

Geo-Congress 2024

Foundations, Retaining Structures, Geosynthetics, and Underground Engineering

Selected Papers from Sessions of Geo-Congress 2024

Geotechnical Special Publication Number 350

Vancouver, Canada
25 – 28 February 2024

Editors:

T. Matthew Evans
Nina Stark
Susan Chang

ISBN: 978-1-7138-9219-9

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2024) by American Society of Civil Engineers
All rights reserved.

Printed with permission by Curran Associates, Inc. (2024)

For permission requests, please contact American Society of Civil Engineers
at the address below.

American Society of Civil Engineers
1801 Alexander Bell Drive
Reston, VA 20191
USA

Phone: (800) 548-2723
Fax: (703) 295-6333

www.asce.org

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2633
Email: curran@proceedings.com
Web: www.proceedings.com

Contents

Deep Foundations

Prediction for Lateral Response of Monopiles: Deep Learning Model on Small Datasets Using Transfer Learning.....	1
Mohammed Alduais, Amir Hosein Taherkhani, Qiwei (Gavin) Mei, and Fei Han	
Pile Setup in Glacial Soils of Northern Missouri	8
Brent L. Rosenblad, Ruaa Al-Forati, and Andy Boeckmann	
Effect of Pile Modeling Options on the Short-Term Stability Analysis of a Clay Slope Stabilized with Piles.....	17
Emre Tekdemir and Irem Zeynep Yildirim	
Downdrag Analysis on Piles by Cyclic Hyperbolic t-z Curves	28
Roman D. Hryciw, Ries Plescher, and Xiaotong Sun	
Centrifuge Testing on Helical Piles in Sand Subjected to Pseudostatic Monotonic and Cyclic Loads.....	38
Naveel Islam, Lijun Deng, Rick Chalaturnyk, and Luke Penner	
Analysis of Laterally Loaded Large-Diameter Rigid Piles Considering Vertical and Horizontal Soil Displacements.....	48
Abhisek Paul and Dipanjan Basu	
Evaluation of Soil Improvement Surrounding Drilled Displacement Piles Installed in Homogeneous Cohesionless Soil Sites through Pre- and Post-Installation CPT Data	59
Genesis Figueroa, Tim Siegel, Morgan NeSmith, and Anne Lemnitzer	
Case Study on Ground Deformations and Vibrations Induced by Impact Pile Driving in Central Florida.....	69
Jorge E. Orozco-Herrera, Berk Turkel, Luis G. Arboleda-Monsalve, and Larry Jones	
Pile Length Estimation Based on Guided Waves and Periodic Analysis.....	79
Shihao Cui, Pooneh Maghoul, and Hamed Layssi	
An Analytical Approach to Determine Point-of-Fixity of Deep Foundation Utilizing Nonlinear Response from <i>p-y</i> Analysis.....	87
Fahim M. Bhuiyan, Ramin Motamed, and Raj V. Siddharthan	

Analysis of the Load-Sharing Behavior of Disconnected Piled Raft Foundation Using Non-Linear Soil-Structure Interaction.....	97
Vincent Zanjani, Satheeshkumar M, and Rob Smith	
Soil-Structure Interface Resistance Changes due to Rigid Awns.....	106
Ryan D. Beemer, Joe Tom, Kaylee Tucker, Ann C. Sychterz, and Isabella Bernardi	
A Study of Laterally Loaded Piles after Failure	114
Rabie Farrag and Anne Lemnitzer	
Foundation Design for Crowchild Trail Short-Term Improvements	125
Iain D. C. Gidley and W. Chris Workman	
Geofoam Bridge Approaches for 11-MN Module.....	140
Rollins P. Brown	
Effect of Feature Selection Technique on the Pile Capacity Predicted Using Machine Learning	153
Baturalp Ozturk, Antonio Kodsy, and Maged Iskander	
Updated Group Reduction Factors for Large Pile Groups under Lateral Loads	164
Farnyuh M. Menq, Daqing Xu, Luis G. Vasquez, and Shin-Tower Wang	
Cyclic Lateral Load Testing of Model Pile Segments in Sand: Equipment Development and Early Results.....	174
Sanjeev Malhotra and Byron W. Byrne	
Design of Drilled Shaft with Environmental Impact Considerations: A Parametric Study	186
Mina Lee and Dipanjan Basu	
Drilled Shaft Load Tests to Investigate Side Friction Development along Drilled Shafts in Very Weak Porous Limestone	196
José R. Ramírez, Matias R. Frediani, and Miguel A. Pando	
Four-Point Bending Test of Micropile Threaded Connections	206
Sebastian Montoya-Vargas, Aaron Gallant, and William G. Davids	
Further Examination of a New Empirical Model for Predicting Underwater Noise due to Pile Driving	215
Raphael Crowley, Amanda Schaaf, Consolatha Mushi, Mariam Makoleo, Emily Sapp, Jim Gelsleichter, and Brian T. Kopp	
Evaluation of the Response of Piled Raft Systems in Soft Soil Undergoing Consolidation and Pore Pressure Drawdown.....	225
Indraneel Sengupta, Nihar Ranjan Patra, and Sathiyamoorthy Rajesh	

Challenges with Pile Design and Construction on the Coquihalla Highway.....236
Stuart Childs, James Williams, and Gurpreet Bala

Shared Anchoring of Marine Renewable Energy Devices Utilizing Monopiles.....246
Neda Jamaledin, Mohammed Gabr, and Roy Borden

