



## Curriculum Vitae of **HOWARD A. PERKO, Ph.D., P.E.**

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(Revised June 4, 2010)

### EDUCATION

Ph.D. Civil Engineering, May 2002, Colorado State University, Fort Collins, CO  
(Area of Study: Planetary Soil Mechanics/Geotechnical Engineering)

M.S. Civil Engineering, May 1996, Colorado State University, Fort Collins, CO  
(Area of Study: Lunar Soil Shear Strength/Geotechnical Engineering)

B.S. Civil Engineering, May 1993, Michigan Technological University, Houghton, MI  
(Concentration: Mining/Geotechnical Engineering)

### PROFESSIONAL ENGINEERING REGISTRATION

Alabama	License No. 28206-E
Colorado	License No. 33340
Florida	License No. 69647
Georgia	License No. 029399
Indiana	License No. 10505050
Kentucky	License No. 22128
Louisiana	License No. 34173
Michigan	License No. 00000
Minnesota	License No. 43042
Maryland	License No. 34952
Missouri	License No. 2008000084
New York	License No. 081365
Ohio	License No. 66008
Pennsylvania	License No. 075099
Tennessee	License No. 00000
Virginia	License No. 040697
West Virginia	License No. 15378
Wisconsin	License No. 35955-006
Wyoming	License No. 10194

## PROFESSIONAL ENGINEERING EXPERIENCE

- 2009 to Present  
Director of Engineering, Magnum Geo-Solutions, Fort Collins, CO
- Principal engineer and managing member of engineering and technical support company associated with Magnum Piering, Inc., a leading manufacturer of foundation products. Assist managers and customers in technical matters, product applications, and new product development. Prepare value engineering and design-build plans and specifications for new foundations, foundation repairs, shoring, underpinning, and other geo-structures projects across North America and other parts of the world.
- 2001 to 2009  
(part-time)  
Engineering Consultant, Magnum Piering, Inc., Cincinnati, OH
- Managed the technical support center for Magnum Piering, Inc. Oversaw new product development activities and planned product test programs for manufactured foundations and earth anchoring systems. Conducted engineering seminars throughout the United States on the technology of hydraulically driven steel pier underpinning systems and helical anchors. Authored company technical literature.
- 2005 to 2009  
Division Manager, CTL/Thompson, Inc., Fort Collins, CO
- Served as a member of the management committee for 300-employee firm Oversaw Northern Colorado Division. Established engineering and administrative policy, division goals, operating and capital budgets, and office procedures. Supervised department managers for geotechnical engineering, structural engineering, environmental engineering, and construction observation/materials testing. Managed complex geo-structures projects on a nationwide basis primarily involving dewatering, foundations, shoring, underpinning, and earth retention.
- 1999 to 2005  
President, CTL/Thompson Structural Engineers Fort Collins, LLC and CTL/Thompson Structural Engineers Denver, LLC (formerly Secure Engineering Companies), Denver, CO and Fort Collins, CO
- Founder and manager of two consulting engineering firms that were acquired by CTL/Thompson, Inc. Prior to the acquisition, the firm completed over 1,000 projects and was ranked the 6<sup>th</sup> fastest growing business in Northern Colorado in 2004. Specialized in foundation and structural engineering for residential and commercial construction. Project experience included a 56,000 sf health club, two 7-story apartment buildings, a 25,000 sf masonry building, a 30,000 sf steel frame building, numerous single family residences, and a variety of different shoring and earth retention projects in Colorado, Ohio, Florida, and New York.

1994 to 1998 Project Engineer, CTL/Thompson, Denver, Ft. Collins, & Glenwood Springs, CO

Planned and supervised geotechnical field investigations and materials testing programs and wrote soil and foundation reports. Also, directed exploratory drilling, collected samples, and logged soil borings, tested soil samples in laboratory, and conducted construction inspections and soil compaction testing. Project experience includes small to large zoned earth dams, ski areas, bridges, underground garages and tanks, pavements, utilities, and foundations for commercial, industrial, and residential structures. Assisted with the establishment of a branch office in Fort Collins, Colorado.

Feb 1992 to May 1993 (part-time) Computer Laboratory Consultant, Michigan Tech, Houghton, MI.

