

# Steel lightens building's

## 77 King Street Sydney

An established inner-city building has received a new lease of life with a lighter-weight composite steel frame solution providing five new levels (four floors and steel roof) that allows more advanced, roomier and environmentally friendly facilities.

Located on the south west corner of King and George streets, 77 King Street was a 34 years old, 19-storey tower in Sydney's CBD, well set to become an A Grade building in line with the Property Council of Australia guidelines.

The client wished to retain the existing building, a former retail bank, office and computer centre, while optimising retail opportunities at or near street level and high quality commercial premises in the levels above.

With careful planning of the staged demolition and rebuilding by engineers, Arup maintained the structural integrity of the building whilst maximising the building's potential within budget, structural and environmental parameters.

"Factors such as strength of the existing building below the new levels, costs and time, meant that steel was the best choice as it proved lighter than post tensioned concrete and traditional reinforced concrete," Arup Structural Engineer, **Steven Lindsay** said.

The existing building was stripped back to a concrete shell and the refurbishment includes a complete rebuild of all services and lifts, interior fit-out, new façade and relocation of structural slabs, strengthening columns and walls plus two new escalators, an additional stair shaft and two new lifts.

The existing façade was removed and new ones constructed on both the George Street and King Street faces. The George Street façade will be a modern glass curtain wall system while the King Street elevation will have an interesting random stone and pocket window façade.

A comparatively light-weight composite steel frame solution was selected so that strengthening the existing foundations, columns and core elements were kept to a minimum.



# load on landscape

*"Steel was the best choice as it proved lighter than post tensioned concrete and traditional reinforced concrete."*

The development application required the Principal to enter into a Commitment Agreement to refurbish the building to achieve a 4.5 Star ABGR Rating with NSW Department of Energy, Utilities and Sustainability (DEUS).

This DEUS Commitment Agreement required the investigation of innovative mechanical and electrical solutions for the building. This was achieved by using 'chilled beam' technology with passive beams used for the centre zone and active beams for the perimeter zone of the floor plate where the heat loads are greater.

Using this system has lowered the need for supply air risers as well as eliminating most of the required beam penetrations in the new structural floor systems as the chilled beam coolant pipes are fitted under the secondary beams.

Once it was decided that the new floors would be constructed out of structural steel it became evident that the fast erection time (with steel construction) would not be fully utilised if the core was to be extended using traditional reinforced concrete. It was therefore decided to extend the core using pre-cast concrete.

"The procurement lead time for steel and pre-cast concrete is similar, resulting in faster floor-to-floor cycle times minimising any delays on site," **Daniel Graham** of Built NSW explained.

There is also significantly less scaffolding required on some faces of the building as the pre-cast extends 1.2 metres above each new level, providing perimeter edge protection for deck installation and pouring.



## Re-inventing existing space

The revamping of the building from a Westpac office, computer centre and retail bank branch focused on the prime retail location of the corner of King and George streets.

The site has major exposure so naturally the ideal tenants for the lower levels should be retail. The two existing basement levels were originally designed to be a loading dock and basement parking. Significant opportunity was realised by repositioning the basement levels through demolishing the existing low ceiling floors, excavating and re-pouring new floors so the area could be re-used as higher clearance retail floor space.

This achieved two new retail floors with ceiling heights of each over 3.5 metres. These basement floors have since been leased by Rebel Sport.

By relocating the lower plant room to the roof, installing a new lift and creating new stair penetrations through the slabs to connect the first three levels above ground meant that the space could be used as a major retail outlet with a total area in excess

of 2500sqm. Apple jumped at this opportunity to create their first 'Apple Store' in Australia.

This careful planning of the staged demolition and rebuilding of the new structure ensured that the structural integrity of the building was maintained and delivered a more environmentally friendly permutation of an existing building.

### Project Team

**Owner Developer:** Kingvest

**Project Manager:** Cerno Management

**Structural Engineer:** ARUP

**Concept Architect:** Burley Katon Halliday

**Project Architect:** Peddle Thorp and Walker

**Contractors:** Built NSW

**Steel Fabricator/Erector:**  
24 Hour Fabrications

**Detailer:** Straightline Drafting

**Shear Studs Fixing:** Santana E Compania