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## REDEFINING HOME SAFETY AND SUSTAINABILITY

Building a coastal ICF home  
to endure the threats of fire,  
earthquakes and termite damage

INSIDE: **ABC SUCCESS STORY**

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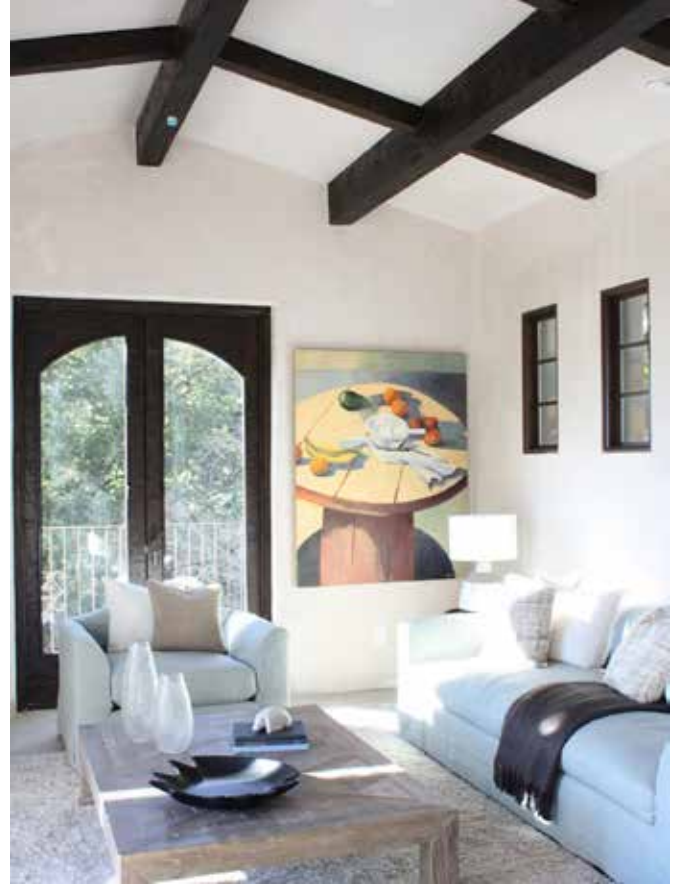
# REDEFINING HOME SAFETY AND SUSTAINABILITY

Building a coastal ICF home  
to endure the threats of fire,  
earthquakes and termite damage

Text by **Sherry A. Boyd**

Photography by **Vickie Edwards** and **Nicholas Nikiforuk**





Old world charm meets energy efficiency.

**P**ERCHED ATOP A CHALLENGING HILLTOP LOT IN MARIN COUNTY, CALIFORNIA, THE 2,570-SQUARE-FOOT CONCRETE HOME SETS NEW STANDARDS FOR SAFETY AND SUSTAINABILITY WITH STYLE AND COMFORT TO SPARE. THE MONOLITHIC ICF HOME WAS BUILT TO ENDURE THE THREATS THAT TYPICALLY UNDERMINE STRUCTURAL INTEGRITY OF LOCAL BUILDINGS.

According to the architect Kimberly Jessup of Jessup and Associates, the homeowner came to her convinced that ICF construction was the best way to create his dream home on a narrow and steep lot with a spectacular view across the bay, while at the same time avoiding the local risks of wildfires, earthquakes, mold and termite damage. He had specific ideas for creating a picturesque, three-level, Spanish-influenced villa with multiple balconies that would be much like one he and his family had enjoyed while living in Spain.

The architect agreed that the ICF would afford much needed flexibility to creatively use the unusual site to meet the homeowner's criteria and yield a virtually indestructible structure, nothing like wooden homes. She points out that these benefits are a trade off for the much thicker walls that reduced the usable square footage by approximately eight percent. But, there are a host of added benefits.

While bedroom communities in the Bay Area near San Francisco are highly desirable, residents live with the constant threat of wildfire, earthquake and even high wind damage. Thousands of homes are lost each year in Northern California. The award-winning Corte Madera home simply eliminates these problems and many others common to the west coast. Unlike wood-frame homes that readily host mold and mildew growth, concrete and expanded polystyrene (EPS) insulating foam do not

host the unhealthy growth. The foam is lightweight and has a high compressive strength that makes it ideal as a leave-in-place insulating medium to retain heat, but no moisture. The durable EPS is also recycled and recyclable. (Both wood and drywall were avoided throughout.)

The homeowner had attended World of Concrete to research ways for maximizing the energy efficiency and thermal mass benefits of concrete and insulating EPS foam panels. He wanted a "whole house" approach with the entire monolithic building envelope constructed of concrete from floor slab to ceiling and including both exterior and interior concrete walls. On grade slabs would even have EPS insulation under them.

The complete concrete and ICF building envelope performs like an above-ground cave. The temperature inside remains a constant 64-degrees, utilizing only minimal energy to reach a comfort zone temperature. The thermal mass of the walls eliminates heat loss and the window buck system that is part of the IntegraSpec system contributes to an airtight envelope.

