CarbonCast Enclosure Systems
CarbonCast High Performance Insulated Wall Panels
CarbonCast Insulated Architectural Cladding

Precast innovation powered by collaboration

altus group®

carboncast®

On the cover:
Capital Federal Hall: KU School of Business
Lawrence, Kan.
Precaster: Enterprise Precast Concrete

BYU Idaho Center
Rexburg, Ida.
Precaster: EnCon

1,500 projects 45 million square feet

A proven technology for resilient building

CarbonCast® Enclosure Systems integrate ultra-strong, non-corrosive C-GRID® carbon fiber grid into the wall panels during fabrication. By taking the place of conventional wythe connectors or steel reinforcement, C-GRID makes factory-made precast concrete an even more intelligent building envelope choice.

Depending on design, CarbonCast panels are priced competitively with other curtainwall systems such as brick veneer, masonry, stud walls or tilt-up concrete. And after factoring in reductions to superstructure requirements and potential HVAC system and operating savings, CarbonCast enclosure systems can help pay for themselves immediately.

Used successfully on more than 1,500 projects comprising over 45 million square feet of surface area, CarbonCast technology is a proven and preferred system for delivering outstanding performance and aesthetic freedom since its market introduction in 2004.

BYU Idaho Center
Rexburg, Ida.
Precaster: EnCon

Enabling technology

It takes jet fighters to Mach 2. Imagine what it does for precast.

Lightweight, non-corrosive C-GRID© is the enabling technology that allows CarbonCast© enclosure systems to be lighter, better insulating, more durable and cost competitive.

C-GRID has many of the same strength-weight benefits as high-performance aerospace carbon fiber, but at a lower cost due to its unique manufacturing process.

C-GRID's carbon fiber is over four times stronger in tensile strength than steel by weight. Each carbon fiber "tow" or strand is a bundle of thousands of ultra-fine fibers. The tows are assembled perpendicular to each other into a grid bound chemically with a tough, heat-cured epoxy resin.

C-GRID's strength and durability deliver:

Improved thermal performance. C-GRID has negligible thermal conductivity. As a wythe connector, C-GRID nearly eliminates thermal transfer in sandwich walls. It enables continuous insulation (c.i.) to comply with ASHRAE 90.1 requirements. The result: more efficient heating and cooling, lower energy costs and improved occupant comfort.

Enhanced resilience, strength and durability. C-GRID's high strength as a shear truss delivers full composite action for load-bearing performance. Thinner than non-composite designs, CarbonCast walls can allow you to increase the amount of usable space inside a building without increasing its footprint.

Lighter weight and sustainability. CarbonCast wall panels with C-GRID truss connectors offer fully composite performance to reduce the thickness (and weight) of interior wythes. When used as reinforcing in the face, C-GRID requires less protective concrete cover. Less concrete means less weight, less embodied energy and a reduced carbon footprint. Lowering weight may also permit a reduction in steel or concrete superstructure, further reducing a building's carbon footprint and embodied energy.

C-GRID reinforcement in CarbonCast products is not susceptible to corrosion like conventional steel mesh reinforcement.

Universal Alloy Light Press Plant
Ball Ground, Ga.
Precaster: Metromont

CarbonCast High Performance Insulated Wall Panels

The proven standard for insulated wall panels

CarbonCast® High Performance Insulated Wall Panels deliver all the benefits of factory precasting with unprecedented thermal efficiency in a fully structurally composite panel.

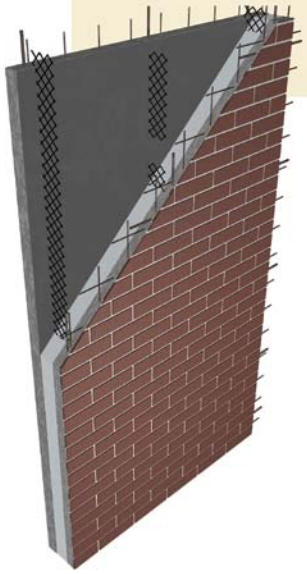
CarbonCast High Performance Insulated Wall Panels are composed of two concrete wythes separated by continuous insulation (c.i.) and connected by C-GRID® shear trusses. With low thermal conductivity, high-strength C-GRID helps deliver a panel with insulation values up to R-37—far above ASHRAE 90.1 requirements—depending on the thickness and type of foam insulation.

