

## **Ross William Boulanger**

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### **Education**

Ph.D. Geotechnical Engineering, University of California, Berkeley, CA (November 1990)  
M.S. Geotechnical Engineering, University of California, Berkeley, CA (May 1987)  
B.A.Sc. Civil Engineering, University of British Columbia, Vancouver, B. C., Canada (May 1986)

### **Registration**

Registered Professional Civil Engineer in the State of California (since June 1992)

### **Professional History**

Director, Center for Geotechnical Modeling, Department of Civil and Environmental Engineering,  
University of California, Davis, CA (2009 - present)  
Professor (2002 - present), Vice-Chair (1998 - 2001), Associate Professor (1998 - 2002) and Assistant  
Professor (1992 - 1998), Department of Civil and Environmental Engineering, University of  
California, Davis, CA  
Senior Staff Engineer, Woodward-Clyde Consultants, Oakland, CA (1990 - 1992)  
Lecturer, University of California, Berkeley, CA (January 1992 - May 1992)  
Lecturer, University of California, Davis, CA (September 1991 - December 1991)  
Staff Engineer, Woodward-Clyde Consultants, Oakland, CA (May 1987 - August 1987)

### **Awards and Honors**

Distinguished Lecture Award, Earthquake Engineering Research Institute (2019)  
ISET Shamsher Prakash Award, Indian Society of Earthquake Technology (ISET), India (2018)  
Member, National Academy of Engineering (elected 2017)  
Cross Canada Lecturer, Fall 2016 Tour, Canadian Geotechnical Society (2016)  
Ralph B. Peck Award, American Society of Civil Engineers (2016)  
TK Hsieh Award, Institution of Civil Engineers, UK (2014)  
Fellow, American Society of Civil Engineers (2012)  
Norman Medal, American Society of Civil Engineers (2006)  
Outstanding Paper Award, United States Society on Dams, 25<sup>th</sup> Annual Conference (2005)  
Walter L. Huber Civil Engineering Research Prize, American Society of Civil Engineers (2002)  
Shamsher Prakash Research Award, SP Foundation (2001)  
Arthur Casagrande Professional Development Award, American Society of Civil Engineers (1998)  
Distinguished Alumni Award, University College of the Cariboo, BC, Canada (1998)  
National Science Foundation CAREER Award (1995)  
Parker Davies Trask Fellowship, University of California, Berkeley (1986)  
Industrial Liaison Program Fellowship, University of California, Berkeley (1986)  
N. M. Skalbania Limited Prize, University of British Columbia (1986)

## ***Professional Affiliations***

Member, US National Academy of Engineering (NAE)  
Fellow, American Society of Civil Engineers (ASCE)  
Member, International Society of Soil Mechanics and Geotechnical Engineering (ISSMGE)  
Member, Earthquake Engineering Research Institute (EERI)  
Member, United States Society on Dams (USSD)  
Member, Association of State Dam Safety Officials (ASDSO)  
Member, Geoprofessional Business Association (GBA)

