

Hybrid-Hut: A Unit for Sustainable Living

In the US, and by extension, to the remainder of the world through a contagious consumer culture, 'desirable' is often equated with 'big', as in gas-guzzling/behemoth SUVs. Although many¹ forecast we are rushing headlong for a 'crash' in terms of resource availability, we continue to replace housing units with ever larger dwellings as if there were no tomorrow. The contemporary housing trend toward 'McMansions' is clearly not sustainable and in fact progressing in the wrong direction. Housing in the US has increased from 290 square feet per family member in 1950 to 893 square feet per family member in 2003; a factor of 3 increase!² Sadly, architects (by and large) have been partner to this crime.

However, merely arguing the case for sustainable architecture will not be enough to change patterns of American habitation. 'Sacrifice' does not sell well to the American consumer. Small will only become desirable when it is perceived as 'getting something better' and that's where architects can play a vital role in reversing the current trend.

A new building approach will be developed to test the feasibility of designing a small dwelling unit for sustainable living. Such a dwelling would be created through the hybridization of sustainable design and domestic spatial poetics. This cross-bred shelter could help adjust the way we live—to endure responsibly within the built world.

Thesis statement

Achieving a greater degree of sustainability in housing architecture is a worthy goal that few would argue against. Progress can be made towards this goal by reducing the size of the buildings we inhabit. The specific focus of this effort is to conserve square footage through adaptability of the spaces we inhabit while comfortably accommodating necessary activities. Likewise, dwellings must adjust to the seasonal changes of the surrounding environment. This thesis aims to test the potential for integration of multi-functional programmatic 'patterns' and environmentally sensitive building systems in a very small footprint. If a functional and sustainable home can also reach high aesthetic standards, then a new direction in architecture can potentially lead the way in promoting a lifestyle among Americans that is more holistic and globally aware.

¹ authors such as J. Kunstler, who wrote *The Long Emergency*. New York: Atlantic Monthly Press, 2005

² Wilson, Alex and Jessica Boehland. *Small is Beautiful; U.S. House Size, Resource Use, and the Environment*, Journal for Industrial Ecology, vol. 9, winter/spring 2005

Site: Climatic Sensibility³

Present global conditions mandate a new vision for resource use. The US is one of the worst offenders in unsustainable living and currently serves as an irresponsible role-model for the rest of the world. As trend-setters, we have the power to be leaders in sustainable design and influence architecture world-wide, especially as the third world develops and grows in population. Sustainability, or the lack thereof, is a global issue and needs to be addressed at the local level, requiring personal action to progress toward a responsible whole.

The Hybrid-Hut is envisioned as part of an eco-hostel complex. In Ithaca such a hostel has been contemplated by an organization called Level Green. The hostel they propose to build exemplifies Ithaca's social concern for ecologically oriented projects and sustainable initiatives. Growing tourism in the area and two major colleges attracting year-round visitors support the need for a hostel in Ithaca. Not only will this be the first hostel in Ithaca, but it will notable as one of only a very few eco-hostels in the nation. Thus, the site selected for my thesis is on the site of the proposed eco-hostel which is located along Route 79 and adjacent to Six Mile Creek Gorge.

I believe site can be primarily understood in terms of its environment and the sustainable principles that follow suit. Latitude dictates solar availability while climate and the site environs determine the immediate environmental conditions. Thus the principles of sustainability are directly linked to a site's global location, regional resources and immediate environment. All of these aspects effect the project's potential for solar orientation and material choices—depending on what is locally available. As part of my thesis, I will delineate the sustainable principles which are directly applicable to this site.

Ithaca's harsh winters and degree of seasonal variation will allow this project to rigorously test passive solar design. Additionally, aesthetics and ideal solar responses are expected to clash with each other at some point. For example, the contextual conditions of road, gorge, slope and woods will challenge the function and lay-out of ideal passive solar systems; desired views will need to be negotiated with thermal positioning of windows. Successful resolution of such conflicts will enhance the optimal integrated solution of sustainable features with the needs of a small dwelling. The house seasonally adapts to its surroundings to let its inhabitants live at one with their natural environment.

