

HELLER AND JOHNSEN

Geotechnical Engineering Consultants

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The geotechnical engineering firm of Heller and Johnsen was founded in 1993 by Robert A. Heller, P.E. and Lawrence F. Johnsen, P.E. Since 1995, the firm has operated under the direction of Mr. Johnsen as a sole proprietorship. In 1996, Dr. Stanley M. Bembem, Ph.D., P.E. joined as primary consultant. In 2001, Dr. John S. Horvath, Ph.D., P.E. joined as primary consultant.

Our practice is focused on finding solutions to difficult geotechnical and foundation problems. We are active in national technical committees on grouting, pile foundations, sheet piles and timber. Mr. Johnsen was the engineer-of-record for the first North American application of jet grouting for underpinning and excavation support, and has introduced deep dynamic compaction to the area. In 1996, Mr. Johnsen co-authored a widely used vinyl sheet piling design manual and is co-editor of the proceedings for the "Third International Conference on Grouting and Ground Treatment" held in February 2003. Mr. Johnsen recently chaired a subcommittee of ADSC/DFI that wrote the new micropile section for the 2006 IBC Code, and is currently chairman of the ASCE/GI Grouting Committee and the DFI Committee on Codes and Standards.

Our technical staff includes seven professional engineers with licenses in Arizona, California, Connecticut, Florida, Illinois, Idaho, Iowa, Massachusetts, Maryland, Michigan, Minnesota, Missouri, New Hampshire, New Jersey, New York, Oregon, Pennsylvania, Rhode Island, Virginia, Washington, Washington D.C. and Wisconsin. Our size allows us to respond quickly to client needs. Specific areas in which we have considerable experience include:

Development of marginal sites: Considerable experience in selecting economical foundations for difficult subsurface conditions including deep deposits of uncompacted fills, weak and highly compressible deposits of organic soils, boulder and organic fills, varved clays, loose sands, unstable slopes and complications arising out of concern for adjacent structures. Many of these projects have utilized deep dynamic compaction techniques to densify existing fills, treat sites having liquefiable sands and serve as an expedient for winter placement of moisture sensitive fills. Other techniques have included compaction grouting, surcharging of compressible soils, mat foundations and new drilling techniques.

Underpinning and repair of building foundations: Development and use of novel methods of underpinning and repair including the first North American application of jet grouting for underpinning and lateral support at Yale University's Sterling Medical Building. Development of methods for successfully stabilizing historic structures founded on unmortared stone walls.

Design of excavation support systems: Design of conventional cofferdams, as well as soil nail walls, shotcreting and hybrid systems.

Forensic investigations and expert witness testimony: Investigation of structures that have settled, landslides, water damage, collapsed or undermined walls, failed bulkheads, effects of blasting and other sources of vibrations, and distressed pavements; assistance in contractors' claims; and, presentation of expert testimony in mediation and in court on behalf of owners, contractors, architects and engineers.

Pavement design and evaluation: Investigation of distressed pavements for truck and bus terminals, roadways and parking areas; Design of pavement structures, overlays and subdrainage.

Pile Foundations: Value engineering studies to determine most suitable pile type; wave equation analyses to estimate pile capacity, driving stresses and installation time; experience in the use of the dynamic pile analyzer for

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the determination of pile capacity by the Case-Goble method; static load tests; investigations of pile installation problems including excessive pile breakage, misestimation of hammer efficiency, soil freeze and soil relaxation.

Design and rehabilitation of waterfront structures: Use of innovative methods to stabilize all types of waterfront structures. Methods have included grouting, tiebacks, cutoffs, blankets, groins and retards. Permitting services in conjunction with our waterfront designs.

Dewatering: Design of permanent underdrainage systems including the reuse of groundwater to reduce energy costs. Investigation of structures damaged by poorly designed dewatering systems. Consultation and design for construction dewatering.

Controlled blasting and rock excavation: Design of controlled blasting techniques to allow the blasting of rock from beneath an operating multilevel shopping mall, as well as the use of controlled blasting techniques to avoid damaging nearby structures and minimizing rock removal; design of rock cuts and scaling of rock faces.

