MacRae Curriculum Vitae

PART 1

1a. Personal details									
Full name	Title		First name	Second name(s)			Family name		
	Dr		Gregory	Anthony		MacRae			
Present position			Professor						
Organisation/Employer			University of Canterbury						
Contact Address Priva			ate Bag 4800						
	Chr		stchurch			Post co	ode	8020	
Work telephon	ie	03 3	64 2247		Mobile	N/A			
Email		Gregory.MacRae@canterbury.ac.nz							
Personal webs	site	http://www.civil.canterbury.ac.nz/staff/gmacrae.shtml							

1b. Academic qualifications

1989 *Ph.D.* in Civil Engineering, University of Canterbury, Christchurch, New Zealand
 1984 *B.E.(First Class Honours)* in Civil Engineering University of Canterbury,

Christchurch, New Zealand

1c. Professional positions held

7/05 – present	Associate Professor/Professor University of Canterbury Dept. of Civil & NR Engineering
2/19 – 2/20	Professor, Tongji University, Shanghai, China
6/12 – 12/12	Government of India, Varahamihira Earth Sciences Chair (Endowed)
6/12 – 12/12	Professor, IIT Gandhinagar, India
3/12 – 6/12	Professor, National Taiwan University
2/12	Visiting Academic, Stanford Univ., Palo Alto, California, USA
12/94 - 10/05	Assistant then Associate Professor, Univ. of Washington, Seattle, Dept of Civil and Env. Engineering
3/92 - 9/94	<i>Post-doctoral Researcher,</i> University of California, San Diego, Dept of AMES
1/90 - 1/92	JISTEC Research Fellow, Public Works Research Institute, Ministry of Construction, Japan
2/85 - 12/85	Graduate Engineer, Morrison, Cooper and Partners, Wellington

1d. Present research/professional speciality

Structural engineering, Earthquake engineering, Loss assessment.

1e. Total years research experience

35 years

1f. Professional distinctions and memberships (including honours, prizes, scholarships, boards or governance roles, etc) – <u>Relevant to this grant</u>

AWARDS, ACKNOWLEDGEMENTS AND REFLECTED GLORY

NZSEE Conference Awards: (i) 2016 Best Student Presentation - to student Westeneng. (ii) 2014 Best Student Presentation - to student Yeow. (iii) 2011 Best Equal Presentation to student Yeow, (iv) Best Poster Paper - to Paganotti, MacRae et al., (v) 2008 Best Poster Paper to Au, MacRae (vi) 2006 Best Poster Paper to MacRae.

- 2020 Steel Construction New Zealand (SCNZ) Chairman's Award "For Outstanding Contribution to The Structural Steel Industry", 13 November 2020
- 2012 **Acknowledgement of Services** from Deputy Minister of Education Government of Iran, Ministry of Education, for planning and facilitating activities with Iranian School Retrofit Programme.
- 2010 **Centre of Urban Earthquake Engineering** (CUEE), Tokyo Institute of Technology **Travel Award** and invitations, 2010 and 2013.
- 2009 **Institute of Structural Engineering (ISE) Award for Education or Healthcare Structures**. Awarded to Aurecon Engineers for low damage construction building in which I provided final testing and advice.
- 2008 Western States Seismic Safety Policy Council's **National Award for Excellence in Outreach**, April (Awarded to the Seattle Fault Scenario of which I was steering group member)
- 2007 Future Science and Technology MacDiarmid **Young Scientist of the Year Award** to student Geoff Rodgers
- 2005 Structural Engineers Association of Washington Appreciation Award
- 2004 **NZ Soc. for Earthquake Engineering** (NZSEE) Distinguished Lecturer
- 2004 AIJ Encouragement Prize to Kimura based on MacRae/Kimura paper
- 2002 **Chi-Epsilon Faculty Award** for Teaching Excellence
- 1990 Japanese Government Science and Technology Agency Fellowship
- 1986 New Zealand University Grants Committee Scholarship

MANAGEMENT COMMITTEES AND BOARD MEMBERSHIPS (i) Quake Centre Board (2015-2019), (ii) Structural Engineering Society (SESOC) Management Committee (2010-2011, 2013-2018), (iii) World Seismic Safety Initiative (WSSI) Board member (2004-2010), Senior Advisor to the Board, 2010-2018, (iv) International Association of Earthquake Engineering, New Zealand Representative and Board Member, 2009-2017, (v) NZ Heavy Engineering Research Association Research Board, 2006-present, (vi) EERI Seattle Fault Scenario Management Committee (2000-2004)

