Emerging Ecologies:

Architecture and the Rise of Environmentalism

Arch 630 – Architectural Theory

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03.07.24

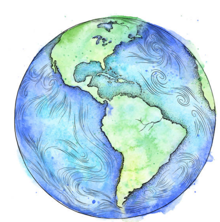
WHY HERE, WHY NOW?

- The built environment produces 42% of the world's annual carbon emissions

- The built environment worsens the problems of capitalism, extractive post-colonialism, and social injustice

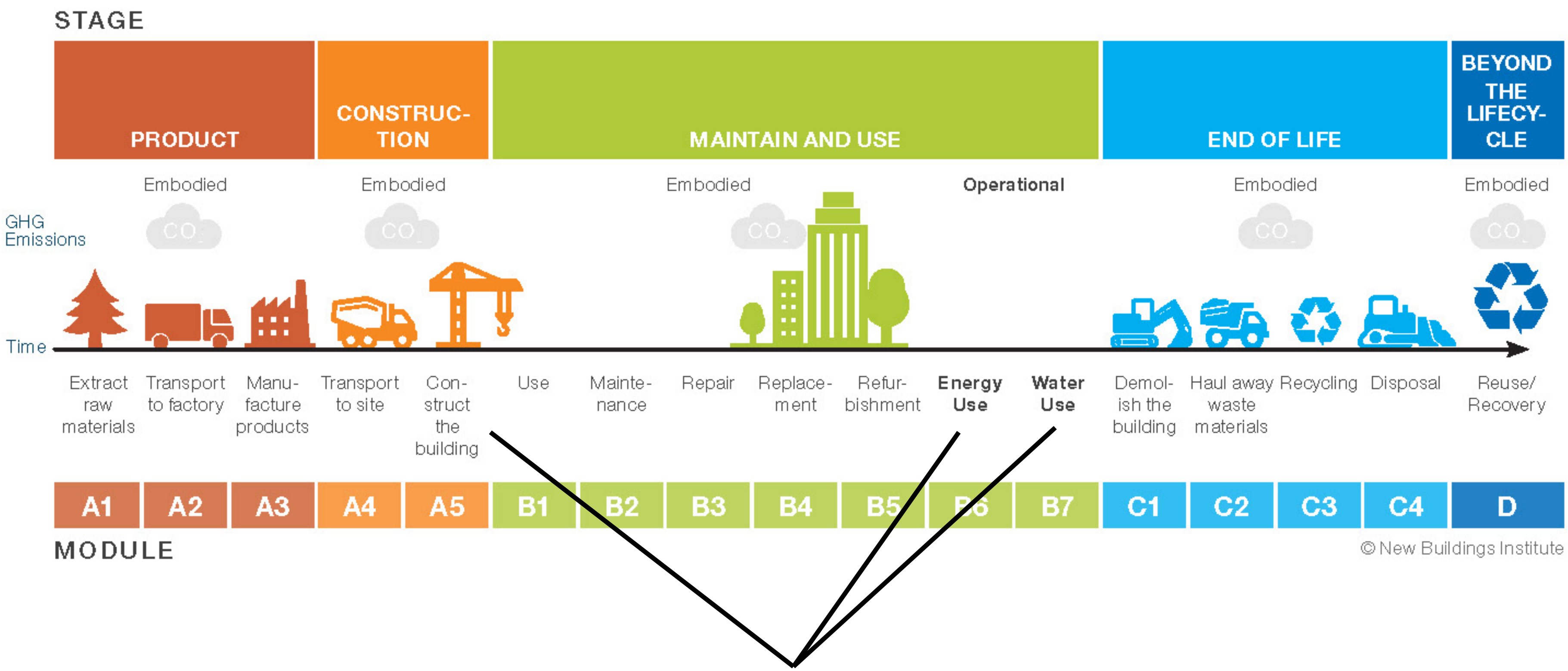
- Heavy cradle-to-cradle environmental impact

- As architects, we can do something about this




Detoxification PROTECTS Landfills KILL!
dump HUNT
Detoxification PROTECTS Landfills KILL!
dump HUNT
PCB PCB
March with WARREN
NO
DUMP HUNT

FIGURE 1: LIFECYCLE STAGES
Data source: BS EN 15978:2011



Traditionally, architects work here

MOMA MODERN ARCHITECTURE EXHIBITION, 1932

MOMA EMERGING ECOLOGIES EXHIBITION, 2023-24


Emerging
Ecologies
Architecture
and the Rise of
Environmentalism


OCCUPANCY
BY MORE THAN
154 PERSONS
IS DANGEROUS
AND UNLAWFUL
adidas


Emerging Ecologies
Architecture and the Rise of Environmentalism
1930
1940
1950
1960

1950

1953

Serge Chermayeff begins teaching his Environmental Design course at the Harvard Graduate School of Design (GSD) in Cambridge, Massachusetts, which is required for all students, whether they're majoring in architecture, landscape, or planning.

