Inspecting Geothermal Boreholes
Drilled with conventional water well drilling rig and service water truck.
Geothermal Heat Pump & Vertical Ground Loop

Provides heating in winter and cooling in summer.
Typical 450 ft deep for a 3 ton heat pump serving a 1500 sq. ft. House.
Drilling can occur year round, if trucks can access the borehole location.
Inside package heat pump for basement ducts & split heat pump to attic air handler serving the second floor.

Two wall mounted Grundfos circulator pumps.
A non pressurized flow center circulator pump.
Software is used to calculate depth based on bedrock thermal conductivity and building heat loss and gain.
Check past Driller’s logs for rock type if available.
If no data, refer to bedrock map. Compare rock type with its expected thermal conductivity.
Final Lawn Grade

4.5' deep trench

90 degree HDPE Elbows

3" diameter concrete cores. HDPE sealed watertight.

Soil

Plastic ring

Soil

Ledge rock

Bentonite Grout between HDPE and bore sides

940 LF 1 1/4" High Density Poly Ethylene (HDPE) Pipe

HDPE Loop filled with 85% water & 15% biodegradable propylene glycol

5 ft. of Casing cut & removed

6" dia steel casing to ledge 40' estimated.

50 ft. deep

U - bend

House First Floor

Piping to & from Heat Pump

Circulator Pump

Basement

Concrete Foundation

GEOTHERMAL CLOSED LOOP BOREHOLE CONSTRUCTION DETAIL
2 boreholes serving a 5 ton heat pump
Plan of 18 boreholes in six sets of three.
Drilling depth is based on length of loop needed for the building.
The bottom of the borehole always features a U bend.
All Underground loop pipe must be High Density Polyethylene (HDPE) or Pex pipe as shown.
Double U bend is possible, but not common.
HDPE Loop is attached to a roller prior to insertion down borehole.
After required depth is drilled, the U bend is unrolled down the borehole.
Borehole is drilled with 6” steel casing set to bedrock ledge.
About one yard of cuttings is produced for each 100 feet of depth. Control with silt fencing or pit.
If drilling hits high water yield vein, control with redundant barriers.
Excavated cuttings pit can be pumped to suitable discharge location.
Oklahoma Drill Rig for soil without ledge, not common in Massachusetts.
Sonic drill rig through soil and boulders, not good in ledge.
Urban Open Loop not covered in this presentation.
Installing a U bend without using the expensive drill rig truck.
Installing loop with a small well service crane truck.
A geo clip to push the loop pipe to the side bedrock walls. Sometimes presents challenges to drillers.
A completed loop insertion, with casing cut shorter than normal.
Apparatus to pressure test the loop.
Pressure cap.
Site Plan can be As Built after drilling and looping are complete.
Inspection articles are available from World Wide Drilling magazine and at www.LitchfieldGeothermal.com