Precast concrete delivers advantages and benefits for everyone involved with parking structures, from the architect and engineer to the owner and the community. Today's parking structures must be designed, built, and operated sustainably, which has created some new challenges and goals. In many cases, parking structures are expanding their use from solely parking to mixed-use applications with retail, residential, or other uses. There is also an increased use of parking structure roofs for other applications, such as solar arrays and green roofs, which can become areas for employees, residents, and the community to enjoy the outdoors. Deciding to build with precast concrete can help you meet these challenges and goals more efficiently than most other building systems and materials, while contributing toward sustainable goals.
Parking Structures

Calgary International Airport
Parkade Calgary, AB, Canada

Halifax Robert L. Stanfield
International Airport, Halifax NS

Rideau Centre Red Garage Ottawa, ON

GTA Airport Authority: Long-term
And Employee Parking Garage
Toronto, ON
Buildings where precast / prestressed concrete components constitute the entire structural framing system and architectural façade. All major structural building components constructed above the foundation are precast or prestressed concrete.
Parking Garages must have a structural frame and an architectural façade. Instead of typically using exterior columns, beams, and façade support systems, accomplish all this with a single building component using precast / prestressed concrete as both the architectural façade and structural load-bearing member.
Subjected to a full range of ambient temperatures and weather conditions, parking deck design must account for the resultant volume changes due to shrinkage, creep, elastic shortening, and temperature. Because precast / prestressed concrete has already experienced elastic shortening prior to erection, shrinkage has been greatly diminished by proper curing techniques in the factory production, and creep is reduced during storage, only temperature remains in complete effect as a design consideration.
Precaster’s Advice

For aesthetic appeal, your precaster can suggest a number of attractive design possibilities. These can extend past the façade to include the structure’s interior, where traffic flow and lighting reassure users that the structure is secure and offers a light, bright interior. Looking for cost-effective ways to design components and floor plans to allow structural elements to maximize illumination and sight lines? Your precaster can give you some great ideas.
Aesthetics

Rich aggregates, attractive stone and masonry veneers, decorative reveals and joints can express a wealth of architectural detail. These are just a few of the materials that can be incorporated at the precaster’s plant, saving valuable on-site finishing time. For more options http://z.cpci.ca/?d=g4e8y2i0e
First, I'll show you how improvements in fabricating processes allow architectural precast to be created in almost any color, form or texture – whatever is most aesthetically pleasing. This ability to achieve totally customized elements makes precast different from any other exterior cladding material.
Aesthetics

Composed of a unique concrete mixture/mixtures with certain physical and structural properties
- White and/or grey cement
- Aggregates define colour, texture, or natural materials
- Pigmented if required to augment colour
Improvements in the fabrication process have brought about more refined finishes. These range from very delicate ones achieved by acid etching or light abrasive blasting to bold textures and patterns that are created by using form liners. Rich, colorful textures also can be produced by chemically exposing colorful coarse aggregates. Quartered photo showing acid etching, abrasive blasting, texturing & patterning and chemical retarding
A designer can achieve strikingly different colors and textures from a single precast mix simply by varying the finish treatment. The single concrete mix shown here has three different finishes. From left to right, they are acid etch, sandblast and retarded. This multiple-finish technique offers an economical, yet effective, way to heighten aesthetic interest.
A very popular use of this aggregate exposing technique is for replicating dimensional stones such as granite. First, two or three different colored granite aggregates are combined into a single precast mix along with color-compatible sands. Then the aggregates are chemically exposed, making the precast look strikingly similar to polished granite. Typically, this application is about half the cost of dimensional granite.
Form liners with special gaskets allow clay products to be placed accurately within the precast form in almost any pattern desired. As shown here, thin bricks are placed face down in the gasketed liner. Concrete, placed over the thin bricks, bonds with the bricks. At the same time, the concrete becomes the exposed-joint material between the brick units.
Aesthetics

