The LEED rating system

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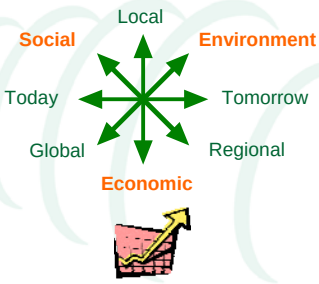
NRMCA

What is Sustainable Development?

"development that meets the needs of the present without compromising the ability of future generations to meet their own needs"

World Commission on Environment and Development's (the Brundtland Commission) report, *Our Common Future,* (Oxford University Press, 1987)

Triple Bottom Line



Green Building

- Focuses on the built environment
- Minimize environmental impact of buildings and their surrounding landscape
- A subset of sustainable development

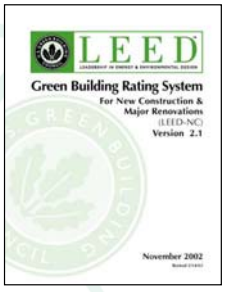
Major "Green" Market Driver

United States Green Building Council

Mission *to promote the design and construction of buildings that are environmentally responsible, profitable, and healthy places to live and work.*

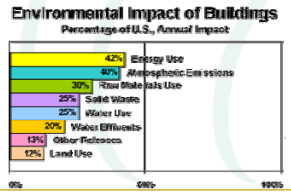
LEED

- LEED – Leadership in Energy and Environmentally Design
- Green Building Rating System
- Covers whole buildings and their exteriors, not individual parts of buildings



Environmental Impact of Buildings

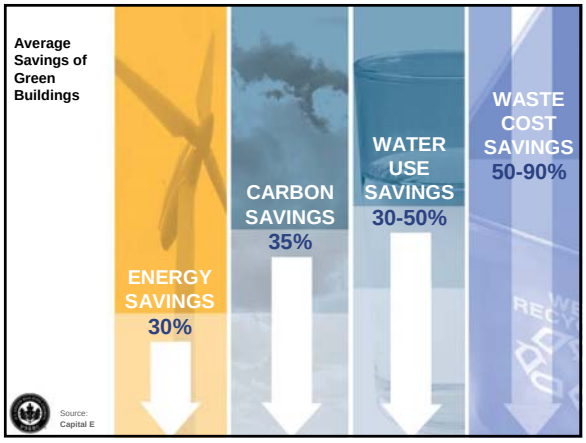
- Buildings accounted for 39.4 percent of total U.S. energy consumption in 2002.
- Buildings in the United States contribute 38.1 percent of the nation's total carbon dioxide emissions, including 20.6 percent from the residential sector and 17.5 percent from the commercial sector.



Concrete vs. Asphalt

- Life cycle analysis on concrete and asphalt roadways
- Compared embodied energy and global warming potential for construction and maintenance over a 50-year life cycle
- For a high volume highway
  - Asphalt pavement required 3 times more energy than concrete pavement
  - Asphalt generated global warming potential of 738 t/km of CO_2 equivalents compared to 674 t/km for concrete

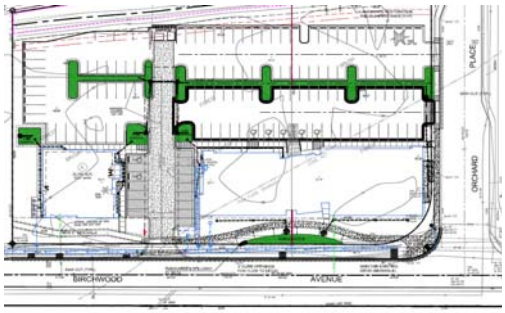
A Life Cycle Perspective on Concrete and Asphalt Roadways: Embodied Primary Energy And Global Warming Potential, Athena Institute, Ottawa, Ontario, 2006.



LEED NC (New Construction)

Buildings are certified, not materials, products, companies, or individuals

LEED NC

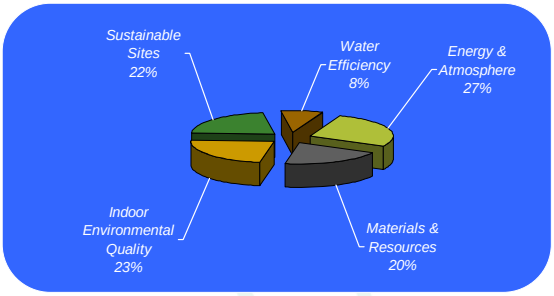


Park Tower Plaza, Bellingham, WA

LEED Certification

Certification Levels	*Points Required*
Certified	26-32 Points
Silver	33-38 Points
Gold	39-51 Points
Platinum	52-69 Points

LEED® Categories



Stormwater Management

Sustainable Sites Credit 6.1

- Limit disruption and pollution of natural water flows by managing stormwater runoff
  - Option 1: If existing imperviousness is less than 50% then maintain existing discharge rate
  - Option 2: If existing imperviousness is more than 50% then decrease discharge rate by 25%

Stormwater Management

- Promote natural infiltration
- Minimize impervious surfaces
  - Green roofs
  - Pervious pavements

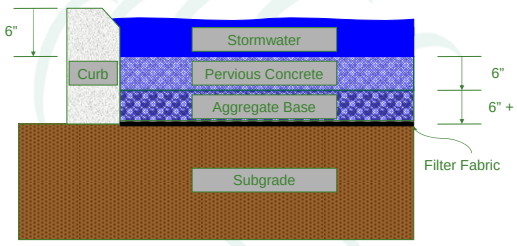
Stormwater Management

- Pervious Concrete
  - 15-30% voids
  - Rainwater percolates through the slab
  - Minimizes runoff to surrounding streams and lakes
  - Functions like retention basins
  - Recharges groundwater supplies

