

## ***Curriculum Vitae***

### **Garry H. Gregory, Ph.D., P.E., D.GE**

#### **Adjunct Professor**

OKLAHOMA STATE UNIVERSITY  
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#### **Principal Consultant**

*GREGORY GEOTECHNICAL*  
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#### **EDUCATION:**

Ph.D. in Civil (Geotechnical) Engineering – Oklahoma State University (2006)  
MS in Civil (Geotechnical) Engineering - South Dakota School of Mines and Technology (1993)  
Bachelor of Science, Concentration: Civil Engineering - Oklahoma City University (1991)  
Civil Engineering Diploma – ICS School of Civil Engineering, Scranton, PA (1983)

Dr. Gregory attained more than 14 years of civil engineering experience under other professional engineers, prior to becoming licensed as a Professional Engineer in April 1984.

#### **PROFESSIONAL LICENSES** - Licensed Professional Engineer in 11 States:

Licensed Professional Engineer in Oklahoma, Texas, Alabama, Arkansas, Colorado, Florida, Kentucky, Mississippi, North Carolina, South Dakota, and Virginia.

**PROFESSIONAL CERTIFICATIONS** – Dr. Gregory has the specialty certification credential “*Diplomate, Geotechnical Engineering (D.GE)*” from the Academy of Geo-Professionals (AGP). He was inducted into the Academy on March 18, 2009 as part of the first inaugural group of 50 eminent geotechnical engineers in a special Geo-Institute ceremony at the International Foundation Congress and Equipment Expo in Orlando, Florida.

**NCEES COUNCIL RECORD** – Dr. Gregory maintains a Council Record (No. 6783) as a Professional Engineer with the National Council of Examiners for Engineering and Surveying, Clemson, South Carolina.

**TECHNICAL CERTIFICATIONS** – Nuclear Moisture-Density Gauge Operation and Safety – Troxler Certificate No. 25664, 1989 (Reissued as Troxler Certificate No. 79381 under Gregory Geotechnical).

#### **ACADEMIC ACTIVITIES:**

##### **Adjunct Professor of Civil Engineering – Oklahoma State University**

Dr. Gregory is a full member of the Graduate Faculty at Oklahoma State University in Stillwater, Oklahoma. He is Adjunct Professor in the Geotechnical Engineering area of the School of Civil and Environmental Engineering. He is engaged on a regular basis in teaching graduate geotechnical engineering courses, serving as advisor and committee chair to selected graduate students, and conducting sponsored research. Current (2010) sponsored research includes “Shear strength of fully softened clays.” Graduate courses typically taught by Dr. Gregory include: Foundation Engineering, Slope Stability, Soil-Structure Interaction, and Rock Mechanics, among others.

1999-2002 - Adjunct Faculty – Department of Civil and Environmental Engineering (CEE), University of Texas at Arlington (UTA). Taught Graduate Geotechnical Engineering classes on a part-time basis. He also performed research and professional activities with other professors in the CEE Department.

Dr. Gregory's research areas include: Computer Analysis of Soil Slopes; Shear Strength of Fully-Softened Clays; Geosynthetics for Soil Reinforcement and Stabilization; Subsurface Stabilization of Problematic Soils; and Finite Element Analysis of Soil-Structure Interaction. He has been a pioneer in the use of fiber-reinforced soil (FRS) for slope stabilization, including extensive research and full-scale project applications involving laboratory shear strength testing, computer modeling, and field QA/QC activities during construction. He has been involved in approximately 25 projects utilizing FRS applications. Dr. Gregory's doctoral dissertation topic was "Shear Strength, Creep, and Stability of Fiber-Reinforced Soil Slopes."

During his previous association with the University of Texas at Arlington and currently with Oklahoma State University, Dr. Gregory has taught numerous graduate level civil engineering courses, examples of which include: *Foundation Engineering, Slope Stability, Soil-Structure Interaction, and Design and Analysis of Buried Pipes (a course developed by Gregory)*.

Dr. Gregory is frequently a guest lecturer on geotechnical engineering and professional practice topics at several major universities.

#### **EXPERIENCE:**

Dr. Gregory has more than 40 years of civil engineering and construction management experience. Areas of expertise include geotechnical engineering, geotechnics of pipeline embedment and backfill and soil-pipe interaction, pavement design, dams and earthwork, expansive soils, geosynthetics, waste management, concrete, slurry trenches, rock mechanics, and erosion control. He has been senior geotechnical consultant, principal-in-charge, project manager, or design engineer on many major civil engineering projects. A partial representative project listing is attached. He has been involved in the design and/or analysis of more than 200 major earth slopes. Many of these projects involved analysis and repair of failures associated with major slopes and landslides. The slope projects have included major earth dams, levees, highway embankments, river banks, general project embankments, cut slopes, landfill and industrial impoundment slopes, and global, composite, and internal stability analyses of retaining wall systems. He has been involved in the design, analysis, review, and/or forensic evaluation of approximately 50 retaining walls. The retaining walls have included MSE Walls, Gabion Walls including gravity and tieback walls, soil nail walls, masonry gravity walls, anchored diaphragm walls, soldier and sheet pile walls, and conventional concrete walls. His past experience includes several tunnel projects involving both micro-tunneling and large-diameter tunnels. He has been involved in approximately 20 major pipeline projects including both raw water and wastewater transmission pipelines with diameters from 36-inches to 102-inches and lengths from 4 miles to 157 miles. Dr. Gregory has been involved in approximately 50 roadway pavement projects. These projects have included design of new pavements, design of pavement reconstruction, and investigation and analysis of pavement failures. He recently was responsible for preparation of the new Pavement Design Manual for the City of Fort Worth, Texas. Dr. Gregory's earlier experience included positions as project engineer, project manager, and vice president with major engineering and construction firms, including Freese and Nichols, and Fugro McClelland.

