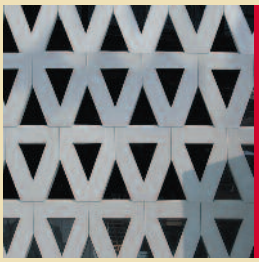
CONCRETE INNOVATIONS & ANSWERS®



PRECAST CONCRETE DESIGN GUIDE

HIGH CONCRETE GROUP LLC

An Affiliate of High Industries Inc.

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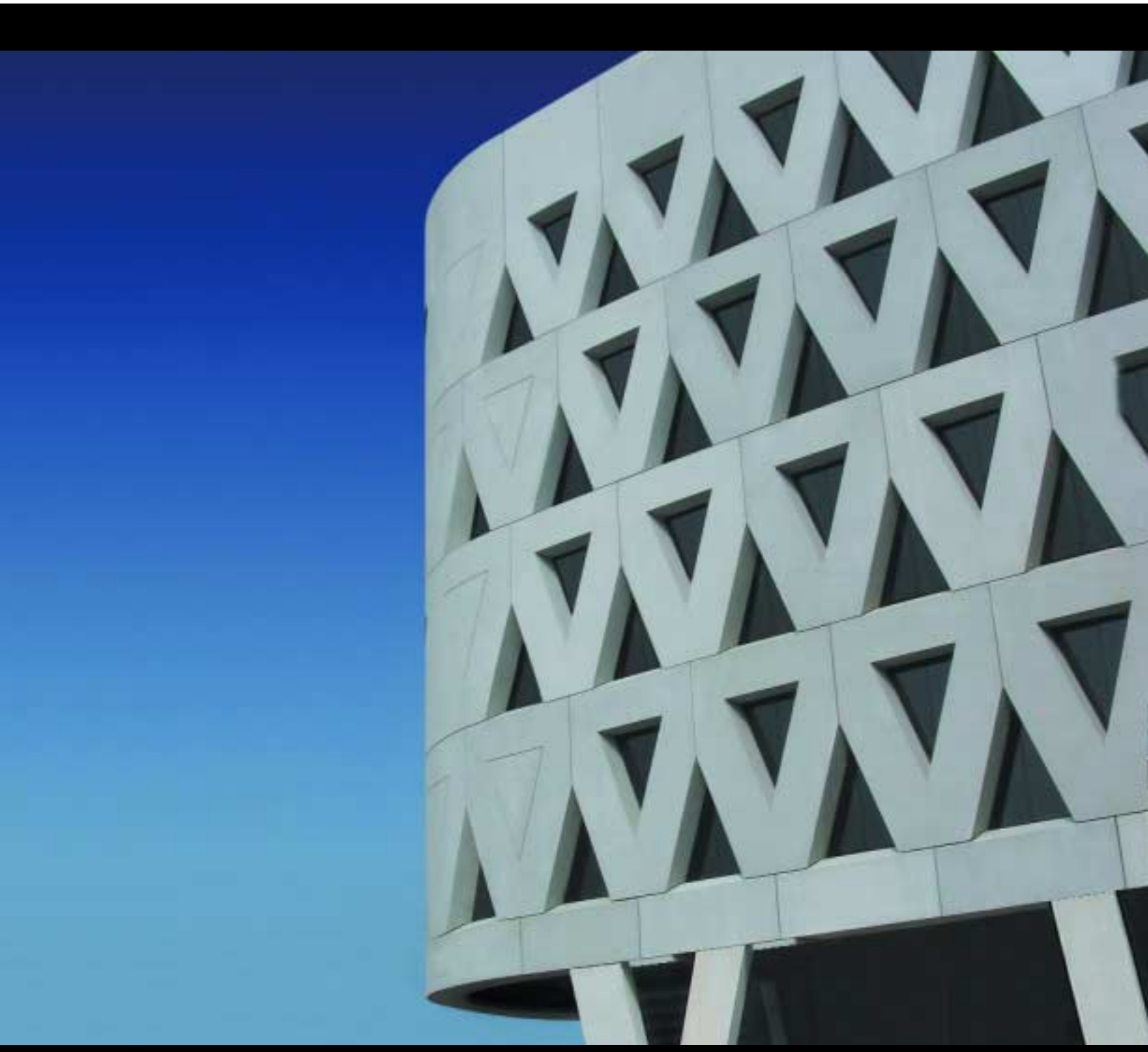


Concrete Innovations & Answers®. The technical support and products you need to bring your designs to life.

QUALITY, VERSATILITY, AND SUPPORT FROM THE INDUSTRY LEADER

High Concrete Group LLC combines innovation, proven technology, more than three-quarters of a century's experience as a building products company, and nearly 50 years as a precaster to give you the first-rate service, technical support, and precast products you need to bring your designs to life. We provide the Innovations and Answers® you need at every stage of your project, together with the high-quality, high-value precast concrete solutions to meet your specific design, cost, schedule, and lifecycle performance requirements.

High's precast products, which include the CarbonCast® line of C-GRID® carbon fiber reinforced products, are manufactured at five indoor precasting facilities that serve Southern New England, the Mid-Atlantic, the Ohio Valley, and the Midwest. Our full line provides the exceptional design flexibility required to meet the diverse challenges you face. Our products also deliver superior durability and value, whatever the project.

We are a leading producer of architectural and structural wall panels, and the nation's largest producer of precast concrete parking structures. We've provided structure and enclosure systems, components, and accessories for virtually every kind of project including corporate, cultural, government, educational, institutional, and multi-unit residential buildings, sports stadiums and arenas, retail, industrial, correctional facilities, and warehouse structures—including some exceptionally complex buildings you'd never imagine could be done with precast.

High Concrete is your single source for the highest quality precast concrete components, systems, service, innovations—and answers.

CarbonCast is a registered trademark of AltusGroup, Inc.
C-GRID is a registered trademark of TechFab, LLC

Put the precast design and performance advantage to work for you.

THE PRECAST ADVANTAGE

Whether you're designing an all or mostly precast structure or simply using precast cladding components, from traditional design-bid-build projects to fast-track or turnkey delivery, High's precast concrete products—including the innovative, lighter weight, thermally efficient CarbonCast line of C-GRID reinforced precast products—offer important advantages and enable countless architectural design opportunities.

