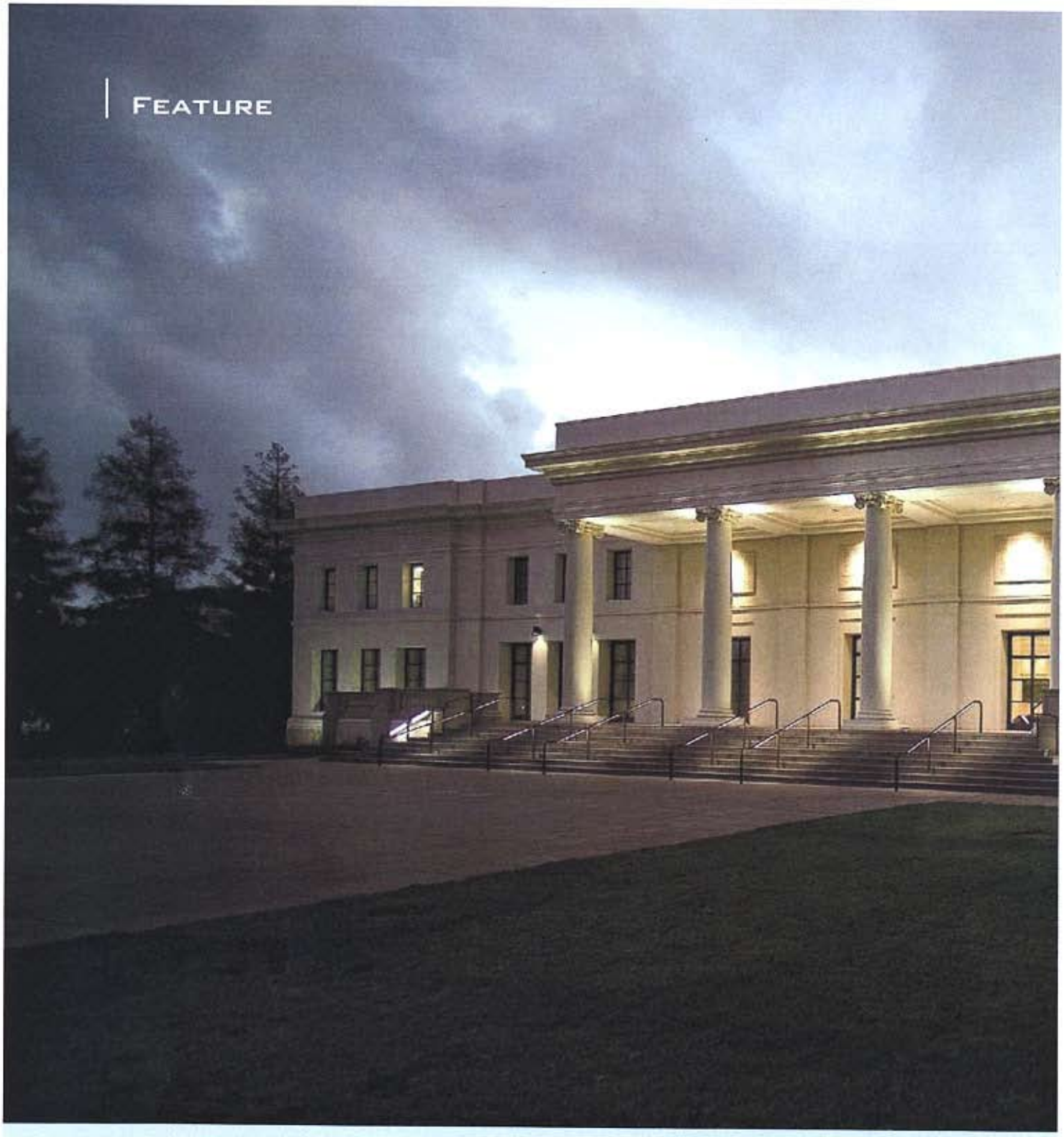
