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Professor, Civil Engineering
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Full Professor: July 2002

Professional Status: P.Eng.

EDUCATION

- 1991 **Commonwealth Scholar**, Ph.D. in Engineering, **Queens' College, Cambridge University**, England "*The Dynamic Response of Short-Span Highway Bridges to Heavy Vehicle Loads*"
- 1987 B.Sc. in Mathematics and Engineering (Structures Option), **Queen's University**, Kingston, Ontario, Canada Rank: **1st** in Faculty of Applied Science

EMPLOYMENT HISTORY

- Jul. 2015 to present **Associate Head**, Department of Civil Engineering, Queen's University, Kingston, Ontario
- Jul. 2002 to present **Professor**, Department of Civil Engineering, Queen's University, Kingston, Ontario
- Jul. 2014 to Jun. 2015 **Acting Head**, Department of Civil Engineering, Queen's University, Kingston, Ontario
- Jul. 2009 to Jun. 2013 **Associate Head**, Department of Civil Engineering, Queen's University, Kingston, Ontario
- Jan. 2013 to Mar 2013 **Acting Associate Dean (Academic)**, Faculty of Engineering & Applied Science, Queen's University, Kingston, Ontario
- Jan. 1993 to present **Consulting Activities**: FRP Strengthening: Parking Garage, Toronto; Highway Overpass, Winnipeg, (Halsall Associates, Toronto; Vector Construction, Winnipeg; Manitoba Department of Transportation and Government Services.); Bridge Dynamics (CN Rail, Montreal; Stantec, Windsor); Developed computer program for design of transmission and telephone poles (Power-Lite Industries).

RESEARCH IN PROGRESS

1. *Fire Resistance of Concrete Members Incorporating Fibre Reinforced Polymers (FRPs) and Sustainable Concrete* This project is a collaboration between Queen's and the NRC Fire Laboratory. I am the principal investigator for Queen's. This research has already had significant impact on the research community and engineering practice. Several invited papers have resulted from this work and approvals have been obtained for FRP applications in buildings (Vancouver, Denver) that would otherwise not have been granted due to concerns about the fire resistance of FRP strengthened concrete members.
2. *Sustainable Engineering for Remote Areas (SERA)* **\$1.6 million** funding over 6 years. SERA uniquely combines training for engineering with ensuring that the graduates understand the societal and cultural impacts of their work. Students will study Aboriginal culture, sustainability, business skills, and research to address three areas of national interest: natural resources and energy (sustainable energy, energy efficient buildings), communications technologies (sensing, structural health monitoring), and economic development and education for Aboriginal peoples.

TRAINING OF HIGHLY QUALIFIED PERSONNEL

- Trained 8 post-docs (7 completed), 15 Ph.D (12 completed) and 38 Masters students (36 completed)
- **seven former graduate** students or postdoctoral fellows hold **faculty positions**
- secured the **Halsall Graduate Partnership Award** (Internship)
- designed the instrumentation of and assisted with curriculum development for the **Integrated Learning Centre** at Queen's, a building focussed on undergraduate teaching;
- invited to teach a graduate course "FRP in Extreme Conditions," **University of Naples, Italy, 2007.**

OTHER IMPACT AND CONTRIBUTIONS:

Over 250 total publications including: **91** Refereed Journal Papers;
 83 Refereed Conference Papers;
 42 Conference Papers

Number of Citations: 1141 **H-Index: 23** (Source: Web of Science May 2016)

Member (2011-present), Section 16 Technical Committee, Canadian Standards Association (CSA) S6 Canadian Highway Bridge Design Code

Member (2010-present), Technical Committee, CSA S806 Design and construction of building structures with fibre-reinforced polymers

Member (2010-present), Technical Committee, CSA S808 Specification for fibre-reinforced polymer (FRP) materials for externally reinforcing structures

Chair (1998-2013) of CSCE Technical Committee on Advanced Composite Materials in Bridges and Structures (ACMBS)

Treasurer (2008-2015) for *Intelligent Sensing for Innovative Structures (ISIS)* Network Association

Co-chair (2009-2012) of MTO/MTQ task force on Repair of Concrete Structures with FRP Reinforcement

Co-chair (2007-2010) ACI 440-F Sub-committee on FRP Repair of Concrete;

Chair (1998-2007) CSCE Subcommittee on Advanced Composite Materials in Bridges and Structures;

Co-chair (1999-2007) ACI 440-C State-of-the-Art Report. Final report published Oct 2007;

Secretary (1996-1997) CSCE Subcommittee on ACMBS;

Queen's CSCE Student Chapter Faculty Advisor (1993 to present);

Member (2000, 2010, 2011, 2015) CSCE Heads and Chairs Meetings;

Member (2008) Organizing Committee for ACMBS Conference, Winnipeg, MB;

Co-Organizer (2003) CSCE National Lecture Tour on *Lessons from the World Trade Center Disaster*.

