

# ADRIAN RODRIGUEZ-MAREK, Ph.D.

---

PO Box 642910 • Pullman, WA 99164-2910 • (509) 335-7088 • [adrian@wsu.edu](mailto:adrian@wsu.edu)

## Education

Ph.D., Civil Engineering, University of California at Berkeley, August 2000  
Advisor: Jonathan D. Bray. GPA: 4.0  
Dissertation: Near-Fault Seismic Site Response  
M.S.C.E., Civil Engineering, Washington State University, Pullman, May 1996  
Advisor: Carlton L. Ho  
Thesis: A Discrete Element Slope Stability Analysis Method  
B.S.C.E., *Summa Cum Laude*, Civil Engineering, Washington State University, Pullman, May 1994

## Professional Experience

Washington State University, Associate Professor, August 2007 – Present  
Ecole National de Ponts et Chaussées, Marne La Valle, France  
Visiting Professor, February 2009 – July 2009  
Laboratoire de Geophysique Interne et Technophysique, University Joseph Fourier, Grenoble, France,  
Visiting Professor, September 2008 – January 2009.  
Washington State University, Assistant Professor, August 2000 – 2007  
Universidad de Concepción, Concepción, Chile, Visiting Professor, May 2006.  
University of California at Berkeley, Research/Teaching Assistant, May 1996 – August 2000  
Department of Civil and Environmental Engineering  
Independent Engineering Consultant, 1998 – 2006  
Washington State University, Research Assistant, May 1994 – May 1996  
Department of Civil and Environmental Engineering  
Engineer in Training, Washington State. Certificate number 19567, 1994  
Washington State University, Research Assistant, May – August 1992, May – August 1993  
Department of Civil and Environmental Engineering

## Research Interests

Geotechnical earthquake engineering with emphasis in:

- Seismic Hazard Analysis
- Site response
- Performance-based design of geotechnical structures
- Soil-structure interaction
- Post-earthquake field reconnaissance

## Teaching Experience

Washington State University (August 2000 – Present)  
CE 317, Introduction to Geotechnical Engineering (Junior Level)  
CE 435, Foundations (Senior Level)  
CE 410/510, Experimental Methods in Geotechnical Engineering (Senior/Graduate Level)  
CE 524, Geotechnical Earthquake Engineering (Graduate Level)  
CE 425/525, Soil and Site Improvement (Senior/Graduate Level)  
CE 510, Characterization of Geomaterials (Graduate Level)

### Training

*ExCEED Teaching Workshop (ETW)*, United States Military Academy, West Point, NY, July 2002  
*Effective Teaching: A Workshop*, presented by Richard Felder, Seattle, WA, October 2000  
*Second Annual Pile Foundation Workshop for Professors*, Utah State University, June 2003  
*Roadway Enhancements with Geosynthetics*, Idaho Technology Transfer Center, April 2003

### Short Courses

*Engineering Seismology*, Erasmus Mundus Program, Joseph Fourier University, Grenoble, France, 2008.  
*Introduction to Geotechnical Earthquake Engineering*, University of Concepción, Chile, May 2006.

*Principles of Shallow Foundations*, La Paz, Bolivia, Bolivian Assoc. of Geotechnical Engineering, May 2006.  
*Geosynthetics in Geotechnical Applications*, La Paz, Bolivia, Bolivian Assoc. of Geotechnical Engineering, May 2006.  
*Introduction to Geotechnical Earthquake Engineering*, La Paz, Bolivia. Jointly organized by the Bolivian Military Academy (Escuela Militar de Ingeniería, EMI) and the Bolivian Assoc. of Geotechnical Engineering, March 2002.

Graduate Students Advised as Major Advisor (Washington State University)

Angela Taylor (M.S., 2002) “Seismic Site Response for the February 28, 2001, Nisqually Earthquake, Washington”  
Wong Joo Chai (M.S., 2004) “Seismic Behavior of Micropiles”  
Adel Cortez-Flores (M.S., 2004) “Investigation of Site Effects, Seismic Compression, and Liquefaction in the June 23, 2001, Southern Peru Earthquake”  
Balendran Surendran (M.S., 2005) “Numerical Analysis of Seismic Soil-Pile-Structure Interaction”  
Jolynn Gillie (M.S., 2005) “Nonlinear Response Spectra of Forward-Directivity Ground Motions”  
Dan Ciani (M.S., 2006) “Probabilistic Assessment of Paleoliquefaction”  
Reza Sehati (Ph.D., 2008) “Probabilistic Seismic Demand Analysis”  
Gonzalo Montalva (Ph.D., Exp. 2010) “Stochastic Site Response”