- PROFESSIONAL SOCIETY MEMBERSHIPS: Past.: (i) ASCE SEI Seismic Effects Committee, (ii) ASCE SEI Seismic Effects Committee, (iii) Member of Federation Internationale Beton (FIB) Task Group 4 (TG4P), (iv) American Society for Non-Destructive Testing, Geohazards International, (v) NEES Consortium; (vi) SEAW Earthquake Engineering Committee, (vi) Architectural Institute of Japan; Current: (ii) ASCE, (iii) Chi-Epsilon, (iv) Earthquake Engineering Research Institute, (v) NZ Society for Earthquake Engineering (NZSEE), (vi) NZ Structural Eng. Society (NZ SESOC)
- SPECIAL ROLES: (i) ASCE SEI Seismic Effects Committee Chair, October 2003 2006,
 (ii) ASCE, Journal of Structural Engineering, Associate Editor, 2002 2005, Editorial Board, (iii) NZ Society for Earthquake Engineering Bulletin editorial board, (iv) 2019-present, Journal of Earthquake Engineering editorial board, 2021-present, (v) Leader of NZ-China ROBUST research programme.
- **STANDARDS COMMITTEE MEMBERSHIPS** (i) **AS/NZS2327** Steel-Concrete Composite Structures Standard Committee, 2014-present, (ii) **NZS1170.5** Structural Actions (Loadings) Standard Committee Member, 2014-present, (iii) **NZS3404** Steel Structures Standard Committee member, 2006-present.

1g. Total number of <i>peer</i> <i>reviewed</i> publications and patents	Journal articles	Books, book chapters, books edited	Conference proceedings	Patents
	130	4	353	0

PART 2

2a. Research publications and dissemination

Relevant Peer-reviewed journal articles (recent)

- Borzouie J., Chase J. G., **MacRae G.A.**, Rodgers G. W. and Clifton C., "Spectral Assessment of the Effects of Base Flexibility on Seismic Demands of a Structure" Advances in Civil Engineering, Volume 2016 (2016), Article ID 3984149, 8 pages, http://dx.doi.org/10.1155/2016/3984149, http://www.hindawi.com/journals/ace/2016/3984149/abs/
- Yeow T., **MacRae G.A.**, Kawashima, K. and Sadashiva V.K. (2013) Dynamic Stability and Design of C-Bent Columns. Journal of Earthquake Engineering 17(5): 750-768.
- Sheet, I.S., Umarani, C. and **MacRae, G.A.** (2013) Modelling of Steel Beam-Column Connections under Dynamic Excitation. Journal of Struct. Eng., # 1186.
- Sheet, I.S., Gunasekaran, U. and MacRae, G.A. (2013) Experimental Investigation of CFT Column to Steel Beam Connections Under Cyclic Loading. Journal of Constructional Steel Research 86: 167–182.
- **MacRae G. A.** (2013) Lessons from the February 2011 M6.3 Christchurch Earthquake. Journal of Seismology and Earthquake Engineering 14(3): 227-238.
- Khoo H. H., Seal C., Clifton G. C., Butterworth J. and MacRae G. A. (2013) Behaviour of Top and Bottom Flange Plates in the Sliding Hinge Joint. Bulletin of the NZ Society for Earthquake Engineering 46(1): 1-10.
- Khoo H. H., Clifton G. C. and Butterworth J., MacRae G. A. (2013) Experimental study of full-scale self-centering Sliding Hinge Joint connections with friction ring springs. Journal of Earthquake Engineering UEQE-2012-1463(In Press) http://dx.doi.org/10.1080/13632469.2013.787378.
- Ahmed, S.M., Umarani, C. and MacRae, G.A. (2013) Slab Effects on Building Seismic Performance: State of The Art. Journal of Structural Engineering 40(2): 136-141.
- Sadashiva, V.K., **MacRae, G.A.,** Deam, B.L. and Spooner, M.S. (2012) Quantifying the Seismic Response of Structures with Flexible Diaphragms. Earthquake Engineering and Structural Dynamics 41(10): 1365-1389.
- Sadashiva, V.K., **MacRae, G.A.** and Deam, B.L. (2012) Seismic response of structures with coupled vertical stiffness-strength irregularities. Earthquake Engineering & Structural Dynamics 41(1): 119-138.
- Rodgers, G., Chase, J.G., Roland, T. and MacRae, G.A. (2012) Spectral analysis for a semi-active-passive net-zero base-shear design concept. Earthquake Engineering and Structural Dynamics 41(8): 1207-1216.
- Labise, C.C., Rodgers, G.W., MacRae, G.A. and Chase, J.G. (2012) Viscous and hysteretic damping: Impact of capacity design violation in augmented structural systems. Bulletin of the New Zealand Society for Earthquake Engineering 45(1): 23-30.
- Khoo, H.H., Clifton, C., Butterworth, J., MacRae, G., Gledhill, S. and Sidwell, G. (2012) Development of the self-centering Sliding Hinge Joint with friction ring springs. Journal of Constructional Steel Research 78:201-211.
- Khoo, H.H., Clifton, C., Butterworth, J., **MacRae, G.** and Ferguson, G. (2012) Influence of steel shim hardness on the Sliding Hinge Joint. Journal of Constructional Steel Research 72: 119-129.
- Corman, S., **MacRae, G.A.,** Rodgers, G.W. and Chase, J.G. (2012) Nonlinear design and sizing of semi-active resetable dampers for seismic performance. Engineering Structures 39: 139-147.
- Corman, S., Chase, J.G., **MacRae, G.A.** and Rodgers, G.W. (2012) Development and spectral analysis of an advanced diamond shaped resetable device control law. Engineering Structures 40(1): 1-8.

