CASE STUDIES IN DESIGN AND ECOLOGY

Transcendent Sustainable Design:
The Role of Aesthetics

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Over the past ten years architects have struggled to gain consensus regarding the true meaning of sustainability and the specifics of sustainable design. The recent ACSA Dean's Roundtable Reports reflect just how varied the perceptions are about this issue. William Mitchell from M.I.T argues that an increase in digital sophistication and computer-enabled miniaturization is the key to achieving sustainability,[1] while Peter Wheelwright from Parsons states, among other things, that we should focus more on the natural sciences and natural systems[2]. Both are probably correct to some extent. More recently, the ACSA published an article by David Brown from Rice University where sustainability is defined as "the confluence of three discourses: ecology, social equity, and economics."[3] Strangely, the issue of aesthetics rarely plays a role in any of the definitions. This begs the question; can an ugly building be sustainable? Surely, beauty is an extremely subjective element, but over the years some buildings, more than others transcend their time, and culture to be commonly accepted as masterpieces. This begs the second question, "Are beautiful buildings automatically sustainable because they are more likely to be preserved for use by future generations? Given the nature of these questions and the apparent confusion in the architectural world about sustainability, it seems appropriate to critique existing definitions of sustainability in order to form a foundation to propose a new, more inclusive definition of sustainable design.

Most of the commonly accepted definitions of sustainable design and sustainability fall into two broad categories. The first group, offered by the A.I.A., United States Green Building Council via the LEED rating system and the Erlich's famous I=PAT equation are primarily concerned with resource conservation and energy efficiency. The second group of definitions offered by The United Nations provides a more robust, open-ended viewpoint, which provides a challenge to architects who wish to understand and build consensus around these issues. At the same time, this view also contains opportunities for multiple interpretations and expansions of the definition of sustainability thereby allowing the second question that this paper will explore: What role does aesthetics play in an expanded definition of sustainability?

The AIA offers the following definition of sustainability as:

...the ability of society to continue functioning into the future without being forced into decline through exhaustion or overloading of the key resources on which that system depends.[4]

Clearly this definition is well intended but it perpetuates the myth that sustainable design is somehow different from actual design. It also suggests that those who achieve so-called sustainable design may neglect other areas of design such as aesthetics, quality of experience, budget, etc. This definition could be said to be "safe" in that it focuses on the quantifiable aspects of design including energy efficiency, water conservation, non-toxic materials, etc. These aspects can be measured, and easily incorporated into a building design regardless of aesthetic quality, site treatment, cultural relevance and a host of other intangible issues. This paradox begins to beg the question: What role, if any, does aesthetics have in the definition of sustainable design?

The United States Green Building Council has developed a measure of sustainability called LEED (Leadership in Energy and Environmental Design). Before offering any critique, it is important to note that the existence of such an index and the seemingly rapid adoption of its rating system by a number of public sector organizations is an encouraging development in the overall movement towards developing a sustainable design and building industry. At the same time, the USGBC, like the A.I.A. have limited their scope in defining sustainability to only quantifiable aspects of design[5]. The rating system is a measurement of a building's sustainability using metrics such as percentage recycled materials, percentage reuse of existing structures, percentage reduction in required energy use, percentage reduction of required water usage, to name a few

Other definitions of sustainability seem to also ignore this question. Ann and Paul Erlich, authors of *Healing the Planet: Strategies for Resolving the Environmental Crisis*[6] a well-known treatise on sustainability, offer the following equation as an attempt to understand the relationships that drive societies towards, or away from sustainability. They propose:

$I = PAT$

where I = environmental impact, P = population growth, A = afflu-
ence and T = technology.

In this model, the measurement of sustainability (impact) is once
again focused on the physical tangible aspects of resource consump-
tion. This is understandable given the complexity of the problems
that face the planet and the fact that they were not dealing solely
with architecture, but with society at large. A more careful look at A
(affluence) reveals how architecture plays a large role in this equa-
tion. The Erlichs define affluence as the wealth of a society where it is
assumed that a richer society will consume more and waste more.
The United States is a case where this is true as a society, however
societies such as Germany have wealth similar to the US and much
less environmental impact. The role of architectural design as an ex-
pression of wealth clearly shows how A is a factor in sustainability
because architects, for example, that specify imported mahogany as
a primary interior material or titanium as an exterior material are
clearly expressing the wealth of a given client without regard for
environmental factors - thereby raising I (impact). The equation also
seems to focus on the reduction of *refining* technologies (T) as a
means to reducing I (environmental impact) while ignoring *renew-
able* technologies such as solar and wind (T_2). By placing T_2 in the
denominator of the equation, we can see the radical effect that re-
newable technologies can play in reducing I.

$$I = PAT/T2$$

Architectural designers can clearly work in both T and T_2 by add-
ing insulation to their building thereby reducing fossil fuel consump-
tion (T) but also by incorporating green technologies such as photo-
voltaic solar panels (T_2).

