

EDUCATIONAL INSTITUTION PROJECTS

As a part of ERA's regular consulting activities, the firm has taken on numerous assignments for educational institutions, ranging from elementary school districts to community colleges and universities and teaching hospitals. A sampling of these assignments includes:

- **Belmont School District - HVAC Infrastructure Renewal Program.** Similar to many districts with aging facilities, the District was facing actual and imminent failure of the heating and ventilating systems in a number of schools. ERA performed feasibility investigations on five different schools, and performed final design and provided construction observation services as well. A summary of the work performed at each school is as follows:
 - Nesbit Elementary:
 - new overhead heating hot water distribution piping system from boiler room to all buildings
 - new coils in existing fan coil units and convectors
 - new overhead fan coil units for kindergarten and library buildings (in-floor radiant heating had failed)
 - new high-efficient lighting system for the multi-purpose room
 - energy management system for the entire site
 - Fox Elementary:
 - refurbishment of existing rooftop H&V units (cleaning, painting, servicing of fans and controls)
 - replace thermostats and service reheat valves
 - energy management system for the entire site
 - Central Elementary:
 - replace in-classroom furnaces and install new controls to coordinate 100% outside air economizers and exhaust fan operation
 - refurbishment of existing rooftop H&V units (cleaning, painting, servicing of fans and controls)
 - energy management system for the entire site
 - Ralston Middle:
 - refurbishment of existing in-classroom unit ventilators (cleaning, new unit controls, new thermostats)
 - replace rooftop units for locker room and shower building
 - energy management system for the entire site
 - Cipriani Elementary:
 - new boiler, pumps and controls to replace existing failed boiler for the site
 - new overhead heating hot water distribution piping system from boiler room to all buildings
 - new overhead fan coil units for all classroom buildings (in-floor radiant heating had failed)
 - energy management system for the entire site
- **Morgan Hill Unified School District - Energy Retrofit Program.** Concerned about high energy use and cost and the cost of servicing a wide-spread district, the District initiated an energy retrofit program.

The program started with a comprehensive study of the newest facility in the inventory, the “new” high school. While of recent vintage, major opportunities for energy efficiency improvements abounded at this site, and resulted in a project that included:

- an energy management system for the entire site, including digital thermostats for the rooftop units for each classroom
- lighting fixture retrofit and controls in all areas of the campus, both indoors and out, including replacing the mercury vapor fixtures in the locker rooms with industrial-style surface mount fluorescent fixtures (the enclosed mercury vapor fixtures were nominally more efficient, but the fixture enclosure so effectively trapped the light in the fixture that the fluorescent fixtures used less than half the wattage to produce a lighting level twice as high - and were automatically controllable)
- cogeneration for the swimming pool

The high school project was so successful that the District then proceeded to implement the program district-wide. Indeed, the maintenance manager’s ability to remotely diagnose rooftop unit problems using the new building automation system and dispatch service mechanics with the correct repair parts was an impressive improvement in manpower utilization! The program for the rest of the District was similar in that it included:

- an energy management system for every school site
- lighting fixture retrofit and controls in most facilities
- cogeneration for the swimming pool at the middle school (which was formerly the high school)

- **Foothill - De Anza Community College District HVAC Master Plan and Performance Contracting Program.** The District was planning to engage a performance contractor, and needed to identify the total HVAC infrastructure renewal needs for overall budgeting purposes. For both of these purposes, ERA was hired to prepare an HVAC Master plan, which included inventorying the HVAC systems and equipment, visually inspecting same, and identifying system deficiencies. In addition, the plan included an overall strategy for future HVAC systems, including the consolidation of refrigeration machinery on the De Anza campus by applying ERA's proprietary *Virtual Central Plant* technology (a melding of plant integration, automation and variable flow). In addition, a similar strategy was developed to add air conditioning to the Foothill campus. ERA ultimately identified a total budget need in excess of \$10,000,000, and managed the District's engagement of a performance contractor to implement a major portion of the needed work.

Other work at the college has included the HVAC design for the ATC Secondary Effects Building.

- **Santa Clara University Facility Condition Assessment and Performance Contracting Program.** Similar to Foothill - De Anza, the University was planning to engage a performance contractor, and needed to identify the total HVAC infrastructure renewal needs as well as begin the process of consolidating HVAC and electrical prime-mover (chillers, boilers and emergency generators) in lieu of stand-alone individual building systems which were exceeding the University's ability to keep up with their maintenance and repair. For these purposes, ERA was hired to prepare a Facility Condition Assessment, which included inventorying the HVAC systems and equipment, visually inspecting same, and identifying system restoration needs.

This data was assembled into a comprehensive Microsoft ACCESS database (FCAD). In addition, ERA prepared a conceptual design for the first mini-utility plant. ERA ultimately identified a total budget need in excess of \$18,000,000, and managed the University's engagement of a performance contractor to implement a major portion of the needed work.