## ***Professional Service and Special Assignments***

Member, Awards Committee, ASCE Geo-Institute (2019 - present)  
Member (2016 - present) and Chair (2018 - 2019), NHERI Council, Natural Hazards Engineering Research Infrastructure network for the National Science Foundation  
Member, NHERI Science Plan Task Group, Natural Hazards Engineering Research Infrastructure program (2016 - present)  
Member, EERI Board of Directors, Earthquake Engineering Research Institute (2016 - present)  
Member, USSD Earthquakes Committee, United States Society on Dams (2010 - present)  
Member (2006 - present), Chair (2016 - 2019), and Vice-Chair (2009 - 2016), Technical Committee No. 203 – Earthquake Geotechnical Engineering, International Society of Soil Mechanics and Geotechnical Engineering  
Chair (2004 - 2009), Co-chair (2000 - 2004) and Member (1996 - present), Earthquake Engineering and Soil Dynamics Committee of ASCE's Geo-Institute  
Advisory Panel Member, Geo-Engineering Earthquake Reconnaissance Association (2005 - present)  
Member, Organizing Committee, NSF-funded Workshop to Advance the NHERI 5-Year Science Plan, Washington, DC, March 18-19 (2019)  
Co-Chair with D. Wijewickreme, 3<sup>rd</sup> International Conference on Performance-based Design in Earthquake Geotechnical Engineering, ISSMGE Technical Committee TC203 on Earthquake Geotechnical Engineering, Vancouver, B.C., Canada, July 16-19 (2017)  
Member, USSD Board of Directors, United States Society on Dams (2009 - 2015)  
International Core Member, Center for Urban Earthquake Engineering, Tokyo Institute of Technology, Tokyo, Japan (2007 - 2013)  
Chair (2014) and Member (2012-2013), EERI Nominating Committee, Earthquake Engineering Research Institute  
Co-lead, Geotechnical Extreme Events Reconnaissance (GEER) team for the March 11, 2011, Tohoku earthquake, Japan (2011 - 2012)  
International Observer, ERTC-12 Evaluation Committee for the Application of the Eurocode 8, International Society of Soil Mechanics and Geotechnical Engineering (2006 - 2010)  
Member, Research Committee, Pacific Earthquake Engineering Research (PEER) Center (2003 - 2010)  
Team Member, International Familiarization of ISO Code for Geotechnical Earthquake Resistant Design, New Energy and Industrial Technology Development Organization, Japan (2005 - 2009)  
Chair, Organizing Committee for the ASCE Geo-Institute's Specialty Conference on Geotechnical Earthquake Engineering and Soil Dynamics, Sacramento, CA, May 18-22, 2008 (2004-2008)  
Member, Site Operations and Shared Use Committee of NEES (2003 - 2006)  
Chair, Proceedings Committee, 100<sup>th</sup> Anniversary Earthquake Conference – commemorating the 1906 San Francisco earthquake, A joint conference co-convened by EERI, SSA, and OES in San Francisco, CA, April 18-22, 2006 (2004 - 2006)  
Organizer, U. S.-Japan Workshop on the Simulation and Performance of Pile Foundations in Liquefied and Laterally Spreading Ground, sponsored by the PEER Center, Davis, CA, March 16-18 (2005)

Member, ISO/TC98/SC3/WG10 Working Group on Draft Standard for Seismic Actions on Geotechnical Works, International Standards Organization (2002 - 2005)

Member, A2K03 Committee on Foundations of Bridges and Other Structures, TRB (2002 - 2004)

Editor, Journal of Geotechnical and Geoenvironmental Engineering, ASCE (2001 - 2004)

Member, Publications Policy Committee of EERI (1999 - 2004)

Organizer, U.S.-Japan Seminar on Seismic Disaster Mitigation in Urban Area by Geotechnical Engineering, Anchorage, AK, June 26-27, sponsored by the National Science Foundation (NSF), East Asia and Pacific Program (2002)

Editorial Board Member, Journal of Geotechnical and Geoenvironmental Engineering, ASCE (2000 - 2001)

Technical Specialist for external review of US Army Corps of Engineers research on liquefaction at high confining stresses, Vicksburg, MS (2000 - 2001)

Member of Geotechnical Reconnaissance Team funded by the National Science Foundation to report on the effects of the 1999 Chi-Chi earthquake in Taiwan (1999)

Member of Geotechnical Reconnaissance Team funded by the National Science Foundation to report on the effects of the 1999 Kocaeli earthquake in Turkey (1999)

Organizing Committee Member, Workshop on the Integration of Engineering Research and Education, sponsored by the National Science Foundation (NSF), Civil and Mechanical Systems Division, Arlington, VA, November 8-10, 1998

Member of Geotechnical Reconnaissance Team funded by the National Science Foundation to report on the effects of the 1995 Hyogoken-Nanbu earthquake near Kobe, Japan (1995)

Organizing Committee Member, Stability and Performance of Slopes and Embankments - II, an ASCE Specialty Conference in Berkeley, CA, June 29 - July 1, 1992

### ***Consulting Activities***

Contra Costa Water District. Member, Technical Review Board for Los Vaqueros Expansion Project, CA (2019 - present)

U.S. Army Corps of Engineers. Independent External Peer Review (IEPR) Panelist for review of the Isabella Lake Dam Safety Modification Project Construction Phase, CA (2019 - present)

Rio Tinto Kennecott Copper. Member, Design Review Board for design and evaluation of tailing embankments, UT (2018 - present)

Metro Vancouver. Member, Geotechnical Expert Advisory Panel for Iona Island Wastewater Treatment Plant, Vancouver, BC, Canada (2018 - present)

