

# **MICHAEL A. MOONEY, PhD, PE**

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## ***Bio***

Dr. Mooney is a Professor of Civil Engineering and the Grewcock University Distinguished Chair Professor of Underground Construction & Tunneling at Colorado School of Mines. He is the Director of the Center for Underground Construction & Tunneling, a consulting engineer and a licensed Professional Engineer. Dr. Mooney's research and consulting focuses on analysis, design, construction and monitoring of tunnels, shafts and excavations, and earth dams & levees. He teaches courses in soft ground tunnel design & construction, earth retaining structures and support of excavations, soil mechanics and dynamics, instrumentation and monitoring, and intelligent geosystems. Dr. Mooney serves on the Executive Committee of the Underground Construction Association and is the Scientific Committee Chair for the 2016 World Tunneling Congress to be held in San Francisco.

A summary of consulting experience in underground construction & tunneling is available upon request.

## ***Professional Experience***

<b>Professor</b>	Colorado School of Mines, Golden CO, 2010 - present
<b>Director</b>	Center for Underground Construction & Tunneling, 2011 - present
<b>Director</b>	SmartGeo Interdisciplinary Graduate Education & Research Traineeship Program, 2009 – 2014.
<b>Associate Professor</b>	Colorado School of Mines, Golden CO, 2003 - 2010 University of Oklahoma, Norman OK, 2001 - 2002
<b>Assistant Professor</b>	University of Oklahoma, Norman OK, 1996 - 2001
<b>Consulting Engineer</b>	Illinois (1993-1995), Oklahoma (1996-2002), Colorado (2004-present), Italy (2008-2009)
<b>Bridge Engineer</b>	Athalye Consulting Engineers, Laguna Hills, CA, 1993
<b>Staff Engineer</b>	Pettit Engineering Co., County Cork, Ireland, 1991 (summer)

## ***Education & Licensure***

<b>Ph.D. Civil Engineering</b>	<b>Northwestern University, Evanston, IL, 1996</b> Dissertation: An Experimental Study of Strain Localization and the Mechanical Behavior of Sand. Advisor: Professor Richard J. Finno.
<b>M.S. Civil Engineering</b>	<b>University of California, Irvine, CA, 1993</b> Research Project: Limited Ductility of Reinforced Concrete Pier Walls During Dynamic Loading. Advisor: Professor Robin Shepherd (retired).
<b>B.S. Civil Engineering</b>	<b>Washington University, St. Louis, MO, 1991</b>
<b>B.A. Physics (3-2 prog.)</b>	<b>Hastings College, Hastings, NE, 1991</b>
<b>Professional Engineer</b>	Oklahoma 1999-2005 (#19151), Colorado 2005-present (#39682)

## *Awards*

- Grewcock Distinguished Chair in Underground Construction & Tunneling (2013-present).
- The 2009-2010 CSM Outstanding Civil Engineering Faculty Award (2010)
- National Academy of Engineering China-America Frontiers in Engineering Symposium invitee (2009)
- Martin Luther King Jr. Faculty Award, Colorado School of Mines (2009)
- The Best Paper, 22<sup>nd</sup> Intl. Symp. on Automation and Robotics in Construction, Ferrara, Italy (2005)
- Minority Engineering Program Outstanding Faculty Award, Colorado School of Mines (2005)
- National Academy of Engineering Frontiers in Engineering Symposium invitee (2004)
- ASCE Arthur Casagrande Award (2003)
- National Science Foundation CAREER Award (2000)
- Williams Faculty Innovator Award for Sooner City team, University of Oklahoma (2000)
- Oklahoma Regents Instructional Technology Excellence Award for Sooner City team (1999)

## *Publications*

(student authors underlined)

### *Refereed Journal Papers*

- J1. Harris, W.W., Viggiani, G., Mooney, M.A. and Finno, R.J. Use of Stereophotogrammetry to Analyze the Development of Shear Bands in Sand, *Geotech. Testing Journal*, ASTM, 1995, 18(4).
- J2. Finno, R.J., Harris, W.W., Mooney, M. A., and Viggiani, G. Strain Localization and Undrained Steady State, *J. Geotech. Engineering*, ASCE, 1996, 122(6), 462-473.
- J3. Finno, R.J., Harris, W.W., Viggiani, G., and Mooney, M.A. Shear Bands in Plane Strain Compression of Loose Sand, *Géotechnique*, 1997, 47(1), 149-166.
- J4. Mooney, M.A., Finno, R.J. and Viggiani, G. Undrained Shear Band Deformation in Granular Media, *J. Engineering Mechanics*, ASCE, 1997, 123(6), 577-585.
- J5. Mooney, M.A., Viggiani, G., and Finno, R.J. The Existence of a Unique Critical State? *J. Geotech. & Geoenv. Engineering*, ASCE, 1998, 124(11), 1100-1108.
- J6. Kolar, R.L., Muraleetharan, K.K., Mooney, M.A. and Vieux, B.E., Sooner City – Design Across the Curriculum, *J. Engineering Education*, ASEE, 1999, 89(1), 79-87.
- J7. Mooney, M.A., Miller, G.A., Teh, S. and Bong, W.T. Importance of Invasive Measures in the Assessment of Existing Pavements, *J. Performance of Constructed Facilities*, ASCE, 2000, 14(4), 149-155.
- J8. Mooney, M.A. and Mooney, P.J., A Student Teaching Based Instructional Model, *Int. J. Engineering Education*, 2001, 17(1).
- J9. Mooney, M.A. and Laubach, T., Adventure Engineering: A Design Centered, Inquiry Based Approach to Middle Grade Science and Mathematics Education, *J. Engineering Education*, ASEE, 2002, 91(3), 309-318.
- J10. Yuan, J. and Mooney, M.A., Development of Adaptive Performance Models for the Oklahoma Airfield Pavement System, *Transportation Research Record: J. Transportation Research Board*, No.1853, 2003, 44-54.
- J11. Mooney, M.A., Khanna, V., Parsons, T.A., Yuan, J. and Miller, G.A. A Web-Based Pavement Infrastructure Management System, *J. Infrastructure Systems*, ASCE, 2005, 11(4), 241-249.
- J12. Mooney, M.A. and Bouton, C.O. Vibratory Plate Loading of Compacted and Instrumented Field Soil Beds, *Geotech. Testing Journal*, ASTM, 2005, 28(3), 1-10.
- J13. Mooney, M.A., Gorman, P.B. and Gonzalez, J.N. Vibration Based Health Monitoring During Earthwork Construction, *J. Structural Health Monitoring*, 2005, 2(4), 137-152.
- J14. Mooney, M.A. and Rinehart, R.V. Field Monitoring of Roller Vibration during Compaction of Subgrade Soil, *J. Geotech. & Geoenv. Engineering*, ASCE, 2007, 133(2), 257-265.
- J15. Rinehart, R.V. and Mooney, M.A. Instrumentation of a Roller Compactor to Monitor Vibration Behavior during Earthwork Compaction, *J. Automation in Construction*, 2008, 17(2), 144-150.

- J16. van Susante, P. and Mooney, M.A. Capturing Nonlinear Vibratory Roller Compactor Behavior through Lumped Parameter Modeling, *J. Engineering Mechanics*, ASCE, 2008, 134(8), 684-693.
- J17. Mooney, M.A. and Miller, P.K. Analysis of Lightweight Deflectometer Test based on In-situ Stress and Strain Response, *J. Geotech. & Geoenv. Engineering*, ASCE, 135(2), 2009, 199-208.
- J18. Rinehart, R.V. and Mooney, M.A. Measurement of Roller Compactor Induced Triaxial Soil Stresses and Strains, *Geotech. Testing Journal*, ASTM, 2009, 32(4).
- J19. Ryden, N. and Mooney, M.A. Surface Wave Analysis from the Light Weight Deflectometer, *Soil Dynamics & Earthquake Engineering*, 2009, 29(7), 1134-1142.
- J20. Rinehart, R.V., Mooney, M.A., Berger, J.R. Comparison of Stress States and Paths: Vibratory Roller-Measured Soil Stiffness and Resilient Modulus Testing, *Transportation Research Record: J. Transportation Research Board*, No. 2116, 2009, 8-15.
- J21. Mooney, M.A., and Rinehart, R.V. In-Situ Soil Response to Vibratory Loading and its Relationship to Roller-Measured Soil Stiffness, *J. Geotech. & Geoenv. Engineering*, ASCE, 2009, 135(8), 1022-1031.
- J22. Rinehart, R.V. and Mooney, M.A. Measurement Depth of Vibratory Roller-Measured Soil Stiffness, *Géotechnique*, 2009, 59(7), 609-619.
- J23. Facas, N.W. and Mooney, M.A. Position Reporting Error of Intelligent Compaction and Continuous Compaction Control Roller-Measured Soil Properties, *J. Testing & Evaluation*, ASTM, 2010, 38(1), 1-6.
- J24. Sensenev, C.T. and Mooney, M.A. Characterization of a Two-Layer Soil System Using a Light Weight Deflectometer with Radial Sensors, *Transportation Research Record: J. Transportation Research Board*, No. 2186, 2010, 21-28.
- J25. Facas, N.W., Mooney, M.A. and Furrer, R. Anisotropy in the Spatial Distribution of Roller-Measured Soil Stiffness, *Intl. J. Geomechanics*, ASCE, 2010, 10(4), 129-135.
- J26. Facas, N.W., van Susante, P.J. and Mooney, M.A. Influence of Rocking Motion on the Vibratory Roller-Based Measurement of Soil Stiffness, *J. Engineering Mechanics*, ASCE, 2010, 136(7), 898-905.
- J27. Facas, N.F., Rinehart, R.V. and Mooney, M.A. Development and Evaluation of Relative Compaction Specification for Roller-Based Compaction QC/QA, *Geotechnical Testing Journal*, ASTM, 2011, 34(6).
- J28. Rinehart, R.V., Mooney, M.A., Facas, N.F. and Musimbi, O. Examination of Roller-integrated Continuous Compaction Control on a Colorado Test Site, *Transportation Research Record, J. Transportation Research Board*, 2012, 2310, 3-9.
- J29. Toohey, N.M. and Mooney, M.A. Seismic Modulus Growth during Laboratory Curing of Lime-Stabilized Soils, *Géotechnique*, 2012, 62(2), 161-170.
- J30. Buechler, S.R., Mustoe, G.G.W., Berger, J.R. and Mooney, M.A. Understanding the Soil Contact Problem for the Light Weight Deflectometer and Static Drum Roller using Discrete Element Methods, *J. Engineering Mechanics*, ASCE, 2012, 138(1), 124-132.
- J31. Facas, N.F. and Mooney, M.A. Characterizing the Precision Uncertainty in Roller-Measured Soil Properties, *J. Testing & Evaluation*, ASTM, 2012, 40(1), 1-9, DOI: 10.1520/JTE103507.
- J32. Mooney, M.A. and Rinehart, R.V. Influence of Sensor Position in Measuring Lateral Vibration due to Vehicle Groove Wander, *J. Vibration & Acoustics*, ASME, 2012, 134, 064502.
- J33. Khanna, V., Mooney, M.A., and Miller, G.A. Impulse Response Dynamic Stiffness Decay in Aging General Aviation Airfield Pavements, *Transportation Research Record, J. Transportation Research Board*, 2012, 2304(1), 119-129.
- J34. Ikard, S., Woodruff, W.F., Revil, A., Parekh, M. and Mooney, M.A. A Saline Pulse Test Monitored by the Self-Potential Method to Non-Intrusively Determine the Velocity of the Pore Water in Leaking Areas of Earth Dams and Embankments, *Water Resources Research*, 2012, 48, W04201, doi:10.1029/2010WR010247.
- J35. Sensenev, C.T., Krahenbuhl, R.A. and Mooney, M.A. Genetic Algorithm to Optimize Layer Parameters in Lightweight Deflectometer Backcalculation, *Int. J. Geomechanics*, ASCE, 2013, 13(4), 473-476.
- J36. Stamp, D.H. and Mooney, M.A. Influence of Lightweight Deflectometer Characteristics on Deflection Measurement, *Geotechnical Testing Journal*, ASTM, 2013, 36(2), 216-226.

