

Sergio F. Breña

Professor and Associate Department Head
Department of Civil and Environmental Engineering
University of Massachusetts Amherst

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Education

University of Texas at Austin
Doctor of Philosophy (Ph.D), Civil Engineering (Structures), 2000
Master of Science in Engineering (Structures), 1990

Universidad Iberoamericana (Mexico City)
B.S. in Civil Engineering, 1989

Academic Experience

University of Massachusetts Amherst, Department of Civil and Environmental Engineering (Structures).

Sept. 2014 – Present: Professor; June 2018 – Present: Associate Department Head

Sept. 2006 – Aug. 2014: Associate Professor

Sept. 2000 – Aug 2006: Assistant Professor

Classes taught

CEE241/CEE241A – Strength of Materials and Laboratory
CEE369 – CEE Laboratory
CEE433 – Reinforced Concrete Design
CEE536 – Advanced Topics in Reinforced Concrete
CEE550 – Introduction to Bridge Engineering
CEE541 – Structural Dynamics
CEE646 – Seismic Structural Analysis

Pontificia Universidad Católica de Valparaiso, Department of Civil Engineering, Valparaiso, Chile.

November 2011: Visiting Professor

École Polytechnique Fédérale de Lausanne, School of Architecture, Civil and Environmental Engineering, Lausanne, Switzerland (on sabbatical leave).

May-July 2009: Visiting Professor

University of Texas at Austin, Department of Civil Engineering.

1996 – 2000: Graduate Research Assistant

Iberoamericana University – Mexico City, Mexico, Department of Civil Engineering.

1991 – 1996: Adjunct Professor

Classes taught

Statics for Architects
Structural Systems I
Reinforced Concrete Structures

Professional Experience

HB Projects and Consulting (Mexico City, Mexico)

1993-1996: Chief Design Engineer - Projects including the seismic rehabilitation of telephone buildings in Mexico, structural design of commercial and residential buildings.

Integral Consulting in Engineering (Mexico City, Mexico)

1992 – 1993: Chief Design Engineer: Tunnel Design Area – Responsible for supervising design of tunnels, vertical shafts, pump houses, and other structures for the Mexico City deep drainage system and Metro.

1991-1992: Design Engineer – Involved in the structural design of the seismic retrofit projects of existing reinforced concrete buildings for TELMEX (Mexican Telephone Company).

HB Construction Company (Mexico City, Mexico)

1987 – 1989: Engineer –Construction bids, resident engineer.

Professional Organizations

1. American Concrete Institute, Fellow (2009); Member 1990 – present
Committee 318C (Voting, Secretary 2011-2014) – Safety, Serviceability, and Analysis
Committee 369 (Voting, Secretary 2006-2015) – Seismic Repair and Rehabilitation
Subcommittee 369F (Voting, Chair 2017-present) – Retrofit
Committee 374 (Voting) - Performance Based Seismic Design of Concrete Buildings
ACI Publications Committee 2006-2013 (Voting-Board Appointed)
Committee 440 (Associate) - Fiber Reinforced Polymer Reinforcement
ACI-ASCE Committee 445 (Associate) – Shear and Torsion
2. Precast/Prestressed Concrete Institute Member 2003 – present
Educational Activities Council (2014-present)
Student Education Committee (Voting 2010-present, Chair 2014 – 2018)
PCI Academy Advisory Board (2015-present)
PCI Handbook (8th Edition) Blue Ribbon Review Team Member (2015 – 2018)
PCI Handbook Committee (9th Edition) (Voting 2018-present)
PCI Design Specification Committee (Voting 2018 – present)
Faculty Advisor, Big Beam Student Competition 2002 (Best report, 6th place national), 2003 (5th place national), 2007, 2010, 2012
3. American Society of Civil Engineering Member 1990 – present
UMass-ASCE Student Chapter Faculty Advisor (2003 - 2007; 2015 – present)
Concrete Canoe Competition Advisor – (2001 – 2007; regional champions in 2004)
Member of the ASCE/SEI Chile (Maule) Earthquake Reconnaissance Team (April 2010)
Assoc. Member of ASCE 41 Standards Committee on Seismic Rehabilitation (2010 – present)
ASCE Designated Member of Project Review Panel for ATC Project 101/Task Order 27 – June 2013
4. Earthquake Engineering Research Institute Member 1990 - present
5. Structural Engineering Institute (ASCE) Member 1996 - present
6. Mexican College of Civil Engineers Life member
7. Boston Society of Civil Engineers Member 2000 – present
8. American Institute of Steel Construction Member 2003 – present

Awards and Honors

Iberoamericana University – B.S. Honorable mention (1989)
Mexican College of Civil Engineers – Awarded life membership (1989)
Texas Department of Transportation – 2000 innovator award
American Society of Civil Engineers (UMass student chapter) – 2005, 2015 faculty of the year award
American Concrete Institute
ACI Fellow (2009)
Concrete Research Council Research Fellowship (2009, 2012)
Precast/Prestressed Concrete Institute – Daniel P. Jenny Research Fellowship (2009-2010, 2010-2011)
Precast/Prestressed Concrete Institute – 2011 Young Educator Award
Pontificia Universidad Católica de Chile – Invited Visiting Professor, November 2011
Phi Kappa Phi Honor Society – 2012
Precast/Prestressed Concrete Institute – 2019 Distinguished Educator Award

Peer Reviewed Publications

1. Behrouzi, A., Breña, S., Elwood, K., Irfanoglu, A., Kreger, M., Lequesne, R., Mosqueda, G., Pujol, S., Puranam, A., Rodriguez, M., Shah, P., Stavridis, A., Wood, R., “Observations about the Seismic Response of RC Buildings in Mexico City”, *Earthquake Spectra*, (submitted- in review)
2. Al-Sammari, A. and Breña, S.F., “An Approach to Determine Strength of Bonded FRP Sheets Attached to Concrete Elements using Supplemental FRP Spike Anchors”, *ASCE Journal of Composites for Construction*, (in review).
3. Al-Sammari, A., Clouston, P.L., and Breña, S.F., “Finite Element Analysis and Parametric Study of Perforated Steel Plate Shear Connectors for Wood-Concrete Composites”, *ASCE Journal of Structural Engineering*, Vol. 144, No. 10, 2018, 10 pp.