But even this more complex definition seems to leave out the
key skill that architects bring to the table, the ability to make build-
ings that are beautiful, meaningful and transcendent (see Pantheon).
All of the definitions discussed so far continue to focus on tangible,
measurable goals as a means of achieving sustainability. It seems
odd that the vast majority of time spent in the typical design studio
deals very little with the measurable aspects of design given the im-
mensity of the sustainability movement - leaving one to wonder two
possible scenarios A: aesthetic design is not relevant to sustainability
(scary) or B: aesthetics is a key component of sustainability but we
have not yet framed the issue correctly to allow that possibility.

The other definition to be explored was developed by the United
Nations and states:

*Sustainability is the ability of present generations to meet their
own needs while not compromising the ability of future
generations to meet their own needs[7].*

This definition at first glance would seem to offer very little to an
architect seeking to define sustainable design. Clearly, resources come

into play as water; energy and clean air can be defined as needs.
However, an examination of human needs seems to be in order as a
means to fully understand the definition. In our search for the an-
swer to this question we consistently encountered Maslow's theory
as the most commonly accepted definition of human needs. We also
felt this was appropriate because of his theory's deep humanistic
base and its basic assumption that humans are inherently good crea-
tures. That represents the extent of any morality that will be intro-
duced into our thinking.

Maslow defines human needs[8] in a three tiered system (see Fig-
ure 1) beginning with the most basic physical needs in the first tier,
psychological needs in the second tier and self actualization, or tran-
scendence, at the third and highest tier. The first tier deals with physi-
cal needs such as food, water, and shelter. Unsustainable architec-
ture serves the shelter need but at the cost of future generations to
meet that same need by creating designs that exhausted key resources.
A sustainable designer will consider how a building design will maxi-
mize efficiency of basic resources like water and heating fuels in or-
der to provide for future generation's basic *needs* as well. Security
forms the second component of the first tier. People need to feel safe,
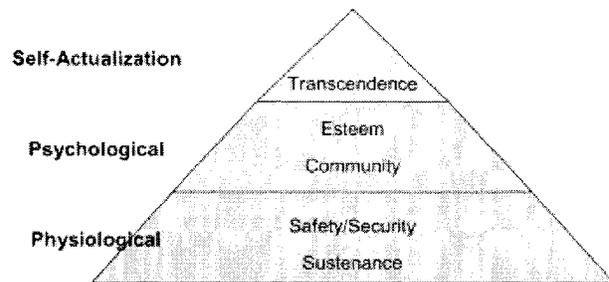Maslow says, in order to be happy. Architecture, sustainable or not,
fulfills this need.

Figure 1. Schematic Illustration of Maslow's Hierarchy of Needs

At the second level are the psychological needs that are divided
into esteem and affiliation. Esteem represents the need to be loved
and appreciated by your peers and self-esteem is the internalized
extension of that need. Architecture plays a large role in esteem build-
ing for individuals in that many clients will seek esteem from their
peers based on the kind of buildings they ask their architect to de-
sign. These kinds of buildings may often contain expensive materials,
outlandish forms or occupy once beautiful natural sites in an effort
to gain attention and esteem from peers while demonstrating the
dominance of the individual over nature. Architects also often design
for esteem by developing buildings that will win awards despite the
actual needs of a given project[9]. Both scenarios suggest unsustain-
able behavior as evidenced by specification of endangered materials

or by exorbitant amounts of energy needed to heat and cool increasing larger and more perhaps unnecessarily complicated architectural expressions.

Sustainable design may be said to be more humble at its core (see Jersey Devil[10]) where smaller scale buildings, use of locally available materials and complex/passive environmental responses form key components of many sustainable designs. With this approach, resources are reserved for future generations – a noble sustainable goal. The aesthetics of the building initiate not the search for esteem, but rather something perhaps deeper and more long lasting.

Concurrently, many developers are now creating "sustainable" buildings in order to gain esteem from their colleagues and also to make more money by claiming green. In most cases these buildings are not fundamentally or robustly sustainable, but offer symbolic gestures that used alone usually do not equal a green building, such as use of non-toxic paint[11].