**Axial Analysis of Small Capacity Helical Piles in Saemangeum Based on the
Load Transfer Method257**
Hyeong-Joo Kim, Peter Rey T. Dinoy, Hyeong-Soo Kim, Tae-Woong Park,
James Vincent Reyes, Young-Soung Joung, Jun-Young Park,
Voltaire Anthony A. Corsino Jr., and Kevin Bagas Mawuntu

**Long-Term Behavior of Pile Groups Resting on Multi-Layered Deposits
Subjected to Combined Compressive and Lateral Loads267**
Venkata Balaiah Kami and Anumita Mishra

**Pile Capacity Reduction due to Wetting in Saharan Deserts and Its
Effect on the Serviceability of Cairo Monorail278**
Ahmed Abd Elmageed, Mohamed Hassan, Ahmed Nader, and Omar Alawneh

Earth Retaining Structures

**Geometric Limits of Foamed Glass Aggregate Fill behind Cantilever
Walls and Abutments286**
Michael P. McGuire, Theresa Andrejack Loux, and Archie Filshill

**Design of Geosynthetic MSE Walls Supporting Bridge Abutment
Footings Using the Stiffness Method296**
Richard J. Bathurst and Reza Jamshidi Chenari

**Effect of Partial Drainage on Optimized Parameters Based on
Deformations of a Deep Supported Excavation305**
Sangrae Kim and Richard J. Finno

Experience with Recent Soil Nail Construction in California315
Mazen E. Adib, Farid Motamed, and Medji Sama

**Deep Excavation in Clayey Soils for a Sanitary Sewer Pump Station in
Maple Ridge, British Columbia331**
Adam McIntyre, (Uthaya) M. Uthayakumar, Reno Fiorante, and Negar Zakipour

**Vertical Settlement of Strip Footings on Top of Geosynthetic-Reinforced
Retaining Abutment Walls.....343**
S. Mustapha Rahmaninezhad and Jie Han

Geosynthetics

Some Rehabilitation Schemes for Geosynthetic-Reinforced Soil Abutments on Soft Soil Foundations.....	350
Pouya Pishgah and Reza Jamshidi Chenari	
Liquefaction Resistance of Fiber-Reinforced Pond Ash	359
Sujay Teli and Ajanta Sachan	
Variability in Membrane Behavior of Geosynthetic Clay Liners	369
Fatih Polat, Sayed A. B. Rahman, Kristin Sample-Lord, Nazli Yesiller, James L. Hanson, and Michael A. Malusis	
Characterization of the Long-Term Tensile Stiffness of Geogrids at the Serviceability Limit of Strain.....	378
Michael P. McGuire, Evaline Bearce, Elise G. Hummel, and Laura Spencer	
Evaluating the In Situ Elastic Modulus of Foamed Glass Aggregate Using Static Plate Load Tests	387
Michael P. McGuire, Theresa Andrejack Loux, and Archie Filshill	
Geocell-Reinforced Capping Layer in Rail Tracks Subjected to Cyclic Loading: Laboratory and Numerical Modeling Study	397
Trung Ngo and Buddhima Indraratna	
Importance of Product-Specific Testing in Determining Durability Reduction Factor for Polyester Geogrids in High pH Conditions	407
Laura M. Spencer and John M. Lostumbo	
Interface Shear Strength of Sand with 3D Printed Geocells.....	416
Aarya Krishna and Gail Madhavi Latha	
Vertical Deformation Analyses for Multi-Axial Geogrid Stabilized Platform Using Conventional Techniques and Back-Analyses with Composite Approach	425
Lois G. Schwarz and Mark H. Wayne	
Investigation of the Effect of Geosynthetics on Climate-Induced Changes in Unsaturated Soil Behavior Using Non-Parametric Measure.....	436
Md. Jobair Bin Alam, Maalvika Aggarwal, and Naima Rahman	
A Numerical Study of Drainage Characteristics of Nonwoven Geotextile on the Performance of a Reinforced Soil Wall Comprising Unsaturated Marginal Backfill.....	447
Amallesh Jana and Arindam Dey	

Performance of Encased Stone Column Aggregates Using Large-Scale Triaxial Testing459
 Upendra Modalavalasa and Ayothiraman Ramanathan

Rehabilitation Design of Railway Tracks Using High-Strength Polymeric Geocell.....467
 Arghya K. Chatterjee, Sanat K. Pokharel, and Marc Breault

Shallow Foundations

New Case Studies to Validate the GT Direct CPT Method for Footings on Sand.....476
 Paul W. Mayne and Jim Greig

Resistance of Shallow Footings to Moment Loads during Seismic Events.....486
 Yeon Sam Kim and Radoslaw L. Michalowski

Underground Engineering

Influence of Ground-Borne Vibrations from the Installation of Rockfill Columns on a Buried Structure.....496
 Silvia Nobre, Marolo Alfaro, and James Blatz

Numerical Investigations on Stability Analysis of Buried Pipelines with Varying Cross-Sectional Shapes to Blast Loading.....507
 Tapobrata Lodh and Kaustav Chatterjee

Analysis of Abrasive Reusability Performed with Different Energy Parameters in Rock Drilling Using Waterjets.....518
 Hyun-Jong Cha, Jun-Sik Park, Eun-Soo Hong, and Tae-Min Oh

Two Decades’ Worth of Lessons Learned from the Use of Distributed Fiber Optics for Ground Characterization and with Tunneling.....528
 N. Vlachopoulos