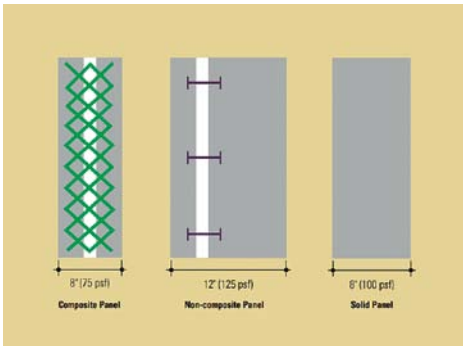
Extensive research has proven its load-bearing performance. For primary flexural reinforcement, prestressing strand or steel rebar is used in each wythe.

CarbonCast High Performance Insulated Wall Panels are:

- Energy Efficient and Lighter in Weight. The exceptional bonding and strength of C-GRID trusses allow AltusGroup® precasters to use less concrete and more insulating foam to reduce energy use and lighten panels.
- Superior at Load Bearing. Vertical panels are available for both load-bearing and non-structural applications and can be manufactured in thicknesses of 6" (152mm) and up, with widths up to 15' (4.6m) and heights of 50' (15.24m) or more. They can eliminate the need for perimeter columns and add to usable floor space.
- Dry, Mold-free and Non-combustible. Unlike brick and block insulated cavity walls or brick with steel studs, concrete does not allow water to penetrate, eliminating the need for a rain screen design. CarbonCast panels have no voids or cavities where air or water can combine to support mold and mildew growth. The inherent fire resistance of concrete provides additional peace of mind. CarbonCast panels can meet NFPA 285 requirements.
- Ideal for Occupant Comfort. CarbonCast High Performance Insulated Wall Panels provide an acoustic isolating environment. Very little sound is transmitted through the walls, which can provide an interior free of exterior noise. And the lack of cold spots provides a more comfortable environment.
- Pre-finished on the Inside Wall. CarbonCast High Performance Insulated Wall Panels can have troweled or sandblasted interior wythes to eliminate the cost and time to install drywall or other surfaces. They are ready for paint or wallcovering and are ultra-durable.

- **Full composite action for load-bearing performance**
- **Continuous insulation to meet ASHRAE 90.1 requirements**
- **Code compliant: ICC-ES with EPS insulation**
- **Aesthetic versatility**
- **Fire rated**





CarbonCast panels can use significantly less concrete than non-composite or solid panels, resulting in lower weight and a lower carbon footprint.

Top to bottom:

Sandy High School
Sandy, Ore.
Precaster: Knife River Prestress

Girls, Inc.
Omaha, Neb.
Precaster: Enterprise Precast

Savannah Harley-Davidson
Savannah, Ga.
Precaster: Metromont

Martin Army Community Hospital
Columbus, Georgia
Precaster: Metromont

CarbonCast Insulated Architectural Cladding

Architectural precast that's up to 40% lighter and has continuous insulation

CarbonCast® Insulated Architectural Cladding features inner and outer wythes that sandwich a layer of insulation of usually 2" (51mm) or more depending on R-value demands. The thicker you specify the insulation layer, the higher the R-value can be.

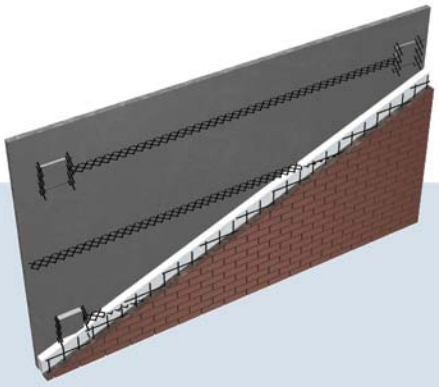
CarbonCast Insulated Architectural Cladding is intended for horizontal and vertical placement as a spandrel or column cover. The similarity in sandwich design means that CarbonCast Insulated Architectural Cladding panels are engineered to exhibit the exceptional strength and durability benefits oftheir brethren.

