# Curriculum Vitae

## Professor John W. van de Lindt, Ph.D.

***July 2012***

***George T. Abell Professor in Infrastructure***
***Department of Civil and Environmental Engineering***
***Colorado State University***
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**Biographical Summary**

Dr. John W. van de Lindt is a Professor of Structural Engineering at the Colorado State University holds the George T. Abell Professorship. He formerly was a Professor at the University of Alabama where he held the Garry Neil Drummond Endowed Chair in Civil Engineering. He has also previously served on the faculty at Colorado State University and Michigan Technological University. Dr. van de Lindt's research program has two major thrusts, both related to improving the built environment by making structures and structural systems perform to the level expected by their occupants, government, and the public. He seeks to accomplish this through the development of performance-based engineering and test bed applications of building systems for earthquakes, hurricanes, tsunamis, tornadoes and floods. To accomplish this has necessitated coupling nonlinear dynamics, including stochastic approaches in both time and space with structural reliability during extreme loading events. His work includes both the development of new nonlinear numerical models and experimental investigations to calibrate those models and support the hypotheses. A related focus has been reliability-based design code calibrations for existing philosophies. Over the last ten years he has successfully led federal, state, and industry sponsored projects totaling $8M ($6.2M as PI and $1.8M as co-PI). As a result of these projects he publishes in scholarly journals such as the *Journal of Structural Engineering*, *Journal of Performance of Constructed Facilities*, *Engineering Structures*, *Structural Safety*, and the *Journal of Earthquake Engineering* and presents work frequently at both national and international conferences. Dr. van de Lindt recently served as the Chair of the Technical Administrative Committee on Wood which oversees four national committees. He has experience teaching both undergraduate and graduate structural engineering courses, and has developed new courses that focus directly on Ph.D. level research by integrating cutting edge concepts such as performance-based seismic design combined with full-scale lab experiments, e.g. full-scale shake table testing to failure.

Professor van de Lindt's research philosophy can be summarized as *Societal need drives philosophy*. In other words, it is the work of basic researchers to formulate science and engineering methodologies to solve the problems of society. Application in engineering is not only critical for the betterment of society and infrastructure but also provides the ability to iterate research cycles and form improvement upon improvement.

**Personal Information**
Marital Status: Married
Children: 3
Citizenship: U.S.A.
Birthplace: Los Angeles, CA

**Professional Preparation**
Ph.D., Civil Engineering, Texas A&M University, May 1999
M.S., Civil Engineering, Texas A&M University, December 1995
B.S., Civil Engineering, California State University Sacramento, June 1993

**Appointments**
George T. Abell Professor in Infrastructure, Department of Civil and Environmental Engineering, Colorado State University (2012 – Present)
Professor and Garry Neil Drummond Endowed Chair in Civil Engineering, University of Alabama (2010 – 2012)
Structural Engineering and Materials Area Leader, UA (2010 – 2012)
Structural Engineering Laboratory Director, UA (2011-2012)
Professor, Colorado State University (2010)
Associate Professor, Colorado State University (2004 – 2010)
Structural Engineering and Structural Mechanics Coordinator, CSU (2007-2010)
Assistant Professor, Michigan Technological University (2000 – 2004)
Assistant Research Engineer, Texas A&M University (May 1999 – December 1999)
Structural Design Engineer, Dynacon Inc., Bryan, Texas (January 1999 – May 1999)

**Adjunct Appointments (For Graduate Committee Participation)**
Adjunct Faculty, Department of Civil, Construction, and Environmental Engineering, University of Alabama (2012-Present)
Faculty Associate, Department of Civil and Environmental Engineering, Colorado State University (2010-2012)
Adjunct Faculty, Department of Civil and Architectural Engineering, University of Wyoming (2009-Present)
Adjunct Graduate Faculty, Department of Wood Science and Engineering, Oregon State University (2008-Present)

**Professional Interests**
Hazard Mitigation
Performance-Based Design
Light-Frame Wood
Structural Reliability
Structural Resiliency/Sustainability
Earthquake/Wind Loading
Engineering Education
Multi-Hazard Engineering
Design Code Calibration
Structural Damage Models
Transportation Structures
Human-Induced Loads

## Honors and Awards

*2012 Raymond C. Reese Research Prize*, American Society of Civil Engineers; This award "recognizes a paper that describes a notable achievement in research related to structural engineering".

*2011 Guest of Honor*, Opening Ceremonies, *International Conference on Earthquake Analysis and Design of Structures*, Coimbatore, India, December 1-3.

*2010 Outstanding Contribution to Research Award*, George E. Brown Jr. Network for Earthquake Engineering Simulation (NEES), NEEScomm.

*2008 George T. Abell Outstanding Mid-Career Faculty Award*, College of Engineering, Colorado State University

*2008 Outstanding Faculty Award*, Department of Civil and Environmental Engineering, Colorado State University

*2007 Foreign Expert in Seismic/Wood Structures*, National Institute for Earth Science and Disaster Prevention, Japan.

*2006 Faculty Excellence in Research Award*, Department of Civil Engineering, Colorado State University

*International Offshore Mechanics Scholarship*, 1998, International Society of Offshore and Polar Engineers

*Dupont Scholarship for Civil Engineering*, 1995, 1997, Dwight Look College of Engineering, Texas A&M University

*Graduate Assistance in Areas of National Need (GAANN) Fellowship*, Dwight Look College of Engineering, Texas A&M University, 1996

## Professional Affiliations/Memberships/Other

<u>National</u>

American Society of Civil Engineers (ASCE)
- Vice Chair, Subcommittee on Design of Wood Structures (2011-Present)
- Associate Member, ASCE7 Tsunami Loads and Effects Subcommittee
- Chair, Technical Administrative Committee on Wood (2006-2009)
- Chair, Subcommittee on Reliability-Based Design of Wood Structures (2000-2006)
- Member, Subcommittee on Safety of Buildings (2002-2008)

Earthquake Engineering Research Institute (EERI), Member (2001-Present)
Consortium of Universities for Research in Earthquake Engineering (CUREE), Member
Seismological Society of America (SSA), Associate Member, 2000-2002
Network for Earthquake Engineering Simulation (NEES), Member
- Standing Committee on Education, Outreach, and Training, Chair, 2007

Chair, NEES User's Forum (2009-Present)
American Society for Engineering Education (ASEE), Member 2000-2003

<u>State Committees</u>
Colorado Earthquake Hazard Mitigation Council, Member (2005-2010)

<u>University Committees</u>

<u>University of Alabama</u>
University Research Advisory Committee, University of Alabama (2011-Present)
Graduate Education, Dept of Civil, Construction, and Env Engineering (2010-Present)
Executive Committee, Dept of Civil, Construction, and Env Engineering (2010-Present)

<u>Colorado State University</u>
Tenure Committee, Civil and Environmental Engineering (2007-2010)
Civil and Environmental Engineering Graduate Instruction Committee, (Member, 2004-2009, Chair, 2007-2009)
Civil Engineering Departmental Advisory Committee (2005-2010)
College of Engineering, Ad Hoc Committee on Internationalization (2005)
College of Engineering, Dean's Think Tank Committee for Special Initiatives (2008-2010)

**Editorial boards and Editorships**

*ASCE Journal of Structural Engineering*
Associate Editor: Wood, 2009-Present
Guest Editor: "NEES Contributions to Earthquake Engineering", 28 papers.

*Engineering Structures: The Journal of Wind, Earthquake, and Ocean Engineering*
Member, Editorial Board, 2008-Present.

*The Open Civil Engineering Journal*
Member, Editorial Board, 2007-Present

**Synergistic Activities**

Professor van de Lindt is currently serving as the project director and PI for a three-year five-university NSF-sponsored project, that has objective of reducing the seismic risk of soft-story woodframe building in North America. Tests at several laboratories around the U.S. (NEES Facilities) are scheduled and the project involves numerous industry and government partners. Professor van de Lindt was also the project director and PI of the four-year five-university NEESWood Project. The final shake table test program took place in June/July 2009 in Miki, Hyogo Prefecture, Japan. The steel moment frame plus light-frame wood building represented the largest building ever tested on an earthquake shake table—designed at almost 17,000 sq ft (1,400 sq meters) and 850,000 lbs. The building was designed using Performance-Based Seismic Design (PBSD) techniques developed during the first three years of the NEESWood Project. There were two phases to the test plan: Phase I was the 0.5g and 1.0g tests on a one-story SMF with six-stories of wood, and Phase 2 was the 0.5, 1.0g, and 1.5g tests on the six-story wood once the SMF was heavily braced. Construction took exactly four months in Miki, Hyogo, Japan where Dr van de Lindt lived with his students while supervising construction. All US and Canadian wood products shipped out of Seattle, WA or Vancouver B.C. and Steel shipped out of Los Angeles, CA. Shipping consisted of twenty 44,000 lb containers full of numerous products that were donated or discounted by both industry and government, with technical collaboration from the U.S. Forest Products Lab, Simpson Strong Tie, Maui Homes, and FPInnovations-Forintek Division. The building performed very well thereby validating the new design method.

Professor van de Lindt was a member of the US FEMA Mitigation Assessment Team (MAT) for the 2008 Mid West Floods and co-author of the final report, provided assistance to the FEMA MAT following the 2011 Southeastern tornado outbreak, and participated on the NSF-funded rapid team to document damage following the Tuscaloosa tornado of 2011.

Professor van de Lindt led an NSF-sponsored six-person team following hurricane Katrina to investigate the damage to residential structures on the Mississippi gulf coast. This investigation resulted in the forensic assessment of numerous buildings and neighborhoods producing a report and journal paper. The journal paper, authored by all six members of the team, was nominated for ASCE's *Journal of Performance of Constructed Facilities* Outstanding Paper Award for 2007. Following that project, Dr van de Lindt was as Invited participant in the National Science Board, Committee on Programs and Plans, Task force on Hurricane Science and Engineering, Workshop "Towards a National Agenda for Hurricane Science and Engineering: Academic Research Perspectives", February 2006, Boulder, CO, National Center for Atmospheric Research. He participated on an ASCE-sponsored damage investigation following the 2010 Chilean earthquake and damage data collection following the 2011 Christchurch, New Zealand.

Dr van de Lindt led the ASCE/SEI Special Project entitled "The Next Step for ASCE 16: Performance-Based Design of Woodframe Structures" and organized and hosted the 1st *Invitational Workshop on Performance-Based Design of Woodframe Structures* in Fort Collins, July 2005. In 2011 after moving to the University of Alabama he organized and hosted a workshop to improve seismic modeling of woodframe buildings in Tuscaloosa, AL.

Professor van de Lindt constantly seeks to move ideas forward and gain valuable peer feedback through the development of conference sessions and meetings. For example, he has organized and chaired American Society of Civil Engineers Structure's Congress sessions in 2002-2004, 2006, 2008, and upcoming in 2012. He developed a special session at the 2006 World Conference on Timber Engineering entitled "Performance-Based Design of Wood Structures: Perspectives from Around the Globe", which highlighted research in both presentation and panel discussion format from five countries actively engaged in this research. He served on the board for the 2008 *Research Needs in the New Millennium* Workshop held in Vancouver, B.C. He also served as the track facilitator and organizer for the Seismic Design of Wood Buildings track at the 2008 *World Conference on Earthquake Engineering* in Beijing and a wood design session with papers from five countries at the US-Canada Joint Conference on Earthquake Engineering in 2010.

In 2005, shortly after arriving at Colorado State University, Professor van de Lindt designed and built Colorado's first shake table facility at Colorado State University's Engineering Research Center. Since that time, several projects have been completed under his direction and numerous assembly tests performed. Following completion of the shake table, he co-authored a Major Research Instrumentation (MRI) proposal to the National Science Foundation with a wind engineering colleague. This resulted in a $590,000 equipment grant from NSF, with $315,000 for construction of a hurricane load structural test frame (20 x 20 x 20ft) capable of controlling seven actuators in force control simultaneously, termed the spatio-temporal structural hurricane test facility. It is currently operational at CSU's Engineering Research Center. Upon joining the University of Alabama, Professor van de Lindt designed a 17ft x 17ft uni-axial shake table with a

20 ton payload and capable of reproducing the world's largest earthquakes. The system is driven by four 180 GPM pumps and the 140 kip actuator has twin 400 GPM valves.

Actively engaging in educational activities forms the bond for any active research program. Dr van de Lindt has mentored more than ten students from underrepresented groups such as women and minorities through the Colorado PEAKS Alliance Summer Program at Colorado State University and has hosted six interns from technical universities in France. He is the past chair of the Education and Outreach Committee for NEES and currently serves on their advisory committee to the board. He previously chaired CSU's Civil and Environmental Engineering Committee on Graduate Instruction, is member of the Civil Engineering Department Tenure Committee, and provides input at the college level as a member of the Dean's ThinkTank Committee on Special Initiatives. Additionally, he has assisted with applications of numerous students resulting in graduate Fellowships from NSF, AISC, and energy-related organizations.

In addition to formal graduate and undergraduate educational activities, Professor van de Lindt has mentored post doctoral scholars. Several of his former Ph.D. students are now professors; one in Thailand, one is an Assistant Professor at South Dakota State University; and one is an Assistant Professor at the University of Minnesota-Duluth. He currently has several Ph.D. students with interest in pursuing academic positions upon completion of their studies.

