

Affordable Housing for Artists: A Sustainable Prototype

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Introduction

Although many architects and builders feel that designing for both sustainability and affordability is impossible, I believe that the only way we can *afford* to live is sustainably. Through the design of housing for artists, this thesis will demonstrate how a building can both meet the needs of its inhabitants and practice sustainable principles in a beautiful design. This Austin, Texas model can be used as a prototype for similar housing in other cities and for other environmentally friendly buildings.

Sustainability is a crucial issue for the energy-guzzling United States. The Rocky Mountain Institute states that the biggest energy consumers in the US "are not cars, but *homes*. In 1990, for example, American households consumed \$110 billion worth of energy."¹ This project investigates means to design a building that uses as little energy as possible while maintaining a high quality of life.

Austin is an ideal site because of its commitment to building sustainably, as established by the Austin Green Builder Program which "assists owners and designers to develop sustainable business practices" and offers an environmental rating system for residential construction.² The Green Building Conference defines sustainability as, "products, systems, buildings, and land planning that create and promote an environment for healthy human living which can be sustained into the future-unpolluted by its waste or byproducts; thus, preserving and maintaining our natural resources for future generations."³

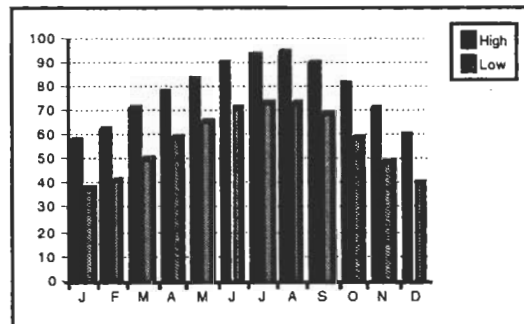
As an architecture student, I am intrigued by the issue of architecture as art. Looking beyond the narrow view of architecture as merely form manipulation to a broader base which considers the needs of the building's inhabitants and its impact on the earth, in addition to its form, is essential. As a former art major, I am interested in helping

artists achieve a quality lifestyle by providing a space where they can afford to live and produce their art.

The struggle for artists to earn a living is a common theme throughout the history of art. The shortage of affordable housing in American cities further contributes to their plight. My goal is to create housing that is efficient, less expensive to operate, and therefore, more affordable. This project studies different types of community living and precedents for both artist housing and affordable housing in the US. I will advance these models further in the direction of energy efficiency without sacrificing their beauty or socio-cultural significance in my design for a community of 16-21 artists.

Site

The site I chose for this project is located at the edge of the downtown area in a lively residential district, with many amenities within walking distance. Austin's climate is very hot and humid during the spring, summer, and fall months, as is evident in the graphs in Figures 1-4⁴. The average rainfall is thirty-two inches a year.⁵ Thus, cooling and water issues are important considerations in this project.



⁴ George Bomar, *Texas Weather* (Austin: University of Texas Press, 1995), 214-46.

⁵ Christensen, Bill. 1997. "Harvested Rainwater." *City of Austin Green Builder Program's Sustainable Building Sourcebook*. Last accessed September 1997. <http://www.greenbuilder.com/sourcebook>
The on-line version of *The Sustainable Building Sourcebook* is exactly the same as the printed version.

¹ Rocky Mountain Institute, *A Primer on Sustainable Building* (Snowmass, CO: Rocky Mountain Institute, 1995), 5.

² City of Austin, "Green Building Program" (City of Austin, Austin, 1997, photocopy).

³ Green Building Conference 1997, "Invitation to Participate" (Green Building Conference, Austin, October 1997, photocopy).

Figure 1. Average high and low temperatures (degrees Fahrenheit)

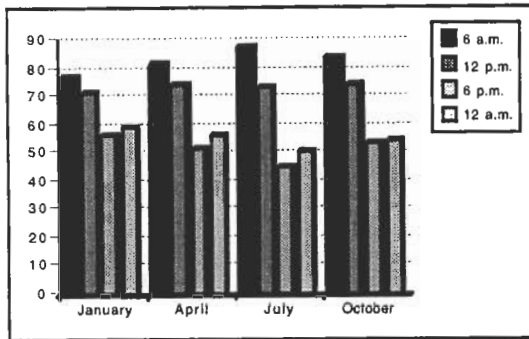


Figure 2. Average relative humidity percentages

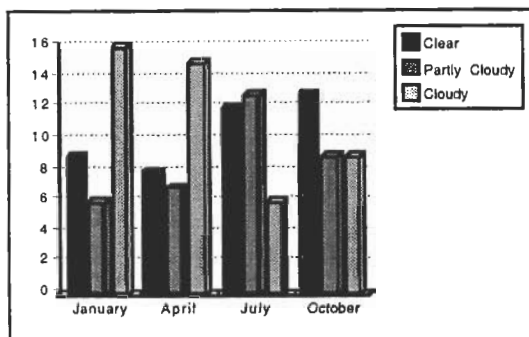


Figure 3. Average number of days with various sky conditions

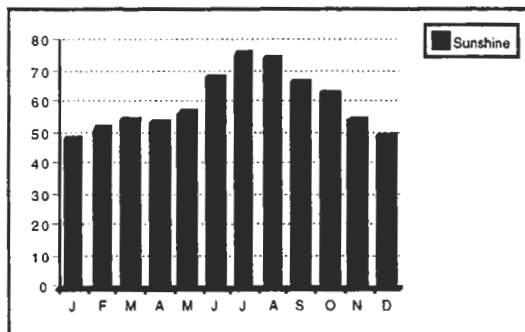


Figure 4. Average amount of sunshine (percentage of total amount possible)

Topographically, the site is very steep, rising over 60 feet in height across its 165 foot width. Given the site context, Austin's history, the programme, and my own engagement with sustainable practices, I will contend that this thesis is a project of complexity.

