Greening Measures for Hawaii's Heritage Homes

Class 1: Preservation + Sustainability

HISTORIC HAWAIʻI FOUNDATION

PAT & EDWARD CHUNG

HISTORIC HAWAIʻI FOUNDATION

A membership-based, statewide non-profit organization, Historic Hawaiʻi Foundation encourages the preservation of historic buildings, sites and communities relating to the history of Hawaiʻi.

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Each session qualifies for 1.5 AIA/CES (HSW).
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Outline of Today's Class

- Welcome and Overview (5 min.)
- Evaluating Sustainability (15 min.)
- Assessing Historic Buildings (15 min.)
- Example of a Historic Home with Sustainability Measures (15 min.)
- Preservation Standards (10 min.)
- Sustainability Guidelines with Examples (15 min.)
- Discussion (15 min.)

PRESENTERS

Kiersten Faulkner, Executive Director, Historic Hawai‘i Foundation

Ms. Faulkner is the chief executive of Historic Hawai‘i Foundation and oversees all aspects of its preservation programs, strategic planning, business lines and operational matters. Prior to joining HHF, Ms. Faulkner was a Senior City Planner for the City & County of Denver, where she managed complex and controversial comprehensive planning, promulgation of land use and urban design regulations, and development proposals. She holds a Master of Arts in Urban and Environmental Policy from Tufts University and is a member of the American Institute of Certified Planners (AICP).

PRESENTERS

Andrea Nandoskar, Education Program Manager, Historic Hawai‘i Foundation

Ms. Nandoskar oversees HHF’s educational programs, including organizing seminars, workshops, lecture series, tours, advocacy campaigns and communications. She manages HHF’s social media program and facilitates traditional media and outreach, including site-specific campaigns and educational initiatives. She holds a Bachelors degree in Literature from the State University of New York at Purchase.

Pat & Edward Chung

The Chungs are historic homeowners living in Mānoa on O‘ahu. Their residence, a modest Vernacular Craftsman Bungalow, was built in 1921 and is on the Hawai‘i State Register of Historic Places. The Chungs have incorporated a myriad of sustainable measures on their historic property.

Goals of the Series

- To share measures homeowners can implement to save energy, conserve resources and integrate respectfully with local culture and natural geography in a way that is harmonious and compatible with a property's historic character and features.
- To help historic homeowners reduce their homes' carbon footprint while retaining the properties' historic integrity.
- To provide information and knowledge to help owners preserve the historic property; save energy, money and resources; and contribute to the natural health and vibrancy of their neighborhoods
- To encourage historic homeowners to approach maintenance of their properties through the lens of sustainability in order to provide affordable and accessible sustainability tools and techniques to incorporate into their preservation maintenance plans.

Maintenance Plans

Handout for developing a maintenance plan

- ❑ Green tips
- ❑ Inspection Checklist
- ❑ Template for creating lists of:
  - Character-defining features
  - Key actions
  - Timing
- ❑ References/Additional Resources

Sustainability

Mālama Honua

Green Homes create:

- Good Health & Well-being
- Affordable & Clean Energy
- Sustainable Communities
- Responsible Consumption & Production
- Climate Action
- Mālama ‘āina (Caring for the Land)

“The Greenest Building is the one that already exists.”

~Carl Elefante, 2018 president-elect, American Institute of Architects

Why Preserving Historic Homes is Green & Sustainable

Albert and Alice Berg Residence, Oʻahu

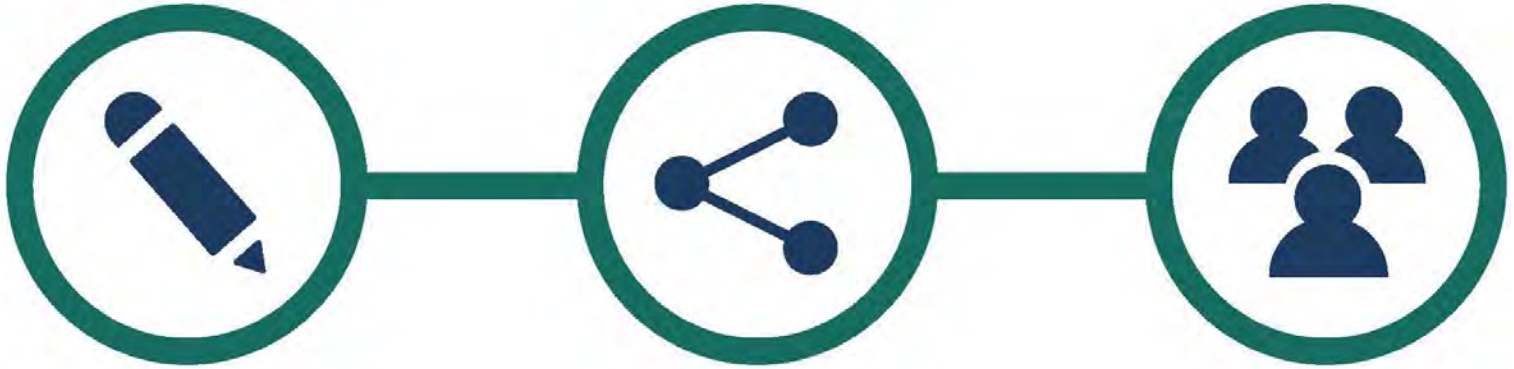
Lānaʻi

Some FACTS

- EMBODIED ENERGY. Old buildings and communities embody the energy and carbon that was devoted to produce them
- PASSIVE DESIGN. Older buildings were often designed to take advantage of naturally occurring energy.
- AVOIDED IMPACT. Reusing old buildings avoids the environmental impacts of the extraction, processing and transportation of new materials and the construction processes.

Source: Tom Mayes. Why Do Old Places Matter? Sustainability, Preservation Leadership Forum, National Trust for Historic Preservation. October 30, 2014

PROCESS



ANALYZE

Understand & Identify existing qualities of your home

PRIORITIZE

Determine priority projects & low-hanging fruit items

IMPLEMENT

Take Action!
Hire an Architect
Self-Perform Work


Sustainable Sites
Water Efficiency
Energy & Atmosphere
Materials & Resources
Indoor Environmental Quality
Innovation in Operations & Regional Priority
U.S. GREEN BUILDING COUNCIL
LEED
USGBC

Stormwater Management & Landscaping

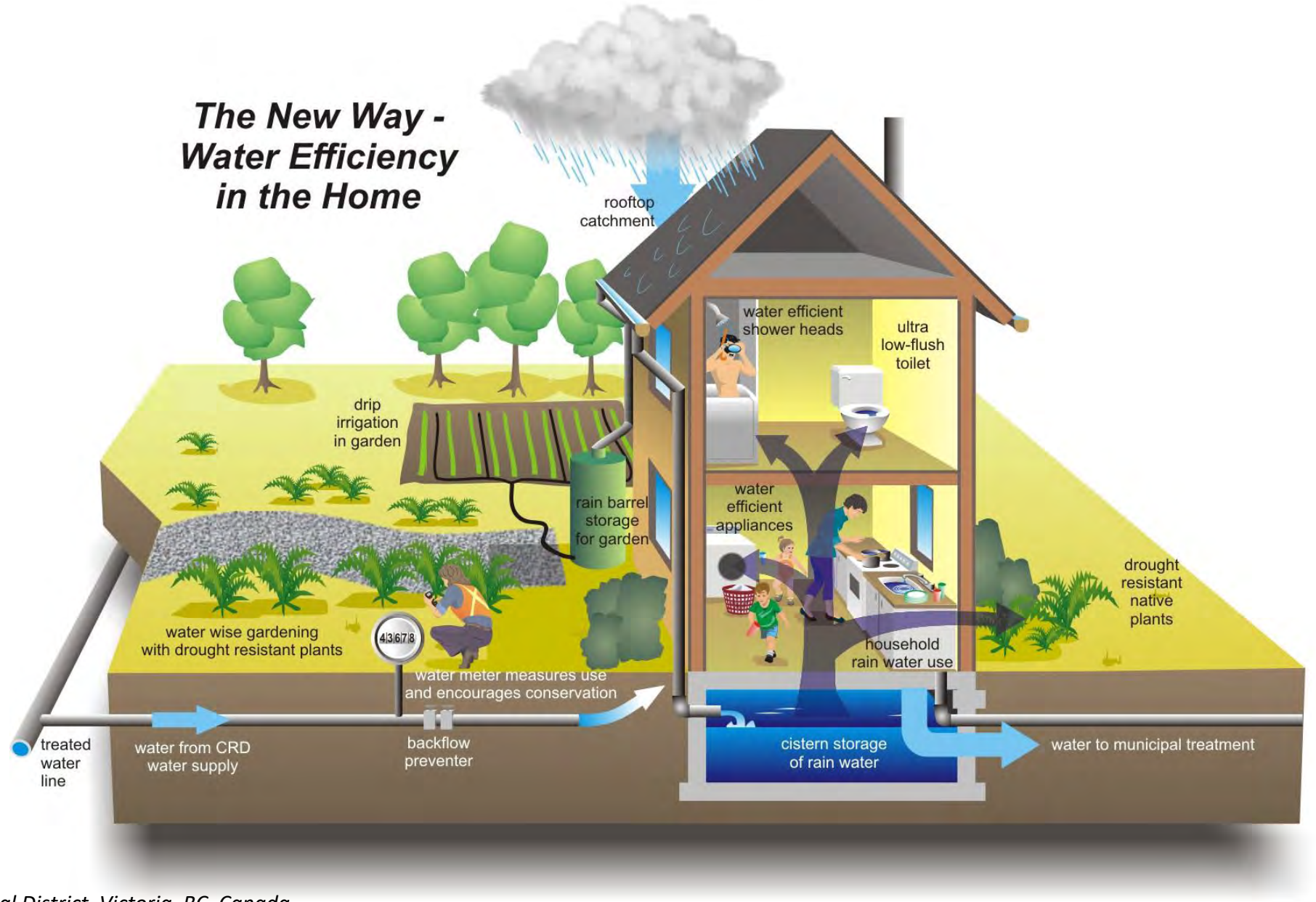
The key to creating a truly resilient and sustainable storm water management plan for your home landscape is to **understand your site**.

