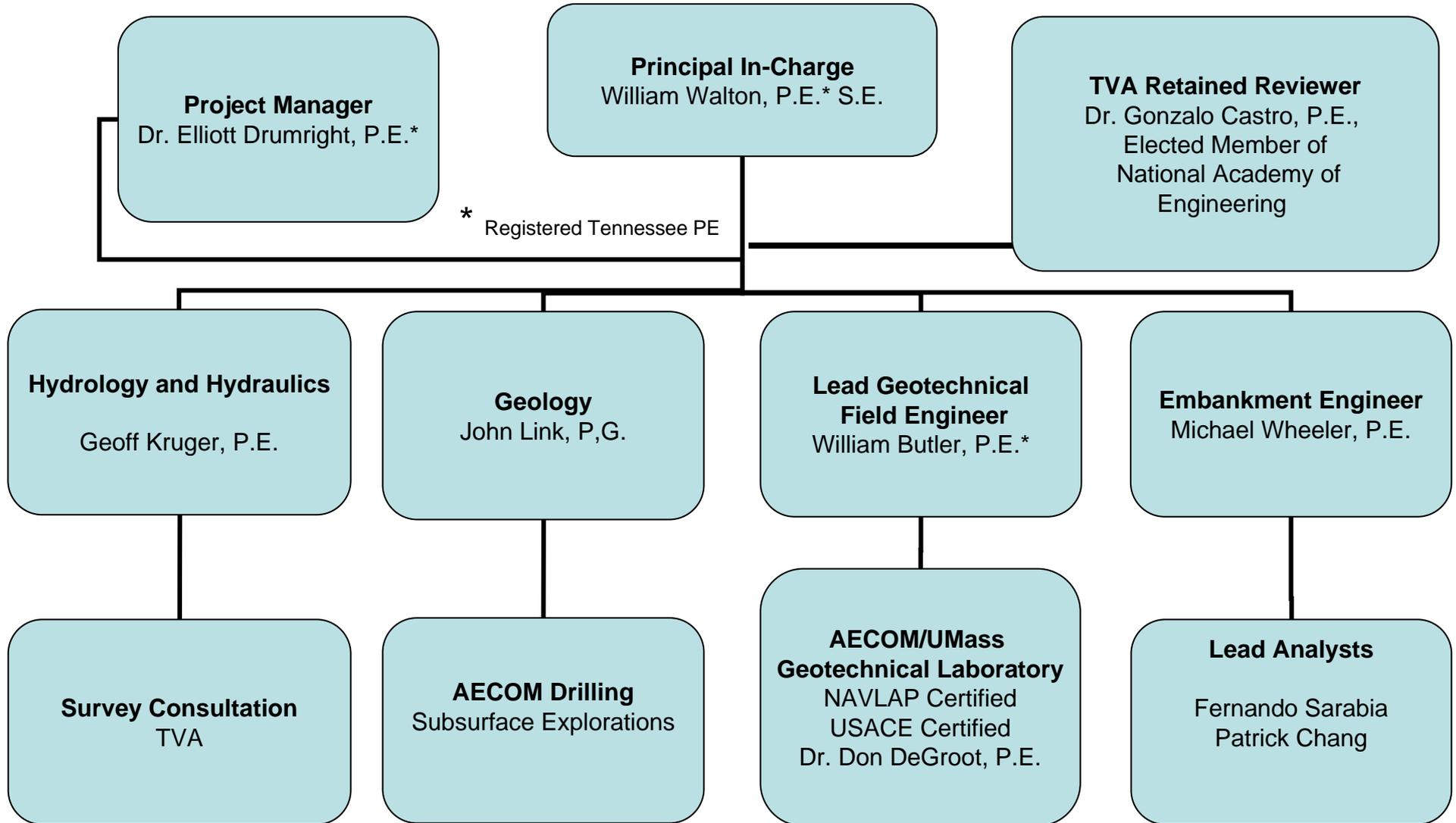


# RCA AECOM Project Team



# **AECOM RCA 2009 Schedule**

- Site Visit & Flyover January 8
- Signed Agreement January 16
- Data Review Jan. 10 to May 1
- Field Explorations Jan. 17 to April 3
- Laboratory Testing Feb 10 to June 8
- Analyses March 15 to June 13
- Preliminary Findings May 21
- Final RCA Report June 25
- Peer Review of Remedial Designs Ongoing