Because I am greatly opposed to the car's typical domination of design, this program will not include any parking areas, although on-street parking may be available.. "Paolo Soleri calculates that over 70 percent of the land in the Los Angeles metropolitan area is devoted to the car."⁶ Austin is a similarly sprawling city, and I have chosen a site within walking distance of many amenities and bus routes in order to discourage residents from owning cars. In addition, laundry facilities, a coffeehouse, and a used clothing shop will be located on the site so basic needs are met. US Housing and Urban Development (HUD) Secretary Andrew Cuomo asserts, "...The basic principles of New Urbanism...bring sustainable development down to the street, block, and lot level. This means human-scaled, pedestrian-friendly streets; development of grocery and retail stores to meet everyday needs within a comfortable walking distance; links to mass transit; and public spaces."⁷

Sustainability

"Every living system in the world is in decline," Ray Anderson, the CEO of Interface Corporation informed the 1997 Green Building Conference in Austin, Texas.⁸ Because of this, Anderson has dedicated himself to making his carpet manufacturing company completely sustainable by 2000. Like Anderson, it is essential that we realize that the negative impact of humans on natural biological processes is now at a critical point where we must make a change in our lifestyles and the way we design. Architecture has a significant impact on the depletion of our natural resources, but it need not be so. William Becker, director of the Department of Energy's Center of Excellence for Sustainable Development states, "Buildings account for a third of all the energy consumed in the US, and two thirds of all our electricity."⁹ The Texas State Energy

⁶Chris Hanson, *The Cohousing Handbook* (Point Roberts, WA: Hartley and Marks Publishers, Inc., 1996), 2.

⁷"Housing Maverick," *Architecture*, August 1997, 44.

⁸Ray Anderson, lecture at the 1997 Austin Green Building Conference, 31 October 1997.

⁹William Becker, "Building On Firm Ground," *In Business*, September/October 1997, 32.

Conservation Office provides these alarming figures:¹⁰

- Texas relies on petroleum for 46% of its total energy.
- At 1994 consumption rates, the US will run out of oil within 23 years.
- "Although Texas is home to only 7 percent of the US population, the state accounts for about 12 percent of the nation's total energy consumption."
- "Texas uses more electricity, natural gas, coal, and oil than any other state."

The need for a reduction of consumption, especially in Texas led me to design an artists' community which demonstrates how to replace some of these damaging behaviors with more sustainable practices.

Some eco-pioneers like Sim Van der Ryn have expressed the opinion that we need to stay away from the word sustainability, as it is "too broad to be operational."¹¹ He encourages the development of tools and processes rather than spending time discussing the definition. In addition, learning to understand the entire life cycle of resources is the basis of sustainability and is critical for architects and designers. We need to know the source, transport, distribution, processing, use, and re-use of the materials we specify.

No matter which interpretation, sustainability is about achieving a quality lifestyle. In order to reach the goal of a sustainable world, it will be essential for the transition to a higher quality lifestyle to include replacing many of our society's highly consumptive, destructive behaviors with healthier ones that demand less from our global resources. In order to really live sustainably, it will be necessary to live with less than our society teaches us to want. David Orr quotes Wendell Berry, "We must acquire the characteristics and the skills to live much poorer than we do. We must waste less. We must do more for ourselves."¹² The key is to produce

considerate, efficient designs which are in harmony with nature in the first place, rather than struggling to deal with waste later.

These principles of designing sustainably are not new. The Rocky Mountain Institute states, "It is only in the past century or so, as cheap energy, large sheets of glass, and air conditioning appeared, that architecture lost its moorings and forgot the ancient truth that the most important building covenants are dictated by the earth. A building designed to heed its surroundings will naturally be more energy efficient and will make elegant and frugal use of local materials."¹³

One ancient example in the Southwest US is the Anasazi cliff dwellings. Passive solar principles were already being used in the south-facing caves with massive walls which provided heat in the winter and protection from the summer sun.¹⁴ Using what was locally available was the only option and a sensible one.

I believe that we, as designers, should look to nature, which has functioned well for so much longer than humans have been in existence, to create a framework for a healthy lifestyle which minimizes waste, pollution, and the destruction of the earth. Wann states, "From this point on, like participants in addiction [recovery] programs, we have to agree not to tolerate design that perpetuates our addiction to cheap resources and energy or we'll never kick the habit."¹⁵

Malcolm Wells, the well-known pioneer of ecological design, published the book *Gentle Architecture* in 1981. Wells never uses the term "sustainable," yet his entire book is about producing a "gentle" architecture which respects the natural environment in order to achieve the same high quality of life for both people today and future generations. Wells raises the issue of architecture as art and states that designing in harmony with

¹⁰ Texas State Energy Conservation Office, "Our Energy Sources are Outstanding in the Field." (Texas, February 1997, photocopy).

¹¹ Sim Van der Ryn, lecture at the 1997 Austin Green Building Conference, 31 October 1997.

¹² Wendell Berry quote in David Orr, *Ecological Literacy: Education and the Transition to a*

Postmodern World (Albany, NY: State University of New York Press, 1992), 21.

¹³ Rocky Mountain Institute, *A Primer on Sustainable Building* (Snowmass, CO: Rocky Mountain Institute, 1995), 30.

¹⁴ *Ibid.*

¹⁵ David Wann, *Biologic* (Boulder, CO: Johnson Publishing Co., 1990), 5.

nature is art, "But architecture must be more than just a balanced budget. It must, in every sense, be art as well. The appropriate almost always is."¹⁶ This project attempts to be an example of Wells' statement, proving that efficiency and affordability can be byproducts of a beautiful design.