Assisted students in the use of engineering software including various CADD packages, structural analysis programs, spreadsheets, and data bases. Skilled Unix, Microsoft, and Macintosh operating systems and several programming languages.

May 1992 to Aug 1992 Engineering Intern, Barr Engineering Company, Minneapolis, MN.

Worked as a water resources engineer in training. Wrote contract and specification documents for a pipeline. Maintained a water quality data base for the Minneapolis chain of lakes. Performed hydrologic studies, open channel flow analysis, water quality studies, and fluid flow calculations for design of municipal storm water collection systems, creek restorations, water wells, and pipelines.

May to Aug 91, 90, & 89 Engineering Technician, Inman, Foltz and Associates, Minocqua, WI.

Performed boundary, topographic, and construction surveying. Drafted figures and worksheets. Wrote property descriptions. Did routine engineering and surveying calculations. Crew chief responsible for providing horizontal and vertical control for over 300 exploratory borings for Noranda Mining, Corp. Achieved 6<sup>th</sup> order closure accuracy despite adverse terrain.

## RESEARCH EXPERIENCE

Aug 2001 to Aug 2003 Research Scientist, Colorado State University, Fort Collins, CO

Science Investigator (Co-PI) on a soil mechanics investigation funded by the NASA Mars Data Analysis Program. Conducted studies of Mars 2003 Mission priority landing sites including computer modeling of landslides from MGS images and MOLA topographic information, measurement of crater geometries in MOC images, laboratory testing of Mars soil simulants, and review of thermal emission spectrometer data. Found a strong correlation between thermal inertia and soil shear strength. Compiled a final report that was provided to Rover Engineers to aid them in navigating the Martian surface during exploration as well

as in selecting appropriate simulants for future use in rover testing and development.

Aug 1999  
to May 2002 Graduate Research Fellow, NASA Jet Propulsion Laboratory, Pasadena, CA

Studied the effects of vacuum and cryogenic temperatures on the adhesive properties of comet mantle dust simulants. Constructed a theoretical model that describes the thermodynamics of a meniscus of adsorbed water between a dust particle and a surface and its effect on adhesion. Performed laboratory experiments consisting of vibration induced dust removal in simulated space environments. Measured dust electrostatic charge using hand-built electrometers.

Aug 1998  
to Aug 1999 Graduate Research Assistant, Colorado NASA Space Grant

During this incubator period, planned research investigations and wrote research proposals on a variety of topics including Comet dust, Mars soil and dust, reduced gravity effects on soil behavior, photovoltaic effects in lunar soils, and vacuum welding of ceramics. Also, worked on education and public outreach activities.

Jan 1998  
to Aug 1998 Research Project Manager, CSU & CTL/Thompson, Inc., Denver, CO.

Administered a joint private and university research program into the volume change characteristics of expansive soils. Developed an improved empirical relationship between soil suction:water content ratio and the suction compression index. Simplified procedures and decreased time required for laboratory testing.

August 1994  
to Feb 1995 Graduate Research Assistant, CSU & CTL/Thompson, Inc., Denver, CO.

Participant in a joint private and university research project involving a 300 home subdivision that has undergone over three (3) feet of heave in some areas. Compiled a data base and analyzed laboratory and field heave data. Developed a method to estimate maximum remaining heave and time rate of heave.

Aug 1993  
to Mar 1995 Graduate Research Assistant, Colorado NASA Space Grant

Studied the effects of low vacuum and diurnal temperature extremes on the interparticle forces, tribologic properties and surface physics of lunar soils. Composed M.S. thesis on the effects of adsorbed gas on lunar soil shear strength.

## TEACHING EXPERIENCE

Aug 2002  
to Present Research Professor, Colorado State University, Fort Collins, CO

(Intermittent) Scheduled to teach project management course during Fall semester 2010.  
Taught engineering project management course during Fall semester 2009.  
Taught statics and solid mechanics courses during Fall semester 2002 and a solid

mechanics course during Fall semester 2003. Course enrollment varied between 22 and 155 students per class. Incorporated various teaching methods including guest lecturers, power point presentations, class demonstrations, experiential learning activities, and semester projects.

