Thomas D. Rockaway, Ph.D., P.E.

Center for Infrastructure Research Civil and Environmental Engineering University of Louisville Louisville, Kentucky, 40292 502/ 852-3272 502/ 321-9882 Office Cell

rockaway@louisville.edu

EDUCATION

Doctor of Philosophy, Civil Engineering - Geotechnical, June 1997
Georgia Institute of Technology, Atlanta, Georgia
"Spatial Assessment of Earthquake-Induced Geotechnical Hazards"
Master of Science - Civil Engineering, Geotechnical, Purdue University, 1991
Bachelor of Science - Civil Engineering, Geotechnical, Purdue University, 1990
Bachelor of Arts, DePauw University, Greencastle, Indiana, 1990

PROFESSIONAL EXPERIENCE

Associate Dean, Programs and Initiatives, July 2020 - Present Professor, Civil and Environmental Engineering, July 2018 - Present Director, Center for Infrastructure Research Speed School of Engineering, University of Louisville, Louisville, Kentucky

Associate Professor, Civil and Environmental Engineering, July 2011 – June 2018 Director, Center for Infrastructure Research Speed School of Engineering, University of Louisville, Louisville, Kentucky

Assistant Professor, Civil and Environmental Engineering, July 2005 - July 2011 Director, Center for Infrastructure Research Speed School of Engineering, University of Louisville, Louisville, Kentucky

Term - Assistant Professor, Civil and Environmental Engineering, Aug 2002 – July 2005 Director, Center for Infrastructure Research Speed School of Engineering, University of Louisville, Louisville, Kentucky

United States Army Corps of Engineers, December 2001 – July 2002 Geotechnical and Dam Safety Section, Louisville, Kentucky

Engineering Department Manager, June 2000 - November 2001 QORE Property Sciences, Louisville, Kentucky

Project Geotechnical Engineer, July 1997 - June 2000 QORE Property Sciences, Duluth, Georgia

Engineer III, Geotechnical Section, February 1992 - June 1993 American Electric Power Service Corporation, Columbus, Ohio

PROFESSIONAL REGISTRATION

Professional Engineer - Kentucky, 2000 Professional Engineer - Georgia, 1999

RESEARCH ACTIVITY:

- Methane Emissions Reduction, Rockaway, T., Mahoney, T, LG&E-KU, \$85,000 November 2021 Dec 2022.
- 2. MSD IOAP FY21 Performance Assessment, Rockaway, T., Rivard, J, and Kazemi H., Louisville-Metropolitan Sewer District, \$44,998 July 2020 June 2021
- MSD IOAP Performance Assessment, Rockaway, T., Rivard, J, and Kazemi H., Louisville-Metropolitan Sewer District, \$422,650 July 2019 – June 2020
- 4. MSD IOAP Performance Assessment, Rockaway, T., Rivard, J, and Kazemi H., Louisville-Metropolitan Sewer District, \$410,000 July 2018 June 2019
- 5. Temporal Performance Assessment of Wastewater Treatment Plant by Using Multivariate Statistical Analysis, Rockaway, T. and Ebrahimi, M., Kentucky Water Resources Research Institute (KWRRI), \$10,000, July 2017 June 2018
- MSD IOAP Performance Assessment, Rockaway, T., Rivard, J, and Kazemi H., Louisville-Metropolitan Sewer District, \$327,000 July 2017 – June 2018
- 7. NSF-IUSE Developing a Foamcrete for Trench Construction, Z.Sun and TD Rockaway, \$2,500, January 2017-January 2018
- 8. MSD IOAP Performance Assessment, Rockaway, T., Rivard, J, and Kazemi H., Louisville-Metropolitan Sewer District, \$276,742 June 2016 June 2017
- 9. America Saves, National Trust for Historic Preservation, NuLu Energy Audit, \$14,000, January 2015 September 2016
- 10. MSD IOAP Performance Assessment, Rockaway, T., Rivard, J, and Kazemi H., Louisville-Metropolitan Sewer District, \$165,025, January 2016 December 2016
- 11. MSD IOAP Performance Assessment, Rockaway, T., Louisville-Metropolitan Sewer District, \$629,000, April 2014 March 2016
- 12. MSD Green Infrastructure Performance, Rockaway, T., Louisville-Metropolitan Sewer District, \$125,000, July 2012 June 2013.
- 13. Partnership for Retention Improvement in Mathematics, Engineering, and Science (PRIMES), Rich, C, Willing, G, Gobin, A, Rockaway, T, Hart, B, Tretter, T, Hadizedeh, J., Parker, T, and Steffen J., National Science Foundation, \$1,997,451, June 2011 May 2016.
- 14. Assessing Quantifiable Impacts of Green Storm water Infrastructure, Louisville-Metropolitan Sewer District and URS, Inc., \$295,000, Jan 2011 Dec 2011.
- Best Practice Protocols for Response and Recovery Operations in Contaminated Water Systems, Ernest, A (WKU), Ormsby, L. (UK), Clevenger, T. (MU), Rockaway, T. (UofL), National Institute for Hometown Security, \$1,5362,264 (\$263,440 UofL), April 2010 – March 2012.
- 16. Infrastructure Asset Identification and Condition Assessment, Rockaway, T.D., U.S. Environmental Protection Agency (X-96426805-0), \$497,100, September 05 October 10.
- 17. Economical Armor Protection, Assessing the effectiveness and efficiency of plastic armor. Rockaway, T.D., Willing, G., Proof of Concept Grant, University of Louisville, Total Value \$25,000, July 08 June 09.
- Report Review for Report of Investigation Breach in the Enclosure Dike, Island 18 Confined Disposal Facility, Toledo Harbor, Ohio, United States Army Corps of Engineers, Total Value \$9,400, December 2007

