



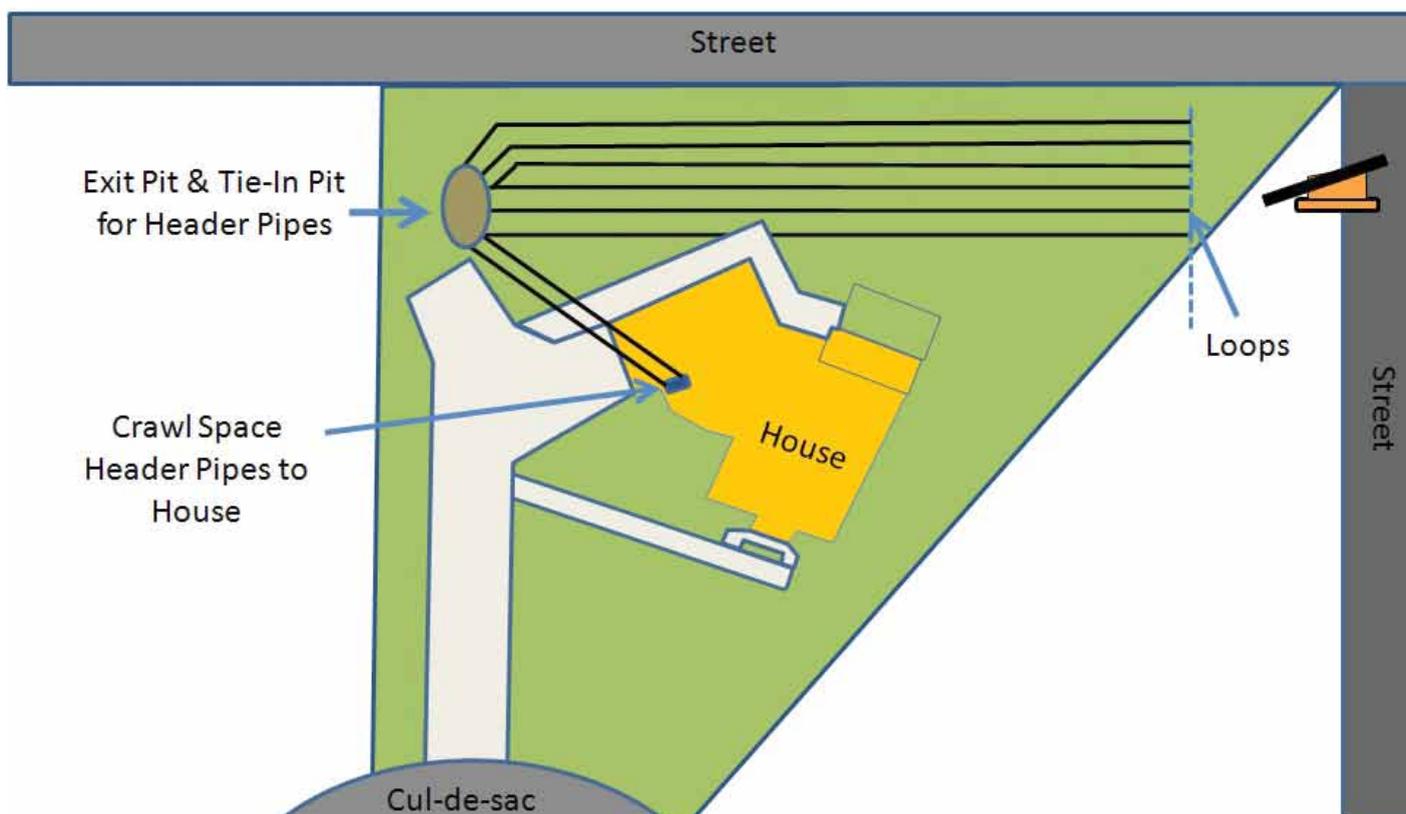
# HDD Geothermal Loop Installation



A ground source heat pump residential retrofit project in Rock Hill, S.C.



The backyard on the property.



Property layout.

Extreme weather conditions, such as the harsh deep freeze we endured this past winter or the stifling record heat that blanketed the United States this summer, should be enough to convince any business or homeowner about the benefits of geothermal heating and cooling systems, not to mention the accompanying federal and state tax credits that are available. Although vertical drilling is the most common method of geothermal loop installation, horizontal directional drilling offers additional benefits, options and flexibility for loop installation, along with the installation of header pipes that connect the loops to geothermal heating and cooling systems. The benefits of horizontal directional drilling can be fully appreciated in ground source heat pump (GSHP) retrofit applications where well-established landscaping and structures present a problem. Benefits of horizontal directional drilling were realized on a recently completed residential retrofit project in Rock Hill, S.C.

Harold Peeples, owner of Tarheel Contractors Supply, needed to upgrade his residential heating and cooling system. As a supplier to both the geothermal heating and cooling industry and the HDD market, Peeples is well aware of the benefits these two converging technologies have to offer. A vertical drill would have severely damaged the extensive backyard landscaping, and installing loops in the front yard just was not an option; therefore, horizontal directional drilling was the only logical choice.

