

Thesis Report for Berks Classroom and Lab Building

Berks Classroom and Lab Building - Berks Campus Reading, PA

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2. EXECUTIVE SUMMARY

This report shows the results of work done in line with the approved proposal submitted 11 January 2012. This proposal states for the depth work, that a ground source heat pump will be designed to meet the load of the Berks Classroom and Lab building. For the two breadths to be completed; the proposal states for the electrical breadth that the components that feed the proposed ground source heat pump will be sized and for the construction management breadth that a cost and schedule analysis will be completed for the proposed system.

Upon analysis of the proposed system in Trane Trace it was determined that 89, 5 ton split system ground source heat pumps would meet the required load for the building. The site analysis requires that a horizontal configuration of pipe be used since the depth to bedrock is estimated to be between 48 - 120 inches or 4 - 12 feet. The length of pipe required is 263,460 linear feet of 1 inch polyethylene pipe. The proposed system showed the energy cost per square foot of the building drops from \$14.12 to \$12.80, with this particular configuration. This translates to an \$82,240.50 annual savings in energy cost. Since the proposed system costs \$3,039,707.31 upfront for materials and installation the payback period for this system is about 37 years.

Each unit as a total ampacity of 37.5 resulting in a total ampacity for the 89 units of 3,337.5, this results in needing a minimum of 5 panels to serve these units. The panels break down as follows, 4 panels at 750 amps and 1 panel at 337.5 amps to accommodate the electrical load. The estimated wire to distribute the required electricity to the units is 3,693.5 linear feet with the assumption that all the units are located in the mechanical room.

Using either cost data from Lowe's Home Improvement Store, Granger's website or MC2 to obtain estimated cost information for materials and cost for typical crews to install it was determined that the total material cost for the proposed system was \$1,655,560.86 and the installation costs are \$1,297,905. The installation cost includes the cost for equipment used to excavate for the pipe installation. The cost of a dedicated crane was done separately and resulted in an additional cost of \$86,241.45. This results in a total cost for the system of \$3,039,707.31.