

Horizontal Pressure on Non-yielding Wall Due to Flexible and Rigid Strip Loading

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Abstract

This paper studies lateral earth pressure on an unyielding wall due to flexible and rigid surcharge strip loadings. Dry Ottawa sand is used as backfill material. The instrumented model retaining-wall at National Chiao Tung University is used to investigate the horizontal earth pressure induced by flexible and rigid surcharge loading. The centerline of footing are applied at 0.15 m, 0.30 m, and 0.60 m from the surface of the wall. Based on the experimental work, the following conclusions are made.

1. As the strip loading approaches the wall, the stress concentration zone under the footing moves closer to the unyielding wall, causing the $\Delta\sigma_h$ acting near the top of the wall to increase.
2. The experimental R/H values are equal to or greater than the R/H values calculated with the method of image. The DM-7.2 method underestimates the point of application of the induced force increment ΔP_h .
3. Terzaghi (1954) suggested that for a value of m less than 0.4, the pressure on the wall due to the line load should be determined as $m = 0.4$. Test results indicate that Terzaghi's suggestion fails to predict the horizontal pressure increase due to a strip surcharge loading.
4. The test results of ΔP_h and R/H due to the application of flexible and rigid footings are quite similar.