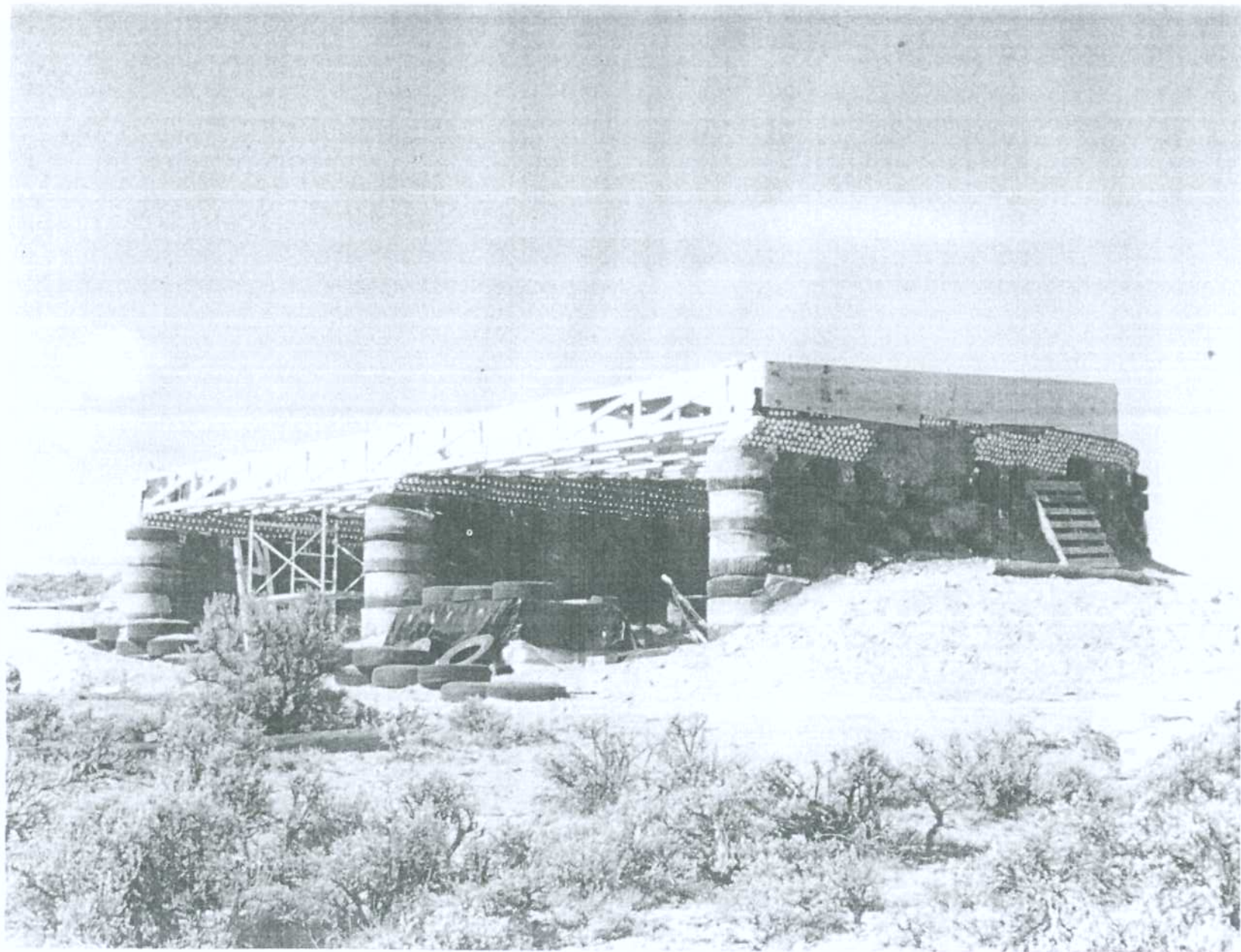


PART FOUR
1993 NEW DIRECTIONS





10. A BUILDING CODE FOR BEARING AND RETAINING WALLS MADE FROM EARTH-RAMMED TIRES

IN EARTHSHIP VOLUME I WE PRESENTED A METHOD OF BUILDING LIVING MODULES FROM DISCARDED AUTOMOBILE TIRES RAMMED WITH EARTH. OVER THE TWENTY TWO YEARS OF DEVELOPMENT AND RESEARCH, WE HAVE COME TO THE OPINION THAT THIS METHOD FAR EXCEEDS ANY OTHER KNOWN BUILDING TECHNIQUE WITH REGARD TO THERMAL, STRUCTURAL, ENVIRONMENTAL, AND AVAILABILITY ASPECTS. OUR BOOKS ARE AIMED AT MAKING THIS CONCEPT PHYSICALLY AVAILABLE TO OWNER BUILDERS. IF THE METHODS PUT FORTH IN THESE BOOKS ARE FOLLOWED, THE RESULT IS A VERY "SUBSTANTIAL LIVING MODULE". HOWEVER, IF THE CONCEPT IS USED BUT NOT EXECUTED COMPETENTLY WITH APPROPRIATE RESPECT FOR AND UNDERSTANDING OF THE NATURE OF THE MATERIAL, AN UNSAFE BUILDING CAN BE THE RESULT. THIS IS TRUE OF ANY BUILDING TECHNIQUE. THIS IS WHY WE HAVE BUILDING INSPECTORS. THESE BUILDING INSPECTORS HAVE A CODE (THE UNIFORM BUILDING CODE - UBC) TO FOLLOW. THIS CODE PROVIDES CRITERIA FOR AN INSPECTOR TO RELATE TO IN DETERMINING WHETHER A PARTICULAR BUILDING TECHNIQUE IS BEING EXECUTED SAFELY OR NOT. THE PURPOSE OF THIS BUILDING CODE FOR BEARING AND RETAINING WALLS MADE FROM EARTH-RAMMED TIRES IS TO PROVIDE THAT SAME KIND OF CRITERIA FOR AN INSPECTOR TO RELATE TO IN DETERMINING WHETHER A TIRE BUILDING IS BEING EXECUTED SAFELY OR NOT. ANY BUILDING TECHNIQUE CAN BE EXECUTED IN A COMPETENT MANNER OR AN INCOMPETENT MANNER. TIRE BEARING WALLS AND THE PERIPHERAL DETAILS ARE NO EXCEPTION. THIS CODE WILL BE AIMED AT BOTH THE INSPECTOR AND THE BUILDERS AS A CLEAR SIMPLE PRESENTATION OF TIRE CONSTRUCTION STANDARDS ("DOS AND DON'TS") THAT MUST BE FOLLOWED TO INSURE A SUCCESSFUL, SAFE, COMFORTABLE BUILDING. IT IS OUR HOPE THAT VARIOUS STATES WILL ADOPT THIS CODE AS THEY MOVE INTO THE ERA OF THE USE OF AUTOMOBILE TIRE CASINGS FOR THE CONSTRUCTION OF BUILDINGS HERE IN THE LATER PART OF THE TWENTIETH CENTURY.

The walls are really the only aspect of a tire building that is significantly unconventional. The roof and floors use conventional materials and are covered by the existing Uniform Building Code. Therefore a thorough presentation of the **standards for bearing and retaining walls made from automobile tire casings rammed with earth** will be used as a guide to those whose job it is to inspect tire buildings for structural integrity, safety and quality.

1. TIRE SIZES USED IN BEARING AND RETAINING WALLS

Automobile tires come in sizes called 13, 14, 15 and 16. These sizes relate to the radius of the tire in inches, #13 tires being the smallest tires used in a bearing or a retaining wall and #16 tires being the largest. These sizes will be specified in different parts of the structure as such.

2. TIRE WALL AS FOUNDATION

In that a tire wall is already wider than its required foundation, it becomes a monolith which is both wall and foundation (see EARTHSHIP VOL. 1 pp. 65-66).

A. The first course of tires of any tire wall must be leveled and dug into undisturbed soil free of organic surface matter such as plants, tree roots or other bio-degradable substances.

B. The first course of tires must be as large in diameter or larger in diameter than any other tire in the wall. No tire may appear in a wall that is larger in diameter than the tires on the ground course of that wall.

C. Tire walls over six courses high must have a ground course of tires #15 or larger exclusively.

3. COURSING

A. All tire walls must use staggered running bond coursing.

B. Joints between tires on any given course must be aligned with the central area of all tires on courses above and below. No joint between tires on any given course may align with any joint on the courses above or below.

C. Half tire techniques as outlined in article 4 must be used to maintain running bond coursing.

4. HALF TIRE TECHNIQUES

A. WOOD HALF TIRES

Wood half tires are outlined in EARTHSHIP VOL. I pp. 95-97. Wood half tires must be treated with two coats of wood preservative and wrapped in two layers of six mill plastic when they occur on outside walls. Breather slits must be slashed into the inside surface of all wrapped wood half tires occurring in exterior tire walls. Wood half tires must be treated with two coats of wood preservative with no plastic wrapping when used on inside walls. Wood half tires must be wired to the adjacent tires in their particular course as per EARTHSHIP VOL I pp. 95-97.

B. CONCRETE HALF TIRES

Concrete half tires must use a mix of 3 parts cement-4 parts sand-5 parts gravel with engineering fibers. All tires adjacent to concrete half blocks must be

porcupined (see EARTHSHIP VOL III pp. 2-4) with 16d nails to lock concrete to tires. In that concrete half tires are the most substantial half tire method, they will be specified in some situations by the architect. All two story tire wall applications will use concrete half tires.

C. RAMMED EARTH HALF TIRES

Rammed earth half tires are described in EARTHSHIP VOL III p. 5. Rammed earth half tires can be used only in tire walls five courses high or less and never at the end of a wall.

5. BEARING WALLS

A. Bearing walls built from earth rammed automobile tire casings must follow articles 1 through 4 of this code.

B. All bearing walls built from earth rammed automobile tire casings must have a continuous bond beam of wood or concrete as described in EARTHSHIP VOL I pp. 101-103 or EARTHSHIP VOL III pp. 6-9.

C. All bearing walls eight courses or higher for their entire length built from earth rammed automobile tire casings must have a continuous bond beam that connects to a continuous bond beam on adjacent non bearing tire walls.

6. RETAINING WALLS

A. All retaining walls built from earth rammed automobile tires must follow articles 1 through 4 of this code.

B. All retaining walls built from earth rammed automobile tire casings must be stepped back or lean into the earth they are retaining.

C. Specifications and construction drawings certified by a licensed architect must appear in the stamped construction drawings for the permitted building for all retaining walls built from earth rammed automobile tire casings.

7. FREE STANDING WALLS

DEFINITION - Any wall not tied into the roof structure of a building.

A. All free standing walls built from earth rammed automobile tire casings must follow articles 1 through 4 of this code.

B. All free standing walls over 2 courses high built from earth rammed automobile tire casings must have continuous arcs built into the design of the wall. These walls cannot be straight for any distance.

C. Free standing walls built of earth rammed automobile tire casings cannot be over 5 courses high unless designed by an architect and certified specifications and construction drawings are provided for that wall.

8. PLATES AND BOND BEAMS

A. All tire walls that are an integral part of the roofed building shall have a **continuous** wood or concrete bond beam. This bond beam shall be anchored to the tire wall with 1/2" anchor bolts set in concrete every other tire or 1/2" rebar driven down through

three courses of tires and bent over the top of the wood plate or set in the concrete bond beam.

B. Wood bond beam plates shall be no less than four inches thick and twelve inches wide. Wood bond beam plates can be made up of (2) 2 x 12 's with 6 mil plastic between the rammed earth tire wall and the wood bond beam plate. The bottom bond beam plate must be treated lumber. Joints in the lower layer of lumber shall never be closer than 2'-0" away from joints in the upper layer of lumber. Upper and lower layers of lumber shall be laminated with (6) 16d nails per running foot.

C. Concrete bond beams shall be a minimum of 8" deep x 8" wide and have two pieces of 1/2" rebar continuous.

9. OPENINGS IN WALLS

A. All openings in walls made of earth rammed automobile tires shall have concrete half blocks on either side of the opening.

B. The wood or concrete bond beam spanning the opening shall be increased in thickness by a minimum of 8". This additional thickness shall extend on either side of the opening a minimum of 2'-4" and shall set on and be anchored to a concrete bearing block equivalent in thickness to the tire coursing height.

10. TWO STORY

A. All two story earth rammed tire structures shall be designed by a licensed architect or engineer.

B. A continuous 9" deep x 2'-0" wide concrete bond beam must occur at each floor level.

C. All tires on the first level must be #15 or larger.

D. All tires on the second level must be #14 or smaller.

E. All blocking must be concrete.

F. All void packing on the first floor level walls must be concrete.

G. All earth rammed tire work must follow articles 1 through 4 of this code.

11. LENGTH OF WALLS

A. In that rammed earth tire walls are not made of a rigid material that is sensitive to expansion and contraction cracks, there is no limit on the length of a earth rammed tire wall.

12. HEIGHT OF WALLS

A. The maximum height for a straight earth rammed tire wall which is an integral part of a structure with a roof or floor load is 10 feet. At this point a wood or concrete bond beam must be installed as per article 8 of this code.

B. The maximum height for a circular earth rammed tire wall which is an integral part of a structure with a roof or floor load is 12 feet. At this point a wood or concrete bond beam must be installed as per article 8 of this code.

C. The maximum height for a free standing earth rammed tire wall that is not a curved or a battered retaining wall or otherwise structurally integrated into a building is 6 feet.

D. There is no maximum height for a battered retaining wall constructed from earth rammed tires. All battered retaining walls must be engineered by a licensed architect or engineer.

13. LOADING OF WALLS

A. Loading on earth rammed tire walls must be **distributed loading** only from joists, beams or rafters setting on a continuous wood or concrete bond beam as per article 8 of this code.

B. **No point or collected loading** is possible on earth rammed tire walls unless special engineering is provided by a licensed engineer or architect.

C. The limits of the **evenly distributed** load an earth rammed tire wall can accept are determined by the bearing capacity of the soil that the earth rammed tire wall is setting on. In cases where an earth rammed tire wall is setting on rock or a concrete foundation which is wider than the tire wall itself and more than typical roof or second story loading is desired, the bearing capacity of the tire wall will be determined by a licensed architect or engineer.

14. FILL OF WALLS

A. Earth rammed tires walls can be filled or rammed with any type of earth, clay, sand or rock fill.

B. All tire casings must be packed tight to 90% compaction with a 6# to 9# sledge hammer. Soft spongy tire packing is not acceptable.

15. VOID FILLING

A. All voids between tires in earth rammed tire walls must be packed solid with mud in a four coat procedure described in Earthship Volume I pages 174-175 unless specific conditions require this packing to be done with concrete as per article 10 of this code.

16. EARTH CLIFFS

A. All Earth cliffs shall be 12" minimum from an earth rammed tire wall.

B. All earth cliffs shall be approved as a result of site and soil inspection by a licensed architect or engineer.

C. Earth cliffs can only occur under non bearing earth rammed tire walls or walls only loaded from one side such as east or west end walls.

17. JOINTS

A. All joints and connections in earth rammed tire walls must be designed and assembled in such a way so that no voids occur within the earth rammed tire wall. These voids must be filled with concrete or 90% compacted earth contained in a double layer of metal lath or a rubber tire casing.

B. All joints and connections in earth rammed tire walls must employ over lapped tires and joining

methods so as not to result in stacked joints occurring over each other.

The regulations for earth rammed tire construction put forth in this code are a guideline relating to structure only and are subject to evolution, refinement, and addendum.

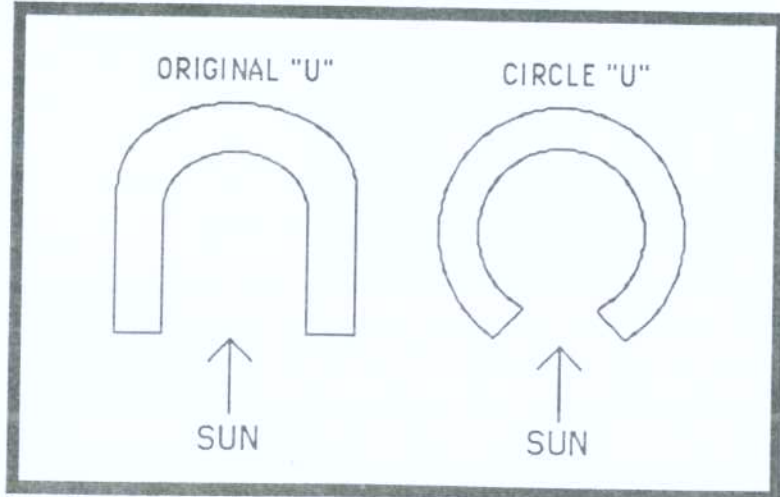
11. THE SURVIVAL POD

THE EARTHSHIP CONCEPT HAS TAKEN SOME FAIRLY RADICAL IDEAS AND EVOLVED THEM INTO A FORM THAT IS PALATABLE TO THE MAJORITY OF THE POPULATION, CONSIDERING THE GRIP OF EXISTING CODES, REGULATIONS, TRADITIONS AND DOGMA. WE THEREFORE STILL USE SOME CONVENTIONAL TECHNIQUES AND MATERIALS LIKE WOOD TRUSSES, FIBERGLASS INSULATION, MODIFIED BITUMEN ROOFING, ETC. AS WE HAVE VENTURED AROUND THE WORLD WITH THE EARTHSHIP CONCEPT WE HAVE OBSERVED THAT IN MANY COUNTRIES WOOD IS SOMETIMES SCARCE AND IS GETTING EXPENSIVE FOR ALL OF US. CONVENTIONAL INSULATION AND ROOFING MATERIALS ARE ALSO HARD TO FIND. **ALUMINUM CANS, AUTOMOBILE TIRES AND CONCRETE** HOWEVER, SEEM TO BE *EVERYWHERE*. WE DECIDED TO RESPOND TO THIS OBSERVATION WITH A *MORE RADICAL FORM OF THE EARTHSHIP CONCEPT* THAT USES LESS WOOD, NO CONVENTIONAL INSULATION, AND NO MANUFACTURED ROOFING MATERIALS. THESE MATERIALS ARE REPLACED WITH YET MORE RECYCLED BY-PRODUCTS OF THE 21ST CENTURY AND CONCRETE. THIS MORE RADICAL EARTHSHIP WOULD BE, IN TERMS OF INITIAL MATERIALS, CHEAPER THAN THE ORIGINAL EARTHSHIP BUT LESS ACCEPTABLE TO CODES AND REGULATIONS. THERE ARE PLACES (3RD WORLD COUNTRIES) AND SITUATIONS (PEOPLE WITH A LOT OF TIME AND NO MONEY) WHERE THIS APPROACH WOULD HAVE SOME MERIT. WE PRESENT THE SURVIVAL POD, AN ALMOST TOTALLY RECYCLED BUILDING.

Graphics by Claire Blanchard

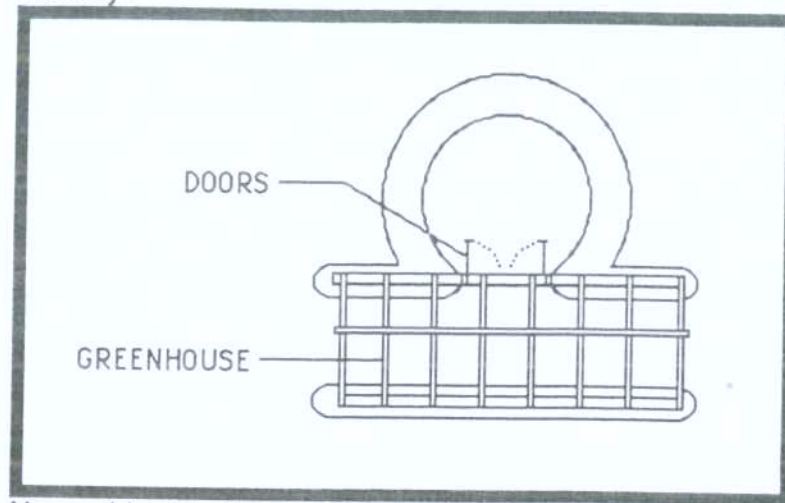
We were asked specifically in Europe and Bolivia to try to extend the recycling thinking of the basic Earthship a little farther into its *rather conventional roof structures*. The survival pod eliminates the wood beams and/or trusses for roof structure. We have been working with aluminum can/cement domes for many years (see Earthship Volume II, Chapter 11). These domes did not, however, lend themselves to the "U" shaped roofing needs nor the catch water needs. Insulation for these domes has also been an expensive spray-on high-tech problem in the past. We sometimes used double domes with insulation in the middle of the two domes but this was also expensive in that we had to build two domes just to achieve insulation (see Earthship Volume II, p. 213).

In an effort to address these issues, we took the tire "U" and molded it into more of a circle so it would receive a dome.

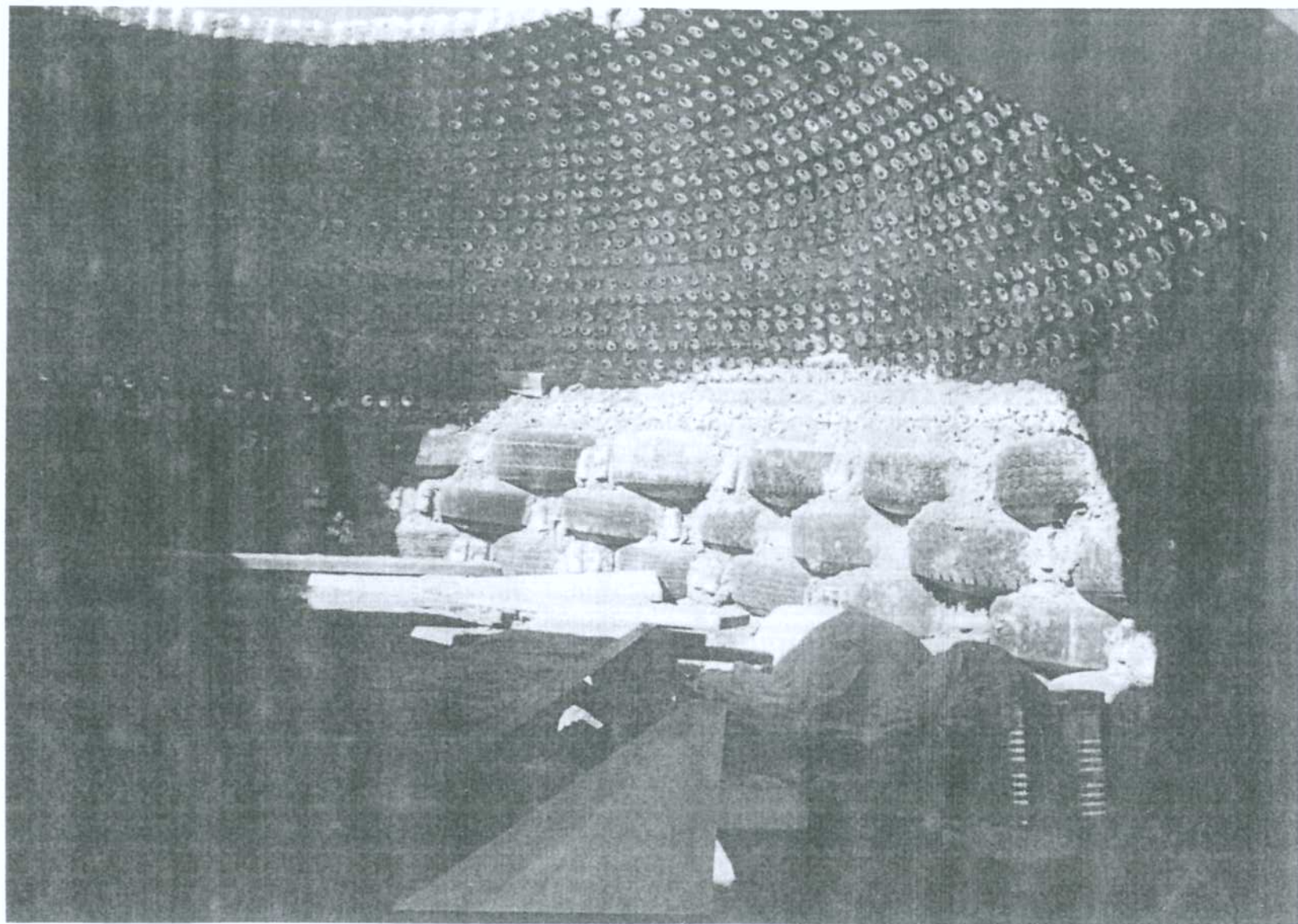


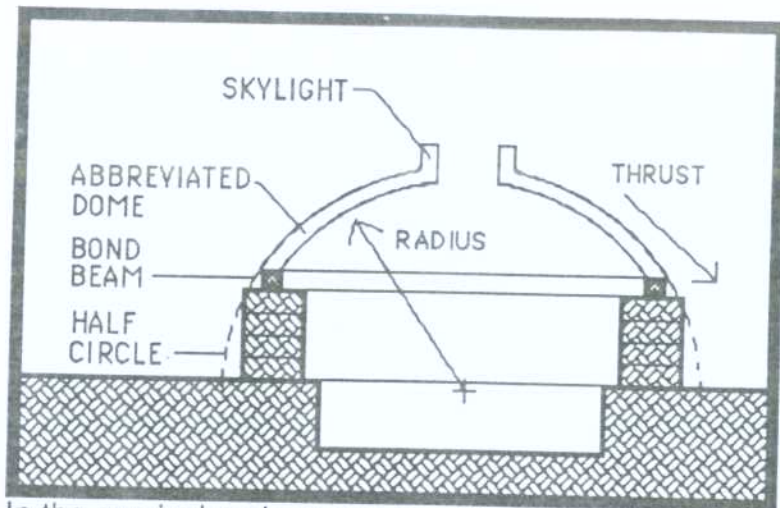
We find this to be satisfactory as the more narrow south opening of the circle could be closed off with glass doors to shut the space off from heat loss

through the greenhouse at night. This compensated for the somewhat lower amount of heat gain during the day.