Design Freedom

- **Brighter, more open and flexible interiors** because longer spans and more open plans are made possible by precast deck systems
- **Virtually unlimited options** of color, texture, and form

Outstanding Performance

- **Safe** Inherently superior fire resistance
- **Secure** Excellent security and impact/blast resistance and great structural strength and durability from reinforcing, pre-stressing, or post-tensioning
- **Environmentally friendly** High thermal efficiency
- **Quiet** Outstanding acoustic insulation and isolation
- **Mold and mildew resistant** Weather tight enclosures form larger impermeable components that require fewer joints
- **Durable** Superior resistance to abuses of man and nature such as impact and soil, mold, and mildew
- **Economical** Low maintenance and life cycle costs

Superior Quality

- **Consistent results** Controlled batching and enclosed factory fabrication, under controlled conditions that exceed PCI's Plant Certification requirements
  - Superior to on-site cast-in-place construction and conventional outdoor precast operations
- **Greater impermeability and strength**
  - Concrete mixes with low water/cement ratios are enabled by factory-controlled batching and immediate placement of concrete to yield higher strength mixes—averaging 7,000 psi or more
  - Precisely controlled air entrainment also results in minimal expansion and contraction and reduced cracking and surface scaling

Faster and Lower-Cost Fast-Track Construction

Indoor factory-cast and factory-cured components can be manufactured year-round and installed in almost any weather, which results in fewer schedule delays and faster occupancy.

Construction costs may also be reduced by

- **Single-source fabrication and erection**
  - Less on-site labor with its associated congestion, cost, and schedule delays, and fewer quality problems due to manpower shortages
  - Eliminates the usual delays caused by multiple trades
- **Just-in-time delivery**
  - Streamlines the construction process by reducing site congestion
  - Reduces general conditions, construction financing, and other carrying costs
- **Rapid installation**
  - Simultaneous erection of structural elements and enclosure
- **Earlier project delivery and occupancy**
  - Reduces general conditions, construction financing, and other carrying costs

Simpler	One source for information, service, and easy-to-use products
Faster	Faster to erect with fewer uncontrollable delays
Better	Superior fireproofing, impact resistance, thermal efficiency, and long-term durability plus virtually unlimited design flexibility

How Precast Compares

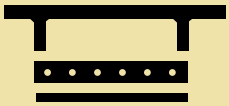
Structure	First Cost	Life Cycle Cost	On-Site Construction Speed	Fire Resistance	Weatherability	Impact Resistance	Open Plan Flexibility
Precast	■	■	■	■	■	■	■
Cast-In-Place	□	◪	□	■	◪	◪	□
Steel	■	◪	◪	◪	◪	□	◪

□ Fair ◪ Good ■ Excellent

Enclosure	First Cost	Life Cycle Cost	On-Site Construction Speed	Fire Resistance	Mold Resistance	Weatherability	Moisture Resistance	Insulation vs. Outside Noise	Impact Resistance
Architectural Precast	◪	■	■	■	■	■	■	■	■
Brick Veneer	▪	◪	□	◪	▪	◪	◪	▪	◪
Stone Veneer	□	■	□	◪	▪	▪	▪	▪	▪
Glass/Steel Curtain	◪	◪	▪	◪	◪	▪	▪	□	□
EIFS	■	□	◪	□	□	□	□	◪	◪
Insulated Metal Panels	◪	◪	▪	□	◪	◪	◪	◪	◪

□ Fair ◪ Fair+ ◪ Good ▪ Good+ ■ Excellent

Use of repetitive components leads to optimal cost effectiveness and construction speed.



Decks, MEGA-Tees and Structural Floor
Long-spanning structural floor and roof elements that require fewer columns and provide more open plan spaces or brighter garage interiors. Slabs, CarbonCast Stem Decks, and hollowcore planks available for shorter spans.

Spandrel
Horizontal load-bearing and non-load-bearing facade panels for MEGA-Span™ Total Precast buildings, parking garages, and buildings with steel or cast-in-place superstructures. May be insulated. May have openings for windows and doors.

Wall Panel
Single- or multi-story vertical load-bearing and non-load-bearing insulated and non-insulated panels used for structure, tenant separation, and facade enclosure May have openings for windows and doors.

Girder
Horizontal structural elements. Inverted "T" and "L" girders.

Column
Vertical structural elements. Rectangular, square, or round shapes.

Stairs, Risers, and Accessories
Precast modular units including signs, bollards, site furnishings and landscape walls. May be finished to complement the appearance of overall structure.

VERSATILE PRECAST COMPONENTS

Any precast structure can be built from a "kit of parts" consisting of about a dozen types of components fabricated in standard and custom shapes and sizes that address a wide range of design requirements.

STRUCTURAL COMPONENTS

Columns

Rectangular, square, and round

- Up to 65' high each
- Stackable to more than 50 stories

Girders

"L" and Inverted "T"

- Horizontal structural elements that can span up to 60'
- More economical than steel
- May have penetrations for mechanical, electrical, plumbing, security, and communications (MEPSC) systems of up to 12"x 48" at 5'0"o.c.

Shear Walls

For wind and earthquake bracing

- Stackable to more than 50 stories

Light Walls

Provide interior bay support and more open and secure parking garage interiors

- Stackable to more than 50 stories
- Excellent for resisting seismic loads

Spandrels

Horizontal load-bearing and non-loading panels for "Total Precast" MEGA-Span buildings and parking garages

- Up to 75' long

MEGA-Tees™ and Double Tees

Floor and roof elements that allow for fewer columns, more open plans, and brighter interiors for commercial buildings and parking garages

- 15' wide standard; 10'–16' wide available
- Floor spans up to 75'
- Roof spans up to 100'
- May have penetrations for MEPSC systems
- Tee depths: 30" standard (18", 22", 24", and 34" available)

Stem Decks™

Long-spanning CarbonCast multi-unit residential floor and roof elements that enable open plans and trade-friendly accommodation of MEPSC systems

Precast Structural Slabs

Floor and roof elements available in a wide range of shapes and sizes to meet unique plan requirements

Hollowcore Planks

Structural floor and roof elements, available in standard sizes, for open, fire-rated multi-unit residential interiors

Wall Panels

Single or multi-story vertical load-bearing and non-load-bearing panels for tenant-separating wall applications

- May have openings for windows and doors
- May be pre-wired
- Can be fire rated up to four hours

ENCLOSURE COMPONENTS

Architectural Cladding

Horizontal or vertical non-load-bearing panels, column covers, soffits, and fascia

- May be insulated
- May have openings for windows and doors
- Available in a variety of finishes, including brick

Insulated Wall Panels

Single or multi-story vertical load-bearing and non-load-bearing panels

- Up to 16' wide x 60' high
- May have openings for windows and doors
- May be pre-wired
- Can be fire-rated up to three hours
- Available in a variety of finishes, including brick

Screen Walls

- Thin exterior walls, usually located on the roof, used to conceal unsightly mechanical systems, etc.

Stem Deck™ is a registered trademark of Oldcastle Precast
MEGA-Span™ is a registered trademark of High Concrete Group LLC

Use of repetitive components leads to optimal cost effectiveness and construction speed.

NONSTRUCTURAL COMPONENTS

Stairs

- Precast modular units
- May be finished to complement the appearance of overall structure

Stadium Risers

- Can be made to fit any design, whether the stadium is constructed of steel or concrete

Architectural Accessories

Signs, bollards, planters, benches, and retaining walls

- Units can be custom fabricated to match any structure using High Concrete architectural or structural components
- Standard units also available

Precast Systems

High Concrete precast components can be combined into three unique building systems.

