



AIA
Honolulu



AIA Honolulu is a Registered Provider with the American Institute of Architects Continuing Education Systems. Credit earned on completion of this program will be reported to CES Records for AIA members. Certificates of Completion are available on request.

This program is registered with the AIA/CES for continuing professional education. As such, it does not include content that may be deemed or construed to be an approval or endorsement by the AIA of any material of construction or any method or manner of handling, using, distributing, or dealing in any material or product. **Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.**

Energy Efficiency Measures for Historic Properties

Historic Hawai'i Foundation
Mason Architects
Allana Buick & Bers, Inc.
Hawai'i Energy

Pacific Building Trade Expo, October 24, 2017



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

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

This session will cover:

- Respecting the Character-Defining Features of Historic Buildings
- Principles of Conservation & Retrofitting for Historic Properties
- Energy Efficiency: Hawai'i Energy Incentive Program

PRESENTERS

Glenn E. Mason, FAIA

President, Mason Architects, Inc.

Mr. Mason will share his experience adapting historic buildings to meet modern functional and energy requirements, focusing on the preservation of the character-defining features of historic buildings. He meets the Secretary of the Interior's Professional Qualifications standards for Historical Architect and has been the principal in charge of award-winning preservation projects.

PRESENTERS

Joseph Higgins, PE

Associate Principal/Hawaii Operations Manager, Allana Buick & Bers

Mr. Higgins has over 26 years of experience with the engineering, installation, and service of building mechanical systems. He is responsible for supervising all projects throughout the Hawaiian Islands and for all operations out of ABBAE's Hawai'i office.

Mr. Higgins is the lead mechanical engineer responsible for managing construction projects conducting project investigations, performing sampling and testing analysis, providing quality assurance monitoring, and preparing construction documents. Mr. Higgins has expertise in the replacement and upgrade of building HVAC systems, Plumbing and Piping Systems, Energy Management Systems, Solar Thermal and Solar PV systems, and Energy Audits.

PRESENTERS

Ramsey Brown

*Resource Acquisition Manager, Hawai'i Energy
Energy Conservation and Efficiency Program*

Mr. Brown is a manager for Hawai'i Energy, leading a team of Energy Advisors to ensure energy reduction resource acquisition targets are met cost-effectively across commercial building sectors. He also works to advance Hawai'i's energy code, promoting adoption of the 2015 IECC and creating educational resources to support compliance to the latest code.

Mr. Brown studied abroad in England before graduating from the California Maritime Academy with a B.S. in mechanical engineering. After committing a year of service in Boston schools and summer programs, Mr. Brown worked in the maritime industry on the team designing, building, and operating the first hybrid ferries in the country. Ultimately this global training led him home to pursue his dream of creating a completely sustainable Hawai'i.

MODERATOR

Kiersten Faulkner

Executive Director, Historic Hawai'i Foundation

Ms. Faulkner oversees all aspects of Historic Hawai'i Foundation's preservation programs, strategic planning, business lines and operational matters. She has been with HHF since 2006, and has extensive experience as a consulting party to Section 106 undertakings, preservation planning, community-based preservation programs and other outreach.

Prior to joining HHF, Faulkner was a Senior City Planner for the City & County of Denver, where she managed complex and controversial comprehensive planning projects, 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).

Respecting the Character-Defining Features of Historic Buildings

Glenn E. Mason, FAIA

President, Mason Architects, Inc.



- August 1916, *National Park Service* was established to manage historic resources.
- In the 1930s, private citizen advocacy led to establishment of local historic districts.
- *Historic Sites Act of 1935* – national policy to preserve for public use historic sites, buildings and objects of national significance and directed the Department of Interior to conduct various preservation programs.



The *National Historic Preservation Act* [NHPA] of 1966

Created a comprehensive system under which the Nation's preservation goals could be achieved.

Strengthened subsequently by the *National Environmental Policy Act* [NEPA] of 1969 and several subsequent transportation acts, and executive orders.

The National Historic Preservation Act accomplished four main things:

1. Established the *National Register of Historic Places*
2. Led to the appointment of a *State Historic Preservation Officer* in every State and Territory
3. Created a program of federal appropriation through the Department of Interior to provide funds to help the states carry out the preservation responsibilities mandated to them under NHPA
4. Created an independent federal agency given the power to review and comment on undertakings that would effect a property on the National Register or determined eligible for the National Register



- Tax incentives with the 1976 *Tax Reform Act* and *Economic Recovery Act* of 1982
- Local ordinances (in over 2,000 communities in the U.S.) These include Special Districts and the establishment of Certified Local Governments, which mandate review of actions involving historic structures
- Hawai'i is governed by *Chapter 6E*, which references the Hawai'i Register of Historic Places

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



- First developed by the Department of Interior in 1976, primarily as an aid to determine appropriateness of Preservation Grant-in-aid program
- Revised and/or expanded several times
- Now accepted by public and private preservation agencies

The Secretary of the Interior's Standards for Rehabilitation

- **Standard 1:** Use a project for its historic use or in a new use that requires minimal change to the defining characteristics of the building, site and environment.
- **Standard 2:** The historic character of a property shall be retained and preserved.
- **Standard 3:** Each property shall be recognized as a physical record of its time, place, and use. Changes that create a false sense of historic development should not be done.
- **Standard 4:** Most properties change over time, those changes that have acquired significance in their own right shall be retained and preserved.

The Secretary of the Interior's Standards for Rehabilitation

- **Standard 5:** Distinctive features, finishes and construction techniques shall be preserved.
- **Standard 6:** Deteriorated features shall be repaired rather than replaced.
- **Standard 7:** Treatments that cause damage to historic materials, such as sandblasting, shall not be used.
- **Standard 9:** New additions, exterior alterations, etc. shall not destroy historic materials, shall be differentiated from the old and be compatible in massing, etc.
- **Standard 10:** New additions or related new construction shall be undertaken in such a manner that if removed in the future, the integrity of the historic property will be unimpaired.

Before You Can Preserve Anything

- You need to respect it.
- You need to understand it.
- You need to force the study of alternatives that will result in meeting preservation and modernization goals.
- Neither the Standards or preservation law automatically trumps health, safety or accessibility requirements, but you need to find the least intrusive ways to meet those requirements.

