

New Zealand RS&T Curriculum Vitae Template

PART 1

1a. Personal details				
Full name	<i>Title</i>	<i>First name</i>	<i>Second name(s)</i>	<i>Family name</i>
	Associate Professor	George	<u>Charles</u>	Clifton
Present position	Associate Professor of Civil Engineering			
Organisation/Employer	The University of Auckland			
Contact Address	Private Bag 92109			
	Auckland Mail Centre			
	Auckland			Post code
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1b. Academic qualifications

1978, BE (Hons), Civil Engineering, University of Canterbury
 1979, ME, Civil Engineering, University of Canterbury
 2005, PhD, Civil Engineering, University of Auckland

1c. Professional positions held

1979 - 1981 , Junior Engineer then Site Engineer, BCHF Ltd, Wellington
 1981 - 1983 , Design Engineer then Senior Design Engineer, R H Sanbar Consultants, London
 1983 - 2008 Structural Engineer then HERA Senior Structural Engineer, NZ HERA, Manukau City
 2008 - The University of Auckland, Associate Professor in Civil Engineering

1d. Present research/professional speciality

Principal areas of technical expertise:

1. Behaviour and design of steel seismic-resisting systems
2. Behaviour and design of steel buildings for fully developed fire conditions, especially in regard to composite floor systems
3. Corrosion rates for steel in above ground and below ground conditions
4. Behaviour and design of composite steel and concrete elements
5. Construction of steel buildings
6. Behaviour and design of light gauge steel

Secondary areas of technical expertise:

1. Acoustic performance of steel structures
2. Performance of steel elements in fatigue
3. Thermal performance of light steel elements of construction

1e. Total years research experience	28 years
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1f. Professional distinctions and memberships (including honours, prizes, scholarships, boards or governance roles, etc)

- 2012 Presented keynote address to STESSA2012 Conference (Steel Structures in Seismic Areas) on performance of steel buildings in Christchurch 2010/2011 earthquake series (see paper reference in part 2a)
- 2011 Invited onto the European Committee for Constructional Steelwork Committees TC13 (Earthquake) and TC3 (Fire Engineering). Only non-European member of both committees.
- 2011 Special Award from UofA for services to the profession and country for building and technical advice around the Christchurch earthquake series of 2010/2011
- 2011 Invited to head the Structures Group of the Department of Civil and Environmental Engineering, UofA
- 2010 Keynote address to the 9th Pacific Structural Steel Conference, 2010, Beijing, China, on 'Status of Structural Steel in New Zealand in 2010: Research, Education, Industry and Earthquakes'
- 2009 Winner of IPENZ Freyssinet Award for Technical Achievement in the Building and Construction Field
- 2009 A series of 3 buildings utilising two of the seismic-resisting systems developed by Clifton in his PhD (Clifton, 2005) have been awarded the Institution of Structural Engineers 2009 Structural Prize for Engineering Excellence in the Healthcare and Education Sectors
- 2008 Meritorious Service Award, Standards New Zealand
- 2008 The Keith Smith Award for Outstanding Services to the Metals Industry of New Zealand
- 1997 Winner of IPENZ Structural Award (Best structural paper at 1997 IPENZ Conference)
- 1989 – 2010 Member NASH New Zealand and technical advisor on light gauge steel design and construction
- 1986 – 2007 Chairman of Standards New Zealand Committee for steel standards since 1986, Amendment No 2 to NZS 3404:1977, NZS 3404:1989, NZS 3404:1992, NZS 3404: 1997, Amendment No 1(2001) and Amendment No 2 (2007) to NZS 3404:1997
- 1986 – 2007 Member of Standards Committee for the loadings standards NZS 4203:1986, NZS 4203: 1992, AS/NZS 1170 set
- 1983 – 2010 Member of SESOC (Structural Engineering Society of New Zealand)
- first editor of the SESOC Journal
 - past Management Committee member
- 1983 – 2010 Member then Fellow NZSEE (New Zealand Earthquake Engineering Society)
- 1983 – 2010 Member then Fellow IPENZ (Institute of Professional Engineers NZ)

1g. Total number of peer reviewed publications and patents	Journal articles	Books, book chapters, books edited	Conference proceedings	Patents
	46	13	41	2

