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Ecological architecture: Redefining the American organic tradition

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ECOLOGICAL ARCHITECTURE:
REDEFINING THE AMERICAN ORGANIC TRADITION

by

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Abstract

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William C. Rosebro

A true ecological architecture acts comprehensively, on all scales, from urban form to building materials. While suburbia is the urban form most destructive to the natural environment as well as to diverse human culture, it persists in the collective American desire. Present proposals exist to turn new suburban development into tight pedestrian communities, but the question remains what to do with the deteriorating fabric of American cities. Medium density, mixed-use urban infill that carefully plans for multiple types of transportation while providing some of the attractive aspects of suburbia, such as personal privacy and security, offers an escape from auto-centric existence. When augmented with the selection of local, non-toxic building materials from renewable resources, passive heating and cooling techniques, and provisions for usable open green-space, mixed-use infill will allow our cities to avoid utopian social engineering on the way to ecological soundness.
Acknowledgements

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I. Introduction

First gaining widespread notice in the late 1960's before succumbing to the excesses of 80's deregulation, environmental responsibility has re-emerged as fashionable these past few years in the U.S.. One wonders whether it will fade again in proper Warholian fashion or resound as part of a profound shift in western consciousness. While important steps have been taken, such as the establishment of the E.P.A., the passing of the Endangered Species, Clean Air, and Clean Water Acts, and more recently the acceptance of recycling into the mainstream, the efforts seem pitiful in the face of the accelerating probability of global environmental catastrophe. In fact, recent reports announce that it is already upon us.

In his article, "The Coming Anarchy," Robert Kaplan uses a fruitful combination of the empirical and theoretical—his own travels through various endangered regions as well as projections by global policy think-tanks—in an attempt to predict the change in the geopolitical map in the next few decades. Kaplan states emphatically the place of environmental issues in his picture of the near future:

Mention "the environment" or "diminishing natural resources" in foreign-policy circles and you meet a brick wall of skepticism or boredom. To conservatives especially, the very terms seem flaky. . . . It is time to understand "the environment" for what it is: the national-security issue of the early twenty-first century. The political and strategic impact of surging populations, spreading disease, deforestation and soil erosion, water depletion, air pollution, and, possibly, rising sea levels in critical overcrowded regions . . . will be the core foreign-policy challenge from which most others will ultimately emanate . . . .

Citing the fact that 6 percent of the world's population is using 35 percent of the world's resource output attempts not just to assign collective guilt, but indicates the fallibility of any calls for greater isolationism. The most objectionable aspect of the

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Persian Gulf War, more so than the cycle of manipulation of and capitulation by the press, is not so much that we went to war for oil but that we had no choice in the matter. Calls to protect the "American way of life" might be a bit more inspirational if that way wasn't so exploitative of finite resources for the sake of leisure and convenience.

"Roughly 70 percent of energy use in this country (which produces a quarter of the planet's greenhouse trace gases) can be attributed to the domain of urbanization: this includes transportation, heating, lighting and power, and the generation of that power itself."³ American architects and planners therefore have a vested interest in understanding green architecture. At this point, though, green issues bear little influence on designers beyond perhaps indoor air quality or site drainage considerations. One often hears from design professionals that you can't sell people something they don't want and we learned from the early modernists the danger of attempting too much social engineering. It remains, though, that good architects, like good citizens, (like good buildings,) challenge an unhealthy status quo; plus, it is easier to sell something in which you believe and which you study and know. Judging from the ominous snapshots we've received from time to come, building ecologically may become firms' inevitable means of surviving in the marketplace.

Sounds simple enough but by no means is green architecture monolithic. The plethora of labels alone suggests the lack of a clear, cohesive idea: green, natural, organic, environmental, ecological, sustainable, each tag offering a different nuance. Many architects call to mind the failed experiments of the 70's--hyper-technical solar heating applications, utopian desert communes--and reject the notion altogether. Others might forgive those years as being but an adolescence and suggest that the movement's maturity involves re-applying timeless ideas like "open space" or "natural materials" or "windows that open." So often, though, when someone presents the latest version of their brand, we find ourselves lacking any means of critical evaluation. After delivering a few save-the-earth-slogans and some shots of

³IBID., p.126.
smokestacks and clearcutting, they dive right into a building’s materials or mechanical systems leaving the big picture conveniently fuzzy. What is the big picture? What exactly is an ecological architecture?

While a study of this length cannot hope to offer an exhaustive answer to such a broad question, the task remains to initiate some sort of overall understanding that allows for critical assessment. On one hand this is dangerous, for the reductive generalizations it tempts could deny a healthy diversity and malleability. On the other hand, the greater danger exists that if we neglect to clarify our understanding of "greenness," opportunistic developers builders and architects, however well-intentioned, will cripple this complex set of ideas by peddling ersatz versions to an ignorant public.

II. Ecology

Although the use of these words has made them the interchangeable, it is fruitful to begin by understanding the original distinction between environmentalism and ecology. In The Rights of Nature, Roderick Nash places the beginning of the history of environmental ethics with the Greeks and Romans who conceived the concepts of natural rights and intrinsic value. Nash traces the broadening of man's natural rights through to today’s most radical expression, the extension of rights to all of nature. Ecology, however, whose beginnings are placed around 1880⁴ is a much more specific phenomenon, namely the biological science that concerns energy flows among organisms in a closed system. "Biological holism [derived from the work of 19th century German zoologist, Ernst Haekel] showed that man and animals were interdependent in and on a balanced environment. It implied that there was a scientific truth that lay outside of man’s perceptions, but on which man depended."⁵ We can see the expansion of natural rights as increasing the autonomy of the individual, as insuring freedom from oppression but possibly at the risk of

⁵IBID., p.15.
endangering the health of the collective. Ecology on the other hand can be seen as increasing individuals' allegiance to community although potentially paving the way for a new authoritarianism.

Bramwell illustrates the frightening nature of this latter possibility by tracing the history of ecologism through to its flowering in the agenda of the Third Reich. Both Hitler and Himmler were vegetarians, the ministry of agriculture set up some 2000 biodynamic farms, and they justified their controlling ways in the name of the interests of the peasant. While this may seem far away and of another culture, Richard Ingersoll warns that the eroding of personal freedom could happen in a much less detectable and more irreversible fashion:

As the audible consequences of the environmental crisis intensify . . . the social responses, as in times of plague or war, will become negligent of human rights, and reason is less likely to be heard. Some sort of environmental dictatorship, what we could gingerly call ecofascism, might gain favor with promises of restoring the biosphere. . . . The "Ecology Question," if it is not proposed as a question of justice among humans, will risk in the short term to continue to be submerged, and thus in the long term will require drastic, and probably inhumane, palliatives.\textsuperscript{6}

Those who dismiss ecologism on the grounds of fascist tendencies should know that there is a body of work that espouses ecologism in humanistic (not to be confused with "anthropocentric") terms.

