FALL 2011

ASCENT®

DESIGNING WITH PRECAST

CONTINUING EDUCATION AIA

AIA Education Program Inside

page 42

And the Award Goes to… 2011 PCI Design Award Winners Inside

- Insulating Systems
- Quality Assurance and Certification–Keys to a Successful Project

WWW.PCI.ORG

WESTERN EDITION

Be part of an award winning team

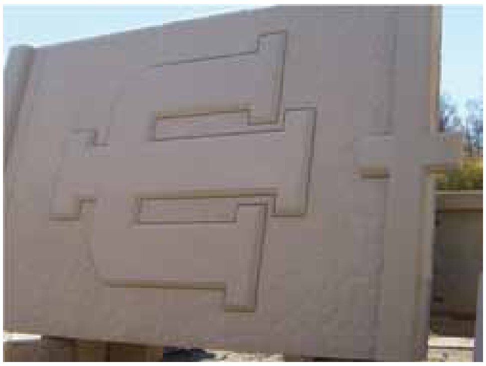
At Thermomass, we are passionate about teamwork.

For over 30 years, we have helped customers from around the world design and build insulated concrete walls that exceeded their expectations for durability, design, energy-efficiency and environmental responsibility. However, a company cannot do it all alone and must develop trusted partnerships in order to grow.

With the combined efforts and teamwork of Thermomass, RATIO and Moody-Nolan Architects, Fink, Roberts &Petrie Engineers, and Gate Precast, our companies were able to build a superior, award-winning project for Indiana University. We are proud to be part of a joint endeavor that is creating its own history of success, from initial sketches to final walkthrough, and we take great pride that our insulation systems were chosen to be a part of this team.

We learned long ago that the best projects are built on not one, but two cornerstones: superior products and trusted partnerships.

For more information about Thermomass projects call (800) 232-1748 or visit www.thermomass.com.



thermomass®
Energy Efficiency in Concrete Terms

TOTAL PRECAST SCHOOLS

Contact us for a **FREE interactive CD and design portfolio** on precast, prestressed concrete construction.

WE DO IT ALL...FROM PRE-CONSTRUCTION BUDGETING, SCHEDULING, DESIGN SERVICES AND TECHNICAL SUPPORT TO PCI-CERTIFIED MANUFACTURING AND ERECTION.

Precast, prestressed concrete is your best choice for building distinctive, high-quality schools cost-effectively and on a fast schedule. Precast construction can make significant contributions to LEED strategies. Its mold and mildew resistance provides healthier learning environments, while its insulation properties enhance energy efficiency for years to come. The design flexibility available with precast includes long span capability, cast-in features and a host of finish options that will move your project to the head of its class. For the best that precast has to offer, contact Tindall today.

Experience. Reputation. Expertise. That's Tindall. Totally precast. Totally awesome.

Tindall Corporation
Tel: 800-849-4521, Ext. 435
Email: schoolsales@tindallcorp.com

www.tindallcorp.com

Tindall

Better Building Through Technology


p. 17

Features


p. 42

Departments

PCI On Call For You

PCI Headquarters
phone: (312) 786-0300 fax: (312) 621-1114
email: info@pci.org www.pci.org

Central Atlantic Bridge Associates — Heinrich O. Bonstedt
phone: (610) 395-2338
email: info@caba-bridges.org
www.caba-bridges.org

Colorado Prestressers Assn. — J. D. Schafer
phone: (303) 880-3843
email: jdschafer@stresscon.com

Florida Prestressed Concrete Association (FPCA) — Joseph Lord
phone: (813) 579-7232 fax: (813) 315-6026
email: info@fpcaweb.org www.fpcaweb.org

Georgia/Carolinas PCI (GCPCI) — Peter Finsen
phone: (678) 638-6220 fax: (678) 638-6221
email: peter.finsen@gcpci.org www.gcpci.org

Mid-Atlantic Precast Association (MAPA) — Greg Winkler
phone: (856) 761-8885
email: gwinkler@mapaprecast.org www.mapaprecast.org

PCI Midwest — Mike Johnsrud
phone: (952) 806-9997 fax: (952) 806-9998
email: mike@pcimidwest.org
www.midwestprecast.com

PCI Central Region — Phil Wiedemann
phone: (937) 833-3900 fax: (937) 833-3700
email: phil@pci-central.org www.pci-central.org

PCI Northeast — Rita L. Seraderian, P.E.
phone: (888) 700-5670 fax: (617) 489-5810
email: contact@pcine.org www.pcine.org

PCI of Illinois & Wisconsin (PCI-IW) — Marty McIntyre
phone: (708) 386-3715 fax: (708) 386-5922
email: martymci@pci-iw.org www.pci-iw.org

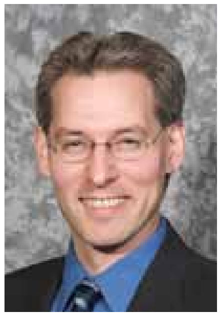
Precast Concrete Manufacturers Assn. of Texas (PCMA of Texas) — Chris Lechner
phone: (210) 633-6743
email: lechner@pcmatexas.org
www.pcmatexas.org

Precast/Prestressed Concrete Manufacturers Assn. of California (PCMAC) — Doug Mooradian
phone: (818) 247-6177 fax: (818) 240-3041
email: doug@precastconcrete.org
www.precastconcrete.org

Prestressed Concrete Association of Pennsylvania (PCAP) — Heinrich O. Bonstedt
phone: (610) 395-2338 fax: (610) 395-8478
email: bonstedt@pcap.org www.pcap.org

CONGRATULATIONS TO OUR CUSTOMERS RECOGNIZED BY THE PCI FOR OUTSTANDING DESIGNS
• Clark Pacific (Fontana)
• Coreslab Structures (Indianapolis)
• Coreslab Structures (Kansas City)
• Coreslab Structures (Omaha)
• Enterprise Precast Concrete, Inc.
• Gage Brothers Concrete Products, Inc.
• Hanson Structural Precast, Inc.
• High Concrete Group LLC
EDUCATION PROVIDER
For AIA & USGBC accredited courses visit: www.lehighwhitecement.com
LEHIGH
WHITE CEMENT
LEHIGH
WHITE PORTLAND CEMENT
TYPE I
Indiana University Innovation Center, photo courtesy of High Concrete Group LLC.

Excellence – Redefined!



Brian Miller,
P.E., LEED AP
Executive Editor
bmiller@pci.org

Forty-nine years ago, PCI started its design awards program, initiating the search for excellence in design and construction using precast concrete. But how does one define excellence?

Excellence is more than just doing a great job; it is the expansion of ideas and exceeding of expectations that comes when we push ourselves beyond our comfort zone. Not only do great innovations result, but we also grow professionally, personally, and as an industry.

This can be applied to virtually anything in life and is especially true in the building industry. Some of the most innovative buildings result from taking a chance on something new. The precast concrete structures industry has been working with designers to "push the envelope" with what is possible with precast concrete.

Today, precast concrete helps architects and stakeholders achieve sustainable, scheduling, and budgetary goals in essentially every building type, from low-rise schools to high-rise condominiums. Precast concrete is a versatile material and system—structurally, aesthetically, and architecturally. It is getting thinner and lighter, spanning farther, being erected more quickly, and providing higher-quality finishes. It is being used for both the structural and the envelope systems of buildings, helping to really optimize projects.

The winning projects of the 2011 PCI Design Awards highlight many of these features and innovations and also demonstrate precast concrete's versatility. This issue showcases 20 buildings that have "pushed the envelope" a bit further, redefining excellence. Some projects used ultra-high-performance concrete to greatly reduce the thickness and weight of precast concrete panels; others used precast concrete to accomplish completely new integrated designs, such as incorporating a quick turnaround operations facility into a rental car parking structure or designing a structure within a structure as with North Central College.

Almost all of the projects included various levels of sustainable design and took advantage of precast concrete's many sustainable features to reach the goals they sought. Let this issue's innovative projects spark your own imagination so that you too can redefine excellence in your next project.

I challenge all of you to continue to redefine excellence and push the boundaries even further. Then enter your project into next year's special 50th PCI Design Awards. Entries will start being accepted in January. Show off your exceptional precast concrete projects and be an inspiration to your peers and generations to come.

PCI
Ascent is a publication of the
Precast/Prestressed Concrete Institute

ASCENT **On the cover: North Central College (see page 21)**

- **Executive Editor:** Brian Miller, P.E., LEED AP
- **Managing Editor:** Craig Shutt
- **Editorial Staff:** Thomas Irvin
- **Editorial Administration:** Jennifer Peters
- **Art Director:** Paul Grigonis
- **Graphic Design:** Ed Derwent
- **Ad Sales:**
  Kirstin Osgood
  Manager, Sales and Member Development
  kosgood@pci.org
  (312) 360-3206
- **Reprint Sales:** Paul Grigonis, Art Director
  (312) 360-3217
  pgrigonis@pci.org
- **Precast/Prestressed Concrete Institute:**
  James G. Toscas, President
- **Industry Technical Review Team:** Jay Cariveau, Peter Finsen, Sidney Freedman, Corey Greika, Marty McIntyre, Mark McKeny, Brian Miller and Greg Winkler
- **POSTMASTER:** Send address changes to *Ascent*, 200 W. Adams St., Suite 2100, Chicago, IL 60606.
  Periodical postage paid at Chicago, IL and additional mailing offices.
- *Ascent* (Vol. 21, No. 4, ISSN 10796983) is published quarterly by the Precast/Prestressed Concrete Institute, 200 W. Adams St., Suite 2100, Chicago, IL 60606.

- If you have a project to be considered, send information to Whitney Stephens, PCI Communications Manager, (312) 428-4945 wstephens@pci.org


A PIGMENT OF YOUR
IMAGINATION!
Imagine a color and we'll bring it to life! Experienced DCS technicians will create just the right quality controlled color for your project.
Not only do we offer custom colors, we offer batch size bags, timely delivery and attentive customer service. Liquid coloring and fully automated dispensing systems complete our palette of services. With DCS the vibrant future of the architectural precast industry is assured.
Our products and services have made us the leading supplier of colored pigment to the architectural precast industry.
Let us show you why. Call today...
(800) 657-0737
2024 S. Lenox Street, Milwaukee, WI 53207
(414) 769-2580 Fax: (414) 769-2585
www.dynamiccolorsolutions.com
DCS
Dynamic Color Solutions
DCS... The color of today's architecture.


Coat Your Forms & Line Your Pockets!
A single coat application, with a durable finish... will cut your downtime, and labor costs!
• Bonds to wood, concrete, steel and Styrofoam®
• 100% solids / solvent free
• Single coat application
• Extremely hard surface
• Simple mix ratio (2:1)
• Durable finish
• Easy to cut
• Low odor
• V.O.C. free
Armorgard 505
Epoxy Form Coating
Distributed Exclusively by
FISTER
1-800-339-9534
Always in stock!
Same day shipping available!
Proud Member of PCI for 32 years
Manufactured by
COPPS
Now the Coating of Choice...Just Ask Your Competition
*Styrofoam is a Registered Trademark of Dow Chemical Company

High Concrete Group Introduces High Solar Reflectance Precast for More Sustainable Designs

DENVER, PENNSYLVANIA

High Concrete Group, LLC has introduced a new high solar reflectance concrete mix design that improves the heat reflectance of precast concrete surfaces, causing them to stay cooler. The mix design has a solar reflective index (SRI) of 82, nearly doubling the SRI of the company's conventional gray concrete mixes.

High Concrete Group developed the high solar reflectance concrete mix design with partner BASF using 75% white cement and 25% ground granulated blast furnace slag, a recycled material, for the cementitious content. Local limestone aggregates provided a neutral-colored base. The SRI of 82 was achieved on a form-finished white concrete block sample.

The high-SRI concrete mix is available for specification in High Concrete Group's architectural precast concrete wall panels. Precast sandwich panels, including the company's line of CarbonCast® and traditional insulated architectural precast enclosure products, can be used to build a thermally-efficient enclosure.

Oldcastle Precast, Inc. Replaces Drainage Pipe for Hazleton's "Broad Street Betterment Program" and Provides Idaho National Laboratory Nuclear Canister Vaults

AUBURN, WASHINGTON

Oldcastle Precast, Inc. - Croydon is providing all reinforced precast concrete pipe, approximately 15,000 feet and 62 RCP pipe fittings for the large drainage project along Route 93 Broad St., Hazleton, Luzerne County, as part of the "Broad Street Betterment Program." The precast concrete pipe is expected to last more than 100 years. The project should be completed by late 2013.

Additionally, **Oldcastle Precast, Inc.** secured a 1.1 million dollar nuclear vault project involving the construction of 36 nuclear canister storage vaults for the Department of Energy's new Integrated Waste Treatment Unit (IWTU) - Idaho National Laboratory Facility (INL). The nuclear canister storage vaults are part of the $570 million INL Integrated Waste Treatment Unit (IWTU) which will start turning 900,000 gallons of sodium-bearing liquid waste into a stable granular material ready for permanent disposal.

Oldcastle Precast, Inc. Purchases Enviro-Systems Corporation

SCOTTSDALE, ARIZONA

Oldcastle Precast, Inc. has acquired Enviro-Systems Corporation, an Arizona-based precast concrete company, specializing in the design, manufacture, and installation of precast concrete sewage treatment systems and equipment; water and wastewater treatment supply and disposal; water treatment consumables; and water treatment and supply equipment products. Enviro-Systems has served the Arizona market for over 20 years.

The expertise and manufacturing assets gained through this acquisition will provide Oldcastle Precast – Chandler with new capabilities of adding additional precast products to their product line.

PCI Joins Twitter

CHICAGO, ILLINOIS

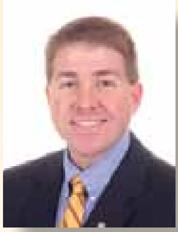
PCI has joined Twitter! The PCI Twitter account (@PCIprecast) will share relevant industry news, as well as information on PCI continuing education opportunities, new publications and articles, upcoming events, and more.

Follow us at www.twitter.com/PCIprecast.

Submit your headline news for consideration in a future issue of *Ascent* to Whitney Stephens at wstephens@pci.org.

Tindall Corporation Announces Several Promotions and Hires

SPARTANBURG, SOUTH CAROLINA



– Joel A Sheets

Joel A. Sheets has been promoted to Vice President and General Manager of the Utilities Business of **Tindall Corporation** located in Spartanburg, S.C. Robert A. "Rob" Smith, Jr., was promoted from Plant Manager to Operations Manager for the South Carolina Division. Henry S. "Scott" Boling joined Tindall Corporation as Plant Manager for the South Carolina Division manufacturing operations. Angela R. San Martin, P.E., was appointed to the position of Sales Engineer.

Metromont Corporation Expands Sales and Business Development Team and Names New Director of Estimating

GREENVILLE, SOUTH CAROLINA

– Paul Inglese

– Debra Chez

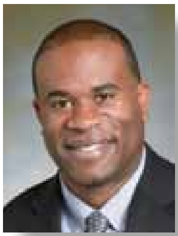
– Tony Smith

Metromont Corporation has promoted Paul Inglese to the role of Sales and Business Development in Bartow, Fla. Inglese brings experience in Glass Fiber Reinforced Concrete and architectural precast concrete to this role. Metromont has also hired Debbi Chez for the role of Sales and Business Development in the Charlotte, N.C. market. Chez has more than 20 years of experience in project management and business development in the construction industry.

Additionally, Tony Smith, who has been with Metromont for 20 years, was recently appointed to Director of Estimating and will be based in Greenville, S.C.

High Concrete Group LLC Announces Promotion

LANCASTER, PENNSYLVANIA



– Melvin Pullen

Melvin D. Pullen, Jr., has been promoted to President of **High Concrete Group, LLC.** In this role, Pullen will be responsible for the overall operating effectiveness, strategy, and leadership of High Concrete Group, LLC. Pullen joined High Concrete Group LLC in 2005, and most recently served as Vice President of Estimating and Construction Services.

Geospatial World Honors CEO Greg Bentley for Lifetime Achievement in Geospatial Innovation

RIO DE JANEIRO, BRAZIL

Geospatial World, published by India-based **Geospatial Media and Communications Pvt. Ltd.** has honored Greg Bentley, CEO of Bentley Systems, with its Lifetime Achievement Award. The award recognizes individuals for their outstanding contributions to geospatial communities worldwide.

Lafarge Introduces Portland-Limestone Cement in Canada to Reduce Carbon Footprint, Help Customers Achieve High Standards in Sustainable Construction

POINTE-CLAIRE, QUÉBEC

Lafarge recently introduced a new portland-limestone cement (PLC) commercial offering in Canada. PLC is a new category of cement that provides performance similar to conventional portland cement with up to 10% less CO2 emissions.

Approved for use by the Canadian Standards Association, the National Building Code of Canada, and the British Columbia, Ontario, and Quebec Building Codes, PLC is produced by intergrinding portland cement clinker with between 6% and 15% limestone. The new GUL cement with up to 15% limestone – which is well below the 35% limit in Europe – will achieve comparable performance to regular portland cement in terms of concrete workability, set time, durability and all ages of concrete strength development.

Lafarge will start the transition from regular portland cement to PLC this year.

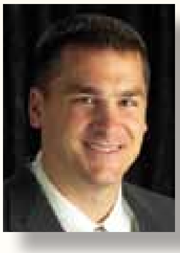
Editor's Note

The following architects and photographers contributed to the "Designing Schools for a Changing Future" article in the summer issue of *Ascent*. This credit has been added to the online edition of *Ascent*.

- Carolina High School, page 26; Design Architect - Perkins+Will; Local Architect of Record - Craig Gaulden Davis; Photographer - Michelle Gunning
- Carolina High School, page 30; Design Architect - Perkins+Will; Local Architect of Record - Craig Gaulden Davis; Photographer - Creative Sources Photography
- Travelers Rest High School, page 31; Design Architect - Perkins+Will; Local Architect of Record - Craig Gaulden Davis; Photographer - Creative Sources Photography

Spancrete Hires New Contracts Manager

WAUKESHA, WISCONSIN



Spancrete has hired Michael "Mick" Linse as Contracts Manager, working with the Contracts and Administration Group. In this role, Linse will be responsible for reviewing, revising and finalizing all commercial aspects of sales contracts. In addition, he will monitor contract performance and compliance, as well as resolve contractual issues.

Choose the Best Insulating System

A plethora of insulating materials and techniques can help designers find the perfect way to negate thermal transmission and create an efficiency wall system.

— By Beth Buffington, AIA, LEED AP BD+C

When designing virtually any type of buildings, architects seek to create a barrier that slows the inevitable transfer of heat as much as possible. That requires creating a continuous layer of insulation between the buildings's interior and exterior. Devising the most effective way to provide this continuous layer provides a significant challenge to designers.

With some notable exceptions—picnic pavilions; open parking structures and beachfront bars, to name a few—a building's interior environment requires a different temperature and humidity than the exterior environment just inches away. The barrier created between these two environments typically consists of a series of components:

- A skin or shell, which prevents water from entering the building.
- Insulation, which reduces heat transfer between sides of the barrier.
- A vapor barrier, which impedes the flow of vapor transpiring on the skin of the building.

Traditional architecture relied on mass (usually masonry) or airspace cavities in the building materials to

– Beth Buffington, AIA, LEED AP BD+C, is studio principal for Community at Little Diversified Architectural Consulting in Arlington, Va.

