Civic Tower

Ultrafloor role in Civic Tower success

On the corner of Castlereagh and Goulburn streets in the Sydney CBD, construction contractors Grocon have been remodelling and extending the old Masonic Centre, extending it upwards by thirty-five storeys from the massive inclined precast columns that support the base of the building.

The original floor design was for a post-tensioned concrete slab with a total thickness of 420mm to cater for the live load of 4kPa plus an additional 1kPa for superimposed live load as well as a 10kPa live loading for a compactus in some zones. Involving NPCAA member Ultrafloor in the planning stage, the Grocon design team were able to bring about savings in construction time and floor zone thickness.

Precast manufacturer
Ultrafloor

Principal Contrcator
Grocon

Builder/head contractor

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Conventional Ultrafloor is a system of profiled precast beams set between 500mm and 700mm apart and in-filled with fibre-cement formboards. Reinforcing mesh is placed over it and the concrete topping is poured. This system caters for spans of up to about 8m under conventional office loading, and can be combined effectively with the company's band beam systems to provide the support structure.

The programming challenge of the Civic Tower required a flooring system with a greater spanning capability, but with the speed of erection associated with precast concrete.

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This led to the selection of the new Ultrafloor Metaldeck system, tested earlier at Melbourne University for structural integrity and resonant frequency. Protruding shear reinforcement trusses in the precast beams ensure proper engagement between the topping and precast concrete, and provide longitudinal shear capacity. Spacing the beams typically at 1.7m, spanning up to 11m, and bridging the gaps with a 0.75mm gauge ribbed metal sheet, the floor thickness was reduced to 370mm. This is made up of 250mm deep precast beams and a 120mm concrete topping thickness. RF82 mesh is placed over the deck before the 32MPa grade concrete is placed in-situ. The ends of the Ultrafloor beams are founded onto the primary structural frame, and along the façade that came from 100mm deep pockets cast into the slip-formed shell. One row of midspan props is the only other support. Up to 1000m2 of Metaldeck floor needed to be installed per day to keep up with the slipform.

A principle feature of the project has been the rate at which the levels have been added. Judicious planning by Grocon with its consultants, aided by the extensive use of precast concrete elements, led to a revolutionary construction method whereby a level is added every three to four days. This was achieved by employing a three-level high slip-form to cast in-situ the exterior shell of the building with reinforced concrete. After three or four days the form is raised to its next position and the interior of the building is constructed, including the 950 square metres of suspended concrete floor per level, the window units and the mechanical services ducting. The plasterboard for the internal walls is brought onto site at this stage. Being able to preload the floors negates the need for loading platforms and contributes to minimal site handling of materials. All these works require an uncluttered, clean site with a minimum of waste. This is where the precast floor elements delivered their benefit.