

HIGH PRECAST PARKING SYSTEMS



i HIGH CONCRETE GROUP LLC
An Affiliate of High Industries Inc.

CONCRETE INNOVATIONS & ANSWERS®



From concept to completion, High helps deliver your project on scope, on spec, on time, and on budget.

| | |
|---|--------------|
| Precast Parking Systems from High Concrete | 3 |
| High Performance Parking Garage Systems from the Industry Leader | 4 |
| Precast Offers Versatility and Peace of Mind | 5 |
| Superior Performance, Durability, and Quality | 6 |
| CarbonCast: The Next Generation | 7 |
| MEGA-Tees: The Core Component of High Precast System Design | 8 |
| Bay Design, Safety, and Maintenance | 9 |
| High Systems Get You There Faster | 10 |
| High Concrete Accessories | 11 |
| The Surprisingly Green, LEED-Friendly Building Material | 12 |
| Across the Spectrum: Colors, Textures, and Finishes | 14 |
| Appearance and Cost Guide | 16 |
| High Concrete Precast Parking System Detail Gallery | 16–23 |
| Project Gallery | 24–25 |

ON THE COVER:

With innovative use of large, horizontal precast pieces, the award-winning River Street Garage in Harrisburg, Pa. creates a nice balance between heavy and light elements while providing an open design, blending well with its neighborhood's urban character.

© Michael Thomas Photography



Precast Parking Systems from High—The Precast Parking Specialists

More above-ground parking structures have been built with precast concrete during the past 40 years than any other structural system, and High Concrete has been responsible for more precast parking systems than any other company. No other building material can rival precast's design, functional, and economic advantages when it comes to parking structures—open and efficient plans, range of shapes, colors, and textures, fire resistance, low maintenance, acoustical insulation, weather tightness, long-term durability, and fast, all-weather erection.

As the nation's leader in precast parking systems, High combines innovation, proven technology, and extensive experience to deliver unique parking solutions. High excels in supplying revolutionary products such as pretopped 15'- and 16'-wide MEGA-Tees—the widest and shallowest in the industry—and 45'–60' spandrels which deliver exceptionally open and bright interiors and allow increased space for turning. And the latest innovation in precast: stronger, lighter, and more durable pretopped CarbonCast® tees with C-GRID® reinforced, noncorrosive carbon fiber grid.

When it comes to parking structures, High Concrete is your clear first choice. We've provided precast products for more than 5,000 buildings since 1957. High will give undivided attention to crucial details that make the difference in the successful fulfillment of your design intentions. It's this attention to detail at every step that has won us, and the customers we serve, numerous awards from PCI, ACI, and AIA.

Along with quality products, High Concrete Group provides extensive design and specification assistance, connection detailing, erection, and other services to ensure a hassle-free, high quality installation. **That's the High Advantage.**

In mixed-use designs—parking with retail, residential, health care, or office—you can maximize the benefits of precast.

Environmentally Friendly

Safe

Secure

Quiet

Watertight

Durable and Economical

HIGH PERFORMANCE PARKING GARAGE SYSTEMS FROM THE INDUSTRY LEADER

High is the nation's leader in precast parking structures. Put the High design and performance advantage to work for you.

Parking structures are an increasingly common feature of the landscape. They represent a visitor's first and last impression of a facility—an impression that should be positive. Today's designers realize that a garage is not just an add-on, but a design element, integral to the visual whole.

Choices, choices...

The three main structural systems for parking garages are

- Precast Concrete
- Cast-in-Place Concrete
- Hybrid (Steel and Concrete)

Of these, precast offers clear advantages for most designs.

Cast-in-place is prone to cracking and corrosion, requires frequent resealing, and may be made from low-strength concrete.

Cast-in-place may be viable for very small garages with little element repetition, but, unlike precast, isn't suitable for construction during adverse weather conditions and doesn't offer the quality assurance of precast's factory fabrication for long-term durability.

Hybrid structures use precast double tee decks on steel frames, and are often clad with and use stairs of precast or other materials. Hybrids have poor fire ratings, and maintenance can be particularly problematic in the Mid-Atlantic and Midwest where road salt corrodes steel, even when galvanized.

Why Precast?

Why have more above ground parking structures been built with precast concrete? During the last 40 years, no other structural system has been utilized more for above ground parking than precast concrete because precast provides a high performance, cost-effective solution to the unique demands of parking structure design.

- High strength and impermeability
- Superior durability
- Speedy construction
- Unlimited design options
- Efficient circulation design, with wide bays and fewer columns
- Lower cost than cast-in-place or hybrids, especially in urban areas and on larger jobs

Precast Beats Cast-In-Place

Precast concrete exceeds cast-in-place with more consistent results, greater impermeability and strength, and faster and lower-cost fast-track construction. High strength precast concrete is virtually impermeable; it resists the ravages of weather.

Prestressing enables even more efficient structural design by allowing smaller, higher, and stronger members and keeping concrete in constant compression to reduce or prevent cracking.

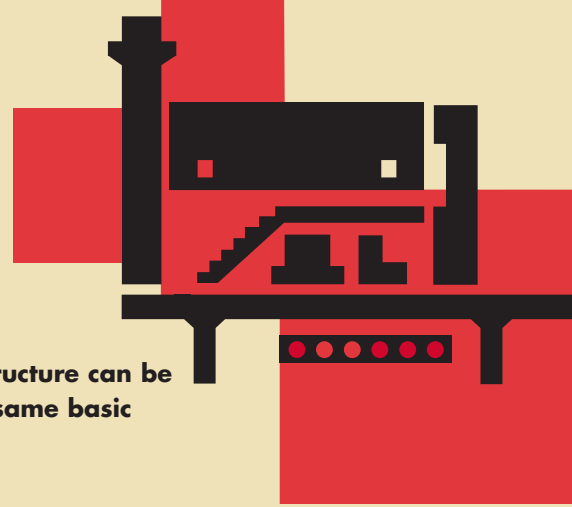
High—the Precast Parking Specialists

Having High as your partner is just one more benefit of using precast. High will give you design and specification help, connection detailing, and support from the initial planning phase of a project through construction. You figure out the traffic flow and architectural appearance. We'll show you how to develop a project to fit your budget. An active design build partner, High can even provide engineer-of-record services for the structure above the foundation.

High Concrete's low-maintenance structure and enclosure systems 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
- Superior durability in salt-laden environments when CarbonCast® MEGA-Tees, with noncorrosive C-GRID reinforced flanges, are used

Any precast structure can be built from the same basic "kit of parts."



PRECAST OFFERS VERSATILITY AND PEACE OF MIND

Unrestrained Design Freedom

Designing with precast gives you ultimate design freedom along with a peace of mind not found with other construction options.

Once you've chosen from precast's infinite appearance options, High will work with you to develop the structure and the details to bring your vision to life, on time and on budget.

With more than 500 garages erected, High Concrete is the nation's leading producer of precast parking systems. Our revolutionary pre-topped 15'- and 16'-wide, long-spanning, 26"-34"-deep MEGA-Tees and 45'-60' 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.

Although an all-precast exterior is always the most economical choice because it serves a dual function—structure and enclosure—a precast parking facility can be clad in whole or in part with glass curtainwalls, stainless steel screened panels, aluminum louvers, and even hand-laid brick veneers.

Often, exterior precast structural stair towers are enclosed with materials such as transparent glass or metal panels, for user security and/or striking visual effect. With such a versatile construction material, the choice is yours.

Standard and Custom Options

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

For more information, call High at 1.800.PRECAST or email concrete.answers@high.net.

