

# Toward [Re]generative Environmental Design

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Thesis submitted to the faculty of Virginia Polytechnic Institute and State University  
in partial fulfillment of the requirements for the degree of

## Master of Architecture

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Michael J. O'Brien [Committee Chairman]

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## In Appreciation...

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# Toward [Re]generative Environmental Design



H. Frederick Oesch

...for our parent's parent's parents, our parents,  
our children, and our children's children's children...

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# Preface:

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## Tree of Knowledge:

Architecture is a unique art form, analogous to the “pure” arts, which affects the consciousness and experience of the participating observer. Architecture however, must embrace a more urgent and far reaching purpose and responsibility, with a direct relationship to the evolution and quality of life on Earth. Architecture must be synonymous with Environmental Design, as the integrated beneficial inter-relationship, between all external conditions and things, that affect the existence and development of the organism, individual, or group. Organism in this sense must be understood to mean our entire living universe, and the definition of environment to include the food we consume, the clothing we wear, the shelters we inhabit, and the biosphere

we live within. Thus environment is both the primary means and the end by which we may hope to influence our collective destiny. We are in an era when the esoteric ecologically negligent monuments to human ego of our past, no longer have meaning, or can be condoned in our future. Indeed, our future survival itself may well be determined by the environmental / architectural quality and opportunity we provide.

Our conceptions of reality, and our visions of the future are reflections of our own self-image. Thus our concepts of environmental reality must facilitate both the present and the future we desire for ourselves and our children's children, by reflecting and projection our evolving concepts of ourselves as Homo Sapiens. Environmental space-forms, both geophysical and built, in a sense,



determine our fate. Different spatial geometries directly affect the quality and types of interactions, relationships, and organizations which may take place. Personal, social, political, cultural, and spiritual fibers must all be seamlessly interwoven into an architectural fabric which nourishes the beauty and health of both our individual and collective home in the cosmos.

The focus of this thesis is not to document and substantiate the current state of our global environmental condition. It is assumed that the reader is well aware of information on this subject, and has already drawn personal conclusions, regarding the magnitude of the situation. We must not make the mistake however, to assume that technology can get us out of the situation that technology has gotten us into. And the important point is, even if our current condition is “sustained”, and doesn’t get any worse, it could be so much better for us all. While not a prediction or a prescription, the hope is to enlighten and inspire the reader / participants’ mind, to reveal what can be done, to suggest perhaps what should be done, but not what must be done. It is hoped that this work will help to facilitate our transition from an ailing

diagnosis, into a healthy prognosis, through the appropriate application of knowledge, and simple loving care.

We have eaten from the Tree of Knowledge, and the fruit can never be replaced, once it has been taken. Our hope lies in using our knowledge with humility, appreciation, and reverence, to “divinely conceive” the rebirth of our innocence lost. Hence we will not be expelled from our earthly garden. It is this, that together, we must unlearn to do.



# Introduction:

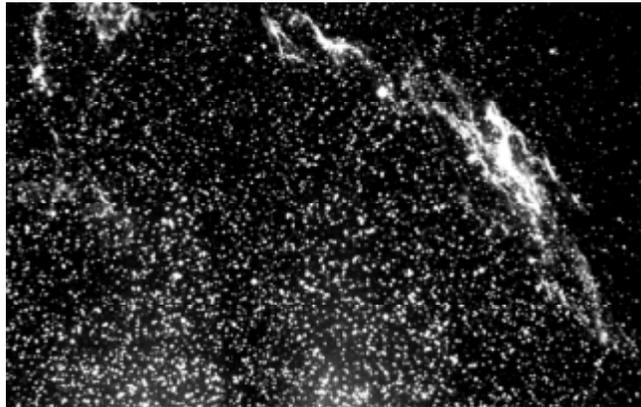
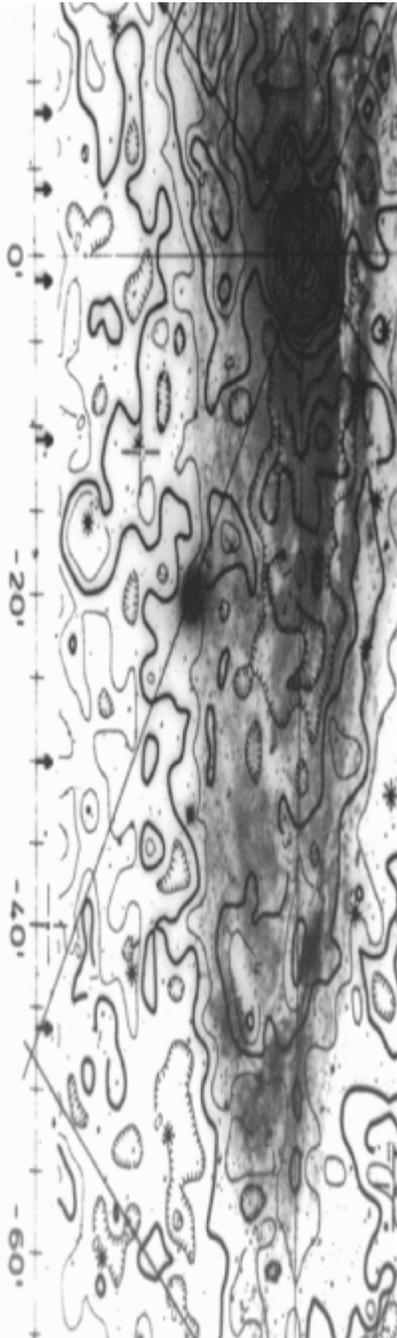
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"We must learn  
to think not only  
logically, but  
biologically as  
well"

[David Wann: *Bio Logic*]

Autochthonous architecture is a literal reflection of the prevailing environmental forces that effect it.





...what is the true extent of life in the universe?

The earth's biosphere is like the cambium of a tree, where life exists only in the wafer-thin layer just beneath the bark. "Humans live at exactly that meeting point, with our feet on the earth, our walking heads in the air."  
[Christopher Day: *Places of the Soul*]

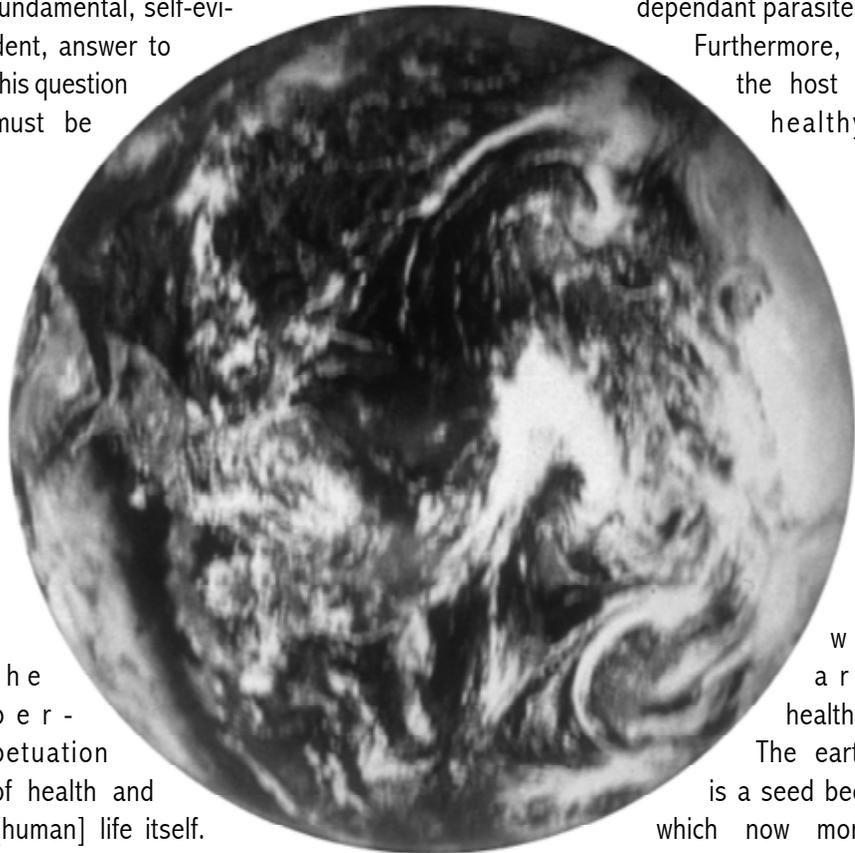
The quest to transform an essential idea into a reality bestows Mankind with meaning. This process of transformation is called design. The question of how best to approach design is directly related to the philosophical world view of the designer. Questions of religious belief, morality, ethics, and vision, contribute toward the formulation of a fundamental functional basis, from which and by which "wise" design can be compared and verified. Thus the philosophical world view is of paramount importance, as it forms the sextant and compass with which to measure the world, and chart a chosen course.

But what are the underlying principles by which choices and decisions should be made, and not another? Of all the possible present and future scenarios we can



conceive of, which one(s) do we collectively most wish to have fulfilled, and why? We're on board and ready to go, but to where, and how is the best way to get there from here? And if we don't really wish to become cybernetic robots after all, what DO we wish to become? How can we make the greatest contribution to ourselves, and facilitate our chosen course?

The most fundamental, self-evident, answer to this question must be



the perpetuation of health and [human] life itself.

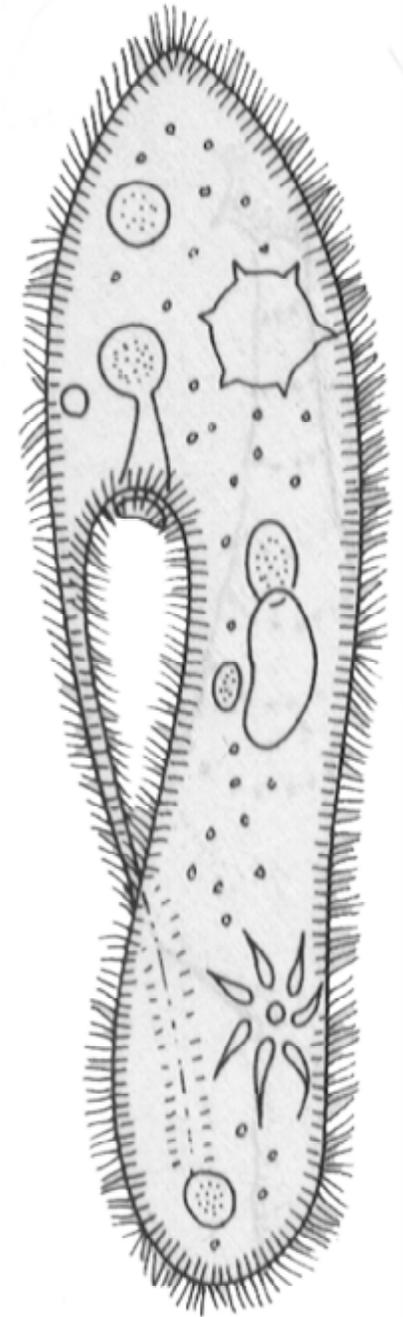
If we are extinct, any well intended desire, dream, or endeavor is mute. To preserve that basic condition, it only follows that whatever can be done to purify and enrich our world organism is to our universal benefit. There is no reason why design and the architectural act of building, can not become a nutrient, rather than a toxin to our global body. We cannot kill the host, of which we and all other life on this

planet, are ultimately co-dependant parasites. Furthermore, if the host is healthy,

we are healthy. The earth is a seed bed, which now more

than ever before, cries out to either be left alone, or to be nourished and lovingly cared for.

But beyond the basic prerequisite of survival, is the more compelling theory that the earth is, in essence, a [single] living organism. Developed by James Lovelock in the 1970's, the "Gaia Theory" asserts that life creates, and maintains, the conditions for its own existence. According to Lovelock, this is what accounts for the fact that the earth has maintained a relatively narrow temperature range, suitable to sustain life, over the last three and a half aeons. The solar output has increased substantially over the same period of time, yet the earth has not overheated. He concludes that there must be some global self-maintaining system at work, and the "system" is none other than life itself. Furthermore, the earth may be analogous to a cell, within the larger universe organism. If this is true, and perhaps even if it is not actually, this view has a profound influence on our conception of "self", and of our position within the whole. It begs to once again ask the question that mankind has always asked: What is the meaning and place of the individual self, within the greater total self, of which we are all a part?