The other component of Maslow's second tier of psychology is the need for affiliation (belonging) or the need for community. Clearly, architecture plays a significant role in enabling people to experience a sense of community. A long history of different ideas and strategies have been attempted to ensure a person's sense of community through manipulation of architectural space, fenestration design, programmatic location of functions, etc. The question here in relation to sustainability is whether our modern conceptions of community have really met the needs of current generations and whether or not they have compromised future generations ability to meet their needs. New-urbanism is one response to the perceived loss of community exhibited by typical suburban development design. In this case, buildings define shared open space and encourage human interaction through proximity of varied functions. From a Maslovian perspective, new-urbanist communities satisfy the second level or psychological needs of human beings.

Maslow's highest level of needs is called self-actualization or transcendence, which is the process of finding a true purpose in life and pursuing that purpose as a primary activity. In order to transcend, all needs of physicality, security, esteem and community must first be met. If that is true, then architecture plays an important supportive role in meeting these needs because the buildings and communities we inhabit must fulfill a persons basic needs before self-actualization can occur.

Maslow's description of transcendence includes complex, metaphysical needs, such as beauty, uniqueness, unity, aliveness, perfection and necessity, completion, justice and order, simplicity, richness, effortlessness, playfulness, self-sufficiency, and meaningfulness. Repositioning these words as adjectives for architecture offers some intriguing insights and opportunities to expand sustainability into

the realm of the poetic. As a vehicle to express some of these ideas, a current theoretical project, funded through a grant from the Sustainable Development Fund, will be used as supporting material. The project was to design a headquarters for a new research center called the Engineering and Design Studio. The Studio's mission is three fold, focusing on the development of green materials, providing a sustainable design resource center and general education, through demonstration projects, towards sustainability. This project will be used to illustrate attempts made by the authors to design a building that meets all three levels of human needs and therefore establish a new threshold for sustainable design.

BEAUTY

While many may argue the subjectivity of beauty, it is safe to say that beautiful buildings, places, artifacts, landscapes serve to inspire humanity towards transcendence. For centuries, "divine" proportioning systems were used as a vehicle to attain beauty. Later, in the 20th century, architects moved to expressions of an emerging industrial idiom as the primary mode of attaining beauty. In the design project considered here, striving for beauty was understood as a factor in achieving sustainability with the rubric that if people come to love the building, it becomes a source of pride for the community and thus increases the likelihood of continuity through future restoration and adaptation to change of use. The primary aesthetic intention was to move beyond the tectonic expression of industrialism to embrace a newly emerging green aesthetic. Images of nature and expressions of its cyclical systems serve as the iconography for the building design rather than outdated, but still popular, industrial expressions. James Wines seems to support this view when he states that,

"If machines influenced the first half of the century, then clearly a concern for the Earth and a response to this incredible global network of information is certainly the iconography of the future."[12]

In this case, the flower like column structure and nautilus inspired retaining walls formed the primary architectural moves in the project (see figure 2). Secondly, incorporating actual natural elements into the design such as a green roof, integrated planters into curved retaining wall and a small water pond, was an attempt to obtain beauty by referencing nature directly.

UNIQUENESS

The goal of creating something new and different has been a fundamental driving force for architects, especially so in the 20th century. The argument here states that if a building is both unique and beautiful, the likelihood that preservation of that structure into the future will be increased. Conversely, it can be argued that prototype based
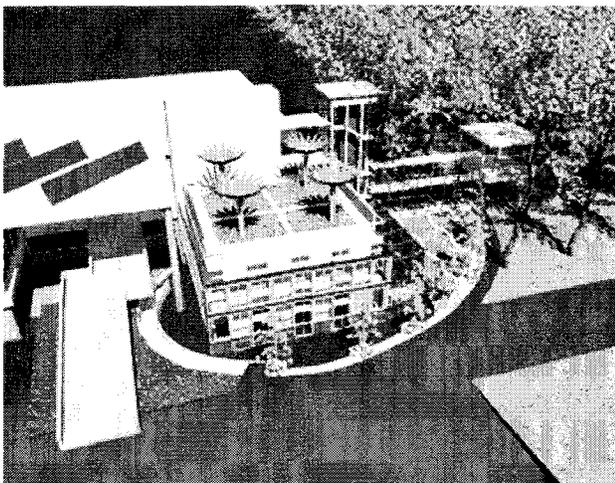
Figure 2. Nautilus and flower inspired iconography.