Dr. Gregory has performed research for private industry on geogrid reinforcement in earth dams, fiber-reinforced embankments, EPS Geofoam (lightweight fill), and geotextiles and geogrids in pavement subgrades, involving special laboratory testing and computer modeling. Dr. Gregory has authored and/or presented more than 35 technical papers on slope stability, pavement design, solid waste, geofoam fill, shear-strength of soils, slurry walls, and geosynthetics, and has been published in numerous proceedings and technical publications of international, national, and regional conferences. A partial listing of his presentations/publications is attached. He is the author of the popular slope stability computer program GSTABL7. GSTABL7 is distributed nationally and internationally and is one of the most advanced and comprehensive computer programs for analysis of earth slopes, including options for tiebacks, geogrids, fiber-reinforced soil, soil nails, piers/piles, applied forces, non-linear undrained shear strength, and curved strength envelope. He is also the author of *GEOSTASE™* which is a highly advanced slope stability analysis program that is used by Dr. Gregory for his own projects and research but has not yet been released for general

distribution. Dr. Gregory is experienced in advanced numerical analyses of a wide range of geotechnical project applications, using the finite element method, finite difference method, and matrix method, as well as conventional limit equilibrium and earth pressure methods. He has written and/or significantly expanded computer programs for all these types of analytical methods.

Dr. Gregory has served as an expert witness in numerous engineering related technical and professional practice cases involving mediation, arbitration, and litigation and has given expert testimony numerous times in depositions and at trial, including local, state, and federal jurisdictions.

**PROFESSIONAL ACTIVITIES and AFFILIATIONS:**

American Society of Civil Engineers (ASCE)

Oklahoma Section, Oklahoma City Branch

Geo-Institute (National) - Embankments, Dams and Slopes Committee Co-Chair

President of the Oklahoma Chapter of the Geo-Institute (2009-2010)

Previously served as ASCE Fort Worth Branch Director, and Texas Section Director

International Society of Soil Mechanics and Geotechnical Engineering (ISSMGE) - Member

United States Universities Council on Geotechnical Education and Research (USUCGER) - Member

United States Society on Dams (USSD) – Member

Materials for Embankment Dams Committee Member

Deep Foundations Institute (DFI) – Member

Landslides/Slope Stabilization Committee member

Association of Environmental and Engineering Geologists (AEG) – Member

Dr. Gregory has been an active member of the ASCE Geo-Institute “Embankments, Dams, and Slopes” committee for more than 12 years, and is currently Co-Chair. This committee is typically responsible for advising national governmental agencies on matters pertaining to slope stability, organizing national conferences and seminars, and promulgating publications regarding state of the art and state of the practice relating to slope stability issues.

**PROFESSIONAL CIVIC ACTIVITIES:**

Session Chair for “Slope Stability and Stabilization Methods” Technical Session at the Geo-Frontiers 2011 national Geo-Institute conference in Dallas, Texas – March 2011.

Geo-Institute representative on the ASCE - COPRI team performing early response damage assessment in the Galveston, Texas area related to Hurricane Ike (October 3 ~ 7, 2008).

City of Arlington, TX – Pavement Subgrade Task Force, 2000 - 2002

Geology Advisory Board, Tarleton State University, Stephenville, Texas 1990-1992, Chairman 1991.

Solid Waste Capacity Assurance Task Force – North Central Texas Council of Governments, 1989-1992.

Tarrant County Solid Waste Advisory Board, 1988-1992.

**CURRENT GENERAL CIVIC ACTIVITIES:**

Boy Scout Pack 3804 – Den Leader for Cub Scouts Den 3 (2008 – Present)

## **PRESENTATIONS AND PUBLICATIONS (Partial Listing):**

### **Published Papers – National and International** (reviewed by multiple independent reviewers and editorial boards)

Gregory, Garry H. (2010). "Stabilization of Deep Slope Failure with Drilled Shafts – Lake Ridge Parkway - Station 248, Grand Prairie, Texas." Presented and published in proceedings – *Geo-Frontiers 2011* – ASCE Geo-Institute annual conference, Dallas, Texas – March 2011.

Gregory, Garry H. (2010). "FRS Repair of Roadway Embankment Slope Enhances Sustainability." Presented and published in proceedings – 24<sup>th</sup> National Conference of the Geosynthetic Research Institute (GRI), Dallas, Texas – March 2011.

Gregory, Garry H. (2010). "Geotechnical Design of Retractable Roof Arch Foundations – Cowboys Stadium-Arlington, Texas." *Geotechnical Special Publication No. 198 – The Art of Foundation Engineering Practice*. Mohamad H. Hussein, J. Brian Anderson, and William M. Camp III - Editors. American Society of Civil Engineers, ISBN 13 978-0-7844-1093-6, February 2010, pp. 295-310.

Gregory, Garry H. (2010) "Stabilization of Problematic Soils Areas – President George Bush Turnpike – Dallas County, Texas." *Proceedings – 61<sup>st</sup> Highway Geology Symposium*, 24 pp. – Oklahoma City, Oklahoma, USA – August 2010.

Gregory, Garry H. (2010) "Stability of the Galveston Seawall," pp. 67-72, and "Lifelines and Infrastructure," pp. 93-107, published in "Hurricane Ike Field Investigation," 138 pp. American Society of Civil Engineers report on the field investigation of damage to the Texas Gulf Coast by Hurricane Ike, October 2008 (published 2010), B. Edge, S. Rogers, R. Dean, J. Kaihatu, L. Ewing, M. Loeffler, M. Overton, J. Suzuki, P. Work, G. Gregory, D. Stauble, J. Waters, E. Wiggins, and M. Garrett, Investigation Team and Editors.

Gregory, Garry H., and Stephen A. Cross (2007). "Correlation of California Bearing Ratio with Shear Strength Parameters"- 9th International Conference on Low Volume Roads, Transportation Research Record: *Journal of the Transportation Research Board*, No. 1989 Volume 1, Transportation Research Board, National Research Council, Washington, D.C., June 2007, pp. 148-153.