4. Al-Sammari, A. and Breña, S.F., “Finite Element Simulation and Parametric Study of Anchored Fiber-Reinforced Polymer Sheets”, *ACI Structural Journal*, Vol. 115, No. 2, 2018, pp. 365-377.
5. Breña, S.F., Messier, J., and Peterfreund, S.W. “Behavior of Straight and T-Headed ASTM A1035/A1035M Splices in Flexural Members”, *ACI Structural Journal*, Vol. 115, No. 1, 2018, pp. 79-90.
6. Alvarez, J.C., Breña, S.F., and Arwade, S.R. “Nonlinear Backbone Modeling of Concrete Columns Retrofitted with FRP or Steel Jackets”, *ACI Structural Journal*, Vol. 115, No. 1, 2018, pp. 53-64.
7. Alves de Souza, R. and Breña, S.F. “Behavior Predictions of Deep Beams with Short Straight Bar Anchorages using Strut-and-Tie Models and Nonlinear Analysis”, *IBRACON Structures and Materials Journal*, Vol. 9, No. 5, 2016, pp. 710-721.
8. Civjan, S.A., Sit, M.H., Breña, S.F. “Field and Analytical Studies of the First Folded-Plate Girder Bridge”, *Journal of Bridge Engineering*, Vol. 21, No. 11, November 2016, 16 pp.
9. Manwell, J.F., McGowan, J.G., Brena, S. and Verma, P. “A comparative study of a three rotor and a single rotor 5 MW wind turbine based on economic and structural considerations”. *Wind Engineering*, Vol. 38, No. 6, 2014. pp. 643-658.
10. Ciftci, C., Arwade, S.R., Kane, B., and Breña, S.F. “Analysis of the Probability of Failure for Open-grown Trees during Wind Storms”, *Probabilistic Engineering Mechanics*, Vol. 37, 2014, pp. 41-50.
11. Ciftci, C., Kane, B., Breña, S.F., Arwade, S.R. “Loss in Moment Capacity of Tree Stems Induced by Decay,” *Trees*, Vol. 28, 2014, pp. 517-529.
12. Alvarez, J.C. and Breña, S.F. “Non-linear Modeling Parameters for Jacketed Columns Used in Seismic Rehabilitation of RC Buildings”. *ACI Special Publication 297- Seismic Assessment of Existing Reinforced Concrete Buildings – New Developments*, Paper no. 297-6, 2014, pp. 6.1-6.22.
13. Breña, S.F., McGuirk, G.N., “Advances on the Behavior Characterization of FRP-Anchored Carbon Fiber-Reinforced Polymer (CFRP) Sheets Used to Strengthen Concrete Elements,” *International Journal of Concrete Structures and Materials*, Springer, Vol. 7 (1), March 2013, pp. 3-16.
14. Ciftci, C., Brena, S.F., Kane, B., Arwade, S.R. “The effect of crown architecture on dynamic amplification factor of and open-grown sugar maple (*Acer Saccharum L.*)”, *Trees*, Vol. 27, 2013, pp. 1174-1189.
15. Civjan, S.A., Kalayci, E., Quinn, B.H., Breña, S.F., and Allen C.A. “Observed Integral Abutment Bridge Substructure Response,” *Engineering Structures*, Vol. 56, pp. 1177-1191.
16. Mones, R.M. and Breña, S.F., “Hollow-core Slabs with Cast-in-place Toppings: A Study of Interfacial Shear Strength,” *PCI Journal*, Vol. 58 (3), pp. 124-141.
17. Krem, M.A., Hoque, S.T., Arwade, S.R. and Breña, S.F., “Structural Configuration and Building Energy Performance,” *Journal of Architectural Engineering*, Vol. 19 (1), March 2013, pp. 29-40.
18. Kalayci, E., Civjan, S.A., Breña, S.F., “Parametric Study on the Thermal Response of Curved Integral Abutment Bridges,” *Engineering Structures*, Vol. 43, October 2012, pp. 129-138.
19. Breña, S.F., Jeffrey, A.E., and Civjan, S.A. “Evaluation of a Non-Composite Steel Girder Bridge through Live-Load Field Testing,” *Journal of Bridge Engineering*, Vol. 18 (7), July 2013, pp. 690-699.
20. Kalayci, E., Civjan, S.A., Breña, S.F., Allen, C.A., “Load Testing and Modeling of Two Integral Abutment Bridges in Vermont, US,” *Structural Engineering International*, Journal of IABSE, Vol. 21, No. 2, May 2011, pp. 181-188.
21. Breña, S.F. and Roy, N.C., Closure to Discussion by D. Kumar Sahoo, B. Singh, and P. Bhargava of “Evaluation of Load Transfer and Strut Strength of Deep Beams with Short Longitudinal Bar Anchorages,” *ACI Structural Journal*, Vol. 107 (4), July-Aug 2010, pp. 491-493.