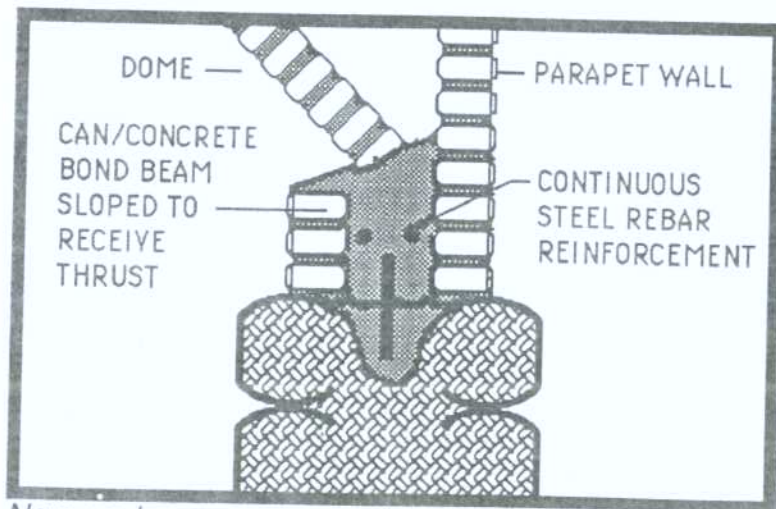


Now with the circular shape we could apply a dome made of aluminum cans and cement (see Earthship Volume II, p. 213). These domes are primarily *perforated cement domes formed* with cans. They take more time to build than wood structures but only one skill, minimal tools, and one purchased material - cement. *Concrete domes can be very dangerous if not executed properly.* Consult Earthship Volume II chapter 11 and SSA or an engineer before you proceed. The dome closes with a skylight "turtleneck" at the top and sits on a continuous can/concrete bond beam (see Earthship Volume II, pp. 220-221 and page 165 this Chapter).



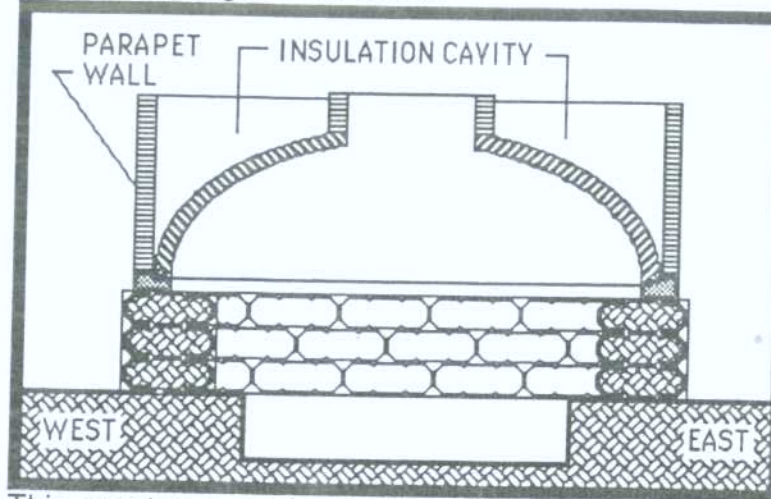


In the survival pod we use an abbreviated dome - not a full half circle. This creates more thrust at the point where it joins the tire circle, hence the structural concrete bond beam. We have a slight slope on this bond beam to receive this thrust.



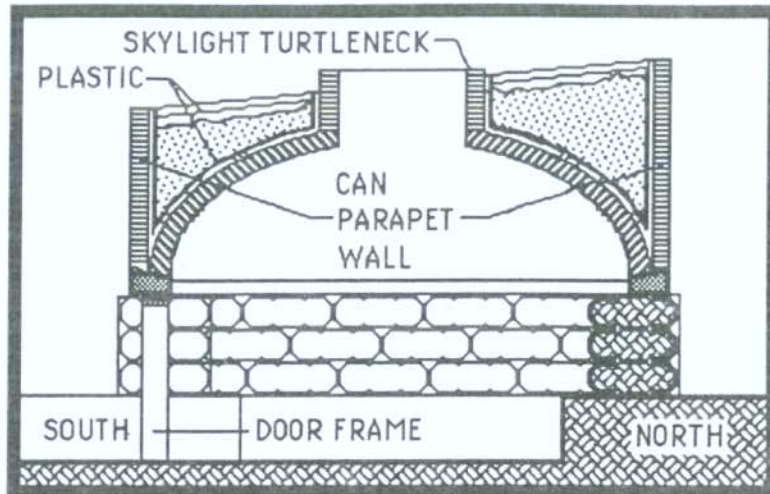
Now we have a room enclosed using no wood.

How do we insulate this room in a low tech way with recycled materials and few skills? We take another aluminum can parapet wall up off the bond beam around the edge of the dome.

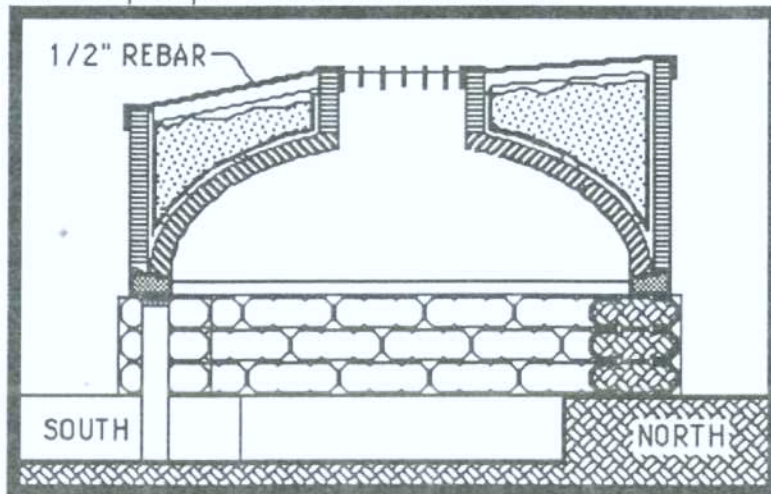


This creates a cavity for insulation. Many different recycled insulations can be used. If you're in a city, use shredded paper. If you're in the country, use straw. Do not use hay as it may spontaneously combust. If you're near a saw mill use *dry* saw dust. Keep all recycled and organic materials dry or they will compost and become a fire hazard. Other possibilities are scrap styrofoam, pumice, cloth, etc. This cavity must be lined, before filling, with 6 mil plastic for a typical vapor barrier and after filling, another layer of plastic is advised.

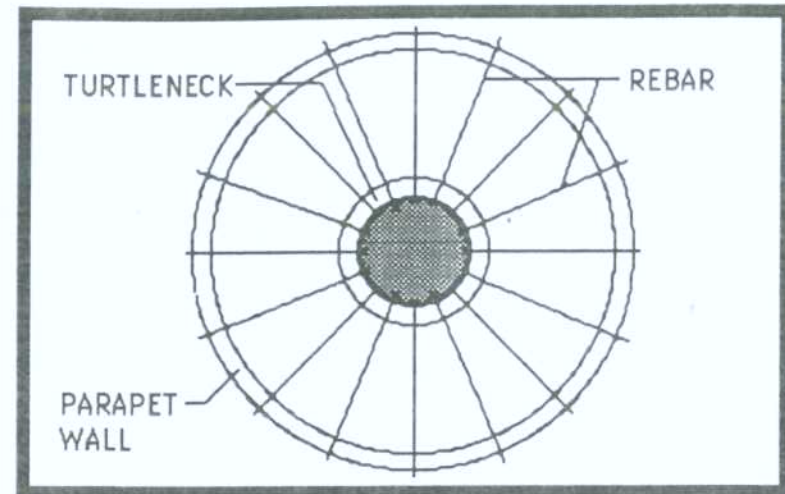
Notice that the can wall forming the cavity is shorter on the south side. This is so the eventual roof covering the cavity can slope to the south for catch water purposes.



The roof can be made by stretching regular steel rebar from the "turtle neck" of the skylight opening to the can parapet wall around the dome.

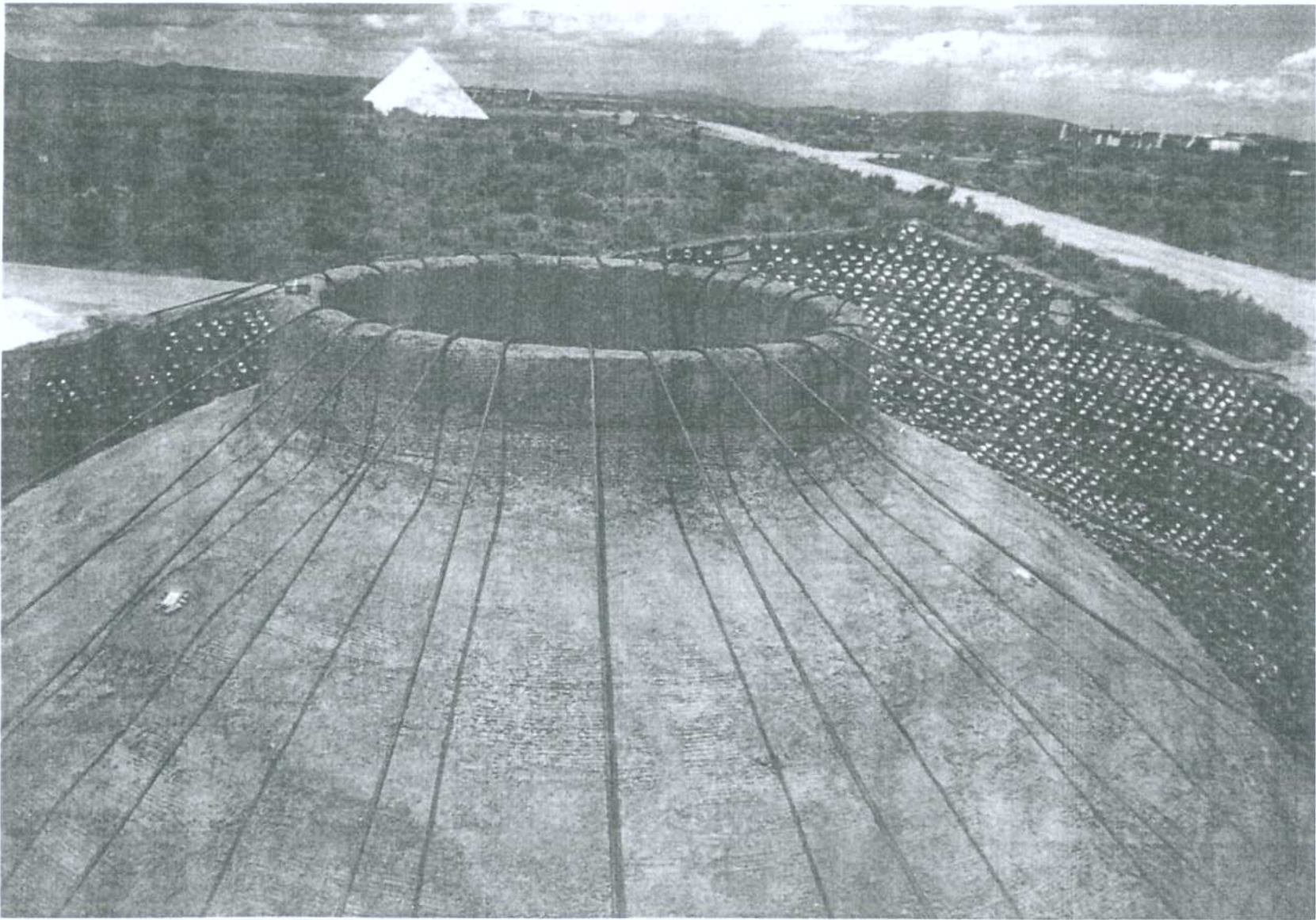


This rebar spokes out all the way around the dome.

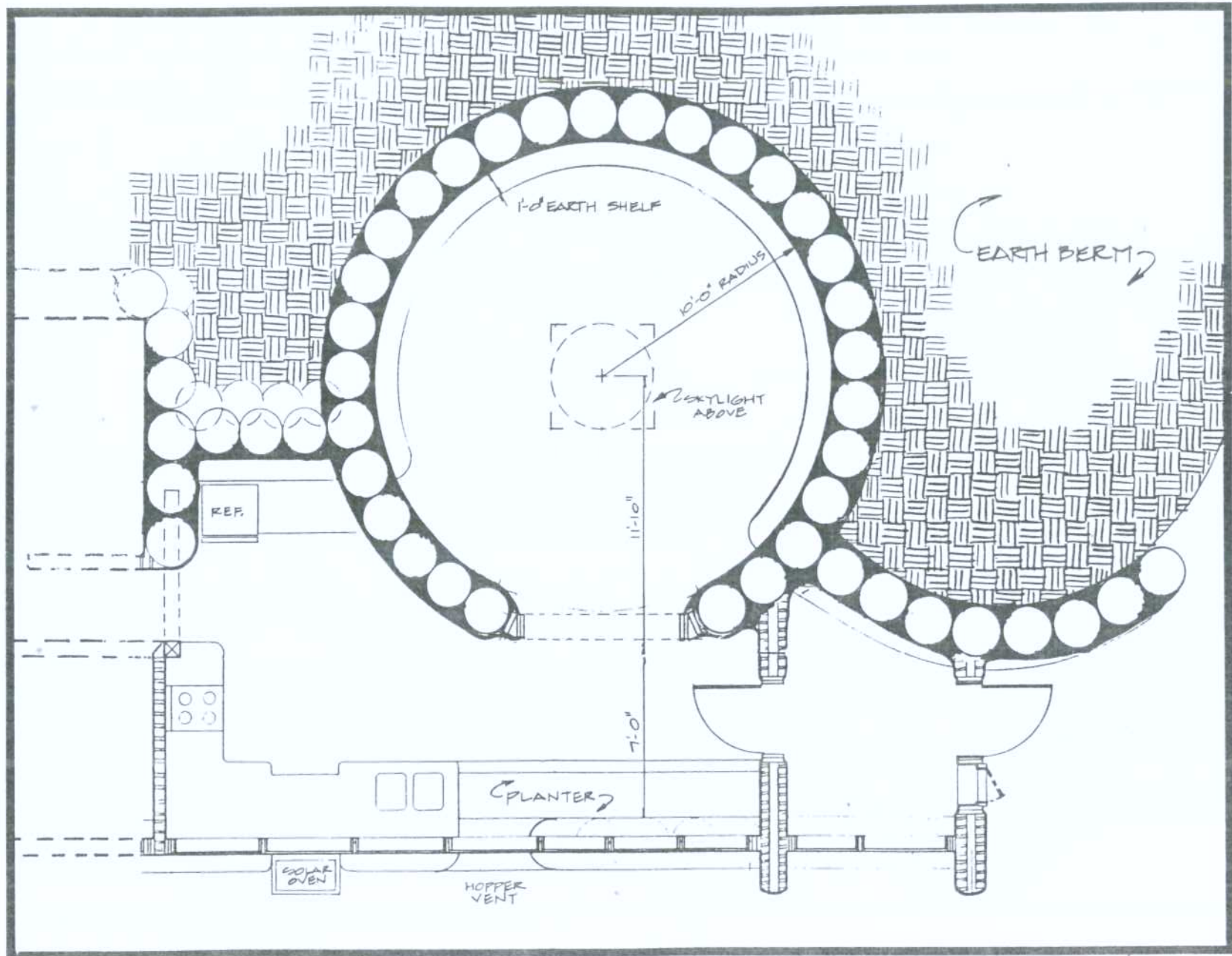


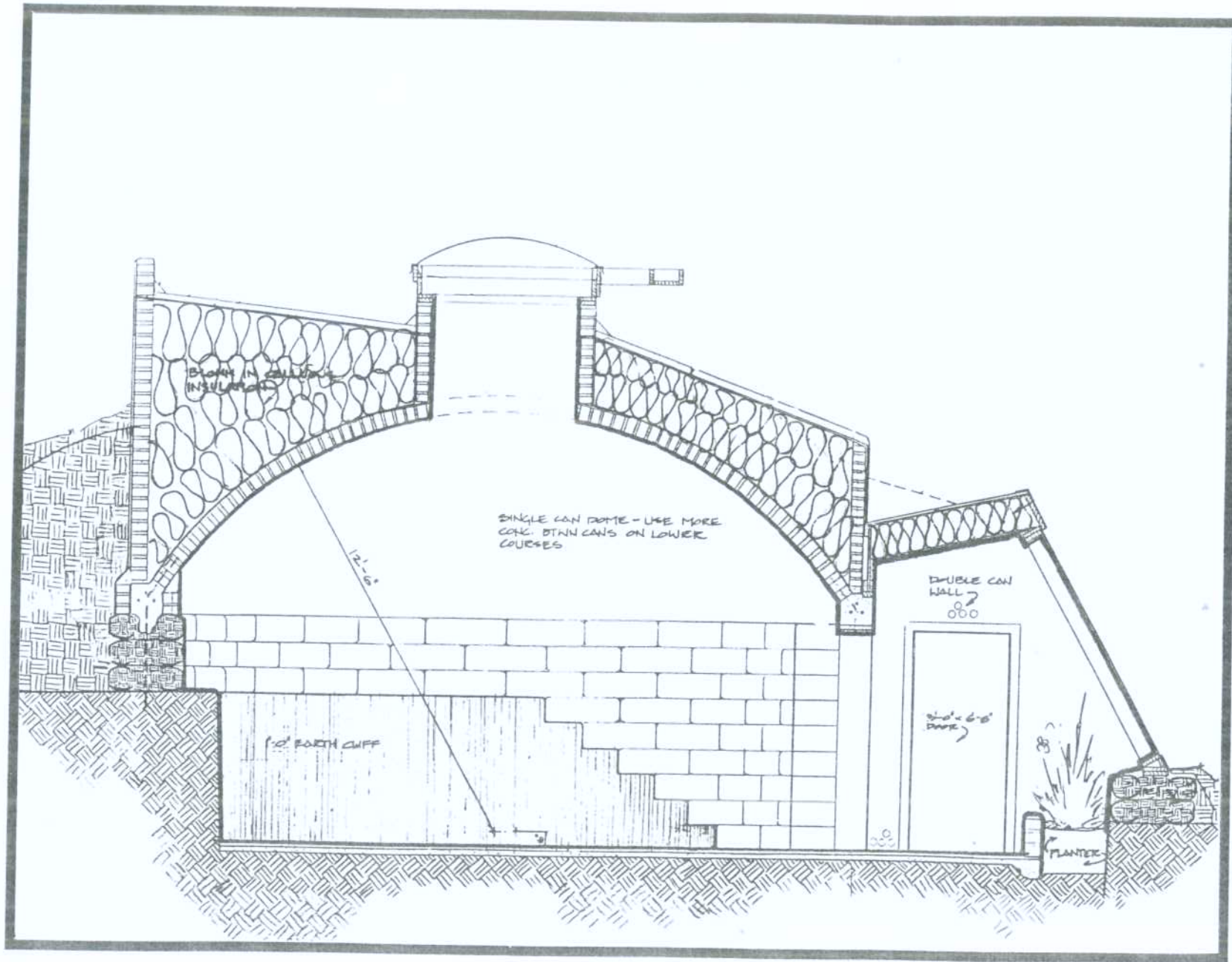
This is then covered with metal lath or a double layer of chicken wire and plastered with 4 coats of regular cement plaster with engineering fibers, scratched after each coat. The final smooth (troweled) coat of plaster can be painted with what ever is available. We use regular latex or an acrylic base paint (see appendix this chapter) to catch clear water.

You now have a **survival pod** using nothing but concrete and recycled free materials. A typical Earthship greenhouse structure can be leaned up against this unit with systems integrated accordingly.

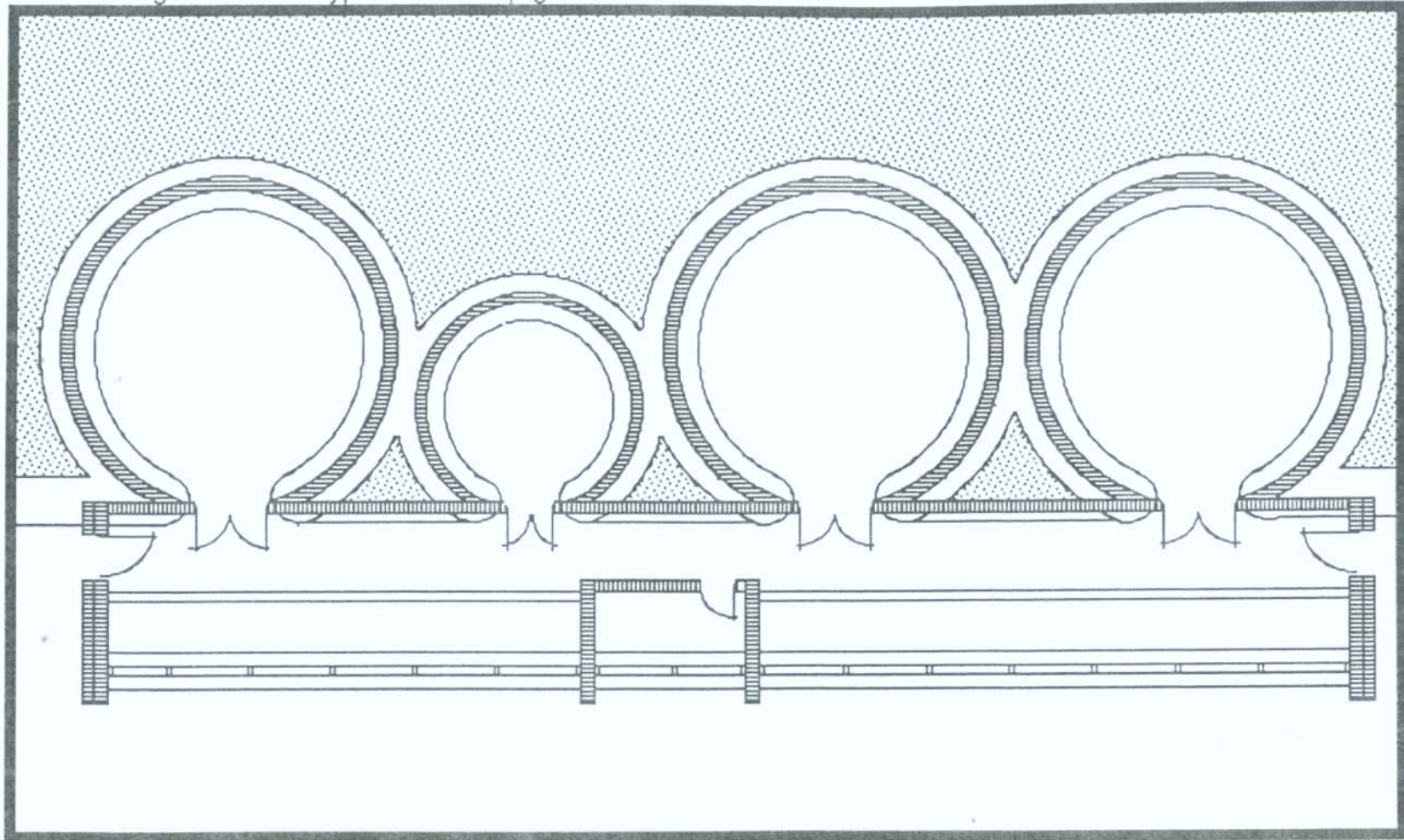


FORMING THE INSULATION CAVITY OF THE CAN DOME

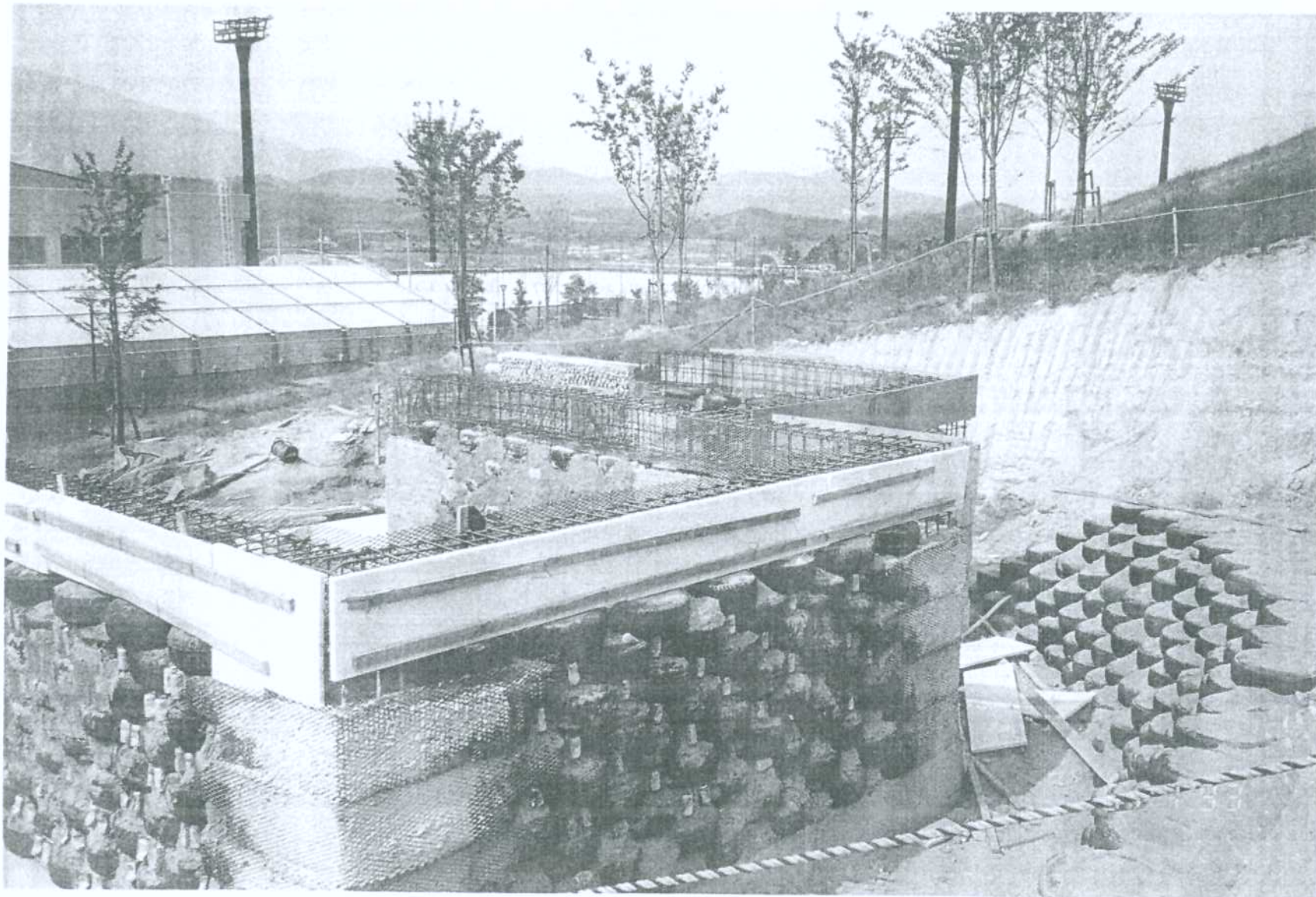




This unit can be built almost anywhere on the globe with "local" materials and local unskilled labor. It can certainly be owner built and moved into before (or without) the greenhouse. Many pods of varying diameters can be linked together with a typical Earthship greenhouse.



