

Residential Geothermal (Ground Source Heat Pump) Systems Design & Construction Considerations

A list of items is provided below to help you prepare to work with a mechanical contractor to design and install a residential GSHP system. Depending upon the specifics of the installation, additional information may be required.

Possible discussion items for review with your GSHP professional:

- Do you require only a rough cost estimate, feasibility study, or detailed installation proposal for a GSHP system?
 - Rough cost estimates or ranges may be possible from general description items (conditioned space, location, etc.)
 - Feasibility studies and detailed installation proposals will require cooling and heating load calculations, ground loop design, etc.
- Your role: Are you the owner, architect, engineer, general contractor, or other, seeking design or construction assistance?
- New construction or retrofit?
- If this is a retrofit, what is the vintage of original construction?
- Regardless if new construction or a retrofit, can a site visit be scheduled?
- What is the configuration of the residence – ranch, multiple levels, etc.?
- What is the total conditioned floor space?
- Do you have a set of plans that can be shared?
- For cooling and heating load calculations, required for equipment sizing and design of the ground loop, insulation values, door and window schedules will be required.
- What is the address or physical location? This is required to factor in climate conditions for load calculations.
- How much land is available? This will influence what type of ground loop options can be considered.
- Do you have a geotechnical report or well logs available for the site?
- If there is a pond or lake accessible, a surface water heat exchanger may be feasible.
- Is your preference for radiant in-floor or forced air space conditioning? For some applications, a combination of delivery options may be preferred.
- Be prepared to discuss your preferences for zoning.
- For most residential applications, control of the system may only require a simple thermostat for each zone. For larger residences, varying levels of automated controls may be an asset. Your GSHP professional can discuss options with you.
- Your GSHP professional may have additional questions or suggestions depending on the specifics of your situation.

Summary Design Process - Residential

1. Cooling and heating loads are calculated to determine sizing of ground source heat pump equipment
2. For forced air systems, the cooling and heating load calculations, minimum air flow requirements are also considered for GSHP equipment sizing.
3. For radiant floor systems, water flow rate and other factors are used to aid in GSHP sizing.
4. Ducting and/or radiant floor requirements are designed to be compatible with the new GSHP system.
5. If the residence is a retrofit installation, an assessment of the existing ducting and/or radiant floor is made and any adjustments are accounted for.
6. Appropriate ground heat exchanger or surface water heat exchanger options are determined depending on site variables.
7. Once load calculations and GSHP equipment selections are confirmed, and appropriate GHX/SWHX options are shortlisted, final design of the system is completed.
8. Other considerations may factor into the final design, such as local regulations or codes that must be considered, surface infrastructure that must be accounted for, scheduling, etc.