Hidden Cavity in the Ground Causing Ground Cave-in

Local subsides or cave-in’s of the ground often occur in urban area. The complicated underground situation as well as the necessity of urgent restoration do not usually allow full investigation of the real cause. The detailed mechanism of the phenomenon has not been, therefore, well understood. Cave-in is usually initiated by the formation of cavity in the ground due to soil loss. When the location of the cavity is deep in the ground, the detection of the cavity is not easy. Then it is possible that the hidden cavity expands for a long time to eventually cause sudden large-scale collapse. In this study, characteristics of formation/expansion of cavity and surrounding ground loosening are investigated, aiming at effectively indicating dangerous pattern of cavity and loosening.

Shallow Underground Cavity Due to Defects of Buried Pipe

Model test simulating ground cavity formation

Subsurface erosion above the defects of buried pipe

Large Scale Cave-in Caused by Deep Underground Cavity

It is not easy to search for deep underground cavities. They sometimes grow silently until they eventually cause large scale cave-in.

Cave-in accident in Hokkaido Abira-town golf course (2009 April)