

## **ANDRES LEPAGE, Ph.D., P.E., S.E., FACI**

Associate Professor – Director of Laboratories  
Civil, Environmental & Architectural Engineering  
The University of Kansas  
School of Engineering  
2150 Learned Hall, 1530 W. 15<sup>th</sup> St.  
Lawrence, KS 66045-7608  
Phone: 785-864-6848, Fax: 785-864-5631, E-mail: alepage@ku.edu



## **EDUCATION**

**Ph.D.**, Civil Engineering, 1997  
University of Illinois, Urbana-Champaign, Illinois

**M.S.**, Civil Engineering, 1991  
Universidad Simón Bolívar, Caracas, Venezuela

**B.S.**, Civil Engineering, 1987  
Universidad Rafael Urdaneta, Maracaibo, Venezuela

## **PROFESSIONAL REGISTRATION**

**S.E.**, Registered Structural Engineer, 2003 – Present  
State of Washington

**P.E.**, Registered Professional Engineer, 1998 – Present  
State of Washington

**P.E.**, Registered Professional Engineer, 1987 – Present  
Venezuela

## **HONORS AND AWARDS**

**Miller Scholar** (2015), School of Engineering, The University of Kansas.

**Outstanding Faculty Award** (2013), Earthquake Engineering Research Institute (EERI) and Structural Engineers Association (SEA) Student Chapters, College of Engineering, Penn State University.

**Fellow** (2007), American Concrete Institute.

**Teaching Excellence Award** (1990), Universidad Católica Andrés Bello, Caracas, Venezuela, Civil Engineering Class of 1990.

**Academic Excellence Award** (1988), Universidad Rafael Urdaneta, Maracaibo, Venezuela, Decade-Best Grade-Point Average, Special Award Celebrating the Tenth Anniversary of the School of Civil Engineering.

**ACADEMIC EXPERIENCE**

**Associate Professor and Director of Laboratories** (July 2015 – Present)

Department of Civil, Environmental and Architectural Engineering  
The University of Kansas, Lawrence, Kansas

**Associate Professor** (August 2013 – June 2015)

Department of Civil, Environmental and Architectural Engineering  
The University of Kansas, Lawrence, Kansas

**Assistant Professor** (January 2006 – June 2013)

Department of Architectural Engineering  
Penn State University, University Park, Pennsylvania

**Adjunct Professor** (March 2000 – June 2000)

Department of Civil and Environmental Engineering  
Seattle University, Seattle, Washington

**Research Assistant** (January 1995 – September 1996)

School of Civil Engineering  
Purdue University, West Lafayette, Indiana

**Teaching Assistant** (January 1993 – December 1994)

Department of Civil and Environmental Engineering  
The University of Illinois, Urbana-Champaign, Illinois

**Adjunct Professor** (July 1991 – December 1991)

Department of Civil Engineering  
La Universidad del Zulia, Maracaibo, Venezuela

**Adjunct Professor** (July 1989 – December 1989)

Department of Civil Engineering  
Universidad Católica Andrés Bello, Caracas, Venezuela

**TEACHING EXPERIENCE**

**A. Department of Civil, Environmental and Architectural Engineering, The University of Kansas, Lawrence, Kansas, August 2013 – Present**

Undergraduate:

CE 563 – Design of Reinforced Concrete Structures

Graduate:

CE 761 – Matrix Analysis of Framed Structures

**B. Department of Architectural Engineering, Penn State University, University Park, Pennsylvania, January 2006 – June 2013**

Undergraduate:

AE 124S – Introduction to Architectural Engineering

AE 402 – Design of Concrete Structures for Buildings

AE 431 – Advanced Concrete Design for Buildings

AE 481W – Comprehensive Architectural Engineering Senior Project I (Co-Taught)

AE 482 – Comprehensive Architectural Engineering Senior Project II (Co-Taught)

Graduate:

AE 530 – Computer Modeling of Building Structures

**C. Department of Civil and Environmental Engineering, Seattle University, Seattle, Washington, March 2000 – June 2000**

Undergraduate:

CEEGR 221 – Mechanics of Materials I

**D. Department of Civil and Environmental Engineering, The University of Illinois, Urbana-Champaign, Illinois, January 1993 – December 1994**

Graduate:

CE 398SA – Structural Analysis Special Topics (Computer Laboratory Sessions)

**E. Department of Civil Engineering, La Universidad del Zulia, Maracaibo, Venezuela, July 1991 – December 1991**

Undergraduate:

Reinforced Concrete I

**F. Department of Civil Engineering, Universidad Católica Andrés Bello, Caracas, Venezuela, July 1989 – December 1989**

Undergraduate:

Reinforced Concrete I

**RESEARCH EXPERIENCE****Selected Research Projects**

1. Title: *Cyclic Response of Concrete Coupling Beams Reinforced with High-Strength Steel Bars*  
Sponsor: MMFX Technologies Corporation  
Budget: \$20,000  
Date: June 2015 – June 2016  
(Principal Investigator)
2. Title: *High-Strength Steel Bars in Reinforced Concrete Walls: Influence of Mechanical Properties of Steel on Deformation Capacity*  
Sponsor: The Charles Pankow Foundation  
Budget: \$112,000  
Date: November 2014 – October 2016  
(Principal Investigator)
3. Title: *Use of Headed Bars as Shear Reinforcement*  
Sponsor: Electric Power Research Institute  
Budget: \$400,000  
Date: August 2014 – August 2017  
(Co-Principal Investigator)
4. Title: *Guide for Limit Design of Reinforced Masonry Walls*  
Sponsor: The NCMA Education and Research Foundation  
Budget: \$149,941  
Date: August 2012 – December 2013  
(Principal Investigator)
5. Title: *Flexural Strength and Deformation Capacity of Concrete Beams, Columns, and Walls Reinforced with High-Strength Reinforcement*  
Sponsor: Applied Technology Council (ATC)  
Budget: \$21,000  
Date: September 2011 – September 2013  
(Principal Investigator)
6. Title: *Cyclic Response of Concrete Members Reinforced with Advanced High-Strength Steel Bars*  
Sponsor: SAS Stressteel, Inc.  
Budget: \$73,209  
Date: January 2011 – December 2012  
(Principal Investigator)

