

SUMMERFIELD

Elementary School

Neptune Township, New Jersey

**NJ's First
LEED Gold
Public School**
**"Live Event
Learning"**

**Sustainability Comes
Full Cycle: *story inside***

"As the superintendent, I was very interested in getting ideas across to our students of the need to protect our dwindling resources. The students have the opportunity to understand what geothermal is, and hopefully, when they become the decision makers of tomorrow, they will choose to look for the renewable resources."

David Mooij, Superintendent of Schools

THE LEEDER IN SUSTAINABLE DESIGN

EI
ASSOCIATES
ARCHITECTS
ENGINEERS
PLANNERS

RAINWATER COLLECTION



Recycling Rainwater:

Rainwater is collected from the roofs and is directed through gutters and leaders to an underground collection tank. Lockable and freeze proof faucets in the instructional gardens allow students to use collected rainwater for irrigation. A level gauge, located in the school lobby, measures rainwater storage. Students can monitor seasonal rainwater cycles and utilization.



Colonial Gardens:

Reflecting the sustenance gardens of colonial times; herb, vegetable, rose, wildflower, and butterfly plantings are organized into small manageable plots maintained by students and teachers. Students can research and cultivate native plant life.

HOSE BIB

INFILTRATION CHAMBER

COLLECTION TANK



Infiltration Chambers:

Four soft stormwater infiltration chambers located under the pre-k playground, allow overflow water from the collection tank to gradually recharge the groundwater. Excess water from the chambers is directed into Hankins Creek.



Collection Tank:

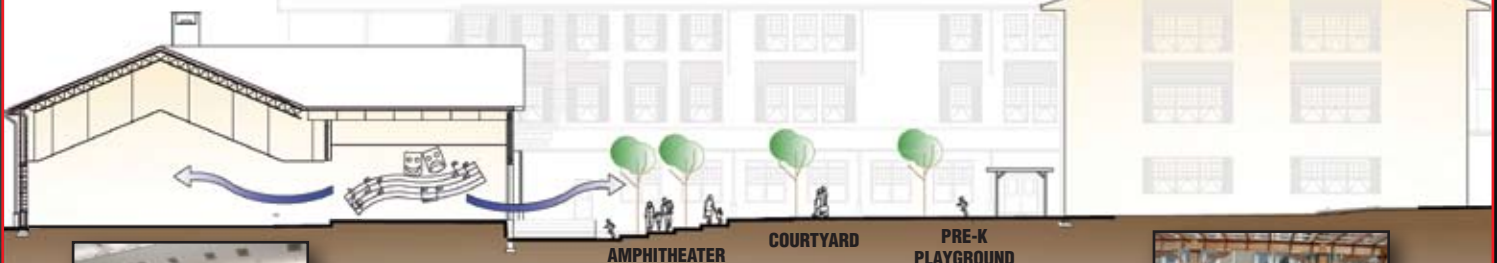
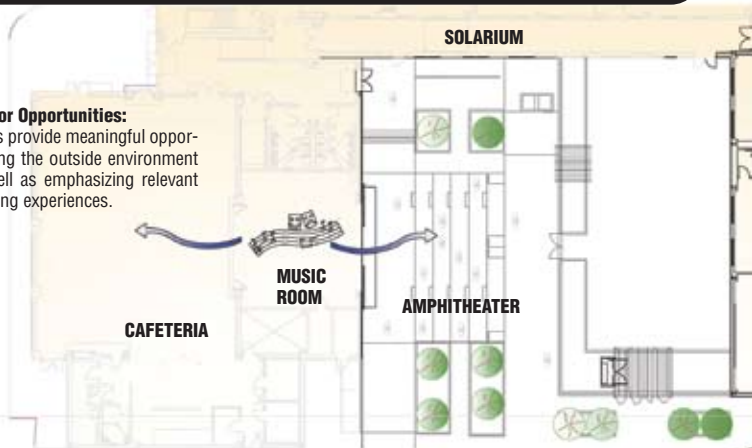
The 6,000 gallon collection tank has an interior baffle for retaining sediments. A recirculation pump introduces a biodegradable enzyme to control the growth of bacteria.