An architect that must be mentioned when discussing architecture and nature is Frank Lloyd Wright. Wells asserts, "Wright, who lived his long life in an age when the world's supply of low-cost fuel and natural resources seemed endless, nevertheless experimented with passive solar heating, earth cover, berming, and task lighting."¹⁷ Like Wells, Reyner Banham praises Wright for his inventiveness in heating and cooling. In *The Architecture of the Well-tempered Environment*, Reyner Banham states, "By any standards, [Wright] must be accounted the first master of the architecture of the well-tempered environment" and describes the Larkin Building as a "masterpiece of the architecture of the well-tempered environment."¹⁸

My interest in sustainability led me to Austin, a city dedicated to becoming "green," by implementing the Green Building Program, which won one of twelve awards at the 1992 Earth Summit in Rio de Janeiro.¹⁹ The Residential Program rates buildings on a 1-4 star system with respect to their use of sustainable practices. Through 1996, approximately 1700 homes have received a rating from the Green Building Program, evidence of its popularity.²⁰

Design Components of Gentle Architecture

In order to determine which sustainable practices to use in the artists' community, I looked to both the Green Building Program checklist and Malcolm Wells' wilderness-based checklist for

gentle architecture.²¹ Listed below are the items from Wells' list and the ways in which my design for the artists' community achieves these goals.



Figure 5. South view of my design for the artists' community

1. Creates pure air

Trees, which remove carbon dioxide from the air, release oxygen, filter dust, cool the air, and provide shade, especially for late afternoon sun, will be planted around the site and existing trees will remain. Xeriscaping, which comes from the Greek, "xeros," meaning dry, is the practice of using plants native to the location, meaning in Texas landscaping that uses little water. In addition, xeriscaping protects the environment and reduces the need for chemical fertilizers that lawns require. Thirty-six percent of household water normally goes to irrigating the lawn and garden, and xeriscaping will reduce that requirement by putting oxygen back into the air.

No paints or carpeting will be used in this project, thus no harmful volatile organic compounds (VOCs) will be emitted in the interior air. Jim Motavalli, the editor of *E* magazine states, "According to a special report to the Massachusetts legislature, as much as fifty percent of all illness is attributable to indoor air pollution."²² Instead of carpeting, earth floors made of caliche will be used in all of the buildings. The many advantages of using earth include its low-cost, its mass which is ideal for passive solar, the fact that humidity cannot be trapped as in carpet fibers, and its beauty. Caliche can be stained and scored to look like ceramic tile.

¹⁶ Malcolm Wells, *Gentle Architecture* (New York: McGraw-Hill Company, 1981), 49.

¹⁷ *Ibid.*

¹⁸ Reyner Banham, *The Architecture of the Well-tempered Environment* (Chicago: The University of Chicago Press, 1969), 70.

¹⁹ City of Austin, "Green Building Program" (City of Austin, Austin, 1997, photocopy).

²⁰ *Ibid.*

²¹ Malcolm Wells, *Gentle Architecture* (New York: McGraw-Hill Company, 1981), 38.

²² Jim Motavalli, "Home Sweet Eco-Home," *E*, July/August 1997, 70.

2. Creates pure water

I will replace the word "creates" with "conserves" for the purpose of this project because water is scarce during several months of the year in Texas. The breakdown of domestic water use is as follows: Showers and baths-20%, drinking and cooking-9%, clothes and dishwashing-16%, toilets-19%, lawn and gardening-36%.²³ These numbers demonstrate the importance of installing water conserving fixtures like faucets, showerheads, and toilets in all of the buildings. These items have small initial costs and save both water and money. I have also chosen to use water conserving washing machines in the laundry facility. Front loaders use water and energy much more efficiently than top loaders-28 gallons as compared to 47 gallons. Although they initially cost from \$150-450 more, the cost will be covered by the people who pay to use the machines, as they are in a laundromat

Another method of conserving water is the process of reclaiming graywater, wastewater from faucets, washing machines, and bathtubs.²⁴ Graywater will be used in this design for irrigation and toilet bowl water--55 percent of domestic water use. Although the additional plumbing necessary to separate graywater from blackwater (wastewater from dishwashers, toilets, and kitchen sinks) raises costs slightly, the water requirements will be cut in half from graywater use alone.

3. Stores rainwater

Harvested rainwater will be stored on the site in cisterns under the family unit building and the community studio building. The roofs are sloped so as to direct the rainwater to collection pipes which carry it to one of these cisterns. Rainwater is a free resource and should be retained on the site for both irrigation and indoor uses.

²³ Christensen, Bill. 1997. "Water Budget." *City of Austin Green Builder Program's Sustainable Building Sourcebook*. Last accessed September 1997.
<http://www.greenbuilder.com/sourcebook/waterbudget.html>

²⁴ Christensen, Bill. 1997. "Greywater." *City of Austin Green Builder Program's Sustainable Building Sourcebook*. Last accessed September 1997.
<http://www.greenbuilder.com/sourcebook/greywater.html> Greywater. 17 September 1997.

Austin has an average rainfall of 32 inches a year. 600 gallons can be harvested from a 1000 square foot area from just one inch of rain.²⁵ The total roof space of the project is approximately 8000 square feet which could meet half of the people's needs for the entire year, thus saving a tremendous amount of money and conserving a very precious resource.

Keeping rainwater from running off the site is important for allowing the natural process of filtration through the soil, recharging groundwater aquifers (water below the surface of the earth that supplies springs and wells), preventing erosion and flooding, and saving money by permitting less runoff in the storm sewers. Pathways will be designed to retain rainwater on the site using pervious pavers which make use of "the scrubby mesquite tree [which] is regarded as a nuisance and ruthlessly cleared away [in Texas]."²⁶

4. Produces its own food

A garden for the artists to grow some of their own food will be located next to the screen porch and community kitchen. Besides enabling the inhabitants to grow fresh food at a low cost, the garden will help to develop the community atmosphere among the occupants who enjoy working there, and will create a beautiful natural space on the site. A few pecan trees, common in the area, will also be planted.