CarbonCast® Insulated Architectural Cladding offers weight reductions of about 40% compared to solid, 6" (152mm)-thick precast.

Highly insulated for lower energy consumption

CarbonCast Insulated Architectural Cladding features edge-to-edge continuous insulation (c.i.). The resulting thermally efficient panel provides steady-state R-values of R-8 or more as additional insulation is incorporated between the panel's inner and outer wythes.

Select EPS, XPS or polyiso foam insulation depending on design requirements. All the insulation you need can be provided by the panel. Additionally, the physical properties of precast concrete provide a beneficial thermal lag effect that can further reduce HVAC demands.



- **Continuous insulation to meet ASHRAE 90.1 requirements**
- **Code compliant: ICC-ES with EPS insulation**
- **Up to 40% lighter; enables reduced superstructure and foundation design**
- **Lower carbon footprint**
- **Aesthetic flexibility**

Less weight, more benefits

Reducing the amount of concrete lowers the panel weight. Inner and outer wythes of 1-3/4" (45mm) result in total concrete thickness of 3-1/2" (89mm). That decreases embodied energy and delivers significant benefits:

- Reduced load/superstructure: Lighter panels mean the building's superstructure and foundation can be engineered for less dead load, resulting in cost savings and a lower carbon footprint.
- Lower transportation costs: Precasters can ship more panels on each truck, lowering fuel consumption.
- Smaller cranes: Crane size and expense can be reduced with lower-weight panels.
- Seismic performance: Lighter panels are generally more desirable in high-seismic areas.

CarbonCast increases R-value, reduces HVAC costs by $700K.

CarbonCast® Insulated Architectural Cladding panels on Georgia State University's 2,000-bed student housing complex in Atlanta delivered R-12 performance and an impressive facade for the school.

The typical panels comprised 4" (102mm) of expanded polystyrene sandwiched between two 2" (64mm)–thick concrete wythes. C-GRID® shear trusses connected the inner and outer wythes. C-GRID, unlike steel, has low thermal conductivity, thereby preventing hot or cold spots.

Compared to similar systems, the increased effective R-value could have enabled the university to specify a less substantial heating and cooling system, saving $700,000, according to calculations. Compared to a simulation of the original envelope design, the thermally efficient CarbonCast design saved $411,000 in energy costs in the first year of operation, a 33% reduction.

The Heights – Montclair State University
Montclair, N.J.
Precaster: High Concrete Group

Versatile aesthetics and outstanding thermal performance in one remarkable technology: CarbonCast

Top to bottom, left

Carrefour d'Excellence en santé
Saint-Charles-Borromée, Quebec; Precaster: Saramac

Henry W Bloch Executive Hall: UMKC School of Business
Kansas City, Mo.; Precaster: Enterprise Precast Concrete

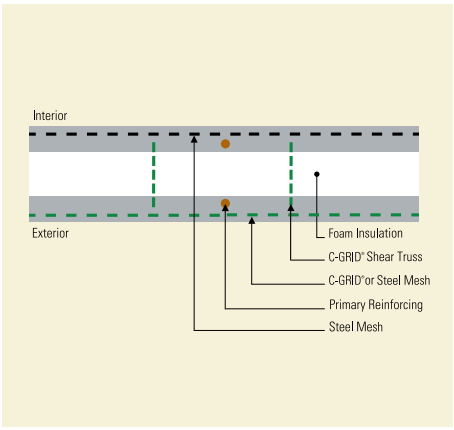
SCAD Museum of Art
Savannah, Ga.; Precaster: Metromont

