Emerging Trends in Historic Preservation

Part 1: Preservation and Sustainability

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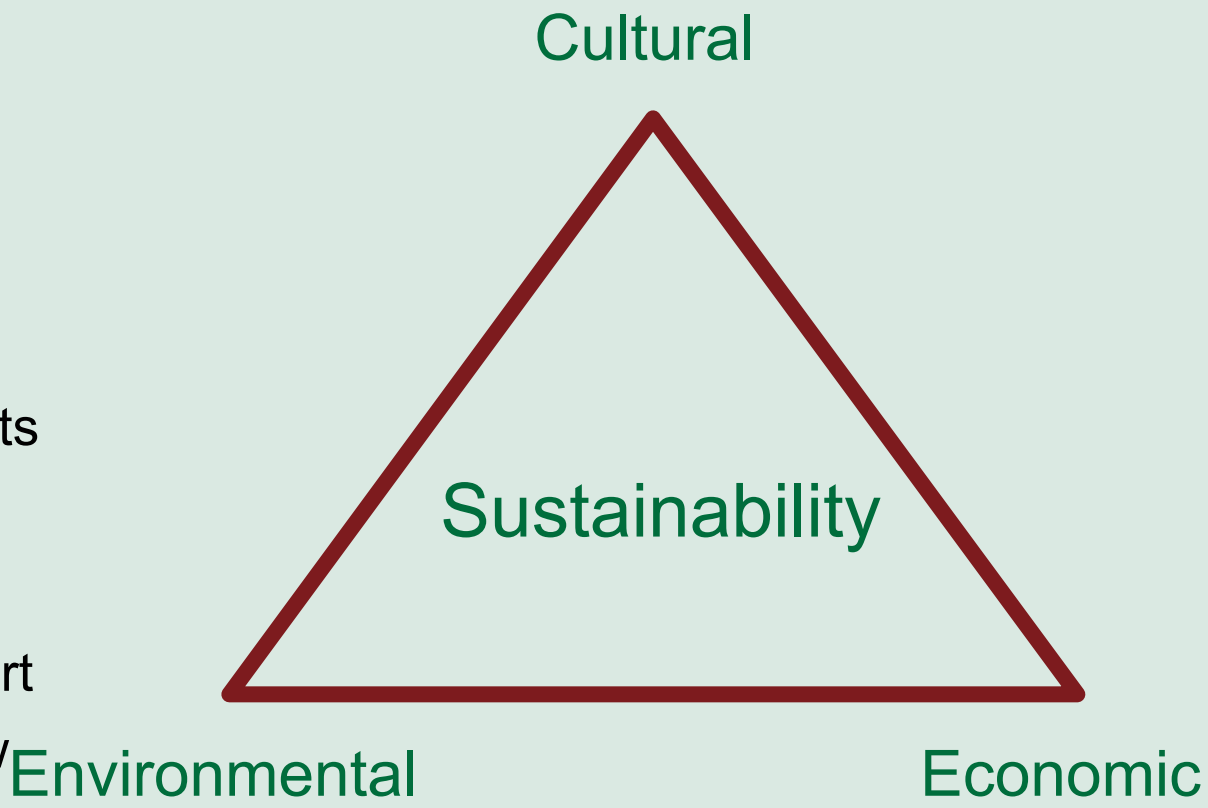
Does Preservation Hinder Sustainability?

"Historic preservation can - and should - be an important component of any effort to promote sustainable development. …(It) is crucial to combating climate change."

