11-10-2011

Autonomy house: conceptual design

Eric Weber
University of Nevada, Las Vegas, eric.weber@unlv.edu

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Our house allows its residents to enjoy autonomy – the state of being independent, self-reliant – and conforms to the Department of Energy's net-zero site energy goal. It is designed as an off-grid vacation home that can be easily assembled on a remote rural site and function as a permanent residence in the city. Load-minimizing design strategies and renewable energy are incorporated to achieve net-zero energy use. Careful consideration of accessibility and aging in place creates a home that can be enjoyed during any stage of life. The Autonomy House is intended to provide memorable experiences and to allow its occupants to live in the beauty of the Mojave Desert with little impact on the environment.

The Autonomy House beckons the visitor to its entrance with native vegetation and the sound of trickling water. The journey begins with a pathway where dappled light filters through perforated screens, seemingly dissolving the building in its pattern. The effect recalls light passing through the native mesquite tree. The movable screens respond to seasonal differences: in the summer, they can enclose the patio space and provide shading for the building. In the winter, the screens can be completely opened up to allow the sun to penetrate the building, providing passive heating. Along the passage enclosed by the screens, the visitor is surprised by a delightful panoramic landscape view before encountering a glistening pool of water that leads to the main entrance.

When entered, the house opens up dramatically, revealing an open, airy, multifunctional space, suited for an active lifestyle. High clerestory windows minimize glare and provide abundant daylight. The main living areas of the Autonomy House offer a flexible, multifunctional space and energy efficient appliances and respond to Las Vegas' reputation of “The Entertainment Capital of the World;” – a large screen can be
lowered from the ceiling, allowing for a big-screen movie experience within the home. The kitchen is an open layout for convenient food preparation and socializing, allowing the chef to interact with guests while cooking. The custom shelving conceals an expandable dining table, which can be stored during a movie night, or extended for a Thanksgiving meal. At the end of the journey is the master bedroom, which offers residents a private retreat that leads to an outdoor patio area under the custom screens.

To provide thermal comfort in the summer, the two ponds provide evaporative cooling, which can be coupled with natural ventilation through operable doors and windows to cool the interior spaces. In the winter, when the screens are fully opened, the house will be heated by using direct gain and an active radiant heating system with solar hot water. A high efficiency mechanical system will assist in achieving thermal comfort. Solar hot water panels will provide for all domestic hot water use, including the radiant system, while all the electricity will be generated by the rooftop photovoltaic system. Water, a treasured resource in the desert, is conserved and reused in landscaping and the water feature.