August 1993 to May 1994 Graduate Teaching Assistant, Colorado State University, Fort Collins, CO.

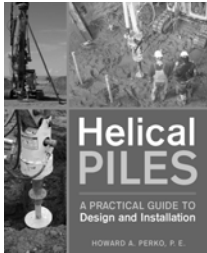
Taught a properties of materials course centered around the mechanical testing of metals, wood, plastic, asphalt concrete, and cement concrete. As the assistant laboratory manager, had responsibilities that included inventory, equipment set-up, maintenance, scheduling, and organization. Supervised an undergraduate student hourly employee.

Feb 1993 to May 1993 Undergraduate Teaching Assistant, Michigan Tech. Univ., Houghton, MI.

Taught a soil mechanics laboratory course. Performed Atterberg limits, sieve analysis, consolidation, proctor, direct shear, permeability, hydrometer, unconfined compression, and other soil tests.

## PUBLICATIONS

### Technical Reference Book



1. Perko, H.A. (2009) *Helical Piles: Practical Guide to Installation and Design*, John Wiley & Sons, New York, U.S.A.

### Dissertation & Thesis

2. Perko, H.A. (2002) *Theoretical and Experimental Investigations in Planetary Dust Adhesion*, Ph.D. Dissertation, Civil Engineering Department, Colorado State University, Fort Collins, CO
3. Perko, H. A. (1996). *Surface Cleanliness Effect on Lunar Soil Shear Strength*, Master of Science Thesis, Colorado State University, Fort Collins, CO

### Journal Papers

4. Perko, H.A. (2010) "Underpinning and Shoring for Underground MRI Research Facility at Ohio State University", *Journal of Professionalism*, ASCE Press, Reston, VA (In Progress)

5. Perko, H. A., and Boulden, J. (2008) "Lateral Earth Pressures on Wood Lagging in Soldier Pile Earth Shoring Systems", DFI Journal, Vol. 2, Deep Foundation Institute, New Jersey
6. Perko, H.A., Nelson, J.D., and Green, J.R. (2005) "Mars Soil Mechanics Investigation" Journal of Aerospace Engineering, ASCE Press, Reston, VA
7. Perko, H.A., Nelson, J.D., and Sadeh, W.Z. (2001) "Surface Cleanliness Effect on Lunar Soil Shear Strength" April 2001, Journal of Geotechnical and Geoenvironmental Engineering, ASCE Press, Reston, VA

#### Refereed Conference Papers

8. Perko, H.A. (2011) "A Study of the Advantages and Disadvantages of Helical Piles for Support of Solar Panels", Proceedings of Geo-Frontiers, Dallas, Texas (In Progress)
9. Perko, H. A. (2010) "Capacity of Full-Displacement Augered Friction Piles", Proceedings of 35<sup>th</sup> Annual Conference of the Deep Foundation Institute, Hollywood, California (In Progress)
10. Thompson, R.W., Rethamel, W., and Perko, H.A. (2006) "Comparison of Constant Volume and Oedometer Swell Pressures", Proceedings of Unsat 2006, American Society of Civil Engineers, Phoenix, AZ
11. Perko, H.A. (2005) "Underpinning and Shoring for Underground MRI Research Facility at Ohio State University" Proceedings of Underground Construction in Urban Environments, ASCE Geo-Institute, New York City
12. Perko, H.A. and Nelson, J.D. (2002) "Mars Global Surveyor Soil Mechanics Data Analysis" Proceedings of the 7<sup>th</sup> International Conference on Construction, Operations, and Sciences in Space, Albuquerque, NM, ASCE Press, Reston, VA
13. Perko, H.A., Nelson, J.D., and Green, J.R. (2002) "A Review of Planetary Dust Transport, Deposition, Adhesion, and Removal" Proceedings of the 7<sup>th</sup> International Conference on Construction, Operations, and Sciences in Space, Albuquerque, NM, ASCE Press, Reston, VA
14. Perko, H.A., Thompson, R.W., and Nelson, J.D. (2000). "Suction Compression Index Based on Results from CLOD Tests", Advances in Unsaturated Geotechnics, C.D. Shackelford, S.L. Houston, and N.Y. Chang, Eds., ASCE Press, Reston, VA, pp. 393-408.
15. Perko, H.A. (2000). "Energy Method for Predicting the Installation Torque of Helical Foundations and Anchors", New Technologies and Design Developments in Deep Foundations, N.D. Dennis, Jr., R. Casteli, and M.W. O'Neill, Eds., ASCE Press, Reston, VA, pp. 342-352.

