

Study on the Compacted Clay Line Shrinkage Crack Characteristics and Crack Soil Representative Elementary Volume

*Yong Wan¹, Qiang Xue¹, Lei Liu¹, Li-ye Zhao¹, Gang Zeng¹

1. State Key Laboratory of Geomechanics and Geotechnical Engineering, Institute of Rock and Soil Mechanics, Chinese Academy of Sciences

The shrinkage cracking is a main reason causing of compacted clay liner (CCL) anti-seepage failure in a landfill final cover. In this paper, six soils with different liquid limit (LL) were obtained by combining two natural soils, and the cracking characteristics and representative elementary volume (REV) size were studied by large scale model experiments. The results show that: With 50% liquid limit is bounded, there has a piecewise linear relationship between crack characteristic parameters (i.e. crack rate and crack length) and soil liquid limit, and the slope at $LL < 50\%$ is bigger than the slope at $LL > 50\%$. The crack elementary volume (CEV) size of CCLs all accord with normal distribution, which the expectation and the mean square error linearly reduce with the increase LL when $LL < 50\%$, while those change is not obvious when $LL > 50\%$. The REV size decrease linearly with increase soil LL ($REV = 90.5 - 1.6LL$) for low liquid limit soil, while the change of the REV size is non-significant and it is approximately equal to 10 cm for high liquid limit soil.