- J37. Haas, A.K., Revil, A., Karaoulis, M., Frash, L., Hampton, J., Gutierrez, M. and Mooney, M.A. Electrical Potential Source Localization Reveals a Borehole Leak during Hydraulic Fracturing, *Geophysics*, 2013, 78(2), 93-113.
- J38. Gharahbagh, E.A., Mooney, M.A., Frank, G., Walter, B. and DiPonio, M.A. Periodic Inspection of Gauge Cutter Wear in EPB TBMs using Cone Penetration Testing, *Tunnelling & Underground Space Technology*, 2013, 38, 279-286.
- J39. Toohey, N.M., Mooney, M.A. and Bearce, R.G. Stress-Strain-Strength Behavior of Lime Stabilized Soils during Accelerated Curing, *J. Materials in Civil Engineering*, ASCE, 2013, 25(12), 1880-1886.
- J40. Toohey, N.M., Mooney, M.A. and Bearce, R.G. Relationship between Resilient Modulus and Unconfined Compressive Strength for Lime Stabilized Soils, *J. Geotechnical & Geoenv. Engr.*, ASCE, 2013, 139(11), 1982-1985.
- J41. Rittgers, J., Revil, A., Karaoulis, M., Mooney, M.A., Slater, L.D. and Atekwana, E.A. Self-Potential Signals Generated by the Corrosion of Buried Metallic Objects with Application to Contaminant Plumes, *Geophysics*, 2013, 78(5), EN65-82.
- J42. Lowry, B., Mooney, M.A., Zhou, W., Grasmick, J., Gomez, F. and Held, B. High Resolution Displacement Monitoring of a Slow Velocity Landslide using Ground Based Radar Interferometry, *Engineering Geology*, 2013, 166(8), 160-169.
- J43. Kimmel, S.C., Bearce, R.G., Rinehart, R.V. and Mooney, M.A. Development of a Machine Integrated Strain-Based Contact Force Sensor for Pad Foot Soil Compactors, *J. Terramechanics*, 2014, 51, 31-41.
- J44. Ikard, S.J., Revil, A., Schmutz, M., Karaoulis, M., Jardani, A and Mooney, MA. "Characterization of Focused Seepage through an Earthfill Dam using Geoelectric Methods," *Groundwater*, 2014, 52(6), 952-965.
- J45. Neff, A., Wang, J. and Mooney, M.A. Analysis of Center of Gravity Roller Drum Vibration and Resultant Soil Stiffness on Layered Earthwork, *Canadian Geotech. J.*, 2015, 52(4), 459-468.
- J46. Senseney, C.T., Grasmick, J.G. and Mooney, M.A. Sensitivity of Layer Parameters to Lightweight Deflectometer Deflections via Finite Element Analysis, *Canadian Geotech. J.*, 2015, 52(7), 961-970.
- J47. Ikard, S.J., Rittgers, J., Revil, A. and Mooney, M.A. Geophysical Investigation of Seepage beneath an Earthen Dam, *Groundwater*, 2015, 53(2), 238-250.
- J48. Grasmick, J.G., Mooney, M.A., Surdahl, R.W., Voth, M. and Senseney, C. Capturing Layer Response during Curing of Stabilized Earthwork using Multiple Sensor Lightweight Deflectometer Testing, *J. Materials in Civil Engineering*, ASCE, 2015, 27(6), 04014183.
- J49. Rittgers, J.B., Revil, A., Planes, T., Mooney, M.A. and Koelwijn, A. 4D Imaging of Seepage in Earthen Embankments with Time-Lapse Inversion of Self-Potential Data Constrained by Acoustic Emissions Localization, *Geophysical Journal Intl*, 2015, 200(2), 758-772.
- J50. Kenneally, B., Musimbi, O.M., Wang, J. and Mooney, M.A. Finite Element Analysis of Vibratory Roller Response on Layered Soil Systems, *Computers & Geotechnics*, 2015, 67, 73-82.
- J51. Grasmick, J.G. and Mooney, M.A. Comparison of Multiple Sensor Deflection Data from Lightweight and Falling Weight Deflectometer on Layered Soil. *Geotechnical Testing Journal*, 2015, 38(6), 851-863.
- J52. Bearce, R.G. and Mooney, M.A. Development of a Seismic Modulus Maturity Function for Lime and Lime-Cement Stabilized Soil, *J. Materials in Civil Engineering*, ASCE, 2016, 28(3), 10.1061/(ASCE)MT.1943-5533.0001430, 04015150.
- J53. Bearce, R.G., Mooney, M.A. and Kessouri, P. Electrical Resistivity Imaging of Laboratory Soilcrete Column Geometry, *J. Geotechnical & Geoenv. Engr.*, ASCE, 2016, 142(3), 10.1061/(ASCE)GT.1943-5606.0001404 , 04015088.
- J54. Planes, T., Mooney, M.A., Rittgers, J.B., Parekh, M.L., Behm, M. and Snieder, R. Time Lapse Monitoring of Internal Erosion in Earthen Dams and Levees using Ambient Seismic Noise, *Geotechnique*, 2016, 10.1680/jgeot.14.P.268.
- J55. Mooney, M.A., Grasmick, J.G., Kenneally, B. and Yong, F. The Role of Slurry TBM Parameters on Ground Deformation: Field Results and Computational Modeling. *Tunnelling & Underground Space Technology*, 2016, doi:10.1016/j.tust.2016.01.007.

- J56. Parekh, M.L., Kanning, W., Bocovich, C., Mooney, M.A. and Koelewijn, A.R. Internal Erosion Monitored by Spatial-Temporal Pore Pressure Changes during Full-Scale Backward Erosion Experiments, *J. Geotechnical & Geoenv. Engr.*, ASCE, doi: 10.1061/(ASCE)GT.1943-5606.0001528.
- J57. Planes, T., Mooney, M.A., Rittgers, J.B., Kanning, W. and Draganov, D. Monitoring the Response of a Sea Levee to Tidal Loading with Ambient Seismic Noise, *J. Applied Geophysics*, accepted, in press.
- J58. Bearce, R.G., Mooney, M.A. and Kessouri, P. Estimation of Jet Grout Column Geometry with a DC Electrical Resistivity Push Probe, *Near Surface Geophysics*, in press.
- J59. Schaeffer, K. and Mooney, M.A. Examining the Influence of TBM-Ground Interaction on Electrical Resistivity Imaging ahead of the TBM, *Tunnelling & Underground Space Technology*, 2016, doi:10.1016/j.tust.2016.04.003.
- J60. Fang, Y., Fan, J., Kenneally, B. and Mooney, M.A. Air flow behavior and gas dispersion in the recirculation ventilation system of a twin-tunnel construction, *Tunnelling & Underground Space Technology*, 2016, 58, 30-39.
- J61. Fang, Y., Guo, J., Grasmick, J. and Mooney, M.A. The Effect of External Water Pressure on the Lining Behavior of Large Cross-Section Tunnels, *Tunnelling & Underground Space Technology*, 2016, 60, 80-95.
- J62. Rittgers, J.B., Revil, A., Mooney, M.A. and Karaoulis, M. Time-Lapse Joint Inversion with Automatic Joint Constraints, *Geophysical Journal Intl*, accepted, in press.
- J63. Mori L., Mooney MA, Laboratory Tests to determine the Relationship between Pressure and Foam Conditioned Sand Behavior in EPB Tunneling, *Tunnels & Underground Space Technology*, in review.
- J64. Bearce, R.G., Mooney, M.A. and Kessouri, P. Direct Couple Electrical Resistivity Imaging of Freshly Constructed Deep Soil Mix Column Diameter, *J. Geotechnical & Geoenv. Engr.*, ASCE, in review.
- J65. Mori, L., Alavi, E. and Mooney, M.A. Apparent Density Evaluation Methods to Assess the Effectiveness of Soil Conditioning, *Tunnels & Underground Space Technology*, in review.
- J66. Alavi, E., Mooney, M.A., Fang, Y. and Nazem, A. Earth Pressure Balance Tunneling in Dense Soils; Controlling Ground Deformation in the Presence of a Large Overcut, *Tunnels & Underground Space Technology*, in review.
- J67. Rysdahl, B. and Mooney, M.A. Estimating Excavated Volume on Slurry TBMs during the Excavation of the Queens Bored Tunnels, *Tunnels & Underground Space Technology*, in prep.
- J68. Mori, L., Alavi, E. and Mooney, M.A. Evaluation of the Pressures along the Shield Exterior of an EPB TBM, *Tunnels & Underground Space Technology*, in review.