7. Title: *Limit Analysis for Limit Design of Reinforced Masonry Walls*  
Sponsor: The NCMA Education and Research Foundation  
Budget: \$72,766  
Date: August 2010 – July 2012  
(Principal Investigator)
8. Title: *Development of Structural Engineering Analysis and Design Method and Experimental Evaluation of Bolt-A-Blok Masonry Wall Systems for Residential and Commercial Buildings – Phase II*  
Sponsor: Bolt-A-Blok, Inc.  
Budget: \$60,000  
Date: February 2010 – December 2011  
(Co-Principal Investigator)
9. Title: *Limit Design of Special Masonry Shear Walls Used as the Primary Seismic Force-Resisting System in Buildings – Development of Trial Designs*  
Sponsor: KPFF Consulting Engineers.  
Budget: \$15,000  
Date: October 2010 – June 2010  
(Principal Investigator)
10. Title: *Development of Guidelines for Structural Engineering Analysis and Design of Bolt-A-Blok Masonry Wall Systems – Phase I: Wall Component Design*  
Sponsor: Bolt-A-Blok, Inc.  
Budget: \$55,000  
Date: January 2009 – June 2009  
(Co-Principal Investigator)
11. Title: *Limit Design of Special Masonry Shear Walls Used as the Primary Seismic Force-Resisting System in Buildings – Development of Code Change Proposal*  
Sponsor: KPFF Consulting Engineers.  
Budget: \$15,000  
Date: January 2009 – September 2009  
(Principal Investigator)

### **Graduate Student Supervision**

#### **Ph.D. Students**

1. E. A. Burgos, Thesis Topic: *High-Performance Earthquake-Resistant Structures*, Ph.D. in Civil Engineering, The University of Kansas, completion expected August 2018. (Chair)

2. A. S. Weber-Kamin, Thesis Topic: *Cyclic Response of RC Coupling Beams with High-Performance Steel Bars and Fibers*, Ph.D. in Civil Engineering, The University of Kansas, completion expected August 2017. (Chair)
3. M. S. Huq, Thesis Topic: *Deformation Capacities of Slender RC Structural Walls with High-Strength Steel Bars*, Ph.D. in Civil Engineering, The University of Kansas, completion expected December 2016. (Co-Chair)
4. S. Ameen, Thesis Topic: *Cyclic Response of RC Coupling Beams with Diagonal High-Strength Steel Bars*, Ph.D. in Civil Engineering, The University of Kansas, completion expected December 2016. (Co-Chair)
5. H. Tavallali, Thesis Title: *Cyclic Response of Concrete Beams Reinforced with Ultrahigh Strength Steel*, Ph.D. in Architectural Engineering, Penn State University, completed August 2011. (Chair)

#### **Master of Science/Engineering Students**

6. E. A. Guillén, Thesis Topic: *Analytical Models for the Nonlinear Seismic Response of Reinforced Concrete Shear Walls*, M.S. in Civil Engineering, The University of Kansas, completion expected August 2017. (Chair)
7. A. Almarshad, Thesis Topic: *Displacement Estimation of Base Excited Structures Using Acceleration and Strain Measurements*, M.S. in Civil Engineering, The University of Kansas, completion expected December 2016. (Chair)
8. A Suwal, Thesis Topic: *Evaluation of Modeling Parameters in ASCE-41 for the Nonlinear Dynamic Analysis of RC Buildings*, M.S. in Civil Engineering, University of Texas – San Antonio, completion expected December 2015. (Co-Chair)
9. B. S. Frederick, Thesis Title: *Evaluation of Limit Design for Earthquake-Resistant Masonry Walls*, M.S. in Architectural Engineering, Penn State University, completed July 2014. (Co-Chair)
10. K. Tretiakova, Thesis Title: *Cyclic Response of Concrete Columns Reinforced with SAS 670 Steel Bars*, M.S. in Architectural Engineering, Penn State University, completed August 2013. (Chair)
11. R. E. Sanchez, Thesis Title: *Limit Design of Earthquake-Resistant Masonry Walls*, M.S. in Architectural Engineering, Penn State University, completed August 2012. (Chair)
12. S. J. Pfund, Thesis Title: *Cyclic Response of Concrete Beams Reinforced with ASTM A1035 Grade 120 Steel Bars*, M.S. in Architectural Engineering, Penn State University, completed August 2012. (Chair)

13. H. Ota, Thesis Title: *Experimental Study of Mortarless Post-Tensioned Masonry Walls and Development of Design Guidelines*, M.S. in Architectural Engineering, Penn State University, completed August 2011. (Co-Chair)
14. J. M. Shoemaker, Thesis Title: *Acceleration Response of Rigid and Flexible Nonstructural Components in Buildings Subjected to Strong Ground Motions*, M.S. in Architectural Engineering, Penn State University, completed December 2010. (Chair)
15. M. W. Hopper, Thesis Title: *Analytical Models for the Nonlinear Seismic Response of Reinforced Concrete Frames*, M.S. in Architectural Engineering, Penn State University, completed December 2009. (Chair)
16. J. Setthachayanon, Project Title: *An Experimental Study of Autoclaved Aerated Concrete Lintels Strengthened with Externally Bonded Glass FRP*, M.Eng. in Architectural Engineering, Penn State University, completed December 2009. (Co-Chair)

#### **Visiting Scholar Supervision**

1. S. Delgado, Project Title: *Analysis of Framed Structures Subjected to Overloads*, Ph.D. Candidate at Universidad de los Andes (Mérida, Venezuela), Visiting Scholar at Penn State University, August 2007 to September 2008. (Co-Chair)

#### **Undergraduate Student Supervision**

##### **Honors Theses**

1. J. Wiest, Thesis Title: *Judicial Center Annex in Rockville, MD*, B.A.E/M.A.E, Architectural Engineering, Penn State University, completed August 2012. (Chair)
2. K. Gromowski, Thesis Title: *Papadakis Integrated Sciences Building at Drexel University, Philadelphia, PA*, B.A.E/M.A.E, Architectural Engineering, Penn State University, completed May 2011. (Chair)
3. K. McKitish, Thesis Title: *Redesign of House of Sweden in Georgetown, Washington, D.C.*, B.A.E/M.A.E, Architectural Engineering, Penn State University, completed December 2009. (Chair)
4. M. Hopper, Thesis Title: *John Jay College Expansion in New York City*, B.A.E, Architectural Engineering, Penn State University, completed December 2009. (Chair)

5. L. Lynch, Thesis Title: *Redesign of Aquablue at the Golden Mile in Hato Rey, Puerto Rico*, B.A.E/M.A.E, Architectural Engineering, Penn State University, completed May 2009. (Chair)
6. A. Bradford, Thesis Title: *Optimization of Building Systems and Processes for the Center for Science and Medicine in New York City*, B.A.E/M.A.E, Architectural Engineering, Penn State University, completed May 2008. (Chair)
7. M. Longenecker, Thesis Title: *Alternative Lateral-Resisting Systems for Whiteland Village in Exton, PA*, B.A.E/M.A.E, Architectural Engineering, Penn State University, completed December 2007. (Chair)