16. Perko, H.A. and Nelson, J.D. (2000) "Effects of Vacuum and Reduced Gravity on Bearing Capacity", Proceedings of the 6<sup>th</sup> International Conference on Construction, Operations, and Sciences in Space, Albuquerque, NM, ASCE Press, Reston, VA, pp. 842-850.
17. Perko, H.A. (1998). "Surface Cleanliness Based Dust Adhesion Model", Proceedings of the 5<sup>th</sup> International Conference on Construction, Operations, and Sciences in Space, Albuquerque, NM, ASCE Press, Reston, VA, pp. 495-505.
18. Perko, H.A., Nelson, J.D., and Sadeh, W.Z. (1996). "Surface Cleanliness Effect on Lunar Soil Mechanics", Proceedings of the 4<sup>th</sup> International Conference on Construction, Operations and Sciences in Space, Albuquerque, NM, ASCE Press, Reston, VA, pp. 689-698.
19. Perko, H. A. (1996). "Effects of Surface Cleanliness on Lunar Soil Shear Strength", Proceedings of the Annual Meeting of the American Institute of Astronautics and Aeronautics, Reno, NV, AIAA 96-0015.

#### Refereed Conference Abstracts

20. Perko, H.A., Green, J.R., and Nelson, J.D. (2001) "Investigations into Planetary Dust Adhesion" Proceedings of the Annual Meeting of the Division of Planetary Scientists, American Astronomical Society, New Orleans, LA
21. Perko, H.A., Green, J.R., and Nelson, J.D. (2000) "Preliminary Results from Ultrahigh Vacuum and Cryogenic Dust Adhesion Experiments" Proceedings of the Annual Meeting of the Division of Planetary Scientists, American Astronomical Society, Pasadena, CA
22. Perko, H.A. (1999). "Solar Energy Conversion Using In Situ Lunar Regolith", Proceedings of the Roundtable Discussion on Space Resources Utilization, Golden, CO.

#### Invited Papers and Presentations

23. Perko, H.A. (2009) "Status of Helical Piles in Building Codes" Guest Lecture, Colorado Association of Geotechnical Engineers, Denver, CO, March 2009
24. Perko, H.A. (2007) "Creating Acceptance for Helical Foundations" Feature Article, Code Updates, Code Developments and Announcements, Structure Magazine, December Issue
25. Perko, H.A. (2007) "Evidence of Seismic Resistance of Helical Foundations", Helical Foundations and Tiebacks Technology Seminar, Deep Foundation Institute, New Orleans, LA
26. Perko, H.A. (2006) "Geotechnical Techniques used in Planetary Exploration", Proceedings of Geo-volution, ASCE and AGU Joint Conference, Denver, CO.

27. Perko, H.A. (2006) "Installation Torque as a Predictor of Helical Pier Axial Capacity" Technical Article, HelicalPierWorld.com.