Figure 3. Attempt to achieve uniqueness through floating "think tank" in center of campus.

buildings such as developer housing and fast food architecture could be said to be unsustainable in that the repetition of similar forms denies opportunity for uniqueness. Therefore they offer an unsustainable proposition in that the opportunity for transcendence if greatly reduced (see Maslow above). In the design project shown below, a floating think tank space was proposed just below a canopy of existing trees. Accessed by a bridge and/or exterior stair, the small room occupies a prominent cross roads on campus and provides a unique focal point for passersby as well as a dynamic space to meet in. (see figure 3).

UNITY
It has long been argued that architects such as Wright and Kahn achieved unity in design. There is a quiet knowing when all of the geometrical aspects of plan as supported by the tectonics of design come together to form a cohesive, comprehendible whole. Wright called it organic architecture, stating that,

"Thus the building and environment are one: Planting the grounds around the building on the site as well as adorning building take on new importance... Site, structure, furnishing – decoration too, planting as well – all of these become as one in organic architecture."[3]

Frank Lloyd Wright's Falling Water, for example, expresses unity at a multitude of scales from the cantilevered desk detail to the cantilevered wall/roof design to the overhang of the planter boxes on the approach bridge.

In the design of the Studio project an attempt was made to approach unity through the use of four columns and arch shaped ceiling forms that help to unify the main floors of the building through a pronounced expression of structure, as illustrated in Figure 4, sec-
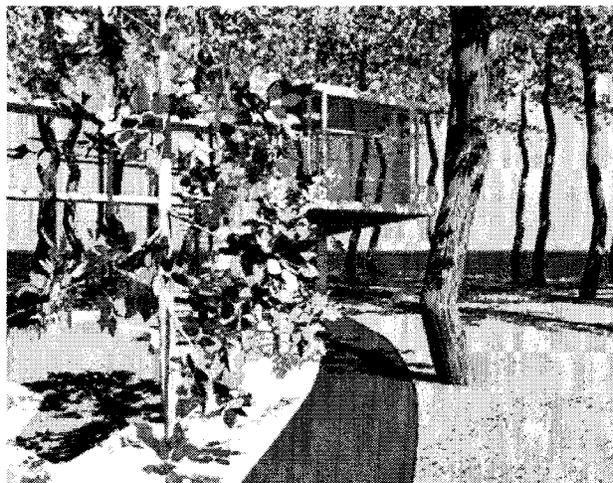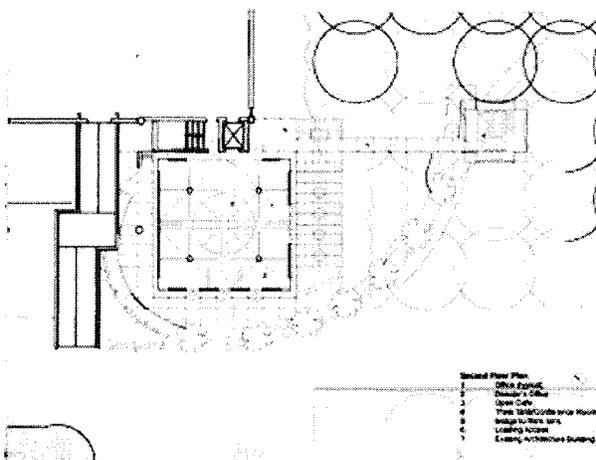

Figure 4. Second Floor Plan of EDS Building

ond floor plan w/ highlighted core.

ALIVENESS
Expression of natural elements can be used to bring a building to "life." Luis Barragon employed cantilevered waterfalls into his projects activating exterior space and animating the architecture. More recently, Wil Bruder developed a solar angle sensitive shading device for the south facade of the Phoenix Public Library project. As the sun changes altitude and angle, computer controlled shades move slowly to block direct light into the space, while allowing softer bounced light into the building. As human's we are drawn to these kinds of elements because, perhaps, they speak to that part of ourselves seeking a sense of aliveness.
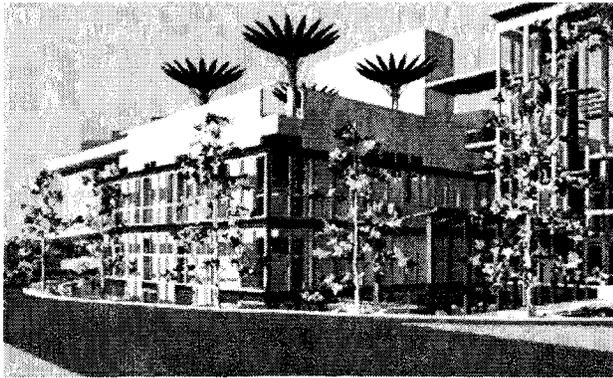
Figure 5. Illustration of water falling into bioremediation pond (enclosed in blue framework) (see also aerial view for another angle).