Regular attendee of CSCE Annual Conference (15 conferences) and other CSCE sponsored conferences (ACMBS, Short and Medium Span Bridges)

Member of the Mohawks of the Bay of Quinte

HONOURS and AWARDS

Leverhulme Visiting Professor, 2014
 Royal Academy of Engineering (UK) Distinguished Visiting Fellow, 2013
 Professional Engineers of Ontario (PEO) Medal for Research and Development, 2013
 Queen's University Employment Equity Award, 2012
 National Research Council (NRC) Award for the project:
 "Fire Resistance of FRP Reinforced Concrete Structures." 2010
 Best Materials Paper, *Structural Faults and Repair* 2008
 Civil Engineering Teaching Award, 1997-1998
 Premier's Research Excellence Award (PREA), 2000
 Pratley Award for the Best Canadian Paper on Bridge Engineering, 1999
 Best paper award *Composite's Institute's 50th Annual Conference and Expo '95*, 1995
 Queen's National Scholar, 1993
 NSERC Postdoctoral Fellowship, 1991-92
 Commonwealth Scholarship, 1987-90
 Governor-General's Gold Medal, 1987
12 invited papers and presentations
Keynote Speaker: *5th International Conference on Advanced Composite Materials for Bridges and Structures (ACMBS-V)*, Winnipeg, MB, Sept. 2008.

CONFERENCE ORGANIZATION: Co-chair of ACMBS-VI, Kingston 22-25 May 2012

TOTAL LIFETIME PUBLICATIONS: 262 (91 Refereed Journal Papers; 83 Refereed Conference Papers; 42 Conference Papers; 46 Theses and Technical Reports)

SELECTED PUBLICATIONS (in last 6 years 2010-2016: 54 refereed journal and conference papers)

REFEREED JOURNAL PUBLICATIONS (30 papers published in last 6 years)

1. Mirzazadeh, M Mehdi and Noël, Martin and **Green**, Mark F. (2016). Effects of low temperature on the static behaviour of reinforced concrete beams with temperature differentials. *Construction and Building Materials*. **112**: 191-201.
2. Gales, John and Parker, Thomas and Cree, Duncan and **Green**, Mark. (2016). Fire performance of sustainable recycled concrete aggregates: Mechanical properties at elevated temperatures and current research needs. *Fire Technology*. **52**(3): 817-845.
3. Laneyrie, Cléo and Beaucour, Anne-Lise and **Green**, Mark F and Hebert, Ronan L and Ledesert, Béatrice and Noumowé, Albert. (2016). Influence of recycled coarse aggregates on normal and high performance concrete subjected to elevated temperatures. *Construction and Building Materials*. **111**: 368-378.
4. Pei; Noël; Fam; Green 2015. "Development Length of Steel Reinforcement with Corrosion Protection Cementitious Coatings," *Cement and Concr. Comp.*, **60**:34-43 (OCE, industry)
5. Cree; Gamaniouk; Loong; **Green** 2015. "Tensile and Lap-Splice Shear Strength Properties of CFRP Composites at High Temperatures." *ASCE J. of Comp. for Constr.* **19**(2): 04014043 (NSERC)
6. DeRosa; Hault; **Green** 2015 "Effects of Varying Temperature on the Performance of Reinforced Concrete," *Materials and Structures*, **48**(4): 1109-1123 (NSERC)
7. Adelzadeh; Hajiloo; **Green** 2014, "Numerical Study of FRP Reinforced Concrete Slabs at Elevated

