



carboncast™

A new partnership, an innovation in precast concrete technology.



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The Precast Advantage

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

- Outstanding fire and impact resistance
- Virtually unlimited aesthetic options—available in a wide variety of shapes, finishes, colors and surface textures to fulfill any design vision
- Quality and consistency—factory fabrication enables greater quality control, superior consistency of finish and greater strength and impermeability
- Fast-track construction—faster to erect, fewer uncontrollable delays, lower costs
- Excellent thermal efficiency and weather tightness
- Low maintenance and life cycle costs

Precast Technology for the 21st Century
AltusGroup introduces CarbonCast™, a new precast technology that adds even greater long-term durability, lighter weight, finer finishes, improved insulating properties and greater sustainability to the list of precast benefits.

CarbonCast is an innovative technology that uses conventional steel for primary reinforcing and C-GRID™ resin-bonded carbon fiber grid for secondary reinforcing and shear transfer. It is the first major innovation in precast concrete in more than half a century, since the development of pre-stressed precast.

CarbonCast components reinforced with C-GRID are:

- Thinner and up to 66 percent lighter
 - Reducing foundation, structure and seismic connection loads
 - Lowering shipping and erection costs
- Stronger and more durable
 - Up to five times the tensile strength of steel reinforcing
- More corrosion-resistant
 - C-GRID won't rust, corrode or cause staining or spalling
 - Minimizing shrinkage cracks up to 50 percent better than steel mesh

In addition, CarbonCast is energy-efficient, with higher insulation values.

- Panels deliver 100 percent of the R-value of insulation
- Higher R-values are achieved in thinner wall sections
- Cold spots created by solid concrete or steel reinforcing are eliminated

As a “green” building material, CarbonCast supports sustainability.

- Made with local materials and industrial and post-consumer waste
- Using less forming material and concrete
- Reducing truck trips, site congestion and disruption

On their own, these are all significant advancements—but they also add up to a more cost-effective building material.

- Reducing material, handling, shipping and erection costs
- Resulting in durable, energy-efficient buildings with lower operating costs

How CarbonCast Compares

Enclosure or Decking Systems	Relative Installed Cost	Relative Life Cycle Cost	Relative Speed of Construction	Light Weight	Impact Resistance	Insulation Performance	Durability	Sustainability
CarbonCast	\$-\$\$	\$	■	■	■	■	■	■
Precast	\$-\$\$\$	\$	■	□	■	■	■	■
Tilt-up	\$	\$\$	■	□	■	□	■	■
Cast-in-Place	\$\$\$	\$\$	□	□	■	□	■	■
Masonry	\$-\$\$	\$\$	□	□	■	□	■	■
Metal Siding	\$	\$\$\$	■	■	□	□	□	■
Glass Curtainwall	\$\$\$	\$\$	■	■	□	□	■	■
Brick Curtainwall	\$\$	\$\$	□	■	■	□	■	■
EIFS Curtainwall	\$-\$\$	\$\$\$	□	■	■	■	■	■
Metal Panel Curtainwall	\$\$-\$\$\$	\$\$\$	■	■	□	■	■	■

Poor
 Fair
 Good
 Excellent



The Difference is C-GRID Inside

C-GRID is the "enabling technology" that allows CarbonCast to be thinner, lighter, more durable and less costly than conventional precast. Developed by TechFab, LLC, non-corrosive C-GRID has a tensile strength of 87–255 KSI—up to five times the strength of steel reinforcing.

C-GRID is an epoxy-coated composite grid made with cross-laid carbon fiber. Until now, carbon fiber has been limited to applications where low weight and high strength are imperative, such as aerospace and sports equipment. Only since the development of industrial-grade carbon fiber materials and new fabric manufacturing technology has carbon fiber become feasible as an economical reinforcing material for new construction.

While C-GRID has a component cost several times the cost of the steel it replaces, it enables changes in precast design that make CarbonCast components equal or lower in cost than conventional precast. For example, C-GRID requires only 1/4" of concrete cover compared with steel reinforcing, which generally requires 3/4" to 1 1/2" to protect it from moisture-induced corrosion.