**Advisees of Professor van de Lindt**

***Post Doctoral and Visiting Scientists***

Dr Sangki Park (2011-Present)
Education: Ph.D. from Colorado State University
Subjects: Understanding and Mitigating Tsunami Risk for Coastal Structures and Communities
Support: Drummond Chair Funds

Dr Thang N. Dao (2010-2012)
Education: Ph.D. from Colorado State University
Subjects: Performance-Based Wind Engineering for Wood Buildings; Cold Formed Steel Design for Earthquakes
Support: University of Alabama; The Prescient Companies, LLC

Dr Shiling Pei (2007-2010)
Education: Ph.D. from Colorado State University
Subjects: PBSD of Light-Frame Wood Structures and Loss Based Design
Support: USDA, NSF, Provincial Government of British Columbia, CDOT

Dr Rebecca Atadero (2006-2008)
Education: Ph.D. from University of California at San Diego
Subjects: Shake table study of Indonesian house, composites, sustainable materials, teaching
Support: APPA, CCHE, Department, College

Mr Jagadish Vengala, India, BOYSCAST Fellowship (2008)
Subjects: Numerical Modeling of Light-frame wood buildings; other structures
Supports: Department of Science and Technology, Govt. of INDIA

***Completed Ph.D. Students (6)***

Sangki Park, Ph.D. Dec 2011
Dissertation Subject: Understanding and Mitigating Tsunami Risk for Coastal Structures and Communities, CSU.
Support: NSF; Drummond Chair Funds
Current Position: Post Doctoral Scholar, University of Alabama

Thang Nguyen Dao, Ph.D. August 2010.
Dissertation Title "The Development of Performance-Based Wind Engineering: From Concept to Application", CSU.
Support: NSF, MPC (UTC)
Current Position: Post Doctoral Scholar, University of Alabama

Hongyan Liu, Ph.D. May 2010.
Dissertation Title "Integration of Base Isolation into the Performance-Based Seismic Design of Woodframe Buildings", CSU.
Support: NSF
Current Position: Visiting Assistant Professor, University of Minnesota-Duluth

Saharat Buddahawanna, Ph.D., 2008
Dissertation: "Reliability-Based Evaluation of Concrete Bridges"
Support: Royal Thai Scholarship
Current Position: Associate Professor, Thammasat University (Thailand)

Shiling Pei, Ph.D., 2007
Dissertation: "Loss Analysis and Loss-Based Seismic Design for Woodframe Structures", CSU
Support: USDA-CSREES, NSF
Current Position: Assistant Professor, South Dakota State University

Jonathan S. Goode, Ph.D., 2007
Dissertation: "Correlated Wind Turbulence and Aeroelastic Instability Modeling for 3-D Time Domain Analysis of Slender Structural Systems", CSU,
Support: CDOT and AISC Fellowship
Current Position: Haag Engineering, Houston, TX.

***Completed M.S. Students (18)***

M. Omar Amini, M.S. 2012
Thesis Title "Determination of a Rational Tornado Wind Design Speed for Woodframe Residential Buildings ", UA.
Support: Graduate Teaching Assistant, Drummond Chair Funds

Karthik Rechan Rudraprasad, M.S., 2010.
Thesis Title "Damage Comparison of a 1/3 Scale RC Portal Frame Having 50% Spray Dryer Ash Content Following Shake Table Testing", CSU

Support: Graduate Teaching Assistant, Self-Supported

Sangki Park, M.S., 2008
Thesis “Formulation of Seismic Fragilities using a Damage Index”, CSU
Support: Partial NSF.

Alex Stone, M.S., 2008
Thesis “ Development of Steel Design Details and Selection Criteria for Cost Effective and Innovative Steel Bridges in Colorado”, CSU
Support: Colorado Department of Transportation, AISC Fellowship

Rachel Garcia, M.S., 2008
Thesis “Wave and Surge Loading on Residential Structures”, CSU
Support: NSF and BOD Fellowship

Aaron Potts, M.S., 2007
Thesis “Application of Superelastic Shape Memory Alloys in Supplemental Energy Dissipating Devices for Wood Shear Walls”, CSU
Support: Self-supported, internal grants.

Mason Taggart, M.S. 2007
Thesis: “Performance-Based Design of Woodframe Structures for Flooding”, CSU
Support: Self-supported, internal grants

Cullen Choi, M.S., 2007
Thesis: “Application of Fly Ash as a Light-Frame Wood House Insulator”, CSU
Support: American Public Power Association through the Platte River Power Authority

Stephanie Pinon, M.S., 2006
Technical Paper Option: “Design of Stairwell Core Systems”, CSU
Support: Graduate Teaching Assistant, Self-supported.

Dao Nguyen Thang, M.S., 2005
Thesis: “A Genetic Approach for Shearwall Placement in Buildings Subjected to Natural and Human-Induced Loads”, CSU
Support: U.S.-Vietnam Fellowship.

Kriselda Cuellar, M.S., 2004
Thesis: “Method for Design Checks of Steel Overhead Sign Support Structures”, MTU
Support: Michigan Department of Transportation, AISC Fellowship

Sridhar Kethu, M.S., 2004
Thesis: “Development of Steel Beam End Deterioration Guidelines for Bridge Inspection and Analysis”, MTU
Support: Michigan Department of Transportation

Yingmin Zhou, M.S., 2003
Thesis: “Towards Earthquake Damage Prediction Using a Type I Slepian Process Model”, MTU
Support: U.S. Geological Survey

Ginhuat Goh, M.S., 2003

Thesis: "Earthquake Duration Effects on Very Low-Cycle Structural Damage Estimates", MTU

Support: Federal Emergency Management Agency through the Michigan State Police

Matthew Lewis, M.S., 2003

Thesis: "Optimization of Cost and Performance of Steel Overhead Sign Support Structures", MTU

Support: Michigan Department of Transportation

Henrique A. de Melo e Silva, M.S., 2003

Thesis: "Development of a Mechanistic Wood Shear Wall Damage Model", MTU

Support: Progress Industries LLC, FEMA.

Jason Huart, M.S., 2002

Thesis: "Strength-Based Seismic Reliability of Wood Shearwalls", MTU

Support: US Peace Corps Fellowship through MTU.

Matthew A. Walz, M.S., 2001

Thesis: "Development and Application of a Nonlinear Wood Shear Wall Model", MTU,

Support: MTU Civil Engineering Fellowship.

***Current Ph.D. Students (6)***

Pouria Bahamini (CSU)

Dissertation Subject: Soft-story woodframe retrofit of at-risk buildings

Support: NSF – NEESR

Giraj Kumar Kandukuri (UA)

Dissertation Subject: Cross laminated timber for improved seismic performance

Support: USDA-FPL

Christine Alfano (UA)

Dissertation Subject: Structural resilience to extreme wind hazards loading

Support: Fellowship

Trung Do (CSU)

Dissertation subject: To be determined

Support: Vietnamese Government Fellowship

Elaina Jennings (CSU)

Dissertation subject: Advanced materials in seismic risk reduction – a multi-scale Approach

Support: NSF – Graduate Fellowship; CSU funds

Negar Nazari (CSU)

Dissertation subject: Integration of aftershocks hazard into performance-based earthquake engineering

Support: NSF- CMMI

M. Omar Amini (CSU)
Dissertation subject: Development of a seismic response modification factor for cross laminated timber buildings
Support: USDA-FPL

***Current M.S. Students***

Ing. Jose E. Mazariegos (CSU)
Thesis subject: Seismic design of masonry
Supported: Self supported

**Undergraduate Researchers Advised**

Approx. 25 over the last 10 years including several NSF REU's, 10 from out of the country; France; India.

Since Summer 2010:
Doug Allen, summer 2010
Omar Amini, summer 2010
Zachary Taylor, summer 2010
Kate Pfretchnzer, summer 2010
Richard Stone, summer 2012

**Courses taught at the University of Alabama**

*Fall 2011 – CE 691 Theory of Structural Reliability*
Please see CE 580 taught at Colorado State University below. The course was similar with a few modifications.

*Spring 2011; Spring 2012 – CE 691 Earthquake Engineering*
Graduate level course that introduces basic methods of structural dynamics for SDOF and MDOF systems and applies them to solve typical structural engineering problems. The course then goes into earthquake engineering including elastic rebound theory, response spectrum analysis, inelastic oscillators, energy dissipation, constant-ductility response spectra, incremental dynamic analysis, equivalent lateral force procedure, response of linear and nonlinear buildings, power spectral density estimation of ground motions, response spectrum compatible ground motion generation, intro to earthquake building codes, and performance-based seismic design concepts and procedures.

**Courses taught at Colorado State University**

*Fall 2006, Fall 2007, Fall 2008 – CE 566 Intermediate Structural Analysis*
This graduate course is the second in the 3-course series of structural analysis. The focus is on matrix methods, buckling, arches, cables, and a group project. The group project focuses on the effect of assumptions made in hand structural analysis when compared to solutions offered by commercial finite element software, including the potential effect on design.

*Fall 2004, Fall 2005, Spring 2006 - CE 367 Structural Analysis*
Basic structural analysis techniques including conjugate beam, virtual work, influence line analysis, direct stiffness method for 2 and 4 DOF beam elements. An introduction to 6-DOF elements for frames is also included.

*Spring 2005, Spring 2007, Spring 2009 – CE 767 Earthquake Engineering*
The course follows graduate level structural dynamics and is mostly made up of Ph.D. students interested in earthquake engineering and included elastic rebound theory, response spectrum analysis, inelastic oscillators, energy dissipation, constant-ductility response spectra, incremental dynamic analysis, equivalent lateral force procedure, response of linear and nonlinear buildings, power spectral density estimation of ground motions, response spectrum compatible ground motion generation, intro to earthquake building codes, and performance-based seismic design concepts and procedures. The course culminates with an earthquake shake table competition between two groups made up of students in the class.

*Spring 2006, Spring 2008, Spring 2010 – CE 580 Theory and Applications of Structural Reliability*
The objective of this course is to present the theory of structural reliability as it relates to analysis, design, construction, and maintenance of structural and mechanical systems; application to existing and emerging code calibration procedures; and introduce advanced topics. Specific topics include basic rules of probability, expectation and moment generating functions, failure probability, statistics of the extremes, first order second moment methods' linear and non-linear performance functions, LRFD code calibration with applications to bridges and woodframe structures, applications of reliability methods to structural dynamics problems, and performance-based design for seismic and wind loads.

**Courses Taught at Michigan Technological University**

*Structural Engineering I (Spring 00, Fall 01, Spring 01, Fall 02, Spring 02, Fall 03)*
Basic structural analysis techniques including conjugate beam, virtual work, influence line analysis, direct stiffness method for 2 DOF beam elements. In addition, this course includes five weeks of basic F.E. level dynamics. Projectile motion, rectilinear and curvilinear particle motion, Newton's $2^{nd}$ Law, impulse-momentum, collision, and an introduction to linear oscillators.

*Structural Dynamics I (Fall 02, Fall 03)*
Graduate level course that introduces basic methods of structural dynamics for SDOF and MDOF systems and applies them to solve typical structural engineering problems. Stadola's method, Rayleigh's quotient, FFT, modal combination, and numerical intergration of the equation of motion. This also includes a brief introduction to probabilistic structural dynamics. Throughout the course examples that relate to different types of dynamics problems including earthquake engineering are presented.

*Structural Dynamics II : Earthquake Engineering (Spring 02)*
Graduate level course that covers response spectra, design spectra, energy dissipation, seismic hazard analysis, equivalent lateral force procedure, soft story buildings, power spectral density, generation of artificial ground motion using an IFFT and envelope function, and an introduction to performance-based seismic engineering.

*Structural Engineering II (Spring 04)*

This is a basic structural design course which is split evenly between steel design and reinforced concrete design. LRFD is applied to steel tension, compression, flexural members, and basic connections and ultimate strength design is applied to concrete flexural members.

## Journal Publications

(Underlining indicates graduate/post doctoral advisee)


1. Pei, S., J. W van de Lindt, N. Wehbe,and H. Liu. (2012). "Experimental Study of Collapse Limits for Woodframe Shear Walls". ASCE *Journal of Structural Engineering*, Accepted.

2. Linton, D., R. Gupta, D. Cox, J.W. van de Lindt, M.E. Oshnack, and M. Clauson.. (2012). "Tsunami Wave Forces on a Wood Wall at Full-Scale.", *ASCE Journal of Structural Engineering*, In Press.

3. Dao, T.N. and J.W. van de Lindt. (2011). "Seismic Performance of an Innovative Light-Frame Cold-Formed Steel Frame for Mid-Rise Construction.", *ASCE Journal of Structural Engineering*, Accepted.

4. van de Lindt, J.W., D.V. Rosowsky, W. Pang, and S. Pei. (2012). "Performance-Based Seismic Design of Mid-Rise Woodframe Buildings.", *ASCE Journal of Structural Engineering*, In Press.

