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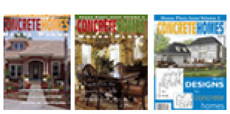

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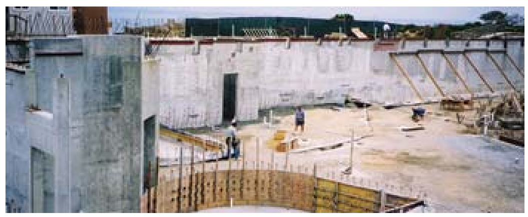
Basement of the Year 2007

Written by Carole McMichael

An extreme home rests on a winning cast-in-place foundation



Every year the Concrete Foundation Association holds a competition to judge basement projects on the basis of material quantities, difficult features, and technology used. Once again, in the category of single-family home greater than 5,000 square feet, the winner is a stunner. The foundation of the Pritt residence in Corona Del Mar, California, runs 780 lineal feet, using 3,879 yards of concrete, 215 tons of steel in the walls, with wall heights ranging from 4 to 45 feet and wall thickness from 8 inches to 36 inches.

Ekedal Masonry and Concrete Inc., based in Newport Beach, California, was the foundation contractor on the project. Voted "most visually intimidating," the home with its two-story, 50,000-square-foot basement occupies three oceanfront lots on the edge of Newport Beach Bay. In 2006, the residence was on the market for $75 million.

The normal process

Matt Arcaris was on-site supervisor for Ekedal and chief detail man for turning the extreme foundation design into a reality. "Initially," he says, "we take the blueprints and go through them ourselves to make sure architecturally everything is on line—the dimensions close, the dimensions stack from floor to floor. Typically, when you get into complex projects with lots of radius and angle work, the dimensions don't actually close. The number-one job is correcting the dimensioning, so we have a working set of dimensions that we can rely on for all the trades. Number two is to go through and check to see if we conflict between architectural and structural details or just between one page to the next. We try to iron out the details ahead of time so that when we get into production, we have all problems solved and don't have 20 guys standing around waiting for answers.

"Once all drawings are sorted out, I draw the foundation plan myself and detail in dimensions of a trenching plan that is color coded with all the elevations. Once we've got the footing layout/control figured out, I do an elevation profile for every cast-in-place wall. That lays out all the elevation control and dimensions, the windows, the pockets, the imbeds, and the hardware. Off of those, we generate the rebar drawings, so every piece of rebar is detailed for the project ahead of time to stay well ahead of the crews that are actually in the field."

Preparing the Pritt site

On the site, Arcaris had anything from cemented bedrock to hard bedrock. Because they were right on adjacent property lines, they had to install shoring. On one side, they used temporary shoring and on the opposite side, permanent shoring, which involved caissons. The caissons are 36-inch diameter holes, drilled 50 feet down. He had about 15 to 20 of them along the north side.

The excavation for the full basement had to get down to 20 feet below the street level. To complete this, a grading contractor used large excavators with breakers to remove the rock, some of it hard blue rock requiring a lot of physical force.

The drainage contractors put in a waterproof membrane, a drainage panel, a French drain, and 3/4-inch crushed rock that ran around the perimeter and around any sunken areas. It directed all water to sump tanks that eject it. A main trunk (lateral pipe) was also dug underneath the foundation to get most of the drainage out to the sea level.

To avoid liability problems related to excavation and drilling in close proximity to some $20 million homes (at one point, only 5 feet away), Ekedal opted to use ground vibration monitoring. According to Arcaris, a company set up probes all along the property lines to record vibration levels and warn them when they were getting close to exceeding the allowed parameters.

Raising the walls

Once the excavation was completed, Arcaris laid out the footings, which were done in stages because they had to leave the truck ramp in to get the dirt out and concrete in. Most of the footings

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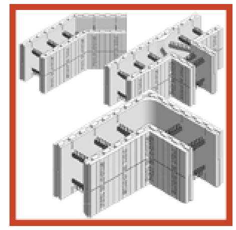

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were 18 inches deep, but some went as deep as 6 to 8 feet to allow for plantings and the interior grottos.

"Next, we started on the cast-in-place walls," Arcaris says, "and ran them up to street level. As we came around, we were able to remove the ramp and put in the walls for the 4,000-square-foot mechanical room for the pool and grotto structure."
Because of the various decks, intricate angles and radii, and architectural elements, such as shelves, corbels, ledges, notches and pockets, a cast-in-place gang system would not work easily on this job.

