

Executive Summary

The final product of two semesters of work studying the engineered systems of the four story, 64,000 square foot DASCO Medical Office Building is contained in this document. A description and evaluation of the existing mechanical system is included as pieces of the three different technical assignments written in the fall 2007 semester. Ventilation calculations, energy standards and performance, as well as an existing conditions report all aided in presenting areas that can be improved upon in a system redesign. Knowledge of the performance of this system is essential in understanding the mechanical system redesign proposal, and is detailed in the body of this report.

The existing system is comprised of three direct expansion packaged roof top units that serve fan powered VAV boxes with individual electric reheat. The building design allowed for adequate ventilation and overall system energy performance as written by the American Society of Heating, Refrigerating and Air-Conditioning Engineers. However, the current system consumes only electricity, which in mass quantities is generated through the environmentally unfriendly process of coal burning. Redesign goals were to increase system efficiency, reduce energy costs, and cut down on emissions. The idea explored over the course of the spring 2008 semester was to create a chilled water plant dedicated to the cooling load of the DASCO building. Also to eliminate electrically run system components, a boiler was sized for both domestic hot water and space heating requirements. Equipment sizing and selection methods are elaborated upon in the discussion of the redesigned system. Most components are based on the building model created using Carrier's Hourly Analysis Program. Overall redesigned system performance reduces emissions, costs less to operate each year and eliminates a percentage of consumed electricity.

In addition to studying the mechanical system, efforts were made to evaluate other areas of the engineered systems and building construction effected by the proposed redesign. An emergency generator was sized to handle power loads based on sizing criteria found in the National Electric Code. This was done since the current shell and core building had no emergency power system previously. Another aspect of redesign was the impact a new mechanical system will have on the cost and schedule of construction. RS Means construction cost data was used to determine the labor cost and daily output of equipment installation. Both systems are comparable so that neither one has a vast effect on construction.

Overall, a redesigned system would improve many aspects of the building.