The first step to understanding: Character Defining Features

Form

Fenestration patterns

Detail

Materials, textures, color

Primary view corridors

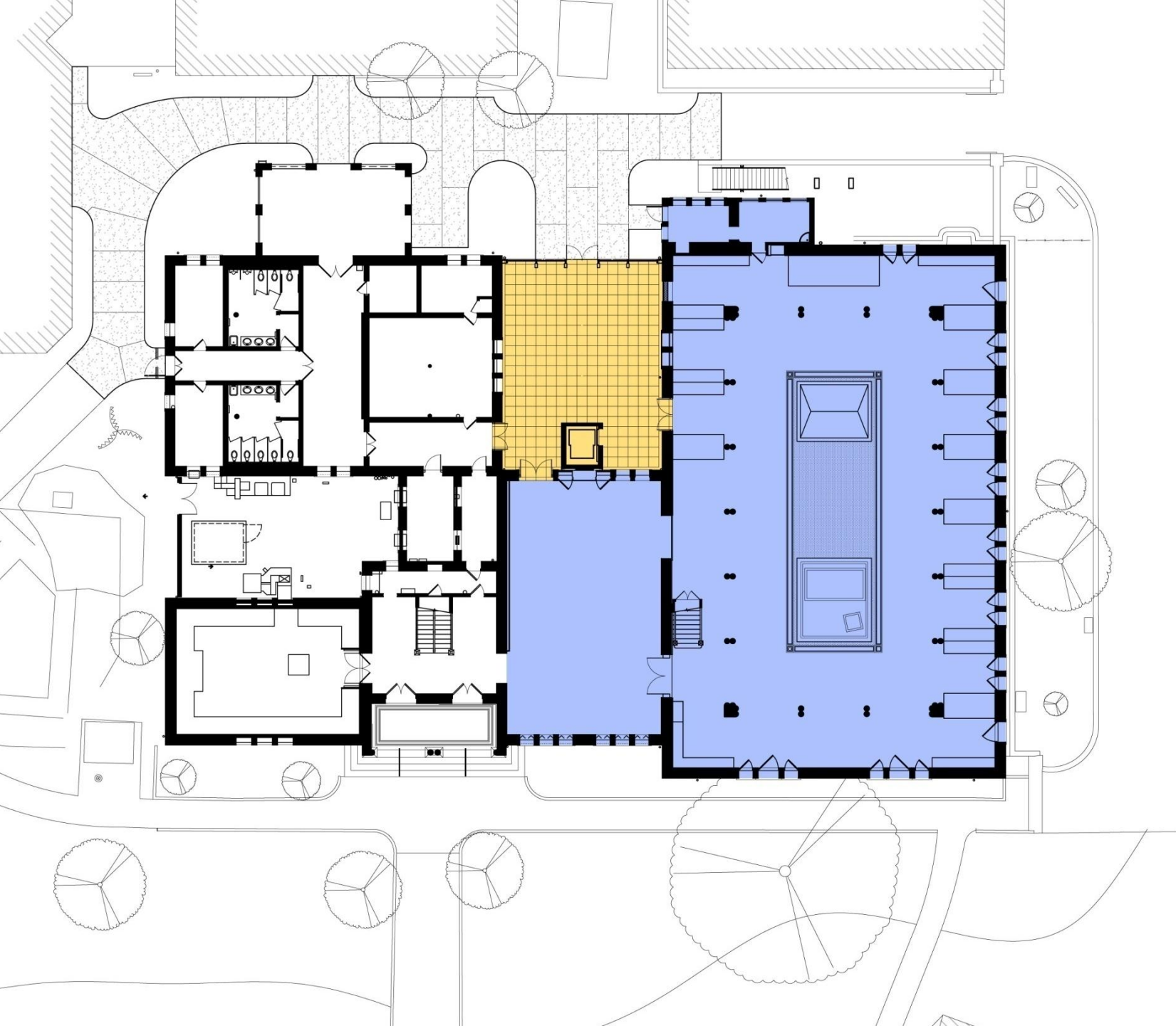
Exterior spaces

Interior spaces

Etc.

- Define a hierarchy
- Think in terms of a “preservation balance sheet”



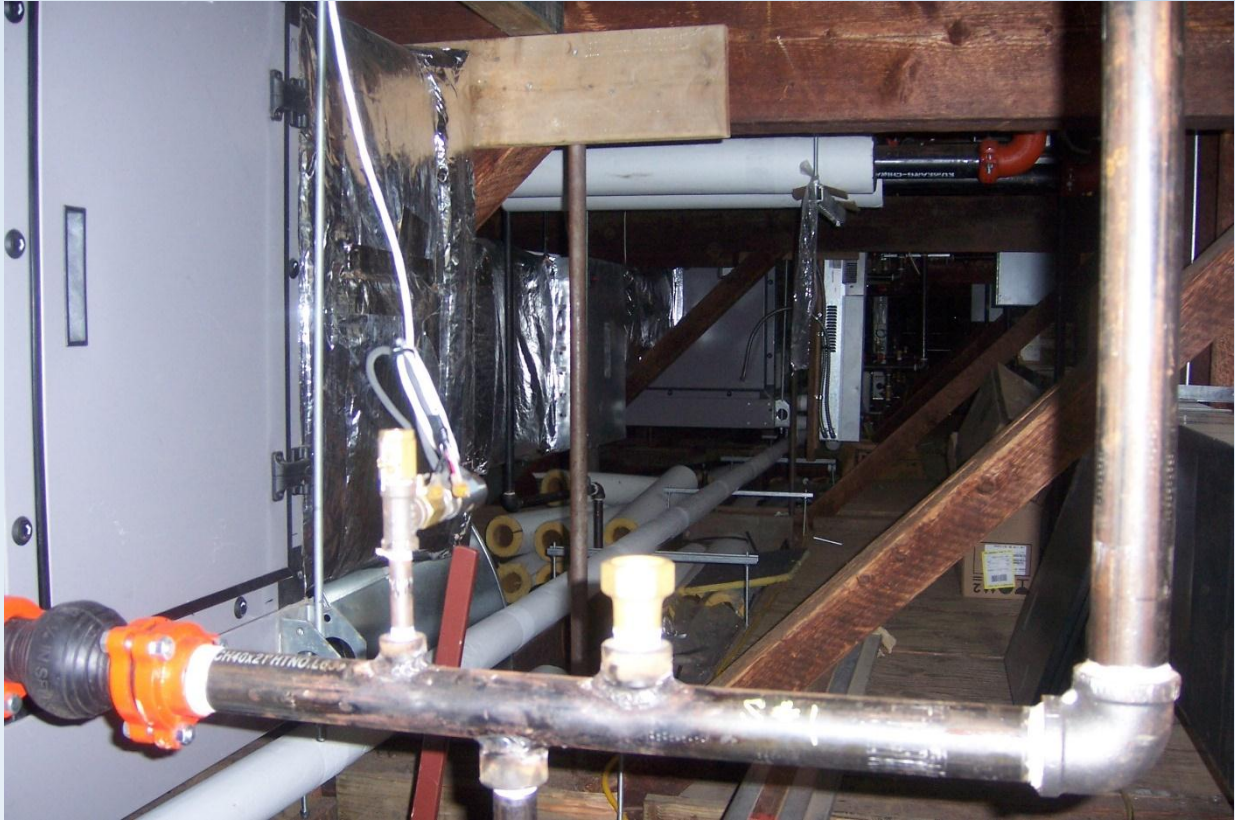


Case Study

Hawaiian Hall Complex
Bishop Museum



Air Conditioning a Building that was never air conditioned.



In a museum, light is the enemy, but it can be managed.

