Vancouver Geotechnical Society
A Local Section of the Canadian Geotechnical Society

www.v-g-s.ca

NOTICE OF UPCOMING TECHNICAL PRESENTATION

Wednesday, October 21, 2015

SUBJECT: **Ruskin Dam – Seismic and Seepage Control Upgrade**

SPEAKERS: **Nathan Sweeney, P.Eng., M.Eng.** - *BC Hydro*

Nathan Sweeney is a Senior Engineer in the Generation and Transmission Engineering group at BC Hydro. He received a BASc from the University of British Columbia and joined BC Hydro in 2005. Nathan has been heavily involved with the Ruskin Dam and Powerhouse Redevelopment Project, including field investigations, site characterization, design of the seepage control system, and resident engineering duties during construction. He has also been involved with projects on Strathcona Dam, John Hart Dam, Terzaghi Dam, and spent some time as the dam safety engineer for the WAC Bennett Dam and Peace Canyon Dam. Nathan has recently completed a Master of Engineering degree in Geotechnical Engineering at the University of British Columbia.

Li Yan, P.Eng., Ph.D. - *BC Hydro*

Dr. Li Yan obtained his B.Eng. in Civil Engineering from China in 1982, and M.A.Sc. and Ph.D., both in Geotechnical Engineering from UBC, in 1986 and 1990, respectively. After about 10 years in consulting practice, he joined BC Hydro in 2000. He has worked extensively in hydroelectric dam safety related projects, ranging from embankment dam performance assessments, deficiency investigations, to dam rehabilitation design and construction. For the Ruskin Dam Right Abutment Seismic and Seepage Control Upgrade (Stage 2) project, he was the lead geotechnical designer, and then the reviewer for the geotechnical work. Currently, he is a Geotechnical Engineering Team Lead in Civil Design, Generation and Transmission Engineering of BC Hydro.

CONTENT: Ruskin Dam is located near Mission, British Columbia and is one of three BC Hydro facilities in the Alouette Stave Ruskin Hydroelectric System. The dam was constructed between 1929 and 1930 and is a concrete gravity structure founded primarily on bedrock. At the right abutment, which consists mainly of glacially deposited sands and silts, the dam connects to a cut-off system consisting of sloping concrete slabs, founded on retaining walls and sheet piles, which extend upstream of the dam. Significant seepage and piping issues occurred at the right abutment after first filling of the reservoir in 1930, and a number of remedial actions were carried out in an attempt to address the problems. Through extensive investigations it was determined that the reoccurring abutment seepage and piping issues, as well as the low seismic withstand of the concrete slab cut-off, posed significant dam safety risks to the facility. A seepage control upgrade project was initiated to address the deficiencies, which resulted in the construction of a new seepage cut-off wall with a special tie-in to the concrete dam, and a reverse filter blanket and drainage system on the downstream slope to collect and measure seepage. Analyses were carried out to evaluate the performance of the proposed upgrade during the design earthquake and to model the seepage regime.

Due to the dam safety risks and complex nature of the site, a unique early contractor involvement (ECI) procurement process was used to encourage innovation and reduce risks by including the contractor in the development of the final design. Several specialized and innovative methodologies were used to construct the seepage control system, including slurry panel construction for the cut-off and retaining walls, and jet grouting, specialized drilling, and placement of an asphalt mastic for the tie-in. Jet grouting was carefully carried out at the tie-in to repair and strengthen the sands and loose fills adjacent to the dam without affecting safe operation of the dam. Successful completion of the jet grouting allowed for construction of a 7.2 m long, 0.168 m wide, and 19.5 m to 25.5 m deep slot to connect the seepage cut-off wall to the concrete dam. The slot, consisting of a series of overlapping holes, required several innovative construction techniques, including the use of the pendulum drilling method, and a custom designed guide system to complete the overlapping holes. The asphalt mastic used to fill the slot is watertight and highly flexible to accommodate potential seismic-caused deformations.

DETAILS:

Location: Executive Inn, 4201 Lougheed Highway, Burnaby, BC V5C 3Y6 (Phone: 604-298-2010)
Social Hour: 5:30 to 6:30 pm (drinks available at the hotel bar)
Technical Presentation: 6:30 to 7:30 pm (No need to RSVP)
Dinner: 7:45 pm ($30 will be charged for dinner).
If you would like to stay for dinner, please RSVP to Shane Magnusson via email or at the door shane.magnusson@amecfw.com