- Look at how water works in your landscape and how it fits into the big picture.
- Identify **existing issues and opportunities** for improvement, and respond to your site's storm water needs in a way that's best for your climate.
- Look at your landscape as a whole when analyzing how water moves through it.
- Observe your yard during a **heavy rain** and take notes on where and how water moves and puddles. How do different surfaces and areas of the garden interact? Seeing your landscape during a rainstorm will help you think about the bigger picture for its storm water design.

Water Efficiency

- **Each year, Americans extract 3,700,000,000,000 gallons more than they return to the natural water system to recharge aquifers and other water sources.**
- Water efficiency measures in residential homes can easily reduce water usage by 30% or more.
- In a typical home, savings of 30,000 gallons of water a year can be achieved very cost-effectively. This results in average annual water utility savings of about $100 per year.

Source: US Green Building Council

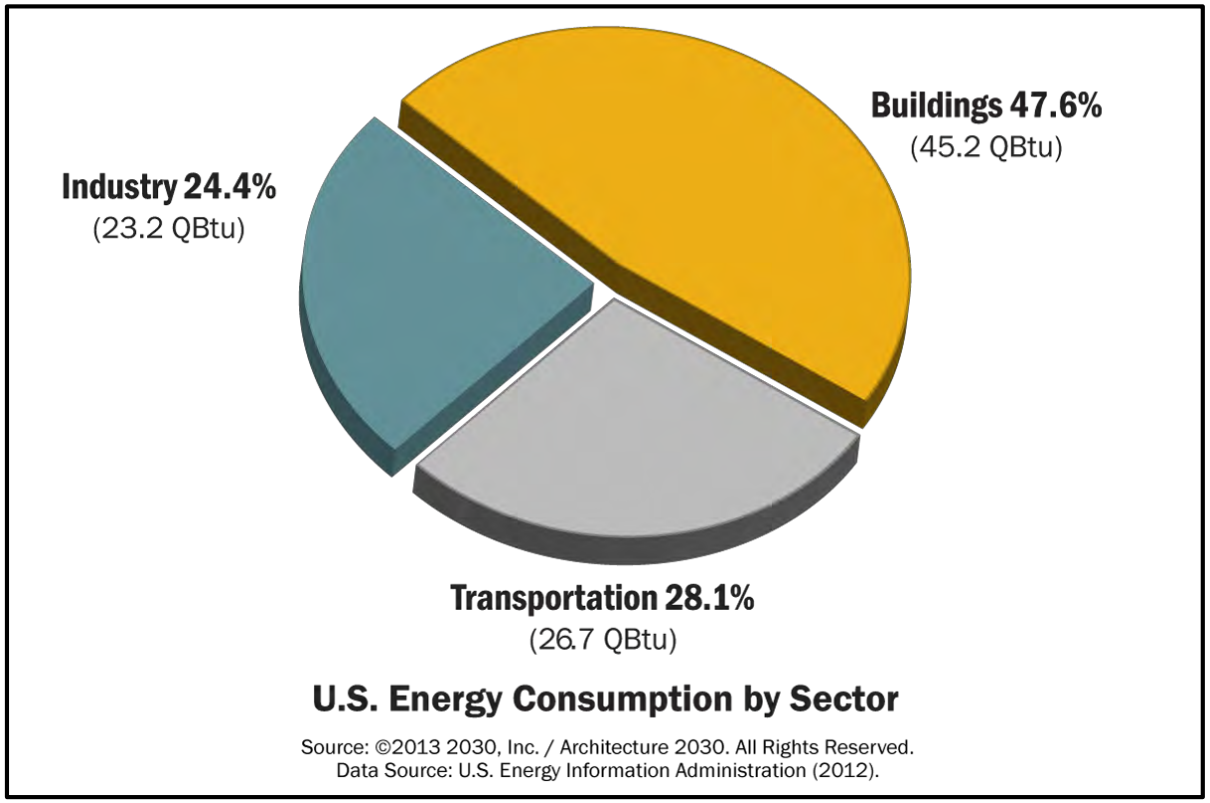


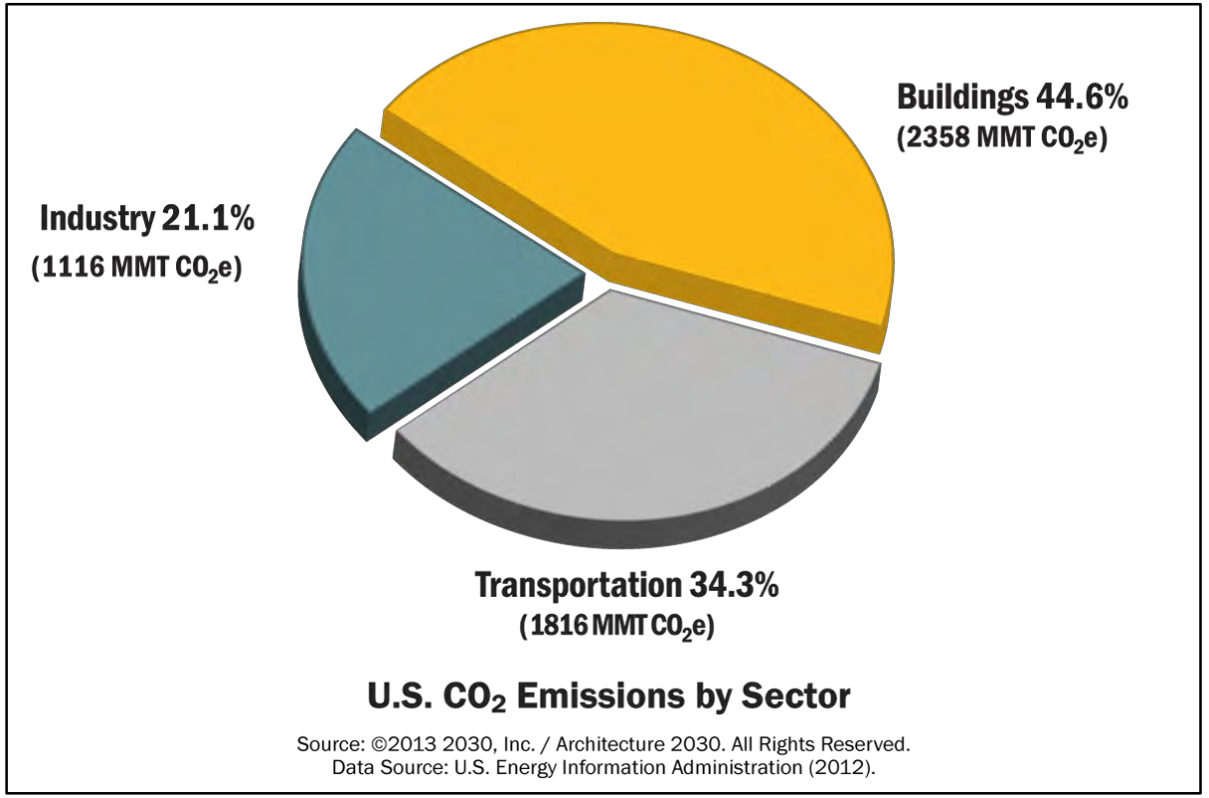
Capital Regional District, Victoria, BC, Canada

