

Sami H. Rizkalla
College of Engineering
North Carolina State University

I. BRIEF RESUME

A. EDUCATION

<u>University</u>	<u>Degree</u>	<u>Year Granted</u>
North Carolina State University	Ph.D., Civil Engineering	1976
North Carolina State University	M.S., Civil Engineering	1974
Alexandria University, Egypt	B.Sc., Civil Engineering	1965

B. PROFESSIONAL EXPERIENCE

<u>Position</u>	<u>Employer</u>	<u>Dates</u>
Director, NSF I/UCRC – Center for Integration of Composites into Infrastructure (CICI)	North Carolina State University	2009 - present
Adjunct Professor	Ain Shams University, Egypt	2007 - present
Distinguished Professor of Civil Engineering and Construction	North Carolina State University	2000 - present
Director, Constructed Facilities Laboratory	North Carolina State University	2000 - present
Director, NSF I/UCRC – Repair of Buildings and Bridges with Composites (RB2C)	North Carolina State University	2002 – 2010
Adjunct Professor	University of Manitoba, Canada	2000 - 2006
President and Scientific Director, ISIS Canada	University of Manitoba, Canada	1995 - 2000
Professor, Civil Engineering	University of Manitoba, Canada	1988 - 2000
Adjunct Professor	Concordia University, Canada	1995 - 1998
Director, Structural Engineering and Construction R & D Facility	University of Manitoba, Canada	1990 - 1995
Associate Dean, Faculty of Engineering	University of Manitoba, Canada	1992 - 1994
Associate Professor, Civil Engineering	University of Manitoba, Canada	1981 - 1988
Assistant Professor, Civil Engineering	University of Manitoba, Canada	1978 - 1981
Post-Doctoral Fellow & Sessional Lecturer	University of Alberta, Canada	1976 - 1978
Graduate Teaching & Research Assistant	North Carolina State University	1971 - 1976
Instructor, Civil Engineering	Alexandria University, Egypt	1968 - 1971
Structural Engineer	Desert Development Corp., Egypt	1966 - 1968
Structural Engineer	VIBRO, Concrete Piles, Egypt	1965 - 1966

C. HONORS AND AWARDS

Charles S. Whitney Medal Award, American Concrete Institute [ACI]	2016
The FRPCS-12 /APFIS 2015 Award for Best Paper	2015
Chester Paul Siess Award for Excellence in Structural Research, American Concrete Institute	2014
T.Y. Lin Award, American Society of Civil Engineers	2013
Charles C. Zollman Award, Precast/Prestressed Concrete Institute	2012
Best paper and best Poster presented at the APFIS 2012 Conference	2012
Arthur Boase Award, Concrete Research Council, ACI Foundation	2010
Fellow, Precast/Prestressed Concrete Institute	2009
Distinguished Educator Award, Precast/Prestressed Concrete Institute	2008
Mirko Ros Gold Medal Award, EMPA Switzerland	2008
Joe W. Kelly Award, American Concrete Institute	2008
Martin P. Korn Award, PCI Journal Award	2007
IIFC Lifetime Achievement Award	2006
Best Paper on the Use of Materials: Structural Faults and Repair	2006
Metropolitan Who's Who in Engineering (Representing Raleigh)	2006
Delmar L. Bloem Award, American Concrete Institute	2004
Fellow, International Institute for FRP in Construction (IIFC)	2004
A.B. Sanderson Award, Canadian Society for Civil Engineering	2000
Sustainable Development Award of Excellence for the Taylor Smart Highway Bridge	1999
National Transportation Award of Achievement	1999
Superior Academic Performance, Faculty of Engineering, University of Manitoba	1999
PCI Harry H. Edwards Industry Advancement Award for the Taylor Smart Highway Bridge	1998
Canadian Council of Professional Engineers Meritorious Service Award	1996
James A. Vance Award, Canadian Society for Civil Engineering	1996
Superior Academic Performance, Faculty of Engineering, University of Manitoba	1996
Superior Academic Performance, Faculty of Engineering, University of Manitoba	1995
Fellow, The Engineering Institute of Canada	1995
Merit Award, Association of Professional Engineers of Manitoba	1994
Fellow, American Concrete Institute	1993
Outreach Award, The University of Manitoba	1992
Fellow, Canadian Society for Civil Engineering	1992
Honorary Professor, Jilin Architectural & Civil Engineering Institute, China	1991
Concrete Award, Ready-mixed Concrete Institution of Singapore	1989
Fellow, American Society of Civil Engineers	1988
Who's Who in Technology Today	1986
Premier's Award of Merit, Manitoba Design Institute	1982
Sigma XI - Scientific Research Society of North America	1980
ASTM Faculty Intern Award	1980
The Honor Society of Phi Kappa Phi	1975
Tau Beta Pi, The Engineering Honor Society	1973
Chi Epsilon, The National Civil Engineering Honor Society	1972
Maritime Prize, Alexandria University, Egypt	1965
Undergraduate Distinction Award, Alexandria University	1960 - 1965

D. PROFESSIONAL LICENSES

Professional Engineer, Province of Manitoba, Canada	1978 - present
Professional Engineer, Province of Alberta, Canada	1976 - 1979

E. PROFESSIONAL SOCIETY MEMBERSHIPS

Fellow in 2004 , International Institute for FRP in Construction (IIFC)	2004 - present
Fellow in 1995 ,The Engineering Institute of Canada (EIC)	1985 - present
Fellow in 1992 , Canadian Society for Civil Engineering (CSCE)	1979 - present
Fellow in 2010, Engineers Canada	1978 - present
Fellow in 1988 , American Society of Civil Engineers (ASCE)	1974 - present
Fellow in 2009 , Precast/Prestressed Concrete Institute (PCI)	1972 - present
Fellow in 1993 , American Concrete Institute (ACI)	1972 - present
Member, Post-Tension Institute	2003 - present
Member, International Concrete Repair Institute	2000 - present
Member, Association of Professional Engineers and Geoscientists of the Province of Manitoba (APEGM)	1978 - present
Member, International Society for Composites in Construction (ISCC)	1997 - 2002
Professional Associate, Transport Institute, University of Manitoba	1988 - 1994
Member, Japanese Society of Civil Engineers (JSCE)	1988 - 1991
Member, International Association for Bridge & Structural Engineering (IABSE)	1987 - 1990
Member, Manitoba Chapter for Canadian Society for Civil Engineering	1979 - 1989
Member, Concrete Institute of Australia	1983 - 1986
Member, American Society for Testing and Material (ASTM)	1979 - 1982

F. EDITORIAL BOARDS

Member, Editorial Board, “International Journal of Sustainable Materials and Structural Systems (IJ-SMSS)	2010 - 2012
Member, Blue Ribbon Review Committee of the Precast/Prestressed Handbook, Precast/Prestressed Concrete Institute	2009 – 2011
Member, Editorial Advisory Board, Elsevier Science, Construction and Building Materials	2007 – 2011
Member, International Editorial Board, International Journal of Concrete Structures and Materials, Korea	2007 – present
Member, International Advisory Board, The Emirates Journal for Engineering Research	2007 – 2012
Member, Advisory Board, International Institute for FRP in Construction (IIFC) Newsletter	2004 – present
Member, Advisory Board, Journal of Advanced Concrete Technology, Japan	2002 – 2011
Member, Editorial Board, ASCE Journal of Composites for Construction	1996 – 2011
Regional Editor, Elsevier Science, Construction and Building Materials	2001 - 2007
Chief Editor, FRP International Newsletter	1993 - 2004
Associate Editor, Canadian Journal of Civil Engineering	1994 - 1998

G. CONSULTING ACTIVITIES

<u>Organization/Company</u>	<u>Nature of Work</u>	<u>Dates</u>
Altus Precast Concrete Group	Conceptual Design of Innovative Precast Concrete Products Reinforced with FRP	2006 -present
Milliken & Company	Design of FRP Strengthening Systems	2012 -2014
International Composite Solutions, LLC	Repair of Concrete Structures with FRP	2009
Carlton Fields Law Firm, Attorneys at Law	Evaluation of Sanibel Causeway Bridge over San Carlos Bay	2004
NC Dept of Transportation	Design of Highway Concrete Bridge Deck Reinforced with FRP	2003
NC Dept of Transportation	Field Evaluation of Steel Bridge Under Construction	2003
Northeast Concrete Products, LLC	Design Guideline Manual for Precast FRP Composite Piling	2002
Parker, Poe, Adams & Bernstein Attorneys and Counselors at Law	Expert Witness for Speedway Bridge Failure	2002
Manitoba Highways and Transportation	Bridge Rating	1999
Dillon Engineering	Saskatchewan Legislative Building Precast Pile System	1998
Marshall Industries	Evaluation of C-Bar GFRP as a Reinforcement for Concrete Structures	1997
City of Winnipeg	FRP for Strengthening the Maryland Bridge	1996 - 1997
CAN/ACM Intelligent Structures	FRP for Prestressing and Reinforcing the Headingley Bridge	1996 - 1997
CAN/ACM Intelligent Structures	Steel-free Deck for the Salmon River Bridge	1995
Wardrop Engineering, Inc.	Charleswood Bridge	1994
Dillon Engineering	Manitoba Legislative Building Project	1993
The City of Calgary	Beddington/Centre Street Bridge Prestressed by FRP	1993
Wardrop Engineering, Inc.	Expert Witness for Failure of Air-supported Structure	1992
Dillon Consulting	Repair of the 90-year Old Shoal Lake Aqueduct	1991 - 1992
Wardrop Engineering, Inc.	Design of Prestressed Concrete Provencher Bridge	1990
ID Engineering	Review of the Design of a Prestressed Concrete Railway Bridge	1990
Wardrop Engineering, Inc.	Design of Containment for Energy System	1989
Dominion Bridge Co., Ltd.	Structural Design of Steel Structures	1988
Con-Force Structures, Ltd.	Design of Precast Concrete Chemical Tanks	1987
Barkman Concrete, Ltd.	Problems Related to Concrete Subjected to Acid Attack	1987
Environment, Workplace Safety & Health	Engineering Investigations	1986 - 1987
Penner & Keeler Partners, Ltd.	26 Storey Precast Concrete Building	1985
Reid Crowther & Partners, Ltd.	Field Testing of Disraeli Bridge	1984

Canadian National Rail	Railway Track Problems	1984
Penner & Keeler Partners, Ltd.	Design of Industrial and Tall Buildings	1980 - 1983
Dominion Bridge Co., Ltd.	New Design Concept for Steel Joist	1981
Betoni-Bowler Structures, Ltd.	Prestressed Concrete Structures	1977 - 1978
The Crop-Designers and Builders	Underground Prestressed Concrete Tanks	1976
Fikri Saleh & Associates	Industrial and Commercial Buildings	1974 - 1975
Gouda Consulting Engineering Office	Industrial and Tall Buildings	1965 - 1971

II. INSTRUCTION

Type	No.
Submitted Refereed Journal Papers	2
Published Refereed Journal Papers	178
Submitted Papers for Conference Proceedings	3
Published Papers in Conference Proceedings	281
Invited Keynote Presentations	89
Technical Presentations	59
Technical Reports	119
Books	5
Editor/Chair of Technical Publications	20

A. SCHOLARLY ACCOMPLISHMENTS

1. **Established and Directed the NSF I/UCRC Center “Center for the Integration of Composite into Infrastructure, CICI”, 2009-present.**
2. Established and Directed the NSF I/UCRC Center “Repair of Buildings and Bridges with Composite, RB2C”, 2002-2010.
3. **Established and maintain accreditation of the Constructed Facilities Laboratory (CFL) to ISO 17025 by the International Accreditation Service (IAS). The CFL is one of five university laboratories in the United States accredited to this standard, which helps the industry to receive approval for new construction materials and/or structural systems requiring accreditation by the International Code Council.**
4. **Establishment of the “Professor Rizkalla Best Graduate Presentation Award” for the bi-annual Australian International Conference on Composites (ACUN) sponsored by the organizing committee, 2005-present.**
5. **Establishment and organization of the “Paul Zia Distinguished Lecture Series”, 2002-present.**
6. Received five-year grant from NSF - Integrative Graduate Education and Research Traineeship (IGERT) program in collaboration with Virginia Tech in the field of “Macromolecular Science and Infrastructure Engineering.” July 2002 – June 2007.

B. INSTRUCTIONAL DEVELOPMENT

1. Distance Education:

“Prestressed Concrete Structures” (CE 522) has been offered through distance education. Course notes have been modified to include state-of-the-art knowledge in the field of prestressed concrete and presented in a format convenient for computer projection to the class and to be downloaded directly by the students.

“Advanced Theory of Concrete Structures” (CE 726) has been offered through distance education. Course notes have been modified to include the up-to-date knowledge in the field of reinforced concrete and presented in a format convenient for computer projection to the class and to be downloaded directly by the students.

2. Continuing Education Activities Attended:

<u>Activity</u>	<u>Location</u>	<u>Dates</u>
Engineering and Economics of Reinforced Concrete Buildings	Chicago	Aug. 2004
Design of Concrete Bridges by the AASHTO LRFD Specifications	Chicago	Aug. 2004
Laptop Computers for Professors, Sponsored by the College of Engineering, NCSU	Raleigh	Aug. 2004
Concrete Repair and Protection Industry Workshop	Chicago	Mar. 2004
Structural Health Monitoring Workshop	Winnipeg	Sept. 2002
Engineered Masonry	Winnipeg	Nov. 1996
Concrete for Professors	Chicago	Aug. 1995
CIDA Management Workshop	Vancouver	Mar. 1989
Two-day Meeting for Steel Structures Educators	Toronto	Feb. 1987
Steel Design, Canadian Institute of Steel Construction	Saskatoon	Jan. 1986
Prestressed Concrete for Professors, Prestressed Concrete Institute	Trent University	May 1982
Short Course on ANSYS Finite Element Computer Program, Cybershare	Winnipeg	Apr. 1981

3. Short Courses and Workshop Presentations (since 2000)

1. Application of FRP in precast Concrete: An Introduction, PCI Convention and National bridge Conference, Nashville, TN, October 1, 2012.
2. Use of FRP for Precast Concrete Products, Annual convention of the Prestressed Concrete Institute, February 2012.
3. Innovative use of Fiber Reinforced Polymer for New Construction, Continuing Education, North Carolina State University, December 8-9, 2011.
4. US-Japan Workshop on Life Cycle Assessment of Sustainable Infrastructure Materials, Hokkaido University, Sapporo, Japan, Sponsored by NSF, October 21-22, 2009.

5. Design your own Educational Experience 2008 Lectures Series for the Design Professional: *Innovation Precast Concrete Product Reinforced with FRP*, Sponsored by Continuing Education, North Carolina State University, December 3, 2008.
6. U.S. – South America Workshop: *Innovative Materials for Civil Infrastructure*, Research and Education, Santiago, Chile, Sponsored by National Science Foundation, October 13-15, 2008.
7. Chair, International Workshop on *The Use of FRP for Sustainable Structure*”, Cairo Egypt, sponsored by National Science Foundation, May 22, 2008.
8. *Design and Behavior of Steel Bridges Strengthened with Fiber-Reinforced Polymer Materials*, TRB Workshop on Design and Construction of Fiber-Reinforced Polymer (FRP) Composites Application, Washington, D.C., January 21, 2007 (sponsored by the Transportation Research Board (TRB) Committee AFF80 on Structural Fiber Reinforced Plastics).
9. *Strengthening and Repair of Concrete and Steel Bridges with FRP Materials*, Melbourne, Australia, July 13, 2006 (sponsored by The Structural Branch of Engineers Australia, Monash University and International Association for Bridge and Structural Engineering).
10. *Design and Construction of Bonded and Unbonded FRP Composites, Strengthening of Steel Structures*, TRB Workshop on Design and Construction of Fiber-Reinforced Polymer (FRP) Composites Application, Washington, D.C., January 22, 2006 (sponsored by the Transportation Research Board (TRB) Committee AFF80 on Structural Fiber Reinforced Plastics).
11. *Design and Construction of Near Surface Mounted FRP Composites*, TRB Workshop on Design and Construction of Fiber-Reinforced Polymer (FRP) Composites Application, Washington, D.C., January 22, 2006 (sponsored by the Transportation Research Board (TRB) Committee AFF80 on Structural Fiber Reinforced Plastics).
12. *Strengthening Prestressed Concrete Bridge Girders with FRP*, International Workshop on FRP Composites in Construction: the State-of-the-Art, Hong Kong, China, December 10, 2005.
13. *Strengthening of Steel-Concrete Composite Beams with High-Modulus Carbon Fiber Reinforced (CFRP) Material*, Workshop on High Performance Materials, Monitoring and Management of Civil Engineering Infrastructures Systems (Sponsored by NSF), Beirut, Lebanon, June 2005.
14. *Material Research and Education: Future Trends and Opportunity*, Doha, Qatar, April 4-6, 2005 (sponsored by the National Science Foundation).
15. *ACI 318-02: Unified Approach for Flexural and Strut and Tie Method for Shear Design*, Design Your Own Continuing Education Experience, NC State University, Office of Professional Development, November 30, 2004.

16. *ACI 440.2R-02: Strengthening Concrete Structures and Bridges with FRP*, Design Your Own Continuing Education Experience, NC State University, Office of Professional Development, November 30, 2004.
17. *Research Needs for FRP*, San Francisco, California, October 22-23, 2004 (sponsored by the National Science Foundation).
18. *Use of FRP for Civil Engineering Infrastructure*, Greensboro Engineers Club, Greensboro, North Carolina, February 2, 2004.
19. *Repair of Structures Utilizing Fiber-Reinforced Polymer*, organized by the Transportation Research Board (TRB), Washington, D.C., January 11, 2004.
20. *FRP Composites for Reinforced Concrete Construction*, organized by the American Concrete Institute across the country, 2003.
21. *Use of FRP in Bridge Engineering*, sponsored by FHWA, NYDOT and Syracuse University, Syracuse, New York, August 7-8, 2003.
22. *ACI Code 318-02 and Design Guidelines for Reinforcement and Strengthening of Concrete Structures with FRP*, Quito, Ecuador, June 5-6, 2003 (sponsored by NCSU International Organization Program and Department of Civil Engineering, Ecuador National Council of Universities, ACI Ecuador and National Foundation for Science and Technology).
23. *Use of Advanced Composite Materials in Civil Engineering*, Ministry of Housing, Utilities and Urban Communities, Housing & Building Research Center, Cairo, Egypt, December 15-16, 2002.
24. *Changes to ACI Building Code 318-02*, Design Your Own Continuing Education Experience, NC State University, Office of Professional Development, December 4, 2002.
25. *Use of Fiber Reinforced Polymer (FRP) for Concrete*, organized by NC State University, Office of Professional Development, Industrial Extension Service, Institute of Construction and Department of Civil Engineering, November 1, 2002.
26. *Use of Fiber Reinforced Polymer (FRP) for Concrete Structures*, NC State University Continuing Education, October 28, 2002.
27. *ACI Design Guidelines on Strengthening of Concrete Structures with FRP*, University of Brasilia, Technology Institute, July 30, 2002.
28. *ACI Design Guidelines for Reinforcement and Strengthening of Concrete Structures*, Melbourne, Australia, July 19, 2002.
29. *State of the Art Research in Structural and Geotechnical Engineering*, North Carolina State University, Professional Engineers of North Carolina (PENC) September 2001.

30. *FRP for Civil Engineering Application*, University of Calabria, Italy, May 31-June 5, 2001 (sponsored by Italian Government).
31. *Use of FRP for Civil Infrastructures*, Cairo Egypt, May 28-29, 2001 (sponsored by USAID in cooperation with George Washington University).
32. *FRP Composites for Reinforced Concrete in the Arabian Gulf: Design, Analysis and Application*, Sixth International Conference on Deterioration and Repair of Concrete in the Arabian Gulf Region, Bahrain, November 18-19, 2000.
33. *Welded Wire Fabric as Shear Reinforcement under Static and Cyclic Loading Conditions*, Institute of Technology, Shimizu Corporation, Tokyo, Japan, May 30, 1988.
34. *Behavior of the Connections used for Precast Concrete Highrise Structures*, Department of Civil Engineering, The University of Newcastle, New South Wales, Australia, March 11, 1988.
35. *University/Industrial Research Interaction in Canada*, School of Civil Engineering, University of New South Wales, New South Wales, Australia, March 9, 1988.
36. *Behavior of the Connections used for Precast Concrete Highrise Structures*, School of Civil and Mining Engineering, University of Sydney, Sydney, Australia, March 8, 1988.
37. *Limit States Behavior of the Connections used for Precast Concrete High Rise Structures*, University of Technology, Sydney, Australia, March 3, 1988.
38. *Movement of House Foundations on Winnipeg Clay*, co-authors L. Domaschuk and D. Flatt, Canadian Geotechnical Society, Winnipeg Branch, Living with Soil Movement, Winnipeg, Canada, February 1986.
39. *Behavioral Load Testing of the Disraeli Facility*, The Canadian Society for Civil Engineering, Local Chapter, Winnipeg, Canada, April 2, 1985.
40. *Loading Facility Erected in 60 Hours*, Precast/Prestressed Concrete Institution Convention, Chicago, Illinois, November 3, 1983.
41. *Behavior of Prestressed Concrete Containment Structures Due to Overpressure*, University of Queensland and New South Wales University, Australia, March 1981.
42. *Air Leakage Characteristics in Reinforced Concrete*, The American Concrete Institute Annual Convention, Las Vegas, Nevada, March 1980.

TEACHING EFFECTIVENESS

Undergraduate and Graduate Teaching:

NC State University:

Sem/Yr	Course	Course No.	Enrollment	Teaching Eval.	Dept. Average
F2016	Theory and Design of Prestressed Concrete	CE522 001			
F2016	Theory and Design of Prestressed Concrete	CE522 601			
SP2016	Reinforced Concrete Design	CE327	65	4.7	4.0
F2015	Theory and Design of Prestressed Concrete	CE522 001	24	4.6	4.5
F2015	Theory and Design of Prestressed Concrete	CE522 601	7	4.3	4.5
SP2015	Reinforced Concrete Design	CE327	77	4.7	4.1
F2014	Theory and Design of Prestressed Concrete	CE522 001	23	4.3	4.4
F2014	Theory and Design of Prestressed Concrete	CE522 601	14	4.5	4.3
Sp 2014	Reinforced Concrete Design	CE327	66	4.4	4.1
F2013	Theory and Design of Prestressed Concrete	CE522 001	23	4.0	4.3
F2013	Theory and Design of Prestressed Concrete	CE522 601	19	4.3	4.3
Sp 2013	Reinforced Concrete Design	CE 327	72	4.2	4.1
F 2012	Theory and Design of Prestressed Concrete	CE 522 001	22	4.5	4.3
F2012	Theory and Design of Prestressed Concrete	CE522 601	14	4.2	4.3
Sp 2012	Reinforced Concrete Design	CE 327	46	4.6	4.2
F 2011	Theory and Design of Prestressed Concrete	CE522	13	4.0	4.4
Sp 2011	Reinforced Concrete Design	CE327	36	4.4	4.1
F 2010	Theory and Design of Prestressed Concrete	CE522	72	4.4	4.4
Sp 2010	Reinforced Concrete Design	CE327	65	4.6	4.1
F 2009	Theory and Design of Prestressed Concrete	CE522	21	4.6	4.4
Sp 2009	Reinforced Concrete Design	CE327	62	4.7	4.2
F 2008	Theory and Design of Prestressed Concrete	CE522	52	4.5	4.3
Sp 2008	Reinforced Concrete Design	CE 327	49	4.35	4.15
F 2007	Theory and Design of Prestressed Concrete	CE 522	24	4.15	4.35

Sp 2007	Reinforced Concrete Design	CE 327	59	4.67	4.21
F 2006	Theory and Design of Prestressed Concrete (Distant Education)	CE 522	13	4.67	4.3
Sp 2006	Reinforced Concrete Design	CE 327	42	4.53	3.90
F 2006	Theory and Design of Prestressed Concrete	CE 522	22	4.6	4.3
S 2005	Advanced Theory of Concrete Structures (Distant Education)	CE 726	9	4.87	4.4
F 2005	Theory and Design of Prestressed Concrete	CE 522	25	4.27	4.4
F 2004	Theory and Design of Prestressed Concrete	CE 522	29	4.95	4.2
Sp 2005	Advanced Theory of Concrete Structures	CE 726	15	4.90	4.4
F 2003	Reinforced Concrete Design	CE 327	51	4.38	3.8
Sp 2004	Advanced Theory of Concrete Structures	CE 726	12	4.78	4.5
F 2002	Reinforced Concrete Design	CE 327	51	4.37	4.0
Sp 2003	Advanced Theory of Concrete Structures	CE 726	10	4.67	4.2
Sp 2002	Advanced Theory of Concrete Structures	CE 726	23	4.56	4.35
F 2001	Reinforced Concrete Design	CE 327	73	4.35	4.0
Sp 2001	Advanced Theory of Concrete Structures	CE 726	8	4.75	4.4

Peer reviews were conducted by Drs. Paul Khosla and Mervyn Kowalsky, Spring 2010

University of Manitoba:

Year	Course	Course No.	Enrollment
1979 - 2000	Prestressed Concrete	023.710	8
1979 - 2000	Behavior of Reinforced Concrete	023.726	8
1979 - 2000	Graduate Project	023.482	3
1979 - 2000	Special Topics in Structures	023.735	1-2
1985 - 2000	Structural Design II (Concrete)	023.439	55
1979 - 1985	Structural Design I (Steel)	023.344	50
1979 - 1985	Material I	023.230	60
1979 - 1982	Dynamics	023.136	80

C. ADVISING ACTIVITIES

Responsibility	Status	Number of Students
Advisor	Completed Ph.D.	27
Advisor	Current Ph.D.	4
Co-Advisor	Completed Ph.D.	4
Advisor	Completed M.S.	61
Advisor	Current M. S.	3

Advisor	Completed M.C.E.	7
Member of Advisory Committee	Ph.D.	18
Member of Advisory Committee	M.S.	12
Research Associates/Visiting Scholars		48

1. Undergraduate Advising:

Advising 15 undergraduate students per year by providing academic guidance and career planning.

2. Chairman - Graduate Student Advisory Committee:

<u>Graduate Student</u>	<u>Degree</u>	<u>Year Granted</u>
Nafadi, Mohamed	Ph.D.	2016
Khalaf Alla, Omar	Ph.D.	In Progress
Kazem, Hamid	Ph.D.	2016
Botros, Amir	Ph.D.	2015
Gautam, Sopal	Ph.D.	2013
Lunn, Dillon	Ph.D.	2012
Soliman, Judy	Ph.D. (Air Shams Unvi.)	2012
Lucier, Greg	Ph.D.	2012
Hosny, Amr	Ph.D.	2010
Mosavi, Amirardalan	Ph.D. (co-chair – Seracino)	2010
Dawood, Mina	Ph.D.	2008
Seliem, Hatem	Ph.D.	2007
Kim, Sungjoong	Ph.D.	2007
Wu, Zhenhua	Ph.D. (co-chair - Mirmiran)	2006
Mertol, Halit	Ph.D.	2006
Choi, Wonchang	Ph.D.	2006
Rosenboom, Owen	Ph.D.	2006
Carneiro, Ronaldson	Ph.D. (co-chair - University of Brasília)	2006
Reis, Engin	Ph.D.	2005
Filho, José Neres da Silva	Ph.D. (co-chair - University of Brasília)	2005
Schnerch, David	Ph.D.	2005
Foud, Al-Douba	Ph.D. (Alexandria Univ., Egypt)	2003
Hassan, Tarek	Ph.D.	2002
Mahmoud, Mohamed	Ph.D.	2002
Fam, Amir	Ph.D.	2000
Hutchinson, Robin	Ph.D.	1999
Shehata, Emile	Ph.D.	1999
Mahmoud, Zaki	Ph.D.	1997
Hassan, Nahla	Ph.D.	1995
Abdelrahman, Amr	Ph.D.	1995
Soudki, Khaled	Ph.D.	1994
Uppal, S.	Ph.D.	1990
Khalaf Alla, Omar	M.S.	2015
Shuford, Joel	M.S.	2014

Miller, Bryant	M.S.	2014
Guaderrama, Lucas	M.S.	2014
High, Cory	M.S.	2013
Tabrizi, Salar	M.S.	2013
Nafadi, Mohamed	M.S.	2013
Soriano, Jonathan	M.S.	2012
Bunn, William	M.S.	2011
Mielke, Benjamin	M.S.	2011
Mielke, Brian	M.S.	2011
Storm, Tyler	M.S.	2011
Ragan, David	M.S.	2011
Obregon-Salinas, Adolfo	M.S.	2010
Heiser, Matthew	M.S.	2010
Hariharan, Vivek	M.S.	2009
Lunn,Dillon	M.S.	2009
Taylor, Elliott	M.S.	2009
Montesdeoca, Fabricio	M.S.	2008
Stanford, Kirk	M.S.	2008
Munikrishna, Aruna	M.S.	2008
Frankl, Bernard	M.S.	2008
Walter, Catrina	M.S.	2008
Mantawy, Ahmad	M.S. (Ain Shams University, Egypt)	2008
Galal, Reham	M.S. (Ain Shams University, Egypt)	2008
Sumpter, Matthew	M.S.	2007
Soliman, Judy	M.S. (Ain Shams University, Egypt)	2007
Hosny, Amr	M.S.	2007
Patrick, Jason	M.S.	2007
Vickery, John David	M.S.	2006
Miller, Anthony	M.S.	2006
Lucier, Gregory	M.S.	2006
Johnson, Charles	M.S.	2006
Mohamed, Tarek	M.S.	2006
Nelson, James Lee	M.S.	2005
Dawood, Mina	M.S.	2005
Smith, Glen	M.S.	2005
Lanier, Bryan	M.S.	2005
Norton, Taylor	M.S.	2004
Cook, Anna	M.S. (co-chair)	2004
Flisak, Bart	M.S. (University of Manitoba)	2004
Yotakhong, Purk	M.S.	2003
El-Agroudy, Hossam	M.S.	2003
Williams, Brea	M.S.	2000
Becque, Jurgen	M.S.	2000
Gentile, Chris	M.S.	2000
Morphy, Ryan	M.S.	1999