Gregory, Garry H. "Fiber-Reinforced Soil – A Key Role in Geosynthetics Applications for the 21<sup>st</sup> Century," *Invited Paper*, Presented and Published in Proceedings – 13<sup>th</sup> GRI CONFERENCE ON GEOSYNTHETICS, Folsom, PA, USA, pp. 164-171. December 1999.

Gregory, Garry H. and David S. Chill (1998). "Stabilization of Earth Slopes with Fiber Reinforcement," presented and published in proceedings of the *Sixth International Conference on Geosynthetics*, Atlanta, Georgia, USA, March 1998.

### **Published Papers – Regional** (Reviewed by Session Chairs and Organizing Committees)

Gregory, Garry H. (2000) "Evaluation of LEM Slope Analyses Using Individual Slice Data," presented and published in proceedings (*Selected as Best of Session Paper*) – ASCE Texas Section Spring Meeting, Austin, TX, USA, April 2000.

Gregory, Garry H. (1999) "Correlation of CBR with Shear-Strength Parameters-Phase I," presented and published in proceedings – ASCE Texas Section Fall Meeting, Midland, TX, USA, October 1999.

Gregory, Garry H. (1999) "Theoretical Shear-Strength Model of Fiber-Soil Composite," presented and published in proceedings-ASCE Texas Section Spring Meeting, Longview, Texas, USA, April 1999.

Gregory, Garry H. (1998) "Reinforced Slopes Using Geotextile-Fibers Composite," presented and published in proceedings - FHWA-30<sup>th</sup> Annual Southeastern Transportation Geotechnical Engineering Conference, Louisville, Kentucky, USA, October 1998.

Gregory, Garry H. (1998) "Mechanisms of Shallow Slope Failures in Clay," presented and published in proceedings – ASCE Texas Section Fall Meeting, Dallas, Texas, USA, September 1998.

Gregory, Garry H. (1998) "Long -Term Repair of Slopes with Fiber Reinforcement," presented and published in proceedings – FHWA - 23<sup>rd</sup> Annual Southwest Geotechnical Engineers Conference, Reno, Nevada, USA, June 1998.

Gregory, Garry H. (1997) "Slope Analysis with Geofoam Inclusion," presented and published in proceedings - ASCE Texas Section fall meeting, Arlington, Texas, September 1997. (*Selected as "Best of Session" paper*).

Gregory, Garry H. (1997) "Slope Reinforcement Using Randomly – Distributed Polypropylene Fibers," presented and published in proceedings - FHWA - 22<sup>nd</sup> Annual Southwest Geotechnical Engineers Conference, Santa Fe, New Mexico, USA, April 1997.

Gregory, Garry H. (1996) "Laboratory Testing of Fiber-Reinforced Soils," presented and published in proceedings – FHWA - 29<sup>th</sup> Annual Southeastern Transportation Geotechnical Engineering Conference, Cocoa Beach, Florida, USA, October 1996.

Gregory, Garry H. and Mark L. Doane (1996) "Shear Strength of Fill with Direct Shear Device," presented and published in proceedings – ASCE Texas Section fall meeting, San Antonio, Texas, September 1996.

Gregory, Garry H. (1995) "Composite Shear Strength of Reinforced Slopes," presented and published in proceedings – ASCE Texas Section spring meeting, Waco, Texas, April 1995.

Gregory, G. H. and S. Bang (1994) "Effect of Geogrid Reinforcement on Seepage Through Earth-Fill Dam Cores," presented and published in proceedings, 30<sup>th</sup> Symposium on Engineering Geology and Geotechnical Engineering, Boise, Idaho, March 1994.

Gregory, G. H. and S. Bang (1994) "Design of Flexible Pavement Subgrades with Geosynthetics," presented and published in proceedings, 30<sup>th</sup> Symposium on Engineering Geology and Geotechnical Engineering, Boise, Idaho, March 1994.

#### **Periodical Publications – National Circulation** (Reviewed by editors)

Gregory, Garry H., et al. (2009) "Field Investigation of Hurricane Ike Impacts to the Upper Texas Coast." *Shore and Beach-Vol. 77 No. 2*, Spring 2009. pp 9 – 23.

Gregory, Garry H. (2008) "Thank You Ralph." Tribute to Ralph B. Peck, *Geo-Strata Vol. 10 Issue 7*, September/October 2008.

Gregory, Garry H. (2005). Invited Book Review of *Soil Strength and Slope Stability* (textbook by J. Michael Duncan and Stephen G. Wright, John Wiley & Sons, 2005). — Book Review published in *Geotechnical News-Vol. 23 No. 2* – Bi-Tech Publishers, June 2005.

Gregory, Garry H. (1999) "Short Geosynthetic Fibers Stabilize Slopes Efficiently." *Geotechnical News-Vol. 17 No. 3*, Bi-Tech Publishers, June 1999." pp 38-39.

#### **Invited Lectures, Presentations, and Seminars** by Garry H. Gregory

Instructor – "Advanced Principles of Slope Stability Analysis" – One day short course sponsored by the Geo-Institute and IFAI at Geo-Frontiers 2011, Dallas, Texas, March 2011. Attended by approximately 65 geo-professionals.

Invited Panel Member - "Stability and Failures of Slopes and Retaining Walls" – Construction Research Center, University of Texas at Arlington. Presentation and Panel Discussion for 60 members of local government agencies and consulting firms, September 15, 2010.

"Complex Slope Stability Analysis with Reinforcing Elements" – Invited lecture delivered at the 34<sup>th</sup> Annual ASCE Geotechnical Engineering Conference, Iowa State University- Ames, Iowa, March 4, 2010.

"Advanced Topics in Slope Stability Analysis" – One day seminar presented to a regional audience of geo-professionals and academics at Oklahoma State University, Stillwater, Oklahoma, April 3, 2009.