### ***Refereed Conference Proceedings & Specialty Publications***

- C1. J.W. Rudnicki, J.W., Finno, R.J., Viggiani, Alarcon, M.A., and Mooney, M.A. "Coupled Deformation-Pore Fluid Diffusion Effects on the Development of Localized Deformation in Fault Gouge," Proc. Eurock 96, Torino, Italy, G. Barla Ed., Balkema, 1996, 2, 1261-1268.
- C2. Mooney, M.A., Finno, R.J., Viggiani, C., and Harris, W.W., "Issues of Uncertainty Regarding Localized Strains in Granular Soils," *Uncertainty in Geologic Environment: Theory to Practice*, ASCE GSP 58, 1996, 1, 312-325.
- C3. Viggiani G., Mooney, M.A., Bardet, J.P., and Chambon R. "A Numerical Investigation of Local Volume Change and Void Ratio Evolution Leading to Failure of Granular Media," Proc. Intl. Symp. Deformation and Progressive Failure in Geomechanics, Nagoya, Japan. Asoaka, Adachi, Oka, Eds., Pergamon, 1997, 401-406.
- C4. Mooney, M.A., Viggiani, G. and Finno, R.J., "The Nature of Strain Softening Exhibited by Dense Sand," Proc. 6<sup>th</sup> Int. Symp. Plasticity and its Current Applications, Juneau, Alaska, A. Khan, Ed., Neat Press, 1997, 319-320.
- C5. Finno, R.J., Alarcon, M.A., Viggiani, G., and Mooney, M.A., "Shear Bands in Plane Strain Active Tests of Moist-Tamped and Pluviated Sands," Proc. XIV ISSMGE, Hamburg, Germany, Balkema, 1997, 1, 295-299.
- C6. Finno, R.J., Viggiani, G., Harris, W.W. and Mooney, M.A. "Localization of Strains in Plane Strain Compression of Sands," Proc. 4<sup>th</sup> Intl. Workshop on Localization and Bifurcation Theory for Soils and Rock, Gifu, Japan. Adachi, Oka, Yashima, Eds., 1998, 249-257.
- C7. Kolar, R.L., Muraleetharan, K.K., Mooney, M.A., Vieux, B.E., and Gruenwald, H. "Integrating Design Throughout the Civil Engineering Curriculum - Sooner City Project," Proc. ASEE National Conference, 1998, Session 1526.
- C8. Mooney, M.A., Miller, G.A. and Mooney, P.J. "The Adoption of A Student Teaching-Based Instructional Method to Facilitate Graduate-Undergraduate Student Interaction," Proc. ASEE National Conference, 1999, CDROM.
- C9. Sun, Q., Gramoll, K., and Mooney, M.A. "Self-Paced Instruction to Introduce Traffic Engineering in a Virtual City (Sooner City)," Proc. ASEE National Conference, 1999, CDROM.
- C10. Mooney, M.A., Bong, W., and Miller, G.A. "The Determination of Soft Subgrade Modulus for Airport Pavement Rehabilitation via Backcalculation of Falling Weight Deflectometer Data," *Pavement Subgrade, Unbound Materials, and Nondestructive Testing*, ASCE GSP 98, 2000, 1-16.
- C11. Mooney, M.A., Bouton, C., Gray, C., Allu, J., and Kolar, R.L. "Development of an NGES-Interfaced, Web-Based Geotechnical Site Investigation Instructional Module," ASCE GSP 93, 2000, 336-346.
- C12. Kolar, R., Fink, L., Gramoll, K., Knox, R., Miller, G., Mooney, M., Muraleetharan, K., Sabatini, D., Vieux, B., "Report on Sooner City Workshop 2000 on Integrated Design," Proc. ASEE National Conference, 2001, CDROM.
- C13. Mooney, M.A., Bouton, C., Pan, J. "Measurement of Acceleration During Vibratory Compaction of Unsaturated Soils." Proc. of 10<sup>th</sup> Int. Conf. Soil Dynamics & Earthquake Engineering, Philadelphia, PA. 2001.
- C14. Mooney, M.A., Gorman, P.B., Chan, G.B. and Srouf, C. "Observed Changes in Vibratory Roller Signature During Soil Compaction." Proc. 1<sup>st</sup> European Conf. on Structural Health Monitoring, 2002, Paris, France.
- C15. Mooney, M.A., Chan, G.B., Farouk, E. and Pan, J. "Health Monitoring during Vibratory Soil of Compaction", Proc. 9<sup>th</sup> Int. Symp. on Smart Structures and Materials, San Diego, CA. March 18-22, 2002.
- C16. Khanna, V. and Mooney, M.A. "Comparison of SASW Backcalculated Profiles With Boring Log and DCP Data," Proc. 2<sup>nd</sup> Intl. Conf. Application of Geophysical and NDT Methodologies to Transportation Facilities and Infrastructure, Los Angeles, CA.
- C17. Mooney, M.A., Nicholas, S. and Laubach, T.A. "The Development and Operation of Adventure Engineering, A K-12 Curriculum Development Program," Proc. ASEE National Conference, 2002, CDROM.
- C18. Mooney, M.A. and Laubach, T.A. "A Template for Engineering Based K-12 Math and Science Units." Proc. Frontiers in Education Conference, 2002, Boston, MA, CDROM.
- C19. Alfaro, K., Barbosa, L., Ishola, Y., Gorman, P., Marquez, N. and Mooney, M.A. "Engineering-Based Math and Science Curricular Units Implemented in Classrooms," Proc. ASEE National Conference, 2003, CDROM.
- C20. Gorman, P.B., Mooney, M.A. "Monitoring Roller Vibration During Compaction of Crushed Rock," Proc. 20<sup>th</sup> Intl. Symp. Automation and Robotics in Construction, 2003, Eindhoven, Netherlands, Maas, van Gassel, Eds., 415-419.

- C21. Sullivan, J.F., Cyr, M.N., Mooney, M.A., Reitsma, R.F., Shaw, N.C., Zarske, M.S. and Klenk, P.A. "The TeachEngineering Online Collection: Making Engineering Come Alive for K-12 Youth," Proc. ASEE National Conference, Portland OR, 2005. CDROM.
- C22. Rinehart, R.V. and Mooney, M.A. "Instrumentation of a Roller Compactor to Monitor Vibration Behavior during Compaction," Proc. 22<sup>nd</sup> Int. Symp. Automation and Robotics in Construction, 2005, Ferrara, Italy. *Recipient of the Best Paper Award.*
- C23. Furlani, K.M., Miller, P.A., Mooney, M.A. "Investigating a Wireless Sensor Node for Measuring Slope Inclination in Geotechnical Applications," Proc. 22<sup>nd</sup> Int. Symp. Automation and Robotics in Construction, 2005, Ferrara, Italy.
- C24. Mooney, M.A., Rinehart, R.V. and van Susante, P. "The Influence of Heterogeneity on Vibratory Roller Compactor Response," Proc. GeoCongress, Atlanta GA, 2006, CDROM.
- C25. Miller, P.K., Rinehart, R.V., and Mooney, M.A. "Measurement of Soil Stress and Strain using In-ground Instrumentation," Proc. GeoDenver, Denver CO, 2007, CDROM.
- C26. Ryden, N., Mooney, M.A. "Surface Wave Testing to Investigate the Nature of Roller Determined Soil Stiffness," Proc. Symp. on Application of Geophysics to Engineering and Environmental Problems, Denver, 2007, 1388-1394.
- C27. Mooney, M.A. and Adam, D. "Vibratory Roller Integrated Measurement of Earthwork Compaction: An Overview," Proc. 7<sup>th</sup> Intl. Symp. Field Measurements in Geomechanics, ASCE, Boston, MA, 2007, CDROM.
- C28. Rinehart, R.V., Mooney, M.A. and Berger, J.R. (2008). "In-Ground Stress-Strain Beneath Center and Edge of Vibratory Roller Compactor," Advances in Transportation Geotechnics: Proc. 1<sup>st</sup> Intl. Conf. Transportation Geotechnics, Nottingham, U.K., Aug. 25-27, Ellis, E.; Yu, H.S.; McDowell, G.; Dawson, A. and Thom, N., Editors; pp. 737-741.
- C29. Facas, N., Mooney, M.A., and Furrer, R. (2009). "Geostatistical Analysis of Roller-Integrated Continuous Compaction Control Data," Proc. 8<sup>th</sup> Intl. Conf. on the Bearing Capacity of Roads, Railways and Airfields, Urbana-Champaign, Ill, June 29-Aug 2.
- C30. Musimbi, O.M., Rinehart, R.V. and Mooney, M.A. "Comparison of Measured and BEM Contact Area between Roller Drum and Layered Soil," Proc. 8<sup>th</sup> GeoFlorida, West Palm Beach, FL, Feb. 20-24, 2010.
- C31. Toohey, N.M., Mooney, M.A. and Ryden, N. "Quality Management of Stabilized Soil Construction using Lab and Field Seismic Testing," Proc. Symp. on Application of Geophysics to Engineering and Environmental Problems, Keystone, CO, April 11-15, 2010.
- C32. Kimmel, S.C. and Mooney, M.A. "Real-Time Soil Compaction Monitoring Through Pad Strain Measurements: Modeling to Inform Strain Gage Placement, Proc. Smart Structures/Nondestructive Evaluation 2011, San Diego, CA, March 6-10, 2011.
- C33. Mooney, M.A., Facas, N.W. and Musimbi, O.M. "Estimation of Layer Design Moduli of Pavement Earthwork from Vibratory Roller Measurements," Proc. Transportation Research Board, Washington, D.C., Jan. 22-25, 2011.
- C34. Khanna, V., Mooney, M.A., Khoury, C., Miller, G.A., "Characterizing AC And PCC Dynamic Stiffness Decay And Correlation to PCI Decay in General Aviation Airfield Pavements," Proc. Transportation Research Board, Washington, D.C., Jan. 22-26, 2012.
- C35. Mooney, M.A. and Toohey, N.M. "Stiffness Monitoring during Vibratory Compaction of Foundation Soil for Venice Lagoon Restoration Project," GeoCongress 2012, San Francisco, CA, March, 2012.
- C36. Mooney, M.A., Walter, B. and Frenzel, C. "Real-Time Tunnel Boring Machine Monitoring: State of the Art Review," Proc. North American Tunneling 2012, Indianapolis, IN, June 24-27, 2012.
- C37. Walter, B., Gharahbagh, E.A., Frank, G., DiPonio, M. and Mooney, M.A. "Extending Tunnel Boring Machine Reliability by Detecting Boulders," Proc. North American Tunneling 2012, Indianapolis, IN, June 24-27, 2012.
- C38. Frank, G., Gharahbagh, E.A., DiPonio, M.A., Mooney, M.A. and Walter, B. "Remote Monitoring of Gauge Cutter Wear in Pressurized Face Tunneling," Proc. North American Tunneling 2012, Indianapolis, IN, June 24-27, 2012.
- C39. Rinehart, R.V., Parekh, M.L., Rittgers, J.B., Mooney, M.A. and Revil, A. "Preliminary Implementation of Geophysical Techniques to Monitor Embankment Dam Filter Cracking at the Laboratory Scale," Proc. 6<sup>th</sup> Intl. Conf. Scour and Erosion, Paris, France, Aug. 27-31, 2012.

