

EXECUTIVE SUMMARY

The Montgomery College New Science Center is a 140,700 square foot four story addition to the Science East university building consisting of laboratories, offices, and classrooms on every floor complimented by an observatory on the roof. The building wishes to achieve LEED accreditation and maintain a safe and healthy environment by meeting all the laboratory ventilation requirements.

The mechanical system consists of a central air handling system, central chilled water system, a central hot water system, and a laboratory exhaust system. All equipment runs on variable speed drives. The central chilled water system consists of cooling towers, chillers, and pumps. The central hot water system utilizes a gas high efficiency boiler and pumps. The central air handling system has two custom roof top units encompassed in the penthouse. And the laboratories are exhausted through four high plume exhaust fans. Overall the current system design is relatively standard for a laboratory building, directly exhausting all labs.

In the pursuit of education, several system alternatives are considered and proposed to be simulation and evaluated over the course of the spring 2009 semester. The system alternatives chosen were combined heat and power and a geothermal system coupled with chilled beams. Combined heat and power systems are based on the concept of recovering thermal energy for heating, cooling, and generating electricity onsite. An open-loop geothermal system transfers heat from a local water retention pond during the heating season, and extracts heat from the building to be dispersed into the pond. Both systems will decrease the energy consumption, lowering the life-cycle costs and improving the environmental quality.

In addition to the mechanical system redesign, two breadth topics will be developed. For the first breadth topic, the lighting fixtures, arrangements and schedules will be potentially altered with the goal of reducing internal loads, and energy use while maintain required task lighting. The second breadth will asses the affects of the new mechanical system on the building acoustics and then potential modifications will be made to improve the space acoustics.

To achieve these results over the course of the semester a schedule for was developed and analysis tools were selected including IES for the load and energy simulations and EASE for acoustic evaluations.