American anarchist and all around tough guy, Murray Bookchin, espouses what he terms "social ecology." In this ethic based on the interconnectedness of all beings predicts that the next stage in human social evolution will involve the dissolution of strict pyramidal hierarchies, a product of the industrial age. He sees a fusion of what until now have been opposing attitudes, science and poetry, reason and intuition. The implications for the built environments are innumerable.

\textsuperscript{6}Ingersoll, "The ecology Question," p.6.
III. Organic Design

In a December, 1990 statement titled "Green Architecture" accompanying A & U's article his work, architect, James Wines, attempts to offer a comprehensive look at "green architecture." Although he does lend necessary urgency to the issue and offer some important information and ideas, there are some gaps in Wines' thinking that when filled will improve the chances of all architecture becoming green architecture.

Much of Wines' criticism about the first generation of environmental architecture is accurate.

... the heated, anti-establishment, politics of 60's radicals failed to acknowledge that their tendency to segregate themselves in insular communities (with all of the solar panels and earth shelters notwithstanding) ignored the first principle of ecology; that is, the necessity for all organisms to relate to the earth in terms of expansive and infinitely adaptable patterns of cooperation (the exact opposite of individualism and isolation). 7

It should be noted as well that not only were most of these experiments utopian and often run by an autocratic visionary, they were usually sited on virgin land, and failed to contribute to the health of the existing city much like the contemporary sprawl of suburban p.u.d.'s. In addition, ecological concerns became for the more mainstream 70's architects a functionalist crutch. For instance, in the name of greater efficiency for mechanical heating and cooling systems, many buildings were given perimeter skins sealed tight without operable windows, porches or door and window screens. Of course a building's type and surrounding climate determine the specifics but in general these buildings are oppressive in that they deny individuals the ability to control their own comfort as well as bring good weather indoors. 8 Lisa Heschong expounds upon the rich variety of haptic experiences that buildings can foster, such as a fire in a hearth or a breeze through an open window or rain on a tin roof. Although people like the comfort that mechanical HVAC systems provide on days of temperature

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extremes, rarely does one hold the same allegiance for an aluminum heating diffuser as for a stone fireplace.]

Embodied in the radical political uprising of that era the 1960's is the paradox that has haunted American politics from the beginning. Initiated by the original Jeffersonian emphasis on agrarian life as the keeper of democracy and re-affirmed by nineteenth-century transcendentalists' search among nature for the "oversoul," emphasis of an individual's relationship to the natural landscape eroded concerns for the preservation of community. Ironically enough, the massive protests that brought the back-to-the-land movement to the fore were facilitated among other things by the close-quartered communities of university campuses. Likewise, the central irony of green or "organic" architecture in terms of urbanism, lies in the fact that Americans' desire to get "back to nature" has caused a great strain on natural systems as well as the social organism that is the city. As it turns out, the destruction of the city was more than just an unanticipated mishap.

It was out of the transcendentalist era that Frank Lloyd Wright emerged to sound the call for an organic architecture. While Louis Sullivan undoubtedly was the initiator of this sensibility, it was Wright who sold it to the public. Giorgio Ciucci points out that for the bulk of his career, Wright rarely concerned himself with urban issues. Later on, though, in his invective over the need to find a democratic architecture to house the American project, Wright proposed Broadachres City, the new non-city, made up of individual families dispersed across the landscape, self-sufficient from working their own plot of land, connected by the latest advances in transportation technology. The realization of Broadachres City, today's suburban landscape is lacking a key ingredient, self-sufficiency. Just as the human scale of the traditional city was blown apart by the convenience of the auto, the scale of business has done the same. Wright's vision of citizens of the democracy growing their own food doesn't quite match the reality of mega-marts and video sales pitches. Suburbia is the combined corpse of the agrarian ideal and the civic realm.

Armed with the lessons of the past, James Wines offers his recipe for an organic building ethic: "... buildings for the 1990's should include energy
conservative technology, increased amounts of vegetation, and at least a sympathy for decentralization. No one could ever deny the benefit of more plants, as Wines reminds us, they are the suppliers of oxygen for animal life. However, decentralization, building "cities of less density and more trees" suggests lack of understanding about the role urban density plays in the preservation of the biosphere as well as civic culture.

Peter Calthorpe, the California architect who has devoted much of his career to ecological design, substantiates this point well in terms of design in the 1981 article with Susan Benson, "Beyond Solar: Design for Sustainable Communities." Calthorpe warns that infatuation with ecological techniques for individual buildings can blind the homeowner, developer, or designer from the larger picture, can become

a false panacea for our energy ills... Quite simply, adding passive solar systems to American homes does save energy inside but does not take into consideration the accompanying land use, infrastructure costs, and transportation demands.

Key to this article is reference to a 1975 study by the Real Estate Research Corporation, "The Costs of Sprawl," which shows that suburban, single-family detached developments, even when fitted with solar apparati, still consume 30% more energy than non-solar attached townhouses. This concrete example serves well to substantiate that urban planning carries greater ecological import than the most carefully designed individual piece.

Along with many others involved in the 1988 document, The Pedestrian Pocket Book, Calthorpe attempts to define "a new suburban design strategy." Given the

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9Wines, IBID.

10IBID.

conclusion from studies like "Beyond Solar," that suburban sprawl in general is the culprit in damaging the life of our natural and cultural worlds, why would Calthorpe be suggesting any kind of suburban development at all? Why not concentrate on the revitalizing decayed and waiting urban centers? Calthorpe's design-mate and host to the 1988 University of Washington charrette on which The Pedestrian Pocket Book is based, Doug Kelbaugh attempts to justify working on suburbia, proclaiming,

> It is now safe to say that most of the theoretical problems of urban design and the technical problems of energy conservation have been addressed. New, mature paradigms have already emerged and been adopted. . . . We do not need to focus on new typologies for urban design--2000 years have shown us how to build livable cities. What we desperately need are new, compelling typologies for our suburbs. . . .

If we know so well how to build livable cities, why then have so many Americans fled the cities for the suburbs? Granted, our transcendental heritage runs deep—the desire for land and space—but the lack of safe streets and good schools in most American inner-cities remains equally as strong in causing centripetal development.

