



Gary L. Seider, *Chairman*
Helical Piles & Tiebacks Committee
Deep Foundations Institute
326 Lafayette Avenue
Hawthorne, NJ 07506 USA

Dear Helical Pile Industry Advocate:

On behalf of all the volunteer members of the DFI Helical Piles & Tiebacks Committee (HPTC), we would like to thank you and your company for considering making a donation to help fund our proposed Helical (Screw) Pile Seismic Study – a comprehensive study to evaluate the effectiveness of helical (screw) piles in a seismic event.

The HPTC is recommending this study for several important reasons including:

- For some time now many engineers in the U.S., who are intimately familiar with slender shaft helical (screw) piles have theorized that this class of piles tends to provide dampening and ductile response when subjected to seismic forces; thus preserving the structural integrity of the structure that is built upon slender shaft piles. Unlike other deep foundations that have been studied for effects during a seismic event, there has never been a similar comprehensive study done for helical (screw) piles.
- A limited, but nonetheless significant, amount of anecdotal information about the performance of helical (screw) piles in seismic events in the U.S. has been accumulated by industry engineers and researchers, and this information has confirmed that slender shaft piles do in fact mitigate structural damage caused by seismic-related forces.
- Discussions with screw pile contractors in or around Christchurch, New Zealand have revealed that upwards of 100 structures in that region were built upon helical (screw) piles prior to the catastrophic earthquakes that occurred between 2010 and 2012. Documented post-quake studies of these structures were conducted, and over 95% of these structures survived the seismic events with little-to-no loss of structural integrity.
- Assuming the results of the study confirm that helical (screw) piles do mitigate the damaging effects of seismic forces, the HPTC will submit the study results along with proposed Code changes to the International Building Code (IBC) in conjunction with a request that helical (screw) piles be approved for use in seismic design categories D, E, and F, and soil site classes D (stiff soil), E (soft soil), and F (special soil)

The HPTC has decided that the proposed study will be directed by Amy B. Cerato, Ph.D., P.E., Rapp Foundation Presidential Professor at the University of Oklahoma, Department of Civil Engineering and Environmental Science. A document that details the timeline, budget and deliverables of the study and a copy of Dr. Cerato's CV have been included for your review.

The cost of the study is projected to be \$250,000, and the study is expected to take somewhat less than three years to complete. Contributions of any amount are welcome. Please see the attached contribution information for instructions to make a contribution.

Thank you in advance for helping us to meet the financial goal so we can launch this very important study for our industry.

Sincerely,

Bill Bonekemper – *Project Manager*
Helical Piles & Tiebacks Committee

Gary, L. Seider, *Chairman*
Helical Piles & Tiebacks Committee



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DFI Helical (Screw) Pile Seismic Research Study

Timeline, Budget and Deliverables:

Task 1: Literature Review (7 month duration = \$35,000)

- May 1, 2015 – Start Literature Review
- Collect past information on seismic studies and results
- Collect New Zealand instrumented helical pile data through Bill Bonekemper
- *Deliverable:* January 1, 2016 – Compiled Report submitted to DFI (7 month duration)

Task 2: Small scale load tests (1 year duration = \$100,000)

- January 1, 2016 (subject to change) – start the small scale load test program
- Based on literature review, determine model scale helical pile size (probably representing 3 size bins) and how to test the piles and record behavior
- Choose soil to use for scale load test program
- Determine type and size of earthquake to subject small scale box to
- Prepare soil bed and install instrumented piles
- 6 total tests performed (each box requires 30 ft³ ~ 1 yd³ of soil), with multiple piles installed in each test box
- Test and analyze data
- *Deliverable:* January 1, 2017 – Compile testing report submitted to DFI (1 year duration)

Task 3: Full-scale loading and Finite Element Modeling (FEM) (1 year duration = \$115,000)

- January 1, 2017 (subject to change) – start the Task
- Install the matrix of piles chosen for testing based on the results of Task 2 with the help of local installers and manufacturers
- Set-up the testing load frames and place loading and measuring equipment on the piles
- Create seismic loads using either an oscillator or hydraulic piston from above, or the Thumper truck generating earthquake from below the ground and measure the pile response
- Set up the Finite Element Methods (FEM) test bed and start performing analyses on various boundary conditions (pinned, fixed or somewhere in between) connections, soil stiffness and pile stiffness. Record pile behavior when subjected to these various parameters.
- *Deliverable:* January 1, 2018 – Compile report submitted to DFI, Suggest Design Guidelines and Recommendations for inclusion in IBC 2021 and the Seismic Design Guide

Amy B. Cerato, Ph.D., P.E.

