

## DEMOLITION METHODOLOGY

TO  
(CLIENT) Jurgens Demolition  
P O Box 281  
Wanganui

DATE 3 August 2011

REGARDING Demolition of 43 Lichfield Street, Christchurch  
Ground Floor Slab Condition

W2  
DESIGN

## Ground Floor Condition

A detailed and intrusive inspection has been carried on the ground floor slab after removal of the carpet that covers this slab revealed unexpected slab damage caused by earthquake loading on the building. The following items were noted which compromise the performance of the ground floor slab:

1. Cracking up to 4mm wide at floor support beam lines that run parallel to floor units. Intrusive survey has confirmed that a topping thickness of 65mm exists over the floor, and that the cracking does not continue into the double tee floor units. The shear capacity of the floor system is has thus been reduced at the ends of floor units to approximately 43% of its previous capacity given the topping concrete is no longer effective. It thus follows that this floor slab is no longer capable of carrying the loading it was designed for.
2. Intrusive survey has confirmed that no reinforcing extends from the concrete beams into the floor topping, and no reinforcing steel (other than mesh) passes over the concrete beams at the ends of the floor units. As such the floor system cannot develop negative moment capacity at the ends of the units, reducing the redundancy and loading bearing capacity of the floor system. It is also evident on site that the mesh does not behave in a ductile manner where bars have sheared with little elongation.
3. Cracking through the floor system parallel to the double tee floor units was noted at the North of the building adjacent to the transfer beam that is currently propped. This suggested that elongation of the floor support structure has occurred, and one would expect residual stresses associated with that to exist in the floor system.

## Effect on Demolition Methodology

The items as noted above necessitate a change in the demolition methodology:

- Given the loss of capacity of the ground floor slab noted it will not be possible to load any part of the ground floor up without a full propping support to the whole floor system. Given the damage noted to the topping slab, it is considered that this become largely ineffective across the floor and thus there are concerns of a punching shear failure through the flange of the double tee floor. As such a propping solution will need to support both the flanges and webs of the double tee units. This could be achieved with 250mm deep steel beams running parallel to the floor ribs between each rib and a perpendicular steel beam arrangement below with props. Such a system will be very expensive given the quantity of propping structure. It will be difficult to install given the access restraints and the need for machinery to maneuver heavy steel beams, and time consuming work under a dangerous building which could collapse in moderate level earthquake.

- Note 2. above confirms the brittle behaviour noted already during the demolition, and has the consequence that higher impact loads can be expected from demolished structure which is more likely to fall. As such it will not be possible to guarantee no damage to the ground floor system and basement. In order to best protect the floor to mitigate damage, it is recommended that a 150mm layer of AP20 fill with a 10mm steel plate over extend over the whole of the ground floor, such protection cannot be introduced until the basement propping is in place, and no further demolition works should proceed until this protection is in place to reduce the risk of damage to the ground floor and basement.
- The demolition contractor has also noted his concerns about safety and loss in confidence in the building if operating heavy machinery on the ground floor given the condition of it that is evident. This concern is valid given that the floor units are not adequately tied to the surrounding beam structure, and the risk of loss of seating of the units in a seismic event is possible.

If you require any further information please contact the undersigned.

Yours faithfully,

**W2 Limited**



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