Thresholds of Awareness

2005 Undergraduate Thesis
Neal A. Zeren

An Artistic Retreat

DATE DUE
**SUBJECT TO RECALL
AFTER 2 WEEKS**

THRESHOLDS OF AWARENESS

A Design Thesis Submitted to the
Department of Architecture and Landscape Architecture
Of North Dakota State University

By

Neal A. Zeren

In Partial Fulfillment of the Requirements
For the Degree of
Bachelor of Architecture

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| Primary Thesis Critic | Secondary Thesis Critic |

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| Blind Thesis Critic | Thesis Committee Chair |

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| Program Director | Department Chair |

May 2005
Fargo, North Dakota

TABLE**CONTENTS**

1

ABSTRACT

A Retreat for artists, whom seek to discover the beautiful
that lies within Nature.

3

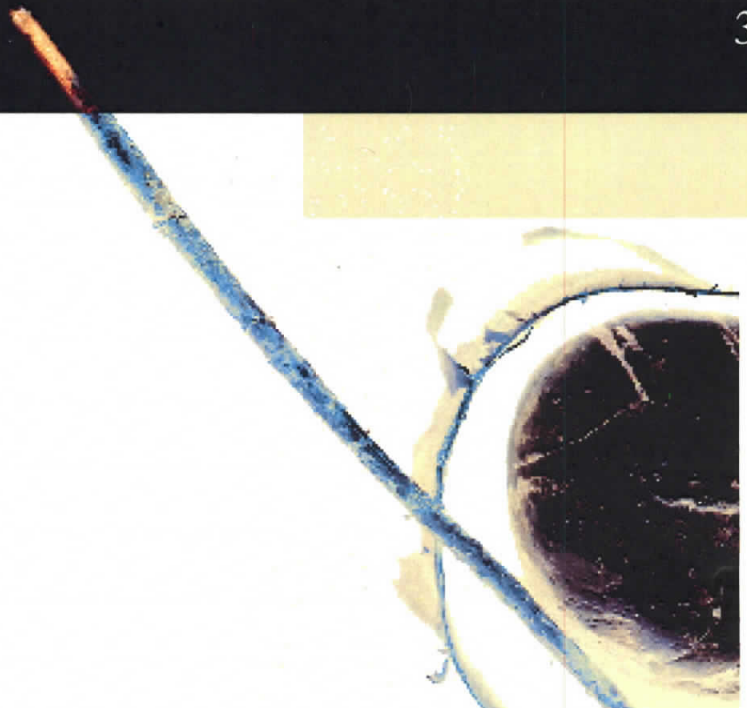This building is a **tangible** which facilitates those of the **intangible** mind. There are no existing buildings of this particular type. This building is a hybridization of several existing building types. In accordance with this building being a facilitator to these great minds, it must

be of the following types. It is a **retreat**, a place of residency, a think tank, an art center, a resource center, and a visitor center. It is a retreat, in so far as; it is there for individual thinkers to remove themselves from the mainstream of society. Through this separation, the building must provide the users with fundamental essentials of food

and shelter. The **art center** aspect will provide the artists with studio spaces and the writers with writing space. The building will provide the theologians and philosophers with a resource center for further exploration. The building is to be a **think tank**, only so far as; to provide a social gathering place where the users may distil their ideas and works. Finally, there will be a visitor center. This will be separate yet will bring public knowledge and money for the facility.
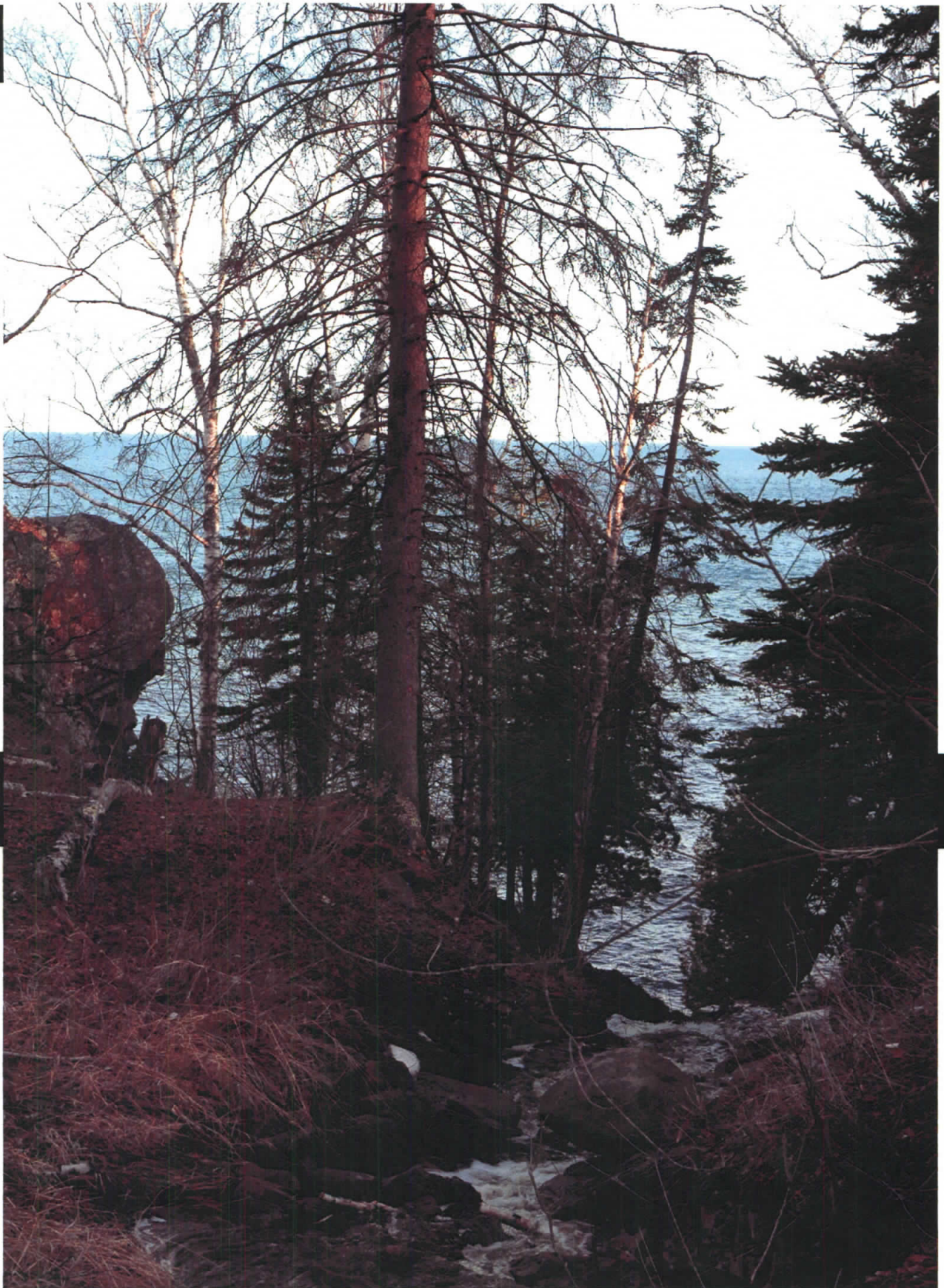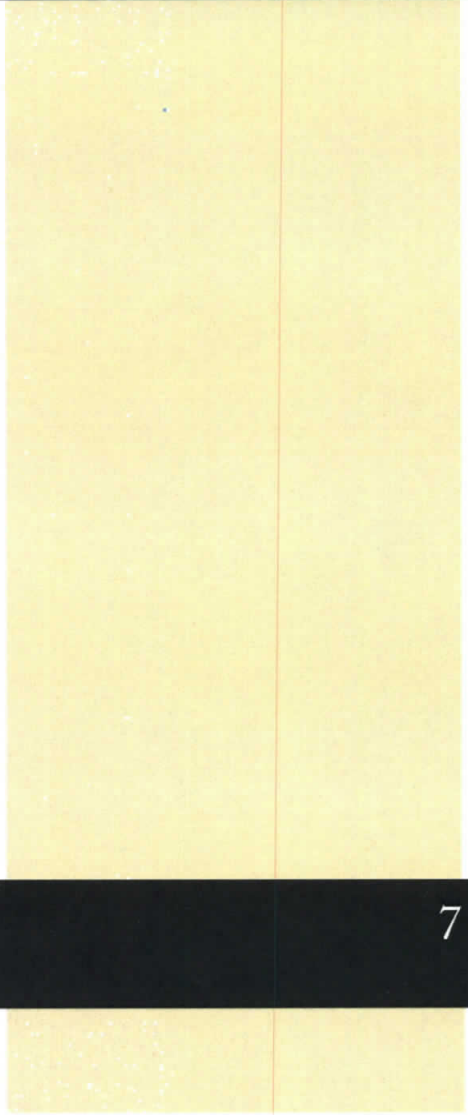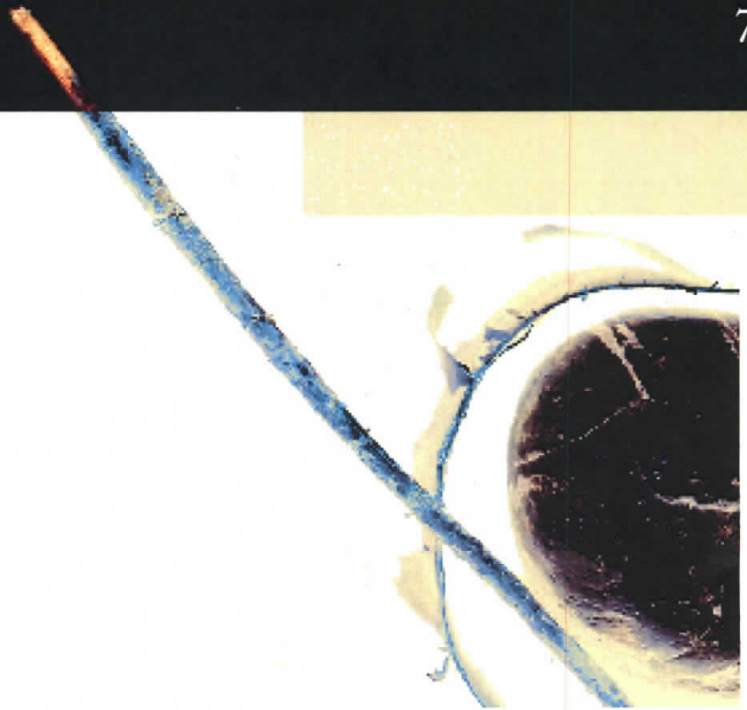
retreat...

intangible

...art center

think tank...

5

7

North America

LOCATION

Ontario

Minnesota

Wisconsin

NORTH

George H. Crosby-Manitou State Park

Manitou River

waterfall and arch
Manitou River

cliffs

cliffs

900 ft.

61

NORTH

NO PUBLIC LANDING AREAS

Fenstad's Resort
(emergency landing only)

Little Marais River

Little Marais

66

65

64

63

cliffs

900 ft.

61

NORTH

LOCATION

9

Vermilion
Misquah Hills
Brule Lake
(2301 ft)
701+East
Birch Lake
Ely
Soudan
497
Tower
485
Babbitt
Embarrass
Isabella
61
Sawtooth
Lutsen
Virginia
Aurora
631
Greenwood Lake
Tofte
Biwabik
Hoyt Lakes
Schroeder
Gilbert
eth
Whiteface Res.
Little Marais
165
Brimson
Silver Bay
Beaver Bay
APOSTLE
NAT. LAK
265
61
200
Cat Island
Rocky Island
Larsmont
Two Harbors
Bear Island
Knife
Sand Island
Cornucopia
River Bark Point
Stock
Red Cliff
Mic
Duluth
Herbster
Is
Superior
Port Wing
Bayfield
La Pointe
Madeline
Proctor
13
Washburn
Oliver
Wentworth
Chequamegon

NORTH

ARCHITECTURE

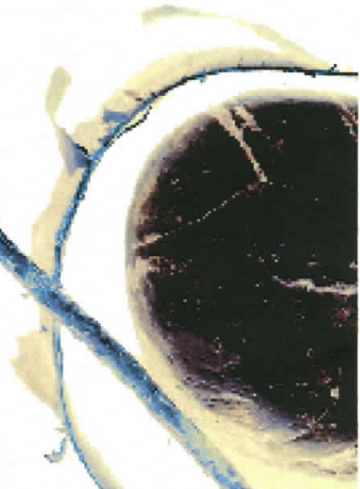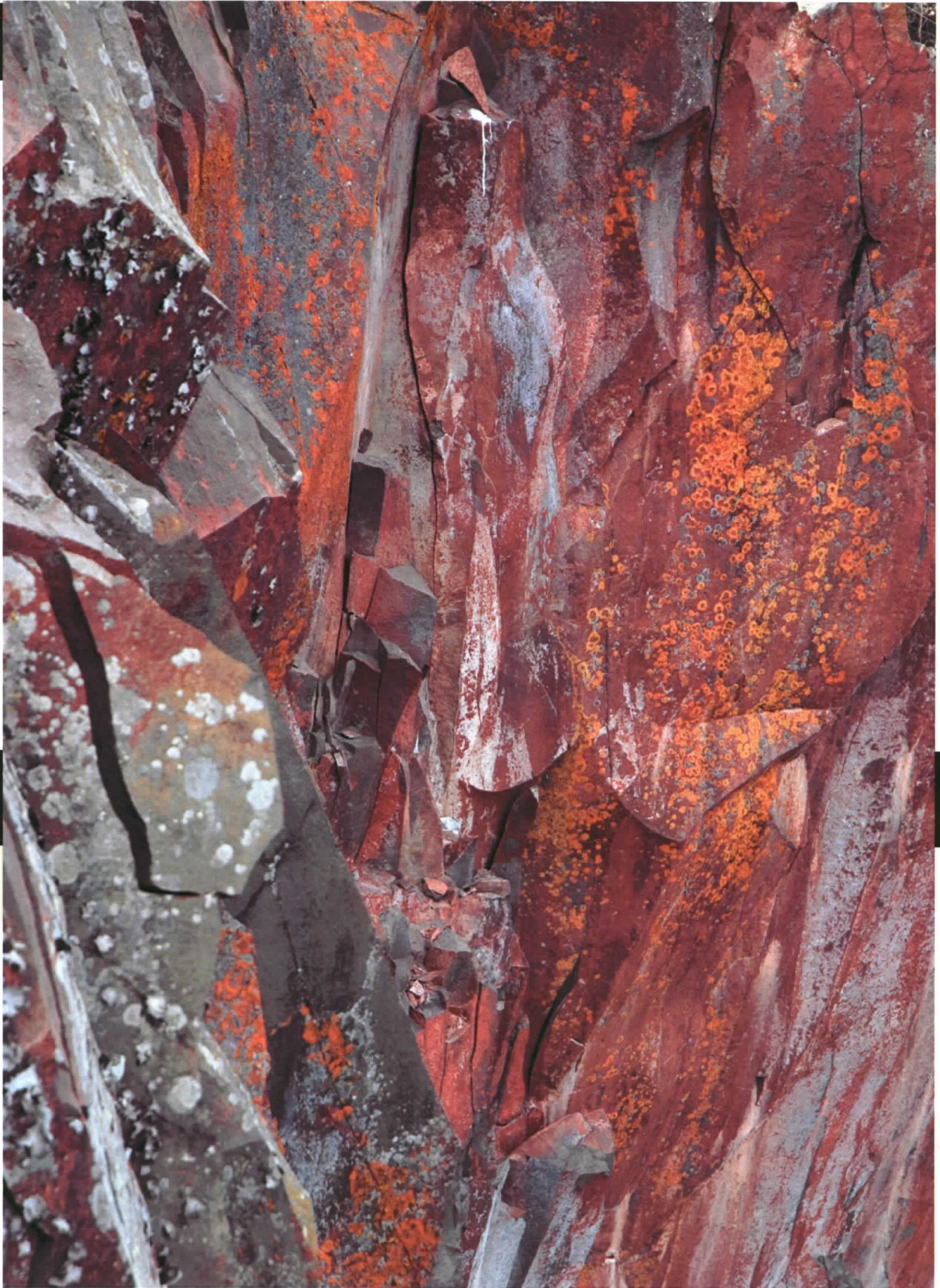Let us assume the world exists. Some may deny this seemingly obvious attribute of the world. However, to even continue to provide relevance for creating anything in this world, I must presuppose the above to be true. If the **world exists**, then we must accept the world as a whole. We must accept the world and all of its many facets. The world essentially is **physical**, social, and of the **mind**. The physical world exists outside of ones self. The social world exists as interactions occurring between external entities. The world of the mind primarily handles internal relations. Daily there are intricate and mysterious interactions and relations between these worlds.

I propose that architecture may be seen as a major **interface** amongst these worlds.

a connection

an iterface

a node

of the mind

of the social

of the physical

11
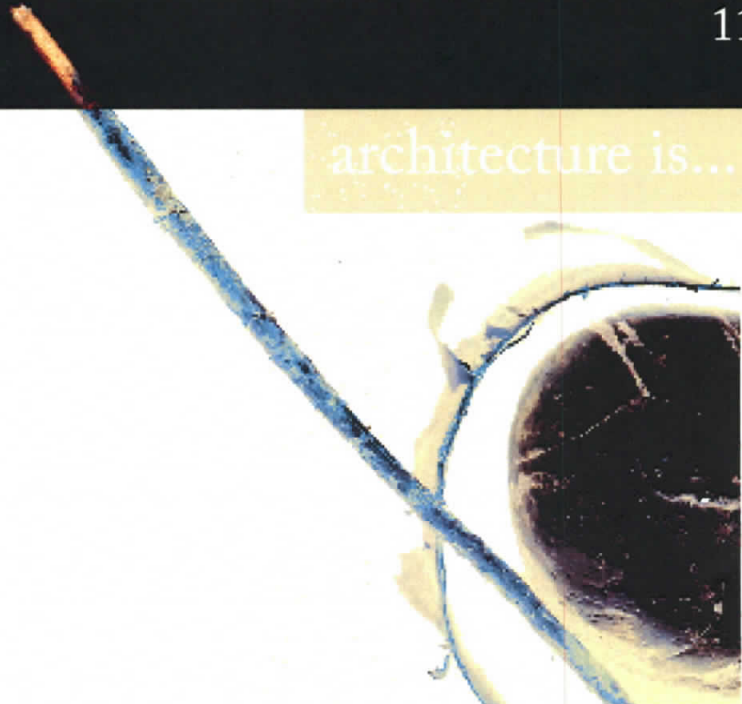
architecture is...

Architecture as a node or connection

The world as we have defined it, is one of infinite possibilities. Architecture is merely a node within that world where these possible interactions occur. Architecture becomes a connector. Architecture exists in the world of the

physical. A building becomes an entity of this idea of a connector. It is obviously of the physical world; and yet, it

is designed in the mental world. Fundamentally, it becomes this connection. However, now that this idea has been realized, it then provides for the other type of connection. This is the connection between social entities. This then become exciting to see what other types of connections may be synthesized between these worlds.

Architecture exists in time

Architecture, through its innate rigorous process, distinguishes it from other designed and built features. This does not exclusively mean that all architecture is good. This does mean is that it may be subject scrutiny and judg-

ment. We may respond to what was said in the past.

We may have an active dialog with the now. We may have a biased conversation with the future, to where they must observe all that we have said. As designers we must constantly be aware of this.

Why should I choose to speak of such seemingly obvious or, quite possibly worse, vague ideologies of what

architecture is? I have chosen to prepare a thesis that explores these connections. The connections between Self, others involved in their Self, and the environment. To define architecture as this, allows me proceed to explore the beauty that lies with in these connections. Architecture is

my medium for exploration.
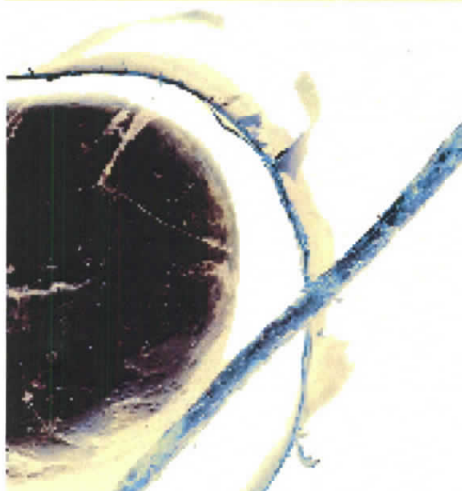
JUSTIFICATION

The moment one gives close attention to any—thing, even a blade of grass, it becomes a mys—terious, awesome, inde—scribably magnificent world in itself.

-Henry Miller

13

where does the beauty lie?

Aesthetics is an idea of the mental mind. Social minds may agree on certain aspects of what beautiful things are. This then takes beauty out of the mental world. As it is realized in the physical world we then have beautiful things the social and mental worlds may agree upon. How then does this apply to architecture? Architecture is of the physical world and may be beautiful in its self.

Can a building be beautiful in so far as to as to perpetuate beauty? This does not necessarily entail the buildings own physical beauty. Can the building be structured socially to perpetuate this beauty?

15

SENSITIVITY In CONNECTIONS
With The
SUSTAINABLE WORLD

What is it to be saturated with a feeling? Something that seems to come from within and that which connects to all that is. You wake up in the morning. The light from the morning sun is in your eyes. You can't help but smile as it warms your face. You go throughout your day with that lasting feeling still burning with in your mind. You attempt to describe it to your friends. Words like "beautiful" and "warm" and "pretty" come out of your mouth; however, you know it is more than that. You know that connection you had the morning prior, was more than these picturesque words seem to suggest. The words still seem to miss what it was. What was it? How does one describe such sensations? Perhaps we lack the vocabulary that is necessary to describe how we are connected to this natural world of beautiful existence. I might be so bold as to describe this connection as a spiritual connection. This connection that we feel is so inscribed in our beings that we cannot deny its existence. Thus, I feel we must embrace its existence.

We are all charged with this duty of embracing this connection. Every moment of the day we face choices which lead us to engage this embrace or to deny this embrace. This embrace of the connection is that to nature as well as humanity within nature. We as designers are called to handle this connection differently than others.

The sensitivity with which a designer addresses the environment shows how apt they are to
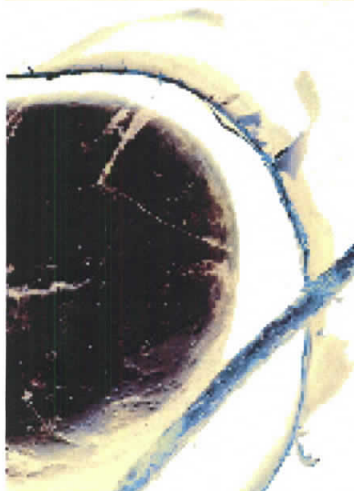
understand the connections that we share between humanity and nature. There are many levels of sensitivity in design. Through my design thesis I shall show the following sensitivities: site sensitivity, user sensitivity, material sensitivity, form sensitivity, encyclical nature of design, subtle inspirations from nature, and finally how we as designers may internalize designing for a sustainable world.

SITE SENSITIVITY
Site selection is a crucial element to the success of this project. I have chosen a site on the upper North Shore of Lake Superior. This site possesses attributes that we attach certain symbolism of fundamental learning to. The site from macro to micro provides the user with features that

attribute to these underlying symbols. These fundamental underlying symbols are: edges, patterns, and power. Beyond the philosophy of site selection, however, lies a necessary dialog between site and designed project. The dialog must be considered delicately.

William McDonough suggests an idea with in his book of "Cradle to Cradle" that I think supports my idea of site sensitivity. He throws caution to the use of "Brute Force," in design. He says, "The attempt to impose universal design solutions on an infinite number of local conditions and customs is one manifestation of this principle[Brute Force] and its underlying assumption, that nature should be overwhelmed; so is the application of the chemical brute force and fossil fuel energy necessary to make such solutions 'fit.'" (McDonough 30, 31).

This sensitive dialog that I propose is my interpretation of not using a 'universal design solution.' Through my design I intend to directly relate to the existing site, both that for the animals and for the vegetation of the site. It must be understood, as well, the spirit of the site which I am responding to. The site is natural and undeveloped. The designs to be put forth on the site must not intrude on this spirit. The forms must become one with the landscape. The materials must not be seen as foreign to the site.

There also is sensitivity with how the designed and built environment directly impacts the site. Heavy machinery is often used to alter the grade of an existing site. In most cases, if the site is inadequate to the designed building; the site must adapt. I see this as an improper way of addressing the relationship between site and built environment. As I design the buildings, the footprints of the buildings shall not touch the earth, save carefully considered point loading. The users of the buildings also impact the site. Sidewalks are in most

cases the automatic design solution to interconnect the buildings within a site. I feel these site paths should be limited. The user should limit the site impact by freely walking between the facilities. The users will come to understand Thoreau's idea of what it is to saunter. "Sauntering; [which] some would derive the word from sans terre, without land or home, which, therefore, in the good sense, will mean, having no particular home, but equally at home everywhere." (Thoreau 627).

USER SENSITIVITY

I intend for the first users of the building to be master craftsmen. These masons, wood workers, and iron workers shall construct the necessary designed buildings of the
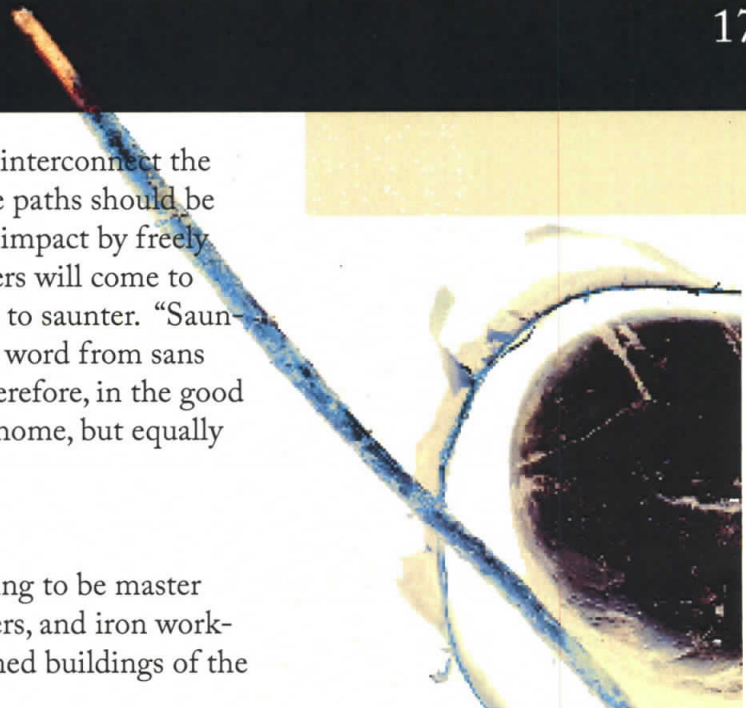
site. These master craftsmen will be instructed to leave the site 'as is.' There will be no heavy machinery allowed on site. These craftsmen shall provide the future users of the facilities with aesthetically inspiring buildings which become one with the natural world.

The designs that I shall create for the craftsmen to build will follow a sensitive dialog between the users and the buildings. The designs will give the users of the site the utmost availability for connectivity to the existing site. My intention is to provide the users with a sense of unity with their environment. McDonough poses a statement which describes this connectivity. "[a] more complex design goal: to create a building that celebrates a range of cultural and natural pleasures – sun, light, air, nature, even food, - in order to enhance the lives of the people who work there" (McDonough 74). These five elements are invaluable to the human environmental interaction.

MATERIAL SENSITIVITY

"Nowadays almost all man's improvements, so called, as the building of houses, and the cutting down of forest and of all large trees, simply deform the landscape, and make it more and more tame and cheap." (Thoreau 633). Simply stated by Henry David Thoreau, this is what we see occurring throughout civilization. Whether it is the cutting down of trees or the stripping of the landscape for minerals, we take from this earth to satisfy our building needs. We see the need for "improvements" with in our cities or even our rural landscapes and often neglect the costs of implication. What Thoreau is reminding us is that as we create these improvements we must remember where the materials are coming from. We must take care not to "cheapen" or "tame" the world by stripping the resources from it.

18
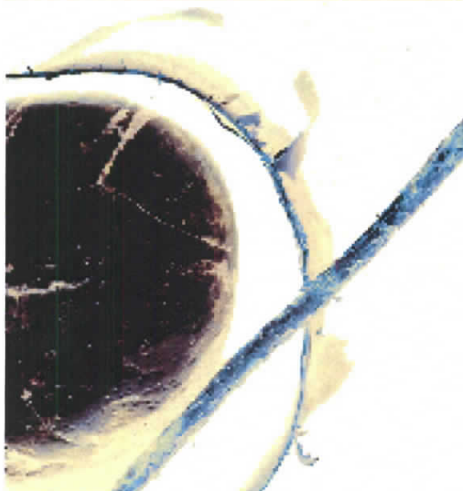
One must then carefully analyze all aspects of the materials when choosing the perfect materials for the building project. We must choose materials in accordance with the environment. We must sensitively understand all there is to each material we choose to build with. Every material has an origin, a state of existence, a level of embodied energy, a level of maintainability, and a life expectancy.

ORIGIN OF MATERIALS

Thoreau, in his quote, says, "…the cutting down of forest and of all large trees…" He is not merely referring to the removal of trees as deforming the landscape. He is also suggesting the removal of any material from the environment to create our improvements. Every material we

choose to build with has an origin from this environment. When we choose to build with these materials, we must understand certain environmental considerations. We must understand where the material comes from, how it is removed from the earth, what processes it goes through to arrive at our site, and how it arrives to our sites. It is with these understandings one can decide whether one material choice is better than another. I would suggest the example of reclaiming materials. It would seem far better to reuse materials that have already been pulled from the earth, than to seek out living trees. It may be argued that ultimately both come from the same source. I would say though that this is where a designer must understand the properties which each material possesses at the time of acquisition.

MATERIAL PROPORTIES

Each material is in a certain state of existence upon acquisition. I use this idea of existence loosely. I shall not enter the metaphysical levels of existence. I shall define existence only so far as the theory of conservation of matter is considered. "Where by matter can neither created nor destroyed in an isolated system" (Farlex). This is a crucial to understanding for designers to have. We must understand what the properties of the material are when we find it. Equally important, is when we are through with the material, what will its state of existence be. What we as designers must realize, is that materials that are in certain states of existence are better in those forms than materials that exist in other states. It would seem obvious that one would prefer the shade of a beautiful oak tree over that of a pile of burnt ashes. I would suggest that allowing materi-

als to exist in their natural state is the sensitive way to understand the material's properties. The less one must add embodied energy to a material the more natural the material remains.

EMBODIED ENERGY

Understanding the embodied energy of a material is an interesting awareness. Every material has a certain amount of energy stored with in it. The energy is that of physical energy and time energy. This consideration of embodied energy is as important as the physical characteristics of the material. I believe most would agree that if a tree embodies hundreds of years into its growth and we convert it into toothpicks, which an individual may
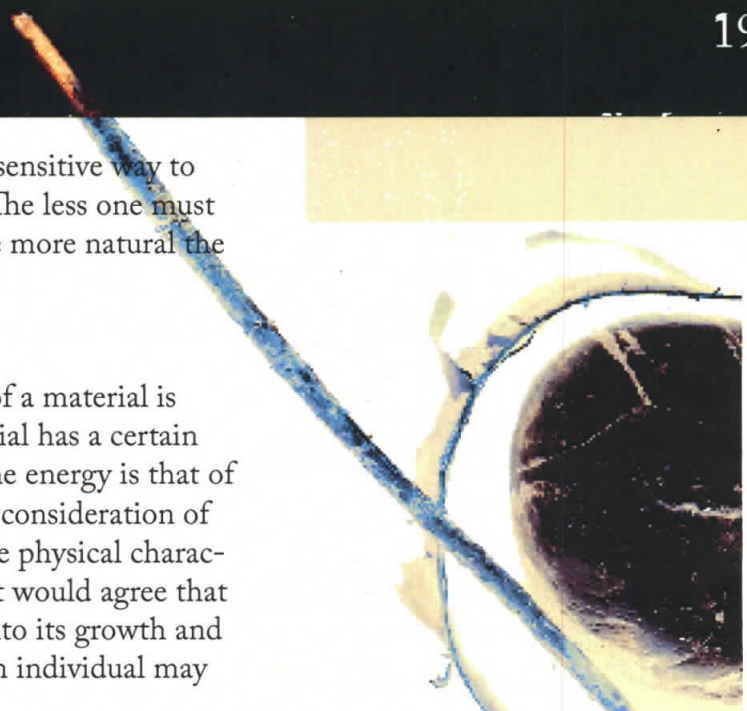
use for five minutes, the trees energy was a grotesquely consumed. Knowing each materials embodied energy insures this sort of waste does not occur.

ENERGY FLOW

The next level of comprehending the materials of this world is to understand how the energy is embodied and how it flows through the materials. We as designers should, "Rely on natural energy flows. Human designs should, like the living world, derive their creative forces from perpetual solar income. Incorporate this energy efficiently and sagely for responsible use" (Hannover). We must understand that the source of our natural energy on earth is from the sun. This Hannover Principle is suggesting that we look to nature for its solutions of energy flows. A tree produces a leaf so that it may gather the sunlight and convert it to food for the plant. We too must adapt these ideas of energy flow.

LIFE EXPECTANCIES

The energy with in a material allows it to exist in a certain form for a certain period of time. Every thing created within the environment has a lifespan of some sort. Some things created have a nanosecond of existence. Others, such as nuclear waste, have a life expectancy of tens of thousands of years. There is a way of understanding these material's life spans and designing accordingly. It would seem that if a designer could truly understand how each material decayed through time, a harmonious balance could be established. A balance, which would suggest how the building may return to the earth.
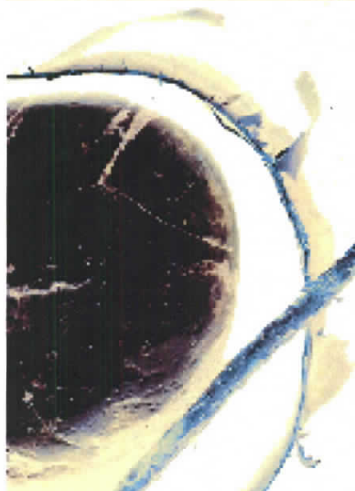
ENCYCLICAL NATURE

The holistic way of understanding the origin of the material as well as the life span of the material leads to McDonough's idea of "Cradle to Cradle." He suggests, with in his book, exactly how one should make material choices. Briefly described, "Cradle to Cradle," is exactly that. It means that one designs the use of a material from origin to origin. Since it has been described that every material's origin is ultimately the environment, how then do we as designers return the materials to their origin. It is through truly comprehending the origin and properties of each material, that we may come to understand this sensitive cycle.

ELIMINATED WASTE

"Eliminate concept of waste. Evaluate and optimize the full life-cycle of products and processes, to approach the state of natural systems, in which there is no waste" (Hannover). One must understand all of the above properties of materials to fully understand how to use this Hannover Principle. Waste can be understood on the level of energy consumption as well as physical consumption. The environment has been sustainably handling its production cycles for billions of years. By understanding the materials we may come to understand the sensitivity of material selection so that we may come closer to uniting with the natural world.

FORM SENSITIVITY

I would introduce this idea of form consideration because form is one element often times excluded from green design. Throughout history designers and especially Architects have been concerned with this idea of form; form, "Form Follows Function," minimalism, and such forth. These approaches have primarily been concerned with aesthetic quality of form. McDonough and Braungart propose the idea of "Form follows Evolution." I will briefly introduce their book is a primary example of this thought process. They have designed a book whose innate formal qualities have changed by rethinking how it is designed. They have challenged the idea of what a book is. They have made the book that is one-hundred percent recyclable. This means that not only are the pages recyclable; but the quality of product is able to be recycled. When regular books are recycled, the paper looses its luster. The form of the 'second generation' book is less desirable. McDonough's book is made of a plastic that can easily be reused with little energy lost. This way of rethinking design must be adapted to Architecture.

How do we adapt this to Architecture? I think that the idea of "Form follows Evolution" directly

leads into another idea proposed by McDonough, "eco-efficiency." This term primarily means, "Doing more with less" (McDonough 51). This idea can be adapted to all elements of design: the material selection, the site selection, in spatial planning, as well as, product waste choices. As designers make these essential decisions about his or her design and overall form perhaps he or she may consider its adaptation to form. This adaptation of eco-efficiency may be seen as a new idea of Minimalism. The form many times merely becomes a function of how the materials are brought together. It seems that with a certain level of sensitivity, the form may be eloquently composed. Doing more with less would seem to be a perfect understanding of all of the properties of materials.

The form then, of sustainable design, may be an aesthetical balance of the natural world and the created world.

RETURNING TO THE ENVIRONMENT

I have discussed this encyclical nature of building materials. I would now like to look at this from another perspective. Every built object has a certain life expectancy. I would like to consider the overall life expectancy of a designed building. Time dictates what elements last and which do not. We must consider the buildings of ancient Greece. The structures which still remain thousands of years later were designed in such a fashion. I would argue that this style of design has its place in history and not in today's world. The design of today has shifted from a cultural idea of designing it to last through time to designing for a "throw away" culture. Designers often look only to the immediate needs of the client and not that of the needs of the future. I would suggest that there must be a balance between these two extremities of design. There are two of the Hannover Principles that touch on the balance that must be established.

The first is to, "Create safe objects of long-term value. Do not burden future generations with requirements for maintenance or vigilant administration of potential danger due to the careless creation of products, processes or standards" (Hannover). This suggests through careful design considerations we may design lasting elements that require little or no maintenance for the future.

The second is to, "Understand the limitations of design. No human creation lasts forever and design does not solve all problems. Those who create and plan should practice humility
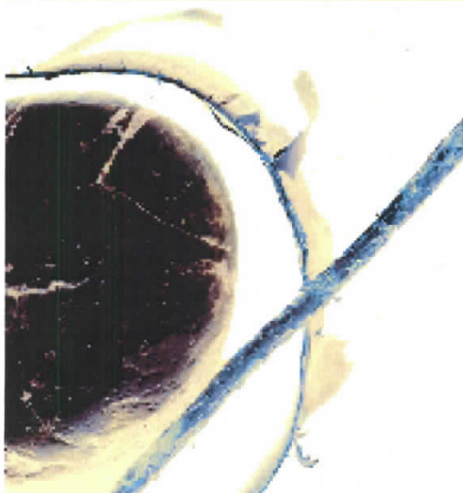
in the face of nature. Treat nature as a model and mentor, not as an inconvenience to be evaded or controlled" (Hannover). We must come to understand what the life expectancy of the building is as well as that of the users. The built world often times outlasts the users of the building. In this sense the built environment should be designed to adapt accordingly or be designed not to outlast the user. The users of the future shall not have to take care of the building after it has out lived its lifespan. The building will simply return to the earth from which it came. We as designers must understand how nature handles the decay of its own built world. There may be an aesthetic way of returning the buildings to the earth.

DESIGN INSPIRATIONS

Through my research of designing for a sustainable world, I came across a wonderful example of design that nature provides us with. Many times as we seek inspiration for architecture or design as a whole, we look to the existing built world. We often neglect the examples nature provides for us.

[the cherry tree] as it grows, it seeks its own regenerative abundance. But this process is not single-purpose. In fact, the tree's growth sets in motion a number of positive effects. It provides food for animals, insects, and microorganisms. It enriches the ecosystem, sequestering carbon, producing oxygen, cleaning air and water, and creating and stabilizing the soil. Among its roots and branches and on its leaves, it harbors a diverse array of flora and fauna, all of which depend on it and on one another for the functions and flows that support life. And when the tree dies, it returns to the soil, releasing, as it decomposes, minerals that will fuel healthy new growth in the same place (McDonough 78).

Nature through, its creation of a cherry tree, has provided for its own growth as well as the environment as a whole. We as designers must learn these ancient techniques of design. We must come to understand the delicate balances and sensitive connections that nature has. We must learn to mimic these principles of nature. We must internalize these ideas.

INTERNALIZING

Historically the world has undergone many revolutions from civil to industrial. I would suggest

a different revolution, a revolution where we as designers are constantly aware of this connection that we have with the environment. A revolution where we have internalized all that it is to design sustainably. We must see designing sustainably as natural as breath. Breath that comes from that of the out, to the in, and again is expelled. We must internalize our natural sustainable design to this unconscious level. We have been taught throughout school to know and understand larger concepts of design: balance, proportion, scale. These concepts have been so engrained that even without thinking we are aware of these understandings. As we encounter the designed world, we know immediately, whether the scale is proportioned right. We understand, as we enter
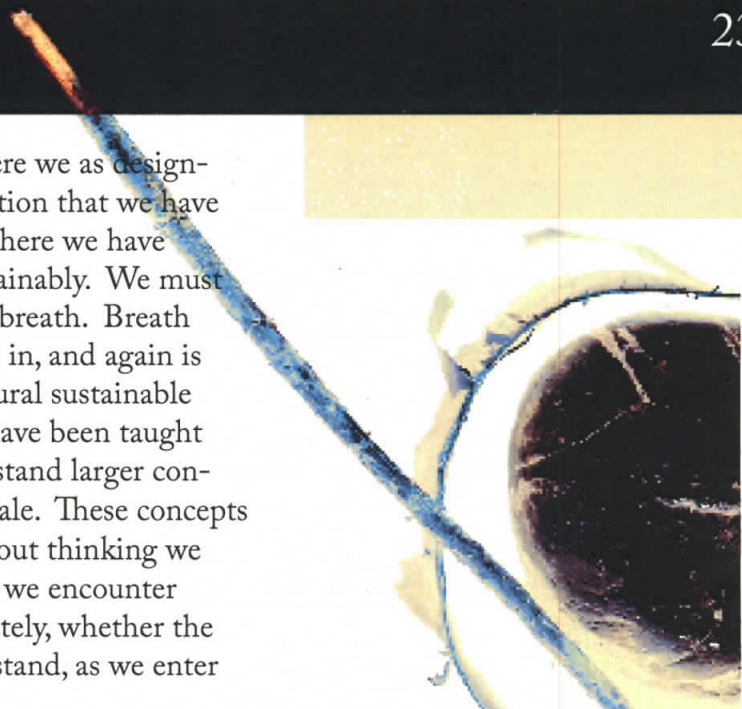
an atrium, whether the architect has placed terraces and trees to lower the scale of the four story space. I would suggest that we may be able to eventually understand sustainable concepts on the same level.

CONCLUSION

The final Hannover Principle suggests a sharing of this knowledge. "Seek constant improvement by sharing the sharing of knowledge. Encourage direct and open communication between colleagues, patrons, manufactures and users to link long term sustainable considerations with ethical responsibility, and re-establish the integral relationship between natural processes and human activity" (Hannover 3). This is the final and most important step to sustainable design. If one is to understand all of the above ideas of designing for a sustainable world, and is able to internalize them, but does not share them, then all may be lost. We must not become islands of sustainable design our concepts must transcend our designs, our contacts, and even time. We must understand that to continue to exist on this planet we must unite with it and with each other.

There are ancient Chinese teachings that I feel are essential to understanding how we as designers think we can improve the world. Lao-tzu is translated as saying, "Do you want to improve the world? I don't think it can be done. The world is sacred. It can't be improved. If you tamper with it, you will ruin it. If you treat it like an object, you'll ruin it." (Mitchell 29). Both Thoreau and Lao-tzu suggest that we must not 'tamper' with the world. McDonough proposes that we should not impose our designs on the environment. We must learn to co-exist with it. There are sensitive ways to connect to the world of the natural. We must learn

to understand these connections and unite through them. We as designers have a far higher call to this understanding. We must recognize this and proceed accordingly.

25

Site selection is a crucial element to the success of this project. This site possesses such attributes of symbolism that which are conducive to fundamental ideologies of knowledge. The site from macro to micro provides the user with the above features that attribute to underlying symbols. These fundamental underlying symbols are edges, patterns, and power.

27

Edges

The above features of site location and geology provide the user with a concept of an edge. The edge of the land and the edge of the water creates a physical edge as well as a visual edge. This edge is not restrictive rather it is permeable. Visually and physically one can pass over this edge or this apparent boundary. Knowledge is seemingly always coming to an edge. The views on the site provide a hope to existence beyond that of these physical boundaries.

Patterns

An individual must be aware of natural cycles. Sleeping, eating, growing; are all cycles that an individual experiences daily. This site provides the user with and awareness to these cycles that exist outside of self. The four seasons of northern Minnesota provide for life cycle awareness. The trees are the most visual of this cycle. Gaining green leaves in the spring, filling out through the summer, taking on color as the chlorophyll parts from the leaves, losing leaves and remaining bare through the winter; all are examples of time passing and encyclical existence.
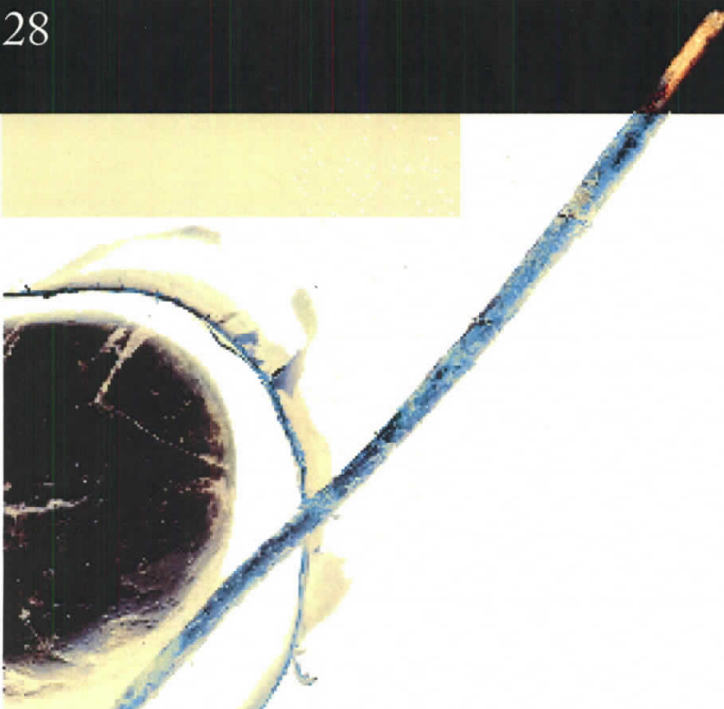
Power

Nature displays tremendous power which may provide the user with humility as well as a cognitive understanding of what power knowledge and beauty have. Lake Superior has incredible impact and force on the North Shore. The water destroys the edges of coarse rocks. It slams in to the shore with tremendous force creating a sound to match. The user will be able to witness such phenomena as the Ides of November. The North Shore is known for the storms of November. The weather will force the lake into twenty foot waves and tremendous swells. Six months later after the lake is frozen, there is incredible power to be witnessed in the ice breaking as it dissipates.

SITE THEORY
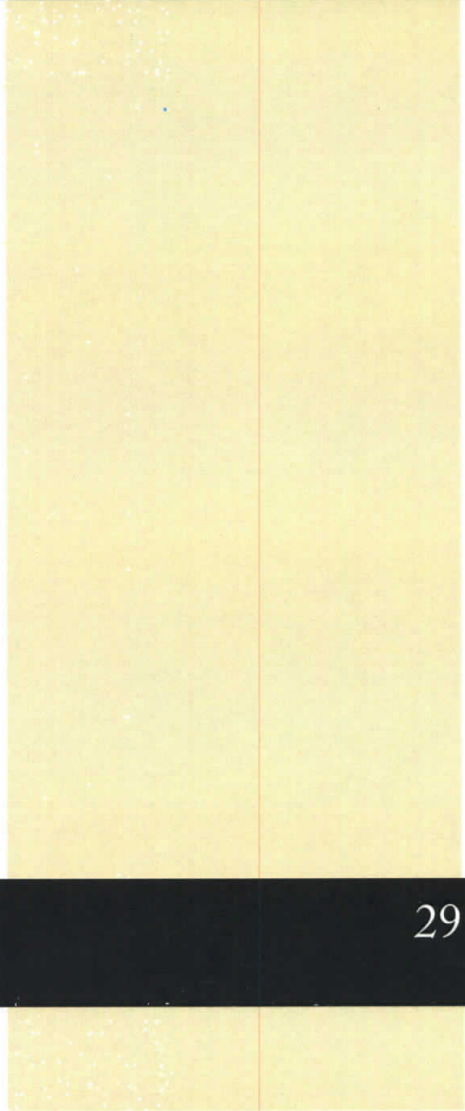
Beauty is not caused.

It is.

– Emily Dickinson

The building's elements have three **major** tasks to provide the users with. The building must be conducive to research, internalization, and production. The users will come to this facility to further themselves as **individuals**, to internalize what they have learned, and to produce hybrid **ideas**, works, and writings.
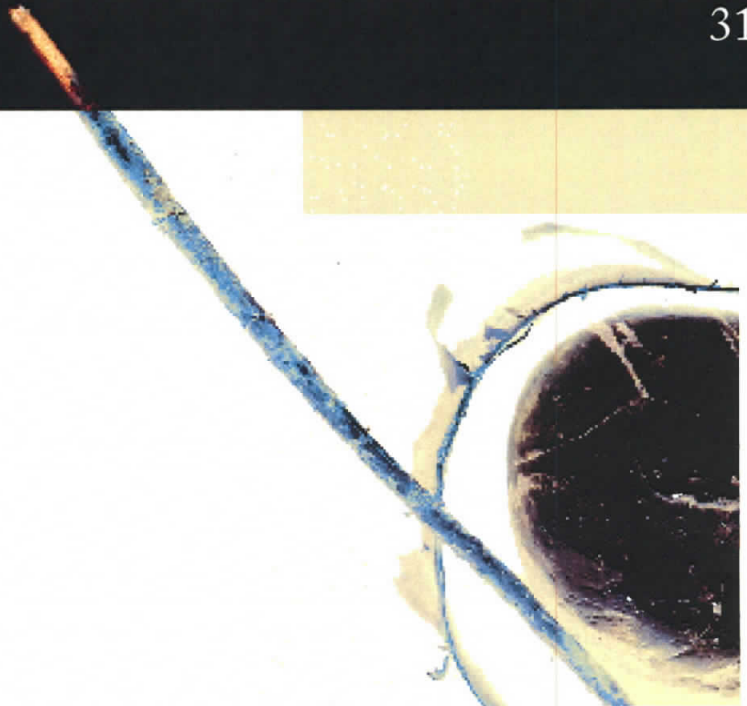
Research

These facilities must be equipped with interconnectivity among all major known bodies of knowledge. These sources may be digital in nature. The facility will also need to establish a library of published writings. These resources must be diverse and specific. Due to the nature of the facility, its users may need a range of creative inspiration as well as precise data.

Internalization

These spaces are as important as the production spaces. The individual users must be able to contemplate and consider ideologies and concepts which they have come to this facility to expand upon. The knowledge they have learned prior to using this facility as well as the information provided in this building, must be rationalized prior to being synthesized. These spaces will be diverse.

- Spaces of solitude

Personal reflection allows for the individual to, with out outside influence, contemplate and ingest ideologies.

- Spaces of social interaction

This social interaction will be that which the users can freely exchange ideas. The space will be open to all fields and will encourage interdisciplinary exchange of ideas.

Production

These spaces will vary in nature. The users will need spaces to express their learned knowledge and internalized ideas. These spaces will require diverse programming considerations. The thinkers and writers will need facilities to write and publish their ideas formally. The artists will need studio spaces conducive to the individual need of the artist. A sculptor may require more space than a painter would.
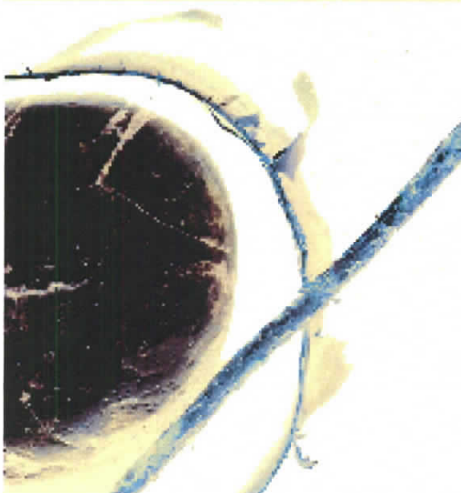
- Work spaces

Individual studios will be provided for this aspect of spatial requirement. These spaces will have direct connection to the environment. The connection to nature is crucial in design decisions.

- Display spaces

The public will be encouraged to support this facility. There will be public spaces to exhibit the productions from the facility.

-Primary Subsidiary Spaces

These spaces are crucial to the support of the above areas would include residency, social spaces, and support facilities.

Residency

The intrinsic nature of this facility is the bringing together of these great minds, thinkers, and creators. These individuals will require a place to stay while contemplating the higher things of life. The residency may be temporary to semi-permanent. The users will appreciate all of the comforts of their native homes.

Whatever is in any way beautiful hath its source of beauty in itself, and is complete in itself; praise forms no part of it. So it is none the worse nor the better for being praised.

-Marcus Aurelius Antoninus

33
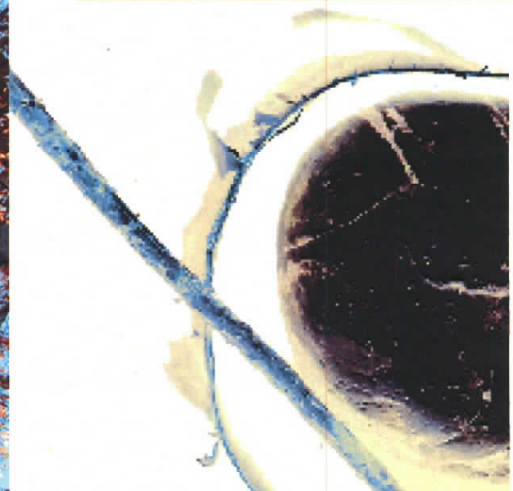
This building has one **primary** user. This user consists of social group to be formed by the users of the faciltiy. This **society** will be formed on creation of the building. Its members will be exclusive on the basis of the level and type of their talent. The individuals must be a **thinkers**, **writers**, or **artists**.

The thinkers include such people that possess degrees in theology, metaphysiology, or **philosophy**. Writers must possess degrees in a language. The language may vary in accordance with the user. Artists must possess degrees in **sculpture**, pottery, painting, printmaking, drawing, or another of the **fine arts**.

SEARCHING

INTERNALIZATION

PRODUCTION

I have come to find this encyclical pattern of

Searching, Internalizing, and Producing. This triune demonstrates not only the process I partake in as I design, rather, it is also mirrored in the design itself.
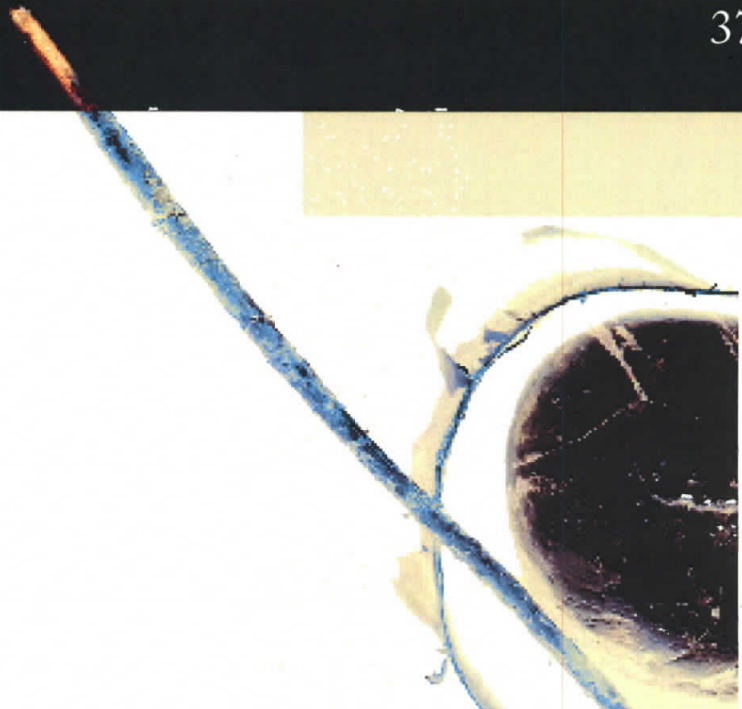
Constantly searching. There seems to be a tendency for individuals to seek out happiness with in a material world. There seems to be a draw to turn away from what once was a need to survival. No more is the mass of the western world in a need of survival. A need where they seek out only the necessary. The desires have shifted to that which is deemed popular. It has shifted to ideas of many must be the way to live. Consumerism would be a label that would describe this tendency. The consumerist world drives people to be directed to what they should have or posses. There wants have been directed to objects which make people "fit in." What is it though, to fit in? Where did this perpetual loop begin? Where is it going? It seems to be human nature to be a social being. It seems as though we are in need of acceptance on some sort of level.

This searching for acceptance, though, seems to lead individuals into an unsatisfiable spiral. We search out what is

What is it then that we search out? Are there definite tangible ideas that every individual is searching for? I would like to search for a larger subset of what these desires. Frank N. Sibley, in his essay of "Aesthetic Concepts," uses a great metaphor. He proposes the idea of a square. He points out that there are a set of necessary and sufficient conditions that the idea of the square falls into. There are four equal lines and four right angles. I would like to adapt this idea and explore whether or not a "square" exists for us to search for. Are there terms for ideas that every individual searches for. Can we label these inter-

nal "desires?" Let us explore this.
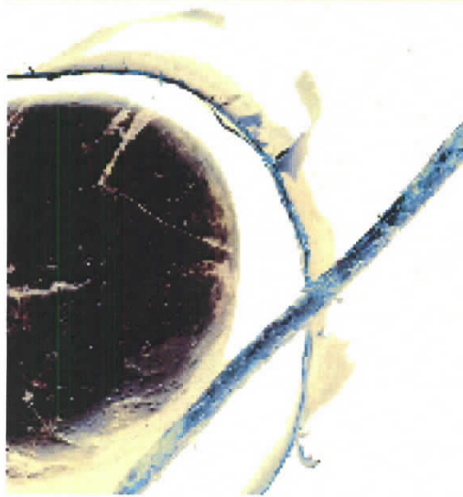
Food shelter clothing safety (physiological levels of acceptance)

It would seem that human nature lends itself to satisfying certain needs; hunger, protection from the elements, both micro, in the form of clothing, and macro, in the form of housing. It would seem that there are certain social needs as well. Human nature lends itself to desiring acceptance.

