## Executive Summary

The Hauptman-Woodward Medical Research Institute is a 74,000 ft$^2$ mixed laboratory, office and learning space in Downtown Buffalo, New York and was designed by Cannon Design in 2004. The mechanical system consists of two DX rooftop units on the office side that provide approximately 42,000cfm of conditioned air, and two 100% outdoor air handling units that provide the laboratory space with 58,000cfm of conditioned air. The cooling coils for the laboratory air-handling units are served by a 300 ton air-cooled screw chiller. In addition, the laboratory system is equipped with a run-around loop which provides heat recovery between the supply and exhaust air. The laboratory is fully exhausted by means of 3 Laboratory Exhaust Fans that provide a total fan exhaust of 81,000 cfm.

This report proposes the incorporation of two dedicated outdoor air systems (DOAS) at the Hauptman-Woodward Medical Research Institute. On the office side, the DOAS system shall consist of an enthalpy and sensible wheel, and the remaining sensible load will be covered by a parallel VAV system. On the more critical laboratory side, the DOAS system shall consist of a single enthalpy wheel equipped with desiccants able to capture particles as small as 3Å. In addition, a purge section will be equipped to further eliminate contaminants in the building. The laboratory system will be supplemented with chilled beams to satisfy the remaining space sensible loads.

Based on the proposed design, the system was modeled using Trane TRACE 700 software and it was found that the required amount of supply air was reduced drastically due to the fact that DOAS systems only require the ventilation air set forth by ASHRAE Std. 62.1. As a result, the amount of electrical energy consumed annually is

reduced by approximately 534,474 kWh, or approximately 25 percent. This will save the Institute approximately $19,997 per year. In addition to the reduced annual consumption, the proposed DOAS system was compared to the existing system using Costworks and the R.S. Means catalog to determine first cost, and the proposed system is approximately $248,145 cheaper than the existing system. This is in part due to the smaller chiller, associated pumps, ductwork and plenum required, which offset the costs of the added parallel systems and expensive DOAS units. Finally, an emissions analysis was done based upon the current and proposed electric output and it was determined that there was a 15% reduction in emissions due to the proposed system.

In light of these findings, it appears that the proposed dedicated outdoor air systems can provide the same quality of conditioned air to critical laboratory spaces while at the same time saving on first costs and annual utility costs. In addition, the reduced electrical consumption reduces emissions and ultimately helps reduce the building impact on the environment. In these respects, the proposed system is an appropriate fit at the Hauptman-Woodward Medical Research Institute.