- 19. Changes in Water Use Patterns, Rockaway, T.D., Coomes, P., AwwaRF Proposal 4036, Total Value \$301,249, November 06 May 09
- 20. Amendment: Performance and Life Expectancy of Elastomeric Components in Contact with Potable Water, Surface to Mass Ratio Affects on Elastomer Degradation, Rockaway, T.D., Willing, G., Total Value \$74,050, November 06 July 07
- 21. Amendment: Guidelines to Minimize Downtime During Pipe Lining Operations, Alternative Disinfection Methods, Rockaway, AwwaRF Total Value \$33,300, October 05 December 06.
- 22. Striking the Balance: Integrated Optimization of Multiple Conflicting Objectives in Water Treatment and Supply, Bhaskar, N., French, M, Rockaway, T., Louisville Water Company, Total Value \$41,580. January 06 December 06.
- 23. HSD-SGER: Understanding Critical Infrastructure in Crisis: Impacts, Linkages and Resiliency in Hurricane Katrina, Simpson, D., Rockaway, T., Weigel, T., National Science Foundation, Total Value \$97,471, January 06 December 06.
- 24. Riverbank Filtration Project, Hagerty, D.H. Rockaway, T.D., Louisville Water Company, Total Value \$48,400 July 05 June 06.
- 25. Development and Application of a Computer-Based Aquifer Model for the B.E. Payne Plant Riverbank Filtration Project, Hagerty, D.H., Rockaway, T.D., Louisville Water Company, Total Value \$10,000 January 05 June 06.
- 26. Emergency Communications With Your Local Government and Community, Water Environment Research Foundation, Total Value \$244,295 May 04 April 06
- 27. Distribution Water Quality Issues Related to New Development or Low Usage, Hasit, Yakir and Rockaway, T.D., AwwaRF Proposal 2954, Total Value \$251,728, December 03 October 05.
- 28. Guidelines to Minimize Downtime During Pipe Lining Operations, Rockaway, AwwaRF Proposal 2956, Total Value \$201,699, December 03 October 05.
- Performance and Life Expectancy of Elastomeric Components in Contact with Potable Water, Rockaway, T.D., Davis K.L., Schreck, R. M., and Hanley, T.R., AwwaRF Proposal 2932, Total Value \$707,967, November 03 - February 07.
- 30. Reliability of Systems Comprised of Components with Disparate Expressions of Fragility, Weigel, T.A., and Rockaway, T. D., UofL Research Foundation, Total Value \$9,600. January 03 January 04
- 31. Biosolids Demonstration Project, Rockaway, T.D., Hagerty, D.J., Metropolitan Sewer District, Total Value \$12,000, January 03 December 03.