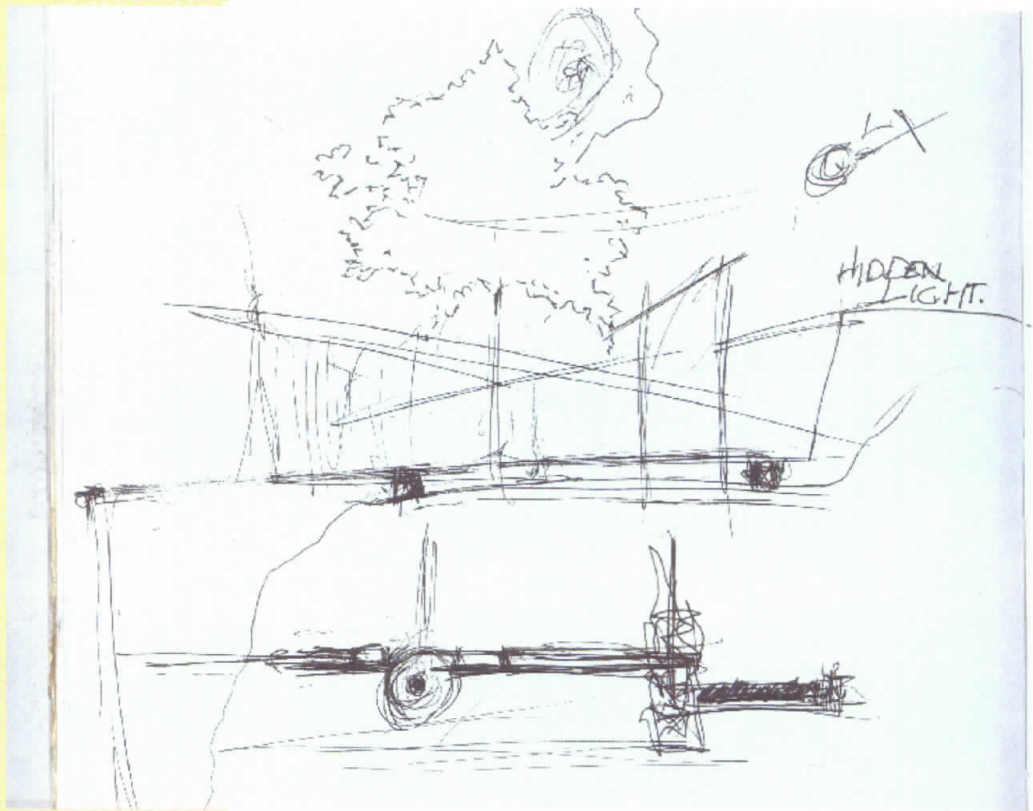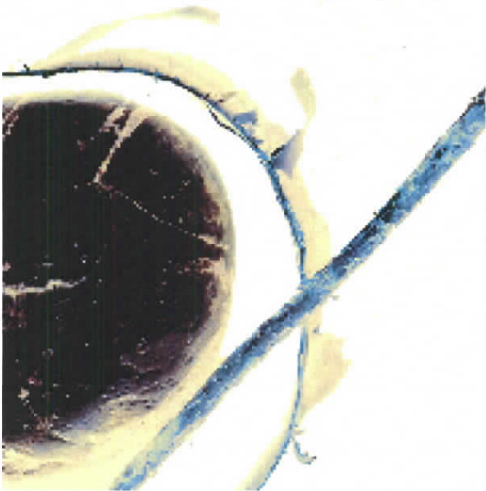Yet we still search out the aesthetic. What is the source of this desire? I propose it is nature.

Focus

41

LAYERS OF BARRIERS
COMPLEXITY OF DESIGN.

HIDDEN LIGHT.
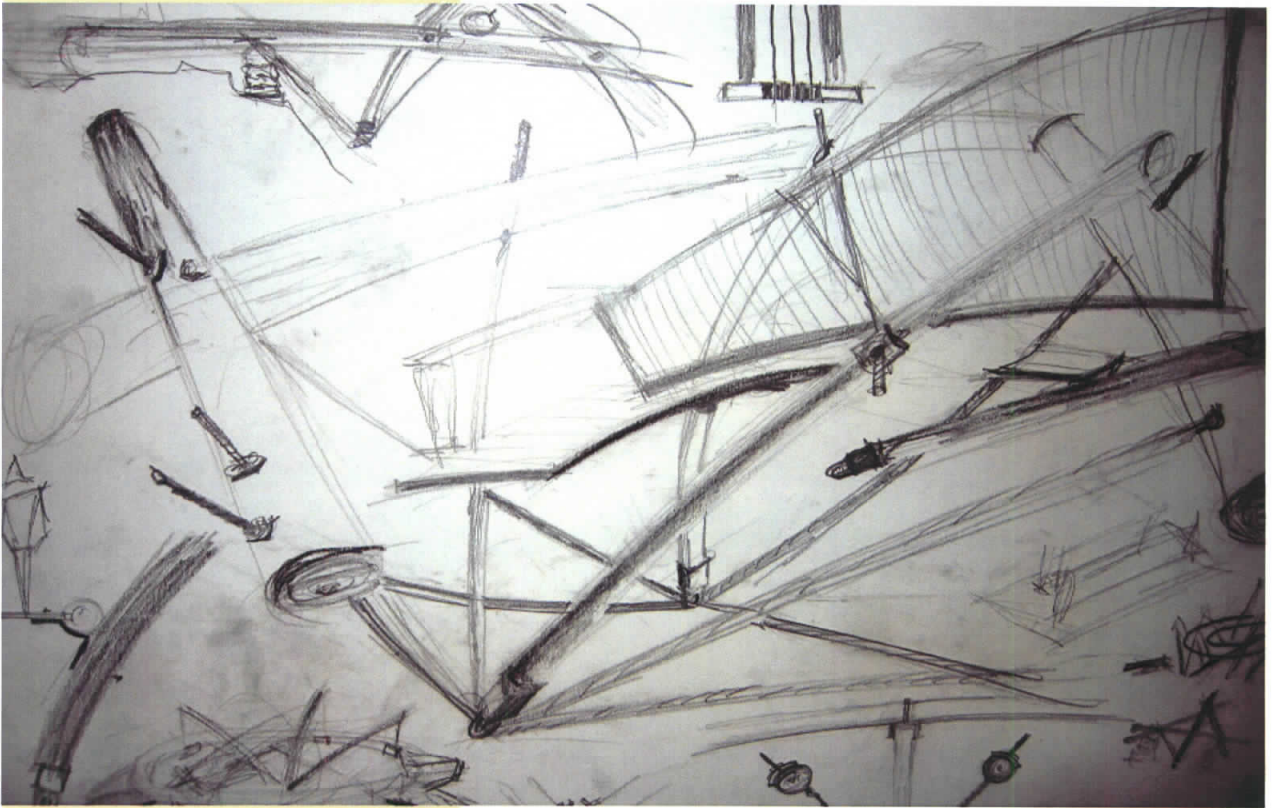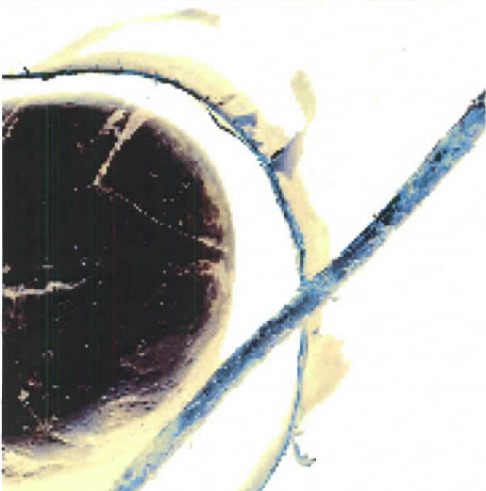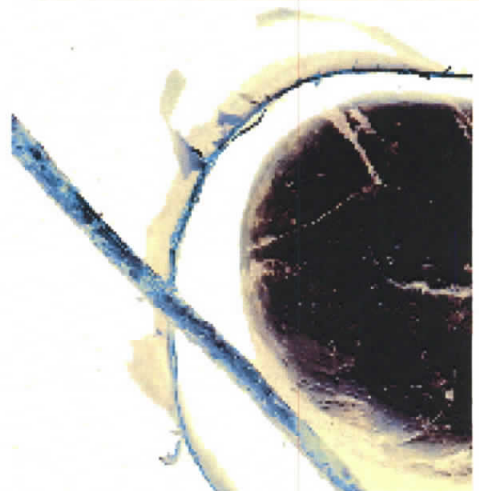
EXPLORATION
LENS TO THE WORLD
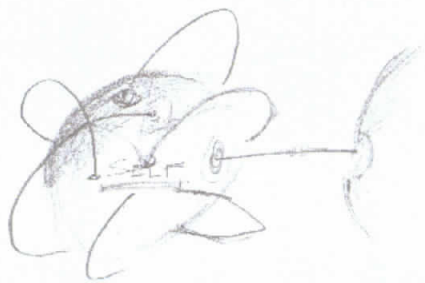
INDIVIDUALS INFORMATION RESOURCES

ENVIRONMENT

A BUILDING
THAT WHICH
IS BEAUTIFUL
IN SO FAR AS
TO PERPETUATE
BEAUTY.
(UTILIZING
ECONOMY
PROPORTION
AESTETICS)

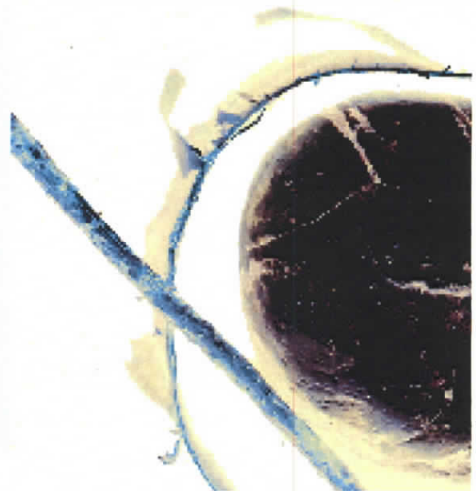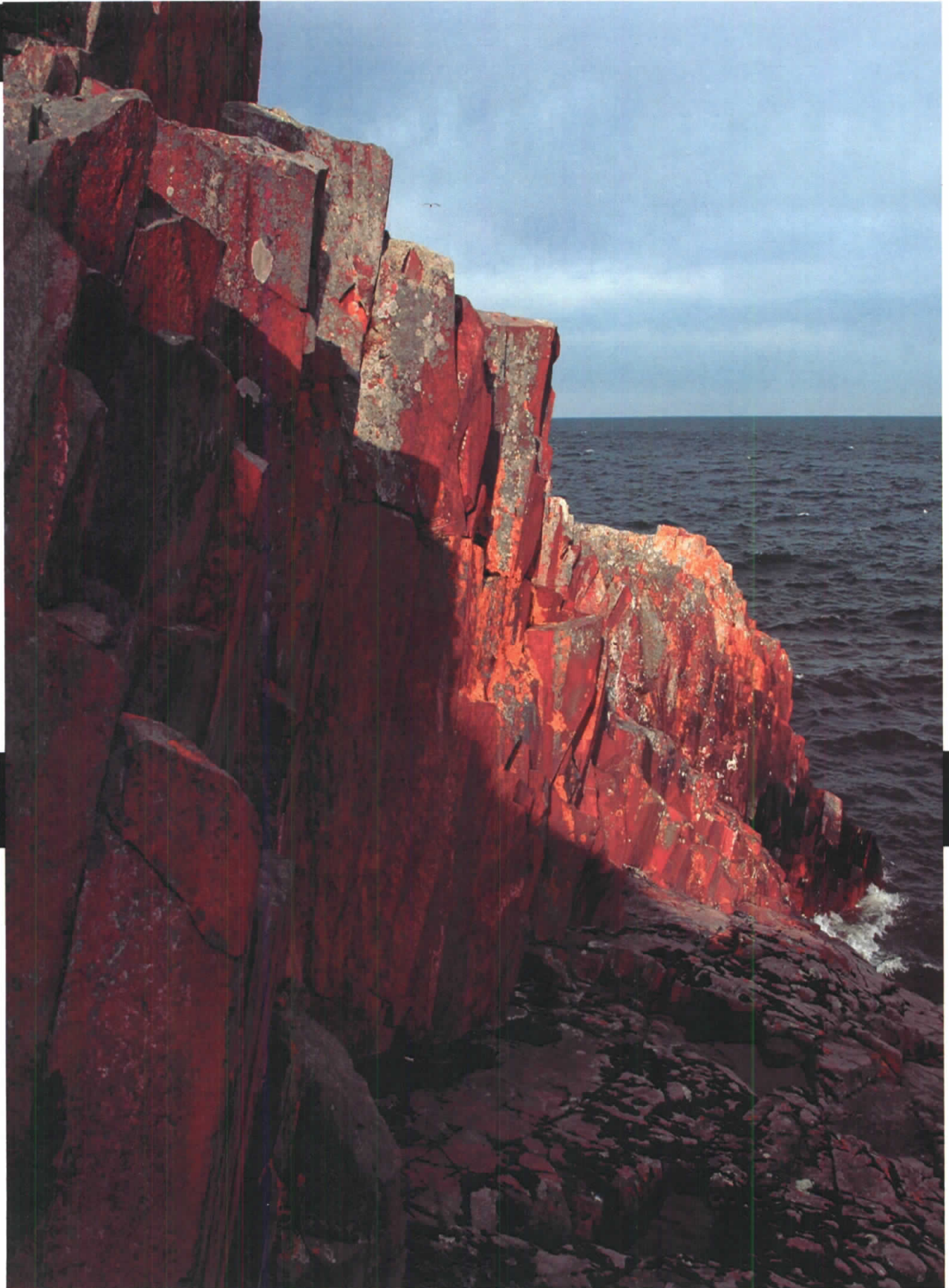BUILDING IS A TANGEBLE
TO FACILITATE
THOSE OF THE INTANGABLE.

43

ARCHITECTURE BECOMES ONE POSSIBLE CONNECTION

The Beautiful that which perpetuates the Beautiful.

This building will require the above major elements to insure a smooth operation for the users. These elements will require acute analysis to insure the building is perceived and yet not perceived. The users must notice the beauty of the building and then disregard its beauty and focus on the beautiful which surrounds them.

The building will be beautiful and capture beautiful in so far as to perpetuate the users within to produce beauty.
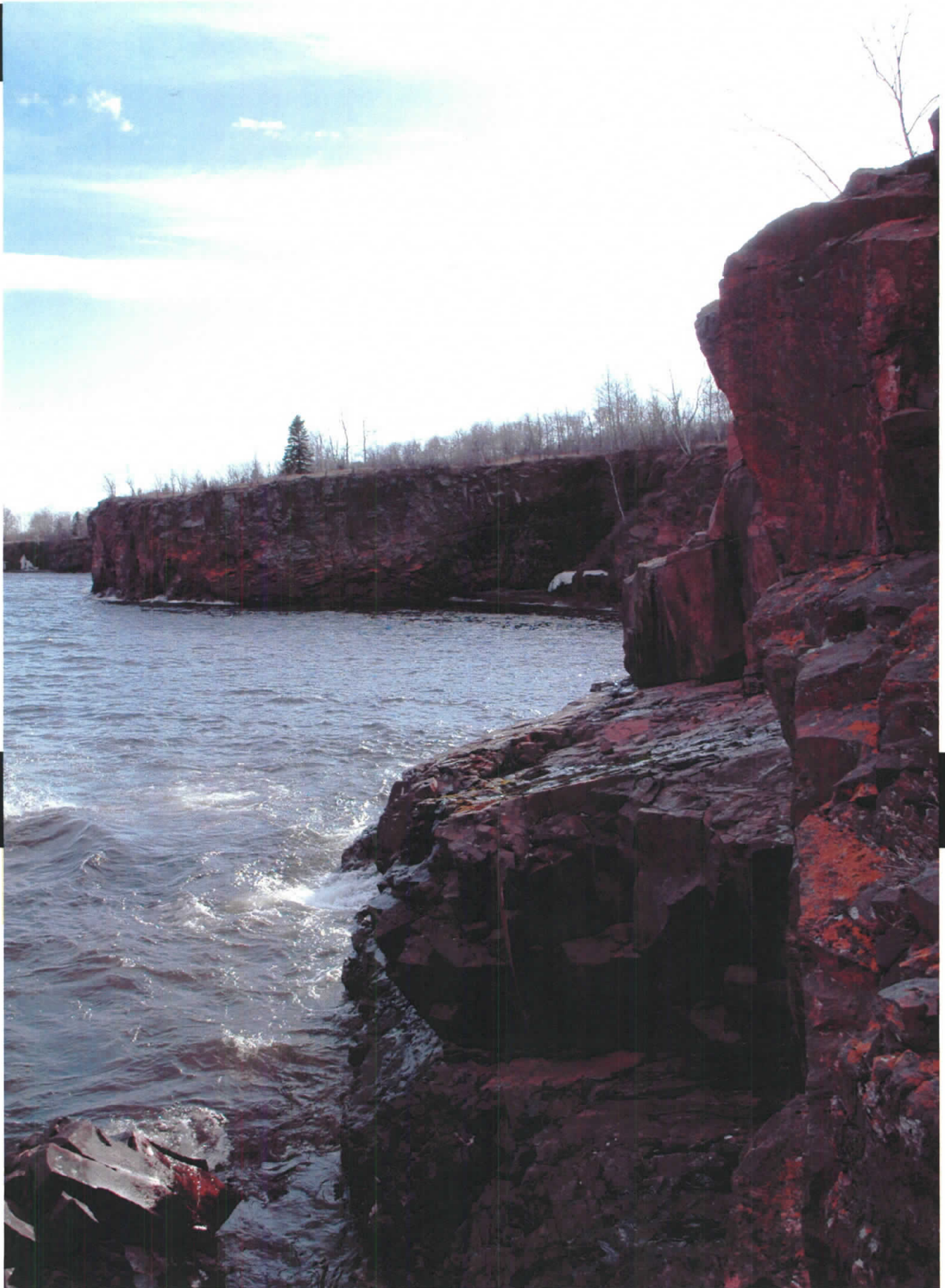
What is Aesthetics?

- a view through Sibley's writings

       - an understanding through:
              Taoism

- an exploration
of other forms of art
by Yasmina Reza

      - a comparison of what
        art is to philosophers:
        Clive Bell
        Frank Sibley
        Leo Tolstoy

What is Sustainable Design?
-Defined By Hannover Principles
-an understanding through:
    Cradle to Cradle

       What if we are poor

Stewards to our planet?
- a look at the Gaia Hypothesis
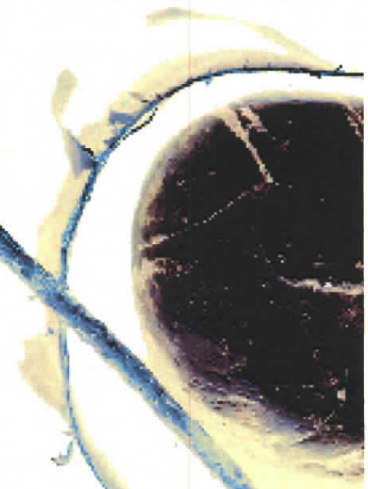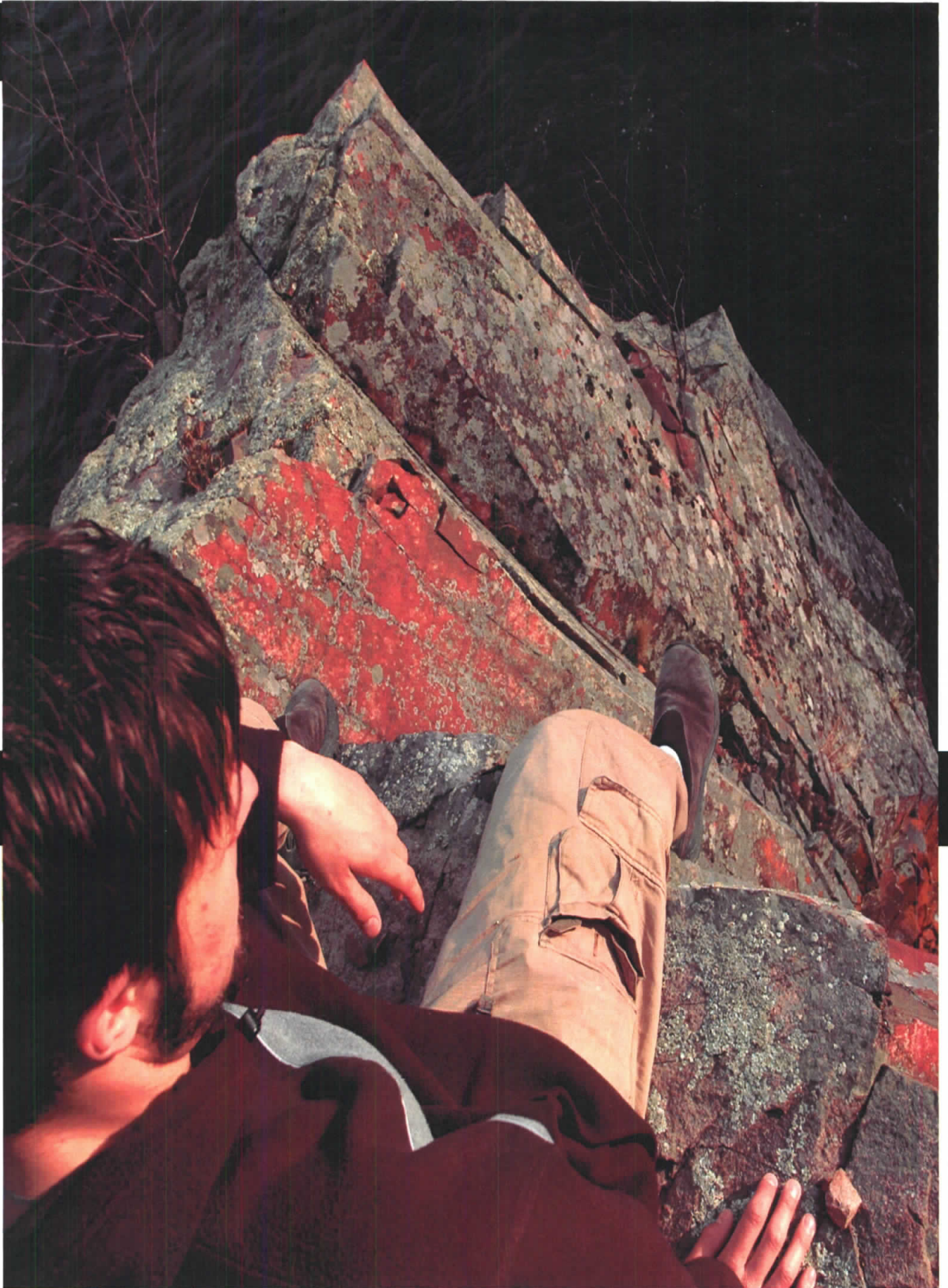
Environmental Considerations

The North Shore is a seasonal site. The fall offers many colorful changes among the trees. The winters bring cold and bitter winds. The spring shows the beginning of the cycles of life with buds and new green leaves. The summers are mild and full of natural activity.

Site Area

The chosen site exists on the northeastern corner of Minnesota. The site lies at the edge of a forested body of land and a massive body of fresh water. The

Specific Location

The site is 60 miles northeast of the major city of Duluth. The site lies between the scenic North Shore Drive and Lake Superior.

Geology

The soil and ground considerations are essential to the design process. The North Shore is composed mostly of decomposed granite and humus. This is conducive for a variety of aesthetically beautiful plant life. Underneath of this top soil are granite shelves. These shelves, also key to design, protrude from the ground. These protrusions create beautiful land features, edges, and shelter.

Hydrology

Basic hydrological considerations must be considered for the overall proposal of the project. The site is located on Lake Superior. This massive body of water affects rain patterns, temperature patterns, and storm conditions. All of these coincide with the seasons to produce beautiful results. On site hydrology relates to the topographic features of the site. The site and site considerations will be such that the drainage on site will have aesthetic considerations.

Transportation Linkage

The site has three major physical links to the rest of the world. This information is valuable to the design.
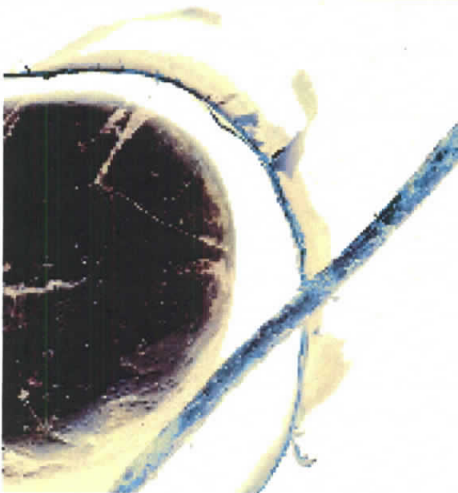
The site may not be too remote as to limit users; however, the presumed isolation provides a retreat setting. The site remains exclusive and yet retains accessibility. The site may be directly accessed from the Scenic North Shore Drive. This road is open to normal passenger vehicle traffic as well as semi traffic. This road connects to two airports to handle long distance travel. Two Harbors has one airport. This is a smaller airport approximately 30 miles southwest from site. This smaller airport does not handle international travel. This accommodation will be handled in Duluth. Duluth is approximately 60 miles southwest from site. The third access point is from the lake itself. This has historically been the main access point of the North Shore.

Views

The views are truly aesthetically beautiful. The water, land, nature, wild life, and trees; provide fantastic views to be captured by careful design of the facility.

51
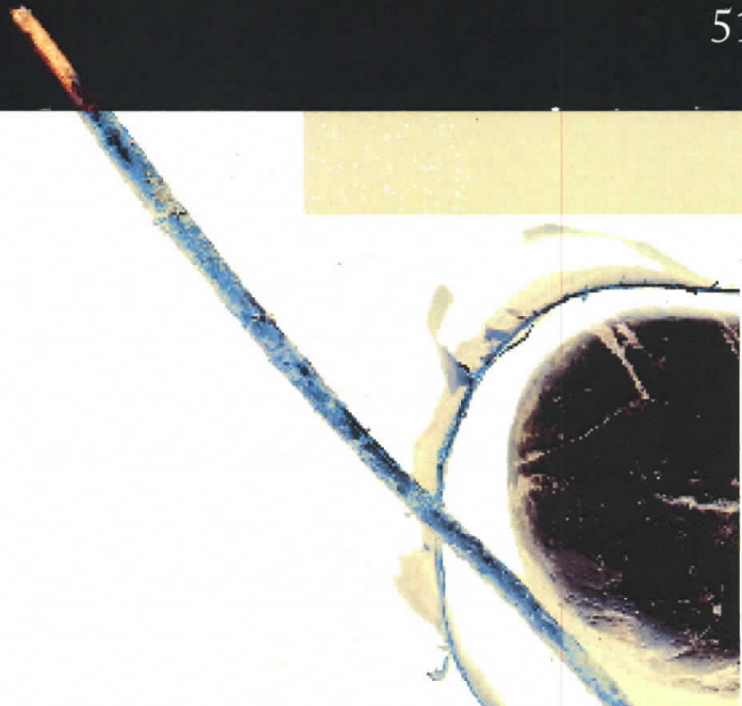
The following case studies have been specifically chosen for their direct **relation** to different elements of this thesis. The case studies give coherant and **powerful** example of types of spaces and environments this thesis should include. The case studies **focus** on three main areas of analysis; building typology, environmental responses, and construction responces.

Building Typology
I chose to divide my case study research into three areas; retreats, think tanks, and visitor centers. For this to be a **holistic** understanding of the spaces required I chose to include three different types of retreats; residency, art cemters, and spiritual. All of these different spaces will be hybridized into one facility.

Building Typology

Environmental Responses

Construction Responses

Environmental Responces
To better understand the possibilities of seemlessly engaging the environment I have chosen to include two types of environmental conditions; cliffs and trees.

53

Construction Responces
These case studies include any inspiration of building methods or lighting conditions.

Building Typology

RETREAT:
Residency:

Island Cabin, Vinalhaven, Maine
Susan Rodriguez, AIA
Mountain House, Dillard, Georga
Scogin Elam and Bray Architects
House on the Tennessee River, Hardin, Tennessee
Mockbee/Coker Architects
Teiger House, Somerset, New Jersey
Ro To Architects

Art Society:

Leeper Studio Complex
Atlantic Center for the Arts
Thompson and Rose Architects

Spiritual:

Rinzai Ji Zen Buddhist Retreat
Desert Hot Springs, California
Predock Frane Architects
Har-El Synagogue and Community Center
West Vancouver, British Columbia
Action Johnson Ostry Architects

THINK TANK:
McKinsey & Co. Canadian Headquarters
Taylor Hariri Pontarini Architects

VISITOR CENTER:

Yaquina Head Outstanding
National Area Interpretive Center
The Miller/Hull Partnership
Trapps Gateway Center
Lee H Skolnick Architecture & Design Partnership
Antelope Island State Park Visitor Center, Utah
Edwards & Daniels Architects
Greenbrook Nature Sanctuary Visitor's Center
Ken Levenson

Environmental Responces

Construction Responces
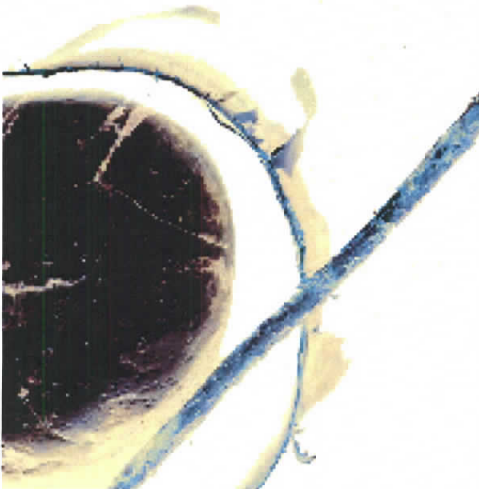
Building Typology

Environmental Responses

Construction Responses

Island Cabin, Vinalhaven, Maine
Susan Rodriguez, AIA

1. Kitchen
2. Loft above
3. Living/ Dining
4. Up to bedroom
5. Bath
6. Bedroom
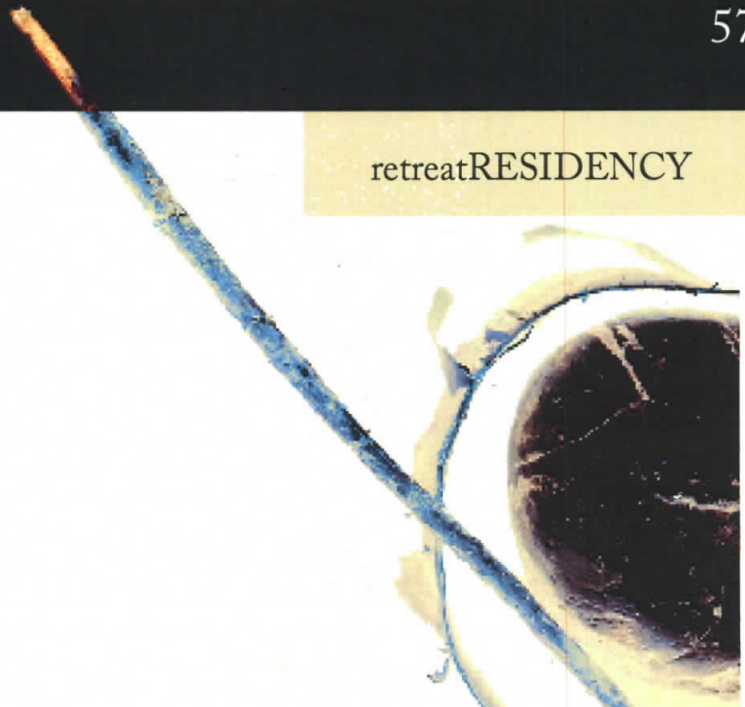7. Guest Cabin

N 0   10 FT.
          3 M.

FLOOR PLAN

retreatRESIDENCY

Building Typology

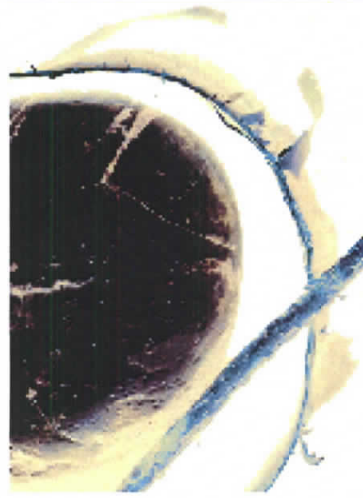Environmental Responses

Construction Responses

57

retreatRESIDENCY

Mountain House, Dillard, Georga
Scogin Elam and Bray Architects

1. Garage
2. Guest
3. Screened Porch
4. Entry
5. Gallery
6. Bedroom
7. Office
8. Kitchen
9. Pantry
10. Dining
11. Living
12. Inglenook
13. Outdoor Room

MAIN FLOOR

58

retreatRESIDENCY
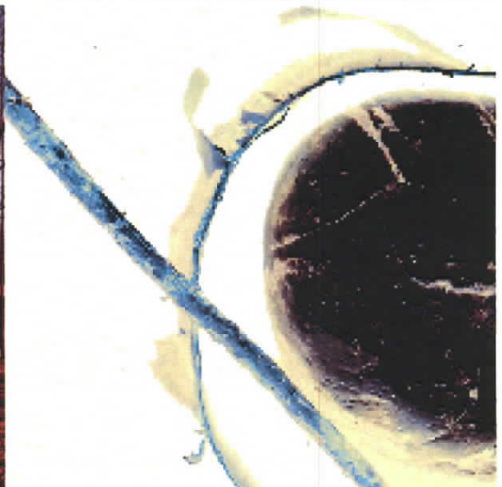
Building Typology

Environmental Responses

Construction Responses
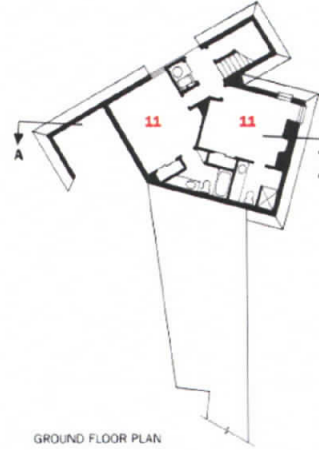
retreatRESIDENCY

House on the Tennessee River
Mockbee/Coker Architects

GROUND FLOOR PLAN

60

retreatRESIDENCY

FIRST FLOOR PLAN

SECOND FLOOR PLAN

0   10 FT.
N   3 M.

Building Typology

Environmental Responses

Construction Responses

61

retreat**RESIDENCY**
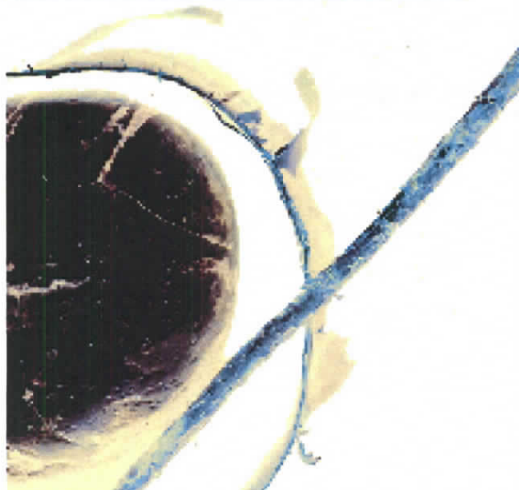
House on the Tennessee River
Mockbee/Coker Architects

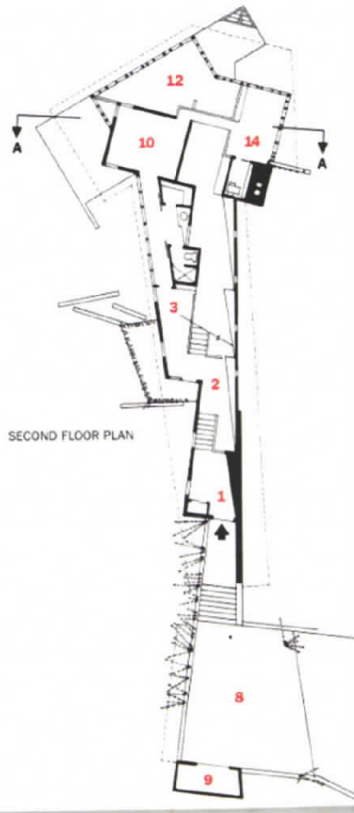1. Bedroom
2. Living/Dining
3. Study
4. Master Bedroom

SECTION AA
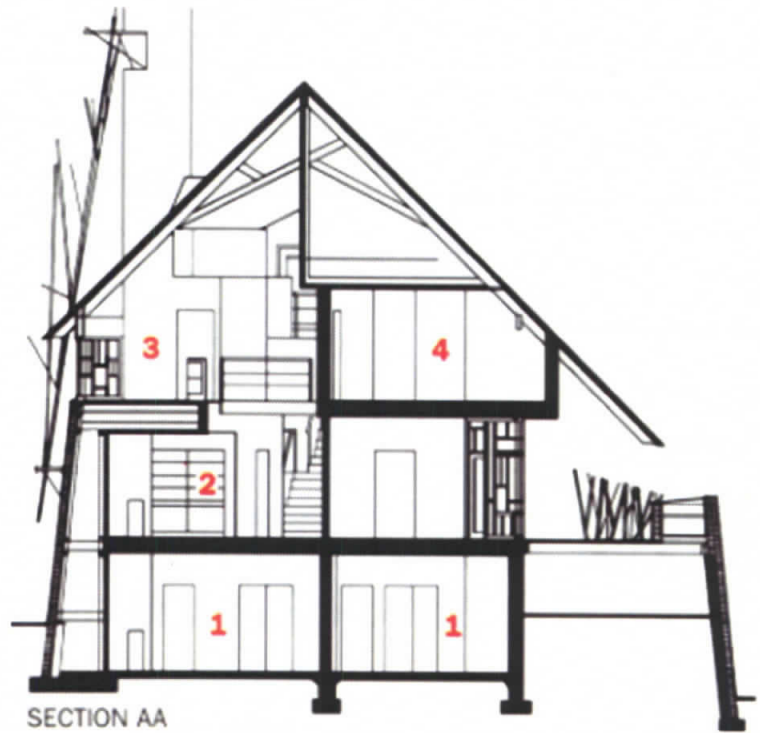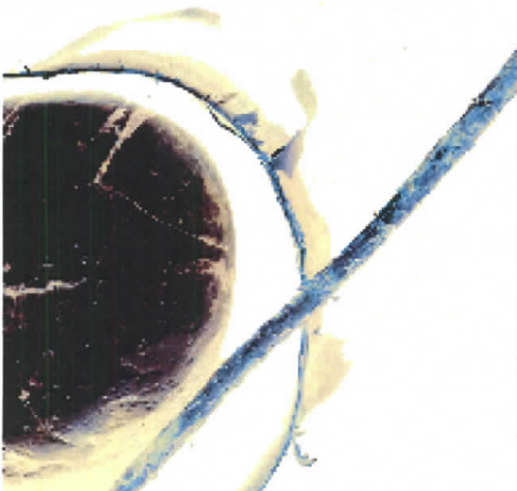
retreatRESIDENCY

CASE**STUDIES**
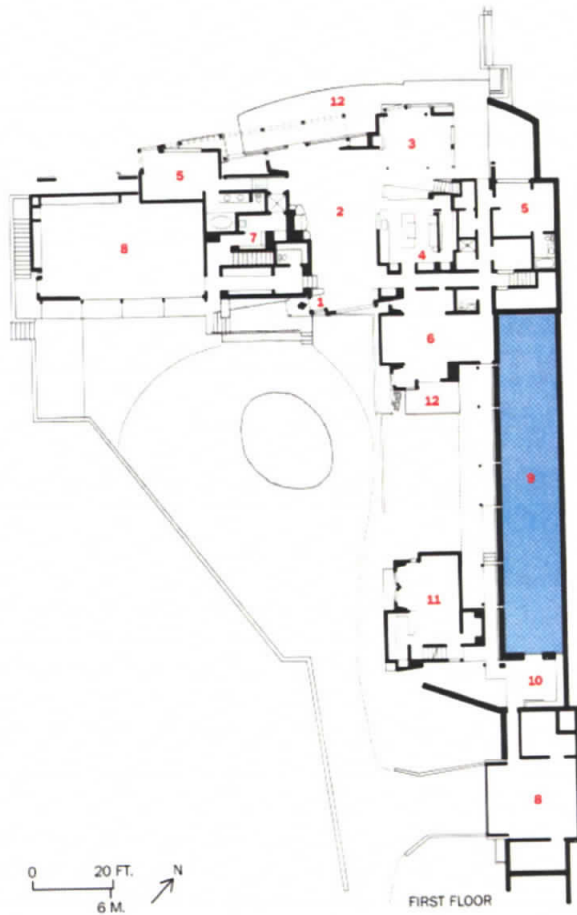
Building Typology

Environmental Responses

Construction Responses

63

retreat**RESIDENCY**

Teiger House, Somerset, New Jersey
Ro To Architects

SECOND FLOOR

64

retreatRESIDENCY

FIRST FLOOR

0   20 FT.   N
—————
6 M.

Building Typology

Environmental Responses
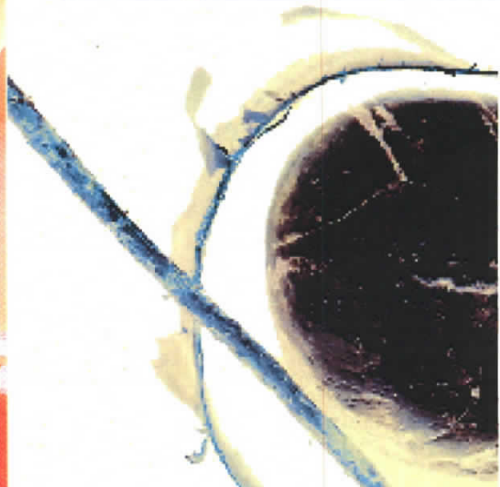
Construction Responses
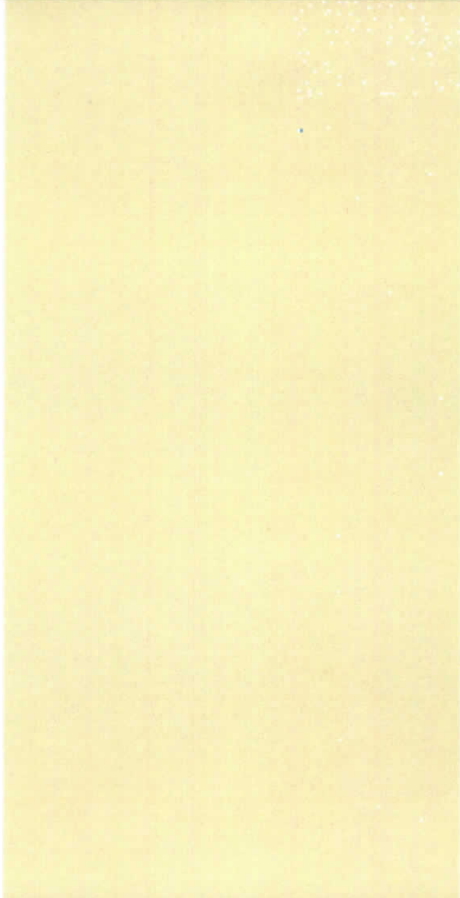
retreat**RESIDENCY**

66
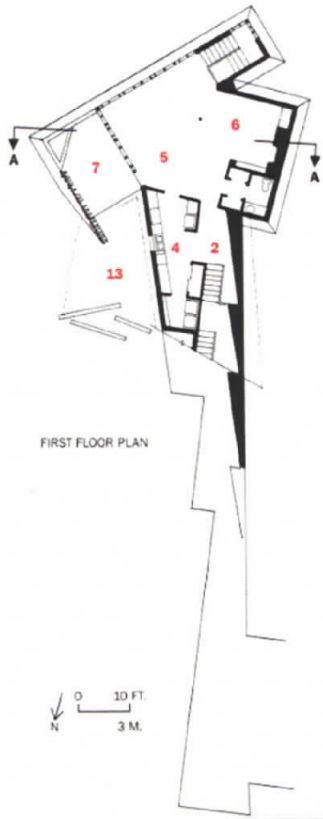
retreatRESIDENCY

Building Typology

Environmental Responses

Construction Responses

67

retreatRESIDENCY
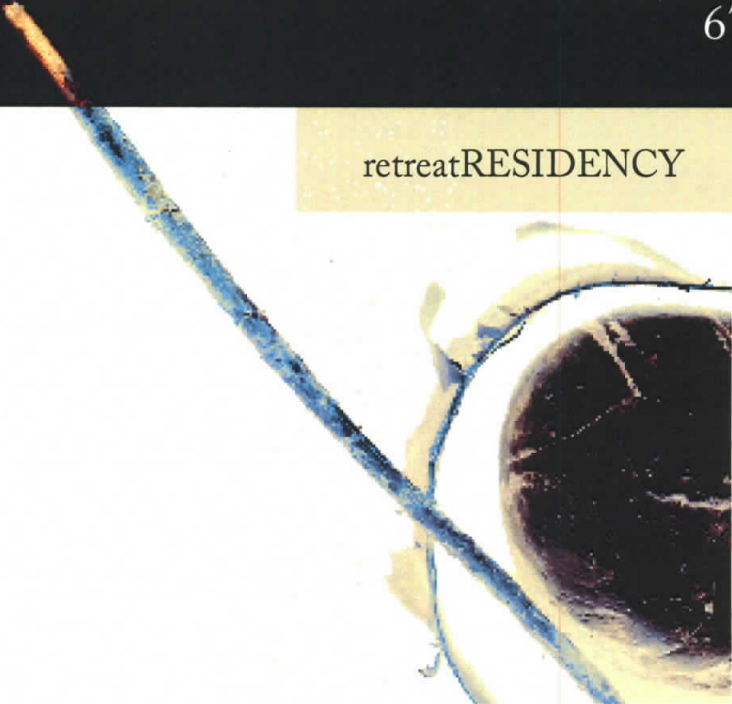
Atlantic Center for the Arts
Thompson and Rose Architects

1. Black Box Theater
2. Gallery/Reception
3. Dance Studio
4. Dressing Room
5. Sculpture Studio
6. Outdoor Work Area
7. Painting Studio
8. Audio Room
9. Music Room
10. Library

Other Spaces Not Shown:

A. Administration
B. Amphitheater
C. Dining/Meeting
D. Field House
E. Master Artist Cottages
F. Associate Artists

retreatART SOCIETY

Building Typology

Environmental Responses

Construction Responses

retreatART SOCIETY

7

5

6

3

4

2

1

N

0   20 FT
      6 M.

Atlantic Center for the Arts
Thompson and Rose Architects

70

retreatART SOCIETY

Building Typology

Environmental Responses

Construction Responses

retreatART SOCIETY

72

retreatART SOCIETY

Building Typology

Environmental Responses

Construction Responses

retreatART SOCIETY

Rinzai Ji Zen Buddhist Retreat
Predock Frane Architects

1. Main Meditation Hall
2. Bathhouse
3. Cooling Pond
4. Sanzen Room

Site plan ⌐   ⌐ 38' <

retreatZEN BUDDHA

Building Typology

Environmental Responses

Construction Responses

75

retreatZEN BUDDHA
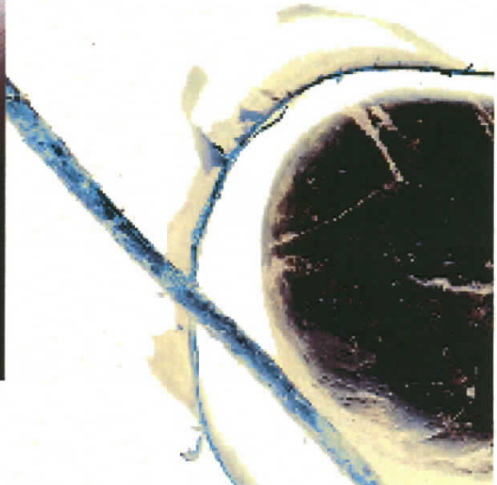
Har-El Synagogue
Action Johnson Ostry Architects

1. Bridge
2. Terrace
3. Porch
4. Lobby
5. Ceremonial Wall
6. Gallery
7. Sanctuary
8. Ark
9. Yahrzeit Wall
10. Social Hall
11. Kitchen
12. Storage
13. Mechanical
14. Administrative
15. Rabbi's Office
16. Cloak Room
17. Reception
18. Education
19. Library
20. Lounge

Second-floor plan
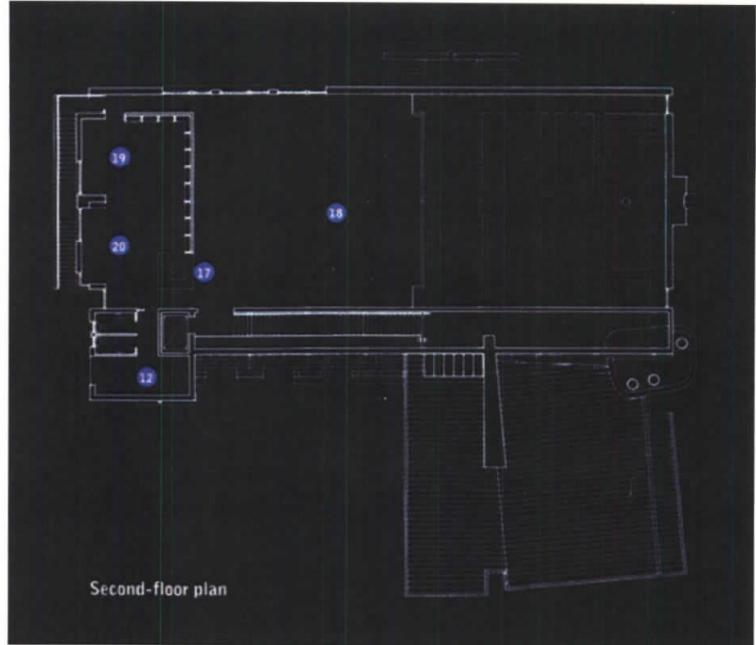
76

retreatSPIRITUAL
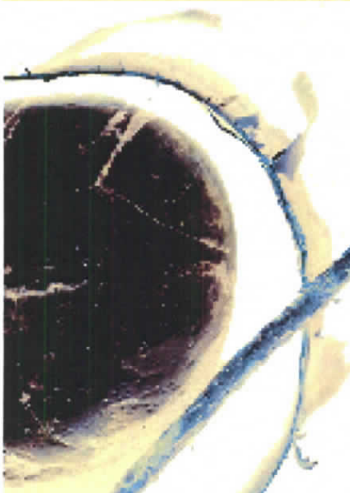
First-floor plan

| | 25'/7.5m | |

Building Typology

Environmental Responses

Construction Responses

77
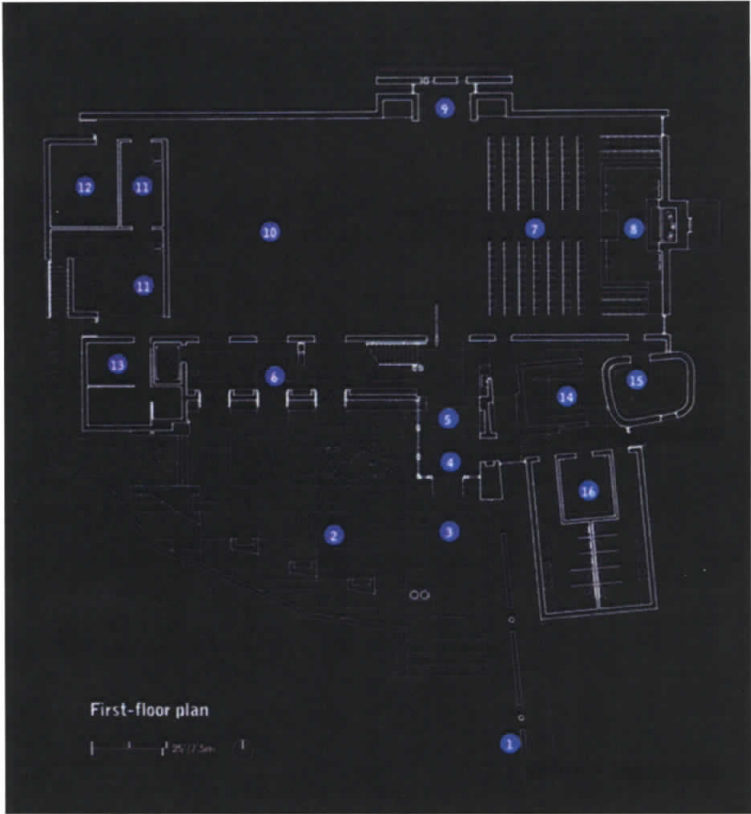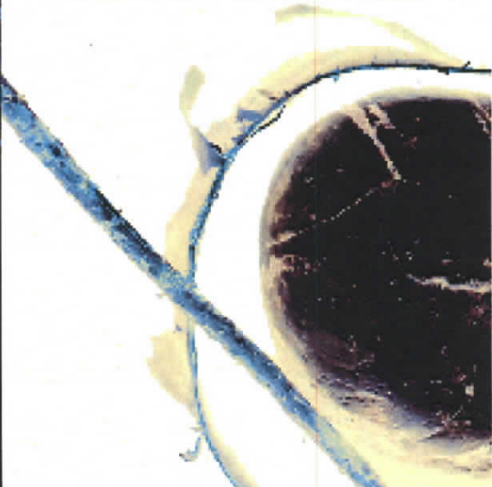
retreatSPIRITUAL

Har-El Synagogue
Action Johnson Ostry Architects
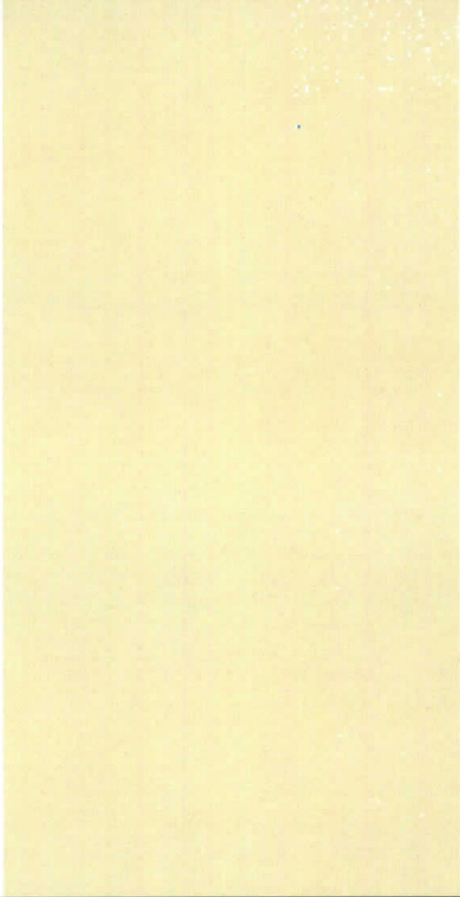
78

retreatSPIRITUAL
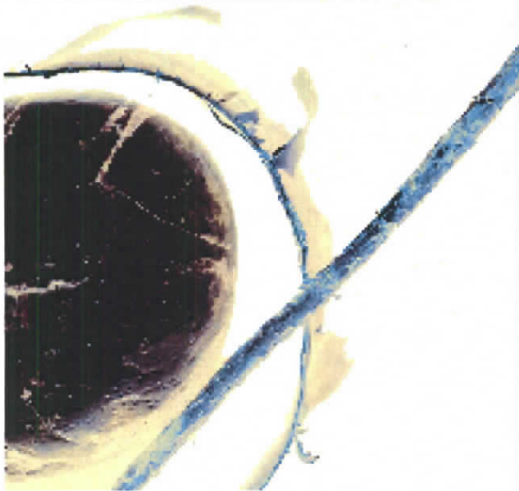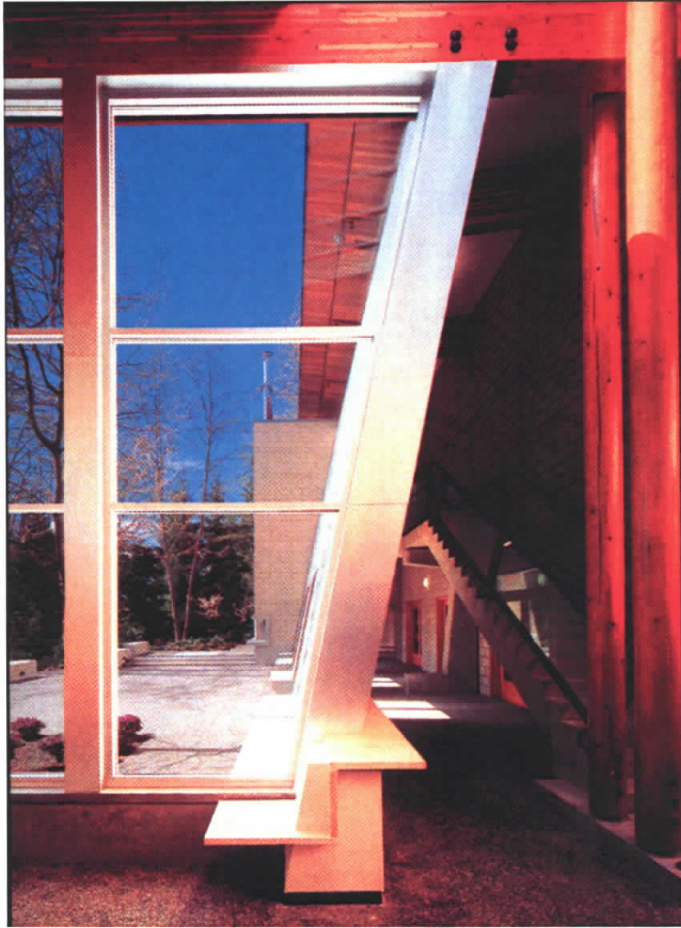
Building Typology

Environmental Responses

Construction Responses

79

retreatSPIRITUAL
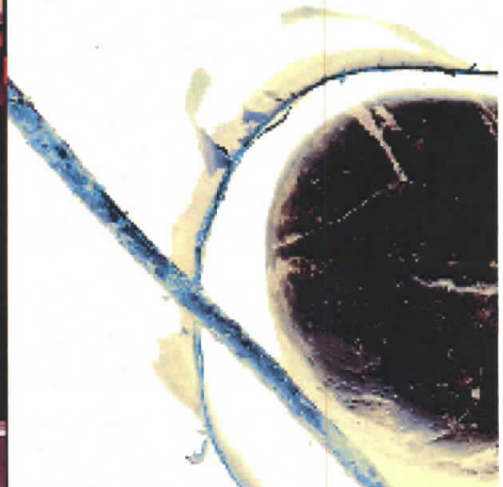
McKinsey & Co. Headquarters
Taylor Hariri Pontarini Architects

Ground floor

0   20m
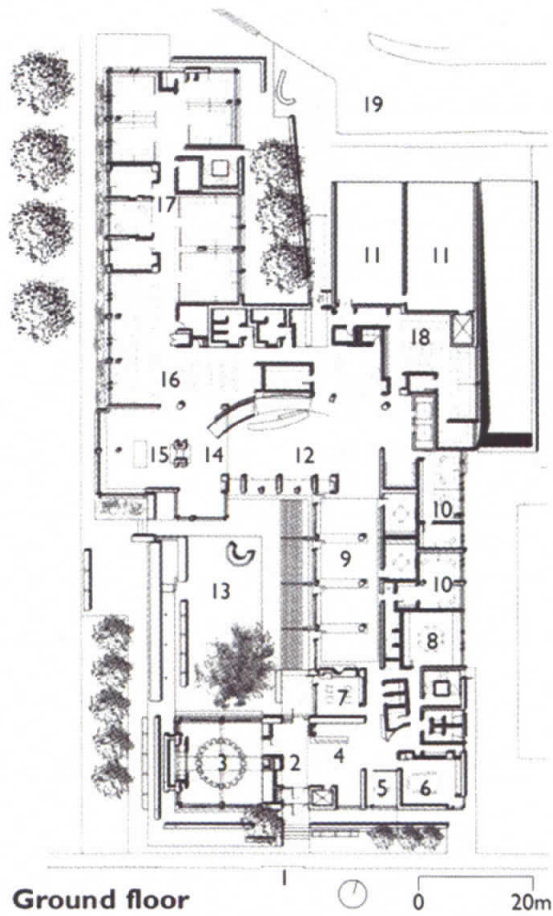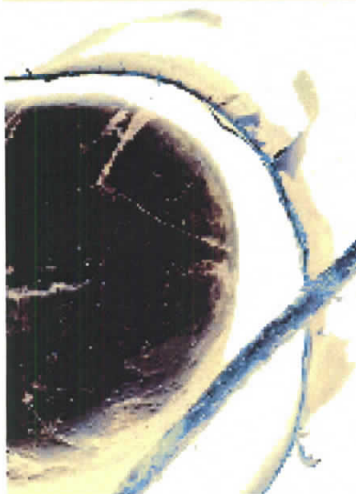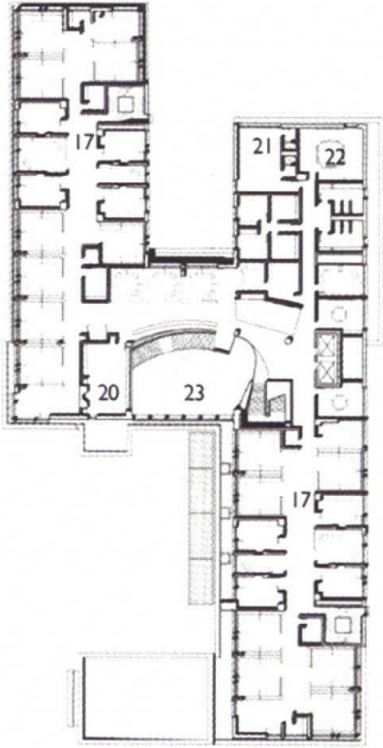
thinkTANK

Second floor

Building Typology

Environmental Responses

Construction Responses

81

thinkTANK

82

thinkTANK

Building Typology

Environmental Responses

Construction Responses

83

thinkTANK
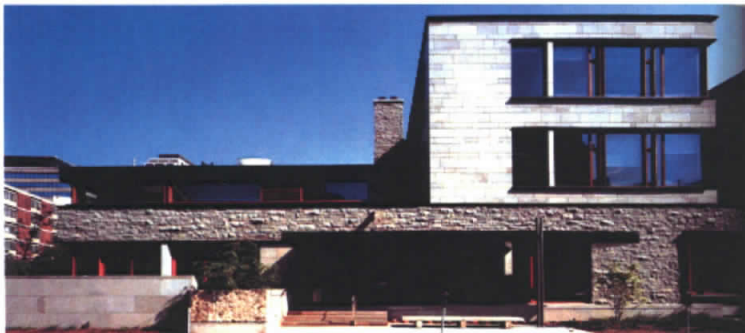
Yaquina Head Outstanding National Area Interpretive Center
The Miller/Hull Partnership

1. Lobby
2. Interpretive
3. Gift Shop
4. Multiuse
5. Administrative
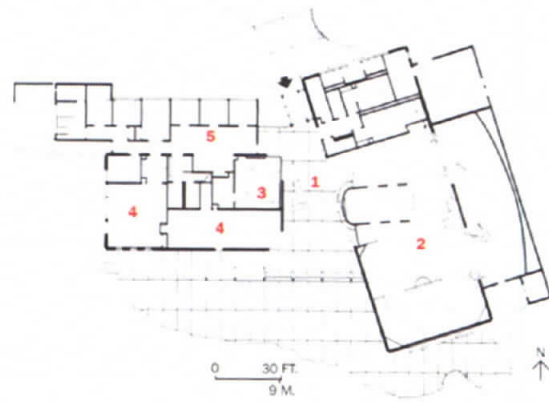
Trapps Gateway Center
Lee H Skolnick Architecture & Design Partnership

1. Reception
2. Office
3. Exhibit/Orientation
4. Main Meeting Room
5. Outdoor Deck
6. Gift Shop
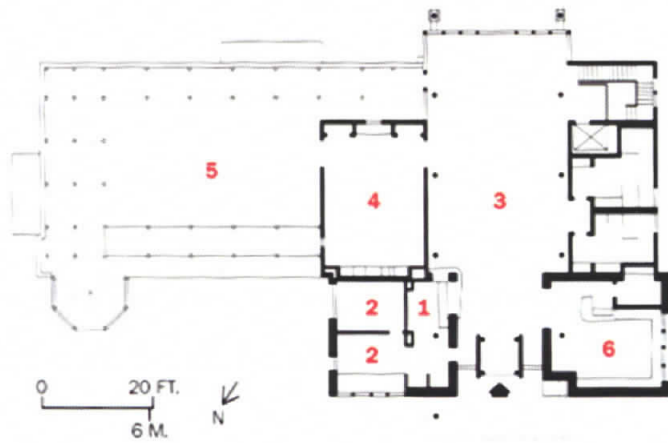
0   30 FT.
     9 M.