It is truly a cellular "natural" home with by-products that we humans discard from our daily lives.



EARTHSHIP IN JAPAN SHOWING KNITTED IN CONCRETE POST AND BEAM FOR EARTHQUAKE DESIGN

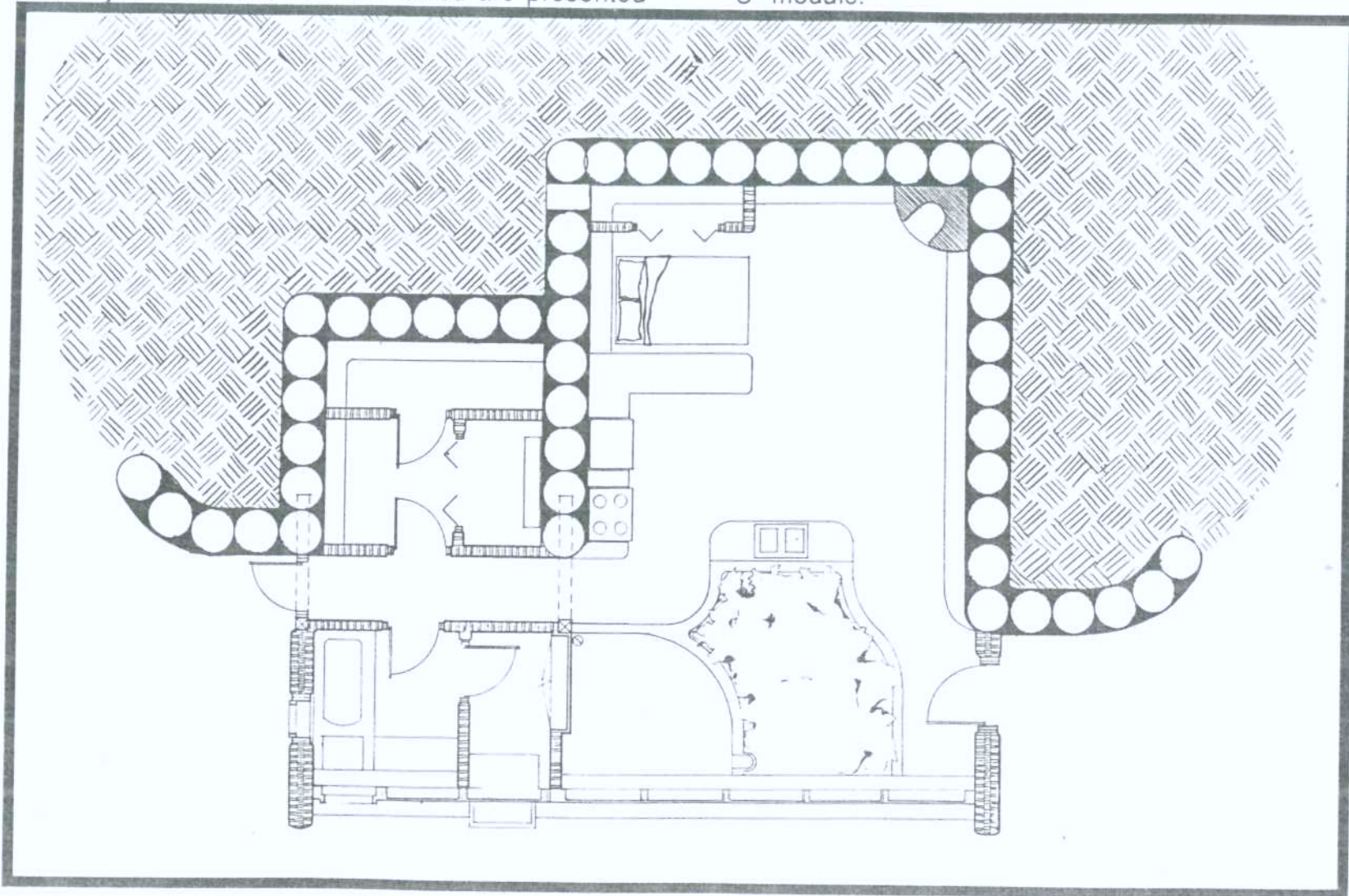
12. CLIMATIC ADAPTATIONS

A FOUR WHEEL DRIVE TRUCK DESIGNED FOR STEEP MOUNTAIN ROADS IS AN AUTOMOBILE POWERED BY A GASOLINE ENGINE. A PORSCHE DESIGNED TO GO 200 MPH IS ALSO AN AUTOMOBILE POWERED BY A GASOLINE ENGINE. THESE ARE BOTH TWO DIFFERENT ADAPTATIONS OF THE SAME CONCEPT - *THE AUTOMOBILE*. THE EARTHSHIP CONCEPT - AN INDEPENDENT DWELLING VESSEL CONSTRUCTED FROM TIRES RAMMED WITH EARTH - DESIGNED TO MAINTAIN TEMPERATURE AND HARVEST ENERGY AND WATER FROM ITS IMMEDIATE ENVIRONMENT - IS ALSO CAPABLE OF MANY DIFFERENT ADAPTATIONS. THESE ADAPTATIONS WILL GEAR THE PERFORMANCE OF THE VESSEL TO THE DEMANDS OF ITS LOCAL CLIMATE. IN SOME CLIMATES THE TEMPERATURE CONTAINED BY THE MASSIVE WALLS WILL BE WARMER THAN THE OUTSIDE AND SOLAR ENERGY WILL BE ADMITTED AND STORED. IN OTHER SITUATIONS THE TEMPERATURE OF THE MASSIVE WALLS WILL BE COOLER THAN OUTSIDE AS THEY ABSORB TEMPERATURES FROM THE COOL EVENING AIR AND THE EARTH ITSELF. THE SOLAR ENERGY IN THIS CASE IS BLOCKED WHILE BREEZES AND UNDER GROUND TEMPERATURES ARE ADMITTED. THIS CHAPTER WILL EXPLORE THE VARIOUS WAYS THE EARTHSHIP AND ALL THE SURROUNDING EARTHSHIP HARDWARE IS APPLIED TO RADICALLY DIFFERENT CLIMATES AND SITUATIONS.

Graphics by Claire Blanchard

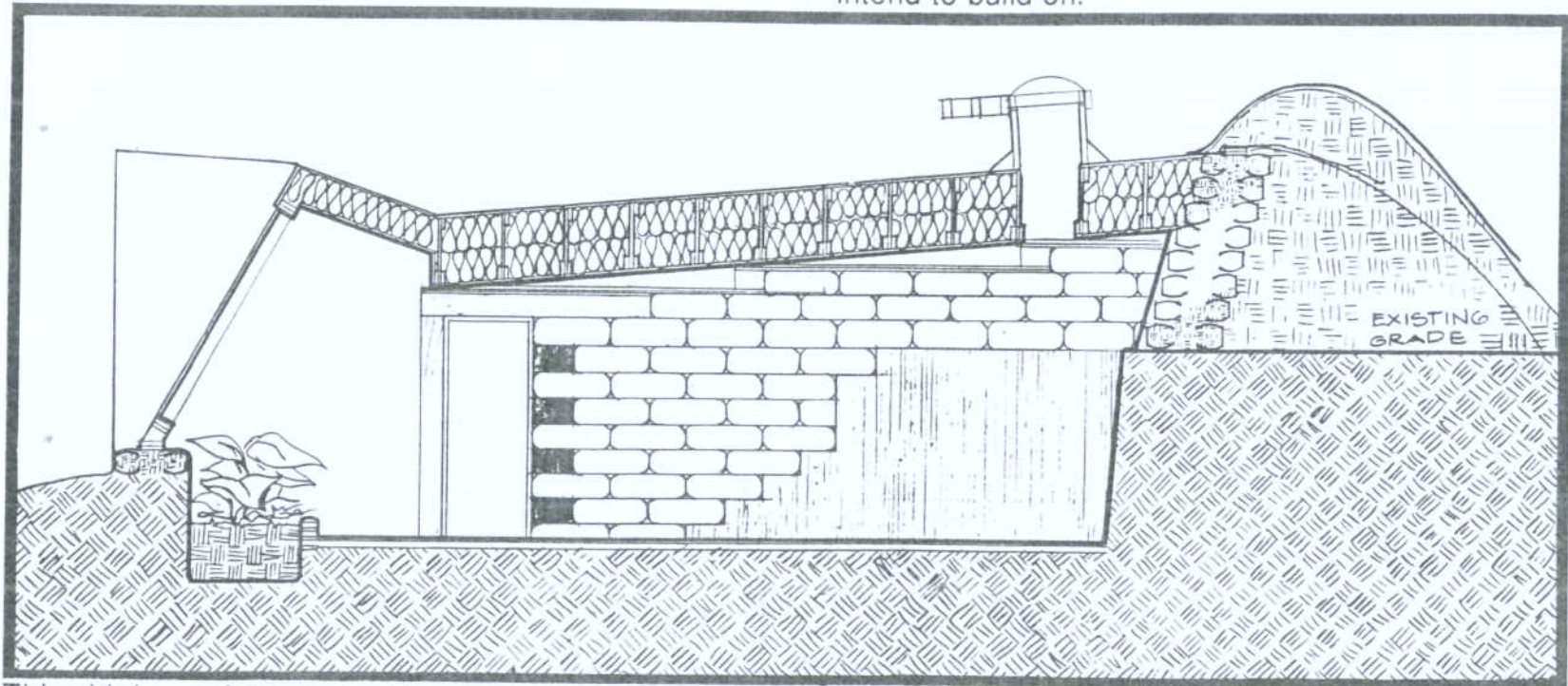
The principals of an Earthship "U" module are explained in concept in Earthship Volume I. How and why it works and how it evolved are presented

there. The evolution of that "U" is presented in this Volume. We have now the high performance generic "U" module.



If you take a Porsche up into the mountains on a rutted steep muddy road you will be in trouble. This is not the fault of the Porsche. It is the fault of the foolish, ignorant, ill-informed driver who drove it up there. The misuse of an Earthship is just as easy and (to those of us who deal with them everyday) seems just as foolish. The important issue here is that the owner/builders must be aware that **the use of the Earthship concept does require some tailoring to site and climatic specifics.**

While we can provide generic drawings for the modules, we must advise that owner/builders solicit the guidance and counsel of Solar Survival Architecture relative to what modifications are necessary for a specific site or climate. A Porsche is a dream car but it can be a very disappointing experience if you purchased it thinking you could drive it on logging roads in the mountains. You must get the right vehicle for the road you intend to travel on. Likewise, get the right Earthship for the land you intend to build on.



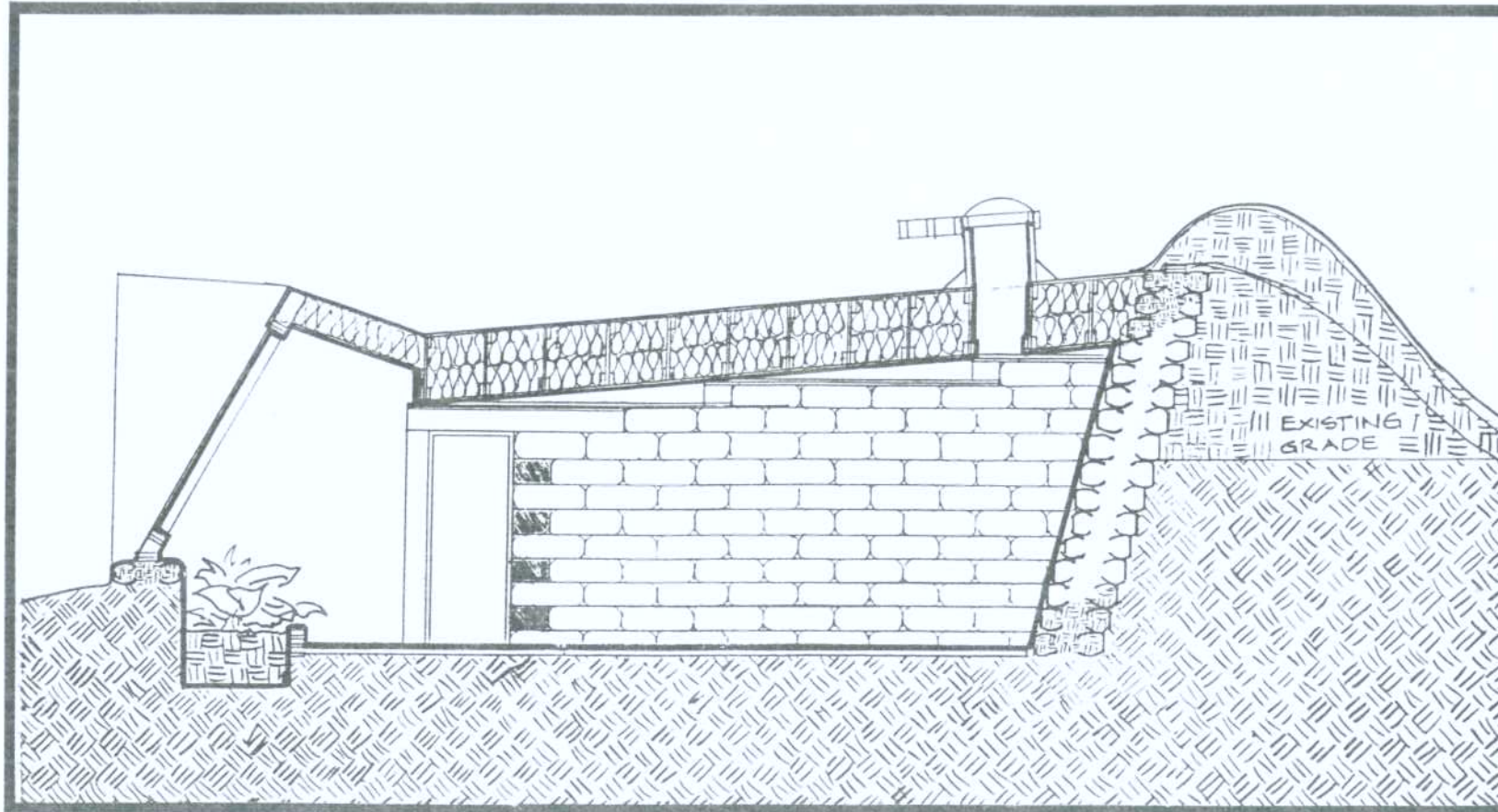
This high performance generic "U" module is designed for 100 degree summers and below zero winters in a generally arid climate (10" total precipitation per year) with reasonably stable soil. Lets take this

typical "U" module through several site and climate variations and watch how it adapts. Because of the modular approach - once you understand how to build and/or adapt a single "U" - you can build and adapt the whole home.

UNSTABLE SOIL

All site and climatic conditions are the same as discussed on the previous page for a basic generic "U" except *the soil is unstable*. The solution is

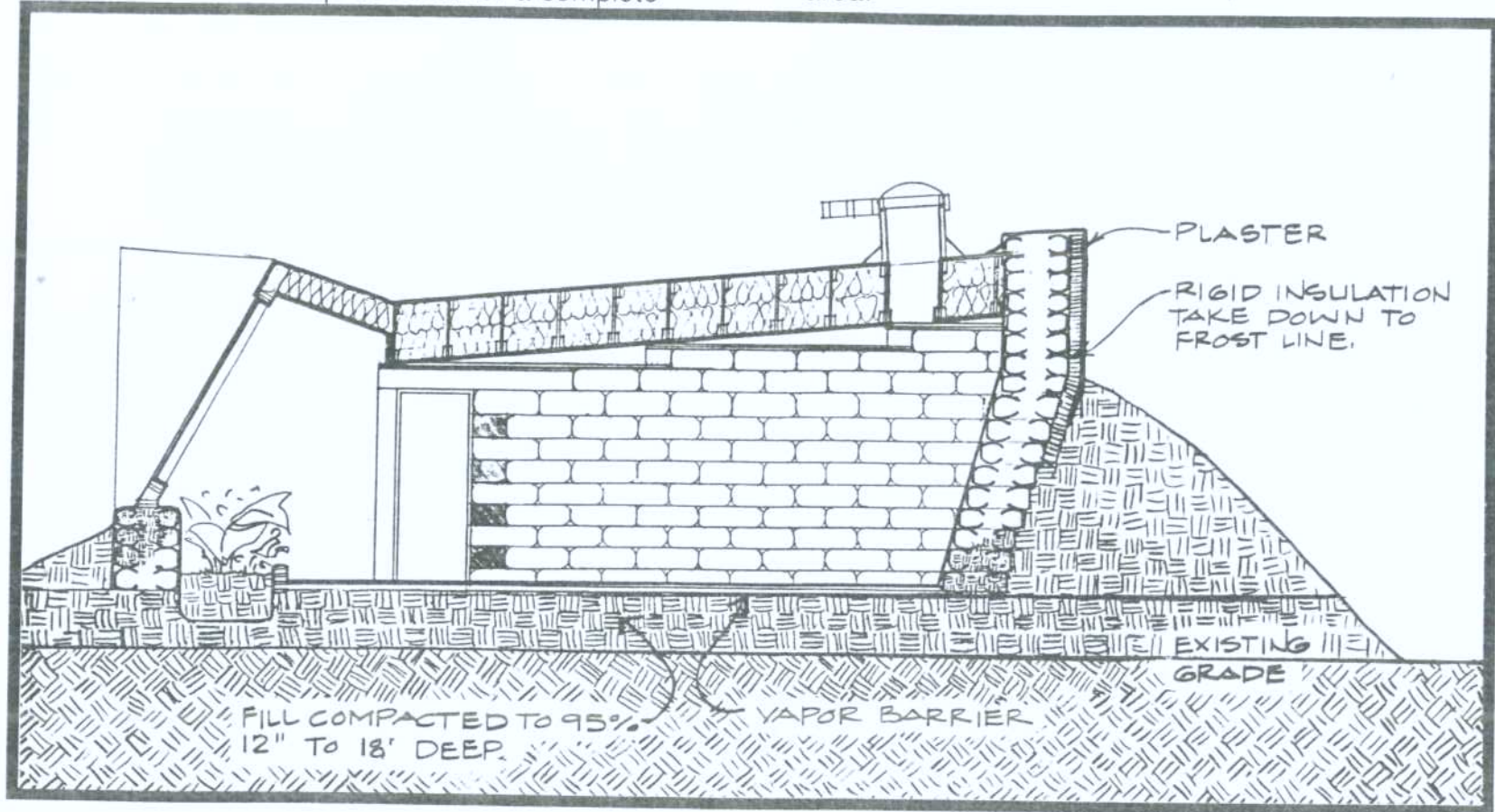
simple. Do not use earth cliffs. Excavate down as low as you want but take the tires to the bottom of this excavation, i.e. all the way down to floor level.

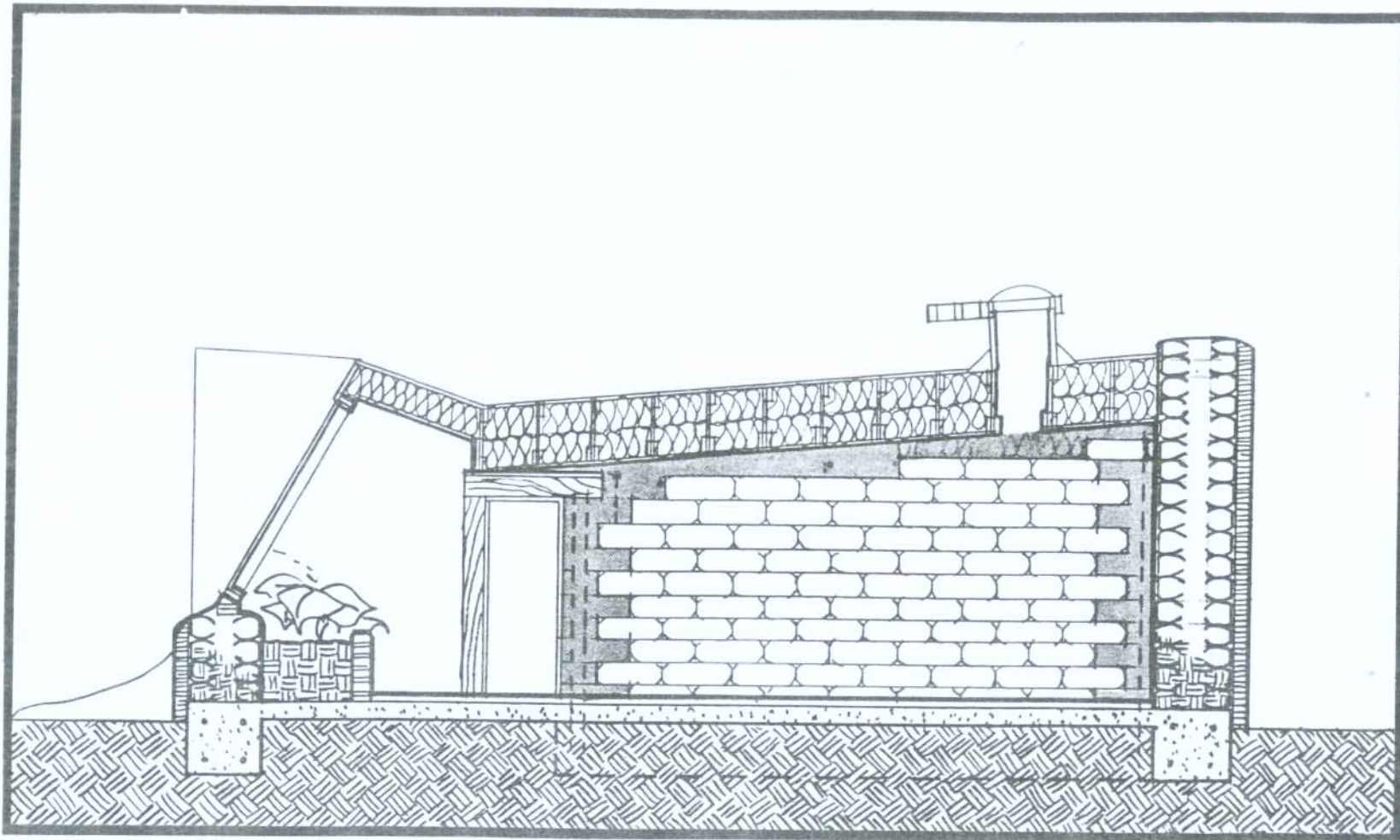


MOIST SOIL - WET CLIMATE - MARSHY LAND

This situation requires that the Earthship be built entirely above ground on a built up base. This base should be machine compacted to 95%. In this situation there is no displaced soil for a complete

burial so soil may have to be brought from another location. Then berm against the building as high as you can and insulate and plaster the rest. The rigid insulation goes down below the burial level 2 to 4 feet depending on the depth of the frost line in your area.