5. Park, S., J.W. van de Lindt, D. Cox, and R. Gupta. (2011). "Concept of Community Survival Fragilities for Tsunami Coastal Inundation". *ASCE Natural Hazards Review*, In Press.

6. Prevatt, D.O., J.W. van de Lindt, E.W. Back, A.J. Graettinger, S. Pei, R. Gupta, W, Coulbourne, D. James, and D. Agdas. (2012). "Making the Case for Improved Structural Design: The Tornado Outbreaks of 2011." *ASCE Journal of Leadership and Management in Engineering*, Special issue on Disasters, In Press.

7. Park, S., J.W. van de Lindt, R. Gupta, and D. Cox. (2012). "Method to Determine Location for Tsunami Vertical Evacuation Shelters." *Natural Hazards*, In Press.

8. Li, Y. and J.W. van de Lindt. (2012). "Loss-Based Formulation for Multiple Hazards with Application to Residential Buildings.", *Engineering Structures*, 38 (2012), 123-133.

9. van de Lindt, J.W., S. Pei, T.N. Dao, A. Graettinger, D.O. Prevatt, R. Gupta, and W. Coulbourne. (2012). "A Dual Objective-Based Tornado Design Philosophy." *ASCE Journal of Structural Engineering*, In Press.

10. Park, S., J.W. van de Lindt, D. Cox, R. Gupta , and F. Aguiniga. (2012). "Successive earthquake-tsunami analysis to develop collapse fragilities.", *Journal of Earthquake Engineering*, In Press.

11. Lucksiri, K., T.H. Miller, R. Gupta, S, Pei, and J.W. van de Lindt. (2012). "Rapid Screening for Plan Irregularity in Single-Family, Wood-Frame Dwellings." *Engineering Structures*, In Press.

12. Dao, T.N., J.W. van de Lindt, D. Prevatt, and R. Gupta. (2012). “Probabilistic Procedure for Wood-frame Roof Sheathing Panel Debris Impact to Windows in Hurricanes.” *Engineering Structures*, 35 (2), 178-187.

13. Vengala, J. and J.W. van de Lindt. (2012). “Seismic Performance of Single Family Dwellings Constructed using Bamboo-Mortar Composite.”, *Asian Journal of Civil Engineering*, In Press.

14. Dao, T.N. and J.W. van de Lindt. (2012) "Loss Analysis for Woodframe Buildings During Hurricanes I: Structure and Hazard Modeling”. *ASCE Journal of Performance of Constructed Facilities*, In Press.

15. van de Lindt, J.W. and T.N. Dao. (2012) "Loss Analysis for Woodframe Buildings During Hurricanes. II: Loss Estimation”. *ASCE Journal of Performance of Constructed Facilities*, In Press.

16. Goode, J.S. and J.W. van de Lindt. (2011). “Reliability-Based Design of Medium Mast Lighting Structural Supports.” *Structure and Infrastructure Engineering*; In Press.

17. Ni, C., S. Pei, J.W. van de Lindt, S. Kuan. And M. Popovski. (2011). “Numerical Study of Six-Story Wood Platform Frame Buildings in Vancouver, B.C.” *Earthquake Spectra*, In Press.

18. Lucksiri, K., T.H. Miller, R. Gupta, S, Pei, and J.W. van de Lindt. (2012). “Effect of Plan Configuration on the Seismic Performance of Wood-Frame, Single Family Dwellings.” *Natural Hazards Review*, 13(1).

19. Li, Y., J.W. van de Lindt, T.N. Dao, S. Bjarnadottir, and A. Ahuja. (2012). “Loss Analysis for Combined Wind and Surge in Hurricanes”, *ASCE Natural Hazards Review*, 13 (1), 1-10.

20. Martin, K., R. Gupta, D. Prevatt, P.L. Datin, J.W. van de Lindt. (2012). “Evaluation of System Effects and Structural Load Paths in a Wood Framed Structure.”, *ASCE Journal of Architectural Engineering*, J. Archit. Eng. 17, 134 (2011).

21. van de Lindt, J.W., S. Pei, W. Pang, and S. Sharazi. (2012). “Collapse Testing and Analysis of a Light-Frame Wood Garage Wall”, *ASCE Journal of Structural Engineering*, In Press.

22. Wu, J., S. Chen, and J.W. van de Lindt. (2012). “Fatigue Assessment of Slender Long Span Bridges: A Reliability Approach.” *Journal of Bridge Engineering*, 17 (1), 47-57.

23. van de Lindt, J.W., R. Gupta, S. Pei, K. Tachibana, Y. Araki, D. Rammer, and H. Isoda. (2012). “Damage assessment of a Full-Scale Six-Story Light-Frame Wood Building Following Tri-Axial Shake Table Tests”, *ASCE Journal of Performance of Constructed Facilities*, 26(1), 1-9.

24. Pei, S. and J.W. van de Lindt. (2012). “Numerical Modeling of a Six-Story Light-Frame Wood Building: Comparison with Experiments.”, *Journal of Earthquake Engineering*, In Press.

25. van de Lindt, J.W. and R. Karthik Rechan, (2011). “Seismic Performance Comparison of a High Content SDA Frame and Standard RC Frame.”, *Advances in Civil Engineering*, Volume 2011 (2011), Article ID 478475.

26. van de Lindt, J.W., S.E. Pryor, and S. Pei. (2011). “Shake Table Testing of a Full-Scale Seven-Story Steel-Wood Apartment Building”, *Engineering Structures*, 33(3), 757-766.

27. Riley, C.E., R. A. Atadero, J.W. van de Lindt, and P. R. Heyliger. (2011). “Cementitous SDA-Tire Fiber Material for Maximizing Waste Product Diversion.” *Advances in Civil Engineering*, Volume 2011 (2011), Article ID 354305.

28. Mensah, A.F., P.L. Datin, D.O. Prevatt, R. Gupta, and J.W. van de Lindt. (2011). “Database-Assisted Design Methodology to Predict Wind-Induced Structural Behavior of a Light-Framed Wood Building.” *Engineering Structures*, 33(2), 674-684.

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37. Wilson, J.S., R. Gupta, J.W. van de Lindt, and D.T. Cox. (2010). “Behavior of Wood-Framed Residential Structure Under Surge Wave Loading.” 11th World Conference on Wood Engineering, Trentino, Italy, June 2010.

38. van de Lindt, J.W., H. Liu, M.D. Symans, and J.K. Shinde. (2010). “Experimental and Numerical Investigation of a Practical Base isolation System for Light-Frame Wood Buildings.”, *5th World Conference on Structural Control and Monitoring*, July, 2010, Tokyo, Japan.

39. Pryor, S., J.W. van de Lindt, and S. Pei. (2010). "Experimental Seismic Response of a Seven-Story Mixed-Use Steel/Wood Apartment Building." 11th World Conference on Wood Engineering, Trentino, Italy, June 2010.

40. Martin, K.G., R. Gupta, D.O. Prevatt, P.L. Datin, J.W. van de Lindt. (2010). "Evaluation of System Effects and structural Load Paths in a Wood-Frames Structure.", 11th World Conference on Wood Engineering, Trentino, Italy, June 2010.

41. van de Lindt, J.W., S.E. Pryor, and S. Pei. (2009). "Shake Table Testing of a Seven-Story Mixed-Use Condominium at Japan's E-Defense." 2009 SEAOC Annual Convention, San Diego, CA, September 23-26. (Presented by van de Lindt).

42. Pei, S. J.W. van de Lindt, and H. Liu. (2009). "Optimization of Base Isolation for Woodframe Buildings Based on Performance", *10th International Conference on Structural Safety and Reliability,* September 14-17, Osaka, Japan. (Presented by van de Lindt).

43. Gupta, R., J. Wilson, J.W. van de Lindt, and R. Garcia (2009). "Tsunami Wave Loading on Residential Buildings." *NEES 7th Annual Meeting*, June 22-25, Honolulu, HI.

44. Liu, H., J.W. van de Lindt, and S. Pryor. (2008). "Application of Performance-Based Design to Wood-Steel Hybrid Structures". *14th World Conference on Earthquake Engineering*, October, Beijing, China. (Presented by van de Lindt)

45. S. Pei and J.W. van de Lindt (2008). "Loss-based seismic design for lightframe wood structures", *14th World Conference on Earthquake Engineering*, October, Beijing, China. (Presented by van de Lindt)

46. van de Lindt, J.W. and S.K. Park. (2008). "Multi-record Incremental Dynamic Analysis of an IBC-Designed Six-Story Light-Frame Wood Building." *14th World Conference on Earthquake Engineering*, October, Beijing, China. (Presented by van de Lindt)

47. Riley, C.E., R.A. Atadero, J.W. van de Lindt, and P.R. Heyliger. (2008). "Sustainable structural materials with fly ash and recycled tire fibers.", 5th International Engineering and Construction Conference, Los Angeles, CA, August 27-29.

48. van de Lindt, J.W., D.V. Rosowsky, M.D. Symans, A. Filiatrault, and R.A. Davidson. (2008). "Performance-Based Seismic Design of Mid-Rise Light-Frame Wood Buildings: An Overview of The NEESWood Project". *10th World Conference on Timber Engineering,* Miyazaki, Japan. (Presented by van de Lindt).

49. S. Pei and J.W. van de Lindt (2008). "Loss-based seismic design for woodframe structures: A fragility based procedure", *10th World Conference on Timber Engineering*, Miyazaki, Japan. (Presented by van de Lindt)

50. Liu, H., J.W. van de Lindt, and M.D. Symans. (2008). "Performance-Based Design of Wood Buildings with Base Isolation." *10th World Conference on Timber Engineering*, Miyazaki, Japan.

51. Dao, T.N., J.W. van de Lindt, and B. Bienkiewicz. (2008). "Performance-Based Design of light-Frame Wood Buildings for Wind using Fragilities", Proc AWAS, Jeju, S. Korea,

May 2008. (Presented by van de Lindt)

52. van de Lindt, J.W. (2008). "Natural Hazards and Wood: The Road to Performance." Invited position paper for the *2008 Research Needs in Wood Engineering Workshop*, Vancouver, Canada. (Presented by van de Lindt)

53. van de Lindt, J.W. and M.A. Taggart. (2008). "Performance-Based Design of Residential Structures for Flood." *2008 Structures Congress*, Vancouver, Canada. (Presented by van de Lindt)

54. van de Lindt, J.W. and T.N. Dao. (2008). "Performance-Based Design of Woodframe structures for Wind." *2008 Structures Congress*, Vancouver, Canada. (Presented by van de Lindt)

55. W. Pang, D.V. Rosowsky, J.W. van de Lindt, H. Liu, and S. Pei (2008). "Tiered Approach to Performance-Based Seismic Design of Wood Frame Buildings", *2008 Structures Congress*, Vancouver, Canada.

56. Shinde, J.K., M.D. Symans, H. Liu, and J.W. van de Lindt. (2008). "Seismic Performance Assessment of Woodframed Structures with Energy Dissipation Systems", *2008. Structures Congress*, Vancouver, Canada.

57. van de Lindt, J.W., K. Fridley, and R. Gupta. (2007). "Summary of Wind Effects on Residential Structures During Hurricane Katrina.", Proc., Durability of Woodframe Structures – Learning from Natural Disasters, Biloxi, MS, November, 2007. (Presented by van de Lindt)

58. van de Lindt, J.W., R. Gupta, R. Garcia, and J. Wilson. (2007). "The Effect of Wind Driven Hurricane Waves on Wood Framed Buildings", Proc., Durability of Woodframe Structures – Learning from Natural Disasters, Biloxi, MS, November, 2007. (Presented by van de Lindt)

59. Pei, S. and J.W. van de Lindt. (2007). "Seismic Design of Woodframe Residential Structures for Lifetime Loss Minimization: A Bayesian Approach." ICASP10, Tokyo, Japan. (Presented by van de Lindt)

60. van de Lindt, J.W. and H. Liu. (2007). "Probabilistic System Identification for Performance-Based Seismic Design." ICASP10, Tokyo, Japan. (Presented by van de Lindt)

61. van de Lindt, J.W. A. Filiatrault, M. D. Symans, D. V. Rosowsky, and R. A. Davidson. "Towards a Performance-Based Seismic Design Philosophy for Woodframe Construction." 9th Canadian Conference on Earthquake Engineering, Ottawa, Ontario, June 27-29, 2007.

62. S. Pei and J.W. van de Lindt. (2007). "Long-Term Seismic Loss Evaluation for Woodframe Structures: A Performance-Based Procedure." 9th Canadian Conference on Earthquake Engineering, Ottawa, Ontario, June 27-29, 2007. (Presented by van de Lindt).

63. Shinde, J., M.D. Symans, A. Filiatrault, and J.W. van de Lindt. "Application of Seismic Protection Systems to Woodframed Buildings: Full-Scale Testing and Field Implementation.", 5th NEES Annual Meeting, June 19-21, 2007, Snowbird, UT.

64. Filiatrault, A., J.W. van de Lindt, M. D. Symans, D.V. Rosowsky, and R.A. Davidson. (2007). "Full Scale Shake Table Testing of a Two-Story Woodframe Townhouse." *2007 Structures Congress*, Long Beach, CA.