INDOOR / OUTDOOR PERFORMANCE SPACE



Indoor/Outdoor Opportunities:

Green Schools provide meaningful opportunities to bring the outside environment indoors as well as emphasizing relevant outdoor learning experiences.



Music Room:

The Music Room has barn like sliding doors that open to an outdoor amphitheater, allowing for performance or instruction in the courtyard. The Music Room also has a folding partition allowing it to be opened to the Cafeteria for performances.



GROUNDWATER RECHARGE

Recycling Rainwater:

Rainwater is collected from the roofs and is directed through gutters and leaders to an underground collection tank. Collected rainwater is used for irrigation.

Bio-Retention Swale:

A bio-retention swale or basin wraps around the Media Center and Gymnasium. Landscaped with natural vegetation, the swale serves to treat on site stormwater and acts as a buffer from the road.



A portion of the parking surface runoff is directed through two basins, connected in series before flowing into Hankins Creek Glen. During a rainstorm, water ponds in the basins and filters through the bio-mass topsoil and specially prepared sandy subgrade to remove pollutants.

Infiltration Chambers:

Large volumes of stormwater are stored in underground chambers allowing natural aquifers to gradually recharge as nature did prior to development.



Flow Control Chamber:

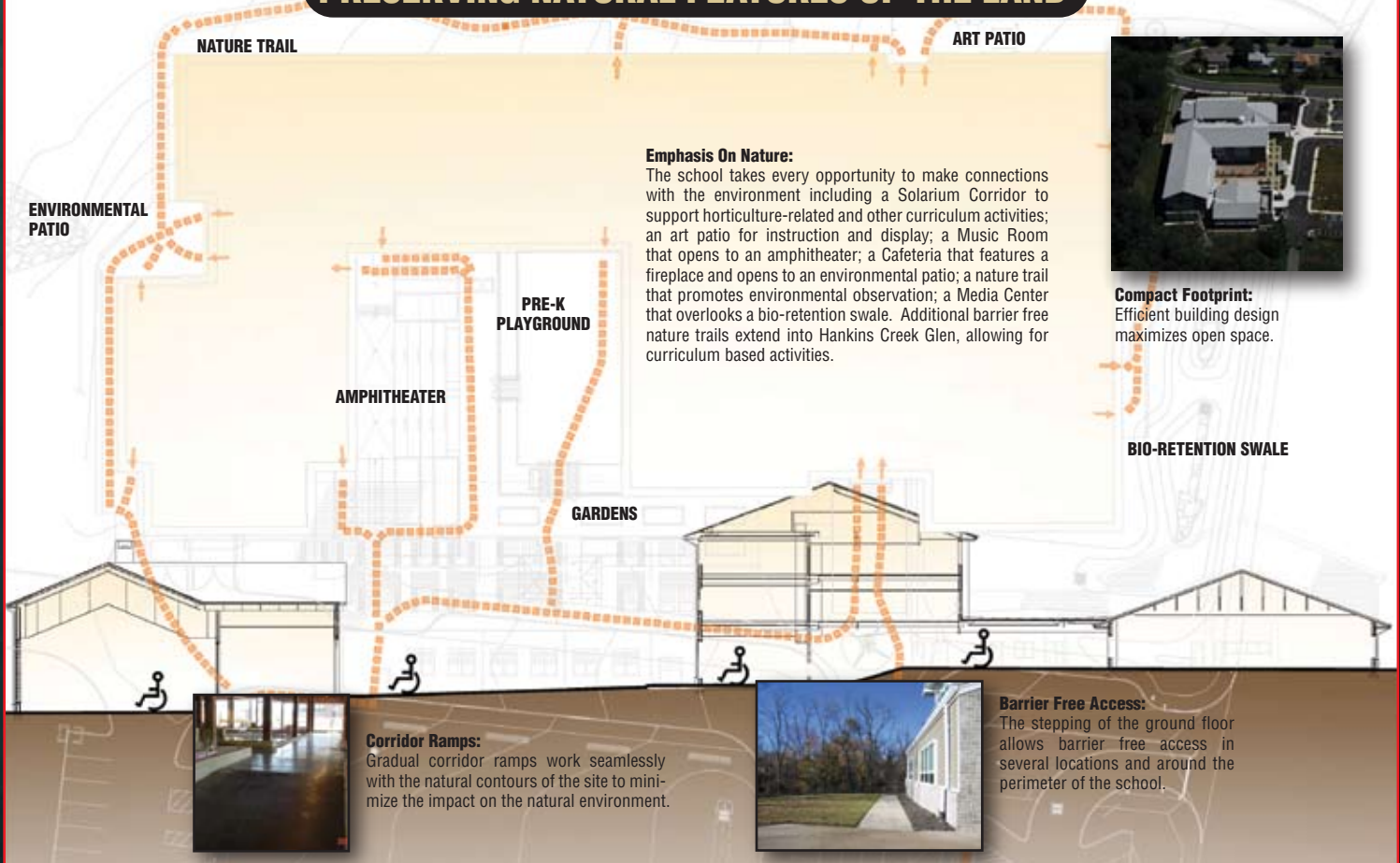
During large storms, excess water flows into a control chamber allowing water to flow gradually into the open space.