Rich aggregates, attractive stone and masonry veneers, decorative reveals and joints can express a wealth of architectural detail. These are just a few of the materials that can be incorporated at the precaster’s plant, saving valuable on-site finishing time.
Complex and intricate details such as arches, radii, ornate corbels, medallions, and numerous bonding patterns with inlaid brick can be incorporated into the exterior, typically on spandrels and columns. Scopes must be clearly defined and coordinated to ensure shape and veneer pattern accuracy.
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Curvilinear Shapes
Reveals and Joints
Aggregates and Cements
Masonry and Stone Veneers
Artistic Form Liners
Relief Textures
Wide Color Ranges
Simulated Natural Materials

Broad range of architectural styles, shapes, and sizes Precast offers limitless potential for manipulating mass, color, form, texture, and detail. Different aggregates, color tones, textures, and patterns can be designed to differentiate every building. Enhance a building’s visual interest with elements such as ribs, bullnoses, reveals, chamfers, and textures. Precast concrete can be designed to harmonize with other materials: natural stone, thin brick, tile, or terra cotta can be cast into panels.
Parking structures today are often incorporating green roofs or other rooftop applications, such as solar arrays or wind farms. These help reduce heat-island effects and the structure’s energy consumption. Precast concrete’s inherent strength and design flexibility can easily support these loads and design conditions.
Meet your Sustainable Goals

• Components can help achieve sustainability in a variety of ways:
  – Their ability to be recycled
  – Local manufacturing capability
  – Thermal mass
  – Insulation
• These attributes help reduce the expended energy needed to manufacture, transport and erect materials - key sustainable requirements.

Precast concrete can contribute to meeting sustainable goals for parking structures in several ways. Some of these include reducing site impact by not requiring storage or staging areas, as well as being able to be constructed quickly within a tight footprint. Precast concrete also uses recycled materials — both post- and preconsumer — such as supplementary cementitious materials, which can be used to reduce the amount of cement in concrete. Precast concrete is also regionally available, with CPCI-Certified plants within 500 miles of any domestic project. Precast concrete, unlike cast-in-place, is recyclable, as well as reusable and can be designed to be deconstructed and used in other projects, providing the ultimate service life. Overall, precast concrete delivers the aesthetic versatility needed, the performance required, and the value expected, all while helping you meet sustainable goals.
Precast with brick finish makes structure blend in with surroundings.

- Designers of this new four-level, car parking structure in the City of Gatineau (formerly Hull) took advantage of the flexibility and versatility inherent in precast concrete to create an infill parking garage that remains visually interesting.
The system of precast concrete structural pieces helps to reduce the mass and added a sculptural effect that breaks the façade into a series of smaller components.

The structure was designed with projecting columns in front of the spandrels. Columns and panels have accent lines to reduce the scale of the pieces. Many of the precast concrete panels have thin bricks inset at the factory so the structure resembles the other buildings in the area.
The use of a total precast concrete system (258 pieces) including columns, beams, long-span double tees and spandrels panels permitted a compact, efficient construction schedule with little disruption to adjacent properties. The structure was designed for future vertical expansion in mind with heavy load-bearing framing to accommodate additional parking and commercial office space to be added on top of the parking structure.
Metro Park
Halifax, Nova Scotia, Canada

- Metro Park, a new high tech, seven level parking and commercial structure, opened in the early spring of 2002 adding much needed parking spaces in the downtown area of Halifax.
- The building was constructed with a precast prestressed concrete building system comprising of beams, columns, architectural spandrels, shearwalls, litewalls and double tee floor slabs.
Innovative Mixed-use Design

- The layout of the garage is continuous interwoven spiral ramp with two-way traffic flow. The building was serviced with two precast concrete stair towers and one elevator.
Innovative Mixed-use Design

- The designers wanted the Parking structure to lend in with surrounding older brick and stone in downtown Halifax.
- To accomplish this, the lower two floors were clad with earth colored pigmented precast concrete panels to express the architecture of the area.
Innovative Mixed-use Design
Credits

- **Owner:** Halifax Regional Municipality - Halifax, Nova Scotia
- **Developer:** The Hardman Group - Halifax, Nova Scotia
- **Architects:** Duffus Romans Kundzins Rounsefell Architects Ltd. - Halifax, Nova Scotia
- **Structural Consultants:** Campbell Comeau Engineering Limited - Halifax, Nova Scotia
- **General Contractor:** McAlpine Construction - Halifax, Nova Scotia
- **Precast Fabricator:** Strescon Limited - Saint John, New Brunswick
Mixed Use, Retail Offices, Parking

Award Winning Project
Downtown Multi-Use
Parking Facility
Burlington, Ontario

2004 Ontario Concrete Award winner for
Material Development and Innovation
Mixed Use, Retail Offices, Parking

THE CHALLENGE

the building site presented a number of major challenges.