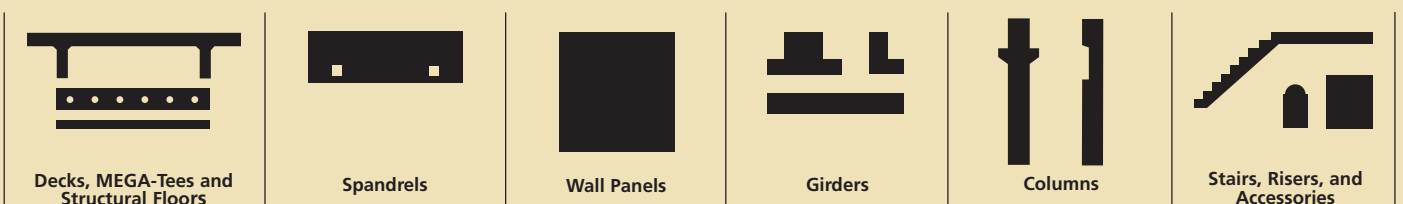
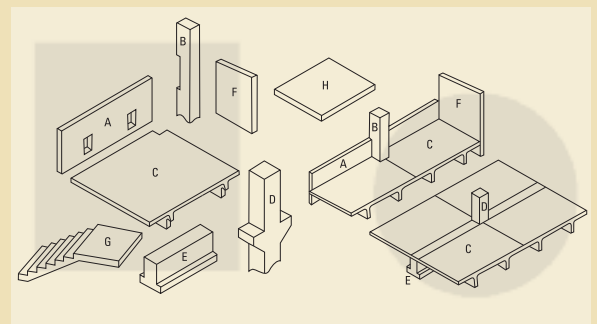


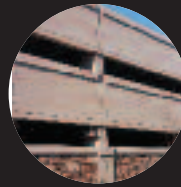
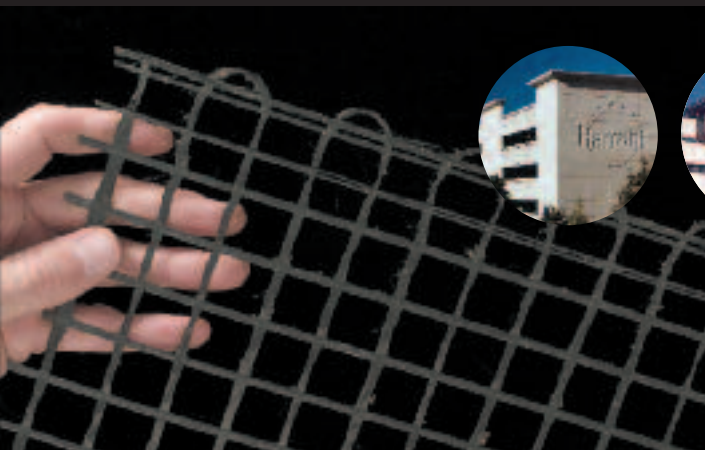
The Parking Garage "Kit of Parts"

Our easy-to-use precast concrete parking garage components include

- A** Spandrels or multi-story structural wall panels
- B** Exterior Columns
- C** MEGA-Tees and smaller double tees where required

- D** Multi-story interior columns
- E** Inverted "T" and "L" girders
- F** Precast light walls and shear walls
- G** Precast stairs
- H** Precast slabs





CarbonCast carbon fiber mesh reinforced precast is lighter and more corrosion resistant—an especially good combination in locations where road salt takes its toll.



SUPERIOR PERFORMANCE, DURABILITY, AND QUALITY

Outstanding Performance

High precast concrete parking systems are extremely high performing, delivering

- **Better parking efficiency**—Large bays and fewer columns and footings
- **Safety**—Inherently superior fire resistance
- **Security**—Excellent security and impact/blast resistance and great structural strength and durability from reinforcing, pre-stressing, or post-tensioning
- **Environmental friendliness**—High thermal efficiency
- **Economy**—Low maintenance and life cycle costs

Corrosion-resistant CarbonCast® enhances performance even more, and does not require initial sealing or regular maintenance resealing.

Optimum Durability

Surveys show that durability and ease of maintenance are top concerns for parking structure facility managers. Once again, precast leads the way. Because it is so durable and corrosion resistant, it retains

its original appearance for many years with minimal maintenance.

- **Abuse resistant**—Superior resistance to the ravages of man and nature such as impact and soil
- **Mold and mildew resistant**—Weather tight enclosures form larger impermeable components that require fewer joints

Superior Quality

High precast parking systems are manufactured under carefully controlled factory conditions that enable concrete mixes with higher strengths and corrosion-inhibiting admixtures to protect steel reinforcing, and consistently high quality.

And CarbonCast with noncorrosive C-GRID® carbon fiber grid doesn't need corrosion inhibitors or surface-applied sealers at all.

- **Consistent results**—Controlled batching and mostly enclosed factory fabrication, under controlled conditions that exceed PCI's Plant Certification requirements
 - Superior to on-site cast-in-place construction

- **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

Post-Tensioned Shear Walls Improve Seismic Performance

A new method to improve building stability and prevent collapse from wind or seismic forces involves casting plastic sleeves into shear walls. Prestressed strand is then fed through the sleeves and post-tensioned.

Studies have shown this to be an effective way to increase structural stability—at a cost lower than conventional methods.



High precast = peace of mind...with expert design assistance, rapid installation, early project completion, and longer long-term durability.



CarbonCast: The Next Generation



Precast concrete is a durable and versatile building material, but parking structures are one of the most demanding applications even for concrete. Now High offers a true breakthrough: CarbonCast®

double tees, with C-GRID® carbon fiber mesh replacing conventional steel mesh flange reinforcing.

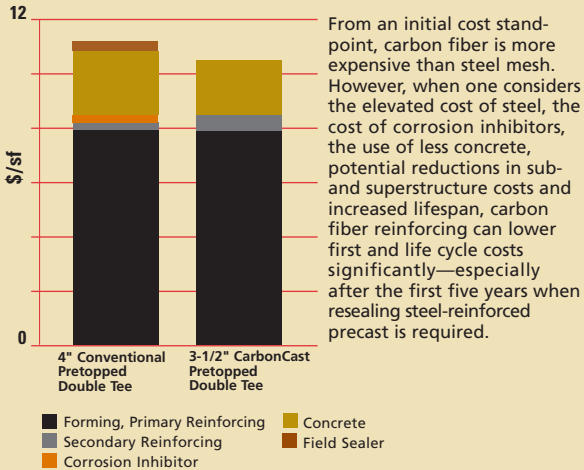
Because C-GRID does not corrode, double tee flange degradation from cracking and spalling is a non-issue. At the same time, pretopped CarbonCast double tees can use less concrete cover—reducing weight up to 12 percent and reducing embedded energy and other superstructure costs.

C-GRID can be placed where it does the most good: along the path of moment diagram in a tee cross-section. CarbonCast can

- Reduce foundation loads
- Support elements and connectors that can be designed for lighter loads and/or wider bays
- Enable increased clearance under shallower tees or decreased structure heights
- Lower shipping and erection costs
- Require less maintenance and perform better, long-term
- Offer greater crack resistance, superior steel reinforcing protection, and faster fabrication and erection compared to cast-in-place
- Be cast to control drainage and minimize ponding
- Better withstand the abusive forces of man and nature—from wind, acid rain, and road salt to earthquakes and fire
- By using MEGA-Tees and long spandrels, reduce the number of joints to be maintained
- Maintain its original appearance for years, with no significant discoloration, staining, or surface decay when properly maintained

CarbonCast is an excellent choice in the Mid-Atlantic and Midwest, where it withstands wintry weather conditions and coastal climates and can be erected year-round.

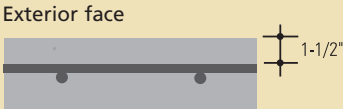
CarbonCast Pretopped Double Tee Cost Comparison Chart



Note: Chart is for comparative purposes only.

Thinner and Lighter, with No Risk of Rust in the "Corrosion Zone"

ACI minimum required cover for steel reinforcing



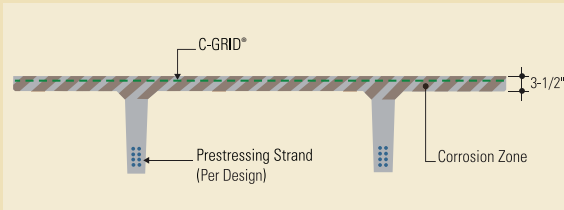
In-use thicknesses begin at 4".

Theoretical minimum required cover for C-GRID reinforcing



C-GRID Eliminates the Corrosion Zone

C-GRID is non-reactive with chlorides, eliminating the risk of spalling, cracking, and deterioration associated with rust in the "corrosion zone."

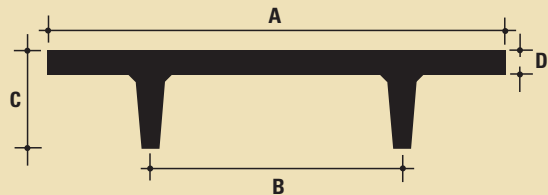


Note: ACI 362 specifies sealer for all precast tees; except when using carbon fiber reinforcement or steel.

CarbonCast® Pretopped Double Tee Size Chart—Widths from 6–16 Feet

| A | Width Range | B | C* | D |
|--------|--------------|------------|----------|--------------|
| 12'-0" | 7'-0"–12'-0" | 6'-0" O.C. | 26", 30" | 3½", 4", 4¾" |
| 15'-0" | 8'-6"–15'-0" | 7'-6" O.C. | 30", 34" | 3½", 4", 4¾" |
| 16'-0" | 8'-6"–16'-0" | 7'-6" O.C. | 30", 34" | 3½", 4", 4¾" |

*As measured from the top of 4" flange to the bottom of stem. For other flange depths add or subtract flange thickness as appropriate.



MEGA-TEES: THE CORE COMPONENT OF HIGH PRECAST SYSTEM DESIGN

The MEGA-Tee Advantage: Fast, Durable, Cost-Efficient— and Great Looking

At the core of virtually every cost-effective parking structure is the 15' MEGA-Tee, a full 25% wider than typical double tees. Long the widest double tee in the industry, it has been joined by the 16'-wide MEGA-Tee for use in 48' bays that facilitate generous turning areas for today's larger vehicles.

