Total Precast = Total Design

— Craig A. Shutt

Colorado architect has become leading proponent of total-precast concrete solutions

Barber Architecture Corp. has a long history of designing for corporate and governmental clients in Colorado and the Midwest. Today, in its 29th year, the company's designers are finding that the needs of those two markets are blurring together in more ways than ever before. Often, a number of the program goals, including budgetary ones, can be met with the use of a total-precast concrete solution that combines structural and architectural components.

"The markets are always changing and going up and down," says Michael Barber, principal. "Public and corporate architecture are our two key markets, and we are finding that more and more, they influence each other and are looking for common goals."

Public administrators, for instance, emphasize sustainability and durability, and are putting more emphasis on meeting LEED criteria. "Those concerns almost always well up within the public sector, but now we're seeing corporate and private-investment properties focusing on those, too." Meanwhile, the key criteria for corporate clients, including cost efficiency, flexibility in design, and workplace environment, are becoming more important to public clients as they understand the long-term savings that can be achieved.

"We are in a unique position, because as the markets rise and fall over time, we can benefit from the knowledge we gain in each market to help meet the goals in the other," he says. That's particularly helpful as clients discover during the design process that they have needs they didn't realize they had.

Barber just completed design work on a speculative Class A office build-

– *Michael Barber, principal, Barber Architecture*

'We are in a unique position, because as the markets rise and fall over time, we can benefit from the knowledge we gain in each market to help meet the goals in the other.'

The total-precast concrete solution for the Aurora Municipal Center in Colorado was completed in only 26 months, with as many as 55 pieces of precast concrete erected per day.

ing in which the developer had no interest in focusing on LEED certification. "But they discovered that the tenant market is very much influenced by the current cultural preoccupation with sustainability," he says. "Potential tenants are pushing to know what sustainable elements a project has, and developers must meet that need. That's an unusual situation to have unfold in the market."

Sustainable Expertise

The designers are well suited to the task, however, as they are steeped in using sustainable concepts. Barber Architecture produced the first LEED-certified projects in Colorado, the three-building CH2M Hill complex in Denver. Barber recently completed a fourth building in the complex, which received a silver LEED certification.

"Most companies are wary of aiming for LEED certification, because they fear there is a cost associated with that," says Barber. "And certainly, if you're aiming for elevated levels, there will be upfront costs associated with achieving that, so you need to perform a strict payback analysis to find the most effective approaches. But there are a variety of concepts you can use to gain LEED certification that have little or no cost impact."

Those include siting considerations to take full advantage of sunlight, as well as locating the building near public transportation. Other concepts, such as recycling water, won't impact the project's design or final appearance. "Much of this work focuses on the budget, and that's where we excel," he says. "It all goes back to the basics—clients establish a budget and look to us to deliver the best building with the highest quality and the most responsive design for that budget."

Total-Precast Solution Dominates

In about 85% of the cases, that analysis leads the designers to specify a total-precast concrete solution. "Early in the process, we examine a variety of systems for the structural frame and enclosure," he explains. "We owe the owner that level of evaluation. Markets change and material prices fluctuate, and owners sometimes have preferences for the expression of the building that may make different factors come to the fore." When the designers quantify structures, the key parameters will be cost, schedule requirements, and constructability, he notes.

"Precast concrete usually makes the most sense, although not always," he says. In most cases, those situations arise when the owner has an image in his head of the project's construction or demands specific types of materials.

