

TIRSO A. ALVAREZ

EDUCATION

Ph.D. in Civil Engineering. January 1997
University of Illinois at Urbana-Champaign.
Major : Geotechnical Engineering.

Master of Science in Civil Engineering, December 1988.
University of Maryland, College Park.
Major : Geotechnical Engineering.

Civil Engineer, October 1986.
Santo Domingo Institute of Technology (INTEC).
Santo Domingo, Dominican Republic.
Honors : Summa Cum Laude

PRACTICE

Soil and Rock Slope Stability
Deep foundations and testing
Dams.
Underground Facilities in Soil and Rock.
Site Investigation.
Dewatering

REGISTRATION

Registered Professional Engineer in the Commonwealth of Puerto Rico. Lic # 17102

PROFESSIONAL EXPERIENCE

President, Horizon Consultants, Santo Domingo, Dominican Republic

*Partner and Senior Geotechnical Engineer, GEOCONSULT, Inc.
San Juan, Puerto Rico.*

Major projects 1999:

Triangulo Dorado San Antonio Tunnel : field exploration, testing, geotechnical recommendations for undersea crossing between existing bridges, 20-m-deep cuts next to buildings, etc. Dewatering, excavation support. Barrett & Hale . Frederic R. Harris Inc.

Baldorioty Boulevard. San Juan PR: field exploration, testing, geotechnical recommendations for 2 km boulevard with flyover bridges to/from Muñoz Rivera Ave. Barrett & Hale . Frederic R. Harris Inc

Cataño Breakwater : Investigation of causes of volume overrun in construction of rubble-mound breakwater over soft soils at Fishermen Village area. Del Valle Group

Highway PR-66 Bo. Trujillo Bajo-Canóvanas: Rock cuts, rockfill & earthfill embankments, nine bridges: spread footings, drilled shafts, pile driving, PDA, CAPWAP, GRLWeap. MSE walls. Blasting & vibration control for 8-mile segment of highway. Rio Construction & Barrett & Hale.

Tren Urbano Villa Nevárez Contract (Section 6). Río Piedras PR: PDA, CAPWAP, GRLWeap, QC driving records piers. Monoshaft support for 7 piers. Redondo-Entrecanales, SE

Fajardo Dam (AFI) Final Design : field exploration, testing, peer review of 37-m-high central core earth dam design & appurtenant structures. Gregory L. Morris & Associates Golder Associates

Major projects 1998:

Carraízo Dredging Project. Gurabo PR: Site V design of embankment dams. Monitoring staged construction segments, soil and rock cuts. Weeks Marine & José A. Meléndez & Assoc.

Tren Urbano STTT Contract (Section 3). Guaynabo PR: Pile driving criteria. PDA testing, construction issues. Redondo-Perini Joint Venture

Tren Urbano Centro Médico Contract (Sections 4&5). Río Piedras PR: PDA, CAPWAP, GRLWeap, Review/ approve driving records piers. Excavation support: tiebacks, open cut, braced excavations. Redondo-Entrecanales, SE & H2A Engineers

Tren Urbano Villa Nevárez Contract (Section 6). Río Piedras PR: PDA, CAPWAP, GRLWeap, Review/ approve driving records piers. Redondo-Entrecanales, SE & H2A Engineers

North Coast Superaqueduct Project.: Construction problems, soft soils, base heave control for pipe installation. Thames-Dick Superaqueduct Partners

PR-66 Bo. Trujillo Bajo-Canóvanas: Rock cuts, rockfill & earthfill embankments, Seven bridges: spread footings, drilled shafts, pile driving, PDA, CAPWAP, GRLWeap. MSE walls. Blasting & vibration control. Rio Construction & Barrett & Hale.

Fajardo Dam (AFI) 35% design : field exploration, testing, peer review of 37-m-high central core earth dam design & appurtenant structures. Gregory L. Morris & Associates Golder Associates

Major projects 1997:

Carraízo Dredging Project. Gurabo PR: Exploration, Embankment dams for dredged material disposal cells, soil and rock cuts. Weeks Marine & José A. Meléndez & Assoc.

Tren Urbano STTT Contract (Section 3). Guaynabo PR: Pile driving criteria. PDA testing, construction issues. Redondo-Perini Joint Venture

Tren Urbano Centro Médico Contract (Sections 4&5). Río Piedras PR: Exploration, Deep foundations (including PDA testing) for elevated guideway, cuts in soils, embankments, cut/cover tunnel. Redondo-Entrecanales, SE & H2A Engineers

Tren Urbano Villa Nevárez Contract (Section 6). Río Piedras PR: Exploration, Deep foundations (drilled shafts and driven piles) for elevated guideway, excavations near river. Redondo-Entrecanales, SE & H2A Engineers

Tren Urbano Río Piedras Contract (Section 7). Río Piedras PR: Exploration for KKZ/CMA (Woodward-Clyde Consultants).