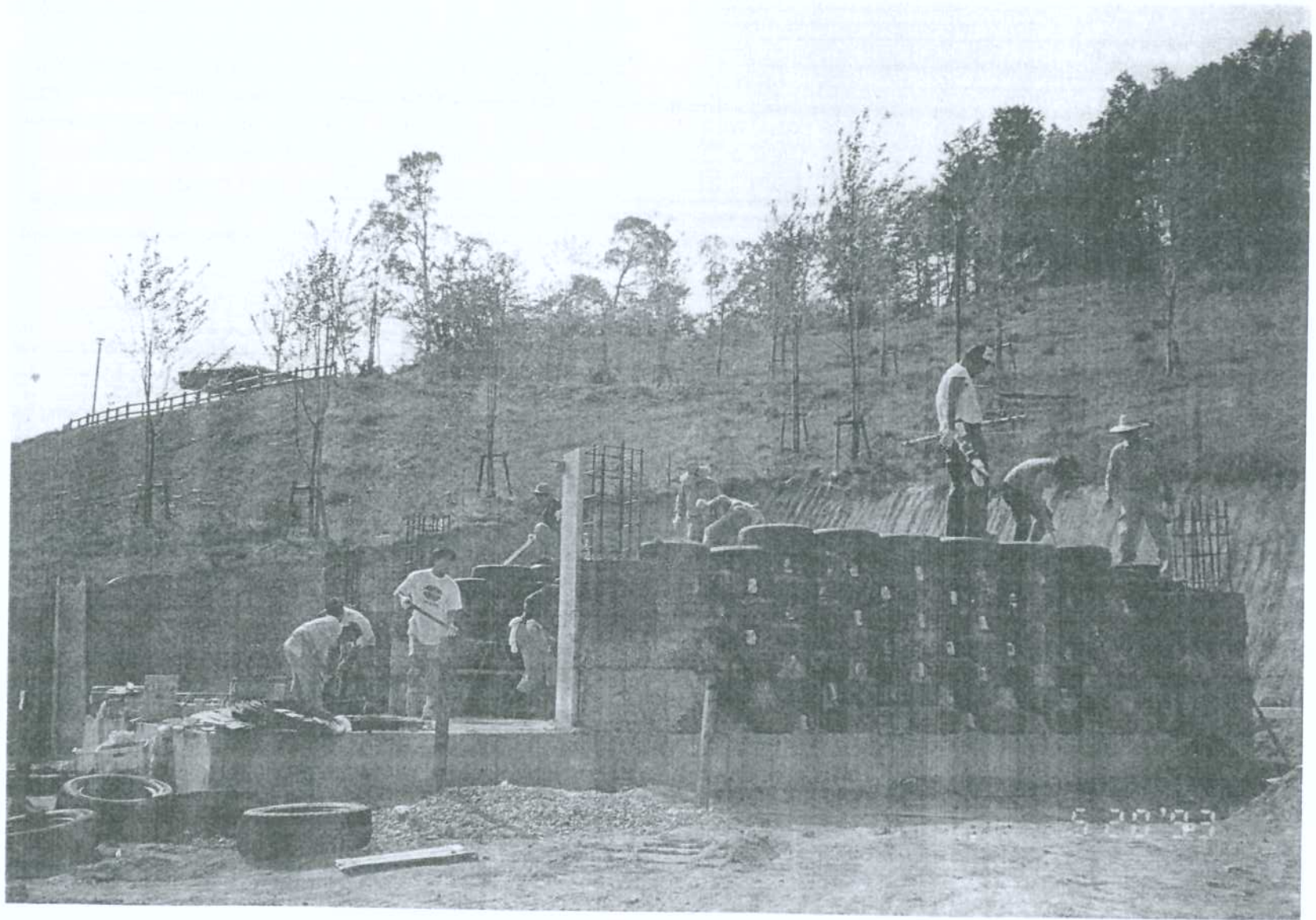




EARTHQUAKE ZONES

In areas of the globe that require a structure that will withstand earthquakes the knitted in concrete columns that occur on the ends and corners of the

tire walls meet this need. These concrete columns, shown in the above diagram and photograph on the following page, are reinforced with rebar and connect to a concrete bond beam.

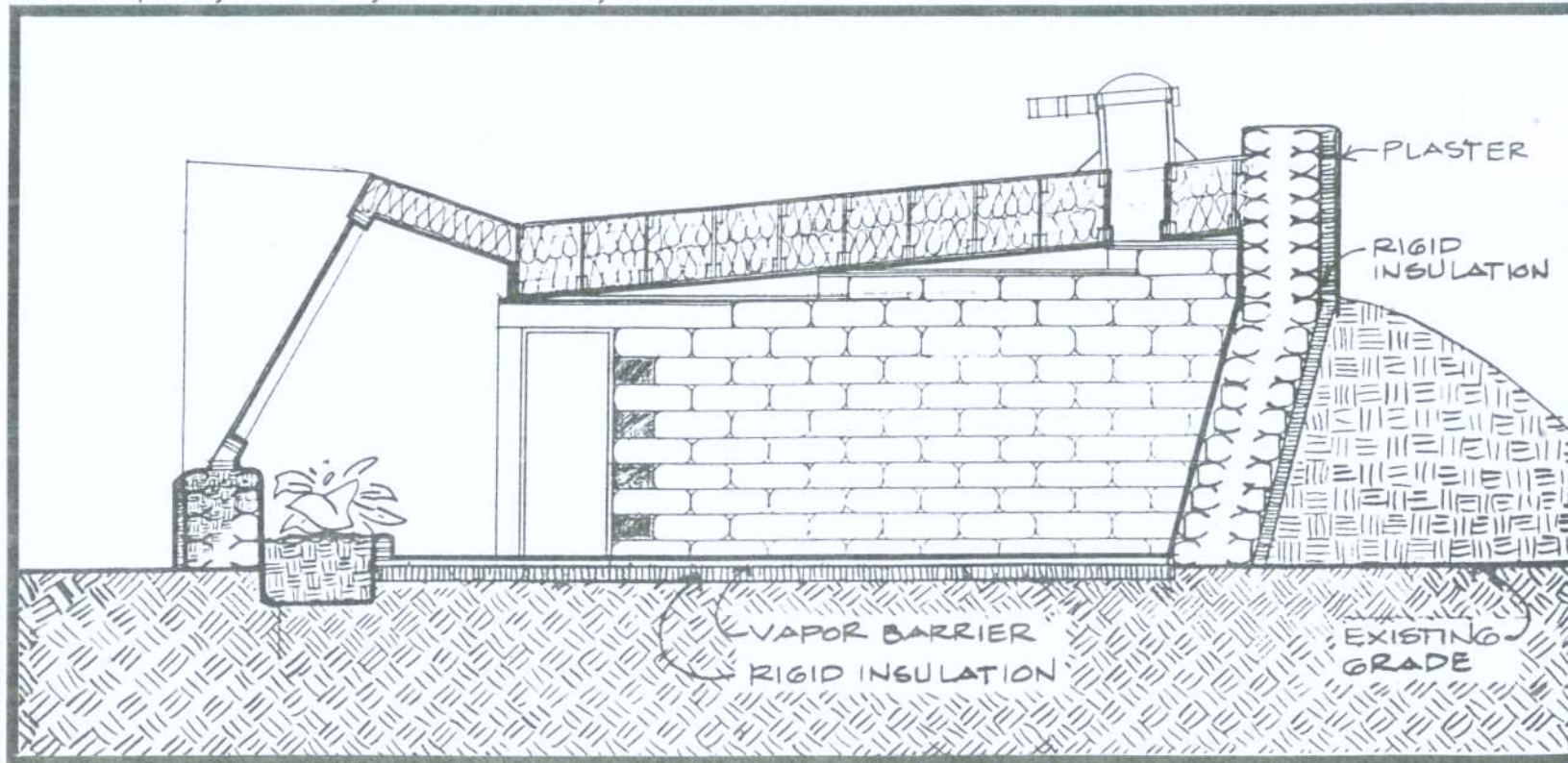


EARTHSHIP IN JAPAN UNDER CONSTRUCTION SHOWING KNITTED IN CONCRETE COLUMNS

EXTREMELY COLD - NOT MUCH SUMMER

When there is no real summer and the frost line is more than 4'0" deep, insulate your mass away from the earth as the earth is not warm enough to help maintain the required comfort zone temperatures. In this situation there is no real advantage to going into the earth as it is not going to embrace you with warmth. It is best to build the vessel *on* the earth and completely insulate your mass away from the

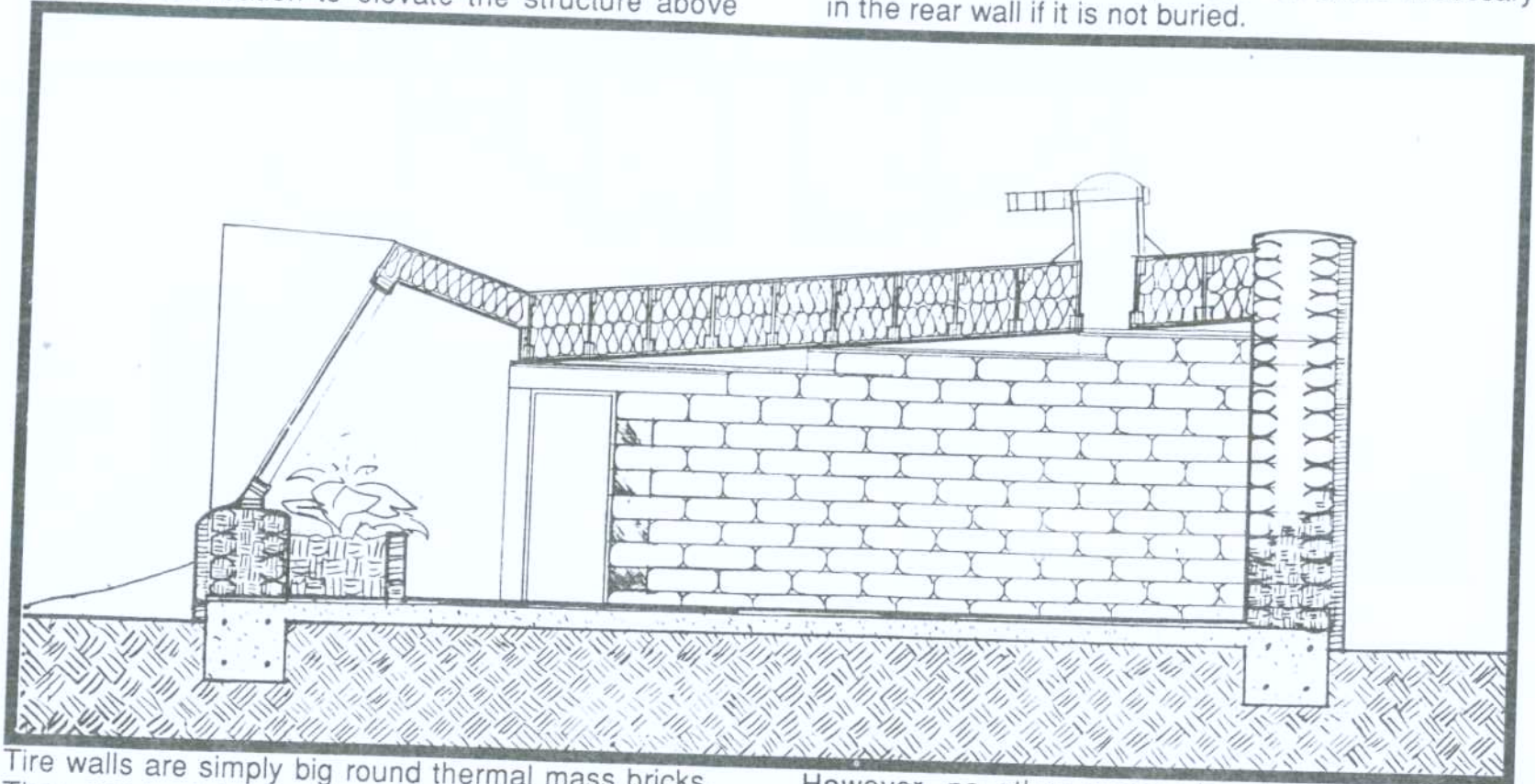
cold earth. Again as on page 213 there will not be any displaced earth for complete burial so insulation and plaster are required above the burial. This is more expensive than the generic totally buried approach but not as expensive as conventional techniques adapted to the same conditions would be. In this situation it would also be advisable to insulate your mass away from the colder earth.



ANOTHER EXTREMELY WET OPTION

Some situations such as a sandy beach or a site near a stream that could swell would require a concrete foundation to elevate the structure above

ground like any other building. In this situation you may not bury at all so a vertical rear wall can be used with rigid insulation and plaster. An arc is necessary in the rear wall if it is not buried.



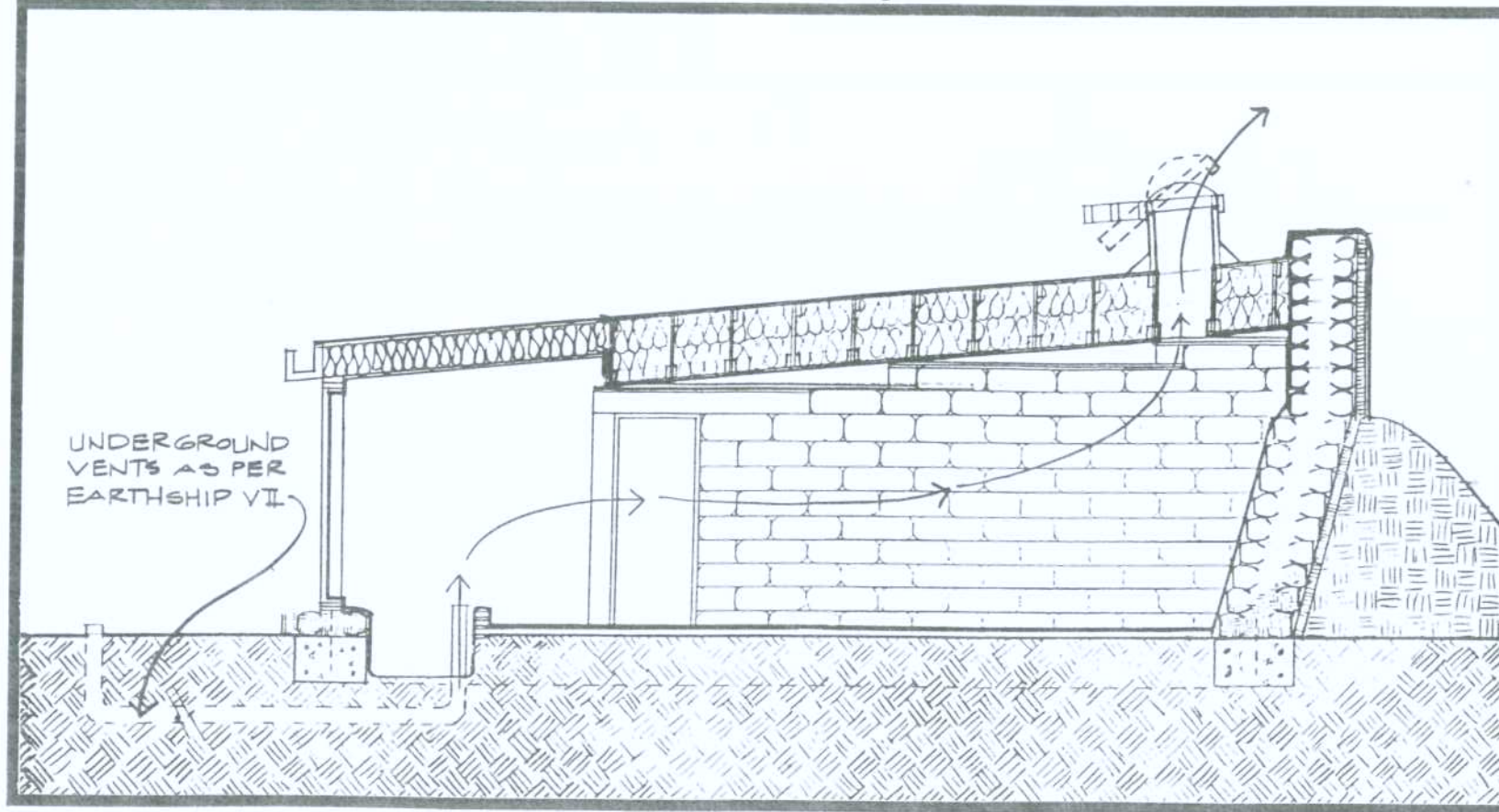
Tire walls are simply big round thermal mass bricks. They can be laid on concrete foundations like any other brick. 90% of the Earthship applications don't require this but it is an option. It is important to note - an Earthship can be built very similar to any other bearing wall building system.

However, no other system has the thermal mass capabilities of the Earthship and the Earthship has many options that conventional methods do not. The generic super economical application of the Earthship may not always be the best for certain situations. Having the need for concrete foundations does not mean you can't have an Earthship.

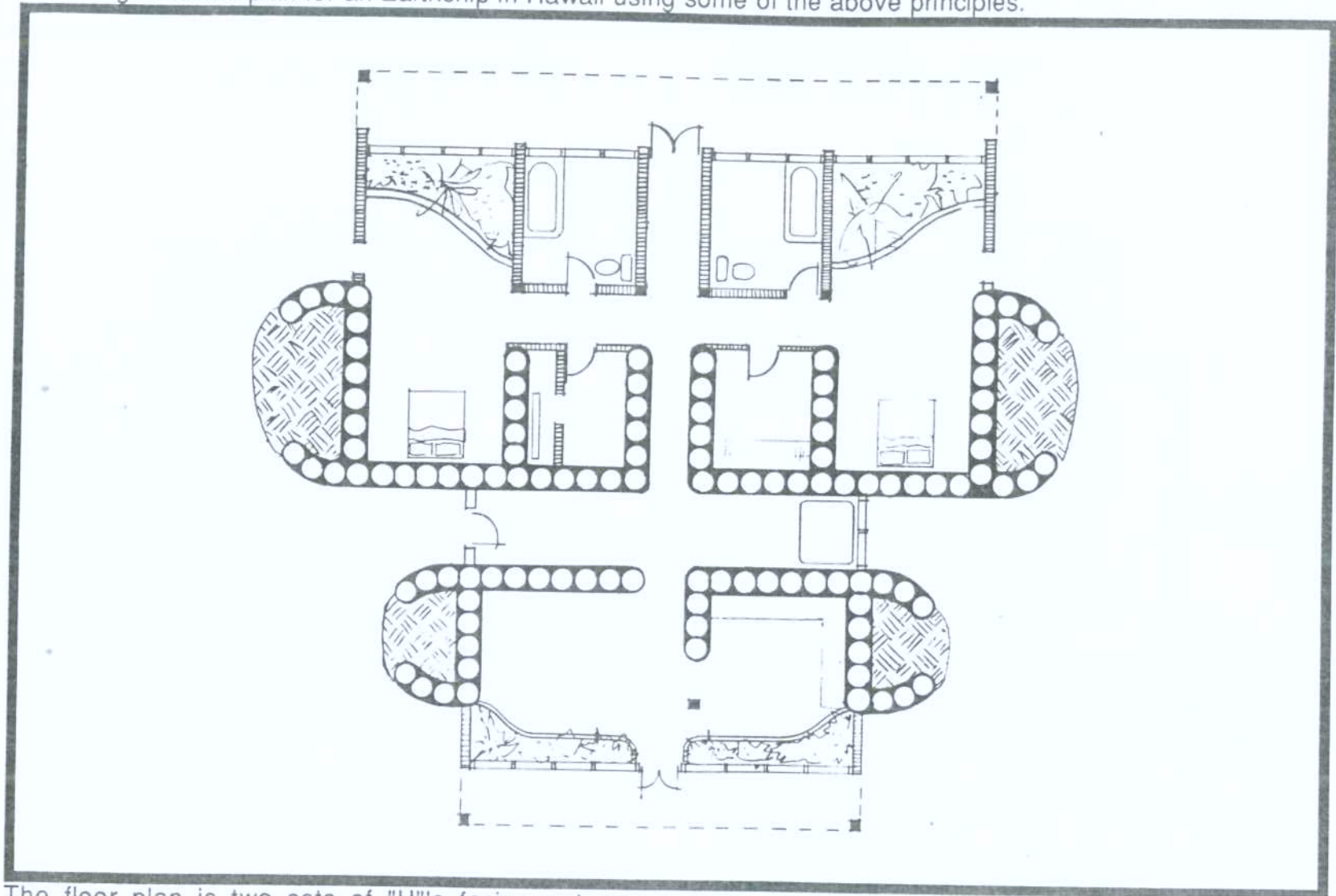
EXTREME WARM AND MOIST - HUMID

Warm, moist, humid climates do not require solar gain. They do not require sloped glass. Dampness could require a concrete foundation as on the previous page, or building on compacted fill as on page 213. Insulating away from the outside heat is necessary. Obviously you wouldn't sink the

Earthship in the moist ground. You would enhance the ventilation (see Earthships Volume I, p. 45 and II pp. 146-147 for humidity control). The mass of the tire walls will still help maintain a cooler temperature and there is no easier, more durable thermal mass bearing wall than earth rammed tires. Higher ceilings are also best in this situation.



Following is a floor plan for an Earthship in Hawaii using some of the above principles.

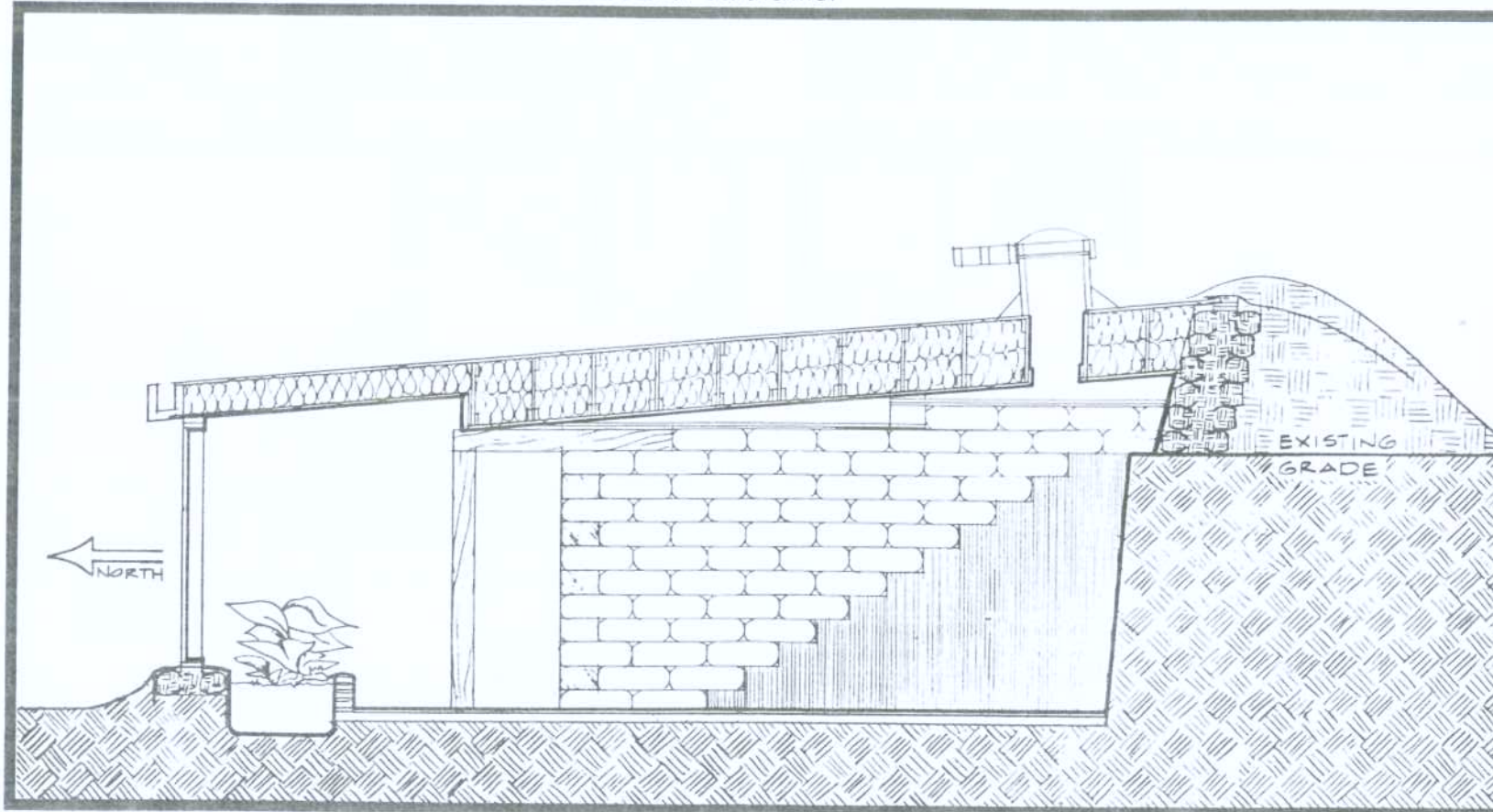


The floor plan is two sets of "U"'s facing out as glazing need not face any specific direction. The building is not buried in the earth due to the damp climate.

It may have concrete foundations under the tire walls. This would be determined by site inspection. The structural concept is still thermal mass "U"'s. Many generic details would apply.

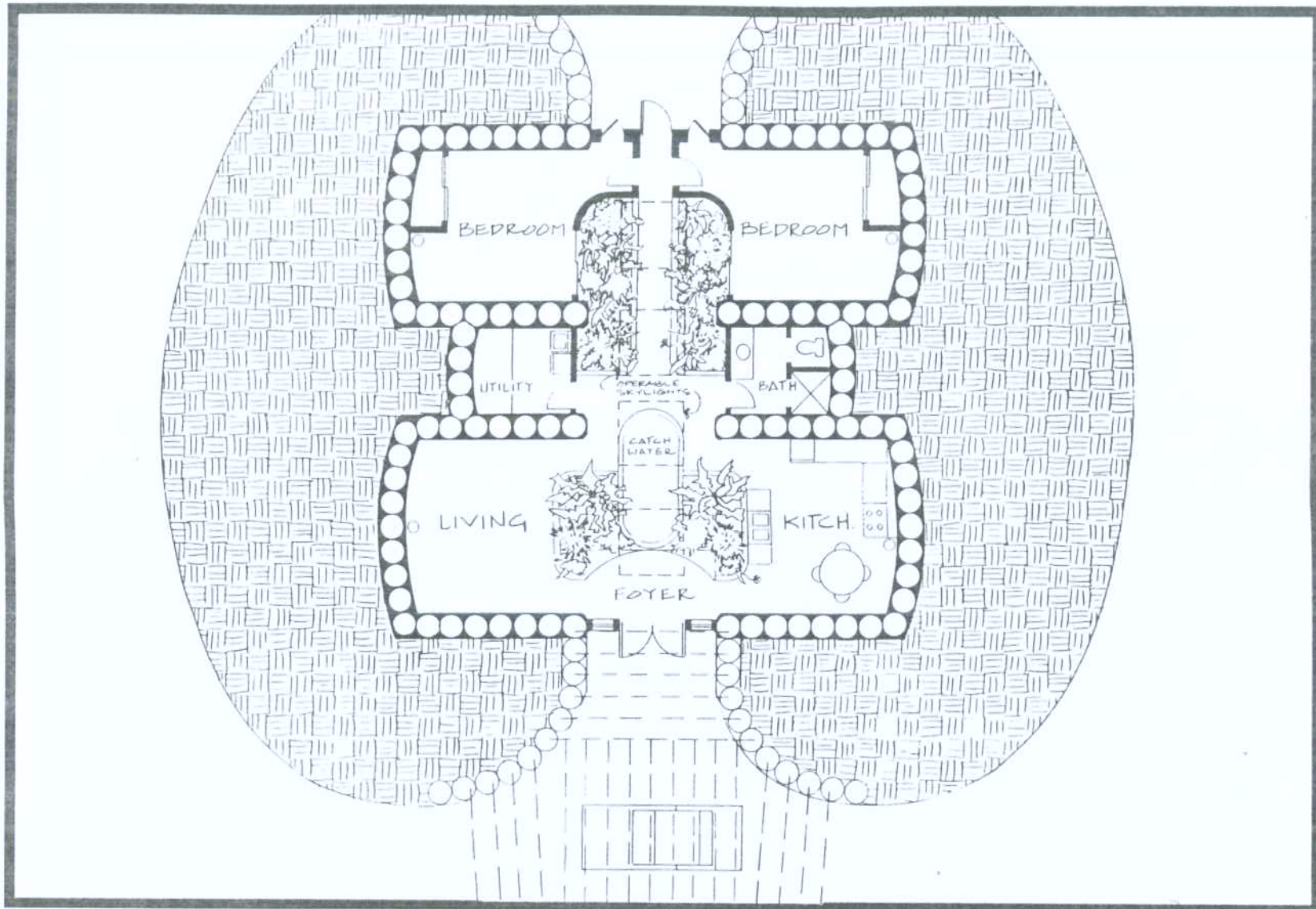
HOT / DRY

In this situation going into the earth as far as possible would be advised to reach for the cool earth temperatures. Soil conditions would have to be checked for use of earthcliffs.