65. van de Lindt, J.W. (2007). "Can Woodframe Structures be Scaled for Shake Table Testing?" *2007 Structures Congress*, Long Beach, CA. (Presented by van de Lindt).

66. Atadero, R.A., Goode, J.S. and J.W. van de Lindt. (2007). Development of Lifetime Statistical Distributions of Wind Speed for Fatigue-Based Design." *2007 Structures Congress*, Long Beach, CA.

67. van de Lindt, J.W. and H. Liu. (2006). "Correlation of Observed Damage and FEMA 356 Drift Limits: Results from a One-Story Woodframe House Shake Table Test." Proceedings of the *2006 Structures Congress*, St. Louis, MO. (Presented by van de Lindt)

68. Goode, J.S. and J.W. van de Lindt. (2006). "Effect of Extreme Wind Gusts on Fatigue Life and Structural Reliability of High Mast Lighting Structural Supports." Proceedings of the *2006 Structures Congress*, St. Louis, MO.

69. Gupta, R. and J.W. van de Lindt. (2006). "Damage Observation and Prediction for Wood Shearwalls Subjected to Simulated Seattle Earthquakes." Proceedings of the *2006 Structures Congress*, St. Louis, MO. (Presented by van de Lindt)

70. H. Liu and van de Lindt, J.W. (2006). "Shake Table Testing of a Performance-Based Seismic Designed Woodframe Structure." Proc of the *2006 World Conference on Timber Engineering*, Portland, OR.

71. W. Pang, Pei, S., J.W. van de Lindt, and D.V. Rosowsky. (2006). "Formulation of Evolutionary Parameter Hysteretic Models for Woodframe Shearwalls." Proc of the *2006 World Conference on Timber Engineering*, Portland, OR.

72. van de Lindt, J.W., D.V. Rosowsky, A. Filiatrault, M.D. Symans, R.A. Davidson. (2006). "The NEESWood Project: Progress on the Development of a Performance-Based Seismic Design Philosophy for Mid-Rise Woodframe Construction". Proc of the *2006 World Conference on Timber Engineering*, Portland, OR. (Presented by van de Lindt)

73. Ellingwood, B.E., J.W. van de Lindt, D. Gromala, D.V. Rosowsky, R. Gupta, and S. Pryor. "Performance-Based Engineering for Light-Frame Wood Construction in the United States: Status and Challenges." Proc of the *2006 World Conference on Timber Engineering*, Portland, OR. (Presented by van de Lindt).

74. Graettinger, A., J.W. van de Lindt, R. Gupta, T. Skaggs, S. Pryor, and K. Fridley. (2006). "Overview of Wind Damage to Woodframe Structures Caused by Hurricane Katrina." Proc of the *2006 ASCE/SEI Structures Congress*, St. Louis, MO. (Presented by van de Lindt)

75. van de Lindt, J.W. and H. Liu. (2006). "Adequacy of FEMA 356 Drift Criteria in the Performance-based Seismic Design of Woodframe Structures" *$8^{th}$ National Conference on Earthquake Engineering*, San Francisco, CA. (Presented by van de Lindt)

76. van de Lindt, J.W., D.V. Rosowsky, S. Pei, and W.C. Pang. (2006). "Next Generation Hysteretic Models for Development of a Performance-Based Seismic Design Philosophy for Woodframe Construction." *$8^{th}$ National Conference on Earthquake Engineering*, San Francisco, CA. (Presented by van de Lindt)

77. van de Lindt, J.W. and J.M. Niedzwecki (2006). "A Slepian Model Approach to Seismic Reliability of Structures." *$8^{th}$ National Conference on Earthquake Engineering*, San Francisco, CA.

78. van de Lindt, J.W. and D.V. Rosowsky. (2005). "Code-Based Reliability of Wood Shearwalls Subject to Natural Hazard Loads." *ICOSSAR 05*, Rome, Italy.

79. van de Lindt, J.W., K. Cuellar, and L.B. Sandberg. (2005). "Steel Overhead Sign Support Structural Design: Meeting AASHTO 2001." *$84^{th}$ Annual Meeting of the Transportation Research Board*. (Presented by van de Lindt)

80. van de Lindt, J.W., T.M. Ahlborn, and S. Kethu. (2005). "An Alternate Approach to Approximate Deteriorated Steel Beam End Capacity." *$84^{th}$ Annual Meeting of the Transportation Research Board*. (Presented by van de Lindt)

81. van de Lindt, J.W., H.A. de Melo e Silva, J.N. Huart, and D.V. Rosowsky. (2004). "Reliability of Wood Shearwalls to Natural Hazard Loading." *2004 Conference on Woodframe Housing Durability and Disaster Issues*, Las Vegas, NV (presented by van de Lindt).

82. van de Lindt, J.W. and G. Fu. (2004). "Highway Bridge Design Load and Locality of Truck Loads." Proceedings at the *IABSE Symposium on Metropolitan Habitats and Infrastructure*, Shanghai, China, September 22-24, 2004.

83. van de Lindt, J.W. and M.W. Drewek. (2004). "Performance-Based Design of Base Isolation Systems using Inverse-FORM." Proceedings of the *$9^{th}$ ASCE Joint Specialty Conference on Probabilistic Mechanics and Structural Reliability*, Albuquerque, New Mexico, July 2004. (Presented by van de Lindt)

84. van de Lindt, J.W. (2004). "Reliability Analysis of Wood Shearwalls Subject to Lateral Loads." Forest Products Society $58^{th}$ Annual Meeting, June 27-30, Grand Rapids, MI, USA. (Presented by van de Lindt)

85. van de Lindt, J.W. and H.A. de Melo e Silva. (2004). "Allowable Damage-Based Seismic Design of Wood Shearwalls." Proc of the *$8^{th}$ World Conference on Timber Engineering*, Lahti, Finland, June 14-17, 2004. (presented by van de Lindt).

86. van de Lindt, J.W. and D.V. Rosowsky. (2004). "Reliability of Wood Shearwalls Subject to Wind and Earthquake Load." Proc of the *$8^{th}$ World Conference on Timber Engineering*, Lahti, Finland, June 14-17, 2004. (presented by van de Lindt).

87. van de Lindt, J.W., T.M. Ahlborn, M.E. Lewis (2004). "Performance-Based Selection of Overhead Sign Support Structures." Proc of the *2004 Structures Congress*, Nashville, TN. (Presented by van de Lindt).

88. van de Lindt, J.W. (2004). "Wood Shearwall Design and Reliability Inherent in AF&PA/ASCE 16." Proceedings of the *2004 Structures Congress*, Nashville, TN. (Presented by van de Lindt).

89. van de Lindt, J.W. (2003). "Seismic Risk Based on Reliability of Structure Groups." *Response of Structures to Extreme Loading*, Toronto, Canada, August 3-6, 2003, (Presented by van de Lindt).

90. van de Lindt, J.W. and G. Goh (2003). "Modeling Earthquake Uncertainty by Coupling Load and Structure." Proceedings of the *ASCE 2003 Structures Congress*, Seattle WA. (Presented by van de Lindt).

91. van de Lindt, J.W., H. A. de Melo e Silva, and Y. Zhou (2003). "New Performance Criteria for Reliability of Wood Shear Walls." Proceedings of the *ASCE 2003 Structures Congress*, Seattle WA. (Presented by van de Lindt).

92. van de Lindt, J.W. and G. Goh (2003). "Earthquake Duration Effects on Very Low-Cycle Structural Damage Estimates." Proceeding of the *2003 Pacific Conference on Earthquake Engineering*, Christchurch, New Zealand, February 13-15, (Presented by van de Lindt).

93. van de Lindt, J.W., G. Fu, Y. Zhou, and R.M. Pablo Jr. (2003). "Structural Reliability of Bridges Designed Using HS25 in the State of Michigan." Proceedings of the *82$^{nd}$ Anuual Meeting of the Transportation Research Board*. (Presented by van de Lindt).

94. van de Lindt, J.W. and M.A. Walz (2002). "Seismic Reliability Estimates Using a Wood Shear Wall Model," *Proceedings ASCE Structures Congress 2002*, Denver, CO, April 4-6, 2002. (Presented by van de Lindt).

95. van de Lindt, J.W. and M.A. Walz (2002). "Earthquake Response Statistics of a Wood Shear Wall Using a Polynomial Hysteresis Model," *Proceedings of the 7$^{th}$ National Conference on Earthquake Engineering*, Boston, MA, July 21-25, 2002. (Presented by van de Lindt).

96. van de Lindt, J.W. and J.M. Niedzwecki (2000). "Reliability Importance for Design Earthquake Identification," *Proc. of the 8$^{th}$ ASCE Joint Specialty Conference on Probabilistic Mechanics and Structural Reliability*, Notre Dame, Indiana, July 2000. (Presented by van de Lindt).

97. van de Lindt, J.W. and J.M. Niedzwecki. (2000). "A Time Variant Approach to Performance-Based Engineering," *Proc. ASCE Structures Congress 2000*, Philadelphia, PA, May 2000. (Presented by van de Lindt).

98. Niedzwecki, J.M. and J.W. van de Lindt (1998). "Modeling the Extreme Behavior of Ocean Waves," Conference Record, 22$^{nd}$ Meeting of the U.S.-Japan Marine Facilities Panel (UJNR), October 25-November 4.

99. Niedzwecki, J.M. and J.W. van de Lindt (1998). "Parametric Characterization of Surface Wave Data." Proceedings *WAVE'98 ASCE*, Houston, TX, May.

100. Niedzwecki, J.M. and J.W. van de Lindt (1998). "Wave Runup on Spar Platforms," Proceedings *OMAE'98*, Lisbon, Portugal.

101. Niedzwecki, J.M. and J.W. van de Lindt (1998). "Extreme Response and Fatigue Estimates in Directional Seas," Proceedings *ISOPE'98*, May 1998. Montreal, Canada. (Presented by van de Lindt)

102. Niedzwecki, J.M. and J.W. van de Lindt (1998). "Effect of Extremes on Fatigue Life Estimates of a Steel Caisson Platform," Proceedings *SEWC'98*, July 1998, San Francisco, CA. (Presented by van de Lindt).

103. Niedzwecki, J.M. and J.W. van de Lindt (1997). "Sensitivity of TLP Tendon Reliability Estimates to Excitation by Multi-peaked Random Seas," Proceedings *ISOPE'97*, May, Honolulu, HI. (Presented by van de Lindt)

104. van de Lindt, J.W. and J.M. Niedzwecki (1996). "Inflated Contour Approach for Deepwater Tendon Design," Proceedings 7$^{th}$ ASCE Specialty Conference on Probabilistic Mechanics and Structural Reliability, August, Worcester, MA (Presented by van de Lindt)

105. Niedzwecki, J.M., J.W. van de Lindt, and O.R. Rijken, (1995). "Behavior of Tendon Models in Random Seas," Proceedings 24$^{th}$ American Towing Tank Conference, November, College Station, TX. (Presented by van de Lindt)

## Upcoming Conferences

1. van de Lindt, J.W., M.D. Symans, W. Pang, X. Shao, and M. Gershfeld. (2012). " The NEES-Soft project: Seismic Risk Reduction for Soft-Story Woodframe Buildings.", *15$^{th}$ World Conference on Earthquake Engineering*, September 24-28, Lisbon, Portugal.

2. <u>Bahmani, P.</u> and J.W. van de Lindt. (2012). "Performance-Based Seismic retrofit for Soft-Story Woodframe Buildings with Excessive Torsion.", *15$^{th}$ World Conference on Earthquake Engineering*, September 24-28, Lisbon, Portugal.

3. <u>Jennings, E.</u> and J.W. van de Lindt. (2012). "Performance of Woodframe Buildings with Shape Memory Alloy Dampers.", *15$^{th}$ World Conference on Earthquake Engineering*, September 24-28, Lisbon, Portugal.

4. Chadwell, C., M. Gershfeld, and J.W. van de Lindt. (2012). "Dissemination of Earthquake Related Research Activities through the use of Online Educational Modules.", *15$^{th}$ World Conference on Earthquake Engineering*, September 24-28, Lisbon, Portugal.

### Technical Reports

1. Pei, S. and J.W. van de Lindt. (2011). "Approximate Response Reduction Factor Calibration of Cross Laminated Timber Walls for Mid-rise Wood Buildings.", Final Report to FPInnovations, Vancouver, Canada.

2. Prevatt, D.O., J.W. van de Lindt, S. Pei, R. Gupta, W. Coulbourne, S. Hensen. (2011). "Damage Assessment Following the April 27, 2011 Tuscaloosa Tornado", National Science Foundation.

3. van de Lindt, J.W. and P.R. Heyliger. (2011). "Structural Integrity of SDAR (Spray-Dryer-Ash-Rubber) Tiles for House Exteriors.", Final Report to the American Public Power Association.

4. Pei, S., J.W. van de Lindt, S.E. Pryor, H. Shimizu, H. Isoda, and D. Rammer. (2010). "Seismic Testing of a Full-Scale Mid-rise Building: The NEESWood Capstone Test.", NEESWood Project Report NW-04, 532pp.