This criticism is mainly rhetorical. Once one acknowledges how tightly Americans hold their desires the search for a more responsible form for suburbia becomes legitimate and crucial. In his chapter, "Fixing Suburbia," Daniel Solomon puts it concretely,

> There is no conceivable circumstance in which [Americans] will choose to relinquish their sunlight, their privacy, their cars, their fancy bathrooms, their access to the out-of-doors. The institutions of community—the cafe, the street, the porch, the square, the public conveyance—are doomed if they threaten the private man.

However, the fact that "new, mature paradigms" are not in place calls for a heartier

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13 IBID., p.32.
disclaimer that explains the suburban study as necessarily in conjunction with, as opposed to in lieu of, inner-city design. The charrette participants would most probably agree, considering that in his feature in the March '91 issue of Progressive Architecture, Calthorpe presents an urban plan along with a suburban plan, and explains the symbiosis:

The problem is to introduce the needs of the pedestrian and transit into the auto dominated regions of our metropolitan areas, not to return to the fiction of small-town America or try to absorb a disproportionate percent of growth in our urban centers. Those centers will grow strong if their suburban areas deliver transit riders rather than cars to their core and if their internal development favors the pedestrian.14

The greatest strength of The Pedestrian Pocket Book lies in this resistance to utopia. Its initial analysis attempts to assess the existing situation and find solutions that will work within that situation to nudge it toward a sustainable alternative. For example, the designers propose using existing models in terms of size, building type, and financing:

In contrast [to New Towns] the Pedestrian Pocket grows at an increment typical of current market-place activities; one hundred-acre projects are common for sub-divisions, office parks and shopping centers. Although more complex than these single-use types, the Pedestrian Pocket never gets too far ahead of market demand or creates massive front-end infrastructure costs.15

Moreover, the project’s incremental growth also applies to the light rail which, instead of debilitating development with another front-end cost, could be phased-in according to the success and need of the Pocket. Kelbaugh invokes Duany, Plater-Zyberk’s "Traditional Neighborhood Development" suburban strategy as being relatively similar to Pedestrian Pockets. Presently being built up and down the Eastern Seaboard, the


15Pedestrian Pocket Book, p.5.
T.N.D.'s fail to resist being "fictions of small-town America" in large part because of their homogeneity. This univalent character can be attributed to the fact that most are built, at least to date, by one or a few developers. The Pedestrian Pocket resists monochromatic life by dictating that many different developers work within the general zoning format while allowing enough freedom for variety. "The public sector's role is merely to organize the transit system and set new zoning guidelines, leaving development to the private sector."\textsuperscript{16} We have to wonder, though, if Calthorpe only refers to the urban form when he laments the "chain-store architecture, scaleless office parks and monotonous subdivisions." Is there a place for these "ugly" inevitabilities in Calthorpe's plan?

Although both their conclusions about Suburbia and their keynote solutions stand solidly, the way Calthorpe and Kelbaugh view some of the statistics deserve more critical commentary.

Our old suburbs were designed around a stereotypical household which is no longer prevalent. Over seventy-three percent of the new households in the 1980's lack at least one component of the traditional husband, wife, and children model. Elderly people over 65 make up 23 percent of the total number of new homeowners, and single parents represent an astonishing twenty percent. Certainly the traditional three bedroom, single family residence is relevant to a decreasing segment of the population.\textsuperscript{17}

The implication that single-family detached are only type built in present suburbia fails to acknowledge all of the condominium and townhouse complexes that occupy much of sprawling perimeter development. These complexes which are targeted at those who don't fit the nuclear family stereotype--young singles, single parents with children, young married couples, the elderly--actually contain the same densities that the Pedestrian Pocket advocates. In fact, Calthorpe acknowledges these types when discussing feasibility saying that they are using types that already exist, just in

\textsuperscript{16}IBID., p.12.

\textsuperscript{17}IBID., p.9.
different composition: "The housing types are standard low-rise, high density forms such as three story walk-up apartments and two story townhouses. Only the interrelationships and adjacent land use has changed."\(^{18}\) The housing type for these "new" lifestyles exists, though whether there are enough to go around is another study altogether. However, this is not the main reason mothers have been turned into chauffeurs, the elderly ostracized, etc.; a different urban form that allows multiple means of transportation rather than dictating one does much more toward helping these new types of families than the individual building designs.

The key distinction involves adjacencies and this is the heart of the matter. The understanding that Calthorpe & co., Duany & Plater-Zyberk, Jane Jacobs and undoubtedly many others share is the need for the reinstatement of mixed-use development that existed before the Second World War. The term, "mixed-use," actually should be used more carefully because Euclidian zoning is in effect a mixed zoning, it's just that the pieces are presently scaled exclusively to the automobile. The mixing of uses on the scale of the pedestrian provides not only the option of pedestrian transportation but can activate the street as a public space, safe and rich in variety of experiences. The point is to zone uses in a way that allows for as many transportation options as possible, which in turn means freedom of choice which in the end is more fitting for a democratic society. Despite the overall strength of the argument for mixed-use development for mixed modes of transportation, there remain two topics that the Pedestrian Pocket designers fail to understand thoroughly: the importance of the car to the life of the street and the nature of the urban edge.

Calthorpe starts the Progressive Architecture article with, "The car is the defining technology of our built environment. It dictates the scale of streets, the relationship between buildings, the need for vast parking areas, and the speed at which we experience our environment." In the Pocket Book he states that "the automobile destroys the urban street."\(^{19}\) Jane Jacobs, to whom Calthorpe often alludes, calls this

\(^{18}\)Ibid., p.11.

\(^{19}\)Ibid., p.19.
sentiment to task in her urban polemic, *The Death and Life of Great American Cities*:

Automobiles are often conveniently tagged as the villains responsible for the ills of cities and the disappointments and futilities of city planning. But the destructive effects of automobiles are much less a cause than a symptom of our incompetence at city building. . . . [Planners] do not know what to do with automobiles in cities because they do not know how to plan for workable and vital cities anyhow—with or without automobiles.  

Although they deal with the car in some useful ways, in their attempts to insulate the pedestrian from the car, Calthorpe and Kelbaugh fail to understand some subtleties in the role cars and pedestrians play in enlivening public streets. The two major strategies they employ in the Pedestrian Pocket—the mix of building use-types and the densification of fabric—work in conjunction to allow/permit circulation both between buildings within the pocket and between different pockets without a car, by the combination of foot or bike and transit. Moreover, they provide well for parking and, in order to avoid the death sprawling lots inflict on streets, tuck the spaces carefully behind buildings and decrease their number from the present norms. That they don’t propose abolishment of cars shows an understanding of the need for a middle solution between the real and ideal, a solution whose variety resists the unrealistic fascism that plagues the likes of Soleri’s proposed carless utopias. (After all, what happens if someone perfects renewable, non-polluting fuel for the private car?)