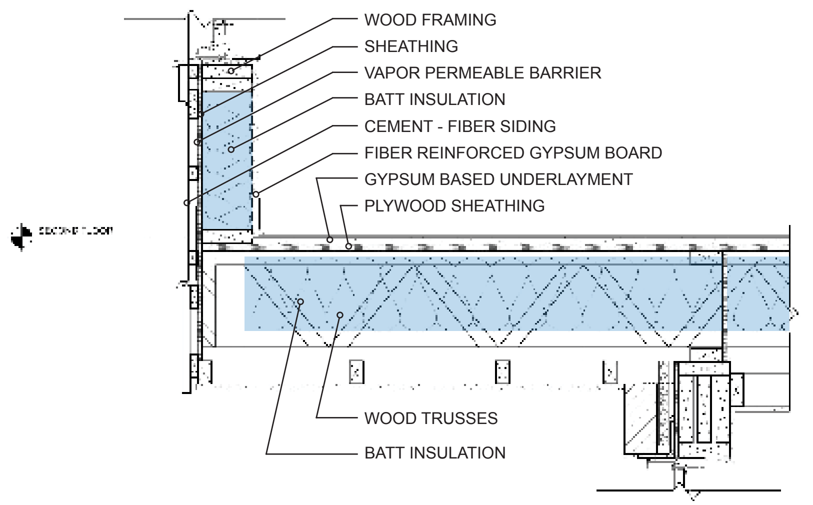


Illustration 1. *A typical frame structure using batt insulation faces the challenge of being penetrated by various materials as well as outlets, conduit and ductwork. Drawing: Little Diversified Architectural Consulting*

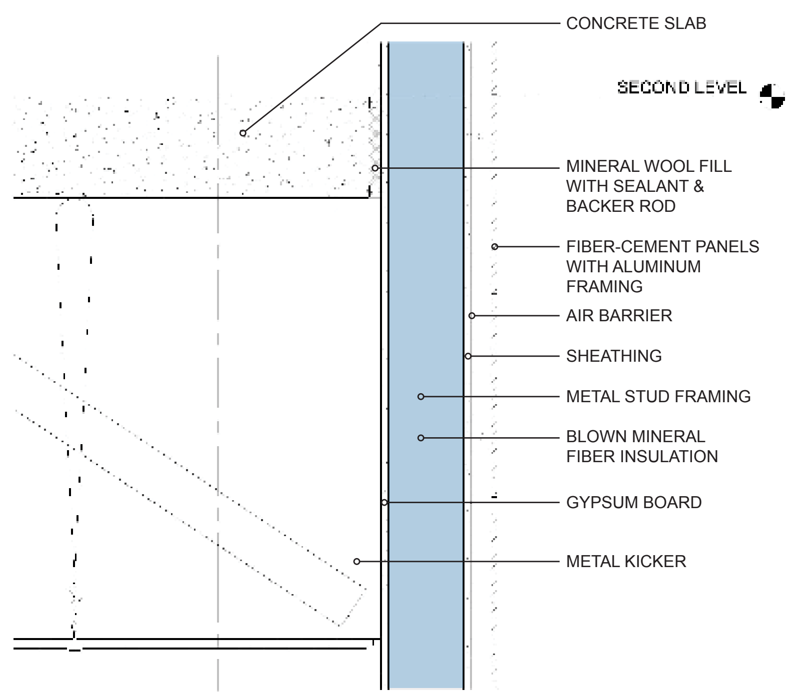


Illustration 2. *For a recent clinic project by Little, light-gage steel framing was filled with loose-fill cellulose insulation. The system avoids the conflict between the slab edge and framing connections, but it still requires penetrations and interruptions. Drawing: Little Diversified Architectural Consulting*

delay heat transfer. However, as more high-performance buildings are created, the insulation layer's thermal resistance and continuity have come under more scrutiny to raise the efficiency.

This reconsideration has been aided by the huge range of insulation materials introduced to the market, each with different characteristics and a different specific thermal resistance (usually described as its R-value). Each building design will take advantage of a particular type of exterior wall and a specific type of insulation to create the best building envelope possible.

Local Conditions Matter

Each material will have a different R-value based on its thickness, as the R-value is calculated as ratio of heat transfer per unit area. While more thermal insulation results in better building performance, the cost effectiveness of various insulations must be weighed under the specific climactic conditions.

As a starting point, the U.S. Department of Energy has recommended R-values for each area of the country based on local energy costs for heating and cooling, which help create a basic evaluation. Local building codes (and in many cases the International Energy Conservation Code) provide minimum requirements for the performance of the wall, one component of which will be the insulation.

Another way to determine the insulation-performance requirement for a specific project is to have a mechanical engineer provide a step-by-step evaluation of wall performance. This will determine thermal transmission and the point where moisture will condense (dew point) in the wall system under various interior and exterior conditions of temperature and humidity. This evaluation helps determine the type of insulation to specify and its preferred location in the wall, as well as the location and type of vapor barrier needed to achieve the best overall performance.

Although a large variety of insulation materials are available; from snow and hay bales to fiberglass batts and extruded polystyrene, selection will be based on project type, exterior wall design and project location. For instance, it is common for multi-story commercial and institutional buildings in mixed climatic zones, which require heating in the winter and cooling in the summer, to use rigid, batt, foam or loose-fill insulation as part of the wall system. It typically is located either within the interior wall framing or within the cavity created between the exterior veneer finish and the wall framing.

Illustration 3. *The horizontal band pattern created in a recent clinic project designed by Little required the wall framing to be attached at the slab edge and supported by angle bracing at the floor below. This design impacted the insulation approach, seen in Illustration 2. Photo: Little Diversified Architectural Consulting*

Continuity is Critical

In most conventional wall systems, the structural components of the wall are framed floor to floor, and the insulation is placed in the wall-framing

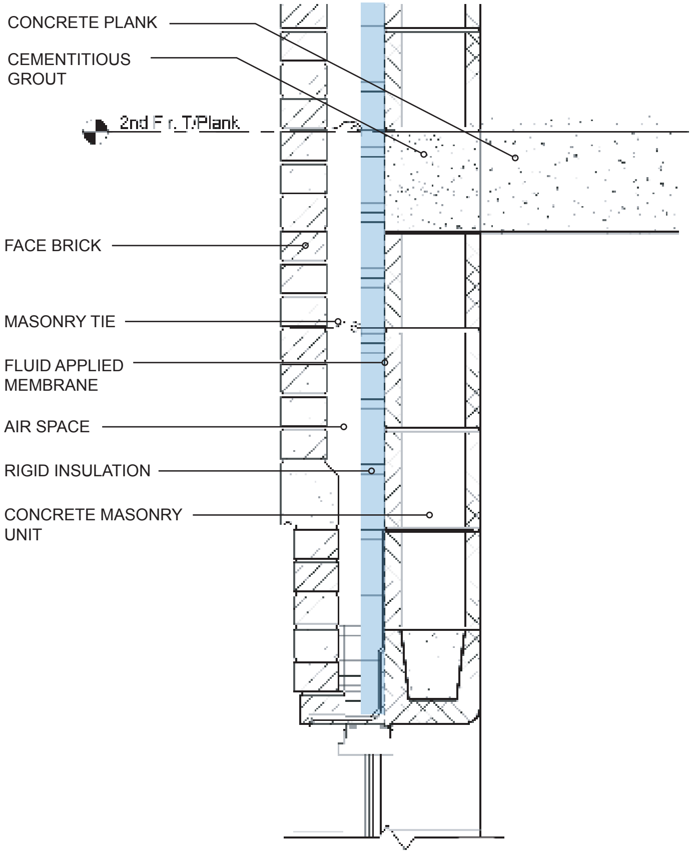


Illustration 4. *This wall system, used for the New Residence Hall at Fairfield University, shows a typical wall section with insulation in the cavity. It eliminates concerns about damaging the insulation layer from the interior. Drawing: Little Diversified Architectural Consulting*

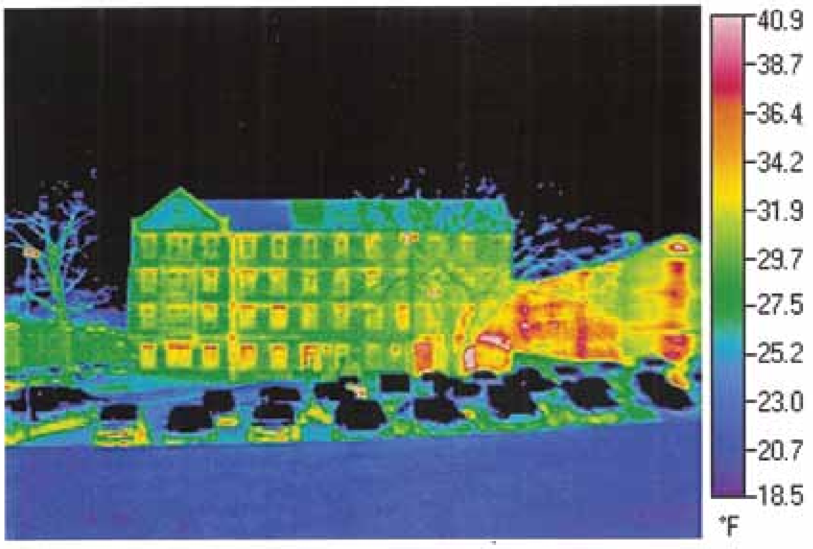


Illustration 5. This thermal image of Millennium Hall at the Catholic University of America, a veneer masonry building with EPS insulation in the cavity shows where heat can escape through penetrations in the wall cavity. Photo: Little Diversified Architectural Consulting

Illustration 6. In contrast to illustration #5, this thermal image of the precast concrete wall system at Opus Residence Hall at Catholic University of America indicates that little heat is escaping anywhere in the building's wall system. Photo: Little Diversified Architectural Consulting

cavity. However, illustration #1, which shows a fairly simple frame structure with batt insulation in the wall cavity, indicates the problems that can be encountered. At each junction, the framing that joins the structure together makes it difficult to maintain insulation continuity.

In addition, the insulation's location within the wall framing cavity makes it vulnerable to interruptions and penetrations from the building's interior. For instance, any outlets, conduit, ductwork or diffusers installed in the exterior wall will interrupt the insulation. Each penetration will be created by a different trade at a different point in construction, and the penetrations may not be repaired. Resulting discontinuities in the insulation will lead to reduced efficiency of the overall envelop and increase opportunity for heat loss and gain through the wall.

In a more sophisticated version of a batt-insulation system within a structural frame, Illustration #2 shows the wall system used in the Unity Anacostia Health Care Center by Little. The windows' horizontal band pattern required the wall framing to be attached at the slab edge and supported by angle bracing at the floor below (as seen in Illustration #3).

Loose-fill cellulose insulation was placed within the wall cavity. Because of the building design, the exterior wall framing by-passes the slab edge. Attaching the wall framing outside the structural slab edge avoids one problem associated with insulating within the wall framing cavity by eliminating conflicts between the slab edge and framing connections. This creates good insulation continuity and improves overall wall-insulation performance. However, the wall still is subject to the same interruptions and penetrations from interior systems as the wall in Illustration #1.

Inside the Cavity

For a variety of reasons, designers often prefer to locate insulation within the enclosure cavity. The benefits include better insulation continuity, location of the vapor barrier outside of the occupied space and reduced potential for penetrating and damaging wall insulation located in the framing cavity. The cavity is located between the wall framing and the veneer-finish material, be it brick, cementitious panels or stone. This detailing is fairly common in institutional masonry construction, whether the wall framing consists of concrete masonry units (CMU) or light-gage steel studs.

In this system, extruded-polystyrene (EPS) insulation is placed in the exterior wall cavity behind the brick veneer. Since modern veneer masonry provides a rainscreen, there is the potential for water to penetrate this cavity. But as EPS is inert, its insulation value is not impacted by moisture.

The diagram of the wall system for the New Residence Hall at Fairfield University shown in Illustration #4 presents a typical wall section with the insulation in the cavity. It provides an improvement over the inclusion of insulation in the interior wall-frame cavity, since it eliminates concerns about damaging the insulation layer from the interior. But this system creates challenges of its own.

First, there continue to be detail conditions that make it difficult to maintain insulation continuity. There also are dimensional tolerances that make it difficult for the contractor to install insulation according to the manufacturer's recommendations and maintain a continuous vapor barrier. In addition, in masonry veneer buildings more than three stories tall, steel relief angles are required at the floor slab to support the weight of the brick.

Thermal Images Reveal Gaps

The impact these elements can have is shown by taking thermal images of the project. Thermal images are created at night on a cold evening when the building is being heated. Blue indicates the surface temperature of the building is cool. Yellow and red show areas where heat is escaping the building.

Illustration #5 shows a thermal image of Millennium Hall at the Catholic University of America, a veneer masonry building with EPS insulation in the cavity. The thermal image indicates the relieving angles that support the brick at each floor break the insulation continuity and act as a conduit for heat to leave the building.

Illustration #6, a thermal image of Opus Residence Hall at Catholic University of America in Washington, D.C., shows a thermal image that is virtually all blue. No heat is escaping this building except at an open window. The exterior wall system consists of an insulated precast concrete panel system. Innovations with this system, such as wythe connectors that do not allow thermal bridging, provides an excellent example of the ways in which the industry is improving wall construction to meet the challenge of creating more energy efficient buildings.

Completed in 2008, the exterior wall consists of insulated precast concrete panels composed of 4 inches of structural precast, 2 inches of polyisocyanurate insulation and 3 inches of veneer precast (as shown in Illustration #7). Bonded together in the precast plant, these panels create edge-to-edge insulation continuity and provide an R-value of 26. The insulation is wrapped in a vapor barrier to prevent moisture transmission.

The panels are large, more than 30 feet long and 10 feet high. Bays that stand out from the primary building mass are U-shaped panels, so the continuity of the insulation envelope is virtually flawless. Hand-tooled concrete provided the interior finish of the space, and because of the excellent insulation in the wall, the interior surface temperature remains the same as the air temperature. No penetrations from the interior impact the panels in any way.

The building was designed to be compatible with adjacent traditional masonry buildings on a university campus. Thin brick in a color and finish that matched adjacent buildings was incorporated into the precast panels. The result, shown in Illustration #8, was a beautiful, well insulated and high performing building design. (For more on this project, see the Summer 2011 issue of *Ascent*.)

Every building has many criteria that impact design solutions and material selections. Putting a little extra time into considering the many insulation choices, selecting the appropriate product and carefully detailing the installation will reward the designer with long-lasting benefits in both improved building performance and user comfort. ■

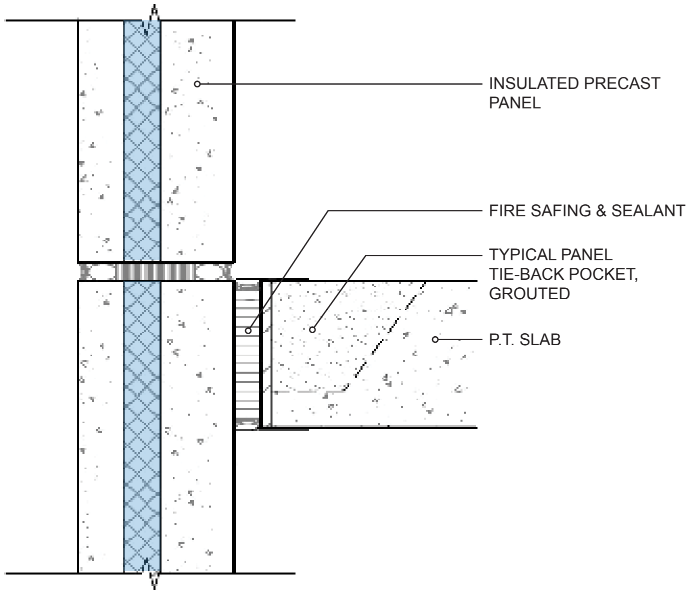


Illustration 7. *The exterior wall system at Opus Residence Hall at Catholic University of America consists of insulated precast concrete panels sandwiching a layer of polyisocyanurate insulation. Drawing: Little Diversified Architectural Consulting*

Illustration 8. *The Opus Residence Hall at Catholic University of America used precast concrete insulated sandwich wall panels with embedded thin brick to create a look that blended with nearby campus buildings and also provided a highly efficient insulating wall system. Photo: Little Diversified Architectural Consulting*

Precast/Prestressed Concrete Institute

The 2011 PCI Design Awards

Interfacing with Innovation

Interfacing with Innovation

The 2011 PCI Design Award winners showcase precast concrete's versatility.

The winners of the Precast/Prestressed Concrete Institute's (PCI's) 2011 Design Awards competition made use of the capabilities and benefits of precast concrete in many ways. Their winning entries both celebrate what has been achieved with the material and point the way for other designers to build on these ideas.

The versatility of precast concrete components allowed them to be used to achieve a wide variety of goals. These included enhanced durability, reduced maintenance costs, rapid construction speed, economy of design, dramatic aesthetics, seismic and wind resistance, ability to overcome site constraints, and sustainable design.

In reviewing the winning entries, judges were struck by precast concrete's capabilities to create dramatic and cost-effective designs. They especially noted its ability to interface well with other materials to create a unified structure and to produce intricate details and unique finishes that add visual interest at low cost.

Judges also noted that in every category, sustainable design remained at the forefront. Minimizing environmental impact, lowering energy costs, and reusing or recycling materials have become paramount to every client.

The following pages present the winning entries in the 2011 Design Awards Competition. In many categories, the competition was so close that judges presented awards to more than one distinctive project.

The awards will be presented to representatives from each precasting company October 22–26, 2011, during PCI's 57th Annual Convention and National Bridge Conference in Salt Lake City, Utah. For more photos of these projects, visit www.pci.org and click on 2011 Design Award Winners.

49th Annual PCI Design Awards Judges

Courtesy of PCI

Special Awards Jury (from left)

Rich Weingardt, P.E., Dist. M. ASCE, F. ACEC
Consulting engineer
Richard Weingardt Consultants Inc.
Denver, Colo.

Jonathan Boyer, AIA
Principal
Farr Associates
Chicago, Ill.

Allen Finfrock, P.E.
Vice president of design
Finfrock Industries
Apopka, Fla.

Courtesy of PCI

Buildings Jury (from left)

Robert Powers, AIA, LEED AP
Architect
HOK
St. Louis, Mo.

Craig Smith, AIA
President
Loebl Schlossman & Hackl
Chicago, Ill.

Richard Fencl, AIA, CSI, LEED AP
Principal/technical director
Gensler
Chicago, Ill.

Jim Crockett
Editorial director
Architectural Products
Palatine, Ill.

Stuart Howard, FRAIC
President
Royal Institute of Architects
Ottawa, ON, Canada

49th Annual PCI Design Awards

Special Awards

Buildings

Harry H. Edwards Award/Best Bridge with Spans More than 150 ft, Cowinner

Cross Street Bridge

Middlebury, Vt.

Owner Town of Middlebury, Vt.

Project EOR (incl. approach spans and substructure) Vanasse Hangen Brustlin Inc. (VHB), North Ferrisburgh, Vt. (www.vhb.com)

Contractor Kubricky Construction Corp., Wilton, N.Y.

Precaster J.P. Carrara & Sons Inc., Middlebury, Vt. (www.jpcarrara.com)

Splice Girder EOR Corven Engineering, Tallahassee, Fla. (www.corveneng.com)

Post-Tensioning Supplier VSL, Baltimore, Mass.

Deck Area 21,440 ft^2 (1992 m^2)

Bridge Length 480 ft (150 m)

Project Cost $16 million

This two-lane, three-span bridge features a 240 ft (74 m) center span, the longest simple-span precast concrete, post-tensioned, spliced-girder bridge in the United States. The main span is anchored by a pair of 120-ft-long (37 m) adjacent box-beam spans.

