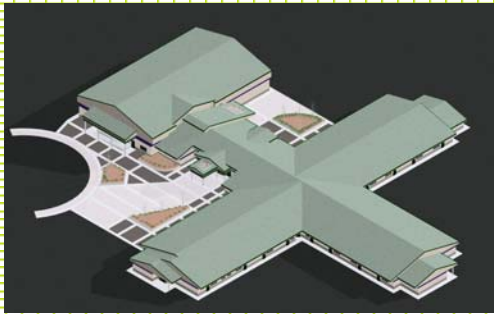


# Millennium Elementary School



Rendering of Millennium Elementary School

FLOOR SPACE: 49,223ft<sup>2</sup>  
BUDGET: Not Available  
BUILDING POPULATION: 600  
CONSTRUCTION DATES: Completed August 2000  
OWNER: Kent School District  
ARCHITECT: CMB Architects  
GENERAL CONTRACTOR: Wick Constructors  
STRUCTURAL ENGINEERS: H.K. Kim Engineers  
MECHANICAL & ELECTRICAL ENGINEERS: Hargis Engineering  
COMMISSIONING: Hargis Engineering  
CIVIL ENGINEERS: RoseWater Engineering  
LANDSCAPE ARCHITECTS: Weisman Design Group

## PROJECT NOTES

### SITE AND WATER

- **Stormwater Collection and Reuse:** A detention pond stores 123 million gallons of water, which is filtered, treated, and used to irrigate the grass playfield. The summer of 2004, the District was able to irrigate entirely from the pond saving \$2,657 in water costs.
- **Vegetation Reuse:** Existing vegetation was protected and reused along with additional native plantings.
- **Reduced Turf Area:** The area traditionally landscaped with turf was reduced significantly, reducing maintenance and watering requirements.



### ENERGY AND ATMOSPHERE

- **Ground-source Heat Pump:** New system eliminated two gas boilers and one cooling tower required for conventional water-source heat pump system, as well as noise, chemical needs and emissions associated with cooling towers and boilers. Eighty four underground heat exchange wells penetrate 300-feet into the ground.
- **Green Power Demonstrations:** A 400 watt wind turbine and 24 photovoltaic panels (2080 watt output) provide power and opportunity for student learning about new technologies.
- **High Performance Glazing:** Windows were

chosen to minimize glare, heat loss, and unwanted solar gain.

- **Efficient Lighting:** T-5 lamps reduce lighting energy use beyond code.
- **Insulation:** Roof insulation was increased to R-30.

- **Commissioning:** Kent School District routinely commissions all their building systems to ensure optimal performance.

### MATERIALS AND RESOURCES

- **Building Salvage and Reuse:** The District sold, moved, and salvaged existing buildings.

- **Electronic Documentation:** Kent was the first public school in Washington to bid on CD-ROM, saving 150 sets of printouts. In addition, all

project management and warranty was done via the web site.

### INDOOR ENVIRONMENTAL QUALITY

- **High Efficiency Air Filtration:** The air filtration system is designed and maintained to remove small particulates and other potential contaminants.
- **Occupancy Sensors:** Classrooms and common areas have motion sensors to turn on the lights and ventilation system as needed rather than running constantly.

LEARNING BY DOING: FINE TUNING A PROTOTYPE SCHOOL

Millennium Elementary is the 13th school built from CMB Architecture & Planning's 1979 school prototype design. The Kent School District was able to focus energy and resources on fine tuning rather than redesigning. Sustainable building was the focus of the Millennium construction project.



Ground source heat pump (GSHP) for heating and cooling was one improvement, a departure from the District standard water-source heat pump with gas fired boiler and cooling tower. The total energy costs are 8.5% less and use is 32% less than the prototype design system. (The decreased use is not all recaptured as cost savings because the savings are largely from reduced gas consumption. Slightly higher electric demand due to larger heat pumps further offsets the energy to cost savings.) Maintenance requirements were reduced by 70% compared to prototype schools.

Lessons Learned: The system performed beyond expectations with building temperatures remaining consistent even in extreme weather. Maintenance savings may be as valuable as the energy savings, and may amplified over time with

commissioning and fine tuning the set points. To get the most benefit ,it is critical to include maintenance staff in the design, construction, and commissioning processes.



Kent School District installed 13 waterless urinals at Millennium and they have all functioned well for the four years the school has operated. The per occupant water use is 30% lower than comparable schools, maintenance is lower, and maintenance supplies are more than offset by the water and sewer cost savings. The City of Kent provided a rebate for the incremental cost difference for the fixtures, but annual savings would have covered the costs in the first year. Users and custodians alike have been pleased with their performance.

While stormwater retention for irrigation can work well — Millennium was able to save \$2,657 in water costs in one year (offset by \$1,290 in energy costs for the pumps and UV light)— it was challenging to get the system to perform as designed. Issues included both control sequence programming as well as the fundamental design, such as pump location and filter sizing and the district irrigation technician spent considerable effort re-engineering the system.

Lessons Learned: While water savings is important, the added energy costs bring into question the overall conservation value of this system. An experienced engineer is critical to successfully implementing a good system when trying something unconventional. A smart design can reduce equipment requirements and user frustration.