22. Breña, S.F., Fernández Ruiz, M., Kostic, N., and Muttoni, A., "Modelling Techniques to Capture the Backbone Envelope Behaviour of Coupling Beams Subjected to Seismic Loading," *Studies and Researches: Annual Review of Structural Concrete*, Politecnico di Milano, Vol. 29, 2009, pp. 53-78.
23. Breña, S.F. and Ihtiyar, O., "Performance of Conventionally Reinforced Coupling Beams Subjected to Cyclic Loading," *ASCE Journal of Structural Engineering*, Vol. 137 (6), June 2011, pp. 665-676.
24. Niemitz, C.W., James, R., and Breña, S.F., "Experimental Behavior of Carbon Fiber-Reinforced Polymer (CFRP) Sheets Attached to Concrete Surfaces using CFRP Anchors," *Journal of Composites for Construction*, ASCE, Vol. 14 (2), March/April 2010, pp. 185-194.
25. Ahern, J., Jennings, L., Fenstermacher, B., Warren, P., Charney, N., Jackson, S., Mullin, J., Kotval, Z., Breña, S., Civjan, S., and Carr, E., "Issues and Methods for Transdisciplinary Planning of Combined Wildlife and Pedestrian Highway Crossings," *Transportation Research Record, No. 2123, Journal of the Transportation Research Board of the National Academies*, Washington, D.C., pp. 129-136.
26. Kane, B. and Breña, S.F., "Forces and stresses generated during rigging operations," *Arboriculture & Urban Forestry*, March 2009, Vol. 35 (2), pp. 68-74.
27. Breña, S.F. and Roy, N.C., "Evaluation of Load Transfer and Strut Strength of Deep Beams with Short Longitudinal Bar Anchorages," *ACI Structural Journal*, Vol. 106 (5), Sept-Oct 2009, pp. 678-689.
28. Roy, N.C., and Breña, S.F., "Behavior of Deep Beams with Short Longitudinal Bar Anchorages," *ACI Structural Journal*, Vol. 105 (4), July-August 2008, pp. 460-470.
29. Breña, S.F. and Morrison, M.C., Closure to 3 Discussions by E. de Souza Sanchez, J. Holtz Silva, and M.T. Gomes Barbosa; R.A. de Souza; and A. Muttoni, N. Kostic, and M. Fernandez Ruiz of "Factors Affecting Strength of Elements Designed using Strut-and-Tie Models," *ACI Structural Journal*, Vol. 105 (2), March-April 2008, pp. 232-236.
30. Breña S.F. and Schlick B.M., "Hysteretic Behavior of Bridge Columns with FRP-Jacketed Lap Splices Designed for Moderate Ductility Enhancement," *Journal of Composites for Construction*, ASCE, Vol. 11 (6), November-December 2007, pp. 565-574.
31. Breña S.F., Bonczar C.H., Civjan S.A., DeJong J.T., and Crovo D.S., "Evaluation of Seasonal and Yearly Behavior of an Integral Abutment Bridge," *Journal of Bridge Engineering*, ASCE, Vol. 12 (3), May-June 2007, pp. 296-305.
32. Breña S.F. and Morrison M.C., "Factors Affecting Strength Calculation of Elements Designed Using Strut-and-Tie Models," *ACI Structural Journal*, Vol. 104 (3), May-June 2007, pp. 267-277.
33. Civjan S.A., Bonczar C.H., Breña S.F., DeJong J.T., and Crovo D.S., "Integral Abutment Bridge Behavior: Parametric Analysis of a Massachusetts Bridge," *Journal of Bridge Engineering*, ASCE, Vol. 12 (1), January-February 2007, pp. 64-71.
34. Breña S.F., Benouaich M.A., Kreger M.L., and Wood S.L., "Fatigue Tests of Reinforced Concrete Beams Strengthened using Carbon Fiber-Reinforced Polymer Composites," *ACI Structural Journal*, Vol. 102 (2), March-April 2005, pp. 305-313.
35. Civjan S.A., Breña S.F., Butler D.A., and Crovo D.S. "Field Monitoring of an Integral Abutment Bridge in Massachusetts," *Transportation Research Record (TRR), Journal of the Transportation Research Board*, No. 1892, National Research Council, 2004, pp. 160-169.
36. Breña S.F. and Macri B. M., "Effect of Carbon-Fiber-Reinforced Polymer Laminate Configuration on the Behavior of Strengthened Reinforced Concrete Beams," *Journal of Composites for Construction*, ASCE, Vol. 8 (3), May-June 2004, pp. 229-240.

37. Breña S.F., Wood S.L., and Kreger M.L., "Full-scale Tests of Bridge Components Strengthened using Carbon Fiber Reinforced Polymer Composites," *ACI Structural Journal*, Vol. 100 (6), November-December 2003, pp. 775-784.
38. Breña S.F. and Steves, M.A., "Increasing the Flexural Capacity of an Existing Reinforced Concrete Bridge in Texas using CFRP Composites," *Field Applications of FRP Reinforcement: Case Studies*, ACI Publication SP-215, 2003, pp. 203-218.
39. Breña S.F., Bramblett R.M., Wood S.L., and Kreger M.L., "Increasing the Flexural Capacity of RC Beams using CFRP Composites," *ACI Structural Journal*, Vol. 100 (1), January-February 2003, pp. 36-46.

Conference Proceedings

1. Salem, M.A.M.K, Breña, S.F., Arwade, S.R., Hoque, S.T. and Altwair, N.M. "Concepts in the Design of Lateral-Load Systems in High Rise Buildings to Reduce Operational Energy Consumption", International Conference on Chemical, Civil and Environmental Engineering (CCEE-2015), Istanbul, Turkey, 05-06 June 2015.
2. Bahjat, R., Ericson, D., Breña, S.F. and Civjan, S.A. "Evaluation of Moment Live-load Distribution of a NEXT-F Beam Bridge through Field Load Testing and FE Modeling", 2014 PCI Convention and National Bridge Conference, Paper no. 88, Washington, DC, 06-09 September 2014.
3. Quinn, B.H., Civjan, S.A., Breña, S.F., and Allen, C.A., "Single-Span Integral Abutment Bridge Response: Straight and Skew Alignments", 2014 TRB Annual Meeting, Washington, DC.
4. Civjan, S.A., Sit, M.H., Breña, S.F., "Field and Analytical Studies of the First Folded Plate Girder Bridge", 2014 TRB Annual Conference.
5. Quinn, B.H., Civjan, S.A., Lahovich, A., Breña, S.F., "Data from the Fitchburg Bridge, an Innovative FRP Arch Structure," 2013 TRB Annual Conference, Washington D.C., January 2013.
6. Civjan, S.A., Kalayci, E., Breña, S.F., and Allen, C.A., "Three Integral Abutment Bridges in Vermont: Description and Overall Results," 2013 TRB Annual Conference, Washington D.C., January 2013.
7. Mones, R.M. and Breña, S.F., "Interface Strength of Hollow Core Slabs with Cast-in-place Toppings," 2011 PCI Convention and National Bridge Conference, Paper no. 78, Salt Lake City, UT, October 22-26, 2011.
8. Civjan, S.A., Kalayci, E., Breña, S.F., Allen, C.A., "Integral Abutment Bridge Monitoring Program in Vermont," 2010 TRB Annual Conference, Paper no. 10-2510, Washington, D.C, January 2010.
9. Breña, S.F. and Alcocer, S.M., "Seismic Performance Evaluation of Rehabilitated Reinforced Concrete Columns through Jacketing," *ATC & SEI 2009 Conference on Improving the Seismic Performance of Existing Buildings and Other Structures*, ASCE/ATC, San Francisco, CA, December 9-11, 2009.
10. Sezen, H., Dragovich, J., Ghannoum, W., Lowes, L.N., Breña, S.F., and Elwood, K.J., "Guide for Seismic Rehabilitation of Concrete Buildings: Summary of Future Changes," *ATC & SEI 2009 Conference on Improving the Seismic Performance of Existing Buildings and Other Structures*, ASCE/ATC, San Francisco, CA, December 9-11, 2009.
11. Breña, S.F., Fernández Ruiz, M., and Muttoni, A., "Applications of Stress Fields to Assess the Behavior and Strength of Coupling Beams Subjected to Seismic Actions," 3rd International fib Congress, Paper no. 534, Washington, D.C., May 29- June 2, 2010.
12. Ahern, J., Jennings, L., Fenstermacher, B., Warren, P., Charney, N., Jackson, S., Mullin, J., Kotval, Z., Breña, S., Civjan, S., and Carr, E., "Issues and Methods for Transdisciplinary Planning of Combined Wildlife and Pedestrian Highway Crossings," 2009 TRB Annual Conference, TRB Paper Number: 09-0441, Washington, D.C., January 2009.
13. Kalayci, E., Breña, S.F., and Civjan S.A. "Curved Integral Abutment Bridges – Thermal Response Predictions through Finite Element Analysis," *Structures Congress 2009*, ASCE, Austin, TX, April 2009, pp. 213-222.