Santa Clara Valley Water District. Technical review regarding dam safety evaluations of Coyote, Chesbro, and Uvas Dams, CA (2018 - present)

Metro Vancouver. Member, Technical Review Board for Annacis Water Supply Tunnel, Surrey and New Westminster, BC, Canada (2016 - present)

Grant County Public Utility District No. 2. Member, Board of Consultants for seismic evaluation and modification of the embankment dam at Priest Rapids on the Columbia River, WA (2015 - present)

Grant County Public Utility District No. 2. Member, Technical Integration Team for seismic risk evaluation of the embankment dam at Wanapum on the Columbia River, WA (2015 - present)

Los Angeles Department of Water and Power. Member, Board of Consultants for seismic assessment and improvement projects: Bouquet Canyon Reservoir Dams No. 1 and 2, Eagle Rock Dam, Ivanhoe Dam, North Haiwee Dam No. 2, South Haiwee Dam, Stone Canyon Dam, Tinemaha Dam, Upper Stone Canyon Dam, and the Van Norman Stormwater Capture project, CA (2013 - present)

California Department of Water Resources, Division of Engineering. Technical support for seismic evaluation of B. F. Sisk Dam, CA (2007 - present)

Cotton, Shires and Associates, Inc. Technical review and consultation regarding investigations and analyses of settlement at the Millennium Tower, San Francisco, CA (2016 - 2018)

Pacific Gas and Electric Co. Member, Dam Risk Panel for seismic risk evaluation of hydro generation facilities, San Francisco, CA (2015 - 2017)

Los Angeles Department of Water and Power. Member, Technical Review and Advisory Panel, Headworks Reservoir Project, Los Angeles, CA (2009 - 2016)

U.S. Army Corps of Engineers. Independent Expert Project Review (IEPR) Panelist for review of the Isabella Lake Dam Safety Modification Project, CA (2015 - 2016)

Geosyntec Consultants, Inc. Technical review and consultation regarding seismic deformation analyses of the Blue Ridge Dam, Fannin County, GA (2014 - 2016)

Bechtel Canada Co. Technical review and consultation regarding site characterization and seismic evaluation for a proposed marine facility, BC, Canada (2015 - 2016)

East Bay Municipal Utility District. Member, Technical Review Board for the seismic upgrades of Chabot Dam, San Leandro, CA (2015 - 2016)

Earthquake Commission of New Zealand. Expert panel for peer review of engineering studies regarding increased liquefaction vulnerability of residential land in Christchurch, New Zealand (2015)

Deltares. Workshop to examine seismic evaluation practices and remediation strategies for levees in the Netherlands, Groningen, The Netherlands (2015)

Tennessee Valley Authority. Workshop to develop guidance document regarding liquefaction assessments with emphasis on numerical modeling, Knoxville, TN (2015)

New Zealand Ministry of Business, Innovation, and Employment. Peer review of ground improvement guidelines for Christchurch, New Zealand (2014 - 2015)

Earthquake Commission of New Zealand. Peer review of ground improvement trials and land damage work, Christchurch, New Zealand (2014 - 2015)

U.S. Department of the Interior, Bureau of Reclamation. Technical review of the Bureau of Reclamation's Embankment Dam Seismic Analysis Design Standard, Denver, CO (2014 - 2015)

Shimmick\FCC\Impregilo Joint Venture. Member, Technical Advisory Panel for review of design and construction of the main span bridge and approach bridges of the Gerald Desmond Bridge Project, Port of Long Beach, Los Angeles, CA (2012 - 2015)

U.S. Army Corps of Engineers (via URS). Quality control and consistency (QCC) review panel coordination meeting, Risk Management Center, Lakewood, CO (2014)

Geocomp Corporation. Technical review services for the Tennessee Valley Authority regarding seismic evaluations of Kingston Fossil Plant Stilling Pond, TN (2014)

EBA Engineering Consultants, Ltd. Technical review and consultation regarding seismic design of the Evergreen Line Rapid Transit Project, Vancouver, BC, Canada (2013 - 2014)

U.S. Army Corps of Engineers. Technical Specialist for review of seismic evaluations for Success Dam, CA (1999 - 2014)

GeoPentech. Consultation regarding seismic site characterization and site response analyses for the San Onofre Nuclear Generating Station, San Onofre, CA (2013)