- Temperature,” *polymers*, **6**(2), 408-422. **invited** (NSERC)
8. **Green**; Hollingshead; Bénichou 2014, “Perf. in Fire of FRP Strength. Concrete Beams & Columns: Recent Research & Implic. for Design,” *J. of Struct. Fire Eng.*, **5**(4): 353–366 **invited** (NSERC)
 9. Bénichou; Mostafaei; **Green**; Hollingshead 2013, “The impact of fire on seismic resistance of FRP strengthened concrete struct. systems,” *Can. J. of Civ. Eng.* **40**(11): 1044-1049. **invited** (NSERC)
 10. Rameshni; Arcovio; **Green**; MacDougall 2013 “Exp. and numerical study of adhesively bonded GFRP – to-steel double-shear lap splices,” *Can. J. of Civ. Eng.*, **40**(11): 1140-1149. **invited** (MTO)
 11. Cree; **Green**; Noumowé 2013 “Residual strength of concrete containing recycled materials after exposure to fire: a review,” *Constr. and Build. Mat.*, **45**(Aug): 208-223. (NSERC)
 12. Burke; Bisby; **Green** 2013 “Effects of elevated temperature on NSM and externally bonded FRP strengthening systems for concrete,” *Cement and Concr. Comp.* **35**(1): 190-199. (ISIS)
 13. Saiedi; **Green**; & Fam, 2013, “Behav. of CFRP-Prestressed Concrete Beams under Sustained Load at Low Temp.” *ASCE J. Cold Regions Eng.* **27**(1): 1-15 (NSERC)
 14. Cree; Chowdhury; **Green**; Bisby; Bénichou, 2012, “Performance in fire of FRP-strengthened and insulated reinforced concrete columns” *Fire Safety Journal* **54**: 86-95 (NSERC)
 15. Adelzadeh; **Green**; & Bénichou, 2012, “Behav. in fire of FRP strengthened T-beams and slabs” *Struct. and Buildings, Proc. of the Instit. of Civil Eng.*, **165**(7): 361-371 **invited** (NSERC)
 16. Chowdhury; Bisby; **Green**; Benichou; & Kodur, 2012, “Heat Trans. & Struct. Resp. Modelling of FRP Conf. Rect. Concr. Columns in Fire,” *Constr. & Build. Mat.* **32**: 77-89 **invited** (ISIS)
 17. Kim; MacDougall; Campbell; & **Green**, M.F., 2012, “Comput. Modeling of Fatigue Performance of a Crosstie System for ART,” *ASCE J. of Perf. of Constr. Fac.* **26**(3): 326-334. (Industry)
 18. Maluk; Bisby; Terrasi; & **Green**, 2011, “Bond ... for CFRP and steel reinf. bars in concr. at elevated temp.,” *ACI SP-279-2 Recent Adv. in the Fire Design of Concr. Struct.*, 1-36. (NSERC)
 19. Kim; Wight; & **Green**, 2011, “Inspection techniques for a damaged prestressed concrete girder bridge: a case study,” *ACI SP-277 Recent Adv. in Bridge Maint. & Repair*, 129-142 (NSERC)
 20. Saiedi; Fam; & **Green**, 2011, “Behavior of CFRP-Prestressed Concrete Beams under High-Cycle Fatigue at Low Temperature,” *ASCE J. of Comp. for Constr.* **15**(4): 482-489 (NSERC)
 21. MacDougall; **Green**; & Amato, 2011, “CFRP Tendons for the Repair of Post-Tensioned, Unbonded Concrete Buildings,” *ASCE J. of Perf. of Constr. Fac.* **25**(3): 149-157 (ISIS)
 22. Chowdhury; Eedson; Bisby; **Green**; & Benichou, 2011, “Mechanical Characterization of Fibre FRP Materials at High Temperature,” *Fire Technology.* **47**(4): 1063-1080. (ISIS, NRC, industry)
 23. Kim; **Green**; & Wight, 2010. “Design and Site App. of Prestressed CFRP Sheets for Strengthening Concrete Structures,” *ASCE J. of Perf. of Constr. Fac.*, **24**(6): 495-496 (NSERC, ISIS)
 24. Kodur; Bisby; **Green**; & Fyfe, 2010, “A review of recent research studying the fire perf. of FRP strengthening systems for concrete,” *Int. J. of 3R’s: Repair, Rest., & Ren. of Built Env.*, **1**(2): 53-62.
 25. Kim; Fam; & **Green**, 2010, “SRP composite sheets for retrofitting RC beams: cracking and tension stiffening” *J. of Reinf. Plast. & Comp.* **29**(17): 2647-2662. (NSERC)
 26. Kim; **Green**; & Wight, 2010 “Bond and Short-term Prestress Losses of Prestressed Composites for Strengthening PC Beams,” *J. of Reinf. Plast. & Comp.* **29**(8): 1206-1218. (ISIS, NSERC, DND)
 27. Kim; **Green**; & Wight, 2010, “Effect of Prestress Levels in PC Beams Strengthened with Prestressed CFRP: Numerical Parametric Study,” *PCI Journal*, **55**(2): 96-108. (NSERC, ISIS, DND)
 28. Kim; Longworth; Wight; & **Green**, 2010, “Punch. Shear of Two-way Slabs Retro. with Prestressed or Non-prestressed CFRP Sheets,” *J. of Reinf. Plast. & Comp.* **29**(8): 1206-1218. (ISIS, NSERC, DND)
 29. El-Hacha; **Green**; & Wight, 2010, “Effect of Severe Environmental Exposures on CFRP Wrapped Concrete Columns” *ASCE J. of Comp. for Constr.* **14**(1): 83-93. (NSERC, DND)
 30. Kim; Fam; & **Green**, 2010, “Flexural Strengthening of RC Beams with SRP Sheets: Analytical and Computational Investigations,” *J. of Reinf. Plast. & Comp.* **29** (14): 2141-2155. (NSERC)

