



Key West City Hall

True Cost of LEED



Bert Bender

Key West City Hall

01.Sustainable Site

Community Connectivity, alternative transportation, storm water design, heat island effect roof

02.Materials and Resources

Resources saved, recycled, reused materials during and after construction

03.Energy & Water Savings

Cistern, solar panels, electric carport, passive design, HVAC, climate-responsive building, advance glazing technologies

04.Improved indoor environmental quality

Greater employee comfort/productivity, reduce employee health costs

05.Adds value to the building and community

Building Life cycle, Energy Efficient building in the community



Sustainability is the ability of the current generation to meet its own needs without compromising the ability of future generations to meet their needs.



01

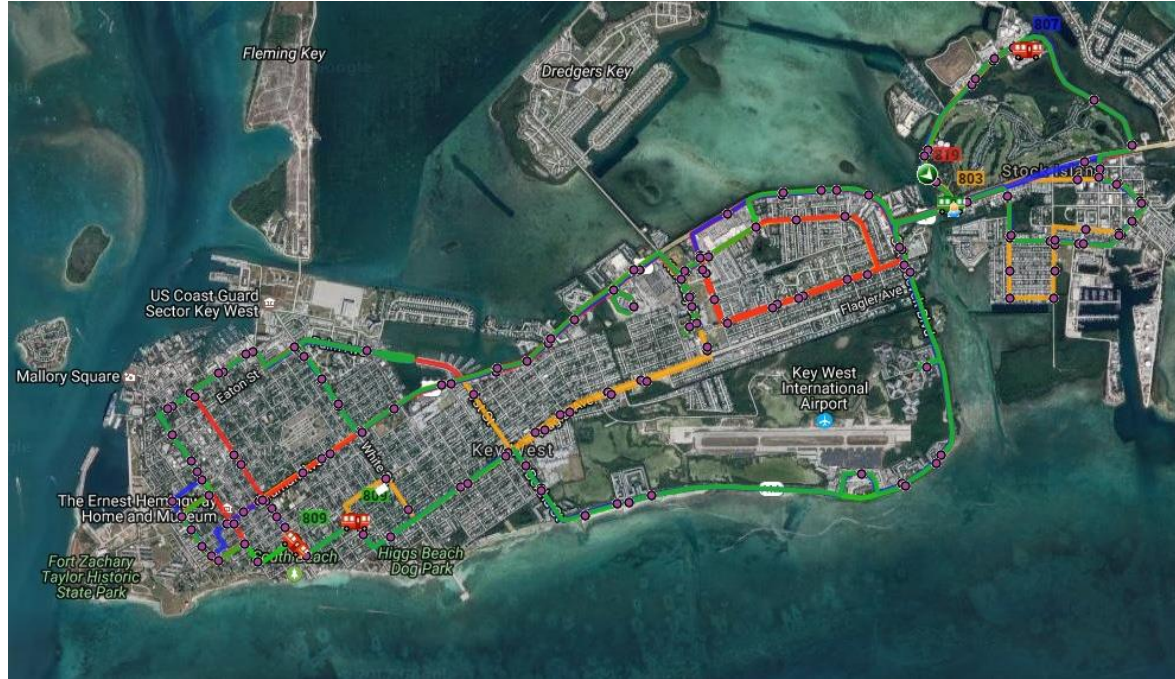
Sustainable Site

Resources saved, recycled, re-purposed,
reused materials during and after
construction

Using a historic building

Sustainable Site – Community Connectivity

The site location can determine how the project impacts the environment and community integration.



- Located in an area that has mass transit (bus routes)
- Encourage car and van pooling
- Promote low-emission and fuel efficient vehicles (electric car chargers)
- Support alternative transportation (bicycle parking)

Key West – public transportation routes

Sustainable Site – Site Development

The use of the entire property so as to minimize the project's impact on the site.



- Increase development density
- Create a smaller footprint
- Build on previously developed site
- Parking Area filled with gravel
- 20.5% Building Coverage
- 120,909 SQFT of Landscape
- 100% of the Roofs have SRI value of 86, thus reducing the heat island effect
- Key West City Hall Plan

Sustainable Site – Stormwater Design

Strategically control and reduce the amount of increased stormwater created by the project.



- Open grid permeable (pervious) parking area
- 88% reduction of previously existing stormwater runoff volume
- 83% total stormwater runoff suspended solids removal efficiency
- 79% of the site hardscape surfaces have SRI values of at least 29, thus reducing the heat island effect

Parking Area

Sustainable Site – Rainwater

Capture rainwater for reuse in areas as irrigation.