# William H. Walton, P.E., S.E.

Senior Principal Engineer and Vice President

## Education

M.S., Agricultural Engineering  
(geotechnical specialization),  
Cornell University, 1981

B.S., Civil Engineering, Worcester  
Polytechnic Institute, 1978

## Professional Affiliations

Elected Fellow of American  
Society of Civil Engineers, Past  
Chairman of Illinois Geotechnical  
Section

United States Society on Dams

Structural Engineers Association  
of Illinois

Chicago Committee on High Rise  
Buildings

## Registrations

Professional Engineer: Illinois,  
Connecticut, Indiana, Iowa,  
Massachusetts, Michigan,  
Minnesota, Missouri, New York,  
New Jersey, Ohio, Pennsylvania,  
South Dakota, Tennessee and  
Wisconsin

Structural Engineer: Illinois

FERC approved Independent  
Consultant and Facilitator

## Experience

Mr. Walton is responsible for managing projects involving the analysis and design of dams, reservoirs, landfills, power plant facilities, excavations, building foundations, and stabilization of earth and rock slopes. He has experience in analysis, design, and field observation of geotechnical projects in North and South America, the Mideast and Africa. Mr. Walton has extensive expertise in foundation and excavation designs for some of the world's tallest buildings, including Trump, Spire, UBS, Doha Towers. His responsibilities include static and seismic liquefaction analyses of embankments, landfills, slope stability analyses, environmental assessment, remedial design, ground water studies and construction monitoring.

- Principal Engineer and Project Manager, LTV Clark Landfill Failure, East Chicago, Indiana. Responsible for explorations and root-cause failure analyses for Jones Day to assess August 7, 1997 2-million cubic yard, 100-foot high landfill failure into Lake Michigan. Mr. Walton supported STS' founder and expert Clyde N. Baker, Jr., during the litigation phase of the work. Currently, Mr. Walton is managing all of the LTV/ISG/Arcelor-Mittal work at Indiana Harbor Steel Mill Works. Successful litigation involving successful Daubert arguments.
- 2005 to 2006 I90/I93 Central Artery Project, Massachusetts Turnpike Authority, Boston, MA – Principal Engineer responsible to MTA to assess as Independent Investigators to assess leaky slurry walls for 100-foot deep cut-and-cover tunnel for Boston's "Big Dig" Project. Developed structural assessment and statistical model of slurry wall system required by FHWA's Inspector General. Also retained as expert to assess failed tunnel ceiling anchorages after collapse of I-90 tunnel ceiling system.
- Silver Lake Dam Failure, Michigan. Retained by Garan, Lucow & Miller, P.C. and Foley & Lardner LLP for root cause failure analysis and consequential damages assessment for the Silver Lake Dam breach which occurred May 14, 2003 near the headwaters of the Dead River, Marquette County, Michigan. Lead forensic geotechnical, civil, hydrologic and survey assessment of the breach event. Also responsible as FERC Facilitator to lead the Board of Consultants Review for dam replacement.