- National Trust for Historic Preservation

The 3 Components of Sustainability

- Cultural
  - Social fabric
  - History
- Economic
  - More jobs per $
  - Supports local crafts
- Environmental
  - Life-cycle energy
  - Green from the start
  - Accommodate new technolgies



Sequence of Conservation Principles in Design Guidelines:

1. First, maximize inherent sustainable qualities
2. Then, maintain building components in sound condition.
3. Next, design landscapes to conserve resources.
4. Finally, add new technologies sensitively

Embodied Energy

Energy used to create and maintain a structure:

1. Create the materials
2. Transport materials to the site
3. Assemble as a structure
4. Repair & maintain

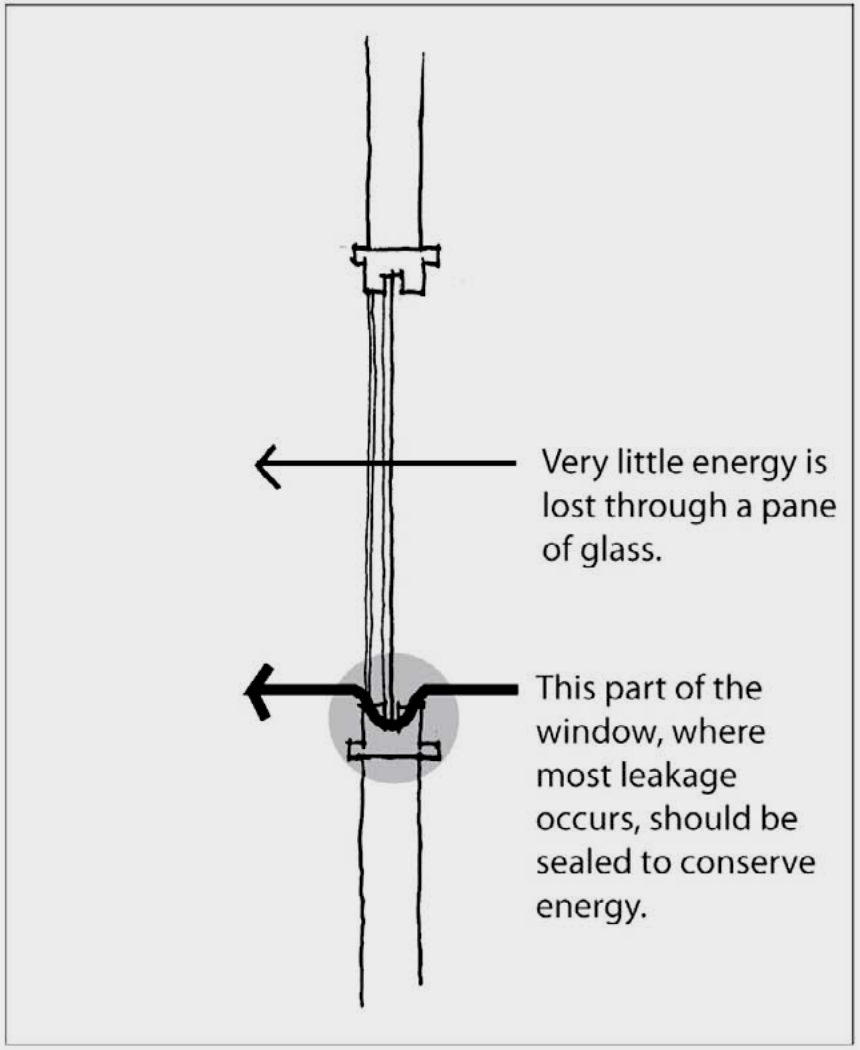
Historic Building Materials

- More durable
- Longer life cycle
- Locally produced
- Locally assembled
- Non-toxic
- Re-useable
- Repairable

Historic Windows

- Repair is more efficient
  - Heat loss is primarily through the frame not the glass,
  - Can be reduced with just proper sealing
  - Wood frames more
  - No pollution issues
  - No waste created