High Concrete's precast building systems are applicable for buildings of every type

- Civic and institutional
- Educational
- Commercial
- Industrial
- Correctional
- Multi-unit residential
- Vehicular

VERSATILE PRECAST SYSTEMS

1

HIGH-PERFORMANCE WALL SYSTEMS

Architectural (non-structural) cladding systems, including lightweight, thermally high-performing CarbonCast panels, consist of horizontal and vertical panels and cladding add-ons such as column, covers and soffits for weathertight, durable, low-maintenance facades on steel frame or cast-in-place structures.

Structural wall systems include single- or multi-story panels, providing an integral structure and enclosure system that can be erected economically and efficiently. Both structural and architectural wall systems can be insulated to meet the requirements of any project and can contribute up to 20 credits toward LEED certification.

(See page 10)

2

PRECAST BUILDING SYSTEMS

MEGA-Span, Stackwall, Filigree, and CarbonCast Multi-Unit Residential Systems

Precast superstructure or structure and enclosure systems are economical, safe, low-maintenance solutions that enable

- Very open and efficient floor plans
- Faster fabrication and erection than steel and CIP structural systems
- Inherent fire and mold resistance
- Up to 21 of 26 MRU credits toward LEED certification

The **MEGA-Span system** uses High's unique MEGA-Tee deck system together with other standard precast components to create buildings with bays of up to 45' x 60'.

The **filigree system**, where precast forms become part of the finished structure, is used in commercial buildings where floor-to-floor heights are constrained and open plans are desired.

Solid or lightweight ribbed and fire-rated **stackwall bearing wall systems**, employing solid slab or hollowcore plank decks, are ideal for hotels, dormitories, condominiums, and apartments.

The **CarbonCast multi-unit residential system** consists of foundation panels, Stem Deck floors and roofs, exterior walls and interior tenant-separating walls. It is a durable, lightweight, insulating, mold-resistant, and safe alternative for low-rise buildings that might otherwise be wood-framed.

(See page 14-16)

3

PARKING GARAGE SYSTEMS

Low-maintenance structure and enclosure systems that deliver

- Longer life than steel, hybrid, and cast-in-place structures
- The brightest, most open, and lowest maintenance parking structures in the industry when pre-topped MEGA-Tees are used because 15' and 16' wide MEGA-Tees are made with super-durable high-strength concrete and have fewer legs and tee-to-tee joints than conventional 12' tees,
- For the best performance in salt-laden environments, CarbonCast MEGA-Tees, with non-corrosive C-GRID reinforced flanges, offer superior durability to steel mesh reinforced alternatives.

(See page 18)

The Next Generation: Carbon Fiber Reinforced Precast

CarbonCast architectural panels and high-performance wall panels weigh less and are more thermally efficient than conventional precast and many other building materials. CarbonCast double tees are lighter and more durable than steel mesh-reinforced tees while CarbonCast foundation panels, Stem Decks, and residential wall panels are ushering in a whole new era in thermally-efficient, safe, durable, multi-unit housing.

C-GRID reinforced CarbonCast products offer many advantages

- Reduced structural costs, including foundation costs, due to lighter weight
- Superior resistance to the effects of the environment
- High thermal efficiency with insulation steady-state R values from R-8 to R-37
- Reduced shipping and erection costs
- Low environmental impact and credits toward LEED certification

Precast components can be used on buildings of almost any height.

Precast Building Selector

	MEGA-Span	Filigree	Stackwall	CarbonCast
Low-Rise	■		■	■
Mid-Rise	■		■	
High-Rise			■	
Offices	■	■		
Schools	■	■	■	
Retail	■	■		
Cultural	■	■		
Institutional	■	■		
Warehouses	■			
Manufacturing	■			
Hotels			■	■
Dormitories			■	■
Apartments/Condos			■	■

Precast Building Selector

	Architectural Panels	CarbonCast Architectural Panels	CarbonCast Architectural High Performance Wall Panels	CarbonCast Industrial High Performance Wall Panels	CarbonCast High Performance Hardwall Panels
Low-Rise	■	■	■	■	■
Mid-Rise	■	■	■		
High-Rise	■	■			
Offices	■	■	■		■
Schools	■	■	■		■
Retail	■	■	■	■	■
Cultural	■	■	■		
Institutional	■	■	■		
Cultural & Entertainment	■	■	■		
Sports	■		■	■	■
Correctional			■	■	
Warehouses		■	■	■	■
Manufacturing		■	■	■	■
Hotels	■	■	■		
Dormitories	■	■	■		
Apartments/ Condos	■	■	■		

Experience the freedom and peace of mind that comes from designing with precast.

1

HIGH-PERFORMANCE WALL SYSTEMS

High Concrete's wall systems consist of a variety of insulated and non-insulated panels, column covers, mullions, infill, and recladding panels. They can provide concrete answers to satisfy your design, program, and project delivery objectives.

Precast wall systems can be used with both steel and cast-in-place structural systems. And they work seamlessly with a wide range of other building materials, enabling easy incorporation of brick, tile, stone, and glazing systems into a single, elegant, expressive facade that will stand the test of time.

Maximum Schedule Flexibility

Single-step rapid installation

- Pre-finished
- Pre-insulated
- Pre-wired (wall panels only)
- Weather tight

Whether you require structural or non-structural exterior walls, High Concrete's state-of-the-art, high-performance precast wall systems offer a broad array of durable, aesthetic, insulating, and weather-tight options that deliver the value, quality, and performance you need.

Maximum Design Flexibility

The form, color, and textural flexibility of precast concrete permit an expressiveness not achievable with any other single material. Even your most imaginative designs can be effectively realized through standard or custom solutions and carefully controlled factory production techniques.

