

ComFlor Case Study

ComFlor 80: Bellagio



ComFlor employed in construction of Wellington's Bellagio Apartments

Project Summary

Project name: Bellagio
Location: Taranaki Street, Wellington, NZ
Structural engineers: Connell Wagner Ltd.
Designed by: Architecture + Ltd., Campbell Pope Architects
Main Contractor: Wellington Construction Ltd.
Project type: Apartment
Mid-floor: ComFlor 80
ComFlor used: 5500sqm

Apartments designed for seismic damage avoidance

When local developer Washington Limited commissioned its up-market Bellagio Apartments for Wellington's Taranaki Street, the brief to the architect was: "Bring Oriental Bay standards to the inner city."

The original design by Architecture + Ltd. provided for two basement parking levels with eight storeys on top. The narrow footprint between Molly Malone's on one side and a clothing outlet on the other meant that there was a constraint on foundation piling. Wellington Construction Limited, as the main building contractor, together with consulting engineers Connell Wagner Ltd., determined that the best solution was an anchored raft foundation that would sit on compacted gravel.

Excavation began preparatory to the construction of retaining walls and underpinning for the adjacent buildings. It stopped abruptly when the diggers uncovered a Maori archaeological site dating from the pre-European era. They'd come across the ponga log walls of three huts, a rare find in the city.

"As the structural steel rose above Taranaki Street, it was quickly followed by the ComFlor 80 flooring system. This was topped with concrete reinforced by ductile high strength 1.2mm mesh."

Three months later and after some intense negotiations with Wellington City Council, work resumed. The artifacts had been preserved and would be integrated into the building, with two of the huts viewable by the general public and the third kept for exclusive use by the local iwi. To compensate for the loss of two basement parking levels, Bellagio Apartments obtained Council approval to add three levels above ground, two of which would be used for parking.

Why ComFlor?

Performance:

ComFlor's design is highly developed offering the longest spans of any steel deck in New Zealand reducing the number of beams and piers required through the apartments.

Simplicity:

"ComFlor 80 was specified because it does not need to be propped, saving time on the construction programme". (Source: SCNZ magazine)

Cost efficiency:

Saving time on the construction programme meant that the project could be completed earlier meaning faster access to rental revenues.

Sustainability:

As with all steel products, ComFlor is fully recyclable at the end of the building's life.



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Composite floor decking

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Campbell Pope Architects were responsible for this next iteration of the design, which called for seismic moment frames along the two long walls and eccentrically braced frames in the shorter direction. But the preservation of the archaeological sites effectively left three large holes in the foundation raft. Connell Wagner's Project Engineer, Darrin Bell, says: "The challenge thus presented was met by surrounding the artifacts with two metre high steel boxes. A special glass cover goes on top for viewing. We combined the raft with 1.1 metre deep strip footing. A total of 12 ground anchors were dropped directly under the main seismic columns of the steel frame.

"We deliberately designed the building for damage avoidance by using an adaptation of the self-centering sliding hinge joint concept pioneered by Dr. Charles Clifton of NZ HERA. The sliding joint design allows for a seismic resisting system to be engineered that reduces acceleration on the floors during a severe earthquake, without degrading in strength or stiffness during severe shaking. Once the earthquake has stopped, the structure returns to the pre-earthquake position and minimal repair should be required."

SCNZ design support engineer Alistair Fussell says: "The sliding hinge joint is much like a connection fuse that allows the engineer to design a beam's strength and stiffness as if they were separate."

Some 200 sliding hinge joints were used in the steel structure. MJH Engineering Ltd.'s managing director Malcolm Hammond says: "Our workshop soon picked up the technical tempo and we adjusted our fabrication methods to suit. On site work went very smoothly and we completed the erection of the steel frame in around 16 weeks."

As the structural steel rose above Taranaki Street, it was quickly followed by the ComFlor 80 flooring system. This was topped with concrete reinforced by ductile high strength 1.2mm mesh. Martin Lee of Composite Floor Decks says: "ComFlor 80 was specified because it does not need to be propped, saving more time on the construction programme."

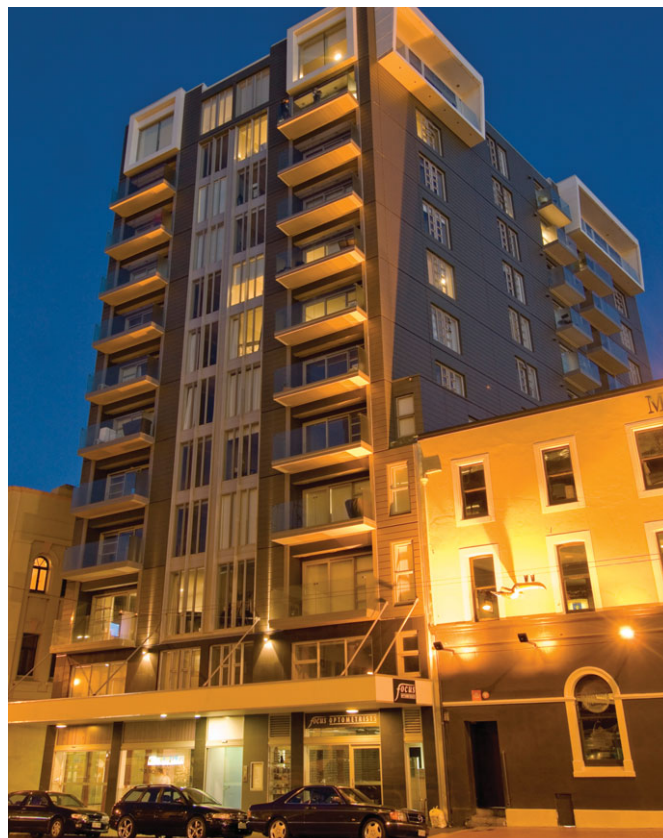
The main gravity floor beams were formed by pairs of channel sections bolted to the flanges of the gravity columns. Darrin Bell

says this system has a number of advantages: "The beams are continuous, so there is no need to detail moment end connections. This allows for minimal structural depth while ensuring adequate stiffness – required for vibration and deflection criteria. The clear span of the floor slab is reduced. And services can be run down inside walls between the channels."

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The cladding is GRC (Glass Reinforced Concrete), produced by Unicast Ltd. in Hastings. Wellington Construction Limited's Contracts Manager, Bruce Paku, says light-weight GRC cladding on a steel frame make a good combination. "Steel is quick and accurate, and with GRC you have to be very accurate." (Main article text sourced from SCNZ magazine).

To learn more about ComFlor, the Bellagio project, or other projects that have used ComFlor to their advantage call +64 (0) 271 7180 to arrange an in-practice presentation from one of our representatives.



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