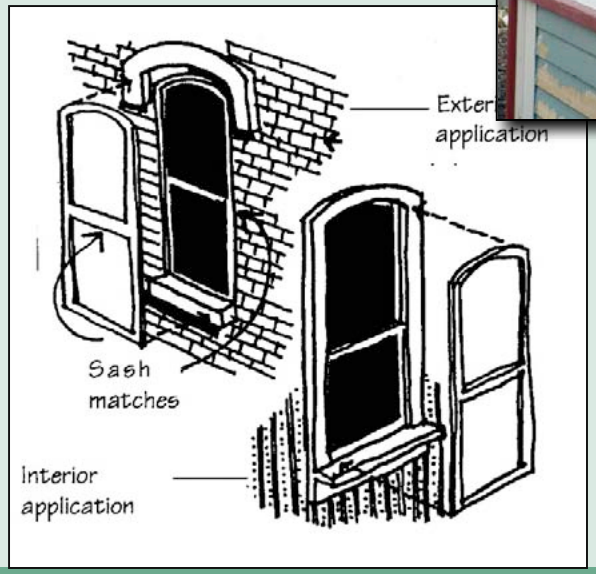
Replacing original windows is NOT more sustainable!



Most heat loss is associated with air leakage through gaps in an older window that are the result of a lack of maintenance, rather than loss of energy through the single pane of glass found in the historic window.

Storm Windows

- Storm Window
  - More efficient
  - Less costly than replacement
  - Little information exists on the life-cycle performance of new windows
- New window
  - Shorter life cycle?
  - Built-in obsolescence?
  - Toxicity concerns?



Building Operations - DOE Study

- Commercial buildings built prior to 1920… are as efficient as most building constructed after 2000

User Managed Conservation Measures

- Adaptable to new uses
- Designed for local climate
- User-controlled operable systems (Day-lighting and natural ventilation)

Operable transom

Traditional Techniques

- Operable shade devices:
  - Blinds,
  - Awnings,
  - Shutters,
- Fixed shade devices:
  - Porches
  - Arcades
  - Canopies
- Air circulation devices:
  - Operable transoms
  - Double-hung windows
  - Ceiling (de-stratification) fans
  - Attic fans

Preservation and Technology
Compatible and Complementary

Sustainable technologies are adaptable to historic structures without reducing their integrity

- This includes passive and active techniques, as well as high- and low-tech strategies
- Such strategies have considerable potential to reduce the building's environmental footprint

Applying Solar Panels

San Jose, CA

Photovoltaics

Standard PV array on rear facade with minimal impact to building fabric.

Building Integrated Photovoltaic (BIPV) roof shingles are coated with PV cells made of amorphous silicon.

Built In Photovoltaics

BIPV shingles
(Sacramento, CA)

BIPV with varied orientation
(Ohio)

