

Executive Summary

A system analysis was completed on Philadelphia School District (PSD) Administration Headquarters in Philadelphia, PA. Part I of the analysis focused on design objectives, cost concerns, site factors, indoor/outdoor conditions, load calculations, and energy use. Part II focused on what was installed in the administration building.

Prior to moving into this new location on 440 North Broad, PSD occupied four buildings in different locations. One of the main objectives was to move everyone into one building where it was easily accessed by both the employees and the public. This was accomplished by choosing this site which is very close to City Hall. Another objective was to keep their employees and visitors happy. Since most would agree that natural light has a big impact on someone's mood and ability to produce, the designers focused on a central atrium space that provided connectivity between both the 15th Street and Broad Street entrances, making the space inviting to workers and guests.

Choosing electricity as the primary energy source gives system with a cheap first cost and one that is easily manageable as well. This was a concern for the district because they wanted a reliable system that would require their maintenance engineers to provide little service to the equipment.

In Technical Assignment #2, Trane's Trace program was used to assess the building's energy usage and operating cost. The total kilowatt-hours used by the building was calculated to be 9,963,009 per year. The following chart gives the distribution of energy use by different components of the building.

Energy Consumption Breakdown	
primary heating	0.23%
primary cooling	31.06%
supply fans	5.25%
lighting	63.47%
Total	100.00%

The total estimated energy cost for the year in the Administration building is \$419,177.84. Mechanical system operating cost is \$153,137.97 per year, about 36.53% of the total operating cost.

The loads within the building were analyzed using Trace in Assignment #2. By trying to match what actually exists in the building after design, it was noticed that the air handling units were sized about 10% larger than estimated by the program, a common design practice.

The air handling unit system in the Administration Headquarters, comprised of 17 main units all equipped with an economizer and an evaporator coil for. The outdoor air is provided through a pressurized ducted shaft to the mechanical room where it is mixed freely with return air from the space. Variable fan powered boxes are provided with a reheat coil for heating. This system may have been cheaper initially, but may require more inefficient energy usage in the long run.