In choosing Radburn, N. J., for a model, with its separation of car and pedestrian for the sake of safety, Calthorpe and Kelbaugh fail to understand the subtle ways cars can contribute to the safety and vitality of streets. Andras Duany carefully describes the role cars and pedestrians play in the positive social life of towns and cities in his article entitled "Traditional Towns:"

On-street parking is crucial to the existence of

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pedestrian life. And yet, planners everywhere are doing their best to strip parking from the roads and inadvertently are stripping life from our streets. . . . Only parked cars can truly slow traffic, because drivers instinctively know that somebody might be pulling in or out or opening a door, and they are cautious. They also protect the pedestrian. The pedestrian can wait between two cars, totally protected, and then make the crossing. . . . It is a balanced equation.\textsuperscript{21}

The same freedoms that Calthorpe attempts to win for the pedestrian could be undermined by the cul-de-sac street patterns that limit the options of routes. In this instance, there may be too much deference to the car. Other participants in the charrette, in particular the teams of Mack/Prowler and Fraker/Solomon, show this understanding of the street as public space that handles not only a mix of building-use types but a mix of transportation types.

The original intention of taking the formless web of suburbia and tying it into tight knots connected by public transit--similar to what Richard Register proposes for cities--is healthy. However, the authors of the \textit{Pocket Book} never discuss strategies to preserving surrounding open land from development. Although they present images of the regional (p.6) and Pocket (p.9) plans, discussion of the physical edge, is conspicuously absent.

Is there a means of limiting the growth, not just of specific suburban developments or cities in general, but of both together--whole metropolitan regions including still-open space within their limits? Is there a way to combat the present fact that "growth is directed mainly by the location of new freeway systems" encouraged mostly by opportunists having bought up cheap peripheral land without any care or understanding of the ecological and social ramifications?\textsuperscript{22} This all seems to suggest some form of regional planning that at this point would be dominated like anything else by corporate or military special interest groups.


One architect has attempted a solution to the lack of city limits. Pliny Fisk with Maximum Potential Building Systems, (MaxPot) was the only American architect to receive commendation at the earth summit in Rio. For a site outside of Austin, Tx. their home base, MaxPot designed a small prototypical complex consisting of storage buildings and a small organic farm to act as a gate between city and countryside. The complex acts as a prototype not only in concept but also in its materiality. Constructed of such unconventional materials as hay bale walls sprayed with concrete, trim boards hewn from the unwieldy indigenous mesquite tree, and steel trellis columns reclaimed from local irrigation operations the complex begins to answer in architectural terms Murray Bookchin’s wisdom about the future of sustainability. Fisk is by no means a Luddite nor a utopianist. He takes the existing natural, cultural and industrial formations and seeks ways to steer them toward sustainability. MaxPot is involved in creating on computer a global map of local resource supplies so that local peoples aren’t purchasing building supplies from halfway around the world while they unwittingly stand on a good supply of some healthy alternative. For example, Fisk has found that the sulphur that is emitted into the atmosphere by countless industrial stacks, when used as an admixture in concrete, makes a stronger, lighter, cheaper cinderblock.

To ask how someone stays in business while spending so much time on exploration is to touch on a fine example of "organic" By combining a for-profit architecture/inventor business with a non-profit component as well as with university teaching, they have created for themselves the opportunity to both invent and test invention through practical application. This means of creativity acts as well at the level of the daily workings of the office: because there is not a hierarchical set-up, ideas and projects are shared and benefit from a productive redundancy and cross-fertilization not engendered by traditional ego-ridden corporate structures.

Unfortunately, however, Fisk does have a slight attitudinal hangover from the 70’s and 80’s in that he tends toward pure functionalism, avoiding what he sees as trivial style wars among architectural fashionplates. Considering that a lack of aesthetic grace shot 70’s functionalism in the foot, one hopes that talents such as Fisk
won't fall off the ascetic ecologist's deep end. So far the buildings he has design are actually quite beautiful in their direct form and materiality.

James Wines, on the other hand, because he uses nature narratively in the work of his firm, S.I.T.E., risks reducing buildings to mere propaganda or even cartoons. Wines provides the title for the play being acted out by his "Forest Building" in Virginia and "Rainforest Building" in Florida: "nature's revenge." In For an Architecture of Reality, Michael Benedict describes this fallacy in symbol-making:

In an "information age" it is too easy to lose sight of the fact that what something is, is distinct from what it communicates. Joining the pervasive suppression of the perception of reality in favor of the suppression of messages—of what is in favor of what is meant—will loosen us even further from the possibility of an architecture grounded in fact and a sense of the necessary.  

By commercializing ecology, in selling only a picture about nature rather than a participant in the workings of nature, S.I.T.E. not only trivializes the gravity of the physical threat, but jeopardizes the power natural processes can register on human imagination. One can see in a windmill, for example, a complete lack of self-consciousness, a cultural artifact that through its use over time takes on its own powerful metaphorical presence.

One wonders if Wines ever wonders about the materials he uses in his projects. He might point out the commendable fact that there are no tropical hardwoods in his buildings. However, due to the fact that architects typically have to settle for a given site, materials specification could be, at least in the short term, the place where they can exert the most influence. Once again, the goal is to be comprehensive in our investigation. Beyond the most obvious examples such as avoiding non-renewable or precious products from the rainforest, we need to consider the complete life of the material. Where was it grown or made? Who and what does the process affect? Is the material long-lasting or can it be re-used? The list of questions is long but truly

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green architects find and support the healthiest industries and in the case where an industry doesn’t exist yet, possibly encourage their inception.

IV. Project: Mixed-use urban infill

The goal is to develop an energy-conscious, inner-city alternative to suburbia, a connection to both nature and culture; both specific to site and prototypical. The program is chosen as a direct response to the socially vapid and environmentally destructive nature of single-use suburban sprawl. The intention is to find a thriving pedestrian district and extend its area appropriately. The specifics of the program should not be determined first and then the hunt for a site begun. Rather, there is first a general intention to insert a viable mix of uses—housing, retail, office and institutional—and then, after a place is found and considered, programmatic elements are added or subtracted according to how appropriate they are for the site. In essence, the site has its own specific needs which will unfold all along the course of the design process and which must be fulfilled as need be. The issue of programmatic uses is moreover linked to the physical site in terms of in terms of scale. On a site whose size would normally—that is, in present development norms—suggest a single use, the plan here is to load as many different uses onto the site as seem plausible.

