3.3 Energy Conservation

Traditional approaches to heating and cooling in historic buildings can be adapted to modern considerations of comfort and energy efficiency. "Air infiltration, air leaking through small cracks in a building's exterior, is a major source of heat loss or gain" (Old House Journal Compendium pg. 103). Efforts to minimize air infiltration by caulking, weather-stripping and installing storm doors and windows should have priority. These measures give a better return in energy savings for the amount invested than installation of insulation.

Historic dwellings have a number of inherent energy conservation qualities such as tall ceilings and door transoms, thick brick or plastered wood walls, and large attic spaces. Other traditional energy savings measures available for the old house owner are window and porch awnings, exterior window shutters, and interior drapes and blinds.

Weather-stripping

Weather-stripping is a relatively inexpensive method to reduce energy costs and the installation of most weather-stripping materials will have little, if any, visual effects on a dwelling. Weather-stripping should be considered for all window and door openings since they are a major source of drafts leading to heat loss and gain. Weather-stripping comes in a variety of shapes and materials depending on its application. This includes spring metal in copper/bronze, adhesive strips of foam or plastic, foam strips, and metal and plastic sweeps.

For windows, weather-stripping should be added at the junction of the meeting rails for sash windows and at the lower sill. The sash channels along the sides of windows are also good places for spring metal. For exterior wall doors, weather-stripping should be added along the exterior jambs, interior stops, and along the bottom. The installation of a plastic and metal sweep at the inside bottom of the door is effective, as are foam or rubber gasket type strips along the threshold.

Storm Windows/ Doors

Approximately 22% of a dwelling's energy loss is a result of air infiltration and conductive gain or loss through windows. Glass is a good conductor and windows are a major source of heat loss in winter and gain in summer.

The application of storm windows creates dead airspace which significantly reduces conductivity. Wood has a higher resistance to transfer of heat than aluminum and is thus a more energy efficient storm window. However, aluminum is also acceptable material for storm windows. Exterior storm windows are the most popular today, but interior storm windows are also an option for historic dwellings since they are less visible.

Insulation

Insulation and reduction of air infiltration is the primary means to prevent heat loss and gain. For most historic dwellings the attic and basement area are traditional locations for the addition of batt, blanket, and blown-in insulation. A dwelling typically loses 28% of its total heat loss through the roof. Heat loss and gain is measured in R-values which is the resistance, R, per inch of thickness of the insulating material. For attics an R-value of R-19 is recommended for gas or oil heat or R-22 for dwellings with electric heat.

Walls are another potential area where insulation can be added although this can be difficult for historic dwellings. Usually the expense of getting to wall cavities discourages the addition of wall insulation. Insulation and vapor barrier should be added when wall spaces are exposed during remodeling. Avoid damaging exterior wall surfaces when installing insulation. Blowing insulation into a wall space without the existence of an interior vapor barrier will trap moisture and is not recommended. Consult with the building department for code requirements on insulation R-values.

Points to Remember in Energy Conservation:

- Sealing up the flow of air through interior walls by weather-stripping, caulking, and repairing cracks- is the most useful and least problematic energy-conserving strategy for historic buildings.
- Maintain and use the inherently energy conserving and comfort enhancing architectural features of historic buildings. These may include:
  - Vestibules as air locks
  - Gable vents to help keep attics dry.
  - Thermal mass of masonry walls to even-out daily temperature extremes.
  - Operable windows for cross ventilation during the summer.
  - Drapes, curtains, and blinds for winter insulation and draft-proofing.
  - Exterior awnings and interior window shades for summer shading.
- Keep interior humidity within a range that will not lead to damage by condensation.
- Keep heating and ventilation equipment well maintained.
- Generally, do not insulate walls without using vapor barriers.
- Ensure as much as possible that moisture does not condense where it will lead to damage in the form of wood rot, corrosion, or freezing. Condensation is often a problem for windows.
- Vent high moisture areas (bathrooms, laundries, etc.) to the outside.
- Insulate ductwork and piping in the basement, crawl space, or attic.