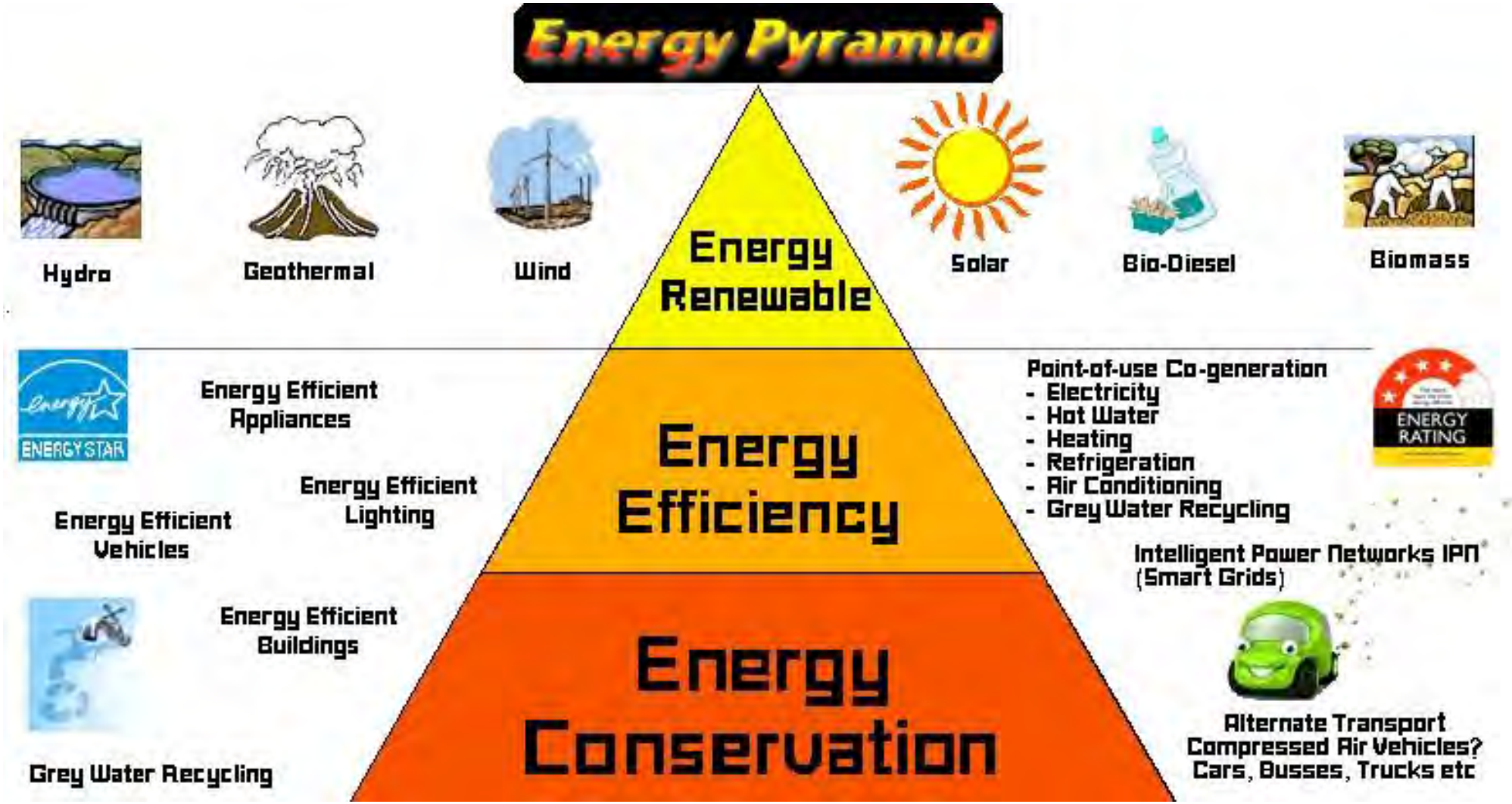
https://www.watercalculator.org/wfc2/q/household/

Energy Efficiency

- Buildings consume between 41% and 48% of the energy and 74% of the electricity produced in the U.S. annually, according to the U.S. Department of Energy.
- In 2010, total emissions from residential buildings were responsible for 1.2 billion metric tons of CO2 emissions, or 22% of the U.S. total. All buildings represent 44% of the total.
- Green homes is one of the best strategies for meeting the challenge of climate change because the technology to reduce energy and CO2 emissions already exists.


Buildings 47.6%
(45.2 QBtu)
Industry 24.4%
(23.2 QBtu)
Transportation 28.1%
(26.7 QBtu)
U.S. Energy Consumption by Sector
Source: ©2013 2030, Inc. / Architecture 2030. All Rights Reserved.
Data Source: U.S. Energy Information Administration (2012).


Buildings 44.6%
(2358 MMT CO_2e)
Industry 21.1%
(1116 MMT CO_2e)
Transportation 34.3%
(1816 MMT CO_2e)
U.S. CO_2 Emissions by Sector
Source: ©2013 2030, Inc. / Architecture 2030. All Rights Reserved.
Data Source: U.S. Energy Information Administration (2012).



Clean Energy Resources, LLC

EPA Carbon Footprint Calculator

What is your carbon footprint?

Take a few minutes to find out with EPA's Household Carbon Footprint Calculator.