2000

2000

Chemist Paul Crutzen popularizes the term “Anthropocene” to describe the current geological epoch, in which human activity has significant impact on the Earth’s climate and ecosystems, rivaling that of natural processes.

MOMA EXHIBITION 2023-24

- Architects from 1950s-1990s address themes of overpopulation, the depletion of natural resources, and the effects of pollution
    - Environment as Information
    - Environmental Enclosures
    - Multispecies Design
    - Counterculture Experiments
    - Green Poetics

ENVIRONMENTAL ENCLOSURES

Space Settlements

A Design Study

(NASA-SP-413) SPACE SETTLEMENTS: A DESIGN STUDY (NASA) 191 p
N77-21106
CSCL 22A
Unclas
00/12 24358

National
Aeronautics and
Space
Administration

Some General Considerations

Because it is expedient, although not entirely justified, to treat the shielding which protects against the dangerous radiations of space separately from the choice of the geometry of the habitat's structure, that problem is left to a subsequent section. Subject to possible effects of the shielding, the choice of habitat geometry is determined by meeting the criteria of the previous chapter at minimum cost. In considering how different configurations may supply enough living space (670,000 m^2) and how they meet the physiological and psychological needs of people in space, the following discussion uses the properties of materials outlined in appendix A. Throughout, aluminum is assumed as the principal structural material.

The Habitat Must Hold an Atmosphere

The simple fact that the habitat must contain an atmosphere greatly limits the possible forms. For economy in structural mass it is essential that large shells holding gas at some pressure must act as membranes in pure tension. There is, in turn, a direct relationship between the internal loading and the shape of the surface curve of such a membrane configuration. Also, when the major internal loads are pressure and sp induced pseudogravity along the major radius of ro tion, R, the possible membrane shapes must be doul symmetric, closed shells of revolution (refs. 5,6). T

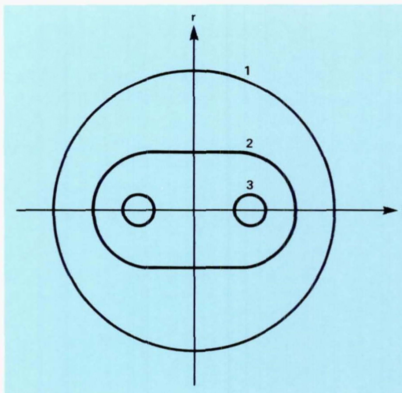


Figure 4-1.– *Subset of Cassini curves which, wh revolved, generate possible geometrics.*

