Precast Sets The Standard

University of California at Davis's new patient support services facility sets design standard for campus while meeting functional needs of 12 departments

University of California at Davis administrators wanted a unique look for the campus medical center's new patient support services building, and that goal was achieved in the structure's final design. Each facade offers a unique shape and appearance, which was emphasized by the use of only one 90-degree corner on the facility. But setting a design standard for the campus met only part of the challenge presented by this project. The building also had to meet the needs of a host of medical departments on a tiny footprint adjacent to a historic structure that couldn't be ignored.

After much computer planning, three-dimensional modeling, and review by university committees, the final design was selected and architectural precast panels were chosen for the facade. "We had quite a successful collaboration with the precaster," says David Fong, design principal with Fong & Chan Architects in San Francisco. "The efforts of the entire team made it work as well as it did."

This model of the new patient support services building at the University of California at Davis medical center shows the distinctive offsets of each floor. A wide variety of precast concrete architectural panels were used to create the facade, which includes only one 90-degree corner.

Although the university had a variety of functional needs, it also had specific aesthetic goals that were equally important, Fong explains. "The university wanted this facility to be a significant building that would set the design standard for the campus's future look," he says. "But it also had to be very functional. We couldn't create significant architecture if it didn't meet all the programmatic needs, which were quite extensive."

Indeed, some 12 different departments required office space and support services, which had to fit into four levels, each about 110 feet by 190 feet. Not only was the plot irregularly shaped, but it was adjacent to two different communities. The campus environment was characterized by large, multi-story, institutional hospital structures set between parking lots and greenery, while the adjacent neighborhood featured small-scale residential buildings.

On top of this dichotomy, the residential neighborhood was oriented obliquely to the university-campus grid, making it difficult to align the two at the junction to be formed by the new building. In addition, the nearby Housestaff Facility had been designated as a historic building, and officials wanted the new structure to complement that look while also standing out as a creative design on its own.

Courtyard Adds To Ambiance

The design team first decided to include a courtyard focused around a circular, three-level, recessed center. "That was a bonus we gave them," Fong says. "We felt that the courtyard would frame the historic building while offering a retreat where staff, patients, and visitors could get away from everything." Each level, created with brick pavers, concrete bands and lawn, provides additional privacy as visitors step down toward the center. "It offers a nice amenity and made the junction of these two neighboring grids less obvious, and it also allowed us to respect the adjoining historic building," he explains. "But it tightened up the available site space even more."

To fit everything onto the site, while not overwhelming the scale of nearby buildings, the designers did two things. First, a basement level was created by utilizing earthstone block walls to "hold

Precast concrete was chosen for a facing material over a variety of other options in part because of the strong, permanent image it projects for the university and the confidence it gave patients. This was emphasized by the use of wide precast panels and a deep overhang at the building's entrance.

back" the earth around the building, and allow plenty of daylight in this lowest section. "I wanted to go even lower to bring the roofline lower, but the budget wouldn't allow it," says Fong. "But being able to add windows in the basement level worked very well." In one area adjacent to the conference room, the soil was cut away for easy exterior access.

The second way designers exploited the small space was to cantilever upper levels to maximize floor area. Facing the residential side, the building offers a straight, low-key appearance. On the institutional side, the first floor (over the basement level) juts out over the lower floor, while the next two levels cantilever from each other. "The cantilevered floors were the only way we could fit all the program needs into the look and size we needed," Fong says.

The cantilevered levels and diverse neighborhood styles that had to be matched on each side mean that no two facades are alike. In addition, in order to flow with the site's irregular shape, only one corner—the southeast—comes to 90 degrees. The southwest corner curves around the courtyard, the northwest corner features an acute angle so the north facade can parallel the street, and the northeast corner requires a matching obtuse angle to run along its adjoining street.

The northeast corner features an obtuse angle that matches the acute angle on the northwest corner, allowing the building to parallel two streets on its irregular site. Precast corner panels wrap around the corner to add to the aesthetics and avoid obvious connecting points.

Wide Variety Poses Challenge

"Each facade is different and connects to the adjoining facades in different ways," Fong says, "but they all meet at similar tangent points despite the varying curves. It was quite a feat to accomplish that." Adds Bob Clark, chief engineer at precasting company Tecon Pacific in West Sacramento, Calif., "Our biggest challenge came in the sheer variety of pieces and the different connection details that were involved. The engineering detail to marry all the components was quite extensive. It created a lot of special conditions we had to be careful about, but it wasn't that difficult beyond that one complexity."

