

William Jones College Preparatory Academy

Chicago Public Schools | Chicago, Illinois



ASHRAE ILLINOIS CHAPTER 2014 EXCELLENCE IN ENGINEERING AWARD

The Jones College Prep project involved the design of a 280,000-square-foot replacement school serving 1,200 students in Chicago's South Loop neighborhood. This project was unique in that the school was designed vertically to accommodate its tight urban surroundings, yet still maintains its school-as-community center feel that most horizontally built schools have. The new mid-rise building nearly doubled the capacity of the previous facility and includes: classrooms, computer and science laboratories, art and music studios, administrative and support services offices, a library, a full-service dining facility, parking garage, athletic facilities, a natatorium, and a performing arts theater.

Mechanical system ventilation for the majority of the building is accomplished through a pair of 40,000 CFM (supply air) dedicated outside air (DOA) energy recovery units (ERUs) located in the Penthouse mechanical room. Each ERU has 201 tons of water-cooled direct expansion (DX) cooling, hot gas reheat (HGRH) dehumidification, hot water heating, desiccant energy recovery wheel (ERW) with bypass, supply fan array and exhaust fan array, each fan with its own variable frequency drive (VFD). The ERU system is variable air volume (VAV) controlling to supply and exhaust duct pressure.

The ERUs provided the majority of the ventilation air to the school (except in the natatorium). At full capacity of 58,500 CFM, summer energy recovery totals 97 tons (14 sensible and 83 latent), and winter recovery is 2,220 MBH. The total fresh air load energy reduction averages 41%.

Occupancy sensors direct two-position isolation dampers in the ductwork to close when spaces are unoccupied, reducing airflow and saving on fan power and energy to heat and cool the ventilation air. In addition, variable-primary arrangements on both the ChW and HW plants saved considerable energy over conventional primary-secondary arrangements in both pumping costs and more efficient operation of chiller and boilers due to higher return water temperatures.

Innovative design resulted in the natatorium being conditioned by a packaged unit with three sources of heat recovery. Additionally, in lieu of designing a dedicated smoke exhaust duct to the roof for the ground-floor auditorium, the ERU exhaust duct was assigned double duty to be used as smoke exhaust. In the case of an auditorium smoke event, fire smoke dampers (FSDs) leading to all floors and to the ERUs are automatically closed and the FSD leading to the dedicated smoke exhaust fan opens.

The modeled baseline energy consumption of the building based on ASHRAE 90.1-2004, System 7 (VAV air handlers with chilled water and hot water, VAV boxes, water cooled chiller and non-condensing boilers) is 33,885,000 MBTU/year. The system as designed achieved a modeled energy usage of 18,609,000 MBTU/year, a total reduction of 45.1%.

The project's sustainable design features helped it successfully achieve a LEED Gold rating.