

March/April 1998

VOLUME 14

NUMBER 2

# Facilities Manager

The official publication of APFA: The Association of Higher Education Facilities Officers

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# Facilities Manager

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## From the Editor

Steve Glazner



Wayne E. Leroy, CAE  
APPA Executive Vice President

### Wayne Leroy to Leave APPA

After nearly 15 years of service to APPA, Executive Vice President Wayne E. Leroy has announced his plans to retire from the association. At press time, a specific departure date had not yet been determined.

Wayne was hired by former Executive Director Paul Knapp in October 1983 to oversee APPA's educational programs and other activities. When Walt Schaw became APPA's executive vice president in 1985, Wayne served as the associate vice president until 1994, at which time he was promoted by the Board of Directors to executive vice president.

In his letter to President Pete van der Have, Wayne explained that his decision to leave APPA is partly based on his desire to explore new opportunities and special projects. He will continue to work closely on a variety of projects with the Council of Higher Education Management Associations, the Washington Higher Education Sec-

retariat, and the American Society of Association Executives. In addition, Wayne plans to do some teaching and consulting on various aspects of the educational enterprise.

During his tenure with APPA, Wayne became the source of information for staff and members alike on virtually any topic related to facilities management. He knew and remembered literally hundreds of members and could recall specifics of their facilities operation, which came in handy when APPA staff was developing a publication or educational program.

In 1993, APPA President Don Mackel presented Wayne with the President's Award for his leadership role in a Department of Energy/Oak Ridge National Laboratory district heating and cooling project. The results of this project showed that higher education was indeed a major player in U.S. energy consumption and helped secure national attention for APPA. Wayne has since spearheaded several other major activities, including the Opportunity Assessment project and the forthcoming metering, monitoring, and verification guidelines, both with DOE.

As a result of Wayne's departure, the Board of Directors announced that Lander Medlin, APPA's associate vice president, is being promoted to executive vice president. We'll provide further information and a full announcement of Lander's promotion in the next issue of *Facilities Manager*.

Best of luck, Wayne. We wish you well. 🙏

## APPA Allies with CMDG to Provide Architects' First Source

In the spirit of advancing APPA's mission, a new strategic alliance between APPA and the Construction Management Data Group has been announced, and APPA members will benefit immediately from the new partnership. Now, the 1998 Architects' First Source (AFS) is available to APPA members at no charge and can be obtained by calling 800-395-1988 or by visiting the AFS website at <http://www.afsonl.com>. Be sure to note that you are requesting your "APPA member copy." The 1998 volume of Architects' First Source is a comprehensive and current "who makes what" reference for the preliminary selection of construction



### 1998 Architect's First Source

products and vendors in the industry, and it lists more than 25,000 construction products from 9,400 manufacturers. In addition, APPA is listed on page 7 of the association section. Through this partnership, APPA members join 76,000 other design/construction professionals who rely on AFS as a daily tool of business.

## Public Distrusts Higher Education Costs

The National Commission on the Cost of Higher Education released its final 50-page report entitled "Straight Talk About College Costs and Prices" and it warns that colleges risk "an erosion of public trust" if their charges continue to soar. The report is the culmination of five months of work by the 11-member commission created by Republican Congressional leaders and appointed in August in an effort to help the government find innovative ways to rein in the rising cost of attending college.

The panel ultimately rejected calls for federal intervention to keep costs down and instead said that colleges must increase their efforts to cut costs



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and keep tuition affordable. As part of that effort, the panel urged colleges to conduct "self-reviews" to identify cost-saving measures. The panel also called for accrediting bodies to scrutinize whether colleges were making serious efforts to be more productive and to restrain their costs. The panel recommended that Congress require colleges to disclose more financial information to help students and their parents better understand why institutions charge what they do including detailed reports on how much they spend each year on capital needs and faculty salaries.

The panel's opposition to federal cost controls was approved of by the leading higher-education associations.

To read the full text of the Commission's report, subscribers to the *Chronicle of Higher Education* should visit [www.chronicle.com](http://www.chronicle.com).

### Tools for Schools

**I**ndoor Air Quality Publications (IAQ)—along with APPA, The National Safety Council, The National Institute of Building Sciences, and the U.S. Green Building Council—is sponsoring "Healthy School Environments '98: Tools for Schools" which will focus on removing environmental hazards from our nation's schools. Two two-day conferences are scheduled: one for April 14-15 in Washington, D.C., and the other for May 4-5 in Chicago, Illinois. Technical sessions cover such topics as School Building-Related Diseases and Complaints, Moisture and Microbial Contamination in the School Environment, and School Construction, Renovation, and Remodeling.