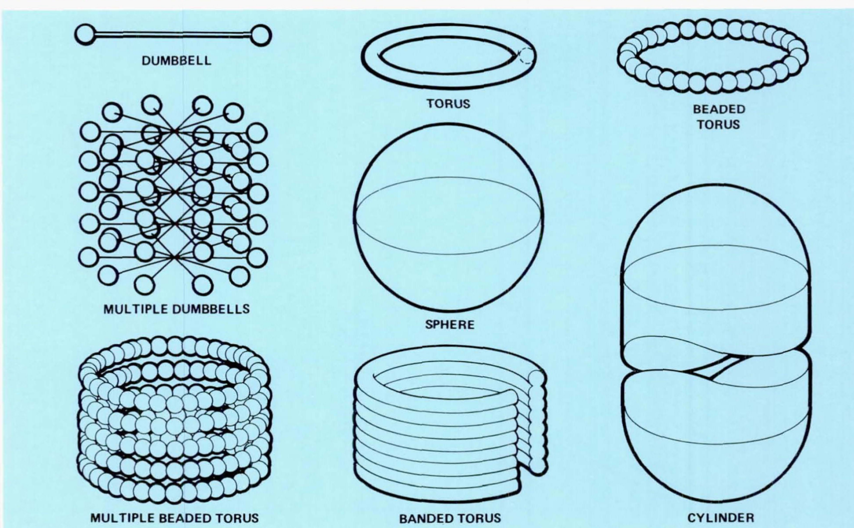
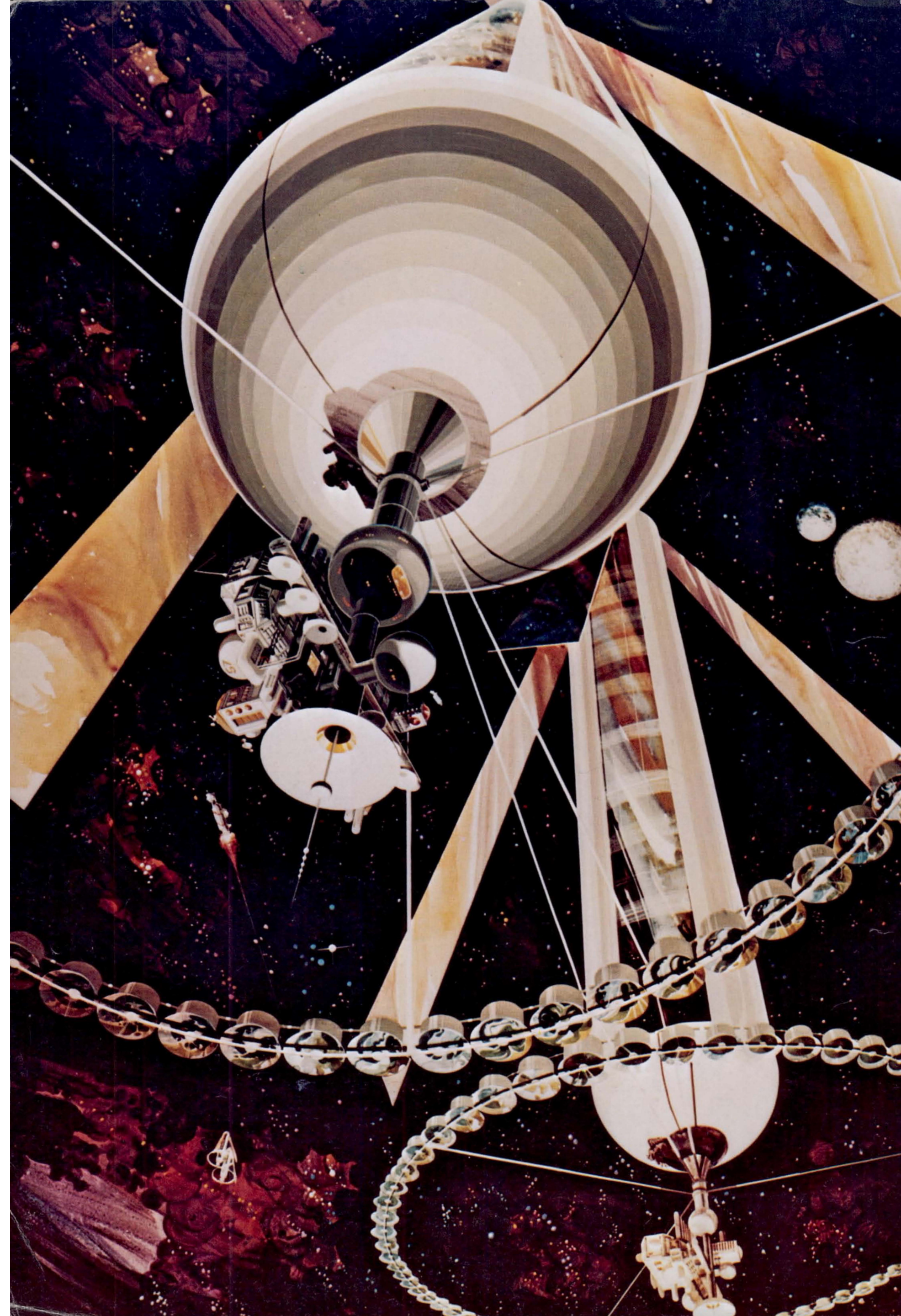
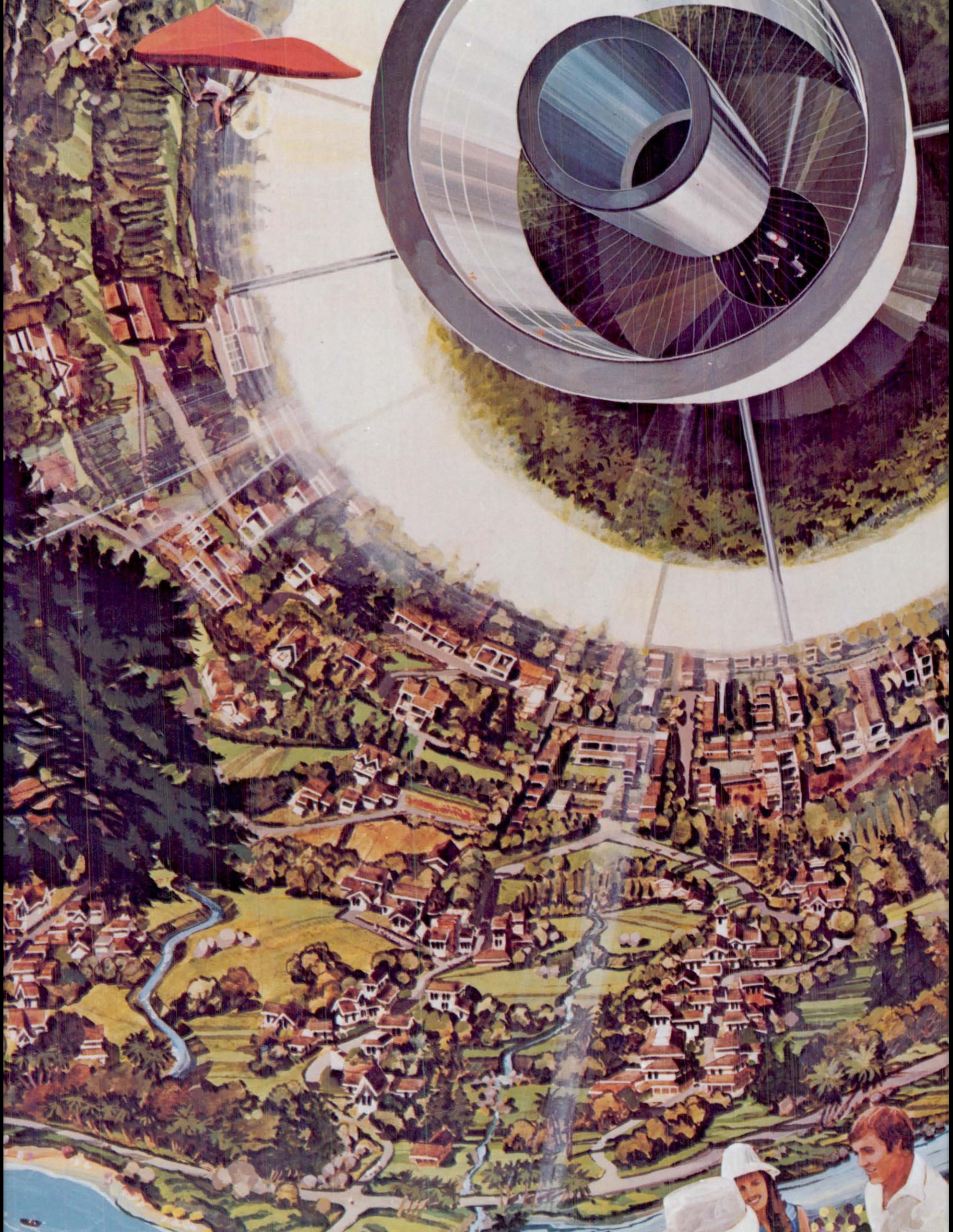