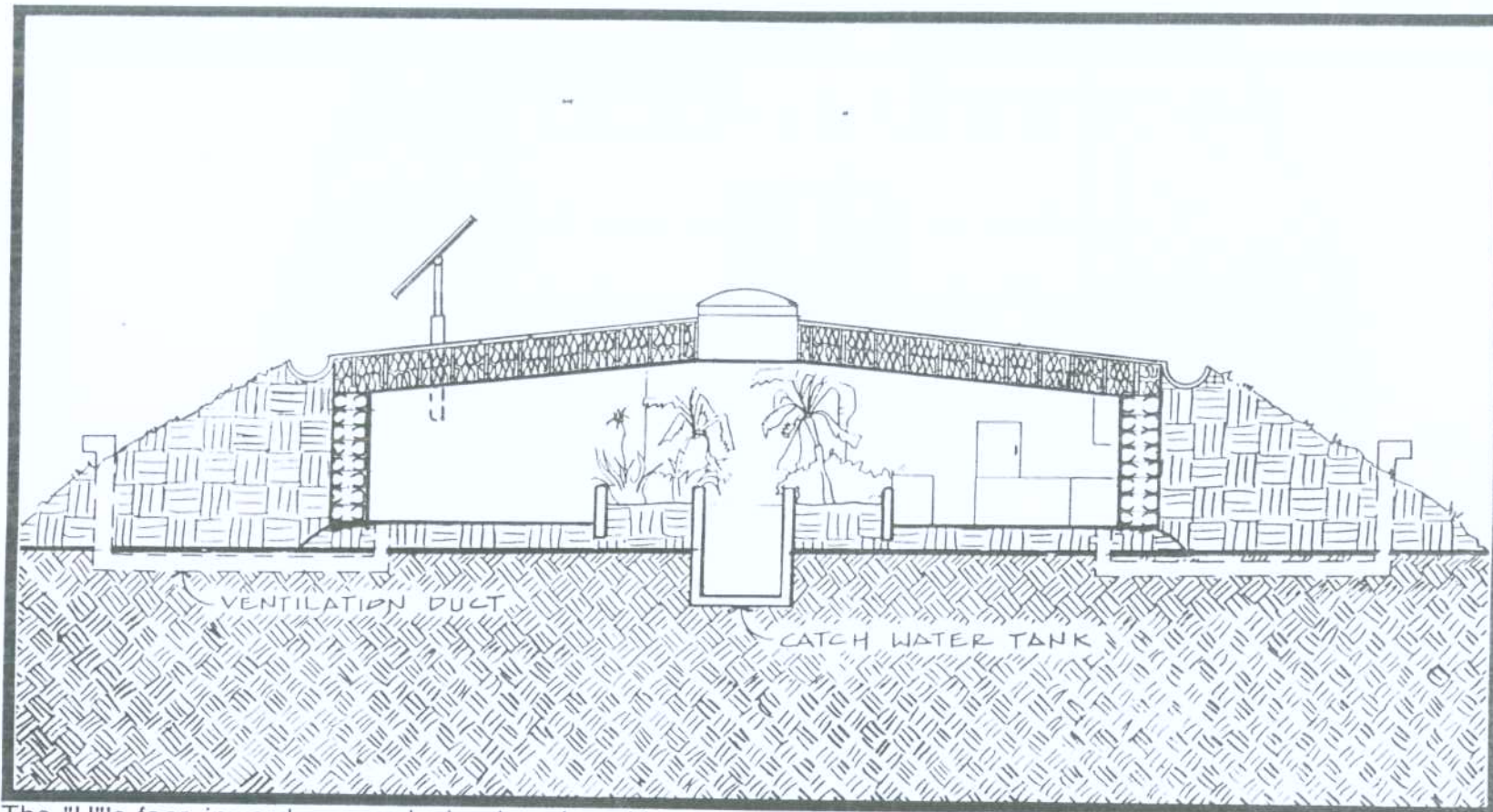
Insulation between the mass and the earth would not be necessary. Glazing could be vertical and the building would want to face north. Ventilation would be enhanced. (see Vol. I & II). Now lets introduce a new factor to the Earthship adaptations - wind. Many conventional homes have been blown away by

hurricanes and tornados. In these areas, if your home was not blown away, you still could not use it because after these holocausts, gas and power are usually down and water and sewage lines are often damaged. The Earthship can address all these issues. We present THE HURRICANE HOME.



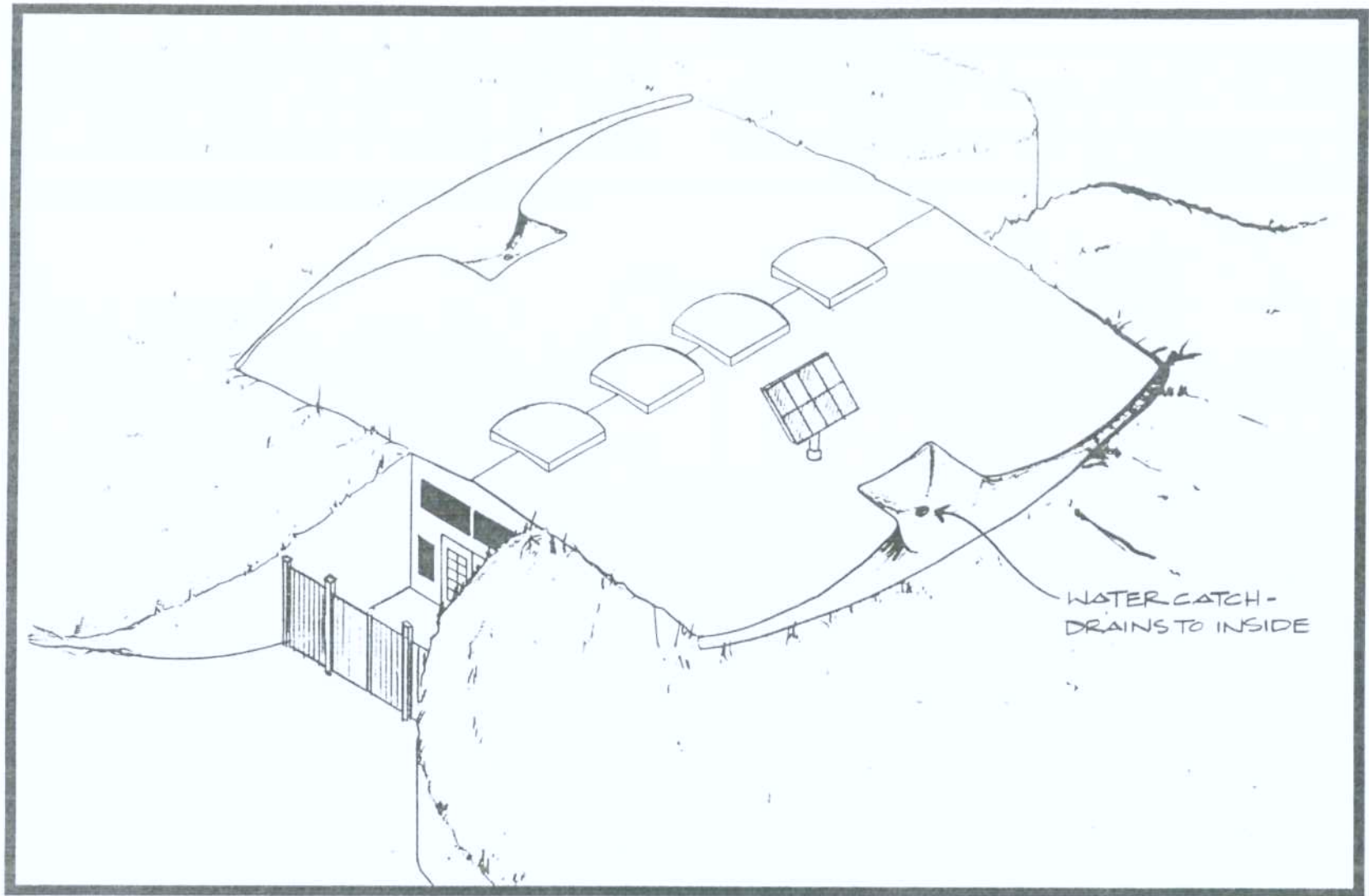
In the Hurricane Home the "U"s face in toward each other so the buried back walls face out to the wind. Large skylights accommodate the central greenhouse area.

Usually hurricanes occur in hot damp climates where solar gain is not required. It is more important to cool the structure than to heat it.



The "U"s face inward so no glazing is vulnerable to wind. The building would most often be placed on the ground as most areas hit with hurricanes are wet. The burial would simply take the wind over the building. Completely protected against wind damage, solar panels for power are in a telescopic pipe to be lowered flat on the roof during high winds.

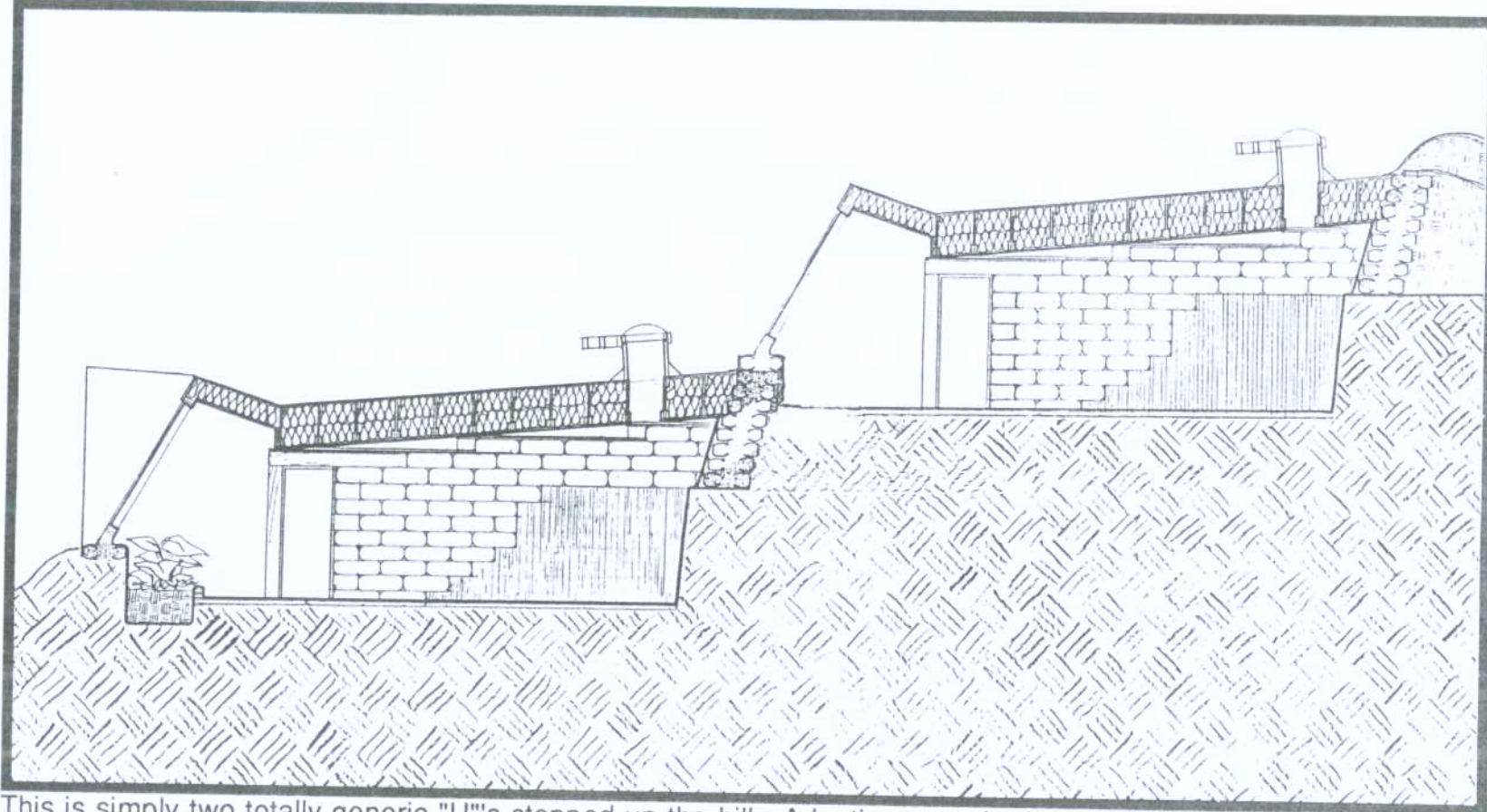
Catch water, solar power, grey water absorption and composting toilets would facilitate total operation of the home when all other homes, dependent on public utilities, would be useless. Gates could protect entrance ways from high winds. The building is elevated so high water would run out.



STEPPED APPLICATIONS

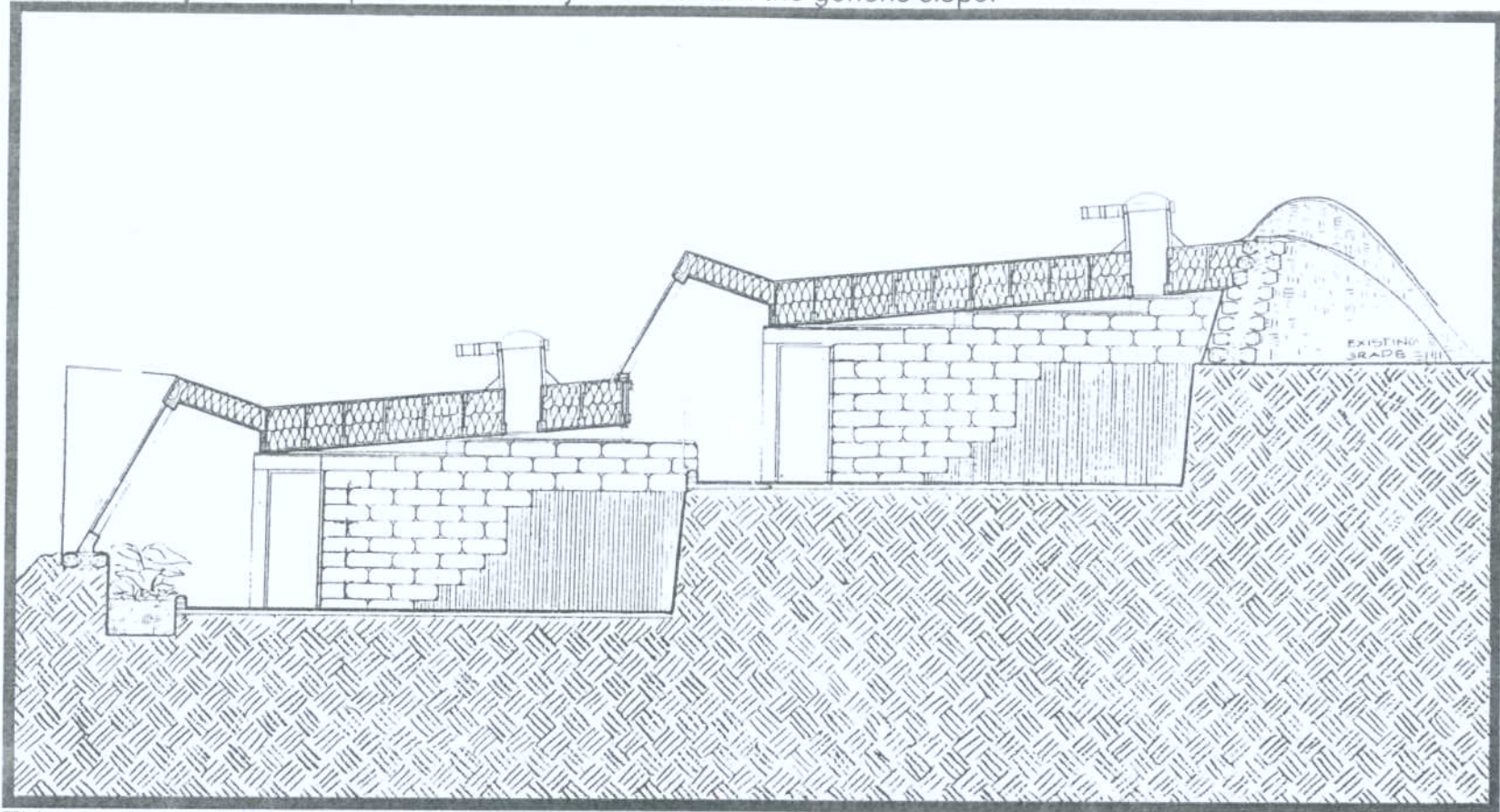
Sloped sites facing the sun are obviously the best for Earthships where solar gain is necessary. These sites introduced the option of stepping up the slope as presented in Volume I.

The most economical approach to this is to maintain the generic section and just repeat it in one of two ways. The easiest way is to place the upper level greenhouse wall over the lower level north wall.



This is simply two totally generic "U"s stepped up the hill. Adapting generic drawings to this site situation would be fairly easy. Stairs between levels can be carved up into the upper "U" as desired.

The other way is to overlap the "U"'s but try and maintain the generic slope.



This requires a major beam to carry the upper solar face and consequently some columns and footings. There are many other variations but the overlapped approach can get very customized, very quickly.

In any application of the Earthship concept where cost is a factor, the generic configuration must be maintained. Then just apply the various climatic adaptations. Don't try to drive in snow with highway tires.



GENERIC EARTHSHIP AT S.T.A.R. UNDER CONSTRUCTION

13. THE NEW GENERICS

THE EARTHSHIP CONCEPT AS PRESENTED IN EARTHSHIP VOLUME I (IN 1990) HAS PROVED TO BE A VIABLE WAY FOR PEOPLE TO BUILD THEIR OWN HOMES. MANY OF THE DETAILS AND METHODS HAVE EVOLVED AS PRESENTED IN PREVIOUS CHAPTERS OF THIS BOOK. HOWEVER THE BASIC "U" SHAPE (OPEN TO THE SUN FOR SOLAR GAIN) CONSTRUCTED OF AUTOMOBILE TIRES RAMMED WITH EARTH FOR THERMAL MASS HAS PREVAILED. THE EVOLUTIONS HAVE SIMPLY MADE IT EASIER AND CHEAPER TO CONSTRUCT, PERFORM EVEN BETTER AND MORE VERSATILE TO VARIOUS CLIMATES. MUCH OF OUR WORK IN THE PAST FEW YEARS HAS BEEN EVOLVING THE *SYSTEMS* THAT MAKE THE STRUCTURE INDEPENDENT. EARTHSHIP VOLUME II (1991) PRESENTED OUR EARLY EFFORTS AND CONCEPTS REGARDING THESE SYSTEMS. AS THESE SYSTEMS CONTINUED TO EVOLVE WE FOUND THAT (LIKE THE "U" MODULE CONCEPT ITSELF) THEY BEGAN TO DICTATE CERTAIN FACETS OF THE BUILDING RELATIVE TO THEIR MAXIMUM PERFORMANCE. WE FOUND OURSELVES TRYING TO *FORCE* THESE SYSTEMS DETAILS AND DEMANDS INTO THE VARIOUS FLOOR PLAN LAYOUTS OF THE GENERIC "U" MODULES. AS THE SYSTEMS CONTINUED TO EVOLVE AND BEGAN TO WORK BETTER AND BETTER, THEIR DEMANDS ON THE FLOOR PLAN LAYOUTS BEGAN TO GAIN MORE AND MORE RESPECT. FINALLY, WE SIMPLY ALLOWED THEM TO DICTATE TO US WHAT THEY REQUIRED FOR ULTIMATE PERFORMANCE MUCH THE SAME WAY WE ALLOWED THE "U" MODULE AND THE TIRE TO DICTATE TO US THE ORIGINAL DESIGN. THIS HAS RESULTED IN WHAT WE CALL THE "NEW GENERICS". THE HIGHEST PERFORMANCE, LOWEST COST, EARTHSHIPS AVAILABLE TO HUMANKIND AT THIS TIME.

Graphics by Claire Blanchard
Photographs by Pam Freund

We, as humans needing shelter on Earth in the 21st century, must forget the concept of "house". Unless you are rich or very skilled, the concept of "custom home" or being able to build your own home must also be let go.

The automobile is too evolved to allow each of us to design our own. Designing your own automobile is conceivable but highly impractical and vastly expensive, i.e. virtually not possible. We must choose from what the various automobile companies have provided from their research and development of the many aspects of automobile performance and design. The dwelling vessels for planet Earth in the 21st century must perform and they must be more available to all without selling our souls and destroying our planet. These "Earthships" (like the automobile) are the result of much research and development relative to structure, performance and cost. In automobile selection, there are not many choices other than style, color, degree of luxury and performance. The same is true for the really appropriate and secure living vessel for future dwellers on Earth. *This concept is one of our major discoveries.*

Our experiences over the last twenty years have shown us that the acceptance of this concept by humans would allow us to step back into stride with the rhythms of the universe. We could then participate in our own evolution rather than preventing it, which is currently the case. The bottom line is - we must *change in our minds* before we can change our course. We must do this soon as our current course is leading to extinction of human life. Various animals and plants are illustrating this fact as

they simply disappear. Surely we can see that as more and more animals and plants become extinct - humans will eventually follow. Don't we realize that we are in the same river that has carried many creatures before us over the falls of destruction? We are just far enough upstream to go ashore and find a new course, carve a new river, evoke a new concept of living that will carry us (evolve us) gently to the sea of life everlasting instead of the edge of extinction.

The new generic Earthships are a new course, a new concept of living. We recommend them over any custom Earthship design at any price. They are both the most economical and highest performance vessel we can provide at the present time. *Any variation from the dictated design of the new generics will simply cost more and perform less.* We will obviously help anyone in any way we can toward any application of the Earthship concepts, however, those who will get the best performance at the lowest price will be those who can drop the concept of custom home and accept the dictated design of the new generics. From what I have seen through many years of being an architect, my seminars and working with hundreds of people; this is the single most difficult and obvious barrier between people and their homes - **the ability to step out of the dead concept of house and into an evolving concept of living.** They can choose a crackerbox in Levittown or a Chevy off the lot but want to design their own passive solar, self sufficient Earthship. The new generics can sail us into the future if we can simply get on the boat.

Just as an automobile has a space for an engine and a space for people, an Earthship has a space for

support systems and a place for people. Just as this automobile engine is a pre-designed functional unit in itself so are the independent mechanical support systems of an Earthship.

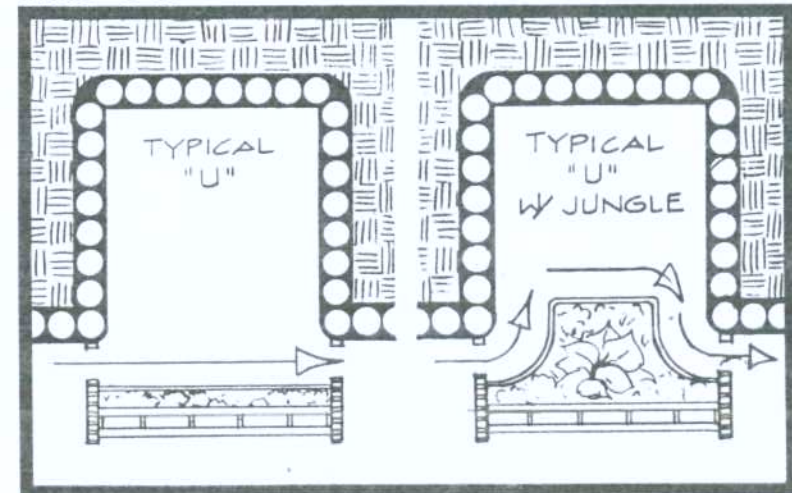
The new generics involve two basic structural modules. The already presented "U" living module and the new "mechanical" module, an "mU". This mechanical module is a synthesized physical and structural arrangement of pre-designed mechanical systems and components that support the living modules. It is far more economical to pre-design the arrangement of these systems (in their own structural module) relative to their optimum performance than it is to custom arrange and install them in each and every Earthship. Some of the considerations toward this design are as follows:

1. Bathroom must be on front face for warmth without blocking solar gain to the "U" living modules.
2. Solar toilet must be in the front face to function.
3. Pump and filter system (WOM) must be near reservoir and waterfall to accommodate pump limitations and reduce plumbing costs.
4. Power organizer (POM) and battery box must be together under P.V. panels and centrally located to the living spaces.
5. Hot water heater must be near water center (WOM).
6. Power organizer (POM) must be near water organizer (WOM) to accommodate power to pumps with minimum copper wire runs.
7. Refrigerator must be near power organizer (POM) to facilitate minimal gauge copper wire runs.