URS Corporation. Technical review of seismic evaluations for Gatun Dam, Panama (2012)

U.S. Department of the Interior, Bureau of Reclamation. Member, Consulting Review Board, Scoggins Dam, Tualatin Project, OR (2011 - 2012)

GEI Consultants, Inc. Member of Technical Expert Panel for review of Delta Seismic Design studies for California Department of Water Resources, CA (2011 - 2012)

Tennessee Valley Authority. Peer review of seismic properties study for Kingston Coal Fly Ash, Kingston Fossil Plant, Harriman, TN (2011)

B.C. Hydro. Technical Specialist for review of seismic evaluations for the John Hart Powerhouse Replacement and Dam Deficiency Investigation Projects, Campbell River, BC, Canada (2009 - 2011)

U.S. Army Corps of Engineers. Technical Panelist for review of seismic evaluations for Isabella Dam, CA (2005 - 2011)

California Department of Water Resources. Independent Review Committee, Delta Habitat Conservation and Conveyance Program, CA (2010)

EBA Engineering Consultants, Ltd. Port Mann Highway Project, Seismic Engineering Review, Category 3 Checking for the Port Mann Bridge, Vancouver, Canada (2009-2010)

Terra / GeoPentech Joint Venture. Member, Technical Review Board for the seismic evaluations of Camanche Dam, CA (2008 - 2009)

Klohn Crippen Berger Ltd. Technical support for seismic testing of tailings samples from Greens Creek project, Canada (2007 - 2009)

URS Corporation. Member, Soil Strength Advisory Panel for the DWR Urban Levee Geotechnical Evaluations Program, Sacramento, CA (2008)

ENGEO Incorporated. Technical Panelist for review of Treasure Island geotechnical conceptual design work, CA (2007 - 2008)

URS Corporation. Member, Seismic Review Panel for the Delta Risk Management Strategy Project's seismic levee vulnerability studies, CA (2007 - 2008)

B.C. Hydro. Member, Technical Review Board for seismic deficiency investigations on Cheakamus Dam, B.C., Canada (2007 - 2008).

Terra / Ninyo & Moore Joint-Venture. Member, Independent Review Board, San Pablo Dam Seismic Upgrading Project, CA (2006 - 2007)

Terrain Engineering. Consultation on the causes of damages to the sewer system at Metro Air Park, Sacramento, CA (2006 - 2007)

GeoPentech. Consultation for seismic evaluation of tailings dam (2005 - 2006)

California Department of Water Resources, Division of Safety of Dams. Member, Consulting Board for Earthquake Analysis (2005)

Harlan Tait Associates. Cyclic triaxial testing of soil samples from Piedmont Reservoir Dam, Piedmont, CA (2002 - 2003)

Farrell Design-Build Companies, Inc. Technical review of rammed aggregate pier technology, Placerville, CA (2002 - 2003)

California Division of Safety of Dams. Technical Specialist for review of seismic evaluations for dams in California (2000 - 2002)

U. S. Army Corps of Engineers. External reviewer of liquefaction research by the Earthquake Research and Development Center (ERDC) (2000 - 2002)

RMC Geoscience. Review panel for liquefaction analyses and ground improvement efforts at the Union Pacific Rail Yard, Sacramento, CA (1998 - 1999)

Sub-consultant to Dr. I. M. Idriss. Dynamic properties for foundation materials along the realignment of the outlet works for Prado Dam, CA (1997 - 1998)

Parsons Brinckerhoff Quade & Douglas, Inc. Study of ground improvement issues for the Posey and Webster Street Tubes Seismic Retrofit Project, Alameda, CA (1996 - 1997)

Sub-consultant to Dr. I. M. Idriss. Review of a soil-structure interaction study for two 15-story structures in Oakland, CA (1995)

Miller Pacific Engineering Group, as retained through the Law Offices of Clinton A. Johnson. Consultation regarding liquefaction hazards and ground improvement by compaction grouting for the Santa Cruz Transit District's Maintenance and Operations Facility, CA (1993 - 1994)

Woodward-Clyde Consultants. Final design, plans and specifications for ground improvement by compaction grouting, stone columns, and a steel-reinforced DSM wall at the California Water Operations Center, Sacramento, CA (1992)

Woodward-Clyde Consultants. Evaluation of compaction grouting effectiveness for ground densification within a test section at the California Water Operations Center, Sacramento, CA (1992)

Contech Construction Products, Inc. Performed finite element analyses of long-span, flexible, metal box culvert structures to evaluate the effects of observed field deformations on load carrying capacity. Compared results with the Simplified Design Procedure in use (1988)

## **Publications**

### **Monographs**

1. Idriss, I. M., and Boulanger, R. W. (2008). *Soil liquefaction during earthquakes*. Monograph MNO-12, Earthquake Engineering Research Institute, Oakland, CA, 261 pp.

