DUNS Number: 080716119
CAGE Code: 7ZFU4
NAICS Codes: 541360 – Geophysical Services (Primary)
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Near Surface Geophysics Innovations, LLC

Bringing the Subsurface into View

Using Electrical Resistivity to identify potential karst features prior to building construction

Background: Developing in karst (landscapes typified by sinkholes, caves, springs etc.) can be hazardous. Although sinkholes are readily observable on the surface, their orientation and extent however are not discernable from atop the ground. These karst features are a challenge for developers and engineers when planning to safely build structures. However, exploratory boreholes coupled with a geophysical investigation effectively determine subsurface geohazards at your site.

Project: The Bowling Green, KY Chamber of Commerce was interested in characterizing an investment lot within the Kentucky Transpark developed by the Inter-modal Transportation Authority located northeast of Bowling Green in Warren County, Kentucky - an area known for its karst. In order to safely plan for a proposed building at the site, the chamber solicited an electrical resistivity (ER) survey to characterize the lot. NSG conducted 18 parallel lines (**Figure 1 represents one half of the proposed building**) and constructed a recommended boring location map based on the potential karst features identified across the site (**Figure 3)**. An example of an annotated electrical resistivity cross-section for such a survey is shown in **Figure 2.**

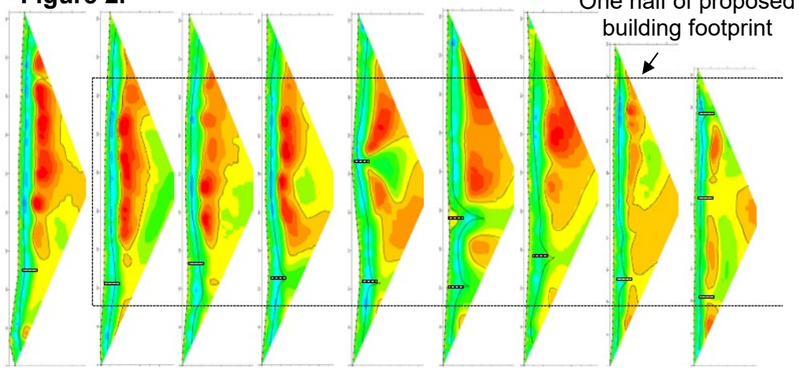

Figure 1. Map showing the results of the electrical resistivity survey across half of the building footprint

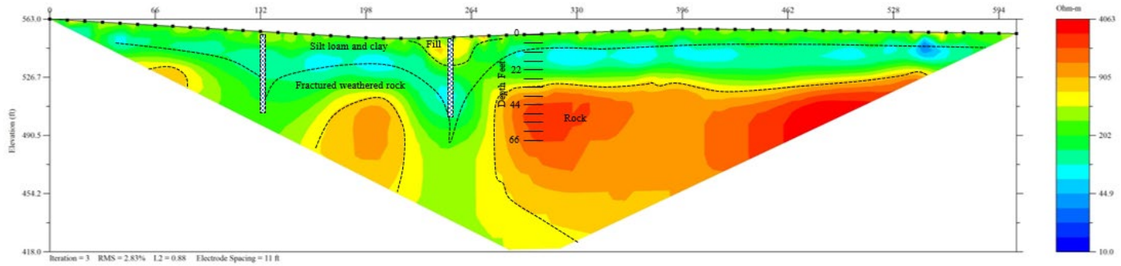

Figure 2. Example of an annotated 2-dimensional electrical resistivity cross-section.

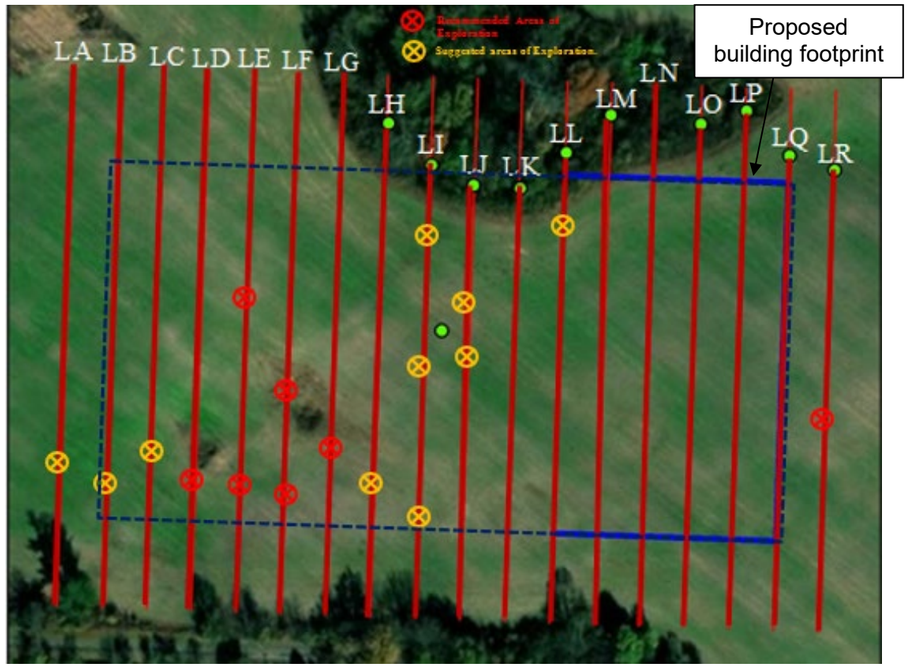

Figure 3. We recommended at least 17 test boreholes, excavations or similar investigations be conducted at the exploration areas identified above. Boring locations noted in red are recommended and the boring locations noted in orange are suggested.

Survey Results: Interpretations like those seen in **Figure 2** contribute to the overall findings of an ER investigation. Dashed lines are added to the cross sections where study of the data suggests changes in lithology (**Figure 2)**. Warm colors (red to orange) generally are indicative of resistive, dry limestone whereas green indicates weathered rock and blue indicates saturated clayey soils. Furthermore, in this environment, conductive features at depth generally indicate solution-enlarged cavities. In this example, numerous features indicating bedrock dissolution and karst features can be seen in the ER data.

Conclusion: After careful data analysis, the ER profiles are compiled into several maps with reference to the potential building location. At this stage in the project, NSG proposed drill targets (**Figure 3)** to confirm the geophysical findings.
Collectively, the ER surveys and the drilling program provide excellent subsurface site characterization. Any potential client could then plan to rectify karst geohazards and develop the site efficiently and safely.

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