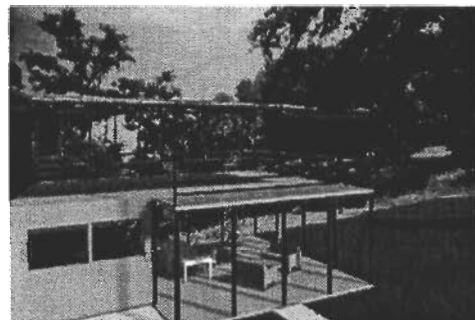


Figure 6. Kitchen and porch

5. Creates rich soil and

6. Consumes its own wastes

²⁵ Tim Blonkvist, lecture at the 1997 Austin Green Building Conference, 1 November 1997.

²⁶ Sim Van der Ryn and Stuart Cowan. *Ecological Design* (Washington, D.C.: Island Press, 1996), 78.

Composting food scraps and landscape clippings creates a good fertilizer to re-use in the garden and in landscaped areas on the site. In addition, composting saves plastic garbage bags, energy for transporting garbage, and landfill space. A compost heap will be located outside of the community kitchen, near the garden.

Recycling does not actually consume the community's wastes, but it does save energy and landfill space. Designated recycling areas will be designed into the kitchens of each unit and in the community kitchen and community studio building. Recyclable materials will be collected by the City of Austin's waste management department. Because the re-use of materials is at least as important as recycling, I plan to use the stones left on the site from the buildings that were previously there to build the retention walls in the courtyard. They will be dry-laid to conserve mortar.

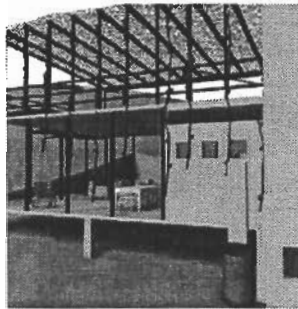


Figure 7. Compost

7. Uses solar energy and
8. Stores solar energy

Energy from the sun is inexhaustible and completely free. Although Austin's climate is mild, some heating may be necessary from November through March, when the low temperature averages 50 degrees. My calculations indicate that the internal loads of the building in combination with the high R-values of the walls, windows, and roofs may render solar heat useless. Cooling dominates in this climate, but the technology for passive solar cooling is not yet well developed. However, the thermal mass of the walls combined with night purging (when the humidity permits) will eliminate the need for air conditioning, except for dehumidifying and circulating fresh air.

Unfired caliche block, the building material I chose for all of the buildings, meets the criteria for thermal mass as well as several other sustainable principles including its abundance around Austin, low embodied energy, durability, and low cost. Traditionally used in road construction, caliche is found throughout Texas in bedrock, in biological sources such as shellfish, and, most desirably, in soil calcium carbonate.²⁷

Caliche may be molded into building blocks on the site. The process for making the blocks is very similar to producing adobe bricks, and semi-skilled labor can be used.

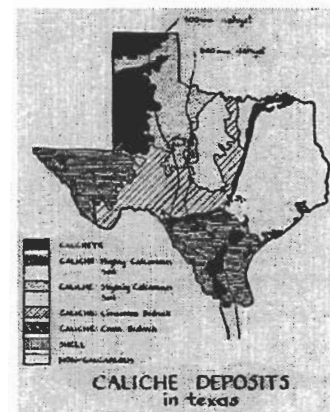


Figure 8. *Caliche deposits in Texas* (Steven Musick, *The Caliche Report* (Austin, Texas: Center for Maximum Potential Building Systems, 1979), 25.)

Two people using a gang mold which forms many blocks at a time and a wheelbarrow can produce approximately 500, 4"x10"x14", 39 pound blocks per day.²⁸ Due to the poor insulative value of earth materials, the caliche walls in this project will be eleven inches thick, with a layer of three inch rigid insulation sandwiched between two four inch caliche block walls. Mud plaster, also locally available and installable by day laborers, will finish both the interior and exterior walls to allow the caliche to breathe. The plaster is inexpensive and eliminates the need for harmful paints as it can be stained with pigments to achieve the desired color. These thick walls are designed to create a feeling of

²⁷ Steven P Musick, *The Caliche Report* (Austin, Texas: Center for Maximum Potential Building Systems, 1979), 22.

²⁸ *Ibid.*

stability and security, as well as being useful as thermal mass for passive solar heating in the winter and storage of coolth in the summer. Overhangs will let in the low rays of the winter sun while blocking the high summer rays.

Passive solar energy can also be used to heat water in order to provide 50-80 percent of all hot water needs, depending on the season. Although the initial cost of the solar hot water heater is \$1000-3500 for domestic uses, if the hot water loads are reduced by insulating the piping and installing water conserving fixtures, costs can be minimized. Solar heaters "can show paybacks of four to seven years depending upon the fuel displaced (electric or gas)," according to *The Sustainable Building Sourcebook*.²⁹ Solar collectors will be located atop two buildings. Distilled water is pumped in pipes through the insulated panels and is then stored in a large hot water tank at the corner of the building until it is pumped to the washing machines and apartment units. This system will provide the hot water for the laundromat and part of the requirements for the units.