Such was the case several years ago when Barber designed the RE/MAX headquarters in Denver after winning a design competition among four architecture firms. The design parameters required a steel-frame building clad with granite. Although the same appearance could have been achieved in a more cost-effective manner with precast concrete components, the owners plan was specific. Even then, the adjoining five-story, 288,493-sq-ft parking structure was built with precast concrete com-

PROJECT SPOTLIGHT

Aurora Municipal Center

Location: *Aurora, Colo.*

Project Type: *Municipal offices and parking structure*

Area: *Office: 286,000 sq ft; parking structure: 241,000 sq ft*

Designer: *Barber Architecture, Denver, Colo.*

Owner: *City of Aurora*

Contractor: *The Weitz Co., Denver*

PCI-Certified Precaster: *Rocky Mountain Prestress, Denver*

Description: *City officials needed to replace the outdated 1970s speculative office building where they were housed with a modern, efficient city hall that consolidated 26 city departments into one facility. Both the office building and parking structure feature total-precast concrete solutions, which combined architectural and structural components into one unit.*

Two five-story office wings feature acid-etched precast concrete panels that include punched windows. The panels connect to a glassy, six-story curving element with a sloping metal roof. The building's roof is accented by a large precast concrete cornice, projecting 3 ft and curving in two directions. Other precast concrete accents were provided throughout the project, including light bollards, signs, wall caps, and gateway walls at the main public-entry drive.

Floor plans were designed for maximum ease of use for both employees and the public. The clear-span space above the 300-seat city-council chamber features 10-ft-wide, 32-in.-deep precast concrete double tees.

(For technical information on this project, contact the precaster; see the Plant Certification directory.)

ponents that complement the granite on the corporate building.

"Typically, we will draw the building with two or three structural schemes and let those be bid," he explains. About 90% of the company's projects, he notes, are done with a construction manager and a general contractor, who is brought in early to create a proposal based on early documents. "That's where the real competition arises on designs." Often, those teams will receive input from the precasters in the area, and precasters from as far away as Utah and South Dakota have been involved with Barber projects.

"We end up a lot of the time with the total-precast system being the most effective and cost-efficient," he says. "It has advantages for achieving the architectural and qualitative goals, giving us more freedom for expressing architectural aspects than with other systems. And the scheduling is an advantage it always provides."

The striking rock-cut granite appearance of the Starz Encore Headquarters in Englewood, Colo., was achieved with load-bearing precast concrete panels cast with formliners created from actual stone.

PROJECT SPOTLIGHT

Starz Encore Headquarters

Location: *Englewood, Colo.*

Project Type: *Office building*

Area: *380,000 sq ft*

Designer: *Barber Architecture, Denver, Colo.*

Owner: *Starz Encore Group, Englewood*

Contractor: *The Weitz Co., Denver*

PCI-Certified Precaster: *Rocky Mountain Prestress, Denver*

Description: *Executives wanted to achieve a solid, permanent appearance for their new world headquarters while providing a distinct personality—and a cost-effective design. To achieve this, designers created a total-precast concrete solution using load-bearing exterior panels that simulate a rock-cut granite along the base course. The texture matches the granite design on a nearby smaller building, helping the buildings to blend together.*

Speed and economics were the key reasons why the total-precast concrete design was chosen, the designers say. The stone appearance of the precast panels was produced by creating individually sculpted form liners, with the panels turned to create more diversity in appearance. The precaster also had to match the color, texture and shapes of the granite as well as hide the joints between panels. In all, 46 different 1- by 1-ft samples were created using a variety of local aggregates to select the final option.

The building, three bays wide, is framed with 10-ft-wide double tees with precast concrete cores. To create the entablature at the front and back entries, round columns were cast vertically with horizontal joints to emulate historically correct Roman/Tuscan columns.

Contractors Prefer Precast

General contractors typically prefer to have a precaster on the project, he adds. "The precaster represents a large subcontractor that is essentially building the building. The contractors like having a precaster erecting the structure and setting the cadence and schedule for the project through their work. The general contractor can follow with other trades behind the precaster, who is essentially setting the scene of the construction."

Barber's designers spend a lot of time ensuring that each design is as cost efficient as possible. With precast concrete designs, that opens a lot of potential for saving money, he says. "Especially with investment-level office buildings, we are going back to basics and focusing on the fundamentals that make total-precast systems really economical." That includes minimizing the number of molds through repetition, maximizing the size of pieces to create the fewest that can be erected efficiently, and optimizing the span length for each structural element. "We study and research each component to optimize the system to take full advantage of precast's inherent characteristics."