Parking structures built with MEGA-Tees offer

- Fewer components to erect and a smoother driving surface
- Improved lighting because there are fewer columns and more open spaces between tee legs
- Lower maintenance costs because there are fewer joints to caulk

High's wide-leg double tees can be shallower than other precaster's tee, even in 12' widths, providing stable, reliable load bearing performance through a double row of prestressed strand embedded deep in each leg. Made of high strength concrete, MEGA-Tees are more impermeable to water than cast-in-place concrete. They may be warped during fabrication for better drainage, and because they're wider, MEGA-Tees have fewer joints for less maintenance and a smoother driving surface than other double tees.

Standard MEGA-Tee Features

- Pretopped, so time-consuming field topping is not required
- Wide arc swirl finish of top surface for multi-directional traction
- Stainless steel flange connectors
- Custom lengths and shapes to accommodate odd or irregular bays

Taking Performance On the Road

Our patented Tilt-Frame Transporter allows cost-effective transportation of MEGA-Tees into almost every market High serves. We can also use these versatile frames to transport 12' double tees into New York City and other tight urban locations with shipping limitations.

Curbs that Eliminate Troublesome Pour Strips

Welded diaphragm steel can now be embedded within 3½" to 4¾" double tee flanges where it is protected from corrosion by high-strength, impermeable precast concrete. As a result, precast curbs may be used to direct water to drains, eliminating corrosion-prone pour strips and achieving a clean-looking, high-performance parking deck surface. Installed on flat-end tees rather than depressed-end tees, the curbs

- Reduce or eliminate the use of low-strength, permeable cast-in-place concrete and the vulnerable joint where it meets the tee
- May be installed in any weather and require no sealer, reducing the number of trades and speeding project completion
- Reduce the overall installed cost of tees, pour strips, and maintenance over time

Options

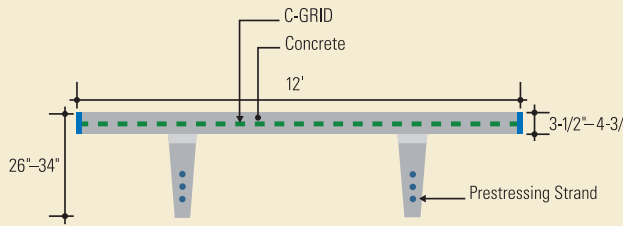
- A wide selection of enduring precast and thin brick exterior options
- Lightweight non-corrosive, CarbonCast® reinforced C-GRID tee flanges
- Corrosion inhibitors to protect steel mesh flange reinforcing
- Epoxy-coated steel mesh for tee flange reinforcing
- Integral end washes
- Pour strips with field cast washes
- 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

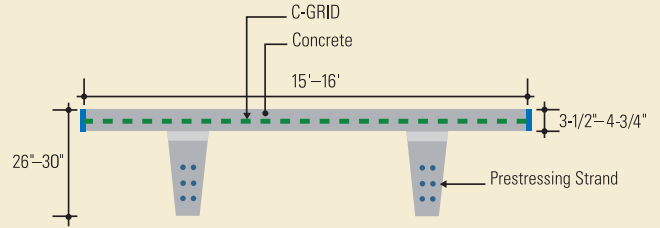
**Our patented Tilt-Frame
Transporter totes 15' and 16'
double tees to most states and
12' Tees into the Big Apple.**



Double Tee



MEGA-Tee



Wide Bays for Efficient Traffic Circulation Design

The open designs made possible by MEGA-Tees make your job easier when designing traffic circulation systems and calculating size of parking spaces. High precast systems using MEGA-Tees provide economical clear spans for parking bays that

- Eliminate more columns between spaces for ease of maneuvering
- Offer more area for full size parking spaces
- Allow for flexibility and ease of restriping to accommodate a variety of vehicle sizes

Mega-Tees are shallower tees using double rows of reinforcing, providing better clearance and improved lighting or allowing for compressed building height.

Precast Takes the Heat

Precast parking structures can be designed to achieve any code-required fire rating, depending on concrete thickness and connection details.

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

- When no fire rating or a one hour fire rating is required, thin-flanged tees (e.g. 3½") and exposed steel bearing and connection details can be used
- Where two-hour ratings are required, thick-flanged tees (e.g. 4¾") and all-concrete bearing and grouted or concrete-covered connection details will be used

StructureCare™

A regular and systematic maintenance program will extend the life and good looks of a parking structure. This consists of periodic inspections and attention to three types of maintenance

- **Housekeeping** including cleaning, restriping, and fixture maintenance
- **Preventive maintenance** including twice-yearly washdowns and maintenance of sealants/caulking and roofing
- **Repairs** such as patching, cracks, and spalls

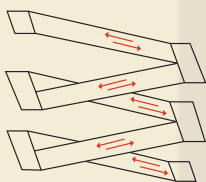
Efficient and Functional Ramp Designs

A full range of ramp designs can be designed using pretopped double tees

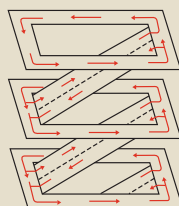


that achieve a fully completed floor with fewer joints. A High Concrete technical representative can help you choose the most efficient ramp layout for your garage based on your specific site and use constraints.

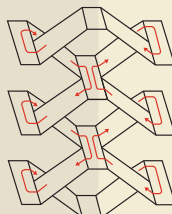
Single Helix
Two way traffic



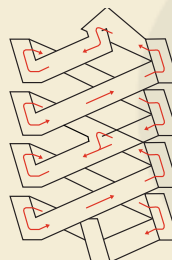
Three Bay Double Thread Helix
One way traffic



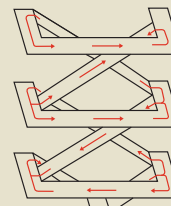
Four Bay Side by Side
Two way traffic



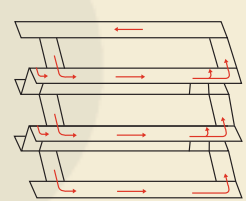
End to End Helix
One way traffic



Two Bay Double Thread Helix
One way traffic



Two Way Split Level
One way traffic





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



HIGH SYSTEMS GET YOU THERE FASTER

Faster and Lower-Cost Fast-Track Construction

Factory-cast and factory-cured components are 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**
 - Reduces site disruption by requiring fewer trades on site and reducing on-site storage, and often allows erection within the structure's footprint

- Reduces general conditions, construction financing, and other carrying costs
- **Rapid installation**
 - Simultaneous erection of structural elements and enclosure
- **Use of MEGA-Tees**
 - Fewer, larger components go up faster with fewer joints
 - Fewer columns and footings
- **Earlier project delivery and occupancy**
 - Reduces general conditions, construction financing, and other carrying costs

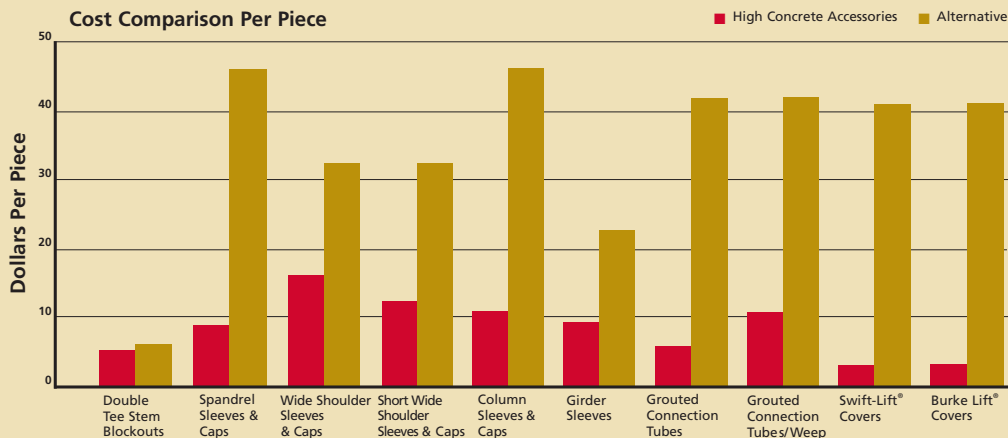


Construction Phases and Time Line

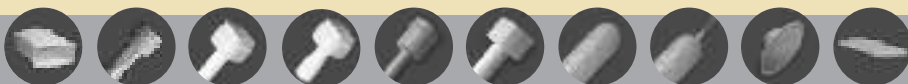
Length of construction in weeks



Estimate how much you can save on your next job using High Concrete Accessories by visiting www.highconcreteaccessories.com and clicking on the Savings Calculator.