For more information or to register, contact IAQ at 800-394-0115.

### A Little Planning Goes a Long Way

**S**CUP, the Society for College and University Planning, is offering a unique educational opportunity—the "Space Management Workshop: A Primer on the Tools and Issues in Higher Education Space Management" to be held in Atlanta, Georgia, June 4-5, 1998.

The two-day workshop is designed to give both the novice and the practiced planner an opportunity to learn the principles of sound space management planning, to discuss unique and mutual problems with colleagues, and to develop a professional network that will continue beyond the experience in Atlanta. After discussing fundamentals, participants will focus on integrating and applying the pieces

*continued on page 7*

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during team exercises. Faculty and facilitators will assist teams researching and solving assigned problems, and solutions will be shared with the group. Space is limited so visit SCUP's website at <http://www.scup.org> for registration details.

### APPA and CSI Offer Joint Symposium on the Future of Educational Facilities

**A**PPA and the Construction Specifications Institute (CSI) have developed a joint symposium for the benefit of members of both organizations. "Constructing the Future of Educational Facilities" will be held Saturday, June 27, 1998 at the CSI Convention and Exhibit in Baltimore, Maryland. Following is the schedule for the symposium:

8:30 - 9:20 a.m.

#### Session 1: The Future of Educational Facilities

Led by William A. Daigneau, associate vice president and chief facilities officer at the University of Texas M.D. Anderson Cancer Center in Houston, Texas.

9:30 - 10:20 a.m.

#### Session 2: Redefining the Campus

Led by Jeffrey Gee, director of planning, design, and project management at the University of California in Berkeley, California.

10:30 - 2:30 p.m.

#### EXHIBITS with Lunch

2:40 - 3:30 p.m.

#### Session 3: The Planning, Design, and Construction Process

Led by Jane Baker, FCSI, CCS, former president of CSI and a specifications consultant in Tulsa, Oklahoma.

3:40 - 5:10 p.m.

#### Session 4: Commissioning Buildings & Beyond

Led by Michael J. King, FCSI, CCS, director of engineering specifications at ARCOM, in Alexandria, Virginia.



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This joint APPA/CSI symposium will be held in conjunction with CSI's Convention and Exhibit, June 25-28, at the Baltimore Convention Center. The cost is \$95 if registration received on or before May 20, or \$125 for registrations received after May 20. Registration includes the June 27 Symposium and Exhibit Hall, and the June 28 Closing Keynote Address.

While you're at the symposium, take advantage of the opportunity to walk the exhibit hall. More than 630 exhibitors will be on hand at the CSI convention this year, bringing you the latest in technology, products, services, and materials available to the non-residential construction industry today. In addition, we encourage you to attend CSI's closing keynote address with Edward Barlow Jr., a leading futurist who helps industries, organizations, and professionals prepare for the world of tomorrow.

For registration and hotel information, contact CSI's Member Customer Service Department at 703-689-2900 or APPA's education department at 703-684-1446 ext. 230. Information can also be accessed from both organizations' websites: APPA <[www.appa.org/educate/csism.htm](http://www.appa.org/educate/csism.htm)>; CSI <[www.csinet.org](http://www.csinet.org)>.

#### Correction

In Joe Spoonmore's "AAPP Trip Report," which appeared in the January/February issue of *Facilities Manager*, we misidentified a campus photo. The institution depicted on page 44 is the University of Sydney. We regret the error.



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Business School Annex	0005	1/15/99	\$112,800.00	8	1/20/99	-12	10
Business School Annex	0006	1/15/99	\$112,800.00	8	1/20/99	-12	10
Business School Annex	0007	1/15/99	\$112,800.00	8	1/20/99	-12	10
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0003	1/15/99	\$112,800.00	\$112,800.00	8	0	1/15/99	0
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### The Challenges and Opportunities for Educational Facilities

by Wayne E. Leroy, CAE

#### The educational

enterprise is an eclectic mixture of over 3,600 institutions of higher education, 14,900 public school districts, in excess of 26,000 private elementary and secondary schools. These combined entities have more than 8 billion square feet of space, in over 280,000 individual/unique buildings representing a capital investment exceeding \$1 trillion. And, it touches the daily lives of 70 million students, faculty and staff. In excess of \$17 billion a year is spent on building new, adding to existing, or remodeling older educational facilities!

