

## **Ernest Naesgaard, Ph.D, P.Eng.**

Ernest Naesgaard, P.Eng., is a senior geotechnical engineer and principal of Naesgaard-Amini Geotechnical Ltd. with over 35 years' experience in subsurface site investigation and geotechnical design work. He has carried out foundation and site preparation designs for a wide variety of structures in varying soil types including: highrise developments, industrial factories, warehouses, water-edge structures, residential subdivisions, excavation shoring, tanks, dams, and major bridges. He has conducted analyses for liquefaction assessment; consequences of liquefaction; soil dynamics; soil-structure interaction; slope stability; pile driving; lateral pile; and settlement assessment. Dr. Naesgaard has carried out complex dynamic soil-structure numerical analyses for several major projects.



In addition to geotechnical design work, Dr. Naesgaard has also kept abreast of latest developments in earthquake engineering. His work includes discovery and mapping of paleoseismic sand dykes that are important prehistoric evidence of a past major earthquake and liquefaction in the Fraser Delta and research on the seismic behaviour of pile foundations in liquefied ground (through grant from B.C. Science Council), and development of numerical models for analyzing soil structures susceptible to soil liquefaction and flow.

Dr. Naesgaard combines the education and experience that make him a valued resource in the design, analysis and site preparation of major geotechnical and civil engineering projects.

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### ▪ **Education**

**2011 Ph.D.**, Civil Engineering (Geotechnical),  
University of British Columbia

**1988 M.Eng.**, Civil Engineering (Geotechnical),  
University of British Columbia

**1973 B.A.Sc.**, Geological Engineering,  
University of British Columbia

### ▪ **Employment History**

**2011-present:** Naesgaard-Amini Geotechnical Ltd.

**2006-2011:** Naesgaard Geotechnical Ltd.

**2000 –2006:** Trow Associates Inc.

**1976 – 2000:** Macleod Geotechnical Ltd

**1974 – 1976:** Piteau Gadsby Macleod Ltd.

**1973 – 1974:** Placer Developments Corp., Endako

### ▪ **Awards & Scholarships**

**2009** Bestowed a Fellow by Engineers Canada

**2004** Canadian Society of Civil Engineering **Casimir Gzowski Medal** for best paper in Civil Engineering

**2004 Canadian Council of Professional Engineers Manulife Financial Scholarship** for practicing Professional Engineers to further their education.

**2003 to 2005 Ministry of Transportation – UBC Partnership scholarship**

**2003 Vancouver Geotechnical Society Award** and Life membership

### ▪ **Professional Affiliations**

Association of Professional Engineers and Geoscientists of British Columbia (since 1976)

Association of Professional Engineers, Washington State

APEGBC Task Force for geotechnical engineering services for building projects

Canadian Geotechnical Society (past BC Region Director)

10th Annual Vancouver Geotechnical Society June 1996 Symposium (Chairman)

Vancouver Geotechnical Society (past secretary, and chairman)

Taskforce on Earthquake Design in Fraser Delta (1991 & 2004/2007)

Earthquake Engineering Research Institute (EERI)

American Society of Civil Engineers

2006 Canadian Geotechnical Society Conf. – Technical Committee & short course organization.

2007/2008 Taskforce on Seismic Slope Stability for Buildings in British Columbia - APEGBC.

2008/2009 Taskforce for Earthquake Design of Retaining Walls – Structural Engineers Association of B.C.

TC203 (formerly TC4): Earthquake Geotechnical Engineering Task Force, ISSMGE – past member

2009 APEGBC Seismic Technical Review Board for BC Schools

▪ **Teaching / Seminars**

1990-present University of British Columbia Civil 411 Case Histories' Class (invited lecturer)

2003/4 Sessional Lecturer UBC Civil 411 (Geotechnical Case Histories)

2004/5 Sessional Lecturer UBC Civil 410 (Foundation design)

2005, 2009 & 2011 Lecturer for VSEGS / SEABC 'Geotechnical Aspects of Foundations' course.