Thesis Committee Member

Dana Lawrence Olcott, M.S., 2001; King Hong Chin, M.S., 2001; Shaadi Saadeh, M.S., 2002; Omar Hattamle, Ph.D., 2003; April Hammar, M.S., 2004; Murugaiah Sathishbalamurungan, M.S., 2004; Tony Vader, M.S., 2004; Ala Rebhi Abbas, Ph.D., 2004; Jingjuan Li, M.S., 2005; Nick Pavlegio, M.S. 2005; Shu Shanzhi, Ph.D., 2005; Eliot Bonvalot, M.S., 2006; Mehrdad Razavi, Ph.D. (2007); Navaratnarajah Sasiharana, M.S., 2003, Ph.D. 2006; Nick Szot, M.S., 2007; Farid Sassoueri, Ph.D. 2008); Habtamu Zeleleu, Ph.D. (2008); Senthilmurugan Thyagarajan, Ph.D. (Expected 2009); all at Washington State University.

Yan Guo, M.S., University of Idaho (2005); Enrique Farfan, Ph.D., University of New Mexico (2007); Efrain Rondinel-Oviedo, Ph.D., Drexel University (expected 2008); Diana Katherine Reyes Suarez, University of Los Andes, Colombia (co-advisor, 2008. Dr. Reyes conducted the last year of her Ph.D. research as a visiting researcher at WSU).

Teaching Assistant

University of California at Berkeley, May 1996 – May 1998  
Courses: Civil Engineering Design, Graduate Geotechnical Engineering Laboratory, Geotechnical Earthquake Engineering  
Washington State University, Pullman, Fall 1994  
Course: Undergraduate Geotechnical Engineering Laboratory

**Honors**

Outstanding Teacher, Civil and Environmental Engineering Department, Washington State University, 2004  
Advisor to the 2<sup>nd</sup> Placed Team in the GeoChallenge Competition, Geo Institute, ASCE, Austin, Texas, 2005  
Outstanding Graduate Student Instructor, Civil Engineering, U.C. Berkeley, 1999  
H.B. Seed Memorial Fellowship, U.C. Berkeley, 1996  
Second Place, GPSA research exposition, Washington State University, 1996  
Honorable Mention, Sigma Xi student paper competition, Washington State University, 1996  
N.A. Degerstrom, Inc. Scholarship, Washington State University, 1994  
O.L. Waller Civil Engineering Scholarship, Washington State University, 1993  
Outstanding student in Civil Engineering, Washington State University, 1992-1994

**Refereed Journal Publications**

Gillie, J.L., Rodriguez-Marek, A. and McDaniel, C.. “Strength Reduction Factors for Near-Fault Forward-Directivity Ground Motions,” *Engineering Structures*, Accepted for Publication, Sept. 16, 2009.  
Rodríguez-Marek, A, J. Bay, K.S. Park, G.A. Montalva, A. Cortez-Flores, J. Wartman, and R. Boroschek. “Engineering analysis of ground motion records from the Mw 8.4 southern Peru earthquake.” *Earthquake Spectra*, Accepted for publication, Sept. 3, 2009.  
Cadet, H., Bard, P-Y., Rodriguez-Marek, A. “Defining a standard rock site: propositions based on the KiK-net data base,” *BSSA*, Accepted for publication, August 19, 2009.

