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

Facilities Manager

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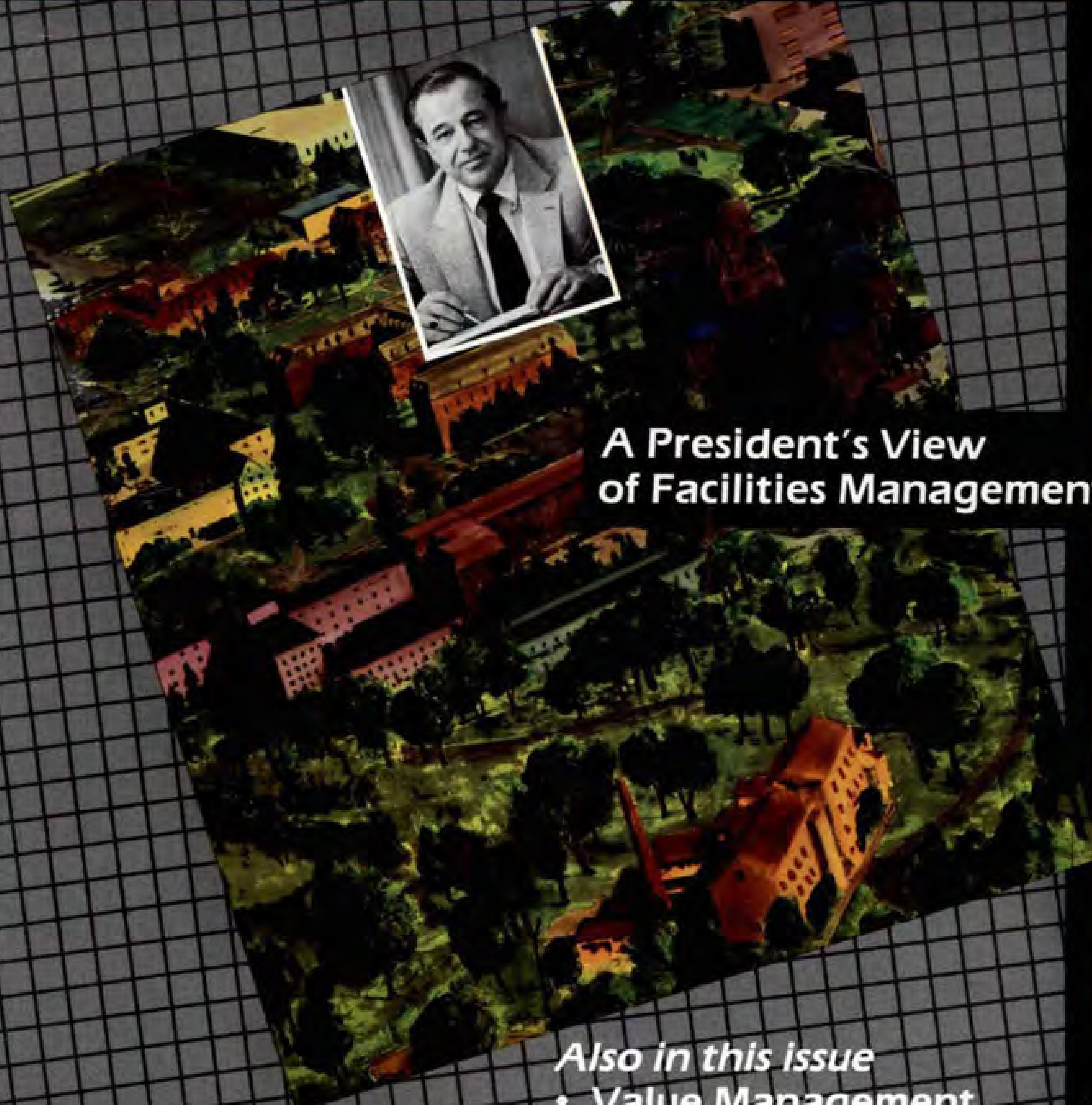
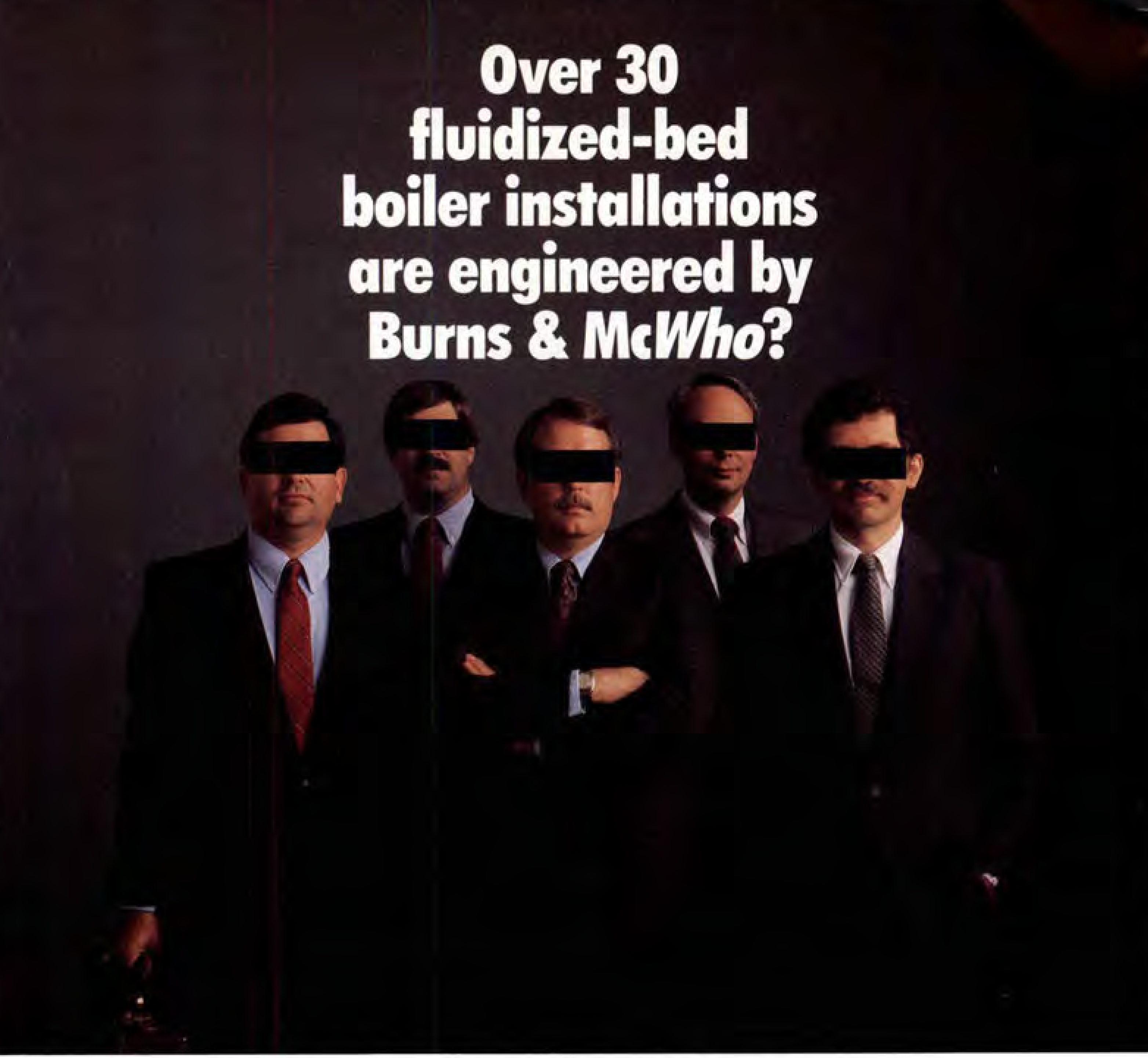


A President's View of Facilities Management

Also in this issue

- Value Management in Construction
- Campus Tree Care
- APPA Update



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Volume 3 Number 4
Winter 1987

Facilities Manager

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APPA UPDATE

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

Executive Development Institute Offers Second Session, April 10-15, 1988

After an enthusiastic and well-received initial offering of the Executive Development Institute last August, APPA and the University of Notre Dame are again proud to sponsor this program. The second Executive Development Institute will be held **April 10-15, 1988** in South Bend, Indiana.

The week-long program is designed for top executive level and experienced senior facilities managers. The courses focus on management issues such as accounting and finance, creativity and innovation in organizations, decision making, leadership and motivation, marketing of services, organizational culture, and strategic planning. The Executive Development Institute, developed in cooperation with the University of Notre Dame College of Business Administration, is conducted by professors from the college who are highly experienced in teaching executive level programming.

Enrollment is limited to 35 attendees; a brochure and application form has been mailed to all APPA Institutional Representatives. Participants who are selected to attend the program will be notified by the first week of March.

If you would like additional information, please contact APPA's Education Department at 703/684-1446. The deadline for receipt of applications is *January 30, 1988*.

Institute for Facilities Management

August 21-26, 1988 *Special Program—Energy & Utilities Management*
Charleston Marriott Hotel
Charleston, South Carolina

January 15-20, 1989 *Special Program—Athletic Facilities Mgt.*
Hyatt Regency Hotel
Austin, Texas

August 20-25, 1989
Stouffers Harborplace Hotel
Baltimore, Maryland

New Publications

Means Facilities Cost Data 1988 is now available in its third annual edition. This estimating guide is more than 900 pages and has been newly revised and updated with more than 40,000 unit prices, assembly costs, square foot costs, estimating hints, and money-saving solutions. For the first time, the book has been rewritten to conform to the CSI MASTERFORMAT numbering system. The cost is $141.95 per copy; the book is available from R.S. Means Company, Inc., 100 Construction Plaza, Kingston, MA 02364; 617/747-1270.

The University of Colorado has released the *Proceedings of a Workshop on Research Needs in HVAC Systems*, the product of a workshop cosponsored by the university, the American Society of Heating, Refrigeration and Air Conditioning Engineers, and the National Society of Professional Engineers. The 182-page book costs $20 and is available from the Department of Civil, Environmental, and Architectural Engineering, Attn: Prof. Chuan C. Feng, Campus Box 428, University of Colorado, Boulder, CO 80309.

Information Exchange

California State University/Fresno is developing a program for a new facility for its School of Education. In addition to classroom and administrative space, the facility will include an instructional technology center and a clinical activities center. The school seeks information on the education department facilities at other campuses, and would appreciate receiving any publications, catalogs, bibliographies, reprints, or other resources. Contact Rose E. Mohan, Space & Facilities Planning, California State University/Fresno, Fresno, CA 93740; 209/294-2424.

• • •

The physical plant at the University of Minnesota/Minneapolis would like to know if anyone has a successful key control program that they would like to share. Write or call Sandra Sweesy, Miscellaneous Services Area Manager, University of Minnesota, Physical Plant Operations, 319 S.E. 15th Avenue, Minneapolis, MN 55455; 612/625-4563.

• • •

Millsaps College is interested in receiving contingency or emergency plans and procedures from any small college (less than 5,000 FTE). Send to Leonard Polson, Director of Services, Millsaps College, Box 15475, Jackson, FL 39210.

• • •

The University of North Carolina/Asheville is seeking statistical data on parking distribution for universities. If possible, this should be broken down by number of spaces (e.g., so many per 100) required for faculty, staff, resident students, commuter students, handicapped, and visitors. Information or sources can be forwarded to Bob J. Criminger, Director, UNCA Physical Plant, Asheville, NC 28804-3299.

Inside APPA

From the Vice President for Professional Affairs

Philip G. Rector
University of Arizona

The 1987-88 Professional Affairs Committee comprises the following members: **Charlie Braswell**, North Carolina State University; **Doug Christensen**, Brigham Young University; **Russ Gonder**, University of Western Ontario; **Jack Hug**, University of California/San Diego; **Art Jones**, Black Hills State College; and **Roger Rowe**, Miami University.

One of the goals set by the committee at our November 1986 meeting in Tucson was to increase the recognition of professional achievement of the APPA membership. I asked Jack Hug to spearhead the development of an award that would accomplish this goal. The members of the committee enthusiastically endorsed this goal and offered their support and ideas.

Many ideas and areas of concern poured forth. Would the award recognize an individual or the entire physical plant department? What about large universities or small colleges; could one award be fair to both? Do the issues of public, private, medical, or community have any significant bearing upon the abilities of a campus to have a real opportunity to qualify and receive an award?

There was even concern about the appropriateness of self nomination versus peer campus nomination. At one point it seemed that the task of balancing all of the ideas would scuttle the whole concept. And to clinch the argument, how could such a decision ever be reached?

But the goal was too compelling to be so easily tossed aside. Besides, it seemed so appropriate to make the first awards at APPA's 75th Anniversary meeting, so we pressed on.

It became apparent at a 1987 committee meeting that two issues needed further consideration. The first was that the use of the word "outstanding" in the original name of the award created an illusion of absolute ranking that was not needed. The intent of the award is instead to recognize excellence.

The second issue was the concern that large and small schools could not compete fairly; the committee resolved this by creating the Large Campus and Small Campus categories (using the APPA definition of Small College as one that has fewer than 5,000 students FTE). Comments and input from the fall regional meetings helped greatly in the final finetuning of the award program.

The result is the new **APPA Award for Excellence in Facilities Management**. This award is actually 14 annual awards: two awards chosen by each region plus the two national awards selected from the regional finalists.

To provide for as much peer understanding and familiarity as possible, the Professional Affairs Committee has asked each region to select—from among the applications generated within its region—the two nominations for the national award in each of the two categories. From the six regional nominations for Large Campuses and six regional nominations for Small Campuses, the committee will select the two national winners.

Much effort went into the development of the criteria for the awards, which provides the framework needed for comparison for schools in an objective manner. However, the committee recognizes that the set of criteria as developed is not a perfect tool to evaluate a campus facilities operation. Instead, it is a fair tool to measure, evaluate, and select a campus organization worthy of meritorious recognition.

With this in mind, I encourage each of you to carefully consider the information found within the Award for Excellence booklet, which was mailed to you in early December. As you prepare to enter the competition within your region, keep in mind the important date of **April 1, 1988**, the date by which each application must be in the hands of your regional president.

To underscore the importance of the Award for Excellence in Facilities Management, the president of the American Council on Education, Robert Atwell, has agreed to present the first two national awards during the Washington annual meeting next July.

We look forward to receiving your application. APPA continues to be on the move!

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 education 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 **Steve Howard**.

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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 **February 10** for the March edition, **March 10** for the April edition, and **April 8** for the May edition. 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. Call 703/684-1446 for more information.

* * *

Director, Physical Plant. The University of North Florida (UNF) is a comprehensive, regional, public institution of 7,000 students. UNF opened in 1972 and is located on a 1,000-acre campus consisting of 33 buildings totaling 715,000 gross square feet. Reporting to the vice president for administration and planning, the physical plant director is responsible for administering, budgeting, and planning for a physical facilities staff of 100. Responsibilities include maintenance, engineering, utilities, custodial, grounds, renovations, and construction management. Requirements include a master's degree in business administration, engineering, or related fields, plus four years' related experience; *or* a bachelor's degree and six years' related experience. The successful candidate will possess proven managerial ability as well as planning, budgeting, and administrative skills to effectively provide a wide array of institutional support services within the context of the overall goals of the institution. Salary range is $39,500 to $45,000. Send letter of application and current resume (postmarked by **January 25, 1988**) to: Mr. Richard L. Crosby, Chairperson, Search Committee for Physical Plant Director, University of North Florida, 4567 St. Johns Bluff Road, South, Jacksonville, FL 32216. *UNF is an Affirmative Action and Equal Opportunity Institution.*

Director of Physical Plant. Barton County Community College is accepting applications for the position of director of the physical plant. The director of the physical plant reports directly to the dean of administration and is responsible for planning, creating, maintaining, and operating an environment condusive to learning and research. Responsibilities include maintenance and operation of all physical properties, equipment, and grounds. Must have general knowledge of building codes and procedures. The understanding of computer application to the physical plant operation is helpful. An appropriate bachelor's degree is preferable. Salary will be commensurate with experience and education. Interested candidates may send a letter of application along with a resume to Robert G. Rumble, Dean of Administration, Barton County Community College, Route 3, Great Bend, KS 67530. Applications will be accepted until a suitable candidate is found. *BCCC is an equal opportunity, affirmative action employer.*

Director of Facilities & Operations

The University of Northern Colorado is seeking a Director of Facilities & Operations. Reporting to the Vice President for Administrative Services, the director manages facilities encompassing 2.4 million gross square feet valued at over $200 million. The director is responsible for the management of new construction, remodeling, maintenance, housekeeping, grounds care, motor pool, power plant, campus security, parking, telecommunications, and environmental safety. The director must manage and balance a budget of approximately $4 million. Applicants with a master's degree in business management, administration, engineering, or technically related fields are preferred. An equivalent combination of education and work experience may be substituted for the master's degree. A minimum of five years' supervisory experience in plant operation or building maintenance is required. Successful candidates must show evidence of effective communication with deans, department chairs, and other university administrators. Submit a letter of application, resume, and a list of three references to: Vice President for Administrative Services, University of Northern Colorado, Carter 4007K, Greeley, CO 80639; 303/351-2208. Application deadline is **March 15, 1988.**

UNC is an Affirmative Action/ Equal Opportunity Employer.

