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## Monthly Seminar

### Findings of the Canadian Engineering Reconnaissance Team After the 2015 Gorkha, Nepal Earthquake

- Date:** October 14<sup>th</sup>, 2015
- Venue:** Room C300, UBC Robson Square, 800 Robson Street, Vancouver
- Time:** Refreshments 6:00pm, Presentation 6:30pm
- Presenter:** Dr. Svetlana Brzev, PhD, P.Eng., BCIT  
Dr. Bishnu Pandey, PhD., BCIT  
Dr. Upul Atukorala, PhD. P.Eng., Golder Associates  
Dr. Carlos Ventura, PhD, P.Eng., P.E., UBC  
John H Pao, M.Eng., P.Eng., Struct.Eng., Bogdonov Pao Associates
- Cost:** Free for SEABC Members. \$75 + tax for non-members  
Registration is required: <http://www.seabc.ca/nepal>



A team of Canadian engineers and geoscientists visited Nepal after the April 25, 2015 Gorkha earthquake (M 7.8). The earthquake and the subsequent aftershocks caused more than 8,700 fatalities and damage or collapse of more than 600,000 buildings, including the UNESCO World Heritage sites. The reconnaissance team, sponsored by the Canadian Association of Earthquake Engineering, studied the earthquake impact on housing, institutional facilities, heritage buildings, schools, hospitals, and lifelines. The ground motions induced by the earthquakes had notable characteristics. The damage patterns observed in non-ductile low- and mid-rise buildings revealed how irregularities can cause significant damage and collapse even at low shaking intensity. Most deaths were due to collapse of vulnerable unreinforced masonry dwellings (mostly adobe and stone masonry). In general, school buildings were worst hit in the earthquake affected area, however there were examples of retrofitted school buildings that performed very well. The team also interacted with Nepalese government agencies, professional organizations and academic institutions regarding the strategies for effective recovery and reconstruction. The team members will present field observations and discuss potential follow-up activities for Canadian earthquake engineering community with regards to technical capacity building for earthquake reconstruction. Lessons of relevance to Canadian engineering practice will also be presented.

## Biography of Presenters

Svetlana Brzev, P.Eng. has over 25 years of combined teaching, research, and consulting experience related to structural and seismic design and rehabilitation of concrete and masonry buildings, municipal and industrial facilities. Prior to joining BCIT Department of Civil Engineering in January 2000, she was a Senior Engineer with Sandwell Engineering in Vancouver, BC, and was responsible for design and rehabilitation of buildings and water reservoirs. Dr. Brzev has published over 100 papers and reports, and is an active member of several professional organizations, including the Technical Committee CSA S304 for design of masonry structures. She has co-authored two books: Reinforced Concrete Design: A Practical Approach with John Pao and Seismic Design Guide for Masonry Buildings with Don Anderson.

Bishnu Pandey, PhD. is a faculty in British Columbia Institute of Technology (BCIT). Dr. Pandey is involved in seismic assessment, design and retrofitting works in Asia and North America since 2000. In 2002-2004, he served as the technical Team Leader of earthquake safety projects including seismic mitigation of schools, hospitals and building code enforcement in Nepal. Dr. Pandey has also worked in a UN agency where he managed projects on seismic upgrading of schools, housing safety and code implementation targeting Asia- pacific countries. He worked at the UBC on development of performance-based guideline for seismic retrofitting of low rise buildings in BC. Dr. Pandey has served as seismic consultant to a number of international organizations including World Bank, Save the Children and UN agencies.

Upul Atukorala, PhD. PEng is a Principal at Golder Associates' Vancouver office with over 25 years of consulting engineering experience in British Columbia, nationally, and internationally. During his career at Golder, he has been involved in the design and construction of foundations for major highway bridges, marine/port structures, LNG storage and handling facilities, oil, gas and water pipelines, water retention and tailings dams, landfills, onshore and offshore slopes, and buildings. He has been involved in the development of liquefaction susceptibility and ground shaking hazard maps for the Fraser Lower Mainland and assessing earthquake-induced ground displacements that impact infrastructure projects. He has been a member of the Task Force formed for earthquake design in the Greater Vancouver Region, Canadian Highway Bridge Design Code.

Carlos Ventura, P.Eng, P.E. , Ph.D is professor at University of British Columbia and the Director of the Earthquake Engineering Research Facility (EERF) at UBC and has more than 30 years of experience as a structural engineer. He has been conducting research on the dynamic behavior and analysis of structural systems subjected to extreme dynamic loads, including severe ground shaking for more than twenty years. His research developments have included development and implementation of performance-based design methods for seismic retrofit of low rise school buildings, novel techniques for regional estimation of damage to structures during earthquakes, detailed studies on nonlinear dynamic analysis of structures and methods to evaluate the dynamic characteristics of large Civil Engineering structures and structural health monitoring of building, bridges and dams including others. Dr. Ventura has written over 400 technical papers and reports related to the seismic behavior of structures, and has received numerous awards for his research accomplishments, including the Lieutenant Governor's Award of Excellence (2013), the Innovation Award of the Canadian Society of Civil Engineering (2010) and the APEGBC Meritorious Achievement Award (2006).

John H Pao, M.Eng., P.Eng., Struct. Eng. is the president of Bogdonov Pao Associates Ltd., established in 1985, John's reputation of practical and cost effective structural engineering solutions became known in other regions and the firm expanded its practice to California and has completed a large variety of projects throughout North America and overseas. He has designed a variety of projects including large parking structures, high rise buildings, hospitals, air traffic control towers, seismic upgrade of buildings and recreational structures. John has co-authored a textbook, "practical design in reinforced concrete". In addition he is the chair of the "Certificate in Structural Engineering" program developed in 2001 to teach practicing structural engineering on a variety of subjects to enhance the structural engineering profession.