³ **sen-si-bil-i-ty**- "2. keen intellectual perception." *The American Heritage® Dictionary of the English Language*, Fourth Edition, Copyright © 2000 by Houghton Mifflin Company.

Program: Patterns of Living

As a prototype of sustainable living, this project is intended as a one person dwelling unit within the context of a larger complex (in this case, an eco-hostel). Resource considerations require this dwelling to be a very small structure. As a goal, a footprint area of less than 120 square feet in area has been targeted because structures of such scale may avoid building regulations. Additionally, at 120 square feet, this hybrid hut will be approximately 4/5th the size of the cabin at Walden Pond, thus slightly besting Henry David Thoreau in his similar experiment. He wrote, “Consider first how light a shelter is absolutely necessary.”

The program is based upon human patterns, or spatial traits of the way we live. The most important challenge the program presents is to achieve ‘poetics’ as Christopher Alexander wrote about in his original book, A Pattern Language. He explains,

“It is possible to put patterns together in such a way that many many patterns overlap in the same physical space: the building is very dense; it has many meanings captured in a small space; and through this density, it becomes profound... The compression illuminates each of the patterns, sheds light on its meaning; and also illuminates our lives, as we understand a little more about the connections of our inner needs... It is quite possible that all the patterns for a house might, in some form be present, and overlapping, in a simple one-room cabin. The patterns do not need to be strung out, and kept separate. Every building, every room, every garden is better, when all the patterns which it needs are compressed as far as possible for them to be. The building will be cheaper; and the meanings in it will be denser...It is the only way of using a pattern language to make buildings which are poems.”⁴

Thus in this thesis, the patterns most important to the Hybrid-Hut will be identified, passing through several stages of filtration and condensation. It is also advantageous to stress the smallness of the program because, if a large number of patterns can be condensed into the space of this modest structure, the architectural language may become poetic and profound, illuminating the connections and interplay of the space’s potential.

⁴ Alexander, Christopher. A Pattern Language. New York: Oxford University Press, 1977 pp. xli-xliv

Theme: environmental sensitivity + human patterns = hybrid architecture

Building on the concepts of site and program, the theme can be thought of as the integration of sustainability and patterned living. Can a house work for both you and the environment? This project intends to communicate primarily external relationships to the climate and internal relationships to the inhabitant through a singular act of architecture. The problem created by this issue for the architect is multi-faceted. Objectively, can a floor space of 120 sq. ft. accommodate one comfortably and does it respond as needed to wide seasonal variation? On a subjective level, is this sustainable design also aesthetically appealing?

This project will touch base with many of the disciplines of architecture—design, planning, programmatic, technological, historical, theoretical—while carefully considering the sustainable aspects within each field. Sustainability is not to be considered as an independent discipline, but rather an integrated part of the solution to each architectural concern.

In terms of design, the project aims to capture as much natural light and sensation of space as possible, without actually increasing square footage or glazing above what is necessary. Space and light will carefully work together in order to guide one's use of the structure. Proportions based on the golden ratio will be used to subtly harmonize the design and give order to the proportions it uses. At the same time, the concepts of passive solar strategies will help determine aperture placement and material choices. Together these design concerns will heavily inform the look and feel of the building.

Programmatically, this project will strive to accommodate all the daily functions of a modern citizen—primarily working, eating, sleeping, bathing, dressing—as well as amenities for hobbies and occasional guests. Through the use of exterior as well as interior spaces, this should be possible to achieve and the relationship that forms between outside and in will demonstrate programmatic hierarchy. The goal remains to accomplish this in a very small space, therefore flexibility and adaptability of programmatic features is imperative. The benefit of a condensed design will relate to architectural philosophies depicted by Christopher Alexander and the notion of proportionally greater use of outdoor space will be inspired by authors such as Henry David Thoreau, who suggests in his discussion of 'Shelter', "It would be well if we were to spend more of our days and nights without any obstruction between us and the celestial bodies... Birds do not sing in caves."⁵ Returning to a perspective of man's real necessities and the instinctual patterns which guide our lives will provide a solid armature for this Hybrid-Hut's message to be heard.