Locating Photovoltaic Panels

- May be applied
- Minimize impacts

Preferred

Not Recommended

Draft Illustrations for Preservation Design Guidelines
Deadwood, SD

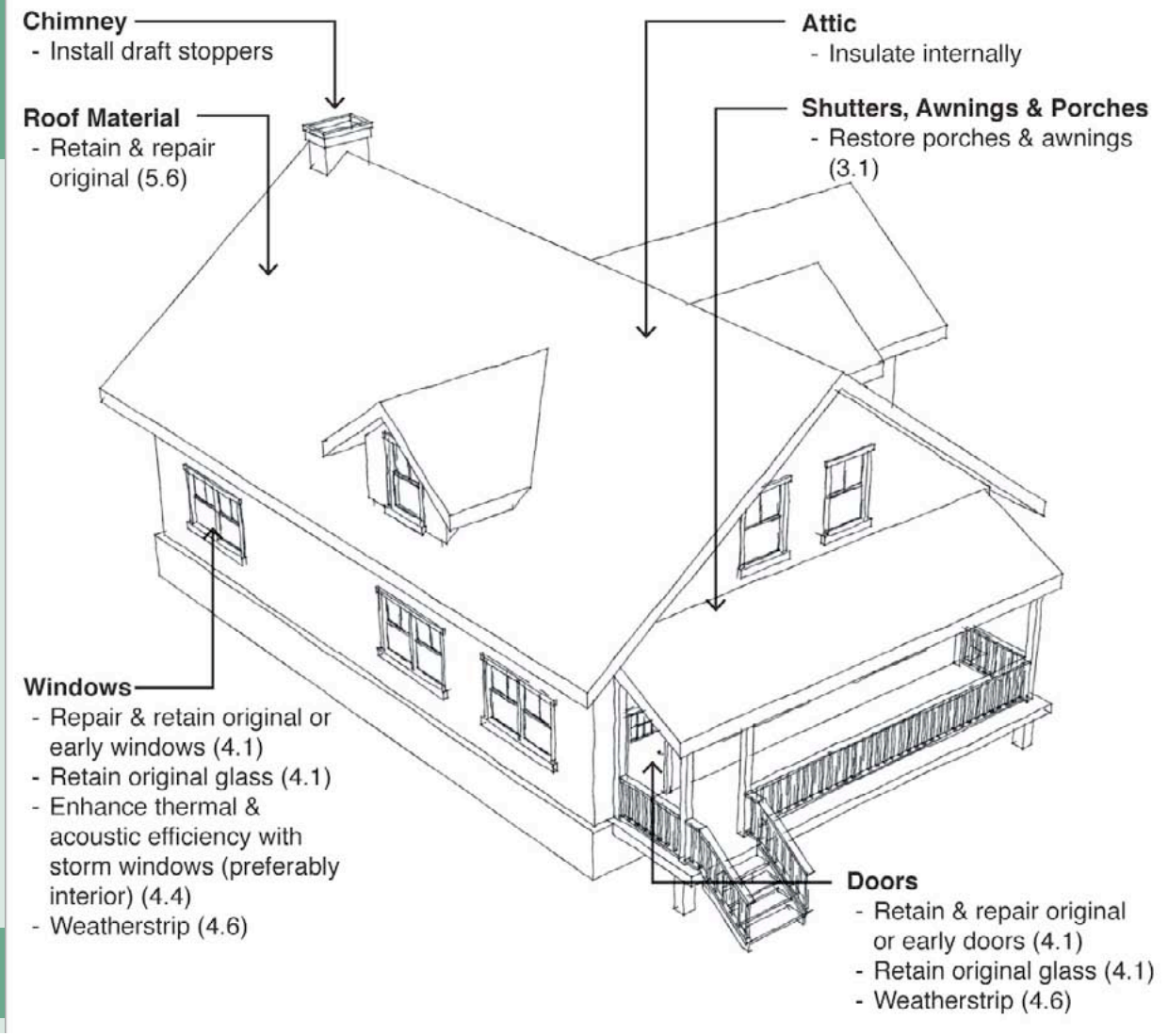
Summarize Green Guidelines

Energy Conservation for Historic Buildings

Pitkin County, Colorado

Building Energy Efficiency Diagram

The Building and Site Energy Efficiency Diagrams summarize the principal direction in the guidelines dealing with considerations of energy efficiency and energy collection. The building perspective covers measures to enhance energy efficiency while retaining the integrity of the historic structure. The site perspective looks at the situation of energy collection equipment, historic orientation and natural shading to minimize any adverse impacts upon the character of the historic site.



Sustainable Landscapes

- Trees and shrubs
  - Wind and rain protection
  - Seasonal shading
  - Carbon offsetting
- Grassy areas & Permeable Paving:
  - Percolation into soils