## PUBLICATIONS

### Peer-Reviewed Major Publications

1. Cheng, M. Y., Hung, S. C., Lequesne, R. D., Lepage, A. (2015). "Earthquake-Resistant Squat Walls Reinforced with High-Strength Steel", *ACI Structural Journal*, American Concrete Institute, 38 pp. (Submitted – In Review).
2. Cheng, M. Y., Wibowo, L. S. B., Lequesne, R. D., Lepage, A., and Giduquio, M. B. (2015). "Deformation Capacity and Strength of RC Frame Members with High-Strength Materials", *ACI SP, Special Publication Honoring J. K. Wight*, American Concrete Institute, Farmington Hills, Michigan, 18 pp. (In Press).
3. Tavallali, H., Lepage, A., Rautenberg, J. M., and Pujol, S. (2014). "Concrete Beams Reinforced with High-Strength Steel Subjected to Displacement Reversals", *ACI Structural Journal*, American Concrete Institute, 111(5), 1037-1048.
4. Geschwindner, L. F., and Lepage A. (2013). "Notes on the Nodal and Relative Lateral Stability Bracing Requirements of AISC 360", *AISC Engineering Journal*, American Institute of Steel Construction, 50(3), 169-179.
5. Rautenberg, J., Pujol, S., Tavallali, H., and Lepage, A. (2013). "Drift Capacity of Concrete Columns Reinforced with High-Strength Steel", *ACI Structural Journal*, American Concrete Institute, 110(2), 307-318.
6. Lepage, A., and Sanchez, R. E. (2012). "Practical Nonlinear Analysis for Limit Design of Reinforced Masonry Walls", *The Open Civil Engineering Journal*, Bentham Science Publishers, 2012(6), 107-118.
7. Lepage, A., Shoemaker, J. M., and Memari, A. M. (2012) "Accelerations of Nonstructural Components during Nonlinear Seismic Response of Multistory Structures", *Journal of Architectural Engineering*, American Society of Civil Engineers, 18(4), 285-297.



8. Song, C., Pujol, S., and Lepage, A. (2012). "The Collapse of the Alto Rio Building during the 27 February 2010 Maule, Chile, Earthquake", *Earthquake Spectra*, Earthquake Engineering Research Institute, 28(S1), S301-S334.
9. Lepage, A., Tavallali, H., Pujol, S., and Rautenberg, J. (2012). "High-Performance Steel Bars and Fibers as Concrete Reinforcement for Seismic-Resistant Frames", *Advances in Civil Engineering Journal*, Hindawi Publishing Corporation, Volume 2012, Article ID 450981, 13 pp.
10. Rautenberg, J., Pujol, S., Tavallali, H., and Lepage, A. (2012) "Reconsidering the Use of High-Strength Reinforcement in Concrete Columns", *Engineering Structures*, Elsevier, 37(4), 135-142.
11. Memari, A. M., Lepage, A., and Setthachayanon, J. (2010). "An Experimental Study of Autoclaved Aerated Concrete Lintels Strengthened with Externally Bonded Glass FRP", *Journal of Reinforced Plastics and Composites*, SAGE Publications, 29(22), 3322-3337.
12. ACI Innovation Task Group 6. (2010). "Design Guide for the Use of ASTM A1035/A1035M Grade 100 (690) Steel Bars for Structural Concrete (ITG-6R-10)", American Concrete Institute, Farmington Hills, Michigan, 90 pp.
13. Lepage, A., Hopper, M. W., Delgado, S. A., Dragovich, J. J. (2010). "Best-Fit Models for Nonlinear Seismic Response of Reinforced Concrete Frames", *Engineering Structures*, 32(9), 2931-2939.
14. Dragovich, J. J., and Lepage, A. (2009). "FDE Index for Goodness-of-Fit between Measured and Calculated Response Signals", *Earthquake Engineering and Structural Dynamics*, 38(15), 1751-1758.
15. Browning, J., Warden, B., Matamoros, A., and Lepage, A. (2008). "Global and Local Seismic Drift Estimates for RC Frames", *Engineering Structures*, 30(5), 1262-1271.
16. Lepage, A., and Delgado, S. A. (2008). "Optimal Hysteresis Model Parameters for the Seismic Response of Reinforced Concrete Frames", *Revista Técnica de la Facultad de Ingeniería Universidad del Zulia*, 31(3), 284-293. (ISSN 0254-0770)
17. ACI Innovation Task Group 4 and Other Contributors. (2007). "Structural Design and Detailing for High-Strength Concrete in Moderate to High Seismic Applications, (ACI ITG-4.3R-07)", American Concrete Institute, Farmington Hills, Michigan, 62 pp.
18. Hueste, M. B. D., Browning J., Lepage A., and Wallace, J. W. (2007). "Seismic Design Criteria for Slab-Column Connections", *ACI Structural Journal*, American Concrete Institute, 104(4), 448-458.

19. ACI Innovation Task Group 4 and Other Contributors. (2007). "Specification for High-Strength Concrete in Moderate to High Seismic Applications – An ACI Standard (ACI ITG-4.1-07)", American Concrete Institute, Farmington Hills, Michigan, 10 pp.
20. Boggs, D., and Lepage A. (2006). "Wind Tunnel Methods", SP-240 (CD) Performance-Based Design of Concrete Buildings for Wind Loads. Special Publication Sponsored by ACI Committee 375, American Concrete Institute, Farmington Hills, Michigan, pp. 125-142.
21. ACI Innovation Task Group 4 and Other Contributors. (2006). "Materials and Quality Considerations for High-Strength Concrete in Moderate to High Seismic Applications (ACI ITG-4.2R-06)", American Concrete Institute, Farmington Hills, Michigan, 26 pp.
22. Matamoros, A., Garcia, L. E., Browning, J., and Lepage, A. (2004). "Flat-Rate Design Method for Low- and Medium-Rise RC Structures", ACI Structural Journal, American Concrete Institute, 101(4), 435-446.