DASH Bus Maintenance Facility
Alexandria, Va.; Precaster: High Concrete Group

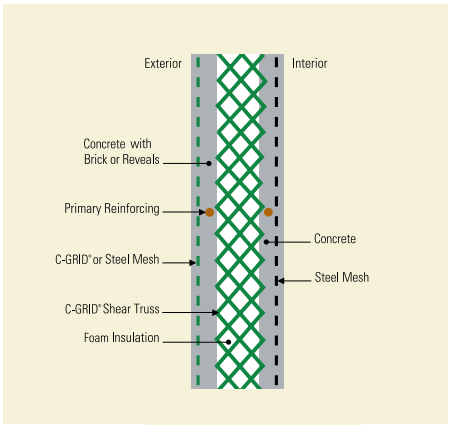
Symphony House Condominiums
Philadelphia
Precaster: High Concrete Group

Typical details

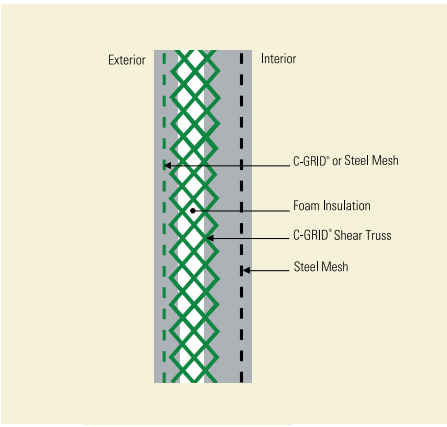
Your AltusGroup® precaster will help you engineer CarbonCast products, connections and joints that will meet your structural and continuous insulation requirements. Common details below.



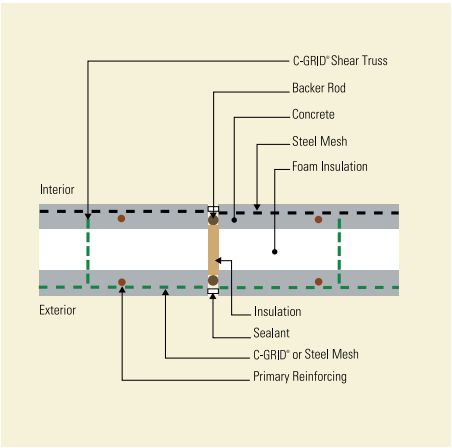
HPIWP & IAC
Cross Section



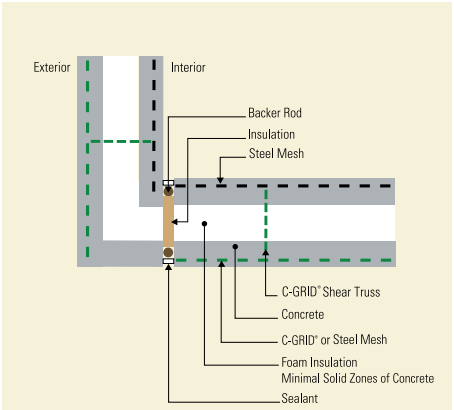
HPIWP—Composite Design
Vertical Section



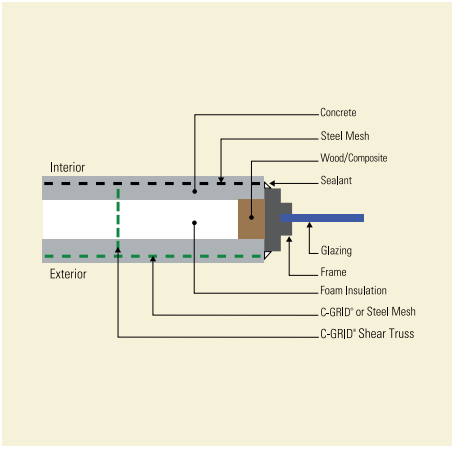
HPIWP—Non-Composite Design
Vertical Section