### **Journals**

102. Boulanger, R. W. (2019). "Nonlinear Dynamic Analyses of Austrian Dam in the 1989 Loma Prieta Earthquake." *Journal of Geotechnical and Geoenvironmental Engineering*, ASCE, in-press.
101. Price, A. B., Boulanger, R. W., and DeJong, J. T. (2019). "Centrifuge modeling of variable rate cone penetration in low-plasticity silts." *Journal of Geotechnical and Geoenvironmental Engineering*, ASCE, in-press.
100. Darby, K. M., Boulanger, R. W., and DeJong, J. T. (2019). "Effect of partial drainage on cyclic strengths of saturated sands in dynamic centrifuge tests." *Journal of Geotechnical and Geoenvironmental Engineering*, ASCE, in-press.
99. Darby, K. M., Hernandez, G. L., DeJong, J. T., Boulanger, R. W., Gomez, M. G., and Wilson, D. W. (2019). "Centrifuge model testing of liquefaction mitigation via microbially induced calcite precipitation." *Journal of Geotechnical and Geoenvironmental Engineering*, ASCE, 145(10): 04019084, 10.1061/(ASCE)GT.1943-5606.0002122.
98. Moug, D. M., Price, A. B., Parra Bastidas, A. M., Darby, K. M., Boulanger, R. W., and DeJong, J. T. (2019). "Mechanistic development of CPT-based cyclic strength correlations for a clean sand." *Journal of Geotechnical and Geoenvironmental Engineering*, ASCE, 145(10): 04019072, 10.1061/(ASCE)GT.1943-5606.0002101.
97. Boulanger, R. W., Munter, S. K., Krage, C. P., and DeJong, J. T. (2019). "Liquefaction evaluation of interbedded soil deposit: Çark Canal in 1999 M7.5 Kocaeli Earthquake." *Journal of Geotechnical and Geoenvironmental Engineering*, ASCE, 145(9): 05019007, 10.1061/(ASCE)GT.1943-5606.0002089.
96. Khosravi, M., Boulanger, R. W., Wilson, D. W., Olgun, C. G., Shao, L., and Tamura, S. (2019). "Stress transfer from rocking shallow foundations on soil-cement reinforced clay." *Soils and Foundations*, Japanese Geotechnical Society, 10.1016/j.sandf.2019.04.003.
95. Moug, D. M., Boulanger, R. W., DeJong, J. T., and Jaeger, R. A. (2019). "Axisymmetric simulations of cone penetration in saturated clay." *Journal of Geotechnical and Geoenvironmental Engineering*, ASCE, 145(4): 04019008, 10.1061/(ASCE)GT.1943-5606.0002024.
94. Darby, K. M., Boulanger, R. W., DeJong, J. T., and Bronner, J. D. (2019). "Progressive changes in liquefaction and cone penetration resistance across multiple shaking events in centrifuge tests." *Journal of Geotechnical and Geoenvironmental Engineering*, ASCE, 140(3): 04018112, 10.1061/(ASCE)GT.1943-5606.0001995.
93. Boulanger, R. W., Khosravi, M., Khosravi, A., and Wilson, D. W. (2018). "Remediation of liquefaction effects for an embankment using soil-cement walls: Centrifuge and numerical modeling." *Soil Dynamics and Earthquake Engineering*, 114(2018), 38-50, 10.1016/j.soildyn.2018.07.001.
92. Tamura, S., Khosravi, M., Wilson, D. W., Rayamajhi, D., Boulanger, R. W., Olgun, C. G., and Wang, Y. (2018). "A simple method for detecting cracks in soil-cement reinforcement for centrifuge modeling." *International Journal of Physical Modeling in Geotechnics*, 18(6): 281-289, 10.1680/jphmg.17.00036.
91. Khosravi, M., Boulanger, R. W., Wilson, D. W., Olgun, C. G., Tamura, S., and Wang, Y. (2017). "Dynamic centrifuge tests of structures with shallow foundations on soft clay reinforced by soil-cement grids." *Soils and Foundations*, Japanese Geotechnical Society, 57:501-513, 10.1016/j.sandf.2017.06.002.