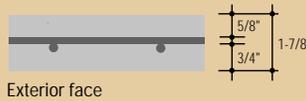
C-GRID also creates a 100 percent structurally composite section between the outer and inner wythes of insulated sandwich wall panels so that they can be thinner or taller. And C-GRID controls shrinkage cracks up to 50 percent more effectively than steel mesh because it bonds very well to concrete, is placed closer to the surface and has a more closely spaced mesh pattern than steel.

The Cover Story: With Concrete, Less is More

While conventional precast requires an exterior face thickness of two to three inches to minimize steel reinforcing corrosion, C-GRID allows a reduction of face thickness to only 5/8". Since C-GRID is 100 percent inert, the exterior concrete faces of CarbonCast products function 100 percent for structural integrity, rather than corrosion protection.

Not only does this offer the benefit of lighter weight components, but it allows you to incorporate premium aggregates and color additives, which could be prohibitively expensive in thicker, conventionally reinforced precast components.

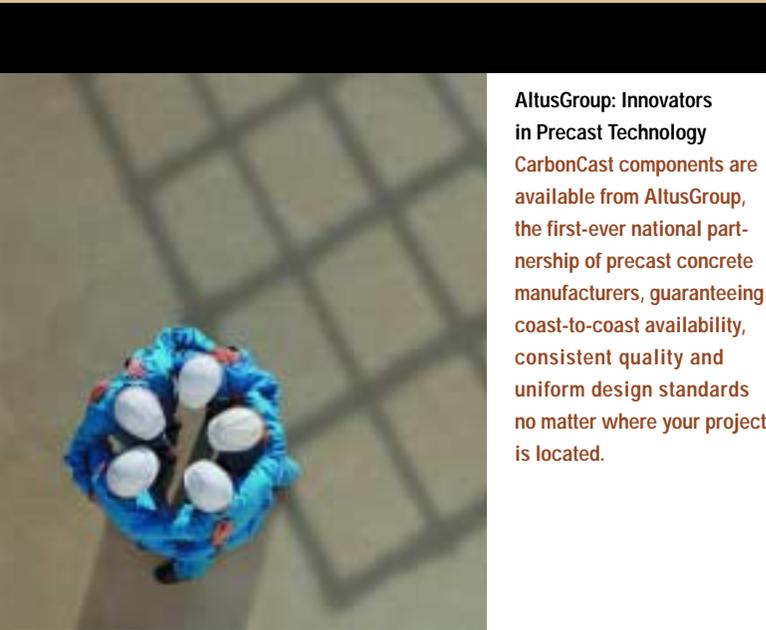
ACI minimum required for steel reinforcement



Minimum required for C-GRID reinforcement



Carbon fiber grid requires 66 percent less concrete cover than steel mesh.



AltusGroup: Innovators in Precast Technology CarbonCast components are available from AltusGroup, the first-ever national partnership of precast concrete manufacturers, guaranteeing coast-to-coast availability, consistent quality and uniform design standards no matter where your project is located.



**CarbonCast Commercial Systems—
Changing the Way You Design with Precast**
CarbonCast components are available in many shapes and sizes, which can be combined into systems to address all possible design requirements. Even your most imaginative designs can be realized through AltusGroup's standard or custom solutions and carefully controlled factory production techniques.

Lightweight CarbonCast components can change the way you think about precast because they:

- Reduce structure loads
- Install rapidly—in virtually any kind of weather
- Enable weather-tight, thermally-efficient panels with performance up to R-24
- Have superior resistance to cracking and the effects of corrosion

Thin CarbonCast panels are also suitable for countertops and interior cladding of lobbies, restrooms and other public areas, creating opportunities for a multitude of interior surface treatments, finishes and textures.