Figure 4-2.– *Basic and composite shapes.*



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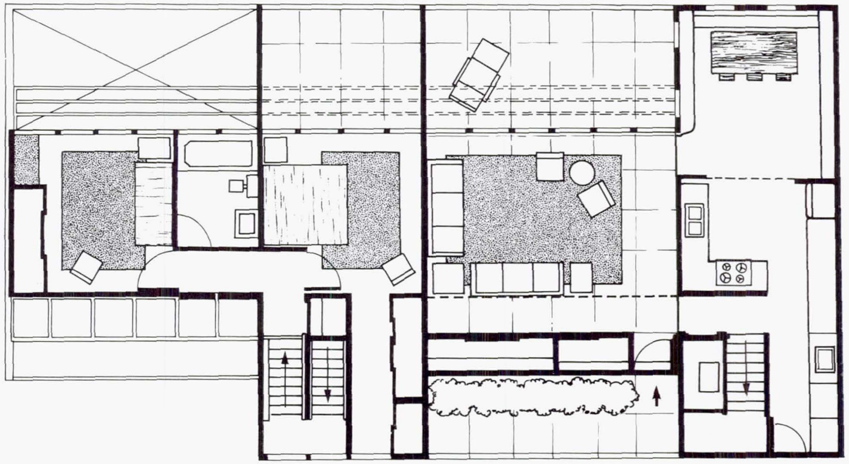