BOOK CHAPTER

31. Kim, Y.J., **Green**, M.F., and Wight, R.G. 2014. “Chapter 2: Prestressed FRP composites for

concrete structures in flexure: fundamentals to applications,” *Advanced Composites in Bridge Construction and Repair*, 30-60, Woodhead Publishing, Elsevier, ISBN: 978-0-85709-694-4

REFEREED CONFERENCE PROCEEDINGS: (24 refereed conference papers last 6 years.)

32. Mirzazadeh, M., Noël, M., **Green, M.** (2016). The Effect of Low Temperature on the Shear-Fatigue Performance of Reinforced Concrete Beams. Canadian Society for Civil Engineering Structures Specialty Conference, June 1-4, London, Canada, STR-924-1-10.
33. Hajiloo, H., and **Green, M.F.** (2016). "Post-Fire Residual Strength of Glass Fibre Reinforced Polymer (GFRP) Bars", *Conference of the Canadian Society for Civil Engineering*, London, ON, 1-4 May.
34. Hajiloo, H., **Green, M.F.**, Bénichou, N., and Sultan, M. (2016a). "Fire Performance of FRP reinforced concrete slabs ", *7th International Conference on Advanced Composite Materials in Bridges and Structures*, Vancouver, BC, 22-24 Aug.
35. Hajiloo, H., **Green, M.F.**, Bénichou, N., and Sultan, M. (2016). "Glass Fibre Reinforced Polymer (GFRP) Reinforced Concrete Slabs with Low Cover in Fire", *9th International Conference on Structures in Fire (SiF'16)*, Princeton, NJ, 8-10 Jul. 3-11.
36. Hajiloo, H., and **Green, M.F.** (2016). "NUMERICAL ANALYSIS OF THE POST-FIRE STRENGTH OF FRP REINFORCED BRIDGE COMPONENTS", *8th International Conference on Fibre-Reinforced Polymer (FRP) Composites in Civil Engineering (CICE 2016)*, Hong Kong, 14-16 Dec.
37. Noël, M.; Pei, X.; Fam, A.; and **Green, M.F.** 2015, "Bond of Steel Reinforcing Bars with Cementitious Waterproofing Coatings," *5th International Conference on Construction Materials*, August 19-21, Whistler, BC. (**Submitted Jan**).
38. Noël, M.; Pei, X.; **Green, M.F.**; and Fam, A. 2015, "Cementitious Capillary Crystalline Coatings for Corrosion Mitigation of Concrete Structures," *5th International Conference on Construction Materials*, August 19-21, Whistler, BC. (**Submitted Jan**).
39. Hajiloo, H.; Gales, J.; Noël, M.; **Green, M.F.** 2015 "Material Characteristics of Glass Fibre Reinforced Polymer (GFRP) Bars at High Temperature," *PROTECT2015 - Fifth International Workshop on Performance, Protection & Strengthening of Structures under Extreme Loading*, East Lansing, 29-30 Jun. (**Accepted Mar**)
40. **Green, M.F.**; and Adelzadeh, M. 2014, "Structural Modelling of the Performance of FRP Strengthened Concrete Beams in Fire," *CICE 2014: 7th International Conference on FRP Composites in Civil Engineering*, Vancouver, 20-22 Aug.
41. Cree, D.; Pliya, P.; and **Green, M.F.** 2014, "Behaviour of preloaded or unloaded concrete with and without polypropylene fibres subjected to high temperature," *8th International Conference on Structures in Fire (SiF'14)*, Shanghai, 11-13 June.
42. Gales, J.A.; **Green, M.F.**; Cree, D.; Parker, T.; and Bisby, L.A. 2014, "High Temperature Performance of Sustainable Concrete with Recycled Concrete Aggregates," *8th International Conference on Structures in Fire (SiF'14)*, Shanghai, 11-13 June.
43. Hoult, N.A.; Bao, X.; Bentz, E.; Collins, M.P.; **Green, M.F.**; and Take, W.A. 2013. "Sensing and Analysis Techniques for Assessing Concrete Bridges," *SHMII-6*, Hong Kong, Dec. 9-11.
44. DeRosa, D.; **Green, M.F.**; Hoult, N.A.; and Take, W.A. 2013 "Comparison of fibre optic sensors and digital image correlation for strain measurement in reinforced concrete beams," *Second Conference on Smart Monitoring, Assessment, and Rehabilitation of Civil Structures*, Istanbul, Turkey, 9-11 Sept.
45. **Green, M.F.**; Hajiloo, H.; and Adelzadeh, M. 2013 "FRP Reinforced Concrete Slabs in Fire: A Parametric Analysis," *Second Conference on Smart Monitoring, Assessment, and Rehabilitation of Civil Structures*, Istanbul, Turkey, 9-11 Sept.
46. Shier, G.W.R.; and **Green, M.F.** 2013 "Performance at elevated temperatures of post-cured CFRP