- Bray, J.D., Rodriguez-Marek, A., and Gillie, J.L. (2009). "Design Ground Motions Near Active Faults," *Bulletin of the NZ Society for Earthquake Engineering*, 42(1).
- Reyes-Suarez, D.K., Rodriguez-Marek, A., and Lizcano, A. (2009). "A hypoplastic model for site response analysis." *Soil Dynamics and Earthquake Engineering*, 29, 173-184. DOI: 10.1016/j.soildyn.2008.01.003.
- Rodriguez-Marek, A. and Ciani, D. (2008). "Probabilistic methodology for paleoliquefaction analyses." *Engineering Geology*, 96(3-4), 159-172. DOI: 10.1016/j.enggeo.2007.10.007.
- Rodriguez-Marek, A., Alva Hurtado, J., Cox, C., Meneses, J., Montalva, G., Moreno, V., Olcese, M., Sancio, R., Wartman, J., (2007). Geotechnical aspects of the August 15, 2007 Pisco, Peru earthquake." *Revista Internacional de Desastres Naturales, Accidentes e Infraestructura Civil*, 7 (2-3), 239-258.
- Xu, L., Rodriguez-Marek, A., Xie, L. (2006). "Design spectra including the effects of rupture directivity in the near-fault region." *Earthquake Engineering and Engineering Vibrations*, 5(2).
- Rodriguez-Marek, A. and Bray, J. D. (2006) "Site response for near-fault forward directivity ground motions." *Journal of Geotechnical and Geoenvironmental Engineering*, ASCE, 132(12), 1611-1620.
- Keefer, D., Navarro Ochoa, C., Wartman, J., Rodriguez-Marek, A., and G. F. Wieczorek (2006). "Landslides caused by the M 7.6 Tecomán, Mexico earthquake of January 21, 2003." *Engineering Geology*, 86(2-3), 183-197.
- Wartman, J., Rondinel-Oviedo, E., and Rodriguez-Marek, A. (2006). "Performance and analyses of Mechanically Stabilized Earth (MSE) walls in the Tecomán, Mexico, Earthquake." *Journal of Performance of Constructed Facilities*, ASCE, 20(3), 287-299.
- Xie, L., Xu, L., and Rodriguez-Marek, A. (2005). "Representation of near-fault pulse-type ground motions," *Earthquake Engineering and Engineering Vibrations*, 4(2)
- Wartman, J., Rodriguez-Marek, A., Macari, E. J., Deaton, S., Ramírez-Reynaga, M., Navarro Ochoa, C., Callan, S., Keefer, D., Repetto, P. C., and Ovando-Shelley, E. (2005). "Ground failure in the January 21, 2003 Tecomán, Mexico Earthquake." *Earthquake Spectra*, 21(2), 493-598.
- Bray, J. D. and Rodriguez-Marek, A. (2004). "Characterization of forward-directivity ground motions in the near-fault region." *Soil Dynamics and Earthquake Engineering*, 24, 815-828.
- Rodriguez-Marek, A., Williams, J. L., Wartman, J., and Repetto, P. C. (2003). "Southern Peru earthquake of 23 June, 2001: ground motions and site response," *Earthquake Spectra*, 19A, 11-34.
- Wartman, J., Rodriguez-Marek, A., Repetto, P. C., and Kiefer, D. K. (2003). "Southern Peru Earthquake of 23 June, 2001: ground failure." *Earthquake Spectra*, 19A, 35-56.
- Repetto, P. C., Wartman, J., and Rodriguez-Marek, A. (2003). "Southern Peru Earthquake of 23 June, 2001: mine facilities – geotechnical aspects." *Earthquake Spectra*, 19A, 57-72.
- Rodriguez-Marek, A., Bray, J. D., and Abrahamson, N. (2001) "An empirical geotechnical seismic site response procedure." *Earthquake Spectra*, 17(1), p. 68-88.
- Luccioni, L. X., Pestana, J. M., and Rodriguez-Marek, A. (2000) "An implicit integration algorithm for the finite element implementation of a nonlinear anisotropic material model including hysteretic nonlinearity." *Computer Methods in Applied Mechanics and Engineering*, 190, 1827-1844.

#### Submitted

- Sehhati, R., Rodriguez-Marek, A., Cofer, W.F., and Elgawady, M.. "Response of Multi-Story Structures to Near-Fault Ground Motions and Equivalent Pulses," *Submitted to Engineering Structures*, November 2008.
- Reyes, D.K., Montalva, G.A., Rodriguez-Marek, A., Lizcano, A. "Propagation of uncertainty in non-linear site amplification" Submitted to *Engineering Geology*, August 2009.

#### In Preparation (Only those close to being submitted are listed below; draft copies available upon request)

- Sehhati, R, and Rodriguez-Marek, A. "A PSDA methodology including the effects of near-fault ground motions." To be submitted to BSSA, June 2009. [This paper is a chapter of the Ph.D. dissertation of Dr. Sehhati. The chapter is yet to be modified into a self-contained article]

## Technical Editor

Rodriguez-Marek, A. and Edwards, C. (2003). "Southern Peru Earthquake of 23 June, 2001, reconnaissance report." Published as a supplement of Earthquake Spectra, Vol. 19.

## Invited Presentations

*Irsn, BRGM, ENPC presentations*

*Observations from major subduction earthquakes on the Pacific Coast of the Americas.* Seminar presented at The Society for Earthquake and Civil Engineering Dynamics, London, England, October 2008 meeting.

*Seismic Hazard for Near-Fault Scenarios.* Seminary, Laboratoire de Geophysique Interne et Technophysique, Joseph Fourier University, Grenoble, France. October 16<sup>th</sup>, 2008.

*Ground Motions in the Near-Fault Region,* Presented at the ASCE San Diego Geotechnical Group Meeting, June 18<sup>th</sup>, 2008.

*Ground Motions in the Near-Fault Region.* Presented at University of Los Andes, Bogota, Colombia, February 8th, 2007.

