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# EKOSE'A HOMES

**Natural Energy Conserving Design**

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## ENERGY INDEPENDENCE WITH AN EKOSE'A HOME

## HOUSE PLANS AND DESIGN SERVICES FOR ULTIMATE LIVING COMFORT

### HOW TO USE OUR SITE

**SELECT EKOSE'A HOMES DESIGNED FOR YOUR CLIMATE**

- CLICK on **Selection & Modification** from the **Home Designs** menu and review the Selection and Modification Criteria
- CLICK on **Climate Zones & Design Chart** from the **Home Designs** menu and select your Climate Zone and DESIGNS for your climate
- CLICK on DESIGNS from the Design Chart to see detailed information for each Design

**REVIEW OUR PORTFOLIO OF EKOSE'A HOMES**

- CLICK on **Portfolio** from the **Home Designs** menu to browse our portfolio of illustrated DESIGNS
- CLICK on the DESIGNS to see detailed information for each Design

**ORDER PLANS OF EKOSE'A HOMES**

- CLICK on **Construction Documents** from the **Products** menu for information

**NAVIGATE THE MENU** at the left or bottom of each page for detailed information about the benefits of The Ekose'a Home, How It Works, Planning a Home, typical Questions and Answers, and Products and Services including Construction Documents and Design Services for Ekose'a Homes.

### THE EKOSE'A HOME - HOUSE WITHIN A HOUSE

**Ekose'a Homes** can be described as a **double envelope** design or a **"house within a house."** In a conventional house, the walls, floors, and ceilings are exposed directly to the extremes of the outside climate. In the Ekose'a Home, the interior and exterior surfaces are separated, creating the **gravity**

**geo-thermal envelope**, a protective blanket of constantly circulating earth-conditioned air. The interior of the house is thereby isolated from the extremes of the outside climate.

**The house "thinks" it is underground.** Since the ground temperature remains stable a few feet down and is only a few degrees below the temperature required for human comfort, the heat generated by people, lighting, equipment, and household activities is sufficient to maintain comfortable interior conditions 90% of the time. A couple of bathroom-size heaters are sufficient to provide the additional heat needed during the other 10%, or most extreme winter conditions. In summer conditions, the geo-thermal heat exchange occurs in reverse. The cool temperature of the earth absorbs heat, and earth-cooled natural ventilation is used to exhaust excessive heat gain.

 

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## INTRODUCTION

There are two global events converging to create the most significant crisis of modern times. The first of these is the escalating consumption of energy and resulting depletion of fossil-fuel resources. The second major event threatening our planet is global warming. *Source: Architecture2030.org*

Impact of the first event:

- **Rapidly increasing costs of energy**

Impact of second event:

- **Life threatening environmental consequences** caused by carbon dioxide emissions from fossil fuels that generate 85% of all energy consumption in the U.S.

In response to this, **Ekose'a Homes, Inc.** offers economical, sustainable, and innovative natural energy conserving home designs that provide a level of interior comfort that cannot be achieved with conventional energy systems.

**Ekose'a Homes**

- Eliminate or drastically reduce costs for heating and cooling
- Eliminate or drastically reduce dependence on fossil fuels
- Can be built at costs comparable to conventional homes
- Can be built using economical and readily available materials
- Do not require highly skilled technicians
- Do not require new product technologies
- **Are TIMELESS**

By incorporating the **gravity-geo-thermal-envelope** and other developments in self-sufficient natural energy conserving architecture, existing Ekose'a Homes have proven it is practical to design and build a structure that maintains any desired range of temperatures through any range of climatic conditions at any habitable place on earth, without or with minimal mechanical systems or fossil-fuel energy sources.

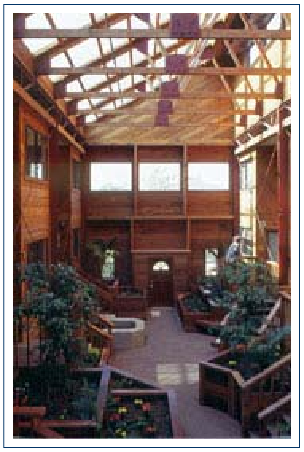
The design techniques are rooted in classical physics and used in various ways for centuries. In this respect, the designs of Ekose'a Homes are not new. What is new is the innovative integration of these techniques in the context of contemporary lifestyles.

## ABOUT EKOSE'A HOMES, INC.

**Ekose'a Homes, Inc**. evolved from the San Francisco born architectural company Ekose'a, founded in 1978 by architects Lee Porter Butler and William Randolph Pearson in San Francisco, California in 1978.

**Ekose'a** in ancient Greek philosophy referred to the family, food and shelter as the "essence of being." Ekose'a was organized around this philosophy for the purpose of developing and publishing plans and specifications of homes for ultimate natural energy conserving and efficient living.

Ekose'a provided design and consulting services for the construction of hundreds of double envelope homes throughout the United States and Canada. Widespread distribution of the publication Ekose'a Homes and articles about Ekose'a in newspapers and nationally popular periodicals influenced the design and construction of thousands of similar double envelope homes and other buildings internationally.



**Ekose'a Homes, Inc.** provides architectural services for the planning and design of individual homes and other buildings for clients who wish to develop unique solutions to meet their individual needs and conditions. It also provides consulting services for the application of Ekose'a concepts to existing homes. As custom designed homes are completed and monitored, they become the basis for publication as stock plans that can be built and adapted to similar site and climatic conditions. Continuous refinements in the concepts are incorporated in the stock plans as new experiences and data become available. The **Home Designs** included in the Ekose'a Homes **Portfolio** are the latest offering in this process.

## ABOUT LEE PORTER BUTLER (1940-2005)

Lee Porter Butler began research and development of natural energy conserving architecture in 1965. In 1975, he developed the **gravity-geo-thermal-envelope** concept for building design. Following his relocation to south Florida in the early 80's, Mr. Butler created the discipline known as **Ekotecture**, an expanded vision of Ekose'a and sustainable construction with the goal of encouraging a more comprehensive and integrated holistic environmental design science.

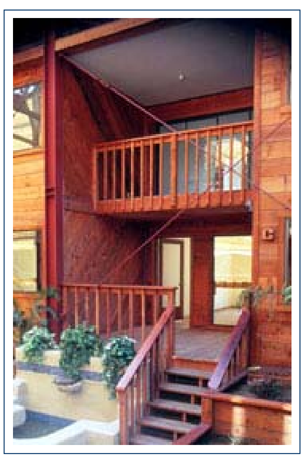
## ABOUT WILLIAM RANDOLPH PEARSON

William Randolph Pearson began his career in sustainable architectural design with Lee Butler and Ekose'a in 1978. Mr. Pearson worked side by side with Mr. Butler in the design, production, and on site observation and monitoring of many of the early Ekose'a home designs. Mr. Pearson is a California licensed architect, LEED Accredited Professional, and director of design and operations of Ekose'a Homes, Inc.

## ABOUT THE FUTURE

In the foreseeable future, research and development of clean and renewable alternative energy sources will not produce a silver bullet to the current and escalating energy crisis.

Therefore, we cannot deny the necessity of energy conservation and efficiency in everything we do – from working, to traveling, to living in our homes. Future generations rely on decisions we make about how we choose to live and behave in the here-and-now.



To this end, homeowners have a responsibility to renovate, construct, or purchase a home that will conserve natural resources and eliminate or drastically reduce its dependence on fossil-fuel energy sources, thus eliminating or drastically reducing its carbon footprint on the environment.

An Ekose'a Home or an existing home incorporating cost effective Ekose'a concepts and energy conserving strategies are giant steps in that direction.

Making these steps easier and more practical are a groundswell of political will and economic incentives both legislated and market driven aimed at curtailing the energy and climate crisis. On this basis, the prospect of a cost effective and sustainable built environment is achievable and encouraging.

**The future of Ekose'a Homes** will incorporate solar and wind generated electrical energy, solar water heaters, solar chimneys, water conservation and management systems including living machines for on-site treatment of bio-wastewater and reclamation and reuse of rainwater and household greywater, and other passive technologies to provide all necessary utilities without consuming non-renewable natural resources or polluting the environment. Greenhouse gardening and food production will also be integrated into the Ekose'a Homes living experience.

**Ekose'a Homes, Inc.** is committed to ongoing research, development, and evaluation of building products and materials focused on increased longevity and reduced life cycle impacts on the environment.

**Ekose'a Homes, Inc.** also anticipates partnering with product manufacturers, pre-fabricated home manufacturers, builders, developers, architects, and engineers in an effort to improve the cost effective and sustainable qualities of Ekose'a Homes.

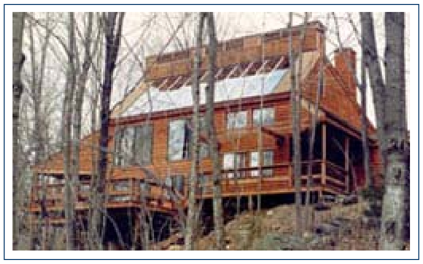
 

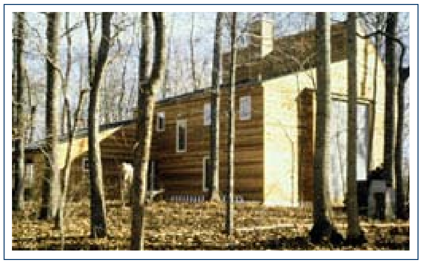
# EKOSE'A HOMES

Natural Energy Conserving Design



## THE EKOSE'A HOME





The protective double shell construction and air envelope in contact with the earth are the fundamental components of Ekose'a Homes. The advantages of this house go far beyond the basic criteria for utility-free maintenance of year round comfort. Health, aesthetic qualities, construction and costs are equally important considerations.

### HEALTH AND COMFORT

In order to better understand how the house works, it is necessary to understand some of the factors that affect human health and comfort.

#### WINTER

Conventional houses attempt to control primarily the air temperature. While this is important, the reader is probably well aware that it is possible to feel cold even though the thermostat may indicate that the air is warm. It is important to remember then, that temperature itself is not a measure of comfort. In fact, improvement in the following conditions makes it possible to feel comfortable at temperatures lower than what we are usually accustomed to.

- **Radiation of Body Heat** – In the conventional house the cold exterior walls, windows and other surfaces absorb body heat and contribute to discomfort. By isolating these surfaces from the climate extremes and surrounding them with earth-heated air, they are able to maintain higher temperatures and thereby improve body comfort.
- **Drafts** – These same cold surfaces cause drafts of cool air to circulate within each room. As this air moves across the skin of the body it produces a cooling effect. Again, by raising these surface temperatures, drafts are reduced or eliminated, further improving body comfort.
- **Infiltration** – The single skin construction of conventional houses allows direct infiltration of outside air. This condition is worst during windy weather. The flow of cold air produces the same cooling effect on the body as interior drafts except with greater intensity. Also, infiltration causes warmer inside air to be forced out contributing significantly to the heat loss of the house. In older homes, this factor has been identified as the single greatest source of heat loss.

Double envelope construction prevents outside air from entering the living space, providing a significant improvement in the level of human comfort and the conservation of interior heat generated or collected inside the house.

- **Humidity** – Relative humidity is another important factor in body comfort. In conventional houses the winter humidity is frequently lower than 5%. The heating system dries the air as it is being heated. Dry air causes moisture to evaporate from the body's skin surfaces, producing a cooling effect.

Also, this extremely low humidity contributes to the drying of respiratory passages, increasing the possibility of respiratory illness and disease. Harmful bacteria and virus grow best in either very high or very low humidity. Healthful bacteria are actually destroyed by many mechanical heating systems.

The circulating air envelope in contact with the earth absorbs moisture as well as heat, and will stabilize relative humidity near the ideal level of 50%, plus or minus 10%.

- **Solar Radiation** – Direct exposure of the human body to solar radiation contributes to the maintenance of body heat, and enables the body to produce vitamin D. Even on a cloudy day, this process can be an important source of health and comfort.

In Ekose'a Homes, the large areas of south facing glass make it possible for this radiant energy to enter the living spaces.

### SUMMER

- **Temperature and Humidity** – Air movement across the body is the easiest and most effective way to help relieve the discomfort of high temperatures. However, in very hot and humid climates this alone is not enough. High humidity prevents the evaporative cooling effect of air movement and is the greatest source of discomfort during summer months. Therefore, in more extreme climates, both heat and moisture must be removed from the air in order to improve body comfort.

In Ekose'a Homes, earth cooled air is ventilated through the house, and in extremely hot and humid climates, masonry walls in connection with the earth and the sun are used to absorb interior heat and humidity.

### YEAR-ROUND

- **Temperature Stability** – Aside from being too cold or too hot, a major cause of discomfort is constantly fluctuating interior temperatures caused by equipment that must turn on and off to regulate temperature. The earth conditioned air envelope buffers the extremes of outside temperature swings. Consequently, interior temperature changes are relatively small and occur at a very slow rate, allowing the body to adapt to new temperatures with little awareness of any change.
- **Fresh, Clean Air** – Fresh air and adequate oxygen levels also play an important role in health and comfort. The plants in the greenhouse convert carbon dioxide to oxygen while providing a fragrance and freshness to the envelope air. Ventilating the house to the envelope by opening a window or door to the greenhouse maintains an interior air quality not found in conventional houses. Also, reduced infiltration and reduced intake and emission of pollutants result in a cleaner, healthier air quality in Ekose'a Homes.
- **Food Production** – When utilized to the full potential, the greenhouse can become a major source of the family food supply. Growing food within the environment of your own greenhouse can result in higher quality food with more nutrients and fewer harmful chemicals. It can contribute significantly to the family budget as well as health.

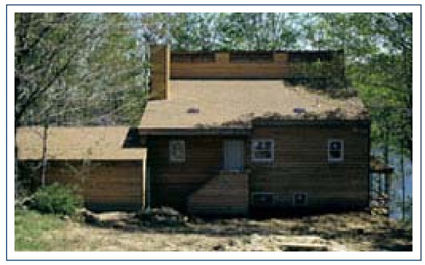
## AESTHETIC QUALITIES

- **Space and Light** – The greenhouse or solarium is a light and airy environment for people as well as plants, and offers living amenities and qualities of space and light unique in Ekose'a Homes.

It extends the visual space of adjacent rooms, making them seem larger than their dimensions might indicate. The large glass areas and tall, open spaces permit sunlight to fill the living areas. This abundance of natural light eliminates the need for most artificial lighting except at night. Even then, moonlit nights produce a unique light quality and atmosphere. During most of the day, sunlight is diffused or reflected from the interior of the greenhouse. This prevents glare as well as fading of building materials and furnishings.

Although an integral part of the air envelope, the greenhouse maintains comfortable living conditions except during the most extreme weather. Owners report that the greenhouse is actually the most popular living space in the house. On cold, sunny days, the greenhouse becomes a toasty space in which to recover from the dark and chilling effects of a long gray winter.

- **Peace and Quiet** – Ekose'a Homes are quiet. There is no noisy equipment associated with conventional heating and cooling and the envelope construction dampens outside noises.
- **Style Flexibility** – The performance of Ekose'a Homes is achieved architecturally or by the structural design. Exterior and interior styles are flexible and controllable by the owner to reflect individual desires and requirements.



## CONSTRUCTION AND COSTS

The cost of building an Ekose'a home is competitive with conventional designs of comparable size and quality. In fact, the actual costs of several dozen Ekose'a Homes have proven to be less than those for conventional design.

How is this possible? While there is no single or simple answer, the fact that these homes are so economical to build is certainly no accident.

Ekose'a Homes have been intentionally designed as simple rectangular boxes with simple roofs and standard details and materials throughout. Stock lumber sizes and other readily available materials are specified in all plans. Construction is monitored continuously and stock plans are revised periodically to reflect cost-effective improvements and to insure their clarity and workability. All of this helps to guarantee that Ekose’a Homes can be built at or below standard market prices.

However, keep in mind that a wide range of costs for any given design is possible, depending primarily on the amount of owner responsibility for construction, the quality of materials and exterior and interior style refinements.

In addition to initial costs, long term or life cycle costs are important considerations. The elimination of fuel, maintenance, repair and replacement costs related to conventional heating and cooling, represent a considerable savings over time to homeowners of Ekose'a Homes.

## SELF-SUFFICIENCY

Self-sufficiency is really at the heart of the Ekose'a Homes design concept. With future energy becoming more and more expensive, Ekose'a Homes become a source of greater and greater savings in the utility bill. The future availability of energy is a concern aside from the actual costs. With Ekose'a Homes you do not have to worry about freezing during a power shortage or blackout. Security, health and comfort are the goals of this house. While the house itself does not guarantee these goals will be met, we believe that the mounting evidence provided by homeowners of Ekose'a Homes indicates that these goals become realistic and attainable.

EKOSE'A HOMES

Natural Energy Conserving Design



# HOW IT WORKS

## NATURAL ENERGIES

Natural energies are the free energies, which are available at any point on the earth's surface. These on-site energies include:

- **GRAVITY**
- **EQUILIBRIUM ENERGY**
- **SOLAR ENERGY**
- **PHASE CHANGE ENERGY**

When combined, these energies are effective in conditioning the atmosphere inside built environments, without reliance on mechanical systems or any kind of off-site energy. To understand and appreciate the potential for designing with natural energies, it is very important to understand the power of these energies individually.

### GRAVITY

Gravity is the attraction of two bodies for one another based on their mass. The energy of gravity is derived from the attraction of particles on the atomic and subatomic levels. Gravity as an energy source is responsible for the major wind and ocean currents. Gravity provides the energy required to stabilize the physical aspects of man and his environment. Gravity forces water downhill providing hydroelectric potential.

The phenomenon in which cold air, being heavier than warm air, is pulled to the earth by gravity, displacing warmer air, which then is pushed upward to a position formerly occupied by the colder air, is known as gravity convection. The use of gravity to control the interior conditions of our built environment dates back several thousand years. Whether understood or not, it has served to regulate and distribute the air inside every space which man has constructed.

Gravity is a very powerful force for moving air within our built environment, and has the capacity to act directly on the air, eliminating the need for any kind of mechanical system for the forced circulation of air. And in moving air, gravity acts to transfer heat.

## EQUILIBRIUM ENERGY

The second form of on-site energy is the energy of equilibrium. Equilibrium is simply defined as a state of balance produced by the counteraction of two or more forces or influences in a system. For instance, when force or heat (energy) is either added to or subtracted from a system, the molecules in that system transfer the energy to balance or bring into equilibrium the effects of the energy transfer. As molecules become more tightly packed, their ability to distribute energy transfers evenly and quickly becomes greater. Another way of stating this is as mass increases; conductivity and heat absorption capacity increases.

The principles of equilibrium are fundamental to the laws of thermodynamics. When two systems are put in contact with each other, there will be a net exchange of enegy between them unless or until they are in thermal equilibrium. Furthermore, heat will transfer by direct contact or conduction or by radiation from a hotter object to a colder object in seeking a balance of the heat energy of the objects.

The energy of equilibrium transfers heat between existing buildings and the outside climate. In other words the energy of equilibrium is responsible in present building design for the lack of heat in the winter and the abundance of heat in the summer. The power of this energy should not be underestimated. Acting alone the energy of equilibrium is responsible for thermal discomfort in all existing buildings. However, this energy can be utilized to create and support, instead of detracting from, comfortable interior environmental conditions in buildings.

The same process of equilibrium is at work between the differences in temperatures of the air and the earth. By controlling the interaction of the temperatures of the earth and the air, the equilibrium process can be used to create a constant temperature level anywhere within the temperature range of the air and the earth. For instance, in Ekose'a Homes, the earth mass is used to warm cold air and cool warm air.

## SOLAR ENERGY

The third form of energy is solar energy. Of all the energies, solar energy is perhaps the easiest to understand. It comes to earth directly from the sun in the form of electromagnetic waves. We see these waves as light and we feel these waves as heat.

Solar energy has received a great deal of attention recently, particularly as a source for producing electrical energy. While the sun may provide us with large amounts of useful energy, its availability varies greatly. In some parts of the world, solar energy is abundant and very strong while in others or during extreme winter conditions it is intermittent and relatively weak. Therefore, the design of Ekose'a Homes is not based primarily on solar energy as a source of heat energy. In fact, the concepts of Ekose'a Homes can be employed to design a comfortable built environment without the use of solar energy. Although Ekose'a Homes are based on the utilization and conservation of natural energies, solar energy is the only energy that can be taken out of the equation for the equation to remain valid.

In assimilating an understanding of the fundamental concepts of Ekose'a Homes, it is important to note that solar energy per se is not required to maintain building comfort. If the reader will accept this fact, then understanding how Ekose'a Homes work will become much easier.

## PHASE CHANGE ENERGY

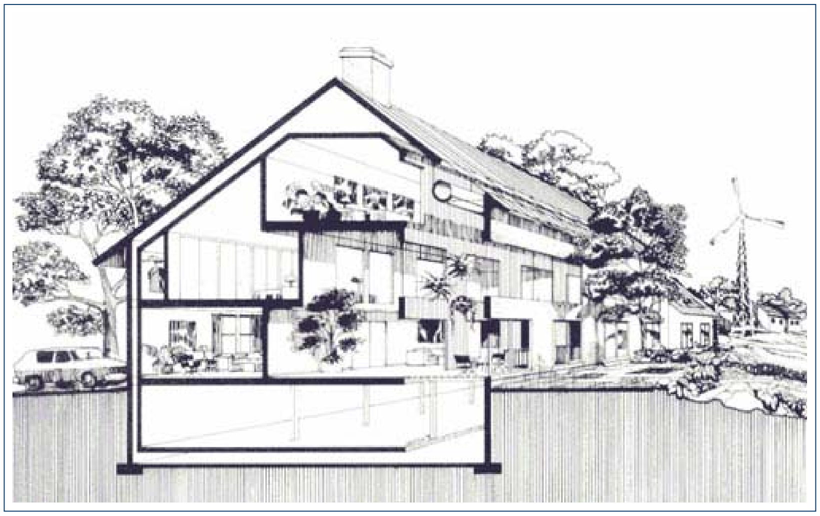
The fourth form of on-site energy is phase change energy. This is the energy that is absorbed or released during a specified temperature and phase change. A phase change is the transition between solid, liquid, and gaseous states of matter. For example, the energy required to change one gram of water one degree centigrade is known as a calorie. When one gram of water at 100 degrees centigrade becomes one gram of steam at 100 degrees centigrade, 538 calories are absorbed. Water provides phase change energy of 538 calories/gram/degree C. Water can evaporate in a building system through vapor differences or temperature differences, or both. In evaporation, both a cooling and a dehumidifying-effect results.

EKOSE'A HOMES
Natural Energy Conserving Designs



## HOW IT WORKS

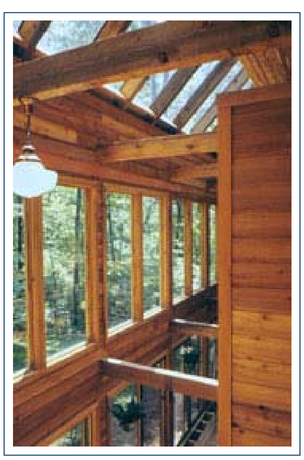


### DESIGN METHODOLOGIES

Designing buildings that effectively integrate the **on-site natural energies** with the microclimate and the basic physical characteristics of ordinary building materials requires a comprehensive knowledge of each interactive element.

#### CLIMATE

With regard to climate, the primary data to be analyzed on a tri-hourly or daily basis is the outside air temperature and solar insolation, the measure of radiant solar heat. If these two quantities of data are plotted on a graph, it becomes obvious that certain sequences of climatological events will have greater impact on the inside air temperature of a building than others. Once these critical periods are identified, the building design must be evaluated analytically with respect to the dynamic sequence of heat loss / heat gain during each critical period. It is absolutely essential that the designer identify the critical sequence of weather as compared to the static statistical mean in observing the dynamic effects of the environment on the building.



#### HEAT TRANSFER

In looking at the points of a building through which the maximum temperature change or heat transfer occurs, it will be observed that the greatest amount of heat transfer takes place either directly through glass areas by conduction or through doors and openings around glass areas by convection, or air infiltration. In the typical modern home, the percentage of this heat loss by conduction and infiltration may reach as high as 80%.

Therefore, in the process of minimizing undesirable heat transfers, it becomes obvious to start at the point of highest heat transfer, or typically the glass openings in the building skin. Due to the extremely high conductivity of glass panels, and even where double or triple layered panels are used, it is necessary in more extreme climates to shield these glass panels from direct contact with the outside climate and/or reduce the amount of glass area. However, since glass areas are highly desirable for allowing sunlight and solar energy into a building as well as for providing visual contact with the outdoor environment, the notion of shielding glass areas when necessary rather than reducing them is the most sensible approach to this issue.

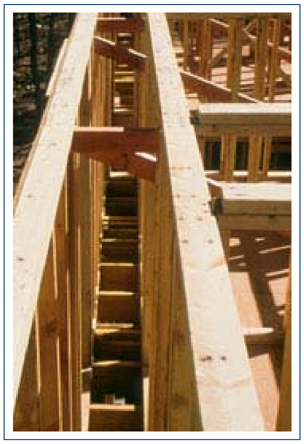
### THERMAL ENVELOPE

The implications of such a shield or barrier led to the development of the **gravity geo-thermal convection envelope**, or **thermal envelope**. The thermal envelope is an active air space covering most if not all of the glass openings in the building skin and is connected with the attic space above the ceiling and with the crawl space below the floor. This forms a complete envelope around the interior living spaces wherein air is free to circulate back and forth due to changes in the temperature or density of the air, which occur in the vertical components of the thermal envelope.

The air in the thermal envelope affects and is affected by the surface temperature of the interfacing earth and building materials. Due to the asymmetrical aspects of climate, site, solar orientation, and building design; the building and the thermal envelope will naturally gain heat on one side and lose heat on another side. The side gaining energy will rise in temperature and the side losing energy will fall in temperature. This will result in colder denser air falling due to gravity on the cold side, forcing up the warmer lighter air on the warm side.

This circulation of air due to **gravity**, or **gravity convection** will continue as long as one building wall loses or gains heat faster than an opposing wall.

The thermal envelope simply acts to achieve **equilibrium** with respect to the density of the air in the vertical components of the envelope and in so doing also acts to achieve temperature or thermal equilibrium of the air and interfacing surfaces. This process of thermal equilibrium is based on the principle that heat will move from a warmer object to a cooler object and on the three modes of heat transfer, **radiation**, **conduction**, and **convection**. Opposing surfaces of the envelope will transfer heat across the envelope by radiation. The air in contact with the surrounding surfaces will transfer heat by conduction. Therefore in the process of achieving equilibrium, the air envelope transfers heat by conduction and distributes heat by gravity convection. In understanding and applying the principles of thermal equilibrium and the modes of heat transfer, it becomes evident that a key factor in designing for critical heat gain and heat loss conditions is the correlation of surface areas and associated mass in contact with the thermal envelope.



A final point regarding the thermal envelope, it is the only functional environment that the interior of the building is able to sense. Therefore during critical climate periods, **the interior occupied spaces lose and gain heat interactively with the thermal envelope, not with the outside climate**. And since the air of the thermal envelope is not in direct contact with the air of the living spaces, its temperature can fluctuate greatly with comparatively little effect on the interior environment.

### EARTH MASS

Another key dynamic in achieving thermal equilibrium, particularly during prolonged extreme conditions, is the flywheel effect of the earth mass. Since the **earth mass** interfacing the thermal envelope is connected to planet earth, its heat storage or thermal capacity is virtually unlimited and thus readily gives up or absorbs heat interactively with the thermal envelope and the surrounding surfaces of the interior building structure.

Performance monitoring of the thermal envelope by Phillip Henshaw in Colorado reveals that the buffering effect of the thermal envelope during extreme winter conditions can be enhanced by the **infiltration of earth-tempered air** through the ground into the air envelope, a direct and relatively fast means of convective heat transfer from the earth to the air envelope. This phenomenon will occur where the intrinsic permeability of the soil outside and under the building is equal to or greater than the permeability or infiltration rate of the exterior building skin, and where the aerodynamics of the building and the wind will cause a negative outside air pressure differential relative to the air pressure inside the envelope. Such air exchange may also be explained by a gravity-chimney effect due to the density or temperature differential between the outside air and the air envelope. The respective infiltration rates of typical soils and standard residential building construction are commonly similar, allowing this type of desirable infiltration to occur.

In explaining the above dynamic conditions, and with respect to low-rise buildings, the earth is utilized as the primary source of mass for absorbing and yielding heat. There are several reasons for this. First, and most importantly, the earth is the only material that is readily available at the site at no cost. Second, the space directly below the building is the most logical location for heat transfer. Placing the thermal mass at the high point or at any intermediate point in the structure would increase or decrease the envelope temperature near the peak, maximizing the heat transfer during extreme periods in both winter and summer. Third, as previously mentioned, it is connected to planet earth, a source of virtually infinite heat. A fourth advantage of earth over any other material is the fact that it absorbs a certain percentage of moisture and holds it. The normal water absorption of the earth in this situation increases the heat storage capacity of the earth by more than 100%. In addition this moisture serves to moderate the internal humidity of the envelope and house.

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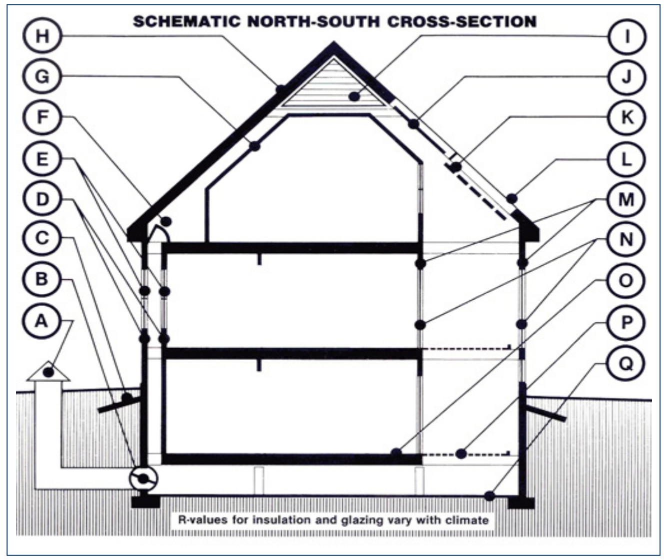
# EKOSE'A HOMES
Natural Energy Conserving Design



## HOW IT WORKS

### COMPONENTS




A. Fresh air intake / underground cooling tubes – number, size and length vary with house design and climate
B. Damper
C. Perimeter insulation – location varies with design and climate
D. Insulated frame walls
E. Glazed openings
F. Fire damper
G. Insulated frame ceiling
H. Insulated frame roof
I. Dampered vents at peak of air envelrope
J. Flat plate solar collector for domestic water behind roof glass
K. Adjustable awning for sun / thermal control
L. Glazed opening
M. Insulated frame walls
N. Glazed openings
O. Insulated frame floor
P. Spaced decking to allow envelope air to circulate
Q. Earth

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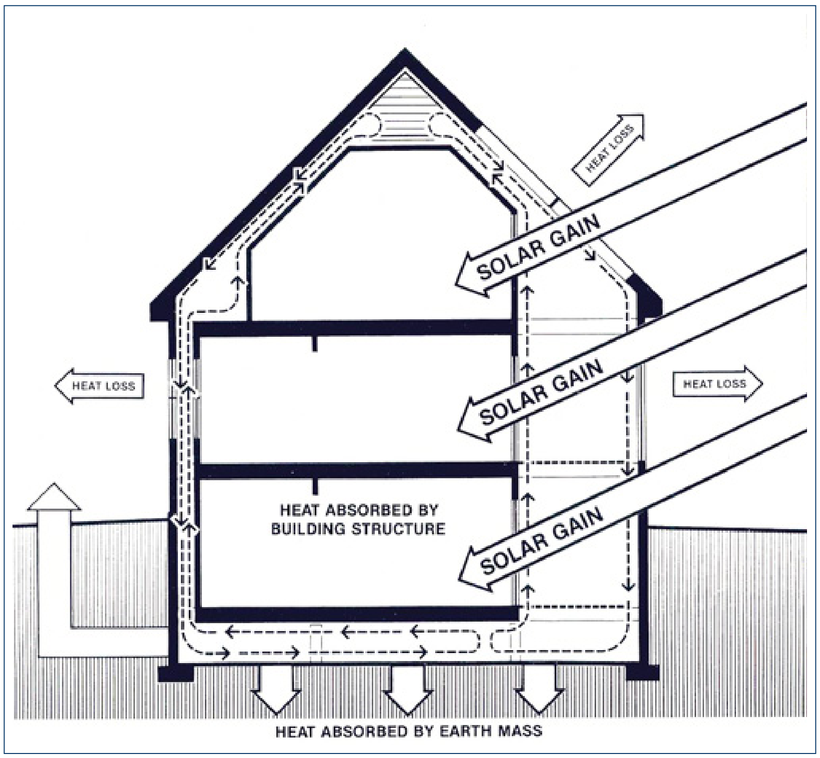
## HOW IT WORKS

### MODES OF OPERATION

### MODE 1 WINTER - SOLAR HEAT GAIN

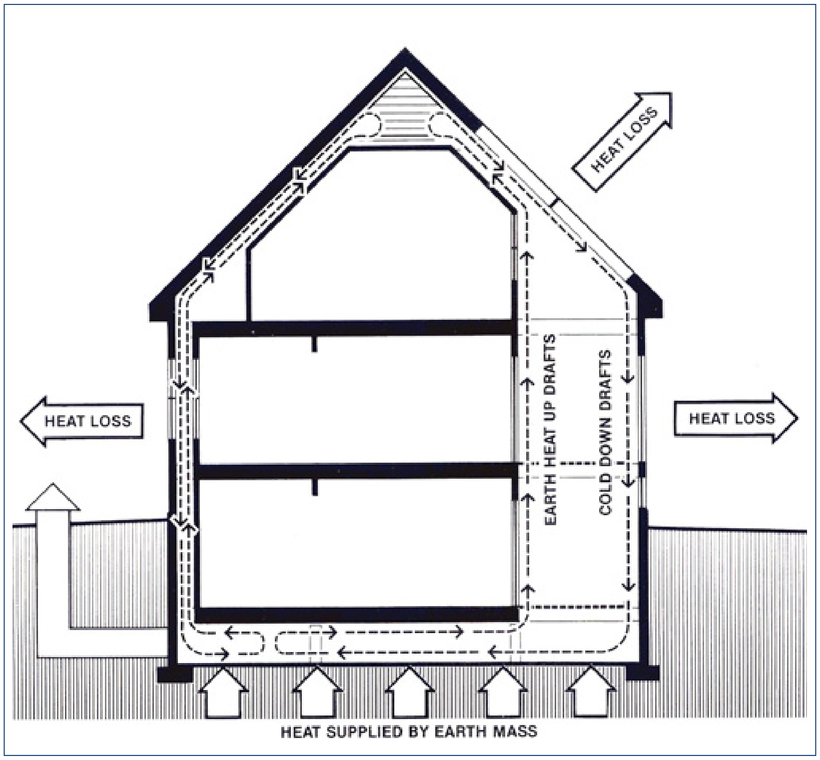
This describes a period in which total heat gain exceeds total heat loss. This occurs when there is direct sunshine supplying direct solar gain to the interior of the structure. This gain is absorbed by the structure and associated thermal mass.