CarbonCast Component Selection Chart								
	Commercial Systems					Residential Systems		
	Architectural Panels	Hardwall Panels	Wall Components	Sandwich Wall Panels	Double Tees	Foundation Panels	Facade Panels	Floor & Roof Panels
Characteristics								
Nonstructural	■	■	■	■			■	
Structural				■	■	■	■	■
Thickness/Depth	5–7"	6"	NA	6'–12"	18"–34"	8"–12"	6"	10"
Width/Height (max.)	0–15'	0–6'	NA	0–15'	10'–16'	8–9'	8–10'	0–12'
Length (max.)	0–45'	0–25'	NA	0–55'	0–60'	0–32'	0–32'	0–32'
R-Value	8–13	13	NA	16–24	NA	NA	13–19	NA
Fire Assembly Rating	0–2 hr	0–30 min	NA	0–3 hr	2 hr	0–2 hr	0–2 hr	0–1 hr
Frame Construction								
Precast	■		■	■	■	■	■	■
Steel	■	■	■	■	■			
Pre-engineered		■	■	■				
Cast-in-Place	■		■					■
Masonry			■					■
Wood						■		
Uses								
Parking			■		■			
Office	■	■	■	■				
Educational	■	■	■	■				
Institutional	■		■	■				
Laboratory	■	■	■	■	■			
Stadiums	■	■	■	■	■			
Retail	■	■	■	■				
Industrial/Warehouse	■	■	■	■	■			
Hotel/Motel	■					■	■	■
Dormitory	■		■			■	■	■
Apartment	■		■			■	■	■
Condominium	■		■			■	■	■
Townhouse						■	■	■
Duplex						■	■	■



Architectural Panels for All Building Types

CarbonCast nonstructural wall systems can be used in combination with both steel and cast-in-place structural systems, and can even have thin brick or stone veneers. They support all glazing systems and work seamlessly with a wide range of other building materials, such as brick, tile and stone, for an expressive facade that will stand the test of time.

5"–7" thick Architectural Panels feature a C-GRID reinforced face and a structural rib design that delivers value-added insulation performance up to R-13. In addition, lightweight, insulated CarbonCast can significantly reduce building superstructure costs.

The patent-pending rib design and manufacturing process deliver value-added performance:

- Panel weights up to 66 percent less per square foot than conventional precast
- Composite R-values of 8 to 13
- Finer and more consistent finishes with fewer air voids

CarbonCast Architectural Panels can also be made with a concrete face on both sides for applications where the back of the panel will be exposed to view.

Architectural Components

CarbonCast nonstructural architectural cladding systems provide weather-tight, durable, low-maintenance facades for steel frame or cast-in-place structures. CarbonCast architectural components include horizontal and vertical panels and applied cladding elements such as column covers, cornices and soffits.

CarbonCast panels, which can be as thin as 1 1/4", can also be an excellent choice for screen walls.

Hardwall Panels for Pre-engineered Building Systems

CarbonCast is also available in exceptionally lightweight insulated horizontal wall panels with 4" of foam sandwiched between a durable C-GRID reinforced one-inch concrete exterior and interior facing for pre-engineered building applications and roof systems.

Spanning from column to column, these panels provide an energy-efficient, non-combustible wall while eliminating the need for metal girt framing which usually supports metal sidewall panels. They also reduce between-column foundation requirements when compared with masonry enclosure systems.

And, when factory finished on one or both sides, they can eliminate the costly, high-maintenance, time-consuming field application of stain, paint or stucco.

Like other CarbonCast products, the Hardwall Panel's patent-pending rib design and manufacturing process deliver additional value-added performance:

- Cost savings resulting from elimination of girts and reduced foundation loads
- Composite R-values of up to 13
- Virtually all-weather installation
- Fewer joints to maintain
- Abuse-resistant; will not stain or spall

Integrally Insulated Sandwich Wall Panels

Vertically installed single- or multi-story Sandwich Wall Panels are available for nonstructural and load-bearing structural applications. They can be manufactured in thicknesses of 6" to 10", with widths up to 15' and heights of 50' or more and are ideal for schools, retail, recreational, laboratory, industrial and warehouse uses.

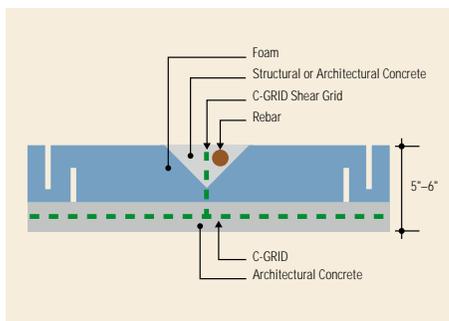
CarbonCast panels use thermally non-conductive C-GRID for shear transfer between the outer and inner wythes of concrete to create a 100 percent structurally composite panel. As a result, they are lighter, thermally higher performing, and more cost-effective than other wall panels. CarbonCast panels are also available in any precast finish to meet your design or budget requirements.

The reduced weight and section thickness of CarbonCast panels translates into lower transportation and erection costs—as well as savings on building superstructure. In addition, the improved insulating properties of CarbonCast components lead to more energy-efficient buildings, making CarbonCast an excellent choice for sustainable designs.