*Ground Motions in the Near-Fault Region.* Presented at the University of Puerto Rico at Mayagüez EERI Student Chapter seminar series. October 5th, 2006.

*Seismic Design for Near-Fault Scenarios.* Presented at the École National de Ponts et Chaussées, Paris, France. April 27, 2009.

## Conference Papers and Professional Presentations

Rodriguez-Marek, A., Bonilla, F., and Cotton, F. (2009). Ground motion variability for site specific PSHA: analysis of KiK-net data. Abstract submitted to "Seismic risk in moderate seismicity area : from hazard to vulnerability. Aix en Provence (France) - July 6-8, 2009.

Meneses, J., Franke, K.W., Cox, B., Rodriguez-Marek, A., and Wartman, J. (2009). "Performance-Based Evaluation of a Massive Liquefaction-Induced Lateral Spread in a Subduction Zone." Proceedings, International Conference on Performance-Based Design in Earthquake Geotechnical Engineering — from case history to practice —, Tokyo, Japan, June 15-18.

Wartman, J., Cox, B., Meneses, J., Moreno, V., Olcese, M., Rodriguez-Marek, A. Sancio, R. (2008). "Landslides triggered by the 15 August 2007 M8.0 Pisco, Peru earthquake." Geophysical Research Abstracts, Vol. 10, European Geosciences Union (EGU) General Assembly, Vienna, Austria on April 13-18.

Rodriguez-Marek, A. (2007) "Geotechnical Site Classification for Building Code Applications." Presented at the NATO Advanced Research Workshop: Increasing Seismic Safety by Combining Engineering Technologies and Seismological Data, Dubrovnik, Croatia, September.

Silva, W., Rodriguez-Marek, A., and Wartman, J. (2007) " Development of synthetic ground motions for the June 23<sup>rd</sup> 2001 Southern Peru Earthquake." 13th PanAmerican Conference on Soil Mechanics and Geotechnical Engineering, Isla de Margarita, Venezuela, July 15-19, 2007, pp 224-229 (CD-ROM).

Rondinel-Oviedo, E, Rodriguez-Marek, A., Wartman, J., Zegarra-Pellane, J., and Repetto, P. (2007) "Geotechnical aspects of the June 23<sup>rd</sup> Mw=8.4 Southern Peru Earthquake." 13th PanAmerican Conference on Soil Mechanics and Geotechnical Engineering, Isla de Margarita, Venezuela, July 15-19, 2007, pp 224-229 (CD-ROM, in Spanish).

Ciani, D., and Rodriguez-Marek, A. (2007). "Probabilistic analysis of paleoliquefaction features," GeoDenver Conference, Denver, CO, Published in Geotechnical Special Publication 170, ASCE.

Bray, J.D., and Rodriguez-Marek, A. (2006). "Design ground motion in the near-fault region." *Proceedings of the Earthquake Geotechnical Engineering Workshop*, University of Canterbury, Christchurch, New Zealand, November 20-23.

Gillie, J., Rodriguez-Marek, A., and McDaniel C. (2006). "Selection of forward-directivity motions for non-linear analyses of bridges." 5<sup>th</sup> National Seismic Conference and Workshop on Bridges and Highways, San Francisco, CA, September 18-20.

Rodriguez-Marek, A. and Bray, J.D. (2006). "Site effects for near-fault forward-directivity motions." 8<sup>th</sup> National Conference on Earthquake Engineering, San Francisco, CA, April 18-22.