Energy Retrofitting

Some character-defining features of a historic building or site such as cupolas, shutters, transoms, skylights, sun rooms, porches, and plantings also play a secondary energy-conserving role. Therefore, prior to retrofitting historic buildings to make them more energy efficient, the first step should always be to identify and evaluate the existing historic features to assess their inherent energy conserving potential. If it is determined that retrofitting measures are necessary, then such work needs to be carried out with particular care to insure that the building's historic character is preserved in the process of rehabilitation.

Recommended

District/Neighborhood

- ✓ Maintaining those existing landscape features which moderate the effects of the climate on the setting such as deciduous trees, evergreen wind-blocks, and lakes or ponds.

Building Site

- ✓ Retaining plant materials, trees, and landscape features, especially those which perform passive solar energy functions such as sun shading and wind breaks.
- ✓ Installing freestanding solar collectors in a manner that preserves the historic property's character-defining features.
- ✓ Designing attached solar collectors, including solar greenhouses, so that the character-defining features of the property are preserved.
- ✓

Masonry/Wood/ Architectural Metals

- ✓ Installing thermal insulation in attics and in unheated cellars and crawlspaces to increase the efficiency of the existing mechanical systems.

Roofs

- ✓ Placing solar collectors on non-character defining roofs or roofs of non-historic adjacent buildings.

Not Recommended

- ❑ Stripping the setting of landscape features and landforms so that the effects of the wind, rain, and the sun result in accelerated erosion of historic materials.
- ❑ Removing plant materials, trees, and landscape features, so that they no longer perform passive solar energy functions.
- ❑ Installing freestanding solar collectors in highly visible areas that obscure, damage, or destroy historic landscape or archeological features.
- ❑ Locating solar collectors where they radically change the property's appearance; or damage or destroy character-defining features.
- ❑ Applying urea of formaldehyde foam or any other thermal insulation with a water content into wall cavities in an attempt to reduce energy consumption.
- ❑ Resurfacing historic building materials with more energy efficient but incompatible materials, such as covering historic masonry with exterior insulation.
- ❑ Placing solar collectors on roofs when such collectors change the historic roofline or obscure the relationship of the roof to character defining roof features such as dormers, skylights, and chimneys.
- ❑ Removing historic shading devices rather than keeping them in an operable condition.
- ❑ Replacing historic multi-paned sash with new thermal sash utilizing false muntins.

Recommended Continued…

Windows

- ✓ Utilizing the inherent energy conserving features of a building by maintaining windows and louvered blinds in good operable condition for natural ventilation.
- ✓ Improving thermal efficiency with weather-stripping, storm windows, caulking, interior shades, and if historically appropriate, blinds and awnings.
- ✓ Installing interior storm windows with airtight gaskets and removable clips to insure proper maintenance.
- ✓ Installing exterior storm windows which do not damage or obscure the windows and frames.
- ✓ Considering the use of lightly tinted glazing on non-character-defining elevations if other energy retrofitting alternatives are not possible.

Entrances and Porches

- ✓ Utilizing the inherent energy conserving features of a building by maintaining open porches, and interior double vestibule entrances in good condition so that they can retain heat or block the sun and provide natural ventilation.

Interior Features

- ✓ Retaining historic interior shutters and transoms for their inherent energy conserving features.

New Additions to Historic Buildings

- ✓ Placing new additions that have an energy conserving function such as a solar greenhouse on non-character defining elevations.

Mechanical Systems

- ✓ Installing thermal insulation in attics and in unheated cellars and crawlspaces to conserve energy.

Not Recommended Continued…

- ❑ Installing interior storm windows that allow moisture to accumulate and damage the window.
- ❑ Installing new exterior storm windows which are inappropriate in size or color.
- ❑ Replacing windows or transoms with fixed thermal glazing or permitting windows and transoms to remain inoperable rather than utilizing them for their energy conserving potential.
- ❑ Using tinted or reflective glazing on character defining or other conspicuous elevations.
- ❑ Enclosing porches located on character defining elevations to create passive solar collectors or airlock vestibules. Such enclosures can destroy the historic appearance of the building.
- ❑ Removing historic interior features which play a secondary energy conserving role.
- ❑ Installing new additions such as multistory solar greenhouse additions which obscure, damage, or destroy character-defining features.
- ❑ Applying urea formaldehyde foam or any other thermal insulation with a water content or that may collect moisture into wall cavities.

  Note: These "expanding" materials can break plaster loose on the inside or create unsightly bulges in the siding.