

JEFFERSON HOUSTON

PreK-8 School- LEED GOLD

Variable Refrigerant Flow | Energy Recovery Technology

Alexandria City Public Schools

New building design for entire city block in the Parker-Grey Historic District. The K-8 school is one of the most energy efficient schools in the country. The HVAC system includes an air-cooled Variable Refrigerant Flow (VRF) heating and cooling system. Ventilation air is brought into the school using a dedicated outside air system (DOAS). The DOAS uses energy recovery technology to pre-heat / pre-cool the outside air and delivers it to each space using an air terminal unit which reads airflow at the EMS. The building also uses LED lighting with daylight controls technology to minimize lighting energy consumption.

Rain Water Harvesting

We are collecting up to 200,000 gallons of water during a significant rain to be stored in the ground, which is treated and used to flush water-closets and urinals. The system is saving more than 40% water than of a typical size school. This reduces the surcharge of water into the old underground storm piping system saving hundreds of thousands of dollars in infrastructure upgrades.

Greenovation

The school is used as a teaching tool. The system components are exposed and clearly labeled for the students to see and discuss.



“one of a kind design”

ACPS hired VMDO Architects and b2e Consulting Engineers, PC to design this new LEED Gold school constructed on the site of the existing K-5 Jefferson Houston Elementary School. The existing school remained open during the entire construction process, with minimal disruption to student life. The new site is an amazing transformation for the City meeting all historic presentation details and adds a new park/athletic space for the area. All exterior lighting uses LED technology and is controlled by the building Energy Management System (EMS).

Energy Cost Reduced

The PreK-8 school is one of the most energy efficient schools in the country. The school will use 50-55% less energy than code requires (ASHRAE 90.1 - 2007). This translates into an annual savings of \$75-80,000 per year in energy related operating costs (electricity & natural gas). The savings are attributable to reducing HVAC unit size due to improved envelope and fenestration design. The building envelope is designed with excellent draft barrier spray an insulation and exterior shades on the southern exposure deflect UV energy from the sun. In addition, the spaces and control one broken down into smaller zones of operation which can be scheduled based on the actual functions of the occupants.



ACPS Projects Completed

1997 : George Washington MS, HVAC and Electrical System Upgrade

1999 : TC Williams High School Chilled Water Plant Upgrade

2000 : Cora Kelly Magnet School, HVAC and Electrical System Upgrade

2002 : Patric Henry ES; HVAC and Electrical System Upgrade

2003 : Charles Barrett ES; HVAC and Electrical System Upgrade

2004 : George Mason ES; HVAC and Electrical System Upgrade

2005 : Minnie Howard Additions and Alterations

2007 : Minnie Howard MEP; Low Energy Building Upgrades (Geo-Solar HVAC System, LEED EB)

2009 : James Polk ES, MEP Low Energy Building Upgrades (Geo-Solar HVAC System, LEED Gold)

2010 : 5 Year Task Order Contract

2011 : Jefferson Houston PreK-8 School Low Energy Building, (LEED Gold)



The ducts are shorter which requires smaller fans and run on less motor energy. Each space is individually controlled and provided ventilation using a variable air volume system that is controlled to maintain room CO₂ levels at 800 ppm or lower. Most of the day ventilation runs at 50% of design saving more than 85% of related fan power and more than half the compressor run time to handle the cooling load. The system uses energy wheels for pre-cooling in Summer and dehumidifies the air to 55 degF . We deliver neutral air to the space using hot (waste) gas reheat for energy recovery.

b2E Consulting Engineers, PC has worked with Alexandria City Public Schools since 1996. We have completed the following projects listed (on left). ACPS has always desired MEP designs be energy efficient using cutting edge technology.

1997 b2E designed George Washington Middle School HVAC and Electrical System Upgrade. This was ACPS first energy recovery HVAC design which included, central water cooled CHW and Pulse Combustion Condensing Boilers for delivery to unit ventilators (No Outside Air) with ventilation provided by dedicated 100% OA ventilation units (DOAS). Building Energy Consumption dropped from \$1.59/SF to \$0.65/SF which is a 244% increase in efficiency while increasing ventilating to meet code by 200%. This was 1997. Using the technology today we can exceed these efficiency values and make healthy fit buildings at the same time.