- Infinity Towers, Dubai, UAE – (Senior Principal Engineer) Responsible for root cause failure assessment of breached 22-meter deep slurry wall at 100-story tower site next to Arabian Sea. Reviewed design for restoration of the site including cofferdam and wall analyses to dewater and retain the site to satisfy Dubai Municipality.
- “Big-Blue” Crane Collapse Investigation, Milwaukee Stadium, Milwaukee, Wisconsin. Retained as Independent Principal Geotechnical Engineer to review foundation conditions under the failure crane support system. Extensive on-site investigations to satisfy Wisconsin Attorney General requests.
- Principal Engineer and Reviewer of Iron Tailings Impoundments. Review expansion designs and impoundment seepage conditions for USS Keetac, Minntac; and Cleveland Cliffs’ United Taconite, Gribben North, Gribben South and Empire Basin. These basins range from 5 to 12 square miles of impoundments and embankments reaching heights of 50 to 160 feet high. Served as expert reviewer and developed methods for static liquefaction and seepage analyses. Developed advanced sediment sampling methods.
- Principal Engineer for the evaluation of the cause and repair of a seven-foot circulation water pipe failure at a coal-fired power plant in Pekin, Illinois. Ruptured joints were causing flooding and unsafe ground conditions. Through extensive subsurface testing, the failure was determined to have been caused by poor compaction of backfill soils which caused overstressing of the pipe joints. A jet-grouting program was designed to support the pipe and prevent future distress.
- Principal Engineer for a 130-foot-high embankment dam near St. Louis, Missouri to retain 1.5 million yards of dredged sediments. Work included dam layout, material selection, construction staging, seepage and stability analyses, design of outlet structures, and development of plans and specifications.
- 1997-Present – High Rise Buildings, Chicago Illinois. (Geotechnical Engineer of Record) Responsible geotechnical engineer for 55-story One North Wacker, 65-story River East with 4-level slurry wall basement, 45-story 191 North Wacker, 65-story 300 North La Salle Tower, 45-story Parkview West Tower, 57-story 111 North Wacker Tower, 40-story ABN Amro Tower, 52-story Fordham Tower, and ongoing 92-story Trump Tower and North America’s 2000 foot high, 150-story Spire Tower in Chicago, Illinois.
- 2005-Present – Block 37 Development, Chicago, Illinois. (Geotechnical Engineer of Record) Responsible for design of Chicago’s deepest top-down construction of multiple-use tower and 4-level basement (50 feet deep) for a new Chicago Transit Authority subway station connecting Red and Blue lines. Provided load analyses and design of slurry walls, secant pile walls, belled and top of rock caissons. The project includes the new CBS Media Center, retail mall, offices and a 35-story residential tower. Extensive testing and re-use of old caissons saved time and money for the project.
- Principal Engineer for dam safety improvements at the Hoist and McClure Hydroelectric projects. Work included construction oversight to document that the work was completed in substantial accordance with the project documents and to document that a final quality product was produced. The majority of the work included oversight of post-tension anchor construction and testing, embankment raising, and concrete repair and rehabilitation work.
- Principal Engineer charged with determining the cause of a small sinkhole within a high-hazard, FERC licensed, intake embankment dam in Baraga County, Michigan. Through the use of tracer dyes and a down-hole video camera the existing drainage system was mapped. A break within the old clay tile drain pipe was identified to be the likely cause of the ground loss; however, research into the project files indicated a chronic history of ground loss at this dam. An

evaluation and repair design was prepared and issued for bidding. During the summer of 2004, the successful contractor implemented the evaluation and repair. Broken clay tile drain pipes were found to have caused significant ground loss and differential movement within the intake structure. Repairs consisted of sealing the concrete and steel cutoff wall, pressure grouting voids beneath the intake structure, and construction of a new mineral filter drain within the reconstructed earth embankment. The pool was filled during the fall of 2004 and the dam is functioning as expected.