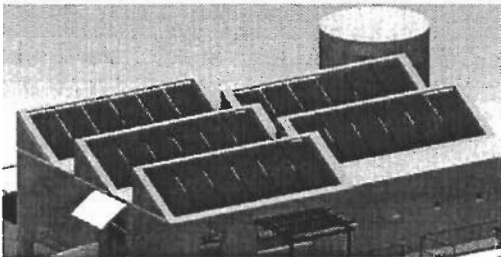


Figure 9. *Collectors*

Daylighting is another way to take advantage of the sun's resources. Light is especially important for most artists. According to Nancy Clanton, light has been proven to increase productivity, encourage creativity, promote retention of information, and calm people.³⁰ Most of the natural light in all of the buildings on the site will come from windows on the south walls

²⁹ Christensen, Bill. 1997. "Solar Hot Water, Heating and Cooling Systems." *City of Austin Green Builder Program's Sustainable Building Sourcebook*. Last accessed September 1997. <http://greenbuilder.com/sourcebook/>

³⁰ Nancy Clanton, lecture at the 1997 Austin Green Building Conference, 31 October 1997.

and high clerestory windows which allow light to enter without direct solar gain. Walls and ceilings will be light-colored to reflect the light and aid its effectiveness. Light shelves will be used when needed to prevent glare.

9. Creates silence

Besides the previously mentioned advantages of caliche, the 11 inch walls will not allow sound to penetrate and the units should be quiet spaces in which to live and work. Another space for solitude will be the sculpture garden in the courtyard around the lap pool. The stepped retention walls will shelter the space, and the works of art will create a place for contemplation and reflection.

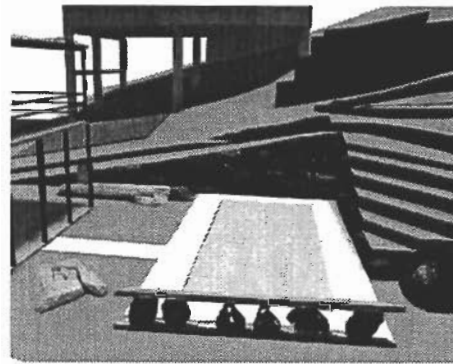


Figure 10. *Sculpture garden and pool*

10. Maintains itself

I interpret this statement to mean that the space creates a self-sustaining environment. Several examples of this concept are evident in the design of the community, most obviously the combined living and working studio spaces. Instead of leaving the site to go to work, the artists remain and create their work within the community. Growing food is another example. The xeriscaped landscape requires little if any maintenance. Renting out retail space in the gallery building generates income for the community and helps to sustain it. Because the community is partially self-sustaining and serves as both a living and working environment, there is the danger of the residents becoming isolated from the community of Austin. In order to achieve a greater interaction with the larger community, the residents may begin a mentoring/apprenticeship program to teach children about the arts.

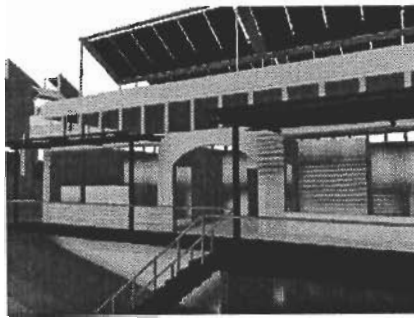


Figure 11. Retail space in the gallery building

11. Matches nature's pace

Wells' description of this criteria is eloquent:

Our twenty-year cycles of construction bear no relation to life's grand, century-by-century pace. We must move toward the use of permanent architectural shells within which we can make our restless changes without damaging the land around or above them. The rhythm of the seasons is part of our heritage whether we like it or not. The current way of dealing with it is to fight, but that's one fight we cannot win.³¹

By using durable caliche blocks, this design is intended to last for as long as it is continued to be used and maintained, which will require the reapplication of the mud plaster every several years. When its useful life is over, most of the materials can return to the soil from which they came. Interior spaces will be designed for flexibility so that the complex may provide for new occupants in the future. In addition, I have attempted to disturb the formation of the land as little as possible. All of the buildings are supported by columns so as to maintain the wonderfully steep slope of the site. The only excavated areas are the central courtyard, and small spaces for the studio building and west apartment building.

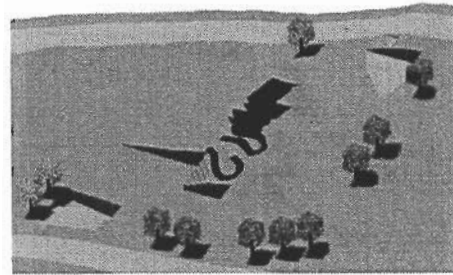


Figure 12. Excavated land

12. Provides wildlife habitat

Retaining the existing trees will help to lessen the disturbance to the ecosystem and planting more trees may bring in additional wildlife.

13. Provides human habitat

Eleven units for single people and five units for families provide human habitat in this complex. In order to conserve land, energy, materials, and money, the individual units are small and stacked so that floors, walls, and ceilings are shared. Although these private spaces are modest in size, the public spaces are generous.



Figure 13. East view of eleven unit building

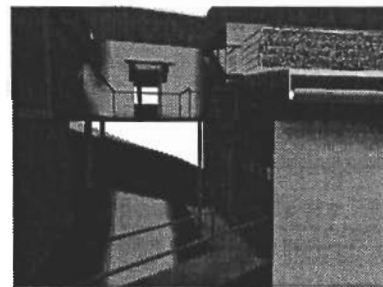


Figure 14. West view

³¹ Wells, Malcolm. *Gentle Architecture*. New York: McGraw-Hill Company, 1981.



Figure 15. North view of east apartment building

Laundry facilities, storage space, and space for works in progress and critiques will be designated in the community studio building at the northeast corner of the site.