HIGH CONCRETE ACCESSORIES



High Concrete Accessories are engineered to eliminate make-shift embedments cobbled together from scrap materials. Noncorrosive and nonreactive, these components install quickly, easily, and securely in any weather, and eliminate grouting, to save time and money.

- **Double Tee Stem Blockouts** provide through openings for conduits in double tee stems or legs
- **Spandrel Sleeves** are designed to facilitate through-bolted connections between spandrels and columns on the inboard side
- **Wide Shoulder Sleeves** facilitate through-bolted connections between columns and spandrels on the inboard side
- **Column Sleeves** are appropriate for through-bolted connections between columns and spandrels on the outboard side

- **Girder Sleeves** are used for anti-roll connections between precast column haunches and precast girders
- **Grouted Connection Tubes** facilitate panel-to-panel connections or connections to cast-in-place foundations and also riser to riser connections
- **Swift-Lift® Covers** cover round lifting devices used on precast components
- **Burke Lift® Covers** are designed to fit oval-shaped holes made by Burke Lifters

High Concrete Accessories is always innovating and expanding its line. Visit www.highconcreteaccessories.com for new product updates.

ARCHITECTURAL ACCESSORIES AND STADIUM RISERS

Accessories

High Concrete offers a full line of accessories that seamlessly integrate with our precast systems, to perform specific functions or simply serve as artistic expression.

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

Signage

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

Stadium Risers

Ideal for mixed use stadium/parking garage applications, 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.





THE SURPRISINGLY GREEN, LEED-FRIENDLY, BUILDING MATERIAL

Concrete is a key solution to modern concerns about energy efficiency, protecting the environment, and using our resources wisely, with many environmental advantages throughout its manufacture and use. And because old concrete can be reused, the energy savings accrue indefinitely, making concrete one of the most environmentally friendly construction materials 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 and sand)
- Portland cement (a fine gray powder)

A growing list of recycled materials can complement this basic list. Portland cement can be supplemented by industrial materials that would otherwise be lost to the waste stream. Ground Granulated Blast-Furnace Slag, a byproduct of the steelmaking process, can add whiteness, strength, and long term durability to concrete. Silica fume, a byproduct of silicon processing, greatly enhances durability and allows for extremely high compressive strength. Even the production of Portland cement uses recycled materials: each year, a single cement kiln can safely burn one million old tires, conserving fossil fuel and reducing landfill.

Stronger, Lasts Longer

Since precast concrete is strong and virtually impermeable, and resists fire, water, and weather, and it has a longer service life than other construction materials. Concrete's durability reduces maintenance and reconstruction, conserving resources.

Use of CarbonCast® with carbon fiber grid reinforcing in double tees and decks increases the longevity of a parking structure even more, especially in areas where salt can aggravate corrosion.

And at the end of its service life, crushed concrete can be reused as aggregate for new concrete.

Parking Structures Gain LEED* Points

Simply designing a parking deck instead of surface parking is one way to get LEED® credits; providing a light colored roof deck is another.

Choice of spandrel and wall system color in precast impacts thermal performance and LEED rating. Light colors help reduce the heat island effect.

When selecting light colors, the aged albedo rating—a measure of a surface's light reflectivity—is important, because concrete can darken slightly with age. Albedo ratings of .3, with ratings up to a highly reflective .7 are possible with many common mix designs, and especially those that employ white cement.

Year-Round Energy Efficiency in Mixed Use Applications

Use of precast for the non-parking sections of a mixed-use design will result in year-round energy savings because the thermal mass of a concrete building reduces temperature swings. A concrete building

- Delays some cooling to off-peak hours, when power is produced more efficiently
- Costs less to heat than a comparable structure made of different materials

Using precast panels allows you to design

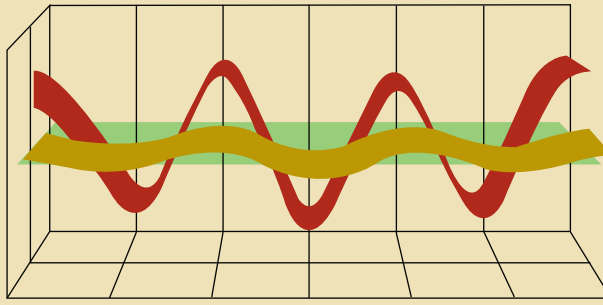
each facade differently to help manage the solar gain or heat loss conditions unique to each orientation.

For instance, thick panels, panels designed for deep window recesses, or integrally cast shading devices can be used on the south to manage solar heat gain, while on the north side, shallow recesses can be used to maximize daylighting. Insulation values can also be varied when CarbonCast panels are used.

*Leadership in Energy and Environmental Design



Precast is excellent for mixed-use designs such as medical or residential atop parking levels or retail below parking levels.



■ Mass Wall Building
■ Conventional Insulated Building
■ Target Operating Temperature

Thermal Mass Effect Can Smooth Heating and Cooling Peaks

The ability of concrete to store energy and dampen the effect of temperature change on heating and cooling systems is known as the Thermal Mass Effect.

Source: PCI Design Handbook, 6th Edition

LEED-friendly attributes available from High:

- Lightweight CarbonCast products
 - Less weight means less mass, less energy, and reduced superstructure mass and cost
- Recycled materials
 - EcoMix™ uses pozzolans made from waste products, which reduces cement content in concrete (e.g. slag and silica fume)



LEED Project Checklist: Precast Concrete Potential Points

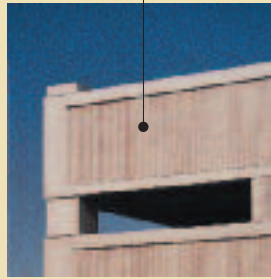
| Leed Category | Credit or Prerequisite | Points Available |
|------------------------------|---|------------------|
| Sustainable Sites | Credit 5.1: Site Development: Protect or Restore Habitat | 1 |
| Sustainable Sites | Credit 7.1: Heat Island Effect: Non-Roof | 1 |
| Energy and Atmosphere | Prerequisite 2: Minimum Energy Performance | — |
| Energy and Atmosphere | Credit 1: Optimize Energy Performance | 1–10 |
| Materials and Resources | Credit 2.1: Construction Waste Management: Divert 50% From Disposal | 1 |
| Materials and Resources | Credit 2.2: Construction Waste Management: Divert 75% From Disposal | 1 |
| Materials and Resources | Credit 4.1: Recycled Content: 10% (post-consumer + 1/2 pre-consumer) | 1 |
| Materials and Resources | Credit 4.2: Recycled Content: 20% (post-consumer + 1/2 pre-consumer) | 1 |
| Materials and Resources | Credit 5.1: Regional Materials: 10% Extracted, Processed, & Manufactured Regionally | 1 |
| Materials and Resources | Credit 5.2: Regional Materials: 20% Extracted, Processed, Manufactured Regionally | 1 |
| Indoor Environmental Quality | Credit 3.1: Construction Indoor Air Quality Management Plan: During Construction | 1 |
| Innovation and Design | Credit 1.1: Apply for other credits demonstrating exceptional performance | 1* |
| Innovation and Design | Credit 1.2: Apply for other credits demonstrating exceptional performance | 1* |
| Innovation and Design | Credit 1.3: Apply for other credits demonstrating exceptional performance | 1* |
| Innovation and Design | Credit 1.4: Apply for other credits demonstrating exceptional performance | 1* |
| Innovation and Design | Credit 2: LEED Accredited Professional | 1 |
| Project Totals | | 20 |

*Up to 4 additional points can be earned, must be submitted and approved (not included in total).
 Note: Scoring System: Certified, 26-32 points; Silver, 33-38 points; Gold, 39-51 points; and Platinum, 52-69 points.

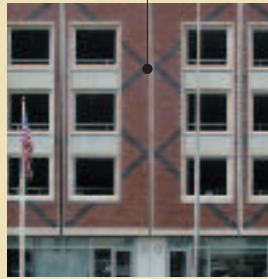
Designs using a parking deck instead of surface parking contribute to LEED credit. A light colored roof deck also contributes to LEED credit.



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



Water wash, acid etch, medium blast



Form finished painted



Medium blast



Light and medium blasts, granite veneer cast into panels

ACROSS THE SPECTRUM: COLORS, TEXTURES, AND FINISHES

Precast Fits In...Everywhere!

HThe problem: a parking structure that must meld seamlessly with an existing building by replicating traditional brick masonry. The solution: precast spandrels cast with thin brick veneer.

That's just one of the ways High can create a parking structure that blends into any environment—from modern to historic, rustic to formal.

In addition to a variety of concrete mix designs to match the performance requirements of your project, High's parking systems can utilize an almost limitless palette of natural colors and finishes.

With such versatile, visually rich material, you can use color, form, and texture to enhance the uniqueness of your design vision using

- Aggregates
- Finishes
- Pigments
- Veneers
- Mixes
- 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.