Number of people in your household

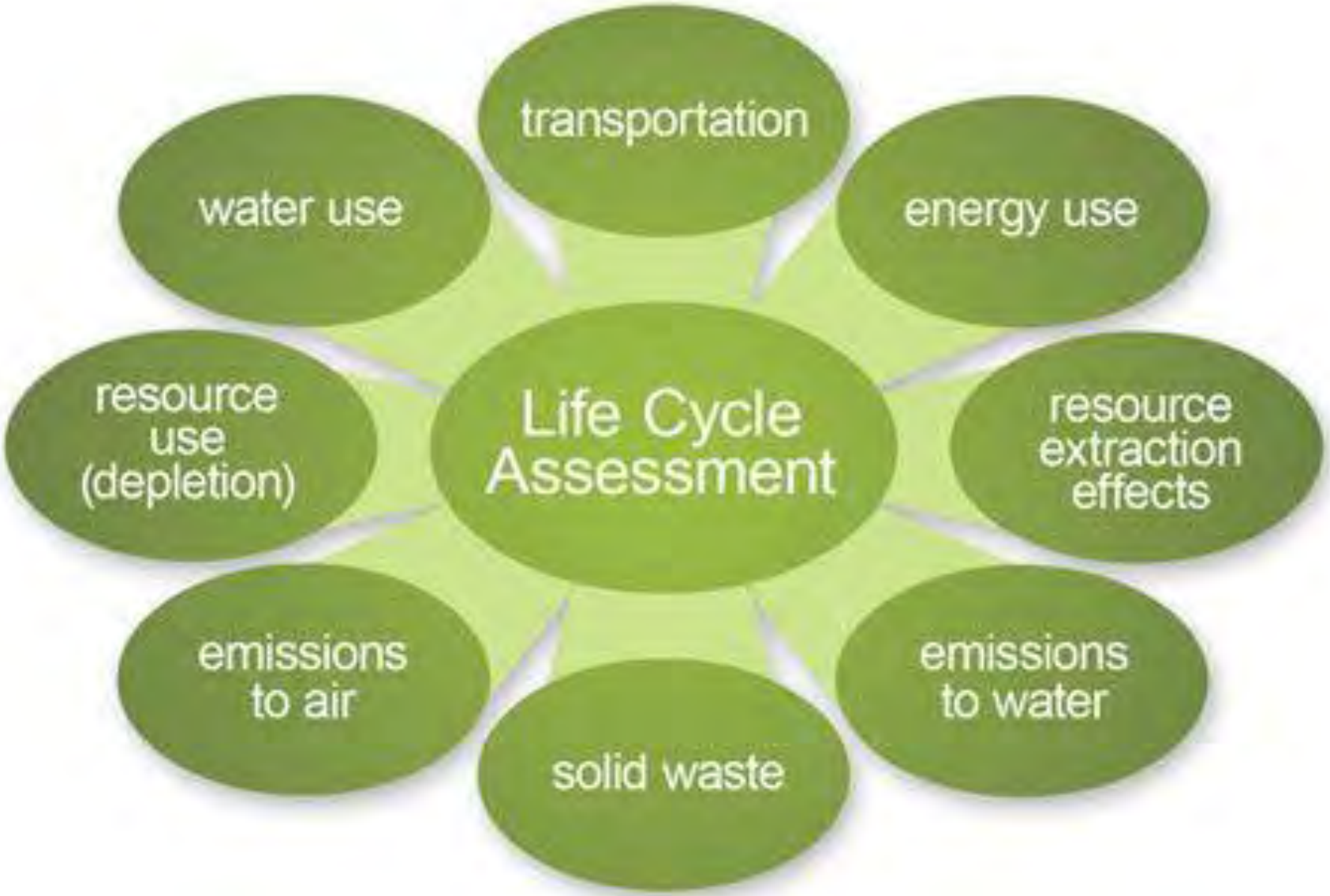
ZIP Code

Get Started

https://www3.epa.gov/carbon-footprint-calculator/

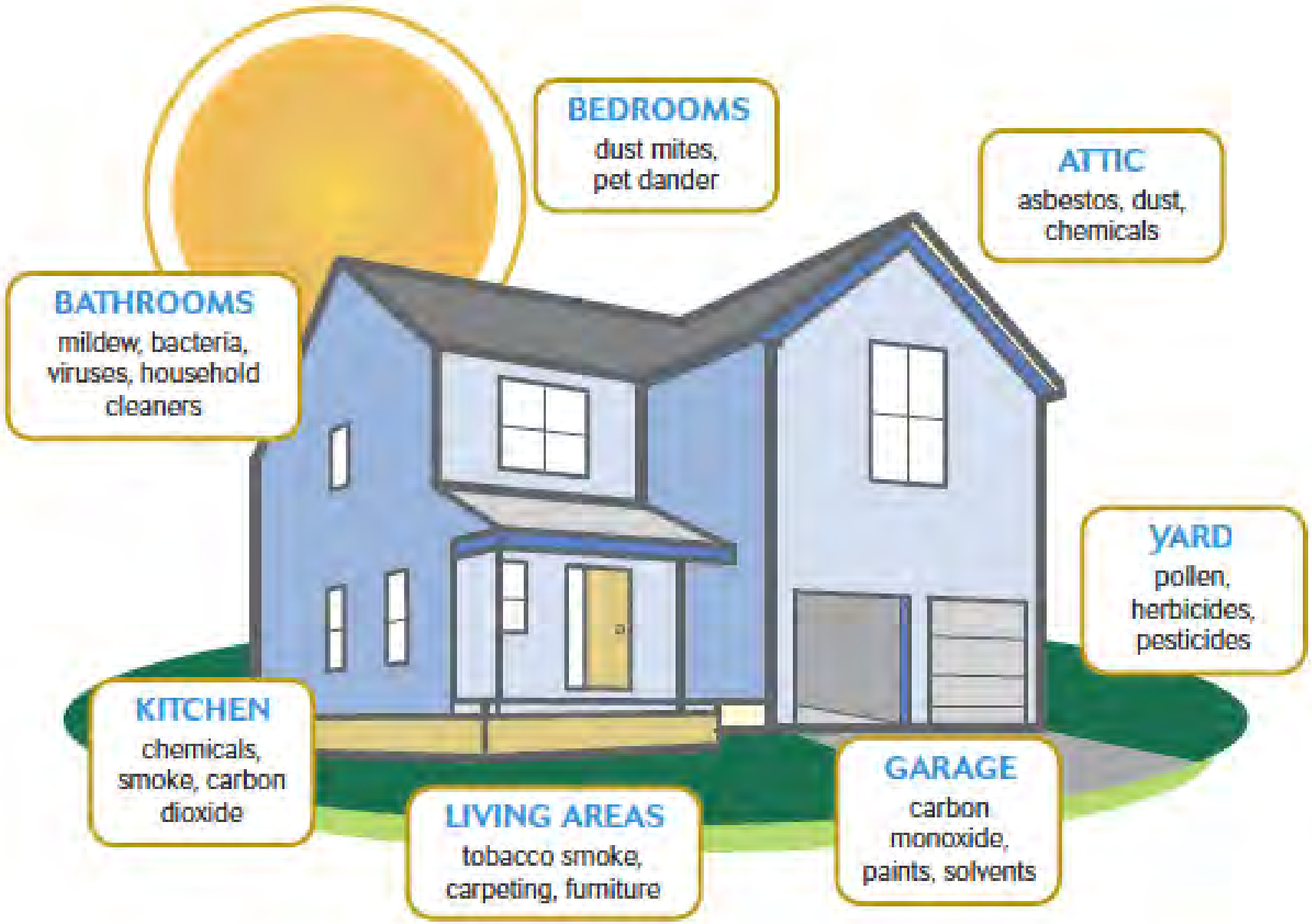
MATERIALS & RESOURCES

- The choice **of building materials** is important for sustainable home building because of the extraction, processing, and transportation they require.
- Activities to produce building materials may pollute air and water, destroy natural habitats, and deplete natural resources.
- **Construction and demolition wastes constitute about 40% of the total solid waste stream** in the U.S.
- Sources should be evaluated when materials are selected for a project.
- Reclaimed (i.e., salvaged postconsumer) materials can be substituted for new materials, saving costs and reducing resource use.
- Recycled-content products make use of material that would otherwise be deposited in landfills.
- Use of local materials supports the local economy and avoids the harmful effects of long-distance transport.


transportation
water use
energy use
resource use (depletion)
Life Cycle Assessment
resource extraction effects
emissions to air
emissions to water
solid waste

Indoor Health

- Preventing indoor air quality problems is generally much less expensive than identifying and solving them after they occur.
- Hazardous household pollutants include carbon monoxide, radon, formaldehyde, mold, dirt and dust, pet dander, and residue from tobacco smoke and candles.
- Many homeowners also store various chemicals inside their homes, including pesticides, fertilizers, solvents, grease, oils, degreasers, gasoline, antifreeze, strong detergents, thinners, and oil- based paints.
- Generally, there are three types of strategies: source removal, source control, and dilution.


BEDROOMS
dust mites, pet dander
ATTIC
asbestos, dust, chemicals
BATHROOMS
mildew, bacteria, viruses, household cleaners
YARD
pollen, herbicides, pesticides
KITCHEN
chemicals, smoke, carbon dioxide
LIVING AREAS
tobacco smoke, carpeting, furniture
GARAGE
carbon monoxide, paints, solvents

Assessing Historic Buildings

Historic Integrity

- 7 Aspects of Integrity
  - Materials
  - Design
  - Workmanship
  - Location
  - Setting
  - Association
  - Feeling

Integrity is the ability of a property to convey significance.

The evaluation of integrity is sometimes a subjective judgment, but it must always be grounded in an understanding of a property's physical features and how they relate to its significance.

To retain historic integrity a property will always possess several, and usually most, of the aspects.

Character-Defining Features

Hilo, Hawai‘i Island

Volcano Village, Hawai‘i Island

Character-Defining Features

Jean & Zohmah Charlot House. Photo by Darren Bradley

East Honolulu House. Photo by David Franzen

Character-Defining Features – HOW To IDENTIFY

Step 1: Identify overall visual aspects, **FROM AFAR** to understand distinctive features, the building site, or landscape

Character-Defining Features – FROM AFAR (step 1)

- ❑ Overall setting
- ❑ Building's site (immediate yard)
- ❑ Overall shape
- ❑ Roof and roof features, such as chimneys or cupolas
- ❑ Openings for windows and doorways
- ❑ Various types of projections and recesses on the building, such as lanai that extend outward, or arcades that appear as voids
- ❑ Exterior materials with their color or patterning
- ❑ Trim and secondary features, such as decorative scrollwork