14. Ihtiyar O. and Breña. S.F. “Assessment of FEMA 356 Techniques for Orthogonally Reinforced Coupling Beams through Experimental Testing, Research Frontiers: FEMA 356/440 & ASCE 41,” *2007 Structures Congress: New Horizons and Better Practices*, ASCE, Long Beach, CA, May 2007, 16 pp.
15. Ihtiyar O. and Breña S.F. “Force-Deformation Response of Conventionally Reinforced Coupling Beams: An Evaluation of FEMA 356,” *CD ROM Proceedings: 8th National Conference of Earthquake Engineering (8NCEE)*, San Francisco, CA, April 2006.
16. Gussenhoven R.B. and Breña S.F. “Fatigue Behavior of Reinforced Concrete Beams Strengthened with Different FRP Laminate Configurations,” *7th International Symposium on Fiber Reinforced Polymer Reinforcement for Reinforced Concrete Structures (FRPRCS7)*, ACI Special Publication SP-230, 2005, pp. 613-629.
17. Bonczar, C., Breña, S.F., Civjan, S.A., DeJong, J., Crellin, B., and Crovo, D. “Field Data and FEM Modeling of the Orange-Wendell Bridge,” *Proceedings: 2005 FHWA Conference: Integral Abutment and Jointless Bridges (IAJB 2005)*, Baltimore, MD, 17-19 March 2005, pp. 163-173.
18. Bonczar, C., Breña, S.F., Civjan, S.A., DeJong, J., and Crovo, D. “Integral Abutment Pile Behavior and Design – Field Data and FEM Studies,” *Proceedings: 2005 FHWA Conference: Integral Abutment and Jointless Bridges (IAJB 2005)*, Baltimore, MD, 17-19 March 2005, pp. 174-184.
19. Schlick, B.M. and Breña, S.F., “Seismic Rehabilitation of Reinforced Concrete Bridge Columns in Moderate Earthquake Regions using FRP Composites,” *CD-Rom Proceedings: 13th World Conference on Earthquake Engineering*, Vancouver, B.C., 2004.
20. DeJong J.T., Howey D.T., Civjan S.A., Breña S.F., Butler D.S., Crovo D.S., Hourani N., and Connors P. “Influence of Daily and Annual Thermal Variations on Integral Abutment Bridge Performance”. American Society of Civil Engineers, GEO-Trans Conference, Los Angeles, CA, 2004, pp.496-505.
21. Civjan S.A., Breña S.F., Butler D.A., and Crovo D.S. “Field Monitoring of an Integral Abutment Bridge in Massachusetts”. *CD-Rom Proceedings: Transportation Research Board (TRB) 2004 Annual Meeting*, Paper no. 04-4172, Washington, D.C., January 2004.
22. Breña, S.F., Wood, S.L., and Kreger M.L., “Fatigue Tests of Reinforced Concrete Beams Strengthened using Carbon Fiber Reinforced Polymer Composites,” *Proceedings: Second International Conference on Durability of Fibre Reinforced Polymer (FRP) Composites for Construction*, Université de Sherbrooke, Sherbrooke, Canada, 2002, pp. 575-586.
23. Breña, S.F., Bramblett, R.M., Wood, S.L., and Kreger M.L., “Flexural Strengthening of Existing Reinforced Concrete Bridges Using Carbon Fiber Reinforced Polymer Composites,” *CD Rom Proceedings: Structural Faults and Repair 2001*, Engineering Technics Press, Edinburgh, U.K., 2001.
24. Breña, S.F., Unal, A., and Wood, S.L., “Seismic Response of Lightly - Reinforced Coupling Beams,” *CD Rom Proceedings: Sixth U.S. National Conference on Earthquake Engineering*, EERI, Seattle, Washington, 1998.

Research Reports

1. Rivera-Cruz, J.A. and Breña, S.F. “Evaluation of the Effect of Bottom Bar Splice Location on Performance of Beams in Reinforced Concrete Perimeter Frames”, *Concrete Reinforcing Steel Institute Report*, 2019, 158 pp.
2. Breña, S.F., Civjan, S.A., Castine, S.L., Ramos, G. “Development of High Early-Strength Concrete for Accelerated Bridge Construction Closure Pour Connections”, *New England Transportation Consortium Report No. NETCR115*, 2018, 211 pp.
3. Alvarez, J.C., Breña, S.F. “Modeling Parameters for the Nonlinear Seismic Analysis of Reinforced Concrete Columns Retrofitted using FRP or Steel Jacketing”, *Concrete Research Council Report No. 71*, 2017, 69 pp.

