

POLICY GOVERNING THE INSTALLATION OF HVAC EQUIPMENT AT HISTORICALLY-DESIGNATED SITES IN CAMBRIDGE

In the current era of global warming, many if not all homeowners consider air conditioning to be a necessity of modern life, deprivation of which could be considered a hardship. Modern energy sources such as heat pumps are the only practical means of lowering carbon emissions generated by home heating. Both technologies require installation of exterior equipment and coolant tubes. The following guidelines have been adopted by the Cambridge Historical Commission for the information of property owners and to guide Commission staff in the issuance of Certificates of Appropriateness or Nonapplicability for conforming installations.

INTRODUCTION

As technologies improve, many homeowners are choosing to install modern HVAC (heating, ventilating, & air conditioning) systems or upgrade their existing ones. HVAC systems often require the installation of exterior mechanical units and related fixtures, typically condenser, which with their associated refrigerant lines can impact the visual character of a historic property.

Publicly-visible exterior alterations to designated landmarks in historic and neighborhood conservation districts, including the installation of HVAC systems, are regulated by the Cambridge Historical Commission and neighborhood conservation district commissions.¹ The following guidelines are intended to expedite the review process by addressing key points concerning the installation of exterior HVAC equipment.

HVAC SYSTEMS AT A GLANCE²

There are several types of HVAC systems on the market. In a **TRADITIONAL SPLIT SYSTEM**, also known as “central air conditioning,” refrigerant circulates between an indoor coil and an outdoor condenser with a compressor. The refrigerant cools the air, and a blower circulates it through ducts inside the house. Outdoor condenser/compressors units are large, cube-like devices that may be noisy and difficult to screen.

A recent variant is the **DUCTLESS SPLIT SYSTEM**, which eliminates ductwork by installing indoor evaporator units in each room to be cooled; an outdoor condenser is still re-

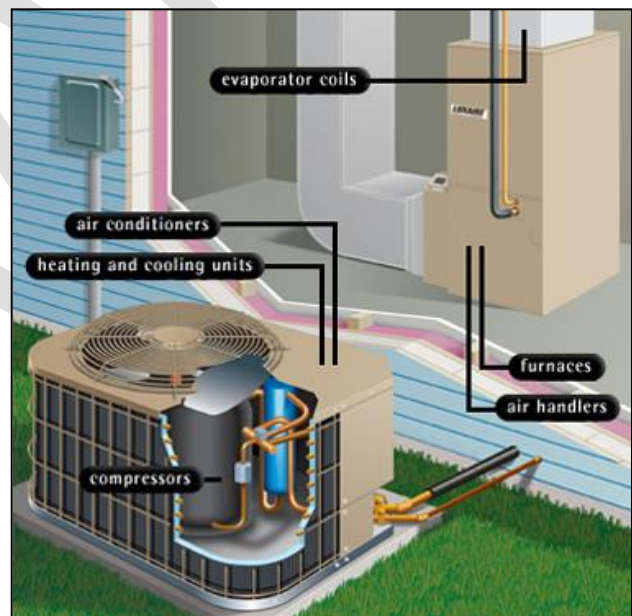


Figure 1: A typical split-system configuration

¹ No building permit may be issued for work on a designated property until a commission has issued a Certificate of Appropriateness, Nonapplicability, or Hardship. A Certificate of Appropriateness will be issued when the commission determines that the work is not incongruous with the character of the building or district; a Certificate of Hardship will be issued if the applicant demonstrates hardship, financial or otherwise, and the proposed work will not have an adverse effect on the district; and a Certificate of Nonapplicability will be issued if the work is judged to be not within the jurisdiction of the commission, or not visible from a public way.

² Removeable window air conditioners are regulated in the Old Cambridge Historic District, but not in the neighborhood conservation districts.

quired. Ductless systems are convenient for older homes that are being retrofitted for new HVAC. “Suitcase” style condensers are relatively small and quiet but serve only two rooms at most. Also, the insulated coolant tube may need to be installed on an exterior wall.

A **PACKAGED/INTEGRAL** system contains the same components you find in a typical split system; however, they’re all engineered to work together in one cabinet. This means the exterior components will be much larger than a single condenser unit.

