Concrete Laboratory (CEE 375 and Concrete Canoe Team)

1. **Materials and Supplies** (annual basis): fine aggregate pycnometers, disposable trays, paper towels, spatulas, spoons, test supplies, equipment maintenance, etc.
   - $2,000/year

2. **Concrete Mixers**
   The concrete mixers used for CEE375 are quite old and in need of frequent repair and cleaning. This would cover the purchase of 2 new replacement mixers (3 cu. ft. batch capacity) which have a non-stick polyethylene drum which is easier to clean.
   - $7000

Environmental Lab

3. **Supplies for undergraduate laboratory classes in the Environmental Lab** (CEE 330, CEE 431, CEE 432, and CEE 434). Items: Aprons ($135), goggles ($50), antimicrobial soap (100), replacement glassware ($200), glass fiber filters ($300), membrane filters ($290), Petri dish 50x9mm ($300), Pipet ($100), Pipettors ($75), pH buffers ($50), Forceps ($25), PhosVer3 powder pillows ($200), Acid, base, salts ($150), Replacement BOD meter ($600), Replacement BOD probe ($770), repair parts ($500) (Mitch can often repair the small equipment that is used for the class), calibration of balances ($250), filter cartridges for water deionizer ($700).
   - $4,800

Geotechnical Lab (CEE 355)

4. **Materials and Supplies the Geotechnical Lab** (annual basis): chemicals, trays, spatulas, spoons, sieves, glassware, equipment maintenance, etc.
   - $2,000/year

5. **Automated Direct/Residual Shear System**
   CEE 355 includes a laboratory session on measurement of direct shear strength of soil. This is the principal strength test that is taught in the course. We currently use highly outdated equipment that is prone to break down, in a couple cases leading to the delay of the lab session or even its cancellation. The existing equipment is over 15 years old. Data is collected by hand and of very poor quality. Students are not exposed to essential knowledge regarding transducers, calibration of transducers, data acquisition software, and data processing. We typically have four groups of students in each lab session and therefore aim to have at least two sets of this equipment available for instruction.
   We are requesting the purchase of 2 Automated Direct/Residual Shear Systems, including all hardware and software. These will be used every semester as the principal equipment for the direct shear laboratory session. Every civil engineering undergraduate student is required to take CEE 355. The equipment will be used exclusively for undergraduate instruction.
   - $25,000

6. **U.S. Rocscience Software Subscription - Slope Stability and Rockfall Software**: In CEE 455 we cover the topic of slope stability. Modern practice is to carry slope and rock stability problems using commercial software. The intention is to use the software to demonstrate stability calculations and compare results with hand calculations when feasible.
   - $250
Hydraulics lab - CEE320 and CEE421 (open channel flow):

The main undergraduate teaching activities in this lab are the CEE320 experiments. In addition, other courses including CEE421 also use the lab for one or two experiments or demos from time to time.

7. **Materials and Supply for the Hydraulics Lab**  
   $2000/year

Pavement Laboratory (CEE 461)

8. **Materials and Supplies for the Pavement Lab** (annual basis): heat resistant globes, nitrile globes, steel putty, epoxy cement, asphalt emulsifier (for cleaning instruments), filter papers, disposable trays, paper towels, construction paper, spatulas, spoons, mixer whip, aggregate, asphalt cement, test supplies, sieves, gyratory molds, hot plate, mixer bowl, glassware, equipment maintenance, etc.  
   $2,000/year

9. **Inline signal conditioners for strain gauges and Poisson ratio measurement sensor**  
   These signal conditioners will allow the measurement of Poisson ratio of asphalt concrete mixes (which is currently not possible) and provide the students the opportunity of selecting term projects involving more advanced measurement as well as working on undergraduate research projects.  
   $2,000

Structures Laboratory

10. **Upgrade SAP for CEE 381**  
    Finite Element Modelling Software used for some of the work in CEE 381.  
    $850

11. **Materials, Supplies and Safety for the Structures Lab** for CEE 370, CEE 485, and CEE 486 (annual basis)  
    CEE 370 – $6,500 (Tension test specimens- $1,000, Strain gages- $2,000, Load cell and LVDT – $3,500)  
    CEE 485 - $4,500 (concrete, reinforcing steel, form ties, Load cell and LVDT etc.)  
    CEE 486 - $4,500 (structural steel, bolts, load indicating washers, welding consumables, load cell, LVDT, strain gauges, strain indicating coatings, hand tools, etc.)  
    $15,500