Louka, Haney	M.S.	1999
Eddie, Darren	M.S.	1999
Jawara, Alieu	M.S.	1999
Hassan, Tarek	M.S.	1999
Grieff, Susan	M.Sc.	1996
Michaluk, Craig	M.Sc.	1996
Fam, Amir Zakaria	M.Sc.	1996
Xie, Yuping	M.Sc.	1995
Domenico, Nolan	M.Sc.	1995
West, Jeffrey	M.Sc.	1994
Wright, James	M.Sc.	1992
Rosner, Charles	M.Sc.	1992
Savic, Jasna	M.Sc.	1991
Hutchinson, Robin	M.Sc.	1990
Wells, John	M.Sc.	1990
Pincheira, J.	M.Sc.	1988
Serrette, R.	M.Sc.	1988
Xiaoyi, Xuan	M.Sc.	1987
Foerster, H.	M.Sc.	1987
Ray, Arunachal	M.Sc.	1986
Ben-Omran, H.	M.Sc.	1984
Saadat, F.	M.Sc.	1984
Hwang, S.Lee	M.Sc.	1983
Lau, Bon Lai	M.Sc.	1982
El-Shahawi, Mohsen	M.Sc.	1981
Cox, James	M.CE. (Online)	In Progress
Adamson, Scott D.	M.CE. (Online)	In Progress
Grayson, Lilly	M.CE. (Online)	In Progress
Artero Rojas, Diana	M.CE.	2016
Lopez, Irvin J.	M.CE. (Online)	2015
Gates, Browne	M.CE. (Online)	In Progress
Adams, Emily	M.CE.	In Progress
Chen, Zhao	M.CE.	In Progress
Forman, Christopher	M.CE.	In Progress
Ighwair, Ahmad	M.CE.	2011
Joshi, Dhruv	M.CE.	2010
Moebs, Jessica	M.CE.	2008
Marsal, Antonio	M.CE.	2005
Cubbage, Doug	M.CE.	2003
Gelo, Lucas	M.CE.	2003
Musiker, Daniel	M.CE.	2002
Bunniran, Thanarat	M.CE.	2002
Charleson, Kenneth	M.Eng.	1997
Chen, Jingang	M.Eng.	1995
Robinson, Lorne	M.Eng.	1995

Cruz, Fortunato	M.Eng.	1994
Klimek, Anna	M.Eng.	1993
Shaohua, Qie	M.Eng.	1993
Navaee, Homayoon	M.Eng.	1990
Dalkie, P.	M.Eng.	1986
Dalkie, A.	M.Eng.	1986
Waung, P.	M.Eng.	1984
Oramasionwu, G.	M.Eng.	1984

3. **Ph.D. External Examiner**

<u>Graduate Student</u>	<u>Degree</u>	<u>Year Granted</u>
Tomlinson, Douglas	Ph.D., Queen's University, Canada	2015
Christian, Abraham	Ph.D., The National University of Singapore	2015
Agarwal, Ankit	Ph.D., The University of New South Wales	2014
Robin, Kalfat	Ph.D., Swinburne University	2013
Lin, Zhisheng	Ph.D., National University of Singapore	2013
Salmah Krem	Ph.D., Waterloo University	2013
Han Ay Lie	Ph.D., Diponegoro University	2013
Rinaldi, Remo	Ph.D., Concordia University	2012
EL_Sokkary, Hossam	Ph.D., Concordia University	2012

4. **Member - Graduate Student Advisory Committee:**

<u>Graduate Student</u>	<u>Degree</u>	<u>Year Granted</u>
Mabry, Nehemiah	Ph.D.	2015
Ghasemzadeh, Farnam	Ph.D.	2015
Hallaji, Milad	Ph.D.	2015
Shapack, Griff	M.S.	2015
Boger, Natasha	M.S.	2014
Das, Baishali	M.S.	2014
Shen, Bowen	M.S.	2014
Forsyth, Michael	M.S.	2013
Clark, Anna	M.S.	2012
Syed, Sammiuddin	Ph.D.	2012
Elsaid, Adel	Ph.D.	2011
Hagues, Vogel	Ph.D. (University of Manitoba)	2011
Mady, M.H.A.	Ph.D. (University of Manitoba)	2011
Morera, Francisco	Ph.D.	2010
Dawood, Nabil	Ph.D. (Memorial University)	2010
Elmahdy, Ayman	Ph.D. (University of Calgary)	2010
Mohamed, Hamdy	Ph.D. (University of Sherbrooke)	2010
Kennedy, Kurtis	M.S.	2010
Williams, Maggie	M.S.	2010
Bush, Blake	M.S.	2010
Lim, Chemin	Ph.D.	2009

Ichhaporia, Pratik	Ph.D. (Textiles)	2008
Grimes, Hartley	M.S.	2009
Vasquez, Diego	M.S.	2008
Jiang, Guoliang	Ph.D. (Mechanical Engineering)	2007
AR Malik	Ph.D. (University of New South Wales)	2007
Lackey, Paul	M.S.	2006
Fisher, Seth	M.S.	2006
Paoinchantara, Nuttapone	M.S.	2005
Logan, Andrew	M.S.	2005
Zhu, Zhenyu	Ph.D.	2004
Ahmad, Iftekhhar	Ph.D.	2004
Whisenhunt, Todd	M.S.	2004
Shao, Yutian	Ph.D.	2003
Bisby, Luke	Ph.D. (Queen's University)	2003
Wu, Zhenhua	M.S.	2003
Coskun, Hilmi	Ph.D.	2002
Durham, Adrian	M.Sc.	2002

1. Research Associates and Visiting Scholars:

<u>Name</u>	<u>Institution</u>	<u>Year</u>
Dr. Tugce Sevil Yaman	Mersin University, Turkey	2016
Dr. Aladdin Sharkawi	Tanta University, Egypt	March-June 2016
Dr. Bo Wang	Jilin Jianzhu University, China	2014-2015
Dr. Carlos Luna	University of Brasilia	2014-2015
Dr. Hodicky Kamil	Technical University of Denmark	2014-2015
Dr. Hatem Seliem	Cairo University, Egypt	2013-2014
Dr. Dillon Lunn	North Carolina State University	2013
Dr. Tarek Hassan	Ain Shams University	2012
Dr. Wooyung Jung	Kangnung National University, Korea	2009 - 2010
Dr. Hatem Seliem	Cairo University, Egypt	2009 - 2010
Ms. Caroline Ding	Southeast University, China	2009 - 2010
Dr. Young-Chan You	Korea Institute of Construction Technology	2009
Dr. Alaa El Din Sharkawi	The University of Tanta, Egypt	2008 - 2009
Dr. Gang Wu	Southeast University, China	2008
Dr. Tarek Hassan	Ain Shams University, Egypt	2008
Dr. Hassan Allam	Housing & Building National Research Center, Egypt	2008
Dr. Sakurada Ryoji	Akita National College of Technology, Japan	2008
Dr. Hatem Seliem	Post Doctoral Fellow, NCSU	2007 - 2008
Dr. Halit Cenar Mertol	Post Doctoral Fellow, NCSU	2006 - 2007
Dr. Malek Batayneh	Fulbright Fellowship, Hashemite University, Jordan	2006 - 2007
Dr. Tarek Hassan	Ain Shams University, Egypt	2006
Dr. Engin Murat Reis	Post Doctoral Fellow, NCSU	2006
Dr. Hyun Do Yun	Chungnam National University, Korea	2005 - 2007
Dr. Chan Ki Jeon	Incheon City College, Korea	2004 - 2005

Dr. Won Ho Kang	Dong-A University, Korea	2004 - 2005
Dr. Tarek Hassan	Post Doctoral Fellow, NCSU (Canada NSERC)	2002 - 2004
Mr. Ronaldson Carneiro	University of Brasília, Brazil	2003 - 2004
Mr. José Neres da Silva Filho	University of Brasília, Brazil	2002 - 2003
Dr. Janet Lees	Cambridge University, United Kingdom	2002 - 2003
Dr. Raafat El-Hacha	Post Doctoral Fellow, NCSU (Canada NSERC)	2001 - 2003
Dr. Amir Fam	Post Doctoral Fellow, NCSU (Canada NSERC)	2000 - 2002
Dr. Mohamed Mohamedien	Suez Canal University, Egypt	1999 - 2000
Dr. Nahla Hassan	Ain Shams University, Egypt	1999 - 2000
Dr. Ning-guang Xu	Nanjing University, China	1999 - 2000
Dr. Thabet Samy	Cairo University, Egypt	1999
Dr. Ahmed Elsheikh	University of Dundee, United Kingdom	1999
Dr. Anil Kumar Patnaik	Curtin University of Technology, Perth, Australia	1998 - 1999
Mr. Guido Camata	University of Bologna, Italy	1998 - 1999
Dr. Aly Sultan	Alexandria University, Egypt	1997 - 1999
Dr. Dagmar Svecova	University of Manitoba, Winnipeg, Canada	1997 - 1999
Dr. Amr Abdelrahman	Ain Shams University, Cairo, Egypt	1996 - 1998
Dr. Hany Abdalla	Concordia University, Montreal, Canada	1995 - 1997
Dr. Tetsuo Harada	Nagasaki University, Japan	1996
Dr. M. Mohamedian	Ain Shams University, Egypt	1992 - 1994
Mr. Huang Jitian	Jilin Architectural & Engineering Institute, China	1992
Mr. Qui Shaohua	Jilin Architectural & Engineering Institute, China	1990 - 1992
Mr. Zhenjia Shen	Tingji University, China	1988 - 1992
Dr. Miao Rouyn	Jilin Architectural & Engineering Institute, China	1991
Mr. Yuping Xie	South China University of Technology, China	1990 - 1991
Dr. Kunio Torii	Technological University of Nagaoka, Japan	1990
Mr. Tian Chuangian	Wuhan University, China	1988
Dr. E. Attigobe	University of Kansas	1986 - 1987
Dr. Kyuichi Maruyama	Technological University of Nagoaka, Japan	1985 - 1985
Dr. Takeshi Higai	Yamanashi University, Japan	1982-1983

III. RESEARCH CONTRIBUTIONS

A. SCHOLARLY ACHIEVEMENTS

1. U.S. Patent Applications

1. “*Concrete Girder Reinforcement*,” Pending US Patent, Submitted July 2015.
2. “*Precast Concrete Pile with Carbon Fiber Reinforced Grid*,” U.S. Patent Number 8,677,720 and Trademark Office, Department of Commerce 2014.

2. Articles Submitted for Publication in Refereed Professional/Technical Journals:

1. **Botros, A., Klein, G., Lucier, G., Rizkalla, S. and Zia, P., “*Dapped Ends of Prestressed Concrete Thin-Stemmed Members Part 1: Behavior*”, submitted to PCI Journal, October 2016.**
2. **Ghaz, M., Miller, B., Khalaf Alla, O. and Rizkalla, S., “*Do Mechanical and Environmental loading have a synergistic effect on the degradation of Pultruded Glass Fiber reinforced Polymers?*”, submitted to Journal of Construction and Building Materials, March 2016.**
3. **Lucier, G., Gleich, H., Klein, G., Rizkalla, S. and Zia, P., “*Advancements in Design and Detailing of Precast L-Beams*,” submitted to Concrete International Journal, February 2016.**

3. Articles Accepted/ Published in Refereed Professional/Technical Journals:

1. **Cholake, S. T., Moran, G., Joe, B., Bai, Yu, Raman, R.K., Zhao, X., Rizkalla, S. and Bandyopadhyay, S., “*Improved Mode I fracture resistance of CFRP composites by reinforcing epoxy matrix with recycled short milled carbon fibre*,” Journal of Construction and Building Materials Journal, April 2016, Volume 11, pp. 399-407.**
2. **Shapack, G., Van Brunt, Z., Seracino, R., Lucier, G., Rizkalla, S., and Pour-Ghaz, M., “*Improving the Durability and Coastal Bridges with CFRP Prestressed Cored Slabs*,” ACI Special publications, April 2016.**
3. **Lucier, G., Botros, A., Rizkalla, S. and Gleich, H., “*Behavior of Free and Connected Double-Tee Flanges Reinforced with FRP*,” accepted for publication, PCI Journal, March 2016.**
4. **Kazem, H., Guaderrama, L., Seliem, H., Rizkalla, S. and Kobayashi, A., “*Strengthening of Steel Plates subjected to Uniaxial Compression using Small-Diameter CFRP Strands*,” Journal of Construction and Building Materials, February 2016, Volume 111, pp. 223-236.**
5. **Seliem, H., Ding, L., Potter, W. and Rizkalla, S., “*Use of CFRP Grid for Precast Concrete Piles*,” accepted for publication, PCI Journal, January 2016.**
6. **High, C., Seliem, H.M., El-Safy, A., and Rizkalla, S., “*Use of Basalt Fibers for Concrete Structures*,” Journal of Construction and Building Materials Journal, October 2015, Volume 96, pp. 37-46.**
7. **Cholake, S.T., Moran, G., Bai, Y., Raman, R.K., Singh, Zhao, X.L., Rizkalla, S. and Bandyopadhyay, S., “*Physico-Chemical Characterization of Novel Epoxy Matrix System Reinforced with Recycled Short Milled Carbon Fibre*,” Journal of Minerals and Materials Characterization and Engineering, September 2015, Volume 3, pp. 373-389.**

8. Kazem, H., Bunn, W.G., Seliem, H., Rizkalla, S., and Gleich, H., “*Durability and Long Term behaviour of FRP/Foam Shear Transfer Mechanism for Concrete Sandwich Panels*,” *Journal of Construction and Building Material Journal*, August 2015, Volume 98, pp. 722-734.
9. Lunn, D., Lucier, G., Rizkalla, S., and Cleland, N., “*A New Generation of Precast Concrete Double-Tees Reinforced with CFRP Grid*,” *PCI Journal*, July-August 2015, Volume 60, pp. 37-48.
10. Tabrizi, S. Kazem, H. Rizkalla, S. and Kobayashi, A., “*New Small-Diameter CFRP Material for Flexural Strengthening of Steel Bridge Girders*,” *Journal of Construction and Building Material*, June 2015, Volume 95, pp. 748-756.
11. Hodicky, K., Sopal, G., Rizkalla, S., Hulin, T., and Stang, H., “*Experimental and Numerical Investigation of FRP Shear Mechanism for Concrete Sandwich Panels*”, accepted for publication in *ASCE Journal of Composites for Construction*, October 2014, Volume 19, Issue 5.
12. Liu, H., Zhao, X., Bai, Y., Singh Roman, R., Rizkalla, S., Bandyopadhyay, S., “*The Effect of Elevated Temperature on the Bond between High Modulus CFRP Sheet and Steel*”, *Australian Journal of Structural Engineering*, July 2014, Volume 15, No. 4, pp. 355-366.
13. Lunn, D & Rizkalla, S. “*Design of FRP-Strengthened Infill Masonry Walls Subjected to Out-of-Plane Loading*”, *ASCE Journal of Composites for Construction (JCC)*, June 2014, Volume 18, Issue 3.
14. Cholake, S., Mada, M., Raman, S., Bai, Y., Zhao, X, Bandyopadhyay, S. and Rizkalla, S., “*Quantitative Analysis of Curing Mechanisms of Epoxy Resin by Mid- and Near-Fourier Transform Infra Red Spectroscopy*”, *the Defence Science Journal*, May 2014, Volume 64, No. 3, pp. 314-321.
15. Klein, G. Lucier, G. Rizkalla, S., and Zia, P., “*Torsion Simplified: A Failure Plan Model for Design of Spandrel Beams*,” accepted for publication by *ACI Concrete International*, October 2013.
16. Lunn, D., Maeda, S., Rizkalla, S., and Ueda, T., “*Anchorage Systems for FRP Strengthening of Infill Masonry Structures*”, *International Journal of Sustainable Materials and Structural Systems*, September 2013, Volume 1, No. 2, pp.142-160.
17. Zhao, X.L., Bai, Y., Al-Mahaidi R. , Rizkalla S., “*Effect of Dynamic Loading and Environmental Conditions on the Bond between CFRP and Steel: State-of-the-Art Review*,” *ASCE Journal of Composites for Construction*, October 2013, Volume 18.

18. Zhao, X.L., Bai, Y., Al-Mahaidi, R. and Rizkalla, S., "*Design of FRP-Strengthened Infill Masonry Walls Subjected to Out-of-Plane Loading*," ASCE Journal of Composites for Construction, July 2013, Volume 18.
19. Rizkalla, S., Lunn, D., Lucier, G., Sennour, L and Gleich, H., "*Precast Concrete Wall Panels*," Journal of the Concrete Plant International Journal, March 15, 2013.
20. Rizkalla, S., Lunn, D., Lucier, G., Sennour, L., Gleich, H. and Carson, J., "*Innovative Use of FRP for Sustainable Precast Structures*", Precast Concrete Façade Tectonics Journal, February 2013, No. 8, pp. 55-63.
21. Storm, T., Rizkalla, S., and Zia, P., "*Effect of Production Practices on Camber of Prestressed Concrete Bridge Girders*", PCI Journal, February 2013, Volume 58, No. 1, pp. 96-111.
22. Lucier, G. Rizkalla, S., and Sennour, L., "*Structural Composites Thermally Efficient Precast Concrete*", Concrete Plant International, CPI, 2 1 2013, pp. 1-10.
23. Mosavi, A., Seracino, R., Rizkalla, S. and Sumner, E., "*Effect of Temperature on Daily Model Variability of a Steel Concrete Composite Bridge*," ASCE Journal of Bridge Engineering, Nov./Dec 2012, Volume 17, No. 6, pp 979-983.
24. Hosny, A., Seliem, H.M., Rizkalla, S., and Zia, P., "*Development Length of Unconfined Conventional and High-Strength Steel Reinforcing Bars*", ACI Structural Journal, Sept-October 2012, Volume 109, No. 5, pp. 655-664.
25. Hassan, T.K., Mantawy, A., Soliman, J., Sherif, A. and Rizkalla, S., "*Bond Characteristics and Shear Behavior of Concrete Beams Reinforced with High-Strength Steel Reinforcement*," the Advanced in Structural Engineering Journal, Volume 15, No. 2, 2012.
26. Lucier, G., Walter, C., Rizkalla, S., Zia, P. and Klein, G., "*Development of a Rational Design Methodology for Precast Slender Spandrel Beams: Part 2, Analysis and Design Guidelines*," PCI Journal, Fall 2011, Vol. 56, No. 4, pp. 106-133.
27. Heiser, M., Hosny, A., Rizkalla, S. and Zia, P., "*Bond and Shear Behavior of Concrete Beams Containing Lightweight Synthetic Particles*," ACI Structural Journal, November – December 2011, Vol. 108 No. 6.
28. Lucier, G., Walter, C., Rizkalla, S., Zia, P. and Klein, G., "*Development of a Rational Design Methodology for Precast Slender Spandrel Beams: Part 1, Experimental Results*," PCI Journal, Volume 56, Number 2, Spring 2011, pp. 88-111.
29. Mosavi, A., Dickey, D., Seracino, R. and Rizkalla, S., "*Identifying Damage Locations Under Ambient Vibrations Utilizing Vector Autoregressive Models and*

Mahalanobis Distances," Mechanical Systems and Signal Processing Journal, 2011, Volume 26, pp. 254-167.

30. Hassan, T., Lucier, G., Nelson, L. and Rizkalla, S., "*Splice Strength of Large Diameter, High Strength Steel Reinforcing Bars*," Construction and Building Materials Journal, July 2011, Vol. 26, Issue 1, pp. 216-225.
31. Ding, L., Seliem, H.M. and Rizkalla, S., "*Behavior of Concrete Piles Confined with CFRP*," ACI Special Publication, April 2011, No. 275, pp. 275-311.
32. Rizkalla, S., Lucier, G. and Dawood, M., "*Innovative Use of FRP for the Precast Industry*," in press Advances in Structural Engineering Journal, 2011.
33. Frankl, B., Lucier, G., Hassan, T. and Rizkalla, S., "*Behavior of Insulated Precast, Prestressed Concrete Sandwich Wall Panels Reinforced with CFRP Grid*," PCI Journal, Volume 56, Number 2, Spring 2011, pp. 88-111.
34. Soong, W.H., Raghavan, J. and Rizkalla, S., "*Fundamental Mechanisms of Bonding of Glass Fiber Reinforced Polymer Reinforcement to Concrete*," Construction and Building Materials Journal, June 2011. Vol. 25, Issue 6, pp. 2813 – 2821.
35. Lunn, D. and Rizkalla, S., "*Strengthening of Infill Masonry Walls with FRP Materials*," ASCE Journal of Composites for Construction, Vol. 15, Number 2, March/April 2011, pp. 206-214.
36. Obregon-Salinas, A.J., Rizkalla, S. and Zia, P., "*Grancrete as Adhesive for FRP Flexural Strengthening System for Concrete Structures*," ACI Special Publication, April 2011
37. El-Hacha, R., Mirmiran, A., Cook, A. and Rizkalla, S., "*Effectiveness of Surface-Applied Corrosion Inhibitors for Concrete Bridges*," ASCE Journal of Materials in Civil Engineering, March 2011.
38. Munikrishna, A., Hosny, A., Rizkalla, S. and Zia, P., "*Behavior of Concrete Beams Reinforced with ASTM A1035 Grade 100 Stirrups under Shear*," ACI Journal, Jan/Feb 2011. Vol. 108, Issue 1, pp. 34 – 41.
39. Dawood, M., and Rizkalla, S., "*Environmental Durability of a CFRP System for Strengthening Steel Structures*," Construction and Building Materials Journal, September 2010. Vol. 24, Issue 9, pp. 1682-1689.
40. Mertol, H.C., Rizkalla, S., Zia, P., and Mirmiran, A., "*Creep and Shrinkage Behavior of High-Strength Concrete and Minimum Reinforcement Ratio for Bridge Columns*," PCI Journal, Summer 2010. Vol. 55, Issue 3, pp. 138 – 154.
41. Zia, P., Rizkalla, S., Mirmiran, A., Russell, H. and Mast R., "*Discussion on Elastic Modulus, Shrinkage and Creep of High-Strength Concrete as adopted by AASHTO*," PCI Journal, Spring 2010. Vol. 55, Issue 2, pp 11-14.

42. Hassan, T. and Rizkalla, S., “*Analysis and Design Guidelines of Precast/Prestressed Composite Load Bearing Sandwich Wall Panels*,” PCI Journal, Spring 2010. Vol. 55, Issue 2, pp. 147 – 162.
43. Dawood, M., Taylor E. and Rizkalla, S., “*Two-Way Bending Behavior of 3-D GFRP Sandwich Panels with Through-Thickness Fiber Insertions*,” Composite Structures Journal, Elsevier, March 2010. Vol. 92, Issue 4, pp. 950-963.
44. Dawood, M., Taylor, E., Ballew, W. and Rizkalla, S., “*Static and Fatigue Bending Behavior of Pultruded GFRP Sandwich Panels with Through-Thickness Fiber Insertions*,” Composites Part B: Engineering Journal, February 2010. Vol. 41, Issue 5, pp 363 – 374.
45. Schnerch, D. and Rizkalla, S., “*Discussion and Closure of Flexural Strengthening of Steel Bridges with High Modulus CFRP Strips*,” ASCE Journal of Bridge Engineering, January/February 2010. Vol. 15, Issue 1, pp. 117-118.
46. Jiang, G., Dawood, M., Peters, K. and Rizkalla, S., “*Self-Monitoring FRP Strengthening System for Civil Engineering Structures*”, Structural Health Monitoring: An International Journal, Online: December 4, 2009. Print: July 2010. Vol. 9, Issue 4, pp 309 – 322.
47. Rizkalla, S., Hassan, T. and Lucier, G., “*FRP Shear Transfer Mechanism for Precast, Prestressed Concrete Sandwich Load Bearing Panels*,” ACI Special Publication, October 2009. Vol. 265, pp 603 – 626.
48. Lanier, B., Schnerch, D., and Rizkalla, S., “*Behavior of Steel Monopoles Strengthened with High-Modulus CFRP Materials*,” Journal of Thin-Walled Structures, Elsevier, October 2009. Vol. 47, Issue 10, pp. 1037-1046.
49. Logan, A., Choi, W. Mirmiran, A., Rizkalla, S., and Zia, P., “*Short-Term Mechanical Properties of High-Strength Concrete*,” ACI Materials Journal, September/October 2009. Vol. 106, Issue 5, pp. 413-418.
50. Seliem, H., Hosny, A., Rizkalla, S., Zia, P., Briggs, M., Miller, S., Darwin, D., Browning, J., Glass, G., Hoyt, K., Donnelly, K. and Jirsa, J., “*Bond Characteristics of ASTM A1035 Steel Reinforcing Bars*”, ACI Structural Journal, July-August 2009. Vol. 106, Issue 4, pp. 530-539.
51. Rosenboom, O., Walter C., and Rizkalla, S., “*Strengthening of Prestressed Concrete Girders with Composites: Installation, Design and Inspection*,” Construction and Building Materials, April 2009. Vol. 23, Issue 4, pp. 1495-1507.
52. Sumpter, M., Rizkalla, S. and Zia, P., “*Behavior of High-Performance Steel as Shear Reinforcement for Concrete Beams*”, ACI Structural Journal, March/April 2009. Vol. 106, Issue 2, pp. 171-177.

53. Rizkalla, S., Zia, P., Mirmiran, A., Russell, H. and Mast, R., “*Proposal for Concrete Compressive Strength up to 18 ksi (124 MPa) for Bridge Design,*” Transportation Research Record of the National Academics, Structures, 2009. Vol. 2131, pp. 59-67.
54. Dawood, M., Guddati, M. and Rizkalla, S., “*Effective Splices for A CFRP Strengthening System for Steel Bridges and Structures,*” Transportation Research Record of the National Academics, Structures, 2009. Vol. 2131, pp. 125-133.
55. Mast, R., Dawood, M., Rizkalla, S. and Zia, P., Closure to “*Flexural Design of Concrete Beams Reinforced with High Strength Steel Reinforcing Bars,*” ACI Structural Journal, 2009. Vol. 106, Issue 4, pp. 551-552.
56. Mast, R., Dawood, M., Rizkalla, S. and Zia, P., “*Flexural Design of Concrete Beams Reinforced with High-Strength Steel Reinforcing Bars,*” ACI Structural Journal, September/October 2008. Vol. 105, Issue 4, pp 570-577.
57. Mertol, H.C., Rizkalla, S., Zia, P., and Mirmiran, A., *Characteristics of Compressive Stress Distribution in High-Strength Concrete,* ACI Structural Journal, September/October 2008. Vol. 105, Issue 5, pp. 626-633.
58. Reis, E., and Rizkalla, S., *Material Characteristics of 3-D FRP Sandwich Panels,* Construction and Building Materials, June 2008. Vol. 22, Issue 6, pp 1009-1018.
59. Rosenboom, O. and Rizkalla, S., *Modeling of IC Debonding of FRP Strengthened Concrete Flexural Members,* ASCE Journal of Composites for Construction, March/April 2008. Vol. 12, Issue 2, pp. 168-179.
60. Schnerch, D. and Rizkalla, S., *Flexural Strengthening of Steel Bridges with High Modulus CFRP Strips,* ASCE Journal of Bridge Engineering, March/April 2008. Vol. 13, Issue 2, pp. 192-201.
61. Hassan, T., Seliem, H., Dwairi, H., Rizkalla, S., and Zia, P., *Shear Behavior of Large-Size Concrete Beams Reinforced with High and Conventional Strength Steel,* ACI Structural Journal, March/April 2008. Vol. 105, Issue 2, pp. 173-179.
62. Rosenboom, O. and Rizkalla, S., *Experimental Study of IC Debonding in FRP Strengthened Beams,* ACI Structural Journal, January/February 2008. Vol. 105, Issue 1, pp 41 - 50.
63. Hassan, T., Vickery, J. and Rizkalla, S., *Properties of Adhesives and CPVC materials proposed for steel tank lining,* International Journal of Adhesion and Adhesives, January/March 2008. Vol. 28, Issues 1-2, pp 77-90.
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71. Schnerch, D., Dawood, M., Rizkalla, S., and Sumner, E., *Proposed Design Guidelines for Strengthening of Steel Bridges with FRP Materials*, Construction and Building Materials, May 2007. Vol. 21, Issue 5, pp. 1001-1010.
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4. Papers Submitted for Publication in Conference Proceedings:

1. **Kazem, H. Borden, M., Kobayashi, A. and Rizkalla, S., “Sustainable Shear Strengthening System for Steel and Bridges,” Proceedings of the North American Steel Construction Conference (NASCC), San Antonio, Texas, March 22-25, 2017.**

2. **Kazem, H. and Rizkalla, S., “CFRP Shear Strengthening System for Steel Structures and Bridges,” Proceedings of the 7th International Conference on Advanced Composite Materials in Bridges and Structures, Vancouver, British Columbia, Canada, August 24-26, 2016.**
3. **Rizkalla, S. and Carson, J., “Effective and Economical Use of FRP for the Precast Concrete Industry,” Proceedings of the 6th Asia-Pacific Conference on FRP in Structures, APFIS2017, Singapore, July 19-21, 2016.**

5. Referred Papers Published in Conference Proceedings:

1. **Nafadi, M., Khalaf, O. Lucier, G., Rizkalla, S., Zia, P. and Klein, G., “Behavior and Design of Directly Loaded Ledges of Short Span L-Shaped Beams,” Proceedings of the PCI Convention and National Bridge Conference in Nashville, TN, March 3-6, 2016.**
2. **Botros, A., Lucier, G., Rizkalla, S., Andrews, B., Klein, G. and Zia, P., “*Splice length of mild steel reinforcing bars to Prestressed strands within the transfer zone,*” Proceedings of the PCI Convention and National Bridge Conference, Nashville, Tennessee, March 3-6, 2016.**
3. **High, C., El-Gelani, A., El-Gabry, A. and Rizkalla, S., “Mechanical and Bond Characteristics of Basalt Fiber Reinforced Polymer Bars”, Proceedings of the 2nd International Conference on Advances in Cement and Concrete Technology in Africa, Johannesburg, South Africa, January 27-29, 2016.**
4. **High, C., El-Gelani, A., El-Gabry, A. and Rizkalla, S., “Flexural Behavior of Concrete Slabs Reinforced with Basalt Fiber Reinforced Polymer Bars”, Proceedings of XIV International Conference on Concrete Engineering and Technology, Zurich, Switzerland, January 12-13, 2016.**
5. **Kazem, H., Rizkalla, S. and Kobayashi, A., “Small Diameter CFRP Strands for Strengthening Steel Bridge Girders”, Proceedings of the 12th International Symposium of Fiber Reinforced Polymers for Reinforced Concrete Structures (FRPRCS-12) and the 5th Asia-Pacific Conference on Fiber Reinforced Polymers in Structures (APFIS-2015), Nanjing China, December 14-16, 2015.**
6. **Shapack, G., Seracino, R. Rizkalla, S. and Lucier, G., “Flexural Behavior of Cored Slabs prestressed with Carbon Fibre Strands”, Proceedings of the 12th International Symposium of Fiber Reinforced Polymers for Reinforced Concrete Structures (FRPRCS-12) and the 5th Asia-Pacific Conference on Fiber Reinforced Polymers in Structures (APFIS-2015), Nanjing China, December 14-16, 2015.**
7. **Rizkalla, S., Lucier, G., Botros, A. and Nafadi, M., “Research Contribution to Practical and Safe Design of Precast Concrete Structures”, Proceedings of the 2nd International Conference on Educational Innovation, Mexico City, Mexico, December 14-16, 2015.**

8. High, C., El-Gelani, A., Rizkalla, S. and Abaid, S., “Effect of Basalt fibers on mechanical properties of Concrete”, proceedings of the 11th International Symposium on Brittle Matrix Composites, Warsaw, Poland, September 28-30, 2015.
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225. Adelrahman, A. and Rizkalla, S., *Serviceability of Concrete Beams Prestressed by Carbon Fiber Reinforced Plastic Rods*, Proceedings of the Second International Symposium on Non-metallic Reinforcement for Concrete Structures, Universiteit Gent, Belgium, August 1995, pp. 403-412.
226. Fam, A., Rizkalla, S. and Saltzberg, W., *Model Tests for Concrete Highway Bridge in Manitoba Fully Reinforced by FRP Reinforcements*, Proceedings of the Canadian Society for Civil Engineering Annual Conference, Ottawa, Canada, June 1995, pp. 595-604.
227. Rizkalla, S. and Abdelrahman, A., *Behavior of Concrete Beams Pretensioned with Carbon Fiber Reinforced Plastic Rods*, Proceedings of the Canadian Society for Civil Engineering Annual Conference, Ottawa, Canada, June 1995, pp. 585-594.
228. Rizkalla, S., Farahmand, F. and Glanville, J., *Durability of Fiber Glass Reinforced Concrete in Marine Environments*, Proceedings of the Canadian Society for Civil Engineering Annual Conference, Ottawa, Canada, June 1995.
229. Fam, A., Abdelrahman, A., Rizkalla, S. and Saltzberg, W., *FRP Flexural and Shear Reinforcements for Highway Bridges in Manitoba Canada*, Proceedings of the 1st Israeli Workshop on Composite Materials for Civil Engineering Construction, Haifa, Israel, May 28-29, 1995, pp. 105-112.
230. Hassan, N., Rosner, C. and Rizkalla, S., *Bolted Connections for GFRP Laminated Structural Members, Infrastructures: New Materials and Methods for Repair*, Proceedings of the American Society for Civil Engineers Conference, San Diego, California, November 13-16, 1994.
231. Rizkalla, S. and Tadros, G., *First Smart Highway Bridge in Canada, Infrastructures: New Materials and Methods for Repair*, Proceedings of the American Society for Civil Engineers Conference, San Diego, California, November 13-16, 1994.
232. Guha-Thakurta, A., Abdelrahman, A., Tadros, G., and Rizkalla, S., *First Smart Prestressed Concrete Highway Bridge in Canada*, Proceedings of the First International Conference on Composites Engineering (ICCE/1), New Orleans, Louisiana, August 28-31, 1994.
233. Measures, R., Alavie, T., Maaskant, R., Karr, S., Huang, S., Grant, L., Guha-Thakurta, A., Tadros, G., and Rizkalla, S., *Fiber Optic Sensing for Bridges*, Proceedings of the Fourth International Conference on Short and Medium Span Bridges (SMSB-IV), Halifax, Canada, August 8-11, 1994.
234. Rizkalla, S., Guha-Thakurta, A., Abdelrahman, A., and Tadros, G., *First Smart Bridge in Canada*, Proceedings of the Fourth International Conference on Short and Medium Span Bridges (SMSB-IV) Halifax, Canada, August 8-11, 1994.

