

Photography by Richard Barnes



Residences In **Steel**

Just as many modern offices and retail establishments depend on exposed structural steel to create a modern, open look, two recent residential projects used steel in much the same way

Sausalito Residence

AS HOUSING COSTS CONTINUE TO SKYROCKET IN NORTHERN CALIFORNIA, many residents are opting to expand and renovate their existing homes rather than move. Not so typical, however, was the expansion undertaken by a couple living in a small bungalow in a dense neighborhood about half-a-mile from the San Francisco Bay. The house sits on a windy ledge on the steep headlands of Sausalito with expansive views of the hills, Bay and city skyline.

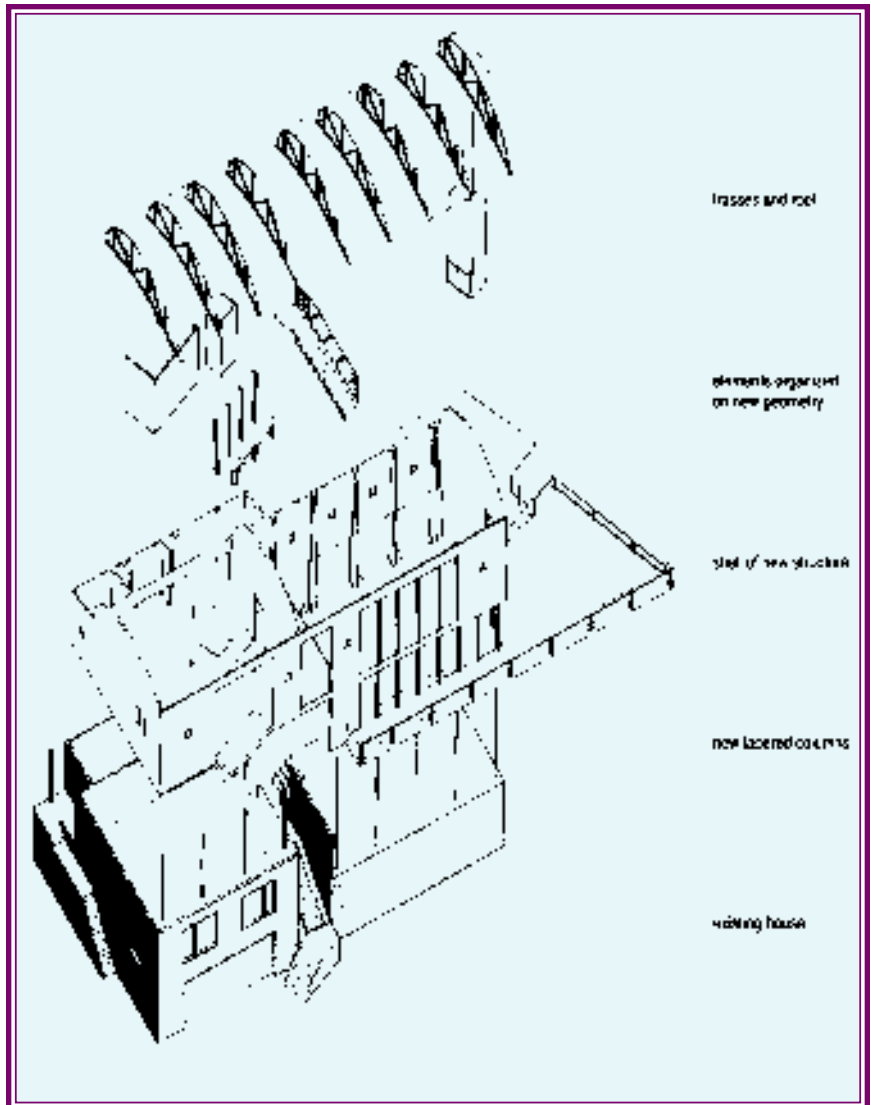
The project involved raising the house's roof and adding a master suite, double height living/dining room, professional kitchen and informal eating area—all while taking advantage of views and protecting privacy. The bedrooms and garage of the existing home were to be retained. The owners, an economist and a pastry chef/cookbook author, wanted a space that related to the site's natural elements: wind, moisture, lightness, air and vista.

"This ambition led quite naturally to the choice of steel as the central structural and aesthetic design element in the restructuring of a small 1950s bungalow to take full advantage of bay views and reflect the owners' love of sailing, including shaping the roof to look like an upturned hull supported by mast-like columns" explained Robert Luchetti of Robert Luchetti Associates, Cambridge, MA, the project's architect.