In terms of planning, there are certain communal functions that this scale of a project will not be able to cover. For those times, a strong connection to the immediate vicinity and local

⁵ Cramer, Jeffrey S. ed. Henry David Thoreau, Walden. New Haven: Yale University Press, 2004. p. 28

community is important. (Extended facilities will be mapped out with public transportation routes.) After all, this building will live better—be more alive—when considered within a greater whole. It has the potential to stand-alone and produce its own energy in certain environmental conditions, but would demand less awareness/effort from the inhabitant when plugged into a larger green energy source that already exists, such as that of the larger eco-hostel complex or if a similar dwelling concept was used as an extension for a family's relative. The community around which the Hybrid-Hut exists is deeply rooted as an extension of the project itself.

Challenges can be expected in selecting an appropriate technology from among various high-tech and low-tech possibilities. For example when considering climate control, the main available technologies include electric heating and cooling, natural gas, liquid propane, wood-burning stoves and passive solar strategies. The most appropriate technology may be some combination of the primarily low-tech options, in order to avoid extensive external resource demands. Energy production and material choices will also be thoroughly investigated through the lens of technology.

The feasibility of construction leads the project to almost certainly consist of a structural grid and interchangeable prefabricated panels (which will hybridize high-tech and low-tech techniques). Obviously, one of the advantages of a small structure is that it could be easily moved, whether deconstructed or moved as a whole. Exactly how this will be accomplished is one of the primary challenges of this thesis.

A historical survey of the evolution of small dwellings will help confirm the essence of this thesis. How were indigenous designs affected by their environments? How did technological advances of the time integrate into these dwellings? What aspects of design were the most fundamental throughout? The main precedents for this study will include Native American teepees, Mongolian yurts, Maasai enkaji, pioneer cabins and even the small cabin LeCorbusier chose to live in for the last ten years of his life. To what degree were these housing types sustainable? And if not still popular today, what caused them to lose their appeal? It may be revealed that at a certain point in history, man valued subjective conditions over the objective features that he built. I believe a lot can be discovered through a thorough analysis of the projects that have withstood the test of time.

Theoretically, there is sustainable future for our world. The vision requires us to start with our basic needs (in the vein of Thoreau) and employ a 'building-up' philosophy. If we become trapped in a mindset of 'cutting back' from our current standards and modern conveniences, then the end result will not be desirable. This thesis will demonstrate a small scale application of this theory and show that other programs and works of architecture can also be a part of this positive vision.

Methodology: Full-scale Prototype

The full scale production of this design will allow for subjective evaluation of aesthetics and objective verification of sustainable strategies at a small scale after one year. The process of construction will also force material and thermal aspects to be thoroughly considered and allow good craftsmanship to reveal its importance in 'architecture'. Through the process I will gain invaluable personal experience in the design-build field and holistic acquisition of materials.

Additional Challenges

One of the main difficulties foreseen in this project is that Ithaca winters can be particularly severe and the low potential solar gain during those times may force dependence on supplemental heating and energy sources. The other major challenge is that 120 sq. ft. is extremely small, in fact rarely achieved or even attempted by architects who consider their designs small. The last challenge I predict concerns the thesis final presentation and that a certain amount of portability in the design will be required for that day.

Conclusion

If a beautiful and sustainable home can be affordably constructed by one person in three months, then there is no excuse why more people in the US can't start leading modern sustainable lives and support a new direction in architecture which facilitates a more holistic and globally responsible lifestyle.