5. Pei, S., J.W. van de Lindt, N. Luco, and S. Hartzell. (2010). "Comparison of Synthetic Ground motion Models using a Damage Potential Indicator.", Final Report to the U.S. Geological Survey, Reston, VA, 39pp.

6. FEMA P765, (2009). "Midwest Floods of 2008 in Iowa and Wisconsin." Mitigation Assessment Team Report, Team member and co-author.

7. van de Lindt, J.W. (2010). "NEESWood Capstone Testing Report.", Ministry of Housing and Social Development, British Columbia, Canada.

8. van de Lindt, J.W. (2010). "The NEEWood Capstone Test at E-Defense.", Report to FPInnovations-Forintek Division, March 2010, 28 pp.

9. Pang, W., D. Rosowsky, J.W. van de Lindt, and S. Pei. (2009). "Simplified Direct Displacement Design of Six-Story NEESWood Capstone Building and Pre-Test Seismic Performance Assessment.", NEESWood Project Report NW-05, 137p.

10. Wood Engineering Challenges in the New Millennium - Critical Research Needs. Editor: Vijaya K.A. Gopu, Assistant Editors: Rakesh Gupta and John van de Lindt. Proceedings of the Pre-Congress Workshop Offered in Conjunction with the SEI / ASCE Structures Congress 2008, April 23-24, Vancouver, BC, Canada.

11. van de Lindt, J.W., A. Stone, and S. Chen. (2008). "Innovative Steel Design Alternatives for Bridges in Colorado: Simple made Continuous", 171pp, CDOT Research Report.

12. Atadero, R., J.W. van de Lindt, and J.S. Goode. (2008). "Lifetime Statistical Distributions for Fatigue Life Assessment of Structural Systems in Colorado.", CDOT Research Report.

13. van de Lindt, J.W., C. Choi, A. Carraro, and P.R. Heyliger. (2008). "Application of Fly Ash as a Wood Wall Insulator." Report to the American Public Power Association, Washington D.C., 94p.

14. van de Lindt, J.W., A. Graettinger, R. Gupta, S. Pryor, T. Skaggs, and K. Fridley. (2005). "Damage Assessment of Residential Woodframe Structures in the Wake of Hurricane Katrina" Report to the National Science Foundation.

15. van de Lindt, J.W. and J.S. Goode. (2006). "Development of a Reliability-based Design Procedure for High Mast Lighting Structural Supports in the State of Colorado", *CDOT Research Report.*

16. van de Lindt, J.W. (2005). "The E-Proceedings of the 1st invitational Workshop on Performance-Based Design of Woodframe Structures." July 30-31, 2005, Fort Collins, CO, USA.

17. van de Lindt, J.W., G. Fu, S. Pei, and R.M. Pablo Jr.. (2005). "LRFD Load Calibration for State of Michigan Trunkline Bridges" *MDOT Research Report RC-1466*, 57pp

18. van de Lindt, J.W. and T.M. Ahlborn. (2004). "Development of Steel Beam End Deterioration Guidelines." MDOT Research Report, August 2004, 60pp.

19. van de Lindt, J.W. and J.M. Niedzwecki. (2003). "Identification of the Ground Motion Parameters that Control Structural Damage using a Slepian Process Model." *Final Report to the U.S. Dept. of the Interior, U.S. Geological Survey*, December 2003, 22pp.

20. van de Lindt, J.W., K. Cuellar, and S. Vitton. (2003). "Comparison of Steel Overhead Sign Support Structures." *MDOT Research Report JN-56893*, November 2003, 102pp.

21. van de Lindt, J.W. (2003). "Development of a Composite Shear Wall for Resisting High Wind Loads." *Report MTU-CEE-JWV-06* to the Michigan State Police Hazard Mitigation Grant Program, July 2003, 19pp.

22. Ahlborn, T.M., J.W. van de Lindt, and M.E. Lewis. (2003). "Optimization of Cost and Performance of Overhead Sign Support Structures". *MDOT Research Report JN-56886*, October 2003, 150pp.

23. van de Lindt, J.W. and H. A. de Melo e Silva (2002). "Experimental Comparison of the Behavior of In-Flange Connectors for use in Pre-cast Concrete Double-Tee Systems." *Report MTU-CEE-JWV-05* to Progress Industries, Inc., 95pp.

24. van de Lindt, J.W., G. Fu, R.M. Pablo Jr., and Y. Zhou. (2002). "Investigation of the Adequacy of Current Bridge Design Loads in the State of Michigan." *MDOT Research Report RC-1413*, 60pp.

25. van de Lindt, J.W. (1999). "Time Variant Reliability of Systems Dominated by Load Uncertainty," Ph.D. Dissertation, Civil Engineering, Texas A&M University, May, 103pp.

26. van de Lindt, J.W. (1995). "Inflated Contours for Extreme Response Prediction in Complex Structural Systems," M.S. Thesis, Civil Engineering, Texas A&M University, December, 44pp.

## Invited Keynotes and Significant Talks

1. *Planning, Design, and Seismic Testing of a Six-Story Full-Scale Building* (2011), Evening Technical Lecture, Association of Consulting Engineers (India), Bangalore Centre, Bangalore, India, December 6, 2011.

2. *The Role of Full-Scale Testing in the Development of Performance-Based Seismic Design*, (2011), Keynote Address, Conference on Earthquake Analysis and Design of Structures, December 1, 2011 Coimbatore, India.

3. *Damage Study and Future Design Direction Following the Tuscaloosa Tornado of 2011*, (2011). International Code Council Tornado Symposium, September 20, Tuscaloosa, Alabama, USA.

4. *Seismic Performance of Woodframe Buildings: Worldwide Observations, Recent Research, and Future Needs*, Dinner Keynote Talk, Solid Wood and Composites Research Liaison Workshop, U.S. Forest Products Laboratory, September 7-8, Madison, WI, USA.

5. *Performance-Based Seismic Design of Mid-Rise Woodframe Buildings*, with Steven E. Pryor, NEES-EERI Joint Webinar, January 14, San Francisco, CA, USA.

6. *Earthquake Engineering Collaboration Across the Pacific* (2010). NSF Tokyo Office 50$^{th}$ Anniversary Symposium, Tokyo, Japan, October 6.

7. *Design, Testing, and Construction of Mid-Rise Light-Frame Wood Building* (2010), Woodworks Seminar, two invited seminars in Long Beach, two in South San Francisco, two in Rayleigh, N.C., 2 in Atlanta, GA, and a webinar, 2010-2011.

8. *Construction and Shake Table Testing of a 16,000 ft$^2$ Full Scale Building* (2010), Northern Colorado Branch of the American Society of Civil Engineering, Budweiser events Center, Loveland, CO, January 14, 2010.

9. *Shake Table Tests of a Full-Scale Seven-Story Apartment Building at Japan's E-Defense Facility* (2009), College of Engineering Alumni Breakfast, Colorado State University; Denver, CO, December 1, 2009.

10. *Full-Scale Shake Table Testing of a Seven-Story 16,000 sq ft Condominium: Planning, Construction, and Seismic Performance* (2009), Invited Semi-Annual Faculty Lecture, Colorado State University, Department of Civil and Environmental Engineering, November 12, 2009.

11. *Design, Construction and Testing of a Seven-Story Full-Scale Condominium* (2009), Seminar, The University of Alabama, Department of Civil, Construction, and Environmental Engineering, November 3, 2009.

12. *Design, Construction, and Testing of the Seven-Story NEESWood Building at Japans E-Defense* (2009), Invited presentation to the Building Experts Committee (BEC), a tri-lateral meeting between the US, Japan, and Canada, October 29, Tokyo, Japan.

13. *A New Design Paradigm Emerging One Natural Hazard at a Time* (2009). Invited seminar, University of Wisconsin-Madison, Department of Civil and Environmental Engineering, April 14.

14. *Industry Contributions to and from the NEESWood Project* (2008). Invited Plenary presentation at the 6$^{th}$ NEES Annual Meeting, Portland, OR.

15. *CAPSTONE Shake Table Tests of a Seven-Story Building in Japan* (2008). Invited Presentation to the Building Experts Committee (BEC), a tri-lateral meeting between the US, Japan, and Canada, October 21, Washington D.C.

16. *Overview of the NEESWood Project*, (2007). Presentation to the Building Seismic Safety Council – Wood technical Subcommittee (TS-7), Washington D.C., July 26, 2007.

17. *Testing of a Six-Story Woodframe Building at E-Defense in Japan*, (2007). Presentation to the Building Experts Committee (BEC), Quebec City, Quebec, Canada, September, 2007.

18. *The NEESWood Project: Research to Practice* (2007), 1st eBrownbag Webinar co-sponsored by EERI and NEESInc, April 4, 2007. Davis, CA. Co Presented with K. Cobeen, Cobeen & Assoc.

19. *Toward Performance-Based Design of Woodframe Structures Subjected to Natural Hazards Loading* (2005), Structural Engineering and Structural Mechanics Seminar, University of Colorado at Boulder, October 19, 2005.

20. *U.S. Japan Collaboration for Wood Research*, 4th Planning Meeting for NEES/E-Defense Collaboration, Miki City, Japan, August 2-3, 2005.

21. *Performance of Woodframe Structures in the Mississippi Gulf Coast During Hurricane Katrina*, West Coast Lumber Inspection Bureau, April 21, 2006.

22. *Damage Assessment of Woodframe Residential Structures in the Wake of Hurricane Katrina*, ASCE Northern Colorado Branch Dinner Seminar, January 12, 2006.

23. In addition, Professor van de Lindt has had the opportunity to give numerous guest presentations in classes, smaller workshops, meetings, and dinners which are not listed for brevity.

### Presentations Exclusive of Papers/Proceedings (Beginning June 2011)

1. van de Lindt, J.W., S. Pei, S.E. Pryor, and D.Rammer. (2011). "Seismic Design and Performance of a Six-Story Wood-frame Building.", *65th International Convention of the Forest Products Society*, Portland, OR, June 19-21.

2. Dao, T.N. and J.W. van de Lindt. (2011). "The development of Performance-Based Wind Engineering for Residential Structures: From Concept to Application.", *65th International Convention of the Forest Products Society*, Portland, OR, June 19-21.

3. van de Lindt, J.W. (2011). "An Overview of the Devastating Tuscaloosa Tornado of 2011: Questioning the Paradigm", Quake Summit 2011, June 8-11, Buffalo, NY.

4. van de Lindt, J.W. and X. Shao. (2011). "Seismic Risk Reduction for Soft-Story Woodframe Buildings: The NEES-Soft Project." Quake Summit 2011, June 8-11, Buffalo, NY.

5. van de Lindt, J.W., D. Cox, R. Gupta, and F. A. (2011). "Tsunami Risk Reduction for Coastal Buildings through Development of Tsunami Collapse Fragilities." Quake Summit 2011, June 8-11, Buffalo, NY.

## Funded Research Projects

Professor van de Lindt has received approximately $8M in funding over the last decade ($6.2M as PI and $1.8M as co-PI). He has led five NSF projects including two with project teams of 8-15 people, served as Co-PI on four NSF projects, led projects funded by the USDA, Forest Products Lab, USGS, Colorado DOT, Michigan DOT, Industry from the US and Canada. In 2009 Professor van de Lindt led the shake table testing program for a full-scale 16,000 square foot 7-story building at Japan's E-defense facility, which was/is the largest shake table test ever performed. He is currently leading a five-university NSF-funded project with full-scale building hybrid testing at the NEES Buffalo facility, shake table testing at the NEES UCSD facility, and real-time hybrid testing at the University of Alabama seismic lab.

## Current Projects

**NEES-Soft: Seismic Risk Reduction for Soft Story Woodframe Building, 9/30/10-9/29/13, NSF, $1,277,000 (PI – van de Lindt, Co-PI's – Symans, Shao, Pang, and Gershfeld). NSF Graduate Fellowship Supplement included.**

As early as 1970, the structural engineering and building safety community recognized that a large number of two-, three- and even some four-story woodframe buildings designed with the first floor used either for parking or commercial space were built with readily identifiable structural system deficiencies, referred to as a "soft story". Thus, many older multi-story woodframe buildings (built prior to 1970s) are susceptible to collapse at the first story during earthquakes. The majority of these older multi-story woodframe buildings have large openings and few partition walls at the ground level. This open space condition results in the earthquake resistance of the first story being significantly lower than the upper stories. These buildings, known as soft-story buildings, are prone to collapse during major earthquake events. The NEESsoft project will (1) enable seismic retrofit of soft-story woodframe buildings based on performance, (2) experimentally validate recently proposed concepts in for retrofit of soft-story woodframe buildings, and (3) provide a fundamental understanding of the way woodframe buildings collapse in woodframe buildings through a systematic experimental program consisting of three major test types at two NEES equipment sites. The NEESsoft project will begin with simultaneous development of a 3-D numerical collapse model while the testing program will (1) confirm the performance of seismic protective systems for retrofit of soft-story woodframe buildings and (2) experimentally validate a retrofit procedure developed through the ATC 71.1 project. Finally, both the ATC 71.1 retrofit technique and a performance-based retrofit technique that utilizes seismic protection devices will be tested at full-scale in a series of shake table tests at the NEES@UCSD outdoor shake table facility. In the final test, the retrofit will be removed and the building allowed to collapse in a controlled manner to provide one of the first collapse data sets for woodframe buildings, thus providing critical information for understanding this complex problem.

