Education at Marin Country Day School
Integrating the Sustainable Features of our School Facility
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Marin Country Day School is an independent, K-8 school of about 540 students nestled in Ring Mountain, a Nature Conservancy area in Marin County, California.

The process of designing these buildings began two years ago after the school engaged the architects to develop a Master Plan. Members of the design team included the Head of School, the Director of Environmental Sustainability, Assistant Head of School for Finance, current Board of Trustee members, architects, and parents. The Director of Environmental Sustainability and one of the EHDD architects have worked closely all along, discussing potential curricular ties with each other and faculty.

During the current phase of construction, three buildings are being erected. Two are being added to existing buildings. The new building features that are being incorporated into the curriculum are the green roof, solar water heating, radiant heating and cooling, and daylighting. The site features that are incorporated into the curriculum include the gardens, composting system, and biofiltration areas, as well as Ring Mountain.

As documented below, there are many areas in the curriculum that incorporate the building and site features of the school. In many cases, there are more than 10 hours of instruction per student per year.

As an independent school, we are not obligated to meet state standards and have more freedom in designing our curriculum. The benefit of this freedom is that we are able to change and adjust our curriculum comfortably, which makes incorporating new building and site features easier than if we did have to worry about meeting outside standards. However, our has adopted standards and does meet many of the California State Standards (denoted in parentheses). New teaching and learning opportunities do support our inquiry-based approach to science and we see endless opportunities for using the buildings for student-directed investigations.

Our school mission is as follows:

Our School is a Community That...

*** Inspires children to develop a love of learning, thoughtful perspectives and a diversity of skills**
*** Nurtures in each of them a deep sense of respect, responsibility and compassion; and**
*** Challenges them to envision and work toward a better world.**

We see our new buildings as opportunities to show and teach our students that we can envision and work toward a better world through many actions, such as tracking our energy use, cooling our building with a grass roof, or composting. By teaching our students about all of these actions, we hope they will see the many possibilities in their future for envisioning and working toward a better world through the buildings that they live and work in.

Grade Level	Education for Sustainability
K	**Farm Unit:** Students work in the garden all year, growing and preparing food. The Lower School garden is active the entire year and the greenhouse enables students to garden even during the rainy weather. They are active participants in the school composting program, driving tractors around campus to collect compost from our green buckets and delivering them to the garden every day. They use the finished compost in the garden. Teachers conduct farming simulations in the classroom, looking at the challenges facing farmers to nurture a greater awareness of where our food comes from. (K Standards: 2b, 2c, 3b, 3c, 4a, 4b, 4c, 4d)
1	**Snail Unit:** Students study snails and learn about habitat, lifecycle, food preferences, movement, etc. The snail is one of nature's decomposers, so first graders learn about decomposition and connect that to the school's composting program, learning more about other decomposers and the elements of a successful compost pile. **Bird Unit:** The spring is spent studying birds, specifically, local birds. Our school is surrounded by Marin County Open Space so there are plenty of opportunities to learn about birds right from campus. Students learn about the environmental needs of birds and what we can do to preserve their habitat. They engage in a service learning project, like planting certain flowers for hummingbirds. (First Grade Standards: 2a, 2b, 2c, 2d, 4a, 4b, 4c, 4d, 4e)
2	**Bay Study:** 2nd graders spend the first half of the year studying the San Francisco Bay. MCDS is on the Bay and part of the Ring Mountain watershed. Students learn about the watershed, what makes an estuary, non-source point pollution, and have stenciled storm drains on campus as a part of this study. The green roof is incorporated into this study as an example of something that slows down storm water run off. Students also learn about water harvesting. (Second Grade Standards: 2a, 2b, 2c, 2d, 3a, 3b, 3c, 3d, 4a, 4b, 4c, 4d, 4e, 4f, 4g,)