Stormwater retention retains water on site AND serves as an amenity

Neighborhood Design Guidelines

Guidelines for Sustainable Neighborhood Design

Galveston, TX

Neighborhood Shading Standards

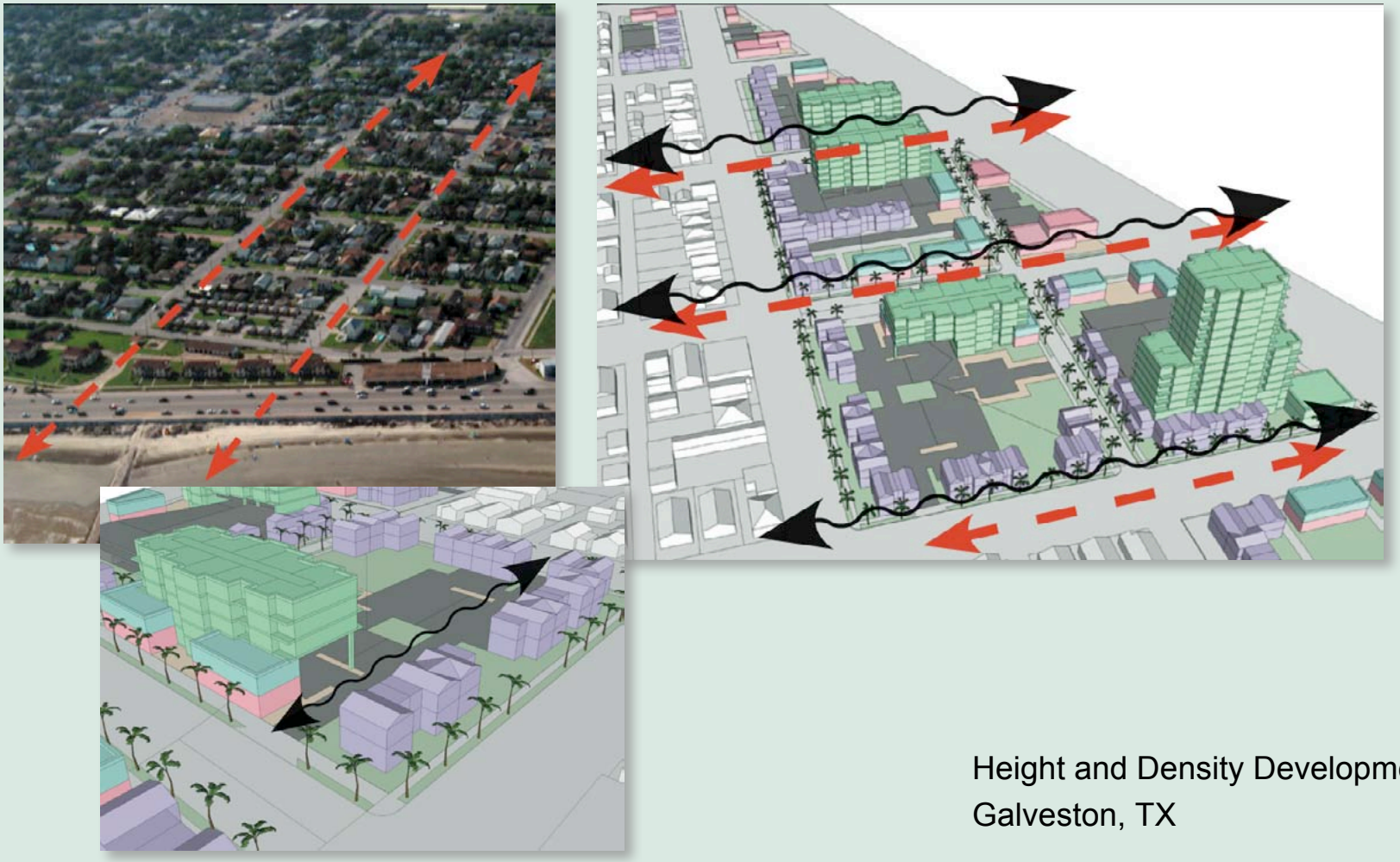
Shadow restrictions

May not cast more than 4 hours of shadow on adjacent historic neighborhood on Dec. 21

Height and Density Development Plan
Galveston, TX

Neighborhood Design Guidelines

View Corridors and Breezeways



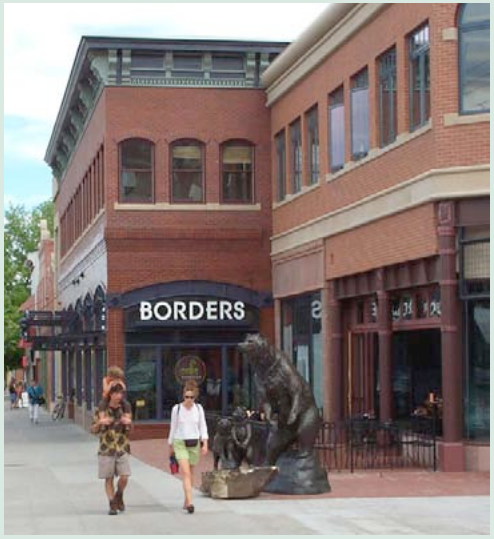
Height and Density Development Plan
Galveston, TX