Quality Water Treatment:

Where space is not available for swales or basins a treatment device filters the stormwater prior to its entering infiltration chambers.

PRESERVING NATURAL FEATURES OF THE LAND



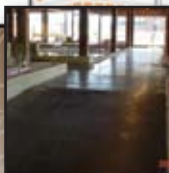
Emphasis On Nature:

The school takes every opportunity to make connections with the environment including a Solarium Corridor to support horticulture-related and other curriculum activities; an art patio for instruction and display; a Music Room that opens to an amphitheater; a Cafeteria that features a fireplace and opens to an environmental patio; a nature trail that promotes environmental observation; a Media Center that overlooks a bio-retention swale. Additional barrier free nature trails extend into Hankins Creek Glen, allowing for curriculum based activities.



Compact Footprint:
Efficient building design maximizes open space.

BIO-RETENTION SWALE



Corridor Ramps:

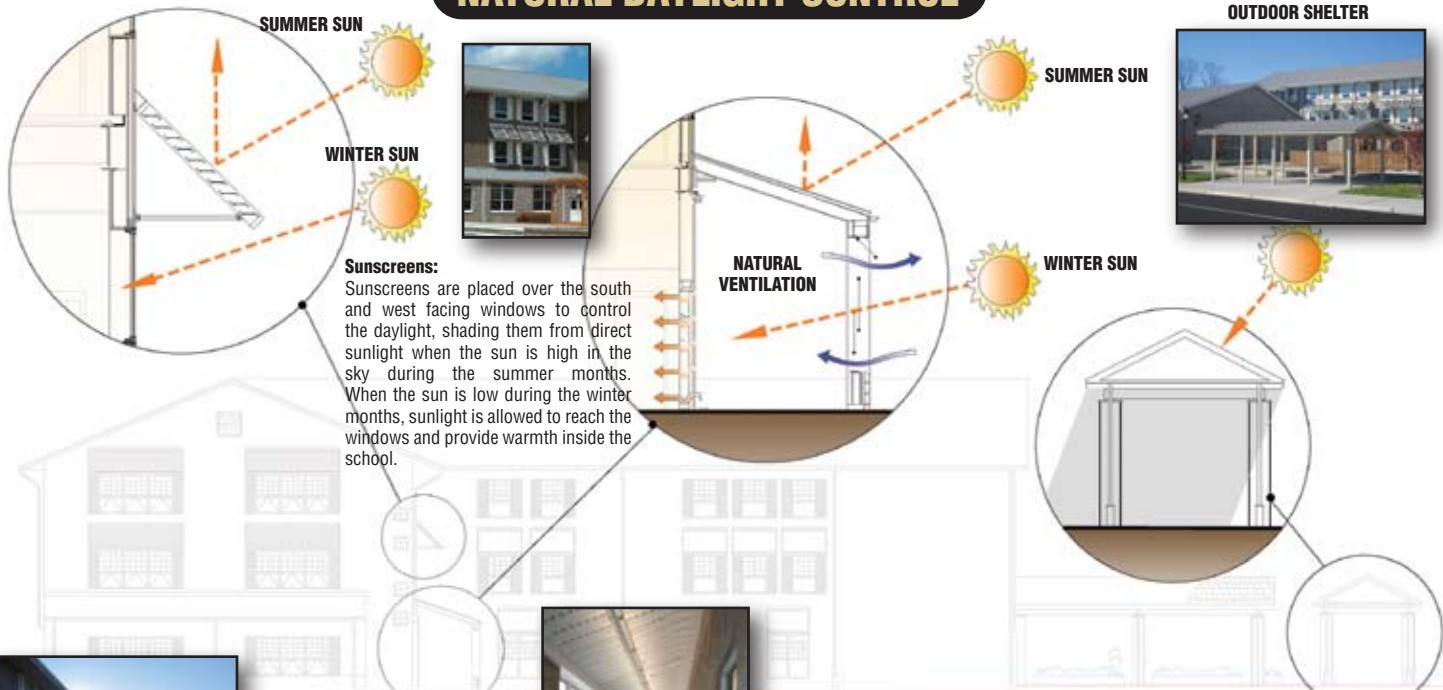
Gradual corridor ramps work seamlessly with the natural contours of the site to minimize the impact on the natural environment.