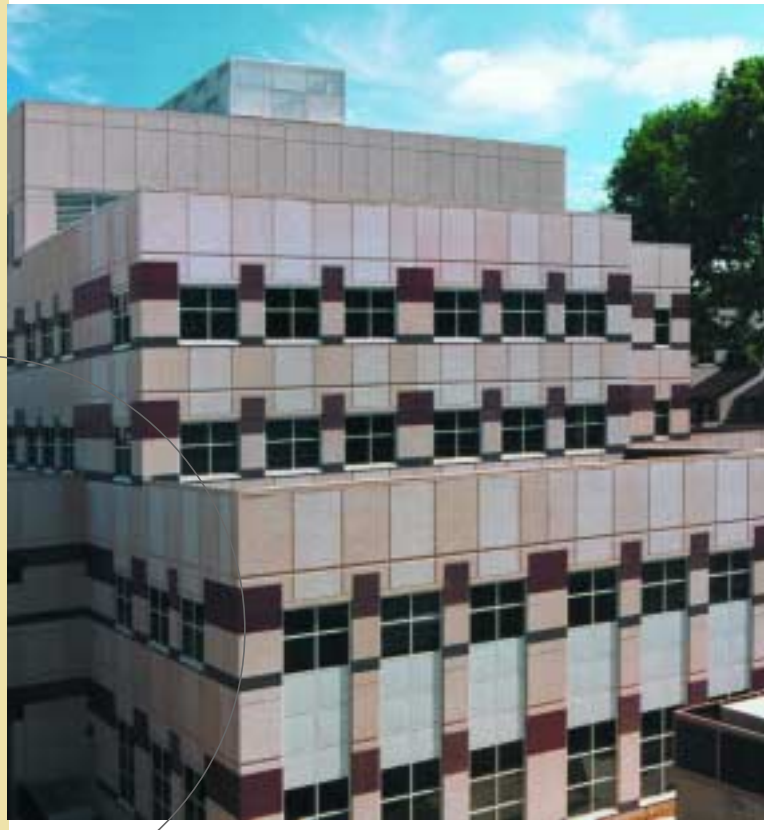
Also suitable for interior cladding of large public areas, our wall systems can create a variety of visual effects, ranging from the subtle to the dramatic.

These highly articulated architectural wall panels employ pigmented concrete, reveals, light sandblasted, and water-washed exposed aggregate finishes

Unlimited Surfaces, Shapes, and Finishes

- Three-dimensional accents, such as
  - Reveals
  - Ribs
  - Reliefs
  - Bullnoses
  - Projections
  - Cornices
- Two-dimensional surface treatments, such as
  - Collage of textures or surface materials
  - Color accents or polychrome treatments
- A wide array of colors is achievable with an almost infinite range of
  - Pigments
  - Aggregates
- Custom-cast finishes, such as
  - Stone
  - Sculptural textures and faux-stone or brick forms
- Factory finishes, such as
  - Blasting
  - Acid etching
  - Polishing
  - Exposed aggregate
  - Staining
- Veneers of
  - Brick
  - Stone
  - Tile
  - Terra Cotta

(For more information see page 24)



The architectural panels on this unique facade use granite veneered panels, pigmented concrete, reveals, and a light sandblasted finish.

HIGH-PERFORMANCE WALL SYSTEMS

Panel Selection Guide

	Architectural Panels	CarbonCast Architectural Panels	CarbonCast Architectural High Performance Wall Panels	CarbonCast Industrial High Performance Wall Panels	CarbonCast High Performance Hardwall Panels
Size	≥14'w x 55'l	≥14'w x 40'l	≥14'w x 55'l	≥14'w x 55'l	≥10'w x 30'l
Weight (psf)	75–100	25–50	60–100	60–100	55–60
Shape	Any	Any	Flat	Rectangular & Flat	Rectangular & Flat
Installed Cost	$$$–$$$$$	$$–$$$$	$$	$–$$	$–$$$
R-Value	n/a	6 to 10	13 to 24	10 to 24	8 to 13
Fire Rating	0–2 hours	0–2 hours	3–4 hours	3–4 hours	3–4 hours
Veneers	☑	☑	☑		☑
Reveals	☑	☑	☑	Limited	☑
Projections and Trim	☑	☑	☑		☑
Carries Glazing & Wind Loads	☑	☑	n/a	n/a	☑
Carries Floor & Roof Loads			☑	☑	
Maximum Wind Load	100 lbs/sq ft	100 lbs/sq ft	100 lbs/sq ft	40 lbs/sq ft	35 lbs/sq ft
Seismic Zones	Any	Any	Any	Any	Any
Maximum Story Height	Unlimited	Unlimited	10*	10*	2*

*Stacked

carboncast®

Shape, Size, Accent, and Finish Options—Appearance and Cost Guide

Industrial and Architectural Wall Panels	Appearance Uniformity	Relative Cost	Industrial PCI Mnl 116	Architectural PCI Mnl 117
Shapes				
Rectangular–4 Sides	■	$	●	●
Articulated–5 or more Sides	■	$$$–$$$$	●	●
Non-Rectangular	■	$$–$$$		●
Curved Shapes/Surfaces	■	$$$$$		●
Punched Shapes (openings)	■	$$	●	●
Sizes				
Small Pieces	■	$$$$$		●
Large Pieces	■	$	●	●
Very Tall Pieces (50'+)	■	$$–$$$	●	●
Thick Panels (up to 2 hour rated)	■	$$–$$$	●	●
Thick Panels (3 to 4 hour rated)	■	$$–$$$	●	●
Accents				
Plain (no reveals)	■	$	●	●
Shallow Reveals (¾" or less)	■	$$	●	●
Deep Reveals	■	$$		●
Reliefs (repetitive)	■	$$$		●
Precast Trims and Projections	■	$$$$$		●
Colors				
Grey Cement	■	$	●	
White Cement	■	$$	●	●
Light Pigments	■	$$	●	●
Dark Pigments–High Dosage	■	$$$–$$$$		●
Locally-Sourced Aggregates	■	$	●	●

Colors (continued)	Appearance Uniformity	Relative Cost	Industrial PCI Mnl 116	Architectural PCI Mnl 117
Quartz & Marble Aggregates	■	$$–$$$$		●
Granite Aggregates (non local)	■	$$–$$$$		●
Standard Mixes (where available)	■	$	●	●
Custom Mixes	■	$–$$		●
Two Mix Colors per Piece	■	$$$-$$$$		●
Finishes				
Form Finish	■	$	●	
Paint/Stain/Stucco	■	$	●	
Light Blast	■	$$		●
Medium or Heavy Blast	■	$	●	●
Acid Etched	■	$$		●
Retarded (exposed aggregate)	■	$$$	●	●
Acrylic Brick (where available)	■	$$	●	
Standard High-Repetition Form Liner (ribs, molded brick, stone, etc.)	■	$$$	●	●
Custom or Low Repetition Form Liner	■	$$$–$$$$$	●	●
Thin Brick or Tile	■	$$$$–$$$$$	●	●
Stone Veneer (stone by others)	■	$$$		●
Honed or Polished (where available)	■	$$$$$		●
Form-Finished Edges	■	$	●	●
Other Edge Finishes	■	$$	●	●

□ Low ■ Medium ■ High

NOTE: Concrete is made from natural materials which vary in the colors they yield over time. Samples will represent a color in the range of colors produced by a mix design. Older samples should only be used as a guide for initial color and finish selection. Fresh 12" x 12" samples should always be used to make near-final color and finish selections. As with natural stone, mock-ups, produced near to the time of actual production should be used for the final color and finish selection.

