# Los Angeles Pierce College

**Los Angeles, California**

*Pierce College Faces Comfort Challenge*

**Growing College Chooses Hybrid Design for Central Cooling**

"This location has its own microclimate. Even for Los Angeles, it's hot. It's not unusual for summer temperatures to reach 108°F. That's why air conditioning was a priority." This is consulting engineer Kevin Smola describing conditions at Los Angeles Pierce College in the San Fernando Valley, northwest of Los Angeles. The college is a member of the Los Angeles Community College District, the largest system of two-year higher education in the United States.

Pierce College is proud of its reputation as a leader in transferring students to UCLA, U.C. Irvine, USC, Pepperdine University and California State University-Northridge. In recent years, the college is also recognized for its aggressive outreach programs toward non-traditional students and those with special needs. The school serves 13,000 students in programs of vocational education, continuing career education, and preparation for schools offering advanced degrees.

**Growing Enrollment Drives Need For Improvements**

The spacious 400-acre campus adjoining Winnetka Avenue is notable for its wooded park-like appearance. With a history going back to the late 1940s, the school

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in recent years has had increases in student contact hours – the measure of its educational activity – in excess of 20 percent annually. As the educational mission expanded, so did the demands that the school placed on its facilities.

In the late 1990s, under the leadership of president Darroch "Rocky" Young, the administration studied future campus requirements. Needed improvements were identified, including new buildings, communications facilities, signs, and landscaping. Plans were also set for a broad lighting improvement program that would dramatically reduce energy costs and improve lighting levels.

Also specifically identified was the need for a broad expansion of air conditioning in campus buildings. Hot conditions in educational and administrative areas had caused unacceptable class cancellations and were interfering with learning and operational efficiency.

**Campus Cooling Plan Formulated**

Consulting mechanical engineering firm Kevin Smola and Associates was retained to assist in developing a comprehensive campus cooling plan. An initial survey revealed that only scattered buildings had cooling systems. Many of these were room units and small package units, often quite old and inefficient. Where there were duct systems for heating, cooling, and ventilation, they were commonly a dual-duct, constant-volume design.

As the cooling needs were identified, Smola 's firm and the college did a comprehensive review of the options for HVAC plant improvements. Planning must include provisions for continuing building expansion on the growing campus. Ultimately the Smola firm recommended – and the school accepted – a plan for a central chiller plant and a chilled water pipeline system. The system would be designed to eventually encompass the entire campus. Additionally, the decision was made to improve or replace existing dual-duct systems with a variable air volume (VAV) design. A pressure – independent system would improve distribution and temperature control and would enhance indoor air quality (IAQ).

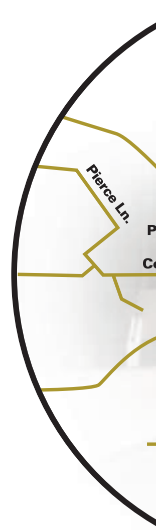
**Hybrid Plant Design Chosen**

The type of chiller plant ultimately selected was a hybrid design, with an absorption chiller and an electric centrifugal chiller operating in series. According to Smola, the hybrid approach allows the college to take advantage of off-peak rates from both the electric and gas suppliers. In addition, this design offers flexibility and security under changing future energy supply conditions. The chilled water system is designed with a chilled water delta T of 18°F. This comparatively large delta T is made possible by chilled water delivery in the range of 42°F. The benefit is reduced investment for piping and pumps and reduced pumping costs.

The proposal included construction of a mechanical plant building on campus. Nearly a mile of fiberglass pre-insulated chilled water pipe, ranging from eight down to two inches in diameter, will be needed on the campus. The chilled water distribution system makes provision for future extensions to buildings in a second stage.

Among the buildings to be initially supplied with chilled water are the north and south gymnasiums, the administration building, and numerous academic buildings. In the next phase, as lines are extended across the campus, chilled water service will be extended to the library and social sciences buildings as well as other facilities.