#### **Peer-Reviewed Conference Proceedings**

1. Dill, S., Lepage, A., Frederick, B., Hochwalt, J. (2014). "Limit Design of Earthquake-Resistant Masonry", 9th International Masonry Conference, Guimarães, Portugal, July 7-9, 9 pp.
2. Kelly, D. J., Lepage, A., Mar, D., Restrepo, J. I., Sanders, J. C., and Taylor, A. W. (2014). "Use of High-Strength Reinforcement for Earthquake-Resistant Concrete Structures", Tenth U.S. National Conference on Earthquake Engineering, July 21-25, 11 pp.
3. Tavallali, H., Lepage, A., Rautenberg, J., and Pujol, S. (2011). "Drift Limits of Concrete Frame Members Reinforced with High-Performance Steel Bars and Fibers", Sixth International RILEM Conference on High Performance Fiber Reinforced Cement Composites (HPFRCC 6), RILEM Bookseries, Volume 2, Springer, pp. 329-337.
4. Lepage, A., Dill, S., Haapala, M., and Sanchez, R. (2011). "Seismic Design of Reinforced Masonry Walls: Current Methods and Proposed Limit-Design Alternative", Eleventh North American Masonry Conference, Minneapolis, Minnesota, June 5-8, 13 pp.
5. Tavallali, H., Lepage, A., Rautenberg, J., Pujol, S. (2011). "Cyclic Response of Concrete Frame Members Reinforced with Ultrahigh Strength Steel", ASCE/SEI 2011 Structures Congress, Las Vegas, Nevada, April 14-16, 11 pp.

6. Lepage, A., Shoemaker, J. M., and Memari, A. M. (2011). "Demands on Nonstructural Components during Nonlinear Seismic Response of Multistory Structures", Proceedings of Architectural Engineering Conference, Oakland, California, March 30-April 2, 8 pp.
7. Rautenberg, J., Pujol, S., Tavallali, H., and Lepage, A. (2010). "Cyclic Response of Concrete Columns Reinforced with High-Strength Steel", Proceedings of the Ninth US National and Tenth Canadian Conference on Earthquake Engineering, Toronto, Canada, July 25-29, 9 pp.
8. Lepage, A., Tavallali, H., Pujol, S., and Rautenberg, J. (2008). "Towards Earthquake-Resistant Concrete Structures with Ultra High-Strength Steel Reinforcement", Proceedings of the Fourteenth World Conference on Earthquake Engineering, Beijing, China, October 12-17, 8 pp.
9. Lepage, A., Delgado, S. A., and Dragovich, J. J. (2008). "Appropriate Models for Practical Nonlinear Dynamic Analysis of Reinforced Concrete Frames", Proceedings of the Fourteenth World Conference on Earthquake Engineering, Beijing, China, October 12-17, 8 pp.
10. Lepage, A., Neuman, S. L., and Dragovich, J. J. (2006). "Practical Modeling for Nonlinear Seismic Response of RC Wall Structures", Proceedings of the Eighth National Conference on Earthquake Engineering, San Francisco, California, April 18-22, 10 pp.
11. Warden, B., Browning, J., Matamoros, A., and Lepage, A., (2006). "Correlating Nonlinear Response with Approximate Linear Analysis", Proceedings of the Eighth National Conference on Earthquake Engineering, San Francisco, California, April 18-22, 10 pp.
12. Lepage, A., Aschheim, M., and Senescu, R. (2004). "Shear-Yielding Steel Outriggers for High-Rise Construction", Thirteenth World Conference on Earthquake Engineering, Vancouver, Canada, August 1-6, 12 pp.
13. Lepage, A. (1998). "Nonlinear Drift of Multistory RC Structures during Earthquakes", Sixth National Conference on Earthquake Engineering, Seattle, Washington, May 31-June 4, 12 pp.
14. Sozen, M. A., and Lepage, A. (1996). "Earthquake-Resistant Design in Regions of Moderate Seismicity", Second International Symposium on Civil Infrastructure Systems, Hong Kong, China, December 9-12, 6 pp.
15. Lepage, A. (1996). "Seismic Drift Estimates for RC Structures", Eleventh World Conference on Earthquake Engineering, Acapulco, Mexico, June 23-26, 8 pp.

**Technical Reports and Other Publications**

1. Sperry, J., Al-Yasso, S., Searle, N., DeRubeis, M., Darwin, D., O'Reilly, M., Matamoros, A., Feldman, L., Lepage, A., Lequesne, R., Ajaam, A. (2015). "Anchorage of High-Strength Reinforcing Bars with Standard Hooks". Structural Engineering and Engineering Materials, SM Report No. 111, The University of Kansas, June, 244 pp.
2. Kelly, D. J., Darwin, D., Fields, D. C., Frosch, R. J., Lepage, A., Sanders, J. C., Whittaker, A. (2014). "Roadmap for the Use of High-Strength Reinforcement in Reinforced Concrete Design, ATC-115, Applied Technology Council, 197 pp.
3. Frederick, B. S., and Lepage, A. (2014). "Examples for the Use of Limit Design Following Appendix C of TMS 402-13". Final Report to the National Concrete Masonry Association (NCMA), July, 155 pp.
4. Kelly, D. J., Lepage, A., Mar, D., Restrepo, J. I., Sanders, J. C., and Taylor, A. W. (2014). "Use of High-Strength Reinforcement in Earthquake-Resistant Concrete Structures (NIST GCR 14-917-30)". Prepared by NEHRP, ATC, and CUREE for NIST, National Institute of Standards and Technology, Gaithersburg, Maryland, 230 pp.
5. Dill, S., and Lepage, A. (2013). "To the Limit: Alternative Design Approach for Earthquake-Resistant Masonry", Smart Dynamics of Masonry Magazine, Spring, 2 pp.
6. Tretiakova, K., and Lepage, A. (2013). "Cyclic Response of Concrete Columns Reinforced with Ultrahigh Strength Steel Bars (SAS Stressteel Grade 97)". Final Report to SAS Stressteel Inc., August, 153 pp.
7. Sanchez, R. E., and Lepage, A. (2012). "Limit Analysis for Limit Design of Reinforced Masonry Walls". Final Report to the National Concrete Masonry Association (NCMA), August, 299 pp.
8. Memari, A. M., Ota, H., and Lepage, A. (2011). "Structural Analysis and Design of Bolt-A-Blok Wall Systems, Phase II: Structural Testing and Simplified Design Guidelines". Final Report to Bolt-A-Blok Inc., September, 275 pp.
9. Lepage, A., and Sanchez, R. E. (2011). "A Primer on Limit Analysis for Limit Design of Reinforced Masonry Walls". Preliminary Report to the National Concrete Masonry Association (NCMA), August, 42 pp.
10. Tavallali, H., and Lepage, A. (2011). "Cyclic Response of Concrete Beams Reinforced with Ultrahigh Strength Steel Bars (SAS Stressteel Grade 97)". Final Report to SAS Stressteel Inc., August, 310 pp.
11. Lepage, A., and Sanchez, R. E. (2011). "Analytical Tools for Limit Design of Shear Walls", Concrete Masonry Designs Magazine, May/June, 1 p.