Writing Sustainability into Preservation Guidelines

1. Tailor to local conditions
   - Climate
   - Resource types
2. Integrate with existing preservation guidelines
   - Integrate throughout the document, or…
   - Add as special chapter
3. Make them educational as well

Site Planning

Plaza Location



12.0 Sustainability in Building Massing. The arrangement, proportions and orientation of a building's masses play a critical role in how a project relates to the environment, and how well a building performs.

Orientation of building massing should take advantage of solar access for both passive and active strategies of daylighting and solar energy collection.

12.1 Design building massing to support passive solar design.

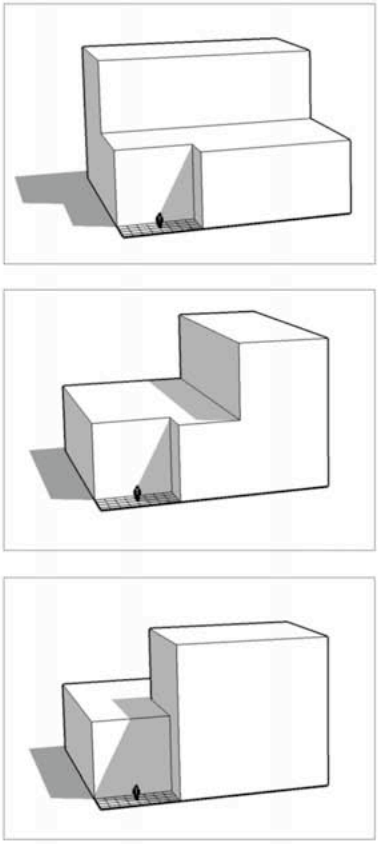
- Maximize massing areas with southern exposures.
- Orient roofs to support solar collectors and/or natural daylighting strategies.
- The depth of building mass should be sized to allow natural daylighting to reach the maximum amount of actively used, interior spaces when feasible.
- Articulate walls to serve as shading for their own surfaces or other surfaces.

12.2 Arrange building masses to provide weather protection.

- Avoid massing that creates wind tunnel effects.
- Articulate massing to help protect pedestrian areas from adverse weather effects.

12.3 Design a building massing to support green building principles for both itself and adjoining areas.

- Minimize or prevent shading on south-facing facades of adjacent buildings during winter months.
- Minimize winter shading of sidewalks and open spaces to prevent ice over.
- Preferred: Taller mass is positioned to minimize winter time shading on an outdoor plaza.
- Discouraged: Taller mass shades outdoor plaza in winter time.



The siting of a building mass affects solar access to adjoining spaces and should be taken into consideration.

Downtown Design Guidelines - Ann Arbor, MI

Site Design Principles

Appropriate: Walkways, landscaped areas and mid-block passages should be used with setbacks to provide solar access, natural ventilation and access to secondary portions of structures and neighboring properties.

Reference the International Dark Sky Association (www.darksky.org) or the Illuminating Engineering Society of North America (www.iesna.org) for more information on proper lighting techniques.

8.0 Sustainable Site Design

The arrangement of buildings, planted area and hard surfaces plays a critical role in how a site relates to the environment, and how buildings on that site operate. Site design can affect environmental considerations for both the site itself and neighboring properties. For example, reducing the amount of impervious surfaces coupled with the implementation of an on-site infiltration systems can reduce the harmful effects of stormwater runoff to adjacent sites.

A site design should support sustainable building principles to maximize energy efficiency and renewable energy strategies as well as to limit negative impacts on local ecosystems. These local ecosystems can be supported through the conservation of existing natural areas and restoration of damaged areas within a site. Allocating open space is critical to the success of biodiversity within a site and is encouraged.