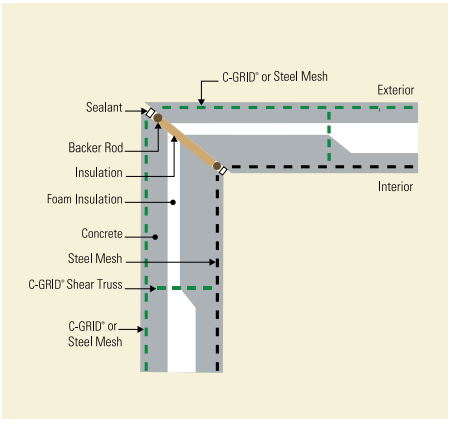
HPIWP & IAC—Thermally efficent butt joint
Horizontal Section



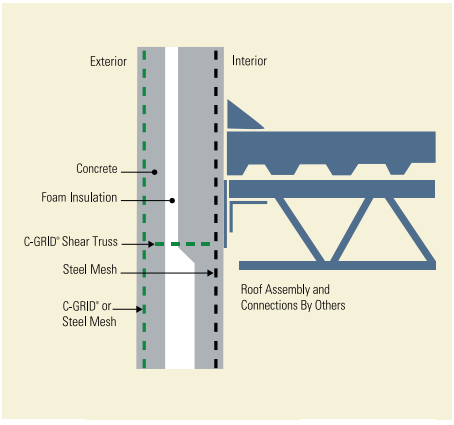
HPIWP & IAC—Thermally efficent corner detail
Horizontal Section



HPIWP & IAC—Door head and sill
Horizontal Section



IAC—Thermally efficent miter corner connection
Horizontal Section



HPIWP & IAC—Wall panel at roof with continuous insulation
Horizontal Section

Drawings are for illustrative purposes only. Your AltusGroup precaster will work with you to determine panel dimensions, C-GRID placement and other design elements to meet the specifications on your project.

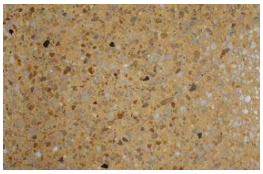
Get started on a great finish

AltusGroup® precasters are able to incorporate a variety of architectural finishes into CarbonCast Enclosure Systems to create a distinct, expressive facade that will meet almost any design need. Finishes options vary by region and precaster. Talk to your local AltusGroup manufacturer about finishes and treatments available in their facilities.

Colors and finishes

Select from a wide variety of cement colors and pigments as well as aggregates to form the foundation of your façade. Treatments such as abrasion (sandblasting), acid etching and polishing create unique expressions of the cement-aggregate combination. An assortment of architectural elements such as cornices, bullnoses and reveals can be cast into the concrete carefully and cost efficiently to provide visual interest and relief.

Buff Burnish


Buff Polish

Buff Sandblast

Buff Acid Etch

Buff Fossil

Gray Burnish

Gray Polish

Gray Sandblast

Gray Acid Etch

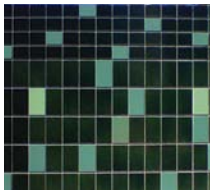
Gray Fossil

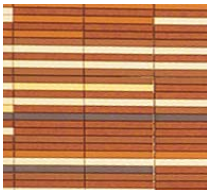
Embedded finishes

Embedded finishes and veneers such as thin brick can also be used as well as simulated limestone or granite instead of extracted rock to reduce job-site labor and raw material extraction.

Thin Brick

Thin Brick


Tile


Terra Cotta Tile

Formliners

Formliners can impart enhanced texture, such as a repeating pattern or single design element, and add depth to the panel face.

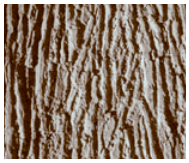
Stone and Block

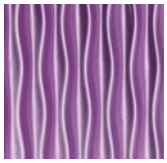
Brick

Wood

Flat

Rhythmic


Fractured


Contemporary

Graphic Concrete

Graphic Concrete, available in North America exclusively through AltusGroup precasters, allows you to place a permanent pattern, design or photograph on the exterior for a stunning, iconic look. The technology "imprints" a surface retarder on a membrane that is placed in the mold during casting. The image results from the contrast between the fair faced and the exposed aggregate surface after curing.

