



Wednesday February 25, 2014 – AEG Dinner Meeting

Topic: Someone is Paying Me to do This! The Geologic, Geohazard, and Geotechnical Field Investigation for the Hoover Dam Bypass Bridge

Speaker: Ken Ferguson, PG, 2014-2015 AEG President, AMEC Environment & Infrastructure, Inc.

Time: 5:30 – Social Hour, 6:30 – Dinner, 7:30 – Program

Place: Ivar’s Salmon House, west of the UW, 401 NE Northlake Way, Seattle; 206-632-0767

RSVP: Please RSVP with your dinner entrée preference (Alder-grilled Coho salmon; rotisserie roasted chicken; or vegetarian pasta). Email Justin Vetter at secretary@aegwashington.org. Please RSVP by 5 PM on Friday, February 20. No shows will be billed.

Cost: \$35- members; \$40-non-members; \$10 for students. If you can’t attend the dinner, but would like to attend the talk, the cost is \$10. Non-members always welcome! Pay by check or cash *only*. Make check payable to AEG.

Our gracious sponsor, GeoStabilization International (GSI: <http://www.geostabilization.com/>), has made it possible for the AEG Washington Section to provide free meals to a limited number of AEG Student Members with advanced approval. Please contact Justin Vetter for more information at secretary@aegwashington.org.

****Attention students:** AEG student membership is now free. Please follow this link <http://www.aegweb.org> and click on the orange membership tab if you are interested in becoming a member of AEG.

Abstract:

This presentation is a retrospective discussion of the field investigation portion of the geohazard investigation and geotechnical design of the Hoover Dam Bypass Bridge that spans the border of Arizona and Nevada, crossing the Colorado River immediately downstream of the Hoover Dam. Or to put it another way, a collection of ‘war stories’ from a young field geologist who, on his first year on the job, had the opportunity to work on a career-defining project. This project was awarded the 2014 Outstanding Environmental and Engineering Project Award from AEG at the 57th Annual Meeting in Scottsdale, Arizona.

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Meeting Announcement

The river bridge structure — the Mike O’Callaghan-Pat Tillman Memorial Bridge — is as grand as its safety, security and economic impact. The 1,900-foot-long Colorado River crossing is the centerpiece of the project, which included 3.5 miles of new approach roadway on both sides of the river and seven other bridges. It is the highest and longest arched concrete bridge in the Western Hemisphere and features the world’s tallest precast concrete columns. The innovative hybrid structure is designed to complement the dam with the high-performance concrete arch while limiting the load demands with a modern steel superstructure. It is the first steel-concrete hybrid arch bridge in the United States.

The spectacular setting provides a backdrop for one of America’s most significant modern civil engineering projects but also proved to be the greatest challenge. The Black Canyon below the dam is an 800-foot-gorge with dramatic rock cliffs, steep to vertical canyon walls and a vast geological palette. Working in such a setting required rock cuts and fills exceeding 100 feet in height, accounting for winds up to 70 miles per hour and setting concrete at night to avoid desert heat reaching more than 120 degrees.

Major challenges faced by the geotechnical investigation included

- Extreme heat (on site temperatures in excess of 130°F in the shade were measured – there was very little shade),
- Extreme access – mountaineering rope work techniques were required, drill rigs were mobilized via helicopter, crane, track, and ‘spyder’,
- High voltage overhead electrical transmission lines constraining helicopter access were present in many locations,
- Security – initial field work began the week after September 11, 2001, and
- Accelerated project schedule due to security concerns.

The project consisted of several investigative phases – 1) Geologic mapping and seismic hazard investigation, 2) Canyon wall mapping, 3) Preliminary drilling investigation at river bridge foundation locations and potential tunnel location, 4) Arizona approach drilling, 5) Colorado River bridge foundation drilling, and 6) Nevada approach drilling. Total time in the field was a little over 6 months over a 1-year period with up to 4 drill rigs on site at a time. Several thousand feet of corehole sampling with optical borehole surveys were drilled. Additional characterization included early adoption of LiDAR scanning to map the canyon walls, pushing the technology at the time, and other techniques such as Goodman Jack testing, surface refraction and downhole seismic surveys, helicopter reconnaissance, and fixed-wing aerial search for any previously unknown area faults.