2b. Previous research work - Selected

Research title: Composite Solutions, \$618k, 2011-2015

Principal outcome: Better design methods for composite structures.

Principal end-user and contact: NHP (Kelvin Berryman)

Research title: *Non-Structural Elements, Horizontal Elements (Ceilings)*, 2010-2011 **Principal outcome:** Assessment methods and example for ceilings, \$365k

Principal end-user and contact: NHP (Kelvin Berryman)

Research title: Low Damage Bridges, \$225k, 2010-2011 (co-PI)

Principal outcome: More robust devices for low-damage bridges.

Principal end-user and contact: NHP (Kelvin Berryman)

Research title: *Building regularity for simplified modelling*, \$85,000, 2006-2009 **Principal outcome:** Simple techniques for assessing when simplified analysis techniques can be used in structural design.

Principal end-user and contact: EQC Research Foundation (Priscilla Cheung) Research title: Steel Systems – Several Grants from 2005-2008, Total \$86,000 Principal outcome: Code provisions for more rational low damage design. Principal end-user and contact: HERA (Charles Clifton), SCNZ (Clark Hyland)

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

- Direct impacts in general construction:
 - Development of assessment and retrofit methods for existing structures (1992-1994). Funded work at UCSD applied to retrofit methods of Central/Bayshore viaduct, an important freeway passing through San Francisco.
 - 1993 discussions with Caltrans were important in the decision that this major bridge be replaced (Maroney, Caltrans)
 - Developments to the Sliding Hinge Joint (SHJ) concept implemented by Aurecon engineers in Victoria University's Te Puni Village high-rise student accommodation buildings (2008) and many subsequent buildings.
 - Conception and development of the Continuous Column Concept (2004) has been used to retrofit buildings in Tokyo (2009).
 - Two way Sliding Hinge Joint (SHJ) concept on CFT columns used in the Terrace Project, Christchurch 2014.
- Impacts on the following codes/standards:
 - NZ Loadings Standard Proposed Provisions (NZS1170.5:2014) Anti-rachetting provisions
 - *NZ Steel Structures Standard (NZS3404:2007)* Moment frame design procedure, column hinges location provisions, *s*lab overstrength provisions
 - Applied Technology Council "Improved Seismic Design Criteria for California Bridges: Provisional Recommendations", (ATC-32:1996) - Design Assessment for Stiffened Steel Members
 - Japan Road Association (1996) Design Specifications of Highway Bridges. Part V: Seismic Design, Tokyo, Japan - First provisions worldwide to assess permanent displacements of structures after earthquake
- Impacts on other design methods: Conception, development and dissemination of Extended Direct Analysis (2009) for more rapid design, rational, simple and economic design. This is used in NZ.

2d. Demonstration of relationships with end-users

Examples standards and management committees, consulting etc. are given above.