**Full STEM Ahead Long Island – Civil Engineering**

**Resources for Your Classroom**

**Background**: Civil engineering is the branch of engineering. These engineers work on things we do every day! They help build bridges, roads, and design ways in which we improve our environment like water filtration systems. Careers in civil engineering include construction, airport management, architecture, environmental firms, transportation, and more!

**Objective:** Introduce students to the field of civil engineering. Provide students an opportunity to explore the value of clean water and the role civil engineering plays in water filtration.

**Vocabulary:**

Below are terms commonly used when learning about civil engineering -

Bedrock Fatigue Compression Shear

Blueprint Load Aqueduct Truss

Infrastructure Reservoir Strain Stress

**Materials:**

2 empty water bottles, scissors, rubber bands, coffee filter, sand, glitter, paper towel, cheesecloth, gravel, cotton ball, food coloring, dirt, pitcher, and any other small goods that may be used for filtration

**Procedure:**

In today’s activity, students will create a water filter to make dirty water cleaner just as a civil engineer may study local water levels and pollutants. Then, students will test their water filter for efficiency and productivity to determine what household items were the best filters and discuss changes to the filter that may be made in the future to get a better result (cleaner water).

Prior to the class, the students and/or teacher will have to cut the water bottles. The water bottles should be cut right where the brand label goes. The top piece (where the spout is) flipped upside down and will fit inside the larger bottom of the bottle. This is will be the filter. In addition, the educator will need to prep dirty water. Using glitter, dirt, water, and food coloring create the water for the students to filter.

To start the project, the educator should display all of the materials on a table in the front of the classroom. Each item by name. Let the students know the objective of their task – to make a filter capable of making the water cleaner. The filters they build will not make the water 100% clean, but the objective is to construct the best filtration system ultimately making it better for the consumer. Students should use their previous knowledge of these household goods to select **3** items for their filter.

Students will then design their filtration system using the smaller top part of the water bottle. They can layer the items in any order he or she would like in order to get the best result. Have the student record their selected materials and the order. Then, using a piece of cheesecloth, the students will rubber band the cheesecloth to the spout of the water bottle. This will prevent the pieces from falling apart and add as a second filter. Ask the student to place their filter system (the top of the bottle) onto the larger bottom half.

Then, the students can present and test their filter. The students should explain their choice to the class and then the educator should add the dirty water mixture to the filter.

What was the outcome? How much filtering occurred? What changes can be made? Would the order of the materials make a difference? What item(s) would you want to switch out in the hopes of better filtering?

**Lesson Resources:**

There are great activities for students of all ages to introduce civil engineering. All lessons are aligned with NGSS learning standards -

ASCE

<https://www.asceville.org/activities.html>

Dream Big!

<http://discovere.org/dreambig/media-assets>

Discover Engineering

<http://www.discovere.org/our-activities>