- Principal Engineer for the evaluation and monitoring of an unstable slope next to a 9.5-foot diameter hydroelectric penstock at a FERC licensed hydroelectric project. Work included a geological assessment of the depositional history of the unstable formations, localized subsurface exploration, installation of inclinometers, wells, piezometers, and movement monuments. The stability evaluation found that the slope was susceptible to movements during spring runoff when pore pressures within thin granular deposits peak. Monitoring of the instrumentation and evaluation of this data is ongoing.
- Principal Engineer, 1,100-MW, Prairie Nuclear Power Plant, Minnesota. Responsible for seismic and liquefaction evaluations of sandy soils underlying the cooling water intake canal for the plant. Managed extensive geotechnical field and laboratory testing.
- Project Engineer, Fortuna Hydroelectric Power Project, Panama. Responsible for rock slope stability analyses and rock slope cut designs for the reservoir intake structure area.
- Project Engineer, Tarbella Third Powerhouse Extension Project, Pakistan. Responsible for design of 2,000 foot long, 80-foot-deep concrete slurry wall and 10,000-foot-long, cellular sheet pile cofferdam. Responsible for seepage analyses beneath slurry wall. Cutoff wall depth design was complicated by previous stratified, old river bed material characteristic of the Indus River Valley.
- Project Engineer, 900-MW Hydroelectric Project, Nigeria Electric Power Authority, Nigeria. Provided alternative feasibility-level designs for 410-foot-high, concrete-faced rockfill, mass buttress head, and concrete gravity dam.
- Consultant, Glenwood Hydroelectric Development, Niagara Mohawk Power Corp., Glenwood, New York. Reviewed stability analyses and established design guidelines for seepage rehabilitation and filter designs for an existing 2,000-foot-long, 60-foot-high earth dam.
- Principal Engineer, Domtar Paper Company, Port Edwards, Wisconsin. Engineer of Record for reconstruction of spillways and intake channel, gates at FERC regulated Centralia Dam and Port Edwards Dam. Port Edwards Dam was fast tracked after STS took over as Engineer of Record.
- Principal Engineer, Inland Steel and Beemsterboer Slag Coal Handling Facility, East Chicago, Indiana. Responsible for geotechnical investigation, instrumentation, structural peer review for a 65-foot deep, 101-foot diameter sheet pile cofferdam; a coal handling facility; silos; and 70-foot high coal piles next to Lake Michigan. The cofferdam was supported with five levels of internal bracing that performed as predicted, with actual readings less than predicted (2.6 vs. 3.0 inches). Foundation basal heave stability was reviewed and design recommendations provided.
- Principal Engineer, Circored Iron Ore Processing Plant, Trinidad. Responsible to Bechtel for providing peer review and subsequent expert geotechnical consultation, analyses, geotechnical foundation and instrumentation design for a 3,000-foot-long pier into the Atlantic Ocean and pre-load designs for two iron ore and iron product piles on deep soft clays with interbeds of loose silts and sands.
- Performed 2-D finite element stress and deformation analyses, including steady-state strength testing to assess soil liquefaction potential.
- Project Manager, Wachusett Reservoir, North Dike, Clinton, Massachusetts. Responsible for seismic stability analyses and final design improvements to this MDC-operated 85-foot-high

embankment dam. A large downstream fill was constructed to limit seismic deformation and ensure adequate freeboard during a seismic event.