• The structure had to be open and user friendly, operate as a parking garage and also be recognizable as a civic building.

• Minimal material storage was available because the structure occupied most of the site.

• Careful consideration had to be made for access, dust control, noise and the impact on surrounding busy streets.
Mixed Use, Retail Offices, Parking

- **THE PROJECT**
  This 360 car, 6 storey garage and 1,000 sq m office was built using high performance precast concrete that was designed to increase the long term durability of the structure and to endure the corrosive elements of road salt.
- The civic offices were incorporated as part of the precast garage structure.
Mixed Use, Retail Offices, Parking

• THE DETAILS
  267 Double Tees - 11,550 sq m
  29 Beams - 195 m
  103 Spandrels - 1,060 m
  35 Columns - 390 m
  21 Column Walls - 580 sq m
  3 Shear Walls - 370 sq m

• Owner: The Corporation of The City of Burlington
  Architect: Stark Ireland Architects Inc.
  Precaster: Pre-Con Inc.
  Structural Engineer: Brenik Engineering
  Project Manager: Dineen Construction Corporation
Moveable

City Of Ottawa Parking Garage, Laurier Ave, Ottawa, ON

- The parking garage opened January 1988 as a temporary parking unit and was built to be movable.
- The garage houses 373 parking spaces on three floors.
Centrepoint Parkade is located in the heart of downtown Winnipeg, Manitoba. It borders Hargrave Street, covering almost the entire block between Portage and Ellice Avenue, and Hargrave and Donald. This total precast structure boasts over 500 pieces of precast prestressed concrete used over 130,000 square feet of double tees, with a unique grey acid etch spandrel on two elevations. Production began in early 2014 in Wells Concrete’s Grand Forks and Albany plants, and the project was completed in 2015.
Centrepoint Parkade has just over 400 stalls on five levels of parking, and includes monthly and casual parking for visitors and residents. The structure supports new office space, the Alt Hotel Tower, the Glass House Apartments, and the Winnipeg Jets hockey arena, as well as nearby restaurants.
The design of the modern parking garage and the selection of the material must give the project a sense of presence within the urban context while being sensitive to the colour and material palette of the neighbouring culture. Wells Concrete collaborated early in the process with the design and construction team, all located in Winnipeg, Manitoba, This was done prior to selection for insight on the architectural aspects of the precast concrete.
Credits

• **Owner:** 310 Donald Inc
• **Architect:** Stantec
• **Engineer:** Crosier Kilgour & Partners LTD
• **Contractor:** Crosier Kilgour & Partners LTD.
• **Precast Supplier:**
  • Wells Concrete
A key aspect of the design intent was to provide a visual connection between the new garage and the airport terminal building. The project required that clear spans must be provided to ensure openness, clear visibility, and intuitive vehicle movements within the garage. This was accomplished by employing 60’ double tee members that ran north to south in alignment with the vehicle main drive aisles.
In reviewing the design options for the major structural system to be employed, precast concrete quickly became the obvious choice for reasons of cost, clear spans, quality control, and speed of construction.
Halifax International Airport Parking Garage

The form liner and exposed aggregate provides for an interesting architectural treatment.
“Clean” form liners provided for a smooth perimeter finish to the garage picture window.
Custom form liner in production.
Construction of the shear walls with punched openings.
Education

- For more information on Precast Concrete
- Parking Garages
- www.cpci.ca
CPCI Certified Members

For more information on CPCI Certification

www.precastcertification.ca
Thank You

Precast Concrete...
Sustainable Structures for Tomorrow!