A site design should take into account effects on an adjoining property's access to light and air as well as its ability to implement the same environmental design principles. Also, the effects of light pollution to adjoining sites and the neighborhood should be mitigat

8.1 **Locate site features to maximize green building principles for solar access and energy efficiency.**

- Minimize access roads and parking footprints, and share with adjacent properties when feasible.
- Position a new building on its site to optimize energy efficiency, allowing for both passive and active strategies.
- Site a structure to maximize daylighting strategies for all portions of the building.
- Locate a building and site elements to take advantage of prevailing southeast winds for natural ventilation.
- Walkways, landscaped areas and mid-block passages should be used with setbacks to provide solar access, natural ventilation and access to secondary portions of structures and neighboring properties.
- Consider sharing parking facilities with an adjacent site.
- Minimize the use of impervious surface treatments.

8.2 **Utilize exterior lighting that minimizes light pollution to adjacent sites and the neighborhood.**

- Only light areas as required for safety and comfort purposes.
- Use light fixtures that shield and focus light onto the ground.
- Use light bulbs that have low luminescence levels.

8.3 **Utilize landscape areas and features to promote energy efficiency.**

- Locate open space where it will provide access to light and air for multiple properties.
- Locate deciduous trees and plants to provide summer shade while also allowing for solar access in the winter.
- Locate landscape elements to allow for natural ventilation.
- Maximize the use of native plant species which are best adapted to the climate and require less energy and resources to maintain.
- Use plant species which require low levels of water and maintenance.
- Utilize irrigation systems which have high efficiency or reuse water from site drainage systems.
- Maintain existing mature trees and other large-scale vegetation where feasible (4"-6" caliper).

Appropriate: Provide natural stormwater systems and retention basins.

8.4 **Provide natural stormwater systems and retention basins.**

- Design a retention basin on site to utilize existing runoff patterns and vegetation.
- Avoid paving a runoff basin.
- Design a landscape a retention basin to provide water absorption and serve as a year-round visual amenity for the site.
- Provide soil areas with high water absorption rates where feasible.
- Integrate the site drainage system with bioswales and on- site retention basins into site open spaces.
- Locate water inlets for most direct, positive site drainage.

8.5 **Minimize runoff from parking lots and structures.**

- Use permeable paving, approved by public works, for surface lots to the extent feasible.
- Direct run off from parking structures into on-site systems for landscaping, or otherwise retain run off on site through the use of bioswales or similar strategies.
- The area of parking lots should be kept to a minimum.

