

### Statement of evidence of Puvirajaratnam Mohanaraj

I, **PUVIRAJARATNAM MOHANARAJ** of Hamilton, Structural Engineer, state:

1. I hold a Bachelor of Engineering (Civil) and a Master of Engineering Studies. I am a member of the Institution of Professional Engineers of New Zealand, and am a Chartered Professional Engineer. I have 19 years experience as a Civil and Structural Engineer. From 2003 to the present I have been employed by Opus International Consultants Ltd and hold the position of Senior Structural Engineer. I am a member of the Structural Engineering Society of New Zealand (SESOC).
2. From 13 to 17 September 2010 and from 7 to 11 March 2011, I was in Christchurch to carry out earth quake damage inspections.
3. The building inspections that I carried out during September 2010 were commissioned by building owners or their insurers.
4. I carried out an inspection of the building on the corner of Gloucester Street and Manchester Street (265-271 Manchester Street/173 Gloucester Street) on 14 September 2010. I was directed by Opus personnel based in Christchurch to carry out the inspection. I understand that Opus was engaged to do this by the building owner's insurance broker.
5. The purpose of the inspection was to identify damage caused by the September earthquake. My inspection was carried out internally and externally. It was a visual, non-intrusive inspection and so did not involve removal of wall linings or floor coverings. I did not have building plans. My inspections were not detailed structural assessments and did not involve calculations of structural capacity or strength.
6. I did not have specific information from GNS about future after shocks. I was generally aware of public information about aftershocks and I was experiencing them along with others in Christchurch at the time. I assumed that aftershocks would continue but in diminishing sequence. When inspecting Christchurch buildings in September, I took the likelihood of continuing aftershocks into account.

7. During my inspection I was joined by one of the owners of the building. She was there for a short while and then left before I finished.
8. I took photographs during my inspection. I have provided all of these to the Royal Commission. I also completed a Rapid Assessment Form – Level 2 [**BUI.MAN265-271.0001.9**].
9. I had internal access to most of the building through the shops which were accessible, except the takeaway shop at the northern end of the building on Manchester Street which was closed.
10. I identified minor damage which I recorded in the Form. Internally, this was cosmetic cracking in a wall lining and ceiling in a stairwell. I found a minor vertical crack in a joint between brick and block walls in the rubbish room of the Map World tenancy.
11. I found similar minor cracking in the ceiling of the fish and chip shop on the Manchester Street side. I found no damage in the shoe repair shop or the dairy on the same side of the building. There was minor cracking in some of the internal timber partition walls and ceilings, in first floor.
12. Externally, I identified a minor crack in a joint between the brick wall and one of the large ground floor windows on the east side of the building. There were also minor cracks in the brickwork of the south side wall (Gloucester Street).
13. I recommended that the damage I observed be repaired and that the arch lintel on the east side (above the Dairy) be checked for any loose bricks and that if loose bricks were found, they should be removed or secured.
14. I also recommended that the owner engage a structural engineer to check the building and provide appropriate crack repair details. One of my recommendations for repairs was a support arrangement for the external arch lintels to prevent sudden failure of lintel blocks. As an example of a support arrangement I referred to the possibility of using steel bands, which would be fixed to the underside of the brick arch lintel. This was not for the purpose of repairing earthquake damage but as a recommendation to the owner to improve robustness for the future. My report notes that I recommended that the owner consult a structural engineer on this recommendation.

15. I recorded a “damage intensity” on the Level 2 form as “Light damage, low risk” and gave the building a green placard and a “usability category” of G2 – “occupiable, repairs required”.
16. I have annexed a table setting out the general areas of damage that I observed, cross referenced to photographs [**Appendix**].
17. When I returned to Opus’s office I believe that I was asked to call the building owner because he wanted to know about the building’s condition. I rang him that evening and summarized what I had written on my inspection form.

Dated February 2012

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Puvi Mohanaraj

## Appendix

**Table showing damage recorded in  
Level 2 Form – Witness statement of Puvi Mohanaraj**

<b>Damage</b>	<b>Photo</b>	<b>Para. ref</b>
Minor cracks in joint b/w brickwall/large windows (E façade)	P1070852	12
Minor cosmetic cracks in gib wall lining and ceiling (stairs area)	P1070855	10
Minor vertical crack in joint b/w brick and block walls (rubbish room)	P1070853	10
Minor cracks in ceiling (fish and chip shop)	No photo	11
Minor cracks in brickwall, “mainly on south side”	P1070848 and P1070851	12
Minor internal cracks in timber wall and ceiling	P1070863	11













































