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NELSON KAWAMURA

Current Position

Geotechnical engineer at management level.

Education

Ph.D. Civil Engineering (Geotechnical), University of Illinois, Urbana-Champaign, 10/1998
MS Civil Engineering (Geotechnical), University of Illinois, Urbana-Champaign, 10/1991
Civil Engineer, University of São Paulo, Brazil, 01/1977

Licensure

Professional Engineer in Michigan

Professional Experience

1998 to date **GeoConsult, Inc.** **San Juan, PR**

Senior Geotechnical Engineer

Responsible for all aspects of geotechnical engineering services in approximately 25 projects for government and private sectors: project and budget management, supervision of field investigations and laboratory tests, geotechnical design analyses, construction sequence studies, geotechnical instrumentation, construction inspection, and preparation of proposals, specifications, geotechnical reports and inspection reports. Examples of projects: cut-and-cover tunnels, earth dams, pipelines, bridge and building foundations, MSE walls, box culverts, ground improvements, slope stabilization, braced and tieback walls, soil nailing, landslides and micro-tunneling. Contract for geotechnical services in a typical project: $40,000 to $500,000 up to one-year duration. Projects generally required a close interaction with owners, designers, structural engineers and contractors.

1989 to 1998 **University of Illinois at Urbana-Champaign** **Illinois**

List of representative part-time research and consulting positions held in Urbana-Champaign concurrently with the graduate study:

Research Assistant, Department of Civil Engineering, 1992-1998

Responsible for a Ph.D. research project entitled "Immediate and Long Term Behavior of the Evanston Tunnel in Chicago Clay", working under the supervision of Prof. E. J. Cording. The project consisted in a case history study, in which a sewer tunnel was instrumented and monitored during and after tunneling. Performed detailed geotechnical engineering analyses for use in the thesis

dissertation and prepared instrumentation report for McNally Construction and Tunneling, which supported the research.

Assistant Geological Engineer, Illinois State Geological Survey, 1993-1998
Responsible for field investigations, rock mechanics laboratory, soil testing, geotechnical instrumentation, data analyses, preparation of final research reports, and supervision of staff members. Examples of projects: longwall coal mines and landslides.

Geological Engineer with Alberto S. Nieto, Ph.D., 1993-1994
Responsible for geological engineering analyses. Examples of projects: landslides, water injection test in a deep disposal well, hydraulic characterization of fractured natural reservoirs in sandstone for gas storage, and laboratory tests.

Geotechnical Engineer, Geotechnical Consultants, Inc., 1992-1995
Responsible for geotechnical design analyses. Examples of projects: Los Angeles Metro and landslides.

1978 to 1989 **CNEC S.A.** **Brazil**

Senior Geotechnical Engineer, 1983-1989
Supervising engineer for the projects of hydroelectric power plants in Amazon region, and acting head of the geotechnical engineering division. Responsible for project and budget management, preparation of geotechnical proposals, geotechnical schedule and cost estimates, preparation of final reports, training and development of staff members, and client contacts. Examples of projects: $11-billion Altamira Hydroelectric Complex (17,000 MW), and $5-billion Belo Monte Hydroelectric Power Plant (11,000 MW).

Resident Engineer, 1981-1982
Supervising geotechnical engineer for the construction of an earth dam.

Staff Geotechnical Engineer, 1978-1981
Responsible for field investigations, geotechnical design analyses, instrumentation programs, preparation of construction specifications and final reports, and management of the soil mechanics laboratory. Examples of projects: earth and rockfill dams, canals for transportation and water supply, pipelines and shafts, water supply tunnel using NATM, foundations of towers for electrical transmission lines, and embankments on compressible alluvial clay deposits for industrial and housing developments.

1977 to 1978 **Goro Kawamura** **Brazil**

Staff Civil Engineer
Responsible for construction inspection, construction schedule, and cost and volume estimates. Examples of projects: residential buildings and hospitals.