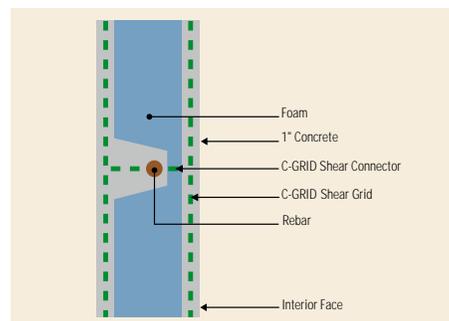
As with other CarbonCast products, the patent-pending design of Sandwich Wall Panels delivers unique and valuable benefits:

- Reduced structure loads that result in cost savings
- Composite R-values of up to 24
- Virtually all-weather installation
- Fewer joints to maintain
- High resistance to abuse

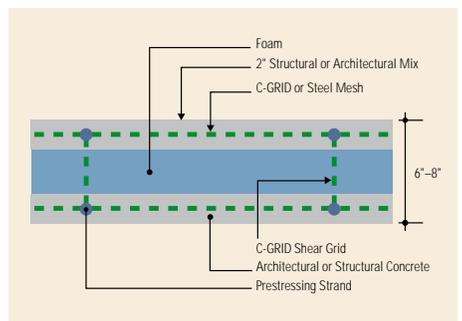
Architectural Panel



Hardwall Panel



Sandwich Wall Panel



CarbonCast Double Tees for High-Performance Parking and Outdoor Decks

CarbonCast's unique corrosion-resistant properties take precast performance to an even higher level as primary floor and roof elements for outdoor parking garages or decks.

Conventional steel reinforced decks exposed to vehicular traffic and weather are subject to corrosion from moisture and the degrading effects of salt and de-icing chemicals. They crack, stain and spall—even when epoxy-coated reinforcing or corrosion-inhibiting concrete admixtures and sealants are used. This is because these treatments inhibit, but do not prevent, corrosion.

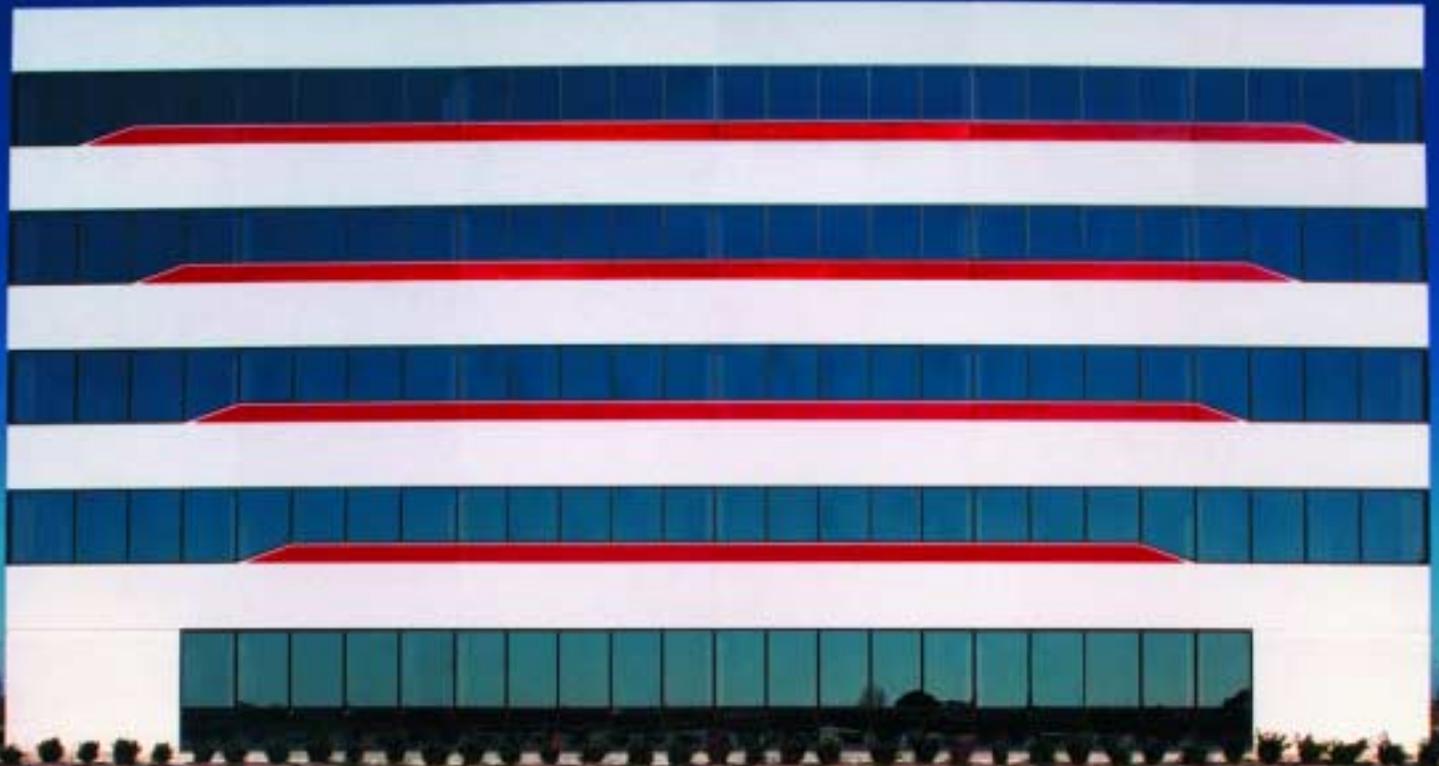
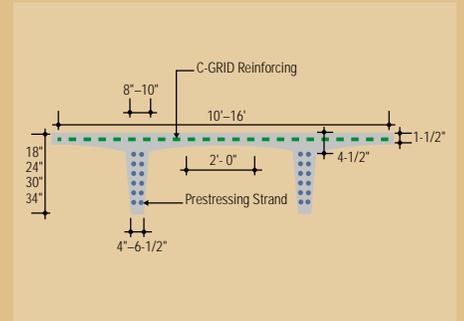
Not so CarbonCast reinforced with inert C-GRID carbon fiber. With an installed cost equivalent to conventional double tees, CarbonCast's non-corrosive properties do not diminish over time—so Carbon Cast tee flanges are less likely to crack, and will not stain from rust, or spall like steel mesh-reinforced decks.