- As the sun, direct solar gain, enters the south envelope space, greenhouse / solarium, it heats the air making it lighter.
- As heat is lost by conduction from the north envelope space, the air is cooled, making it heavier.
- The force of gravity pulls the heavier cold air down to the lowest point in the system, the crawl space, and causes a predominantly counter clockwise force on the air envelope.
- This constant circulation of air due to gravity convection distributes the heat gain uniformly throughout the entire building mass and structure.
- The air movement indicated for MODE 1 and 2 is a generalization of the circulation patterns of the air envelope, which are unique and variable in every case. However, the two diagrams illustrate the basic principles of gravity convection and what appear to be predominant air movement patterns.

## MODE 2 WINTER - EARTH HEAT GAIN

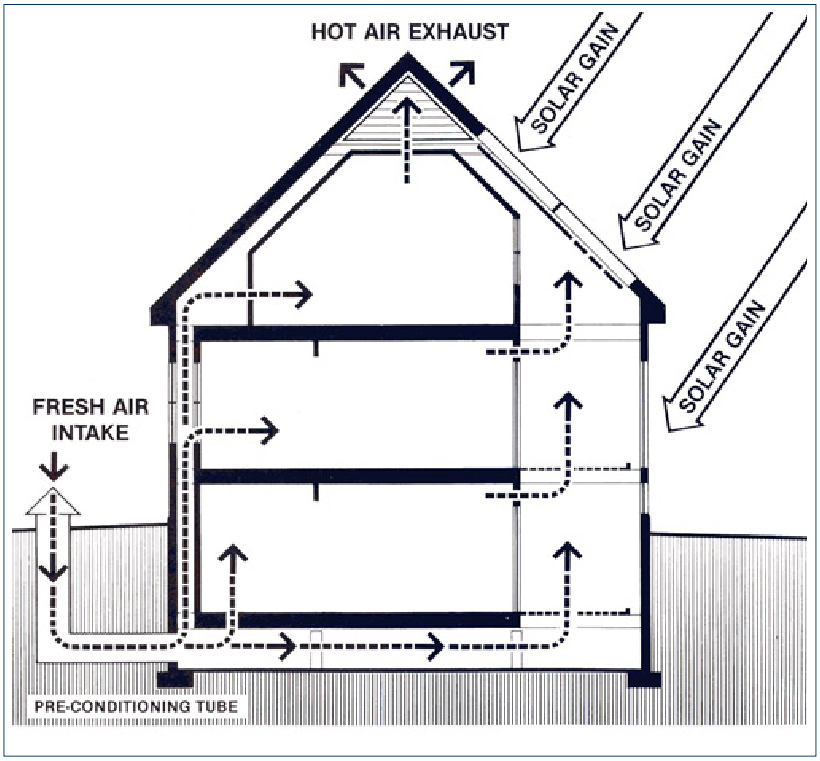
This describes a period when solar gain is insufficient to offset losses due to conduction and infiltration. During this period, the ground surrounding the foundation walls and the earth in the crawl space supplies heat to the air envelope. Monitoring by Phillip Henshaw as previously referenced indicates that air as well as heat is drawn up through the ground due to a gravity-chimney / infiltration effect. This phenomenon could account for the actual amount of heat being supplied during overcast periods. This earth heat serves to maintain the temperature of the envelope at or near the earth temperature, surrounding the house with a buffer zone of earth-tempered air.




- The maximum heat loss occurs by conduction through the glass in the south envelope space, cooling the air in this space faster than anywhere in the system.
- The force of gravity pulls the air in the south envelope space down into the crawl space forcing the air to move more in a clockwise direction.
- This constant circulation during a heat loss, or cool down period, distributes the heat loss uniformly throughout the entire building mass and structure.
- Heat from the earth mass replaces the majority of the heat loss whenever the air temperature falls below the mass temperature.

## MODE 3 SUMMER - VENTILATION AND COOLING

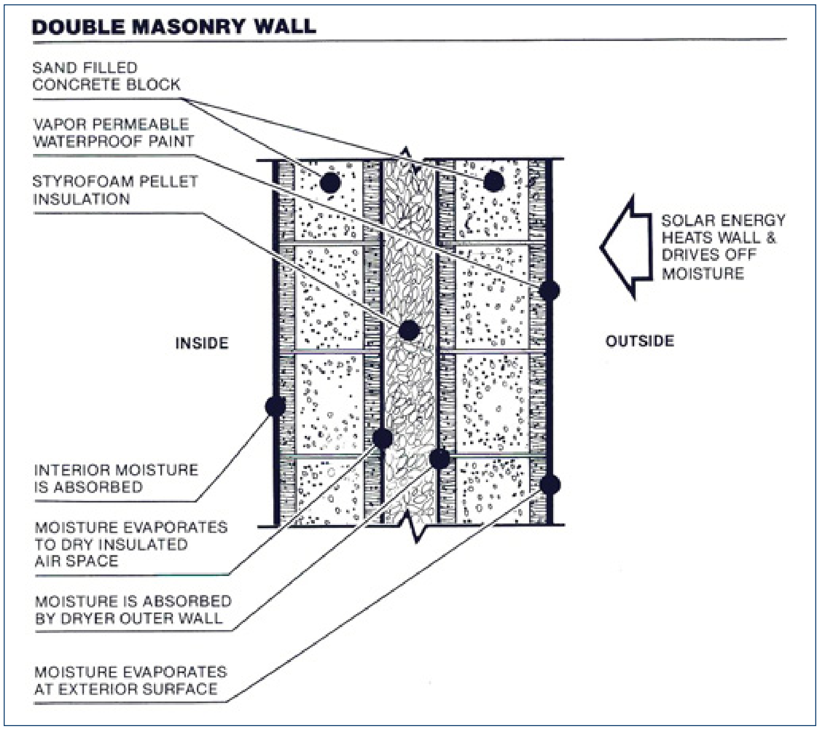
This describes a period in which the house is receiving more solar heat than is required to maintain comfortable temperatures. During such a period, the house is ventilated by opening vents near or at the top of the structure and drawing in earth-cooled air through the cooling tubes. In Deep South locations where temperature and humidity are very high, fans and dehumidifiers have been required to augment the natural systems. We are developing and testing solar chimneys and other practical building systems that would eliminate the need for such mechanical assistance. However, at the present time we cannot represent the stock plan designs as drawn to be totally adequate in the cooling mode.




- During hot summer conditions, the roof and/or shade overhangs prevent the sun from striking the ceiling of the interior living areas, thus reducing heat gain.
- East and west glazing is held to a minimum, also reducing heat gain.
- The attic space at the top portion of the thermal envelope heats up, but in this mode the air is allowed to escape through vents in the attic space.
- This hot air is replaced by a constant flow of cooler air entering at the lowest point of the house. Underground pipes or cooling tubes are required in most climates.

#### EVAPORATIVE COOLING

This describes a process utilzing **Phase Change Energy** to effectively cool and dehumidfy the interior living spaces in climates with prolonged summer periods of high temperature and humidty, This is achieved in Ekose'a Homes with a double masonry wall assembly located on the east and west walls or west wall only and requires full morning and/or afternoon sun exposure.




- The sun strikes, heats, and dries the outer masonry wall on the east and/or west walls.
- The moisture then moves from the inner wall, across the air space to the drier, outer wall.
- As the moisture evaporates from the inner wall, it cools this inner wall.
- As moisture evaporates from the inner wall to the outer wall, the inner wall is able to absorb moisture from the interior living spaces, lowering the relative humidity.
- Also, the inner wall is in thermal contact with the cool earth mass below the house.
- These different yet coincident cooling processes combine to keep the inner wall cool and able to absorb body radiant heat as well as keep the air temperature in the house cool and the humidity level constant.
- The insulation filled air space in the double masonry wall minimizes heat transfer between the outer and inner walls during winter and summer.

# EKOSE'A HOMES
Natural Energy Conserving Design



## HOW IT WORKS

### MONITORING DATA

The diagrams on the following pages describe the performance of the Mastin residence in Newport, Rhode Island during a 6-day period in January 1980. Brookhaven National Laboratory performed the monitoring under contract to the Department of Energy, Ralph Jones, project director.

During the entire period indicated, the sky was overcast resulting in no direct solar radiation. Winds ranged from 0 to 30 mph. Three bathroom sized (1500 watt) electric heaters were provided to supply a small amount of backup heating when interior temperatures dropped below 65 degrees. The heaters on the top two floors rarely ran during the day and ran about 50% of the time at night.

It is significant that the performance indicated was for a period with little or no solar gain. Although direct sunshine will raise the interior temperatures above those shown, solar gain is not required to maintain comfort during the worst winter weather. The principle source of heat to the air envelope during these periods is the heat from the ground below the house.

The question of thermal performance of Ekose'a Homes involves a large number of variables over which the homeowner has control. For example, in the case of the Mastin house, it could be explained that with four children living in this household, and three meals being cooked every day, a certain number of baths being taken every day, a certain amount of clothing being washed and dried periodically; the heat generated from these activities could easily amount to the quantity of backup heating that was actually consumed.

Furthermore, ignoring the possibility of additional occupants, it should be noted that the east and west walls are not incorporated into the thermal envelope. If the east and west walls were incorporated into the envelope, it would have more than a 4,000 BTU/hr effect on the heat loss during these conditions, especially where there are windows in both the east and west walls. It should also be noted that there is some single glazing on the inner envelope wall, and by changing to double glazing, or by using conventional lined draperies, the additional thermal advantages would cause an effect of providing some of the backup heat which was required during the monitoring period.

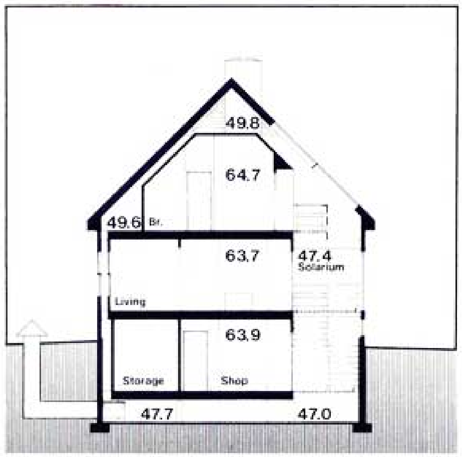
The point is simply that the potential exists for achieving a 100% efficient system if that is the goal and that there are a variety of ways to accomplish this end, only a few of which we have mentioned above.

## MONITORING DATA

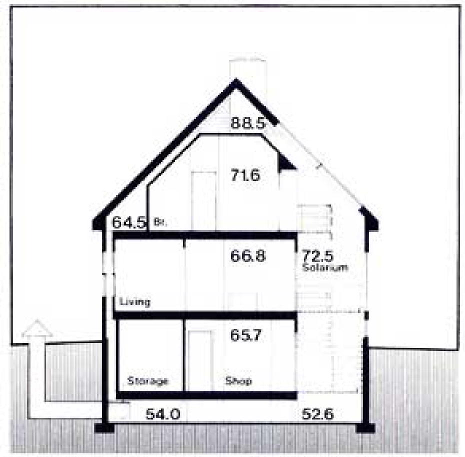
All temperatures below are in degrees fahrenheit.

# DAY 1

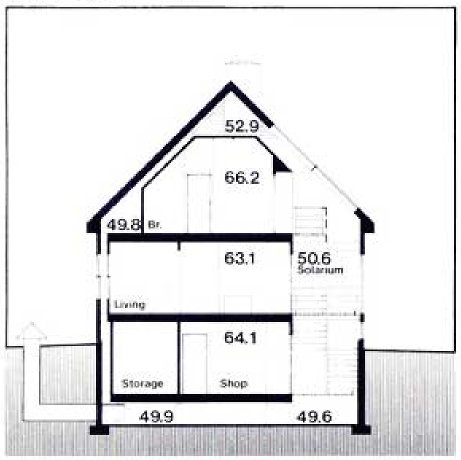
**6AM 23.4** outside temperature



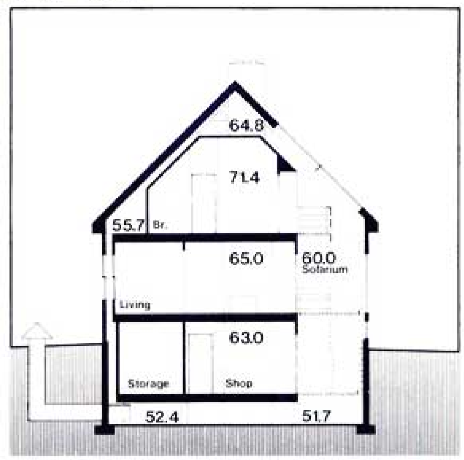

**NOON 35.4**

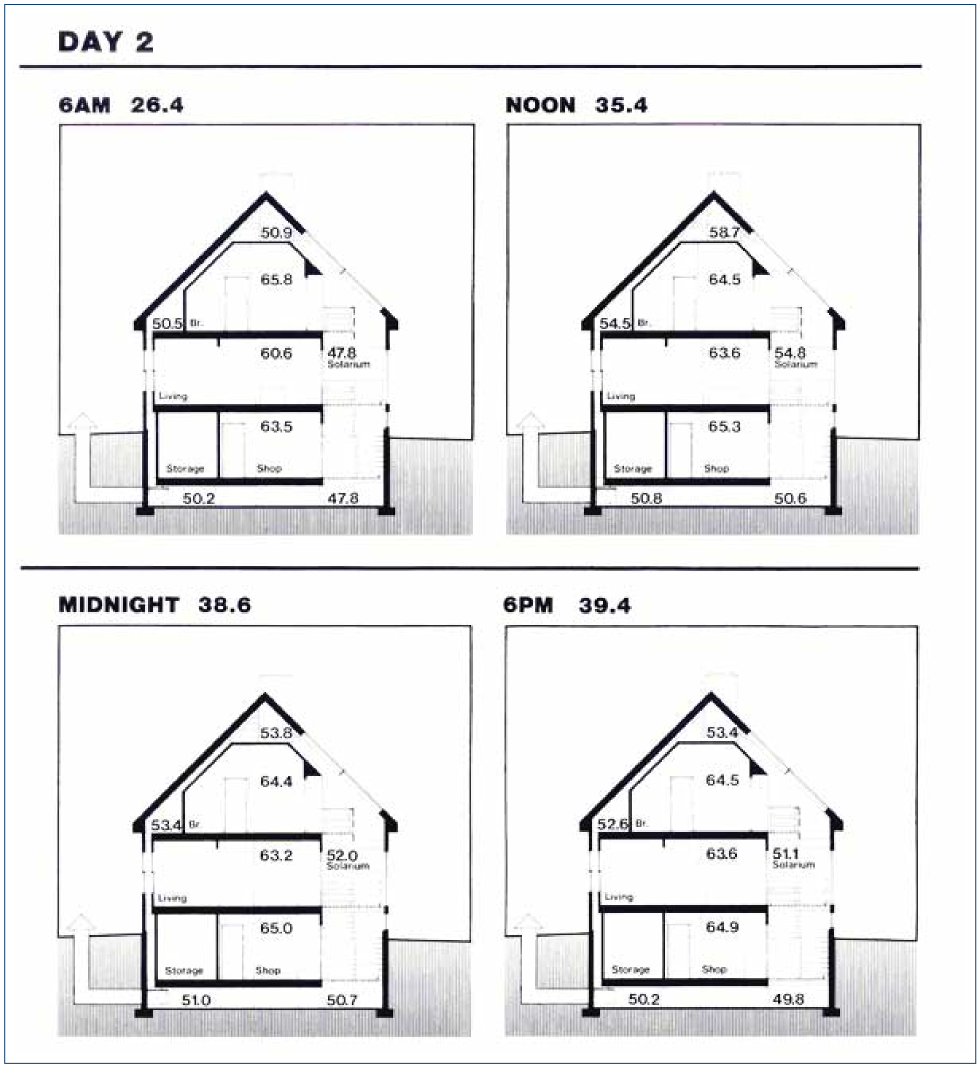


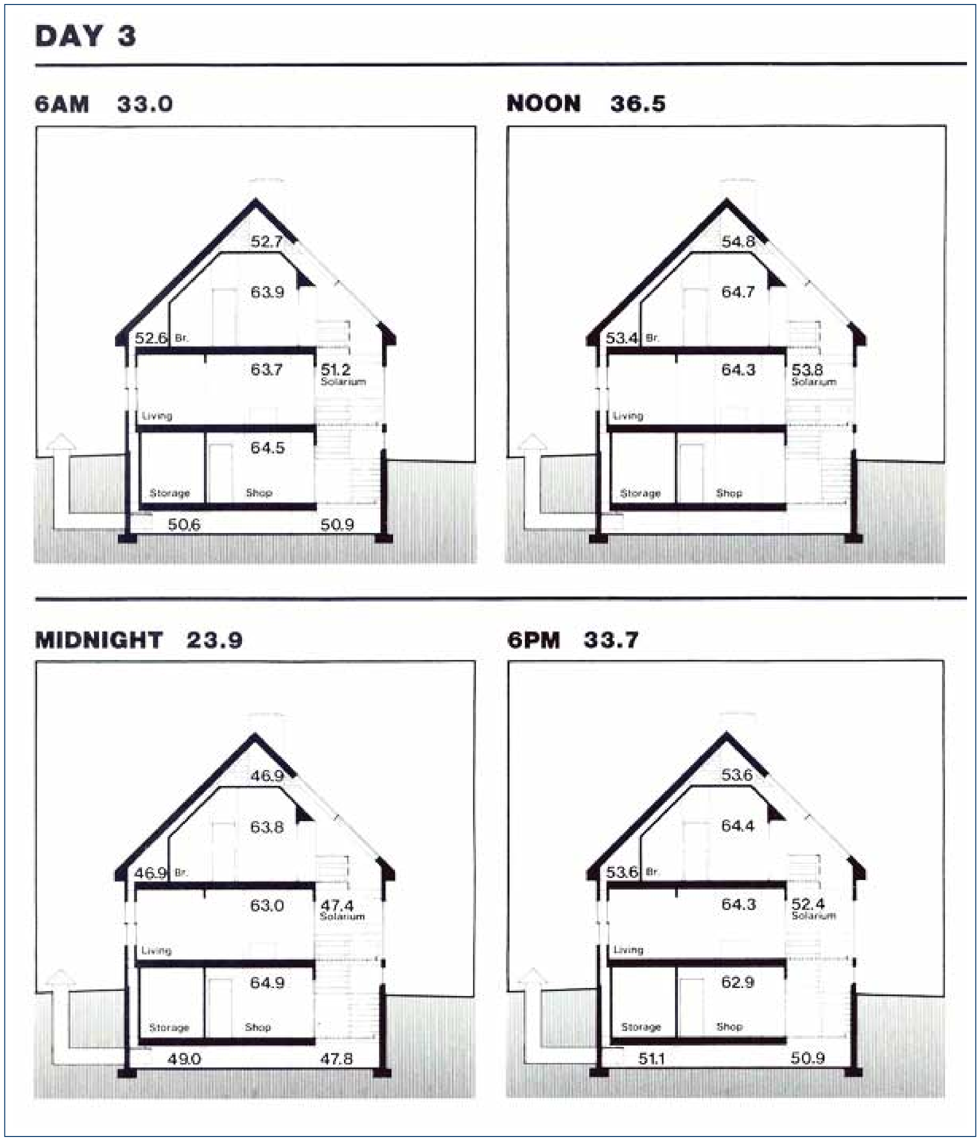

**MIDNIGHT 27.1**



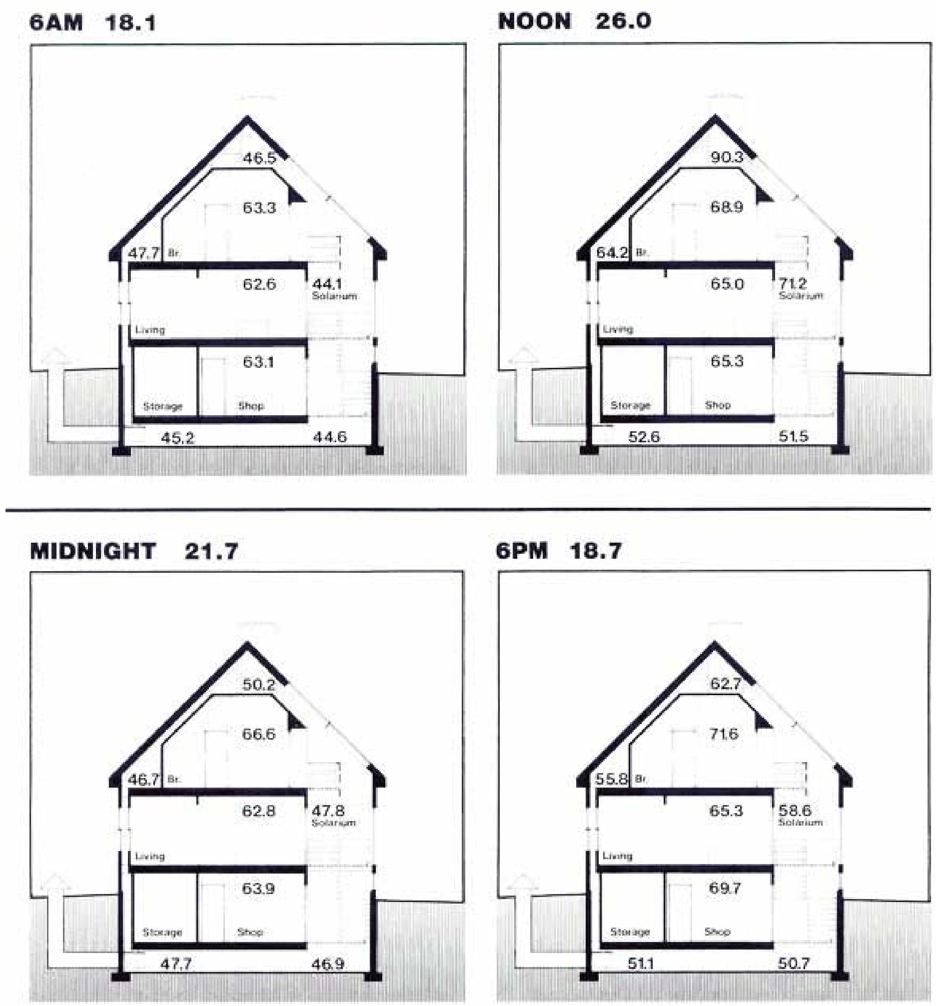

**6PM 30.8**

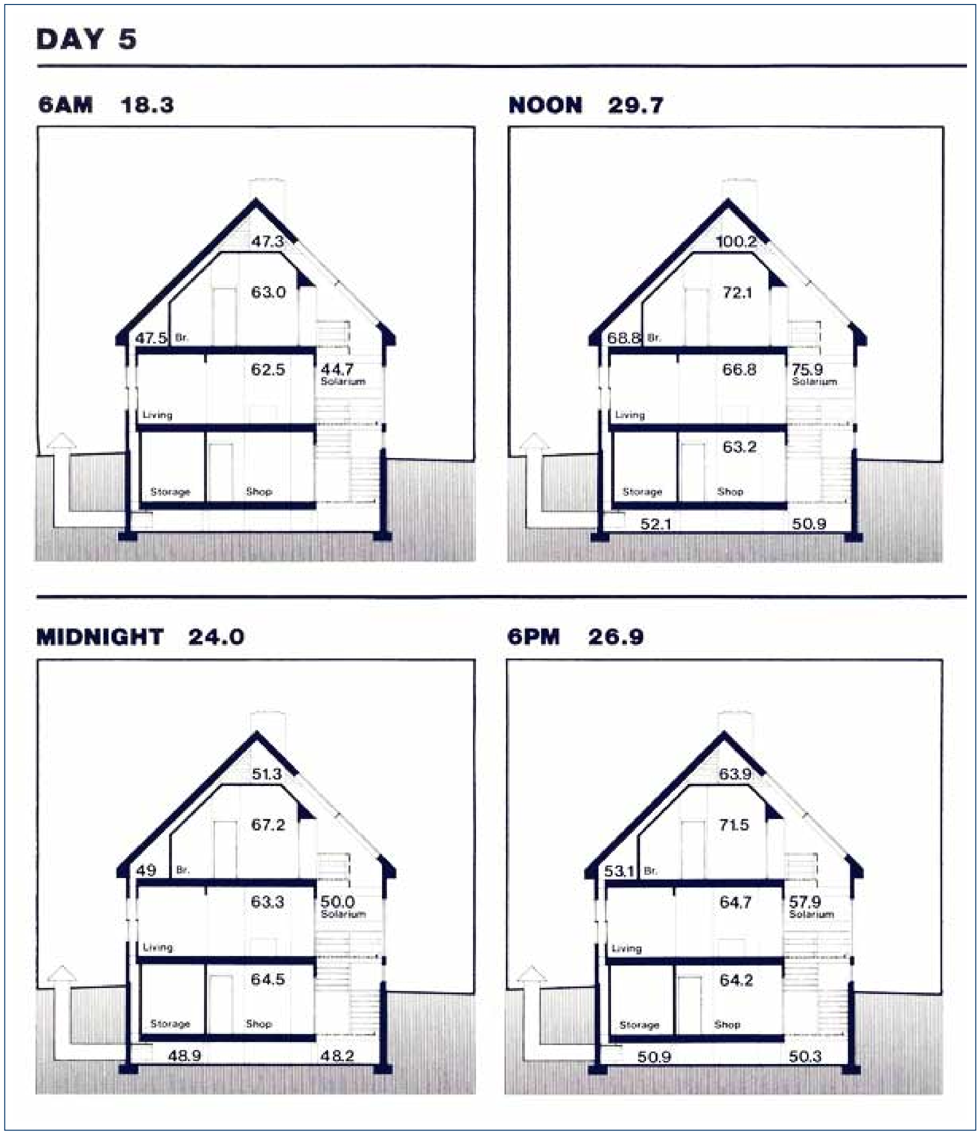


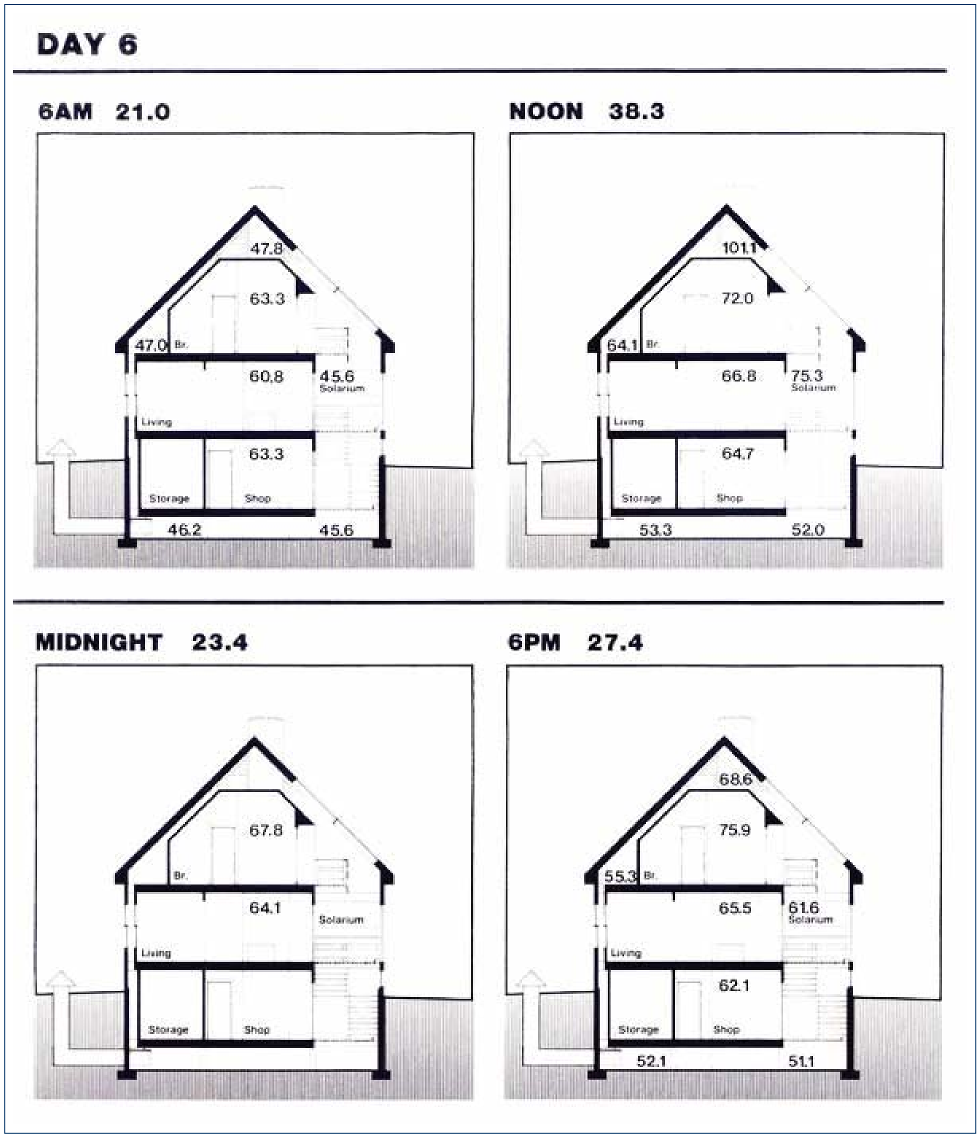

DAY 2
6AM 26.4
50.9
65.8
50.5 Br.
60.6
47.8 Solarium
Living
63.5
Storage
Shop
50.2
47.8
NOON 35.4
58.7
64.5
54.5 Br.
63.6
54.8 Solarium
Living
65.3
Storage
Shop
50.8
50.6
MIDNIGHT 38.6
53.8
64.4
53.4 Br.
63.2
52.0 Solarium
Living
65.0
Storage
Shop
51.0
50.7
6PM 39.4
53.4
64.5
52.6 Br.
63.6
51.1 Solarium
Living
64.9
Storage
Shop
50.2
49.8


DAY 3
6AM 33.0
52.7
63.9
52.6 Br.
63.7
51.2 Solarium
Living
64.5
Storage
Shop
50.6
50.9
NOON 36.5
54.8
64.7
53.4 Br.
64.3
53.8 Solarium
Living
Storage
Shop
MIDNIGHT 23.9
46.9
63.8
46.9 Br.
63.0
47.4 Solarium
Living
64.9
Storage
Shop
49.0
47.8
6PM 33.7
53.6
64.4
53.6 Br.
64.3
52.4 Solarium
Living
62.9
Storage
Shop
51.1
50.9

## DAY 4


6AM 18.1
46.5
63.3
47.7 Br.
62.6
44.1
Solarium
Living
63.1
Storage
Shop
45.2
44.6
NOON 26.0
90.3
68.9
64.2 Br.
65.0
71.2
Solarium
Living
65.3
Storage
Shop
52.6
51.5
MIDNIGHT 21.7
50.2
66.6
46.7 Br.
62.8
47.8
Solarium
Living
63.9
Storage
Shop
47.7
46.9
6PM 18.7
62.7
71.6
55.8 Br.
65.3
58.6
Solarium
Living
69.7
Storage
Shop
51.1
50.7


DAY 5
6AM 18.3
47.3
63.0
47.5 Br.
62.5
44.7 Solarium
Living
Storage
Shop
NOON 29.7
100.2
72.1
68.8 Br.
66.8
75.9 Solarium
Living
63.2
Storage
Shop
52.1
50.9
MIDNIGHT 24.0
51.3
67.2
49 Br.
63.3
50.0 Solarium
Living
64.5
Storage
Shop
48.9
48.2
6PM 26.9
63.9
71.5
53.1 Br.
64.7
57.9 Solarium
Living
64.2
Storage
Shop
50.9
50.3

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# EKOSE'A HOMES

Natural Energy Conserving Design



## HOME DESIGNS

Each design presented in this section was originally a custom design reflecting specific site, climate, program requirements, and budget criteria. Their purpose is to provide:

- A variety of designs from which you may select and modify for constructing a home
- Examples for developing or modifying your own design
- A sense of design flexibility

Construction Documents are available for each Home Design, with a few noted exceptions.

