

# YOSEMITE COMMUNITY COLLEGE DISTRICT

## Measure E Bond Program

Columbia College

### SCIENCE & NATURAL RESOURCE PROJECT

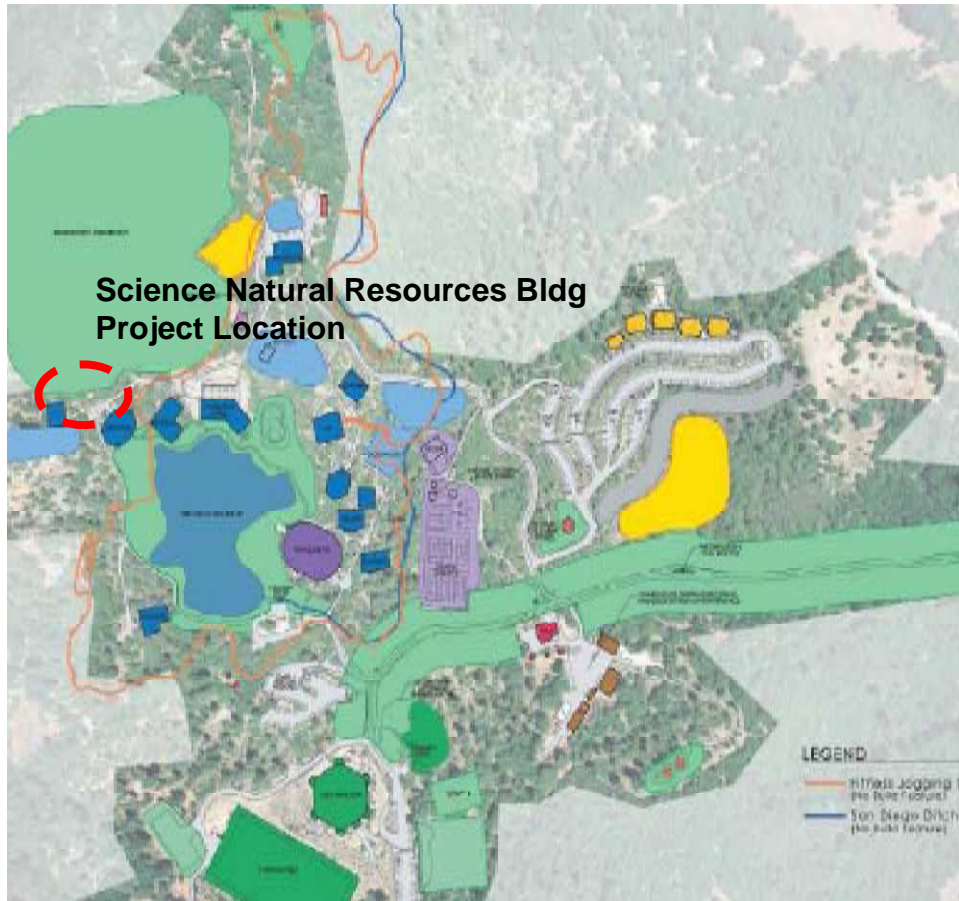
March 2009







# SCIENCE & NATURAL RESOURCE PROJECT

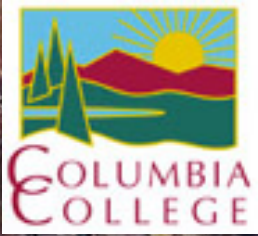




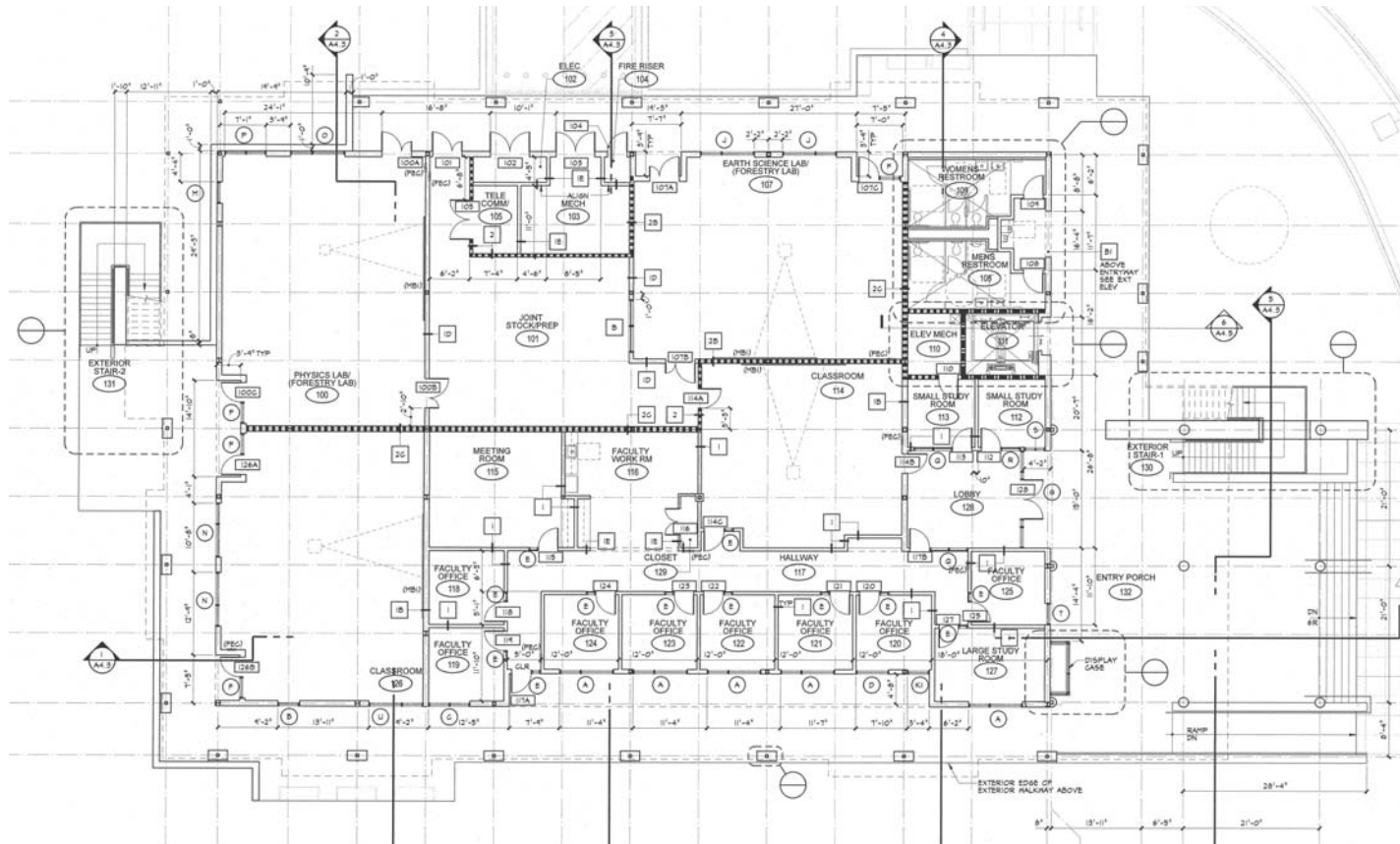


# SCIENCE & NATURAL RESOURCE PROJECT



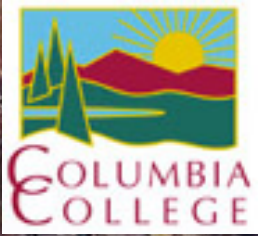


# SCIENCE & NATURAL RESOURCE PROJECT

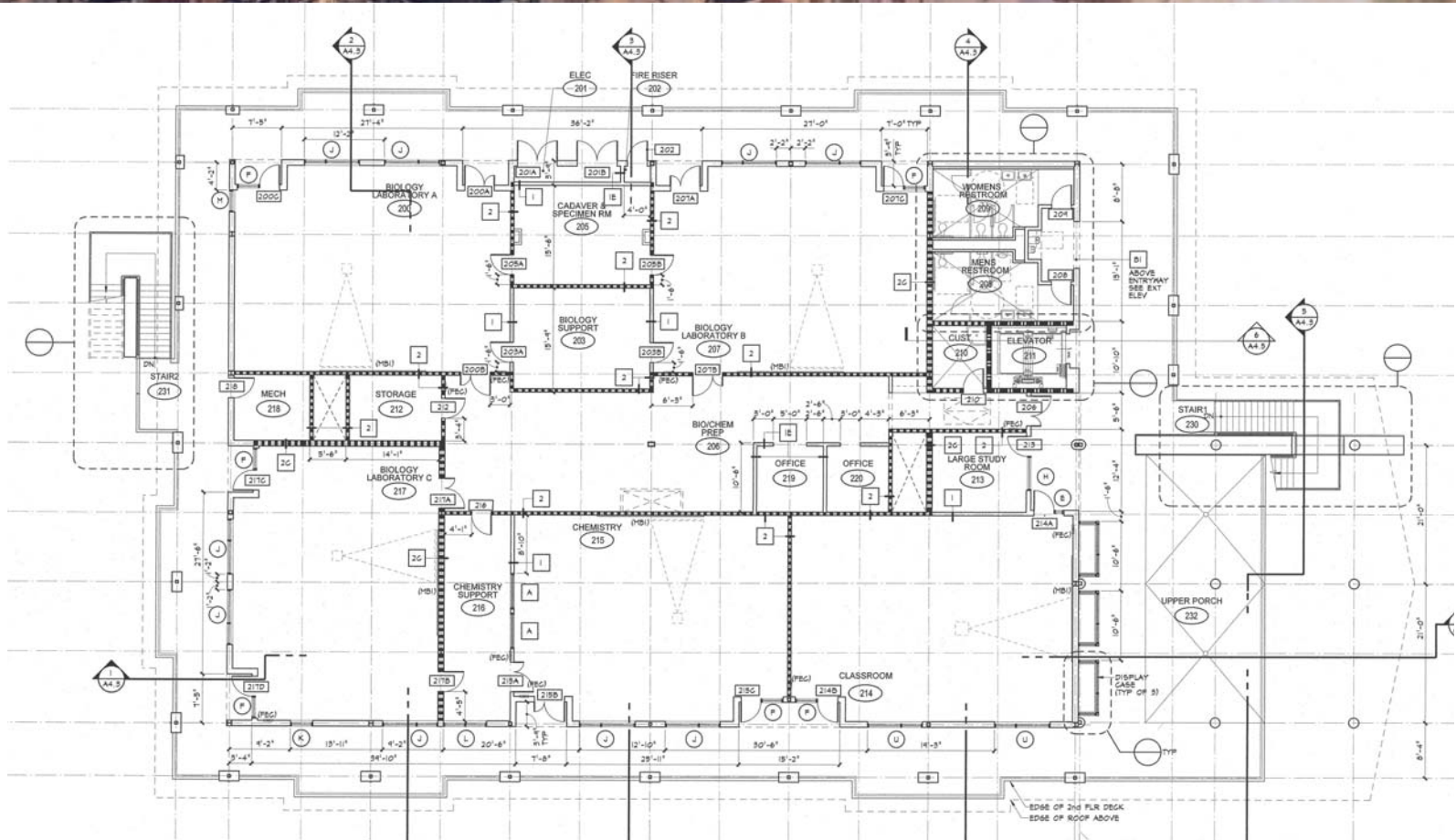


First Floor





# SCIENCE & NATURAL RESOURCE PROJECT



Second Floor