Other Papers, Presentations, Articles, and Reports

28. Perko, H.A. (2010) "Failures of Helical Piles and Helical Anchor Supported Structures and Associated Lessons Learned" Annual Conference, Structural Engineers Association of Kentucky, Louisville, KY
29. Perko, H.A. (2010) "Failures of Helical Piles and Helical Anchors and Associated Lessons Learned" Helical Foundations and Tie-Backs Seminar, Deep Foundation Institute, Las Vegas, Nevada
30. Perko, H.A. (2010) "Lateral Capacity and Redundant Design of Helical Piles" Helical Foundations and Tie-Backs Seminar, Deep Foundation Institute, Las Vegas, Nevada
31. Perko, H.A. (2009) "State of Practice Regarding Helical Piles" Annual Conference, Structural Engineers Association of Kentucky, Lexington, KY
32. Perko, H.A. (2009) "History, Design and Applications of Helical Piles and Steel Push Piers" Quarterly Meeting, Structural Engineers Association of Tennessee, Mid-Section, Nashville, TN
33. Perko, H.A. (2009) "State of Practice Regarding Helical Piles" Helical Foundations and Tie-Backs Specialty Seminar, Deep Foundation Institute, University of Alberta, AB, Canada
34. Perko, H.A. (2008) "Status of Helical Piles in Building Codes" Helical Foundations and Tie-Backs Specialty Seminar, Deep Foundation Institute, Las Angeles, CA
35. Perko, H. A. (2008) "Helical Foundation for Alexan Broadway Parking Structure" Case Histories in Deep Foundations Seminar, Deep Foundations Institute, Cincinnati, Ohio
36. Perko, H.A. (2008) "Innovative High-Production Methods for Driven H-Piles and Monotubes" Deep Foundations Magazine, Spring Issue, DFI, New Jersey
37. Perko, H.A., Dwyer, B.B., and Bonekemper, W. (2007) "Lateral Resistance of Helical Foundations for Hurricane Prone Coastal Areas", Helical Foundations and Tiebacks Technology Seminar, Deep Foundation Institute, New Orleans, LA
38. ICC-Evaluation Services (2007) *AC358 Acceptance Criteria for Helical Foundation Systems and Devices*, Howard A. Perko, Prime Consultant and Originating Author
39. Perko, H.A. (2005) *HeliPost Engineering Handbook*, Secure Piers, LLC, Fort Collins, CO



40. Perko, H.A. (2004) "Introduction to Corrosion and Galvanizing of Helix Foundations" Helical Foundations and Tiebacks Technology Seminar, Deep Foundation Institute, Tampa, FL.
41. Perko, H.A. (2004) "Mars Soil Mechanics Investigation" Final Technical Report, NASA OSS Proposal No. NRA-00-01-MDAP-059, NASA Contract NAG5-11280 Supp 1.
42. Perko, H.A. (2003) "Lateral Capacity and Buckling Resistance of Helix Pier Foundations" Helical Foundations and Tiebacks Technology Seminar, Deep Foundation Institute, Cincinnati, OH.
43. Perko, H.A. and Rupiper, S.J. (2000) *Basic Helix Foundation Engineering*, Ingal-Precision Foundations, Inc., Larkspur, CO
44. Perko, H.A. (1999) "Summary of Earth Retaining Methods Utilizing Helical Anchors", *Magnum Helix Foundation Tech. Ref. Manual*, Magnum Piering, Inc., Cincinnati, OH
45. Perko, H. A. (1996). "Predicting Remaining Heave and the Time Rate of Heave by the Hyperbolic Method", Colorado State University Technical Report, Fort Collins, CO.

## PATENTS

*Earth Anchors and Methods for their Use*, U.S. Patent No. 6,058,662.  
*Helice Pier Post for Support of Sound Barriers*, U.S. Patent No. 6,722,821  
*Helical Pier with Opposed External Bars*, U.S. Patent No. D612,954  
*Helical Pile for Support of Decks and Other Light Structures*, U.S. Patent Pending 2010  
*Helical Pile and Method of Installation for Solar Structures*, U.S. Patent Pending 2010  
*Multipurpose Foundation Bracket with Attachments*, U.S. Patent Pending 2010  
*Method of Grouting a Steel Pile*, U.S. Patent Pending 2010  
*Cross Brace Device and Method for Supporting Boardwalks*, U.S. Patent Pending 2010

## AWARDS

NASA Graduate Student Research Fellowship, Jet Propulsion Laboratory, 1999-2002  
 First Place Technical Paper, Graduate Division, AIAA Regional Conf., Albuquerque, NM, 1996  
 Resident Scholar Appointment, Colorado Gamma Chapter, Sigma Phi Epsilon, 1993-1994  
 Honorable Mention for Outstanding Teaching, Michigan Technological University, 1993  
 Outstanding Leadership Award, Michigan Technological University, 1993  
 Initiation into Chi Epsilon National Civil Engineering Honor Fraternity, 1992  
 Inductee, Order of the Engineer, 1992  
 Exceptional Student Scholarship, Michigan Technological University, Houghton, MI, 1989-1993