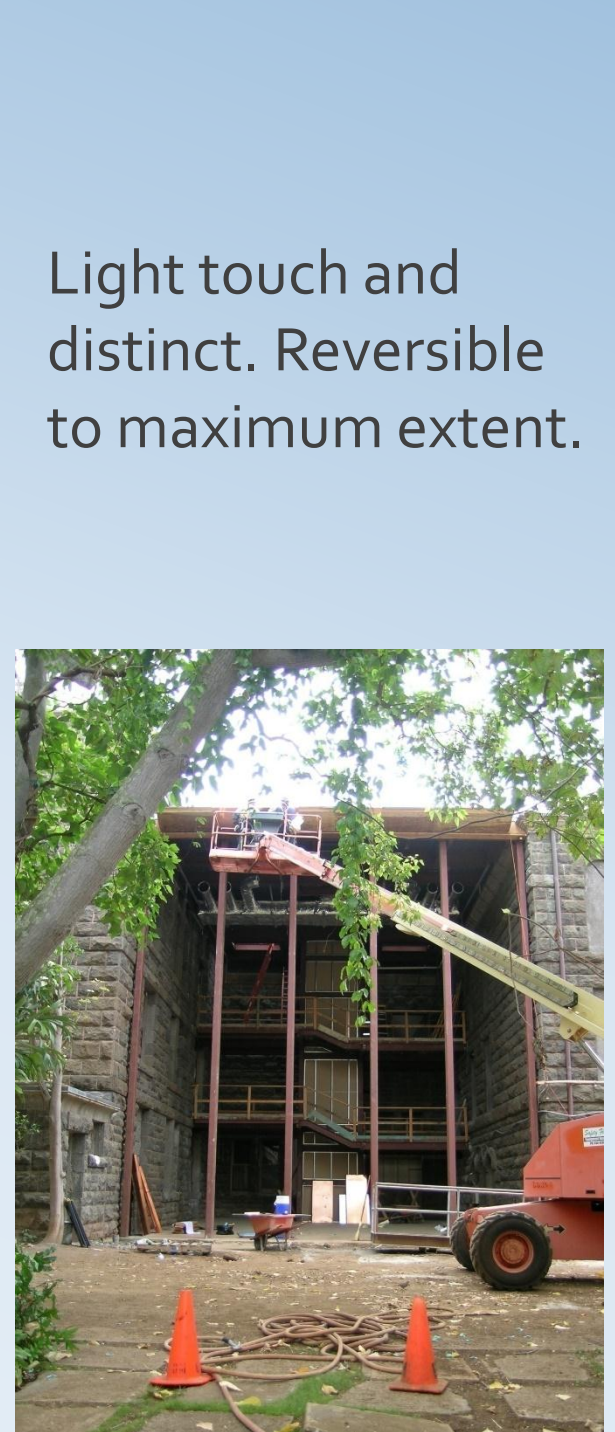






Hide modern improvements to maximum extent.





Light touch and distinct. Reversible to maximum extent.

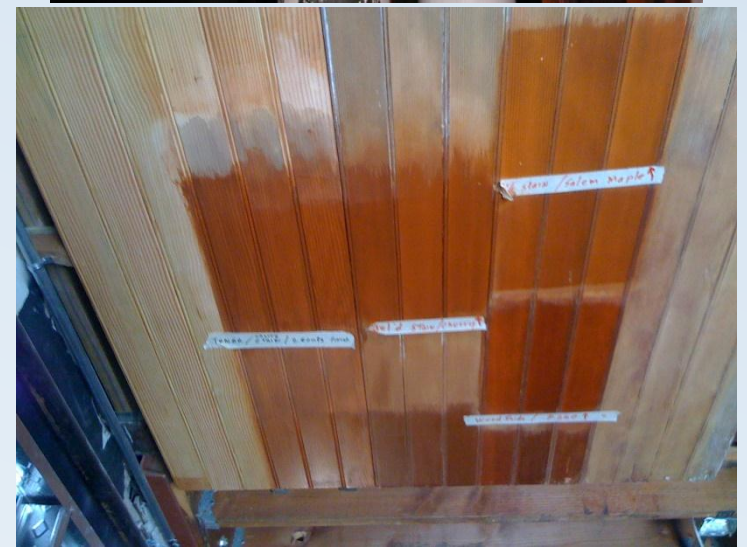
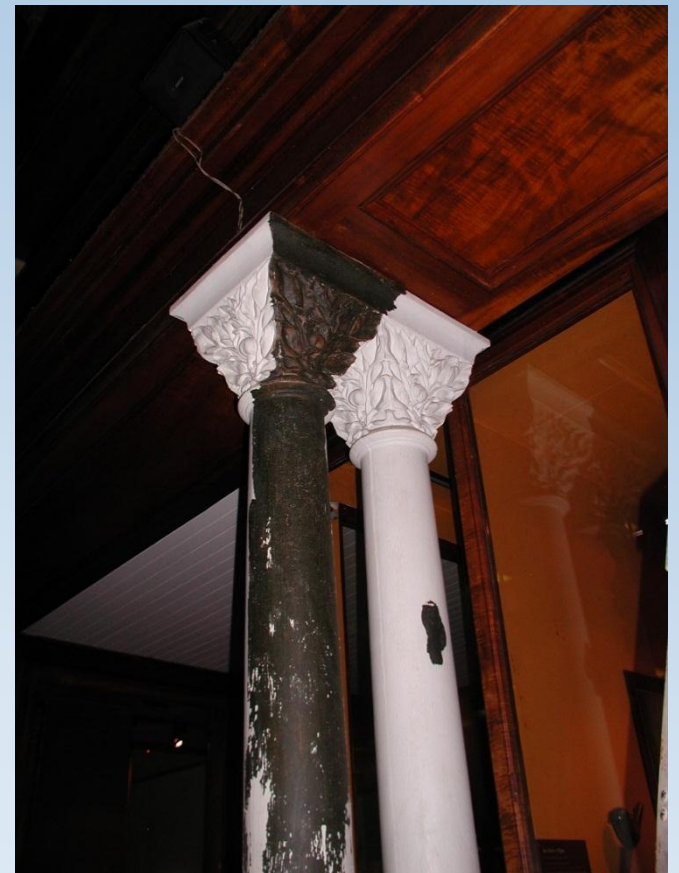
Preservation Balance Sheet

Plus Side of Preservation

- Exterior forms and classic interiors preserved and/or restored
- Windows made visible again, with significant reduction to energy impact
- Roof insulated
- Air conditioning made almost invisible
- Interior finishes restored

Minus Side of Preservation

- Enclosure of former exterior courtyard and
- Creation of new openings in courtyard



Principles of Conservation & Retrofitting for Historic Properties

Joseph Higgins, PE

Associate Principal/Hawaii Operations Manager, Allana Buick & Bers

- Architectural-Engineering Firm
- Established in 1987 – 30 Years
- Multi-Disciplined
 - Architects
 - Structural Engineers
 - Mechanical Engineers
 - Electrical Engineers
 - Civil Engineers
 - Building Envelope Experts
 - Solar Consultants
 - Construction Administrators
 - Project Managers
- 140 Employees
- 16 Employees Honolulu
- 12 Offices
 - Honolulu, Palo Alto, Oakland, Kehei
 - Sacramento, Los Angeles, Irvine, San Diego
 - Las Vegas, Seattle, Charlotte, Portland OR



Palo Alto



Honolulu in The Block – Richards Building

Allana Buick & Bers, Inc.

City & County of Honolulu Energy Code

Hawai`i

What does the 2006 IECC code say regarding Historic Buildings?

101.4.2 Historic Buildings:

Any building or structure that is listed in the State or National Register of Historic Places; designated as a historic property under local or state designation law or survey; certified as a contributing resource with a National Register listed locally or designated historic district; or with an opinion or certification that the property is eligible to be listed on the National or State Registers of Historic Places either individually or as a contributing building to a historic district by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places.

ARE EXEMPT FROM THIS CODE



State of Hawai`i Energy Code

What does the 2015 IECC code say regarding Historic Buildings?

