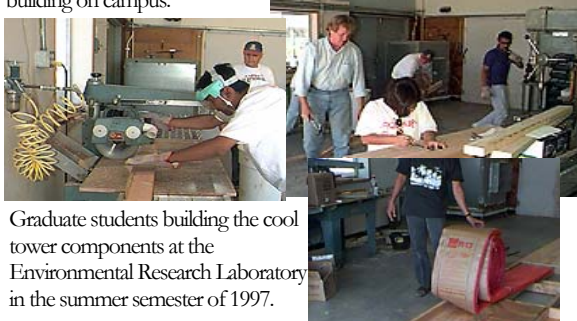
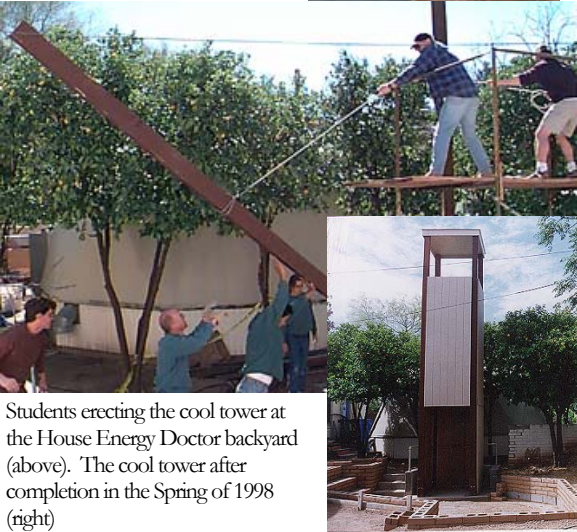


## Design Build Studios:

The House Energy Doctor program annually offers students the opportunity to participate in design/build workshops on energy conservation and passive solar systems. The last workshop focused on the construction of a “cool tower” at the backyard of the HED building on campus.



Graduate students building the cool tower components at the Environmental Research Laboratory in the summer semester of 1997.



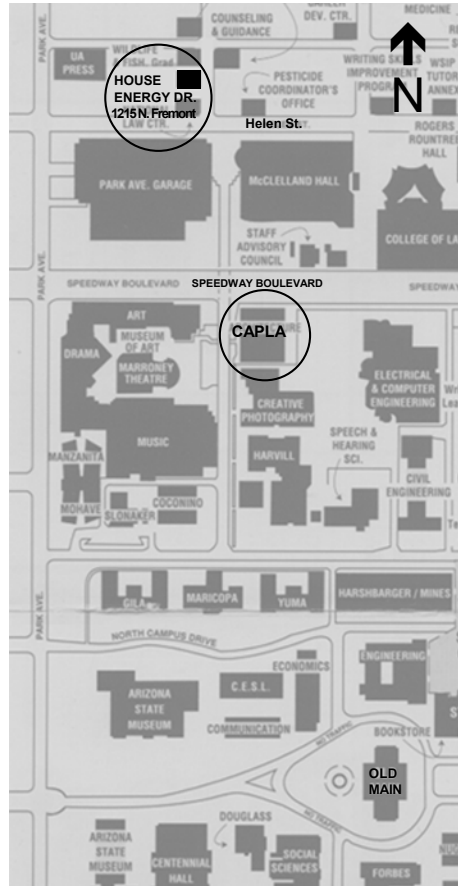
Students erecting the cool tower at the House Energy Doctor backyard (above). The cool tower after completion in the Spring of 1998 (right)

## Urban Outdoor Analysis:

Recently, the HED team developed a new methodology for assessing outdoor thermal comfort in urban spaces. Utilizing sophisticated tools, in-house developed software, scale models and fish-eye lens photography, the thermal performance of an outdoor space is predicted, evaluated and redesigned for comfort.



## How to find us:



U of A Campus Map



### House Energy Doctor® Program

College of Architecture, Planning and Landscape Architecture

1040 N. Olive, Tucson, AZ 85721

Phone (520) 621-6751  
(520) 621-3755

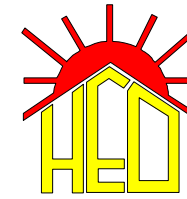
Fax (520) 621-8700

chalfoun@u.arizona.edu

matter@u.arizona.edu

dab@u.arizona.edu

www.capla.arizona.edu



THE UNIVERSITY OF  
**ARIZONA**®  
TUCSON ARIZONA  
CAPLA

## HOUSE ENERGY DOCTOR®

An education, research, and community service program that promotes student learning of energy conservation and passive solar design through field investigation of existing buildings and innovative sustainable design.