For exceptional long-term durability, the ICF walls are 10-, 8-, 6- and 4-inch core with #4 steel rebar placed every 12 inches on center horizontally. #5 steel rebar was also placed every 16 inches on center vertically. The deck system used #5 and #6 rebar steel reinforced concrete joists spaced every two feet on center and included wire mesh. The 3000 psi concrete mix with 25% fly ash



IntegraSpec Insulating Concrete Forms were used to construct both exterior and interior walls of the three-story custom home. ICF use: 25,000 square feet. Photo courtesy Nicholas Nikiforuk, IntegraSpec.

was used for all concrete pours. To increase waterproofing for the decks and roof, Zypex crystalline PRAH was added.

Using a 9-inch concrete slump with plasticizer, the IntegraSpec ICF wall system allowed for 10-foot and 12-foot wall heights to be poured in one lift – a time and money saving process. Internal vibrating was eliminated. The building inspector who came to site was favorably impressed at the efficiency.

But before work on the home construction could begin, the excavation for the road level detached garage commenced. The garage roof was designed to hold a seven-foot soil load. The walls and the roof of the garage also were poured monolithically. The landscape retaining walls and footings also are ICF. After the concrete roof was poured and cured, it was in part earth-bermed to form the lower level of the landscaping in the garden lawn around the house.

The lower level required a stepped retaining wall that was easily accomplished using standard ICF panels and interchanging the web spacers that determine wall width. The exterior finish in many areas is stone veneer that adds a sense of permanence, as if

the home had been in this place for many generations. Poured-in-place concrete steps provide access to the home above and poured-in-place concrete staircases are the access point between floors inside the home.

At the top, the master bedroom suite provides magnificent views across the bay and fresh breezes.

The architect took great care to orient the house to a true north and south axis on the lot to take advantage of passive solar principles. Cantilevered concrete decks provide shade and weather protection and create inviting indoor/outdoor spaces. The home design also incorporates radiant floor heating, vaulted ceilings, LED lighting, Velux skylights. ICF skylights and expansive windows in every room to take great advantage of natural lighting.

Interior finishes carry through the Spanish-influenced style with 24 hand-carved doors and massive hand-hewn wood beams imported from Mexico complemented by wrought iron railings and accents. Although authentic in appearance, interior and exterior cement stucco finishes on ceilings and walls are an



The kitchen windows provide a breathtaking view across the bay. The beautiful high vaulted ceilings and hand-hewn, real wooden beams imported from Mexico give the space a feeling of warmth and age, even in this new home. Photo courtesy Nicholas Nikiforuk, IntegraSpec.