N

84

vistitorCENTER

Building Typology

Environmental Responses

Construction Responses
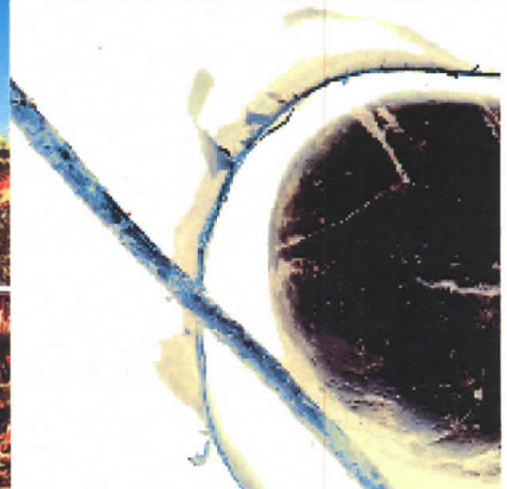
vistitorCENTER

Antelope Island State Park Visitor Center, Utah
Edwards & Daniels Architects

1. Walkway from Parking
2. Bookstore
3. Exhibit
4. Office
5. Resource
6. Multiuse
7. Walkway to Overlook

Greenbrook Nature Sanctuary Visitor's Center
Ken Levenson

1. Existing Office
2. New Deck
3. Exhibit
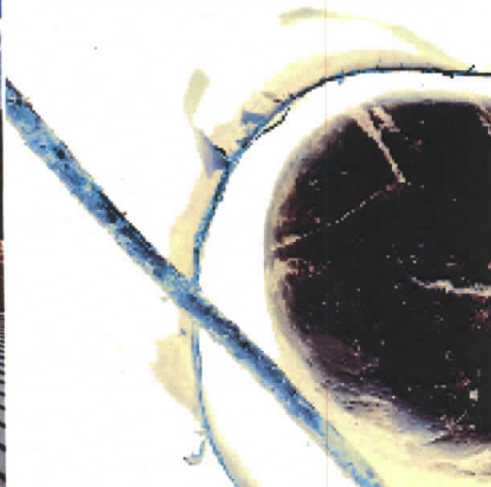4. Research Office
5. Bird-Watching Niches
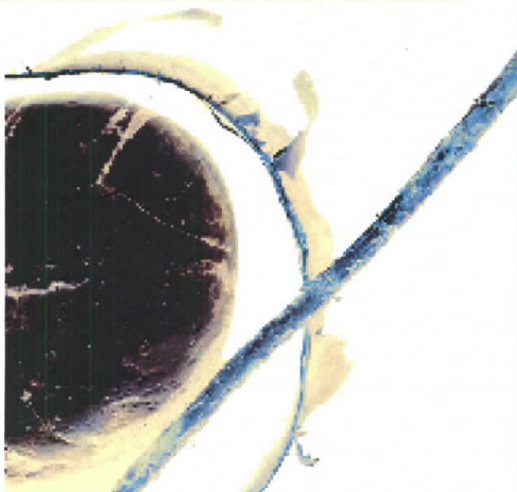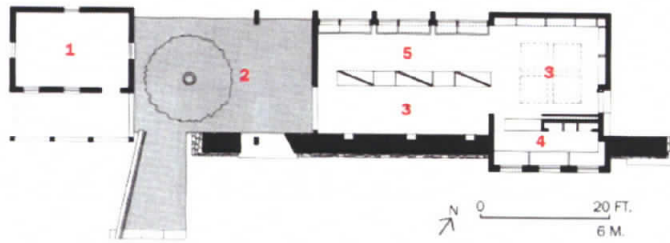
86

vistitorCENTER

Building Typology

Environmental Responses

Construction Responses

87

vistitorCENTER
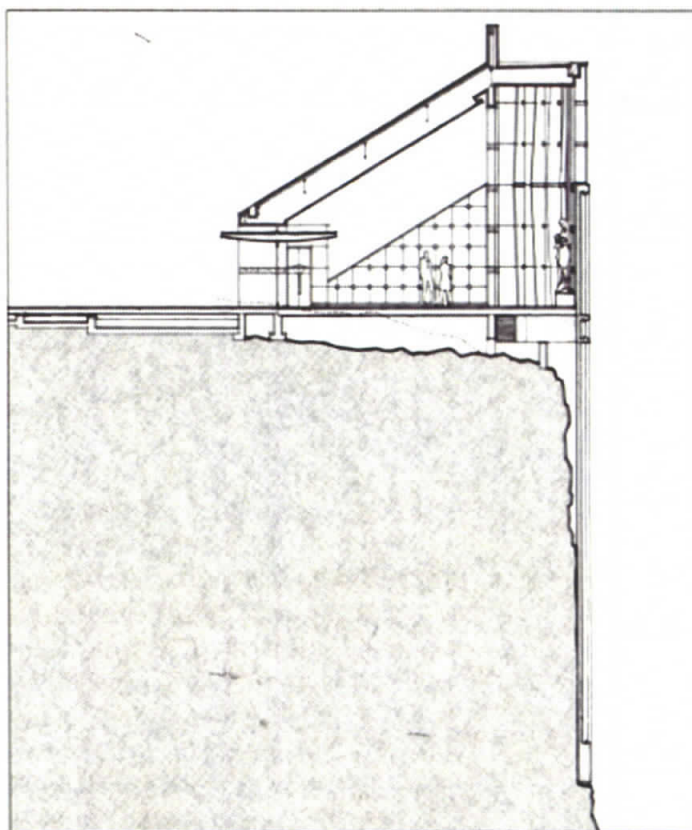
SOUTH-NORTH SECTION
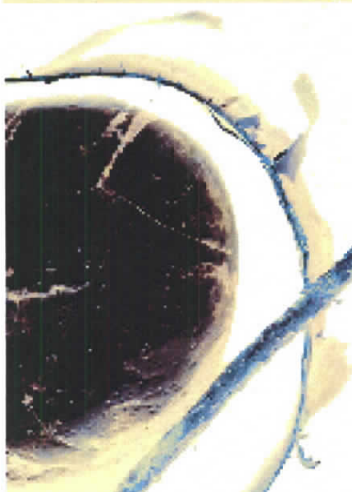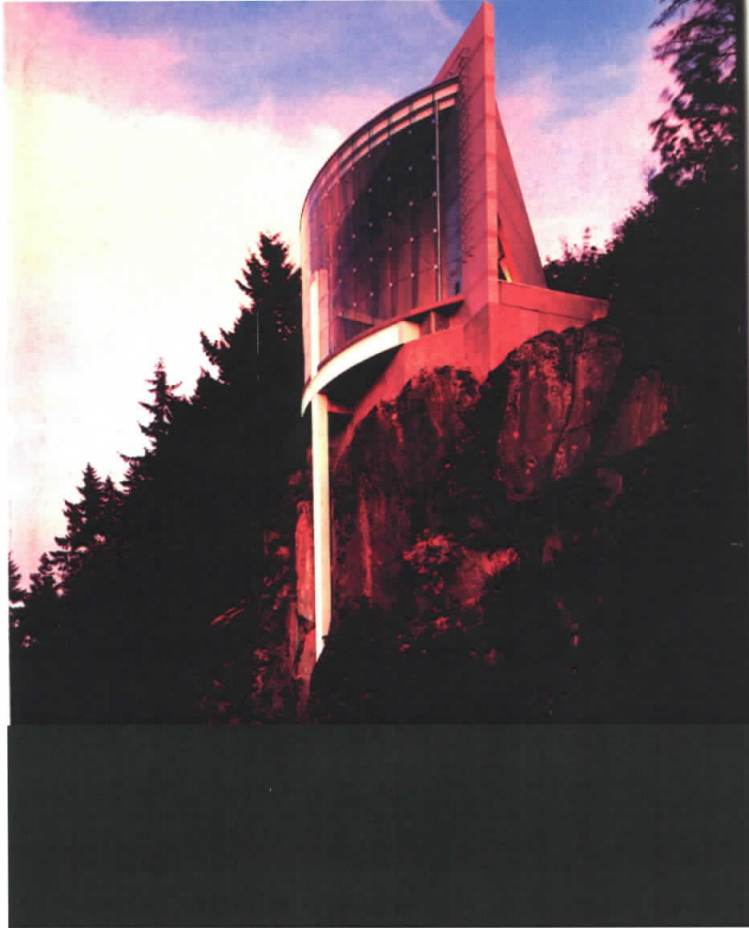
reponseCLIFF

Building Typology

Environmental Responses

Construction Responses

89

reponseCLIFF
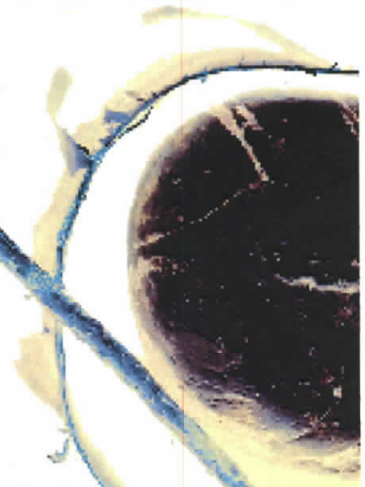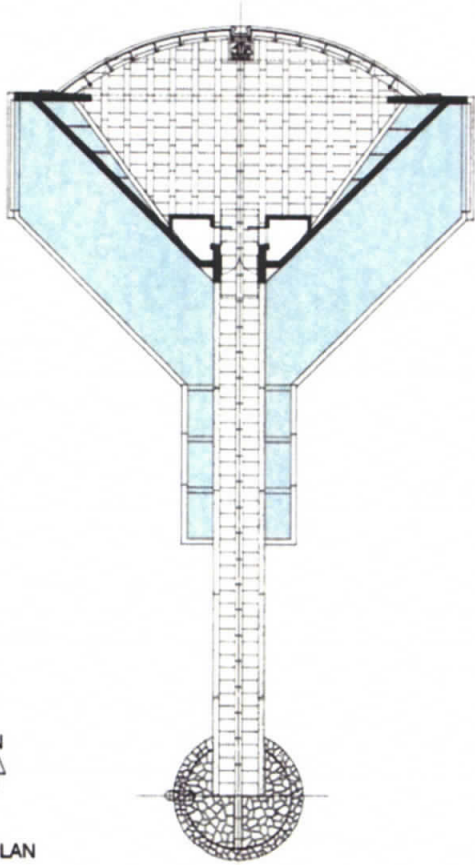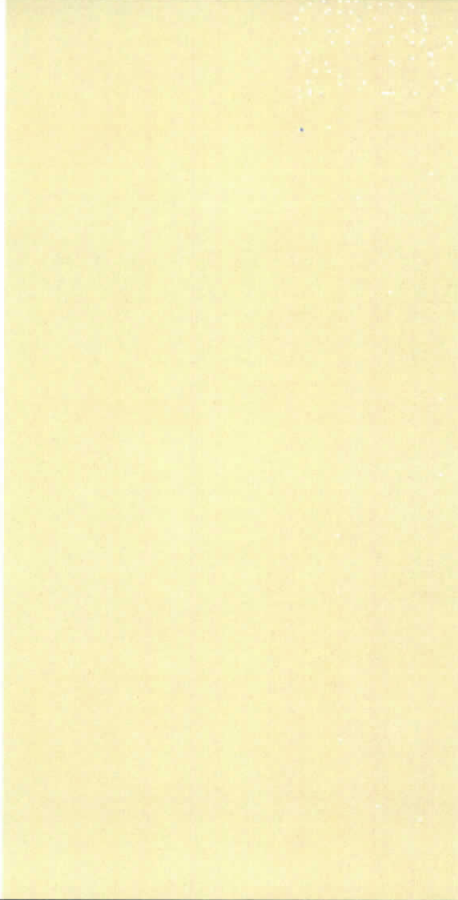
N

PLAN

90
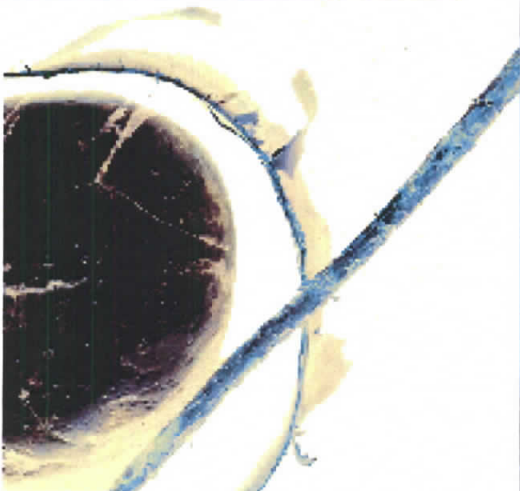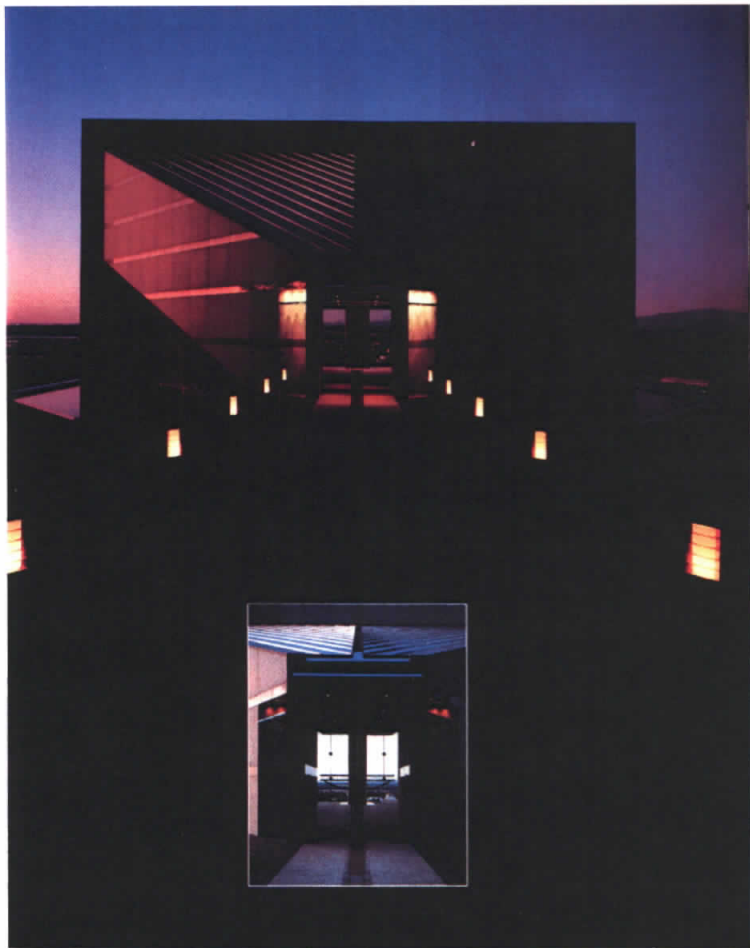
reponseCLIFF

Building Typology

Environmental Responses

Construction Responses

reponseCLIFF
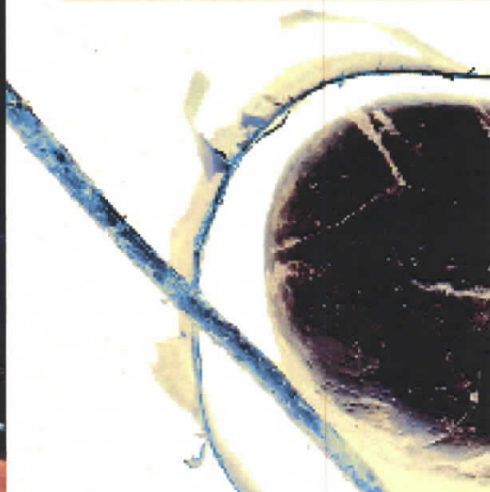
Cultural Center, New Caledonia
Renzo Piano
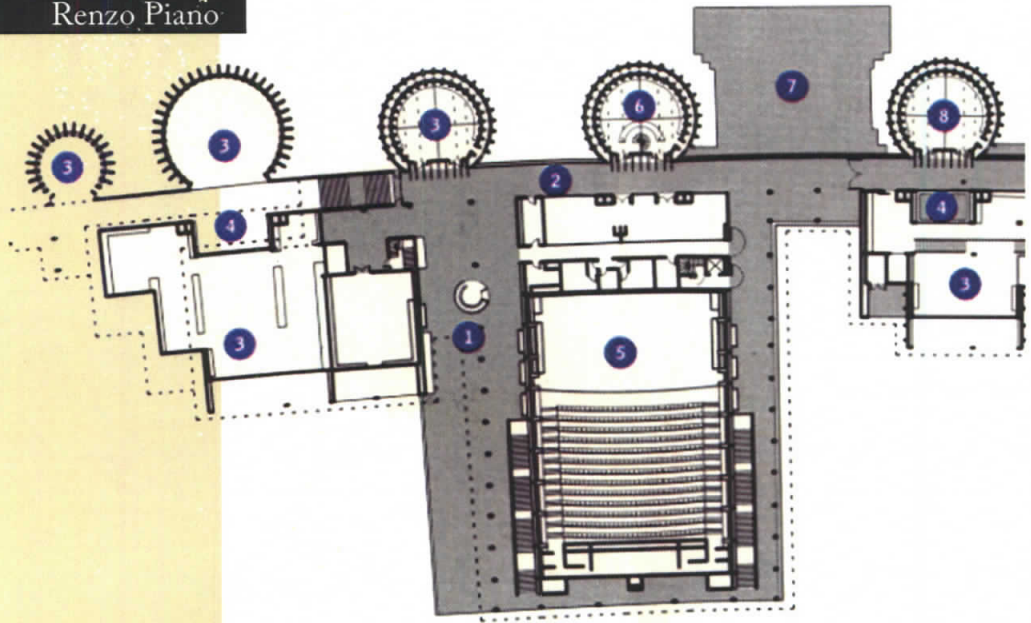
1. Entrance Porch
2. Passage
3. Gallery
4. Courtyard
5. Theater
6. Cafe
7. Terrace
8. Lecture Hall
9. Library
10. Media Center
11. Class Room
12. Administration
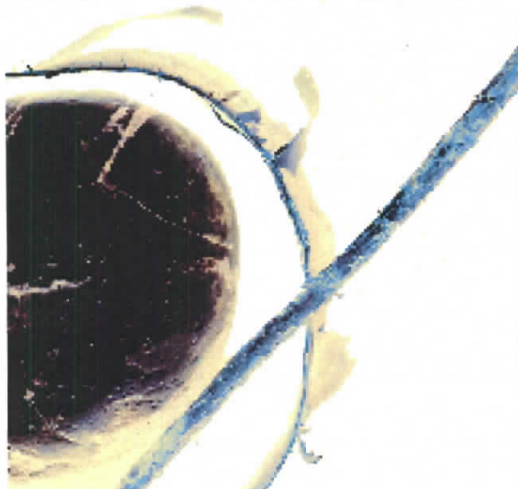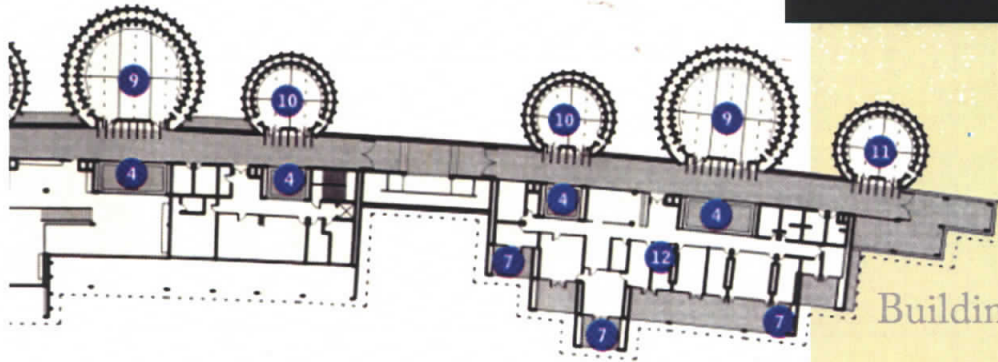
reponseFOREST

150'/45m
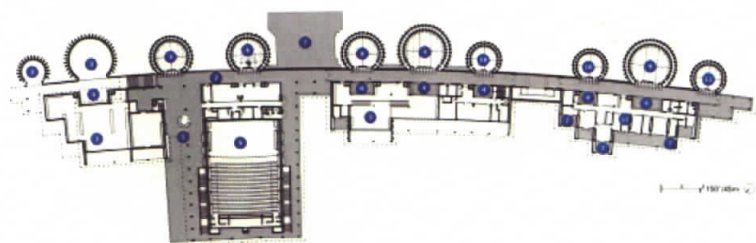
Building Typology

Environmental Responses

Construction Responses

reponseFOREST
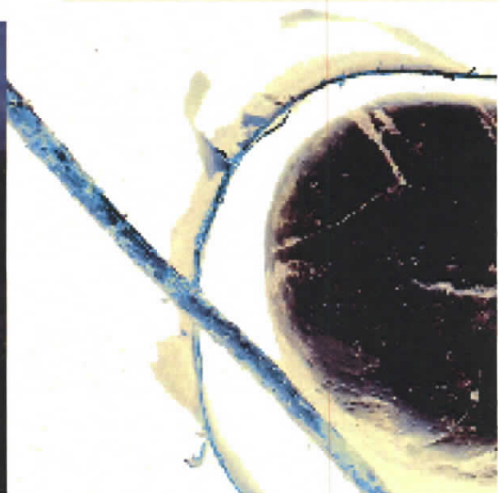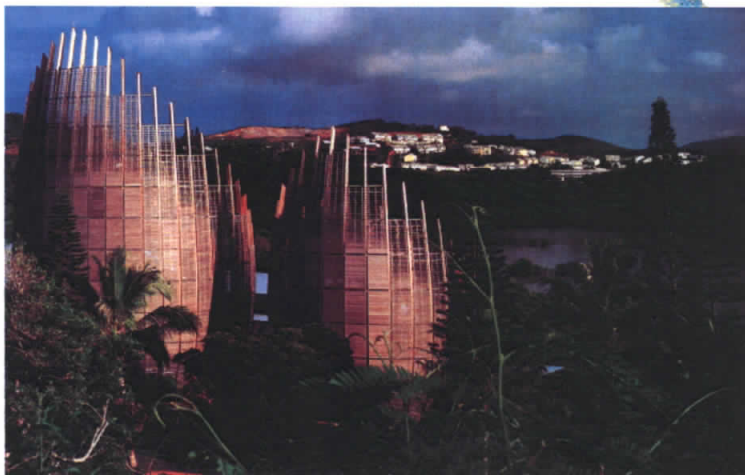
Cultural Center, New Caledonia
Renzo Piano
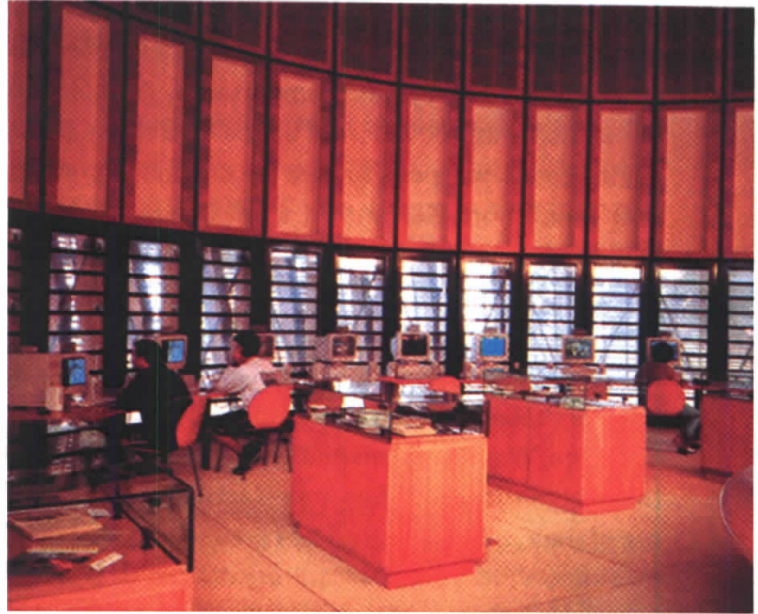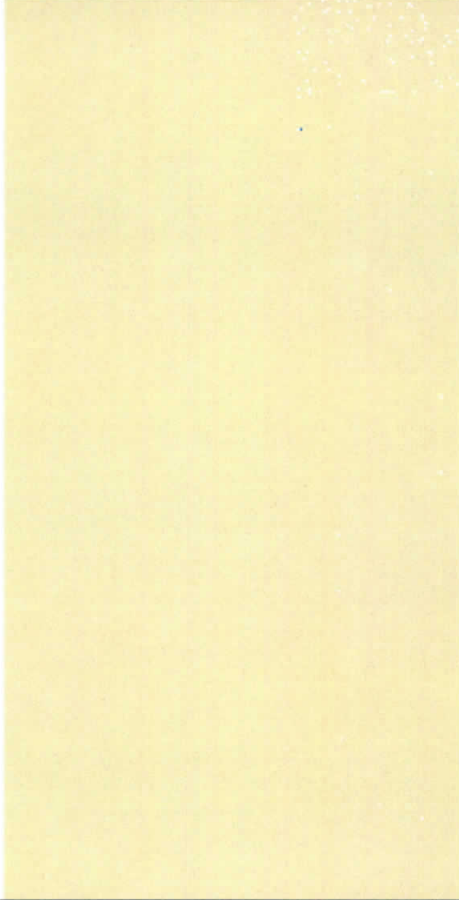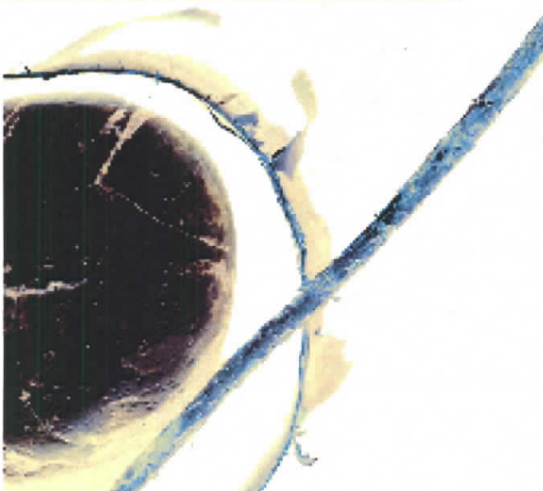
reponseFOREST

Building Typology

Environmental Responses

Construction Responses

95

reponseFOREST

Northeast-southwest section
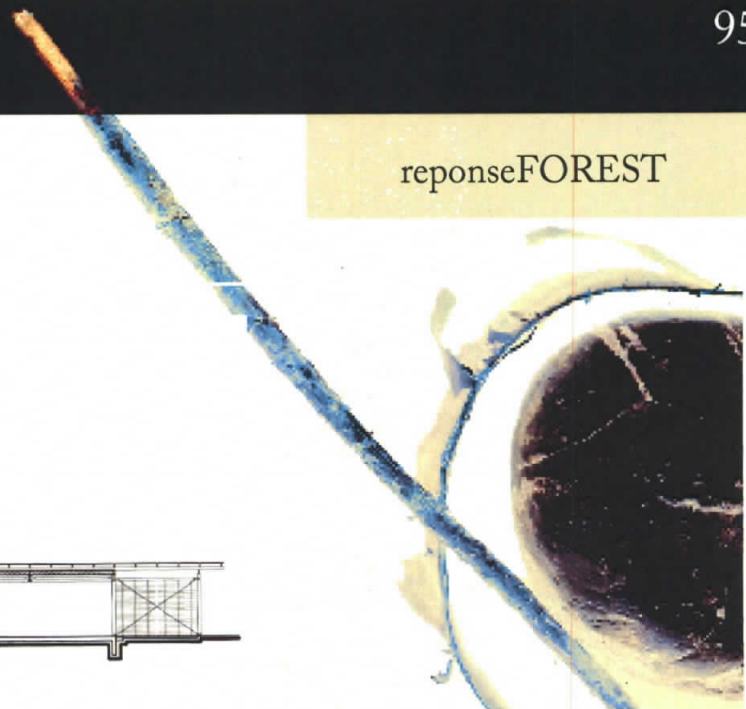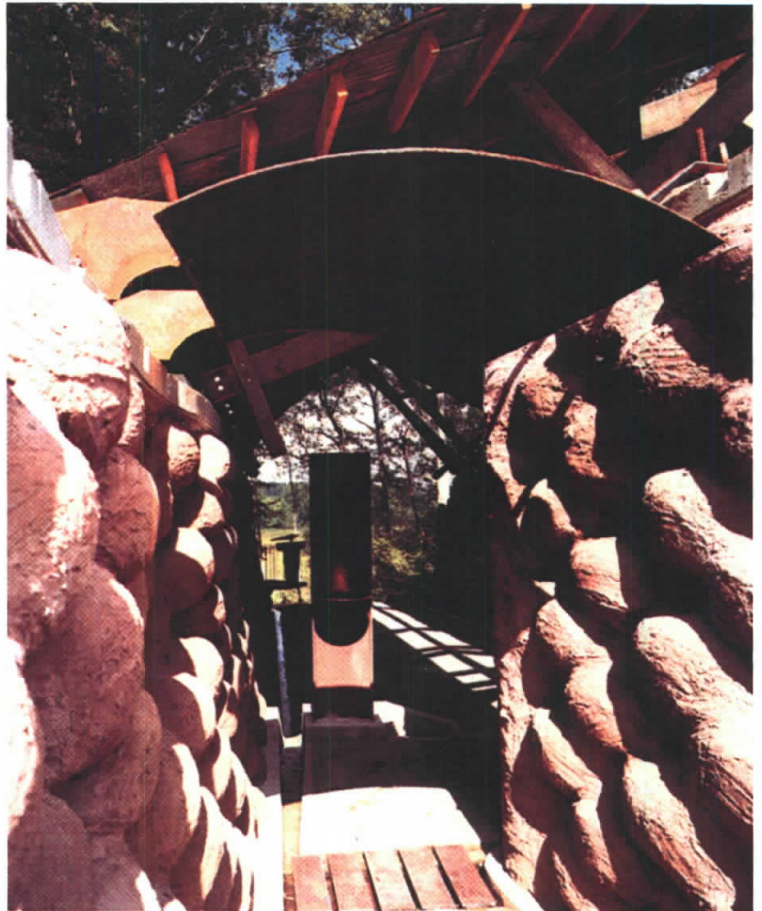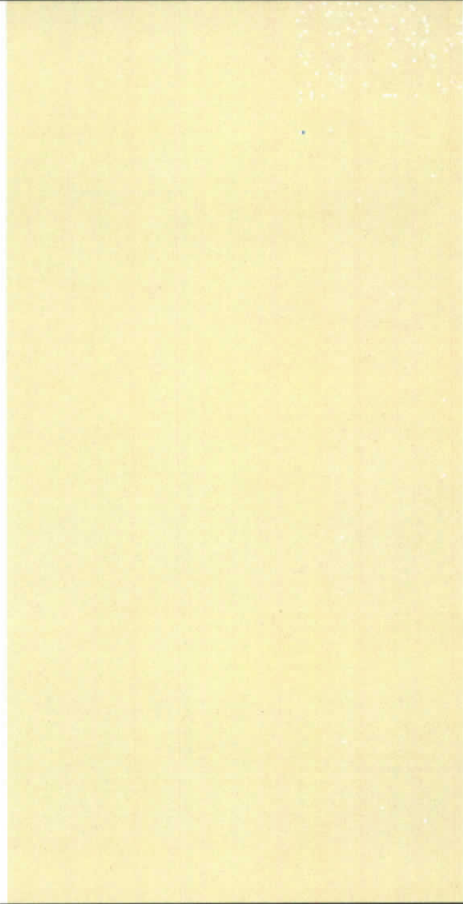
96
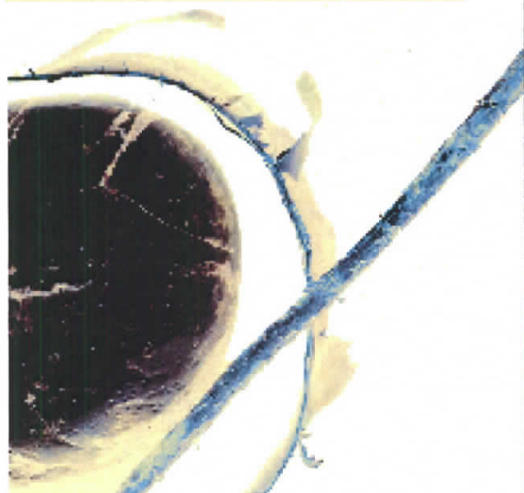
reponseFOREST

Building Typology

Environmental Responses

Construction Responses

97

reponseFOREST
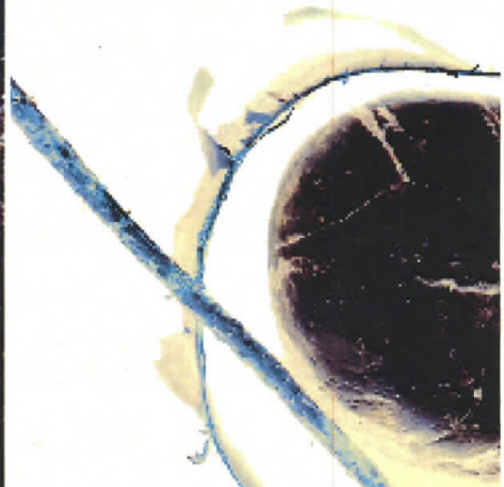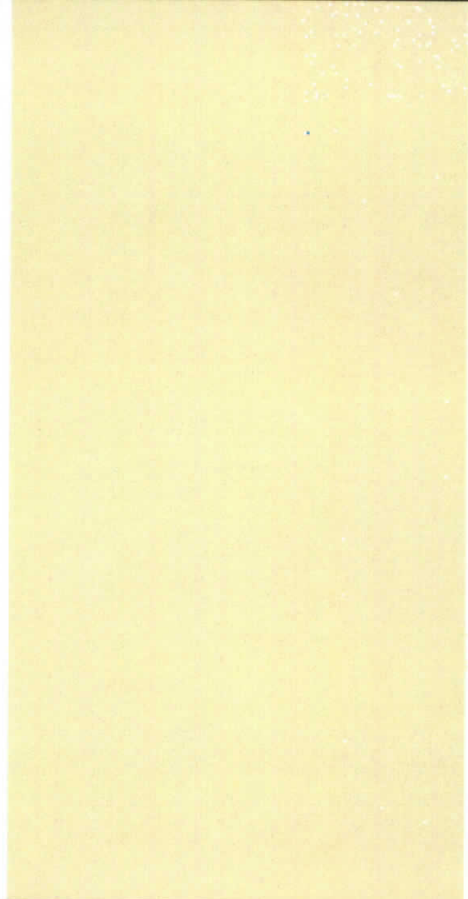
98
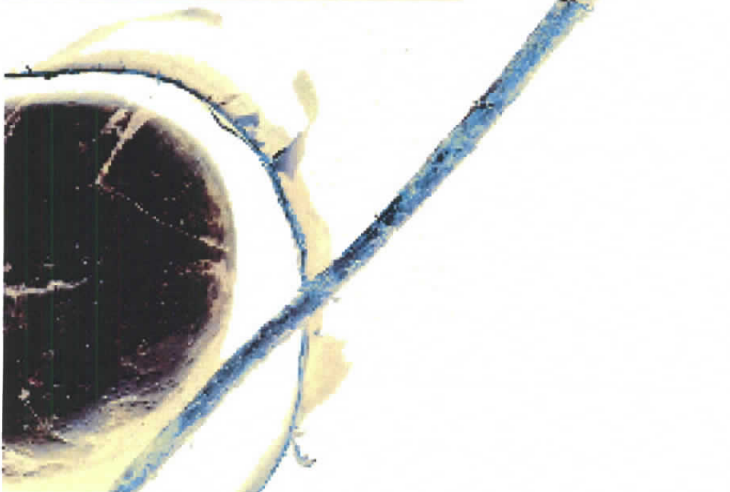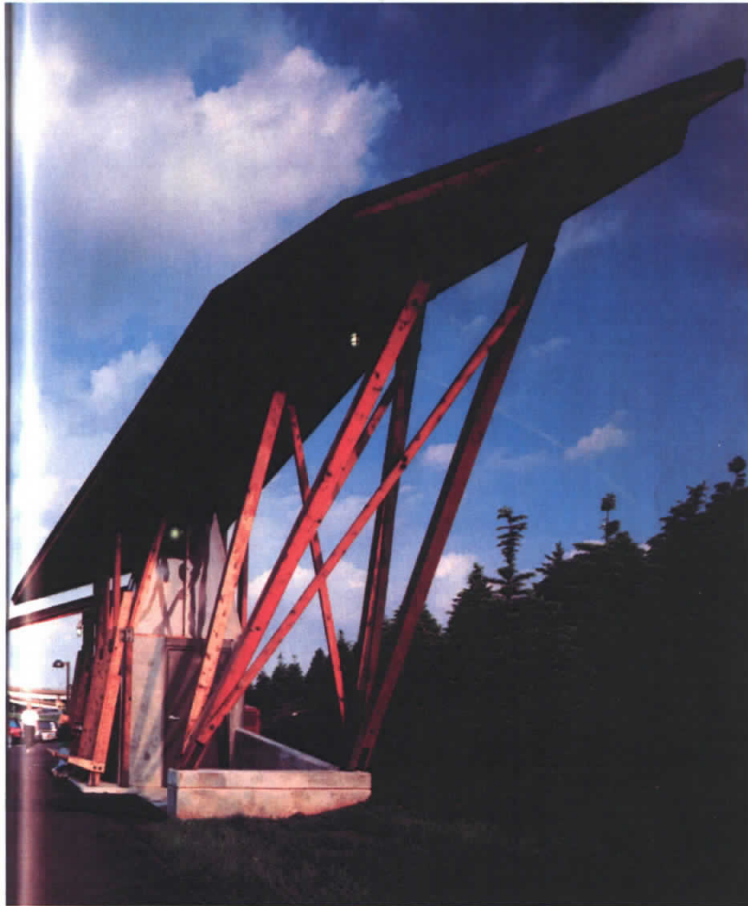
responseMATERIAL

Building Typology

Environmental Responses

Construction Responses

99

response**MATERIAL**

Courtyard Mausoleum
Dan Tuttle
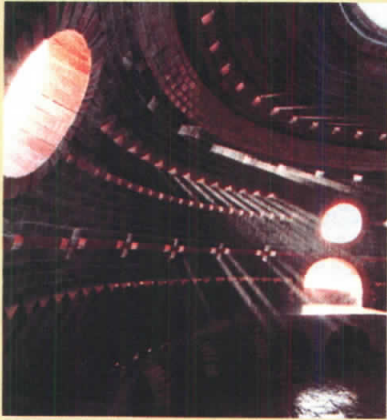
Rumi Dome, California
Nader Khalili

100

responseLIGHTING
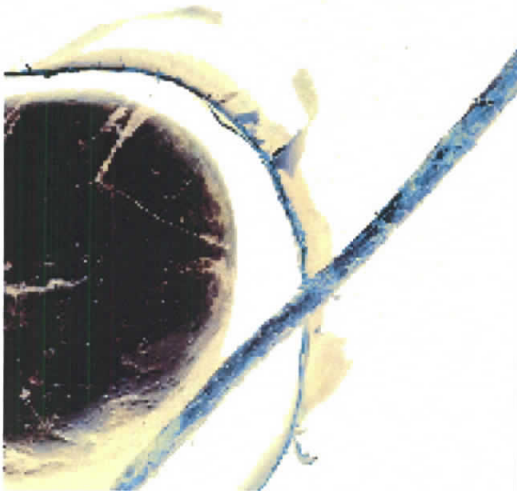
Building Typology

Environmental Responses

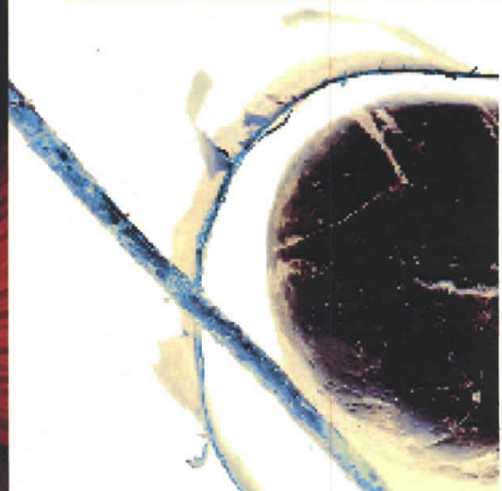**Construction Responses**

101

responseLIGHTING
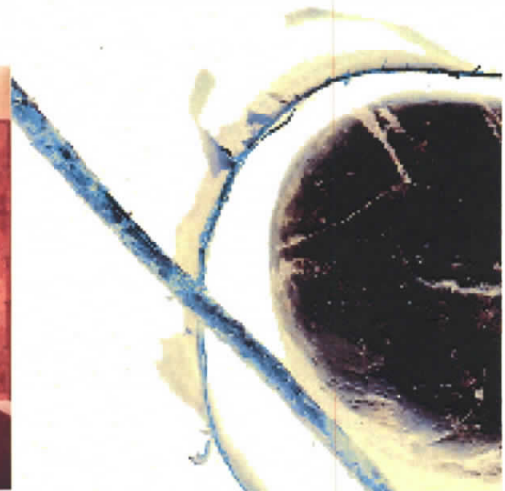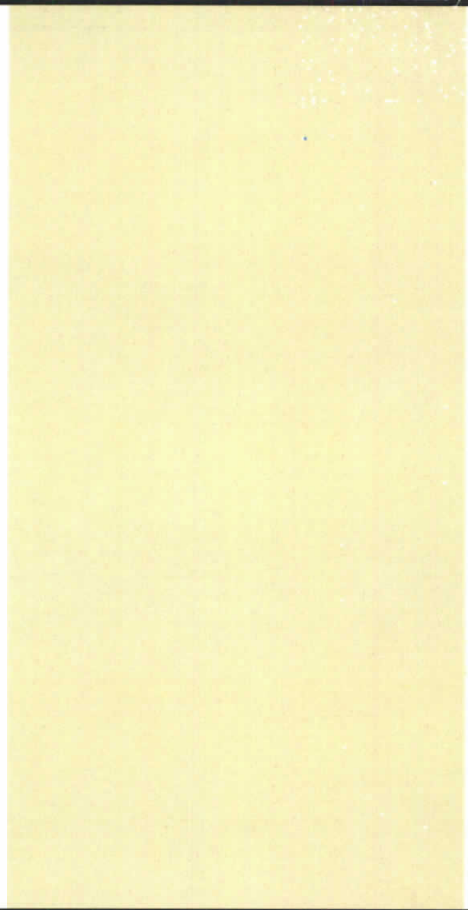
102

responseLANDSCAPING
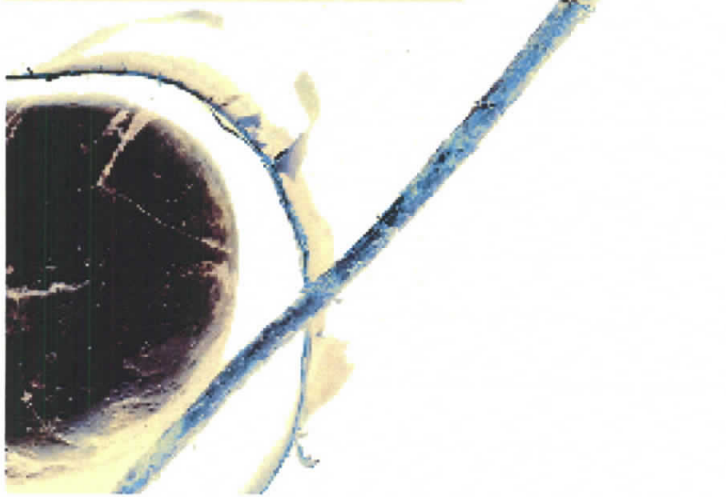
Building Typology

Environmental Responses

Construction Responses

103

Nike Complex, Portland Oregon
Robert Murase

responseLANDSCAPING
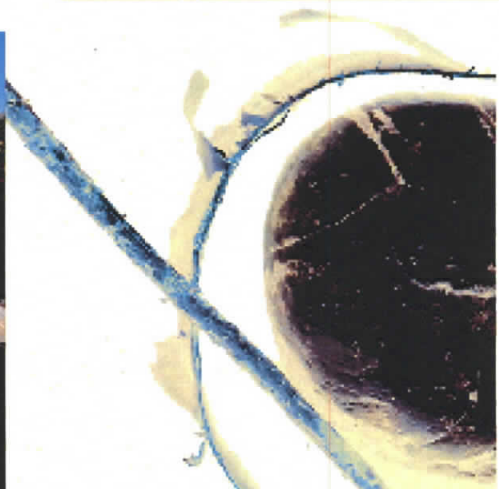
PROGRAM

Research
Internalization
Synthesis

Ambiguous

Residency

Public
Subsidiary

105
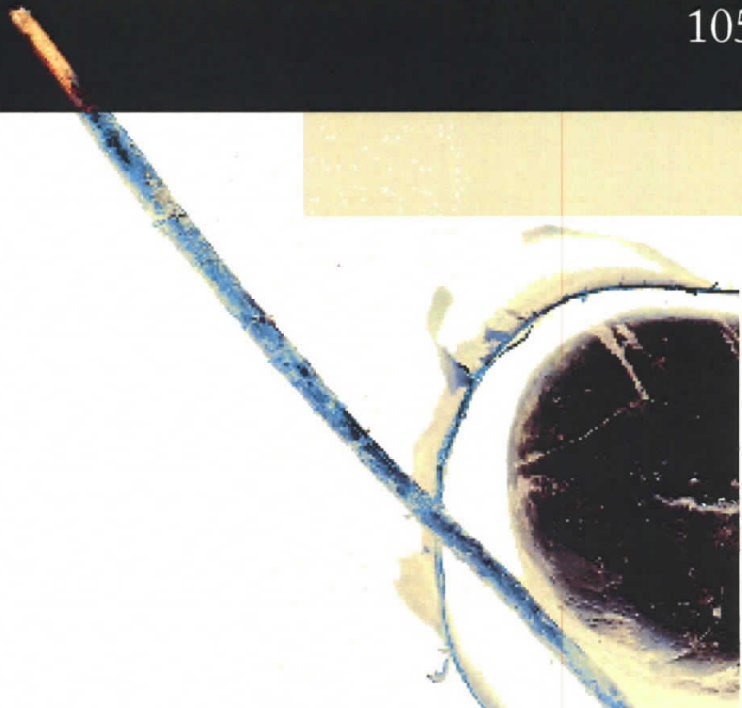
Research

The following spaces are the initial beginning of encyclical nature of the building's spatial relations. A user begins by researching and then internalizing what they have researched. They may then synthesize what they have internalized and then they and others may learn and research what has been synthesized, thus creating a cycle. The user has come to this facility to further themselves and to remove themselves from the norm. The user brings with them a certain wealth of knowledge. They are a resource in themselves. As they use the spaces they evolve as a resource. The architecture must then provide residency for these resources. Other resources must be housed by the architecture of the facility. These resources are; a library, studio spaces of in progress projects, and a gallery of finished projects.

Library

A library should be a multifaceted facility. This space should contain resources digital in nature, as well as, traditional published works. This space will have private and public elements within. To contain both elements of public and private, will allow the site to provide the user with

internalization space. The space then becomes ambiguous. This space will make direct references or connections to the outside world. It must suggest ties to the world from which the documented material comes.

Studio

A studio also becomes ambiguous. In this aspect, the studio spaces are resources for research and production. All of the users will be provided with private and public studio spaces. The innate nature of these spaces allows them to be considered resources for research. The studio space houses the user, who is a resource. The studio also houses the works of the user, which is a resource. These
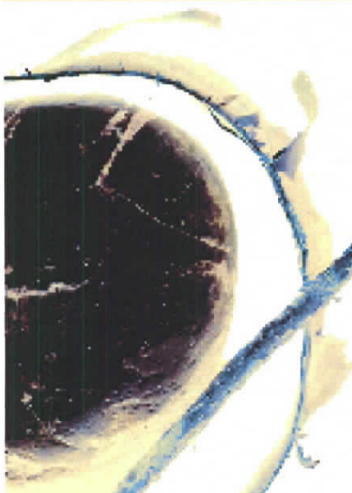
spaces must allow for a connection to the external world. The user must always be aware that they do not exist in a vacuum.

Gallery

A gallery is resource of finished projects of the facility as well as those of visiting shows. A gallery provides the user with a three-dimensional resource facility. The gallery essentially is the end of the cycle; however, it gives birth to further development and research.

Internalization

A user must take what is discovered in research and internalize it. This is a crucial step to fully understanding what is learned. These spaces may be both private and social. Many times there is a constant dialog between researching and internalizing. Many of the following then become ambiguous.

-Private

Living Space

This space will be provided for the user within their res-

PROGRAM

Research
Internalization
Synthesis

Ambiguous

Residency

Visitor
Subsidiary

107

spatialCHARACTARISTICS

idential arrangements. The space will be a retreat space separate from the socially programmed spaces of the facility. The space may provide meditative properties for the user. This space must have special considerations to remove it from the social world and yet maintain a strong connection with the elemental world.

-Social

Sauna

This type of facility is strong with historical connotations to social experiences. There are strong social rituals tied to a sauna. The sauna is a social internalization tool. As

people share ideas, they may be quickly internalized. This space is another ambiguous space where there is a constant dialog between researching from other users and the personal internalization of information. This space must be located close to a cold-water source due to the historic nature of the ritualistic sauna experiences.