At Smola's recommendation, in many locations the dual-duct, constant-volume systems were converted to "simulated" VAV operation by the addition of ventilation duct and a



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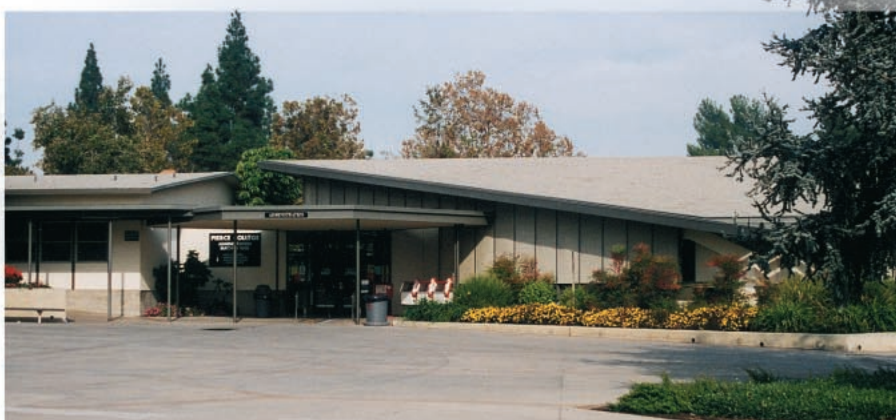
third damper in the mixed-air stream. In other cases, new VAV boxes were installed on existing ductwork or on new duct systems. The system as designed will allow the cold duct to be modulated from 100 percent to 0 percent and the hot duct from 0 percent to 100 percent, with a preset minimum 40 percent of ventilation air. The entire system is based on a design temperature of 108°F.

Work on system improvements began in early 1999 and the first stage was operable by January 2000. The mechanical contractor for the project was All Temperatures Controlled of Chatsworth, California. Michael Hart from that firm indicates that the chiller installation itself was uneventful. The new plant building



had been designed to allow ample space for installation and maintenance access. Installation of the chilled water lines was coordinated with the college to minimize disruptions to classes and campus traffic.

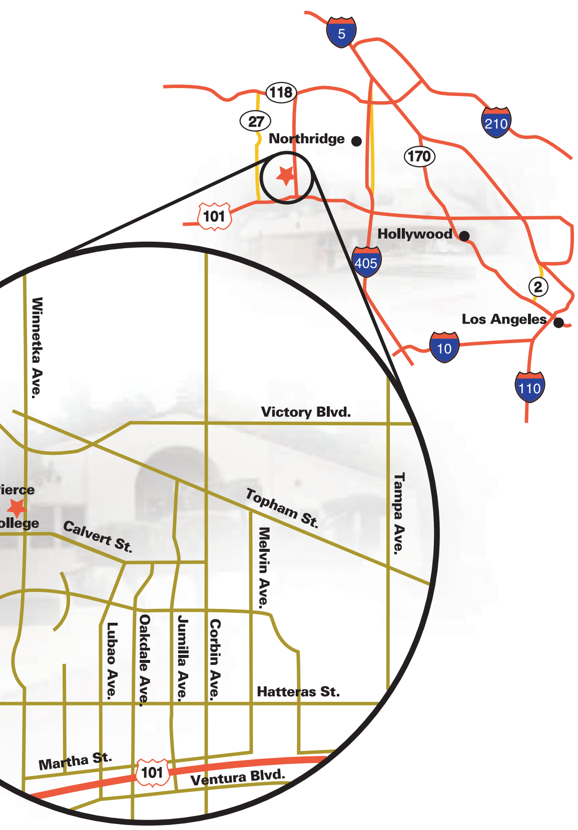
The chillers selected for the project were a Trane CenTraVac™ Model CVHE centrifugal chiller rated at 312 tons and a Trane Horizon™ absorption chiller rated at 458 tons. The electric power supplier is the Los Angeles Department of Water and Power and the gas supplier is Southern California Gas Company. Natural gas for steam supply is purchased through a contract with the California Office of General Services that has statewide contracts with gas producers for supplies to public facilities.

