

 EARTH-SHELTERED ATRIUM HOME	
Reference:	06
Name:	Earth-sheltered Atrium Home
Climates:	Dry Climates Humid Middle Latitude Climates Continental Climates Cold Climates
Occupants:	
Living area:	1658.35 ft2 154.07 m2



Description:

Some have it that in the future, our resources will run so scarce that water will become the most valuable produce on the planet. Earth, on the other hand, is still one of the most abundant materials on the planet. Thus, water collection, treatment and conservation, together with the fine insulating properties of earth, provide the principles on which this EcoHouse is founded.

Earth-sheltered buildings are best protected against extreme temperature variations, storms, earthquakes, noise and sadly, even military air strikes. With this in mind, as well as the passive design principles of internal heat zoning and compact planning was this EcoHouse designed.

Due to the oval shape of the inner atrium (the court), the living room, the kitchen and dining and the bedrooms all face maximum sunlight, sometimes from the south, at other times from the east and the west. Special emphasis has been put on the utility room to accommodate major installation equipment.

The house would be ideally located in valleys and plains, and the excavated earth could easily be used to top the building. The windows oriented towards the sun attract maximum solar radiation during the cold season, but are also provided with external reflecting surfaces rigid insulating boards that are operated manually, which means that you can regulate the amount of sun needed throughout the day/year yourself, or shut them completely in the night, to store the solar heat collected during the day, thus acting like shutters.

The entire roof area can be used for planting vegetables or making a roof garden, thereby providing an independent food source to the occupants. Apart from that, an insulated vertical wind shaft, ending in a skylight, provides natural cross-ventilation and lighting of the living room. At the foot of the skylight there is a food-chain pond, over which the airflow freshens up. The windcatch can be oriented to face the prevailing winds in your area.

The pond is envisaged to provide an additional home-made food source for the household: it is used for breeding algae, shrimps, and catfish. The softwater algae feed on crayfish excrement. The shrimps eat the algae, and the occupants of the house, in turn, may eat both the shrimps and the catfish. Please bear in mind, that if you are a vegetarian, or would not readily support such a food chain under your own roof, you can always use the pond as an internal fountain, or an aquarium instead!

Another food source can also be given by the atrium pond which, in this case, has been designed as a Zen Garden, but can be of any other design to meet your requirements. The atrium pond helps refresh the air but additionally accumulates solar heat for the building. The focal point of the garden is the environmental sculpture made of Shape Memory Alloys (SMA's), which changes shape every time there is a 10°C temperature drop or rise in your environment. This means that Nature itself gives your sculpture the current look, so that it does not follow any artistic style or ideology, but whose form is determined by your environment and climate.

Considering that the ideal location for this EcoHouse would be in a plain, which are usually characterised by abundant windpower, Earth-sheltered Atrium has also **optionally** been provided with a stand-alone wind turbine, to produce electricity for the household. However, before you consider buying and using the wind turbine, make sure that you have adequate wind power in your surrounding area. Southwest Windpower - the manufacturer of the Whisper 500 wind turbine used in our design, provide international wind maps at <http://www.windenergy.com/International.htm> which enable you to assess the windpower in your country and your area.

The Whisper 500 can produce enough energy to power an entire home. Formerly the Whisper 175, the Whisper 500 was completely redesigned in 2004 to work in harsh high wind environments. The Whisper 500 is a two bladed fiberglass reinforced blade and incorporates the patented side furling design that optimises output at any wind speed. Assuming a 12 mph (5.4 m/s) wind, a Whisper 500 will produce as much as 500 kWh per month. That is enough energy to power the average EcoHome.

Masonry walls and foundations are made of recycled concrete blocks with recycled paper fillings. Recycled glass is used for floor insulation, as well. An insulating entry air lock has been provided, together with sliding doors with tempered, insulated glass. All windows are sliding, double-glazed, with the possibilities of the beadwall system inclusion. Water-saving toilet seats and other water-saving sanitary equipment has been used throughout the project.

Areas:

Living Space		ft2	m2	Living Space		ft2	m2
Living		287.3964	26.7	Corridor 1		118.9197	11.048
Kitchen & Dining		116.7238	10.844	Corridor 2		140.9319	13.093
Utility		133.0742	12.363	Foyer		30.86013	2.867
Garage		212.5442	19.746	Total:		1658.353	154.066
Entry		37.7598	3.508	External Space			
Bathroom 1		48.556	4.511	Atrium (entire)		500.5218	46.5
Bathroom 2		28.40596	2.639	Zen Garden		155.56	14.452
Laundry		28.3952	2.638				
Master Bedroom		237.7102	22.084				
Bedroom 1		138.736	12.889				
Bedroom 2		74.28175	6.901				

