DIVISION OF CAPITAL ASSET MANAGEMENT & MAINTENANCE

GROUND SOURCE HEAT PUMP AT RCC

04 | 04 | 2017

WHAT IS A GROUND SOURCE HEAT PUMP SYSTEM?

- A geothermal exchange system that uses the earth's natural, relatively constant thermal temperature to "condition" water used to heat, cool and provide hot water for a facility.

- A geothermal system consists of three parts:
  - A ground heat exchanger (a series of pipes buried in the ground that transfers the warmth from the earth into the building.)
  - A heat pump (connects the ground portion to the inside of the building), and
  - A delivery system (the ductwork or hydronic system that transfers the conditioned air or water throughout the building.)

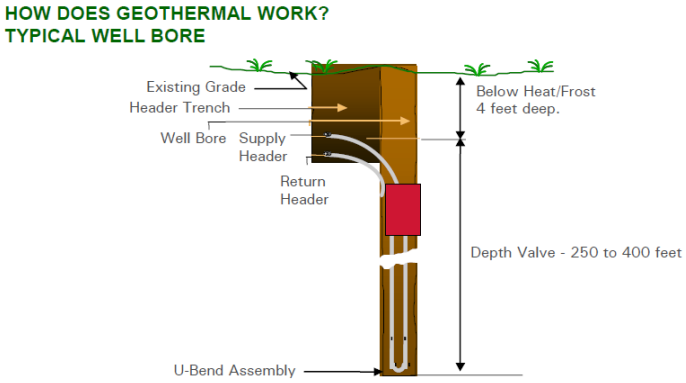


Image from Arizona Geology Magazine

GSHP ADVANTAGES AND DISADVANTAGES FOR HVAC SYSTEMS

ADVANTAGES

- No outside equipment to conceal / place
- Mechanical rooms can be smaller (no chillers, smaller boilers)
- Less simultaneous heating and cooling
- Typically more efficient , ≈ 33% for RCC
- Lowered cost when paired with an existing water source heat pump system

DISADVANTAGES

- May be more expensive installation
- Need area for ground field
- Lots of equipment to maintain (instead of a few large pieces of equipment)
- Typically no economizer ‘free’ cooling

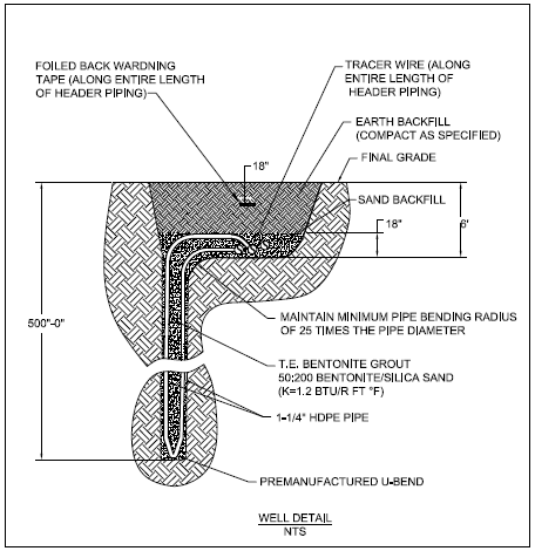
DCAMM'S GSHP SYSTEMS (Partial List)