Program: Co-housing

When the subjects of ecology and housing are brought up together, Americans usually recall the images of rag-tag tents and geodesic domes loosely clustered on some desert floor. Although some communes still exist in the U.S., as an idea they have failed in their original desire to revolutionize the culture. Originated in Denmark and brought to the U.S. by San Francisco-based architects, Kathryn McCamant and Charles Durrett, co-housing sheds the utopian agenda and bases the argument for communal living on more practical concerns:

Contemporary post-industrial societies such as the United States and Western Europe are undergoing a multitude of changes that affect our housing needs. The modern single-family detached home, which makes
up 67 percent of the American housing stock, was 
designed for a nuclear family consisting of a 
breadwinning father, a homemaking mother, and two to 
four children. Today, less than one quarter of the United 
States population lives in such households. Rather, the 
family with two working parents predominates, while the 
single-parent household is the fastest-growing family 
type. Almost one-quarter of the population lives alone, 
and this proportion is expected to grow as the number of 
Americans over the age of 60 increases.24

Based on these changing demographics, Co-housing consists of a group of anywhere 
from five to thirty-five or so families and individuals who gather a community around 
some shared activities and spaces.

The community centers itself around a central kitchen and dining hall where 
evening meals are prepared each night by one or two adults for the whole community 
such that all residents cook dinner approximately once or twice a month depending on 
the number of residents in the community. Co-housing differs from traditional 
communal living in that it provides not only communal facilities but also allows 
autonomy for each resident. All individual homes are equipped with a full kitchen for 
the preparation of breakfast or lunch or dinner on those nights when an individual or 
couple or family wants their solitude. Shared meals not only provide for a greater 
degree of community than can the nuclear family but free residents, whether working 
parents or individuals, from the demands of shopping for, cooking, and cleaning up 
after dinner every night, tasks that can become quite taxing on those days of long 
work hours, commutes, and car pools. Examples of other things shared by the 
community include laundry rooms, children's play rooms or day care facilities, 
cooperative stores, visiting guest rooms and workshops or toolsheds. "The sharing of 
resources gives all residents access to a wider variety of conveniences at a lower cost 
per family than is possible in traditional single-family houses".25

Much of co-housing's agenda emerges as a reaction against the homogenized,

24 Kathryn McCamant and Charles Durrett, Co-Housing: A Contemporary Approach to Housing Ourselves, 

25 Ibid., p.25.
often de-personalized nature of single-use suburbia. Because residents become involved with the planning of their community from the beginning, and because they occasionally opt to build part of their homes themselves, they invest not only of their finances but of themselves, they involve themselves more permanently, if not more passionately in the place. Co-housing also allows that different family types and age groups can take part in the community. For those individuals or couples who are dissatisfied with the prospect of retiring to a typical senior citizens home, co-housing’s double allowance of owning one’s privacy and coexisting among people of all ages provides an attractive alternative. Thoughts come to mind of traditional cultures where the young learn from elders who are valued in their old age rather than vacuum-wrapped and placed on a shelf to dry.

While some of the communities portrayed in Co-Housing carry an explicit environmental outlook—employing such techniques as solar and wind power to generate electricity for the community—the nature of co-housing is ecological in the broader, implicit sense. In the sharing of facilities we find not only the positive social aspect of community but an efficiency in the consumption of resources, as one resident states, "Although our monthly house payment increased, our total lifestyle costs decreased because of the common facilities and shared resources here". Moreover, co-housing embodies a more complex organization than either traditional single-family existence or its extreme opposite, the commune; just as successful pedestrian environments allow different options—to walk or bike or drive—co-housing provides for both independence and participation.

Co-Housing: A Critical Take

Although the strength of community that co-housing attempts to build remains a positive thing, that strength risks cutting the community off from the larger community in which it sits. Of the dozen or so co-housing communities they document in their book, McCamant and Durrett show only one urban example. All

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26IBID., p.33.
the rest are suburban not only in location but in type. That is, not only are they situated on the periphery of cities but they fail to articulate their perimeter edges according to any context; typically the community plan pushes off-street parking to the periphery and orients the buildings inward. While the book’s different examples suggest a variety of community types, this basic organizational introversion produces an enclave, not too far in effect from the gated suburban bourgeois communities that dominate the perimeter of most American cities. In fact, a recent Wall Street Journal article on fledgling co-housing communities in the U. S. explained that many are finding homes in existing condominium-with-pool-and-clubhouse type complexes.

That these communities fit easily into existing enclave developments comes as no surprise. The co-housing program in its essence is introverted. Amenities that one once shared with the rest of the city at large--such as the laundromat, the day-care center, and the open green playspace--for a co-housing inhabitant are now contained solely within his community. The challenge for this design, then, becomes finding a way to bridge this natural gap between the co-housing community and the surrounding neighborhood. Because the people who are interested in new, more social ways of living, tend to be progressive in their leanings, it is not far-fetched to presume that they would want to place themselves into a neighborhood responsibly. They understand that their health depends on the health of the greater whole.

Site Selection

Where and how we place buildings influences our impact on the environment more than how we design the buildings, therefore choosing an appropriate site was crucial toward the success of this project. Because the intention of this project is to avoid utopian posturing, the site must be a believable location for mixed-use development. The goal was to find a thriving pedestrian neighborhood near some city center in order to strengthen and extend that neighborhood in order to strengthen the city core.

If one were shopping for a city with a strong presence of pedestrian neighborhoods, the quintessential find would be Baltimore. These days when someone
starts to speak of pedestrian cities with small shops and corner bars and houses with porches, eyes start to roll in fear of a nostalgic diatribe. But Baltimore often is that way; there are places that seem to have decided to take their own sweet time about making it through the 50’s.

**Analysis: Neighborhood**

Site analysis came in the form of two methods, the first, objective, and the second, more subjective. This site which was actually chosen rather intuitively revealed itself upon analysis to be a point of convergence for many of the social forces acting within the Federal Hill district. Based on data collected by means of a walking tour, as well as from some readings, initial analysis involved mapping four considerations most important to site planning: land use, open space, parking, and block size.

The land use map revealed that the site sits in a swath of small scale retail—including some office space and a few public institutions like the Red Cross, the library, the fire station—that runs north/south along both sides of Charles and Light Streets, and anchored by Cross Street Market two blocks to the south. East and west of the site remain predominantly housing. The most interesting aspect of the site that the land use map revealed is its nature as transition point between south and north: the dense retail marches north from below Cross Street Market and stops at the frame shop existing on the southeast corner of the site. North of the site is almost all housing. That much of this housing north of the site was new suggested that there might be a kind of invasion of single-use toward the older multi-use stock. This understanding helped clarify the importance of re-introducing mixed-use buildings on the chosen site. Moreover, in terms of the immediate site, the existence of retail on Charles suggested that would be the proper side on which to re-establish ground-floor retail.