The construction system consists of lightweight steel bow trusses resting on standard tapered steel light poles, used here as columns. A steel window wall is used to keep the mullion section to a minimum, and the roof is constructed of standing seam pre-coated steel over plywood, anchored with steel outriggers and stainless steel cables and fittings. The master suite bed and deck, the informal dining area and the main living



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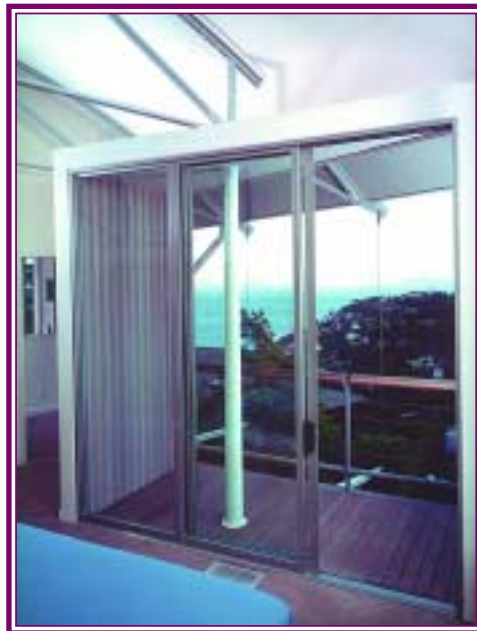


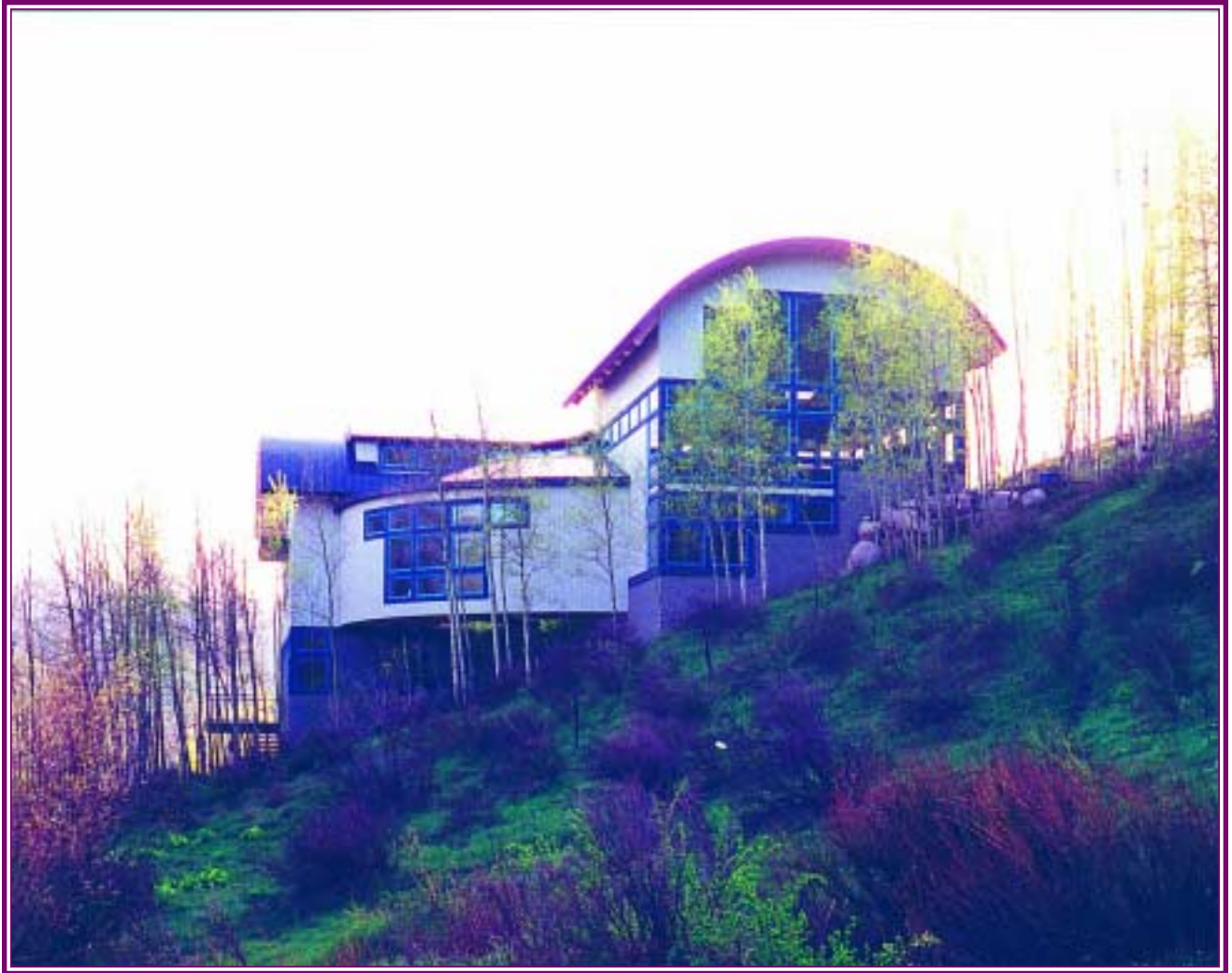
room fireplace and staircase are rotated 22 degrees off the main axis to align them with the San Francisco skyline.