12. Memari, A.M., and Lepage, A. (2011). "Introduction of an Innovative Bolted Mortarless Concrete Masonry System: Review of Preliminary Test Data and Strength Evaluation", Part of Book, *Advances in Materials Science Research*, Editor: Maryann C. Wythers, Nova Publishers, Volume 4, Chapter 3, pp. 91-144.
13. Memari, A. M., and Lepage, A. (2010). "Structural Analysis and Design of Bolt-A-Blok Wall Systems, Phase I: An Exploratory Study". Final Report to Bolt-A-Blok Inc., February, 130 pp.
14. Lepage, A. (2005). Discussion of "Proposed Revisions to ACI 318-02, Building Code Requirements for Structural Concrete and Commentary", *Concrete International*, 27(3), 169-173.
15. Browning, J., and Lepage, A. (1999). Discussion of "Nonlinear Analyses of an Instrumented Structure Damaged in the 1994 Northridge Earthquake (by Li, Y., and Jirsa, J. O.)", *Earthquake Spectra*, 15(1), 175-179.
16. Lepage, A. (1996). "A Method for Drift-Control in Earthquake-Resistant Design of RC Building Structures", Ph.D. Thesis Submitted to the Graduate College of the University of Illinois, Urbana-Champaign, Illinois, 251 pp.
17. Lepage, A. (1991). "Evaluación de Métodos para el Diseño de Columnas Rectangulares de Concreto Armado en Flexión Biaxial", Master of Science Thesis Submitted to the Universidad Simón Bolívar, Caracas, Venezuela, 178 pp.

#### **Technical Presentations**

1. Matamoros, A., Suwal, A., and Lepage, A. "Collapse Simulation of RC Moment Frame Building". 2<sup>nd</sup> JCI & ACI Joint Seminar, Resilience of Concrete Structures, JCI 50<sup>th</sup> Anniversary Commemorative Symposium, July 13, 2015, Tokyo, Japan. [Presented by Matamoros]
2. Lepage, A., and Dill, S. "Limit Design of Reinforced Masonry Walls: Design Examples". ASCE Structures Congress, Track 8: Masonry Topics, April 25, 2015 [Presented by Dill]
3. Lepage, A., and Dill, S. "Limit Design of Reinforced Masonry Walls: A New Seismic Design Alternative". ASCE Structures Congress, Track 8: Masonry Topics, April 25, 2015 [Presenter]
4. Cheng, M. Y., Lequesne, R., and Lepage, A. "Deformation Capacity and Strength of RC Frame Members Constructed with High-Strength Materials", American Concrete Institute, Fall Convention, J. K. Wight Honoring Session: A Tribute from His Students and Colleagues, October 27, 2014 [Presented by Cheng]
5. Lepage, A., and Dill, S. "Limit Design of Reinforced Masonry Walls". The Masonry Society Annual Meeting, General Session, October 11, 2014 [Presenter]

6. Kelly, D. J., Lepage, A., Mar, D., Restrepo, J. I., Sanders, J. C., and Taylor, A. W. "Use of High-Strength Reinforcement for Earthquake-Resistant Concrete Structures", Tenth U.S. National Conference on Earthquake Engineering, July 21-25, 2014 [Presented by Kelly]
7. Dill, S., Lepage, A., Frederick, B., Hochwalt, J. "Limit Design of Earthquake-Resistant Masonry", 9th International Masonry Conference, Guimarães, Portugal, July 7-9, 2014 [Presented by Dill]
8. Lepage, A. "Limit Design of Masonry", The University of Kansas Civil, Environmental and Architectural Engineering Professional Development Series, Kansas City, Missouri, April 14, 2014. [Presenter]
9. Kelly, D. J., Lepage, A., Mar, D., Restrepo, J. I., Sanders, J. C., and Taylor, A. W. "Use of High-Strength Reinforcement for Earthquake-Resistant Concrete Structures", Hot Topic Session: High-Strength Reinforcing Bars—Balancing Design Requirements with Achievable Material Properties, October 20, 2013 [Presented by Kelly]
10. Lepage, A. "Flexural Strength of Beams, Columns, and Walls with High-Strength Reinforcement, and Required Usable Strain", Workshop on Use of High-Strength Reinforcement in Seismic Applications, Sponsored by ATC-98 Project Technical Committee, Applied Technology Council, San Francisco, California, November 8, 2012. [Presenter]
11. Lepage, A. "Deformation Capacity of Special Reinforced Masonry Walls Using Limit Design", Webinar on the Proposed Provisions for New MSJC Appendix on Masonry Limit Design, Sponsored by the Masonry Standards Joint Committee (MSJC), July 18, 2011. [Presenter]
12. Tavallali, H., Lepage, A., Rautenberg, J., and Pujol, S. (2011). "Drift Limits of Concrete Frame Members Reinforced with High-Performance Steel Bars and Fibers", 6th Workshop on High-Performance Fiber Reinforced Cement Composites, Ann Arbor, Michigan, June 20. [Presenter]
13. Lepage, A., Dill, S., Haapala, M., and Sanchez, R. E. (2011). "Seismic Design of Reinforced Masonry Walls: Current Methods and Proposed Limit-Design Alternative", Eleventh North American Masonry Conference, Minneapolis, Minnesota, June 6. [Presented by Haapala]
14. Lepage, A., Shoemaker, J. M., and Memari, A. M. (2011). "Demands on Nonstructural Components during Nonlinear Seismic Response of Multistory Structures", Architectural Engineering Conference, Oakland, California, April 1. [Presented by Shoemaker]
15. Tavallali, H., Lepage, A., Rautenberg, J., Pujol, S. (2011). "Cyclic Response of Concrete Frame Members Reinforced with Ultrahigh Strength Steel", ASCE/SEI 2011 Structures Congress, Las Vegas, Nevada, April 16. [Presented by Tavallali]