2

TOTAL PRECAST BUILDING SYSTEMS

MEGA-Span™ is a "Total Precast" building system that makes optimal use of High Concrete's exclusive MEGA-Tees, the widest double tees available, for

- Reduced costs
- Speedy construction
- Open plans with bay sizes of up to 48' x 60'

The versatile MEGA-Span system includes these precast building components

- MEGA-Tees
- Spandrels
- Inverted tee girders
- Multi-story columns
- Precast light walls and shear walls
- Multi-story structural wall panels
- Precast stair and elevator enclosures
- Precast stairs

The MEGA-Span Advantage

MEGA-Span, a proven system solution that has outperformed steel frame curtain-wall-clad structures for more than 40 years, offers all the advantages of a "Total Precast" building

- Faster fabrication and erection than either steel or cast-in-place concrete
- Increased durability
- Inherent fire, blast, and mold resistance

Leveraging MEGA-Tee technology, MEGA-Span is the only "Total Precast" system that delivers these unique benefits

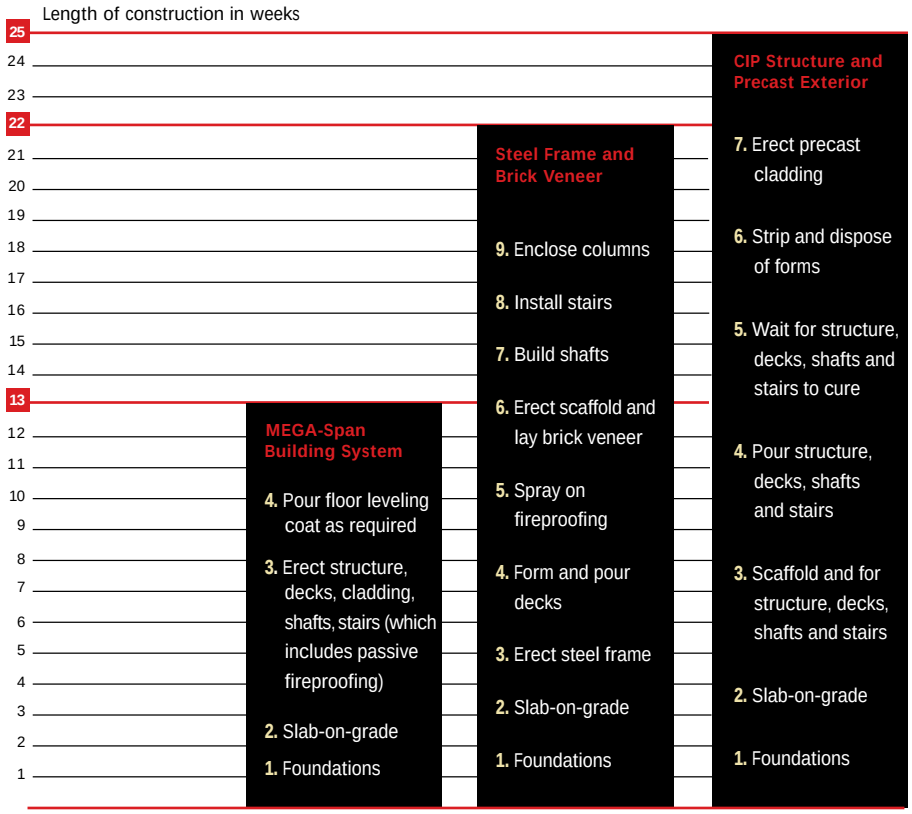
- Superior interior flexibility
- Economic advantage of fewer components to erect and maintain
  - Fewer columns
  - Larger bays
  - More usable and net rentable area
- Fastest erection
  - Fewer and larger components
  - Lower maintenance due to fewer components and joints

And with our patented tilt-frame transporter, which enables MEGA-Tees to travel over almost any road without the need for costly escort vehicles, you are assured consistent on-time, on-budget delivery no matter where your project is located.

The MEGA-Span system also offers

- Superior aesthetics and optimum economy
- The benefits of precast cladding at a lower cost, because precast spandrels perform the dual function of providing structural support and enclosing the building
- Faster project completion and occupancy
- Year-round construction
- Concurrent erection of precast structure and enclosure
- Quieter environment; acoustically insulating concrete keeps outside noise out and dampens structure-borne noise
- Lower life cycle costs because precast structures
- Look new longer
- Require less maintenance
- Yield lower insurance and operating costs because they are inherently fire-proof and thermally efficient

Construction Phases and Time Line 100,000 sq. ft. four-story building



The Surprisingly Green Building Material

Concrete is as old as the Romans, but it's also a key solution to modern concerns about energy efficiency, protecting the environment, and using our resources wisely. You know that concrete offers exceptional stability, durability, and design flexibility. But you may not be aware of the environmental advantages it offers throughout its manufacture and use. And because old concrete can be reused, the energy savings accrue indefinitely. In fact, concrete is one of the most environmentally friendly construction products currently available.

Natural and Recycled Materials

Some building materials rely on scarce or nonrenewable resources. In contrast, concrete is made from three abundant ingredients

- Water
- Aggregate (stone, sand, and gravel)
- Portland cement (a fine gray powder, plentiful in nature)

A growing list of recycled materials can complement these basic ingredients. Aggregate may contain safe industrial by-products, such as steelmaking's slag. Portland cement can be supplemented by materials such as fly ash, a discard of coal burning power plants. Even cement's manufacturing process uses recycled materials. Each year, a single cement kiln can safely burn one million old tires, conserving fossil fuels and reducing landfill.

Stronger, Lasts Longer

Since concrete is strong and adaptable, and resists fire, water, and weather, it has a longer service life than other construction materials. Concrete's durability reduces maintenance and reconstruction, conserving resources. And at the end of its service life, crushed concrete can be reused as aggregate for new concrete.

Year-Round Energy Efficiency

The thermal mass of concrete buildings saves energy year round by reducing temperature swings. A concrete building will require cooling mainly during off-peak times, when power is produced more efficiently. The same building will also cost less to heat than a comparable structure made of different materials.

These benefits last as long as the building itself—which in the case of concrete structures is a very long time.

Source: Environmental Council of Concrete Organizations

LEED-friendly attributes available from High:

- Lightweight CarbonCast products
  - Less weight means less mass and less engineering
- Recycled materials
  - EcoMix™ uses recycled carpet fiber, which reduces cement content in concrete

LEED Project Checklist: Precast Concrete Points

	Sustainable Sites	Points
Credit 3	Brownfield Redevelopment	1
Credit 6.1	Stormwater Management, Rate and Quantity	1
Credit 7.1	Landscape and Exterior Design to Reduce Heat Islands	1
	Energy and Atmosphere	
Prerequisite 2	Minimize Energy Performance	Required–0
Credit 1	Optimize Energy Performance, 15 to 60% savings	2–10
	Materials and Resources	
Credit 1.1	Building Reuse—Maintain 75% of Existing Shell*	1
Credit 1.2	Building Reuse—Maintain 100% of Existing Shell*	1
Credit 2.1	Construction Waste Management, Divert 50%	1
Credit 2.2	Construction Waste Management, Divert 75%	1
Credit 4.1	Recycled Content—Use 5% Post-Consumer or 10% Other	1
Credit 4.2	Recycled Content—Use 10% Post-Consumer or 20% Other	1
Credit 5.1	Local/Regional Materials—20% Manufactured Locally	1
Credit 5.2	Local/Regional Materials—50% Harvested Locally	1
	Innovation in Design Process	
Credit 1	Innovation in Design—Use of High Volume Supplementary Cementitious Materials	1
Credit 2	LEED Accredited Professional	1
	Potential Total	***up to 21**

* Points for building reuse cannot be obtained on the same project as those for new construction.