- Project Manager, Quabbin Reservoir, Goodnough Dike, Belchertown, Massachusetts. Performed numerous safety inspections at this MDC facility. Primary focus was on seepage conditions at 150-foot-high Goodnough Dike.
- Project Manager, 120 Phase II Dam Safety Inspections of Municipal and Private Dams in Massachusetts. Performed safety inspections for the Massachusetts Department of Environmental Management.
- Project Manager, Ashfield Lake Dam, Ashfield, Massachusetts. Provided seismic and static stability analyses, final filter overlay design, construction specifications and construction monitoring services for repair of 800-foot-long, 15-foot-high earth dam. Permits were MEPA, MDEM, U.S. Army Corps of Engineers, MDEP and local conservation commission.
- Project Engineer, Linwood Mill Dam, Mumford River, Northbridge, Massachusetts. Performed a detailed hydrologic/hydraulic analysis at the 100-year-old, 15-foot-high earthen dam. The analysis was performed to define Spillway Design Flood, including a 52-square-mile watershed above the dam with 12 upstream reservoirs. Also evaluated alternative configurations and recommended construction of a new spillway and embankment overflow section design of an inverted filter bed to prevent erosion. Environmental permits were secured for the project.
- Project Manager, Wetfoot Lake Dams, Hoffman Estates, Illinois. Responsible for explorations, analyses, designs and dam safety of three small and one intermediate size dams, all with a significant hazard rating for a suburban park complex. Designed slurry cutoff trench and dam filters.
- Project Engineer, Dam Safety Inspections for the State of Connecticut Department of Environmental Protection. Performed numerous dam inspections and reviewed dam design and construction reports prepared by other firms.
- Consultant, Reservoir Dams 1, 3 and 5, West Hartford, Connecticut and Richards Corner Dam, Metropolitan District Commission, New Hartford, Connecticut. Reviewed static and seismic stability analyses performed on MDC water supply dams ranging in height from 20 to 70 feet. Dams were constructed in the 1800s.
- Project Manager, Rocky River Pumped Storage Project, Northeast Utilities Service Company, New Milford, Connecticut. Performed seismic stability analysis on NUS Co.'s three, FERC-regulated, 70-year-old hydraulic earth-fill dams that serve as impoundments for the upper reservoir of America's first pumped storage hydroelectric station.
- Project Engineer, Harriman Dam, Whitingham, Vermont, and Carry Falls Dike, Colton, New York. Conducted static and seismic stability analyses and designed improvements for two FERC-licensed dams: NEPS's 215-foot-high Harriman Dam and NMPC's 30-foot-high Carry Falls Dike. Responsible for overlay filter berm designs, construction drawings, construction specifications and project reports. Served as resident engineer during construction of Harriman Dam improvements.
- Project Engineer, Seismic Stability Analyses of FERC-licensed Dams. Performed seismic stability analyses on NMPC's 150-foot-high Terminal and 80-foot-high Division Dams, Crogham, New York; NEPS's 115-foot-high Somerset Dam, Somerset, Vermont; NEPS's 110-foot-high Sherman Dam, Rowe, Massachusetts; and two 40-foot-high dikes at CMP's Azischohos Project, Wilson Mills, Maine. In addition, Mr. Walton performed static and seismic stability analyses on at least 10 other FERC-licensed earth dams, including liquefaction analyses on compacted zoned fill and hydraulic fill dams. Responsible for exploration, analyses and reports.
- Project Engineer, FERC Dam Safety Inspections. Performed five-year FERC Dam Safety Inspections and prepared reports for projects in Massachusetts, New York, Pennsylvania, New

Jersey and Vermont, including the St. Lawrence Power Project, Massena, New York; Niagara Power Project, Niagara Falls, New York; Blenheim-Gilboa Pumped Storage Power Project, Blenheim, New York; Upper and Lower Deerfield River Projects (nine total), Readsboro, Vermont; Bear Swamp Pumped Storage Power Project, Rowe, Massachusetts; Muddy Run Pumped Storage Project, Pennsylvania; and Yards Creek Pumped Storage Project, Blairstown, New Jersey.

- Consultant, Yards Creek Pumped Storage Project, Blairstown, New Jersey. Responsible for seismic evaluation of foundation and embankment stability of the Lower Reservoir Dam. Triaxial testing was performed on undisturbed carved clay samples from beneath the FERC-regulated facility.