Representative Project Experience

San Antonio Tunnel, San Juan, PR - Several lines of undersea crossings in the 90-m-wide by 6-m-deep San Antonio Channel for the Puerto Rico Highway and Transportation Authority (PRHTA). Length of cut-and-cover tunnels: 853 m, length of boat sections: 955 m, length of tieback wall: 51 m, maximum excavation width: 35 m and maximum excavation depth: 20 m. Typical subsurface conditions: fill, underlying loose marine sand and compressible peat over competent alluvium resting on residual soil of limestone; subsoil under artesian conditions. Analyzed bearing capacity for the foundations of cut-and-cover tunnels and boat sections; determined lateral earth pressure distributions for the design of temporary support and permanent concrete structures. Determined the rate of load transfer for the design of tiedowns and tieback walls. Specified a minimum wall permeability of 1×10^{-8} m/s to secure dry working area during construction, and specified minimum wall rigidity next to existing buildings to reduce adverse ground movements. Proposed and analyzed three alternatives of internally braced retaining systems: deep slurry walls, short walls with dewatering, and short walls with underwater excavation using tiedowns. Recommended the use of steel pipes for strut, with minimal support piles or locking. Recommended the pre-installation of H-piles, precast prestressed concrete piles or ground anchors for tiedowns against uplift force. Studied the excavation sequence in the channel area. Recommended instrumentation of the tunnel next to the existing structures. Prepared final geotechnical reports.

TREN URBANO, Centro Médico Contract, San Juan, PR - Three retaining systems to protect existing roadway and hospital buildings during the construction of a cut-and-cover tunnel for the PRHTA rail transit system. Total length of the three retaining systems: 250 m, average excavation width: 20 m and maximum excavation depth: 11 m. Subsurface conditions: predominantly stiff silty clays of Tertiary Age. Designed two Z-sheet pile walls using tieback bracing. Analyzed global stability of walls to select anchor loads, anchor spacing, rebar diameter and rebar inclination; determined rate of load transfer to select anchor diameter and length. Recommended the use of high capacity post-grouted anchors. Programmed, specified and supervised proof, performance and creep tests on about 60 tiebacks. Recommended the use of shotcrete with passive anchors to support the ground exposed below the sheet piles that stopped due to refusal. Designed soldier piles with timber lagging for the third wall. Determined minimum pile length below the excavation assuming a cantilever wall to eliminate the need for bracing. Recommended staged construction to minimize ground disturbance adjacent to the existing buildings. Verified long-term stability of permanent concrete structures under static and seismic loading. Conducted foundation and slope inspections during construction. Prepared geotechnical and inspection reports.

Rio Blanco Dam, Naguabo, PR - An earth dam with a length of 1.3 km and maximum height of 20 m to create a raw water storage reservoir in southeastern Puerto Rico for the Infrastructure Financing Administration (AFI). The project also included a 42-inch diameter concrete outlet pipeline, an intake tower and a concrete spillway. Typical subsurface conditions: compressible alluvial clay and loose alluvial sand over residual soil of granodiorite in the floodplains and colluvium over highly weathered volcaniclastic rocks in one of the abutments with intense landslide events in the past; high seismicity area, with sand deposits under artesian conditions. Supervised field investigations composed of about 65 borings, 50 observation pits, 25 standpipe piezometers, 12 slug tests, and sets of packer tests in three borings; supervised laboratory tests. Peer-reviewed the dam design. Performed finite element dynamic analyses and finite element seepage analyses assuming foundation treatment with stone columns to minimize liquefaction potential and cutoff

trench to minimize the rate of flow for several hypotheses. Performed slope stability analyses for the spillway project. Prepared final geotechnical reports and companion addenda.

Baldorioty Boulevard, San Juan, PR - A 2-km expressway for the PRHTA involving improvements to the existing roadway and addition of a new route. The project included a 5-span flyover bridge, a single-span bridge, mechanically stabilized earth (MSE) walls, a 1-km pipeline and a bi-directional marginal road. Typical subsurface conditions: compressible peat and organic soils, loose and medium-density sands over competent alluvium resting on residual soil of limestone and underlying weathered limestone with potential for cavity formation. Performed axial and lateral capacity analyses in H-piles, pipe piles, pre-cast pre-stressed concrete piles and drilled shafts; performed pile driveability analyses. Estimated settlements in pile group. Conducted global stability analyses in MSE walls for undrained and long-term drained conditions. Computed the magnitude and rate of consolidation settlements in peat and organic clay below the approach embankments and MSE walls. Specified the spacing, pattern and length of vertical wick drains, and determined the surcharge heights to accelerate primary consolidation and minimize secondary compression in peat and organic clay; recommended geotechnical instrumentation. Designed the foundations and specified backfill materials and compaction requirements for a 60-inch diameter sewer pipeline. Prepared the final geotechnical report and companion addenda.