2009 Sessional Lecturer UBC Civil 311 (Soil Mechanics)

▪ **Experience Summary (example projects)**

**BUILDINGS**

**Vancouver International Airport Domestic Terminal Building** - Seismic upgrade design, including soil-structure dynamic analysis and full-scale testing of lateral deformation tolerance of timber piles.

**Emergency Communications Facility, Vancouver** - foundation design for post-disaster facility

**Expo 86, Vancouver** - Foundation design for numerous pavilions, and general site preparation

**Doman Property Development** - A 32-acre development. Work included: water edge stabilization, high-rise tower and low-rise building foundations, site preparation, services and bridge foundations.

**Schools & Colleges** - Kwantlen College, Cambie Secondary School, Sedgewick Library Seismic upgrade

**Excavation, Shoring & underpinning** - B.C. Courthouse Vancouver, Vancouver General Hospital, and several downtown highrise buildings.

**SLOPE STABILITY**

**Slope Stability and Erosion Assessment** - Wall Street Cliffs, Acadian Ravine, Mosquito Creek Ravine, Graham Drive landslide stabilization, & Delta Slope Hazard Permit boundary assessment.

**DOCK FACILITIES**

**Vanterm Expansion** - Numerical analyses of caisson and piled dock structure to model seismic behaviour.

**Lynnterm Container Feasibility study** - preliminary design for using existing caisson dock structures to support large container cranes.

**Whittier, Alaska Rail Barge off-load** - sheetpile cofferdam and piled deck alternatives for barge dock.

**Vancouver Wharves Tank Farm** - Dynamic numerical analyses for water edge tank farm

**TANKS, RESERVOIRS & INFRASTRUCTURE**

**Central Park & Cape Horn Reservoirs - Burnaby** post-disaster seismic upgrade design

**Cloverdale and New Westminster Sewerage overflow tanks** - 50m diameter by 9m deep tanks founded within very soft and deep clay soils and water bearing sands respectively.

**Preliminary Beach Yard Facilities Seismic upgrade** Project management and geotechnical seismic upgrade design of North Vancouver valve chamber facility.

**BRIDGES**

**Seismic Retrofit design for Lions Gate, Oak Street, Port Mann, Mosquito Creek, Pitt River, and Teslin River (Yukon) Bridges** - work for each typically included assessment of seismic risk, ground response to earthquake shaking, liquefaction risk and consequence, soil "springs" for dynamic analysis, foundation/soil interaction, and design of mitigative measures.

**W.R. Bennett (Okanagan Lake) Bridge** - Seismic analyses, foundation design, and embankment design for 1.5 km long bridge founded over very loose and very soft lake bottom soils. Proposed design includes piers founded on 50m deep 914 diameter piles and embankments constructed using light-weight expanded polystyrene fill.

**Alex Fraser Bridge** - Construction tiedown design (included full scale cyclic load tests)

**Third Avenue Overpass Bridge, New Westminster** - Site investigation & foundation design - Geotechnical Engineer of Record

**White River Bridge, Yukon** - Site Investigation, Seismic Response Analyses, and field review.

**Churn Creek Bridge** - upgrade design for old two lane suspension bridge over the Fraser River

**Golden Ears Bridge** - Six lane bridge over Fraser River at Fort Langley with liquefiable sand over deep soft clay subsoil - Geotechnical Engineer of Record for main span and approaches

**RAV Rapid Transit Bridge** - over North Arm of Fraser River - Geotechnical consultant & reviewer.

**Port Mann Bridge** - new 10 lane bridge over the Fraser River - Geotechnical consultant & reviewer to the geotechnical checking engineer.

## TUNNELS

**George Massey Tunnel** – Seismic upgrade design for major tunnel under Fraser River (structural component complete)

## DAMS & RESERVOIRS

**Tulsequah Mines Tailings dams** – Dynamic numerical modelling to assess seismic performance.

**Ruskin Dams** – Review and dynamic numerical modelling to assess seismic performance of right abutment slope.

**John Hart Intake Structure, Middle, and North Earth dam** – Dynamic soil-structure numerical modelling to assess seismic performance.