Ready to Pass the Toughest Test: Yours

More than $2 million in independent laboratory testing has affirmed a number of CarbonCast's performance characteristics. Below is a sampling of tests that demonstrate the suitability of CarbonCast Enclosure Systems for a variety of applications.

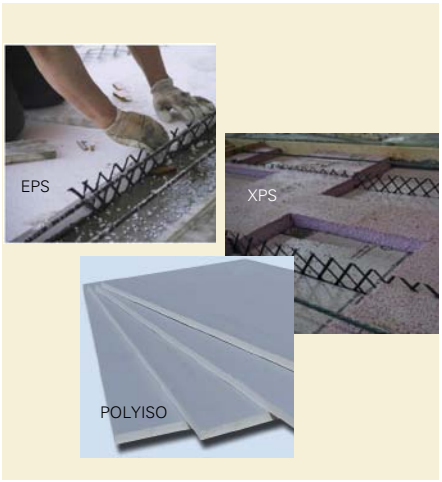
C-GRID Material Properties

- Strand tensile strength and cross-shear strength
- Behavior under sustained loads and fatigue behavior C-GRID reinforced concrete behavior
- Tension tests and pull-out strength of shear grid
- Effect of temperature on C-GRID used for shear transfer

CarbonCast High Performance Insulated Wall Panel and Insulated Architectural Cladding

- Axial load and flexure performance plus full-scale load testing
- ASTM E119 and NFPA-285 fire tests
- 50-year wind load fatigue test
- Missile impact test
- RILEM moisture absorption test for 1" (25mm) concrete wythes

CarbonCast Enclosure Systems have undergone dozens of tests to verify their fire resistance, fatigue performance and overall durability. They are among the most tested wall products in the industry.



CarbonCast works with any standard insulation. (Just try that with other systems.)

CarbonCast is one of the only exterior wall technologies that allows you to choose EPS (expanded polystyrene), XPS (extruded polystyrene) or polyisocyanurate (polyiso) rigid foam boards for insulation depending on project-specific requirements such as end-use, geographic climate zone, R-value and budget.

Your AltusGroup® precaster can help you determine the ideal insulation choice for your project.

ICC-ES compliant

CarbonCast High Performance Insulated Wall Panels with EPS insulation have received an evaluation report (ESR#2953) from the ICC Evaluation Service, providing evidence that the CarbonCast wall panels with EPS insulation meet code requirements. +Building team members often utilize ICC-ES Evaluation Reports to provide a basis for using or approving products in construction projects under various ICC building codes.

Many municipalities and building jurisdictions require an ICC-ESR certification before allowing use of a structural building product in their area.

Improves the job site, not to mention the rest of the earth

Delivered ready to erect, precast components avoid the costly scheduling, quality and safety issues associated with coordinating various trades, delays, scaffolding and site congestion caused by laborers and stored materials and equipment.

For decades, architects and engineers have depended on the strength, durability and design possibilities of precast concrete to achieve:

- Outsanding design flexibility
- Peace of mind—Quality-oriented, consistent factory fabrication from PCI-certified plants enables greater quality control, superior consistency of finish and greater strength and impermeability.
- Thermal efficiency and weather tightness, which can reduce HVAC system requirements and energy consumption thanks to continuous insulation
- Fast-track construction—faster to erect, fewer uncontrollable delays, lower costs (up to five times faster than field fabrication)
- Low maintenance and life cycle costs
- Outstanding durability, including fire and impact resistance
- Improved resistance to mold compared to most other systems
- Exceptional sound-isolating properties
- Lighter weight to reduce embodied energy by using less cement and concrete than conventional precast products
- Reduced crane, foundation and superstructure requirements

AltusGroup precasters have implemented sustainable manufacturing efforts such as reclaiming aggregates, slurry water and recycling formliners and molds. And all AltusGroup® member plants are certified through the Precast/Prestressed Concrete Institute (PCI) third-party auditing program for quality control.