The open space analysis used four categories, public hard surface, private hard surface, public green, and private green. The map revealed an absolute lack of public
hard surface places and a paucity of open green spaces. Streets can be considered public hard surfaces, but their spacial and functional qualities limit their range of operation and make them different from an open plaza. Although plazas are difficult to introduce successfully into American culture, (as evidenced by the likes of Charles Moore’s Kresge College), just across the Harbor in the center of Fell’s Point, a neighborhood similar to Federal Hill, sits a successful paved plaza. Its success suggests that one of appropriate scale might succeed in Federal Hill as well.

As for green spaces, although there do exist some large examples—Federal Hill Park to the north-east, Central High School to the south-east, and the Grover Cleveland Park to the south-west—because their perimeters are not programmed with a mix of uses, they do not take on the character of lively, day-to-day social spaces. Many of the blocks north of the site have been gutted of housing on the alley to provide small scale back greens. Although well intentioned, these have problems, too, in that they are surrounded by back yard fences as opposed to actual backs of houses with their windows and doors to provide safety through surveillance and access. In general, while there are both thriving mixed-use buildings and substantial open green spaces, never do they combine to create a public place worthy of the strong community in Federal Hill.

The parking analysis showed that the district in general understands well the subtleties of placing parking. Most of the parking is public, on-street parallel or private off of an alley. Many of the new developments, that is those with parking decks like the housing block on the south-east corner of Charles and Henrietta, are to be commended for their sensitive placement of parking: they tuck parking garages into the interior of blocks and access them off of an alley thus preserving street frontage and the integrity of the pedestrian sidewalk. The few instances of bad parking placement, including the lot in front of 7-11, so obviously erode the pedestrian quality of their respective streets that taking notice not to repeat the same seems the obvious task to take. In fact, according to Leslie Leach, director of the Society for the Preservation of Historic Fell’s Point and Federal Hill, there was talk of turning the chosen site into a parking lot predominantly for people going to baseball games at
Camden Yards, about ten blocks to the northwest. Fortunately, the community associations have been wise enough and strong enough to stave off such unimaginative development.

The final issue influencing the site looked at the district in terms of scale built form. According to Thomas Linsay’s May ’92 article in Planning27 recent development around the area of the Inner Harbor has considerably coarsened the urban texture. Many of the new hotels and parking garages that are taking advantage of the Harbor’s success offer long blank walls to the pedestrian. This coarsening of the urban texture occurs as well in the developments to the north that have scraped housing from alleyways to provide for greenspace. Federal Hill attests to Leon Krier’s emphasis on scale as a crucial determinant as to whether cities provide most for pedestrians or for vehicles. For one, because long and thin lots cause small street frontage for each household, one experiences a large number of varied facades in the length of one block. Row houses still stand in Federal Hill with inside widths as little as ten feet. In addition, the blocks are typically only around two hundred feet long and are split by a service alley. In some areas, amazingly enough, the alleys have accumulated over the years smaller rowhousing that effectively has turned the alleys into streets. The opportunity thus arises in this project to use alleys to reverse the trend and re-refine the neighborhood’s texture toward the pedestrian scale.

After the objective recording of land use, open space, and parking patterns provided a certain number of conclusions, it became necessary to undertake some subjective analysis of the neighborhood in order to more fully understand some of its social patterns. The first of two analyses involved marking the territories of the different socio-economic communities within the larger neighborhood. As it turns out, all four of the different communities border on this site: the lower income, predominantly black neighborhood including a mid-rise and a row house public housing development, extends from the freeway and the Baltimore Gas & Electric natural gas facility to the west and south extends up Hanover Street to the southwest.

corner of the site; the lower-to-middle income, predominantly white community of South Baltimore filters up through the combination retail and housing "swath" between Charles and Light Streets; the middle-to-upper income mostly white neighborhood inhabiting mainly renovated, historic row housing meets the site on the east side; and the a-little-more-upper-than-middle-income white neighborhood inhabiting perimeter blocks of both renovated and new row housing (mentioned earlier) borders the site to the north. The challenge suggested by this confluence of somewhat distinct communities suggests a challenge to somehow create a link between them all as opposed to defaulting to gentrification.

The second subjective analysis came as a reaction to the subtle enclaves being formed to the north of the site with the gutting of blocks for interior greens and the selective closing off of streets. The task thus presented itself to map the buildings in the district that are grouped in this fashion. Although the result had no real effect on design considerations it is worth mentioning. The three types of enclaves were first, the aforementioned gutted blocks to the north, second, the Christ Church and elderly housing complex to the north-east, and third, the low income row house project to the south. This demonstrated that the enclave form crossed economic boundaries. These enclaves might be seen as perfect forms in which to house a co-housing project, because co-housing by its very nature is exclusive, at least as demonstrated in McCamant and Durrett's book. A central concern/challenge for this project, therefore became finding a way to provide a protected open space exclusively for the co-housing inhabitants as well as means of connecting the community to the surrounding neighborhood.

Another observation made during the walking tour of Federal Hill that deserves mention concerns typology. While there do exist different architectural types that represent different programs—the row house with front door and stoop for housing and glazed front for shops, the school, the church—those types are always flexible enough to accommodate other programs. Many of the old schoolhouses have been converted into condominiums, the same for one church whose nave windows have been replaced by doors with stoops, and offices fit into just about anywhere. This flexibility of
programs showed that design need not be so specific as to overburden form. In addition, the general trend of conversion of many different types of buildings to housing indicates a homogenization that would weaken pedestrian viability. That is, this could be moving the whole district toward status as a bedroom community that requires vehicular transportation for all activities other than sleeping. Thus, the goal reasserts itself that one should attempt to insert as many plausible uses as possible into every development.

Analysis: Site

In terms of the immediate site, three conditions influence site design: the sparse street frontage on the west side of Hanover street to the west; the alley that approaches the site from the east, is indicated as extending across the site east/west on the city plans; and existing buildings on the southeast and northwest corners of the site.