Barrier Free Access:

The stepping of the ground floor allows barrier free access in several locations and around the perimeter of the school.

NATURAL DAYLIGHT CONTROL



Sunscreens:
Sunscreens are placed over the south and west facing windows to control the daylight, shading them from direct sunlight when the sun is high in the sky during the summer months. When the sun is low during the winter months, sunlight is allowed to reach the windows and provide warmth inside the school.

NATURAL VENTILATION

OUTDOOR SHELTER



Northern Light:
Most classrooms have views of Hanks Creek Glen. Because the sun does not reach the north facing windows, sunscreens are not used.



Solarium:
Operating as a greenhouse, students learn how to control the climate by using the various windows and shading devices. Concrete floors and stone walls retain heat, keeping the space warm during the winter months. Ventilation keeps the space cool during the summer months.

Outdoor Shelter:
An outdoor shelter provides additional student drop off area, an instructional area or place from which to monitor children at the playground.

HIGH PERFORMANCE HEATING, COOLING & VENTILATING SYSTEM



Heat Pumps:
Heat pumps located in the ceilings over the corridors control the temperature in the individual classrooms. Their location also provides for increased acoustical isolation providing an exceptionally quiet space. This simple system does not require complicated controls or operating procedures.

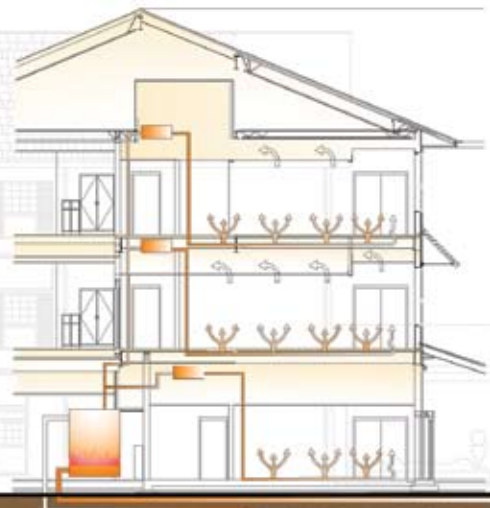


Underfloor Air Distribution (Air Displacement)
Air distribution is handled under the floor (raised floor) and is introduced at the occupant level (displacement ventilation). The specially designed swirl diffusers introduce the air in a quiet and comfortable pattern. Because there is no mixing of the air in the space, contaminants are continually swept from floor to ceiling level where they are removed.