Color in Concrete

Color is achieved through a combination of pigments, and fine or coarse aggregates added to the mix. High 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, including High's innovative EcoMix—concrete reinforced with pozzollans made from waste products—can improve initial appearance and long-term performance by reducing shrinkage and temperature-induced cracking. Mixes that incorporate these recycled materials can improve concrete's properties including resistance to moisture and 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.

To Seal or Not To Seal

Breathable sealers may be used to keep a surface clean and reduce or eliminate rain or dew-induced shadowing by resisting or preventing liquid moisture penetration. While sealers are not required to "waterproof" high-strength precast concrete, they

- Prevent streaking caused by runoff from glazing systems
- Resist surface mold growth

Sealers can also guard against corrosion in double tees and other components exposed to chlorides. Sealers can be integral to the concrete mix or surface-applied. The two basic kinds of surface-applied sealers are penetrating

sealers and face-filling film sealers. Face filling film sealers prevent moisture absorption but need to be reapplied at regular intervals. Some sealers may affect color or finish appearance; integral sealants affect mix design.

Two-part polyurethane or silicone formulated for adhesion to concrete is recommended, along with an appropriate primer.

Color-Matched Caulks Protect Against Moisture

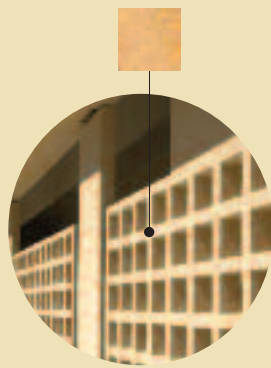
A wide array of color matched silicone or polyurethane joint sealants—aka caulks—are available. Silicone sealants usually have the highest initial cost, but are resistant to ultraviolet rays, and break down more slowly than polyurethane sealants. Polyurethane sealants bond well to concrete, aluminum, etc. and have additives to improve their resistance to breakdowns caused by ultraviolet rays. Both types of sealants can be obtained with 5- and 10-year warranties.

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, green, and more.



Form liner acid etch,
water washed



Pigmented heavy blast



Pigmented light and
medium blast



Medium blast



Medium blast

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

- **Acid etch** Reveals 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
- **Exposed aggregate** Creates a near-full exposure of the aggregates nearest the surface
- **Honed or Polished** Reveals a finish resembling granite or limestone
- **Form liner finishes and reliefs** Use molds to create textures and patterns
- **Form finish** Exposes natural color variations and surface imperfections intact
- **Field paint or stain** Can be applied for economical visual impact

Veneers

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

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

Thin brick is highly impervious compared to full or half-bricks due to its molding process and because an impervious precast panel backer replaces traditional pervious "mortar" joints. Water will not get behind a thin brick-veneered panel and cause bricks to pop off. Thin bricks are modular and course dimensions are fixed, so designs should take this into account to avoid excessive cutting to achieve the desired look. High-strength precast bonds thin brick in place; backs feature keyways for mechanical connection.

Limestone, marble, and granite veneers

(e.g., 1 1/2"–2" thick) can be drilled, fitted with stainless steel pins, and cast into rigid precast backers to provide large, full- or partially-veneered panels. Stone-veneered precast panels can be an efficient way to clad high-rise buildings. For economy, natural stone veneers may be used on lower levels of buildings with precast panels simulating stone on the upper levels

These veneers also eliminate the fire-proofing required to protect steel-framed curtainwall assemblies. To ensure best quality, and to speed installation, sealing between stone joints can be done in the factory, leaving only the sealing between panels to be completed in the field.

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.

Cast-in thin brick looks like full-depth brick but is highly impervious, more economical, and more sustainable.



For more detailed information about color, texture, and finish in concrete, see High's *Precast Concrete Colors and Finishes Guide*.

HIGH PRECAST PARKING SYSTEMS DETAIL GALLERY

| | |
|----------------------------|-------|
| Precast Parking Components | 17 |
| Parking Bay Design | 18 |
| Framing Details | 19–22 |
| Stairs | 23 |
| Project Gallery | 24–25 |

Following are schematic details. Many applications require custom details. High Concrete will do all the final shop drawings and engineer all precast concrete connections. Get standard or custom CAD details by calling us at 1.800.PRECAST.

All panels also available as conventional panels without insulation.

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

| | Appearance Uniformity | Relative Cost | | Appearance Uniformity | Relative Cost |
|-----------------------------------|-----------------------|--------------------------|---|-----------------------|-----------------|
| Shapes | | | Accents | | |
| Perimeter–4 sides | ■ | \$ | Plain (no reveals) | □ | \$ |
| Perimeter–5 or more sides | ■ | \$\$–\$\$\$\$ | Shallow Reveals (3/4" or less) | ■ | \$\$ |
| Non-Rectangular | ■ | \$\$–\$\$\$ | Deep Reveals | ■ | \$\$\$ |
| Curved Shapes/Surfaces | ■ | \$\$\$\$ | Reliefs (repetitive) | ■ | \$\$\$ |
| Punched Shapes (openings) | ■ | \$\$ | Precast Trims and Projections | ■ | \$\$\$\$ |
| Returns | ■ | \$\$\$ | Finishes | | |
| Sizes | | | Form Finish | □ | \$ |
| Small Pieces | ■ | \$\$\$\$ | Paint/Stain/Stucco | ■ | \$\$ |
| Large Pieces | ■ | \$ | Light Blast | ■ | \$\$\$ |
| Thick Panels (up to 2 hour rated) | ■ | \$ | Medium or Heavy Blast | ■ | \$\$ |
| Colors | | | Acid Etched | ■ | \$\$ |
| Standard Mixes (where available) | ■ | \$ | Retarded (exposed aggregate) | ■ | \$\$\$ |
| Custom Mixes | ■ | \$–\$\$ | Integral Sealer (optional) | | \$ |
| Grey Cement | ■ | \$ | Surface Sealer (optional) | | \$\$ |
| White Cement | ■ | \$\$ | Standard High-Repetition Form Liner (ribs, molded brick, stone, etc.) | ■ | \$\$\$ |
| Light Pigments | ■ | \$\$ | Custom or Low Repetition Form Liner | ■ | \$\$\$–\$\$\$\$ |
| Dark Pigments–high dosage | ■ | \$\$\$–\$\$\$\$ | Acrylic Brick (where available) | ■ | \$\$\$–\$\$\$\$ |
| Locally-Sourced Aggregates | ■ | \$ | Thin Brick or Tile | ■ | \$\$\$–\$\$\$\$ |
| Quartz & Marble Aggregates | ■ | \$\$–\$\$\$\$ | Stone Veneer (stone by others) | ■ | \$\$\$ |
| Granite Aggregates (non local) | ■ | \$\$–\$\$\$\$ | Honed or Polished (where available) | ■ | \$\$\$\$ |
| Two Mix Colors per Piece | ■ | \$\$\$–\$\$\$\$ | Form-Finished Edges | ■ | \$ |
| | □ Low | | Other Edge Finishes | ■ | \$\$ |
| | ■ Medium | | | | |
| | ■ High | | | | |
| | | Low \$ → High \$\$\$\$\$ | | | |

Concrete is made from natural materials which vary in the colors they yield over time. High Concrete has 12"x12" samples available to 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 selections. Fresh 12"x12" 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 final color and finish selections. For samples, call 1.800.PRECAST and ask for the sales representative nearest you.



