

## LOAD CARRYING CAPACITY OF UNDERGROUND BOX STRUCTURE WITH FIRE SPALLING

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### ABSTRACT

In this study, the numerical fire analysis for temperature distribution and spalling behavior of underground concrete box structures that contained life lines, such as power cables and communication cables. The temperature field of inner space were assumed based on the fire curve with the thermal gradient obtained from CFD analysis. It was assumed that the spalling behavior of concrete are occurred when the concrete temperature reached the threshold, as dehydration degree. In this case, the elements correspond to spalling parts were removed and the analysis model were updated. Three fire scenarios were analyzed and the results were showed adequate spalling behavior.

Based on the obtained temperature distribution and spalling histories, the thermal stress and moments of underground box structure were estimated. Additionally, the ultimate sectional moment considering with the thermal nonlinearities of material were estimated and the load carrying capacity of underground box structure was also obtained. As results, the load carrying capacity of negative moment part was dominated by thermal moment that come from thermal gradient of the section. However, the load carrying capacity of the positive moment part was rules by the yield stress of rebar that exposed to the high temperature induced spalling phenomena.

### REFERENCES

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