**Integration of Aftershock Seismic Hazard Into Performance-Based Earthquake Engineering 10/1/10-9/30/13, NSF, $280,000 (Co-PI – van de Lindt, PI – Li, MTU)**

The objective of this project is to use existing experimental data available in NEEShub to calibrate nonlinear models for wood and steel buildings in order to investigate the effect of aftershock hazard on performance-based earthquake engineering. Once this is quantified, a systematic approach for engineers that want to incorporate this procedure into PBSD for their clients will be developed.

**Seismic Design and Behavior of Cross Laminated Timber Buildings 8/1/11-7/31/12, USDA-FPL, $177,500 (PI – van de Lindt; Co-PI – Pei, SDSU; D. Rammer, FPL)**

Cross laminated timber is a technology that has been used throughout Europe for over a decade, but is just being introduced into the U.S. market. Currently, there is a dearth of data on its performance during strong ground shaking. This project has the objective of enabling CLT construction in seismically active regions of North America.

**The Prescient Companies: Phase I, 8/1/10-9/30/11, $150,000 (PI – van de Lindt).**

The objective of this study is to investigate a unique type of structure under seismic loading, both numerically and experimentally. A non-disclosure agreement has been signed by all parties involved.

**Seismic Risk Assessment for the I-25/I-70 Corridor in the Mountain Plains Region of the U.S., $31,000 (PI – van de Lindt)**

Seismic hazard assessment in Colorado has demonstrated that there is the potential for an M6.5 event. Most structures in Colorado are designed with a focus on wind, which puts them at significant risk if an earthquake of M6 or greater were to occur. This type of situation has been termed low-occurrence high-consequence for natural hazards and is a challenge because of the public perception, i.e. a lack of need to consider this type of hazard. According to the 2035 Regional Transportation Plan for the Intermountain Transportation Planning Region (2007) there is up to 38,000 vehicles on I-70 each day. Now, consider what would happen if this was disrupted for some period of time, and perhaps if I-25 which intersects I-70 was also disrupted because of one or more bridge or overpass failures. In this study a seismic risk assessment for the I-70 / I-25 intersection and surrounding area will be performed. This will include seismic risk assessment using FEMA's HAZUS software and quantification of the disruption including traffic flow based on estimates of downtime for overpasses and bridges in the region.

## <u>Completed Projects</u>

**NEESWood: Development of a Performance-Based Seismic Design Philosophy for Mid-Rise Woodframe Construction, 8/15/05-8/14/10, *NSF*, $1,420,000 (PI-van de Lindt, Co-PI's – Rosowsky, Filiatrault, Symans, and Davidson).**

While woodframe structures have historically performed well with regard to life safety in regions of moderate to high seismicity, these types of low-rise structures have sustained significant structural and non-structural damage in recent earthquakes. To date, the height of woodframe construction has been limited to approximately four stories, mainly due to the lack of understanding of the dynamic response of taller (mid-rise) woodframe construction, non-structural limitations such as material fire requirements, and potential damage considerations for non-structural finishes. Current building code requirements for engineered wood construction around the world are not based on a global seismic design philosophy. Rather, wood elements are designed independently of each other without consideration of the influence that their stiffness and strength have on the other structural components of the structural system. Furthermore, load paths in woodframe construction arising during earthquake shaking are not well understood. These factors, rather than economic considerations, have limited the use of wood to low-rise construction and, thereby, have reduced the economical competitiveness of the wood industry in the U.S. and abroad relative to the steel and concrete industry. This project seeks to take on the challenge of developing a seismic design philosophy that will provide the necessary mechanisms to safely increase the height of woodframe structures in active seismic zones of the U.S. as well as mitigating damage to low-rise woodframe structures. This will be accomplished through the development of a new seismic design philosophy that will make mid-rise woodframe construction a reality in regions of moderate to high seismicity. Such a design philosophy falls under the umbrella of the performance-based design paradigm. This project is culminated with the world's largest shake table test in Miki, Japan under the direct supervision of Professor van de Lindt. Details can be found in the synergistic activities section of Professor van de Lindt's curriculum vitae.

**Reliability-Based Analysis and Design of Slender Long-Span Bridges, NSF, $243,000, (Co-PI – van de Lindt; PI – Chen, CSU).**

Slender long-span bridges exhibit unique features not presented in short-span bridges, such as higher traffic volume, simultaneous presence of high-sided trucks, strong sensitivity to wind and high dead load and live load ratio. The current design loads in the AASHTO LRFD bridge specifications, which were developed primarily from bridges with spans of 200 feet and less, are reasonable for short-span and most medium-span bridges, but may not capture the worst-case scenarios for long-span bridges. Under wind as well as traffic loading, slender long-span bridges exhibit large dynamic responses through dynamic interactions, which can cause fatigue accumulation, deterioration, and related safety issues for the whole bridge. In the United States, more than 800 long-span bridges in the national bridge inventory are classified as fracture-critical. The lack of an accurate and systematic performance analysis methodology for long-span bridges with in-depth evaluations based on combined loading such as traffic and environmental impacts has been found to be the primary reason for this potential. This project focuses on the behavior and analysis of long-span bridges under combined extreme loads in an attempt to capture the governing scenario for long-span bridges subjected to combined loading. The scope focuses on 1) developing an integrated reliability-based Bridge/Traffic/Wind dynamic analytical model for slender long-span bridges based on improved "real traffic" flow simulation, improved wind tunnel test data, and equivalent wheel loading approach; and 2) calibrating the design load based on limit states through influence surface techniques using structural reliability theory to achieve the desired target reliability level.

**Feasibility Study for Highway Traffic Noise Barriers from a Spray Dryer Ash and Used Rubber Composite, Colorado Department of Public Health and the Environment, $91,374, (PI – van de Lindt; Co-PI – Heyliger)**
Flue gas desulfurization in new coal combustion power plants is required by the Clean Air Act to combat the effects of acid rain. The Rawhide Power Station, managed by the Platte River Power Authority (PRPA) in Northern Colorado, uses this process. One by-product of the extraction mechanism results in the production of spray dry absorber material known as spray dryer ash (SDA). Eventually, all coal burning power plants in Colorado and the entire United States will be required to use this procedure to maintain a clean environment. In 2007 approximately 3.5M tons of SDA were produced in the U.S. and it is estimated that 18M tons will be produced by 2017. Currently, only 8.3% of SDA is put to beneficial use with most of that utilized in the mining industry. One positive aspect of the production of this material is that the SDA has many properties that are similar to fly ash, which is widely used in a number of different applications. The negative aspect is that its chemical makeup is such that it is not covered by any of the standards and specifications for fly ash usage in engineering materials, and therefore the SDA produced locally typically finds its way to landfills in the state of Colorado. This project is an extensive feasibility study to engineer highway traffic noise barriers from a combination of SDA and rubber from used car tires, both normally disposable products, focusing on (1) durability; (2) structural aspects; (3) acoustics; and (4) aesthetics. The project focuses on waste diversion and recycling aligning directly with Colorado Senate Bill 07-182.

**Rapid Load Rating of Short Rural Bridges, $31,000 (PI – van de Lindt)**
Short rural bridges are defined as bridges less than 20 feet long and are not typically kept on state bridge inventories. These types of short bridges often span a culvert and are either one or two lanes because they carry very low volume routes. Although these rural bridges carry a low volume of traffic and are in rural regions their importance to the communities that they provide service to is high. Because there are limited resources for counties who typically have oversight for these, it is proposed to develop a rapid, concise procedure for load rating these bridges. The approach will use as input the results of a visual inspection with moderate measurements of deteriorated locations taken. Then, based on a series of design charts and multi-dimensional interpolation rules (which will be checked during the development process proposed here) a reduction factor for moment and shear capacity can be determined almost immediately. If an original load rating is not known, then a simple flow diagram provides the load assessment which can be combined with the reduction factor to determine the rating. Larimer County, Colorado will be used as a test bed for the approach.

**Innovative and Economical Steel Bridge Design Alternatives for Colorado: Hybrid Girders, Double-Composites, Epoxy FRP covers plates, and External Post Tensioning (Phase-II),CDOT, $70,000 (PI – van de Lindt)**
While SMC design and construction does represent an innovation, there are several methods that can be combined with this type of construction to provide the state of Colorado key opportunities to pave the way in steel and composite bridge design. Other approaches include: (1) External post tensioning using either steel or FRP rods; (2) Use of hybrid steel girders to enable the use of high performance steel in key regions of the girders; (3) Use of double composite steel-concrete bridges as depicted in Figure 2 (this can also be a beam with two webs angled to form a tub and a bottom concrete flange poured; and (4) Application of an FRP cover plate to the bottom flange using epoxy to optimize the cross section. Each of the above mentioned approaches can provide true innovation and when combined with the SMC design and construction technique, represents true bridge design innovation in Colorado. During this Phase-II study,

detailed finite element analysis and numerical modeling will be carried out to comprehensively investigate the innovative approaches described above. In addition, physical laboratory testing will be performed to verify the models developed during the study once FHWA-MPC funds are secured for that task.

**Financial Support for Six-Story Wood Building Tests in Japan, $75,000(CAD), Government of British Columbia (PI – van de Lindt)**
One time financial support for existing NEESWood Project above.

**Financial Support for NEESWood Tests in Japan, $50,000(CAD), FPInnovations (PI – van de Lindt)**
One time financial support for NEESWood tests in Japan

**Understanding the Behavior of Mid-Rise Light-Frame Wood Buildings, $273,000, U.S. Forest Products Lab (PI's – van de Lindt and Rammer, FPL)**
Mid-rise wood-frame construction provides many benefits, ranging from rapid and economical construction to sustainable and resilient construction. A design philosophy was recently developed in the NEESWood project that enables this type of construction for six-story multifamily buildings in high seismic regions of the United States. The NEESWood Project is a five-university project that involves analysis, testing, and societal risk assessment with the intent of safely increasing the height of light-frame wood buildings to six stories in regions of moderate to high seismicity. In this project, the building will be tested on the world's largest earthquake shake table in Miki, Japan. The building has over 14,000 square feet of living space with 23 living units totaling 36 bedrooms. Forest Products Laboratory researchers are working closely with Colorado State University to optimize this instrumentation so that key measurements are gathered during testing, and will work on post test analysis of data including in and out-of-plane diaphragm analysis.

**International Travel Support for US Researchers to attend E-Defense Testing in Japan, NSF, $25,000 (PI-van de Lindt)**
Travel grants for 10 US early career researchers to attend the NEESWood Capstone tests in Japan. A special program was arranged including an ice breaker reception dinner, tour of the facility, and access to the laboratory floor and building before and after testing.

**Performance-Based Wind Engineering: Interaction of Hurricanes with Residential Buildings, 6/01/08-5/30/10, NSF, $100,000 (Co-PI – van de Lindt, PI – Prevatt, Florida, Co-PI – Gupta, OSU)**
This project focuses on the relationship between spatially varying wind loads and structural load paths in wood-frame buildings. Existing wind tunnel data and database-assisted design methodology will be used with experimentally derived influence surfaces to predict roof-to-wall connection uplift loads. Van de Lindt's portion of this project is the integration of airborne missiles into fragility curves for wind damage to woodframe buildings.

**Developing Damage potential Indicators through Coupling Intrinsic Mode Functions and Structural Characteristics for Improvement in Synthetic Ground Motion Generation: Collaborative Research with Colorado State University and USGS, 12/1/08-11/30-09, Department of the Interior – USGS, $60,000 (PI – van de Lindt).**
In this project the Hilbert-Huang transform will be applied to identify intrinsic mode functions for an array of ground motions for the Northridge and Loma Prieta earthquakes. Synthetic records from four different established techniques will be provided by USGS collaborators. Modified ground motions will be developed by systematically removing IMF's and computing damage potential indicators, established through multi-dimensional correlation. The objectives are to develop a formulation for quantitative damage potential indicators of ground motion records coupled with variants of structural models and to quantitatively evaluate synthetic motions through comparison of synthetic ground motin DPI's for four different numerical building models.

**NEESR II: Mitigating the risk of coastal infrastructure through understanding tsunami-structure interaction and modeling, 10/108-9/30/11, $375,000 (Co-PI – van de Lindt, PI – Cox, OSU, Co-PI's – Gupta, OSU; Aquiniga, TAMU-Kingsville)**

The current US tsunami evacuation strategy puts large populations at high risk to nearfield tsunamis because it requires that everyone evacuate the inundation zone and does not consider the possibility of vertical evacuation within the zone. It is the vision of this project that building damage level, and, therefore, the debris hazard of collapsed structures and potential for vertical evacuation on survivable structures, can be modeled for large coastal communities by coupling existing hydrodynamic flow models with fragility curves for different structure types. The goals of this NEESR-II project are to (1) develop a methodology to assess the risk of residential structures to tsunami inundation and wave forces through a systematic experimental study coupled with a numerical fragility analysis; (2) enable the development of innovative retrofit products by developing a structural testing protocol that is representative of hydraulic impact/forces during a tsunami; and (3) refine the current hydraulic force equation in the ASCE 7 based on a series of wave basin tests to account for building density and other variables.

