

Buried Pipes in Rubber-Soil Backfilled Trenches Under Cyclic Loading

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Abstract:

In geotechnical engineering, recycled tires are used in lightweight fills, backfill materials, highway embankments, soil reinforcement and soil-retaining walls. The rubber-soil mixture can exhibit a greater capacity for energy absorbency than soil alone under cyclic loading and tends to decrease the stress and shocks transferred into the ground. The shear strength and energy absorbance of the rubber-soil mixture is highly dependent on the size of the rubber fragments and the proportion in the soil. In this paper, soil surface settlement, pipe deflection and pressure distributed over a pipe placed in a trench and subject to cyclic loading were investigated as a function of chipped and shredded rubber used as backfill. The observed responses show the shredded rubber-soil mixture used over the pipe is more effective in reducing these three parameters when covered by a soil cap, than using the same soil alone for the whole of the fill. Also using the rubber-soil mixture in the whole of backfill without a soil cap delivers a negative influence on the responses. Overall, shredded rubber has a better performance as regards the pipe responses than the chipped rubber. By using a soil cap over the rubber-soil mixture, the reduction in the subsequent soil settlement and plastic pipe deflection, attenuation of the pipe's accumulating strains and finally protection of the buried pipe from fatigue are achievable.

Keywords: *Settlement; Rubber; cyclic loads; Buried Pipes; Trench*

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