In-situ testing: Experience in the use of shear vane, electronic cone penetrometer, pressuremeter, and Marchetti dilatometer for estimating shear strength of soft organic silts and varved clays, permeabilities of varved clays and settlement modulus of sands, and identifying dilatant sands and liquefiable sands.

Geotechnical instrumentation: Vibration monitoring for the effects of pile driving, deep dynamic compaction, vibrating machinery and blasting; plate load testing to determine subgrade modulus for settlement estimations; slope indicator measurement to monitor slope and wall movements; borehole extensometers to measure subsurface settlements; monitoring of horizontal and vertical movements of buildings; and the measurement of excess pore pressures during the field loading of clays.

Construction monitoring: Experience in the installation of conventional deep foundations, controlled fill, dynamic compaction, grouting, minipiles, tiebacks, soil nail walls and shotcreting. Laboratory testing services to support our design, construction monitoring and investigative studies.

Firm membership:

American Consulting Engineers Council
Connecticut Engineers in Private Practice
Deep Foundations Institute

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LAWRENCE F. JOHNSEN, P.E.

PRINCIPAL

Education:

B.S. Civil Engineering, University of Illinois
M.S. Civil Engineering (Geotechnical Engineering), University of Illinois

Professional Registration:

Licensed Structural Engineer in Massachusetts.

Licensed Professional Engineer in Arizona, California, Connecticut, District of Columbia, Florida, Idaho, Illinois, Iowa, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, New Hampshire, New Jersey, New York, Oregon, Pennsylvania, Rhode Island, Utah, Virginia, Washington, and Wisconsin.

Professional Membership:

American Society of Civil Engineers
Technical Committee on Grouting, ASCE, (1992-2008), Chairman (Since 2005)
Metropolitan New York Section, ASCE, Geotechnical Group, Chairman (1991-92)
Pile Driving Contractors Association
National Society of Professional Engineers
Connecticut Society of Professional Engineers, President (1994-95)
Southwest Chapter, CSPE, President (1992-93)
International Society of Soil Mechanics and Foundation Engineering
Earthquake Engineering Research Institute
Micropile Committee of ADSC/DFI
Soil Nail Committee of ADSC/DFI
Codes and Standards Committee of DFI, Chairman (since 2008)

Professional Experience:

Mr. Johnsen has 35 years of experience on a variety of projects including building foundation design, underpinning, design of dewatering systems, seismic analyses, failure investigations, pile foundations, seismic monitoring and construction observations. He served as engineer-of-record for:

- Micropiles – design or investigation of micropiles on more than 75 projects, including: World Trade Center Towers 3 and 4; Baltimore Washington Airport; Newark Airport; Electric Boat, Groton, Connecticut; Yuma Medical Center, Yuma, Arizona; Boat House, Oakland, California; and numerous high rises in Manhattan. Chairman of ad-hoc ADSC/DFI committee that wrote micropile section for 2006 IBC.
- Dynamic Pile Testing – Principal in charge or project manager for over 300 PDA projects during the past 20 years.