An **AIR SOURCE HEAT PUMP** system works like a typical air conditioner condenser, except that it can also operate in reverse to provide warm air during the heating season. This works by heating up a piped refrigerant in the outdoor air, then pumping the heat that is generated by the warmed refrigerant inside to warm indoor air. Today’s improved heat pumps can be effective in all but the coldest climates. This option for heating and cooling is ordinarily electrically powered and is becoming increasingly popular as property owners and municipalities move away from fossil fuels and reduce greenhouse gas emissions.

A **GROUND SOURCE (GEOTHERMAL) HEAT PUMP** uses the constant temperature of the earth accessed by deep wells to provide cooling and heating for a home. These systems are very quiet and can be located indoors because there is no need to exchange heat with the outdoor air.

Although much more expensive to install than traditional HVAC systems, geothermal systems will greatly reduce gas or electric bills, allowing for relatively rapid payback periods. This is still a relatively new technology in the US market, and homeowners should satisfy themselves that the system will be well engineered and reliable. Geothermal systems typically have no visible exterior components, and in designated districts can be approved without a hearing.

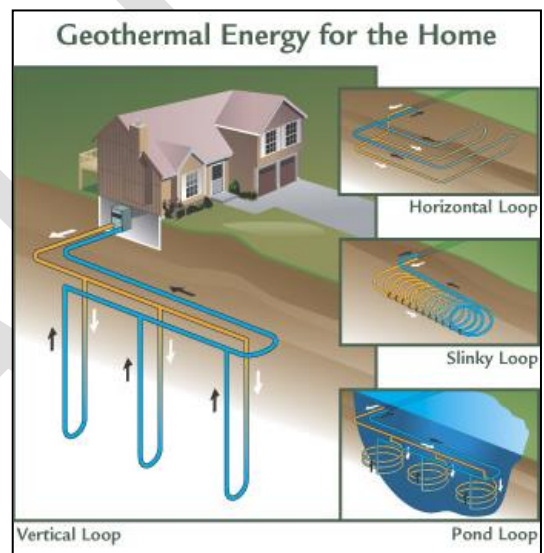


Figure 2: A geothermal heat pump system

FACTORS FOR PROPERTY OWNERS TO CONSIDER

Placement and Screening

Be sure the installation is properly sized. Factors to consider include: the square footage of the conditioned space; the height of the ceilings; the number and size of doors and windows; and the thickness of the insulation. An improperly sized installation may be too small or too large for the purpose.

To lessen the visual impact of HVAC equipment, it is important to consider an appropriate location. **Rear yards** that are not visible from a public way are preferred and may allow for administrative approval. **Side yards** are an

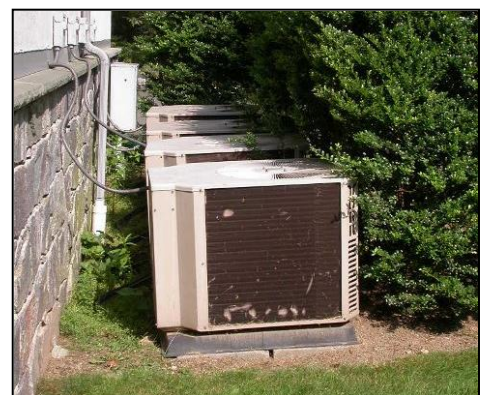


Figure 3: Problematic installation of condenser units

alternative location but may require a screening plan. **Front yards and walls and rooftops** (and other above-ground locations) are the least preferred options. However, rooftop mechanical equipment that is not visible from a public way, mostly in the case of larger commercial buildings, is often an acceptable option. Another consideration when choosing a site is the proximity to abutting houses, specifically when factoring in noise levels (see below for more discussion on noise).