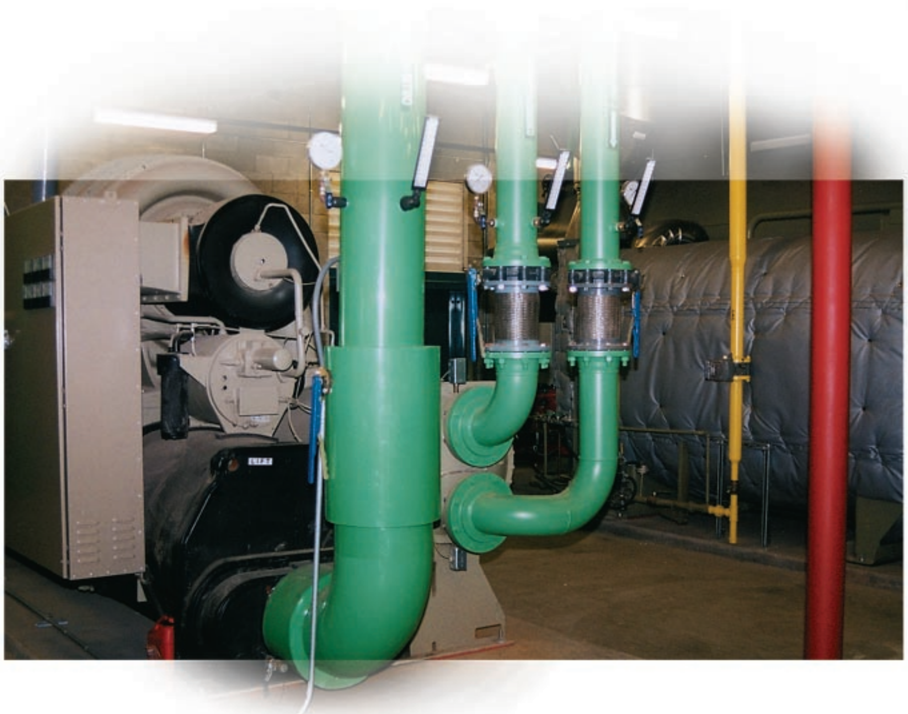
**Special Challenges In California**

The college's location in California presented special challenges for central chiller plant design. The campus is only 2.5 miles from the center of the 1994 Northridge earthquake, one of the most costly disasters in American history. The new facilities had to be built to meet the rigorous standards of Seismic Zone 4, which meant additional bracing, clearances, shock supports, and piping restraints.

The chiller plant has adequate capacity for the first two stages of plant expansion. With growing enrollment and new facilities on the campus, additional chiller capacity can be added in the spacious chiller plant building. Administration, faculty, and students immediately noticed the value of the central cooling system. Kevin Smola notes, "The college administration believes the improved climate for learning will result in increased enrollment and educational contact hours."

Under the series chiller design, the chilled water path is first through the absorption machine and then through the centrifugal chiller. The decision on which chiller to base load is based on prevailing energy prices. As load on the first chiller approaches 90 percent, the second chiller is brought online and the loading on both chillers is optimized for total





system efficiency. Smola points out that this series operating concept was chosen over a parallel design because its overall efficiency was calculated to be better by two to three percent.

Smola feels that the hybrid plant approach has been a success, in part, because of the aptitude and training of the college staff. He notes that HVAC supervisor Frank Vitone and his staff made a commitment to success by learning about the system and understanding the energy supply process. Vitone indicates, "We attended training classes and got to understand the equipment and the process. When startup time came, we were ready."

According to Smola, "For this type of system to pay off, you need to have good data going in, including detailed utility bills. You need to understand the energy purchasing process and you need to have the political will to make the right energy supply decisions on a recurring basis. You need to have trained operating personnel. Pierce College was ready to make that commitment."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