12. **Plasma Cutter Supply (CEE 486)**  
    Purpose/Use: To cut steel for research projects in structures lab and other special projects including hydraulics experiments. This plasma supply would enhance our current CNC capability by allowing us to cut thicker steel (up to 1") for a wider variety of projects. Making practical demonstration items for CEE 486.  
    $7,500
13. **Large capacity hydraulic actuator and load cell**
   During the CEE485 laboratory, students construct 8 full-scale reinforced concrete beams. These beams are then tested in bending to illustrate the various modes of failure possible for a reinforced concrete beam. These bending tests are performed using the four-post frame with 300,000 pound hydraulic actuator in the structures laboratory. This load frame, actuator and associated load cell were purchased using research project funds for tests performed on large scale prestressed concrete beams. Once that test program was completed, the load frame was used for the CEE485 beam tests. For the past two years, the actuator and load cell have been removed from the four-post frame and used to test masonry walls as part of an NSF funded Hybrid Masonry project. In order to test the CEE485 beams it has been necessary to halt the NSF project for at least a month each time CEE485 is offered, and transfer the 300 kip actuator back into the four-post frame to perform the CEE485 beam tests. The actuator and load cell then have to be transferred back into the Hybrid Masonry load frame before the NSF project can continue. This is likely to be a problem in the future as well, since this is the only large capacity, long-stroke actuator and load cell in the structures lab. It is proposed that undergraduate student fees be used to purchase a large capacity actuator and load cell to be installed permanently in the four-post frame specifically for performing the beam bending tests in CEE485. With this load frame permanently available for undergraduate instruction, consideration will also be given to plans to introduce a laboratory section to CEE486, structural steel design, which will demonstrate the performance of large scale steel beams and columns.

   **$60,000**

14. **Replacement Strain Gauge Indicators and Recorder.**
   We currently use Vishay P-3500 strain readout boxes which are from the 1980s. They are starting to breakdown often and should be replaced by similar. These would be used in the CEE 370 and CEE 486 laboratory experiments where it is beneficial to break the lab up into 3 groups each working with a strain indicator. We are currently down to only 2 working indicators (from 4).

   **$6,500** (estimated cost including shipping: $1,970 each x 3 plus tax & shipping).

15. **PhotoStress Analysis System and Consumables.**
   This system would be used in the CEE 486 laboratory experiments to validate concepts of residual stresses, stress concentrations, plastic yielding behavior at bolted and welded connections. The system can also be used to validate finite element models prepared by students. These concepts are not sufficiently explored in the laboratory in CEE 370. Test assemblies are coated with a plastic consumable used in conjunction with video captured through polarizing lenses. Analysis of the captured video allows for accurate stress analysis and real time visualization of complex structural component behavior.

   **$15,000** ($14,000 for equipment, $1,000 for initial set of consumables).

**Other undergraduate teaching related requests:**

16. **General supplies (all labs)**
   All CEE Department labs require general supplies including paper towels, trash bags, and printer toner cartridges. This is in addition to specific lab supplies such as globes, materials, glassware, etc. (listed separately for each laboratory.)

   **$3,000**
17. **New Projectors for classrooms H244 & H287**
The current projectors in these rooms are over 10 years old and image quality is now very poor. The images are getting difficult to read and may totally fail soon. Needless to say, projectors are an integral part of classroom instruction.

$4000

18. **Surface Water Modeling System - SMS v11.2 + WAM and GENCADE Add ons.**
http://www.aquaveo.com/software/sms-surface-water-modeling-system-introduction. WAM ($750) is a wind-driven wave model that can be used as input for GENCADE ($1,500), a sediment transport model. These programs add-on programs will be used with SMS ($2,400) in CEE491, a new sustainability course that is currently being put together and that focuses on how climate and waves affects coastal regions (i.e. coastal hazard analysis). The programs will also be used in CEE421.

$4,650

19. **Cantilever Rack for Structures Lab**
As everyone knows, floor space is tight in the Structures Lab and storing items outside deteriorates them quickly. The current rack is light duty and short (1/2 ceiling height) which doesn't allow very good use of space. We'd like to purchase a cantilever rack which would extend to the full height of the ceiling in H101, allowing us to more efficiently use vertical space. The formwork for CEE485 will be stored on this rack. CEE 375 and 370L will benefit from this rack in the form of increased floor space. The future CEE 486 Lab will store materials on this rack as well.

$5,500

20. **Replacement Cabinets for Instrumentation Room** (off structures lab)
Current cabinets had to be removed and demolished due to termite infestation. The new cabinets will be steel or other non-wood material

$8,000

21. **New Computers for Undergraduate Lab**
Undergraduates primarily use the computers to run Autocad which is very demanding on computers. Students have complained (most recently at Dean’s lunch in March) how Autocad runs sluggishly and sometimes crashes. This would provide enough funds to replace all 9 computers in the lab.

$18,000