In the Studio project, the flow of water is expressed through a Luis Barragon inspired waterfall that lands in a bioremediation pond near the entrance of the building (see figure 5). Water is periodically pumped into the pond as powered by photovoltaic panels on a nearby roof. Also, the four columns of the building express themselves as super scaled flowers on the roof level. The "petals" of the flower open and close with the movement of the sun, while the "stem" bends towards the light. (see figure 6). Lastly, there is a computer controlled environmental system that alerts users when the conditions are right for opening the operable windows thereby suggesting an "intelligence " that resides within the building.

PERFECTION AND NECESSITY

Perhaps a desire for perfection is the heart of many architects. Mies Van Der Rohe stated that, "God is in the details." The Bauhaus sought the divine through a heightened focus on the details of the building, thereby expressing the "necessity" of the building's functional connections as a means to achieve perfection in design. The limitation here is that the search for perfection was pursued at the expense of a host of other factors in transcendent sustainability discussed in this paper.

The recent trend of tectonics where the expression of necessary structural and assembly systems as the primary aesthetic focus of the building design seems to support this transcendent category. "Form follows function" may also be an attempt to describe this phenomenon.

JUSTICE AND ORDER

This transcendent aspect of Maslow inspired sustainability focuses on ethics. It can be argued that if people believe that their building is protecting the environment then there is an ethical satisfaction derived from perception leading towards transcendence. For example,

Figure 6. Photovoltaic "flowers" open and close to receive sun and rain.

employees of the Chesapeake Bay Foundation Headquarters, the highest rated LEED building in the country, take great pride and satisfaction in knowing that they come to work everyday in a truly environmentally just building.[14] The Bauhaus architects sought to alleviate the ills of workers housing through their designs, thus helping to form the "progressive" mantra of orthodox modernism. Even the failed experiment of low income "projects," was, at its core, about the search for justice. At the same time, virtually every other category discussed in this paper as necessary for transcendence was ignored in these projects.

SELF-SUFFICIENCY

Connected with the previous category, self-sufficiency can be interpreted as most closely paralleling the current definitions of sustainability. A building that generates its own power, cleans its own wastewater, provides its own heating and cooling without externally supplied fuel could be said to be self-sufficient. Maslow suggests that people, and perhaps buildings, that are self-sufficient have the potential to become transcendent or self-actualized.

CONCLUSION

Many of the above attributes have been accomplished repeatedly over the entirety of architectural history and many transcendent buildings have been constructed and remain today. But in the 21st century, architects, as prompted by the A.I.A. and LEED, are now asked to consider issues of environmental quality and energy efficiency as fundamental core aspects of sustainable design. The argument presented in this paper, is that the definition of sustainable design should be expanded to include community and transcendence (including beauty etc.) as key components of the definition. This can be argued from

the Maslovian perspective in terms of needs, but also from the idea that transcendent buildings are more likely to be preserved, reused, renovated, altered, protected, and appreciated because of their intrinsic qualities that successive generations will value.[15]

NEW DEFINITION OF SUSTAINABLE DESIGN

Sustainable architecture as defined through the lenses of Maslow and the UN Brundtland Commission asks architects to address the following criteria:

Level 1 Physical needs: **Minimize environmental impact**, while providing shelter and safety for all members of society.

Level 2 Psychological needs: **Strengthen communit**y and build esteem for society through architecture that achieves personal and collective pride of accomplishment and that creates viable shared public space

Level 3 Transcendence needs: **Strive for beauty**, uniqueness, unity, aliveness, perfection and necessity, completion, justice and order, simplicity, richness, effortlessness, playfulness, self-sufficiency, and meaningfulness