235. Measures, R. M., Alavie, T., Maaskant, R., Karr, S., Huang, S., Grant, L., Guha-Thakurta, A., Tadros, G., and Rizkalla, S., *Fiber Optic Sensing of a Carbon Fiber Prestressed Concrete Highway Bridge*, Proceedings of the First World Conference on Structural Control, Los Angeles, California, August 1994.
236. Rizkalla, S., Hassan, N., Salem, A., and Mohamedien, M., *Multi-Bolted Connections for Composite Laminated Structural Members*, Proceedings of the Canadian Society for Civil Engineering Annual Conference, Winnipeg, Canada, June 1-4, 1994.
237. Soudki, K. and Rizkalla, S., *Precast Concrete Shear Wall Connections for Seismic Zones*, Proceedings of the Fifth International Colloquium on Concrete in Developing Countries, Cairo, Egypt, January 3-6, 1994.
238. Wade, C., Abdelrahman, A., Rizkalla, S., and Tadros, G., *First Concrete Highway Bridge in Canada Prestressed by Carbon Fiber Cables*, Proceedings of the FIP Symposium '93: Modern Prestressing Techniques and Their Applications, Kyoto, Japan, October 1-20, 1993, pp. 775-782.
239. Rizkalla, S., Soudki, K. and West, J., *Precast Concrete Shear Wall Connections used for Medium and High Rise Structures*, Proceedings of the Fifth Structural Engineering Conference, Tripoli, Libya, November 1993.
240. Measures, R. M., Alavie, T., Maaskant, R., Ohn, M., Karr, S., Huang, S., Glennie, D., Wade, C., Tadros, G., and Rizkalla, S., *Structurally Integrated Fiber Optic Strain Sensing of Composite Prestressing Tendons within a New Road Bridge*, Proceedings of the Second Canadian International Conference on Composites, Ottawa, Canada, September 27-29, 1993.
241. West, J., Soudki, K., and Rizkalla, S., *Behavior of Precast Concrete Shear Wall Connections under Large Reversed Cyclic Loads*, Proceedings of the Canadian Society for Civil Engineering Annual Conference, Fredericton, New Brunswick, Canada, June 1993.
242. Soudki, K., West, J., and Rizkalla, S., *Seismic Design Consideration for Precast Concrete Shear Wall Connections*, Proceedings of the Canadian Society of Civil Engineering Annual Conference, Fredericton, New Brunswick, Canada, June 1993.
243. Rosner, C. and Rizkalla, S., *Design of Bolted Connections for Orthotropic Fiber-Reinforced Composite Structural Members*, Proceedings of the First International Conference on Advanced Composite Materials in Bridges and Structures, Sherbrooke, Canada, October 7-9, 1992.
244. Uppal, A. S. and Rizkalla, S., *Extending the Service Life of Timber Railway Bridges*, Proceedings of the International Heavy Haul Association Specialist Technical Conference, Swaziland, Republic of South Africa, June 1992.

245. Rosner, C., Rizkalla, S. and Erki M., *Bolted Connections for Fiber-Reinforced Composite Structural Members*, Proceedings of the Canadian Society for Civil Engineering Annual Conference, Quebec, Canada, May 1992.
246. Wright, J., Shen, Z. and Rizkalla, S., *A Three-year Field and Laboratory Evaluation of Linseed Oil as a Concrete Sealer*, Proceedings of the Canadian Society for Civil Engineering Annual Conference, Quebec, Canada, May 1992.
247. Rizkalla, S., West, J. and Soudki, K. A., *Connections for Precast Concrete Panels Used for High Rise Structures*, Proceedings of the International Colloquium on Structural Engineering, Cairo, Egypt, April 1992, pp. 45-64.
248. Rizkalla, S., Lau, M. and Soudki, K. A., *Design Consideration for the Connection Used for Precast Concrete Structures*, Proceedings of the Fourth International Colloquium on Concrete in Developing Countries, Kingston, Jamaica, February 1992, pp. 197-211.
249. Wright, J. R., Shen, Z. and Rizkalla, S., *Evaluation of Linseed Oil as a Concrete Sealant*, Proceedings of the American Oil Chemists Society 82nd Annual Meeting and Exposition, Chicago, Illinois, May 12-15, 1991.
250. McQuade, R., Rizkalla, S. and Morris, G., *Partnership with Industry - The Manitoba Experience*, Proceedings of the American Society for Engineering Education Meeting, University of Wisconsin, Platteville, Wisconsin, October 1991.
251. Soudki, K. A., Rizkalla, S., and Uppal, S., *Performance of Bridge Timber Ties Under Static and Dynamic Loading*, Proceedings of the Canadian Society for Civil Engineering Annual Conference, Vancouver, Canada, May 1991.
252. Rizkalla, S., Rosner, C. N. and Erki, M. A., *Behavior of Bolted Composite Joints in Civil Engineering Applications*, Proceedings of the Canadian Society for Civil Engineering Annual Conference, Vancouver, Canada, May 1991.
253. Rizkalla, S., Lau, M. and Soudki, K. A., *Connections for Precast Concrete Load-bearing Shear Wall Panels*, Proceedings of the Sixth Canadian Construction Congress "Preview 2000" Toronto, Canada, December 5, 1990, pp. 198-228.
254. Stewart, D., Thompson, B. and Rizkalla, S., *Provencher Bridge Over the Red River, Winnipeg, Manitoba*, Proceedings of the Third International Conference on Short and Medium Span Bridges, Toronto, Canada, August 1990, pp. 141-151.
255. Rizkalla, S., Savic, J., Polyzois, D., and Wong, C. K., *Buckling Behavior of Wooden Poles*, Proceedings of the Canadian Society for Civil Engineering Annual Conference, Hamilton, Canada, May 1990.
256. Wells, J., Attiogbe, E. and Rizkalla, S., *Deleterious Expansion of Cement Paste Subjected to Wet-Dry Cycles*, Proceedings of the Canadian Society for Civil Engineering Annual Conference, Hamilton, Canada, May 1990.

257. Rizkalla, S., Hutchinson, R. and Lau, M., *Post-tensioned Connections for Precast Concrete Load-bearing Shear Wall Panels*, Proceedings of the Canadian Society for Civil Engineering Annual Conference, Hamilton, Canada, May 1990.
258. Polyzois, D. and Rizkalla, S., *Behavior and Design of Cold-Formed Steel Angles*, Proceedings of the Structural Engineering Conference, Cairo, Egypt, May 1989.
259. Rizkalla, S., Hutchinson, R. and Wong, C., *Connections Used for Precast Concrete High Rise Structures*, Proceedings of the 14th Conference of "Our World in Concrete and Structures", Singapore, August 24-26, 1989.
260. Rizkalla, S., Serrette, R. and Heuvel, J. S., *Shear Resistance of the Various Connections Used for Precast Concrete Load-Bearing Shear Wall Panels*, Proceedings of the Tenth Japanese Concrete Institute Conference, Sendai, Japan, June 28-30, 1988.
261. Rizkalla, S. and Serrette, R., *Limit States Behavior of the Connections Typically Used for Precast Load-bearing Shear Wall Panels*, Proceedings of the International Structural Engineering Convention, "Trends in Structural Engineering", Manila, Philippines, May 27-28, 1988.
262. Uppal, S., Pinkney, B. and Rizkalla, S., *An Analytical Approach for Dynamic Response of Timber Railway Bridge Spans*, Proceedings of the Canadian Society for Civil Engineering Annual Conference, Calgary, Canada, May 1988.
263. Rizkalla, S., Serrette, R. L. and Heuvel, J. S., *Limit States Behavior of Multiple Shear Keyed Joints used in Precast Concrete Load-Bearing Shear Wall Panels*, Proceedings of the Canadian Society for Civil Engineering Annual Conference, Calgary, Canada, May 1988.
264. Rizkalla, S., Pincheira, J. A. and Attiogbe, E. K., *Behavior of Welded Wire Fabric as Shear Reinforcement under Cyclic Loading Conditions*, Proceedings of the Canadian Society for Civil Engineering Annual Conference, Calgary, Canada, May 1988.
265. Uppal, A. S. and Rizkalla, S., *Prolonging the Useful Life of Railroad Timber Bridges*, Proceedings of the Canadian Society for Civil Engineering Annual Conference, Montreal, Canada, May 17-22, 1987.
266. Rizkalla, S. and Uppal, A. S., *Dynamic Response of Railroad Timber Bridges*, Proceedings of the Canadian Society of Civil Engineering Annual Conference, Montreal, Canada, May 17-22, 1987.
267. Rizkalla, S. and Maruyama, K., *Design Consideration for Pretensioned Prestressed Beams*, Proceedings of the Canadian Society for Civil Engineering Annual Conference, Montreal, Canada, May 17-22, 1987.

268. Rizkalla, S., *Limit States Behavior of Nuclear Containment Structures*, Proceedings of the Second International Conference on Concrete Technology for Developing Countries, Tripoli, Libya, October 27-30, 1986.
269. Omar H., Morris G. and Rizkalla, S., *Modeling of Moment Rotation Behavior of Flat Plate-Column Connection*, Proceedings of the Second International Conference on Concrete Technology for Developing Countries, Tripoli, Libya, October 27-30, 1986.
270. Rizkalla, S. and McCulloch, W. J., *Field Testing of Steel Bridges*, The Sixth Volume of the Proceedings of the Exchange of Experience Conference, Behavior of In Situ Building Structures, Bucharest, Romania, June, 1986.
271. Domaschuk L., Rizkalla, S. and Kwok R., *Economics of Alternative House Foundations*, Proceedings of the Canadian Society for Civil Engineering Annual Conference, Toronto, Canada, May, 1986.
272. Tinkler, J., Del Frate, R. and Rizkalla, S., *The Prediction of Air Leakage Rate Through Cracks in Pressurized Reinforced Concrete Containment Vessels*, Proceedings of the 8th International Conference on Structural Mechanics in Reactor Technology, Brussels, Belgium, August 19-23, 1985, Vol. J, pp. 1-8.
273. McCulloch W.J., Militano C. and Rizkalla, S., *Behavioral Load Testing of the Disraeli Facility*, Proceedings of the Canadian Society for Civil Engineering Annual Conference, Saskatchewan, Canada, May 1985.
274. Rizkalla, S., Saadat, F. and Higai, T., *Fundamental Characteristics and Behavior of R.C. Bridge Piers Subjected to Reversed Cyclic Loading*, Proceedings of the Transportation Research Board Annual Meeting, National Research Council, Washington, D.C., January 14-19, 1985.
275. Rizkalla, S., Elsherbeni, Hamid, Kwasnicki, and Omar, *Complex Permittivity of Lossy Granular Dielectrics at Microwave Frequencies*, Proceedings of the 19th Annual Microwave Power Symposium, Minneapolis, Minnesota, September 1984.
276. Rizkalla, S., Higai, T., Ben-Omran H., and Saadat, F., *Response of R.C. Bridge Piers Subjected to Large Deflection Reversals*, Proceedings of the Canadian Society for Civil Engineering Annual Conference, Halifax, Canada, May 1984.
277. Rizkalla, S., Lau, B. L. and Simmonds, S. H., *Leakage of Pressurized Gases Through Unlined Concrete Containment Structures*, Proceedings of the 7th International Conference on Structural Mechanics in Reactor Technology, Chicago, Illinois, August 22-26, 1983, Vol. J, No. 1/5.
278. Hwang, L. and Rizkalla, S., *Effective Tensile Stress-Strain Characteristics for Reinforced Concrete*, Proceedings of the Canadian Structural Concrete Conference, Ottawa, Canada, June 1-3, 1983.

279. Rizkalla, S. and Keeler, R. D., *Sixty Hours Erection Time for a Concentrate Loading Facility at Sherritt Gordon Mines, Lynn Lake, Manitoba*, Proceedings of the Canadian Society for Civil Engineering Annual Conference, Edmonton, Canada, May 27-28, 1982.
280. Rizkalla, S., El-Shahawi, M. and Kwok, C.K., *Cracking Behavior of Reinforced Concrete Members*, Proceedings of the Canadian Society for Civil Engineering Annual Conference, Edmonton, Canada, May 27-28, 1982.
281. Rizkalla, S., MacGregor, J. G. and Simmonds, S. H., *Air Leakage Characteristics of Prestressed Concrete Containment*, Proceedings of the 6th International Conference on Structural Mechanics in Reactor Technology, Paris, France, August 17-21, 1981, Vol. J, No. 5/14, pp. 1-8.
282. Simmonds, S. H., MacGregor, J. G. and Rizkalla, S., *Response of Prestressed Concrete Containment Model in Post-Cracking Region*, Proceedings of the 6th International Conference on Structural Mechanics in Reactor Technology, Paris, France, August 17-21, 1981, Vol. J, No. 4/11, pp. 1-8.
283. MacGregor, J., Simmonds, S. H. and Rizkalla, S., *Cracking of Prestressed Concrete Containments Due to Internal Pressure*, Proceedings of the 6th International Conference on Structural Mechanics in Reactor Technology, Paris, France, August 17-21, 1981, Vol. J, No. 4/10, pp. 1-8.
284. Rizkalla, S., Chitnuyanondh, L., Murray, D., and MacGregor, J. G., *Effective Tensile Stiffening in Prestressed Concrete Wall Segment*, Proceedings of the 5th International Conference in Reactor Technology, Berlin, West Germany, August 1979, Vol. J, No. 3/4, pp. 1-8.
285. Rizkalla, S., Simmonds, S. and MacGregor, J. G., *A Test of a Model of Thin-walled Prestressed Concrete Secondary Containment Structure*, Proceedings of the Fifth International Conference on Structural Mechanics in Reactor Technology, Berlin, West Germany, August 13-17, 1979, Vol. J, No. 4/2, pp. 1-8.
286. Rizkalla, S., Simmonds, S., Murray, D., and MacGregor, J., *Behavior of Prestressed Concrete Containment Structures Due to Over-pressure*, Proceedings of the Canadian Structural Concrete Conference, Banff, Alberta, May 10-11, 1979, pp. 67-87.
287. Rizkalla, S. and Zia, P., *Segmentally Constructed Prestressed Hyperboloid Cooling Tower*, Proceedings of the International Conference of the Behavior of Slender Structures, London, England, September 14-16, 1977, pp. 111.5.1-111.5.25.
288. Zia, P., Mirza, J. F. and Rizkalla, S., *Static and Fatigue Tests of Composite T-Beams Containing Prestressed Concrete Tension Elements*, Proceedings of the Transportation Research Board Annual Meeting, Washington, D.C., January 19-23, 1976.

6. Invited Keynote Papers:

1. ***“Effective Use of FRP for strengthening Steel Structures and Bridges”***, The 9th Annual Alexandria International Conference on Structural and Geotechnical Engineering, December 19-21, 2016, Alexandria, Egypt.
2. ***“Effective and Economical Use of FRP for Civil Structures”***, Innovation Day, University of Manitoba, Winnipeg, Manitoba, Canada, October 26, 2016.
3. *“Advancements in the Design and Construction of Precast Concrete members for buildings”*, The Sixth Annual Conference of the Structural Engineers Association of North Carolina, Raleigh, NC, October 9-10, 2014.
4. *“Innovative use of FRP for Precast Concrete Structures”*, ASCE North Carolina Second Annual Meeting, Asheville, NC, September 11-12, 2014.
5. *“Structural Engineering Research at NCSU,”* The annual meeting of Georgia/Carolina PCI, Hilton Head, South Carolina, June 12-15, 2014.
6. *“Effective Research through Industry/University Collaboration,”* The Eight Alexandria International Conference on Structural and Geotechnical Engineering, Alexandria, Egypt, April 14-16, 2014.
7. *“Use of FRP Sustainable Precast Concrete Structure,”* CSI 2013 Symposium on Innovations in Construction, Swinburne University of Technology, Melbourne, Australia, December 10, 2013.
8. *“Behavior and Analysis of Precast Prestressed Concrete Sandwich Wall Panels reinforced with CFRP Grid,”* Federal Univeristy of San Carlos (UFS Car), July 10, 2013.
9. *“Analytical and Rational Modeling of Precast Slender Spanderel Beams,”* Federal Univeristy of San Carlos (UFS Car), July 10, 2013.
10. *“FRP for Sustainable Precast Products,”* the 3rd Brazilian Conference on the Integration of Research Design Production in the Field of Precast Concrete, San Carlos, Brazil, July 8-9, 2013.
11. *“Advancing Eco-Concrete Technology for a Lifetime Sustainability,”* the 3rd International Seminar on Concrete Technoloy Green Concrete Technology Innovation, Diponegoro University, Semarang, Indonesia, June 4, 2013.
12. *“Innovative Use of FRP for Sustainable Precast Concrete Structures,”* 2013 Tulane Engineering Forum, New Orleans, LA, April 5, 2013.
13. *“Use of FRP for Sustainable Precast Stuctures,”* ACUN-6 International Composites Conference: Composites Nanocomposites in Civil, Offshore, and Mining Infrastructure, Monash Univeristy, Melbourne, Australia, November 14-16, 2012.

14. Invited Keynote Presentation for the Lecture Series of the PCI - Foundation, "*Innovative Use of FRP for Precast Concrete*," University of North Florida, Jacksonville, Florida, February 9, 2011.
15. "*Meeting Engineering Needs through the Use of Fiber Reinforced Polymer (FRP) Materials*," Bridges 2010 Conference, Raleigh, NC, February 22, 2010.
16. *Current and Future Vision of the Use of FRP for Civil Infrastructures*, International Conference of Fiber Reinforced Polymer for Reinforced Concrete Structures, (FRPRCS-9), Sydney, Australia, July 2009.
17. *Understanding Design Basics with CFRP*, Carolina Spring Conference of the International Concrete Repair Institute, Durham, North Carolina, March 27, 2009.
18. *Innovative Use of FRP for the Precast Concrete Industry*, Workshop on Concrete Advances & Challenges, Cairo, Egypt, February 14, 2009.
19. *Use of CFRP for Strengthening Steel Structures and Bridges*, The 21st Session of the Japan Carbon Fiber Manufacturing Association, Tokyo, Japan, February 18-19, 2008.
20. *Applications of Fiber Reinforced Polymer in Infrastructure*, International Construction Innovations Conference (ICIC 2006), Peoria, Illinois, October 30-31, 2006.
21. *High Modulus Carbon Fiber Materials for Retrofit of Steel Structures and Bridges*, co-authored with Dawood, M., ACUN-5 International Composites Conference Developments in Composites: Advanced, Infrastructural, Natural and Nanocomposites, UNSW, Sydney, Australia, July 11-14, 2006.
22. *Repair and Strengthening of Highway Bridges with FRP*, co-authored with Dawood, M. and Rosenboom, O., International Conference on Bridge Management Systems – Monitoring, Assessment and Rehabilitation, Cairo, Egypt, March 21-23, 2006.
23. *Strengthening of Scaled Steel-Concrete Composite Girders and Steel Monopole Towers with CFRP*, International Conference on Future Vision and Challenges for Urban Development, Cairo, Egypt, December 20-22, 2004.
24. *Static and Fatigue Performance of 40-year old Prestressed Concrete Girders Strengthened with various CFRP Systems*, International Conference: Future Vision and Challenges for Urban Development, Cairo, Egypt, December 20-22, 2004.
25. *Strengthening of Steel Structures and Bridges with FRP*, COMPOSITES 2004 Conference, Tampa, Florida, October 8, 2004.
26. *Strengthening of Steel Structures and Bridges with FRP*, Innovative Materials and Technologies for Construction and Restoration, University of Lecce, Lecce, Italy, June 6-9, 2004.

27. *FRP Composite Solutions for Civil Infrastructure - A World Perspective*, 2003 Technical Conference on Construction, Corrosion and Infrastructure, Las Vegas, April 22, 2003.
28. *Guide Specifications from the American Concrete Institute*, Technical Conference on Construction, Corrosion and Infrastructure, Las Vegas, April 22, 2003.
29. *NCSU's Constructed Facilities Laboratory (CFL) - Fulfilling The Needs of the Construction Industry Through Innovative Research and Product Development/Certification/Training Programs*, Lunch Meeting of the Triangle Chapter of the Construction Financial Management Association, NCSU Centennial Campus, January 31, 2003.
30. *State-of-the-Art of Concrete-Filled FRP Tubular Structural Members*, 3rd Middle East Symposium on Structural Composites for Infrastructure Application (MESC-2), Aswan, Egypt, December 17-20, 2002.
31. *FRP: Solution for Infrastructure*, University of Minnesota, Civil Engineering Seminar Series, Minneapolis, MO, November 15, 2002.
32. *ACI Code Activities on Fiber-Reinforced Polymers (FRP) for Construction with Concrete*, Annual Meeting of the American Society of Civil Engineers, Washington, D.C., November 2, 2002.
33. *Strengthening of Concrete Structures with FRP*, Annual Meeting of the American Society of Civil Engineers, Wilmington, NC, October 2002.
34. *Evaluation of ISIS Canada 1995-2002*, Structural Health Monitoring Workshop, ISIS Canada Research Network, Winnipeg, Manitoba, Canada, September 19-20, 2002.
35. *Rehabilitation of Concrete Structures with FRP*, 3rd International Conference on the Behavior of Damaged Structures (DAMSTRUC 2002), Rio de Janeiro, Brazil, July 29-31, 2002.
36. *Cost-Effectiveness of Various FRP Strengthening Techniques for Concrete Structures*, International Composites Conference on Composite Systems: Macrocomposites, Microcomposites and Nanocomposites, Sydney, Australia, July 21-25, 2002.
37. *Rehabilitation of Concrete Structures with FRP*, Jornadas Sul-Americanas De Engenharia Estrutural, Brasilia, Brazil, June 27-31, 2002.
38. *ACI Design Guidelines on FRP Reinforcements*, Transportation Research Board Annual Meeting, Washington, D.C., January 2002.
39. *FRP Solutions for Civil Engineering Infrastructures*, American Society of Civil Engineers Annual Meeting, Raleigh, NC, September 27, 2001.

40. *ACI Guidelines for the Use of FRP for Concrete Structures*, International Workshop on Structural Composites for Infrastructure Applications, Cairo, Egypt, May 23-30, 2001.
41. *FRP for Infrastructure: The Canadian Perspective*, ACUN-2 (Australian Conference on Composites), Sydney, Australia, February 14-18, 2000.
42. *Rehabilitation of Structures and Bridges*, ACUN-1 (Australian Conference on Composites), Sydney, Australia, February 23-25, 1999.
43. *FRP for Innovative Structures*, ACUN-1 (Australian Conference on Composites), Sydney, Australia, February 23-25, 1999.
44. *ACI Activities Related to FRP*, ACUN-1 (Australian Conference on Composites), Sydney, Australia, February 23-25, 1999.
45. *Advanced Materials for the New Millennium*, 48th Annual Concrete Conference, Minneapolis, Minnesota, December 3, 1998.
46. *Smart Bridges and Structures for the New Millennium*, ACI Symposium on High Performance Concrete - A Look Back, A Look Ahead, A Tribute to Paul Zia, Houston, Texas, March 24, 1998.
47. *Design of Concrete Members Prestressed by FRP*, co-authored by A. Abdelrahman, Second International Conference on Composites in Infrastructure, Tucson, Arizona, January 3-6, 1998
48. *A New Generation of Civil Engineering Structures and Bridges*, Al-Azhar Engineering Fifth International Conference, December 19-22, 1997, Cairo, Egypt, pp. 89-102.
49. *Headingley Smart Bridge - A New Generation of Civil Engineering Structures*, Western Canada Water and Wastewater Association 49th Annual Conference, November 16-19, 1997, Winnipeg, Manitoba, Canada.
50. *A New Generation of Civil Engineering Structures and Bridges*, Third International Symposium on Non-metallic (FRP) Reinforcement for Concrete Structures, October 14-16, 1997, Sapporo, Japan, pp. 113-128.
51. *Application and Current International Development of the Use of Carbon Fiber Composites in Infrastructure Repair*, ICRI/SAMPE Seminar, Newark, New Jersey, October 23, 1997
52. *FRP for Large Span Highway Bridge in Canada*, co-authored by E. Shehata, A Abdelrahman and G. Tadros, US-Canada-Europe Workshop on Bridge Engineering, July 11-15, 1997, Zurich, Switzerland, pp. 247-254.

53. *Shear Strengthening Using CFRP Sheets for a Prestressed Concrete Highway Bridge in Manitoba, Canada*, co-authored by R. Hutchinson and A. Abdelrahman, US-Canada-Europe Workshop on Bridge Engineering, July 11-15, 1997, Zurich, Switzerland, pp. 99-106.
54. *A New Generation of Civil Engineering Structures and Bridges*, Structural Faults and Repair '97, July 8-10, 1997, Edinburgh, Scotland, pp. 11-19.
55. *Advanced Composites for Infrastructure Applications*, ASCE Structures Congress XV, Portland, Oregon, April 13-16, 1997.
56. *Canadian Centre of Excellence (ISIS Canada)*, ACI Convention, Denver, Colorado, March 14, 1996.
57. *Prestressed Concrete with FRP*, co-authored by Abdelrahman, A., First International Conference on Composites in Infrastructure, Tucson, Arizona, January 15-17, 1996.
58. *Analysis and Design of FRP Prestressed Concrete Structures*, ACI Convention, Québec City, Canada, November 10-12, 1995.
59. *FRP for the 21st Century*, Association Internationale Des Pont Et Charpentes, Groupement belge, Belgische Vereniging, Gent, Belgium, March 23, 1995.
60. *FRP Reinforcement for Two Bridges in Canada*, Transportation Research Board 74th Annual Meeting, Washington, D.C., January 22-28, 1995.
61. *Bolted Connections for GFRP Laminated Structural Members*, co-authored by N. K. Hassan, C. H. Rosner., American Society of Civil Engineering Conference, San Diego, California, November 13 -16, 1994.
62. *Fiber Optic Structurally Integrated Sensing of a New Highway Bridge*, co-authored by Measures, Alavie, Maaskant, Ohn, Huang, Tadros, American Concrete Institute Fall Convention, Tarpon Springs, Florida, October 1994.
63. *Horizontal Connections for Precast Concrete Load-Bearing Shear Walls in Seismic Zones*, American Concrete Institute Spring Conference, San Francisco, California, March 21-28, 1994.
64. *National Lecture Tour - Advanced Composite Materials in Bridges and Structures Network of Canada*, Regina, Saskatoon, Victoria, Vancouver, Edmonton, Canada, February to March 1994.
65. *National and International Activities on the Use of Advanced Composite Materials for Civil Engineering Applications*, Canadian Institute of Industrial Technology, Winnipeg, Canada, May 11, 1993.