"Slope Stability Issues in the Constructed Environment" – A half day seminar presented at the 16<sup>th</sup> Building Professional Institute – University of Texas at Arlington (UTA), Arlington, Texas, May 21, 2008.

"Stone Rip Rap Design" – A half-day seminar presented at the ASCE Texas Section Fall Meeting, Fort Worth, Texas – October 4, 2007.

"Advanced Slope Stability Analysis – Selected Topics" – Seminar presented to Fugro Consultants, Dallas, Texas, August 8, 2007.

"The New 2005 City of Fort Worth Pavement Design Manual" – Two day (11 hour) seminar presented to 65 people from City staff and engineering firms on the technical aspects and use of the Pavement Design Manual developed by Gregory. – March 8 and 9, 2007.

"Advanced Computer Analysis of Slope Stability" – Half-day technical seminar presented at the GSI Annual Meeting, Grand Island, Nebraska – February 20, 2006

"Concepts of Advanced Slope Stability Analysis" – Full-day technical seminar sponsored by the Kansas City, MO ASCE and presented to a regional audience of engineers and geologists, Kansas City, MO, January 17, 2003.

"Advanced Stability Analysis of Earth Slopes" – Principal instructor for a two-day seminar and computer training session sponsored by the University of Texas at Arlington (UTA), and presented to a national audience of geo-professionals, Arlington, Texas, USA, September 28 – 29, 2001.

"Geotechnical Design and Analysis of Large Diameter Flexible and Semi-Rigid Pipe," – Seminar presented to Carter-Burgess, Inc. – Denver, Colorado, July 1999.

"Use and Abuse of Geosynthetics in Civil Engineering," presented to the American Society of Civil Engineers, Austin Branch, May 1995.

Gregory, Garry H. and Kent W. Wicken (1992) "Slope Stability Analysis of Solid Waste Fill," extensive research paper presented at the ASCE Texas Section spring meeting, Fort Worth, Texas, April 24, 1992.

Gregory, Garry H. and Stefan Stamoulis (1992) "Hydrogeologic Site Characterization," presented at the ASCE Texas Section spring meeting, Fort Worth, Texas, April 24, 1992.

Gregory, Garry H. (1991) "Design and Construction of Soil-Bentonite Slurry Trenches," presented at the ASCE Texas Section spring meeting, San Antonio, Texas, April 5, 1991.

"Waste Management Planning," presented at the American Planners Association annual meeting, Fort Worth, Texas, October 4, 1990.

"Surviving Under Subtitle-D," presented at the Texas Municipal League annual meeting, Corpus Christi, Texas, October 26, 1990.

"Design, Construction and Testing of Slurry Trenches," presented to the Texas Department of Health, Bureau of Solid Waste Management, Austin, Texas, September 5, 1990.

"Soil-Bentonite Slurry Wall Design and Construction," presented at a WMI Seminar in Irving, Texas, June 15, 1990.

"Detailed Planning for a Regional Solid Waste Management Facility," - Panel member and presenter with TDH and TWDB during a forum/workshop presented in Arlington, Texas to representatives of a 13-city region, June 1989.

"Regional Solid Waste Management," presented to municipal representatives at regional seminars in Tyler and San Antonio, Texas, October 1988.

Gregory, Garry H. (1987) "Design of Flexible Pavements with Geotextiles," presented at the ASCE fall meeting, Houston, Texas, October 1987.

"Design of Rigid Pavements for Roadways," presented at a Freese and Nichols seminar, Fort Worth, Texas, March 1987.

"Stone Riprap Design," presented at a Freese and Nichols seminar, Fort Worth, Texas, June 1987.

"An Overview of Geosynthetics," presented at a Freese and Nichols seminar, Fort Worth, Texas, July 1987

### **Other Publications**

Gregory has authored and published approximately 500 major technical reports for consulting projects. These reports have ranged from approximately 100 pages to multi-volume reports up to approximately 800 pages in length.

Gregory has also authored and published approximately 35 research reports for private industry involving fiber-reinforced soil research, Geofoam fill research, geosynthetics research, and soil strength and slope stability research.

Gregory is the author of the popular slope stability software program "GSTABL7" which is widely used by geotechnical engineers, civil engineers, and engineering geologists. He is also the author of the highly advanced slope stability analysis software program GEOSTASE which is used by Dr. Gregory for his consulting projects and research, but has not yet been released for public use.

### **Publications in Progress**

"George F. Sowers – A Giant on the Earth." A biography in progress of the professional career of George F. Sowers (1921-1996) Regents Professor of Civil Engineering at Georgia Tech, principal and co-founder of Law Engineering, and internationally recognized geotechnical engineer. The writing of this book by Garry H. Gregory was sanctioned by Francis L. Sowers, the late widow of George Sowers, prior to her death in 2008.

"Significance of the Cohesion Index in the Correlation of Soil Parameters" – Journal grade research paper in progress.

"Correlation of Fully-Softened Shear Strength of Clay with Index Properties" – Journal grade research paper in progress.

"Computer Analysis of Slope Stability" – Textbook in progress.

### **RESEARCH AREAS**

- Computer analysis of soil slopes.
- Fiber-Reinforced Soil (FRS) for slope stabilization.
- Shear strength of fully softened clays.
- Geosynthetics for soil reinforcement and stabilization.
- Subsurface Stabilization of Problematic Soils.
- Finite Element Analysis of Soil-Structure Interaction.

## **REPRESENTATIVE RESEARCH PROJECTS (Partial Listing)**

### **Privately-Funded Research**

Fiber-Reinforced Soil (FRS) Research – Extensive private research project funded by Synthetic Industries, Inc. (now known as SI-GeoSolutions) of Chattanooga, Tennessee. This 3.5 year research project involved extensive laboratory testing of FRS involving four fiber types and five soil types. The laboratory testing program included triaxial shear, conventional direct shear, and large scale direct shear testing. The project also involved approximately 15 full-scale field test sites. A model was developed to predict the increase in shear strength from the addition of fibers to the soil. Approximately 20 research reports and papers were published in relation to the research. This research project essentially launched the use of FRS in the United States in the mid to late 1990s. It is now estimated that more than 200 major FRS projects have been constructed in the US.

