

The official publication  
of the Association  
of Physical Plant  
Administrators of  
Universities and Colleges

# Facilities Manager

Volume 6 Number 1

Spring 1990



1985



1987



1986



1988



1989

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# Facilities Manager

ANNUAL MEETING PREVIEW  
PAGES 56-59

**Facilities Manager** (ISSN 0882-7249) is published quarterly (Spring, Summer, Fall, Winter) by the Association of Physical Plant Administrators of Universities and Colleges, 1446 Duke Street, Alexandria, Virginia 22314-3492. Editorial contributions are welcome and should be sent with SASE to this address.

Of APPA's annual membership dues, \$30 pays for the subscription to *Facilities Manager* and APPA Newsletter. Additional annual subscriptions for both periodicals cost \$40 (\$50 for non-U.S. addresses).

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POSTMASTER: Send address changes to *Facilities Manager*, 1446 Duke Street, Alexandria, VA 22314-3492.

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Date of Completion \_\_\_\_\_  
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# APPA UPDATE

NEWS FROM THE ASSOCIATION OF PHYSICAL PLANT ADMINISTRATORS OF UNIVERSITIES AND COLLEGES

Critical Issues in  
Facilities Management

6

ENERGY  
MANAGEMENT

APPA  
Association of Physical Plant  
Administrators of Universities and Colleges

## APPA Publishes New Energy Management Book

APPA has added a sixth book to its Critical Issues in Facilities Management series, *Energy Management*. This publication includes chapters on a circulating fluidized bed boiler project, by David J. Miller; holistic energy management, by Jeffrey W. Kanzelberger; creative funding of energy conservation projects, by Eugene Simko; privately financed cogeneration, by David L. Wenner; how to structure an energy management and conservation program, by M. Reza Karkia, and much more. Mohammad Qayoumi, associate executive vice president of facilities development and operations at San Jose State University (CA), wrote the introduction.

This book is 147 pages and costs \$22 for members, \$30 for nonmembers, plus \$8 shipping and handling. To order your copy send your purchase order number or check to P.O. Box 753, Waldorf, MD 20604.

Other books available in the Critical Issues series include *Computer Applications*, *Work Control*, *Personnel Management*, *Capital Renewal and Deferred Maintenance*, and *Management Basics*.

## Information Exchange

Facilities maintenance and operations at **Clemson University** is assisting the College of Architecture's building science de-

partment in developing a new facilities management curriculum. If you know of existing facilities management programs, undergraduate or graduate, please contact Gary Pringle, Associate Director of Facilities Maintenance and Operations, Clemson University, Clemson, SC 29634-5901; 803/656-4939, fax 803/656-0144.

## Awards Available for Administrators

The Council for International Exchange of Scholars (CIES) has made three awards available for American college and university administrators, including facilities managers, under the United States-United Kingdom Academic Administrators Program, part of the Fulbright program. The awards provide opportunities for administrators to broaden their professional perspectives and enhance cross-cultural skills and insights.

Administrators from four-year institutions only are eligible. The awards are designed for career administrators and are not appropriate for faculty. Projects may be single purpose or comparative in scope, and investigative or operational in focus. Proposals that have a bearing on issues of common concern to administrators in the United States and the United Kingdom are particularly welcome.

Each project will need to be linked with an office affiliated within the formal administrative structure of a university, polytechnic, or other degree-granting institution in the United Kingdom. Applicants are expected to arrange affiliation with one of the designated participating institutions in the United Kingdom and to present a letter of invitation with their application. Awards are for a minimum duration of three months and grantees are expected to be on paid leave of absence from their home institutions as a condition of the grant.

Winthrop M. Wassenar, director of physical plant at Williams College (MA), received this award last year. He was in the United Kingdom from October 1, 1989 to January 4, 1990. Wassenar said, "It is a great program—a wonderful opportunity to go over and see what people are doing in another country." If you are planning to apply for this award,

Wassenar advised that you should pay special attention to your project. "The project description is crucial. It should be something that will help both institutions gain knowledge."

Wassenar's award allowed him to study planning, computerization, and energy conservation, comparing physical plants in the United States to ones in the United Kingdom. He is presently preparing a report on his findings.

Wassenar said, "They are much more into recycling [in the United Kingdom] than we are here, so I found myself spending lots of time on conservation. The program allows you a lot of freedom to pick a path. I went to a number of universities to see what they were doing [in energy conservation and recycling]."

The deadline for applications is **November 1, 1990**. For more information and a list of institutions approved for affiliation, contact the Council for International Exchange of Scholars, 3400 International Drive, N.W., Suite M-500, Washington, DC 20008; 202/686-7878.

CIES is also offering a four-week, spring 1991 seminar in Germany on "An opportunity to discuss educational, cultural, and political issues in academic exchange." For more information or to obtain an application form and instructions, contact CIES Administrators—Germany, at the address and telephone number above.

## Improving Safety

OSHA is initiating a number of plans to improve construction safety. Some of these actions include creating a new Office of Construction and Engineering within OSHA, improving inspection scheduling, and appointing a liaison for small businesses to keep on top of the needs of small construction contractors and subcontractors. Be watching for implementation of some of these changes.

• • •

*Is your institution experiencing major personnel changes or undertaking special activities? If so, please send them to us for possible inclusion in the newsletter. Send all items to Stephanie Gretchen, Editor, APPA Newsletter, 1446 Duke Street, Alexandria, VA 22314-3492; 703/684-1446, fax 703/549-2772.*



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## Inside APPA

### Books Available for Review

The following books are available for review. Reviews will be published in future issues of APPA's quarterly magazine, *Facilities Manager*. When you submit a completed book review you may keep the book you reviewed with our compliments. You will also receive copies of the issue in which your review appears. Call Stephanie Gretchen at 703/684-1446 for more information or to reserve a book.

- *Age Discrimination: An Administrator's Guide*
- *Artificial Intelligence Applications in Engineering*
- *Building Productive Teams: An Action Guide and Resource Book*
- *Community Right-To-Know Handbook*
- *Confronting AIDS: On the Campus and In the Classroom*
- *Crimes and Transgressions on College and University Campuses 1988-89*
- *The Cynical Americans: Living and Working in an Age of Discontent and Disillusion*
- *Environmental Statutes 1989 Edition*
- *Getting Disputes Resolved: Designing Systems to Cut the Costs of Conflict*
- *Groups that Work (and Those That Don't)*
- *High-Involvement Management*
- *How 25 Hospitals are Saving Millions in Energy Use*
- *Lawns: Basic Factors, Construction and Maintenance of Fine Turf Areas*
- *Managing Change in Higher Education: Preparing for the 21st Century*
- *Managing Projects in Organizations: How to Make the Best Use of Time, Techniques, and People*
- *Managing the Training Enterprise: High-Quality, Cost-Effective Employee Training in Organizations*
- *Planned Maintenance for Productivity and Energy Conservation*
- *Productivity in Organizations*
- *Recreation Resource Management*
- *Strategic Planning and Energy Management*
- *Strategic Planning for Public and Non-Profit Organizations*
- *Training and Development in Organizations*
- *Thermal Insulation Building Guide*

### Maintenance and Construction Covered

The February 19, 1990 issue of *Community College Week* reported on various maintenance and construction issues, including retrofitting older facilities for new needs, community colleges' new facilities, and excellence in facilities management. For more information or a copy contact *Community College Week*, 10520 Warwick Avenue, Suite B-8, Fairfax, VA 22030; 703/385-2981.

### Asbestos Case Refused

Mercer University (GA) filed a suit in 1985 to recover more than \$2 million it paid to remove asbestos-containing materials from its buildings. A jury awarded the university \$2.4 million. However, the 11th U.S. Circuit Court of Appeals overturned that verdict citing the state's four-year statute of limitations on property damage cases, according to the NACUBO *Business Officer*. The U.S. Supreme Court refused to hear the case and let stand the Circuit Court's ruling.

### Pay Raises Don't Match Inflation

The February 21, 1990 issue of *The Chronicle of Higher Education* reported that college and university administrators' salary raises increased an average of only 4.5 percent, while inflation rose 5 percent. Last year public school administrators' salaries increased 4.9 percent, with an average salary of \$44,076 for chief physical plant officer. This year the salary for the same position is \$45,000.

### Correction

In the February APPA Newsletter, page 3, subscribing member Applied Management Engineering was identified incorrectly in the article "A Force for Change: APPA's Higher Education Facilities Trust."

**APPA Update** appears in each issue of *Facilities Manager* and features news from the Association of Physical Plant Administrators of Universities and Colleges. APPA is an international association, founded in 1914, whose purpose is to promote excellence in the administration, care, operation, planning, and development of higher education facilities. **APPA Update** is compiled and edited by **Stephanie Gretchen**.



# The Environment



The EPA is planning to publish a final version of the **Toxicity Characteristic rule** (under Subtitle C of RCRA) in the near future. The Extraction Procedure Toxicity Characteristic is one of four characteristics used to identify hazardous wastes regulated under RCRA. To help communities that will be affected, higher education institutions are included, EPA is distributing informational material and publications concerning this ruling. The toxicity characteristic outreach materials include vehicle maintenance, dry cleaning and laundry, furniture/wood refinishing, equipment repair, textile manufacturing, wood preserving, printing and allied industry, chemical manufacturers, pesticide end-users, construction, railroad transport, educational/vocational, laboratories, metal manufacturing, pulp and paper industry, formulators, cleaning and cosmetics, and leather/leather products. A waste minimization booklet, permit modification and used oil brochures, and Federal Register Notice Reprint are also available. You may order these materials directly from EPA by contacting the RCRA Information Center, 401 M Street, S.W., OS-305, Washington, DC 20460; or call the RCRA/Superfund Hotline on 800/424-9346. Your prompt response to EPA will aid them in determining their printing needs.

Du Pont is offering environmental **seminars and videotapes** on such topics as RCRA, SARA Title III, minimizing waste, and fundamentals of ground water hydrology. Most of these seminars are offered in various locations through the spring and fall of 1990. For more information on either the seminars or videotapes contact Du Pont Company, Montgomery Building, Room 288, P.O. Box 80800, Wilmington, DE 19880-0800; 800/248-7020.

The American Society of Heating, Refrigeration and Air-Conditioning Engineers, Inc., has published its 1989 *ASHRAE Standard, Ventilation for Acceptable Indoor Air Quality* (ASHRAE 62-1989). The standards are updated on a

five-year cycle. Copies may be purchased for \$42 from the ASHRAE Publications Sales Department, 1791 Tullie Circle, N.E., Atlanta, GA 30329; 404/636-8400.

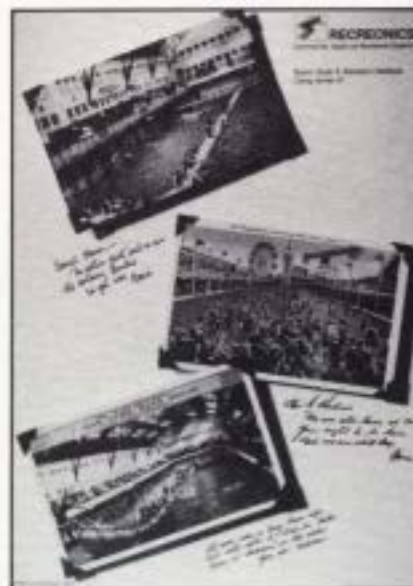
Finding room in landfills or at incinerators is becoming increasingly difficult. Since the trend will only continue, a call for more recycling is going out. According to EPA, a final rule on **technical standards for landfills** will include a proposal requiring landfill operators to separate 25 percent of their waste streams for recycling. EPA is already considering a December 20, 1989 proposal that would require incinerator operators to remove 25 percent of the waste stream, by weight, for recycling before the trash is burned (20 ER 1445, 1508).

*Aboveground Storage Tank Management: A Practical Guide* is a new manual that provides current and prospective aboveground storage tank (AGST) regulations and information. The publication is divided into eight chapters: regulatory highlights, AGST facilities, structural

and engineering concepts, piping and product handling systems, leak monitoring and containment, AGST operations, hazardous substances and wastes stored in AGSTs, and tank management planning. The book is available from Government Institutes for \$54. For more information or to order a copy contact Government Institutes, Inc., 966 Hungerford Drive, #24, Rockville, MD 20850-1714; 301/251-9250.

World Resources Institute has published a number of **books** on natural resources, energy, climate, pollution, Greenhouse effect, and agriculture. Some of the titles include *Troubled Waters: New Policies for Managing Water in the American West*, *Energy for Development*, and *A Better Mousetrap: Improving Pest Management for Agriculture*. For more information contact World Resources Institute, Publications Department, 1709 New York Avenue, N.W., Washington, DC 20006; 202/638-6300.

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# Job Corner

## Job Corner Deadlines

Job Corner classified advertisements cost \$20 per column inch; display ads cost \$25 per column inch. There is a two-inch minimum charge on all ads and no agency discounts are available.

Upcoming Job Corner deadlines are **May 10** for the June issue, **June 8** for July, and **July 10** for August. Closing deadlines for job announcements are posted at the request of each institution. In some cases, deadlines may be extended by an institution. APPA encourages all individuals interested in a position to inquire at the institution regarding its closing/filing date.

Send all ads, typed and double-spaced, with an official purchase order to Diana Tringali, Job Corner Advertising, APPA, 1446 Duke Street, Alexandria, VA 22314-3492. Or send your ad via fax 703/549-APPA (703/549-2772). Call 703/684-1446 for more information.

### PHYSICAL PLANT ADMINISTRATOR

Reports to the executive officer, division of facilities management. Salary: commensurate with qualifications and experience. Responsibilities: management of the operation, maintenance, and repair of the physical assets comprising the University of California, Riverside campus including more than 2 million gross square feet of buildings, 325 landscaped acres, 220 full-time employees, with a total budget of \$20 million. Qualifications: interpersonal skills in people-oriented management of a large, diverse organization and customer-oriented service to a campus community. Knowledge of state-of-the-art facility maintenance techniques applicable to an institution of higher education. Five years experience in the management of a facilities maintenance/operation organization. A BS degree in engineering or equivalent experience with an MS or MA in management desirable. Closing date: **April 25, 1990**. To respond: send resume with cover letter to: Personnel Office, University of California, Riverside, California 92521. Reference job number 90-02-001. *The University of California is an Affirmative Action, Equal Opportunity Employer.*

**Health and Environmental Safety Director.** Ball State University is launching a national search for a health and environmental safety director. This will be a newly established leadership position for the university and will play a major role in development of the unit's activities. The director reports to the physical plant director. This position is available immediately. The director has overall responsibility for the following functions: sanitary/environmental health, industrial hygiene, radiation protection safety, fire safety/inspection, and office systems. Ball State is a public university in the Mid-American Conference with a managed enrollment of under 19,000 students and 2,500 faculty and staff. The minimum qualifications for this position are a doctorate in a related science area or a combination of relevant education and experience; at least three years of experience in administrative management of environmental activities in university settings, industry, government, or private practice. The annual salary to be paid for this position will be commensurate with the qualifications of the successful candidate. Send a letter of application, resume, transcript(s), and three letters of reference to: Thomas Smith, Director, Physical Plant, Ball State University, Muncie, IN 47306. This search will continue until the position is filled. A review of applications will begin on **May 15, 1990**. *Ball State University practices Equal Opportunity in Education and Employment.*

**Director of Facilities Management and Planning.** Shippensburg University, a member of the Pennsylvania State System of Higher Education, is extending their search in seeking a director of facilities management and planning who will be responsible for the management of university facilities totaling 1.5 million square feet of building space and 200 acres. Responsibilities include development of a facilities masterplan and establishment of priorities and plans for maintenance, renovation, and repair projects. The director will manage budgets in excess of \$8 million and will supervise a staff of more than 130. A bachelor's degree in architectural or engineering sciences or related fields and five years of senior managerial experience in facilities management, administration, and planning is required. Preference will be given to candidates with a professional engineering license or ability to be licensed and additional education in business or public administration. Salary: commensurate with qualifications and experience. Qualified candidates should send letter of application, resume, and name and telephone numbers of three references to Donald Klinedinst, Director of Personnel, Shippensburg University, Shippensburg, PA 17257. Applications will be received until position is filled. *Shippensburg University is an Affirmative Action/Equal Opportunity Employer. Women and all minorities are encouraged to apply.*

### DIRECTOR OF PHYSICAL PLANT AND PLANNING MEMPHIS STATE UNIVERSITY

Memphis State University, located in Memphis, Tennessee, with an enrollment of 21,000, seeks applications for the position of director of physical plant and planning.

**Responsibilities:** The director will direct all aspects associated with physical plant and planning operation, maintenance and repairs, grounds, custodial services, motor pool, campus planning, new construction, facility rehabilitation, architect recommendations, interior design, capital budget requests, and project planning and design.

**Qualifications:** Requires a bachelor's degree in an engineering specialty or in architecture. Ten years experience in administrative-engineering-architectural type positions characterized by a progressive increase in authority and responsibility. Engineering license and formal training in management, law or labor relations. Prefer advanced degree in engineering, architecture, or business and experience in building codes and regulations.

**Salary:** Commensurate with experience.

Those interested in applying for this position must submit an application for employment (available from the Department of Personnel) to:

Memphis State University  
Department of Personnel  
Room 108 — Jones Hall  
Memphis, TN 38152  
Telephone: 901/678-2601

Application deadline for this position is **April 16, 1990**.

*An Affirmative Action/Equal Opportunity Employer.*



## TARLETON STATE UNIVERSITY EXECUTIVE DIRECTOR FOR PHYSICAL PLANT

Nominations and applications are invited for the position of executive director for physical facilities at Tarleton State University. The executive director is responsible for all phases of operation, maintenance, and planning of university facilities, which include 82 buildings valued at more than \$80 million covering more than 2,000 acres of property. Duties include direct responsibility for supervising the operations of 10 departments with 102 full-time employees and more than 50 part-time workers. Responsibilities include the coordination of all construction projects.

Tarleton State University, with an enrollment of 5,900, is part of the Texas A&M University System. Located in Stephenville, Texas, 60 miles southwest of Ft. Worth, TSU will be celebrating its 100th birthday in 1999. TSU is a fast-growing institution experiencing a 64 percent growth rate during the decade of the eighties.

Qualifications for this position include a baccalaureate degree in engineering and certification as a professional engineer; a minimum of ten years of administrative experience at the executive level; preference will be given to those candidates with construction experience. The person employed for this position must be able to work effectively with others, provide strong leadership with vision, and communicate (both orally and in writing) effectively.

The salary for this position is commensurate with qualifications, including education and experience.

The deadline for application is **April 18, 1990**. The preferred date of employment is May 15, 1990. Minor candidates are invited to apply. Send a letter of application; a professional resume; and the names, addresses, and telephone numbers of five references to:

Dr. Dennis P. McCabe  
Vice President for University  
Operations  
Tarleton State University  
P.O. Box T-498  
Stephenville, TX 76402  
Telephone: 817/968-9464

*Tarleton State University is an Equal Opportunity, Affirmative Action Employer.*

## DIRECTOR OF FACILITIES

The Alamo Community College District seeks candidates for the Director of Facilities for this public, two-year, multi-college system serving the diverse educational needs of Bexar County (San Antonio) Texas.

With four campus locations, over 32,000 students, and 3,000 employees, ACCD provides educational programs, activities, and services for the purpose of general education, career preparation, transfer education, developmental studies, continuing education, student support, personal development, and community service.

The director of facilities serves as a senior administrative official responsible for the planning and direction of all construction and building maintenance programs. Functions supervised include: design and construction, utilities, maintenance, custodial services, and groundskeeping.

The district invites applications from individuals who meet the following criteria:

- Baccalaureate degree in engineering, public administration, or business is required; master's degree or state registration as a Professional Engineer is preferred.
- Ten years progressively responsible experience in construction and/or facilities operations, preferably in a publicly funded college or university setting.
- Management experience in the areas of responsibility is preferred.

Alamo Community College District provides a competitive salary and excellent fringe benefits. The successful candidate must provide a transcript of degree work prior to appointment.

Appointment of the director of facilities is scheduled for September 1, 1990. An earlier appointment date will be considered for the successful candidate.

