

Vertical Closed-Loop Geothermal System

Phillips Academy - Rebecca M. Sykes Wellness Center

For real-time performance of the geothermal system and to learn more about the building's other sustainability features, visit the touchscreen in the resource area near the stairwell.

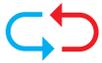


27°F

71°F

HOW IT WORKS

Located at the bottom of the hill, south of the Rebecca M. Sykes Wellness Center, Phillips Academy's geothermal system reduces the load on conventional heating and cooling systems and lowers the Sykes Wellness Center's space conditioning costs. Geothermal technology operates on the principle that the Earth's temperature a few feet below the surface remains constant year-round, cooler in the summer and warmer in the winter than outside air. The system uses this differential for heat transfer.



The closed-loop system is made up of a field of 19 vertical shafts that are each fitted with a fluid-filled rigid polyethylene supply and return pipe.



55°F

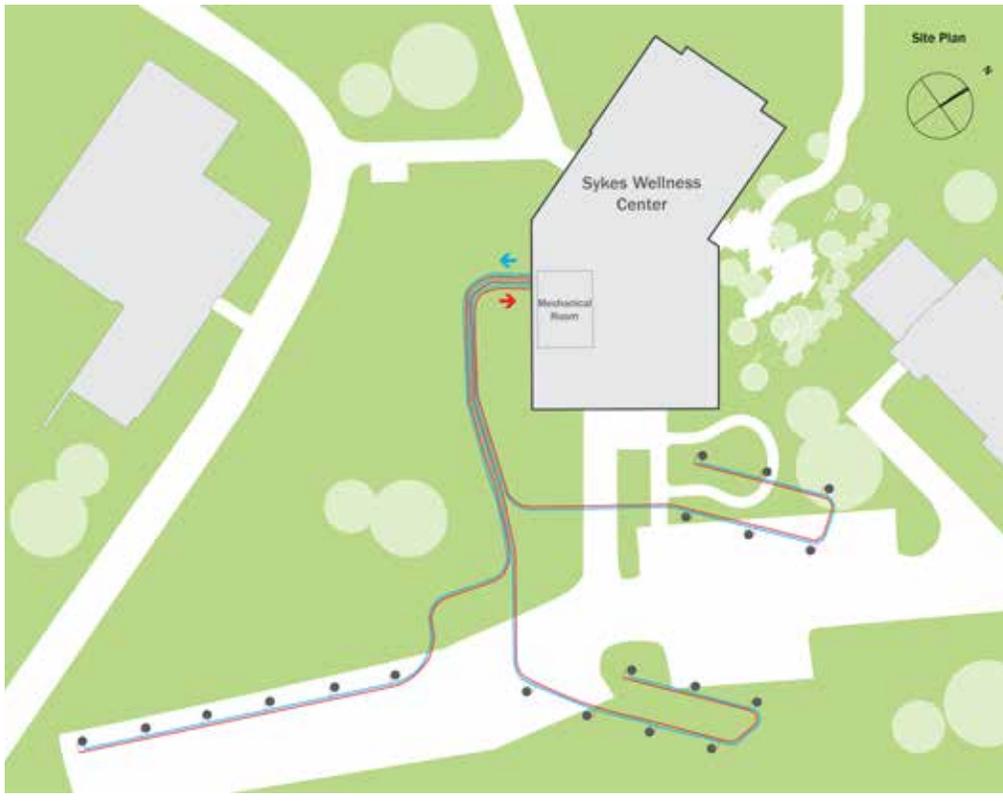
The fluid in the geothermal loops is heated or cooled by the constant 55° F temperature of the Earth, which mediates seasonal temperature fluctuations on the surface.



500'

Each of the field's vertical shafts is 6 inches in diameter and bored to a depth of 500 feet.