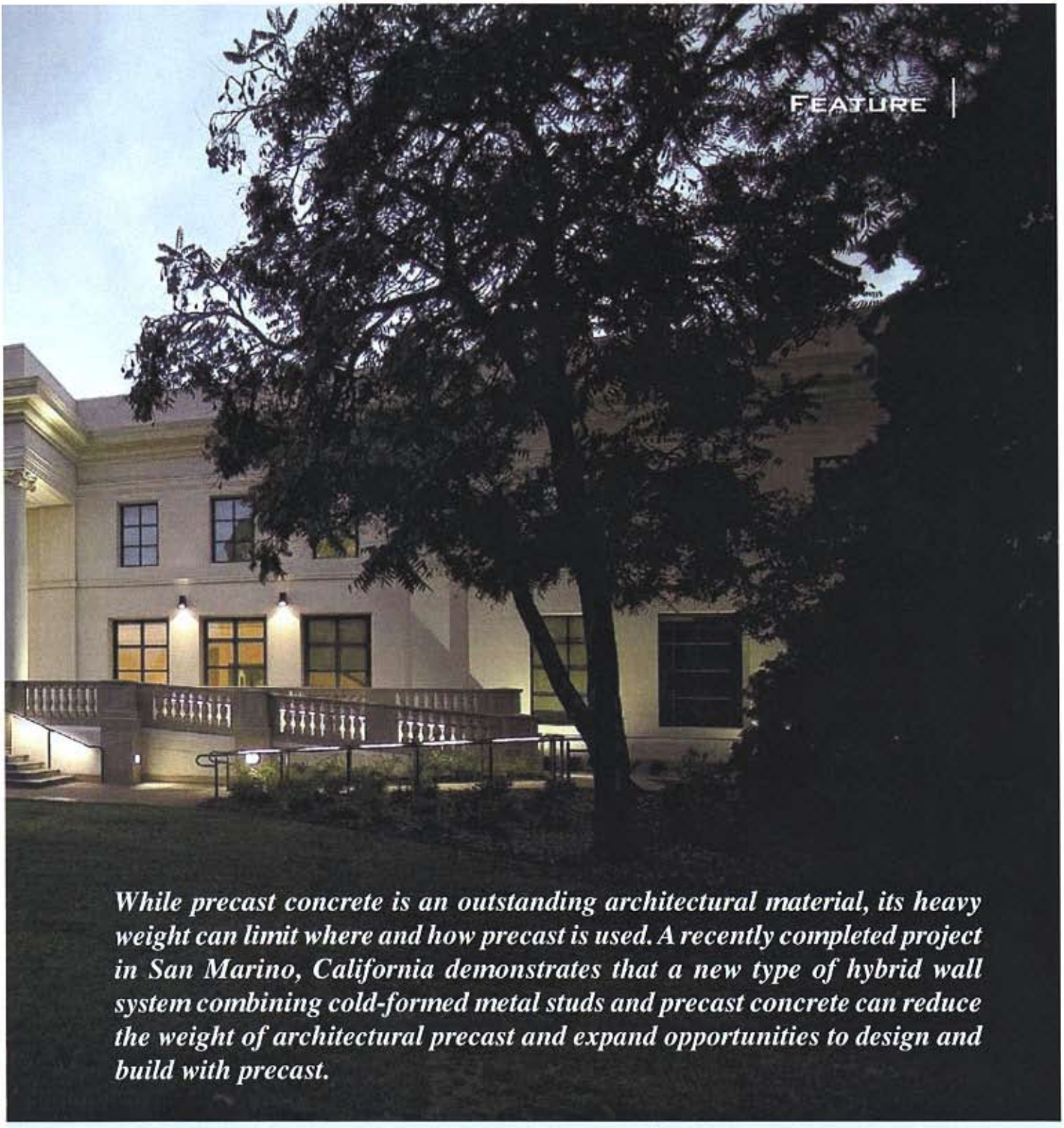