For more technical information and testing reports, visit: altusprecast.com/resources or contact an AltusGroup precaster at: altusprecast.com/find-a-precaster.

Piedmont Central Student Housing And Dining Hall—Georgia State University
Atlanta; Precaster: Metromont

Precast innovation powered by collaboration

AltusGroup,® Inc., was founded by some of the industry's largest precasters and C-GRID® manufacturer Chomarat North America LLC, to speed the development of precast technologies like CarbonCast that improve the built environment.

AltusGroup members collectively support more than two dozen manufacturing and sales locations in the United States and over 150 specification-oriented sales, marketing and engineering professionals and generate more than $1 billion in annual revenue.

With pooled research resources, knowledgeable manufacturing engineers and a national network of quality-conscious, PCI-certified plants (www.pci.org), sales support staff and university collaborators, AltusGroup can help you achieve your design, construction and budget objectives.

PRECAST MEMBERS:

Chomarat North America LLC
(C-GRID® supplier)
Anderson, S.C.
carbongrid.com

EnCon–Stresscon
Denver, Colo.
enconunited.com

Enterprise Precast Concrete
Omaha, Neb.; Corsicana, Tex.
enterpriseprecast.com

Gage Brothers Concrete Products
Sioux Falls, S.D.
gagebrothers.com

GPRM Prestress
Kapolei, Hawaii
gracepacificcorp.com

High Concrete Group LLC
Denver, Pa.; Springboro, Ohio
highconcrete.com

Kerkstra
Grandville, Mich.; Detroit, Mich.
kerkstra.com

Knife River Corporation
Harrisburg, Ore.
kniferiverprestress.com

Marxuach Precast Solutions
San Juan, Puerto Rico
mpsprecast.com

Metromont Corporation
Bartow, Fla.; Hiram, Ga.;
Greenville, S.C.; Richmond, Va.;
Winchester, Va.
metromont.com

Mid-States Concrete Industries
South Beloit, Ill.
msprecast.com

Missoula Concrete Construction
Missoula, Mont.
missoulaconcrete.com

Oldcastle Infrastructure
Eastern: Selkirk, N.Y.
Western: Spokane Valley, Wash.
oldcastleinfrastructure.com

Pre-Con
Brampton, Ont.
pre-con.com

Rocky Mountain Prestress
Denver, Colo.
rmpprestress.com

Saramac
Terrebonne, Q.C.
saramac.com

Spancrete
Valders, Wis.
spancrete.com

Strescon Limited
Saint John, N.B.; Bedford, N.S.
oscoconstructiongroup.com/concrete.aspx

Wells Concrete
Wells, Minn.
wellsconcrete.com

INTERNATIONAL AFFILIATES:

Verheyen Betonproducten
Antwerp, Belgium
verheyenbeton.be

Prelco
Satigny, Switzerland
prelco.ch

INNOVATION PARTNERS:

ALP Supply
alpsupply.com

BASF Admixtures, Inc.
basf.com

Graphic Concrete
graphicconcrete.com/en

High Concrete Accessories
highconcreteaccessories.com

JVI
jvi-inc.com

Kawneer
kawneer.com

Meadow Burke Products
meadowburke.com

Owens Corning
owenscorning.com

StructureWorks
structureworks.net

AltusGroup, Inc. is a supplier associate member of PCI.

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Details and drawings may vary slightly depending on precaster and region.

C-GRID is a trademark of Chomarat North America LLC
CarbonCast is a trademark of AltusGroup
LEED is a registered trademark of the U.S. Green Building Council
CarbonCast® precast products are protected under the following US patents: 6,898,908 B2; 7,100,336 B2

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C-GRID® REINFORCED
C-GRID is a trademark of TechFab, LLC

For more information about AltusGroup, CarbonCast precast concrete components and the C-GRID technology, call 866-GO-ALTUS or visit altusprecast.com.