8. Bathroom and washing machine must be near reservoir to minimize plumbing.
9. Each "U" living module must have adequate ventilation and egress with a minimum amount of detailing and noise from mechanical systems.
10. Sufficient planter space must be allowed to accommodate the wetlands grey water treatment tank.

THE "U" MODULE

There are many types of "U" modules. They are basically *spaces* that can be used as kitchen/living/dining, bedroom, study or any arrangement of the above, i.e. a "U" module is a room module typically larger than single rooms in frame houses. As per Chapter 2, the "Jungle" can be placed in any or all of these "U"s.



The floor of the jungle area of a "U" is dug out and lined for a continuous wetlands grey water treatment tank with plants above (see Chapter 2). This is in effect

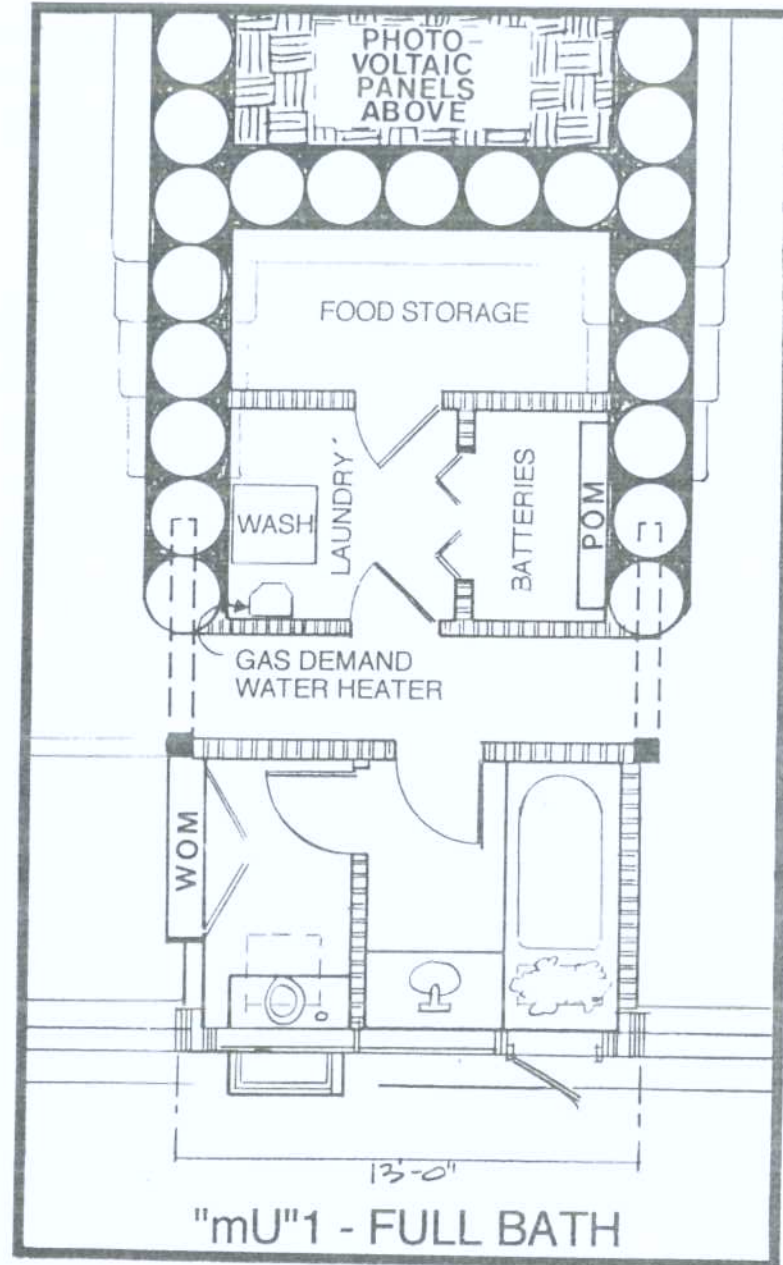
your "septic tank" room. Originally we planned to close these jungle rooms off from the rest of the Earthship but they have proved to be such delightful spaces that we have started integrating the jungle into typical "U"s. Thus the jungles are part of a room space as well as a grey water treatment facility and a garden for food and flowers. We have grown bananas, grapes, all vegetables, herbs, etc. in these jungle rooms (see Chapter 2). "U" modules, therefore accommodate typical living spaces with or without a jungle.

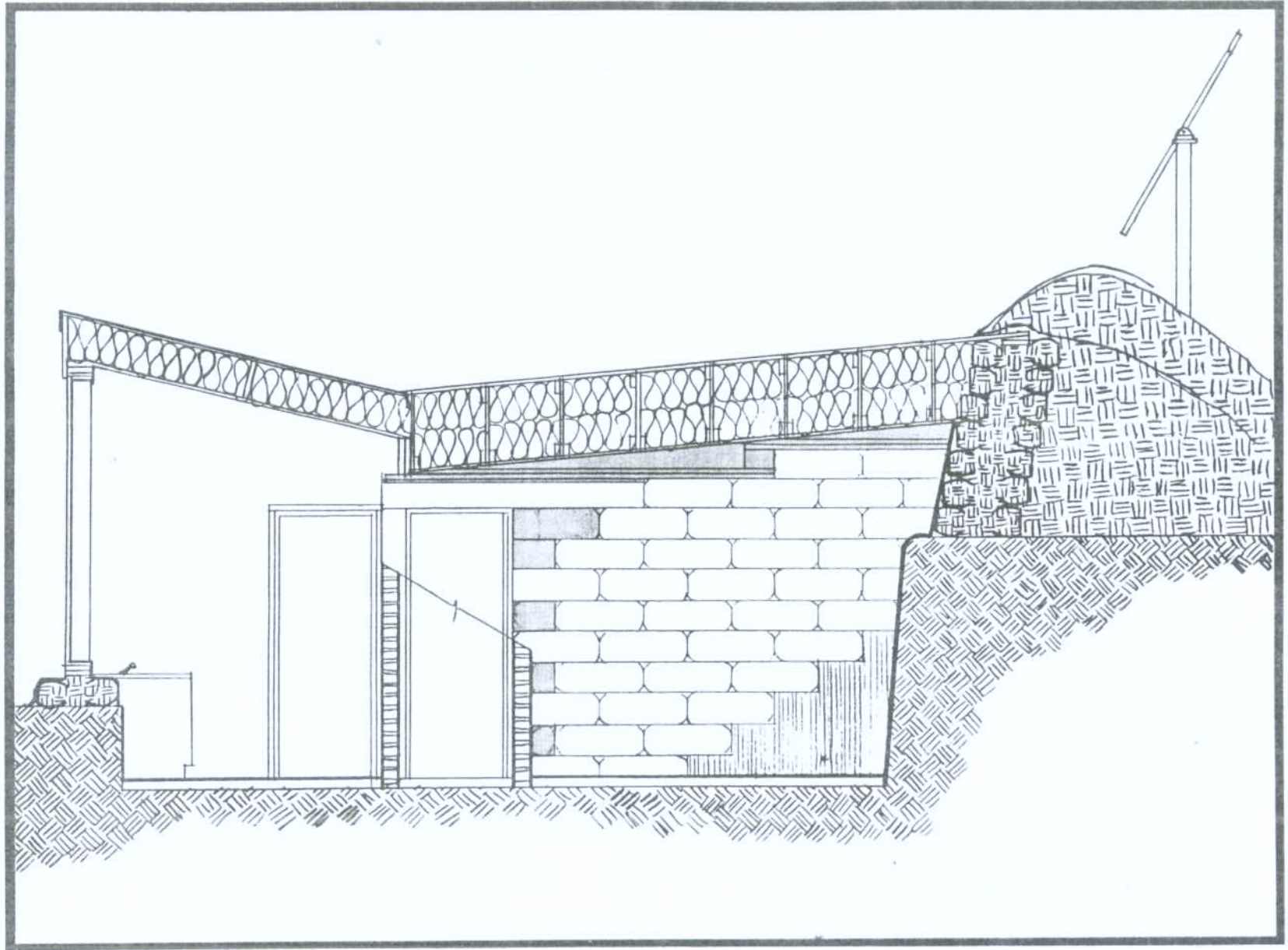
THE "mU" MODULE

Bathrooms must be on the front face for warmth without back up heat. This results in a space behind the bathroom that receives no solar gain. This space is a logical location for predesigned mechanical and utility components (and storage) both because of its lack of solar gain and its proximity to the bathroom. The "mU"s therefore evolved to accommodate this situation. Since the solar toilet design (see Chapter 4) requires vertical glass, the basic "mU"s are a narrow mechanical "U" with a vertical front face.

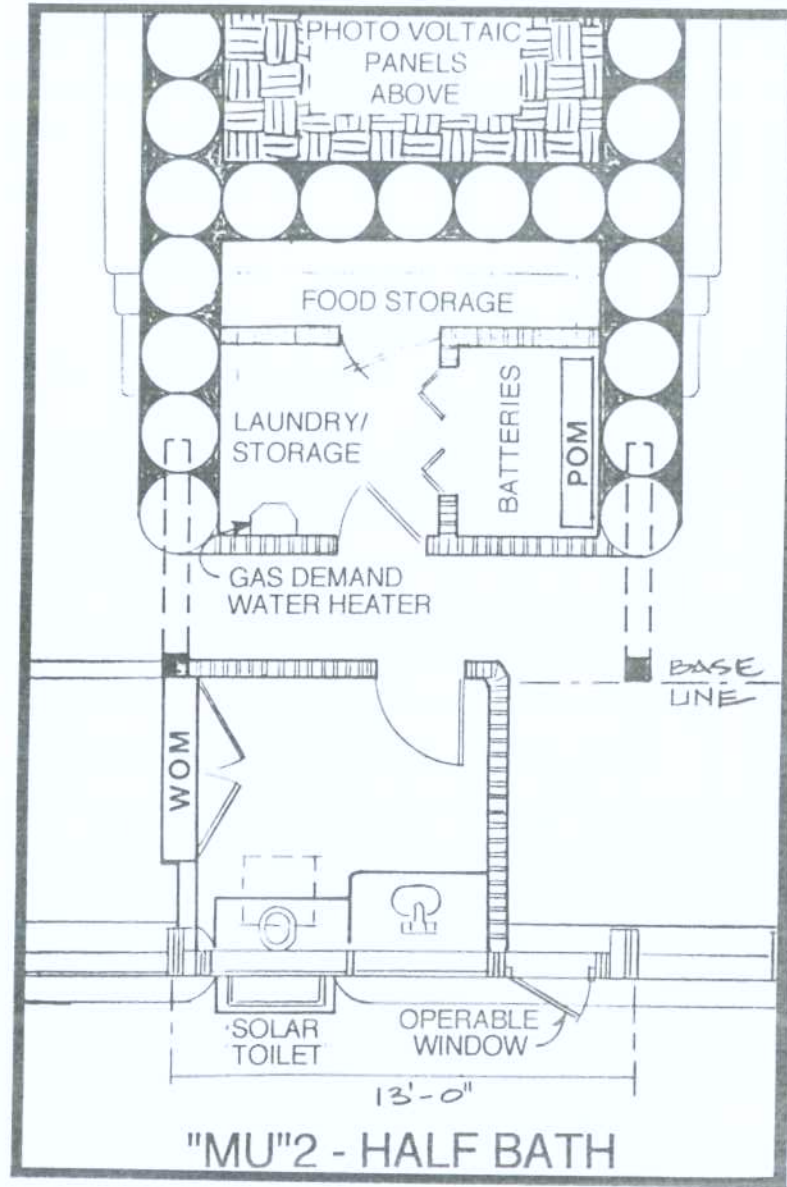
In that there are several different applications of the "mU", we have tried to take advantage of this vertical front face (as often as possible) for ventilation and egress windows and doors. This reduces interruptions in the sloped front face fixed glass (see overview page 235) in front of the typical "U" modules. We are, therefore, reducing the detailing and making the generic Earthship more simple and economical.

"mU"1 is the full bath on the front face and utility/power/hot water/food storage in the rear.





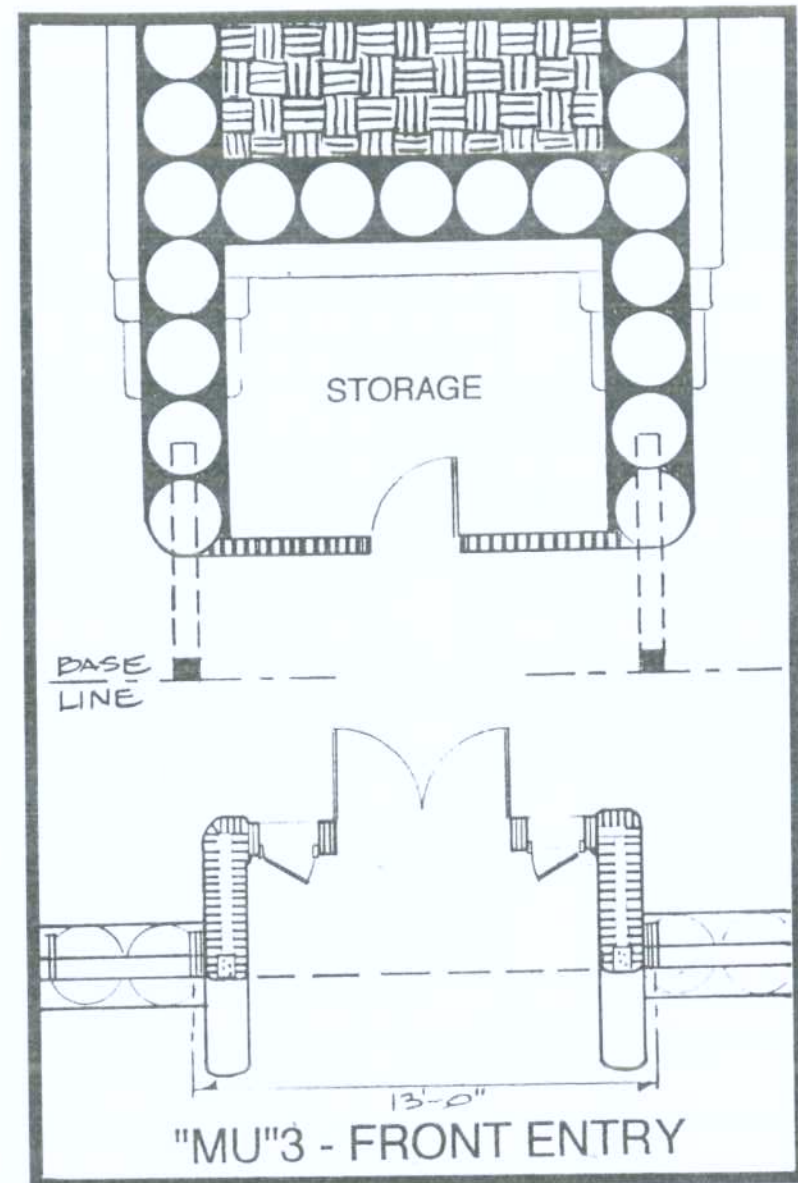
"mU"2 is the 1/2 bath on the front face and laundry/storage/power in the rear. "mU"2 accommodates an operable window in the vertical face for ventilation and egress for an adjoining "U" module. Note that both "mU"1 and "mU"2 are designed to accommodate a water organizing module for an adjoining catch water cistern. It is important to note that like regular "U"s, all "mU"s are structurally identical in section and plan.



"mU"3 provides egress and ventilation on the front face with storage in the rear. This module is used for egress when bedrooms are desired in the middle of the layout.

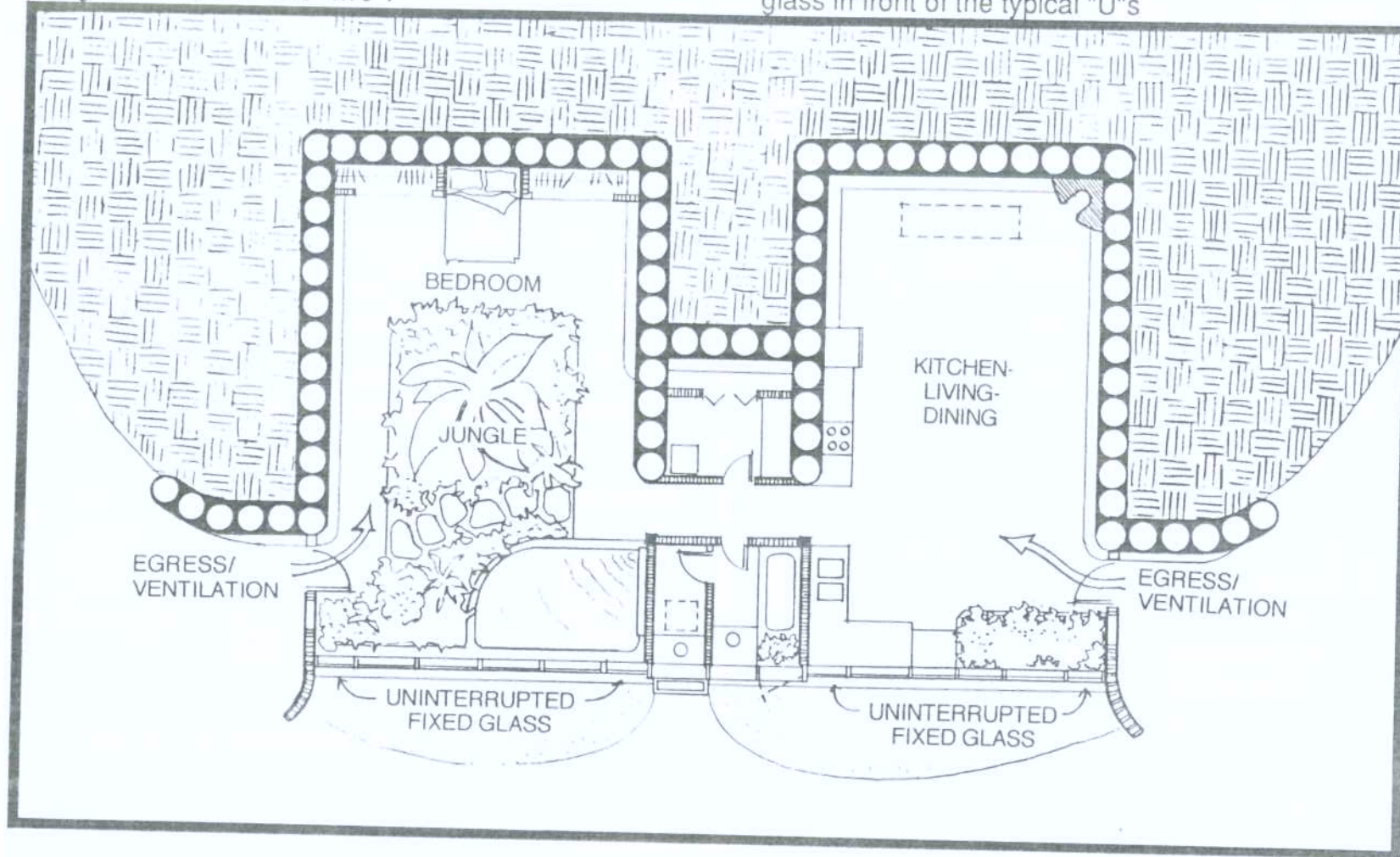
Obviously if there is more than one "mU" the rear shaded space would not always be needed for mechanical. In the case of more than one "mU", the mechanical can be split up with electrical in the rear of one "mU" and water/utility in the rear of another. There is never enough storage in any home so the rear of certain "mU"s can be used totally for storage.

Any combination of the front and rear uses of these example "mU"s can be applied. Remember that the structure of every "mU" is the same. The depth can vary ("U"s can be deeper or shallower) but the width is better left as designed due to the detailing required for stock sizes of fixed and operable front face windows. If a larger bathroom is desired (a wider "mU") the sizes of the front face windows would have to be changed and this would probably result in a custom piece of thermal glass as compared to the stock sized thermal glass shown. The result would simply be a little more architectural and construction expense.



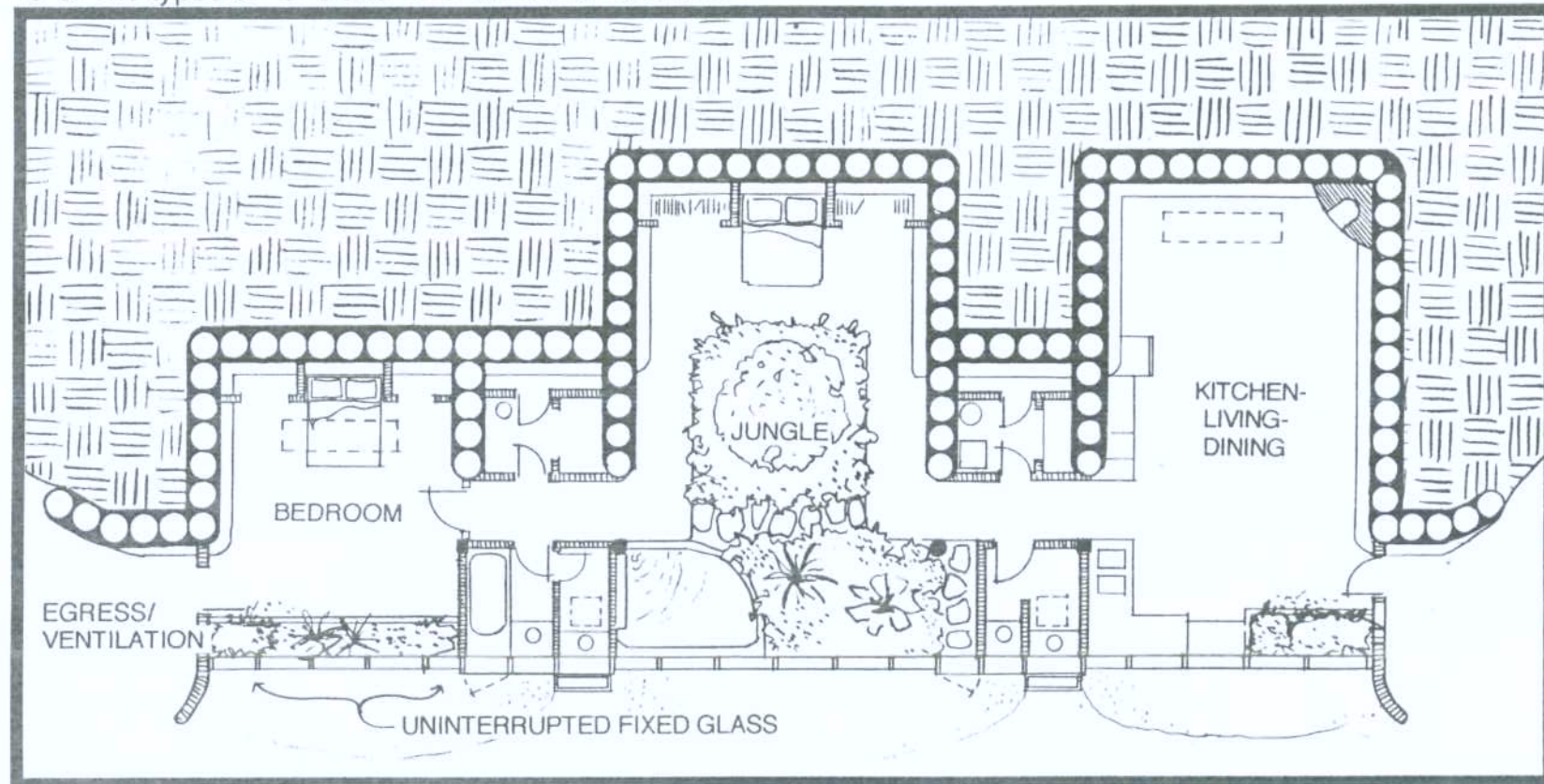
There are obviously many combinations of "U"s and "mU"s. Below is a one bedroom generic floor plan using two "U"s and one "mU".