That effort has resulted in some impressive cost savings, as shown in one recently completed speculative office building. The final cost of the precast contract was $23 per sq ft, compared to the mid-$30s for most projects in the region. "That total astounds people, especially in a market with rapidly rising construction costs," he says. "When they hear about it, they call us to ask how we did it, and we tell them that it was just a matter of going back to basics and working with the precaster to optimize everything to the fullest extent. We worked out the mold designs, repetition of elements, and the sizes of double tees to the inch. By doing that, we created a cost-effective and very handsome building."

Architectural Artistry

Architectural precast concrete also provides advantages as part of the total system, he notes. "Precast concrete, from an artistic side, gives us more

30 Years of History

Barber Architecture opened its doors on July 1, 1979, only a few blocks from its current location in Denver. Since that day, the firm has completed more than 750 projects ranging in size from 5,000 to more than 2.5 million sq ft, offering a full range of architectural and interior design services.

"Our goal has been to seek out projects that define communities and enhance the built environment," says Michael Barber, principal. "Regardless of the project type, we believe that good design is uplifting and benefits owners and users through positive architectural symbolism and effective, functional space. We maintain the philosophy that architecture and interior design must involve the continuous development of process and idea, a simultaneous movement that ultimately leads to inspired buildings and satisfied clients."

In October 1997, the firm was granted the highest level of recognition for quality design when it was presented with the Presidential Award for Design Excellence by the National Endowment for the Arts for its work on the Byron White United States Courthouse.

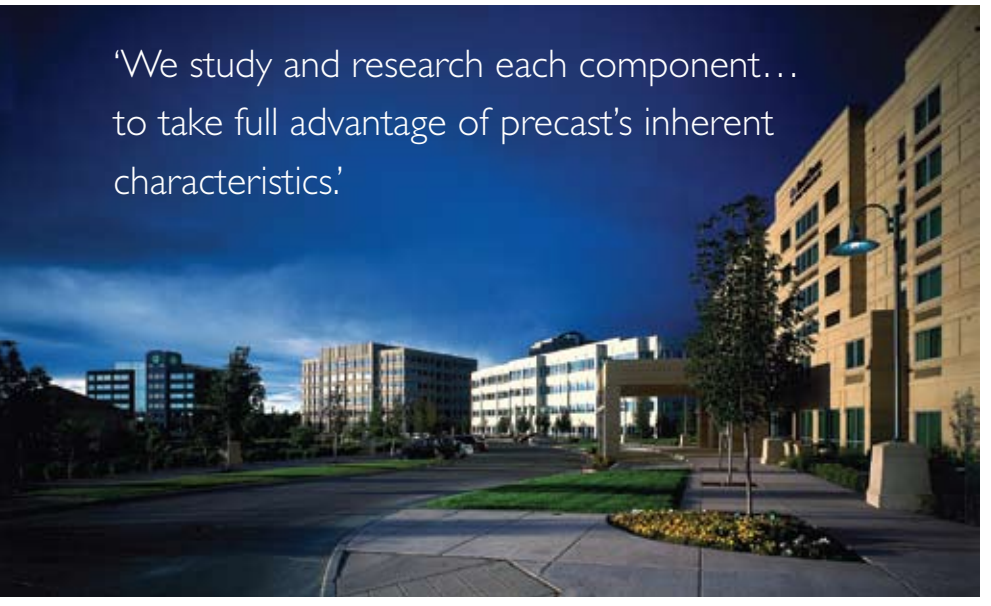
The company's staff of 25 employees has generated between $5 and $15 million annually during the past eight years, based on commissions. "We engage in only a few select projects each year," he explains. "We view each client and each project as unique. We are committed to nurturing these relationships, and the result is an extensive list of repeat clients."

possibilities. It has an inherent sense of permanence that is often important. We often are doing Neoclassical designs, especially for public clients and for high-profile corporate clients who are creating headquarters buildings. Those CEOs want to project an image, especially to investors, that this is a company that's going to be around for a while. Providing that strong masonry look is a key ingredient."