Director of Space Management

San Jose State University is seeking candidates for the position of director of space management. Areas of responsibility are for campus space allocation, space scheduling, space planning, and other allied functions. The director is responsible for all activities related to the effective use of space on campus. Candidate should possess a master's degree in planning or related field with five years of related experience in a university environment. Salary commensurate with qualifications. Applications accepted through **February 15, 1988.**

Engineering Design Construction Manager

San Jose State University is seeking a qualified candidate for the position of engineering design construction manager. This position is responsible for long-range planning and evaluation of physical facility needs of the university, which includes the mechanical, electrical, and architectural projects involving major and minor capital outlays and special repair projects. Includes supervision of all engineering and architectural project activities, from pre-construction contracts through project completion, final testing, and acceptance. Combination of five years of experience in mechanical, electrical, and structural engineering. B.S. in Mechanical Engineering; professional engineering license is desirable. Salary commensurate with qualifications. Applications accepted through **February 15, 1988.**

San Jose State University
Human Resources and Employee Relations Dept.
1 Washington Square
San Jose, CA 95192

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Job Corner

Director of Physical Plant. Position available immediately. Bachelor's degree or equivalent experience; five years' experience in institutional facilities management, including budgeting, preventive maintenance, and utilities; building remodeling; computer applications for facility management; direction of supervisory staff for maintenance, custodial, grounds, and security; ability to work with a wide variety of staff, faculty, students, and university administrators. Salary and fringe benefits are competitive. Send letter of application with resume and names, addresses, and phone numbers of three professional references to: Kenneth Brown, Vice President for Business Affairs, Millikin University, Decatur, IL 62522. Millikin University consists of 15

(cont. on p. 8)

Job Corner

Jobs *(cont. from p. 7)*

major buildings totaling 600,000 sq. ft. on a 40-acre site in a central Illinois city of 95,000. *An EOE employer.*

Superintendent of HVAC Building Systems, Texas Christian University, Fort Worth, Texas. Oversee the operation, maintenance, repair, and replacement of building systems in the areas of underground electrical utilities, transformers, building electrical distribution systems, lighting (interior, exterior, and parking), and building HVAC controls (electrical or mechanical). Bachelor's degree in engineering (electrical or mechanical) or other technically-related field and one year experience working with people in a supervisory capacity and working with a variety of control systems is required. Submit letter of application, resume, and salary history to: TCU Personnel Office, P.O. Box 30797, Ft. Worth, TX 76129. *An Affirmative Action/Equal Employment Opportunity Employer.*

Director of Facilities Planning, Texas Christian University, Fort Worth, Texas. Direct the facilities planning activities for the university. Serve as planning and construction coordinator on major university building and renovation projects. Bachelor's degree in architecture or engineering and Texas State registration as an architect or engineer is required, five years' management experience in facilities planning is required, experience with higher education is preferred. Submit letter of application, resume, and salary history to: TCU Personnel Office, P.O. Box 30797, Ft. Worth, TX 76129. *An Affirmative Action/Equal Employment Opportunity Employer.*

DIRECTOR
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Challenging position for professional to manage a large workforce of building, engineering, and maintenance trade workers. Successful candidate will have substantive administrative experience, including utilities management, preventive maintenance programming, contract administration, building inspection and fiscal planning/control plus any combination of related coursework equivalent to graduation from a 4-year college desired. Annual salary range $50,000-$59,000. Apply by **2/08/88** to: California State University/Los Angeles, Human Resource Management, 5151 State University Drive, Los Angeles, CA 90032. *EO/AA/Handicapped/Title IX Employer.*

Assistant Director
Facilities Management

The University of Pennsylvania School of Medicine is seeking an experienced facilities engineer (with strength in HVAC systems) to be responsible for ensuring optimum delivery and performance of maintenance, building systems and utilities, and minor construction. This is a hands-on position that serves as principal liaison and provides direction and coordination for the day-to-day facilities operations between the multi-building, research intensive/teaching complex and the various suppliers of support services. Qualification requirements include a degree in engineering (preferably BSME) and a minimum of two years' relevant experience in a research/health care environment. Qualified, interested candidates should submit resume and salary history to: K. Rick, 316 Blockley Hall, University of Pennsylvania, Philadelphia, PA 19104-6069.

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Coming Events

APPA Events

Jan. 24-29—**Institute for Facilities Management.** Sacramento, CA. Special programs: Small College Management & Capital Project Planning and Construction.

Jan. 26-29—**Train-the-Trainer Seminar.** Kansas City, MO. Seminar on developing a training program for personnel who handle asbestos. Cosponsored by the National Asbestos Training Center. $525, registration limited. Contact: National Asbestos Training Center, 5005 West 95th Street, Shawnee Mission, KS 66207; 913/648-5790.

Feb. 16-17—**Custodial Staffing and Standards Seminar.** Hartford, CT. $295/APPA members, $345/nonmembers. Contact: APPA Educational Programs, 1446 Duke Street, Alexandria, VA 22314; 703/684-1446.

Feb. 23-26—**Train-the-Trainer Seminar.** San Francisco, CA. $525, registration limited. Contact: National Asbestos Training Center, 5005 West 95th Street, Shawnee Mission, KS 66207; 913/648-5790.

Feb. 25-27—**National Swimming Pool and Aquatic Symposium.** Arlington Convention Center, Arlington, TX. Cosponsored by the National Spa and Pool Institute, 2111 Eisenhower Avenue, Alexandria, VA 22314; 703/838-0083.

Mar. 29-Apr. 1—**Train-the-Trainer Seminar.** Nashville, TN. $525, registration limited. Contact: National Asbestos Training Center, 5005 West 95th Street, Shawnee Mission, KS 66207; 913/648-5790.

Apr. 10-15—**Executive Development Institute.** University of Notre Dame, South Bend, IN. *Applications due January 30.* Contact: APPA Education Department, 703/684-1446.

Apr. 21-22—**Roof Inspection, Diagnosis, and Repair.** Denver, CO. Cosponsored by the Roofing Industry Educational Institute.

Jul. 24-27—**APPA's 75th Anniversary Annual Meeting.** Washington Hilton, Washington, DC. Contact: APPA Educational Programs Department, 703/684-1446.

Other Events

Mar. 10-11—**Southeast Builds '88.** Hyatt Regency, Atlanta, GA. Annual tradeshow and conference sponsored by Georgia Consulting Engineers Council. Contact: Paula DiFoggio, Practice Management Associates, Ten Midland Ave, Newton, MA 02158.

May 2-5—**A/E/C Systems '88.** McCormick Place North, Chicago, IL. Contact: A/E/C Systems '88, P.O. Box 11318, Newington, CT 06111.

Membership

New Institutional Members

Cerritos Community College District, 11110 East Alondra Boulevard, Norwalk, CA 90650; 213/860-2451. Representative: John Ribbens, director of physical plant.

Erskine College, One Washington Street, Due West, SC 29639; 803/379-8811. Representative: L. Daniel Cobb, director of physical plant.

Grace College and Theological Seminary, 200 Seminary Drive, Winona Lake, IN 46590; 219/372-5226. Representative: Marlin E. Rose, director of physical plant.

Inter-American University, G.P.O. Box 3255, San Juan, PR 00936; 809/766-1912. Representative: Felix Enrique Ocasio, vice president for administration.

Lycoming College, 700 College Place, Williamsport, PA 17701; 717/321-4042. Representative: Walter D. Nyman, director buildings and grounds.

Marshalltown Community College, 3700 South Center Street, Marshalltown, IA 50158; 515/752-7106. Representative: Ron Hawn, director of maintenance and grounds.

Morgan State University, 1701 East Coldspring Lane, Baltimore, MD 21239; 301/444-3383. Representative: Dr. Richard S. Nietubicz, director of physical plant operations.

Pratt Institute, 200 Willoughby Avenue, Brooklyn, NY 11205; 718/636-3777. Representative: Andrew P. Stone, vice president for campus management.

Seminole Community College, Highway 17-92, Sanford, FL 32771; 305/323-1450. Representative: Roy E. King, director of physical plant.

St. John's University, Perboyre Hall B-22, Jamaica, NY 11439; 718/990-6357. Representative: Salvatore P. Ciampo, assistant director of plant operations.

Thiel College, College Avenue, Greenville, PA 16125; 412/588-7700. Representative: Jack Subasic, director of maintenance and housekeeping.

University of Rochester Medical Center, 601 Elmwood Avenue, Rochester, NY 14642; 716/275-4810. Representative: Donald A. Ruffell, superintendent of physical plant.

University of Sydney, Sydney 2006, New South Wales, Australia; 692-2317. Representative: R. Philip Westwood, deputy bursar for buildings and grounds.

New Institutional Representatives

Augsburg College, Minneapolis, MN: **James C. Weninger,** plant services director.

Bethel College, North Newton, KS: **Doravon A. Schmidt,** director of physical plant.

Castleton State College, Castleton, VT: **Joe Cannon,** director of physical plant.

Central Michigan University, Mt. Pleasant, MI: **Melvyn D. Remus,** acting assistant vice president for plant management.

City College, New York, NY: **John A. Cendali,** chief adminsitrative superintendent of campus and buildings.

Columbia University, New York, NY: **Lawrence R. Kilduff,** vice president for facilities management.

Dekalb College, Decatur, GA: **Travis E. Weatherly Jr.,** director of plant operations.

Findlay College, Findlay, OH: **A. Jack Wilfong,** director of physical plant.

Grand Rapids Baptist College and Seminary, Grand Rapids, MI: **Sam Wiltheiss,** maintenance supervisor.

Howard Community College, Columbia, MD: **Terry C. Albaugh,** executive director.

Lake Erie College, Painesville, OH: **Dana L. Stearns,** director of services.

Louisiana Tech University, Ruston, LA: **Jack Potter,** director of physical plant.

Mercy College of Detroit, Detroit, MI: **Ronald W. Clark,** director of physical plant and public safety.

Muskingum College, New Concord, OH: **Lloyd Yoho,** superintendent of buildings and grounds.

New York Medical College, Valhalla, NY: **Richard Frey,** director of facilities management.

Ocean County College, Toms River, NJ: **Harry Schneider,** director of physical plant.

Oglethorpe University, Atlanta, GA: **Adrina Richard,** director of auxiliary services.

Otero Junior College, La Junta, CO: **Wayne W. Stuchlik,** director of physical plant.

Penn State University/Harrisburg, Middletown, PA: **Kenneth E. Witmer,** manager of facilities and maintenance operations.

Pennsylvania College of Podiatric Medicine, Philadelphia, PA: **Anthony J. Morris,** director of physical plant.

Rend Lake College District 521, Ina, IL: **R. Dow Smith,** director of physical plant.

Savannah State College, Savannah, GA: **Herman Lester,** director of physical plant.

Simon Fraser University, Burnaby, Canada: **R. Johnson,** acting director of physical plant.

Southwest Baptist University, Bolivar, MO: **Robert D. Glidwell,** director of physical plant.

Southwest Missouri State University, Springfield, MO: **John Branstetter,** assistant director of physical plant administration.

SUNY/College at Stony Brook, Stony Brook, NY: **Tuncay M. Aydinalp,** assistant vice president for physical facilities.

Swarthmore College, Swarthmore, PA: **Judith D. Zuk,** acting director of physical plant.

Trinity Valley Community College, Athens, TX: **Max E. Logan,** dean of physical facilities.

University of California/Santa Barbar, CA: **Don DuBay,** director of facilities management.

University of Chicago, Chicago, IL: **William D. Caddick,** director of physical plant.

University of Minnesota, Duluth, MN: **Ernest L. Meyer,** acting superintendent of plant services.

University of Montana, Missoula, MT: **Glen I. Williams,** vice president for fiscal affairs and acting director of university facilities.

University of Nebraska/Lincoln, Lincoln, NE: **John Amend,** interim director of physical plant.

University of San Diego, San Diego, CA: **Roger G. Manion,** director of physical plant.

West Shore Community College, Scottville, MI: **Robert C. Shuman,** director of physical plant.

Whitworth College, Spokane, WA: **Keith Sullivan,** director of physical plant.

William Carey International University, Pasadena, CA: **Craig Soderberg,** physical plant manager.

New Associate Members

Baylor College of Medicine, Houston, TX: **Jesse Weir.**

Bowling Green State University, Bowling Green, OH: **Keith A. Pogan.**

California State University/Fullerton, Fullerton, CA: **Willem van der Pol.**

Catholic University, Washington, DC: **Robert J. Fawbush.**

Cuyahoga Community College, Cleveland, OH: **Charles Hoffner, Carl Miluk.**

Dekalb College, Decatur, GA: **Glen Solomon, Tom Stowe, Ernie Williams.**

Del Mar College, Corpus Christi, TX: **Gilbert D. Martinez, Robert S. Olivo.**

Drexel University, Philadelphia, PA: **Joseph T. Wyatt.**

Duke University, Durham, NC: **C. Ronald Gilchrist.**

Essex Community College, Baltimore County, MD: **Fred Florian.**

Glassboro State College, Glassboro, NJ: **Michael J. Lagnese Jr.**

Harvard University, Boston, MA: **William F. Mini.**

Hebrew University of Jerusalem, Jerusalem, Israel: **Eli Gonen, Harry Kolber, Oded Sobol.**

(cont. on p. 10)

Membership *(cont. from p. 9)*

Ithaca College, Ithaca, NY: **Bruce Hatch.**

Loyola Marymount University, Los Angeles, CA: **John Zessau.**

McMaster University, Hamilton, Ontario: **John C. Farrell.**

Montclair State College, Upper Montclair, NJ: **James Brighton, David McComb.**

Moorhead State University, Moorhead, MN: **John M. McCune.**

Morgan State University, Baltimore, MD: **Vernon Dorkins, Kenneth Ellis.**

Murray State University, Murray, KY: **Stephen Richardson.**

Northern Illinois University, DeKalb, IL: **Keith Steute.**

Oakland University, Rochester, MI: **Nainan Desai, Roger Walklin.**

Oakton Community College, Des Plaines, IL: **Patricia Dalzell.**

Oregon State University, Corvallis, OR: **Meg Swan.**

Saint John's University, Jamaica, NY: **Henry Carattini, William Grupe, Thomas Mylod.**

Samford University, Homewood, AL: **Willie Harville.**

Shippensburg University, Shippensburg, PA: **Dave Wozniak.**

Southeastern Louisiana University, Hammond, LA: **Karl Ingram.**

Temple University, Philadelphia, PA: **Charles Aitken, Andrew Riccardi.**

Texas A&I University, Kingsville, TX: **Neil Jolly.**

Trinity College, Washington, DC: **Kathleen A. Hanley.**

University of Akron, Akron, OH: **Guy Caudill, Thomas Gallagher, Russel Giersch, Edward Hegnauer, Trina Vecez.**

University of Arkansas/Little Rock, Little Rock, AR: **Olen Taylor.**

University of California/Riverside, Riverside, CA: **Elmer Ross.**

University of California/Santa Barbara, Santa Barbara, CA: **Christopher D. Browne.**

University of California/Santa Cruz, Santa Cruz, CA: **Danny R. Johnson.**

University of Houston, Houston, TX: **Michael L. Burgess.**

University of Iowa, Iowa City, IA: **Gary Bleckween, Jon H. MacLeod, John R. Schenk.**

University of Melbourne, Victoria, Australia: **Arthur Bradley, Nigel Postill.**

University of Michigan/Dearborn, Dearborn, MI: **Debra Taulber.**

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Member Update

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Perspective

Dr. Kenneth A. Shaw

Learning from the Japanese Model

As people involved with physical plant operations of colleges and universities, you are more attuned to what is happening in the world of commerce and industry than many of your campus colleagues. For instance, you may have heard Art Buchwald's proposal to reduce Japanese productivity and make it easier for us to compete with their industry—send all their upper management to the Harvard Business School for retraining!

Productivity and quality are two words we must not take lightly. Of course, a college or university is not a business. It is a unique blend of teaching, research, and service that makes it an essential strand in the overall warp and woof of our society. This unique aspect must be protected and preserved in order to permit our society to grow and mature.

It must be our first goal, regardless of whether we serve administration or the physical plant, to create the best possible environment for teaching, research, and service. This environment is essential if our institutions are to fulfill their role. If our institutions fulfill their role, then we will be successful in training the bright, young students who arrive at our doors each fall. And we will be successful in creating the new knowledge, through research, by which society advances itself.

