Executive Summary:

Building A and B will be housing the functions of the existing Walter Reed Hospital after being constructed at the current National Naval Medical Center. Once construction is complete, the facility will be renamed the Walter Reed National Military Medical Center. Building A and B will house medical facilities such as Examination Rooms, Operating Rooms, Rehabilitation Spaces, and Patient Bedrooms. Occupancy patterns within the buildings will be fairly predictable with Building A having occupancy during normal office hours and Building B having 24 hour occupancy.

Both Building A and B are conditioned using 100% outdoor air system that supplies a constant volume of conditioned outside air to the occupied spaces. Due to the large energy usage associated with a 100% outdoor air system, total energy wheels have been installed in custom duct housings in order to offset a portion of the energy costs. Heat recovery chillers have been installed on the water side of the system in order to help recover energy from the condenser water stream.

External electronically controlled solar shading will be studied to determine both the potential day lighting benefits along with the energy load reduction possibilities. The quantity of light entering the space along with the quality of light being transmitted through the shading device will be investigated. The size of some mechanical equipment may get smaller due to the reduced heat load from the addition of the solar shades.

After the solar shading investigation, an analysis into the use of backpressure steam turbines along with a combined heat and power investigation will take place. Backpressure steam turbines have the opportunity to be utilized separately as well as in conjunction with a combined heat and power system to reduce the steam to the required supply pressure. Preliminary research shows that combined heat and power can be a good system candidate for this site due to the large facility size along with Building B's 24 hour operation which helps flatten the building load profile.

An analysis into decentralizing the main supply fans in the basement will also take place. Removing the supply fans from one central location and relocating them throughout the building will potentially be able to reduce the total amount of fan horsepower installed. Reducing the total amount of horsepower will directly result in a reduction in the total amount of energy that is consumed by the fans. An analysis will need to be performed investigating the added cost of the new fans versus the energy savings potential.

Load calculations and energy simulations will be performed utilizing the Trane TRACE model that was created for previous technical reports. Being able to run full 8,760 hour computer simulations with multiple system alternatives at the same time will be able to provide detailed results regarding system considerations. Engineering Equation Solver along with Microsoft Excel will also be utilized for areas such as parametric tables and various liquid and gas property values.