PART 2

2a. Research publications and dissemination

Peer-reviewed journal articles

- **CLIFTON, G. C.**, BRUNEAU, M., MACRAE, G. A., LEON, R., & FUSSELL, A. (2011). Steel Structures Damage from the Christchurch Earthquake Series of 2010 and 2011. *New Zealand Society for Earthquake Engineering Bulletin*, 44(4).
- KHOO, H. H., **CLIFTON, G. C.**, BUTTERWORTH, J., MACRAE, G. A., & FERGUSON, G. (2011). Influence of steel shim hardness on the Sliding Hinge Joint performance. *Journal of Constructional Steel Research*
doi:[10.1016/j.jcsr.2011.11.009](https://doi.org/10.1016/j.jcsr.2011.11.009)
- FERGUSON, W. G., SEAL, C. K., HODGSON, M. A., & **CLIFTON, G. C.** (2011). Structural Steel Performance Following Severe Earthquake Loading. In *Advanced Materials Development and Performance*.
- MACRAE, G.A., **CLIFTON, G.C.**, MACKINVEN, H., MAGO, N., BUTTERWORTH, J.W. and PAMPANIN, S. 'The Sliding Hinge Joint Moment Connection', paper submitted for publication in the *Bulletin of the NZSEE*, 2010.
- SEAL, C.K., HODGSON, M.A., **CLIFTON, G.C.**, PROF W GEORGE FERGUSON 'A novel method for predicting damage accumulation in seismically deformed steel', *Journal of Constructional Steel Research*, 65, (12), p2157-2166, 2009
- PENG, B.H.H., MACRAE, G.A., WALPOLE, W., MOSS, P.J., DHAKAL, R., **CLIFTON, G.C.** 'Plastic Hinge Location in Columns of Steel Frames Subjected to Seismic Actions', *New Zealand Society for Earthquake Engineering Bulletin*, 41, (1), p1-10, 2008
- GILLIES, A.T., **CLIFTON, G.C.**, ZAKI, R., BUTTERWORTH, J.W. 'Recommendations for Shear Connector Design and Detailing for Interior and Exterior Secondary Composite Beams', *Australian Journal of Structural Engineering*, 7, (2), p-, 2007
- SHORT, A., WOERNER, W., FERGUSON, G.W., **CLIFTON, G.C.** 'Failure of welded moment-resisting connections', *Engineering Journal-American Institute of Steel Construction Inc*, 43, (4), p287-301, 2006
- BUTTERWORTH, J.W., **CLIFTON, G.C.**, MACRAE, G.A. 'Developments in steel frame joints in New Zealand', *The Structural Engineer*, 86, (16), p20-21, 2008

Peer reviewed books, book chapters, books edited

- **CLIFTON, G.C.**, AND THE P3404 COMMITTEE *Steel Structures Standard Part 1: Materials, Fabrication and Erection*, (NZS 3404 Part 1:2009edn), Wellington, New Zealand, Standards New Zealand, p1-158, 2009
- **CLIFTON, G.C.**, 'Chapter 6 Post – flashover fires' in: Michael Spearpoint (ed), *Fire Engineering Design Guide*, Third Edition, Christchurch, New Zealand, New Zealand Centre for Advanced Engineering, pp 57-82, 2008
- **CLIFTON, G.C.**, AND THE P3404 COMMITTEE *Amendment No 2 to the Steel Structures Standard NZS 3404:1997*, (Amendment No 2edn), Wellington, New Zealand, Standards New Zealand, p1-75, 2007

Refereed conference proceedings

- **CLIFTON, G. C.**, BRUNEAU, M., MACRAE, G. A., LEON, R., & FUSSELL, A. (2012). Multi-storey Steel Frame Building Damage from the Christchurch Earthquake Series 2010/2011, *STESSA 2012 Steel Structures in Seismic Areas, Proceedings of 7th International Conference on Steel Structures in Seismic Areas, Santiago, Chile., 09 - 11 January, 2012*, p.15-24
- GEBREYOHANESS, A., **CLIFTON, G. C.**, & BUTTERWORTH, J. (2011).

'Behaviour of Inadequately Detailed Reinforced Concrete Walls'. *Australian Earthquake Engineering Society 2011 Technical Conference*