- **University of Judaism, Los Angeles, CA.** Concerned about operating cost and facility operations, the University initiated a comprehensive energy retrofit program. The first phase was to conduct a detailed analysis and feasibility study of the facility. A unique University providing educational, community and cultural services, it presented quite a challenge from an energy retrofit perspective. The investigation did identify numerous opportunities for energy savings and facilities management improvements, and was pursued by the University in a comprehensive retrofit installation, including:
 - comprehensive indoor and outdoor lighting fixture retrofit (including an innovative surface-mount classroom fixture lighting system which reduced the existing luminous ceiling power consumption by more than 60%!)
 - occupancy-based lighting controls for classrooms and offices
 - an energy management system for the entire site
 - digital controls for the main air handling system and chillers
 - classroom fan coil unit control integrated with the occupancy controls for the lighting system
 - a sub-metering system to allocate power being consumed by the food service concessionaire at the site
 - special environmental controls for the mikvah

- **U.C. Davis Medical Center - Investigation of Chilled Water Distribution System.** Practically since it was first built, this 500,000+ square foot acute care hospital suffered from inadequate cooling in the summer months, with transplant and ICU patient room temperatures approaching 90°F in the summer months - for days at a time! In the early 1990's, a large project was commissioned to correct this problem, but resulted in making the situation worse, rather than better. In 1996 ERA was engaged to perform a thorough investigation of the system. This task included preparing floor plans, isometrics and a schematic diagram for the entire chilled water distribution piping system encompassing all of the piping work performed over more than 50 construction projects over the years. These drawings were then verified/corrected in the field with the assistance of the operations and maintenance staff. Next a computer model of the piping system was prepared and this analysis clearly revealed that the use of a constant flow system with booster pumps at each air handling unit was over-pumping the water and actually causing water to flow backwards through significant portions of the piping system. The result, which explained the building's poor cooling performance, was that many air handling units were receiving warm return water flow backwards through their coils. ERA developed a \$1,400,000 remediation plan which consisted of conversion of the entire system to variable flow, elimination of all booster pumps and the installation of digital controls for the variable speed main chilled water pumps. This project was implemented in early 1997, with the result that the entire building was comfortable for the first time in 25 years! In addition, the few small areas in the hospital that suffered from cooling problems not related to the flow problems (inadequate airflow, undersized controls, etc.) could be focused on and resolved.

Ongoing work at UCDCMC includes, in mid-1998, the creation of a new high pressure, fluid heater, satellite boiler plant at the main hospital. The construction of this facility will allow closure of the old main boiler plant at the facility and is being implemented on a fast-track basis.

Work for Other Institutions. In addition to the projects above, ERA has done numerous other projects for a wide variety of institutions, including, for example:

Studies and Investigations:

Delaware State College, Dover, DE	Energy Retrofit Feasibility
East Central University, Ada, OK	Energy Conservation Potential Assessment
Elk Grove High School, Elk Grove, CA	Energy Conservation Potential Assessment
Fresno Pacific College, Fresno, CA	Energy Retrofit Feasibility
Gavilan College, Gilroy, CA	Cogeneration Feasibility
Jesse Jones High School, Houston, TX	Energy Retrofit Feasibility
Jesuit High School, Sacramento, CA	Energy Conservation Potential Assessment
Laney Community College, Oakland, CA	Master Plan for Swimming Pool Restoration
Los Alamitos High School, Los Alamitos, CA	Energy Retrofit Feasibility
Moreland USD, San Jose, CA	Multi-School Heating System Replacement Study
Ohlone Community College, Fremont, CA	Energy Retrofit Feasibility
Pacific Grove USD, Pacific Grove, CA	District-Wide Energy Retrofit & Cogeneration Feasibility
Rio Lindo USD, Rio Lindo, CA	District-Wide Energy Retrofit Feasibility
Riordan High School, San Francisco, CA	Energy Retrofit Feasibility, HVAC Restoration
Solano Community College	Chiller Plant Replacement, Thermal Storage and Energy Retrofit
St. Mary of the Plains College, Dodge City, KS	Energy Retrofit Feasibility
Stockton Unified School District, Stockton, CA	Stagg High School Energy Retrofit Feasibility
Stockton Unified School District, Stockton, CA	Edison High School Energy Retrofit Feasibility
Stockton Unified School District, Stockton, CA	Franklin High School Energy Retrofit Feasibility
Tulane University Medical School, New Orleans, LA	Energy Retrofit Feasibility
University of Texas, Austin, Dobie Center	Energy Retrofit Feasibility
Utah State University, Logan, UT	Energy Conservation Potential Assessment
Yuba City High School, Yuba City, CA	Energy Retrofit Feasibility

Project Design and Management:

Laney Community College, Oakland, CA	Repair Earthquake Damage to Swimming Pool
Laney Community College, Oakland, CA	Replace Steam Distribution system in Dry Cleaning Lab
Riordan High School, San Francisco, CA	Energy Retrofit and HVAC System Replacement
Solano Community College	Boiler Plant AQMD Permitting and Burner Modification
St Mary's Elementary School, Walnut Creek, CA	Air Conditioning Installation
Tulane University, New Orleans, LA	Energy Retrofit
University of California, San Francisco	Install Health Science Building Potable Water System

Other Projects:

Marysville Joint Unified School District, CA	Review Performance Contracting Audit and Proposal
Fort Bend School District, Fort Bend, TX	Monitor and Evaluate Energy Services Project
Larson & Burnham	Expert Witness, University Campus Chilled Water Distribution Piping Failure