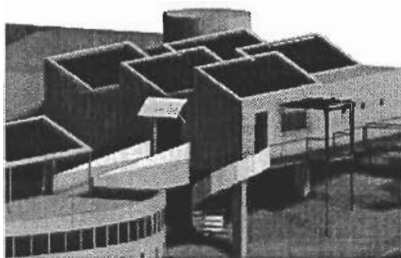


Figure 16. Community studio building

The gallery building at the northwest corner will be a place for the artists to showcase their work to the public and will also provide a coffeehouse and a used clothing shop for the artists' community and entire neighborhood. As previously mentioned, the central courtyard will include a sculpture garden around the lap pool, which will be a place for exercise, another aspect of a healthy lifestyle. Although the pool, with its large water requirement, may not be completely in harmony with nature, I believe that its value as a place for exercise and retreat from the summer heat justifies its addition to the complex. In addition, the large body of water will create cooler air around the courtyard due to evaporation. Adjacent to the courtyard is a screened porch and kitchen which will be gathering spaces for the community during the spring, summer, and fall. Another opportunity for gathering (away from work) will occur on the stepped slope which faces a large screen that can be pulled down to view movies--possibly the work of resident artists

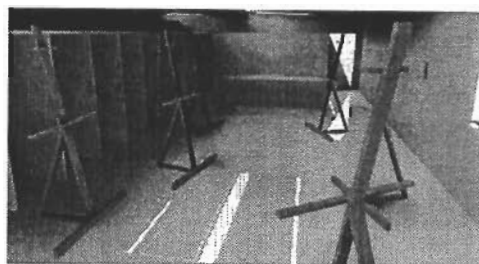


Figure 17. Interior view of studio

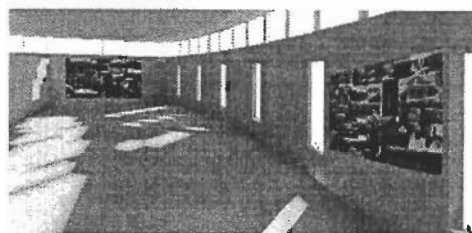


Figure 18. Gallery

14. Moderates climate and weather

Besides providing beauty, oxygen, and shade, each tree is able to reduce the cooling load by evaporating water from the air. "A single tree can 'provide the same cooling effect as ten room-size air-conditioners working twenty hours per day.'"³² The combination of shade trees and a light-colored roof "can lower the building's cooling load by 30%."³³ A light colored, high recycled content steel roof will be used in this design. Although steel has a high embodied energy, the fact that it is partially recycled and can easily be recycled again lowers the energy requirements. In addition, the roof is lightweight and much more durable than asphalt shingles which last only 20-30 years.³⁴ Roof overhangs which block the high summer sun

³² John Tillman Lyle, *Regenerative Design for Sustainable Development* (New York: John Wiley and Sons, 1994), 134.

³³ Rocky Mountain Institute, *A Primer on Sustainable Building*. (Snowmass, CO: Rocky Mountain Institute, 1995), 77.

³⁴ Christensen, Bill. 1997. "Radiant Barrier and Ridge-and-Soffit Venting." *City of Austin Green Builder Program's Sustainable Building Sourcebook*. Last accessed September 1997. <http://greenbuilder.com/sourcebook/radiantbarrier.html>

but let in the lower winter rays will be included in the design of all of the roofs in this project.

In order to further minimize the cooling load, a radiant barrier will be utilized. *The Sustainable Building Sourcebook* describes a radiant barrier as "a layer of metallic foil that blocks radiated heat. Most foil type radiant barriers have an emissivity of .05 or below which means 95 percent of the radiant heat is being blocked. Temperature reductions of ten degrees or more are typical during peak summer days." The cost is reasonable at ten cents per square foot.³⁵

Finally, two inexpensive methods will help to moderate high summer temperatures. First, ceiling fans, with prices starting at \$30, are a cheap way to reduce cooling requirements and costs. "Ceiling fans permit raising the thermostat setting on an air conditioning system 4 to 6 degrees."³⁶ And, "in the heating season, ceiling fans can help bring the warmer air that stratifies near the ceiling down to where the occupants are located."³⁷ Second, borrowing a custom from Middle Eastern architecture, ceramic pots filled with water will be placed along the pedestrian walkways to cool the air as natural breezes pass the water.

15. And is beautiful

Epilogue

Sustainability encompasses much more than the environmental issues I have addressed in relation to my design. David Orr states that we cannot "deal with issues of sustainability without simultaneously confronting issues of peace, equity, cultural diversity, and the structure of political institutions."³⁸ I believe that addressing these issues will require widespread education, grassroots efforts by citizens, and a willingness to live with less than our society teaches us to want. Orr asserts, "If large numbers of people do not

³⁵ *Ibid.*

³⁶ Christensen, Bill. 1997. "Fans." *City of Austin Green Builder Program's Sustainable Building Sourcebook*. Last accessed September 1997.

<http://greenbuilder.com/sourcebook/fans.html>

³⁷ *Ibid.*

³⁸ David W Orr, *Ecological Literacy: Education and the Transition to a Postmodern World* (Albany, NY: State University of New York Press, 1992), 136.

understand the environmental facts of energy, resources, land, water, and wildlife, there is little hope for building sustainably at any level."³⁹ This is where a change in the practice of architecture by rethinking the way we design can have a great impact on the education of the public and on our society's lifestyle choices.

Van der Ryn's three concepts of conservation ("doing more with less"), stewardship ("knowing and caring for place"), and regeneration ("restoring and designing with the web of life") create a framework for rethinking conventional architecture which is based on short-sighted minimum level design with maximum return of investment for profit.⁴⁰ Van der Ryn's three concepts are integral to my design for the creation of a living and working community which provides artists with a conducive environment in which they can sustain the quality of artistic expression in Austin, thus sustaining the quality of life for patrons of the arts, as well. By creating a community in harmony with nature, I hope to encourage the artists to preserve this harmony in their work.

Artists

Artists who live in my designed community will also be encouraged to use sustainable practices in their work. For example, photographers are encouraged to use digital cameras, high-end scanners, energy efficient computers with recycled parts, and software such as Photoshop to produce their

In my design, each artist will have a private studio in their residence which will allow space for painting, drawing, sculpture, ceramics, and digital media. A community studio building is for artists who enjoy working together, for critiques, and for very large projects. Two rooftop studios - one above the gallery, the other atop the screened porch - may be used for creating sculpture.