All applications, resumes, or nominations should be delivered or mailed by **May 1, 1990**, to:

Alamo Community College District  
District Department of  
Human Resources  
811 West Houston Street  
P.O. Box 3800  
San Antonio, Texas 78284  
*An Equal Opportunity/Affirmative  
Action Employer.*

**Facilities Engineer**, Southern Arkansas University. SAU is seeking applications for the position of facilities engineer. The successful candidate will report directly to the director of physical plant and will

have organizational responsibilities for planning, estimating, scheduling of capital improvements, performing in-house design studies, preparing bid documents, maintaining record drawings, evaluating deferred maintenance requirements, monitoring energy consumption, assuring EPA regulatory compliance in areas such as asbestos and PCBs, and dealing with other technical problems as may be assigned. Qualifications: bachelor's degree in the engineering sciences or a closely allied field preferred, and a minimum of three years of facilities-related technical experience. Salary commensurate with qualifications and experience. Applications will be accepted until the position is filled. Position is available immediately. Send letter of application, resume, and three professional references to: Mr. Roger W. Giles, Director of Planning/Personnel, Southern Arkansas University, SAU Box 1288, Magnolia, AR 71753; 501/235-4008. *Affirmative Action/Equal Opportunity Employer.*

**Plant Engineer**. Applications are being sought for the position of plant engineer, physical plant division at the Medical College of Georgia (MCG). Located in Augusta, MCG is the health sciences university of the University System of Georgia and consists of schools of medicine, dentistry, nursing, allied health science, and graduate studies, as well as a 540-bed tertiary care teaching hospital. The MCG facility, possessing a highly sophisticated electrical system and state of the art energy conservation program, is a complex of more than 3.5 million gross square feet, housed in 80 buildings, valued at more than \$262 million. The plant engineer reports to the director of physical plant and is responsible for the energy, mechanical, electrical, and building maintenance services provided by the division. The successful candidate should possess excellent communication and problem-solving skills, strong interpersonal and administrative skills, as well as a minimum of five years of successful managerial experience in an engineering position, preferably in other academic medical centers, hospitals, or other institutions of similar complexity. A bachelor's degree in a technical field such as mechanical or electrical engineering and licensure eligibility is required; a graduate degree in management or business is desirable, but not required. Although nominations and applications will be accepted until a suitable candidate is selected, those received by **May 1, 1990**



(cont. from p. 7)

are best assured of receiving full consideration. The appointment is expected to take effect July 1, 1990. Salary: competitive and commensurate with experience and qualifications. Qualified candidates should send a resume and a cover letter, summarizing the most significant accomplishments in his/her most recent position to: E.K. Parker, Chairman, Search Committee Plant Engineer, Medical College of Georgia (AA-155), Augusta, GA 30912-4755. *The Medical College of Georgia is an Affirmative Action, Equal Opportunity Employer.*

**Manager—Structural Trades (MAP I).** Office of Physical Resources: Physical Plant. Management position. Be responsible for the alteration, repair, and maintenance of all structural problems relating to the 95 campus buildings. Assure that building structural integrity and related services are maintained. Plan, manage, and direct the activities of all structural trades (carpentry, asbestos removal and insulation, labor, locks, roofing, glazing, and painting). Review and approve plans for and oversee the inspection of structural support systems of all new facilities, retrofits, renovation, or modifications of existing facilities; take corrective measures as necessary. Develop, implement, and administer work standards, preventive maintenance programs, personnel administration, incentive programs, work order procedures, recharge policies and rates. Formulate division's budget in excess of \$10 million. Be responsible for resolution of grievances and employee conflicts under staff personnel procedures manual and university labor agreements. Qualifications: education and training in architecture engineering, construction management or a related field. Experience in the management of building maintenance, renovations and/or construction in a comparable sized environment. Demonstrated oral and written communication skills. Demonstrated analytical skills. Experience in policy development and implementation. Experience in budget management and personnel administration. Knowledge of governmental policies, regulations, procedures, and codes required. Salary: \$43.5-\$65.3K, with excellent benefits. Closing date: **April 20, 1990.** To apply, send cover letter and resume to: Berkeley Campus Personnel Office, Box 10-138-18 MX, 2539 Channing Way, Berkeley, CA 94720. *The University of California at Berkeley is an Equal Opportunity/Affirmative Action Employer.*

**Assistant Manager of Grounds Maintenance.** Vassar College is searching for an individual who, with considerable autonomy, will supervise and plan the work of the department of grounds maintenance. The department of grounds maintenance is responsible for the maintenance of about 1,200 acres of land including the 450-acre campus and arboretum, the 540-acre farm with a biological field station, athletic fields, off-campus properties, seven miles of paved road, two miles of walkways, 150 varieties of trees, two greenhouses, and the vehicle maintenance facility. Applicants must possess strong written and oral communication skills and have: three to five years experience as grounds and landscaping supervisor in a college or university setting, including maintenance scheduling and estimating responsibilities; the ability to analyze information in order to make recommendations and draw conclusions; a college degree preferably in horticulture or landscape design, related experience considered; and must hold or be able to obtain New York State Pesticide Applicator's License. Send resume and names of three references to: Office of the Director of Facilities Operations, P.O. Box 25, Vassar College, Poughkeepsie, NY 12601. *AA/EO Employer.*

## PHYSICAL PLANT DIRECTOR

**Special Qualifications Desired:** At least three to four years experience in building construction and basic institutional/commercial custodial care. Must hold a BS degree in engineering, with an emphasis in maintenance, HVAC, and electrical systems. Five years experience in supervision is preferred. Must have experience in long-range planning, inventory control, and budget allocations.

**Job Description:** Ability to effectively and efficiently manage and supervise approximately 33 physical plant employees and oversee the repairs and maintenance of approximately 40 buildings and 100 acres of grounds.

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Interested person or persons should submit a resume to:

Mr. Elliott Robinson  
Vice President for Financial Affairs  
Johnson C. Smith University  
100 Beatties Ford Road  
Charlotte, North Carolina 28216

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## FACILITIES MANAGEMENT

West Chester University seeks applicants for two newly created management positions in the Facilities Maintenance Division. Due to reorganization and major facilities upgrading, the Division seeks a Director of Physical Plant and a Director of Facilities Support Services.

**THE DIRECTOR OF PHYSICAL PLANT** is responsible for overseeing the maintenance, repair and alterations of facilities; operation and maintenance of utility systems; management of a project work force; management of the work control effort; development and administration of a \$5.0 million budget for a University of 11,000 FTE students and 2,100,000 sq. ft. of space on 388 acres. Qualifications include a bachelor's degree in engineering or architecture with a minimum of five years of management-level facilities experience, preferably in an educational environment. PE registration is desirable.

**THE DIRECTOR OF FACILITIES SUPPORT SERVICE** is responsible for overseeing the grounds maintenance and operations, housekeeping and transportation which includes directing a work force of 140 full-time employees. Qualifications include a bachelor's degree in engineering, business or related degree plus five years of increasingly responsible facilities or business related experience preferably in an educational environment.

Salary for both positions commensurate with qualification and experience. The University offers an extensive benefits package which includes undergraduate tuition fee waiver for dependents. Please send resume, letter of interest (indicating position), and the names and phone numbers of three references postmarked by **April 30, 1990 to Personnel Office, WEST CHESTER UNIVERSITY, West Chester, PA 19383. AA/EOE.** Women and minorities are encouraged to apply.



West Chester University



**Assistant Director, Physical Plant.** Arizona State University West Campus in-

vites applications for the position of assistant director, physical plant. The assistant

## Director, Physical Plant

Babson College is seeking an individual with proven management skills and extensive administrative experience in maintenance operations for the position of Director, Physical Plant.

The director will be responsible for overseeing the maintenance and operation of all physical facilities and grounds of the college. Specific responsibilities will be to develop, implement and administer work standards; oversee preventive maintenance programs; prepare and oversee a complex budget; and inspect the conditions of buildings and grounds as well as evaluate and make recommendations. The current physical plant staff consists of approximately 80 employees in the union workforce in addition to 7 managers and office support personnel. The physical plant consists of one million square feet located on 450 acres of grounds.

Babson is a co-educational college of management, located 14 miles west of Boston in Wellesley, Massachusetts. Founded in 1919, the college now enrolls 1500 undergraduates, 250 full-time MBA students and 1400 part-time MBA students. We also offer a variety of programs in executive education.

Requirements include: a Bachelor's degree in engineering or a related field (a Master's degree is highly desirable); at least 6 years' administrative experience in facilities operations, preferably in a college or university setting; excellent communication skills; and knowledge of the collective bargaining process is a plus.

For consideration, please send cover letter and resume by April 18, 1990 to Elizabeth A. Lemons, Director, Human Resources, Babson College, Babson Park, MA 02157.

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EXECUTIVE THINKING

## NOTICE OF VACANCY UNIVERSITY OF THE VIRGIN ISLANDS

A four-year public institution with campuses on St. Thomas and St. Croix, U.S. Virgin Islands, serving full-time and part-time students, is seeking candidates for the following professional staff position.

### Maintenance Supervisor, St. Croix Campus.

Appointee will assist the business and facilities manager in upgrading facilities planning and management systems and procedures. Will be responsible for day-to-day supervision of custodial, groundskeeping, and maintenance programs. Will upgrade and maintain computer-based work order and preventive maintenance data bases. Will develop departmental records and files in areas of maintenance logs, procedures manuals, service manuals, and record keeping associated with safety, health, and environmental regulations.

A bachelor's degree with emphasis in engineering, architecture, management or related field. A history of progressively responsible supervisory responsibilities in facilities management. Experience with physical plant management and administrative techniques, including computer systems and applications.

Salary range is \$26,085 to \$36,107, plus benefits. Address letter of application, up-to-date resume, and list of personal and professional references to:

Mr. Glen Lukey  
Business & Facilities Manager  
University of the Virgin Islands  
RR #2, Box 10,000  
Kingshill, St. Croix, VI 00850

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director, physical plant is a new position at this developing campus and will be responsible to the director of facilities management, ASU West Campus for the management of the West Campus custodial, grounds, specific skilled services, utility and energy management systems, and central heating and air conditioning plant operations. The successful candidate should have considerable knowledge of and experience in cleaning methods for high volume/high use educational institutions, landscaping and horticulture techniques, preventive maintenance of mechanical and electrical equipment, and budget formulation. In addition, the successful candidate should have considerable knowledge of electronics, HVAC systems, electrical distribution systems, utility distribution systems, and automated energy management systems, thermal energy storage systems, building mechanical operating equipment, maintenance and utilities service in an institutional setting, skilled trades practices and techniques, administration and management principles, and practices, techniques, and considerable skill in written and oral communication and in maintaining effective working relationships. Required qualifications are a bachelor's degree in engineering, management, business administration, or a related field and five years of progressively responsible facilities management or physical plant experience that includes four years of supervisory experience; or nine years of progressively responsible experience in facilities management/physical plant functions, to include at least four years at junior level of management. Prior university experience and/or exposure to high use, multi-project/mixed use facilities preferred. Arizona State University West Campus is a recently created, upper level, branch campus of Arizona State University and is located in northwest metropolitan Phoenix. ASU West Campus currently consists of three buildings (184,000 GSF) situated on 300 acres. A \$47 million capital expansion program is currently under way that will add four buildings (368,500 GSF) to the existing facilities. Salary: \$30,000 to \$37,500 based on experience and qualifications, with an excellent benefit package. To apply, please submit by **May 1, 1990**, a letter of application, current resume, and names, address, and telephone numbers of at least three references to: Personnel Department, Arizona State University, ASB 326, Tempe AZ 85287-1403. *Arizona State University is an Equal Opportunity/Affirmative Action Employer.*

(cont. on p. 10)



# Job Corner

(cont. from p. 9)

**Manager—Planned Maintenance (MAP I).** Office of Physical Resources: Physical Plant. Management position. Be responsible for evaluating, planning, organizing, reviewing, and directing the efforts of the planned maintenance unit. Manage a staff responsible for a facility audit process, life-cycle cost analysis, and preventive maintenance schedules on a continuous basis in order to adequately maintain all campus systems. Report on facility conditions and provide justification for remedial action. Identify scope of work to be performed. Oversee the set-up and processing of status reports on funded deferred maintenance projects, and review progress through completion. Be responsible for resolution of grievances and employee conflicts under staff personnel procedures manual and university labor agreements. Develop, implement, and manage incentive programs, training programs, work rules and standards, and pay-

roll/personnel actions. Formulate budget in excess of \$5 million. Qualifications: management experience in comparable planned maintenance operations. Education and training in architectural and/or engineering fields. Experience in personnel management and training. Knowledge of conflict resolution and labor agreements. Demonstrated oral and written communication skills. Demonstrated analytical skills. Experience in policy development and implementation. Experience in budget formulation and planning. Knowledge of governmental policies, regulations, procedures, and codes required. Salary: \$43.5-\$65.3K, with excellent benefits. Closing date: **April 20, 1990**. To apply, send cover letter and resume to: Berkeley Campus Personnel Office, Box 10-140-18 MX, 2539 Channing Way, Berkeley, CA 94720. *The University of California at Berkeley is an Equal Opportunity/Affirmative Action Employer.*

## DIRECTOR, OFFICE OF FACILITIES PLANNING

Colorado State University seeks a qualified individual for the position of director, office of facilities planning. The director is responsible for development and coordination of the university's physical development master plan and operating space plan; preparation of capital construction budget requests; maintaining liaison relationships with university departments and government agencies; and representing the university at local, state, and federal facilities planning meetings.

The office is a unit within the division of administrative services and reports to the vice president of administrative services. The director works closely and cooperatively with the provost, academic community, facilities services, and the executive administration of the university.

Qualified applicants will possess a minimum of five years experience in facilities planning, architecture, or engineering methods and cost, preferably in higher education, and ability to communicate effectively. A working knowledge of computer-based facilities management systems is highly desirable. A bachelor's degree in architecture, engineering, planning, or related field. An advanced degree, applicable professional license/certification, and an additional three to five years of experience is preferred.

Colorado State University is located in Fort Collins, approximately 65 miles north of Denver. Current enrollment is approximately 20,000 students. The main campus is comprised of 830 acres and 100 buildings, while the 1,700-acre Foothills Campus accommodates numerous research facilities. The university also includes 550-acre Pingree Park Campus, located on the northern border of Rocky Mountain National Park, a 240-acre agriculture campus, and 11 statewide research centers.

For consideration, applications must be postmarked by **April 30, 1990**. Position is available July 1. Submit resume and letter of application to:

Pamela Garcia, Chair  
Director of Facilities Planning Search Committee  
Colorado State University  
309 Administration Building  
Fort Collins, CO 80523  
Telephone: 303/491-5257

*In order to assist Colorado State University in meeting its affirmative action responsibilities, ethnic minorities, women, and other protected class members are encouraged to apply and to so identify themselves. The Office of Equal Opportunity is located in Room 314, Student Services Building.*

## POSITION WANTED

Energetic MBA student seeks position of responsibility in physical plant after August graduation. Have BS in physical plant administration from BYU. Skills in microcomputer application—especially PM and CAD. Excellent oral and written communication skills. Bilingual. For more information or resume please contact S. Jeff Cold at 2457 U Street, Lincoln, NE 68503; 402/476-9787.

## DIRECTOR OF FACILITIES AND CONSTRUCTION

Allegheny College, a residential liberal arts college of 1,900 students, located in northwest Pennsylvania, invites applications for the position of director of facilities and construction. Under the direction of vice president for finance and administration, this senior supervisory position will be responsible for the planning, construction, and remodeling of college physical facilities and for managing the operation and maintenance of college buildings, grounds, and utilities systems.

A bachelor's degree in architecture, a construction engineering discipline, construction management or similar discipline is required. A minimum of 10 years of relevant experience with a history of increasing levels of job responsibility, including supervision of operations and management of technically complex construction are required. The successful candidate will possess excellent written and oral communication skills, good basic computational skills, a thorough working knowledge of management, facilities operations and maintenance, and planning and construction principles, procedures, and technology.

Salary and benefits are competitive. Starting date will be around June 1, 1990. Review of complete applications will begin **April 30, 1990**. Qualified individuals should send a letter of application including salary history, a resume, and three letters of professional reference to: Ms. Delores M. Steffen, Vice President for Finance and Administration, Allegheny College, Meadville, PA 16335. Allegheny College is an Equal Opportunity Employer.



# Membership

## New Institutional Members

**Casper Community College**, 125 College Drive, Casper, WY 82601; 307/268-2492. Representative: Jeff L. Turner, physical plant director.

**Minnesota Community College**, 550 Cedar Street, 203 Capitol Square Building, St. Paul, MN 55101; 612/297-4495. Representative: William L. Olson, assistant director of facilities.

**Monmouth College**, 700 East Broadway, Monmouth, IL 61462; 309/457-2300. Representative: Pierre Loomis, physical plant director.

**Tusculum College**, P.O. Box 5100, Greeneville, TN 37743-9997; 615/638-1111 ext. 210. Representative: James R. Spillman, dean of student and auxiliary services.

**Viterbo College**, 815 South 9th Street, La Crosse, WI 54601; 608/791-0040. Representative: Robert Johnson, director of physical plant.

## New Institutional Representatives

**CUNY/City College**, New York, NY: **Anthony Rodriguez**, assistant vice president, facilities/space planning.

Department of Advanced Education and Training, Fredericton, New Brunswick, Canada: **Ronald LeBlanc**, facilities manager.

**Essex County College**, Newark, NJ: **Ed Partridge**, acting director of facilities management.

**Massachusetts Institute of Technology**, Cambridge, MA: **Harmon E. Brammer**, director of physical plant.

**Northern Montana College**, Havre, MT: **Jim Wikoff**, director of physical plant.

**Queen's University**, Kingston, Ontario, Canada: **F. George Hutson**, director, campus engineering services.

**Sisters of Providence, St. Mary-of-Wood, IN**: **Henry W. Plahn Jr.**, administrator of physical plant.

**University of the South, Sewanee, TN**: **Mike Releford**, director, physical plant services.

**MacDuffie School**, 7 Ames Hill Drive, Springfield, MA 01105; 413/788-7723. Representative: James A. Marquis, facilities manager.

## New Associate Members

**CUNY/City College**, New York, NY: **Peter Bundock**.

**Minnesota Community Colleges**, St. Paul, MN: **Dan Brennan**, **Denny Harper**, **Arlin Schaap**, **Roger Virchow**.

**Philadelphia College of Textiles and Sciences**, Philadelphia, PA: **J. Thomas Becker**.

**University of California/Los Angeles**, Los Angeles, CA: **Ruie Arnett**.

**University of Cincinnati**, Cincinnati, OH: **Curtis E. Forney**.

**University of Delaware**, Newark, DE: **Bruce A. Campbell**.

## New Affiliate Members

**Brewster Academy**, South Main Street, Wolfeboro, NH 03894; 603/569-1600 ext. 142. Representative: H. Thomas Gerrish, facilities manager.

## New Subscribing Members

**Culbertson Restoration Ltd.**, 590 Snyder Avenue, West Chester, PA 19382; 215/436-4455. Representative: Melissa L. Alleman, marketing.

A specialty weatherproofing company providing exterior restoration and rehabilitation services from foundation to rooftop.

**Dugmore and Duncan**, 30 Pond Park Road, Hingham, MA 02043; 617/740-1993. Representative: Edward Minishak.

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**Hok Sports Facilities Group**, 323 West 8th Street, Suite 700, Kansas City, MO 64105; 816/221-1576. Representative: Rick Martin, project manager.

Full-service architectural firm specializing in the planning, design, and renovation of stadiums, arenas, recreation centers, and athletic facilities.

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## The Campus Environmental Crisis: Part I The PCB Crackdown

by Barbara Ruben

[Ed. note: This is the first of four special articles on environmental concerns affecting higher education facilities management. Future issues of Facilities Manager will focus on asbestos, recycling, and hazardous waste. If you have a case study to share—dealing with federal or state agencies, successful staffing or funding strategies, cooperative efforts with other organizations, etc.—please contact Stephanie Gretchen, assistant editor, at 703/684-1446.]

Charles W. Jenkins, director of physical plant at St. Mary's University in San Antonio, Texas, learned about PCBs the hard way. To Jenkins, polychlorinated biphenyls were merely part of a confusing alphabet soup of toxic substances controlled by a myriad of ever-changing regulations.

But in 1984 all that changed. One day in July, U.S. Environmental Protection Agency (EPA) officials arrived at St. Mary's to learn that an electrical transformer had leaked PCB-contaminated oil right outside Jenkins' office. The school had also failed to keep any records about transformers that contained PCBs.

Despite the fact that Jenkins and his staff had already embarked on a program to identify and control PCBs on campus, EPA fined the school \$31,000.

"We screwed up just about any way you could," Jenkins said of his experience. "EPA cut no slack, gave us no



mercy, which I suppose is the way they should have acted."

After an out-of-court settlement conference, the fine was reduced to \$4,000, providing that St. Mary's dispose of PCB transformers in storage and in use.

Including the fine, St. Mary's, with a student body of 3,500, paid more than \$25,000 to comply with EPA regulations. To pay for what Jenkins calls his PCB get-well program, funds had to be diverted from money earmarked for new roofs, landscaping, and pavement repairs.

However, Jenkins' troubles were not yet over. Three years later, EPA found more PCB transformers, which his

staff had not told him were on campus. This time, the school paid about \$1,000 in civil penalties.

St. Mary's crash course in PCB regulation was not unusual, nor were the fines paid particularly high compared to other institutions. During fiscal year 1989, from October 1988 to October 1989, twenty-one colleges and universities were levied a total of more than \$1.65 million in proposed fines. According to one EPA enforcement official, the agency has only just scratched the surface in uncovering violations by colleges and universities.

And, with more PCB regulations scheduled to take effect October 1, 1990 EPA inspectors will continue to be vigilant in enforcing regulations.

### A PCB Primer

PCBs were first commercially produced in 1929 for use primarily in dielectric fluid in electrical and heat transfer equipment, such as transformers, capacitors, switches, and circuit breakers. PCBs proved useful because of their chemical stability and thermal and biological properties, especially as a fire retardant.

PCBs are a family of 209 different chlorinated organic chemicals, and there is no natural counterpart. More than one billion pounds of PCBs were manufactured between 1929 and 1979.

PCBs have also been used in carbonless carbon paper, ink, wax extenders, and adhesives. But because of increasing health concerns, in 1971, the major American manufacturer of

Barbara Ruben is a freelance writer based in Chevy Chase, Maryland.



PCBs, the Monsanto Company, voluntarily stopped producing the substance for non-enclosed uses. Monsanto stopped manufacturing PCBs altogether in 1977, and the EPA banned their manufacture in 1979.

Exposure to PCBs can cause a severe skin condition known as chloracne, liver dysfunction, and elevated cholesterol levels. Prolonged exposure to PCBs has been linked to birth defects and reproductive problems. Because natural breakdown processes do not eliminate PCBs and because these chemicals are stored in fat tissue, bioaccumulation occurs throughout the food chain.