San Jose Trunk Sewer Pipeline, San Juan, PR - A 90-inch diameter concrete pipeline in a landfill site for the Puerto Rico Aqueduct and Sewer Authority (PRASA). Typical subsurface conditions: soft alluvial and organic clays over competent alluvial sand and clay resting on residual soil of limestone; within the landfill footprint, the overlying waste materials were composed of soil, plastic, wood, glass, paper, textile and metal randomly placed; potentially contaminated ground. Studied three alternative routes: Route 1 of 1,200 m in length surrounding Landfill Mound C clockwise; Route 2 of 530 m crossing underneath Landfill Mound C; Route 3 of 380 m running between Landfill Mounds B and C parallel to an existing pipeline. Determined bearing capacity of pipeline foundations and lateral earth pressure distributions for the design of retaining walls. Estimated consolidation settlements in clay deposits below the pipeline for foundation design. Recommended solutions that minimize groundwater infiltration in the excavated area: braced retaining walls with plug (soil mixing or jet-grouting) in Routes 1 and 3, and micro-tunneling using earth pressure balance (EPB) method in Route 2. Proposed one thrust shaft with one inter-jacking at mid-length of the micro-tunnel in Route 2. Prepared geotechnical reports.

42-inch ID Outlet Concrete Pipe for Fajardo Dam, Fajardo, PR - A 257-m-long pipeline for the AFI founded on soils derived from tuff and volcanic breccia; pipeline alignment was not perpendicular to the dam axis and its direction changed underneath the dam. Section area of the concrete encasement surrounding the pipe was variable. Used finite element method to back-calculate settlements and horizontal displacements measured in pipeline during construction and predicted pipeline performance during and after reservoir filling. Prepared the geotechnical report.

PR-5 Expressway, Bayamón, PR - An ongoing ground improvements project for the PRHTA to reduce settlements underneath the approach embankments and MSE walls next to the bridge ends using approximately 500 stone columns of 10 m in average length. Typical subsurface conditions: fill over soft to stiff alluvial clay resting on residual soil of siltstone. Analyzed the bearing capacity of stone columns, estimated the consolidation settlements in clay surrounding the stone columns and

analyzed the global stability of MSE walls. Recommended the use of 1.1-m diameter stone columns spaced 2 to 2.5 m on centers in a triangular pattern to the top of residual soil. Prepared reports with geotechnical recommendations and specifications.

Bridge No. 956 Over PR-18 Expressway, San Juan, PR - An ongoing single-span bridge project for the PRHTA using shallow foundations. The new bridge, which is about 60 m in length, is intended to replace the existing bridge without interrupting vehicular traffic. The bridge is being built in two phases so that half of the existing lanes can operate during construction, which required vertical excavations of as much as 11.5 m in depth during the first phase. Subsurface conditions: highly weathered water-bearing siltstone. Computed bearing capacity of the bridge foundations, determined elastic settlements and analyzed global stability of the temporary excavations. Recommended the installation of about 90 nails using helical anchors typically spaced 1.8 to 2.1 m on centers in a triangular pattern, but adding extra anchor rows in conjunction with concrete walls below the existing bridge footings. Coordinated and inspected the installation of initial nails and proof tests. Prepared geotechnical and inspection reports.

