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EARTHSHIPS: The buildings of the future.

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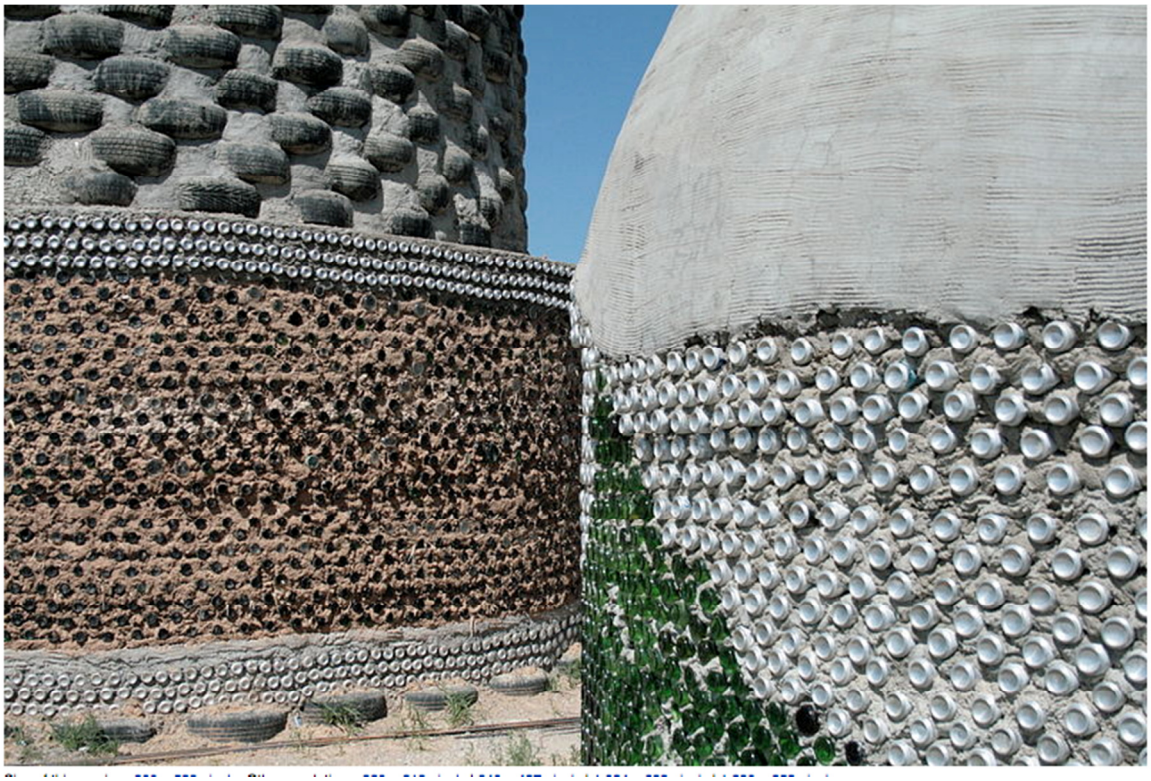
Abstract: Earthships are houses built based on natural and residual materials, such as used tires, empty glass bottles and aluminum cans. (Imagenumber01.jpg)



(Imagenumber01.jpg)

The term “Earthship” is a registered trademark of Michael Reynolds, an american architect who built the first earthship in the early 1970s.

Earhships are comfortable, long lasting and totally self-sufficient buildings, that’s the reason why they are called ships. This technique of construction aims to reduce costs of building materials, confer housing the status of autonomous regarding to networks of electricity, water, trash, etc., and allow its low-pollution integration into the environment towards conventional homes uses materials that require a lot of fossil fuels.

The concept of this type of building is to use readily available sustainable materials and resources available from its natural surroundings to recycle their own garbage and wastewater and to use renewable energy, like the sun, water and wind.

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Earthships produce water and electricity for its own use. They need to be able to create their own utilities, and to handle the three systems of water, electricity and climate, in order to be entirely self-sufficient. They rely on natural energy sources and are independent, free from the electrical and water lines. They are designed as structures that are free of the constraints of centralized utilities, on which most modern shelters rely.

Electricity is generated by solar panels and stored in batteries. The roofing collects rainwater that is filtered and used for drinking and various household activities such as cooking and washing. Used water from sinks and showers – greaywater- is reused to water indoor plants and after that for toilet flushing.

Keywords: Earhships, Sustainable buildings, Sustainable designs and construction, renewable energy, Permaculture, self-sufficient buildings, recycling, sustainable architecture, radically sustainable living, greywater.