**Suncor Pond 5 Safe Cover** – Numerical analyses for lightweight reclamation cover over extremely soft tailings including modelling consolidation process with inclusion of wick drains.

## Publications

**Naesgaard, E., Amini, A., Uthayakumar U.M., and Fellenius, B.H., 2012.** “Long Piles in Thick Lacustrine and Deltaic Deposits. Two Bridge Foundation Case Histories,” In Full-Scale Testing and Foundation Design, ASCE Specialty Publ. 227, pp 404-421.

**Uthayakumar, M., and Naesgaard, E., 2011,** “Geotechnical Design for the William R. Bennett Bridge, Kelowna, British Columbia”, 2011 Pan-Am CGS Geotechnical Conference, Canadian Geotechnical Society, Toronto, Ontario.

**Naesgaard, E., 2011.** “A hybrid effective stress – total stress procedure for analyzing soil embankments subjected to potential liquefaction and flow”, Ph.D. Thesis, Civil Engineering, University of British Columbia, May

**Amini, A., Brockbank, B. and Naesgaard, E., 2010,** “Assessment of seismic performance of a Reinforced Earth wall using dynamic analysis”, 63<sup>rd</sup> Canadian Geotechnical Conference, Canadian Geotechnical Society, Calgary, Alberta.

**Amini, A., Brockbank, B. and Naesgaard, E., 2010,** “Dynamic Analysis of a Reinforced Earth Wall”, Vancouver Geotechnical Society 19th Symposium, June.

**Naesgaard, E., Beaty, M.H. and Byrne, P.M., 2009.** “Performance-based design of potentially liquefiable embankments using a combined effective stress—total stress model” IS-2009 Tokyo, Performance-Based Design in Earthquake Geotechnical Engineering – Kokusho, Tsukamoto & Yoshimine (eds) © 2009 Taylor & Francis Group, London, ISBN 978-0-415-55614-9.

**Naesgaard, E., Azizian, A., Yang, D., Uthayakumar, M., Amini, A. and Byrne, P.M., 2008.** “Golden Ears Bridge – Geotechnical seismic design aspects,” 61<sup>st</sup> Canadian Geotechnical Conference, Canadian Geotechnical Society, Edmonton, Alberta.

**Amini, A., Fellenius, B.H., Sabbagh, M., Naesgaard, and Buehler, M., 2008.** “Pile Load Testing at Golden Ears Bridge,” 61<sup>st</sup> Canadian Geotechnical Conference, Canadian Geotechnical Society, Edmonton, Alberta.

**Yang, D., Naesgaard, E. and Byrne, P.M. 2008.** “Soil-structure interaction considerations in seismic design for deep bridge foundations”, 6<sup>th</sup> International Conf. on Case Histories in Geotechnical Engineering, Arlington, Va.

**Naesgaard, E., Byrne, P.M., and Wijewickreme, D., 2007.** “Is P-Wave Velocity an Indicator of Saturation in Sand with Viscous Pore Fluid?” International Journal of Geomechanics, ASCE. Vol. 7 No. 6 Nov/Dec. pp 437-443.

**Naesgaard, E. and Byrne, P.M., 2007.** “Flow liquefaction simulation using a combined effective stress - total stress model,” 60<sup>th</sup> Canadian Geotechnical Conference, Canadian Geotechnical Society, Ottawa, Ontario, October.

**Anderson, D.L., Byrne, P.M., DeVal, R.H., Naesgaard, E., and Wijewickreme, D., Eds. & Contributing Authors, 2007.** “Task Force Report on Geotechnical Design Guidelines for Buildings on Liquefiable Sites in Greater Vancouver in Accordance with NBC2005,” University of British Columbia publication.

**Naesgaard, E., Uthayakumar, M., Ersoy, T. and Gillespie, D., 2006.** “Pile load test for W.R. Bennett Bridge,” 59<sup>th</sup> Canadian Geotechnical Conference, Canadian Geotechnical Society, Vancouver, B.C., October.