Dining/Banquet hall

This facility will be a social internalization space as well. Within the patterns of eating, there obvious moments of silence and moments of conversation. This then allows for another dialog between resources and internalizing what is shared. The facility may also be considered a celebration hall. Where there may be very little internalization. Rather people may merely share comradery.

Synthesis

This may be labeled as the final 'step' in the process. The synthesis is taking raw data, internalizing it, and then producing your ideas. The medium of production will vary according to the will or talent of the user. There will be private and social spaces provided for these users to synthesize that of the mind.
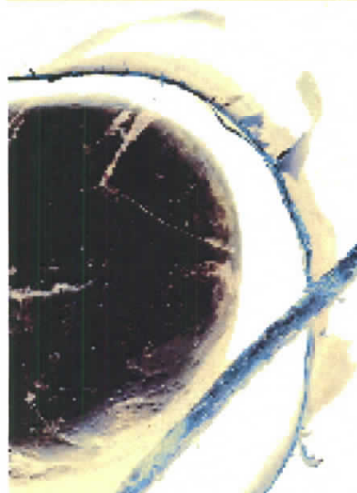
-Private

Personal Studios

The personal studios will provide the user with space removed from the social environment but still connected to the elemental world. This type of space will be placed within their residential arrangements. This will allow an immediate dialog between private internalizing and private synthesizing. This space will be highly adaptable to the individual user. The space will have to focus on the basic connections to the world and rest of the facility.

Social Studios

These studios will provide the user with many innovative and diverse resources for the production of internalized ideas. The user will share the space with many other users of the facility. The social atmosphere of the space will provide the user with all three elements of the process. The user will have other users as a resource. The user will be able to internalize what comments are shared. The user will also be able to synthesize through production their ideas. There will be many different types of social studios to tailor to the user's individual needs. These studios will include sculpture, pottery, painting, dark room, outdoor work area, writing, and an adaptable studio.

Sculpture
Pottery
Painting
Dark Room
Outdoor Work Area
Writing

PROGRAM

Research
Internalization
Synthesis

Ambiguous

Residency

Visitor
Subsidiary

109

Ambiguous

There are many ambiguous spaces. These spaces are labeled

spatialCHARACTARISTICS

ambiguous because they are open to more then one interpretation or programmatic use. The space may be used to internalize as well as synthesize. The space may provide for residency needs as well as research needs. The types of spaces distinctly labeled as being ambiguous are; living, social dining, shared pantry, the gallery, amphitheater, and the library. The specific qualities of these spaces are listed elsewhere in the programmatic requirements.

Residency

A user of this facility may utilize its resources for differing amounts of time. The individual may use the facility from six months to a year. This amount of time provides

the user with the time to form social connections with other users. The time constraint also allows for the facility to become an evolving entity. It may adapt and be ever morphing. There must be certain amenities provided to the users so that they may reside at the facility for those lengths of time. The user will be provided with a kitchen, bath, bedroom, porch, entry space, and access to a public pantry.

Kitchen
Bath
Bedroom
Pantry
Porch
Entry

Gallery

This gallery is open to the visitors. They may view and purchase any for sale items. The profits from the sales will go to the community.
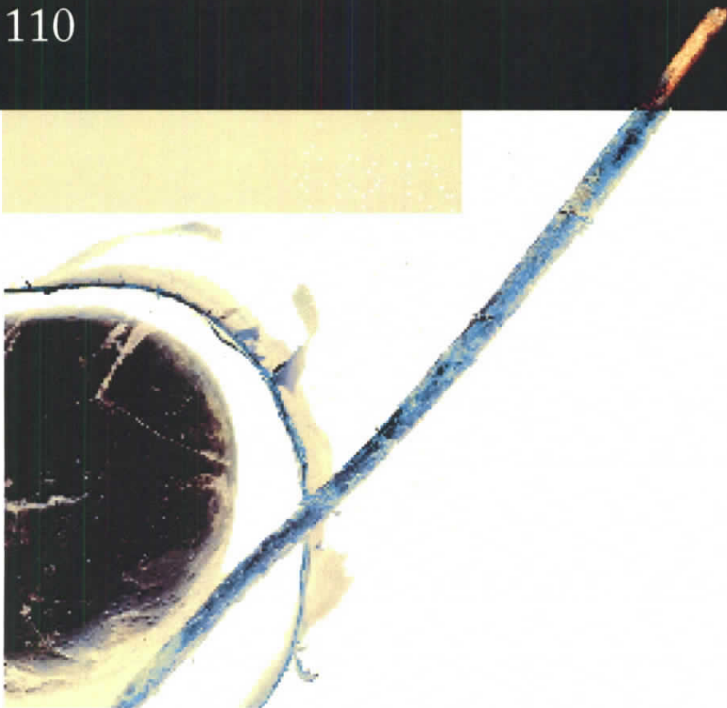
PROGRAM

Research
Internalization
Synthesis

Ambiguous

Residency

Visitor
Subsidiary

spatialCHARACTARISTICS
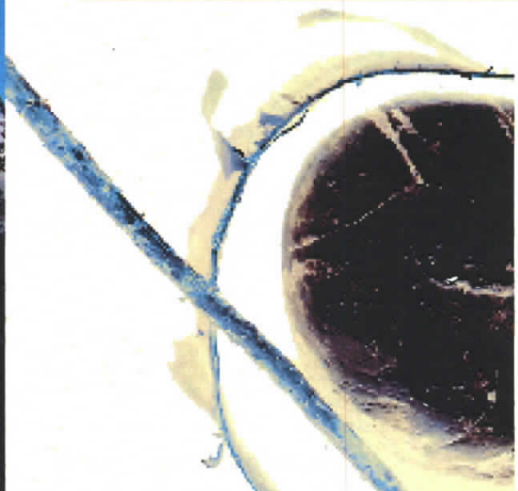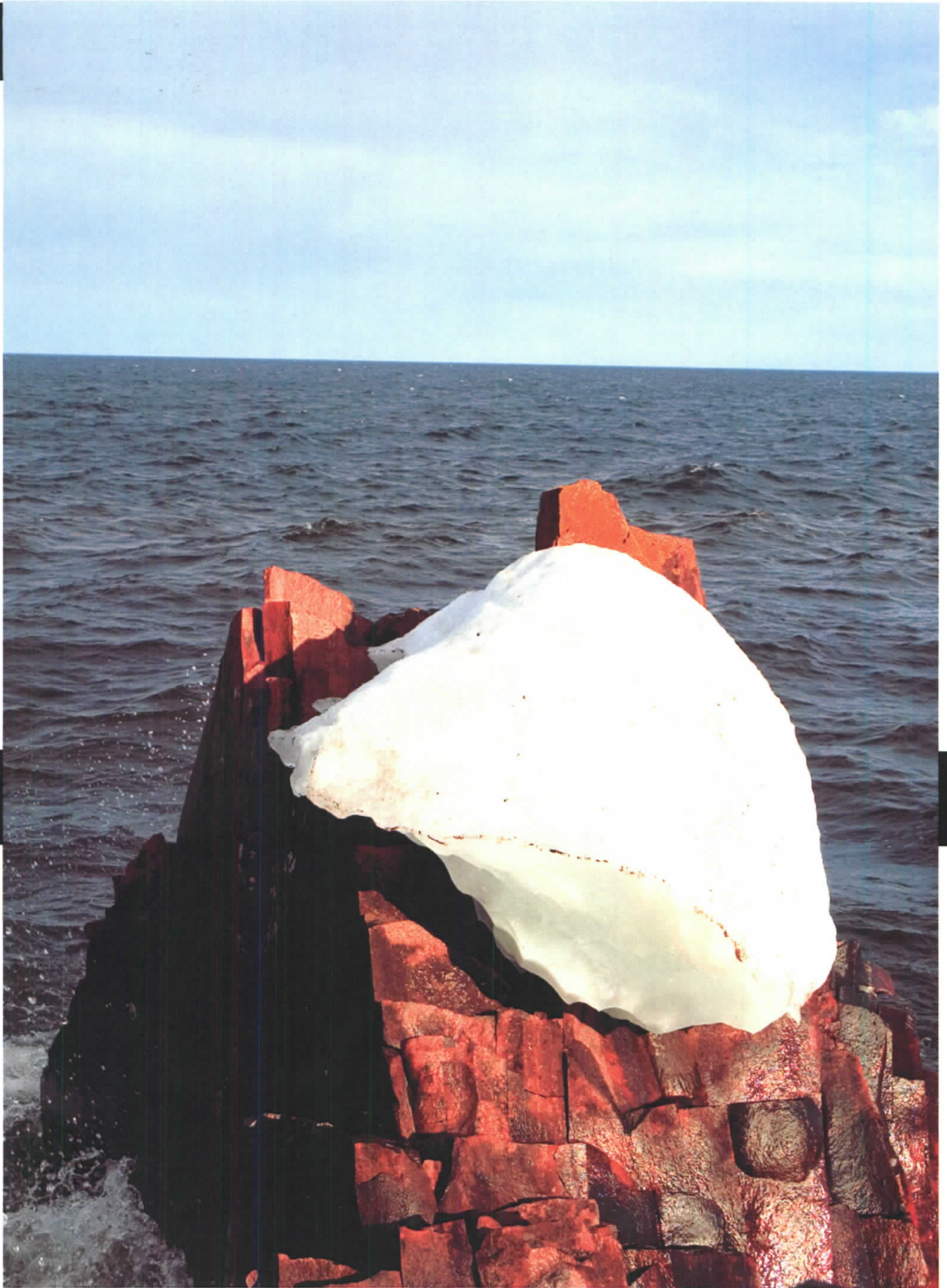
PROGRAM

Research
Internalization
Synthesis

Ambiguous

Residency

Visitor
Subsidiary

113

spatialCHARACTARISTICS

Research   1650 Sq Ft.

Library   625 Sq Ft.
Gallery   625 Sq Ft.
Studio Research   400 Sq Ft.

Internalization   Sq Ft.

Private   Sq Ft.
Living Room   Sq Ft.
Sauna   800 Sq Ft.
Dining   Sq Ft.

Synthesis   Sq Ft.

Private   Sq Ft.
Personal Studios   Sq Ft.

Social   Sq Ft.
Sculpture   Sq Ft.
Pottery   Sq Ft.
Painting   Sq Ft.

Research
Internalization
Synthesis

Ambiguous

Residency

Visitor
Subsidiary

115

Dark Room   Sq Ft.
Outdoor Work Area   Sq Ft.
Writing   Sq Ft.

spatialREQUIREMENTS

Ambiguous   Sq Ft.

Living   Sq Ft.
Dining   275 Sq Ft.
Cooking   1600 Sq Ft.
Pantry   200 Sq Ft.
Gallery   (625) Sq Ft.
Library   (625) Sq Ft.
Sauna   Sq Ft.

PRESENTATION

MODELS

BOARDS

117

PRESENTATION

MODELS

BOARDS

PRESENTATION

MODELS

BOARDS

121

the...

Thresh

of...

Awareness

a retreat for artists.

'05

prepared by
Neal Zeren

PRESENTATION

MODELS

BOARDS

searching

126

PRESENTATION

MODELS

BOARDS

127

128

A
5 (±)

3
8(±)

PRESENTATION

MODELS

BOARDS

129

$B = B : (A + B) = 0.618$

$B : A = (A + B) : B = 1.$

Select Images: "Power of Limits" Gyorgy Doczi
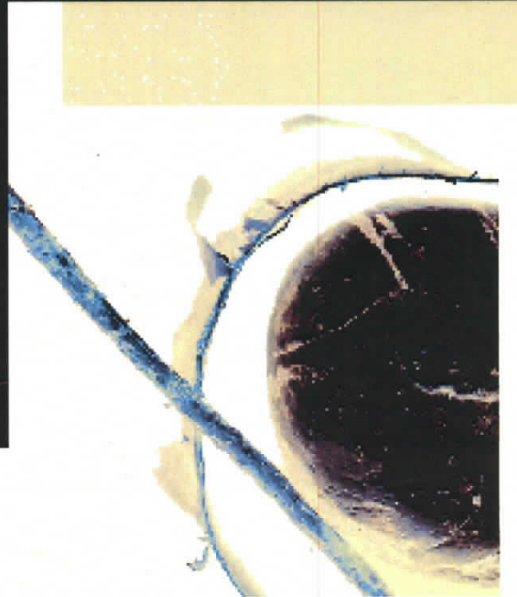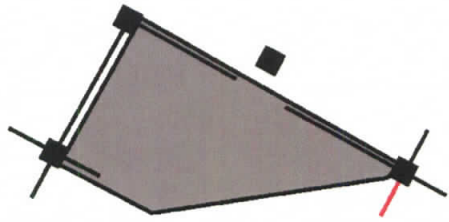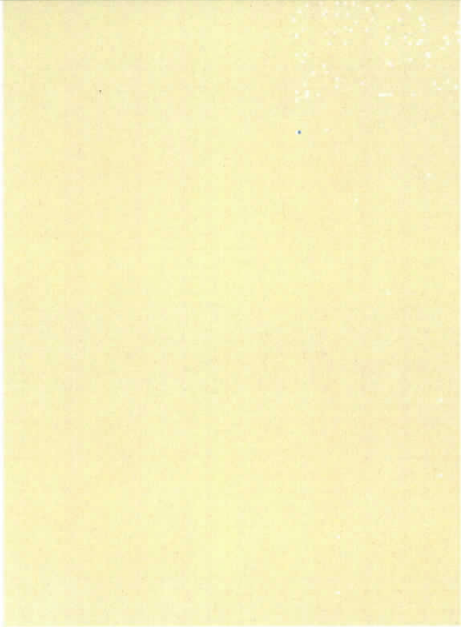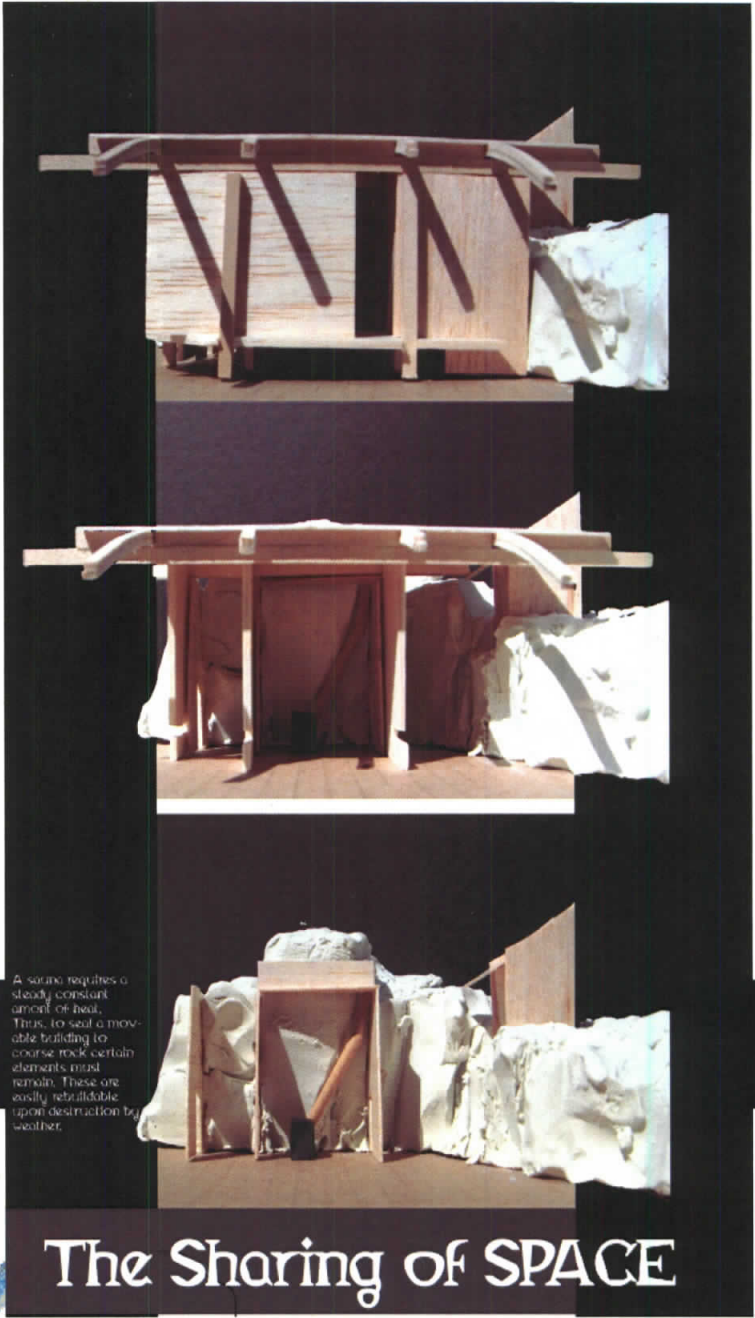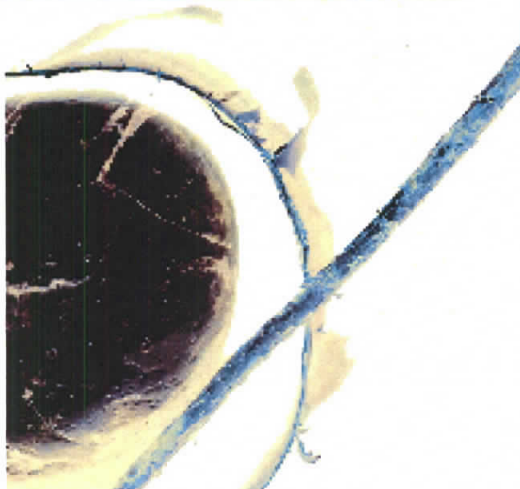
A sauna requires a steady constant amount of heat. Thus, to seal a movable building to coarse rock certain elements must remain. These are easily rebuildable upon destruction by weather.

The Sharing of SPACE

L.E.D.

INTERIOR LIGHT QUAL-
ITY WILL PRIMARILY RELY
ON NATURAL DAY-
LIGHT; HOWEVER,
DURING TIMES OF HIGH
DEMAND, THERE WILL
BE LED LIGHTING TO
ILLUMINATE INTERIOR
SPACES. LED LIGHTS
ARE EXTREMELY VERSIT-
ILE, WITH VERY LITTLE
MAINTENANCE, HIGH
OUTPUT, AND WITH LOW
DRAW.
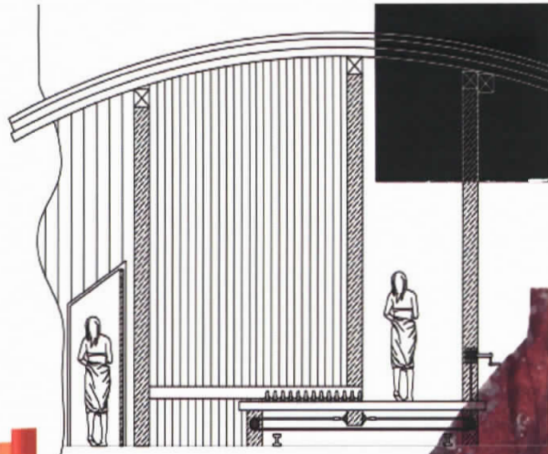
SCALE
1/2" = 1'

Proposed Interior Colors

DESIGN SOLUTION

PRESENTATION

MODELS

BOARDS

131
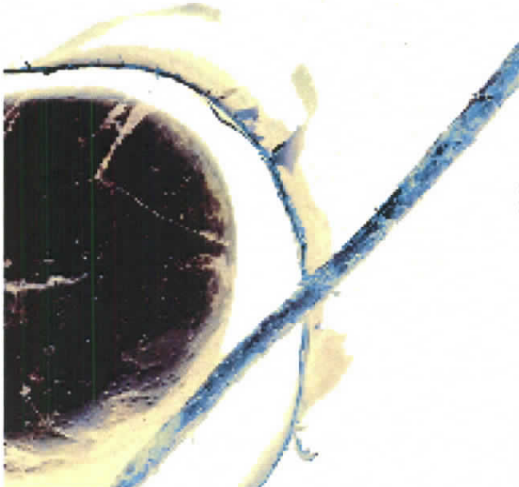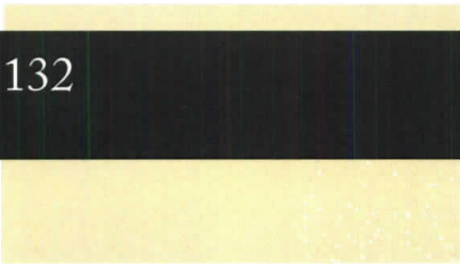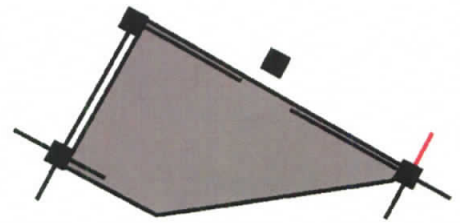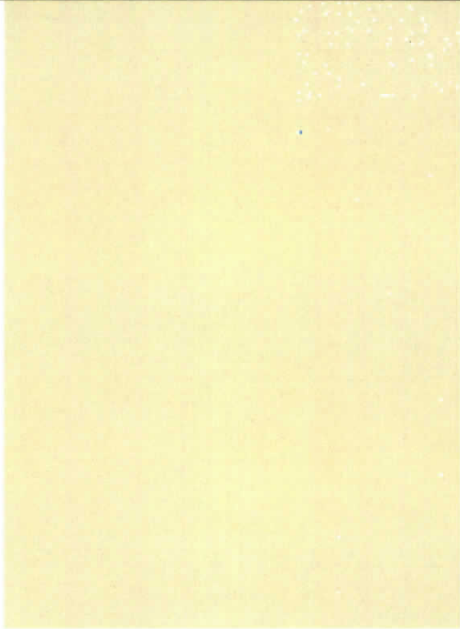
The **SAUNA** provides the users of the facility with the ability to further share their ideas and use each other as means of research. The sauna may also be experienced alone providing for contemplation and internalization time.

Environment

The North Shore of Lake Superior is infamous for tremendous weather in mid-November. These storms are often referred to as the **IDES of NOVEMBER**. This weather is constantly changing the shore, which itself is composed mostly of Granite. The **FORCE** of the weather requires an acute sense of place and design to accomidate.

The choosen site has few options for placement of this type of facility. A sauna experience requires direct access to a supply of cold water to achieve the full experience of a cleansing transformation. The choosen site supplies the users with such an amenity.

To work with **NATAURE**, the building must be movable.

The proposed sauna takes advantage of recylced rails from the mining area to move the building when the severe storms are to hit.
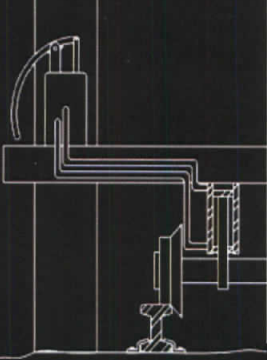
SCALE
1" : 1'

SCALE
1" : 1'

Stationary Transit

Primary
Dressing

Healing
Space

Final
Dressing

Outdoor
Showers

SCALE
1/4" = 1'

Path of Cleansing

SCALE
1/4" = 1'

SAUNA

PRESENTATION

MODELS

BOARDS

133
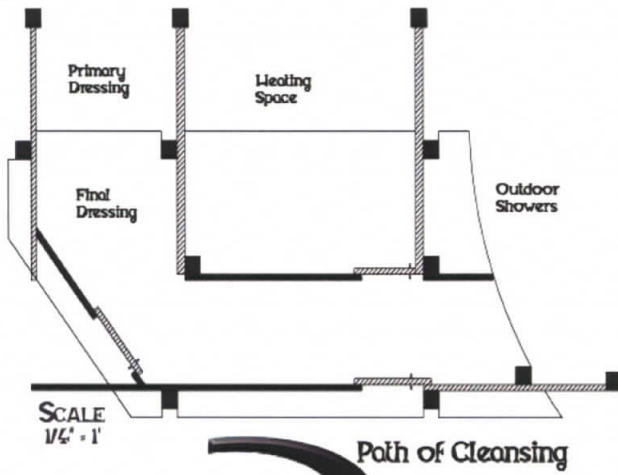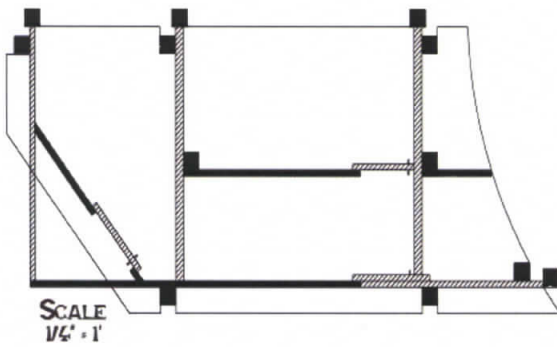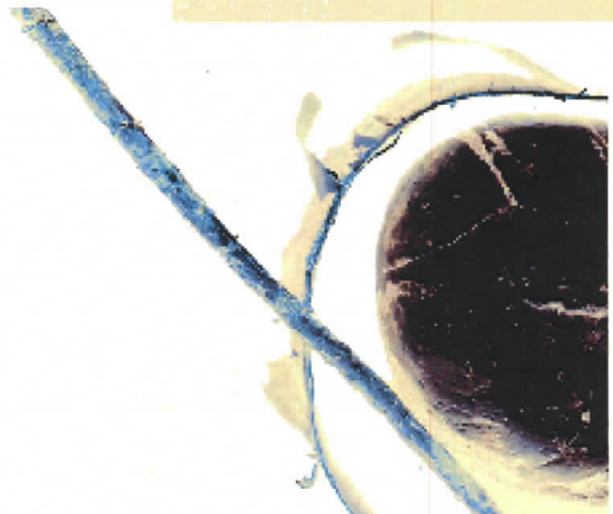
BOARDS

BIOMIMICRY | BALANCE

SOLAR PANELS PROVIDE RESIDENTS WITH TNECESSARY OFF-GRID POWER.

SOUL

MIND   BODY

GLAZING

The adaptation of larger scale curtain wall systems to smaller scale residential facility provides ample freedom of space. The system allows for minimal visual interruptions which normal gazing systems cannot provide. The glass panels are suspended by cables and held in place with stock manufactured aluminum brackets.

Green Roof Design

The adaptation of larger scale curtain wall systems to smaller scale residential facility provides ample freedom of space. The system allows for minimal visual interruptions which normal glazing systems cannot provide. The glass panels are suspended by cables and held in place with stock manufactured aluminum brackets.

SCALE
1/2" = 1'

SCALE
1/4" = 1'

135

GLASS RADIATOR

SCALE
1/2" = 1'

SOUND

LIGHT

HEAT

A complex structure system provides the building with a unique form as well as allowing an open floor plate for the user to adapt to their needs.

THE SUPLIMENTARY HEATING DEVICES COMBINE THE THREE ABOVE ELEMENTS INTO ONE UNIQUE SENSATION OF HEAT TRANSFER. THE GLAZING PROVIDES WINDOW LIKE PROPORTIES. AS THE HEATED WATER RISES THE THERMASTATE ON THE TOP ALLOWS WATER TO ESCAPE AND FLOW DOWN THE SIDE INTO A BASIN OF COLD WATER RETURN, PRODUCING SOUND

STRUCTURE

Movement

Transition through space

RYTHUM HARMONY

EXPLORATION

what it is to Saunter....

"I wish to speak a word for Nature, for absolute freedom and wildness, as contrasted with a freedom and culture merely civil, to regard man as an inhabitant, or a part and parcel of Nature, rather than a member of society."

"I have met with but one or two persons in the course of my life who understood the ART of Walking, that is, of taking walks, who had a genius, so to speak, for sauntering: which word is beautifully derived 'from idle people who roved about the country, in the middle ages, and asked charity, under pretense of going 'a la Sainte Terre,' to the Holy Land, till the children exclaimed, 'There goes a Sainte-terrer,' a Saunterer, a Holy Lander. They who are indeed mere idlers and vagabonds; but they who do go there are saunterers in the good sense, such as I mean. Some, however, would derive the word from 'sans terre,' without land or home, which, therefore, in a good sense, will mean, having no particular home, but equally home everywhere. For this is the secret of successful sauntering.

-Henry David Thoreau
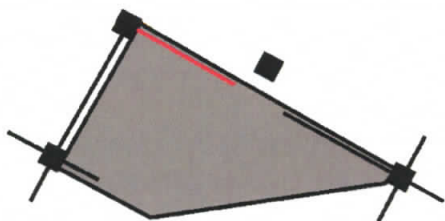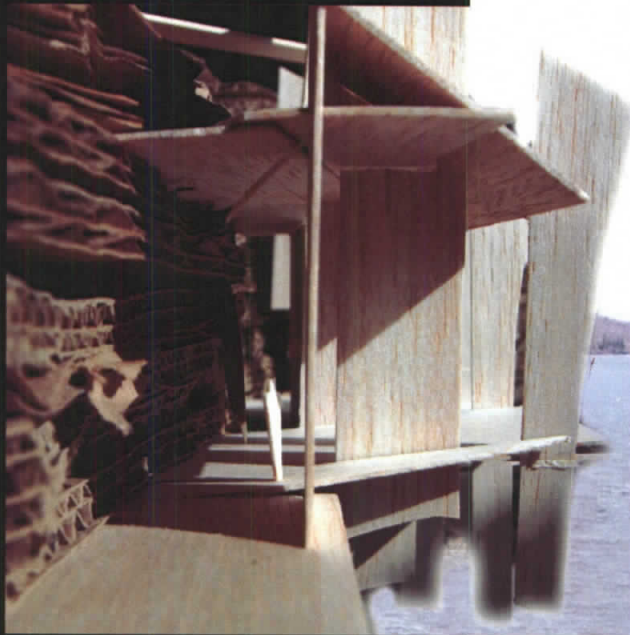
Production Studios

This production studio provides the users with all three elements of the retreat facility.

This facility provides the users of the site with resources needed for exploration through art.

Balconies provide contemplation and internalization space.

The facility provides the user with the written research of a library, as well as an art gallery of the user's works. This becomes the one of the most crucial elements of research for this retreat facility.

DETAIL

From the micro to the macro details bring Architecture to the humanistic level. Form often times removes the individual from reality. Detail then is the unifying feature of Architecture. It is that which brings humanity, environment, and the built world into a single existence.
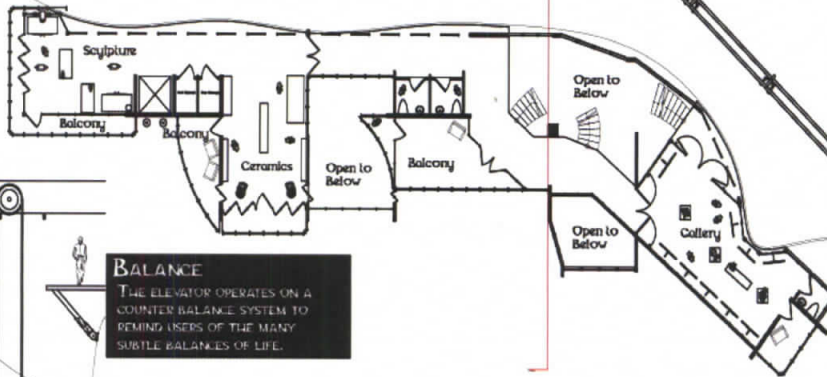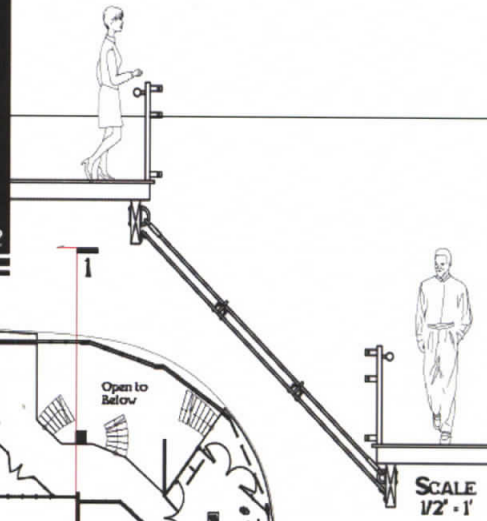
2

1

Sculpture

Balcony

Balcony

Ceramics

Open to Below

Open to Below

Balcony

Open to Below

Gallery

Open to Below

SCALE 1/2" - 1'

BALANCE
THE ELEVATOR OPERATES ON A COUNTER BALANCE SYSTEM TO REMIND USERS OF THE MANY SUBTLE BALANCES OF LIFE.

Dinning

Balcony

Painting

Balcony

Lounge

VENTILATION
OPERABLE WINDOWS ALLOW CROSS WINDS TO COOL INTERIOR SPACES NATURALY.

BALANCE
THE ELEVATOR OPERATES ON A
COUNTER BALANCE SYSTEM TO
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Balcony

Dinning

Painting

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VENTILATION
OPERABLE WINDOWS ALLOW
CROSS WINDS TO COOL
INTERIOR SPACES NATURALY.

Lounge

Library

SCALE
1/8" = 1'

SCALE
3/32" = 1'
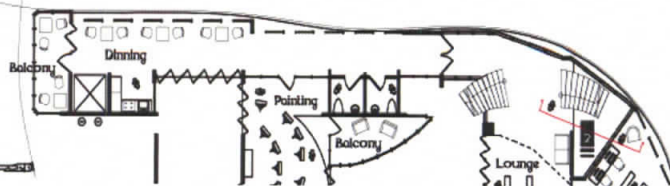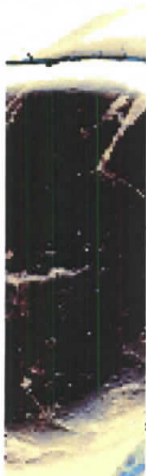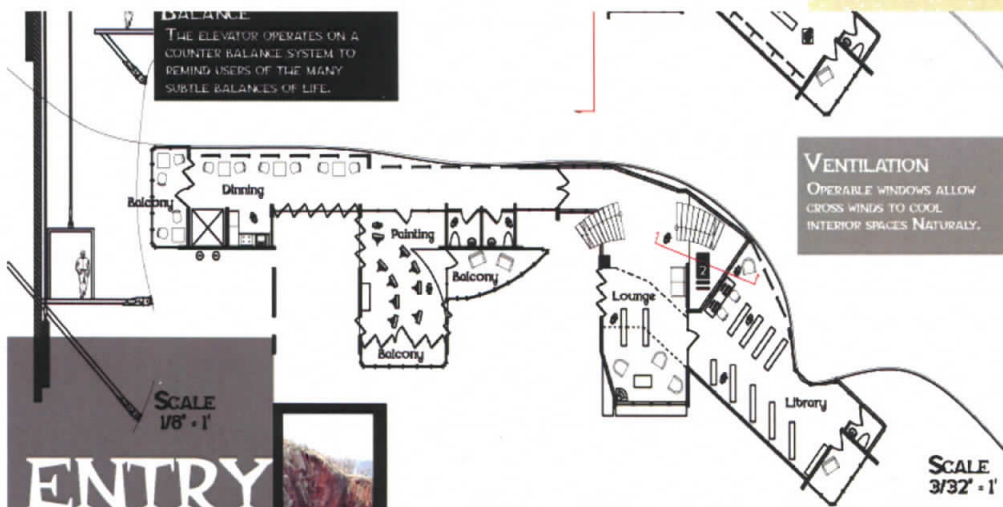
ENTRY

THE LOCATION OF THE FACILITY
DEMANS A UNIQUE ENTRY SEQUENCE.
THE INDIVIDUAL PROCEDES DOWN A
LONG AXIS WHICH ENDS WITH A SPIRAL
STAIR. THE SPIRAL STAIR PROVIDES THE
INDIVIDUAL WITH MANY DIFFERENT VIEWS
AS THEY DECEND. THE DECENT SPIRALS
THE USER THROUGH COLORFUL VIEWS OF
STONE AND BLUE WATER.

SCALE
1/8" = 1'

MODELS

MODELS

MODELS

MODELS

149
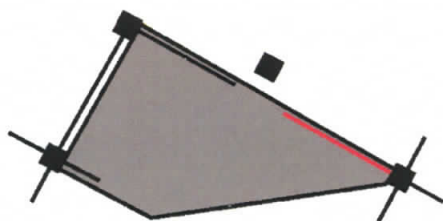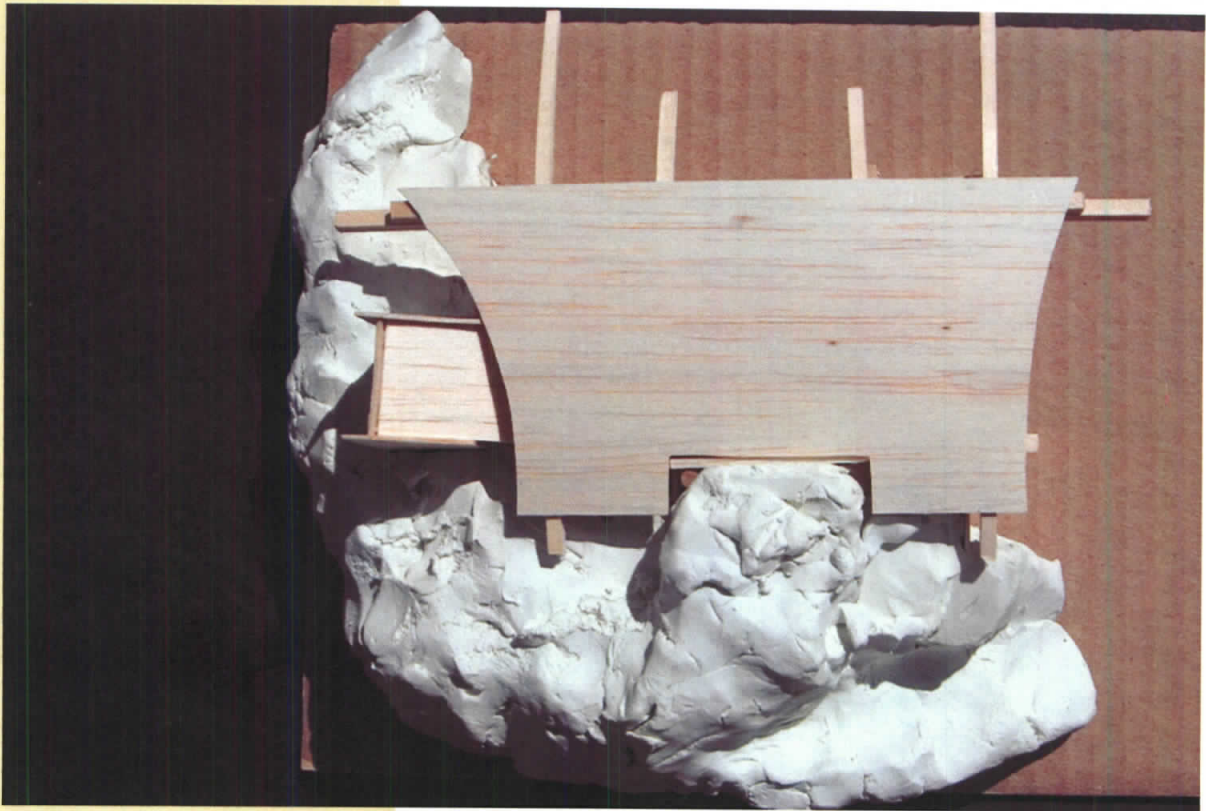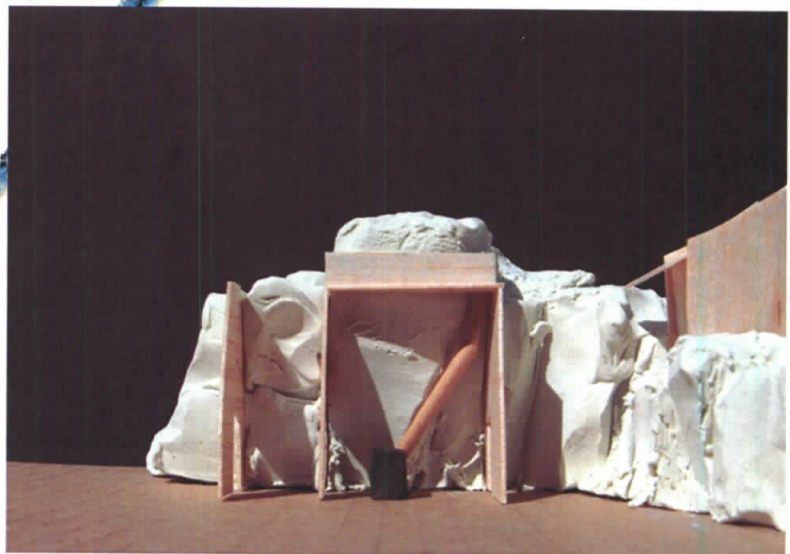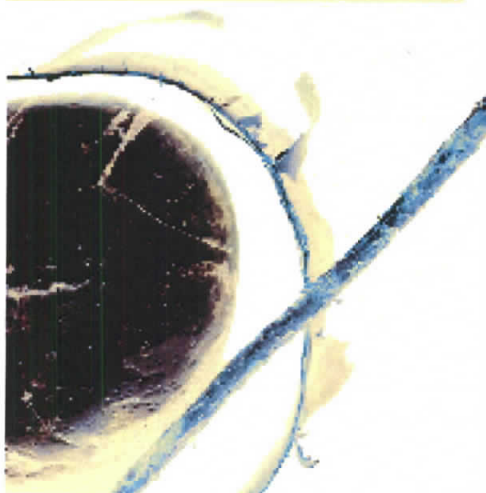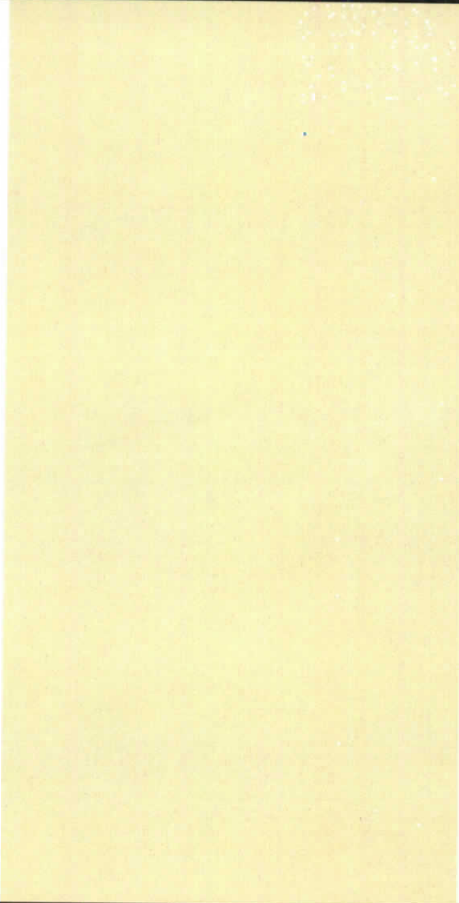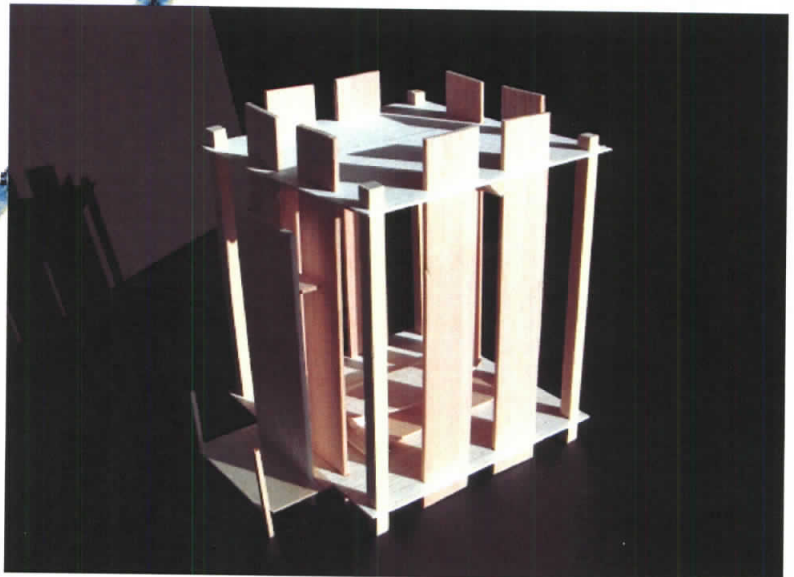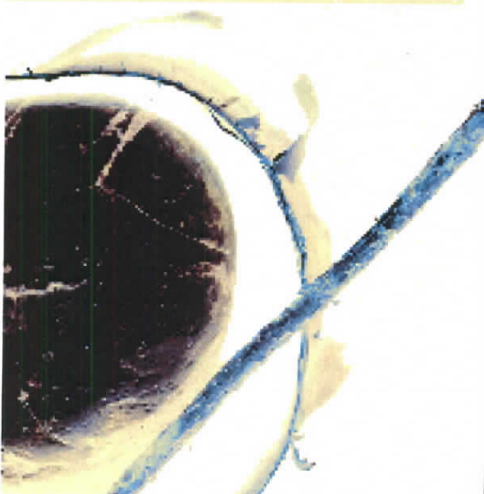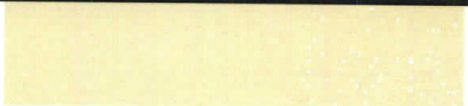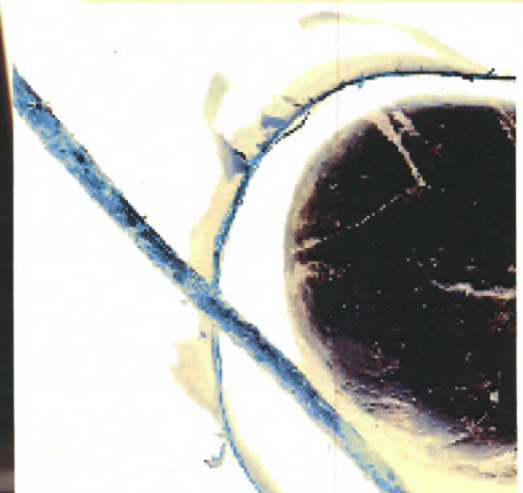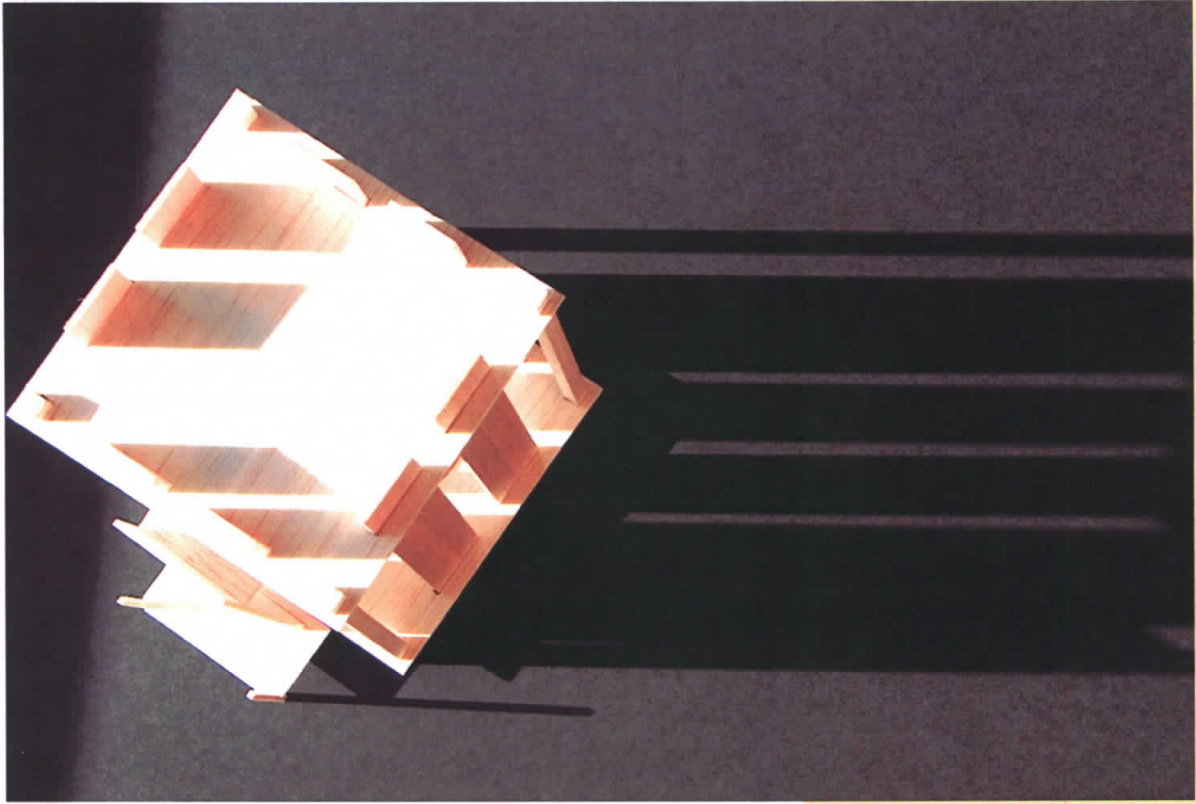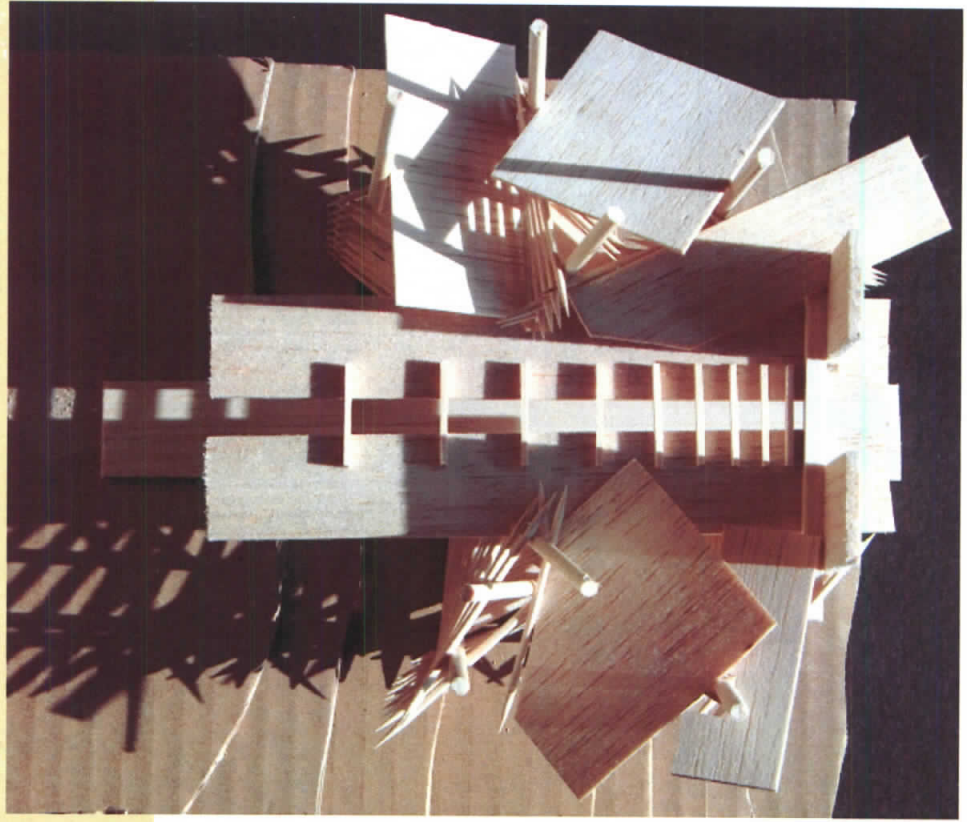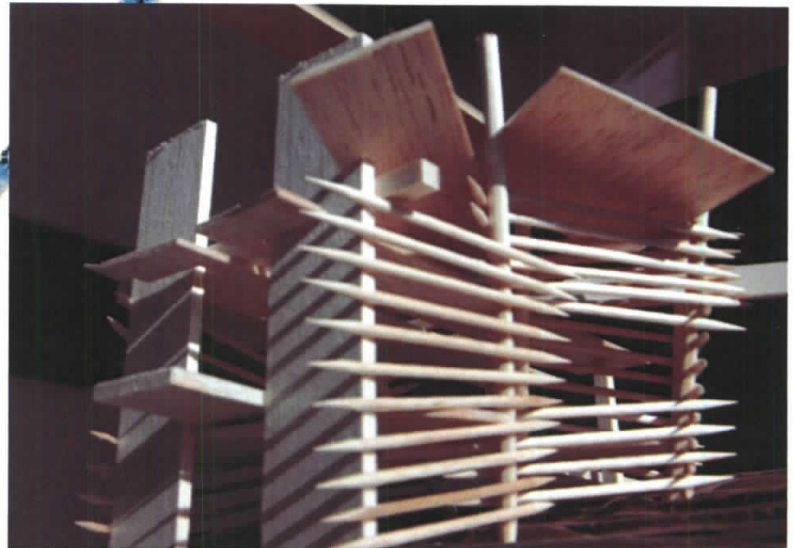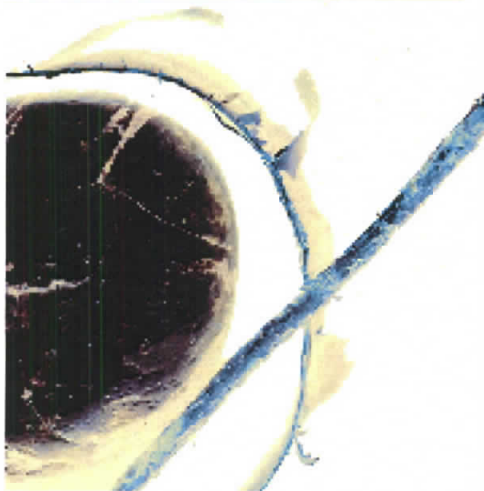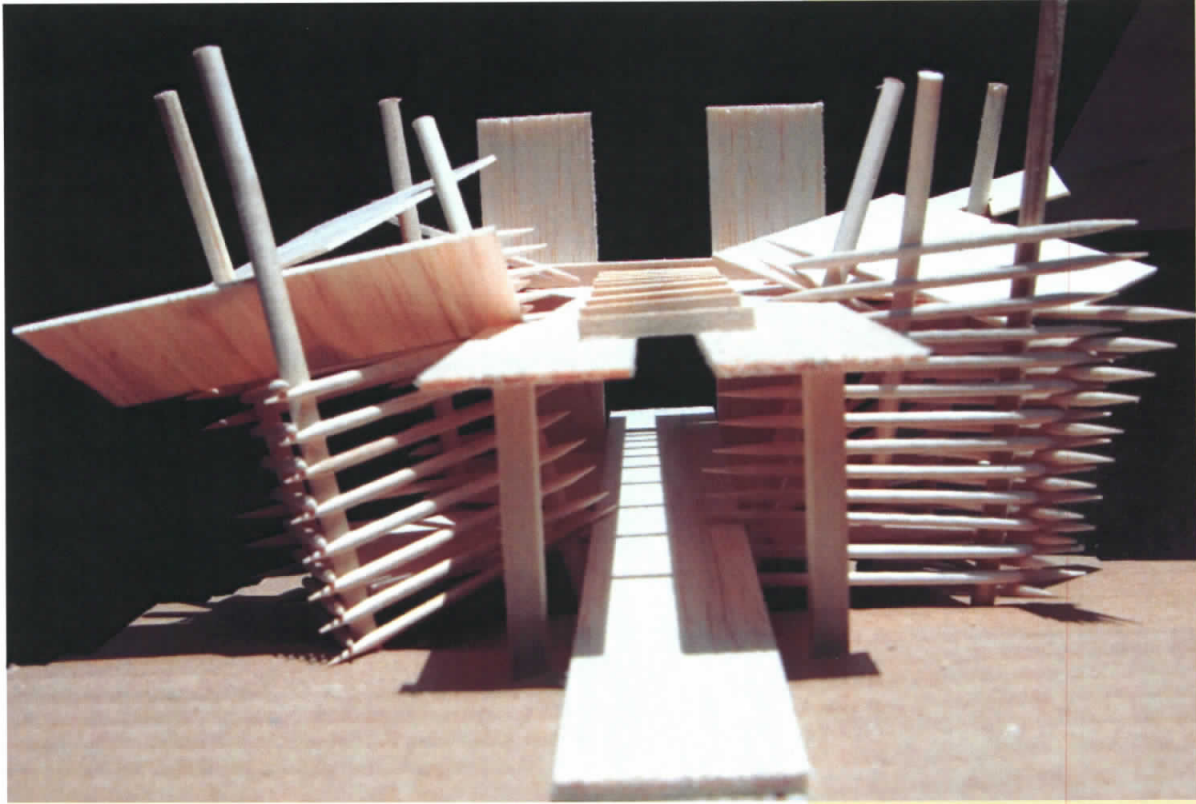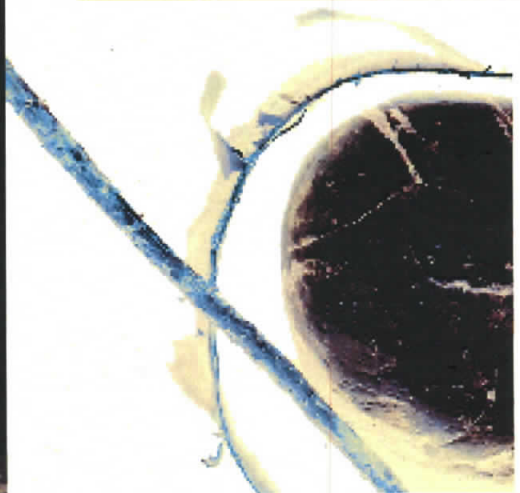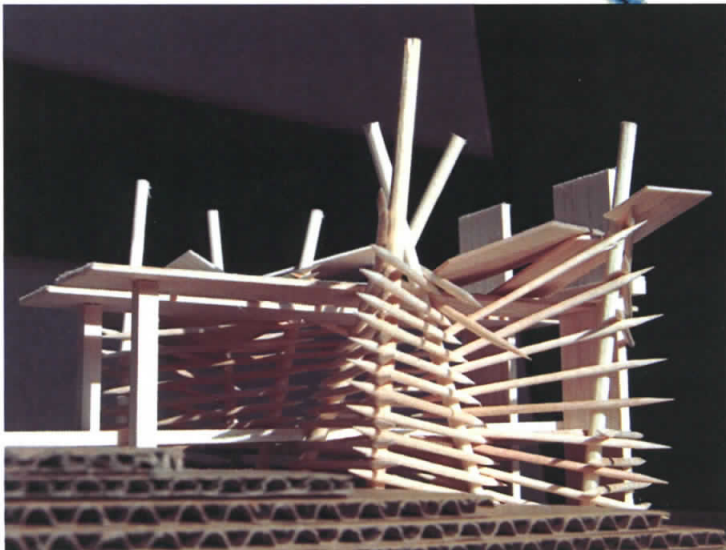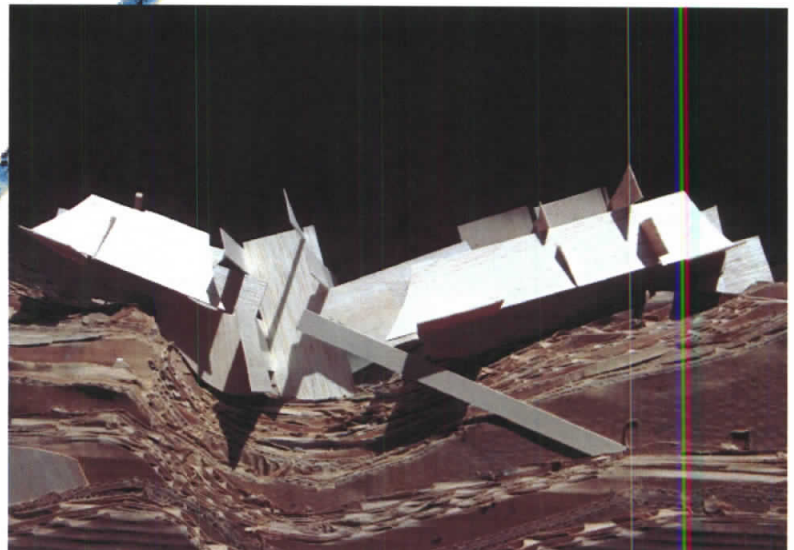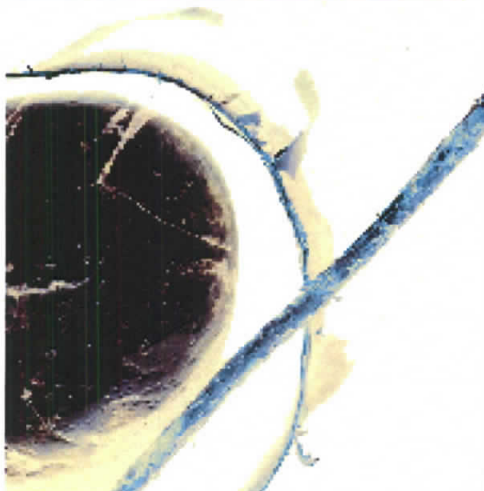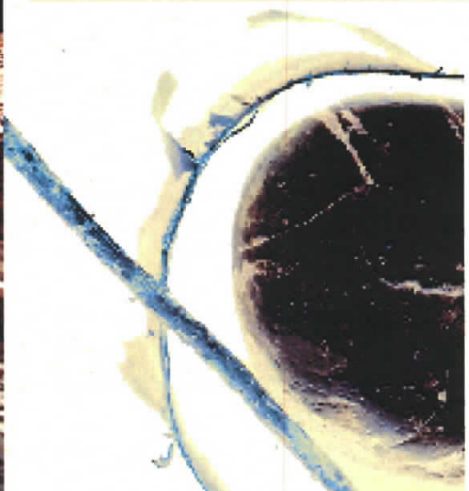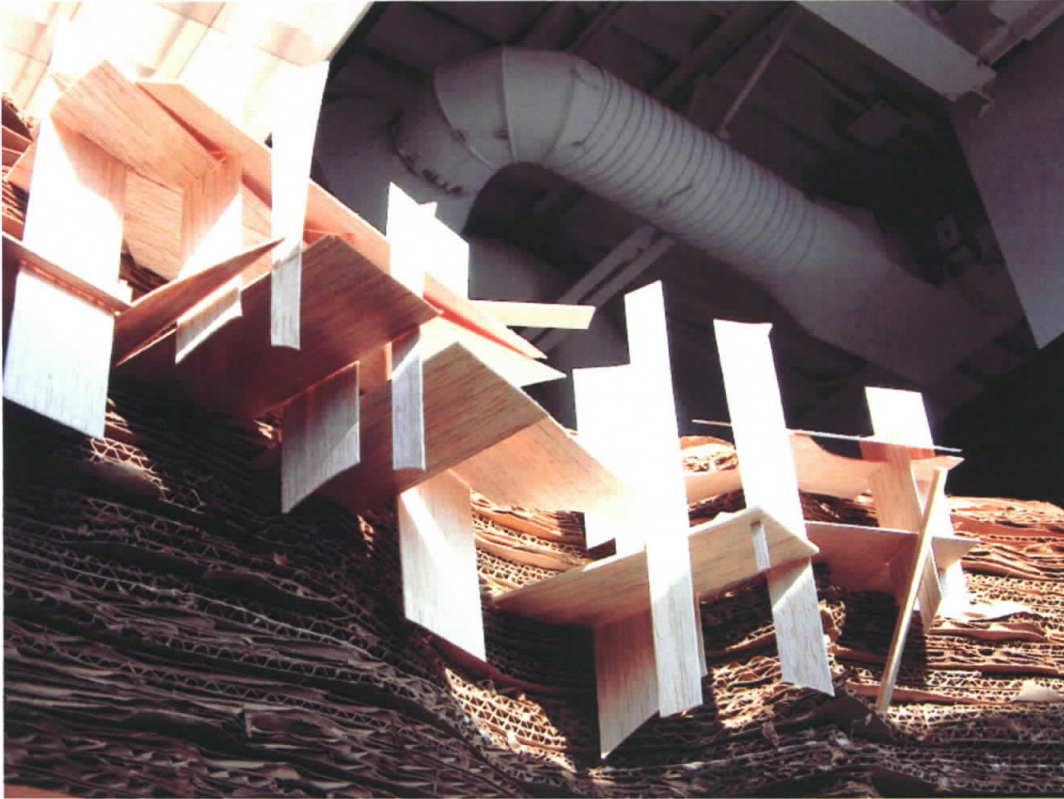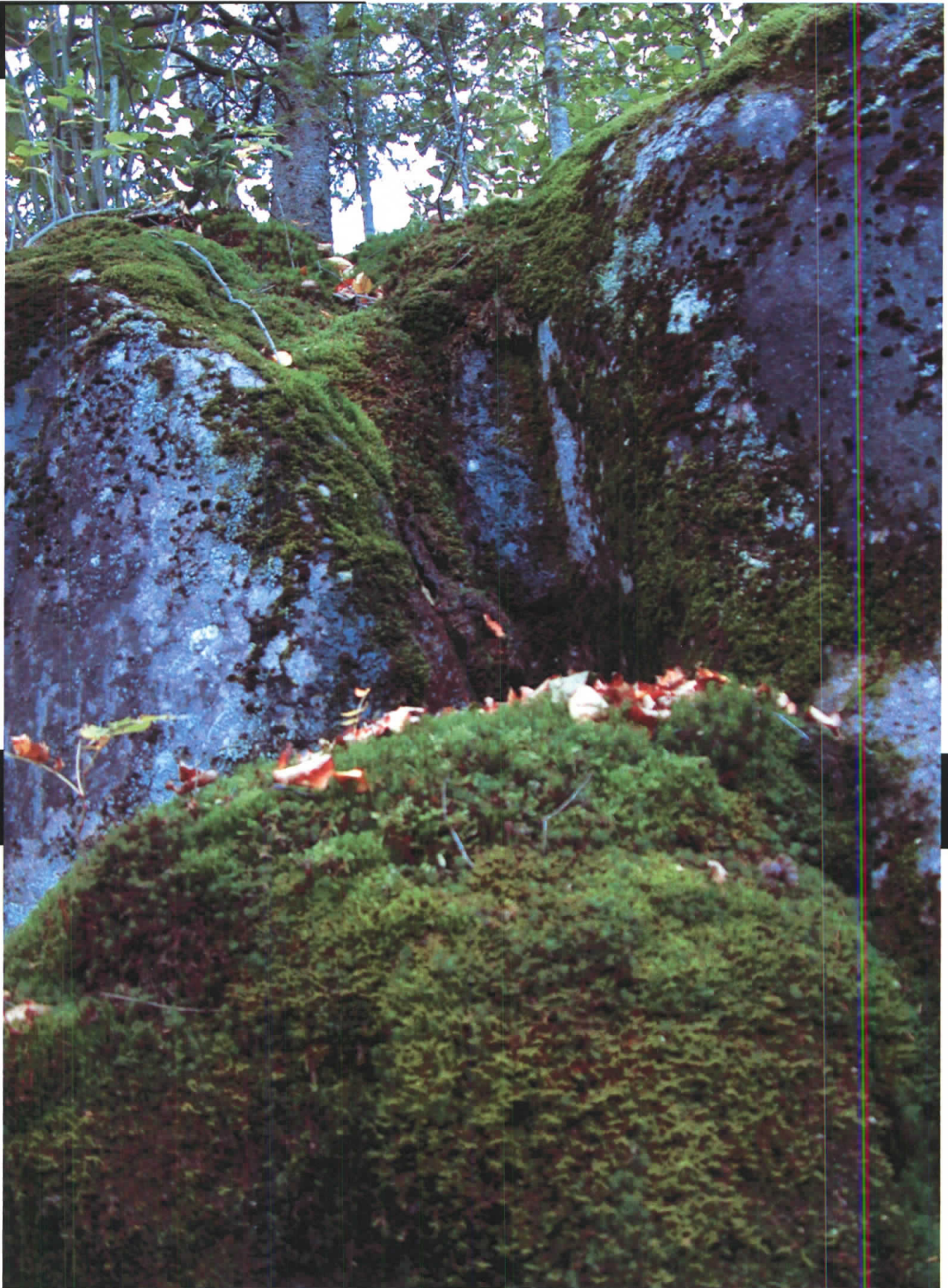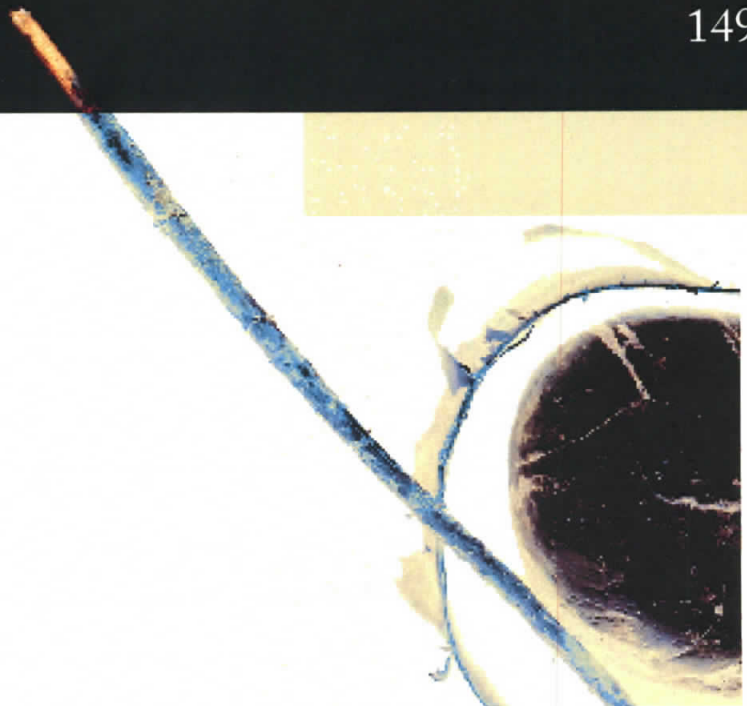
AUTHOR: NEAL ZEREN
TITLE: UNDERSTANDING