Water Efficient Landscaping

- Limit the use of potable water for landscape irrigation
  - Potable water for irrigation must be reduced by 50%
- The gravel sub-base under pervious concrete can be used to store stormwater for irrigation,

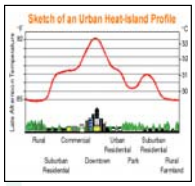
Pervious Pavement Profile



Heat Island Effect (non-roof)

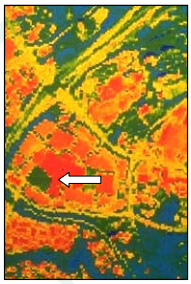
Sustainable Sites Credit 7.1

- Reduce heat islands
- Option 1: Provide any combination of the following for 50% of the site hardscape
  - Shade (w/in 5 years of occupancy)
  - Paving materials with a Solar Reflectance Index (SRI) of at least 29
  - Open grid paving system for 50% of parking area
- Option 2: Place a minimum of 50% of parking spaces under cover where roof has an SRI of at least 29

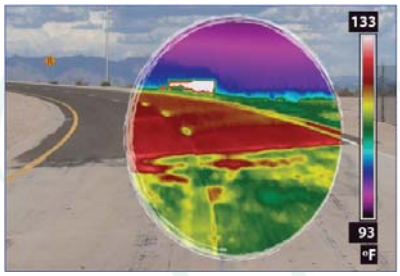


Heat Island Effect

- Shade constructed surfaces with landscape
- Use green roofs
- Specify high-albedo materials (reflectance greater than 0.3)
  - Concrete reflectance: 0.35 - 0.8
  - Asphalt reflectance: 0.05 – 0.15
- Use underground or covered parking



Heat Island Effect (Green Highways)



Light Pollution Reduction

Sustainable Sites Credit 8

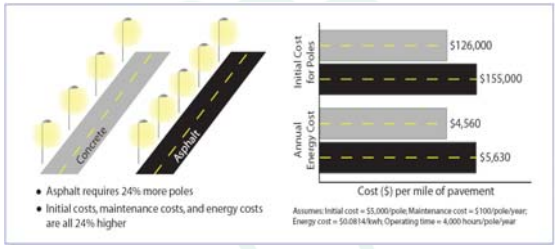
- Reduce impact on night sky
- Interior Lighting: Angle of maximum candela shall not exit out through windows
  - OR – All non emergency lighting shall be automatically controlled to turn off during non-business hours
- Exterior Lighting: In addition to interior lighting requirements, only light areas required for safety and comfort.

Reduced Light Pollution

- 30% fewer fixtures can produce the same level of lighting on concrete compared to asphalt

Source: Road Surface's Reflectance Influences Lighting Design" RP269.01P, R. E. Stark, Portland Cement Association, April 1986.

Reduced Light Pollution (Green Highways)



Regional Materials

Materials & Resources Credit 5.1 and 5.2

- Increase demand for materials within region
- Based on value (cost) of materials
- Worth 1 point for 10% manufactured regionally within a radius of 500 miles
- Worth 2 points if 20% of regionally manufactured materials are also extracted, harvested, and recovered with 500 miles

Regional Materials

- Concrete
  - manufactured within 500 miles
  - often extracted within 500 miles

Recycled Content

Materials & Resources Credit 4.1 and 4.2

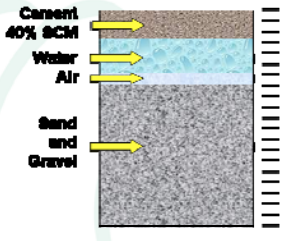
- Increase demand for recycled products
- Post-consumer + ½ post-industrial
- Based on value (cost) of materials

Recycled Content

- Identify material suppliers that use recycled material
  - Fly Ash
  - Slag
  - Silica Fume
  - SCMs are considered post-industrial

Innovation in Design

- Reduction of CO_2 by 40%
- Increase use of SCMs such as fly ash and slag



Benefits of LEED Certification

- Minimizes environmental impact
- Projects a positive image
- Energy cost savings
- Increased labor productivity
- Tax credits in some cities and states
- Higher rents for green buildings

Pervious Concrete Pavement
LEED Example Project – City Recreation Center

- 75,000 SF community center on 10.5 acres
- No curbs
- No catch basins
- 100,000 SF of pervious concrete pavement
- Raingardens
- Infiltration of roof water
- Pool-water re-use for toilet flushing

Firstenburg Community Center, City of Vancouver, WA

Pervious Concrete Pavement
LEED Example Project – City Recreation Center

Firstenburg Community Center, City of Vancouver, WA

Summary

- U.S. Green Building Council (USGB)
  - Developer and administrator of the LEED® Green Building Rating System
- LEED® - A leading-edge system for designing, constructing, operating and certifying the world's greenest buildings.
- LEED® - Categories:
  - Sustainable site planning
  - Safeguarding water and water efficiency
  - Energy efficiency and renewable energy
  - Conservation of materials and resources
  - Indoor environmental quality
- **CONCRETE** - Is a major contributor to earning points necessary for LEED® Certification.

Additional Information

www.nrmca.org
www.rmc-foundation.org
www.ecco.org
www.usgbc.org

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Questions?

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