



A Study on the Prediction of Damage Extent at the Time of Perforating Operation on Reinforced Concrete Structure through Horizontal Excavation

Ju-hyoung Lee (1), Hakman Kim (2), and Jin Woo Cho (3)

(1) Korea Institute of Civil Engineering and Building Technology(leejh73@kict.re.kr), (2) Korea Institute of Civil Engineering and Building Technology(kimhakman@kict.re.kr), (3) Korea Institute of Civil Engineering and Building Technology(jinucho@kict.re.kr)

When a building collapses in downtown due to a sudden external factor such as earthquake, gas explosion or terror, the rescue of a survivor in the buried area should be prioritized. When a collapse accident occurs in downtown, there is a difficulty of access to the surrounding area of the collapsed building site due to building debris and a risk of the second collapse, and it takes a lot of time to rescue any survivor in the top excavation method to rescue while removing building debris. Therefore, there is a method to rescue any survivor safely by installing the second lifeline after securing the first lifeline within 72 hours using inclined excavation near the site of collapsed building or horizontal excavation at the underground parking lot of an adjacent building and prolonging the life of any survivor. When a building collapses in downtown, the perforating operation is carried out at the existing structure in the process of establishing the first lifeline to the position of a survivor through the parking lot of an adjacent building or the external wall of the building, and the damage extent in case of carrying out such operation was confirmed in this study. In order to determine the stability of the damaged existing structure and the range of repair, the reinforced concrete wall was produced and the damage extent of the reinforced concrete for each perforating position was measured by installing a measuring instrument at a position separated by 150%~200% from the perforating position. As a result, it was shown that the average damage area for each perforating position was influenced within approximately a 254% radius.

Keywords: horizontal excavation, damage, reinforced concrete, building collapses

Acknowledgement

This research was supported by a Grant from a Strategic Research Project (Horizontal Drilling and Stabilization Technologies for Urban Search and Rescue (US&R) Operation) funded by the Korea Institute of Civil Engineering and Building Technology.