- PATON-COLE, V.P., **CLIFTON, G.C.**, GAD, E.F., HEATH, D.J., DAVIES, C., HICKS, S., LAM, N. 'Seismic Performance of a Brick Veneer Steel Framed House', *AEES 2009, Proceedings of the 2009 Conference of the Australian Earthquake Engineering Society, Newcastle, Australia, December 11 to 13 2009, 2009*
- MACRAE, G.A., **CLIFTON, G.C.**, BUTTERWORTH, J.W. 'Some Recent New Zealand Research on Seismic Steel Structures', *STESSA 2009, Proceedings of 6th International Conference on Steel Structures in Seismic Areas, Philadelphia, USA, 16-20 August 2009, 2009*
- MACRAE, G.A., **CLIFTON, G.C.**, BUTTERWORTH, J.W. 'Some Recent New Zealand Research on Seismic Steel Structures', *STESSA 2009 Steel Structures in Seismic Areas, Proceedings of 6th International Conference on Steel Structures in Seismic Areas, Philadelphia, PA, USA., 16 - 20 August, 2009, p.1-6*
- MACKINVEN, H., MACRAE, G.A., PAMPANIN, S., **CLIFTON, G.C.**, BUTTERWORTH, J.W. 'Generation four steel moment frame joints', *8th Pacific Conference on Earthquake Engineering, Singapore, December, 2007*
- PENG, B.H.H., MACRAE, G.A., WALPOLE, W., MOSS, P.J., DHAKAL, R., **CLIFTON, G.C.** 'Location of Plastic Hinges in Columns of Steel Frames', *New Zealand Society for Earthquake Engineering 2007 Technical Conference, Palmerston North, New Zealand, March 30 - April 1, 2007*
- **CLIFTON, G.C.**, MACRAE, G.A., MACKINVEN, H., PAMPANIN, S., WALPOLE, W., BUTTERWORTH, J.W. 'Sliding Hinge Joints and Subassemblies for Steel Moment Frames', *New Zealand Society for Earthquake Engineering 2007 Technical Conference, Palmerston North, New Zealand, March 30 - April 1, 2007*
- MACRAE, G.A., MACKINVEN, H., **CLIFTON, G.C.**, PAMPANIN, S., WALPOLE, W., BUTTERWORTH, J.W. 'Tests of Sliding Hinge Joints for Steel Moment Frames', *Pacific Structural Steel Conference 2007, G Charles Clifton(ed.), Proceedings of Eighth Pacific Structural Steel Conference, 2, Wairakei, New Zealand, 13-16 March 2007, 2007, p.109-114*
- MACRAE, G.A., **CLIFTON, G.C.**, MAGO, N. 'Overstrength Effects of Slabs on Demands on Steel Moment Frames', *Pacific Structural Steel Conference 2007, G Charles Clifton(ed.), Proceedings of Eighth Pacific Structural Steel Conference, 1, Wairakei, New Zealand, 13-16 March 2007, 2007, p.275-282*
- **CLIFTON, G.C.**, MACRAE, G.A., WALPOLE, W., MOSS, P.J., DHAKAL, R., HYLAND, C.W.K., PENG, B.H.H. 'Evaluation of Lay's Equation for Plastic Hinge Location in Steel Columns', *Pacific Structural Steel Conference 2007, G Charles Clifton(ed.), Proceedings of Eighth Pacific Structural Steel Conference, 2, Wairakei, New Zealand, 13-16 March 2007, 2007, p.341-345*

Patents

CLIFTON, G.C., EL SARRAF, R.Z. 'Panels (Panels with lightweight cement based core)', New Zealand, NZ Design Application No 410479 NZ Patent Appln No 555414/560655, 2009.

CLIFTON, G.C., 'The Sliding Hinge Joint' Provisional Patent Granted 2000.

Other forms of dissemination (reports for clients, technical reports, popular press, etc)

- **CLIFTON, G.C.** 'Durability of Steel With Emphasis on Piles', *Screw Piles and Anchor Foundations, IPENZ, 2008, IPENZ, 1-12*
- **CLIFTON, G.C.**, 'Semi-Rigid Joints for Moment-Resisting Steel Framed Seismic-Resisting Systems', 2005, The University of Auckland PhD Thesis

- **CLIFTON, G.C.**, editor and principal contributor, '*The HERA Steel Design and Construction Bulletin*', 78 Issues from 1992 to 2005 covering a wide range of guidance on steel and composite structures from design to construction, HERA

2b. Previous research work

Research title: Seismic Damage-Resistant System for Modular Steel Structures, currently underway

Principal outcome: new damage resisting system to allow multi-storey modular light steel framed construction to be built for earthquake resistance

Principal end-user and contact: EQC Research Foundation (Priscilla Cheung)

Research title: Composite Structural Assemblies Project, \$6,031,000; commenced 2004, finishes September 2010

Principal outcome: New light weight forms of construction utilising light gauge steel

Principal end-user and contact: FRST and HERA (Ms Rosemary Scofield)

Research title: HERA Fire and Seismic Research Programme, commenced 1995, completed 2004, annual value approx \$200,000

Principal outcome: For earthquake, new seismic-resisting systems for moment-resisting steel frames (MRSFs), incorporating the Flange Bolted Joint (FBJ) and the Sliding Hinge Joint (SHJ)

Principal end-user and contact: FRST

2c. Describe the commercial, social or environmental impact of your previous research work

- the semi-rigid joint systems (MRSFs with FBJ and SHJ) are new, innovative, damage resistant seismic-resisting systems which are now used in \$ 3 billion of new buildings. An example won a 2009 international prize for innovation in structural engineering as described earlier
- the Slab Panel Method of designing composite floor systems for dependable inelastic response in severe fires with many support beams unprotected is now in widespread use in New Zealand, Australia and is currently being considered in projects in the UK and USA. It arose from the HERA Fire and Seismic Research Programme described above
- outcomes of my research are in the Steel Structures Standard, NZS 3404, Loadings Standard AS/NZS 1170 set and applied to most if not all steel framed buildings in New Zealand
- have obtained over \$ 12 million in corporate, contestable and other research grants, principally in seismic and fire engineering since 1995

2d. Demonstration of relationships with end-users

- professional end user: 19 design guides, 67 technical reports, in addition to the publications listed above covering all aspects of structural steel design
- fabrication industry: 4 reports covering fabrication, durability, construction accuracy
- provider of specialist consulting and design query answering service to the engineering profession
- peer reviewer on fire engineering design for structures in fire for the Auckland City Council