REFEREED JOURNAL PUBLICATIONS Full paper peer review

- 1. Li, S, Kazemi, H, Rockaway, T., (2021), Statistical modelling of hydrological performance in a suite of GI practices, Water Science and Technology, ref: WST-EM21997R1
- 2. Ebrahimi, M., Kazemi, H., Ehteshami, M., and Rockaway, T., (2019). "Quality Appraisal of Groundwater in Arid Regions Using Probabilistic and Deterministic Approaches", Environmental and Engineering Geoscience (2019) 1-14. https://doi.org/10.2113/EEG-2240
- Shanshan, L., Kazemi, H., and Rockaway, T. (2019). "Performance assessment of stormwater GI practices using artificial neural networks", Science of The Total Environment, 651(2). DOI: 10.1016/j.scitotenv.2018.10.155
- 4. Kazemi, H., Abdollahian, S., Rockaway, T.D., and Gullapalli, V. (2018). "Stormwater Quality Benefits of Permeable Pavement Systems with Deep Aggregate Layers", Environments, 5(6). DOI: 10.3390/environments5060068
- 5. Ebrahimi, M., Kazemi, H., Mirbagheri, S. A., and Rockaway, T., (2018) "An Integrated Approach to Treatment of High Strength Organic Wastewater by using Anaerobic Rotating Biological Contactor", Journal of Environmental Engineering, DOI: 10.1061/(ASCE)EE.1943-7870.0001312
- 6. Kazemi, H., Rockaway, T.; Rivard, J., Abdollahian, S., (2017) Assessment of Surface Infiltration Performance and Maintenance of Two Permeable Pavement Systems in Louisville, Kentucky, in ASCE's Journal of Sustainable Water in the Built Environment, https://doi.org/10.1061/JSWBAY.0000830
- 7. Ebrahimi, M., Gerber, E and Rockaway, T.D., (2017) Temporal performance assessment of wastewater treatment plants by using multivariate statistical analysis, Journal of Environmental Management, 193 (2017) 234-246, DOI: 10.1016/j.jenvman.2017.02.027
- Hyun, J., Rockaway, T.D. and French, M.N., (2016) Case Study: Ground-Level Rainfall Variation in Jefferson County, Kentucky, Journal of Hydrologic Engineering, 21:12 DOI: http://dx.doi.org/10.1061/(ASCE)HE.1943-5584.0001438
- 9. Ebrahimi, M., Kazemi, H., Ehteshami, M., and Rockaway, T., (2016) "An Optimized Biological Approach for Treatment of Petroleum Refinery Wastewater" Journal of Environmental Chemical Engineering 4.3: 3401-3408. doi:10.1016/j.jece.2016.06.030
- Ebrahimi, M., Kazemi, H., Ehteshami, M., and Rockaway, T., (2016) "Assessment of Groundwater Quantity and Quality and Saltwater Intrusion in the Damghan Basin, Iran", Journal for Chemical Problems of the Geosciences and Geoecology, DOI 10.1016/j.chemer.2016.04.003. ISSN 0009-2819, http://dx.doi.org/10.1016/j.chemer.2016.04.003.
- Radfar, A. and Rockaway, T. (2015). "Captured Runoff Prediction Model by Permeable Pavements Using Artificial Neural Networks." Journal of Infrastructure Systems, 10.1061/(ASCE)IS.1943-555X.0000284, 04016007.
- 12. Radfar, A. and Rockaway, T. (2015). "Clogging Prediction of Permeable Pavement." J. Irrig. Drain Eng., 10.1061/(ASCE)IR.1943-4774.0000975, 04015069.
- 13. Nagisetty, R., Rockaway, T., and Willing, G. (2014), Drinking Water Quality Concerns from Chloramine Induced Elastomeric Compounds Degradation, Journal AWWA, September. DOI: http://dx.doi.org/10.5942/jawwa.2014.106.0077
- Hagerty, D.J. and Rockaway, T.D., (2012). Adapting entry-level engineering courses to emphasize critical thinking. *Journal of STEM Education: Innovations and Research*, 13(2), p.25. ERIC Number: EJ978724