The center span comprises five modified New England Bulb Tee (NEBT) girder lines, each consisting of three segments of 64 ft, 108 ft, and 64 ft (20 m, 33 m, and 20 m). This final configuration evolved during the permitting process after state environmental regulators prohibited a permanent pier in Otter Creek. A design-build delivery system, the first to be used on a major transportation project in Vermont, greatly accelerated completion.

The precaster used 10,000 psi (69 MPa) self-consolidating concrete to meet the design demands on the large girders. The approach spans each feature 10 adjacent box beams cast using 8000 psi (55 MPa) self-consolidating concrete. Coordination with the precaster throughout the design of the girders and development of the fabrication drawings allowed timely modifications to existing precast concrete forms and helped expedite fabrication.

With girders standing nearly 10 ft (3 m) tall, the ceiling heights of the precasting plant were just high enough to lift the beams onto the transport trailers. Girder segments were erected using a single Manitowoc crane with a 160-ft (49-m) boom capable of hoisting the 93-ton (84-tonne) segments into place. Once erected, the girder segments had closure pours filled with cast-in-place concrete, and the cast-in-place diaphragms between girder lines were constructed.

Designed to be low maintenance, the bridge features an 8 in. (200 mm), cast-in-place concrete deck with 3 in. (75 mm) of pavement and 6-ft-wide (2 m) sidewalks with precast concrete architectural features and lighting. A pedestrian overlook was created on each of the four piers along the creek channel.

The use of precast concrete superstructure materials saved design and construction time and brought another level of efficiency to the project.

Judges' Comments

"We were very impressed with how the designers pushed a new standard single-span length using precast concrete elements to eliminate piers in the creek. It was a tremendous solution for the local community, which came together to fund and build this bridge. That unusual approach resulted in a unique, record-setting design. This span sets the example for using precast, prestressed concrete and will allow new approaches for using existing precast girder forms. It is the only material that can provide rapid construction in remote areas to create long spans, and it's the most durable."

Photo courtesy VHB

Sustainable Design Award
North Central College Residence Hall/Recreation Center
Naperville, Ill.

Owner North Central College, Naperville, Ill.

Architect Thomas A. Buchar & Associates, Joliet, Ill. (www.buchar.com)

Engineer Architectural Consulting Engineers, Oak Park, Ill.

Contractor Mustang Construction, Naperville, Ill.

Precaster Dukane Precast Inc., Naperville, Ill. (www.dukaneprecast.com)

Project Size 201,000 ft^2 (18,700 m^2)

Project Cost $24 million

To maximize efficiency while minimizing material costs, the North Central College Residence Hall/Recreation Center in Naperville, Ill., combined a residence hall and recreational facility by enclosing the latter inside the former. In the process, the project achieved silver LEED certification, becoming the first in the nation of this type of structure. It consists of a four-story, 265-bed residence hall wrapped around a 62,000 ft^2 (5800 m^2) field house.

The field house features 50-ft-tall (15 m) precast concrete walls and 180-ft-span (55 m) roof trusses, which allow for an open-spaced 200 m (220 yd) indoor track, activity courts, and a suspended walking track. The surrounding residence hall was constructed with precast concrete sandwich wall panels along with precast concrete columns, beams, stairs, and water-retention storage tanks.

Precast concrete contributed to the LEED certification in a variety of ways, including the use of recycled materials such as slag cement, fly ash, and recycled steel. Recycled slag aggregate was used in all of the flooring and walls to lighten footing loads, decrease wall thickness, and achieve the necessary fire ratings. Energy efficiency was improved through the concrete's thermal mass and high *R*-value insulating foam and the local manufacture of the concrete components.

Additional energy-efficient features include efficient windows, radiant heat, high-efficiency air-conditioning, heat-recovery ventilators, domestic hot-water waste-heat recovery, a white membrane roof to reduce the heat-island effect, low-flow plumbing fixtures, and extensive use of recycled and low-VOC-emitting materials.

The project also includes one of the largest geothermal installations in the Midwest, consisting of sixty 650-ft-deep (200 m) geothermal wells and underground precast concrete double-wall storm-water retention tanks.

This innovative approach shows the potential for using precast concrete to combine two normally separate structures into one building that aids sustainable-design and energy-efficiency goals. For more on this project, see the Summer 2011 issue of *Ascent* from PCI.

Judges' Comments

"What stood out most was the use of materials in more than one way, such as built-in insulation and radiant tubing built into the wall systems. That is where manufacturing is going, to eliminate labor and time from the site and put more of the construction into the manufacturing environment. The precast concrete also contributed a lot to the building's sustainability. The sandwich wall panel's capability to be both structural and insulating provided a creative solution. The design's goal of making the building multifunctional ensured it was used throughout the day, creating a very sustainable solution."

Photo courtesy of Dukane Precast, Inc.

All-Precast Solution Award
Tucker High School
Tucker, Ga.

Owner DeKalb County School System Design & Construction, Tucker, Ga.

Architect Milton Pate Architects, Tucker, Ga. (www.miltonpate.com)

Engineer Bennett & Pless, Atlanta, Ga.

Contractor Turner Construction Co., Atlanta, Ga.

Precaster Metromont Corp., Hiram, Ga. (www.metromont.com)

Project Size 340,000 ft^2 (32,000 m^2) in two phases

Project Cost $53 million

Photo courtesy of George Spence, Metromont

By using a total–precast concrete structural system, including wall panels, double tees, spandrels, columns, and beams, the construction team on this high school could erect portions of the building within 2 ft (0.6 m) of the existing, and still occupied, campus buildings. This approach resulted from community input, which indicated citizens wanted the new facility to retain the original high school's presence as an architectural anchor for the town's Main Street.

Because of the proximity to ongoing activities, the project was completed in two phases. In the first phase, the existing gymnasium was demolished, utilities were rerouted, and two total–precast concrete classroom buildings were erected. These facilities consisted of classrooms, labs, a media center, and administrative offices. Students could then occupy the new classrooms, after which the original building was torn down. The second phase completed the campus with technology classroom labs, an auditorium, a gymnasium, a kitchen, athletic fields, and landscaped courtyards.

The design features load-bearing exterior precast concrete walls with continuous insulation that allowed the building to achieve a steady-state *R*-value of 19. The components were shipped from only 40 mi (64 km) away and included all local materials: aggregates, cements, sands, fly ash, strand, reinforcing, and insulation.

A variety of postconsumer and preconsumer recycled materials were used in fabricating the precast concrete materials. These included fly ash, reinforcing bars and mesh, cement, strand, foam insulation, connections, and steel shapes. Recycled materials were used throughout the project. For instance, concrete was salvaged from the original school building and reused.

The owner, design team, and construction manager at risk agreed that erecting the 210,000 ft^2 (20,000 m^2) precast concrete shell in only 52 working days was the key to achieving the overall schedule and ensuring that the students made a swift and smooth transition to the new school.

Judges' Comments

"This project used precast in a unique and innovative way, combining many concepts into one panel. The tight site lent itself well to precast concrete construction, allowing panels to be erected within a few inches of an existing building, which many other materials would not have been able to accomplish. The school also is quite compelling aesthetically. This building excelled in providing textural variety and wedding exterior materials. Its scale fits the community perfectly. The design represents a very efficient method and the future of how to use precast concrete."

Best Office Building: Low Rise (1–3 Stories)
California ISO Headquarters
Folsom, Calif.

Owner California ISO, Folsom, Calif.

Architect Dreyfus Blackford Architects, Sacramento, Calif. (www.dreyfussblackford.com)

Engineer Buehler & Buehler Structural Engineers, Sacramento, Calif.

Contractor Clark Design Build of California, Oakland, Calif.

Precaster MidState Precast LP, Corcoran, Calif. (www.midstateprecast.com)

Project Size 278,000 ft^2 (25,800 m^2)

Project Cost $113 million

This three-wing, design-build project for high-voltage electric-grid operator California ISO in Folsom, Calif., achieved LEED platinum certification, thanks in part to the precast concrete structural system. It includes insulated precast concrete wall panels as well as a post-tensioned hybrid moment-frame structural system.

Each wing of the headquarters serves a different function: a facility for state-of-the-art grid operations and data, offices for 500 employees, and meeting and training spaces. The office wing lent itself to a regular form, with uniform bay spacing that benefited from the hybrid moment frame. This approach achieved the aesthetic goals while providing an economical system.

The precast concrete columns and beams, used with hollow-core slabs, were left exposed to create a loft-like quality to the space. The mass of the concrete flooring serves as a heat sink, moderating temperature fluctuations and reducing energy consumption. Raised-access flooring allows for under-floor HVAC systems.

The precast concrete structural system not only enhanced energy efficiency but aided the construction schedule. The mission-critical wing (the grid-operations center) also contained supporting mechanical and electrical-plant services, which had to be completed first. Notice to proceed was given in mid-March 2009, and an aggressive, fast-track schedule with phased permitting accelerated construction.

The insulated precast concrete panels were fabricated off-site as other prep work was under way, speeding the building's enclosure. Wall erection took about one month and was completed in September 2009, only six months later, allowing the weather tight shell to be erected before winter. Five precast concrete hybrid moment-resisting frames and a total of 1360 precast concrete components were used.

The relatively slender structural lines permitted extensive exterior openings that maximize daylighting and minimize artificial lighting. A variety of additional sustainable-design concepts contributed to the LEED platinum certification.

Photo courtesy of MidState Precast, LP

JUDGES' COMMENTS

"We found this project to be very, very, very exceptional. The combination of the structural frame and the aesthetic design provide a straightforward honesty of composition. The ability to weave the precast concrete together with other materials, including sun shades, produced an effective project. There's a strong repetition in the base layered with classic metal components that enliven and enrich the façade. The precast concrete carries to the inside of the building and enhances the interior space as well."

Best Office Building: Mid-Rise (4–6 Stories)
JE Dunn Corporate Headquarters
Kansas City, Mo.

Owner Dunn Realty, Kansas City, Mo.

Architect 360 Inc./BNIM Project, Kansas City, Mo. (www.360architects.com/www.bnim.com)

Engineer Structural Engineering Associates (SEA), Kansas City, Mo.

Contractor JE Dunn Construction Co., Kansas City, Mo.

Precaster (Architectural Wall Panels) Enterprise Precast Concrete Inc., Omaha, Neb. (www.enterpriseprecast.com)

Precaster (Parking Structure) Coreslab Structures, Marshall, Mo. (www.coreslab.com)

Precaster (Hollowcore) Stress-Cast, Inc., Assaria, Kans.

Precast Concrete Specialty Engineer Structural Engineering Associates (SEA), Kansas City, Mo.

Precast Concrete Specialty Engineer Rupprecht Engineering, Omaha, Neb.

Project Size 204,000 ft^2 (19,000 m^2)

Project Cost $44.3 million

To consolidate operations spread over five downtown locations in Kansas City, Mo., the owners of general-contracting company JE Dunn Construction created a single six-story, 204,000 ft^2 (19,000 m^2) corporate headquarters and adjacent 780-car parking structure. To maximize efficiency, designers used a variety of specially cast precast concrete insulated architectural wall panels on the building along with a total–precast concrete framing system on the parking structure. The project not only met the client's programmatic and aesthetic requirements but also achieved LEED gold certification.

The designers wanted to generate a modern-day loft feel for the interiors, with an exposed structure and exterior bearing walls. Hundreds of standard formliner options were considered. The team decided to create custom designs that hid the repetition and seams while providing strong visual depth.

The building features gray architectural precast concrete panels with a linear formliner design at street level. This appearance contrasts with upper levels, which showcase flat panels with white cement and an acid-etch finish. The interior face of these insulated sandwich wall panels was left exposed with an acid-etch finish as well, emphasizing the fundamental nature of the material, which the architect sought.

Vertical lines accentuate vertical window openings and blend with the character of the neighboring buildings. The upper panels were fabricated to be light and smooth, simulating cut limestone in texture and color, which pays homage to the city hall building on the southwest corner of the property.

The project's decision process was streamlined by having the company serve as developer, owner, and contractor. While those functions were joined, the precast concrete fabrication was expanded by having three precasters work on the project. One provided architectural insulated wall panels, the second fabricated the integrated precast concrete components for the parking structure, and the third provided hollow-core slabs for select areas of the office building.

JUDGES' COMMENTS

"This project was very exciting on two levels: the juxtaposition of the window system that made the façade so interesting and the variety of finishes used for the precast concrete panels. The precast concrete design was well thought through and was handled in a straightforward and honest manner while creating a dramatic look. The use of color helped give the building some scale and differentiate the base from the tower. The thin floor plates allowed daylight into the space and also captured outdoor space for public use."

Best Mixed-Use Building
The Atrium
Victoria, BC, Canada

Owner Jawl Investment Corp., Victoria, BC, Canada

Architect D'Ambrosio Architecture + Urbanism, Victoria, BC, Canada (www.fdarc.ca)

Engineer Stantec Consulting Ltd., Victoria, BC, Canada

Engineer Fast+Epp, Vancouver, BC, Canada

Contractor Campbell Construction Ltd., Victoria, BC, Canada

Precaster Lafarge Canada, Inc., Calgary, AB, Canada (www.lafargenorthamerica.com)

Precast Concrete Specialty Engineer DIALOG, Calgary, AB, Canada

Project Size 204,000 ft^2 (19,000 m^2)

Photo courtesy of Lafarge

Ultra-high-performance concrete (UHPC) helped The Atrium, a seven-story building in Victoria, BC, Canada, achieve a dramatic and cost-effective façade in its first use in a precast concrete exterior cladding system in North America. The UHPC allowed the panels to be light enough to be hung from a unitized curtain-wall envelope system and thin enough to allow an air-displacement ventilation system to fit within the exterior-wall thickness. The panels also helped reduce structural requirements to resist seismic forces.

The 204,000 ft^2 (19,000 m^2) building, located in a historic downtown neighborhood, features ground-floor shops and a seven-story central atrium that introduces daylight into the heart of the building. The building was designed as a high-density, mid-rise form to fit into its environs, using a palette of natural and durable materials.

The UHPC panels were cast with a surface pattern of vertical lines cast from a mold that was hand-carved by the architect. Just $^3/_4$ in. (19 mm) thick, the textured spandrel panels used minimal fiber-reinforced-polymer bars in the perimeter ribs as a safety precaution against accidental overloading. By eliminating reinforcing bars in the panels, it was possible to create thin, complex, curved precast concrete panels.

The panels also provide superior durability, thanks to an extremely dense matrix. Consequently, the building's maintenance requirements are greatly diminished because the UHPC panels are much less susceptible to the absorption of environmental debris.

About 690 panels were produced from curved and flat molds using a displacement-casting process. The panels are $^3/_4$ in. (19 mm) thick with 1.18 in. (30 mm) ribs, making each light, strong, and thin. The façade design used rectangular panels that are straight, curved, and a combination of both. All of the panels were 51 in. (1.3 m) high and varied in width from 30 in. to 85 in. (800 mm to 2.2 m), with a mode of 51 in.

The façade techniques helped the building achieve Canada Green Building Council's LEED gold certification.

JUDGES' COMMENTS

"We believe we are seeing the future of precast concrete with this project. It was amazing to see how they curved the panels and used them to create a lightweight curtain-walled system. Traditionally, we view precast concrete as a heavy, massive material, and now we can think in terms of lightweight capabilities. There is a lot of potential for this concept for many projects. We also liked it for its shape and relationship to the streetscape. It's quite well done, a beautiful building."

Best Parking Structure (0–999 Cars)
164th Street Garage
Bronx, N.Y.

Owner New York City Department of Parks and Recreation, New York, N.Y.

Architect Clarke Caton Hintz Architects, Trenton, N.J. (www.clarkecatonhintz.com)

Engineer Fay Spofford Thorndike, New York, N.Y.

Contractor Prismatic/Hunter Roberts, Fairfield, N.J.

Precaster Unistress Corp., Pittsfield, Mass. (www.unistresscorp.com)

Precast Concrete Specialty Engineer Hoch Associates, Fort Wayne, Ind.

Parking Vendor Standard Parking, New York, N.Y.

Project Size 256,330 ft^2 (23,800 m^2)

Project Cost $46 million

Photo courtesy of Jeffrey Totaro Photography

Adjacent to the new New York Yankees baseball stadium in the Bronx, this five-tier, 660-space precast concrete parking structure provides one of the four façades for the stadium. With white precast concrete and stainless steel mesh panels, the structure blends with the stadium's neo-traditional design while projecting a modern appearance.

The thin, rectangular structure runs the length of 164th Street and provides parking for the club, VIP guests, and season-ticket holders. Due to an adjacent stand of trees that could not be removed, along with setback requirements from a nearby elevated rail line, the parking structure required a narrow footprint. As a result, it was designed with a scissor-ramp configuration for vertical circulation and one-way vehicle flow with angle-in parking.

The precast concrete structural system allowed open floor plates to be created, providing drivers with unobstructed views. The project uses a typical 36 ft (11 m) structural grid and 186,000 ft^2 (17,300 m^2) of precast concrete double tees.

The visually striking mesh fabric is held tautly in place with spring-loaded tensioning devices that allow the structure to self-moderate and account for the seasonal temperature differentials of the stadium. The mesh shrouds the pure white concrete mix to create a rich blend of textures. Concealed ground-mounted uplights wash the mesh to provide a soft blue glow at night.

JUDGES' COMMENTS

"What struck us about this project was its simplicity and harmonious marriage with the stadium without being overwhelmed by the stadium's size. That says a lot, considering it is beside one of the more famous structures in the country. This project provides a very simple but elegant design with a striking façade that worked very well to achieve its goals."

Best Parking Structure (1000+ Cars), Cowinner
Norman Y. Mineta San José International Airport CONRAC Garage
San José, Calif.

Owner The City of San José Norman Y. Mineta San José Airport Department, San José, Calif.

Architect TranSystems, Phoenix, Ariz. (www.transystems.com)

Architect Fentress Architects, San José, Calif.

Engineer Watry Design, Redwood City, Calif.

Engineer TranSystems, Phoenix, Ariz.

Contractor Hensel Phelps, San José, Calif.

Precaster Clark Pacific, West Sacramento, Calif. (www.clarkpacific.com)

Project Size 1.8 million ft^2 (170,000 m^2)

Project Cost $260 million

© Mikki Piper

The nation's first on-site integrated car-rental and quick-turnaround (QTA) operations facility, the new airport parking structure at Mineta San José International Airport in San José, Calif., features a precast concrete structural system that shaved more than five months from the construction schedule. The facility combines an eight-story, 3000-car rental-car parking area and a four-story QTA area that includes refueling stations and car washes. The combination allows rental cars to be located within walking distance of the terminals.

The 1.8 million ft^2 (170,000 m^2) structure is nearly twice the size of the state's previous largest precast concrete parking structure. The facility contains 3817 precast concrete components, consisting of double tees, L-beams, inverted-tee beams, transfer girders, rectangular collector beams, columns, and spandrels.

To match the curved shape of the structure's north end, both the shear walls and double tees in that area were curved, with the tees cast in pie-shaped wedges. Precast concrete spandrels serve as car-impact shields as well as a base skin for metal mesh and artwork murals. Façade features were still being decided by the city while the project was being erected, so blockouts were provided in the precast concrete to allow final materials to be erected later.

