

# Smart Savings-Designing and Building our Own

The construction of this equipment came as a result of the need to upgrade some labs in the LCOE and their unique equipment requirements. The experience, expertise, and abilities of Lyles College's lab technicians, Steve Scherer and Derick Gangbin, and faculty, allowed us to conceptualize, design, construct, and commission this equipment. We are showcasing just five of over fifty projects with unique specifications that have been completed at a substantial cost savings to Fresno State.

These Labs are used in the following classes:

- CE85-Intro to Civil Engineering
- CE121L-Mechanics & Mats Lab
- CE123L-Soils Lab
- CE129-Hydraulics Lab
- CE132-Reinforced Concrete Design
- CE153-Traffic Operations & Control



## One Plane Test Frame

**Cost to Purchase: \$165,000**

**Cost to Manufacture: \$8,000**

**Cost Savings: \$157,000**

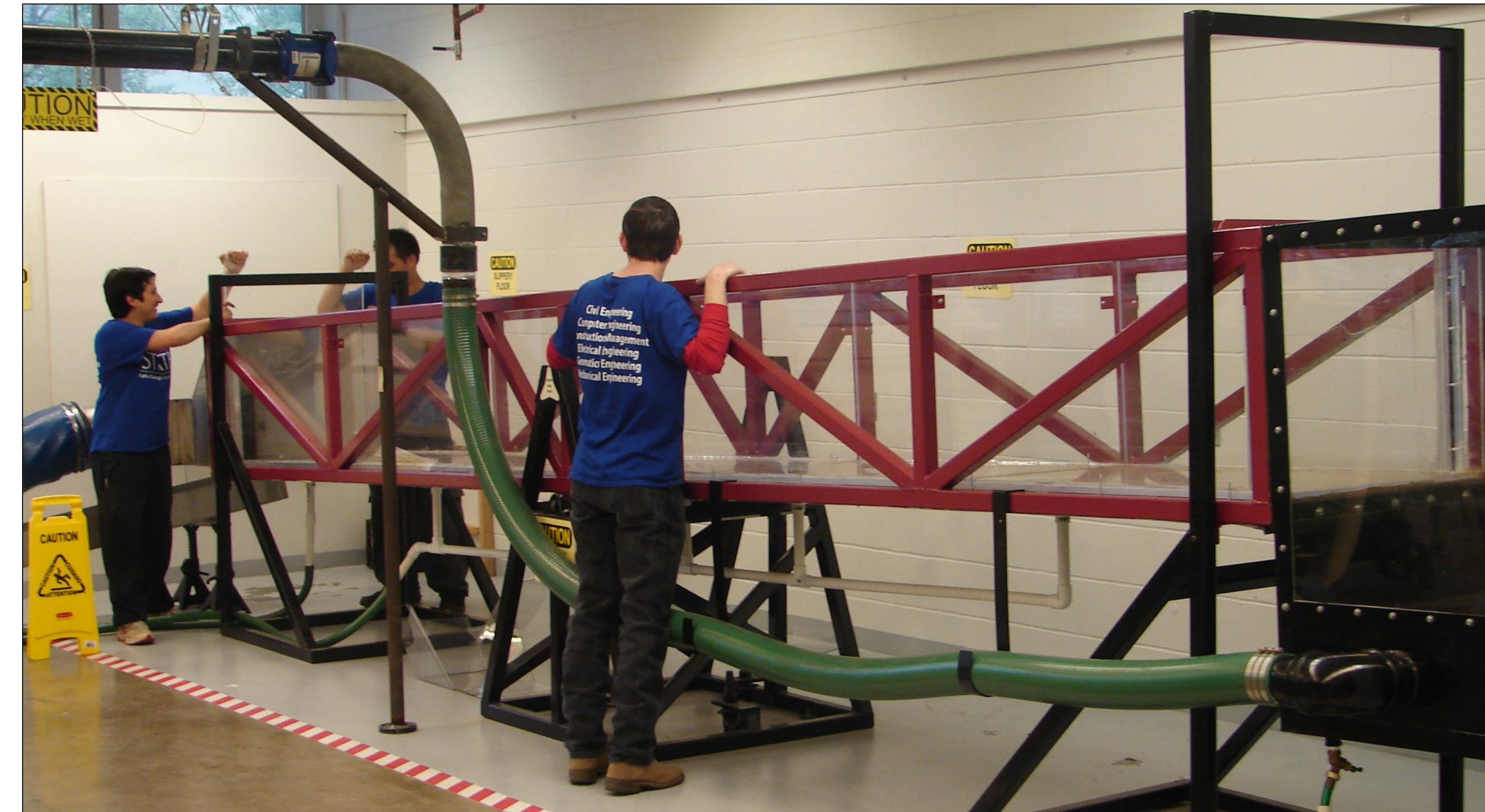
This test frame is capable of exerting up to 53,000 lbs. of force and can accommodate beams and columns up to 15 feet tall. Students and researchers use this machine to test concrete, steel or wood structures. Power for the hydraulic ram is supplied by a MTS hydraulic power system, rated at a maximum of 3000 psi. The hydraulic pump provides 2 levels of flow, (3.1 and 6.4 gpm.) at pressures up to