**Major Research Instrumentation: Acquisition of an Infrastructure for Real-Time Testing of Wind Effects on Structures, 10/01/05-9/30/09, *NSF*, $590,000 (Co-PI – van de Lindt, PI-Bienkiewicz).**

Mitigation of natural and human-induced hazards will play a fundamental role in defining what society demands of engineers in the U.S. and worldwide. In the past, designing to a minimum standard was believed by many to provide adequate performance. A new developing paradigm, shared by several engineering fields, is performance based engineering (PBE), which seeks to measure design adequacy based on multi-objective system performance rather than the traditional component strength approach. To date, this paradigm has only received attention by earthquake engineering researchers. This MRI project seeks to enable researchers at Colorado State University to take a step toward establishing a design philosophy for performance-based wind engineering (PBWE) by utilizing what has been learned by earthquake engineering researchers (i.e. utilizing the NEES IT infrastructure for test equipment linkage). In order to do this, an infrastructure improvement to enable hybrid spatio-temporal testing of wind effects on structures will beacquired. This will make it possible to (1) apply realistic wind loads on structures, and (2) couple the left and right sides of the equation of motion during simulated wind loading in the presence of nonlinearities. Both these capabilities are essential for this next generation of design philosophies.

**The Next Step For ASCE 16: Performance-Based Design of Woodframe Structures, ASCE/SEI, $6,000 (PI-van de Lindt, Co-PI's Rosowsky and Fridley)**

This is an ASCE/SEI Special Project being led by J.W. van de Lindt with Co-PI's Ken Fridley and Dave Rosowsky and consists of a travel budget for two invitational workshops. The first workshop was held at Colorado State University in Fort Collins, CO on July 28$^{th}$ and 29$^{th}$, 2005.

**Monitoring of Signal Mast Arms for Dynamic Response to Wind Loading, CDOT, 4/1/08-3/31/10, $80,000 (PI: van de Lindt; Co-PI: Chen, Bienkiewicz)**

Signal support structures are approximately cylindrical in shape with a highly tapered diameter. The addition of traffic signals and other components results in dynamic properties, e.g. frequency, that causes cantilevered signals to be susceptible to wind induced vertical motion which is most likely a combination of vortex shedding and galloping. This vertical motion has a significant effect on fatigue life at/near the connections for these long slender steel structures. To date, this problem has been addressed by increasing the resistance, or strength and stiffness, of the structure, e.g. the addition of stiffeners. Numerical modeling of wind/structure interaction has progressed enough in the last 15 years that it is now possible to accurately model the interaction behavior, opening the door to explore better, more economical solutions. This is the first phase of a study with the specific objective of monitoring the motion of five such structures for a period of 12 months using accelerometers and wind velocity gages.

**Reliability-Based Shearwall Design for Multiple Performance Objectives, 12/01/04-11/30/08, *USDA*, $381,546 (PI-van de Lindt, Co-PI – Rosowsky, Texas A&M Univ.)**

The field of structural engineering is evolving toward the adoption of performance-based design procedures with the greatest momentum in the seismic design community. The proposed research project focuses on the design and construction of light-frame wood structures. The research objective of this project is to develop a logical, performance-based decision procedure to assist/direct design engineers in the selection of engineered wood shearwalls for use in seismic design of woodframe structures. Specifically, the development of a methodology for performance-based selection of engineered shearwalls taking into account the various performance and dynamic behavior issues, construction costs as well as statistical distributions of losses, and ultimately basing selection criteria on a probability-based lowest expected loss; while still leaving some level of subjectivity to the informed designer.

**NEESR Payload: Wave Loading on Residential Structures with Earthquake and Hurricane Applications, NSF, $75,000 (PI: van de Lindt; Co-PI: Gupta, OSU)**

The NEES@OSU tsunami wave basin allows for the very unique opportunity to perform experiments that will provide one-of-a-kind data for residential structures subject to wave loading. This payload project will provide one-of-a-kind data for residential structures – specifically: structural engineering design, system analysis, coastal risk assessment, and decision-making in support of public policy within the NEES data repository. The project presents an opportunity to gain insight into a complex fluid/structure interaction problem that has extensive multi-disciplinary (e.g. engineering and decision-making/policy) applications and directly affects millions of structures, and families, in coastal regions of the U.S. The investigators performed wave tests on one-sixth scale structural models representative low rise woodframe structures. Residential structures, typically woodframe in the U.S., are built in close proximity to the shoreline with this near-shore population increasing significantly each year. The shearwalls, roof trusses, and connections have all been scaled to be compliant rather than rigid like most wave basin models. Approximately 4 to 6 models will be constructed since they are expected to be destroyed by the larger waves during some of the tests.

**Innovative applications of Fly Ash: Roof Tiles, Colorado Commission on Higher Education, $113,000 (Co PI – van de Lindt; PI - Heyliger; Co-PI - Atadero).**

Fly ash is a byproduct created from coal burning power plants. Until recently fly ash was solely discarded into landfills. Multiple studies have been completed to determine the characteristics and uses for fly ash. These fly ash studies and products include, but are not limited to, insulation, flowable fills, ceramic tiles, and bricks. Traditionally, fly ash has also been used as a partial cement substitute when producing concrete. Further investigation has centered on high volume substitutions or total substitutions of cement with fly ash.

**Time History Analysis of Mid-Rise Light-Frame Wood Buildings in British Columbia, FPInnovations, $26,000, 11/1/08-3/31/09 (PI – van de Lindt)**

The Provincial government of British Columbia has mandated that the allowable height of light-frame wood construction go from four to six stories. This project involves running nonlinear numerical analysis of the buildings to determine if the seismic performance is adequate. Recommendations will be made by the team in collaboration with FPInnovations-Forintek Division to the B.C. government.

**Enabling Innovative Plate Girder Bridges: Simples Spans Made Continuous, MPC (UTC), $35,000 (PI – van de Lindt).**

The state of Colorado currently designs and builds concrete bridges nineteen times for every steel bridge they build. However, state law mandates that they fully consider both types of construction. This project, which follows a previous project whose objective was to build design and cost estimation procedures and software for compact rolled sections, will enable fair and competitive bids for contractors attempting to contract with the Colorado Department of Transportation.

**Statistical Charaterization of Wind Distributions for fatigue Assessment of Structural Supports in Colorado, CDOT, $40,100.**

Design of slender metal structures can be controlled by fatigue considerations. Accurately characterizing the fatigue life of such structures requires a lifetime distribution of wind speeds. Presently most wind speed information available for design is in the form of maximum three-second gust speeds. These speeds give no information about the lifetime distribution. This report presents the development and results for lifetime wind speed distributions at various Colorado sites. Additionally, due to the unique geography of the Front Range the data used to develop the lifetime wind speeds has also been used to compute maximum three-second gusts. The wind data developed in this study are useful for the design of structures sensitive to fatigue as well as structures sensitive to extreme wind speeds. Finding comprehensive wind data in sets long enough for analysis is a challenging task. Long term changes due to development can affect the wind speed distributions and three-second gusts described herein.

**Investigation of the use of Fly Ash for Light-frame Wood wall Insulation, APPA, $30,000 (PI: van de Lindt; CO PI's: Cararro, Heyliger).**

Finding a power generation solution to the ever increasing world demand for electricity that is ecological, economical, and efficient, has long been elusive. Traditionally, the answer has resided in any method which would bring power to the masses, cheaply and in bulk. To this end, the negative ecological effects are felt to be outweighed by the economic ease of coal power generation. Each year, nearly two-thirds of the fly ash produced by coal burning power plants is disposed of in landfills and ash ponds. This percentage equates to approximately 40 million tons in the United States and hundreds of mega-tons in India and China. This project provides one solution of creating a use for the waste stream products of manufacturing and power generation facilities. The work contained herein quantifies the increase in thermal efficiency of a light-frame residential structure that has been augmented with a fly ash composite insulation as compared to a "traditional" fiberglass insulated house. This is accomplished using Fourier's law of conductive heat transfer, assuming a one dimensional, steady-state conductive heat transfer problem. The solution found empirically is then extrapolated to two different, larger scale house plans to quantify the typical cost savings and increase in efficiency that could be expected in an environment similar to the one in which the testing was performed, i.e. Northern Colorado, as well as three other regions of the United States.

**Innovative Steel Design Alternatives for Bridges in Colorado, CDOT, 4/15/06-3/30/09, $50,000 (PI: van de Lindt; Co-PI: Chen).**

Currently, virtually all bids from contractors are for concrete bridges except when it is not possible to shore over traffic below during the construction process. The lack of steel bids by contractors is due to several causes, one of which can be changed. Specifically, there is a lack of available and adequate steel resources for the contractors in Colorado to make a reasonable bid. These necessary resources will be developed within the scope of this project and provide resources, and a mechanism for contractors to bid on a CDOT bridge using steel. This research provides CDOT three deliverables that can, in turn, be made available to contractors bidding on design and/or construction projects: (1) revised cost as a function of span tables/charts for simply supported common continuous span bridges using rolled steel beams; (2) a "database" for economical steel details procured and developed in conjunction with fabricators most commonly used by contractors bidding CDOT jobs; (3) a final report outlining the approach used in the development of deliverables (1) and (2), so that they may be updated in the future. This is particularly true as more LRFD data becomes available nationwide and in Colorado.

**Collection of Perishable Data on Woodframe Residential Structures in the Wake of Hurricane Katrina, 10/01/05-09/30/06, *NSF*, $15,000 (PI – van de Lindt, Co-PI – Graettinger, University of Alabama)**

This Small Grant for Exploratory Research (SGER) project supports the acquisition of perishable data on damage to and performance of woodframe structures following hurricane Katrina by a multi-institutional post-disaster team (Colorado State University, University of Alabama, Oregon State University, Michigan Technological University, Simpson Strong Tie Co., and in cooperation with APA) made up of members from both academia and industry. Four members of the team are committee chairs and members of the American Society of Civil Engineers / Structural Engineering Institute Committee on Wood, thus technology, i.e. data, transfer will be almost instantaneous. Such data is perishable in that once repairs begin and clearing of woodframe debris is underway it is no longer available to the engineering community in order that we may learn how to improve the performance of woodframe structures during very high winds. The vast majority of the residential building stock in the U.S. is light-frame, or woodframe, construction including the affected areas in Louisiana, Alabama, and Mississippi.

**LRFD Load Calibration for State of Michigan Trunkline Bridges – Phase III, *Michigan Department of Transportation*, 10/21/05 – 12/21/05, $19,000 (Co-PI –van de Lindt, PI- Fu, Wayne State Univ.).**

The is an extension of the calibration project described below to enable the researchers to project the live load data in a different manner for comparison prior to computing load factors.

**Development of a Reliability-Based Design Procedure for High mast Lighting Structural Supports in Colorado, 10/01/04-9/30/05, *Colorado Department of Transportation*, $44,500 (PI – van de Lindt)**

High mast lighting structural supports are subjected to a tremendous number of loading cycles each year due primarily to wind fluctuations. The height of these structures results in large forces and moments at the base connections which, in turn, results in large stresses. These can be due to higher modes of vibration, i.e. $3^{rd}$ mode, which are common in slender structures of this height and result in a very large number of cycles. AASHTO's Standard Specifications for Structural Supports for highway Signs, Luminaries, and Traffic Signals (2001) defines *fatigue* as "damage resulting in fracture caused by stress fluctuations". This proposal outlines a work plan, submitted at the request of Mr. Richard Osmun, to develop a semi-prescriptive design procedure for high mast lighting structural supports in the state of Colorado. The approach presented herein will account for the damage caused by these higher modes through a concept known as the "killer pulse" concept. This technique can account for accumulated fatigue damage and then answer the question: What wind velocity is enough to fail the damaged structure? By understanding and identifying this critical wind velocity we can design the structure to withstand it while possessing the desired margin of safety. The deliverable outlined herein will provide a prescriptive guideline that guarantees a minimum structural reliability level. That minimum, or target, structural reliability level will be prescribed by the Colorado Department of Transportation (CDOT) through discussions with Dr. van de Lindt during the course of this project.

**LRFD Load Calibration for State of Michigan Trunkline Bridges, *Michigan Department of Transportation*, 09/15/03 – 4/30/05, $135,000 (PI's – van de Lindt and Fu, Wayne State Univ.).**

The objective of this research project is to determine what scaling of the HL93 bridge design load configuration will provide Michigan trunkline bridges designed using the LRFD bridge design code a consistent structural reliability index of 3.5. A key feature of this study will be the projection of the load effects from a limited amount of data to form a 75-year load effect distribution for moments and shears. Millions of truck loads will be used to check the adequacy of the methods developed for data projection. This will include both closed-form approaches as well as numerical statistical approaches.