4. Ericson, D., Breña, S.F., Civjan, S.A., Singh, A. "Evaluation of Live-load Distribution Factors for NEXT-F Beam Bridges", Research Report, PCI Daniel P. Jenny Fellowship Program, 2014, 63 pp.
5. McGuirk, G.N. and Breña, S.F., "Development of Anchorage System for FRP Strengthening Applications using Integrated FRP Composite Anchors," *Concrete Research Council Report No. 54*, 2012, 277 pp.
6. Mones, R.M. and Breña, S.F., "Flexural and Shear Strength of Hollow-core Slabs with Cast-in-place Field Topping," Research Report, PCI Daniel P. Jenny Fellowship Program, 2012, 170 pp.
7. Jeffrey, A.E., Breña, S.F., and Civjan, S.A., "Evaluation of Bridge Performance and Rating through Non-destructive Load Testing," *Report no. 2009-1*, Vermont Agency of Transportation, January 2009, 271 pp.
8. Breña S.F., Civjan S.A., and Goodchild M., "Advanced Composite Materials for New England's Transportation Infrastructure: A Study for Implementation and Synthesis of Technology and Practice," *Final Project Report: NETC 01-1*, New England Transportation Consortium, May 2006.
9. Bonczar, Christine H., Civjan, Scott A., Breña, Sergio F., DeJong, Jason, "Behavior of Integral Abutment Bridges: Field Data and Computer Modeling," Final Report prepared for the Massachusetts Highway Department, June 2005.
10. Breña S.F., Bramblett R.M., Benouaich M.A., Wood S.L., and Kreger M.E., "Use of Carbon Fiber Reinforced Polymer Composites to Increase the Flexural Capacity of Reinforced Concrete Beams," *Research Report # 1776-1*, Center for Transportation Research, University of Texas at Austin, 2001, 228 pp.
11. Breña S.F., Wood S.L., and Kreger M.E., "Increasing the Flexural Capacity of Typical Reinforced Concrete Bridges in Texas Using Carbon Fiber Reinforced Polymers," *Research Report # 1776-2*, Center for Transportation Research, University of Texas at Austin, 2001, 266 pp.
12. Aguilar J., Breña S.F., Del Valle E., Iglesias J., Picado M., Jara M., and Jirsa J.O., "Rehabilitation of Existing Reinforced Concrete Buildings in Mexico City – Case Studies," Ferguson Structural Engineering Laboratory, *Report No. PMFSEL 96-3*, 1996, 170 pp.

Presentations

National Conferences (Presenter in Bold)

Breña S.F., Unal A., and Wood S.L., "Seismic Response of Lightly - Reinforced Coupling Beams," *Sixth U.S. National Conference on Earthquake Engineering*, EERI, Seattle, Washington, 31 May – 4 June 1998.

Breña S.F., "Evaluation of the Seismic Rehabilitation of a Low-Rise Reinforced Concrete Building in Mexico," Poster Presentation, *51st EERI Annual Meeting*, San Diego, California, 3-6 February 1999.

Breña S.F., Bramblett R.M., Wood S.L., and Kreger M.E., "Behavior of Reinforced Concrete Bridge Specimens Strengthened Using Carbon Fiber Reinforced Polymer Composites," Open Paper Session, *ACI-2000 Spring Convention*, San Diego, California, March 2000.

Alcocer S.M., Pincheira J.A., **Saatcioglu M.**, and **Breña S.F.**, "Wall and Frame Analysis and Design," *Theme Session – Performance-Based Seismic Design of Reinforced Concrete Buildings*, Sponsored by ACI Committee 374, ACI Fall 2002 Convention, Phoenix, AZ, 27 October – 1 November 2002.

Breña S.F. and Steves M.A., "Increasing the Flexural Capacity of an Existing Reinforced Concrete Bridge in Texas using CFRP Composites," Theme Session – FRP Composites for External Reinforcement, Sponsored by ACI Committee 440, *ACI-2003 Fall Convention*, Boston, MA, 27 September – 1 October 2003.

Civjan S.A., Breña S.F., Butler D.A., and Crovo D.S. "Field Monitoring of an Integral Abutment Bridge in Massachusetts," *Transportation Research Board (TRB) 2004 Annual Meeting*, Washington, D.C., January 2004.

Peterfreund S.W. and Breña S.F., "Development Length of Micro-Composite Reinforcing Bars used in Bridge Deck Applications," Special Session: Bond Between High-Performance Materials, Sponsored by ACI Committee 208, *ACI-2004 Spring Convention*, Washington, D.C., 14-18 March 2004.

Breña S.F. and Harries K.A., “Fatigue Behavior of Bonded FRP Flexural Retrofit Systems,” Special Session: Durability Performance of FRP Systems, Sponsored by ACI Committee 440, *ACI-2004 Spring Convention*, Washington, D.C., March 14-18, 2004.

Breña S.F. (for Alcocer S.M.), “Recent Research on Seismic Rehabilitation of Buildings in Mexico,” Special Session: Recent Developments in Seismic Evaluation and Rehabilitation of Concrete Buildings, Sponsored by ACI Committee 369, *ACI-2004 Fall Convention*, San Francisco, CA, October 24-28, 2004.

DeJong, J. T., Howey, D. T., Civjan, S. A., Breña, S. F., Butler, D. S., Crovo, D. S., Hourani, N. and Connors, P. (2004) "Influence of Daily and Annual Thermal Variations on Integral Abutment Bridge Performance", American Society of Civil Engineers, *Geo-Trans Conference*, Los Angeles, CA. pp. 496-505.

Bonczar C., **Breña S.F.**, Civjan S.A., DeJong J.T., Crellin B., and Crovo D. “Field Data and FEM Modeling of the Orange-Wendell Bridge,” *2005 FHWA Conference: Integral Abutment and Jointless Bridges (IAJB 2005)*, Baltimore, MD, March 17-19, 2005.

Bonczar C., Breña S.F., Civjan S.A., DeJong J.T., and Crovo D. “Integral Abutment Pile Behavior and Design – Field Data and FEM Studies,” *2005 FHWA Conference: Integral Abutment and Jointless Bridges (IAJB 2005)*, Baltimore, MD, March 17-19, 2005.

Ihtiyar O. and S.F. Breña, “Effect of Aspect Ratio and Reinforcing Details on the Response of Conventionally Reinforced Coupling Beams,” *2006 EERI Annual Meeting*, San Francisco, CA, April 17 – 21, 2006.

Ihtiyar O. and S.F. Breña, “Force-deformation Response of Conventionally Reinforced Coupling Beams: Evaluation of FEMA 356 and FEMA 306,” *8th US National Conference on Earthquake Engineering*, San Francisco, CA, April 18 – 22, 2006.

Ihtiyar O. and **Breña S. F.**, “Assessment of FEMA356 Performance Level Criteria for Orthogonally Reinforced Coupling Beams through Experimental Testing,” *2007 ASCE/SEI Structures Congress*, Long Beach, CA, May 16-20, 2007.

Breña, S.F., Civjan, S.A., Jeffrey, A. “Evaluation of Bridge Performance and Rating through Non-destructive Load Testing,” *Research Advisory Board - Vermont Agency of Transportation*, November 2008.