³⁹ *Ibid.*

⁴⁰ Sim Van der Ryn, lecture at the 1997 Austin Green Building Conference, 31 October 1997.



Figure 19. Studio above gallery

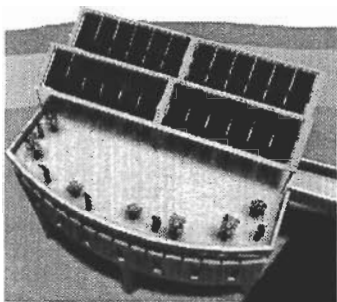


Figure 20. Studio atop porch

My research indicates that affordability is a concern for artists all across the country. owned into living and working spaces for artists. One very successful attempt at affordable housing for artists is Artspace in Salt Lake City which was founded in 1979 by Stephen Goldsmith, a sculptor, who could not find a place where he could afford to live when he moved to the city. He raised money, went to the city council, and was permitted to renovate an old tire company warehouse in a high crime area into affordable housing for the city's artist community. Reusing the old building in the crime-ridden area accomplished much more than just providing habitat; the neighborhood was transformed and sustainable building practices were utilized. Artspace provides a safe playground for the children in the area and runs a mentoring program for the residents to teach children about the arts. Instead of having a run-down warehouse in the neighborhood, a beautiful building helps to create community pride. Twenty-three living spaces and thirty galleries are housed in the 81,000 square foot building. Rent is on a sliding scale from \$180-600/month.⁴¹

Affordable Housing

Affordable housing is generally defined as housing with a cost lower than one third of one's

⁴¹ *Ibid.*

net income. Despite this, HUD Secretary Andrew Cuomo states that, "The demand for affordable housing, the need, is growing. Over five million American families spend more than fifty percent of their income on rent."⁴² In his book, *The Architecture of Affordable Housing*, architect Sam Davis raises the question of whether low incomes are the real problem of affordable housing. This section will address these issues.

The answer to Davis' question is that the lack of affordable housing and low incomes are both big problems. "Since 1995, the federal housing budget has shrunk by 25 percent."⁴³ This figure illustrates that there is definitely a lack of money going towards combating the issue of housing. In addition, a recent AIA survey found that "only 500 of its 58,000 members (fewer than one percent) identified affordable housing as a primary interest."⁴⁴ If the experts on designing housing are not willing to face the problem, it is unlikely to be solved anytime soon. On the other hand, low incomes for artists are mainly a result of the lack of support for the arts in the United States.

Davis brings up another problem with affordable housing: although it is usually subsidized, administrative costs associated with implementing subsidies is one of the main reasons for difficulties in keeping costs down. Thus, it is imperative that the architect design thoughtfully and efficiently. Davis enforces the point that affordable housing should be attractive in order to give the inhabitants a sense of dignity and to change the public's perception of affordable housing.⁴⁵ Davis lists choice, fit, and flexibility as the three important aspects of dignity.⁴⁶

Choice allows the occupants to make their own decisions about things such as furniture placement. Fit refers to the relationship between the design and the inhabitants' living patterns. Flexibility relates to the sustainable goal of how

⁴² "Housing Maverick," *Architecture*, August 1997, 44.

⁴³ Bradford McKee, "Public Housing's Last Hope," *Architecture*, August 1997, 95.

⁴⁴ Alice Horrigan, "Affordable by Design," *E*, July/August 1997, 56.

⁴⁵ Sam Davis, *The Architecture of Affordable Housing* (Berkeley: The University of California Press, 1995), 107.

⁴⁶ *Ibid.*

the home can be used in the future as the occupants' needs change. Davis asserts, "One reason loft space works so well for artists is its generous volume and incredibly loose fit. There are no obstructions, no walls--just light and space."⁴⁷

In my design of the apartment units, I have attempted to allow for choice, fit, and flexibility, while also using a layout for the kitchen and bathroom that repeats throughout the sixteen apartments to decrease costs. The plan clusters the kitchen and bathroom in the smaller part of the apartment so that the artist can arrange the studio how he or she wishes. In the smaller units, the bed is located on a loft above the bathroom, and in the larger apartments, hinged walls on tracks and a murphy bed can move to form a bedroom or can be folded away to allow for a larger studio. Lots of light enters each unit through the clerestory windows and the south windows provide great views that enlarge the space. The only permanent walls are the bathroom walls.

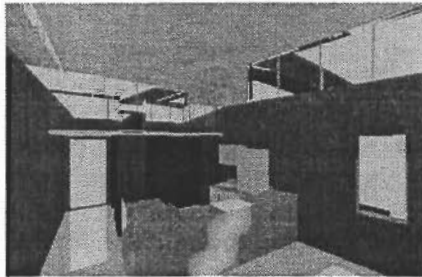


Figure 21. *Interior of a small apartment*

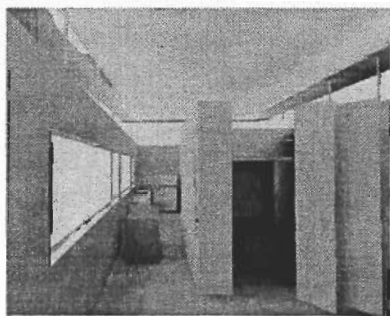


Figure 22. *Interior of a larger apartment*

Thoughtful aesthetic features can enhance the beauty of a building without greatly increasing the cost. Davis states:

Giving special care, attention, and detail to the elements of a building that people

⁴⁷ *Ibid.*

actually encounter helps to create a human scale in a cost-effective way. People sit under a trellis that covers a patio and creates shade; they pass alongside gates and fences that can either be solid walls or offer glimpses of life beyond and they walk into buildings under awnings or on porches.⁴⁸

In my design, the thick caliche walls chosen for their thermal mass and local availability also give the perception of stability and security. Attention to the landscape design of the site creates a pleasant exterior space without a significant increase in cost. A small trellis defines the entrance to each apartment to create a sense of ownership of one's doorway and to provide a threshold between the outside and inside of the home.