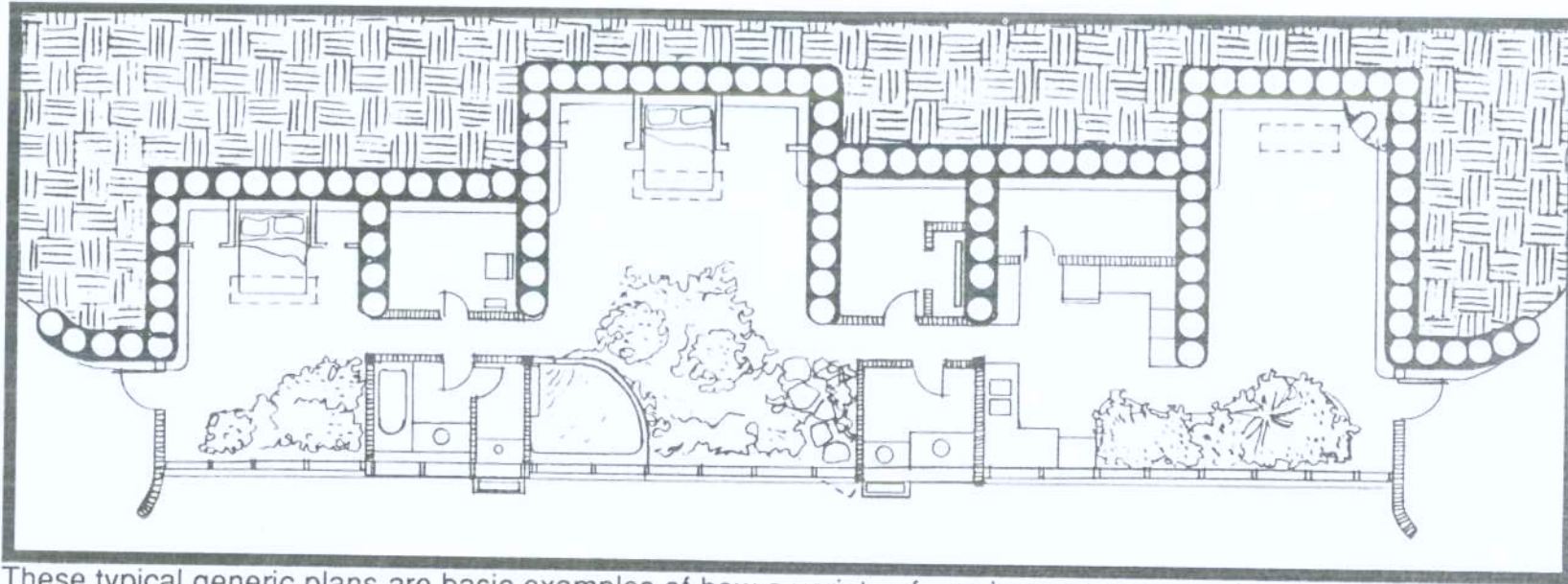
Egress and ventilation are achieved on the ends of the building so we have no interruptions in the fixed glass in front of the typical "U"s



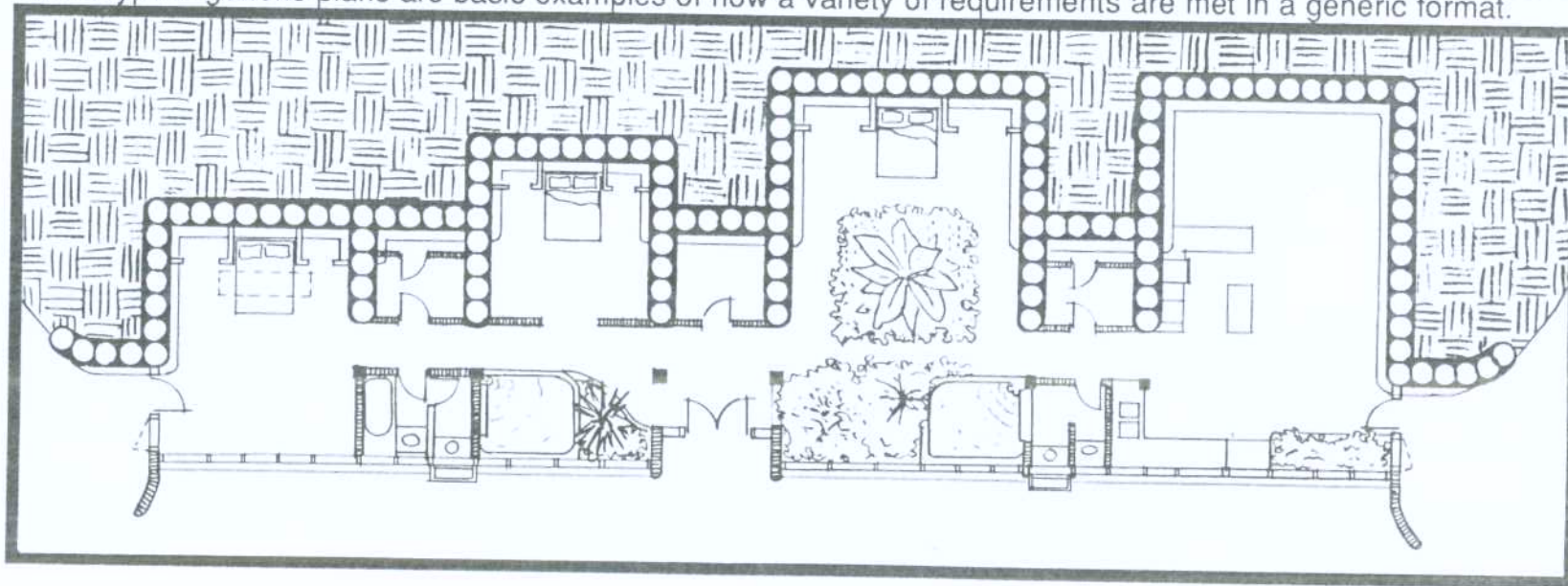
Another important consideration in arranging the modules is that the only way two regular "U" modules can be placed next to each other is when they are both being used for kitchen, living, dining, or study. Two bedroom "U" modules cannot be placed together in the middle of the plan as egress and ventilation cannot be adequately accommodated. Both are required by code. Thus, when arranging living modules, an "mU" must occur every one or two "U"s. The types of "U"s and "mU"s are the variables.

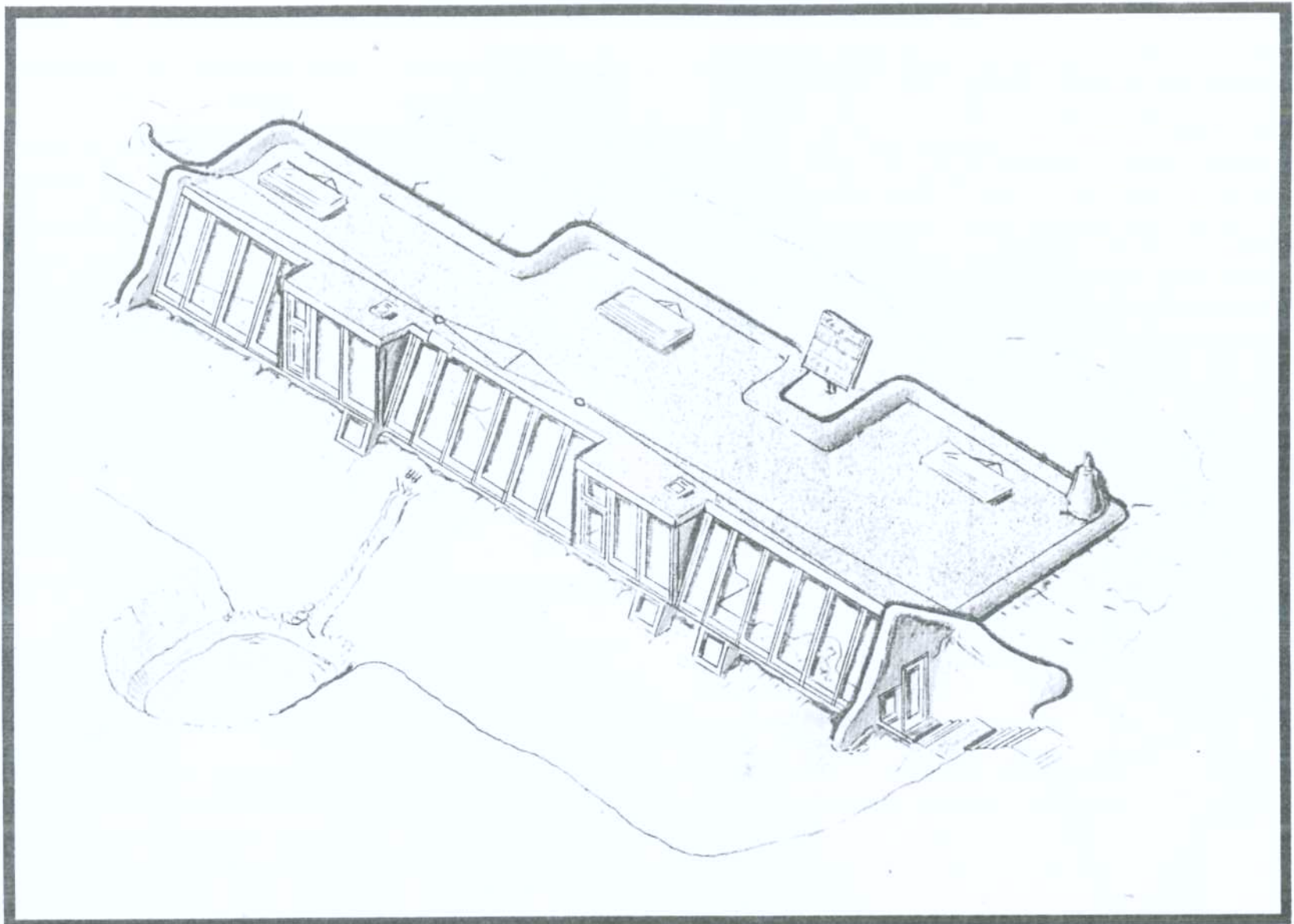
In the arrangement below, the front face does not need to be interrupted with various operable window types for ventilation and egress as both are achieved in the "mU" or on the ends. This keeps the front face detailing to a minimum which keeps costs down. Operable windows most economically occur on the east and west or in "mU" modules with vertical front faces.





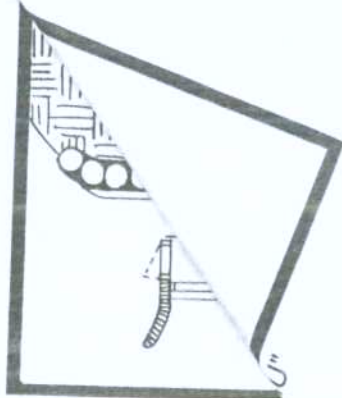
These typical generic plans are basic examples of how a variety of requirements are met in a generic format.





A TYPICAL GENERIC OVERVIEW. NOTICE THE VERTICAL GLASS AREA DEPICTING THE "mU"

Now we have uninterrupted fixed glass front face detailing (see overview previous page) with two basic structural modules both of which are very simple to build. This leaves the owners with the task of arranging various different types of "mU" and "U" modules to tailor the concept to their needs. This is the most economical and highest performing application of the Earthship concept to date. Of course there can be custom applications but the architectural and construction costs (and degree of difficulty) go up and performance usually goes down. *This new generic method is the way to be successful in building your own home out of pocket.* As soon as you drift from this method, costs go up. Solar Survival Architecture has provided a new generic information package in an effort to enlighten prospective clients on the most economical way to build with getting an Earthship. *We have seen that an owner's desire for customization is a double-edged sword. As the owner's desires grow in cost and diminish*



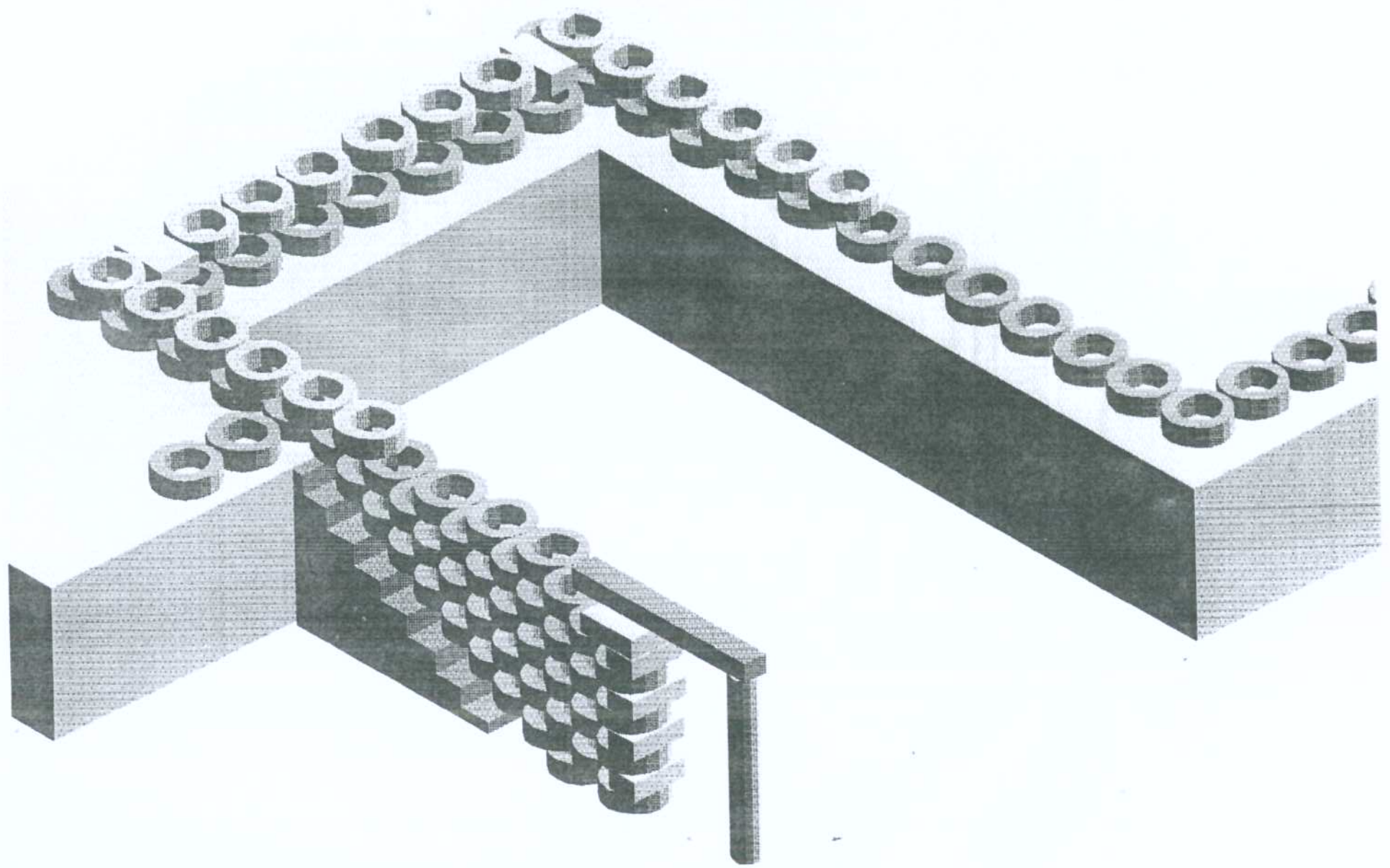
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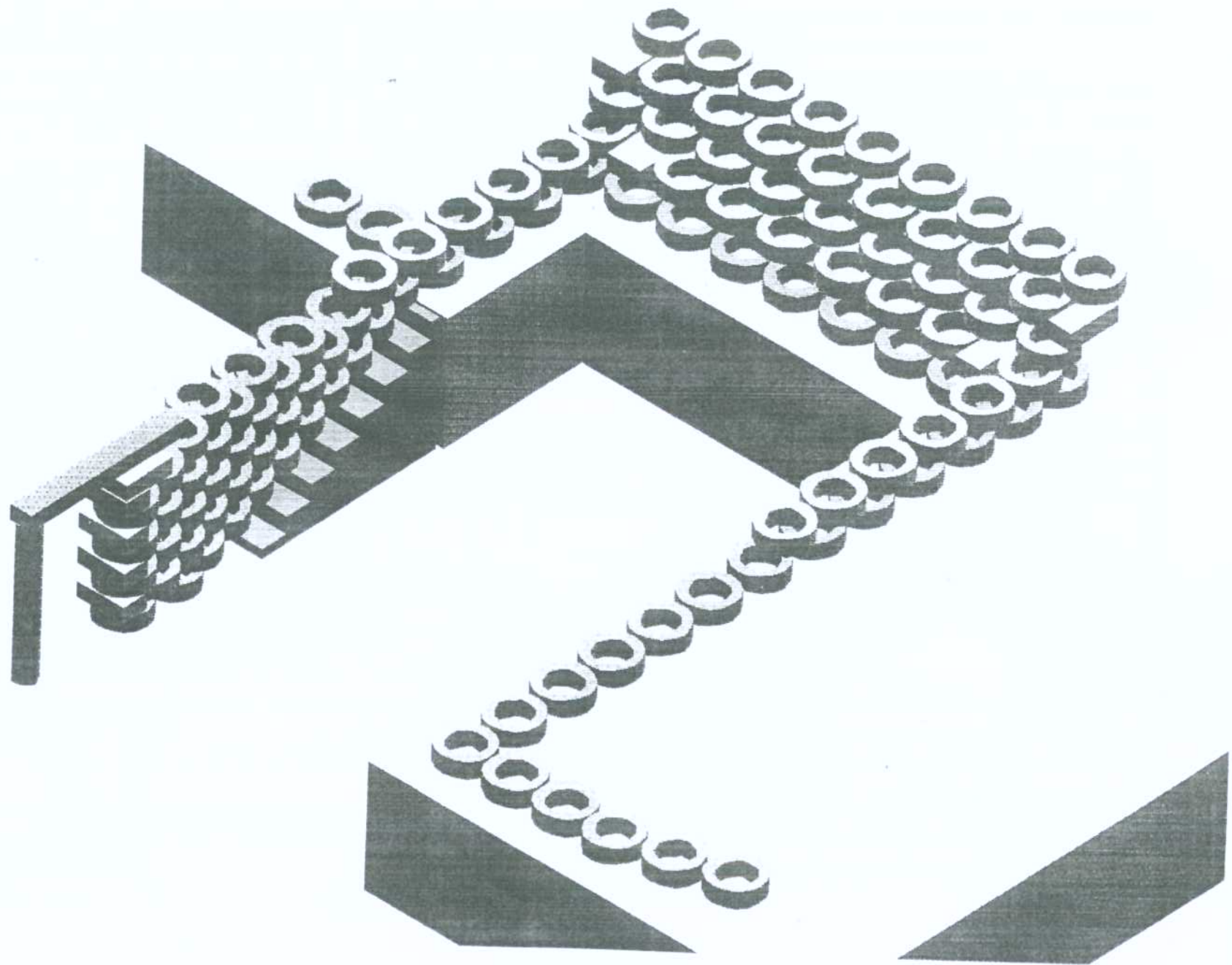
above instances. See Chapter 13, Climatic Adaptations.

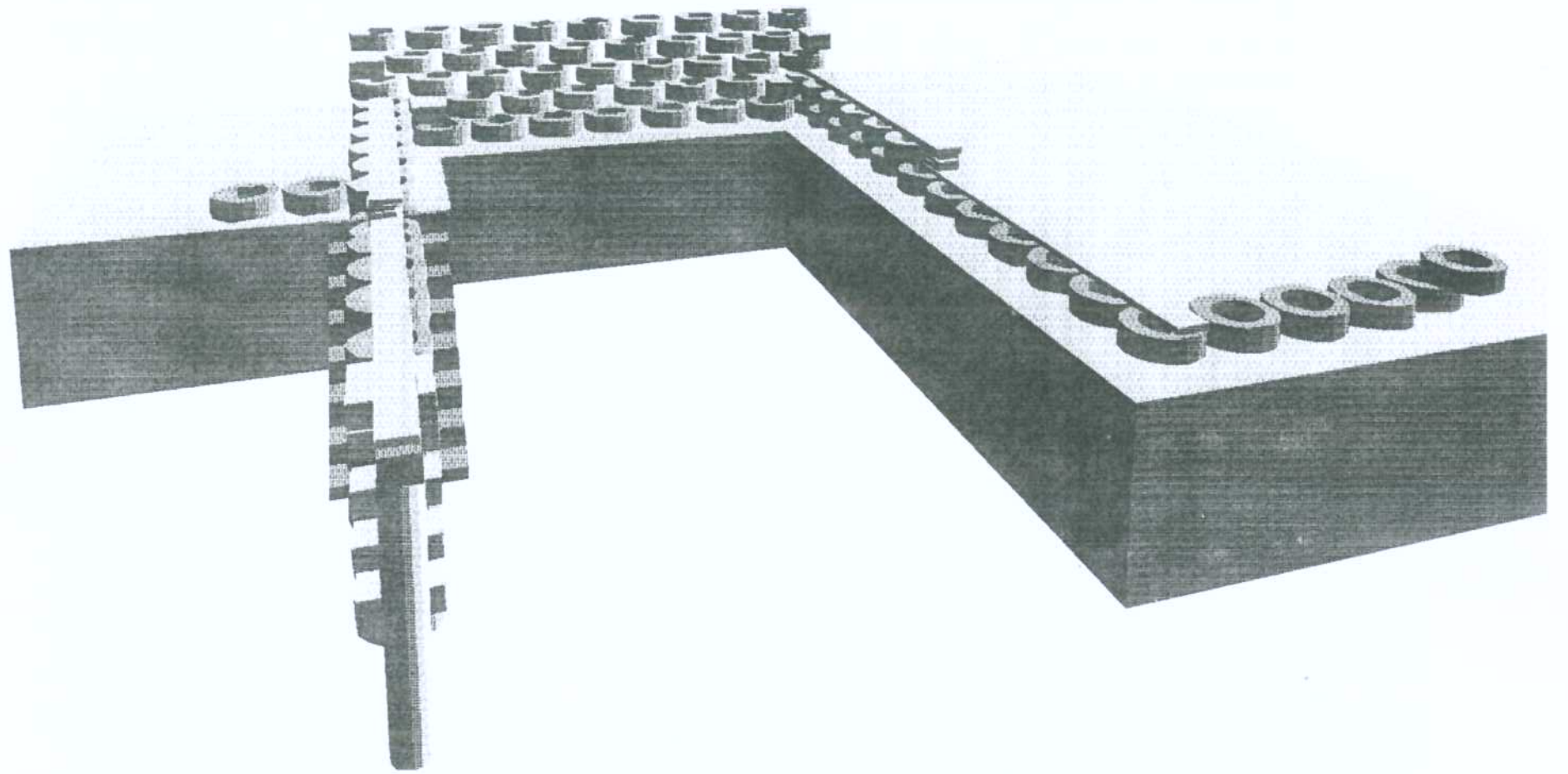
The analogy of the automobile has served us well here, to illustrate the importance of using predesigned systems and modules to keep cost down and performance up. There is, however, a very important difference between Earthships and automobiles that needs to be emphasized. While the new generic Earthships offer the high performance and low cost of a mass produced automobile, the Earthship makes its own "fuel", catches its own water, puts out no air or noise pollution and can go anywhere.

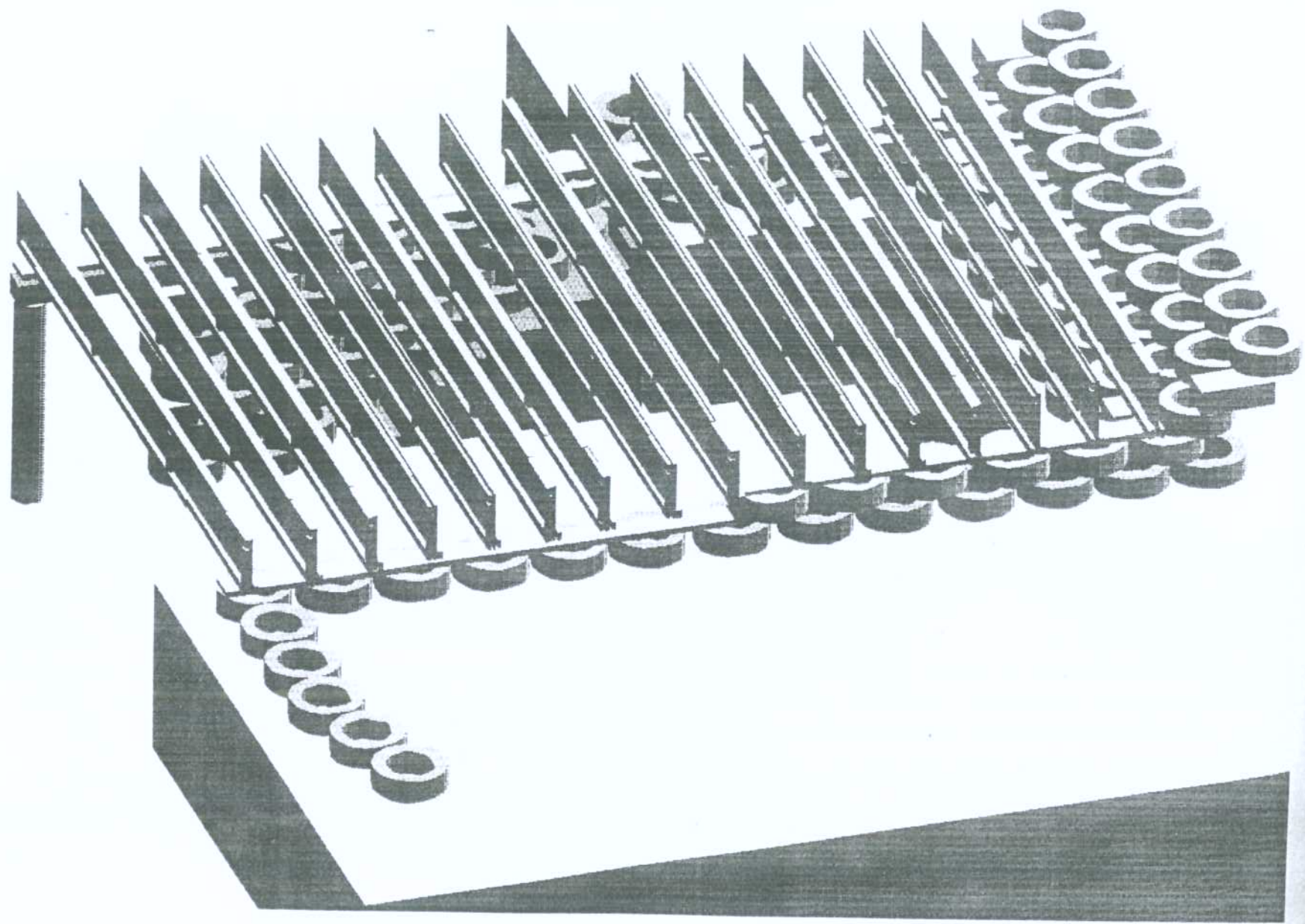
MATERIAL AVAILABLE

- New Generic package \$5.00
This package explains how to apply the generic approach and develop or choose your own tailored floor plan.
 - New Generic Construction Drawings \$1,500.00
(with video and books)
These are architect stamped detailed drawings (26 pages) including all mechanical for a generic Earthship based on your tailored generic floor plan.
- All prices subject to change after the printing of this book.