16. Rautenberg, J., Pujol, S., Tavallali, H., and Lepage, A. (2011). "Cyclic Response of Concrete Frame Members Reinforced with Ultrahigh Strength Steel", Structural Engineering Graduate Student Seminars, Penn State University, Department of Civil Engineering, University Park, Pennsylvania, March 22. [Presented by Tavallali]
17. Tavallali, H., Lepage, A., Rautenberg, J., Pujol, S. (2010). "Ultrahigh Strength Steel: A Viable Option for Seismic Design of Concrete Beams", EERI Student Chapter Speaker Series, Penn State University, University Park, Pennsylvania, December 2. [Presented by Tavallali]
18. Lepage, A., Shoemaker, J. M., and Memari, A. M. (2010). "Demands on Nonstructural Components During Nonlinear Seismic Response of Multistory Structures", Structural Engineering Graduate Student Seminars, Purdue University, School of Civil Engineering, West Lafayette, Indiana, November 23. [Presenter]
19. Zia, P., Ghosh, S. K., Lepage, A., Lubell, A. S., Luttrell, K. A., Mast, R. F., Paulson, C., Russell, H. G., and Sanders, J. C. (2010). "ITG-6: High-Strength Reinforcing Bar", American Concrete Institute, Fall Convention, Special Technical Session, Pittsburgh, Pennsylvania, October 24. [Presented by Zia]
20. Rautenberg, J., Pujol, S., Tavallali, H., and Lepage, A. (2010). "Cyclic Response of Concrete Members Reinforced with High-Strength Steel", American Concrete Institute, Fall Convention, Special Technical Session, Pittsburgh, Pennsylvania, October 26. [Presenter]
21. Lepage, A., Dill, S., Haapala, M. W., and Sanchez, R. E. (2010). "Design of Special Reinforced Masonry Shear Walls: Current Methods and Proposed Limit-Design Alternative", The Masonry Society's 2010 Annual Meeting, General Session, Bellevue, Washington, October 16. [Presenter]
22. Rautenberg, J., Pujol, S., Tavallali, H., and Lepage, A. (2010). "Cyclic Response of Concrete Columns Reinforced with High-Strength Steel", Ninth US National and Tenth Canadian Conference on Earthquake Engineering, Toronto, Canada, July 27. [Presented by Rautenberg]
23. Tavallali, H., Lepage, A., Rautenberg, J., and Pujol, S. (2009). "Behavior of Ultrahigh Strength Steel Reinforced Concrete Members Subjected to Large Deflection Reversals", American Concrete Institute, Fall Convention, Special Technical Session, New Orleans, Louisiana, November 9. [Presented by Tavallali]
24. Lepage, A., and Delgado, S. A. (2008). "A Shot in the Dark: Use of Nonlinear Dynamic Analysis for Computing the Seismic Response of Reinforced Concrete Structures", Structural Engineering Graduate Student Seminars, Penn State University, Department of Civil Engineering, University Park, Pennsylvania, April 9. [Presenter]

25. Lepage, A., and Delgado, S. A. (2008). "Optimal Hysteresis Model Parameters for the Seismic Response of Reinforced Concrete Frames", American Concrete Institute, Spring Convention, Special Technical Session, Los Angeles, California, March 31. [Presenter]
26. Ghosh, S. K., Bracci, J. M., Caldarone, M. A., Harman, D. K., Jansen, D. C., Matamoros, A., Taylor, A. W., Kelly, D. J., Lepage, A., and Russell, H. G., (2006). "High-Strength Concrete in Moderate to High Seismic Applications (ACI ITG 4)", American Concrete Institute, Fall Convention, Special Technical Session, Denver, Colorado, November 7. [Presented by Ghosh]
27. Boggs, D., and Lepage A. (2006). "Wind Tunnel Methods", American Concrete Institute, Fall Convention, Special Technical Session, San Francisco, California, October. [Presented by Boggs]
28. Lepage, A., Neuman, S. L., and Dragovich, J. J. (2006). "Practical Modeling for Nonlinear Seismic Response of RC Wall Structures", Eighth National Conference on Earthquake Engineering, San Francisco, California, April 20. [Presenter]
29. Warden, B., Browning, J., Matamoros, A., and Lepage, A. (2006) "Correlating Nonlinear Response with Approximate Linear Analysis", Eighth National Conference on Earthquake Engineering, San Francisco, California, April 19. [Presenter]
30. Lepage, A., Aschheim, M., and Senescu, R. (2004). "Shear-Yielding Steel Outriggers for High-Rise Construction", 13th World Conference on Earthquake Engineering, Vancouver, Canada. August. [Presenter]
31. Matamoros, A., Garcia, L. E., Browning, J., and Lepage, A. (2004). "Flat-Rate Design Method for Low- and Medium-Rise RC Structures", American Concrete Institute, Fall Convention, Special Technical Session, San Francisco, California, October. [Presenter]
32. Hueste, M. B. D., Browning J., Lepage A., and Wallace, J. W. (2004). "Performance Based Seismic Design Criteria for Slab-Column Connections", American Concrete Institute, Fall Convention, Special Technical Session, San Francisco, California, October. [Presented by Hueste]
33. Lepage, A. (2004). "Seismic Design Using the 2003 IBC and ASCE 7-02", Structural Engineers Association of Washington (SEAW), Engineering Seminar, SEAW Earthquake Engineering Committee, Seattle, Washington, October. [Presenter]
34. Lepage, A., and Hochwalt, J. (2002). "A Practical Approach for Addressing the Deformation Compatibility of Flat Slabs", American Concrete Institute, Spring Convention, Special Technical Session, Detroit, Michigan, April. [Presenter]



35. Lepage, A. (1998). "Response of an Instrumented Seven Story Reinforced Concrete Building to Ground Motions", American Concrete Institute, Spring Convention, Special Technical Session, Seattle, Washington, April. [Presenter]

## **PROFESSIONAL AFFILIATIONS AND SERVICES**

### **Memberships**

1. The Masonry Society (TMS)  
Member since 2008
2. Consortium of Universities for Research in Earthquake Engineering (CUREE)  
Member 2013 – Present (The University of Kansas)  
Member 2006 – 2013 (Penn State University)
3. Structural Engineers Association of Washington (SEAW)  
Member since 2003
4. Honor Society of Phi Kappa Phi  
Member since 1997
5. Earthquake Engineering Research Institute (EERI)  
Member since 1993
6. American Society of Civil Engineers (ASCE)  
Member since 1992
7. American Concrete Institute (ACI)  
Fellow since 2007  
Member since 1983

### **Service to the Profession**

#### **Technical Committees**

1. Architectural Engineering Institute (AEI)  
– Committee on Seismic Effects on Nonstructural Components  
Member, 5/12 – Present
2. Applied Technology Council  
– ATC 115 Project Technical Committee, Development of a Roadmap on Use of High-Strength Reinforcement in Reinforced Concrete Design  
Voting Member, 5/14 – 9/14  
– ATC 98 Project Technical Committee, Use of High-Strength Flexural Reinforcement in RC Seismic Design  
Voting Member, 9/11 – 9/12