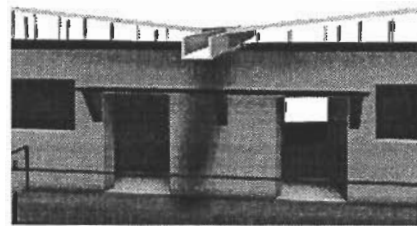


Figure 23. *Trellis*

Davis' book provided a discussion on the needs of the inhabitants of affordable housing, while Chris Hanson's *The Cohousing Handbook* gave me several ideas about how to relate aspects of affordable housing to community-style living. Cohousing is a housing type which is not defined as "affordable" but definitely incorporates cost-saving elements which can be implemented to differing degrees. The main feature of cohousing is a centrally located common house which is shared by all of its residents. Cohousing's philosophies about community and shared space are directly related to this project.

Hanson provides a brief history:

Cohousing started in Denmark in the late 1960s when a group of dual income professional families were searching for better child care and a way to share evening meal preparation. ...Cohousing is a means for people to make a major step toward community

⁴⁸ *Ibid.*

without giving up their privacy, or control over their personal lives.⁴⁹

According to the September/October 1997 issue of *In Business*, "More than forty cohousing projects are now completed, several dozen are under construction, and over 150 groups are in various stages of planning or development."⁵⁰ The four main elements of cohousing include:⁵¹

- a centrally located common house which may include a kitchen, dining space, children's play area, mail pick-up, storage, laundry, lounge, and guest rooms
- the separation of the car from the residence
- pedestrian pathways which link the access of each residence
- locating the kitchen on the pedestrian pathway side of the house in order to look outside while working and supervise children

My design uses cohousing as a model for some of its features. A community kitchen and screened porch is located adjacent to the central courtyard for people who choose to eat meals together. One way to reduce costs could be to purchase grocery staples collectively. Laundry facilities (which generate revenue by being open to the public), storage space, and a shared studio space are located in the community studio building.

Although my goal is to enable the artist community to be largely self-sufficient, I do not want it to be completely cut off from the larger community of Austin. By creating some public spaces such as the coffeehouse, gallery, and sculpture garden, I hope to design an inviting place for the public to enjoy as well.

The third element of cohousing, linking the pedestrian pathways has been largely accomplished, although my design requires pathways at different levels. All of the paths (except two) face the courtyard to encourage activity and a means of supervision and security. In addition, two of the roofs on the courtyard side are

meant for gathering spaces at yet another level. Regarding the fourth element, because only the units in the west building are large enough to house families, the kitchens were not designed with supervision in mind.

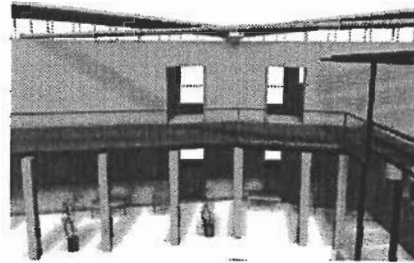


Figure 24. Shaded pedestrian pathway

Although the units of cohousing are generally market-rate and unsubsidized, Hanson's manual includes several ideas for making the individual houses more affordable:⁵²

- increase the number of units so that costs are distributed
- reduce the size of the personal unit and increase the size of the common area
- shared walls rather than free-standing units
- stacking units saves the costs of additional foundations and roofs
- some units may be shared by single people
- standardize kitchen and bathroom designs
- consider life cycle costs

I have attempted to include all of these cost-saving measures in my design. Expenses will be distributed over sixteen units. Units in the east apartment building are very small at only about 450 square feet and in the west apartment building at 550 square feet. The community studio, gallery building, kitchen and porch, and rooftop studios increase the communal spaces. Flooring and roofing materials have been conserved by stacking the units and most units share one major wall. All of the bathroom and kitchen designs are essentially the same.

Life cycle costs have been considered in the choice of materials. The thermal mass of the caliche block combined with the insulative value of the 1/4 inch argon-filled, low-e windows, and the

⁴⁹ Chris Hanson, *The Cohousing Handbook* (Point Roberts, WA: Hartley and Marks Publishers, Inc., 1996), 2.

⁵⁰ Paula I. Robbins, "A New Way to Live Environmentally," *In Business*, September/October 1997, 26.

⁵¹ Chris Hanson, *The Cohousing Handbook* (Point Roberts, WA: Hartley and Marks Publishers, Inc., 1996), 4.

⁵² Hanson, Chris. *The Cohousing Handbook*. Point Roberts, WA: Hartley and Marks Publishers, Inc., 1996.

radiant barrier have easily paid for themselves by eliminating the need for a heating and cooling system. Because of this great savings, the cost of the rainwater cistern can be justified. Other measures that will quickly pay for themselves are the solar heated water system, the energy efficient appliances, and the durable, low-maintenance caliche blocks and recycled-content steel roofs.

The need for affordable housing is clear. Through the precedents discussed and my design, I have shown that both the issues of affordability and sustainability can be addressed in one design. By using common sense, a thoughtful design which maximizes materials and space and considers life-cycle costs can create a beautiful, low-cost, eco-home or housing complex.

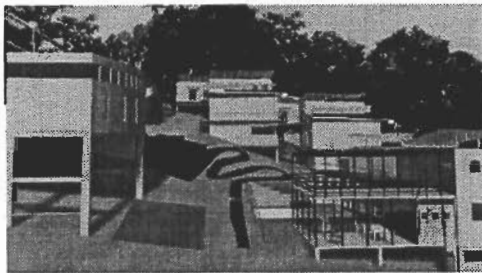


Figure 25. West view

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