- Cortez-Flores, A., Rodriguez-Marek, A., and Wartman, J. (2005). "Failure mechanisms observed in the road infrastructure during the 2001 Southern Peru earthquake." 2<sup>nd</sup> Pan-American Congress of Integrated Transportation, Tarija, Bolivia, October 20-22. *In Spanish*.
- Rodriguez-Marek, A. and Wartman, J. (2004). "Characteristics of strong ground motions recorded during the 2003 Tecomán, Mexico, Earthquake." 11<sup>th</sup> International Conference on Soil Dynamics and Earthquake Engineering and 3<sup>rd</sup> international Conference on Earthquake Geotechnical Engineering, Vol. 1, 310-317, Berkeley, CA, January.
- Rodriguez-Marek, A., Wartman, J., Repetto, P. C., and Williams, J. L. (2004). "Observations of site amplification and liquefaction in the June 23, 2001, Southern Peru Earthquake." 5<sup>th</sup> International Conference on Case Histories in Geotechnical Engineering, New York, NY, April.
- Prudencio, M., and Rodriguez-Marek, A. (2004). "Applications of the Discrete Element Method in geotechnical engineering." *Proceedings, 1<sup>er</sup> Congreso Departamental de Ingeniería Civil*, La Paz, Bolivia, November (Awarded Bronze Medal Prize for third best paper). In Spanish.
- Rodriguez-Marek, A., Repetto, P., Wartman, J., and Zegarra-Pellane, J. (2002). "Preliminary observations of the geotechnical aspects of the June 23, 2001 Southern Peru Earthquake." Presented in the 34<sup>th</sup> Engineering Geology and Geotechnical Engineering Symposium, Boise, ID, March.
- Rodriguez-Marek, A., Bray, J. D., and Pestana, J. M. (2001). "Site response to near-fault ground motions." Presented in the 10<sup>th</sup> International Conference on Soil Dynamics and Earthquake Engineering, Philadelphia, PA, October.
- Rodriguez-Marek, A., Repetto, P., Wartman, J., and Zegarra-Pellane, J. (2001). "Preliminary observations of the geotechnical aspects of the June 23, 2001 Southern Peru Earthquake." Presented in the 10<sup>th</sup> International Conference on Soil Dynamics and Earthquake Engineering, Philadelphia, PA, October.
- Bray J. D., Sancio, R., Kammerer, A. M., Merry, S., Rodriguez-Marek, A., Khazai, B., Chang, S., Bastani, A., Collins, B., Hausler, E., Dreger, D., Perkins, W. J., and Nykamp, M. (2001). "Some observations of geotechnical aspects of the February 28, 2001, Nisqually Earthquake in Olympia, and South Seattle, Washington." Presented in the 10<sup>th</sup> International Conference on Soil Dynamics and Earthquake Engineering, Philadelphia, PA, October.
- Rodriguez-Marek, A., Luccioni, L. X., and Cetin, O. (2001). "Probabilistic assessment of liquefaction over large areas." 4<sup>th</sup> International Conference on Recent Advances in Geotechnical Earthquake Engineering and Soil Dynamics and Symposium in Honor of Professor W. D. Liam Finn, San Diego, CA, March.
- Luccioni, L. X., Rodriguez-Marek, A., and Cetin, K. O. (2000). "Probabilistic assessment of liquefaction over large areas." Proceedings, 8<sup>th</sup> Specialty Conference on Probabilistic Mechanics and Structural Reliability, PMC2000, Notre Dame University, IN, July.
- Rodriguez-Marek, A., Bray, J. D., and Abrahamson, N. (2000). "A Geotechnical Seismic Site Response Evaluation Procedure." 12<sup>th</sup> World Conference on Earthquake Engineering, New Zealand, January – February.
- Bray, J. D., and Rodriguez-Marek, A. (2000). "Near-fault seismic site effects." U.S.-Japan Workshop on the Effects of Near-Field Earthquake Shaking, PEER-2000/02 Report, Pacific Earthquake Engineering Research Center, Berkeley, CA, March 20-21 [invited paper]
- Rodriguez-Marek, A., Bray, J. D., and Abrahamson, N. (1999). "Empirically-based geotechnical seismic site classification." In *Optimizing Post-Earthquake Lifeline System Reliability*, Proceedings of the 5<sup>th</sup> U.S. Conference on Lifeline Earthquake Engineering," TCLEE Monograph No. 16, W. M. Elliot and P. McDonough, Eds., ASCE. Seattle, WA, August.
- Ho, C. L., Rodriguez-Marek, A., and Muhunthan, B. (1997). "Slope stability analysis application of a static discrete element method." Proceedings, XIV International Conference on Soil Mechanics and Foundation Engineering, Hamburg, Germany.
- Rodriguez-Marek, A., Ho, C. L., and Muhunthan, B. (1996). "Slope stability analysis by means of a static discrete element method." (In Spanish), 3<sup>rd</sup> Latin American Conference of Young Geotechnical Engineers, Venezuela.
- Rodriguez-Marek, A., Muhunthan, B., and Ho, C. L. (1996). "Discrete Element Method for Slope Stability Analysis." 7<sup>th</sup> International Symposium on Landslides, Norway.

### **Technical Reports/Other publications**

- Rodriguez-Marek, A. and Cofer, W. (2008). "Incorporation of forward-directivity into seismic hazard analysis," Report submitted to TRANSNOW, University of Washington, Seattle. October.