Biotecture: Architecture and Wisdom

The fifth of the Human Rights is the right live in a decent and adequate house. There are more than 2 billion homeless people in the world.

So far it has not been possible to solve the immense needs of habitat in many countries. Building Earthships is a solution for many problems: enviroment, habitat, garbage, etc.

We need more wisdom, more awareness of where we are and what environmental impact we are causing to our ecosystems, more common sense in order to live in harmony with nature.

Earthships can adapt to different climates and are being build worldwide. In North- and South America, the Carribeans, Asia, Africa and Europe. The colder climates require the use of stronger insulation on the outside of the tire walls. Air conditioning and maintenance costs are low since 3 of its walls are covered with Earth, which offers protection for temperature changes.

Scrap tires are converted into usable "bricks" (Imagenumber01.jpg). The tire walls are additionally strengthened by using concrete in the tires on the ends. Earthships are not limited to tires – any dense material with a potential for thermal mass, such as concrete, adobe, earthbags, or stone could theoretically be used to create an Earthship. Internal walls are often made of recycled cans joined by concrete and usually thickly plastered with adobe.

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imagenumber02jpg

Additional benefits: Earthships are resistant to earthquakes, tornadoes, floods or other natural disasters. A fully rammed tire is massive enough to surpass conventional requirements for structural load distribution to the earth.
The roof is made using wooden support beams which rest on the tin can walls. The roof as well as the north, east and west facing walls of an Earthship are also heavily insulated to prevent heat loss.

The rammed earth tire are its high load-bearing capacity and its resistance to fire. The tires full of soil do not burn when exposed to fire.

External coatings:

We can make beautiful and original coatings for external walls with various small light objects. Some of the waste that you can use to coat the walls are: used pens and markers, sticks of ice cream, small boxes, broken watches, old cutlery, damaged tools, bolts, small metal objects, coil springs, hooks, pins, hair pins, old jewellery, broken glasses, pieces of puzzles, expired credit cards, empty perfume bottles, caps of cosmetic products, small aluminum cans marbles, old CD and DVD, small toys, etc (imagenumber 02.jpg, imagenumber03.jpg, imagenumber4.jpg)

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imagenumber03.jpg

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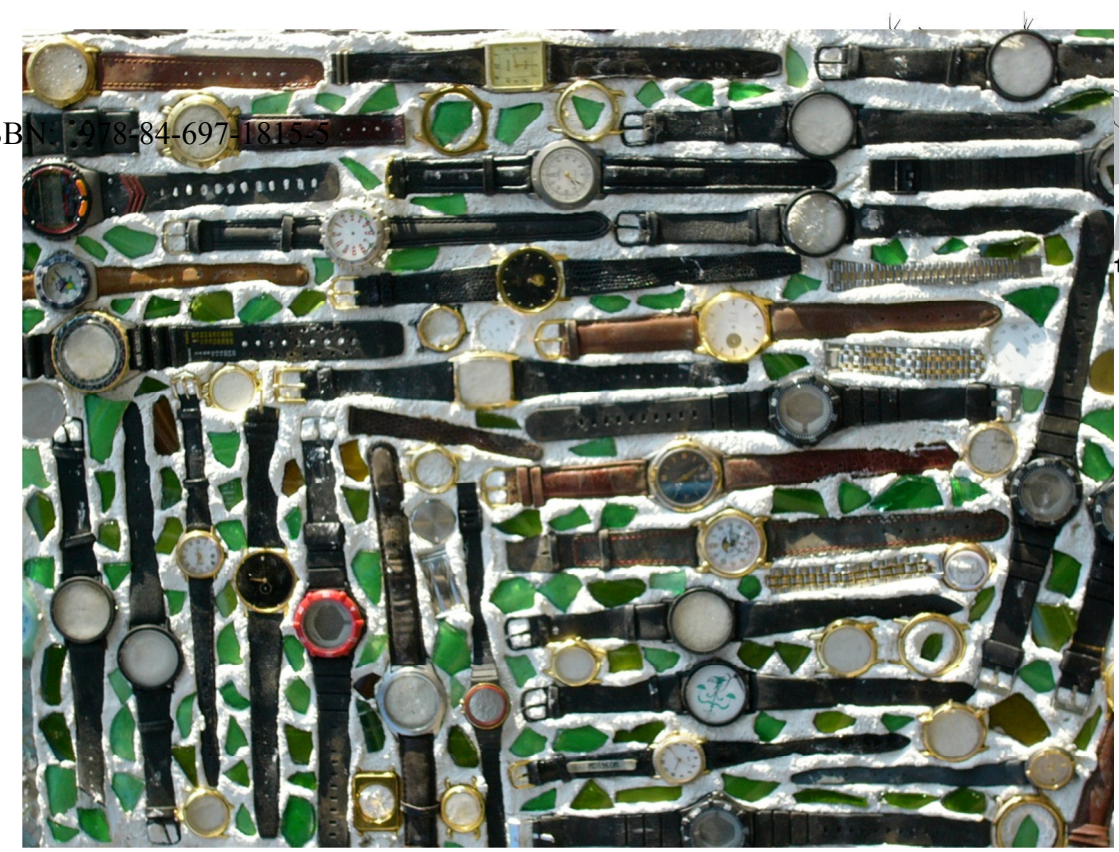

