

## Microgravity

Sinkhole in parking lot overlying stormwater infiltration basin



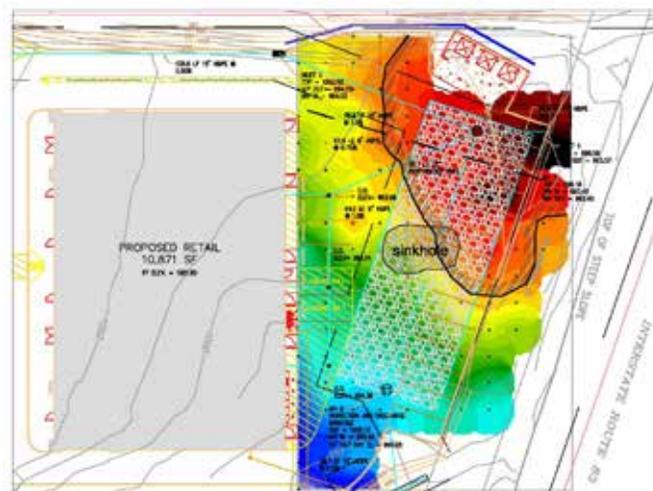
Gannett Fleming's Quantum Geophysics Division (Quantum) used microgravity to determine the cause of a sinkhole at a retail facility in Harrisburg, Pa. The sinkhole occurred in the portion of the parking lot that overlies the stormwater infiltration basin. Though the area is underlain by carbonate geology, geotechnical drilling that preceded construction showed no signs of sink activity. The microgravity data showed that the sinkhole lies along the edge of a steeply-sided shallow ridge of rock and that sink activity was most likely triggered by the percolation of stormwater down to and then along the steeply-dipping rock surface. The stormwater acted like a lubricant so that the overlying soils failed under its own weight. The same failure mechanism is observed when melt water causes snow to slump to the bottom of a windshield.

Quantum owns and operates a Scintrex CG-5 gravimeter. The latest in gravimeters, the CG-5 is a high-precision gravity meter with a resolution precision of .001 milligals. It incorporates a quartz-fused sensor so that readings are not influenced by changes in the earth's magnetic field. Onboard software corrects observed readings for tidal effects. Data are stored in solid state memory and then downloaded to a laptop computer via a USB connection in American Standard Code for Information Interchange (ASCII) format.

Geophysics does not replace drilling. When used judiciously, geophysics minimizes the number of borings and maximizes the information obtained from drilling. Microgravity provides excellent spatial coverage at a fraction of the cost of drilling for the same level of detail. The microgravity survey at this retail facility was completed in one field day.

### Other Applications:

- Evaluate sink activity
- Identify abandoned mine workings
- Map geologic structures (e.g., faults, salt domes)
- Locate disposal areas with organic material
- Identify impact craters.



This Bouguer gravity contour map shows a shallow ridge of rock expressed by warmer colors, which indicate higher gravity. The stormwater infiltration basin is highlighted by the bubble pattern. Small solid black circles represent gravity stations on 10-foot centers.