The weak street edge on Hanover Street caused by the church and its parking lot call for a strong street frontage on the west side of the design site. This will not only preserve the spacial quality of the street hence continuity from north of the site to south but will also complete the perimeter backdrop against which the church would sit as the set piece. That the alley continues through the site provides good opportunity to refine the texture of development and that the alley does not extend across the church property to the west provides some flexibility as to the orientation and placement of a new alley. Finally, it must be decided whether the existing buildings on the site—a group of eleven houses that wrap the northwest corner and one frame shop on the southeast corner—should be demolished or whether they should be saved and incorporated into the new plan. The latter would most probably be the best course especially in light of the tenor of the thesis idea for accepting existing structures not only to save resources but to save the history and rich diversity that old buildings provide. The frame shop is an especially elegant building and the long, blank, side wall, exposed because its neighboring buildings on the north have been demolished, stands as a sublime architectural element.
1. PRIVATE PARKING
2. STORAGE
3. HOUSE
4. DUPLEX
5. RETAIL
6. CAFE
7. COMMUNITY KITCHEN/DINING HALL/REAR TERRACE
8. GUEST QUARTERS
9. DAY CARE
10. ECO-LAUNDRY
11. ARCADE
12. READING ROOM
13. PLAZA
14. COMMUNITY GREEN
15. COMMUNITY ROOF GARDEN
16. STUDIO

ROOF/SITE PLAN
FIRST FLOOR PLAN

1. PRIVATE PARKING
2. STORAGE
3. HOUSE
4. DUPLEX
5. RETAIL
6. CAFE
7. COMMUNITY KITCHEN/DINING HALL/REAR TERRACE
8. GUEST QUARTERS
9. DAY CARE
10. ECO-LAUNDRY
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THIRD FLOOR PLAN
Site Design

Having chosen a promising site, general site diagramming seemed the obvious first step in the design process, but the thesis committee quickly threw those assumptions into question. Albert pointed to the selection of a block as opposed to two sides of a street as possibly the most important decision I would make in the whole design process. The point was well taken that choosing the interior of a privately owned block instead of the public space of a street for communal gathering would have different societal ramifications. The possibility arose to consider the implications of taking that point to its extreme and scattering the co-housing community throughout the neighborhood and allowing the common hall to be an urban monument, a private building that nonetheless takes on a public presence by situating itself prominently within the urban fabric.

Having stepped back to reexamine the site location strategies, the alternative solutions seemed unrealistic in light of how a group of co-housers would most likely want to build: straddling a street would not provide the protected greenspace that co-housers would want—and that would bring some qualities of suburbia into the city—and dispersing the project would not engender cohesiveness among the co-housing residents. Although the site selection did not change, this unexpected piece of analysis emphasized the importance of fighting the inherent insular qualities of a city block and of finding ways to connect the co-housing community to the neighborhood and city at large. The project would have two take on Venturi's "both/and" qualities in order to handle the contradictions between site and program.

Re-commencing the study of how to arrange buildings around the site, one diagram emerged above the numerous others because of its multivalency. The central idea of this final solution is the simultaneous creation of two different outdoor spaces, one private (to the co-housing community), grass-covered and informally planted throughout with a variety of species, the other public, paved and formal,[lined with tall pines]. The co-housers take their private place but offer a public space back to the neighborhood. In a sense, the interior green is the back garden and the plaza which fronts appropriately on Charles Street, becomes the monumental front stoop of the co-
housing community where its residents and the larger community meet. This would give Federal Hill a hard-surfaced gathering place much like the one in Fell’s point, would make the site a sort of book-end to go with Cross Street Market containing the rich diversity of retail in between this true Montgomery Square would also act as a strong pivot between Cross Street Market and Federal Hill Park, the district’s two most prized possessions.

These two new spaces on the co-housing block are separated formally by the alley which has been turned from its east-west orientation to run north-south. Including the alley adjusts the size of the block to a scale befitting to the neighborhood and fronting buildings on each side of the alley turns it into a small street. As it turns out this becomes the street the initial critique suggested should be the public space for the community, hence, instead of being the one public space for the community, is but one of many. Turning the alley allows a flexibility of block size that an east-west alley couldn’t, because it would naturally have to line up with the existing alley coming from the east. The new alley, in combination with the pulling away of new buildings from the frame shop’s blank north wall to create the plaza, allows the plaza to act not only as a place of sitting in but one of passing through. People shortcutting across the plaza sets up the probability of a livelier space than if the plaza were but a notch in the fabric, a three-sided cul-de sac.

Site planning gestures based on the existing context tie the new project into the place, make the new an inextricable piece of the whole. The pulling away from the frame shop not only sets up the practical capabilities of the wall as a public billboard or place to show movies in the summer, it emphasizes the sublime beauty of the long, blank party wall and sets up the existing building as a set piece. Celebrating this frame shop building as well as including the other existing row houses attempts to set a symbolic as well as practical example for the preservation of any site’s history. Although the alley has been turned ninety degrees, the path of the old alley becomes an organizer for the community. Now a pedestrian thoroughfare, the east-west axis positions the new public arcade that faces onto the plaza such that the alley still extends across the site both visually and for the pedestrian. Counting on the back
doors, windows and the like for natural surveillance along with a raising of the level of the co-housing green three feet above grade, the alley becomes a path whereby the public can pass through the site without taking part, much like James Stirling’s path through the Staatsgalerie in Stuttgart. The new co-housing path reveals the varying layers of place, extending west from Charles Street along the arcade, across the new alley-street, between the houses, through the private green, again between the buildings and out to Hanover Street.

Having settled on this site diagram, the next stage of site design involved placing the community’s "monuments" into its "fabric" in positions appropriate relative to their use. While in McCamant and Durrett’s book the communal amenities belong exclusively to their co-housing communities, this project posits that since priority is given to interfacing with the Federal Hill community, sharing these amenities could be one means. Because day care could be run by co-housing residents and offered as well to the community at large, its building sits at the southern end of the green providing public entrance off of the street and access to the protected green. Likewise, the laundromat steps just north of the end of the east-west axis with public access off of the Hanover Street. Once the home of the dining hall before the dining hall found its present place, the space above the arcade becomes the public reading room, its long side facing south onto the plaza and shading its generous glazing against the high summer sun, its end facade looking down the alley toward the church on Light Street, and its roof holding the soil for the community’s organic vegetable and flower garden. The most important building in the program, the co-housing kitchen and dining room, remains the one "monument" not shared with the larger community. Having moved around a bit in more monumental locations, it finally finds its place embedded in the fabric, backing onto the green with a large dining porch, and fronting on the alley-street facing the public plaza. Its tall, vertical, solar shading columns express its communal significance.