- 15. Rockaway, T.D., Coomes, P.A., Rivard, J. and Kornstein, B., (2011). Residential water use trends in North America. *Journal AWWA*, *103*(2), pp.76-89.
- Simpson, D.M., Lasley, C.B., Rockaway, T.D. and Weigel, T.A., (2010). Understanding critical infrastructure failure: examining the experience of Biloxi and Gulfport, Mississippi after Hurricane Katrina. *International journal of critical infrastructures*, 6(3), pp.246-276.
 DOI: 10.1504/IJCIS.2010.033339
- 17. Nagisetty, R.M., Rockaway, T.D. and Willing, G.A., (2010). Aqueous chloramine diffusion into elastomers. *Journal of applied polymer science*, *117*(5), pp.2597-2611. DOI: 10.1002/app.30970
- 18. Rockaway, T.D. and Ball, R.T. (2008) Time and Cost Saving Strategies for Pipe Lining Operations, ASCE Journal of Infrastructure Systems, 14:3, September, pp. 178-184.
- 19. Rockaway, T.D., Willing, G.A. and Nagisetty, R.M., (2007). Life predictions of elastomers in drinking water distribution systems. *Journal (American Water Works Association)*, pp.99-110. Stable URL: http://www.jstor.org/stable/41313921
- Simpson, D.M., Rockaway, T.D., Weigel, T.A., Coomes, P.A. and Holloman, C.O. (2005) "Framing a new approach to critical infrastructure modeling and extreme events", Int. J. Critical Infrastructures, Vol. 1, Nos. 2/3, pp. 125-143. DOI: 10.1504/IJCIS.2005.006115
- 21. Frost, J.D., Carroll, D.P. and Rockaway, T.D., (1997). Spatial liquefaction analysis. In *Spatial analysis in soil dynamics and earthquake engineering* (pp. 70-86). ASCE.
- 22. Rockaway, T.D., Frost, J.D., Eggert, D.L. and Luna, R., (1997). Spatial earthquake hazard assessment of Evansville, Indiana. *Seismological Research Letters*, *68*(4), pp.675-688. DOI: 10.1785/gssrl.68.4.675

REFEREED PROCEEDINGS AND CONFERENCES Full paper peer review

- 1. Lewis, J.E.; Rockaway, T.D. Willing, G.A.; (2017) "Peer-Led-Team-Learning in a Mechanics I: Statics Course," 124th Annual American Society for Engineering Education (ASEE), Columbus, OH, June 25-28.
- 2. Javadi, S., Abdollahian, S., Zhao, Q., Ghavami, M., Rockaway, T., (2016) "Effectiveness of Heavy Metal removal in Urban Permeable Pavement Systems", Geo-Chicago 2016 GSP 273, DOI: 10.1061/9780784480168.003
- 3. Lewis, J.E.; Willing, G.A.; Rockaway, T.D. (2016) "Peer-Led-Team-Learning in Introductory Calculus Course," 123nd Annual American Society for Engineering Education (ASEE), New Orleans, LA, June 26-29.
- 4. Kazemi, H., Abdollahian, S., Rockaway, T.D., and Rivard, J.A. (2015). "Water Quality and Quantity Performance of a Permeable Pavement System in Louisville, KY." Water Environment Federation Technical Exhibition and Conference, Chicago.
- 5. Lewis, J.E.; Willing, G.A.; Rockaway, T.D. (2015) "Peer-Led-Team-Learning in Early General Engineering Curriculum," 122nd Annual American Society for Engineering Education (ASEE), Seattle, WA, USA, June 14-17.
- Radfar, A. and Rockaway, T. (2015) Neural Network Models for Captured Runoff Prediction of Permeable Interlocking Concrete Pavements. World Environmental and Water Resources Congress 2015: pp. 349-358. DOI: 10.1061/9780784479162.034
- 7. Radfar, A., Rockaway, T., and Ehsaei, A. (2015) Clogging Progression Prediction of Permeable Pavement Laboratory Model Using Artificial Neural Networks. Watershed Management 2015: pp. 149-159. DOI: 10.1061/9780784479322.014