- Existing Cisterns used to collect and reuse rainwater
- 100% Potable water savings for irrigation due to no irrigation with municipal water; after 1 year
- 30% Reduction in annual potable water use on all plumbing fixtures

Building A – Cistern



02

Materials and Resources

Resources saved, recycled, re-purposed,
reused materials during and after
construction

MATERIALS AND RESOURCES— Building Reuse

Historic rehabilitation saves on energy and resources used to extract, transport, process and manufacturing of new materials, plus the energy used to build it.



- Exterior building walls and related foundation for Buildings A, B and the Auditorium were not demolished
- Reducing amount of gas emissions related to demolition

MATERIALS AND RESOURCES – Material Reuse

Recycling construction demolition and land clearing debris reduced demand for virgin materials which benefits from associated affects of harvesting new materials



- Storage and collected Recyclables in the Gym
- 30% of the total building materials content, by value, were manufactured using recycled material
- 25% of the total building materials content, by value , were manufactured, extracted, harvested or recovered within 500 miles of the project site

Materials and Resources – Recycled Materials



Dade County Pine

- Refinished and reused in the building, i.e. wainscoting, trim, furniture
- Remainder used in other local projects

Construction Waste Management

- Building Size- design the building size appropriately to meet the owners requirements
- 95% /diversion of all waste during construction (5,700 tons)

Building B 2nd floor



03

Energy and Water Savings

Cistern, solar panels, car charging stations, use of daylight, HVAC

Using a historic building

ENERGY AND WATER SAVINGS – Water Efficient Landscaping

Buildings in the U.S. uses 47 billion gallons of water per day.



Water Efficient Landscaping

- Use of native plants that support a self sustaining landscape
- Mulching was used through out the landscape, which provides water to the plant's root system and helps prevent evaporation of the plant's water
- 100% Potable Water Savings due to no Irrigation

Indoor Water

- Low-Flow plumbing fixtures, faucet metering and proximity sensor technology
- 30% Reduction in annual potable water use on all plumbing fixtures

Process Water Use

- Cisterns were used to collect rainwater

Landscape Areas

ENERGY AND WATER SAVINGS – HVAC System



Optimize Energy Performance

- 42% reduction in Annual Energy Costs (lighting, HVAC, Building Envelope)
- Used tinted, laminated, low-e glass
- Chilled water system with Variable Air Volume (VAV) devices
- HVAC refrigerants with low Ozone-depletion and Global-warming Potentials
- Large historic windows allow sunlight to enter and reduce the need for artificial lighting (building occupied during the day)
- 100 % of all roof surfaces have SRI value of 86, thus reducing the heat island effect
- Building Envelope –glazing to minimize heat gains and losses

Chiller Building

ENERGY AND WATER SAVINGS – Solar Arrays

Renewable energy sources reduce the demand for conventional energy such as coal ,oil, natural gas and nuclear power, Reducing their environmental impacts.



