Team

Owner:
Private Residence

Architect:
Eggleston Farkas Architects, PS
Seattle, WA

Engineer:
Quantum Consulting Engineers LLC
Seattle, WA

General Contractor:
By Owner

Reinforcing Bar Fabricator:
Gerdau Ameristeel, Louisville, KY

Total Project Cost:
$1.4 million

Total Project Size:
1,670 sq ft

Award:
2010 CRSI Design Award Honorable Mention
– Residential Building Category

Photography:
Vam Gundy Photography

Structural Framing System

Homeowners wanting to create a family vacation retreat in the eastern foothills of the Cascade Mountains faced several significant challenges. Wind-driven, snowy winters and hot, arid summers with occasional lightning-generated brush fires characterize the severe climate. The remote site also is off the grid, requiring electricity to be generated by solar power and energy to be conserved every way possible. To meet these needs, designers created a V-shaped house made of conventionally reinforced concrete and notched it into an existing ridge.

Unique Design Features

Tucking the home into the ridge created earth sheltering that aids energy efficiency, providing insulation in the winter and a cave-like cooling effect in the summer. The 12”-thick earthside walls provide retaining support, gravity support for the roof and lateral-force resistance.

Concrete foundations consist of conventional strip footings combined with reinforced concrete slab on grade. A concrete topping slab, separated by a layer of insulation, serves as the finished floor. A large double-wall central fireplace acts as a shear wall and creates an architectural focal point. Rolling metal shutters form a second skin while offering additional thermal control and fire protection.

The one-way concrete slab that serves as ceiling and roof spans 20’ and can support 136 psf snow loads. By maintaining its thickness at only 12” minimized excavation needs while providing the most headroom. It cantilevers 7’ to provide shading and snow protection.

Because of the remote location, reinforcing bar sizes were kept to #6 and smaller to ensure ease of handling and crack control. The same construction crew doing the reinforced concrete retaining walls, slab on grade and footings also constructed the reinforced concrete roof.

Due to the short summer construction season, the residence had to be built in two phases. The concrete shell was constructed one summer, closed for the winter with rolling steel shutters, and interior and finish work was resumed the following summer. Other construction materials would not have been durable enough to survive the winter snowdrifts undamaged. Likewise, the remote location would have made it prohibitively expensive to bring a crane to the site to erect steel beams.

Reasons for Choosing Reinforced Concrete

Using concrete allowed interior and exterior finishes to blend together, creating a dramatic look and allowing the material to serve as both structure and finish. The result is a creative, efficient home that provides a quiet retreat without concern.