**Planning of the NEES/E-Defense International Collaboration, *National Science Foundation*, 10/15/03—1/31/05, $50,000 (PI – van de Lindt, Co-PI – Rosowsky, Oregon State Univ.).**

This project will develop collaborative linkages between the Network for Earthquake Engineering Simulation (NEES) and the E-Defense large shake table facility being constructed in Japan at the researcher level. This SGER grant is primarily supporting the development of a full "small group" (SG) proposal to NSF through the NEESR (Network for Earthquake Engineering Simulation / Research Phase) program which includes the assembly of a small group of researchers, i.e. 4 to 7, to write the full proposal and participate on the project. The dual objectives of the larger proposal will be (1) to partially tie the large shake table facility in Japan into the NEES grid, and (2) address the seismic performance of woodframe structures in the United States, comprising more than 80% of the building inventory.

**Development of Steel Beam End Deterioration Guidelines, *Michigan Department of Transportation*, 03/01/03-07/31/04, $68,000 (PI – van de Lindt).**

The objective of this project is to 1) identify the common types of damage to steel beam ends and develop guidelines to assist/direct inspectors in determining when to report section losses to the structural analyst, and 2) to provide the analyst with guidelines for computing the reduced capacity of the section. These objectives will be accomplished using solid modeling / FE analysis in combination with a small experimental program. Multivariate regression will be performed based on the results of the FE analysis to revise the AASHTO/AISC design equations to provide either the same stress level or possibly safety level.

**Re-Evaluation of LRFD for Engineered Wood Products: Keeping Pace with Changes in ASCE 7, 06/01 – 12/03, Travel funds only, (ASCE/SEI Special Project being carried out by the Committee on the Reliability –Based Design of Wood Structures.)**
The objective of this study is to determine the structural reliabilities inherent in ASCE Standard 16 for engineered wood products. The task assigned to J. van de Lindt is the assessment of structural reliability indices for wood shear walls designed to ASCE 16, subjected to wind and earthquake load. The wind portion of the study was recently completed and the seismic portion is almost completed.

**Investigation of the Adequacy of Current Bridge Design Loading in the State of Michigan, *Michigan Department of Transportation*, 02/14/01-04/05/02, $45,000 (PI's – van de Lindt and Fu, Wayne State Univ.).**
In 1972 the Michigan Department of Transportation (MDOT) approved an increase in their design load for all bridges located on Interstate and Arterial highways to HS25 loading. Currently the Michigan DOT still uses the HS25 loading for the global design of these bridges. Recently, the question of whether or not this design load adequately represents the real truck loads on Michigan's bridges attracted some attention at the federal level and was investigated within the scope of this project. The objective of that project was to evaluate the adequacy of the Michigan design load for highway bridges, based on weigh-in-motion data. The target reliability index for the evaluation of the primary bridge components was set equal to 3.5, the target reliability index used to calibrate the AASHTO LRFD Bridge Design Specifications. It was concluded that the HS25 design load does not consistently provide a reliability index of 3.5.

**Identification of the Ground Motion Parameters that Control Structural Damage using a Slepian Process Model, *United States Geological Survey*, 05/15/02-08/31/03, $60,000 (PI – van de Lindt; Co-PI – Niedzwecki, Texas A&M Univ.).**
A Slepian process model is a model that describes the extreme behavior of a process in terms of the covariance of the underlying process and the statistical distribution of the first derivative at level crossings. It was reasoned that if the extreme behavior of a process can be modeled using this approach it may also be possible to model the damage since it is related to the extremes. If the structural components or system can be modeled with simplified hysteretic models it should be possible to predict the expected value of the damage.

**Development of a Composite Shear Wall for Resisting High Wind Loads, *Federal Emergency Management Agency Hazard Mitigation Grant Program through the Michigan State Police*, 11/15/01-05/15/03, $38,000 (PI – van de Lindt).**
Non-structural damage often occurs during wind storms due to excessive displacements which in properly engineered light-frame structures is relatively preventable. The objective of this study was the development of a low-cost, constructible, shear wall made primarily of wood that was capable of transferring forces to the foundation with minimal displacement levels. Adhesives and/or steel components were added to a basic plywood sheathed shear wall to examine the effect and make basic recommendations regarding their potential for application.

**Comparison of Steel Overhead Sign Support Structures, *Michigan Department of Transportation*, 03/19/03-08/31/03, $54,000 (PI – van de Lindt).**
This is a short project, approximately 5 months, and has the objective of checking to ensure that the overhead sign support structures identified in *Optimization of Cost and Performance of Overhead Sign Structures* meet the 2002 AASHTO criteria. One aspect of this project includes identifying problem areas for implementation of the new design criteria.

**Optimization of Cost and Performance of Overhead Sign Structures, *Michigan Department of Transportation*, 05/11/02-08/10/03, $70,000 (Co-PI – van de Lindt; PI – Ahlborn).**
The Michigan DOT is required to implement the new 2002 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaries, and Traffic Signals. This project focuses on overhead sign support structures, particularly cantilevers. The objective is the development and application of a technique to select one or more existing designs based on expected fatigue performance. The ASCE-7 wind load is used in combination with a random vibration fatigue approach developed by Crandall and Mark (1963) to estimate the fatigue life of each structure. Wind loading, i.e. natural wind gusts, were the modeled load source. This is combined with cost estimates based primarily on steel weight to round out a decision support algorithm.

**Experimental Comparison of the Behavior of In-Flange Connectors for use in Precast Concrete Double-Tee Systems, *Progress Industries Inc.*, 08/01/02-12/20/02, $9,000 (PI – van de Lindt).**
Prestressed double-Tee beams are used in multi-level parking structures and in some states' bridges. The advantage of double-Tee beams is that the flange forms the floor of the garage or bridge deck. Steel brackets, called in-flange connectors, are embedded in the flanges of the beams and are welded together on-site to facilitate system behavior of the beams. To date, placement, i.e. spacing, of these connectors has been based primarily on engineering judgment. This is primarily due to limited knowledge of their behavior under various types of loading. The objective of this study was to help to fill in this gap in engineering knowledge by testing ninety-eight flange connectors embedded in 3ft x 3ft x 4in concrete slabs: seventy (70) monotonic and twenty-eight (28) reversed-cyclic tests were performed. All specimens and test apparatus were provided by the sponsor. The test protocols included (1) monotonic tension, (2) vertical shear upward, (3) vertical shear downward, (4) horizontal shear left, (5) horizontal shear right, (6) vertical reversed-cyclic shear, and (7) horizontal reversed-cyclic shear. Six different connectors were tested using each of these seven test protocols, each in duplicate.

**Development of a Nonlinear Wood Shear Wall Model for Seismic Reliability Applications, *Michigan Tech Graduate School*, 04/01/00 – 07/15/01 (PI – van de Lindt).**
This study developed a new hysteretic model for the dynamic analysis of wood shear walls. The model, termed a polynomial backbone model, was developed in order to assess the seismic reliability of wood shear walls in Boston, Seattle, Los Angeles, and St. Louis. Calibration of the model was achieved by performing full-scale shear wall tests.

**Proof of New Structural Damage Model Concept, *Michigan Tech Office of Research and Sponsored Programs*, 01/01/02 – 12/31/02, (PI – van de Lindt).**
Internal faculty scholarship grant (FSG) to examine the application of damage models within the context of seismic hazard analysis.

**Seismic Hazard Estimation, *Michigan Tech Office of Research and Sponsored Programs,* $3,500, 01/01/01 – 12/31/01, (PI – van de Lindt).**
A faculty scholarship grant to extend a seismic hazard method to develop a composite seismic response spectra for specific sites.

**Feasibility Study: Time Variant Bayesian Decision Theory for Urban Evacuation Planning, *Michigan Space Grant Consortium*, 5/15/01 – 9/30-02 (PI-van de Lindt)**
This project was a seed grant to examine the feasibility of the development of a new hurricane evacuation methodology.

**Professional Consulting**

**FEMA** Mitigation Assessment Team, Midwest Floods of 2008, Iowa and Wisconsin. Approximately 10 days of site visits and co-authorship of FEMA P765.

**FPInnovations-Forintek Division**, 2009; 2011

**FEMA** The 2011 Southeastern Tornadoes, in-kind.

**Conference Sessions Organized, Chaired, Proposal Review Panels, and other Activities**

1. Special Session Organizer and Chair; "Performance-Based Design of Wood Structures", PLSE, Hong Kong, December 5-7, 2012.

2. Session Chair; "Lateral Load Systems"; 2012 World Conference on Timber Engineering, Auckland, NZ; July 15-19.

3. Reviewer for NRC Research Associateship Programs, National Academies, 2012 (ongoing).

4. Session organizer and Chair for 2012 Structures Congress "Seismic Risk Reduction for Soft-Story Woodframe Buildings.", Chicago.

5. Invited Participant (representing NEES Users), NSF Budget and Operations Subcommittee Meeting on Re-competition of Large Facilities, Nov 2-3, 2011.

6. Conference Co-Chair on behalf of the University of Alabama, *Earthquake Analysis and Design of Structures*, December 1-3, 2011, Coimbatore, India.

7. Co-organizer (with Yue Li), Multiple Hazards Risk Assessment and Mitigation, Mini Symposium, ICASP 11, Zurich.

8. Workshop Organizer and Chair, First Invitational workshop on Improving Seismic Modeling of Woodframe Buildings, Feb 2-3, 2011, Tuscaloosa AL. 15 participants with travels funds provided by USDA-FPL.

9. Session Organizer and Chair, Special Session: Changes in the Seismic Design of Wood Buildings to Reach New Heights, 9th U.S. National and 10th Canadian Conference on Earthquake Engineering, Reaching Beyond Borders, Toronto, Canada, July 25-29, 2010.

10. Session organizer, QuakeSummit2010, San Francisco, CA, Wood and Masonry Buildings, Joint NEES-PEER Annual Meeting.

11. Session organizer and chair, Wood Buildings Session, US-Canada Joint Conference on Earthquake Engineering, 2010, Toronto, Canada.

12. Track organizer and session chair. "Seismic Design of Wood Buildings." *2008 World Conference on Earthquake Engineering*, Beijing, China.

13. Developed presentations and presented at AF&PA sponsored workshop on Nonlinear Time History Analysis of Light-frame Wood Structures". Software developed by Professor van de Lindt with one of his students, Dr. S. Pei, was highlighted for a half day with a hands-on tutorial.

14. Technical Program Chair, 5th Annual Network for Earthquake Engineering Meeting, June, 2006, Snowbird, Utah.

15. Coordinating Board Member and Breakout Session Facilitator "Wood Research Needs in the New Millenium". Breakout Session: Natural Hazards. *Structures Congress*, 2008.

16. Session organizer. "Natural-Hazards Induced Damage to Woodframe Structures." *2006 Structures Congress and Exposition*, St. Louis, MO, May.

17. Session organizer. "Performance-Based Design of Woodframe Structures: Perspectives from Around the Globe." World Conf on Timber Engineering, Portland, OR, August 1-6.

18. Session chair and organizer. "Re-evaluation of LRFD for Engineered Wood Products: Keeping Pace with Changes in ASCE 7." *2004 Structures Congress and Exposition*, Nashville, TN, May 18-24.

19. Organizer and Host of the 1st Invitational Conference on Performance-Based design of Wood Structures, Fort Collins, CO, July 28-29, 2005.

20. Session chair and session organizer. "Performance-Based Reliability of Wood Shear Walls." *2003 Structures Congress and Exposition*, Seattle, WA, May 29-June 1, 2003.

21. Session chair and session organizer, "Behavior of Light-Frame Wood Wall Systems." *2002 ASCE/SEI Structures Congress and Exposition*, Denver, CO April 4-6, 2002.

22. Session co-chair, *8th ASCE Joint Specialty Conference on Probabilistic Mechanics and Structural Reliability*, Notre Dame, IN, July 24-26, 2000.

23. National Science Foundation Review Panel Member, *Investigation of the Turkey and Taiwan Earthquakes*, 2000.

24. National Science Foundation Reviewer for *Development of the NEES Consortium*, 2001.

25. National Science Reviewer for *CAREER Development* Panel, Jan 2004.

26. National Science Reviewer for *Major Research Instrumentation* Panel, Jan 2005.

27. Reviewer for McGraw-Hill Companies, *Fundamentals of Structural Analysis, 2nd Ed., Chapter 2: Design Loads*, K.M. Leet and C-M Uang.

28. Reviewer for Jon Wiley and Sons, *Structural Analysis: Using Classical and Matrix Methods, 3rd Edition,* J.K. Nelson, Jr. and J.C. McCormac.

29. Reviewer for Jon Wiley and Sons, *Fundamentals of Structural Analysis, 2nd Edition,* H.H. West and L.F. Geschwindner, Jan 2004.

30. Proposal reviewer for the Southwest Research Institute, Florida Sea Grant.

**Served as Paper Reviewer**
(Approximately 15-20 papers/year)

*Journal of Structural Engineering*
*Journal of Bridge Engineering*
*Journal of Infrastructure Systems*
*Structural Safety*
*Engineering Structures*
*Practice Periodical on Structural Design and Construction*
*Natural Hazards Review*
*Open Civil Engineering Journal*
*Earthquake Engineering and Structural Dynamics*
*Earthquake Spectra*
*Journal of Performance of Constructed Facilities*
*Probabilistic Engineering Mechanics*
*Ain Shams Engineering Journal*
*Journal of Earthquake Engineering*