## Mechanistic Self:

Self-  
starting  
feeding  
operating  
monitoring  
defrosting  
propelling  
inspecting  
correcting  
regulating  
reconstructing



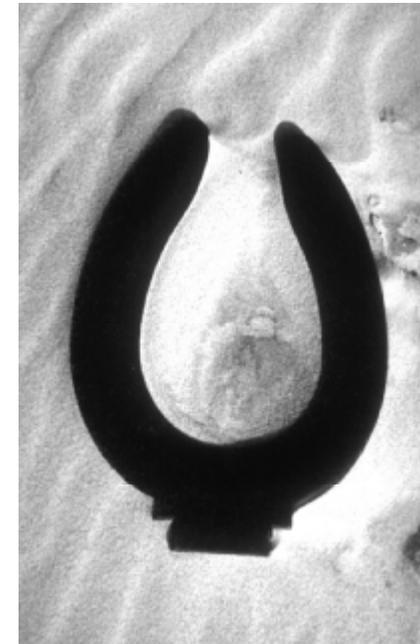
*...so what happened?*

*Human beings are not machines, and architecture is not "machines for living".*



Like Icarus, we have flown too close to the sun, and it has melted our waxen wings.

We can not continue to throw things away... there is no "away".



# Definitions:

## Environment =

The aggregate of external circumstances, conditions, and things that affect the existence, development, and well being of the individual, group, or organism.

Environment includes the full range of scale, from micro- to macro-, from the sub-atomic to the cosmic. This includes: food, shelter, clothing, the biosphere, and ultimately the universe.

Environment includes both [External] surroundings, and [Internal] containment.

## Sustainable =

To endure without yielding; to withstand. To undergo or suffer, as a loss or injury. To maintain the status quo, keep in effect or being.

## Regeneration =

To cause complete moral and spiritual reform. To produce grow or form anew; re-create. To impart spiritual life by divine grace.

Autogenesis, Inspiration, Sanctification  
Rebirth and Renewal

## Vitalistic Self:

### Self-

awareness  
love  
protection  
observation  
preservation  
control  
determination  
inspection  
correction  
nourishing  
conservation  
sufficiency  
adaptation  
healing  
renewing  
fertilization  
perpetuation  
enriching  
expression  
communion  
exaltation  
actualization  
righteousness  
[re]generation

A distinction needs to be made between the "Mechanistic" Self and the "Vitalistic" Self. Although we associate the term "self" with many technological inventions, i.e., self-starting, self-regulating, etc., machines do not have a self. Self requires a certain awareness of being. Only life has this awareness and the ability to regulate its own functions. It is precisely this awareness of being alive which results in the most fundamental actions being taken to maintain life, to reproduce, and to grow. It is this force which causes the cells on one side of a plant stem to thicken, bending it toward the light. Biologically based, life is inherently the only self-fixing mechanism. It is the only anti-entropic device. Ironically, it is the only possible perpetual motion machine.



...in the beginning

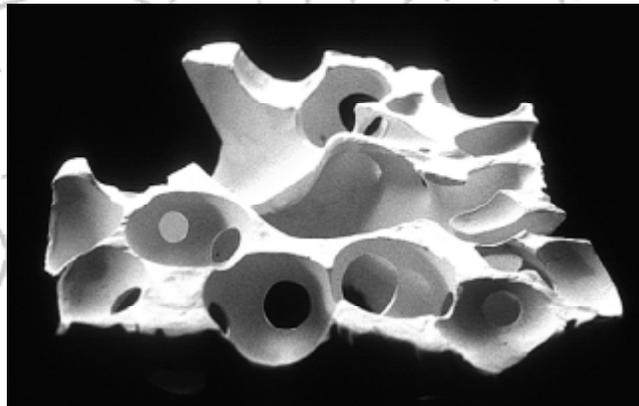




"Shape clay into a vessel;  
it is the space within that makes it useful.  
Cut doors and windows for a room;  
it is the holes which make it useful.  
Therefore usefulness comes from what is not there."  
[LoaTzu: *Tao Te Ching*]

Design is an assemblage -- a heterogeneous conglomerate -- by its nature  
a nonlinear process.

Architecture which is most revered and enduring, is a manifestation of its  
archetypal tectonic source.



"The organic form is innate... it shapes as it develops itself from within."

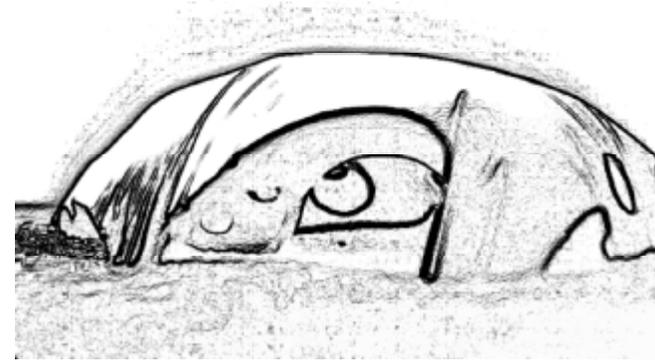
[Philip Ritterbush:  
*The Art of Organic Forms*]

## Destiny by Design:

The shape of the universe is directly related to the question of its ultimate destiny. Form, in a sense, is fate. Different spacial forms directly influence the types of activities and social interactions which may take place therein. Indeed, rate and quality of growth is a direct function of environmental opportunity. A plant will grow to fill the space that is available and contains it.

This position fully concedes however, that the ultimate fate of mankind is an infinitely more complex responsibility than architecture alone can assume. Society, culture, and religion often determine the forms of our buildings, rather than the other way around. Architecture can not dictate human nature, nor is this the objective. It can however, be a powerful tool for facilitating a desired way of life and human interaction.

"The myth of physical determinism is simply stated. It is the idea that if you place a person in a new environment you will change his character and behavior. This is not entirely false, but it is certainly not entirely true, and if it were it



...the room as womb





internal functional spacial pressures pushing out, and external ambient contextual forces pushing in. It is precisely at this boundary that architecture exists. It is the strongest force of all... it is the force of the thing itself.

## "Form is the habitat of Life."

[G. Bachelard: *The Poetics of Space*]

Organic structural form is the material inverse of the invisible energy forces channeled within. Such are the forms of the bones in our bodies. In addition, every material or composite requires its own unique proportions, especially in section, to achieve structural soundness. Variation of materials applied to the same shape, will

would be horrifying. Many of the anti-slum campaigners have made assumptions -- that if you clear the slums you will have no poverty -- and the analogy can be usefully pursued to produce the axiom that if you burn all the lifeboats you will have no shipwrecks."

[Eugene Kamenka: *Utopias* p.111]

Like the wafer-thin life yielding cambium of a tree, or the biosphere of our planet, architectural form is a "dynamic fluid". It is a flexible surface boundary membrane, in continuous fluctuation, expanding-contracting, inhaling-exhaling, maintaining homeostasis, between



inevitably and unavoidably result in variation of form. Thus, an efficient structural system does not need to conform to an idealized traditional rectilinear geometry. Indeed, a cursory observation of natural structures shows that cubes rarely occur. Nature frequently utilizes apparent distortions of ideal mathematical forms because the distortions are more efficient and economical. The need for diversity as a function of the response to unequal extrinsic and intrinsic forces suggest forms which are asymmetrical. Therefore, "optimum" forms occur between the crystalline and the amorphous. It turns out, they are also the most beautiful.

Forms are most beautiful that exist at the margin between order and disorder, with an overall arrangement of elements which imply a symmetry, which can never actually be found. This would suggest that beautiful forms exhibit a "balance" between seemingly unrelated elements. However, balance is by definition a static condition. Harmonic resonance, rather than balance, is a more dynamic life enriching condition. But even harmony requires a certain degree of discord to maintain stability over self-destruction. This is the reason

for breaking cadence when crossing a bridge, or counter-weighting the seismic whiplash effect in tall buildings. It is the sympathetic harmonic vibration that shatters the wine glass with it's own resonate sound frequency. Harmony does not annihilate diversity. Quite the contrary, it requires it.

Optimum forms are endlessly repeating, with ever changing variations, which are different every time. They are minimum inventory / maximum diversity, [least effort / maximum advantage] organizations. This is the source of the awe we feel, as we observe each unique snowflake that falls on our dark woolen sleeve. This is the form of the earth and the patterns of rivers and mountains. This is the form of air and the turbulence of clouds. This is the form of fire and the lick of the flame. This is the form of water and the action of waves. In it's purest sense too, this is the form of design and architecture as a way of life.

# Criteria for Wise Design:

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Design is not a  
"Problem"  
needing a  
"Solution"...

## Symbiotic Unity:

It is the position of this thesis that the most beneficial method by which we can make choices is to arrive at an appropriate means of conception, a way of seeing and doing, rather than through conventional problem solving techniques. Careful forethought and preventive measures are better than solutions, even brilliant solutions.

Nor should design be considered as a "Program" requiring a "Resolution". It is even somewhat of a misnomer to label design as a "Process". It can not be so constrained by a formula or sequential deductive analysis. It is so easy to overlook one vital link in a causal chain, and there are always more factors to consider.

Designers should choose an initial position which enhances the possibility of discovery, growth, and evolution. We must

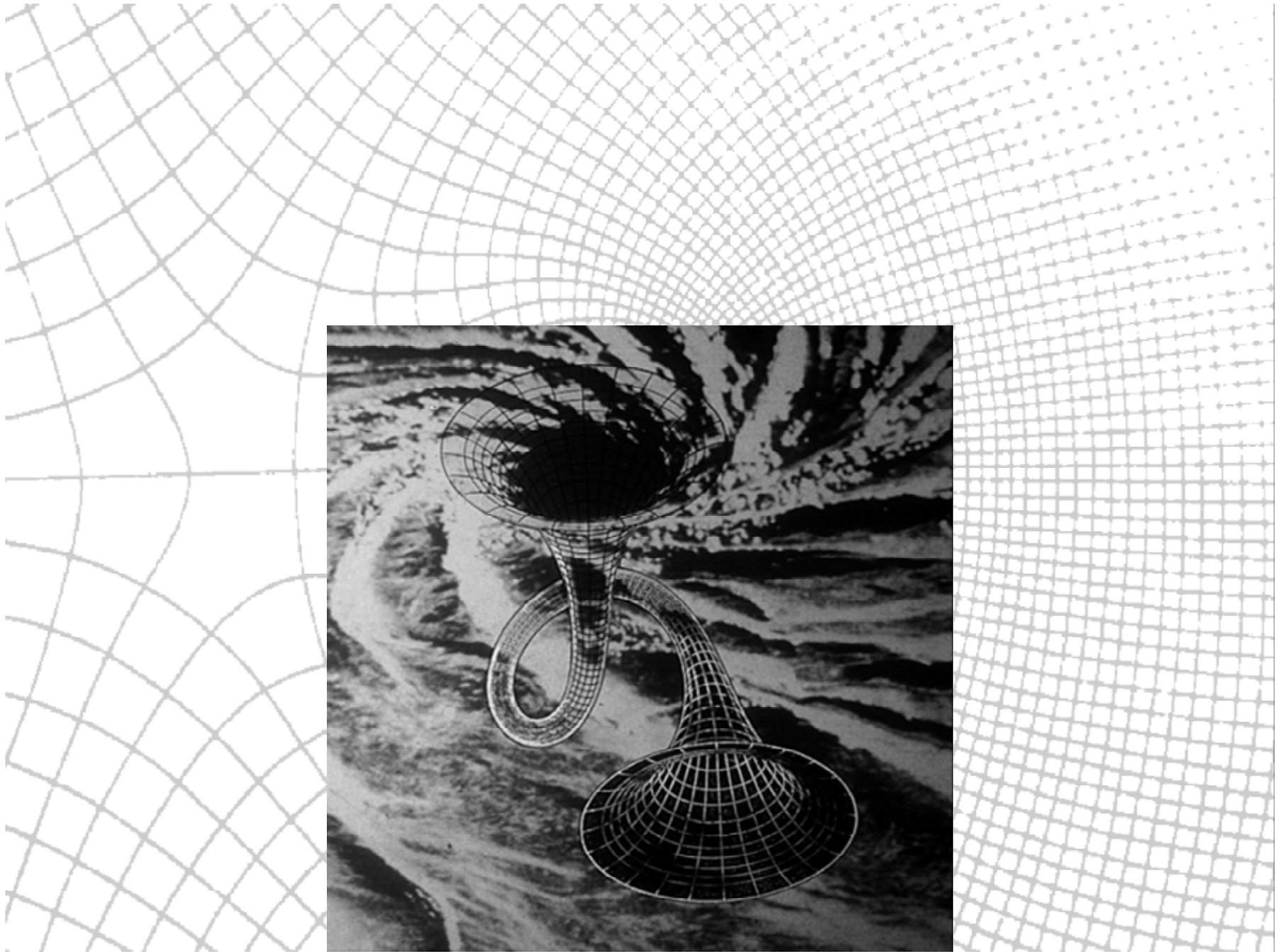
retain a certain spontaneity, in order to avoid becoming slaves of analysis, and "factor in" fluctuation as a normal part of the overall process. The challenge is to weave a living tapestry, from the complimentary coloured threads of logic and instinct, reason and emotion.

