FIDLE TEST OF SINKHOLE INDUCED BY MAN-MADE UNDERGROUND PIPE

Taegeon Lee, Hongik University, Seoul, Republic of Korea
Dong-Woo Ryu, Korea Institute of Geoscience and Mineral Resources, Daejeon, Republic of Korea
Heejung Youn[*]*, Hongik University, Seoul, Republic of Korea*

Abstract

Sinkholes are reported to be caused by damaged underground pipe, especially in South Korea and Japan. Field data before the sinkhole occurrence is hard to obtain because it is impossible to specify where it occurs. For this reason, many results of laboratory experiments and numerical analysis have been published. The laboratory results were performed under two-dimensional trapdoor conditions and covered changes in behavior due to groundwater flow or groundwater head difference. The numerical analysis results were also performed in the two-dimensional trap door condition and focused on stress changes without considering groundwater. In this study, field tests were conducted on sinkholes by embedded damaged pipe in the ground with two relative density and applying artificial rainfall to the ground surface. Earth pressure gauges and water content sensors were installed in the ground, and stress and water content changes occurred during rainfall. The damaged part of pipe was designed as a trap door, and water and soil could flow into the pipe after the test setting had been completed. For the uniformity of the relative density of the ground, the ground was divided into several layers and roller compaction was performed. In order to apply artificial rainfall, a spray device was created and installed at the ground surface. During the rainfall, the stress state was confirmed through the installed earth pressure gauge. When the relative density was large, the sinkhole did not occur and the sinkhole occurred when the relative degree was small.