Executive Summary

The American Society of Heating, Refrigerating and Air-Conditioning Engineers Standard 62.1 (ASHRAE 2007) provides a source to ensure that minimum ventilation requirements are met within a building. Proper outdoor air ventilation to spaces in the building is essential in maintaining a proper level of indoor air quality. Every day the Xanadu Meadowlands Sports Complex will entertain thousands of occupants for long periods of time. For this reason excellent indoor air quality is critical in ensuring the well being of every guest to this state of the art facility. To evaluate the effectiveness of the ventilation systems in the Xanadu Sports Complex Building A, calculations have been conducted using the ASHRAE Standard 62.1 guidelines to determine whether or not the current system meets the standards requirements.

Building A of the Xanadu complex is comprises of approximately 553,000 square feet of leasable space within its four floors. The building is divided into two sections; the south side of Building A will contain sporting good stores, restaurants, and night clubs, while the north side of the building will house America's first indoor ski resort. The retail end of the buildings receives ventilations from four rooftop air handling units (RTUs) while the Snowdome indoor ski resort is served by a single air handling unit (AHU) housed in a mechanical room adjacent to the ski resort. For this analysis, the required ventilation rates for various spaces are governed based on the peak occupancy, the use of the space, and the floor area of the space. (ASHRAE 2007)

The majority of the retail space is comprised of a single large atrium that is open from the first to third floor. Two of the RTUs will provide ventilation directly to the first and second floor walkways of the atrium while back of house rooms are to draw fresh air supplied to the atrium through corridors. Two larger RTUs supply fresh air to the third floor; however, these two units have been oversized to allow air to drop from the top of the atrium and supply more fresh air to the first and second floor. The ground floor of the retail section houses a loading dock and back of house rooms that are supplied fresh air through louvers in the exterior walls.

The ASHRAE 62.1 compliance analysis of building A revealed some potential ventilation problems. The largest problem is that ductwork only supplies fresh air to the central atrium. There is no ductwork to the other spaces which are required to have ventilation. In place of ductwork, the design is meant to have the over ventilated atrium air work its way through various passageways and corridors to the rooms in need of ventilation. Besides the air having to travel long distances through corridors, it also must try to find its way through door cracks since there are no louvers to allow the corridor air in. This presents a problem since a minority of the rooms are equipped with exhaust fans to create

a negative pressure to draw air from the corridors. Another area of concern is the placement of the return grilles. The only return grilles are placed at the top of the atrium, the same place where the majority of all the air for the building is supposed to be supplied from. This presents a large threat of short circuiting which would cause all the spaces to receive little to no ventilation. The AHU compliance summary table is listed below demonstrating how the poor air distribution in AHU-1 and AHU-2 are creating low ventilation efficiencies which increases the demand of fresh outdoor air.

Air Handeling Unit	Serves	Ventilation Efficiency	Required O.A. (cfm)	Supplied O.A. (cfm)	Meets Standard?
RTU-1	1st & 2nd Floor East Common Areas	0.6	9,410	1,358	**No**
RTU-2	1st & 2nd Floor West Common Areas	0.6	11,564	1,637	**No**
RTU-3	3rd Floor	1.0	1,515	3,039	**Yes**
RTU-4	3rd Floor	1.0	1,563	3,038	**Yes**
AHU-Snowdome	Indoor Ski Resort	1.0	48,000	15,000	**No**

Table 1: Air Handling Unit Compliance Summary

Problems arose with the natural ventilation louvers that are installed on the ground floor. In all cases either the louver-free area was too small or the louver was too close to a confinement source.

It is to be noted that many of the discrepancies in this report are due to differences from ASHRAE Standard 62.1 2007 and the Building Officials and Code Administrators 1996 code which is the governing code for this project.