Precast structures are easy to design, go up quickly, last a long time and have outperformed steel-frame curtain-wall-clad structures for more than 40 years.

TOTAL PRECAST BUILDING SYSTEMS

Sculptural and aesthetically appealing, long-spanning, fire-safe, and durable precast components can be combined into environmentally-friendly building systems to satisfy a wide range of program requirements. And when required, they can even be combined with steel components or partial steel superstructures to economically solve even the toughest design or structural challenges.

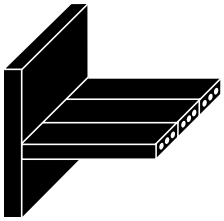
The dual structure and enclosure function of most precast building systems eliminates the time-consuming, coordination-intensive, and expensive redundancies of independent superstructure and enclosure common to steel construction. Precast structures are easy to design, go up quickly, last a long time, and have outperformed steel-frame curtain-wall-clad structures for more than 40 years. This is because they are

- Green—very environmentally friendly
  - Concrete uses local and recycled materials, is inert, emits no VOCs, and is non-nutritive for mold and mildew
  - Factory-fabricated precast reduces site disruption
  - Concrete's thermal mass reduces HVAC requirements and energy use
  - Integrally insulated systems virtually eliminate opportunities for mold and mildew
- Incredibly versatile and offer unequalled design freedom
  - Superior interior flexibility
- Super-safe—providing unmatched peace of mind
  - Inherently fire-resistant
  - Blast and impact resistant
  - Quieter—acoustically insulating concrete keeps outside noise out and dampens
- Extremely durable—and stay looking good longer
  - More weather tight with fewer components and joints to maintain than other systems
- Economical—a smart choice
  - Fewer components to erect and maintain
  - Concurrent erection of structure and enclosure gets projects dried-in faster and reduces opportunities for mold growth
  - Factory pre-fabrication and virtually all-weather installation reduce field delays and costs and enable faster project completion and occupancy
  - Reduced insurance and operating costs because concrete is inherently fireproof and thermal mass reduces HVAC requirements and energy use

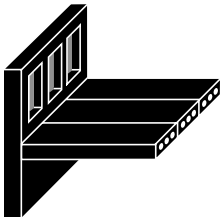
Except for the floor and roof construction, all precast building systems can employ many of the same elements and are similar in cost. There are four basic types of precast building systems.

- **Hollowcore Plank**—used primarily for multi-unit residential construction where spans are relatively short. MEPSC* systems must be suspended below the underside of the plank.
- **Filigree Stay-in-Place (SIP) Form**—a hybrid precast and cast-in-place system used primarily for commercial construction where height restrictions exist and floor-to-floor heights must be kept to a minimum. MEPSC systems must be suspended below the underside of the plank.
- **Stem Deck**—a shallow quad-tee system used for multi-unit residential and light commercial construction. The space between the legs can be used to accommodate MEPSC systems.
- **Double Tee**—capable of carrying the heaviest loads and the longest spans. Used primarily for commercial construction where long spans and open plans are important and where future occupancies may require field-cutting large openings through the floors (e.g, 7' x 30'). The space between the legs can be used to accommodate MEPSC systems.

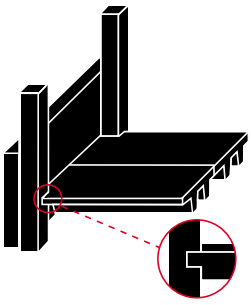
*MEPSC: Mechanical, Electrical, Plumbing, Security & Communication



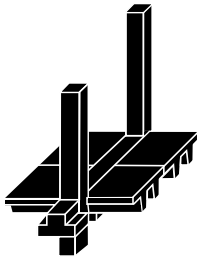
Standard Stackwall



Lightweight Ribbed Stackwall



MEGA-Span Exterior Spandrel



Interior Column Bay

Factory pre-fabrication and virtually all-weather installation reduce field delays and costs and enable faster project completion and occupancy.

Fast, durable, cost-efficient and great-looking.

3

PARKING GARAGE SYSTEMS

More aboveground parking structures have been built with precast concrete during the past 40 years than any other structural system. That's because precast's high strength and impermeability, superior durability, speed of construction, and unlimited design options provide a high-performance, cost-effective solution to the unique demands of parking structure design.

With nearly 400 garages erected, High Concrete is the nation's leading producer of precast parking systems. Our revolutionary pre-topped 15' and 16'–wide, long-spanning, 30"deep-MEGA-Tees and 45'–48' spandrels deliver exceptionally open and bright interiors and are more cost-effective than other systems. 16' wide Mega-Tees are especially efficient for end bays, providing increased space for turning. Our easy-to-use precast concrete parking garage components include

- MEGA-Tees and smaller double tees where required
- Spandrels or multi-story structural wall panels
- Inverted "T" and "L" girders
- Multi-story columns
- Precast light walls and shear walls
- Precast stair and elevator enclosures
- Precast stairs

Why Select High Concrete's Precast Parking Structures?

Our precast parking garage system is manufactured under carefully controlled factory conditions that enable concrete mixes with higher strengths, corrosion-inhibiting admixtures to protect steel reinforcing and generate consistently high quality. And now non-corrosive C-GRID reinforced CarbonCast Double Tee flanges are available, extending the life of the garage. Thinner flanges also result in

- Reduced foundation loads
- Supporting elements and connectors 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
- Greater crack resistance, superior steel reinforcing protection, and faster fabrication and erection compared to cast-in-place concrete
- Are cast to control drainage and minimize ponding
- Withstand the abusive forces of man and nature, from wind, acid and road salt, rain, to earthquakes and fire
- Wide MEGA-Tees and long spandrels reduce the number of joints to be maintained and associated costs and repairs
- Maintain their original appearance for years, with no significant discoloration, staining, or surface decay when properly maintained

Our patented Tilt-Frame Transporter allows transportation of 15' and 16' double tees throughout most of the Mid-Atlantic, Mid-West and New England states.

Fast, Durable, Cost-Efficient—and Great Looking.