What I am coming to realize as, I research aesthetics, is that I am not researching an answer to what art is. I am searching for a method or way of understanding art. Aesthetics is not some logarithm with a certain set of variables which combined lead to some ultimate final answer. It can not be denied, however, that there is a set of variables. Nor can it be denied that by bringing these certain variables together one may come to a certain understanding. This understanding though is not an answer. This understanding merely allows individuals with the same, but not limited to, understanding of art. They may discuss and share their understandings to further their understandings. These understandings then become the variables and are added to the set. Thus, there is no specific logarithm because no answer exists. However, due to the encyclical nature discovering an understanding of art, there seems to be an extremely large set of variables to understanding art.

Perhaps, I will further this understanding of this set of variables by describing the set as a closed set of variables, rather than an open set. There seems to be a limit to the number of variables. Sibley attempts to define this set in terms of aesthetic terms and non-aesthetic terms. Even though there are terms that may transverse between that of the aesthetic and non-aesthetic; this does not mean that the set of variables is then infinite.
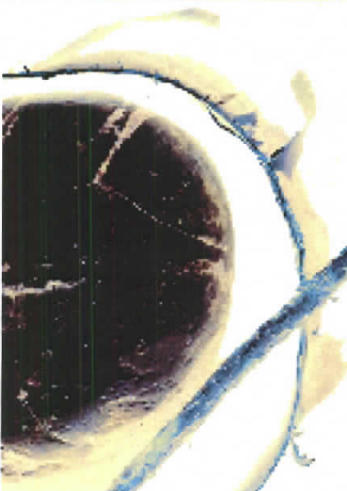
"To Prophet by precedents we have to understand them, and we must argue consistently from case to case" (Sibley 362).

This statement demonstrates exactly what I am attempting to establish. In the search for an understanding of art, rather than an answer, we must proceed with a common language to communicate. The language I search for is far broader than that of English or Spanish. It is far more inclusive than languages of Romantic, Germanic, or even Latin origin. Yet, this language is similar in nature and is still bound with in these languages. This type of language, and its terms, are necessary, and yet at the same time, are irrelevant. The words that they use are directly related to a subset of experiences that they use to define their world.

Thus, in an attempt to understand art, they choose a language where they have a shared set of experiences. This is not unlike the shared set that aesthetics is attempting to establish. The language of aesthetics is necessary to proceed to understand it. Aesthetics is a language that which denotes terms related to concepts. It is in understanding these terms that individuals may proceed to share a more complex understanding.

I propose this example; I would suggest that of two individuals discussing a whosit. The multi-linguistically competent individuals may share understanding of Spanish, English, and German. The individuals may agree to discuss certain attributes of the whosit. To proceed, the individuals must discover and understand the concepts of the particular attributes. They must understand what the attributes of the concepts are. All of this relates to a common understanding of a language. A language that is composed of words that are metaphorical in nature as well as independent.

With these metaphors and shared understanding of language, we may begin to understand how to understand art. We may share our ideas freely, of what we understand about art. With this shared set of language, we may proceed to introduce the idea of taste.

Let us dismiss Sibley's attempt to distinguish between learned aesthetic judgment and inherent aesthetic judgment. I will not deny the fact that there may be individuals that need not learn how to understand what is aesthetically pleasing. Just as there are individuals who have perfect pitch. It would seem that it would be as difficult for an individual with perfect pitch to

explain a note to one who was tone def. The two individuals may still discuss what sounds good to them but may not understand what it is about the work that sounds good. It may be another thing intirely for the first individual to discuss a note to a def person. Is there a language. This seems ridiculous there must be a common plane. Can a seeing individual describe something to a blind person. Can an adult describe quantum physics to a child of normal state of mind.
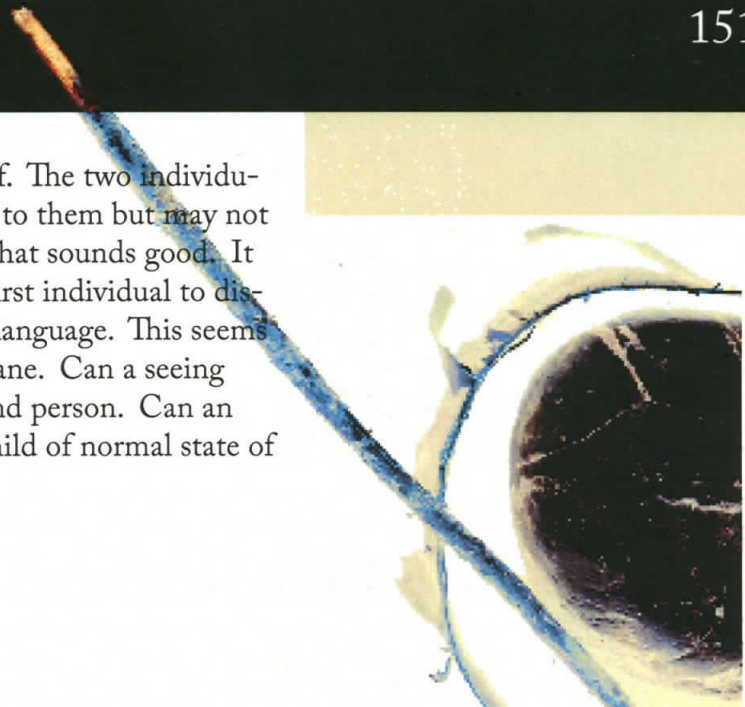
AUTHOR: NEAL ZEREN
TITLE: WHAT IS TAO?

We are bound to an illusive language of analogies and references. A single word can allude to a string of emotional ties. I may suggest the idea of Rape. To a victim, this may result in tears and emotional counseling. Where as, to the assailant there may be a far different idea of the word. Why is this? Our minds establish strings of references. We attempt to make sense of the world by connecting to what we know. We build extensive superstructures within our minds where we can make quick references to stimuli. Psychologists perform tests called word association to understand how an individual has structured their information chains.

As one begins to define a word you must look at all properties of that word. The language with which the word now exists, must be defined. Many times the words origin must be given as to understand historical references that the word may have. The type of word must be given. We must understand whether the word is a noun, adjective, or verb. The specific definitions of the word may be given. These are given as references or understood ideas and concepts that may allude to the word in question. One could then provide other uses or tenses of the word to fully understand how it is to be used within the language of choice.

This is the contemporary way of defining a word. If one has a question of what a word means Webster is there to provide this type of response. If the idea is more complex we search out encyclopedias. These provide a slightly different type of definition. These define concepts using more in depth examples. The concepts may require diagrams, pictures, or formulas to convey the idea. Though, this gives a far broader definition of the idea, there is still a direct and scientific methodology to how the idea is expressed. This is an effect way of defining science, math, and language. Yet, how does one explain everything that is and is not? How does one explain an idea?

Language, in all forms, has its limits. Whether it is the stroke of a pen or a brush, language, as a communication tool, has definite boundaries. Yet, it is the gate keeper. We must use it. Our consciousness has not yet evolved to a state of higher communication. We are still bound to this rudimentary information sharing. We make futile references to that which is beyond references. How then do we use this tool when describing, that which is all things of referent?

"True words seem paradoxical" (Lao-tzu 78).

Tao Te Ching is a written form of an oral tradition. It was believed to have been recorded by Lao-tzu in the early centuries before Christ, circa 500 B.C. The idea of the Tao is brought to light using language in the form of verses. These verses allude what Tao is and is not. Tao Te Ching is a poetic way of describing the art of living.

Taoism is a way of living. Taoism is an art of living. It is to live so true to yourself that you want to be followed. It is to be such a true example that you need not impose upon others. So much of modern ideologies must be imposed. The media feels that you must know how pretty you must be. The media chooses to force there ideas of what should be; of how you should think. Organized religion is guilty of this. Most preach that, as a parishioner, you should inform others what they should believe. The Tao is a different idea. It suggests that you should be an individual so in touch with Tao that others see this and want to follow you.

What then is this Tao that you are to be in touch with? How are you to know how to live so others may want to follow? How are you to be a leader so others will follow? There are a number of references to being a leader.

"If you want to be a great leader,
you must learn to follow the Tao.
Stop trying to control.
Let go of fixed plans and concepts,
and the world will govern itself" (Lao-tzu 57).
"Man follows the Earth.
The Earth follows the universe.
The universe follows the Tao.
The Tao follows only itself" (Lao-tzu 25).
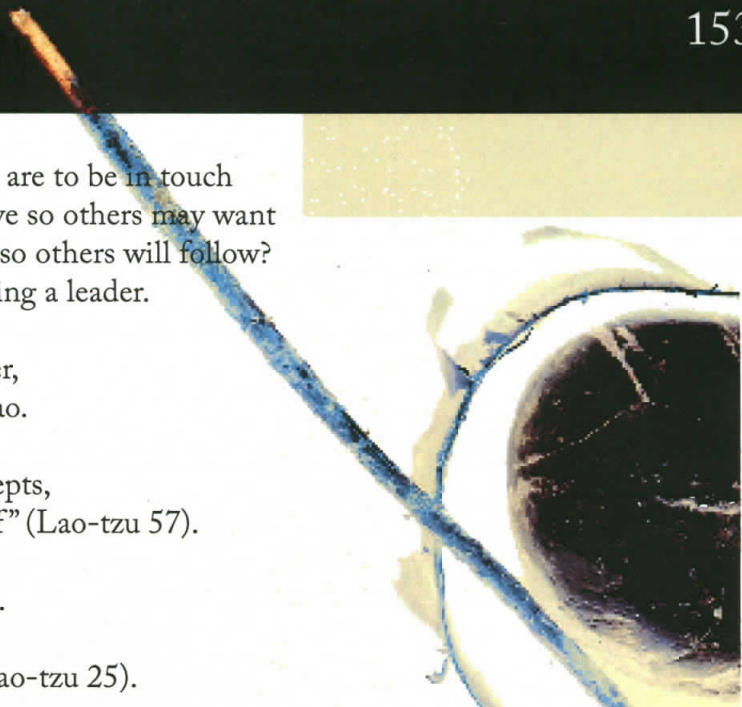
"Can you love people and lead them
without imposing your will?
...leading and trying not to control" (Lao-tzu 10).
You must lead by living. You must understand what Tao is.

It is to trust your inner aspirations. It is to be in touch with the It. It is to not force your will upon others. It is to allow the will of the It to lead you, even though, It has no will. It will let the World be.

"The more you talk of it, the less you understand" (Lao-tzu 5).
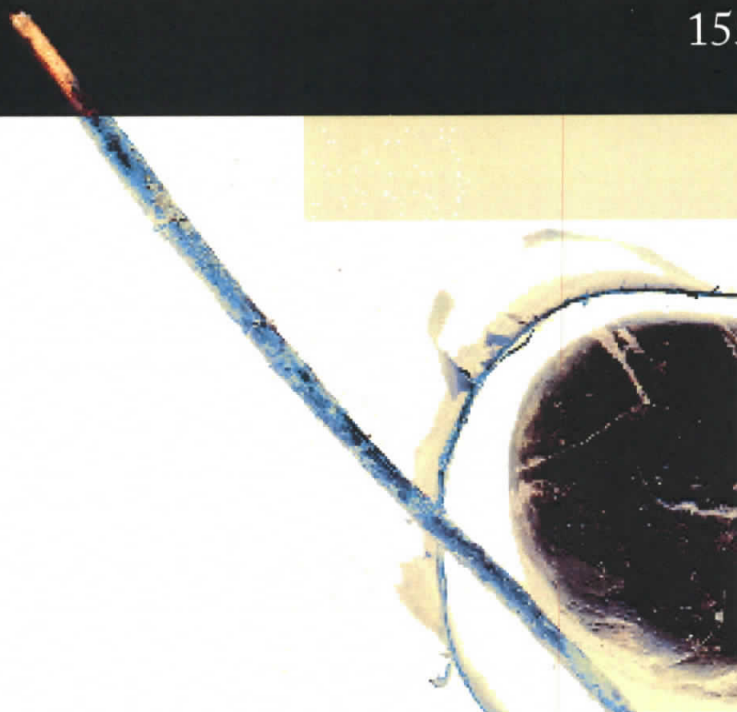
AUTHOR: NEAL ZEREN
TITLE: ESSENCE OF ART?

"It's a canvas about five foot by four: white. The background is white and if you screw up your eyes, you can make out some fine white diagonal lines" (Reza 1).

Three characters, three different ideas of what art is. Yasmina Reza has written a play addressing the mythical unicorn of philosophical questions. What is Art? The question has a labyrinth of ideas which all lead close to attaining an answer. Perhaps, though, they lead you farther from the answer? Reza has chosen to allow three friends to attack the issue and inevitably each other. There is a single piece which is the catalyst for the strong beliefs of art. Each character is constructed to have their ideologies of art and taste. The stage becomes a gallery of the real world. Their social interactions give rise to these questions and provoke the audience to consider their own ideologies of art.

The Piece in Question:

The painting is white; its dimensions are four feet by five feet. There are three diagonal markings on the surface of the painting. The simplicity of the piece, proposed by Reza, allows the audience to focus on the basic questions of art. We are asked not to look at

whether the artist chose the right color combinations, for there are none. We are not asked to judge its subject matter, for there is no specific content. We are however asked to focus deeper on the ideas of what is art. We are asked to dissect the piece into the very basic building blocks of art. The piece was bought for two hundred thousand francs. This forces the audience to either consider the competence of the buyer or to attempt to discover what makes art worth any thing.

Let us assume that the buyer, Serge, is competent. What then makes the work of art worth two hundred thousand francs? One can readily dismiss that it is the paint, canvas, and stretcher that give the piece its extreme value.

If it is not the materials that make the piece so valuable then what might drive the price. Yvan poses questions about the artist and whether or not he is fashionable. The artist, by Serge's standards, is well known in the art world. However, neither Marc nor Yvan have heard of the artist, Antrios. This then becomes a subjective point to determining the painting's value. Due to no further information and conflicting views, we must look outside of this to determine the piece's value.

"Well, for me, he is a god! You don't think I would have forked out a fortune for a mere mortal!" (Reza 25).

This arises several other questions. Is this play about a love for an artist? A love that is so strong that an individual would spend more than they make in a year just to have a token of that person. This seems to be quite an unsupported idea. Perhaps, by mentioning the above line, the idea was meant to be a subtly. To proceed, though, let us dismiss this subtle idea. Reza does not allude the infatuation in any other lines of the play. What this line does do, I to ask the audience to consider the type of relation or connection that the artist and the viewer have. When an artist creates a piece is there a forced connection between the observer and the artist. Good or bad, there is some sort of undeniable assertion being created. 'Art,' seems to suggest that the stronger the connection, the higher the value of the piece.

The Characters:

The characters of this play have their attributes which provide the play with intense levels of emotion. Reza has carefully developed the characters so as to show the emotion ties between art and the observer. She has shown that art can be considered as personal of a choice as choosing a fiancé or a life style. Reza uses the whole play to develop all the intricacies of the characters.

The audience is first introduced to Marc. Marc is an aeronautical engineer. He has a classical training in art appreciation. He is very set in his ways about life and especially art. His complacent views bring with it much anger and pretentious comments. Marc is very outspoken.
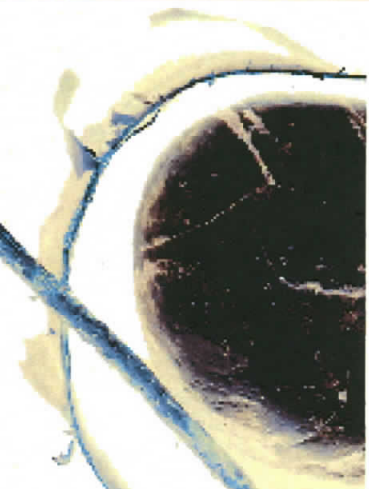
Serge is the buyer of the art piece. He is a dermatologist. His art training is that of the modern beliefs. He is slightly less assertive about his beliefs. He is even slightly sympathetic to out side opinions, assuming they are not a narrow minded view.

"He doesn't like the painting. Fine… But there was no warmth in the way he reacted. No attempt. No when he dismissed it out of hand. Just that vile pretentious laugh. A real known all laugh. I hated that laugh" (Reza 4).

- Yvan is a stationary salesman. He has fallen into a mundane ritualistic life style. He has settled on a fiancé. He is referred to as being an 'ameba' by his friends. He is depicted as being an easily influenced individual. Reza also sets him up to be a mediator between the Serge and Marc.

The Stage

Stage is simple. It is sterile. It is designed as to not detract from the hanging art. Reza makes a wonderful choice by not allowing her stage to take away from the meaning of the play. I believe Reza does this to get the audience not to focus on the play as being the work of art. The audience is to focus so strongly on the ideas the white painting brings forth and dismiss the acting and set design of the play. A similar approach is done by architects. As they design art galleries, they must develop the spaces to be beautiful and yet sterile. The art gallery must not become more important than the art which is contained internally. Reza has successfully adapted this approach.

The Interactions

The social interactions Reza proposes are made very believable. As the friends inter act emotions increase in intensity. It is unclear where this increase of emotions may come. The interactions seem to suggest possible underlying hidden feelings toward each of the friends. Reza has possibly hidden the complexity of social interactions with in a play about art. She may be using the painting as vehicle to bring these emotions to the surface. I think, however, that the play entitled 'Art' truly is about art. The ideas and strong feelings of art merely provoke defense mechanisms with in each of the characters. Reza allows these emotions to come forth to show how passionate art is or should be

considered. These three friends, of fifteen years, are driven apart by a single work of art. A painting demonstrates such strong, emotive beliefs, that years of friendship bonds are broken.

The play, 'Art,' is a strong entertaining piece. It brings to the surface many questions of what art is.

Three characters, one stage, one simple piece of art. Yasmina Reza has eloquently brought to the audience a barrage of questions. These are questions that the audience may share with the philosophers of the ages. These questions lead to more questions which begin to form a web of ideas to what art is. Perhaps, the only way to capture this elusive answer is to continually pose questions. What is Art?
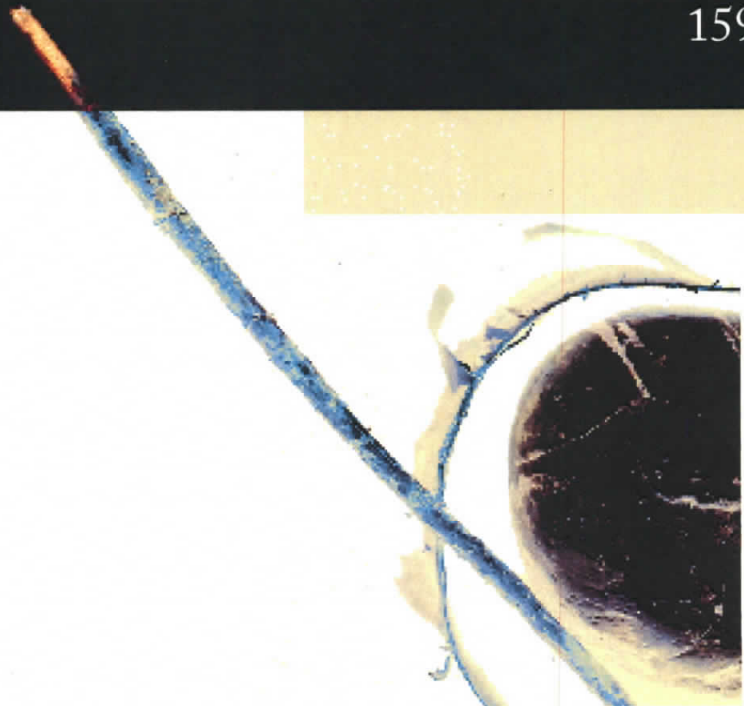
AUTHOR: NEAL ZEREN
TITLE: THOUGHTS OF ART

"It is improbable that more nonsense has been written about aesthetics than about anything else: the literature of the subject is not large enough for that. It is certain, however, that about no subject with which I am acquainted has so little been said that is at all to the purpose" (Bell 73). This statement by Clive Bell, in all of its whimsical tones, seems to be very true. Aesthetical definitions and hypothesizes seem to be as diverse as the art which they are directed toward. One philosopher may cling to the purely emotive responses art gives the viewer. Where as, another may say it is only formal qualities of art that the viewer may comment upon. I must argue, though, that all is not lost. It seems the more theories of art that come together, the closer society comes to understanding it. We as a society may not come to an agreement to what particular pieces of art are more aesthetically pleasing than another. It does seem that we can agree on certain properties of aesthetical judgment. I would choose three different philosophers of aesthetic judgment to understand the diversity of philosophies toward art. We shall see, though, there are certain similarities between there judgments. The three essays to be critiqued are "Aesthetic Concepts," "Art as the Communication of Feeling," and "Art as Significant Form."

160
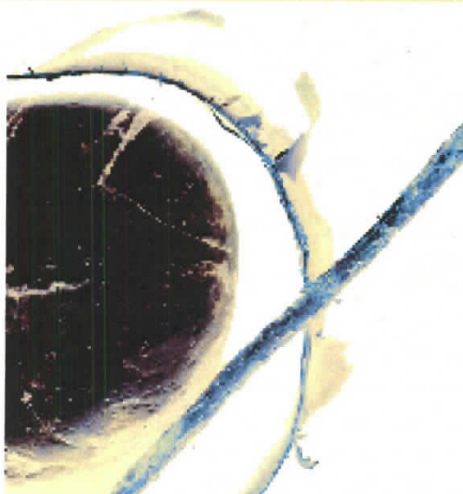
The first of the three essays was written by Frank Sibley. His essay of, "Aesthetic Concepts," is just that. Sibley takes a critical approach to defining aesthetics. He uses his essay to mainly focus on the terminology that surrounds aesthetical judgment. This critical approach is a strong approach to discussing aesthetics. By structuring a common language of aesthetics, there is then a framework where different opinions of aesthetical judgment may meet on a similar plain. Sibley attempts to give, what Bell would describe as, "nonsense," some order. This seems the most practical way in to attempting to define what aesthetics is.

Any type of established language allows the sharing of information and ideas between individuals. The language could be Spanish, binary, or science. One allows those of Spain to freely share ideas. Binary allows the computers of the world to freely share information. The users of the computers use this binary language to share their ideas. Science, at times, even transcends both of these languages. Yet, the concept is still the same. Language is an interface connecting those of different backgrounds and beliefs. Sibley has chosen to define terms that allow this interaction. To formally assess what Sibley has done, one may say that he has taken an intellectual approach to defining aesthetics.

The second essay is written by Leo Tolstoy. He seems to focus mostly on the emotive aspects of aesthetics. He comments on how art is similar to language in connecting humanity. "Speech, transmitting the thoughts and experiences of men, serves as a means of union among them, and art acts in a similar way" (Tolstoy 57). The connection, however, he describes, is that of an emotive one. His essay lays out how art is the vehicle, much like words, that one man uses to share an expression of feeling.

Later in his essay, he describes a certain religious perception of art. He chooses to use the religion of the time to judge the aesthetic value of art. This seems to be a slightly week argument. I do not mean this in the sense of attacking the structure of his argument, rather, he seems to neglect a crucial element. When using the religion of a society to judge the aesthetic quality of art, one neglects the creating of art for a society that does not exist yet. Perhaps the concepts

and ideas of the art are not meant for this time period. One must not neglect the potentiality of the art. If one were use this in the reverse order, to aesthetically judge art of the past. We would not be able to use our own morals or beliefs to judge the piece. We would have to know and fully understand the religion of the time, to make an educated assessment of the piece.

Clive Bell's essay of, "Art as Significant Form," seems to be a synthesis of the above theories. I do not pretend to know whether Bell did synthesize his paper from reading these two writings. Nor do I imply that his writing style suggests this. I do, however, make my own hypothesis of their relations. Clive Bell says that there must be two
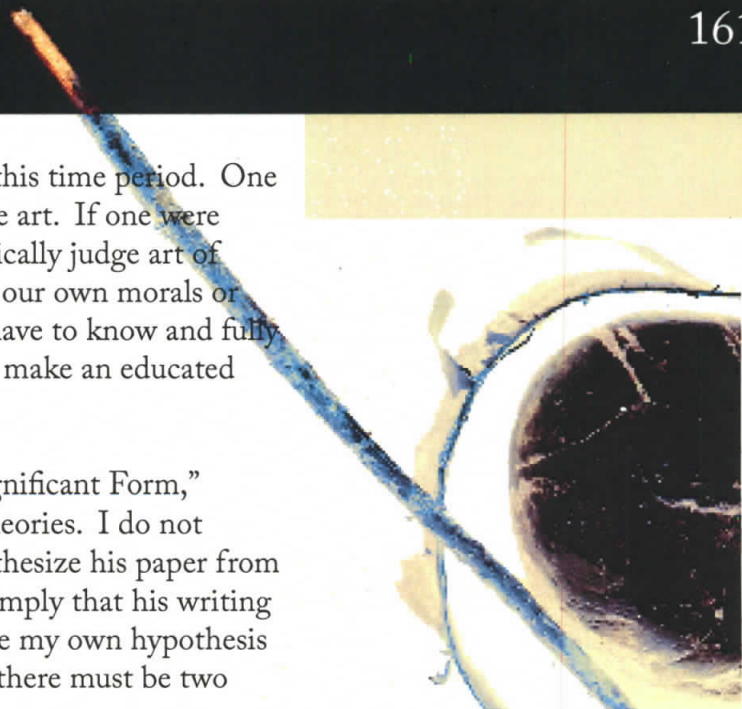
elements present to put forth aesthetic judgments. In his essay, he says one must posses both that of a 'robust' intellect as well as a 'delicate' sensibility. He argues that to make a true aesthetic statement the critique must posses both attributes. It would seem that Bell sees the importance of Sibley's language as well as Tolstoy's emotive responses.

All three philosophies of art lead us closer to understanding aesthetical judgment. As our awareness of aesthetical language, ideas, and concepts; grow perhaps we one day may understand what it is to create and view art. Until that sort of unity exists, we can share aesthetical ideas through a common language established by these as well as other philosophers.
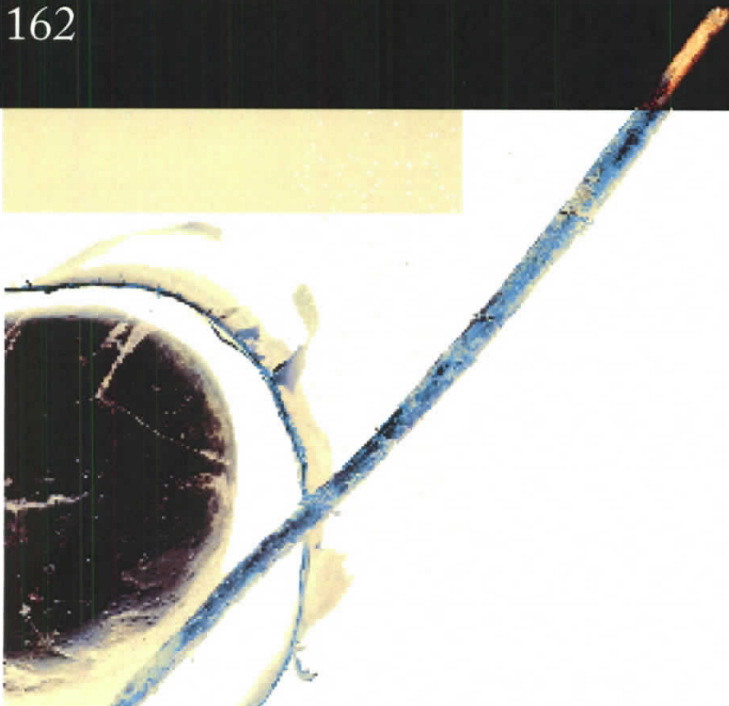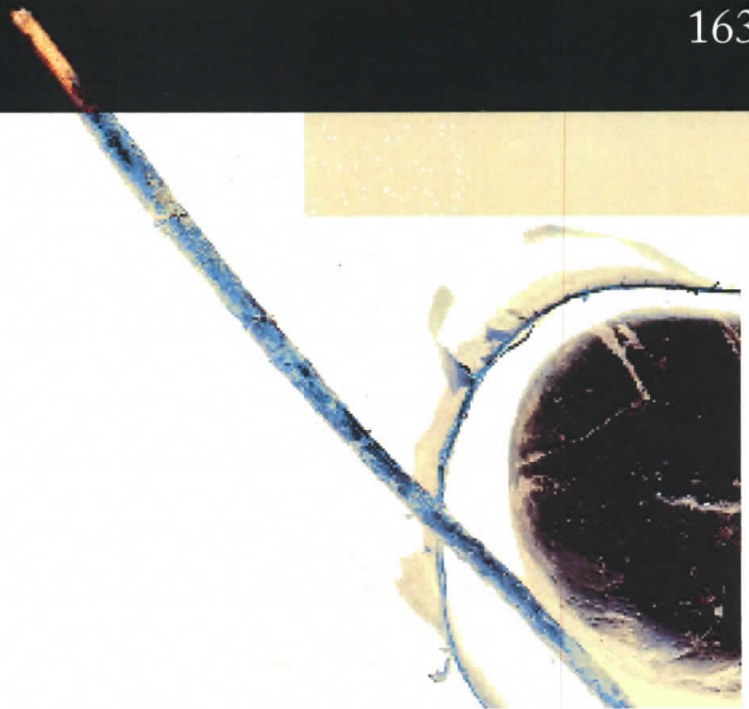
The Hannover Principles

Design for Sustainability
Prepared for EXPO 2000
The World's Fair
Hannover, Germany
William McDonough & Partners
410 East Water Street
Charlottesville, VA 22902
tel 804 979 1111
fax 804 979 1112
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TABLE OF CONTENTS

166

INTRODUCTION

The City of Hannover, Germany, has been designated as the site of the world exposition in the year 2000. Hosting the world's fair on the eve of the next millennium is both a great challenge and a great responsibility. By choosing "Humanity, Nature, and Technology" as the theme for EXPO 2000, the city has decided to directly address the difficult issue of imagining and encouraging a sustainable future. Ideally, humanity will redefine itself, its placement in nature, and refine the role of technology within the environment. In order to insure that the design and construction related to the fair will represent sustainable development for the city, region, and world, the City of Hannover has commissioned "The Hannover Principles" to inform the international design competitions for EXPO 2000. The Principles are to be considered by designers, planners, government officials and all involved in setting priorities for the built environment. They will help form the foundations of a new design philosophy underlying the future of proposed systems and construction for the City, its region, its global neighbors and partners in the world exposition. World history offers many examples of societies with environmentally sustainable structures and communities which have endured for thousands of years. However, we have also pursued other paths which have led to ecologically unsustainable practices. For the development and improvement of humankind, it is imperative to renew a commitment to living as part of the earth by understanding development and growth as processes which can be sustained, not exploited to impractical limits. It is hoped that the Hannover Principles will inspire an approach to design which may meet the needs and aspirations of the present without compromising the ability of the planet to sustain an equally supportive future.
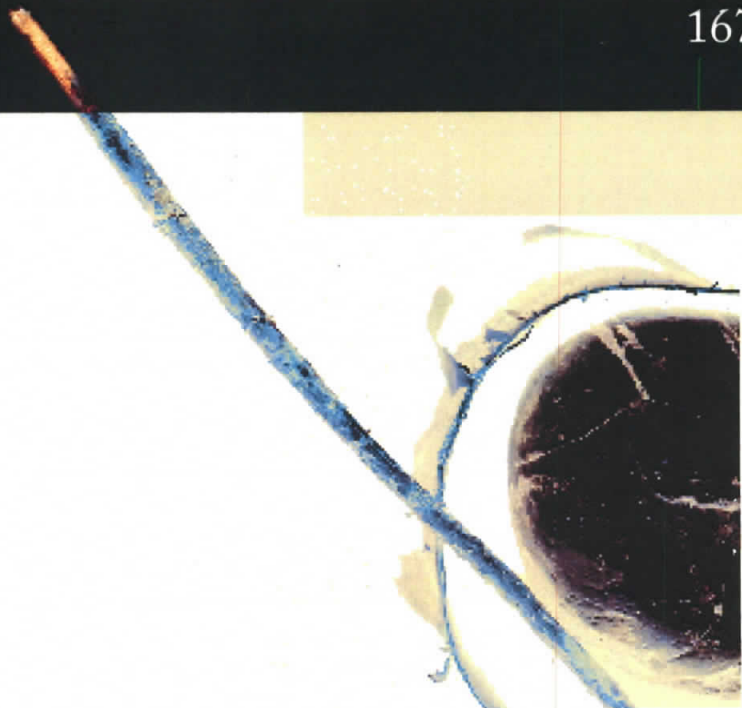
DEFINITIONS

Sustainability:

The concept of sustainability has been introduced to combine concern for the well-being of the planet with continued growth and human development. Though there is much debate as to what the word actually suggests, we can put forth the definition offered by the World Commission on Environment and Development: "Meeting the needs of the present without compromising the ability of future generations to meet their own needs." In its original context, this definition was stated solely from the human point of view. In order to embrace the idea of a global ecology with intrinsic value, the meaning must be expanded to allow a l l parts of nature to meet their own needs now and in the future.

Design:

The Hannover Principles aim to provide a platform upon which designers can consider how to adapt their work toward sustainable ends. Designers include all those who change the environment with the inspiration of human creativity. Design implies the conception and realization of human needs and desires.

Design for Sustainability:

Designing for sustainability requires awareness of the full short and long-term consequences of any transformation of the environment. Sustainable design is the conception and realization of environmentally sensitive and responsible expression as a part of the evolving matrix of nature.

PROLOGUE

Human society needs to aspire to an integration of its material, spiritual and ecological elements. Current technologies, processes and means tend to separate these facets rather than connect them. Nature uses the sun's energy to create interdependent systems in which complexity and diversity imply sustainability. In contrast, industrialized society extracts energy for systems designed to reduce natural

complexity. The challenge for humanity is to develop human design processes which enable us to remain in the natural context. Almost every phase of the design, manufacturing, and construction processes requires reconsideration. Linear systems of thought, or short-term programs which justify ignorant, indifferent, or arrogant means are not farsighted enough to serve the future of the interaction between humanity and nature. We must employ both current knowledge and ancient wisdom in our efforts to conceive and realize the physical transformation, care and maintenance of the Earth.

In this spirit the Hannover Principles have been assembled, after extensive consultation with representatives from the design, environmental, and philosophical communities. It is hoped that, i f accepted, they will evolve to adapt to the concerns of different cultures and countries across the globe, so that all may find a way to endure and build into the future without compromising the future's ability to meet its own challenges.

THE HANNOVER PRINCIPLES

1. Insist on rights of humanity and nature to co-exist in a healthy, supportive, diverse and sustainable condition.

2. Recognize interdependence. The elements of human design interact with and depend upon the natural world, with broad and diverse implications at every scale. Expand design considerations to recognizing even distant effects.

3. Respect relationships between spirit and matter. Consider all aspects of human settlement including community, dwelling, industry and trade in terms of existing and evolving connections between spiritual and material consciousness.

4. Accept responsibility for the consequences of design decisions upon human well-being, the viability of natural systems and their right to co-exist.

5. Create safe objects of long-term value. Do not burden future generations with requirements for maintenance or vigilant administration of potential danger due to the careless creation of products, processes or standards.
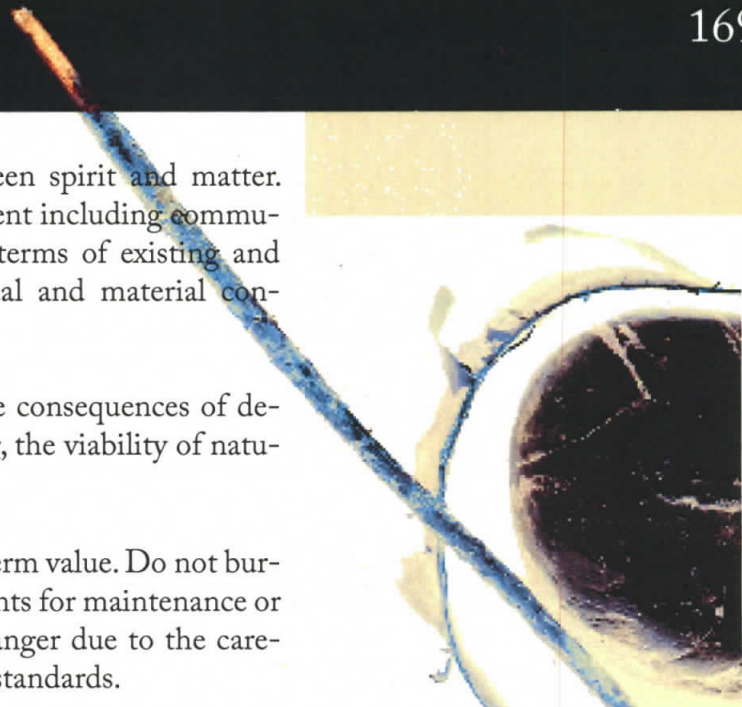
6. Eliminate the concept of waste. Evaluate and optimize the full life-cycle of products and processes, to approach the state of natural systems, in which there is no waste.

7. Rely on natural energy flows. Human designs should, like the living world, derive their creative forces from perpetual solar income. Incorporate this energy efficiently and safely for responsible use.

8. Understand the limitations of design. No human creation lasts forever and design does not solve a 1 1 problems. Those who create and plan should practice humility in the face of nature. Treat nature as a model and mentor, not as an inconvenience to be evaded or controlled.

9. Seek constant improvement by the sharing of knowledge. Encourage direct and open communication between colleagues, patrons, manufacturers and users to link long term sustainable considerations with ethical responsibility, and re-establish the integral relationship between natural processes and human activity.

The Hannover Principles should be seen as a living document committed to the transformation and growth in the understanding of our interdependence with nature, so that they may adapt as our knowledge of the world evolves.
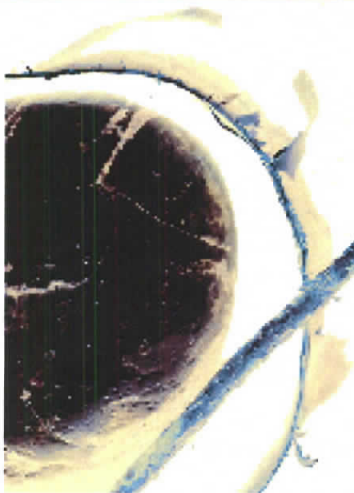
GUIDELINES

The Hannover Principles are a set of maxims that encourage the design professions to take sustainability into consideration. They are descriptive of a way of thinking, not prescriptions or requirements. The guidelines below demonstrate the City of Hannover's intention to apply these principles as elements of the overall design competitions associated with EXPO 2000. They take the form of a framework, based on the enduring elements of Earth, Air, Fire, Water, and Spirit, in which design decisions may be reviewed and evaluated. The guidelines offer critical instruction on the responsibility of designers.

It is hoped that those who enter the competitions will bring to their task uncommon ability, skill and care, assuring that their creative acts will be able to blend aesthetic concerns with ecological principles and provide a new inspiration for the challenge of design. In this way, design becomes a didactic tool to demonstrate that sustainable thinking can be put into practice in the real world.

ELEMENTS

The five elements provided a structure for the ancient world. The world can still be perceived along these lines, and they are presented here as an outline to frame the primary concerns of the environmental program for the EXPO site.

Earth. In design, the earth is both the context and the material. For the EXPO site a balance must be struck between context and material which provides a meaningful and livable diversity of scale. A full range of experience from the "urban" to the "wild" is essential to the landscape within which human culture evolves.

Design solutions should benefit flora and fauna as much as humans, upon the notion that natural processes take care of themselves best when left alone. The overall sense of community, linking humanity and nature, should be enhanced. A premium value should be placed on unbuilt space, particularly existing undeveloped lands. Re-use and expansion of the existing fabric may offer alternatives to new construction that will preserve the natural landscape. New construction,

when necessary, should be seen as an extension of the present built fabric, not as independent, self-contained development. Building materials need to be considered for their broadest range of effects, from emotive to practical, within a global and local context. Local production should be stressed, along with approaches that emphasize the regional, cultural, and historical uniqueness of the place. Designers should consider the interaction and implementation of diverse materials within local climate and culture in a meaningful and productive way. They are encouraged to consider the use of indigenous materials and the practical and effective utilization of modern technology, including advanced glazing, energy efficient fixtures and appliances, and non-toxic water treatment systems.

All materials used must be considered in the following terms:

• Buildings should be designed to be flexible enough to accommodate many human purposes, including living, working or craft, allowing the materials to remain in place while serving different needs. After the EXPO, the use of the site will change. Design should include alternatives for how the site can be adapted to post-fair requirements.

• Materials should be considered in light of their sustainability; their process of extraction, manufacture, transformation and degradation through proper resource management and biodiversity on a global and local scale. All materials should be considered in terms of their embodied energy and characteristics of toxicity, potential off-gassing, finish and maintenance requirements.

• Products used shall not be tested on animals.

• Recycling of materials is essential. But recycled materials should not be encouraged if they are the result of a product designed for disposability. Provision should be made for the disassembly and re-use of all products by the manufacturer if necessary. The reuse of entire structures must be considered in the event that building fails to be adaptable to future human needs.

• Materials should be chosen to minimize hazardous chemicals.
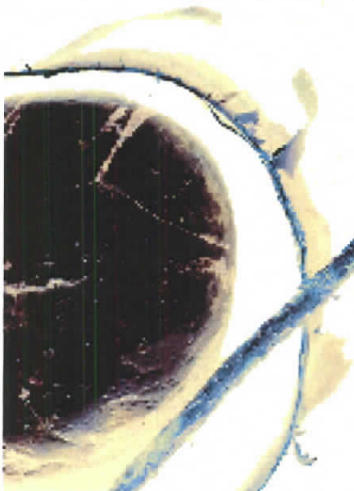
• Solid waste left after maximal avoidance must be dealt with in a non-toxic manner. In nature, waste equals food. The aim is to eliminate any waste which cannot be shown to be part of a naturally sustainable cycle.

• Life-cycle analysis of all materials and processes is important. (Life-cycle assessment is a process in which the energy use and environmental impact of the entire life cycle of the product, process, or activity is catalogued and analyzed, encompassing extraction and processing of raw materials, manufacturing, transportation and maintenance, recycling, and return to the environment.

• The design should qualify the environmental and economic costs such that the benefit of the project in relation to expense is understood in both the short and long terms. Air. The air is the element whose degradation we can sense most immediately. When the air is bad, all can feel it. Local atmospheric pollution may have felt global consequences, so the overall design must not contribute to further atmospheric denigration of any kind. Designs must be evaluated in terms of their atmospheric effects, including those on ozone depletion and global warming. Alteration of the micro-climate is equally significant. Any possibility for the design to counter-balance or contribute to remediation of existing environmental damage should be explored.

• Air pollution implications of all design systems will be considered in the evaluation of designs. General air quality issues should also be considered to insure that no off-site or on-site air pollution results from the design.

• Wind patterns in all seasons should be evaluated for both detrimental and beneficial effects on site configuration.

• Noise pollution should be accounted for and minimized.

• Building design must accommodate ventilation systems suitable to the issues of air quality. This may involve strategies which show concern for dangerous outdoor air conditions as well as efficient indoor air exchange.

• Natural ventilation patterns must be considered at every scale from the urban to the domestic as an alternative to artificial climate control.

• The health effects from indoor air quality problems must be considered during the design process. Fire. Fire is the most dramatic symbol of the human ability to harness natural energy. Energy is required to achieve comfort and convenience and to transform materials to useful effect. Designers are encouraged to instill their designs with the ability to operate based on on-site renewable energy sources, insofar as is possible, without reliance on fossil fuels or remote electrical generation. It is possible, given technologies and materials available today, to create buildings which maintain

comfort levels passively without fossil fuels. This should be considered a minimum condition of energy design.

• The design should be aware of its interaction with renewable natural energy flows. Solar energy should be evaluated in terms of its efficiency and its enjoyment by inhabitants and visitors throughout the annual cycle. This implies an understanding of solar access and care for proper screening and shading techniques.

• Possibilities for on-site energy production must be considered, and accommodations should be incorporated into design.

• Buildings should, wherever possible, be net exporters of energy.

• Water heating shall be from renewable resources and be efficiently incorporated into the design.

• Transportation requirements will be considered in terms of their impact on overall energy consumption. Pedestrians and bicyclists should have priority. Mass transit should be efficient and available, and private automobile use should be discouraged. Allowances for automobiles should be carefully considered for their present and future implications with regard to energy use, urban planning and social effect. Auto services should anticipate alternative fuel strategies.
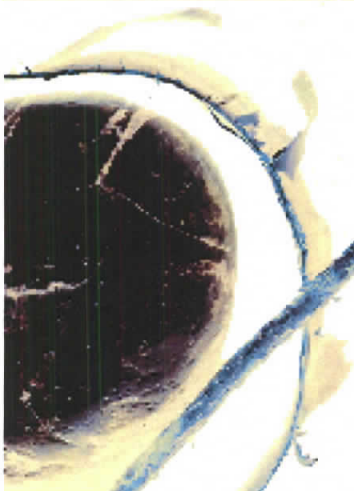
• The relationship of the design and the power grid should be considered. Minimum impact on energy demand from the grid is a goal, as well as the value of decentralized energy sources.