C501.6 Historic Buildings:

No provisions of this code relating to the construction, repair, alteration, restoration and movement of structures, and change of occupancy shall be mandatory for historic buildings provided a report has been submitted to the code official and signed by a registered design professional, or a representative of the Sate Historic Preservation Office or the historic preservation authority having jurisdiction, demonstrating that compliance with that provision would threaten, degrade or destroy the historic form, fabric, or function of the building.

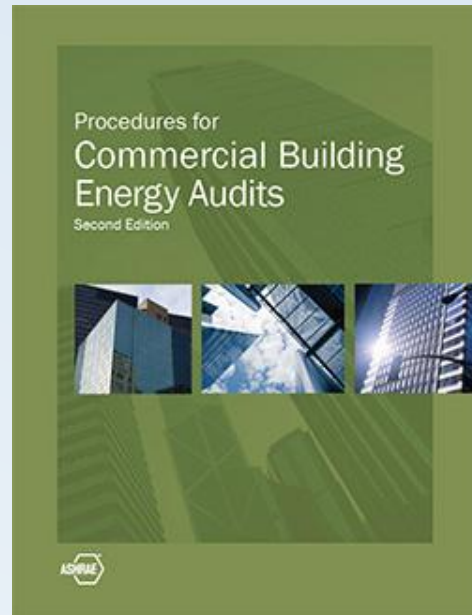


Energy Audits – American Society of Heating, Refrigeration & Air Conditioning Engineers (ASHRAE)

Level I - Understand where the building performs relative to its peers; establish a baseline for measuring improvements; deciding whether further evaluation is warranted; and if so, where and how to focus that effort. The Level-I audit also will outline the range of potential financial incentives available from Federal, State, Local, and Utility sources.

Level II - Evaluates the building energy systems in detail to define a variety of potential energy-efficiency improvements (Energy Conservation Measures).

Level III – Investment Grade Analysis.

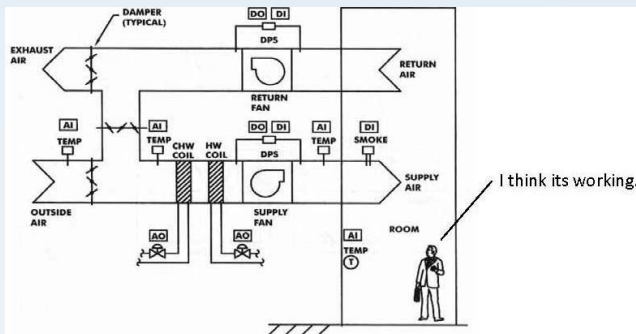


Inappropriate Selection of AC Equipment



Possible Energy Conservation Measures (ECMs)

- Air Conditioning Systems
 - Programmable thermostats or Building Automation Systems (BAS)
 - Duct air leakage
 - Proper air distribution & temperature
 - Improved mechanical cooling systems
 - Variable Refrigerant Flow (VRF)
 - Mini Splits
 - Replace all motors 1 HP and smaller with Electronically Commutated Motors
 - Proper integration into Building Envelope



Possible Energy Conservation Measures (ECMs)

- Replacement of lighting (LED upgrades)
 - LED Lighting is not Plug n Play
 - Photometrics is key
 - Power over Ethernet (POE) is latest LED twist
 - Upgrade fixtures consistent with culture and age of the building



Possible Energy Conservation Measures (ECMs)

- Daylighting with Natural Light
 - Promote open space concepts
 - Use sensors on lights – Motion and Light



Existing HVAC –Retro Commissioning

- Assessment of equipment
- Evaluation of facility needs
- Development of system operation plan to meet facility needs
- Execute the plan
- Sometimes there are low to NO cost strategies
 - 1.) Check your time clocks
 - 2.) Check your basic set-points on equipment
 - 3.) Shorten AC run hours if no “push-back” from tenants



SAVE YOUR BUILDING!!!

Control Your Outside Air and Humidity...Dedicated Outside Air Systems

- The need for proper Building Pressurization and a proper balance
- A building that is over pressurized wastes conditioned air to the outdoors
- A building under Negative Pressure brings in unwanted Humidity
- Proper Indoor Air Quality (IAQ) crucial to tenant satisfaction
- Automatic dampers on outside air intakes only allow what is needed
- Unwanted humidity causes AC systems to work harder and use more energy and promotes MOLD growth



AVOID INTERIOR MOISTURE THAT CAN DAMAGE HISTORIC BUILDINGS!