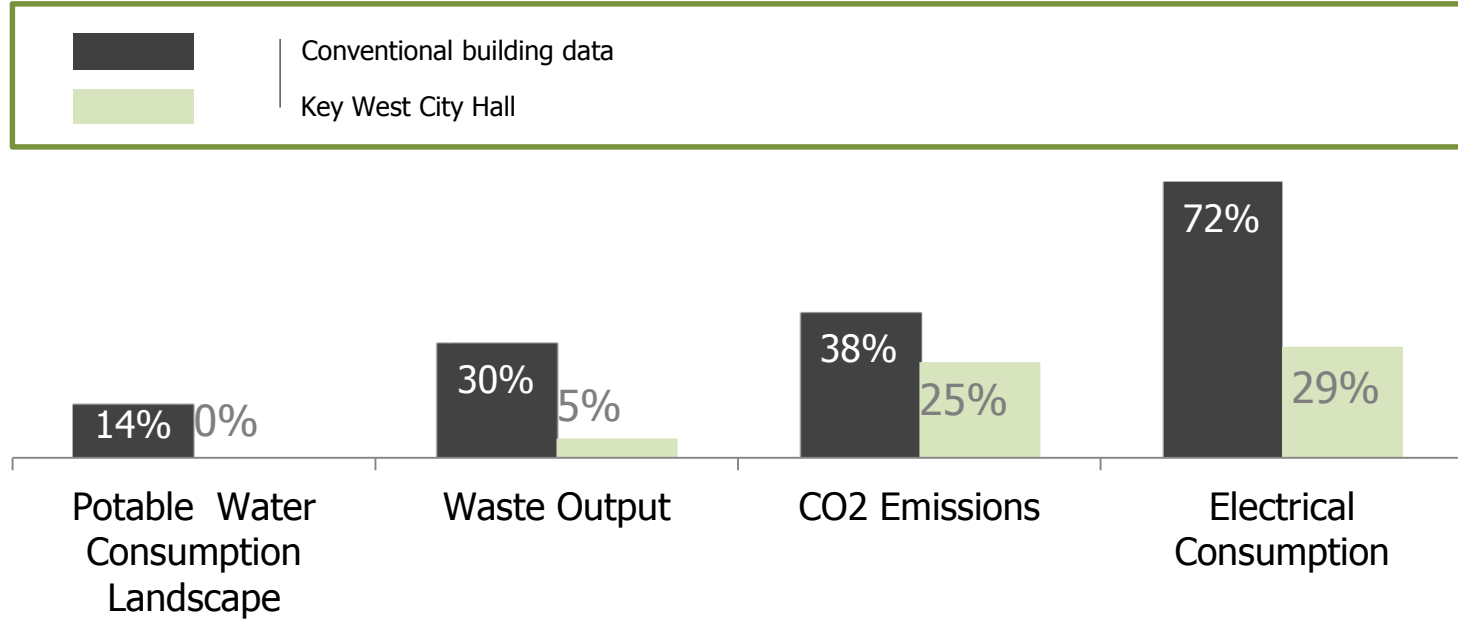
Green Power

- 25% of Building's Annual Energy Consumption is generated on site (via 75kW photovoltaic panel array)
- By purchasing 100% "renewable energy credits" for the first 2 years of operation, the City will help avoid 451 metric tons of carbon dioxide emissions from being emitted into the atmosphere

Parking Area

U.S. Buildings Impacts on Resources

The U.S. conventional buildings account for a high portion of natural resources use and waste generation





KEY WEST CITY HALL

100% Irrigation Potable water savings: no municipal water used for irrigation after the first year

95% Construction Waste Diverted (5,700 tons)

88% Reduction of previously existing stormwater runoff volume

42% Reduction in annual energy costs

30% Recycled content of total building material

25% Of Building's Annual Energy Consumption is generated on site

LEED PLATNIUM

Sustainable Sites	23/26
Water Efficiency	6/10
Energy & Atmosphere	31/35
Material & Resources	6/14
Indoor Environmental	12/15
Innovation & Design	5/6
Regional Priority	4/4



04

**Improved indoor environmental
quality**

Greater employee comfort/productivity,
reduce employee health costs

IMPROVED INDOOR ENVIRONMENTAL QUALITY

The EPA has designed indoor air pollution as a top environmental risk to public health and increase in building related illness.



Workplace Design

- 90% of all regularly occupied spaces are provided with a view to the outside
- Using historic windows, exterior glass doors and interior glass partitions

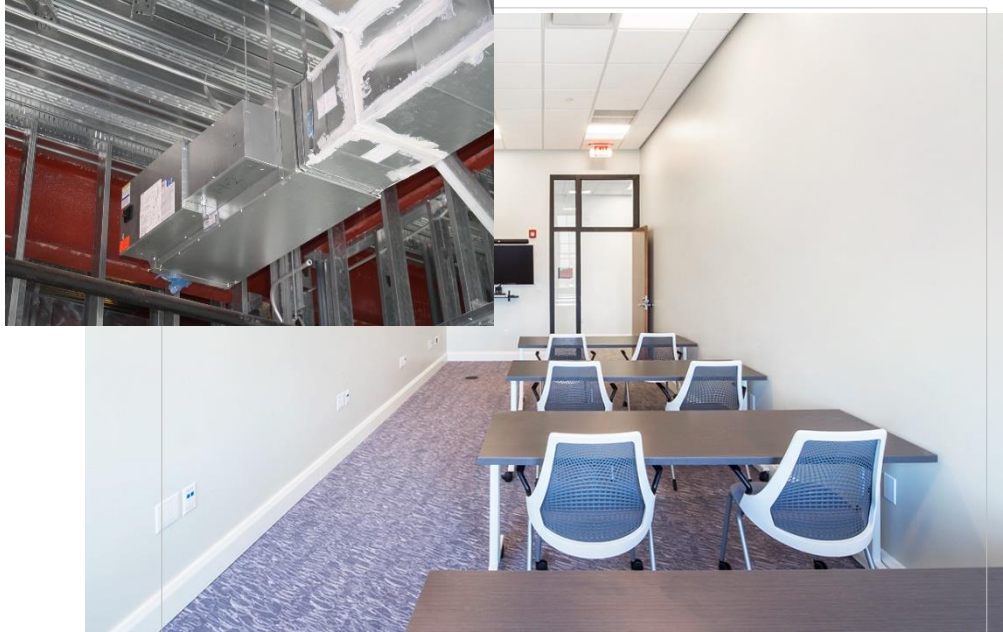
Occupants and Operations

- Occupants interact with building
- Wider temperature ranges
- Low energy IT
- Increased ventilation control
- Increased temperature control
- Increased lighting control
- Increased daylighting

Building B – reception area

IMPROVED INDOOR ENVIRONMENTAL QUALITY

The interior of Key West City Hall was created to maintain an environment that promotes the well being of its occupants.



