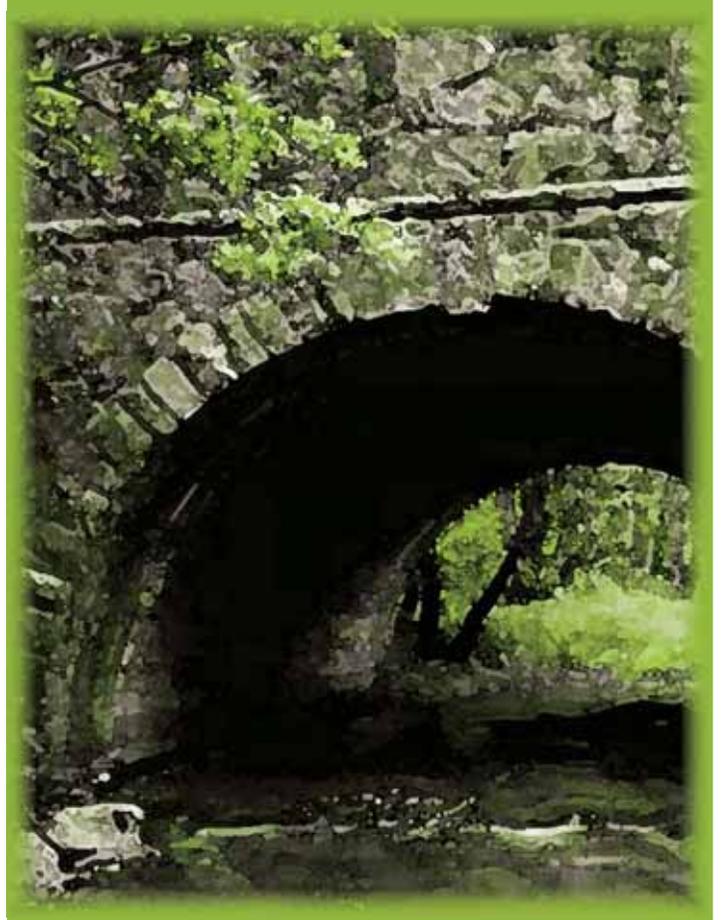


CHAPTER 3
Guidelines for Sustainable Building Strategies



Chapter 3: Sustainable Building Strategies

The City of Manitou Springs along with the Manitou Springs Climate and Air Quality Committee and the Historic Preservation Commission encourages the design and construction of alterations, additions and new buildings that promote energy efficiency. The City of Manitou Springs also encourages landscaping strategies that promote water conservation and that help to minimize stormwater runoff.

In 2007, the Manitou Springs Climate and Air Quality Committee was established to conduct a local emissions inventory, forecast greenhouse emissions and recommend to City Council an emissions reduction goal and target date. The committee is currently working with City Council to implement the Local Action Plan. In addition, the Committee is working diligently to educate the Manitou Springs community. Additional information regarding the Committee and additional resources may be found on the City's website: <http://www.manitousprings-co.gov>

Historic Preservation and Green Building

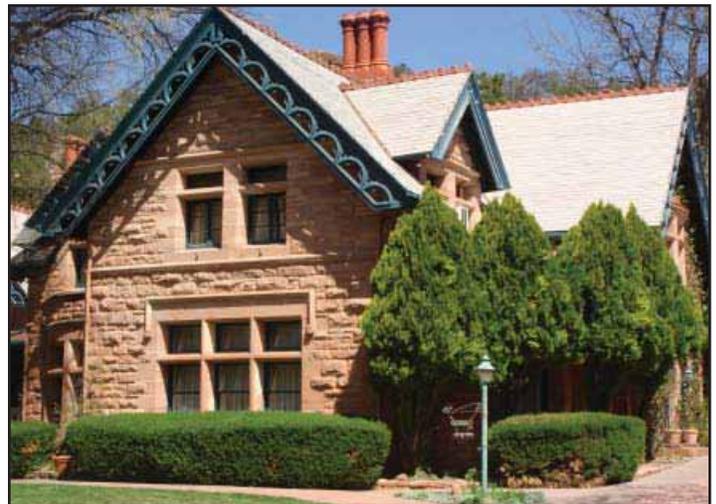
Contributing and non-contributing structures often contain architectural features and construction materials that are valuable from several perspectives:

1. The embodied energy and materials expenditure that reuse of existing materials displaces,
2. The architectural features and workmanship that may be impossible to replace and
3. The societal value of maintaining an important, contributing structure in an historic setting.
4. Historic buildings often contain several "green design features: operable windows, high ceilings, thermal massing and building orientation.