Dorado del Mar Condominium, Dorado, PR - A 21-story building for a residential developer. Typical subsurface conditions: beach sand deposits of Quaternary Age overlying soil strata containing sandstone and limestone fragments. Defined subsurface conditions using the results of electronic piezocone penetration tests, seismic tests, pore pressure dissipation tests, SPT N-values and grain size distribution. Mapped the depths, extent and thickness of sand deposits. Performed liquefaction potential assessment using three accepted empirical approaches: grain size distribution criterion, SPT blow count criterion and CPT tip resistance criterion. Recommended the use of mat in conjunction with vertical drains where the sand deposits were interfaced with less permeable soils to minimize build-up of excess pore water pressures during seismic loading. Prepared the final geotechnical report.

San Cristóbal Apartments, Barranquitas, PR - A slope stabilization and building protection project for a residential developer. Several buildings with shallow foundations were constructed on man-made fills placed without compaction control in early 1980s. Slope instability started during building construction, leading to the opening of several cracks on slope, parallel to the contour lines, which progressed over the years to about 50 m in length and several inches in aperture. One building was demolished due to extensive damage. Typical subsurface conditions: fill over highly plastic residual soils of volcanic rocks; recent clay deposits recorded at the toe of natural slope. Proposed and analyzed several remedial measures for the slope: ground anchors, passive H-piles grouted in pre-drilled holes, passive driven H-piles, ground improvements using soil mixing, concrete panels perpendicular to the contour lines and stabilizing berm. Selected ground anchors embedded into weathered rocks based on cost-effectiveness. Recommended and designed vertical and inclined mini-piles for building protection. Performed corrosiveness potential assessment, inspected the installation of 40 anchors and 63 mini-piles, supervised proof, performance and creep tests, and grout tests. Prepared geotechnical and inspection reports.

Plaza del Prado, Guaynabo, PR - Five-story and 6-story walkup apartment units and 2-story parking building on natural slope inclined 25 degrees to the horizontal line in an area susceptible to landslides, working for a local developer. Fills of as much as 9 m in height proposed on the slope for parking lots, and old houses lined next to the lot. Subsurface conditions: unstable colluvium

over weathered siltstone. Recommended the use of drilled shafts socketed into weathered siltstone for building foundations; performed axial and lateral capacity analyses and elastic settlement analyses in drilled shafts. Recommended drainage shafts, sub-horizontal drains and rock anchors to stabilize the slope; recommended slope instrumentation. Conducted global slope stability analyses to evaluate the effect of colluvium and rise in groundwater level during rain seasons on slope stability. Prepared the final geotechnical report.

Deep Tunnel of the Basin S06 Flood Relief System, Evanston, IL - A research project for the contractor, McNally Construction and Tunneling, conducted by the University of Illinois. The sewer tunnel for the City of Evanston was 1.3 km in length and 3.7 m in diameter, excavated at an average depth of 11 m using a conventional Lovat shield. Typical subsurface conditions: fill over glacial silty clay deposits resting on limestone. Prepared monitoring program, installed, calibrated and monitored geotechnical instruments in three test sections during and after tunneling. Instruments in tunnel lining included load cells, curvometer-distometer integrated system and tape extensometer. Instruments surrounding the tunnel included deep settlement points, pneumatic piezometers and inclinometer-Sondex system. Instruments at the ground surface included masonry nails and 4-ft-long settlement points. In addition, monitored about 25 other stations composed of masonry nails and 4-ft-long settlement points, and monitored adjacent houses close to the tunnel alignment. Analyzed the instrumentation data and prepared a report on tunnel performance. The instrumentation data obtained in this tunnel was the basis of a Ph.D. research project entitled "Immediate and Long Term Behavior of the Evanston Tunnel in Chicago Clay" directed by Prof. E. J. Cording. The research involved: stress analyses around the tunnel, estimates of excess pore water pressures, and assessment of the interaction of shield and initial lining with the surrounding ground. Determined the sources and areas of influence of the immediate and long term ground movements. Investigated the effects of soil disturbance at the periphery of tunnel, dissipation of excess pore water pressure and gravitational drainage into the tunnel on two-dimensional consolidation settlements. Compared the data with Terzaghi and Peck's data from Chicago subway tunnels and data from other tunnels in clay. Reviewed typical design assumptions. Proposed a method to estimate consolidation settlements around tunnels in clay.