Earth was cut back to bring air and natural light to the basement and to keep its overall height in tune with adjoining buildings. Each upper level was cantilevered to maximize available space. This view shows the transition provided in window design from punched openings on the right, which face toward historic residential buildings to ribbon windows on the left that face a similar design in hospital facilities across the new courtyard.

The designers performed various studies prior to finalizing their design, Fong notes. "We used both computer animation and modeling to examine the options," he says. Each facade was reviewed individually to see if it met all the needs, and then it was combined with the adjoining ones to see how they blended as a unit. A number of university design review committees also commented on final options, including the dean of the Bay-area architectural university.

Many Materials Considered

The team considered a host of material options for the facade, Fong adds. These included an exterior insulation finish system, brick, plaster, and metal panels. Ultimately, precast concrete was chosen for a variety of reasons. "Precast concrete panels allowed for a higher quality finish than stucco or synthetic plaster could achieve, but one that is still compatible with the finishes of the existing buildings," Fong explains. "Precast's properties also allowed for the complex design of various shapes and angles for the building enclosure."

The inherent strength of the material also provided the strong image the university sought in two ways, he notes. "The strength and permanence of the precast evokes the academic image that the school wanted to project," he says. "It also offered an image of stability to patients, giving them confidence and security. From a maintenance standpoint, it was far better than any of the other alternatives."

'The strength and permanence of the precast evokes the academic image that the school wanted to project'

Using precast also sped up the construction schedule, he adds. "Precast offers the unique advantage of being able to be cast off-site while other preparatory work is underway. As soon as the site was ready, we could begin erection. This was a big advantage, because we were working through the winter. That's what I like particularly about the use of precast on this project."

Curving Corner Connects Visually

The curving southwest corner offered the greatest design challenges, Fong notes. The goal was to cut it back to

Variations On A Precast Theme

Only seven types of precast components were cast for this project—but each had between 17 and 45 variations. The list includes:

21 balcony spandrels with 17 variations, each 7 feet deep and 3 feet to 32 feet long.

75 sill spandrels with 45 variations, each nine feet to 37 feet long and six feet or eight feet deep.

26 roof spandrels with 23 variations, each two feet to 37 feet long and seven feet deep.