PRECAST PARKING COMPONENTS



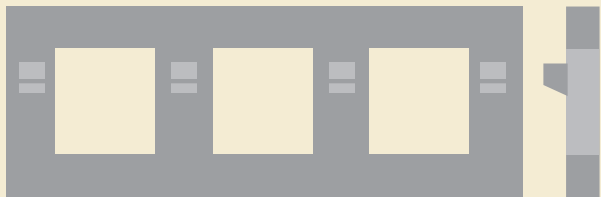
Spandrel with Haunches



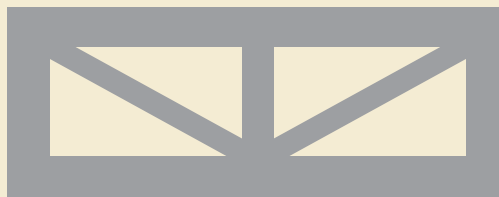
Spandrel with Pockets



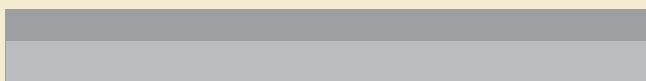
Spandrel with Bearing Ledge



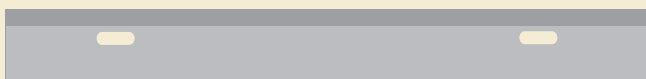
Lite Wall



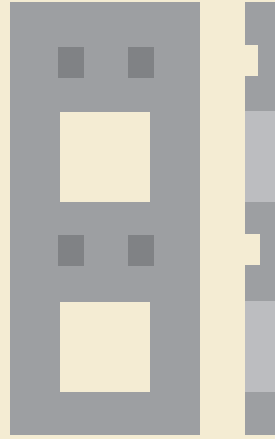
K Frame Shear Wall



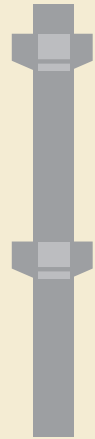
Girder



Double Tee



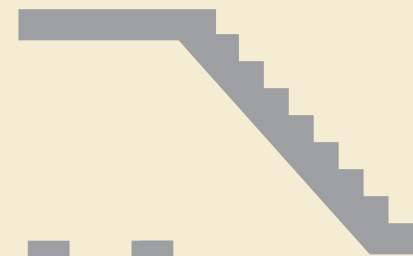
Exterior Wall Panel



Column with Haunches



Column with Spandrel Ledges

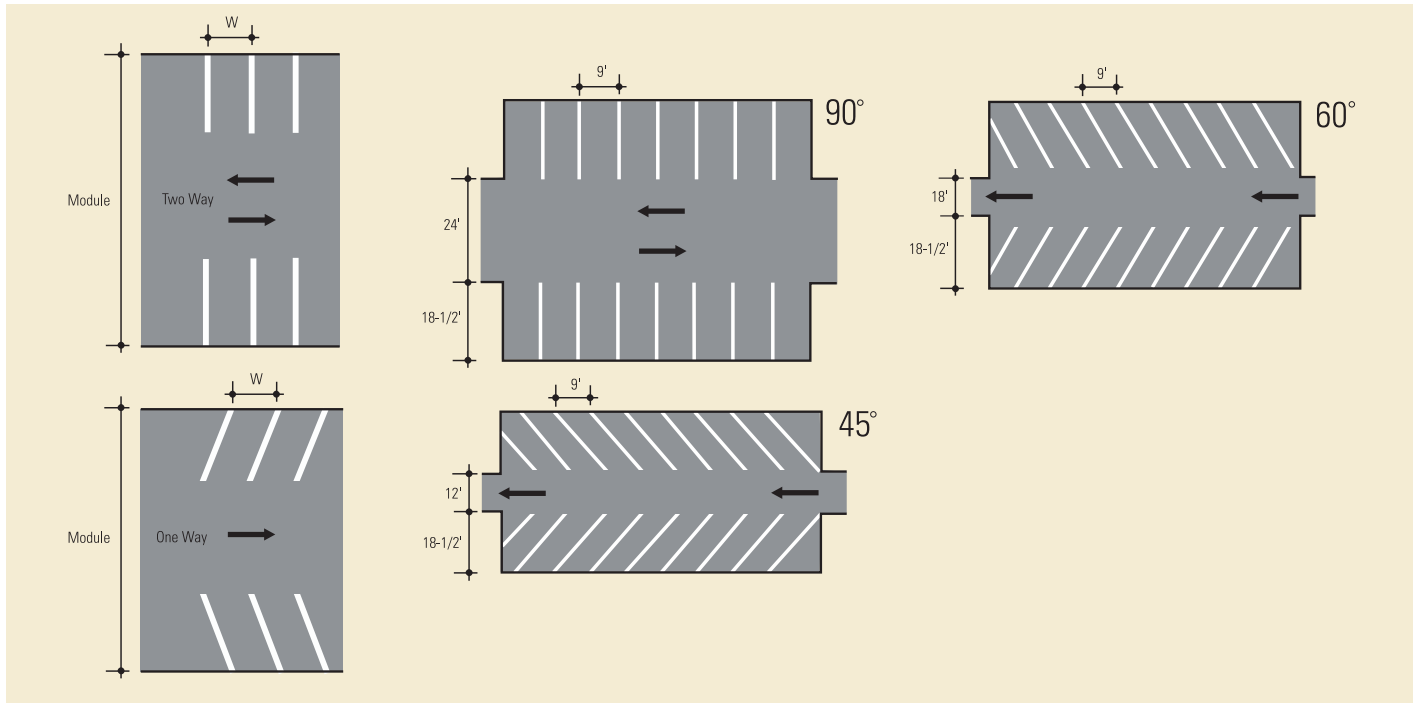


Stairs

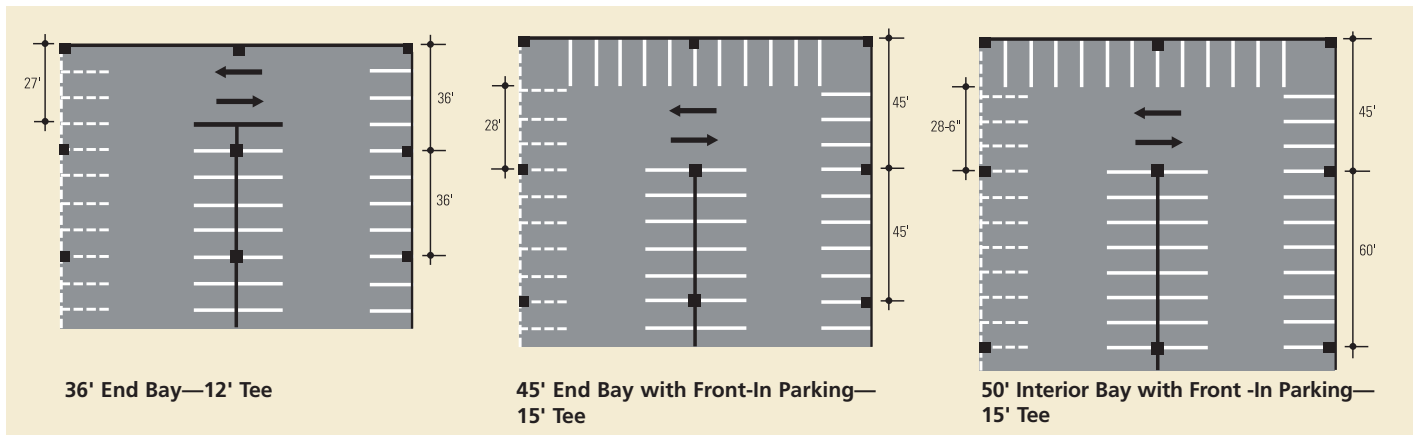


PARKING BAY DESIGN

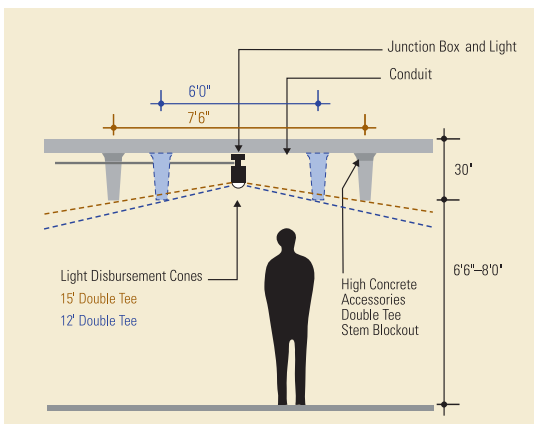
Functional Layouts

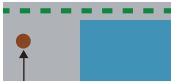


Bay Designs 12' vs. 15' Tees

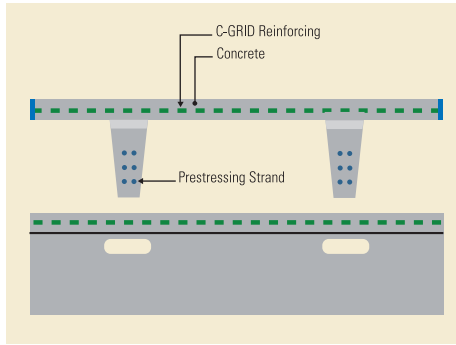


Parking Bay Illumination

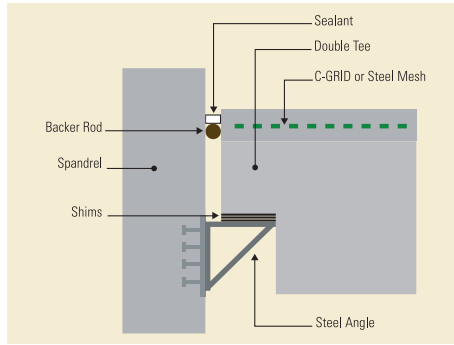