CLICK on **Construction Documents** from the **Products** menu for information

### SELECTION CRITERIA

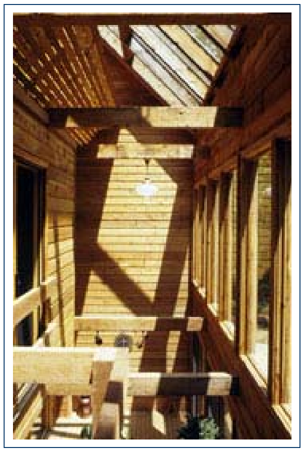
- CLICK on **Climate Zones & Design Chart** from the **Home Designs** menu.
- Study the CLIMATE ZONES map and descriptions to determine the climate zone of your area. The locations and types of climate zones are very generalized, but serve to initially define the scope of climate criteria. Your area may graphically fall in one zone or border two zones and yet be more characteristic of another. The zone descriptions, therefore, are more significant to the selection criteria than their geographic representations.
- Refer to the DESIGN CHART for the DESIGNS adaptable to your climate.
- Select DESIGNS that can be modified to meet your building requirements.
- CLICK on the DESIGNS from the Design Chart to see detailed information for each design.

### MODIFICATION CRITERIA

All the designs can be modified to function in a climate somewhat different than the climate for which they were designed; and, any group of designs adaptable to a particular climate may be modified to satisfy individual design preferences. However, there is a practical limit to modifications beyond which less efficient performance cannot be adjusted.

The following are examples of some design variables that are adjusted to maintain specified comfort standards with respect to climate variations and design modifications:

- Insulation values of both the inner and outer building envelopes
- Type, size, and location of windows, doors, skylights
- Relation of exterior surface areas below and above grade
- Slope, height and orientation of the roof above living areas



- Depth and position of sun shading
- Location and surface area of roof vents, dampers
- Specifications for air pre-conditioning tubes
- Waterproofing and sub-grade drainage

The following are guidelines for modifying a particular design to satisfy individual design preferences.

## BUILDING ORIENTATION

Most of the houses represented in this section were designed with large glass areas and solarium / greenhouse spaces facing a southern orientation. The north-south axis of these houses may vary between 20 degrees east and 10 degrees west of true south except in climate zones 1 and 2 orientation should be limited between 0 and 20 degrees east of true south.

## EXTERIOR SURFACE AREAS, DIMENSIONS, GEOMETRY

Dimensional and geometric changes of the active air envelope and of the overall building configuration should be discouraged. Generally however, the east-west dimensions of houses with north-south active air envelopes may be increased but not decreased. Furthermore, the relation of exterior surface areas below and above grade should remain unchanged except in favor of increased proportional area below grade.

## INTERIOR AND EXTERIOR MATERIALS

There are no significant thermal considerations in the selection of materials except in the case of evaporative cooling walls and of substitutions for glass. Interior color values should be light. Exterior color values should be lighter in warmer climates, darker in colder climates.

## EXTERIOR GLASS

SOUTH: reduction of glass areas should be minimal.
NORTH: small reductions or increases are primarily practical or aesthetic considerations.
EAST-WEST: Glass area in this orientation is a summer / winter trade-off and more costly to accommodate. Generally, direct interior solar gain from early morning and late afternoon sun in the winter is an advantage, but must be properly insulated. In summer it is a disadvantage and should be shaded externally and insulated as well. However, east-west windows incorporated into the thermal envelope would be more effectively accommodated.

## FLOOR PLANS

Alteration of interior floor plans is permitted and easily accommodated. However, these changes should respect the quality and availability of natural light to the interior inherent in the original design.

The following are examples of some modifications or additions to consider:

- Finished space in the attic
- Basement
- Deck or screened porch
- Small wing on the east or west for additional living space
- Dormers
- Additional gables
- Garage or carport
- Balconies or decks in the solarium-greenhouse

# EKOSE'A HOMES

Natural Energy Conserving Design

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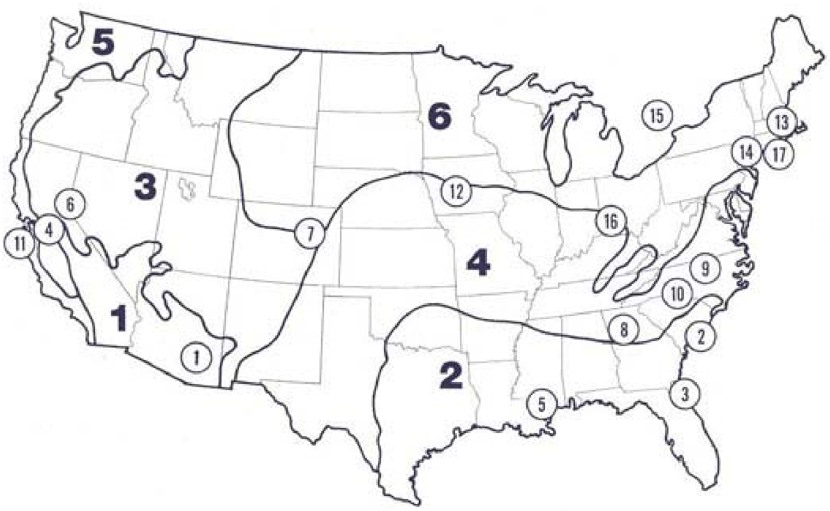
## HOME DESIGNS

### CLIMATE ZONES




| | Winter | Summer |
|---|---|---|
| **Zone 1** | Mild winter temperatures<br>Excellent solar insolation<br>Short overcast periods | Highest Temperatures<br>Low humidity, de-humidification not requred |
| **Zone 2** | Mild temperatures<br>Good solar insolation<br>Short overcast periods | High temperatures<br>High humidity<br>■ Low humidity |
| **Zone 3** | Cold temperatures<br>Moderate solar insolation<br>Short overcast periods | Mild temperatures<br>Low humidity |
| **Zone 4** | Cold temperatures<br>Moderate solar insolation<br>Moderate overcast periods | Moderately high temperatures<br>Moderatly high humidity |
| **Zone 5** | Cold temperatures<br>■ Mild temperatures<br>Lowest solar insolation<br>Long overcast periods | Mild temperatures<br>Mild humidity |
| **Zone 6** | Coldest temperatures<br>Low solar insolation<br>Long overcast periods | Mild temperatures<br>Moderate humidity |

### DESIGN CHART

| | Design - Location | Climate Zones | | | | | |
|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 |
| 1 | TUCSON 01 | ● | | | | | |
| 2 | CHARLESTON 01 | ○ | ● | | | | |
| 3 | JACKSONVILLE 01 | ○ | ● | | | | |
| 3 | JACKSONVILLE 02 | ○ | ● | | | | |
| 4 | SACRAMENTO 01 ■ | | ● | | | | |
| 5 | NEW ORLEANS 01 | ○ | ● | | | | |
| 6 | TAHOE 01 | | | ● | | | |
| 6 | TAHOE 02 | | | ● | | | |
| 7 | ASPEN 01 | | | ● | | | |
| 8 | ATLANTA 01 | | ○ | | ● | | |
| 9 | RALEIGH 01 | | | ○ | ● | ○ | |
| 10 | CHARLOTTE 01 | | | ○ | ● | ○ | |
| 11 | LOS ALTOS 01 ■ | | | | | ● | |
| 11 | SAN FRANCISCO 01 ■ | | | | | ● | |
| 11 | HALF MOON BAY 01 ■ | | | | | ● | |
| 11 | REDWOOD CITY 01 ■ | | | | | ● | |
| 12 | DES MOINES 01 | | | ○ | | ○ | ● |
| 13 | NEWPORT 01 | | | ○ | | ○ | ● |
| 14 | NEW YORK 01 | | | ○ | | ○ | ● |
| 15 | TORONTO 01 | | | ○ | | ○ | ● |
| 16 | CINCINNATI 01/02 | | | ○ | | ○ | ● |
| 17 | EAST HAMPTON 01 | | | ○ | | ○ | ● |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

● Climate Zone of Design
○ Climate Zone for which Design may be modified
■ See Climate Zone descriptions

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- Products
- Services

## HOME DESIGNS

### PORTFOLIO

Tucson 01

Charleston 01

Jacksonville 01

Jacksonville 02

Sacramento 01

New Orleans 01

Tahoe 01

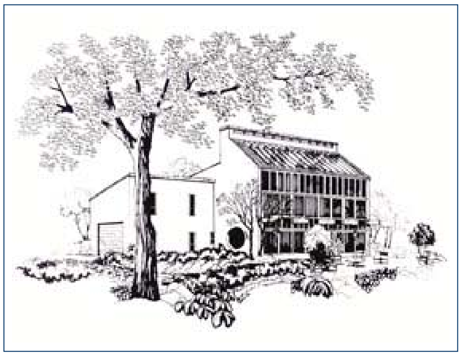
Tahoe 02

Aspen 01

Atlanta 01

Raleigh 01

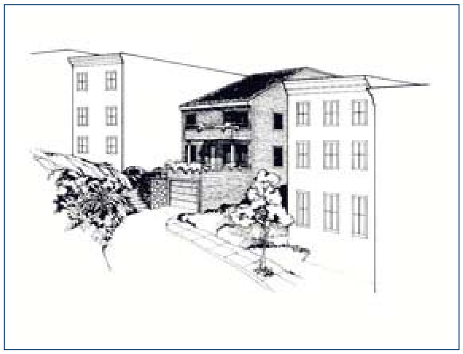
Charlotte 01



Los Altos 01

San Francisco 01

Half Moon Bay 01



Redwood City 01

Des Moines 01

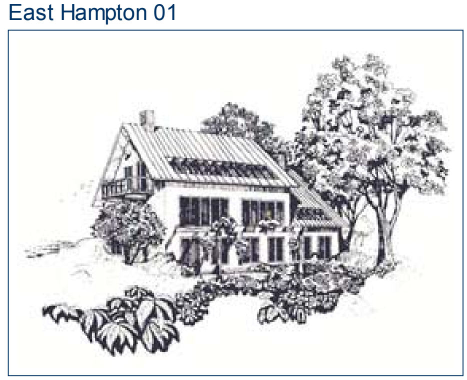
Newport 01

New York 01

Toronto 01

Cincinnati 01/02

East Hampton 01



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# TUCSON 01

| 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|
| ● | | | | | |

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## TUCSON 01

SITE

The site is a gently rolling, high desert plateau 4,800 feet above sea level. Overlooking a narrow valley to the south, it is framed by the Santa Rita Mountains to the north and the Patagonia Mountains to the south.

CLIMATE

Characterized as semi-arid continental, climatic features include low relative humidity, abundant sunshine, light rainfall, moderate winds and a broad range of diurnal and seasonal temperatures.

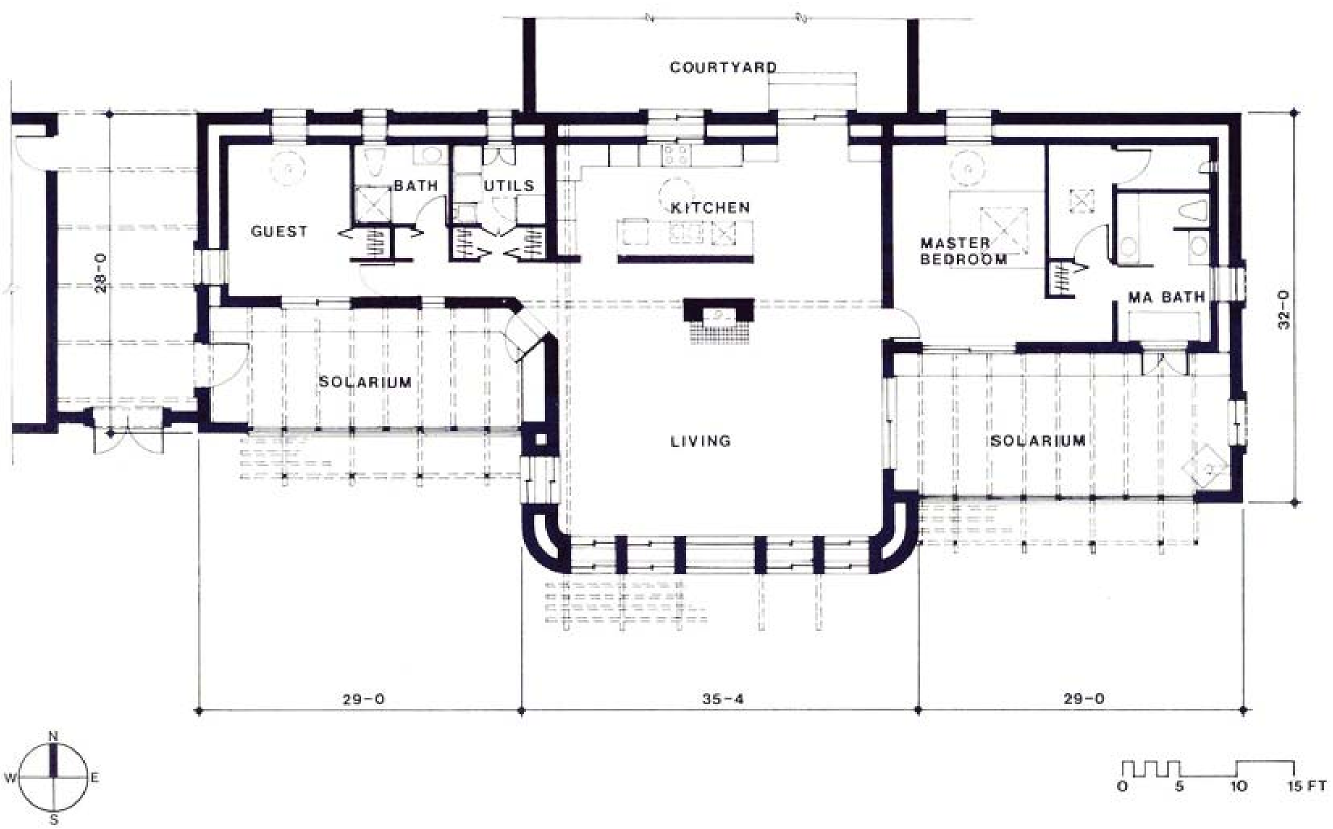
• Winter: cool to warm days and cold nights, short overcast periods, temperatures ranging between the low 70's and high 20's

• Summer: hot days and cool nights, temperatures ranging between the 90's and 50's

DESIGN

This contemporary retirement home reflects a native style of this southwestern region. Adobe brick, an indigenous, low technology material is used throughout the house. The combined effect of the adobe mass and the double envelope design is the absorption of extreme diurnal temperature variations. Ventilation and cooling are effected by three underground, preconditioning tubes, and several interior ceiling fans

| | | |
|---|---|---|
| 2032 | 1072 | 3104 |




# TUSCON 01

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# CHARLESTON 01

| 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|
| ○ | ● | | | | |

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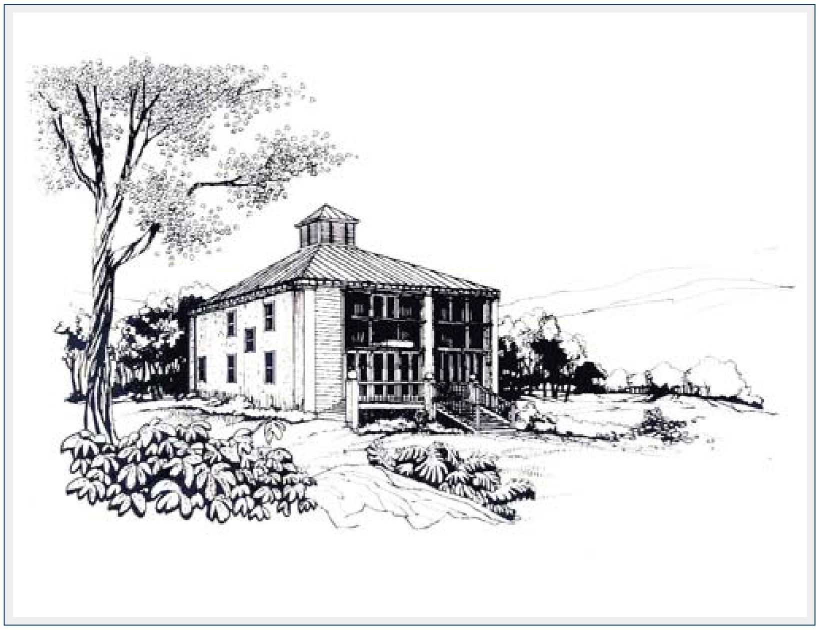


Submit Query

## CHARLESTON 01

SITE

The site is flat, near the Atlantic Ocean, and 7 feet above sea level. The soil is sandy and a high water table is present year round. Moss covered oaks dominates the site and a marsh and nearby bay are visual features to the southwest.

CLIMATE

Extreme seasonal temperatures of the region are modified due to the proximity of the ocean and coastal breezes. Throughout the year, relative humidity in the early mornings is often 80 to 90% and rarely drops below 50% by late afternoons. Rainfall is frequent and particularly heavy during summer thunderstorms.

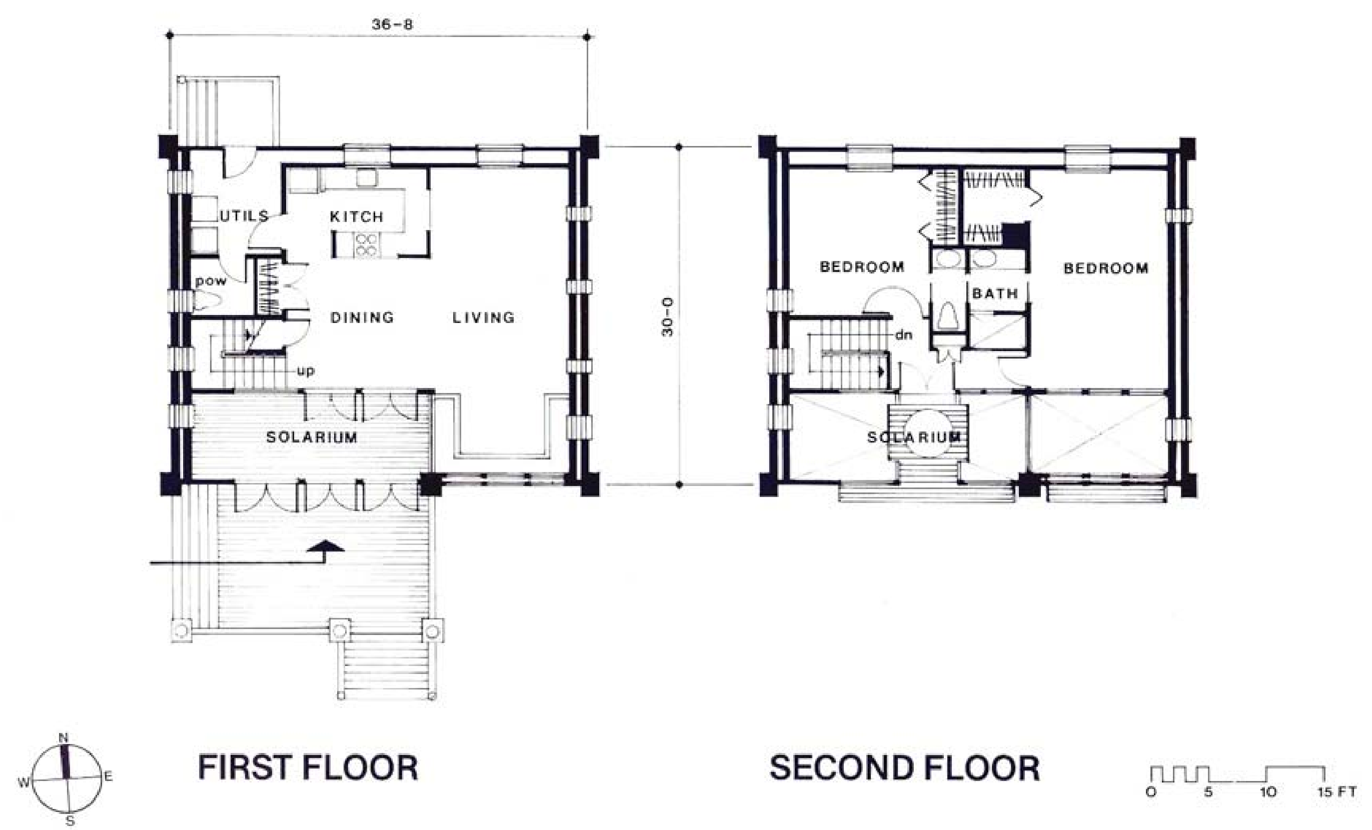
• Winter: consistently cool, rarely below freezing

• Summer: long, hot and muggy

DESIGN

This house is a compact, efficient design reflecting a character of traditional "Charleston" architecture. Interior floor area is maximized. Only a portion of the south active air envelope is expanded to provide a main entry / solarium and a visual focus for the living and dining areas. The high humidity and summer temperatures require complete east and west cooling walls and variable internal ventilation. Ceiling fans are used to aid air movement. The hipped roof and cupola vent are also significant features of the ventilation system. A local building regulation required raising the first floor 3 feet above ground level. This requirement coupled with the high water table restricting excavation made it practically necessary to berm around the base of the house to reduce exterior surface area above grade and maximize the geothermal effect of the earth below the house.

| | | |
|---|---|---|
| 1433 | 220 | 1653 |




# CHARLESTON 01

Submit Query

# JACKSONVILLE 01

| 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|
| ○ | ● | | | | |

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## JACKSONVILLE 01

SITE

The site is flat, near sea level with sandy soil and high water table conditions. Ground vegetation is dense; oak, palm and other deciduous trees cover the site. A nearby swamp highlights the natural surroundings.

CLIMATE

Seasonal extremes of the region are slightly modified due to the proximity of the Atlantic Ocean. Average relative humidity is 75%. The greatest rainfall, mostly local thunderstorms, occurs in the summer one out of every two days. During this period the sky is predominantly partly cloudy to cloudy.

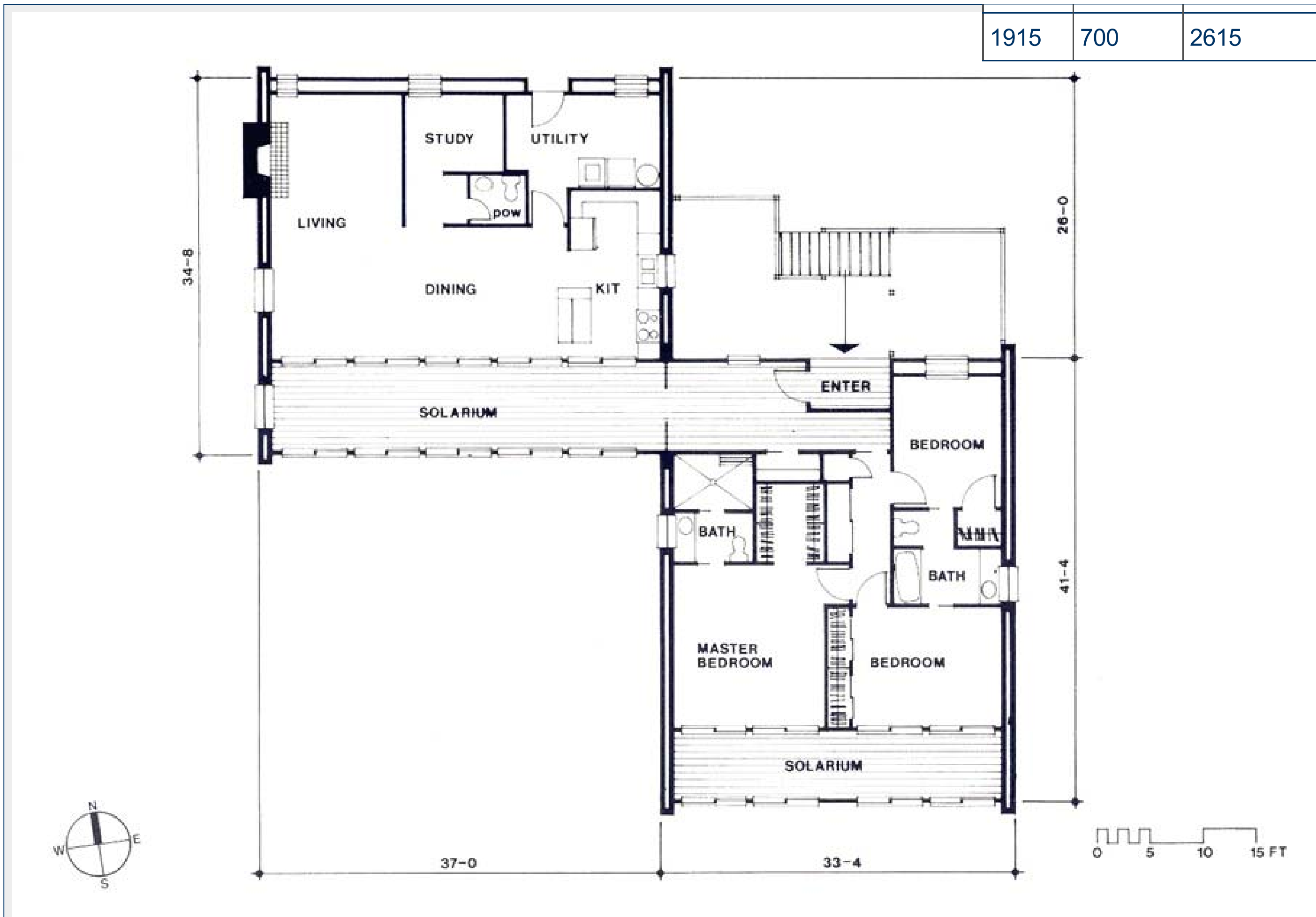
• Winter: occasional cool and cold air from the north, temperatures average near 55° F

• Summer: long, warm and relatively humid, temperatures average near 80° F

DESIGN

This house was the original design of the two Jacksonville houses for a family of 4, including 2 children. Programming criteria called for sight and breeze lines to connect with the external environment similar to a Japanese house, and separation of activity / living and bedroom areas into two basic single story building modules using the envelope spaces for circulation and connection of the two modules. As in other designs for humid climates, east and west cooling walls and an underground preconditioning system are required. This design maximizes east /west surface areas in relation to interior volume. The same roof-ceiling structure as in Jacksonville 02 is used in this

| | | |
|---|---|---|
| 1915 | 700 | 2615 |




# JACKSONVILLE 01

Submit Query

# JACKSONVILLE 02

| 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|
| ○ | ● | | | | |

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## JACKSONVILLE 02

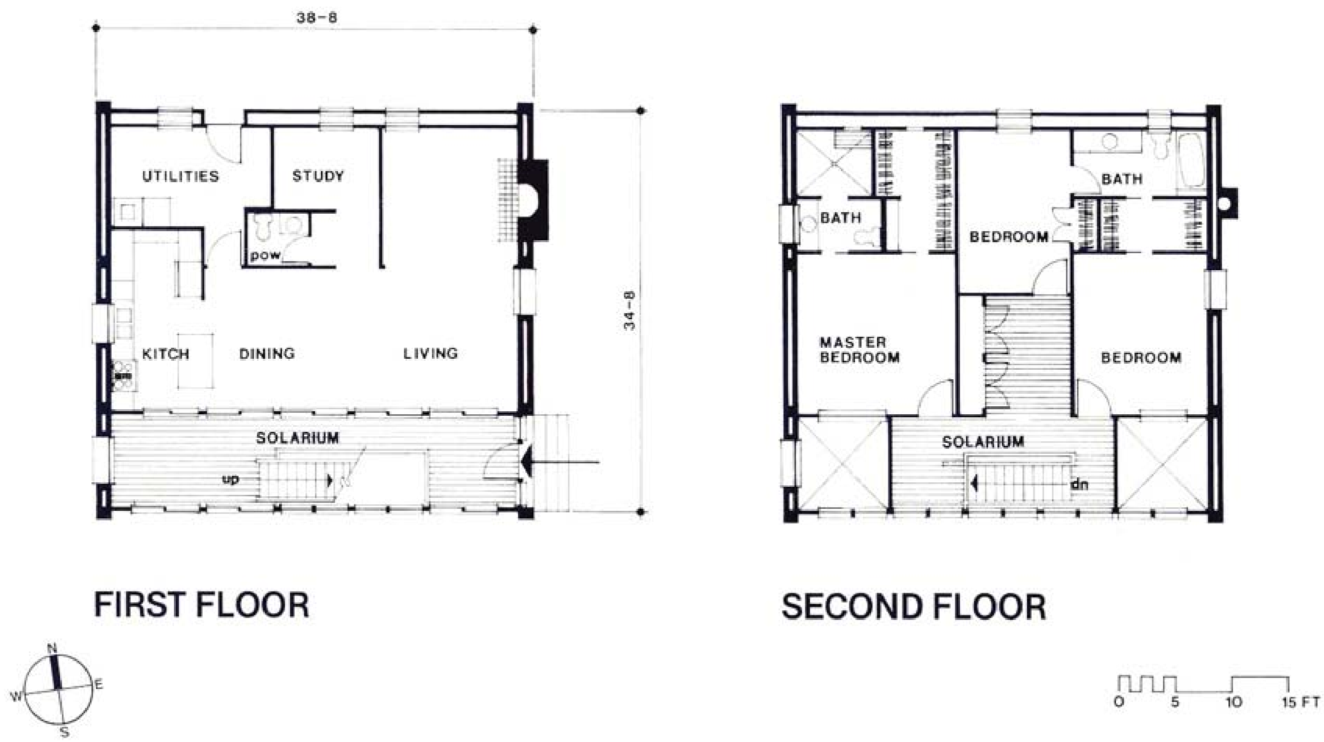
SITE AND CLIMATE

See Jacksonville 01

DESIGN

This house is an alternate design of Jacksonville 01. In evaluating the two designs, cost is a basic consideration. As much as 20% reduction in building cost can be realized in a two story house over a one story house of the same size due to the difference in foundation work, wall and roof areas. In this case, interior floor area requirements remained the same while circulation area was reduced, effecting a net reduction in total square footage and additional cost savings. Note the integrated functions of the front entry and stairs in the solarium. Roof trusses designed for this house provide a combination of flat and pitched ceilings and an interesting variety of room volumes.

| | | |
|---|---|---|
| 1930 | 437 | 2367 |




# JACKSONVILLE 02

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# SACRAMENTO 01



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## SACRAMENTO 01

Construction Documents for this Design are not currently available. Contact Ekose'a Homes about architectural services related to this Design.