- C40. Mooney, M.A., Karaoulis, M. and Revil, A. Investigation of Geoelectric-While-Tunneling Look Ahead Methods through Modeling and Analysis of Project Data, *Proc. 2013 World Tunneling Congress*, Geneva, Switzerland, June 1-5, 2013.
- C41. Bearce, R., Mooney, M.A., Neiderleithinger, E. Revil, A. "Characterization of Simulated Jet Grout Column Curing using Acoustic Tomography," *Proc. Geocongress 2014*, Atlanta, GA, Feb. 23-26, 2014.
- C42. Sehat, S., Vahedifard, F., Aanstoos, J.V., Dabbiru, L., Hasan, K., Mooney, M.A. Analysis of the Output from a Radar-based Levee Monitoring System using In-situ Soil Data, *Proc. Geocongress 2014*, Atlanta, GA, Feb. 23-26, 2014.
- C43. Mooney, M.A., Parekh, M.L., Lowry, B., Rittgers, J., Grasmick, J., Koelwijn, A., Revil, A., Zhou, W. Design and Implementation of Geophysical Monitoring and Remote Sensing during a Full Scale Embankment Internal Erosion Test, *Proc. Geocongress 2014*, Atlanta, GA, Feb. 23-26, 2014.
- C44. Mooney, M.A., Grasmick, J., Clemmensen, A., Thompson, A. Ground Deformation from Multiple Tunnel Openings: Analysis of Queens Bored Tunnels, *Proc. North American Tunneling*, Los Angeles, CA, June 22-25, 2014.
- C45. Mooney, M.A., Walter, B.W., Steele, J.P., Cano, D. Monitoring Earth Pressure Balance TBM Vibration to Assess Geological Conditions, *Proc. North American Tunneling*, Los Angeles, CA, June 22-25, 2014.
- C46. Schaeffer, K., Mooney, M.A. Implementation Aspects of TBM Look Ahead Imaging using Geoelectrics, *Proc. North American Tunneling*, Los Angeles, CA, June 22-25, 2014.
- C47. Godinez, R., Yu, Hongjie, Mooney, M.A. and Alavi, E. Earth Pressure Balance Machine Cutterhead Torque Modeling: Learning from Machine Data, *Proc. Rapid Excavation and Tunneling*, New Orleans, LA, June 7-10, 2015.
- C48. Rysdahl, B., Mooney, M.A., Grasmick, J.G. and Robinson, B. Calculation of Excavated Volume using Machine Data from Two Slurry TBMs During the Excavation of the Queens Bored Tunnels, *Proc. Rapid Excavation and Tunneling*, New Orleans, LA, June 7-10, 2015.
- C49. Mori, L., Wu, Yuanli, Cha, M. and Mooney, M.A. Measuring the Compressibility and Shear Strength of Conditioned Sand under Pressure, *Proc. Rapid Excavation and Tunneling*, New Orleans, LA, June 7-10, 2015.
- C50. Grasmick, J.G., Rysdahl, B., Mooney, M.A., Robinson, B., Prantil, E. and Thompson, A. Evaluation of Slurry TBM Design Support Pressures using East Side Access Queens Bored Tunnels Data, *Proc. Rapid Excavation and Tunneling*, New Orleans, LA, June 7-10, 2015.
- C51. Li, Z , Grasmick, J.G., Mooney, M.A. Modeling of Ground Deformation Control Induced by Slurry Shield Tunneling. *Proc. Rapid Excavation and Tunneling*, New Orleans, LA, June 7-10, 2015.
- C52. Li, Z , Grasmick, J.G., Mooney, M.A. Influence of Slurry TBM Parameters on Ground Deformation. *Proc. World Tunneling Congress*, Dubrovnic, Croatia, May 24-28, 2015.
- C53. Neiderleithinger, E. Abraham, O. and Mooney, M.A. Geophysical Methods in Civil Engineering: Overview and New Concepts. *Proc. NDE-CE*, Berlin, Sept 14-17, 2015.
- C54. Bearce, R.G., Mooney, M.A., Kessouri, P., Neiderleithinger, E., Galindo-Guerreros, J.C., and Albers, W. Estimation of Jet Grout and Deep Soil Mixed Column Geometry with a DC Electrical Resistivity Push Probe, *Proc. NDE-CE*, Berlin, Sept 14-17, 2015.
- C55. Kanning, W., Bocovich, C., Schweckendiek, T., and Mooney, M.A. Incorporating observations to update the piping reliability estimate of the Francis levee. *Proc. 5<sup>th</sup> Intl Symp on Geotechnical Safety and Risk*, Rotterdam, NL, Oct 13-16, 2015.
- C56. Mooney M.A., Grasmick J.G., Prantil E., Thompson A., Risk Management-based Ground Deformation Monitoring During Queens Bored Tunnels Project. *Proc. 5<sup>th</sup> Intl Symp on Geotechnical Safety and Risk*, Rotterdam, NL, Oct 13-16, 2015.
- C57. Mooney, M.A., Grasmick, J.G., Kenneally, B. and Yong, F. The Role of Slurry TBM Parameters on Ground Deformation: Field Results and Computational Modeling. *Proc. Intl. Conf. Tunnel Boring Machines in Difficult Grounds*, Singapore, Nov. 18-20, 2015.
- C58. Mosavat, K. and Mooney, M.A. Examination of Excavation Chamber Pressure Behavior on a 17.5m Diameter Earth Pressure Balance Tunnel Boring Machine. *Proc. Intl. Conf. Tunnel Boring Machines in Difficult Grounds*, Singapore, Nov. 18-20, 2015.



- C59. Mori L., Mooney MA., Alavi E., Frank G. and DiPonio MA. Assessment of EPB Soil Conditioning on Two TBMs using Apparent Density. *Proc. World Tunnels Congress*, San Francisco, Apr. 22-28, 2016.
- C60. Hagan B., Alavi E., Frank G., DiPonio M., Mori L., and Mooney MA. Pressure Distribution along the TBM Body in EPB Tunneling. *Proc. World Tunnels Congress*, San Francisco, Apr. 22-28, 2016.
- C61. Mooney MA., Wu Y., Mori L., Bearce R. and Cha M. Earth Pressure Balance TBM Soil Conditioning: It's About the Pressure. *Proc. World Tunnels Congress*, San Francisco, Apr. 22-28, 2016.
- C62. Grasmick JG., and Mooney MA. A Probabilistic Approach for Predicting Ground Deformation in Heterogeneous Ground. *Proc. World Tunnels Congress*, San Francisco, Apr. 22-28, 2016.
- C63. Kuyt J., Mooney MA., Mangione M. and Li Z. Observed Loading Behavior during Cross Passage Construction – Brisbane Airport Link Project. *Proc. World Tunnels Congress*, San Francisco, Apr. 22-28, 2016.
- C64. Mooney, MA. and Bearce, RG. Assessment of Jet Grout Column Diameter during Construction using Electrical Resistivity Imaging. *Proc. Grouting 2017*, Honolulu, July 9-12, 2017. In review.
- C65. Bocovich, C., Kanning, W. and Mooney, MA. Multiple Pore Water Pressure Measurements to Reduce Uncertainties in Piping Risk Assessment of Levees. *Proc. 6<sup>th</sup> Intl Symp on Geotechnical Safety and Risk*, Denver, June 4-7, 2017.
- C66. Grasmick, JG. and Mooney, MA. *Georisk*.
- C67. Yu, H, Mooney, MA. and Bezuijen, A. Chamber Pressure Modeling for Earth Pressure Balance Tunnel Boring Machines: a Tri-Phase Simulation Framework. *Proc.*
- C68. Mooney, MA, .... *Proc. Brazil*.
- C69. Mooney, MA., Tilton, N., Parikh, D. and Wu, Y. .... *Proc. RETC 2017*
- C70. Mooney, MA., Alavi, E., Buckley, J. .... *Proc. RETC 2017*.

### **Technical Reports**

- R1. Mooney, M.A. "Functional Evaluation of Cushing Airport Runway," Report to Oklahoma Aeronautics Commission, 1997, 21 pp.
- R2. Mooney, M.A. "Evaluation of Runway 17/35 at Eaker Field in Durant, Oklahoma," Report to Oklahoma Aeronautics Commission, 1997, 9 pp.
- R3. Hossain, Z., Ahsunazzaman, A.N., Bong, C.T., Zaman, M.M. and Mooney, M.A. "Impact of Loaded Trucks on Infrastructure Deterioration," Oklahoma Department of Transportation Research Report, 1997, 160 pp.
- R4. Mooney, M.A. and Bong, C.T. "Functional Evaluation of Poteau Airport Main Runway," Report to Oklahoma Aeronautics Commission, 1998, 9 pp.
- R5. Miller, G.A. and Mooney, M.A. "Forensic Investigation of Will Rogers Turnpike Pavement," Report to Benham Group, Oklahoma City, 1998, 15 pp.
- R6. Mooney, M.A. "State of the Art – Pavement Management Systems for General Aviation Airports," Report to the Oklahoma Aeronautics & Space Commission, 1999, 20 pp.
- R7. Mooney, M.A., Gorman, P.B., Tawfik, E.F., Gonzalez, J.N. & Akanda, A.S. "Exploring Vibration-Based Intelligent Soil Compaction" Oklahoma Department of Transportation Research Report, 2003, 234 pp.
- R8. Mooney, M.A. and Rinehart, R.V. "GK-12 Adventure Engineering: Inquiry Learning, Design Driven Approach to Middle Grade Science and Mathematics Education, " National Science Foundation final report, 2005.
- R9. Mooney, M.A., "GeoWorks: A Multidisciplinary Design Studio Fostering Innovation and Invention in Geoconstruction, National Science Foundation, CAREER award final report, 2005.
- R10. Nocks, C.S. and Mooney, M.A., Improving Quality Assurance of MSE Wall and Bridge Approach Earthwork Compaction: Phase I Findings report to Colorado Department of Transportation, 2006, 51 pp.
- R11. Mooney, M.A. and Rinehart, R.V. "Measurement and Analysis of Vehicle Squirring Due to Longitudinal Pavement Tining," Report CDOT, Colorado Department of Transportation, 2006, 8 pp.
- R12. Mooney, M.A., "TeachEngineering: A Collection of Engineering Resources for K-12 Math and Science," National Science Foundation final report, 2006.
- R13. Mooney, M.A., White, D.J., Rinehart, R.V., et al. "Intelligent Soil Compaction Systems, "National Cooperative Highway Research Program Interim Report, 2007, 250 pp.

- R14. Mooney, M.A., Nocks, C.S., Selden, K.L., Bee, G.T. and Senseney, C.T., "Improving Quality Assurance of MSE Wall and Bridge Approach Earthwork Quality Assurance," Report CDOT-2008-11, Colorado Department of Transportation, 2008, 79 pp.
- R15. Rinehart, R.V. and Mooney, M.A. "Lateral Vehicle Accelerations Due to Longitudinally Tined Portland Cement Concrete Pavement," Report CDOT 2009-21-81, Colorado Department of Transportation, 50 pp., 2009.
- R16. Mooney, M.A., Senseney, C.T. and Rudkin, C.R. "Feasibility Study for Air Force use of Light Weight Deflectometer in Airfield Evaluation," Study FA4819-07-D-0001, Air Force Research Laboratory, 44 pp., 2009.
- R17. Mooney, M.A. and Toohey, N.T., "Accelerated Curing and Strength-Modulus Correlation of Lime Stabilized Soils," Report CDOT-2010-1, Colorado Department of Transportation, 2010, 56 pp.
- R18. Mooney, M.A., Rinehart, R.V., Kimmel, S.C. and Bearce, R.G. "Development of Soil Stiffness Measuring Device for Pad Foot Roller Compactor," Phase 1 Report to Federal Highway Administration, Washington, D.C., 77 pp., 2010.
- R19. Mooney, M.A., Rinehart, R.V., White, D.J., Vennapusa, P., Facas, N. and Musimbi, O., "Intelligent Soil Compaction Systems," NCHRP Report 676, Transportation Research Board, Washington, DC, 178 pp., 2011.
- R20. Mooney, M.A., Coad, C., Brayford, P. MacCarthy, P. and Rinehart, R.V. "Encouraging Innovation by CDOT Workers," Colorado Department of Transportation, 935 pp., 2011.
- R21. Mooney, M.A., Kimmel, S.C., Rinehart, R.V. and Bearce, R.G. "Exploration of Soil Stiffness Measurement for Pad Foot Roller Compactor," Federal Highway Administration, Washington, DC, 145 pp., 2011.
- R22. Mooney, M.A. and Facas, N. "Extraction of Layered Properties from Intelligent Compaction Data," National Cooperative Highway Research Program, Washington, DC., 26 pp., 2012.
- R23. Mooney, M.A. and Grasmick, J.G. "Using the Lightweight Deflectometer for Construction Quality Control/Quality Assurance of Full Depth Reclamation on Low Volume Roads," Central Federal Lands Highway Division, FHWA, 148 pp., 2013.
- R24. Mooney, M.A. and Bearce, R. "Evaluation of Seismic Testing for Quality Assurance of Lime-Stabilized Soil," Report No. CDOT-2013-15, Colorado Department of Transportation, 115 pp., 2013.
- R25. Mooney, M.A., Grasmick, J.G., Senseney, C.T. and Stamp, D.H. "Feasibility/Proof of Concept Study for Air Force Use of Lightweight Deflectometer in Airfield Evaluation Phase II: Advancing LWD Capabilities," U.S. Army Engineering Research and Development Center, 163 pp., 2013.