Providing the fuel and water requirements for the QTA portion created key challenges. Wash and rinse water was supplied in multiple 2000 gal. (7600 l) tanks on each level, including a reverse-osmosis system for spot-free finishing. To provide moisture resistance, a $3^1/_2$-in. (90 mm) topping was applied to the top of the double tee, followed by a hot-asphaltic waterproofing layer and another 4-in (100 mm) concrete topping. The fueling tanks are secured at grade level, with fuel delivered to pumps on each level via pressurized pipes.

The precast concrete design was the key to reducing first costs and construction time, providing seismic resistance, providing a flexible design to enable post-applied architectural treatments, and easing congestion on the construction site.

JUDGES' COMMENTS

"This project used the structure as a blank canvas to create a strong framework of precast concrete that was then layered with incredible artwork. It highlights the versatility of precast as a form and shape maker on its façade. It works well both as a framework for the art and for creating a nice structure of its own. It has a very large scale and is very linear, creating an interesting design without being overwhelming. It really demonstrates a versatility of precast as an architectural building element."

Best Parking Structure (1000+ Cars), Cowinner
Orlando Health Parking Deck C
Orlando, Fla.

Owner Orlando Health, Orlando, Fla.

Architect Baker Barrios Architects, Tampa, Fla. (www.bakerbarrios.com)

Engineer Finfrock Design Inc., Apopka, Fla.

Contractor Jack Jennings & Sons, Orlando, Fla.

Precaster Finfrock Industries Inc., Apopka, Fla. (www.finfrock.cc)

Project Size 767,300 ft^2 71,300 m^2)

Project Cost $27.5 million

Chad Byerly Photography

This nine-level, open parking structure, part of a new medical office and surgery center for the Orlando Regional Medical Center in Florida, stands out for its palm-tree murals installed on the precast concrete wall panels. The decorative accent softens the scale of the structure and allows it to better blend with the surrounding medical-office campus.

The facility, with a footprint of 310 ft × 280 ft (94 m × 85 m), stands 100 ft (30 m) tall. It features a total–precast concrete structural system, including columns, shear walls, lite walls (shear walls with openings cast into them to provide visual continuity), double tees, inverted-tee beams, stairs, horizontal frames, flat slabs, and spandrel panels. The panels form frames on the structure's façade that help to reduce the visual mass. Metal-framed grilles were used to mimic windows on a building, providing a more pleasing appearance and aiding in mass reduction.

The murals, which were fit into the precast concrete frames, range in height from 32 ft to 61 ft (10 m to 19 m). The palm trees replicate original artwork created by nationally known local artist Maria Reyes-Jones. To further downsize the huge structure and heighten visual interest, colorful graphic banners dress up portions of the elevation.

A total of 1656 precast concrete components were erected on the project. The project went from start to completion in 15 months.

JUDGES' COMMENTS

"This parking structure avoided a utilitarian look by employing architectural precast concrete to create a façade that eliminated the parking structure vocabulary. Using precast concrete in two color tones created some layering and depth, while the addition of metal mesh added a layer of richness. The facility fits in nicely with the level of the quality of the rest of the medical campus. Using a number of repetitive forms allowed the designers to put the panels together in an economical way that still creates interest and variety."

Best Stadium, Cowinner **Indiana University Stadium North End Zone Addition** Bloomington, Ind.

Owner Indiana University, Bloomington, Ind.

Architect RATIO Architects Inc., Indianapolis, Ind. (www.ratioarchitects.com)

Associate Architect Moody-Nolan Inc., Indianapolis, Ind.

Engineer Fink, Roberts & Petrie Inc., Indianapolis, Ind.

Contractor Pepper Construction Co. of Indiana LLC, Indianapolis, Ind.

Precaster Gate Precast Co., Winchester, Ky. (www.gateprecast.com)

Precast Concrete Specialty Engineer CSD, Milwaukee, Wis.

Project Size 130,000 ft^2 (12,000 m^2)

Project Cost $21.5 million

In designing a 130,000 ft^2 (12,000 m^2) addition onto Indiana University's football stadium in Bloomington, Ind., architects needed to ensure that it both matched the existing stadium on a campus where limestone is the predominant material and provided a collegiate gothic architectural style for a highly functional structure.

Narrow, smooth-faced precast concrete piers rise from the structure's base, framing curtain-wall openings. The addition connects the stadium's two original seating sides, forming a bowl shape. It also figuratively connects the past and the future by providing space for the Hall of Champions, a museum-quality exhibit displaying the school's athletic history. Spaces include a student-athlete physical-development center, administrative offices, football offices, team meeting rooms, and an academic-support commons.

The design team used architectural precast concrete panels to help create a style that not only flows with the original stadium but also ties in with the rest of the campus. The team saved considerable cost and scheduling time by using precast concrete's flexibility in color, shape, and scale to match cut-stone limestone.

Formliners, created by taking impressions from actual blocks of stone, provided the split-faced texture needed to emulate giant blocks of quarried limestone. Bands of smooth-faced precast concrete panels were integrated with the textured areas to help articulate the look of individual stone blocks.

The corners of the towers feature panels cast with an invisible cold-formed joint at the outside corner, which provided significant depth to each leg. Cast into the architectural panels is a one-story-tall Indiana University logo. The university's name is also cast into the panels with an incised font.

Insulated punched windows with large variances of projection in the precast concrete panel's face allowed for a more practical section than a more conventional system would have allowed.

JUDGES' COMMENTS

"There were a number of great stadium projects, but this one stood out for its capabilities in replicating limestone, for which the area is justly famous. This replication provided a nice way to marry limestone with the Gothic style while maintaining the sporting-event functions. Logistics and scheduling no doubt were challenges to ensure the stadium was completed on time. The design captured the feeling of the campus as a whole while creating a unique expression in this particular location. Precast concrete is a good solution for stadiums in general."

Photo courtesy of MV2 Photography

Best Stadium, Cowinner
Target Field, Minnesota Twins
Minneapolis, Minn.

Owner Minnesota Ballpark Authority, Minneapolis, Minn.

Architect Populous, Kansas City, Mo. (www.populous.com)

Contractor Mortenson Construction, Minneapolis, Minn.

Precaster Gage Brothers Concrete Products Inc., Sioux Falls, S.Dak. (www.gagebrothers.com)

Precaster Hanson Structural Precast, Maple Grove, Minn.

Precast Specialty Engineer The Consulting Engineers Group, Apple Valley, Minn.

Project Size 80,000 ft^2 (7400m^2)

Project Cost $544.4 million

JUDGES' COMMENTS

"This was a great project, producing a very attractive but very different-looking structure for a baseball stadium. It provides a terrific use of limestone on precast panels, bringing economy to the project yet still providing an attractive look. It shows precast concrete's versatility and its ability to work with more traditional materials, uniting them into an easy package to mount and install. The design helps open doors for revisiting some older or more expensive materials that often are ruled out that now can be put back onto the agenda."

Photo courtesy of Bob Perzel

Precast concrete architectural panels proved an essential component for achieving the aesthetic goals for Target Field, which serves as home to Major League Baseball's Minnesota Twins in Minneapolis. The urban location and surrounding light-rail and commuter-train services added appeal, but they also created site restrictions that the precast concrete helped to overcome.

There was nothing square, straight, or plumb about the 88-ft-tall (27 m) exterior precast concrete wall system, which features large, cast-in limestone blocks. These blocks consisted of honed and quarry-creek rocked-faced stone in various thicknesses. Casting odd-sized blocks with nonuniform surfaces and thicknesses, which varied by up to 2 in. (50 mm), presented major manufacturing challenges.

To achieve the desired look, the limestone blocks were placed face down into the forms with $^3/_4$ in. (19 mm) joints. Stainless steel ties anchored the blocks to the precast concrete wall. A bond breaker prevented concrete from entering the joints and allows thermal expansion of the dissimilar materials. The design also includes a gradation in stone color from darker at the base to lighter at the top.

The superstructure consisted of a multilevel waffle-slab floor system with concrete columns. Walls are battered a variety of degrees, while corners seem to intersect at different angles. To achieve this look, the precaster had to mark foundations, project the walls, and determine the corner conditions so panels could be fabricated to meet the as-built site conditions.

The precaster provided a tube-based, steel-frame subwall assembly to support the precast concrete well system. The limestone-faced precast concrete components were set from inside the bowl because there was no perimeter access. ■

In 2010, the stadium was voted by ESPN as offering the best sports experience in all professional sports in the United States.

Best Custom Solution
International Brotherhood of Electrical Workers Local No. 697 and Joint Apprenticeship Training Center
Merrillville, Ind.

Owner International Brotherhood of Electrical Workers, Merrillville, Ind.

Architect Design Organization, Chicago, Ill. (www.designorg.com)

Engineer McCluskey Engineering, Naperville, Ill.

Contractor Berglund Construction Co., Chesterton, Ind.

Precaster National Precast Inc., Roseville, Mich.

Project Size 40,000 ft^2 (3700 m^2)

Project Cost $9 million

The use of a precast concrete structural frame allowed quick completion of the building envelope on this training facility, which was designed to emphasize sustainability and to achieve LEED certification. The design reflects the owner's commitment to new technology and training in alternative energy for photovoltaic and wind energy. Architectural precast concrete wall panels helped achieve those goals, including helping the envelope to be enclosed quickly so photovoltaic panels could be installed to power the construction site.

Designed as a living laboratory, the facility features glass-enclosed electrical and technology rooms in the main lobby with video displays monitoring building performance. The rooftop serves as an outdoor classroom, with photovoltaic arrays monitored by the apprentices. The architectural precast concrete panels allowed extensive design detailing, including an embossed random stick pattern around the perimeter of the panels. In all, 94 precast concrete panels were used on the project, with the largest measuring 11 ft × 31 ft (3.4 m × 9.4 m). They were connected to a steel-frame structure.

The project includes such sustainable features a slow-cutoff LED lighting, plug-ins for hybrid and electric vehicles, and a high percentage of recycled and regional materials. A significant portion of the native habitat was preserved.

The construction team also worked with the Save the Dunes Council to preserve a significant amount of the native habitat during construction. An arborist assisted in proper stewardship of the wooded areas, while hardwoods in the area of the building footprint were harvested, milled, and reused in the building.

JUDGES' COMMENTS

"What we liked about this project was the simple massing and composition of the building, but it was really the combination of precast with other materials that made it stand out. The precast concrete helps support the aluminum banding and the glass panels very well. They work terrifically in concert to raise the eye to the photovoltaic array, which the client wanted to emphasize. This type of facility often has a boxy, unattractive look, but this design is very striking."

Photo courtesy of Design Organization, Inc.

Best Public/Institutional Building, Cowinner

City of Miami College of Policing/ Miami-Dade School of Law Studies, Homeland Security and Forensic Sciences

Miami, Fla.

Owner City of Miami, Fla.

Architect/Engineer AECOM, Coral Gables, Fla. (www.aecom.com)

Contractor James B. Pirtle Construction, Davie, Fla.

Precaster Gate Precast Co., Kissimmee, Fla. (www.gateprecast.com)

Precast Concrete Specialty Engineer Gate Precast Co., West Chester, Ohio

Project Size 116,000 ft^2 (10,800 m^2)

Project Cost $36.47 million

Photo by Mike Butler

A sleek, contemporary design with a richly textured exterior was created for this combination police academy training center and magnet high school for students interested in legal studies and forensic science in Miami, Fla. Architectural precast concrete panels were used to tie together a mix of materials.

The City of Miami College of Policing and Miami-Dade School of Law Studies, Homeland Security and Forensic Sciences facility was designed specifically to reinforce the goals of the new Miami 21 zoning and planning guidelines. The building creates a rich pedestrian environment with lush landscaping, multicolored patterned sidewalks, multiple street-level entrances, textured exterior materials and built-in benches. The design helps define the urban street edge and creates a formal plaza suitable for public gatherings between the facility and the adjacent police headquarters.

The main police entrance is defined by a four-story-tall wall of light, buff-colored architectural panels with a light sandblast finish. The panels include incised building signage, a detailed recess, and a large cast-metal police badge set into the precast concrete. The southeast corner contains a similar four-story-high precast concrete element with the high school name and logo.

On other façades, four-story elements continue as thinner precast concrete strips, which mark the edge of a stucco infill wall. The wall's lower portion is defined by black-colored precast concrete panels. Black precast concrete panels with a richly textured light-sandblast finish also clad a shared auditorium. Formliners were used to create enhanced shadow and texture on the auditorium façade, providing a visual focal point.

The design incorporates numerous sustainable-design features, including the high-efficiency precast concrete exterior skin with excellent thermal properties. A large east-facing great window opening mitigates heat loads through the use of low-emittance, fritted glazing with extensive sun shades to maximize daylight. The HVAC and electrical systems also use high-efficiency components, including the light fixtures and air-handling equipment.

JUDGES' COMMENTS

"This beautiful project uses different colors and textures of precast in conjunction with massing techniques to create a great result. The rustication, reveals, and joinery provide an excellent example of how precast concrete can work successfully. The designers worked very hard to create a unique solution that utilized the different materials quite well and tied them together perfectly. This project was a natural for precast concrete, providing all the attributes and showing that it was absolutely the right material."

Best Public/Institutional Building, Cowinner
The National World War II Museum Phase IV Expansion
New Orleans, La.

Owner The National World War II Museum Inc., New Orleans, La.

Architect Voorsanger Mathes LLC, New Orleans, La. (www.voorsanger.com)

Engineer Weidlinger Associates Inc., New York, N.Y.

Contractor Satterfield & Pontikes Construction Inc., Kenner, La.

Precaster Gate Precast Co., Monroeville, Ala. (www.gateprecast.com)

Project Size 75,140 ft^2 (6980 m^2)

Project Cost $42 million

Photo courtesy of Thomas Damgaard

This extensive expansion to the National World War II Museum in New Orleans, La., showcases the ability of precast concrete to be formed into different shapes, angles, and sizes.

Multiple exhibit pavilions are set onto a symbolic parade ground. Created in four phases, the completed building integrates three historic structures and completes most of the new construction.

At the northern end, the Theater Pavilion functions as an interface hub between the existing museum and future pavilions. It consists mostly of large-scale precast concrete panels with angular edges and joints. In contrast, through the extensive use of glazing and metal panels, the parade ground façade provides a more open and lightweight appearance.

The building's overall design was planned to represent the cliffs of Normandy, and the large precast concrete panels help achieve this goal by being cast with multiple angular edges and joints. There are no 90° corners on the project. On different façades, the panels lean in and out at varying angles. On one elevation, for instance, panels lean out at 84° and gradually lean farther near the top of the building. On another elevation, the panels are set at 90° but angle out near the top.

The panels attach to a steel frame, with vertical tube steels located along the grids for connecting the panels. Close coordination between the precaster and the steel subcontractor was required to ensure that the connections aligned perfectly.

Thirteen precast concrete panels serve as a roof deck, with some cantilevering more than 10 ft (3 m). Other panels were erected inside, requiring special coordination to ensure no structure was created that would prevent erection of these panels.

JUDGES' COMMENTS

"This project provides one of the best pieces of design in the entire competition. The unique shapes and the way they were articulated on the façade, with planes in and out, made its appearance very effective. We also liked the cornice and the capability to accomplish goals with precast that traditionally would be done with other materials. The designers made good use of precast concrete's versatility to create forms while gaining strength to avoid wind- and weather-related issues. It's a beautiful building that's well detailed, nicely handled, and very interesting in form and development."

Best University Project, Cowinner
Indiana University Innovation Center
Bloomington, Ind.

Owner Indiana University Department of Facilities, Bloomington, Ind.

Architect/Engineer BSA Lifestructures, Indianapolis, Ind. (www.bsalifestructures.com)

Contractor Messer Construction, Indianapolis, Ind.

Precaster High Concrete Group LLC, Denver, Ind. (www.highconcrete.com)

Project Size 40,000 ft^2 (3700 m^2)

Project Cost $10 million

JUDGES' COMMENTS

"This building was singled out for the ways that it uses precast concrete both for its forming ability and for its ability to meet sustainability goals that perhaps other materials couldn't have met. It's also an interesting piece of architecture. It integrates different materials well into the overall context of the building, and it's also beautifully integrated into the landscape. It was well put together and nicely detailed. It creates a nice solution for this need."

Photo courtesy of High Concrete Group LLC

The ability of insulated precast concrete wall panels to quickly be erected while providing an aesthetic design that allowed a university business-park structure to fit into the surrounding architectural context created early innovation for the Indiana University Innovation Center in Bloomington. The insulated panels also helped the two-story project achieve LEED silver certification.

The building, which represents the first phase of an information-technology and technology-transfer economic-development zone, consists of an innovation center that provides modular labs and offices to emerging companies. By the time the university awarded the project, three months of its available 15-month inception-to-occupancy time frame had been used. To expedite its aggressive schedule, university officials included a precast concrete option in its RFP, which the team used.

Buff-colored precast concrete walls emulate the Indiana limestone of nearby buildings and counterbalance the structure's glass curtain wall and dark brown metal panels. Reveals break up the precast concrete panels. Curtain-wall mullions bleed across to continue the line established in the precast concrete panel spacing. In one vestibule, the precast concrete is turned inside to provide visual continuation and also a durable surface in a high-traffic area.

The precast concrete sandwich panels feature a 3 in. (75 mm) layer of rigid extruded polystyrene foam insulation and carbon-fiber wythe ties to deliver an *R*-value of 15 with extremely low thermal conductivity. The insulated panels were applied heavily to the north and south elevations, while metal panels and continuous-glass curtain walls were used on the upper portions of the east and west façades.

A canopy over the entrance was mounted using outriggers attached to embeds in the precast concrete panels. The canopy implies the continuation of other metal elements on the façade, with a second metal panel on the east elevation serving as a visual connector.

Best University Project, Cowinner
CEDETEC
Atizapán de Zaragoza, Mexico

PPRETECSA Archive

Owner/Engineer/Contractor Instituto Tecnologico de Estudios Superiores Monterrey, Atizapán de Zaragoza, Mexico

Architect LANDA Arquitectos, San Pedro, Mexico (www.landaarquitectos.com)

Precaster PRETECSA, Atizapán de Zaragoza, Mexico (www.pretecsa.com)

Project Size 157,500 ft^2 (14,600 m^2)

Project Cost $4.5 million

JUDGES' COMMENTS

"This academic center creates a striking yet simple form with its circular tower and basic structure. We liked the way the precast concrete forms created different appearances from just one form, providing a cost-effective solution. The building stands out. It's not a project that blends in at all, which was the intent. It has a unique look that works quite well, and the colors are perfect. No other material would have provided this level of fine finish in this particular shape with this kind of patterning."

A creative combination of architectural precast concrete panels in varying positions and textures creates a pictorial composition in a rustic, brutalist style for this academic center in Atizapán de Zaragoza, Mexico. The unique shape for the 12-story CEDETEC building, which from a distance resembles a cylindrical circuit board, was achieved with more than 300 curved architectural precast concrete panels cast with a white-marble aggregate.

The building, which is dedicated to technology education and academic research, houses classrooms and laboratories for the development of low-cost energy and sustainable-design techniques, digital systems, prototypes, multimedia, and network systems. As such, officials wanted an architectural plan that exalted creativity, research, and knowledge.

The curved precast concrete panel sections were combined in different positions to create pictorial compositions, which minimize the required casting beds while achieving a varied look. The variety of the façade appearance was enhanced with randomly placed embedded windows. Imitation tier wires were cast into the panels to simulate a cast-in-place look, and the panels were attached to a cast-in-place frame.

The combination of designs contributed to the building's objective of communicating a sober and innovative image in harmony with its essential function. It also was accomplished quickly: The panels ranged in size from 26 ft^2 to 97 ft^2 (2.4 m^2 to 9.0 m^2) and were erected in three months.