Illinois Mine Subsidence Research Program, IL - Several high-extraction longwall coal mine panels were monitored in southern Illinois; they were several hundred feet in width and average depth, and several thousand feet in length; the overburden was composed of sedimentary rocks. The intent of this research project was to respond to the coal industry's need for lowering production costs and the agricultural industry's concerns regarding high-extraction mining; Illinois Coal Development Board and U.S. Bureau of Mines sponsored the project. Monitored electrical piezometers, observation wells and time-domain reflectometry (TDR) cables, and conducted level and total station surveys. Performed rock mass characterization using core logs and geophysical logs, and defined geo-mechanical properties of intact rocks using the results of laboratory tests. Evaluated mine subsidence phenomenon under Illinois' geologic conditions. Investigated the effects of longwall mining on farmland, groundwater, overburden and at mine level. Determined the sources of ground movements during and after mining, and their ultimate effects on subsidence levels and changes in hydrogeology. Investigated the mechanisms of bedrock fracturing and deformation above the mines in response to mining operations, and evaluated their propagation process toward the ground surface. Co-authored final research reports.

Strawpile Landslide, Aspen, CO - A consulting service for a ski resort to investigate the stability conditions of a landslide site using boring logs, geotechnical instrumentation data, results of pumping tests and records of annual rainfall, snowfall and temperature. Analyzed the results of pumping tests to estimate the hydraulic conductivity of sedimentary rocks. Interpreted pneumatic piezometer readings to evaluate seasonal variations in piezometric heads and their effects on slope movements. Conducted integrated data analyses to estimate the effects of temperature-induced snow melting, in conjunction with rainfall intensity, on piezometric levels. Interpreted inclinometer readings to define the sliding surface, rate of ground displacements and volume of landslide. Formulated mechanisms responsible for the landslide and investigated remedial measures, such as a surface drainage system. Co-authored the consulting report.

Los Angeles Metro - Red Line Segment 1, CA - A consulting service to provide comprehensive investigations of the existing conditions and structural integrity of tunnels for the Los Angeles County Metropolitan Transportation Authority (LACMTA). Twin tunnels of 7 km in length and 6.4 to 6.7 m in diameter excavated in alluvium and weak sedimentary rocks at depths of 6 to 28.5 m. Analyzed available pre-bid geotechnical data, construction history, lining thickness records and grout placement records. Analyzed ground penetrating radar investigation data, lining cores and post-construction tunnel survey data (such as crack patterns, flow lines and groundwater inflow locations on lining). Prepared profiles summarizing the results of analyses.

Altamira Hydroelectric Complex in Xingu River, Brazil - Three principal dams and more than 80 dikes involving about 162,000,000 m^3 of earthfill and 37,000,000 m^3 of rockfill for the Centrais Elétricas do Norte do Brasil S.A. (ELETRONORTE). Volume of concrete for two spillways and two powerhouses: 8,000,000 m^3, and volumes of soil and rock excavations: 51,000,000 and 32,000,000 m^3, respectively. Typical subsurface conditions: alluvium over residual soils of granite and migmatite on the lowlands and succession of sedimentary rocks on abutments. Inspected hundreds of observation pits along the dams and dikes to define the top of residual soils and select undisturbed samples for laboratory tests. Prepared specifications for in-situ permeability tests in observation pits. Prepared and supervised laboratory testing programs on soil and rock samples, including expansion tests on shale to determine the critical pressure and magnitude of expansion. Investigated pozzuolanic properties of clay samples for on-site cement production. Designed and used a portable cone for dynamic penetration tests along the dikes lined in a span of 100 km, inaccessible to drill rigs and tripod-mounted equipment. Correlated the blow counts obtained from the portable cone with the blow counts from Standard Penetration Tests (SPT). Used the portable cone blow counts to define the depths and extent of incompetent foundation soils for undercut. Supervised the stability and seepage analyses in earth and rockfill dams. Studied the construction sequence of dams on a typical 4-km-wide riverbed. Analyzed the technical and economic feasibility of concrete-faced rockfill dam as compared with rockfill dam with clay core. Evaluated the use of hydraulic fill for dikes as an alternative to compacted earthfill. Studied the transitions from earth dam to rockfill dam with clay core, concrete-faced rockfill dam, clay-faced rockfill dam and spillway, and from concrete-faced rockfill dam to clay-faced rockfill dam and powerhouse. Revised the design criteria for foundation treatment, filter and compaction requirements, slope protection, and instrumentation, among others. Prepared geotechnical design guidelines for earth dams founded on shale taking into account its strain-softening behavior. Prepared geotechnical reports for the Board of Consultants meetings; prepared and supervised final geotechnical reports.