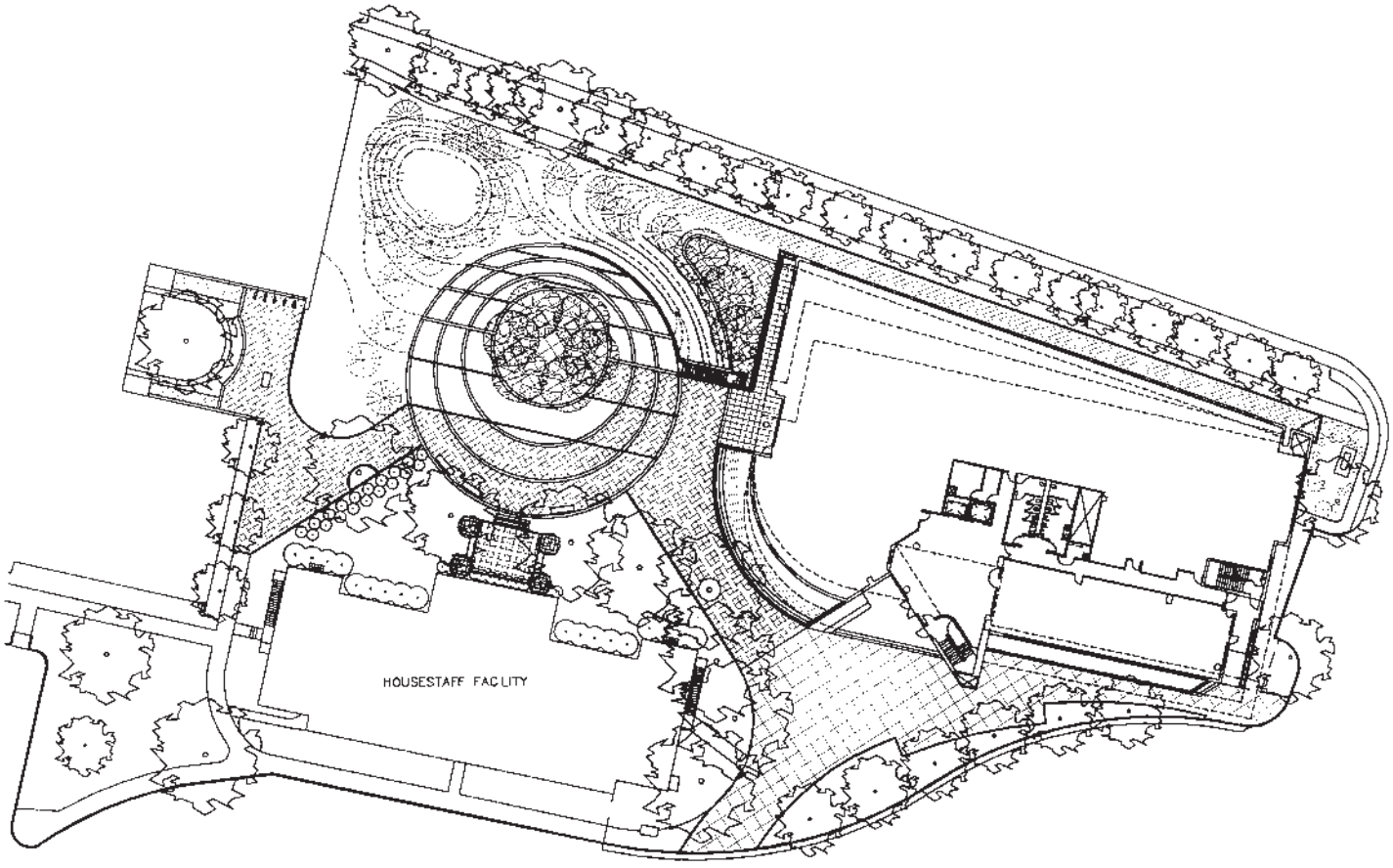
36 header panels with 20 variations, each eight feet to 31 feet long and three feet deep.

70 column covers with 43 variations, each two feet to 14 feet wide and 5'3" or more deep.

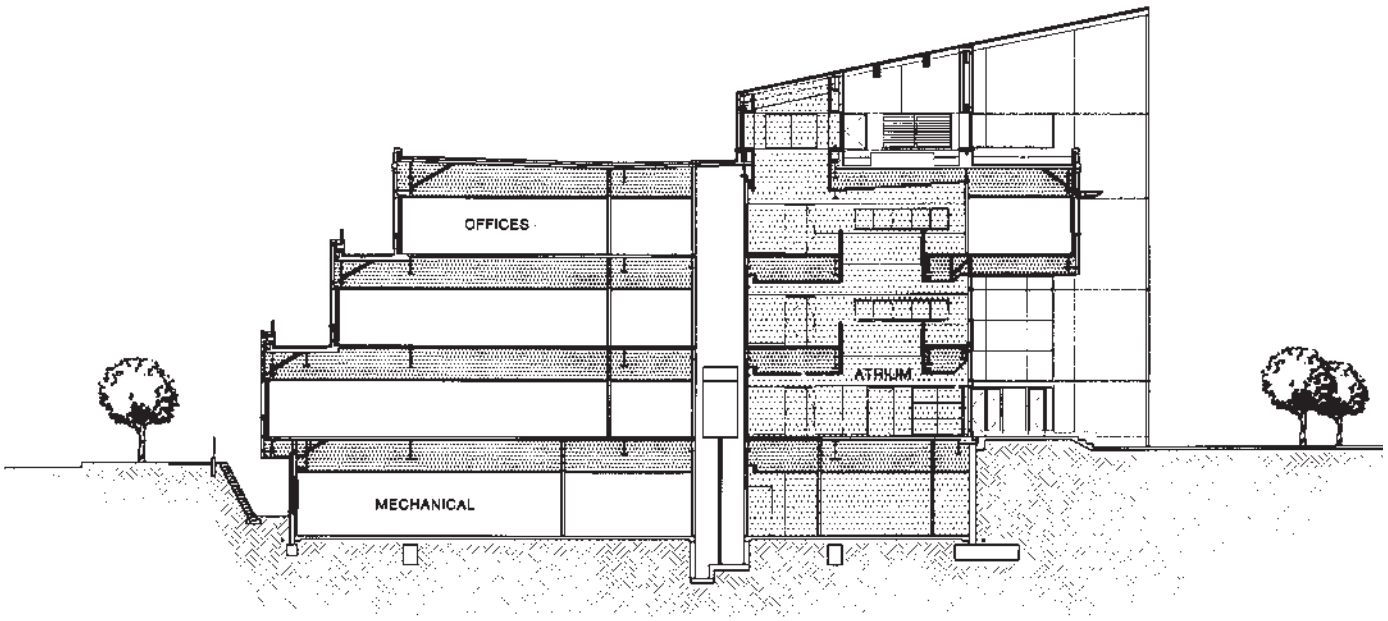
56 wall panels with 39 variations, each measuring between 5' x 35' and 11' x 27'.