66. *Behavior of the Connection for Precast Concrete Shear Wall Load Bearing Subjected to Seismic Loads*, co-authors J. West and K. Soudki, American Concrete Convention, Vancouver, Canada, March 31, 1993.
67. *Use of Advanced Composite Material for Civil Engineering Application*, General Lecture, International Colloquium on Structural Engineering, Cairo, Egypt, April 16, 1992 and Alexandria University, Alexandria, Egypt, April 21, 1992.
68. *Use of Advanced Composite Materials for Civil Engineering Application*, Emerging Technologies Workshop organized by Canadian Institute of Industrial Technology, Winnipeg, Canada, April 2, 1992.
69. *Joints, Connections and Anchorages of Advanced Composite Bridge Materials*, CSCE Annual Conference, Vancouver, Canada, May 29, 1991.
70. *Durability of Concrete*, Annual Meeting of the External Advisory Committee of the Transport Institute, University of Manitoba, Winnipeg, Canada, May 16, 1991.
71. *Evaluation of Linseed Oil as a Concrete Sealer*, co-authored by J. Wright and Zhenjia Shen, 82nd Annual Meeting and Exposition of the American Oil Chemists Society, Chicago, Illinois, May 15, 1991.
72. *Horizontal Post-tensioned Connections for Precast Concrete Load-bearing Shear Wall Panels*, co-authored by R. L. Hutchinson, M. Lau and S. Heuvel, Precast/Prestressed Concrete Institute Annual Convention, Las Vegas, Nevada, October, 1990.
73. *Advances in Construction Materials*, A Half-day Forum on New Materials Technologies and their Application in Canadian Industry, organized by the Association of Professional Engineers of the Province of Manitoba, Manitoba Research Council and the University of Manitoba, Winnipeg, Canada, October 17, 1989.
74. *Behavior and Design of the Connection of Shear Wall Load-bearing Panels*, Department of Civil Engineering, University of Alberta, Edmonton, Canada, October 6, 1988.
75. *Post-tensioned Connections for Precast Load-bearing Shear Wall Panels*, co-authored with R. Hutchinson, ACI Annual Convention, San Diego, California, October 1989.
76. *Connections for Precast Load-Bearing Shear Wall Panels*, School of Civil Engineering, University of New South Wales, New South Wales, Australia, September 7, 1989.
77. *Canadian Standard and Design of Concrete Structures in Canada*, Taisei Corporation, Shinjuku-ku, Tokyo, Japan, July 11, 1988.

78. *Behavior of the Shear Connections Typically used for Load Bearing Wall Panels*, Kajima Institute of Construction Technology, Chofu-Shi, Tokyo, Japan, June 23, 1988.
79. *Trends in Engineering Education in Canada*, Yamanashi University, Kufo, Japan, June 17, 1988.
80. *Trends in Engineering Education in Canada*, Nagaoka University of Technology, Nagaoka, Japan, June 8, 1988.
81. *Welded Wire Fabric as Shear Reinforcement under Static and Cyclic Loading Conditions*, Nuclear Power Engineering Test Centre, Abiko, Japan, June 2, 1988.
82. *Welded Wire Fabric as Shear Reinforcement under Static and Cyclic Loading Conditions*, Institute of Technology, Shimizu Corporation, Tokyo, Japan, May 30, 1988
83. *Behavior of the Connections used for Precast Concrete Highrise Structures*, Department of Civil Engineering, The University of Newcastle, New South Wales, Australia, March 11, 1988
84. *University/Industrial Research Interaction in Canada*, School of Civil Engineering, University of New South Wales, New South Wales, Australia, March 9, 1988
85. *Behavior of the Connections used for Precast Concrete Highrise Structures*, School of Civil and Mining Engineering, University of Sydney, Sydney, Australia, March 8, 1988
86. *Limit States Behavior of the Connections used for Precast Concrete High Rise Structures*, University of Technology, Sydney, Sydney, Australia, March 3, 1988
87. *Movement of House Foundations on Winnipeg Clay*, co-authors L. Domaschuk and D. Flatt, Canadian Geotechnical Society, Winnipeg Branch, Living with Soil Movement, Winnipeg, Canada, February 1986
88. *Behavioral Load Testing of the Disraeli Facility*, The Canadian Society for Civil Engineering, Local Chapter, Winnipeg, Canada, April 2, 1985
89. *Loading Facility Erected in 60 Hours*, Precast/Prestressed Concrete Institution Convention, Chicago, Illinois, November 3, 1983
90. *Behavior of Prestressed Concrete Containment Structures Due to Overpressure*, University of Queensland and New South Wales University, Australia, March 1981
91. *Air Leakage Characteristics in Reinforced Concrete*, The American Concrete Institute Annual Convention, Las Vegas, Nevada, March 1980

7. Technical Presentations:

1. **“Behavior, Modeling and Design of Infill Masonry Wall Strengthened with FROP Using Various End Achorage,”** ACI Convention, Philadelphia, Pennsylvania, October 27, 2016.
2. **“Splice Length of Mild Steel Reinforcing Bars to Prestressed Strands within the Transfer Zone,”** PCI Convention and National Bridge Conference, Nashville, TN, March 1-5, 2016.
3. **“Behavior and Design of Loaded Ledges of Short Span L-Shaped Beams,”** PCI Convention and National Bridge Conferendce, Nashville, TN, March 1-5, 2016.
4. “Improving the Durability of Coastal Bridges with Carbon FRP Prestressing Cored Slabs,” ACI Convention, Kansas City, MO, April 13, 2015.
5. “Innovative use of FRP for Precast Concrete Products,” University of Illinois at Urbana-Champaign, Champaign, IL, November 16, 2014.
6. “FRP for Sustainable Precast Concrete Double Tees,” ACI Convention, Washington, D.C., October 26-28, 2014.
7. “Proposed Revisions to Extend Bridge Design Specifications to Concrete Compressive Strenth up to 18 Ksi,” 2013 PCI Conventions and National Bridge Conference, Grapevine, TX, September 20, 2013.
8. “Behavior and Design of Directly-Loaded L-shaped Beam Ledges,” 2013 PCI Conventions and National Bridge Conference, Grapevine, TX, September 19, 2013.
9. “Behavior and Design of Directly Loaded, L-shaped Beam Ledges,” PCI Convention, Washington, D.C., September 6- 9, 2014.
10. “FRP for Sustainable Precast Concrete Structures,” The Hong Kong Polytechnic University, Hong Kong, May 31, 2013.
11. “CFRP Grid/Rigid Insutlation Connector for Concrete Sandwich Panels,” CarbonCast College Workshop, Chicago, IL, April 24, 2013.
12. “CFRP Grid for Sustainable Precast Concrete Double Tees,” CarbonCast College Workshop, Chicago, IL, April 24, 2013.
13. “Strengthening of Infill URM walls subject to Out-of-Plane Bending,” ACI Sub-Committee 440-M FRP Repair of Masonry Structure, 2013 ACI spring Convention, Minneapolis, MN, April 15, 2013.
14. *“Innovative Use of FRP for Sustainable Precast Concrete Sturctues,”* Waterloo University, Ontario, Canada, April 10, 2013.

15. *“Realities of Camber and Deflection Predictions for Prestressed Concrete Bridge Girders,”* Predicting camber in prestressed concrete members, American Council of Engineering companies of North Carolina Bridge Workshop, Raleigh, NC, October 15, 2012.
16. *“Behavior and Design of Directly-Loaded L-shaped Beam Ledges,”* PCI Convention and National Bridge Conference, Nashville, TN, September 29-October 2, 2012.
17. *“New Applications for FRP in Infrastructure Repair,”* The 91st Annual Convention of the Transportation Research Board, Washington, D.C., January 22-26, 2012.
18. *“Innovative use of FRP for the Precast Concrete Industry”*, The Third International Congress and Exhibition, PCI Annual Convention, Salt Lake City, NV, November 2011.
19. *“Prediction of Camber and Deflection for Prestressed Concrete Bridge Girders”*, North Carolina Department of Transportation, Raleigh, NC, November 17, 2011.
20. *“Behavior of Composite Concrete Sandwich Panels Reinforced with FRP Grid Shear Mechanism,”* Korea Institute of Construction Technology, Seoul, Korea, June 23, 2011.
21. *“Concrete Structures Reinforced with High-Performance Steel Bars: Behavior, Design and Applications,”* Korean Concrete Institute, Seoul, Korea, June 22, 2011.
22. *“Sustainable Precast using Carbon-Fiber Reinforced Polymer (CFRP) Grid,”* Achieving Sustainability with Prestressed Concrete Series, PCI Convention, Cincinnati, OH, October 2011.
23. *“Bond and Shear Behavior of Reduced Unit Weight Concrete Flexural Members Using LSP Additive,”* Research in Progress Session, ACI Convention, Chicago, IL, March 27, 2010.
24. *“Identifying Damage Location in Bridge Girders: An essential step for Bridge Prognostics,”* Poster, The fourth annual DHS University Network Summit, March 10-12, 2010, Washington D.C. (Co-author Mosavi, Elsaid and Seracino)
25. *“Application of Fiber-Reinforced Polymer Material in the Prestressed/Precast Concrete Industry,”* Korea Institute of Construction Technology, Seoul, Korea, December 13, 2009.
26. *“Micro-Composite Multi-Structural Formable Steel (MMFX) ASTM A 1035 Steel,”* Korea Institute of Construction Technology, Seoul, Korea, December 13, 2009.
27. *“Development of a Rational Design Methodology for Precast, Prestressed Concrete Spandrel Beams,”* Technical/Research Track Education Sessions, PCI Annual Convention/PCI National Bridge Convention, September 13, 2009, San Antonio, TX.

28. *“Innovative Applications of FRP in Civil Infra-Structures”*, Meeting of the Structural Engineering Association of North Carolina, Raleigh, NC, June 6, 2009
29. *“Understanding Design Basics with CFRP,”* Carolina Spring Conference of the International Concrete Repair Institute, Durham, North Carolina, March 27, 2009.
30. *“Development of Rational Design Methodology for Precast Prestressed Concrete Spandrel Beams”*, ACI Convention, March 16, 2009.
31. *“Innovative Use of FRP for the Precast Concrete Industry,”* Workshop on Concrete Advances & Challenges, Cairo, Egypt, February 14, 2009.
32. *“Proposed Revisions to Extend Bridge Design Specification to Concrete Compressive Strengths up to 18 Ksi (124MPa)”* Transportation Research Board 2009 Annual Meeting, January 13-14, 2009.
33. *“High Modulus CFRP Strengthening System for Steel Structures and Bridges”*, U.S. – South America Workshop: Innovative Materials for Civil Infrastructure, Research and Education, Santiago, Chile, October 13-15, 2008.
34. *“State-of-Practice on the Use of FRP in Precast/Prestressed Concrete Industry”*, PCI Convention, Orlando, FL, October 7, 2008.
35. *“Thermally and Structurally Efficient Composite Sandwich Panels”*, PCI Convention, October 7, 2008.
36. *“Carbon Fiber Grid Reinforced Toppings of Precast Concrete Systems Subjected to Diaphragm Action”*, Seismic Design & Research Issues Session, PCI Convention, Orlando, FL October 6, 2008
37. *“Development of a Rational Design Methodology for Precast Prestressed Concrete Spandrel Beams”*, Leveraging Technology with Marketing for Future Industry Growth, PCI Convention, October 5, 2008, Orlando, FL
38. *“Design Approaches for Shear and Torsion in Slender Spandrel Beams”*, ACI 445 Shear and Torsion Committee, Los Angeles, California, March 31, 2008.
39. *“Proposed Design Guidelines for L-shaped Prestressed Spandrel Beam”*, Prestressed Concrete Institute Convention, Phoenix, Arizona, October 20, 2007.
40. *“Use of High Performance Steel Reinforcing Bars for Concrete Structures”*, American Concrete Institute, 2007 Fall Convention, Fajardo, Puerto Rico, October 16, 2007.
41. *Use of High-Performance Steel Reinforcing Bars for Concrete Structures*, Research in Progress Session, ACI Fall Convention, Puerto Rico, October 14-18, 2007.

42. “*Research Activities of NCSU Constructed Facilities Laboratory*” Meeting of the Triangle Chapter of the Construction Financial Management Association”, October 9, 2007.
43. *Strengthening of Steel – Concrete Composite Bridge With High Modulus CFRP Strips*”, Presentation to FRP Virtual Team Web-conference, Tuesday, October 9, 2007.
44. “*Troubled Bridge Over Water*”, North Carolina Museum of Natural Science and SIGMA X1, Raleigh, N.C., September 25, 2007.
45. “*Use of High Modulus CFRP for Strengthening Steel Bridges*” FHWA , *Bridge Technology*, Washington, D. C., September 13, 2007.
46. *Strengthening Steel Bridges with Composites*, Special Interest Session: FRP Composites-Proven Performance in Bridge Construction, 24th Annual International Bridge Conference, June 5, 2007.
47. Project 12-64—Flexural and Axial Force Provisions, co-authored with Zia, P. and Mirmiran, A., Session on Results of NCHRP Projects on High-Strength Concrete, ACI Spring Convention, Atlanta, Georgia, April 24, 2007.
48. *Coordinated Research on Bond of ASTM A1035 Reinforcement: First Progress Report*, co-authored with Zia, P., Browning, J., Darwin, D., and Jirsa, J., Research in Progress Session, ACI Spring Convention, Atlanta, Georgia, April 23, 2007.
49. *Durability of Concrete Beams Prestressed with CFRP*, co-authored with Mertol, H., Scott, P., Lees, J, El-Hacha, R., and Rizkalla, S., Research in Progress Session, ACI Spring Convention, Charlotte, North Carolina, March 27, 2006.
50. *Behavior of RC Bridge Decks Using MMFX Steel*, Transportation Research Board 85th Annual Meeting, TRB Committee AHD30: Structures Maintenance Meeting, Washington, D.C., January 23, 2006.
51. *Full-Scale Testing of Bridge Decks Reinforced with High Strength Steel*, co-authored with Seliem, H., Lucier, G., Rizkalla, S., and Zia, P., 85th Annual Transportation Research Board (TRB) Meeting, Washington, D.C., January 22-26, 2006.
52. *Innovative FRP Materials for Civil Engineering Infrastructure Applications*, co-authored with Rizkalla, S. and Sumner, E., Composites 2005, Columbus, Ohio, September 28-30, 2005.
53. *Value Engineering of Various FRP Systems for Strengthening of 43 Year Old Prestressed Girders*, Transportation Research Board 84th Annual Meeting, TRB Committee AFF80: Structural Fiber Reinforced Plastics Meeting, Washington, D.C., January 10, 2005.

54. *Behavior of 43-year old Prestressed Bridge Girders Strengthened with various FRP Systems*, Innovative Materials and Technologies for Construction and Restoration conference (IMTCR 2004), Lecce, Italy, June 6-9, 2004.
55. *Analysis and Design of FRP Reinforced Concrete Bridges*, FHWA Conference, Syracuse, New York, August 7-8, 2003.
56. *Beam-Column Behavior of Circular and Rectangular Concrete-Filled FRP Tubes*, co-authored with Fam, A., Flisak, B. and Schnerch, D., ACI Fall Convention, session on the FRP Stay-In-Place Form, Phoenix, Arizona, October 2002.
57. *High Performance Steel Reinforcing Bars*, co-authored with El-Hacha, R. and Faza, S., ACI Spring Convention, Detroit, Michigan, April 22, 2002.
58. *ACI Fiber-Reinforced Plastic Reinforcement Specification*, Transportation Research Board Annual Meeting, Washington, D.C., January 2002.

8. Technical Reports:

1. **Seracino, R., Lucier, G., Rizkalla, S. and Shapack, G., “CFRP Strands in Prestressed Cored Slab Units,” Submitted to North Carolina Department of Transportation, September 2015.**
2. Rizkalla, S., Lucier, G. and Kazem, H., “Shear Transfer Mechanism of Concrete Sandwich Panels connected by Neopor RCFRP Grid,” No. IS-15-01, Submitted to AltusGroup, Inc., January 2015.
3. Kazem, H., Guaderrama, L., Seliem, H. and Rizkalla, S., “CRFP ‘FORCA’ Strands for Shear Strengthening of Steel Bridge Girders,” No. RD-14-04, Submitted to Nippon & Sumikin Materials, Co. Ltd., Japan, June 19, 2014.
4. ElSafty, A., Benmokrane, B., and Rizkalla, S., “Degradation Assessment of Internal Continuous Fiber Reinforcement in Concrete Environment,” Submitted to Florida Department of Transportation, October, 2013.
5. Lunn, D., Lucier, G. and Rizkalla, S., “Strength of Uncracked and Cracked Double-Tees Subjected to Uniform Load,” Technical Report IS-13-08, submitted to AltusGroup Inc. by the North Carolina State University Department of Civil, Construction, and Environmental Engineering, Constructed Facilities Laboratory (CFL), Raleigh, North Carolina, July 2013.
6. Sopal, G. and Rizkalla, S., “Proposed Design equation to estimate the shear flow of C-Grid Precast Concrete Sandwich Panels,” Submitted to AltusGroup, Inc., July 2013.
7. Tabrizi, S. and Rizkalla, S., “Strengthening of Steel Structure with Carbon Fiber Reinforced Polymer (CFRP),” No. RD-13-01, Submitted to Nippon Steel Company, Japan, May, 2013.

8. Lucier, G. and Rizkalla, S., "Bond of FRP Sheets to Steel," Submitted to Structural Technologies, LLC, NCSU, Constructed Facilities Laboratory, Raleigh, NC, March 2013.
9. Rizkalla, S., Kazem, H. and Lucier, G., "Behavior of Insulated Concrete Sandwich panel with GFRP Grids under sustained load and outdoor exposures," No. IS-13-13, Submitted to Koren Institute of Construction Technology, 2013.
10. Lucier, G. and Rizkalla, S., "Material Tests of the Freyssinet Foreva CFRP System: Interlaminar Shear," Submitted to Freyssinet, Inc., NCSU, Constructed Facilities Laboratory, Raleigh, NC, December 2012.
11. Lucier, G. and Rizkalla, S., " Tests of Welded Connections between Precast Double-Tees and Inverted T-Girders," Submitted to Metromont Corporation, NCSU, Constructed Facilities Laboratory, Raleigh, NC, December 2012.
12. Nafadi, M., Rizkalla, S., Zia, P., and Lucier, G., "Behavior and Design of Directly loaded L-Shaped Beam Ledges – Phase I," No. RD-12-01, Submitted to PCI, October 2012.
13. Soriano, J., and Rizkalla, S., "Use of Glass Fiber Reinforced Polymers for Innovative Insulated Concrete Sandwich Panels," No. RD-11-06, Submitted to Korean Institute of Construction Technology, June 2012.
14. Forsyth, M., Lucier, G., and Rizkalla, S., "Flexural Tests of Concrete-Filled FRP Composite Piling", Technical Report, Submitted to Lancaster Composites, NCSU, Constructed Facilities Laboratory, Raleigh, NC, March 2012.
15. Mielke, B., Lucier, G., and Rizkalla, S., "Shear Tests of Beams Strengthened with the Freyssinet Foreva CFRP System", No. IS-12-04, Submitted to Freyssinet, Inc., NCSU, Constructed Facilities Laboratory, Raleigh, NC, Januray 2012.
16. Mielke, B., Lucier, G., and Rizkalla, S., "Flexural Tests of Beams Strengthened with the Freyssinet Foreva CFRP System", No. IS-12-03, Submitted to Freyssinet, Inc., NCSU, Constructed Facilities Laboratory, Raleigh, NC, Januray 2012.
17. Mielke, B., Lucier, G., and Rizkalla, S., "Flexural Tests of Slabs Strengthened with the Freyssinet Foreva CFRP System", No. IS-12-02, Submitted to Freyssinet, Inc., NCSU, Constructed Facilities Laboratory, Raleigh, NC, Januray 2012.
18. Mielke, B., Lucier, G., and Rizkalla, S., "Axial Compression Tests of Columns Strengthened with the Freyssinet Foreva CFRP System", No. IS-12-01, Submitted to Freyssinet, Inc., NCSU, Constructed Facilities Laboratory, Raleigh, NC, January 2012.

19. Bunn, W., Lucier, G., and Rizkalla, S., “Evaluation of Parameters Influencing the CGRID Shear Transfer Mechanism in Precast Concrete Sandwich Panels – 18 Additional Tests”, No. IS-11-12, Submitted to AltusGroup, NCSU, Constructed Facilities Laboratory, Raleigh, NC, June 2011.
20. Bunn, W., Lucier, G., and Rizkalla, S., “Push Tests on Precast Sandwich Panel Specimens with Sand Blasted XPS Foam Insulation”, No. IS-11-11, Submitted to Metromont Corporation, NCSU, Constructed Facilities Laboratory, Raleigh, NC, June 2011.
21. Bunn, W., Lucier, G., and Rizkalla, S., “Direct Tensile Strength of Precast Concrete Sandwich Panels Reinforced with CFRP Grid”, No. IS-11-10, Submitted to AltusGroup, NCSU, Constructed Facilities Laboratory, Raleigh, NC, June 2011.
22. Bunn, W., Lucier, G., and Rizkalla, S., “Evaluation of the Toray-Toray CGRID/Foam Shear Transfer Mechanism in Precast Concrete Sandwich Wall Panels”, No. IS-11-09, Submitted to Chomarat, NCSU, Constructed Facilities Laboratory, Raleigh, NC, June 2011.
23. Bunn, W., Lucier, G., and Rizkalla, S., “Push Tests on Precast Sandwich Panel Specimens with AC70 Foam Insulation”, No. IS-11-08, Submitted to Metromont Corporation, NCSU, Constructed Facilities Laboratory, Raleigh, NC, June 2011.
24. Bunn, W., Lucier, G., and Rizkalla, S., “Age Effect on the the Interface Bond of Expanded Polystyrene (EPS) and Concrete for Precast Concrete Sandwich Wall Panels”, No. IS-11-06, Submitted to AltusGroup, NCSU, Constructed Facilities Laboratory, Raleigh, NC, February 2011.
25. Ragan, D., Lucier, G., and Rizkalla, S., “Behavior of Two-Story Precast Concrete Ribbed Wall Panels”, No. IS-10-11, Submitted to Metromont Corporation, NCSU, Constructed Facilities Laboratory, Raleigh, NC, June 2010.
26. Lucier, G. and Rizkalla, S., “Full-Scale Testing of Precast Architectural Panels”, No. IS-10-04, Submitted to AltusGroup, NCSU, Constructed Facilities Laboratory, Raleigh, NC, March 2010.
27. Seliem, H., Lucier, G. and Rizkalla, S., “*Strengthening of Precast Lightweight FRC Panels with Tyfo® SEH-51A GFRP Sheets*,” No. IS-10-03, Submitted to Fyfe Co. LLC, NCSU, Constructed Facilities Laboratory, Raleigh, NC, March 2010.
28. Ding, L., Lucier, G., Rizkalla, S., and Seliem, H., “Use of C-Grid for Precast Concrete Piles”, No. IS-10-02, Submitted to AltusGroup, NCSU, Constructed Facilities Laboratory, Raleigh, NC, February 2010.
29. Lucier, G. and Rizkalla, S., “*Bond Tests of SAS High-Strength Threaded Bars: AC237*”, No. IS-09-11, Submitted to SAS Stressteel, NCSU, Constructed Facilities Laboratory, Raleigh, NC, February 2010.

30. Ding, L. and Rizkalla, S., "Behavior of CFRP Grid as Reinforcement for Concrete Progress Report No. 1 Piles," Technical Report, IS-09-16, Submitted to AltusGroup, NCSU, Constructed Facilities Laboratory, Raleigh, NC, October 2009.
31. Rizkalla, S., Hosny, A., Heiser, M. and Zia, P., "*Use of Expanded Polystyrene Spheres to Produce Concrete with Reduced Unit Weight*," Technical Report, RD-09-05, Submitted to NOVA, NCSU, Constructed Facilities Laboratory, Raleigh, NC, October 2009.
32. Rizkalla, S., Hosny, A., Heiser, M. and Zia, P., "*Use of Expanded Polystyrene Spheres to Produce Concrete with Reduced Unit Weight*," Technical Report, RD-09-04, Submitted to NOVA, NCSU, Constructed Facilities Laboratory, Raleigh, NC, October 2009.
33. Rizkalla, S., Hosny, A., Heiser, M. and Zia, P., "*Use of Expanded Polystyrene Spheres to Produce Concrete with Reduced Unit Weight*," Technical Report, RD-09-02, Submitted to NOVA, NCSU, Constructed Facilities Laboratory, Raleigh, NC, July 2009.
34. Rizkalla, S. and Lucier, G., "*Behavior of 42' EPS Altus Wall Panel*", Technical Report, IS-09-13, Submitted to AltusGroup, NCSU, Constructed Facilities Laboratory, Raleigh, NC, July 2009.
35. Rizkalla, S. and Lucier, G., "*Bond Tests of High Strength Threaded Bars: AC237*", Technical Report, IS-09-11, Submitted to SAS Stress Steel, NCSU, Constructed Facilities Laboratory, Raleigh, NC, June 2009.
36. Lucier, G., Walter, T., Rizkalla, S., Zia, P. and Klein, "*Development of a Rational Design Methodology for Precast Spandrel Beams*", Technical Report, IS-09-10, Submitted to Precast/Prestressed Concrete Institute, NCSU, Constructed Facilities Laboratory, Raleigh, NC, May 2009.
37. Hariharan, V., Lucier, G., Rizkalla, S. and Zia, P. "*Behavior of Full-Sized Compact L-Girders*", Technical Report, IS-09-09, Submitted to Metromont, NCSU, Constructed Facilities Laboratory, Raleigh, NC, May 2009.
38. Lucier, G., Dawood, M. and Rizkalla, S., "*Thermal Testing of Hardwire Bridge Armoring Components*", Technical Report, IS-09-07, Submitted to Hardwire, LLC, NCSU, Constructed Facilities Laboratory, Raleigh, NC, March 2009.
39. Hosny, A., Dawood, M. and Rizkalla, S., "*Evaluation of Recron 3s Polypropylene Fibers for Use in Precast Concrete Members*," Technical Report, IS-09-01, Submitted to Metromont Corporation, NCSU, Constructed Facilities Laboratory, Raleigh, NC, January 2009.
40. Hosny, A., Heiser, M., Dawood, M., Rizkalla, S. and Zia, P., "*Use of Expanded Polystyrene Spheres to Produce Reduce Weight Concrete*," Technical Report, RD-09-01, Submitted to Nova Chemicals, NCSU, Constructed Facilities Laboratory, Raleigh, NC, February 2009.

41. Lunn, D., Hariharan, V., Lucier, G., Seliem, H. and Rizkalla, S., “*Testing of Strengthening Brick Walls with FRP Sheets*”, Technical Report, IS-09-03, Submitted to Fyfe Company, LLC, NCSU, Constructed Facilities Laboratory, Raleigh, NC, February 2009.
42. Lucier, G., Sharkawi, A. and Rizkalla, S., “*Testing of Connection Plates Embedded in Precast Concrete Hollowcore Planks*”, Technical Report, IS-09-02, Submitted to Oldcastle Precast, NCSU, Constructed Facilities Laboratory, Raleigh, NC, January 2009.
43. Dawood, M., Rizkalla, S., and Taylor, E., “*Testing Program for Transonite RDP0009 Panel with Internal Web Skins*”, Technical Report, IS-08-07, Submitted to Martin Marietta Composites, NCSU, Constructed Facilities Laboratory, Raleigh, NC, August 2008.
44. Lucier, G., Walter, C., Sumner, E. and Rizkalla, S., “*Full Scale Testing of Prestressed Double-Tees Reinforced with CFRP Grid*”, Technical Report, IS-08-02, Submitted to Altus Group, NCSU, Constructed Facilities Laboratory Raleigh, NC, July 2008.
45. Seliem, H., Nelson, L., Seracino, R. and Rizkalla, S., “*Testing of V-Wrap C100/C200 High Strength Carbon Fiber Strengthening System for ICC-ES*”, Technical Report submitted to Structural Group, NCSU, Constructed Facilities Laboratory (CFL), Raleigh, NC May 2008.
46. Lucier, G., Frankl, B. and Rizkalla, S., *Behavior of Altus Wall Panels: Part 3 Tests of 20’ XPS Panels*, Technical Report: IS-08-01, submitted to AltusGroup, North Carolina State University (NCSU), Constructed Facilities Lab (CFL), Raleigh, North Carolina, January 2008.
47. Rizkalla, S., Zia, P., and Mirmiran, A., “*Application of the LRFD Bridge Design Specification to High-strength Structural Concrete: Flexure and Compression Provisions*” Final Report to NCHRP Project 12-64, National Cooperative Highway Research Program Report 595, October 25, 2007.
48. Walter, C., Lucier, G., Dawood, M., Rizkall, S., *Evaluation of the CFRP Material used for the Sunshine Skyway in Florida*, Technical Report: IS-07-12, submitted to MMFX Technologies, Inc., North Carolina State University (NCSU), Constructed Facilities Lab (CFL), Raleigh, North Carolina, July 2007.
49. Lucier, G., Frankl, B. and Rizkalla, S., *Behavior of Altus Wall Panels: Part 2 Tests of 20’ XPS Panels*, Technical Report: IS-07-11, submitted to AltusGroup, North Carolina State University (NCSU), Constructed Facilities Lab (CFL), Raleigh, North Carolina, July 2007.

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51. Rizkalla, S., Zia, P. and Sumpter, M., *Behavior of High Performance Steel as Shear Reinforcement for Concrete Structures*, Research Report: RD-07-03, submitted to the MMFX Technologies Corporation, North Carolina State University (NCSU), Constructed Facilities Lab (CFL), Raleigh, North Carolina, June 2007.
52. Seliem, H., Hosny, A. and Rizkalla, S., *Evaluation of Bond Characteristics of MMFX Steel*, Research Report: RD-07-02, submitted to the MMFX Technologies Corporation, North Carolina State University (NCSU), Constructed Facilities Lab (CFL), Raleigh, North Carolina, June 2007.
53. Mertol, H., Seracino, R. and Rizkalla, S., *Testing of STAY-FORM Stay-in-place Concrete Form*, Technical Report: IS-07-07, submitted to Alabama Metal Industries Corporation, North Carolina State University (NCSU), Constructed Facilities Lab (CFL), Raleigh, North Carolina, April 2007.
54. Lucier, G. and Rizkalla, S., *Proof Load of #20 SAS Flanged Nut Bearing on Confined Concrete*, Technical Report: IS-07-06, submitted to SAS Stressteel, Inc., North Carolina State University (NCSU), Constructed Facilities Lab (CFL), Raleigh, North Carolina, March 2007.
55. Lucier, G. and Rizkalla, S., *Anchorage Testing of High-Strength SAS Bars*, Technical Report: IS-07-04, submitted to SAS Stressteel, Inc., North Carolina State University (NCSU), Constructed Facilities Lab (CFL), Raleigh, North Carolina, March 2007.
56. Rosenboom, O., Miller, Miller, A., Walter, C., and Rizkalla, S., *Value Engineering and Cost Effectiveness of Various Fiber Reinforced Polymer Repair Systems-Part II*, Research Report: RD-07-01, submitted to the North Carolina Department of Transportation (NCDOT), North Carolina State University (NCSU), Constructed Facilities Lab (CFL), Raleigh, North Carolina, February 2007.
57. Lucier, G., Hassan, T., Rizkalla, S., and Zia, P., *Finite Element Validation of Spandrel Testing*, Technical Report: IS-06-20, submitted to Metromont Corporation, North Carolina State University (NCSU), Constructed Facilities Lab (CFL), Raleigh, North Carolina, November 2006.
58. Nelson, L., Lucier, G. and Rizkalla, S., *Bond Tests of High Strength Threaded Bars*, Technical Report: IS-06-16, submitted to SAS Stressteel, Inc., North Carolina State University (NCSU), Constructed Facilities Lab (CFL), Raleigh, North Carolina, September 2006.