3. Network for Earthquake Engineering Simulation (NEES)
  - NEES Users Forum  
Member, 7/10 – 12/13
  - NEESComm Earthquake Reconnaissance Team, 2010 Chile Earthquake  
Member, 3/10 – 11/10
4. American Institute of Steel Construction (AISC)
  - Task Committee TC5, Composite Design  
Voting Member, 1/08 – Present
5. The Masonry Society (TMS)
  - Research Committee, M.S. Theses and Ph.D. Dissertations Competition  
Voting Member, 8/14 – 9/14
  - Masonry Standards Joint Committee (MSJC), Flexure-Axial-Shear Subcommittee  
Corresponding Member, 2014 – Present
  - Masonry Standards Joint Committee (MSJC), Seismic Subcommittee  
Corresponding Member, 2008 – Present
  - Ductility Task Group, MSJC Seismic Subcommittee  
Voting Member, 10/07 – 12/10
6. American Concrete Institute (ACI)
  - Voting Member in Committees
  - ACI 318R Struct. Conc. Building Code (High-Strength Steel), 10/14 – Present
  - ACI CAP-SC3 Award for Papers in Structural Research, 2/12 – 8/13
  - ACI ITG-6 High-Strength Steel Reinforcement, 6/07 – 8/10
  - ACI CAP-SC1 Awards for Papers in Construction, 1/06 – 6/06
  - ACI PUBS Publications Committee (Board Appointment), 1/05 – 4/11
  - ACI 318H Structural Concrete Building Code (Seismic), 10/04 – 10/14
  - ACI ITG-4 High-Strength Concrete in Seismic Regions, 10/02 – 4/07
  - ACI 335 Composite and Hybrid Structures, 9/02 – Present
  - ACI 369 Seismic Repair and Rehabilitation, 4/01 – 12/09
  - ACI 375 Performance-Based Wind Design, 10/99 – Present
  - ACI 374 Performance-Based Seismic Design, 10/98 – Present
7. Structural Engineers Association of Washington (SEAW)
  - Concrete Task Group  
Chair, 1/03 – 12/05
  - Earthquake Engineering Committee  
Corresponding Member, 1/06 – Present  
Voting Member, 7/98 – 12/05

**Editorships and Manuscript Reviews**

1. Editorial Board Member, International Journal of High-Rise Buildings, Council on Tall Buildings and Urban Habitat, 7/11 – Present
2. Journal Papers – Peer Reviewer
  - Earthquake Spectra (EERI)
  - Structural Journal and Special Publications (ACI)
  - Structural Journal (ASCE)
  - The Masonry Society Journal (TMS)
3. Conference Papers – Peer Reviewer
  - Architectural Engineering Institute Conference, 2013
  - Architectural Engineering Institute Conference, 2011
  - Sixth Intl. Conf. on Innovation in Architecture, Eng., and Construction, 2010
  - Ninth U.S. National and Tenth Canadian Conf. on Earthquake Eng., 2010
  - Eighth U.S. National Conference on Earthquake Engineering, 2006
4. Grant Review Panels
  - National Science Foundation, Program Solicitation NSF 08-519, Network for Earthquake Engineering Simulation Research (NEESR), 2008

**Organizing Conferences and Other Activities**

1. New Appendix for the 2013 Building Code Requirements and Specification for Masonry Structures: Limit Design Method for Special Reinforced Masonry Shear Walls (Main Author), July 2011.
2. Member of Advisory Panel for NIST-Sponsored Research Project “Performance-Based Design of Reinforced Masonry Shear Walls”, May 2010 to June 2013.
3. Chair of Seismic Conversion Task Group, Reorganization of “Building Code Requirements for Structural Concrete (ACI 318-14), Version 1.0”, Conversion of ACI 318-08 Chapter 21 to ACI 318-14 Chapter 17. January 2010.
4. ACI Special Technical Session on Recent Developments in Seismic Evaluation and Rehabilitation of Concrete Buildings (Co-Organizer and Moderator), Sponsored by ACI Committee 369 on Seismic Repair and Rehabilitation, American Concrete Institute, ACI 2008 Spring Convention, Los Angeles, CA, April 2, 2008.
5. Member of ACI Committee 318 Ad-hoc Task Group for Overall Review of Proposed Seismic Code Provisions in ACI 318-08 (Building Code Requirements for Structural Concrete and Commentary), February – April 2007.

6. External Reviewer for Proposed Changes to ACI 318-05 (Building Code Requirements for Structural Concrete and Commentary) by Subcommittee 318-D (Flexure and Axial Loads), February 2007.
7. External Reviewer for Proposed Changes to ACI 318-05 (Building Code Requirements for Structural Concrete and Commentary) by Subcommittee C (Serviceability/Safety), February 2007.
8. ACI Special Technical Session on New Frontiers in Shear Design (Co-Organizer and Moderator), Sponsored by ACI-ASCE Joint Committee 445 on Shear and Torsion, American Concrete Institute, ACI 2006 Fall Convention, Denver, CO, November 7, 2006.
9. Corresponding Member for the Department of Architectural Engineering at Penn State University, Academic Council for Preparation of Problems for the NCEES Architectural Engineering Professional Licensure Exam (AE/PE). Prepared and submitted seven peer-reviewed problems for use in the AE/PE exam, August 2006.

### **Service to Institutions**

#### **The University of Kansas**

#### **Department of Civil, Environmental and Architectural Engineering**

1. CEAE Director of Laboratories, Summer 2015 – Present.
2. CEAE Architectural Engineering Steering Committee Member, Spring 2015 – Present.
3. CEAE Faculty Search Committee Member, Structural Faculty Positions, Fall 2014 – Spring 2015.
4. Guest lecture, ARCE 101 Introduction to Architectural Engineering, “The Structures Option in Architectural Engineering”, Fall 2014 and Fall 2015.
5. CEAE Undergraduate Recruitment Committee Member, Fall 2014 – Present.
6. CEAE Curriculum Committee Member, Fall 2014 – Present.
7. CEAE Scheduling and Planning of Undergraduate and Graduate Structural Engineering Courses, Fall 2014 – Present.
8. Faculty Co-Advisor to the Earthquake Engineering Research Institute (EERI) Student Group, Fall 2014 – Present.
9. KU Structural Engineering Conference Moderator, Spring 2014.
10. KU Structural Engineering Conference Steering Committee Member, Fall 2013 – Present.

