and Lectures. Cambridge: Harvard University Press, 1971.

Higuchi, Tadahiko. The Visual and Spatial Structure of Landscapes. Translated by Charles Terry. Cambridge, MA: MIT Press, 1989.

Jackson, J.B. Landscapes. University of Massachusetts Press, 1970. (HN57.J13)

Kazin, Alfred. A Writer's America: Landscape in Literature. New York: Alfred A. Knopf, Inc., 1988.

Kepes, Gyorgy. The New Landscape in Art and Science. Chicago: Paul Theobald and Co., 1956. (N72.K38)

Mather, Kirtley. The Earth Beneath Us. New York: Random House, 1964. (QE31.M427).

McKibben, Bill. The End of Nature. New York: Anchor Books, 1989.

Stevens, Peter. Patterns in Nature. Boston: Little, Brown, and Company, 1974. (QH81.S845).

Thoreau, Henry David. Walden and Civil Disobedience. New York: Penguin Books, 1986.

culture

Bronowski, J. The Ascent of Man. Boston, Little, Brown, and Company, 1973.

Norbert-Schultz, Christian. Genius Loci: Towards a Phenomenology in Architecture. New York: Rizzoli International Publications, 1984.

design theory/process   Habraken, John. <u>Transformations of the Site</u>. Awater Press, 1988.

Klee, Paul. <u>The Thinking Eye</u>. Jung Spiller, editor. New York: George Wittenborn, 1961. (ND588.K63.S756)

Klee, Paul. <u>Notebooks, Volume 2: The Nature of Nature</u>. New York: George Wittenborn, 1970. (ND588. K63.A52)

Smith, Maurice K. <u>Fragments</u>. Course reader, 1992.

Tzonis, Alexander. <u>Towards a non-oppressive environment.</u> Boston: i press inc., 1972.

design/visual references Feininger, Andreas. <u>The Anatomy of Nature</u>. New York: Crown Publishers, Inc.,1956. (QH245.F299)

Feininger, Andreas. <u>Trees</u>. New York: Rizzoli International Publications, 1991.

<u>Antoni Gaudi</u>. Ignasi Sola Morales, editor. New York: Rizzoli,

Hoffman, Donald. <u>Frank Lloyd Wright's Fallingwater</u>. New York: Dover Publications, Inc., 1978. (NA737.W949.H6)

Kahn, Lloyd and Bob Easton, editors. <u>Shelter</u>. Shelter Publications, 1975.

<u>Katsura</u>. Tokyo: Shinkenchiku-sha, 1983. (NA1557.K9,K36)

Kirby, John. <u>From Castle to Teahouse: Japanese Architecture of the Momoyama Period</u>. Rutland, Vermont: Charles E. Tuttle Company, 1962. (NA1553.K58)
<u>Le Corbusier, Complete Works, Volume 5</u>. Zurich: Verlag dur Architecktur, 1976.

Lipman, Jean. <u>Calder's Universe</u>. New York: Viking Press, 1976.

Lotus Documents. <u>Santiago Calatrava: The daring flight</u>. New York: Rizzoli International, 1987. (NA4.Q32)

Moholy-Nagy, Sibyl. Native Genius in Anonymous Architecture. New York: Horizon Press Inc., 1957.

Rudolfsky, Bernard. Architecture without Architects. Albuquerque: University of New Mexico Press, 1987.

Soleri, Paolo and Scott M. Davis. Paolo Soleri's Earth Casting. Salt Lake City, Peregrine Smith Books, 1984. (TT295.S65)

Villegas, Marcelo. Tropical Bamboo. New York: Rizzoli, 1990. (SB317.B2.B3713)

Team Zoo: Buildings and Projects 1971-1990. Manfred Speidel, editor. New York: Rizzoli International Publications, 1991.

descriptions

Abbey, Edward. Abbey's Road. New York: E.P. Dutton, 1979.

A Brief History of World's End. Trustees of the Reservations.

Banham, Peter Reyner. Scenes in America Deserta. Cambridge: MIT Press, 1989.

Berger, John. Ways of Seeing. New York: Penguin Books, 1988.

Harrison, Gilbert A. Gertrude Stein's America. Washington D.C.: Robert B. Luce, Inc, 1965. (PS3537.t264.A6)

Mendelsohn, Erich. Russland - Europa - Amerika: An Architectural Cross Section. Boston: Birkhauser, 1989.

Ponge, Francis. Things: Selected Writings. Translated by Cid Corman. White Pine Press, 1986.

Stein, Gertrude. Four in America.

theses

Batchelor, James. Landscapes as References for Design. MIT M.Arch Thesis, 1981. (Smith, advisor)

Hajian, Paul. The Essence of Space. MIT M.Arch Thesis, 1980. (Anderson, Myer, advisors)

Miller, Frank. Design Projecions for an Astronomical Observatory: A Small Living/Working Communicy Lost in the Ozone at 13.600 feet. MIT M.Arch Thesis, 1979. (Smith, advisor)

Shen, Kairos. Design as a Context for Research: The Design of a Museum of Modern Art as a Vehicle for Studying Alvar Aalto's Work. MIT M.Arch Thesis, 1991. (Chastain, advisor)

miscellaneous

Hanh, Thigh Nanh. Being Peace.

Morrison, Philip and Phylis and the Office of Charles and Ray Eames. Powers of Ten: About the Relative Size of Things in the Universe. New York: Scientific American Library, 1982.

Olson, Charles. Selected Writings. Edited by Robin Creeley. New York: New Directions Books, 1965.

Lao Tsu: Tao Te Ching. Translated by Gia-fu Fent and Jane English. Introduction by Jacob Needleman. New York: Vintage Books, 1989.

Websters Dictionary. Seventh Edition.

168