

# Prescription for Comfort, Efficiency and Savings

## Geothermal Home Retrofit Case Study



### Bosch Water-to-Water and Water-to-Air Geothermal Heat Pumps

Rill Home, Former Estate of Rite-Aid Pharmacy Founder, Harrisburg PA

#### Project Goals

- ▶ Convert from oil to efficient geothermal system
- ▶ Upgrade comfort heating/cooling and hot water
- ▶ Reduce high operating & maintenance costs
- ▶ Eliminate large boiler plant in basement

#### Background

Mr. Morris Rill purchased this 7,383 sq ft contemporary design home from the late Alex Grass estate. Mr. Grass was the founder of the Rite-Aid pharmacy chain with its

headquarters in Central Pennsylvania. Mr. Grass built this home in the early 1970's when oil was the dominant fuel for home heating. The system was actually a commercial boiler / chiller system using pneumatic controls. When Mr. Rill purchased the home he knew that he would need to upgrade the heating and cooling system because of the following reasons:

- Costs to heat and cool the home averaged \$6,000 per month for electricity and heating oil
- Complexity of pneumatic controls resulted in numerous service calls, averaging about \$700 per call
- Excessive space required for HVAC system, associated piping, ductwork and controls in basement
- Design new system for simplicity, cost savings and improved serviceability



Two of six Bosch SM two-stage geothermal heat pumps installed in basement



Geothermal flow system and manifold



Portion of former HVAC system consisting of commercial boiler and chiller system

## Installation Summary

According to Michael Armstrong, Morrison Inc. Residential Sales Manager, "This proposal was based upon a thorough heat loss/gain done on the structure using the original blueprints and then calculating the needs of the customer to design and adapt the existing ducting to provide comfort zones meeting the family's lifestyle. We proposed and installed a system comprising six closed loop water-to-air Bosch SM two-stage geothermal units feeding 11 different air zones. In addition to the water-to-air systems, we proposed and installed a closed loop Bosch TW036 two-stage water-to-water geothermal unit which provides the home with all of its domestic hot water. The hot water system was coupled with a 120 gallon in-line storage tank to feed into the home's existing recirculating domestic hot water piping. The total capacity of the geothermal system was 31 tons with 4,650 feet of closed loop vertical bore and 9,300 feet of HDPE piping."

All systems have electric, condensate, wiring, pumping/flow centers, and piping. All Bosch geothermal units have electric supplemental heat coils factory installed.

To save money on the installation Mr. Rill removed the existing central system himself and scrapped the metals, thereby reducing costs of the installation.

Armstrong added "We were able to work in stages to allow a transition from the original system to the new geothermal system, thus allowing the family to stay in their home during the entire installation and removal process."



*Bosch TW036 water-to-water system provides domestic hot water*

## Benefits and Conclusion

After nearly a year of being in the home since the installation, the family is extremely happy with their decision to install the geothermal system. The home is now totally electric. Their highest single month electric bill since the installation was \$1,141 last winter - one of the region's coldest on record.

"Mr. Rill keeps detailed usage records and says he cannot be happier. The comfort level is fantastic and he loves the fact that he can set the various areas of his home to the temperature that he wants. He is also happy knowing that by using Bosch equipment he will have peace of mind due to the strong warranty and quality of the Bosch geothermal system."



### Project Name:

- ▶ Rill Home - Former residence of Rite-Aid Pharmacy founder, Harrisburg PA

### Geothermal Design / Installation

- ▶ Morrison, Inc., Duncannon PA

### Wholesaler

- ▶ APR Supply, Harrisburg PA

### Sales Representative

- ▶ Kiely Assoc., Chester Springs PA

### Application and Equipment:

- ▶ Six Bosch SM CDi Series two-stage and one TW036 two-stage geothermal heat pumps with domestic hot water storage tanks
- ▶ Drilling by Morrison, Inc., 4,650 feet of closed-loop vertical bore, 9300 feet of HDPE piping

### Project Completion:

- ▶ October 2015

*Total capacity of geothermal system is 31 tons with 4,650 feet of closed loop vertical bore*