Geofoam Light-Weight Fill Research – Multi-year research project involving laboratory testing and analysis of expanded polystyrene (EPS) blocks (now known as “Geofoam”) for use as light weight fill for earthwork projects. The research was funded by Therma-Foam, Inc. of Fort Worth, Texas. The research resulted in multi-project use of the Geofoam fill, most notably under the runways and taxiways of the New Orleans Airport expansion.

Geocomposite Drainage Layer in Pavement Subgrades Research – This research project was funded by TENAX Corporation of Baltimore, Maryland and involved extensive laboratory testing and analysis of a new tri-planar sheet geosynthetic that combines drainage and reinforcement functions into one composite sheet material. The laboratory program involved California Bearing Ratio (CBR) testing of clay soils with and without the geocomposite drainage material to establish an “improvement coefficient” for the increase in apparent CBR value by inclusion of the geocomposite. A model was developed to incorporate the subgrade improvement into standard pavement thickness design methods. The laboratory program also involved testing of the potential infiltration of cement paste into the geocomposite during concrete placement directly on top of the geosynthetic material.

### **Current Academic Research**

“Correlation of Fully-Softened Shear Strength of Clay with Index Properties – Phase I.” This research is currently being conducted at Oklahoma State University, School of Civil and Environmental Engineering, Stillwater, Oklahoma by Dr. Garry H. Gregory, Ph.D., P. E., D.GE – Adjunct Professor and Mr. Azmi Baryun, Graduate Research Assistant. Phase I of the research was funded jointly by the Oklahoma Department of Transportation, E TTL Engineers and Consultants, Inc. of Tyler, Texas and Soil Nail Launcher, Inc. of Fruita, Colorado. Phase I involves research on one clay soil type. The research involves laboratory testing of the clay soil in the “in-situ” and “fully-softened” conditions in a triaxial shear device. From the relationship between the in-situ and fully-softened test results, an initial model was developed for correlation of fully-softened shear strength based upon in-situ condition tests and index properties. A future Phase II will involve four more clay soil types.

“Increase in Confining Stress in Soil Due to Installation of Ballistic Soil Nails.” – This is a proposed research project that is under consideration for funding by Soil Nail Launcher, Inc. and will involve installation of earth pressure-cell and other related instrumentation in a local slope with long-term monitoring prior to and following installation of sacrificial ballistic soil nails to measure and predict the increase in confining stress in the soil mass between ballistically installed nails. An increase in confining stress would increase the shear strength of the interstitial soil and contribute to slope stability in addition to the tensile contribution of the actual soil nails. The research is anticipated to begin during 2011.

## **REPRESENTATIVE CONSULTING PROJECTS (Partial Listing)**

### **Highlight Projects:**

*Dallas Cowboys Stadium, Arlington, Texas.* Special consultant on geotechnical design of foundations for the 1,300-ft clear-span retractable roof arches for the new stadium. The foundation design consisted of evaluation of numerous foundation options and final selection of friction wall foundations consisting of slurry-placed concrete diaphragm walls. Each of the four foundations consisted of two parallel walls approximately 140 feet long and 60 to 70 feet deep. Gregory served as a special consultant along with Clyde N. Baker. *This project is one of the five finalists for the 2011 ASCE – Outstanding Civil Engineering Achievement (OCEA) award.*

*President George Bush Turnpike (PGBT) Segment IV– Dallas County, Texas.* Segment IV of the PGBT is located between I-635 North and Sandy Lake Road near Farmers Branch and Carrollton, Texas. This project, with an overall construction cost of approximately \$339 million, involved special geotechnical analysis and design of stabilization of problematic soils areas where the Tollway was designed to cross two old landfills, water treatment plant lagoons, rubble fill areas, and areas where steep embankment slopes were necessary to prevent encroachment onto another landfill. The design and analyses included solutions involving large areas of Deep Soil Mixing, Dynamic Deep Compaction and Lime-Fly Ash Injection, Vertical Wick Drains and Staged Construction, Compaction Grouting, Vibro Concrete Columns, and stabilization with geogrids and geotextiles. The new embankment slopes were constructed of fat clay soils and were stabilized with geogrids and fiber-reinforced soil (FRS). This project involved the largest use to date of FRS for slope stabilization. This project also involved the installation and monitoring of 142 geotechnical instruments to measure settlement and lateral movement in the embankments over the stabilized areas to verify performance of the subsurface stabilization.

### **Projects by Category**

The project category headings listed below are included for convenience only. Numerous projects involve multiple categories, but are listed under only one heading.

### **Water and Wastewater Related Projects**

*Lake Alan Henry Pipeline - 48-Inch – 50 Mile Long Raw Water Distribution Pipeline – Lubbock County, Texas:* Geotechnical engineering study involving special laboratory testing to determine modulus values of candidate embedment materials and Finite Element Method analysis of the pipe/soil interaction to determine acceptability of on-site material as pipe embedment (for Freese and Nichols, Inc. and the City of Lubbock)

*Canadian River Municipal Water Authority (CRMWA) 48-Inch Phase III Raw Water Supply Pipeline - Pampa, Texas:* Geotechnical engineering study involving Finite Element Method analysis of the pipe/soil interaction for a 12.5 mile pipeline to determine acceptability of on-site material as pipe embedment (for Freese and Nichols, Inc. and CRMWA)

*O. H. Ivie Pipeline:* Geotechnical engineering study for the 157-mile long, 60-inch raw water pipeline from O. H. Ivie Reservoir to Midland, Texas. This project involved special analyses of the pipe/soil interaction and resulting use of in situ materials for pipe embedment resulting in substantial savings to the owner (for Freese and Nichols, Inc).