Outdoor Air:
With large amounts of outside air required for ventilation (as much as 50% of the air conditioning load), energy recovery units transfer 60% to 70% of the energy normally lost back into the building. Modular chillers (made extra efficient by the temperature of the geothermal loop) provide chill water to remove moisture from the outside air required for ventilation for proper de-humidification control.

Geothermal System:
A field of ninety-four wells, 400 feet deep, provide the geothermal source of the majority of the heating and air conditioning needs of the school. Using the earth as a source of energy allows the school to get both cooling and heating from the system. This provides for air conditioned spaces using 33.5% less energy over comparable traditionally designed schools. Heat pumps, as their name suggests, transfer energy from inside the school and reject it to the geothermal field, keeping the school cool. They also can extract energy from the ground and transfer it to inside the school, keeping it warm.



GEO THERMAL WELLS

Geothermal Cooling:
By using the energy difference between the interior of the school and the cool ground temperature (as compared to outside temperature), energy is effectively and efficiently transferred. The heat pumps, in cooling mode, provide all classroom air conditioning needs.

GEO THERMAL WELLS

Geothermal Heating:
In heating mode, the heat pumps take energy from the geothermal loop and transfer it to the classrooms, keeping them warm and comfortable.

Sustainability Comes Full Cycle at Summerfield

From the initial planning and conceptual design, through the entire construction phase and culminating in the daily instructional activities, Neptune Township's Summerfield Elementary School serves as a model for Sustainability and Green School construction. Recently recognized as the first public school in New Jersey to be certified as LEED Gold by the USGBC, this Pre-K-5 elementary school provides a healthy learning environment while at the same time offering numerous opportunities for students to become future ambassadors for our environment.

Design Phase:

Using an Early American, agricultural theme, the school design makes every opportunity to link the building and site with environmentally sensitive learning opportunities. The school borders Green Acres land and includes:

- Nature trail, a solarium corridor to support horticulture related activities
- Music room that opens to an outdoor amphitheater and also serves as a stage for the cafeteria
- Media center that overlooks a bio-retention swale
- Learning center that describes the architectural and sustainable features of the school and an environmental patio outside of the cafeteria. The site design incorporates features such as ground water recharge facilities, water quality treatment, bio-retention swales, rain water collection capabilities for children's garden irrigation and colonial planting beds, a sundial with a compass rosette and shade trees to reduce heat islands.

Construction Phase:

During the construction phase of the school every effort was made to minimize disturbance to the environment, and the ground floor steps with the natural contours of the land to provide barrier free access in several areas around the school. The high performance mechanical and electrical systems, together with the high thermal rating of the building envelope and sunscreens reduce energy consumption by 33% and water usage by 34.6%. Some of these features include: demand control ventilation, a geothermal field with heat pumps, carbon dioxide monitoring, under floor air distribution, superior temperature and humidity control, waterless urinals and low flow fixtures, multi level light switching and room occupancy sensors. During the construction phase extensive use of recycled and locally manufactured materials was used, and the construction waste management plan resulted in a 83.4% reduction in construction waste.

Instructional Phase:

Completing the Sustainability Cycle are the numerous opportunities at Summerfield that provide interactive learning with the environment. Growing plants, measuring energy and water use, understanding the function of bio-retention swales and ground water discharge systems and the benefits of geo-thermal heating and cooling are but a few of the opportunities available to Summerfield students. In addition, members of the EI design team are currently providing professional development programs for the staff and students, as well as helping to develop Green Schools Curriculum activities that will be incorporated into the K-12 curriculum program. In what Superintendent of Schools, David Mooij, calls "**Live Event Learning**", students will actually be using the building and the site as a living textbook so that they can develop skills and lifestyle commitments that will benefit our global environment.