**Byrne, P.M., Naesgaard, E., and Seid-Karbasi, M., 2006.** “Analysis and design of earth structures to resist seismic soil liquefaction,” 59<sup>th</sup> Canadian Geotechnical Conference, Canadian Geotechnical Society, Vancouver, B.C., October.

**Naesgaard, E., Byrne, P.M., and Seid-Karbasi, M., 2006.** “Modelling flow liquefaction and pore water redistribution mechanisms,” Proc. 8<sup>th</sup> National Conf. on Earthquake Engineering, San Francisco, April.

**Yang, D., Naesgaard, E. and Byrne, P.M. 2006.** “Nonlinear Dynamic Soil-Structure Interaction Analyses of Immersed George Massey Tunnel”, ASCE Specialty Publ., GeoShanghai, June.

**Naesgaard, E. and Byrne, P.M., 2005.** “Flow liquefaction due to mixing of layered deposits,” Proc. Geotechnical Earthquake Engineering Satellite Conf., Osaka, Sept. 10, TC4 committee ISSMGE, Publ. by Japanese Geotechnical Society, pp. 103-108.

**Naesgaard, E., Byrne, P.M., Seid-Karbasi, M., and Park, S.S., 2005.** “Modelling flow liquefaction, its mitigation and comparison with centrifuge tests,” Proc. Geotechnical Earthquake Engineering Satellite Conf., Osaka, Sept. 10, TC4 committee ISSMGE, Publ. by Japanese Geotechnical Society, pp. 95-102.

**Seid-Karbasi, M., Byrne, P. M., Naesgaard, E., Park, S.S., Wijewickreme, D., and Phillips, R., 2005.** “Response of sloping ground with liquefiable materials during earthquake: a class A prediction.” *In Proc.*, 11<sup>th</sup> Int. Conf., Int. Association of Computer Methods and Advances in Geomechanics, IACMAG, Turin, Italy, V. 3, pp. 313-320.

**Yang, D., Naesgaard, E., Byrne, P.M., Adalier, K., and Abdoun, T., 2005.** “Numerical Model verification and

calibration of George Massey Tunnel using centrifuge models" Canadian Geot. Journal, Vol. 41, No. 5, April (Awarded Casimir Gzowski Medal for best paper in Civil Engineering in Canada in 2004)

**Naesgaard, E., Zergoun, M., and Auyeung, W., 2004.** "The Construction and Performance of Post-grouted Micro-piles for Vancouver International Airport Domestic Terminal Building," 29<sup>th</sup> Deep Foundations Institute Conference, Vancouver, September.

**Naesgaard, E., Yang, D., Byrne, P.M., and Gohl, B., 2004.** "Numerical analyses for the seismic safety retrofit design of the immersed-tube George Massey tunnel," 13th World Conference on Earthquake Engineering, Vancouver, August.

**Smith, D., Naesgaard, E., and Kullmann, H., 2004.** "Seismic design of a new pile and deck structure adjacent to existing caissons founded on potentially liquefiable ground in Vancouver, BC., 13th World Conference on Earthquake Engineering, Vancouver, August.

**Uthayakumar, U.M. and Naesgaard, E., 2004.** "Ground response analysis for seismic design in Fraser River delta, British Columbia," 13th World Conference on Earthquake Engineering, Vancouver, August.

**Yang, D., Naesgaard, E. and Gohl, B., 2003,** "Geotechnical Seismic Retrofit Design of Immersed George Massey Tunnel", 12<sup>th</sup> Panamerican Conference on Soil Mechanics and Geotechnical Engineering, June.

**Adalier, K., Abdoun, T., Dobry, R., Phillips, R., Yang, D., and Naesgaard, E., 2003.** "Centrifuge modeling for seismic retrofit design of an immersed tube tunnel," International Journal of Physical Modeling in Geotechnics, 3(2): 23-32.

**Naesgaard, E., Uthayakumar, M., 2002,** "Seismic Safety retrofit of the Port Mann Bridge North Approach", Vancouver Geotechnical Society 16th Annual Symposium, May.