While the overall institutional goals are educational, your operations come down to the business of providing and maintaining facilities—laboratories, offices, housing, and parking among them. Facilities people need to know, as they go about the knowledge business, that our approach to providing these facilities should be to make them like efficient business operations.

In doing that, I would like to suggest that there may be some things we can learn from a different model, offered by the Japanese, particularly in the areas of cooperation, consultation, and effective management.

Cooperation

Japanese culture fosters a cooperative atmosphere; there is a strong group orientation. Our labor relations model is different, although changing. We must become less confrontational and much more open.

Kenneth Shaw is president of the University of Wisconsin System, Madison, Wisconsin. These comments are taken from his keynote address given at APPA's August 1987 Institute for Facilities Management.

Japanese labor/management centers around three common values:

- Quality of product and service.
- Job security for employees (a Japanese company regards its employees as its most important resource).
- Maintaining competitiveness, which is a concern of labor as well as management.

We should talk with students, faculty, and staff—our clients—to see how our services and facilities can be improved, what more might be offered, and even which services might be deleted.

The most successful enterprises in our nation ask users how they are doing; we should do no less. We must find out from our users what they want and how well we are providing our services.

Consultation

In Japan the quality circle, or some other careful consultation process, is implemented before decisions are made. Under such a system decisions take much longer to reach, but once reached, implementation is much quicker and the focus is on long-term solutions, not short-term fixes.

Adaptations are evolving in the United States, most notably in the automobile industry where workers are involved in meaningful discussions on ways to improve the product. Good managers need not fear a loss of authority. Competent leadership makes it clear that the ultimate decision must be made by management.

We are learning in the United States that consultation works if done correctly, the American way, as exemplified by shared governance in higher education.

We must consult with our employees, using the concept of the quality circle. Let's find out from them how we can perform our services better. Based on their first-hand involvement and knowledge, we might find that there are things we should be doing differently.

It works in our most forward-looking corporations, and for good reason. It just makes good common and economic sense! To serve clients best, we must use consultation. We should call on strengths, talents, and wisdom of our employees to ensure first-rate service.

Effective Management

Development of a corporate culture, consisting of high values that describe what the company stands for, calls for clear goals, communicated frequently by management. Japan's Matsushita Electric Company (Panasonic) makes the following statement: "If you make an honest mistake, the company will be forgiving. You will be in trouble, however, if you deviate from basic company principles."

Principles can form the basis of employee orientation training, the background to major decisions. College and university values form the basis of what we do; it means using these values as a guide when moving forward.

Effective management means having a corporate philosophy, with clearly understood and accepted goals, helping employees understand how their work contributes to the larger goal. It means shared ownership of mission, of goals.

Ours should be an environment that encourages quality service, based on a commitment to our mission, to our self-worth, to our customers. It would make sense for each institution to have a basic statement of philosophy so that all employees have a way to measure their own performance.

In short, I am suggesting that while we are not a private business, many of our physical plant functions can and should be more businesslike. We must be more creative in our thinking and in devising new ways to meet future funding challenges.

We can learn from the Japanese, but we can also learn from our own peers and from our better service corporations. We can even learn from the mistakes of some our worst service corporations—especially the airlines!

But learn we should. ■

The View From the Top: A President Looks at Facilities Management

by Dr. Ronald Calgaard

College presidents are always glad these days to be invited anywhere, especially to be invited off the campus. On the campus, the most standard view about the president is probably best described in a line which a tenured member of the faculty of the University of Kansas once gave to me. He said that if all college presidents were laid end to end, it would be a good thing.

Most of what college presidents do, whether in public or private higher education, is spend a lot of time courting legislators, governors, or individuals and foundations in the private sector to raise funds for the operation of the institution. We spend a lot of time speaking to the people about the importance of higher education and the need to support it either with tax appropriations or private gifts. Therefore, presidents tend to tell stories about fundraising, especially fundraising as it relates to the building of buildings.

One of my favorites is a story that is told about the late Henry Ford, not Henry Ford II, but the founder of the Ford Motor Company. Mr. Ford had no particular reputation of philanthropy during his lifetime. The Ford Foundation was clearly an accident and not an intention. Mr. Ford, late in his life, had returned to his native Ireland and was visiting in Dublin. Late one afternoon he was called upon by Mother Superior and several of her aides who were trying to raise funds to build a children's hospital in Dublin. They asked Mr. Ford to consider a contribution for this worthy cause. After half an hour or so Mr. Ford, more out of a sense of exasperation of trying to get rid of his guests, agreed he would make a modest contribution of $1,000; the sisters left and Mr. Ford was somewhat relieved. The next morning he picked up a copy of the Dublin newspaper that carried a headline that said, "Henry Ford Contributes $50,000 to Children's Hospital." He was a bit chagrined. He asked one of his aides if the Mother Superior could come and see him. She came im-

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PHOTO BY TRINITY UNIVERSITY

mediately. Mr. Ford showed her a copy of the newspaper, and Mr. Ford said, "What is this? You know I didn't contribute $50,000." She looked for a moment and said, "Oh my goodness, I can't imagine how they got that information. I'll tell you what we'll do. We'll have them print a retraction." Mr. Ford thought about that for a moment and considered the consequences, and he decided that it might be better given the circumstances if he were to make the contribution of $50,000. He agreed on one condition: that above the front entrance of this new hospital the following words from scripture be engraved—"He came among them and they took him in."

There are several views about the role and function of a college presidency, and those views have clearly changed over time. There was a time, at least the history books record that there was a time, when college presidents were regarded as somewhat heroic figures. They were men, and in that period only men, who went out to build institutions unfettered by government regulations and the requirements of search committees, and they assembled great faculties and built great institutions. The leaders of Harvard, Columbia, and Chicago and public institutions such as Michigan State and Indiana were largely built by people of great vision, enormous energy, and the drive of personality. That view of the college presidency, however, waned rather quickly and was replaced in later years by the view of the presidency as essentially a manager of a large and complex institution.

Clark Kerr, the former president of the University of California, probably provided the best description of the role of the president, especially the president of a large public university. Kerr once told a group of legislators that he had three major functions as president of the institution: to provide parking for the faculty, football for the alumni, and sex for the students.

The managerial view of the presidency has changed in recent years. The college president, frequently by our own assessment of our weakness in office, because of regulations and controls is now viewed as a somewhat futile figure or figurehead with little or no influence on or off the campus. Jim March, a well-know sociologist at Stanford University, conducted a study several years ago of college presidents to determine what they really did and whether it made any difference. One of his conclusions was that college presidents as a group made very poor use of their time. But there was a reassuring conclusion; it didn't seem to make any difference at all.

Let me now spend some time talking about what you do. You are professionals engaged in a major role in colleges and universities, frequently not afforded the status on your campuses that your responsibilities should provide. The management of the physical plant and grounds on colleges and universities is an absolutely essential and vital function. It is essential to the well-being of the institution, both for the maintenance of the enormous investment of that plant and for the education purposes of the institution. Some of the things I am going to say are going to be fairly obvious to all of you, but they are not necessarily obvious to all of the people who are on campus with you.

Early in my career as an academic administrator, I had, although there were days I would not have said so, the pleasure of working for a chief executive officer who had an absolute fetish for the cleanliness of the campus. And, while as his chief academic officer I did not frequently receive memoranda concerned about the quality of the faculty or the academic programs at that public university, the director of physical plant would have received maybe twenty or thirty memos a week concerned with how the campus appeared—whether the litter had been picked up, whether the floors had been polished, and a wide variety of other concerns about the general appearance of the campus.

My initial reaction was that it was a bit overdone, and some of those of us in academic administration used to believe that we were committing more resources than we really should have been committing to physical plant, both construction of new facilities and maintenance of existing facilities. I probably held that view as strongly as most people who do not have to be responsible for the overall welfare and well-being of a campus.

> *"The attractive environment is an enormous factor in how we behave."*

When I became a college president, now almost a decade ago, I had a very different view of the world. When you walk on a campus, and it's been my privilege to walk on many of the 3,000 college and university campuses in America, the first thing that you see is not how good the faculty is, or what the average SAT scores of the undergraduate students might be, or how many volumes there are in the library, or how large is the endowment of the institution. You see what the place looks like—not necessarily how elaborate the buildings may be, or how interesting the architecture may be. Is it clean? Is it well maintained? Does somebody care about this place?

Last summer we had a group of several hundred prospective students and their parents on our campus for an early phase of college recruitment. As I walk across the campus with the parents, the thing that always comes to their attention most visibly and most clearly is that it's a lovely campus. The lawns are green, there's not debris all over the campus, and the buildings are well-maintained. From the perspective of the institution, that is of vital importance. It is vital to the environment that is established on campus, the recruitment of students, and very importantly, the recruitment of quality faculty and staff. Faculty members are frequently assumed to be much more concerned with things other than how well the campus is maintained, or how attractive the buildings are. Let me assure you that that is probably not true. Even for faculty members, the first thing that strikes them when they come on to a new campus is how the place looks. Does somebody care about this place, how it appears, and how it is maintained?

For all of us who work in a campus environment day after day after day, the impact of what you do day-to-day in maintaining and constructing buildings and grounds is of critical importance to the overall well-being and morale of that campus. It is amazing the impact that the environment has on human conduct. If you walk into a residence hall that is beat up, that has not been painted in a decade, where all the carpet is already badly soiled, and there's graffiti all over the walls—and you as a residence hall administrator tell your incoming students that you hope they respect the university's property—by and large you will not get what you hope for.

If you want students to keep the facilities looking nice, then you must be willing as an institution to continue to invest sometimes dear resources to maintain an attractive environment. The attractive environment in itself is an enormous factor in how we behave. When you walk across a campus that is covered in soda cans and last night's beer bottles and discarded wrapping paper, it is very easy to wad something up yourself and throw it on the ground. On the other hand, if you walk across a campus that is beautifully maintained, there is a temptation to do just the opposite, because it isn't the thing to do in that environment.

Therefore, from the perspective of a college president, the campus, its buildings, its grounds, its physical environment, is an extraordinarily important factor in the health and well-being of the institution and its people, and the quality of the academic programs which the institution offers. What you do as facilities managers is therefore very important.

When you travel around America's colleges and universities, you find that there are serious problems related to the physical facilities on some college campuses. We know the history of many of those problems. Fortunately, I'm the president of an institution that was built from scratch, on a new campus beginning in 1952 so that the oldest building on campus is thirty-five years old. Therefore, you have less accumulated deferred maintenance than you probably do on a campus that has been there for a hundred years or more. But when you walk on a lot of campuses, it is first of all obvious that the institution has been engaged in major construction in the 1950s and 1960s during a period of rapid enrollment growth.

We were anxious to put up a lot of new buildings—much more anxious to build new buildings, frankly, than we were to maintain existing ones. And after the period of rapid growth in most institutions waned, and a few institutions began to experience enrollment decline, there are some places where there are clearly more physical facilities than the campus really requires to carry out its educational programs. The soaring utility bills in the 1970s and other tremendously detrimental impacts of inflation and escalation came at a time when state legislators, and for that matter private donors as well, were either not increasing or actually reducing funding on the college campuses.

What happened in that process is fairly obvious. When there is enormous competition for scarce resources, what are you going to do about salaries for faculty and staff? How do you fund new equipment for the science laboratories? Do you maintain the appropriations and levels of support for the library? And, you develop a long, long list of other important and vital functions for the maintenance of academic quality at any institution. The easiest thing to do was to defer physical plant maintenance, although I believe, perhaps to an extreme, that the appearance of a campus and the quality of the physical environment is of the utmost importance.

Like all college presidents, I often meet with someone on campus, whether it is the vice president for fiscal affairs or the director of physical plant, who says that we have a utility problem and need to replace all the underground cable, or that we have roofs that are leaking and need replacing. It's going to cost one or three or five million dollars and it has no cosmetic value whatsoever. There's no new building to show anybody, no bright new renovation, no new paint on the walls—they are repairs that you cannot see, and they are going to cost dearly. You know that in that kind of environment, you are going to be in a difficult position in the competition for those resources.

That is true in spite of the fact that, intellectually, the president and the vice president for fiscal affairs and the other senior officers of the university all know that today's $5,000 will be two years from now a $50,000 problem. The most economical way to maintain the facilities of the campus is to invest in solving those problems early on, rather than to defer them. Nevertheless, deferral has occurred on a fairly massive scale on most college campuses, and in some places, when you walk through the residence halls, or into some of the older buildings on campus, you're not quite sure what the plan is for the institution unless the institution is planning to go out of business some time in the not terribly distance future.

> "There is no fundraising charisma to giving $3 million to replace a roof."

They have accumulated for themselves the massive problem of having to spend not hundreds of thousands of dollars, but millions and perhaps tens of millions of dollars — and not in the construction of new facilities, but in the renovation, retrofitting, and reconstruction of existing facilities on those campuses. It is a difficult process in public higher education. You always have the problem of how to persuade the state legislature that it ought to spend lots of money for building new facilities to replace obsolete facilities.

In spite of the fact that most of us have more space than we really need, there's always the need to replace obsolete facilities. But how do you persuade a state legislature in periods of economic restraint, and in many campuses, flat or declining enrollment, that they ought to appropriate millions of dollars for physical facilities? That's something they were doing in the 1950's and 1960's when enrollment was growing rapidly on the campus.

In the private sector of higher education, it is an even more complex process because there is almost no fundraising charisma at all to giving $3 million to replace an underground utility system or the roof on a building that already bears somebody's name. It has the fundraising charisma of paying off last year's operating deficit, and it is a difficult process.

The result is that on most college campuses you do see a fair amount of deferral of physical plant maintenance. How do you deal with this issue, and how do you bring it to the attention of campus administrators and to the governing boards of your institutions? In part, the strategy begins on the campus with a careful process by which you make decisions about your physical facilities, whether it is the planning of new buildings or major renovation and improvement activities on the campus.

> "I have never met an architect whose cost estimates I believe."

A few years ago, we decided at Trinity University that we were dealing with these matters far too much on an ad hoc basis. That is, whatever got on the list would come up in a variety of ways in an informal process, and as is typically the case on many campuses, whoever screamed the loudest was getting the most attention. We tried desperately to establish a new set of policies and procedures for our long-term planning.

Obviously in theory, and we hope in practice, where you start is where we all should have started in the first place. We asked ourselves, "What kinds of activities and programs will we be offering on the campus in the next five or ten or fifteen years, and what kinds of physical facilities do we really need in order to carry out those programs?"

What kinds of improvements to existing facilities do we need in order to make sure that the quality of our programs, whether academic or extramural, are carried forward in a satisfactory matter? It's a difficult process. Look at your own campus and think about the reasons that you have buildings that no longer serve satisfactory functions. In many cases it is the result of the fact that there was poor planning to begin with. We built a building that didn't really meet the needs of any particular program and was almost obsolete from the day it was built. So the real process begins with how you relate the building, the physical facilities issue, to the academic and non-academic programs of your campus.

I'm always amazed on many campuses at how little involvement the people in facilities planning or physical plant administration have in that process. Lots of new projects are initiated by the chairperson of the department of music, for instance, walking into the dean's office saying, "We need to have a major improvement in our recital halls and practice rooms," and the dean persuades the president that they ought to do it without ever asking the serious questions about whether building the facility makes much sense or whether the existing facilities could be renovated. A fairly elaborate process gets underway without much involvement from the people who have to help construct it and who will certainly have to maintain it after it is built.

If you are going to be successful in your roles as facilities managers, it is important to find a way to be centrally and meaningfully integrated into a fairly formalized campus physical facilities planning process. Your participation should be not just for the construction of new facilities, but also in looking every year at what are the real priorities from this campus for renovation and improvements. How do we deal with the questions of deferred maintenance? How do you push these concerns to the fore?

No one in that room other than the director of physical plant and perhaps the vice president to whom you report is going to be an advocate of replacing that roof (except for the faculty member on whose head the roof is leaking); no one else will argue for those priorities. Therefore, it is an important process that the magnitude of the problems be clearly understood by your colleagues in the university administration, by the president, and by the governing board.

Now, there's always a desire to get along. No one likes to be the bearer of bad news all the time, because the bearer is sometimes greeted with harsh words by those who receive the bad news. But your task really is to identify the problems, avoid the problems if at all possible, and bring those problems clearly to the fore with precise and clear understanding of the financial costs of dealing with those problems.

One of the frustrations of a college president has to do with budgeting and cost estimates, whether it be for renovation or improvement projects or for new buildings. I can say to this day I have never met an architect whose cost estimates I believe.