Thinner = Better

C-GRID's unique non-corrosive properties also mean that CarbonCast Double Tee flanges can be made with less covering concrete. Weighing up to 20 percent less than conventional precast, this can significantly reduce structure costs. Thinner CarbonCast Double Tee flanges result in:

- Reduced foundation loads
- Supporting elements and connections that can be designed for lighter loads and/or wider bays
- Shallower tees that enable increased clearance under tees or decreased structure heights
- Lower shipping and erection costs
- Less maintenance and better long-term performance

Double Tee



The Durable, Lightweight Alternative for Multi-Unit Residential Structures

CarbonCast residential foundation, facade and deck panels are ideal for apartments, condominiums, townhouses, hotels and dormitories.

When used with solid precast wall panels between units, lightweight CarbonCast components provide a complete foundation framing and enclosure system that is:

- Non-combustible and fire-ratable
- Fast and economical to erect with small cranes—in virtually any weather
- Friendly to conventional mechanical, electrical, plumbing, security and communication systems
- Insulating with values up to R-13
- Highly durable, easy-to-maintain
- Impervious to insects, vermin, mold, rot, corrosion and other hazards of conventional construction

Foundation Panels

CarbonCast Foundation Panels are 8" to 12" thick and designed to bear on an easy-to-install crushed stone footer. Caulked at the joints, they work best if damp-proofed on the exterior face below grade, and when caulk joints between panels are covered with a waterproof sheet membrane. Above grade they can be finished with masonry paint, stucco, stenciled brick, thin brick, tile or thin stone veneers.

The exposed interior ribs of CarbonCast Foundation Panels can be fitted with openings to accommodate the work of mechanical, electrical, plumbing, security and communication trades. Panels can also be furred out and finished with drywall.

Floor and Roof Decks

CarbonCast Decks, with an overall depth of only 10" to 12" and an easy-to-cut C-GRID reinforced 3/4" flange, can span up to 32' for wide open and flexible interior spaces. They also weigh much less than precast hollowcore concrete or solid concrete slabs.