- strengthened reinforced concrete beams” *Proceedings of 11th International Symposium on Fiber Reinforced Polymers for Reinforced Concrete Structures (FRPRCS11)*, Guimarães, Portugal, 26-28 June.
47. Bénichou, N; Mostafaei, H.; **Green, M.F.**; Bisby, L.A.; Kodur, V.K.R. 2012. “The Impact of Post-Fire Earthquakes on FRP-Strengthened Concrete Structural Systems,” *Proceedings of the Advanced Composite Materials in Bridges and Structures Conference*, Kingston, ON, 23-25 May (CD-Rom 7p)
 48. **Green, M.F.**; Hollingshead, K.; Shier, G.; and Bénichou, N. 2012 “Performance in fire of fibre reinforced polymer strengthened concrete beams and columns: Recent research and implications for design,” *Structures in Fire*, Zurich, June.
 49. Adelzadeh, M., **Green, M.F.**; Khalifa, T.; Li, W.; Bao, X.; and Bénichou, N., 2011, “Fibre Optic Sensors for High Temperatures and Fire Scenarios,” *First Middle East Conference on Smart Monitoring, Assessment and Rehabilitation of Civil Structures (SMAR 2011)* Dubai UAE 8 –10 Feb. 2011 CD-Rom (8p)
 50. **Green, M.F.**; Cree, D.; Chowdhury, E.U.; Bisby, L.A.; and Bénichou, N., 2011, “Fire testing of FRP strengthened reinforced concrete columns,” *CDCC 2011 Fourth International Conference on Durability & Sustainability of FRP Composites for Construction and Rehabilitation* July 20–22, 2011, Quebec
 51. Saiedi, R.; Fam, A.Z.; and **Green, M.F.**, 2010, “CFRP-Prestressed Concrete Girders subjected to Bending Fatigue at Low Temperature,” *8th International Conference on Short and Medium Span Bridges (SMSB 2010)*, Niagara Falls, ON, 3-6 Aug.
 52. Rameshni, R.; **Green, M.F.**; and MacDougall, C., 2010, “Fatigue-resistant centre-beam field splices for MBEJs,” *8th International Conference on Short and Medium Span Bridges (SMSB 2010)*, Niagara Falls, ON, 3-6 Aug.
 53. **Green, M.F.**; Adelzadeh, M.; Khalifa, T.; Eedson, R.; Bisby, L.A.; Bénichou, N.; Bao, X.; Li, W. 2010, “Performance in fire of fibre reinforced polymer strengthened concrete beams including embedded fibre optic sensors,” *Structures in Fire (SiF 2010)*, East Lansing, MI, 2-4 June.
 54. Saiedi, R.; Fam, A.Z.; and **Green, M.F.**, 2010, “Combined Effects of Sustained Load and Low Temperature on Concrete Girders Prestressed using Carbon Fiber-Reinforced Polymer (CFRP) Rods,” *fib Congress, PCI Convention and Bridge Conference*, Washington, DC, 29 May – 1 June.
 55. Chowdhury, E.U.; **Green, M.F.**; and Bisby, L.A., 2010 “Modelling Slenderness Effects in FRP Confined Circular Reinforced Concrete Columns,” *Structural Faults & Repair-2010*, Edinburgh, UK, 15-17 June.