SITE

The site is on a north-facing slope in a grove of oak trees approximately 200 feet above sea level.

CLIMATE

Solar radiation is consistently 60% except in December and January when tulle fog cuts it down to 45% to 50%. Rainfall is predominantly in winter; summer rains are rare.

• Winter: moderately cool, minimum temperatures range between 35° and 45° F, maximum temperatures range between 50° and 60° F

• Summer: hot and dry, maximum temperatures range between 80° and 100° F, night temperatures drop to 55° to 65° F

DESIGN

This house was designed for a married couple without children who wanted an unobtrusive, inconspicuous house, which complemented the site. Programming needs included an open floor plan downstairs for entertaining guests with some separation of the kitchen; single private rooms for husband and wife, also to serve as guest bedrooms; and open views to the north. Because of mild California winter conditions, large areas of north glass can be accommodated and a greater freedom of room arrangements is permitted. A masonry cooling wall on the west and an underground preconditioning system are specified to moderate the summer heat. Many north and south openings take advantage of direct outside ventilation for nighttime cooling.

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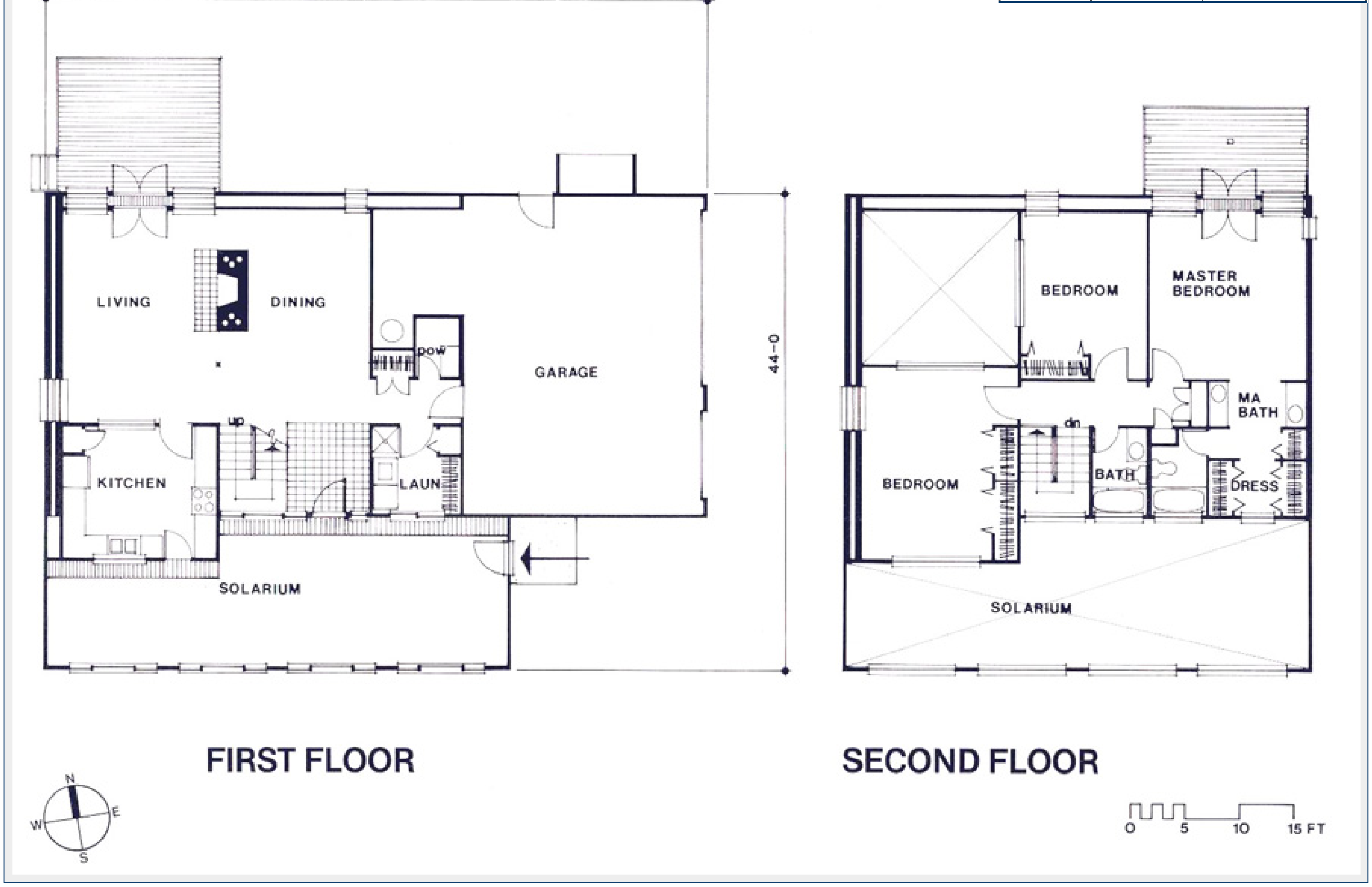
|---|---|---|
| 2445 | 531 | 2976 |




# SACRAMENTO 01

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# NEW ORLEANS 01

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## NEW ORLEANS 01

SITE

The site is flat to gently rolling, grassy with scattered medium tall oaks, and is near sea level.

CLIMATE

This Gulf Coast climate is damp with good solar insolation. Humidity is consistently high year round with average relative humidity between 80 and 95% in the morning and rarely below 60% in the afternoon. The area is subject to frequent and heavy rains and high winds.

• Winter: very mild, temperatures average between the mid to high 40's and mid to high 60's

• Summer: long, hot and muggy, temperatures average between 70˚ and 90˚ F

DESIGN

This spacious house was designed for a family of 4 and accommodates a variety of recreational activities. The simple shed form of the structure provides tall, airy volumes that are needed to effect comfort in this humid climate. Specifications include cooling walls for east and west exposures and interior ceiling fans to aid air movement.

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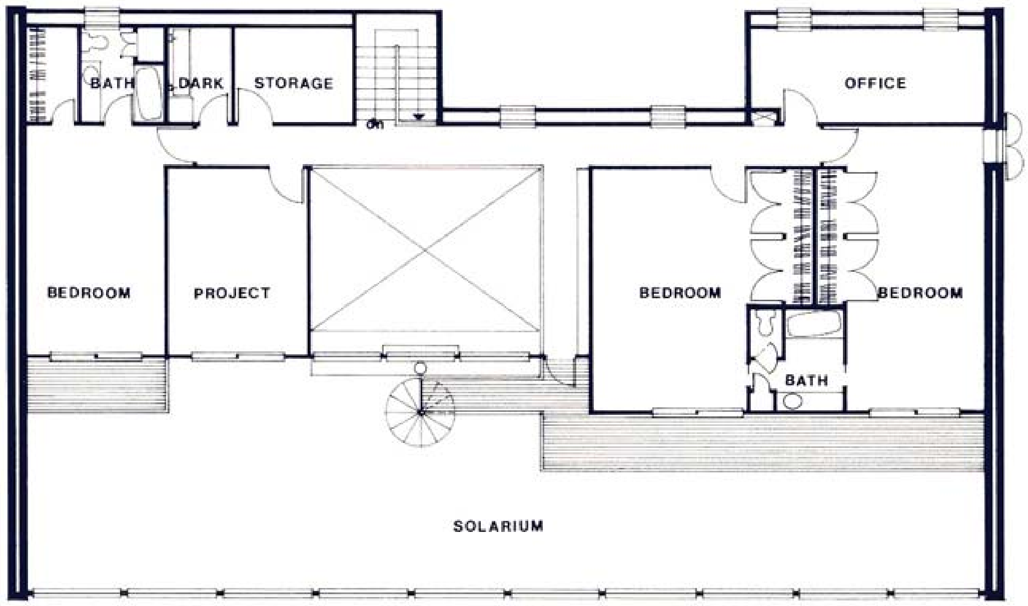
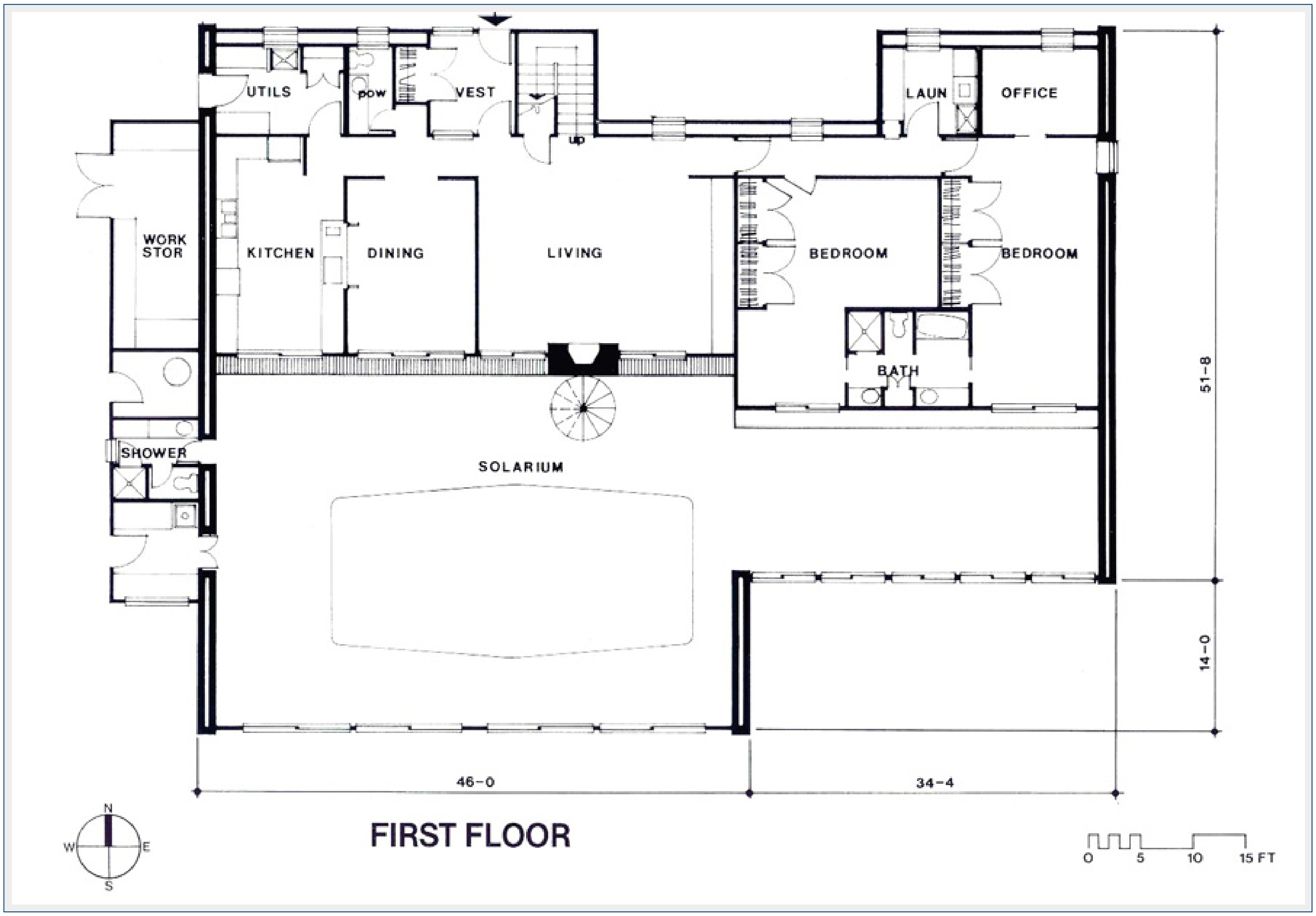
| 5014 | 2648 | 7662 |




SECOND FLOOR




# NEW ORLEANS 01

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# TAHOE 01

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## TAHOE 01

SITE

On a west face of the Sierra Mountains surrounding lake Tahoe, approximately 7,000 feet above sea level, the site affords a spectacular distant view to the south and west. Pine and fir trees populate this mountainous region.

CLIMATE

Alpine in character, the climate is cool to cold with very good solar insolation. Precipitation is predominantly in the form of winter snow which may average 20 inches per month and cover the ground 6 to 8 months. Winter storms tend to be short, and extended periods of overcast skies are rare.

• Winter: temperatures average between 18° and 40° F with occasional drops below zero in the early a.m.

• Summer: temperatures average between 40° and 80° F

DESIGN

This compact plan is suitable as either a vacation home or a year round home for a small family. The original prototype of this design was the first completed home representative of the current state of the art in double envelope design. A particularly important consideration and controlling design factor in this region is the structural requirement for supporting heavy cumulative snow loads on the roof. This design features pitched ceilings on the second floor parallel with north and south rooflines.

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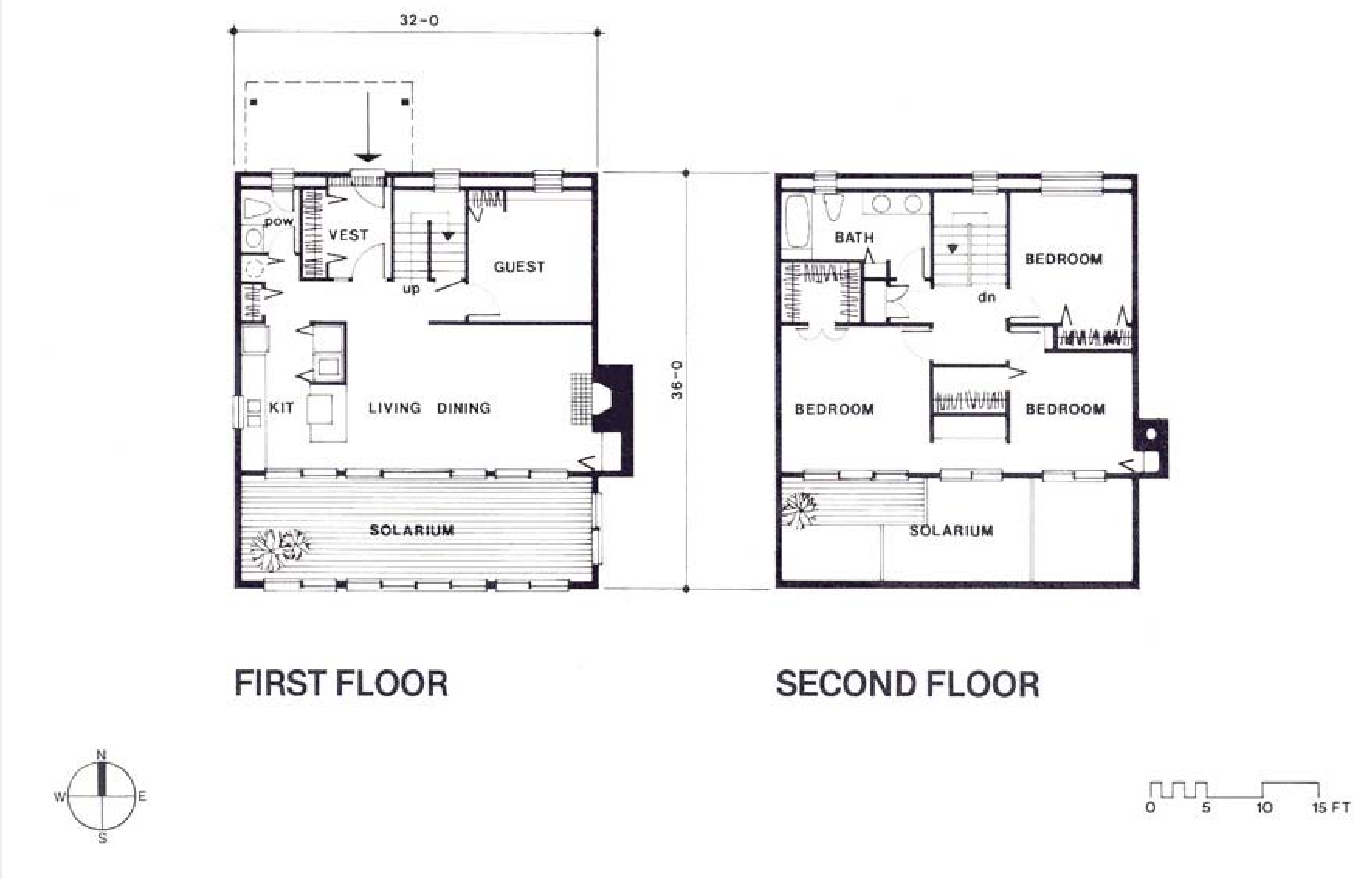
| 1580 | 378 | 1958 |




# TAHOE 01

Submit Query

3



# TAHOE 02

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## TAHOE 02

SITE

The site is located on a steep, south-facing slope at the north end of the Lake Tahoe basin approximately 7,200 feet above sea level. The most significant feature of the site is a "postcard perfect" full southern view of the lake and surrounding mountains. Street access is from above, adjoining the north end of the site.

CLIMATE

See Tahoe 01

DESIGN

This house was designed for a young family of 4 including 2 children. Their program called for a maximum range of southern view - from major interior spaces of the house, maximum utilization of the solarium for living and recreation, extensive use of wood finishes, and particular consideration for the problems associated with winter conditions of the region. The house is cut into the site providing adequate thermal mass of the earth and full southern exposure for each level. Large structural framing members required to support heavy snow loads of this region are visually predominant in the solarium. The location of stairs in the solarium conserves interior floor area and heightens the integration of activity between the solarium and adjacent interior spaces. Giving rise to spiritual feelings, the exterior projection of the upper solarium deck elevates you to treetop level and extends your senses into this awesome, natural wonderland. Other design features include pitched ceilings parallel with rooflines and a stepped, covered walkway leading from the garage to the entry deck

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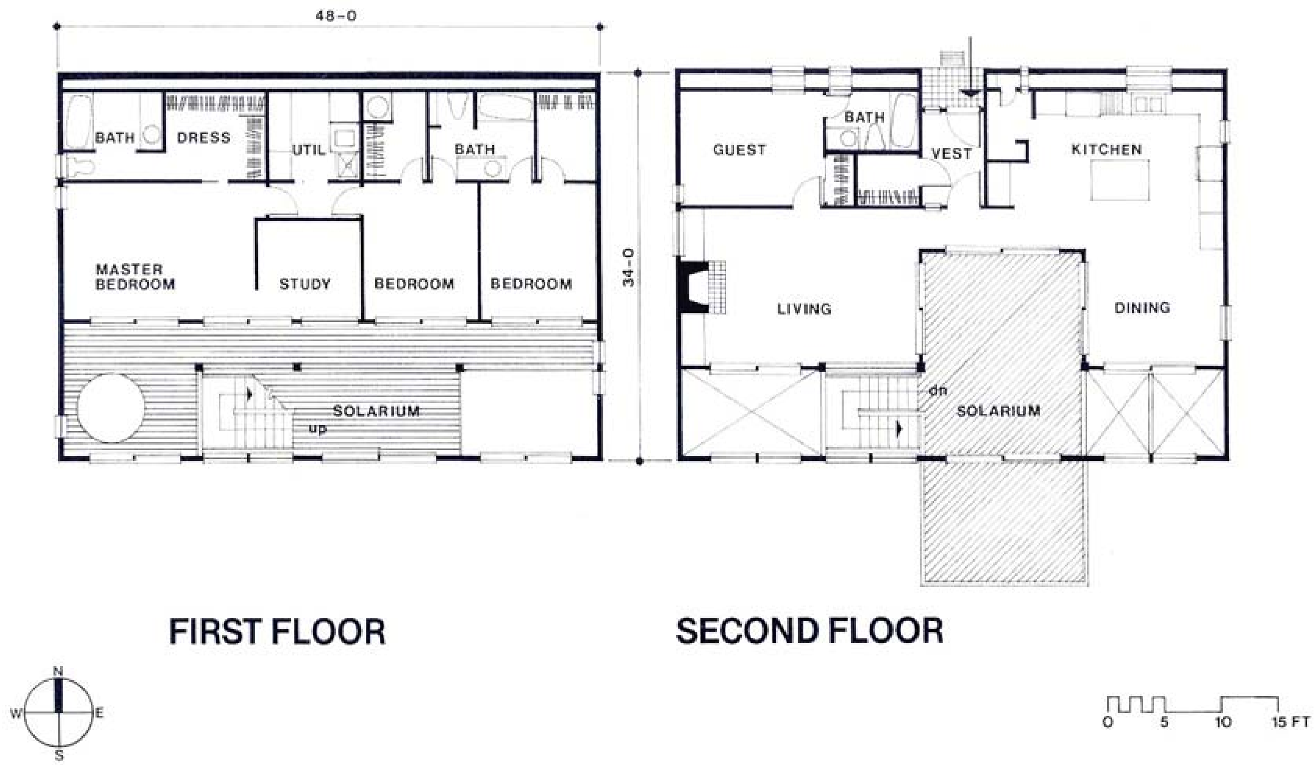
| 2176 | 744 | 2920 |




# TAHOE 02

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# ASPEN 01

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## ASPEN 01

Construction Documents for this Design are not currently available. Contact Ekose'a Homes about architectural services related to this Design.

SITE

Near a small lake nestled in the Rocky Mountains, the site is relatively flat and otherwise typical of this alpine region.

CLIMATE

See Tahoe 01

DESIGN

This house was a speculative duplex project for two small families in this winter resort area. The first floor is partially below grade to reduce exterior surface area above grade and to provide additional earth mass in contact with the active air envelope. Each unit design is the same; and, by modifying construction of the party walls, either unit can be built separately. However, the cost per unit in this case will be greater due to additional foundation, framing, insulation, and finish work. The units can also be worked into multi-unit groupings for a larger development project.

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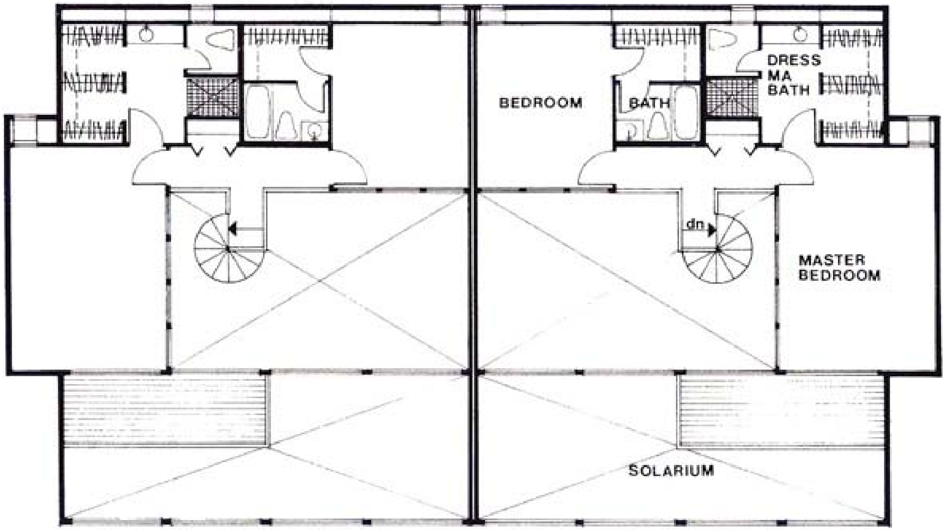
| 1908 | 661 | 2569 |

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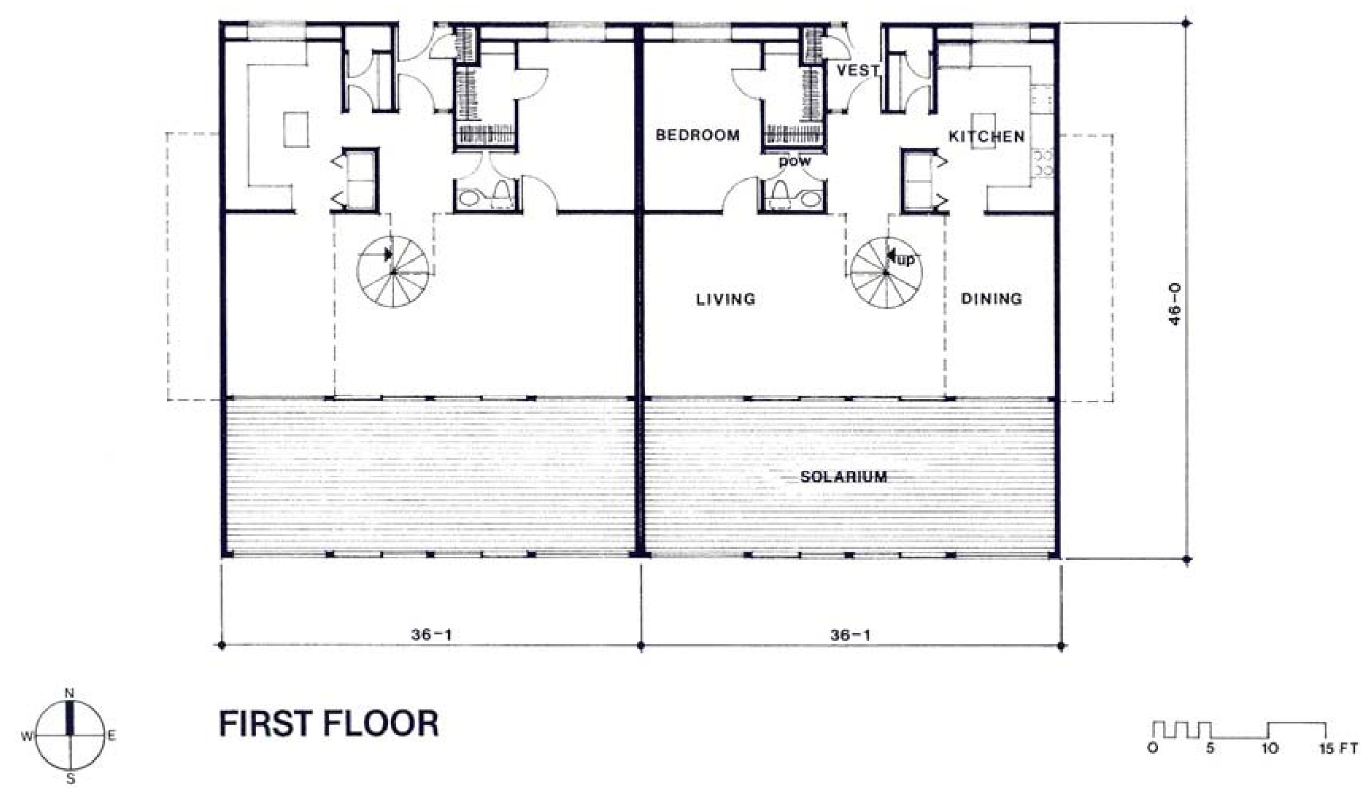
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# ASPEN 01

# ATLANTA 01

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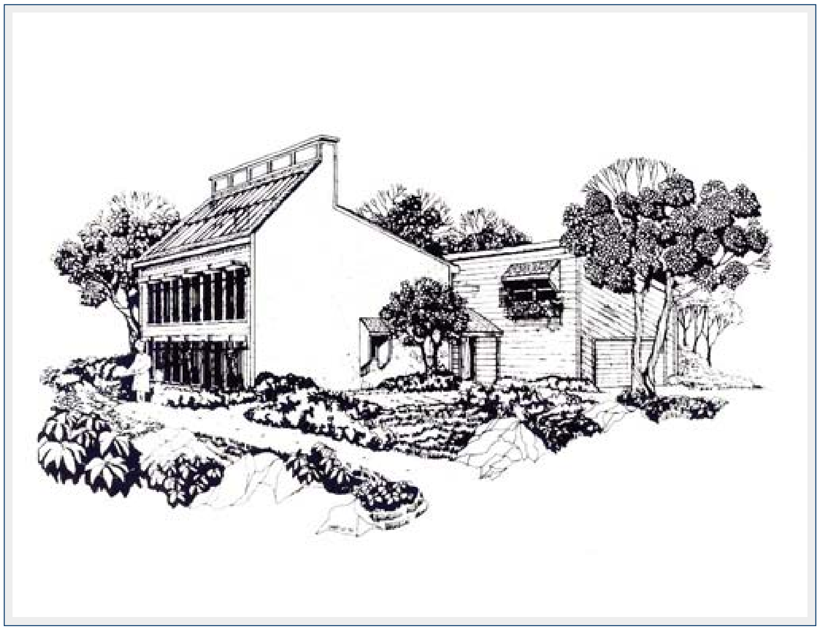

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## ATLANTA 01

SITE

The site is located at the north end of a small plateau in the Appalachian foothills, approximately 1,000 feet above sea level. Tall, deciduous trees densely populate the site. The soil is Georgia red clay that exhibits poor drainage characteristics.

CLIMATE

The proximity of the Gulf of Mexico and the Atlantic Ocean has a significant influence on the climate of this area. Mountains to the north retard polar air masses. Rainfall is abundant. Spring thunderstorms are frequent, and freezing rain and ice storms occur about every other year.

• Winter: cool, temperatures average between the high 30's and low 50's, cold spells are short-lived but not unusual

• Summer: warm to hot and humid, temperatures moderated by elevation average between the high 60's and high 80's, prolonged periods of hot weather are rare

DESIGN

This simple, compact house was designed for a young, expanding family of 3. Floor levels below grade are not necessary in this climate; however, efficient space planning is required to minimize the ratio of exterior surface area to interior volume. The solarium is a key factor in this regard as it may serve multi-functional purposes. The front entry of this design is an example. Other features typical of some other designs include layout of the utility room, bathrooms, and closets on the north to help buffer interior living spaces and to allow greater access to an abundance of natural light and other amenities of the solarium. Prefabricated wood roof trusses, commonly specified, are called out for their cost advantage.