• The energy "embodied" in the building materials can have a significant impact on the energy consumption of the project. Embodied energy refers to all the energy necessary to extract, refine, transform and utilize the materials. Water. Water is the most basic element of life on the planet— it will be celebrated as a fundamental life-giving resource. Opportunities to create understanding and enjoyment of water will be encouraged throughout the design of buildings, nfrastructure and landscapes. Elements which celebrate the

profound value of this resource on both material and spiritual levels deserve serious consideration. Designs will recognize the communal, cultural, historical, spiritual and poetic possibilities of the use of water and its central role as a precondition for life.

• Water use must be carefully accounted for throughout the entire design process.

• Water sources must be protected from contamination and careful consideration given to efficiency techniques at every step.

• Potable water consumption should only be used for life-sustaining functions.

• Water from aquifers, rain water, surface run-off water, gray water, and any water use for sewage transport or processing systems should all be considered within a cyclical concept.

• Waste water must be returned to the earth in a beneficial manner. Organic treatment systems should be considered.

• No ground water contamination should result from any use of water resources related to the construction or operation of any of the project's facilities.

• Design shall consider rainwater and surface run-off water as a possible resource for inhabitants and in building systems.

• Design should minimize impermeable ground cover.

• Gray water can be treated and applied to practical or natural purposes suitable to its characteristics.

• Water use in any process related activity shall be put back into circulation, and toxic chemicals or heavy metals should be minimized. All discharges of process-related water shall meet drinking water standards.
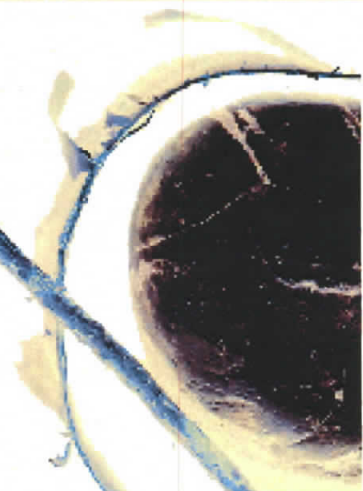
• Water, if used for sewage treatment or transportation, shall be restored to drinking water standards prior to distribution or re-use. Spirit. This most ineffable of elements is also the most human. Concern for sustainability is more than a matter of compliance with industrial regulation or environmental impact analysis. It embraces a commitment to conceive of the work of design as part of a wider context in time and place. The design for EXPO 2000 must embody the form of the theme "Humanity, Nature and Technology," illustrating and fostering the sense of place essential to any human experience of the meaning of sustainability. To present the message of the value of all life and the rightful human place as a part of this, people must be able to experience the feeling of belonging to the earth firsthand. Living in sustainable architecture is nothing less than an appeal to accept our place in the world, mediated between human and natural purposes.

The presence of the element of spirit ensures that design will be seen as only part of the solution, never the whole. Building on the principle of humility, the design philosophy here should realize its inherent limitations in trying to plan and direct both human and natural processes. Design may encourage a sense of permanence and community, but it cannot legislate it. Similarly, no assumed laws of nature can be the only criteria for evaluating a design. The solution must present an aesthetic statement which sets up human society as a conduit toward the further understanding of nature, not as an affront or an enemy to it.
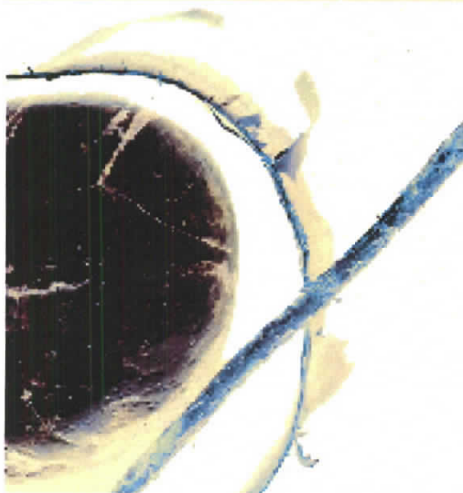
One of the most prevalent arguments against holding EXPO 2000 in Hannover is the fear that the impact of the expected 50 million visitors might degrade the city and its environs. At the same time, i t is essential that the principles of sustainability to which Hannover has committed itself could be articulated in such a way that they reach some of the billions of the earth's inhabitants who will have no opportunity to reach the site at all. Therefore, designers are encouraged to consider approaches to decentralizing the fair, such that the plan could incorporate pavilions or centers in other countries, scattered across the globe, that might be linked by electronic means such as "tele-presence" communications technology. It may then be possible for the wisdom of thousands of encouraged "sustainable" solutions and examples to be shared and enjoyed among the world's people

in a "sustainable world's fair". The philosophy behind these guidelines is to point those who partake in EXPO 2000 in the direction of greater concern and conception of the enduring human place in nature.

The Hannover Principles / Design for Sustainability
DESIGNING THE COMPETITION

Designing for Sustainability implies an ecological method whose composite fabric has implications and opportunities for the structuring of the competition rules and regulations. We propose that a spirit of cooperation and interconnectedness that personifies the Hannover Principles of Design guide the design of the competition as well. We suggest that the competition be phased in three steps:

Phase 1: A symposium comprised of all competitors and a committee of international advisors to review the idea of sustainable design and to share information. The Hannover Principles will be presented, debated and expanded there.

Phase 2: An independent design development competition based on the criteria contained herein, and the results of the symposium in Phase 1. After Phase 2 the jury would select three proposals, which would be further developed in Phase 3.

Phase 3: Ecological success depends in the end on cooperation, not competition. So we

envision the last   step to be a collaborative, cross-disciplinary effort by the three winners, the Planungsberrat of the City of Hannover, and committee of international advisors, to produce a workable, appropriate design in which none of the principles are compromised.

This strategy will result in an interdependent, democratic process to build on the diversity of solutions. This will achieve a plurality of ideas and visions which truly must work together to offer a model of realistic sustainable design for the 21st century. But in sustainable terms, a century is quite a short time. In the year 2000, one ends, and another begins. More significant is the possibility that an ethos for design may begin to evolve enabling human settlements to endure throughout the next millennium, or even longer.
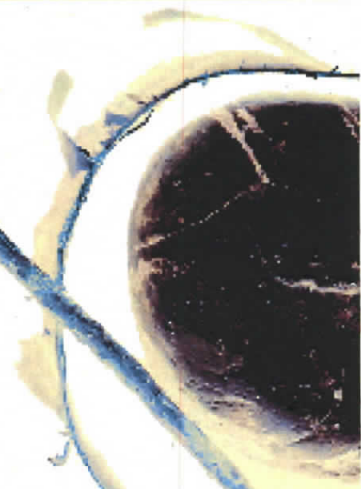
The Hannover Principles
Design for Sustainability

Part II:

BACKGROUND MATERIAL

This background material is intended to supplement the principles and guidelines set up to frame the issues to be considered in the fulfillment of the design program for EXPO 2000 in Hannover. Because of the ecological imperative associated with the event and its long-term goals, it is important that the design criteria not be seen as a checklist .

What follows is intended to be a discourse of inspiration, an essay of clues, to encourage creative responses to the suggested program. It is not meant as a historical or critical analysis of the thinking alluded to, but a suggestion of potential sources. No one knows the right answers to the challenge of sustainability as of yet. Here we present the reasons the sustainable vision is essential, and some tools to begin to shape it.

It is important from the outset to question the very project itself. Does the world need yet another world's fair? The strongest argument against EXPO 2000 from the point of view of the environmentally conscious public is: who needs it? What kind of arrogant display of hu-

man invention and knowledge could be necessary in a world with so many pressing ecological and social problems? And in a nation with so much rebuilding to do, how could such pageantry be justified?
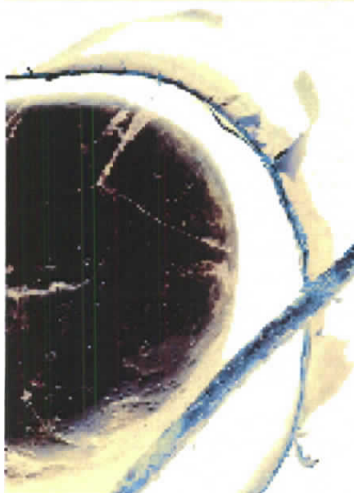
EXPO 200 could be an opportunity to define goals as we attempt change the way we live and relate to the earth. We recommend that EXPO 2000 be built only if it is courageous enough to address the world's problems, concentrating on the ecological links between local and global issues. Every piece of material used in the construction should have a sustainable origin, and this should be documented so visitors can understand how many countries and geographically disparate industries are represented. The presence of the di-

verse cultures of the world should be ensured, but with a serious attempt to avoid the mistakes so prevalent in previous fairs, despite their good intentions. The problems as well as the promises of each culture need to be presented to educate visitors as to the interconnected issues of the global situation. This could be manifest in an allegorical design which mirrors the world situation according to various models: Haves/have-nots, North/South, developed/developing, indigenous/colonial. But whatever part of the human and natural world is presented, it should be done in an inviting, not an alienating manner. Any evaluation will require an assessment of the successes and failures of previous world expositions.

SUMMARY OF BACKGROUND MATERIAL

• EXPO 2000 as an idea is facing a lot of public criticism. To convince the public, it needs to be an event that depicts a worthy cause. That cause should be environmentally sound and sustainable development.

• The challenge of a world eco-exposition is a serious one. There exists no road map to produce it. The document we have produced has been carefully assembled to encourage a new way of thinking about very pressing problems. History and philosophy are necessary to frame the situation with insights of the past.

• Most discussion of environmental aspects of the exposition address human needs, and then natural needs. We believe that these two sides of the question are inseparable from one another. A whole new kind of philosophy on our connection to the surrounding world needs to be established to break through the barrier of dualistic thinking.

DECENTRALIZATION OF EXPO 2000

I. What Ever Happened to the Future? Learning from Previous World's Fairs
• Every previous world's fair has tried to be an optimistic vision of the solutions of the future. Each of them tended to fail because of their unwillingness to consider the
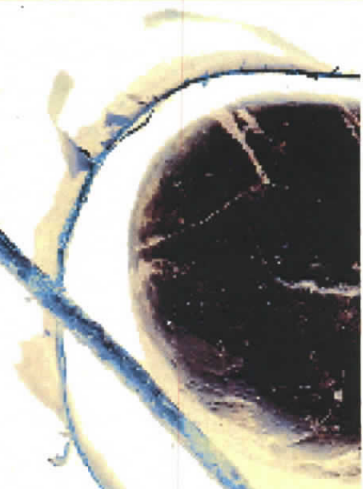
problems of their time. The changing troubles of the twentieth century world were veiled over by cleansed, shiny dreams of a world made better with new technology.

• EXPO 2000 must be different, because it will specifically address the ecological problems of our time, and teach the world by example what can be done about them.

II. EXPO 2000 as Global Village

• Here we propose the possibility that EXPO 2000 might be decentralized around the world, so that people may participate in the project without needing to bring too many millions of people to Hannover. This makes sense on ecological grounds as well as informative ones, as it will bring the message of sustainability to as many people as possible.

• The case of transportation is discussed as a specific example of how decentralized thinking may be applied to EXPO 2000.

THE MEANING OF SUSTAINABILITY

III. Sustainability Explored
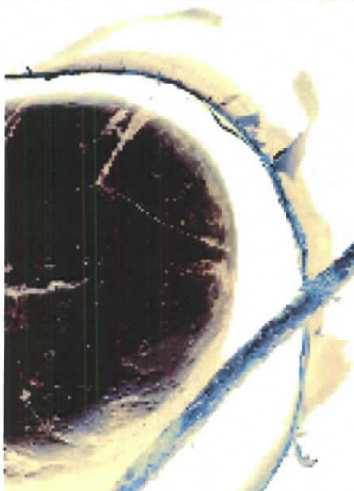
• Sustainable development is a tentative concept that has not been defined very well. The best examples of it come from simpler societies, with cities and towns designed so they fit into the landscape, using the natural flows of energy.

• But no simple return to vernacular architecture can help us now. We know too much about the global and interconnected aspects of the world's problems. Any local land use plan will have global implications, and these need to be investigated.

IV. From the Urban to the Wild

• Many attempts at designing new towns and landscapes have tried to plan for a range of scale from dense structures to the wilderness.

• Many have failed because they tried to implement specific solutions based on principles too distant from experience.

• Ecological realities like waste management and solar energy opportunities must be integrated into the EXPO site, not tacked on to a separate aesthetically motivated plan.

• A new type of thinking about design is necessary to expand scientific industrial thinking to include the idea of the living machine.

V. Life-Cycle Analysis: the Quantification of Environmental Responsibility

• Life-cycle analysis in design implies the study of the entire cycle of material to construction to adaptation or recycling of structures which will be built.

• Usually this information is considered part of environmental impact analysis, but we want it to be an intrinsic part of the design. Quality of life needs to be implied in the design itself, not legislated by a list of rules.

HISTORICAL AND PHILOSOPHICAL ROOTS

VI. The Evolution of the Industrial Age — What Went Wrong?

• The rise of industrialism brought a society built on the extraction of energy from nature. The ecological society will consider energy use as part of nature, eliminating the concept of waste. The idea of returning design to nature is not a new one. But nature cannot be fixed by our statistics; it remains unquantifiable. Nor can we reduce it to stereotypes of balance or harmony.
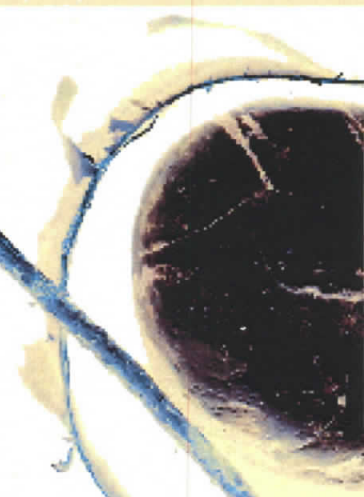
VII. Rights and Responsibility

• Human rights have been expanded into natural rights in ecological thinking. We need to design for the needs of all species, not just our own needs.

• Ecological thinking has a social and a philosophical side. The social approach looks for roots of the problems in social structures, and the philosophical approach looks for these roots in the way we think about the world. Both approaches need to be considered by the designer, in understanding the competition and in delivering a solution.

• Responsibility for the ecological situation means that we need to be able to gauge the effects of a design far into the future.

VIII. Humility in Design

• The built fabric of our world tends to alienate people from nature. It simultaneously encourages us to imagine that we comprehend systems more complex than we can ever know.

• When our designs affect the natural world, we must be humble enough to acknowledge the unknown.

• We gauge the success of a design by the experience of it through time. It cannot be judged against a pre-existing checklist of criteria.
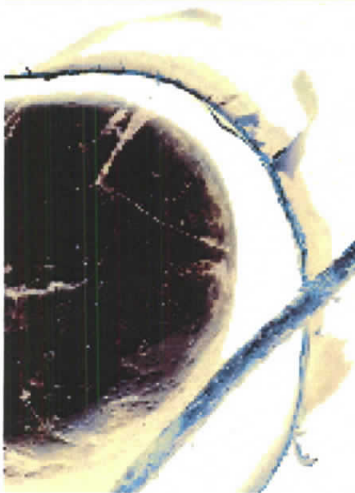
IX. Cooperation as Excellence

• There should be no single winner to the competition. We advocated a diverse group of designers who can offer a stronger combination of diverse kinds of expertise than any one person.

• Previous world's fair projects are discussed as positive examples of solutions that evolved through cooperative working relationships.

• The sustainable imperative demands that designers work together in a spirit of affirmation and optimistic support.

DECENTRALIZATION OF EXPO 2000

I. What Ever Happened to the Future? Learning from Previous World's Fairs For the EXPO 2000 we need structures whose conceptual use will endure as much as the built fabric. Think of the reminders of world's fairs past... what is left of them. The Eiffel Tower is perhaps the best example, as it is the surviving centerpiece of the exposition of 1889. Though once considered an eyesore, it has now become the emblem for an entire nation. Harmonizing beauty with the promise of engineering, it was for its time the world's tallest building. It is doubtful today that we need to prove this kind of point with the fair of the century's end, but creating an emblem for the site and the moment could be an important part of the solution.

It has not worked this way for all such fairs. Little is left of the great Columbian Exposition of 1893, and the one surviving monument of New York's 1939 World's Fair is a hollow aluminum globe, left to corrode as the remnant of a site which has faded into public obscurity. To be considered sustainable a fair must become a community, merging with the surrounding land- and city-scape once its celebratory role is reduced. The Disneyland effect is a direction to be avoided here. EXPO 2000 should not become a theme-park for the sensitive promises of tomorrow — it should prove the value of the sustainable path by trying to put this into practice. Yet how is this different from, say, the world's fair of 1939, which had as its theme "The World of Tomorrow"? This celebration introduced television, home air conditioning, the fluorescent light, and the promise of

leisure, which only World War II put at bay. "It is important to remember," said the narrator at the exhibit on the future of the automobile, "that the people of 1960 will have more time, more energy, and more tools to have fun." Now we know firsthand the liberation and destruction the car has wrought on modern civilization. The future from the perspective of the year 2000 should embrace criticism as well as promise.

In 1939 the most popular exhibit was Futurama, built by General Motors as a model of a future city based on the ideas of Le Corbusier, with a city center at the intersection of two highways symmetrically surrounded by skyscrapers. Another model was Democracity, a radial plan based on the geometrically precise suggestions of Ebenezer Howard's gar-

den city, where rings of greenbelts alternated with industry and housing out from the city center to the wilds beyond. Each of these images has to some degree been put into practice over the intervening fifty years, but neither has done much to promote any organic sense of place. They remain fantasies or plans, distanced from experience through the minds of their creators.

It must be stressed that putting a model up for display as an ideal tends to separate it from its context and may detract from its exemplary value. Witness "main street USA" at Disneyland, Disneyworld, or Euro-Disney, where something is built that looks like a friendly town, but more resembles a bleak shopping mall hidden behind a quaint facade, where all is for entertainment and consumption, without encompassing the full range of human life which made such a place so significant for those visitors who can remember when towns were more than intersections, more necessary than abstract plans. (One of the only residents of main street USA was Walt Disney himself.) Later, when Disney introduced EPCOT (the Experimental Prototype Community of Tomorrow) in Florida, they sidestepped the challenge of creating a real community. People do not live there, so visitors are seduced by displays of optimistic forward-looking ideas as advertisements for the giant corporations that pay for them.

If EXPO 2000 is to engage in prediction and imagination of how we might live further into the centuries, it should do so by example. That is why the design should aim from the outset to link the key elements of humanity, nature, and technology through the litmus test of sustainability. The kind of world exposition we need now is nothing that blindly co-opts the insights of
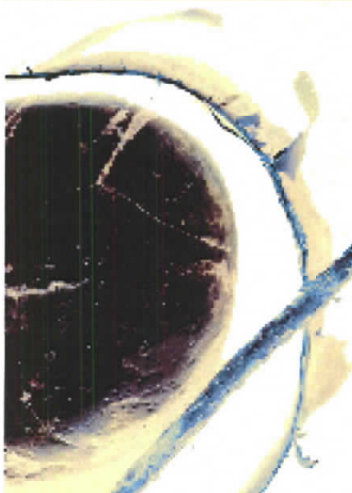
the world's people to suggest that they all agree and are ready to join together into a common future. Diversity of cultures and of solutions to living with nature need to be celebrated, and this means real conflicts need to be addressed. Previous world's fairs have more often tried to simulate harmony while cloaking over dispute. At the Vancouver Expo of 1986, General Motors sponsored something called the "Spirit Lodge," aiming to integrate the voice of native peoples into the fair's stated message of benign and wonderful technology for the coming future. A Kwakwaka'wakw storyteller addresses a giant plastic raven and demands that the wise bird tell him what has gone wrong with the world: "Maybe all the modern changes of the last century are your trickery. Then again, perhaps change is an illusion, thin as smoke. For what has really

changed? Our machines have changed, but our dreams remain the same." The Native American ponders the situation and has a sudden conversion over to the technological worldview: "I took another look at this world's fair and saw that the new science of transportation seeks nothing new. It reaches for the same old dream that my Grandmother knew was good. It reaches for the magic canoe. Each small improvement brings us closer to that day, when we will only have to step Inside, wish where we want to go, take one stroke, and we'll be there. The dream is as real and as old as life. For life and the freedom to move are as one." This facile appropriation of indigenous modes of thinking to justify technological progress is easy to see through. But the important point is that all previous world expositions have imagined that they were presenting encouraging visions of how the world would embrace a wonderful tomorrow. These symbols of world achievement have always been built to bolster our confidence, not educate us as to the seriousness of our problems. To meet these goals, the previous world's fairs have always been full of a lot of lies.

In Hannover in the year 2000, we want to be honest about the prospects of future civilization by creating an exemplary place of possibility. But the harsh realities of our global social and ecological crises should not be ignored or hidden behind the smiling veil of corporate or ideological sponsorship. Even the ideology of "sustainability" must contain criticism of itself and its limitations. This exposition will achieve greatness only if it makes people think, not just gives visitors a giddy feeling of how fascinating the unknown future will be. EXPO 2000 is a cause for education as much as for celebration.

We start from the premise that the last several world's fairs have been failures a t realistically addressing the historical occasions that gave rise to them. Alexander Wilson describes i t well in The Culture of Nature: "It is a failure of imagination. The modernist vision of EPCOT Center and the Canadian EXPO's of 1967 and 1986 discards the history of genuinely utopian initiatives of the world's peoples in favor of an ideology of growth and development. For all the scientific exactitude of these futurist plans, they are incapable of moving beyond a rigid technological determinism. A future of emancipation, on the other hand, can only be reclaimed by a society willing to debate its own survival. This century's world's fairs stand squarely in the way of that debate and condemn us to a recurrent and eternal present."

II. EXPO 2000 as Global Village

There has been some discussion that the very idea of an event involving an expected 50 million people represents an impossible premise for sustainable development. Witness some of the unnecessary building done for the sake of the Olympic games: In Lake Placid, NY, huge stadiums and winter sports arenas have been built for a demand that will never return, unless the winter games are brought back to this tiny town in the midst of the nation's largest wilderness park. What remains is empty overdevelopment, and the city struggles to find ways to attract visitors to fill all the empty hotels and convention centers. Too much was planned and constructed, and the imagined growth in the region simply cannot be sustained. How can Hannover avoid this? There is the possibility of temporary but architecturally significant structures, like those of the Columbian Exposition of 1893. There is also the possibility of adapting existing structures. A third possibility is the conception of a fair which makes use of the virtual realities characteristic of today's global system. Work and life occur not always in person, but across a global network of communication lines. Could a sense of ecological community be based on this electronic web of connections as much as the inherent web of food and energy chains? Certainly Marshall McLuhan thought so. The Canadian communication theorist saw possibilities for a brand new tribalism in the world shown on television and the promise of the computer. In the early 1960s he praised the wide reach and personal touch of the kind of world we now take for granted: "Ours is a brand-new world of all-at-onceness. 'Time' has ceased, 'space' has vanished. We now live in a global village...a simultaneous happening. We are back in acoustic space. We have begun again
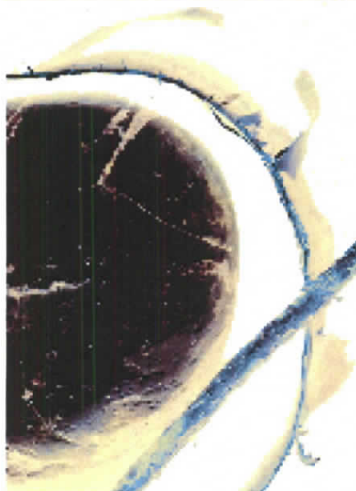
to structure the primordial feeling, the tribal emotions from which a few centuries of literacy divorced us."

These are strong words. They suggest a full-scale historical cycle, in which the best of the past may be recovered with the latest of machines. By accepting electronic technologies as instruments to coax participation out of us, we might constitute a complete human community out of virtual materials and invisible networks. The key is choosing the right tools, or perhaps more accurately, finding the right side of our tools — the side which invites us into new encounters by remaining ambiguous, as opposed to the other side which overburdens us with a fountain of information and precision beyond our ability to assimilate.

Those who work on electronic networks, to say nothing of business by telephone, understand how entire cycles of work and society can be created without ever meeting face to face. This is the way much of our linkage from the local to the global is perceived. (The international flow of resources, manufacturing, and design is much harder to perceive.) But McLuhan is quite optimistic. Although he anticipated the global information explosion, he did not think much about how restrictive the new technology really is. Only the privileged throughout the world's nations have access to computers and modems—they are more expensive than typewriters and telephones. There are many problems with the world formed out of electronic, virtual links between people who never actually meet each other. The lack of enuine contact certainly contributes to the alienation and detachment characteristic of modern society. But we do not want to suggest that information technology is only a problem. We hope that it is possible to find a way to adapt this prevalent technology to encourage real community building and the exchange of information between people who would otherwise have little chance to participate in this new technological development. If sustainable concerns are brought into the progress of cyberspace in its current, early stages, it might develop into a technology which could encourage, and not stifle, community. But if EXPO 2000 could find a way to encourage mass communication from remote outposts in the world with the central facility in Hannover (or between regional sites), this could become a realistic fair of the global village. Imagine a pavilion in Sri Lanka where a farmer could go in and communicate directly with other farmers in Nigeria or Uruguay, discussing what to look for in a variety of rice. The conversation could be much quicker than that mediated by a traveling expert from the West. Such decentralized access points could be part of the fundamental design of the event, recognizing that

187

i f community is to become a global concept, it must manifest the invisible and instantaneous ways communication can flow across the planet.

Analysis may reveal that inviting many millions to one site would be an ecological disaster. If so, the celebration need not be rejected. It may instead take place all over the world, with Hannover as a point of inspiration, rather than a physical gathering. Though this fair is based on ecology, it is not opposed to technology, but should instead show how it can be directed to sustainable ends. So if developing "virtual presence" means of communication through high-definition computer screens and interactive three dimensional graphics prove to be feasible in the coming years, their role in promot-

ing real communication between people of different cultures should be considered. It could be a special priority of the fair to get this technology to people who would otherwise be unable to afford or experience it.
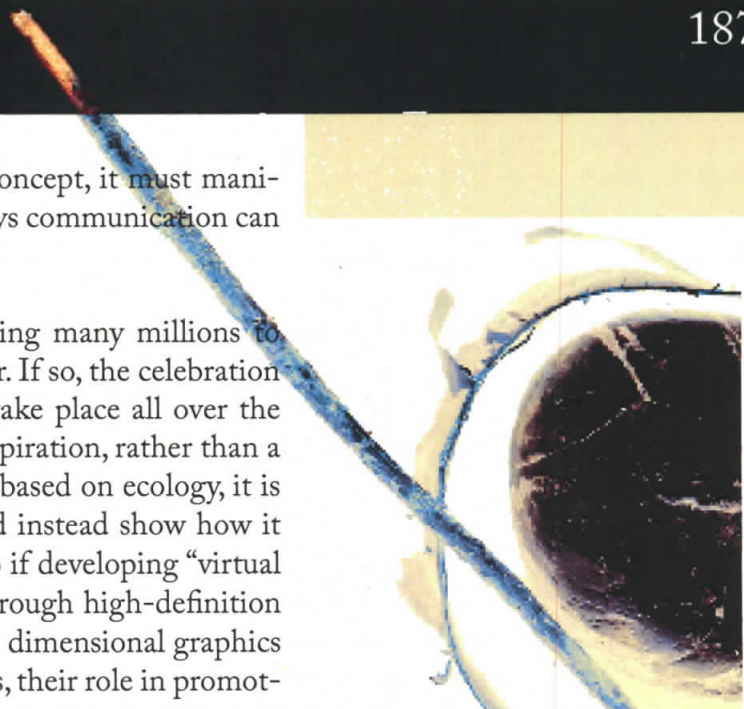
THE EXAMPLE OF TRANSPORTATION

Design for sustainability involves radically changing the principles which guide the process of design. Our primary aim is to present the framework necessary for the adoption of such thinking. The application of specific formal and conceptual design decisions should remain the responsibility of the designers who will participate in the EXPO competitions. The Principles imply a structural metaphor of interconnected concerns suggesting linked global, bioregional, and local imperatives. It is like a set of interconnected circles located within the larger circle of global sustainability. It is informed by current understanding of the world and allows for creative evolution. Here are a series of imperatives from local to global scales and back again:

Local Imperative: Promote Zero-Emission Vehicles A city's land use defines its transport system more than any traffic planner or engineer can. Michael Renner writes in Rethinking the Role of the Automobile that "a more comprehensive transportation policy must recognize that transportation needs are not abstract. What people need is access to jobs, homes, and services. More compact and integrated communities can provide such access without long commutes. If urban design - creating new communities as well as reshaping existing urban landscapes -
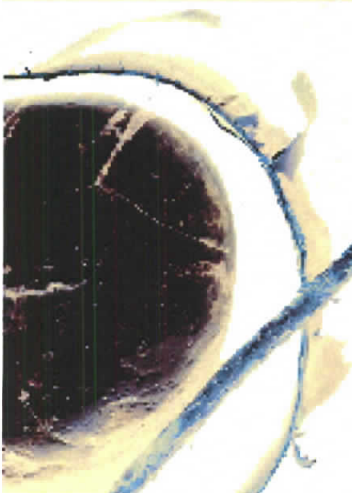
can become an integral component of future transportation policies, the contrasting individual interests in mobility and societal interests in fuel supply, security, environmental protection, and urban integrity may be reconciled."

• The Kronsberg site should be restricted to zero emission vehicles.

• The public transportation should be extensive and accessible, reaching all aspects of an integrated land use plan.

• It should run on clean renewable energy sources. Current technologies point to hydrogen power realized from solar collection, electric power from solar, wind, tidal or geothermal sources, and magnetic levitation from superconductors. Each of these technologies should be evaluated with

lifecycle analysis. EXPO must employ the most efficient system available at the time. However, "efficiency" must be assessed in terms of the functioning of the system as a whole, not only its expediency. Therefore an evaluation of the transport system must consider its side effects on the site, region and world as well as its specific practical performance.

•The City of Hannover should encourage the use of public transportation by offering transportation vouchers to residents and manufacturers who practice sustainable and responsible habitation.

•Bicycles should be given priority within the EXPO village. Connections to public transport should encourage bicycle use. Transport vehicles should provide space for bicycles. Roadways should be designed to encourage bicycle use as a primary means of individual transportation. Bioregional Imperative: Respect Natural Borders A bioregion may be defined as a structural unit, forming a cluster of ecosystems arranged topographically and climatically to produce a distinct and identifiable region. Translate this as a means of understanding human transportation structures, so that each aspect of the bioregion must be understood as it operates and contributes to the whole. For example, the EXPO will need the capacity to move many people by public transportation over a limited period of time. Even if the number of people traveling to EXPO is reduced, this will greatly exceed the eventual transportation needs of the EXPO village after the fair. Framing this need as a bioregional constraint offers many possibilities, including the following:

•Link the concept that nature produces no waste with the understanding that the force of

189

evolution is a creative one by designing transport vehicles of flexible utility.

•Specifically, design non-polluting mass transportation for use during EXPO.

•From the beginning, design this transportation system to be incorporated into existing infrastructures where possible. After the fair, install the surplus transport vehicles in a sister city in former eastern Germany that would benefit from the new technology. By supporting the bioregional needs of reunification and the short-term needs of the EXPO, we can establish a clean transportation system for both the EXPO village and her sister city.
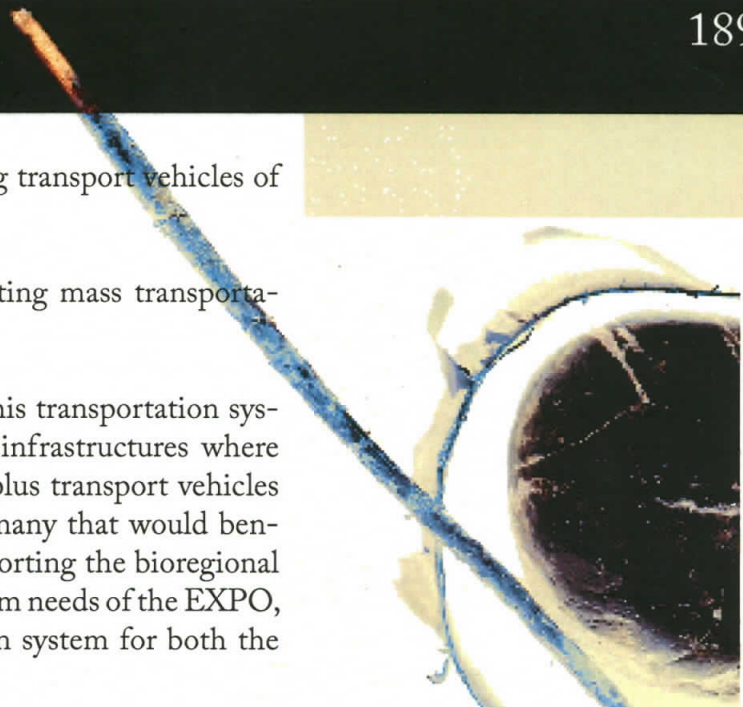
•Encourage public transportation to the EXPO by offering incentives to those who travel by train or some other means of collective, alternative fuel vehicle.

Global Imperative: Promote Remediation Estimate the number of people who will come to the fair and offset the CO2 produced by planting trees. The establishment of a re-mediation level commensurate with the profound impact of the EXPO will allow the new EXPO village to grow after the fair and still keep air pollution under control. Furthermore, as new non-polluting methods of transportation evolve, existing forests will be a resource for the developing communities. These forests must be harvested sustainably, as a model of responsible resource management, to ensure long-term viability. Global Imperative: Reduce transportation loads through advances in communication A challenge: bring fewer people to the site yet make EXPO more accessible to more people. Initially this may seem to be con-tradictory, but through advances in Virtual Presence it may be possible to link up people in very distant places through three-dimensional interactive computer environments. By the year 2000 this technology may improve enough to offer a real alternative in communication.

This strategy might also:
- Reduce CO2 emissions that would result from transport to the EXPO.
- Reduce human load on the EXPO site and the Hannover metropolitan area.
- Revitalize existing Fair grounds as communication satellites
- Promote an interconnected worldview based upon biomes rather than national borders.
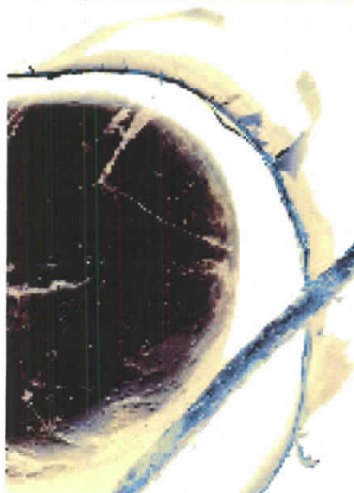
• Make the EXPO accessible to a broad range of people for whom the transportation costs would otherwise be economically prohibitive and ecologically untenable.

• Promote environmentally responsible technology in developing nations.

Solution in terms of the nested circles of scale From a consideration of the issue of transportation, an ecological approach reveals that the solution recommends electronic communication as much as moving people from one place to another. The Hannover Messe (industry) and CEBIT (com-puter fair) are already the largest in Europe and happen every year. If we aim for an audience of 20 million rather than the

50 million expected, ecological effect may be kept under control. Through the latest telepresence technologies which make virtual communication more real than ever before, the improvement in electronic linkage will be tremendous. People from all over the world will be able to participate in the message of EXPO 2000 without needing to travel to the city of Hannover in person. Such tools have just as much potential to alienate their users as earlier advances, but it is a challenge to those developing and managing them to make the new techniques part of a sustainable global vision.

THE MEANING OF SUSTAINABILITY

III. Sustainability Explored

Sustainability is a loaded and slippery term. It names those activities which can be continued far into the future, defining a way of life that will last. The trouble is that it is nothing new—business and industry have always hoped that whatever course they choose will be the sustainable course, one that will not push them out of business. In a sense, there is no practical need to scold business too much. I f environmental considerations are something that can really be addressed, they have to encourage business activity, rather than forbid it. Business will not change overnight. Will it change fast enough to respond to ecological needs? That is another question. "Sustainable development" implies a kind of growth that will be able to go on. Will there be a point when we will have to chastise growth itself? That is just what the industrial community does not want to hear. This is why the definition of sustainable development is couched so carefully by the Brundt-

land Commission: "Meeting the needs of the present while not compromising the ability of the future to meet its own needs." If humans in the future decide it is time to forsake the Earth, this definition says nothing to stop it. The phrase is intentionally weak, to garner the most chance of acceptance. It says: at least make it possible so that the future will have a choice. They should not regret their past.

World Bank economist Herman Daly points out the kinds of definitions of sustainability that he finds to be counterproductive. They include "sustainable development is development that sustains the highest rate of economic growth without inflation." That's just business as usual, described a little differently, so that our present notion of growth will
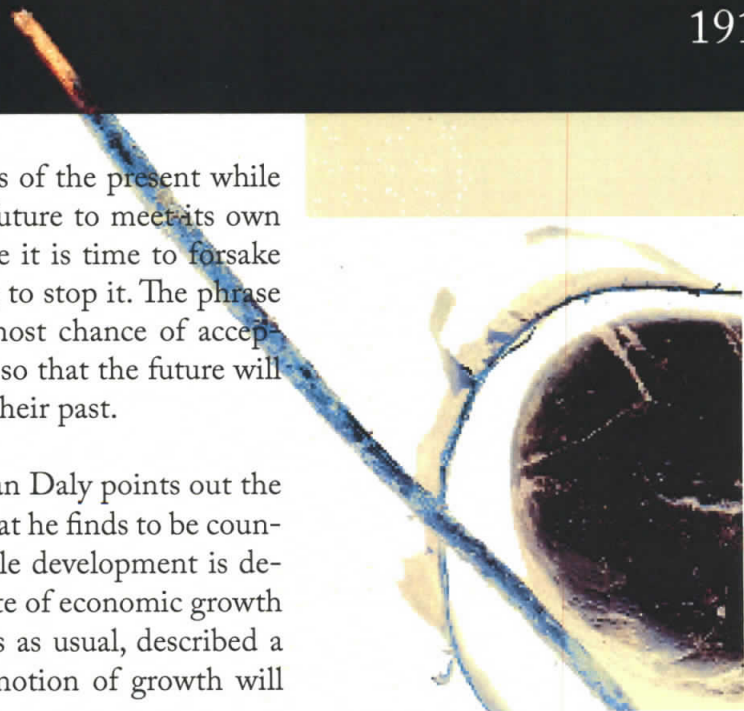
keep its course. Or: "Sustainability considers the expanding needs of a growing world population, implying a steady and necessary growth." It implies that development will need to be continuous and steady, instead of requiring any leveling off to meet a carrying capacity. Formulations like these are inadequate, so Daly himself proposes three specific rules of sustainability to make sense in economic terms:

1. Harvest renewable resources only at the speed at which they regenerate.
2. Limit wastes to the assimilative capacity of local ecosystems.
3. Require that part of the profit be put aside for investment in a renewable substitute resource.

And for him, sustainable development does not follow from more free trade between production and consumption ecosystems across global lines. For a nation to create a sustainable economy, it must step back from the global economy. Sustainability requires a smaller scale bound in which to be tested. I t will begin as an experiment, not as law. This is the remarkable potential of EXPO 2000. Imagined as a sustainable community, it will be a model for the planet of what a sustainable settlement might look like in our increasingly complicated world. Examples of sustainability are not hard to cull from the history of world cultures. But most often they are small scale social solutions that involve a small number of people who do little or no damage to their surrounding habitat. And often there is no design or designer which guides the inhabitation of the place. But now the complex of human/nature interactions is

more intricate and overlapping, and the scale of change gets faster all the time. We cannot simply set up a benign situation and let an innovative solution slowly evolve to meet ecological constraints. Design is necessary, but a very special kind of design that does not claim to control more than it knows. We find hopeful, if distant, examples in works such as Bernard Rudofsky's Architecture without Architects. Villages, cities, fortresses, and monasteries are presented from traditional cultures across the globe. Buildings are arranged so that the flows of wind are channeled and harnessed, not blocked and diverted. It is clear that they have had the luxury of time: no one commissioned these structures and demanded them built and ready for use in a year or two. Intervention was slow enough to be tested by the strength of natural forces and the

sobering spirit of time. Still, the structures of less mechanistic cultures are those that have endured the longest, suggesting that sustainable building relies less on an absolute coherent plan than on the cooperation between designers and end-users. Often hey were the same people. But a change in attitude can also link the two groups. In the Himalayas, for example, the mostly stone houses are never considered fixed, finished buildings. They evolve as the usage changes, with new rooms and structures built to flow out of existing walls, gradually forming the irregular urban fabric where no angle is exactly ninety degrees and no street follows an exact grid, even though these principles may have had a hand in the original thought behind the town. (Now the Sherpa have cut down all of their previously renewable forests to fuel the tourist trade.) Similarly, the beloved and varied landscape of European country villages was not planned by any overseeing authority, but developed slowly and tentatively. Communities organized themselves, and because each environmental intervention took so much longer then than now, the expectation from the change was so much less. The coherence of regionalism can avoid the kitsch problem associated with the blanket appropriation of nostalgic models of land planning.

When we ask for a design cognizant of long-term sustainability, we mean something that will be able to adapt to the unknown future. Thus it cannot legislate so much that what is not known will be made invisible at some later date. The plan must leave room for changing human understanding of what nature means. The forthcoming Agenda 21 Document, which will comprise the main policy statement from the June UNCED conference in Brazil, states: (Section I, Chapter 6 of Agenda 21; document A/CONF.151 /PC/100/ Add.7).

"By the year 2025, 60% of the Earth's population will live in cities. Degradation of the environment and human living conditions is already seen in cities, particularly in developing countries. Cities also generate 60% of gross national product worldwide, and can develop the capacity to sustain their productivity.

"Proposals the United Nations is considering focus on sustainable planning and management methods that will meet the housing, water, sanitation, safety, and waste management needs for billions of people.

"Solutions to problems caused by human settlements are linked to issues of energy, air, and water on a global scale.

International organizations and funding sources should provide both human and financial resources. Traditionally, funding for human settlements has been low."

This is rather vague, but illustrative of why the sustainable settlements of the future will need to be very different from the beautiful organic examples prevalent in the historical record of vernacular architecture from around the globe. The environmental criteria for sustainability are today simply global in scope, as we know too much about the damage the totality of the human species can inflict upon the world. The greenhouse effect and the widening ozone hole are two graphic and unintended consequences of worldwide industrialization—no one planned them, yet they are the clear results of the combination of all our energy interventions. A way of life based on building which will last must also consider the full range of atmospheric in which local events affect global. The planetary must be combined with the regional. This is a standard by which the picturesque examples of previous such communities cannot be judged, as every new development we begin is much more connected to the global network of resource use than any Italian hill town or Yemenite fortress. Every bit of energy expended in the creation of the project must be accounted for, and the goal of the elimination of all waste should hold from the material side to the spiritual side.

The strategy for sustainability published by the International Union for the Conservation of Nature (IUCN), Caring for the Earth, takes an ecological tack in the definition of sustainable development: "improving the quality of human life while living within the carrying capacity of supporting ecosystems." The carrying capacity of an ecosystem, biome, or biore-

gion is challenged differently by less industrial cultures with a high population growth and density, or a more industrial culture with a more stable population but with much higher per capita energy use. World Resources 1992-93 lists the general direction resource use within carrying capacity limits needs to be explored: "Sustainable development necessitates protecting the natural resources needed for food production and cooking fuels, while expanding production to meet the needs of growing populations. These are potentially conflicting goals, and yet failure to conserve the natural resources on which agriculture depends would ensure future shortages of food. Sustainable development means more efficient use of arable lands and water supplies, as well as development and adoption of improved agricultural practices and technologies
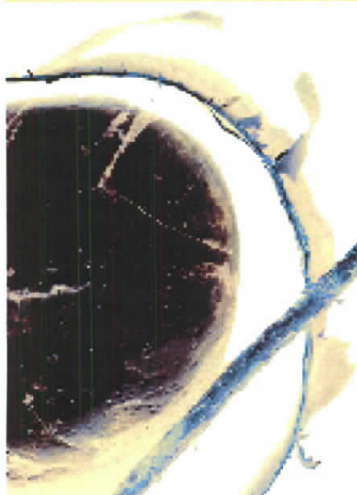
to increase yields. It aims to avoid overuse of chemical fertilizers and pesticides, so that they do not degrade rivers and lakes, threaten wildlife, and contaminate human food and water supplies. It means careful use of irrigation, to avoid waterlogging of cropland. It means avoiding the expansion of agriculture into marginal soils that would rapidly erode." The full effects of each intervention on the fragile and heavily used north German environment, part of the temperate forest biome, needs to be considered at each step. The large scale ramifications of an event that will draw millions to the region by car, bus, train and plane need to be carefully managed so that a sudden onslaught of visitors does not irreparably degrade the site. Germany, with a population of 77,573,000 is the twelfth largest country in the world. At 1.4 trillion dollars, it is fourth highest in GNP, and at 1.14 billion tons CO_2 equivalent, the country is sixth highest in greenhouse gas emissions. With a land area of only 137, 801 square miles, Germany is the fifty-seventh largest country on the planet.

The incongruity of population and available land makes environmental pressures among the country's top concerns. Most of Germany is part of the temperate forest biome, which covers only 4% of the world's surface, despite its preference by humans as habitat. So from the point of view of other species in this type of life community, preserving forests is of utmost importance. Forest damage from acid rain is visible throughout the nation, and as much as 50% of a l l trees are thought to be damaged. Heavy metals and toxic effluents lace the waters, and air quality is often threatened. And much of the wooded area is so rigorously managed that nothing near the optimal level of biodiversity is encouraged. An example of the possible ecological richness this habitat could sustain may be found in Poland's Bialowieza National Park, an area of 47.4 square kilometers, protected by a buffer zone, 15 kilometers wide, of managed forest. Among the mammals thriving

there are lynx, wolf, wild boar, elk, red deer, roe deer, and the celebrated European bison, re-introduced after near-extinction in 1929. The unique value of this fragment of an ancient forest has been appreciated by the nation under successive forms of government, and is respected around the world as well. Perhaps some analogous kind of recovered habitat could be planned for the distant future as part of EXPO 2000. With the merging of East and West Germany in 1990, the West inherited a land of severe environmental degradation. By 1996, even the eastern parts of Germany will need to meet the waste, water, and air pollution standards of the European Community. EXPO 2000 would be an ideal time to celebrate the meeting of these requirements as Germany sets itself up as a model of sustainability for the next millennium.
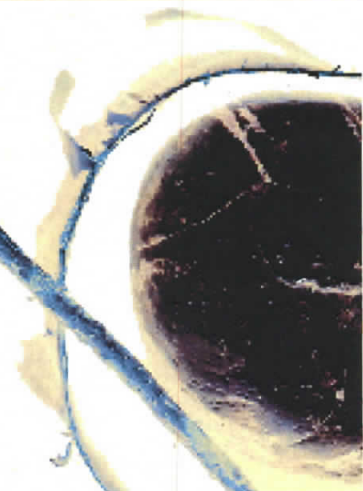
IV. From the Urban to the Wild

A complete fair will offer the full range of landscape experience from civility to the wilderness. It is over the full course of possible interactions with the ecology that the meaning of nature is articulated. We need a range of built scales, like the non-modular rhythms of the natural world, not imposed, but suggested. Previous attempts to plan for diversity have usually legislated too much, and made it all look far too artificial. Most famous in modern times is the garden cities movement, led by Ebenezer Howard, which tried to specify not only the physical layout of the ideal urban form, but also took a stab at defining the socioeconomic and philosophical basis for a modern way of life which would bring its inhabitants into contact with nature even as industrialization grew. Agriculture and industry were to be linked in a design where financial equity would be shared with the residents. The socialists Charles Fourier and Robert Owens had come up with similar ideas in the middle of the nineteenth century, but they usually envisioned a single building surrounded by productive land. Not having firsthand experience with building the environment, their ideas were more sophisticated than their models. Howard's visions were diagrammatic and geometric, not so much specifying building type as how open space, streets, and built sections were to be laid out. The idea was socialist, but the picture was orderly and somewhat totalitarian. The notion that new developments could be conceived not as suburban sprawl, but as independent self-sufficient communities offered a profound alternative to the rapidly growing urban centers. Here is how Howard described Welwyn, a garden city seen as a satellite of London in 1919: "The town will be laid out on gar-

den city principles, the town area being defined and the rest of the estate permanently preserved as an agricultural and rural belt. Particular care will be taken, in the arrangement of the town, to reduce internal transport and transit, whether of factory and office workers, or of goods, to the practicable minimum. A population of 40-50,000 will be provided for, efforts being made to anticipate all its social, recreative, and civic needs. The aim is to create a self-contained town, with a vigorous life of its own independent of London."
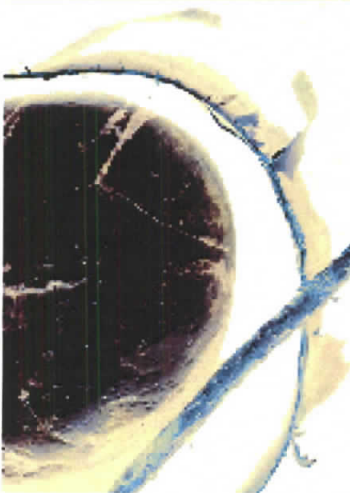
Though garden cities did try to mix housing, workplaces, and commerce, it was wrong to imagine that they could be closed systems, autonomous and detached from the rest of suburban sprawl. Macroeconomic catastrophes like the Great Depression began to control their fiscal situation,

and it was difficult to maintain the co-ownership over any length of time. Welwyn was eventually taken over by a developer, and now it is primarily a residential suburb. Another of Howard's garden cities at the outskirts of Oslo, Norway, at Ulleval, originally conceived as worker housing, is now considered so picturesque that only the most wealthy can afford to live there. That is a mark of both its success and failure: Superior to the more lifeless suburbs that followed it, the garden cities now are valued nostalgically, more as places of residential luxury than anything else. They had the forces of a growing economic system against them, and they had to defer to external demographic change before their own sustainability could be tested. The great modernist Le Corbusier had his own principles for how the city could embrace its location, and in principle they do not seem so different from the kind of things proposed today:

1. We must decongest the center of our cities.
2. We must augment their density.
3. We must increase the means for getting about.
4. We must increase parks and open spaces.

So much for principles! The problem is in the lack of concern for the "edges" between these conflicting aims, and the street separation between the parts of the plan. Corbusier enjoyed huge high-rises overlooking independent countryside, and when you look at the places where he was allowed free reign, such as his whole new cities in northern India, you see the imposed exact geometry of modernism turning away from a nature left unconsidered outside the city walls. This kind

of rigid separation encourages the idea that human interests are separate from natural interests, assuming they will always conflict. This division precludes creative solution, and speaks again for the virtue of modesty in urban planning. Lewis Mumford later called Corbusier's well-articulated vision the picture of the "anti-city:"

"The first mistake was the overvaluation of mechanization and standardization as ends in themselves without respect for human purpose. The second was the theoretical destruction of every vestige of the past, without preserving any links in form or visible structure between past and future, thereby magnifying the importance of the present and at the same time threatening with destruction whatever permanent values the present might in turn create... This is the error of
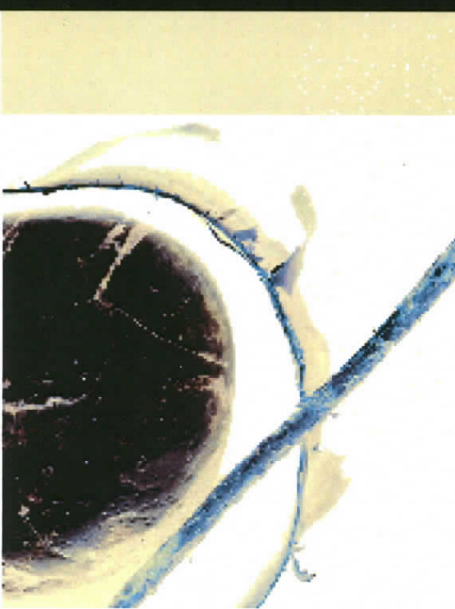
the disposable urban container. Finally Corbusier's concept carried to its extreme the necessary reaction against urban overcrowding: the mistake of separating and extravagantly overspacing facilities whose topographic proximity is essential for their daily use."

Corbusier's greatest contribution to planning was to liberate the plan from pre-conditioned constraints. With the new materials of reinforced concrete and steel, he demonstrated that whole new environments could be conceived, based on the designer's experience of the site. His best work is on a smaller scale where the sculptural nature of his architecture defines fascinating spaces. He just tried to expand theseideas too far, beyond the limits of their indifference to context. And yet the mainstream application of his ideas proved even worse than the monumental models: Suburbia as it has turned out lacks any organic focus, because it is seen as a place to live, not to work, thereby separating livelihood from home.

How could anything but alienation result?

The backlash to the sterility of New Town theory can be said to have begun with the work of Jane Jacobs, who argues as a writer from outside the architectural profession that the congestion and mixed use of older cities supports a vitality and genuine community which the planned does not. The original city was based on the intermingling of people from different social classes and the cultural value of chance meetings in streets with a past. Can such a traditional way of life be simulated? A successful community needs a locus mundi where an identifiable center for human interaction and interchange is scaled to social and cultural de-

mographics. There needs to be a well point where unplanned communication can occur.

Is the recovery of tradition compatible with the ecological imperatives of using solar-based renewable energy and eliminating the concept of waste? The planners who build on Jacobs' approach, such as Leon Krier, Peter Calthorpe, and Andres Duany and Elizabeth Plater-Zyberk, are less motivated by ecological worry than by the social boredom of most post-World War II building worldwide. There are so many aspects involved in design that even well-intentioned planning strategies may go awry. It is important that design not constrain the human or natural economy; people should be free to determine spatial utility. Design should never dic-

tate, but be didactic only as part of a larger environmental education. I f ecological constraints are too strong, it may be best not to build anything new, but instead retrofit what we have so that as little damage is done as possible, while ensuring that the city allows for the presence of nature throughout its fabric. Corridors of green such as Frederick Law Olmstead's nineteenth-century "emerald necklace" in Boston and Washington now may be seen to have value for wildlife in itself, not just for human enjoyment, but the strategy is still the same. It should be stressed that the diversity of scales and habitats should be accessible to everyone. Habitats should not be arranged as if in a museum, but readily experienced in daily life. It is a great challenge to link environmental conscience with enduring design. John Todd, founder of the New Alchemy Institute on Cape Cod, Massachusetts, has worked for several decades on "living machines" conceived as miniature earths containing many components of a food chain. More than greenhouses, they represent a synthesis of solar, wind, biology and electronics for cultivating food and sustaining a comfortable environment. He imagines them all over the future human environment: "A living machine is a device made up of living organisms of all types, usually housed within a casing or structure of 'gossamer' materials. Like a conventional machine it is comprised of interrelated parts with separate functions and used in the performance of some type of work.... They are engineered with the same design principles used by nature to build and regulate its great ecologies in forests, lakes, prairies, or estuaries. Their primary energy source is sunlight. Like the planet they have hydrological and mineral cycles. They are, however, totally new, contained environments. The full expression of the living machines is far from being realized. I predict that it will become an integral part of the architecture and design of towns, villages, and city neighborhoods. Urban agriculture will be widespread and productive.

199

Sewage will be treated and recycled in living machines. With plants, animals, soil, water, and purifying gases, these structures will become the workhorses of a solar age." The following table demonstrates how living machines differ from conventional technologies in regard to energy use:

Living Machines Conventional Technology primary sources: the sun fossil fuels, nuclear power secondary sources radiant energy combustion and electricity internal biogenesis of gases capture of external energy intrinsic rare to design internal storage heat, nutrients, batteries and gases efficiency low biological high in best technologies transfer efficiency low when total infrastructure in subsystems, is calculated high in overall aggregate efficiency lifespan long, to centuries
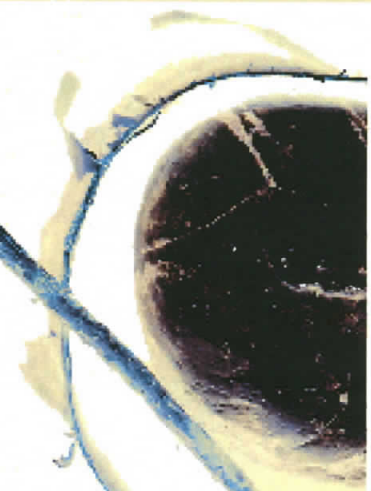
short, to decades recycling internal and intrinsic pollution control devices if anything material parts are livinghardware based populations.