GENERAL PROJECT STATISTICS:

Owner/Client:	Neptune Twp Public Schools, Neptune, NJ
Type of School/	Elementary School
Grades Served:	Pre-K-5
Capacity:	656 Students
Size of Site:	6.7 Acres
Building Area:	101,912 square feet
Square Foot Cost:	\$181.
Construction Cost:	\$18.5 Million
Total Project Cost:	\$22.1 Million
Contract Date:	July 2004
Completion Date:	May 2006

LEED STATISTICS:

Initial USGBC Submittal: 40 points
Final USGBC Certification: 41 points, LEED Gold
(min. 39 points required for LEED Gold)

ECONOMIC/ENVIRONMENTAL STATISTICS:

Energy & Atmosphere:	35.1% Reduction in energy usage
Water Efficiency:	34.64% Reduction in water usage
Daylight & Views:	92.4% of Critical Visual Task areas have direct access to outdoor views
Indoor Environmental Quality:	Carbon Dioxide (CO2) Monitoring System installed Air Change Effectiveness of 0.9 or greater in each ventilated zone Low-Emitting Materials Specified
Materials & Resources:	83.4% Reduction in construction waste 50.55% of materials were manufactured regionally

Why Green Schools?

20% of America goes to school everyday – that's more than 55 million students and more than 5 million faculty, staff and administrators. Over a quarter of these students and teachers attend schools that are considered substandard or dangerous to occupant health. Green Schools are healthy for students, teachers and the environment. Built right, Green Schools are productive learning environments with ample natural light, high-quality acoustics and air that is safe to breathe. Public and private schools alike realize that going Green just makes sense. On average, Green Schools save \$100,000 per year – enough to hire two new teachers, buy 250 new computers or purchase 5,000 new textbooks. If all new school construction and school renovations went Green starting today, energy savings alone would total more than \$20 billion over the next 10 years. By promoting the design and construction of Green Schools, we can make a tremendous impact on student health, test scores, teacher retention, school operational costs and the environment.

What Is A Green School?

A school building or facility that creates a healthy environment that is conducive to learning while saving energy, resources and money.

Thermal Comfort

Comfortable indoor temperatures enhance productivity and keep students more alert. Fresher, cleaner air can be achieved with windows that open or ventilation systems that provide a constant supply of air.

Energy Efficient Lighting

Adequate levels of the right kind of light can save energy and enhance learning conditions. Adding remote sensors, individual controls and task lighting can greatly reduce electricity costs.

Water Efficiency

Low-flow sinks, waterless urinals and dual-flush toilets reduce total water use by as much as 50%. Toilets that use harvested rainwater instead of potable water help ease the strain on municipal water systems. Students get a first-hand lesson in how to use water more conservatively.

LEED Certification: LEED certification confirms that the school has been built to the highest performance standards.

Daylighting

Large windows allow daylight to stream in, reducing energy costs and improving student concentration and performance. Adjustable blinds and shades help reduce glare.

Acoustics

Improved acoustics can be achieved with acoustical ceiling tiles, lined ductwork, and quiet HVAC systems with appropriately placed vents. Classrooms with improved acoustics create a more productive learning environment for children and allow teachers to be heard without straining their voices.

Low-Emitting Materials

Using paint and carpet adhesives that don't emit toxic gasses and using ceiling tiles, wall systems and furniture made with non-toxic materials will improve air quality in the classroom and throughout the school. High indoor air quality keeps students and faculty healthier and reduces absences related to respiratory conditions and other environmental illnesses.

Mold Prevention

Providing adequate ventilation and keeping relative humidity below 60% inhibits mold growth. The presence of mold can lead to serious health concerns, especially in children.

Alternative Transportation Options

Alternative fuel buses reduce CO2 emissions and reduce smog and ground level ozone. Bike racks and safe bike paths and sidewalks encourage an active lifestyle and decrease emissions.

Recycling

Recycling programs that involve students directly teach responsible environmental habits that they can apply at home. Diverting solid waste from landfills reduces impacts on municipal services.

Joint Use Of Facilities

By making school spaces available for use by the larger community, the need for additional facilities decreases, saving costs community-wide and decreasing the environmental impact of the community as a whole.

THE LEADER IN SUSTAINABLE DESIGN



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