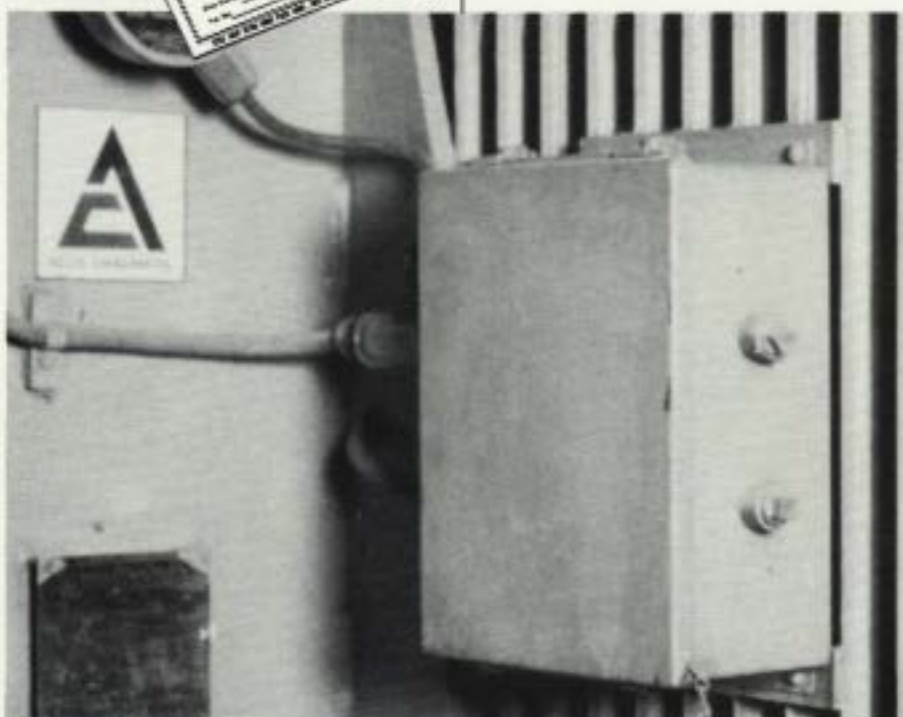
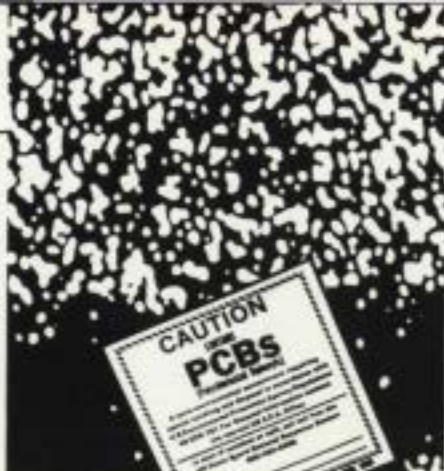
The greatest potential harm from PCBs comes when they are burned and form carcinogenic dioxins and furans. For this reason, EPA has specific stringent regulations pertaining to fires and PCBs. These rules will be amended in October.

### Regulating PCBs

The first federal regulation of PCBs occurred when Congress passed the Toxic Substance Control Act (TSCA) in 1976. TSCA mandates that owners of PCB-containing equipment properly store, mark, inspect, and keep records. TSCA became effective in 1982.

EPA bases regulation of PCB equipment on the concentration of PCBs it contains. A transformer containing less than 50 parts per million (ppm) is considered non-PCB and is not regulated by the federal PCB rules. However, it may be subject to state regulations regarding use, disposal, or servicing. A transformer containing 50 to 499 ppm is considered a PCB-contaminated transformer, and disposal of the fluid inside is regulated.

A transformer that contains 500 ppm or greater is classified as a PCB transformer. This includes transformers filled with mineral oil with greater than 500 ppm PCBs and askeral units of greatly higher concentrations, from 400,000 to 600,000 ppm.



Transformers containing concentrations of 50 ppm or greater must be disposed of in an incinerator that complies with EPA regulations. Starting February 5, 1990, new rules requiring close tracking of the disposal procedures became effective. Under these regulations, commercial entities, including colleges and universities, must notify EPA of their PCB activities within sixty days to be issued an identification number for records. If the generator does not operate any regulated storage facility, EPA does not need to be notified, but should use the generic EPA identification "40 CFR PART 761" on all records and reports. Starting July 4, it will be illegal to deliver any regulated PCB waste for disposal to a facility that does not have an identification number.

Under the regulations, the generator is given the responsibility for ensuring that PCB waste reaches its destination. EPA now requires generators of PCB wastes to use a tracking form called the Uniform Hazardous Waste Mani-

fest when sending waste for storage or disposal. When the waste is received by the facility, a signed copy of the manifest is sent back to the generator. The EPA has added extra safeguards to this process and requires the generator to call the waste facility to verify receipt. These calls must be kept in an annual log, and manifests must be kept for three years.

The waste is then allowed to be stored for a year before disposal. The final part of the tracking system requires the disposal facility to return a Certificate of Disposal confirming that the waste was properly disposed of.

These new regulations supplement existing record-keeping rules that have been in place since the late 1970s. Through these, annual PCB records must be kept that include, among other things, the number of PCB transformers in service and those removed, the total weight in kilograms of PCBs contained in transformers and the dates of removal from service. All transformers not marked during man-





ufacturing must have a label durable enough so that it can accompany it all the way through disposal.

Since 1982, a visual inspection of each PCB transformer either in use or stored has been required. Cleanup of a leaking transformer must be started within forty-eight hours of discovery of the leak. Institutions must maintain a record of these inspections and a maintenance history for each transformer for at least three years following the disposal of the transformer.

#### Fire Rule

Another facet of PCB regulation includes registering PCB transformers with the local fire department. It is

important for firefighters to know if they are dealing with a blaze with hazardous byproducts. The fire department must be given the following information: 1) the address of buildings and physical location of PCB transformers and the location of outdoor substations, 2) the principal constituent of the dielectric fluid in the transformers, 3) the name and phone number of a person to contact if there is a fire.

Beginning in 1985, PCB transformers were no longer allowed to be installed in commercial buildings, which includes colleges and universities. All PCB transformer locations must also be cleared of stored combustible ma-

terials. The most serious violation of these rules came not at a school, but from a large state office building in Binghamton, New York, in 1982. A fire started in the basement and the building filled with smoke. Firefighters had no idea there were PCB transformers in the building and did not prepare to deal with hazardous waste. In the end, the building was closed for more than five years while its entire contents were disposed of.

In general, starting October 1, network PCB transformers with secondary voltages greater than 480 volts located in or near commercial buildings must either be disposed of or reclassified to either non-PCB or PCB-contaminated status. Also by October 1:

- All radial PCB transformers with higher secondary voltages in use or near commercial buildings must be equipped with electrical protection to avoid transformer failures caused by high current faults.
- All radial PCB transformers with higher secondary voltages in use or near commercial buildings must be equipped with protection to avoid transformer failures caused by sustained low-current faults.
- Non-sidewalk vault transformers equipped with high current fault protection by October 1, may be used for the remainder of its useful life. Starting October 1, 1993, sidewalk vault transformers must be removed or reclassified.

#### Following the Rules at Small Schools

With the complexity of the above regulations and dozens of other details, Jenkins of St. Mary's University asks if it is any wonder he's pleading ignorance. The stories on campuses around the country are much the same.

Tiny Haverford College in Pennsylvania was originally fined \$93,000 for not keeping records of inspection or annual reports prior to 1985. They



also notified the fire department too late and had cartons of combustible fiberglass filters in the transformer room. The fine was later reduced to \$14,700, but the incident has left Physical Plant Director Norman Ricker Jr. bitter.

"The federal government has blown the whole thing out of proportion to its threat," he said. "A lot of things are hazardous when burned, but what anybody outside EPA feels isn't going to make any difference."

Of the lessons Ricker has learned, he says the most important is not to just worry about the big stuff like leaking transformers, but to look at the administrative details.

"The problem at smaller colleges is keeping track of the regulations," said Ricker, whose school has 1,100 students. "We're just too small to research the myriad of regulations that come out."

And that is precisely the problem at numerous other small schools. Despite many facilities managers' best intentions, with asbestos removal, tracking generation of small quantities of hazardous waste in science labs and the day-to-day maintenance of the campus, PCBs have sometimes gotten lost in the shuffle.

According to Sheldon Eliot Steinbach, vice president and general counsel of the American Council on Education, EPA is becoming more vigilant in its enforcement, and many times smaller schools are taking the brunt of its increasing inspections on campuses, especially in the East.

"It's a wonderful issue for the EPA to sink its teeth into. PCBs just sit there, and a lot of physical plant administrators just aren't aware of them," he said. "EPA found there's money in them thar hills."

Another example of a college caught unaware is the 850-student Washington College in eastern Maryland. The school had six transformers in use on campus and several in storage. No inspection logs were kept.



Several transformers leaked onto a concrete floor.

"Basically it was more a matter of ignorance than anything else and a failure on EPA's part to publicize the regulations," said Clint Baer, director of planning for the school.

In September 1988, the school was fined \$150,000, but has since lowered the penalty to \$110,000 and is still negotiating further reductions.

"To me, there's some question on how much risk PCBs pose. They don't pose much of a risk at all if they're in a locked area. There is some risk if there's a fire," Baer said. "But I'm positive cigarette smoke is a lot more hazardous to your health than a PCB transformer."

Baer planned to have all transformers removed or retrofitted by January 1990 to avoid any hassles with the new fire rules. He estimated removal alone is costing the school \$100,000. In some cases the transformers were old and due for replacement anyhow, but others were still useful. To pay for the cleanup and penalties, the school is postponing pursuing deferred maintenance and the enhancement of their energy management program.

"It seems as if this is an overblown issue," he said. "The problem is that EPA has decided to target small colleges."

#### Through EPA's Eyes

Although EPA won't confirm that it is cracking down on small schools or even colleges and universities in particular, officials admit education facilities have presented a problem.

"We have detected an alarming amount of noncompliance at colleges and universities," said Mike Walker, assistant enforcement counsel for the toxic litigation division. "Why cam-



puses seem to be so far behind the curve on this is a good question. I don't know."

But Mike Calhoun, an inspector with the compliance division of TSCA, is a little less charitable.

"We have been kicking a bunch of colleges and universities lately," he said. "Here it is eleven years after TSCA. They have to comply with rules like everyone else. Saying 'We didn't know' is not good enough."

Across the country, there are approximately 500,000 facilities that use PCBs in one form or another. EPA does about 3,000 inspections a year, and of these, 10 to 15 percent are public institutions, including colleges and universities. In fiscal year 1989, twenty-one of 341 companies and institutions cited for violations were colleges and universities.

Of the ten EPA regions nationally, two did not cite any schools for violations; these were Region I, in New England, and Region 7, which covers Iowa, Kansas, Missouri, and Nebraska. By contrast, nine schools were cited in Region 3, which covers five mid-Atlantic states and the District of Columbia. Region 6 followed with four citations in the southern states.

Fines also varied widely and are based on the number and severity of violations. Highest proposed fines last year at schools were at Bryn Mawr College, Pennsylvania, for \$335,850 and Johns Hopkins University, Maryland, for \$280,000.

"It is frustrating to go into a university and still find they're out of com-





pliance," Walker said. "Even a quarter million dollar fine is peanuts when compared to \$5 million to \$10 million in cleanup costs."

Walker recommends that facilities managers check to make sure they have done an adequate job of inspecting transformers and check now to know which transformers on campus will be subject to the rules that take effect October 1.

#### The Schools' Stories

Frustration over PCBs touches both big and small schools. At 24,000-student, state-funded Eastern Michigan University, William Smart, director of physical plant, admits he has some hard feelings left from a \$29,000 fine levied last year. The fine was reduced by about two-thirds.

"The amount of the fine was kind of silly," he said. "What they're doing is taking the money from one tax-funded account and putting it in another. When we had such good intentions, it's inappropriate to fine so heavily."

Eastern Michigan was fined in the middle of its five-year replacement program, which will cost about \$1 million.

"With a deferred maintenance list of nearly \$40 million, to send even \$7,000 away to the EPA is hard," he said.

At Dillard University in New Orleans, Louisiana, Milton Scheuermann Jr., director of physical plant, is still unclear about what EPA wanted when they fined his school \$3,200 last year.

"The fine we got was unfair," Scheuermann said. "We did not have the records, and EPA insisted we make up records for transformers we don't even have any more."

The fine for PCB rule violations at Seattle University in Washington was reduced from \$12,500 to \$8,000. The school had one transformer it was in the process of removing when it was inspected.

"We weren't real happy about it, of course," said Robert Fenn, director of plant and public safety. "But PCB regulations had been in effect for ten years. We should have known."

#### Cleaning Up

Although some schools are just beginning the laborious process of disposing of transformers or lowering their levels of PCBs, others have put the task behind them and are moving on to other issues.

Vanderbilt University in Nashville, Tennessee, spent more than \$3 million to remove nearly 150 transformers. They decided against retrofitting because the transformers would still have to be monitored.

"We have completely taken care of our PCBs. Most campuses have dealt with this issue and it is mostly behind us," said Jon Gullette, director of plant operations. "If people are paying attention to the law, there should be no problem."

Cost of replacing a transformer is about \$50,000 while retrofitting about \$30,000, according to a PCB waste management firm. In the retrofitting process, the PCB oil is drained, destroyed, and replaced with a non-PCB coolant that will draw remaining PCBs from the inside of the transformer. The cost is about 40 to 60 percent of total cost of removing, dispos-

ing of, and replacing a PCB transformer.

Ohio State University opted to get rid of all PCB equipment on campus, at a whopping cost of \$20 million, the highest amount any school has paid to replace PCB equipment. The school embarked on the project in February 1989 in response to the upcoming Fire Rules amendments and hopes to complete work by start of the fall semester this year.

Transformers are being removed from 272 locations, and about 60 percent of the work is now completed. This spring, a helicopter will lift out a unit the size of a living room.

The school is now appealing a small fine imposed by EPA because no PCB records were kept from 1978 to 1982, according to John D. Houck, director of engineering and maintenance. Unlike some other facilities managers, Houck said he feels the citation is deserved.

Miami University, also in Ohio, has been PCB-free for five years. With only five transformers on campus, the decision to replace them was easy, said Roger E. Rowe, director of physical facilities.

"I think any school could say they've had PCB problems. We've had it relatively easy, however," he said.

The nineteen-campus California State University system did a study in 1986 to prioritize which transformers to replace, with those that were leaking having the highest priority. At San Jose State University, about ten transformers are being replaced.

"I've seen a big shift in the last three or four years. More people are now more sensitive and knowledgeable about PCBs. Universities have found they're not immune from being fined," said Mohammad H. Qayoumi, SJSU's associate executive vice president for facilities development and operations. "Just as energy was the hot topic in the 1970s, the 1990s will be the decade of the environmental issue."



## Illuminating the University Campus: Aspects of Security, Aesthetics, and Efficiency

by Werner K. Sensbach

It has been said that college campuses are places of light and learning, but little illumination. However this double-entendre may be understood, administrators of American universities and colleges are giving increased attention to outdoor illumination, with special emphasis on improved security and an eye to enhancing the campus grounds. Recent occurrences of personal assault and rape of students and the resulting unfavorable publicity have persuaded universities to place high priority on any measures designed to increase the lighting of the campus grounds while improving the security and personal safety of campus occupants.

When parents grow alarmed about the security of their children on college campuses, administrators are quick to respond with assurances of forthcoming remedial action. A recent letter from a southern university informed concerned parents of an extensive program of lighting improvements and security measures scheduled to be accomplished within record time. Some universities have discovered that declining student enrollment would be a high price to pay for neglecting the need for better exterior lighting. It is an issue that some may consider a trivial matter, but for others it is a matter of life and death.

### A Historical Perspective

Contemporary notions and perceptions of campus lighting have been shaped by many years of historical usage and attitudes. Since universities have been built on trust, cooperation, and honor, they have always been vulnerable to outside intruders. Enconced in the protective cocoon of a college campus, students have grown used to keeping their dormitory rooms unlocked, leaving their belongings unguarded, and riding bicycles without



headlights in evening rush hour traffic. The carefree attitude of youth, combined with the perception of special protection afforded by the campus environment, may permit trouble to walk right through the college gates.

In the early years of American colleges, the image of a campus illuminated with only a minimum of light for nighttime hours suited not only the romantic notion of college life, but also accorded with the Spartan practicalities of a college campus. As long as the light source depended on an open flame, the fear of conflagration of campus buildings was ever present, at least up to the middle of the last century when gas lights, then electric lights, were installed on American campuses.

In 1817, when Thomas Jefferson laid out the University of Virginia in his famous open plan, he argued that the wide spatial separation of the major campus buildings into individual pavilions, dining halls, student rooms, and library would prevent the spread of fire and contagious diseases. When the price for university attendance included not only tuition, room, and board, but also firewood and light, the

possibility of a disastrous fire was never far from the mind of the college community. During the early gestating years of American colleges, many a studious scholar, trying to memorize critical passages of Ovid's "tamest," may have fallen asleep next to a smoking whale oil lamp or wax candle, only an arm's length away from peril and perdition.

In the twentieth century, especially since the 1950s, as colleges grew into universities—and universities metamorphosed into multiuniversities, and campus boundaries exploded into open farm land or urban neighborhoods, campus lighting followed the path of expansion of college facilities only incidentally or reluctantly. By mid-century, when the majority of students of institutions of higher learning were intrepid veterans of foreign wars, universities had other things to worry about.

### The Impetus to Improve Campus Illumination

In the 1960s and 1970s, universities became dramatically aware of the need for better lighting of their campus grounds when the increasing enrollment of women students signaled the tsunami wave of the most profound societal changes in recorded history. During the last quarter of this century, women, dissatisfied with the limiting role of the traditional "homemaker," entered the world of business and management, increased personal and civil rights, and enrolled in large numbers in colleges and universities. While in 1965 only 20 percent of the students in institutions of higher learning were women, their numbers increased rapidly in the intervening years, so that in 1987 they constituted more than 50 percent of the student body nationwide. The implication for improved security and better lighting on university campuses was obvious, the need for action urgent.

### Setting the Stage for a Lighting Study

In assuming the job of improving campus illumination, the facilities

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manager may see wisdom or necessity in employing a lighting consultant in the actual preparation of plans, the establishment of illustration standards, and in the choice and placing of light fixtures.

In the contemporary environment where perceptions have nearly equal weight with objective knowledge, a general discussion about light quality, design of light fixtures, and the aesthetics of light may prove useful to those administrators involved with user groups and consultants. Measurements with a light meter will reveal absolute values of the intensity of light, but the ability of the pedestrian to see clearly and move with ease through the nighttime campus depends on many factors: light intensity, blinding glare, threatening shadows, open landscaping, safe walking surfaces, and surveyable surroundings.

The 1989 edition of the APPA *Facilities Management* manual observes: "At night, when darkness envelops the university grounds, a different campus reveals itself along its pathways, below illuminated windows of dormitories and research labs and around spotlighted towers and building facades." If this observation tells of the different, unknown campus environment that students inhabit after nightfall, how well do administrators really know the streets, alleys, and walkways, the quads and plazas, the terraces, gateways, nooks and crannies of their campus after sundown, when daytime occupants have abandoned classrooms, offices, and laboratories for their suburban retreats? Can administrators empathize with and experience the anxiety of a young woman student who, after leaving the library late in the evening, has to wend her way back to her dormitory through a darkened campus? Will not every large bush appear a hidden danger, not every gateway a giant chasm, not every wide lawn a sea of peril?

Even if security and lighting committee members once a year tour the campus grounds at night to discover potential trouble spots, that occasion is always one of earnest sociability. Assuming that the cautious, yet circumspect, university administrator may only infrequently venture through the nighttime campus to explore its pathways, byways, academic areas, dormitory districts, and parking precincts, he or she should pay careful attention when students speak of their concerns, impressions, experience, percep-



tions, and fears about campus safety. Although fear fits only poorly into statistical charts, the wise administrator may have to abandon temporarily the current academic axiom that "nothing is worth knowing that cannot be counted."

Even if a university campus should not want to compete with the brightness of a shopping center parking lot, each university would wish to explore and develop solutions for better lighting appropriate to its own situation. A campus of high density development, such as the Westwood campus of UCLA, derives some of its nighttime illumination from the light reflecting off building surfaces and the ambient light effusing through the windows of classrooms and laboratories.

In contrast, the symbolic and geographical center of the University of Virginia, composed of a tree-covered lawn and ten ornamental gardens enclosed by serpentine walks, requires a different solution. What in the daytime sparkles in full Cartesian clarity may appear at night, to some students, as a labyrinth of dark alleyways. In order to provide lighting adequate and appropriate to a residential area, yet respecting the historic significance of Thomas Jefferson's architectural masterpiece, the University of Virginia has developed a "lighted pathway" plan for the whole of the university grounds, which it has urged all stu-

dents to observe during their peregrinations through the nocturnal campus.