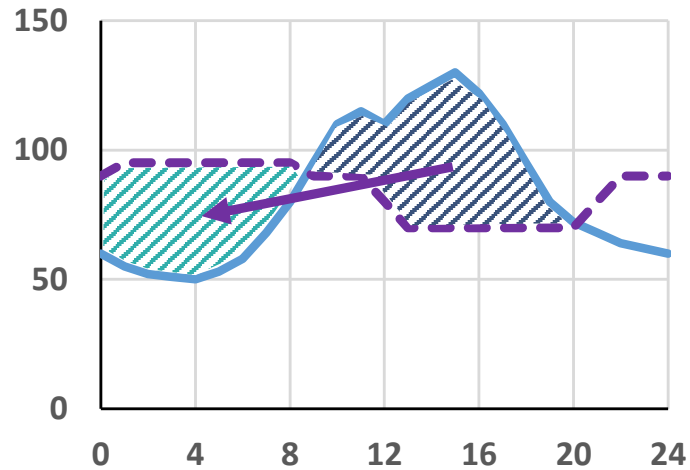
Budget Costs

- ENERGY AUDITS
 - BETWEEN \$0.50 AND \$1.00 PER SQ FT
- COMMISSIONING
 - BETWEEN \$1.00 AND \$2.00 PER SQ FT

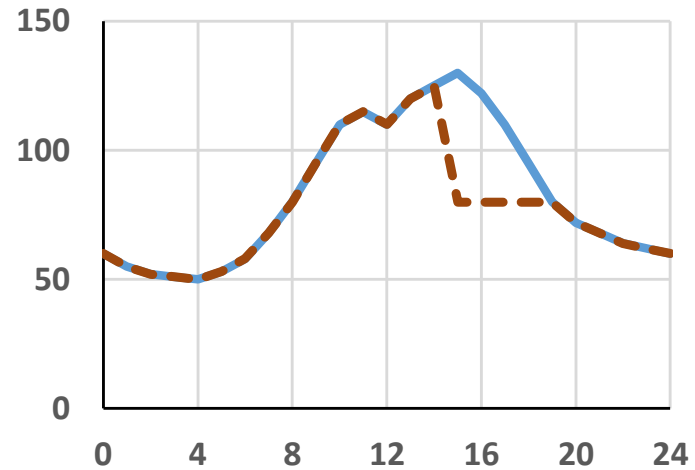


Emerging Energy Strategies To Lower Demand Charges

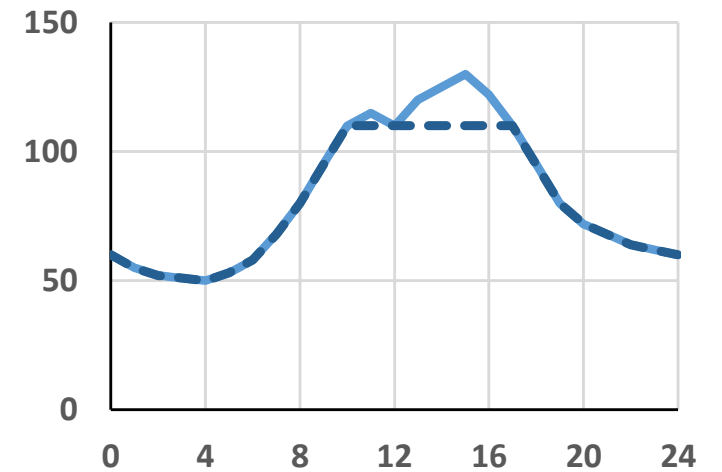
Shift It



Shed It



Shave It

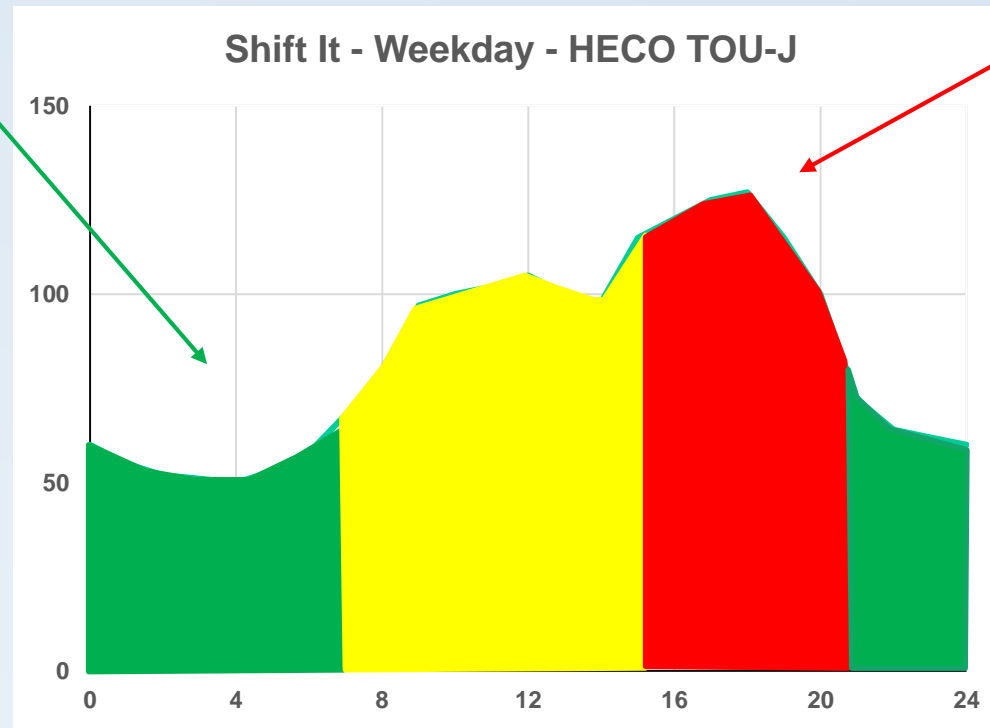


Store Energy When It's Cheap, Use It When It's Expensive

Periods	\$ / kW	\$/ kWh
Priority Peak	\$18.69	0.2197
Mid-Peak	\$11.69	0.1897
Off-Peak		0.16

**Off-
Peak
Store**

**Priority
Peak
Use**



What Do Battery Storage Systems Look Like?

- On-site behind-the-meter Battery Energy Storage



30kW / 60 kWh



54kW / 108 kWh



200kW / 400 kWh

What Do Shaving Systems Look Like?

- Power Conditioning and Power Shaving



Energy Efficiency: Hawai'i Energy Incentive Program

Ramsey Brown

*Residential Program Coordinator, Hawai'i Energy
Conservation and Efficiency Program*

Our state has made a commitment to achieve 100% clean energy by 2045.

At Hawai'i Energy, we believe that we can get there faster and cheaper with the help of Hawai'i's families and businesses.

They just need to know what to do and how to do it.

That's where we come in...



Hawai'i Energy

[HawaiiEnergy.com](https://www.HawaiiEnergy.com)



**To empower island families & businesses
to make smart energy choices**



Hawai'i Energy

[HawaiiEnergy.com](https://www.hawaiienergy.com)



Smart energy choices...



reduce energy use



save money



**pursue a 100%
clean
energy future**

AGENDA

- **Rebates**
- **Case Studies**
- **Energy Code**



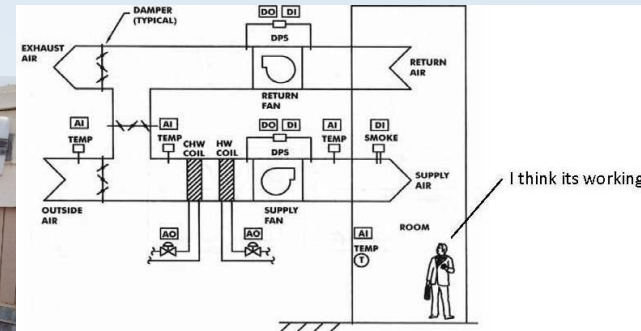
Hawai'i Energy

Possible Energy Conservation Measures (ECMs)

- Air Conditioning Systems
 - Programmable thermostats or BAS systems
 - Duct air leakage
 - Proper air supply temperature – 52 to 55 degrees
 - Improved mechanical cooling systems
 - Variable Refrigerant Flow (VRF)
 - Mini Splits
 - Proper air distribution through location of grilles
 - Proper integration into Building Envelope

PY17 Hawai'i Energy incentives:

- Chillers: **\$45/ton**
- Packaged/Split: **\$175/ton**
- Inverter Variable Refrigerant Flow (VRF): **\$250/ton**
- Variable Frequency Drive (VFD) controls:
 - Fans: **\$50/ton**
 - Pumps: **\$80/ton**



AIR CONDITIONING

AIR CONDITIONING: Chillers						
Incentive: \$45/ton						
Full Load & IPLV Requirements						
	Units: kW/ton	< 75 Tons	≥ 75 tons and < 150 tons	≥ 150 tons and < 300 tons	≥ 300 tons and < 600 tons	≥ 600 tons
Positive Displacement (Reciprocating, Rotary Screw, Scroll)	Path A	≤ 0.750 FL ≤ 0.600 IPLV	≤ 0.720 FL ≤ 0.560 IPLV	≤ 0.660 FL ≤ 0.540 IPLV	≤ 0.610 FL ≤ 0.520 IPLV	≤ 0.560 FL ≤ 0.500 IPLV
	Path B	≤ 0.780 FL ≤ 0.500 IPLV	≤ 0.750 FL ≤ 0.490 IPLV	≤ 0.680 FL ≤ 0.440 IPLV	≤ 0.625 FL ≤ 0.410 IPLV	≤ 0.585 FL ≤ 0.380 IPLV
Centrifugal	Path A	≤ 0.610 FL ≤ 0.550 IPLV	≤ 0.610 FL ≤ 0.550 IPLV	≤ 0.560 FL ≤ 0.520 IPLV	≤ 0.560 FL ≤ 0.500 IPLV	≤ 0.560 FL ≤ 0.500 IPLV
	Path B	≤ 0.695 FL ≤ 0.440 IPLV	≤ 0.635 FL ≤ 0.400 IPLV	≤ 0.595 FL ≤ 0.390 IPLV	≤ 0.585 FL ≤ 0.380 IPLV	≤ 0.585 FL ≤ 0.380 IPLV
Air-cooled with condenser	Path A	≥ 10.100 FL ≥ 13.700 IPLV	≥ 10.100 FL ≥ 14.000 IPLV			
	Path B	≥ 9.700 FL ≥ 15.800 IPLV	≥ 9.700 FL ≥ 16.100 IPLV			