90. Price, A. B., DeJong, J. T., and Boulanger, R. W. (2017). "Cyclic loading response of silt with multiple loading events." *Journal of Geotechnical and Geoenvironmental Engineering*, ASCE, 143(10): 04017080, 10.1061/(ASCE)GT.1943-5606.0001759.
89. Boulanger, R. W., Moug, D. M., Munter, S. K., Price, A. B., and DeJong, J. T. (2016). "Evaluating liquefaction and lateral spreading in interbedded sand, silt, and clay deposits using the cone penetrometer." *Australian Geomechanics*, The Australian Geomechanics Society, 51(4), 109-128.
88. Boulanger, R. W., and Montgomery, J. (2016). "Nonlinear deformation analyses of an embankment dam on a spatially variable liquefiable deposit." *Soil Dynamics and Earthquake Engineering*, 91(2016), 222-233, 10.1016/j.soildyn.2016.07.027.
87. Montgomery, J., and Boulanger, R. W. (2016). "Effects of spatial variability on liquefaction-induced settlement and lateral spreading." *Journal of Geotechnical and Geoenvironmental Engineering*, ASCE, 2017, 143(1), 04016086, 10.1061/(ASCE)GT.1943-5606.0001584.
86. Ziotopoulou, K., and Boulanger, R. W. (2016). "Plasticity modeling of liquefaction effects under sloping ground and irregular cyclic loading conditions." *Soil Dynamics and Earthquake Engineering*, 84 (2016), 269-283, 10.1016/j.soildyn.2016.02.013.
85. Khosravi, M., Boulanger, R. W., Tamura, S., Wilson, D. W., Olgun, G., and Wang, Y. (2016). "Dynamic centrifuge tests of soft clay reinforced by soil-cement grids." *Journal of Geotechnical and Geoenvironmental Engineering*, ASCE, 142(7), 04016027, 10.1061/(ASCE)GT.1943-5606.0001487.
84. Rayamajhi, D., Boulanger, R. W., Ashford, S. A., and Elgamal, A. (2016). "Dense granular columns in liquefiable ground: Effects on deformations." *Journal of Geotechnical and Geoenvironmental Engineering*, ASCE, 142(7), 04016024, 10.1061/(ASCE)GT.1943-5606.000147.
83. Rayamajhi, D., Ashford, S. A., Boulanger, R. W., and Elgamal, A. (2016). "Dense granular columns in liquefiable ground: Shear reinforcement and cyclic stress ratio reduction." *Journal of Geotechnical and Geoenvironmental Engineering*, ASCE, 142(7), 04016023, 10.1061/(ASCE)GT.1943-5606.0001474.
82. van Ballegooy, S., Wentz, F., and Boulanger, R. W. (2015). "Evaluation of CPT-based liquefaction procedures at regional scale." *Soil Dynamics and Earthquake Engineering*, 79 (2015), 315-334, 10.1016/j.soildyn.2015.09.016.
81. Boulanger, R. W., and Idriss, I. M. (2015). "CPT-based liquefaction triggering procedure." *Journal of Geotechnical and Geoenvironmental Engineering*, ASCE, 142(2), 04015065, 10.1061/(ASCE)GT.1943-5606.0001388.
80. Boulanger, R. W., and Idriss, I. M. (2015). "Magnitude scaling factors in liquefaction triggering procedures." *Soil Dynamics and Earthquake Engineering*, 79 (2015), 296-303, 10.1016/j.soildyn.2015.01.004.
79. Idriss, I. M., and Boulanger, R. W. (2015). "2<sup>nd</sup> Ishihara Lecture: SPT- and CPT-based relationships for the residual shear strength of liquefied soil." *Soil Dynamics and Earthquake Engineering*, 68, 57-68, 10.1016/j.soildyn.2014.09.010.
78. Rayamajhi, D., Tamura, S., Khosravi, M., Boulanger, R. W., Wilson, D. W., Ashford, S. A., and Olgun, C. G. (2015). "Dynamic centrifuge tests to evaluate reinforcing mechanisms of soil-cement columns in liquefiable sand." *Journal of Geotechnical and Geoenvironmental Engineering*, ASCE, 141(6), 04015015, 10.1061/(ASCE)GT.1943-5606.0001298.
77. Howell, R., Rathje, E. M., and Boulanger, R. W. (2014). "Evaluation of simulation models of lateral spread sites treated with prefabricated vertical drains." *Journal of Geotechnical and Geoenvironmental Engineering*, ASCE, 141(1), 04014076, 10.1061/(ASCE)GT.1943-5606.0001185.
76. Montgomery, J., Boulanger, R. W., and Harder, L. F., Jr. (2014). "Examination of the  $K_{\sigma}$  overburden correction factor on liquefaction resistance." *Journal of Geotechnical and Geoenvironmental Engineering*, ASCE, 140(12), 04014066, 10.1061/(ASCE)GT.1943-5606.0001172.

