GREEN SCHOOLS CASE STUDY
First Mesa Elementary School

School name: First Mesa Elementary School - Hopi Education Line Office
Address: P O. Box 750, Polacca, Arizona 86042
Contact: Phil Sarracino, BIA, Facilities Management and Construction Center
Phone number: 505-563-5162
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General location: Hopi Indian Reservation
Grade Levels: K- 6
Number of students: 400 projected
Number of staff: 37
Superintendent/Principal: Kathy Wiggins
Phone number: 928-737-2581

Physical descriptors:

Building area	74,580 Sq ft	Number of stories	1
Number of buildings	1	Number of classrooms	33
Square footage	36,136	Floor area of conditioned space	74,580
Site area	40 acres		

Date of "commissioning": Completed August 2004, LEED Certified

School Cost:
Total construction cost: $14,000,000
Cost per square foot: $188.00
Note: this number is the cost of the building divided by the square footage. It does not include site work, plaza, landscape, etc. which would need to be taken into consideration for an accurate cost per square foot.

SUSTAINABLE SITES GOALS

Building area used as Community Space
Erosion and Sedimentation Control
Site selection
Reduced Site Disturbance - protect/restore open space
Reduced Site Disturbance - Development Footprint
Stormwater Management - rate and quantity
Landscape and exterior design to reduce heat islands - non roof
Landscape and exterior design to reduce heat islands - roof
Light Pollution Reduction

Sustainable sites strategies used
Alternative paving materials - High-albedo (minimum reflectance of 0.3) concrete and gravel.
Reflective roofing material - Steven's EP membrane roof with a reflectivity of .85 and emissivity of 0.90.
Stormwater retention ponds.

Results obtained
Decreased the heat island effect
Reduced the environmental impact of traditional asphalt paving
Preserved open space
Decreased stormwater runoff
Building used as Community Space

WATER EFFICIENCY GOALS

Water efficient landscaping reduce by 50%
Water efficient landscaping no potable use or no irrigation
Water Use Reduction (20%)
Water Use Reduction (30%)

Water efficiency strategies used
Aerators were placed on all the lavatories.
Native drought tolerant plants

Results obtained
Reduced indoor water consumption by a total of 34%.
Saved additional water through the use of drought tolerant plants
After initial growing season, the irrigation was abandoned and there has been sufficient rain for plants to survive.

Environmental Benefits	**Measurement**
Baseline water consumption	773,200 gal/year
Indoor Water consumption [this site]	506,752 gal/year
Water savings	266,448 gallons
Water consumption FY 10/06-9/07	350,295 gal/year
Water savings from baseline	422,905 gallons

ENERGY AND ATMOSPHERE

Building Specifications:
Energy sources: electric, natural gas, purchased green power
The building was designed with a Variable Air Volume (VAV) air supply and Variable Frequency Drive (VFD) DX, Air-cooled, Packaged Rooftop units with an SEER of 9.5 and IPLV of 11.4. A heating water boiler burning fossil fuels is 84% efficient.

Insulation R-Values	Roof	R-33	Walls	R-7.1 (mass walls) & R-13.0 (frame walls)	
Window types	U-0.57 & SC-0.49				

ENERGY AND ATMOSPHERE GOALS

Fundamental building systems commissioning
Minimum Energy Performance (prerequisite)
CFC Reduction in HVAC & R Equipment (prerequisite)
Optimize energy performance
Additional commissioning
Green power

Energy and Atmosphere strategies used
Systems management
Careful attention to a commissioning agent, who made sure the building systems ran efficiently
Purchase of Green Power - The green power renewable certificates were purchased from Renewable Choice Energy.

Results obtained
Electrical cost $59,956.62 for 713,530 KWH
Propane cost $60,093.59 for 40,215 gal. ($2.22 per gallon)
15% savings in energy use
Green power purchase the equivalent environmental savings as planting 62 acres of trees or taking 39 vehicles off the road
Green power purchased 324,970 KWh/yr

MATERIALS AND RESOURCES GOALS

Storage and Collection of Recyclables
Construction Waste Management (Divert 50%)
Construction Waste Management (Divert 75%)

Construction waste management strategies used
Concrete, asphalt and cardboard were the main items recycled. A small portion of steel was also recycled. The steel, cardboard and concrete were taken to places within 100 miles of the site. The asphalt was actually reused on site and greatly contributed to reaching 77.80% (by weight) of the construction materials being recycled. More metals probably should have been recycled, but due to the rural site it was best to minimize transportation costs and fuel burning

Results obtained
Nearly 78% of construction debris was reused onsite or recycled.
Over 1400 tons of materials were diverted from the landfill.

Integrated material strategies used
Continuation of recycling program

Results obtained
Students appreciated and support the recycling program at the new school

Additional information:
Recycling during the construction phase was
Very easy easy **average** difficult very difficult n/a

Finding materials with recycled content was
Very easy easy average **difficult** very difficult n/a

Finding materials to “reuse” was
Very easy easy average **difficult** very difficult n/a

Generally finding materials with recycled content is relatively easy, but it was difficult in this case because it was not paid attention to early on. Also, recycling during the construction phase is usually fairly easy, but average was marked because of the remoteness of the site. They did an excellent job of construction waste diversion and recycling considering the location.