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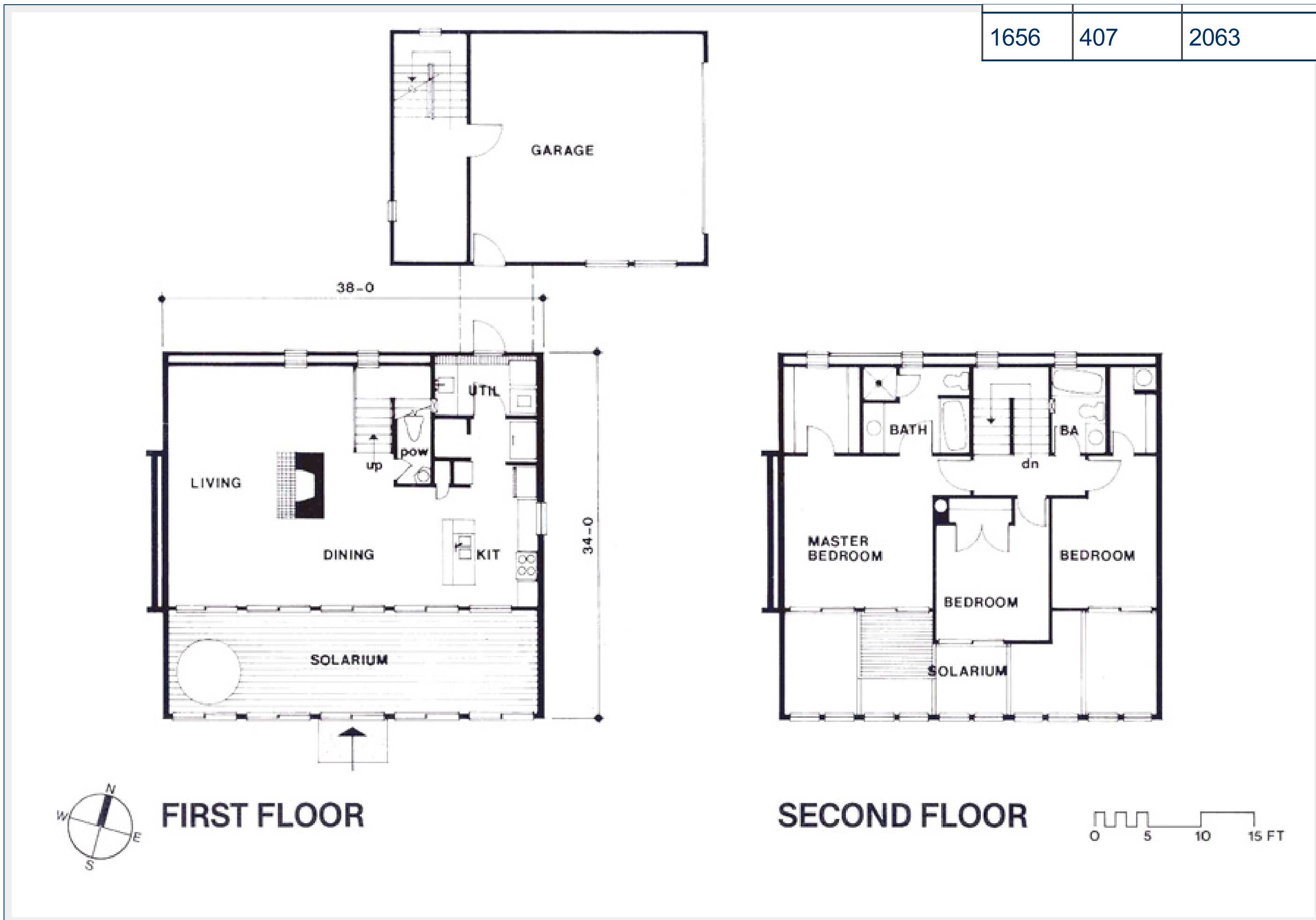
| 1656 | 407 | 2063 |




# ATLANTA 01

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# RALEIGH 01

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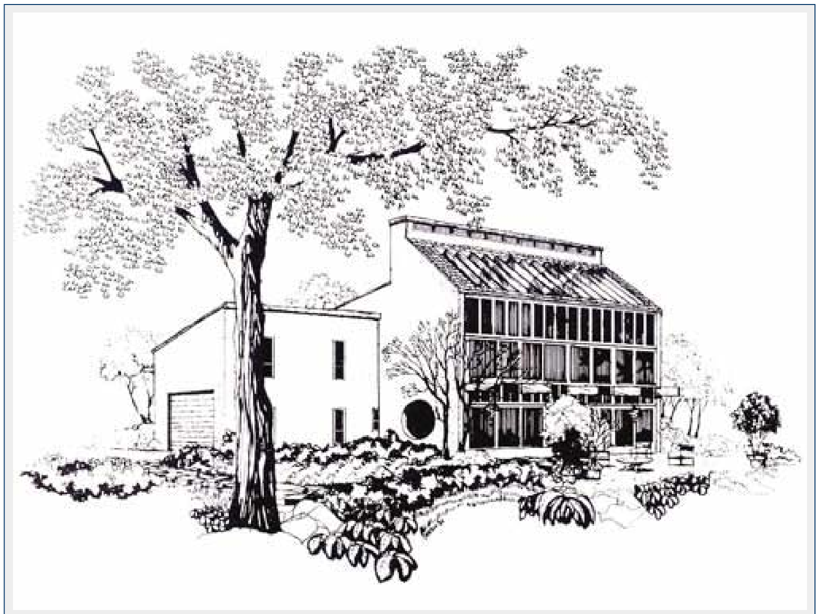

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## RALEIGH 01

SITE

The site is rural and densely populated with a variety of mature hardwoods. It slopes gently downhill from south to north and rests about 400 feet above sea level.

CLIMATE

Centrally located between mountains to the west, which buffer cold air masses from the central U.S. and the ocean to the east, this region experiences favorable climate. Rainfall is the greatest in July, the least in November, and otherwise is distributed throughout the year. Winter snowfall is light.

• Winter: temperatures average between 30˚ F and the low 50's and seldom drop below 20˚ F

• Summer: tropical air brings warm temperatures and relatively high humidity, afternoon temperatures reach 90˚ F 25% of the time but rarely exceed 100˚ F, average temperatures range between the high 60's and high 80's

DESIGN

This house was designed for a family of 4 including 2 children. Particular design features include 9-foot ceilings on the first floor, and a pitched ceiling and loft spaces in the bedrooms on the second floor. Summer cooling, a major consideration in this climate, is effected by underground pre-conditioning tubes. Perhaps the most often repeated statement about this house comes from the owner who proclaims, "Of all the Ekose'a designs, mine is the best."

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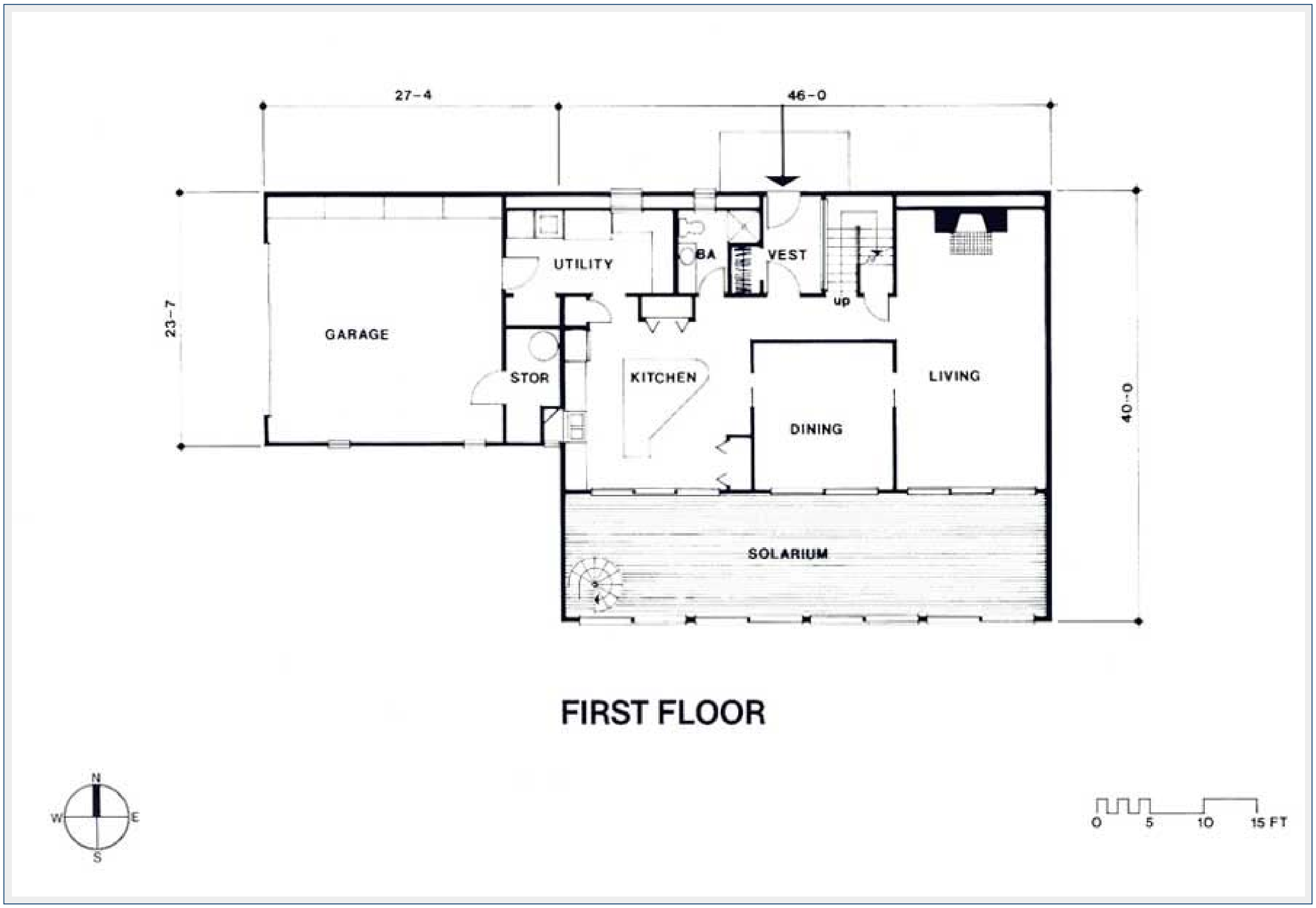
| 2771 | 742 | 3513 |


SECOND FLOOR




# RALEIGH 01

Submit Query

# CHARLOTTE 01

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## CHARLOTTE 01

SITE

The site is rural and densely populated with a variety of mature hardwoods. It slopes gently downhill from south to north and rests about 400 feet above sea level.

CLIMATE

Centrally located between mountains to the west, which buffer cold air masses from the central U.S. and the ocean to the east, this region experiences favorable climate. Rainfall is the greatest in July, the least in November, and otherwise is distributed throughout the year. Winter snowfall is light.

• Winter: temperatures average between 30° F and the low 50's and seldom drop below 20° F

• Summer: tropical air brings warm temperatures and relatively high humidity, afternoon temperatures reach 90° F 25% of the time but rarely exceed 100° F, average temperatures range between the high 60's and high 80's

DESIGN

This house was designed for a family of 4 including 2 children. Particular design features include 9-foot ceilings on the first floor, and a pitched ceiling and loft spaces in the bedrooms on the second floor. Summer cooling, a major consideration in this climate, is effected by underground pre-conditioning tubes. Perhaps the most often repeated statement about this house comes from the owner who proclaims, "Of all the Ekose'a designs, mine is the best."

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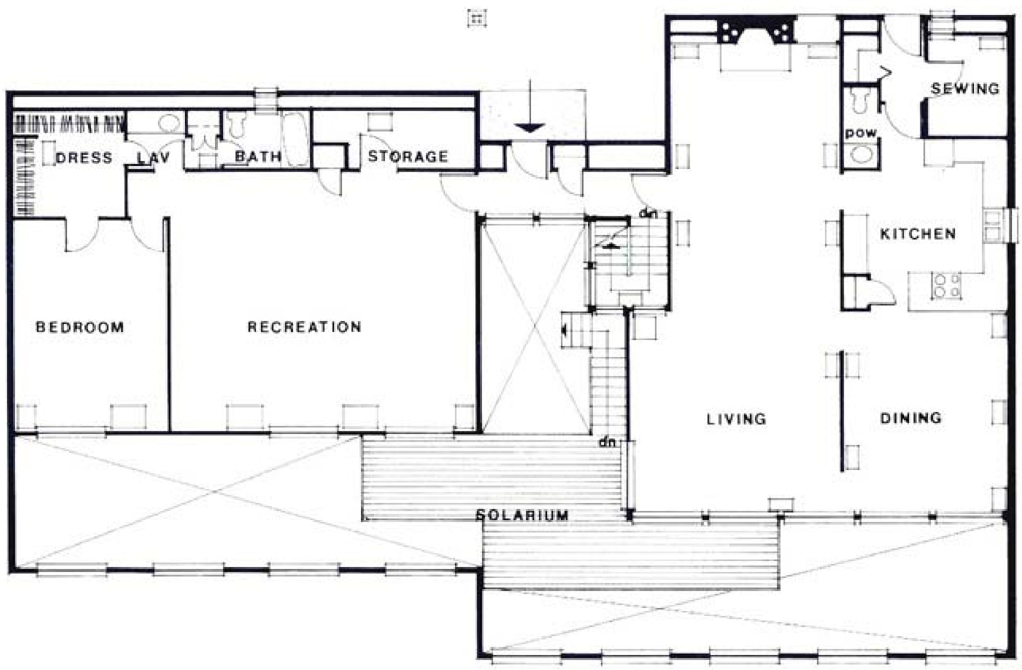
|---|---|---|
| 5356 | 2490 | 7846 |

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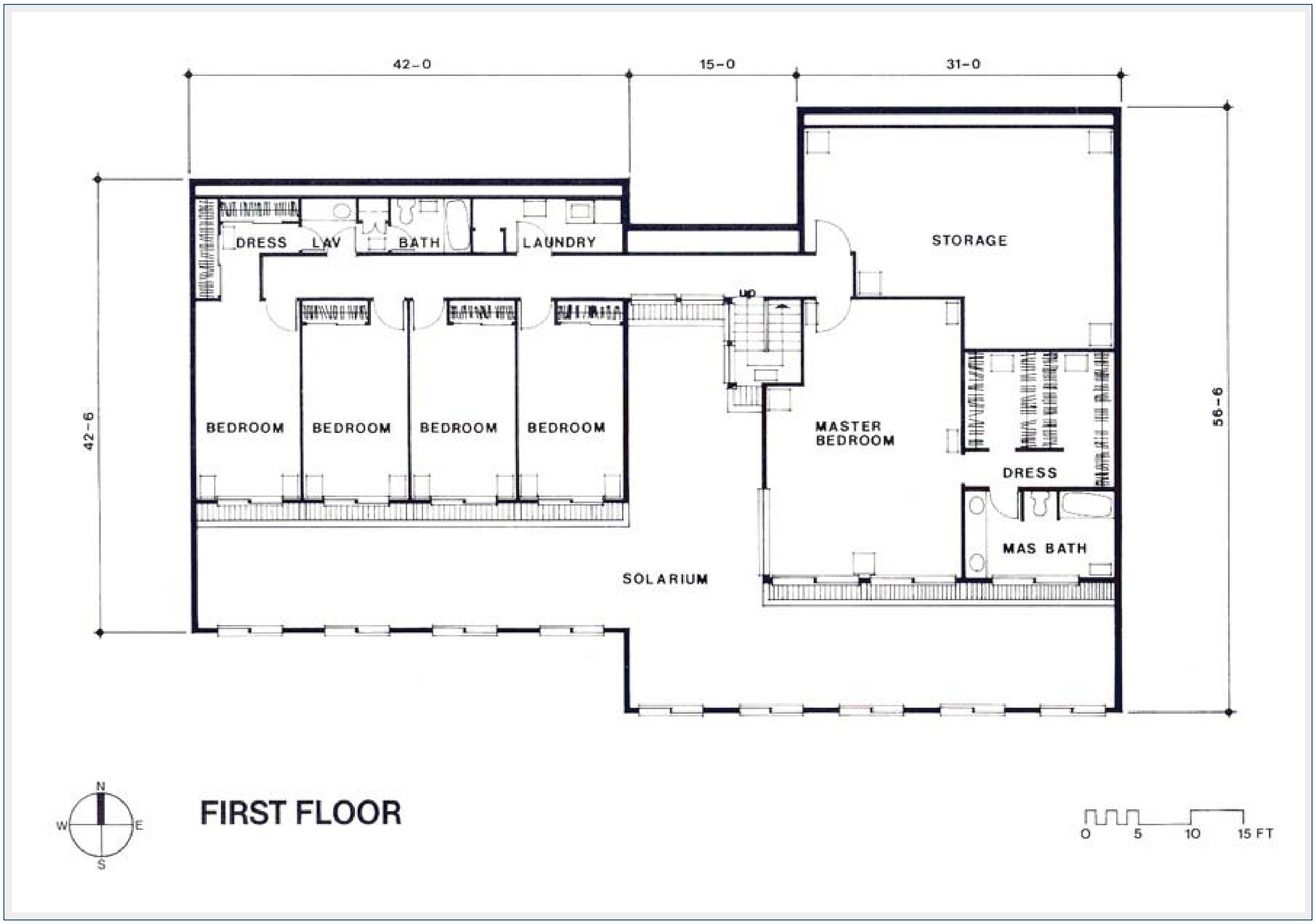


# CHARLOTTE 01

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# LOS ALTOS 01



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## LOS ALTOS 01

SITE

The site is small and flat in a fully developed residential section of Los Altos. The soil is sandy and a variety of fruit and other deciduous trees are scattered about the site.

CLIMATE

The moderating effect of the Pacific Ocean produces a mild climate in this region. Buffered by coastal mountains, the range of daily and seasonal temperatures is greater than in San Francisco 30 miles north. However, this area is also subject to low, coastal stratus clouds and is similarly characterized by dry and wet seasons. Sunshine is abundant.

• Winter: mild, temperatures average between the 40’s and 60’s

• Summer: warm, temperatures average between the 60’s and 80’s

DESIGN

The house was designed for a young professional couple. The style – single story, stucco, and hipped roof with cedar shakes – is typical of homes in this area. However, the interior is quite the contrary. The sense of “a house within a house” is visually evident. Almost half the square footage of the house is solarium space with totally wood finishes, full roof glass and operable awning for sun control. Only primary activity areas are isolated interior spaces. Natural light is abundant throughout the house. The mild climate and good solar insolation of the area permits practical use of passive solar / direct gain techniques for heating, less dependence upon earth mass, greater surface to volume ratio, and ultimately greater use of the active air envelope as integrated living space. Drawing outside air through an opening on the north at ground level effects ventilation and exhausting of excessive heat gain.

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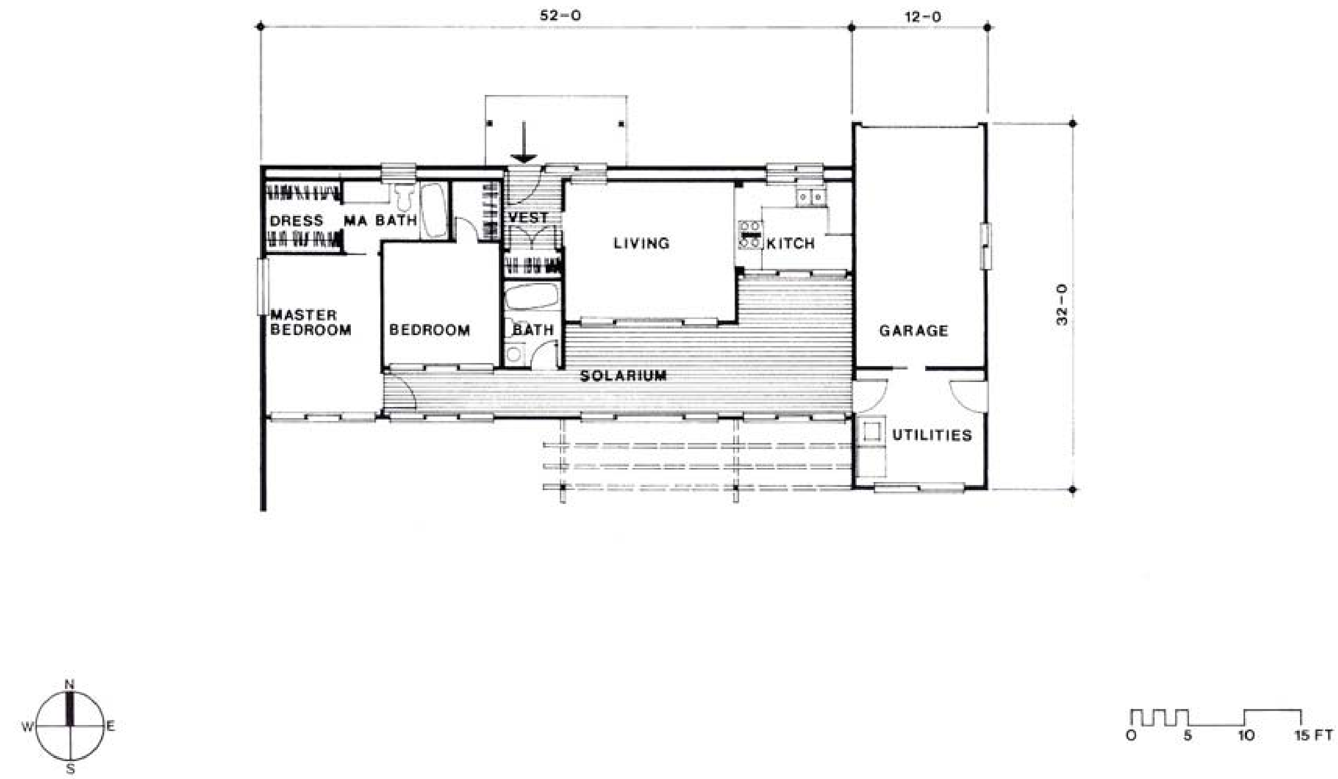
| 772 | 320 | 1092 |




# LOS ALTOS 01

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# SAN FRANCISCO 01



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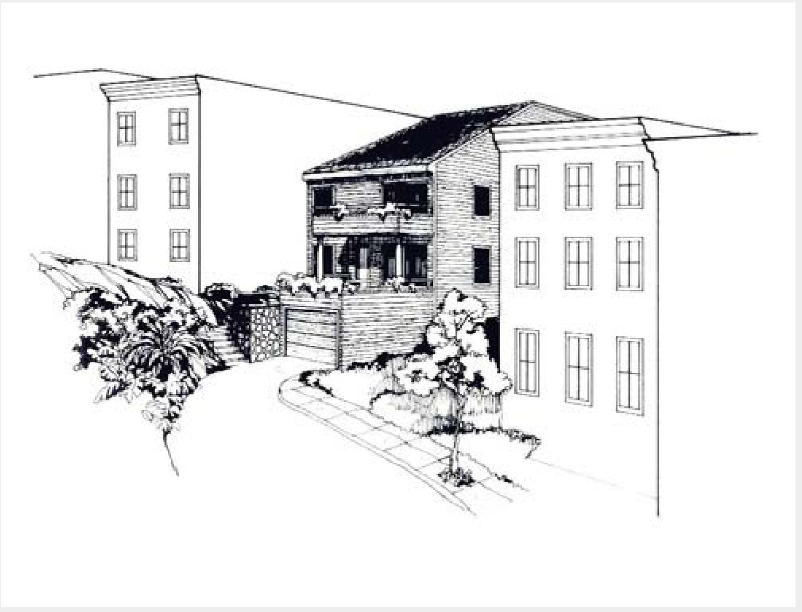

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## SAN FRANCISCO 01

SITE

The steeply sloping site is on the east side of a predominant hill in the city of San Francisco with a background view of the downtown area and a southeast view of the south bay. The 25' x 75' lot with zero side yard setbacks is typical for residential sections of the city.

CLIMATE

The "Golden Gate," surrounding hilly terrain and proximity of the central valley inland create a unique microclimate in the bay area. Westerly winds are brisk and persistent making San Francisco the "naturally air conditioned city." This steady sweep of air from the Pacific causes little change in diurnal and seasonal temperatures. Total variation in annual temperatures is only about 20° F. Fog and low stratus clouds are predominant and a variable influence, particularly during the winter and summer months, causing wide contrasts in climate in short distances. However, the sun shines for varying periods almost everyday. The climate is further characterized by pronounced wet and dry seasons with rainfall almost exclusively during the winter months.

• Winter: mild, temperatures average between the high 40's and mid 50's

• Summer: cool to warm, temperatures average between the mid 50's and high 60's, warmest months in September and October

DESIGN

This urban dwelling projects a traditional character of San Francisco architecture which is highly articulated by a variety of forms and styles with particular attention to finish details. The more horizontal orientation of the roof glass takes advantage of diffuse solar radiation during overcast periods due to the fog and low clouds.

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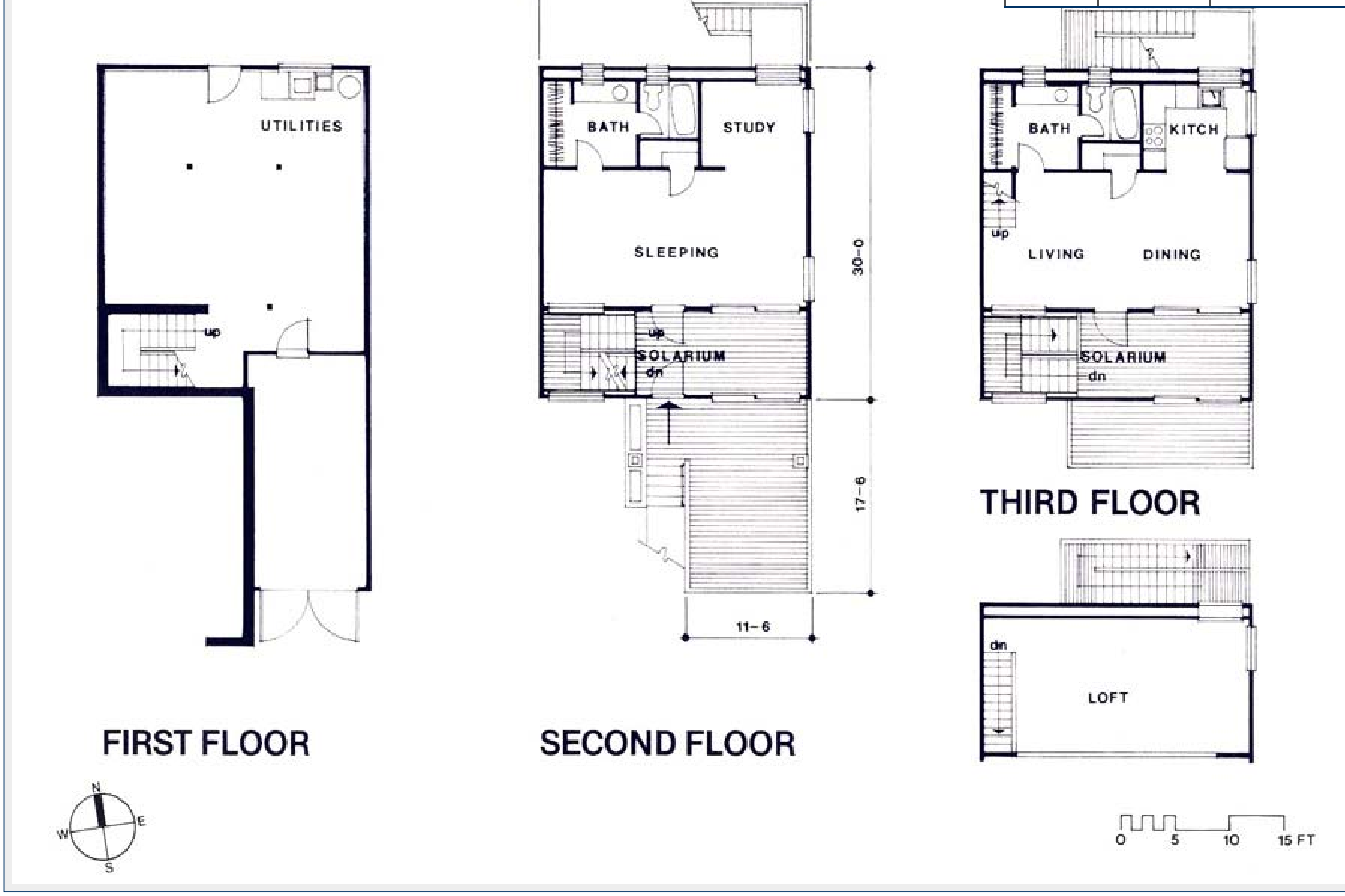
| 1367 | 878 | 2245 |




# SAN FRANCISCO 01

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# HALF MOON BAY 01

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## HALF MOON BAY 01

SITE

Within 100 yards of the Pacific Ocean, the site is small and gently slopes toward the sea.

CLIMATE

The climate along this coastal strip is very similar to that of San Francisco 20 miles north. Rainfall is slightly more and winds are not as brisk, but offer at any time the advantage of natural cross ventilation and cooling. Summer fog is also more persistent, but even then there is often midday clearing.

• Winter: mild

• Summer: cool and foggy

DESIGN

Oriented to the ocean view, the house and major vertical glass areas face northwest. Southern orientation is no advantage in this climate; rather orientation to the sky is the most efficient means of collecting what is predominantly diffuse radiation due to the frequently foggy conditions. Almost all of the roof and ceiling area forming the active air envelope is glass. Operable awning sections between the glass layers control the amount of natural light and direct heat gain to the open, airy space of the second floor. This design also features exposed wood, post and beam framing with steel plate and cross tie connections

| | | |
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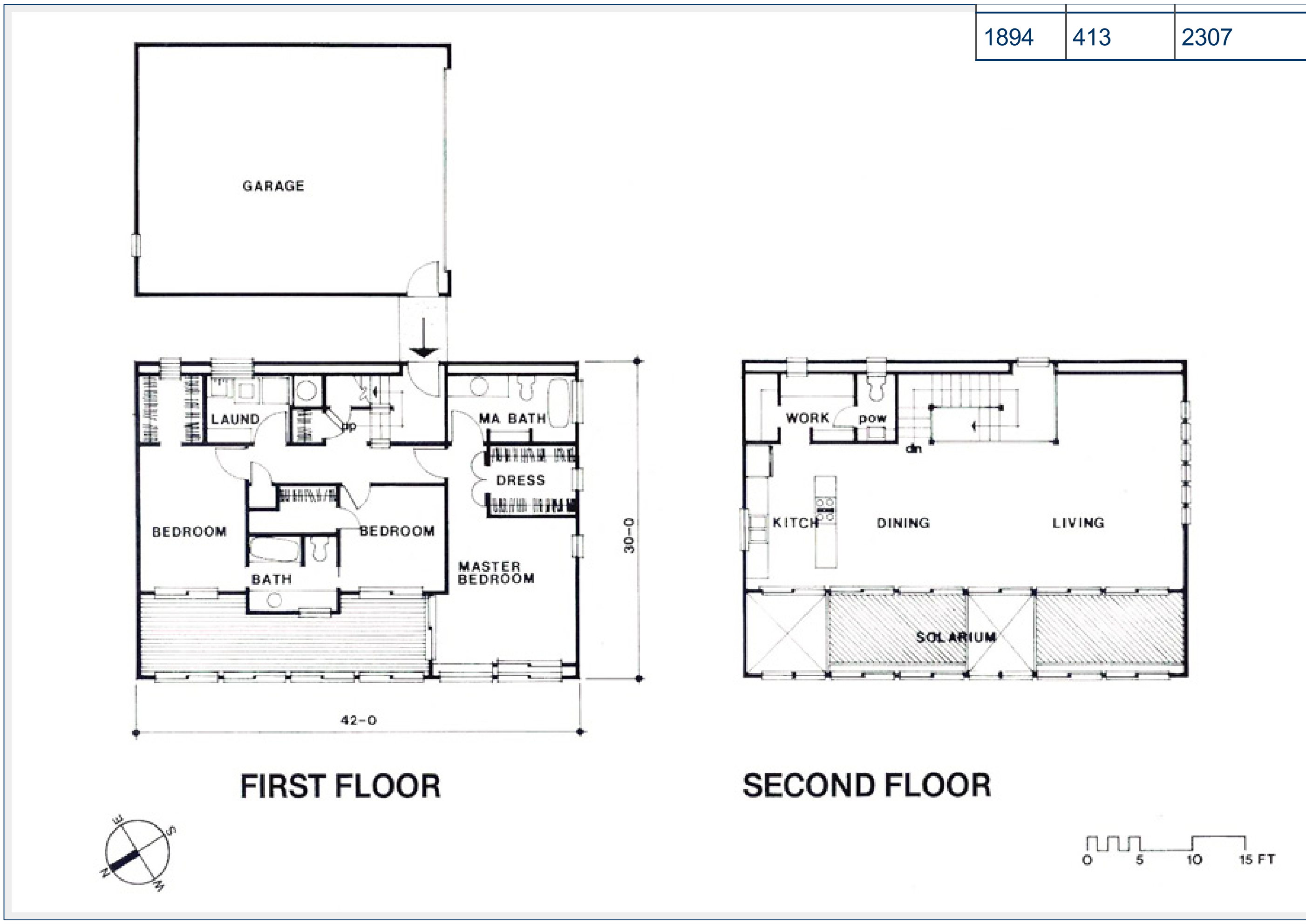
| 1894 | 413 | 2307 |




# HALF MOON BAY 01

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# REDWOOD CITY 01

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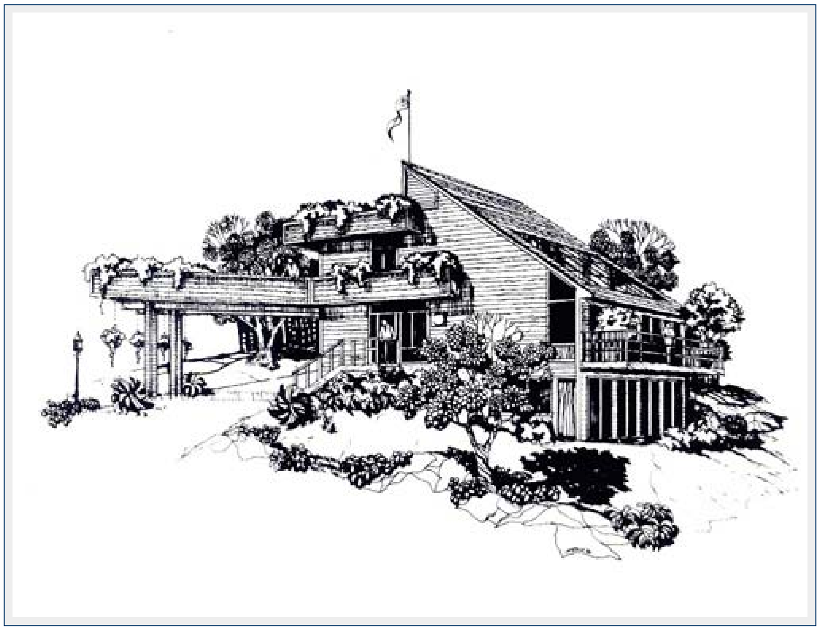

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## REDWOOD CITY 01

SITE

The site is a steep, south-facing slope at the top of a ridge, nearly 500 feet above sea level. The primary feature of the site is a commanding view of the surrounding region.