59. Seliem, H., Hosny, A., Dwairi, H., and Rizkalla, S., *Shear Behavior of Concrete Beams Reinforced with MMFX Steel Without Web Reinforcement*, Technical Report: IS-06-08, submitted to MMFX Technologies Corporation, North Carolina State University (NCSU), Constructed Facilities Lab (CFL), Raleigh, North Carolina, April 2006.
60. Johnson, C., Mohamed, T., Norton, T., Tillman, C., and Rizkalla, S., *Innovative Textile Technology for Modular Bridge Decks*, Research Report: RD-06-03, submitted to the National Science Foundation (NSF), North Carolina State University (NCSU), Constructed Facilities Lab (CFL), Raleigh, North Carolina, April 2006.
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62. Reis, E. and Rizkalla, S., *Testing Program for Precast Lintels and Columns Manufactured by P&D Precast Co.*, Technical Report: IS-06-04, submitted to P&D Corporation, North Carolina State University (NCSU), Constructed Facilities Lab (CFL), Raleigh, North Carolina, February 2006. Joshi, H., Burlacu, B., Prabhu, M., Yoon, S., Sichertiu, M., Dutta, R., and Rizkalla, S., *Wireless Structural Health Monitoring System Design, Implementation and Validation*, Research Report: RD-06-02, submitted to the National Science Foundation (NSF), North Carolina State University (NCSU), Constructed Facilities Lab (CFL), Raleigh, North Carolina, January 2006.
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9. Books:

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2. *Advanced Composite Materials in Bridges and Structures in Japan*, published by the Canadian Society for Civil Engineering, Chapter 3, co-authored by M. A. Erki, August 1992.
3. *Use of Advanced Composite Material for Bridge Application*, published by the Canadian Society for Civil Engineering, Chapter 8, co-authored by M. A. Erki, 1991.
4. *Basic Reinforced Concrete Design*, co-authored by B. M. Thadani, Cantext Publications, Winnipeg, Manitoba, 1985.
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1. ACI 440.9R-15 “Guide to accelerated conditioning Protocols for Durability and External Fiber Reinforced Polymer (FRP) Reinforcement”, ISBN: 978-1-942727-17-0, May 2015.
2. ACI 440.1R-15 “Guide for the Design and Construction of Structural Concrete Reinforced with Fiber-Reinforced Polymer (FRP) Bars”, March 2015.
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4. ACI 440.8-13 “*Specification for Carbon and Glass Fiber – Reinforced Polymer (FRP) Materials Made by Wet Layup for external strengthening of Concrete and Masonry Structures*”, January 2014.
5. “ASCE Standard for Load Resistance Factor Design (LFRD) of Pultruded Fiber Reinforced Polymer (FRP) Structures”, (Chair), 2011.
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8. ACI 550.IR-09 “*Guide to Emulating Cast-in-Place Detailing for Seismic Design of Precast Concrete Structures*”, Published by the American Concrete Institute, 2009.
9. ACI 440-2R-08, *Guide for the Design and Construction of Externally FRP Systems for Strengthening Concrete Structures*, published by the American Concrete Institute, August 2008.
10. ACI 440.6-08, *Specifications for Carbon and Glass Fiber – Reinforced Polymer Bar Materials for Concrete Reinforcements*, An ACI Standard, July 2008.
11. ACI 440.5-08, *Specification for Construction with Fiber Reinforced Polymer Reinforcing Bars*, An ACI Standard, July 2008.
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14. ACI Special Publication SP-245, *Case Histories and Use of FRP for Prestressing Applications*, published by the American Concrete Institute, November 2007. (Co-Chair)
15. ACI 440.4R-04, *Prestressing Concrete Structures with FRP Tendons*, published by the American Concrete Institute, December 2004. (Chair)
16. ACI 440.3R-04, *Guide Methods for Fiber Reinforced Polymers (FRPs) for Reinforcing or Strengthening Concrete Structures*, October 2004. (Chair)
17. ACI-SP 215, *Field Application of FRP Reinforcement: Case Studies*, published by the American Concrete Institute, September 2003. (Co-Chair)
18. ACI 440.1R-03, *Guide for the Design and Construction of Concrete Reinforced with FRP Bars*, published by the American Concrete Institute, May 2003. (Chair)
19. ACI 440.2R-02, *Guide for the Design and Construction of Externally Bonded FRP Systems for Strengthening Concrete Structures*, published by the American Concrete Institute, October 2002. (Chair)
20. ACI 440.1R-01, *Guide for the Design and Construction of Concrete Reinforced with FRP Bars*, published by the American Concrete Institute, May 2001. (Chair)
21. ACI SP-188, *Fourth International Symposium on Fiber Reinforced Polymer Reinforcement for Reinforced Concrete Structures*, published by the American Concrete Institute, March 1999. (Co-Chair).

B. RESEARCH PROJECT RECORD

Title: Non-Destructive Inspection of Dry Storage Nuclear Fuel Facilities via Robotic Sampling and Sensing
Granting Agency: US Department of Energy (DOE)
Funding Amount: \$3,570,572
Dates: January 2015 – December 2017
PI: M. Bourham
Status: Applied
Abstract: The main objective of the project is to develop a non-destructive sensory system and devices for inspection and surface sample collection for dry storage of used nuclear fuel. The plan is to employ robotic systems for inspection to develop enhanced NDT Sensors and viewing techniques to detect cracks, corrosion, lose parts and seals monitoring humidity, surface temperature, air flow through the vents; and collecting surface samples such as debris, dirt and clay.

Title: Thermally and Structurally efficient Concrete Sandwich Panels
Granting Agency: Altus Group
Funding Amount: \$50,000
Dates: May 1, 2014 – March 30, 2015
PI: Sami Rizkalla
Status: Submitted
Abstract: The main objective to evaluate the effective use of CFRP Grid in providing the composite action of concrete sandwich panels typically used as load bearing panels for commercial buildings. The various parameters investigated are the thickness of the rigid foam and the spacing between the Grids.

Title: CFRP Strands in Prestressed Cored Slab Units
Granting Agency: NCDOT
Funding Amount: \$91,649
Dates: August 1, 2013 – August 15, 2014
PI: Rudi Seracino
Status: Awarded
Abstract: The research aims to investigate the potential use of non-corroding Carbon Fiber Reinforced Polymer (CFRP) prestressing strands in place of steel strands and the use of Glass Fiber Reinforced Polymer stirrups in place of steel stirrups. The use of these new materials has the potential to greatly enhance the durability and corrosion resistance of cored slab deck members. The research

will include literature and design guide study, full-scale laboratory testing of cored slab girders, material testing, computer modeling, and rational analysis. Design recommendations and guidelines will be developed for the NCDOT.

Title: Innovative CFRP small diameter strands for strengthening steel structures and bridges
Granting Agency: Nippon Steel
Funding Amount: \$150,000
Dates: July 1, 2013 – June 30, 2017
PI: Sami Rizkalla
Status: Awarded
Abstract: The research investigate the effectiveness of using high strength, almost twice of the steel strength, CFRP small diameter strands to strength the buckling and shear resistance of the web of steel girders typically used for bridges. The research consider various parameters including the aspect ratio of the steel plate, thickness of the plates, orientation of the CFRP strands and the number of layers of the strengthening system. The first phase include testing using pure axial compression load and the second phase investigates the behavior under pure shear loadings using special test set-up.

Title: Center for the Integration of Composites into infrastructure (CICI)
Granting Agency: National Science Foundation
Funding Amount: \$225,000
Dates: August 16, 2014 – August 15, 2019
PI: Sami Rizkalla
Status: Submitted on March 2014
Abstract: The center activities will enhance the international competitiveness of the American industry in the area of composites including modular construction and rapid deployment techniques using natural and bio-materials; thus reducing carbon emissions into the atmosphere. The use of composite will lead to structures of higher safety, shorter construction times, and longer life spans at a reduced overall cost.

Title: Center for the Integration of Composites into Infrastructure (CICI)
Granting Agency: National Science Foundation
Funding Amount: \$315,000
Dates: August 16, 2009 – August 15, 2014
PI: Sami Rizkalla
Status: Awarded
Abstract: The center activities will enhance the international competitiveness of the American industry in the area of composites including modular construction and rapid deployment techniques using natural and bio-materials; thus reducing carbon emissions into the atmosphere. The use of composite will lead to structures of higher safety, shorter construction times, and longer life spans at a reduced overall cost.

Title: Behavior and design of Directly Loaded L-shaped Beam Ledges
Granting Agency: Prestressed Concrete Institution – Member of I/UCRC CICI Center
Funding Amount: \$200,000
Dates: July 1, 2011 – June 30, 2014
PI: Sami Rizkalla
Status: Awarded
Abstract: The goal of the proposed research is to determine the ledge capacities for a wide range of L-spandrel and ledger beam geometries. The primary objective is to develop more reliable design equations for ledge punching shear. However, the research will also evaluate other interrelated ledge resistance mechanisms: cantilever flexure, longitudinal flexure, and ledge-to-web attachment. The detailed investigation will rely upon existing test data, published literatures, current design guides, advanced computer analyses, and experimental testing. Based on these results, the research will develop a comprehensive set of appropriate and practical design procedures, suitable for implementation. The research program consists of two phases.

Title: Development of Rational Design Metodologies for Dapped Ends of Prestressed concrete thin-Members
Granting Agency: Wiss, Janney, Elstner – Member of I/UCRC CICI Center
Funding Amount: \$100,000
Dates: July 1, 2012 – June 30, 2014
PI: Sami Rizkalla
Status: Awarded
Abstract: The objective of this research is: 1) develop rational methodologies for proportioning key reinforcements in dapped end double tees, and 2) develop standard details that been rigorously reviewed by industry experts and have proven to be effective by extensive analyses and tests.

Title: Innovative Bonding materials and Fibers for Strengthening Concrete Structures
Granting Agency: Freyssinet Inc. – Member of I/UCRC CICI Center
Funding Amount: \$150,000
Dates: July 1, 2011 – June 30, 2013
PI: Sami Rizkalla
Status: Awarded
Abstract: This research investigates the use of several innovative strengthening systems consisting of different types of fiber reinforced polymer materials in combination with different adhesive materials, for strengthening and repair of civil engineering infrastructure. The study combines two inter-related projects under the umbrella of innovative materials for strengthening of concrete structures.

Title: FRP Shear Transfer Mechanism for Concrete Sandwich Panels
Granting Agency: Altus Group – Member of I/UCRC CICI Center
Funding Amount: \$100,000
Dates: July 1, 2011 – June 30, 2013
PI: Sami Rizkalla
Status: Awarded
Abstract: This project is investigating a glass fiber reinforced polymer grid, used as a shear transfer mechanism for concrete sandwich panels in conjunction with the bond formed between the foam insulation and the concrete wythes. It is well documented that steel is an effective means of transferring shear forces through the foam core, however steel is thermally inefficient. GFRP and CFRP (carbon) offers significant thermal benefits, as it does not conduct heat through the foam core, however its structural properties needs to be defined.

Title: Degradation Assessment of Internal Continuous Fiber Reinforcement in Concrete Environment
Granting Agency: Florida Department of Transportation
Funding Amount: \$200,000 (\$25,000 for NCSU)
Dates: July 1, 2011 – June 30, 2013
PI: Sami Rizkalla
Status: Awarded
Abstract: The objective of the research project is to examine the structural performance and durability of the basalt, carbon, and glass fiber reinforced polymer reinforcements for concrete structures. The research includes evaluation of the material aspects as well as the structural performances, such as bond characteristics of these reinforcements with concrete.

Title: Use of Fiber Reinforced Polymer Materials for innovative Insulated Concrete Sandwich Panels
Granting Agency: Korea Institute of Construction Technology (KICT)
Funding Amount: \$120,000
Dates: May 2011 – May 2013
PI: Sami Rizkalla
Status: Awarded
Abstract: The proposed research program investigates the use of fiber reinforced polymer (FRP) materials, produced in Korea, to achieve the composite action of innovative precast and possibly prestressed concrete sandwich panels. The panels could be used as load bearing panels or non-load bearing architectural panels.

Title: Durability and Life Cycle performance of Pultruded and Infused FRPs for Infrastructure
Granting Agency: National Science Foundation
Funding Amount: \$100,000
Dates: July 2012 – June 2014
PI: Sami Rizkalla
Status: Awarded
Abstract: The objectives of the research project are: i) evaluate mechanisms that lead to the degradation of pultruded and infused composite material properties at micro- and macro-levels (coupons and components); ii) minimize manufacturing (pultrusion vs. infusion) and durability related defects, including debondings to ensure composite integrity and durability; and iii) develop a unified model(s) to predict life-cycle performance of polymer composites using the fundamental principles of mechanics and thermodynamics so that a master curve(s) with vertical shift factors (strength degradation) can be developed as a function(s) of time, temperature and pressure.

Title: Behavior of Semicontinuous FRP Grid Connectors for Concrete Sandwich Panels
Granting Agency: Altus Group
Funding Amount: \$63,000
Dates: July 2011 – June 2012
PI: Sami Rizkalla
Status: Awarded
Abstract: The objective of the research project is to examine the effectiveness of carbon fiber reinforced polymer materials in grid configuration as shear connectors for Reinforced Concrete Sandwich Panels. The new panels are structurally and thermally efficient.

Title: 3D FRP Sandwich Panels with Web Corrugation
Granting Agency: Martin Marrietta – Member of I/UCRC CICI Center
Funding Amount: \$50,000
Dates: July 1, 2010 – June 30, 2011
PI: Sami Rizkalla
Status: Awarded and Completed
Abstract: The project involved parametric testing program which evaluated the structural performance of new 3-D FRP sandwich panels in presence of web corrugation. The initial phase of experiment studied influence of web corrugations on the fundamental characteristics of 3 inches thick sandwich panels under various loading conditions. The subsequent phase of the experimental program focused testing 2 inches thick panels emphasizing alteration effects on the structural behavior. To evaluate the influence of web corrugation on shear modulus in comparison to panels without web corrugations, a total of six specimens were tested.

Title: Predicting Camber, Deflection & Prestress Losses of Prestressed Concrete Members
Granting Agency: North Carolina Department of Transportation
Funding Amount: \$110,573
Dates: July 2009 – March 2011
PI: Sami Rizkalla
Status: Awarded
Abstract: The objective of the proposed project is to evaluate the effectiveness of the current NCDOT methodologies to predict prestress losses, camber and deflection of prestressed concrete members in light of the recent development of using longer spans of bulb-tee girders and box beams as well as higher concrete strengths in the range of 8000 psi to 12,000 psi.

Title: I/UCRC Center, “Repair of Buildings and Bridges with Composites (RB²C)” – Three Year Extension
Granting Agency: National Science Foundation
Funding Amount: \$90,000
Dates: September 2007 - August 2010
PI: S. Rizkalla
Status: Awarded and completed
Abstract: The NSF Industry/University Cooperative Research Center entitled “Repair of Buildings and Bridges with Composites” (RB²C), is located at the Constructed

Facilities Laboratory, North Carolina State University (NCSU). The Center is working in collaboration with the Center located at the University of Miami, Florida. The Center at NCSU focuses on the needs of the construction industry in development of new and innovative structural components as well as strengthening/repair methods for existing structures using advanced composite materials.

Title: Validation of Compliance of EPS-LWC to Shear and Bond Provisions of ACI 318-08 Building Code Concrete
Granting Agency: NSF – I/UCRC - RB²C - Nova Chemicals
Funding Amount: \$100,000
Dates: July 2008 – June 2010
PI: Sami Rizkalla
Status: Awarded and completed
Abstract: The research program is designed to evaluate the compliance to the shear and bond provisions of the ACI 318-08 Building Code for reduced weight concrete using expanded polystyrene spheres produced by Nova Chemicals. The proposed experimental program will be conducted in two phases. The first phase focuses on evaluating the shear behavior of beams produced by the reduced unit weight concrete with polystyrene spheres. The second phase focuses on evaluating the development length of the steel reinforcement for concrete with polystyrene spheres.

Title: Structural Behavior of Grancrete Material
Granting Agency: NSF – I/UCRC - RB²C - Grancrete Corporation
Funding Amount: \$150,000
Dates: January 2007 - June 2010
PI: S. Rizkalla
Status: Awarded and completed
Abstract: The proposed research program is designed to examine a new type of concrete as material for construction of buildings, bridges and special infrastructural applications. The initial phase of the evaluation includes tests to determine the basic material characteristics of Grancrete including compressive strength, elastic modulus, tensile strength, creep, shrinkage, and toughness of materials. The second phase will include examining the behavior of Grancrete mixed with small aggregate to enhance the overall behavior as construction materials. Based on the findings, the research will be extended to include the behavior of Grancrete reinforced with steel reinforcements and fiber reinforced polymer materials.

Title: Development of Rational Design Methodology for Precast, Prestressed Concrete Spandrel Beams
Granting Agency: NSF - I/UCRC - RB²C – Precast/Prestressed Concrete Institute
Funding Amount: \$170,000
Dates: July 2006 – March 2010
PI: S. Rizkalla
Co-PI: P. Zia
Status: Awarded and completed
Abstract: The goal of the proposed research is to develop appropriate design procedures and to simplify the detailing requirements for precast, L-shaped spandrel beams. The research includes an extensive experimental program designed to test prototype precast L shaped spandrel beams and an analytical phase based on non-linear finite element techniques.

Title: Evaluation of a New High Corrosive Resistant Steel Reinforcement for Concrete Structures in the Mediterranean Salt Environments
Granting Agency: National Science Foundation
Funding Amount: \$36,290
Dates: September 2005 – December 2009
PI: S. Rizkalla
Co-PI: T. Hassan
Status: Awarded and completed
Abstract: MMFX is a high strength, highly corrosion resistant steel, ideal for use in civil engineering applications for salt environments such as the Mediterranean environment in Egypt and high humidity climate such as in North Carolina and many other ocean exposed states. The research will introduce the MMFX steel as a new material has a high corrosion resistance to the engineering community in Egypt for the first time. The proposed research project consists of three major tasks; (i) experimental work, (ii) analytical phase, (iii) development of design guidelines. The research is currently in progress at Ain Shams University, Cairo, Egypt.

Title: Evaluation of Bond Characteristics of MMFX Steel
Granting Agency: NSF – I/UCRC - RB²C - MMFX Technologies Corporation
Funding Amount: \$183,333
Dates: July 2005 – December 2009
PI: S. Rizkalla
Status: Awarded and completed

Abstract: The high-strength steel commercially known as Micro-composite Multi-structural formable (MMFX) steel could lead to potential savings through the use of lower reinforcement ratios due to its higher strength. The proposed research will investigate the bond behavior of MMFX steel to concrete. The first phase of the proposed research program will include the parameters believed to significantly affect the bond strength: concrete compressive strength, bar size, concrete clear cover, and confinement level. Three universities are participating in this study, namely, University of Texas at Austin, The University of Kansas, and North Carolina State University. Each university will test twenty-two full-scale splice beams for the first phase of the program.

Title: Developing a Telematics Platform for Bridge Monitoring and Health Prognostics
Granting Agency: National Science Foundation (Supplement to RB²C Center)
Funding Amount: \$100,000
Dates: July 2007 – June 2009
PI: S. Rizkalla
Status: Awarded and completed
Abstract: The research project integrates the extensive research on physics of bridge damages and instrumentation of bridge monitoring system, conducted at the RB²C Center, with the feature-based smart prognostic agent, namely the Watchdog Agent® developed by the IMS Center, to accurately quantify and predict bridge deterioration. The major merit of this work will be the initiation of a combined physics-statistics-based prognostics approach, which expands and integrates the theories and tools developed in RB²C and IMS. The developed methodology will bring about innovation to predict bridge deterioration and provide a general framework for prognostic bridge health management for next-generation intelligent transportation maintenance systems.

Title: Basalt Fiber Reinforced Cementitious Matrix Composites for Infrastructure Repair
Granting Agency: National Science Foundation (Supplement to RB²C Center)
Funding Amount: \$50,000
Dates: July 2007 – June 2009
PI: S. Rizkalla
Status: Awarded and completed
Abstract: The project focuses on the strengthening and upgrade of existing reinforced concrete (RC) structures using a new class of composites made of basalt fibers embedded in a cement-based matrix (BFRC). Basalt fibers are manufactured in a single-stage process by melting naturally occurring basalt rock. The BFRC confining system represents a promising solution to overcome limitations of

current fiber-reinforced-polymer (FRP) systems that make use of carbon or glass fibers impregnated with an epoxy resin. The research will first study the mechanical and durability performance of commercial grade basalt fibers and then of the system obtained by combining them with the cementitious matrix.

Title: Strengthening In-fill Brick Walls with Composite
Granting Agency: E. Fyfe Company
Funding Amount: \$89,000
Dates: July 2007 – June 2009
PI: S. Rizkalla
Status: Awarded and completed
Abstract: The research is designed to examine the effectiveness of various strengthening techniques for in-fill brick walls using glass fiber reinforced polymer material. The experimental progress consists of fourteen full scale In-fill brick wall unites subjected to uniform pressure to simulate the pressure and extreme wind loading conditions. Various constraints and anchorage systems were included.

Title: International Workshop on the Use of Fiber Reinforced Polymers (FRPs) for sustainable structures.
Granting Agency: National Science Foundation
Funding Amount: \$25,000
Dates: May 2008 – July 2008
PI: Sami Rizkalla
Status: Awarded and completed
Abstract: The funds were used to organize an International workshop in Egypt to facilitate technology transfer, to disseminate research findings and to identify the methodology that should be undertaken to initiate research collaboration between USA researchers and the Egyptian counterpart on the use of FRP, for strengthening and repair Civil Engineering infrastructures leading to sustainable structures.

Title: Behavior of Concrete Sandwich Panels Reinforced with CFRP Grid
Granting Agency: Altus Group
Funding Amount: \$47,000
Dates: August 2006 - July 2007
PI: S. Rizkalla

Status: Awarded and completed
Abstract: The objective of the study is to determine the behavior of prestressed concrete sandwich panels under the effect of gravity and simulated wind loading conditions. The panels are reinforced transversely by a new innovative carbon fiber reinforced polymer to achieve composite action under the combined gravity and wind load. The research consists of an experimental program which included testing of six full-scale sandwich panels varying from 20 to 40 feet. All panels will be tested under fatigue and monotonic loading conditions to failure.

Title: Development of Repair Systems for Steel Structures and Bridges
Granting Agency: NSF – I/UCRC - RB²C - Mitsubishi Chemical FP America
Funding Amount: \$300,000
Dates: July 2002 - June 2008
PI: S. Rizkalla
Status: Awarded and completed
Abstract: The project investigates the use of high modulus carbon fiber polymer (CFRP) material for strengthening steel structures and bridges. The material in use now is in the form of sheets and strips bonded to the tension surface of steel structures. The first phase includes selection of the appropriate resin and bond characteristics of the material. The second phase is to test large-scale steel monopoles strengthening with different materials, configurations and subjected to static and fatigue loading conditions. The study will be continued to include the environmental effect on the strengthening system.

Title: An Innovative Bridge Deck System
Granting Agency: NSF - I/UCRC - RB²C - Martin Marietta Composites
Funding Amount: \$300,000
Dates: July 2002 - June 2008
PI: S. Rizkalla
Status: Awarded and completed
Abstract: The research includes development of an innovative system for highway bridge decks. The system is also suitable for manufacturing trailer walls using small thicknesses. The innovative concept consists of two layers of 2-D fiber pultruded sheets and styrofoam layers in between to provide the required thickness. At a later stage, bundled fibers are inserted in the third direction to increase the strength through-thickness properties of the panels. The system is a modified process for the Z-technology used for the aerospace industry. The test program consists of different tests to examine the material characteristics as well as the behavior of the panel.

Title: Performance of High Strength CFRP for Strengthening Concrete Structures
Granting Agency: NSF – I/UCRC - RB²C - Structural Preservative System
Funding Amount: \$50,000
Dates: 2007
PI: Rizkalla
Status: Awarded and completed
Abstract: The study is focused on the behavior of high strength CFRP material for strengthening concrete structures. The specific parameters to be considered are flexural strengthening of beams, shear strengthening of beams and flexural strengthening of concrete slabs.

Title: Debonding Failure in CFRP Strengthened Steel Structures
Granting Agency: Australian Research Council
Funding Amount: \$ 325,000 (Australian)
Dates: January 2005 – December 2007
PI: X. Zhao (Monash University)
Co- PIs: S. Rizkalla & R. Al-Mahaidi (Monash University)
Status: Awarded and completed
Abstract: The research will make a breakthrough in understanding the bond characteristics between CFRP and steel. It will enhance the capacity of Australian researchers to participate in a new cutting-edge research area, and help create a vibrant new industry for strengthening steel structures. The project will contribute to improved cost efficiency and safety of steel structures thereby contributing to the socio-economic well being of Australia and the USA including road, offshore, building and mining industries.

Title: RC Beams Strengthened with Near Surface Mounted FRP
Granting Agency: Hong Kong National Research Council
Funding Amount: HK \$633,695
Dates: January 2005 – December 2007
PI: Jin-Guang Teng
Co-PIs: S. Rizkalla & B. Taljsten (Sweden)
Status: Awarded and completed
Abstract: The project investigates the use of fiber reinforced polymer (FRP) material to strengthen reinforced concrete (RC) beams to increase their flexural and shear capacity. The project at Hong Kong will focus on installing these materials into the tension zones of the flexural members using the near surface mounted technique. The project complements the research in progress at North Carolina

State University sponsored by the North Carolina Department of Transportation using 43-year old prestressed c-channels and AASHTO girders. The research findings will be greatly enhanced by the collaboration with the University of Technology, Sweden.

Title: Torsional Strengthening of Concrete Structures Using Near Surface Mounted Fiber Reinforced Polymers
Granting Agency: Australian Research Council
Funding Amount: \$1,540,818
Dates: 3 years
PI: R. Al-Mahaidi (Monash University)
Co-PI: S. Rizkalla
Status: Awarded July 2007 and completed.
Abstract: The proposed study focuses on the torsional strengthening of concrete flexural members in bridges and buildings using Fiber Reinforced Polymers (FRP). The proposed study will fill the gap that currently exists in the FRP strengthening of RC structures. It will also provide the engineering community with analytical tools for the design of FRPs in torsional strengthening applications.

Title: Characteristics of Glass Fiber Reinforced Polymer Material
Granting Agency: Martin Marietta Composites
Funding Amount: \$45,400
Dates: August 2006 - July 2007
PI: S. Rizkalla
Status: Awarded and completed
Abstract: The main objective of the project is to evaluate the structural performance of 3-D FRP sandwich panels. The panels consist of GFRP laminates and foam core where the top and bottom skin GFRP layers are connected together with through thickness fibers. The experimental program focuses on the overall flexural behavior under various loading conditions. The variables are number of GFRP piles, core configurations, density of the through-thickness fibers and the direction of the embedded through-thickness fibers.

Title: Bond Behavior of SAS High Performance Steel
Granting Agency: SAS Stressteel, Inc.
Funding Amount: \$ 70,110
Dates: April 2004 – July 2007
PI: S. Rizkalla

Status: Awarded and completed
Abstract: To evaluate the bond characteristics of the SAS high tensile strength steel using end-block and splice beam test specimens according to the ICC specifications.

Title: Shear Behavior of MMFX Stirrups
Granting Agency: MMFX Technologies Corporation
Funding Amount: \$50,000
Dates: July 2006 – June 2007
PI: S. Rizkalla
Status: Awarded and completed
Abstract: The objective of this test program is to determine the feasibility of using MMFX reinforcing bars as shear reinforcement for reinforced concrete structures. To achieve this objective, comparative tests will be conducted for shear critical reinforced concrete beams using both conventional steel and MMFX steel reinforcements. The experimental program consists of nine reinforced concrete beams of each series are further divided into 3 groups of 3 beams each. Within each group, the variable would be the amount of shear reinforcement – the minimum, the intermediate, and the maximum amounts.

Title: I/UCRC Center, “Repair of Buildings and Bridges with Composites (RB²C)”
Granting Agency: National Science Foundation
Funding Amount: \$250,000
Dates: July 2002 - June 2007
PI: S. Rizkalla
Status: Awarded and completed
Abstract: The NSF Industry/University Cooperative Research Center entitled “Repair of Buildings and Bridges with Composites” (RB²C), is located at the Constructed Facilities Laboratory, North Carolina State University (NCSU). The Center is working in collaboration with the Center located at the University of Missouri-Rolla (UMR). The Center at NCSU focuses on the needs of the construction industry in development of new and innovative structural components as well as strengthening/repair methods for existing structures using advanced composite materials.

Title: Application of the LRFD Bridge Design Specifications to High-Strength Structural Concrete Flexure and Compression Provisions
Granting Agency: National Cooperative Highway Research Program (NCHRP)

Funding Amount: \$600,000
Dates: May 2003 - May 2007
PI: S. Rizkalla
Co-PIs: A. Mirmiran and P. Zia
Status: Awarded and completed
Abstract: The objective of this research is to develop recommended revisions to the AASHTO LRFD Bridge Design Specifications to extend the applicability of the flexural and compression design provisions to concrete up to 18 ksi. The research results will allow full utilization of the material characteristics and greater use of high-strength concrete, since the current LRFD limits the design strength of the ultimate compressive strength of concrete to 69 MPa (10 ksi). The results will have great economical advantages by allowing bridge design engineers to design AASHTO girders more effectively in terms of the thickness of the web and larger beam spacing.

Title: Value Engineering and Cost-Effectiveness of Various FRP Repair Systems – Part II
Granting Agency: North Carolina Department of Transportation
Funding Amount: \$83,663
Dates: July 2005 – December 2006
PI: S. Rizkalla
Status: Awarded and completed
Abstract: This research program is an extension of NCDOT Project 2004-15: Value Engineering and Cost-Effectiveness of Various FRP Repair systems, which will be completed in June 2005. Results of Project 2004-15 and the proposed extension will be used to produce complete design guidelines. The project will provide bridge maintenance engineers with a comprehensive document to select the most appropriate repair or strengthening systems along with the cost effectiveness and value engineering for each system.