Best Healthcare Facility, Cowinner
Methodist Women's Hospital
Omaha, Neb.

Owner Methodist Health System, Omaha, Neb.

Architect/Engineer HDR Inc., Omaha, Neb. (www.hdrinc.com)

Contractor MCL Construction, Omaha, Neb.

Precaster Coreslab Structures (OMAHA) Inc., LaPlatte, Neb. (www.coreslab.com)

Project Size 443,000 ft^2 (41,100 m^2)

Project Cost $101 million

The new 116-bed, all-private-room hospital and companion medical-office building at Methodist Women's Hospital was designed to meet the increasing demand for high-quality women's healthcare in the Omaha, Neb., area. The design team chose to feature architectural precast concrete panels with embedded thin brick on the façade, providing a traditional look with a contemporary material that sped up construction and added durability.

The project highlights how the look of masonry can be replicated or even enhanced with thin-brick precast concrete panels without having to deal with the challenges of weather and mason availability, which typically are concerns associated with field-laid masonry. Serving as a canvas to allow architects to stretch the limits of design, the embedded thin brick features darker-colored bricks in the reveal areas to produce shadow effects.

The thin-brick panels provided a clean look without through-wall flashing or weep holes. A stack-bond pattern was used to lessen the visual impact of the vertical joints between panels. Creating the intricate, embedded thin-brick reveals required precision during the manufacturing process. Corner and edge-cap bricks are located around the recesses to create the dramatic reveal effect without exposing the concrete. Plane changes in several panels provide transitions from the buff panels to projected thin-brick facing.

The panels aided the project's fast-track schedule because components could be fabricated off-site while progress on other activities continued on-site. The building's enclosure coincided with the end of the construction season, bringing the project in on a schedule that could not have been met using other materials.

JUDGES' COMMENTS

"This project was very successful with its composition. It strongly distinguishes between the procedural platform at the base clad in architectural precast concrete that combines a limestone and brick aesthetic and the glass podium .... The precast concrete does a wonderful job of anchoring the project to the site, while the patient care tower floats above. Another successful aspect is the use of landscape plazas and public green spaces, which are enhanced by the thin-brick panels to create a nice pedestrian scale for these spaces."

Photo courtesy of HDR Architecture, Inc.; © 2010 Ari Burling

Best Healthcare Facility, Cowinner
St. Joseph Regional Medical Center
Mishawaka, Ind.

Owner St. Joseph Regional Medical Center, South Bend, Ind.

Architect/Engineer HOK, St. Louis, Mo. (www.hok.com)

Contractor Mortenson/Tonn & Blank, Elk Grove, Ill.

Precaster Gate Precast Co., Winchester, Ky. (www.gateprecast.com)

Precast Specialty Engineer Gate Precast Co., Lexington, Ky.

Project Size 663,000 ft^2 (61,600 m^2)

Project Cost $355 million

Photo by Paūl Rivera, archphoto 2009

The exterior design for the St. Joseph Regional Medical Center, a 254-bed replacement community hospital in Mishawaka, Ind., was designed to integrate the building seamlessly into the local community. To achieve this, architects combined architectural precast concrete panels cast to simulate native limestone with panels embedded with a thin-brick veneer.

Warm, buff-colored precast concrete panels with a sandblasted finish define the three-story diagnostic and treatment spaces that form the base of the structure. The five stories devoted to intensive-care and patient rooms are clad with red thin-brick panels. The brick was a last-minute decision by the client that was incorporated smoothly into the design process. Horizontal bands matching the buff precast concrete panels unify the tower and base. Unique windows with extended top lights bring natural light into the patient rooms. A five-story precast concrete cross, with a white glazed ceramic inset, is integrated into the stair tower.

The insulated panels eliminate thermal breaks at corners and optimize the building's thermal characteristics. Plastic sheathing extends into the panel joints with two lines of caulk, creating a complete water-vapor barrier.

Earthquake-design requirements also created challenges in which the precast concrete panels provided help. The exterior brick-inlay architectural precast concrete skin was designed to allow 2 in. (50 mm) of story drift to meet seismic design requirements. This was accomplished more easily with the panelized design, which spanned from floor to floor and column to column. Each panel was independent from adjacent panels in every direction, allowing sufficient movement if needed.

The panels also reduced enclosure time over hand-set, bed-depth brick, which sped up the schedule while reducing costs.

JUDGES' COMMENTS

"A community hospital has to have a strong identity. This project achieved that goal with a strong entrance component, which created a highly visible entry to direct visitors as they approach. The precast concrete was integrated well, with a lot of nice detailing and use of different cladding materials to break down the large massing. This design was quite successful at making people feel welcome and not intimidated as they come to the hospital."

Best Multifamily Building
The Carlyle (The Century Wilshire Condominiums)
Los Angeles, Calif.

Owner El Ad Group, New York, N.Y.

Architect KMD, San Francisco, Calif. (www.kmdarchitects.com)

Executive Architect Harley Ellis Devereaux, Los Angeles, Calif.

Engineer Englekirk Partners, Los Angeles, Calif.

Contractor Swinerton Builders, Los Angeles, Calif.

Precaster Clark Pacific, Fontana, Calif. (www.clarkpacific.com)

Project Size 300,000 ft^2 (28,000 m^2)

Project Cost $90 million

© Paul Turang

Precast concrete architectural panels played a key role in achieving the dramatic aesthetic design sought for The Carlyle (Century Wilshire Condominiums), a 24-story, luxury high-rise condominium project in Los Angeles, Calif. Complicating the production of the required wall and spandrel panels, as well as column covers, was that each floor contains 48 corners, creating a highly vertically articulated structure.

With a kinetic, piston-like twin-tower design, the building features a boomerang floor-plan configuration that captures streetscape views to the east and west with outstretched arms. The 65 ft (20 m) front setback provides opportunities for passersby to inspect the changing visage of the building's architectural image as they move along the 200 ft (61 m) boulevard frontage.

The design harks back to classic tripartite architectural systems, with a base, shaft, and capital. The base consists of limestone- and granite-clad precast concrete panels with some unique joinery used to create overlapping stones, epoxied cornerstones, and 1 in. (25 mm) of recessed, exposed precast concrete backup on the horizontal stone joints with a smooth finish.

The shaft portion features 23 stories of residential units, 4 per floor, clad with 5-in.- (130 mm) thick architectural precast concrete wall and spandrel panels. Reveal patterns predominantly in a 2 ft × 2 ft (0.6 m × 0.6 m) size with random light- to heavy sandblast patterns were used to simulate the limestone on the base. The precaster masked off different portions of each panel in the yard prior to finishing them to create some deeper sandblasted finish, creating more variety.

In all, 762 panels were used, with 80% of them consisting of corner column covers. Due to their varied shapes and sizes, as well as the consistent high-quality finish desired, the panels required more than 1200 castings. The 2 ft (0.6 m) reveals and metal accents emphasize the classical architectural motifs while providing a contemporary appearance.

JUDGES' COMMENTS

"This project provided an excellent marriage between the precast concrete and the other materials, creating a lot of detail and good articulation both at the crown and at the pedestrian level. The precast concrete showed its capability for creating a stone appearance on a smaller budget. It provided a nice solution to enhancing value while also ensuring resistance to wind that is necessary for a taller structure. It also provided a good speed of construction, which minimized speed to market, which developers always are interested in accomplishing."

Best Hotel
Conjunto Paragon
Santa Fe, Mexico

Owner Condominio Paragon, Santa Fe, Mexico

Architect IDEA Asociados de México S.A. de C.V., Alvaro Obregon, DF, Mexico (www.ideasociados.com)

Precast Concrete Specialty Architect PRETECSA, Atizapán de Zaragoza, Mexico

Engineer DYS S.A., Col. Del Valle, Mexico

Contractor DEZ Construcciones, S.C., Miguel Hidalgo, Mexico

Precaster PRETECSA, Atizapán de Zaragoza, Mexico (www.pretecsa.com)

Project Size 414,400 ft^2 (38,500 m^2)

Project Cost $35 million

PRETECSA Archive

This high-rise Conjunto Paragon hotel in Santa Fe, DF, Mexico, boasts a winding, S-shaped design that created challenges in fabricating the architectural precast concrete wall panels with which it was clad. Precisely fabrication of the panels was the key to defining the unique shapes needed. Complicated geometry, curved panels, intricate medallions, cubic protruding shapes, and balconies called for high-quality manufacturing.

The 29-story building was sited on the highest ground in the recently developed area, making it a prominent landmark. Its massive size was slimmed visually with the undulating design, which blends the precast concrete panels with large windows that give expansive views of the landscape.

The panels had to be vertically aligned with the façade's harmonious curves while providing easy fabrication and installation of curved precast concrete elements. The panel shapes were optimized using three-dimensional modeling. A flexible-form casting system significantly reduced the number of molds needed, requiring only a few turns of nuts and bolts to adjust them to the next needed radius.

The panels were erected in a horizontal sequence, which led erectors to maintain close spacing between panels at an early stage of the project. This format released large sections of the façade for the placement of glass and protected crews working on interior finishes as each portion was completed.

The early close-in also allowed owners to offer the space to hotel chains before the interiors were finished. This, in turn, allowed the selected hotels to adapt interiors to their specific needs as each was constructed.

Wind, site restraints, project height, the winding design, the protruding windows at the top floors, and the construction schedule all created challenges that could have only been met with the precast concrete architectural panels.

JUDGES' COMMENTS

"This hotel jumped out at all the jurors and spoke to us as being well thought out. There were a number of innovative elements. These included the curved panels cladding the complicated S shape and the repetitive recesses that added an interesting detail to the curve's simplicity. The precast concrete also provided a durable material that projects a strong, fireproof image, one that speaks to both goals of solidity and comfort. The patterning was well detailed and finely handled. It's a beautiful application of precast."

Best Retirement/Assisted Living Center
Résidence Le Saint-Jude
Alma, QC, Canada

Owner BPDL, Alma, QC, Canada

Architect EPA Èric Painchaud Architecte, Chicoutimi, QC, Canada (www.epaarchitecte.com)

Engineer Gemel Experts Conseils, Alma, QC, Canada

Contractor BPDL, Alma, QC, Canada

Precaster Bétons Préfabriqués du Lac, Alma, QC, Canada (www.bpdl.com)

Precast Concrete Specialty Engineer Axys Consultants, Ste-Marie de Beauce, QC, Canada

Project Size 115,200 ft^2 (10,700 m^2)

Project Cost $15 million (Canadian)

Photo courtesy of èric Painchaud, architecte

An all–precast concrete structural system, along with architectural precast concrete panels in varying shapes, finishes, and colors, created a dynamic exterior appearance for the Résidence Le Saint-Jude retirement facility in Alma, QC, Canada. Designers chose total–precast concrete construction for its aesthetic possibilities; durability; resistance to fire, earthquakes, and high winds; and its speed of erection.

The structural frame for the project, a six-story residential center with 126 units, consists of precast concrete columns, beams, floor slabs, insulated wall panels, stairs, and balconies. The precast concrete frame created large open spaces while maintaining excellent sound insulation between floors. It also sped construction; electrical and plumbing work began as each section of the frame was completed. Precast concrete stairs also allowed quick access between floors, ensuring a clean and safe working area.

The exterior wall design juxtaposes a red hammered finish on balconies with a sandblasted beige finish at the apartment levels. At the ground floor, a mosaic integrates cast stone in large sections of the precast concrete walls with false joints and several abrasive treatments. In the corridors, the panels were given a slight sandblast finish, reducing maintenance requirements.

The precast concrete walls also are part of a seismic- and wind-forces recovery system that was spread across several structural elements. This system reduced the number of connections between panels, which enhanced construction speed.

The panels were transported to the site using special trailers, which allowed all windows and other glass areas to be installed at the precaster's plant in advance. This saved time and money by reducing the number of components that had to be installed on-site. The panels' textures and shapes were highlighted further after erection with a special exterior lighting system.

JUDGES' COMMENTS

"The jury liked this retirement home because it didn't look like a retirement home, thanks in part to the use of precast concrete. It provides a strong image while also retaining a sense of home that is important. It speaks to the versatility of precast that it could be so flexible with curved spandrel panels that could be rusticated to stand out so well. This project speaks to the beauty of precast concrete in its ability to be cost effective while providing design flexibility beyond what most materials can do."

Quality Assurance and Certification – A Design for a Successful Project!

Certification is more than a checklist. Programs should be closely tied to an industry's "Body of Knowledge"

— By Brian Miller, PE, LEED AP, and Dean Frank, PE, LEED Green Assoc.

A tremendous amount of work goes into designing a project to ensure that it will meet its program goals, construction timelines, budgets, and be constructed and used safely. To accomplish this is no easy task when you consider that an average project has dozens, if not hundreds of companies involved, hundreds, if not thousands of people, and usually thousands of materials, parts or components from the foundation to the light bulbs. All of this must be coordinated, manufactured and constructed to meet specifications and stakeholder expectations.

The success of a project is measured in many ways, often in terms of budgets, quality, and schedules. But what about safety? Society relies on professionals to design and build structures that are safe, not only during construction, but throughout their service lives and even during deconstruction. Therefore, having safe designs is only the beginning. The final structures must be built and perform as designed and specified–otherwise safety, along with the likelihood of a project's success, can be compromised.

So how is this accomplished when the design team is relatively small compared to the task, or in some cases just one person? The answer is quality assurance. Quality assurance is an ongoing system of knowledge, programs, activities, people, inspections, tests, documentation, and assessment, with the sole goal of making sure structures meet their intended design and specifications. Quality assurance is not only linked to the common expectations (i.e. aesthetics, durability, and performance), but also applies to safety. If quality is overlooked, then safety can be compromised.

Quality control, a term sometimes confused with quality assurance, refers to the daily tasks and routine actions that help ensure the quality according to the requirements of the quality assurance system. For example, a good quality assurance system may require 28-day compressive strength tests on concrete to help ensure that each batch meets the designed strength requirements. The act of testing cylinders is part of the quality control process. The testing regimen, specifications, inspection frequency, minimum strength requirements, etc. are part of the quality assurance system.

So how does Certification fit in? Certification is a process to check the quality assurance system. It helps ensure the essential components of the quality assurance system are present and functioning properly, resulting in the highest probability of meeting specifications and building a successful project. Therefore, certification is a vital component of a quality assurance system, but does not itself constitute a quality assurance system.

Selecting the right certification program

A proliferation of certification options has caused some confusion in the marketplace. This has led some specifiers to believe all programs calling themselves 'certification' offer similar benefits and are interchangeable. Unfortunately, this is simply not the case.

The most effective certification programs are those that are part of a comprehensive quality system. These are the programs created and managed by industry-specific technical institutes, such as the Precast/Prestressed Concrete Institute (PCI), the American Institute for Steel Construction (AISC), and the American Concrete Institute (ACI). Institute-based certification programs are part of an integrated knowledge development and continuous improvement process connecting directly with the industry's body of knowledge. This is critical, since it is this knowledge that everything related to a specific industry is based on. (For more on this topic, see "Body of Knowledge–The Foundation of Certification," page 46.)

To highlight this, imagine you are reviewing a quality assurance system for an elevator manufacturer. Sure,

– Brian Miller, PE, LEED AP is managing director of business development at the Chicago-based Precast/Prestressed Concrete Institute (PCI). He has over 23 years of experience in the precast concrete, concrete materials and construction industries. Miller may be contacted via email at bmiller@pci.org

– Dean Frank, PE, LEED Green Assoc. is director of quality programs for PCI. He is actively involved with construction codes and standards bodies and has specialized in engineering and quality assurance for the concrete and precast concrete industries for more than 15 years. Frank can be contacted via email at dfrank@pci.org.

we know the basics: there are codes that define the number of required elevators, proper sizing, as well as specifications about their speed of operation and safety features, among other things. However, are we knowledgeable enough to know what an appropriate quality assurance system for an elevator manufacturer should consist of? It is not likely. Who better to define these important elements than the technical institute for the elevator industry? They are plugged into the code development process. They develop, maintain, and disseminate the body of knowledge for that industry, and are best positioned to provide certification programs that help ensure that an elevator manufacturer's quality assurance system is complete and functioning correctly. This example can be applied to nearly any industry.

Certification programs established and monitored by industry-specific technical institutes provide architects, owners and all project stakeholders with the highest degree of quality assurance. Technical institutes are uniquely qualified to develop, implement, and maintain certification programs. Furthermore, companies going through the rigorous and ongoing procedures to become certified demonstrate their commitment to the quality and safety.

Essential elements of a quality system

Quality systems should contain essential elements that are offered by industry specific technical institutes. In 2009 the American Association of State and Highway Transportation Officials (AASHTO) subcommittee on materials and bridges/transportation structures resolved that certification should be provided by technical institutes. Afterward, PCI joined with the AISC to produce a white paper to help designers better understand what it takes to develop and maintain a certification program.

The white paper identifies 12 characteristics essential to any organization offering construction-industry certification. Typically, these are found within the national not-for-profit technical institutes established to provide a consensus-driven forum for the development and continuous refinement of engineering, design and quality standards, and related certification programs. The elements are:

Courtesy of Getty Images/Stockbyte

PCI's Plant Quality Personnel Certification Program provides instruction and evaluation for three levels of trained and certified quality control personnel.

Facts about certification

This section focuses on certification for fabricators of pre-manufactured components such as precast concrete.

Cost

Certification does not really increase the pre-manufactured component costs. Most of the cost typically associated with subscribing to a certification program represents the cost of doing the job right. If a fabricator is not executing all necessary steps required to be certified, one may ask, why not? What are the consequences to quality and safety? Or, what is the increased risk assumed?

The other certification cost involves administrating audits by third-party entities to examine evidence that the fabricator is following the required procedures and processes. This is already incorporated into ongoing certification programs. The other option is to require special inspections for a project, typically increasing the owner's project costs.

Common standard

Specifying products from certified fabricators ensures a uniform yardstick of performance is being equally applied to all bidders. This reduces the temptation to cut corners, often in ways not readily apparent.

Reliable project partner

Certified fabricators have made significant investments in plants, procedures, and people to meet stringent certification standards. They have also developed a habit of measuring and achieving quality, and a documented history of consistent production to meet specifications. As noted in the article, this cannot be turned on or off for a given project, but must be part of the organization's culture.

As-designed becomes as-built

A designer's vision and reputation for quality depend heavily on the fabricator and installer's capabilities. Certification ensures the finished project meets the designer's expectations and requires less supervision and field inspection, saving time and money.

It is easy to understand certification programs provide many benefits. However, which certification program does one rely on to provide the highest probability of success? What makes a certification program work? The answers to these questions are important to understand.

How to Specify PCI Certification

To ensure accredited certification is used on each project, the Precast/Prestressed Concrete Institute (PCI) recommends specifying architects reference the following.

Manufacturer qualifications

The specifying process should begin with a list of required precast concrete products, from which the appropriate product group and category for each product can be determined based on the product's use, the reinforcement method, and special surface finishes. PCI recommends manufacturer qualifications according to the following specification:

The precast concrete manufacturing plant shall be certified under the PCI Certified Plant Program. The manufacturer shall be certified at the time of bidding. Certification shall be in the following product group(s) and category(ies):

[Choose one or more of the following, as applicable]

GROUP A: ARCHITECTURAL PRODUCTS
AT–Architectural Trim Units
A1–Architectural Precast Products

GROUP B OR BA: BRIDGE PRODUCTS
B1 or B1A–Precast Bridge Products (No Prestressed Reinforcement)
B2 or B2A–Prestressed Miscellaneous Bridge Products (Non-superstructure)
B3 or B3A–Prestressed Straight-Strand Bridge Beams (Superstructure)
B4 or B4A–Prestressed Deflected-Strand Bridge Beams (Superstructure)
[Group BA products require an architectural finish.]