Owners today are emphasizing market flexibility over creating a unique appearance that is tailored to the company's distinct personality, he notes. "The after-market potential is more important than creating a personal touch, so there is less of a tailored look to the projects." Some owners do want to play up unique attributes or create an exceptionally employee-oriented design, he notes. Knowing the company's long-term goals and philosophy will impact the final aesthetic design.

That doesn't mean projects that want to enhance long-term market viability lack personality. The designers have achieved innovative looks, such as at the Starz Encore building in Denver, where formliners were created from rubber molds of cut rock to provide a unique texture to the panels. The formliners were turned to ensure that each panel had a different look.

"I don't want to brag, but in our area,



PROJECT SPOTLIGHT

Crescent Town Center

Location: *Denver, Colo.*

Project Type: *Office, hotel, and restaurant complex*

Area: *Five office buildings, plus a hotel and two restaurants*

Designer: *Barber Architecture, Denver*

Owner: *Denver Technological Center, Denver*

Contractor: *The Weitz Co., Denver*

PCI-Certified Precaster: *Rocky Mountain Prestress, Denver*

Description: *This eight-building complex was designed to serve as a dynamic urban gateway into the Denver Technological Center business park. A curving, dedicated vehicular traffic boulevard connects two corner parcels, allowing for the creation of eight development sites.*

To generate consistency among the office buildings, which were constructed in phases over several years, designers created a structural design featuring precast concrete load-bearing panels with an acid-etched finish. While each building maintains its own identity, the emphasis was placed on creating an overall look for the complex and the synergy among the multiple uses.

The designs showcase large glass areas to allow daylight to enter and include large vertical precast concrete elements to emphasize the projects' height. The office buildings vary in size from 30,000 to 135,000 sq ft, creating a dramatic low-rise complex with complementary designs offering a strong, classical image.

Although each building has a unique design, they all feature a basic three-bay structure with two 50-ft-long bays on the ends and a 20-ft-long bay in the center, which offered the most design flexibility. Two precast concrete elevator center cores provide additional support at the building's center.

Multiple colors were provided in some of the panels to create the unique design look for each project, creating additional challenges for the casting. The architectural panels received an acid-etched finish.

The Crescent Town Center complex of eight office buildings features total-precast concrete structural systems in complementary but distinctive styles.

The unique geometry of the TCI / AT&T Broadband World Headquarters in Douglas County, Colo., made designing the total-precast concrete structural system more challenging. The design features architectural load-bearing walls and double tees for flooring units.

PROJECT SPOTLIGHT

TCI / AT&T Broadband World Headquarters

Location: *Douglas County, Colo.*

Project Type: *Corporate office building*

Area: *270,000 sq ft*

Designer: *Barber Architecture, Denver, Colo.*

Owner: *AT&T Broadband, Douglas County*

Contractor: *The Weitz Co., Denver*

PCI-Certified Precaster: *Rocky Mountain Prestress, Denver*

Description: *This headquarters building represents the actualization of business goals through architecture. The goal was to create an environment of synergy, cooperation, and interaction, and spaces were designed to achieve those relationships. The project also was seen as an anti-corporate ego statement, to create the opposite of an architecture that expresses a hierarchy of individual status and department memorials.*

The unique geometry of the building produced challenges for casting the concrete panels. The main building is circular, and it connects to a support building shaped like a truncated cone. Close attention was paid to the load-bearing precast concrete panels to ensure the radius and other connections fit well. A particular challenge came in casting the 4 ft eyebrow that serves as a focal point at the top of the building.

The design features architectural precast concrete load-bearing panels, with double-tee and inverted-tee beams providing the flooring units. Precast concrete stair units serve as shear walls at the building's center.

'Today the most prestigious buildings in Colorado are being created with precast concrete.'

we've been leaders in innovating and developing new ideas with architectural precast," he says. "And that covers textures, colors, finishes, and sizes." The firm was responsible for the largest panels ever to be transported over the Rocky Mountains and for the largest panels to be erected in the state.