- Rodriguez-Marek, A. and Cofer, W. (2007). "Dynamic Response of Bridges to Near-Fault, Forward Directivity Ground Motions," Report submitted to the Washington State Department of Transportation.
- Rodriguez-Marek A. and co-authors (2007). "The Pisco, Peru, Earthquake of August 15, 2007," EERI Newsletter, March (along with various co-authors), October.
- Rodriguez-Marek, A., Alva Hurtado, J., Cox, C., Meneses, J., Moreno, V., Olcese, M., Sancio, R., Wartman, J. (2007). Preliminary Reconnaissance Report on the Geotechnical Engineering Aspects of the August 15, 2007 Pisco, Peru Earthquake ([http://gees.usc.edu/GEER/Peru\\_2007/Peru\\_2007\\_WebPage/index.htm](http://gees.usc.edu/GEER/Peru_2007/Peru_2007_WebPage/index.htm)).
- Rodriguez-Marek, A. and Muhunthan, B. (2005). "FHWA supported structures research: seismic behavior of micropiles," Report prepared for the Washington State Department of Transportation and the Federal Highway Administration. Washington State Transportation Research Center (TRAC), Pullman, WA.
- Rodriguez-Marek A. and co-authors (2003). "Preliminary Observations on the Tecomán, Colima, Mexico, Earthquake of January 21, 2003." EERI Newsletter, March (along with various co-authors).
- Wartman, J., Rodriguez-Marek, A., Keefer, D., Deaton, S., Repetto, P. C., Macari, E. J., Navarro Ochoa, C., Tejeda-Jacome, J. C., Silva Echartea, C., Téllez Alatorre, J. A. (2003). "Preliminary reconnaissance report on the geotechnical engineering aspects of the January 21, 2003 Colima, Mexico Earthquake." (<http://gees.usc.edu/GEES/>).
- Rodriguez-Marek, A., Muhunthan, B., and Itani, R. (2002). "Micropiles research at Washington State University." International Workshop on Micropiles, Venice, Italy, May.
- Bray, J., Sancio, R., Kammerer, A. M., Merry, S., Rodriguez-Marek, A., Khazai, B., Chang, S., Bastani, A., Collins, B., Hausler, E., Dreger, D., Perkins, W. J., and Nykamp, M. (2001). "Some observations of geotechnical aspects of the February 28, 2001, Nisqually Earthquake in Olympia, South Seattle, and Tacoma, Washington." Abstract and poster for the Cascadia/Pacific Northwest Session at the Seismological Society of America Annual Meeting, San Francisco, CA, April 20.
- Bray, J. D., Sancio, R., Kammerer, A. M., Merry, S., Rodriguez-Marek, A., Khazai, B., Chang, S., Bastani, A., Collins, B., Hausler, E., Dreger, D., Perkins, W. J., and Nykamp, M. (2001). "Some observations of the geotechnical aspects of the February 28, 2001, Nisqually Earthquake in Olympia, South Seattle, and Tacoma, Washington." (<http://peer.berkeley.edu/nisqually/geotech/index.html>).
- Rodriguez-Marek, A., Repetto, P. E., Wartman, J., Baures, D., Rondinel, E., Williams, J. L., and Zegarra-Pellane, J. (2001). Geotechnical earthquake engineering reconnaissance of the June 23, 2001, Southern Peru earthquake: a preliminary web report ([http://peer.berkeley.edu/peru\\_earthquake/index.html](http://peer.berkeley.edu/peru_earthquake/index.html)).
- Rodriguez-Marek, A., Bray, J. D., and Abrahamson, N. (1999). "Task 3: characterization of site response: general site categories." PEER Report 1999/03, Pacific Earthquake Engineering Research Center, College of Engineering, U.C. Berkeley.

### **Extramural Funded Research**

*United States Geological Survey*, Rodriguez-Marek, A. (PI). Stochastic site response analysis (\$50000 – May 2008-May 2009).

The objective of this research is to evaluate how uncertainties in soil parameters and in ground motion characterization are propagated in site response analyses. Such an understanding is needed when site response estimates are used to characterize site specific seismic hazard.

*Transportation Northwest*, Rodriguez-Marek, A. (PI), Cofer, W. C. (co-PI). Incorporation of forward-directivity into seismic hazard analysis (\$62646 – December 2008).

The overall purpose of this research project is to develop a methodology for the inclusion of the effects of near-fault forward-directivity into the determination of seismic demand for a structure or a geotechnical system. The focus of the study is the potential for near-fault effects associated with the Seattle and Tacoma faults in Washington State, and how these near-fault effects can affect the transportation infrastructure in the state.

*Federal Highway Administration*, McDaniel, C. (PI), Rodriguez-Marek, A. (co-PI). Bridge Response to Near-Fault Ground Motions (\$200,000 – August 2007).