CLIMATE

See Los Altos

DESIGN

This house is a retirement home with potential for accommodating a young, growing family. With the proximity of the San Andreas Fault, 50 miles west, the house is heavily structured to resist earthquake forces. Exterior decks and balconies take advantage of the year round potential for outdoor activities and the panoramic views afforded by the site. Self- sufficiency is a major theme of this house which utilizes the ground level of the solarium for food production and other gardening, recycled gray water for supporting plant life, solar heated water and a clivus multrum composting toilet. The earth mass associated with this design is more than adequate for stabilizing the effect of outside temperature variations. Cooling is also effected by drawing outside air low into the active air envelope, across the earth floor of the crawl space, and up through the solarium to exhaust excessive heat gain.

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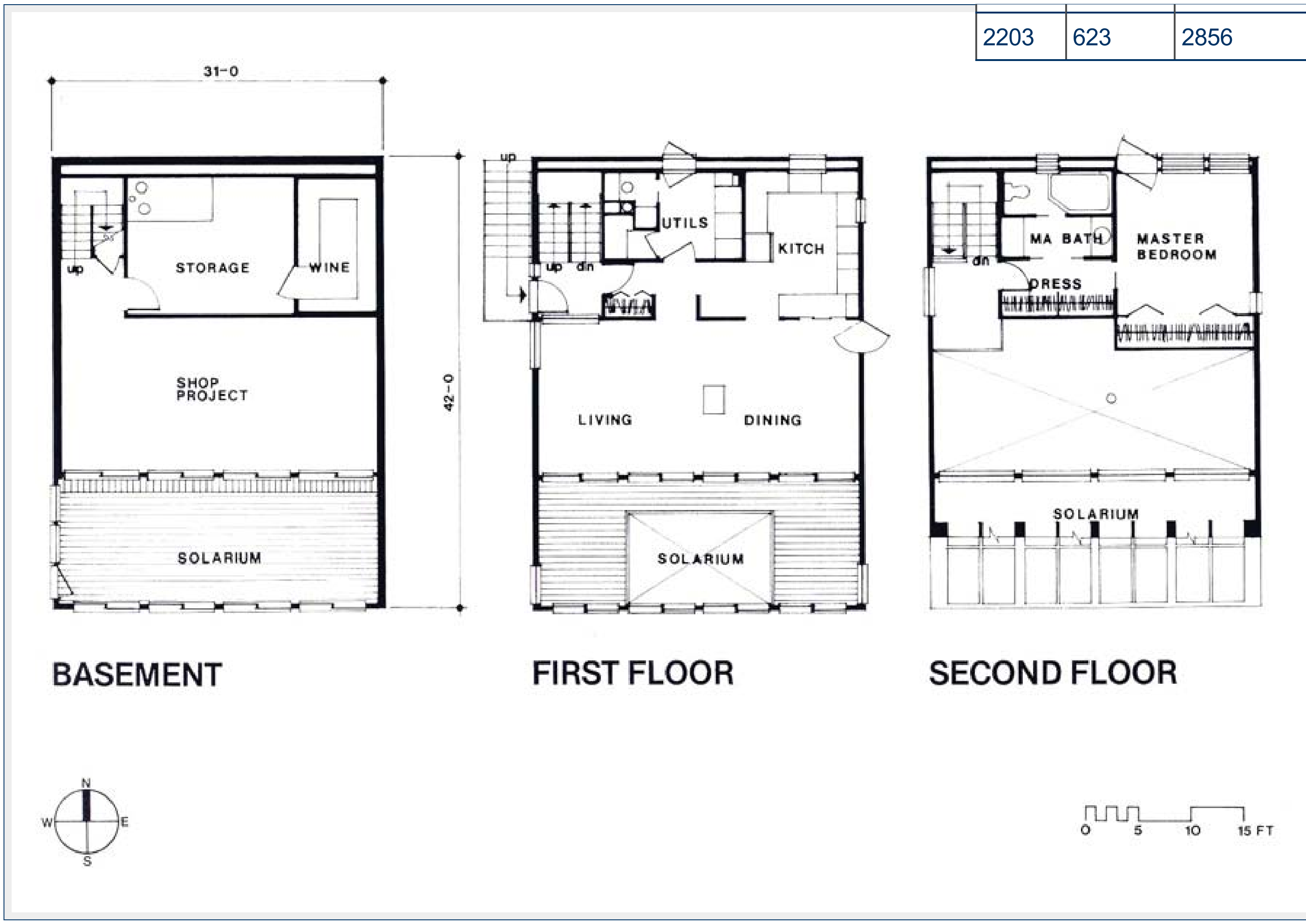
| 2203 | 623 | 2856 |




# REDWOOD CITY 01

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# DES MOINES 01

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## DES MOINES 01

SITE

The site is a relatively flat and open residential subdivision lot, approximately 900 feet above sea level.

CLIMATE

Continental in character, the climate exhibits a marked seasonal contrast in both temperature and precipitation. During the winter months, precipitation, mostly snowfall, is about 20% of the annual amount. By summer, southerly winds provide humid air from the Gulf of Mexico causing rainfall mainly in the form of showers and thunderstorms, often accompanied by hail or damaging winds. This precipitation is nearly 60% of the annual amount. The fall harvesting season is a period of diminishing rain with ample sunshine.

• Winter: cold and dry, interrupted by occasional storms of short duration followed by occasional cold waves, temperatures average in the low 20's

• Summer: relatively comfortable, temperatures average in the low 70's

DESIGN

A builder commissioned this house as a speculative project. A significant design factor for this climate region is the proportion of space and surface areas above and below grade. Generally as the climate gets colder, the depth of the mean earth temperature increases and the potential for heat flow or heat loss to the outside increases. Therefore, it is necessary and traditionally practical to set a portion of the house into the ground to provide sufficient surface area of earth mass at mean temperature and to reduce the exterior surface area above grade. For this particular design, it is necessary to set the first floor level 3 feet below grade. Location of the garage on the east or west as in this design helps to buffer the extremes of climate conditions.

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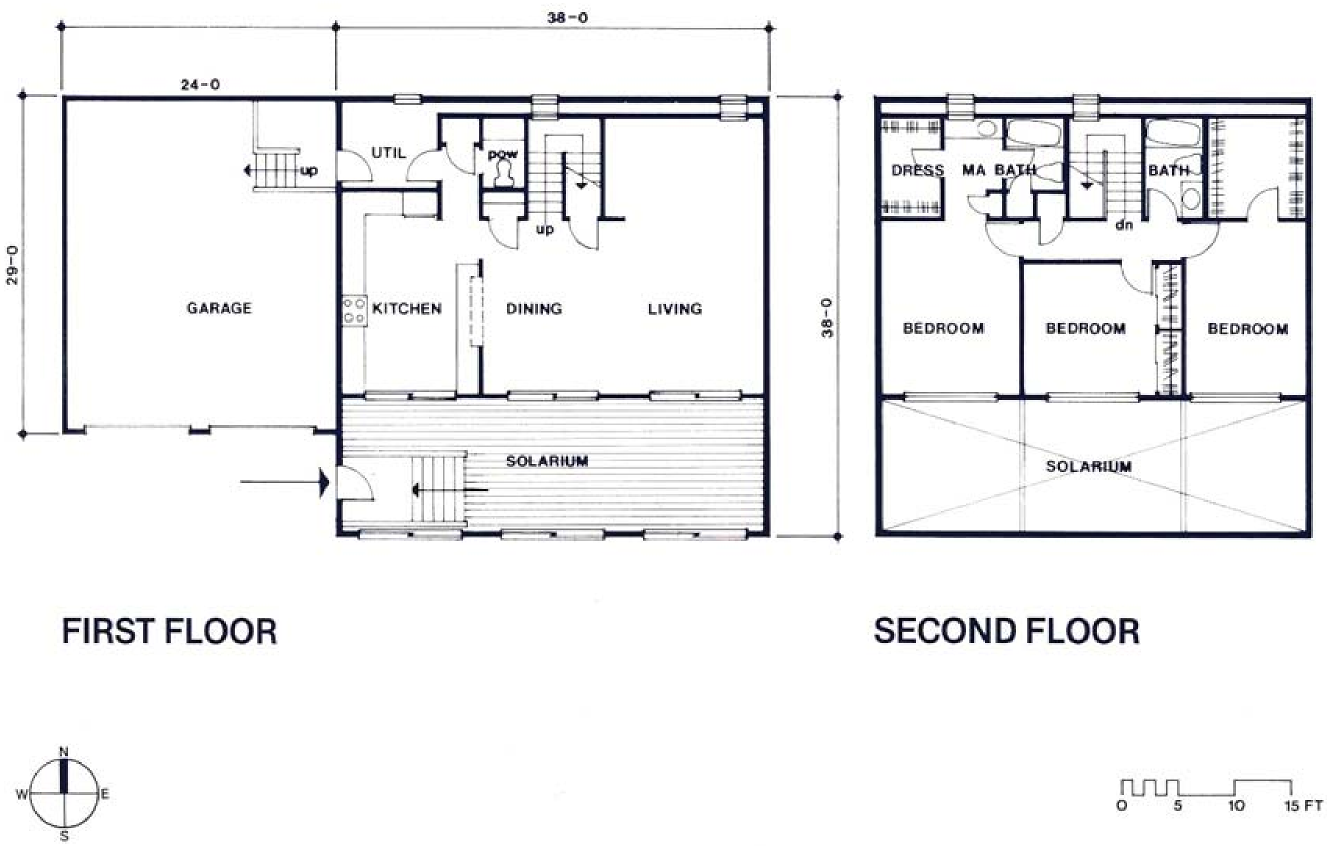
| 1862 | 456 | 2318 |




# DES MOINES 01

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# NEWPORT 01

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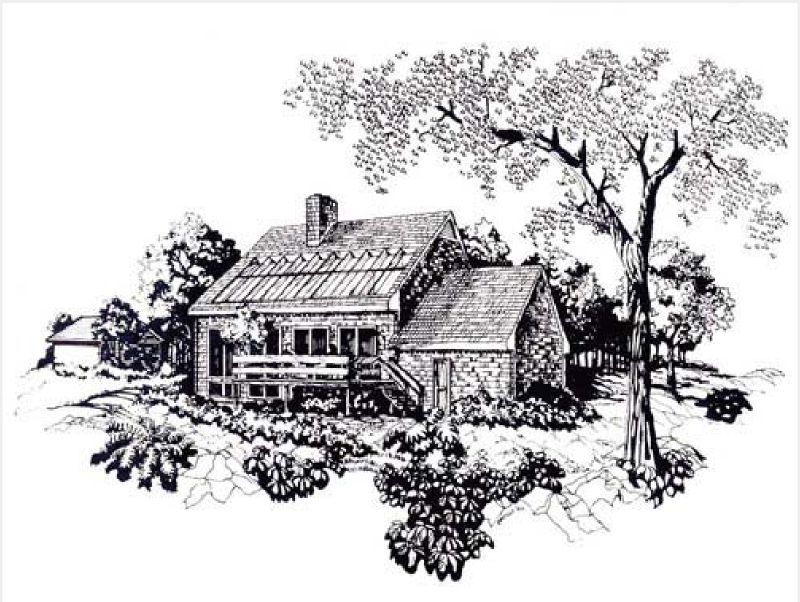

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## NEWPORT 01

SITE

The site is a relatively open, flat residential setting affording a second floor southern view of the ocean a mile away.

CLIMATE

The proximity of the Narragansett Bay and the Atlantic Ocean is an important influence on the climate of the area. Winter temperatures are modified considerably and many storms precipitate rain rather than snow. Refreshing sea breezes cool summer temperatures. Dense fog generally occurs 2 or 3 days a month and coastal storms produce the most severe weather.

• Winter: cold, temperatures average between the low 20's and mid to high 30's

• Summer: warm, temperatures average between the high 50's to low 60's and near 80° F

DESIGN

Designed for a young professional couple, this house, traditionally conservative, modestly simply, and small in appearance encloses three levels of living space in a variety of forms and arrangements. The open quality of the solarium allows an abundance of natural light to all levels and heightens your sense of space in this compact design. With the first floor and second floors set between ground level, access from the garage through the solarium to either level or vice versa is an easy and pleasant transition. The third floor in the space formed by the roof creates a gambrel type ceiling and provides an open view through the roof glass. This house was monitored extensively by the Department of Energy, the results of which are presented in the section "How it Works."

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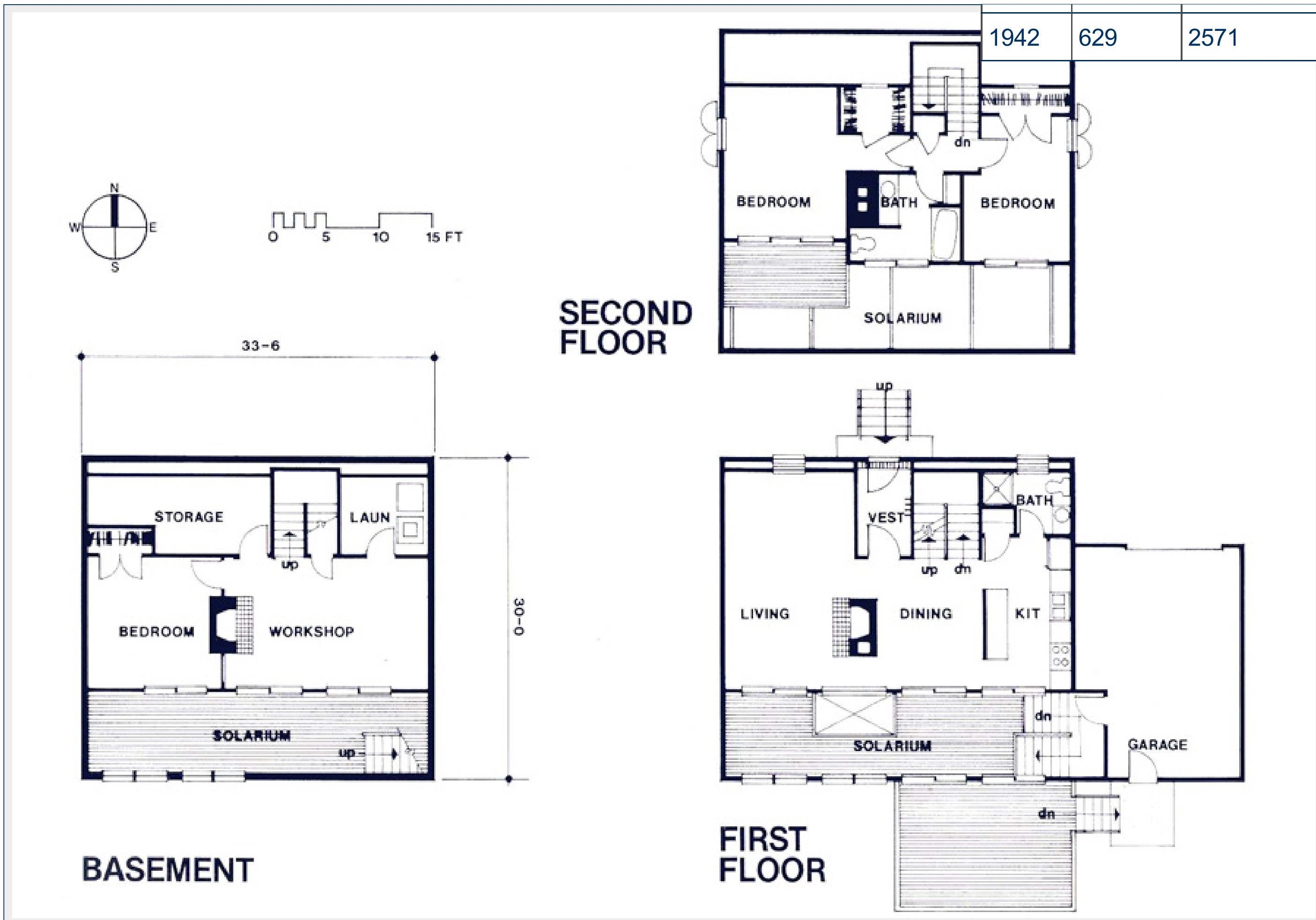
|---|---|---|
| 1942 | 629 | 2571 |




# NEWPORT 01

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# NEW YORK 01

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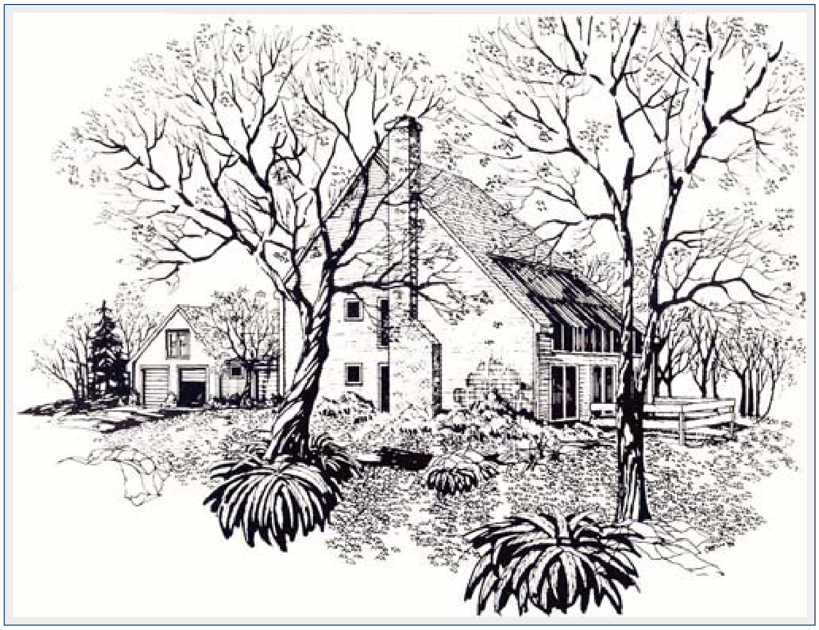

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## NEW YORK 01

SITE

The site is a heavily wooded, hilly terrain in a rural subdivision near New York City. The trees are deciduous and provide exposure to the sun in winter and shade in summer.

CLIMATE

A somewhat temperate climate in comparison to Upstate and New England areas; winters are cool, and summers are warm with relatively high humidity. Prevailing winds from the northwest produce a chilling discomfort in winter and a cooling effect in summer. Precipitation is consistent and abundant year round.

• Winter: cool, temperatures average between the high 20's and 40° F

• Summer: warm and humid, highest temperatures average between the high 60's and low 80's

DESIGN

This house was developed for speculative sale in an upper income market. The simple rooflines, and the style of its elevations and floor plan arrangements are in keeping with the New England tradition of the area. A full basement is necessary for this climate and design to provide sufficient depth and surface area of the earth mass, and the compact form of the house provides a favorable surface to volume ratio.

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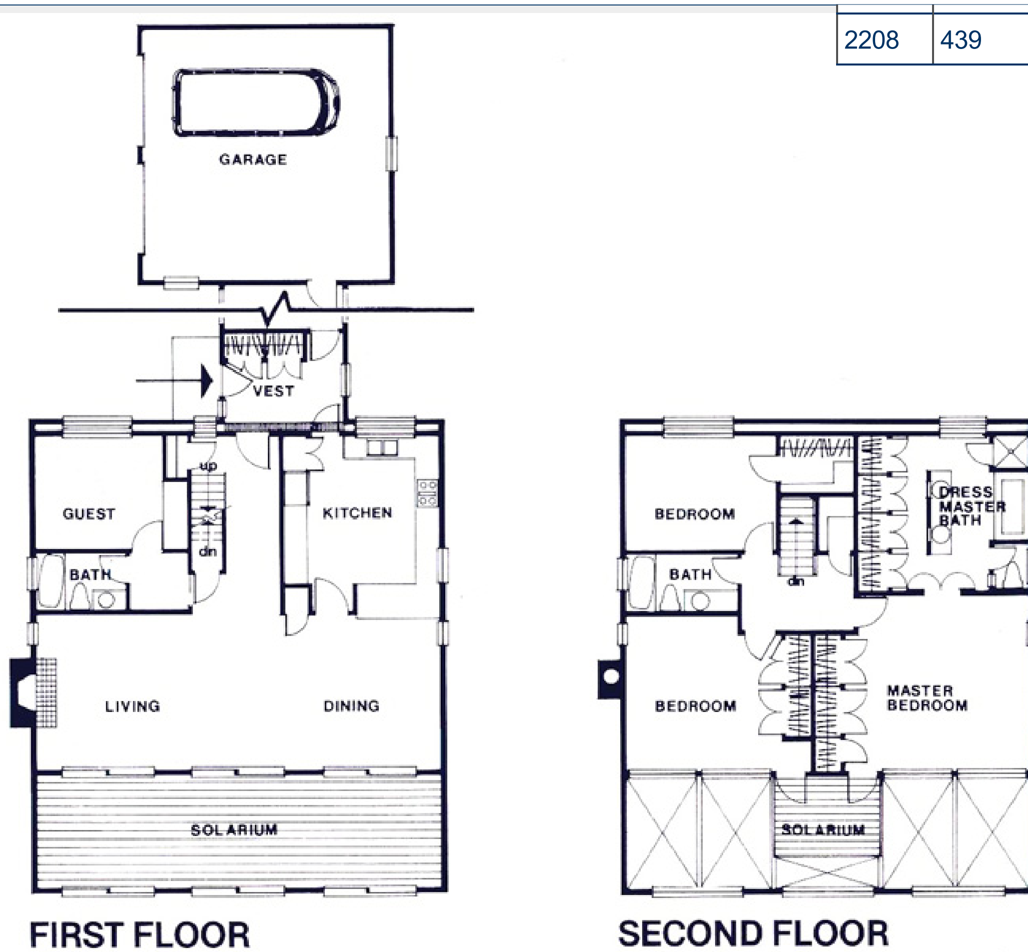

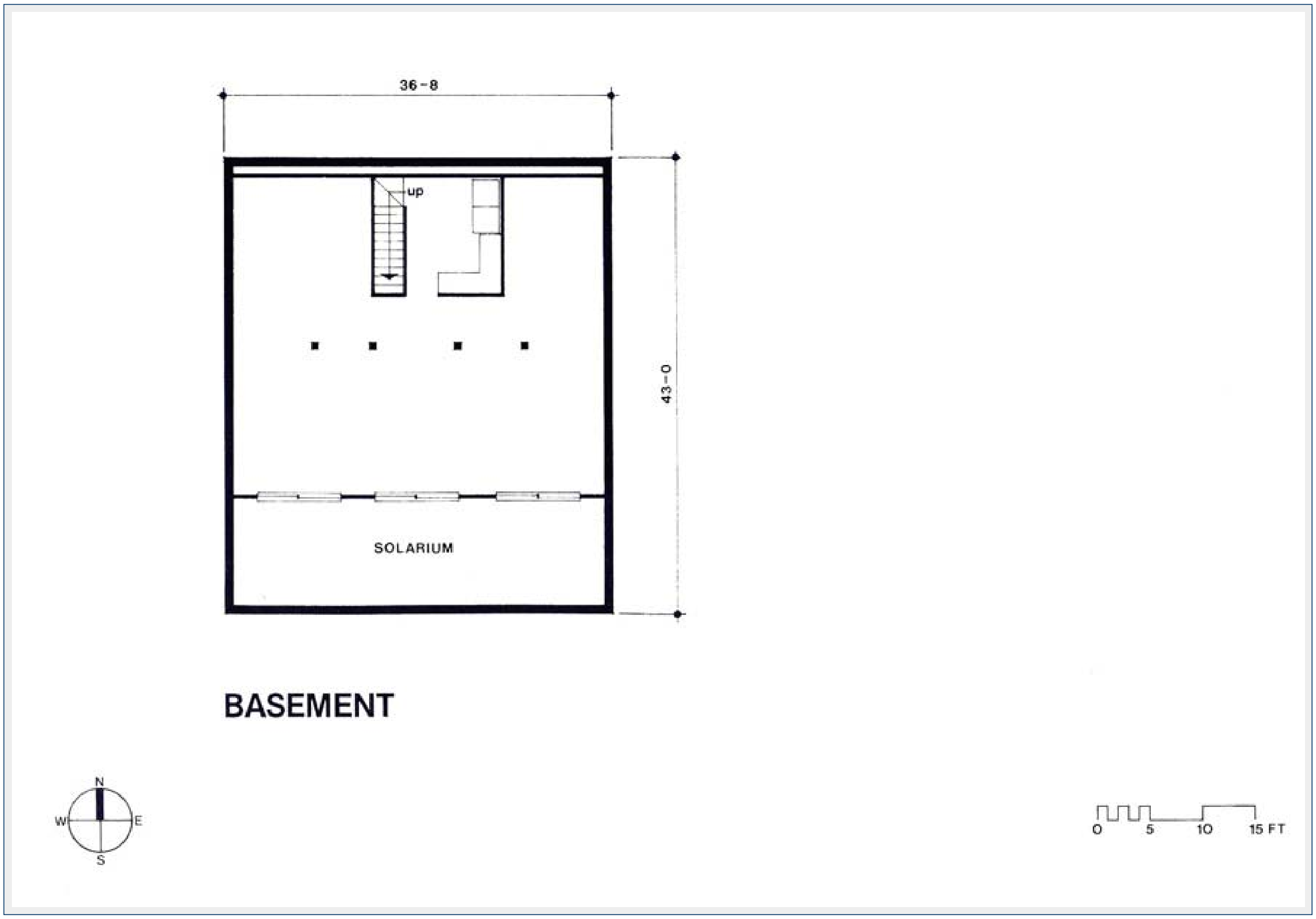


# NEW YORK 01

Submit Query

# TORONTO 01

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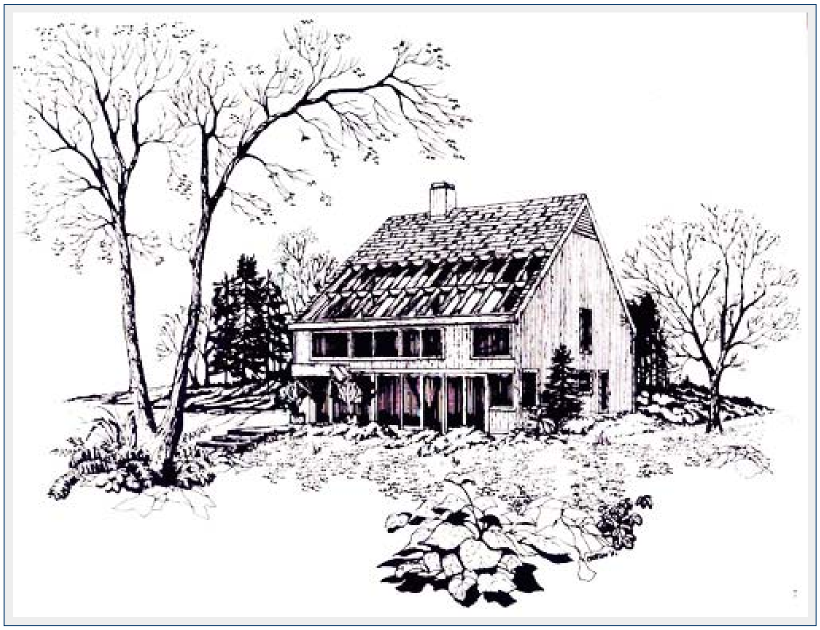

Submit Query

## TORONTO 01

SITE

The gentle south sloping site is in a region of fertile farmlands. Several large deciduous trees are near the building site and line the hedgerows between fields. A seasonally high water table requires giving particular attention to waterproofing and backfilling foundation work and to sub-grade drainage.

CLIMATE

The regional climate is characterized by four distinct seasons having pleasant springs and long, mild autumns. Annual rainfall is abundant and strong winds frequently accompany storms. Southerly breezes across lake Ontario produce a comfortable cooling effect in summer.

• Winter: long and cold, considerable snowfall

• Summer: mild, occasional periods of hot, humid weather

DESIGN

Designed for a professional couple, this house could be easily modified to accommodate 3, 4, or 5 bedrooms. Contrasting a simple traditional form, the interior has a contemporary spatial quality in the open planning of the first and second floors, and in the two story tall living room.

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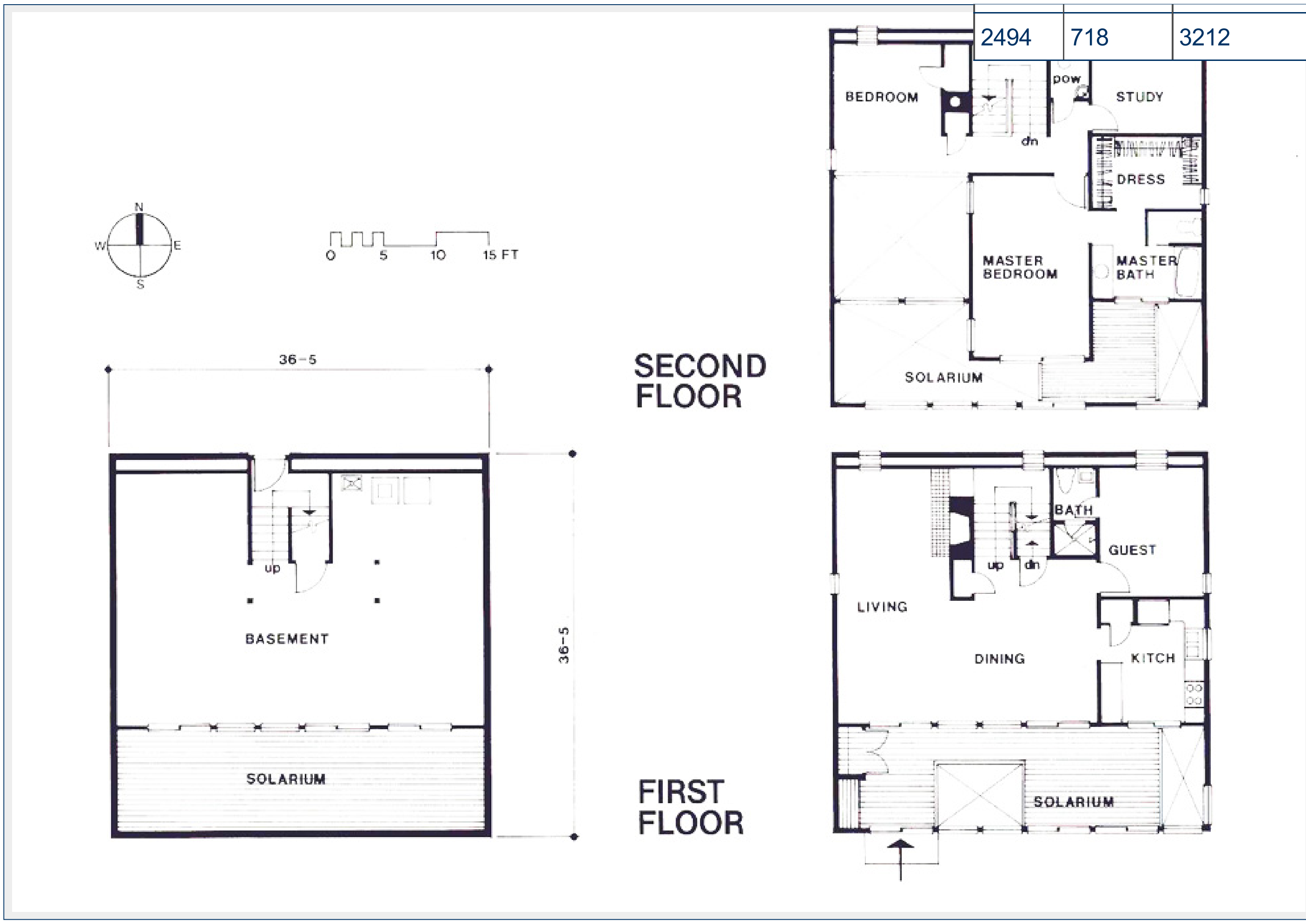


# TORONTO 01

Submit Query

# CINCINNATI 01/02

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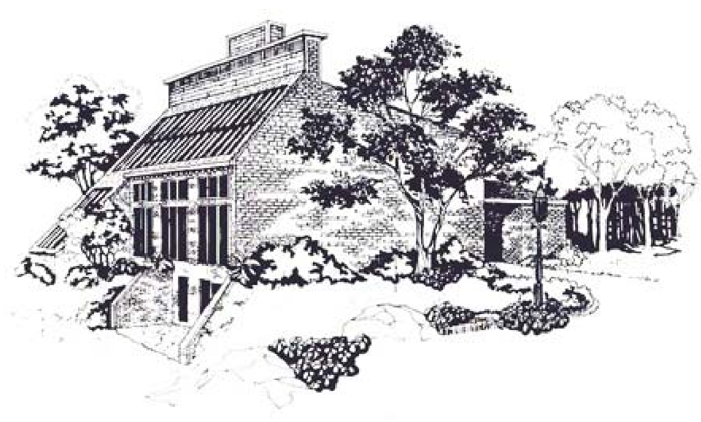

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## CINCINNATI 01/02

SITE

The site is rural, flat and approximately 550 feet above sea level. Features include a dense population of deciduous trees and a ravine to the south and west.