Ahern, J., Warren, P., Charney, N., Jackson, S., Mullin, J., Kotval, Z., Breña, S., Civjan, S., Carr, E. “Issues and Methods for Transdisciplinary Planning of Combined Wildlife and Pedestrian Highway Crossings”. *Transportation Research Board Annual Meeting*. Washington D.C., 2009.

Kalayci, E., Breña, S.F., Civjan, S.A., “Curved Integral Abutment Bridges -Thermal Response Predictions through Finite Element Analysis,” *2009 ASCE Structures Congress*, Austin, TX, April 2009.

Breña S.F. and Alcocer S.M., “Seismic Performance Evaluation of Rehabilitated Reinforced Concrete Columns through Jacketing,” *ATC & SEI Conference: Improving the Seismic Performance of Existing Buildings and Other Structures*, San Francisco, CA, December 9-11, 2009.

Civjan S.A., Kalayci, E., Breña S.F., Allen C. A. (2010) “Integral Abutment Bridge Monitoring Program in Vermont” *Transportation Research Board Annual Meeting*. Washington D.C., 2010.

Mones R. and **Breña S.F.**, “Flexural and Shear Strength of Extruded Hollow Core Slabs with Cast-in-place Field Topping,” *PCI Annual Convention & Bridge Conference*, Washington D.C., May 29- June 2, 2010.

Mones R. and **Breña S.F.**, “Interface Shear Strength between Hollow Core Slabs and Cast-in-place Toppings,” *PCI Committee Days*, Chicago, IL, September 2010.

Breña S.F., Civjan S.A. and Singh A. “Field Monitoring of an Integral Abutment Prestressed Concrete NEXT Beam Bridge in Massachusetts” *Research and Development Session - PCI Annual Convention*. Nashville, TN., 2012.

- Ciftci, C.**, Breña, S.F., Kane, B., “Effects of Crown Architecture on Dynamic Behavior of Trees: Understanding the Relationship between Branches and Stem,” International Society of Arboriculture (ISA), *ISA Annual Conference*, Portland, OR, August 2012.
- Quinn, B., **Civjan, S. A.**, Lahovich, A. and Breña, S.F. “Data from the Fitchburg Bridge, an Innovative FRP Arch Structure” *Transportation Research Board Annual Meeting*. Washington D.C., 2013.
- Civjan, S. A.**, Kalayci, E., Breña, S.F. and Allen, C. A. “Instrumentation and Long Term Monitoring of Three Integral Abutment Bridges in Vermont” *Transportation Research Board Annual Meeting*. Washington D.C.. 2013.
- Civjan, S. A.**, Sit, M. H. and Breña, S. F. “Field and Analytical Studies of the First Folded Plate Girder Bridge” *Transportation Research Board Annual Meeting*, Washington D.C., 2014.
- Quinn, B. H., **Civjan, S. A.**, Breña, S. F., Allen, C. A. “Single Span Integral Abutment Bridge Response – Straight and Skew Alignments” *Transportation Research Board Annual Meeting*, Washington D.C. 2014.
- Civjan, S. A.**, Quinn, B. H., Breña, S. F., Allen, C. A. “Integral Abutment Data from Three Steel Girder Bridges”. *World Steel Bridge Symposium*. Toronto, ON, 2014.
- Bahjat, R., Ericson, D., **Breña, S. F.**, Civjan, S. A. “Evaluation of Moment Live-Load Distribution of a NEXT-F Beam Bridge through Field Load Testing and FE Modeling” *2014 PCI Annual Meeting and National Bridge Conference*. Washington D.C., September 2014.
- Alvarez, J.C.** and Breña, S.F. “Non-linear Modeling Parameters for Jacketed Columns Used in Seismic Rehabilitation of RC Buildings”. *ACI Special Session - Seismic Assessment of Existing Reinforced Concrete Buildings – New Developments*, ACI-2014 Spring Convention, Reno, NV, March 23-27, 2014.
- Rivera-Cruz, J.A.**, Breña, S.F., and Gerasimidis, S. “Analytical Evaluation on the Effect of Damage Location on Collapse Performance of Reinforced Concrete Perimeter Frames”, *Engineering Mechanics Institute Conference (EMI 2016)*, Nashville, TN, May 2016.
- Rivera-Cruz, J.A.** and Breña, S.F. “Evaluation on the Effect of Bottom Bar Splice Location on Performance of Beams in Reinforced Concrete Perimeter Frames”. *ACI Research in Progress Session, ACI-2017 Fall Convention*, Anaheim, CA, October 15-19, 2017.
- Al-Sammari, A.** and Breña, S.F. “A New Approach to Determine Debonding Strain Limit of FRP Sheets Anchored with FRP Spike Anchors”. *ACI Research in Progress Session, ACI-2018 Spring Convention*, Salt Lake City, UT, March 25-29, 2018.
- Tzortzinis, G.**, Gerasimidis, S., and Breña, S. “Computational Assessment of the Stability and Residual Capacity of Deteriorated Steel Beam Ends in Aged Bridges”, *Structural Stability Research Conference, SSRC 2018*.
- Rivera-Cruz, J.A.**, Breña, S.F., and Gerasimidis, S. “Evaluation on the Effect of Bottom Bar Splice Location on Performance of Beams in Reinforced Concrete Perimeter Frames”. *Engineering Mechanics Institute Conference (EMI 2018)*, Cambridge, MA, May 29-June 01, 2018.
- Tzortzinis, G.**, Knickle, B., Gerasimidis, S., and Breña, S. “Computational Assessment of the Stability and Residual Capacity of Deteriorated Steel Beam Ends in Aged Bridges”, *Structural Stability Research Conference, SSRC 2018*.
- Al-Sammari, A.**, Breña, S.F. “A New Approach to Determine Debonding Strain Limit of FRP Sheets Anchored with FRP Spike Anchors”, *ACI Open Paper Session, ACI-2018 Fall Convention*, Las Vegas, NV, October 13-18, 2018.
- Tzortzinis, G.**, Knickle, B., Gerasimidis, S., Bardow, A., and Breña, S. “Identification of Most Common Shapes and Location for Beam End Corrosion of Steel Girder Bridges”, *TRB Annual Meeting 2019*, Washington, DC, January 13-17, 2019.
- Al-Sammari, A.**, Breña, S.F. “A Procedure to Determine Anchorage Requirements of FRP Sheets Used to Strengthen RC Flexural Members”, *Structures Congress 2019*, Orlando, FL, April 24-27, 2019.