Character-Defining Features – FROM AFAR

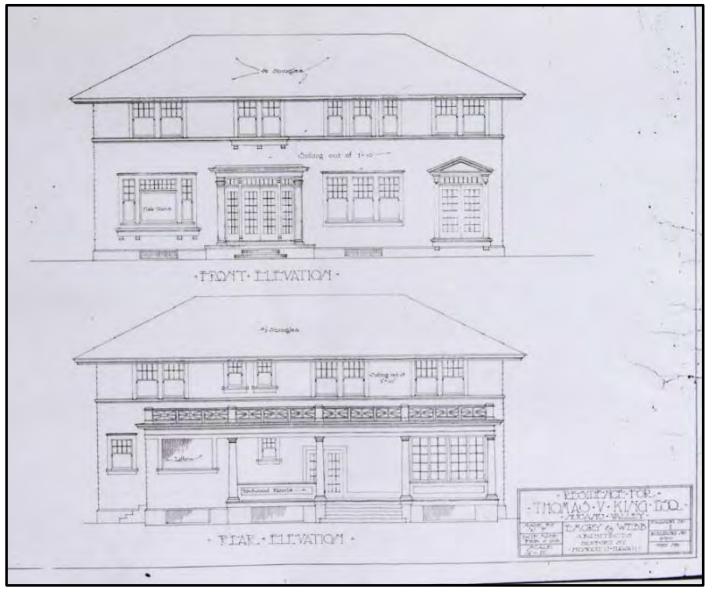
Setting

‘Ewa Plantation Villages, O‘ahu

Site

Nu‘uanu, O‘ahu

Shape



Nu‘uanu, O‘ahu

Character-Defining Features – FROM AFAR

Roof and Roof Features

Palm Circle Historic District, O‘ahu

Openings

Kaimukī House, O‘ahu

Projections and Recesses

Shangri La, O‘ahu

Character-Defining Features – FROM AFAR

Exterior Materials

Kahala House. Photo by Ryan Masuda

Trim and Secondary Features

Nu‘uanu House. Photo by Joe Lynch

CHARACTER-DEFINING FEATURES – HOW TO IDENTIFY

STEP 2: IDENTIFY THE VISUAL ASPECTS AT **CLOSE RANGE** BY MOVING UP VERY CLOSE TO SEE MATERIALS, CRAFTSMANSHIP AND SURFACE FINISHES.

Character-Defining Features – CLOSE UP (step 2)

- ❑ Material
- ❑ Details and Craftsmanship

Character-Defining Features – CLOSE UP

Materials

Detail and Craft

New Jersey

Fort Kamehameha, O‘ahu

Character-Defining Features – HOW To IDENTIFY

Step 3: Identify the **<u>INTERIOR</u>** visual aspects by going into and through the building to identify the distinctive spaces, features and finishes.

CHARACTER-DEFINING FEATURES – INTERIOR (STEP 3)

- ❑ INDIVIDUAL SPACES AND SPACES THAT ARE RELATED TO EACH OTHER
- ❑ INTERIOR FEATURES THAT ARE PART OF THE BUILDING
- ❑ DISTINCTIVE SURFACE MATERIALS AND FINISHES
- ❑ ANY EXPOSED STRUCTURAL ELEMENTS

Character-Defining Features – INTERIOR

Individual Spaces

East Honolulu House. Photo by David Franzen

Related Spaces

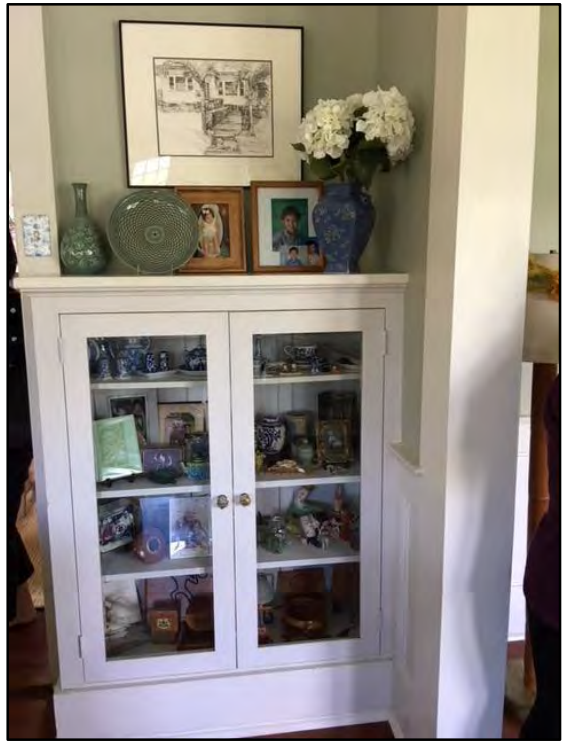
Kāhala House. Photo by Sylvia Lee

Character-Defining Features – INTERIOR

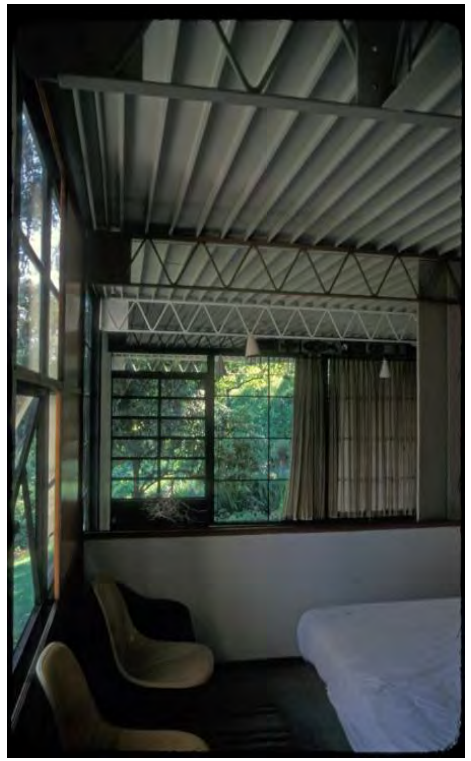
Features

Mānoa House, O‘ahu

Material Finishes



Exposed Structure



California House

Case Study: Historic Features

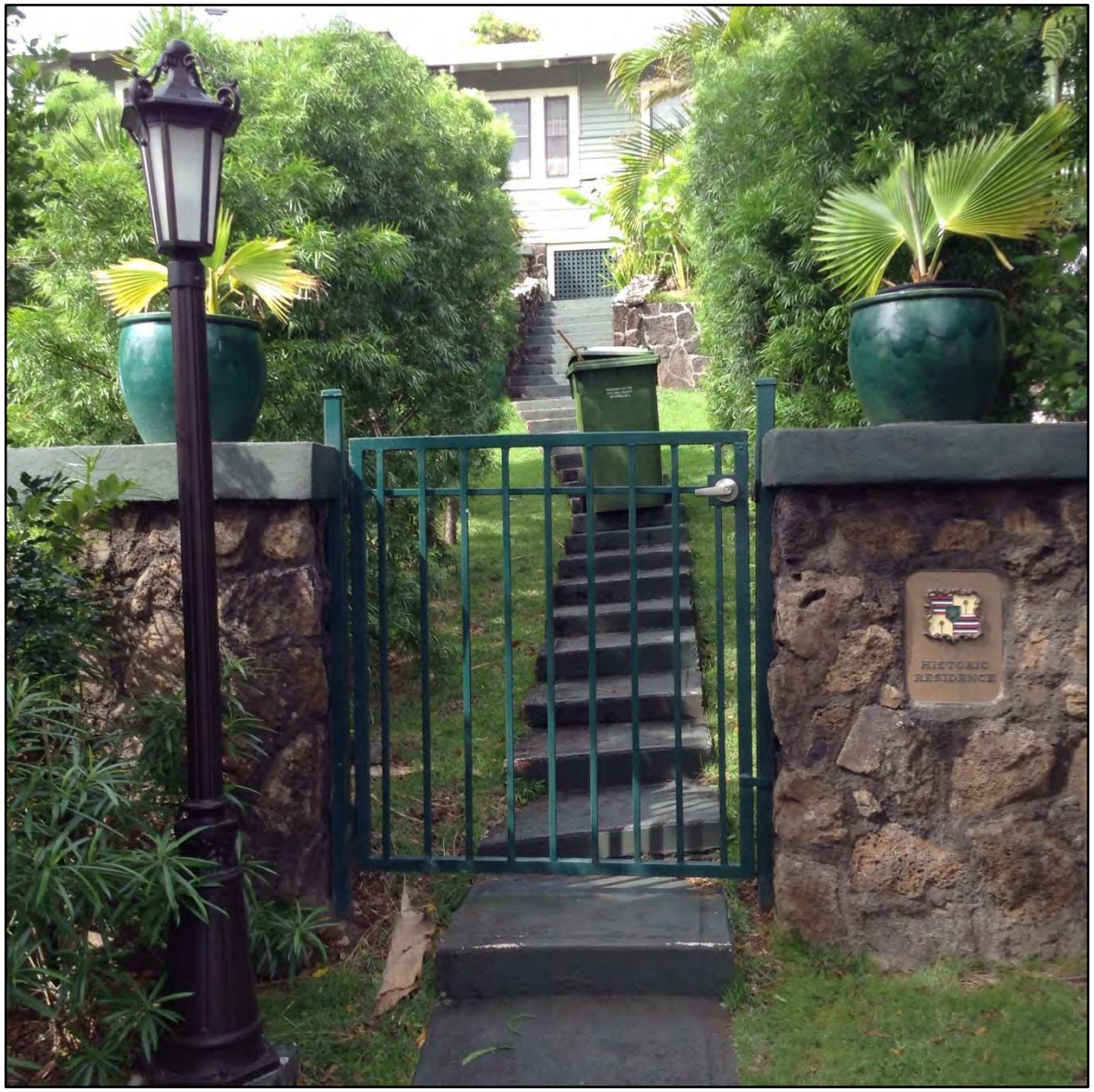
DAVIS RESIDENCE, PAT & EDWARD CHUNG HOUSE