Our patented Tilt-Frame Transporter allows cost-effective transportation of 15' or 16' double tees into almost every market High serves. We can also use it to cost-effectively transport 12' tees into tight urban areas such as New York City

Parking structures constructed with MEGA-Tees offer

- Fewer components to erect and maintain
- Improved lighting and signage options because there are fewer columns and more space between tee legs
- Lower maintenance costs because there are fewer joints to maintain

The MEGA-Tee Advantage

At the core of virtually every cost-effective parking structure is the 15'-wide MEGA-Tee, the widest double tee in the industry. And now 16' wide MEGA-Tees are also available for use in 48' end-bays that facilitate more generous turning areas to accommodate today's larger vehicles.

Parking structures constructed with MEGA-Tees offer

- Fewer components to erect and fewer joints to maintain
- Improved lighting and signage options because there are fewer columns and more open spaces between tee legs

Optional integral end "washes" replace field-poured washes to direct water away from tee ends to in-floor drains. Integral washes improve deck integrity and performance because the higher strength precast concrete is more impermeable to water than cast-in-place concrete. And there is no joint between the pre-topped precast tee and a field-poured wash where water can penetrate to cause joint failure and spalling.

Design Flexibility

High Concrete offers a variety of standard features and options to support your parking structure design needs

Standard Features

- Pre-topping, so field topping is not required
- "Wide arc" swirl finish of top surface for multi-directional traction
- Stainless steel flange connectors
- Custom double-tee lengths to accommodate odd module bays

Options

- Lightweight non-corrosive, CarbonCast reinforced C-GRID tee flanges
- Corrosion inhibitors to protect steel mesh flange reinforcing
- Epoxy-coated steel mesh for tee flange reinforcing
- Integral end washes
- A wide selection of enduring precast exterior options
- Tee stem blockouts to accommodate conduit and piping
- Fabricated openings in girders for conduit and piping
- Fabricated openings between tee legs for elevators, stairs, and MEPSC* chases

*MEPSC: Mechanical, Electrical, Plumbing, Security & Communication

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ARCHITECTURAL ACCESSORIES AND STADIUM RISERS

Signage

In keeping with our attention to every detail, High Concrete precast signs are a great low-maintenance complement to a precast building. We can create custom signs according to your designs.

Accessories

High Concrete offers a full line of accessories that seamlessly integrate with our precast systems

Screen walls

- Hide any unsightly view on the ground or on the roof

Bollards

- For traffic control and security or decoration
- Can be made ready for lights

Benches and Planters

- To further beautify the structure and add comfort to its surroundings

Sculpted walls

- For aesthetic reliefs not available with other materials

Stadium Risers

Our many riser options are highly durable, meeting heavy load and long span requirements. They also

- Provide a uniform appearance, with consistent finish, color, and contour
- Resist corrosion, dents, punctures, and weather over the long term
- Ensure quick construction and earlier stadium use
- Reduce maintenance

Precast stadium risers can be adapted to fit stadiums large or small, and eliminate the need for unattractive fireproofing. Precast architectural accessories can perform specific functions or simply serve as artistic expression.

Precast architectural accessories can perform specific functions or simply serve as artistic expression.

Precast stadium risers can be adapted to fit stadiums large or small, and eliminate the need for unattractive and easily damaged fireproofing.

ACROSS THE SPECTRUM: COLORS, TEXTURES, AND FINISHES

In addition to a variety of cement mix designs to match the performance requirements of your project, High Concrete precast products come in an almost limitless palette of natural colors and finishes that can blend into any environment—whether modern or historic, formal or rustic

With such versatile, visually rich material, you can choose color, form, and texture to enhance the uniqueness of a project and express a particular design vision using

- Aggregates
- Pigments
- Mixes
- Finishes
- Veneers
- Shapes

High Concrete will work with you from the beginning of a project to choose the finish with the aesthetic and structural attributes you need. And all components are manufactured by High under factory-controlled conditions to ensure a uniform, high-quality facade.

Precast concrete is also a great interior finish option—especially in large public spaces, gymnasiums, and natatoriums or in buildings such as warehouses and manufacturing facilities or dormitories where impact-resistance and low-maintenance durability are required.

Color in Concrete

Color is achieved through a combination of cement, coloring agents, or pigments, and fine or course aggregates added to the mix. High Concrete is expert in matching color to existing buildings. Matching caulk colors, stains, and paint are also available.

Mix Designs for Beauty and Strength

Environmentally friendly "green" mix design, such as High Concrete's innovative EcoMix™, is concrete reinforced with recycled carpet fiber to improve initial appearance and long-term performance by reducing shrinkage and temperature-induced cracking. Mixes that incorporate recycled materials—such as slag or carpet fiber—can improve concrete's properties including resistance to moisture, impact, load-carrying capacity, and even component size.

Consult High Concrete to pick a mix and finish that fits your budget while maintaining optimum strength and durability and giving the visual appearance you desire.

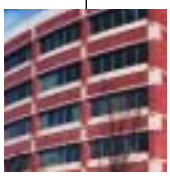
Water wash, acid etch, medium sandblast.

Form finished painted.

Medium sandblast.

The industry's widest selection of additives, mixes, colors, and finishes offers total design flexibility.

In architectural precast concrete, color is affected by light, shadow, and other surrounding or near-by colors. Colored exterior floodlights can also change the color of light concrete.



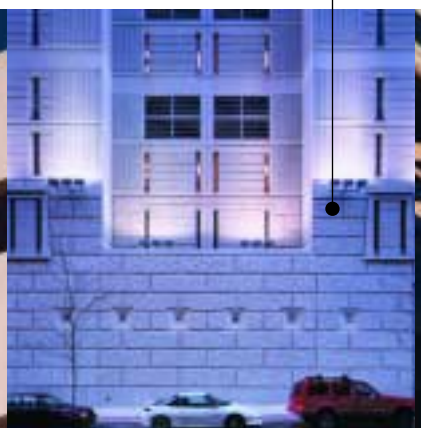
Surface texture also affects color.

Cement may be gray, white or buff, or a mix-ture. The inherent color of the concrete will have a great impact on the final color of a structure.

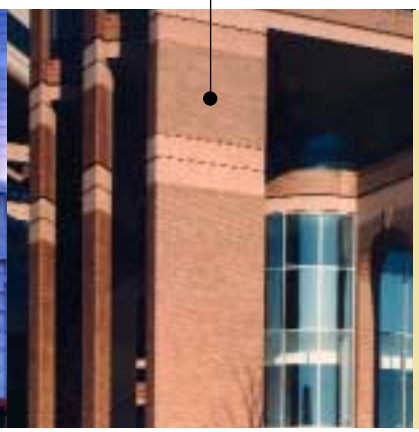
Multiple colors and finishes can be used in the same structure and even in the same component.

Texture and shadow can make overall surface light or dark.

Light sandblast.



Form liner acid etch, water washed.



Pigmented heavy sandblast.

With simple combinations of color, form, and finish, any structure can become a lasting work of art.