AIR CONDITIONING: Packaged / Split Systems						
Incentive: \$175 / ton						
		kW/Ton and SEER or EER Requirements				
	BTU/hr	< 65,000	>65,000 to 135,000	>135,000 to 240,000	>240,000 to 760,000	>760,000
	Tons	<5.42	>5.42 to 11.25	>11.25 to 20	>20 to 63.33	>63.33
Packaged	SEER / EER	15 SEER	12.9 EER	12.7 EER	11.5 EER	10.6 EER
Split	SEER / EER	15 SEER	12.9 EER	12.7 EER	11.5 EER	10.6 EER

AIR CONDITIONING: IVRF / VFD		
<i>Please see corresponding worksheet for eligibility requirements</i>		Incentive
Inverter Variable Refrigerant Flow		Retrofit: \$250 per ton New Construction: \$250 per ton
Variable Frequency Drive (VFD) Controls	for HVAC fans; new construction > 10HP not eligible Chilled and Condenser Water Pumps	\$50 per HP \$80 per HP

MOTORS

	Incentive
Electronically Commutative Motors (ECM) & Speed Control Commercial Refrigeration (retrofit only)	\$85 each
Electronically Commutative Motors (ECM) & Speed Control HVAC Fan Coil Applications	\$55 each

PUMPS

	Requirements*	Incentive
VFDs for Pool Pumps	<ul style="list-style-type: none"> Pre-approval required 3HP or less (> 3HP see Customized) Existing equipment must not have VFD 	\$225 per HP
VFD Domestic Water Pump System	<ul style="list-style-type: none"> Retrofit only; pre-approval required Total HP must ≤ to existing system; limited to system reduction of ≤ 129HP. All motors must meet CEE Premium Efficiency Standards. 	\$3,000 + \$80/HP Reduced

*For a full set of requirements for each measure, please refer to its corresponding worksheet, available online at HawaiiEnergy.com.

2017-06-30

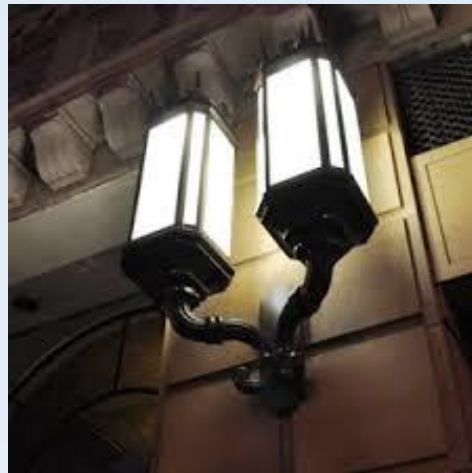


Hawai'i Energy

HawaiiEnergy.com

Possible Energy Conservation Measures (ECMs)

- Replacement of lighting (LED upgrades)
 - LED Lighting is not Plug n Play
 - Photometrics is key
 - Power over Ethernet (POE) is latest LED twist
 - Upgrade fixtures consistent with culture and age of the building



LIGHTING

LED Incentives:

- Linear
- U-bend
- Troffer
- Directional & Omni-directional Screw-in & pin
- Corn Cob
- Exit Sign
- Refrigerated Cases

Fluorescent Incentives:

- T12 to T8
- Delamping

Occupancy sensors

Qualifications

- Design Lights Consortium (DLC)
- ENERGYSTAR
- Lighting Facts

Lighting Incentives



Hawai'i Energy

Lighting retrofits offer the biggest value of all energy efficiency projects – they're relatively simple, significantly reduce electricity costs and typically pay back savings in less than 2 years. You may also enjoy added benefits like clearer vision, decreased cooling loads and increased safety. Our financial incentives make it easy to upgrade your outdated lighting! To learn more, call us at **839-8880** (Oahu) or **1-877-231-8222** (toll-free neighbor islands) or visit HawaiiEnergy.com/lighting.

NOTE: Incentives apply to **retrofit** projects only. Please contact us for new construction or major renovation projects. All LED lamps and fixtures must be listed by ENERGY STAR®, Design Lights Consortium (DLC) or LED Lighting Facts®.

LED

LED: Linear		
Lamp Length	Type	Incentive (per lamp)
2 ft.	Type A	\$3.00
	Type B	\$3.00
	Type C	\$5.00
4 ft.	Type A	\$4.00
	Type B	\$4.00
	Type C	\$8.00

Lamp types designated by Underwriters Laboratories (UL) under certification UL 1598: Type A = Plug & Play Type B = Internal driver / Line voltage Type C = External Driver

LED: U-Bend		
Lamp Technology	Type	Incentive (per lamp)
2 ft. LED Retrofit (Replaces 4 ft. U-bend, reflector required)	Type A	\$10.00
	Type B	\$10.00
	Type C	\$15.00
4 ft. U-bend LED (Processed as 4 ft. Linear)	Type A	\$4.00
	Type B	\$4.00
	Type C	\$8.00

Lamp types designated by Underwriters Laboratories (UL) under certification UL 1598: Type A = Plug & Play Type B = Internal driver / Line voltage Type C = External Driver

LED: Troffer (fixture replacement or retrofit kit)	DLC Category: Indoor Luminaires or Indoor Retrofit Kit*	DLC Category: Indoor Retrofit Kit**
	Incentive (per fixture)	Incentive (per fixture)
2 ft. x 2 ft.	\$20.00	\$16.00
1 or 2 ft. x 4 ft. (2 lamp replacement fixture)	\$20.00	\$16.00
2 ft. x 4 ft. (3 or 4 lamp replacement fixture)	\$50.00	\$24.00

* General Application: Troffer Primary Use: Ambient Lighting or Integrated Retrofit Kits
** General Application: Troffer Primary Use: Linear Retrofit Kits

LED: Directionals & Omni-Directionals	
Lamp Type	Incentive (per lamp)
A-series (ex: A19) / globe / decorative with screw/GU base	\$2.00
Replacement for plug-in CFL, 2 or 4-pin base (ex: PL)	\$5.00
Directional (ex: MR16, PAR/BR/R 20/30/38/40) - screw/pin base	\$6.00

LED down can kit retrofit must use custom worksheet

LED: Corn Cob (HID replacement)	
LED Lamp Wattage	Incentive (per lamp)
Less than 29 W	\$20.00
29W to 49W	\$25.00
50W to 79W	\$35.00
80W to 125W	\$45.00

- Replacement lamps must be Type B or Type C
- Ballast must be removed
- Existing wattages must use nominal measurement value.
- Qualifying LED lamps greater than 125W may receive an incentive through the customized lighting program.



