SUSTAINABILITY:

Thinking holistically about how everything you do affects everything around you.

It is an attempt to minimize each person’s impact on the world.
GREEN BUILDING:

1. Increase the efficiency of how buildings & their sites use energy, water and materials
GREEN BUILDING:

2. Reduce building impacts of human health and the environment, through better sitting, design, construction, operation, and maintenance throughout life cycle.
PRE- 20TH CENTURY

- Architect-Builder
- Understood Entire Design-Building-Lifetime Process
- Passive Solar Design
- Simple Mechanical Systems to Heat, Cool & Light
- Site Sensitive
- Local Materials
- Had to Meet the Needs of Lifestyle
PUEBLO INDIANS

LOCAL MATERIALS

NATURAL PROTECTION
PUEBLO INDIANS

- Shelter From Elements
- Overhanging Cliffs Cool
- Sunlight Heats
- Situated Near Water Sources
- Protection From Enemies
GREEN BUILDING TIMELINE

- **Pre-20th Century**
  - Cliff Dwellers

- **Native Americans**

- **Present**

- **Future**
NATIVE AMERICANS

- Energy Efficient
- Solar Heated
- Naturally Ventilated
- Transportable
- Resource Efficient
GREEN BUILDING TIMELINE

Native Americans

Cliff Dwellers

Barns

Pre-20th Century

Present

Future
BARNS

NATURAL VENTILATION

LOCAL MATERIALS
BARNs

COMMUNITY

DAYLIGHTING/CHIMNEY EFFECT
BARNs

PERMEABLE FLOORS FACILITATE DRAINAGE & HELP MAINTAIN CLEAN INTERIOR
GREEN BUILDING TIMELINE

- Pre-20th Century:
  - Native Americans
  - Cliff Dwellers
- Early 1900’s:
  - Barns
- Present
- Future
EARLY 1900’S

- Built in Conjunction with Railway Lines
- Situated Around Existing Towns & Cities
- Increase in Transportation = More Building Materials
- More Affordable Housing
- Detached Garage for New Autos
- Underground Sewage Pipes = Healthier
- No Servants, Smaller Homes
EARLY 1900’S

DEEP PORCHES INTEGRAL IN PASSIVE SOLAR DESIGN
1930’s

- New Technologies Transforms Urban Landscape
- Air Conditioning, Structural Steel, Reflective Glass
- Reliance on Non-Renewable Energy
- Regressive Movement in Architecture
- Design Began to Ignore Climate Issues & Their Effects
- Loss of Builder-Architects = Lack Holistic Approach
- Easy to Alter Internal Environments, Rather than Adapt
“Most conventional practitioners of modern design and construction find it easier to make buildings as if nature and place did not exist. In Rangoon or Racine, their work is the same.”
FACILITATING CHANGE

1977: Department of Energy Established to Address Energy Usage & Conservation

1987: UN Commission Provides First Definition of Sustainable Development - “meets the needs of the present without compromising the ability of future generations to meet their own needs”

1990: Austin Establishes 1st Green Building Program

2000: Increasing Number of Municipalities & Corps Begin to Demand Internal Green Bldg Standards
GREEN BUILDING TIMELINE

Pre-20th Century
- Native Americans
- Cliff Dwellers

Early 1900's
- Barns

"Green" Homes
- "Green" Homes

Present

Future
GREEN BUILDING TODAY

- Minimizes Home’s Footprint on Earth
- Integrated Design
- Uses Less Energy & Water
- Durable/Low-Maintenance
- Healthier
- Reduced Greenhouse Emissions
- Recycled Content Materials/Renewables
DESIGN PRINCIPLES

- Building Should be Elongated on an East-West Axis to Control Sun’s Intrusion
- Light Color, Highly Reflective Exterior Products
- Utilize Natural Breezes and Shading
- Work with, Not Against, Natural Setting
PASSIVE SOLAR DESIGN

- Good roof and ceiling insulation
- Avoid hot summer and cold winter winds
- Summer exclusion
- Winter: maximum penetration
- Deciduous trees are good for sun control
- Well insulated heavyweight internal walls
PASSIVE SOLAR DESIGN
DAYLIGHTING
PASSIVE SOLAR DESIGN

PORCHES

SOUTH ORIENTATION
DESIGN VARIETY
DESIGN VARIETY
DESIGN VARIETY
DESIGN VARIETY
CHOOSING GREEN MATERIALS

- Is It Site/Climate Appropriate (Availability)
- Is It Durable (Life Cycle, Maintenance, Wind Resistant)
- Ease of Assembly (Avoid Cuts to Minimize Waste)
- Is It Cost Effective
- Is It Resource Efficient (Recycled/Reclaimed)
- Aesthetics
- Optimize Material Selections that Provide Greater Energy Efficiency
SPRAY FOAM INSULATION
SIP’S
ICF’S
ROOFING
SOLAR HOT WATER
ENERGY STAR APPLIANCES

Appliances & lighting can account for 20-40% of home energy use.