Because the field of sustainable construction is evolving, the HPC supports and encourages new and innovative approaches to materials used in alterations, additions and new construction. Property owners who are in the process of planning an alteration, addition and/or new building are encouraged to research current technologies that maximize the potential longevity of a structure, not just the lowest construction cost. Factors that should be considered include the costs and environmental impacts of resource extraction, materials and assembly manufacture, costs and energy consumption associated with the transport of materials and construction equipment to the construction site, construction requirements, maintenance, potential reuse of the structure and recycling or disposal of materials.

Easy Things You Can Do:

1. Preserve Old Buildings!
2. Change 5 Light Bulbs with C.F.
3. Purchase Energy Star Qualified Products
4. Heat and Cool Smartly
5. Seal and Insulate
6. Use Green Power
7. Reduce, Reuse, Recycle
8. Be Green in Your Yard
9. Use Water Efficiently
10. Spread the Word



*Preservation of existing structures is a crucial component to conservation and reuse of resources.
Briarhurst Manor, Manitou Springs, CO*



The City of Manitou Springs advocates the maintenance and repair of windows on contributing structures. This original window includes exterior storm windows that are removed in the warmer months. Denver, CO



This window contains rare architectural detailing that warrants ongoing maintenance. Winter Street, Manitou Springs, CO

To encourage property owners to assess options for energy conservation, the HPC recommends adherence to the following key principles:

1. Use less to do more: allow individual building components to multi-task.
2. Design holistically: consider the effects of individual building systems on each other and the building as a whole.
3. Build to last: assess options to create flexibility over time and adapt to new uses or interior configurations.
4. Prevent future problems: minimize and disperse structural loads.
5. Take advantage of free natural resources: integrate climate-responsive design.

Solar Orientation

Most of the location, orientation and massing decisions made in the early stages of design have a profound effect on the energy and environmental impacts of an alteration, addition or new building. This is particularly the case for solar-responsive, daylighting and natural cooling design, where early decisions establish the potential for passive renewable energy use. Other environmental strategies, such as storm-water management, are also greatly influenced by site planning.

1. Careful orientation and massing can minimize solar energy entering the building and greatly reduce cooling needs, especially for commercial and retail buildings. This translates into lower energy costs over the life of the building and less air pollution from electricity generation.
2. Daylighting design has a major impact on the form and orientation of a building; the building and its openings (windows and skylights) should be oriented to allow light to enter interior spaces without causing glare or visual discomfort.
3. When carefully combined with daylighting and thermal mass, natural ventilation can greatly reduce the cooling and air conditioning needs of a building, and minimize or eliminate the need for mechanical cooling (in most circumstances) in mountain communities.
4. Building sites have a role to play in reducing

the amount and contamination of stormwater runoff. The most effective approach is to limit the amount of impermeable surfaces on the site, since permeable surfaces both reduce stormwater runoff and treat stormwater pollutants.



Shed constructed of salvaged materials. Puget Sound, WA



Architectural Salvage Yard

Energy Efficiency

Energy Audits

The first step when beginning any significant construction or remodeling of a historic home is to assess the current energy usage. This is vital in terms of energy conservation, occupant comfort and building durability. Ron Flax, Project Manager at Rodwin Architecture in Boulder, Colorado, notes that “It is important to properly understand the existing building. It is easy to accidentally create new problems while solving others. A competent home energy audit almost always reveals some surprisingly simple opportunities and is an essential first step.”



*Trex Brasilica:
Recycled Construction Materials*



*Trex Prefabricated Railings:
Recycled Construction Materials*

Weatherization

Typically the first place to save energy involves weatherization. This underrated activity is well within the capability of the handy “do-it-yourselfer” with some basic education in modern Building Science. There are a number of potential pitfalls (as well as heroic measures) to be had with weatherization of older homes, and they should be explored intelligently, not stumbled upon by accident. Safety first! And this applies to both your safety and the safety of your home. Your home has endured over the years and you need to do justice to the craftsmen who put it together the first time.



*Installing insulation manufactured
from recycled materials*

Window Preservation vs. Replacement

“When it comes to saving energy in older buildings, air infiltration measures are at the top of the list. Nothing else comes close,” notes Flax. After initial weatherization, the next likely culprit for air infiltration is the fit and function of existing windows. An amazing amount of energy can be saved by spending the time to restore proper installation. Older, well-constructed windows that are in reasonable condition are worth the effort! Traditional maintenance tech-



Photo-voltaic cells are often slim and can be directly mounted to existing roof planes. Stinson Beach, CA



Newly relaxed regulations allow for multi-family structures to share one satellite dish antenna.