CLIMATE

The climate of this region is basically continental in character with a wide range of temperatures possible over the year. Numerous storms during winter bring frequent weather changes and relatively long overcast periods, producing cold temperatures and significant wind chill. Prevailing south to southwest winds during summer bring moist air from the Gulf of Mexico. This humidity and relatively warm temperatures create significant cooling loads. Throughout the year the area receives about 50 to 70% possible sunshine.

• Winter: cold, temperatures average between the mid 20's and 40° F

• Summer: warm, humid, temperatures average between the mid 60's and high 80's

DESIGN

The house was designed for a professional couple with grown children. Cincinnati 02 is an alternate design of Cincinnati 01 and both were developed for the same site. A large increase in building costs during an unavoidable delay of this project required reworking the original design. Located near the edge of the ravine, the house features outdoor accessibility to the first floor / basement and a cistern below the garage slab. An underground pre-conditioning tube provides cooled, make-up air for exhausting the active air envelope. The significant outcome of this project is the owners, acting as their own contractor, completed the original Cincinnati 02 in the winter of 1979 for $18 per square foot.

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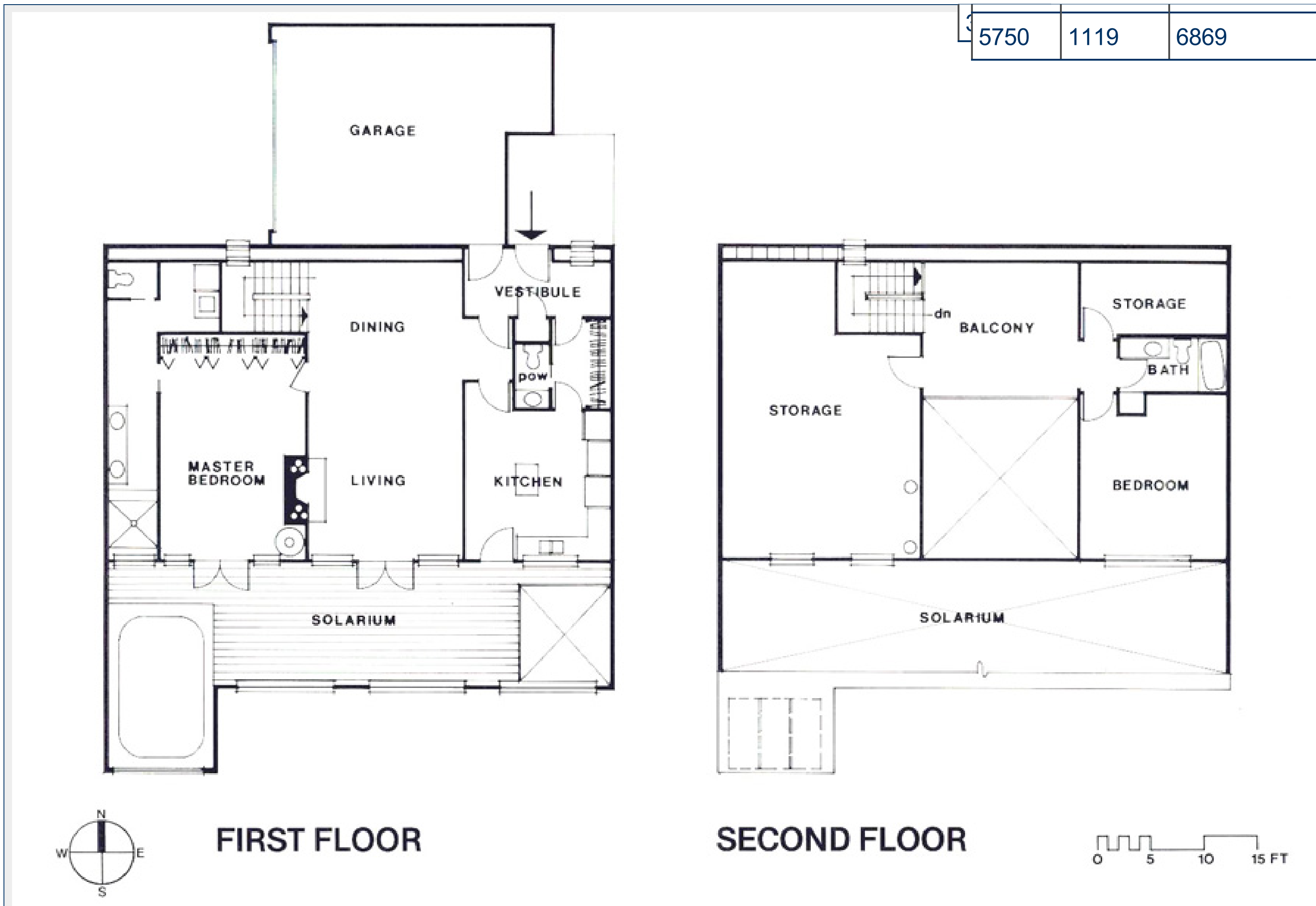
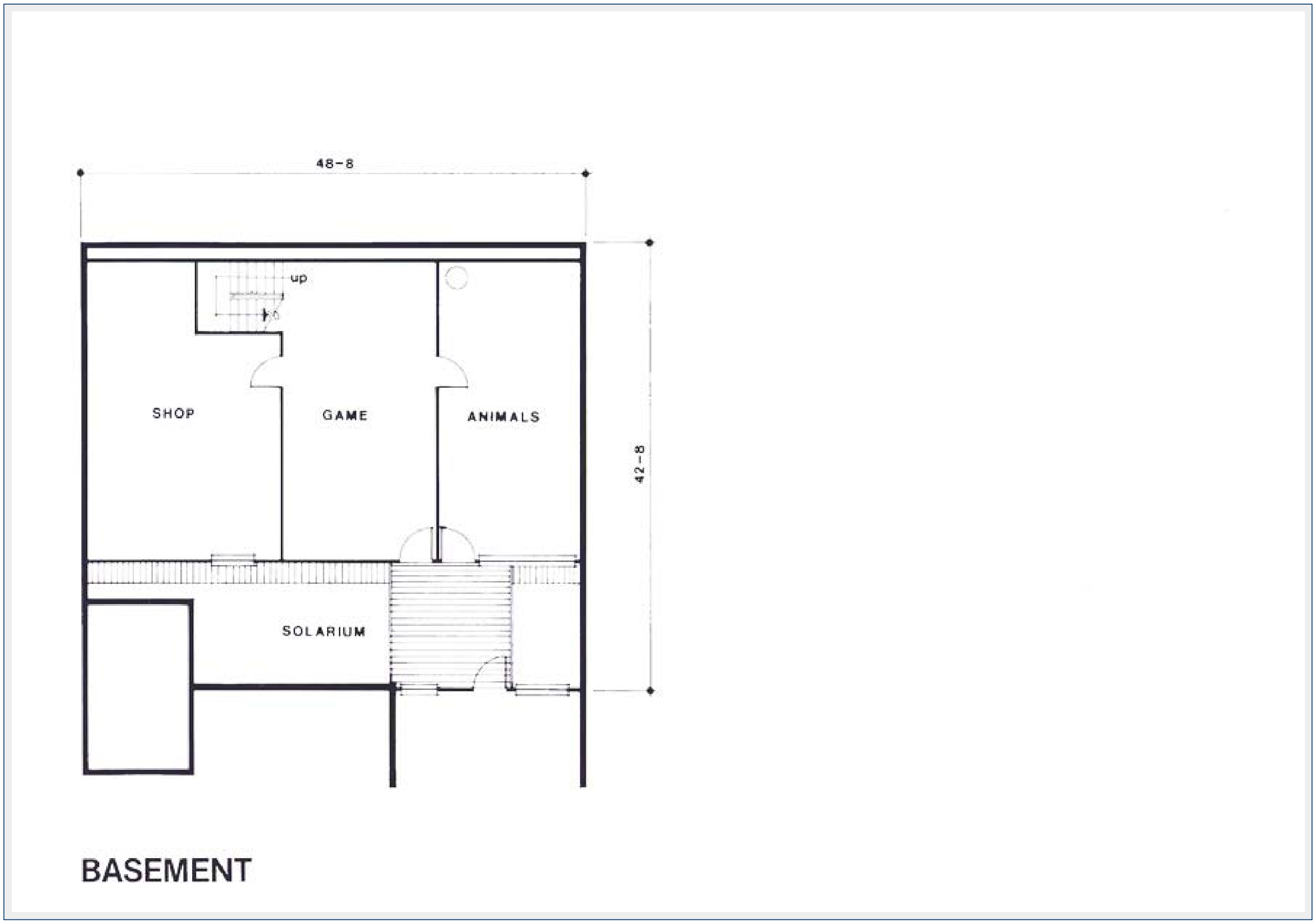
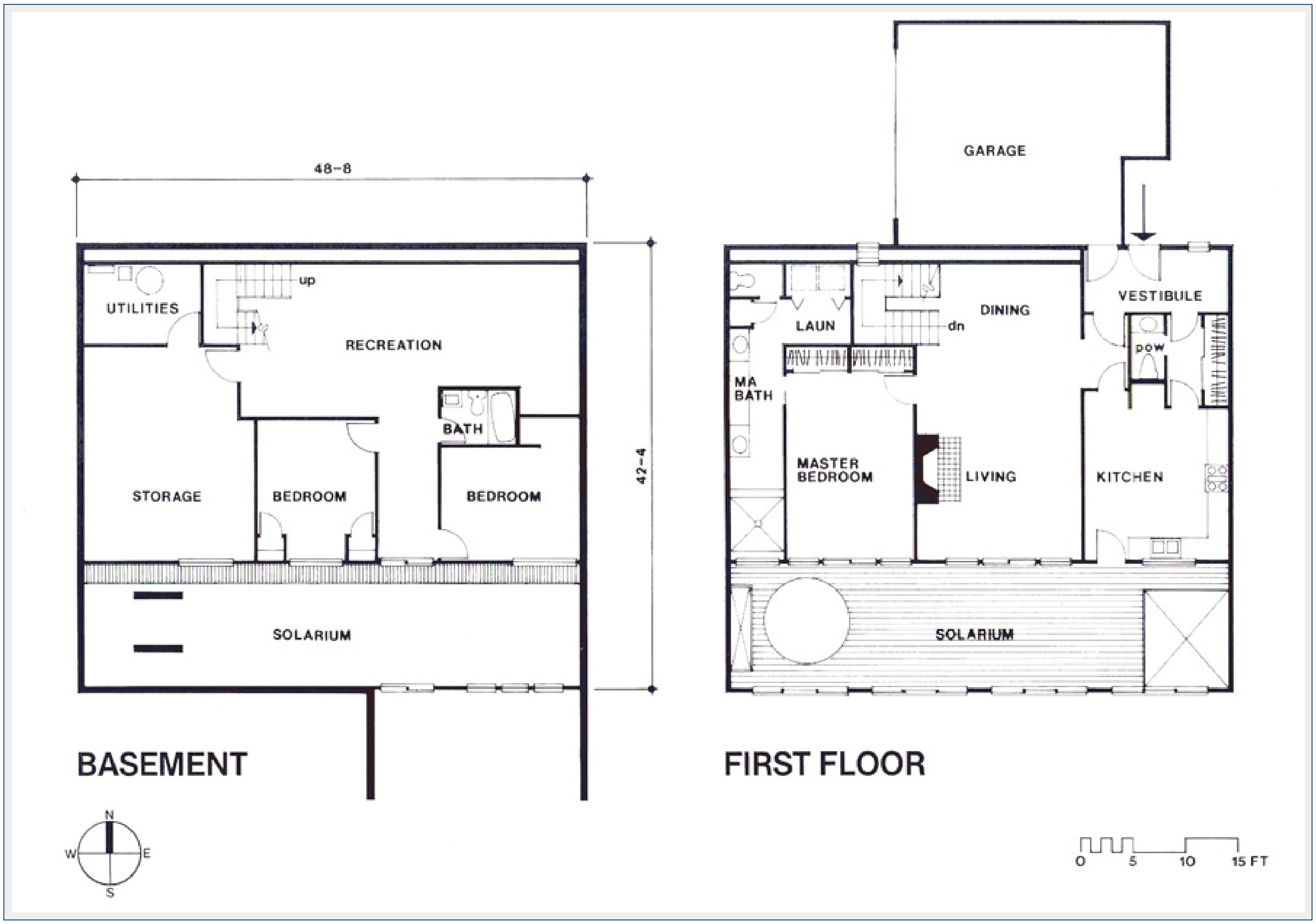





# CINCINNATI 01




# CINCINNATI 02

Submit Query

# EAST HAMPTON 01

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## EAST HAMPTON 01

Construction Documents for this Design are not currently available. Contact Ekose'a Homes about architectural services related to this Design.

SITE

At water's edge, the site is a small, heavily wooded, hilly peninsula overlooking Long Island Sound.

CLIMATE

There are four distinct seasons similar to the climate of New England. The ocean has a moderating effect on the extremes of the region; however, occasional strong winds produce a high wind chill in winter. Moderate to good solar insolation persists year round with occasional periods of overcast for more than a week.

• Winter: cold and windy, moderate snow and sleet, average temperatures consistently near freezing ranging between the mid 20's and high 30's to low 40's

• Summer: warm, temperatures consistently in the 70's

DESIGN

This large, spacious three and a half stories house sits predominantly on the site near the water and reflects the owner's preference for a traditional style indigenous to the area. In order to accommodate the desired east-west window area for views of the ocean, most of the east and west walls are double envelope construction similar to the double north walls and a part of the active air envelope surrounding the "inner house." This additional envelope construction is also added protection against winter winds and a greater potential for heat loss due to infiltration. Sea breezes and north openings to the active air envelope help ventilate and exhaust excessive heat gain.

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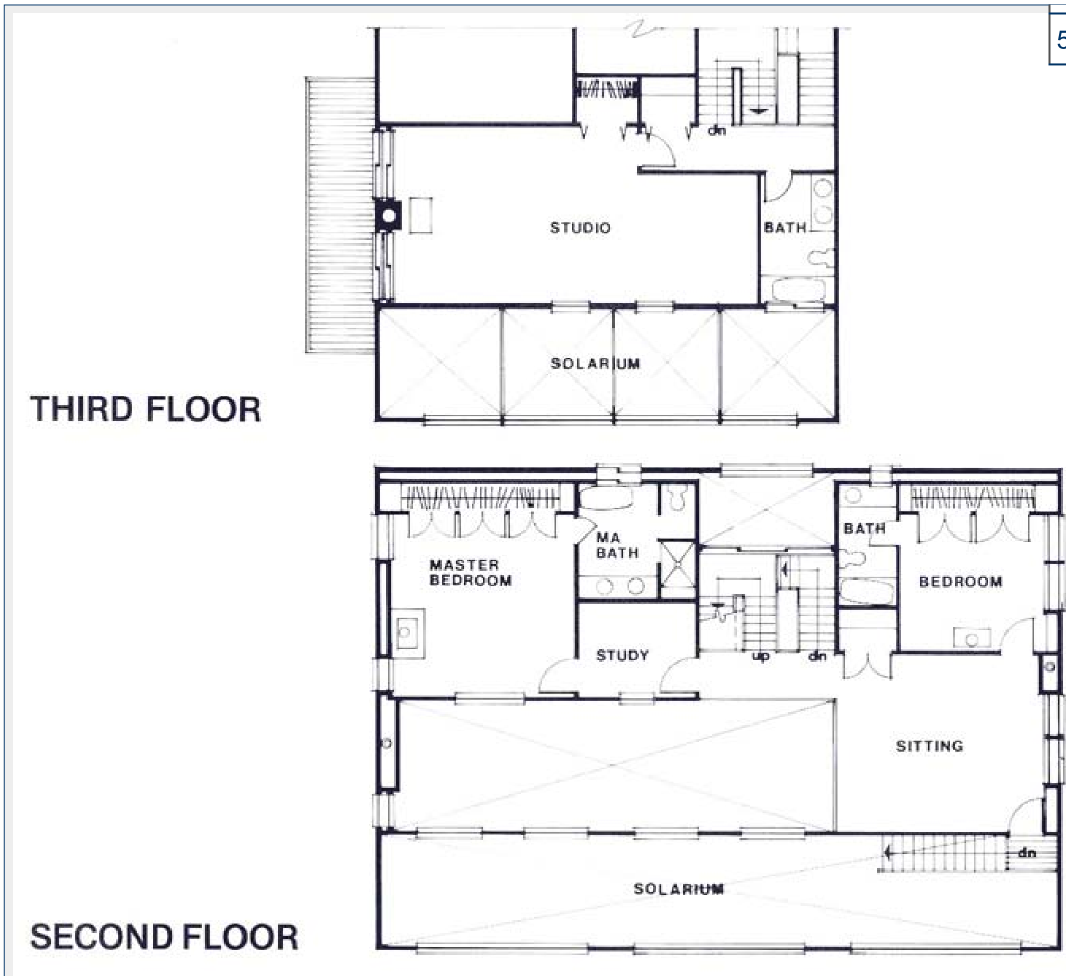

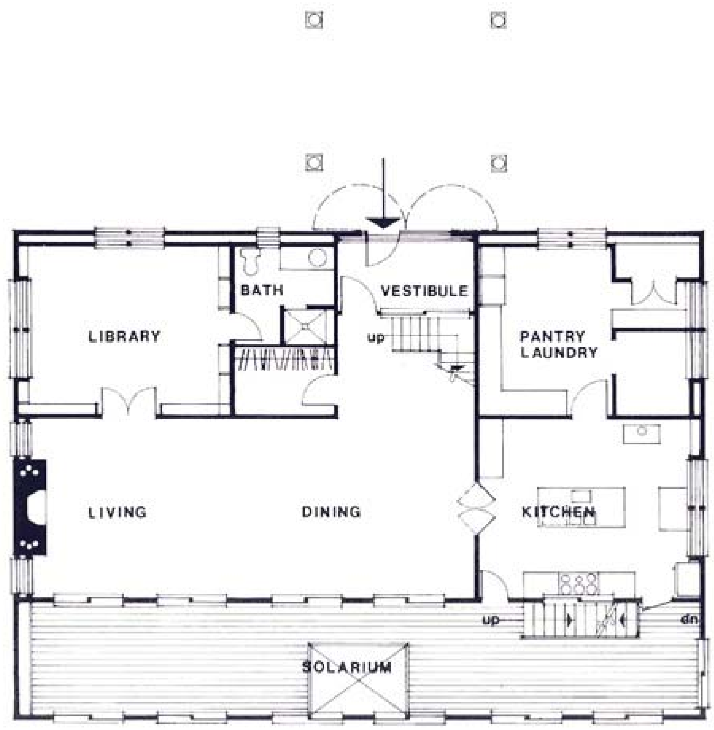
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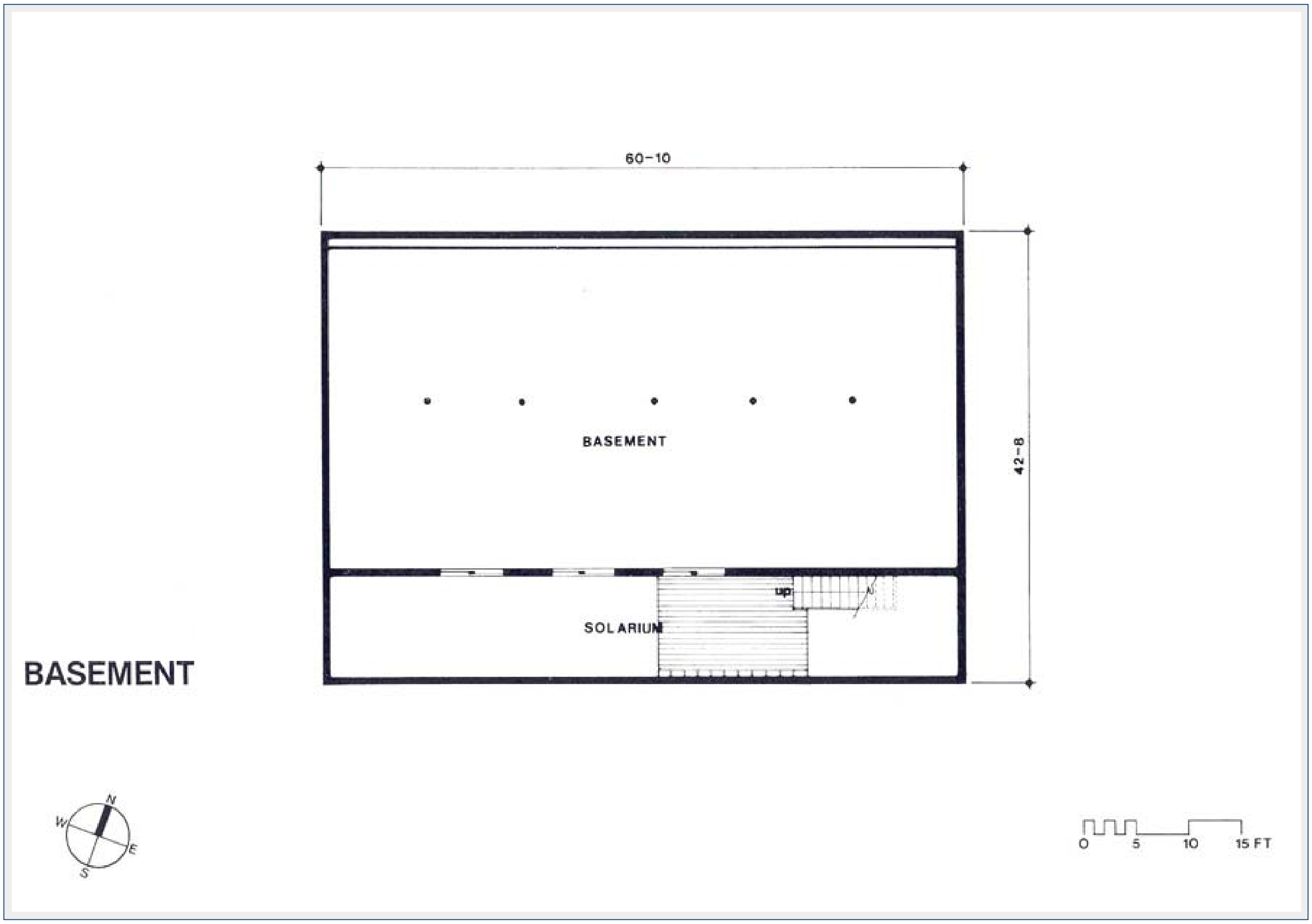
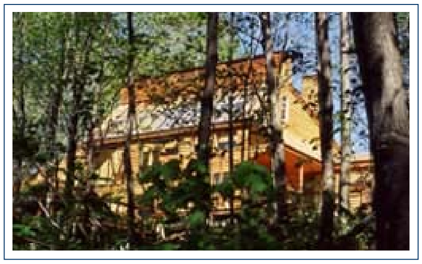



# EAST HAMPTON 01

EKOSE'A HOMES
Natural Energy Conserving Design



# PLANNING A HOME



Building a home is a complex problem requiring considerable commitment of time and energy. Essential to the successful completion of this task is the initial process of prudent, organized planning. Therefore, in beginning, consider the following:

- Develop a comprehensive understanding of the scope of the problem. The following text of this section brings into focus the nature of this problem and the important issues involved.
- Familiarize yourself with the particular conditions of your building project. Start a notebook / file; and using the Planning Checklist, begin collecting information applicable to your situation.
- Once you begin working with all the pieces to formalize your design criteria, organize your priorities with respect to the issues involved.
- Detail an expected sequence of events over time. By anticipating future requirements, the necessary regulatory information can be compiled sequentially to minimize possible delays in the, sometimes arduous, permit approval and construction process. Scheduling becomes most critical once financing has been committed and throughout the construction period.

Upon completion of the planning phase of your building project, the time required for acquiring or developing construction documents and obtaining building permits may vary greatly. Acquiring or developing construction documents may take from two weeks to six months depending on whether you build from stock plans with minor modifications or contract for architectural services. Plans and permit approvals may take from one to two days in rural areas to one year or longer in rapidly developing, high-density areas where temporary building moratoriums may be imposed. Construction normally should take approximately six months. However, climate and limited building seasons in some areas are important factors to the timing and pace of construction.

Depending on your abilities or the extent to which you are willing to take responsibility for the planning, construction documents, and construction phases and on whether a custom design or modification of an Ekose’a Homes design is best suited to meet your needs, an architect or residential design professional is singly the most qualified individual to assist you in the guidance and development of your project from start to finish. The cost of architectural or design services will vary greatly depending on the complexity of the project and assigned responsibilities. Ekose’a Homes, Inc. can provide architectural services directly to the owner or on a consulting basis to the owner’s architect, design professional, or builder. Refer to the Services section of the Ekose’a Homes website for details.

## PLANNING CHECKLIST

### BASIC SITE CONSIDERATIONS

Water Supply
Septic System
Utilities
Site Accessibility
Soil Conditions
Site Drainage
Water Table
Plant and Tree Cover
Climate Data
Optional Energy Systems

### SITE SURVEY

Size
Configuration, location of corners
Orientation: true, magnetic
Streets
Terrain
Easements
Adjacent Property
Existing Structures

### TOPOGRAPHICAL SURVEY

Contours
Trees
Other Shading
Springs
Water Level
Drainage
Rocks
Elevations of Sewer Connections
Utility Locations/Hook-ups
Setback Requirements
Sidewalks
View Lines
Prevailing Winter and Summer Winds

### REGULATORY

### PHOTOGRAPHS

Perspectives
Principal Views Reference to Site Plan

## DESIGN PROGRAM

### ROOMS AND SPACES

Living Room
Dining Room
Kitchen
Bedrooms
Studio - Den - Library
Greenhouse - Solarium
Hallways - Foyer - Entrance
Closets
Utility Rooms
Stairs

### AMENITIES

Kitchen Appliances
Other Equipment
Sauna
Hot Tub
Pool
Fireplace - Stove
Porch - Deck Areas

### STYLE

Lighting
Plumbing Fixtures
Cabinetwork
Shelving
Hardware
Exterior and Interior
Floor - Walls - Ceiling
Finishes
Indigenous Materials

Zoning
Building Codes
Municipal Ordinances
Subdivision Requirements
Development Restrictions
Permits:
Septic
Water
Power
Building Approval
Engineering Reports:
Water
Soil
Percolation Tests
Structural Calculations, Details and Specifications
Thermal Calculations

**COSTS**

Desired Budget
Land
Standard Construction Costs
Relation to Total Square Feet
Construction Loan
Permanent Financing
Permit Fees
Architectural and Engineering Fees

## FINANCING

Several years ago when the first Ekose'a homes were being constructed some bankers were reluctant to finance a home containing no conventional heating or cooling system. Hundreds of such homes are now built and although your local banker may need supporting data to approve a loan for an Ekose'a home, loans are available. Ekose'a Homes can provide thermal performance evaluation services including computer printouts showing thermal performance and supporting information to help facilitate obtaining mortgage financing.

## TAX CREDITS & INCENTIVES

U.S. federal tax credits are available to homeowners for qualified energy efficiency improvements or residential energy property costs for a main home in the U.S. Refer to Internal Revenue Service (IRS) Form 5695, Residential Energy Credits. There are two credit categories, Nonbusiness Energy Property Credit that is limited to a total of $1,500, and Residential Energy Efficiency Property Credit that is limited to 30% of the total property costs. Under the Nonbusiness Energy Property Credit, qualified energy efficiency improvements include building envelope components such as thermal insulation, exterior doors and windows, and roofing materials designed to reduce heat gain; and, qualified energy property includes certain types of water heaters and boilers, heat pumps, air conditioners, biomass fuel stoves, and furnace fans. Under the Residential Energy Efficiency Property Credit, qualified property includes solar electric (photovoltaic) systems, solar water heating, small wind energy systems, geothermal heat pumps, and fuel cell systems. Except in the case of a fuel cell system, credit may be taken for these systems installed in a home other than the main home.

Also, inquire locally about state, municipal, and utility company programs for rebates and financial incentives such as property tax and permit fee exemptions and low interest loans, which are widely available for renewable energy systems, weatherization improvements, reduced energy consumption, and other “green” building measures.

DSIRE (Database of State Incentives for Renewables & Efficiency) at www.dsireusa is a comprehensive online source of information on state, local, utility, and federal incentives and policies that promote renewable energy and energy efficiency.

## BUILDING CODES

Various building authorities have identified several problem areas; of these, the main one has been fire and smoke protection in concealed, unoccupied spaces of the thermal envelope. Several solutions have been accepted as follows:

- The surfaces of these spaces can be lined with a non-combustible material.
- Sprinklers can be installed at various points within the envelope.
- Fire dampers can be designed to close off the vertical portions of the envelope in case of smoke or fire.
- Smoke and temperature sensors can be installed to provide early warning. Individual building authorities may require that different conditions be met.

We advise against the use of PVC or other plastic pipes, which would be exposed within the thermal envelope. We also advise against the use of urea based foams in any portion of the structure which could be exposed to fire since both of these products cause toxic gasses to be released when exposed to flames.

All wiring should be kept clear of the envelope space and run inside the interior, or exterior wall cavity.

Building codes typically require that habitable spaces maintain a minimum temperature for human comfort during net heat loss conditions. To meet this requirement, some building authorities will require the provision of a back-up heating system. But in most cases, this requirement has been waived when evidence of other successful Ekose'a Homes is presented. In some cases they might also require a computer analysis of heat loss and heat gain. In other cases they have accepted a fireplace or a wood stove as back-up heating. However, wood burning is highly toxic and polluting and should be considered only in remote, rural settings. Increasingly more jurisdictions, particularly in densely populated areas, prohibit fireplaces in new construction. Radiant space heaters or systems are more environmentally friendly alternatives for back-up heating. Also, building codes address ventilation requirements with which Ekose’a Homes comply, but they typically do not require a cooling system.

Each building authority looks at each house on an individual basis. To date, we have found that most agencies are receptive to the thermal envelope concept and will work with the owner and his or her design professional or builder to satisfy the building codes as well as maintain the integrity of the Ekose'a Homes design. And in the future, we expect more widespread acceptance of passive energy conserving design, as building codes will become increasingly focused on combating the energy and climate crisis.

## BUILDING SITE

The building site and associated climate are significant determining factors in shaping the overall development of any building project. Basically, the considerations for selecting a site are the same for Ekose'a Homes as for any other type of home.

Site analysis is one of the most important tools in shaping the design of an Ekose’a Home in order to achieve functional requirements and optimize human comfort conditions. Ekose'a Homes, as natural energy-conserving architecture, are direct responses to the indigenous environment of the site and to the gathering and balancing of available natural energies.