The chart below (Figure 7) represents an attempt to model sustainable design based on the newly proposed definition above. Frank Gehry's Guggenheim Museum in Bilbao, for example, clearly satisfies society's need for transcendence, but does so at the expense of resource efficiency. This building type (if repeated) would compromise future generations' ability to meet their resource needs because of the large amounts of energy needed to manufacture and transport titanium. 1970's solar architecture maximized resource efficiency, but neglected aesthetics making it difficult for those types of buildings to satisfy transcendent human needs.
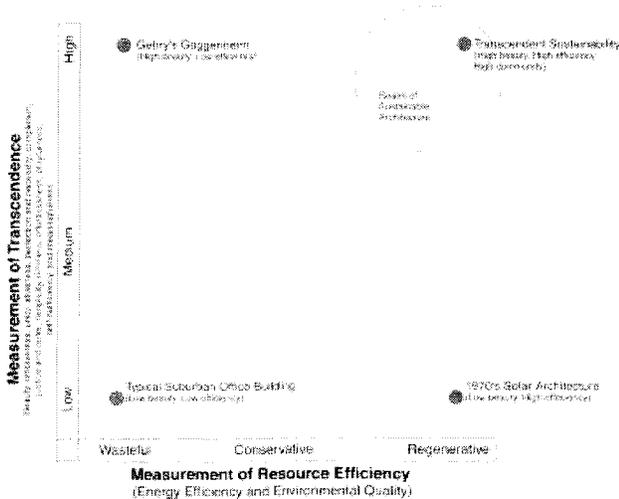

Figure 7. Performance Evaluation Map of Resource Efficiency and Transcendence.

As interest in, and demand for sustainability continues to rise, it is essential that architects and educators work to develop increasingly clearer and more inclusive understandings of sustainability. Sustainable design should be about much more than simply applying green technologies and materials to a predetermined building design. Instead, sustainable design should be embraced as a robust, ecological system of thinking about architecture that spans issues of environment/energy, community and beauty. Many have argued that sustainable design will "disappear" in the next twenty years as it is subsumed by the larger interests of the architectural profession – that somehow it will become automatic and "expected." That argument perpetuates the perception that sustainable design is an "add-on" to the actual design process and does not include issues of community, beauty, aliveness, justice, uniqueness etc, as core components of sustainability. Ultimately, if sustainability is to become a truly meaningful architectural movement, inclusive understandings of the issues and their ecological relationships are vital. Hopefully, the ideas and thoughts contained in this paper will contribute to a further understanding of the full potential of sustainability as a transcendent proposition.

NOTES

[1] Mitchell, William "E-Green," *ACSA News, April 2001, Volume 30: number 8* (American Collegiate Schools of Architecture, Washington D.C.): 5.

[2] Wheelwright, Peter M., "Texts and Lumps: Thoughts on Science and Sustainability," *ACSA News, December 2000, Volume 30: number 4* (American Collegiate Schools of Architecture, Washington D.C.): 5.

[3] Brown, David P. "Project Row Houses, the Art of John Biggers, and Sustainable Revitalization," *ACSA News, October 2001, Volume 31: number 2* (American Collegiate Schools of Architecture, Washington D.C.): 1.

[4] Mendler, Sandra F. A.I.A., Odell, William, A.I.A., *The HO+K Guidebook to Sustainable Design* (New York, New York: John Wiley & Sons, 2000).

[5] Although the LEED rating system does not address the issue of aesthetics head on, it does, indirectly, through clever writing of the various criteria including radius of material selection, access to natural light and light pollution, increase the odds that a building design will have some positive visual aspects.

[6] Ehrlich, Paul and Ehrlich, Anne, *Healing the Planet: Strategies for Resolving the Environmental Crisis* (New York: Addison-Wesley Publishing Company, 1991).

[7] *Notre avenir à tous: Commission mondiale sur l'environnement et le développement.* Brundtland, Gro Harlem, Montreal: Les Editions du fleuve, 1988. (HC 79.E5 W67) & (HC 79.E5 W6714)

[8] Maslow, Abraham H., *Toward a Psychology of Being* (NY, NY: John Wiley and Sons, 1964).

[9] Obviously this is a generalization made by the authors and is intended as a parable.

[10] Jersey Devil is an architecture firm known for humble, site sensitive design.

[11] This is another example where efforts such as LEED that require quantification of sustainability distinguish superficial efforts from substantial efforts.

[12] Wines, James, Quote from the video, *Ecological Design; Inventing the Future*

[13] Wright, Frank Lloyd, *Frank Lloyd Wright: Writings and Buildings*, Kaufmann, Edgar and Raeburn, Ben editors (NY, NY: Meridian Press, 1960).

[14] Testimonial from documentary video about construction and design of the Chesapeake Bay Foundation building.

[15] There was brief period in the 20th century when many transcendent buildings were demolished or retrofitted due to a conviction that progress was reflected by buildings made of then-contemporary or futuristic materials.