imagenumber04.JPG

Driking water, gray water and black water:

Earthships are designed to catch and use water from the local environment without bringing in water from a centralized source. Water used in an Earthship is harvested from rain, snow, and condensation. As water collects on the roof, it is channeled through a silt-catching device into a cistern.

The cisterns are positioned so they gravity-feed water organization module that filters out bacteria and contaminants and makes it suitable for drinking.

Water collected in this way is used for every household activity except flushing toilets. The water used for flushing toilets has been used at least once already: frequently it is filtered waste-water from sinks and showers, and described as "greywater".

Greywater made at earthships is not polluted enough to justify treatment. Its "pollution" being usually just soap, is often not environmentally damaging. It is used within the Earthship for a multitude of purposes. It is unsuitable for drinking,

The first Erathships used composting toilets which use no water at all. With the new greywater treatment, the general water system has been redesigned and Earthips now can have flush toilets.
Blackwater from flush toilets is not reused within the Earthship. It is sent to a solar-enhanced septic tank.

Electricity:

Earthships can be considered as an off-the-grid housing, meaning that they can live away from public utilities and fossil fuels such as gas, electricity, water or sewage.

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Earthships are designed to collect and store their own energy from a variety of sources. The majority of electrical energy is harvested from the sun and wind. Photovoltaic panels and windturbines located on or near the Earthship generate energy that is then stored in several types of batteries.

If additional energy is required, it can be obtained from gasoline-powered generators or by integrating with the city grid.

Temperature and ventilation:

Earthships are primarily designed to work as autonomous buildings using termal mass construction and natural cross ventilation assisted by thermal draught to regulate indoor temperature.

The sun provides heating, ventilation, and lighting. To take advantage of the sun, the front and principal wall of an Earthship, which is nonstructural and made mostly of glass sheets, is is solar-oriented and angled so that it faces directly towards the equator, perpendicular to light from the winter sun. This positioning allows for optimum solar exposure: maximum exposure in the Winter and lesser exposure in the summer. Windows on sun-facing walls are placed so that sunlight is shone inside the house to be used for lighting and heating. The buildings are often horseshoe-shaped to maximize natural light and solar-gain during winter.

The thick and load-bearing walls of an Earthship made from earth-filled tires, hold up the roof and provide a dense thermal mass that will soak up heat during the day and radiate heat during the night, keeping the interior climate relatively comfortable all day.

Earthips use the properties of this natural phenomena from the termal mass. Passive solar heating and cooling naturally regulates the interior temperature during both cold and hot outside temperatures. This natural heat insulation and ventilation, stabilize and maintain its inside temperature. They rely on a balance between the solar heat gain and the ability of the tire walls and subsoil to transport and store heat.

The large series of windows and the use of tires characterize the earthsheltered building. Earthships usually use their own natural ventilation system. It consists of cold air coming in from a front window, especially made for this purpose and flowing out through the skylights that are placed on the Earthship. As the hot air rises, the system creates a steady airflow of cooler air coming in, and warmer air blowing out.

Burocraty:

The permit office in the community where you plan to build an Earthship will determine if you can easily obtained full planning permit for buildig or you are invitd imnto a burocratic war. This constructive system does not require foundations. In a a couple of hours you can delete the entire building without any problem.

Economy and self construction:

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Earthships are economically feasible for the average person with no specialized construction skills to be able to create. Construction drawings and training should enable people to build their own off-the-grid Earthship home and become independent from public and commercial utilities.

The speed of its construction and its very low cost, compared to traditional construction, makes easy a house extension.

This type of construction is an architectural model that fits into the parameters of the Permaculture movement holistic whose goal is to repair the damage caused to the ecosystems, managing resources in a sustainable manner to the mutual benefit of humankind and nature. It integrates harmonically the House and the Landscape. Permaculture also includes aspects of natural treatment of water, renewable energy, community development and bio-construction, among others.