“The house interior was conceived of as a balance between two spatial expressions symbolized by steel and wood,” Luchetti said. “The crisp, formal and delicate qualities of the central volume, with its lightweight exposed trusses resting on tapered steel columns, is flooded with light, embracing the view and the immensity of space looming beyond. The compression and tension members of the trusses, requiring different thicknesses, create a visually expressive web over the central interior space. Wrapping this primary form are a series of shed-roofed volumes cut into the hillside. In these more intimately scaled spaces, wood beams and exposed wood decking express shelter and earth-boundedness, gripping the hillside and seemingly holding the house in place. Appropriately located here, the kitchen serves as the alternate focal point for the life of this home and was built to suit one of the owners, a professional chef.”

In plan, the house is a sequence of layers graduating from the density of the kitchen’s rear wall and becoming lighter and increasingly attenuated as they progress toward the front. This sequence functions on both a spatial and material level culminating with the ephemeral plane defined by the net of cables that capture the slender volume outside the building envelope. “The cables tension the building envelope so that the roof, though constructed of standing seam steel over plywood, resembles a billowing sail,” Luchetti added.

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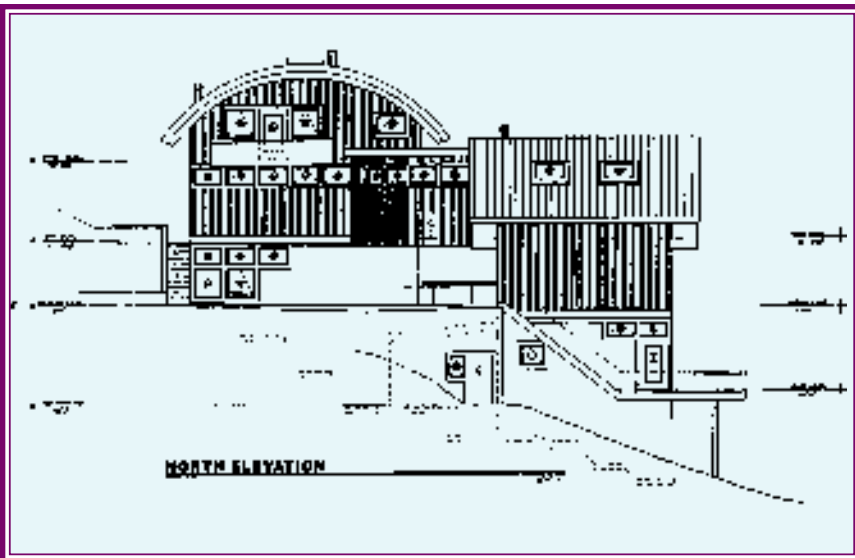


Vail Residence

AS THE RESIDENCE AND OFFICE OF A STRUCTURAL ENGINEER, it was essential that Mark and Patricia Mueller's new home incorporate progressive uses of easily obtainable, conventional and economical building materials. The solution was the use of wood finishes over a steel-framed 5,800-sq.-ft. home on a 7/8th of an acre lot adjoining the White River National Forest.

"The design is located in a mountainous ski area, so special attention had to be paid to snow accumulation control and special regards for mountainous topographical considerations," Mark Mueller explained. Impact of the construction on the site





needed to be minimized, with all trees more than 5' outside of the building footprint preserved and most of the original landscaping left intact. Mueller is a fan of both Frank Lloyd Wright and the time-tested alpine designs found in Bavaria, Switzerland and Austria. "Since Colorado is known for 300 days per year of sunshine, the residence had to be able to enjoy and capture the solar benefits of the site," Mueller added. Likewise, window placement was critical to capture views of the surrounding mountains and national forest, while also minimizing views of

a rapidly growing mountain community. Finally, due to various uses of the structure, the primary residence, secondary apartment and the office area had to be separated to maintain the privacy of the various areas.

The original plan was a traditional wood home with large window walls. However, the sculptural qualities of the house required that much of the structure be constructed of steel. The 20 tons of steel beams and columns were then largely concealed by finishes.

The geometry of the residence is

fairly straightforward. Two separate three-story towers with curved roofs are connected by two clear span bridges with curved roofs. The bridges project from the face of one tower, curve 90 degrees and intersect the face of the adjoining tower. The upper bridge spans 32', while the lower bridge spans 45'. A visitor entering the building walks beneath the upper bridge and crosses a transparent walkway to the entry door into the lower bridge. This type of geometrical form has not been found in many buildings due to the long term effects of gravity and the difficulty of constructing curved forms. The outside faces of the bridges are supported by field constructed cold-rolled steel trusses. Tensile members are tied back into each tower to prevent sag of the trusses. The floor and roof diaphragms are used to prevent horizontal displacement and buckling of the top and bottom chords of the steel trusses.

The steel trusses used for support of the bridges of this residence would have been cost prohibitive using the old segmental method of constructed curved steel trusses. The new three-pin steel rolling machines, now available for cold rolling structural steel, have made the construction of these trusses more accessible when considering engineering, construction and budgetary constraints, according to Mueller.

"While the building's finishes hide the details of the structural steel magic in this structure, visitors will constantly speculate on just what actually does support these unusual geometric forms," Mueller added.