

Jan 14, 2011

Thesis Proposal Revision

Revised Proposal for the Investigation of
Alternative Systems

Army National Guard

Readiness Center Addition

Arlington, Va.

Mitchell E. Peters

Mechanical

Dr. Bahnfleth – Advisor



Executive Summary

The Army National Guard Readiness Center Addition (ArNG) will function as an administrative headquarters in conjunction with the existing complex on site. It mainly houses open office spaces and conference centers but will contain an auditorium and training facility as well. This building however deviates from a typical office building with its security and operations centers which have a higher concentration of computing equipment.

The most important aspects of the mechanical system design were to provide substantial thermal comfort as well as indoor air quality. This was of primary concern, but energy efficiency was greatly considered as well.

The ArNG building houses a hydronic HVAC system consisting of a heating and chilled water 4 pipe system. Variable Air Volume (VAV) terminals and Computer Room Cooling (CRAC) units condition the spaces where applicable. This type of system is easy to manage (common for this type of building), cheap to maintain, and fairly efficient.

Direct digital control is achieved through building automation systems (BAS) and building management systems. The BAS system controls all of the VAV terminals as well as damper systems.

The ArNG building contains over 126,000 square ft. of office space. This is roughly half of the total building area and as a result the largest area for potential improvement. To reduce loads to these spaces, a Dedicated Outdoor Air System (DOAS), will be analyzed. When used in conjunction with Chilled Radiant Ceiling Panels (CRCP) or fan coil unit, this system should handle the latent and partial sensible loads of the building. With the loads reduced, they can be applied to a Ground-Source Heat Pump (GHSP) system as well as the existing hydronic system respectively.

The overall object of this proposal is to minimize energy consumption of the ArNG building thus making it less expensive in daily operations. Doing this will in effect reduce the carbon footprint of the building.

Several programs including Trane Trace will be utilized. Using the load data from the energy model it is possible to conclude which solution will provide the lowest initial cost with significant long term paybacks, while maintaining an ease of operation and efficiency.