



## Increasing Awareness of Geoexchange in Massachusetts – Part 2 of 5

Heat pumps are heat pumps are heat pumps, right? While most people seem to picture an air-source mini-split system when they hear 'heat pump' there actually are a variety of heat pump types. These include the common mini-splits and whole house air-to-air but there are also air-to-water heat pumps and my favorite: Ground Source Heat Pumps (GSHPs). GSHPs are used in Geoexchange Systems to efficiently heat and cool buildings and can also provide hot water.

Geoexchange systems offer significant advantages for both homeowners and businesses. In Massachusetts, where weather conditions can be extreme in both winter and summer, geoexchange systems provide distinct benefits over air-source heat pumps (ASHPs). There is some technical complexity in explaining the reasons for this. I have prepared 5 separate posts to explore some of the most compelling advantages of Geoexchange/GSHPs one at a time. The individual posts are written to stand on their own so you can pick and choose the order you read them or just focus on the topic(s) that are important to you right now.

### **In the Series, I provide information related to:**

- 1 Efficiency and Peak Load Advantages
- 2 Aesthetic Advantages in Historic Districts
- 3 Longer Service Life and Lifecycle Cost Advantages of GSHPs
- 4 Risk from Refrigerant used in GSHPs and ASHPs
- 5 Potential for Networked Geothermal Systems.

I hope this Series can promote discussion of building electrification using either ASHPs and GSHPs. Here is Part 1 of 5 which considers Aesthetic Advantages of Geoexchange:



## Aesthetic Advantages of Geoexchange in Historic Districts

*Historic districts, such as Marblehead, MA, place a high value on preserving the architectural and visual integrity of their buildings and streetscapes. These areas often have strict guidelines that limit alterations to building exteriors, particularly when it comes to modern technology installations, such as HVAC systems. In this context, Geoexchange (Ground-Source Heat Pump) systems offer significant aesthetic advantages over Air-Source Heat Pumps (ASHPs), as they do not require visible outdoor equipment*

### CHALLENGES OF AIR-SOURCE HEAT PUMPS (ASHPS) IN HISTORIC DISTRICTS

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Air-Source Heat Pumps (ASHPs), while efficient and increasingly popular, present several challenges in historic districts due to their external components. ASHPs typically require outdoor condenser units that are mounted on the exterior walls, rooftops, or placed on the ground next to buildings. These units can be bulky, often measuring between 2 to 4 feet in height and width, and they introduce a modern, mechanical appearance that can clash with the traditional architectural styles of historic buildings.

In towns like Marblehead, where colonial and Federal-style architecture is prevalent, placing modern HVAC equipment on building exteriors may violate local historic district regulations. Many architectural review boards strictly regulate changes to facades, meaning that the installation of ASHPs may be restricted or require special approvals. In addition, the visible and audible operation of ASHP units can detract from the historic ambiance of the area.

### AESTHETIC BENEFITS OF GEOEXCHANGE SYSTEMS

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Geoexchange systems offer a distinct advantage in historic districts because their critical components are installed underground. The heat exchange process occurs below the surface, with the heat pump unit itself housed indoors, typically in a basement or utility room. This eliminates the need for any visible outdoor components, preserving the historical character of the building's exterior and the surrounding streetscape.

In addition to avoiding the installation of external units, Geoexchange systems also reduce noise pollution. ASHP units, while quieter than traditional HVAC systems, still produce audible fan and compressor noise. By contrast, Geoexchange systems operate silently from the exterior, further contributing to the preservation of the tranquil, historic environment.





## REGULATORY ADVANTAGES AND SUCCESSFUL CASE STUDIES

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Geoexchange systems have gained approval more easily than ASHPs in many historic districts because they meet preservation guidelines for maintaining the original aesthetic of buildings. In communities like Marblehead, where maintaining the appearance of historic homes is critical, Geoexchange systems have been installed successfully in both residential and commercial properties without violating local zoning or preservation rules.

For example, in historic neighborhoods across New England, several projects have involved retrofitting older homes with Geoexchange systems to provide modern heating and cooling without compromising the building's exterior. In one case, a 19th-century building in Marblehead was retrofitted with a Geoexchange system, preserving its architectural integrity while reducing its carbon footprint. Such installations have become model projects for balancing energy efficiency with historic preservation.

## COMPLIANCE WITH PRESERVATION STANDARDS

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Many historic districts, including those in Massachusetts, have specific guidelines that restrict alterations to the exterior of historic properties. These guidelines typically focus on preserving the visual character of the building, which can include maintaining original materials, colors, and architectural elements. Geoexchange systems align well with these standards because they do not alter the appearance of the building's exterior.

In cases where outdoor components are unavoidable, such as with ASHPs, property owners may be required to screen or conceal the units, adding complexity and cost to the installation. By avoiding visible equipment altogether, Geoexchange systems simplify the process of obtaining approvals from local architectural review boards and preservation committees.