*Canadian River Municipal Water Authority (CRMWA) 54-Inch Raw Water Distribution System Pipeline - Borger, Texas:* Geotechnical engineering study involving Finite Element Method analysis of the pipe/soil interaction to determine acceptability of on-site material as pipe embedment, and engineering observation and consulting during construction (for Freese and Nichols, Inc. and CRMWA).

*Regional Treated Water System, Denton County, Texas:* Geotechnical engineering study for a regional treated water system, including a water treatment plant, intake structure in Lake Lewisville, approximately 30 miles of water distribution pipelines, booster pump station, elevated water storage tank, and ground storage tank (for Upper Trinity Regional Water District).

*Benbrook Connection Pipeline and Pump Station – Tarrant Regional Water District:* Senior Geotechnical Consultant during the construction materials testing phase of the project. The project involved a water transmission pipeline and tunnel from Kennedale, Texas to Benbrook Lake, and a large pump station in Benbrook Lake (for Freese and Nichols, Inc. and TRWD).

*Lake Chapman Water Supply Project for the City of Irving, Texas (Montgomery Watson, Inc.):* Special geotechnical engineering study for a 35-mile long raw water pipeline, including special triaxial testing and finite-element analyses of soil-pipe interaction (for Montgomery-Watson and City of Irving).

*Plano – McKinney Pipeline – North Texas Municipal Water District:* Senior Geotechnical Consultant during the construction materials testing phase of this water transmission pipeline from Plano to McKinney, Texas (for Freese and Nichols, Inc. and North Texas Municipal Water District).

*Mesquite-Garland Pipeline – North Texas Municipal Water District:* Principal Geotechnical Consultant on backfill and embedment placement and testing during the construction phase of this water transmission pipeline project in North Texas (for Freese and Nichols, Inc. and North Texas Municipal Water District).

*Abilene Connection Pipeline:* Geotechnical engineering study for a 51-mile, 36-inch diameter raw-water pipeline involving Finite Element Method analysis of the pipe/soil interaction to determine acceptability of on-site material as pipe embedment, and engineering consulting during construction (for City of Abilene and Freese and Nichols, Inc.).

*Headwork's Rehabilitation Central Plant in Grand Prairie, Texas:* Geotechnical engineering study for a 102-inch diameter influent tunnel pipeline and junction boxes including finite element analysis of pipeline stresses (for Trinity River Authority).

*Village Creek Collector - Parallel Sewer - Phase II located in Fort Worth, Texas:* Geotechnical engineering study for 48-inch sewer pipeline, including slope stability analyses and tieback design for a section of the pipeline along a 35-foot tall slope (for City of Fort Worth).

*Intel Pump Stations and Sewer Line - City of Fort Worth, Texas:* Alliance Development, Geotechnical engineering study for two 7.5 mgd pump stations and a 10-mile long sanitary sewer pipeline to serve the new Intel Computer Chip Facility at the Alliance Development north of Fort Worth, Texas. The study involved foundation recommendations and deep excavation stability analyses of the below-ground pump stations (for City of Fort Worth).

*Lewisville Sewer Line – City of Lewisville, Texas:* Geotechnical engineering study and analyses for a 24- to 27-inch diameter sewer main approximately 9,000 feet long, involving micro-tunneling and pipe-jacking installations (for City of Lewisville).

*West Fork Relief Interceptor - West Fork of the Trinity River, Dallas County, Texas:* Geotechnical engineering study for a parallel relief interceptor sewer pipeline including slope stability analysis and erosion protection (for Trinity River Authority).

*Wastewater Treatment Facility and Collection System for the City of Denver City, Texas:* Geotechnical site exploration study, including recommendations for earthwork, foundation settlement and bearing capacity, slope stability analysis, pavement thickness design, and lateral earth pressures.

*BWSA–6 MGD Water-Treatment Plant Expansion – Benbrook Water and Sewer Authority:* Geotechnical Engineering Study and Engineering Observation during construction for a 6 MGD expansion of an existing water treatment plant, Benbrook, TX.

*Village Creek Wastewater Treatment Plant for the City of Fort Worth:* Earthwork design, including slope stability and settlement analysis for two miles of levees and a slurry wall approximately 80 feet deep and two miles long, a 100-acre flood relief channel and water storage pond involving more than two million cubic yards of excavation and one million cubic yards of earth fill on the Sludge-Only Landfill project.

*Plant Expansion - \$110 Million Central Plant Expansion in Grand Prairie, Texas:* Earthwork design including a geotechnical-geological site study, embankment design with geogrids, soft ground stabilization with geotextiles and geogrids, a two-mile-long 70-foot deep slurry wall, and relocation of approximately one million cubic yards of sludge (for Trinity River Authority).

*Trinity River Siphon Project at the Village Creek Wastewater Treatment Plant for the City of Fort Worth.* This project included a 60-inch diameter siphon sewer main line crossing the Trinity River and passing through the Plant levee to connect new and existing junction boxes on opposite sides of the Trinity River. The project involves an open cut across the river, slope stability issues, and compaction grouting for support of one large junction box founded in loose sand strata (for CDM and the City of Fort Worth).

#### **Transportation and Roadway Projects:**

*Interstate 635 – Managed Lanes Project – Texas Department of Transportation -* Special consultant to E TTL Engineers and Consultants during the preliminary design of this multi-billion dollar facility. Duties included development of soil stratigraphy models, slope stability analysis, and preliminary retaining wall design for highway slopes and 30-foot tall tied-back diaphragm retaining walls on both sides of a 6-mile length of the proposed facility.

*Highway 290 Investigation – TXDOT, T. J. Lambrecht Construction, and Brown and Root Construction, Houston, Texas:* Forensic evaluation and Geotechnical Engineering analysis of pavement and slope failures during a major construction project on U.S. Highway 290 west of Houston, Texas. The study included Finite Element and Limit Equilibrium analyses of the slope failure on a major bridge header bank, and testing and analyses of pavement failures, along with recommendations for repair.