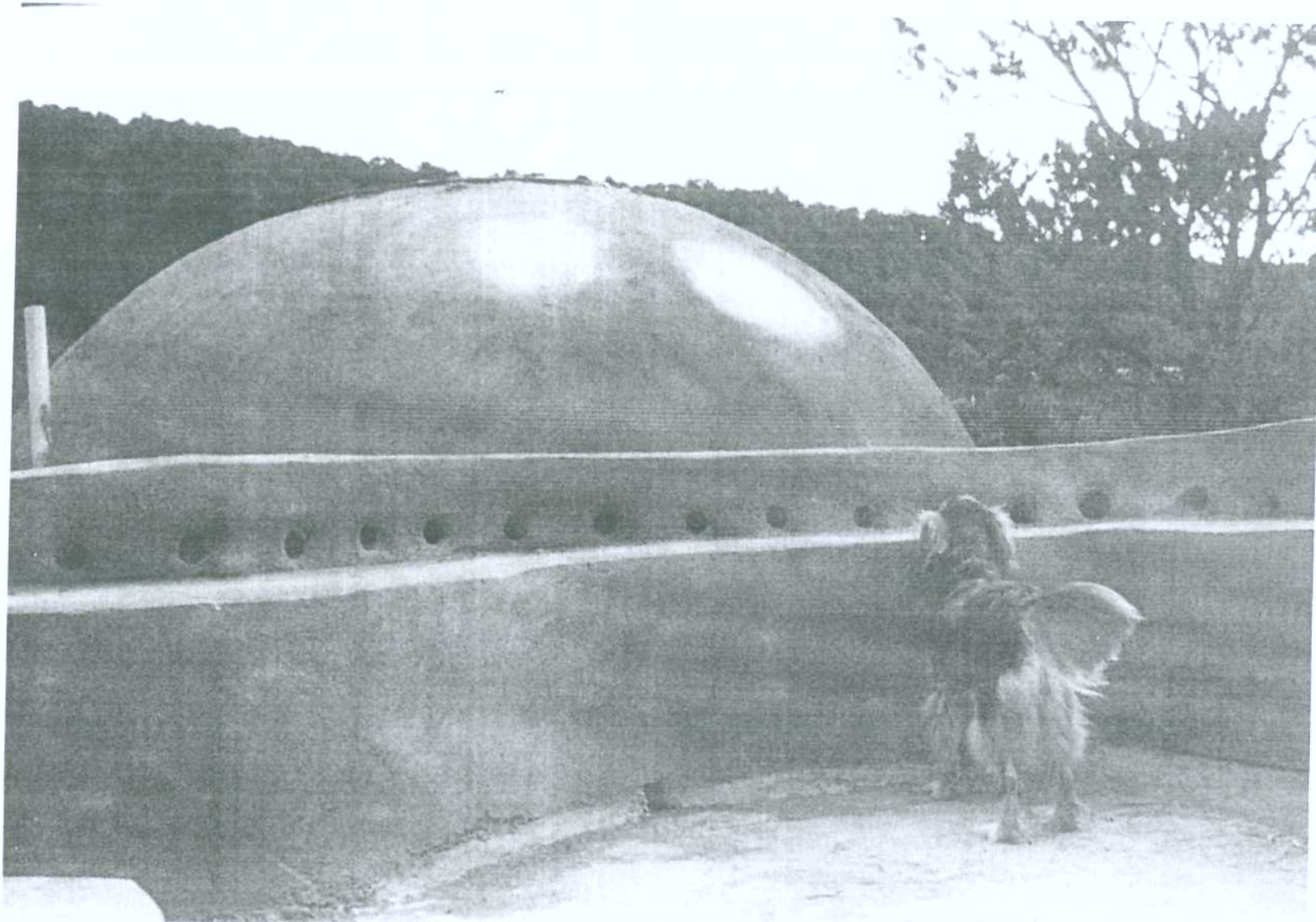




I WAS RUNNING ON A MOUNTAIN TRAIL ABOUT 3 MILES FROM CIVILIZATION. I WAS HEADING UP TO THE CREST OF ONE OF MANY LITTLE PEAKS ALONG THE TRAIL. AS I NEARED THE PEAK I HEARD WHAT SOUNDED LIKE WIND BLOWING THROUGH THE TREES. THE SOUND GOT LOUDER AS I REACHED THE PEAK. THE OXYGEN "INTOXICATION" WHILE RUNNING ON HIGH ALTITUDE UP AND DOWN HILLS TENDS TO REMOVE ONE FROM THE CLARITY OF THE "REALITY" AT HAND. I DID NOTICE, HOWEVER, THAT THERE WERE NO TREES MOVING IN THIS "WIND". IT GOT VERY LOUD AT THE PEAK LIKE IT WAS RIGHT IN MY EARS. THEN AS I PASSED THE PEAK IT BEGAN TO DIMINISH. THIS ALL HAPPENED IN A FEW SECONDS. I STOPPED TO FIGURE OUT WHAT WAS GOING ON. I LOOKED BACK AND THERE RIGHT BY THE TRAIL WAS A LARGE GREEN RATTLESNAKE ALL COILED UP AND RATTLING. IT WAS RIGHT BY THE TRAIL. I HAD RUN PAST WITHIN 3 FEET OF IT. THE LOUD NOISE OF THE RATTLE VIBRATION IS WHAT SOUNDED LIKE THE WIND. I SHUDDERED TO THINK HOW CLOSE I HAD COME TO IT. WITH THE THOUGHT OF WHAT COULD HAVE HAPPENED TO ME (SNAKE BITE THREE MILES OUT ON FOOT) I PICKED UP A ROCK AND THREW IT AT THE SNAKE. I MISSED. AFTER MISSING WITH A COUPLE MORE ROCKS I FINALLY PICKED UP A FAIRLY LARGE ROCK AND HIT IT IN THE HEAD. THE SNAKE WAS HURT - IT BEGAN STRIKING ITS OWN TAIL AND FLOPPING AROUND. I HAVE KILLED AND EATEN RATTLE SNAKES BEFORE AND THIS THOUGHT WAS IN MY MIND. HOWEVER, I DIDN'T WANT TO CARRY IT HOME THIS TIME SO I LEFT IT THERE STRIKING AT IT'S TAIL. ON THE WAY HOME I BEGAN THINKING WHY I REALLY KILLED IT. IT WASN'T REALLY FOR FOOD OR THE SKIN. I KILLED IT FROM THE FEAR OF WHAT IT COULD HAVE DONE. THE FACT IS *IT WARNED ME ONLY*. IT COULD HAVE STRUCK AS I WENT BY BUT IT DIDN'T. I REACTED TO ITS WARNING NOT ITS ATTACK. IT ACTUALLY HAD EVERY RIGHT TO WARN ME. I HEARD ITS WARNING FROM MANY YARDS AWAY. TOO OFTEN FEAR OF WHAT COULD HAPPEN CAUSES THE SAME REACTION AS IF IT ACTUALLY DID HAPPEN. A WARNING IS DIFFERENT FROM AN ATTACK. I KILLED THE SNAKE BECAUSE OF WHAT IT COULD HAVE DONE - NOT BECAUSE OF WHAT IT DID - IT DID NOTHING.

FEAR REACHES BEYOND CONSCIOUSNESS AND STRIKES FASTER THAN LOGIC.

WE MUST HAVE A LIFE WHERE THERE IS NO FEAR.



DOMES OF THE DEGAN AND SIEGAL EARTHSHIP, SANTA FE NEW MEXICO

EPILOGUE

Most of us are aware of the fact that insurance companies dictate what procedures doctors can perform and when they can perform them. Likewise mortgage companies dictate what kind of housing can be built and when it can be built. Insurance companies also have a hand in this. Power brokers dictate what kind of decisions congressmen and women make and when they make them. We can and do point the finger at these corporate/political "villains", but do we realize that many of us work for them or otherwise depend upon and support them?

This situation is very much like a cancer infested human body. The cancer (the villain) is actually a part of the body and the body is part of the cancer. We are part of the villain that controls us. *We are the problem.* Nothing will evolve in a different direction as long as we support the villains by allowing them to support us. *We and the villains are co-dependant.*

How futile it appears when any political leader presents a plan of attack on how to make this co-dependency work. If you were on a sinking ship would you want to be dependent on a predominantly white male life boat full of leaks with no gas, no oars and seven people fighting over which way to go, or would you want to be independent and have your own life jacket?

I once heard a cancer patient say "I'm dying, don't waste my time". We are all dying, why waste time? Lets grab a life jacket and all help each other. The **Earthship** and its related concepts **is a life jacket.** *It won't let you sink.* You still have to kick and swim

and position yourself in movement toward the shore, but it won't let you sink.

The concept for a cancer starts with a single mutant cell that is "born" within the existing activities of the body. Whether the cell multiplies into a tumor or a rampant "family" running through the body it still lives *within the existing activities of the body.* The body feeds the cancer as it feeds itself. The original cancer cell found a way to survive and multiply from the processes already taking place in the body. This sounds a lot like insurance companies, mortgage companies and politics. They have become malignant tumors inhibiting our "body processes".

The *concept* of cancer can be applied to cancer itself in an effort to eliminate cancer. Imagine planting a cell within a cancerous tumor that functions in relation to the tumor exactly like the cancerous tumor itself relates to the human body. The "anti-cancer" cell is planted in the tumor and lives from the *existing activities of the tumor.* It grows and becomes an "anti-tumor" within the tumor. This is an Aikido approach to cancer and to life on Earth in the later part of the twentieth century.

A major part of the concept of the Earthship is that it can be owner built without a mortgage payment. Now, without a mortgage payment no one can tell you what the building must look or function like to assure resale. This means one person is not being manipulated by and dependant on the mortgage and insurance companies. This is little more than a "cell" in the whole cancerous scheme of things in the "civilized" world. Now, this Earthship needs no centralized electric power, water or sewage support

so it further becomes an "anti-cell" with respect to other "tumors" in our society such as power companies, water controllers, and politically "stained" sewage systems. This Earthship is a little cell of life that was born out of the system but is not a functioning part of the system - much like a cancer cell. Now, this Earthship multiplies much like a cancer cell. It worked so well for its owner that others wanted one and lo, we see many Earthships multiplying into an "anti-tumor" within the system - a *community*. This community grows within the system and begins to displace and render useless certain aspects of the system. The system becomes weaker and the concepts of the community become stronger. **Human interest and support will simply gravitate to that which takes care of it best.** No amount of political promises and television ads or even dogmatic legal threats can compete with the snowballing effect of *people choosing life over waning survival*. In this analogy, all malignant aspects of our civilization will simply starve. They will not have to be cut out, fought, disguised, or otherwise reckoned with. They will simply starve. We are feeding them. All we have to do is stop feeding them and feed ourselves.

The cancer analogy is not new. A photo of a group of cancer cells has been blown up while an aerial photo of Los Angeles was reduced and both looked the same. The cancer concept is alive and well on the planet earth both within the human body and without. What **is** new is the "cancer within a cancer" concept. This is new as a way of dealing with cancer within the human body and a way of dealing with "cancers" on the planet earth.

Many seemingly valid new inventions, cures for diseases, and social reforms are scrapped because of lack of funds and support. I submit that they are not valid if they need continuous, conscious support and/or funds from the very malignancy they are fighting. The "land build" concept (which is fueled from by products and redirected existing forces in our society) is a "cancer within a cancer" application and so is the Earthship itself.

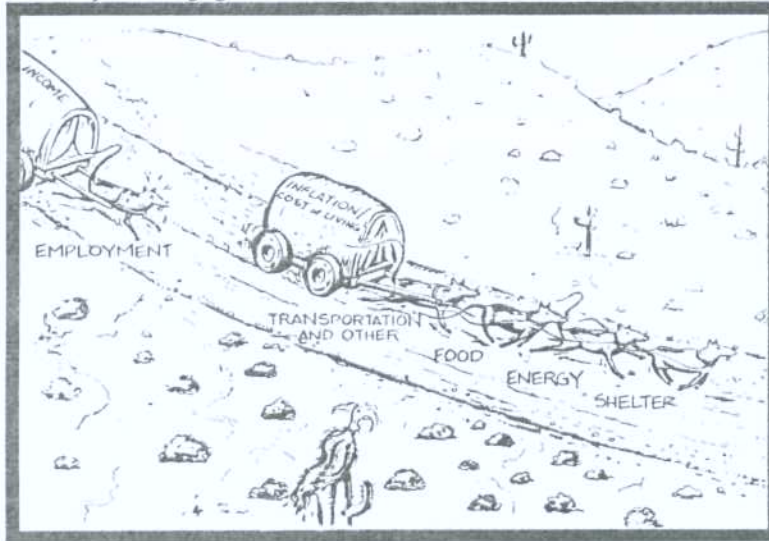
The new concepts for the future must come from an "immaculate conception" and must thrive on conceptual and physical by-products of the beast.

Cancer does not need the conscious mental and physical support of the human body. That is why it is so feared. Likewise, our solutions and reactions to the various forms of the cancer that we are facing (both within the human body and around the earth) must not need the support of the very "tumors" they are trying to replace. Our new ages will be like the phoenix rising from the ashes of the dying ages. This is a fact of physics and metaphysics. The only question is *will the human being be able to pass through the vortex of the death of the old and the birth of the new?* This is our choice - **to participate in our own evolution** or to perish as the universe continues to evolve in spite of us.

Much attention is being given toward trying to create employment for humans on earth so that they may keep up with the ever growing cost of living. Although many seem to think they understand why the cost of living (i.e. the cost of survival) continues to swell, no one can control it. It continues to grow year after year. Our lenders' and politicians' approach to

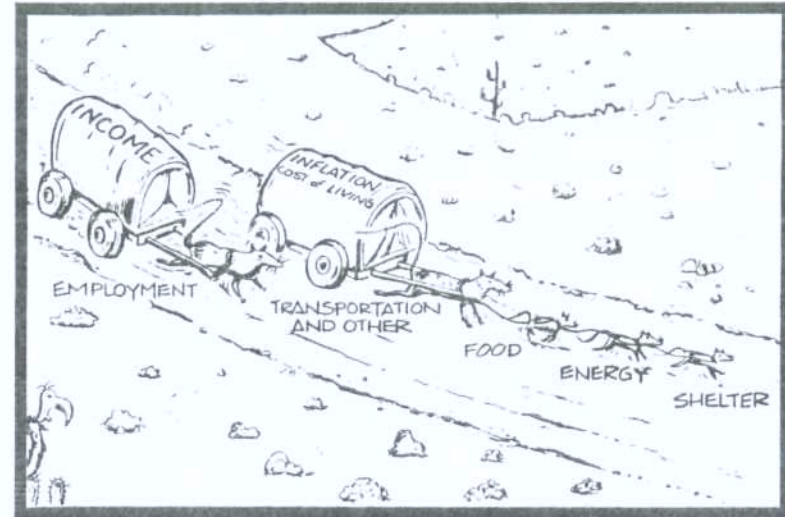
this problem is a "catch up football" approach. Keep creating jobs so people can keep paying for the ever increasing cost of living. A tremendous amount of money has to be injected into the economy to finance the creation of these often meaningless jobs. This gives people a chance (if they can handle a little stress) of staying in the race to keep up with inflation.

All my life I have seen inflation somehow racing across the sky with employment and income of the masses feebly trying to just stay in the race but usually losing ground. Hence, *the rat race*.



This is what I have grown to see as "life" on this planet. I am not playing this game anymore. Let me ask some questions. Why is the focus of attention always on jobs and employment? Why isn't anyone able to slow up or stop inflation so that jobs and employment can coast a while?

What is inflation? Inflation is essentially the rising cost of living. This is shelter, food and energy. Shelter is the single largest investment that the average human ever spends. An effect on the "price" of shelter would therefore be an effect on inflation. An effect on shelter, energy and food would result in a significant effect on inflation. The graphic result would be as follows.



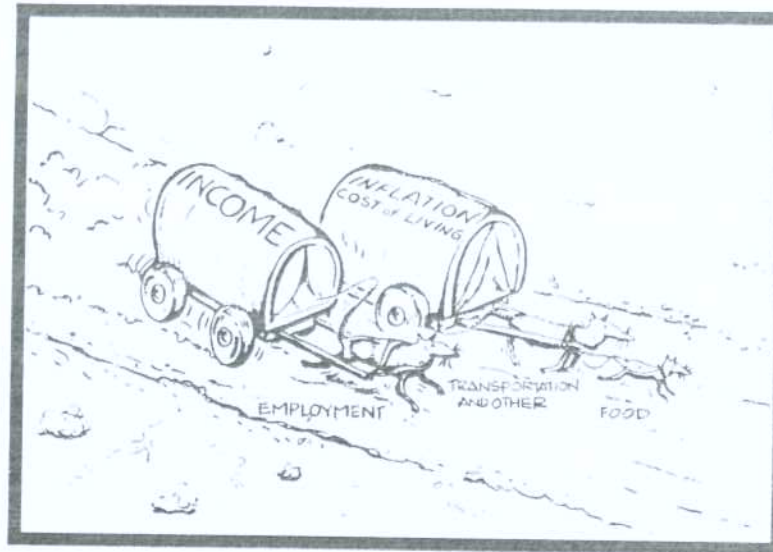
We are always trying to speed up employment and income. Why not put that energy towards slowing up or even stopping inflation? This should not be attempted with numbers, banks, interest rates, charts, politicians' promises or economists. This should be done by us, *the people*. We are not dependent on ghost economics and figurehead politicians for our way of life. We do not have to ask their permission to change our focus. We simply have to look at and observe the phenomena and simple logic will show us that rather than trying to stress our "rat wagon" to keep up with the cost of living,

let's attack the cost of living.

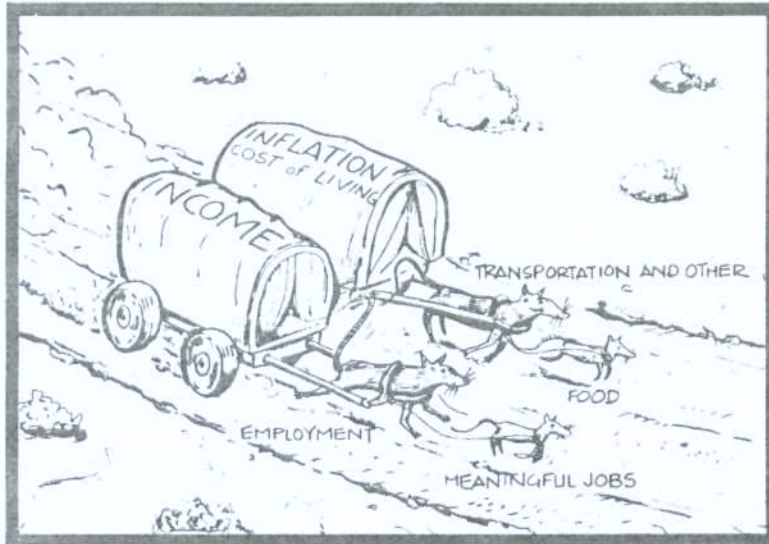
The Earthship concept does this. We can literally slash the power of inflation. Imagine (as we have said before) no mortgage payment, no rent, no utility bill and living in a situation where you can grow much of your own food year round.

Suppose you are trying to dislodge a rock and you have been pushing in one direction with all your might for quite some time but to no avail. Often you simply try pushing in another direction and sometimes you get results. Why have all of our approaches toward trying to fight the world of economics been with economic weapons? Economic survival is nothing more than a ruthless game and we do not have to play it. Money has become the sea of life and everyone needs a boat. The sea keeps getting rougher and the boats keep getting more elaborate, but never elaborate enough for a comfortable ride. We do not have to stay here. There is land out there where you don't need a financial boat, you just need an Earthship.

The real dream application of the Earthship concept is for people to buy memberships in land users associations for relatively small amounts of money. They build their own independent, food producing, homes for a fraction of the cost of having a conventional home built and end up with little or no mortgage payment and no utility bills. The result of this is a serious reduction in power of the "inflation" wagon.



Now, without major portions of revenue going to shelter and nothing going to utilities and less going to food, *we have a LIFE not just a grueling race.* This whole process creates jobs relative to the building of Earthships and their various components as well as some management and office work relative to the land users association and various businesses. The result of this is that employment and income can catch up to inflation (cost of living.)



When we stop trying to catch up, the race becomes just a ride. Of course if the government got behind this kind of program it could help, although I wonder if they could keep from bureaucracizing it to a standstill. The opportunity, however, is there without any kind of help. One grain of sand at a time can eventually tip the scales.

One Earthship at a time can change the world. The land users associations both rural and urban (see Chapter 8) set the stage for Earthship development. They are the "soil" from which Earthship communities can grow.

The trick here is the individual approach. These concepts can and have stopped inflation (the race) for people *on an individual basis*. When many people have been affected individually you have a *movement*. Our world - our reality - our problems are

too big for thin blanket approaches such as mass creation of jobs and massive welfare programs that actually fuel the fires of inflation. We need a program that allows each individual to stop inflation for themselves. This will take the burden off of the already over-burdened government. The governments greatest burden is itself. How can it take care of us? ***We must not only help ourselves - we must eventually help our government. When the masses are all quietly and peacefully sailing through life in Earthships maybe we can throw a life preserver to the bureaucrats.***

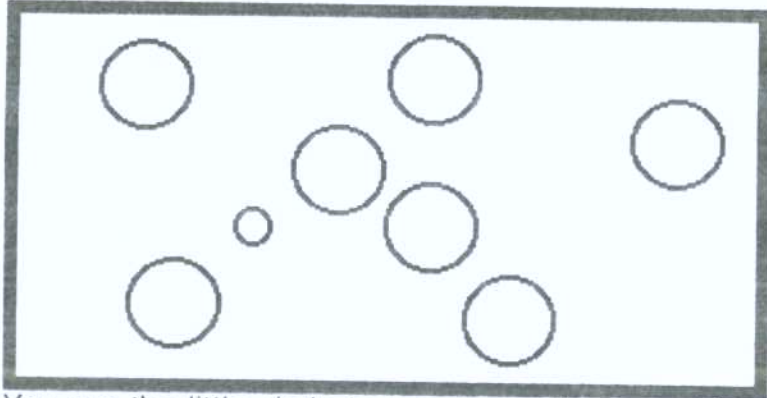
Imagine you are riding on a school bus down a highway. The road slowly gets worse and worse and eventually the pavement runs out and you are on a dirt road. This road deteriorates more and gets very treacherous for the big bus. Then the bus gets a flat tire but still tries to keep going - thumping along up the bumpy hills and around the sharp curves going slower than you could walk. If the road kept deteriorating to nothing more than a trail, at some point you would eventually make the decision to *get out of the school bus and walk*. Now is the time. The school bus is on a *one* dimensional journey. There are, however, many dimensions into which we can journey. The Earthship is a good vessel for that journey. It can cross the seas between us and freedom.

In *one* dimensional thinking there is *one* response to a situation.



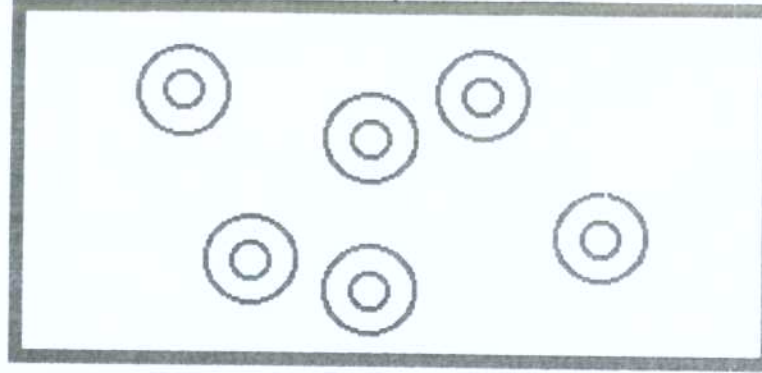
You are the short line in the above diagram. Your object is to conform. You have one choice - grow.

In a *two* dimensional world there are *two* responses to a situation.

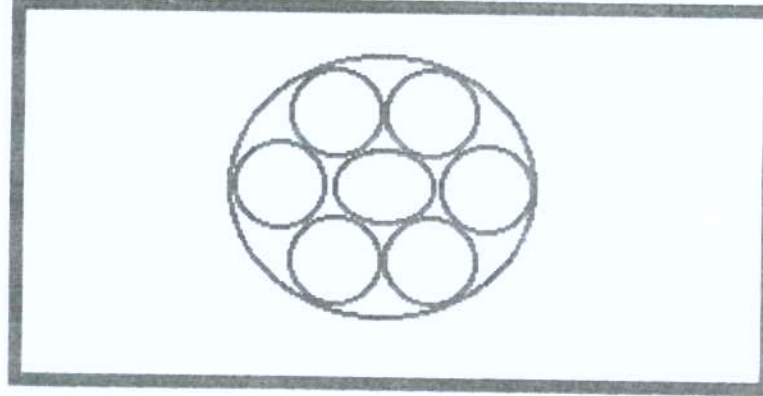


You are the little circle in the above diagram. Your objective is to conform. You have *two* choices - grow or shrink the others. The point is there are *two* choices.

Three dimensional thought gives you *three* choices, grow, shrink the others, or join the others.



In *four* dimensional thought you have *four* choices - grow, shrink the others, join the others, or have the others join you.

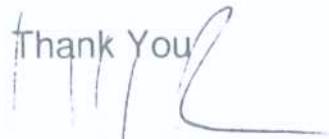


Five dimensions - grow, shrink the others, join the others, have the others join you, change the rules.

And so on.

Power is a matter of how many choices you have. How do you get these choices? You create/invent them. Everything is a choice. Only one choice is right for any given situation. The more choices, the more of a bank of responses to any one situation. This "bank" is a method of maneuverability through the physical world. It is at our disposal. We may use it to direct our evolution.

On behalf of the entire Solar Survival staff

Thank You

Michael Reynolds