

Geo-Exchange Loop Phasing Capacity and Cost Summary										
Phase	Cooling Capacity	Heating Capacity	Bldg GSF Served by Cooling	Bldg GSF Served by Heating	Installation Cost of Geo-Exchange Loop	Installation Cost of Geo Loop Compatible Building HVAC Equipment	Annual Energy Cost for Geo-Exchange & Biomass	Installation Cost of Conventional Cooling & Heating System	Annual Energy Cost for Conventional Heating & Cooling	Notes
Total:	875 Tons	875 Tons	1,310,350	393,105	\$3,000,000	\$39,310,500	\$176,000	\$ 32,758,750	\$529,000	
Phase One	350 tons	350 tons	165,000	49,500	\$1,200,000	\$4,950,000	\$22,000	\$ 4,125,000	\$67,000	GSF does not include existing residence hall - this building does not have systems that can connect to the campus loop
Phase Two	175 tons	175 tons	105,000	31,500	\$600,000	\$3,150,000	\$14,000	\$ 2,625,000	\$42,000	
Phase Three	175 tons	175 tons	210,000	63,000	\$600,000	\$6,300,000	\$28,000	\$ 5,250,000	\$85,000	
Phase Four	175 tons	175 tons	830,350	249,105	\$600,000	\$24,910,500	\$112,000	\$ 20,758,750	\$335,000	
<p>Notes:</p> <ol style="list-style-type: none"> All costs given in 2017 dollars. Estimated cost of HVAC building equipment compatible with geo exchange loop = \$30/sf. Estimated cost of conventional HVAC building equipment = \$25/sf. Energy costs based on \$0.89/therm of natural gas, \$0.0759/kWh of electricity, and \$0.0025/kBtu of biomass. Heating GSF is shown as 30% of cooling GSF to indicate that 70% of total heating energy to come from a central boiler plant. This is due to unbalanced annual heating and cooling energy. <p style="text-align: right;"> Additional cost of campus sys: \$9,551,750 Annual utility savings: 353,000 Simple payback: 27 </p>										

Photovoltaic Array Summary				
Energy Design Target	PV Array Size (kW)	Total sqft of PV Array (sqft)	Ground mount PV Array Area (sqft)	PV Cost (\$)
Better	8500	495,000	350,000	25,500,000
Better +	8800	510,000	370,000	26,400,000
Best	6300	365,000	190,000	18,900,000
Best +	6400	370,000	200,000	19,200,000
<p>Notes:</p> <ol style="list-style-type: none"> All costs given in 2017 dollars. Estimate of current PV cost is \$3000/kW. Area of PV array based on 17.3 W/sf. Assumed 205,000 sqft of PV to be accommodated on building rooftops. Remaining ground mount array area assumes 20% additional area required for spacing of rows and aisles. 				