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New Information on the Guatemala City Sinkholes from Post Collapse Investigations

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ABSTRACT

In Sept 2007 and in May 2010 two large sinkhole collapses occurred in Guatemala City, the first in Zone 6 and the second in Zone 2. The 2010 collapse killed one person. Both collapses occurred along a major, deep storm water collector/drainage tunnel. The collector/drainage tunnel is constructed in thick layer of volcanic tuff, known as pumice, that underlies Guatemala City. After the May 2010 second sinkhole collapse in Zone 2 in Guatemala City the collectors were rebuilt. The municipal authorities then authorized inspections of the main collector and investigations of the subsoil conditions around the collector. Those investigations found groundwater along the collector, caverns and concrete cracks in the collector. These findings were investigated with additional explorations and resistivity tests. Saturation around the collector was another issue that raised concerns about collector stability, collapse due to subsidence and subsoil caverns. The subsoil has changed its permeability and much of the material on top of the collector is saturated. Caverns 20 m below the lower level collector were also discovered. These results indicate the need for more comprehensive geophysical investigations using techniques capable of reaching at least 100 m depth.

All of the investigations to date were done in the collector line between Zone 6 and Zone 2, where the collapses happened. It is of high priority, therefore, to expand the official inspections, investigations and monitoring to include the behavior of the subsoil in the surrounding of this collector and the others ones in the city, to prevent additional sinkhole collapses and the resulting impact on the current population. This need was emphasized when a 1 m diameter, 13 m deep sinkhole catastrophically opened under a woman's bed on 20 July 2011 in the same area of Guatemala City. Luckily, no one was hurt in the latest collapse.