Title: Supplement Funding to Support Undergraduate Student
Granting Agency: National Science Foundation
Funding Amount: \$11,625
Dates: July 2003 - June 2006
PI: S. Rizkalla
Status: Awarded and completed
Abstract: Efforts at repair of steel bridges with FRP have not been very successful because of low modulus of most FRP materials as compared to steel. The new carbon fibers have high modulus of elasticity that is about 3 times that of steel in fiber form and twice that of steel in laminate form. The student will be involved in an experimental plan consisting of testing the fibers with a variety of resins to identify the most effective and compatible resin for the repair of steel. Tests will include laminates as well as bond with steel plates.

Title: Evaluation of New Generation of Adhesives for Marine Structures
Granting Agency: IPS Corporation
Funding Amount: \$250,000
Dates: July 2002 - June 2006
PI: S. Rizkalla
Status: Awarded and completed
Abstract: The project investigates the behavior and material characteristics of two proposed adhesives designed for marine structures. The project is mainly an experimental study at this stage. The experimental program initially consists of lap shear test to determine the bond characteristics of two adhesives between two surfaces; each consists of Carbon Fiber Reinforced Polymer (CFRP) and steel surface. A specially designed insulated room has been constructed at the Constructed Facilities Laboratory to house the instrumentations, which were built to subject the specimens to the specified environment.

Title: Use of MMFX for MAT Foundation Phase I: One-Way Shear Mechanism
Granting Agency: MMFX Technologies Corporation
Funding Amount: \$25,000
Dates: March 2005 – June 2005
PI: S. Rizkalla
Co-PIs: M. Kowalsky
Status: Awarded and completed
Abstract: The research proposal investigates the use of a new reinforcement steel, commercially known as MMFX Steel, for the construction of large footing and Mat Foundations. The first phase of the funding will investigate the “one-way mechanism” of the reinforced concrete flexural members reinforced with this high yield strength steel and their effects on the shear strength and failure modes. The study includes testing of large scale beams with shear span to depth ratio of three to examine the mode of failure for Mat Foundation. The behavior will be compared to a beam reinforced with conventional grade 60 steel.

Title: Torsion Behavior of Precast Prestressed Ledger Beams
Granting Agency: Metromont Corporation
Funding Amount: \$ 65,000
Dates: September 2005 – December 2005
PI: S. Rizkalla

Co-PI: P. Zia
Status: Awarded and completed
Abstract: To evaluate the behavior of precast prestressed ledger beams under the effect of eccentric loading of precast beams typically used for parking structures. Two full size beams with spans of 30 and 45 feet will be tested using double T-beams to load the beams up to failure. Four different reinforcement details are considered in this integration.

Title: Evaluation of MMFX Steel for NCDOT Concrete Bridges
Granting Agency: North Carolina Department of Transportation
Funding Amount: \$115,000
Dates: July 2004 - December 2005
PI: S. Rizkalla
Co-PI: P. Zia
Status: Awarded and completed
Abstract: This research project investigates the effectiveness of highly corrosive, resistant, high strength steel reinforcements, recently patented as MMFX Steel, for use in highway concrete bridge applications. The experimental program consists of multiple phases to examine the mechanical properties, effect of bend and corrosion resistance claimed by the manufacturer. The structural performance includes full-scale concrete bridge decks. The analysis will be based on non-linear-finite elements to determine the influence of other parameters, which could affect the design. The research will provide design guidelines for the use of this new tool.

Title: Innovative Textile Technology for Modular Bridge Decks
Granting Agency: National Science Foundation
Funding Amount: \$186,290
Dates: July 2003 - December 2005
PI: S. Rizkalla
Status: Awarded and completed
Abstract: This research program is designed to, for the first time ever, adapt the 3-D weaving process to develop innovative FRP bridge decks. The work plan has both experimental and analytical components. The experimental work consists of testing scale models of FRP decks as well as coupon testing under static and fatigue loading. The analytical work includes finite element modeling of the FRP decks using micro- and macro-models. Once the models are calibrated using the experimental results of Part I, a parametric study will be carried out to optimize the shape and configuration of the deck.

Title: Developing a Simplified Method for Predicting Deflection in Steel Plate Girder under Non-Composite Dead Load for Stage-Constructed Bridges
Funding Agency: North Carolina Department of Transportation
Funding Amount: \$149,000
Dates: July 2003 - December 2005
PI: E. Sumner
Co-PI: S. Rizkalla
Status: Awarded and completed
Abstract: This research program is designed to develop an empirically based method to predict the non-composite deflection of steel plate girders in staged-constructed bridges. The effects of bridge skew, girder length, girder spacing, cross-frame stiffness, in-place deck slab thickness, and composite action on a portion of the girder length will be included in the method. The empirically based method will utilize a series of simple modifiers to adjust the traditionally predicted single girder line deflection to the expected staged-construction deflection. The formulation of the simplified method will require a combination of field measured data and extensive three-dimensional analytical simulation.

Title: Wireless Sensor Networks for Structural Health Monitoring of Bridges
Granting Agency: National Science Foundation
Funding Amount: \$50,000
Dates: July 2003 – December 2005
PI: S. Rizkalla
Status: Awarded and completed
Abstract: The research project deals with structural health monitoring of bridges and civil engineering buildings. The first part addresses sensing/data interpretation, the second part addresses the transfer of data from sensors to the location interpretation occurs. The proposal ties together the expertise of the two NSF-I/UCRC Centers at NC State, RB²C in the Department of Civil Engineering and CACC in the Electrical and Computer Engineering Department. The specific issue is the wireless communication of data for structural health monitoring of civil engineering structures.

Title: Value Engineering and Cost Effectiveness of Various FRP Repair Systems
Granting Agency: North Carolina Department of Transportation
Funding Amount: \$154,243
Dates: July 2003 - June 2005
PI: S. Rizkalla
Status: Awarded and completed
Abstract: This research program is designed to investigate the feasibility of using the most efficient externally bonded FRP repair/strengthening system to rehabilitate

prestressed concrete bridge girders damaged due to accident or collision impact causing loss of prestressing and/or spalling of concrete. The research will investigate the efficiency and cost-effectiveness of externally bonded FRP sheet and strip repair/strengthening systems using prestressed channel beams supplied by NCDOT from existing bridges. It will also investigate the use of Near-Surface-Mounted FRP bars and strips to strengthen the same prestressed channel beams along with examining the flexural behavior under the effect of static and fatigue loadings.

Title: Macromolecular Science and Infrastructure Engineering
(Joint with Virginia Tech)
Granting Agency: National Science Foundation
Funding Amount: \$89,215/year (part of IGERT to Virginia Tech)
Dates: September 2001 - August 2005
Co-PI with Virginia Tech
Status: Awarded and completed
Abstract: The Integrated Graduate Education Research and Traineeship (IGERT) Program provides the opportunity for our graduate students to conduct an interdisciplinary research in Macromolecular Science and Infrastructure Engineering, focused on polymeric adhesives and composites in civil engineering structures. The program allows collaboration between the following seven departments: Chemistry, Engineering Science, Civil Engineering, Electrical Engineering, Computer Engineering, Wood Science and Marketing from four colleges, including NC State University. It will include exchange of students and faculty members, as well as development of new courses in the field of infrastructures.

Title: GFRP Structural Material Testing for Wraps used for Highway Bridge
Granting Agency: North Carolina Department of Transportation
Funding Amount: \$7,000
Dates: January 2004 - April 2004
PI: S. Rizkalla
Status: Awarded and completed
Abstract: The work involved evaluation of the glass fiber reinforced polymer (GFRP) materials used for wraps of bridge piers on westbound US-64 over the Haw River in Chatham County, North Carolina. Tests were performed using five structural material samples (witness panels) produced during the construction.

Title: Corrosion Inhibitors for Concrete Bridges
Granting Agency: NC Department of Transportation
Funding Amount: \$170,681
Dates: July 2002 – December 2004
PI: A. Mirmiran
Co-PI: S. Rizkalla
Status: Awarded and completed
Abstract: The research project evaluates the effectiveness of commercially available corrosion inhibitors for remediation purposes in delaying, slowing, stopping or reversing the corrosion process in existing concrete under laboratory conditions of wet-dry cycles and salt water spray, simulating severe field conditions. The results will be used to compare the effectiveness of corrosion inhibitors at different levels of chloride contamination and establish the threshold beyond which surface application does not provide any significant improvement. The project will develop guidelines and specifications for surface treatment using corrosion inhibitors and recommend means to incorporate surface treatment scheduling in bridge inspection and maintenance plans for NCDOT.

Title: Under Construction Bridge Deflection Measurements of Eno River
Granting Agency: North Carolina Department of Transportation
Funding Amount: \$7,000
Dates: February 2003 - April 2003
PI: S. Rizkalla
Co-PI: E. Sumner
Status: Awarded and completed
Abstract: NCDOT Structure Design Unit is currently investigating alternate means to accurately predict girder deflection due to the casting of the concrete decks. The accurate prediction of this deflection becomes increasingly important as the high performance steel and the associated long span structures increases. In addition, the prediction of deflection for adjacent girders of two different stages of construction is important to ensure that the adjacent cast results in an even deck and that the ultimate deck thickness matches that used in the design of the girders.

The primary objective of the project is to provide NCDOT a field measurement of the steel girders of the Eno River Bridge in Durham, NC. The measurement will be compared to the predicted deflections.

Title: Selection of Structural Adhesives for Strengthening Steel Structures
Granting Agency: Reichold
Funding Amount: \$50,000
Dates: July 2002 - June 2003
PI: S. Rizkalla
Status: Awarded and completed
Abstract: The research focused on the selection of the most appropriate adhesive for the use of high modulus carbon fiber polymer material to steel surfaces. The research also examined the various techniques which can be used to speed the erection and curing of these adhesives under severe environmental conditions.

Title: Performance of Sandwich Panels Under Axial, Flexural and Shear Loads
Granting Agency: Bally Refrigerated Box, Inc.
Funding Amount: \$56,925
Dates: 2002
PI: S. Rizkalla
Co-PI: R. Nunez
Status: Awarded and completed
Abstract: The objective of this investigation is to evaluate the structural performance of Bally's sandwich panels in accordance with ICBO AC04 "Acceptance Criteria for Sandwich Panels." The panels are examined under the effect of axial compression load, transverse load and racking shear loads. End condition and panel sizes are randomly selected for typical products line.

Title: Mechanical Properties of MMFX Steel Rebars
Granting Agency: MMFX Steel Corporation of America
Funding Amount: \$21,000
Dates: 2002
PI: S. Rizkalla
Status: Awarded and completed
Abstract: The project provides the fundamental mechanical material properties of the new high performance steel reinforcing bars commercially known as MMFX. The investigation included the tensile strength, shear strength, bend effect, bond strength and behavior of the bars in concrete compression members. The work extended to examine the flexural behavior including deflection, cracking and mode failure. Large-scale specimens are currently used to examine the development length for different sizes of MMFX bars.

Title: Shear Strength of FRP Anchors
Granting Agency: Fyfe Co., LLC
Funding Amount: \$3,170
Dates: 2002
PI: S. Rizkalla
Status: Awarded and completed
Abstract: The project evaluates the strength and mode of failure of typical joints for aluminum trusses used for highway sign structures and strengthened by carbon fiber-reinforced polymer materials (CFRP). Typical joints have been subjected to membrane tension forces to examine the behavior. The CFRP is wrapped to correct the diagonal member with the bottom chord members. This phase includes static loading conditions only.

Title: Concept Paper for Establishment of Industry/University Cooperative Research Center, Repair of Buildings and Bridges with Composites (RB²C)
Granting Agency: National Science Foundation
Funding Amount: \$10,000/year
Dates: April 2001 - July 2002
PI: S. Rizkalla
Status: Awarded and completed
Abstract: The “Repair of Bridges and Buildings Center” (RB²C) is an industry/university/government cooperative research center sponsored jointly by North Carolina State University, the University of Missouri - Rolla, the National Science Foundation, and participating industrial corporations and government agencies.

Faculty members from the Department of Civil Engineering are involved in unique research programs with industrial relevance. Center programs provide research assistants (MS and PhD candidates) with pertinent research topics, the means for carrying out their research, and valuable career-oriented experiences.

Current research in RB²C is focused in what areas?

- Strengthening Concrete Structures and Bridges with Composites.
 - Innovative composite structural system for Bridge decks.
 - Performance of different Adhesives for Composite Structures.
 - Strengthening Steel Towers and Bridges with Composite.
-

Title: Structural Behavior of Precast Concrete Wall Panels
Granting Agency: Superior Walls of America, Ltd.
Funding Amount: \$20,251
Dates: August 2001 - April 2002
PI: R. Nunez

Co-PI: S. Rizkalla
Status: Awarded and completed
Abstract: The experimental program, conducted at the Constructed Facilities Laboratory (CFL) was designed to examine the structural behavior of precast concrete wall panels produced by Superior Walls of America. The panels were examined under the effect of axial compression loading conditions and racking shear load forces simulating wind loads on the structures. Behavior during and equivalent loading conditions, as well as the mode of failure, were examined and reported. Based on the test results, the company modified some of the structural design and connection details of the wall system.

Title: Performance of Laminated and Unlaminated Glass under Impact Load
Granting Agency: Clear Defense Sports & Athletics
Funding Amount: \$11,140
Dates: 2001
PI: S. Rizkalla
Co-PI: R. Nunez
Status: Awarded and completed
Abstract: The project examined the behavior of 1/2 and 5/8" polymer laminated glass used in hockey arenas as security glazing against the impact of a flying puck or high-speed hockey player, instead of the traditional glass currently used. Typical panel sizes have been tested under static and impact load using drop weight approach. The contact surface was a typical puck and loaded with the appropriate weight and speed through selected heights.

Title: Performance of GFRP Deck
Granting Agency: Martin Marietta Materials
Funding Amount: \$11,132
Dates: 2001
PI: S. Rizkalla
Status: Awarded and completed
Abstract: This project examined the structural behavior of new glass fiber reinforced polymer (GFRP) for highway bridge decks produced by Martin Marietta to overcome the serious durability issues of reinforced concrete decks, commonly used. This project provides structural testing of the new deck using AASHTO specifications to simulate truck loads.

Title: Repair of Aluminum Joint with GFRP and CFRP
Granting Agency: Fyfe Co., LLC
Funding Amount: \$4,820
Dates: 2001
PI: S. Rizkalla
Status: Awarded and completed
Abstract: An innovative technique is introduced to repair the joints of aluminum trusses with GFRP and CFRP. In this project, damage of the welded joint is simulated by grinding the weld before applying a number of FRP layers to the joint in both the longitudinal and circumferential directions of the members. The diagonal members are tested in tension to evaluate the strength of the repaired joint.

Research Grants (Canada):

<u>Sponsor</u>	<u>Type</u>	<u>Granted</u>	<u>Length</u>	<u>Amount/Year</u>
NCE - ISIS Canada (not including matching funds from industry)	Grant	2000	1 year	2,651,000
NSERC Operating Grant	Grant	1999	4 years	42,000
Technology Partnerships Canada Advisory Board	Travel Grant	1999	1 year	7,000
Manitoba Department of Highways & Transportation	Contract	1999	1 year	35,000
Agri-Food Research & Development Initiative	Contract	1999	2 years	40,000
Triple S Community Futures Development Corp.	Contract	1999	2 years	40,000
NCE - ISIS Canada (not including matching funds from industry)	Grant	1999	1 year	2,651,000
Technology Partnerships Canada Advisory Board	Grant	1998	1 year	8,000
NCE - ISIS Canada (not including matching funds from industry)	Grant	1998	1 year	2,651,000
Manitoba Department of Highways & Transportation	Grant	1998	1 year	35,000
Technology Partnerships Canada Advisory Board	Travel Grant	1997	1 year	9,000
Manitoba Department of Highways & Transportation	Grant	1997	1 year	35,000
City of Calgary	Grant	1997	1 year	50,000
NCE - ISIS Canada (not including matching funds from industry)	Grant	1997	1 year	2,651,000
Technology Partnerships Canada Advisory Board	Travel Grant	1996	1 year	9,000
City of Winnipeg	Grant	1996	1 year	60,000
AECL	Contract	1996	1 year	33,000
AECL	Contract	1996	1 year	65,000
NCE - ISIS Canada (not including matching funds from industry)	Grant	1996	1 year	2,651,000
AECL	Grant	1996	3 years	101,400
NCE - ISIS Canada (not including matching funds from industry)	Grant	1995	1 year	1,400,000
Manitoba Department of Highways & Transportation	Contract	1995	1 year	35,000
NSERC Operating Grant	Grant	1995	4 years	134,400
NSERC Collaborative Project (Joint with University of Toronto and TUNS)	Grant	1995	3 years	204,000
Manitoba Department of Highways and Transportation	Contract	1994	1 year	64,000
Flax Council of Canada (Joint with University of Hong Kong)	Contract	1993	3 years	430,000
Con-Force (Alberta) (Joint with Univ. of Toronto)	Contract	1993	1 year	166,000
University of Manitoba (Joint with D. Polyzois and G. Morris)	Grant	1993	1 year	13,000
NSERC - CRDA (Joint with Univ. of Sherbrooke)	Grant	1993	3 years	285,000
Manitoba Hydro (Joint w/D. Polyzois and G. Morris)	Grant	1992	2 years	197,785
Manitoba Department of Highways and Transportation	Contract	1993	1 year	28,000
NRC-IRAP (Con-Force)	Grant	1992	6 months	10,782
NRC-IRAP (Supercrete)	Grant	1992	6 months	10,782

NSERC	Operating	1992	3 years	108,000
NSERC	Infrastructure	1992	3 years	105,000
Transport Institution	Contract	1991	1 year	35,000
Transport Institution	Operating	1990	1 year	50,000
Manitoba Hydro	Equipment	1990		33,000
University of Manitoba	Equipment	1990		65,000
Prestressed Concrete Institute (US Funds)	Grant	1989	1 year	8,000
NRC - IRAP	Grant	1989	1 year	32,000
NSERC	Operating	1989	3 years	84,000
University of Manitoba Research & Development Fund	Operating	1989	6 months	14,000
Manitoba Hydro	Operating	1989	1 year	14,960
The Flax Council of Canada	Contract	1989	3 years	128,820
NSERC	Equipment	1989		750,000
NSERC	Travel	1988	2 months	3,410
Promotion of Science	Travel	1988	2 months	7,400
Canadian National Railway	Contract	1988	18 months	80,000
Manitoba Hydro	Operating	1988	1 year	15,280
Manitoba Hydro	Operating	1988	1 year	16,280
Barkman Concrete	Contract	1987	6 months	6,160
Con-Force Ltd.	Contract	1987	6 months	12,320
Manitoba Hydro	Operating	1987	1 year	12,040
Transport Institute	Operating	1987	1 year	7,200
Con-Force Ltd.	Contract	1986	6 months	6,160
Manitoba Hydro	Operating	1986	1 year	10,000
NSERC	Operating	1986	3 years	51,000
Transport Institute	Operating	1986	1 year	8,000
Centre of Transportation	Operating	1985	1 year	4,000
C.M.H.C.	Operating	1984	9 months	19,440
Work Study Program	Operating	1984	6 months	2,671
Transport Canada	Operating	1984	6 months	15,000
Canadian National	Contract	1984	3 months	5,375
City of Winnipeg	Contract	1984	5 months	48,000
Sperry Univac Co.	Contract	1983	3 months	12,000
UMSU/Federal Government	Operating	1983	6 months	2,352
NSERC	Operating	1983	3 years	45,000
Centre of Transportation	Operating	1983	1 year	7,000
NSERC International Scientific Exchange Award	Operating	1982	1 year	4,800
U of M Research Committee	Operating	1982	1 year	2,200
NSERC	Equipment	1981		130,000
U of M Research Committee	Operating	1980	1 year	1,250
NSERC	Operating	1979	3 years	29,000
U of M Research Committee	Operating	1978	1 year	2,000

MASTER'S AND DOCTORAL THESES DIRECTED

Theses Directed (Chairman):

1. **Kazem, Hamid, 2016, “*Shear Strengthening of Steel Bridge Girders Using Small-diameter CFRP Strands,*” Ph.D. Thesis, North Carolina State University.**
2. Khalaf Alla, Omar, 2015, *Design and Behavior of ledges for Short Span L-shaped Spandrel Beams*, M.S. Thesis, North Carolina State University.
3. Botros, Amir Wagih, 2015, *Behavior and Design of Dapped Ends of Prestressed Concrete Thin-Stemmed Members*, Ph.D. Thesis, North Carolina State University.
4. Guaderrama, Lucas, 2014, *Strengthening of Steel Web plates using CFRP*, M.S. Thesis, North Carolina State University.
5. Miller, Bryant Leroy Hensby, 2014, *Synergistic effect Loading and Environmental Conditions on the Degradation of Pultruded Glass Fiber-Reinforced Polymers*, M.S. Thesis, North Carolina State University.
6. Farshchi Tabrizi, Salar, 2013, *Strengthening of Steel Structures with Carbon Fiber Reinforced Polymer (CFRP)*, M.S. Thesis, North Carolina State University.
7. Nafadi, Mohamed, 2013, *Analytical Modeling and Behavior of Ledges of L-shaped Beams*, M.S. Thesis, North Carolina State University.
8. Soriano, Jonathan, 2012, *GFRP Shear Grid for Precast, Prestressed Concrete Sandwich Wall Panels*, M.S. Thesis, North Carolina State University.
9. Lunn, Dillon, 2012, *Behavior and Modeling of Infill Masonry Walls Strengthened with FRP using Various End Anchorage*, Ph.D. Thesis, North Carolina State University.
10. Soliman, Judy, 2012, *Behavior of Reinforced Concrete Beams Strengthened with Externally Bonded Fiber/Steel Reinforced Polymers and Grancrete*, Ph.D. Thesis, Ain Shams University, Egypt.
11. Lucier, Greg, 2012, *Development of a Rational Design Methodology for Precast Concrete Slender L-Shaped Spandrel Beams*, Ph.D. Thesis, North Carolina State University.
12. Bunn, William, 2011, *CFRP Grid/Rigid Foam Shear Transfer Mechanism for Precast, Prestressed Concrete Sandwich Wall Panels*, M.S. Thesis, North Carolina State University.
13. Mielke, Benjamin, 2011, *Advanced Fiber Strengthening Systems for Reinforced Concrete Structures*, M.Sc. Thesis, North Carolina State University.

14. Mielke, Brian, 2011, *Effective Carbon Fiber Reinforced Polymer Strengthening System for Reinforced Concrete Structures*, M.Sc. Thesis, North Carolina State University.
15. Mady, M.H.A., 2011, *Seismic Behavior of Exterior Beam-Column Joints Reinforced with FRP Bars and Stirrups*, Ph.D. Thesis, University of Manitoba.
16. Vogel, Hugues M., 2011, *Serviceability of Concrete Beams Reinforced with FRP and Concrete Prisms Prestressed with FRP*. Ph.D. Thesis, University of Manitoba.
17. Storm, Tyler, 2011, *Predicting Camber, Deflection, and Prestress Losses in Prestressed Concrete Members*. MSc Thesis, North Carolina State University.
18. Ragan, David Michael, 2011, *Behavior of Efficient Two-Story Precast Concrete Wall Panels*, MSc Thesis, North Carolina State University.
19. Obregon-Salinas, Adolfo Javier, 2010, *Use of Grancrete as Adhesive for Strengthening Reinforced Concrete Structures*, MSc Thesis, North Carolina State University.
20. Hosny, A., 2010, *Behavior of Concrete Member Containing Lightweight Synthetic Particle*, Ph.D. Thesis, North Carolina State University.
21. Heiser, M. J., 2010, *The Shear Behavior of Reduced Unit Weight Concrete Using Lightweight Synthetic Particle*, M.S. Thesis, North Carolina State University.
22. Mosavi Khandan, A., 2010, *Vibration-Based Damage Detection and Health Monitoring of Bridges*, Ph.D. Thesis, North Carolina State University.
23. Hariharan, V., 2009, *Behavior of Precast Compact L-Shaped Spandrel Beams*, M.S. Thesis, North Carolina State University.
24. Taylor, E., 2009, *Two-Way Behavior and Fatigue Performance of 3-D GFRP Sandwich Panels*, M.S. Thesis, North Carolina State University.
25. Lunn, D., 2009, *Behavior of Infill Masonry Walls Strengthened with FRP Materials*, M.S. Thesis, North Carolina State University.
26. Stanford, K., 2008, *Strengthening of Steel Structures with High Modulus Carbon Fiber Reinforced Polymers Materials*, M.S. Thesis, North Carolina State University.
27. Montesdeoca, O., 2008, *Basic Characteristics of Grancrete HFR*, M.S. Thesis, North Carolina State University.
28. Dawood, M., 2008 *Bond Characteristics and Environmental Durability of CFRP Materials for Strengthening Steel Bridges and Structures*, Ph.D. Thesis, North Carolina State University.

29. Walter, C., 2008, *Behavior of Slender, Precast L-Shaped Spandrel Beams*, M.S. Thesis, North Carolina State University.
30. Munikrishna, A., 2008, *Shear Behavior of Concrete Beams Reinforced with High Performance Steel Shear Reinforcement*, M.S. Thesis, North Carolina State University.
31. Frankl, B., 2008, *Structural Behavior of Precast Prestressed Concrete Sandwich Panels Reinforced with CFRP Grid*, M.S. Thesis, North Carolina State University.
32. Mantawy, A., 2008 *Behavior of High-Strength Steel as Shear Reinforcement for Concrete Beams*, Ph.D. Thesis Ain Shams University, Cairo, Egypt.
33. Reham M. El Tahawy, 2008, *Flexural Behavior of Concrete Beams Reinforced With High Strength and Corrosive Resistant Steel*, M.S. Thesis Ain Shams University, Cairo, Egypt.
34. Soliman, J., 2007 *Bond Characteristics of High Strength Steel Reinforcements for Concrete Structures*, M. S. Thesis, Ain Shams University, Cairo, Egypt.
35. Sumpter, Matthew, 2007, *Behavior of High Performance Steel as Shear Reinforcement for Concrete Beams*, M.S. Thesis, North Carolina State University.
36. Seliem, Hatem, 2007, *Behavior of Concrete Bridges Reinforced with High-Performance Steel Reinforcing Bars*, Ph.D. Thesis, North Carolina State University.
37. Hosny, Amr, 2007, *Bond Behavior of High Performance Reinforcing Bars for Concrete Structures*, M.S. Thesis, North Carolina State University.
38. Kim, Sungjoong, 2007, *Behavior of High-Strength Concrete Columns*, Ph.D. Thesis, North Carolina State University.
39. Patrick, Jason, 2007, *Fundamental Characteristics of 3-D GFRP Pultruded Sandwich Panels*, M.S. Thesis, North Carolina State University.
40. Wu, Zhenhua, 2006, *Behavior of High-Strength Concrete Members under Pure Flexure and Axial-Flexural Loading*, Ph.D. Thesis, North Carolina State University.
41. Choi, Wonchang, 2006, *Flexural Behavior of Prestressed Girder with High Strength Concrete*, Ph.D. Thesis, North Carolina State University.
42. Mertol, Halit Cenan, 2006, *Behavior of High-Strength Concrete Members Subjected to Combined Flexure and Axial Compression Loadings*, Ph.D. Thesis, North Carolina State University.
43. Vickery, John D., 2006, *Fundamental Properties and Bond Characteristics of Chlorinated Polyvinyl Chloride (CPVC) and SS340 Adhesive for Evaluation of Steel Tank Linings*, M.S. Thesis, North Carolina State University.

44. Miller, A., 2006, *Repair of Impact-Damaged Prestressed Concrete Bridge Girders Using Carbon Fiber Reinforced Polymer (CFRP) Materials*, M.S. Thesis, North Carolina State University.
45. Rosenboom, Owen, 2006, *Behavior of FRP Repair/Strengthening Systems for Prestressed Concrete*, Ph.D. Thesis, North Carolina State University.
46. Lucier, Gregory, 2006, *Evaluation of MMFX Steel for Concrete Bridge Decks*, M.S. Thesis, North Carolina State University.
47. Johnson, Charles, 2006, *Fabrication and Behavior of 3-D Orthogonal Woven FRP/Concrete Bridge Deck*, M.S. Thesis, North Carolina State University.
48. Mohamed, Tarek Said, 2006, *Fabrication and Behavior of Three-Dimensionally Woven Glass Fiber Reinforced Polymeric Bridge Deck*, M.S. Thesis, North Carolina State University.
49. Reis, Engin, 2005, *Characteristics of Innovative 3-D FRP Sandwich Panels*, Ph.D. Thesis, North Carolina State University.
50. Nelson, James Lee, 2005, *Behavior of GFRP Bridge Decks for Highway Bridges*, M.S. Thesis, North Carolina State University.
51. Dawood, Mina, 2005, *Fundamental Behavior of Steel-Concrete Composite Beams Strengthened with High Modulus Carbon Fiber Reinforced Polymer (CFRP) Materials*, M.S. Thesis, North Carolina State University.
52. Schnerch, 2005, *Strengthening of Structures with High Modulus Carbon Fiber Reinforced Polymer (CFRP) Materials*, Ph.D. Thesis, North Carolina State University.
53. Smith, Glen, 2005, *Bond Characteristics and Qualifications of Adhesives for Marine Applications and Steel Pipe Repair*, M.S. Thesis, North Carolina State University.
54. Lanier, Bryan, 2005, *Study in the Improvement in Strength and Stiffness Capacity of Steel Multi-Sided Monopole Towers Utilizing Carbon Fiber Reinforced Polymers as a Retrofitting Mechanism*, M.S. Thesis, North Carolina State University.
55. Norton, Taylor, 2004, *3D Orthogonal Woven Glass Fiber Reinforced Polymeric Bridge Deck: Fabrication and Experimental Investigation*, M.S. Thesis, North Carolina State University.
56. Cook, Anna, 2004, *Evaluation of the Effectiveness of Surface Applied Corrosion Inhibitors for Concrete Bridges*, M.S. Thesis, North Carolina State University.
57. Flisak, Bart, 2004, *Concrete Filled Fiber Reinforced Tubes for Structural Members*, M.Sc. Thesis, University of Manitoba, Canada.

