Executive Summary

The Hauptman-Woodward Medical Research Institute is a 3 story, 73,000 square foot building which provides a full service biomedical research lab as well as supporting office and classroom spaces to the Buffalo-Niagara Medical Campus in Buffalo, New York. This report first discusses the design objectives and requirements to gain a better understanding of what dictated the current mechanical system design. At the Hauptman-Woodward Medical Research Institute, there were many factors which influenced building design. Energy sources and rates, mechanical equipment first costs, and maintenance costs were all considered in the design.

Once the design objectives were clearly stated, the report details the proposed ideas for the redesign of the mechanical system at the Hauptman-Woodward Medical Research Institute. After several alternatives were discussed, the proposed redesign, consisting of the implementation of a Dedicated Outdoor Air System is discussed. In addition, the feasibility of implementing a Water-Source Heat Pump System will also be determined. The primary reasons for implementing these systems were improved humidity control and decrease in energy consumption.

In addition to the depth portion of the thesis proposal, two breadth areas were also discussed. The first area to be discussed is the large lighting power density and the alternative light fixtures that can be implemented that will improve power density while preserving the architectural aesthetics and lighting levels required to suit the building function. This will have an effect on the electrical system and mechanical system due to reduced energy load. The second breadth topic is the feasibility of wind power to supplement the electrical grid. Although it would not be sufficient to power the building on its own, it would certainly be able to supplement the electrical system and cut down on energy costs. The location of Buffalo, New York between the Great Lakes makes it a prime area for wind power.

Finally, the solution methods, tools and preliminary research for the AE 482 Thesis project is discussed in detail for the depth and breadth areas. Trane Trace-700 and Carrier HAP will be used extensively for the redesign, in particular to determine operation costs and comparisons to the original design. In addition, lighting software such as AGI may have to be used to model indoor light scenarios to determine if particular lighting schemes will be better over others. At the conclusion of the report, a tentative schedule is provided for the duration of the spring semester, when the mechanical redesign will take place.