GROUP C OR CA: COMMERCIAL (STRUCTURAL) PRODUCTS
C1 or C1A–Precast Concrete Products (No Prestressed Reinforcement)
C2 or C2A–Prestressed Hollow-Core and Repetitive Products
C3 or C3A–Prestressed Straight-Strand Structural Members
C4 or C4A–Prestressed Deflected-Strand Structural Members
[Group CA products require an architectural finish.]

GROUP G: GLASS-FIBER-REINFORCED CONCRETE PRODUCTS (GFRC)
In the specifications, list each precast concrete product and each required group and category included in the project's scope.

Personnel qualification guide specification

PCI's Plant Quality Personnel Certification Program provides instruction and evaluation for three levels of trained and certified quality-control personnel. The project specifications should require trained and certified quality-control personnel in the manufacturing plant. PCI recommends that the manufacturer employ personnel according to the following personnel qualifications specification:

The manufacturer shall employ a minimum of one person, regularly present in the plant, who is certified by PCI for Plant Quality Personnel, Level II.

Note: All PCI-certified plants are required to employ at least one PCI-certified individual.

Erection qualification

In addition to basic fabrication and manufacturing standards, the precast concrete industry offers certification for the erection of its components. This additional standard provides assurance the high-quality precast concrete components are erected to the exacting standards expected by the owners, developers, architects, contractors, and the precast industry itself. An erector may qualify in one of two structural classifications and/or an architectural classification, as follows:

CATEGORY S1
(Simple structural systems)
This includes horizontal decking members (such as hollow-core slabs on masonry walls), and single-lift wall panels attached to a structure.

CATEGORY S2
(Complex structural systems)
This includes everything contained in S1 as well as total–precast concrete construction, multi-product structures (those that combine vertical and horizontal members), and single- or multi-story load-bearing members, including those with architectural finishes.

CATEGORY A
(Architectural systems)
This includes non-load-bearing cladding and GFRC products, which may be attached to a supporting structure.

PCI recommends manufacturer qualifications according to the following specification:

Erector Qualification: Prior to beginning any work at the jobsite, the erecting organization, including all crews erecting precast concrete, shall be certified in category[ies] [A, S1, and/or S2] under the Precast/Prestressed Concrete Institute (PCI) Erector Certification Program.

Copyright 2010 Paul Grigonis and PCI

PCI's certified auditors compare products against project specifications and minimum requirements as spelled out in the institute's manuals.

Industry standing

Technical institutes serve as the principal body of knowledge within their industries. They facilitate exchanging and encouraging new ideas and test those concepts across the full spectrum of stakeholders. Their programs are based on decades of experience. They can also join together to assess noncompetitive issues aiding their industries, thanks to the all-encompassing scope of their membership and responsibilities.

Clearly stated purpose

Certification programs run by not-for-profit technical institutes state their purpose and foundation transparently. They ensure no hidden agenda in their direction, and no individual person or company stands to profit from their programs.

Broad professional involvement

A technical institute's membership and committee participation reflect a diverse mix of industry professionals—including engineers, manufacturers, and academicians. In contrast, a trade association is generally dominated by a single interest. An institute's diversity of input ensures every perspective is considered and best practices are identified. Documents and other knowledge products created by the organization are subject to review by committees representing all interested parties.

Governance and consensus

Technical institutes are governed by boards with elected officers and members having no ownership interest. They have formal, consistently applied procedures for making decisions and achieving consensus. This formalized process allows a technical institute to create and apply a comprehensive quality system in a fair and balanced manner that reflects a true consensus of the industry and its professions.

Research

Technical institutes base their programs on a body of knowledge that includes formal and informal research activities addressing current industry challenges, emerging technologies, and innovative practices. These activities are ongoing, and new and improved knowledge is directly applied to the institute's quality programs—in many cases, well before being incorporated into published codes and standards.

Institutes also monitor and disseminate results from the global independent research community, keeping the industry up-to-date on all types of data. Institutes' research credibility is evidenced by their ability to attract funding and collaborative assistance from outside sources, including corporations, universities, and associations. These vetted efforts further expand the available knowledge base and improve the effectiveness of the certification and quality programs.

Validation

Certification programs developed by technical institutes provide a rigorous review process that includes oversight committees and review panels of experts and stakeholders. Each element is examined and documented to ensure it helps meet the goal of achieving high quality standards.

Dissemination

Technical institutes have access to a wide range of communication media that can immediately alert the industry to concerns, best practices, regulatory issues, and technical matters. They also offer educational programs with qualified instructors to spread new information and explain new developments.

Certification of personnel

A comprehensive quality system must validate the competence of the personnel involved with quality control and other key activities. Quality is not an end point, but a continuous examination of best practices that continue to develop and improve quality performance consistently over time. Technical institutes ensure both fabricator personnel and auditors have the capabilities to review project requirements, audit records, interview personnel, and observe practices and equipment to ensure procedures reinforce quality goals.

Certification of fabrication process

The primary focus of a manufacturing certification program is to ensure fabrication of high-quality components meet specifications on a consistent basis. Technical institutes base their audits on their own promulgated standards, procedures, and research, creating a foundation for auditors and fabricators to understand the reasoning behind requirements.

Independent audits

Credible certification programs require periodic on-site audits by independent, technically qualified, and professionally accredited personnel who have no financial or employment interest in the institute or the audited fabricators. Auditor-qualification programs should verify the quality and effectiveness of the individual auditors themselves and include periodic training to remain current with evolving quality standards.

Feedback and recourse

Technical institutes can take advantage of their various communication media—including publications, technical conferences, educational programs, and auditor feedback—to gather and immediately apply enhancements to the audit process. A credible certification program must include a formal procedure establishing consistent rules under which fabricators can dispute and/or address identified nonconformance. The goal is to raise the bar on quality to achieve a consistent, continuous level and ensure fabricators are accountable for their quality.

Continuing commitment

A vast array of stakeholders provide the foundation for technical institutes, which have provided long-term service to their industries and are supported through various funding sources. This history provides a stable basis for certification programs and ensures they will remain in place as consistent, continuously improving systems for assessing quality processes.

Government agencies endorse institute certification

The Federal Office of Management and Budget (OMB) stated that government agencies are encouraged to reference nonprofit, consensus-based standards and participate with these institutes, rather than create their own requirements. Programs lacking the foundations of strong research, the organization of technical committees to gather consensus, or the ongoing commitment to a continuous-improvement process will fail to meet the standard development requirements of the American National Standards Institute (ANSI).

Quality and safety are a commitment

Quality and safety are a mindset and commitment, succeeding only when a system of plans, procedures, and events are in alignment. They are part of an integrated process that cannot be turned on or off for a given project, but must be an ongoing part of an operation, and also part of a company's culture. Therefore, it is difficult to raise your standards simply for one project.

Essentials of a quality system

Certification is more than just a checklist. It is part of an integrated, comprehensive, continuously improving quality system specific to the products or systems being addressed and directly linked to a substantial body of knowledge. Only a technical institute can provide all the essential components for a comprehensive quality system intimately connected to the evolving body of knowledge for the industry it serves.

Industry stakeholders and project decision-makers must recognize these distinctions and insist they take advantage of the highest levels of quality assurance and quality control available to them. With their vision and support, technical institutes can build on their strong base and provide the market with consistent, continuously improving programs that ensure best practices are used throughout the industry. Such systems are the only way to ensure the highest levels of safety, quality, and the ultimate successful project. ■

Body of Knowledge–The Foundation of Certification

The Body of Knowledge (BOK) refers to the collective knowledge of an industry that is relied upon to design and build with a specific material or system. It is from this BOK that building codes, design guides, education programs, certification, and everything else relied upon is derived.

Several key elements are integrated and required to develop and maintain a BOK. Some of these include industry experts and stakeholders who must be involved via multiple channels, such as committees of the technical institute and industry organizations. Industry organizations include codes and standards organizations, research and higher learning facilities, and government organizations. Additional elements are the research programs used to test and develop concepts, methodologies, or address concerns, all of which feed into the BOK, and the continuous feedback loop created from the end users and the inspection process that also feeds back.

As one can imagine, given the magnitude and complexity, it is impractical, inefficient, and even dangerous to have more than one BOK for a specific industry. Adopting certification programs outside an industry's nationally recognized technical institute effectively fragments the industry's quality assurance machinery and isolates groups of fabricators from immediate access to the industry's official, continuously evolving body of knowledge. More than that, new certification programs may create confusion by establishing parallel but inconsistent procedures, references, and benchmarks. An industry must be attuned to one national standard.

Fortunately, in the construction industry, technical institutes have clearly defined domains of expertise. While there may be many trade associations, there is typically only one technical institute for a specific industry. Quite often, technical institutes collaborate to ensure the quality and safety of the built environment. The white paper created by PCI and AISC is an example of institutes placing quality and safety above all else.

AIA Learning Units

This program is registered with the AIA/CES for continuing professional education. As such, it does not include content that may be deemed or construed to be an approval or endorsement by the AIA of any material of construction or any method or manner of handling, using, distributing, or dealing in any material or product. Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.

The Precast/Prestressed Concrete Institute (PCI) is a Registered Provider with the American Institute of Architects Continuing Education Systems. Credit earned on completion of this program will be reported to CES Records for AIA members. Certificates of Completion for non-AIA members are available on request.

Instructions

Review the learning objectives below.

Read the AIA Learning Units article.

Answer the 11 questions at the end of the article and submit to PCI. Submittal instructions are provided on the Learning Units form. You will need to answer at least 80% of the questions correctly to receive the 1.0 HSW Learning Units associated with this educational program. You will be notified when your Learning Units are submitted to AIA.

Learning Objectives

After reading this article, readers will be able to:

1. Define Quality Assurance

2. Describe the essential elements of a quality assurance system

3. After reading this article, readers will be able to explain the differences between certification offered by Institutes and other industry organizations

4. Describe how a good QA program impacts design and safety

Ascent 2011 – Quality Assurance

Name (please print): ____________________

Company Name: ____________________

Address: ____________________

City: ____________________ **State:** __________ **Zip:** __________

Phone Number: __________ **Email Address:** ____________________

Title: ____________________

Background (circle one): Architect – Engineer – Business – Marketing/Sales – Finance – Other

1. Quality Assurance
    a. is an ongoing system of knowledge, programs, activities, people, inspections, tests, documentation, and assessment
    b. is focused on making sure structures meet their intended design and specifications
    c. is directly linked to safety
    d. provides the highest probability of having a successful project
    e. All of the above

2. Quality Control is
    a. the same as Quality Assurance
    b. refers to the daily tasks and routine actions that help ensure quality according to the requirements of the quality assurance system
    c. is an ongoing system of knowledge, programs, activities, people, inspections, tests, documentation, and assessment
    d. can serve as a certification program on its own

3. Quality Assurance should be a part of a company's mindset and culture.
    a. True
    b. False

4. Certification is
    a. is part of quality control
    b. is a way of checking that the quality assurance system is complete and working properly
    c. is sufficient to serve as a quality assurance system by itself

5. The Body of Knowledge refers to the
    a. any knowledge in an industry and does NOT need to be vetted
    b. standard specifications of an industry
    c. collective knowledge of an industry that is relied upon to design and build with a specific material or system
    d. amount of knowledge you personally have

6. Technical Institutes are uniquely qualified to develop, implement and maintain certification programs because
    a. they develop, maintain and disseminate a specific industry's Body of Knowledge
    b. they are dominated by a single stakeholder interest
    c. they are integrated into the codes and standards organizations
    d. only a and c
    e. only b and c

7. Which of the following are benefits of requiring institute-based certification?
    a. a uniform yardstick of performance is being equally applied to all bidders
    b. costs typically do not increase since most of the costs are related to what it takes to do the job right while providing a high level of quality assurance
    c. certified producers have demonstrated a commitment to quality and have made it part of their culture
    d. all of the above
    e. a and c only

8. All Certification programs are essentially equal as long as they use the same checklist
    a. True
    b. False

9. Why is it important to have broad professional involvement in a quality system?
    a. this ensures every perspective is considered and best practices are identified fairly for all stakeholders
    b. it keeps people employed
    c. it allows for one stakeholder group to dominate the outcome

10. Which of the following are NOT part of the 12 essential elements for a quality system?
    a. Broad professional involvement
    b. Independent audits
    c. Validation
    d. Feedback and recourse
    e. None of the above

11. Many government agencies endorse certification by technical institutes
    a. True
    b. False

To receive credit, please submit completed forms to:
Attn: Education Dept. - Alex Morales, Fax (312) 361-8079, Email amorales@pci.org


PCI
eLearning

PCI Continuing Education

PCI is a registered continuing education provider with the American Institute of Architects (AIA), the National Council of Examiners of Engineers and Surveyors (NCEES), and the U.S. Green Building Council (USGBC). PCI's educational offerings include a variety of programs to fit your schedule and preferred learning environment, such as webinars, seminars, lunch-and-learns, and online education. To learn more, visit www.pci.org/education.

Distance Learning Opportunities

Webinars

PCI webinars are presented live each month by industry experts on a variety of topics from design and construction to sustainability and more. All webinars are FREE, one hour long, and scheduled to start at noon in each time zone in the contiguous United States. Webinars provide an inexpensive way to stay up to date on new materials, products, concepts, and more while earning continuing education credits. Visit www.pci.org/webinars for the full webinar schedule and registration information.

Upcoming Webinars:

- **Sustainability through Durability, Adaptability, and Deconstructability**
  November 15 and 17, 2011

PCI eLearning Center

The PCI eLearning Center is the first education management system dedicated to the precast concrete structures industry. This free 24-hour online resource provides an opportunity for architects and engineers to earn continuing education credits on demand. Each course includes a webinar presentation recording, reference materials, and a quiz. Visit this new resource at www.pci.org/elearning.

In-Person Learning Opportunities

Seminars

PCI and its regional affiliates offer seminars all over the United States on a variety of topics. Visit www.pci.org/education for up-to-date seminar listings, additional information, and registration.

Upcoming Seminars:

- **Quality Control School**
  Level I/II
  November 16-19, 2011, Nashville, Tenn.
  January 23-25, 2012, Las Vegas, Nev.
  Level III
  November 16-19, 2011, Nashville, Tenn.
  CFA/IES
  November 16-19, 2011, Nashville, Tenn.
  January 23-25, 2012, Las Vegas, Nev.

Lunch-and-Learns

PCI's lunch-and-learn/box-lunch programs are a convenient way for architects, engineers, and design professionals to receive continuing education credit without leaving the office. Industry experts visit your location; provide lunch; and present on topics such as sustainability, institutional construction, parking structures, aesthetics, blast resistance, the basics of precast, and many more. Visit www.pci.org/education/box_lunches for a list of lunch-and-learn offerings and to submit a program request.

PCI-Certified Plants

(as of September 2011)

When it comes to quality, why take chances? When you need precast or precast, prestressed concrete products, choose a PCI-Certified plant. You'll get confirmed capability—a proven plant with a quality assurance program you can count on.

Whatever your needs, working with a PCI plant that is certified in the product groups it produces will benefit you and your project.

- You'll find easier identification of plants prepared to fulfill special needs.
- You'll deal with established producers—many certified for more than 30 years.
- Using quality products, construction crews can get the job done right the first time, keeping labor costs down.
- Quality products help construction proceed smoothly, expediting project completion.

Guide Specification

To be sure that you are getting the full benefit of the PCI Plant Certification Program, use the following guide specification for your next project:

"Manufacturer Qualification: The precast concrete manufacturing plant shall be certified by the Precast/Prestressed Concrete Institute Plant Certification Program. Manufacturer shall be certified at time of bidding.

Certification shall be in the following product group(s) and category(ies): [Select appropriate groups and categories (AT or A1), (B1,2,3, or 4), (C1,2,3, or 4), (G)]."

Product Groups and Categories

The PCI Plant Certification Program is focused around four groups of products, designated A, B, C, and G. Products in Group A are audited to the standards in MNL–117. Products in Groups B and C are audited to the standards in MNL–116. Products in Group G are audited according to the standards in MNL–130. The standards referenced above are found in the following manuals:

- MNL–116 Manual for Quality Control for Plants and Production of Precast and Prestressed Concrete Products
- MNL–117 Manual for Quality Control for Plants and Production of Architectural Precast Concrete
- MNL–130 Manual for Quality Control for Plants and Production of Glass-Fiber-Reinforced Concrete Products

Within Groups A, B, and C are categories that identify product types and the product capability of the individual plant. The categories reflect similarities in the ways in which the products are produced. In addition, categories in Groups A, B, and C are listed in ascending order. In other words, a plant certified to produce products in Category C4 is automatically certified for products in the preceding Categories C1, C2, and C3. A plant certified to produce products in Category B2 is automatically qualified for Category B1 but not Categories B3 or B4.

Please note for Group B, Category B1: Some precast concrete products such as highway median barriers, box culverts, and three-sided arches are not automatically included in routine plant audits. They may be included at the request of the precaster or if required by the project specifications.

GROUPS

GROUP A – *Architectural Products*

Category AT – Architectural Trim Units
Wet-cast, nonprestressed products with a high standard of finish quality and of relatively small size that can be installed with equipment of limited capacity such as sills, lintels, coping, cornices, quoins, medallions, bollards, benches, planters, and pavers.

Category A1 – Architectural Cladding and Load-Bearing Units
Precast or precast, prestressed concrete building elements such as exterior cladding, load-bearing and non-load-bearing wall panels, spandrels, beams, mullions, columns, column covers, and miscellaneous shapes. This category includes Category AT.

GROUP B – *Bridges*

Category B1 – Precast Concrete Bridge Products
Mild-steel-reinforced precast concrete elements that include some types of bridge beams or slabs, sheet piling, pile caps, retaining-wall elements, parapet walls, sound barriers, and box culverts.

Category B2 – Prestressed Miscellaneous Bridge Products
Any precast, prestressed element excluding super-structure beams. Includes piling, sheet piling, retaining-wall elements, stay-in-place bridge deck panels, and products in Category B1.

Category B3 – Prestressed Straight-Strand Bridge Members
Includes all superstructure elements such as box beams, I-beams, bulb-tees, stemmed members, solid slabs, full-depth bridge deck slabs, and products in Categories B1 and B2.

Category B4 – Prestressed Deflected-Strand Bridge Members
Includes all products covered in Categories B1, B2, and B3.

GROUP BA – *Bridge Products with an Architectural Finish*

These products are the same as those in the categories within Group B, but they are produced with an architectural finish. They will have a form, machine, or special finish. Certification for Group BA production supersedes Group B in the same category. For instance, a plant certified to produce products in Category B2A is also certified to produce products in Categories B1, B1A, and B2 (while it is not certified to produce any products in B3A or B4A).

GROUP C – *Commercial (Structural)*

Category C1 – Precast Concrete Products
Mild-steel-reinforced precast concrete elements including sheet piling, pile caps, piling, retaining-wall elements, floor and roof slabs, joists, stairs, seating members, columns, beams, walls, spandrels, etc.

Category C2 – Prestressed Hollow-Core and Repetitive Products
Standard shapes made in a repetitive process prestressed with straight strands. Included are hollow-core slabs, railroad ties, flat slabs, poles, wall panels, and products in Category C1.