**School of Engineering**

1. School of Engineering Faculty Rights, Privileges, and Responsibilities Committee, Summer 2015 – Present.
2. Judge for the 8th Annual GEA Poster and Presentation Competition, School of Engineering, Graduate Engineering Association, April 16, 2015.
3. Judge for the 7th Annual GEA Poster and Presentation Competition, School of Engineering, Graduate Engineering Association, April 10, 2014.

**University Level**

1. Judge for the 2015 Graduate Research Competition, Poster Presentations, Office of Graduate Studies, April 9, 2015.
2. Fulbright Scholars Evaluation and Interview Committee, Fall 2014 – Present.

**Penn State University**

**Department of Architectural Engineering**

1. Climate and Events Committee Member, Spring 2008 – Spring 2012.
2. English Proficiency Doctoral Candidacy Exam Committee Member, Fall 2007 – Spring 2012.
3. Faculty Advisor, Student Organization of the Architectural Engineering Institute (AEI), Formerly Student Society of Architectural Engineers (SSAE), Fall 2007 – Spring 2008.
4. Guest lectures, AE 124S Architectural Engineering Orientation, “The Structures Option in Architectural Engineering”, Semester (# lectures): Fall 2006 (4); Spring 2007 (2); Fall 2007 (4); Spring 2008 (2); Fall 2009 (4); Spring 2009 (2); Fall 2009 (4); Spring 2010 (2); Fall 2010 (4); Spring 2011 (2); Fall 2011 (4).
5. Structural Depth Doctoral Candidacy Exam Committee Member, Fall 2006 – Spring 2012.
6. Structural Breadth Doctoral Candidacy Exam Committee Member, Fall 2006 – Spring 2012.

**College of Engineering**

1. Guest Lecture, CE 597D Structures Seminar, Department of Civil and Environmental Engineering, Seminar Presentation, “Cyclic Response of Concrete Frame Members Reinforced with Ultrahigh Strength Steel,” March 22, 2011.
2. College of Engineering Faculty Council Member, Fall 2009 – Spring 2012.

3. Guest Lecture, CE 597D Structures Seminar, Department of Civil and Environmental Engineering, Seminar Presentation, "A Shot in the Dark: Use of Nonlinear Dynamic Analysis for Computing the Seismic Response of Reinforced Concrete Structures," April 9, 2008.
4. Faculty Search Committee Member for Dept. of Civil and Environmental Engineering, Fall 2007 – Spring 2008.
5. College of Engineering Open House, Dept. of Architectural Engineering Coordinator, Fall 2007 – Fall 2009.
6. Invited Speaker, "Major Night, Real World", Workshop Organized by the National Society of Black Engineers, October 10, 2006.

**INDUSTRY EXPERIENCE**

- A. KPFF Consulting Engineers Inc., Seattle, Washington**  
Associate, July 1998 – December 2005
- B. Andersen Bjornstad Kane Jacobs Inc., Seattle, Washington**  
Project Engineer, October 1996 – June 1998
- C. Servicios de Ingeniería en Microcomputadoras SRL., Caracas, Venezuela**  
Project Engineer, September 1987 – December 1991

**Selected Industry Projects**

1. *Sea-Tac Rental Car Facility* (2006)  
Lateral System Design Specialist – KPFF Consulting Engineers, Inc.  
Three 5-story buildings provide 2.1 million square feet to accommodate parking for 5,400 vehicles and office/commercial spaces. The reinforced concrete post-tensioned floor system typically consists of 5.25-in. one-way slab spanning 18 ft over beams spanning 60 ft. The beams frame into 36-ft long girders supported by 32-in. square columns with a typical clear height of 10-ft. Beams and girders are typically 24-in wide by 35.25-in. deep. Every column line (on a 36 ft by 60 ft grid) is used as part of the seismic force-resisting system designed as post-tensioned special moment frames without shear walls. Modern seismic design criteria were developed to supplement the rudimentary design provisions contained in the building code for this type of system, first of its kind in the West Coast.
2. *Olive 8, Seattle, Washington* (2005)  
Lateral System Design Specialist – KPFF Consulting Engineers, Inc.  
The first LEED certified hotel/condo building in Seattle. The 39-story mixed-use tower includes a 349-room five-star Hyatt hotel and 198 residential condominiums. The hotel occupies the first 17 floors while the condos occupy the top 22 floors. There are five levels of underground parking. The elevated floor slabs consist of reinforced concrete two-way flat plates. The lateral system consists of reinforced concrete structural walls (stand-alone core) without moment frames. The design of the lateral system, not compliant with the Building Code, triggered special peer review that requested nonlinear dynamic analyses to satisfy stringent structural performance objectives when subjected to ground motions representative of the 2500-year seismic event.

3. *Fred Hutchinson Cancer Research Center, Seattle, Washington (2002)*  
Project Engineer – KPF Consulting Engineers, Inc.  
A series of state-of-the-art research facilities: the Cancer Care Alliance Building, a seven-story superstructure with 150,000 square feet of treatment space, as well as a four-story basement with 147,000 square feet of parking and mechanical space; the Administrative Building, a 203,000-square-foot structure with six levels of office space and four levels of below grade parking; and the Public Health Sciences Building, a 500,000-square-foot building with three underground levels and five stories of office space above grade. The lateral force-resisting systems combine eccentric and/or concentric steel braced frames with special reinforced concrete shear walls. The buildings were designed using performance-based design to attain immediate occupancy during the 475-year seismic event.
4. *Sammamish Parkplace, Issaquah, Washington (1998)*  
Project Engineer – KPF Consulting Engineers, Inc.  
Two office buildings, each six-story high, provide 1.1 million square feet of office space. In addition, two separate parking structures provide space for more than 1800 cars. The floor construction for both office buildings consists of two-way post-tensioned concrete flat slabs. The floors for both parking structures combine post-tensioned one-way slabs and long-span beams. Lateral loads in all four structures are resisted by special reinforced concrete shear walls proportioned and detailed using displacement-based design provisions.
5. *Harbor Steps North Towers, Seattle, Washington (1997)*  
Project Engineer – Andersen Bjornstad Kane Jacobs, Inc.  
Two high-rise residential towers, one rises 13 stories, the other 29 stories. The structural floor system consists of two-way post-tensioned concrete flat slabs. The lateral force-resisting system for the 13-story tower uses stand-alone special reinforced concrete shear walls around a central core. The 29-story tower uses a dual system with “skipped moment frames” (interior concrete shear walls and exterior special moment-frames work in parallel, columns are restrained by beams at every other floor).