3	**Structures Unit:** 3rd graders spend the first half of the year studying structures: What is a structure, what makes a structure strong, what materials are used to make structures, what natural forces affect structures and what makes a structure sustainable are some of the guiding questions for this unit. The third grade teachers were able to take advantage of the buildings under construction to enhance this unit. **Energy:** Students spend the second half of the year studying electricity and renewable sources of energy: wind, water, and solar power are the main areas explored. Students learn about the pros and cons of each kind of renewable energy. The future PVs at Marin Country Day School will be a great teaching tool for this unit and we hope to also have a small teaching wind turbine in the future. The final project of the year is blending the structures and energy units to help students explore the notion of sustainable buildings. (Third Grade Standards: 1a, 1b, 5a, 5b, 5c, 5d, 5e, Fourth Grade Standards 1a, 1g)
4	**Native/non-native plans study:** Students spend the first half of the year exploring the plants of Ring Mountain, a nature conservancy area adjacent to the school. They learn about both native and non-native plants and participate in a service learning project such as creating field guides for hikers, creating a website, and a newsletter, all to raise awareness about the ecosystem of this area. **Light:** Fourth graders begin the light study by observing shadows. They learn that light travels in a straight line and that light is made up of multiple images of the light source. During their shadow investigations, students learn about the motion of the earth relative to the sun. This information, coupled with the idea of light traveling in a straight line, will enable students to understand the practice of daylighting a building. Students will look at the new construction and compare it the older buildings on campus to understand why the architects designed the buildings the way they did. Using Google Sketch Up, students design their own daylit buildings incorporating the principles they have learned. (Third Grade Standards 2a, 2b, 2c, 2d, 4a, 4b, 4c, 4d, 4e)
5	**Ecosystems:** The first half of the year is spent studying ecosystems and beginning an all-year study of Ring Mountain, the Nature Conservancy land adjacent to the school. Students learn about the nutrient cycle and the role that decomposers play in the compost. The interdependence of all the elements of ecosystems is also taught. **Conservation:** 5th graders embark on a study of resources and design conservation projects at school. Past projects have affected lasting change at the school such as making ceramic mugs available instead of paper cups, metal spoons instead of plastic in the lunchroom, big containers of ketchup and mustard instead of individual servings, etc. Students have looked at the school's various transportation options, tracked the distance the fruit travels, and calculated water usage.

6	**Ecological footprint and food:** Students learned about the concept of ecological footprint, then started to look at food in their homes. They figured out which foods came from the farthest away and the closest to home. The final project involved mapping the ingredients of a favorite snack food to begin to understand the environmental impacts involved in food production. **Water:** Students learn about the water cycle, watersheds, and do a water study to learn more about the content of the water coming from their faucets at home. Our future rainwater harvesting and cistern fit in perfectly to this study. Students learn about the importance of water as a resource and can appreciate the significance of using harvested rainwater for toilet flushing. Students will also learn about biofiltration and how the green roof helps slow down storm water runoff as well as some newer areas in the landscaping with semi-permeable surfaces are also examples of slowing down storm water runoff **Green Building Project:** Students conduct a research project on an element of green building design to connect to the buildings being constructed at their school: green roof, PVs, radiant heating and cooling, air quality, day lighting, LEED, composting, and energy efficiency. This year students will help with tours of the new buildings at an event for the whole community and will share what they know about these features of the buildings. Possible curricular ties: **Heat & Temperature:** During this unit, students could conduct experiments using infrared thermometers to compare the newer white roofs with the older dark roofs (as well as the green roof). They could also test double-paned vs single-paned windows.
7	**<u>Possible curricular ties:</u>** **Life science:** Using the Upper School garden to teach ecosystems using native plants and for a native plant nursery. Learning about the carbon cycle and how it relates to our composting system and the microorganisms that play a part in this. Biomimicry: learning about the science of mimicking nature to solve problems or advance technologies. The solar panels at school are a great example. **Human Biology:** Affect of air quality on the human body, rise in CO2 in rooms and how it affects the body (circulation/respiration). Students can conduct experiments by measuring CO2 in rooms with windows and doors shut and what happens over time vs rooms with better ventilation, like our new classrooms.

8	**<u>Possible curricular ties:</u>** **Environmental Science:** 8th grade has an environmental science unit that can incorporate anything about the buildings. PVs would be a great unit for the age group because they can understand the complexities of how solar energy is converted into electricity.