## Publications

- Walton, W.H., Diehm, D.S., Burns, J., Sarabia, F., Browne, G., and Provanzana, S., "Geotechnical Engineering of the 600m Chicago Spire," 17<sup>th</sup> Congress of IABSE Chicago 2008, Creating and Renewing Urban Structures, International Association for Bridge and Structural Engineering, ETHZ Höggerberg, CH – 8093 Zürich, Switzerland, August 2008.
- Walton, W.H., Diehm, D.S. and Baker, C.N., "Practical Reuse of Caisson Foundations in High-Rise Construction," Deep Foundations Institute, 30th Annual Conference of Deep Foundations, Conference Proceedings, September 22-24, 2005.
- Bushell, T.D., Butler, L.W., Walton, W.H. and Mathur, R., "Drake Lake Dam – A Performance Case History," Proceedings: Fifth International Conference on Case Histories in Geotechnical Engineering, New York, New York, April 13-17, 2004.
- Walton, W.H., Butler, L.W., Wheeler, M., Goodman, G. and Castro, G., "Evaluation of Static Liquefaction Potential of Upstream Dike Construction for Iron Mine Tailing Impoundment," Tailing Dams 2002, Proceedings, Assoc. of State Dam Safety Officials/ U.S. Society on Dams, Las Vegas, Nevada, April 29-May 1, 2002.
- Olson, S.M, Stark, T.D., Walton, W.H. and Castro, G., "1907 Static Liquefaction Flow Failure of the North Dike of Wachusett Dam," Journal of Geotechnical and Geoenvironmental Engineering, December 2000.
- Hertlein, B.H. and Walton, W.H., "Assessment and Reuse of Old Foundations," Transportation Research Record 1736, Soil Mechanics 2000, Paper No. 00-0792.
- Walton, W.H. and Scherer, S.D., "Mini-Pile Foundations for Orchestra Hall Renovation and Expansion Project," ASCE Newsletter (Illinois Section), July/August 1996.
- Walton, W.H. and Rook, M.E., "Canal Dike System Improvements," Proceedings of Waterpower '95, San Francisco, California, July 25-28, 1995.
- Baril, P.H., Wood, D.W. and Walton, W.H., "The Wachusett Dam in the 21st Century: Modifications After 100 Years of Service," Twelfth Annual USCOLD Lecture Series, Fort Worth, Texas, April 27-May 1, 1992.
- Walton, W.H., Sangrey, D.A. and Miller, S.A., "Geotechnical Engineering Characterization of Hydraulically Piston-Cored Deep Ocean Sediments," Initial Reports DSDP, Leg 72; Washington, D.C., U.S. Government Printing Office, 1982.
- Walton, W.H., "The Influence of Chemical Stabilizers on the Effective Stress-Strain-Strength Parameters of Stabilized Soils," (Thesis), Cornell University, 1981.

# William Butler, P.E.

Senior Geotechnical Engineer

## Education

M.S., Civil Engineering,  
Colorado State University, 1994

B.S., Civil Engineering,  
Colorado State University, 1986

A.A., Northeastern Junior  
College 1978

## Professional Affiliations

American Society of Civil  
Engineers (ASCE) (President  
Fox River Valley Branch 1993-  
1994, Secretary/Treasurer  
1989-1992, Wisconsin Section  
Treasurer 1998-2002)

ASCE Wisconsin Section  
Geotechnical Committee  
Chairman (2003-2004)

Association of State Dam Safety  
Officials

International Society of  
Explosives Engineers

## Registrations/Training

Professional Engineer:  
Wisconsin, Michigan, Ohio,  
Minnesota, New Jersey, and  
Tennessee

MSHA Part 46 Training

MSHA Part 48 Training

## Experience

Mr. Butler serves as a Senior Geotechnical Engineer for the geotechnical group. A representative sampling of recent project experience includes:

- Designed and evaluated the construction of clay core and downstream filters for 150-foot-high rock fill dam in southeast Missouri.
- Managed the geotechnical evaluation for the Root Cause Analysis and Consequential Damages Assessment for the Silver Lake Dam Breach, which occurred May 14, 2003, near the headwaters of the Dead River, Marquette County, Michigan.
- Evaluated the liquefaction stability for five iron tailings basins in the upper Midwest.
- Evaluated the failure of a dam in central Illinois. Performed subsurface exploration and installed instrumentation to analyze the failure conditions. Performed stability and seepage analysis to evaluate remedial options to stabilize the dam for safe operations.
- Performed slope stability studies for upstream and downstream construction of mine tailings dams in Michigan's Upper Peninsula.
- Performed design of slope stabilization and new toe drain for Water Retention Dam No. 8 for the former Groveland Mine Tailings Basin to increase the long-term stability of the structure.
- Performed design and construction management of a new dam adjacent to mine pit exposed to nearby blasting. Required dynamic compaction of up to 40 feet of fill and loose soils beneath the dam foundation.
- Performed state-required dam safety inspections of ten dams in Michigan's Upper Peninsula.
- Conducted an evaluation of the causes of a sinkhole at the outlet for a dam in Morris, Illinois. Fieldwork included soil borings and piezocone penetration testing.

- Conducted subsurface exploration, slope stability, and settlement evaluation for 40-foot sledding hill placed on 60 feet of soft to very soft fill and lake deposits at Soldier Field, Chicago, Illinois. This also included the completion of permitting process, construction oversight, and monitoring of instrumentation.
- Provided evaluation and wrote the geotechnical section for the "Improvements Required to Accommodate Land Use" report for the Keegan Landfill Land Use Feasibility Study in the Town of Kearny, New Jersey.
- Provided the design of temporary retention structures for the construction of multi-story structure on Lawrence University Campus (Appleton, Wisconsin) adjacent to the Fox River.
- Completed a geotechnical re-evaluation for the Alger Correctional Facilities in Munising, Michigan, which resulted in the redesign of the foundation from a pile foundation to shallow footings.
- Completed a geotechnical evaluation and coordinated field construction monitoring for the Eagle II Project at the Wisconsin Tissue Mills Plant No. 1 in Menasha, Wisconsin.
- Provided geotechnical recommendations including pressuremeter testing for paper machine at the Georgia-Pacific Mill in Green Bay, Wisconsin, resulting in increasing the allowable bearing capacity to 8,000 pounds per square foot.
- Performed pressuremeter tests at Oneida Casino and Radisson Inn in Green Bay, Wisconsin.
- Conducted subsurface exploration, pressuremeter testing, and geotechnical evaluation for foundations for a paper mill power plant expansion in Wisconsin Rapids, Wisconsin.
- Provided geotechnical recommendations and design for the installation of mini-piles for the addition to Crawford Hall on the Lake Superior State University campus in Sault Ste. Marie, Michigan.
- Evaluated the excavation for a deep road cut in a residential area for State Highway 441 for Wisconsin Department of Transportation in Appleton, Wisconsin.
- Performed over 1,000 subsurface exploration and geotechnical evaluations for foundations of numerous projects in Wisconsin and Michigan.

#### **Blasting and vibration monitoring**

- Performed vibration monitoring of structures near pile driving.
- Performed evaluation of blasting on nearby structures and utilities for construction of tunnel beneath the Fox River in Green Bay, Wisconsin.
- Completed evaluation of blast induced liquefaction for a dam adjacent to an active mine pit in the Upper Peninsula in Michigan.

**Research experience**

- Performed research for the development of the Piezovane, which is an in-situ tool for estimation of liquefaction potential of saturated soils.
- Performed research on determining the potential of blast-induced liquefaction occurring within saturated sands.
- Evaluated in-situ testing methods for determining potential for static liquefaction of fine-grained iron ore tailings.

**Publications/Presentations**

"Piezovane Evaluation of Liquefaction Pile Foundations," presented at the 46th Annual Canadian Geotechnical Conference at the University of Saskatchewan, September 1993.

"Estimating Liquefaction Potential of Sand Using the Piezovane," *Geotechnique* Volume 45, No. 1, pages 55-67, 1995.

"Evaluation of Static Liquefaction Potential for Upstream Dike Construction for Iron Mine Tailings Impoundments," *Tailing Dams 2002*, Las Vegas, Nevada. April 2002.

"Drake Lake Dam - A Case History" *ASDSO Dam Safety 2002*. Tampa, Florida. September 2002.