Draft Design Guidelines for Sustainable Design
Galveston, TX

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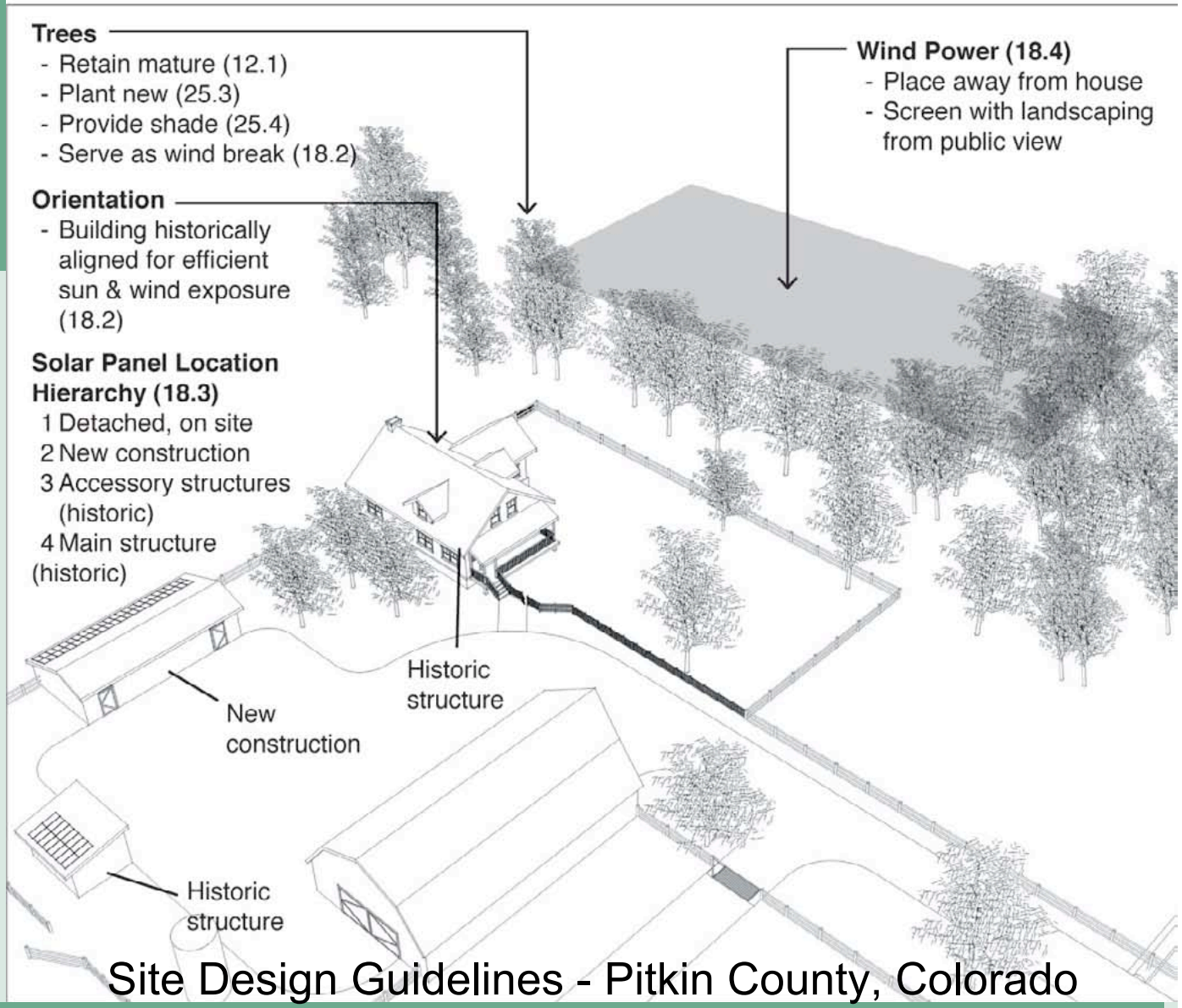
Summarize Green Guidelines

Site Energy Efficiency Diagram



Site Design Guidelines - Pitkin County, Colorado

Regulations

1. Building Energy Code
   - Focus only on energy saving/consumption
2. Green Building Code
   - Includes site, neighborhood design
3. Zoning standards
4. Design Guidelines

Codifying Green Building

- Issues:
  - Proper credit for Historic Structures
  - Does not recognize embodied energy
  - No qualitative comparison for existing materials vs. replacement

Codifying Green Building

Sustainability in Landscapes

- Green Building Codes often include provisions for water conservation:
  - No sprinklers within 18” of hardscape
  - Lawn area limited to less than 20% of yard
- Interaction with historic properties:
  - Protects foundations from moisture
  - May have conflicts with historic landscapes

Energy Codes Should:

- Acknowledge inherent savings in preservation
- Discourage tear-downs
  - Wastes embodied energy
  - Reduce impacts on local landfills
  - Replacement may take more energy than repair and maintenance
- Address practical standards for existing buildings
  - Improve efficiency, AND
  - Preserve integrity of the structure

Key Principles for Sustainable Technology and Preservation

- Think Holistically
  - Consider all factors; entire life-cycle costs, manufacture, energy consumption, mining waste, original and waste toxicity, transportation costs, reuse or disposal etc.
- Use Technology Creatively
  - Use technologies that maximize efficienc
  - Use existing systems
  - Take advantage of inherent building features
- Seek Common Design Solutions
  - Respect the integrity of the historic structure, while
  - Advancing sustainability

Observations

- Preservation is key to sustainability.
- The relationship is not well understood.
- Planners should keep preservation in the discussion.
- New data is emerging.
- New standards will be forthcoming.

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