Billings Dam, Brazil - An earth dam of 300 m in length and 20 m in maximum height for the Companhia do Saneamento Básico de São Paulo (SABESP). Typical subsurface conditions: soft alluvial clay over permeable alluvial sand resting on residual soil of gneiss. Conducted seepage analyses to estimate the rate of flow through the dam and foundation; computed piezometric levels in alluvial sand. Analyzed slope stability of the dam. Designed rip-rap for the protection of upstream slope of the dam. Prepared specifications for in-situ full-scale drawdown test to simulate the reservoir operation and its effects on dam performance. Prepared construction specifications and geotechnical instrumentation program for the dam. Recommended grouting of permeable alluvial sand using soil-cement mix to reduce the rate of flow, and designed relief trenches at the toe of downstream slope to reduce uplift pressures on the base of alluvial clay. Inspected the construction of the dam as a resident engineer, and prepared a report on dam performance.

Pedra do Cavalo Dam, Brazil - A rockfill dam of 500 m in length and 135 m in maximum height with inclined clay core for the Companhia de Desenvolvimento do Vale do Paraguaçu (DESENVALE). Subsurface conditions: predominantly residual soil of granite. Prepared specifications for laboratory tests on disturbed and undisturbed soil samples and prepared laboratory testing programs. Prepared specifications for trial embankment, stipulating the class of borrow material, maximum lift, type of compaction equipment, number of passages and compaction control. Prepared geotechnical specifications for the compaction of rockfill and clay core based on trial embankment data. Prepared geotechnical instrumentation program for clay core and rockfill; prepared specifications for assembly, installation and reading of observation wells and standpipe piezometers in clay core. Analyzed the results of stress path tests on undisturbed block samples extracted from clay core, which were performed to simulate the in-situ effective stress paths for use in finite element stress-strain analyses. Prepared specifications for in-situ confined plate load tests in clay core, intended to review deformability parameters obtained in laboratory. Designed excavations in granite for spillway and prepared specifications for cut slopes, bench widths and bench elevations. Prepared several geotechnical reports.

Pereira Barreto Canal, Brazil - A canal in sandstone with a length of 16 km and maximum depth of 60 m for the Companhia Energética de São Paulo (CESP). Analyzed geotechnical instrumentation data obtained during and after excavation. Designed rock bolts to anchor concrete pipes on cut slopes, assuming hydrodynamic forces induced by the water running inside the pipe. Performed slope stability analyses to determine the cut slopes in alluvium. Conducted stability and seepage analyses in cofferdam built at the end of canal to protect the excavated area from the waters of an existing reservoir. Prepared specifications for in-situ test on exposed sandstone slopes to evaluate the erosive action of rainwater. Prepared a report on the performance of cofferdam. Prepared monthly progress reports for the construction of canal.

Consolação-Vila América Water Tunnel, Brazil - A NATM tunnel of 1.8 km in length and 3 m in diameter proposed at an average depth of 10 m for the SABESP. Subsurface conditions: highly porous unsaturated colluvium over a succession of sand and clay deposits of Tertiary Age. Performed the sampling of undisturbed blocks from existing excavations next to the tunnel alignment. Prepared the laboratory testing program and supervised triaxial compression and extension tests, which were intended to simulate the effective stress paths around the tunnel during excavation. Installed and read standpipe piezometers along the tunnel axis before construction to monitor seasonal variations in piezometric levels at the tunnel depth. Conducted constant head

permeability tests in standpipe piezometers. Analyzed the results of laboratory tests and in-situ permeability tests to determine geotechnical parameters for use in finite element stress-strain and seepage analyses, respectively. Prepared the geotechnical report.