One of the frustrations we have is that we look out at the process and we're asked to say if we will undertake a major new building program for this particular program. Let me give you an illustration of a project that we began about two years ago. It was clear that we needed to make some improvements to our student center, both of a cosmetic nature and in providing additional facilities. We had a quick look around the facility and a walk through with the director of physical plant, the vice president for fiscal affairs, the dean of students, and an outside architect who had done most of the work on the Trinity campus over a number of years.

My judgment in the preliminary conversations was that we were talking about a project that we should have been able to do for about $2.5 million. Then we began a planning process in which the architect visited all of those people who want to be part of the planning process on a campus: the students, the director of student activities, the dean of student affairs, and others. When the project came back it didn't look at all like the project that had started out in my office six months earlier. Instead of being a project that was going to cost $2.5 to $3 million, the price tag was now $4.5 or $5 million.

We moved along with the process of planning and we went out to bids, by the time we were in the bid process it was a $6 million project. About that time the temptation is always to go back and start all over again. Unfortunately, in our case we had gone so far with the process that it was virtually irreversible; the result was that we went ahead with the project.

But my experience in planning many major projects both in public and private universities, has been that one of the great difficulties we have in making judgments in priorities is a great tendency on the part of the original presentors of the proposal to enormously underestimate the cost of the project.

It's a bit like the process by which all of us who were ever in public higher education got new PhD programs approved by boards of regents. When a president or chancellor wants to get a new doctorate program approved by the public universities board, you go in and explain to them with great care that for almost no money a doctoral program can be established, not many new faculty will be added, no new money will be required for the library, and the like, and the boards approved those new doctoral programs.

Three years later the requesting person or department goes back in the room and says that this program, if it is to be maintained, must have an infusion of five new faculty members, $300,000 a year in additional library costs, equipment for the laboratories, and the like. We do a lot of that as we engage in our planning for physical facilities.

When I get lists of projects on my desk and I look at the estimated costs, my tendency always is to add 30 or 40 or 50 percent. I don't quite add as much of a fudge factor as I do when I get estimates of what it will cost to convert computing systems, although I simply multiply by three. If I like the cost benefit ratio after I have engaged in the multiplication, I go ahead with that project.

"You will continue to play a central role in higher education."

But that is an extremely annoying factor. I appreciate some of the problems you have when you are sitting out there with a lot of discussion and forty or fifty items up for possible consideration on the plant, and the boss wants to know what's it going to cost to do the project. There are lots of projects that someone might be interested in at $25,000 or $50,000 that you're not interested in as a priority if it's a $250,000 job.

From the perspective of the president in terms of making a judgment on how to allocate resources and what the relationship is between a particular proposal and where it fits in the priority, having some reasonable estimate of what it's really going to cost to do it is of vital importance. It's also of vital importance for the future credibility of the process. The first time it's 50 percent or 100 percent off, it's a getting-acquainted experience. The second time is a matter of serious concern. The third time there is a new director of physical plant. That's what happens in these processes. That kind of a dialogue, in terms of keeping those surprises to a minimum, is an important part of the relationship between you as physical plant administrator on campus and the president or governing boards who are going to have to make decisions. No one likes surprises, especially when there are serious fiscal consequences.

Day-to-day, you have a difficult task of supervising the construction of new buildings, managing renovation or improvement activities, keeping the grounds maintained, and responding in some way to fifty or 100 or 200 work orders to replace a light bulb, change an outlet, fix the broken window, or move furniture from one place to another. What you do in that process of making the campus look good, that logistical system that gets pulled together in your office every day, is very, very important. Your ability to keep the place running, to be responsive, and to facilitate the work of others is vital tothe well-being of your campus. How effectively and efficiently you can do those jobs is really an amazing thing from the perspective of a president.

I have been in higher education all my adult life. I was giving a commencement speech earlier this year—the kind of speech you give about going out in the real world and what it's going to be like. I went to college as an eighteen year old—a long time ago—and I decided that I would never go to the real world, so I stayed. I have spent the last thirty-two years on a college or university campus; I never left.

I really have found it a remarkable experience. The most remarkable aspect for those of us who work in higher education in any capacity is its endless variety. The ebb and cycle of a college year begins with new freshmen with their bright shiny faces, their mothers and fathers coming onto the campus. It ends every spring with the ceremony of commencement. It's an exciting place. The opportunity to participate in the educational process, to teach, to learn, to work in that environment is a great privilege.

It never occurred to me until recently in my life that most people, even those who in every visible way are successful, don't really enjoy what they do. They go to work every day more out of a sense of the need of the paycheck than out of a sense of excitement or enthusiasm for what they do.

If you are a college president and you like the job every day, you're crazy. But if you don't like it more days than you do, you ought to be doing something else. As campus facilities managers, you can take a great deal of satisfaction in what you do. Most days, at least, it won't be boring. There will be an endless cycle of challenges and people who come into this strange environment of the college or university. You have a highly important role to play on those campuses of making it work, bringing it together to support and encourage what is, in spite of all our criticisms of ourselves, one of America's great success stories—American higher education.

We certainly have problems, but higher education above everything else remains one of the incredible achievements of this society. No society in the history of the world has ever sought to educate as large a percentage of its people to the level that we have been committed. From all over the world, students come to participate in the benefits of this glorious experiment in higher education.

We are part of a great challenge and a great opportunity. As the people who are most responsible day-to-day for administering that enormous investment we have made in our physical equipment, our land, our buildings, and what's in those buildings, you play and will continue to play a central role in higher education.

I congratulate you on what you do and I applaud you. One thing you can be sure of is that at most institutions the president shares your concern about the appearance of the campus. Despite all of the frustrations of dealing with the sometimes incredible bureaucracy of the university and the frustrations of dealing with the recalcitrant state legislature or governing board, I hope that you will continue day in and day out to show a quality of caring, not only for what your campus looks like physically, but a caring for the process of education that's going on at your college or university. ■

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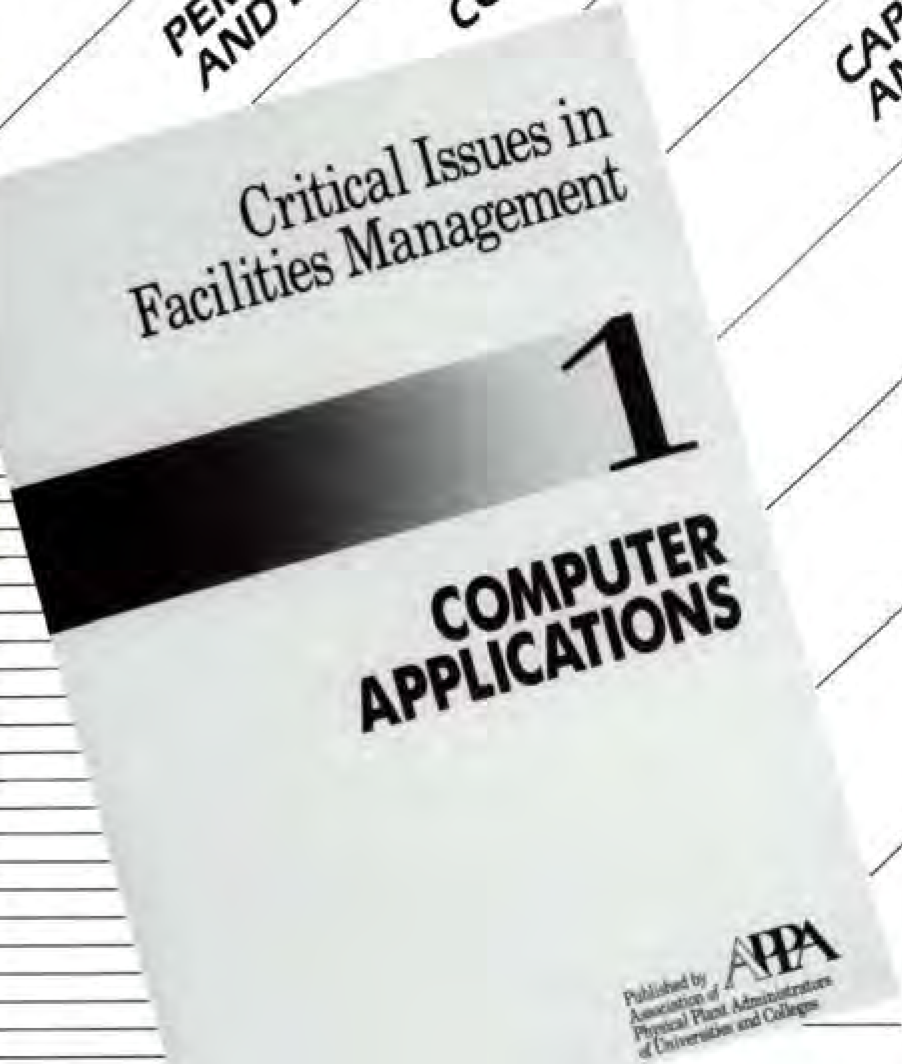

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Value Management in Construction Management

by C. Edwin Haltenhoff, P.E.

During the early days of construction management development, practitioners used the term "value engineering," or "VE," to describe cost-cutting procedures during design. VE was a conveniently available term made popular in the construction industry by the United States Army Corps of Engineers.

Corps contracts contained a VE provision that opened their design to economic review by awarded contractors and the construction arm of the Corps itself. If a proposed change could save money while retaining the utility and intent of the design, the Corps would approve the change and share the savings with the contractor who made the proposal. If the change was proposed by the construction division of the Corps, all savings would revert to the Corps.

VE generated considerable interest, and significant savings accrued from the program, according to the Corps. In time, the concept struck the imagination of the construction industry, and value engineering developed into a form of independent professional practice as well as an option for contractors on certain projects. It has become common for owners to specify value engineering for projects. VE was progressively formalized and attained organizational status through the Society of American Value Engineers (aptly shortened to SAVE) and the American Association of Cost Engineers. Seminars to instruct and in some cases qualify value engineers for certification are now common. The practice or application of value engineering is a significant part of today's construction industry.

It should be pointed out that VE as practiced by the Corps of Engineers or as specified by owners in specific applications is only part of the value process provided by construction managers. Total value-oriented involvement is called value management (VM). It is a concept worthy of expansion and explanation since the cost savings from VM are substantially larger than those from VE alone.

Value management is the term given to the collective exercise the project team provides in a cooperative effort to give the owner the best possible cost-to-quality ratio on his or her project. VM focuses on four prime decision areas: *value engineering decisions, life cycle cost decisions, budget or cost control decisions*, and *construction and contracting decisions*. To facilitate the decision making, two determining factors—cost efficiency and cost quality—must be applied. The relationships are shown in Figure 1.

Cost efficiency factors involve time, cost, and action elements that must be economically balanced to the owner's advantage. They address questions about when and how to contract for construction or the value of delayed delivery on a less expensive piece of equipment as opposed to immediate delivery on a more costly item.

Cost quality factors influence projects through their ultimate value to the owner. Every alternate product possibility has a relative cost quality factor. Whether or not to use a superior product strictly on the basis of owner preference is a decision based on cost quality factors. As Figure 1 shows, cost quality factors affect three of the four major decision areas. Cost quality factors do not affect construction and contracting operations. Cost efficiency factors, on the other hand, affect all four prime decision areas.

Construction Management Value Engineering (CMVE)

The intent of value engineering as a part of construction management services is to optimize the material aspects of a project so that a pre-deter-

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mined cost to quality ratio can be achieved. CMVE is a continuing process throughout design, with pre-established checkpoints set aside for specific VE review and evaluation. This facilitates an ongoing critique of A/E output and permits constructive change before design solidifies. Both cost efficiency and cost quality factors are involved in CMVE decisions. The other three prime decision areas are not isolated from CMVE decisions—a decision in one area can very well affect a decision in another.

An example of a CMVE application that involves all aspects of value management is the selection of an environmental system, its component parts, and the related requirements to fully meet the owner's needs. Decisions must be made with regard to fuel, controls, heating medium, distribution systems, energy conservation, and system sophistication. These decisions will in some way affect the structure, electrical system, roof system, building envelope, and interior surfaces.

Concern must be given to the operating, replacement, and maintenance costs affecting the owner's operating budget after occupancy. Ultimately, equal consideration must be given to delivery dates, installation procedures that affect the construction schedule, and the method of contracting for the installation. Given all of these variables, reaching an optimum design requires a well-planned and closely coordinated effort.

Life Cycle Costing

The intent of life cycle costing is to match construction materials and installed equipment with the planned useful life of the building or structure. The more receptive areas for life cycle application are those subject to wear, such as mechanical and electrical equipment, and those subject to maintenance, such as wall and floor finishes, moving parts on doors and windows, and in some cases the materials of the structure itself. Not all materials and equipment can be matched to a given life cycle, and such an exercise should not be attempted. However, every building or structure has numerous components that can be economically adjusted to produce a more uniformly matched relationship between costs and planned life cycles.

A major consideration of life cycle costing is future maintenance. Deterioration through time and use is progressive, and maintenance attention progressively intensifies as a component's life cycle approaches its end. If components were instantly degradable at a specified age, with no interim maintenance required, life cycle costing would be far easier. As it is, the cost of maintenance and the cost of eventual replacement are at best estimated figures. A problematic variable to be taken into account is the degree of maintenance that will be provided.

The speculative nature of life cycle costing is not sufficient reason to neglect it; the time spent analyzing life cycle costs is beneficial. The fact that consideration is being given to alternate materials and equipment will contribute significantly to the knowledge of the project and have a positive effect on decisions about cost and quality.

Budget and Cost Control

Budget and cost control matters are the responsibility of the construction manager. Budget control assures that the dollars allocated to the project remain sufficient until the project is completed. The budget is subjected to substantial influence between the establishing of the conceptual estimate and the final payment to the last contractor. Positive influences (such as phased construction and prepurchasing of "long lead" items) are utilized to control costs, while negative influences (such as differing site conditions and labor disputes) challenge cost control. Some negative influences, such as material shortages, a variety of escalator clauses, and response bidding, can be anticipated and their cost effects essentially neutralized.

For example, in the early 1970s the petroleum shortage seriously and spontaneously affected the roofing materials market. Roofing costs rose rapidly, and roofing contractors could not predict their costs at delivery. To compensate they either included an escalator clause in their proposal or added a high contingency to their lump sum proposals.

Although it is a precept of construction management that the way to get the best price for a unit of work is to bid it as close to its on-site need as possible, there are times when this precept should be reconsidered. The roofing materials shortage was one of those times. In order to get the most economical roofing proposals during that period, roofing bids were taken as early a possible and were based on the current prices for materials. Materials

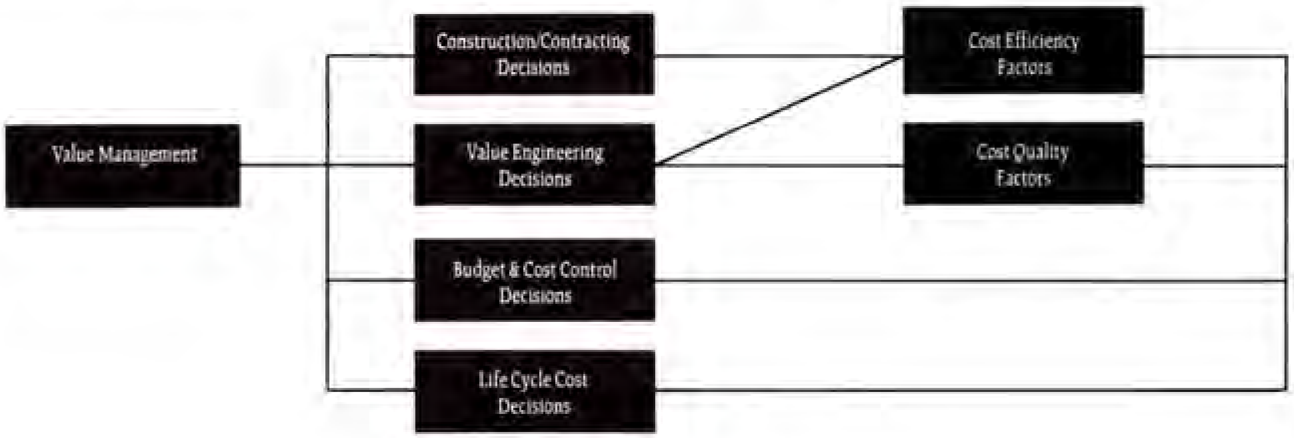


Figure 1
Value Management Decision Making

were immediately ordered by the successful contractor and placed in storage upon delivery. By doing this, escalator clauses and contingencies were avoided, and satisfactory bids were received. The contractors were paid for their stored materials and the only added charge was the known warehousing cost, which was generally less than the estimated or actual escalation.