New mental constructs may be used to bring design back to the spiritual dimension of man. We may be misdirected into a condition which is overly analytical and process oriented. Reason is not always the best way to arrive at solutions. The soul can perceive as self-evident what seems incomprehensible to mere reason. Instinct and intuition, acquired and consolidated over millennia, may be a more comprehensive and reliable directive.

The five criteria by which we can most effectively evaluate and choose between design alternatives include:

- 1] Appropriateness:
  - Timeliness
  - Fitness
  - Expedience
- 2] Suitability: [relative to condition, circumstance, time]
  - Expedience
  - Timeliness
- 3] Fitness: [relative to intention, and aspiration]
  - Health
  - Timeliness
  - Expedience
  - Preparedness
- 4] Expedience:
  - Desirability
  - Advisability
  - Fitness
  - Timeliness
- 5] Timeliness:
  - Seasonableness
  - Opportuneness
  - Expedience
  - Appropriateness

Design is a  
Way of Life...  
a Way of Doing



# Principles of Regenerative Design:

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"The essential nature of a tree... is neither confined to its roots, nor to its trunk, its branches, twigs, or leaves, nor to its blossoms or its fruits. The real nature of the tree lies in the organic development and relationship of all these parts... in the totality of its spacial and temporal unfoldment.



Though root, trunk, branches, leaves, blossoms, and fruits are potentially present in the undifferentiated oneness of the seed, it is only when they are unfolded in space and time, that they become reality to us."  
[Lama Anagarika Govinda: *Foundations of Tibetan Mysticism*]



"The quality of life is just like that: it cannot be made, but only generated."

[Christopher Alexander: *The Timeless Way of Building*]

## Principles of Regenerative Design:

- 1] Life as a Way of Design / Design as a Way of Life.
- 2] Reflection of Evolving Regional Society, Tradition, Culture, and Religion.
- 3] Utilization of Indigenous Technology, Materials, and Labor Skills.
- 4] Direct Response to Micro-climate and Seamless Site Integration.
- 5] Minimum Inventory / Maximum Diversity Systems
- 6] Direct Designer / Builder / Inhabitant Participation
- 7] Inseparability of Rationality and Emotion
- 8] Net Resource and Energy Production
- 9] Self-Regenerating 'Living' Systems

## Living Architecture:



Many practical factors reinforce the application of an earthen “Living Roof” system. In addition to the initial construction cost, these include reduced energy consumption and operating cost, and life cycle maintenance cost.

There is a notable distinction between a “Living Roof” building, and an “Earth Sheltered” building. Earth shelter typically connotes an underground building, earth bermed on most of its exterior walls, with earth covering the majority if not all of its roof. While there may be many localized situations where such a design

strategy is most appropriate, it is a more specialized case than is being suggested here. A living roof building is essentially above ground, with increased opportunity for omnidirectional natural daylighting, ventilation, views, and access. It affords none of the, primarily psychological perceptions of earth shelter, as dark, stuffy, cold, damp, and entrapping.

In theory, a living roof never needs to be replaced, and once established needs little or no maintenance! If monitored and cared for, a living roof can be self-sustaining and maintaining indefinitely, i.e., regenerating. The care

involved requires no more than a typical lawn or garden, and even this is optional. A living roof may even perform best if just left alone. By allowing it to grow, mature, die, and fertilize itself, the cycle of regeneration is perpetuated. A well detailed living roof system should however, continue to function properly, i.e., not leak, even if it is “dead”. The proper utilization of modern materials, combined with a design strategy of built-in redundancy, can insure against human neglect.

A living roof eloquently exemplifies the very definition of “shelter” itself, as protection from the elements, and these include:

- Extreme sunlight
  - [Ultra-Violet Radiation]
- Thermal Shock
  - [Rapid Temperature Fluctuation]
- Water, Ice, Acid Rain
  - [Freezing and Thawing Cycles]
- Oxidation
  - [Rust]
- High Winds
- Natural Cooling
  - [Self-shade and Transpiration]]
- Wildfire
- Seismic
- Ambient Noise

Furthermore this protection includes the building’s structure itself, as well as for the inhabitants. This in turn helps to insure the building’s longevity, and likelihood to remain cared for over time. And in the event the building is abandoned and left to ruin, the transition back to the land (providing new habitat for animals in the process), will be one of dignity, beauty and grace. Living roofs return to the site, at least as much as the building footprint has trampled away. From a bird’s perspective, the site changes very little, or even improves with the availability of safe new nesting sites, wildflower seeds, or perhaps a bird bath water fountain.



“For years the Norwegians have used the organic roofed house. When the house is first constructed, birch bark is laid as a sealer. Then squares of pasture dirt, about five inches thick, along with roots and grass, are laid over the bark. As the seasons pass, the mat perpetuates itself, root intertwines root, and the roof becomes a solid whole. Rain and weather only strengthen it. In winter the dead stalks of grass hold the snow for effective insulation. The spring rains beat the grasses down to shed the excess water, then bring the roof to life again. In summer the grasses grow long and effectively reflect the sun’s heat. As the years pass, the roof renews itself from season to season, needing little or no maintenance. Visually, the house blends into the forests and pastures, becoming part of its environment.”  
[Craftsmen of Necessity ]

Thus, a living roof can be a self-preserving, maintaining, sustaining, healing, renewing, perpetuating, regenerating, and I would argue enriching shelter system. Of course today we have modern materials and methods available to us which provide better options than birch bark. The current strategy is to achieve maximum planting efficiency, with minimum organic support, and its associated weight. In this way any additional structural and logistical requirements, and their related costs, are minimized.

The built landscape as a mural... a mosaic [both figurative and literal] of walkways, plazas, and dwellings.



# Lessons of Traditional Building:

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The white deeply walled narrow streets are effective barriers against the hot sun and winter winds, providing both shade and reflected light into every corner.





## Matera, Italy:



Map of Madera, Italy. An imprint of the meeting of chaos and order.

One of the oldest cities in the world, architectural artifacts from over 4,000 years of continual habitation may be observed from the canyon rim. Contemporary building foundations are literally built upon older foundations, which ultimately are built upon the ruins of Neolithic cave dwellings, some still in use.





The fusion of the natural terrain and the built environment. The dynamic interplay of light, shadow, and form is constantly changing through out the day, as is the spacial experience with every step.

Indigenous technology is utilized to cut local sandstone into architectural building blocks.



Ancient olive trees which adorn the landscape are revered for their bounty, which continue to bare.

Carefully sculpted stone steps provide dry footing, while allowing for effective storm water drainage.



Cinque Terre, Italy:





Seamless site integration... where the architecture appears to literally *grow* out of the natural landscape.

Preservation of the surrounding landscape is established by the compactness of the towns.

Site, place, and building must converse in the form language vocabulary for a meaningful dialog to occur... and the designer / builder / inhabitant is the translator.

Timeless elegant solutions, ironically do not comply with some contemporary codes, which tends to deprive us of such rich architectural fabric.



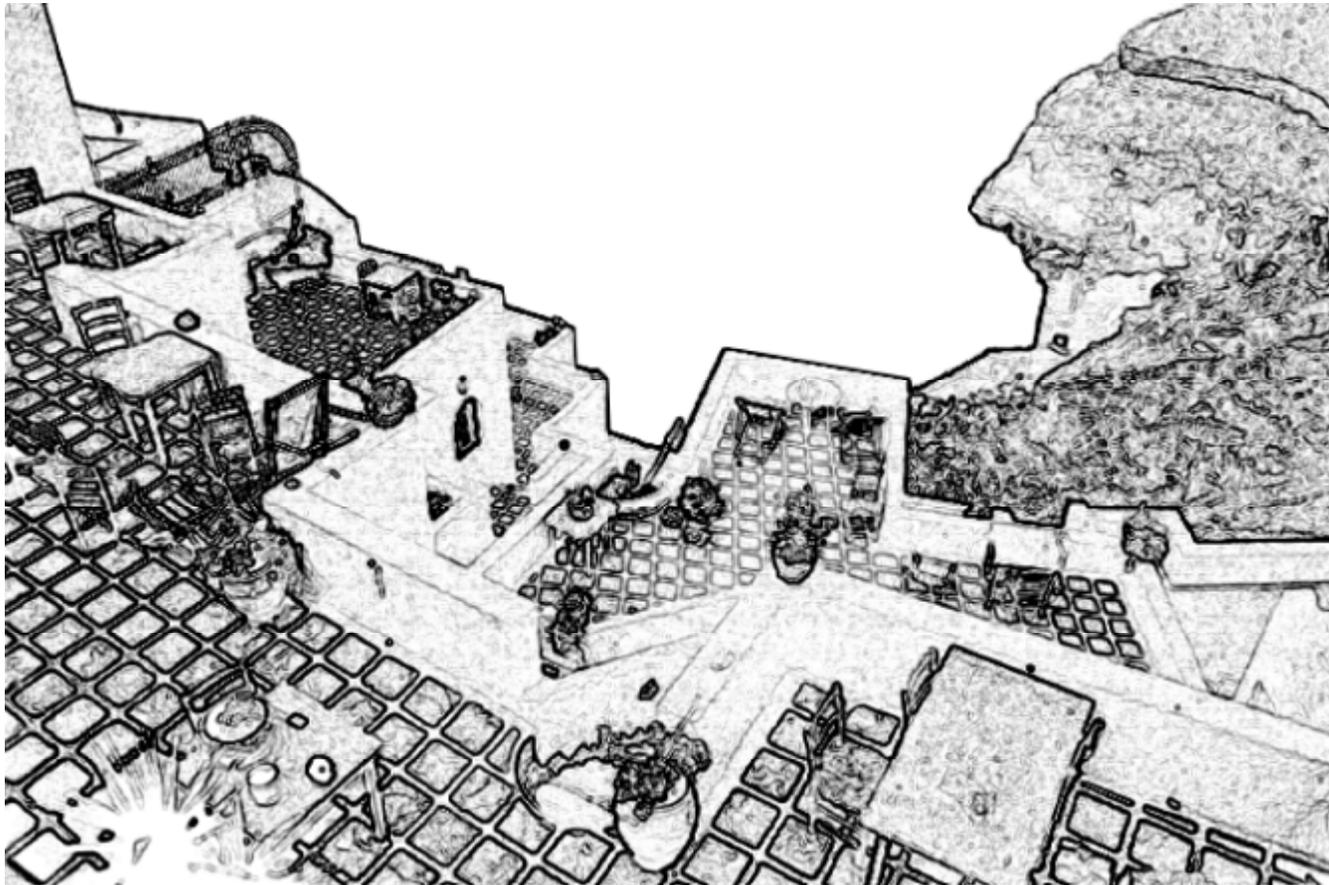
# Santorini, Greece:



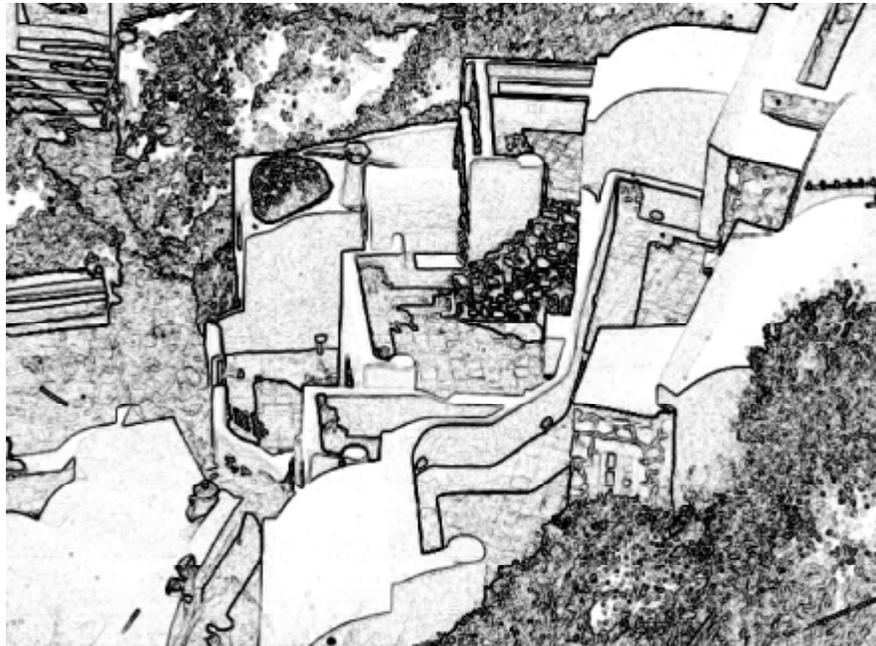
Santorini [Thira] was the site of the largest cataclismic volcanic explosion in recorded history. Originally round, in 1450 B.C. the massive geological event transformed the island into the knife edge crescent shape that it is today. The resulting tidal waves and earthquakes are also responsible for the downfall of the Minoan civilization on

Crete. The original island may even have been Atlantis. Santorini is an example of regenerative environmental design at its finest. Inhabited continuously for the past four mellenia, new construction continues today, in accordance with the same traditions upon which it was founded.

Every step is an exciting adventure, as the spacial experience is ever changing and unfolding.



Harmony does not annihilate diversity... it requires it.



This is an architecture truly "of" the earth, within and upon which it is built. The stable yet relatively soft volcanic pumice is excavated with small hand picks. The larger stones are used for exterior walls and barrel vaults, and the pumice is mixed with cement to make mortar. The whole effect is rather like white icing on a large chocolate cake.



The profound and sometimes whimsical attention to detail, is a living testament to the inhabitants labor or love.



"...an incredible variety of shapes, each separate unit unrepeated, but leading inevitably to the next one and to the whole..."

[Ayn Rand: *The Fountainhead*]



"At every stage  
the place needs  
to be both  
complete... and  
also allow  
opportunities for  
future growth."

[Christopher Day:*Places of the Soul*]



It is difficult to distinguish an ancient ruin from new buildings under construction. It is common practice for new construction to be incorporated into, and built upon the foundations of the old, maintaining continual recycling, reuse, and regeneration. Contemporary urban practice is to raze the old and build anew in its place, with little contextual historic fabric preserved. Thus, the embodied energy, the heritage, and the story are lost.

New additions or configurations look as though that was the way it always was... and was always meant to be.

Even before the builder puts away his hammer, the destructive forces for nature start decomposing the newly completed structure: the wind erodes, the sun dries, the rain leaches and washes, and the animals, insects, and organisms of decay, eat at it.

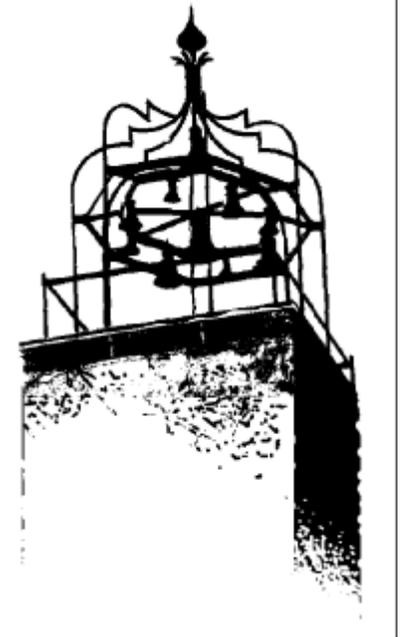
Reverence for the ruin. Historic preservation is practiced by virtue of simply being allowed to remain.



An architecture which exists due to the unconscious unremitting activity of the force of life itself.

...to bring together seemingly disparate elements, by showing their hidden or unsuspected unity

....to treat the part in such as way as to suggest the whole.



More action  
than object...  
these buildings  
are as  
inseparable  
from the  
inhabitants that  
build them, as  
from the land of  
which they are  
built.



There is virtue in the record of the mark of the tool... the dialog between the mark, and the marked upon. The hand that delineates is thus a visible extension of the mind that conceives.

There is an unfortunate tendency in contemporary design, particularly with the current obsessive use of CADD, to overspecify the optimum level of precision required. This is partly the result of

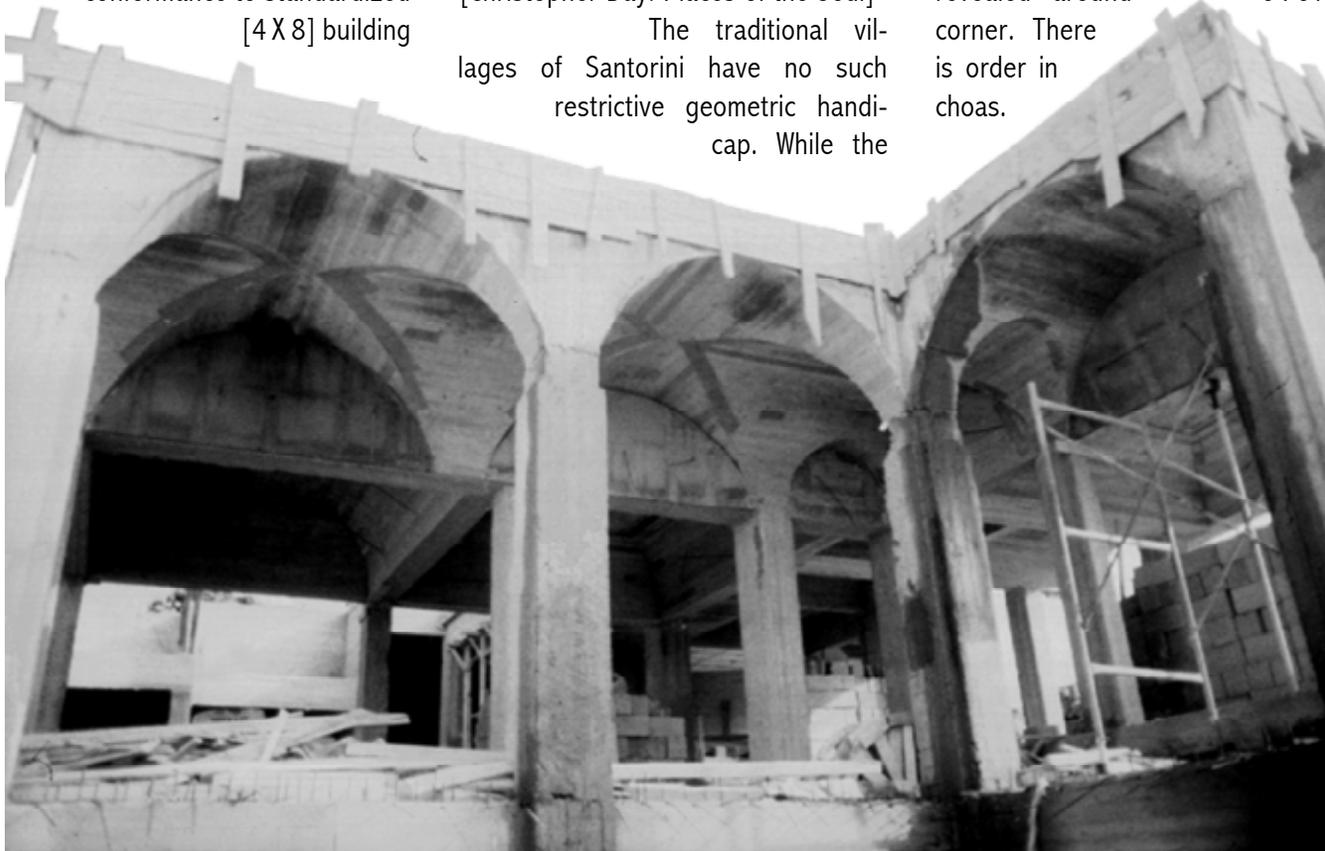
conformance to standardized [4 X 8] building

components, combined with the rather limited capabilities of current popular CADD programs and users skill. CADD is most adept at drawing repetitive rectangular elements, which exhibit a bi-lateral [mirrored] symmetry. "Computer systems have their place as aids to fulfilling our intentions; too often however they have a shaping influence upon these intentions, leaving no room for living processes of design, construction, use and maturation."

[Christopher Day: Places of the Soul]

The traditional villages of Santorini have no such restrictive geometric handicap. While the

floor plans are essentially rectilinear, there is rarely a right angle. While elevations of individual vaults are basically symmetrical, the overall composition of forms and spaces is rarely bi-lateral. The result is a richly varied, and exciting architectural landscape, which changes dynamics and reveals new vistas with every step. It is an architecture that one never tires of, because there is always a new discovery waiting to be revealed around every corner. There is order in chaos.



"Between the mind that plans and the hands that build there must be a mediator, and this must be the heart"

[*Metropolis* the Movie]



This elegant staircase stands with the dignity that it's builder imparted.

# Contemporary Applications:

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## Living Architecture + Self-Design:

The most beneficial way of directing natural forces, is through the use of organic systems, working with and channeling the forces, rather than trying to dominate and overpower them. Less work is required to build, little maintenance is necessary, and longevity is achieved with the creation of a self-regulating system... a living system. In this way the designer / builder treats architecture as an organism that he brings to life, and then, by its own mechanisms of self-renewal, allows to sustain itself.

...one may sow and cultivate the seed, but it grows the flower.

"The primary goal of sustainable design is to lessen the harm poorly designed buildings cause by using the best of ancient building approaches in logical combination with the best of new technological advances. Its ultimate goal is to make possible [buildings] that are net producers of energy, food, clean water and air, beauty, and healthy human biological communities." [Rocky Mountain Institute]

Children's Learning Center featuring Solar "Catcher" Domes



"The Present,  
grown out of the  
past,  
needs to be  
both complete  
in itself and  
open to the  
future."

[Christopher Day:*Places of the Soul*]



Early "honest" mistakes.

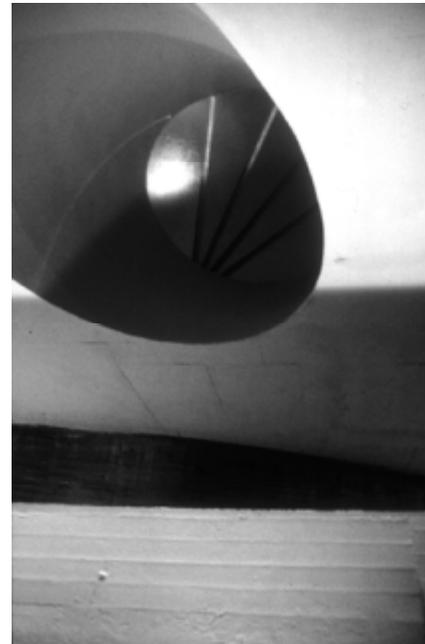
While early examples of "Solar" architecture are founded upon good intention, they suffer from the same brutal misguided approach as the Industrial Revolution... that mankind must dominate Nature to achieve his aims. This sometimes resulted in buildings that were every bit as beautiful as the back of a refrigerator.