The last important aspect of site design and one that directly relates to the intention to design an inner-city alternative to suburbia is parking. One might propose that this project should take a strong stand against the car and not provide parking.
This attitude erroneously disregards the power of Americans' attachment to their cars and the inefficiency of public transportation in a city as low in density as Baltimore. Instead, this project provides ample parking for the residents while taking care to preserve the social character of the street. It takes to heart Jane Jacobs' description of how cars parked on street as opposed to in lots actually help slow traffic and protect the pedestrian. Therefore, all curbs around this block allow parking and it should be noted that the inclusion of the street-alley provides that many more spaces. However, because curbside parking does not provide enough parking for the probable number of residents, one level of "car storage" occurs where possible under the new buildings a half level below grade. More than one level would demand too much ramp space. The entrance ramps are collective--no garage-lined house-fronts here--and their number is kept to a minimum. Moreover, in order to maintain the vitality of the street, the lack of direct access from garage to inside of house cause one to traverse the public realm.

Unit Design

Mid-way through design, when the basic plan and sectional ideas of the site as well as the units were set and it came time to give aesthetic expression to the block, something intangible was getting in the way. I finally realized that my discomfort lie with the prospect of one hand designing the entire block in a district where as many as eight or so designers or builders to one block. Thus arose the possibility that the planning guidelines--again, in both plan and section--could be established and set such that individual owners could make their own decisions for their individual properties. This new strategy opened up new advantages, especially in light of the co-housing program: First, by making their own decisions, people would be provided the opportunity to invest themselves more permanently in the place. Moreover, the system allows people the freedom not to participate in some of the designing or building of their place; developer's even could work within this scheme. Finally, the development would sit more gracefully into the existing neighborhood than a large, monolithic project.
So the unit design involved careful consideration in both plan and section to achieve a handful of goals: provide a variety of unit sizes for different sized families, maintain the health of the public street, incorporate passive heating and cooling techniques, and insure privacy and a connection to nature for each individual house or apartment.

Developers bank on the image of suburban subdivisions as one of stability and permanence. However, the reality of suburbia is such that the lack of variety in unit types in most subdivisions demands that if a change in a family’s size mandates a different sized house, they are obliged to find a completely new neighborhood. This project plans different sizes for homes and apartments, and even includes rentable flats so that not only is a changing family allowed to remain in this place that they helped build—co-housers are typically those who intend to settle relatively permanently—community at large is insured to contain a certain level of social variety. Instead of counting on income levels to insure property values, this community invests in peoples’ desire to care for a special place.

Many of the ideas for the organization of the individual houses act to insure the viability of the street as a lively and social, hence, safe public space. At some point the committee suggested that flats be considered along with row houses as a housing type. The crucial difference between a block of flats and a row of houses in terms of its effect on the street is that the horizontal circulation—that is, traffic from neighbor to neighbor—in row housing occurs on the street compared to on a balcony or internal corridor in flats. Therefore, the row house remains the sole building type for this project. In order to erase some of the redundancies of vertical circulation found in conventional individualized row housing, all housing units are paired around a shared stoop and stair. In addition, all housing meets the street with a porch, an element not found in Federal Hill but quite effective in similar neighborhoods in Baltimore. People often criticize suggestions for porches saying they are nostalgic and won’t be used, but even if porches only get used a few times a year, that the option is provided keeps the possibility open for a change in habits.

In addition to designing the houses toward stronger ties between residents and
the neighborhood, there is also an intention of allowing stronger ties between individual households and the natural elements. Just as row houses are typically notched in the rear of the plan to provide light and air to the interior, each of the three story housing units shares a passive solar notch. This glassed-in, roofed-over space catches the sun’s heat for winter heating and produces a stack effect for summer cooling. While every unit must share a notch with a neighbor, each unit is also insured its own private rear garden. The back yards which we saw in the developments north of the site that diluted the potential of the back greens to be safe and collective, is now lifted up into the air and connected directly to a living space. The Co-housing residents are thus given a rich variety of outdoor spaces: the urban public plaza, the suburban bucolic collective green, and the extremely private sky-garden.

This project stands in large part as a reaction to the peddling of hollow imagery as opposed to intricate planning; when you gaze at the plans for Montgomery Square, you find that, lo-and-behold, there’s no square there.

V. Conclusion

The final jury’s main criticism concerned the lack of a more overt green aesthetic. On one hand I was attempting to avoid Wines’ eco-disney, avoiding over-design. Some of the most beautiful buildings in the area are warehouses for their austerity, materiality, scale, lack of pretension. The main opportunity for more elaborate design would have to do with the relationship between the communal pieces of the block and the housing units: if the individual units were owner-designed, that is, each unit different from the other, then perhaps the set pieces should be extremely mute in their appearance; if the housing units were built as complete blocks, then the other pieces could be more elaborate. Of these two, the former would probably be better considering that individualized units would match the texture of the surrounding neighborhood. Moreover, because of a shortage of time, the aesthetic could not benefit from the particulars of materials and passive heating and cooling techniques.

When I began the process, in an effort to bring a sort of holism to the
methodology, I aspired to follow the design on as many parallel tracks as possible. Unfortunately, as time became too precious, those lower-priority tracks that were too time-costly had to be dropped, such as mapping the real estate market realities, employing 3-D computer modelling, and collaging found images and objects into "intuitive boxes." Of these I feel most the most important to be the attempt to make green design competitive in the current market, to change the unhealthy system from within.

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VII. Appendix

INDEX OF ECOLOGICAL DESIGN CONSIDERATIONS:

An attempt to catalogue the design process comprehensively under an ethic of global sustainability.

A. Site Selection

1. History of Land
   a. Virgin
   b. Used
      i. Vacant
      ii. Existing building(s)
         a. Re-use/ remodel
         b. Tear down

2. Natural character of Land
   a. Topography
   b. Soils/ Geology
   c. Climate
d. Hydrology
e. Fauna; endangered species?
f. Flora

3. Relationship to City/Infrastructure: independent, dependant
   a. Power: electrical, gas, coal, oil; co-generation
   b. Water
      i. Supply
      ii. Waste: grey vs. black
   c. Food
   d. Transportation

B. Selection of Program
C. Selection of Form

1. Site Planning
   a. Solar orientation
   b. Wind orientation
   c. Massing/Density
   d. Orientation to landscape

2. Materials
   a. Effects of Manufacturing Process and Transport
      i. Embodied energy
      ii. Waste produced
      iii. Renewability of raw materials
   b. Recycled
   c. Recyclability
   d. Toxicity
      a. Indoor air quality
      b. Seepage into ground water
   e. Durability

3. Building Systems
   a. Construction
i. Labor vs. energy intensive
ii. Pollution: noise, trash, exhaust
iii. Soil erosion prevention

b. Operation
   i. Heating/ Cooling systems
      a. air
      b. water
   ii. Appliances
   iii. Lighting
      iv. Waste management

c. Demolition