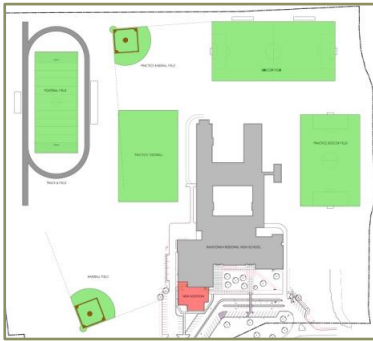




Heat exchange and duct systems resemble conventional equipment



Wells located beneath athletic fields



Existing ducts, insulation, and light fixtures affect building energy demand

### Residential Geothermal System Southeastern Pennsylvania

Due to the rising cost of home heating oil prices, a homeowner in Southeastern Pennsylvania opted to investigate and install a residential geothermal/ground source heating and cooling system. Construction of a 3-ton closed-loop vertically drilled geothermal system required drilling three vertical wells, 275 feet of piping in each, and two heating/cooling units. The system is cost-effective, resulting in monthly savings of at least 50 percent for both heating and air conditioning.

### Institutional Geothermal System Wahconah Regional High School, Dalton, MA

As part of a site design for a new building addition at Wahconah Regional High School in Dalton, MA, Bioengineering Group evaluated three types of geothermal well systems to be used in conjunction with the ground source heat pump for the HVAC system: a vertical closed loop system, a shallow horizontal closed loop system, and a deep standing column well system. Based on available space, high water table, and cost of installation, we recommended the use of shallow horizontal closed loops with individual pumps. Our feasibility study proposed additional energy reduction methods including roof mounted solar hot water system and maintain heat temperatures in the building during the winter months.

### Commercial Geothermal System River Wharf Realty Trust, Salem, MA

Bioengineering Group analyzed the property for the feasibility of geothermal heating and cooling to replace existing HVAC equipment. We conducted a blower door infiltration test to evaluate the building envelope and constructed an energy use model. Using the energy use and infiltration test, we calculated subsequent maximum loads based on average seasonal temperature fluctuations during the building's normal operating hours in the summer and winter months. The design consisted of three 400-foot closed loop geothermal wells based on thermal load test following the drilling of the first well to confirm the estimated design and optimize the well depth for overall efficiency.