Adaptive reuse can sometimes reflect exceptional ingenuity and a sense of humor, as in this example of an industrial artifact transformed into condominiums.



## La Tourette Convent:

Designed by Le Corbusier (1887-1965) at Eveux-sur-Arbresle, near Lyon, France, built from 1957 to 1960, this monastery is one of the earliest and finest examples of modern ecologically responsive architecture.



Here the inspired juxtaposition of sculptural yet functional form, expressed through the use of rough formwork and raw exposed concrete, creates a rhythmic chant, as a welcome guest upon the natural landscape.

Natural daylighting and solar access are optimized through the innovative use of sculpted skylights.



Living earth roofs return to the land what the building's footprint has taken away, provide a grassed roof terrace for observing the surrounding natural area, and a private place for spiritual contemplation.



The building's sculpted forms anticipate the natural forces that might have shaped them.



# Residence at Windy Ridge:

## Abstract:

Even with all the knowledge and wisdom we can acquire, combined with the best of collective intentions, it will always be the case, that ultimately we have to balance what's desirable with what's possible. But what's possible always proceeds us, like a carrot in front of our nose. Yet yesterdays dreams, could have been today's reality... and perhaps today's dreams, can become real tomorrow.

"Too often budget restrictions are used as the reason why good design is not possible, but the vernacular demonstrates over and over that fine, low-budget, small-scale design is possible if the designer [builder and inhabitant] cares."

[Wayne Attoe: The Architecture of Ricardo Legorreta ]

In this case, the project is a new rural family residence for a couple and their son, with an adjacent cottage for their aging parents. With a collective desire to design, build and live in the most ecologically responsible manner possible, the challenge is to integrate as many environmentally beneficial principles as logistics and budget constraints will allow. The result is a collaborative choreography of site, structure, materials selection, and sequence.

The appropriate criteria by which a given structural system or material should be specified, is relative to the total system performance and longevity. Optimized performance is achieved through the correct inter-relationship of elements, to maximize the greatest cumulative benefit. For example, the high embodied energy and

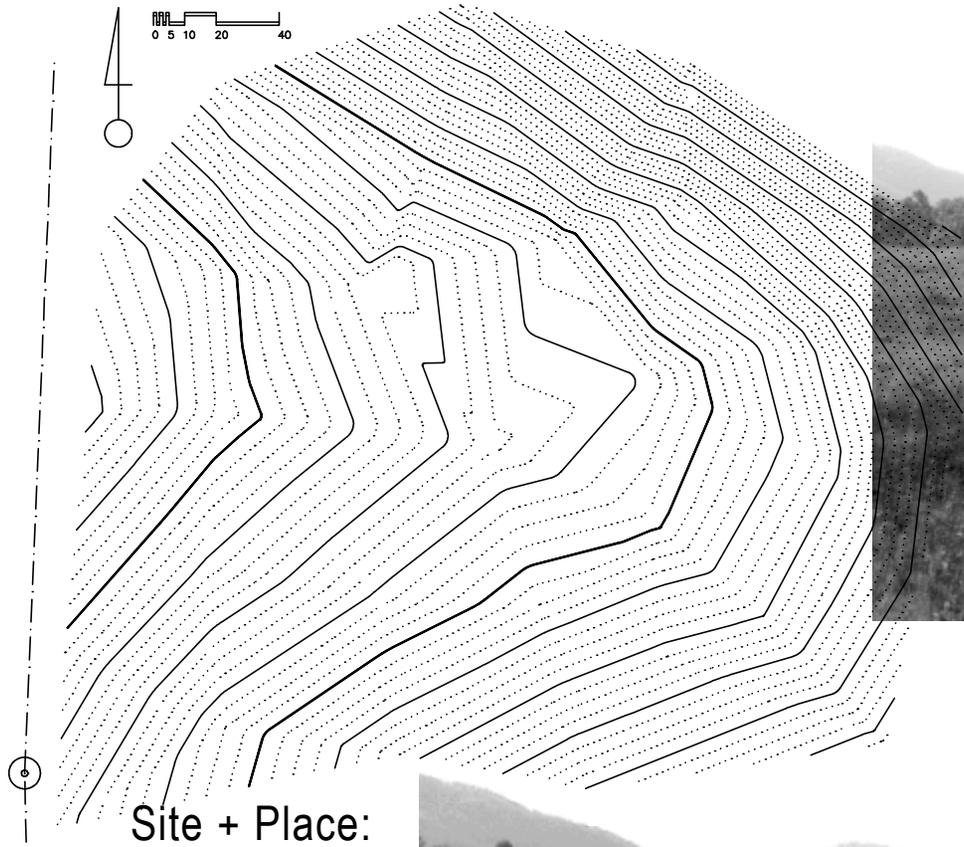
pollution from the manufacture of extruded polystyrene [XPS] insulation is undesirable. However, because of its high R-value, moisture resistance, compressive strength, and dimensional stability, it is currently the best insulation available for below grade applications. Its use makes a living sod roof practical, which may have an enormous overall positive impact, but otherwise might not even be possible.

"The most elegant design solutions... those that reduce complexity while solving multiple problems... won't be found by considering each item in isolation."

[Alex Wilson and Nadav Malin: Environmental Building News, 10.95]

In keeping with the principles and intentions cited earlier, the decision was made to build a [passive solar / straw bale and heavy timber / living roof] home.

The result is a collaborative choreography of site structure materials selection and sequence.



### Site + Place:

Straw Bale construction homesite looking toward the South with "on grade" Living Roof terrace.



The integration of architecture into the site, should be analogous to non-invasive surgery.

Homesite looking toward the Northwest, with Living Earth Roof System and Guest Cottage Silo.

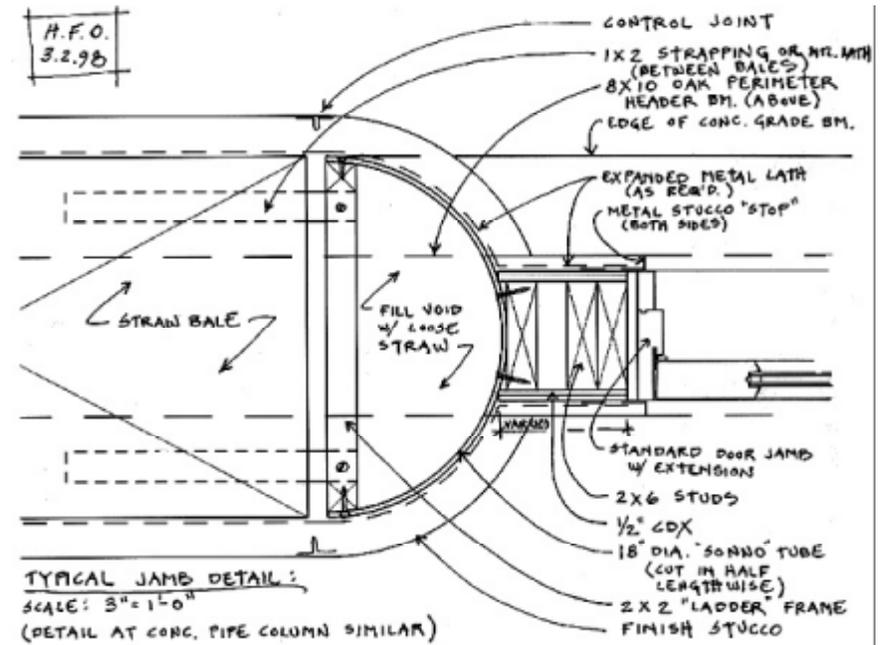
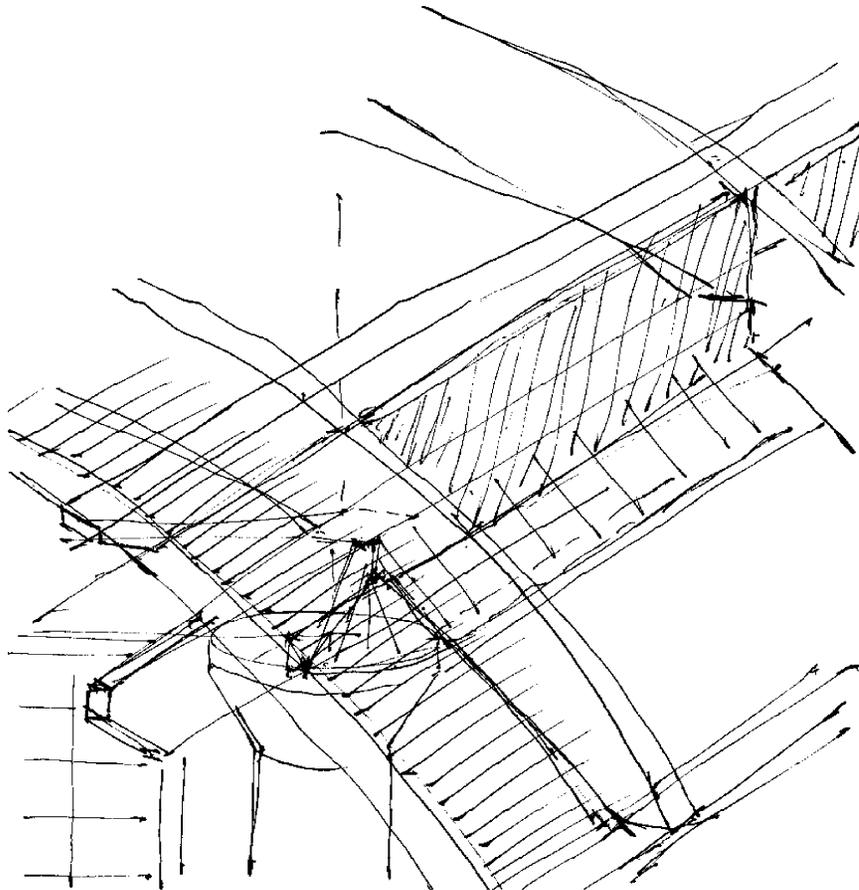