## CURRENT ACTIVITIES

Editorial Board, DFI Journal  
Editorial Advisory Board, HelicalPierWorld.com  
Chair, Helical Foundations and Tie-Backs Committee, Deep Foundation Institute  
Member, Soil Nail Committee, Deep Foundations Institute  
Member, Colorado Association of Geotechnical Engineers  
Member, American Society of Foundation Engineers  
Professional Member, American Galvanizers Association

## WORKSHOP PARTICIPATION

DFI Helical Foundations and Tiebacks Workshop, Las Vegas, NV 2010  
DFI Helical Foundations and Tiebacks Workshop, Edmonton, AB 2009  
DFI Helical Foundations and Tiebacks Workshop, Las Angeles, CA 2008  
DFI Case Histories in Deep Foundations, Cincinnati, OH 2008  
DFI Helical Foundations and Tiebacks Workshop, New Orleans, LA 2007  
DFI Soil Nail Earth Retention Workshop, Denver, CO 2006  
DFI Helical Foundations and Tiebacks Workshop, Los Angeles, CA 2005  
DFI Helical Foundations and Tiebacks Workshop, Tampa, FL 2004  
DFI Helical Foundations and Tiebacks Workshop, Cincinnati, OH 2003  
DFI Auger Cast Pile Workshop, New York, NY 2004  
Strategic Planning, Valuation and Ownership Seminar, Denver, CO 2003  
Planetary Science Summer School, Pasadena, California, 1999 & 2001  
NASA Planetary Protection Workshop, Pingree Park, CO, 2001  
JPL/CSWG Comet Nucleus Sample Return Workshop, Pasadena, CA, 2000  
Ball Aerospace Deep Impact Cratering Workshop, Boulder, CO, 2000  
Helix Pier Short Course, GeoDenver Conference, ASCE, Denver, CO, 2000  
Expansive Soils Short Course, CSU, Fort Collins, CO, 2000

## PAST ACTIVITIES

Secretary, Northern Colorado Branch, American Society of Civil Engineers, 2009  
Vice-Chairman, Helical Foundations and Tiebacks Committee, DFI, 2007-2008  
Chairman, 32<sup>nd</sup> Annual Conf. of Deep Foundations Institute, Colorado Springs, CO 2007  
Secretary, Helical Foundations and Tiebacks Committee, DFI, 2002-2007  
Technical Paper Review Panel, Geo-Denver Conference, ASCE Geo-Institute, Denver, CO, 2007  
Guest Speaker, Geo-volution, ASCE & AGU, Denver, CO, 2006  
Co-Chairman, DFI Soil Nail Earth Retention Workshop, Denver, 2006  
Organizing Committee, DFI Helical Foundations & Tie-Backs Workshop, Newark, 2006  
Member, American Institute of Aeronautics and Astronautics, 1994-2005  
Session Chairman, Lunar and Martian Construction and Exploration, ASCE Space Conf., 2002  
Judge, ASCE Undergraduate Robotics Competition, Albuquerque, New Mexico, 2000 & 2002  
Guest Faculty, Space Science and Engineering K-12 Teacher Workshop, Fort Collins, CO, 2001  
Science Consultant, Mars Dust Mitigation Technology Development, Mars 2007 Mission, 2001  
Chapter Counselor, Colorado Gamma Chapter, Sigma Phi Epsilon Fraternity, 1996-2000

Member, ASCE Subcommittee on Lunar and Martian Soil Simulants, 1994-1999  
Alumni Board Member, Colorado Gamma Chapter, Sigma Phi Epsilon Fraternity, 1993-1998  
Session Co-chairman, Development for Lunar and Mars Basing, ASCE Space Conference, 1998  
Balanced Man Project Steward, Sigma Phi Epsilon National Fraternity, 1993-1997  
Man Power Web Volunteer, Sigma Phi Epsilon Alumni Relations, Western Region, 1993-1995  
Graduate Student Advisor, Colorado State Chapter, AIAA, 1994  
President, MTU Student Chapter of the American Society of Civil Engineers, 1992  
Student-Faculty Interaction Committee, Michigan Technological University, 1992

#### PAST CERTIFICATIONS

ACI Certified Concrete Technician (expired)  
NICET Certified Nuclear Gage Operator (expired)