58. Yotakhong, Purk, 2003, *Flexural Performance of MMFX Reinforcing Rebars in Concrete Structures*, M.S. Thesis, North Carolina State University.
59. El-Agroudy, Hossam, 2003, *Bond Characteristics of Micro-Composite Multi-Structural Formable Steel Used in Reinforced Concrete Structures*, M.S. Thesis, North Carolina State University.
60. Foud, Al-Douba, 2003, *Elasto-Plastic Analysis of Space Frames*, Ph.D. Thesis, Alexandria University, Egypt.
61. Hassan, Tarek, 2002, *Flexural Performance and Bond Characteristics of FRP Strengthening Techniques for Concrete*, Ph.D. Thesis, University of Manitoba.
62. Mahmoud, Mohamed, 2002, *Behavior of Reinforced Concrete Columns Confined by FRP Under Eccentric Loads*, Ph.D. Thesis, Tanta University, Egypt.
63. Williams, Brea, 2000, *The Development of GFRP Bridge Deck Modules*, M.Sc. Thesis, University of Manitoba.
64. Fam, Amir, 2000, *Concrete-filled FRP Tubes for Axial and Flexural Structural Members*, Ph.D. Thesis, University of Manitoba.
65. Becque, Jurgen, 2000, *Analytical Modeling of Concrete Columns Confined by FRP*, M.Sc. Thesis, University of Manitoba.
66. Gentile, Chris, 2000, *Flexural Strengthening of Timber Bridge Beams Using FRP*, M.Sc. Thesis, University of Manitoba.
67. Morphy, Ryan, 1999, *Behavior of Fiber Reinforced Polymer (FRP) Stirrups as Shear Reinforcement for Concrete Structures*, M.Sc. Thesis, University of Manitoba.
68. Hutchinson, Robin, 1999, *The Use of Externally Bonded CFRP Sheets for Shear Strengthening of I-Shaped Prestressed Concrete Bridge Girders*, Ph.D. Thesis, University of Manitoba.
69. Eddie, Darren, 1999, *Fiber Reinforced Polymer Dowels for Concrete Pavements*, M.Sc. Thesis, University of Manitoba.
70. Jawara, Alieu, 1999, *Low Heat High Performance Concrete for Glass Fiber Reinforced Polymer Reinforcement*, M.Sc. Thesis, University of Manitoba.
71. Shehata, Emile, 1999, *Fiber Reinforced Polymer (FRP) for Shear Reinforcement of Concrete Structures*, Ph.D. Thesis, University of Manitoba.
72. Hassan, Tarek, 1999, *Behavior of Concrete Bridge Decks Reinforced by FRP*, M.Sc. Thesis, University of Manitoba.

73. Louka, Haney, 1999, *Behavior of a Hybrid Reinforced Concrete Bridge Deck*, M.Sc. Thesis, University of Manitoba.
74. Mahmoud, Zaki, 1997, *Bond Characteristics of Fiber Reinforced Polymers Prestressing Reinforcement*, Ph.D. Thesis, University of Alexandria/University of Manitoba.
75. Grief, Susan, 1996, *GFRP Dowel Bars for Concrete Pavement*, M.Sc. Thesis, University of Manitoba.
76. Michaluk, Craig, 1996, *Flexural Behavior of One-way Concrete Slabs Reinforced by GFRP Reinforcements*, M.Sc. Thesis, University of Manitoba.
77. Farahmand, Fariborz, 1996, *Shear Behavior of Concrete Beams Reinforced with Glass Fiber Reinforced Plastic*, M.Sc. Thesis, University of Manitoba.
78. Domenico, Nolan, 1995, *Bond Properties of CFCC Prestressing Strands in Pretensioned Concrete Beams*, M.Sc. Thesis, University of Manitoba.
79. Abdelrahman, Amr. A., 1995, *Serviceability of Concrete Beams Prestressed by Fiber Reinforced Plastic Tendons*, Ph.D. Thesis, University of Manitoba.
80. Fam, Amir, 1995, *Carbon Fiber Reinforced Plastic Prestressing and Shear Reinforcements for Concrete Highway Bridges*, M.Sc. Thesis, University of Manitoba.
81. Hassan, N.K., 1995, *Multi-bolted Connections for Fiber Reinforced Plastic Structural Members*, Ph.D. Thesis, University of Ain Shams, Egypt.
82. Xie, Y., 1995, *Effect of Canadian Linseed-Oil Based Concrete Preservatives on the Durability of Concrete in Hong Kong*, M.Sc. Thesis, University of Manitoba.
83. West, J., 1994, *Behavior of Horizontal Connections for Precast Concrete Load-Bearing Shear Wall Panels Subject to Reversed Cyclic Shear Loading*, M.Sc. Thesis, University of Manitoba.
84. Soudki, K., 1994, *Behavior of Horizontal Connections for Precast Concrete Load-Bearing Shear Wall Panels Subjected to Large Reversed Cyclic Deformations*, Ph.D. Thesis, University of Manitoba.
85. Wright, J., 1992, *A Field and Laboratory Evaluation of Linseed Oil as a Concrete Sealer*, M.Sc. Thesis, University of Manitoba.
86. Rosner, C., 1992, *Single-Bolted Connections for Orthotropic Fiber Reinforced Composite Structural Members*, M.Sc. Thesis, University of Manitoba.
87. Uppal, S., 1991, *Dynamic Response of Timber Railroad Bridges*, Ph.D. Thesis, University of Manitoba.

88. Savic, I., 1991, *Buckling Behavior of Wooden Poles*, M.Sc. Thesis, University of Manitoba.
89. Hutchinson, R., 1990, *Post Tensioned Horizontal Connections Typically Used for Precast Load-bearing Shear Wall Panels*, M.Sc. Thesis, University of Manitoba.
90. Wells, J., 1990, *Deleterious Expansion of Cement Paste and Concrete*, M.Sc. Thesis, University of Manitoba.
91. Serrette, Reynaud, 1988, *Multiple Shear Key Connections for Load-bearing Shear Wall Panels*, M.Sc. Thesis, University of Manitoba.
92. Pincheira, Jose, 1988, *Welded Wire Fabric as Shear Reinforcement in Concrete T-Beams Subjected to Cyclic Loading*, M.Sc. Thesis, University of Manitoba.
93. Xuan, X., 1987, *Effectiveness of Welded Wire Fabric as Shear Reinforcement in Pretensioned Prestressed Concrete*, M.Sc. Thesis, University of Manitoba.
94. Foerster, Harry, 1987, *Behavior of the Connection Typically used in Precast Concrete Shear Walls*, M.Sc. Thesis, University of Manitoba.
95. Ray, A., 1986, *Behavior of Thin Webbed Prestressed Concrete Beams of Low Shear-Span to Depth Ratio with Different Shear Reinforcement Configurations*, M.Sc. Thesis, University of Manitoba.
96. Saadat, F., 1984, *Fundamental Characteristics and Behavior of Reinforced Concrete Bridge Piers Subjected to Reversed Cyclic Loading*, M.Sc. Thesis, University of Manitoba.
97. Hwang, L. S., 1983, *Behavior of Reinforced Concrete in Tension at Post-cracking Range, Vol. I and Vol. II*, M.Sc. Thesis, University of Manitoba.
98. Ben-Omran, H., 1983, *Behavior of Reinforced Concrete Bridge Piers Subjected to Large Deflection Reversals*, M.Sc. Thesis, University of Manitoba.
99. El-Shahawi, M., 1982, *Cracking Behavior of Reinforced Concrete Members Subjected to Tensile Membrane Forces*, M.Sc. Thesis, University of Manitoba.
100. Lau, B. L., 1982, *Leakage of Pressurized Gases Through Cracks in Reinforced Concrete Structures*, M.Sc. Thesis, University of Manitoba.

Theses Advisory Committees (Member) - starting 1997:

1. Christian, Abraham, 2015, *Fibre Reinforced High Strength Concrete with Cellular Steel Sandwich Composite Panel for Blast and Impact Mitigation*, Ph.D. Thesis, National University of Singapore.

2. Hallaji, Milad, 2015, *Monitoring Damage and Unsaturated Moisture Flow in Concrete with Electrical Resistance Tomography*, Ph.D. Thesis, North Carolina State University.
3. Tomlinson, Douglas George, 2015, *Behavior of Partially Composite Precast Concrete Sandwich Panels under Flexural and Axial Loads*, Ph.D. Thesis, Queen's University.
4. Mabry, Nehemiah James, 2015, *Detection of Bond Defects in Carbon Fiber Reinforced Polymer Strengthened Concrete using Pulse Phase Thermography*, Ph.D. Thesis, North Carolina State University.
5. Robin, Khalfat, 2013, *Anchorage Systems in Concrete Structures strengthened with Carbon Fiber Reinforced Polymer Composites*, Ph.D. Thesis, Swinburne University of Technology.
6. Lin, Zhisheng, 2013, *Study on DFD Moment-Resisting Connection for Implementation in HDB Apartment Blocks*, Ph.D. Thesis, National University of Singapore.
7. Aylie, Han, 2013, *Modeling the Stiffness properties of the Aggregate-to-Mortar interfacial transition zone in concrete*, Ph.D. Thesis, Diponegoro University.
8. Hao, Hu, 2011, *Development of a New Constitutive Model for FRP-and-steel-confined Concrete*, M.Sc. Thesis, North Carolina State University.
9. Dawood, N.A., 2010, *Behavior of Steel Reinforced Concrete Panels Subjected to Direct Tension*, Ph.D. Thesis, Memorial University of Newfoundland.
10. Bush, Blake, 2009, *Analytical Evaluation of Concrete Penetration Modeling Techniques*, M.S. Thesis, North Carolina State University.
11. Grimes, Hartley, 2009, *The Longitudinal Shear Behavior of Carbon Fiber Grid Reinforced Concrete Topping*, M.Sc. Thesis, North Carolina State University.
12. Lim, C., 2009, *Low Cycle Fatigue Life Prediction of Four Bolt Extended Unstiffened End Plate Moment Connections*, Ph.D. Thesis, North Carolina State University.
13. Vasquez, Diego, 2008, *Plate-end Debonding of Longitudinal Near-Surface Mounted Fiber Reinforced Polymer Strips on Reinforced Concrete Flexural Members*, M.S. Thesis, North Carolina State University.
14. Ichhaporia, P., 2008, *Composite from Natural Fibers*, Ph.D. Thesis, North Carolina State University.
15. Jiang, G., 2007, *Self Monitoring Fiber Reinforced Polymer*, Ph.D. Thesis, North Carolina State University.

16. Lackey, P., 2006, *An Investigation of Bridge Deck Overhang Falsework Systems Installed onto Modified Bulb Tee Girders*, M.S. Thesis, North Carolina State University.
17. Fawzia, Sabrina, 2007, *Bond Characteristics Between Steel and Carbon Reinforced Polymer Composite*, Ph.D. Thesis, Monash University, Australia.
18. Fisher, Seth, 2006, *Development of a Simplified Procedure to Predict Dead Load Deflections of Skewed and Non-Skewed Steel Plate Girder Bridges*, M.S. Thesis, North Carolina State University.
19. Paoinchantara, Nuttapone, 2005, *Measurement and Simplified Modeling Method of Non-Composite Deflections of Steel Plate Girder Bridges*, M.S. Thesis, North Carolina State University.
20. Logan, Andrew, 2005, *Short-Term Material Properties of High-Strength Concrete*, M.S. Thesis, North Carolina State University.
21. Zhu, Zhenyu, 2004, *Joint Construction and Seismic Performance of Concrete Filled Fiber Reinforced Polymer Tubes*, Ph.D. Thesis, North Carolina State University.
22. Ahmad, Iftexhar, 2004, *Shear Response and Bending Fatigue Behavior of Concrete-Filled Fiber Reinforced Polymer Tubes*, Ph.D. Thesis, North Carolina State University.
23. Whisenhunt, Todd, 2004, *Measurement and Finite Element Modeling of the Non-composite Deflections of Steel Plate Girder Bridges*, M.S. Thesis, North Carolina State University.
24. Bisby, Luke, 2003, *Fire Behavior of Fiber-Reinforced Polymer (FRP) Reinforced or Confined Concrete*, Ph.D. Thesis, Queen's University, Canada.
25. Shao, Yutian, 2003, *Seismic Performance of Concrete-Filled FRP Tubes*, Ph.D. Thesis, North Carolina State University.
26. Wu, Zhenhua, 2003, *Prestressed FRP Tubular Deck System*, M.S., North Carolina State University.
27. Coskun, Hilmi, 2002, *Construction of Simcon Retrofitted Concrete Columns*, Ph.D. Thesis, North Carolina State University.
28. Durham, Adrian, 2002, *Influence of Confinement Plates on the Seismic Performance of Reinforced Clay Brick Masonry Walls*, M.Sc. Thesis, North Carolina State University.
29. Timo, Tikka, 2001, *Second-Order Effects in Structural Concrete Columns and Braced Frames*, Ph.D. Thesis, University of Manitoba.
30. Ibrahim, Sherif, 2000, *Performance Evaluation of Fiber-Reinforced Plastic Poles for Transmission Lines*, Ph.D. Thesis, University of Manitoba.

31. Zou, X. W., 1999, *Short-term and Time-dependent Behavior of Concrete Beams Prestressed with Fiber Reinforced Polymer (FRP) Tendons*, Ph.D. Thesis, The University of New South Wales.
32. Lacroix, E., 1998, *Comparative Study of Strength Design Methods for Rectangular Reinforced Concrete and Composite Steel-Concrete Columns*, M.Sc. Thesis, University of Manitoba.
33. Zlatan, S., 1997, *Non-Linear Structural Analysis for Shear Connected Cavity Walls Subject to Wind Load*, M.Sc. Thesis, University of Manitoba.
34. Marek, R., 1997, *Application of Genetic Algorithms in Control Design for Advanced Static Var Compensator at ac/dc Interconnection*, Ph.D. Thesis, University of Manitoba.
35. Irhouma, A., 1997, *Rehabilitation of Cracked Concrete Dams*, Ph.D. Thesis, University of Manitoba.

Master's of Engineering Projects:

1. Joshi, Dhruv, 2009, *Recent Development of Prestress Losses of Precast Prestressed Concrete Bridge Girders*, MCE Project, North Carolina State University
2. Musiker, Daniel, 2002, *In-Plane Testing of Damaged Masonry Wall with FRP*, MCE Project, North Carolina State University.
3. Bunniran, Thanarat, 2002, *Behavior of Sandwich Panels with Aluminum Faces and Urethane Core*, MCE Project, North Carolina State University.

Undergraduate Theses Supervised - starting 1996:

1. Tan, Hui Hun, 2000, *FRP Stay-in Structural Form*, University of Manitoba.
2. Stoyko, Mike, 1999, *FRP Dowels for Concrete Pavements*, University of Manitoba.
3. Madrid, Carolina, 1999, *Strengthening of Wood Bridges Using FRP*, University of Manitoba.
4. Beaudette, Martin, 1998, *The Performance of the Renderoc Anode in Providing Cathodic Protection for Reinforced Concrete*, University of Manitoba.
5. Flisak, Bart and Horeczy, Grant, 1998, *Fiber Reinforced Polymers for Shear Reinforcement of Concrete Structures*, University of Manitoba.
6. Pantel, Shaun, 1998, *Glass Fiber Reinforced Polymers for Concrete Structures*, University of Manitoba.
7. Liu, Steven and Yum, Bonnie, 1998, *The Performance of Low Heat High Performance Concrete for Concrete Structures*, University of Manitoba.

8. Donald, David, 1997, *Bond Characteristics of Carbon Fiber Sheets Used for Shear Strengthening of Concrete Bridge Girders*, University of Manitoba.
9. Charleson, Kenneth, 1997, *Full Scale Testing of a Bridge Deck Slab Reinforced with CFRP*", University of Manitoba.
10. Burns, Daniel, 1997, *Application of Electrochemical Chloride Extraction to Reinforced Concrete Bridges*, University of Manitoba.
11. Sze, Karen and Foster, Mark, 1997, *Behavior of Bridge Deck Reinforced by CFRP*, University of Manitoba.
12. Adams, Angie, 1996, *Strengthening an Existing Roof Using CFRP Strips*, University of Manitoba.
13. Morphy, Ryan, 1996, *Performance of Carbon Fiber Reinforced Plastic Stirrups*, University of Manitoba.
14. Klassen, David and Mizak, Derek, 1996, *FRP for the 21st Century*, University of Manitoba.

IV. EXTENSION AND PUBLIC SERVICE

A. PUBLIC SERVICE

Board Member, A.A. Rophael and St. John Church	2012 - present
Member, Raleigh Rotary Club	2005 - present
Executive Committee, St. Mary's Coptic Orthodox Church in Raleigh	2005 - 2009
Member of the Board, Raleigh Rotary Club	2006 - 2008
Member, Winnipeg Rotary Club	1987 - 2000
Director, Winnipeg Rotary Club	1994 - 1995
Vice-President, St. Mark's Coptic Orthodox Church	1992 - 1995
Executive Committee, St. George Romanian Orthodox Church	1978 - 1995
Technical Chairperson, Formettes Rythmic Gymnastics Club	1991 - 1992
Chairperson, Scoring of Western Canada Games	July 1990
President, Formettes Rythmic Gymnastics Club	1986 - 1990
Judge, Great Northern Concrete Toboggan Race	March 1982
Manitoba School Scientific Symposium	May 1981
Manitoba High School Students Curricular Topic Day	May 1979

V. OTHER CONTRIBUTIONS

A. UNIVERSITY COMMITTEE ASSIGNMENTS AND SERVICES

1. University:

North Carolina State University

NCSU Campus Faculty Advisor, IAESTE United States	2009-2011
Member, University Standing Committee on the Evaluation of Teaching	2004-2011
Member, Integrated Advanced Transportation Research Committee	2004-2006
Member, Committee to Review Distinguished University Professor Candidate	2004-2006

University of Manitoba

President, Network of Centres of Excellence on Intelligent Sensing of Innovative Structures	1995 - 2000
Member, Winnipeg Rh Institute Foundation Medal Selection Committee	1997 - 1998
Member, Ad Hoc Committee on Intellectual Property	1994 - 1997
Member, Board of Graduate Studies Appeal Panel	1994 - 1995
Member, NSERC International Fellowship	1989 - 1995
Member, Advisory Committee, Institute of Industrial Mathematical Science	1993 - 1994
Presidential Advisory Committee on the Selection of the Dean of Agriculture	1993 - 1994
Chairman, Ad hoc Committee, Membership in the Faculty of Graduate Studies	1993 - 1994
Research Liaison Officer	1992 - 1994

Member, Board of Graduate Studies	1992 - 1994
Member, Graduate Course and Regulations Approval Committee	1992 - 1994
Member, Faculty Council of Graduate Studies	1992 - 1994
Member, Research Grants Committee, University of Manitoba	1991 - 1994
Advisory Committee on the Appointment of a Head of the Department of Civil Engineering	1990 - 1991
Presidential Advisory Committee on the Appointment of a Dean, Faculty of Engineering	1988 - 1989

2. College:

North Carolina State University

Chair, Nomination Committee – Candidate for “Distinguished University Professor” in Civil, Construction, and Environmental Engineering	2012
Member, Nomination Committee – Candidate for “Jimmy Clarke Distinguished Professorship” in Civil Engineering	2010
Member, Nomination Committee – Candidate for “Edward I. Weisinger Distinguished Professorship” in Civil Engineering	2008
Judge, The 13th Annual NC State University Undergraduate Research Symposium	2004
Advisor, MGE Summer Research Experience (SRE) Orientation organized by Graduate Schools	2003
Chair, Search Committee for Duncan Chair Professor, Mechanical Engineering	2002 - 2003
Member, Search Committee for Duncan Chair Professor, Mechanical Engineering	2001 - 2002

Faculty of Engineering (University of Manitoba)

Member, Nomination Committee for Glenn E. Futrell, Distinguished Professorship in Civil, Construction and Environmental Engineering	2015
Chair, Nomination Committee for E. I. Clancy, Distinguished Professor	2015
Chair, Nomination Committee for Jimmy D. Clark, Distinguished University Professor of Civil, Construction and Environmental Engineering	2015
Member, Engineering Affiliates Program	1990 - 2000
Member, Selection Committee for Department Head, Civil and Geological Engineering	1998
Member, ITD Internal Advisory Committee	1989 - 1995
Chairman, Tenure Committee, Faculty of Engineering	1992 - 1994
Chairman, Promotion Committee, Faculty of Engineering	1992 - 1994
Chairman, Faculty of Engineering Graduate Studies Committee	1992 - 1994
Chairman, Facilities Committee, Faculty of Engineering	1991 - 1994
Member, Promotion Committee for the Faculty of Engineering	1989 - 1992
Member, Engineering Awareness of Elementary School	1989 - 1992
Vice Chairman, Dean's Strategic Planning Committee	1990 - 1991
Scholarships, Bursaries and Awards, Standing Committee, Faculty of Engineering	1987 - 1990
Fort Garry School Division Visit to Encourage Awareness of Science and Technology	June 1989
Engineering Homecoming Committee	1988
Faculty of Engineering Graduate Committee	1983 - 1987
Academic Staff Selection Committee, Electrical Engineering Department	1984 - 1985
Faculty Representative on the APEM Liaison Committee	1980 - 1982

3. Department:

Department of Civil, Construction and Environmental Engineering (North Carolina State University)

Member, Honor and Awards Committee	2011 - present
Member ABET Committee	2002 - present
Established and organized Paul Zia Distinguished Lecture Series	2002 - present
Member, Tenure and Promotion Committee	2006 - 2011
Member, Honor and Awards Committee	2001 - 2006
Chair, Honor and Awards Committee	2005 - 2006
Chair, Selection Committee for SEM Faculty Position	2004 - 2005
Chair, Selection Committee for SEM Faculty Position	2002 - 2003
Chair, Selection Committee for SEM Faculty Position	2001 - 2002
Member, ABET Committee, Civil Engineering Department	2001 - 2002

Department of Civil and Geological Engineering (University of Manitoba)

Postgraduate and Research Committee	1999 - 2000
Graduate Studies Committee	1987 - 2000
Academic Staff Selection Committee for Structural Engineering Position	1998
Search Committee for Transportation/Materials Position	1997 - 1998
Departmental Graduate Committee	1996 - 1998
Director, Structural/Construction Research and Development Facility	1989 - 1995
Curriculum Committee	1991 - 1992
Academic Staff Selection Committee	1990 - 1991
Curriculum Committee	1985 - 1990
Computer Committee	1985 - 1990
Chairman, Structures Division	1981 - 1989
Co-op Program Committee	1986 - 1988
Academic Staff Selection Committee	1985 - 1987
Department Representative on the Faculty Council of Graduate Studies	1982 - 1987
Chairman, Graduate Studies Committee	1981 - 1987
Technical Support Staff Committee	1980 - 1982
Post-grad and Research Committee	1979 - 1982
Coordinator of the Civil Engineering Seminar Series	1979 - 1982
Selection Committee for Headship	1980 - 1981

B. PROFESSIONAL ACTIVITIES

Director, NSF – I/UCRC, Center for Integration of Composite into Infrastructure (CICI)	2009 - present
Director, NSF – I/UCRC, Repair of Building and Bridges with Composite (RB2C)	2002 – 2009
Direcor, Construction Facility Laboratory, North Carolina State University	2000 – present
President, ISIS Canada, Networks of Centers of Excellence	1995 – 2000
Vice President, ACMBS Network of Canada	1993 – 2000
Director, American Concrete Institute, Manitoba Chapter	1990 – 1993
Vice-President, Prairie Region, Canadian Society for Civil Engineering	1989 – 1991

Technical Committee Memberships:

Member, PCI Technical Activities Committee	2016 - present
Member, ACI 318G Committee	2015 - 2016
Member, ACMA’s Communications Committee	2012 - 2016
Member, ASCE Fiber Composites and Polymers Standards (FCAPS).	2011 - 2016
Member, Transportation Research Board Sub-Committee on FRP Strengthening of Steel Bridge Girders	2009 - 2014
Member, ASCE FRP Standards Committee	2009 - 2011
Member, The International Advisory Committee to Review the Hong Kong Guideline for Strengthening of Concrete Structures Using FRP Composite	2009 – 2016
Member, ASCE Experimental Analysis and Instrumentation Committee	2009 – 2014
Member, North Carolina Advanced Material Group	2009 – 2011
Member, Scientific Advisory Board, Sustainable Structures & Buildings, College of Engineering, United Arab Emirates	2008 – 2016
Chair, The Canada Foundation for Innovations, Leading Edge Fund and New Initiatives.	2008 - 2011
Chair, Advisory Committee, "Load Resistance factor Design Standard for FRP Pultruded Composite Construction", ASCE and ACMA	2008 – 2011
Member, IIFC Council	2007 – present
Member, IIFC Technical Advisory Committee	2007 – present
Member, Advisory Committee the Center of Excellence for Research in Engineering Materials (CEREM) at King Saudi University, Riyadh, Saudi Arabia	2007 – 2015
Member, IIFC Working Group on FRP-Strengthened Metallic Structures	2005 – present
Chair, FRP Composites Committee, Precast/Prestressed Concrete Institute	2004 – 2012
Member, Student Education Committee, Precast/Prestressed Concrete Institute	2003 – present
Member, Post-Tension Institution, Educational Committee	2003 – 2014
Member, Research and Development Committee Precast/Prestressed Concrete Institute	2002 – present
Member, ACI Committee 423, Prestressed Concrete -- Joint ACI-ASCE	2002 – present
Member (Consultant), Egyptian FRP Code Committee	2002 – present
Member, International Concrete Repair Institute, Publication Committee	2000 – present
Member, FIB Task Group 5.1, Monitoring and Safety Evaluation of Existing Concrete Structures	1998 – 2015
Member, FIB Task Group 9.3, FRP Reinforcement for Concrete Structures	1997 – 2014
Member, ACI Committee 550, Precast Concrete Structures -- Joint ACI-ASCE	1992 – present

Member, Scientific Advisory Board for "Sustainable Structures & Buildings"	2008 – 2010
Chair, Project Advisory Committee "Pre-Standard for Load Resistance Factor Design (LFRD) of Pultruded Fiber Reinforced Polymer (FRP) Structures" ASCE	2008 – 2010
Chair, Expert Committee #366, Canada Foundation for Innovation Expert Panel	2009
Member, Transportation Research Board (TRB) Committee AFF80 on Structural Fiber Reinforced Plastics	2000 – 2009
Chair, ACI Subcommittee 440-I, FRP Prestressing for Concrete Structures	2004 – 2007
Chair, Subcommittee B, Transportation Research Board (TRB) Committee AFF80 on Structural Fiber Reinforced Plastics	2002 – 2007
US Delegate, International Organization for Standardization/TC 71/SC 6 Committee "Non-Traditional Reinforcing Materials for Concrete Structures"	2002 – 2007
Member, Expert Committee, Canadian Institute of Steel Construction, Quebec Chapter (reviewed research proposals submitted to Canada Foundation for Innovation)	2006
Member, International Advisory Committee to Review the Australian Design Guideline for Retrofitted RC Structures with FRP and Metal Plates	2005 – 2006
Member, Committee on Structural Fiber Reinforced Plastics, National Research Council	1997 – 2003
Chairman, ACI Committee 440, FRP Reinforcement	1997 – 2003
Associate Member, ACI Committee 423, Prestressed Concrete -- Joint ACI-ASCE	1999 – 2002
Member, CEB Task Group on Non-Metallic Reinforcement	1996 – 2002
ASCE/SCAP Task Force on Composites	1995 – 2002
ASTM Committee D20.18.02, Reinforced Plastics Pultruded Shapes	1994 – 2002
Canadian Standards Association Technical Committee S806 on FRP Codes	1994 – 2002
Member, Navy/FRP Concrete Composite Pier Project Advisory Committee	1994 – 2002
Member, Association of Professional Engineers and Geoscientists of the Province of Manitoba (APEGM) Academic Committee	1999 – 2000
Member, Association of Professional Engineers and Geoscientists of the Province of Manitoba (APEGM) Council	1998 – 2000
Member, Precast/Prestressed Concrete Institute Subcommittee on FRP Composites	1997 – 2000
Member, Precast/Prestressed Concrete Institute Committee on Research & Development	1997 – 2000
Member, Association of Professional Engineers and Geoscientists of the Province of Manitoba (APEGM) Awards Committee	1996 – 2000
Member, Technology Partnerships Advisory Board of Canada, Chaired by Hon. John Manley	1996 – 2000
Manitoba Composite Material Working Group Management Committee	1995 – 2000
Member, Manitoba Infrastructure Council (MIC)	1994 – 2000
National Executive Committee for CSCE Structural Division	1979 – 2000
Member, Committee on Structural Fiber Reinforced Plastics, National Research Council	1997 – 1999
Member, City of Winnipeg Strategic Infrastructure Reinvestment Policy Task Force (SIRP)	1994 – 1998
Member, ACI Committee 118, Use of Computers	1986 – 1998
Member, ACI Committee 440, FRP Reinforcement	1992 – 1997
Member, ACI Committee 10, Chapter Activities	1992 – 1995
Chairman, Structural Division, Canadian Society for Civil Engineering	1991 – 1995
Member, Association of Professional Engineers and Geoscientists of the Province of Manitoba (APEGM) University Liaison Committee	1986 – 1994
Member, CSCE Awards Committee for the "President Best Student Chapter Award"	1989 – 1990
Member, Association of Professional Engineers and Geoscientists of the Province of	1983 – 1990

Manitoba (APEGM) Examination Program	
Chairman, Association of Professional Engineers and Geoscientists of the Province of Manitoba (APEGM) Salary Research Committee	1986 – 1989
Regional Council of Canadian Society for Civil Engineering	1985 – 1989
Chairman, Student Award Committee, Canadian Society for Civil Engineering	1985 – 1989
Member, Association of Professional Engineers and Geoscientists of the Province of Manitoba (APEGM) Salary Committee	1984 – 1986
Member, ACI Committee 533, Precast Panels	1983 – 1985
Member, ASTM, Committee C27 on Precast Concrete Products	1980 – 1982

Technical/Scientific Committees for Conferences and Workshops (since 1980):

Member, International Scientific Committee of the 8th International Conference on Advanced Composite Materials for Bridges and Structures (ACMBS-VIII), Vancouver, B.C., Canada, August 22-24, 2016	2016
Member, International Scientific Committee of the 6th Asia-Pacific Conference on FRP in Structures, APFIS2017, July 19-21, 2017, Singapore.	2016
Member, Scientific Committee of the 14 th International Conference on Structural & Geotechnical Engineering, Cairo, Egypt, December 20-22, 2015	2015
Member, International Scientific Committee of the 12 th International Conference in the Fiber Reinforced Polymer for Reinforced Concrete Structures, FRPRCS-12 and the 5 th Asia-Pacific Conference on FRP in Structures, APFIS-2015, Nanjing, China, December 15-16, 2015	2015
Member, International Scientific Committee of the 7 th International Conference in the Advanced Composites in Construction (ACIC), Cambridge, UK, September 9-11, 2015	2015
Chairman, NCSU-Technical University of Denmark, University Workshop on “Recent Advancement in Construction Materials and Structural Systems”, Raleigh, NC, May 27-29, 2014.	2014
Member, International Scientific Committee of the 23 rd Australian Conference on the Mechanics of Structures and Materials, Bryon Bay, Australia , December 9-12, 2014	2014
Member, Technical Review Committee, 2014 PCI Convention and National Bridge Conference, Washington, DC, September 6-9, 2014	2014
Seminar Chair, Hollowcore Seminar PAP04, 2013 PCI Convention and National Bridge Conference, Grapevine, TX, September 21, 2013	2013
Member, International Scientific Committee of the SMAR 2013 Conference, Second Conference on Smart Monitoring Assessment and Rehabilitation of Civil Structures, Istanbul, Turkey, Sept. 9-11, 2013	2013
Member, International Advisory Committee of the Civil Engineering Infrastructure Based on Polymer Composites 2012 Conference, Krakow, Poland, November 22-23, 2012	2012
Member, International Scientific Committee of The 6 th International Conference on Composites in Construction Engineering (CICE), Rome, Italy, June 13-15, 2012	2012
Member, International Scientific Committee of The 6 th International Conference on Advanced Composite Materials in Bridges and Structures (ACMBS-VI), Kingston, Ontario, Canada, May 23-25, 2012	2012
Member, International Scientific Committee of The 3 rd Asia-Pacific Conference on FRP in Structures, Hokkaido University, Sapporo, Japan, February 2-4, 2012	2012
Member, Organizing and Scientific Committee, The Sixth Middle East Symposium on Structural Composites for Infrastructure Application, Luxor, Egypt, December 14-16, 2011	2011