The primary considerations with respect to a building site include the following:

- **Water** – quality, source, and extent of supply
- **Septic System** – alternatives and requirements
- **Utilities** – availability and accessibility
- **Site Accessibility** – Distance away from material suppliers and ease of getting to the site affect construction costs.
- **Soil Conditions** – Most soils will provide adequate support for residential construction. Solid rock near the surface is expensive to remove; however, a practical balance between excavation and berming can be achieved to create the desired results.
- **Site Drainage** – Site drainage above and below ground away from the building is very important. Although controllable, this condition may have significant cost implications. Avoid sites that may experience flooding.
- **Water Table Levels** – A seasonally high water table may present drainage and waterproofing problems. Again, earth berming may be a practical consideration to avoid or minimize excavation below water table levels.
- **Slope / Topography** – Ekose'a Homes concepts are not restricted by the degree or direction of slope; however, topography may significantly affect the microclimate of the site. Investigate these conditions with respect to winds, inclement weather, and the amount of sunlight available to the site. Also, steep sloping sites are more difficult to build on and thus affect construction cost.
- **Plant and Tree Cover** – Established indigenous vegetation is important for stabilizing the soil and controlling erosion, and may also help to moderate moisture and temperature conditions of an area. Particular types of trees offer several advantages. Evergreens can form protective screens against winter winds and deciduous trees can provide valuable summer shade and glare control.
- **Climate Data** – In addition to investigating microclimatic conditions of a particular site, regional climate narratives should be obtained from the nearest local National Weather Service Office, cooperative station or climatologist.

A **Site Survey** should be obtained which portrays the size and configuration of the site, directional orientation, streets, and general slope of the terrain.

A **Topographical Survey** is necessary in many cases, particularly for undulating sloped sites. This drawing indicates the contours of the site at two-foot intervals, with any unusual or distinctive features.

For lots having very gentle slopes and no other features, the topographical survey need only indicate the corner elevations. For those lots having steep grades, it is advisable to have a surveyor prepare a complete topographical survey of the site. Also, indicate relevant views (draw exact view lines showing altitude and azimuth of relevant features), large trees, and sources of unusual noise.

**Color Photographs** taken from different directions including principal views from the home site are very useful in describing a visual image of particular site conditions. Number and reference photos to the site or topographical survey, and indicate the location and orientation of each shot.

## PROGRAMMING DESIGN

Programming your design is the most exciting aspect of the planning process. It includes detailing your space requirements to form a complete statement of your visual expectation of what the house and its components will look like when finished. Incorporate all the design features thought of in this process. Take one room at a time to begin. State the sizes and uses or functions for all the rooms and spaces including requirements for site and sound privacy. Then, consider the whole house and the appropriate relationships of each room according to their functional requirements. In deciding room sizes and layouts, it is helpful to list furniture to be included and suggest possible areas for its use.

The next set of considerations, include your preferences for exterior and interior style - the geometry and materials of the building. Finally, make a list of amenities you wish to incorporate in your plans to create an efficient and comfortable home. Many of our clients have found it particularly helpful to read popular building magazines and to clip out examples of details that appeal to their sense of design, style, and amenities.

Once the conception of your home begins to materialize, the next step is to develop your design program in relation to the building site and budget requirements.

First make sure your proposed home will fit on the site. Then consider how the slope, views, winds and other features may affect siting the house, the location of a driveway and garage or carport, front and back doors and finally the arrangement of rooms and windows.

With respect to cost, use the standard cost per square foot of construction in your general area as a preliminary measure for estimating the cost of your home. Then justify to yourself the relationship between the desired budget, total square footage and the standard costs. Keep in mind that the basic costs per square foot must be carefully defined. For instance, you must know the overall quality represented and whether the prices include carports, porches, tool storage or basements. Check with several reputable builders and possibly with several owners who have recently built or purchased a new home to obtain a good measure of the costs in your area.

In sketching out your ideas, we recommend using tracing paper with which you can make overlay drawings of floors above one another and of alternate floor plan arrangements. You should also purchase architectural and engineering scales for working out dimensions on your plans. For working out preliminary modifications of the plans in this book, make a scale, which matches the common scale of the plans. Also, make measurements of the spaces you live in now for use as full scale references in developing or comprehending spaces at smaller scales.

## CONSTRUCTION RESPONSIBILITY

The single most important factor in the cost of any home is the amount of responsibility for construction assumed by the owner. Typically, a building contractor is constructing a number of projects at the same time; and he or she no matter how honest or competent cannot look after the costs and quality of your home as well as you can. Even if you have no prior construction experience, there is much you can do to control the cost if you have the time and the interest. However, most people traditionally chose to leave the major responsibility of the construction to the contractor.

### METHOD 1: THE OWNER ACTING AS THE MASTER BUILDER

The most ambitious level of owner responsibility is where the owner is the builder, performing the work and administration of construction and hiring only occasional or specialty labor as desired to assist with the actual work. This approach would seem to require some prior construction knowledge and experience; and yet, we have observed success where this has not been the case. There are many ways to obtain the knowledge and most of the skills needed. In some areas, there are instructional classes for owner-builders. And in most cases, there are willing friends with sufficient construction knowledge and experience to help guide the owner in acquiring the necessary organizational and hands-on construction skills. While this level of commitment may be beyond the capability of the average person, we are suggesting this possibility simply to make the point that it can and has been done. The rewards for such effort go far beyond the actual cost savings, which may run as high as 40%.

**METHOD 2: THE OWNER ACTING AS HIS OWN CONTRACTOR**

If the owner has a genuine interest in participating in the process of construction but has neither the time nor the interest in doing the actual building, there is an intermediate level of responsibility, which is acting as your own contractor. This method involves much less time and energy than METHOD 1.

If you have the time and interest in acting as your own contractor, and if you are willing to put in some long, hard hours of advance planning, it may be possible for you to save as much as 20-30% of the actual construction cost. Our experience indicates that anyone with the ability to afford to own a home has the ability to actually build it. Every member of the family can participate in the planning, shopping, and construction of the project; thus relieving some of the responsibility from falling onto one individual.

Should you have no prior construction experience, we advise you to find a carpenter foreman to run the job on site. This is a big responsibility and you should be very careful in making your selection. Such individual should have a verifiable track record in doing what you are going to require.

He or she will leave the owner free to account for all expenses, shop for the best sub-contract and materials prices, write all checks, justify expenses with money as it is made available from the financing institution, and to contribute labor in the actual execution of the work.

**His or Her Responsibilities:**

- Reading and interpreting the plans and specifications
- Laying out the work to be done and supervising the work of all persons involved
- Making a list of all materials and equipment needed
- Assistance in locating and evaluating additional labor and sub-contractors
- Approving work done by subs prior to payment
- Actual ordering of materials or telling the owner what and when to order
- Suggesting sources for materials
- Suggesting alternative materials and details
- Keeping managing time cards for all hourly paid employees

**METHOD 3: LETTING A CONTRACTOR TAKE 100% RESPONSIBILITY**

The owner can also elect to work with an established and competent building contractor on a cost-plus basis in which the contractor's fee is a negotiated amount in addition to the actual cost of construction. In this way the owner can help to shop for better sub-contracts, better material prices, and even do some of the work to further save in costs.

Although it is usually the most expensive option, the owner can elect to turnover the entire project to several contractors for competitive bidding. This relieves the owner from all responsibility except paying the contractor. It is important to remember that no matter which method is chosen the more time and energy the owner devotes to the project, the more satisfied they become with the final results, both from a standpoint of costs and quality.

## QUALITY OF MATERIALS

Following the aspect of owner responsibility, the quality and cost of the building materials is the next important concern. There are literally thousands of individual components that go together in the construction of a home. Each one of these items is available in a wide range of costs. Typically, costs range as much as 100% and some components are offered in a range of as much as 400% – 600%. The cost difference between the cheapest and the most expensive plumbing or electrical fixtures produced by the same manufacturer are often 300%, or more.

One of the predicaments faced by the owner-builder is being forced to constantly select cheap materials if the costs are to be kept competitive with houses produced by tract developers. When you are building a house in which you expect to live for a number of years, it is heartbreaking to compromise on basic quality; and yet, the owner should face this fact very early on.

Again, the most sensible approach to the question of material quality is doing thoughtful advance planning and careful competitive shopping. If building your own home is going to be the largest single investment of your lifetime, it makes a lot of sense to spend as much time as possible on the planning process. Once you have started construction, the pace of building will leave little time for reflection or rational comparisons. Planning is the key.

EKOSE'A HOMES
Natural Energy Conserving Design



# QUESTIONS AND ANSWERS

## GENERAL SYSTEM INFORMATION

**Can this system be used in Fairbanks, Alaska where such systems as Trombe walls soak up more heat than they return?**

Yes, the concepts involved in Ekose'a Homes are applicable in any climate. Again, quantities of mass, orientation of the structure, types of glazing, types of insulation, and other related factors are all referenced to climate considerations.

This system should not be compared to a Trombe wall in any sense. The Trombe wall soaks up all the solar radiation available on the south surface, and in the process heats up to a very high temperature, thus radiating a significant amount of heat back out through the glass. Most importantly, the Trombe wall does almost nothing to minimize the heat loss from the structure itself, and it is this process that is the heart of the Ekose'a Homes system.

**How does this design work in rainy / foggy climates?**

The considerations in special climates such as in rainy / foggy areas are different from those in a high elevation / high solar intensity climate such as Lake Tahoe, California. These differences in solar insolation and outside temperatures and direction of solar heat energy from the sky all have to be taken into account.

The Tahoe houses would not be suitable for Seattle, although if built in Seattle, such a house would reduce the heating requirements by 80% to 85%. However, a different design utilizing these same principles could be made to function at 100% efficiency in the Seattle climate, or in any other climate. Please note that the design does not depend so much on the sun or the earth as much as on the type of measures taken to conserve energy in the inner portions of the structure.

**How is the temperature regulated?**

The temperature of the air is regulated by the gravity convection of air, which insures a constant and thorough circulation of all air in the envelope space. The mass of the house that is part of the envelope space and the earth mass below the house serve as a heat absorbing, radiating element to regulate the temperature in the envelope spaces. The air circulation pattern is regulated by demand, whereby the more extreme the climate forces are, the faster the air will move in the system.

**Why is there not a serious heat loss to the outer surfaces of the air passages?**

Because the outer surfaces of the envelope are well insulated or double-glazed and the air temperature in the passage is significantly lower than the temperature in the house, resulting in less heat transfer and loss.

**Would building into a slope help?**

Building into a slope is not required thermally to enable the house to function properly, but building into a slope can provide additional thermal mass that can be used to justify additional glass on other elevations where it is desired.

**Is there a relationship that must be kept between the size of the greenhouse and the air passages?**

The relationships must be measured and understood so that the thermal performance of the structure can be maintained; but knowing this, the air spaces can be enlarged at will. Technically speaking, the greenhouse is not required for the thermal system to work. All that is needed is a double envelope, which is carefully designed with shadow casting and percentage of solar contact carefully studied.

The air spaces can be enlarged to accommodate storage and other uses which do not demand the temperature heating requirements of interior living spaces. Spaces such as storage areas, workshops, photographic laboratories, and other specialized uses that would not require the normal house heating could be designed into the structure.

**What calculations and formulas are used to design the system?**

The system is designed with a thorough understanding of solar theory, thermodynamics, and a practical understanding of air drafts and body comfort levels and their relationship to solar orientation and climate conditions.

Computerized thermal evaluations are performed as needed by building authorities or financial institutions to predict probable interior thermal performance during critical climate sequences. However, there is currently an insufficient database of monitored performance of Ekose'a Homes, which is needed to adapt thermal performance modeling software in order for it to be used as a reliable design tool.

**What is the power source for dampers - are they manually or thermostatically opened and shut?**

Dampers in most of our designs are simply doors that are manually operated, directly or with a cable and pulley system. They can be controlled by thermostats and mechanically operated. But it is important to note that the system works in such a way that it is not necessary to operate the dampers except once every few weeks at most. They are not used to regulate the system temperature, as the system is self-regulating. Seasonal changes require different damper positions in some cases, and that is the point when they may be operated manually.

**Is a basement compatible with this system?**

Yes, in all cases. In fact, in more extreme climates a basement is necessary to increase the thermal mass that will be acting on the total system. The basement thus acts to dampen any extreme temperature fluctuations in the system.

**Do you advise against north windows?**

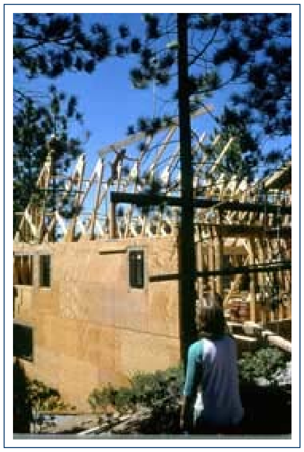
No. North windows do not contribute to the heat loss any more than south windows. South windows, on the other hand, do contribute to the heat gain. As long as there is a balance achieved whereby the heat gain is sufficient to compensate (for any heat losses, there is no limit on the number of north windows.)

**Is the garage heated, or a part of the heating / cooling or insulation design?**

The garage can act as a buffer zone on the east and west elevations. It is normally not heated, but it could be included in the design so as to be heated.

**Are your techniques amenable to an office building using essentially residential construction techniques?**

Yes.



## HEAT STORAGE - BACKUP HEATING

**Have you considered using loose gravel beneath the house?**

Yes, we've considered using almost everything. However, the dirt that is found on any site is equal or superior to any other material that could be used, including rocks. The heat transfer characteristics of a rock bed are not suitable for this design, although they would work. Rocks tend to give up their heat too quickly.

**Is the crawl space insulated?**

Yes, the perimeter of the crawl space should be insulated to the outside of the foundation walls to a level below grade, thus insuring that the mass underneath the building is protected from the immediate effect of ground temperatures outside of the building. The thermal mass below the crawl space, below the earth bed in the crawl space, should not be insulated.

**Shouldn't the storage mass have direct sunlight?**

No. Letting the sunshine directly on the storage mass would not be consistent with the design concepts and assumptions. The design assumes that the sunlight entering the structure converts quickly to hot air as opposed to stored heat, and that the hot air will flow through the envelope space and become stored evenly throughout the entire structure.

Direct sunlight would heat up the storage mass to a fairly high temperature and re-radiate that heat to that space too quickly, since its own temperature would be considerably higher than the temperature in the air space. If this same amount of heat energy were used to heat the mass of the entire structure, the structure mass would only heat up a fraction of the amount that a concentrated mass placed in direct sunlight would.

Since the temperature difference between the storage mass and the air in the envelope space determines the amount of heat that is transferred back and forth, it is desirable to make small changes in temperature in large amounts of mass near the operating temperatures of the system. This is favorable to making large changes in the temperature of the storage mass, which vary considerably from the operating temperature of the system, thus making the system less stable.

**How would a fireplace / wood burning stove interfere or integrate with this system?**

There is no problem integrating one or the other into an Ekose'a Home. It should be in the interior portion of the house, and therefore will not directly contact or interfere with the air in the envelope or affect the gravity convection loop performance.

You do have to supply air from the outside envelope to the inner space for combustion air, and you also have to supply some outside air to the envelope space to make up for the combustion air. The reason for this is that the house is so tight that there would be no air to fuel the combustion and carry the exhaust gasses off up the chimney unless a way to introduce outside air was provided. This outside air should be ducted to the point of the fire so that cold drafts are not blown across the room in order to supply air to the fireplace or stove. That being said, wood burning is highly toxic and polluting; and therefore fireplaces and wood stoves are generally discouraged except in remote rural areas.

## COOLING CYCLE

**How is the house kept cool in the summer?**

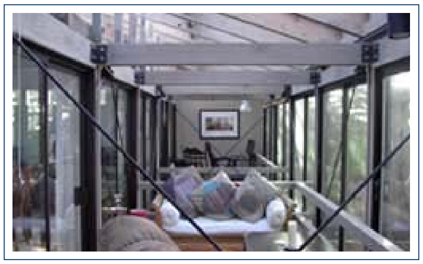
Basically, the interior living spaces are kept cool in the summer by being an inner house that does not receive direct sunlight, except through east and west elevations. The south wall, roof and north wall of the house are all isolated from direct solar insolation in the summer. This reduces the cooling task tremendously.

In addition, the diurnal temperatures exposed to the total mass of the system bring the temperatures of the system near the diurnal average.

In hot climates, outside air is introduced into the crawl space and cooled by the earth mass, which then ventilates the build up of hot air from the attic by the gravity-chimney effect. Cooling tubes buried in the ground are also used to pre-condition the air before entering the crawl space. The Chimney effect for exhausting hot air in the envelope can also be utilized and controlled to affect cross ventilation of the earth-cooled air through the living spaces through opposing openings to the air envelope; inducing air movement and evaporative cooling of the body.

**Are overhangs necessary to shade from the summer sun?**

Absolutely. Sun control and heat control are necessary to maintain comfort levels in the interior spaces during summer.



## GREENHOUSE CONSDERATIONS

**Can the upper greenhouse area be used for living space in some way?**

Yes, as deck space off any room or rooms on the second level or higher if there are more levels.

**Would a concrete slab floor in the greenhouse help?**

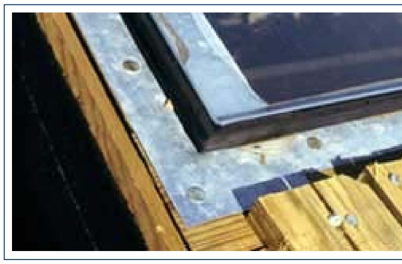
No.

**What about stale air and household odors?**

In the interior living spaces, odors are easily discharged through a window opening or sliding door to the envelope or greenhouse. This is more desirable than in a conventional house since the air in the greenhouse is not the freezing cold air or extremely hot air of the outside climate. This means that you can, and will ventilate more often.

The envelope space is large enough and absorbent enough and has sufficient infiltration so that odors transferred to the envelope space are dissipated and reduced naturally.

In addition to this, the presence of plants in the greenhouse / solarium area tremendously increases the capacity of the envelope area to re-oxygenate, filter and re-fragrance the air to its natural outdoor level.



## GLASS - WINDOWS

**I am worried about the south glass wall and windstorms, need I be?**

Windstorm considerations are no different for this design than for any other type of house. The support spacing / size of glass panels can be reduced, and the type of windows can be modified to meet wind load design standards. Otherwise, the important considerations are total window area as a ratio of mass and total heat loss.

**What about insulated coverings for windows?**

We can usually avoid having the owner manually operate insulated coverings for windows in order to maintain thermal comfort. In a situation where there was no other way to reduce the heat transfer to the outside at night, such as in an existing building or in an extremely cold climate with no possibility for basement mass, it would be possible to compensate for the heat loss through insulated coverings for window areas.

**Is it necessary for interior glass to be thermo-pane?**

Not in all climates. In milder climates single glazing is adequate. In more severe climates, it is necessary to use double and sometimes even triple glazing for both heating and cooling thermal performance.

**How is the sloping roof glass of the greenhouse sealed from leakage?**

The standard detail for sealing glass to sloping roof surfaces is to first attach a sheet metal cover to the wood structure and then seal the glass in place using a silicon caulking compound such as GE silicon sealant.

**With all the glass on the south side, isn't some privacy lost?**

All the glass is not required if that is the preference of the owner. A completely conventional plan could be designed to function in the same way. There are also methods of creating some privacy, such as curtains on the interior windows.

## MOISTURE - CONDENSATION

**What are the problems of moisture and condensation in the air spaces and passages?**

Condensation occurs less in Ekose'a Homes than in conventional houses. Condensation occurs chiefly where there are extreme differences in temperatures. The thermal envelope space enables an intermediate temperature to be established between the interior living environment and the outside climate, thus reducing the dangers of moisture and condensation.

By stabilizing the moisture content of the structural building materials, the envelope system actually prolongs the life of the system. The double wall approach allows for the free circulation of air in and around all structural members and thereby minimizes the potential for rot, mildew, mold, decay or any other type of degenerative process for wood.

**Is condensation on south-facing glass a problem?**

Condensation will occur on the south glass and occasionally on the north glass of the outer envelope in extremely cold weather early in the morning, but normally evaporates during the day. However, particular attention should be given to the detailing and construction of sills at glass openings. Condensation will never occur on the inner glass wall of the living space itself.

**How do you keep the crawl space dry?**

The moisture content of the air in the crawl space is maintained at around 45% to 55% during a twenty-four hour period due to constant air circulation, which is maintained year-round. The interior environment is essentially prevented from receiving direct outside moisture from the air, and from any precipitation that falls on the building, so that the moisture content in the crawl space remains at this optimal level.

In hot humid climates, where outside air is drawn through the cooling tubes into the crawl space, humidity can be substantially higher.

**Is water a problem in the foundation?**

Less so with this design than with conventional basement designs. This design requires that the space be- low the house be treated as a conditioned space and as such, enables consideration of slope, drainage and constant circulation of air to minimize moisture problems in the foundation. It may also be necessary in extreme climate situations to provide perimeter footing drains and even sump pumps, as would be required in conventional construction given the same circumstances.

**Should the soil in the crawl space be treated for termites?**

Absolutely not, some other practice such as termite shields at the top of foundation work should be considered. Also periodic visual inspection to spot tunneling and sounding wood sills, floor beams, and joist headers with a hammer are your safest alternatives. Termite activity when detected can then be treated locally as required.

## CONSTRUCTION - BUILDING CODES

**Can your design accommodate the requirements of being built on pilings and be able to withstand high humidity?**

Yes.

**Is post and beam construction feasible for this system?**

Yes. This system involves a concept of envelope spaces and openings combined with insulating values and quantities of thermal mass; and as such, it does not dictate any type of structural system or any architectural style.

**Are there critical dimensions in the roof and north wall plenums for the free area?**

Yes, the minimum cross section restriction here should be about eight inches, and twelve inches is better.

**Is a vapor barrier necessary under the crawl space?**

This depends upon the moisture conditions of the site, but normally they are not necessary.

**What about vents from the outside to the crawl space?**

Except where underground cooling tubes are required for summer cooling, no vents are required to the crawl space. Since the crawl space is connected to the air envelope and a relatively large area of exterior building skin, there is sufficient air movement due to gravity convection and outside air infiltration to satisfy any concerns or building code requirements for crawl space ventilation.

**What sort of insulation is used?**

The type of insulation is not important. What is important is that you understand the limitations, the cost and the effectiveness of the various different insulations in doing their basic job.

We normally recommend conventional fiber batt insulation and rigid polystyrene board in certain applications.

EKOSE'A HOMES

Natural Energy Conserving Designs



# PRODUCTS

Products are provided for purchase or free of charge as noted for each product and for downloading to your computer as electronic files in PDF format. In order to view a PDF file on your computer, you need either Adobe Reader, free from www.adobe.com, or Foxit Reader, free from www.foxitsoftware.com.

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## CONSTRUCTION DOCUMENTS PACKAGE

**$500** each **Design**

**Add to Cart** from the detailed page of each Ekose'a Homes DESIGN:

- CLICK on **Climate Zone & Design Chart** or **Portfolio** from the **Home Designs** menu
- CLICK on a DESIGN from the **Design Chart** or **Portfolio** to see the detailed page of each DESIGN

The **Construction Documents Package** or **CDP** represents the plans, specifications, and other related information for each of the **Home Designs**, with a few noted exceptions.

The **CDP** is provided in full size plans (36"x24") for purchasing, downloading, and customer printing.

The **CDP** includes the following minimum information and may include additional information depending on the extent of services provided for the original design:

- Foundation and Framing Plans
- Floor Plans
- Building Elevations
- Building Cross-Sections
- Construction Details
- Electrical Plans
- Specifications related to Ekose'a concepts and performance criteria

Each **CDP** is a copy of the hand-drafted plans of the original custom design that pre-date current drafting practices of Computer Aided Drafting (CAD). Over time, Ekose'a Homes will convert these plans into AutoCAD DWG format that will make them more presentable and useful, particularly in making modifications to the plans in order to meet specific site conditions, owner needs, and local requirements. Since this will create added value in terms of their usefulness and savings to the owner in making modifications, the cost of the CDP will be increased for future Auto CAD editions.

### CDP SERVICES PACKAGE

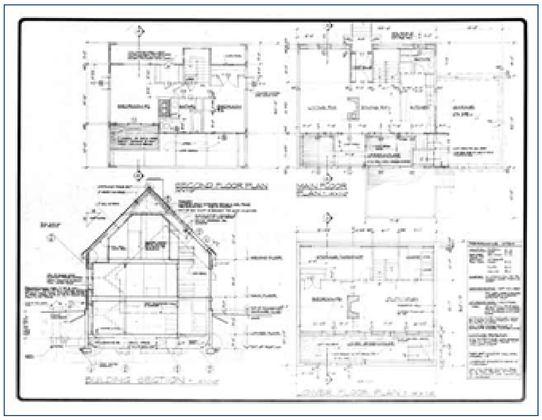
**$4000** for a **CDP Services Package** including an **AutoCAD CDP**.

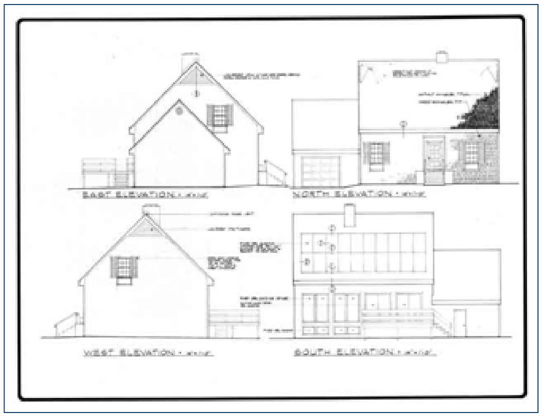
If you want a CDP in AutoCAD DWG format before its availability online, Ekose'a Homes will include the converted plans as part of **CDP Services**.

CLICK on **Consulting Services** from the **Services** page for information about **CDP Services**.

Contact Ekose'a Homes to request the Consulting Services Package.

### EXAMPLE CDP

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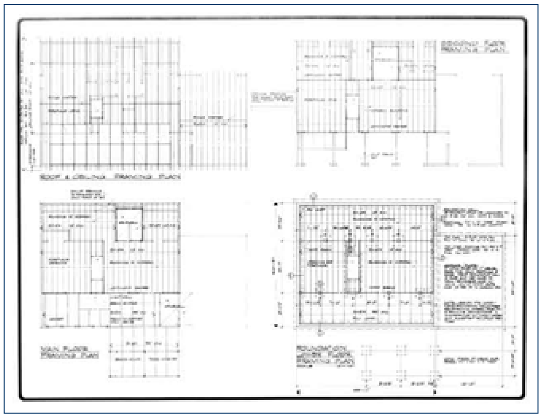
NORTH ELEVATION
WEST ELEVATION
SOUTH ELEVATION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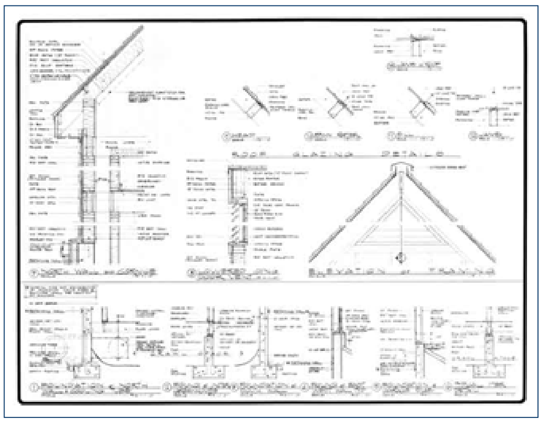
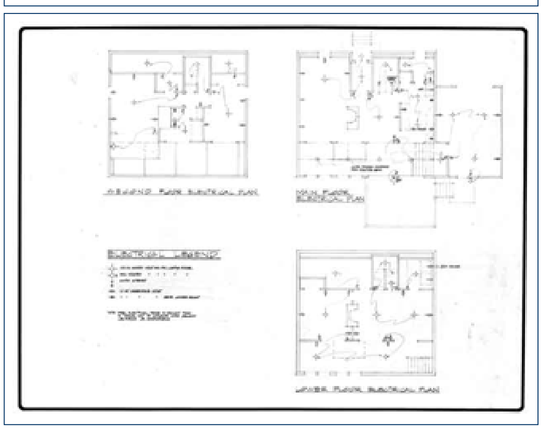
ROOF & CEILING FRAMING PLAN
MAIN FLOOR FRAMING PLAN
FOUNDATION LOWER FLOOR FRAMING PLAN


ROOF GLAZING DETAILS


SECOND FLOOR ELECTRICAL PLAN
MAIN FLOOR ELECTRICAL PLAN
ELECTRICAL LEGEND
LOWER FLOOR ELECTRICAL PLAN

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# EKOSE'A HOMES

**Natural Energy Conserving Design**

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▪ Introduction
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▪ How It Works
▪ Home Designs
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▪ Q & A
▪ Products
▪ Services

## SERVICES

Should you decide to develop a custom Ekose'a Homes design or incorporate the concepts of Ekose'a Homes into your own design or building project, your next step is to consider the options of Services listed below, which are most relevant to your needs and particular situation

Please intiate inquiries or requests for services via email to info@EkoseaHomes.com

Also, we are working on setting up a network of representatives who as homeowners and builders of Ekose'a Homes will provide the opportunity for visitors to talk with them and to physically experience the environmental quality of thier homes. These individuals will also be qualified by Ekose'a Homes in various capacities to provide local assistance and services.

### ARCHITECTURAL SERVICES

- Single Residential
- Multi-Residential
- Commercial
- Institutional

**PROVISIONS**

- Schematic Design and Preliminary Plans
- Construction Documents
- Construction Observation
- Commissioning and Fine-Tuning of Building Performance

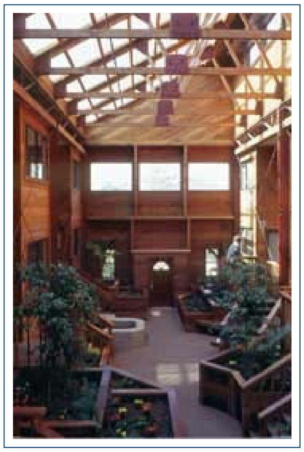
**COST**

**15%** of estimated construction cost (square footage of proposed house X standard square foot cost for the area). This figure applies to single family residential and small building projects with a construction cost fo up to $500,000. The cost of services for larger projects is negotiated on a per project basis. Traveling expenses and other out-of-pocket costs are additional.

**NEXT STEP**

Submit a Program Package including the following:

- Verbal description of the project: building type, location, site
- Square footage, standard costs, and budgeting information
- Anticipated schedule
- Topographical survey and/or site survey
- Photographs of the site, reference to site survey or a plan sketch indicating orientation
- Preliminary plans, sketches, magazine clippings



**Ekose'a Homes** will prepare a contract for services based on the Program Package of information. Following agreement, Ekose'a Homes will arrange to visit the site and finalize program requirements.

## CONSULTING SERVICES

**Design Coordination** of new or existing buildings in collaboration with an architect or builder-developer.

Ekose'a Homes will act as the Passive Heating, Ventilating, Air Conditioning (HVAC) consultant to coordinate design development of natural energy systems for environmental health and comfort.

Services, fees, and other requirements vary with the type and size of the project. Services may be provided by means of verbal and written communications, standard documents, and notations and mark-ups on drawings submitted for review and evaluation.

## COMPUTERIZED THERMAL EVALUATION

A Computerized Thermal Evaluation may be run for any building incorporating the gravity geo-thermal convection envelope and other passive solar buildings. A completed Thermal Evaluation includes a computer printout and supplemental text for identification and clarification of the following data:

- Annual heating and cooling load calculations
- Peak loads
- Comparative energy costs
- Natural energy contributions

Generally, complete construction documents, fuel costs, site and weather data are required to perform the computer evaluation.

Because of the dynamic nature of the air envelope, local climate, insufficient database of monitoring data, and other widely variable conditions of the building project, an accurate methodology and modeling software for predicting the performance of Ekose'a Homes are not presently available. However, the energy modeling software currently in use provides generally conservative but reasonable estimates of thermal performance and useful in the following ways:

- Secure building permits and institutional financing
- Provide guidelines for back-up heating and cooling requirements

# EKOSE'A HOMES

## Natural Energy Conserving Design



## CONTACT

Ekose'a Homes

500 Montgomery St.

San Francisco, CA 94111

415-933-800

Please make initial inquiries via email as this is the most practical and expedient means of contacting us and receiving a timely response. Thank you for your interest in Ekose'a Homes, and we look forward to hearing from you.