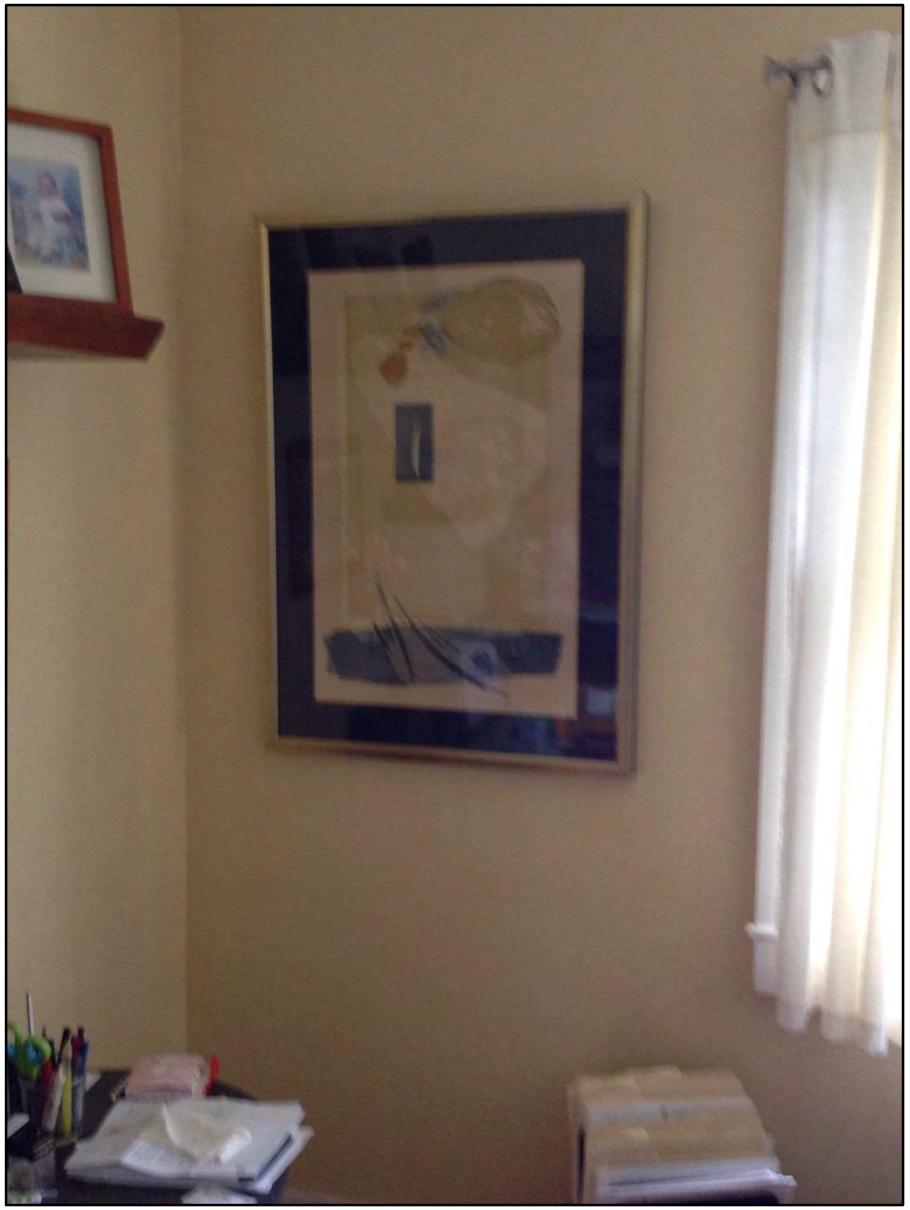
LISTED ON THE HAWAIʻI STATE REGISTER OF HISTORIC PLACES

