

John Holland overcomes challenging site with reliable concrete framing

Construction of a new thirteen storey office building in Parramatta's CBD created unique challenges for builder John Holland due to the site's historical importance. An archaeological team required over four months of the valuable project schedule to investigate the site.

With the available construction program greatly reduced, and an anchor tenant and contract finish dates locked in, the design and construct team opted for fast and flexible concrete framing.



A concrete framed solution

The adopted solution consisted of a reinforced concrete core and columns for the vertical elements, and floor system of post-tensioned slabs and band beams. This provided a structural system that, through its simplicity, facilitated rapid work flow in both design and construction phases. Turn-around time from completion of final design drawings to construction of concrete structural elements was minimised, which allowed John Holland to meet the ambitious programme.

The building was designed on a standard 8.4 m grid. Floors consisted of 300 mm thick post-tensioned band beams of maximum 11 m spans and 150 mm slabs constructed with metal deck permanent formwork.

Colonial First State Properties Building

101 George Street, Parramatta, NSW

developer:

Leighton Properties Pty Ltd

builder:

John Holland Pty Ltd

structural engineer:

Taylor Thomson Whitting

architect:

Architectus

Construction cost \$45 million

12 storeys above ground, two below

Excavation to roof completed in 11 months

17,900 m² total net lettable area

8.4 metre column grid

25 to 60 MPa concrete used in structure



Fit-out follows closely behind construction

Concrete framing provides superior value

Following an initial review of several alternative solutions for the structural framing system, the combined experience of the design and construct project team soon determined that concrete best met the key criteria of cost, speed and reliability of material and labour supply.

\$1 million cost saving achieved...

One million dollars cost saving on the building frame construction was achieved through a last minute design revision. Moving the columns in by 3 m on two facades and 1 m on the other two facades produced smaller more efficient cantilevered beams with simplified beam-column connections and overall column layout. Such a dramatic change to the structure was only possible in concrete due to its inherent flexibility in both construction and design.

Four day floor cycles achieved with half floor construction method...

2000 m² typical floor plates were split into two separate pours of a half floor each, which gave a better logistical flow for the raw materials each week, and improved economy of formwork, propping, reinforcement, and concrete supply.

Early strength concrete that achieved 22 MPa strength at 3 days was utilised to allow early partial stressing of the post-tensioned beams and slabs, and early partial stripping of formwork shutters. The resulting half floor construction method achieved a full floor cycle of four days.

Reliability and flexibility of concrete framing lowers risk...

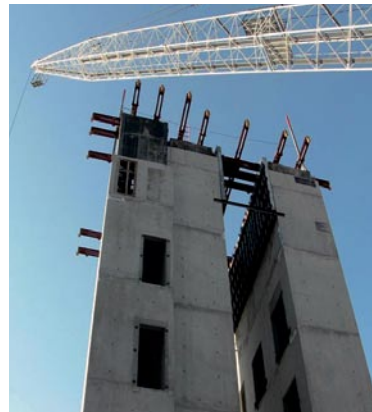
Major risk areas considered by the project team included material and building price rises, meeting the schedule and material supply, all of which were minimised by opting for concrete framing. No one could have predicted however, that the time tested reliability of building in concrete would also help John Holland to make up the unforeseen time delays that arose from a significant archaeological find.

The inherent flexibility of concrete allowed last minute changes, such as the column shifts, to be made throughout the construction period with minimal lead time required between final drawings and construction. Another example occurred when the contracted anchor tenant requested the late inclusion of inter-tenancy stairs between selected floors. This was easily provided with the flexibility of concrete, and in addition, future provisional inter-tenancy stair sites were also incorporated into the structure.

Innovative basement solution...

The site was close to the Parramatta River and actually located in a natural water course contained in a sand aquifer. Consequently the excavated basement area was subject to a high water table. This created challenging water proofing problems for the two underground basement levels. An innovative integral water proofing system incorporated in the concrete walls and floors provided a dry, water tight solution.

Jump-formed core construction



Core construction topped out

Key features of the design-and-construct solution:

- Compressed construction program achieved by using concrete.
- Integral water-proof system for basements located below the water table.
- Jump-formed core construction.
- Post-tensioned floor plates.

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