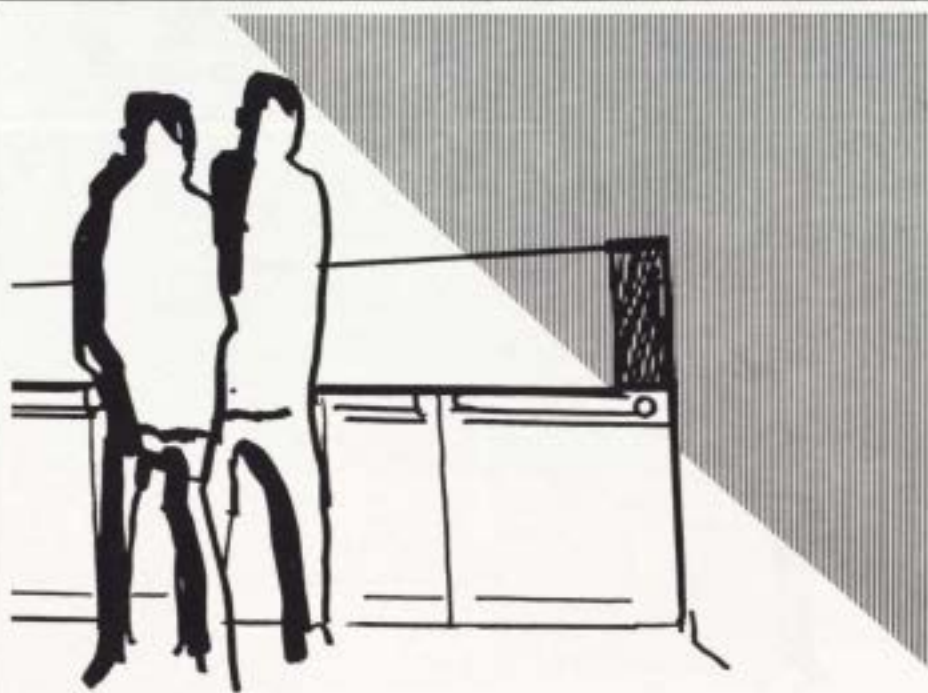
#### Utility of Light Fixtures

Much of our aesthetic judgment relies on one single, immutable scale—the human body, its dimensions, its capabilities, but especially on the ability of the human eye to perceive and record the world around us. Illumination within an obscure environment, moreover, puts a special strain on the eye's capacity to observe objects in space clearly because the source that illuminates can also cause glare, distortion, and irritation.

A simple experience at the University of Virginia demonstrates the point. For several years, students destroyed with persistent regularity the fluorescent light fixtures placed two feet above the walking surface along a pedestrian bridge leading to a dormitory area. No heavy wire screening could curb the students' angry urge for destruction. Yet all trouble ceased immediately as soon as the university shielded the offending glaring lights, deflecting the light downward on the walk surface. What had been decried as student vandalism was nothing more than the response to visual irritation.

The glare of light is reduced and the ability to recognize objects clearly is enhanced at an increasing degree





when the light source is placed above the six-foot level of the forward looking eye. In a pedestrian environment, along walkways and plazas, an exterior light mounted twelve feet high or higher can be considered in general as producing agreeable illumination with a tolerable level of glare. Conversely, it is quite unnecessary to hide the lamp inside a deep box, especially if the fixture is mounted on a sixteen-foot-high pole. The choice of such extravagant light fixtures must therefore be considered more the consequence of a designer's aesthetic choice rather than a consideration of utility. While producing "hot spots" at the base of the light posts, covered light sources at higher elevations prevent the even distribution of illumination over a larger area. For dormitory areas, however, where the horizontal cast of light into bedrooms would be disturbing to sleepers, many institutions have chosen one of the several shoebox designs for better downward spread of light in their housing precincts.

#### The Aesthetics of Light Fixtures

In selecting a standard light fixture, each institution has to make its own choice as to design and material of post and lantern and the luminescence of the light source. Institutions that years ago may have chosen a simple design for light posts and fixtures from a standard catalog at a reason-

able cost, may find the same design is available only in the "nostalgia" catalog at greatly inflated prices. In recent years, American manufacturers have updated their products with designs inspired by traditional motives, yet capable of dispensing high intensity light. Contemporary designs of post-mounted light fixtures, on the other hand, seem to appear on the market at a much slower pace and with less satisfactory results.

The globe light, a favorite with the American public since the halcyon days of the City Beautiful movement and the start of electric street lighting (about 1910), is considered by many the most decorative, most efficient, and most pleasing of all exterior light fixtures. In the 1930s, every American city prided itself of the ornamental illumination of its downtown districts; until, in the name of progress, all globe lights were dismantled and replaced by fluorescent lights that drove out crime and shoppers. No other design can express more efficiently and symbolically the radiant nature of light, be it as a single source or a cluster combination of lights, both in traditional or contemporary design. Its attraction for flying objects of all sorts seems only a small price to pay for a superior light.

Free-standing, post-mounted lights have traditionally provided most of the exterior lighting on American

campuses. The design aesthetics of post and lantern, while only partially visible at nighttime, play a significant part in the appearance of the daytime campus. How light fixtures harmonize with the architecture of adjacent buildings, how orderly the light fixtures are placed throughout the campus, and how the usual confusion associated with street furniture is avoided contributes measurably to the pleasant appearance of the university grounds.

Although most manufacturers offer a complete package of light fixtures, users frequently have the option of combining different designs for post and lanterns to suit their needs or tastes. The traditional heavy cast-iron post has recently received serious competition from lighter materials notably aluminum, fiberglass, and even pressure-treated lumber. Spun-concrete posts, preferred by power companies, can be sunk into the ground without the need of a separate concrete base, yet installing them perfectly plumb requires heavy equipment and a degree of precision not always assured in today's labor force. Mounted on or suspended from these light posts may be lanterns, called luminaries by the trade, of various designs inspired by such traditional sources as Beaux Arts, Art Deco, or Central Park Floral.

Another large group of light fixtures, generally fitting into the category of shoe box lanterns, is coming into more frequent use on college campuses. Highly efficient in the opinion of some users, these light fixtures carry a minimum of ornamental value in the array of campus street furniture items.

#### The Quality of Light

One of the most important yet subjective judgments a university has to make in lighting the campus is related not only to the light intensity, but also the quality, particularly the color of the light diffused from the lantern. While the traditional incandescent light bulb is generally considered the quality base against which all other light sources are judged, most institutions have discontinued its exterior use for reasons of economy, except for historic areas where its warm glow is said to contribute to the ambiance of a special area.

Within the last fifty years, the light industry has produced increasingly more energy efficient, long lasting



light fixtures of high intensity that have found wide application in outdoor illumination. Fluorescent light dispensed from long tubes have now largely been replaced by newer devices for outdoor lighting. The mercury vapor, though widely used and energy efficient, has never gained much public acceptance because of the greenish light it casts on people and objects. Highest on the chart of energy efficiency is the high pressure (and low pressure) sodium lamp—a favorite with power companies for installation along freeways and parking lots. Yet its orange cast and its distortion of color perception should relegate its use to areas of low architectural significance.

The most recent addition to the arsenal of the campus planner is the metal halide lamp which, though criticized for its intense "whitish" light, preserves the full array of color perception of buildings, people, and landscape. Though a far cry from the rosy glow of the traditional light bulb, metal halide, in the opinion of those who remember the early decades of this century, is the closest approximation to the gaslight that illuminated the streets of American cities nearly 100 years ago. After a period of experimentation, lighting engineers at the University of Virginia accepted metal halide lamps as an appropriate alternate choice.

### Modern Architecture and Exterior Lighting

Ever since Adolf Loos decreed fifty years ago that "ornament is crime" in modern architecture, designers of contemporary buildings have shown a strange aversion to exterior lights on or near their buildings. Straight lines, pristine solid walls surfaces, and repetitive arrangement of windows seem to frown on the intrusion of randomly placed light fixtures. At best, soffit lights, or "tomato can" spotlights, would reluctantly be accepted for the illumination of building entrances.

As with other architectural aspects, Bauhaus Modern encouraged the trend to the impoverishment of artistic elements in contemporary architecture by rejecting ornamental light fixtures. Only now in the post-modern area has the simple elegance of traditional design found new favor with a more discerning public.

Where architects have turned a blind eye to the needs for exterior lighting, landscape architects and inte-



rior designers have tried to fill the vacuum. On occasion, their special expertise has produced spectacular results by such means as uplighting on trees, spotlighting of landscape features, light reflected from walls or mirrored in water surfaces, continuous soffit lighting, or other devices from the lighting industry. However capable of generating seductive scenes of outdoor lighting in special small scale areas, landscape lighting or light reflecting from building surfaces can only be considered a supplement, not a substitute for the standard, freestanding light fixtures that traditionally have illuminated American campuses.



### Special Lighting Needs

Even a cursory review of lighting catalogs and lighting industry publications reveals that American designers in the past two decades have produced some of the most elegant, imaginative, useful light fixtures, both large and small for shopping malls, lobbies of concert halls, churches, executive offices, airports, newly reclaimed water fronts, and other public spaces. No wonder they had little time to consider the more mundane needs of university campuses. A case in point is the design of an emergency telephone streetlight for which the University of Virginia discovered a pressing need a few years ago.

When women students first began to enroll on this campus, immediate action on security measures became mandatory. Initially, the university put up temporary devices consisting of a ring-down telephone mounted on a galvanized pipe, a design evidently devised by a telephone worker, an electrician, and a plumber. But after reviewing numerous manufacturers' catalogs, and after installing several commercially available light post as test samples, the search for a satisfactory commercial product had to be abandoned. Other universities may have had similar disappointing experiences, judging from the cumbersome devices installed on many campuses.

The specifications for an illuminated emergency telephone seem simple enough: place a telephone connected to the police department at easy reach, especially for the handicapped, along critical pathways of the campus grounds; illuminate the telephone and the near environment with a white downlight; identify the area with a blue light at a height of about nine feet. After a few failed attempts, the university shops finally developed and built their own design in the most elementary way possible, with economy of stock materials, simplicity of form and function, and in complete response to the use for which it was intended.

The overarching concern of all persons involved in campus lighting will remain the attainment of a safe, surveyable, attractively illuminated nighttime campus that complements the appeal of the daytime campus that parents, visitors, legislators, students, and university alumni confirms to remain a source of pride and pleasure. ■



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## Coping With Natural Disasters: The California Earthquake

by Ruth E. Thaler-Carter



Recent natural disasters have made campus facilities managers around the country take new looks at their emergency preparedness plans. Since the physical plant administrator and department often take a leading role during natural disasters, a good emergency preparedness plan is an essential element of facilities management.

In recognition of this issue and in light of late-1989 crises such as Hurricane Hugo and the California earthquake, APPA has put new emphasis on actively encouraging its member institutions to develop, disseminate, and train personnel in carrying out comprehensive plans for handling natural disasters. Many institutions already have such plans in place or are revising them in the aftermath of actual use. This article focuses on the responses of several APPA member institutions to last October's earthquake in northern California. The summer *Facilities Manager* will discuss the re-

sults of Hurricane Hugo, as well as emergency planning for floods, snows, tornados, and other natural disasters.

James Burns and Louis Concordia once wrote in *APPA Newsletter* that a "well-thought-out and well-organized, written contingency plan is the key to a rapid and cost-effective response to any property-threatening disaster... equally appropriate both to campus-wide calamities—floods or earthquakes, for example—and limited occurrences such as fire contained in a single building."

Preparedness may be the key to preventing major damage to lives and property, but physical plant administrators also should be prepared to deal with problems after an emergency. According to a recent issue of *The Chronicle of Higher Education*, not only was "damage to campuses from earthquake and hurricane... far more extensive and costly than early estimates," but Hurricane Hugo and the California earthquake left many colleges and universities in the lurch on the costs of repairing and replacing damage. Damage to colleges and universities alone has reached several hundred million dollars at two dozen

schools so far, according to various sources. Thus, in addition to good plans and coping systems, it is essential to have appropriate insurance in place and a sense of the "health" of campus facilities so the cleanup and repair process can be as efficient and cost-effective as possible. Campuses in geologically or climatically sensitive areas may need to maintain emergency repair funds, for instance.

Keeping such information up to date can be a real boon after the dust settles. Said one California APPA member whose campus was affected slightly by the 1989 earthquake, "We originally thought the October 17 earthquake was the disaster; we've since learned the true disaster is the bureaucracy required by the Federal Emergency Management Agency."

It also is important to remember that some situations simply defy planning and preparedness. "There was no way we could have predicted or planned for the effects of the earthquake," said one APPA member in California. "It happened too fast and too extensively."

Here is how a number of physical plant administrators have structured

Ruth Thaler-Carter is a freelance writer based in Washington, D.C. and Baltimore, Maryland. She profiled APPA President Jack Hug in the Fall 1989 *Facilities Manager*.



their responses to emergencies caused by natural disasters—and a few examples of how those responses worked in reality. It is interesting to note that many of the physical plant administrators interviewed for this article felt a strong responsibility toward "their" buildings and facilities, accepting the inherent personal risks almost automatically.

### When the Earth Moves

The University of California-Berkeley, although not critically affected by the October 1989 earthquake, "has put an earthquake task force in place to deal specifically with the issue of emergency preparedness," said Paul F. Tabolt, director of physical plant in the university's office of physical resources. The October quake hit seventy miles from the Berkeley campus, but it made Tabolt and his colleagues keenly aware of the need to update their planning process. "Our campus lies on the Hayward Fault—it runs right through the stadium—so there is a greater than 50 percent chance that we will experience a major quake in the next thirty years. It could be any time—it could be tomorrow," he said. "The plan includes seismic upgrades and guidelines on how it should be used. We have a policy command center, incident center, and tactical centers. When an emergency occurs, we make a decision about the level of emergency—everyone is involved—and proceed from there."

Because the institution makes sure its emergency plan is disseminated thoroughly, Tabolt said, "Everybody knows they are to get to the campus and their assigned place if we have an emergency."

The role of the physical plant staff is "critical" to handling any emergency, Tabolt noted. "We have a large role and played a predominant role in the October quake," he said. Until recently, physical plant had not developed its own emergency preparedness plan; rather, some elements of the university's general plan referred to the physical plant department, "but there were no specifics about what our 450 employees were to do." In view of the October earthquake experience, "we are developing that and are planning



to hold a simulation exercise, since we gained a great deal of insight from an earlier simulation," Tabolt said.

The October quake was a learning experience for Tabolt and his staff. "We learned that we have to be more prepared," he said. "We have an obligation to the campus, the community, and ourselves to be prepared and a special commitment to be ready for emergencies." [See following story on the earthquake experiences of UC-Berkeley and UC-Santa Cruz—Ed.]

### The Quake Hits Stanford Hard

Stanford University in Stanford, California, was among the worst hit of the October 1989 earthquake targets. Although its emergency plan worked well last October, Stanford's campus sustained at least \$160 million in damage, said Ralph Buchanan, director for operations and maintenance. "We do have a university emergency operations plan designed for all sorts of emergencies, including earthquakes," Buchanan said. "It sets out initial assignments for all personnel who comprise the policy and operations groups. Physical plant administration fits into both sides of the process." Physical plant was involved in developing the plan, which has been in place for about ten years. Its written component includes phone numbers and basic responsibilities for all university personnel.

The damage estimate includes current estimates of both actual damage, primarily to unreinforced sandstone buildings that shifted drastically during the quake, and of the cost of repairing damage, said Buchanan. There were no total building collapses, but thirteen student housing buildings had to be closed, of which seven remained closed in early March. "We have to go in and conduct seismic upgrades of all our buildings," he said.



In retrospect, despite the extensive damages at Stanford, "all in all, our disaster plan worked pretty well," Buchanan said. "The effectiveness of any plan is based on when the situation occurs and who's available. Since this earthquake occurred at about 5:00 p.m., most of our people were on hand."

As a result of the recent quake, the president of Stanford has formed an earthquake commission "to look at facilities and operations, to decide when we are 'reasonably' prepared for the really big quake" predicted to hit California in the next few years, Buchanan said. "We are asking ourselves, 'how safe is safe?' It's an ongoing process. Life safety, of course, is our first and paramount concern. We are trying to develop a plan to determine what it would take for us to get back in operation within a week."

To do so, Buchanan and his department are focusing on seismic upgrades. "Those buildings that had seismic upgrades most recently had little or no damage," he said.

Among the better results of the 1989 experience is that Buchanan developed an unexpected source of such expertise. "The key to making decisions is having knowledgeable people to make damage surveys," he said. "We used all available people—including graduate engineering students. In fact, one of our civil-engineering professors designed the survey we used."

Satisfied that the school's disaster plan is as effective as could be hoped





in the face of unpredictable crises, Buchanan and Stanford are doing their best to be prepared for the future while they recover from the present.

#### The One-Building University

Although Ronald A. Doerr oversees physical plant operations for a one-building campus, he finds emergency preparedness as important as the physical plant administrator of the sprawling, populous, multi-facility entity that most people think of as a college campus. "We have only the one building, with six stories above ground and two below; no parking, no dorms, no labs," said Doerr, director of facilities for Golden Gate University in San Francisco. "Our planning was all preliminary, but we had written a draft disaster plan. It wasn't really required of us because our building is not a high-rise, but we followed the

same guidelines as more complex facilities."

The nature of the college makes emergency planning a different kind of challenge than larger institutions, said Doerr. "Our problem is that we have three distinct time periods to plan for," he said. "The October quake occurred at a good time for us, when our first evening session courses had begun but there were comparatively few people onsite." Doerr's staff numbers only four, with janitorial services provided on contract and only two or three people onsite each day. One evening administrator who acts as security and several "rent-a-cops" complete the staffing.

During the earthquake "we lost power and everyone sort of evacuated," Doerr recalled. "I checked the mechanical systems—if I hadn't been there, other people probably would

have been less concerned about the building and that wouldn't have been done. We had no injuries."

The key to Golden Gate's emergency plan is a system of floor wardens who are responsible for making sure people move out of the building safely in an emergency and for checking their areas to see who needs help. "I have a feeling we need a less rigid plan," Doerr said. "It's still in flux. We aren't set up for long-term accommodations of victims, for instance, although in October we had twenty people stay overnight. I stayed overnight, because I feel I have a responsibility to the building and the people. I also didn't want to think about how to get home!"

During the October quake, "our phones were out because they were not on the emergency system," Doerr said. "We did all our telecommunications from pay phones. We formed car pools and found out that some buses and diesel trolleys were still running and the ferry was still operating, so people who lived in the East and North Bay areas could get home."

Doerr said he would do a number of things differently if a similar emergency occurred again:

- "We probably would put the phones on an emergency system;
- "We could use more fuel, although the emergency generator did kick on and operate;
- "We probably would run an information center in the main lobby—





there was a lot of miscommunication, with people coming to pick up students and students not sure of what to do;

- "We'd rethink where to put people—our building has a newer and an older wing. We ended up with people in the older wing, which is the weakest part of the building but also the most convenient, with vending machines and more space;

- "We probably will go through a major upgrade of the older wing;

- "We need portable radios or walkie-talkies;

- "We're thinking of putting in a supply of hand tools, although we don't have a grounds department, for emergencies;

- "We don't have a kitchen so we're thinking of putting in small lockers with food and first aid sup-

plies, but first we have to find a place for them and then we have to worry about finding the keys if they're needed."

One effect of an earthquake that is specific, but often overlooked, for colleges, according to Doerr, is damage to the college library. "The library shelves came down and we had to spend about \$100,000 in moving and rental charges and \$40,000 on new shelves that had to be strengthened," he said. And seismic updates may not be as useful as assumed—"because the building behaved differently than expected." Cabinets fell over, so "we're bolting things down. The heck with the 'big one'—we're planning for the small quakes," Doerr said.

#### A Community College Responds

As a result of the October quake, the chancellor of the Peralta Community College District in Oakland, California, "requested that we take a hard look at our plans and preparations," said Arthur E. Sykes, director of physical plant for the district. "Our plan hadn't been used in years, but it worked—and worked well. We were one of the first entities to be back in operation—we were up and running again in two days. It's now time to review the plan."

The review process is extensive, according to Sykes. "Each of our four colleges is reviewing and revising its local plan," he said. "Each campus has a safety committee that plays a key role. We have a district-wide task force with three representatives from each college, including the business officer, nurse, district risk manager, police and safety services, and myself." The first district-wide meeting was held at the end of January 1990 to review the notes and existing disaster plan of each campus, as well as the civil emergency plan booklets currently available, said Sykes.

The task force approach is important, but "physical plant is the first response team in any disaster," Sykes said, "so our people have to be trained, no matter what the nature of the emergency. Training is a necessity." His department does ongoing training in various issues affecting college and university facilities, such as asbestos or hazardous chemicals and materials.

Training outside the department also is important, he said. "It is critical to be prepared; all elements have to fit

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in," Sykes said. "The involvement of the educational campus in keeping people informed, so they won't panic, also is critical." For that reason, training in handling crises is open to the entire campus, he noted. In addition, "we have a commitment from the chief executive officer that these things are necessary and have to be done, even if it requires time and money for seminars, equipment, and training. That 'top-down' commitment is important," Sykes said.

Sykes relies on seminars offered by a private, corporate emergency preparedness program as a key in training physical plant staff for disasters. The week before the 1989 quake, coincidentally, the district had sent the maintenance engineer, chief engineer, risk manager, and Sykes to a workshop on evaluating buildings after an earthquake, training which came in handy pretty quickly. "It helped considerably," he recalled.

Unlike some institutions, Sykes said Peralta had a good experience with the Federal Emergency Management Agency (FEMA) after the recent earthquake, in part because of the district's efficient preparedness planning and response. "They worked with us on damage reports, probably because we were prepared when they arrived," he said. "We had pictures and repair estimates ready." In the aftermath of the emergency, Peralta also benefited from a history of good relationships with the community, he said. "Cultivating such relationships helps you out in emergencies," said Sykes. "We had consultants volunteer immediately to help us with assessing structural damage and initiating repairs—architects, builders, seismic engineers, contractors."

One detail from the October quake in particular stood out for Sykes as a learning experience. "One of the chlorine pump rooms for the pool was damaged and the other untouched," he recalled. "We are looking at what happened so we don't make the same mistake when we rebuild."