Screening ground-level HVAC equipment that is visible from a public way is an important part of the installation. The size of a unit, combined with the additional height created by the concrete pad it sits on, may create the need for **fencing, latticework, plantings**, or similar screening options. If fencing is the preferred approach, it is important to consider how the fence will relate to the architecture and materials of the house and existing landscape features. Plantings also must be chosen carefully, as the goal is to provide consistent year-round screening; evergreen shrubs and bushes are typically used for this reason. Keep in mind that some plants may not thrive if they are too close to a source of heat or exhaust. Rooftop mechanical equipment can usually be screened, but sometimes the screen may be more intrusive than the mechanical unit itself.

Screening options must be discussed with the installation contractor, as condenser units require ample clearance to provide adequate air flow. Units mounted too close to a wall or surrounded by shrubs, or multiple units located too closely together may not receive enough cool air to function properly. The result can be shorter compressor life and/or less efficient operation. Most manufacturers call for a separation of at least 12 inches between the condenser and any nearby wall, wood fence, shrub, or tree. Fences and other screening should not obscure architecturally significant features on a property.

In addition to condenser units, homeowners should realize that supplementary equipment such as circuit breakers and electrical conduits must be installed nearby. These components are typically attached to a building and should be factored into the screening plan.

Finally, refrigerant lines connecting condensers to indoor air handling units must often be installed on the exterior to reach even a first-floor room. These are typically concealed within a white PVC cover, which offers a neater installation but may be visually intrusive, especially on a street-facing façade. Such installations will require approval in designated districts; be sure to consult Historical Commission staff before committing to an installation.

Noise

Although noise is not within the jurisdiction of the Cambridge Historical Commission, homeowners should always consider the aural impacts of exterior condensers. Technology has improved and newer units are quieter than ever, but condenser placement relative to abutting houses still has the potential to create conflict with neighbors. Under Cambridge's Noise Control Ordinance, Chapter 8.16 of the City Code, there are restrictions on decibel levels as measured from lot lines. A reading over 60 decibels during daytime hours (7:00am-6:00pm) or over 50 decibels at night, for example, would be considered a violation of the ordinance in a residential district. With this in mind, it is important to know the decibel levels of condenser units when purchasing a HVAC system.

The more energy efficient a condenser unit, the quieter it will be. As of January 2023, HVAC manufacturers can no longer produce residential central air conditioners with a Seasonal Energy Efficiency Ratio (SEER) rating of less than 14. The higher the SEER rating, the more efficient

the unit. However, the size of the condenser units usually increases as the SEER rating is increased, because manufacturers need to install more coils to transfer heat more efficiently. While noise might be reduced, the visual impact may increase. Screening can act as a sound attenuation strategy to help reduce noise while also reducing the visual impact of an exterior condenser unit.

When multiple condenser units are installed together, the noise levels will also increase. Even if each unit would pass the requirements of the noise ordinance on its own, the cumulative effect may exceed allowed noise levels. Stated levels may be in optimal/laboratory settings; actual decibel levels will vary depending on materials and configuration of the built environment.

For more information on the Noise Control Ordinance contact the License Commission at (617) 349-6140 or go to <https://www.cambridgema.gov/Departments/licensecommission>. Noise control regulations are listed in Chapter 8.16 of the Cambridge Municipal Code ([Chapter 8.16 - NOISE CONTROL | Code of Ordinances | Cambridge, MA | Municode Library](#)).

Furnace Vents

Another consideration regarding the installation of mechanical systems is the impact of associated parts used for exterior ventilation. These parts, constructed of modern materials such as PVC and galvanized sheet metal, should ideally be installed in the rear or other non-visible location to avoid a direct visual impact on a designated property. Appropriate installation of exterior vents should consider the impact on cladding and roofing materials, as well as the heat, moisture, and noise generated from the vents. Traditionally, heating systems were vented through chimneys. When high-efficiency furnace systems are installed in a designated property with updated ventilation devices, the removal of abandoned historic chimneys may be considered inappropriate and, in any case, would require review.



Figure 4: Highly visible PVC vent pipes

CONTACT THE HISTORICAL COMMISSION FOR MORE INFORMATION

Commission staff may issue Certificates of Appropriateness or Nonapplicability for synthetic replacements that match existing or original details. Staff may refer questionable cases to the Commission for further review.

CHC staff are always available to advise on appropriate installation of HVAC equipment, whether or not the property is designated as a landmark or located in a district.

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