Environmental Benefits	Measurement
Avoided landfill materials – construction phase	1403.56 tons

INDOOR ENVIRONMENTAL QUALITY GOALS

Minimum IAQ Performance (prerequisite)
Environmental Tobacco Smoke Control (prerequisite)
Carbon Dioxide (CO2) Monitoring
Low emitting Materials (Adhesives and Sealants)
Low emitting materials (Carpet)
Indoor Chemical & Pollutant Source Control
Controllability of systems, non-perimeter
Daylight and views – daylight 75% of spaces
Daylight and views – views for 90% of spaces

Indoor environmental quality strategies used

Finishes selected for the classrooms were linoleum, and carpet tiles are all non-toxic. Interface was the carpet manufacturer and Boucle Grid and Paint Box were the models chosen. The carpet meets the CRI (Carpet & Rug Institute) Green Label Program as does the adhesive. The adhesive chosen was a water-based adhesive and had 0 calculated VOCs.

Ceilings are lay-in acoustical panels with linear lighting that provide both direct and indirect lighting.

Through the switching of the fixtures, three levels of illumination are provided.

Daylighting was accomplished through the use of clerestories, skylights and windows.

Carbon Dioxide sensors to increase amount of fresh air ventilation while maintaining energy efficiency.

Results obtained

During the day a majority of spaces in the school do not require any artificial lighting.

Lighting system contributes to increasing the energy performance of the building by 15% above conventional standards.

Less toxins (VOC's) were used in the school creating a healthier environment for staff and students.

More comfort controls allow staff to regulate their areas thereby creating a more productive and satisfactory work environment.

Additional Information:

We use IPM **Yes** No

List IPM strategies and estimated amounts of toxic materials avoided in yearly maintenance. EcoLab is the vendor used.

Finding materials with low VOC content was:

Very easy easy **average** difficult very difficult n/a

Note: Incorporating more low-VOC materials (such as paint), into the design of the school could have occurred but it was something that was new and not easily understood. Therefore, average was selected because more low VOC materials could have been selected but low-emitting adhesives/sealants and carpet were found so it wasn't difficult.

The benefit from incorporating daylighting as been:

Very beneficial beneficial no change not worth the effort

Students and staff ***like*** *dislike* the daylighting aspects of the buildings.

Staff absenteeism has decreased: **Yes** No If yes, by how much? Unknown

Student absenteeism has decreased: **Yes** No If yes, by how much? Unknown
Asthma attacks have decreased: Yes No **Unknown** If yes, by how much?

Environmental Benefits	**Measurement**
Low Emitting Materials (air quality section ?)	Carpet & plumbing, electrical and mechanical adhesives and sealants.
Daylight and Views – percent of building area that is daylighted with outside views	81% daylit 90% of spaces with views

INNOVATION AND DESIGN PROCESS GOALS

Innovation and design strategies used
Incorporating school wide recycling program and school weather station into their Green Education Program
Green Housekeeping program
Self-guiding building tour to teach about benefits of green buildings

Results obtained
Decrease energy consumption through the use of daylight.
Create healthy environments for staff and students.
Educate visitors and students about the benefits of a green school.

OVERALL BENEFITS

The green projects included in the design and operation of this school have improved the overall efficiency of the campus: **Yes** No

We have used the “green” features of our school as teaching tools: **Yes** No

Specifically we have designed a brochure highlighting our green features so parents and visitors can take a self guided tour.

TRAINING

Did staff attended trainings on Design for Green Schools? Yes **No**

Staff attended trainings on Green Schools Operations and Maintenance? Yes **No**

Has staff attended trainings on energy efficient operations? Yes **No**

Staff has attended trainings on water conservation? Yes **No**

LESSONS LEARNED (please describe your experiences during the following phases)

Before design phase: (obtaining funding, etc.) – Make project team aware of LEED benefits. It takes very little upfront cost to achieve LEED basic certification, but this project ran into a lot of problems believing that LEED was expensive and did not really have any benefits.

During design phase: Make suggestions throughout the design phase in regards to LEED compliance. Keep team members involved or the LEED portion will falter.
During build phase: Checking in weekly with the contractor is the best policy. Waiting to the end of a project to collect data is detrimental to the LEED certification process. It also is not cost or time efficient for any team members.

After completion: See above. Request information for LEED submittal requirements as project moves along. All team members should be willing to provide documentation in an efficient manner so that the project has a clear idea of what LEED credits it will be attempting and which are out of the question. Scrambling for points at the end does not equate to a truly sustainable building.

If only one of your "Green Features" could be highlighted, it would be:

Choosing one is hard. I am proud that the project, being in a desert environment, chose to utilize water conserving fixtures in the school. I also am glad they chose to decrease stormwater runoff thereby decreasing erosion and I think the fact that they recycled 77.80% of their construction waste is quite admirable for the location.

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