Construction and Contracting

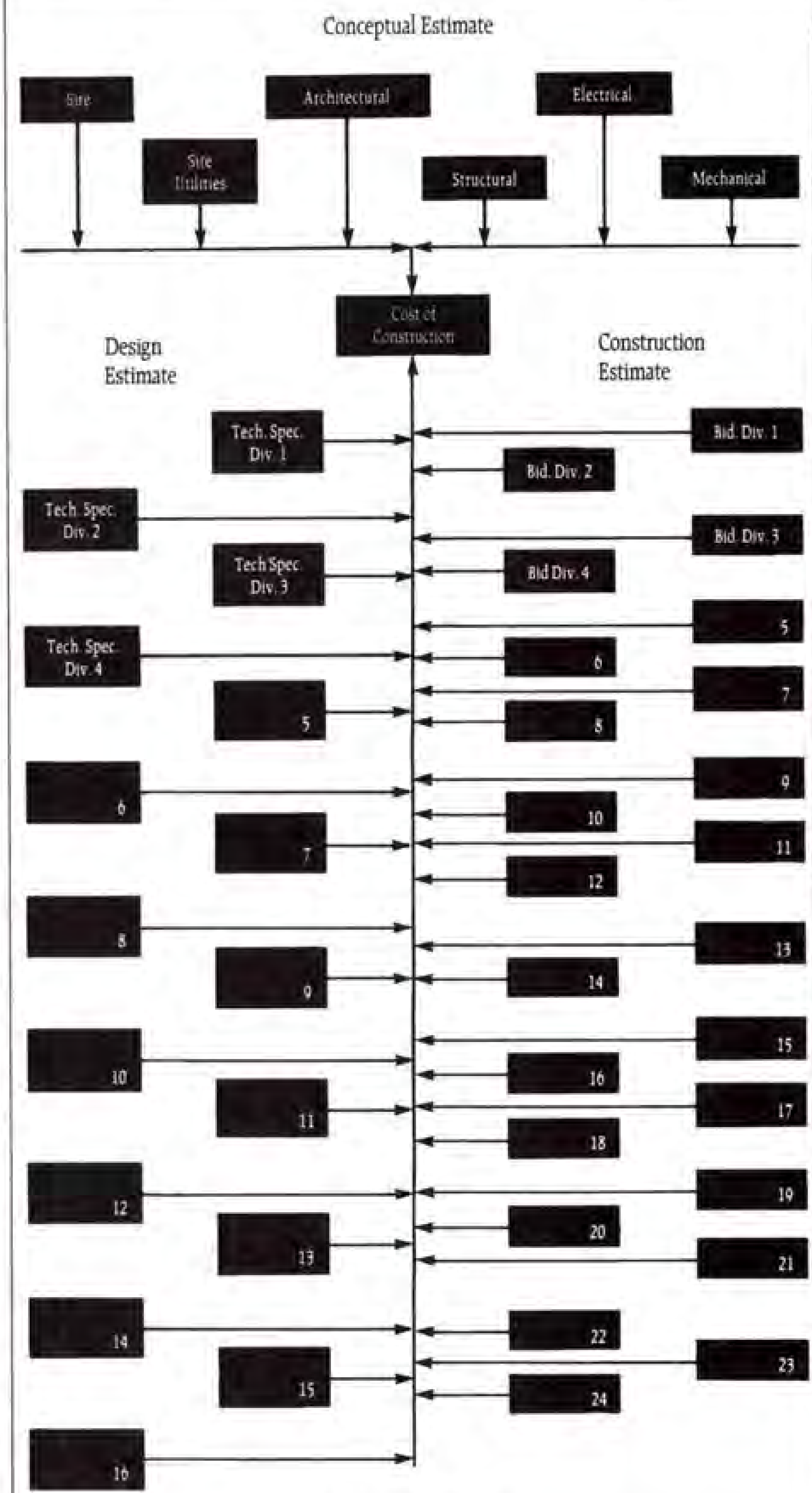
Probably the most consequential construction and contracting VM decision is whether or not to fast-track a project. Considerations that will influence the decision include the required occupancy date, climate conditions, the labor and material markets, and the demands of the team members. Fast-tracking cannot meet every schedule and can be problematic and expensive under certain project conditions.

Other construction and contracting decisions are important to the time, cost, and quality outcome of the project. These deal with contractor types and availability, structural details, long lead purchase items, and bid packaging. The construction industry is complex, fragmented, and not always logical. Sound construction and contracting decisions generated by an industry practitioner who is involved on a daily basis will significantly improve project outcome.

VM Organization

The construction manager's VM organization must match the type and size of the project to which it is assigned. This means that the construction manager should be familiar with a building's use and type to a degree that will permit productive and meaningful results during the VM process. A specialist in hospital projects, for example, will have a difficult time contributing to the VM activities of a power plant project and vice versa, since some aspects of VM are specialized and restrict versatility. At other times the utilization of VM input from a base other than the specific building type can be beneficial because it can correct tunnel vision and cross-match solutions with technical evaluations.

For optimum performance the value management staff should consist of professionals and practitioners with collective capabilities in all technical



VM Estimating Format

The Cost of Constructing, Owning and Operating a Building Over a 40 Year Period

aspects of a project. They can work on the VE functions one-on-one with the team's professional design members and can provide resource information based on construction and contracting experience for the ideas being exchanged.

The life cycle cost function is accomplished in a similar manner but utilizes the experience of the owner's team members as well. Budget and cost control decisions, as well as construction and contracting decisions, depend heavily on practitioner expertise rather than on professional expertise. However, the final VM decisions are ultimately dependent upon team synergism, and input from both practitioners and professionals is encouraged as a means of providing adequate checks and balances for the decision-making process.

VM Staff

The ideal VM organization is one that will collectively work one-on-one with the design member's technical staff on all aspects of the project. If it is a large project, the VM staff must have enough depth to handle the quantity of activity that will be generated. If the project is medium in size, depth of staff is not as consequential. In both cases, however, the range of VM input is essentially the same. Only the quantity requirement of the input changes.

It is a large and expensive undertaking to recruit, train, and maintain an in-house VM staff. While it is a virtual necessity if the construction manager is to take on large, complex projects, it is not a requirement for handling most projects of lesser scope. The majority of construction managers fall into the latter category, and the size and character of the VM staff necessary to handle small and medium projects is worthy of further comment.

On small and medium size projects of average complexity, much of the VE and life cycle costing can be accomplished by the team's design member, with input from the construction manager's VM practitioners. Construction management firms sized to do only small projects cannot afford to maintain in-house VM professionals. In fact, many construction managers operating in the small project arena will not have electrical or mechanical value managers on staff either. Besides depending on the architectural/engineering team member for VE and life cycle cost design input, these firms may also resort to using local electrical and mechanical contractors to provide their VM match-up.

On medium size projects (and especially on those with some degree of complexity), in-house electrical and mechanical practitioners are virtually essential. The time demands of the VM process make in-house self-reliance the only practical approach. It may still be practical to provide VM services without an in-house VM professional staff, but an increase in project size and complexity removes the contracted practitioner VM option that is acceptable on smaller projects.

It is difficult to specify the level at which optimization of the construction manager's value management staff occurs. Factors such as the volume of activity and the capabilities of individual staff members become important. A firm that completes eight to ten small or medium projects each year can afford to have the full complement of practitioners.

There is a unique construction industry organizational structure that conveniently provides an ideal VM staffing arrangement within excellent economic parameters. Consider a design/build organization that has the in-house capability to produce projects on a turnkey basis. All of the required disciplines are present, and the staff includes both professionals and practitioners. A design/build firm has all of the staff and all of the disciplines necessary to provide VM services. Furthermore, if the personnel requirement for VM is considered a major part of the total personnel requirement for a complete construction management organization, it becomes obvious that a design/build firm has all of the inherent qualities to operate as an effective construction manager.

The VM organization chart (Figure 2) shows the in-house requirements for an ideal staffing arrangement. It is not necessary that a person be exclusively employed to fill one position. However, it is necessary that each position be assigned to a person with the capabilities and expertise to satisfactorily carry out the requirements of that position.

The VM Process

The initial step in the value management process is the logical establishment of a project budget. It is on this dollar amount that the management of values will begin and end successfully. The four prime VM decision areas listed in Figure 1 must be coordinated throughout the course of the project in order to provide the owner with the best possible cost, time, and quality relationships. The intent is to establish a solid budget at the conceptual stage of the project that can withstand the effects of design and the realities of construction, all with the help of the VM process.

One approach to establishing a conceptual budget is to initiate the project with a brainstorming session. Brainstorming is a collective meeting of team members for the purpose of bringing out as many of the project's parameters, quirks, and problems (obvious or otherwise) as is possible at the outset. The meeting has little structure, relying on informality as the mechanism to surface information. The session is attended by as many potential contributors as is practical, on the premise that all aspects of the project, both technical and managerial, will be discussed.

The end purpose of brainstorming is to provide a solid basis for the conceptual budget. With few drawings to work from and little data that can be relied upon, the participants talk the project through until a common understanding of scope is achieved. In the days following the brainstorming session, the conceptual budget can be formulated from information and input from those who attended the session. The validity of the budget and its ability to survive project delivery is dependent on the knowledge and detail expounded upon during the brainstorming session.

After the conceptual budget is established by the team, value management activities can proceed in a programmed manner. Decisions pertaining to construction and contracting should be considered early so that time saving procedures can be incorporated into the design program from the beginning. VE decisions about structure type and mechanical and electrical systems become urgent as design delineation moves ahead. Life cycle cost analysis is applied to wall systems, equipment, and interior finishes as design decisions are required. Continuously and concurrently, budget and cost control are exercised as part of the team's decision-making responsibility.

There are two application approaches to the process of VM. One is continuous and the other periodic, and both should be exercised if a smooth and effective VM experience is to result. The spine of VM is team participation at scheduled meetings where comprehensive consideration of specific project alternatives occurs. These are the one-on-one sessions where value engineering, life cycle costing, and construction and contracting decisions are discussed (and at times hammered out) between team members. Meetings are scheduled at strategic intervals as a means of avoiding re-design situations. The team's program schedule can be used to determine and chart these meetings and provide cooperative order to the process.

Continuing VM smooths out the undesirable peaks and valleys inherent in any periodic process. The "in-between times" are used for VE and life cycle investigations and analysis and the necessary cost studies required of these investigations. Opportunities are provided for alternate material and equip-

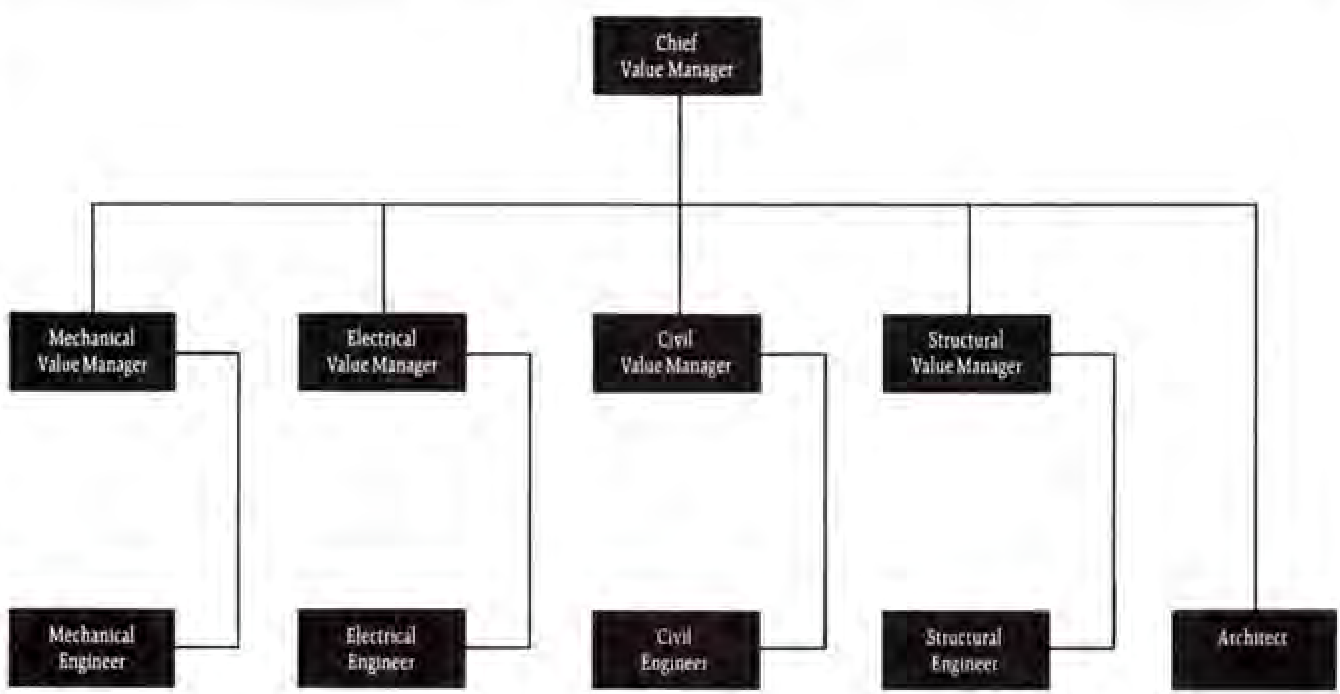


Figure 2
Typical Interacting Value Management Organization

ment pricing, and considerable detail is accumulated to support the decisions that will be made at the periodic VM meetings. In essence, VM is a continuous process with established checkpoints scheduled to facilitate team decision-making along the way.

For appropriate coordination with the design process, periodic VM meetings ought to coincide with the contractual stages of architectural/engineering participation. Meetings should be scheduled near the completion of the schematic and design development phases and at a point of completion somewhere between 50 and 80 percent of the contract document phase. These are natural times to verify budgets and petition approval from the owner to continue to the next phase of the project. The VM meeting during contract documents should occur at a point where the general trades have good design definition and the electrical and mechanical designs are still flexible enough for VE and life cycle cost input.

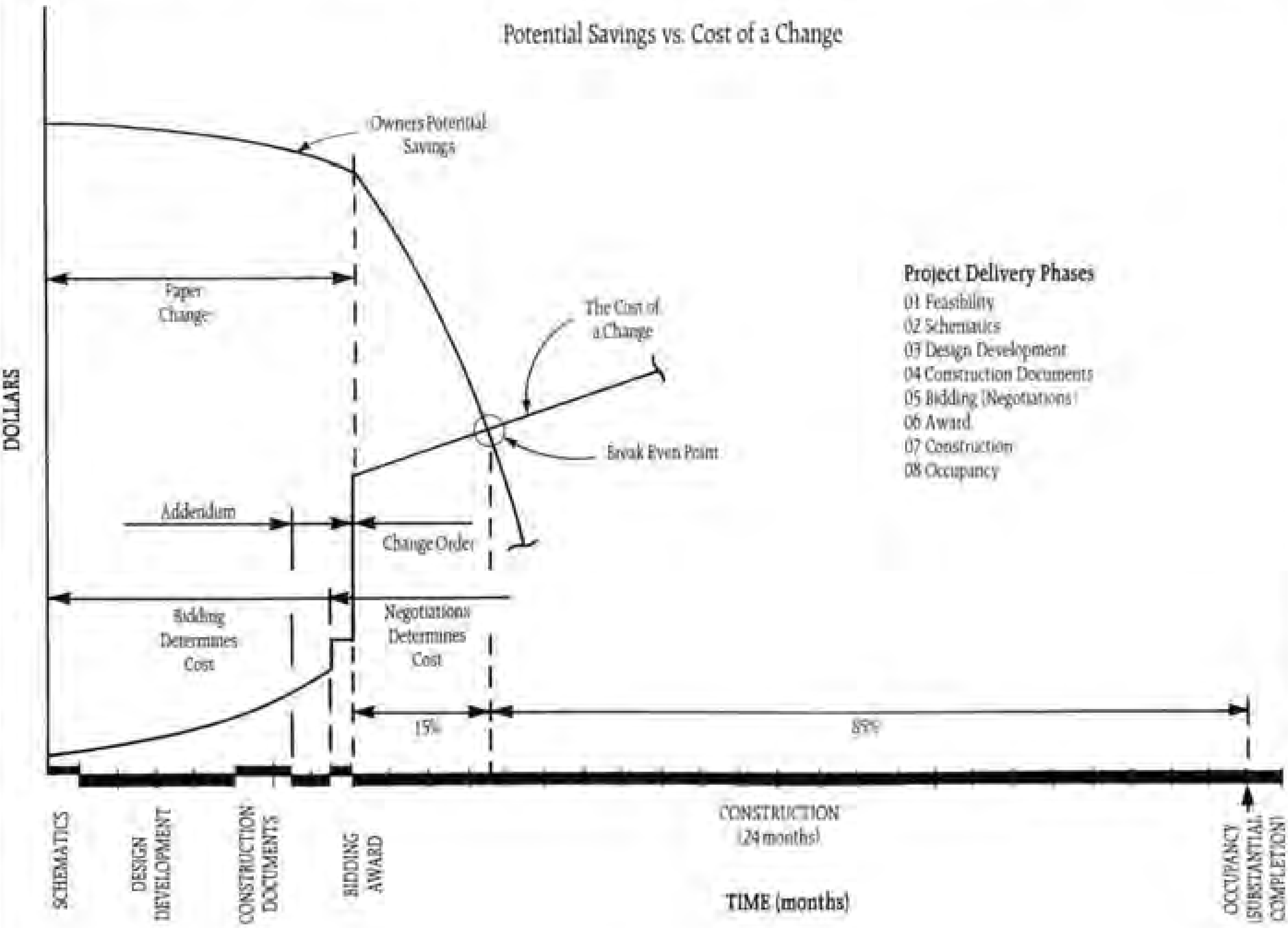
After the contract document VM review is complete, final consideration can be given to the bid division breakdown and the writing of detailed bid division descriptions. This is the implementation portion of the construction and contracting decision on bid packaging and determines the scope of work for each contract that is to be let. For cost prediction purposes the VM staff will estimate the anticipated amount of each bid division after the contract document phase is complete. These construction estimates can be used as guides during bidding or negotiation to pinpoint budget overruns and detect "bad" bids. They can also be used during post-bid interviews with contractors to check quantities and pricing prior to committing awards.

