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Geotechnical Engineering: The In-Demand, High-Pay, Easy-Entry Job You've Likely Never Heard Of

I was posting up with a friend back in my hometown over the holidays when the subject of his line of work came up. My compadre – whom I've known since we dominated the local pee-wee hoops circuit – works as a geotechnical engineer for a midwest-based engineering and consulting concern.

He noted that the shortage of experienced professionals in his field is so acute that one no longer needed a masters in geotechnical engineering to procure employment. Any relevant undergraduate major – such as a four-year degree in civil engineering from an ABET-accredited school – will get you in the door. If you have a masters in geotechnical engineering, you are likely to be hired. All the more likely if you are female or minority or, ideally, both.

According to data from the Bureau of Labor Statistics (BLS), the average median salary for a civil engineer with a bachelor's degree is $79,340 a year, though salaries can be much higher depending on company and geography. According to my

Stanford-education friend, if you also have a one-year masters in geotechnical engineering, your salary will be at least 20% higher. With geotech salaries going up around 4% a year, plus profit-sharing, "you are making six figures in no time," he added.

But what – for the love of Albert Atterberg – is geotechnical engineering? According to whatisgeotech.org, "geotechnical engineering is the science that explains mechanics of soil and rock and its applications to the development of human kind. It includes, without being limited to, the analysis, design and construction of foundations, slopes, retaining structures, embankments, roadways, tunnels, levees, wharves, landfills and other system that are made of or are supported by soil or rock."

If you've ever wondered why John Lautner's mid-century masterpiece, Chemosphere – which sits atop a 29-foot-high, 5-foot-wide concrete column – doesn't slide off the Hollywood Hills, you can thank the geotechs who laid the intellectual groundwork for that amazing feat of engineering. Moreover, if New York-based Millennium Partners' Millennium Hollywood two-tower development is ever going to be built – let alone withstand a 7.0 earthquake along the intermittently active Hollywood fault – a geotech is going to be intimately involved.

On a more mundane – though no less heroic – level, you can thank a geotech for certifying the supports for the bridge you cross everyday, not to mention the dam that stores the water you drink. As whatisgeotech.org notes, “Everything around you is supported by soil or rock. Geotechnical engineers are responsible for that. Anything that is not supported by soil or rock, either floats, flies, or falls down.”

Though geotechnical engineering is a subset of civil engineering, it is not the same as geology. According to my friend, “a geologist studies the earth, takes samples, looks at samples, and interprets the nature of the whole area. Geotechs do the engineering.” Indeed, based on a geologist’s characterization of rocks and soil, a geotech ascertains how to support a structure there, what the constraints are, and what the supports need to be. Or as my sharp-shooting pal put it, “geotechs assess what they are going to do to the earth and what the earth is going to do to them and how to design against it.”

From 1700 to the present day, a range of scientific luminaries has slowly developed the geotechnical engineering field. These include: Hubert Gautier, who discovered soil’s “natural angle of repose”; Charles-Augustin de Coulomb, of the Mohr-Coloumb theory, which, in geotech parlance, defines the strength of rocks and soils at varying stresses; Henri Darcy, he of Darcy’s Law – not Jane Austen’s *Pride and Prejudice* – which describes the flow or fluids through porous media; and Karl Terzaghi, widely considered the father of modern geotechnical engineering.

Midwest-based geotechs mostly deal with soil-based complications arising from the region’s glacial history of deposition and erosion. In a geologically and seismically complicated state like California, the need for top-level geologists and geotechs is greater because the risks of seismic exposure are higher and the consequences of failure more dramatic. This is why California is one of only two states – the other being Oregon – that requires licensing in geotechnical engineering in addition to the standard Professional Engineer (PE) credential that most states require of all engineers.

However, the dramatic rise in earthquakes in frack-happy Oklahoma may change how geotechs – and those who license them – view the previously un-dramatic midwestern terrain.

So, where can one get training in this in-demand field that is projected to grow even larger as state and local governments green-light a range of transportation and reclamation projects, as well as other infrastructure needed to support America's booming energy business? According to my friend, the best schools to obtain a masters in geotechnical engineering are, in no particular order, Iowa State, Virginia Tech, Stanford, the University of California at Berkeley and the University of Illinois at Urbana-Champaign. US News and World Report ranks Berkeley as the top graduate civil engineering program in the nation.

There is one caveat in all this alluvial joy, however. As my friend noted, the daily practice of geotechnical engineering requires that one have excellent communication skills. In fact, a large part of the job is writing clear, concise, technically accurate reports. Moreover, one must be able to verbally articulate site characterizations and excavation and support analyses in universally understood English. Finally, one must be able to dream. Because, at heart, a great geotech creatively extrapolates from raw data to what can be structurally conceived.

According to my geotech pal, his ideal job applicant has at least taken some courses in english, journalism, and public speaking. Moreover, it helps if he or she is not a city slicker. According to my friend, "the best engineers I ever worked with are farm kids. They implicitly understand the land, including runoff, erosion, and the nature of soil."

According to the BLS, the median starting for an in-demand STEM (Science, Technology, Engineering, Math) job like computer engineer is an impressive $93,350 a year. However, the difference in workplace settings between geotechnical and computer engineers is profound. Geotechs get the best of both worlds: spending as much time in as they want in the field, while getting a fair share of time in the office to report on what they learned.

In 2015, the field of dreams is no longer baseball, but anything STEM-related. And of those many STEM possibilities, the best of the lot might be one tethered to the earth itself.

– CROTTY