- Zhao, Q., Burns, S., and Rockaway, T. (2014) Organic Contaminant Sorption and Diffusion in Engineered Clays with Organoclay Additives-Understanding Barrier Performance at the Molecular Level. Geo-Congress 2014 Technical Papers: pp. 1919-1928. doi: 10.1061/9780784413272.188
- Kazemi, H., Rockaway, T., and Rivard, J. (2013) Monitoring Hydrological Performance of Green Infrastructure Stormwater Controls. World Environmental and Water Resources Congress 2013: pp. 230-238. DOI: 10.1061/9780784412947.022
- Radfar, A, and Rockaway, T.D., (2013) Long-term Performance of filtration layer (abstract), American Geophysical Union, Fall Meeting 2013. Bibliographic Code: <u>2013AGUFM.H43A1415R</u>
- 11. Rockaway, T.D. and Hagerty, J.D. (2010) Quality Enhancement in Statics, American Society for Engineering Education, 2010 ASEE Annual Conference & Exposition, June 20-23, Louisville, KY.
- 12. Rockaway, T.D., Rivard, J.A., (2010) Application of Ground Penetrating Radar in the Urban Environment, 13th International Conference on Ground Penetrating Radar, June 21-25, Lecce, Italy. DOI: 10.1109/ICGPR.2010.5550270
- 13. McGinley, W.M., Rockaway, T.D. Hackler C., Weiss C., and Malone P. (2008) "An Innovative Corrosion-Resistant Coating for Steel Reinforcing Bars in a Marine Environment", Proceedings of the Mega Rust Conference, August 2008 Louisville, KY.
- 14. Rockaway, T.D., Ball, R.T., (2006) Methods to Reduce Down-Time During Pipe Lining Operations, 24th International NO-DIG 2006 Conference and Exhibition, Queensland Australia, October.
- 15. Mohsen, J.P., Rockaway, T.D. and Gupta, D.K. (2006) Test Field Design and Development for GPR Techniques for Infrastructure Asset Identification, 11th International Conference on Ground Penetrating Radar, June 19-22, Columbus, Ohio.
- Rockaway, T.D., Frost, J.D., Eggert, D.L., Fehlenberg, S., and Harper, D., (1995), Geotechnical Earthquake Hazard Analysis of the Evansville, Indiana Area, Proceedings of 5th International Conference on Seismic Zonation, Nice, France, October, Vol. 2, pp. 1351 - 1358.

Abstract review

- 1. Coomes, P.A., Kornstein B.D., Rockaway, T.D., and Rivard, J.A. (2010) North American Water Usage Trends since 1992. Water Environment Federation Technical Exhibition and Conference, New Orleans, United States.
- 2. Rockaway, T.D., Bigdeli, S., Ball, R.T., (2004) Preliminary Assessment Of Procedures To Minimize Downtime During Pipe Lining Operations, Water Professionals Conference, Nashville, TN July 20-23
- Rockaway, T.D., Davis, K.A., Schreck, R.M., Thompson, M.A. Valleru, J., (2004) Overview of Chloramine Induced Elastomer Degradation Testing, Water Professionals Conference, Nashville, TN July 20-23
- 4. Mohsen, J.P., Zhao, Z., and Rockaway, T.D., (2004), Locating Subsurface Voids Below City Streets Using Ground Penetrating Radar, Water Professionals Conference, Nashville, TN July 20-23
- Coffin, S.L., Rockaway, T., Navelekar, R., (2003) Financing Local Public Infrastructure: Determining and Effective Revenue Stream that Supports Local Projects, Urban Affairs Association, 33rd Annual Meeting, Cleveland, OH, March 27-30, 11pp.

APPLIED RESEARCH PUBLICATIONS Advisory committee peer review (Books)

- 1. Coomes, P., Rockaway, T., Rivard, J and Kornstein, B. (2010) North America Residential Water Usage Trends Since 1992, Project #4031, Water Research Foundation, Denver, Colorado.
- 2. Rockaway, T.D. and Simpson, D.M. (2008) Emergency Communications with your Local Government and Community, 03CTS5SCO, Water Environment Research Foundation, Arlington, Virginia.
- 3. Rockaway, T.D., Willing, G.A., Schreck, R.M. and Davis, K.R. (2007), Performance of Elastomeric Components in Contact with Potable Water, Project #2932, American Water Works Association Research Foundation, Denver, Colorado.
- 4. Rockaway, T.D., Ball, R.T. (2007), Guidelines to Minimizing Downtime During Pipe Lining Operations, Project #2956, American Water Works Association Research Foundation, Denver, Colorado.
- 5. Hasit, Y.J., Rockaway, T.D., Anderson, J.L., Parolari, A.J., French, M.N. (2006) Distribution Water Quality Issues Related to New Development or Low Usage, Project #2954, American Water Works Association Research Foundation, Denver, Colorado.