"Sludge and Ash Landfill Waste Characteristics," proceedings of the GRI-17 Conference in Las Vegas, Nevada. December 2003.

"Drake Lake Dam - A Performance Case History," proceedings of the Fifth International Conference on Case Histories in Geotechnical Engineering, New York, New York. April 2004.

"The Design and Construction of Lake Ogden Dam," 69th Annual Meeting Minnesota Section SME and 57th Mining Symposium, University of Minnesota, April 1996.

"Drake Lake Dam - A Case History" Wisconsin Section ASCE Annual Meeting, September 2002.

"Soil Structure and Drainage Engineering for Railroads," Short course for University of Wisconsin, Madison, February 2003.

**Patents**

"A Method for Determining Liquefaction Potential of Cohesionless Soil," US Patent No. 5109703; US Patent and Trademark Office, Washington, D.C.

# Elliott E. Drumright

Associate

## Education

Ph.D., Civil/Geotechnical  
Engineering, Colorado State  
University

M.S., Civil/Geotechnical  
Engineering, Colorado State

B.S., Civil Engineering,  
Colorado State

## Professional Affiliations

Member, American Society of  
Civil Engineers

## Registrations/Training

Registered Professional  
Engineer: Colorado, Illinois,  
California, Virginia, Tennessee

## Community Activities

Baseball Coach, West Jefferson  
County Junior Baseball  
Association

## Experience

Mr. Drumright has returned to STS after 13 years of due-diligence consulting for the lending industry. His combined 21 year professional career includes the following relevant project experience:

- Petronas Towers, Kuala Lumpur, Malaysia. Resident geotechnical consultant for the third tallest buildings in the world. Responsibilities included field decisions related to grouting for deep foundation improvements, and barrette pile construction.
- Various Clients, U.S.A.: Completion of more than 50 Document and Cost reviews for new construction, combined with monthly Field Reports for associated general contractor pay requests.
- Various Clients, U.S.A.: Completion of more than 250 Property Condition Assessments to evaluate and forecast the condition and performance of building structural, HVAC, roofing and parking lot systems, and 200 Phase I Environmental Site Assessments for retail, industrial and multi-family properties.
- Gallatin National Landfill, Fulton County, Illinois. Project Manager for design of facilities, including geotechnical design of clay liner, and mechanical/pumping design of leachate and groundwater control systems.
- Chicago Board of Trade, Chicago, Illinois. Project Manager for geotechnical evaluation, including reuse of rock caissons for building addition.
- 700 North Michigan Avenue, Chicago, Illinois and Newport Office Tower, Jersey City, New Jersey. Installation and monitoring of instrumentation for straight-shaft, friction and end-bearing caissons drilled dry or under slurry.
- Various Clients (Albany, New York, Menlo Park, New Jersey and Southfield, Michigan) Setup and completion of load tests on drilled shafts using the Osterberg load cell.

**Publications**

The Tallest Building has the Deepest Foundations, Civil Engineering Magazine, November 1996.

Influence of Hammer Type on SPT Results, Journal of Geotechnical Engineering, ASCE, July 1996.

The Shear Strength of Unsaturated Tailings Sand, First International Conference on Unsaturated Soils, Paris, France, 1995.

Long-Term Load Transfer in Drilled Shafts, XIII ICSMFE, New Delhi, India, 1994.

Use of Non-Destructive Testing and Quality Control in Evaluation of Drilled Shafts, Transportation Research Board Annual Meeting, 1991.

Use of Non-Destructive Testing to Evaluate Defects in Drilled Shafts-Results of FHWA Research, Transportation Research Board Annual Meeting, 1991.

Dynamic Testing to Predict Static Performance of Drilled Shafts, ASCE, Foundation Engineering Congress, Boulder, Colorado, 1991.

A New Combined Footing and Drilled Shaft Foundation Design, ASCE Foundation Engineering Congress, Chicago, Illinois, 1989.