

FINAL REPORT
DEFENSE INFORMATION SYSTEMS AGENCY
HEADQUARTERS FACILITY
FT. GEORGE G. MEADE, MD.



GEORGE SLAVIK III

MECHANICAL OPTION

ADVISOR: DR. TREADO

APRIL 5, 2010

1.0 EXECUTIVE SUMMARY

The Defense Information Systems Agency (DISA) Headquarters building is an integrated campus of six buildings located in Ft. Meade, MD. The facility consists mostly of office space and a high security TE lab with support spaces such as a wellness center and a cafeteria. In the previous technical reports, this building was found to exceed ASHRAE expectations and has been labeled a L.E.E.D silver building. Due to the fact that the project is under the jurisdiction of the Army Core of Engineer's strict policies, this building was well designed.

The TE Lab has extremely high loads due its function as a home to high density servers. In fact, the lab contributes to over 30% of the facilities cooling load. Due to this, the Mechanical redesign was focused on the Lab building. The lab is currently under extremely high loading (55 W/SF) and is expected to rise as high as 125 W/SF.

The focus of this redesign was the server racks. The racks are the reason the cooling loads are so high in this building and they are extremely important. These servers contain very sensitive and sometimes classified information. A failure would be catastrophic; therefore it is extremely important we not only provide enough cooling now, but also for the future.

In the original design, the engineer provided oversized mains and branch piping to accommodate for the future loads. Originally, this redesign was going to include a built up chiller plant separate from the central utility plant to meet the current loads and to prepare for the future. After initial calculations showed this would not be economical, the focus was shifted to the source of the loads, the servers.

The mechanical redesign included designing water cooled server racks fed from the central utility plant. The first cost, energy savings, and payback were calculated. The result was that this system could be installed and has a significant energy reduction. There would be a high first cost, but that could be paid back within five years. The only potential red flag was in the event of a water leak, equipment could possibly be damaged.

This led me to evaluate the effects of DX refrigerant cooled server racks. Again the first cost, energy savings, and payback were calculated. The result indicated an even higher energy reduction than the previously investigated water cooled racks. There would also be a higher first cost which would lead to a payback period of 8 years.

Also investigated in this report was a feasibility study on rainwater collection. As an attempt to receive L.E.E.D points and to reduce water the landscape architect has only specified plants which do not require irrigation. Therefore, the water collection was investigated to flush toilets which are allowed by the International Plumbing Code. The result was that every toilet in the facility could be flushed 100% by rainwater, but due to the cheap cost of water it was not worth the investment which was reflected by a payback period of over 60 years.

Finally, an acoustic solution was found for a problem with the roof top units. The units were causing disturbances in the rooms surrounding the shafts. This problem was solved by adding fiberglass duct liner to the supply plenums of the air handling units in question.