OTHER PUBLICATIONS

- 1. Rockaway, T.D. and Hagerty, J. D., (2007) Review Comments Breach in the Enclosure Dike, Island 18 Confined Disposal Facility, Toledo Harbor, Ohio, December.
- 2. Rockaway, T.D., Simpson D.M. and Rivard, J. (2009). Effective Emergency Communications in Natural and Human-Generated Disasters, Water Environment and Technology, Water Environment Federation, January, pp. 58-59.
- Rockaway, T.D., (1997), Spatial Assessment of Earthquake Induced Geotechnical Hazards, DISSERTATION, School of Civil and Environmental Engineering, Georgia Institute of Technology, June, 418 pp.
- 4. Rockaway, T.D., Frost, J.D. (1997), Geotechnical Earthquake Hazard Analysis of the Evansville, Indiana Area, , U.S. Geological Survey Grant No. 1434-94-G-2476, 205pp.
- 5. Frost, J.D., Rockaway, T.D., and Eggert, D.L., (1996), ABSTRACT Spatially Evaluated Liquefaction Hazard for Evansville, Seismological Research Letters, Seismological Society of America, Vol. 67, No. 2, April, pp. 38.
- 6. Rockaway, J.D., Lorey, R.L., Cosper, K.B., Rockaway, T.D., (1988), Environmental Study of the Lake Taneycomo Area, Taney County Missouri, Department of Natural Resources: Division of Geology and Land Survey, October, 29 pp.

COMMITTEES AND BOARDS

Community Service Committees

Administrative Advisory Committee – Kentucky Water Resources Research Institute, 2017-2021
The institute administers the Title I Annual Allotment Program, makes recommendations on proposals submitted for the Title I Matching Grants Program, and provides a liaison between Kentucky water resources officials and university faculty.

Lead (Pb) in Drinking Water Workgroup,

Kentucky Energy and Environment Cabinet, Division of Water, 2016 – present Addressing the affects of lead contamination in drinking water for Kentucky water utilities.

Transportation Advisory Board, Congressman Thomas Massie, KY-4, 2013-2016

109 Board – Solid Waste, Shelby County, Kentucky, 2008 – 2018

The three-person board is responsible for and sets policy for landfill, liter abatement and recycling operations in Shelby County. Annual budget of approximately \$1,300,000 with six fulltime employees. The board has taxing authority.

Capital Expenditure Steering Committee, Louisville Water Company, 2009 - 2010

The seven-member board is responsible for the independent review of the 20-year capital improvement spending plan. This works sets the policy for company long-term objectives. Recommendations are then provided to the water company board.

Technical Committees

Kentucky ASCE Infrastructure Report Card, Chair, 2011 and 2019

AWWA Gasket Materials, Committee 240, 2014 - Present

Bluegrass Economic Advancement Movement, Infrastructure Steering Committee, 2013

Committee on Research and Policy for the Kentucky Water Resources Research Institute, 2011-2014

KY/TN AWWA Section Treasurer, 2008 - 2012

Kentucky ASCE Infrastructure Report Card, Chair, 2010 - 2011

HDPE Technical Advisory Panel, 2009 - 2010

UPAM Sanitary Sewer Committee – Secretary, 2007 – 2009

Kentucky Geotechnical Engineering Group, President 2005

Kentucky Geotechnical Engineering Group, Secretary 2004

Ohio River Valley Soil Seminar – Steering Committee 2001, 2004, 2007, 2013

Student Leadership

ASCE/SAME Student Chapter Faculty Advisor, 2008 – 2018

University Committees

International Affairs Advisory Committee 2021 – present

Faculty Council President, 2019, 2020

Faculty Council President-Elect, 2018

ABET Accreditation Coordinator – Civil and Environmental Engineering 2017 – 2018

RSC Committee - Chair, Energy and Sustainability Research Focus Group, 2015-2018

Sustainability Council, University of Louisville, 2013 – 2018

Sustainability Operations Committee, 2016 - 2018

i2a Unit Leadership Committee, 2014 - 2016

CEE Faculty Search Committee - 2015

CEE Promotion and Tenure Committee, JB Speed School of Engineering, 2013 – 2015