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- Bridges – cofferdam design, geotechnical investigations, dynamic pile load testing and instrumentation during construction. Projects included: Pearl Harbor Memorial Bridge in New Haven, CT; Metro-North and Amtrak lines in Stamford, Bridgeport and Branford, CT; Route 7 in Ridgefield and Redding, CT; Gulf Street Bridge in Milford, CT; and Olive Street, Tomlinson and Washington Avenue Bridges in New Haven, CT.
- Building surveys and evaluation of construction vibrations for residential, commercial, industrial and institutional buildings. Vibration sources including pile driving, drilling, blasting, hoe ramming and dynamic compaction.
- Subsurface investigations of unstable sands, design of foundations and underpinning systems, and monitoring and quality control during the installations of *jet grouted* columns for the expansion of the Yale Medical Library and St. Raphael's Hospital in New Haven, Connecticut. The Yale Medical Library received the 1992 Engineering Excellence Award of CEPP. Other jet grouting projects include: St. Raphael's Hospital - New Haven, CT, Trumbull Shopping Park - Trumbull, CT, Pediatric Hospital - New Haven, CT, The Home Depot - Bloomfield, CT and Avery Hall at Vassar College - Poughkeepsie, NY.
- Development of a comparative load test program of friction piles in alluvial sand at the Tomlinson Bridge in New Haven, which included instrumentation to measure settlement and identify zones of dilatant sands.
- Deep dynamic compaction of over 20 sites in the Northeastern United States.
- A major expansion at the Connecticut Post Mall, Milford, Connecticut, including the conversion of 140,000 square feet of underground storage space into an at grade retail shopping area, which required the lowering of floors and foundations and the installation of a permanent dewatering system, and which was accomplished using minipiles, soil nail walls, anchored H-pile walls, shotcrete and tiebacks.
- Evaluation of sewer installation methods for a large residential area in Queens, New York. Most of the residences were supported on shallow timber rafts underlain by organic soils, and had required previous periodic leveling.
- Design of steel, timber and vinyl bulkheads, and repairs to existing bulkheads. Wrote design manuals for C-LOC vinyl sheet piles.
- Evaluation of methods to maintain stability of 40 ft. high seawall in East Boston, Massachusetts in conjunction with dredging below its base elevation.
- Instrumentation of Cobble Mountain Dam, Russell, Massachusetts. Cobble Mountain Dam is the world's tallest hydraulic fill dam. Instrumentation includes vibrating wire piezometers and accelerometers that are monitored by an automatic data recording system.
- Instrumentation for ConnDOT projects: slope indicators for Oliver Street Bridge, New Haven; manually read tiltmeters and automatic data recording of slope indicator casings, Viaduct Street Bridge, Stamford; horizontal slope indicator under I-95 and Amtrak to measure tunneling induced subsidence, Branford; dynamic pile testing on numerous projects.

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- St. Catherine of Siena Church/Sloane Kettering Hospital, Manhattan, New York. Engaged by Archdiocese of New York to review instrumentation blasting and rock anchoring procedures for deepest building excavation in rock in New York City. The 85 ft. deep vertical cut was located within one foot of a historic church. Instrumentation included seismographs, tiltmeters and an automated theodolite with prisms.
- Vibro-Compaction, Vibro-Replacement and Stone Columns – WWTP, Provincetown, Massachusetts; Holiday Inn, Dumfries, Virginia; Swansbury Residence, Beverly, Massachusetts; West Hills/Conte Magnet School, New Haven, Connecticut; UPJohn Facility, North Haven, Connecticut; Arts Magnet School, New Haven, Connecticut; Route 2 Embankment, Harvard, Massachusetts; Society Hill, Jersey City, New Jersey; Conference Center, Dubuque, Iowa; WWTP, West Chicago, Illinois; University of Connecticut Football Complex, Storrs, Connecticut; Sanyo, Salem, Oregon; Massachusetts Turnpike Embankment, Allston, Massachusetts.

Publications

Burke, George K., Johnsen, Lawrence F., and Heller, Robert A., "Jet Grouting for Underpinning and Excavation Support", *Foundation Engineering: Current Principles and Practices*, ASCE, 1989.

Burke, George K., Heller, Robert A., and Johnsen, Lawrence F., "Jet Grouting for Underpinning - The Cutting Edge", *Geotechnical News*, 1989.

Morgan, Russell J., Johnsen, Lawrence F., and Grynkewicz, Franklin, "Permanent Excavation Support and Underpinning in Sands - A Case History", *Grouting, Soil Improvement and Geosynthetics*, ASCE, 1992.

Johnsen, Lawrence F., Pizzi, John F., and Benway, Jeffrey M., "Comparative Pile Load Tests in Alluvial Sands", Deep Foundations Institute, Proceedings 18th Annual Convention, 1993.

Johnsen, Lawrence F., and Tonzi, Christopher, "Dynamic Compaction Used as a Winter Construction Expedient", *Special Session on Deep Soil Improvement*, ASCE Annual Convention, 1994.

Johnsen, Lawrence F., and Crofts, Thomas R., "Foundations", *Field Inspection Handbook*, by McGraw-Hill Book Company, 1995.