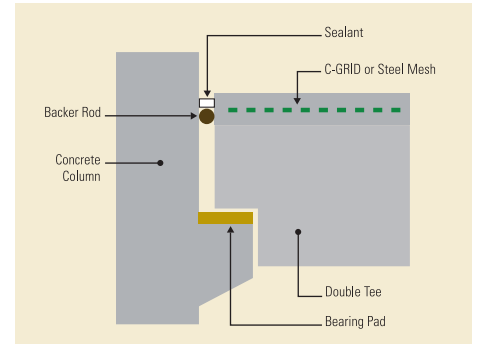
FRAMING DETAILS



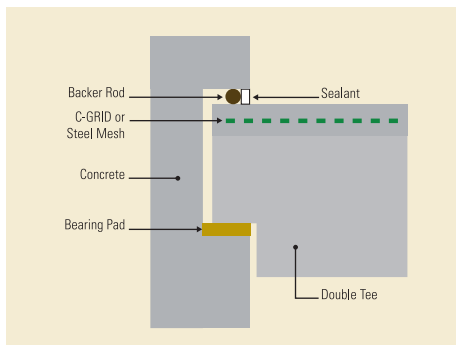
Pretopped Tee



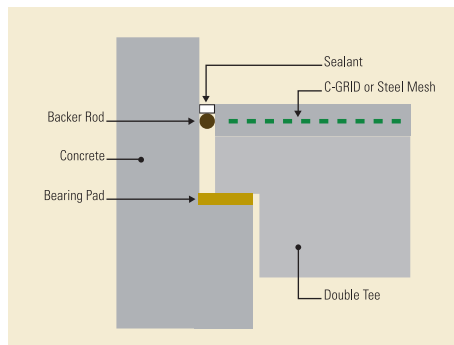
Pretopped Tee—Angle Bearing



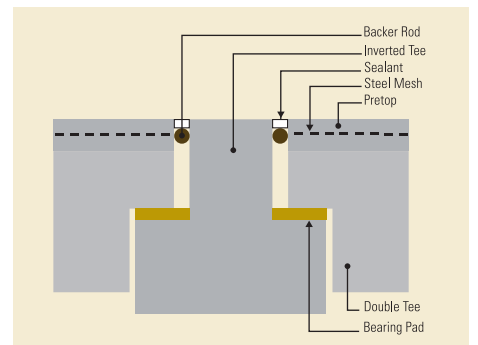
Pretopped Tee—Haunch Bearing



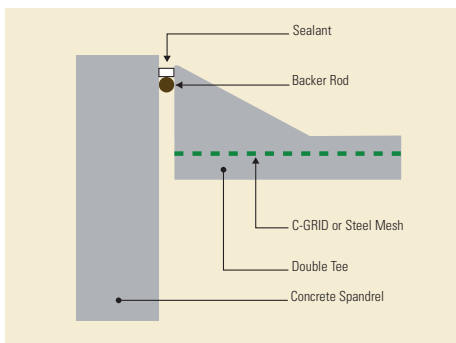
Pretopped Tee—Pocket Bearing



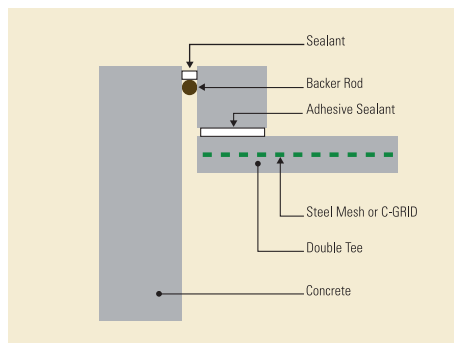
Pretopped Tee—"L" Spandrel or Girder Bearing



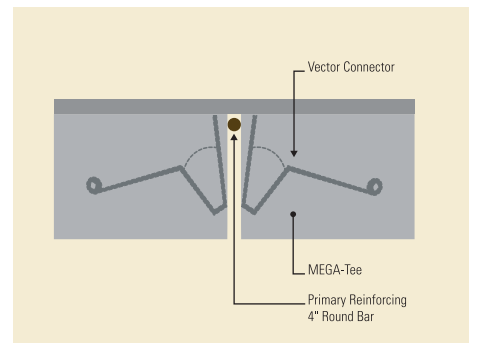
Pretopped Tee—Inverted "T" Bearing



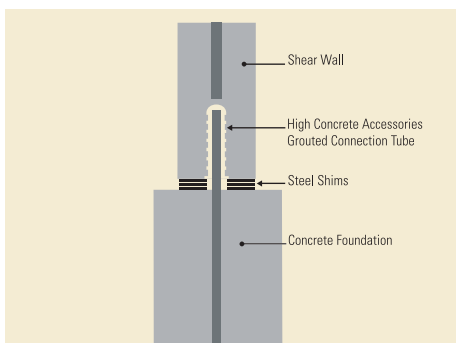
Pretopped Tee



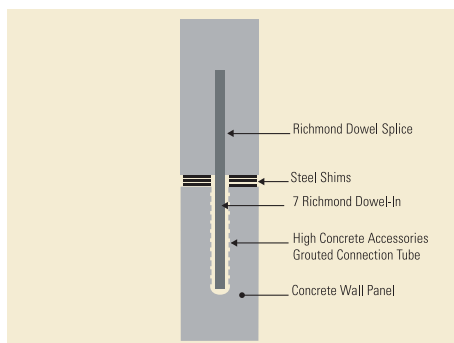
Pretopped Tee—Curbed Wash



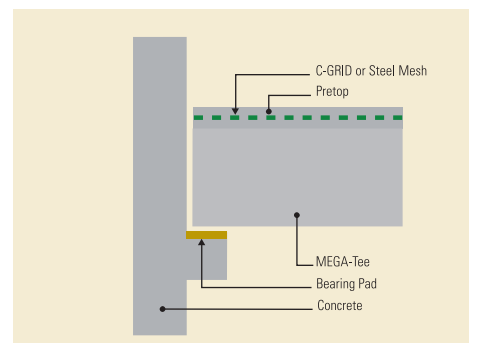
MEGA-Tee to MEGA-Tee—3" flange with lightweight topping



Shear Wall to Foundation



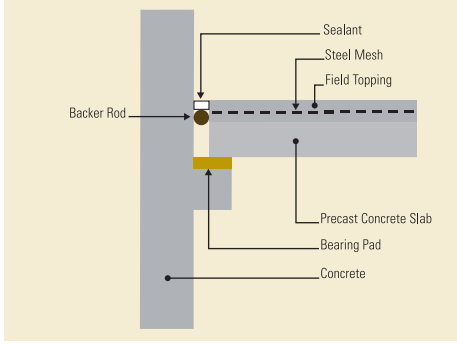
Wall Panel to Wall Panel



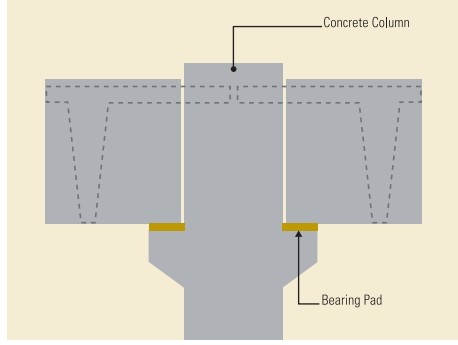
Wall Panel to MEGA-Tee—Haunch Connection