With widths of up to four feet between supporting legs, and cast-in openings in legs, CarbonCast Deck Components easily accommodate all mechanical, electrical, plumbing, security and communication systems.

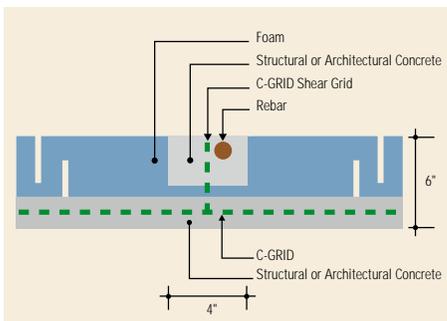
CarbonCast Deck Components can be furred and enclosed and finished with drywall to provide a truly residential look and feel as well as a one-hour fire rating.

Wall Panels

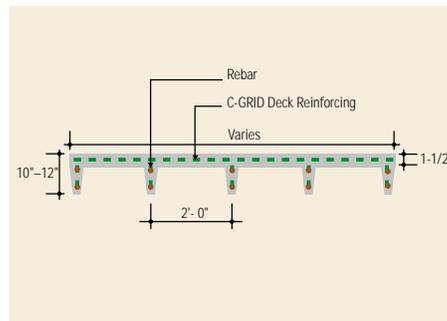
Lightweight 6"-thick load bearing and non-load bearing wall panels have a patent-pending structural rib design that delivers value-added insulation performance up to R-13. Ribs are designed and spaced to make attachment of wood or metal furring for drywall, wiring and plumbing quick and easy.

The low-maintenance, highly durable exterior faces of wall panels can be veneered with thin brick, or cast to simulate brick, stone or even clapboard siding. Any precast finish can be used including sandblasting, paint, stain or stucco.

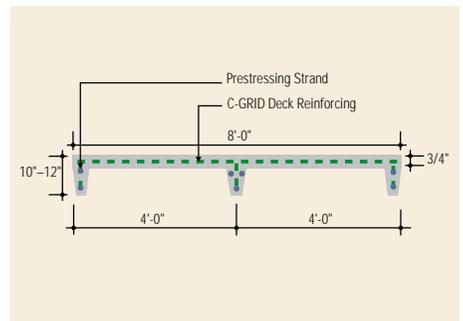
Residential Wall Panel



Residential Foundation Panel



Residential Deck





CarbonCast Finishes Cost Less and Look Better Longer

CarbonCast products come in an almost limitless palette of natural colors and finishes to fit any project. Multiple materials and surface treatments can be combined in the same structure—even in the same component—and finishes can be matched to existing structures.

In addition, CarbonCast offers expanded design opportunities beyond conventional precast. Since the CarbonCast components utilize up to 66 percent less concrete, expensive pigments and aggregates become more affordable.

And CarbonCast resists staining and spalling so your design vision remains intact for decades. CarbonCast Architectural and Hardwall panels can achieve even finer finishes where SCC (Self Compacting Concrete) mixes with smaller aggregates and vibration are specified.

Since all components are manufactured by AltusGroup under factory-controlled conditions, you are ensured uniform colors, finishes and textures, no matter where your project is located. CarbonCast components also offer great interior finish options—especially in high-profile spaces or in areas with high maintenance requirements.

AltusGroup is expert in assisting architects to select the CarbonCast mix and finish that maintain optimum strength and durability while ensuring the desired visual appearance.



Finishes Chart								
	Architectural Panels	Hardwall Panels	Wall Components	Sandwich Wall Panels	Double Tees	Foundation Panels	Facade Panels	Floor & Roof Panels
Factory Accents								
Reveals	■		■	■		■	■	
Precast Trims	■	■	■	■			■	
Surfaces								
Precast	■	■	■	■	■	■	■	■
Molded Brick	■		■	■			■	
Molded Stone	■		■	■			■	
Molded Clapboard							■	
Factory Veneers								
Tile	■		■	■			■	
Thin Brick	■		■	■			■	
Thin Stone	■		■	■			■	
Factory Finishes								
Clear Sealer	■	■	■	■	■	■	■	
Paint	■	■	■	■		■	■	
Stain	■	■	■	■		■	■	
Stucco	■	■	■	■		■	■	
Acid Wash	■	■	■	■		■	■	
Light Sandblast	■	■	■	■		■	■	
Medium Sandblast	■	■	■	■		■	■	
Heavy Sandblast	■	■	■	■		■	■	
Exposed Aggregate	■	■	■	■		■	■	
Honed	■		■	■				
Polished	■		■	■				
Field Finishes & Accents								
Synthetic Trims	■		■	■			■	
Clear Sealer	■	■	■	■	■	■	■	■
Paint	■	■	■	■	■	■	■	■
Stain	■	■	■	■	■	■	■	■
Stucco	■	■	■	■		■	■	

CarbonCast products can help you earn credits to qualify your project for LEED certification.