Category C3 – Prestressed Straight-Strand Structural Members
Includes stemmed members, beams, columns, joists, seating members, and products in Categories C1 and C2.

Category C4 – Prestressed Deflected-Strand Structural Members
Includes stemmed members, beams, joists, and products in Categories C1, C2, and C3.

GROUP CA – *Commercial Products with an Architectural Finish*

These products are the same as those in the categories within Group C, but they are produced with an architectural finish. They will have a form, machine, or special finish. Certification for Group CA production supersedes Group C in the same category. For instance, a plant certified to produce products in Category C2A is also certified to produce products in C1, C1A, and C2 (while it is not certified to produce any products in Groups C3 or C4A).

Group G – *Glass-Fiber-Reinforced Concrete (GFRC)*

These products are reinforced with glass fibers that are randomly dispersed throughout the product and are made by spraying a cement/sand slurry onto molds. This produces thin-walled, lightweight cladding panels.

Visit www.pci.org for the most up-to-date listing of PCI-Certified plants.

ALABAMA

Gate Precast Company, Monroeville (251) 575-2803 — A1, C3A
Hanson Pipe and Precast Southeast, Pelham (205) 663-4681 — B4, C4
Standard Concrete Products, Theodore (251) 443-1113 — B4, C2

ARIZONA

Coreslab Structures (ARIZ) Inc., Phoenix (602) 237-3875 — A1, B3, C4A
CXT Concrete Ties, Tucson (520) 644-5703 — C2
TPAC, Phoenix (602) 262-1360 — A1, B4, C4A

ARKANSAS

Coreslab Structures (ARK) Inc., Conway (501) 329-3763 — C4A

CALIFORNIA

Bethlehem Construction, Inc., Shafter (661) 391-9704 — C3A
Clark Pacific, Fontana (909) 823-1433 — A1, C3A, G
Clark Pacific, West Sacramento (916) 371-0305 — A1, C3A
Clark Pacific, Woodland (916) 371-0305 — B3, C3
Con-Fab California Corporation, Lathrop (209) 249-4700 — B4, C4
Con-Fab California Corporation, Shafter (661) 630-7162 — B4
Coreslab Structures (L.A.) Inc., Perris (951) 943-9119 — A1, B4, C4A
CTU Precast, Olivehurst (530) 749-6501 — C2
Hanson Structural Precast, Irwindale (626) 962-8751 — C4
Hanson Structural Precast, San Diego (619) 423-9030 — C4
KIE-CON Inc., Antioch (925) 754-9494 — B4, C3
Mid-State Precast, L.P., Corcoran (559) 992-8180 — A1, C3A
StructureCast, Bakersfield (661) 833-4490 — A1, B3, C3A
Universal Precast Concrete, Inc., Redding (530) 243-6477 — A1
US Concrete Precast Group /dba Pomeroy, Perris (951) 657-6093 — B4, C2A
Walters & Wolf Precast, Fremont (510) 226-5162 — A1, G
Willis Construction Co., Inc., San Juan Bautista (831) 623-2900 — A1, C1, G

COLORADO

EnCon Colorado, Denver (303) 287-4312 — B4, C2
Plum Creek Structures, Littleton (303) 471-1569 — B4, C3A
Rocky Mountain Prestress LLC, Denver (303) 480-1111 — B4, C4
Rocky Mountain Prestress LLC, Denver (303) 480-1111 — A1, AT, C3A
Rocla Concrete Tie, Inc., Denver (303) 296-3505 — C2
Stresscon Corporation, Colorado Springs (719) 390-5041 — A1, B4A, C4A
Stresscon Corporation, Dacono (303) 659-6661 — C4A

CONNECTICUT

Blakeslee Prestress Inc., Branford (203) 481-5306 — A1, B4, C4A
Coreslab Structures (CONN) Inc., Thomaston (860) 283-8281 — A1, B1, C1
Oldcastle Precast, Inc./dba Rotondo Precast, Avon (860) 673-3291 — B2, C1A
United Concrete Products Inc., Yalesville (203) 269-3119 — B3, C2

DELAWARE

Concrete Building Systems of Delaware, Inc., Delmar (302) 846-3645 — B3, C4
Rocla Concrete Tie, Inc., Bear (302) 836-5304 — C2

FLORIDA

CDS Manufacturing Inc., Gretna (850) 875-4651 — B4, C2
Cement Industries, Inc., Fort Myers (239) 332-1440 — B3, C3
Colonial Construction, Concrete, Precast, LLC, Placida (941) 698-4180 — C2
Coreslab Structures (MIAMI) Inc., Medley (305) 823-8950 — A1, C4A
Coreslab Structures (ORLANDO) Inc., Orlando (407) 855-3191 — C2
Coreslab Structures (TAMPA) Inc., Tampa (813) 626-1141 — A1, B3, C3A
Dura-Stress, Inc., Leesburg (800) 342-9239 — A1, B4A, C4A
Finfrock Industries, Inc., Orlando (407) 293-4000 — A1, C4A
Florida Precast Industries, Inc., Sebring (863) 655-1515 — C2
Florida Rock and Sand Prestress Precast Co., Inc., Florida City (305) 247-9611 — B3, C3
Florida Rock and Sand Prestress Precast Co., Inc., Miami (305) 247-9611 — B3
Gate Precast Company, Jacksonville (904) 757-0860 — A1, B4, C3
Gate Precast Company, Kissimmee (407) 847-5285 — A1
Metromont Corporation, Bartow (863) 440-5400 — A1, C3
South Eastern Prestressed Concrete, Inc., West Palm Beach (561) 793-1177 — B3, C3
Stabil Concrete Products, LLC, St. Petersburg (727) 321-6000 — A1
Standard Concrete Products, Inc., Tampa (813) 831-9520 — B4, C3
Stress-Con Industries, Inc., Fort Myers (239) 390-9200 — B3
Structural Prestressed Industries, Medley (305) 556-6699 — C4

GEORGIA

Atlanta Structural Concrete Co., Buchanan (770) 646-1888 — C4A
ConArt Precast, LLC, Cobb (229) 853-5000 — A1, AT, C3
Coreslab Structures (ATLANTA) Inc., Jonesboro (770) 471-1150 — C3A
Gulf Coast Pre-Stress, Inc., Jonesboro (228) 234-7866 — B4
Metromont Corporation, Hiram (770) 943-8688 — A1, C4A
Standard Concrete Products, Inc., Atlanta (404) 792-1600 — B4
Standard Concrete Products, Inc., Savannah (912) 233-8263 — B4, C4
Tindall Corporation, Conley (800) 849-6383 — C2A
Tindall Corporation, Conley (800) 849-6383 — C4A

HAWAII

GPRM Prestress, LLC, Kapolei (808) 682-6000 — A1, B3, C4
GPRM Prestress, LLC, Puunene (808) 682-6000 — C4

IDAHO

Hanson Structural Precast Eagle, Caldwell (208) 454-8116 — A1, B4, C4
Teton Prestress Concrete, LLC., Idaho Falls (208) 523-6410 — B4, C3

ILLINOIS

ATMI Precast, Aurora (630) 896-4679 — A1, C3A
AVAN Precast Concrete Products, Lynwood (708) 757-6200 — A1, C3
County Materials Corporation, Champaign (217) 352-4181 — B3, B3-IL
County Materials Corporation, Salem (618) 548-1190 — A1, B4, B4-IL, C4
Dukane Precast, Inc., Aurora (630) 355-8118 — A1, C3
Illini Concrete Company of Illinois, LLC, Tremont (309) 585-2376 — B3, B3-IL
Illini Precast, LLC, Marseilles (708) 562-7700 — B4, B4-IL, C3
Lombard Architectural Precast Products Co., Alsip (708) 389-1060 — A1
Mid-States Concrete Industries, South Beloit (608) 364-1072 — A1, B3, B3-IL, C3A
Prestress Engineering Corporation, Blackstone (815) 586-4239 — B4, B4-IL, C4
Spancrete of Illinois, Inc., Crystal Lake (815) 459-5580 — C2
St. Louis Prestress, Inc., Glen Carbon (618) 656-8934 — B3, B3-IL, C3
Utility Concrete Products, LLC, Morris (815) 416-1000 — B1A, C1A

INDIANA

ATMI Indy, LLC, Greenfield (317) 891-6280 — A1, C2A
Coreslab Structures (INDIANAPOLIS) Inc., Indianapolis (317) 353-2118 — A1, C4A
Hoosier Precast LLC, Salem (812) 883-4665 — B3, C1A
Precast Specialties, Inc., Monroeville (260) 623-6131 — A1
StresCore, Inc., South Bend (574) 233-1117 — C2

IOWA

Advanced Precast Co., Farley (563) 744-3909 — C1A
Andrews Prestressed Concrete, Inc., Clear Lake (641) 357-5217 — B4, C4
IPC, Inc., Des Moines (515) 243-5118 — B3, C4
IPC, Inc., Iowa Falls (515) 243-5118 — A1, B4, B4-IL, C4A
MPC Enterprises, Inc., Mount Pleasant (319) 986-2226 — A1, C3A

KANSAS

Coreslab Structures (KANSAS) Inc., Kansas City (913) 287-5725 — B4, C4
IPC, Inc., Pleasanton (913) 352-8800 — B3, C3
Prestressed Concrete, Inc., Newton (316) 283-2277 — A1, B4, C4
Stress-Cast, Inc., Assaria (785) 667-3905 — C3A
Waffle-Crete International, Inc., Hays (785) 625-3486 — C3A

KENTUCKY

Bristol Group, Inc., Lexington (859) 233-9050 — C3
de AM - RON Building Systems LLC, Owensboro (270) 684-6226 — B3, C3A
Gate Precast Company, Winchester (859) 744-9481 — A1
Prestress Services Industries LLC, Lexington (260) 724-7117 — B4, B4-IL, C4A
Prestress Services Industries LLC, Lexington (859) 299-0461 — A1, B4, C4A
Prestress Services Industries LLC, Melbourne (859) 441-0068 — B4, C3

LOUISIANA

Boykin Brothers, Inc./Louisiana Concrete Products, Baton Rouge (225) 753-8722 — A1, B4, C3A
F-S Prestress, LLC, Princeton (318) 949-2444 — B4, C3
Fibrebond Corporation, Minden (318) 377-1030 — A1, C1A

MAINE

Oldcastle Precast, Auburn (207) 784-9144 — B2, C1

Visit www.pci.org for the most up-to-date listing of PCI-Certified plants.

MARYLAND

Atlantic Metrocast, Inc., LaPlata (301) 870-3289 ____ B3, C1
Larry E. Knight, Inc., Glyndon (410) 833-7800 ____ C2
Oldcastle Precast Building Systems Div., Edgewood (410) 612-1213 _ A1, C3A

MASSACHUSETTS

Oldcastle Precast, Inc./dba Rotondo Precast, Rehoboth (508) 336-7600 _ B4, C3
Unistress Corporation, Pittsfield (413) 499-1441 ____ A1, B4, C4A
Vynorius Prestress, Inc., Salisbury (978) 462-7765 ____ B3, C2

MICHIGAN

Grand River Infrastructure, Inc., Grand Rapids (616) 534-9645 ____ B4, C1
International Precast Solution, LLC, River Rouge (313) 843-0073 _ A1, B3, C3
Kerkstra Precast Inc., Grandville (800) 434-5830 ____ A1, B3, C3A
Nucon Schokbeton / Stress-Con Industries, Inc.,
Kalamazoo (269) 381-1550 ____ A1, B4, C3A
Stress-Con Industries, Inc., Detroit (313) 873-4711 ____ B3, C3
Stress-Con Industries, Inc., Saginaw (989) 239-2447 ____ B4, C3

MINNESOTA

Crest Precast, Inc., La Crescent (507) 895-8083 ____ B3A
Cretex Concrete Products North, Inc., Elk River (763) 545-7473 ____ B4, C2
Fabcon, Savage (800) 727-4444 ____ A1, B1, C3A
Hanson Structural Precast Midwest, Inc., Maple Grove (763) 425-5555__A1, C4A
Molin Concrete Products Co., Lino Lakes (651) 786-7722 ____ C3A
Wells Concrete Products, Albany (320) 845-2299 ____ A1, C3A
Wells Concrete Products Co., Wells (507) 553-3138 ____ A1, C4A

MISSISSIPPI

F-S Prestress, LLC, Hattiesburg (601) 268-2006 ____ B4, C4
Gulf Coast Pre-Stress, Inc., Pass Christian (228) 452-9486 ____ B4, C4
J.J. Ferguson Prestress-Precast Company, Inc., Greenwood (662) 453-5451__ B4
Jackson Precast, Inc., Jackson (601) 321-8787 ____ A1, C2A
Rotondo Weirich Enterprises, Inc., Yazoo City (215) 256-7940 ____ C1
Tindall Corporation, Moss Point (228) 435-0160 ____ A1, C4A

MISSOURI

Coreslab Structures (MISSOURI) Inc., Marshall (660) 886-3306 __A1, B4, C4A
County Materials Corporation, Bonne Terre (573) 358-2773 ____ B4
Mid America Precast, Inc., Fulton (573) 642-6400 ____ A1, B1, C1
Prestressed Casting Company, Ozark (417) 581-7009 ____ C4
Prestressed Casting Company, Springfield (417) 869-1263 ____ A1, C3A

MONTANA

Missoula Concrete Construction, Missoula (406) 549-9682 ____ A1, B3, C3
Montana Prestressed Concrete, Billings (605) 718-4111 ____ B4, C3

NEBRASKA

Concrete Industries, Inc., Lincoln (402) 434-1800 ____ B4, C4A
Coreslab Structures (OMAHA) Inc., LaPlatte (402) 291-0733 __ A1, B4, C4A
CXT, Inc., Grand Island (308) 382-5400 ____ C2
Enterprise Precast Concrete, Inc., Omaha (402) 895-3848 ____ A1, C2A
Stonco, Inc., Omaha (402) 556-5544 ____ A1

NEW HAMPSHIRE

Newstress Inc., Epsom (603) 736-9348 ____ B3, C3

NEW JERSEY

Boccella Precast LLC, Berlin (856) 767-3861 ____ C2
High Concrete Group LLC, Buena (856) 697-3600 ____ C3
Jersey Precast Corp., Hamilton Township (609) 689-3700 ____ B4, C4
Precast Systems, Inc., Allentown (609) 208-1987 ____ B4, C4

NEW MEXICO

Castillo Prestress, Belen (505) 864-0238 ____ B4, C4
Coreslab Structures (ALBUQUERQUE) Inc.,
Albuquerque (505) 247-3725 ____ A1, B4, C4A
Ferreri Concrete Structures, Inc., Albuquerque (505) 344-8823 ____ A1, C4A

NEW YORK

David Kucera Inc., Gardiner (845) 255-1044 ____ A1, G
Lakelands Concrete Products, Inc., Lima (585) 624-1990 ____ A1, B3A, C3A
Oldcastle Precast Building Systems Div., Selkirk (518) 767-2116 __B3, C3A
The Fort Miller Co., Inc., Greenwich (518) 695-5000 ____ B1, C1
The L.C. Whitford Materials Co., Inc., Wellsville (585) 593-2741 ____ B4, C3

NORTH CAROLINA

Gate Precast Company, Oxford (919) 603-1633 ____ A1, C2
International Precast Inc., Siler City (919) 742-3132 ____ A1, C3A
Metromont Corporation, Charlotte (704) 372-1080 ____ A1, C3A
Prestress of the Carolinas, Charlotte (704) 587-4273 ____ B4, C4
S & G Prestress Company, Leland (910) 397-6255 ____ B4
S & G Prestress Company, Wilmington (910) 763-7702 ____ B4, C3
Utility Precast, Inc., Concord (704) 721-0106 ____ B3A

NORTH DAKOTA

Wells Concrete, Grand Forks (701) 772-6687 ____ C4A

OHIO

DBS Prestress of Ohio, Huber Heights (937) 878-8232 ____ C2
Fabcon LLC, Grove City (614) 875-8601 ____ C3A
High Concrete Group LLC, Springboro (937) 748-2412 ____ A1, C3A
KSA, Sciotoville (740) 776-3238 ____ C2
Mack Industries, Inc., Valley City (330) 483-3111 ____ C2
Prestress Services Industries LLC, Grove City (614) 871-2900 ____ B4, C1
Prestress Services Industries of Ohio, LLC, Mt. Vernon (800) 366-8740 __B4, C3
Prestress Services Industries of Ohio, LLC, Mt. Vernon (740) 393-1121 __B3, C1
Sidley Precast, Thompson (440) 298-3232 ____ A1, C4A

OKLAHOMA

Coreslab Structures (OKLA) Inc. (Plant No.1),
Oklahoma City (405) 632-4944 ____ A1, C4A
Coreslab Structures (OKLA) Inc. (Plant No.2),
Oklahoma City (405) 672-2325 ____ B4, C1
Coreslab Structures (TULSA) Inc., Tulsa (918) 438-0230 ____ B4, C4
Tulsa Dynaspan, Inc., Broken Arrow (918) 258-1549 ____ A1, C3

OREGON

Knife River Corporation, Harrisburg (541) 995-6327 ____ A1, B4, C4
R.B. Johnson Co., McMinnville (503) 472-2430 ____ B4

PENNSYLVANIA

Concrete Safety Systems, LLC, Bethel (717) 933-4107 ____ B1A, C1A
Conewago Precast Building Systems, Hanover (717) 632-7722 ____ A1, C2A
Dutchland, Inc., Gap (717) 442-8282 ____ C3
Fabcon East, LLC, Mahanoy City (570) 773-2480 ____ C3A
High Concrete Group LLC, Denver (717) 336-9300 ____ A1, B3, C3A
J & R Slaw, Inc., Lehighton (610) 852-2020 ____ A1, B4, C3
Newcrete Products, Roaring Spring (814) 224-2121 ____ B4, C4
Nitterhouse Concrete Products, Inc.,
Chambersburg (717) 267-4505 ____ A1, C4A
Northeast Prestressed Products, LLC, Cressona (570) 385-2352 ____ B4, C3
Pittsburgh Flexicore Company, Inc., Donora (724) 258-4450 ____ C2
Say-Core, Inc., Portage (814) 736-8018 ____ C2
Sidley Precast, Youngwood (724) 755-0205 ____ C3
Technopref Industries Inc., Royersford Plant, Royersford (450) 569-8043_ B1, C1
U.S. Concrete Precast Group Mid-Atlantic, Middleburg (570) 837-1774 _A1, C3A
Universal Concrete Products Corporation, Stowe (610) 323-0700 _A1, C3A

SOUTH CAROLINA

Florence Concrete Products, Inc., Sumter (803) 775-4372 ____ B4, C3A
Metromont Corporation, Greenville (864) 295-0295 ____ A1, C4A
Parker Marine Contracting Corporation, Charleston (843) 723-2727 ___ B2
Tekna Corporation, Charleston (843) 853-9118 ____ B4, C2
Tindall Corporation, Fairforest (864) 576-3230 ____ A1, C4A

SOUTH DAKOTA

Gage Brothers Concrete Products Inc., Sioux Falls (605) 336-1180__ A1, B4, C4A

TENNESSEE

Construction Products, Inc. of Tennessee, Jackson (731) 668-7305 _ B4, C4
Gate Precast Company, Ashland City (615) 792-4871 ____ A1, C3A
Metromont Corporation, LaVergne (615) 793-3393 ____ A1, C4A
Mid South Prestress, LLC, Pleasant View (615) 746-6606 ____ C3
Prestress Services Industries of TN, LLC, Memphis (901) 775-9880__ B4, C3
Ross Prestressed Concrete, Inc., Bristol (423) 323-1777 ____ B4, C3
Ross Prestressed Concrete, Inc., Knoxville (865) 524-1485 ____ B4, C4
Sequatchie Concrete Service, Inc., Chattanooga (423) 867-4510 ____ C2

Visit www.pci.org for the most up-to-date listing of PCI-Certified plants.