Summary

Value management is an all-encompasing term used to describe the process of providing optimum value to every controllable aspect of a specific building program. The major headings under VM are value engineering, life cycle costing, budget and cost control, and construction and contracting decisions. Both cost efficiency factors and cost quality factors influence the decisions made under the major headings.

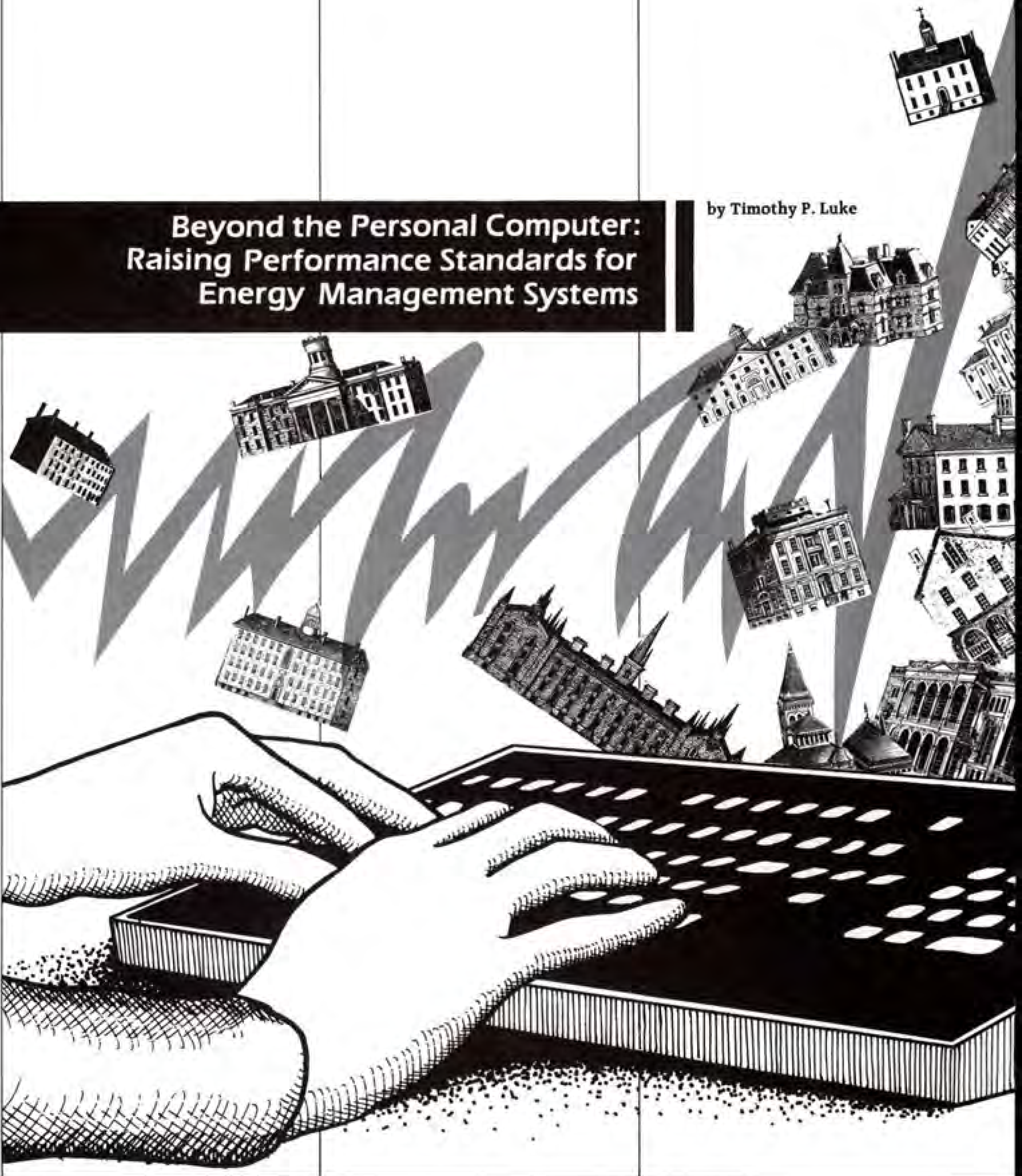
VM requires input from both professionals and practitioners on the technical and practical decisions made concerning the project. This requires the construction manager to maintain a VM staff with match-up capabilities consistent with each project's size and complexity.

VM is a team function with the construction manager providing the practical checks and balances necessary for value-based design, contracting, and construction decisions. Day-to-day involvement in the construction and contracting industry is a valuable asset to VM staff input. ■



Beyond the Personal Computer: Raising Performance Standards for Energy Management Systems

by Timothy P. Luke



The purpose of this article is to examine the current state and future potential of master station computer hardware and software used in computer-controlled energy management systems for a typical college campus or public school district (multiple campus) installation. My view is that administrators are often settling for over-priced and/or out-of-date technology. As a result, their energy management systems' performance and versatility have suffered.

Typically, energy management systems (EMS) develop around one of two models. Model one involves distributed HVAC control through a local area network (LAN) of "intelligent" remote units tied to a master station computer located at some central site. Usually, such a system has control over the HVAC functions in buildings that are separated geographically. Often, such systems are installed in one or more major efforts characterized by large dollar expenditures (for sensor installation, wiring, and HVAC equipment installation or rehabilitation).

The master computer can be anything from an expensive minicomputer (e.g., Digital Equipment Corporation's VAX 8250) all the way down to the cheapest microcomputer (often referred to as a personal computer, or PC). The remotes are microprocessors (usually Intel or Motorola) that perform most of the HVAC work (optimized start/stop, duty cycling, etc.) based on schedules and parameters previously prepared at the master station and transmitted to the remote via the master station communication links. The key point here is that the control functions are automatically executed at the remote level in response to changing field conditions. These functions may occur based either on pre-programming or on operator overrides transmitted down from the master station to the remote.

The master station computer is the location for the application development software (used for such things as defining start/stop schedules) and system-wide control software (such as campus-wide load shedding). Master station capabilities should include the ability to add other customized user functions, such as key control or preventive maintenance (PM). Such custom options should be accessible to the user through standard system terminals. Any decently designed system, with a reasonable software development environment, should easily support these additions. Further, these additions should not usually require additional user effort on a regular basis after initial user setup. For example, the system should be able to automatically analyze equipment runtime trends and generate PM work orders at appropriate times without requiring extra user work. Finally, users should be able to easily initiate the printing of reports, such as key control status reports, at any time.

The second EMS systems model represents the situation in which a system has been developed and installed in a piece-meal fashion. Remotes are installed in the field on an as-needed basis. Each remote operates in a stand-alone fashion, with no communication between remotes. No master station exists, so there is no coordination at this level. Each remote is individually programmed, usually by an installed keyboard or a portable, hand-held keypad. In many cases the manufacturer provides an upward-expansion capability that allows the remotes to communicate with a PC and software purchased from the vendor at a later date.

The limitations of this "building

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block" approach are fairly obvious. This approach will only save the user part of the "easy" 40 percent of energy waste. The remotes that operate independently will only perform HVAC functions for their assigned areas. Any wide-area coordination would have to be planned by the user and implemented by going to each remote site and entering the programming individually. Changes in strategy can be time-consuming and expensive. If the remotes are designed for both stand-alone operation and PC communication, then the user is paying for the increased design and hardware costs of that dual functionality. Finally, the PC communication option will usually have significant expansion and performance limitations. If your ultimate goal is a campus-wide, sophisticated EMS system, this second approach will simply cost you more money in the long run. The remainder of this article will assume the use of the first EMS system model.

Let me digress for a moment. I sympathize with the problems of trying to implement energy conservation plans on a limited budget. However, a user should recognize the ultimate costs of anything he or she tries. Further, let me say that I love personal computers. I own one and this article was prepared on one. But, as will become obvious, I don't want to run HVAC control on one.

For years there was a wide price/performance gap between powerful minicomputers and inexpensive PCs. Further, there was a limited real-time software environment (multi-tasking operating systems, software development tools, etc.) at the PC level. This crucial support was only available at the more expensive minicomputer level.

Today, we see that gap being bridged by new generations of machines. Minicomputer manufacturers are now able to package their traditional machine designs into smaller, cheaper packages (such as DEC's MicroVAX line) in the $10,000 to $30,000 price range with no loss of speed or efficiency. (Note that this cost does not include expensive peripheral devices such as graphics terminals and large-capacity hard disk drives).

Many manufacturers (DEC, Data General, Honeywell) support a full line of fast, easily available peripherals specifically designed to function effectively in coordination with their computer lines. A wise system integrator selects a company that offers a full line of computers and peripherals, thus providing an upwardly compatible expansion path should a larger installation ever be necessary.

The crucial software environment for these machines has remained intact, thus making sophisticated HVAC control and energy conservation available at a potentially lower cost than ever before. Data base management systems, multi-tasking operating systems with substantial real-time capabilities, code application generators, optimizing code compilers, and sophisticated graphics software are some examples of the components of the software environment. These tools are essential to the development of a sophisticated, flexible system.

On the other hand, new models of PCs (IBM Personal System 2) and Compaq Deskpro 386) have come out promising, but not really delivering, advanced technology. Based on new microprocessor developments, these machines are an improvement over earlier models. However, they simply do not compare in performance to the much more powerful minicomputers. But, at least there are now tougher "factory floor" versions of these machines (i.e., IBM's 7532 Industrial Computer) to help alleviate some of the hardware reliability concerns.

Manufacturers proudly display charts showing that their machines deliver more megaflops per dollar. (A megaflop equals one million floating point operations per second—one measure of machine processing power.) What they don't tell you is that these little machines simply can't reach a high enough megaflop level to pass the critical point of operation necessary for a large school installation. The little machine is simply swamped at that level.

Other system integrators have tried adding third-party hardware enhancements, such as expanded memory boards and coprocessor "turbo" boards, to the "original" PC in an attempt to boost performance. These boards work, but they are not designed to solve the basic input/output (I/O) handling problems of a large system processing large amounts of data. Yes, I know that the system designers tell you that they reduce I/O by handling data on an exception reporting basis. But everyone is an exception when a blue norther causes the temperature to drop 40 degrees in an hour, or when a feeder on your electrical distribution system drops. Systems must have the capacity to handle peak I/O loads without getting behind in processing the information. That's why they call it "real-time" processing. However, front-end processors can offer some relief for this I/O bottleneck.

System integrators continue to hang more terminals and bigger disk drives on these underpowered PC systems in a vain attempt to duplicate the features and number of simultaneous users supported by the larger systems. Just like field sensors, these devices increase the I/O load on the system. It is the efficiency of these peripheral devices, and their associated I/O controllers, that helps determine the overall speed and efficiency of these systems. Remember, raw processing speed will not automatically translate into efficiency without a good system design. Also, the cost of these extremely large disk drives can approach the cost of the basic computer on most large-scale installations. This warning applies equally to minis and micros.

The critical development of the needed software environment has lagged behind at the PC level, particularly in its most crucial component: the real-time, multi-tasking operating system. In fact, the lack of suitable operating systems has forced many manufacturers to develop their own customized task schedulers. The customer inevitably bears the hidden cost of this software development.

Manufacturers have responded to the lack of good software by attempting to move even more functionality from the master computer level to the remote processing units. This substitution of hardware for software increases the remote's design complexity and raises the unit cost of each remote. Thus, when a remote fails, the maintenance effort is increased substantially. Some manufacturers rely on maintenance contracts to make their profit on a system—they sell a low-priced system and then sock it to the customer on maintenance.

So the problem remains: how to raise EMS performance standards? Answer: the user must simply specify higher performance requirements. The technology already exists to provide the needed improvement. I have always been puzzled by the low performance requirements found in HVAC control system specifications. Much tougher requirements are used for oil and gas pipelines and factory automation systems that are comparable in price to a sophisticated EMS system.

I simply do not buy the concept that things always happen slowly in HVAC applications. Sure, it takes a while to affect temperature in a chill water loop, but fire and security alarms and electrical failures happen quickly and often result in a large number of field value changes. Further, using a plus-or-minus three degrees deadband to measure changes in room temperature, when sensors accurate to plus-or-minus one degree are readily available, is ridiculous! Why not the best, if it doesn't cost any more?

The technology is readily available to scan several thousand field points every five seconds and update each point's status in the on-line data base. I am not talking about only processing out of bound values; I mean processing several thousand new individual data values accurately every five seconds. Demand better system status graphics. Anything your draftsperson can draw, a computer graphics terminal can reproduce. Your EMS system software should allow you to create the graphic easily and quickly. Quit settling for block diagrams and for curved surfaces that look like they've been chewed on by a dog. For report generation, if your computer is monitoring a field value (or

several hundred), then that computer system should be able to generate reports for you when and how you want them, in any format or colors you specify.

What about the future? Computers will continue to get cheaper and more powerful as competition increases. The last traces of distinction between minicomputers and microcomputers will disappear. Software costs will continue to be higher, relatively speaking, than hardware. New generations of microprocessors (the Intel 80386 and Motorola 68030) are upon us, giving us better PCs and field remotes. The multitasking Unix operating system is here, although it still lacks some needed real-time enhancements. Local area network technology will continue to develop.

Each advance will move more quickly from laboratory and office applications into the harsher field application environment. General Motors' manufacturing automation protocol (MAP) has already been adopted as an industry standard for future developments in making computers, remotes, and sensors communicate in a common, consistent manner in the factory. Developments in all these areas will spill over into HVAC system design, thus producing cheaper, better systems.

How about you? Even with the current slump in energy prices, what do you think the level of campus energy costs will be in ten to fifteen years? Make the manufacturers deliver by specifying higher standards. Also, insist that they install these improvements at current sites to demonstrate that they will work. The technology is available, if you want to take advantage of it. ■

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Management Considerations for Campus Tree Care

by Dale Getz

To professors, administrators, and particularly students, the college campus is both backyard and park. Physical plant grounds are used for recreation, leisurely walks, nature studies, and for providing a healthy work and study environment as well as a pleasing atmosphere to visitors and prospective students.

To maintain the integrity of the grounds it is necessary to have a well organized management strategy, including all facets of grounds care—turf maintenance, tree maintenance, landscape construction, roadway and walk maintenance, and snow removal where necessary. This article will focus on the tree management aspect of grounds care and how it has helped us maintain the quality, health, and beauty of the trees, both young and old, at the University of Notre Dame.

Tree Maintenance

Living trees find their own niche in nature, whether growing on a mountain or on a campus. They grow best where the soil, light, moisture, and nutrient levels are adequate. In a wild setting, trees are superior in many ways, especially since they are in an environment where nutrients are recycled through decaying plants and animals and where soil compaction is minimal and relatively undisturbed. This is unlike the campus environment where soil conditions are minimal, at best, where nutrients must be added artificially, where light conditions may be poor due to buildings, where moisture is hard to regulate, and where genetic origins are unknown or altered.

Ground managers need to create conditions that simulate a natural environment to ensure longevity of the campus landscape. Maintaining established trees should be the number one priority of a tree management program. To facilitate this, it is necessary to divide the campus into tree management areas to aid in the location of trees, the assignment of work crews, and the management of projects.

Tree Trimming

Proper pruning is without a doubt the single most significant operation to improve the health, beauty, and safety of trees. By removing dead, dying, and diseased limbs, further disease spread is halted and entrance by decay-causing bacteria and fungi is minimized. Pruning balances the above ground portions of the tree with the root system, assuring maximum use of available water and nutrients. Judicious pruning will balance the carbon/nitrogen ratio and help the tree survive in its unnatural environs. Pruning will also shape a tree so it will grow into its most desirable form, and limbs that would have a tendency to split can be removed.