In response to the need for sustainable design and more energy conscious architects, the House Energy Doctor (HED) was developed in 1986 at the College of Architecture, Planning and Landscape Architecture (CAPLA). HED has 3 missions:

### 1. Education:

Each semester, graduate and upper division undergraduate students are taught the fundamentals of solar geometry and physics, building thermodynamics, psychrometrics and thermal comfort, climate and microclimate, energy conservation and passive solar design. Using up-to-date site survey methods, advanced instruments, and state-of-the-art computer simulation techniques, the thermal performance of selected buildings is predicted and optimized.



Outdoor classroom at the HED cool tower pit

## 2. Research:

The House Energy Doctor program provides students the opportunity to develop research projects related to their Masters studies, senior (capstone) design, and/or funded research. Research activities include development of new site survey methods and instruments used in field investigation of buildings, development of new computer programs for specialized research, and development of innovative methods, systems and guidelines for energy conservation and passive solar design. Research activity also leads to publication of findings and opportunity for national and international travel.

### *Creative Instruments:*

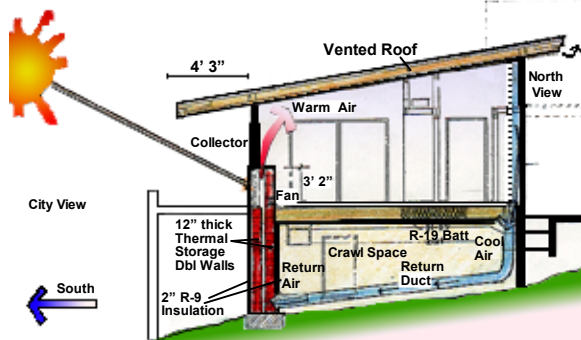
The Azimuth Protractor is an in-house developed and patented site instrument which uses the sun and special charts to precisely measure a building's azimuth angles.



### *Publications:*

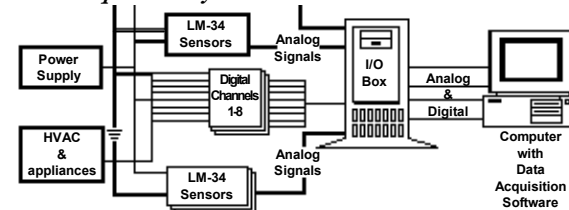
Over the past 10 years, the HED team has published more than 44 national and international research papers in conferences, peer-reviewed journals and magazines. Students traveled to Mexico, Spain, Portugal, and other places to present their work.

### *Innovative Systems:*



Below-collector Tromb-wall system with low-flow fan and insulated double brick thermal storage wall coupled with return air ducts at the Mittal residence in Tucson, Arizona (Arch. Robert Hershberger).

### *Data Acquisition Systems:*



## 3. Community Service:

The no-cost energy consultation service the HED program offers encourages home and building owners to participate in the program. The elaborate energy analysis the students perform helps identify critical design elements in the structure which contribute most to energy waste. Alternative solutions are optimized and reported to the owners to help them implementing the new strategies and to start saving energy.



1



2



3



4



5



6

Students interviewing homeowners (1), measuring roof tilt (2), inspecting the heating, cooling and water heating systems (3), measuring volume of conditioned air distributed through registers (4), checking leaks using the blower door and smoke sticks (5), and measuring reflectance of ground surfaces (6).



For over ten years, the House Energy Doctor program has serviced 65 residences, 12 commercial buildings, 120 builders residential prototypes, two major city libraries, four university buildings and one major health center in Southern Arizona. In 1998, the HED program was awarded the best energy education program in Pima County.

### **Community Workshops:**

Building on years of experience, the House Energy Doctor team has developed an interactive multimedia computer-based energy workshop that demonstrates the theory, application and results of applying a number of energy conservation strategies to buildings. The workshop, which takes the form of a competition between teams from the audience, has been presented to community professionals, high and middle school students, and to universities in southern Arizona and in Mexico. The workshop was funded by the Environmental Protection Agency of the Department of Energy.



Mansfield Middle school spring 1996 workshop, Tucson, Arizona