

## **MECHANICAL SYSTEMS REDESIGN EXECUTIVE SUMMARY**

The Milton Hershey School New Supply Center is a very wide and long single story 110,000 square foot building. Analyzing the existing mechanical systems proves that the design is very practical and energy conscience for this application. However, there are specific features to the HVAC system that have potential for improvements.

The goal of this mechanical system redesign is to increase energy efficiency, decrease life cycle cost, and maintain or improve the level of thermal comfort that the existing systems set. The original design of the supply center achieves the status of LEED Certification. Any alterations to the mechanical system are not to lower this standard. The final goal of the redesign is to use unique or non-ordinary methods and systems for the study, and measure there performance in this situation. The results from the analyses will not only prove whether the redesign meets the project goals, but will serve as educational value to see how these different systems react with the given conditions.

Eliminating the air handling units that are part of VAV systems and replacing them with dedicated outdoor air systems is one part of the mechanical systems depth. The modifications to the air side system with the use of DOAS should see energy savings while improving indoor air quality. Parallel cooling systems are also needed when using DOAS. Water source heat pumps will serve as the space conditioning devices as well as lead the way to integrating other building systems with the mechanical system. Using a water source loop that maintains a certain temperature for proper heat pump operation allows for other building systems to reject heat to this loop. The walk-in freezers and coolers will reject heat from their condensing units to the water source loop which will maintain the water temperature required for the heat pumps to cool the spaces. The cooling towers needed for the supply center is used to reject the water loop's excessive heat to maintain the appropriate temperature.

A chiller-heater plant is also proposed for examination. Producing chilled water for the DOAS units is the main purpose of the chiller-heater, but utilizing the capabilities of simultaneous heating and cooling is what the new plant is to accomplish. Using only the natural gas system as the main energy source for chilled and hot water production has the potential to save energy cost. All of the redesign alternatives must be justified by proving to have pay back periods of no longer than 3-4 years from their potential energy saving capabilities.

The new mechanical system redesign also creates structural and construction management work. Detailed cost estimates on alterations to the buildings structural system due to the mechanical system redesign serves as the breadth topics.