Project Name	System Type	Wells / Depth / Building Load	Building Type	DCAMM Process / Background	Completion Date	Heating/ Cooling Load
MA Maritime Academy (Bourne)	Closed loop (CL)	o 48, 400 foot wells o 6 well field circuits o Provides full heating/cooling load	New Library (approx. 15,000 sq. feet)	o New construction project (Gensler) o Retained GSHP experienced firm to oversee construction	August, 2011	
North Shore Community College (Danvers)	Closed Loop (CL)	o 60, 4-500 foot deep wells o 5 well field circuits	Allied Health Building (58,700 sq. feet)	o GSHP was one component of a Zero Net Energy Building project o Required Legal Office mediation	September, 2011	
Greenfield Community College (Greenfield)	Standing Column well (SCW)	o 6, 1,500 foot wells o GSHP supplements existing water-cooled chiller plant	o Core Building (96,000 sq. feet)	o New construction project o US DOE grant o Two design phases	March, 2011	150 tons
Springfield Tech CC (Springfield)	Standing Column well (SCW)	o 2, 1,000 foot wells o Has steam back-up for winter load	o Building #11 (20,000 sq. feet)	o Gut renovation of historic building o GSHP chosen by designer and facility	July, 2011	
Middlesex Community College (Bedford)	Closed Loop (CL)	o 7, 500 foot wells o Provides full heating/cooling most of year. o Existing gas boilers kept for winter load back-up	o Trustee's House, office space (9,800 sq. feet)	o Replace existing gas-fired HVAC with GSHP. o Feasibility study and performance specification o Two designs	October, 2012	17.5 tons

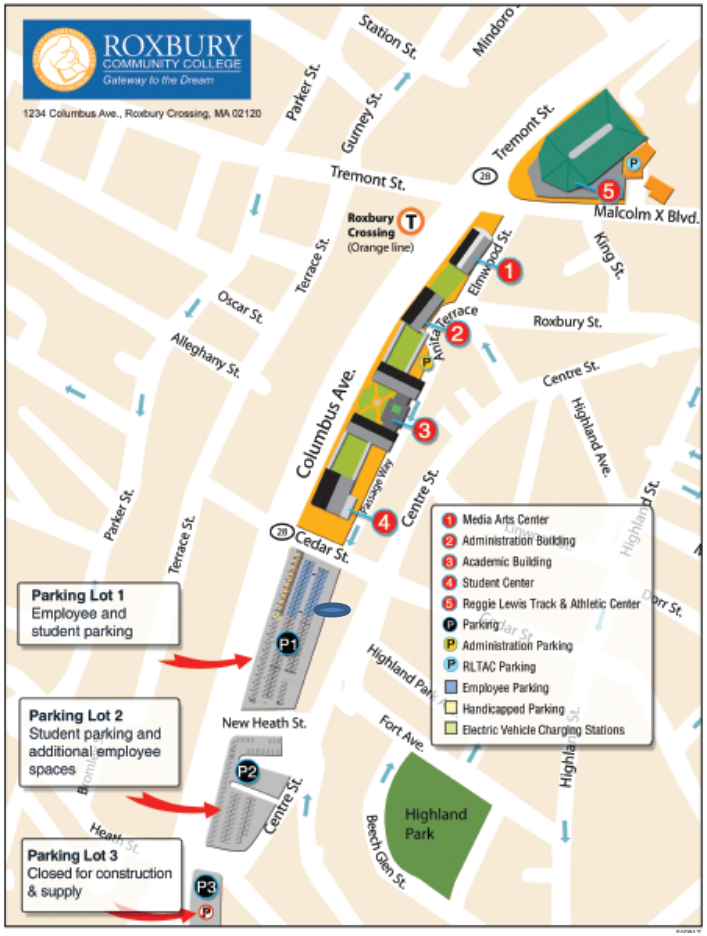
PARAMETERS OF THE RCC INSTALLATION

- 115 Well, closed loop system (A **closed loop system** consists of underground continuous piping loops that are filled with an anti-freeze-like liquid that helps transfer the ground temperature, ≈ 50-54 degrees, to the geothermal heat pump.)
- Well depth – 500 feet
- Buildings Served (4) – Media Center, Administration, Academic, and Student Center
- Heating/Cooling Load – Estimated 400 tons
- Estimated yearly savings - $136,000

Under Construction – Oct. 2016



SITE MAP / PROJECT PROGRESS



Parking Lot #1 Today with 1MW PV Canopy &
115 - Well GSHP Field

QUESTIONS

FOR ADDITIONAL INFORMATION PLEASE CONTACT:

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