**Rapp Foundation Presidential Professor
School of Civil Engineering and Environmental Science
University of Oklahoma
202 W. Boyd St., Rm. 334
Norman, OK 73019**

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<http://cerato.ou.edu/>**

Academic Employment

Associate Professor of Civil Engineering, University of Oklahoma – Norman (5/11 – current)
Assistant Professor of Civil Engineering, University of Oklahoma – Norman (1/05 – 5/11)
American Association for University Women (AAUW) Selected Professions Fellow (7/04-6/05)
Research Assistant, Civil Engineering, University of Massachusetts (6/99-9/04)

Education

Ph.D. Geotechnical Engineering	University of Massachusetts-Amherst, Massachusetts: (2005)
M.S. Geosciences	University of Massachusetts-Amherst, Massachusetts: (2004)
M.S.C.E. Civil Engineering	University of Massachusetts-Amherst, Massachusetts: (2001)
B.S.C.E. Civil Engineering	Lafayette College, Easton, Pennsylvania: (1999)

Industry Related Experience

Geotechnical Engineer: Cerato Geotechnical Engineering, PLLC – August 2014 – present;
Civil Engineer: Pietrzak and Pfau Engineering and Surveying, PLLC., Goshen, NY Summer 1998.

Professional Awards and Honors

2011 UMass-Amherst Outstanding Young Alumni Award
2010 ASCE Arthur Casagrande Professional Development Award
2009 Presidential Early Career Award for Scientists and Engineers (PECASE)
2009 Rapp Foundation Presidential Professorship
2009 Alumni Teaching Award (top 10% Fall '08 & Spring '09 course evaluations in OU CoE)
2008 National Science Foundation (NSF) CAREER Award
2008 George W. Tauxe Outstanding Professor Award (awarded by the OU-CEES students)
2008 Graduate College Special Recognition for Outstanding Efforts in Graduate Recruiting
2005 Junior Faculty Research Program Award
2004 American Association for University Women (AAUW) Selected Professions Fellowship
2004 Society of Women Engineers (SWE) Past Presidents Scholarship
2004 UMass – Amherst Geotechnical Engineering Fellowship
2003 Association for Women in Science (AWIS) Predoctoral Certification of Merit
2002 Trent R. Dames and William W. Moore Fellowship (ASCE)
2001 National Fraternity Graduate Fellowship
2001 UMass – Amherst Geotechnical Service Award
2001 National Science Foundation Graduate Fellowship - Honorable Mention



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Helical (Screw) Pile Seismic Study

Pledge Form

Contributor Information (please print or type)

Company Name	
Billing address	
City	
State	
ZIP Code	
Contact Person	
Telephone (business)	
Fax	
E-Mail	

Pledge Information

The above-named company (the Contributor) pledges to donate a total of \$_____ to DFI's Helical (Screw) Pile Seismic Study, as detailed in a solicitation letter and attachment received from DFI's Helical Piles and Tiebacks Committees (HPTC)

The total cost of the project is estimated to be \$250,000. The project will be carried out in three phases. The contributor promises to pay DFI the pledged amount immediately upon being notified by DFI that the first phase is about to commence.

Contributions shall be deemed to be donations and shall not confer upon the Contributor any proprietary interest in the study, its findings, or any related deliverables. All proprietary rights shall be vested in DFI only. Contributor will receive a copy of the study at no cost.

The Contributor understands that the contribution is not tax deductible as a charitable contribution.

Acknowledgement Information

Please use the following company or individual name in all acknowledgements of this donation:

Signature

Name	
Title	
Signature	
Date	



Helical (Screw) Pile Seismic Study

Payment of Donations *Instructions*

By Check:

Make check payable to: Deep Foundations Institute
(Please write "Helical Pile Seismic Study" on memo line)

Send to: Deep Foundations Institute
326 Lafayette Avenue
Hawthorne, N.J. 07506

By Credit Card: (Visa, MC, Amex)

Please call DFI Headquarters at (973) 423-4030 (M-F, 9AM-5PM, Eastern Time) and give credit card information to staff member over the phone. Specify that you are making a donation to the Helical Pile Seismic Study.

By Wire Transfer:

A Bank Wire transfer can be made to DFI's Account directly from your bank. \$30 US MUST BE ADDED TO YOUR PAYMENT TO COVER DFI's BANK SERVICE CHARGES. You will need to give your bank the following information:

Wire to: TD Bank N.A., Wilmington, DE

For further credit to: TD Bank N.A., 617 Lafayette Ave, Hawthorne, NJ 07506

Routing Number: 031201360

In favor of Account #: 4278386268

Beneficiary: Deep Foundations Institute, 326 Lafayette Avenue, Hawthorne, NJ 07506

- ◆ Please have your bank annotate the wire transfer with payment reference information such as invoice number or description of what the transfer is for.
- ◆ Please cover any charge your bank may impose on the wire to assure DFI will receive the entire net due amount.
- ◆ Please notify DFI by fax (973 423 4031) when you have made the Transfer.

NOTE: Donations are not tax-deductible as charitable contributions