75. Armstrong, R. J., Boulanger, R. W., and Beaty, M. H. (2014). "Equivalent static analyses of piled bridge abutments affected by earthquake-induced liquefaction." *Journal of Geotechnical and Geoenvironmental Engineering*, ASCE, 140(8), 04014046, 10.1061/(ASCE)GT.1943-5606.0001152.
74. Khosravifar, A., Boulanger, R. W., and Kunnath, S. K. (2014). "Design of extended pile shafts for the effects of liquefaction." *Earthquake Spectra*, EERI, 30(4), 1775-1799, 10.1193/032512EQS107M.
73. Khosravifar, A., Boulanger, R. W., and Kunnath, S. K. (2014). "Effects of liquefaction on inelastic demands on extended pile shafts." *Earthquake Spectra*, EERI, 30(4), 1749-1773, 10.1193/032412EQS105M.
72. Dahl, K. R., DeJong, J. T., Boulanger, R. W., Pyke, R., and Wahl, D. (2014). "Characterization of an alluvial silt and clay deposit for monotonic, cyclic and post-cyclic behavior." *Canadian Geotechnical Journal*, 51(4): 432-440, 10.1139/cgj-2013-0057.
71. Maki, I. P., Boulanger, R. W., DeJong, J. T., and Jaeger, R. A. (2014). "State-based overburden normalization of cone penetration resistance in clean sand." *Journal of Geotechnical and Geoenvironmental Engineering*, ASCE, 140(2), 04013006, 10.1061/(ASCE)GT.1943-5606.0001020.
70. Rayamajhi, D., Nguyen, T. V., Ashford, S. A., Boulanger, R. W., Lu, J., Elgamal, A., and Shao, L. (2014). "Numerical study of shear stress distribution for discrete columns in liquefiable soils." *Journal of Geotechnical and Geoenvironmental Engineering*, ASCE, 140(3), 04013034, 10.1061/(ASCE)GT.1943-5606.0000970.
69. Boulanger, R. W., Kamai, R., and Ziotopoulou, K. (2014). "Liquefaction induced strength loss and deformation: Simulation and design." *Bulletin of Earthquake Engineering*, Springer, 12: 1107-1128, 10.1007/s10518-013-9549-x.
68. Boulanger, R. W., Wilson, D. W., and Idriss, I. M. (2013). Closure to "Examination and reevaluation of SPT-based liquefaction triggering case histories." *Journal of Geotechnical and Geoenvironmental Engineering*, ASCE, 138(8), 2000-2001.
67. Chang, D., Boulanger, R. W., Brandenburg, S., and Kutter, B. L. (2013). "FEM analysis of dynamic soil-pile-structure interaction in liquefied and laterally spreading ground." *Earthquake Spectra*, EERI, 29(3), 733-755.
66. Ziotopoulou, K., and Boulanger, R. W. (2013). "Calibration and implementation of a sand plasticity plane-strain model for earthquake engineering applications." *Journal of Soil Dynamics and Earthquake Engineering*, 53, 268-280, 10.1016/j.soildyn.2013.07.009.
65. Boulanger, R. W., and Ziotopoulou, K. (2013). "Formulation of a sand plasticity plane-strain model for earthquake engineering applications." *Journal of Soil Dynamics and Earthquake Engineering*, Elsevier, 53, 254-267, 10.1016/j.soildyn.2013.07.006.
64. Nguyen, T. V., Rayamajhi, D., Boulanger, R. W., Ashford, S. A., Lu, J., Elgamal, A., and Shao, L. (2013). "Design of DSM grids for liquefaction remediation." *Journal of Geotechnical and Geoenvironmental Engineering*, ASCE, 139(11), 1923-1933, 10.1061/(ASCE)GT.1943-5606.0000921.
63. Brandenburg, S. J., Zhao, M., Boulanger, R. W., and Wilson, D. W. (2013). "p-y plasticity model for nonlinear dynamic analysis of piles in liquefiable soil." *Journal of Geotechnical and Geoenvironmental Engineering*, ASCE, 139(8), 1262-1274.
62. Kamai, R., and Boulanger, R. W. (2013). "Simulations of a centrifuge test with lateral spreading and void redistribution effects." *Journal of Geotechnical and Geoenvironmental Engineering*, ASCE, 139(8), 1250-1261.
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4. Boulanger, R. W., and Tokimatsu, K. (2006). Editors, Seismic Performance and Simulation of Pile Foundations in Liquefied and Laterally Spreading Ground, Geotechnical Special Publication No. 145, ASCE.
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### **Professional Course Instruction**