COLORS, TEXTURES, AND FINISHES

Aggregates

Many color and texture options are possible by varying aggregate color, size, finishing processes, and depth of exposure. Combining color and texture accentuates the natural beauty of aggregates.

Aggregate colors range from white to pastel to red, black, and green.

Finishes

A smooth form finish highlights the natural mottled look of concrete as well as any imperfections in the form. As a result, it's usually desirable to use an applied finish to achieve a more uniform appearance and to bring out the full color, texture, and natural beauty of the aggregates. Finish options include

- **Form finish** A natural look, with natural color variations and surface imperfections intact
- **Field paint or stain** For economical visual impact
- **Acid etch** Provides a smooth, sand-textured surface resembling natural stone
- **Water washed** Brings out the color and texture of natural stone
- **Blasted** Creates light, medium, or heavy exposure of aggregate
- **Polished** For a finish resembling granite or limestone
- **Form-liner finishes and reliefs** Use molds to create textures and patterns

Veneers

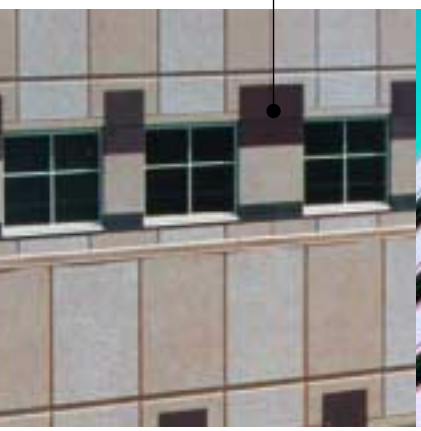
Brick and stone veneers set in precast achieve the look of a hand-laid masonry or stone cladding with greater construction efficiency, safety, and water tightness. Veneers include

- Standard brick
- Oversized brick
- Honed or polished concrete block
- Tile (ceramic and terra cotta)
- Stone (granite, limestone, and marble)

Form-Lined Shapes

Using plaster, rubber, grained wood, rope or other material as a liner in the casting form can offer finishes, reliefs, textures, shapes, and patterns limited only by your imagination.

(See chart on page 13)



Light and medium sandblasts, granite veneer cast into panels.

Pigmented light and medium sandblast.

A wide array of colors and textures can be achieved through the use of various aggregates, cements, pigments, and finishing techniques. Almost any stone can be incorporated into a precast facade.

MITCHELL H. COHEN
UNITED STATES COURTHOUSE

THE HIGH CONCRETE ADVANTAGE WILL WORK FOR YOU AT EVERY STAGE OF YOUR PROJECT.

When you work with High Concrete, the acknowledged industry leader, you can count on our undivided attention to crucial details—the details that make the difference in the successful fulfillment of your design intentions. Since 1956 we've provided precast products for more than 5,000 buildings. It's attention to detail at every step that has won us, and the customers we serve, numerous awards from PCI, ACI, and AIA.

From design inception to project completion, High Concrete delivers unsurpassed service and support to help you get the job done efficiently, cost-effectively, and to your complete satisfaction

State-of-the-Art Technical Expertise; Unsurpassed Precast Construction Experience

Our licensed in-house engineering, technical, and project management staff, which include some of the most respected experts in the precast industry, are ready to provide the comprehensive assistance you require. Our seasoned construction professionals can help you anticipate and solve nearly any technical, design, and construction challenge.

Unparalleled Service

We are at your service whenever you need us. Reach us toll-free by phone (800-PRECAST). Or via e-mail (concrete.answers@high.net).
Or visit us online (www.highconcrete.com), where you can download technical information, guide specifications, and details, including CAD drawing files.

Innovative Solutions

High's innovative thinking produced the 15'-wide MEGA-Tee and the nation's only patented over-the-road delivery system for extra wide double tees. Other industry firsts include patented casting accessories to ensure consistent and better looking solutions for structural connections and openings in precast components, our innovative, lightweight, insulating CarbonCast C-GRID carbon fiber-reinforced products, and our newest introduction: recycled carpet fiber reinforcing to increase concrete strength and reduce shrinkage and temperature-related micro-cracking.

Unique Facilities and Systems

High Concrete operates several production facilities in the Mid-Atlantic, Ohio Valley and Midwest including one of the largest single-site precasting facilities in the world. We are capable of producing projects of any size—at any time. Our fully enclosed, PCI-certified fabrication facilities ensure strictly controlled conditions and consistent results. Our computerized estimating and concrete batching and our production quality management help you save time, stay on budget, and get the high-quality results you expect.

Environmentally Friendly Manufacturing and Erection

Our commitment to sustainability and our adherence to Green Building principles reflect a responsible concern for the environment and our neighbors.

From the start, concrete is environmentally friendly. It is made from abundant, easy-to-extract ingredients—and the quarries that supply raw materials can be easily reclaimed.

High precast concrete is made using recycled waste and industrial byproducts like slag, carpet fiber, and fly ash that would otherwise end up in landfills. Even old concrete and wastewater are recycled for used for new concrete mixtures. These byproducts reduce the amount of cement required to make concrete. Cement, the most energy-intensive component, typically makes up only10–15% of concrete.

Plus, High Concrete uses natural pigments whenever possible to create exactly the colors you specify.

Finally, concrete is energy efficient, from manufacture to transport to construction. Once in place, concrete offers energy savings over the lifetime of a building. Insulated panels afford high R-factors, and thermal mass moderates temperature swings. And since concrete is so durable, it conserves resources by reducing maintenance and the need for reconstruction.

Non-Disruptive Construction Methods

An entire concrete superstructure can generally be erected with one or two fixed-position cranes, often situated within the building footprint. Construction can even take place at night to minimize traffic disruption around a site. Plus, erection of precast concrete generates relatively low noise levels, which is important in areas where existing occupancies prohibit excessive noise.

Safety, First and Foremost

Our skilled, professional, on-site work force will safely erect your project. Our OSHA scores keep insurance rates low and bonding capabilities high, and help to ensure your structure is erected damage and incident-free. As the winner of the PA Governors Safety Award, our attention to safe practices has been recognized.

Simply put, High Concrete is your best resource for **Concrete Innovations and Answers.**

CONCRETE INNOVATIONS & ANSWERS®
High Concrete Group LLC

With more than 50 years of experience in precast concrete and a firm commitment to innovative thinking and quality manufacturing, High Concrete Group has become a nationally recognized leader in the design, manufacture, and installation of architectural and structural precast concrete products. With facilities serving Southern New England, the Mid-Atlantic, the Ohio Valley, and the Midwest, High products include architectural cladding, high-performance insulated wall panels, parking garages, precast commercial and multi-unit residential structures, and recreational structures.

Call us today to learn more about how our state-of-the-art information, products, and services can help you achieve your project design, performance, cost, and schedule objectives—or to find how High can help you get CEUs to maintain your professional standing.

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Meet High—We provide Concrete Innovations and Answers®

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