#### Preparing An Emergency Plan

The threat of imminent earthquakes and a governor's executive order mandating emergency plans for state institutions were the motivating factors for San Jose State University, San Jose, California, to develop and update its emergency preparedness plan about five years ago, according to Mohammad H. Qayoumi, associate exec-



utive vice president, facilities development and operations. In response to the governor's order, the chancellor asked campuses to set up a system-wide committee to look at the issue of safety, Qayoumi said. "Each campus developed pretty elaborate plans, such as specifying central sites with enough rooms to accommodate emergency teams, phone jacks, beds, etc., to be in place by 1986. These were pretty good—but very general."

Since "our physical plants have a lot of people involved in emergencies, in fact the bulk of the people responding, we developed our own plan for facilities management," Qayoumi said. "It's in a good-sized binder and outlines major areas of response and responsibility, with different categories of emergencies. We keep a list of the machinery available as part of the emergency plan manual, which lists everyone's phone numbers and pager numbers—it even notes ham radio operators—with whom to call and how to respond. There is a basic plan of the campus noting the gasoline line and electrical connections and other important information. For our own people, we list personal information on each employee, such as blood type, medical information, whether they know CPR and first aid, their Social Security numbers, and their next of kin."

Class 1 emergencies are those that affect small areas, such as a contained flood or fire on one floor, and require little specialized response; Class 2 are those involving a major building or number of buildings, such as a large fire or a riot; Class 3 is for severe natural disasters such as earthquakes, in which case "we can tap into city services, but we have to be self-sufficient," said Qayoumi. "We created an

organizational plan for emergencies because the basic hierarchical structure is irrelevant in an emergency."

In the event of an emergency, Qayoumi said, "everyone in the facilities management department is expected to report in. We have a building coordinator for every building."

Under the plan, "everyone has two backup people, and each group has a defined, particular area to meet," Qayoumi said. Assignments include rescue operations, crowd control, and operating heavy machinery, some of which may require volunteers.

The San Jose campus was nominally affected by the October earthquake, yet it provided Qayoumi and his colleagues with experience that led to changing some aspects of the disaster plan. "We have programmed every individual in the department with their own phone number and message in the emergency phone system," he said. They also discovered the following:

- "Although there were updates every few minutes, there was no good means of communicating to all involved, so we're looking at creating a newsletter for the days of such an event;

- "We had adequate flashlights and radios on hand, but we are in the process of converting an old bus with shelves and cubicles to store small generators, emergency purchase order forms, phone books, schedules, food, and current replacement value information and square footage of our buildings, both for ourselves and for the media;

- "We are trying to put our basic contact and response information on laptop computers, because major systems can go down in an emergency and become useless;





• "Relying a lot on the news media is not a good idea, because they can be too sensational. That's why we think it's better to have a programmed phone system that people can call for information, which also keeps the regular phone system from jamming."

Qayoumi cited information and effective communications as the most important element of any disaster plan: "Your plan is meaningful only if people know of it and if it is kept up to date," he said. "Dry runs on a regular basis are a must. No area is immune from emergencies—you can have floods, fires, earthquakes—so you must be prepared."

Although his campus did not suffer from the October 1989 earthquake, "the need for a disaster preparedness plan has been evident for several years," said Chris Christofferson, director of physical plant for California State Polytechnic University, Pomona. His institution was under the same governor's executive order as Qayoumi's and responded by forming a task force to investigate emergency planning and preparedness, Christofferson said. "We developed standards for plans for each campus. We are required to address multi-hazard planning—to cope with anything from earthquake to fires to chemical spills to aircraft crashes."

That plan has been used twice in Christofferson's tenure, once to cope with a 300-acre brush fire and once to organize an orderly shutdown of the campus during a failure of the regular power supply.

Emergency operations at Cal State Polytechnic are "staffed by key individuals with predetermined roles, usually headed by the campus police chief from an operations standpoint and the chancellor from a policy standpoint," Christofferson said. The disaster plan lists essential equipment, maintenance issues, the location of two-way and hand-held radios, the emergency communication system—a converted carillon that was made electronic and can be operated as a campus-wide loud-speaker by picking up a handset and pressing a button. "It lets us talk to the entire campus."

Physical plant had a major role in developing the disaster plan, according to Christofferson. "We were members of the planning committee and identified the kinds of things that would become issues," he said, "such as ensuring safe water in facilities and other aspects of safety."



The role of physical plant during an actual emergency is equally important. "Our role is to determine the safety of utilities in an emergency," said Christofferson. "We do preliminary damage analysis, assist in evacuation, and respond as necessary with heavy equipment to help survivors."

Key people in the plan have been sent for specialized emergency planning, Christofferson noted, including simulations.

The Polytechnic is making its emergency plans in concert with its sister campuses, but operates "on the assumption that we will be on our

own," Christofferson said. "We are surrounded by a freeway system that could come down in an earthquake." To keep on top of the issue, a campus task force recently completed audits of all plans for completeness, effectiveness, and timeliness, a crucial process that Christofferson said "keeps you humble. The important thing about the process of disaster planning is that it always is in progress," he said.

"Flexibility is really important. What you are asked to do and the logistics of doing it can vary. Our whole watchword is flexibility, not to be set on a certain path arbitrarily." ■

## The Earthquake and UC-Berkeley

by Paul F. Tabolt

Within a ten-minute drive from the Berkeley campus, a disaster occurred at 5:04 p.m. on October 17, 1989 that would physically, financially, and emotionally affect the San Francisco Bay Area. A 7.1 earthquake resounded through the area, causing the collapse of the Cypress Expressway and a section of the Bay Bridge; fires broke out in the San Francisco Marina District, and structural damages became evident fifty to seventy miles from the earthquake epicenter. The loss of life and property was unclear at first, but we gradually learned that sixty-seven people died, 10,000 were left homeless, and physical damages would amount to more than \$7.2 billion.

Emergency response actions on the Berkeley campus began at 5:05 p.m. Initial damages and assessments were underway

immediately. Electrical power had not been lost and some local phone service was still available. Reports of natural gas leaks, water leaks, and steam leaks were first to arrive. The daylight work shifts had departed, but the evening shift was available and responded heroically to trouble calls. The immediate reaction of seasoned Californians was, "Oh, it's just another quake," until the true extent of the devastation began to be felt. Tension, anxiety, and emotions started to heighten as the reality of the damages began to unfold.

Our immediate mission was one of damage assessment. Phones enabled people to report some of the problems, but the critical question that we needed to answer was the extent of the damage on the University of California at Berkeley campus. A rapidly coordinated walk-through of facilities by physical resources, campus police, and environmental health and safety personnel unveiled no major structural damage. The next eight hours, although filled with re-

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quests for services related to the quake, did not present any problems that we could not address with normal emergency response activities. Time didn't permit repairs, but elevators were shut down as they were evacuated, valves were shut off where leaks were reported, and rooms were closed off where ceilings had fallen.

We decided that the campus would be open the next day based on the first level of assessment, which indicated no visible structural damages, and because the campus' value as a resource for the quake-related needs was paramount to the surrounding communities. Structural engineers, seismologists, geologists, and a cast of thousands from the campus responded throughout the next days, weeks, and months to the impacts of a shaky fifteen seconds.

The decision to remain open, although sound, was challenged the next morning, when superficial cracks in walls were observed by building occupants. Four buildings were evacuated and closed to assess damages reported as severe by 10:00 a.m. There was immediate concern that the rapid assessment may not have uncovered these problems, but three of the four buildings reopened shortly thereafter following assessments by structural engineers. The four involved a day care center, where wooden beams had to be reinforced (a two-day task) before reopening.

In retrospect, the decision to remain open became the most qualified aspect of the quake response on the campus. Building occupants, many of whom were aware of their buildings' seismic ratings from a previous engineering study, did not want to reoccupy unless they could be assured that a structural engineer had inspected their buildings and proclaimed them to be "safe." By the end of the day, the eight structural engineers retained by us were returning from their inspections questioning whether their services truly were war-

ranted. They, too, assessed the damage to the campus as minimal and felt their service to the community could be more valuable elsewhere. We were faced with an emotional reaction demanding concerted attention.

At 3:30 p.m. on October 18, physical resources, campus police, and environmental health and safety personnel met with more than 100 building coordinators to detail the initial assessment—the process, findings, and conclusions. Building occupants were assured that problems, cracks, sprawled concrete, and plaster were all being looked at but that the evidence showed no structural damage. With the exception of a single facility, all of the buildings were structurally sound and open.

It would have been easier on many of us in "essential services" to close the campus for a single day. More detailed analyses of

facility conditions could have occurred, but the outcome may not have changed. The campus was physically prepared for business as usual except for a day care center. Had we closed for a single day, we might have faced the same public reaction on day number two as occupants observed minor problems that, to them, were and still are unsettling. We could have inspected all of our facilities more closely if we had another day. We also could have posted notices of each building indicating what, if any, problems had been identified.

Even though the damages we incurred were superficial, the total estimate costs for building repairs presently exceed \$1.5 million. Some of the lessons we learned from this experience are as follows.

- Our two-way radio communications worked well with the campus police and our physical plant work force, but we had only intermittent phone contact with environmental health and safety and the university's administration. In a true disaster, we need immediate radio access to the campus hospital, local fire and police officials, and university administrators.
- Our campus hospital could not communicate with local hospitals without phone service. The likelihood of serious injuries and the demand for medical services require we initiate some form of direct communication.
- The names of emergency contacts and their phone numbers need to be clearly posted on laboratory doors, along with the hazardous material contents.
- Illegal locking devices prohibited access to certain labs and need to be removed.
- Earthquake anchoring of bookshelves and preventive measures to prevent chemical spills from shelves and cabinets need to be enhanced.
- Secondary water supplies for fire fighting need to be identified (pools, wells,





and storage tanks) in the event of water-distribution system failure.

- We need an identified group of structural engineers available on a standby basis who are willing to provide structural analysis in emergency situations.
- An inventory of flashlights and batteries needs to be located somewhere within the organization.
- The identification of damages eligible for Federal Emergency Management Agency disaster assistance can be significantly enhanced with an immediate videotape of observed conditions, as well as of emergency response. Not only does a videotape capture the physical aspects of the campus, it also provides a record of the intensity of the response actions.
- We need to prepare for our next disaster with further refinement of our emer-

gency plan as well as simulated disaster drills.

We have since benefited from a disaster simulation (originally scheduled before the earthquake) involving campus and local police, Red Cross, emergency disaster services, fire officials, physical resources, environmental health and safety, ham radio operators, housing and food services, public information, and hospitals. The simulation identified how well we could perform as well as numerous problems with which we were not prepared to cope.

We can only suggest that every physical plant administrator recognize the potential for disaster by setting aside time each year to develop a formal plan. A practice drill to raise the awareness of potentially affected parties also is in order, to assure preparedness.

We were most fortunate. We didn't face the "big one." But when one chooses to live in fault-laden California, one must accept the risk related to that decision. It is a known fact that larger and more devastating quakes will strike the Bay Area. Severe damage and loss of life can be expected on the Berkeley campus, which lies on the Hayward Fault, sometime in the future.

For weeks and months to come, those of us on the Berkeley campus will continue to contemplate worst-case scenarios that could have occurred. For a longer duration, we also need to ask ourselves whether we are prepared for our next disaster. Our colleagues must reflect and act upon their own preparedness. If you don't begin preparing for your next or first disaster in the next twenty-four hours, you risk never taking that first step. ■

## The Earthquake and UC-Santa Cruz

by F. Louis Fackler

I was fortunate to have been home when the October 1989 quake happened, so that I could help clean up the first layer of debris. I then turned my attention to the campus; after driving through the dark city, I was thankful to see lights as I entered the west entrance of the campus. I knew the 2.5 megawatt cogeneration unit was doing its job in keeping power on to the campus during this emergency. My first stop was at the heating plant where I received a quick briefing on the problems to date. The immediate problems seemed to be leaks in the hot water heating systems in two of our major buildings, which caused considerable flooding. The cogen unit was operating well and, although there was a short outage when the power first went off, it had faithfully supplied power to the campus since that time, and in fact, continued supplying power through the next day.

I then went to the emergency response center located at the campus firehouse. The campus had a disaster plan, and campus personnel had been drilled as to their various responsibilities in case of a disaster. Thus, I found an orderly group of campus people taking charge of the disaster. The campus fire chief has immediate responsibility for the operation of this group, and the chancellor and other campus administrators reported in to this location.

More than 4,000 students live on campus in residence halls. There are eight residential colleges, each consist of dormitories

or apartments, administrative offices, faculty offices, classrooms, and dining commons, as well as other student life facilities. Given the time of day, a large number of students were in their residence halls. It is amazing that there was no loss of life, and only seven minor injuries. This successful record was due in part to information given to students in earthquake preparedness, and to the seismic design of the campus facilities.

The first order of business was to examine all residence halls to determine building safety so that students could return to their rooms. Because power remained on, it was possible to feed these students outside their residence halls.

October 17th was quite warm, which is unusual for Santa Cruz, as we often have cold weather in October and almost always have cold evenings. The students brought blankets and other personal items



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from their rooms, and enjoyed the balmy weather within the open spaces of their various colleges. Campus facilities architects and engineers started immediately to examine residence halls for structural damage. Only two residence halls were considered not safe to enter, and the majority of students slept in their own bed that night. A request for help from UCLA was immediately responded to, and that campus sent two structural engineers, a hazardous cleanup team, a medical team, and additional police to the campus immediately.

The next day, the structural engineers examined the questionable residence halls and certified their safety. The structural engineers from UCLA were joined by structural engineers provided by the Office of Emergency Services. Accompanied by campus facilities architects and engineers, all major buildings on campus were quickly checked for structural damage.

Immediately after the quake, environmental health and safety teams made thorough examinations of all science buildings. The UCLA hazardous waste Team was joined by teams from the Santa Barbara and the Davis campuses, and it was possible to make a thorough investigation of all of our science buildings during the next three days and to remove dangerous materials.

The campus has a written disaster plan and an emergency operating committee as a standing committee, chaired by the fire chief. Representatives from environmental health and safety, telecommunications, campus facilities, housing, the science divisions, public relations, and other campus constituencies are on this committee. The campus plan is based on having individual plans for each of the campus units, and using building coordinators who are acquainted with the emergency features of their buildings. All campus facilities personnel, including physical plant and physical planning and construction personnel, have assignments that they are to assume during disasters.

The campus fire station is the Emergency Command Center, and all campus personnel know that they can report to that location and obtain briefings and assignments as to necessary action. On Wednesday, October 18, the emergency response team met at the command center and, after hearing a briefing from the various units, determined that classes would resume on Monday, October 23. This decision was based on projections of completing hazardous waste review and cleanup by that time, and the ability to clean and repair the majority of the classroom spaces on campus. On Thursday, faculty and staff were encouraged to return to the campus, and except for two of the science buildings, which had not been cleared because of toxic contamination, these persons were able to return to their offices and gradually put things back to normal.

The main chemical stock room had been provided with restraints on all of its



shelves, and only one bottle fell on the floor. Unfortunately, these restraints were not used universally within research laboratories. A large amount of chemicals and equipment fell to the floor causing serious concern for toxic hazards as well as breaking a great deal of valuable laboratory equipment.

Asbestos raised its ugly head during the cleanup effort; one of the buildings had asbestos within the fan plenums. A contract had been let for asbestos removal, but this work had barely begun. It was fortunate, however, that it had begun, because the campus had at its disposal a qualified abatement team and a consulting industrial hygienist. The first order of business was to remove loose asbestos material within these plenums before the fans could be turned on. This was also a laboratory building, and it was necessary to clear it for toxic hazard, so all of this work was completed within three days.

The campus student services building has a sprayed-on asbestos material on the ceilings. While this material is not considered friable under normal circumstances, an earthquake causes a great deal of white dust to appear on all surfaces and the floor. It was necessary for the abatement team to handle the cleanup, and the area was certified to meet health requirements by the industrial hygienist. This is a good reason for campuses within earthquake areas to re-

move all asbestos ceiling material even if it is not considered hazardous at the present time.

With normal operations resumed on Monday, October 23, the campus facilities work order desk was flooded with repair requests and observations of possible damage. Each of these was recorded and an inspector/planner/estimator was dispatched to review the situation. Where it appeared that possible structural damage may have occurred, an architect or a structural engineer was dispatched. No serious structural problems were observed, although we did discover a large number of cracks, spalling of concrete, and other types of damage.

The campus was required to provide a "rough" estimate of damage and extra cost caused by the earthquake; our initial rough and total estimate was between \$12 million and \$18 million.

The California Office of Emergency Services and the Federal Emergency Management Agency (FEMA) set up offices in Santa Cruz and invited representatives of all public agencies to a meeting. The campus applied for emergency aid, and FEMA inspectors visited the campus starting November 3, 1989. All departments were requested to assemble costs to date of actual expenditures during the first emergency phase, and to provide listings of all damaged equipment.

We then shifted into the next stage of





carefully assessing the damage, arriving at estimates for permanent repairs, and obtaining funding through state and federal sources. Of equal importance, was that of reviewing the actions taken on the night of the emergency and the days following, to determine what went well and what could be improved.

Following are lessons learned from this earthquake and reasons why the campus responded well to the emergency. There are also suggestions for improved response in the future.

1. The Santa Cruz campus can survive a 7.1 earthquake—with the epicenter located less than twelve miles from the campus—with minor injuries, no loss of life, and no major structural damage.
2. Having a disaster preparedness committee charged with the responsibility of disaster planning and training, and a planned emergency control center contributed greatly to the immediate response to the disaster. This increased our ability to get the campus back into operation in very short order. More

training is needed, especially for residential students and college faculty.

3. The Regents policy for strict adherence to seismic codes, the insistence on independent seismic review of major projects, and the fact that the campus administration placed high priority in correcting potential seismic problems provided safe buildings that minimize physical injury and property damage.
4. The availability of emergency power from the cogeneration system, which provided for the ability to feed and house students, and providing for immediate structural inspection of campus buildings was essential in this operation.
5. The factor of fear and emotional distress became apparent both during the emergency and especially in the days that followed. While the earthquake itself was a traumatic experience, the large number of aftershocks kept people on the edge emotionally for the first week after the disaster and perhaps for weeks or even months thereafter. Through the campus counseling center, counseling groups were established for students, faculty, and staff immediately after the disaster.
6. The need to structurally fasten equipment such as bookcases, gas cylinders, and other large pieces of equipment was well known before this emergency. However, in many cases this was not accomplished. The structural fastening of this equipment, and the providing of restraints on shelving and cabinets, is relatively simple and well worth while for areas within earthquake country.
7. Toxic hazards cause great concern in the aftermath of an earthquake. All laboratory buildings must be carefully examined by professional environmental health and safety personnel using rescue breathing apparatus to determine the extent of hazardous materials and to provide for cleanup of these materials. Asbestos materials will be loosened during an earthquake and these must be carefully cleaned up and the areas tested before occupancy.
8. There is an immediate need for help from others, including structural engineers, to assess building safety. Environmental health and safety personnel are needed to supplement campus personnel, and there is a possible need for emergency medical personnel. Our sister campuses responded immediately and contributed greatly to our efforts.
9. There is a need for better communication at all levels both within the campus and outside. The campus radio station should be more effective as an emergency broadcasting center.
10. The campus is isolated from the community, and we must review staffing and equipment needs of the fire department, the environmental health and safety unit, the campus health center, and other units needed in an emergency.



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## Facilities Administration: Who's in Charge of What?

by Herbert I. Collier

Administration of a facilities organization at an institution of higher education is different from any other organization within or outside the academic environment. Yet, there are similarities that cause administrators to try to identify the facilities organization with other units.

First, the mission of a university facilities organization is quite different from its industrial or commercial counterparts. In general, these outside entities consider their mission one of minimizing total maintenance costs, or maximizing production capabilities, depending upon the particular enterprise. Any reductions in maintenance costs or in maximizing production present the opportunity to give a better financial return to the investor.

However, the role of facilities organizations in higher education generally is to provide the best possible environment to support the institution's mission of academics, research, and community service. In most instances, the facilities budget has been established after careful administrative review of the range of services desired from physical plant, consideration of past performance, and, perhaps most importantly, the amount of financial resources available for providing facilities support.

Given the budget established by a higher authority, facilities administrators generally find that there are too many needs for the amount of money allotted. When this situation occurs year after year, institutions then have a deferred maintenance problem. This national crisis has been highly publicized in recent years, especially through the efforts of APPA.

Thus, the ultimate goal of the facilities administration is *not* to turn back budgeted funds, as may be desirable in the industrial/commercial sector, but to optimize maintenance services in support of the institution. Savings through cost reductions should be applied to existing backlog of deferred maintenance. When this concept is understood, it becomes somewhat easier to structure the facilities administration to accomplish this objective. The facilities organization is unique.

For example, the police department is structured like a military organization with well defined reporting levels and responsibilities. Although its day-to-day problems are somewhat different, they are still much the same, either falling within the law or without, and with few "gray" areas.

The campus financial organization also deals with a lot of "sameness" situations. Their personnel are trained in accounting techniques and procedures, and all transactions fit into a certain mode of handling. The low level employee needs little supervision; he or she has had general training before being hired and is given additional specific on-the-job instructions after being employed. In the financial operation, supervision is routine and, when there are questions to be answered, the supervisor is nearby. In contrast, the maintenance worker is often miles away from the shop, facing different problems every day.

