

Experimental Study on Use of Crumb Rubber to Mitigate Expansive Soil Pressures on Basement Walls

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Abstract : The extreme annual weather patterns of the central United States have increased the need for underground shelters for protection from destructive tornadic activity. However, very few residential homes have basements due to the added construction expense and the prevalence of expansive soils covering the central portion of the United States. These expansive soils shrink and swell, increasing earth pressure on basement walls. To mitigate the effect of expansive soils on basement walls, this study performed bench-scale tests using a common natural expansive soil mitigated with a backfill layer of crumb rubber. The results revealed that at 80% soil compaction, a 1:6 backfill height to total height ratio produced a 66% reduction in swell pressure. However, this percent reduction decreased to 27% for 90% soil compaction. It was also found that there is a strong linear correlation between compaction percentage and reduction in swell pressure when using the same backfill height to total height ratio. Using this correlation and extrapolating to 95% compaction, the percent reduction in swell pressure was approximately 12%.

Keywords : expansive soils, swell/shrink, swell pressure, stabilization, crumb rubber

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