Pruning specifications should be adapted to the needs and conditions of your own situation. Copies of the complete specifications can be obtained by sending $1 and a self-addressed, stamped envelope to the National Arborist Association, 174 Route 101, Bedford, NH 03102.

Realistic goals should be set for a pruning rotation or cycle. These goals must be reflected in the pruning specifications to ensure that a tree will "go the distance" after pruning. For example, our goal is a six year pruning cycle. We propose to prune each tree on campus once every six years according to our specifications. To accomplish this goal, the work is organized by scheduling crews within the management units, then recording the progress on a color coded acetate map.

Since pruning is so important to the health of trees, it should be given top priority when budgeting for tree care.

Dale Getz is superintendent of golf at the University of Notre Dame, Notre Dame, Indiana.

Tree Fertilizing

As previously mentioned, campus soils suffer many atrocities. They are trampled upon and driven on. They have had chemicals of unknown origin and building construction residues dumped on them. They have been removed, turned over, cemented, and drained of nutrients. Few, if any, of these roadblocks are encountered in the natural environment. We cannot afford to simply put a tree into the ground and expect it to grow well. In fact, it is utterly amazing that trees can survive at all under these conditions. What we can do, however, is to supply the essential nutrients needed for tree growth.

There are three primary nutrients required for tree growth. They are nitrogen, phosphorus, and potassium. In addition, secondary and trace elements of magnesium, calcium, sulphur, manganese, boron, iron, copper, zinc, and molybdenum play essential roles in tree growth and metabolism. Deficiencies of these nutrients result in specific symptoms but can be classed as dieback or decline.

While it is beyond the scope of this paper to delve into nutrient symptomology, much research data is available on the subject. Suffice it to realize there are many fertilizer products available that contain primary, secondary, and micronutrients, and these products should be used in a comprehensive fertilizer program.

When developing such a program, consider the type of equipment available, staffing needs, the time of year most convenient for fertilization, the cost of fertilizer, and the number of trees to be fertilized. Fertilizing trees can be done by surface application, by foliar application, by placing dry fertilizer in drilled holes, or by pressure injection of soluble or suspended fertilizers. These last two methods offer additional benefits. First, fertilizer can be placed directly into the root zone (the top eighteen inches of soil). Second, the root zone is aerated, providing an increased exchange of gases.

At Notre Dame, we fertilize in the

fall because we are not busy with graduation and mowing. When fertilizing in the fall, it is a good idea to have a portion of the nitrogen in a slow release form. We use a 12-12-24 anaysis with half of the nitrogen in a slow release form. The higher levels of potassium and phosphorus promote root growth and flowering. This amount of nitrogen is sufficient to give good green foliage without producing excessive top growth. Injecting the fertilizer using a soil injection needle and 250 to 300 pounds of pressure not only disperses

the fertilizer throughout the root zone, but it also breaks up compacted soil.

Prioritizing fertilizer needs is necessary for budgeting purposes. The first priority is to check whether trees are under obvious stress or decline. These stresses could be from nutrient deficiencies, insects, diseases, construction damage, poor soil conditions, physical damage, or drought. Next, check whether new plantings are in need of a boost for the following year. The third priority is to fertilize by general area. Choose a management section and fertilize all of the trees in it before progressing to the next section. Of course, accurate records must be kept so that fertilizer performance and tree health can be monitored.

Another type of fertilizing to consider on an as-needed basis is injecting fertilizers into the vascular system of the tree. Both liquid and solid implants are available for injection. These offer a quick boost of fertilizer when a tree is subject to acute stresses or nutrient deficiencies. For example, if an underground pipeline is to be installed near a tree, one third to one half of the total root system can be removed. Ground fertilizing would accomplish little since the roots are severed. The injection of fertilizers directly into the trunk of the tree can provide immediate nutrients to the stressed tree. However, it should be noted that these injection fertilizers should not be expected to substitute for a good ground fertilization program.

To summarize, fertilizing is a necessary function of campus tree care. It provides nutrients in an otherwise deficient environment and it can aerate the root zone if injected or if placed in holes drilled into the soil.

Insect and Disease Control

Within any plant environment there are insects and diseases that occasionally reach proportions that warrant control. Once again, because the campus is an artificial environment, the balance between natural controls and insects and diseases is often skewed. In addition, trees that are not in good health are more susceptible to insects and diseases. For these reasons, control programs and strategies are necessary.

It is important to seriously consider the environmental effects of using chemical controls. For example, there are few times, if any, when there are no people around. This makes it difficult to spray. In many situations, chemical controls kill beneficial insects as well as harmful ones. Also, insects and diseases can develop resistance to certain chemicals that have been used on a regular basis.

Integrated pest management (IPM) is an approach to insect and disease management where chemical controls are used as a last resort. IPM relies on close monitoring of pests and establishing pest population and damage thresholds, beyond which controls are implemented. IPM encourages the use of controls and methodologies least harmful to the environment and promotes cultural practices (fertilizing, watering, aerating, and so forth) that discourage insects and disease and that promote natural controls.

When chemical controls are needed, systemic pesticides can be used on many pests. Systemic pesticides travel through a tree's vascular system. When an insect begins feeding on the tree, it ingests the pesticide. Environmentally, systemic pesticides are less harmful than traditional sprays because they kill only the insects that are feeding on the tree and not other, possibly helpful, insects. They can be injected directly into the trunk or enter the tree through the roots or leaves from soil drenches or foliar sprays.

IPM also promotes preventive care to keep trees healthy. We can curb the use of chemicals harmful to the environment by planting species and varieties that can tolerate the conditions in which they are planted, by using proper spacing to assure room for growth, by planting species and varieties resistant to insects and diseases, and by providing fertilizer, water, and aeration when needed. It must be remembered that the premise of IPM is not to have trees pest-free, but rather to strike an equilibrium between the pests, their natural enemies, and their tolerable levels.

Preventive sprays should be kept to a minimum. Of course, some insects and certain diseases require preventive sprays for adequate control. For example, large populations of American elms require a preventive spray as part of an overall Dutch elm disease abatement program. Also, many fungus diseases (apple scab, diplodia tip blight, anthracnose, and others) require sprays prior to observance of symptoms.

However, in many cases the weather conditions can be monitored to reduce the number of sprays needed. The use of dormant oil is also recommended as a preventive spray for the control of scale and other insects. Dormant oils kill by coating the eggs or overwintering portions of insects, starving them of air. Most contain no toxic chemicals and are applied in early spring when work crews are more available and pedestrian traffic is minimal.

Tree Planting

As living entities, trees progress through their life processes and die. Inherent, then, in any tree management program is the need for a tree planting plan to replace this natural succession of life and deaht, as well as to develop new areas with trees.

Campus managers have several sources of trees for planting. One is purchasing trees from growers or retailers of nursery stock. Another is receiving donated trees from memorial donors or from homeowners who have trees they no longer want in their yards. Transplanting wildland trees is another good source of trees. Many campuses are adjacent to undeveloped property they own. There may be excellent sources of oak, redbud, amelanchier, dogwood, sugar maple, and other trees suitable for campus planting.

A final source is growing your own trees. Having your own nursery offers several advantages. It allows you to have control over nursery pruning and other care to assure the best possible trees at transplanting time. It allows the convenience of having trees on hand when needed, and the cost of growing your own trees is less than that of purchasing trees.

Planting Techniques

It has been said that if you have $20 to spend on planting a tree, you should spend $2 on the tree and $18 on preparing the hole. While this is slightly exaggerated, the importance of the planting site should not be underestimated. The hole should be dug at least one-and-a-half times the ball diameter, or larger if the soil is poor or highly compacted. Planting at the proper depth is extremely critical. Ideally, the tree should be planted at the same depth from which it was taken out of the nursery. This can be determined by the soil ring at the base of the trunk. However, one to three inches of settling should be allowed for if the tree is planted in loose soil. Planting a tree too deep delays or inhibits root establishment because of a lack of ability to exchange gases readily. In addition, certain trees can develop bacterial or fungal diseases in the bark that is covered with soil.

After planting, staking the tree and wrapping the trunk will protect it until it becomes established. Wrapping the trunk will protect certain thin-barked trees such as sugar maples, London plane trees, and others from frost crack during winter temperature fluctuations.

It is important to water the tree according to the particular conditions of the site. The objective is to water the tree well, then allow it to dry moderately before wating again. In extremely sandy soil this might mean you may have to water every other day. In clay soil possibly once or twice per week is sufficient. The point is to tailor your watering scheme to your conditions. Assigning one person to monitor and water all new plantings is a good way to assure quality care after transplanting. It must be remembered that trees planted in the fall need watering the following season as much as those planted in the spring. Watering should continue for one full growing season or longer if site conditions warrant.

Tree Inventory

Tree inventories are an accounting of the trees in a particular area, along with sufficient information about them to make intelligent management decisions. An inventory can be as simple as numerical counting of trees and their location, or as complex as recording information such as diameter, height, condition, and recommendations for pruning, fertilizing, cabling, spraying, removal, and so on. Other inclusions could include noting obstructions such as overhead wires and underground cables, tunnels, or pipes.

Likewise, storage of information can range from a 3x5 card filing system, where data is collected, stored, and retrieved manually, to a completely computerized inventory. Computerization offers many advantages. Depending upon the system, data collection can be accomplished with a hand-held computer in the field, then entered directly into a personal computer or similar unit. The computer can also be programmed to make management computations. For example, the amount of fertilizer needed for each tree can be calculated, or the amount of insecticide needed for spraying elm bark beetles can be determined.

Retrieval of information is much more efficient with a computerized inventory. For example, a list of trees that need to be fertilized can be accessed almost immediately. So can information on the number and location of Austrian pines in need of spraying for diplodia tip blight. The value of a computerized system is obvious in making schedule, budget, and purchase decisions.

Conclusion

Trees are a dominant part of the campus landscape. They provide shade and protection from the wind, and they purify the air. They create scenes and vistas of extraordinary beauty. It is the responsibility of those in charge of the grounds to maintain the quality, safety, and beauty of the campus trees. ■

One Dozen Reasons...

Management Resources

J. Roger Kurtz


PHOTO BY THE UNIVERSITY OF ARKANSAS/FAYETTEVILLE

The Senior Sand Hogger at the University of Arkansas/Fayetteville.

Concrete Savings

Back in 1905, the tradition of Senior Walks began at the University of Arkansas/Fayetteville. Each year, the names of the graduating seniors were inscribed in concrete walkways. At first, this was a class project, with students doing the lettering by hand in wet cement. By the 1940s, the students got out of the work, and the project was entirely the responsibility of the physical plant. The names of seniors were stamped into a one-inch layer of wet concrete using a set of steel letters. With the growth in enrollment over the years, what began as an afternoon's project for students turned into a task of many days for crews of workers. Since the Senior Walks were so popular, there was no question of dropping the tradition, but there certainly had to be a better and cheaper way to inscribe the names. After much experimentation, the physical plant chose a sandblasting method. Two workers are needed to operate the machine that can inscribe an average of one name per minute. Director of Physical Plant Leo Yanda reports that the work can now be easily scheduled, can be accomplished at half the cost, and produces more attractive lettering.


PHOTO BY UW PHYSICAL PLANT

Surplus typewriters at the University of Washington.

Recycling. . . Everything

Looking for a good but inexpensive typewriter, desk, chair, or even a forklift? Departments at the University of Washington know where to go—to the Surplus Property Warehouse. Overseen by Transportation Supervisor Mary Larson, the warehouse will pick up and store the university's surplus equipment and supplies. For departments on a limited budget, it serves as a bargain basement where the used items may be purchased at a reasonable price. And for offices that are moving or remodeling, it's an excellent way to clear some space. "As every little closet becomes a computer work station, departments no longer have the luxury of keeping everything around," Larson says. Every several months, the warehouse outgrows its capacity and has a public auction of its holdings. Bidders can make offers on anything from muffin tins to dentist chairs. One recent auction was particularly successful. "We sold everything—134 lots in two hours!" says Larson.

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Letters

To the Editor:

I was pleased to read the discussion of FASB's Statement 93 ["The Cost of Depreciation," Fall 1987], including Jay Fountain's response. The article was helpful in communicating both FASB and GASB activities of interest to constituents.

I would like to take this opportunity to clarify a sentence in the editor's note that might lead to some misunderstanding. It reads: "External financial statements will have to show the value of a building at its replacement cost, not at its historical cost." That is incorrect. Statement 93 does not address measurement; it simply requires that all not-for-profit organizations begin recognizing depreciation of long-lived tangible assets in their general-purpose financial statements.

Generally accepted accounting principles (GAAP) require the recognition of assets at their historical cost. Statement 93 does not change that. The result is that assets will be presented at their historical cost less related accumulated depreciation, a value that seldom equals a building's replacement cost.

Ronald J. Bossio
Project Manager
Research and Technical Activities
Financial Accounting Standards Board
Stamford, Connecticut

New Products

With this issue of Facilities Manager, *APPA introduces its annual new products section. Advertisers will have the opportunity to purchase space at a nominal cost in order to promote their new products and services. The cost is only $50 for each two-inch space reserved and includes copy, photos, headlines, and logos. Contact Diana Tringali at 703/684-1446 for more information about advertising in New Products.*

Stadiums Unlimited, the originator of aluminum spectator seating, is pleased to introduce its new full-product catalog.

The catalog beautifully illustrates and comprehensively describes the company's complete line of top-notch spectator seating products.

Featured in the catalog are custom designed Permanent Steel Grandstands, permanent and transportable Angle Frame Bleachers, Stadium Chairs, the Trans-Stand and the Trans-Stage "Over-the-Road" seating and staging units, Picnic Tables, and Park and Team Benches.

A distinguishing hallmark of Stadiums Unlimited is that all spectator seating products are consistently made of top-quality, long-lasting, maintenance-free materials.

The catalog is free—call 800-STADIUM or write Stadium Unlimited, P.O. Box 627, Grinnell, Iowa 50112.

Management Resources

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Curbing Crime

Crime prevention efforts at West Virginia University are succeeding, reports Assistant Director for Public Safety Bob Roberts. For the month of August—a time when crime reports routinely increase—the public safety department was pleasantly surprised by the results. The school had a 69 percent reduction in reported thefts, a 71 percent drop in property losses, and significantly fewer assaults and batteries from the previous year. Roberts attributes the success to increased efforts by the department staff and increased awareness on the part of the public. "We have completed the transformation from a reactive stance to a progress attack attitude," he says. "I cannot commend our shift officers enough for their crime prevention efforts. The hours of writing Insecure Premise Reports, passing out 'You Could Have Been Ripped Off' cards, and locking or securing property are beginning to pay off."

Achieving an Original Look

Primrose Hall, a 100-year-old tower on the North Carolina State University/Raleigh campus, received a face-lift recently that called for some tricky work on its round windows. Ninety percent of the design, layout, and fabrication on the windows was done in the carpentry shop. Each of the windows has sixty-seven parts. Other trade service shops were also involved in restoring the tower to its original state. The superstructure, ceiling, roof, window panes, mortar rafters, and supporting timbers all had to be replaced to prevent the tower from collapsing. On the inside, trap doors were removed. Seven hundred hours of labor when into the project. ■

The Bookshelf

Maximizing Personnel Assets

Human Resource Accounting, by Eric G. Flamholtz. San Francisco: Jossey-Bass, Inc., 1985. 389 pp. $32.95, hardcover.

Eric G. Flamholtz's *Human Resource Accounting* is a new approach to personnel accounting and deals with the concept of accounting for people as assets that can be maximized rather than expenses that should be minimized. Physical plant managers, regardless of their physical plant size, must continue to maximize all assets in order to deliver the highest level of service to their facilities. *Human Resource Accounting* offers, in detail, accounting methods to carefully obtain and apply costs and values for employees as assets.

Each of this volume's four sections outlines the principles used in human resource accounting. Section one explains how the human resource accounting system was first conceived, implemented, and studied. This section details what areas of management can best use the information obtained from this method of accounting, including human resource professionals, personnel officers, and front-line managers.

Section two analyzes costing concepts for human capital. A position opening is broken into the individual steps that must be followed in the hiring process; costs are then attached to each step. The sum of these costs then allows a manager to see graphically the dollar cost associated with a position. With the use of examples, charts, and actual case histories, the author dispels the idea that entry level positions can be filled at little or no cost. The author shows clearly how the cost of employee replacement can run into the thousands once all associated costs are tallied.