## 20 Foot Adjustable Incline Flume

**Cost to Purchase: \$50,000 Our Cost to Manufacture: \$3,500 Cost Savings: \$46,500**

The Flume is an important piece of equipment used in Hydraulics research and teaching. Our Flume is 2 feet tall, 3 feet wide and 20 feet long, and is capable of moving water up to 420 gpm. With weirs in place at 18 inches tall, the Flume will hold about 650 gallons of water with a weight of about 5,500 pounds. The Flume's slope is adjustable by 1/2 degree increments to a maximum of 11 degrees. The Flume allows us to conduct the important studies of water flows in rivers and channels.



## River Flow Simulator

**Cost to Purchase: \$14,500 Our Cost to Manufacture: \$3,500**

**Cost Savings: \$11,000**

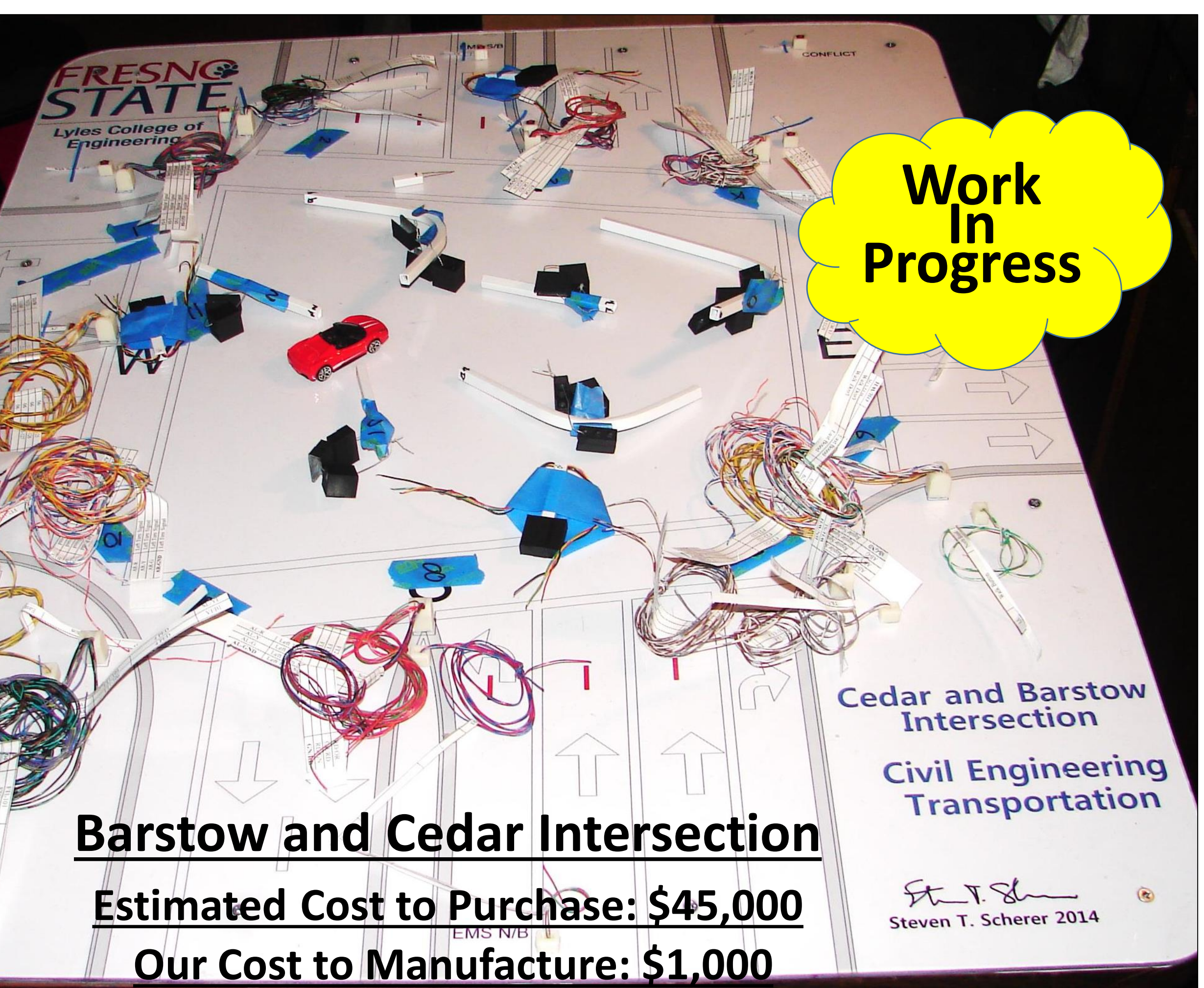
The River Flow Simulator is a self-contained simulator for the study and visualization of river formations, soil erosion, and bed load studies. The tank is 3 feet wide, 7 feet long, and 6 inches deep. The tank is mounted on a steel frame with a 4-point jacking system to allow not only longitudinal slope, but also lateral inclinations. The slope of the tank can be easily and safely adjusted while fully loaded. The submersible sand pump makes the system totally self-contained, with discharge ports to remove all water and sand. The submersible pump, variable area flow meter and control valve are capable of generating flows from 1/3 to 3 gal/min.