These comparisons suggest the goals of such technology, but it requires creative understanding on the part of the designer to create real places from such organic devices. On a trip with anthropologist Margaret Mead, Todd visited Bali, where they experienced villages which fused practical, artistic, and religious elements in their dealings with the natural world. He realized that the organic constructions he was trying to envision as part of a city were too individually conceived, too much like single buildings, than whole plans that address the complex ways people live. The ecological imperative of thinkers like Todd fails if used to replace architecture, rather than supplement it. The designer's challenge is to combine engineering philosophy with aesthetic and stylistic planning constraints. Appropriate solutions also involve a certain specific attention to the site at hand. Local knowledge is essential to guarantee ecologically aware designs. Roberto Burle Marx, celebrated Brazilian landscape architect, uses 50,000 species of plants rather than the 12,000 species of the European world. This respect for the great tropical diversity leads to an ecological sensibility:

"People are so uneducated. Nature is always destroyed in the name of progress. Nature is a cycle of life that you must understand in order to take liberties with it in good conscience. The means at our disposal like the great bulldozers, fire, defoliants, can just as well be used for good as for evil but in Brazil they are used to create misery." But this ecology is not extremist: " I don't say that in my gardens I don't plant foreign plants—I do. But they

must fit into our landscape. It is important that a design is a result of our existing landscape and flora." In most cases, the traditional division between settlement, agricultural, and forestry land use patterns may be preserved. If care is taken with the existing landscape, its features may be preserved as new development is put on the site. However, in Germany it may be useful to take an over-managed monoculture forest and change it into a mixed stand simply to demonstrate the failings of previously restrictive forest management. A truly sustainable community will need to be far more integrated than most planning or environmental experiments to date. An inspiring example is Curitiba, Brazil, a city of 1.6 million inhabitants which has made environmental concerns a priority of development. Highrise development is encouraged

only in structural axes with central, special lanes for buses. Instead of huge, expensive downtown renewal projects, the city has favored small-scale projects that preserve traditional localities and as much parkland as possible. Separation of trash for recycling by individual families is encouraged by exchanging garbage for food and bus vouchers in the poorer parts of town. Environmental education is instituted at all school levels. As a result of its commitment to providing a high quality of life, the city is a favored site for new industries of local and foreign origin. It is not design's place to create a religion of appropriate habitation, but that may be happening of its own accord as attention to ecology becomes a fact of our present life, much like attention to progress was earlier on in this century. Ecological thinking must not become too thin and scattered. It is an important aspect of life, but not a self-contained 'new system.' Design can teach both a practical involvement with natural cycles as well as an aesthetic celebration of the range of possible ways to live outward into the natural and social world. It need never hide the individual in a sealed box of his own making. These are the qualitative concerns. Quantitative aspects are discussed in the next section:

V. Life-Cycle Analysis:

The Quantification of Environmental Responsibility The environmental imperative is more than an appeal to a return to more traditional, timetested aesthetic routes which do not overrun the rich range of natural experiences. We are asking for a consideration of the full life cycle of materials and constructions such that a realistic, sustainable interaction with the natural world is achieved.

With the endorsement of "Life-Cycle Analysis," we are suggesting one of many approaches to environmental impact study, not as any sole criteria, but as one part of the evaluation process. The biggest advantage this method has over other comparable ones is that it encourages optimization: that is, finding a solution, rather than just pointing out the problems. Systems analysis of the entire life-cycle of each part of the built environment is an outgrowth of the modeling pioneered by the Limits to Growth Report written at MIT in the early 1970s, applied at a much more specific and smaller scale. The Society for Environmental Toxicology and Chemistry states that "the life-cycle assessment is an objective process to evaluate the environmental burdens associated with a product, process, or activity by identifying and
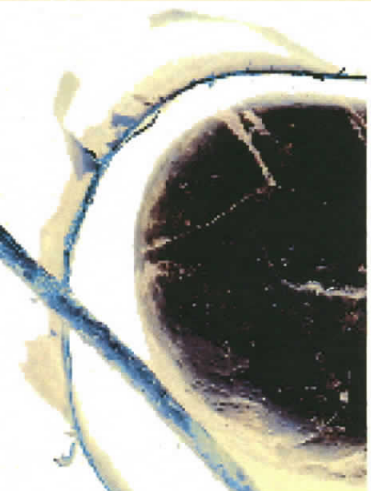
quantifying energy and material usages and environmental releases, to assess the impact of those energy and material uses and releases on the environment, and to evaluate and implement opportunities to effect environmental improvements. The assessment includes the entire life-cycle of the product, process, or activity, encompassing extracting and processing of raw materials, manufacturing, transportation, and distribution, use/re-use/maintenance, recycling, and final disposal." The following items are from their report, A Technical Framework for Life-Cycle Assessment:

There are three phases to the analysis:

•Inventory—The data-based process of quantifying energy and raw material requirements, including air emissions, waterborne effluents, solid waste, and all other releases incurred throughout the life-cycle of the activity.

•Impact Analysis—The qualitative and quantitative method to assess environmental loads identified in by inventory, including human and non-human health considerations.

•Optimization—A systematic evaluation of the needs and opportunities to reduce these environmental loads throughout the entire life-cycle under scrutiny, using both quantitative and qualitative measures of improvements in design, material use, processing, consumption, and waste management. The inventory involves these six elements:

•Raw Materials Acquisition and Energy. The boundary for the raw material element of the inventory begins with all of the activities needed for the acquisition of a raw material or energy and ends at the first manufacturing stage of refinement.

•Manufacturing, Processing, and Formulation. The processing step of the inventory takes feedstocks or raw materials and converts them to final products.

•Distribution and Transportation. Transportation is the movement of materials or energy between operations at different locations and can occur at any stage during the life-cycle. Distribution is the transfer of the manufactured product from manufacturer to end user.

•Use/Re-Use/Maintenance. This phase occurs after the distribution and before entry into a waste management system.

•Recycle. This stage encompasses all activities necessary to take the material out of the waste management phase and return it to the manufacturing phase.

•Waste Management. Waste is generated at all phases of the cycle, and refers to any component released to the air, water, or land. Waste must be eliminated or reduced as much as possible.

The impact analysis should consider the following effects:

•Ecological effects specific to the process and region of the manufacturing site should be listed in the inventory phase.

•Site selection for manufacturing facilities should be examined for all interfaces between human and environmental resources, including population centers, roads, schools and hospitals, and uniquely valued ecosystems.

•Habitat Alteration should be examined for each manufacturing site. How many acres will be removed from ecosystems, and how can their intrinsic value be assessed?

•Community Relations should be considered in the evaluation of a manufacturer, insuring there is a partnership of concern and action for overall improvement of quality of life. In terms of optimization, the following goals are included:

• Maintain deposit return systems so that the producer is responsible for buying back products after their useful life.

• Implement environmentally sound and economically competitive manufacturing practices.

• Improve energy and materials efficiency so that environmental responsibility connects with product performance.

• Develop recycling systems which eliminate the concept of waste.

• Product optimization is the goal of life-cycle analysis.

These criteria need to be considered for all manufacturing to be done at the EXPO site as well as the integrity of materials from which the fair will be constructed. If the new structures are a symbol of anything, they should prove the availability of sustainable building practices and materials in the world. Go to the site, analyze all aspects that contribute to the sense of place, and create a living allegory of the realism of these ideas. The design needs to prescribe that the entire process of building, enjoying, and disman-tling/converting of EXPO 2000 seek and respect quality of life at all levels of its creation. Quality of life needs to be optimized in environmental and social terms. Relation to natural processes and open place in the social fabric can be enjoyed by all. Exploitation should be eliminated throughout the plan for building and execution.

This is a tall order for designers. The challenge for the plan is to imply this, rather than demand or legislate it. Life-cycle analysis is, as this summary of it should indicate, an open concept that needs further development to be a realistic tool of assessment. The Hannover Principles which introduced this document should be seen as part of the way to integrate design concerns into the life-cycle picture. Here are some examples:
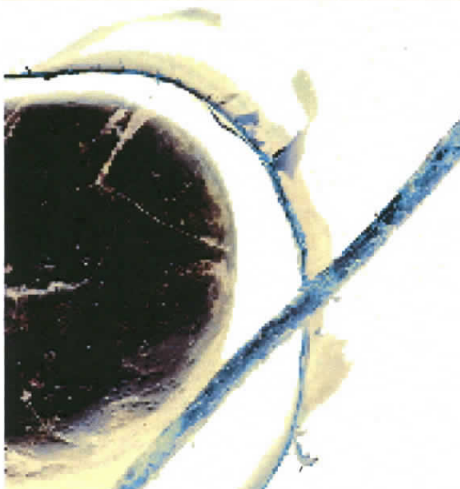
• The buildings must be designed to be flexible as their usage-changes. In the SoHo section of downtown New York City, the lofts were designed with high-ceilings and tall windows to allow daylight to penetrate deeply before the advent of electric lighting. Originally built as workshops for factories, clothing, and furniture, they are now in great demand as artists' studios, office, and homes. The neighborhood as component of the city is maintained, because building stock has adapted to changing demographic patterns. They never needed to be torn down.

• In terms of liquid waste, land use planners often find it sufficient to have a pipe coming out of their project. They may not think about sewage as part of large scale land use

plans. On-site ecologically sustainable solutions include greenhouses, meadows, large open ponds or Todd's "living machines." Areas must be allocated and the topography must be considered.

• Surfaces must be specified in the land use plan to encourage a range of uses. The Hannovermesse has its overflow parking on grass because it is permeable and is not needed a l l the time. You don't need asphalt for maximum capacity after the world's fair is through. The parking lot might be converted into a park. One needs to determine just how much parking will destroy the landscape. Research the use of gravel or other permeable paving materials as a part of the land use plan over time.

• Adverse environmental impact in the life cycle can be compensated for by evaluating the overall energy consumed. If wood is used, trees might be planted somewhere else. There is land use of the site itself, but off-site compensation is also a possibility. A sister city in former East Germany could be chosen as a site for tree planting or water purification to offset the resources used in building the Expo. The point of these cases is to illustrate that even at the initial scale of site planning and urban design, it is essential to consider the cyclical nature of ecological effects. This will force planners to consider interconnected issues of material, energy, and waste, even at the initial macro level of the project.

Many methodologies have been developed to evaluate a project's performance according to sustainable criteria. One approach is the sustainability matrix, first suggested by Malcolm Wells

in his book Gentle Architecture, and then revised by Osama Salem in 1990. Although this approach looks ready-made for the process of judging a competition for sustainable design, it is still an example of linear thinking. There is no sense of the interaction between theseelements and how they support and affect each other. When "response to culture" and "response to nature" are given a simple rating, it is easy to see the superficiality. Yet in fact, "response to natural ventilation" and "recycling of embodied energy" are just as complex. Design to solve the sustainability problem will be more than the sum of its parts.

This matrix is the simplest system of evaluation which could be used to test a project's quotient of sustain-

ability. However, it is also limited, and unlikely to guarantee the desired results. Instead, we recommend careful study of the historical and philosophical roots of the problems of modernity. If contestants would consider the ideologies and activities that have led up to our present situation, they might offer a deeper design response to the difficult and non-linear criteria of sustainability. We present Salem's version not as a procedure which we endorse, butonly an example of how the multidimensional goal of sustainability might be quantified:
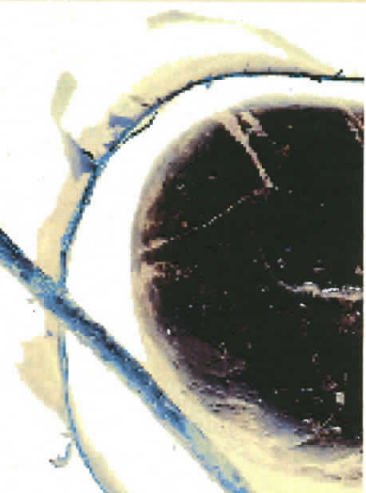
MATRIX OF SUSTAINABILITY
-100 negative extreme positive extreme +100

MATERIALS

imported materials
high-embodied energy materials
non-renewable materials
non-recyclable materials
toxic materials
indigenous materials
low-embodied energy materials.
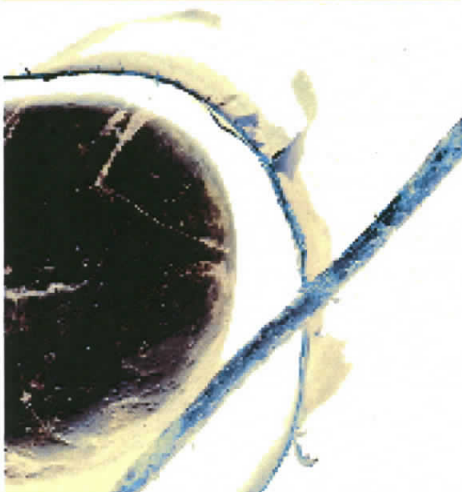
renewable materials
recyclable materials
non-toxic materials

LAND USE

destroys rich soil
destroys nutrients
produces no food
destroys wildlife habitat
uses high-productivity land
protect/creates rich soil
creates/adds nutrients
produces its own food

provides wildlife habitat
uses low-productivity land

URBAN CONTEXT

favors high-energy transport
favors polluting transport
excludes urban agriculture
homogeneous building types
no open space
destroys human habitat
no solar and wind access
favors low-energy transport
favors non-polluting transport
includes urban agriculture
mixed building types
forever preserved open spaces
provides human habitat
zoned for solar and wind access

WATER

destroys pure water
wastes rainwater
ignores gray-water use
wastes run-offs
obtains water far away
creates pure water
stores and uses rainwater
uses gray-water
creates percolation
obtains water locally

WASTES

dumps black-water
wastes embodied energy
dumps solid waste
recycles black-water
recycles embodied energy
recycles solid waste

AIR

destroys clean air
pollutes air thermally
pollutes indoor air
creates clean air
avoids thermal pollution
purifies indoor air

ENERGY

wastes solar energy
ignores buildings' thermal inertia
dumps waste energy
wastes wind energy
wastes biomass
ignores daylighting
ignores natural ventilation
intensifies microclimate
uses solar energy
uses buildings' thermal inertia
recycles waste energy
uses wind energy

uses biomass
uses daylighting
uses natural ventilation
moderates microclimate

RESPONSIBILITY

destroys silence
no participatory design
needs frequent repair
addictive and enslaving
no response to nature
no response to change
no response to culture
creates silence
participatory design
maintains itself
enlightening and liberating
responsive to nature
responsive to change
responsive to culture

HISTORICAL AND PHILOSOPHICAL ROOTS

VI. The Evolution of the Industrial Age — What Went Wrong?

Most thinking on the relationship between humanity and nature tends to separate us from our surrounding context by virtue of the constraints in our language. The words we have are "humanity" and "nature" but the problem of sustainability can be solved only by defining who we are, by understanding where we are and how we can enhance and preserve our sense of place. To come to terms with the problem, we will investigate how dual separate concepts have led
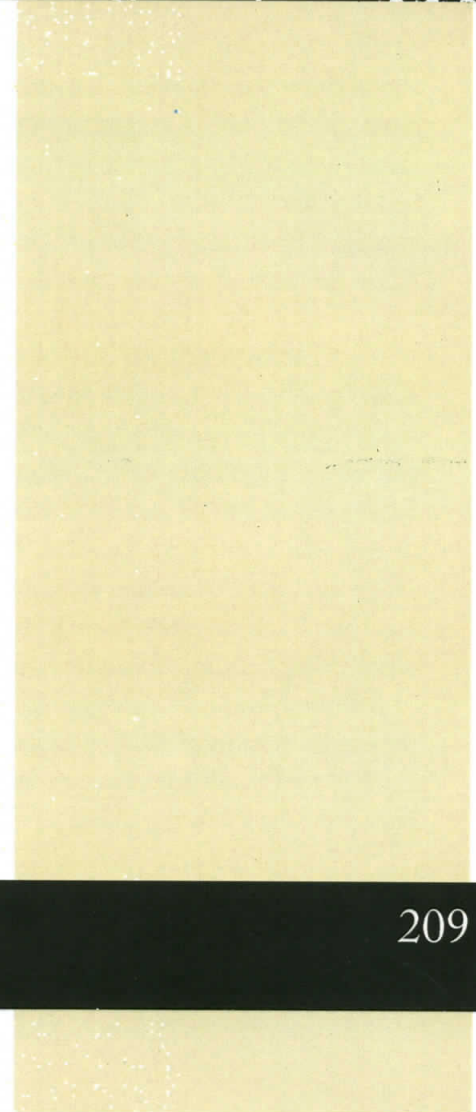
to the disastrous developments of recent history. Ecological degradation is nothing unique to modern times. Plato lamented the total deforestation of the Greek isles. Whole Middle Eastern ivilizations were brought to ruin after water supplies could not be sustained. The cliff dwellings of Mesa Verde in Colorado were abandoned after a twenty-year drought. Since the industrial revolution, human society has moved further away from a sustainable path. Society wrought by industry is based on principles that discourage human life that nature can tolerate. Some history of recent ideas is necessary to set the stage for sustainability.

Despite misuse by political forces, the social analysis of Karl Marx is still one of the more profound attempts to address these problems. He emphasized how the factory worker makes only pieces of larger objects which he will never have any use for, thus alienating himself from the fruits of his labors. The direction industry pursued in the nineteenth century separated facets of our lives into cogs in a wheel, with each of our actions never cognizant of the whole context. Instead, Marx wished for "production in a human manner," where we share and give of ourselves through the things we design and build. No plan is imposed on another; each creation fulfills itself by connecting each maker to another and to the world as a whole. The failure of these ideas to be realized is testament of the path the modern era chose to follow. Martin Heidegger placed the roots of our detachment from nature in the moment we began toextract energy from nature, storing it to be consumed at will with no sense of the Earth's cycles. When energy is seen as "standing-reserve," the concept of waste is inherent, because energy is regarded as something there to be used up. The world is no longer some-

thing to partake in, but supplied for consumption. This approach has fostered progress as opposed to a way of life which understands the limits of nature and seeks to sustain society within it. Lewis Mumford made famous the goal of a post-industrial, progressive culture that might respect the value of organic cycles. His categorization of history is pertinent to designers so we will discuss it at greater length here. He puts forth a conception of three great phases intechnology, the eotechnic, the paleotechnic, and the neotechnic. The first extends roughly to 1750, the second runs through the industrial revolution until the turn of our century, and the third gathers momentum in the 1920s and 30s, extrapolating promise into generations to follow. The eotechnic is marked by handicraft, agricul-

ture, and the direct embodiment of human extension into the environment through our own labors. By expanding human presence outward, this phase enhances human life by harnessing the immanent natural forces which surround us.

Water, wood, and stone are the dominant materials. Tools are manufactured by craftspeople for specific tasks, easily customizable by the user because they are simple enough not to require mass standardization. In this, for Mumford, generally positive time, technology enriched the life of the senses through direct perceptual extensions like the telescope. It was also characterized by developments in urban and garden design, and the artistic depiction of dailyexistence. We expressed ourselves in nature's terms, and did not focus on the control of our habitat for our own ends.

Why did we move on from it? According to Mumford, the change began in England, somewhat at the fringes of the eotechnic establishment. When the population increased dramatically, the old agricultural order could not be sustained. At about the same time, it became economically feasible to consume energy out of the Earth in the form of coal. The new industry was not based on life enhancement, but on the extraction of a source of power, , fueling transformative inventions like the steam engine and the railroad. Human presence is expanded into nature through machines driven by coal, robbed from the landscape. Life becomesquantified and driven, run by the intertwined materials of iron and carbon. Workers suffer to make these industries grow, and the physical environment is sacrificed as well. It was capital that drove this advance into squalor—so runs Mumford's compelling but somewhat romantic view.

For Mumford this period was not the culmination of human innovation, but a preliminary phase in which human strength is tested against nature, only to learn in the end that life must be upheld once more. This is why he calls the industrial age the paleotechnic era, a passing phase in which quality of human life was sacrificed to further the prowess of technology. To transcend it, we should step back from its unique brutality to affirm a higher humanity in aliving world.

Pre-World War II optimism renewed faith in technology as a natural force. Human culture would find a way to progress and at the same time follow the guide of life, eschewing destruction of ourselves and the world around us.
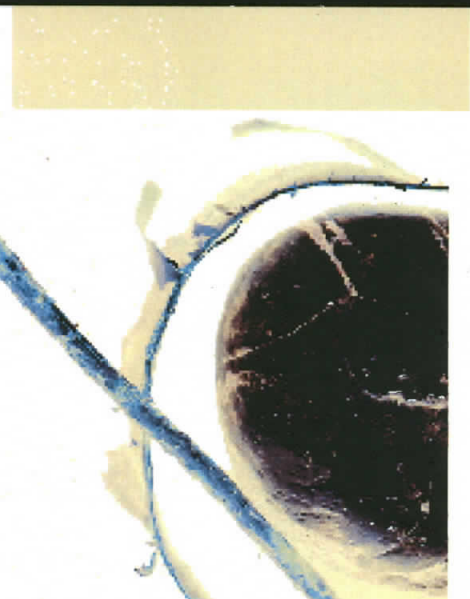
Mumford names this time of promise the neotechnic era, when technology fulfills its original purpose by bringing humanity and the expanded world back together. This is the time of electricity, of social engineering, efficiency, and the birth of instantaneous communication; the period when the machine begins to arc backand affect human essence in more profound ways. Cooperative thought, the functionalist esthetic, and a more balanced, material sense of human personality are some of the effects of mechanization upon the mind. Comprehension of the modern machine makes order accessible to all, no longer the sole privilege of an industrial complex ruled from above. Mumford is not naïve enough to claim our progression towards the renewal of humanity with the aid of the machine to be an absolute democratic goal. No, even in his steadfast belief that the machine may be inducted into the service of life, nature is never to be wholly independent of human inquiry: "We may arbitrarily define nature as that part of our experience which is neutral to our desires and interests: but we...have been formed by nature and inescapably are part of the system of nature. Once we have picked and chosen from this realm, as we do in science, the result is a work of art—our art: certainly it is no longer in a state of nature."

Mumford implores us to assimilate the mechanical virtues of impersonality, objectivity, and neutrality before we can sail towards the edge of the more richly organic, more profoundly human civilization that returns to the virtues of life. What evidence does he give us to support the conclusion that technology has radically changed enough to suggest goals beyond itself?

Machinery itself is no longer composed of standardized, identical units which are pieced together. Instead, individual parts are specialized, refined, made more particularly precise to fit into the whole and achieve meaning in the great technical system. Earlier machinery needed to simplify organic processes to render them in mechanical form. Neotechnic mechanical parts become more complicated individually to mirror complexity inthe species and niches of the natural world. The game of machines is no longer like checkers, with teams of identical pieces; but chess, with complexities of moves and regulations. The goal: dissolving the rigid mechanical world picture and redirecting towards an organic understanding, quantifiable only in terms of growth and change.

The shift toward the natural in technology begins when we see machinery not as the towering achievement of an ingenious humanity, but as "lame counterfeits of living organisms." What is an airplane next to an eagle, a radio next to the voice? Our proudest technical achievements only approximate the organic functionalism within nature. By reconsidering the wonder of natural processes, human techniques can be rejuvenated. But the twentieth century has not reached the utopia Mumford expected. It is with Mumford's illustrations of 'organic' architecture 'harmon zing' humanity and nature that his optimistic and reforming technical vision begins to appear suspect, sixty years later. A photograph of boxlike, concrete single-room dwellings for Swedish workers framed against an evergreen forest is touted as a "handsome and well-integrated human environment, in which the efficiency of neotechnical production can be registered in a higher standard of living and a wider use of leisure." From our vantage point, it looks like a row of mobile homes, parked at the edge of the wilderness, ruining the view and reducing biodiversity. A hydropower station seems as rectilinear and devoid of affinity with nature as any concrete skyscraper glimpsed across a prairie. The scale of the place alone is enough to suggest certain environmental disaster. Yet for Mumford it is a "symbol of a fresh mode of thinking and feeling."

Why do these images appear woefully artificial to us now, if they seemed to herald the clean, purposeful lines of nature in the 1930s? We are no longer able to conceive the relation of these structures to a context, as they and the grids which guide them have expanded so rapidly and easily that the wild has been trampled in their tracks. Two generations have gone by, a Second World War, and advances in technology that threaten to overrun the Earth by their tremendous triumph.

It is impossible to look at current technology and affirm that it has approached the irections of nature. Yet nature remains alive as an alternative, home to a more profoundly human life beyond the horizon of present capacities. Aspiring to nature is striving to be more settled into the world around us.

Mumford re-evaluated technology at the end of his life. Despite all his encouraging 1930s rhetoric, our built environment had failed to earn the quality necessary to really be a part of nature. Design may have claimed to look organic, but it rarely understood its full context enough to void harming the natural processes which surround it. Change in social structures, implied by the suburbanization of the city and dependence on the automobiles, served to alienate people from each other and their ecological place.
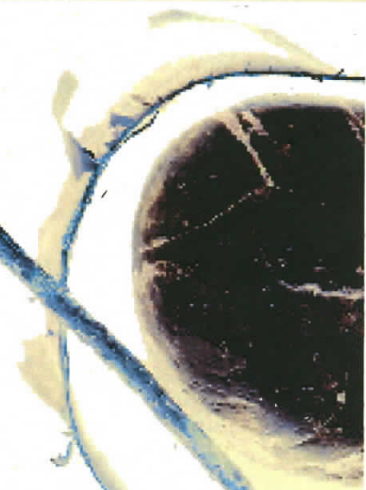
Early twentieth century attempts to build in line with nature, including Mumford's own, were too dependent on the metaphors of engineering thinking. The idea of efficiency, of minimizing this or maximizing that, reinforces the limitations of mechanistic thinking, which imagines everything we do or experience to be part of a quantifiable system. We need increased awareness of those aspects of nature and experience which are excluded from such approaches: the unplanned, the fortuitous, the places evolved without any imposed and directing idea. I f the concept of efficiency is to be salvaged, it must distinguish itself from expediency: The best solution may not always be the shortest route from point A to point B. After recognizing the failures of modernism and industrialization, various possible paths emerge. There is the optimistic idea of a ultra-high tech industry, based not on resource exploitation but on electronic notions of work and creation. In the ineffable realm of cyberspace, humanity would metamorphose so as to no longer depend on the physical. There is the Arcadian dream of a return to earlier, local neighborhoods or towns where each inhabitant learns and knows the value of community and inherently limits his or her impact on the globe. Neither principle of hope confronts the realities of a skyrocketing population using more of our bounded resources all the time. Even if population growth were to level off in the next generation, we still would be in danger of running out of basic necessities unless we curb our consumption patterns and reduce our overall impact on energy flows. So design thinking to address these issues must be more than aesthetic response or the adoption of eco-rhetoric. Considerations need to enter the design process which were formerly considered alien; left to engineers or environmental auditors. The idea of making human creation part of nature is as old as Aris-

totle, but the meaning of the goal has changed as we have become more aware of the fragility and interdependence of natural processes. It is hoped that the refinement of the concept of sustainability will guide our civilization without holding i t unnecessarily back.
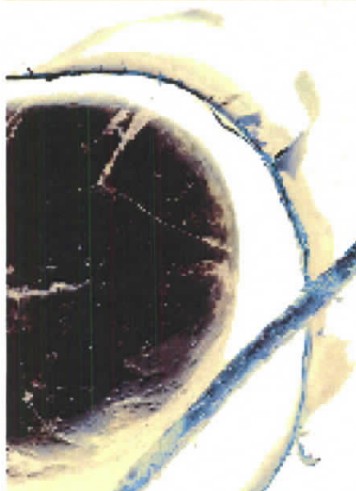
VII. Rights and Responsibility

The history of the concept of "right" shows an expansion of those considered to be worthy of equal moral consideration. It was once common to accept slavery in many societies, and women are just gaining equal rights in political and social matters. Now we speak of extending the concept of right far enough to include animals, plants, and ecosystems, protecting their own fulfillment, independent

of our agendas. This cannot mean staying out of nature's way as much as possible. Increasing world population and the very notion of development preclude this. It simply means accepting nature as something with inherent, intrinsic value, not just as seen from the gaze of human beings. Immanuel Kant thought we should "never use a person only as a means." Contemporary ecophilosopher Arne Naess expands this to state "Never use a living being only as a means." This does not mean that we never incorporate people or living beings into our schemes, but we always respect their value beyond our immediate requirements. The consequences of this expansion of right into nature are very simple: Design for the needs o f all species and interactions between species, never just for people's needs. This means: some facets of the design may be of no value to people, only to the rest of nature. A swamp which supports an astounding diversity of life may be more valuable than the pretty, managed marsh. And if we choose to sequester some areas as undisturbed natural habitat, recognize that the setting up of boundaries is itself a human disturbance, and that the effects of this need to be understood. The use of ecological sustainability as a guiding direction for design can be taken in two different ways, following the two kinds of environmental philosophy known as social ecology and deep ecology. "Deep ecology" tends to believe the denuding of the Earth will be prevented by a change in mindset and in values, while "social ecology" asserts that the structures of society need to be totally revamped before we can even imagine what improvement might look like. The former finds favor with philosophers, eco-activists, and environmental consultants, who affirm the power of a change in an individual mind to change the world. The latter approach appeals to social planners and activists of the class struggle, those who see people primarily as products of the social systems they are born into. The choice is between articulating a strong idea of what values

environmentalism should hold onto, or looking for what reconception of the system of society might prevent ecological devastation from continuing at the present rate.

Deep ecology is well-articulated in the work of philosopher Paul Taylor in his work Respect for Nature. His central goal is the establishment of respect for nature as a guiding ethical principle, expanded from the principles of respect for human life. Arne Naess, who coined the term "deep ecology" and has been named its philosophical grandfather, thinks intuition about the intrinsic value of all nature will ground a respectful way of living in and with the natural, non-human world. Taylor demands a rational structure to articulate the bounds of respect for the world outside our own
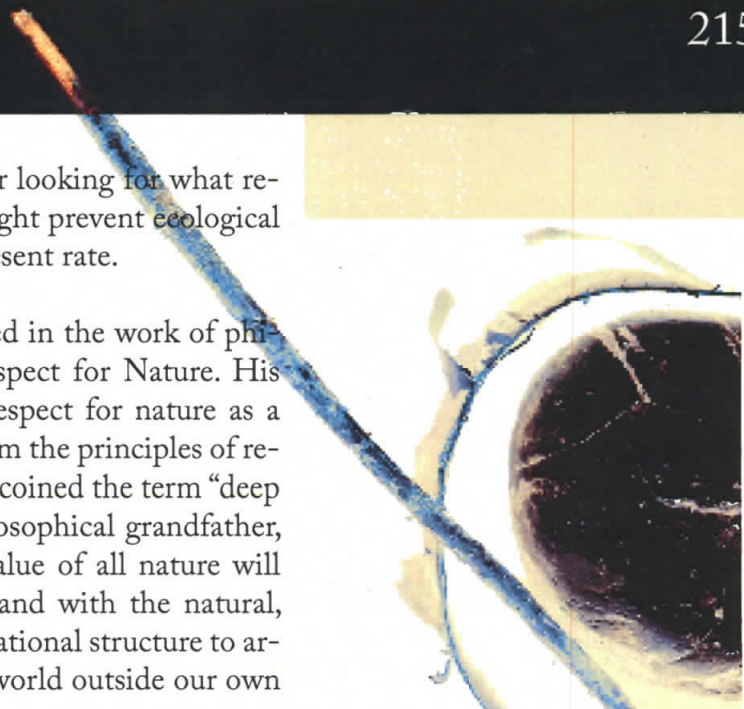
species' goals and dreams. The unifying question according to Taylor two is: "What is the ethical significance of our being members of the Earth's community of life?"

The natural science of ecology may serve to bring into focus the relationships between human beings and other components of the biosphere, but it will never tell us what to do about these relationships. As a natural science, it has difficulty dealing with values in its own terms. To decide how to act is up to us as people, as moral agents. This is where philosophy is meant to help us. Given a new perspective on the situation engendered by ecology, it might now offer suggestions of how to act in response to the scientific vision. Scientists, as much as the rest of us, need to take moral considerations into account even if they are outside the assumed bounds of their profession. Respect for nature is not the same as love of nature. It is not just affection or care. Respect, says Taylor, is a public and moral commitment. It demands the definition of rules for behavior towards its object. In loving nature you embrace all the uncertainty and tumult of the wild, while admitting its necessity for your survival. Respect is a question of treating the other fairly, stipulating specific ethical regulations. These include real, tangible ways to evaluate competing claims for the environment. He analyzed competing interests upon the priority principles of self-defense, proportionality, minimum wrong, and distributive justice. With this emphasis on human and non-human conflicts, Taylor realizes that dissent may be the norm in human contact with the rest of the world. We have to think sometimes for ourselves, sometimes for the rest of nature whom we respect. We cannot always do right. Deep ecologists tend to take insights from the natural science of ecology and then wonder what changes in human forms of
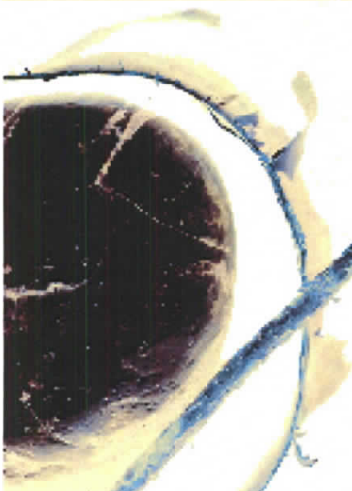
thought will be necessary to appreciate them. Yet this may be too short a step. Perhaps the metaphors from ecology offer more pertinent challenges to the wholemanner in which we conceive our communal existence. Rather than assume that nature is good, and reorient our beliefs to reflect this respect, we might take the definitions of life and interconnectedness offered by scientific ecology as preliminary hints for a new way of seeing society. Not immediately a new vision of a better society, but a new device for understanding what we have. This is the view of Niklas Luhmann in his Ecological Communication. A social theorist in the German critical tradition, Luhmann is quick to caution against laying too much weight on any shared moral consensus in our time. There are just too many different kinds of people with different wants

and needs, such that real agreement on highest goals and value systems is not very likely. A principle like 'respect for nature' will never mean only one thing to all people. Instead, ecology can offer new methods to take stock of the differences in human activities and situations. It can offer new conceptions of existing society, necessary before any realistic goal may be articulated.

Environmental ethics, according to Luhmann, is most often a rhetoric of anxiety. It gets us worked up and nervous about the end of the Earth, just as we make moral pronouncements that the current course of human progress is wrong. But to what extent are environmental problems moral problems at all? It is not a question of individuals believing the wrong things, but of social systems doing real damage to the world in which we live. Environmental ethics tends to shy away from the revelation of what's wrong with the systems of civilization, taking refuge in uncertain hopes and fears. If you speak only of persons and not of society, you can only hope to change persons, not society. And society is not a person that needs instruction or admonishment. Luhmann seeks to reconfigure modern society to discover the means to a socially respectful ecoethic. Why bring in these devices at all? Ecology has excelled at showing the relationships between previously unconnected aspects of the biosphere, and disparate parts of society might be linked in an analogous way. Ethicists too often assume the autono my of the human and thenatural, though society interactively defines the two. Consider the working of social systems upon emerging principles of natural systems, and the relationship may come clear. Luhmann is intrigued by the concept of autopoiesis, or self-direction and renewal, a principle in biology developed by Humberto Maturana and Francisco Varela as a criterion for life. Themechanical systems of cybernetics, invented by the

early computer pioneers to suggest how machines might become self-regulating, could not renew or create themselves. Thus cybernetic automata could never quite encompass life. In outlining the qualities of systems that refer to as well as regenerate themselves, these two contemporary biologists are attempting to model the elusive sense of what it means to be alive. In applying autopoiesis to social systems, Luhmann is the latest instance of a long tradition of taking concepts from natural science into social rhetoric. He is often more careful than his predecessors like Herbert Spencer, who drew quick moral conclusions from Darwinism, rather than thoroughly rounding out a theory. For Luhmann social systems remain 'alive' if they continue to communicate, and the links between them makep a vast ecological network of relation-

ships through the net of society. There is an ecology of social structures as much as there is order in a self-referent ecosystem. No part makes sense without communicating to the rest. Autopoiesis is a code of social existence. Its operative meaning is to continue to communicate. When communication fails, the system becomes diseased, falling apart at its wounds. If the course of information goes smoothly, the defined 'life' of social systems functions as an immune system to keep the ecology of society afloat. Polluting a water supply happens when we do not understand the adverse effects of an industry. If we find that the water is rendered unpalatable, we redesign the system to reduce pollution. Luhmann's concept of ecological communication is a theoretical schema intended to reveal how social systems respond to their contexts, and why we usually fail to see the natural limitations of these organizations. Luhmann develops a very specific and somewhat mechanistic language to explain the way it all fits together. In a style typical of sociology, Luhmann models social reality as a series of codes and programs, connected to each other like some vague machinery, whose invisible cogs reflect nature only as they simplify it. But he does place a limit on these social mechanics: we can never glimpse the whole from within the whole. Inside the whale, Jonah does not know where he is.

As early as 1974, Hans Magnus Enzensberger offered this most succinct critique of the political uses of ecology: "The bourgeoisie can conceive of its own imminent collapse only as the end of the world." What looked like genuine concern for the well-being of the Earth was in fact panic in the wake of the losing battle of the elite against the masses. Political ecologists fail
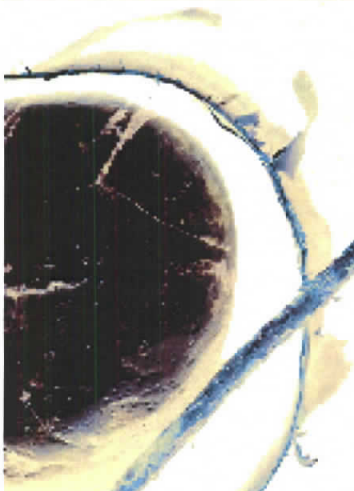
to recognize that the roots of the problems they care for are not overpopulation or pollution, but the unequal distribution of resources and privilege so that the few may consume to excess while the many suffer, their basic needs never met in the first place. That's the basic perspective of social ecology. The solution implied by the idea of sustainability must take both of these perspectives into account. There needs to be respect for the absolute limits learned from nature which include elimination of the concept of waste and recognition that solar energy is the one overall external renewable source of energy on the Earth. At the same time there needs to be attention to the social inequities that are in part responsible for the manifestations of scarcity and degradation worldwide. In Germany air and water pollution and forest-death

from acid rain are the most visible aspects of the eco-crisis, but the world's fair will have to find a way to address these as well as the more distant problems of the developing nations of the world that should be represented as part of the plan in some way. If there is any doubt that we as designers have some responsibility to these problems, we need only consult the work of German philosopher Hans Jonas in The Imperative of Responsibility.

Our present world is one dominated by change. The objects in our world do not stay the same. What was constructed ten years ago already seems old. What about it continually demands the new? Do the constructions of our present age display an inherent inadequacy, or are they (by nature) open, in that they exist to set the stage for some other to come? In their realization they seem to imply a future, for they are not complete. A kind of movement is generated. This movement keeps our culture going. Must we lose ourselves in this movement, or can we somehow guide it? Jonas points out that continuation of any form of our life into the future involves an "imperative of responsibility."

This would require the advancement of our ethical agenda beyond immediate, foreseeable effects, to the distant needs and rights of future generations of all kinds of life on Earth, as well as the planet itself. Some Native American peoples are used to looking at least seven generations into the future to assess the value of any particular decision.

He argues that the rapid movement of our lives and society necessitates a new ethical system which would allow us to cast our notions of responsibility far into the future to insure the survival of the Earth an organic system. In addition to the expansion of ethics from humans to natural entities introduced above, this involves ethical expansion into the future of time. In order to approach both these enlightened points of view—biocentric ethics and long-term ethics—we must identify an already-present striving towards them somewhere in theundefined but accelerating movement that enlivens our society now. Humanity creates—this action is part of our definition. The only thing we do not create is nature. Yet we can perceive and study its creative methods, and thus come to see that our perspectives may point towards the fluxing of nature.
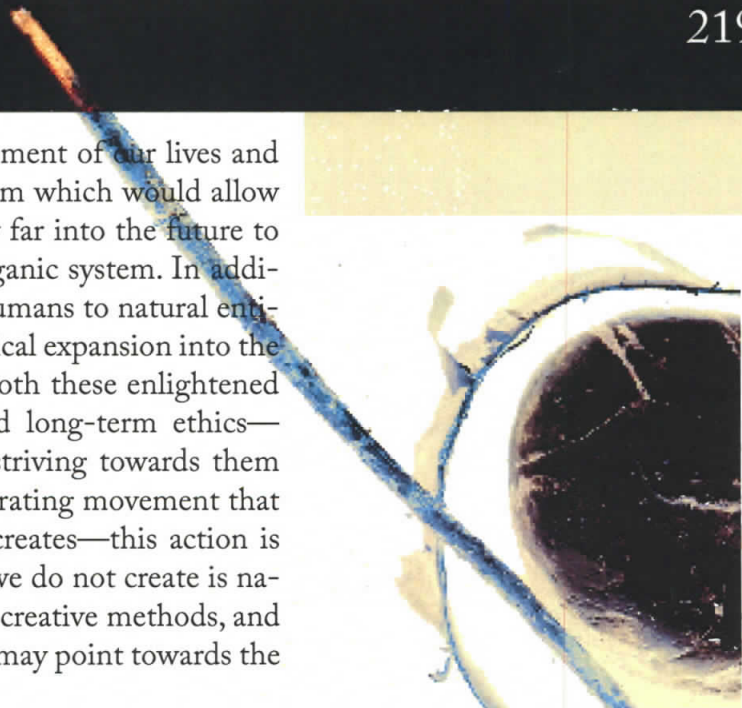
It is only through extending the bounds of our considerations forwards and back in time, from ourselves out to the largest entities we can imagine, that we can hope to establish a connection with nature. The movement which began us through time, still the same movement which is us in this present, changing time, propels us to strive in this direction. This is Jonas' responsible imperative. If we do not choose this direction, we will spiral out of control into an escalating change devoid of meaning. If we temper the movement we can spiral asymptotically towards a circle of resonance, oscillating towards a timelessness which has always been there. The creation of art and design and the discovery of truths in their purest form, involve a claim to some beauty independent of the limitations of context. Beauty of place also has a fundamental value. Added to these are activities that expand our knowledge of the authentic world. Design can teach us about natural processes and increase our awareness of global systems.

The revolution in thought implied by sustainability means that in the future, we will not be able to consider human rights without recognizing that they are contained within and limited by the sphere of natural rights. Our prime responsibility is acceptance of our place within these processes, not as the Earth's eternal enemy.

VIII. Humility in Design

Never has a world exposition chosen to celebrate the fact that humanity does not know very much about the world. Yet this is an essential part of our program. Architects have often
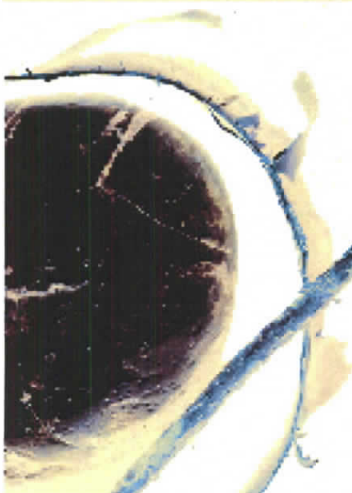
brought with their work magnanimous pronouncements of how important their creations are as part of a new social vision, but rarely do they step back to realize that the built environment does not change everything. In fact most of the world's best architecture is not designed by any single force, but represents a community solution to a variety of problems which are often better understood by diverse parts of the social fabric, not just the designer or planner.

When we suggest humility, we mean leave space for the design to evolve on its own. Leave room for the many important aspects of life not dictated by design. Leave room for a nature far greater than any notion of "closed-system", "feedback loop", "balanced ecology", "sublime wilderness", or

any kind of ideal we may ascribe to it. Ortega y Gasset wrote that the modern man, what he called the "Mass Man", is unable to distinguish between a natural object and an artifact, because we do not need to question technology as we use it. When we get in the train we assume it will take us to our destination. When we type at the computer we assume words will appear on the screen. There is no need to know more about the tools that we use, and most of us do not understand them enough to keep them in good repair.

These are the products of our design, and we cannot think about them too much if we are to use them successfully. We accept them, and go on. It is the same with our artificial ideas of nature. We come up with truisms like balance and interdependence of nature, and then we step back from them, assuming we can exclude ourselves from the equation. Then we imagine nature as somehow contained in our simplistic analyses. That misses the point. Nature needs to remain more than we can ever know or describe about i t . Only a design which encourages the possibility for future discovery will be able to ensure this. One that plans too much will limit its expression to the limited current understanding about humanity in the world. And understanding is always on the move, changing both according to popular fads and the expansion of common knowledge. It is very difficult to introduce humility into prescriptions about the future, or into any plans that authorize a specific intervention into what exists in the environment. Scientific ecologists are used to saying things like "we simply do not know enough to be sure what course of action is best for the biosphere," but political and philosophical ecologists are quick to say "design with nature! Follow the rules of balance and harmony so essential to the natural world!" One must be careful to mold these

imperatives into methods truly usable, not just new dogmas to replacethe old. The evidence is clear from the record of our century: claims to plan all aspects of theenvironment have failed. Neither previous world's fairs nor suburban sprawls were founded on evil intentions. It's just that their promoters were too sure of their ideology to be able to include questioning in the design process.

Instead we need to recognize the absolute nature of the sustainable goal without claiming to know too much about what to call it. Here, architectural theorist Christopher Alexander's Timeless Way of Building may be of help: In this, the first of his many books intended to guide design towards structures respectful of place and purpose, he does
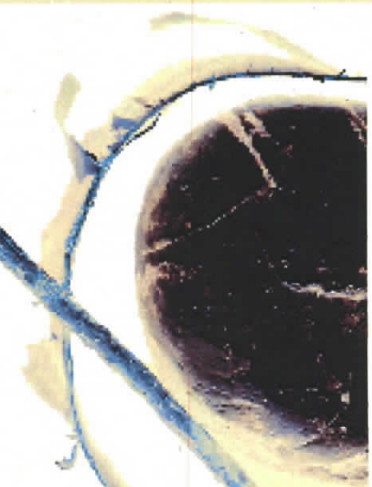
not outline any specifics of method, but instead writes poetically of the truth of an integrative kind of beauty which is so impossible to describe: rather than writing of nature or of harmony or of sense of community or space he talks of the "quality without a name" which cannot be talked about, but can always be recognized by those who visit a place that has it. Writing a book about it might seem a fruitless exercise, but Alexander succeeds because he speaks, Zen-like, circling around the subject rather than holding it up for all to examine: "It is a process which brings order out of nothing but ourselves; it cannot be attained, but it will happen of its own accord, if we will only let it."

So design becomes the setting up of spaces which allow the spontaneous and the integrated to occur. Description never dulls experience if enough unplanned space is left around the plan. These ideas of regularity, of systems, of rules of the closed and the open — these are always only limited human creations. The future is not up for grabs in the relative merits of the postmodernists: nature is absolute and stronger than we will ever be. But we cannot say anything certain about it.

We hope in vain for the pure and exact, just to discuss it. But waves in the ocean beat rhythmically on the shore, never in the same rhythm. No snowflake is exactly the same. Alexander writes: "The character of nature is no mere poetic metaphor. It is a specific morphological character, a geometric character, which happens to be common to all those things in the world which are not man-made.... Nature is never modular. Nature is full of almost similar units.... We cannot even find two leaves which are the same." Any rule or prescription is thus only an attempt at explaining the ineffable. When the design works in terms of its context and its inhabitation,
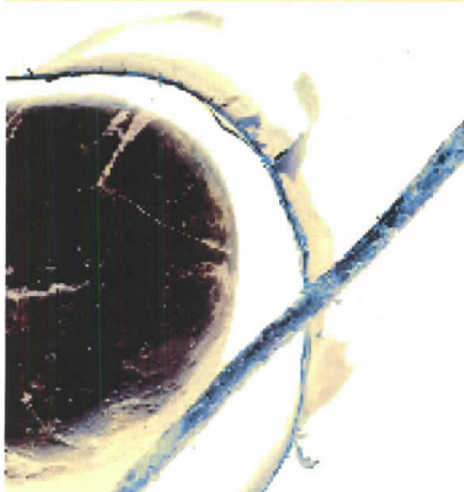
we can sense this at once. But the sensation is never planned. We love buildings in which we have fallen in love, or where the space looks out to the rest of the world to suggest that the whole has meaning. Despite all our talk here of ecological responsibility, space must be left for wonder and the preservation of not the known, but the unknown.

Two photographs from Christian Norberg-Schultz's Concept of Dwelling: On the left, a green, lush Norwegian forest. On the right, a dark wood house with a solid thatched roof. Of course one belongs in the other. There is no jarring contrast, no doubt. This kind of building is not opposed to its landscape, not making such demands on the surroundings so the context dies or is made invisible. Martin Heidegger comes back again, with his most succinct advice for archi-

tects: "We dwell in that we build." Building only works when it instills us in the world.

Dwelling means to belong to things you don't understand. The house is not a closed system, but one that opens toward the world. Heidegger goes on to speak of "releasement" Gelassenheit, a

word which he re-invigorates to mean letting go to the Earth so that it will speak through you

in your acts and structures. EXPO 2000 does not so much need to bring the world to Hannover as to show that Hannover already opens up toward the world. Visitors should be encouraged to

see farther into the essence of their place, not through the imposition of blindly optimistic dreams, but through the beauty of the interconnected nature of our most important problems.

We may be unequal to the problems of solving them but know they do exist. Heidegger points out that buildings should "bring the inhabited landscape close to humanity," rather than imposing humanity onto the landscape. The locally specific, traditional, or vernacular architecture has survived over the centuries because it accomplishes this. Norberg- Schultz speaks of the Einhaus of Lower Saxony, the large farmhouses on the North German plains are built of "long ridges surrounded by groups of trees, looking like man-made hills which give structure to the surroundings." They make the landscape readable, but they do notpave it over with their intentions. Adolph Loos wrote in Austria in 1910 of the essentially biological nature of vernacular construction:

"The peasant cuts out the spot on the green grass where the house is to be built and digs out the earth for the foundation walls.... He makes the roof. What kind of roof? One that is

beautiful or ugly? He does not know—his aim was to build a house for himself, his family and his livestock and in this he has succeeded. Just as his neighbors and ancestors succeeded. As every animal which allows itself to be led by its instincts, succeeded."

A bit romantic, perhaps. Instinct needs to be combined with the latest in global ecological awareness. But can it be done fast enough to meet the pace of our fleeting, modern world?

Kenneth Frampton writes that architecture must deal most poignantly with the present, instead of the past or the future, when it comes to construction: "Building by virtue of its materiality and actuality cannot realize itself in terms of some redeeming future. For all its relative permanence it has
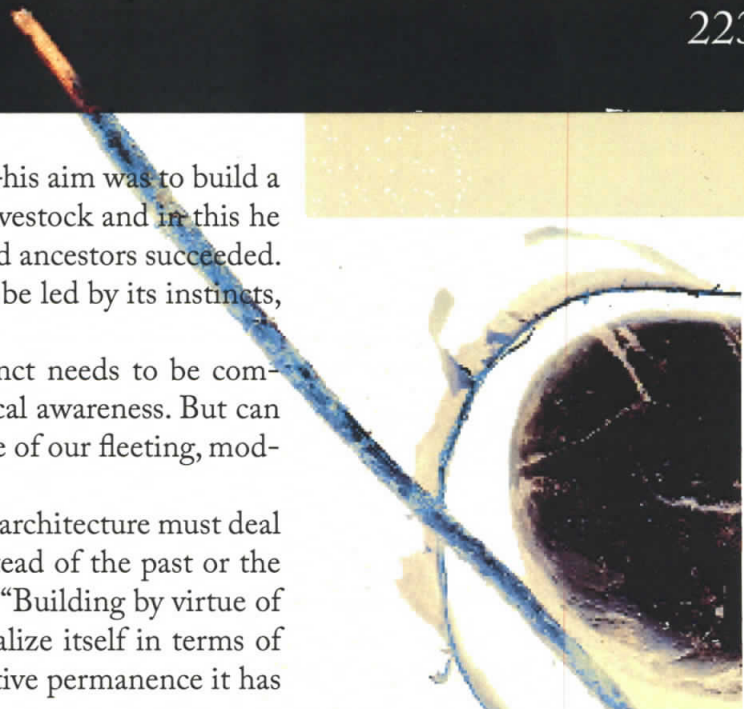
no choice—like most instrumental acts—but to exist in its own historical moment. It has as its objective task the non-reductive realization of humanity here and now. Its true object is no longer the idealized projections of the Enlightenment but rather the physical constitution of the necessary attributes of place. " The architecture of the EXPO site may build on the vernacular, being local (traditional) and global (eternal/sustainable) a t the same time, making ecological concern a reality of today—not a dream of the future or a reinvention of the past.

Among the biggest obstacles to a sustainable and releasing design here is the question of time. Can anything be built quickly that is designed to last, be it a building, a city, a road, or even a poem or a story? Human works which endure are not concocted overnight, changing lead into gold. They need to balance the sudden flash of individual insight with the slow testing of the waters, so by the time they are built, used, and gently aged, no one person or idea can be identified as being solely responsible. Architecture belongs to no one. It expresses the essential anonymity of a species at one with its niche, as both are created together from among the possible choices of symbiotic survival.

At times design must defer to the insights of other disciplines. Town planners often speculate on the behavior of those who live in their model worlds. Who can know how much the built environment influences people, who do not let infrastructure tell them just what to do? Design should leave room for the flexible use of other builders of society. At its best, it can suggest new poetic, aesthetic, and scientific insights, rather than imagine it can provide
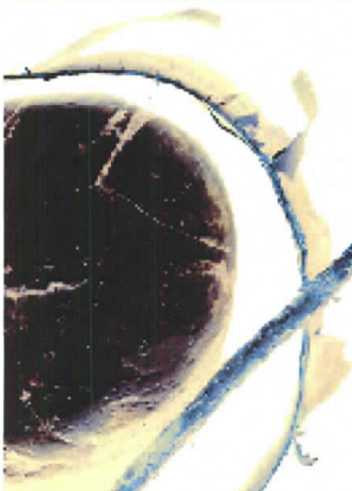
them all. It is very difficult for visionary thinking to admit its partiality or incompleteness. Yet it will always be only part of the solution, not the whole. So each detail of the sustainable dream does not need to be included—only the vantage points that direct the rest of us to fill in some of the blanks, and to recognize which parts of the map remain blank. Ideally sustainable development recommends the leveling-off of increases in population and resource consumption. It will finally require a redefinition of values and a commitment from consumers to want and buy less, a pledge from industry to make less, and from builders to build less. This may be the most humble and difficult message to swallow.

IX. Cooperation as Excellence

In this "competition," there will be no single winner. It is our view that the problems proposed for EXPO 2000 cannot be solved by a single planning solution, and probably not by any singledesigner. What is necessary is a framework by which innovators in different aspects of the problem may be encouraged to participate and build something more profound than the sum of its parts. We must leave room for the evolutionary play that comes from the chance encounter of different ideas. It is the consequence of the principle of humility, and an escape from the tyranny of the plan. Room must be made for diverse responses to the challenge of the vision ofsustainability.

A useful historical antecedent may be the Columbian Exposition of 1893 in Chicago, which may be the most influential of previous world's fairs in terms of assessing a present and offering a model for its future. Almost nothing remains of the construction, but the image of the world put forth at the event contrasts starkly with the mainstream of American modernism that replaced i t . The Columbian World Exposition was proposed to commemorate a date nearly as auspicious as the end of the millennium: the four hundredth anniversary of the date of Columbus' supposed discovery of America. The most celebrated designers of the United States were called upon to participate together: Frederick Law Olmstead chose the site on the shores of Lake Michigan. (It was a stretch of unreclaimed marshland which would justify instant protection today, but that was not in the arena of then-contemporary concern.) Working with architect Daniel Burnham, later made famous by his Flatiron Building in New York, an overall plan was devised as a miniature version

of the American national landscape, to combine the grid and the garden, linking park and city with wide landscaped boulevards. The idea was not to focus on industrial innovation as in previous fairs, but to present the artistic and cultural ambitions of the nation taking a leading role in the views of the rest of the world. New York architects Richard Morris Hunt and McKim, Mead, and White contributed buildings.

From Boston came Peabody & Stearns, and from Chicago, Louis Sullivan. Sculptor Auguste St.- Gaudens was the chief art consultant, and he commented on the gathering as "the greatest meeting of artists since the fifteenth century." It should be noted that they were only American artists. (Humility was not really a part of the gathering, but it was true that no one person was in charge.)

The durability of the 1893 fair was specifically temporary, not sustainable. The building material was a mixture of jute, cement, and plaster, to emulate alabaster in structures that were meant only to last a summer. (Actually, such temporary intervention might in fact be moresustainable than the dream of creating a whole new city where there is little demand for one.) The style of the construction was an ornate classicism, which Robert Stern sees as an attempt to establish America as a great nation by virtue of a self-proclaimed role as guardian of the classical tradition. Louis Sullivan, however, came to see the classical monumentality of the site as an aberration that set back the solidly American direction of functional modernism by fifty years.

The fair dealt with a myriad of readable symbols in a manner that only a diverse group of cooperative thinkers could accomplish without rendering a vision more personal than accurate. There were allegories of Art, Science, Industry, and Agriculture, along with carnival rides and attractions. Twenty-seven million people visited the exposition in the single summer it was open. That was nearly one-third the population of the United States at the time. The nation was clearly impressed by the monumental classical vision of what a city could be, even thoughit did little to alleviate the strained conditions of the Chicago slums which lie, then as now, just a few miles away from the site. Architecturally, the pictures of the site reveal it as an impressive and unified place, and detailed study of the individual pieces of it reveal an organic sense that only a diverse group of designers could create using a general guiding philosophy. Yet it remains a success of appearance, not permanence. What were its last-

ing, sustainable effects? Those that worked on the fair were spurred on to be asked to build major, lasting buildings in the same model. The Chicago waterfront parks were expanded, and the subsequent dredging of the Chicago River suggested to Burnham a future for Chicago where it might resemble Paris, with urban center as artwork itself. These designers did not have enough political power to make their vision accepted, but they had better luck refurbishing L'Enfant's plan for Washington, DC, with a series of neo-Federalist buildings that stand unto this day. The Chicago Exposition was like a cardboard model of the real project: it showed what a collaboration of brilliant designers might look like if they were given the encouragement to work together around a common aesthetic vision. Another important antecedent is

the Artists' Pavilion at the Osaka Exposition of 1970. This project was initiated by the organization E.A.T. (Experiments in Art and Technology), founded by engineer Billy Klüwer and artist Robert Rauschenberg in 1966. E.A.T. was founded to provide artists with the technical expertise to realize their ideas with the most up-to-date technology available at the time. The pavilion presented the efforts on behalf of art merged with technology to comment on the possibilities of the future. Klüwer explains how art can address these questions: "Artists are not limited to functionality. They are sensitive to scale. They question assumptions, and assume responsibility for their creations. They make a strongstatement with a minimum of means and a single-mindedness of purpose."