Figure 5-6.– *A possible apartment plan.*

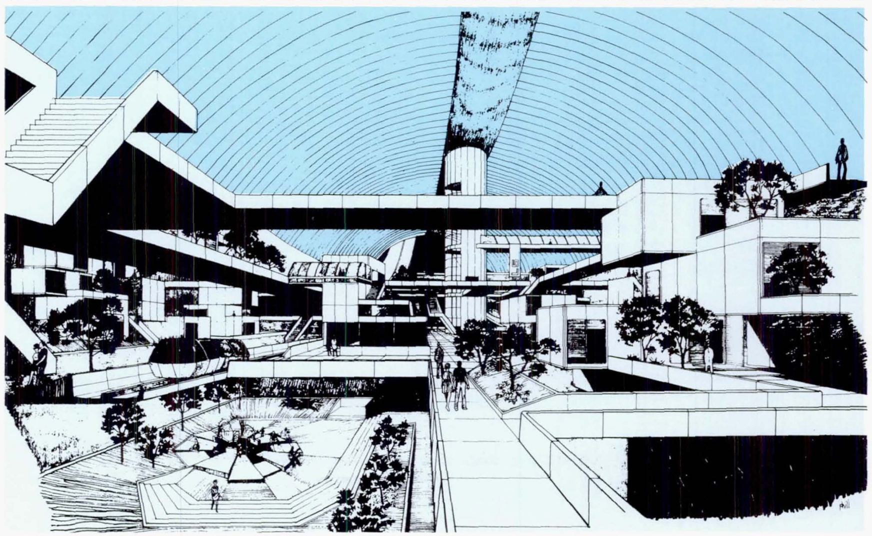


Figure 5-7.– *View of housing.*

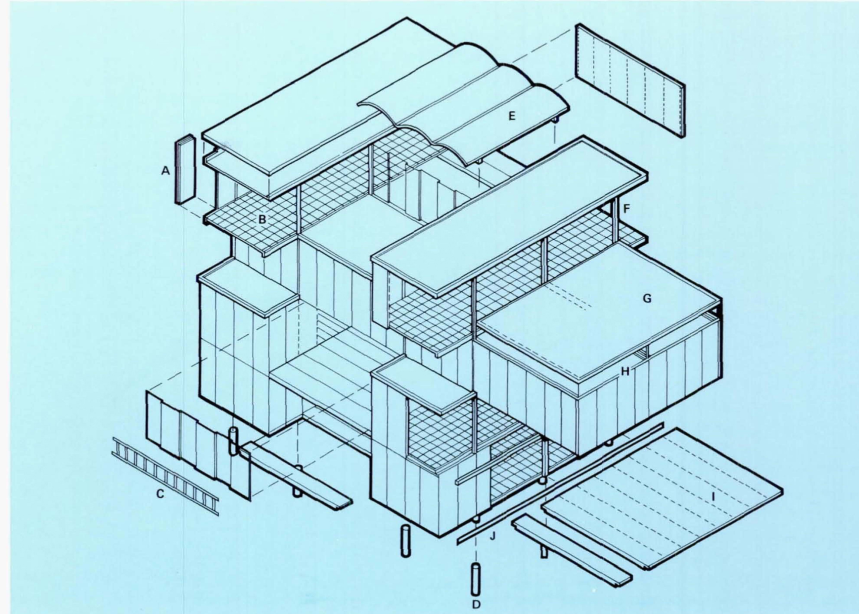


Figure 4-8.– *Modular construction for inside the habitat. This diagram illustrates the kinds of components whic might be used in building the space colony. A. Wall panels, nonstructural, can be any material depending c acoustical, thermal, and stability requirements; B. floor construction light honeycomb panels; C. shades, railing etc., added in place; D. structural supports – receives frame; E. "roofing" kits – translucent, clear or opaque, c various configurations; F. structural frame – stacks four stories, 1.82 m or 3.64 m × 5.46 m structural ba G. roof panels – used where tops are intended for walking surfaces; H. ceiling panels – visual and thermal barrie I. spanning planks or beams; J. beams. Source: Building Blocks Design Potentials & Constraints, Center for Urba Development Research, Cornell Univ., 1971.*

having in space permanent communities of sufficient productivity to sustain themselves economically.

Size and Suitability of Population

It is possible in principle to specify a productive task, for example, the manufacture of solar power satellites, and then calculate the number of people necessary to perform it, the number needed to support the primary workers, and the number of dependents. The sum of such numbers does not accurately define the population needed to found a colony since the calculation is complex. Even a casual consideration of what is necessary for a truly closed society would suggest that a colony population be far in excess of any reasonable first eff in space.

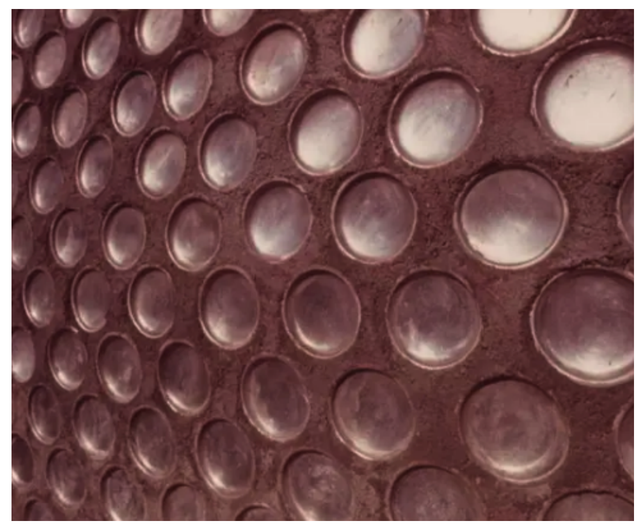
A similar approach would bypass the calculation j described and simply copy the population size and dis bution of a major productive urban center on Earth. T difficulty, however, is that such communities are qu large, on the order of some hundreds of thousands people. Moreover, close inspection reveals that hum communities on Earth are less productive by labor fo measurement standards than what would be needed in least the early stages of space colonization.

One way to have a colony more productive th Earth communities would be to make the colony factory, populated only by workers. The colony wo


DON DAVIS
11-25-75

COUNTERCULTURE EXPERIMENTS

Michael Reynolds –
Earthship Biotecture
Taos, NM 1970s - present



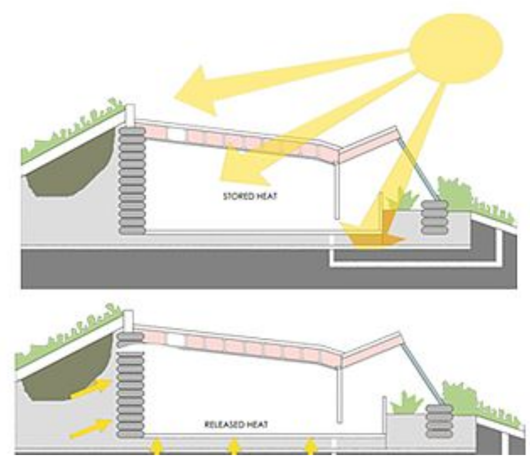
HEATING AND COOLING SYSTEM - House as a battery

The sun is the source of heat. The Earth itself is a battery tp store heat. Earhship uses both these phenomenon in the design.