**Naesgaard, E., Yip, G., 2001,** "A.R. MacNeill School – site development and foundation design", Vancouver Geotechnical Society 15th Annual Symposium, May.

**Uthayakumar, M., Naesgaard, E., 2000,** "Seismic retrofit design, Pitt River Bridges, British Columbia", Vancouver Geotechnical Society 14th Annual Symposium, May.

**Naesgaard, E., Uthayakumar, M., 1999,** "Numerical analyses for seismic retrofit design, Lions Gate Bridge, Vancouver, B.C.", FLAC Symposium on Numerical Modeling in Geomechanics, Minneapolis, Minnesota, September.

**Naesgaard, E., Byrne, P.M., and Ven Huizen, G., 1998,** "Behaviour of Light Structures Founded on Soil 'Crust' over Liquefied Ground" Proc. ASCE conf. on Geotechnical Earthquake Engineering and Soil Dynamics, Seattle, August, 1998.

**Clague, J.J., Naesgaard, E., and Mathewes, R.W., 1998,** Geological evidence for prehistoric earthquakes, in Geology and Natural Hazards of the Fraser delta: Geological Survey of Canada Bulletin 525, p. 177-194.

**Clague, J.J., Naesgaard, E., and Nelson, A.R., 1997,** "Age and significance of earthquake-induced liquefaction near

Vancouver, British Columbia, Canada," Canadian Geot. Journal, Vol. 34, No. 1, pp. 53-62.

**D. Inglis, G. Macleod, E. Naesgaard, and M. Zergoun, 1996.** "Basement Wall with Seismic Earth Pressures and Novel Expanded Polystyrene Foam Buffer Layer", Vancouver Geotechnical Society 10th Annual Symposium, June.

**Clague, J.J., Bobrowsky, P.T., Guilbault, J.P., Linden, R.H., Mathewes, R.W., Naesgaard, E., Shilts, W.W., and Sy, A., 1996,** Paleoseismology and seismic hazards, Southwestern British Columbia, Geological Bulletin 494, Compiled and edited by J.J. Clague.

**Chang, C.Y., Naesgaard E., Wang Z.Liang, Siu, D., 1995.** Geotechnical Considerations for Seismic Vulnerability Study of Port Mann Bridge, National Seismic Conference on Bridges and Highways, San Diego, California, Dec.

**Naesgaard, E., Macleod G., and Inglis, D.J., 1995,** Shoring Practices in Greater Vancouver, 48<sup>th</sup> Canadian Geotechnical Conference, Canadian Geotechnical Society, Vancouver, B.C., September.

**Inglis, D.J. and Naesgaard, E., 1994,** Case History of Pile Relaxation in Vancouver, 8th Annual Vancouver Geotechnical Society Symposium - Deep Foundations, Vancouver, B.C.

**Naesgaard, E. and Beaton N., 1993,** Dynamic Compaction Densification for Liquefaction Mitigation and Improved Foundation Support in the Fraser Delta - A Case History, 7th Annual Vancouver Geotechnical Society Symposium.

**Naesgaard, E., 1992,** "Lateral Load Tests to Examine Large-Strain (Seismic) Behaviour of Piles," Canadian Geotechnical Journal, 29:245-252

**Clague, J.J., Naesgaard, E. and Sy, A., 1992,** Liquefaction Features on the Fraser Delta: Evidence for Prehistoric Earthquakes?, Canadian Journal of Earth Sciences, 29: No.8, pp.1734-1745

**Naesgaard, E., Sy, A. and Clague, J.J., 1992,** Liquefaction Sand Dykes at Kwantlan College, Richmond, B.C., First Canadian Symposium on Geotechnique and Natural Hazards, Vancouver, pp.159-166

**Macleod, G., Naesgaard, E. and Piteau, D.R., 1976.** "Anchor Tieback Shoring for Provincial Government Buildings, Vancouver, B.C.," 29th Canadian Geotechnical Conference, Vancouver, B.C.

## ▪ Contact Information

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