Geo heating and cooling in a tight space
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We recently completed a geothermal installation for a large renovation and addition of an 1890 single-family home in Denver. The home, about 7,000 square feet, was originally heated and cooled with an ancient coal-fired, gravity-fed furnace. Over the years, various furnaces had been installed and the HVAC system had become a hodgepodge of new and old ducting; the result was an inefficient, leaky, and uncomfortable home with rampant hot and cold spots throughout all four levels.

The owners were very dedicated to making their old home as efficient as possible, but also wanted to upgrade to modern comfort standards.

The challenge in upgrading the existing heating and cooling system was maintaining the original architecture with a minimum of chases, soffits, dropped ceilings, and other traditional locations for ducts. Radiant floor was eliminated as an option because of structural concerns and the need for cooling, among other reasons.

The top two floors were challenging in particular—there were no existing ducts on the third floor (where the master bedroom was located) and the top floor had been heated with electric baseboards and had no attic to run ductwork in. The solution was a high-velocity air handler for each floor, coupled with a 410-a ground-source heat pump. High-velocity air handlers work at a higher static pressure than our typical air handlers, which equates to much smaller ductwork (2" round supply trunks).

Example of 2" round supply trunk

For the master bedroom wing, an air handler located in the basement was able to supply heated or cooled air to the floor within the interior 2X8" walls. The result is a quiet, effective system with no visible chases or duct accesses through the main level.

The top floor air handler was located in the peak of the roof, with 2" rounds distributing air evenly through the large, open top floor. A central return adjacent to the air handler helped keep the ductwork simple here.

R410-A air handler