Earthships store energy by wrapping every room with 3' thick dense walls. It interfaces with the wall by aligning with the phenomenon of thermal mass.

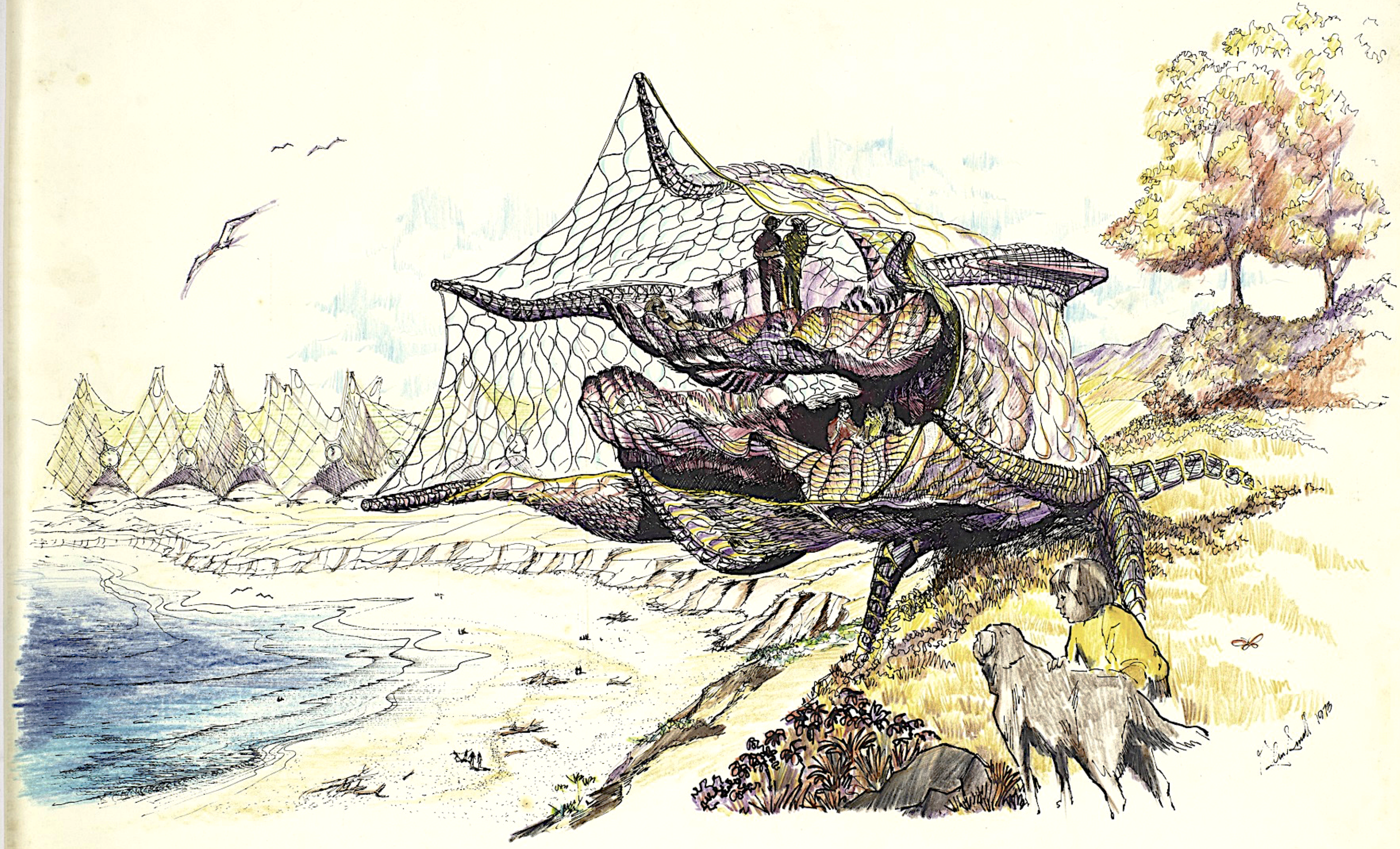
ELECTRICAL SYSTEM -- House as a power plant