Acuaexpreso Service Vehicle Station. San Juan PR: PDA testing to develop driving criteria.

North Coast Superaqueduct Project. Arecibo PR: PDA testing & driving criteria for Arecibo Intake Structure; Evaluation of stability of cut near steep slope.

Deck Additions to bridges 957 & 959. New HOV lane PR-18: Deep foundation and spread footing solution for 10-meter-wide addition. Caribe Contractors & Erasto L. Serbia.

PR-18 West cuts for new HOV lane: Exploration, Soil Nail wall, slope stability for 10-meter-wide addition. CMA Architects & Engineers.

Research Assistant,

University of Illinois at Urbana-Champaign
1989 to 1996

US Army Corps of Engineers, Construction Engineering Research Laboratories (CERL)
1991 to 1992.

GEOCONSULT

Engineer II, **Shannon & Wilson**, Inc. St. Louis, Missouri. Summer 1991
Contact: Dr. J. Ronald Salley, PE, President.

Geotechnical Engineer, Engineering Consultants, Inc. **ECI**, and **EPSA-LABCO**,
Jigüey- Aguacate Hydroelectric Project
Santo Domingo, Dominican Republic. Summer 1989.
Contacts: ECI: Mr. William Bliton, PE; EPSA-LABCO: Dr. Manuel Gómez-Achécar.

Consulting :

Consorcio INARSA+TECNOAMERICA, Consulting Engineers
Santo Domingo, Dominican Republic. February 1996
Contacts: Ing. Pedro Delgado Malagón, President

Evaluated the conditions leading to landslides (35 m high) in the new alignment of the Duarte Highway, to the West of the existing one, which passes through weathered ultramafic rock and saprolitic soils, in the area of *Loma de Miranda*, (E 4+600 - 5+080). Groundwater springs and seepage faces saturated the subgrade and slope. Several field inspections were performed. Slope stability and Finite Element Seepage analyses were performed to prescribe stable final cuts and drainage measures.

Dr. Edward J. Cording, Geotechnical Consultant
Savoy, Illinois. 1994 - present.

Assistant to Dr. E. J. Cording in the defense of The Reinforced Earth Company on a Puerto Rico lawsuit. A Reinforced Earth[®] wall, constructed on top of a residual soil slope, sustained fill placed to provide level backyards to houses on top of the slope. A global slide occurred after a period of continued rains. The causes of the failure were determined.

Frederic R. Harris, Inc. - COINDISA, Consulting Engineers
Santo Domingo, Dominican Republic. June 1994
Contacts: Harris: Mr. Paul Muccino, PE, Assoc. vice-president. COINDISA: Ing. T. Alvarez Efres, President

Performed a field study of the stability of existing highway cuts, in weathered rocks, in the area of *Loma de Miranda*, km. 104 of the existing Duarte Highway. Cuts were planned on the East side of the existing highway. The study emphasized the back analysis of existing slides, and the tabulation of Failure/No-Failure configurations to prescribe stable slope inclinations for the expansion of the highway.

Frederic R. Harris, Inc. - COINDISA, Consulting Engineers
Santo Domingo, Dominican Republic. February 1994
Contacts: Harris: Mr. Paul Muccino, PE, Assoc. vice-president. COINDISA: Ing. T. Alvarez Efres, President

Performed a field study of the stability of existing highway cuts, in residual soils from Metavolcanic rocks, in the area of *La Cumbre*, km. 61-66 of the Duarte Highway. The study emphasized the back analysis of existing slides, and the tabulation of Failure/No-Failure configurations to prescribe stable slope inclinations for the expansion of the highway.

GEOCONSULT

Dr. Gabriel Fernández, Geotechnical Consultant
Savoy, Illinois. November 1993

Summarized case histories illustrating the behavior of reinforced concrete tunnel liners subjected to strong earthquakes in California. This effort was part of the study on the stability of the tunnel liners of the Los Angeles Metro subway tunnels, prompted by allegations by the press of poor construction of the liners.

Mr. Donald E. Plotkin, PE, Principal Investigator. US Army Corps of Engineers,
Construction Engineering Research Laboratories (CERL-FMM)
Champaign, Illinois. August 1992

Analyzed and interpreted the results of a field measurements program conducted at Aberdeen Proving Grounds, in Maryland. The objective was to correlate the magnitude and change in magnitude of railroad track geometry measurements with the physical condition of the railroad track structure for the efficient location of substandard track sections and optimal allocation of maintenance and rehabilitation funds. Three types of track geometry vehicles were used and the effect of speed of measurement and vertical load was assessed on four different track sections, namely two tangent and two curve section in good and poor state.

