Gateways

The periodic Newsletter of Gateway Geotechnical, LLC

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What's unusual about St. Louis underground?

In many parts of the country, geotechnical engineers deal with a limited number of issues, but in the St. Louis area we are challenged by a huge variety of subsurface conditions. Here's our "Top Ten" countdown of the most significant underground issues that might affect your next project, in true David Letterman fashion, along with brief discussions on perhaps the most "colorful" of these issues.

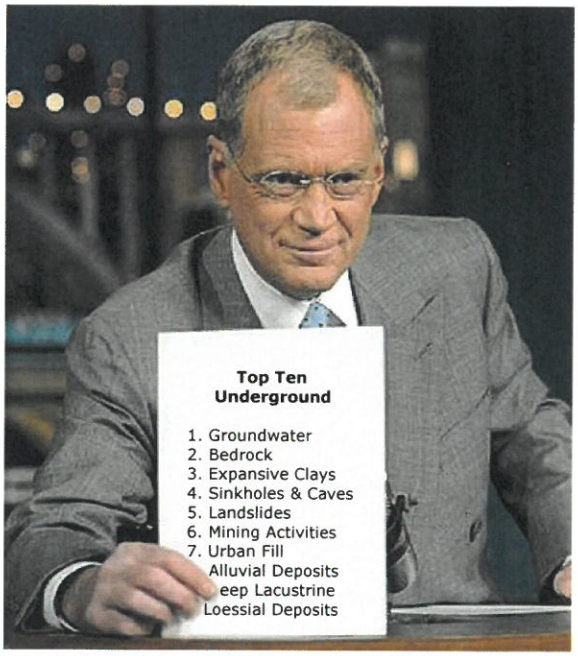
Deep Lacustrine. Very soft and deep glacial lakebed materials, more than 100 feet in some areas, are best recognized in the Hazelwood-Florissant area, from the vicinity of Lambert Field to "Big Foot" and further across I-270 to the north. A similar depression, along the Mill Creek drainageway and the "Chouteau's Pond" area, is present near downtown. These deposits are not capable of supporting heavy loads, exhibit excessive and long-term settlement, and have poor seismic characteristics.

Mining Activities. Unpredictable and excessive settlement or collapse can occur with construction over mined areas. Coal seams, mined for fuel in the late 1800s and early 1900s, and sometimes from seams only a few feet in thickness, are located predominantly on the Illinois side. Clay from mines on the Missouri side was used primarily for the manufacture of roof and sewer tiles, from about 1900 to as recent as the 1950s. Adequate roof support of the mines may exist where "room and pillar" or similar methods were used, but some mines experienced "uncontrolled robbery" and poor, if any, backfill. Many of the clay mines were simply abandoned by flooding.

As many as 25 quarries existed in the area, many of which were 70 to 200 or more feet deep. Backfill of the quarries often consisted of soil, rock, construction debris, and "whatever was available," all without controlled placement.

Sinkholes and Caves. Water flow, eroding softer material in joints and seams of limestone bedrock, has formed karst features, with the resulting cavities triggering long-term or sudden settlement. Sinkholes are typically characterized by a funnel or bowl shaped depression, and sometimes used in rural areas as a dump for old refrigerators. The Tilles Park grounds at McKnight and Litzinger Roads is a great example of karst topography.

More than 20 caves have been identified in the St. Louis area, mostly downtown and somewhat focused in the vicinity of Anheuser Busch; these were used by many of the local breweries for beer storage before refrigeration was widely available, and sometimes as hideouts for "unsavory river people." Cherokee Cave, a commercial cave closed in 1960 for the construction of I-55, may be the best known.



David Letterman and his famous Top Ten Segment.

Yes, you can build in each of the above areas. And, in fact, with the attractive location of some of these sites, their "curb appeal" makes them prized sites for development. The only caveat is that the owner needs to be aware of the associated risk of development, and the geotechnical engineer needs to have the ability and experience to define that risk.

The Geotechnical Gap

For most of us, it's obvious that geotechnical participation, exploration followed by design and construction recommendations, is needed at the onset of a project - matching the project site and the right foundations. Input is again normally provided during construction, to verify design assumptions and the quality of the built product.

What's missing? Well, if the project transitions from design into construction without delay, probably not much. But if there is a lengthy delay, or if the concept of the project evolves with time, the result can be a very expensive gap.

On one of our recent projects, such a delay happened. Not only did the footprint of the building change dramatically, the finished floor elevation changed as well. Unexpected rock removal, increased high plastic clay remediation, and the presence of inadequate fill resulted in significant additional cost. Also added, was a tall retaining wall which required global stability analysis. Unfortunately, any one of these issues could have required redesign and resulting delay.

Participation of the geotechnical engineer during the gap would have at least identified these extras, which could then have been considered by the owner before their costs were incurred. Timely, alternative design recommendations could have saved everyone headaches, as well as their time and dollars. Don't let the gap surprise you.

Our corporate mission is "to be a valued member of the design team, respected for technical ability and personal commitment." And that includes relationships that carry all the way from conception to occupancy, and even in the gaps along the way.

HAPPENINGS - - - - -

Wade Mathes finished up his coursework this semester for his Associate of Arts degree from East Central College in Union. This last semester he took three courses – psychology, algebra, and English literature – in addition to guiding our construction testing. Busy, busy, busy.

T. Michael McMillen presented all 10 of the underground issues to the St. Louis Post of the Society of American Military Engineers at their March 22 luncheon. T. Mike is a Fellow of the Society. He also presented a seminar explaining how geotechnical engineers predict settlement – sometimes it's a little bit of magic. This presentation was part of Gateway's Geotechnical Solutions series.

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