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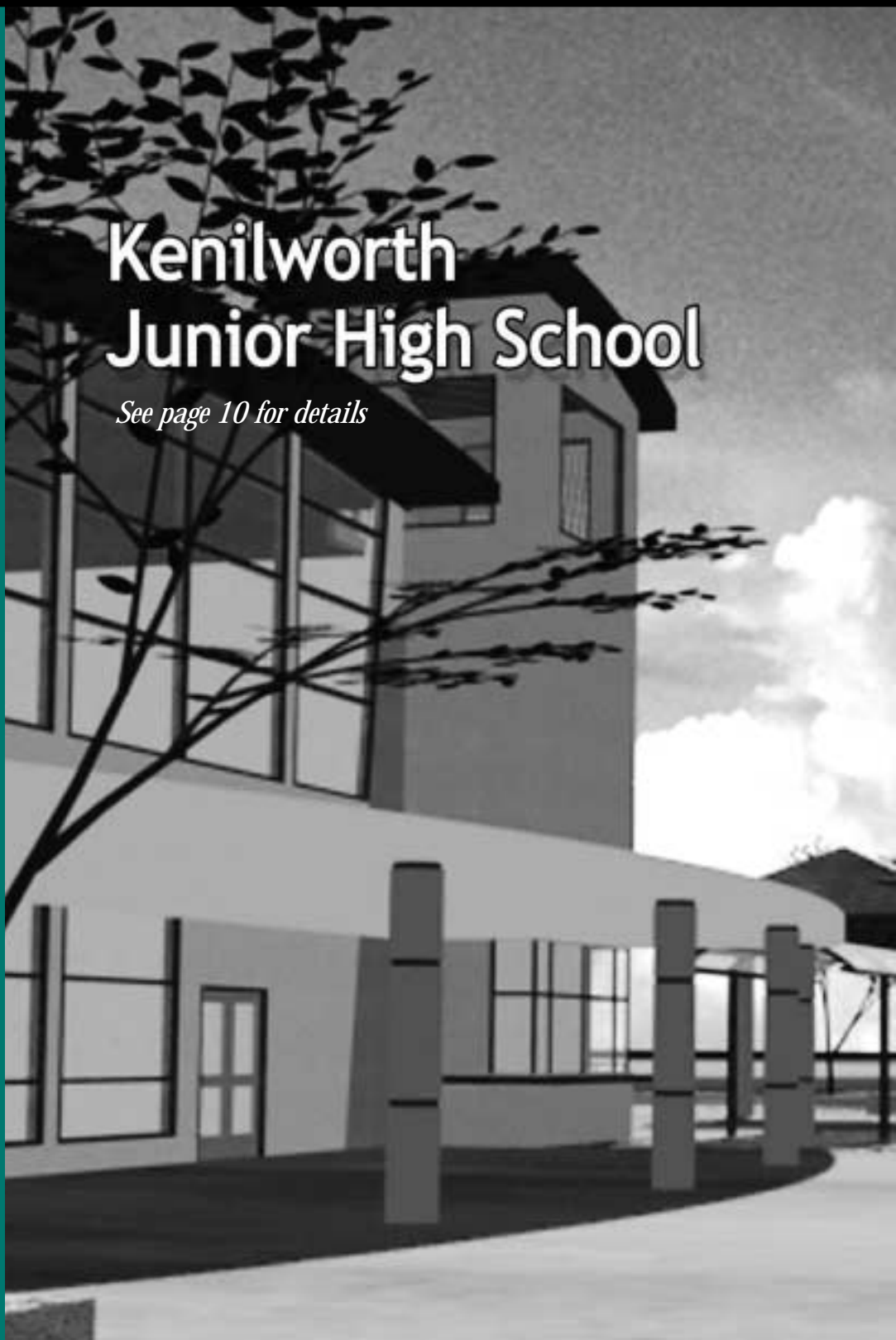
REGISTER

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THE NEWSLETTER OF THE COALITION FOR ADEQUATE SCHOOL HOUSING

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Kenilworth Junior High School

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The Making of a California High Performance School

When the Petaluma School District decided to replace an aging Kenilworth JHS campus with a new school and site, it wanted to include a wide variety of sustainable, healthy and energy-efficient features that reflect the community's progressive spirit.

When completed, the new Kenilworth JHS will meet standards of the Collaborative for High Performance Schools (CHPS) and reduce energy usage by roughly 25% over and above Title 24 standards.