Entry Perspective looking toward the Southwest

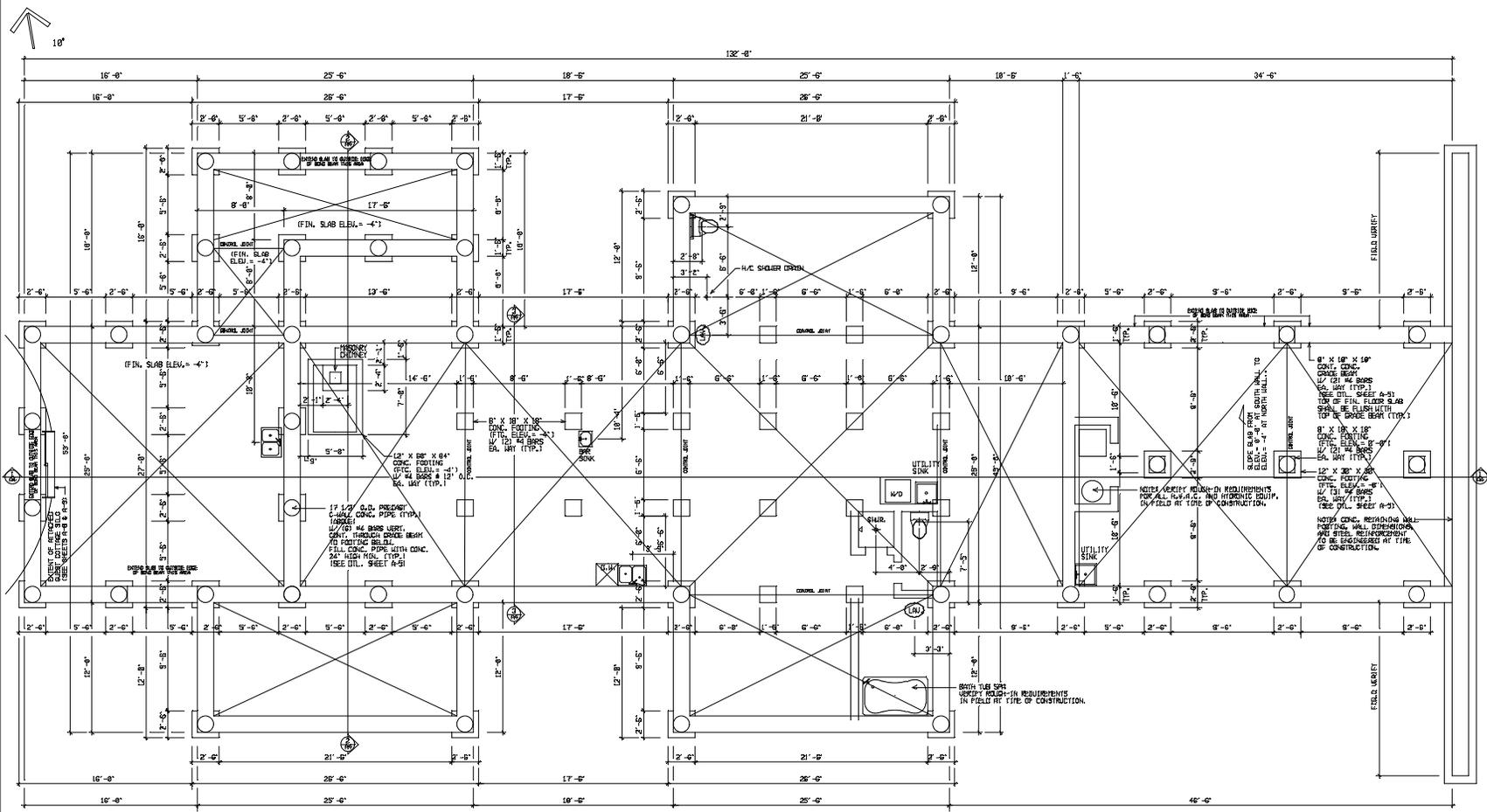


# Residence at Windy Ridge:

## Materials + Structure:



The strategy is an independent free-standing structure which will support a living roof, and permit the flexible definition of unrestricted interior space and exterior [straw bale] wall infill. By building the roof first, this “top-down” approach also provides immediate shelter for working during inclement weather, and for storage of construction materials, including the straw. The use of standard 18" dia. precast concrete water pipes as primary structural load bearing and lateral members, achieves this practically. The system also facilitates simple window and door integration.



SCALE: 1/4" = 1'-0" **1** FOUNDATION PLAN:



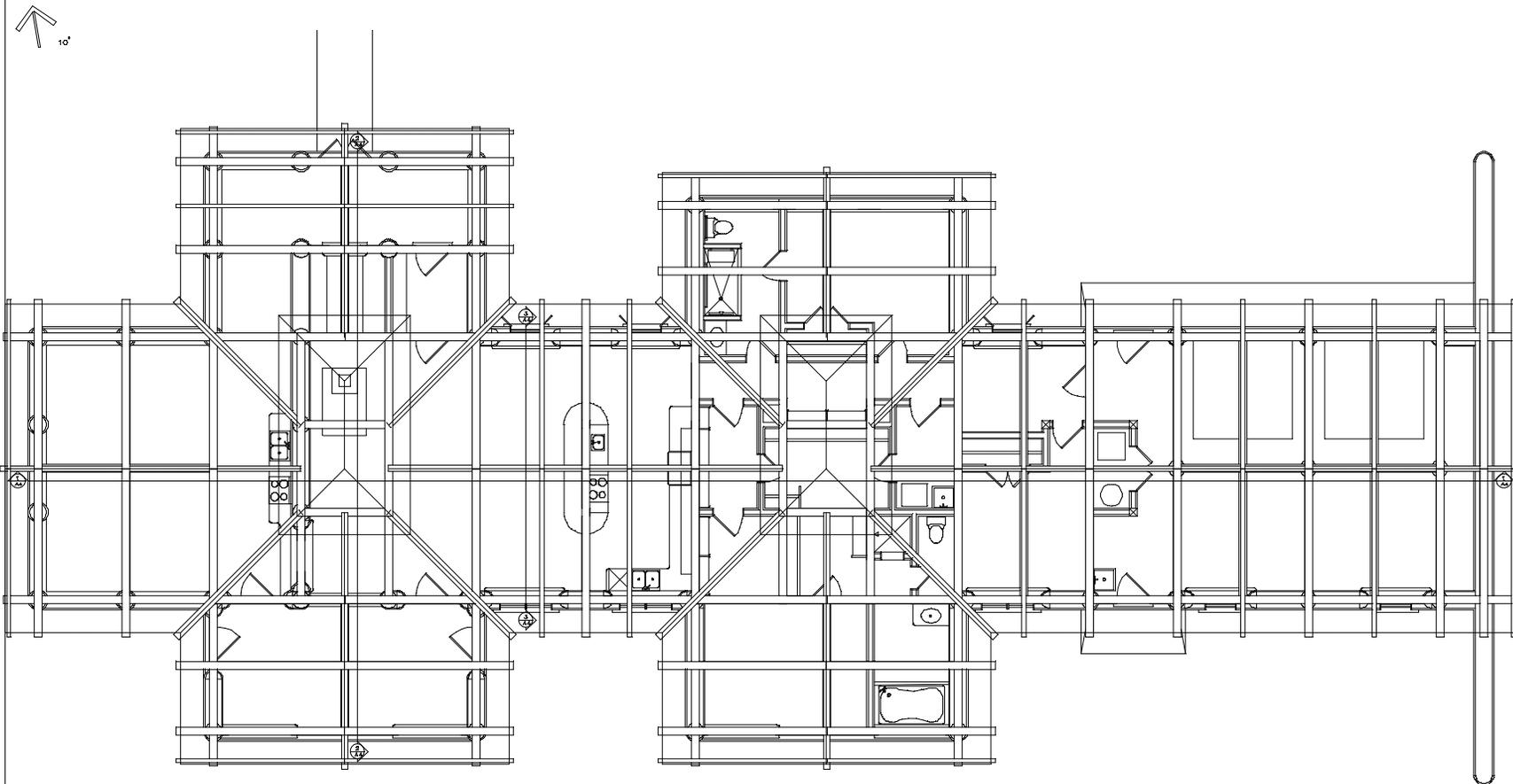
105 9th, St. N.W.  
 CHARLOTTEVILLE  
 VIRGINIA, 22902  
 Tel - 804.917.9919  
 Fax - 804.296.6170  
 email - k@coaschdesign.com  
 http://www.coasch.com

Residence for Jacque Battle and David Frank  
 WINDY RIDGE  
 Bedford County, Virginia

RESIDENCE FOUNDATION & PLUMBING ROUGH-IN PLAN

DATE	07, 15, 99
SCALE	1/4" = 1'-0"
DATE	01.97
SHEET	9





SCALE 1/4" = 1'-0"

1  
A7

CEILING, COLLAR TIE, & ROOF FRAMING PLAN:



108 7th St. N.W.  
CHARLOTTEVILLE  
VIRGINIA 22902  
Tel + 804.977.9919  
Fax + 804.296.6710  
email + oeschenvi@aol.com  
http://www.oeschenvi.com

Residence for Jacque Battle and David Frank  
WINDY RIDGE  
Bedford County, Virginia

RESIDENCE CEILING, COLLAR TIE, & ROOF FRAMING PLAN

DATE

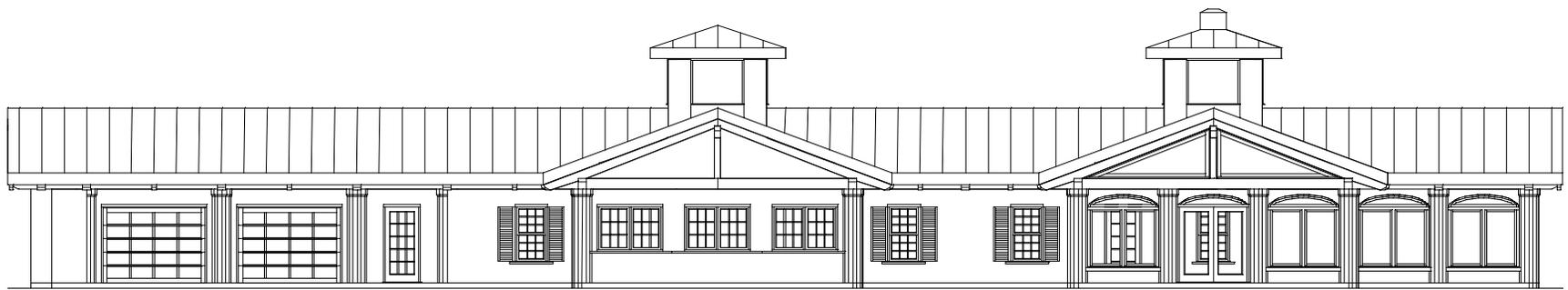
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SCALE 1/4"=1'-0"

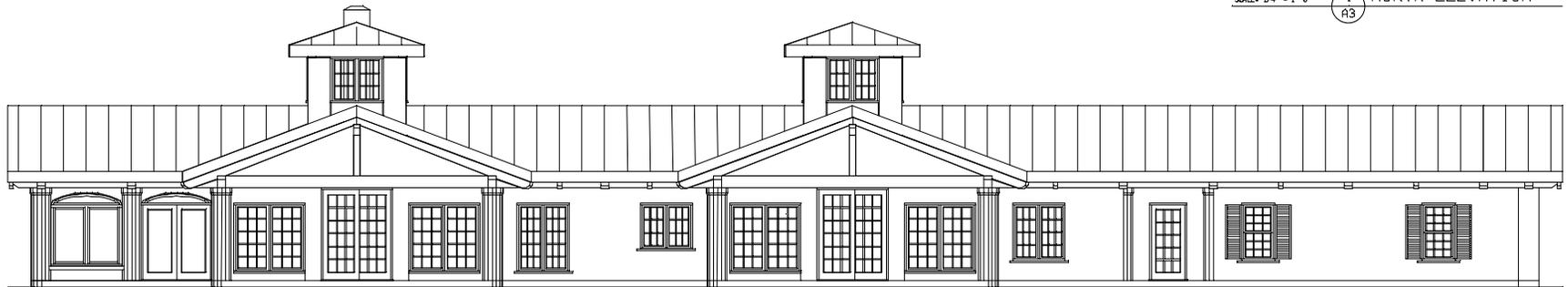
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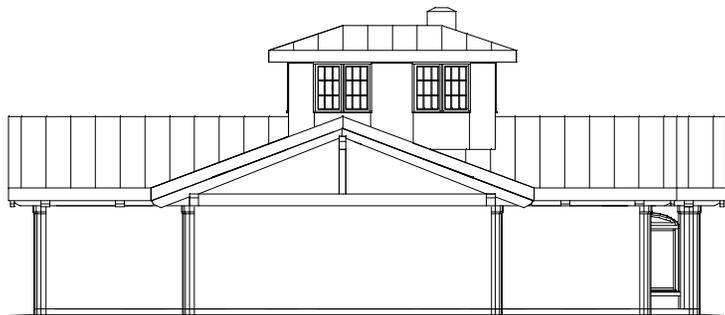
A7 9



SCALE: 1/4" = 1'-0" 1  
A3 NORTH ELEVATION:



SCALE: 1/4" = 1'-0" 2  
A3 SOUTH ELEVATION:



SCALE: 1/4" = 1'-0" 3  
A3 EAST ELEVATION:



SCALE: 1/4" = 1'-0" 4  
A3 WEST ELEVATION:

**Oasch Environmental Design**  
  
 108 2ND. ST., N.W.  
 CHARLOTTEVILLE  
 VIRGINIA, 22902  
 Tel.: 804.977.9919  
 Fax.: 804.296.8710  
 Email: oaschenv@earthlink.net  
 http://www.oasch.com

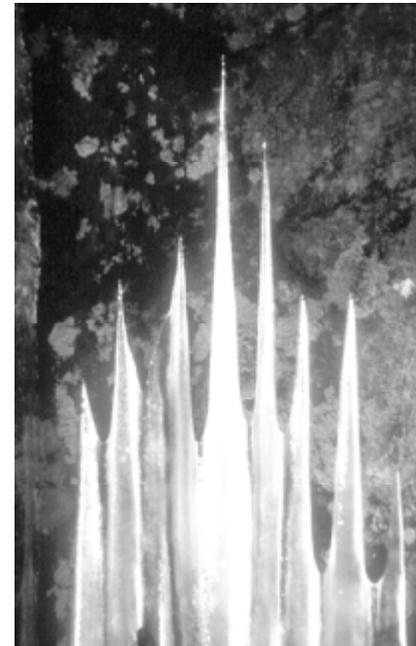
Residence for Jacque Battle and David Frank  
 WINDY RIDGE  
 Bedford County, Virginia

RESIDENCE EXTERIOR ELEVATIONS

DATE:	07.15.98
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SCALE:	1/4" = 1'-0"
DATE:	101.97
SHEET:	A3
NO.:	9

"Intuitive  
knowledge and  
spontaneous  
feeling merge  
here into an  
inseparable  
unity."