### ***Patents and Applications***

1. **Kimmel, S.K., Mooney, M.A., and Berger, J.R.** Intelligent Pad Foot Soil Compaction Devices and Methods of Using Same. 2014, U.S. Provisional Patent Application No. 61/974,026. Washington, DC: U.S. Patent and Trademark Office.
2. **Bearce, R., Mooney, M.A., and Kessouri, P.** Jet Grout Probe....2015, U.S. Electrical Resistivity Push Probe and Methods of Using the Same. Provisional Patent Application No. No. 62/305430. Washington, DC: U.S. Patent and Trademark Office.

## *Student Advising*

### *Ph.D. Students Advised* (13 completed; 7 in progress)

1. **Khanna, Vivek**, Development of a Web-Based Infrastructure Management System for Oklahoma's General Aviation Airports and Exploring the Use of Spectral Analysis of Surface Waves and Impulse Response for Pavement Health Monitoring, PhD, U. Oklahoma, 2007.
2. **Rinehart, Robert**, Characterizing Soil Stiffness Measured by a Vibratory Roller Compactor and its Relationship to In-Situ Stress-Strain Response, PhD, Colorado School of Mines, 2008.
3. **Facas, Norman**, Characterizing, Modeling and Performance Specifications of Vibratory Roller-Measured Soil Properties, PhD, Colorado School of Mines, 2010.
4. **Musimbi, Odon**, Experimental and Numerical Investigation of Vibrating Drum Interacting with Layered Elastic Media, PhD, co-advised with Judith Wang, Colorado School of Mines, 2011.
5. **Senseny, Chris**, Extraction Layered Properties of Semi-Prepared Airfields, Colorado School of Mines, 2011.
6. **van Susante, Paul**, Soil-Machine Interaction Experimentation and Modeling: Compaction and Excavation, PhD, co-advised w/ Robert King, Colorado School of Mines, 2011.
7. **Walter, Bryan**, Detecting Changing Geologic Conditions with Tunnel Boring Machines using Passive Vibration Measurements, PhD, Colorado School of Mines, co-advised with John Steele, 2013.
8. **Kimmel, Shawn**, Investigation of Intelligent Pad Foot Soil Compaction Method through the Development of In-Situ Elasto-Plastic Material Characterization Devices, PhD, Colorado School of Mines, co-advised with John Berger, 2014.
9. **Kenneally, Bernadette**, Time and Frequency Domain Finite Element Analysis of Vibratory Drum Interaction with Layered Earthwork, PhD dissertation, Colorado School of Mines, co-advised with Judith Wang, 2015.
10. **Toohy, Nathan**, Experimental Characterization of Monotonic, Cyclic, Dynamic and Streaming Potential Response of Water-Saturated Soils, PhD dissertation, Colorado School of Mines, 2015.
11. **Bearce, Rick**, Geometry Assessment and Elastic Modulus Monitoring of Lime and Cement Modified Soils via Characterization of Curing-Induced Physiochemical Changes Estimated from Seismic Wave Propagation Techniques and Electrical Resistivity, PhD dissertation, Colorado School of Mines, 2015.
12. **Schaeffer, Kevin**, An Experimental and Computational Investigation of Electrical Resistivity Imaging for Prediction ahead of Tunnel Boring Machines, PhD dissertation, Colorado School of Mines, 2016.
13. **Lisa Mori**, Topic: Advancing Understanding of the Relationship between Soil Conditioning and Earth Pressure Balance Tunnel Boring Machine Chamber and Shield Annulus Behavior, PhD dissertation, Colorado School of Mines, 2016.
14. **Parekh, Minal**, Topic: Earth Dam & Levee Monitoring, PhD, Colorado School of Mines, 2009-present.
15. **Bocovich, Carlyne**, Topic: Data driven modeling of internal erosion in soils, Colorado School of Mines, PhD, 2012-present.
16. **Grasmick, Jacob**, Topic: Data driven modeling in tunneling, Colorado School of Mines, PhD, 2013-present.
17. **Yu, Hongjie**, Topic: Learning from Tunnel Boring Machine Data, PhD, 2014-present.
18. **Wu, Yuanli**, Topic: Fundamentals of soil conditioning in pressurized conditions, PhD, 2014-present.
19. **Nazem, Ali**, Topic: Earth pressure balance TBM tunneling, PhD, 2014-present.
20. **Hall, Justin**, Topic: TBD, PhD, 2015-present.

***M.S. Thesis Students Advised*** (27 completed; 1 in progress)

1. **Akanda, Ali**, The Effect of Molding Water Content & Clay Fraction on the Cyclic Behavior of Soil during Compaction, U. Oklahoma, 1998.
2. **Legrand, Nicholas**, Miniature Cone Penetration Testing to Assess Sand Bed Density, U. Oklahoma, 2000.
3. **Bong, Bill**, Assessment of Soft Subgrade Modulus for Airport and Highway Pavement, U. Oklahoma, 2000.
4. **Bouton, Cyril**, Meas. of Acceleration during Vibratory Compaction of Unsaturated Soils, U. Oklahoma, 2001.
5. **Parsons, Tim**, Develop. of Web-Based Geotechnical Information Management System, U. Oklahoma, 2001.
6. **Yuan, Frank**, Development of Adaptive Performance Models for Oklahoma Airfield Pavement Management System, U. Oklahoma, 2002.
7. **Farouk, Essam**, Lumped Parameter Nonlinear Modeling of Vibratory Roller, U. Oklahoma, 2003.
8. **Gorman, Patrick**, Relationship between Roller Vibration and Soil Compaction, U. Oklahoma, 2003.
9. **Furlani, Karen**, Investigating the Use of Wireless Sensor Nodes for Geotechnical Inclinometer Applications, Colorado School of Mines, 2005.
10. **Miller, Patrick**, Advancement of the Analysis and Understanding of the Light Weight Deflectometer, Colorado School of Mines, 2006.
11. **Nocks, Christopher**, Improving Quality Assurance of MSE Wall and Bridge Approach Earthwork Compaction, (non-thesis project report), Colorado School of Mines, 2007.
12. **Facas, Norman**, Variogram Properties and Anisotropy in the Spatial Distribution of Roller-Measured Soil Stiffness, Colorado School of Mines, 2009.
13. **Toohey, Nathan**, Analysis of Strength and Seismic Modulus Gain during Curing of Lime Stabilized Soils, Colorado School of Mines, 2009.
14. **Rudkin, Caleb**, Investigation of Lightweight Deflectometer Unload Modulus, Colorado School of Mines, 2010.
15. **Bearce, Rick**, Experimental Characterization of Pad/Soil Interaction Mechanics, Colorado School of Mines, 2011.
16. **Stamp, David**, The Influence of Lightweight Deflectometer Design Parameters on Measured Deflection and Estimation of Modulus, Colorado School of Mines, 2012.
17. **Jacob Grasmick**, Using the Lightweight Deflectometer with Radial Offset Sensors on Two-Layered Systems for Construction Quality Control/Quality Assurance of Reclaimed and Stabilized Materials, Colorado School of Mines, 2013.
18. **Sam Dyas**, Condition Health Monitoring and its Application to Cavitation Detection/Characterization within Hydropower Turbines, Colorado School of Mines, 2013.
19. **Aaron Neff**, Analysis of Intelligent Compaction Field Data on Layered Soil, Colorado School of Mines, co-advised with Judith Wang, 2013.
20. **April Clemmensen**, Topic: East Side Access tunnel project data analysis, (non-thesis project report), Colorado School of Mines, 2013.
21. **Kamyar Mosavat**, Examination of Excavation Chamber Pressure Behavior on 17.5 m Diameter Earth Pressure Balance Tunnel Boring Machine, Colorado School of Mines, 2015.
22. **Brock Rysdahl**, Determination of Uncertainty in Excavated Volume Estimation from Slurry Shield Tunnel Boring Machines used on Queens Bored East Side Access Tunneling Project, Colorado School of Mines, 2015.
23. **Robert Godinez**, Topic: Earth Pressure Balance TBM Torque Performance Modeling, (non-thesis project report), Colorado School of Mines, 2015.
24. **John Kuyt**, Observed Loading Behavior during Cross Passage Construction for Brisbane Airport Link Project, Colorado School of Mines, 2015.
25. **Jessica Buckley**, Monitoring the Vibration Response of a Tunnel Boring Machine: Application to Real Time Boulder Detection, Colorado School of Mines, 2015.
26. **Noah Kimmes**, Planning for Monitoring of Probe Hole Drilling and Pre-Excavation Grouting with Measurement While Drilling, Vibration Monitoring and Borehole Radar, Colorado School of Mines, 2016.
27. **Brian Weiner**, Frequency-Dependent Attenuation of Acoustic Waves in Simulated Jet Grout Block, (non-thesis project report), 2016.
28. **Joy Foley**, Topic: Internal erosion in laboratory samples, 2014-present.

### ***Undergraduate Student Research Supervised***

1. William Chat Bong (U. Oklahoma, 1996-1997)
2. Patrick Gorman (U. Oklahoma, 2000-2001)
3. Kyle LaPointe (U. Oklahoma, 2000-2001)
4. Kate Saltanovitz (U. Oklahoma, 2001)
5. Godfrey Chan (U. Oklahoma, 2001-2002)
6. Yetunde Ishola (U. Oklahoma, 2001-2002)
7. Marcus Evans (U. Oklahoma, 2001-2002)
8. Ankur Shaw (U. Oklahoma, 2001-2002)
9. Desiree Taylor (U. Oklahoma, 2001-2002)
10. Dustin Beck (U. Oklahoma, 2001-2002)
11. Jeremy Constantino (U. Oklahoma, 2001-2002)
12. Lorena Barbosa (U. Oklahoma, 2001-2002)
13. Chris Rhees (U. Oklahoma, 2001-2002)
14. Corylee Lopez (U. Oklahoma, 2001-2002)
15. Ana Barrios (U. Oklahoma, 2001-2002)
16. Constance Burris (U. Oklahoma, 2001-2002)
17. Adam Cobb (U. Oklahoma, 2001-2002)
18. Marie Nguyen (CSM, 2003-2004)
19. Lindsey van Cleave (CSM, 2003-2004)
20. JoAnn Murray (CSM, 2003-2004)
21. Rita Yakupova (CSM, 2003-2004)
22. Stuart Fehr (CSM, 2004-2005)
23. Justin Hayes (CSM, 2005-2006)
24. Jacquelyn Schmalzer (CSM, 2006)
25. Laura DeHerrera (CSM, 2006-2007)
26. Derek Clifford (CSM, 2006-2007)
27. Kristi Seldon (CSM, 2007-2008)
28. Geoffrey Bee (CSM, 2007-2008)
29. Pierre-Alexis Joumel (EPF-Ecole 2007)
30. Kyle Jackson (CSM, 2008-2009)
31. Seth Goings (CSM, 2007-2009)
32. Paul Brayford (CSM, 2010)
33. Jasmine Lambert (CSM, 2011-2012)
34. Kristin Straily (CSM, 2011-2012)
35. Levi Martinez (CSM, 2011-2012)
36. Martha Nawacki (CSM, 2011-2012)
37. Adam Moore (CSM, 2012-2013)
38. Conor Lenon (CSM, 2012-2013)
39. Jonathan Knudtsen (CSM, 2012-2013)
40. Justin Downs (CSM, 2013-2014)
41. Heather Mergentime (CSM, 2013)
42. Stephanie Ecker (CSM, 2013-2014)
43. Andrew Eberle (CSM, 2013-2014)
44. Carolyn Nichols (CSM, 2013-2014)
45. Jeremy Myers (CSM, 2014-2015)
46. Robert Ariniello (CSM, 2014)
47. Curtis Burke (CSM, 2015)
48. Mary Weiss (CSM, 2015)
49. Cole Rosenbaum (CSM, 2014-2015)
50. Luke LaRoque (CSM, 2015)
51. Morgan Sander-Olhoeft (CSM, 2015-2016)
52. Grayson Sander-Olhoeft (CSM, 2015-2016)
53. Max Mifkovic (CSM, 2016-present)
54. Scott Jarriel (CSM, 2016)
55. Hunter Hodge (CSM, 2016-present)
56. Lauren Thatch (CSM, 2016-present)
57. Jared Clark (CSM, 2016-present)
58. Zach Waanders (CSM, 2016-present)