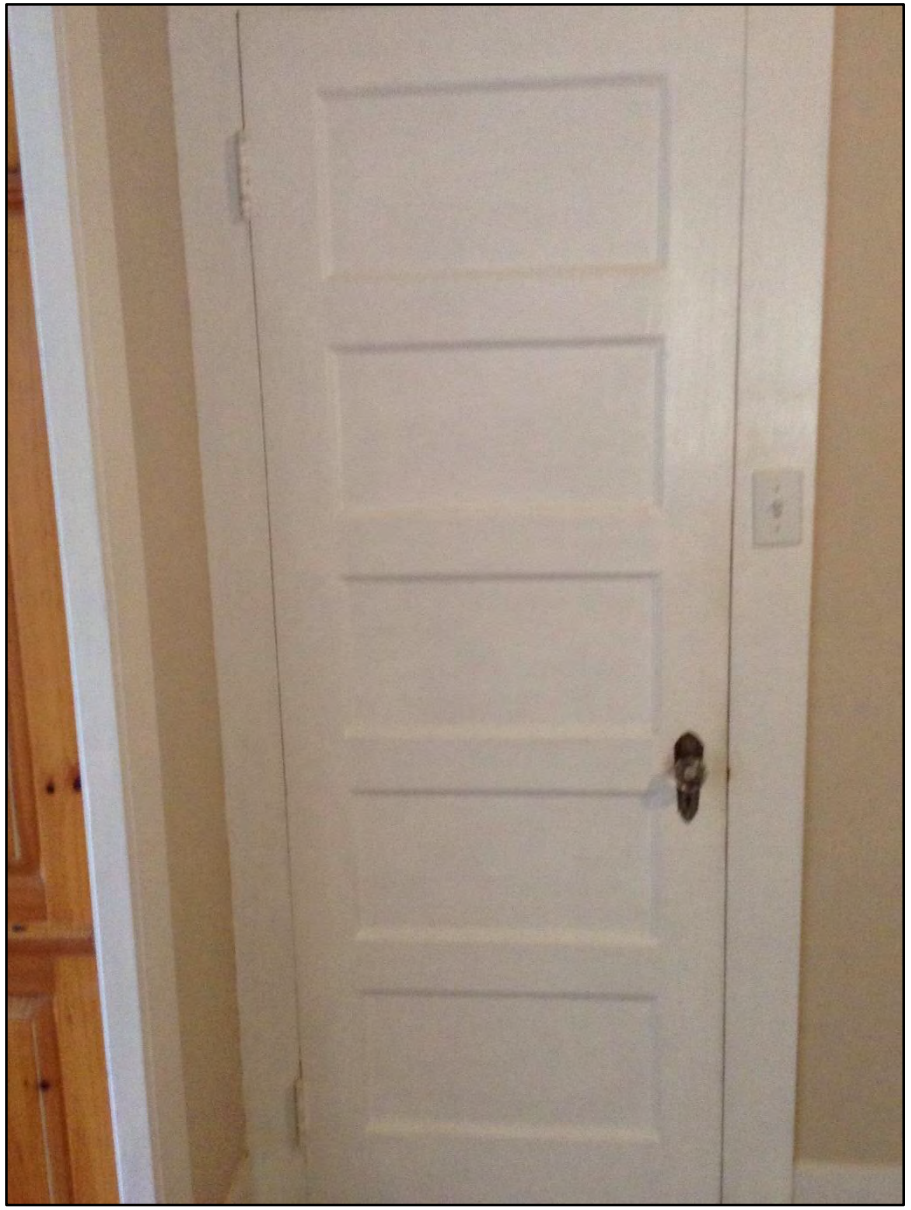
Chung's House

- About our house

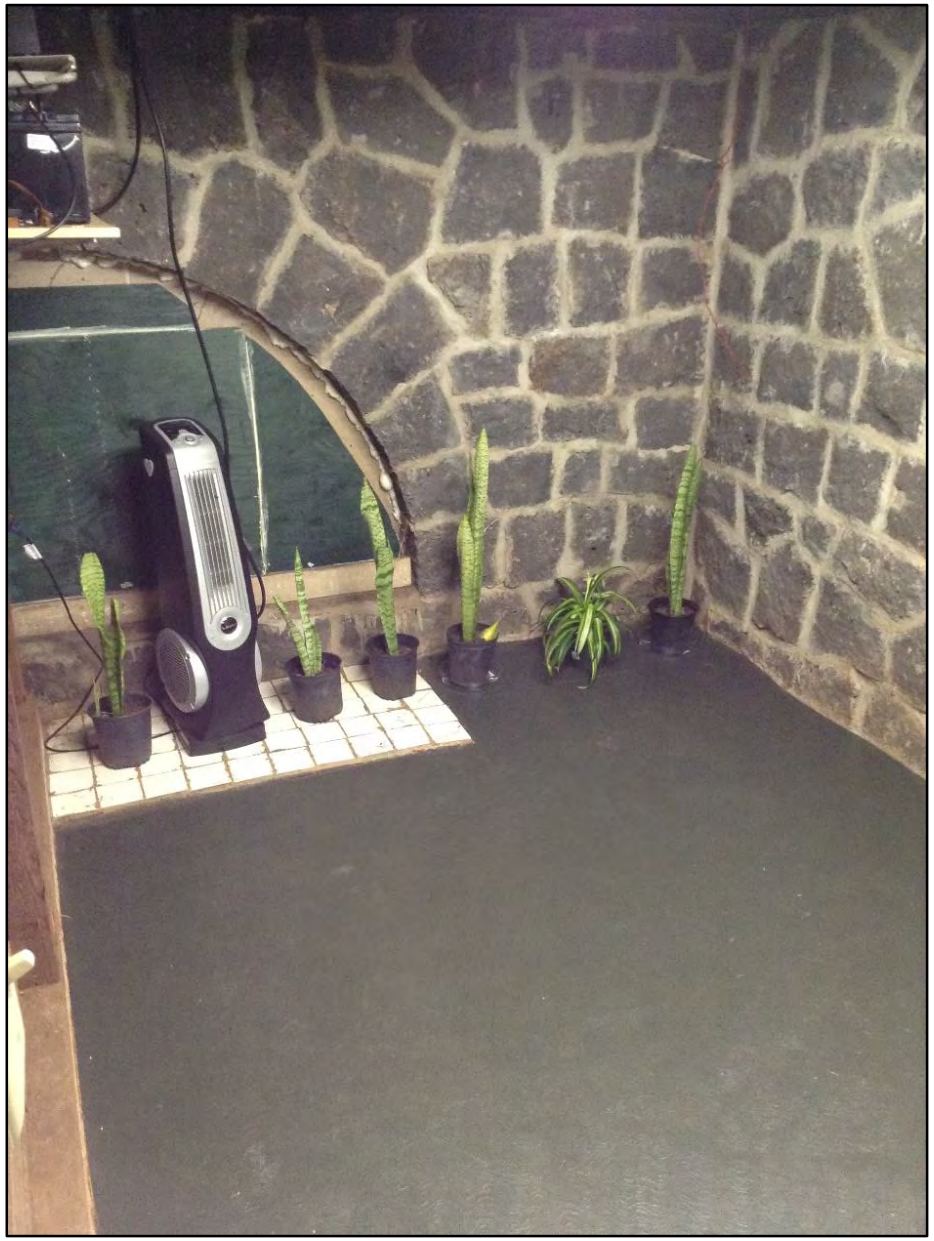

KIRKLAND
LAUNDRY DETERGENT


HISTORIC
RESIDENCE






inergy
KODIAK™
DANGER



Secretary of the Interior's Standards for the Treatment of Historic Properties

Treatment Types

- Preservation
- Rehabilitation
- Restoration
- Reconstruction

Specific Standards are associated with each Treatment

Treatment Type: Preservation

Focuses on retention of all historic fabric through conservation, maintenance and repair.

Liljestrand House, Tantlus O‘ahu

Treatment Type: Rehabilitation

Dormitory to Conference Center, Maui

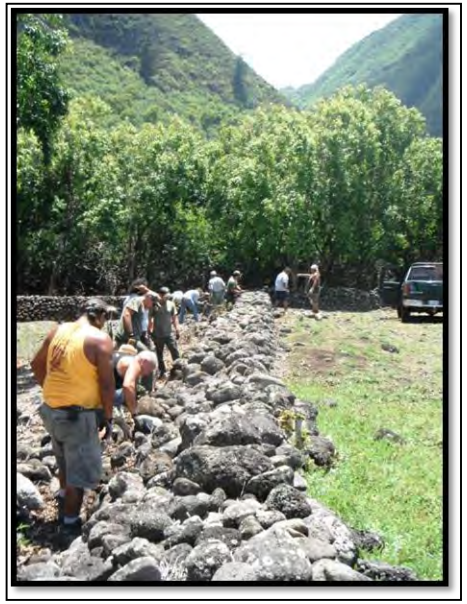
Altering a historic structure to facilitate its continued use into the future while retaining the character defining features which make it significant

ADA Accessibility Addition, Lānaʻi

Office to Bank, Lānaʻi City

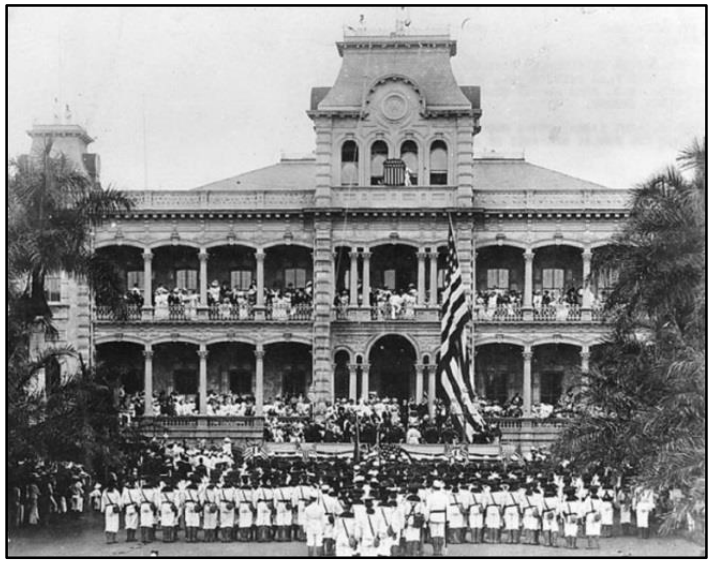
Treatment Type: Restoration

Restores historic property to most significant period of its history



Hāpai Pōhaku Crew at Kalaupapa
Photo Courtesy Park Service

Philomena Church Restoration
Photo: NPS



‘Iolani Palace
Photos: archives.starbulletin.org,
Friends of ‘Iolani Palace

Treatment Type: Reconstruction

Recreation of a Non-surviving Historic Resource

Hanalei Bridge, Kaua‘i

Haraguchi Rice Mill, Hanalei, Kaua‘

What are the Secretary of the Interior's Standards and Guidelines?

The Standards are a series of concepts about maintaining, repairing, and replacing historic materials, as well as designing new additions or making alterations.

The Guidelines offer general design and technical recommendations to assist in applying the Standards to a specific property.

Together, they provide a framework and guidance for decision-making about work or changes to a historic property.

Secretary of the Interior's Standards for Rehabilitation

1. A property should be used for its historic purpose or be placed in a new use that requires minimal change to the defining characteristics of the building and its site and environment.
2. The historic character of a property shall be retained and preserved. The removal of historic materials or alteration of features and spaces that characterize a property shall be avoided.

Secretary of the Interior's Standards for Rehabilitation

3. Each property shall be recognized as a physical record of its time, place, and use. Changes that create a false sense of historical development, such as adding conjectural features or architectural elements from other buildings, shall not be undertaken.
4. Most properties change over time; those changes that have acquired historic significance in their own right shall be retained and preserved.

Secretary of the Interior's Standards for Rehabilitation

5. Distinctive features, finishes, and construction techniques or examples of craftsmanship that characterize a property shall be preserved.

6. Deteriorated historic features shall be repaired rather than replaced. Where the severity of deterioration requires replacement of a distinctive feature, the new feature shall match the old in design, color, texture, and other visual qualities and, where possible, materials. Replacement of missing features shall be substantiated by documentary, physical, or pictorial evidence.