Likewise, academic organizations are totally unlike the facilities. Each academician is a specialist in a very finite aspect of a somewhat broader field. The nature of academic/research work leads to a democratic type of governing, with selection of the department chair usually being by mutual consent of others in the department. Even the dean is often hired (or

fired) by democratic participation of the college faculty.

It is no surprise that university presidents and vice presidents have little understanding of facilities administration, since most of them come from an academic or financial background. After looking at the facilities organization chart, they immediately ask, "Why so many supervisors?" or "Isn't your overhead too high?" or "You have six, seven layers of supervision—that's too much!"

No matter how the organization chart is structured, there are only *three* levels of facilities administration. In small organizations, these three levels may be filled by a *single* administrator. In more extensive organizations that serve a large campus community, these three levels of supervision may appear to be five, six, seven, or more levels. However, a closer look will reveal that there are only three basic levels:

1. Planner
2. Implementor
3. Doer

### The Planner

The Planner is usually identified as being the chief facilities administrator, the director, vice president, or whatever title goes with that function. However, the function itself may be performed by several subordinates working with the chief, all to accomplish this overall planning goal.

What is included in this function? Obviously, as the name implies, it is a planning function. But what kind of planning? First, this level of administration must decide the proposed level of facilities support required by the institution. This is accomplished in a variety of ways. There must be an active communication process between the facilities administrator and the deans,

*Herb Collier is director of physical plant at the University of Houston in Houston, Texas, and a past president of APPA.*



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department heads, academic/research administrators, and the faculty. This is of primary importance in order to determine their level of expectations for facilities needs in assisting their mission.

After the support expectations have been determined, the chief administrative level must work with upper levels of university administration and with the budgeting office to integrate these needs in the budgeting process. As these budget allocations are finalized, communications with academic/research units must be continued so that they will know what levels of support services have been funded and what support they can expect from the facilities organization. Thus, the communications with those supported must be a continuous never-ending process.

After budget allocations have been finalized, the chief administrator must decide how to allocate these resources internally to maximize services. Some of the questions they must ask are:

- Which work programs can best be accomplished internally and which should be contracted to an outside organization?
- What types of administrator/professional employees are needed to implement the programs?
- What organizational structure will best serve to implement the programs? Totally different structures may be utilized to accomplish the same result. Establishment of the organizational structure must take into consideration local conditions including labor environment (union or nonunion), training/experience of work force, layout of physical facilities, etc. Therefore, there is no one "best" organizational structure.

The Planner must also consider the internal financial controls that must be implemented to maximize the use of each dollar. The Planner may elect to control every employee hired, every purchase, every job order, or he or she may choose to delegate this responsibility further down the line. The facilities organization must follow institutional accounting procedures. However, it still has a lot of latitude regarding the delegation of internal responsibilities. In addition, the planning level must determine the advantages and disadvantages of changing to new internal accounting systems. It must decide whether to relegate some accounting procedures to manual control, whether or not it is feasible to put some activities on the institution

mainframe computer, or whether personal computers should be used for some or all financial controls.

Once a decision is made concerning financial controls, other related questions must be resolved. If computers are to be utilized, other computer applications must be considered, such as preventive maintenance programs, work order and estimating systems, key control, personnel records, materials procurement, and warehouse inventory records. All of these decisions rest with the Planner.

Other issues that rest with the Planner include: 1) a continual evaluation of energy sources such as coal, oil, natural gas, and electricity; 2) the development of long-range equipment replacement programs, particularly electrical and mechanical equipment, often overlooked by other university administrators; 3) development of specific departmental personnel policies, in accordance with general institutional policies; 4) development of action plans for resolving deferred maintenance items and bringing needs to the attention of university administrators and budget officers; 5) input into space allocation so that the economic suitability for assigning specific facilities for offices, classrooms, and laboratories is considered; 6) development of a campus master plan with special consideration for future land use for parking, buildings, streets, and with particular attention to future electrical and mechanical extensions.

The above illustrates a few of the responsibilities of the long-range planning function of facilities administrators. In small institutions, this may be done by a single administrator, but, in many institutions, this single function may require ten to twenty positions in an organizational format that appears to be made up of many different levels.

### The Implementor

The Implementor develops a plan of action in his or her area of responsibility and often carries the title of manager, supervisor, or superintendent. Their function is to put into effect the plans of upper management. To be completely effective, the Implementor should have freedom in budgeting his or her resources, particularly in deciding amount of funding between labor, equipment, and operating materials.

Given this flexibility, the Implementor can consider many fac-



tors that relate to the implementation of a working unit. These include the establishment of labor requirements; qualifications of employees; implementing training and safety programs; the hiring and termination of employees (with appropriate review by higher levels); selection of equipment; the testing of materials and supplies; the providing of clerical support for working units in this area of responsibility; development of quality control standards for the unit; administration of employee performance reviews; and recommendations for employee merit raises. Basically, the Implementor is responsible for translating the mission determined by the Planner into a working program for day-to-day operations.

#### The Doer

The final level of responsibility is the Doer. Most often, this position consists of the front-line foreman. At this level, one takes the resources provided by the Implementor and makes specific work assignments to accomplish current tasks. Although the Doer looks ahead to the future, her or his primary responsibility is the accomplishment of the task at hand. He or

she makes specific assignment to each employee, making sure that each employee is capable of handling the assigned task, and that the employee has the proper tools, equipment, and material to do that task. For this reason, the Doer must be the one responsible for safety and accident investigation as well as be responsible for quality control. The majority of the Doer's time should be in the workplace where she or he can inspect work performance and be able to assist the workers in solving problems.

Because facilities problems are seldom the same, the Doer should have a limited number of employees to supervise. Usually the span of control is about eight or twelve employees. Therefore, in a large unit, several assistant foremen may be needed to assist the Doer.

In a facilities organization, money is best spent on well-trained foremen who are on the job assisting employees in solving problems. For that reason, the Doer's time should be kept free of unnecessary paperwork. Clerical support should be provided to assist the Doer in keeping time, preparing requisitions, and all of the other paperwork that constitutes much of a

university's procedures. Most Doers have come up through the ranks as trades journeymen, or custodial workers or groundskeepers. Since they are so good at what they do, they are promoted to a Doer (foreman) position. Very often, they immediately become burdened with a lot of unfamiliar paperwork. In most cases, a clerk can be hired who can do clerical work better than the foreman at half the salary, thus the foreman can be freed for the work they know best—that of being on the job with their employees.

In conclusion, there are three levels of facilities administration consisting of planning, implementation, and the action performers. These levels are usually identified by some other name or can be simply considered as Level 1, Level 2, and Level 3. Responsibility of several levels may be assigned to a single individual responsible for fulfillment of that function. Regardless of the specific character of the many institutions throughout the country, all must utilize these three levels of management. This is essential to provide the best possible academic environment so that the college or university's overall goal of learning, research, and community service can be achieved. ■

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## Water Treatment Specifications for Colleges and Universities

by HEFT/APPA

**T**his article has been developed to assist facilities managers in selecting a water treatment vendor for their institutions. The General Scope, Service Requirements, Bidding

*This article is the result of a project funded through APPA's Higher Education Facilities Trust. APPA gratefully acknowledges the generous contribution of Betz Entec, Inc., Horsham, Pennsylvania.*

Process, and Vendor Qualifications portions are designed in a format that can be used without modification. The Formal Proposal and Presentation section includes guidelines that will have to be modified, based on operating conditions, equipment, etc., at your facility.

The first step in the process should consist of qualifying all bidders to be certain that your organization will be working with technically oriented and

ethical companies. After you have found a workable number of qualified vendors, you should provide them with operating parameters for use in their program design. We have included boiler and cooling system description sheets for you to complete and distribute to all qualified bidders.

Schedule a vendor walk-through. This will allow the qualified bidders to become acquainted with all systems to be treated. This should be followed by





a general question-and-answer period. Inform the vendors that they will have the opportunity to make additional visits to collect any data necessary to prepare their bids.

Develop a schedule for presentations. Allow all vendors to present a proposal and any supporting information. At the end of the discussion, you may wish to ask some prepared questions based on what is important in your particular water treatment program. Reserve these questions for the vendor's impromptu response, which may provide insight regarding its program selection and how that pertains to your facility.

The information gathered through this process will be sufficient to allow you to make a sound decision!

### General Scope

The college or university is considering contracting for the services of a firm that can provide a complete service-oriented water treatment program. That program shall include all boiler systems, cooling towers, hot-water loops, and chilled-water loops. In addition, the water treatment program shall include all chemical products, any required control and feed equipment, and professional consulting services to accomplish the following:

- Minimize scale, corrosion, fouling, and microbiological growths, thereby optimizing fuel and electrical consumption.
- Minimize repair and maintenance costs associated with replacement and cleaning of equipment due to scale, corrosion, fouling, and microbiological activity.
- Provide professional, knowledgeable and involved sales/service personnel to ensure program success.

- Accurately monitor program results and make appropriate recommendations.
- Thoroughly train physical plant personnel on the implementation and control of the program.
- Provide state-of-the-art water treatment programs at a competitive cost consistent with the technology.

The term of the resultant contract shall be for a \_\_\_\_\_-month period commencing on \_\_\_\_\_ (date) and terminating on \_\_\_\_\_ (month). The college or university shall have the right to extend the resultant contract a maximum of \_\_\_\_\_ beyond the original expiration date.

### Service Requirements

The vendor agrees to have a technical representative available to provide the following services at no additional charge:

1. Make extra service visits for the first three months of contract, as agreed upon by vendor and college/university.
2. Make regular service visits (minimum monthly) during the contract, as agreed upon by vendor and college/university.
3. Review all systems operations during visits, review operator logs, test critical parameters of systems, and submit a written report on the results of tests and work performed.
4. Based on tests results, recommend adjustments on chemical feed pumps and controllers to ensure proper water treatment.
5. Prepare a written statement on the condition of all equipment that has been made available for inspection.
6. Train personnel in proper testing procedures and proper maintenance of treatment systems and equipment.

7. Supervise installation of any new feed and control equipment.
8. Train personnel on chemical safety procedures.

Representatives shall be available to the college or university on 24-hour notice.

### Bidding Process

The bidding process will be in two steps:

#### 1. Vendor Qualification

The bidder shall provide all requested information. Responses will be evaluated by the college/university. In addition to the materials that the bidder provides, the college/university may visit the bidder's plant and may request additional material, information, or references from the bidder.

#### 2. Normal Proposal and Presentation

Bidders who meet the qualification criteria will be designated as "qualified," and the college/university will provide them with the necessary information to develop a proposal. Each bidder shall then submit a proposal and make a presentation of the products and services being recommended. Evaluation of products and services will be based upon the proposal and presentation.

### Step 1: Vendor Qualification

The criteria listed below shall be mandatory to establish the responsibility and capability of firms to meet the college/university's requirements. The vendor shall provide sufficient information regarding each of the items below so that the college/university can thoroughly evaluate the vendor's qualifications.

#### A. Vendor Experience

The vendor shall be a company normally engaged in selling water treatment chemicals and services for boiler and cooling systems. A minimum of ten years experience will be considered sufficient to have demonstrated technical proficiency and good business practices. The vendor shall enclose documentation and a copy of its most recent annual report.

The vendor shall also be experienced in the college/university field. The vendor shall provide a list of at least ten college/universities where it treats boiler and cooling systems, and supply names and phone numbers of contacts at those locations.



### B. Vendor Representation

The vendor shall provide a primary technical representative to handle all contacts and service on at least a monthly basis. A secondary representative shall visit the plant once every six months and shall be required to have a working knowledge of all systems. Both persons shall be full-time employees of the vendor. The vendor shall submit a list of the names, phone numbers, educational backgrounds, years in water treatment industry, and years with the vendor for each representative.

### C. References

Vendor shall submit a list of clients in the surrounding area who are served by each company representative named above. The college/university shall be free to contact or visit customers so listed. At least two of these references shall have systems similar in complexity and size to the college/university's. The vendor shall provide a list of seven clients, their addresses, contact names, and phone numbers.

### D. Health and Safety

As a part of the college/university's hazard communication program, Material Safety Data Sheets (MSDS) shall accompany all first-time orders. The vendor shall provide a sample copy of its Material Safety Data Sheets.

The vendor shall operate a 24-hour, 7-day-per-week emergency response group who can be called for emergency information regarding chemical spills and/or accidents involving the vendor's products. The vendor shall provide the phone number of the 24-hour emergency group that is actively staffed by the vendor's qualified personnel. Vendor shall also supply a sample of the documentation that outlines instructions for reporting accidents and chemical spills.

### E. Quality and Liability Control

The vendor shall own and operate chemical-blending facilities to assure consistent product quality and minimize liability. The vendor shall provide a list of blending facility locations with personnel contacts and phone numbers.

### F. Program Administration

In order for the college/university to have quick access to all technical



and safety information, the vendor shall provide a water treatment program control book. This book shall contain an outline of the chemical program, all chemical control test procedures, log sheets, product bulletins, Material Safety Data Sheets, feed and

control equipment specifications, and service reports. The vendor shall submit a sample of the water treatment control book.

### G. Equipment Financing

The vendor shall have the capabil-

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ity of leasing any chemical feed and control equipment, as well as ion exchange equipment, required to enhance the system performance in case the need should arise. The vendor shall provide a copy of the equipment lease agreement.

#### H. Delivery Options

The vendor shall be able to supply alternate methods of chemical delivery besides drums and pails to minimize drum-handling and disposal problems where they exist. The vendor shall provide descriptive literature on delivery system options for quantities greater than 200 gallons per product.

#### I. Training

The vendor shall provide operator training that includes chemical testing, reporting and understanding chemical program results, safe handling of chemical products, and general knowledge of boiler and cooling systems. The vendor shall submit descriptive literature of a typical training program given to customers.

#### J. Efficiency Monitoring

The vendor's capabilities shall include computer-generated reports on energy use in boiler and cooling systems. The vendor shall provide examples of those computer-generated reports.

#### K. Laboratory Support

The vendor shall have laboratory facilities capable of performing a complete range of analytical work to assist with monitoring, control, and troubleshooting of the college/university's water systems. The successful vendor shall have a completely staffed laboratory including has a full-time Ph.D. in chemistry or related sciences. The vendor shall provide the name of the Ph.D.-level laboratory person, including educational background.

The laboratory facilities shall be equipped to run the following: water analyses, deposit analyses, corrosion coupon analyses, microbiological analyses, ion exchange resin analyses, and metallurgical analyses. The vendor shall submit a sample analytical report for each of the above.

The analytical laboratory capabilities shall include the following equipment as a minimum requirement:

- Atomic absorption spectrophotometer (AA)
- X-ray fluorescence spectrophotometer
- High-pressure liquid chromatograph (HPLC)
- Gas chromatograph/mass spectrometer (GCMS)
- Infrared spectrophotometer (IR)
- Scanning electron microscope-energy dispersive spectroscopy (SEM-EDS)
- Nuclear magnetic resonance spectrophotometer (NMR)
- Particle size analyzer
- Polarograph
- Microscopes with photographic capabilities

The vendor shall provide examples of analytical reports that demonstrate use of each of the above.

#### L. Research and Development Capabilities

The vendor shall have a research and development facility that includes test boilers capable of operating up to 500 psig. The facility shall also include test cooling systems for the analysis, development, and testing of new product formulations. The R&D staff shall include no fewer than four Ph.D.-level researchers. The vendor shall provide a list of these personnel, including their qualifications.

#### M. Technical Support

The vendor shall have a fully staffed technical support group, including a licensed professional engineer. These personnel shall be available for consultation during normal business hours of the college/university. The vendor shall submit a list of the support group, including its qualifications; and the phone number and normal working hours for that group.

#### N. Microbiological Testing

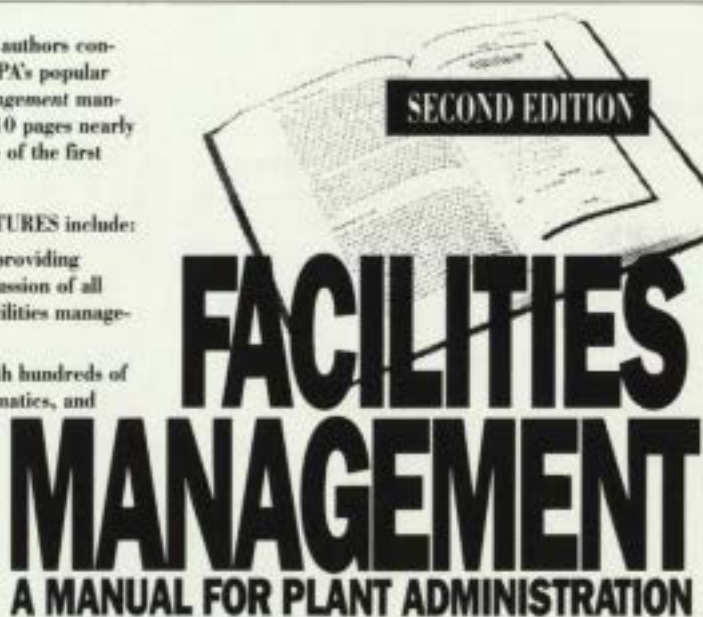
The college/university is concerned with bacterial control in water systems and the potential growth of Legionnaire's Disease Bacteria (LDB). The vendor shall provide laboratory data concerning biocidal efficacy in controlling LDB growth.

The vendor shall keep the college/university informed on any new reports from the Centers for Disease Control, Atlanta, Georgia. The vendor shall provide its most recent report on Legionnaire's Disease.

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**O. Insurance Requirements**

The vendor shall meet the college/university's requirements, as outlined in Appendix A. The vendor shall supply a certificate of insurance indicating the types and amounts of insurance provided.

**P. Field Service Capabilities**

The vendor will have the capability of conducting the following on-site field tests:

- Microbiological studies
- Stack gas analyses
- Corrosion studies via coupons
- Elution studies

- Instantaneous corrosion readout
- Fiber-optic (or equivalent) inspections

- Test heat exchanger studies
  - Dissolved oxygen studies
  - Steam purity studies
- The vendor shall submit sample reports and test procedures for the above.

**Q. In-house Regulatory Affairs**

In order to assure that all water treatment programs comply with local, state, and federal laws on environmental protection, the vendor shall have an in-house regulatory affairs group. The vendor shall provide the

name and phone number of the supervisor of this group.

In order to simplify the college/university's task, the vendor shall submit and organize all responses in the same order as the listed Vendor Qualification criteria.

The vendor shall submit the information requested to (name) at (address) by (date)

**Step 2: Formal Proposal and Presentation**

Congratulations! You have been selected as a qualified vendor to bid on

## APPENDIX A Insurance Requirements

(TO BE PROVIDED BY THE COLLEGE/UNIVERSITY)

## APPENDIX B Proposal Format

Your proposal should be structured in the following manner:

COVER LETTER (summary of your program)  
TOTAL ANNUAL COST WITH DELINEATION BY SYSTEM  
MONITORING AND CONTROL  
FEED AND CONTROL EQUIPMENT  
IDLE SYSTEMS (outline lay-up programs, products and dosages)  
ADDITIONAL INFORMATION (include recommendations or comments)  
TERMS AND CONDITIONS (enclose Appendix C with modifications, if any)  
PRODUCT BULLETINS (include for all products recommended)  
MATERIAL SAFETY DATA SHEETS (include for all products recommended)

Deliver the proposal to (name) \_\_\_\_\_  
at (address) \_\_\_\_\_  
by (date) \_\_\_\_\_

## APPENDIX C Terms and Conditions

(TO BE PROVIDED BY THE COLLEGE/UNIVERSITY)

## APPENDIX D Boiler System Description

**Boiler Data:**

No. or designation \_\_\_\_\_  
Year installed \_\_\_\_\_  
Mfr. name and type \_\_\_\_\_  
Firetube? (Y/N) \_\_\_\_\_  
If watertube: \_\_\_\_\_  
    "D," "O," "A" \_\_\_\_\_ Other? \_\_\_\_\_  
    No. of drums \_\_\_\_\_  
If electric: \_\_\_\_\_  
    electrode \_\_\_\_\_  
    or \_\_\_\_\_  
    resistance type \_\_\_\_\_  
Rated capacity: lbs./hr. or HP \_\_\_\_\_  
Avg. % makeup \_\_\_\_\_  
Steam production: \_\_\_\_\_  
    \_\_\_\_\_ avg. #/day X \_\_\_\_\_ days/yr. = \_\_\_\_\_ avg. #/yr.  
Boiler pressure = \_\_\_\_\_ psig  
DA pressure = \_\_\_\_\_ psig FW temp. = \_\_\_\_\_ °F  
Fuel Type (oil, gas, coal, other) \_\_\_\_\_

Answer "Yes" or "No" (Y/N) to the following:

FDA regulated? \_\_\_\_\_  
Economizer installed? \_\_\_\_\_ Blr(s) # \_\_\_\_\_  
Superheater installed? \_\_\_\_\_ Blr(s) # \_\_\_\_\_  
Steam turbine in use? \_\_\_\_\_  
Are pressure-reducing stations in use? \_\_\_\_\_  
Is the steam attemperated? \_\_\_\_\_ If "yes,"  
    indicate the source of desuperheat water. \_\_\_\_\_

Answer "Yes" or "No" (Y/N) to the following:

Is condensate returned by: \_\_\_\_\_  
Gravity and pump? \_\_\_\_\_  
Vacuum? \_\_\_\_\_  
High pressure direct to boiler? \_\_\_\_\_  
Is boiler blowdown flash tank installed? \_\_\_\_\_  
Is blowdown heat exchanger installed? \_\_\_\_\_



the water treatment program at \_\_\_\_\_ (institution) \_\_\_\_\_. The steps in the Formal Proposal and Presentation are as follows:

1. *Vendor walk-through/question-and-answer period.*

This has been scheduled for \_\_\_\_\_ (date/time) \_\_\_\_\_. Please confirm that you will attend by calling \_\_\_\_\_ (name) \_\_\_\_\_ at \_\_\_\_\_ (phone number) \_\_\_\_\_. The session will convene at \_\_\_\_\_ (location) \_\_\_\_\_.