Section three presents concepts for determining the value an employee has for an organization. Value is determined for a number of variables: productivity, transferability, and promotability. Both monetary and nonmonetary values are analyzed, and detailed examples are presented for value costing. Decisions regarding new positions or layoffs can be analyzed with the value analysis presented in this section. The author uses an example that clearly shows that layoffs in many cases cost more than the short term savings realized in lower payroll.

Part four guides the reader through the necessary steps of designing and implementing a human resource accounting system. The implementation of this system more appropriately falls under the jurisdiction of a college or university business office.

The concepts for treating employees as assets has a wide audience in physical plants. Physical plant professionals can obtain valuable information on how to attach cost and values to their physical plant's human resources from this edition.

Human Resource Accounting is available from Jossey-Bass, Inc., 433 California Street, Suite 1000, San Francisco, CA 94104-2091.

—John Ruhrup
Director of Physical Plant
Nazareth College
Kalamazoo, Michigan

Robotics and the Future of Computers

Industrial Robot Handbook, by Richard K. Miller. 1987. 686 pp. $99, softcover. **Machine Vision,** by Nello Zuech & Richard K. Miller. 1987. 209 pp. $45, hardcover. **Fifth Generation Computers,** ed. by Richard K. Miller. 1987. 221 pp. $45, hardcover. Lilburn, Georgia: The Fairmont Press, Inc.

In three new books we are provided, respectively, an analysis of the robot industry of today, a technical evaluation of the form of robot using video, and a report on the newest concepts in hardware and software being explored internationally. Each book is written or edited by Richard K. Miller, with Nello Zuech co-authoring *Machine Vision*. Miller is a recognized expert in artificial intelligence, computer-aided engineering, and robotics. Zuech is the founder of Vision Systems International and is heavily engaged in the field of machine vision, electro-optics, and factory automation.

Cost-effectiveness considerations dictating, none of the applications discussed in these books are directly applicable to the physical plant or facilities areas. However, advances in the computer industry are so rapid and so profound that it behooves each administrator, engineer, and architect in the facilities operation to review books of this nature and to keep current in the new technology. In the not too distant future, the applications discussed will be employed in one form or another by facilities personnel.

Industrial Robot Handbook is a most comprehensive compendium of robot applications. Beginning with definitions (both American and Japanese) of robotics, classifying robots into groups, and providing a brief history, Miller follows with an analysis of robots' impact on the industrial world now and in the immediate future. For example, today there are just over 16,000 robots is use in American industry (vs. 60,000 in Japan), but by the mid-1990s there will be more than 90,000. Miller washes the argument that robots will displace normal labor by advising that to not fully use robots and automation, competitive pressures from abroad (Japan) will cause more factory closings and a greater job loss.

Miller explains how the industrial robot works through diagrams, pictures, and language known by engineers but generally understandable by most readers who have been involved in the maintenance field. He clearly relates the microprocessor and computer language growths to those of the robot, which is entering its fifth generation (mechanical-cam controlled, hardwired controlled, programmable controls, networked and minicomputer controlled and, finally, internally controlled artificial intelligence). Miller warns that any thought of employing robots should include careful evaluations of economic justifications, organization priorities, the implementation process, and safety.

Finally, Miller leads us through many current applications, including automobile manufacturing, airplanes, machinery, welding, spray painting, material handling, assembly, plastics, cutting (water and flame), packaging, and decorating. After each application he provides a bibliography.

Included in *Industrial Robot Handbook* is a discussion on quality control inspection and acceptance procedures and the application of robots in this function. Robots using "vision" are extremely important and a rapidly growing field in itself. Zuech and Miller wrote *Machine Vision* to provide interested persons with a current report in this field, its applications, and its future. Machine vision by definition is "the process of producing useful symbolic descriptions of a visual environment from image data [and] automatic interpretation of imagery to control a manufacturing process." In other words, the machine looks at something, compares it to what is stored in its memory, evaluates the comparison, and decides on subsequent action (i.e., accept, reject, weld, change colors, stop, etc.). The definition suggests, and further reading confirms, that this text is a fairly technical report and one from which individuals in industry would mostly benefit.

Zuech and Miller point out that machine

vision systems have two primary elements—the camera, which serves as the eye of the system, and a computer video analyzer. The authors provide an in-depth discussion of the hardware and software currently employed in machine vision and the progress being made in other aspects, such as the integration of computer aided design (CAD) data points as a method of inspecting the first product. If the first product is perfect (within tolerances), subsequent products are less likely to be defective. As with robotics, machine vision is becoming more and more useful in industry as its capabilities increase.

The future application of artificial intelligence and the artificially intelligent eye will open new areas for employment. Zuech and Miller discuss some current applications such as container and label inspection, dimensional inspections, grading, glass tube inspection, and printed circuit board inspection. They foresee in the 1990s that 30 percent of all robots will utilize vision. The concluding chapters of their book review the status, as of 1983, of companies manufacturing robots with vision capability and current research in machine vision at five institutions.

Miller provides a view of the evolutionary growth of robots and suggests that the robot first was a black box, then it acquired arms, then a leg, then a second, then a head—with vision, and soon a "mind." The "mind" will be a result of the successes of artificial intelligence and parallel processing, both of which make up the objectives of the fifth generation computers. He reports on the progress of this research in *Fifth Generation Computers.*

Current computers operate in serial fashion—extremely fast, yet one step at a time—and employ programs that dictate every step the computer is to follow. The fifth generation computer will be a machine consisting of perhaps hundreds of microprocessors, each capable of operating simultaneously on different aspects of the problem presented and each capable of accepting spontaneous input, verbal or visual input or researching world-wide sources for knowledge input, retaining facts (or rejecting same), evaluating stored data, and generally being able to act, in almost human fashion, upon a problem presented. The efforts, on eight important fifth generation computer projects, are discussed in detail by Miller using terminology easily understood by the lay person.

This is an important book, for it reports on efforts that will affect the future of the world's population. Nothing is said of Russia or China's efforts, but Europe, Japan, and the United States are deeply involved, as are specific industries and the defense establishment. Miller states: "Recognizing the influence of computer technology on today's society, it is clear that a second computer evolution would have the potential of altering the balance of international power as well as influencing the life style of virtually every individual in the industrial world." As such, billions of dollars are being spent on these eight projects alone. Miller analyzes and reports the progress of each, the potential impacts, the objectives, findings, and the social and economic side benefits.

As I indicated at the start, none of these three books have a direct benefit for facilities managers. I do not recommend them, therefore, as books for the reference bookshelf. However, I would strongly recommend Miller's *Fifth Generation Computers* as a book to read by anyone who will be in the maintenance or facilities fields for the next five-plus years. Indeed, it should be read by all managers; the ideas and technology will likely be the language and applications of the mid-1990s.

Machine Vision, except for those interested, could be avoided without loss, and *Industrial Robot Handbook* is one that should be reviewed at the library (and a special effort made to do so). All three books are available from the Fairmont Press, Inc., 700 Indian Trail, Lilburn, GA 30247; 404/925-9388.

—Gary H. Kent
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U.S. Asbestos Regs

The Attorney General's Asbestos Liability Report to the Congress, by the U.S. Department of Justice. Voorhees Township, New Jersey: SourceFinders Information Corporation, 1981. 213 pp. $19.95, softcover.

Printed in September 1981, *The Attorney General's Asbestos Liability Report to the Congress* responds to a directive (Section 8(b)) in the Asbestos School Hazard Detection and Control Act of 1980. The Act directed the United States Attorney General to:

> Conduct an investigation to determine whether, by using all available means, the United States should or could recover, from any person determined by the Attorney General to be liable for such costs, the amounts expended by the United States to carry out this Act (federal grants and loans to detect, remove and contain friable asbestos in the schools).

The Act further required a report on the findings and recommendations of the Attorney General. This book is that report.

The report recommended that the United States should not sue, although it could, and it concluded that litigation by local school authorities should be quickly investigated as a potential means of reducing the fiscal impact on local taxpayers. It also stated that the federal government should support such litigations.

So much has developed, however, since the 1981 report, that its utility and conclusions may not be valid any longer. The research and investigation, as reported, are well worth review by those physical plant administrators involved with the asbestos issue, as well as other school officials who may become involved in liability and fiscal matters arising from the costs associated with asbestos. In all cases, time may be a major factor and he or she who hesitated may in fact be the loser.

The report is segmented into two general sections: General Background and Legal Issues. In the General Background section, the report provides a fairly concise statement of what asbestos is, its applications, and its benefits. It catalogs the asbestos industry including names of mining and manufacturing firms, and their production and market shares. And it reports on the various major health hazard results: asbestosis, lung cancer, and mesothelioma. Finally, the report traces selected correspondence between industry representatives to demonstrate that what asbestos manufacturers knew or should have known is important for establishing "failure to warn," "failure to test," and "foreseeability of harm" issues for product liability.

In the final two parts of the General Background section, the report discusses asbestos in schools (elementary and secondary) including comments on the characteristics of friable asbestos, use of sprayed asbestos, and potential school health hazards. The efforts of five sample school districts are cited.

The second section, Legal Issues, begins with a summary outline of those elements considered common to any potential theory of financial recovery:

1. Duty—the defendant has a duty to the plaintiff (school district).
2. Breach of Duty—the defendant has a duty to test and warn. He is the expert.
3. Injury—the plaintiff has an obligation to prove his injury and to show his injury is one for which recovery may be obtained.
4. Statutes of Limitation—plaintiff may exceed these limitations if he does not carefully establish a comparatively recent "accrual" date.

Following the summary outline, the report discusses, in somewhat legalistic, but not entirely incomprehensible terms, their analysis of:

1. Economic loss as a compensable injury.
2. Likely equitable and common law theories of recovery.
3. Federal statutory theories of recovery.
4. "Persons" in addition to the manufacturers potentially liable.
5. Statute of limitations issues.

The report is almost like reading a mystery story. First, the school districts win, then the manufacturers, then a new issue is discussed and the school district is on top again, and so on. In total, the school districts appear to have the most wild cards—if they act promptly and intelligently. This report will help them (and their legal counsel) to do so. For institutions of higher education, most of the investigation and findings will apply, but again, timing is important.

I would strongly recommend this report be read by all physical plant administrators and business officers as well as any official in education who may become involved with asbestos in any capacity. This recommendation is made with a further comment that since 1981, many new issues, decisions, laws, and regulations have evolved. The most important of which is the fact that inaction by an administrator may be a breach of duty.

The report is available from SourceFinders Information Corporation, 68 Sandra Road, Voorhees Township, NJ 08043; 609/772-2355.

—**John J. Byrne**
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Increasing CAD Productivity

The AutoCAD Productivity Book, by A. Ted Schaefer & James L. Brittain. Piedmont, California: Ventana Press, 1986. 314 pp. $39.95, softcover.

This book is written for people with some AutoCAD familiarity who wish to improve their productivity. Many have used AutoCAD is it was written, with existing commands and standard menus, not realizing the extent that AutoCAD techniques can facilitate drafting and design.

With this goal in mind, the author suggests three major strategies for enhancements:

1. Computer fine tuning through DOS utilities to improve program response time through more efficient management of disk space and AutoCAD files.

2. Customizing screens for a particular discipline by creating simple time-saving macros, which combine several command steps into one, and designing screen, tablets, and button menus based on frequency of use.

3. Automating part of the design/drafting process by interacting with other application programs for processing text or performing calculations, or by writing AutoLISP routines to prompt for design parameters and automate graphics.

The book is not just about how to construct a symbol library, make innovative use of certain AutoCAD commands, or how to write AutoCAD macros/routines. While it covers all of these items, it also goes further to provide readers with an overall view of what can be accomplished through AutoCAD. Furthermore, it demonstrates that the majority of these enhancements do not require special programming expertise. AutoCAD, with its power of "built-in-ability to be easily customized to your own needs," makes the improvements accessible to non-technical users.

The book tends to be process-oriented, guiding readers through examples so that they may grasp the principles, as well as some of the specific applications, which can be directly adapted to their own discipline.

Chapters 1 through 7 are written as tutorial, preliminary reading. The book constantly intersperses overall principles and specific examples. Occasionally, this logical continuity is lost. For example, in menu design, after a conceptual introduction, the reader is plunged directly into a thirty-page listing of menus for mechanical design. In all the tutorials, the inefficient DOS editor EDLIN is used. Numerous lines are devoted to the lengthy process of creating/changing files. These defects do not contribute to the book's goal.

The need for productivity enhancement can vary drastically from one discipline to another. Facility managers are concerned more with managing existing facilities than with designing new ones. Therefore, digitizing existing floor plans and associating facilities data with floor plans for the purpose of query and analysis become primary interests.

The book is not intended to be a quick reference containing ready-to-use tools addressing specialized interests. While it tries to be generic in its approach, the majority of examples are drawn from mechanical design. The second part of the book consists of a library of seventy AutoCAD macros and routines, of which less than half are applicable to facilities management. The tips on managing files and disk space and some simple macros are quite useful; a few of them are related but require creative "transformation." The majority, however, are simply not applicable.

On the other hand, for the purposes of gleaning ideas and setting guidelines, this is an impressive book. It broadens the reader's expectations on the use of AutoCAD for increasing productivity and suggests a planning outlook, a framework on how to pursue that goal. Besides the three extremely useful strategies described above, there are numerous practical guidelines, stimulating examples, and scenarios.

For example, the scenario on automating beam design seems to be a fantasy. AutoCAD prompts for design parameters, performs calculations, then picks the appropriate beam from a prescribed catalogue list. There is no step-by-step implementation for this scenario, but enough clues are provided to let readers explore possibilities on their own. Above all, it stimulates readers to re-evaluate and plan for their own CAD operations, and reminds them throughout that automation is within their reach.

Productivity is the theme of the book. Numerous guidelines and strategies are presented. One could be easily bogged down in the nuts and bolts within this maze of information. Facility managers should emphasize the areas that can directly affect decision making and should focus on their critical needs rather than on what AutoCAD can do. Unfortunately, this is an area not treated in the generalized approach of the book.

While the book is originally written as a shortcut for improving productivity, it opens up to readers a wealth of new possibilities which require serious thinking before taking any action. For this reason, it is especially recommended for facility managers.

The AutoCAD Productivity Book is available from Ventana Press, P.O. Box 11004, Piedmont, CA 94611-9937.

—Lu Liu
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Making the Whole World a Campus

Telelearning Models: Expanding the Community College Community, ed. by James Zigerell. Washington: American Association of Community and Junior Colleges, 1986. 73 pp. $11.95, softcover.

It is my opinion that reading this little 72-page monograph will stimulate you to think about how your institution can use and respond to the changes resulting from the surge of telecommunication technology. If so, the authors' intent will be met.

The American Association of Community and Junior Colleges sponsored this project, which led to locating and developing articles on nine exemplary programs that indicate how the advance of new technologies and media have provided tools for serving a wide variety of student clienteles.

The introduction by James Zigerell is a superb summary and review of the nine projects. The excellent editing has resulted in each unit having a positive cohesiveness while relating with continuity to the monograph as a whole. For a document on technologies it is especially easy reading.

The broad data base used for the articles makes this booklet especially interesting. The subject matter covers nine areas of technologies/media, with examples from seven states and two Canadian provinces. One is further impressed with the number of people that can be and are being reached with a variety of technical means and educational materials, as well as the vast physical areas covered. Examples include Videodiscs: "The six discs were field-tested with nearly 700 college students and forty-five instructors in seven colleges and universities across the country." Educational Access Cable: "This system has grown over the years and now includes over 4,000 videotape titles and a 36-channel internal cable system." Television: "Enrollments have been high. So far, in Canada and the United States, there have been more than 50,000 paid registrants."

Although the monograph relates to community, technical, and junior colleges, the successful results suggest trends that have or will affect four-year colleges and universities. Included in these samples are indications of the physical and academic changes of things. References to open campuses, no-wall campuses, and open degrees are ideas consistent and in step with the national trend of decentralization in government, business, and industry.

This brief booklet provides validated examples of how education, through learning systems, can take place outside the brick and mortar box of traditional institutions. It suggests that technologies can make the whole world a classroom.

From a facilities management/physical plant point of view, the articles raise the question of where will the physical aspects of such technology/media be located, serviced, and secured. Are present organizations able to absorb these functions? Will a new bureaucracy with additional planning, budgetary, and operational procedures emerge?

The influx of technology and its effects on organizational management is a subject to be studied. From the thought provoking data in these articles, it appears that soon technology will be so commonplace in all aspects of education that it will be homogenous to all facets of the institution's academic and administrative organization.

Continuing advances in technology/media will cause significant changes to the status quo. This booklet is exciting reading and highly recommended for college and university administrators responsible for planning, coordinating, and managing facilities.

Telelearning Models is available from AACJC, One Dupont Circle, Suite 410, Washington, DC 20036; 202/293-7050.

—Jerry Boyea
Facilities Management Consultant
Hendersonville, North Carolina

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