### ***Post-Doctoral Fellows, Research Faculty & Staff Supervised***

1. Pan, Jialong. Post-doc. Topic: Roller and plate vibration modeling & experimentation. 2000-2001.
2. Nicholas, Sacra. Program Coordinator. Topic: Adventure Engineering K-12 Outreach program. 2001-2002.
3. Laubach, Tim. Program Coordinator. Topic: Adventure Engineering Assessment coordinator. 2002.
4. Ryden, Nils. Post-doc. Topic: Surface wave testing and roller-integrated stiffness measurement, 2006-2007.
5. Rinehart, Robert. Post-doc. Topic: Intelligent Geosystems. 2008-2010.
6. Kaiming Xia, Post-doc. Topic: Numerical modeling of roller/soil interaction. 2009-2010.
7. Norman Facas, Post-doc. Topic: Intelligent Geosystems. 2010.
8. Julie Vanlaanen, SmartGeo Program Coordinator, 2010-2011.
9. Jina Martingano, SmartGeo Program Coordinator, 2011-2014 (50% appt).
10. Amy Martin, Center for Underground Construction & Tunneling Coordinator, 2012 (50% appt).
11. Marios Karaoulis, Post-Doc, Topic: Geo-electrics for monitoring of geosystems, 2012-2013 (25% effort).
12. Ehsan Alavi, Research Asst. Professor, Topic: Underground Construction & Tunneling, 2013.
13. Andi Niess, Center for Underground Construction & Tunneling Coordinator, 2013-2014 (50% appt).
14. Cara Lourcey, PIRE & Center for UC&T Project Coordinator, 2013-2014.
15. Thomas Planes, Post-Doc, Topic: Passive seismic monitoring of geosystems, 2013-2015.
16. Pauline Kessouri, Post-Doc, Topic: Electrical imaging of internal erosion, 2013-2015 (50% appt).
17. Jacob Grasmick, Post-MS, Center for UC&T research staff, 2013-2016.
18. Zili Li, Post-Doc, Topic: Computational modeling of underground structures, 2014-2015.
19. Wim Kanning, Post-Doc, Topic: Data driven modeling of earth dams and levees, 2014-2015.
20. Begona Ruiz, Administrator, Center for Underground Construction & Tunneling, 2014-2016.
21. Minsu Cha, Assistant Research Prof., Center for Underground, 2014-2015 (50% appt).
22. Yong Fang, visiting professor, Southwest Jiaotong University, China, 2014-2015.
23. Nathan Toohey, Post-doc, Center for Underground, 2014-2015.
24. Rick Bearce, Post-doc, Center for Underground, 2015-2016.
25. Kellan Barr, Marketing and Operations Manager, Center for Underground, 2016-present.

## ***Federal/State Research Grants***

- 32 grants from federal/state agencies totaling \$13.7M, incl. 25 grants (\$12.0M) as Principal Investigator
- 11 agency sponsors including 7 federal (NSF, FHWA, FAA, NCHRP, AFRL, USACE, DoEd) and 4 state

### ***External Grants as Principal Investigator (25 external grants totaling \$12.0M)***

1. Evaluation of General Aviation Pavement Integrity, Oklahoma Aeronautics Commission, PI, 1996-1997, \$12k.
2. Development of General Aviation Airfield Pavement Management System - Phase I, Oklahoma Aeronautics Commission, PI, 1998-1999, \$21k.
3. Intelligent Soil Compaction, Oklahoma Department of Transportation, PI, 1998-2002, \$259k.
4. Adventure Engineering: A Creativity Based and Design Centered Approach to Introductory Level Undergraduate and Secondary School Education, National Science Foundation Course, Curriculum and Laboratory Improvement, PI, 1999-2001, \$75k.
5. Career: GeoWorks - A Multidisciplinary Design Studio Fostering Innovation and Invention in Geoconstruction through Research, Development, and Education, National Science Foundation CAREER, PI, 2000-2006, \$310k.
6. Development of General Aviation Airfield Pavement Management Technologies," Federal Aviation Administration & Oklahoma Aeronautics Commission, PI, 2000-2002, \$390k.
7. GK12 - Adventure Engineering: An Inquiry Learning, Design Driven Approach to Middle Grade Science and Mathematics Education, National Science Foundation, PI, 2001-2005, \$1,200k.
8. TeachEngineering: A Collection of Engineering Resources for K-12 Math and Science, National Science Foundation National Science Digital Library, PI, 2003-2006, \$131k.
9. Increasing Teacher and Student Science Content Knowledge in the Denver Area, Colorado & U.S. Departments of Education, PI, 2005-2008, \$534k.
10. A Comprehensive Pathway for K-16 Engineering Education, National Science Foundation National Science Digital Library, PI, 2005-2011, \$176k.
11. Intelligent Soil Compaction Systems, National Cooperative Highway Research Program, PI, 2006-2009, \$600k.
12. Improving Quality Assurance of MSE Wall and Bridge Approach Earthwork Compaction, Colorado Department of Transportation, PI, 2007-2008, \$35k.
13. Determination of Strength and Modulus Correlation for the Design of Lime Stabilized Soils, Colorado Department of Transportation, PI, 2007-2009, \$40k.
14. Development of Soil Stiffness Measuring Device for Padfoot Roller Compactor, Federal Highway Administration, PI, 2007-2010, \$430k.
15. Investigation of Vehicle Squirring due to Longitudinal Tining, Colorado Department of Transportation, PI, 2008-2009, \$10k.
16. Feasibility/Proof of Concept Study for Air Force Use of Light Weight Deflectometer in Airfield Evaluation, Air Force Research Laboratory, PI, 2008-2009, \$89k.
17. IGERT: Intelligent Geosystems, National Science Foundation, PI, 2008-2014, \$3,000k.
18. Monitoring Underwater Vibratory Soil Compaction for Venice Lagoon Restoration Project, National Science Foundation SGER, PI, 2008-2009, \$49k.
19. Extracting Layer Properties from Intelligent Compaction Data, National Cooperative Highway Research Program IDEAS, PI, 2009-2011, \$150k.
20. Encouraging Innovation at the Colorado Department of Transportation, Colorado Department of Transportation, PI, 2009-2010, \$80k.
21. Exploring the Relationship between Vibratory Roller Response and Layered Soil Properties, National Science Foundation, PI, 2010-2014, \$295k.

22. Evaluation of Seismic Testing for Quality Assurance of Lime-Stabilized Soil, Colorado Department of Transportation, PI, 2010-2013, \$45k.
23. Light Weight Deflectometer Quality Control, Federal Highway Administration – Central Federal Lands Highway Division, PI, 2010-2012, \$60k.
24. Feasibility/Proof of Concept Study for Air Force use of Light Weight Deflectometer (LWD) in Airfield Evaluation, Phase 2: Advancing LWD Capabilities, U.S. Army Corps of Engineers, PI, 2010-2012, \$156k.
25. PIRE: Advancing Earth Dam and Levee Sustainability through Monitoring Science and Condition Assessment, National Science Foundation, PI, 2012-2017, \$3,858k.
26. Development of an Electrical Probe for Rapid Assessment of Ground Improvement, National Cooperative Highway Research Program IDEAS, PI, 2015-2017, \$150k.

***External Grants as Co-Principal Investigator (5 external grants totaling \$1.76M)***

27. Impact of Loaded Trucks on Deterioration of Infrastructure, Oklahoma Department of Transportation, co-PI, 1996-1997, \$10k.
28. TLC Design: Integrating Team Learning, Computing, and Design in Undergraduate Engineering Education, NSF Course & Curriculum Development, co-PI, 1997-1999, \$100k.
29. Development of Statewide Portland Cement Patching Products and Procedures, Oklahoma Department of Transportation, co-PI, 1997-1999, \$120k.
30. Research Experience for Undergraduates in Geo-Environmental Systems, NSF, co-PI, 2000-2001, \$418k.
31. "Sooner City: Design Across the Curriculum," NSF Action Agenda, co-PI, 1998-2000, \$750k.
32. Acquisition and Development of Equipment for Unsaturated Soil Research, NSF Major Research Instrumentation, co-PI, 2000-2002, \$369k.

***Internal Grants (15)***

1. The Dependence of Stress Path on the Steady State of Sand, University of Oklahoma Junior Faculty Research Program, PI, 1996, \$6k.
2. Use of Digital Imaging to Develop Infrastructure Rehabilitation Strategies, University of Oklahoma Research Council, PI, 1996, \$20k.
3. Multimedia Courseware for Design Oriented Engineering Education, University of Oklahoma Office of the Provost, co-PI, 1996-1997, \$14k.
4. REU supplement for NSF TLI proposal, University of Oklahoma, 1997, \$6k.
5. Automated Triaxial Testing System for Unsaturated Soils, University of Oklahoma, co-PI, 1997, \$25k.
6. The Development of Portable Data Acquisition Software," University of Oklahoma Provost's UTIL Program, PI, 1998, \$7k.
7. Intelligent Soil Compaction equipment matching funds, University of Oklahoma, PI, 1998, \$35k.
8. NSF TLC Design cost share, University of Oklahoma, co-PI, 1997-1999, \$26k.
9. Sooner City cost share, University of Oklahoma, co-PI, 1998-2000, \$114k.
10. NSF CAREER Award equipment matching funds, University of Oklahoma, PI, 2000, \$20k.
11. NSF MRI cost share, University of Oklahoma, co-PI, 2000-2001, \$160k.
12. General Aviation Airfield Pavement Management equipment funds, University of Oklahoma, PI, 2000-2001 \$35k.
13. NSF REU cost share, University of Oklahoma, co-PI, 2000-2001, \$124k.
14. Improvement of Undergraduate Soils Lab equipment, Colorado School of Mines Technology Fee Grant, PI, 2006-2007, \$40k
15. NSF IGERT institutional commitment, Colorado School of Mines, PI, 2008-2012, \$600k.