# SCIENCE & NATURAL RESOURCE PROJECT







# SCIENCE & NATURAL RESOURCE PROJECT

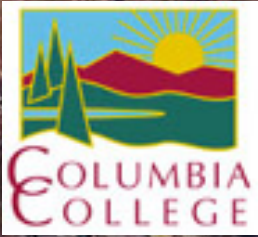
## "GREEN BUILDING"



LEED (Leadership in Energy and Environmental Design) is an ecology-oriented building certification program run under the auspices of the U.S. Green Building Council (USGBC). LEED concentrates its efforts on improving performance across five key areas of environmental and human health: energy efficiency, indoor environmental quality, materials selection, sustainable site development, and water savings.

There are four levels in LEED certification: Platinum, Gold, Silver and Basic.

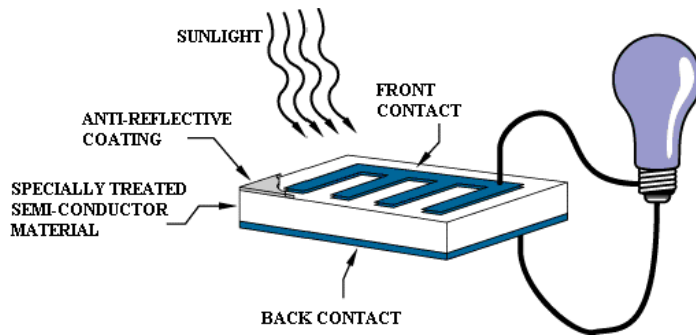
The building will be LEED Certified Silver



# SCIENCE & NATURAL RESOURCE PROJECT

## PHOTOVOLTAIC (PV) CELLS

Photovoltaic (PV) cells are devices that convert sunlight to electricity, bypassing thermodynamic cycles and mechanical generators. PV stands for photo (light) and voltaic (electricity), whereby sunlight photons free electrons from common silicon.