"We hand-built all the forms ourselves in the field," Arcaris says, "using on average between 25 and 35 men on the foundation walls and multiple level structural decks. We had elevations anywhere from the bottom of the footings on the pool grotto to the top of the roof that were close to 50 feet tall, all cast-in-place concrete.

"Besides bracing, we used a lot of scaffolding. The basement initial pour was done all in one pour. At the 50-foot levels, we had to do multiple pours because we pour from the footing level to the next structural cast-in-place deck. Then the deck would capture the tops of the wall, and we would go up to the next cast-in-place deck—two stages for the walls and two stages for the decks."

For the decking, Ekedal used steel I-beams and a thin-gauge steel sheet that is ribbed or corrugated. Concrete was put on top of the metal, creating the flooring surface and tying the whole structure together.

Typically, the mixes were 4,500 psi concrete. In the cast in-place walls and decks, Arcaris used a mid-range water reducer for more workability and better flow and consolidation during the vibrating process. On jobs like this, he has two vibrating crews chasing the boom pumpers all the time.

Surprising features
The layout of the house is pretty elaborate and full of surprises. On one end of the basement is a 6,500-square-foot auto museum. Then there is an interior grotto down in between the garage area and living space, which included a beachfront café, jewelry store, bowling lanes and an elegant theater with a large foyer and box office. The owner can actually drive his show cars through the basement, through the grotto and out to the pool, parking by the storefronts. There is also a vanishing-edge pool with a bar system in the pool that has pop-up stools.

Perhaps the most challenging features to build were the water slide, the grotto waterfalls, the tunnel and the "mushroom" roof.
The water slide, which is a fiberglass tube, starts on the roof, goes through the structural decks, comes out through the walls, goes back in, spiraling down through a concrete shaft buried underground and shoots the slider out into the 12-foot-deep pool. As the crew installed a level of the deck, they had to integrate the concrete tubes for the water slide.
The grotto also presented problems because it had waterfalls coming off from all the different levels, spilling down to little niches, nooks and crannies, and hidden doorways.

Building a tunnel system with structural exits that go out to a private beach from the basement was challenging because it was added mid-construction. "We had already poured some of the walls," Arcaris says, "though not where they would put the tunnel. We hand-braced the existing concrete walls so we could back fill to a certain level to create the tunnel access. There was a bowling alley just inside where the excavation was to happen, so we ended up hand-excavating the whole section. It was too far to use a crane and we couldn't get equipment back to it. The tunnel, which ran 75 feet to the beach, had a 12-foot-high ceiling and was all underground and all concrete. From its narrowest point, it was 5 feet wide and opened up to 15 feet, creating a good-sized room that could be used to store things such as water gear and kayaks."

The "mushroom" roof
"The concrete roof was extremely complicated," Arcaris says, "There was nothing symmetrical. It came up from the two sides to a peak. The whole deck was a radius on one side, angled on the other and met in a twisted warping roof. Even with that, we had the radius cut slots for the water slide. For the radius walls, we hand-cut templates for whatever the radius was, the inside first, then vertically studded the wall, layered with 3/4-inch plywood and connected using snap ties. For the outside of the radius, the process was reversed. The angled walls were formed traditionally, but when we got into tight angles, we had to do a layout for the complex bends. I did detailed profiles, so the guys knew physically how to cut out the pieces.

"There was a CAD operator on site, feeding info from the architect to us in the field. Because this building was so big and complex, everything was set up on a grid pattern. We laid out control lines, 10 feet on center from one end to the other. The house was 260 feet long and 100-plus feet wide on average. We laid out 26 control lines one way and 12 the other way, using coordinates on those points. When the CAD operator would give us sheets, I would recheck and plot his coordinates on the grid and triangulate it.

"Because the radius on the roof was so large, we had to plot the lines off the point. I would give the crew a plotting and tell them on every foot increment, 'this is the dimension from control line X or control line B.' The math was trickier than for your normal elements, so I did a lot of checking and rechecking."

Never boring
"The Pritt house project from caissons to main basement was completed in year and a half," Arcaris says. "It was a pretty big crunch trying to keep everything flowing because we had so many players and so much design work was being done as we were building it. It is a little more elaborate because of the special features; but it was definitely interesting—a one-of-a-kind. I really enjoy these."

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