Hawai'i Energy

HawaiiEnergy.com

Existing HVAC –Retro Commissioning

- Assessment of equipment
- Evaluation of facility needs
- Development of system operation plan to meet facility needs
- Execute the plan
- Sometimes there a low to NO cost strategies
 - 1.) Check your time clocks
 - 2.) Check your basic set-points on equipment
 - 3.) Shorten AC run hours if no “push-back” from the tenants



RE/RETRO-COMMISSIONING

1. The lessor of: 50% of study cost at \$0.20 per Sq.Ft. or \$15,000
2. Additional \$0.08 per kWh saved in the first year
(optimization & operational changes)

Requires Hawai'i Energy pre-approval

ENERGY SERVICES & MAINTENANCE

	<u>Requirements*</u>	<u>Incentive</u>
Re-Commissioning & Retro-Commissioning	Requires pre-approval and other Program requirements, see application for details	Total incentive is the sum of two parts below , capped at a total of 80% of total project cost: 1. The lessor of: 50% of study cost, \$0.20 per square foot, or \$15,000. 2. Additional \$0.08 per kWh saved in the first year



Hawai'i Energy

HawaiiEnergy.com



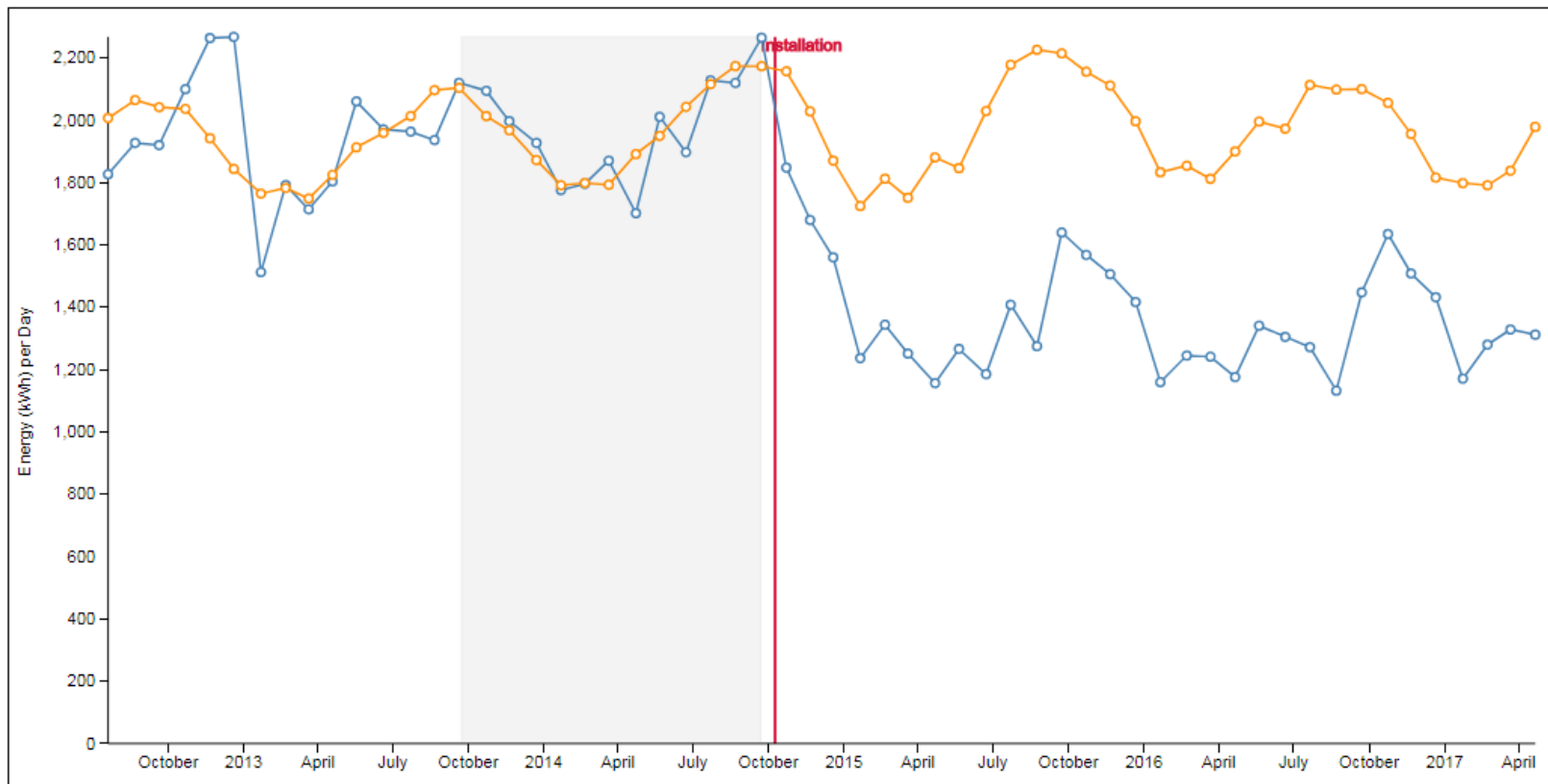
MOANA SURFRIDER HOTEL

- 40 ECM motors for walk-in refrigerator saving over \$3,000/year (18,000 kWh/year)
- Landscape & interior LED lighting saving \$34,000/year (200,000 kWh/year)
- 83 kW & 624,000 kWh/year energy reduction from 832 Guest Room EMS saves \$106,000/year
- Over \$20,000 in Hawai'i Energy incentives plus annual savings of over \$143,000/year



Today's estimated rate: \$0.17 per kWh

Central Union Church Complex



- 2 Condenser Water Pump VFDs in Central Plant
- 6 Air Handler VFDs in Parish Hall & Family Life building
- 26-Ton inverter-driven split A/C unit serving Administration Building
- Window tinting on all buildings

- \$19,000 in Hawai'i Energy incentives
- Estimated over 100,000 kWh/year savings

- Energy efficient lighting in most fixtures

IOLANI PALACE



Photo credit: Kawika Lopez



Photo credit: 'Iolani Palace

2011:
Explored
LEDs

2012:
Sample LEDs from
Hawai'i Energy

2013:
LEDs mitigate heat
issues and high lamp
burnout

2014-2015:
Light too blue & odd-
shaped for exhibits.
- Look & feel discussion
- Color temp decision

June 2016:
Retrofit project start

“Iolani Palace serves as a model for how historic sites can evolve in an energy-efficient world,”
Brian Kealoha, Executive Director of Hawai'i Energy.



Rebates



Case Studies

Energy Codes



Hawai'i Energy

[HawaiiEnergy.com](https://www.hawaiienergy.com)



Counties Adopt 2015 IECC

Energy Industry Training & Education



2015 IECC HIGHLIGHTS

Commercial

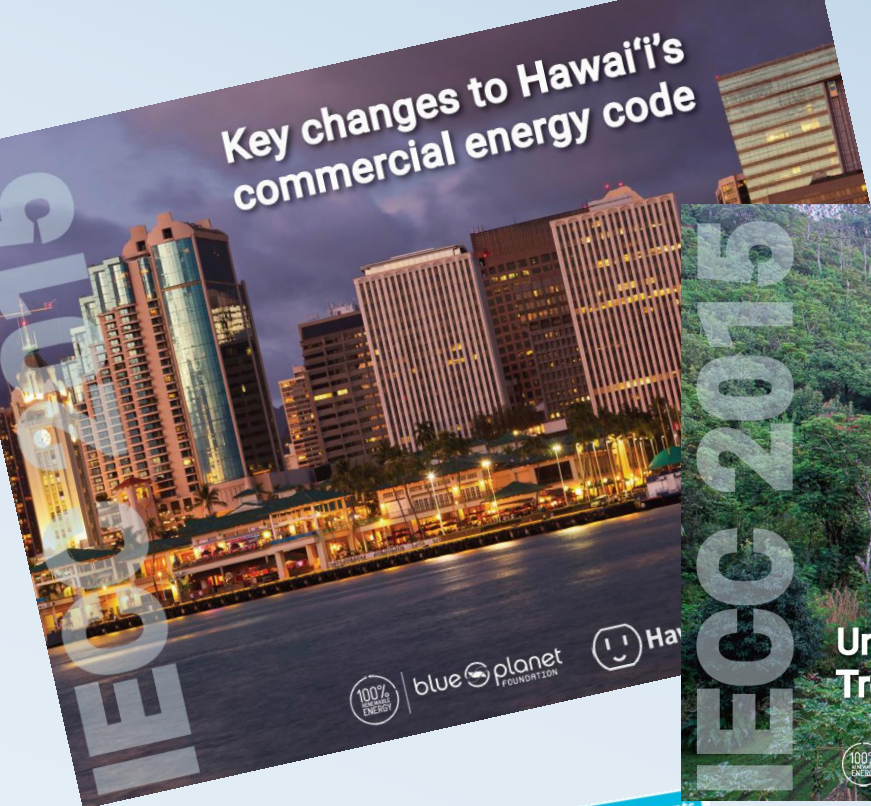
- Building Envelope
 - Roof Solar Reflectance
 - Insulation
 - Air Barriers
- Advanced Lighting & HVAC Controls
- Commissioning