Dr. Edward J. Cording, Geotechnical Consultant,
Savoy, Illinois. Fall 1990

Studied the issues involved in the containment of natural gas in unlined rock caverns and the conditions for gas bubble migration along saturated rock fractures.
Performed Finite Element Analyses to assess the stress distribution around four parallel underground caverns for natural gas storage in Brooklyn, NY, prepared for Fenix and Scisson, Inc. Tulsa, OK. Three cavern geometries under four different far field stress-internal pressure states were studied to aid in the design of the openings.

Constructora Pérez Fermín & Asociados, Civil Engineering Contractors
Santo Domingo, Dominican Republic. August 1989

A solution cavity was accidentally found near the footing of a highway bridge column on shallow foundation, on marine limestone with karst features. The structure consisted of two parallel 4 lane curved bridges for the expansion of J.F. Kennedy Avenue. A geophysical exploration program was implemented using seismic fan shooting to locate any other features. Recommendations were given on filling of the cavities, confirmation borings for newly detected features and sampling of the previously grouted foundations to check the quality of the job and for testing.

RESEARCH EXPERIENCE

Research Assistant, September 1988 - 1996.
Department of Civil Engineering,
University of Illinois at Urbana-Champaign.

In charge of CE 486 (Rock Mechanics I) Laboratory sessions on rock testing.
Ph.D. Thesis: A Study of the coupled hydromechanical behavior of jointed rock masses around pressure tunnels. December 1996

Research Assistant, January 1987 - September 1988.

GEOCONSULT

Department of Civil Engineering,
University of Maryland, College Park.

Master's Thesis: Centrifuge Model Testing of Geotextile Reinforced Cohesive Soil Walls. Dec. 1988

GRADUATE COURSES

Soil Mechanics, Foundations, Earth Pressures, Advanced Consolidation of Clays, Advanced Shear Strength, Deep Foundations, Embankment Dam Design, Rock Mechanics, Rock Engineering, Soil and Rock Dynamics, Engineering Geology, Structural Geology, Site Investigation, Structural Mechanics, Structural Dynamics, Linear and Non-linear Finite Element Methods, Fracture Mechanics, Theory of Plasticity, Numerical Methods, Reinforced Concrete, Statistics.

LANGUAGES: Spanish, English & French

AWARDS

University of Illinois at Urbana-Champaign, Fall 1988.

Ralph B. Peck Fellowship (1992).

Stanley D. Wilson Fellowship, (Shannon & Wilson, Inc.) (1989)

Hanson-Rodríguez International Fellowship (1989)

PUBLICATIONS

Journals and Conference Proceedings

Alvarez, T. A., Cording E.J. and Fernandez, G (1999) "Pressure tunnels in fractured rock. Minimum cover criterion from the stability of rock wedges." Geo-engineering for Underground Facilities. Third Geo-Institute conference of ASCE (Fernández & Bauer Eds.). Urbana, IL

Alvarez, T. A. (1997) "Geotécnia Práctica para Problemas de Estabilidad de Taludes", Presented at the *Conference 40 years of Soil Mechanics in the Dominican Republic*. Symposium honoring the late José Luis Capacete, PE. CODIA.

Alvarez, T. A., Cording E.J. and Mikhail R. (1995) "Hydromechanical Behavior of Rock Joints. A Re-interpretation of Published Experiments", Proc. 35th *U.S. Symposium on Rock Mechanics*, Lake Tahoe, Nevada. Balkema

Fernández, G. and Alvarez, T.A.(1994) "Seepage-Induced Effective Stresses and Water Pressures Around Pressure Tunnels", *Journal of Geotechnical Engineering*, Vol. 120, No. 1, pp 108-128, ASCE.

Plotkin, D.E., Sandhaas, L. and Alvarez, T.A.(1993) "TRACK (1.0): A Railroad Track Design and Evaluation Computer Program for Work Planning and Budgeting", *Infrastructure Planning and Management*, Proc. Conference sponsored by the Committee on Facilities Management and the Committee on Urban Transport Economics of the Urban Transport Division of the American Soc. of Civil Engrs., Denver, CO, pp 132-136.



PROFESSIONAL SOCIETIES

College of Engineers and Surveyors of Puerto Rico (CIAPR), American Society of Civil Engineers (ASCE), Associate Member, American Rock Mechanics Association (ARMA), Member, U.S. Chapter, International Society for Rock Mechanics (ISRM), Member.

Member Embankment, Dams & Slopes Technical Committee Geo-Institute of ASCE