Energy Star identifies this washing machine as at least 50% more efficient than most top load machines.
ENERGY STAR WINDOWS

LOW-E, ENERGY STAR WINDOWS & DOORS
RAINWATER CATCHMENT
ATTIC FANS

DUAL ATTIC FANS DELAY USE OF AC
OTHER FEATURES

- No or Low VOC Paints & Stains
- Regional Cabinetry
- Tankless Water Heaters
- PET Carpet, Bamboo, Concrete
- Xeriscaping
OTHER FEATURES

- James Hardie Siding
- Impasse Termite Protection
- Sealed Combustion Fireplace
- Dual Flush Toilets
- Low Flow Faucets & Showers
HEALTH

- Maintain Indoor Relative Humidity (35-50%)
- Use Low or No VOC Paints, Stains & Adhesives
- Use Easy to Clean Materials
- Use Certified Green Carpets
- Eliminate Garages from Conditioned Spaces
LIMIT OR ELIMINATE VOC’S

- Low VOC & Low Odor
- Paints, Stains, Adhesives & Sealants
- Flooring
- Green Seal Certification
- Garage Chemicals
HVAC & AIR INFILTRATION

- Choose High Efficiency Equipment
- Use Programmable Thermostats
- Correct Ventilation
- Correct Sizing
- Correct Ducts
- Correct Sealing
GREEN BUILDING PROGRAMS

- Energy Star
- American Lung Association Health House
- Green Built North Texas
- NAHB Green Building Standard
- Leadership in Energy & Environmental Design (LEED)
CONSUMPTION

- Industry: 33%
- Buildings: 39%
- Transportation: 28%

21% Residential
- Refrigeration: 9%
- Cooling: 10%
- Lights: 12%
- Water Heat: 13%
- Heating: 32%

18% Commercial
- Refrigeration: 4%
- Office Equipment: 7%
- Ventilation: 7%
- Water Heat: 7%

Cooking: 2%
Computers: 3%

Other: 4%
CONSUMPTION

![Bar chart showing alternative energy consumption by the United States, October 2005 to September 2006. The chart indicates the percentage of energy consumption from various sources, with Petroleum Products being the highest at 40.16%, followed by Coal and Natural Gas at 22.65% and 22.28% respectively, and Wind Energy at 0.24%.]
Figure 7. World Marketed Energy Consumption, 1970-2025

GREEN BUILDING TIMELINE

- Native Americans
- Early 1900’s
- Renewables

- Cliff Dwellers
- Barns
- “Green” Homes

Pre-20th Century  Present  Future
CALL TO ACTION

- Increased Use of Renewables
- Re-evaluating Product Life Cycle (*Cradle to Cradle*)
- Return to Passive Solar Design Roots
- Capitalize on Advancements in Technology
- Continued Education
- Gaining Green Home Market Share- Valuations
- Incentives, Rebates, Partnerships
DOE BUILDERS CHALLENGE

- Voluntary

- E-Scale: Facilitate Energy Efficient Home Sales

- Ultimate Goal: By 2030 any Consumer Will Have Access to Net Zero Energy Homes (Uses as Much Energy as it Produces in a Year)
Voluntary
Ultimate Goal: By 2030 any Consumer Will Have Access to Net Zero Energy Homes (Uses as Much Energy as it Produces in a Year)

U.S. Department of Energy EnergySmart Home Scale

- Estimated annual energy usage:
  - Electric (kWh) 7728
  - Natural gas (Thems) 237
- Estimated average monthly energy bill: $104
- Conditioned floor area (sq. ft.): 3,312

123 Main Street, Gainesville, FL 32601
Rated by Home Performance, Inc.
Rating conducted June 8, 2008
www.buildingamerica.gov/challenge

Verdict: Your Home!

64

- Poor Energy Performance
- Average energy performance of existing housing stock: Typical existing home
- Average energy performance of a home built to code (2004 IECC)
- Builders Challenge (70 or lower)
- Net-Zero Energy Home
- Best Energy Performance

Estimated monthly energy bill

Verified performance estimate for home. A 64 rating on the E-Scale saves about 36% in energy use on utility bills.
INCENTIVES

- Solar PV Program
- Solar Water Heater Program
- AC Installations
- Low-Income Weatherization
- Energy Efficient Upgrades
FEDERAL TAX CREDITS

- Windows/Doors, Insulation, Water Heaters, AC’s
- 30% credit (up to $1,500 for most)
- Some have no cap (Solar, Wind, Geothermal)
- 2009 & 2010