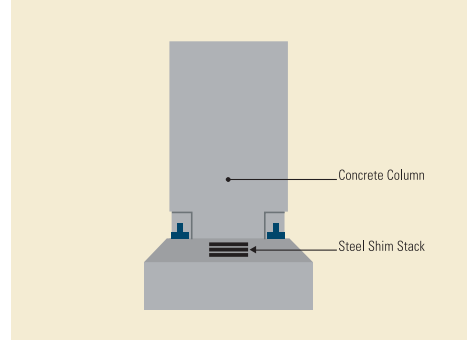
FRAMING DETAILS



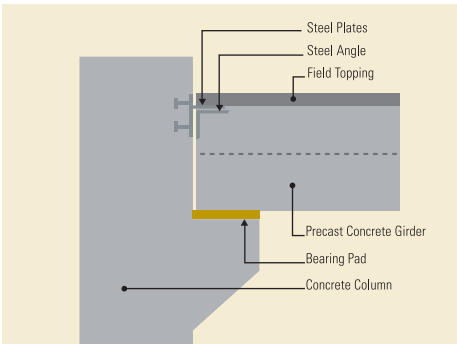
Wall Panel to Custom Precast Slab



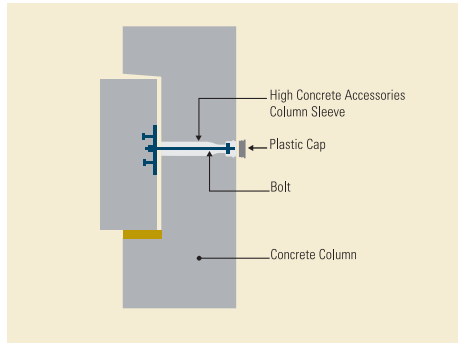
Column to Girder Haunch



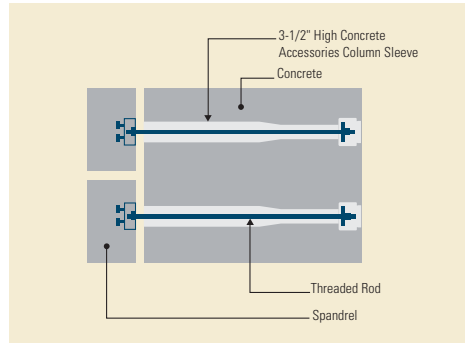
Column to Base or Foundation



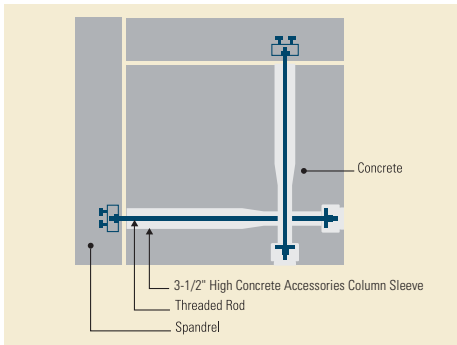
Column to Girder



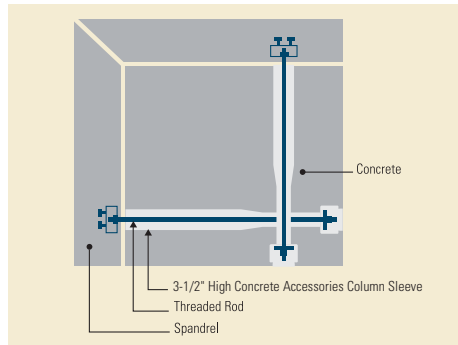
Column to Exterior Spandrel



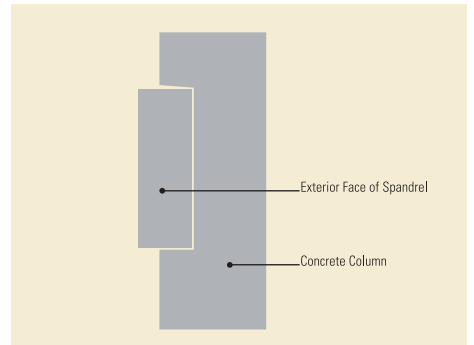
Column to Exterior Spandrel Plan



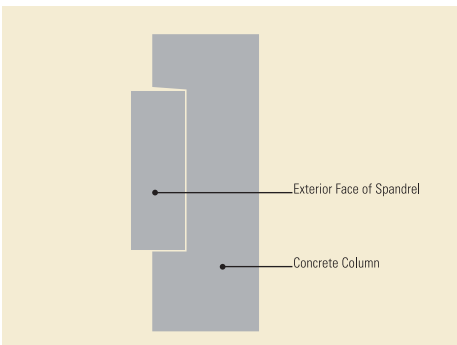
Column to Exterior Spandrel Corner Column



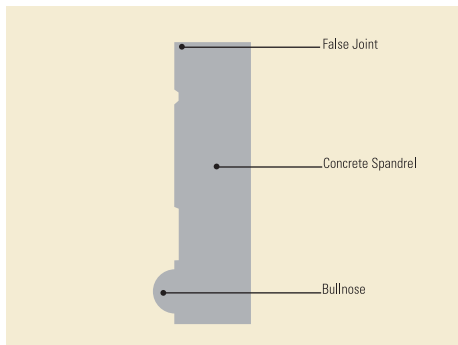
Column to Exterior Spandrel Corner Column 2



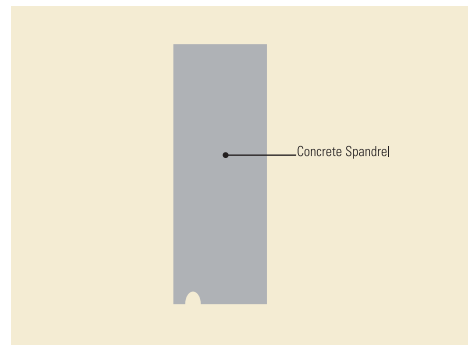
Exterior Spandrel to Column Placement Setout



Exterior Spandrel to Column Placement Flush



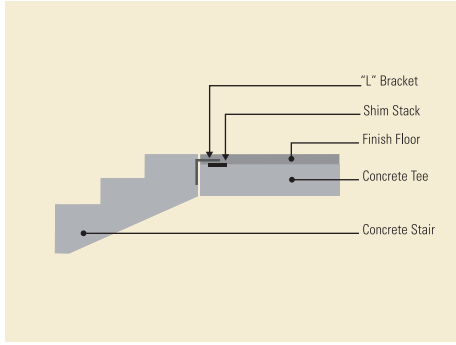
Exterior Spandrel Shallow Reveal



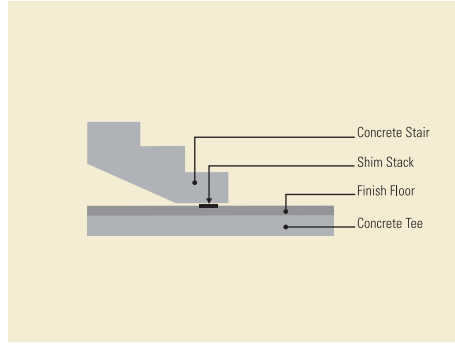
Exterior Spandrel Drip



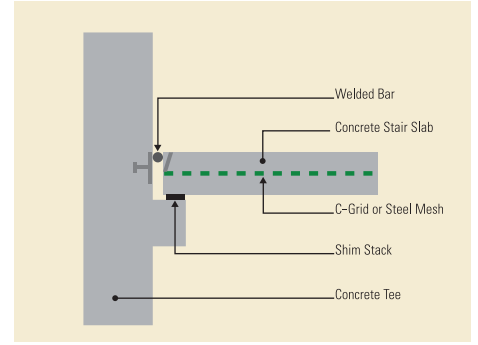
STAIRS



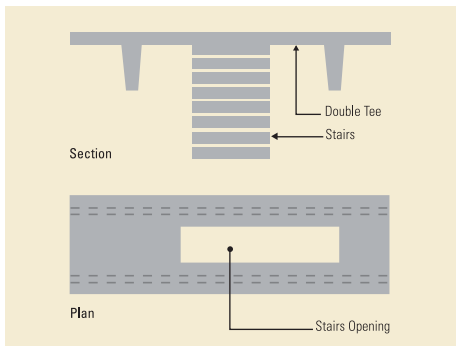
Stair to Tee—Top



Stair to Tee—Bottom



Stair/Slab to Panel



Punched Stairs

PROJECT GALLERY



This page:
St. Joseph's Parking Garage, Philadelphia, Pa.

Opposite page, top:
Lehigh University Alumni Parking Garage,
Bethlehem, Pa.

Opposite page, middle, bottom:
York Hospital Patient and Visitor Parking Garage,
York, Pa.



The High Advantage: State-of-the-Art Technical Expertise; Unsurpassed Precast Construction Experience

High Concrete Group combines innovation, proven technology, more than three-quarters of a century's experience as a building products company, and more than 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 Concrete Innovations & 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.

Our precast products, including the CarbonCast® line of C-GRID® carbon fiber reinforced precast, are manufactured at PCI-certified 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—and superior durability and value—to meet the diverse challenges you face.

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.

We are your single source for the highest quality precast components, systems, and service that keeps your projects on time, on spec, and on budget. We are at your service whenever you need us. Call toll-free 1.800.PRECAST or email concrete.answers@high.net. Visit us online at www.highconcrete.com to download technical information, guide specifications, and details, including CAD drawing files.

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



An Affiliate of High Industries Inc.

High Concrete Group LLC

www.highconcrete.com
1.800.PRECAST (800.773.2278)
concrete.answers@high.net

125 Denver Road
Denver, PA 17517
717.336.9300
717.336.9301 (fax)

344 Pancoast Mill Road
Buena, NJ 08310

95 Mound Park Drive
Springboro, OH 45066

100 Technology Lane
Paxton, IL 60957



Meet High—We provide
Concrete Innovations & Answers®

Need more information?

Ask your sales representative about
these brochures:

- High Precast Building Systems
- High Architectural Facade Systems
- High Precast Stadium and Arena Systems
- High Hollowcore Plank
- High Performance Wall Systems

A complete list of information products including brochures, specifications, details, project profiles, and CAD drawings is available online at www.highconcrete.com.



See us in Sweets in section 03450/HIG
AltusGroup® and CarbonCast® are registered
trademarks of AltusGroup, Inc.

C-GRID® is a registered trademark of
Chomarat North America.

Concrete Innovations & Answers®, SpecIFacts®, StructureCare®,
Eco-Mix®, Swift-Lift®, Burke Lift®,
Mega-TEE®, High® and the lower case "h" logo
are trademarks of High Concrete Group LLC.

LEED® is a registered trademark of the
US Green Building Council.

All other trademarks are the property of their
respective owners.

©2009 High Concrete Group LLC
Printed in the United States of America. 01-09