Bio:

Ken Ferguson, P.G. (AZ) is a Senior Geologist with AMEC Environment & Infrastructure, Inc. (AMEC) in Phoenix, Arizona, and the 2014-2015 President of the Association of Environmental & Engineering Geologists (AEG). Ken has a BS in engineering geology from Texas A&M University and a MS in geology from Arizona State University. He has been with AMEC since November 2000. Since that time, he has been utilized as a project manager, technical lead, project geologist, task manager, and field geologist performing geologic, geotechnical and geologic hazard investigations for dams, levees, channels, basins, buildings, roadways, bridges,

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power plants, transmission lines, mining projects, pipelines, and other structures. In addition, Mr. Ferguson has been extensively involved in the characterization of land subsidence and subsidence-related hazards such as earth fissures and associated impacts for planning, design and remediation of significant infrastructure. Mr. Ferguson has also been involved in projects that utilize remote sensing technologies such as interferometric synthetic aperture radar (InSAR) as they apply to geologic and geotechnical characterization, including ground subsidence and earth fissuring, landslides, and slope stability issues. Mr. Ferguson has also utilized mountaineering techniques obtained in a specialized training course to map the geology, fracture patterns, and other concerns on canyon walls specifically applied to geotechnical characterization for bridge foundations and slope stability. He has experience investigating geologic hazards such as land subsidence, earth fissuring, landslides and seismic hazards and has received specialized training in the use of LiDAR and high resolution DEMs for landslides and slope stability.

Mr. Ferguson has worked internationally in Canada, Mexico, Germany, Romania, the Czech Republic, and has supported other projects worldwide.

Mr. Ferguson is also active with the Arizona Hydrological Society (AHS), The Arizona Land Subsidence Group, The Arizona Geological Survey Earth Fissure Advisory Group, and the Geotechnical Extreme Events Reconnaissance (GEER).

2014-2015 AEG WASHINGTON SECTION CALENDAR AND ANNOUNCEMENTS

2014-2015 Dinner Meetings:

- September 18, 2014 (Thu) – Dr. Tom Doe (Golder), What’s Up With Fracking?, Best Western Executive Inn, Seattle, WA. Sponsored by Cascade Drilling.
- October 16, 2014 (Thu) – Dr. Greg Hempen (URS), 2013-2014 Jahns Lecturer, What’s My Line? Site Assessment! [AKA: Applying Geophysics in Site Assessment], Ivar’s Salmon House, Seattle, WA. Sponsored by Golder.
- November 20, 2014 (Thu) – Taryn Sparacio (Exponent), An Environmental Forensics Case Study: Reconstructing Historical Chemical Releases in the Hylebos Waterway, Coast Hotel, Bellevue, WA. Sponsored by Instrumentation Northwest (INW).
- December 11, 2014 (Thu) – Holiday Party, Personal slide shows from AEG members and family, pizza, gift raffle, food drive. Tutta Bella Pizzeria in the Wallingford area of Seattle, WA.
- January 15, 2015 (Thu) – Trenton Cladouhos, PhD (AltaRock Energy), An Overview of a Geothermal Development Project at Newberry Crater, Oregon. Best Western Executive Inn, Seattle, WA. Sponsored by Holt Services.

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- February 25, 2015 (Wed) –Ken Ferguson, PG (AMEC), 2014-2015 AEG President, The Geologic, Geohazard, and Geotechnical Field Investigation for the Hoover Dam Bypass Bridge, Ivar’s Salmon House, Seattle, WA. Sponsored by GeoStabilization International (GSI).
- March 19, 2015 (Thu) – Dave McCormack, LG, LEG (Aspect Consulting), Port Angeles Landfill Cell Stabilization, Best Western Executive Inn, Seattle, WA. Sponsored by APS.
- April 16, 2015 (Thu) – Thomas Colligan (Floyd Snider), Thermal Remediation of the Fox Avenue Site in the Duwamish Waterway, Seattle, WA. Ivar’s Salmon House, Seattle, WA. Sponsored by Friedman-Bruya, Inc.
- May 14, 2015 (Thu) – Student Night, Best Western Executive Inn, Seattle.

2015 AEG Membership:

RENEW YOUR AEG MEMBERSHIP!

Membership Has Benefits! Renew your membership on-line at <http://www.aegweb.org/> (look for the red membership button on the main page). Or if you prefer, call AEG at 303-757-2926 to complete your renewal over the phone.

AEG Professional Forum on Landslides:

February 26-28, 2015, University of Washington, Seattle, WA. Time to Face the Landslide Hazard Dilemma: Bridging Science, Policy, Public Safety, and Potential Loss.

The conference will consist of 2 days (Thu-Fri) of technical and other presentations by invited speakers, posters, discussion sessions and workshops regarding: landslide hazard assessment and risk methodology, current state and local programs and how these can be integrated into current and potential future national programs, what’s working and where do we need to improve, can we develop consensus recommendations and guidance for agencies responsible for land use, and more. There will also be an optional field trip to the Oso landslide and another recent landslide impacting several houses in Everett, WA on Saturday. Additional details available at www.aegweb.org and presented in future AEG email announcements and publications.

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2015 AEG Annual Meeting:

Please consider attending or presenting at the 2015 AEG Annual Meeting in Pittsburgh, PA, September 19-26, 2015. For more information, visit: www.AEGannualmeeting.org



58TH Annual Meeting
SEPTEMBER 19 - 26
PITTSBURGH

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