Member, Scientific Committee of the International Symposium on Innovation and Sustainability of Structures in Civil Engineering, Xiamen University, Xiamen, P.R. China, Oct. 28 – 30, 2011	2011
Member, Scientific Steering Committee, and Chairman of Technical Session, 10 th International Symposium on Fiber Reinforced Polymer for Reinforced Concrete Structures, FRPRCS-10, Tampa, Florida, April 2-4, 2011	2011
Member, International Scientific Committee of the First Middle East Conference on Smart Monitoring, Assessment and Rehabilitation of Civil Structures (SMAR) Dubai UAE, February 8-10, 2011	2011
Member, International Scientific Committee of “CICE 2010: 5 th International Conference on FRP Composites in Civil Engineering,” Beijing, China, September 27-29, 2010	2010
Member, Scientific Committee, Precast/Prestressed Concrete Institute, 3rd Congress of the International Federation for Structural Concrete (fib), Washington, DC, May 29-June 20, 2010	2010
Member, International Scientific Committee of 2009 Asia Pacific Conference on FRP in Structures, Seoul, Korea, December 9-11, 2009	2009
Member, International Scientific Committee of the "International Symposium on Innovation & Sustainability of Structures in Civil Engineering," Guangzhou, China, Nov. 28, 2009	2009
Member, International Scientific Committee, Advanced Composites in Construction 2009, Edinburgh, September 1-3, 2009	2009
Member, International Scientific Committee, 9 th International Symposium on Fiber Reinforced Polymer Reinforcement for Concrete Structures (FRPRCS-9), Sydney, Australia, July 13-15, 2009	2009
Member, International Advisory Committee, 6 th International Conference Analytical Models and New Concepts in Concrete and Masonry Structures (AMCM 2008), Lodz, Poland, June 9-11, 2008	2008
Member, International Scientific Committee, The Fifth Middle East Symposium on Structural Composites for Infrastructure Applications (MESC-5), Elgonah, Hurgada, Egypt, May 23-25, 2008	2008
Member, International Scientific Committee, 2 nd Canadian Conference on Effective Design of Structures (CCEDS-II), McMaster University, Hamilton, Ontario, Canada, May 20-23, 2008	2008
Member, International Scientific Committee, International Symposium on Innovation and Sustainability in Civil Engineering (ISS 2007), Tongji University, Shanghai, China, November 17-19, 2007	2007
Member, Organizing Committee, Advanced Composite Materials in Bridges and Structures (ACMBS-V), Winnipeg, Manitoba, Canada, Sept 22-24, 2008	2008
Member, International Scientific Committee, The First Asia-Pacific Conference on FRP in Structures (APFIS 2007), Hong Kong, December 12-14, 2007	2007
Session Chair, Externally Bonded FRP – Special Topics 2, 8 th International Symposium on Fiber Reinforced Polymer Reinforcement for Concrete Structures (FRPRCS-8), University of Patras, Patras, Greece, July 16-18, 2007	2007
Session Chair, Plenary Session-Closure, 8 th International Symposium on Fiber Reinforced Polymer Reinforcement for Concrete Structures (FRPRCS-8), University of Patras, Patras, Greece, July 16-18, 2007	2007
Member, International Scientific Committee, Third International Conference on Durability & Field Applications of Fiber Reinforced Polymer (FRP) Composites for	

Construction (CDCC 2007), Quebec City, Quebec, Canada, May 22-24, 2007	2007
Member, Organizing Committee, Third International Conference for Advanced Composites in Construction, University of Bath, UK, April 2-4, 2007	2007
Member, International Scientific Committee, Sixth Alexandria International Conference on Structural and Geotechnical Engineering (AICSGE 6), Alexandria, Egypt, April 14-16, 2007	2007
Member, International Scientific Committee, 8 th International Symposium on Fiber Reinforced Polymer Reinforcement for Concrete Structures (FRPRCS-8), University of Patras, Patras, Greece, July 16-18, 2007	2007
Member, International Executive Board, Second International Construction Innovations Conference (ICIC), Peoria, Illinois, October 29-31, 2006	2006
Session Chair, NDT of Concrete & Advanced Composite, Structural Faults and Repair 2006, Edinburgh, Scotland, June 13 - 15, 2006	2006
Session Moderator, Innovative Uses of Fiber Reinforced Plastics (FRP) in Bridges, 85th Annual Transportation Research Board Meeting, Washington, D.C., January 23, 2006	2006
Member, International Scientific Committee, Third International Conference on FRP Composites in Civil Engineering (CICE 2006), Miami, Florida, December 13-15, 2006	2006
Member, International Scientific Committee, An International Conference on Advances in Engineering Structures, Mechanics & Construction, Waterloo, Ontario, Canada, May 14-17, 2006	2006
Member, Advisory Board, Bridge Management, Assessment and Rehabilitation Techniques, Cairo, Egypt, March 21-23, 2006	2006
Member, Scientific Committee, 7 th International Conference on Short and Medium Span Bridges, Montreal, Canada, August 23-25, 2006	2006
Member, Advisory Board, Structural Faults and Repair 2006, Edinburgh, Scotland, June 13-15, 2006	2006
Member, Scientific Committee, Civil Engineering Infrastructure Systems (CEIS 2006), Beirut, Lebanon, June 12-14, 2006	2006
Member, Steering Committee, International Workshop on Innovations in Materials and Design in Civil Infrastructure, Cairo, Egypt, December 20-29, 2005	2005
Member, International Scientific Committee, International Symposium on Bond Behavior of FRP in Structures, Hong Kong, December 8-10, 2005	2005
Session Moderator, FRPRCS-7 Symposium Session: Bond of FRP Bars, Sheets, Laminates and Anchorages to Concrete (7 th International Symposium on FRP Reinforcement for Reinforced Concrete Structures), Kansas City, Missouri, November 7, 2005	2005
Chair, Technical Session on Fiber Reinforced Plastics Field Applications, 84th Annual Transportation Research Board Meeting, Washington, D.C., January 9-13, 2005	2005
Member, Scientific Committee, 7 th International Symposium on Fiber Reinforced Polymer Reinforcement for Concrete Structures (FRPRCS-7), New Orleans, Louisiana, November 7-10, 2005	2005
Member, International Scientific Committee, Third International Conference on Composites in Construction (CCC 2005), Lyon, July 11-13, 2005	2005
Member, Selection Committee of the Canadian Network Centers of Excellence for 2004 and 2005 Competition	2005
Member, Scientific Committee of the International Conference: Future Vision and	2004

Challenged for Urban Development, Cairo, Egypt, December 20-22, 2004	
Member, Workshop Steering Committee on “Research in FRP Composites in Concrete Construction”, sponsored by the National Science Foundation, San Francisco, California, October 22-23, 2004	2004
Member, Scientific Committee, Eleventh International Conference on Composites/Nano Engineering, Hilton-Head, South Carolina, August 8-14, 2004	2004
Member, International Advisory Committee, Second International Conference on FRP Composites in Civil Engineering (CICE 2004), Adelaide, Australia, December 8-10, 2004. Also invited as keynote speaker for the conference	2004
Member, International Scientific Committee of the 4 th International Conference on Advanced Composite Materials in Bridges and Structures, Calgary, Canada July 20-23, 2004	2004
Member, Steering Committee of the 4 th International Conference on Concrete Under Severe Conditions: Environment and Loading, Seoul, Korea, June 20-23, 2004	2004
Member, Scientific Committee, Innovative Materials and Technologies for Construction and Restoration, University of Lecce, Via per Monteroni, Lecce, Italy, June 6-9, 2004	2004
Member, International Scientific Committee, Advanced Polymer Composites for Structural Applications in Construction, Guildford, Surrey, UK, April 20-22, 2004	2004
Member, Steering Committee, Second International Workshop on Structural Composites for Infrastructure Application, Cairo, Egypt, December 17-18, 2003	2003
Member, Advisory Board, Structural Faults and Repair Conference, London, UK	2003
Member, Scientific Committee, Fifth Alexandria International Conference on Structural and Geotechnical Engineering, Alexandria, Egypt, December 20-22, 2003	2003
Member, International Advisory Committee, International Conference on Structural Health Monitoring and Intelligent Infrastructure, Tokyo, Japan. November 13-15, 2003. Also invited as keynote speaker for the conference.	2003
Member, International Scientific Committee, 2 nd International Conference in Construction, CCC 2003, Renda, Italy, September 16-19, 2003	2003
Member, Scientific Committee, Composites in Construction International Conference, University of Calabria, Rende, Italy, September 16-19, 2003	2003
Member, International Scientific Committee, FRPRCS-6, Singapore, July 6-11, 2003	2003
Member, Consortium of Universities for Research in Earthquake Engineering (CUREE)	2003
Expert Assessor of International Standing, The Australian Research Council	2002
Member, International Steering Committee and International Scientific Committee of FRPRCS Symposiums, Singapore, July 2002	2002
Member, International Advisory Board, Structural Faults & Repair Conference, London	2002
Member, International Scientific Committee, The Third Middle East Symposium on Structural Composites for Infrastructure Application, Aswan, Egypt, December 17-20, 2002. Also invited as keynote speaker.	2002
Member, International Advisory Committee on Advanced Composite in Construction (CACIC), Chaired by Professor Hollaway, June 2002	2002
Member, NSF/SBIR Review Panel	2002
Member, NSF Review Panel for the PATH Program	2001
Member, International Advisory Committee of the FRP Composite for Civil Engineering Conference (CICE), Hong Kong, December 12-14, 2001. Also invited as keynote speaker.	2001

Member, Multidisciplinary Assessment Committee (MAC) for 2001 Competition of The Canadian Innovation Fund, Ottawa, Canada, December 5-6, 2001	2001
Member, Scientific Committee on the First International Conference on Composite In Construction, Porto, Portugal, October 10-12, 2001. Also invited as keynote speaker.	2001
Member, International Advisory Committee, Third Canadian International Conference (CANCOM 2001), Montreal, Canada, August 21-24, 2001	2001
Member, Organizing Committee of International Conference, Non-Metallic Reinforcement for Concrete Structures (FRPRCS-IV), Cambridge, UK, July 16-18, 2001	2001
Member, International Executive Steering Committee of the Third International Conference on Concrete Under Severe Conditions: Environment & Loading, Vancouver, Canada, June 18-20, 2001	2001
Member, Organizing Committee of the Third International Conference, Technology in Composite Applications, Sydney, Australia, February 6-9, 2001	2001
Member, National Science Foundation Structure System & Engineering Division Panel, Washington, D.C.	2000
Member, Advisory Committee on the Centre for Applied Research and Sustainable Development	2000
Member, Organizing Committee of the Third Canadian International Conference on Composites	2000
Member, World-Wise '99 Advisory Committee	2000
Member, Advisory Board, Technology Partnerships Canada	2000
Member, City of Winnipeg Strategic Infrastructure Reinvestment Policy Task Force	2000
Executive Committee, Infrastructure Council of Manitoba	2000
Member, Advanced Materials Focus Group, Manitoba Industry, Trade and Tourism	1999
Member, International Scientific Advisory Committee, Computation Methods and Testing for Engineering Integrity, Lexington, Kentucky	1999
Co-Chair, the Fourth International Symposium on Non-Metallic (FRP) Reinforcement, Baltimore, Maryland	1999
Member, Research Panel on Advancing the Design and Construction Industry through Innovation, Washington, D.C.	1998
Member, International Scientific Committee of the Al-Azhar Engineering Conference, Egypt	1997
Member, International Scientific Committee of the Third International Symposium on Non-Metallic (FRP) Reinforcement, Sapporo, Japan	1997
Chairman, Second International Conference on Advanced Composite Materials for Bridges and Structures, Montreal, Canada, August 1996	1996
Member, International Scientific Committee of the Second International Symposium on Non-Metallic (FRP) Reinforcement, Ghent, Belgium	1995
Admissions Review Board of Professional Engineers of the Province of Manitoba	1995
Member, EITC Task Group for Research Park, Province of Manitoba	1994
Member, International Scientific Committee of the First International Symposium on Non-Metallic (FRP) Reinforcement, Vancouver, Canada	1993
Session Chairman, Canadian Congress of Applied Mechanics Conference	1991
Secretary, Canadian Society for Civil Engineering Conference	1981

C. CONFERENCE/SEMINAR ATTENDANCE (since 1995)

1. **Technical Visit to University of Adelaide, Sydney, Australia, May 2016**
2. **ACI Spring Convention, Milwaukee, Wisconsin, April 16-20, 2016**
3. **PCI Convention and National Bridge Conference, Nashville, TN, March 3-6, 2016**
4. SF Workshop and Conference, Cairo, Egypt, December 15-22, 2015.
5. 2nd International Conference on Educational Innovation, Mexico City, Mexico, December 14-16, 2015.
6. ACI Fall Convention and Technical Committee Meeting, Denver, Colorado, November 11, 2015.
7. PCI Fall Committee Days and Membership Conference, Louisville, Kentucky, October 15-18, 2015.
8. PCI Spring Committee Days and Membership Conference, Chicago, Illinois, April 30-May 3, 2015.
9. ACI Spring Convention, Kansas City, MO., April 11-15, 2015.
10. Second PCI International Symposium, Dubai, United Arab Emirates, January 19-22, 2015.
11. Industrial Advisory Board Meeting, Nanjing Tech University, China, October 29-30, 2014.
12. International Conference on Infrastructure Management, Assessment and Rehabilitation Techniques, Sharjah, United Arab Emirates, March 4-6, 2014.
13. Façade Tetonics Workshop, Los Angeles, CA, February 22, 2013.
14. 6th International Composite Conference (ACUN-6), Melbourne, Australia, November 14-16, 2012.
15. ACI Fall Convention, Toronto, ON, Canada, October 21-25, 2012.
16. PCI 2012 Convention, Nashville, TN, September 29-October 2, 2012.
17. LimesNet Research Conference 2012, Bath, United Kingdom, July 11-13, 2012.
18. 6th International Conference on FRP Composites in Civil Engineering (CICE 2012), Rome, Italy, June 13-15, 2012.
19. 6th International Conference on Advance Composite Materials in Bridges and Structures (ACMBS-VI 2012), Kingston, Ontario, Canada, May 22-25, 2012.
20. Asian-Pacific Conference on FRP in Structures (APFIS 2012), Sapporo, Japan, February 2-4, 2012.
21. Transportation Research Board 91st Annual Meeting, Washington, D.C., January 22-26, 2012.
22. PCI 2011 Convention, Salt Lake City, Utah, October 22-26, 2011.
23. CCC 2011, Balatonfured, Hungary, September 22-23, 2011.
24. ACI Spring Convention and FRPRCS10, Tampa, Florida, April 2-4, 2011.
25. The 3rd Congress of the International Federation for Structural Concrete (fib) PCI FRP Session, Washington, DC, May 29- June 2, 2010.
26. ACI Spring Convention, Chicago, IL, March 21-25, 2010
27. Asia-Pacific Conference on FRP in Structures (APFIS 2009), Seoul, Korea, December 9-11, 2009.
28. ACI Fall Convention, New Orleans, LA, November 8-12, 2009.
29. PCI 2009 Annual Convention, San Antonio, TX, September 12-15, 2009.
30. PCI Committee Days, Chicago, IL, April 23-25, 2009.
31. ACI Convention, San Antonio, TX, March 14-18, 2009.

32. 16th Plenary Meeting for ISO/TC71 & ACE Regional Conference, Cairo, Egypt, February 9-15, 2009.
33. ACI Fall Convention, St. Louis, MO, November 2-6, 2008.
34. PCI 2008 Annual Convention, Orlando, FL, October 5-8, 2008.
35. Advanced Composite Materials in Bridges and Structures (ACMBS-V), Winnipeg, Manitoba, Canada, September 22-24, 2008.
36. 4th International Conference on FRP Composites in Civil Engineering (CICE 2008), July 22-24, 2008.
37. Analytical Models and New Concepts in Concrete and Masonry Structures (AMCM '2008), Lodz, Poland, June 9-11, 2008.
38. The Fifth Middle East Symposium on Structural Composites for Infrastructure Applications 2008 (MESC-5), Hurghada, Egypt, May 23-25, 2008.
39. PCI Committee Days, Chicago, IL, April 23-27, 2008.
40. ACI Spring Convention, Los Angeles, CA, April 3, 2008.
41. The Inaugural Asia-Pacific Conference on FRP in Structures (APFIS 2007), December 12-14, 2007
42. PCI Annual Convention, Phoenix, Arizona, October 21-24, 2007
43. ACI Fall Convention, Puerto Rico, October 14-18, 2007
44. 8th International Symposium on FRP Reinforcement for Reinforced Concrete Structures (FRPRCS-8), Patras, Greece, July 16-18, 2007
45. 24th Annual International Bridge Conference, Pittsburgh, Pennsylvania, June 4-6, 2007
46. 3rd International Conference on Durability & Field Applications of FRP Composites for Construction (CDCC 2007), Quebec City, Quebec, Canada, May 22-24, 2007
47. ACI Spring Convention, Atlanta, Georgia, April 22-26, 2007
48. 86th Annual Transportation Research Board Meeting, Washington, D.C., January 21-25, 2007
49. Third International Conference on FRP Composites in Civil Engineering (CICE 2006), Miami, Florida, December 13-15, 2006
50. ACI Fall Convention, Denver, Colorado, November 5-9, 2006
51. International Construction Innovations Conference (ICIC 2006), Peoria, Illinois, October 29-31, 2006
52. PCI Annual Convention, Grapevine, Texas, October 22-25, 2006
53. 7th International Congress on Advances in Civil Engineering, Istanbul, Turkey, October 11-13, 2006
54. 7th International Conference on Short and Medium Span Bridges 2006, Montreal, Canada, August 23-25, 2006
55. ACUN-5 International Composites Conference, Sydney, Australia, July 11-14, 2006
56. Structural Faults and Repair 2006, Edinburgh, Scotland, June 13-15, 2006
57. International Conference on Advances in Engineering Structures, Mechanics and Construction, Waterloo, Ontario, Canada, May 14-17, 2006
58. ACI Spring Convention, Charlotte, North Carolina, March 26-30, 2006
59. International Conference on Bridge Management Systems, Monitoring, Assessment and Rehabilitation, Cairo, Egypt, March 21-23, 2006
60. 85th Annual Transportation Research Board Meeting, Washington, D.C., January 22-26, 2006
61. International Symposium on Bond Behavior of FRP in Structures, Hong Kong, China, December 7-9, 2005
62. FRP Composites in Construction Workshop, Hong Kong, China, December 10, 2005

63. ACI Fall Convention, Kansas City, Missouri, November 6-10, 2005
64. 7th International Symposium on FRP Reinforcement for Reinforced Concrete Structures (FRPRCS-7), Kansas City, Missouri, November 7-10, 2005
65. The Royal Military College of Canada, Round Table Symposium, "The Future of Structures: 2030 and Beyond" in Honor of Dr. Urs Meier, Kingston, Ontario, Canada, November 4, 2005
66. Elsevier Editors' Conference, Nashville, Tennessee, October 21-13, 2005
67. PCI Annual Convention, Palm Springs, California, October 16-19, 2005
68. 3rd International Composites in Construction Conference (CCC 2005), Lyon, France, July 11-13, 2005
69. Seventh International Symposium on Utilization of High-Strength/High Performance Concrete, Washington, D.C., June 20-24, 2005
70. Fourth Middle East Symposium on Structural Composites for Infrastructure Applications (MESCA4), Alexandria, Egypt, May 20-23, 2005
71. ACI Spring Convention, New York, New York, April 17-21, 2005
72. First International Conference on Materials Research and Education: Future Trends and Opportunities, Doha, Qatar, April 4-6, 2005
73. 84th Annual Transportation Research Board Meeting, Washington, D.C., January 9-13, 2005
74. International Conference on Future Vision and Challenges for Urban Development, Cairo, Egypt, December 20-22, 2004
75. Second International Conference on FRP Composites in Civil Engineering (CICE 2004), Adelaide, Australia, December 8-10, 2004
76. ACI Fall Convention, San Francisco, California, October 24-28, 2004
77. ACI 440 Research Workshop on FRP Composites in Concrete Construction, San Francisco, California, October 22-23, 2004
78. Second International Conference on Bridge Maintenance, Safety and Management (IABMAS '04), Kyoto, Japan, October 19-22, 2004
79. PCI Annual Convention, Atlanta, Georgia, October 17-20, 2004
80. COMPOSITES 2004, Tampa, Florida, October 6-8, 2004
81. 4th International Conference on Advanced Composite Materials in Bridges and Structures (ACMBS IV), Calgary, Canada, July 20-23, 2004
82. Innovative Materials and Technologies for Construction and Restoration (IMTCR2004), Lecce, Italy, June 6-9, 2004
83. ACI Spring Convention, Washington, D.C., March 14-18, 2004
84. 83rd Annual Transportation Research Board Meeting, Washington, D.C., January 11-15, 2004
85. Second International Workshop on Structural Composites for Infrastructure Applications, Cairo, Egypt, December 17-18, 2003
86. Fifth Alexandria International Conference on Structural and Geotechnical Engineering, Alexandria, Egypt, December 20-22, 2003
87. PCI Convention, Orlando, Florida, October 17-20, 2003
88. ACI Fall Convention, Boston, Massachusetts, September 27-29, 2003
89. FRP Conference, Syracuse University, New York, August 7-8, 2003
90. 6th International Symposium on Fiber-Reinforced Polymer Reinforcement for Concrete Structures (FRPRCS-6), Singapore, July 8-10, 2003
91. MDA/CFA 2003 Technical Conference, Las Vegas, Nevada, April 21-22, 2003
92. ACI Spring Convention, Vancouver, Canada, March 28-April 2, 2003

93. 82nd Annual Transportation Research Board Meeting, Washington, D.C., January 12-15, 2003
94. Third Middle East Symposium, Egypt, December 13-22, 2002
95. Precast/Prestressed Concrete Bridge Design Seminar (sponsored by North Carolina Department of Transportation (DOT) and Georgia/C Carolinas PCI, Raleigh, North Carolina, November 14, 2002ACI Fall Convention, Phoenix, Arizona, October 26-30, 2002
96. PCI Convention, Nashville, Tennessee, October 5-7, 2002
97. North Carolina ASCE, Wilmington, North Carolina, October 3, 2002
98. First International Symposium on Structural Health Monitoring, ISIS Canada, Winnipeg, Canada, September 17-19, 2002
99. DAMSTRUC 2002, Brazil, July 27-August 2, 2002
100. ACUN-4 (Australian Conference on Composites), Sydney, Australia, July 13-24, 2002
101. Canadian Society for Civil Engineering Annual Conference, Montreal, Canada, June 2002
102. ACI Spring Convention, Detroit, Michigan, April 2002
103. ACI Fall Convention, Dallas, Texas, October 2001
104. American Society of Civil Engineers Annual Conference, Houston, Texas, October 2001
105. FRPRCS-5 (Fiber-Reinforced Plastics for Reinforced Concrete Structures), Cambridge, England, July 14-19, 2001
106. NSF, PATH Panel Review, Washington, D.C., July 2001
107. Use of FRP for New and Strengthening of Concrete Structures, Egypt/Italy, May 2001
108. Field Trip to Bayshore Concrete Products, Cape Charles, Virginia, May 2001
109. Structures Congress, Washington, D.C., May 19-23, 2001
110. Rehabilitating and Repairing the Buildings and Bridges of Americas: Hemispheric Workshop on Future Directions (sponsored by National Science Foundation), Puerto Rico, May 14-18, 2001
111. ACI Spring Convention, Philadelphia, Pennsylvania, March 23-28, 2001
112. 80th Annual Transportation Research Board Meeting, Washington, D.C., January 7-11, 2001
113. CERF Symposium & Innovative Technology Tradeshow, Washington, D.C., August 2000
114. Third International Conference on Advanced Composite Materials in Bridges and Structures (ACMBS-III), Ottawa, Ontario, August 2000.
115. 4th South African Conference on Polymers in Concrete, Kruger National Park, South Africa, June 2000
116. Fifth Annual ISIS Canada Conference, Montreal, Quebec, May 2000
117. ACI Spring Convention, San Diego, California, March 2000
118. ACUN-2 (Australian Conference on Composites), Sydney, Australia, February 2000
119. 79th Annual Transportation Research Board Meeting, Washington, D.C., January 2000
120. World Wise '99, Winnipeg, Manitoba, December 1999
121. ACI Fall Convention, Baltimore, Maryland, October 1999
122. Structural Faults and Repair '99, London, England, July 1999
123. 12th International Conference on Composite Materials, Paris, France, July 1999
124. Canadian Society for Civil Engineering Annual Conference, Regina, Saskatchewan, June 1999
125. Fourth Annual ISIS Canada Conference, Toronto, Ontario, May 1999

126. ACI Spring Convention, Chicago, Illinois, March 1999
127. ACUN-1 (Australian Conference on Composites), Sydney, Australia, February 1999
128. 78th Annual Transportation Research Board Meeting, Washington, D.C., January 1999
129. 48th Annual Concrete Conference, Minneapolis, Minnesota, December 1998
130. ACI Fall Convention, Los Angeles, California, October 1998
131. Arab Conference on Repair and Rehabilitation of Structures, Cairo, Egypt, September 1998
132. Conference on Durability of FRP Composites for Construction, Sherbrooke, Quebec, August 1998
133. Fifth International Conference on Composites Engineering, Las Vegas, Nevada, July 1998
134. Structural Engineers World Congress, San Francisco, California, July 1998
135. Fifth International Conference on Short and Medium Span Bridges, Calgary, Alberta, July 1998
136. Canadian Society for Civil Engineering Annual Conference, Halifax, Nova Scotia, June 1998
137. European Conference on Composite Materials, Naples, Italy, June 1998
138. Third Annual ISIS Canada Conference, Winnipeg, Manitoba, May 1998
139. ACI Spring Convention, Houston, Texas, March 1998
140. Second International Conference on Composites in Infrastructure, Tucson, Arizona January 1998.
141. 77th Annual Transportation Research Board Meeting, Washington, D.C., January 1998
142. Al-Azhar Engineering Conference, Cairo, Egypt, December 1997
143. ACI Fall Convention, Atlanta, Georgia, November 1997
144. Third International Symposium on Non-metallic (FRP) Reinforcement for Concrete Structures (FRPRCS-3), Sapporo, Japan, October 1997
145. US-Canada-Europe Workshop on Bridge Engineering, Zurich, Switzerland, July 1997
146. Structural Faults and Repair '97, Edinburgh, Scotland, July 1997
147. Rehabilitation and Development of Civil Engineering Infrastructure Systems, Beirut, Lebanon, June 1997
148. Second Annual Symposium on Concrete Durability, Calgary, Alberta, June 1997
149. Canadian Society for Civil Engineering Annual Conference, Sherbrooke, Quebec, May 1997
150. Society for the Advancement of Material and Process Engineering (SAMPE) Symposium and Exhibition, Anaheim, California, May 1997
151. American Society of Civil Engineers Structures Congress XV, Portland, Oregon, April 1997
152. Second Annual ISIS Canada Conference, Winnipeg, Manitoba, April 1997
153. ACI Spring Convention, Seattle, Washington, April 1997
154. Industry Portfolio on Science and Technology, Ottawa, Ontario, March 1997
155. Jaeger International Symposium, Halifax, Nova Scotia, January 1997
156. Innovation in Urban Infrastructure, Toronto, Ontario, December 1996
157. American Society for Civil Engineers Annual Conference, Washington, D.C., November 1996
158. ACI Fall Convention, New Orleans, Louisiana, November 1996
159. Second International Conference on Advanced Composite Materials in Bridges and Structures (ACMBS-II), Montreal, Quebec, August 1996
160. Fiber Reinforced Plastics in the Construction Industry, Italy, June 1996

161. First Middle East Workshop on Structural Composites for Infrastructure Application, Egypt, June 1996
162. ISIS Canada Conference, Toronto, Ontario, April 1996
163. ACI Spring Convention, Denver, Colorado, March 1996
164. Smart Structures and Materials '96, San Diego, California, February 1996
165. Canadian Construction Association '96, Hawaii, February 1996
166. First International Conference on Composites in Infrastructure, Tucson, Arizona, January 1996
167. ICFRSPCE, Madras, India, December 1995
168. ACI Fall Convention, Montreal, Quebec, November 1995
169. CMC Conference, Saint Jérôme, Québec, October 1995
170. Second International Symposium on Non-metallic (FRP) Reinforcement for Concrete Structures (FRPRCS-2), Gent, Belgium, August 1995
171. Canadian Society for Civil Engineering Annual Meeting, Ottawa, Ontario, June 1995.

D. REVIEWER OF TECHNICAL PAPERS AND PROPOSALS

Technical Papers for Journals

Japanese Advanced Concrete Technology Journal

Korean Concrete Institute Journal

ASCE Journal of Composites for Construction

Precast/Prestressed Concrete Institute Journal

Canadian Journal of Civil Engineering

Applied Mechanics Reviews

ACI Structural Journal

Journal of Structural Engineering

Experimental Mechanics

Concrete International

Elsevier Science

Construction and Building Materials

Journal of Intelligent Material Systems and Structures

Canadian Journal of Civil Engineering

Advanced Composites Letters

ACI Special Publications

Arabian Journal for Science and Engineering, RILEM Publication - Material and Structures Journal

Indian Concrete Institute

Research Proposals

National Science Foundation (NSF)

Hong Kong Research Grants Council

Australian Research Council

National Science Foundation Operating Grant Proposal, 2009

Industry Research Chair in Repair and Maintenance of Concrete Infrastructure (submitted to NSERC), 2005

Natural Science and Research Council of Canada (NSERC)

Transportation Research Board of the National Research Council

NSF Research Council of Canada