"We work hand-in-hand with the precasters, and as a result, today the most prestigious buildings in Colorado are being created with precast concrete. It provides an advanced aesthetic potential and allows us to design beautiful buildings." The company has yet to use much high-performance concrete or other high-tech mixtures, he notes, but that's not due to a lack of awareness. "There hasn't been much application for these technologies, but we always start our projects with a serious period of review of the available options to see how we can exploit them."

The volatility of the markets, especially the speculative-office portion, keeps Barber wary of what the future will bring. "My concern every day when I come to work is which project will really go ahead, and which will be placed on hold," he explains. "I've been through four or five cycles of growing intensity in developing investment projects, but only a small percentage actually gets built, because the market becomes flooded."

Colorado, and Denver in particular, is a strong market, he asserts, and the public side of the market remains consistent, offsetting some of the ups and downs from the corporate side. "But we have to be cautious about the future of each project because of the volatility," he says.

No matter how the market ebbs and flows, it's fairly certain that Barber Architecture's designs will ensure that clients receive cost-efficient, quickly constructed, and aesthetically pleasing buildings. No doubt many, if not most, of those projects will include total-precast concrete structural solutions. ■

For more information on these or other projects, visit www.pci.org/ascent.

PROJECT SPOTLIGHT

CH2M Hill Headquarters

Location: *Denver, Colo.*

Project Type: *Corporate headquarters*

Area: *503,000 sq ft (165,000 sq ft for corporate headquarters building and 113,000 sq ft apiece for the other three)*

Designer: *Barber Architecture, Denver*

Owner: *CH2M Hill, Denver*

Contractor: *The Weitz Co., Denver*

PCI-Certified Precaster: *Rocky Mountain Prestress, Denver*

Description: *As one of the leading engineering firms in the country decided to create a four-building complex to reflect its corporate identity, executives established goals for cost efficiency and high energy performance. To help achieve this, designers specified load-bearing precast concrete wall panels. The project, to which the fourth building recently was added, has been LEED certified.*

CH2M Hill's four-building complex features buildings with a total-precast concrete solution, consisting of load-bearing architectural panels and double tees for flooring.

The project features 50-ft-long bays on each end, with a central 20-ft-long bay to provide open expanses that create layout flexibility. The structural system consists of load-bearing architectural precast concrete panels supporting double tees for flooring units. Two interior shear cores with elevator and stair access provide additional support at the center.

Two colors were provided in different panels to create contrast, and the architectural panels received an acid-etch finishing. A fifth building is now underway.

PROJECT SPOTLIGHT

American Family Insurance Regional Headquarters

Location: *Denver, Colo.*

Project Type: *Corporate office building*

Area: *Four-story, 150,000 sq ft*

Designer: *Barber Architecture, Denver*

Owner: *American Family Insurance Co., Madison, Wis.*

Contractor: *M.A. Mortenson Construction Co., Minneapolis, Minn.*

PCI-Certified Precaster: *Rocky Mountain Prestress, Denver*

Description: *This regional headquarters building in Denver's Meridian International Business Center was designed to serve as a regional center for training that would also provide visibility in the community while offering substantial space for future growth. The design features a total-precast concrete structural solution that forms two office wings and a central pavilion.*

The building's design overall and the load-bearing precast concrete panels were tailored to fit the site while offering regional flavor and a unique manipulation of neo-Gothic style. Creating that style with precast concrete pieces required intricate forming, especially for the spires on top of the columns.

The building features a three-bay design with two 50-ft-long bays formed with double tees on the ends with a 20-ft-long bay in the center. The 50-ft-long bay produced efficient spaces that enhanced design flexibility for office layouts. Two different colors of panels were produced to create contrast, with an acid-etched finish adding texture.

The American Family Insurance Regional Headquarters building in Denver, Colo., features a four-story building constructed with a total-precast concrete structural system.