The objective of this research is the evaluation of the response of bridges to near-fault, forward-directivity ground motions. The research has explored the characterization of forward-directivity motions via nonlinear response spectra. Dr. Rodriguez-Marek provided site compatible near-fault forward-directivity ground motion records for the structural analysis of specific bridges in Washington State. This research is being performed in collaboration with

structural engineering faculty at WSU. Preliminary results highlight the importance to consider near-fault ground motions separate from ordinary ground motions. In particular, the effect of pulse period on structural must be explored systematically because of the large damage potential that arises when pulse period matches structural periods.

*Washington State Department of Transportation*, Rodriguez-Marek, A. (PI), Muhunthan, B., and Itani, R. (co-PIs), Behavior of Micropile Networks (\$280,000 – June 2005).

Performed finite element simulations of seismic and lateral loading on micropiles in various group arrangements. The finite element analyses were used to determine the effect of micropile geometry (i.e., inclination and location within the group) on lateral stiffness. Finite element analyses were used to calibrate p-y curves for use in design codes such as L-Pile. The effect of system nonlinearity and pile diameter on transfer functions and impedance functions of flexible, floating piles was explored using finite element models.

*National Science Foundation*, Rodriguez-Marek, A. (PI), Collaborative Research: Investigation of Site Effects, Seismic Compression, and Liquefaction in the June 23, 2001, Southern Peru Earthquake (\$134,346 – March 2005).

This research was part of a collaborative research with Joseph Wartman of Drexel University. The research goals were to determine the influence of site effects on the recorded ground motions as well as on the observed damage in two affected cities; to study the damage in highway embankments throughout the affected region; and to document liquefaction case histories. The research plan includes collaboration with Dr. Walter Silva, of Pacific Engineering, who developed a finite fault model to obtain representative ground motions throughout the affected area, and Dr. Jim Bay of Utah State University, who was in charge of SASW testing at various sites in Peru and Chile. The research also involved close collaboration with faculty in Peruvian and Chilean institutions. The research expanded from the original goals to study wave propagation effects in small-scale basins using finite-difference modeling; and modeling the seismic response of a large concrete-faced rockfill dam.

*National Science Foundation*, Rodriguez-Marek, A. (PI), Wartman, J., and Repetto, P. C. (co-PIs), Geotechnical Earthquake Engineering Reconnaissance of the June 23, 2001, Arequipa Earthquake (\$29,671 - 2002).

The PI led a team of 6 researchers from 4 institutions to conduct geotechnical reconnaissance of the region damaged by the June 23, 2001 Southern Peru Earthquake (moment magnitude,  $M_w = 8.4$ ). Results were made available to the public immediately through an internet-based report and published in *Earthquake Spectra*.

*National Science Foundation*, Wartman, J. and Rodriguez-Marek, A. Geotechnical Earthquake Engineering Reconnaissance of the January 21, 2003, Colima Earthquake (\$30,000 - 2004).

Dr. Rodriguez-Marek collaborated with Dr. Joseph Wartman, of Drexel University, to form and lead a six-member team from different institutions to study the effects of the  $M_w 7.6$  Tecoman earthquake (earlier called Colima Earthquake). Results were made available to the public immediately through an Internet based report and a comprehensive reconnaissance paper in *Earthquake Spectra*.

*Pacific Earthquake Engineering Research Center*. Bray, J. D. (PI), Rodriguez-Marek, A. (co-PI), Identification and Characterization of Important Ground Motion Parameters in the Near Fault Region (\$16,684 – Summer 2001).

This study focused on characterizing ground motion parameters for use in probabilistic based design. The research was a continuation of research performed by the P.I. during his doctoral dissertation.

#### Additional Research Projects

*Site Response to Near-Fault Ground Motions*. Ph.D. Dissertation, 2000. U.C. Berkeley. Advisor: Jonathan D. Bray

The research includes the development of control near-fault motions, numerical modeling of site response using finite elements, and development of attenuation relationships for the time-domain representation of near-fault ground motions. The finite element analysis included an implementation of a bounding surface plasticity model into a finite element code.

*A Discrete Element Slope Stability Analysis Method*. M.S. Thesis, 1996, Washington State University. Advisor: Carlton L. Ho.

An implementation of a Discrete Element Method for slope stability studies. This study included developing a code for slope stability analysis using the static Discrete Element Method.

*Probabilistic approach to paleoliquefaction studies*. Funded through a teaching assistant position in the Civil Engineering Department, Washington State University (2006).

This research was aimed at applying methods used in probabilistic seismic hazard assessment and reliability theory to the study of paleoliquefaction features. The methodologies were applied to previously published paleoliquefaction data. Preliminary results indicate that the magnitude of previous earthquakes could be underestimated if uncertainty in input motion parameters is ignored.

