

Executive Summary

The New Inpatient Tower at the Butler Memorial Hospital is a 209,000 square foot addition seated in Butler, Pennsylvania that has just been completed in July 2010. The eight story tower was built to house state of the art operating and recovery rooms.

The primary means of heating, ventilation, and air-conditioning is done through the variable air volume system with reheat at the terminal boxes and supplementary finned tube radiation heating coils at the perimeter of patient rooms. After doing extensive research, it appears that the New Inpatient Tower at the Butler Memorial Hospital is a prime candidate for a dedicated outdoor air system. The current design calls for 54,000 CFM of ventilation air; however, only 28,000 CFM of ventilation is required by AIA guidelines. By decreasing the amount of ventilation air, chiller and boiler loads will be decreased, as well as air handling units and duct sizes.

In order to supplement the dedicated outdoor air system, examining the use of chilled beam technology will be analyzed. The chilled beam technology will only be responsible for sensible loads created within the space. Two different options of chilled beams will be investigated; either an active chilled beam system or a passive chilled beam system.

In order to saving additional energy with the dedicated outdoor air system, energy recovery and water-side free cooling will also be implemented. Two different options for energy recovery from exhaust air are a runaround glycol loop or a total heat recovery wheel. Both systems have pros and cons which will be analyzed further. Water-side free cooling will utilize the cooling tower to alleviate some of the burden imposed on the chillers during temperate seasons.

An investigation will be done to evaluate the impact of the mechanical system re-design on the electrical and structural systems. Structural members on the roof will be re-sized and priced to account for lower roof loads due to smaller air handling equipment. An electrical analysis will also be done in order to tie the additional pumps and DOAS air handlers into the existing power distribution.