Tzortzinis, G., Knickle, B., Gerasimidis, S., Bardow, A., and Breña, S. “Development of Analytical Framework for Objective Resilience of Corroded Steel Bridges”, *Engineering Mechanics Institute Conference (EMI 2019)*, Pasadena, CA, June 18-21, 2019.

International Conferences

Breña S.F., “Rehabilitation Techniques Used in Reinforced Concrete Buildings in Mexico City” (in Spanish), *IX National Conference on Earthquake Engineering (Mexico)*, Manzanillo, Mexico, October 1991.

Breña S.F., Bramblett R.M., Wood S.L., and Kreger M.L., “Flexural Strengthening of Existing Reinforced Concrete Bridges Using Carbon Fiber Reinforced Polymer Composites,” *Structural Faults and Repair 2001*, London, England, July 4-6, 2001.

Breña S.F., Wood S.L., and Kreger M.L., “Fatigue Tests of Reinforced Concrete Beams Strengthened using Carbon Fiber Reinforced Polymer Composites,” *Second International Conference on Durability of Fibre Reinforced Polymer (FRP) Composites for Construction*, Montreal, Canada, May 29-31, 2002.

Schlick B.M. and **Breña S.F.**, “Seismic Rehabilitation of Reinforced Concrete Bridge Columns in Moderate Earthquake Regions using FRP Composites,” Poster Presentation, *13th World Conference on Earthquake Engineering*, Vancouver, B.C., August 1-6, 2004.

Gussenhoven R.B. and **Breña S.F.**, “Fatigue Behavior of Reinforced Concrete Beams Strengthened with Different FRP Laminate Configurations,” *7th International Symposium on Fiber Reinforced Polymer Reinforcement for Reinforced Concrete Structures (FRPRCS7)*, New Orleans, LA, 6-9 November 2005.

Niemitz, C. and Breña S.F., “Anchorage of Carbon Fiber-Reinforced Polymers to Reinforced Concrete in Shear Applications,” *Fall 2007 ACI Convention*, Fajardo, Puerto Rico, October 14-18, 2007.

Breña S.F., Fernández Ruiz M. and Muttoni A. “Applications of Stress Fields to Assess the Behavior and Strength of Coupling Beams Subjected to Seismic Actions,” *3rd International fib Congress*, Washington, D.C. May 29-June 2, 2010.

Invited Presentations (presenter in bold)

Breña S.F. and Bramblett R.M., “Flexural Strengthening of Existing Reinforced Concrete Bridges Using Carbon Fiber Reinforced Polymer Composites,” *Structures Seminar Series*, University of Texas at Austin, October 1999.

Breña S.F., Bramblett R.M., Wood S.L., and Kreger M.E., “Flexural Strengthening of Existing Reinforced Concrete Beams Using CFRP Composites,” *1999 State Conference - Structural Engineers Association of Texas*, Austin, Texas, October 1999.

Breña S.F., “Use of Carbon Fiber Reinforced Polymer Composites to Upgrade Existing Reinforced Concrete Bridges,” *Northeastern University – Graduate Seminar Series*, November 2003.

Breña S.F., “Performance of Reinforced Concrete Bridge Columns Retrofitted using FRP Composites,” *Institute of Transportation Engineers (ITE) – UMass Student Chapter*, April 2004.

Breña S.F., “Use of Composite Materials in Rehabilitation of Concrete Structures (in Spanish),” *Instituto de Ingeniería – National Autonomous University of Mexico (UNAM)*, July 2005.

Breña S.F. and **Civjan S.A.**, “Advanced Composite Materials for New England’s Transportation Infrastructure: A Study for Implementation and Synthesis of Technology and Practice,” *American Association of State Highway and Transportation Officials (AASHTO): Annual Meeting of Committee T-6 – Fiber Reinforced Composites*, Newport, RI, June 2005.

Civjan S.A., Bonczar C.H., Breña S.F., DeJong J.T, and Crovo D.S., “Integral Abutment Bridges: A Case Study and Parametric Analysis,” *Louisiana Structures Congress*, New Orleans, LA, September 2005.

Breña S.F., “Seismic Rehabilitation of Concrete Columns containing Short Lap Splices (in Spanish),” *Civil Engineering Department - Universidad Iberoamericana (Mexico City, Mex.)*, October 25, 2005.

Breña S.F., Civjan S.A. and Bonczar C., “Thermal Response of and Integral Abutment Bridge (in Spanish),” *Civil Engineering Department -Unviversidad Iberoamericana (Mexico City, Mex.)*, October 24, 2005.

Civjan S.A., Breña S. F., and Bonczar C. H. “Integral Abutment Bridge Behavior: Case Study and Parametric Analysis,” *Northeastern University -CEE Department Seminar*, Boston MA, March 29, 2007.

Breña, S.F., “Bridge Infrastructure Rehabilitation in the U.S. using Fiber-Reinforced Polymer Composites,” *Civil Engineering Seminar Series - Ecole Polytechnique Federale de Lausanne*, Lausanne, Switzerland, May 28, 2009.

Breña, S.F. “Integral Bridges: Recent Experiences in Switzerland and in the U.S.,” *Civil Engineering Seminar- Ecole Polytechnique Federale de Lausanne*, Lausanne, Switzerland, June 8, 2009.

Breña, S.F. “Evaluation of Bridge Performance and Rating through Non-destructive Load Testing,” Connecticut Department of Transportation, January 15, 2009.

Breña, S.F. “Observed Damage to Reinforced Concrete Buildings during the 2010 Chile Earthquake,” *Structural Engineering and Mechanics Seminar- University of Massachusetts*, Amherst, MA, April 30, 2010.

Civjan S. A., Allen, C. A., Kalayci, E., and Breña S. F. “Performance Monitoring of Jointless Bridges”, *NESGE Annual Meeting*. Burlington, VT, 2010.

Mones, R.M., and **Breña, S.F.** “Interfacial Strength between Prestressed Hollow Core Slabs and Cast-in-place Topping,” *Simpson, Gumpertz & Heger – In house presentation*, Waltham, MA, February 14, 2011.

Breña, S.F., Civjan, S.A. and Singh, A., “NEXT Beam Monitoring Project,” *PCI Northeast Bridge Technical Committee Meeting*, Sturbridge, MA, March 15, 2011.