2. *Submitting the proposal.*

• In order to simplify our task of evaluating all of the proposals that

will be submitted, we have developed a format in which proposals must be prepared (see Appendix B).

• Detailed information regarding the boiler and cooling systems can be found in Appendices D and E, respectively. Makeup water and discharge information are shown in Appendix F. All of the information that you require to determine program costs can be found in these three appendices. Make no assumptions regarding the system data or the water chemistry; call if you have any questions. If you find an error in the boiler or cooling system specifications, and we agree that the error is significant, then all vendors

will be notified in writing of the specification change.

3. *Making the presentation.*

• After our evaluation team has reviewed each proposal, you will receive a schedule for making your presentation.

The contract will be awarded to the vendor who best satisfies all of our water treatment needs at optimum cost/performance. Cost will not be the sole criterion for determining the contract award.

The successful vendor will be notified by \_\_\_\_\_ (date) \_\_\_\_\_. ■

## APPENDIX E Cooling System Description

### System Data:

#### Tower

Tower identification \_\_\_\_\_  
 Manufacturer \_\_\_\_\_  
 Evaporative condenser? (Y/N) \_\_\_\_\_  
 Type of fill \_\_\_\_\_  
 Is tower galvanized? (Y/N) \_\_\_\_\_  
 Sidestream filters? (Y/N) \_\_\_\_\_ If "Yes," \_\_\_\_\_ gpm  
 Is cooling water throttled? (Y/N) \_\_\_\_\_  
 % of circulating gmp to AC \_\_\_\_\_  
 Tower circulation rate \_\_\_\_\_ gpm  
 System volume \_\_\_\_\_ gal.  
 Hours/day operation \_\_\_\_\_  
 Days/year operation \_\_\_\_\_  
 Weeks/year operation \_\_\_\_\_

#### Air conditioning

Centrifugal tons (total) \_\_\_\_\_  
 Absorption tons (total) \_\_\_\_\_  
 Manufacturer/Model \_\_\_\_\_  
 Design Delta T \_\_\_\_\_ °F  
 % load \_\_\_\_\_  
 Max. water temperature \_\_\_\_\_ °F

#### Process (if applicable)

Average Delta T \_\_\_\_\_ °F  
 Heat exchanger metallurgy \_\_\_\_\_  
 Max. water temperature \_\_\_\_\_ °F  
 Shellside cooling? (Y/N) \_\_\_\_\_

### Closed System Data:

Total closed system volume \_\_\_\_\_ gal.  
 Expansion tank volume \_\_\_\_\_ gal.  
 Mechanical seals? (Y/N) \_\_\_\_\_  
 Crossover system (Y/N) \_\_\_\_\_  
 Filter installed? (Y/N) \_\_\_\_\_  
 Is anti-freeze used? (Y/N) \_\_\_\_\_  
 Makeup rate \_\_\_\_\_ gals./\_\_\_\_\_

## APPENDIX F Makeup Water and Discharge Information

### Water Analysis

Total hardness	_____	ppm as CaCO <sub>3</sub>
Calcium hardness	_____	ppm as CaCO <sub>3</sub>
Magnesium hardness	_____	ppm as CaCO <sub>3</sub>
P Alkalinity	_____	ppm as CaCO <sub>3</sub>
M Alkalinity	_____	ppm as CaCO <sub>3</sub>
Sulfate	_____	ppm as SO <sub>4</sub>
Chloride	_____	ppm as Cl
Silica	_____	ppm as SiO <sub>2</sub>
Total phosphate	_____	ppm as PO <sub>4</sub>
Total inorganic phosphate	_____	ppm as PO <sub>4</sub>
Orthophosphate	_____	ppm as PO <sub>4</sub>
pH	_____	
Conductivity	_____	mmhos
Iron	_____	ppm as Fe
Other	_____	

### Water source data (check):

Municipal	_____
Plant well	_____
Surface	_____
Pond	_____
Other (specify)	_____

System blowdown—discharged to: (use "b" for boiler, "c" for cooling)

Municipal sewer	_____	Plant waste treatment	_____
Stream	_____	Other (specify)	_____

Does plant have a National Pollution Discharge Elimination System (NPDES) Permit? (Y/N) \_\_\_\_\_  
 Permit Number \_\_\_\_\_



# Facilities Manager

The Future of Campus Facilities Management



# Facilities Manager

A Conversation With Walter A. Schaw



# Facilities Manager

When the Boss Is a Woman



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by Steve Glazner

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## Training

So, this is your first day on the job, and what do they do but bring you to a work station, tell you when lunch is, and leave you to the elements. Unfortunately, this sort of scenario happens all too often.

Miami University's (OH) physical facilities has worked to change that. Brian Whitlock, who was the training manager until his job was reclassified as administrative assistant, once did all the on-the-job training and orientation, but the department found that the housekeeping people were not very receptive to this plan. Whitlock explained that now all the senior housekeeping managers share the training. For one week the new employee goes to two hours of classroom orientation covering department policies and procedures and video training, and the rest of the time is spent in campus tours, tours of the physical facilities, and getting a perspective of custodial services. Then the employee trains on the job with a senior housekeeping manager and a coworker.

Whitlock said, "The new employees enjoy orientation more this way, and it has built a sense of teamwork among the managers. They not only help each other with the training, but they are helping one another with other projects as well. Also, the

*Stephanie Gretchen is the editor of APPA Newsletter.*

## Resource Management

### Stephanie Gretchen

housekeeping staff is much more receptive now that they are involved in the process."

### Seeking Excellence

Feedback without criticism. That is the principle on which George Sittner, director of physical plant at Red Rocks Community College (CO), bases his biweekly walk-through with his custodial staff. For thirty minutes Sittner, his two lead men, and five custodians spot-check the restrooms, the classrooms, or anything else in each of the custodians' territories.

Sittner said, "We are not doing any finger pointing. All we want to do is find out where help is needed. [The process] encourages pride because the employees don't want to look bad in front of their peers . . . I've noticed a definite improvement since we started these spot-checks. It works very well."

## Cutting Down on Pollution

Switching institution vehicles over to a fuel other than gasoline is an excellent way to reduce air pollution and fuel costs. Many institutions have been converting their fleets.

Dorsey Jacobs, director of physical plant at West Virginia University, also converted fifteen vehicles to natural gas in December 1989. WVU's efforts to convert its fleet were done as part of the 1977 Clean Air Act Amendments to help attain clean air standards, as well as to reduce maintenance needs to change oil, replace spark plugs, and create less engine wear and carbon build-up. There is also a great cost benefit; the natural gas equivalent of a gallon of gasoline costs only 40 cents.

WVU and Hope Gas Inc. worked together on converting the fleet. Hope Gas provided total funding for installation of a compressor and pumping station and converting fifteen vehicles.

The University of Arizona also made a switch, but not to natural gas. The university is doing its part to cut down on air pollution by converting its 450+ vehicle fleet to oxygenated fuel. The university is using methyl tertiary butyl ether (MTBE) to cut carbon monoxide emissions by 16 percent on vehicles built prior to 1981. MTBE's extra oxygen helps the gasoline burn more completely and releases less carbon monoxide. The use of oxygenated fuel is already mandated in Maricopa County (Phoenix area). The switch by UA, accomplished in January 1990, is as easy as letting the gas tank get low enough and then using the new fuel.

Not only is UA switching the fleet over to oxygenated fuel, but the physical resources department even purchased seven highly fuel-efficient vehicles—bicycles. These bicycles were purchased from UA's Surplus Properties, overhauled, and registered with Parking and Transportation. They save on gas, you don't have to worry about air conditioning or parking problems, and they improve employees' health.

Tom Harkenrider, acting director, physical resources, said the program is so successful they are buying more bicycles. "It is really a kick to see our folks riding around [on the bicycles] with a smile on their faces." Harkenrider explained that not only do UA's 35,000 students use bikes often, many of the university's 13,000 employees even commute to work by bicycle.

The employees using the bikes are physical resources estimators, shop supervisors, engineers, and business services staff. These vehicles are for official use only, but on a 334-acre campus there is plenty of space to ride in.

So far physical resources has nothing but praise for the program that Ray Umashankar, assistant director for engineering and utilities, devised. "The economic savings is obvious when you have a vehicle that does not need gas or much maintenance, but the bikes have been an image saver."

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## IBM Merges Minis, Micros, and Mainframes Under One Task Umbrella—Office Vision

If you subscribe to the "Big Bang" theory for the creation of the universe, the computer industry offers its own parallel. Back in the early 1980s the computer industry expanded so fast it virtually exploded. Fragments were everywhere. Piecing those fragments together elude even the industry's giants like Microsoft and IBM.

But they never give up trying. IBM's latest foray into the grand reunification process is called Office Vision. What separates Office Vision from many of its competitors is IBM's marketing clout (which is substantial, unlike their marketing wisdom). To give Big Blue their due, they apparently did their homework this time and may have finally hit upon the right mix.

IBM needed a way to tie their lucrative and stable mainframe systems business to the volatile and highly competitive

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## Data Base Update

Howard Millman

desktop computer trade. Their long overdue answer is a group of common software offerings that spans nearly all their computer systems. Versions of Office Vision run on MVS, VM, AS/400 and OS/2 (PCs). While the details are complex, the bottom line is that as long as a facility has reasonably current IBM equipment, all the hardware can be interconnected. Your department can freely exchange data with the computer center, accounting department, and the registrar's office.

Office Vision consists of several integrated software modules topped with a graphic interface. Here are its highlights.

- Since it's graphics-based you deal with icons more often than words. Is one picture worth a thousand words? When you are introducing staff to a new software program it is.
- All programs that run under Office Vision have similar menus and command syntax. The basic Office Vision package includes:

—Electronic mail—send/receive information between local area network users, and IBM's mini and mainframe computers.

—Address books—an electronic Rolodex.

—Composite correspondence processor—create and revise text documents complete with graphics and images.

—Telephony—(yes, that's its name) telecommunications via local area network links or modem.

—Calendar—dynamic time scheduling of appointments.

—File system—store, search, and retrieve stored documents.

Executive Decision (nice ring to that name), a subset of Office Vision available for the VS, MVS, and AS/400 systems, presents selected information in an easily digestible form. Usually graphic, Executive Decision's charts and summaries provide streamlined access to E-mail, online news services, and key corporate data.

Okay, what does this one-size-fits-all technology cost? For the small office using individual computers hooked to a local area network the software costs a reasonable \$750 per user.

On larger computer systems the cost escalates quickly. For example, for the VM computer system the graduated pricing begins at \$8,500 and escalates to a maximum of \$51,000 depending on the number of connected workstations. ■

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## Job Evaluation

**Systematic Job Evaluation and Comparable Worth**, by Dov Elizur. Brookfield, Vermont: Gower Publishing Co., 1987. 290 pp., hardcover.

The author's intention in this text is to supply information on the problems of achieving equitable pay by using a systematic approach to job evaluations, job comparisons, wage structure, and implementation of the results.

Do not confuse this publication with a book in which there is a rehash of things that are known to all of us. This is a manual that is concise and, as the title suggests, systematic. The author takes us through five steps in the job evaluation process.

Step one explains the concept, the legislation in many areas of the globe, the difference between equal pay for equal work as opposed to equal pay for work of equal value, as well as the psychological aspects of labor market discrimination.

Part two takes us into the current techniques of job evaluation and an explanation of quantitative and qualitative analytical methods of evaluation.

Part three leads us through the praxis of job evaluation: planning, principles, defining content and design, and collecting the job information.

Part four evaluates job comparison. This section includes scale analysis and image analysis, two complimentary means of analyzing jobs.

Part five covers the complex systems of designing the wage structure. Using the information in this text it becomes clear that without proper implementation of the wage structure and maintenance of the plan, the process might as well never have been started. Grade levels, impact of grade systems, professional groups, market surveys, reevaluation of vacant positions, appeal procedures, and changes in positions all play a part in wage implementation and maintenance.

This text is a guide for developing a job evaluation plan and a warning about pitfalls to watch for. It does not cover all the problems inherent in specific jobs or geographical locations; to do this would be an impossible task.

If the reader has not been through the process of job evaluations or pay equity evaluations, this publication will seem tedious. Experience in evaluations should be a prerequisite to reading this text and being able to understand fully the author's intentions and put them into practice. This seems to be putting the cart before the horse; however, I would use this book as a reevaluation of an existing process, not as a start of a process.

This book is available from Gower Publishing Co., Old Post Road, Brookfield, VT 05036.

—Norman Loat  
Assistant Director, Physical Plant  
University of Winnipeg

## The Bookshelf



### Training

**Successful Training Strategies**, by Jill Casner-Lotto and Associates. San Francisco, CA: Jossey-Bass, 1988. 409 pp., hardcover.

Read this book if:

- You have high-level decision-making authority for your campus' physical plant;
- You can influence decision-making for your campus' physical plant;
- You recognize the importance of incorporating training into your goal-directed planning and operations; or
- You are willing to be convinced that it is important to incorporate training into your goal-directed planning and operations.

Don't read this book if:

- Your physical plant is not interested in long-range and strategic planning;
- The quality of your physical plant's services is as high as top management cares to have it; or
- Your physical plant will not experience any significant changes in mission, budget, personnel, equipment, procedures, output requirements, or survivability in the foreseeable future.

*Successful Training Strategies* is chock-full of valuable ideas on how training can support the goals of an organization. The author's purpose is to "bring the state of the

art in training and on-the-job learning to public attention, and disseminate this knowledge to a wide audience of corporate and union decision-makers."

They achieve their purpose admirably by organizing twenty-six "how-we-did-it" case studies into five sections:

- Aligning Training Strategy with Corporate Goals
- Continuous Learning for All Employees
- Manufacturer-User Training Partnerships
- Designing and Delivering Training Cost-Effectively
- Combining Continuous Learning and Employment Security

On the surface, it would be easy to dismiss these case studies as irrelevant for higher education physical plants; all the studies are of private sector corporations. But inquiring minds won't be misled by that fact. Instead, if you choose to accept the challenge of exploring these studies, you will discover a gold mine of action-provoking ideas.

Yes, it's true, IBM *does* have more money to spend on training than most physical plants. So what? Yes, General Motors and General Electric and General Foods and Motorola and Goodyear and Xerox *do* have to worry about their Japanese competitors or other transnational conglomerates, and so are more willing to make significant changes in their operations to survive and be profitable. Big deal. Are physical plants any less vulnerable to change? I don't think so. What is critical in considering the place of training in your scheme of things is how you approach the future. This book suggests a proactive approach. Every case study describes the conditions that led management to consider doing things differently. Each corporation's leaders (and often, the leaders of the unions whose members worked within these corporations) were trying to anticipate problems or achieve goals before they were overtaken by crises.

The section "Aligning Training Strategies with Corporate Goals" may have the most important implications for physical plants. That is because most physical plants probably don't have the equivalent of corporate goals or training strategies. If you're like most physical plant administrators, your planning consists of the annual or biannual budgeting nightmare, plus assorted problem-specific meetings intended to get someone (trustees, department heads, deans, etc.) off your back and telephone. So looking ahead more than a few months or a year is an uncommon exercise. If your department *does* accomplish long-range or strategic planning (and those are different), I salute you and urge you to share your experience with other.

"Continuous Learning for All Employees" is a concept that adult educators have been trying to get employers to practice for many years. This section shows why and



how four corporations have done it. Again, for most physical plants, this is not an operational concept. Most departments do not have anything resembling career planning for their employees. But they could, if they saw the value in morale, retention, and productivity. These chapters will explicate the benefits and some possible methods.

"Manufacturer-User Training Partnerships" is a section that is right on target for physical plants. When new equipment is installed, training for plant employees should be an integral part of the supplier's responsibilities. Too often it isn't. Or the "training" is a lecture and demonstration with a question/answer session tacked on. That is not adequate, as frequent callbacks to the supplier's representative will attest. Physical plant people should know how to do what needs to be done—not just because it may save money (and I realize that in some cases it may not save out-of-pocket expenses), but because it can save downtime—a critical factor when dozens, hundreds, or thousands of students, faculty, and staff may be affected. The six chapters suggest how.

"Designing and Delivering Training Cost-Effectively" gets at ways to do what may often be considered difficult or impossible: How do you measure the impact of training? The chapters don't give cookbook recipes. Rather they describe approaches, such as IBM's systems approach, that can allow you to conduct training activities in ways that can affect your bottom lines. Training ought to be considered as just one of management's many tools for achieving its goals. And it ought to be required to justify itself as clearly as any other of those tools. It can—if management encourages it to do so.

Finally, "Combining Continuous Learning and Employment Security" offers ideas on how to improve competitiveness and enhance long-term growth, while adjusting to change. I hope nobody believes that physical plants need not worry about being competitive. When hourly rates for craftworkers rise, and deans and department heads complain about their costs and how they can go "outside" to get the same services cheaper, physical plants must be competitive. Not only that, they must look ahead and invest in their major resource: their people. These chapters describe how retraining and related concepts can be operationalized to the benefit of employer and employee alike.

This book should generate a lot of internal dialog for the reader. Many will argue a range of viewpoints within themselves as they assess the viability of the methods described. *Successful Training Strategies* is not a lightweight. You won't digest it in one sitting. But it can help you decide on the proper role of training within your physical plant, and it will help you figure out how to implement that role. After you read the book, give it to another physical plant administrator whom you think will benefit

from it. I plan to give it to just such a person: the director of our physical plant—my boss.

This book is available from Jossey-Bass, Inc. Publishers, 350 Sansome Street, San Francisco, CA 94104.

—Paul Schneller

Training and Communications Coordinator  
Indiana University

## Quality Control

**Guide to Quality Control for Design Professionals**, by David K. Ballast. Newton, MA: Practice Management Associates, Ltd., 1986. 286 pp. \$125, looseleaf.

"Quality" is becoming a byword for architects, engineers, and interior designers, as clients put more and more emphasis on this aspect of their projects. *Guide to Quality Control for Design Professionals* addresses this crucial management issue.

The book's author is an experienced architect, teacher, and author; Practice Management Associates provides management advice to architectural and engineering firms. Input for the book comes from some of the more successful architectural and engineering firms, as well as from professional associations and professional liability insurance carriers. Consequently, the book is a thorough treatment of the issue

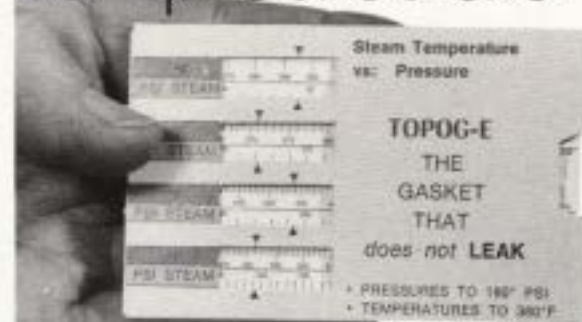
of quality control in providing design services.

The book mentions, but does not elaborate on, the corporate cultural change and firm leadership necessary to even think about issues of quality. It does go into great length and detail, in almost checklist format, describing the procedures and components of a design project. The *Guide* is comprehensive and well organized according to phases of service. Through references it brings into focus a whole library of essential related publications.

The section covering coordination checking is, in some aspects, broader than the "Redicheck" list developed by William T. Nigro (1987), but lacks the emphasis on the coordination process inherent in the Redicheck system. The fallacy of all checklists, of course, is the inevitable item that is unique to a specific project that did not make it to the list. The message to firms interested in quality is the need to develop a quality management plan for each project. That plan may incorporate one or more lists or guides, which must then be augmented by the requirements peculiar to that project. It is that planning and management that lead to a quality project.

Several attempts have been made in recent years to define the minimum acceptable level of practice. There are two risks here: one, that a practitioner may rely on these documents as a cookbook to success,

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and also that an unhappy client may rely on them as evidence of malpractice, even when the procedure cited is inappropriate. A debate rages among the professional architectural and engineering societies as to the advisability of such publications. The *Guide to Quality Control for Design Professionals* is neither a cookbook nor a benchmark for minimum practice. It is a well-thought-out, useful tool for the design practitioner who will use it as a part of a quality management plan.

This book can be ordered from Practice Management Associates, Ltd., 10 Midland Avenue, Newton, MA 02158.

—James E. Gehman

AIA

Hanbury Evans Newill Vlattas & Company  
Norfolk, VA

## Energy Management

**Retrofit Opportunities for Energy Management and Cogeneration**, E. William Payne, compiler and editor. Lilburn, Georgia: Fairmont Press, 1989. 606 pp. softcover.

*Retrofit Opportunities for Energy Management and Cogeneration* is actually a series of papers written by more than 100 energy experts. The papers were a summation from the Annual World Energy Engineering Congress, which is sponsored by the Association of Energy Engineers. Because of the various authors and broad range of subjects the book is not a continuous treatment of energy conservation, but rather 100 different strategies and techniques.

The book contains twenty major sections that can be grouped into the following groups: lighting system retrofits, energy management, HVAC retrofit, conservation, and energy purchasing. Some of these sections present subjects that are practical, down-to-earth retrofit type projects, while others are more theoretical and philosophical in nature.