Huntington Library

By Michael Chusid



While precast concrete is an outstanding architectural material, its heavy weight can limit where and how precast is used. A recently completed project in San Marino, California demonstrates that a new type of hybrid wall system combining cold-formed metal studs and precast concrete can reduce the weight of architectural precast and expand opportunities to design and build with precast.

features
Hybrid Wall System

The new Munger Research Center provides 90,000 sq ft of space for the Huntington Library, San Marino, California, home to one of the world's most important collections of rare books, an extensive botanical garden and a museum of fine art. The new building adds laboratories and work rooms for the conservation of historic documents, rare-book storage, administrative offices, and a reading room for scholars. "We had so many different requirements for the project," says David Zeidberg, Avery Director of the Library, "the challenge was to put them into one building and making them function seamlessly."

Together with design-build contractor, Earl Corporation, Irwindale, California, the Huntington established the following objectives for the new building:

- Reinterpret the neo-classical architecture style of the Huntington's original buildings.
- Work within a limited budget and tight schedule to design and complete the building within just 18 months. And most importantly,
- Provide a safe home for the Library's collection of rare and historic documents.

The Munger Research Center offers a contemporary reinterpretation of the neoclassical architectural detailing used throughout the Huntington Library and Gardens. Thin-shell precast concrete panels were used for exterior walls.

Panels used the Metal Stud Crete shear transfer strip to create a composite with a 2½ in thick concrete face joined to cold-formed metal stud framing.

Design requirements

Early in the project, precast concrete was identified as an appropriate cladding for the building's steel structure as it could be finished to match the plaster and natural stone used on existing buildings at the campus. Precasting panels off site could accelerate construction. And the durability of precast made it suitable for the 100-year service life projected for the facility. The only problem with conventional precast was its heavy weight. This was especially important due to two special design requirements.

First, the building is located in an area of high seismic activity. In order to protect the Library's collection, the building was designed as an 'essential facility' using the building code's highest safety factors. The mass of heavy concrete walls would have required additional and costly bracing for the building's steel structure.

The other unique concern was to create a nearly airtight exterior envelope for the building to maintain interior environmental conditions necessary for the protection of fragile documents in

To make the thin-shell concrete panels, Y-shaped shear transfer strips are used to create composite action between the cold-formed steel studs and the concrete faces. Welded-wire mesh is used to reinforce the concrete.

the archives. The weight of conventional precast limits the practical size of panels, and the design team wanted to use larger panels to minimise the number of joints where air infiltration could occur.

Metal Stud Crete system

Both problems were solved by using the Metal Stud Crete system of thin-shell precast concrete panels to clad the Library. The prefabricated panels feature architectural precast concrete faces only 2½ in thick and supported by light-gage cold-formed steel framing. Metal Stud Crete's shear transfer strips join the concrete and the metal framing to create a panel with composite strength.

Bert England, lead designer for the project and Senior Vice President of Earl Corporation, explains, "The Metal Stud Crete shear transfer strip is fabricated from galvanised steel sheet. The strips are screwed onto studs and their Y-shaped flanges are embedded into the concrete to produce an economical and reliable composite panel. Using the thin, lightweight panels enabled us to get the aesthetic and functional benefits of precast concrete without the normal limitations of the material. The panels were engineered to move independently from the structural steel frame to resist cracking due to building movement, yet provide the long-lasting quality and appeal of concrete."

The Metal Stud Crete system also helped maintain a dust-free environment and nearly stable temperature and humidity inside the building. The light weight of the thin precast panels made it practical to transport and erect panels up to 16 ft tall by 40 ft long, much larger than most other wall panel systems. "It was very aggressive to make precast panels this large," says Bob Konoske, vice president and general manager of Coreslab Structures (L.A.) Inc., the precast subcontractor, explaining that precast panels typically do not exceed 8 ft by 20 ft. "If these panels were a more conventional 4½ in thick precast concrete," he says, "they would have been much heavier. Practically, we could not have made conventional panels this big; the panels would have had to be smaller, and more joints would have been exposed."

It is estimated that using the thin-shell composite precast panels reduced the quantity of joints on the Research

Because the thin-shell panels are lightweight, they could be fabricated in sizes up to 16 ft high by 40 ft long. Special handling procedures were required to transport the very large panels to the job site.