[Lama Anagarika Govinda:  
*Foundations of Tibetan Mysticism*]

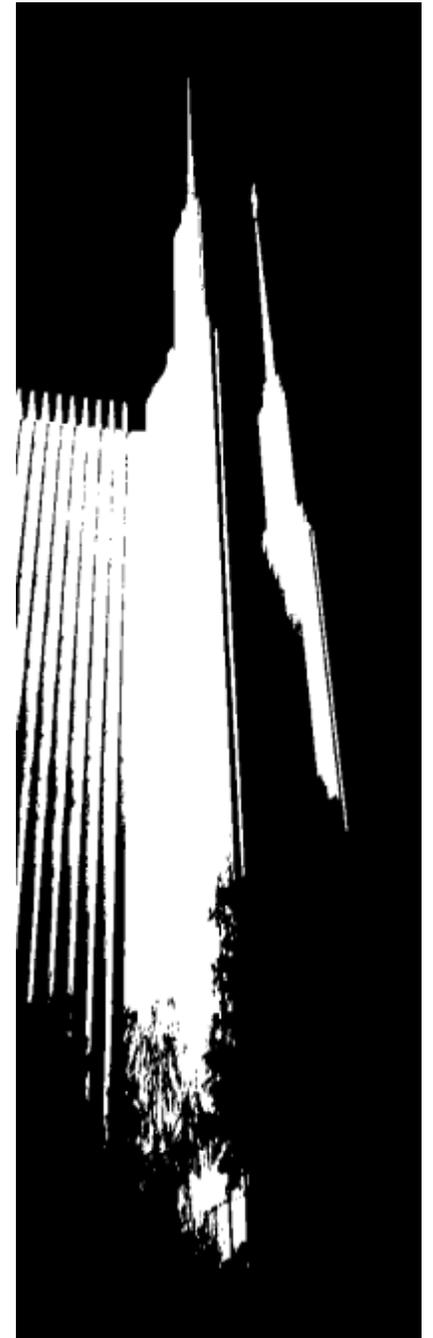


# Summary + Conclusions:

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"The cherry bloom has fallen  
revealing a temple  
rising between the trees."

[Buson]



## Blossom In the Seed:

The place of man is not only to live in harmony with nature, but also to exult, celebrate, and express the great sense of awe, wonder, and creativity of mankind. Thus, ecologically responsible architecture need not be anonymous, unseen, and unexciting. Quite the contrary, it should be a stimulating artistic expression and testament, of the people who design, build, and inhabit the buildings of their dreams.

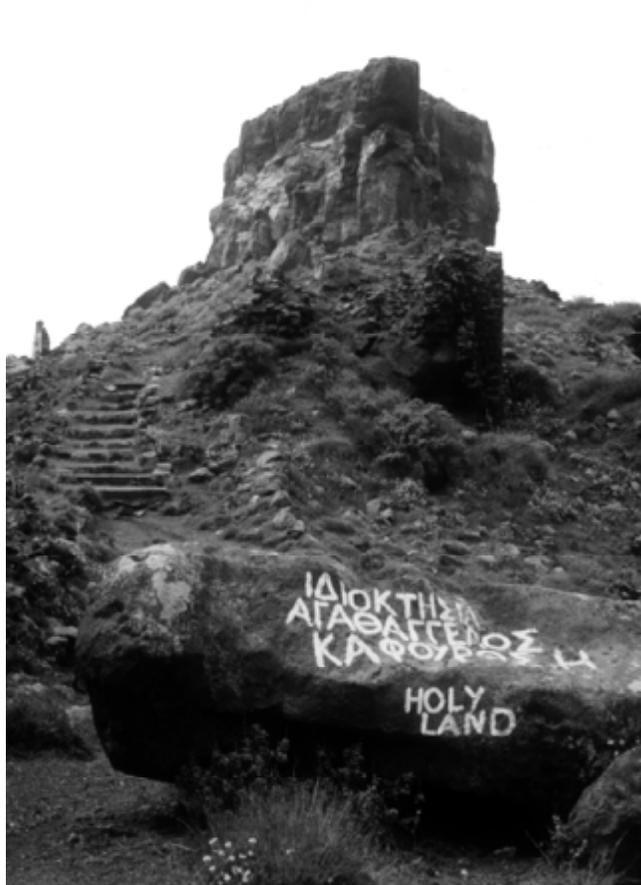
We should celebrate that within us which is human. What should be taken seriously... is the joy.

We can evolve systems and conditions that will allow for the maximization of life potential, and new definitions of what constitutes "Fact", if indeed facts exist at all. (The only fact may be that there are no facts.) We can try to understand and respect the consequences and the inter-relatedness of all our actions. We can evolve a higher order of cultural cohesion and a sense of future destiny.

Manifesting least effort and maximum advantage, our built environment can have meaning not only in the present, but also embrace accountability and consequence, by anticipating and providing an inherent potential responsiveness to future needs and conditions.

Unity is a homogeneous inter-relatedness, of and between disparate specialized ele-

ments, combined in such a manner to create a more meaningful and beneficial whole. Not only is the total greater than the sum of its parts, but it is the manifestation of wise design, which transcends the moment. The essential nature of design is neither confined to its form, function, environmental impact, or socio-political consequence. What is truly essential... is invisible to the eye. The real nature of design lies in the symbiotic development and relationship of all parts, i.e., in the totality of its spacial and temporal unfoldment.



Entry into the Promised Land or the Return to Paradise?  
Entry into the Promised Land **IS** the Return to Paradise.

Regenerative design is a confluence, where a myriad variety of streams of intention merge together, forming an integrated and interrelated flow... which is itself a tributary channel of a greater river of meaning... flowing into a sea of unity.





Unity is at once  
both the  
process *and*  
the product...  
the journey *and*  
the destination.



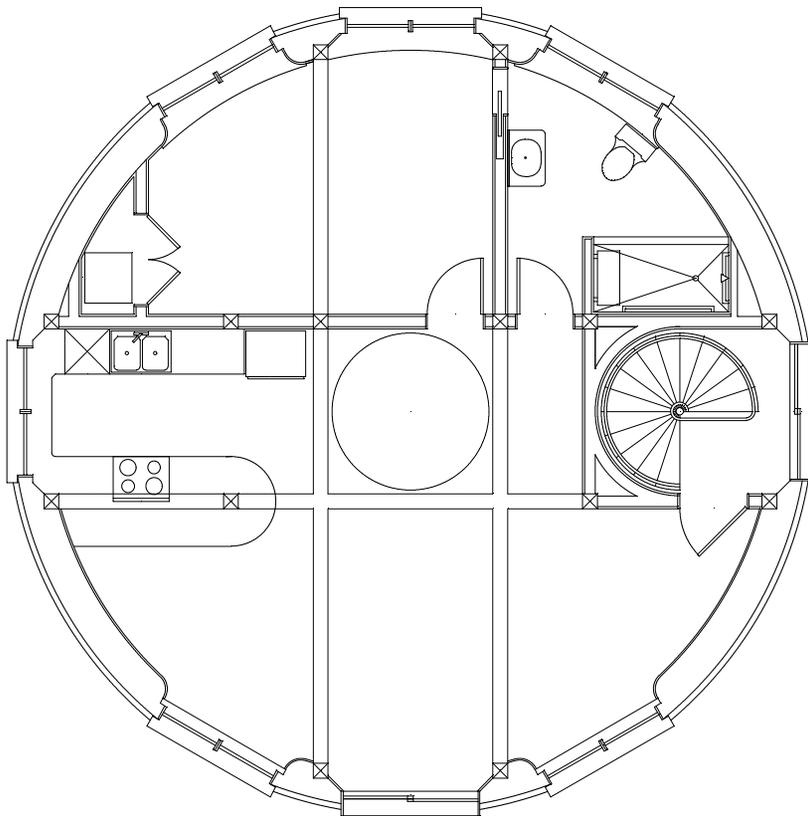
# Appendix:

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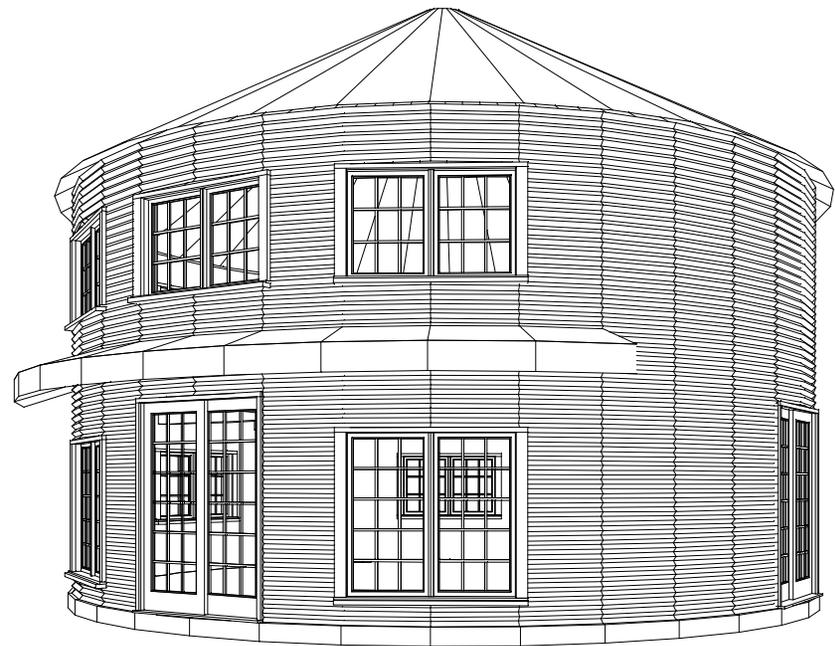
# Adapted Silo Guest Cottage:

## Ecologic Strategies:

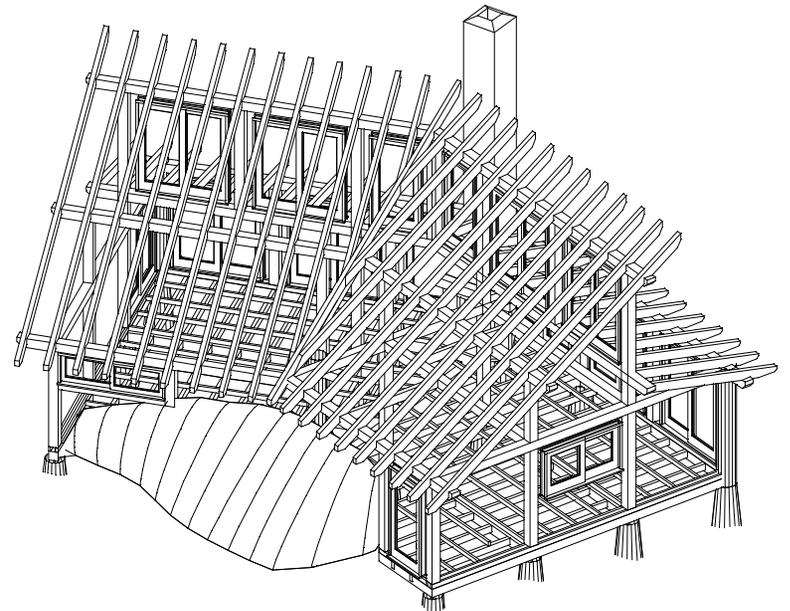
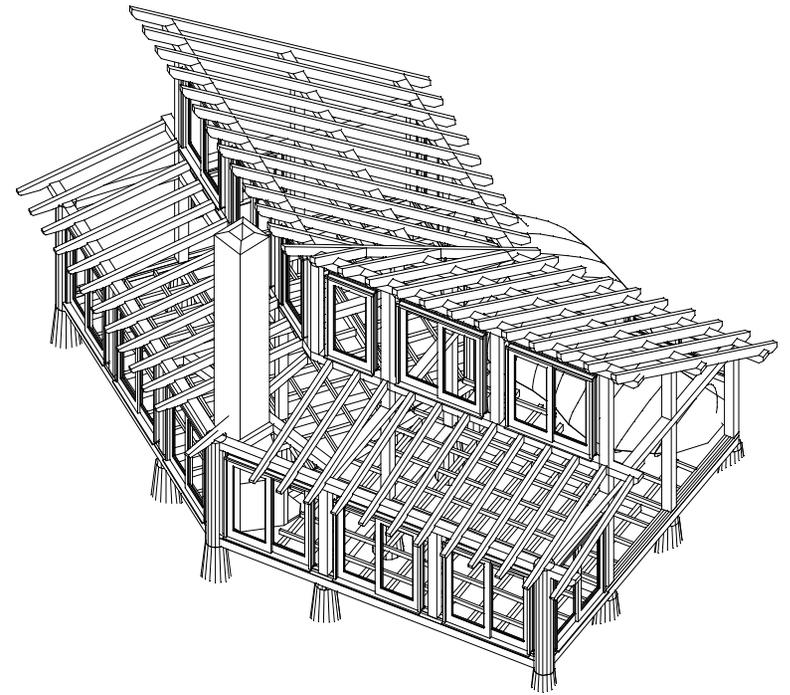
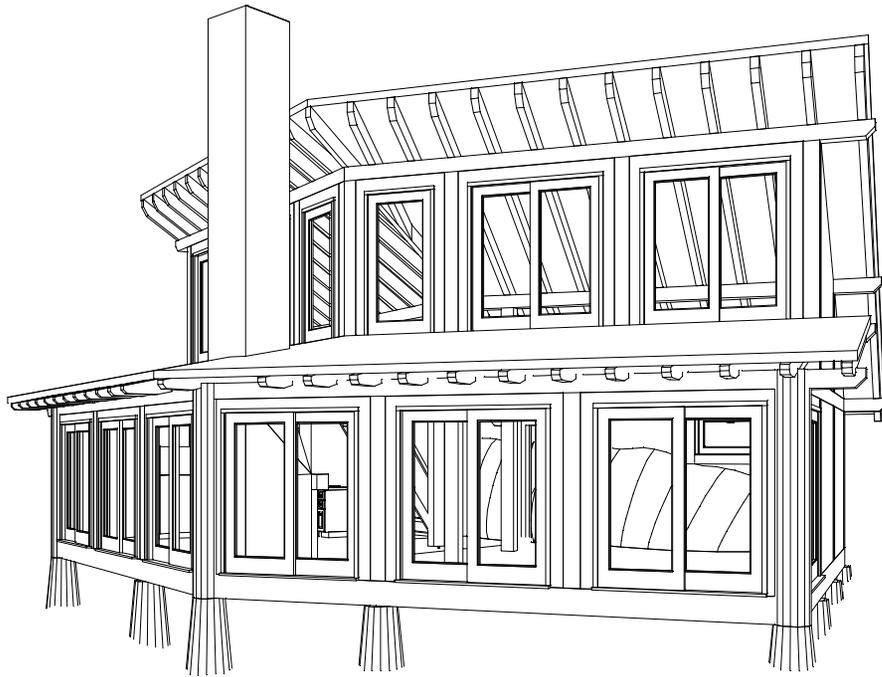


- Optimized orientation for Direct Gain Passive Solar w/ high-performance low-emissivity glazing.
- Integrated hydronic radiant floor heating and cooling system w/ stabilized earthen floor heat storage mass, and rooftop solar hot water collector. [Backup high-efficiency propane water heater.]
- Correctly proportioned eave overhangs w/ thermal break at exterior wall, providing maximum solar penetration in the Winter, and maximum shade in the Summer.
- Optimized natural daylighting w/ light colored interior walls, and high wall transoms at ceiling.
- Integrated shading device and Photovoltaic collector window overhangs, for environmental control system backup, task lighting and small appliances w/ compact fluorescent bulbs.
- Provision for natural ventilation and cooling w/ low northern and high southern operable windows, minimum east and west glazing, isolated ventilation of interior humidity sources, reflective steel exterior walls, and self-shading and cooling living roof transpiration.

- Minimum inventory / maximum diversity modular structural "kit of parts", w/ precast concrete pipe interior structural columns, and prefabricated green oak floor joists and roof rafters, from local sustainable yield forests, provided by local timber frame builder.
- Non-loadbearing R-45 straw bale and stucco perimeter interior walls w/ lime and clay based "breathable" stucco finish.
- "Living" earth tempered grass roof w/ extended outdoor landscaped terrace and garden, with indigenous grasses, plantings, and wildflowers.
- Earth bermed northern walls w/ entry air locks.
- Composting toilets and on site greywater treatment and irrigation w/ constructed wetland.
- Water-conserving plumbing fixtures throughout.
- High efficiency wood burning Finnish heater and bake oven.
- Shallow frost-protected rubble-trench foundation minimized construction site impact w/ on site field stone for selected wall facings.
- **62** Exterior fire resistance detailing w/ constructed wetlands "fire pond".



# Mountain Solar Cabin:



Emerging integrated Solar design draws upon the best of traditional indigenous elements and materials, while taking maximum advantage of natural daylighting, cooling ventilation, and passive solar heating. Here an existing outcropping of bedrock is used as a partial foundation and as both a summer heat sink, and a winter direct gain heat storage mass.

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# Vitae:

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## H. FREDERICK OESCH

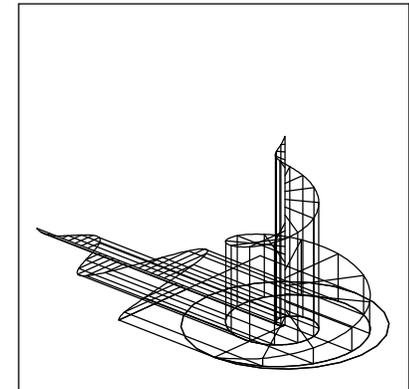
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<http://www.hfoesch.com>

### Summary of Qualifications:

A combination of education, technical experience, teaching, and management of human and material resources; encompassing the full range of design disciplines.

### Education:

- 8/94 - 5/97 • **Virginia Polytechnic Institute and State University**, Blacksburg, VA  
Master of Architecture, Graduate Assistantship and Instructional Fee Scholarship  
European Study Abroad Program, Spring 1996  
Thesis: "Toward Regenerative Environmental Design: The Future Vernacular"
- 8/90 - 5/92 • **Mary Baldwin College**, Staunton, VA  
Bachelor of Arts, Art, with Distinction. (Computer Enhanced Multi-Media)
- 1/86 - 5/90 • **Piedmont Virginia Community College**, Charlottesville, VA  
(C.A.D.D.)
- 9/81 - 5/82 • **University of New Mexico**, Albuquerque, NM  
School of Architecture, Dean's List
- 1/75 - 5/75 • **Kansas City Art Institute**, Kansas City, MO  
(Design Technology)
- 9/70 - 6/72 • **Marlboro College**, Marlboro, VT  
(Design/Assemblage)
- 9/69 - 6/70 • **University of Missouri**, Columbia, MO  
(Management, Philosophy and Religion)



## Professional Experience:

- 5/97 -
- **Oesch Environmental Design**, Charlottesville, VA
    - Principal Owner Architectural Design firm.
    - Specializations include green timber frame, straw bale construction, living earth roofs, solar design, and organic environmental control systems.
- 6/99 -
- **Yestermorrow Design / Build School**, Warren, VT
    - Instructor
- 1/88 -
- **Gallery NEO, NEO Graphix / Organic CADD**, Charlottesville, VA
    - Fine Art Gallery and Software Owner-Developer.
    - Registered AutoCAD, MicroStation, and DataCAD third party software development and Beta test site. Architectural presentation and production symbol libraries. Mail order markets include U.S. and export to six countries.
- 4/86 - 8/94
- **Browne, Eichman, Dalgliesh, Gilpin & Paxton Architects**, Charlottesville, VA
    - C.A.D.D. Supervisor and Project Manager
    - Responsible for the implementation and management of C.A.D.D. Department and office computer systems; including training, scheduling, and supervision of automated and manual construction document production, for five principal architects. Duties also include: environmental, code, and cost analysis, consultant coordination, and construction administration. Projects include: historic preservation, adaptive reuse and new construction for residential, inns, restaurants, banks, courthouses, and churches.
    - C.A.D.D. consultant for the restoration of the Lincoln and Jefferson Memorials, Washington, D.C., using Videogrammetry and Image Processing.
- 1987 - 1993
- **Piedmont Virginia Community College**, Charlottesville, VA
    - Instructor of C.A.D.D., Architectural Drafting I & II, and Blueprint Reading.
- 1983 - 1986
- **Products Plus, Inc.**, Asheville, NC
    - Head of Product Design and General Manager
    - Furniture manufacturing. Market research, product design and engineering, computerized inventory control and production monitoring systems. Designed and marketed the "Series: 2000" line of contemporary oak furniture. (Markets: Dallas / Atlanta / High Point)

1975 - 1983 • **Middle River Mill Co.**, Machias, ME

- Design / Build firm Co-founder and Owner
- Design development, estimating and materials specification, working drawings, and construction supervision. Projects include: solar homes, custom interiors and furniture, product design, commissioned fine art.

## Publications:

- “Expanding the Definition of Architecture”, Center for Living Democracy, Vol.6, Issue 2, Fall 1999.
- New Technology: New Architecture by William Zuk and Thomas Zuk, Computer-generated illustrations by H. Frederick Oesch, WordCrafters Editorial Services, 1994.
- “Videogrammetry: Toward a New Preservation Paradigm”, The Construction Specifier, July '90.
- “3D Illustrations”, DataCAD DC Modeler Training Manual, Microtecture Corp., 1987.

## Exhibitions:

- “Flights of Fantasy”, 10/07 to 10/29 1994, Gallery NEO, Charlottesville, VA. Solo show of computer enhanced colour prints and multi-media performance.
- “Cyber-Scapes”, 06/12 to 06/19 1992, Gallery X, Charlottesville, VA. Solo show of computer enhanced multi-media abstract landscape painting and assemblage.
- “L’Image Feminine Impossible”, (The Impossible Female Image), 10/24 to 11/09 1991, Mary Baldwin College, Staunton, VA. Solo show of computer enhanced multi-media painting and sculpture.

## Affiliations:

- Virginia Society of The American Institute of Architects (Associate Member)  
(Recipient of Alice Lehmen Sunday Prize for Construction Documents)
- College Art Association, New York, NY
- Friends of Kebyar, Atlanta, GA
- World Future Society, Washington, DC

## Personal:

- Birth: 09/19/50
- Interests: Travel, Hiking, Climbing, Dancing, Nude Photography, and Creative Writing