TEXAS

Coreslab Structures (TEXAS) Inc., Cedar Park (512) 250-0755 ______ **A1, C4A**
CXT, Inc., Hillsboro (254) 580-9100 ______ **B1, C1**
Eagle Precast Corporation, Decatur (940) 626-8020 ______ **A1, C3**
East Texas Precast Co., LTD., Hempstead (936) 857-5077 ______ **C4A**
Enterprise Concrete Products, LLC, Dallas (214) 631-7006 ______ **B3, C3**
Gate Precast Company, Hillsboro (254) 582-7200 ______ **A1**
Gate Precast Company, Pearland (281) 485-3273 ______ **C2**
GFRC Cladding Systems, LLC, Garland (972) 494-9000 ______ **G**
Heldenfels Enterprises, Inc., San Marcos (512) 396-2376 ______ **B4, C4**
Lowe Precast, Inc., Waco (254) 776-9690 ______ **A1, C3A**
Manco Structures, Ltd., Schertz (210) 690-1705 ______ **B4, C4A**
North American Precast Company, San Antonio (210) 509-9100 ______ **A1, C4A**
Rocla Concrete Tie, Inc., Amarillo (806) 383-7071 ______ **C2**
Tindall Corporation, San Antonio (210) 248-2345 ______ **C2A**

UTAH

EnCon Utah, LLC, Tooele (435) 843-4230 ______ **A1, B4, C3A**
Hanson Structural Precast Eagle, Salt Lake City (801) 966-1060 ______ **A1, B4, C4A, G**
Harper Contracting, Salt Lake City (801) 326-1016 ______ **B2, C1**
Owell Precast LLC, Bluffdale (801) 571-5041 ______ **B3A, C3**
The Shockey Precast Group, LLC, Harriman (540) 667-7700 ______ **C3**

VERMONT

Dailey Precast, Shaftsbury (802) 442-4418 ______ **A1, B4A, C3A**
J. P. Carrara & Sons, Inc., Middlebury (802) 388-6363 ______ **A1, B4A, C3A**
S.D. Ireland Companies, South Burlington (802) 658-0201 ______ **A1**

VIRGINIA

Atlantic Metrocast, Inc., Portsmouth (757) 397-2317 ______ **B4, C3**
Bayshore Concrete Products Corporation,
Cape Charles (757) 331-2300 ______ **B4, C4**
Bayshore Concrete Products/Chesapeake, Inc.,
Chesapeake (757) 549-1630 ______ **B4, C3**
Coastal Precast Systems, LLC, Chesapeake (757) 545-5215 ______ **A1, B4, C3**
Metromont Corporation, Richmond (804) 222-8111 ______ **A1, C3A**
Mid-Atlantic Precast LLC, King George (540) 775-2275 ______ **C2**
Rockingham Precast, Inc., Harrisonburg (540) 433-8282 ______ **B4, C3**
Smith-Midland Corporation, Midland (540) 439-3266 ______ **A1, B2, C3**
The Shockey Precast Group, Fredericksburg (540) 898-1221 ______ **A1, C3A**
The Shockey Precast Group, Winchester (540) 667-7700 ______ **A1, C4A**
Tindall Corporation, Petersburg (804) 861-8447 ______ **A1, C4A**

WASHINGTON

Bellingham Marine Industries, Inc., Ferndale (360) 676-2800 ______ **B3, C2**
Bethlehem Construction, Inc., Cashmere (509) 782-1001 ______ **B1, C3A**
Central Pre-Mix Prestress Co., Spokane (509) 533-0267 ______ **A1, B4, C4**
Concrete Technology Corporation, Tacoma (253) 383-3545 ______ **B4, C4**
CXT, Inc., Spokane (509) 921-8716 ______ **B1**
CXT, Inc., Spokane (509) 921-7878 ______ **C2**
EnCon Northwest, LLC, Camas (360) 834-3459 ______ **B1**
EnCon Washington, LLC, Puyallup (253) 846-2774 ______ **B1, C2**
Wilbert Precast, Inc., Yakima (509) 248-1984 ______ **B3, C3**

WEST VIRGINIA

Carr Concrete Corporation, Waverly (304) 464-4441 ______ **B4, C3**
Eastern Vault Company, Inc., Princeton (304) 425-8955 ______ **B3, C3**

WISCONSIN

Advance Cast Stone Co., Inc., Random Lake (920) 994-4381 ______ **A1**
County Materials Corporation, Eau Claire (800) 729-7701 ______ **B4**
County Materials Corporation, Roberts (800) 426-1126 ______ **B4, C3**
International Concrete Products, Inc., Germantown (262) 242-7840 _ **A1, C1**
MidCon Products, Inc., Hortonville (920) 779-4032 ______ **A1, AT, C1**
Spancrete, Inc., Green Bay (920) 494-0274 ______ **B4, C4**
Spancrete, Inc., Valders (920) 775-4121 ______ **A1, B3, C3A**
Stonecast Products, Inc., Germantown (262) 253-6600 ______ **A1, C1**
Wausau Tile Inc., Rothschild (715) 359-3121 ______ **AT**

WYOMING

VAE Nortrak North America, Inc., Cheyenne (509) 220-6837 ______ **C2**

CANADA

ALBERTA

Armtec Limited Partnership, Calgary (403) 248-3171 ______ **A1, B4, C4**

BRITISH COLUMBIAA

Armtec Limited Partnership, Richmond (604) 278-9766 ______ **A1, B4, C3**

MANITOBA

Armtec Limited Partnership, Winnipeg (204) 338-9311 ______ **B4, C3A**

NEW BRUNSWICK

Strescon Limited, Saint John (506) 633-8877 ______ **A1, B4, C4A**

NOVA SCOTIA

Strescon Limited, Beford (902) 494-7400 ______ **A1, B4, C4**

ONTARIO

Artex Systems Inc., Concord (905) 669-1425 ______ **A1**
Global Precast INC, Maple (905) 832-4307 ______ **A1**
Prestressed Systems, Inc., Windsor (519) 737-1216 ______ **B4, C4**

QUEBEC

Betons Prefabriques du Lac Inc., Alma (418) 668-6161 ______ **A1, C3A, G**
Betons Prefabriques du Lac, Inc., Alma (418) 668-6161 ______ **A1, C2**
Betons Prefabriquaes Trans. Canada Inc.,
St. Eugene De Grantham (819) 396-2624 ______ **A1, B4, C3A**
Prefab De Beauce, Sainte-Marie De Beauce (418) 387-7152 ______ **A1, C3**
Schokbeton Quebec, Inc., St. Eustache (450) 473-6831 ______ **A1, B4A, C3**

MEXICO

PRETECSA, S.A. DE C.V., Atizapan De Zaragoza (000) 000-0000 ______ **A1, G**
Willis De Mexico S.A. de C.V., Tecate ______ **A1, C1, G**

Visit www.pci.org for the most up-to-date listing of PCI-Certified plants.

PCI-Qualified & PCI-Certified Erectors

(as of September 2011

When it comes to quality, why take chances? When you need precast or precast, prestressed concrete products, choose a PCI-Qualified/Certified Erector. You'll get confirmed capability with a quality assurance program you can count on.

Whatever your needs, working with an erector who is PCI Qualified/Certified in the structure categories listed will benefit you and your project.

- You'll find easier identification of erectors prepared to fulfill special needs.
- You'll deal with established erectors.
- Using a PCI-Qualified/Certified Erector is the first step toward getting the job done right the first time, thus keeping labor costs down.
- PCI-Qualified/Certified Erectors help construction proceed smoothly, expediting project completion.

Guide Specification

To be sure that you are getting an erector from the PCI Field Certification Program, use the following guide specification for your next project:

"Erector Qualification: The precast concrete erector shall be fully qualified or certified by the Precast/Prestressed Concrete Institute (PCI) prior to the beginning of any work at the jobsite. The precast concrete erector shall be qualified or certified in Structure Category(ies): [Select appropriate groups and categories S1 or S2 and/or A1]."

Erector Classifications

The PCI Field Certification Program is focused around three erector classifications. The standards referenced are found in the following manuals:

MNL–127 Erector's Manual - Standards and Guidelines for the Erection of Precast Concrete Products

MNL–132 Erection Safety Manual for Precast and Prestressed Concrete

GROUPS

Category S1 - Simple Structural Systems

This category includes horizontal decking members (e.g. hollow-core slabs on masonry walls), bridge beams placed on cast-in-place abutments or piers, and single-lift wall panels.

Category S2 - Complex Structural Systems

This category includes everything outlined in Category S1 as well as total-precast, multi-product structures (vertical and horizontal members combined) and single- or multi-story load-bearing members (including those with architectural finishes).

Category A - Architectural Systems

This category includes non-load-bearing cladding and GFRC products, which may be attached to a supporting structure.

Certified erectors are listed in blue.

ARIZONA

Coreslab Structures (ARIZ), Inc., Phoenix (602) 237-3875 **S2, A**
TPAC, Phoenix (602) 262-1360 **S2, A**

ARKANSAS

Coreslab Structures (ARK) Inc., Conway (501) 329-3763 **S2**

CALIFORNIA

Coreslab Structures (L.A.), Inc., Perris (951) 943-9119 **S2, A**
Walters & Wolf Precast, Fremont (510) 226-9800 **A**

COLORADO

Gibbons Erectors, Inc., Englewood (303) 841-0457 **S2, A**
Rocky Mountain Prestress LLC Denver (303) 480-1111 **S2, A**
S. F. Erectors Inc., Elizabeth (303) 646-6411 **S2, A**

CONNECTICUT

Blakeslee Prestress, Inc., Branford (203) 481-5306 **S2**
Jacob Erecting & Construction LLC, Durham (860) 788-2676 **S2, A**

FLORIDA

Concrete Erectors, Inc., Altamonte Springs (407) 862-7100 **S2, A**
Finfrock Industries, Inc., Orlando (407) 293-4000 **S2, A**
Florida Builders Group, Inc., Miami (305) 278-0098 **S2**
Florida Precast Industries, Sebring (863) 655-1515 **S1**
Gate Precast Erection Co., Jacksonville (904) 757-0860 **A**
Gate Precast Erection Co., Kissimmee (407) 847-5285 **A**
James Toffoli Construction Company, Inc., Fort Myers (239) 479-5100 **S2, A**
Pre-Con Construction of Tampa Inc., Tampa (813) 626-2545 **S2, A**
Solar Erectors U. S. Inc., Medley (305) 825-2514 **S2, A**
Specialty Concrete Services, Inc., Altoona (352) 669-8888 **S2, A**
Structural Prestressed Industries, Inc., Medley (305) 556-6699 **S2**
Summit Erectors, Inc., Jacksonville (904) 783-6002 **S2, A**

GEORGIA

Big Red Erectors Inc., Covington (770) 385-2928 **S2, A**
ConArt Precast, LLC, Cobb (229) 853-5000 **S2, A**
Jack Stevens Welding LLP, Murrayville (770) 534-3809 **S2**
Precision Stone Setting Co., Inc., Hiram (770) 439-1068 **S2, A**
Rutledge & Son's, Woodstock (770) 592-0380 **S2**

IDAHO

Precision Precast Erectors, LLC, Worley (208) 660-5223 **S2, A**

ILLINOIS

Area Erectors, Inc., Rockford (815) 562-4000 **S2, A**
Creative Erectors, LLC, Rockford (815) 229-8303 **S2, A**
Mid-States Concrete Industries, South Beloit (800) 236-1072 **S2**
Spancrete of Illinois, Inc., Crystal Lake (815) 459-5580 **S2**

IOWA

Architectural Wall Systems Co., West Des Moines (515) 255-1556 **A**
Cedar Valley Steel, Inc., Cedar Rapids (319) 373-0291 **S2, A**
Topping Out Inc. / dba Northwest Steel Erection, Des Moines (800) 247-5409 **S2**

Visit www.pci.org for the most up-to-date listing of PCI-Certified plants.

KANSAS
Carl Harris Co., Inc., Wichita (316) 267-8700 — **S2, A**
Crossland Construction Company, Inc., Columbus (620) 429-1414 — **S2, A**
Ferco, Inc., Salina — **S1**
Topping Out Inc. / dba Davis Erection Kansas City, Kansas City (800) 613-9547 — **S2**

LOUISIANA
Lafayette Steel Erector, Inc., Lafayette (337) 234-9435 — **S2**

MAINE
American Aerial Services, Inc., Falmouth (207) 797-8987 — **S1**
Cianbro Corporation, Pittsfield (207) 679-2435 — **S2**
Reed & Reed, Inc., Woolwich (207) 443-9747 — **S2, A**

MARYLAND
E & B Erectors, Inc., Pasadena (410) 360-7800 — **S2, A**
E.E. Marr Erectors, Inc., Baltimore (410) 837-1641 — **S2, A**
EDI, LLC, Upper Marlboro (301) 877-0000 — **S2, A**
L.R. Willson & Sons, Inc., Gambrills (410) 987-5414 — **S2, A**
Mid Atlantic Precast Erectors, Inc., Baltimore (410) 837-1641 — **A**
Oldcastle Building Systems Div. / Project Services, Baltimore (518) 767-2116 — **S2, A**

MASSACHUSETTS
Prime Steel Erecting, Inc., North Billerica (978) 671-0111 — **S2, A**

MICHIGAN
Assemblers Precast & Steel Services, Inc., Saline (734) 429-1358 — **S2, A**
Devon Contracting, Inc., Detroit (313) 965-3455 — **S2, A**
G2 Inc., Cedar Springs (616) 696-9581 — **S2, A**
Pioneer Construction Inc., Grand Rapids (616) 247-6966 — **S2**

MINNESOTA
Amerect, Inc., Newport (651) 459-9909 — **A**
Fabcon, Inc., Savage (952) 890-4444 — **S2**
Hanson Structural Precast Midwest, Inc., Maple Grove (763) 425-5555 — **S2, A**
Molin Concrete Products Company, Lino Lakes (651) 786-7722 — **S2, A**
Wells Concrete Products Co., Wells (507) 553-3138 — **S2, A**

MISSISSIPPI
Bracken Construction Company, Inc., Jackson (601) 922-8413 — **S2, A**

MISSOURI
Acme Erectors, Inc., St. Louis (314) 647-1923 — **S2, A**
J. E. Dunn Construction Company, Kansas City (816) 474-8600 — **S2, A**
Prestressed Casting Co., Springfield (417) 869-7350 — **S2, A**

NEBRASKA
Moen Steel Erection, Inc., Omaha (402) 884-0925 — **S2**
Topping Out Inc. / dba Davis Erection Lincoln, Lincoln (800) 881-2931 — **S2**
Topping Out Inc. / dba Davis Erection Omaha, Omaha (800) 279-1201 — **S2, A**

NEW HAMPSHIRE
American Steel & Precast Erectors, Inc., Greenfield (603) 547-6311 — **S2, A**

NEW JERSEY
CRV Precast Construction LLC, Eastampton (800) 352-1523 — **S2, A**
J. L. Erectors, Inc., Blackwood (856) 232-9400 — **S2, A**
JEMCO-Erectors, Inc., Shamong (609) 268-0332 — **S2, A**
Jonasz Precast, Inc., Westville (856) 456-7788 — **S2, A**

NEW MEXICO
Ferreri Concrete Structures, Inc., Albuquerque (505) 344-8823 — **S2**
Structural Services, Inc., Albuquerque (505) 345-0838 — **S2**

NEVADA
Cedco Commerical, LLC, Las Vegas (702) 361-6550 — **A**

NEW YORK
Arben Group LLC, Pleasantville (914) 741-5459 — **S2**
Empire Constructors LLC, Pittsford (585) 586-1510 — **A**
Koehler Masonry, Farmingdale (631) 694-4720 — **S1**
Oldcastle Building Systems Div. / Project Services, Manchester (518) 767-2116 — **S2, A**
Oldcastle Building Systems Div. / Project Services, Selkirk (518) 767-2116 — **S2, A**

NORTH CAROLINA
Buckner Steel Erection Inc., Graham (336) 376-8888 — **S2**
Carolina Precast Erectors, Inc., Taylorsville (828) 635-1721 — **S2, A**

NORTH DAKOTA
PKG Contracting, Inc., Fargo (701) 232-3878 — **S2**
Wells Concrete, Grand Forks (701) 772-6687 — **S2**

OHIO
Ben Hur Constructionn Company, Fairfield (513) 874-9228 — **A**
Precast Services, Inc., Twinsburg (330) 425-2880 — **S2, A**
Sidley Precast Group, Thompson (440) 298-3232 — **S2**
Sofco Erectors, Inc., Cincinnati (513) 771-1600 — **S2, A**

OKLAHOMA
Allied Steel Construction Co., LLC, Oklahoma City (405) 232-7531 — **S2, A**
Bennett Steel, Inc., Sapulpa (918) 260-0773 — **S1**
Coreslab Structures (OKLA), Inc., Oklahoma City (405) 632-4944 — **S2, A**

PENNSYLVANIA
Century Steel Erectors, Kittanning (724) 545-3444 — **S2, A**
Conewago Enterprises, Inc., Hanover (717) 632-7722 — **S2**
High Concrete Group, Denver (717) 336-9300 — **S2, A**
Maccabee Industrial, Inc., Belle Vernon (724) 930-7557 — **S2, A**
Nitterhouse Concrete Products, Inc., Chambersburg (717) 267-4505 — **S2**
Patterson Construction Company, Inc., Monongahela (724) 258-4450 — **S1**

SOUTH CAROLINA
Davis Erecting & Finishing, Inc., Greenville (864) 220-0490 — **S2, A**
Florence Concrete Products Inc., Florence (843) 662-2549 — **S2**
Tindall Corporation, Fairforest (864) 576-3230 — **S2**

TENNESSEE
Hoosier Prestress, Inc., Brentwood (615) 661-5198 — **S2**

TEXAS
Empire Steel Erectors LP, Humble (281) 548-7377 — **A**
Gate Precast Company, Pearland (281) 485-3273 — **S1**
Gulf Coast Precast Erectors, LLC, Hempstead (832) 451-4395 — **S2**
Precast Erectors, Inc., Hurst (817) 684-9080 — **S2, A**

UTAH
Hanson Structural Precast Eagle, Salt Lake City (801) 966-1060 — **S2, A**
OutWest C & E Inc., Bluffdale (801) 446-5673 — **S2, A**

VERMONT
CCS Constructors LLC, Morrisville (802) 888-7701 — **S2**

VIRGINIA
Sprinkle Masonry Inc., Chesapeake (757) 545-8435 — **A**
The Shockey Precast Group, Winchester (540) 665-3253 — **S2, A**
W. O. Grubb Steel Erection, Inc., Richmond (804) 271-9471 — **A**

WASHINGTON
Central Pre-Mix Prestress Co., Spokane Valley (509) 536-3334 — **S2, A**

WISCONSIN
Modern Crane Service, Inc., Onalaska (608) 781-2252 — **S1**
Spancrete, Valders (920) 775-4121 — **S2, A**
Spancrete, Waukesha (414) 290-9000 — **S2, A**
The Boldt Company, Appleton (920) 225-6127 — **S2, A**

Visit www.pci.org for the most up-to-date listing of PCI-Certified plants.