CALIFORNIA SCIENCE & ENGINEERING FAIR
2018 PROJECT SUMMARY

Name(s)
Diana A. Michaelson

Project Number
J0325

Project Title
Compressive Strength in Concrete vs. Environmental Sustainability

Abstract

Objectives/Goals
My project was designed to figure out if there is potentially a more environmentally sustainable coarse aggregate alternative that will have a similar compressive strength to traditional coarse aggregate in concrete.

Methods/Materials
For my experiment I used 3 different coarse aggregates in my concrete samples: traditional # inch large aggregate (control), recycled aggregate from a previous construction and recycled rubber mulch. I made 3 samples of each aggregate type. My hypothesis was that the control would be the strongest, but that the recycled aggregate would be very close in strength, and the rubber would be the weakest. After mixing, my samples cured in a moisture controlled environment. My tests were performed at Twining Lab in Long Beach, CA, using industry standards for testing compressive strength in concrete.

Results
At 7 days, the traditional coarse aggregate had a compressive strength of 2970 psi, the recycled aggregate was at 2720 psi, and the rubber aggregate was at 480 psi. After 28 days of curing, I tested the remaining 2 samples from each aggregate type. The traditional coarse aggregate samples had an average compressive strength of 4460 psi, the recycled aggregate was at 3925 psi, and the rubber aggregate was at 601 psi.

Conclusions/Discussion
Therefore my hypothesis that the traditional aggregate would be the strongest followed by the recycled aggregate, and that the rubber would be the weakest, was supported by my results. However, I also learned that although rubber aggregate does not give a high compressive strength to concrete, it has other potentially useful qualities.

Summary Statement
I found that recycled aggregate has a similar compressive strength to traditional coarse aggregate, and could be a viable replacement in most construction jobs, while rubber cannot be a replacement for high strength requirements.

Help Received
I mixed my samples with the help of my Aunt Sunny. Corey Rhodes, the laboratory manager at Twining Laboratory, sulfur capped the concrete samples and preformed the compression tests.