## ***Presentations***

*(presentation of conference proceedings papers not re-stated here – see above)*

1. Strain Localization in Geomaterials. Laboratoire 3S: Sols, Solids, Structures, Universite Joseph Fourier, Grenoble, France, July, 1996.
2. Overview, U. Oklahoma Geotechnical Research. USUCGER Workshop, Newport, Rhode Island, November 1998.
3. NSF Workshop on Autoadaptive Media in Geotechnical Earthquake Engineering, Austin, TX. January 2001.
4. Geotechnical Health Monitoring and Intelligent GeoSystems. Colorado School of Mines, Division of Engineering Graduate Research Seminar, March 2003.
5. NIST Workshop on Construction Automation, Gaithersburg, MD, June 2003.
6. Overview of CSM Geotechnical Research. USUCGER workshop, Atlanta, GA, September 2003.
7. Development of a Wireless Sensor Network to Measure Ground Inclination. Northwestern University seminar, Evanston, IL, October 2003.
8. Emerging Opportunities in Geotechnical Health Monitoring and Intelligent GeoSystems. University of Colorado-Boulder Geotechnical Graduate Research Seminar, October 2003.
9. Advances in Intelligent Geosystems, Heiland Lecture, Dept. of Geophysics, Colorado School of Mines, 2004.
10. Modeling Vibratory Roller Compaction of Soil Using a Two-DOF Nonlinear Lumped Parameter Model. McMAT Mechanics and Materials Conference, Baton Rouge, LA, June, 2005.
11. Vibration and Wave Propagation Based Monitoring to Improve Civil Geoconstruction. DoE Workshop on Advanced Noninvasive Monitoring Techniques, Houston, TX, Nov. 11-13, 2005.
12. State of the Art in Intelligent Soil Compaction. Ingersoll Rand Corporation, Shippensburg, PA, January 14, 2005.
13. Development of Intelligent Soil Compaction Specifications. Bomag Corporation, Boppard, Germany, May 2006.
14. Intelligent Soil Compaction, Ammann Corporation, Langenthal, Switzerland, May 2006.
15. Development of Intelligent Soil Compaction Specifications, Technical University of Munich, May 2006.
16. NCHRP Project 21-09 Intelligent Soil Compaction Systems, Transportation Research Board Emerging Technologies Committee, Washington D.C., January 23, 2006.
17. Overview of Intelligent Soil Compaction Systems, Colorado ASCE Geotechnical meeting, Denver CO, October 19, 2006.
18. Overview of Intelligent Soil Compaction Systems, Colorado Association of Geotechnical Engineers Luncheon, Lakewood CO, November 8, 2006.
19. State of the Art: Intelligent Soil Compaction, NCHRP 21-09 Open House, Minnesota Road Research Facility, Albertville MN, July 17, 2006.
20. Overview of Intelligent Soil Compaction Systems, Colorado Department of Transportation, Denver, CO. Sept. 2007.
21. Overview of Intelligent Soil Compaction Systems, Maryland State Highway Administration, Frederick, MD, Nov. 2007.
22. Vibration Based Monitoring of Compaction via Instrumented Rollers, Univ of Padova, Italy, Dec. 2007.
23. Intelligent Compaction Systems used at Mn/ROAD, Univ. Minnesota CTS Conference, May 2007.
24. Roller Integrated Quality Control/Quality Assurance of Earthwork Compaction, Trimble Dimensions Exposition, Las Vegas, Nov. 2007.
25. Roller-Based Monitoring of Soil Properties during Compaction, Seminar, Turner-Fairbanks Highway Research Center, Washington, D.C., Oct. 27, 2008.

26. Overview of Intelligent Soil Compaction Systems, North Carolina DOT, Raleigh, NC, June 2008.
27. Integrating New Technology into Practice: A Case Study on Intelligent Compaction, seminar, Tufts University, Oct. 23, 2008.
28. Determination of Strength and Modulus Correlation for the Design of Lime Stabilized Soils, Colorado DOT Headquarters, Oct. 21, 2008.
29. Vibration-Based Monitoring of Soil Properties during Compaction, Seminar, MIT, Oct. 23 2008, Boston, MA.
30. Comparison of Stress States and Paths: Vibratory Roller-Measured Soil Stiffness and Resilient Modulus Testing, Transportation Research Board Annual Meeting, Washington, D.C., Jan.13, 2009.
31. Vibration-Based Monitoring of Soil Properties during Compaction, National University of Ireland Galway, June 2, 2009.
32. Accelerated Curing and Strength-Modulus Correlation of Lime Stabilized Soils, Colorado Department of Transportation, Denver, CO, July 28, 2009.
33. Intelligent Soil Compaction: Principles and State of Practice, Utah Asphalt Conference, Salt Lake City, UT, Apr. 1, 2009.
34. U.S. Experience with Continuous Compaction Control and Intelligent Compaction, 2<sup>nd</sup> European Earthworks Symposium, London, U.K., June 3-4, 2009.
35. Vibration-Based Monitoring of Soil Properties, Cambridge University, Cambridge, U.K., June 5, 2009.
36. Vibration-Based Monitoring of Soil Properties, National University of Ireland Galway, June 2, 2009.
37. Geostatistical Analysis of Roller-Integrated Continuous Compaction Control Data, 8<sup>th</sup> Intl. Conf. Bearing Capacity of Roads, Railways and Airfields, Urbana-Champaign, Ill, June 30, 2009.
38. Accelerated Curing and Strength-Modulus Correlation of Lime Stabilized Soils, Colorado Department of Transportation, Denver, CO, July 28, 2009.
39. SmartGeo Intelligent Earth Dams & Levees, U.S. Bureau of Reclamation, Lakewood, CO, Aug. 14, 2009.
40. Presentation to US Bureau of Reclamation, Jan 8 on intelligent erosion monitoring.
41. SmartGeo Intelligent Geoconstruction, NIST, Gaithersburg, MD, Jan 13.
42. Intelligent Earth Dams and Levees, Office of Homeland Security, Washington D.C., Mar. 18, 2010.
43. Accelerated Curing and Strength-Modulus Correlation for Lime Stabilized Soils, Colorado DOT Materials Advisory Committee Workshop, Denver, CO, March 10, 2010.
44. Development of Soil Stiffness Measuring Device for Pad Foot Roller Compactor, Exploratory Advanced Research Workshop, Federal Highway Administration Turner-Fairbanks Research Center, McLean, VA, March 18, 2010.
45. Extracting Top Layer Information from Intelligent Compaction Rollers, Trimble Dimensions Conference, Las Vegas, NV, Nov. 10, 2010.
46. Extraction of Layer Parameters from Intelligent Compaction Data, NCHRP Review Board, National Academy of Engineering Beckman Center, Irvine, CA, Nov. 16, 2010.
47. Pursuing Solutions to Geotechnical Problems through Interdisciplinary Research and Education, ASCE Denver Section meeting, February 17, 2011.
48. Intelligent Compaction, 38<sup>th</sup> Annual Rocky Mountain Asphalt Conference, Denver, CO, Feb 23-25, 2011.
49. Preparing the Well-Rounded Professional Engineer in Graduate School, SWE Regional Conference, Colorado School of Mines, March 5, 2011.
50. Leadership Training and Multi-disciplinary Technical Teams, Society Hispanic Professional Engineers Regional Conference, University of Colorado - Denver, March 25, 2011.
51. Intelligent Earth Dams and Levees, UrbanFlood Symposium, Amsterdam, NL, Nov 3, 2011.
52. Stiffness Monitoring during Vibratory Compaction of Foundation Soil for Venice Lagoon Restoration Project, Geocongress 2012, Oakland, CA, March 25-29, 2012.
53. SmartGeo Intelligent Earth Dams and Levees, Colorado Association of Geotechnical Engineers, Lakewood, CO, April, 2012.

54. Real Time Tunnel Boring Machine Monitoring: State of the Art, North American Tunneling Congress, Indianapolis, IN, June 24-27, 2012.
- 55.
56. Analysis of Slurry Shield TBM Ground Deformation Control during Queens Bored Tunnels Project in NYC, Ruhr University, Bochum, Germany, Sept, 2015.
57. Towards Zero Deformation TBM Tunneling. Cutting Edge: Urban Tunneling, Denver, CO, Sept, 2015.
58. Jet Grout Monitoring and Zero Deformation TBM Tunneling. Vienna University of Technology, Vienna, Austria, Oct, 2015.
59. A Framework for Zero Deformation TBM Tunneling. National University of Singapore, Nov, 2015.
60. Assessment of Ground-Structure Interaction and Liner Forces during Tunnel Cross Passage Construction, GeoSEI Congress, Phoenix, AZ, Feb, 2016.
61. Estimation of Jet Grout Column Geometry using a DC Electrical Resistivity Push Probe, GeoSEI Congress, Phoenix, AZ, Feb, 2016.
62. Towards Zero Deformation TBM Tunneling. Cambridge University, UK, April, 2016.

# *Teaching*

## *Courses Taught*

1. Structural Analysis II (CE4673, U. of Oklahoma)
2. Foundation Analysis & Design (CE5333, U. of Oklahoma)
3. Introduction to Engineering (5X) (ENGR1112, U. of Oklahoma)
4. Introduction to Computing (ENGR3001, U. of Oklahoma)
5. Advanced Soil Mechanics (3X) (CE5343, U. of Oklahoma)
6. Mechanics of Materials (2X) (ENGR2153, U. of Oklahoma)
7. Pavement Design (2X) (CE5693, U. of Oklahoma)
8. Introduction to Soil Dynamics (2X) (CE5353, U. of Oklahoma)
9. Senior Capstone Design (CE4903, U. of Oklahoma)
10. Rigid Body Dynamics (team-taught) (CE3253, U. of Oklahoma)
11. Foundation Engineering (5X) (EGGN464, CSM)
12. Advanced Foundation Design (3X) (EGGN498/598, CSM)
13. Soil Dynamics (EGGN598, CSM)
14. Freshman Success Seminar (CSM101, CSM)
15. Soil Mechanics Lab (4X) (EGGN363, CSM)
16. Advanced Engineering Measurement (4X) (EGGN501, CSM)
17. Intelligent Geosystems (2X) (SYGN550, CSM)
18. Nondestructive Evaluation (2X) (EGGN598F, CSM)
19. Tunnel Design in Soft Ground (3X) (CEEN523, CSM)
20. Earth Retaining Structures/Support of Excavations (4X) (CEEN520, CSM)
21. Earth Dams and Levees (CEEN598, CSM)
22. Introduction to Civil Infrastructure (CEEN211, CSM)
23. Underground Construction & Tunnel Engineering Lab (CEEN???, CSM)

## *Course Development Activities*

1. Co-developed Introduction to Engineering and Introduction to Computing courses for the student laptop pilot program at U. of Oklahoma (1996-1997).
2. Co-PI and geotechnical coordinator for the Sooner City design-throughout-the-CE curriculum at U. of Oklahoma. Sooner City was a multi-year grant from NSF to integrate a shared design theme throughout all civil engineering courses (1997-2000). Led the integration of multimedia and design elements into geotechnical courses. The Sooner City team received 2 education awards.
3. Introduced multidisciplinary (civil, electrical, mechanical) project into the CE Senior Capstone Design at U. of Oklahoma (2001).
4. Developed Foundation Engineering (EGGN 464) into design project-driven course. Two-thirds of the course is driven by team design of a foundation and retaining wall system for a project under construction or recently constructed in the Denver metro area (2003-2006).
5. Led the development of a \$40k tech fee proposal for Soil Mechanics lab at CSM to modernize lab with student-friendly consolidation, triaxial and axial compression equipment. Introduced two new labs to reflect modern practice: (1) mechanically stabilized earth wall construction; (2) field testing with light weight deflectometer and dynamic cone penetrometer (2006-2007).
6. Led development of campus-wide IGERT graduate education program in intelligent geosystems. Co-developed a new course on Intelligent Geosystems (SYGN 550), assisted in formal leadership/teamwork development program, and assisted in formation of social/environmental ethics & policy Ph.D. minor (2006-present).
7. Serve as Acting Director to create multi-disciplinary Center for Underground Construction & Tunneling. Working with colleagues in Civil, Geological and Mining Engineering, we are building undergraduate and graduate education programs as well as growing research efforts to become a distinguished international center of excellence in this field.