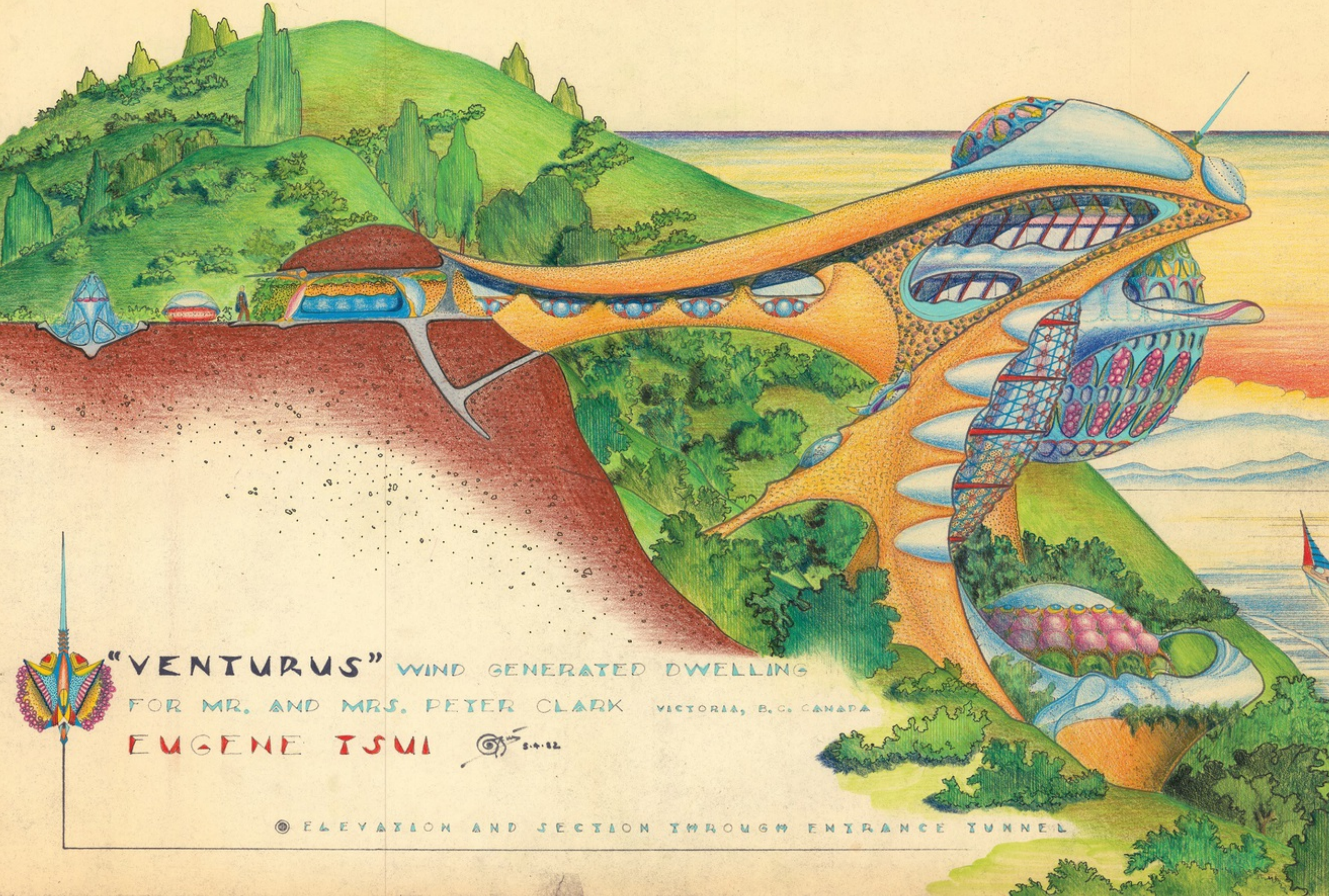
The simple admission of sunlight reduces the need for daylighting. The vessel is a small independent power station. It uses the energy of the sun and wind in a clean way. It collects the energy from windmills and photovoltaics and stores it in batteries to be used later.



ENERGY CONSUMPTION OF A HOUSEHOLD IN A YEAR - 10,656 kwh
ENERGY PRODUCED BY A WINDMILL - 400 KWh per month at 12 MPH (5.4 m/s) (12 feet (3.72 m); 50-330 RPM)