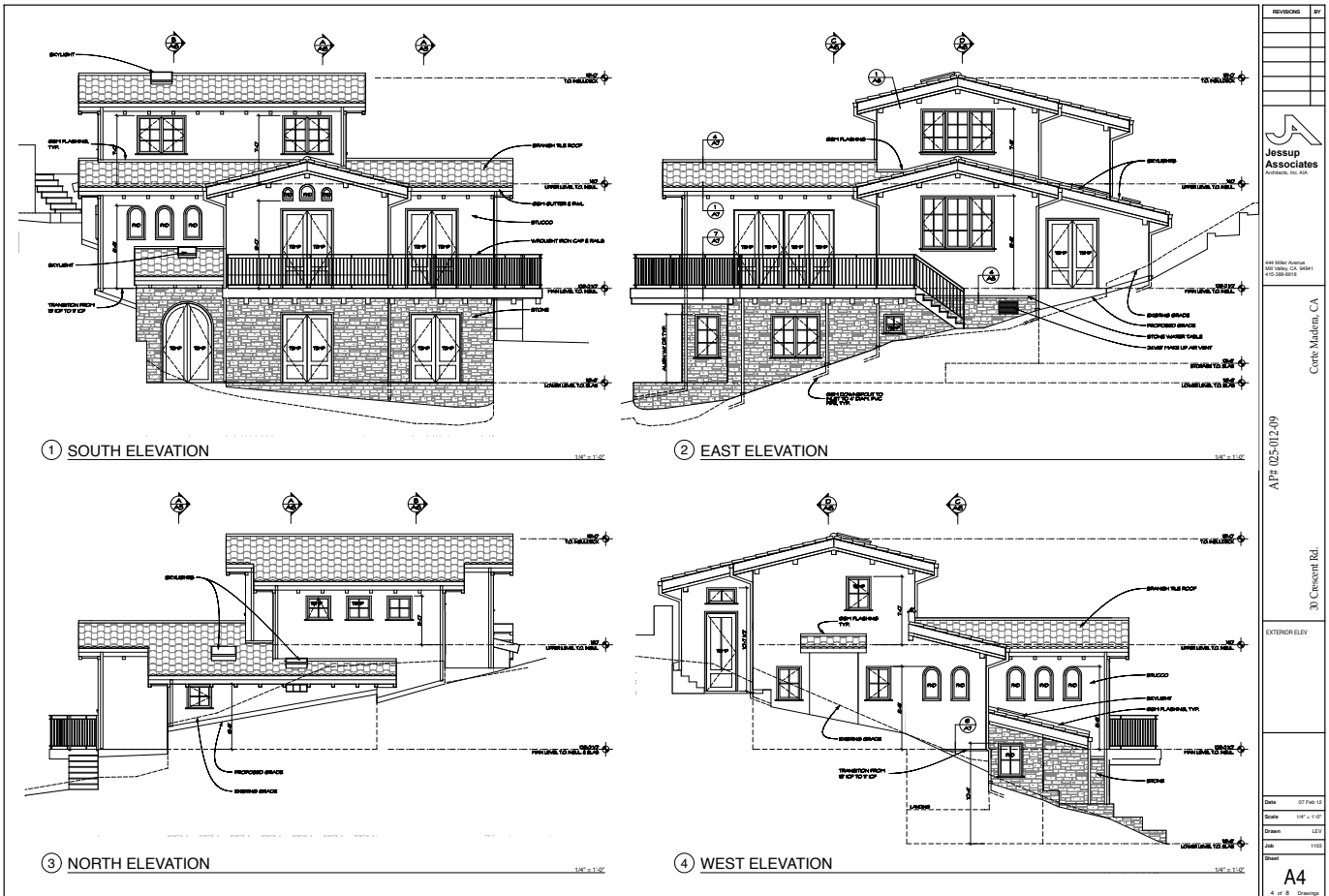
advanced technology from GigaCrete. A fire-rated and highly durable formulation of cementitious stucco from GigaCrete was applied directly to the outer surface of the IntegraSpec EPS foam to provide durability and eliminate the typical IAQ and moisture intrusion issues of homes built in humid, rainy coastal areas. Both PlasterMax and StuccoMax from GigaCrete are ASTM-tested, high performance, fire-retardant finishes that can replicate the appearance of stucco or Venetian plaster, as well as improve thermal efficiency. The one-step application also was a time-saving measure.

The resulting home greatly exceeds the energy performance and safety standards typically seen for earthquake and fire safety regulations. Using IntegraSpec insulating concrete forms with Insul-Deck panels for floor/ceiling deck construction, the house was formed to create a unified monolithic unit. The ICF wall system created an outer skirt beam for the placement of the ICF deck system, making it easy to tie both together. The floor rib rebar and slab mesh tie into the steel in the walls. When the slab was poured it formed the lintel and floor all in one continuous

pour – making the structure extremely stable and strengthening the building diaphragm to maximize resistant to seismic events.


These are just a few of the reasons the Corte Madera home was a double winner in the 2015 ACI Construction Awards presented at the end of the year by the Northern California and Western Nevada Chapter of the American Concrete Institute. It was recognized as the “Green/Environmental Home” category winner and also received an award for “Unique Use of Concrete.”

The region is also noted for being favorable to termite infestation and mold. Fortunately, ICF construction meets the very strict building regulations in the Bay Area and is gaining popularity as a way to overcome the risks of termite and earthquake damage. During a seismic event, all the elements of a wood house tend to move independently and fragment, whereas the wall and deck systems of a monolithic concrete structure move as one unit and do not break apart when properly designed. In the end, the new home looks like it has been in the neighborhood for many decades. The stone veneer adds to the charm of the hillside home and enables it to blend into the surroundings in style.



The architectural elevations above show the complexity of the project. The Insul-Deck panels used for ceilings and roofs are ready for the concrete pour. (Shown below on freestanding garage.)



“This is a millennium home among century homes. The Mark Shade Residence is a complete ICF structure,” according to Nicholas Nikiforuk the ICF consultant on the project. “All exterior and interior walls are ICF, with ICF floors and an ICF concrete roof. Even the decks are concrete. They were formed with Insul-Deck, and EPS decking material, and finished with a decorative stained concrete finish. Interior floors received a similar treatment. Built from reinforced concrete, this residence can withstand earthquakes, tornadoes, fire, termite infestation, water penetration and will not support mold or mildew.” 

**IMPORTANT FACTS**

Total construction – 10 months

ICF placement – 120 days of 300

Walls – R-50

Roof – R-70

**PROJECT TEAM**

PROPERTY OWNER/DEVELOPER:

**Mark Shade**

ARCHITECT:

**Kimberly, Jessup, Jessup Associates, Inc.**

ENGINEER:

**Dave Gowers  
Engineering LLC**

CONCRETE CONTRACTOR/ICF INSTALLER:

**Allen Winters Concrete Construction**

FINISHING CONTRACTOR:

**Ramsey Mejia & Associates**

ICF CONSULTANT:

**Nicholas Nikiforuk  
IntegraSpec**

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