Secretary of the Interior's Standards for Rehabilitation

7. Chemical or physical treatments shall not be used. The surface cleaning of structures, using the gentlest means possible.
8. Significant archaeological resources affected by a project shall be protected and preserved. If disturbed, mitigation measures shall be undertaken.

Secretary of the Interior's Standards & Guidelines for Rehabilitation

9. New additions shall not destroy historic materials that characterize the property. The new work shall be differentiated from the old to protect the historic integrity of the property and its environment.

10. New additions and adjacent or related new construction shall be undertaken in such matter that if removed in the future, the essential form and integrity of the historic property and its environment would be unimpaired.

Secretary of the Interior's Standards for Rehabilitation & Illustrated Guidelines on Sustainability

https://www.nps.gov/tps/standards/rehabilitation/guidelines/index.htm

PLANNING

Recommended	Not Recommended
Forming an integrated sustainability team when working on a large project that includes a preservation professional to ensure that the character and integrity of the historic building is maintained during any upgrades.	Omitting preservation expertise from a sustainability project team.
Analyzing the condition of inherently-sustainable features of the historic building, such as shutters, storm windows, awnings, porches, vents, roof monitors, skylights, light wells, transoms and naturally-lit corridors, and including them in energy audits and energy modeling, before planning upgrades.	Ignoring inherently-sustainable features of the existing historic building when creating energy models and planning upgrades.
Identifying ways to reduce energy use, such as installing fixtures and appliances that conserve resources, including energy-efficient lighting or energy-efficient lamps in existing light fixtures, low-flow plumbing fixtures, sensors and timers that control water flow, lighting and temperature, before undertaking more invasive treatments that may negatively impact the historic building.	
Prioritizing sustainable improvements, beginning with minimally invasive treatments that are least likely to damage historic building material.	Beginning work with substantive or irreversible treatments without first considering and implementing less invasive measures.

PLANNING

MAINTENANCE

Recommended	Not Recommended
Maintaining historic buildings regularly to preserve historic fabric and maximize operational efficiency.	Delaying maintenance treatments which may result in the loss of historic building fabric or decrease the performance of existing systems or features.
Retaining and repairing durable historic building materials.	Removing durable historic building materials and replacing them with materials perceived as more sustainable; for instance, removing historic heart pine flooring and replacing it with new bamboo flooring.
Using environmentally-friendly cleaning products that are compatible with historic finishes.	Using cleaning products potentially harmful to both historic finishes and the environment.
Using sustainable products and treatments, such as low VOC paints and adhesives and lead-safe paint removal methods, as much as possible, when rehabilitating a historic building.	

MAINTENANCE

Site Features and Water Efficiency

Recommended	Not Recommended
Respecting an important cultural landscape and significant character-defining site features when considering adding new sustainable features to the site.	Installing new sustainable site features without considering their potentially negative impact on an important cultural landscape and character-defining site features.
Using to advantage existing storm-water-management features, such as gutters, downspouts and cisterns, as well as site topography and vegetation that contribute to the sustainability of the historic property.	Ignoring existing features that contribute to the sustainability of the historic property.
Adding natural, sustainable features to the site, such as shade trees, if appropriate, to reduce cooling loads for the historic building.	Removing existing natural features, such as shade trees, that contribute to the building's sustainability.
Using permeable paving where appropriate on a historic building site to manage storm water.	Planting trees where they may grow to encroach upon or damage the historic building.

Site Features and Water Efficiency

Recommended	Not Recommended
Avoiding paving up to the building foundation to reduce heat island effect, building temperature, damage to the foundation and storm-water runoff.	Paving up to the building foundation with impermeable materials.
Landscaping with native plants, if appropriate, to enhance the sustainability of the historic site.	Introducing non-native plant species to the historic site that are not sustainable
Adding features, such as bioswales, rain gardens, rain barrels, large collection tanks and cisterns, if compatible, to the historic building site to enhance storm-water management and on-site water reuse.	

Site Features & Water Efficiency

Solar Technology

Recommended	Not Recommended
Considering on-site, solar technology only after implementing all appropriate treatments to improve energy efficiency of the building, which often have greater life-cycle cost benefit than on-site renewable energy.	Installing on-site, solar technology without first implementing all appropriate treatments to the building to improve its energy efficiency.
Installing a low-profile solar device on the historic building so that it is not visible or only minimally visible from the public right of way: for example, on a flat roof and set back to take advantage of a parapet or other roof feature to screen solar panels from view; or on a secondary slope of a roof, out of view from the public right of way.	Installing a solar device in a prominent location on the building where it will negatively impact its historic character.
Installing a solar device on the historic building in a manner that does not damage historic roofing material or negatively impact the building's historic character and is reversible.	Installing a solar device on the historic building in a manner that damages historic roofing material or replaces it with an incompatible material and is not reversible.
Installing solar roof panels horizontally—flat or parallel to the roof—to reduce visibility.	Removing historic roof features to install solar panels. Altering a historic, character-defining roof slope to install solar panels. Placing solar roof panels vertically where they are highly visible and will negatively impact the historic character of the building.

Solar Technology

WINDOWS

Recommended	Not Recommended
Maintaining windows on a regular basis to ensure that they function properly and are completely operable.	Neglecting to maintain historic windows and allowing them to deteriorate beyond repair with the result that they must be replaced.
Retaining and repairing historic windows when deteriorated.	Removing repairable historic windows and replacing them with new windows for perceived improvement in energy performance.
Installing compatible and energy-efficient replacement windows that match the appearance, size, design, proportion and profile of the existing historic windows and that are also durable, repairable and recyclable, when existing windows are too deteriorated to repair.	Installing incompatible or inefficient replacement window units that are not durable, recyclable or repairable when existing windows are deteriorated beyond repair or missing.
Repairing or reopening historically-operable interior transoms, when possible, to improve air flow and cross ventilation.	Covering or removing existing transoms.

Windows

Daylighting

Recommended	Not Recommended
Reopening historic windows that have been blocked in to add natural light and ventilation.	Blocking in historic window openings to accommodate new building uses.
Installing light-control devices on the historic building where appropriate to the building type, such as light shelves in industrial or mid-century modern buildings, awnings on some commercial and residential buildings and shutters on residential buildings that had them historically.	Installing light-control devices that are incompatible with the type or style of the historic building.
Installing automated daylighting controls on interior lighting systems that ensure adequate indoor lighting and allow for energy-saving use of daylighting.	
Adding new window openings on secondary and less visible facades, where appropriate, to allow more natural light into the historic building.	Adding new window openings on primary elevations that will negatively impact the character of the historic building.

DAYLIGHTING

WEATHERIZATION

Recommended	Not Recommended
Using a variety of analytical tools, such as a comprehensive energy audit, blower door tests, infrared thermography, energy modeling or daylight modeling, to gain an understanding of the building's performance and potential before implementing any weatherization or retrofit treatments.	Implementing energy-retrofit measures without first diagnosing the building's performance and energy needs.
Developing a weatherization plan based on the results of the energy analysis of the building's performance and potential.	
Eliminating infiltration first, beginning with the least invasive and most cost-effective weatherization measures, such as caulking and weather stripping, before undertaking more invasive weatherization measures	Undertaking treatments that result in loss of historic fabric, for example, installing wall insulation that requires removing plaster, before carrying out simple and less damaging weatherization measures.

Heating, Ventilating and Air Conditioning (HVAC) and Air Circulation

Recommended	Not Recommended
Retaining and maintaining functional and efficient HVAC systems.	Replacing existing HVAC systems without testing their efficiency first.
Upgrading existing HVAC systems to increase efficiency and performance within normal replacement cycles.	Replacing HVAC systems prematurely when existing systems are operating efficiently.
Supplementing the efficiency of HVAC systems with less energy-intensive measures, such as programmable thermostats, attic and ceiling fans, louvers and vents, where appropriate.	Installing an inefficient HVAC system or installing a new system based on pre-retrofit building performance when a smaller system may be more appropriate.
Retaining or installing high efficiency, ductless air conditioners when appropriate, which may be a more sensitive approach than installing a new, ducted, central air-conditioning system that may damage historic building material.	

DISCUSSION

Greening Measures for Heritage Home Series 2018

- April 9: SIGNIFICANCE & SUSTAINABILITY: What makes your historic home unique & sustainable measures to green it
- April 23: WATER: Water conservation, storm-water management and on-site water reuse
- May 7: ENERGY: Renewable energy & conservation: solar, wind, lighting, appliances, energy incentives
- MAY 21: WINDOWS: Sustainability measures to maintain/restore your historic windows
- JUNE 4: LANDSCAPE: Creating a sustainable & culturally-sensitive landscape