8. Developed two new courses: Earth Retaining Structures/Support of Excavations (CEEN 520) and Analysis & Design of Tunnels in Soft Ground (CEEN 523) (2012-present).

# *Professional Service*

## *International*

- PhD committee for
- PhD committee defense
- International Tunnel Association Committee on Education and Training (ITA-CET), 2013-present.
- Chair of Scientific Committee, 2016 World Tunnels Congress, April 22-28, 2016, San Francisco, CA.
- Scientific Committee, 9th Intl. Symp. Geotechnical Aspects of Underground Constructions in Soft Ground, April 4-6, 2017, São Paulo, Brazil.
- Scientific Committee, World Tunnels Congress, June 9-16, 2017, Bergen, Norway.
- Opponent for PhD Thesis Defense of Carl Wersall, KTH Royal Institute of Technology, August, 2016, Stockholm, Sweden.
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## *National/International*

- Committees
  - USUCGER Research Committee, 2000-2003.
  - ASEE K-12 Division Organizing Committee, 2004.
  - ASEE K-12 Division Committee, 2004-2007.
  - ASCE Soil Improvement Committee, 2005-2010.
  - Transportation Research Board University Representative, 2008-present.
  - TRB Committee on Geotechnical Instrumentation & Modeling, 2009-present.
  - ASCE Embankments, Dams and Slopes Committee, 2011-present.
  - ISSMGE Committee on Underground Construction & Tunneling in Soft Ground (TC204), 2011-present.
  - ASCE Underground Engineering Committee, 2012-present.
  - International Tunneling Association Committee on Education and Training (ITA-CET), 2013-present.
  - Underground Construction Association (UCA) Executive Committee, 2014-present.
- Technical Conference Session Organizer/Chair
  - Session chair, Sensors, Identification and Control, Intl. Symp. Automation and Robotics in Construction, Ferrara, Italy, 2005.
  - Session chair, Advanced Sensing and Monitoring Techniques for Earthwork QA/QC, GeoCongress 2006, Atlanta, GA, 2006.
  - Session chair, Nondestructive Structural Evaluation, 8<sup>th</sup> Intl. Conf. on the Bearing Capacity of Roads, Railways and Airfields, Champaign, IL, 2009.
  - Session organizer: Stiffness Measurement for Compaction QC and/or QA, Transportation Research Board, Washington, D.C., 2010.
  - Session co-organizer, Ground Improvement, GeoFlorida 2010.
  - Session organizer & chair, SAGEEP 2010.
  - Session organizer & chair, Real Time Geoconstruction Monitoring, Geocongress 2012.
  - Session co-organizer & co-chair, Pavement Geotechnics, Geocongress 2012.
  - Session co-organizer & co-chair, Monitoring of Embankment and Slopes Earthwork, Geocongress 2013.
  - Session chair, Lessons Learned during Geotechnical Research Deployment: How Organizations Encourage Implementation, Transportation Research Board, January, 2014, Washington D.C.
  - Session co-organizer & co-chair, Geotechnical Testing, Monitoring and Modeling for Underground Construction & Tunneling, Geocongress, February, 2014, Atlanta, GA.
  - Session co-chair, Planning and Designing Tunnels and Underground Structures, World Tunnels Congress, May, 2015, Dubrovnik, Croatia.
  - Session co-organizer & co-chair, Risk and Safety Assessment of Dikes, 5<sup>th</sup> Intl. Symp. Geotechnical Safety and Risk, Oct, 2015, Rotterdam, Netherlands.
  - Session chair, Intl. Conf. Tunnel Boring Machines in Difficult Grounds, Nov 18-20, 2015, Singapore.
- Conference Committees
  - Technical Committee, 8<sup>th</sup> Intl. Symp. Geotechnical Aspects of Underground Construction in Soft Ground, Aug. 25-27, 2014, Seoul, Korea.
  - Scientific Committee, Nondestructive Testing in Civil Engineering, Sept. 15-17, 2015, Berlin, Germany.

- Scientific Committee, 2015 World Tunnels Congress, May 22-28 2015, Dubrovnik, Croatia.
  - Scientific Committee, 5<sup>th</sup> Intl. Symp. Geotechnical Safety and Risk, Oct. 13-16, 2015, Rotterdam, NL.
  - Organizing Committee, Tunnel Boring Machines in Difficult Ground, TBM DiGs, Nov. 18-20, 2015, Singapore.
  - Organizing Committee, Cutting Edge: Urban Tunneling, Denver Colorado, Sept. 21-23, 2015.
  - Chair of Scientific Committee, 2016 World Tunnels Congress, April 22-28, 2016, San Francisco, CA.
  - Scientific Committee, 9th Intl. Symp. Geotechnical Aspects of Underground Constructions in Soft Ground, April 4-6, 2017, São Paulo, Brazil.
  - Scientific Committee, World Tunnels Congress, June 9-16, 2017, Bergen, Norway.
  - Organizing Committee, Geo-Risk Denver, June 4-6, 2017, Denver, US.
- Publications
    - Editorial Board Member, *Journal of Geotechnical & Geological Engineering*, 2008-2015.
    - Editorial Board Member, *Geotechnical Testing Journal*, 2009-present.
    - Editorial Board Member, *Tunnelling and Underground Space Technology*, 2015-present.
    - Guest co-editor, special issue for *Near Surface Geophysics*, Geophysics for non-destructive testing in civil engineering, 2015.
    - Reviewed papers for dozens of journals and conferences.
- Outreach to K-12 Community
    - Organizer & chair of two-week summer *Adventure Engineering* workshops for K-12 teachers, 2005-2007.
    - Member of TeachEngineering.com and K-16 EngineeringPathway.com development team, 2005-present.
    - Organized & chaired working meeting at CSM for TeachEngineering.com development team, 2008.
    - Organized and chaired working group of 4 Denver-area science teachers throughout summer 2008 to explore student & teacher attitudes towards engineering, 2008.
    - Built and distributed renewable energy classroom kits for 5 Denver area science teachers, 2008.
    - Helped organize NSF workshop at CU-Boulder for GK-12 engineering education programs, 2008-2009.
- Other
    - Reviewed numerous proposals for NSF; served on 4 NSF review panels (Geotech, IGERT, GK-12).
    - Taught 4 days of geotechnical engineering review annually to Colorado engineers for the Professional Engineering exam, 2006-present.
    - Given presentations on roller-integrated continuous compaction control and intelligent compaction to 6 DOTs, FHWA, Asphalt Institute chapters, Bureau of Reclamation, 6 roller manufacturers (U.S., Germany, Switzerland), and numerous ASCE and geotechnical chapters.

### **Departmental**

- Faculty Search Committees
  - Chair of Structural Engineering Faculty Search Committee (hired 3 faculty), U. Oklahoma, 2001-2002.
  - Civil Engineering Search Committee (Lecturer), CSM, 2003-2004.
  - Chair of Clare B. Luce Professor in Engineering Search Committee, CSM, 2005-2006.
  - Paden Chair in Geotechnical Engineering Search Committee, CSM, 2005-2007.
  - Chair of Geotechnical Engineering Faculty Search Committee, CSM, 2006-2007.
  - Geotechnical Engineering Faculty Search Committee (Lecturer), 2007-2008.
  - Structural Engineering Materials Faculty Search Committee, 2007-2008.
  - Geophysics Faculty Search Committee, 2013.
  - Mining Engineering Underground Construction & Tunneling Faculty Search Committee, 2013-2014.
  - CEE Water Faculty Search Committee, 2013-2014.
  - Chair of CEE Geotech - Underground Construction & Tunneling Faculty Search Committee, 2014-2015.
  - Mining Engineering Underground Construction & Tunneling Faculty Search Committee, 2014-2015.
  - Geological Engineering Underground Construction & Tunneling Faculty Search Committee, 2014-2015.
- Committees
  - Undergraduate Curriculum Committee, Civil Engineering & Enviro. Science, U. Oklahoma, 1996-2002.
  - Chair of Scholarship Committee, Civil Engineering & Enviro. Science, U. Oklahoma, 1997-1999.
  - Graduate Studies Committee, Civil Engineering & Enviro. Science, U. Oklahoma, 2000-2002.
  - Chair of Graduate Recruiting Committee, Division of Engineering, CSM, 2006-2008.
  - Member, Graduate Recruiting Committee, Division of Engineering, CSM, 2011-2012.

- Chair, Graduate Admissions Committee, Civil & Environmental Engr, CSM, 2012-2015.
- Other
  - ASCE Student Chapter Advisor, U. Oklahoma, 1998-1999.
  - Civil Specialty Graduate Program Coordinator, CSM, 2005-2006.
  - ASCE/AGC Co-Advisor, CSM, 2009-2014.

### ***University***

- Committees
  - Curriculum Committee, CSM, 2003-2004.
  - Diversity Committee, 2003-2008.
  - Diversity Steering Committee, CSM, 2004-2007.
  - Faculty Senate, CSM, 2006-2008.
  - Budget Committee, CSM, 2006-2008.
  - Chair of Academic Standards Committee, CSM, 2006-2007.
  - Athletics Oversight Committee, CSM, 2009-2012.
  - University Promotion & Tenure Committee, CSM, 2012-2015.
  - Director, Underground Construction & Tunneling graduate degree program, 2013-2015.
- Other
  - Faculty Advisor for Engineers Club (student organization), U. Oklahoma, 1998-2000.
  - Faculty Advisor for Society for Hispanic Engineers, U. Oklahoma, 2000-2002.
  - Faculty lead for Colorado Science & Engineering Fair, 2005.
  - Developed partnership with CU-Boulder Engineering outreach to have CSM deliver an engineering elective course each year at the Denver School of Science & Technology, 2005-2006.
  - Director for campus-wide NSF IGERT (SmartGeo) Program, 2008-present.
  - Member, Civil & Environmental Engineering Department Head Search Committee, 2011.
  - Member, Electrical Engineering & Computer Science Department Head Search Committee, 2011.
  - Director, SmartGeo IGERT Program, 2008-2015.
  - Director, Center for Underground Construction & Tunneling, 2011-present.