WITH APPROPRIATE design and the correct use of materials and manufacturing processes overseen by skilled personnel, precast concrete provides the strength and durability that is synonymous with concrete.

Manufactured in a dedicated off-site facility, precast concrete can meet tight quality controls, while its portability is ideal for transport and rapid on-site erection.

Precast is all around
Precast concrete components can be found throughout the built environment with building applications including offices and residences, correctional facilities, retail complexes and multi-level car parking structures.

For specific building components, precast concrete can be used for floor, wall, column, service core and stairway requirements.

Precast prestressed concrete is also used in highway construction, rail and pedestrian bridges and in civil applications for tunnels and mining infrastructure. Familiar precast elements include concrete poles and retaining and noise walls, as well as road barriers.

Enhanced durability
Concrete’s ability to resist the ravages of the environment is well recognised. Fabrication in a controlled setting, where mix design, compaction and curing can be closely monitored, serves to enhance the durability of precast concrete.

Fire resistance
Precast concrete is non-flammable and non-combustible and an extremely effective fire shield. Most concrete structures survive fire and can be repaired to reduce inconvenience and cost.

Thermal and acoustic properties
The mass of internal precast concrete helps reduce temperature fluctuations - when exposed to the sun, it absorbs heat during the day and releases it through the night. This mass also provides sound separation between adjoining rooms and from exterior sources.

Design versatility
The initial plasticity of concrete allows for complex structural and architectural shapes to be formed. This, combined with a myriad of colours, formliner profiles and surface
finishes, means precast concrete remains popular with designers.

**Fast construction**

As soon as drawings have been approved, the manufacture of precast components can begin off site while on-site foundation work gets underway. The process overlap means a shortened construction timeline.

**Structural capability**

Loadbearing precast concrete wall panels and columns form a critical part of the structural frame, providing support for floors and roof. Reinforcement, including prestressing, ensures the structural capability of precast components as required, while connections are constantly evolving.

**Sustainable aspects**

Precast concrete’s sustainability features include using greywater and recycled concrete aggregate, while off-site manufacture means optimum use of constituent materials and reducing on-site health and safety hazards. For more: Visit www.ccanz.org.nz and www.precastnz.org.nz or see the Precast concrete handbook (2009) published by NPCAA and CIA.

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**Q Theatre, Auckland**

Q Theatre, a new performing arts facility on Auckland’s Queen Street, makes extensive use of precast concrete and reused the existing concrete frame to deliver a building of character and beauty within rigorous budget constraints.

**THE PRECAST CONCRETE-CLAD** auditorium building designed by Cheshire Architects extracts the maximum value from the material by using its structural capacity for shear walls, its mass for acoustic separation and its free-form potential and texture to enliven the façade.

The 2,234 m² of complex precast concrete panels were developed in collaboration with Nauhri Precast, the project engineers and theatre acoustician.

The panels use naturally pigmented McCallum’s aggregate, ground and off-form surfaces, tessellated geometry and applied dye to generate a consistently coloured and dynamic surface.

**PANELS CAST FROM TWO MOULDS**

The façade pattern and panel divisions were designed to allow all cladding and shear wall panels to be cast from only two moulds. Precast panel sizes were optimised to help reduce transport and crane costs while maximising production efficiencies at the same time.
The use of precast panels offered a way to control concrete mix, mould design and surface finish to create façades that help generate a unique identity for the organisations within the theatre while fitting comfortably into the varied heritage cityscape.

BLEND WITH SURROUNDING BUILDINGS
In particular, the textured and coloured panels align with the brick rear façades of the neighbouring Queen Street shops and also provide a graffiti manageable and non-abrasive surface on busy pedestrian access routes. The exposed aggregate also references the base level stonework of the Town Hall.

TIGHT SITE AND TIGHT BUDGET
Working on a tight site, with an even tighter budget, the project team, which also included Holmes Consulting and Naylor Love Construction, used precast concrete to help transform a redundant historic building into a popular civic facility.

Q Theatre enriches its setting and has become an important part of the city’s streetscape, anchoring Auckland’s cultural precinct and demonstrating its success through a regularly packed auditorium.

Note: The Q Theatre project won the Excellence in Commercial Concrete Construction at the 2013 Concrete Sustainability Awards.