CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
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Project Number
31696

Project Title
For Shear Joy

Abstract

Objectives/Goals
To determine the effects of adding recyclable materials (thermoplastic strips and polyethylene terephthalate strips) to soil behind an MSE (mechanically stabilized earth) retaining wall.

Methods/Materials
Scale models of MSE walls were constructed using dry, poorly graded sand as the soil type. The thermoplastic strips and polyethylene terephthalate strips were added to the soil behind the front-facing wall (scaled to size and strength of posterboard) at various addition rates. Normal force was then added to the top of the scale model as a surcharge load. The more normal force the MSE wall held, the greater the improvement in shear strength.

Results
The scale MSE wall with the polyethylene terephthalate strips at an addition rate of 2% held the most normal force, exhibiting the greatest increase in shear strength. The scale MSE wall with the polyethylene terephthalate strips at an addition rate of 1% held the second highest normal force, showing the second greatest increase in shear strength. The scale MSE wall with the thermoplstic strips at an addition rate of 0.2% held the third highest normal force, showing the third greatest increase in shear strength. The thermoplastic strips at an addition rate of 0.1% held the least normal force (excepting the Control) showing the least improvement in shear strength.

Conclusions/Discussion
Adding plastic materials to soil can greatly improve the shear strength of the soil. The more friction generated in the soil when the soil begins to slip, the stronger in shear the soil is. When placed in the soil, the plastic strips generate friction as well as cross over many shear planes, further stabilizing the soil. The more abrasive the plastic strips are, the more friction they create when the soil tries to slip, and the more the increase in soil stability.

Summary Statement
This project explores the effects of different recyclable plastic additives on the shear strength of soil behind an MSE retaing wall.

Help Received
Gary Welling was my project mentor and advisor. Mother helped on display board.