GREEN POETICS


1973



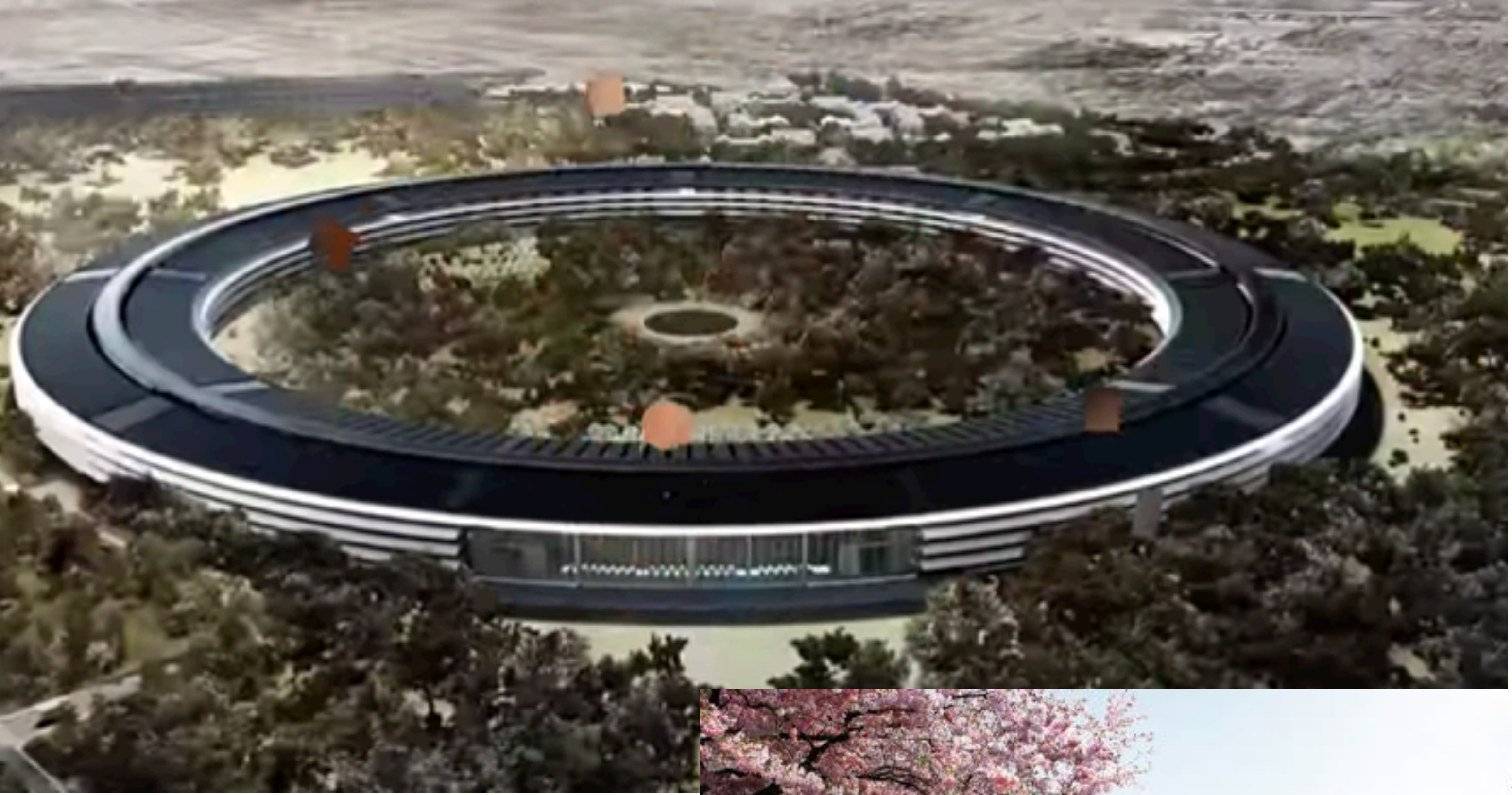
"VENTURUS" WIND GENERATED DWELLING
FOR MR. AND MRS. PETER CLARK VICTORIA, B.C. CANADA
EUGENE TSUI
5.4.82
ELEVATION AND SECTION THROUGH ENTRANCE TUNNEL

The Climatron in winter — Shaw's Garden — Saint Louis

INFLUENCE

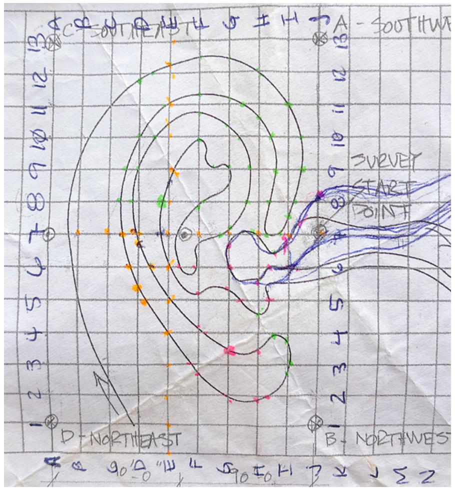
Emilio Ambasz - Prefectural Int’l Hall, Fukuoka, Japan 1990

Rafael Vinoly - The Hills at Vallco Cupertino, CA 2015



Foster + Partners -
Apple Campus 2
Cupertino, CA 2015

Ron Rael – Skylos
San Luis Valley, CO
2022 – present


SURVEY
START
POINT
D - NORTHEAST
B - NORTHWEST

PhD RESEARCH

My doctoral work focuses on practice-based design research about how built and natural environments worldwide can have a positive impact on community cohesion and environmental resilience, and may contribute to fostering a regenerative culture.

Regenerative culture refers to humans evolving from ego-centric, through socio-centric, to bio-centric ways of approaching life. It moves beyond the idea of the Anthropocene with a leap in human self-awareness that considers the human species as one facet of a larger, interconnected, timeless ecosystem.

It brings us back full circle to ancient epistemologies where humans participated in reciprocal, mutually beneficial relationships with the rest of the natural world.