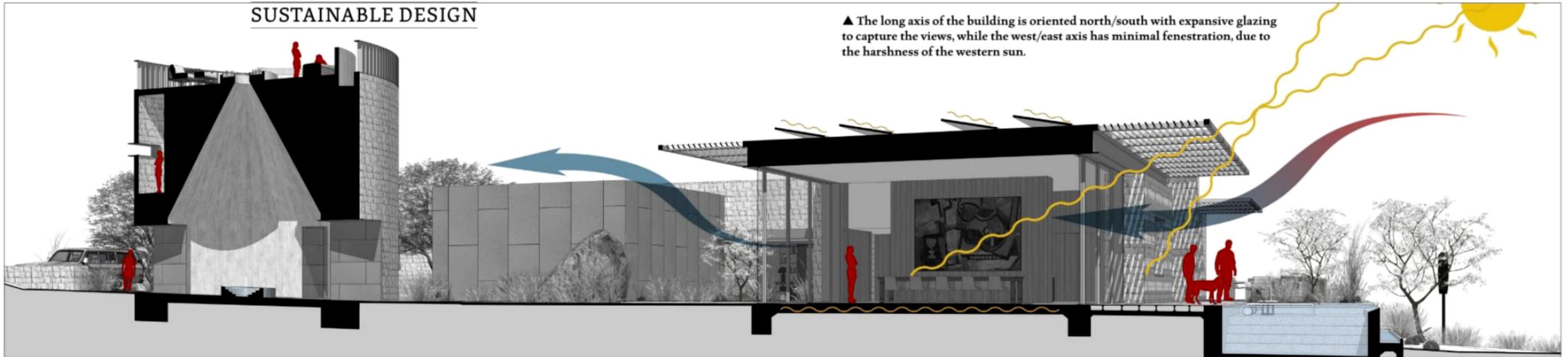


SUSTAINABLE DESIGN



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Sustainability Starts With the Site

A case study in site-specific green home design

By Daniel Chenin



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As a native Nevadan, I have dedicated much of my career to designing for the desert. In the Southwest's hot, arid climate, it is crucial to capitalize on, and mitigate, the effects of sun, light and wind as they are the foundational elements of passive sustainable design.

For me, green design is smart design, and it starts with the site. Building orientation, massing and the organization of forms on the site are of paramount importance. I start each project with a site analysis, including solar access and shading studies, as well as mapping of prevailing winds to understand the benefits and challenges inherent to the location.

Located in Las Vegas, Nevada, Fort 137 serves as a case study for site-specific sustainable design. The approach, and the lessons learned throughout the process, showcase the ability to design a beautiful, eco-conscious home without sacrificing luxury and

livability.

Minimizing the home's carbon footprint was among the clients' top priorities. A family of nature enthusiasts, they sought a home with a direct relationship to its site that allowed them to feel embedded in the landscape. Their desire to be rooted in nature led to selection of the site at the edge of the city where development gives way to federally protected land.

Tasked to design a structure that would blend into the surrounding desert, and inspired by the property's rugged isolation, the historic fort structures that dotted the early Southwestern frontier immediately came to mind. With courtyard configurations, thick earthen walls, deep-set fenestrations and trellis shade structures, these buildings used proven strategies that work with the environment rather than against it.

Informed by a study of the site, the conceptual de-

sign took shape as a series of connected rock masses emerging from the earth. Each volume was carefully placed to maximize views of the surrounding landscape while mitigating the harsh effects of the desert. The intent was to create a home that would withstand the elements with two flanking walls protecting the communal indoor and outdoor areas. The long axis of the building is oriented north/south with expansive glazing to capture the views, while the west/east axis has minimal fenestration, due to the harshness of the western sun. The walls become a fortified shield against winter winds and the western sun with a large entry rotunda leading to a central courtyard.

One-foot-thick wall assemblies are comprised of regionally sourced stone over continuous ridged insulation with an air gap that eliminates thermal bridging—creating an air-tight building envelope. Open cell insulation in the wall cavities and closed cell insulation in the roof exceed International Energy Conservation Code standards and help regulate indoor air temperature in summer and winter months. The robust walls, ballast roofs and shaded, low-e glazing resulted in an Energy Use Intensity score well below the baseline for a similarly sized homes within the region.

The main living area sits at the center of the residence and opens into a sheltered courtyard to the north and pool deck to the south. Large, operable glass walls extend the living space beyond

the architectural perimeter while providing cross-ventilation and daylighting. Utilizing prevailing winds, further activated by the negative pressure created by the northern courtyard, the pool provides evaporative cooling for the connected living area and courtyard. Pocket courtyards at east and west provide additional cross-ventilation for thermal comfort.

Extensive glazing throughout provides natural light and views in all occupied spaces – including bathrooms and closets – eliminating the need for artificial light during the day. Louvered roof overhangs at the north and south exposures minimize heat gain during summer months while allowing natural light and warming rays to permeate in the winter. Deep set windows help mitigate the impacts of the direct sun while providing abundant daylighting to interior spaces.

Designed to achieve Net Zero Energy, our approach centered on site-specific passive strategies including daylighting, shading, natural ventilation and thermal mass paired with high-performance systems, LED lighting and photovoltaics to help offset the home's carbon footprint, reduce its dependence on the grid and provide good stewardship for the land. As a result, the building is robust and anchored in the landscape recapturing the character of Nevada's vernacular architecture by harnessing the elements rather than fighting the climate. 🌱

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