CHPS' goal is to help create "environments that are not only energy efficient, but also healthy, comfortable, well lit and contain the amenities needed for a quality education." CHPS has produced a series of excellent "Best Practices Manuals" available free at its

website (www.chps.org). To aid designers, a "Scorecard" lists six major areas: site, water, energy, materials, indoor environmental quality, and District resolutions. A project is assigned an increasing number of points for greater conformance with goals in each area.

To help achieve a CHPS designation, the Petaluma District carefully chose the site itself to be centrally located, reducing transportation usage. Bike racks and bike lanes will encourage students to use cleaner, simpler transport. To conserve resources, the community will enjoy joint use of school facilities as well.

Some energy-efficiency features are extremely simple and add little or no cost to the project. For example, computer simulations showed how to orient windows to maximize daylighting while minimizing solar heat gain and glare. In addition, instead of aligning the campus with its major

access road, as is traditional, each building is rotated to a true north-south axis, making the windows and overhangs perform better. Cool Roofs on most buildings will help cut cooling loads and avoid creation of a "heat island."

A High Performance School should include wise use of water, low-emittance and recycled materials as well as energy efficiency. Among other features, Kenilworth will incorporate water-saving plants and landscaping practices, waterless urinals, and high levels of recycled fly ash into its concrete slabs.

By reducing heating and cooling loads and improving daylighting, the campus' innovative electrical and mechanical systems can work easier and more efficiently. High-efficiency lighting systems, combined with daylighting and occupancy sensors, will produce proper lighting at all times while minimizing energy use. Photovoltaic panels will help offset electric utility bills. Careful outdoor lighting design will minimize light pollution as well.

The school's mechanical systems will incorporate old and new ideas for sustainability, efficiency and a healthy environment. Most buildings will be served by radiant floor heating systems, a mainstay of schools built in the boom years after World War II. Unlike those older projects, today's radiant systems use specially formulated, continuous polyethylene tubing loops for reliability and durability. Small, high-efficiency boilers at each building complete these simple, easily maintained systems to complement today's smaller maintenance staffs and tighter budgets.

In a new twist on this old idea, a few classrooms will experiment with radiant cooling as well. Chilled water will circulate through the floor tubing under careful control to provide cooling without condensation. Except for these few areas, the classrooms will not be mechanically cooled. Variable speed ceiling fans under teacher control will provide cooling breezes for students when temperatures rise.

To supplement natural ventilation from operable windows, each classroom will use a variable speed fan to bring in fresh outdoor air. The fans will be tied to carbon dioxide sensors that will start and accelerate the fans only as needed to provide additional ventilation. Indoor air quality will be enhanced

further by the use of "walk-off" mats at entrances to trap dirt from the shoes of active students, and by the use of linoleum instead of vinyl or acrylic flooring that emits volatile organic chemicals (VOC's). The

acoustical environment has been improved by careful use of sound-absorbing materials in the classrooms.


Perhaps the most innovative (and architecturally dominant) energy-efficient system will be giant "Cooltowers" attached to the gymnasium, multi-use and library buildings (see computer rendering). The Cooltowers, each more than 30 feet tall, are passive cooling units that rely on evaporation and gravity, rather than compressors and fans, to cool air and circulate it throughout the buildings.

Each tower includes three main components: large evaporative pads at the top, one on each side, connected to a water sump and circulation system; a tall "chimney"; and a large roll-up door

at the base of the tower that opens into the space to be conditioned. Operable windows or louvers high within the conditioned space work together with the tower to complete the system. To start, the roll-up door and windows/louvers are opened and the water pump turned on. As air passes through the

evaporative pads, it becomes cooler and heavier, falling down the chimney and spilling into the conditioned space. Warmer air within the building is pushed out of the operable

windows to complete the circuit. The largest Cooltower should produce over 14,000 CFM of 65°F air on an 80°F day. Although Cooltowers are most effective in hot, dry climates, the District hopes they will prove a wise investment in more temperate Petaluma.

The new Kenilworth JHS should break ground by press time. When it opens in August 2005, it will join the ranks of CHPS-designated schools that provide healthy, efficient and sustainable places to educate our children. 

Jim Horn, P.E. is president of Horn Engineers, a consulting mechanical/electrical engineering firm in Santa Rosa, CA that specializes in school design. He is also a trustee of the Gravenstein Union School District near Sebastopol, CA.



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Brelje & Race Civil Engineers
ZFA Structural Engineers
Horn Engineers (mechanical)
O'Mahony & Myer Electrical Engineers
Quadriga Landscape Architects
Walsh-Norris & Associates (acoustical)
AIM (sustainability consultant)
Martin Yoklic (Cooltower consultant)

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