*SH-287 and Fruitland Road Landslide – TXDOT and Synthetic Industries, near Bowie, Texas.* Slope stability analyses of embankment landslide involving back analysis of failure and analysis of slope repairs with fiber-reinforced soil.

*FM-1382 Landslide - TXDOT and Synthetic Industries, near Joe Pool Lake, Texas.* Back analysis of slope failure and repair recommendations using fiber-reinforced soil and interceptor drains.

*Laver Court Cul- De-Sac Landslide – City of Fort Worth, Texas.* Geotechnical engineering study, special laboratory testing, and slope stability analyses of a major slope failure near a creek including repair recommendations involving a gabion buttress.

*Thornhill Road Slope Failure – Benbrook Texas – Jenkins & Gilchrist –* Analysis and design of repairs for a major slope failure involving a residence and a major cantilever retaining wall adjacent to a city street.

*SH-130 Turnpike, Austin, Texas –* Design, installation, and monitoring of approximately 190 geotechnical instruments on this project to verify settlement rate and magnitude of compressible soils beneath new embankment fills to determine when target levels had been reached to allow pavement construction to proceed. The instrumentation included vibrating wire piezometers, vibrating wire liquid-filled settlement cells, and open-standpipe piezometers. The monitoring phase covered approximately one year. The project also involved evaluation of soils for pavement subgrade fill including CBR testing.

*I-30 Reconstruction, Arlington, Texas.* This project involved reconstruction of the intersections of Center Street, Collins Street, and Baird Farm Road with Interstate 30. The services involved geotechnical engineering analysis and design of subsurface stabilization of soft clay areas to support up to 25-foot tall MSE retaining walls. The stabilization methods include Deep Soil Mixing (DSM) and Vertical Wick Drain systems.

*Lake Ridge Parkway Slope Repair, Grand Prairie, Texas.* This project involved slope repair of more than 6,000 linear feet of highway embankment slopes along Lake Ridge Parkway adjacent to Joe Pool Lake. The initial geotechnical services included field exploration, laboratory testing to determine shear strength properties and recommendations for slope repair and stabilization. The repair and stabilization method included the use of fiber-reinforced soil (FRS). The project involves the second largest use to date of FRS for slope stabilization.

*Post and Paddock Road Reconstruction – City of Grand Prairie, Texas:* Geotechnical Engineering Study and recommendations for reconstruction of a Principal Arterial roadway using Cement-Treated Permeable Base (CTPB), edge drains, and geosynthetics, including engineering observation and consulting during construction.

*Great Southwest Parkway Reconstruction – City of Grand Prairie, Texas:* Geotechnical Engineering Study and recommendations for reconstruction of a Principal Arterial roadway using Permeable Base, edge drains, and geosynthetics, including engineering observation and consulting during construction.

*Warrior Trail Extension – City of Grand Prairie, Texas:* Geotechnical Engineering Study and recommendations for extension of a major roadway, including pavement thickness design, alternatives for internal pavement drainage, subgrade treatment, and earthwork recommendations.

*Southeast 11<sup>th</sup> Street and Turner Parkway – City of Grand Prairie, Texas:* Geotechnical Engineering Study and recommendations for construction of a residential street using permeable base, edge drains, and geosynthetics.

*Pavement Design Consulting – City of Denton, Texas:* Consulting with City Staff and performing pavement thickness design analyses for rigid and flexible pavements for Arterial streets.

*Ridgehaven Road and Court – City of Fort Worth, Texas:* Geotechnical Investigation and forensic evaluation of pavement failures on two roadways, including recommendations for monitoring and repair of the pavements.

*Altamesa Blvd Reconstruction – City of Fort Worth, Texas:* Geotechnical design of permeable base, edge drains, interceptor drains, subgrade stabilization, and compaction grouting for reconstruction and repair of Altamesa Blvd.

*Foard and Nolan Streets-Distress Evaluation – City of Fort Worth, Texas:* Geotechnical Evaluation of premature pavement failure of two streets to determine cause of failures and provide recommendations for repair.

*John T. White Blvd – Pavement Distress Evaluation - City of Fort Worth, Texas:* Geotechnical Evaluation of pavement stress to determine cause of failures and provide recommendations for repair.

*Broken Arrow South Loop – Oklahoma Turnpike Authority & T.J. Lambrecht Construction, Tulsa, Oklahoma:* Geotechnical Engineering consulting on the use of local soil materials for construction of large bridge header banks on a major highway project at Broken Arrow, Oklahoma.

#### **Dams, Levees, General Earthwork, Heavy Foundations, Retaining Walls, and Erosion Control Projects:**

*Global slope stability analyses of a composite sheet-pile wall and MSE Wall system to retain approximately 25 feet of vertical fill for a new office complex at Three Forks Harbor on the Arkansas River near Muskogee, Oklahoma.* The project involved extensive slope analyses of proposed construction and development of options to stabilize the proposed fill. The selected option was a stone rip rap buttress placed through water.

*Geotechnical study and design, including slope stability analyses of gabion walls for three phases of erosion control projects for the City of Plano and Freese and Nichols.* These projects involved both gravity and tieback gabion walls with heights to approximately 30 feet. Approximately 15 gabion walls were involved and were used to stabilize steep banks along various creeks. The projects also involved construction phase engineering services.

*Global stability analysis of MSE walls for the George Bush Turnpike in Carrollton, TX.* This project involved approximately 32 different wall sections for retaining earth fill for ramp construction with full highway loadings. The walls ranged in height from 12 to 27 feet.

*Geotechnical study of the slope stability and seepage on Tanyard Dam, Texas Eastman Company.* Project Manager and Chief Design Engineer during the investigation of this 50-foot tall earth-fill dam. The investigation resulted in the installation of a reverse filter and weir system to control and monitor seepage in the right groin of the dam.

