

### **Designing and Testing a Storm Drain to Minimize Plastic Waste in Drainage Systems**

This project's goal is to design, build, and test a storm drain that filters plastic waste from water before it reaches an ocean, lake, or river. Storm drains typically have a metal grate that extends onto the surface of a road as well as an opening along the curbside. The inside of these drains often contain no additional filtration. My project aims to improve storm drain designs by adding a grate and waste compartment for plastics.

To build the storm grate, I used a 36-inch by 36-inch piece of 22-gauge aluminum sheet metal, a 12-inch by 24-inch piece of aluminum sheet metal with small triangular cutouts, a Milwaukee Aviation Snip, zip ties, and a power drill. For precise measurements, I used a ruler, measuring tape, and protractor. To imitate angled concrete floors, I used two 48-inch by 24-inch pieces of sheet wood. The support system was constructed using various beams of wood, nails, hammers and an electric saw. Once the design was completely assembled, I ran a series of experiments by pouring water and plastics through my design to test its effectiveness.

The storm drain design was 90.4% effective. This means that there was 9.6% error. Most of the plastic waste made it into the waste bin. The plastic that didn't, fell to the floor. None of the plastic fell into the water bin, keeping the water clean.

The new storm drain design was successful in filtering plastic from the water pipe. This is a good foundation for a storm drain that controls flooding and minimizes pollution while being cost effective.

I would like to thank you and the engineers of CalTrans for this award. I am so grateful to have received recognition for my hard work and I appreciate the encouragement from you and your colleagues. Receiving this award has strengthened my confidence in pursuing a career in engineering and I can't wait to take the next step at college next year.

This project was my first in the engineering field, and I am so excited to continue my journey to becoming an environmental engineer. Thank you for everything you have done to encourage me and other students to get involved in science!