This new residence in Boulder includes photo-voltaic cells mounted at the same angle as the roof to match the profile of the roof. Boulder, CO

niques such as repairing broken sash components, installing weather stripping, and fine tuning the fit and function of the windows are simple and cost-effective steps to address air leakage.

Replacing windows in their entirety can improve energy efficiency and occupant comfort. However, they have a relatively small positive gain because high quality windows that maintain the design features of the building can be expensive to retrofit. They also raise issues of historic accuracy and architectural integrity that can be substantial challenges for projects that are located in Historic Districts. Retaining and/or repairing weather stripping and storm windows affords similar benefits and is preferred to window replacement.

Refer to www.rodwinarch.com “Additional Technical Resources” for links regarding energy raters, historic window restoration and other related topics.

Mark Webster, a senior staff engineer at Simpson, Gumpertz & Heger, Inc., in Boston, notes that “There are technical benefits of traditional building design and materials that aren’t always recognized or appreciated today.” As an example, Webster points to windows, which are a major issue repeatedly addressed and discussed by the HPC. “On old windows you tend to get mature materials that hold up well,” he said. While acknowledging the environmental benefits of lower-quality, finger-jointed wood commonly used in today’s windows, Webster said, “Their durability is poor. Once they weather, they start to open up.” Based on his experience with modern windows, insulated glass units (IGUs), which boast double- or triple-pane sealed glass with high energy efficiency, the old windows hold up better when refurbished than the new windows. This is why the City of Manitou Springs advocates the maintenance and repair of existing windows and/or the addition of storm windows as a means to preserve important features of a contributing structure and also improve energy efficiency.

Owners of historic properties are often concerned with energy efficiency. Older windows and doors are

typically key elements cited by homeowners seeking to reduce heating bills and energy consumption.

1. If energy conservation and heat loss are primary concerns, consider using storm windows and doors rather than replacing historic windows and doors.
2. The City of Manitou Springs urges preservation of all windows on contributing structures. Technical information regarding maintenance and preservation are included in Appendix B. Restoration of windows is also recommended; adding a well-sealed exterior storm window will preserve the architectural integrity of the window and eliminate both convective heat loss and infiltration of air. Replacement windows have a short operational-life. These environmental impacts combined with the energy expenditures required to manufacture non-recyclable windows and landfill needs result in window preservation and/or restoration as being the preferred approach. Refer to Chapter 4 for additional information regarding window components and repair.
3. Install storm windows on the exterior, if feasible. Match the sash and frame detailing dimensions to the original component. The storm window should be sized to fit the opening without the use of a subframe or panning around the perimeter, which detracts from the historic character of the façade.
4. Older homes often used storm windows (and screens) that were hung from the top of a window and that fit flush with the window trim. Seasonal installation of these storm windows may pose maintenance and labor concerns, but should be used and maintained if at all possible to preserve the historic character of the structure.
5. To improve the energy efficiency of a door, weather-stripping should be installed on all sides of the door frame and door windows should be caulked. These steps will minimize air leakage.
6. Storm doors can also be installed; steps should be taken to carefully match the width of trim and door components to that of the original door



Salvaged windows and doors can be integrated into rehabilita-

to ensure that the overall character of the door remains visible from the street.

Solar Panels and Photo-voltaic Cells

Solar panels and photo-voltaic cells should be sensitively located to minimize the impact on the Historic District and overall street character. Although solar energy is encouraged, new and historic buildings should attempt to integrate the solar collectors into the overall roof and building form to minimize the impact on adjacent properties.

3.1 Mount solar collectors to minimize their visibility from the street.

- Locate solar collectors on roof planes that are not visible from the street edge. If secondary roof planes are available, solar panels should be mounted on these roofs to maintain the historic integrity of the primary structure.
- Photo-voltaic panels should maintain a low profile and extend no higher than 6” from the roof surface; mount panels parallel to the existing angle of the roof plane.
- New construction that includes solar energy components should consider solar orientation requirements early in the design process. Roof form and pitches should reflect optimum solar orientation requirements in a manner that minimizes the profile of solar panels.

Satellite Dish Antennas

Although new technology is rapidly advancing to the point of making satellite dish antennas obsolete, property owners should work carefully with service providers to identify locations for satellite dish antennas to minimize the visual impact from the primary street.