Mones, R.M., and **Breña, S.F.** “Flexural and Shear Strength of Extruded Hollow Core Slabs with Cast-In-Place Field Topping,” *PCI Committee Days, Hollow Core Committee*, Chicago, IL, March 26, 2011.

Singh, A. **Breña, S.F.** and Civjan, S.A. “Field Monitoring of an Integral Prestressed Concrete Bridge in Massachusetts using NEXT Beams,” *PCI Committee Days, R&D Committee*, March 26, 2011.

Breña, S.F. “The 2011 Tohoku Earthquake: A Structural Engineering Success Story?” *Scientific Forum on the 2011 Japanese Earthquake and Tsunami*, University of Massachusetts, March 31, 2011.

Brena, S.F. and **Mones R.** “Field Monitoring of an Integral Prestressed Concrete Bridge in Massachusetts using NEXT Beams,” *R&D Session III, PCI Convention and National Bridge Conference*, Salt Lake City, UT, Oct 22-26, 2011.

Breña, S.F. “Perspectives on the Seismic Rehabilitation of Buildings in the U.S.(in Spanish),” *International Seminar: Rehabilitation and Repair of Historic Buildings, Current Situation and Future Challenges*, Catholic University of Valparaiso (Chile), November 9, 2011.

Breña, S.F. and Mones, R.M. “Interface Shear Strength of Hollow Core Slabs with Cast-in-place Toppings,” *61st Annual Concrete Conference*, University of Minnesota, December 8, 2011.

Breña, S.F. “Perspectives on the Seismic Rehabilitation of Buildings in the U.S.(in Spanish),” *International Seminar: Rehabilitation and Repair of Historic Buildings, Current Situation and Future Challenges -2*, Catholic University of Valparaiso (Chile), November 15, 2012.

Breña, S.F., Civjan, S.A., Singh, A., “Field Monitoring of an Integral Abutment Prestressed Concrete NEXT Beam Bridge in Massachusetts,” *PCI-Northeast: Bridge Tech Committee Meeting*, Publick House, Sturbridge, MA, June 5, 2012.

Breña, S.F., Civjan, S.A., Singh, A., “Field Monitoring of an Integral Abutment Prestressed Concrete NEXT Beam Bridge in Massachusetts,” *R&D Session, PCI Convention and National Bridge Conference*, Nashville, TN, Sept. 30- Oct. 2, 2012.

Castine, S., **Breña, S. F.**, and Civjan S. A. “Development of High-Early Strength Concrete for Accelerated Bridge Construction Closure Pours Connections” *PCI Bridge Technical Committee Meeting*. Sturbridge, MA, March 2015

Civjan, S. A. and Breña, S. F. “Integral Abutment Bridges Behavior and Design Observations from UMass Studies”, *First International Bridges Conference – Chile 2014, Future Challenges: Design, Construction and Maintenance*. Santiago, Chile, August 2014.

Civjan, S. A. and Breña, S. F. “Integral Abutment Bridges Behavior and Design Observations from UMass Studies”, *Universidad Católica de Valparaíso*. Valparaiso, Chile, August 2014.

Breña, S.F. “Observed Damage to Reinforced Concrete Buildings during the 2017 Puebla, Mexico Earthquake,” *EERI Seminar- Tufts University*, Medford, MA, November 27, 2017.

Breña, S.F. “Observed Damage to Reinforced Concrete Buildings during the 2017 Puebla, Mexico Earthquake,” *Structural Engineering and Mechanics Seminar- University of Massachusetts*, Amherst, MA, December 08, 2017.

Keynote Presentations

Civjan, S. A., Breña, S. F. “Keynote Lecture: Bridge Instrumentation Programs and Maintenance Issues from UMass Experiences”, *First International Bridges Conference – Chile 2014, Future Challenges: Design, Construction and Maintenance*. Santiago, Chile, August 2014.

Short Courses

Breña, S.F. and Foinquinos, R., “Curso Especialización Norma AASHTO LRFD para Diseño y Análisis Estructural de Puentes (Course on the AASHTO LRFD Code for Structural Design and Analysis of Bridges)”, Pontificia Universidad Católica de Valparaíso, Santiago, Chile, August 21-25, 2017.

Breña, S.F., “Diseño de Vigas de Puentes Simples de Concreto Presforzado (Prestressed Concrete Beam Design in Simple Bridges)”, *Universidad de Costa Rica*, San José, Costa Rica, May 11-13, 2016.

Breña, S.F., “Basic Prestressed Concrete Design”, *Precast/Prestressed Concrete Institute*, 2007-2012 (various dates and venues).

Breña, S.F., “Overview of Rehabilitation Techniques using FRP Composites”, *Rhode Island Department of Transportation*, 13 February 2009.

Summary

Sergio F. Breña has over 23 years of experience in laboratory and field testing of structures and structural systems. Additionally, he has over six years of structural design experience in projects involving rehabilitation of existing buildings to improve earthquake performance and structural design of underground structures and tunnel liners, among others. His research interests include design and behavior of reinforced and prestressed concrete structures, use of fiber-reinforced materials in civil infrastructure applications, and field performance of bridges and buildings. Recent projects include investigations on the use of fiber-reinforced composites to strengthen existing reinforced concrete beams and columns, design and behavior of structural concrete elements using strut-and-tie models, earthquake performance of coupling beams, field performance of integral abutment bridges, and live-load testing of existing bridges. After the M8.9 - 2010 Maule Earthquake (Chile), he was selected to participate with the ASCE/SEI reconnaissance team that traveled to the area affected by this large magnitude earthquake to document the performance of rehabilitated structures. He was also a member of the ACI reconnaissance team that travelled to Mexico City after the M7.1 2017 Puebla, Mexico Earthquake. He currently serves as a voting member of several committees of the American Concrete Institute (ACI), including subcommittees C and H of the *ACI 318 Building Code Committee* (ACI 318C - Safety, Serviceability, and Analysis; ACI 318H – Seismic Provisions), ACI 369 - Seismic Repair and Rehabilitation (chair of ACI 369F – Retrofit), and ACI 374 - Performance Based Seismic Design of Concrete Buildings. A member of the Precast/Prestressed Concrete Institute (PCI), he is past-chair of the PCI Student Education Committee and currently serves as a voting member of the PCI Design Handbook Committee and the PCI Design Specification Committee.