Residential Tropical

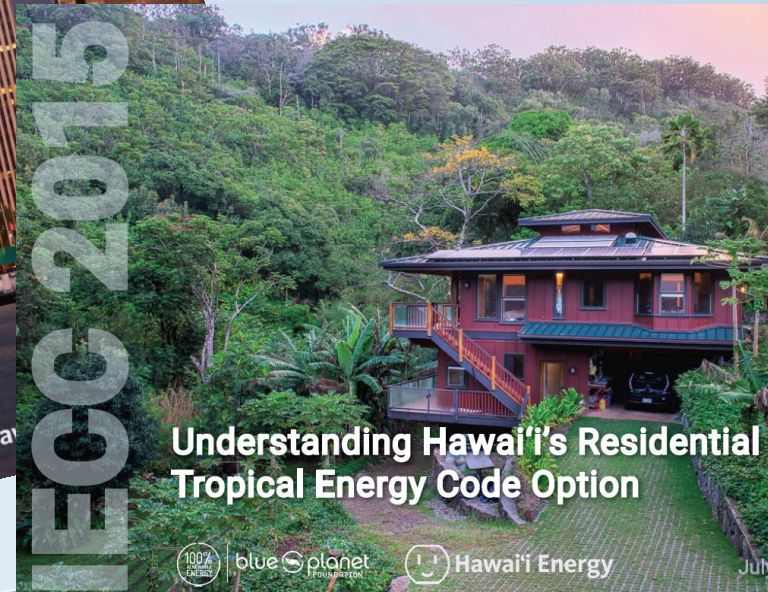
- <50% conditioned
- Window SHGC
- Roof + SWH
- Operable Windows
- Ceiling Fan/rough-ins
- Points or Rating options

Residential Conditioned

- \geq 50% conditioned
- Insulation Requirements
- Air Barrier
- Duct Leakage Testing
- Ceiling Fan/rough-ins
- Points or Rating options



Key changes to Hawai'i's commercial energy code



Understanding Hawai'i's Residential Tropical Energy Code Option



Key changes to Hawai'i's residential energy code for conditioned homes



July 2017

Hawaii Energy		IECC 2015 with Hawaii Amendments	
YOUR CONSERVATION & EFFICIENCY PROGRAM		COMMERCIAL DESIGN CHECKLIST	
Project: _____		Date: _____	
Component/System	Requirement	Code Section	Describe Proposed Design
ENVELOPE REQUIREMENTS			
Certification	Responsible design professional certification on plans	C103.1*	
Construction documents	Responsible design professional certification on plans	C103.2	
Roof - insulation above deck	Include: • Insulation R-values • Fenestration U-factors and solar heat gain coefficients (SHGCs) R-25 or U-0.039 (group R) R-20 or U-0.048 (others)	C402.1, C402.2, C402.3	
Roof - metal building	R-19 + R-11 (with thermal block and liner system)	C402.1, C402.2	
Roof - attic or other	R-38	C402.1, C402.2	
Wall - mass	R-5.7 or U-0.151	C402.1, C402.2	
Wall - metal building	R-13 + R-5 or U-0.077 (R-5 not required with reflectance ≥0.64 or shading PF≥0.3)	C402.1, C402.2	
Wall - metal frame	R-13 + R3.8 or R-20 or U-0.064 (R-3.8 not required with reflectance ≥0.64 or shading PF≥0.3)*	C402.1, C402.2*	
Wall - wood frame and other		C402.1, C402.2*	

COMMERCIAL RETAIL GUIDE 2015 Hawai'i Energy Code Compliance

Energy Code Provision	Provision Number	Summary	New Building	Alteration / Buildout	Why it Matters
RETAIL LIGHTING					
Interior Controls	C405.2.1	Occupancy sensors must be installed for all interior lighting	●	●	Occupancy sensors reduce wasted lighting energy as well as reduce the HVAC load.
Automatic Time Switch	C405.2.2	Time switch controls must be installed for all interior lighting (except for emergency egress lighting)	●	●	Automatic time switch controls installed in spaces not containing occupancy sensors saves lighting energy.

NATURAL VENTILATION REQUIREMENTS

Fenestration
Operable fenestration provides ventilation area equal to not less than 14 percent of the floor area in each room. Alternatively, equivalent ventilation is provided by a ventilation fan.

Bedrooms with exterior walls facing two different directions have operable fenestration on exterior walls facing two different directions.

Interior doors to bedrooms are capable of being secured in the open position.

Ceiling Fans
A ceiling fan or ceiling fan rough-in is required for bedrooms and the largest space that is not used as bedroom (R404.2).

Hawaii Energy		IECC 2015 with Hawaii Amendments	
YOUR CONSERVATION & EFFICIENCY PROGRAM		COMMERCIAL PLAN REVIEW CHECKLIST	
Project: _____		Date: _____	
Component/System	Requirement	Code Section	Plan Review Notes
ENVELOPE REQUIREMENTS			
Certification	Responsible design professional certification on plans	C103.1*	
Construction documents	Responsible design professional certification on plans	C103.2	
Roof - insulation above deck	Include: • Insulation R-values • Fenestration U-factors and solar heat gain coefficients (SHGCs) R-25 or U-0.039 (group R) R-20 or U-0.048 (others)	C402.1, C402.2, C402.3	
Roof - metal building	R-19 + R-11 (with thermal block and liner system)	C402.1, C402.2	<input type="checkbox"/> Signed statement on plans
Roof - attic or other	R-38	C402.1, C402.2	<input type="checkbox"/> Insulation location on plans <input type="checkbox"/> Insulation R-value on plans
Wall - mass (CMU or concrete)	R-5.7 or U-0.151	C402.1, C402.2	<input type="checkbox"/> Insulation location on plans <input type="checkbox"/> Insulation R-value on plans

Mahalo

Contact:
Ramsey Brown
brownrk@leidos.com

Hawai'i Energy

Rebates Find a Contractor

For Homes For Business Clean Energy Allies Education About

We're here to help you make smart energy choices.

Our role is to make it easy for everyone in Hawaii to play their part in the clean energy movement.

www.hawaiienergy.com

RESOURCES

<https://www.nps.gov/tps/standards/rehabilitation/sustainability-guidelines.pdf>