Example of Other Research Projects

Reinforced Concrete Liners for Pressure Tunnels [1990-1991] - Independent study undertaken at the University of Illinois under the direction of Prof. E. J. Cording. Principal topics investigated: criteria for the selection of liner types, conditions suited for reinforced concrete liners, preliminary layout using rule of thumb, final design based on allowable hydraulic pressure and allowable circumferential strain at the liner-rock boundary, design examples, and requirements for watering up and dewatering.

Membership in Professional Organizations

American Rock Mechanics Association
American Society of Civil Engineers
United States Society on Dams
Canadian Geotechnical Society
International Society for Rock Mechanics
International Society of Soil Mechanics and Geotechnical Engineering
Brazilian Society of Soil Mechanics and Geotechnical Engineering

Recent Publications

Kawamura, N., and Cording, E. J. (1999). Performance of a shield tunnel in Chicago Clay. Proceedings of the XI Pan-American Conference on Soil Mechanics and Geotechnical Engineering, Foz do Iguassu, Brazil, Vol. 2, p. 629-636.

Kawamura, N., and Cording, E. J. (1999). Long term behavior of tunnels in Chicago Clay. Geo-Engineering for Underground Facilities, Proceedings of the Third National Conference, ASCE, Urbana, IL, p. 866-878.

Kawamura, N. (1998). Immediate and Long Term Behavior of the Evanston Tunnel in Chicago Clay. Ph.D. Thesis in Civil Engineering, University of Illinois, UMI Number 9912285, 600 p.

Bauer, R. B., Mehnert, B. B., Van Roosendaal, D. J., DeMaris, P. J., Kawamura, N., and Booth, C. J. (1998). Overburden, surface, and hydrogeologic changes due to longwall coal mining in Illinois. Land Subsidence Case Studies and Current Research: Proceedings of the Dr. Joseph F. Poland Symposium, p. 281-289.

Presentations at Conferences and Universities

Long term behavior of tunnels in Chicago Clay. Invited speaker in the Third National Conference sponsored by the Geo-Institute of ASCE, Urbana, IL, June 16, 1999.

TDR cables, inclinometers and extensometers to monitor coal mine subsidence in Illinois. Invited speaker in the Symposium and Workshop on Time Domain Reflectometry, Evanston, IL, September 9, 1994.

Geotechnical aspects of the Altamira Hydroelectric Complex. Invited speaker for a lecture series at the University of Brasilia, Brazil in Spring Semester 1989.

Training and Short Courses

• Estimation of soil properties for foundation design, Geo-Institute Congress, Orlando, FL, 2002
• Course on computational geotechnics, University of Colorado, Boulder, CO, 2001
• Deep foundations, ASCE Continuing Education Course, San Juan, PR, 2001
• Construction quality management for contractors. USACE, San Juan, PR, 2000
• Design and construction of soil nail walls. FHWA, San Juan, PR, 1999
• Geological aspects of fracture mechanics. By Prof. T. Engelder (PenState), Urbana, IL, 1994
• Special topics on the slope stability of earth and rockfill dams, UnB, Brazil, 1985
• Use of finite element method in geotechnical problems, USP, Brazil, 1980
• Use of finite and boundary element methods in dam design, USP, Brazil, 1979
• Dam foundations: geological, geo-mechanical and geotechnical conditions, USP, Brazil, 1979
• Compacted earth dams, USP, Brazil, 1978

Computer Skills

PLAXIS Version 7.2 (finite element code for soil and rock analyses under static and dynamic loading), SLOPE/W Version 4 (slope stability analysis), SEEP/W Version 4 (finite element seepage analysis), SIGMA/W Version 4 (finite element stress and deformation), LPILE Plus 3.0 (lateral pile capacity analysis), GRLWEAP Version 1998-2 (wave equation analysis), DRIVEN (pile capacity), GTGS v3.1 (geotechnical graphics system), SigmaPlot 4.0 (technical graphing), CorelDRAW 9 (drawing), PowerPoint 97 (presentation graphics), Microsoft Project (project schedule).

Languages

• English and Portuguese: fluent

References

Available upon request

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