



# Kentlands Community Center Geothermal Upgrade

## Case Study



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### Kentlands Community Center, Gaithersburg, MD

#### Standing Column Geothermal Wells

#### Project Goals:

- Low equipment replacement cost
- Longevity of HVAC system
- Energy savings and environmental comfort
- Elimination/reduction of combustion/electric resistance heating
- Reduced Drilling Costs

#### Background

The Kentlands Community Center is a 9,000 sq ft, two-story building with a high glass ratio. The building's 15-year-old air source cooling system with gas furnace heating had reached the end of its useful life. In an effort to do a responsible upgrade to the building's heating and cooling systems, Kentlands' staff considered the available options including replacement with similar air source heat pumps, improving building filtration, air flow and pressure ratios, and possibly upgrading to geothermal heat pumps. Though administrators wished to upgrade to a geothermal HVAC system, there was concern about the amount of excavation required to drill and connect 20 or more geothermal wells for a closed loop system. Upon further investigation, a standing column geothermal source was considered and determined to be favorable. To provide better zone control, it was decided to utilize a quantity of four 6-ton geothermal heat pumps, single and two-stage.

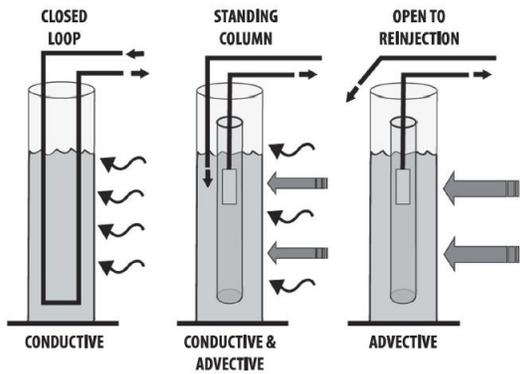


*Four 6 ton Bosch FHP horizontal geothermal heat pumps serve the 9,000 sq ft Kentlands Community Center to provide abundant heating and cooling*

#### Installation Summary

HVAC contractor Harvey W. Hottel Inc., in Gaithersburg, founded more than 70 years ago, was chosen to do the design and installation of the upgraded geothermal HVAC system for Kentlands Community Center. The geothermal source involved two standing column wells (SCW), 900 feet deep into granite, cased to 100 feet. The static water level settled at 14 feet with a pumping yield of 4 gallons per minute each. This is the classic scenario (water found in small fractures within solid rock) in which standing column geothermal sourced technology is optimal. Dick Hottel has designed many standing column systems and understands that this type of geothermal source





Two 900 foot deep standing column wells through 2" Porter Shrouds provide water for the efficient FHP geothermal system (illustration by Sarah Cheney, "Modern Geothermal HVAC Engineering and Controls Applications," McGraw-Hill Education 2013 with permission.)

takes advantage of heat transfer through conduction, convection, and advective heat transfer.

Equipment selected for the project included two each 6 ton single-stage and two-stage FHP heat pumps. Each SCW has a 2 hp VFD controlled submersible pump set at 100 feet drawing well water through a 2" Porter Shroud from a depth of 900 feet and injecting return water back into the static water at the top of the wells. Having functioned through the extreme "polar vortex" winter of 2013-14, the supply water to the heat pumps averaged an astonishingly warm 46°F, providing abundant energy to be highly efficient Bosch FHP heat pumps.

"The FHP heat pumps are a remarkably good fit for retrofits of this kind," says Mike Heavener, president of GeoSolar Energy. "When I attended a meeting with the board of directors, they watched our geothermal demonstration. I believe that sealed the deal, and they signed on for a standing column well geothermal system."

Dick Hottel, President of Harvey W. Hottel Inc. remarked, "It's not easy for a nonprofit organization to invest money like this, and when I needed to find a way to reduce site drilling and shave a few dollars off the installation costs, the local Bosch representative, GeoSolar Energy, was right there with the answers."

### Benefits and Conclusion

The Kentlands Community Center Leaders are satisfied with the install. The entire installation took less than two months, and the system has performed better than expected. After the extreme winter of 2013-2014, Kentlands is pleased to note that they experienced superior heating performance all winter and reduction of about 40% in energy costs, even with the elevated heating loads required during such a brutally cold winter.

"I think we can be reasonably certain that the Kentlands Community Center's FHP geothermal heat pumps will be heating and cooling the building for a long time to come; certainly exceeding 15 years" said Dick Hottel.



### Project Name:

- ▶ Kentlands Community Center Geothermal Upgrade

### Manufacturer's Representative and Geothermal Consultant:

- ▶ GeoSolar Energy, Mike Heavener

### Mechanical Engineer:

- ▶ Harvey W. Hottel, Inc. Gaithersburg, MD

### Application and Equipment:

- ▶ Bosch FHP geothermal heat pumps: two each 6 ton horizontal heat pumps ES 070-3 and ES 071-3 with two standing column wells

### Project Completion:

- ▶ September 2013