The Pavilion at Osaka was commissioned by PepsiCo to highlight the adventurous possibilities of new technologies. Even so, they questioned the dominant mode of futuristicthinking: the Expo demanded that the pavilion be a large geodesic-like dome, in the tradition of monumental world's fair architecture at that time. But the artists and engineers found that too banal, and covered the dome with a constantly rising cloud of mist, cloaking the regularity of the imposed design with an organic, volcanic feel. Inside were mirrors, changing sounds and materials emphasizing the diversity of the world's possible cultures, even telexes allowingvisitors to communicate with different parts of the world. There were handheld radios, the walkmans of the past, that could be carried through the exhibit to pick up changing broadcasts from around the inside of the sphere. It was a cooperative effort of many thinkers anddesigners from all over the world, leading to among the most popular and least expected attractions at the fair. Still, that Expo was, like most previous ones, based on the premise of the technology of tomorrow. The Hannover EXPO is based on ideas of re-

straint, awareness, and concern for solving the world's problems, not hiding them behind a wall of promising machines. Yet a similar consortium of artists and technologists should be called upon to address the diversity of problems in a way that no one person could tackle alone. With EXPO 2000, we propose that the community of designers rally around a common ecological vision, with aesthetic direction open to choice. Cooperative design work may help to diminish the quirks of individual egos, and respond to a complex situation in the complete way only themany can accomplish in contrast to the one.

We would like the language of sustainability, a language still undergoing development, to be the framework for

the design thinking around this important and momentous project to kick off the next millennium. What Christopher Alexander says about group process in conceiving a building can easily be extended to a large plan such as this: "When a group of people try to do something together, they usually fail, because their assumptions are different at every stage. But with a common language, the assumptions should be explicit from the start. Of course they no longer have the medium of a single mind, as an individual person does. But instead, the group uses the site 'out there in front of them' as the medium in which the design takes shape. People walk around, wave their arms, gradually build up a common picture as the plan takes its shape... It is for this reason that the site becomes so much more important for a group. The site speaks to the people—the building forms itself—and people experience it as something received, not created." For successful cooperation to happen on this project, those involved need to have some agreement that the goal of sustainability is an important one, as well as a commitment to understand the ramifications of their design work well beyond the immediate concept. Ecological integrity of materials, effect upon the overall landscape, role of the project in meeting basic needs of visitors and inhabitants now and in the future, and articulation of the goals of humanity embarking upon the next millennium must all be addressed in a spirit of affirmation and optimistic support. EXPO 2000 is like an imaginary city which must be built as something real and enduring to prove its point. As author Italo Calvino alludes: "Cities, like dreams, are made of desires and fears. Even if the thread of their discourse is secret, or their rules absurd..., everything conceals something else." The ecologically sustainable vision for Hannover at the edge of the millennium is motivated by the fear of a devastated planet,
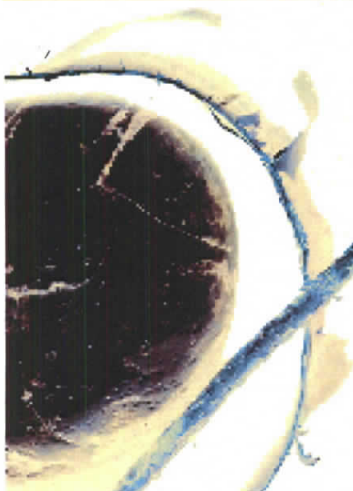
with a desire to show that we have a real chance to save it and continue the evolution of our species at the same time. There are no easy rules to follow this course, and every choice not only hides another but implies further questions which require consideration. The full exploration of this interwoven net of questions is the sane path towards ecological resolution of the fate of this earth.

AUTHOR: NEAL ZEREN
TITLE: HOW ARCHITECTS
DESIGN, EXECUTE, AND
REUSE

Cradle to Cradle, a book written by William McDonough and Michael Braungart in 2002, takes an interesting approach to the way in which we think and design things. The book proposes ideas on rethinking the way which we make things. The book begins describing how the world was fundamentally blinded by progress. They then describe some of the evils we as humans have against this world. Throughout the book and indefinitely in the end of the book they suggest methods of betterment.

With this paper I have chosen to look at their writings from an Architects point of view and a personal point of view. McDonough and Braungart have produced many definitions of ideologies which may be readily adapted to architecture. An Architect may use these writings in all stages of their practice. He/she may change the way they address the "process" by internalizing many of this book's principles. Architects may address these ideologies at all levels of the process; design, execution, and reuse. I have chosen to focus on the most fundamental of these three, the design aspect.
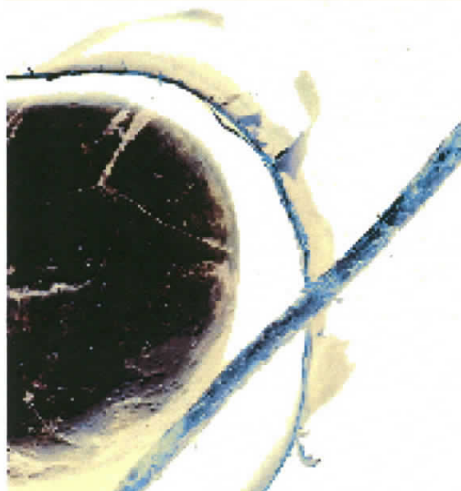
DESIGN

Design, it is what we as designers intend to happen. There is existing design to be analyzed and new design to be created. We as designers are charged with the duty of taking observance, creativity, and intuition into all we do. Once we complete a single design process this process must be analyzed, critiqued, and rethought. In this way we must also look onto past design solutions and question their effectiveness and validity to the future. We become the filters to whether designed elements live or die in the world of perception. What we now perceive as a book may one day be changed. McDonough and Braungart raise this thought of what was a book and what is it to become.

"Imagine if we were to rethink the entire concept of a book, considering not only the practicalities of manufacture and use but the pleasures that might be brought to both." [70]

They have challenged the preconceived idea of a book. The book itself has completely been rethought. What was once an object of ____ now rethinks these standards. The production of books, in the past and even now, requires the removal of trees from our forests, the production of inks with heavy metals, and the production of toxic glues to hold it all together. We have for years accepted this process because of the history behind it. There have been no prevalent challenges to this process. There has been an individual rebuttal. Environmentalists have proposed using recycled paper for books. This, however, as Cradle to Cradle points out, is not "rethinking" our idea of a book. This may be a solution; but, there then are set backs with this that make the proposal merely a step in the right direction. They ask us to consider changing the production methods as well as what the book is produced from. By changing the fundamental composition of the book the designers have changed what it is to have a book. The book Cradle to Cradle is made of a plastic that may be reused while maintaining the original quality of the plastic. The book is also designed to make its original life span longer. The book may get wet and resists decay from the environment. The designers have changed what a book is. One may use it in places not normally conceived for book use: bathtubs, beaches, and rain showers. If we take this approach to the design of other customary products how might our world change? Thus, by looking environmentally, McDonough and Braungart have changed its composition as well as its overall form.

Through out history designers and especially Architects have been concerned with this idea of form; form, "Form Follows Function," minimalism, and such forth. These approaches have primarily been concerned with aesthetic quality of form. McDonough and Braungart propose the idea of "Form follows Evolution." Their book is a primary example of this thought process. They have designed a book whose innate formal qualities have changed by rethinking how it is designed. I feel it is essential that this thinking is adapted to Architecture. The book states many ecological reasons that which adaptation and evolution is a must.
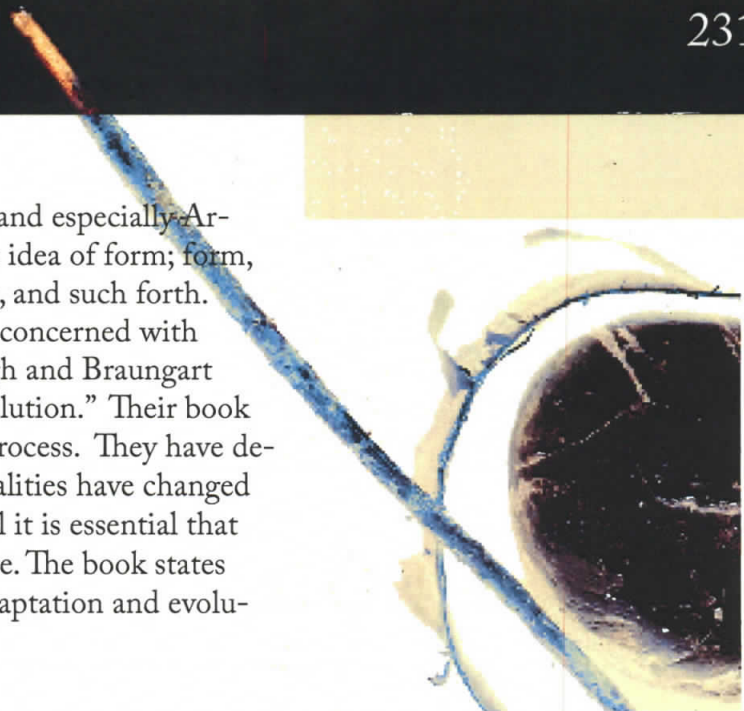
If one were to draw one other approach to fundamental form designing; I would say their idea of Eco-efficiency has evolutionary roots to a new age Minimalism.

"Primarily the term means, 'doing more with less.'" [51]

Minimalism would deal with the historical ideologies of overall form; but then, it would encompass "doing more with less." It involves doing more with less, in spatial planning, material choices, and product waste choices. As an Architect makes these essential decisions about there design and overall form perhaps they can consider this ideology or look to the book for far more examples on what it means to be Eco-efficient. The designer must not stop there tough. There are even far better examples for inspiration to form stemming from McDonough and Braungart's thoughts of Eco-Effective approaches.

Form design may be part of the initial design considerations; however, there are many more steps to a final product. Their book has other thoughts that apply to many other considerations. The book raises the question about who are we truly designing these buildings for. Our design methods prove to be contradictive to our original intentions.

"With their sealed windows, constantly humming air conditioners, heating systems, lack of daylight and fresh air, and uniform fluorescent lighting, they might as well have been designed to house machines, not humans." [29]
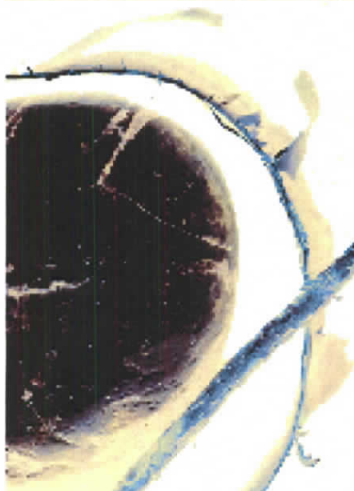
"Not humans," why when human clients come to us have these become our responses as designers? These solutions that when analyzed seem to be contradictory to the actual needs of the humans.

Design must not exist on its own. It must be internalized, evaluated, and produced simultaneously with the rest of the built world, so as not to have a separation through the process. In the design aspect one must be thinking about the materials and packaging of the execution aspect as well as what is to happen to the materials after the building as "out-lived" its designed intention. While the builders are executing the plans they must be thinking

about the site and how what they do to it will affect the reuse, such as dumping paint thinners or destroying trees with diesel machinery. Finally, the reuse must not completely ignore the design intensions of the original Architect; there are always reasons for the decisions implemented.

INDIVIDUAL HUMANISTIC APPROACH

After much reflection I have chosen to analyze my own life. The above ideologies give precedence to life as an Architectural practitioner. One cannot carry a forked tongue and separate their life from their preaching. If I were to live my professional practice life telling others how to design, build, and reuse; and yet I exempt my own life style, I would undermine my conscience. I must realize that I do have an affect in this world. Many time actions supercede words. If I were to meet with a client or even a family member and contradicted my words with my actions, my professionalism and personal integrity would be compromised.

"When I submit these thoughts to a printing press, I am helping cut down the woods. When I pour cream in my coffee, I am helping drain a marsh for cows to graze, and to exterminate the birds of Brazil. When I go birding or hunting in my Ford, I am devastating an oil field, and re-electing an imperialist to get me rubber. Nay more: when I father more than two children I am creating an insatiable need for more printing presses, more cows, more coffee, more oil, to supply with more birds, more trees, and more flowers will either be killed, or… evicted from their several environments. [46, 47] George Perkins Marsh

APPENDIX G

AUTHOR: NEAL ZEREN
TITLE: CONCEQUENCES, A LOOK AT THE GAIA HYPOTHESIS

What might one compare Gaia to? What is this idea of Gaia? Can one believe in mere parts of the Gaia Hypothesis? Why should one care? What can be done? I propose these questions because I to have wondered what Gaia is or perhaps more appropriate who Gaia is.

What is the hypothesis of Gaia? Stated simply, the idea is that we may have discovered a living being bigger, more ancient, and more complex than anything from our wildest dreams. That being, called Gaia, is the Earth (Miller).

What is Gaia?

To begin one must divorce themselves from normal stereotypes of what we once thought the world was. We must give up the apparent inanimateness of the earth.

There are two parts that which the earth is made of. The biota and the abiota are components of the earth as a whole. The biota is a name for all of the living biomass of the earth. This includes all scales of life. This includes the micro world of bacteria to the macro world of whales in the south pacific. This also includes the apparent inanimate vegetation of our world: trees, flowers, grass. These 'alive' elements of the biota seem to exist on the abiota. This abiota could be considered the biosphere of the earth. This is the element that is home to all of the biota. It is the stone of

the Himalayan Mountains to the plains of the Dakotas. It is also extends from the top of Everest to the solid core of the earth. Together the biota and abiota make up what we call the earth.

Where then does Gaia exist? One must consider the following abstraction. Gaia is both of these two elements; and yet, Gaia is not exclusive to these two elements. These two elements are the physical sensible element of Gaia. Gaia then may be considered a force outside of this physical world. Gaia in herself is a living organism. To better understand this, let us examine Gaia as any other living organism that goes through a process of life.

"(Gaia is) a meta-life form which began an ongoing process of transforming the planet into its own substance (Miller).

The idea is that an ancient cognitive life force came to the earth before life existed here. The life force then began to make the planet its own. The life force began to change the planet so that it may support life. The process is in cyclical in nature. Evolution allowed for species to grow and produce an environment for further growth and development of other species. However, to understand where Gaia exists one must see this process as a holistic evolutionary process. The evolution of the biota is merely to allow the earth as a whole to evolve. Gaia in herself is growing and evolving.

There are many cultures through out the world that share this similar idea of the earth having a holistic life force that which encompasses it. Kali, Tapuat, Gaia, are all names of what different cultures have described this life force as.

The Native Americans believe in a life force which is over the whole earth. The Native Americans call the force Tapuat. This is a Hopi name for 'Mother Earth.' The actual translation means 'mother and child.' They believe in the cycle of life as a rebirth of the spirit, an earthly path, and a return to the spiritual domain. This idea has a more simple approach to this life force than Lovelock proposes.

Kali is of the Hindu tradition. Kali is the goddess of the Cosmic Force or Cosmic Power. As a whole she represents all scales of the 'good' and 'evil' forces in the universe. She represents delicacy of the creation of life, as well as, the ultimate power of destruction. Kali is scene to hold the force of all processes of the earth and universe. She creates, preserves, and destroys. This Hindu belief is very similar to James Lovelock's hypothesis of Gaia. Lovelock does take it beyond religious beliefs and uses science to prove certain aspects of Gaia.

Gaia, which James Lovelock borrowed the name for his hypothesis of this life force, comes from the Greek tradition. The Greeks goddess of the earth was 'Ge' or 'Gaia.' The Greeks believed that the goddess of the earth encompassed the living as well as the not living or the earth as a stone.

James Lovelock developed these ideas of Gaia in the 1960's. He then published them in 1979 in his book Gaia: A New Look at Life on Earth. He later published a second version of the book in 1995. Lovelock's ideas of Gaia are inclusive of the above ideologies; however, he has taken one further step and introduced the science of today to justify some parts of his hypothesis.

Range of Views:

Let us explore the possible ranges of Lovelock's hypothesis. As was stated, there is much of his hypothesis that can be proven through science. There are parts that fall outside the realm of science. The systematic nature of science negates the ability to test certain parts of his hypothesis. If one is to truly test the Gaia hypothesis and all of its facets, there would have to be millions of millions of years of research and documentation to prove through science that Lovelock is right. Thus, we must rely on philosophical reasoning to justify certain elements of his argument.

Philosophical to Scientific:

One can now look at these beliefs as a spectrum. We can consider these ideas from the strictly scientific to the purely philosophical. There a two incremental beliefs which lie between the extremes. We will then address four stages on this spectrum.

The first is the idea of the earth as a system. This idea is undeniable. Science has proven that the earth is composed of delicately balanced systems. If an ecosystem becomes unbalanced it will fail. All ecosystems work in a balance. There is a balance of predators and prey, food sources, clean water, spatial habitats. The earth has similar properties. If humans continue to strip the earth of vital habitats or other delicate balances there will a balance shift. Hydrology, air, and earth are elements of the earth which have delicate balances which make them systems.

The second ideology is where the term Gaia is introduced. This second stage states that all life forms on the earth are apart of one being. This takes the first idea further by saying that all living organisms are not merely balanced but are one. The human body may be seen as a microcosmic example of this one. If the body is without an organ, the body would fail as a whole. If we as humans continue to abuse these systems we may strip the earth of vital organs needed for life.

The third idea introduces the consciousness of Gaia. It states that Gaia consciously chooses to keep all of the systems in balance with in her self. She consciously chooses to better the conditions with in her self to grow and evolve. We then as organisms, despite our conscious ability, may not be aware of her conscious will or choices. Our decisions may then be irrelevant to Gaia's will. This idea is where biologists have a difficult time proving that Gaia is a life form. They say that she can not be a life form because she does not reproduce. This is where the time factor is key to proving this scientifically. With out millions of millions of years of documentation and proof we can not say that she is not a life force. If she is a life force perhaps she has not yet reached gestation or her ability to reproduce. This then leads to the final idea of the Gaia Hypothesis.
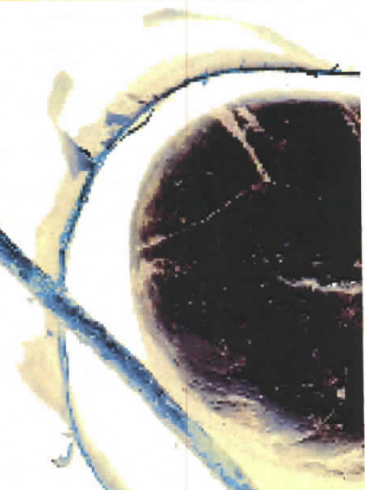
The forth is the idea that Gaia is apart of a whole and there is universal evolution. This is the furthest exploration to the Gaia theory. This proposes that Gaia may be only one being in Universal Evolution. There may be a universal consciousness that is evolving Gaia so as to better the evolution of the universe.

Why Should We Care?

If the above is true; we must take steps to preserving this life force. We must evolve to the point where we understand that we are apart of this whole. We must as humans evolve beyond the stage of parasite. We as humans are nothing more than parasites to Gaia. On which ever level one chooses to understand Gaia, we still are parasites to her. Gaia provides all with a sustainable supple environment for life to be born, grow, and evolve. We as humans must be good stewards to Gaia, on all levels of belief. We must be careful that we are not merely a disease to Gaia. A disease which Gaia may strive to remove from her body. We must be cautious to the signs that may be out there signifying perhaps a destruction of the virus. Perhaps we as the virus can evolve to better Gaia. Perhaps we may become one with the life force instead of battling against it and stripping it of itself.

239

How to Use:

WIND SPEED (Knots)

- ■ (green) >= 22
- ■ (blue) 17 - 21
- ■ (red) 11 - 17
- ■ (light red) 7 - 11
- ■ (yellow) 4 - 7
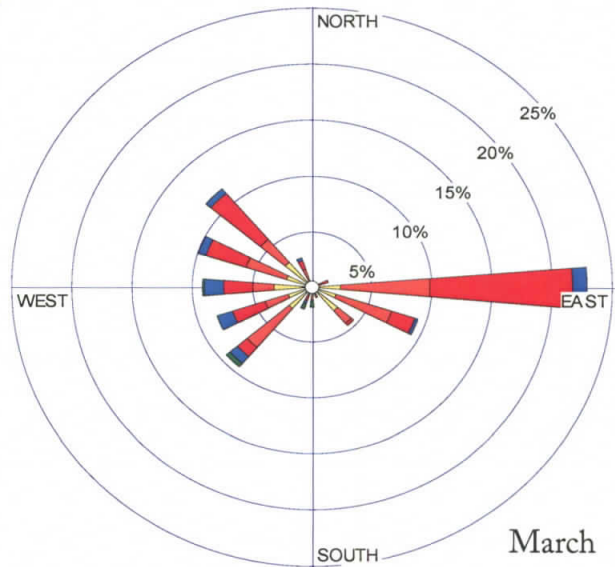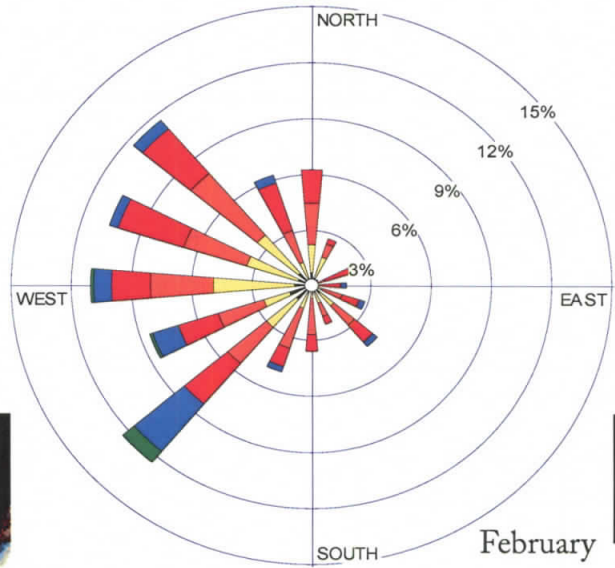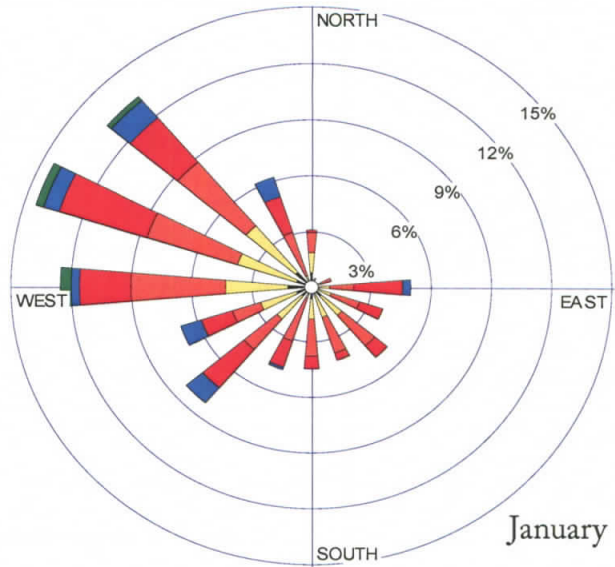- ■ (black) 1 - 4

Calms: 9.63%

Color:

The color designates the amplitude of the wind. The numbers are represented in knots.

1 knot : 1.150779 mph

240   SITE

monthly

January

February

March
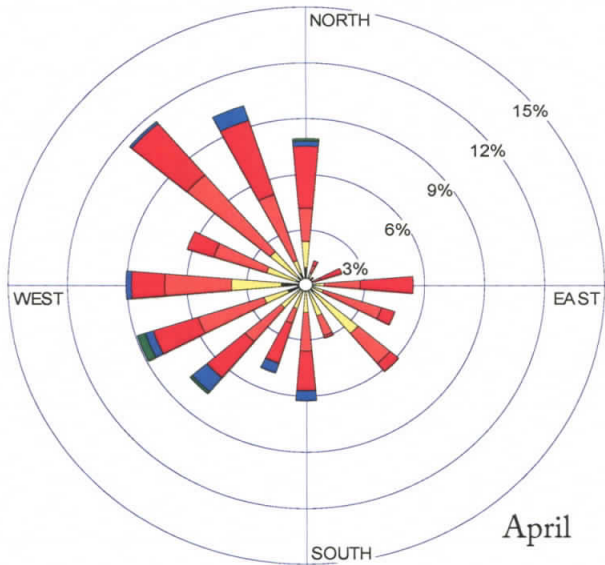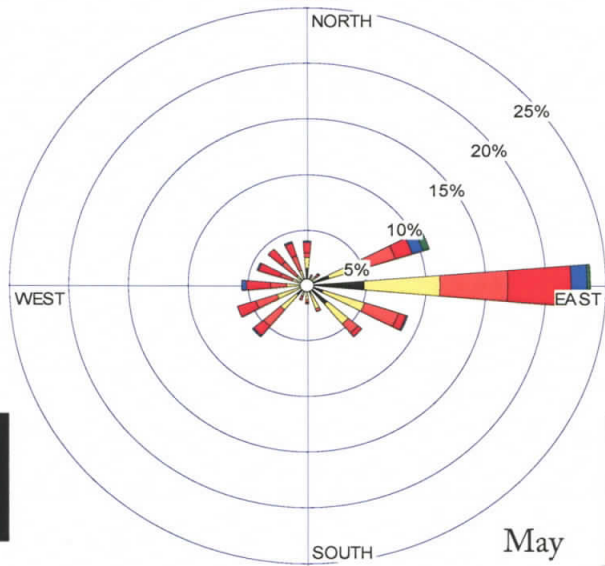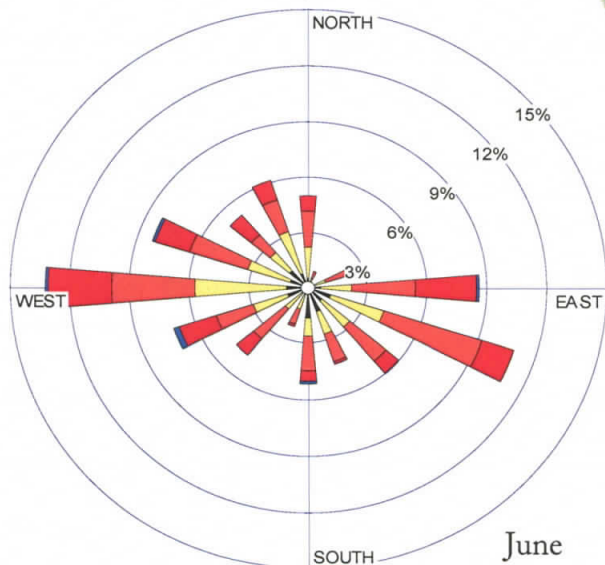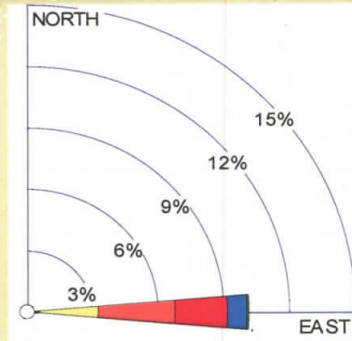
April

May

June

Color:
This describes the magnitude of the wind speed.

Angle:
This shows from which direction the wind is blowing

Percent:
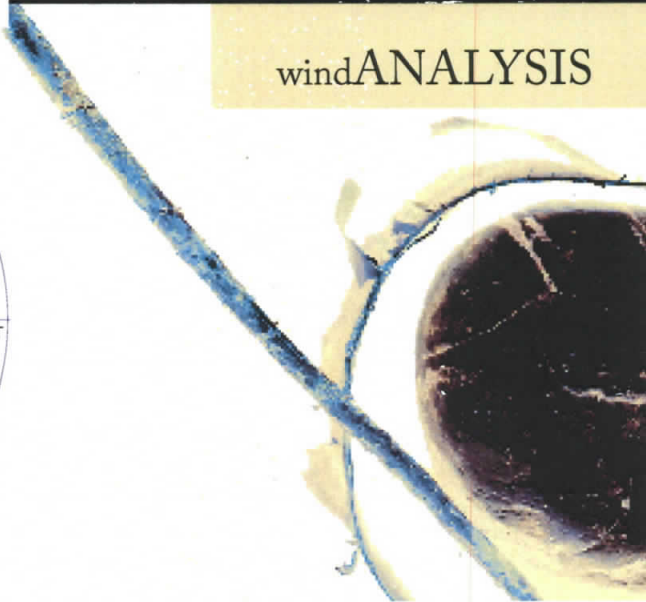This shows the percent of time the wind comes from a particular direction

Length:
This shows the percent of total time the wind blows.

SITE 241

windANALYSIS
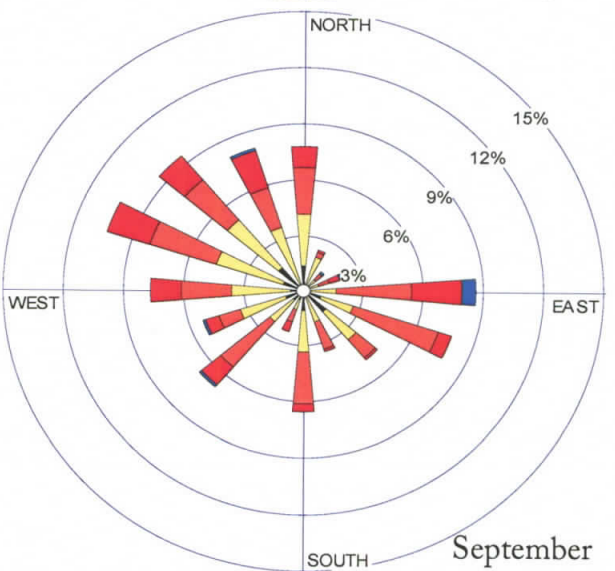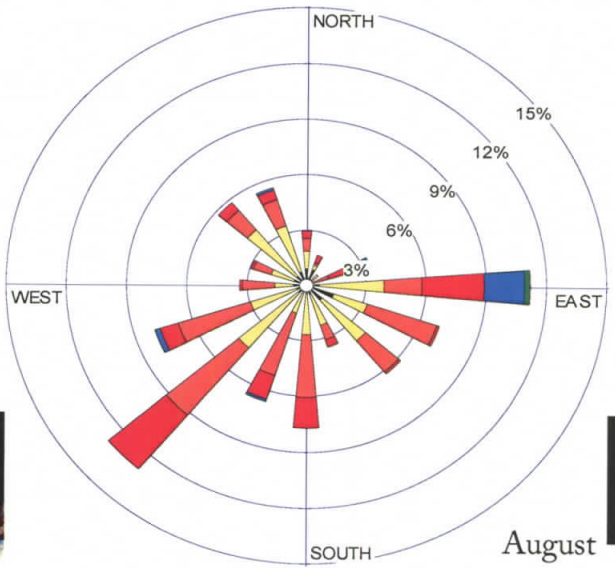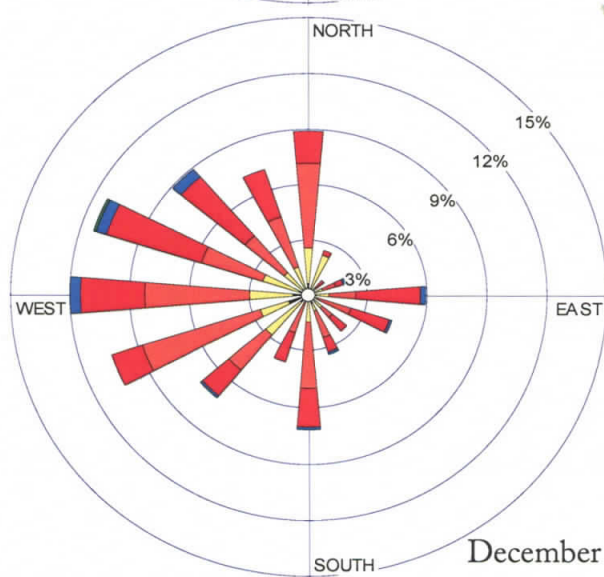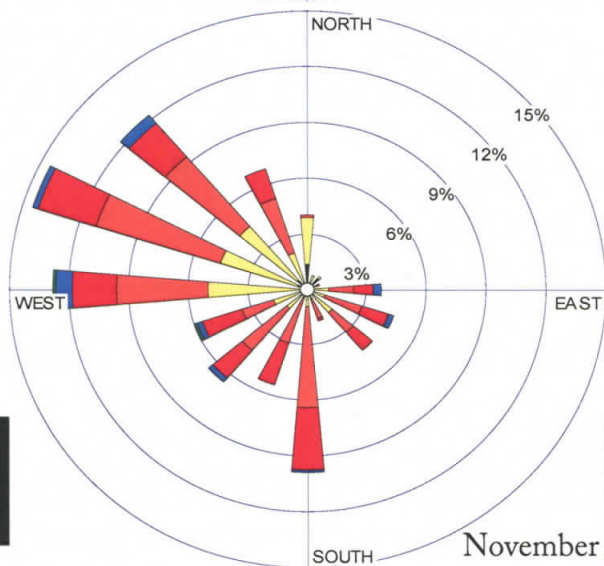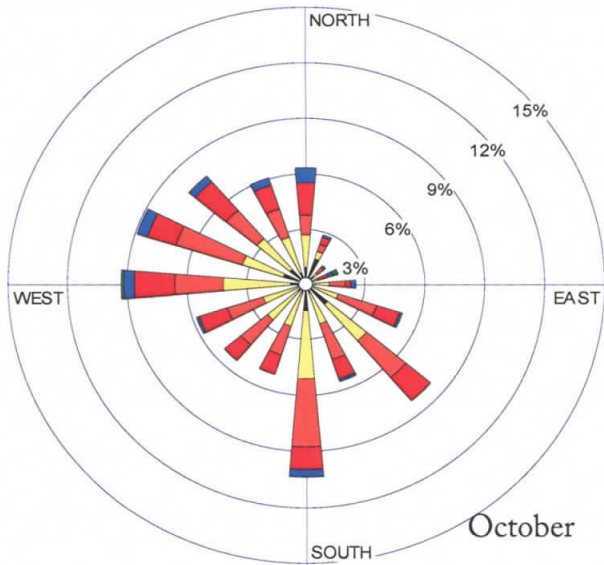
SITE

monthly

July

August

September

NORTH

15%
12%
9%
6%
3%

WEST

EAST

SOUTH

October

NORTH

15%
12%
9%
6%
3%

WEST

EAST

SOUTH

November

NORTH

15%
12%
9%
6%
3%

WEST

EAST

SOUTH

December

SITE   243

windANALYSIS

Winter

SITE

seasonally

Spring

Summer
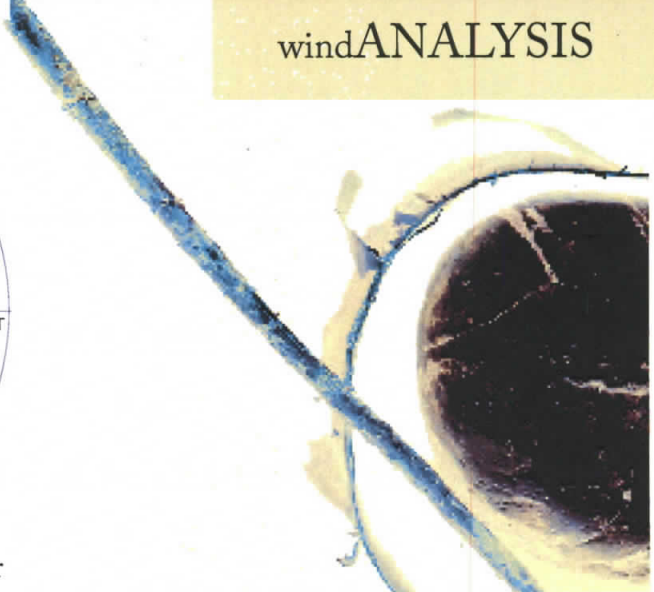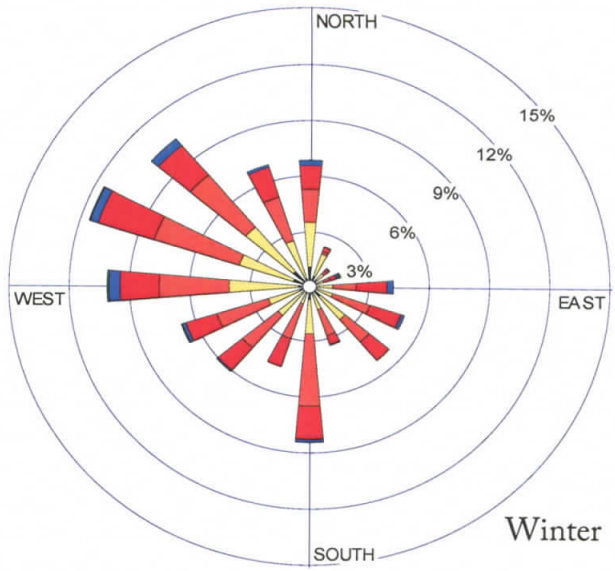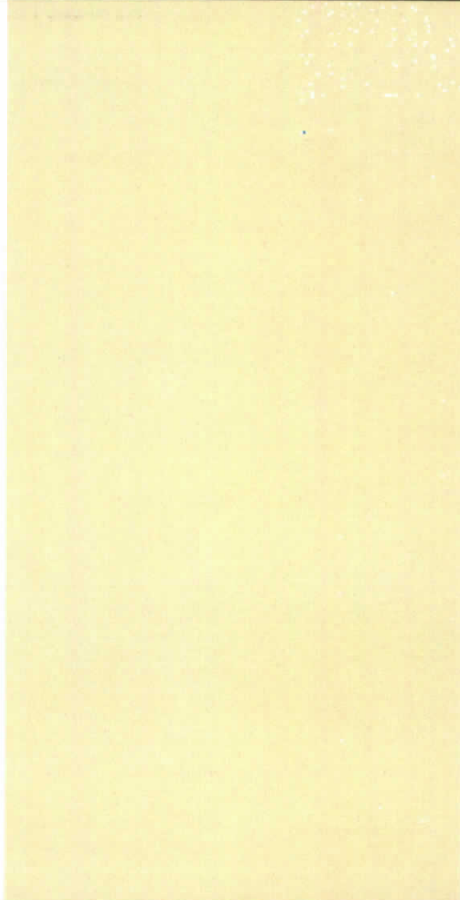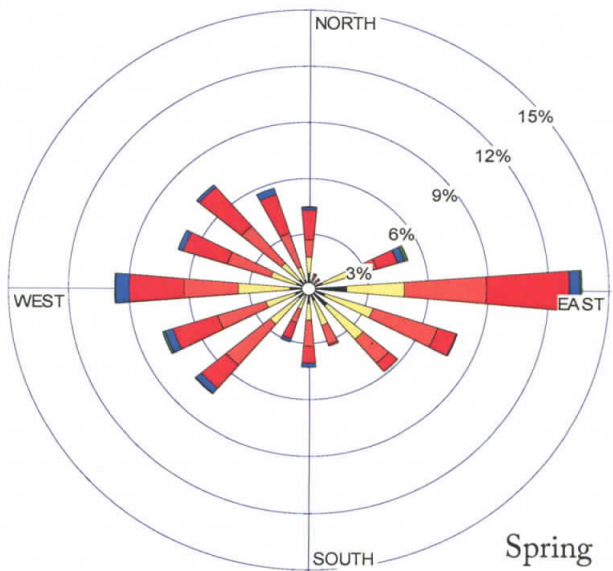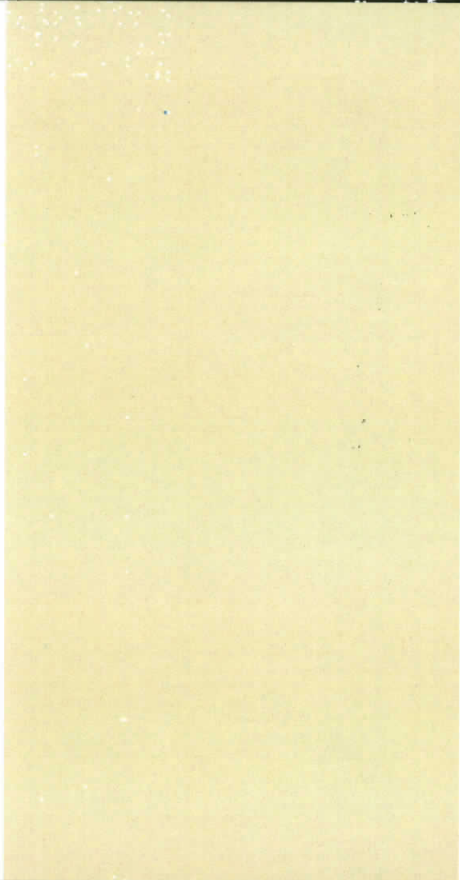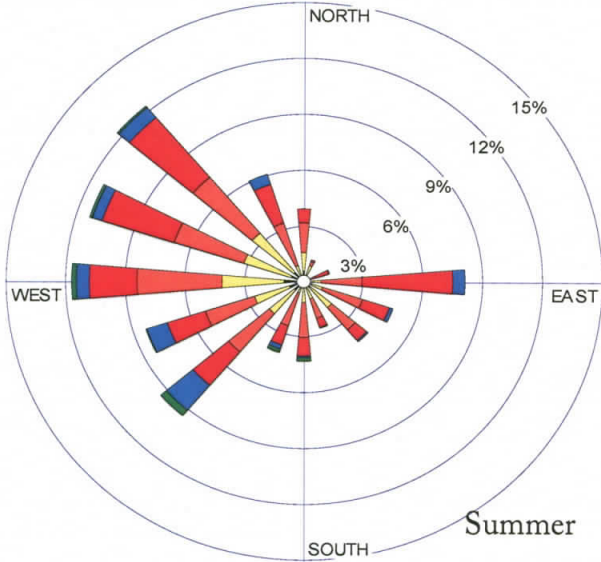
wind**ANALYSIS**
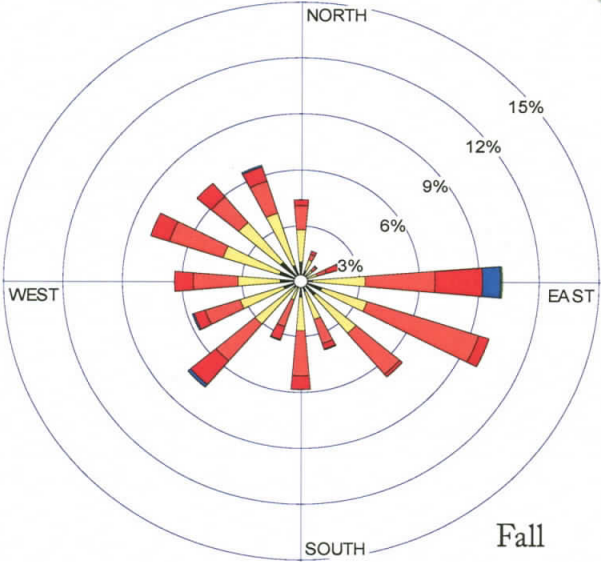
Fall

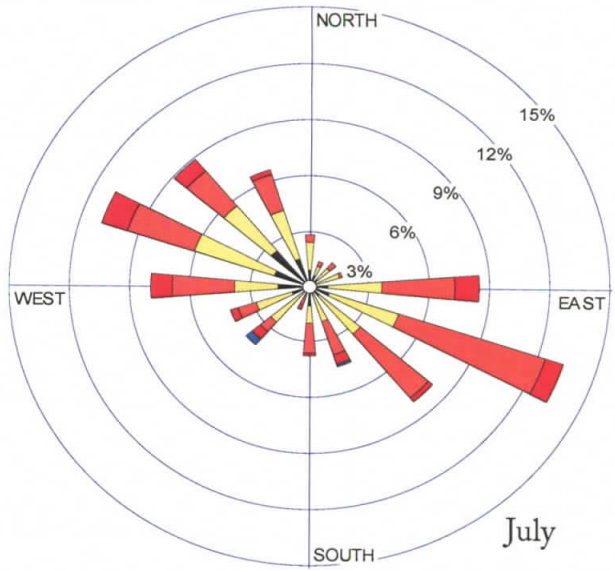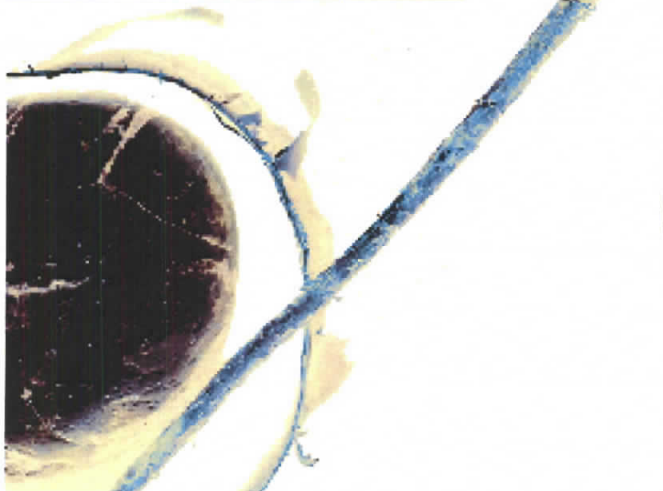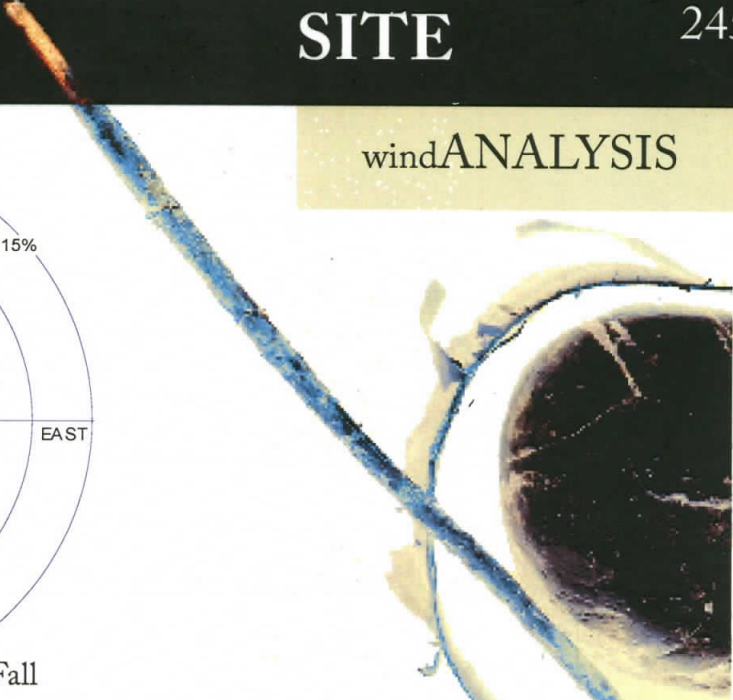| Duluth Temperature	Jan	Feb	Mar	Apr	May
Avg. Temperature	7.0	12.3	24.4	38.6	50.8
Avg. Max Temperature	16.2	21.7	32.9	48.2	61.9
Avg. Min Temperature	-2.2	2.8	15.7	28.9	39.6
Days with Max Temp of 90 F or Higher	0.0	0.0	0.0	0.0	< 0.5
Days with Min Temp Below Freezing	31.0	28.0	29.0	20.0	5.0

Duluth Heating and Cooling

	Jan	Feb	Mar	Apr	May
Heating Degree Days	1798	1476	1259	792	445
Cooling Degree Days	0.0	0.0	0.0	0.0	0.0

Duluth Precipitation

	Jan	Feb	Mar	Apr	May
Precipitation (inches)	1.2	0.8	1.9	2.2	3.0
Days with Precipitation 0.01 inch or More	12.0	9.0	11.0	10.0	12.0
Monthly Snowfall (inches)	17.9	11.5	13.6	6.6	0.7

SITE

Other Duluth Weather Indicators

	Jan	Feb	Mar	Apr	May
Average Wind Speed	11.6	11.3	11.8	12.3	11.6
Clear Days	7.0	7.0	7.0	6.0	6.0
Partly Cloudy Days	7.0	6.0	7.0	8.0	10.0
Cloudy Days	17.0	15.0	17.0	16.0	15.0
Percent of Possible Sunshine	48.0	53.0	55.0	56.0	57.0
Avg. Relative Humidity	57.0	73.5	72.0	70.0	65.5
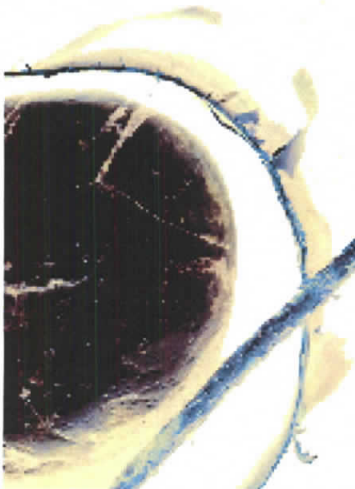
Jun	Jul	Aug	Sep	Oct	Nov	Dec	An
59.8	66.1	63.7	54.2	43.7	28.4	12.8	38.5
71.0	77.1	73.9	63.8	52.3	35.2	20.7	47.9
48.5	55.1	53.3	44.5	35.1	21.5	4.9	29.0
< 0.5	1.0	1.0	< 0.5	0.0	0.0	0.0	2.0
< 0.5	0.0	< 0.5	2.0	12.0	26.0	31.0	184
170	60.0	113	329	660	1098	1618	9818
14.0	94.0	72.0	0.0	0.0	0.0	0.0	180
3.8	3.6	4.0	3.8	2.5	1.8	1.2	30.0
13.0	12.0	11.0	12.0	10.0	11.0	11.0	134
< 0.05	< 0.05	< 0.05	0.1	1.5	13.0	15.6	80.5

Jun	Jul	Aug	Sep	Oct	Nov	Dec	An
10.4	9.4	9.4	10.4	11.2	11.6	11.2	11.0
5.0	7.0	7.0	6.0	7.0	5.0	6.0	77.0
11.0	13.0	12.0	9.0	8.0	6.0	6.0	102
14.0	11.0	11.0	15.0	17.0	20.0	19.0	187
58.0	65.0	61.0	52.0	46.0	35.0	39.0	52.0
67.5	72.5	74.0	76.0	73.5	72.0	75.5	77.5

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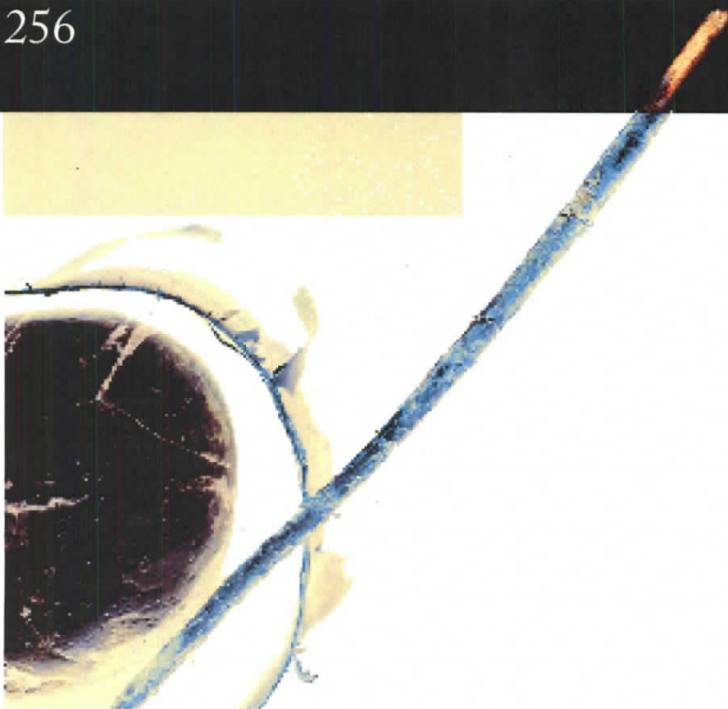
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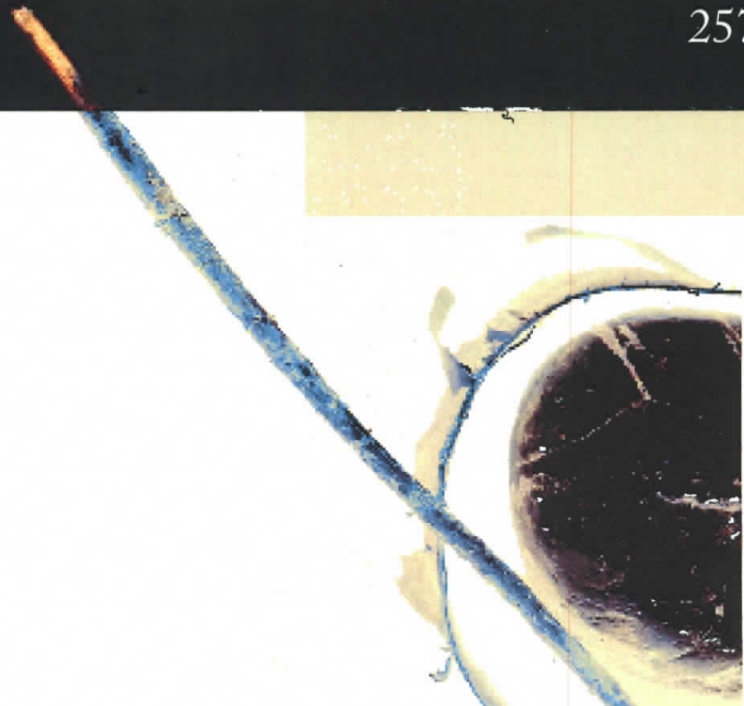
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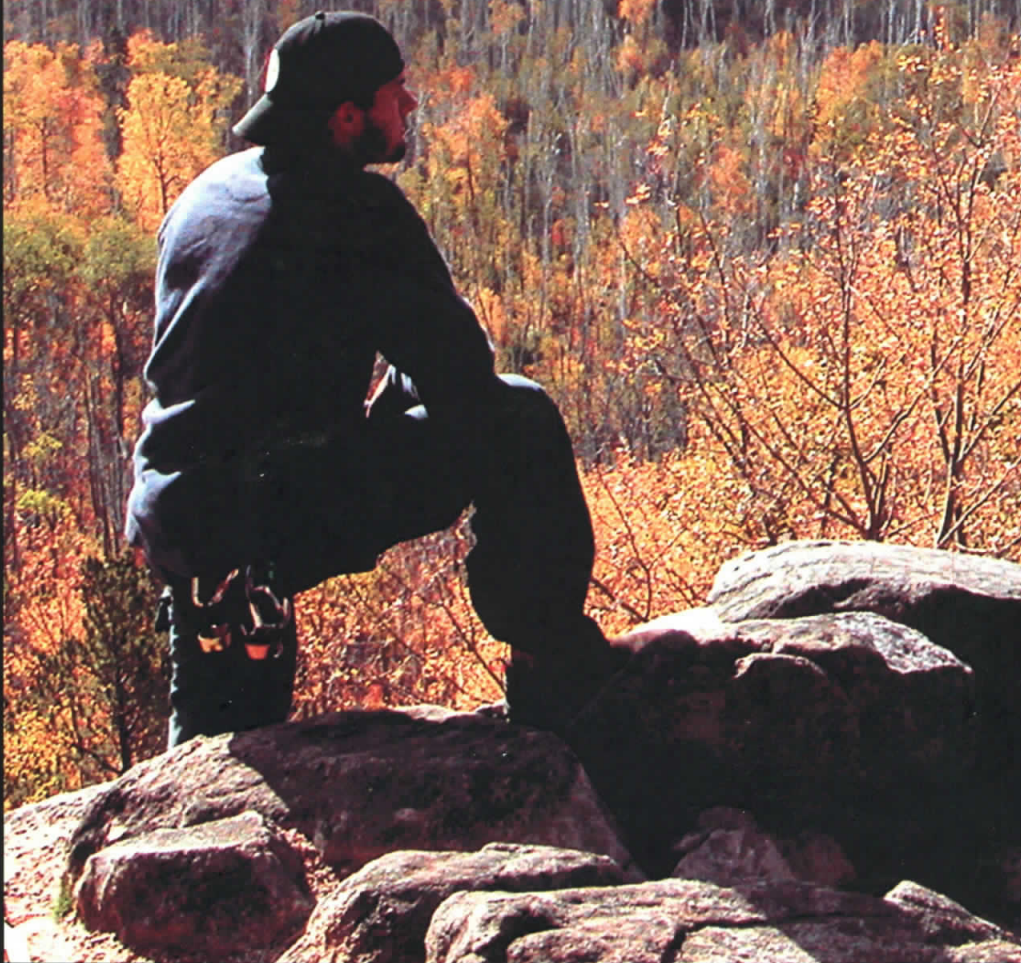
You've blessed me with friends
and laughter and fun
With rain that's as soft
as the light from the sun
You've blessed me with the stars
to brighten each night
You've given me help to know
wrong from right
You've given me so much,
so please Lord give me too
A heart that is always Grateful to you.

-irish blessing

May Peace find all who read this...
for with the Grace of God all is possible.

May 2005