Sustainable Sites, Energy and Atmosphere

CarbonCast optimizes energy performance, contributing up to 10 extra credits in structures that outperform minimum ASHRAE requirements. Light-colored precast reflects solar heat and reduces cooling loads. Since light-colored facades also reflect lighting better, fewer fixtures or lower wattage fixtures are required. In addition, the thermal mass of concrete can moderate heating and cooling peaks, lowering HVAC requirements and energy use.

Materials and Resources

CarbonCast diverts construction waste by returning it to the construction process. Forms, content, material, aggregate, CCPs (Coal Combustion Products) including silica flume, fly ash and slag and post-consumer waste are also used or recycled.

Reduced Site Disturbance and Energy Used in Transportation

Most CarbonCast products are manufactured locally or regionally, with virtually all materials extracted from within a 500-mile radius of your project site. Since CarbonCast products are lighter than conventional precast, transportation fuel consumption is reduced. On site, CarbonCast takes up less space, goes up faster and causes less congestion and delays, reducing fuel wastage from cars detouring construction sites or idling in traffic jams.

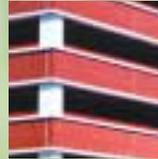
Improved Indoor Environmental Quality

CarbonCast products can reduce indoor chemical and pollutant sources, and produce no dust or airborne contaminants. In addition, CarbonCast components can be left unpainted, avoiding the use of VOC-emitting paints, stains or sealants. Outdoor moisture does not penetrate and will not condense on the interior of 100 percent thermally efficient CarbonCast Wall Panels.

Innovation and Design Process

CarbonCast products, and C-GRID, its enabling technology, are uncompromisingly innovative, with many design, cost, schedule and performance benefits

Technical Requirements	
Material	Applicable Codes, Standards or Guidelines
Precast Concrete	ACI 318; PCI MNL-117
Steel Reinforcing	ASTM A706; ASTM A82; ASTM A185; ASTM A496; ASTM A497; ASTM A416
Structural Welding	AWS D1.1; AWS D1.4
Foam	IBC 2603; UBC 2602
Carbon Fiber	ACI 440.1R-01





AltusGroup was founded by these industry leaders:

Oldcastle Precast Building Products Division,
Edgewood, MD and Spokane, WA

HIGH Concrete Structures, Inc.,
Denver, PA

Cretex Companies (JW Peters and Iowa Prestress),
Elk River, MN

Metromont Prestress Company,
Greenville, SC

Rocky Mountain Prestress,
Denver, CO

A Unique Innovation. An Unprecedented Partnership.

AltusGroup, a partnership of five of the industry's largest precasters and C-GRID developer TechFab LLC, was formed to make CarbonCast technology—and other future innovations—available throughout North America.

AltusGroup members collectively support more than 25 manufacturing and sales locations in the United States, more than 200 specification-oriented sales, marketing and engineering professionals, and more than \$1 billion in annual revenue. With pooled research resources, knowledgeable manufacturing engineers and a national network of PCI certified plants, sales support staff and university collaborators, AltusGroup can help you achieve design, construction and budget objectives.

AltusGroup is a single point of contact for:

- Outstanding technical expertise
- Innovative products
- National product availability
- Consistent superior quality

Superior Technical Service and Support
AltusGroup provides architects, specifiers and engineers easy access to relevant technical information and support, uniform performance standards and high quality products virtually anywhere in the United States and many locations in Canada.

Innovative CarbonCast products have an unparalleled network of service and support, including:

- Extensive testing and the backing of trusted industry leaders
- A central source for complete technical information, including CAD details, specifications and engineering design standards.
- Local sales and technical representatives to help with design and construction challenges
- Uniform quality standards and details consistent with the IBC and local codes
- Coast-to-coast delivery

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

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