*Rehabilitation of Ferguson Dam, Texas Eastman Company, Longview, Texas.* Project Manager and Chief Design Engineer for the geotechnical study, design, and engineering observation during construction of major rehabilitation of this 50-foot tall earth-fill dam. The rehabilitation included placement of earth fill to flatten the downstream slope, installation of a blanket drain system, installation of an interceptor drain system in the right abutment, and erosion control facilities.

*Aledo Dam for Aledo Lake Partnership (Freese and Nichols, Inc.):* Geotechnical engineering study for a proposed 1,000-foot long, 20-foot tall dam in Parker County, Texas.

*WWPP Backwash Lagoons, Weatherford Water Purification Plant for the City of Weatherford, Texas (Carter-Burgess, Inc.):* Geotechnical engineering study for proposed backwash lagoons for the City's water treatment plant, including slope stability analysis, structure foundation recommendations, and earthwork recommendations.

*S. W. Freese Dam (Stacy Dam), Stacy, Texas, Colorado River Municipal Water District.* Consultant and member of the quality overview committee for Freese and Nichols for this major earth-fill dam. Duties included consulting on selected technical items and general quality review and overview during the design phase of the dam. The dam is an earth and rock fill structure, approximately 2 miles long with a maximum height of approximately 156 feet.

*Rehabilitation of the main service spillway on Cooling Water Reservoir No. 1, Texas Eastman Company, Longview, Texas.* Project Manager and Chief Design Engineer on the geotechnical study, design and construction of remedial measures on this 100-foot long, 35-year old reinforced concrete spillway. Stability and seepage analyses indicated a marginal factor of safety due to the high phreatic surface beneath the spillway. Remedial measures included construction of a large temporary coffer dam to dewater the approach channel adjacent to the spillway, construction of a slurry wall to reduce the seepage, installation of an upstream clay blanket to reduce seepage, lean concrete injection to fill extensive voids underneath the spillway, general concrete repairs, and installation of soil-cement erosion control protection in the approach channel.

*Ellison Creek Spillway Rehabilitation, Lone Star Steel Company, Lone Star, Texas.* Senior Geotechnical Engineer during the geotechnical study for rehabilitation of this 300-foot wide reinforced concrete spillway. The study included evaluation of voids beneath the spillway, and stability of the foundation soils, and recommendations for rehabilitation measures.

*Intake structure and Discharge Header, Lewisville Dam, Lake Lewisville, Lewisville, Texas.* This project involved a geotechnical engineering study of the existing earth fill dam to determine the impact of installing a new intake structure and discharge header pipeline on the dam. This study included soil borings on the dam, laboratory testing, slope stability analyses in the area of the intake structure, and foundation recommendations for the structures adjacent to and on the dam.

*Stonehouse and Royal New Kent Golf Courses – New Kent and James Counties, Virginia:* Forensic evaluation and expert testimony concerning slope failures and erosion failures at two major golf courses near Richmond, Virginia.

*City of Richardson, Texas - Northeast Park:* The scope of this project included the design of a 10-acre recreational lake, a reinforced concrete spillway and a stone riprap lined discharge channel. The lake design included a clay side-slope liner.

*Southeast Sanitary Landfill, Fort Worth, Texas:* Preparation of permit documents, construction plans and specifications, engineering representation during the public hearing and engineering observation during construction for the \$6 million expansion and improvements of a 297-acre municipal solid waste landfill site, involving approximately 1.2 million cubic yards of excavation and earth fill, and a slurry wall approximately 50 feet deep around the landfill perimeter.

*Texas Eastman Company, Longview, Texas:* Study, design, and construction administration of remedial measures on 11 industrial wastewater surface impoundments consisting of approximately 950 acres for an RCRA Part B permit application. The scope of work included an extensive geotechnical investigation, slope stability analyses, seepage analyses, erosion modeling and design of remedial work on the levee system, including dragline dredging,

special earthfill placed through water, erosion control, and a slurry trench approximately 50 feet deep and 2,000 feet long.

*Fiber-Reinforced Soil Study - South Prong Dam, Lake Waxahachie, Waxahachie, Texas.* This is the first dam in the United States with a fiber-reinforced soil zone. The fiber-reinforced zone is in the main portion of the earth fill dam on the downstream slope. The purpose of the study was to perform laboratory testing to determine the increase in shear strength resulting from the fiber reinforcement, and to perform slope stability analyses to determine the increase in the factor of safety resulting from the reinforced zone. The study also involved site inspections over a one-year period to observe and document performance of the reinforced zone compared to adjacent non-reinforced zones.

*1982 World's Fair Construction – Knoxville, Tennessee.* Gregory served as the Executive Project Manager for CMI (construction manager) with a peak work force of over 300 people for construction of over one-half the World's Fair facilities including earthwork, retaining walls, subsurface stabilization, pavements, and pavilion structures.

#### **Notable Mentors of Garry H. Gregory (partial listing)**

**Haden Paul Gregory (Father).** Paul Gregory was formerly a nationally recognized construction superintendent during Garry Gregory's early years. Garry visited jobsites with his father from an early age and worked summers on major construction projects where he obtained his first experiences with earthwork and structures. His father has been a life-long mentor in the aspects of heavy construction and field techniques on civil engineering projects.

**Dr. Ralph B. Peck, Ph.D., P. E. (1912-2008)** and **George F. Sowers, P. E., PG (1921-1996)** internationally recognized geotechnical engineers, professors, and Terzaghi Lecturers. Although Gregory was never an academic student of either of these mentors and did not work for the same firms or organizations, over the years he developed a long-time association and friendship with these individuals and sought advice and guidance from them often at conferences, in private meetings, telephone communication, and written correspondence. These associations had a major impact on the substance and direction of Gregory's professional career.

**John A. Focht, Jr., P. E. (1923-2010)** formerly national president of ASCE and a Terzaghi lecturer. Gregory had the opportunity to work closely with John Focht for many years when their respective companies worked together on many major projects, and later to work with him in the same firm. After Gregory formed his own firm Focht was a consultant and technical reviewer for Gregory on numerous projects.