



1 Assembly of the Crossing Development elements. 2 Connections of the beams. 3 Construction site for the Crossing Development.

THE CROSSING DEVELOPMENT

Engco Consulting for The Carter Group

Project Location: Christchurch



Traditional two-way steel moment resisting frame (MRF) designs are hampered by costly externally collared beam-column joints. In what is a New Zealand first, Engco Consulting, in consultation with the University of Canterbury and local steel fabricator, John Jones Steel, have designed a revolutionary cost-effective beam-column joint system that is set to change the way these types of structures are built.

The four storey “Building C” at The Crossing Development, in Christchurch, is laterally stabilised by a two-way MRF structure. The MRF system utilises concrete filled steel square hollow section columns and custom welded steel beams with innovative through-bolted moment end plate connections to the SHS columns. During the concept design stage two frame options were explored; both a two-way MRF system and a braced frame system were analysed. These two options were debated and while the two-way MRF provided the open plan flexibility desirable to prospective tenants, it carried a cost premium over the braced frame system, largely due to traditionally designed collared beam-column joint.

In order for the two-way MRF design to be considered by the client, Engco needed to develop a more economical jointing system. The resulting detail, while simplistic in concept, provided immense engineering challenges in the design and correct specification of the erection sequences. The benefits include considerable fabrication cost reduction, easy installation for the contractor, more compact connection and inherent passive fire resistance to name a few.

The detail developed by Engco satisfied the developers’ requirements and was successfully incorporated into the building design. The final design was independently peer reviewed to confirm the assumptions made during the design. Currently there is an increase in popularity and demand for composite structures. While some design guidance is available for the collared joint detail, there is no formal guidance available for through-bolted moment end plate connections. The University of Canterbury is currently undertaking further research in this field to improve the quality of design guidance available to structural engineers for steel-concrete composite structures.

Judging & Copyright Statement

This project is an entrant in the 2016 INNOVATE NZ Awards of Excellence competition. The winners will be celebrated at our Awards Gala Dinner on Saturday, 12th August 2017 in Taupo.

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