

# FACILITIES FOR 21<sup>ST</sup> CENTURY LEARNING

## Implications for 21<sup>st</sup> Century Learning

### Sustainable Design Strategies

Sustainable schools are healthy for students, teachers and the environment. Sustainable schools are productive learning environments with ample natural light, high-quality acoustics and air that is safe to breathe.

School facilities that are designed and constructed according to sustainable principles demonstrate and encourage stewardship in students, thus also addressing the future lives of the learners. In addition, the school building can be a teaching tool for sustainability, for example, students can learn about alternative energy from the solar panels on the roof of the school. Because of the use of efficient materials and available sustainability technology, the building can become a three-dimensional learning space.



The U.S. Green Building Council (USGBC), a nonprofit organization, was founded to promote the design and construction of buildings that are environmentally responsible. Green design refers to design and construction practices that

significantly reduce or eliminate the negative impact of buildings on the environment and occupants.

The USGBC developed and maintains the Leadership in Energy and Environmental Design (LEED) Green

Building Rating System. LEED is the national benchmark for buildings promoting sustainable design and construction. The objectives of LEED include:

- Reduce impacts of natural resource consumption.
- Protect air quality and water quality, biodiversity, and eco-system health.
- Improve economics of building operations, asset value, worker productivity, and the local economy.
- Enhance building occupants health and safety, relating to risk management.
- Minimize strain on local infrastructure such as landfills, water supply, stormwater sewers and related development and costs; decrease transportation development and maintenance for roadways, and encourage better performance of mass transit systems.

The LEED for Schools Rating System recognizes the unique nature of the design and construction of educational facilities and provides verification that a building project, whether new or renovated, is sensitive to the environment. It addresses such issues as classroom acoustics, mold prevention, environmental site assessment, and other matters related to school design and operation. Green schools are healthy places to learn, to teach, save money, provide hands-on learning and are environmentally friendly.

The following LEED planning principles are useful guidelines when renovating or constructing new schools.



### Sustainable Sites

- Construction activity pollution prevention
- Protect or restore habitat
- Stormwater design (i.e. using existing natural features such as ponds and creeks enhanced by constructed basins, and lot-line swales over gutter-and-pipe engineering)
- Joint use of facilities

### Water Efficiency

- No potable use or no irrigation
- Water use reduction (i.e. use collected rainwater or gray water for toilet and urinal flushing or other non-potable uses)

### Energy & Atmosphere

- Optimize energy performance
- On-Site renewable energy (i.e. geothermal, Hydro-electric, solar, wind)
- Green power (i.e. purchase of green electricity)

### Materials & Resources

- Storage & collection of recyclables
- Building reuse
- Construction waste management
- Regional materials
- Rapidly renewable materials (i.e. bamboo flooring, cork wall covering)
- Certified wood (wood/paper that comes from good forest management)

### Indoor Environmental Quality

- Increased ventilation
- Outdoor air delivery monitoring
- Low-emitting materials

- Lighting system design & controllability
- Thermal comfort design & controllability
- Daylight & views (75-90 percent of classrooms & other spaces)
- Enhanced acoustical performance
- Mold prevention

### Sustainability Considerations

Establish sustainability goals at the conceptual stage of project development:

- Fuel usage
- Water usage
- Electricity usage
- Maintenance expenditures
- Training expenditures

Consider building orientation to take advantage of the site characteristics:

- Provide south facing windows to maximize natural light infiltration.
- Use natural features to protect from wind loads.
- Consider predominant wind direction when identifying window size and location.
- Consider predominant wind, and snow drift direction when identifying door and building ventilation location.
- Consider that the majority of usage will take place during the school year (September-May).

Consider joint-use of a school facility with other organizations such as community schools programs, community health programs, mental health programs, senior care or service programs or other programs compatible with the school mission.

Consider a choice of heating and ventilation alternatives that provide the district with the best combination of energy efficiency and ease of maintenance.

Consider day-lighting alternatives that minimize the use of artificial lighting throughout the building while still providing adequate insulation characteristics for the school location. Compare costs of alternative day-lighting strategies in terms of electricity cost, as well as anticipated heating costs.

Consider strategies to minimize water use:

- Low-flow double-flush toilets
- Waterless urinals
- Recapture of grey-water and treatment for non-potable water uses
- Rainwater recovery systems

Compare the cost of increasing insulation R-values versus the long-term benefit of decreased heating costs.

Consider computer controlled heating, ventilation and lighting controls with remote monitoring and data collection capacity to monitor and analyze energy usage.

Consider rapidly renewable materials.

Consider use of regionally available materials.

Establish a minimum Indoor Air Quality (IAQ) standard and develop a process to monitor IAQ during peak usage.

Establish a minimum acoustical performance standard and verify with commissioning.

Establish a minimum classroom and hallway lighting level and verify with commissioning.

*Refer also to DoDEA Administrative Instruction for Sustainability and Energy Efficiency.*

The school pictured uses native plants and natural wild flower grasses and provides water quality treatment on site with an outlet into an existing creek.



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