62 sills with 27 variations, measuring three feet to 10 feet long.

Ribbon windows are placed into the precast spandrels above the building's entrance. In part due to the varying window designs, 45 variations were required in the 75 sill spandrels that were cast for the project.



This site plan shows how the new patient support services building (at right) fits onto the site along with the courtyard, which helps provide a transitional space and make the alignment of the buildings less obvious. The facility is faced on two sides by modern hospital structures and on two others by historic residential spaces, and each facade works to match its facing neighbors.



This transverse building section indicates how each level of the building cantilevers to maximize available space. The lowest level was set below grade, creating challenges in erecting the precast components but keeping the building's overall profile low.

Aluminum sun shades were installed over each window to cut energy costs. The braces were set into the architectural precast panels, providing a slim profile that doesn't detract from the building's sleek lines.

reveal the new courtyard beyond. "The curve helps to connect the spaces visually and draw visitors into the center," he says. Each precast panel features the same radius dimensions, and cantilevers in a swivel pattern with center points offset from each other to avoid making joints apparent.

To avoid having joints align or meet at corners on each facade, all four corners feature wrap-around panels. This meant some had to combine angled forms and tangent straight sections. "The precast panels were designed so their connections wouldn't interfere with the aesthetics of the building," Fong explains. "On three corners, the precast makes an angled turn, but we tried to put the joints at less obvious positions than the edge of the panel. This required close collaboration with the precaster."

The most difficult casting involved the wraparound corner panels that incorporated the acute angle. Designers and precasters had to ensure it could be stripped from the mold and fastened properly. "With so many configurations and cantilevers, we were concerned that we would have to create a lot of precast fragments," Fong says. "The more fragments we had, the more connections it would mean. So we tried to maximize panel size wherever possible to reduce the connections needed."

Two Window Styles Used

Complicating the design further was the use of different window designs, depending on which neighborhood was being faced. Punched window openings were included on the facades that faced the adjacent historic Housestaff Facility, to reflect its design. On the facades facing the hospital structures, bands of ribbon windows were designed that reflect those buildings' designs. "There were a lot of vocabulary analogies that went into fitting this building's design to the site," Fong says. "It took a lot of work and review to satisfy everything."

Another distinctive design element was included in the precast "cap" built on the roof to hide mechanical systems. It was formed into the shape of a triangle, with the corners pointing toward the hospital. The entrance itself features a corresponding triangular shape with a heavy precast overhang to enhance the solid image. This roof-top triangle supplies a subtle directional indicator from outside while hiding the rooftop equipment from patients in the taller hospital buildings nearby.

As a final touch, the designers included aluminum sun shades on the windows to reduce energy costs. "They provide a clean look that doesn't interfere with the design but does provide shade," Fong says.

The project not only met all of the university's aesthetic and functional needs, it came in under budget as well. "The university was happy with that, because they were sure that the complicated design would make it go over budget, especially when we added in the courtyard," Fong says. "They were very worried during construction, but it worked out well. Throughout the project, we focused on combining design ideas with constructability and ensuring everything was do-able and kept to the cost we had to work with."

Clark agrees that everything went smoothly in construction. "Actually casting and erecting the precast presented no difficulties," he says. "The real challenge came in casting such a variety of forms and ensuring everything matched up correctly before delivering it to the site," he says. "We've done a number of projects with this type of complicated design. This was probably a medium level of complexity for us. We enjoy the challenges that are involved with designs such as on this project." ■

— Craig A. Shutt