## Service

### National Service

- Corresponding Member, *BSSC NEHRP Provisions Update Committee, Foundations and Geotechnical Subcommittee TS-3*, Building Seismic Safety Council, Washington D.C. 11/2006 - present.
- Steering Committee member for the “Building Partnerships Between Museums and Engineering Research”, NSF-funded project through the Consortium of Universities for Research in Earthquake Engineering (CUREE).
- Member of the Risk Assessment Committee, Geo Institute, ASCE.
- Member of the Earthquake Engineering and Soil Dynamics Committee, Geo Institute, ASCE.
- Member of the Learning from Earthquake Geosciences Data Management and Collection Committee, EERI (2004 – present).
- Member of the Board of Directors of the Consortium of Universities for Research in Earthquake Engineering, CUREE (2001-2002).
- Co-Leader, National Science Foundation Reconnaissance Team, Colima Earthquake, 2003.
- Member, ASCE/TCLEE Reconnaissance Team, Colima Earthquake, 2003.
- Leader, National Science Foundation Reconnaissance Team, Southern Peru Earthquake, 2001.
- Panel reviewer. National Science Foundation, 2005.
- External Proposal Reviewer for the National Science Foundation, 2003 – 2005.
- Proposal Reviewer for the Louisiana Board of Regents Office, Sponsored Programs, 2005.
- Proposal Reviewer for the Civil Engineering Research Foundation, 2002.
- Paper and abstract reviewer for numerous national and international conferences.
- Session Chairman, 8<sup>th</sup> National Congress of Earthquake Engineering, San Francisco, CA, April 2006.
- Session Chairman, GeoCongress 2006, Atlanta, GA, February.
- Session Chairman, 10<sup>th</sup> Int. Conference on Soil Dynamics and Earthquake Engineering, Drexel, PA October 2001.
- Session Reporter: 4<sup>th</sup> Int. Conference on Recent Advances in Geotechnical Engineering, San Diego, CA, March 2001.
- Represented Bolivia in the International Congress of Soil Mechanics and Geotechnical Engineering, Istanbul, Turkey, August 2001.

### Washington State University

- Faculty co-Advisor, ASCE Student Chapter (August 2006 – August 2008).
- Member, Curriculum Committee (August 2005 – Present).
- Member, Computing Committee (8/00 – 8/04).
- Member, Safety Committee (8/00 – 8/04).
- Member, Pavements Faculty Search Committee (10/02 – 8/03).
- Member, Structures Faculty Search Committee (9/01 – 5/02).
- University Director, Consortium of Universities for Research in Earthquake Engineering (2001- 2004).
- Represented Washington State University in meetings with three Bolivian universities.
- Faculty advisor: Society of Latino Engineers and Scientists.
- Faculty advisor: GeoChallenge team, ASCE Student Chapter (2005, 2007, and 2008).

### Journal Reviewer

- Journal of Geotechnical and Geoenvironmental Engineering, ASCE
- International Journal for Numerical and Analytical Methods in Geomechanics
- Earthquake Spectra
- Earthquake Engineering and Engineering Vibrations
- Seismological Research Letters
- Structural Engineering and Mechanics
- ASTM Geotechnical Testing Journal
- GSA Bulletin
- Bulletin of the Seismological Society of America
- Acta Geophysica
- Engineering Structures
- Journal of Geophysical Research

## **Consulting**

*GERMAN Consulting*

*SWISS Nuclear Company*

*Robert Larrabee Construction.* Performed seismic hazard and slope stability evaluation of cut and fill sections of a subdivision, Lewiston, ID (2005-Present)

*HartCrowser, Inc.* Developed time histories for structural analysis of a high-rise in Seattle, WA (2002).

*Prof. J.D. Bray.* Performed finite element analysis of fault rupture through reinforced fills in Moorpark, CA (1998).

*Prof. R.B. Seed.* Developed ground motion time histories for liquefaction analysis in Manaus, Brazil (1998).

## **Membership in Scientific and Professional Societies**

- American Society of Civil Engineers (ASCE)
- International Society of Soil Mechanics and Geotechnical Engineering (ISSMGE)
- Earthquake Engineering Research Institute (EERI)
- Seismological Society of America (SSA)
- American Society of Engineering Educators (ASEE)
- Consortium of Universities for Research in Earthquake Engineering (CUREE)
- George E. Brown Network for Earthquake Engineering Simulation (NEES)
- Asociación Boliviana de Ingenieros Geotécnicos (ABIG)
- The Scientific Research Society, Sigma Xi
- Tau Beta Pi

## **Community Service**

- Volunteered as soccer coach for City of Pullman Parks and Recreation program