Johnsen, Lawrence F., and Gardella, Skip, "Engineering Control of Pile Installation", *Field Inspection Handbook*, by McGraw-Hill Book Company, 1995.

Johnsen, Lawrence F., Burke, George K., and Walker, Andrew, "Jet Grouting", *Verification of Grouting Performance*, edited by Michael Byle and Roy Borden, by ASCE, 1995.

Johnsen, Lawrence F., and Berry, Richard M., Editors, "*Grouts and Grouting*", Geotechnical Special Publication No. 80, ASCE, October, 1998.

Graham, James S., Johnsen, Lawrence F. and Jagello, Jon J., "History of Foundation Pile Driving Hammers in New York City – 1900 to 2000", Deep Foundations Institute, 2000.

Johnsen, Lawrence F., Bembem, Stanley M. and Jagello, Jon J., "SPT Energy Measurements for Liquefaction Evaluations in the Northeast", Fourth International Conference on Recent Advances in Geotechnical Earthquake Engineering and Soil Dynamics", 2001

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Johnsen, Lawrence F., "Monitoring Earthwork and Foundation Construction", *Structure Magazine*, National Council of Structural Engineers Association, February, 2001.

Graham, James S., and Johnsen, Lawrence F., "Problems with Timber Piles", *Deep Foundations 2002*, ASCE, 2002.

Johnsen, Lawrence F., Bruce, Donald A. and Byle, Michael J, Editors, "Grouting and Ground Treatment, Proceedings of the Third International Conference", Geotechnical Special Publication No. 120, ASCE, 2003.

Johnsen, Lawrence F., Anderson, Andy and Jagello, Jon J., "Low Strain Testing of Compaction Grout Columns", *Grouting and Grout Treatment*, ASCE, 2003.

Bemben, Stanley M., Johnsen, Lawrence F. and Superneau, Joseph J., "Monitoring the Safety of the World's Highest Hydraulic Fill Dam", *United States Society on Dams*, 2003.

Cavey, Joseph, Johnsen, Lawrence F. and DiStasi, Jeffrey, "Deep Soil Mixing for Foundation Support of a Parking Garage", *Geo Support 2004*, Geotechnical Special Publication No. 124, ASCE, 2004.

Johnsen, Lawrence F., "Basics of Ground Anchors", *Structure Magazine*, National Council of Structural Engineers Association, June 2004.

Johnsen, Lawrence F., Editor, "Discussion Volume of Grouting and Ground Treatment, Proceedings of the Third International Conference", *Deep Foundations Institute*, January 2005.

Johnsen, Lawrence F. and Gallagher, Marc J. "Proposed Micropile Section for the 2006 IBC", *Deep Foundations Institute, Proceedings 30th Annual Conference on Deep Foundations*, 2005, and *Geo³ Industry in Action*, The International Association of Foundation Drilling, 2005.

Johnsen, Lawrence F. and Gallagher, Marc J. "Micropile Section for the 2006 IBC", *Buildings Conference & Expo, Structural Engineer Magazine*, December, 2005.

ASCE Grouting Committee, "Glossary of Grouting Terminology", *Journal of Geotechnical and Geoenvironmental Engineering*, ASCE, December, 2005.

Johnsen, Lawrence F., "Standard Penetration Test Energy Measurements", *Structure Magazine*, National Council of Structural Engineers Association, December, 2006.

Johnsen, Lawrence F., and Hurley, Thomas M., Editors, "Innovative Concepts and Applications of Grouting for Ground Improvement", *Proceedings of the Geo-Denver 2007 Congress*, ASCE, 2007.

Johnsen, Lawrence, F. and Jagello, Jon J., Discussion of "Energy Efficiency for Standard Penetration Tests", *Journal of Geotechnical and Geoenvironmental Engineering*, ASCE, April, 2007.

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Johnsen, Lawrence F., and Thomas, Michal D., "Video Inspection of Micropile Rock Sockets in New York City", *International Workshop on Micropiles*, London, England, May, 2009

Johnsen, Lawrence F., and Fahoum, Khaldoun, "Comparision of U.S. and U.A.E. Construction Practices", *2nd Piling and Foundations Forum*, Abu Dhabi, U.A.E., May, 2009