Utilizing a Ditch Witch 1220 horizontal directional drill, Lee Electric from Aberdeen, N.C., set up and drilled from the side of the road, under the fence and landscaping, and punched out into an exit pit just beyond the end of the driveway. Once the drill punched out into the exit pit, 1-inch geothermal loops, along with a 1¼-inch grout tremie line, were pulled behind the drill bit, back toward the drill entry point. Mule tape was utilized as a spacer between the u-bend and the bit, so that when the bit was out of the ground, and the mule tape was cut loose, the u-bend of the loop was in the desired position/depth. Additional depth (35-ft. deep) was added to the bore profile to compensate for the lack of linear footage, and six 250-foot-long, 1-inch-diameter loops were installed.

After the installation of each loop, a thermally enhanced grout mixture of 16 gallons of water, a 150-pound bag of geothermal grout, and 200 pounds of sized silica sand (provided by U.S. Silica), was pumped through

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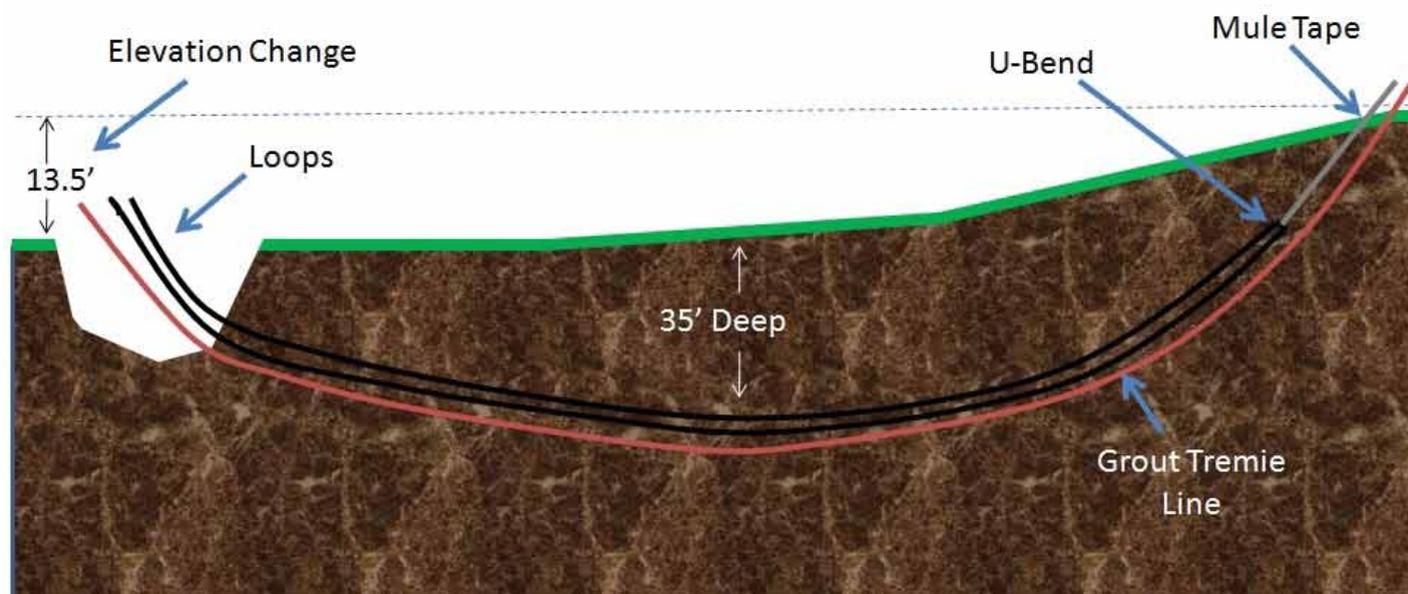
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Lee Electric on the job.



The tremie line.



Bore profile.

the tremie line via a ChemGrout grout mixing and pumping unit to fill the void area between the loops and the borehole. This recipe was used to achieve a thermal conductivity of 0.90 Btu/hr/ft/F. Thermally enhanced grout increases the efficiency of the ground loop system by providing bet-

ter heat transfer from heat loops to the earth, and the grout provides a low permeability seal in the annular space of the borehole.

After all of the loops were installed and grouted, the drill was repositioned behind the exit pit where Lee Electric drilled from the exit pit, un-

der the driveway, and punched out into a small exit pit below a crawl space under the house. Once they punched out under the crawl space, two 1¼-inch header pipes, which connected the loops to the geothermal heating and cooling system in the house, were pulled back. Panther

Heating and Cooling of Rock Hill, S.C., installed the WaterFurnace heating and cooling system, purged the loops, and got the system up and running in time for the Christmas holiday season.

Horizontal directional drilling provided a means of installing the geothermal loops and header pipes without damaging the picturesque backyard. Today, there are no visible signs outside of the home to indicate that such a system was installed and operating – other than the lack of a noisy air-conditioning unit and an electrical meter that now turns quite a bit slower. Peeples and his wife have been enjoying the comfort and savings provided by the WaterFurnace ground source heating and cooling system, which immediately was put to the test by starting up in the harsh winter of 2010-2011 before going up against record-high temperatures of the summer of 2011. **ND**

*George Dugan is a regional manager for CETCO.*