Multiple modules can be wired together to form an array. In general, the larger the area of a module or array, the more electricity that will be produced. Photovoltaic modules and arrays produce direct-current (dc) electricity. They can be connected in both series and parallel electrical arrangements to produce any required voltage and current combination.

This project will have 264 PV panels in 22 strings with a peak generation rate of 33 kWh. The PV panels will generate a total of 47,291 kWh per year.





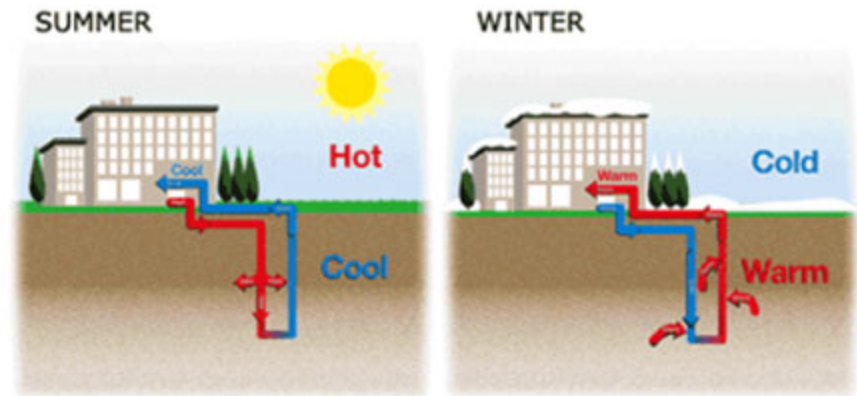
# SCIENCE & NATURAL RESOURCE PROJECT

## VERTICAL GEOTHERMAL GROUND LOOP

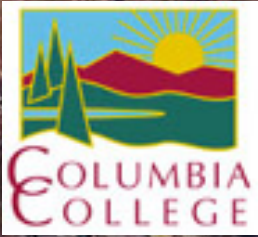
### With Hydronic Heat Pump

For this vertical geothermal ground loop, a drilling rig will be used to drill 300 foot deep holes in which hairpin shaped loops of pipe will be dropped and then grouted.

Driven by a basic vapor-compression refrigeration cycle, this system will extract heat from the earth during the heating season and reject heat into the earth during the cooling season. The system will use the earth's relatively constant temperature to provide space heating and cooling.



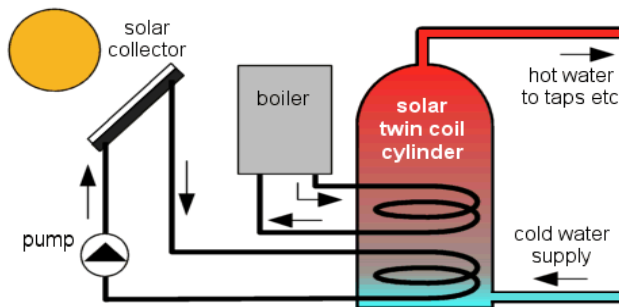
This project will have a 5 ton Geofield Exchange with the ability to provide cooling for the Cadaver Room. This system will provide 800 cubic feet per minute of cooling.



# SCIENCE & NATURAL RESOURCE PROJECT

## SOLAR HOT WATER

Most solar water heating systems for buildings have two main parts: a solar collector and a storage tank. Small tubes run through the box and carry the fluid — either water or other fluid, such as an antifreeze solution — to be heated. The tubes are attached to an absorber plate, which is painted black to absorb the heat. As heat builds up in the collector, it heats the fluid passing through the tubes.



The storage tank then holds the hot liquid; the tank is usually larger and very well-insulated. Systems that use fluids other than water usually heat the water by passing it through a coil of tubing in the tank, which is full of hot fluid.

This project will have the ability to supplement the hot water supply by using 80 sq ft of solar collectors. This system will supply 60% of the buildings annualized hot water demand





# SCIENCE & NATURAL RESOURCE PROJECT

PROJECT BID DATE      May 2009

PROJECT COMPLETED      February 2011