Greetings AEG Southern California Chapter Member
We hope you will join us for the next AEG Southern California meeting of 2024. The meeting will be on **Tuesday, April 9th** at Zin Bistro Americana in **Westlake Village** with a presentation by Hans Hoek.

Meeting date: Tuesday, April 9th
Location: Zin Bistro Americana, 32131 Lindero Canyon Rd #111, Westlake Village, CA 91361
Time: 6 pm Networking / Happy Hour, 7:30 pm Presentation
Cost: $45 per person with reservations in advance for AEG members, $50 without reservations (at the door), FREE for students with a valid student ID and current AEG Student membership, the Student Membership is FREE as well, so join and get a free dinner!!
Reservations: Please email Robert Woodford (aka Bob) at: **robert@woodfordgeo.com** or reply to this email

Presentation: The use of photogrammetry (digital photo stitching) in engineering geology

Abstract: The speaker will be Hans Hoek, PG, CEG, PhD. (Byer Geotechnical).
In my talk, I will go over some of the basics of photo stitching, but mainly show examples of photo models of faults in borings and trenches (the Santa Monica Fault in Westwood); trenches without faults (Hollywood); shored excavations (fault verification during construction); things you can see in test pits; and some interesting outcrops. I am a low-tech guy, I don't have a drone, I use a simple camera with a flash and wifi (Olympus Tough), and use home-made devices to lower my gear into a boring. I am still working to improve things: record camera positions, get even lighting, increase the depth range, etc. My dream is to develop a set-up and methodology for mapping borings that is relatively (!) quick and easy to use for anyone.

I have been taking pictures in borings and test pits at least since 2009. I learned early that a picture from a digital camera with a flash can show you much more than what you can see directly in a boring or test pit. Also, especially in a test pit or a boring, your visibility is extremely limited, you can at best maybe see seven feet of half of a boring at any given time. To get an overview you need to take overlapping photos. I spent many hours making mosaics "by hand" by warping pictures in a drafting program.

In 2016 I did a fault study on Sycamore Street in Hollywood. Boring and CPT data indicated there was some anomaly so we dug a trench. The anomaly turned out to be a channel in the older alluvium. This was the first time I used photo stiching to map a trench. I had just become aware of the photo stitching technology, I think from a 2015 USGS report of a fault trench in Frazier Park. I read a paper about using photogrammetry on archeology digs, which introduced me to Photoscan, now Metashape from Agisoft LLC, which is the software I have been using since. If you take pictures with enough overlap and dump them in the program, it will figure what goes where.

Perhaps the main thing to learn was how to take pictures with enough overlap. Overall I have spent more frustrating hours (nights, weeks, months?) trying to match "chunks" in Agisoft than I have mosaicking "by hand". If it works it is fantastic. You end up with an incredibly detailed model, with pixels that are mapped on a 3D surface, basically at the resolution of the original pictures. Since most of the time the camera is within several feet of the edge of the boring (trench, test pit), the resolution is great, even with a relatively simple camera. You see things you could never have seen when you were in there. You learn the value of cleaning the whole trench or boring. When done correctly you can measure dimensions and planar orientations, often better than in the boring.

This will be the subject of my talk: how I take photos in test pits, trenches and borings, what are some of the pitfalls, how I stitch them together, and how I have used them in our reports.

Bio: Hans Hoek pursued his studies at Utrecht University in the Netherlands, culminating in a degree equivalent to a Masters in Structural Geology, with a field area focus in Switzerland, and minors in Petrology, Computer Science, and Materials Science. His academic journey continued as he earned a Ph.D. in Structural Geology, also from Utrecht University, with his thesis centered on the Mechanics of Mafic Dike Emplacement based on three summers of fieldwork in the Precambrian of the Vestfold Hills, Antarctica, with the Australian Antarctic Research Expeditions.

Following the completion of his Ph.D., Hans spent nine years in Australia, where he balanced a part-time post-doc position at the University of Melbourne with his role as an outdoor tour guide. In 2003, he relocated to California, and by 2005, begun his tenure at The J. Byer Group, now known as Byer Geotechnical. Despite lacking prior training in engineering geology, Hans adapted swiftly, learning on the job. He found himself drawn to the engineering aspects of his work, particularly in areas such as slope stability, retaining wall calculations, kinematic analysis, and wedge failure calculations.

Presently, Hans employs a 3D approach in his work, utilizing a DEM based on the LARIAC elevation data. He develops his own vector-based programs to analyze the forces acting on potential blocks in the terrain, considering both topography and geologic structure. This enables him to determine the minimum support required, whether it be shoring, retaining walls, or soil nail systems, to achieve the necessary factor of safety.

Four guiding principles motivate Hans in his professional endeavors: (1) if something is worth doing, it's worth doing well; (2) it's ok to question the way things are done; (3) keep all your notes and take many pictures since (4): you don't know how or when information that seems irrelevant at the time can come in handy later (serendipity).

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