3.2 Mount satellite dish antennas as unobtrusively as possible; small satellite dish antennas shall not be located on the primary building façade.

- Multi-family residences or multi-tenant commercial properties should explore com-

binning satellite antennas.

- Smaller satellite dish antennas should not be located on the primary building façade.
- If satellite dish antennas are mounted to the original structure, mounting apparatus should be used that does not damage historic features.

Recycled-Content Products

There are several quality recycled materials available on the market for use in rehabilitation projects and new construction. Products with recycled content are “industry ready”, generally of equal or better quality and usually require no special handling. Some products, such as outdoor lumber made with waste plastics and composite panels made with mineral waste and plastic, are uniquely suited to some applications, and have new uses that are still being explored. It is important to obtain information from manufacturers verifying that the recycled content listed for a product is actually material that would otherwise have been discarded.

Salvaged Materials

When rehabilitating structures the exterior features such as windows, doors and siding should be carefully inventoried to ascertain opportunities to integrate salvaged materials into future construction.

1. Any clapboard siding that is removed from the house could be carefully stored and incorporated into the new addition.
2. Older windows and doors as well as hardware, bath fixtures and other items are readily available from architectural salvage companies and can easily be refinished and incorporated into rehabilitation projects and/or additions.
3. Integrating old doors and windows into interior finishing designs can lend a unique character to a new addition that strives to maintain and express architectural integrity.

Buy Regionally

As business owners and residents know, a healthy community benefits when people shop locally, when possible and regionally - along the Front Range;

building construction can aid by using localized products and services where they are available. A regionally-based economy can be more easily sustained than one based on imported materials and exported goods and services. Regional materials, such as stone, tile, brick and timber, also give a building a quality of “place”, or belonging in the region. In addition, materials found regionally can substantially reduce the energy and environmental impacts of transporting materials over long distances.

Exterior Site and Building Lighting

Exterior light fixtures and light levels are a special concern to mountain communities who have enjoyed a “dark sky” environment for generations. Exterior lighting should be carefully located using current technological advances in fixtures and bulbs to prevent light pollution, reduce nighttime glare and improve energy efficiency.

1. Exterior light sources should have a low level of illumination.
2. Prevent glare onto adjacent properties by using shielded and focused light sources that direct light toward the ground. Exterior light sources should be shielded, including all lighting associated with parking areas and patios. Fixtures should be carefully located to avoid light trespass onto adjacent property.
3. Timers and motion detectors are encouraged to minimize and control night lighting.
4. Minimize the visual impact of light spill from the interior of a building.

Landscape and Site Improvements

Ecological, informed landscape design can minimize a property’s maintenance and water requirements. A plant palette and landscape design should consider the region’s water flow, climate, native vegetation, wildlife and urban development patterns. Understanding the ecology of a region helps property owners make informed decisions regarding the needs of site-specific design, including solar access, wind patterns, topography, rainfall, drainage patterns and wildlife habitat. The Planning Department has recommended plant lists for each plant zone within the City.

1. Control solar gain and heat absorption by locating plant material on the south and southwest of a building.
2. Trees and other vegetation can also shade paved areas and provide a canopy for pedestrians.
3. Landscaping and landscape structures can enhance a building’s natural ventilation and cooling by influencing wind flow. This requires the landscape design to respond to prevailing wind patterns and local wind flow variations, and strategically locating trees, hedges and shrubs to direct winds.
4. Dissipating turbulent, higher velocity winds in circulation areas around buildings can also be achieved by placing a multi-layered planting of large trees and shrubs with dense foliage at the base and corners of buildings.
5. Through mulching and composting green matter, ecologically-based landscaping can maintain and improve soil fertility, retain soil moisture, stimulate soil-based microbial activity and maintain the cycle of nutrients in the soil.
6. The use of native and other ecologically appropriate plants reduces water consumption, maintenance requirements, and the use of pesticides and herbicides and increases the area’s suitability for wildlife.

Recycling Facilities

Recycling efforts should be considered an important attribute of a community and neighborhood. New additions and construction of new multi-family and commercial buildings should include designated recycling areas. A clean, convenient, recycling area and/or receptacle can serve as on-site education for users about waste separation and recycling and can mean the difference between minimal effort and a committed, successful recycling program.

Sources:

- *City of Santa Monica Green Building Program*
- *City of Manitou Springs Climate and Air Quality Committee*
- *Historic Preservation and Green Building: A Lasting Relationship Environmental Building and News January 2007*