**We manufactured \$560,000 of Equipment for \$172,000, saving Lyles College of Engineering \$388,000 on over 50 projects**



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**Barstow and Cedar Intersection**  
**Estimated Cost to Purchase: \$45,000**  
**Our Cost to Manufacture: \$1,000**  
**Cost Savings: \$44,000**

This is a replica of the intersection at Barstow and Cedar and it is connected to a Caltrans Model 2070 Traffic Controller. The developed system (built replica intersection and connected controller) represents a unique educational tool that was envisioned and developed at Fresno State. Students will use this system to learn about the complexity associated with intersection and traffic light design. They will learn about the various components of a signalized intersection, including traffic detectors; signal poles, masts and heads; conflict control; preemption components; and associated wires and connections. In addition, students will learn to program the traffic light controller according to different designs. The scale-replica intersection will simulate, test, and observe these designs in real time. The controller and its traffic cabinet were donated by Caltrans in perfect working condition. The Caltrans Model 2070 Traffic Controller is one of the most advanced traffic light controllers used nationwide.

## Seismic Table

**Cost to Purchase: \$76,500      Our Cost to Manufacture: \$20,000**

**Cost Savings: \$56,500**

The two blue beams were salvaged from the old section of the University library during its deconstruction. Each beam weighs about 3,500 lbs., stands over 2 feet tall, and is 10 feet long. The table top alone weighs about 10,000 lbs. and has 192 holes with nuts welded to the underside of the table for anchoring various structures. The hydraulic actuator can simulate earthquakes of any magnitude, but only in one direction. The pump used to drive the actuator is equipped with two 100 HP electric motors capable of delivering 100 gpm of hydraulic fluid, flowing at 3000 psi. The system is capable of shaking up to a 40,000 pounds (the weight of a Greyhound bus) structure at +/- 3 inches, and up to 1.5 g's of acceleration.



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 CE123T-Soils Lab

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