

MINNIE HOWARD  
SCHOOL

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Enhancing lives**

## **Minnie Howard High School**

The combination of solar technologies and a RAUGEO geexchange system slashes school's natural gas consumption by 66%.

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# Geoexchange provides an authentic lesson in sustainability

Alexandria City Public Schools (ACPS) has implemented eco-friendly building practices for years, constructing T.C. Williams High School as a green building, which earned the LEED Gold distinction. As the school system embarks on a plan to renovate existing facilities, it is using the 54-year old Minnie Howard campus as a working laboratory for sustainable building technologies, assessing both the performance and cost-benefits.

Hays Large Architects and b2E Consulting Engineers, P.C. worked with ACPS to merge several sustainable building technologies to create one of the more energy-efficient systems in the country. The combination of solar technologies with REHAU's RAUGEO ground loop heat exchange system alone is estimated to slash the school's natural gas consumption by 66%.

The well field for the RAUGEO ground loop heat exchange system is located under the school's parking lot, plunging 300 ft (90 m) below the earth's surface to take advantage of the consistent underground temperatures for heating and cooling the school.

The 65-borehole installation of REHAU PEXa pipe was fitted with RAUGEO Double U-bends for greater energy extraction. The strong, yet flexible PEXa pipe is bent 180° and cast in a fiberglass-reinforced polyester tip, resulting in a rugged U-bend that resists damage during installation and eliminates risks associated with underground joints.

A heat transfer fluid circulates through the PEXa pipes, taking heat from the building during cooling, and dispersing it in the earth. When heating, it works in reverse, collecting naturally stored heat and delivering it to the structure.

The system was designed so that each borehole is individually connected to a series of REHAU polymer manifolds, located in five easily accessible vaults for enhanced control of each borehole.

The RAUGEO system is anticipated to contribute to a more than \$400,000 life cycle cost savings over the next 20 years, as well as reduce greenhouse gases by 110,000 lbs of CO<sub>2</sub> per year.

Linking the sustainable building technology concepts to its ninth-grade curriculum offers students real-world applications, turning the more than 700 students who inhabit the building each day into scientists. An Energy Dashboard – a large interactive display in the lobby – allows students to monitor energy and resource use in real time, leading to awareness and reduced consumption.



**Project:** Minnie Howard High School, Alexandria, VA  
**Construction type:** School renovation, opened in 2009  
**Architect:** Hays Large Architect  
**Engineer:** b2E Consulting Engineers, P.C.  
**Contractor:** Northern Virginia Drilling, Inc.  
**REHAU systems used:** RAUGEO™ ground loop heat exchange system

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