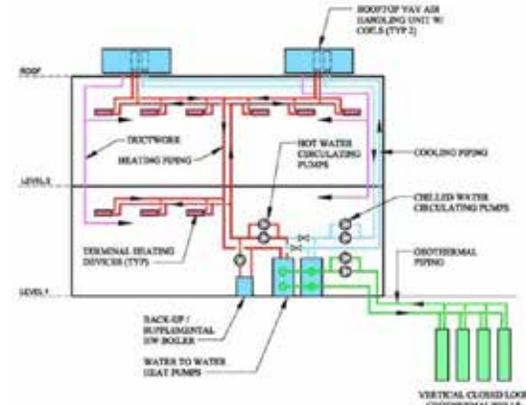




- Return Line
- Supply Line
- Vertical Loop

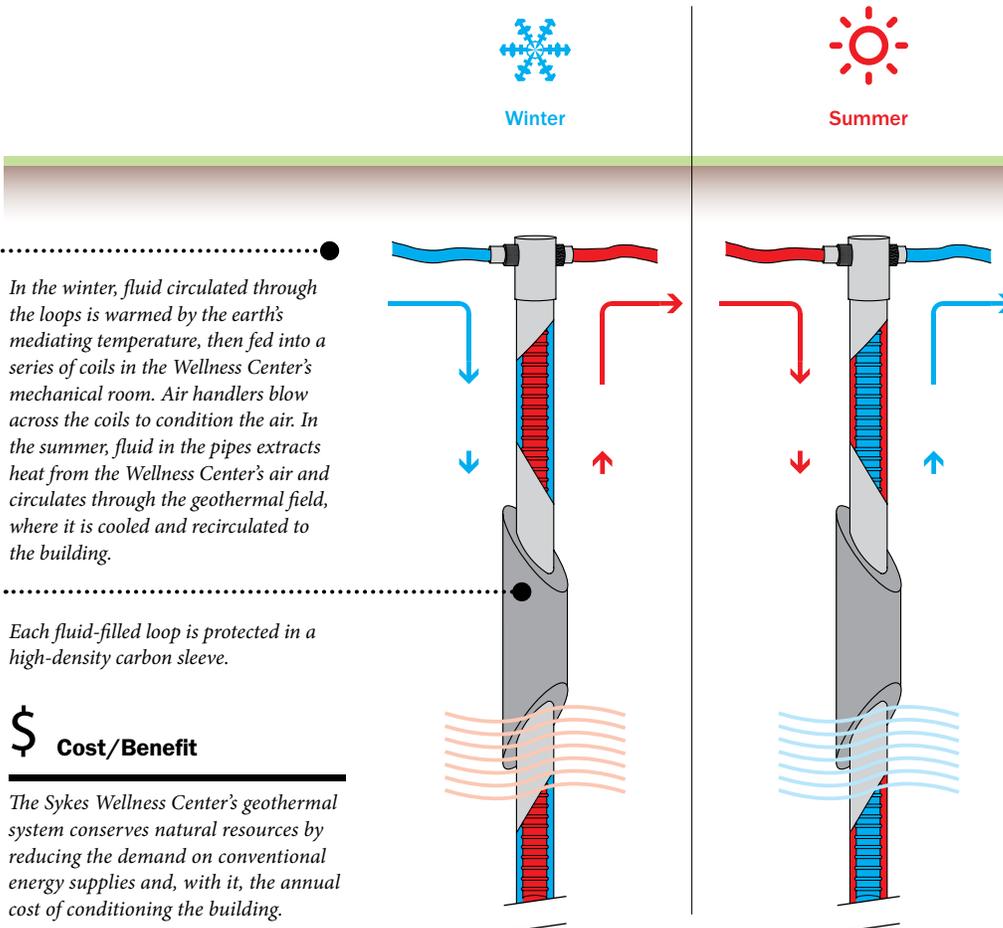
Geothermal systems vary in layout and scale depending on regional conditions and climate, building requirements, and space constraints. The pipes for each of the vertical shafts in the horizontal closed-loop system at Phillips Academy meet at the mechanical room where they are fed into a single manifold for distribution to the heat pump system.

Mechanical System Diagram



The Mechanical Room is the hub for all of the building's systems. Color coding allows for comprehensive system maintenance:

- GREEN** Geothermal Loop
- BLACK** Heating or Cooling (seasonal)
- ORANGE** Building Heating (hot water)
- BLUE** Building Cooling (chilled water)



In the winter, fluid circulated through the loops is warmed by the earth's mediating temperature, then fed into a series of coils in the Wellness Center's mechanical room. Air handlers blow across the coils to condition the air. In the summer, fluid in the pipes extracts heat from the Wellness Center's air and circulates through the geothermal field, where it is cooled and recirculated to the building.

Each fluid-filled loop is protected in a high-density carbon sleeve.

The Sykes Wellness Center's geothermal system conserves natural resources by reducing the demand on conventional energy supplies and, with it, the annual cost of conditioning the building.