The first section, Lighting System Retrofits, consists of eight chapters. These chapters show optimal lighting configurations and retrofit opportunities in case studies. J.L. Fettes, AT&T Network Services, wrote one chapter, "Lighting Retrofits That Make Sense and Save Dollars," which discusses nine lighting retrofit cases. These case studies delineate the problem, the recommended solutions, the illumination characteristics of the change, the economics, and any other problem they ran into in implementation. The purpose of this chapter is not to lay out all the energy-saving methods, but rather, as the author states, to "demonstrate that good lighting practice does not have to be sacrificed for energy efficiency." Other chapters focus on optimal methods of lighting design, economics of reflectors projects, and the Federal Government Shared Energy Savings Project.

The next section, encompassing nineteen chapters, is Energy Management Systems.

These chapters are aimed at two major points: selecting EMCS vendors and methods of upgrade. The papers do not specify actual hands-on techniques as the title of the book would indicate. However, the subjects of DDC, open protocols, and building commissioning are of such a broad nature that to delve deeper into these subjects would require a book unto itself.

The third major section, HVAC Retrofit, is composed of twenty-nine chapters that range in subject from cooling towers, VAV, evaporative cooling, indoor air quality, heat pumps, and chillers. A majority of these chapters are detailed case studies emphasizing test data. Each chapter describes a particular facilities problem and the resulting solutions. Graphics and tables summarize the energy savings actually experienced. One chapter was especially well presented: "Energy Conservation Through Condensing Heat Exchangers," by Singh, Malik, and Kapur, North Carolina A&T State University. This article quantified the savings of condensing heat exchangers. Normal practice is to keep the flue gas above 300-325 °F to prevent condensation that, because of the acidity, can corrode the heat exchanger. This paper goes through the condensation threshold limits analyzing effects of condensation and a discussion of corrosion resistant materials to fabricate heat exchangers. Next the paper presents four case studies that detail the operating parameters, heat exchanger performance, and economic data. This article was written clearly with back up on actual data.

The next section concerns cogeneration and consists of fourteen separate chapters, half exploring case studies and the others discussing the environmental impact and public policy issues of cogeneration. These chapters are most practical and present the information in a down-to-earth manner. One chapter, "Optimizing Heating and Cooling with an Existing Cogeneration Facility," by Fierce, Behrendt, of the John Deere Harvester Works, describes the conversion of their facility to a cogeneration facility. Diagrams of the cogeneration system and heating and cooling systems are clearly drawn. The engineering design parameters are fully discussed with emphasis on the optimization of the entire system through various manipulations of components of the system. Finally, an economic analysis is presented. The article is well laid out with ample explanations and graphics. The other section of the cogeneration articles is composed of chapters dealing with the environmental impact of cogeneration. Most chapters discuss each author's facility and its efforts to minimize emissions. Once again the real life discussions are most helpful to determine whether the article would be applicable to the reader's facility.

The last section of the book concerns a broad spectrum of topics that I would term energy conservation policy. Topics in this

section concern natural gas and electricity purchasing, energy conservation effectiveness, restructuring the electric power industry, and case studies of energy efficient designs. By the subject, these chapters are broad-based studies of these topics. The articles can be used as guideposts for an energy conservation manager. Each facility and utility is different and thus a step-by-step procedure of energy conservation is not possible.

A book that presents an orderly discussion of various energy conservation techniques may be more helpful to some people. However, the emphasis here is how well actual projects have been applied and what new ideas need to be investigated.

Overall this book has a great deal of information that is valuable to energy conservation managers. The book, because it is written by so many people, has no continuity and therefore is difficult to read. Rather than thinking of it as a unified book, think of it as a compilation of unrelated subjects concerning energy. My only disappointment with the book is the title. While there are many case studies of retrofit projects, many of the chapters, especially about EMCS, cogeneration, and fuel purchasing, are not about retrofit, but rather energy and utility cost savings.

This book is available from Fairmont Press, Inc., 700 Indian Trail, Lilburn, GA 30247.

—Dean Alderson, PE

Mechanical Engineer

University of Texas

Health Science Center at San Antonio  
San Antonio, Texas

## Management

**Riding the Waves of Change**, by Gareth Morgan. Jossey-Bass, Inc. Publishers, 1988. 230 pp. hardcover.

In this book, Gareth Morgan attempts to describe a method for private sector (profit driven) managers to utilize in order to "develop managerial competencies for a turbulent world" (as is claimed in the book's subtitle). The author utilizes a series of quotations from managerial forums to describe and support his plan. While such a practice sounds good, unfortunately in this case it detracts from the author's description of his plan and how to implement the program. The reader will, as I did, get lost in a maze of quotes and statements. Since this book is really about steps a private-sector manager should take to prepare his or her company to be prepared to take advantage of future changes, a public sector manager can benefit from the discussion concerning the need for long-range planning.

Morgan criticizes other recent management books as looking in the rear-view mirror to determine what other managers

*Continued on page 60*





# MANAGING STRATEGIC CHANGE:

## A GLOBAL PERSPECTIVE

### APPA 77th Annual Meeting July 1-4, 1990 Ottawa, Canada

Join your APPA colleagues at the 77th Annual Meeting in Ottawa, Canada. Enjoy visiting Canada's capital city with its unique blend of historic sites and attractions, modern buildings and shopping, and idyllic setting along the canal and three rivers. Ottawa is an excellent place for a family vacation and an appropriate setting for recognition of APPA's increased international efforts.

The dates of this meeting, July 1-4, offer a special opportunity for attendees to help two countries celebrate their independence days. On July 1, Canada Day, a host of activi-

ties from concerts to shows to fireworks will take place all over the city. The meeting closes on July 4, America's independence day, as APPA hosts an Old-Fashioned Fourth of July Picnic. No other association has brought this unique international perspective to their annual meeting.

When planning your trip to Ottawa you will want to arrive on Friday, June 29 or Saturday, June 30. There are pre-convention tours, regional meetings, and a welcome reception planned for Saturday. In addition, the Opening Ceremony & Brunch will begin Sunday, July 1 at 10:00 am and finish at 2:00pm so that you will have time to participate in the Canada Day activities.

Join APPA that evening for a first-rate view of the fireworks from the terrace of the Ottawa Congress Centre.

This year's meeting features two keynote addresses from individuals of international standing—Dr. John G. Stoessinger, Ph.D. and Dr. Claude Lajeunesse. Over 50 educational sessions have been planned, including an international track with presentations given by delegates from Australia and Egypt. A host of social activities that will let you experience the highlights of Ottawa include a cruise along the Ottawa River and a visit to one of Canada's national museums.

The Preliminary Program has been mailed to all APPA members with complete details on the meeting and registration/hotel information. Next month, the APPA Newsletter will feature the sights of Ottawa, special events, the spouse/guest program and post-convention trips.

### Meeting and Hotel Facilities

APPA will be using multiple properties in Ottawa to host this meeting. The exhibit hall and most educational sessions will take place at the Ottawa Congress Centre; breakfasts and the banquet will take place at the Westin Hotel. Details will be provided in registration materials distributed at the Annual Meeting. All properties are within a two-block radius. Sleeping rooms are available at The Chateau Laurier, the Westin, and the Novotel Ottawa. Reservations for sleeping rooms must be submitted to the APPA Housing Bureau—the hotel will not accept reservations directly (details in the Preliminary Program).



## KEYNOTE ADDRESSES

### International Perspectives in the Decade Ahead

**John G. Stoessinger, Ph.D.**  
*Professor of International Affairs  
Trinity University*

Dr. Stoessinger is an internationally recognized political analyst and prize-winning author of ten leading books on world politics. He holds a Ph.D. from Harvard and has taught at several institutions. His book, *The Might of Nations: World Politics in Our Time*, was awarded the Bancroft Prize. Dr. Stoessinger is a Professor of International Affairs at Trinity University at San Antonio, Texas. His address will focus on the implications of world politics on America's ability to economically compete, and the critical role of quality higher education to the outcome.

*Monday, July 2*

### Quality Facilities: Quality Education—A Global Perspective

**Dr. Claude Lajeunesse**  
*President*

*Association of Universities and  
Colleges of Canada*

Dr. Lajeunesse is a leading figure in higher education in Canada. He will share his vision on international recognition of the facilities component as a key to the academic mission. Dr. Lajeunesse has a broad background of experience serving as President and CEO of the Computer Research Institute of Montreal prior to assuming the presidency of the Association of Universities and Colleges of Canada.

*Wednesday, July 4*

## EDUCATIONAL PROGRAM HIGHLIGHTS

### CRITICAL ISSUES IN HIGHER EDUCATION

Series of educational sessions that focus on topics of vital interest and timeliness to facilities managers.

#### • Capital Renewal/Deferred Maintenance

Since the release of the report in 1988, AFPA has become a force for reversing the decay of the American campus. Presidents, trustees, legislators and the facilities management community have evolved into a dynamic leadership force on policy direction and development. Panelists will examine results of this effort including the emerging role of the state higher education commission; the role of facilities officers as leaders for change, and financial issues.

##### Speakers:

*Brenda Albright, Deputy Executive Director,  
Tennessee Higher Education Commission  
Sean C. Rush, Director National Higher  
Education Consulting Services, Coopers &  
Lybrand  
Walter A. Schanz, Executive Vice President,  
AFPA  
Robert Witmar, Trustee, University of  
Rochester*

#### • Environmental Concerns

This two-hour session focuses on regulatory/legislative issues and waste management. The first hour will review recent regulations and provide an update on pending legislation in such areas as groundwater contamination, radon, accessibility standards and other areas covered in AFPA's *Regulatory Compliance for Facilities Managers*. The second hour will focus on how to analyze and develop a plan to manage waste and examine some critical areas of concern in waste management such as hazardous waste, solid waste, and recyclable materials.

##### Speakers:

*Sheldon Steinbach, General Counsel, American Council on Education  
Maureen Budetti, Principal Legislative  
Analyst, University of California System  
Representative from Center for the Biology  
of Natural Systems, Queens College, CUNY*

#### • Excellence in Human Resource Management

This session will focus on the importance of developing and fostering excellence on campus through institutional support and commitment from all management levels. The first presentation—*Building a Foundation for Excellence*—reviews the blueprint for excellence at the Smithsonian Institution including its training needs, organizational development, and career development. The second presentation will be announced at a later date.

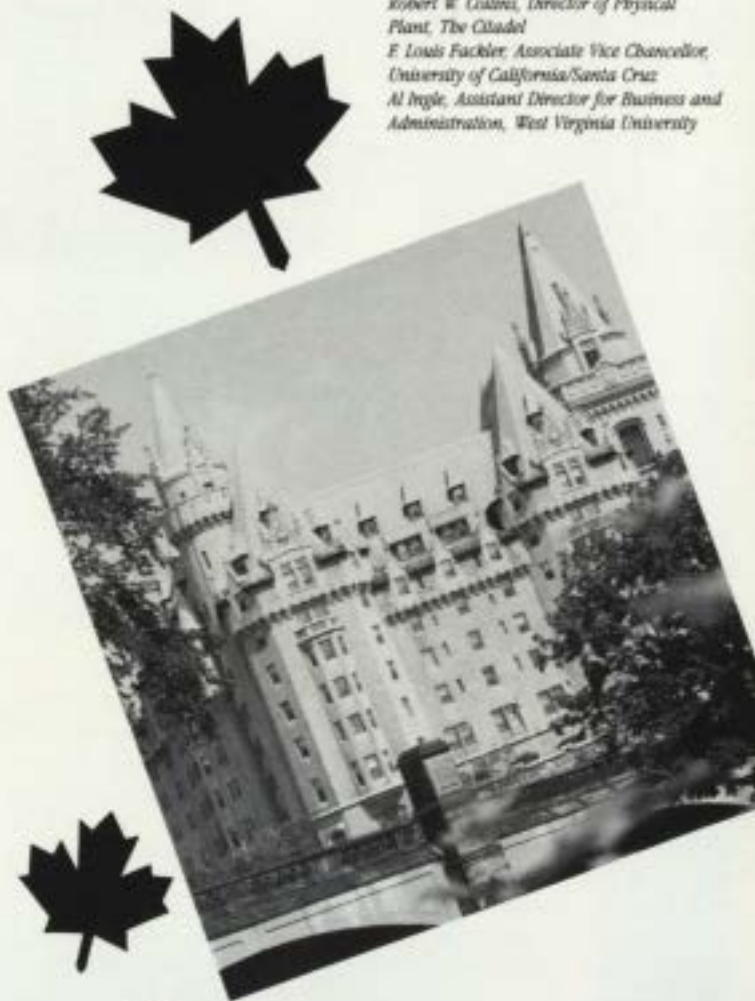
*Speaker: Almee L. Hill, Chief, Training  
Branch, Smithsonian Institution*

#### • Emergency Preparedness

The past year several natural disasters have occurred in which the physical plant has played a pivotal role. This session will focus on emergency preparedness—support, planning, and experience including how to develop an emergency preparedness program; training of emergency service units; and risk assessment. Two case studies will focus on institutional response—The Citadel and its brush with Hurricane Hugo and the University of California/Santa Cruz experience during the 7.1 earthquake.

##### Speakers:

*Robert W. Collins, Director of Physical  
Plant, The Citadel  
F. Louis Fackler, Associate Vice Chancellor,  
University of California/Santa Cruz  
Al Ingle, Assistant Director for Business and  
Administration, West Virginia University*





## FOCUS SESSIONS

APPA is pleased to introduce this new series of educational sessions designed to address emerging issues and needs of specific audiences. A distinguished series of speakers will highlight the issues of the 1990's.

- Financing for the Future: Achieving Facilities Equilibrium
- Issues in Small College/Campus Management in the 1990's
- Managing the Community College in the Next Decade
- Trends in Human Resource Management

## EXPERIENCE EXCHANGE SESSIONS

Panels of experienced facilities professionals will share their knowledge on trends and developments in key topic areas.

- Community College Management
- Contracting Physical Plant Services
- Employee Evaluations
- Hazardous Materials Management
- How APPA Can Support the International Community
- Research & Health Science Facilities Management
- Sick Buildings
- Small College/Campus Management
- Strategies for Achieving Facilities Equilibrium
- Training Issues

## EDUCATION SESSIONS

Technical presentations cover a variety of topics. Many of this year's sessions focus on the key topics examined in the Critical Issues in Higher Education series in an effort to provide a greater coverage of these topic areas. Other presentations highlight subjects of broad concern to all facilities administrators.

### Capital Renewal/Deferred Maintenance Issues

**CR/DM—Needs Analysis**  
by Frank J. Kuszpa, University of Hartford

**Physical Plant Performance Evaluation Pulse Points**  
by Robert L. Allen, Lamar University and William Humble, University of Queensland

**The Decaying Australasian Campus—The Antipodean Time Bomb**  
by William Humble, University of Queensland and Maurice Patey, University of Melbourne

### Environmental Concerns

**Getting the Lead out . . . of the Water**  
by Gordon E. Cheesman, Colby College

**Indoor Air Quality: A Case History**  
by Aidan E. Kiernan, Memorial University of Newfoundland

**Indoor Air Quality: Problems, Causes, Preventions and Cures**  
by Wayne Robertson, Heery Energy Consultants and Dr. Marilyn Black, Air Quality Sciences, Inc.

**Mechanical Service Issues in Design of Biohazard Containment Facilities**  
by Michael R. Lorenz, The Kling-Lindquist Partnership, Inc.

### Facilities Planning, Design & Construction

**A Community College Goes Shopping for space**  
by Nicholas Cimino and David J. Eckas—Truckee Meadows Community College

**Claims Avoidance—A Project Necessity**  
by S. Leonard DiDonato and William E. Loew—Hill International, Inc.

**SATURDAY, June 30**  
9:00am-12:00noon  
& 1:30-4:30pm  
4:00-5:30pm  
6:00-8:00pm

**SUNDAY, July 1**  
10:00am-2:00pm  
2:00-8:30pm  
8:30-10:30pm

**MONDAY, July 2**  
7:30-8:45am  
9:00-10:00am  
10:15-11:15 am  
11:30am-12:30pm  
12:30-3:00pm  
3:00-4:00pm  
4:15-5:45pm  
7:30-10:30pm  
8:00-10:00pm

**TUESDAY, July 3**  
7:30-8:45am  
9:00-11:15am  
9:00-10:00am  
10:15-11:15am  
11:30am-12:30pm  
12:30-3:00pm  
3:15-5:15pm  
3:15-4:15pm  
4:30-5:30pm  
6:00-9:00pm

**WEDNESDAY, July 4**  
7:30-8:45am  
9:00-11:15am  
9:00-10:00am  
10:15-11:15am  
12:00noon-2:00pm

**WEDNESDAY, July 4-FRIDAY, July 6**  
Post Convention Tour—Montreal

Pre-convention Tours—The Sights & Sounds of Ottawa  
Regional Meetings  
Welcome to Canada Reception

Opening Ceremony & Brunch in the Exhibit Hall  
Canada Day Celebration (On Your Own)  
Fireworks Finale

Breakfast & Opening Keynote Address  
Focus Sessions  
Experience Exchange Sessions  
Educational Sessions  
Exhibit Hall Open  
Exhibitor Technical Sessions  
Campus Tours  
Ottawa River Boat Cruise & Dinner  
Desserts/Coffee at National Museum of Natural Sciences

President's Breakfast  
Critical Issues in Higher Education  
Educational Sessions  
Educational Sessions  
Exhibit Hall Open  
Critical Issues in Higher Education  
Educational Sessions  
Military Reception  
Annual Awards Reception & Banquet

Breakfast & Closing Keynote Speaker  
Critical Issues in Higher Education  
Educational Sessions  
Educational Sessions  
Old-Fashioned Fourth of July Picnic



**Construction Management:  
The Owner's Perspective**

by Douglas K. Ault, *The Pennsylvania State University* and John Kreidich, *Hershey Medical Center*

**Mechanical Service Issues in  
the Design of Biohazard Con-  
tainment Facilities**

by Michael R. Lorenz, *The Kling-  
Lindquist Partnership, Inc.*

**Project Management/  
Construction of a Laboratory  
Facility**

by Daniel C. Johnson, *The Pennsyl-  
vania State University*

**Space Planning & Management:  
An International Review**

by Edwin A. Dews, *James Cook  
University of North Queensland*  
and S. Ragusa, *Griffith University*

**The University Design Build  
Team—A Success Story**

by Kenneth G. Smith and J.  
Richard Swistock—*University of  
Virginia*

**Human Resource  
Management**

**Biting the Training Bullet:  
Why You Should & How**

by Gary R. Kent, *Indiana  
University*

**In-House Development of Cus-  
todial Supervisors: A Success  
Story**

by Greg Fichter, *Indiana  
University*

**Offensive Strategies in Public  
Relations: PR Men are Made  
Not Born**

by Frank Schmidt, *University of  
Alabama*

**Sexual Harassment—  
Problems & Solutions**

by John D. Rulfs and Sherry L.  
Rulfs, *Stephen F. Austin State  
University*

**Thirty Ways to Improve Cus-  
todial Productivity**

by Jon H. Fraker, *Service Engineer-  
ing Associates, Inc.*

**What Semiotics Tell Us About  
You**

by Esther M. Geiermann, *Univer-  
sity of Cincinnati*

**Physical Plant Operations**

**Case Study: Replacing &  
Retrofitting Laboratory Fume  
Hoods**

by Verle A. Williams, *Verle A. Wil-  
liams & Associates, Inc.*

**Electrical Energy Management  
Through Lighting Retrofits**

by Paul Black, *University of  
California/Berkeley*

**Thermal Storage for the Large  
& Small Campus**

by Glen L. Carver, *Arizona State  
University*

**Utilities Master Planning in  
the Campus Setting**

by Edward C. Knipe, *California  
State University*

**Work Management &  
Control**

**A CAD-Linked Facilities Man-  
agement System**

by D. Hardman, *The Australian  
National University*

**A Project Management  
Approach to Facility  
Management**

by Roy C. Allen, *University of  
Texas M.D. Anderson Cancer  
Center*

**New Maintenance Practices  
and Technology**

by Adly Abdel Fattab, *Arab Mari-  
time Transport Academy*

**The General Building Preser-  
vation Plan**

by Jean-Louis Braun, *University of  
Ottawa*; Pierre Fleurant, *Univer-  
sité Du Québec à Montréal*; and  
Marc J. Gagnon, *EPIX, Inc.*

## CANADA DAY ACTIVITIES

Theme: The Environment: A Conscientious Use of Our Natural Resources

**Parliament Hill**  
12:00 noon-8:00 p.m.

Performances by artists from the four re-  
gions of Canada  
Variety Show  
Fireworks

9:00 p.m.  
10:00 p.m.

**Major's Hill Park**  
10:00 a.m.-8:00 p.m.

Canadian Neighbourhoods  
A Tribute to Canadian Inventors  
Friends of the Environment—Public  
Awareness Program  
Storyteller's Corner  
Variety Show  
Country/Pop Concert

1:00-5:00 p.m.  
7:00-10:00 p.m.

**Jacques Cartier Park**  
10:00 a.m.-6:00 p.m.

Canadian Games—Cultural games for  
children  
Capital Builders—Workshop for children  
Kids' Corner (2-6 years)  
Craft Workshops  
Entertainment for Children  
Entertainment for the Family

1:00-5:00 p.m.  
7:00-10:00 p.m.

**Astrolab**  
12:00 noon-5:00 p.m.

Ottawa Folk Art Council presents local  
multicultural groups

Information Courtesy of National Capital Commission.







Photograph by Malik—Ottawa









# Building Confidence

is as easy as the design and  
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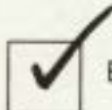


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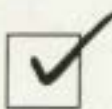
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