Outdoor Air Delivery Monitoring

- CO2 monitoring system installed in order to improve occupant comfort and well being

Construction Indoor Air Quality Mgt. Plan- during construction

- Contractor protected all air-conditioning ductwork
- All absorptive materials were protected from moisture damage and special filters were installed in the air handlers prior to building occupancy

Construction Indoor Air Quality Mgt. Plan-before occupancy

- Air Quality Testing-During construction the contractor implemented an Indoor Air Quality Management Plan for the project.

IT Training Conference Room

IMPROVED INDOOR ENVIRONMENTAL QUALITY

The interior of Key West City Hall was created to maintain an environment that promotes the well being of its occupants.



Low Emitting Materials

- Low or zero VOC products requiring zero use of formaldehyde based wood adhesives
- 100% of all adhesives, sealants, paints, coatings and flooring systems used in the building meet or exceed low VOC requirements

Indoor Chemical and Pollutant Source Control

- A high level of lighting system control by individual occupants or group in multi-occupant spaces
- Achieved by providing additional controllability (light switches and dimming for general and task lighting)

Controllability of Systems – thermal comfort

- Provided additional thermostats and properly zoning areas within the building

IMPROVED INDOOR ENVIRONMENTAL QUALITY – Case studies

It is too early to measure the productivity of Key West City Hall.



RMI – Productivity increase of 6% for improvements in thermal control, lighting, acoustics and indoor quality

Johnson Controls Study – 5-15% performance impact related to indoor environmental quality

USGBC Study- West Bend Mutual Insurance increase productivity by 16% from old building to new green building (a 2 million value per year)

Commission Chamber



05

Adds value to the building and community

Building Life cycle, Energy Efficient
building in the community

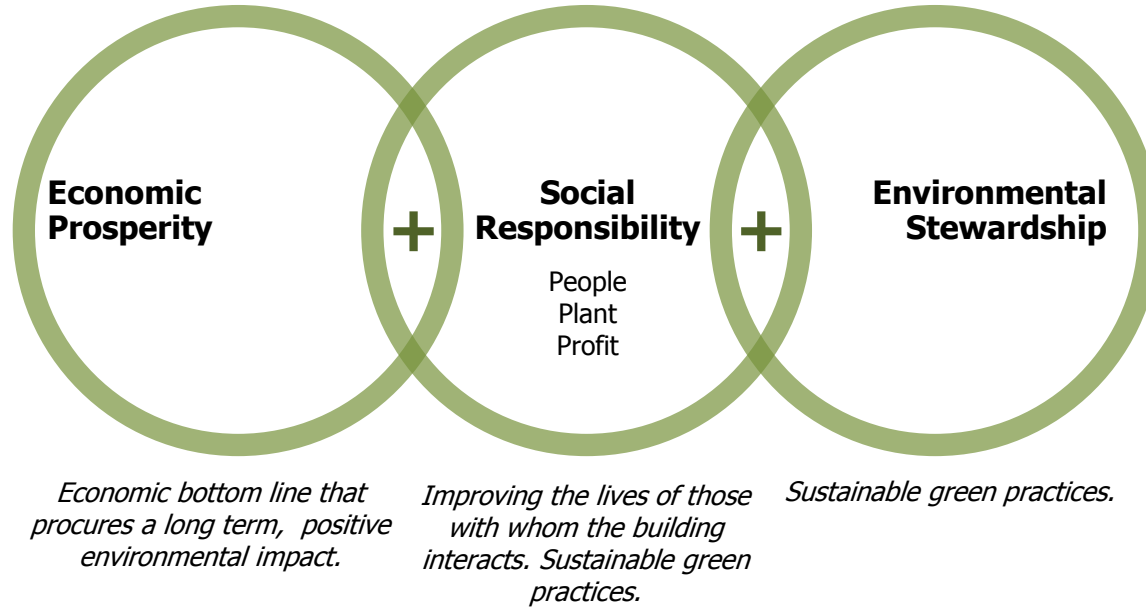
ADDS VALUE TO THE BUILDING AND COMMUNITY



- Minimize strain on local infrastructures and improve quality of life
- Increase building valuation (reduction in annual operating costs)
- Decrease vacancy, improve retention (marketing advantages)
- Improve productivity
- Reduce liability
- Optimize life-cycle economic performance

Sustainability - The triple bottom line

Key West City Hall demonstrates that it has addressed the elements that balance and reconcile humanity with nature.



Key West City Hall

Thank you

Preservation embodies the heart and soul of our
sustainable architectural philosophy.
Bert Bender