- PM4Sand and nonlinear dynamic modeling of liquefaction during earthquakes. A one-day short course by R. W. Boulanger and K. Ziotopoulou for the Vancouver Geotechnical Society, Vancouver, B.C., Canada, October 27, 2017.
- Prospect 247 Seismic Analysis of Embankments. Contributed lectures on fundamentals, liquefaction, and cyclic softening of soils for a five-day multi-instructor course to employees of the USACE, Risk Management Center, Lakewood, CO, May 16, 2017.
- Prospect 247 Seismic Analysis of Embankments. Contributed lectures on fundamentals, liquefaction, and cyclic softening of soils for a five-day multi-instructor course to employees of the USACE, Risk Management Center, Lakewood, CO, May 24, 2016.
- Soil liquefaction during earthquakes – Recent developments. Two-part short course by R. W. Boulanger and J. T. DeJong, Bechtel Corporation, San Francisco, January 8 & 14, 2016.
- Soil liquefaction during earthquakes. A one-day short course for ConeTec Investigations Ltd., Vancouver, B.C., Canada, January 5, 2016.
- Integrated site characterization and selection of design parameters. A one-day short course by R. W. Boulanger, J. T. DeJong, C. Goetz, and P. Lucia at the University of California, Davis, CA, October 23, 2015.
- Soil liquefaction during earthquakes. One-day short course by R. W. Boulanger and I. M. Idriss at the XII Congreso Nacional de Geotecnia, San Jose, Costa Rica, July 1-2, 2015.
- Soil liquefaction during earthquakes – Recent developments. A one-day short course by R. W. Boulanger, J. T. DeJong, and I. M. Idriss for the ASCE Seattle Section and Geo-Institute Chapter, Seattle, WA, May 1, 2015.
- Soil liquefaction during earthquakes – Recent developments. A one-day short course by R. W. Boulanger, J. T. DeJong, R. Hadidi, and I. M. Idriss at the University of California, Davis, CA, October 24, 2014.
- Soil liquefaction mini course. A 4-hour course for the Vancouver Geotechnical Society, Vancouver, November 18, 2010.
- Seismic deformation analyses of embankment dams considering liquefaction effects. A three-day short course by M. B. Beaty, R. W. Boulanger, and I. M. Idriss for employees of the Federal Energy Regulatory Commission (FERC), Davis, CA, September 22-24, 2009.
- Seismic analysis of embankment dams for liquefaction effects. A four-day short course by M. B. Beaty, R. W. Boulanger, and I. M. Idriss for employees of the Federal Energy Regulatory Commission (FERC), Davis, CA, July 29 – August 1, 2008.
- Soil liquefaction during earthquakes. A one-day short course by R. W. Boulanger, and I. M. Idriss at the ASCE Geo-Institute's Geotechnical Earthquake Engineering and Soil Dynamics IV Conference, Sacramento, CA, May 22, 2008.
- Seismic training. A five-day short course by J. Martin, I. M. Idriss, and R. W. Boulanger for employees of the Federal Energy Regulatory Commission (FERC), Virginia Tech, August 8-12, 2005.