Everywhere school administrators, faculty, staffs, students, parents, legislators, policy making boards, and many other interested groups are "looking into the crystal ball" and asking themselves: what will the next millennium bring to our institutions? For many schools the picture is not all that clear. The reason for the murky view is varied, but two items are key reasons for an uncertain future:

**1. Student Population Growth**—Projections indicate that by midway through the first decade of the new millennium, K-12 enrollments will increase from the current 52 million to 54 million. Higher education will grow from its present 14.3 million students to 16.5 million. An increase of 4 million additional students.

**2. Public Opinion & Financing of Facilities**—Throughout the land there is skepticism by state legislators, governing boards, taxpayers, parents, students, and other groups that education costs too much, is unresponsive to the needs of society, and is not very accountable for the \$419 billion being spent annually on the educational enterprise.

Wayne Leroy is APPA's executive vice president. He can be reached at [leroy@appa.org](mailto:leroy@appa.org).

What does all this mean to institutional administrators and others grappling with decision-making that impacts facilities in the next millennium? The time is now for school administrators to strategically assess and plan for the next millennium. Three areas of strategic assessment are vital to the area of facilities construction.

#### \* *Building What is Truly Needed:*

With 8 billion square feet of existing space, we need to ask the question: how much additional space is needed to accommodate 4 million new students? Think and plan strategically regarding utilization of current space. Perhaps it is time to think "outside of the box" for alternatives to building additional space. Have we explored other alternatives such as flex scheduling, extended school hours/calendars, creative community partnerships for using to greater advantage underutilized space/facilities. Creative thinking can usually find options for enhancing utilization of space. I recall my days as a parent with teenagers; we were a family of four people with five vehicles, plus assorted motorcycles, bicycles, and other transportation conveyances. Our challenge was to make all this fit into a two car garage and driveway! However, with some creative scheduling and cooperation we managed to keep the place from looking like a disaster area.

\* *Building Beyond the Capacity to Maintain:* Recent data indicates that K-12 combined with higher education institutions have a deferred maintenance backlog and capital renewal need above \$200 billion. With this amount of deferred maintenance and capital renewal need, we should be doing serious strategic thinking about building additional facilities without at the same time providing financial resources for their maintenance and periodic renewal. President Clinton in his recent State of the Union address

emphasized the facilities renewal issue by proposing a school construction tax cut that would allow communities to build or renew 5,000 schools. One thing is clearly evident, it is impossible to provide quality education without quality facilities.

\* *Technology Integration and Enhancement:* Pick up any newspaper, listen to the local news program, or attend any PTA, school board, or faculty meeting and the topic of "technology enhancement" will be mentioned at least a half dozen times. Technology is a fact of life, and harnessing its many existing as well as emerging uses will be one of education's greatest challenges during the next millennium. The age of television, telephone, faxes, e-mail, Internet, etc., is now commonplace in today's home and work environments. The challenge of the future will be how do we as educational administrators provide our institutions with the capabilities necessary to deliver technology-enhanced education. Not only will we need to provide new facilities with "smart classrooms" and electronically connected libraries, but we also have the challenge to do this for the existing 280,000 school buildings! This is what will take creative strategic planning leveraged with ongoing efforts of facilities upgrading and renewal.

Yes, the time is now for educational administrators and decision makers to begin assessing their true facilities needs and strategically planning to meet those needs. We must now begin adopting the economic value-added approach by strategically leveraging existing financial resources, coupled with exploration of appropriate partnership opportunities, and making wise and prudent strategic decisions. All of these combined actions could pave the way for meeting the challenges and opportunities for educational facilities construction in the next millennium. ▲



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# An Integrated Approach to Interior Master Planning:

## How Place Communicates and Affects Mission

by Beth Worthington

"WE SHAPE OUR BUILDINGS; THEREAFTER THEY SHAPE US" —WINSTON CHURCHILL

Colleges and universities are facing an increasingly competitive environment in attracting and retaining students, hiring top-notch faculty, attaining research funding and grants, and sustaining alumni contributions. Planners, facility managers, designers, and administrators are recognizing the important connection between the physical environment and mission. Building a community for learning, teaching, and research must embody a strong sense of mutual purpose and mission.

A campus that appears disorganized, uninviting, unsafe, or utilitarian is at odds with the academic reputation the institution must promote. Creating a campus environment that communicates the school's mission and expresses its culture is a meaningful goal; not merely in terms of how well the campus functions for the users, but also how it appeals to visitors and attracts prospective students. As one university vice president for planning stated: "As a product, the mission statement not only sets the objectives for planning . . . it can serve to differentiate a college or university from its competitors."<sup>1</sup>

*Beth Worthington is a designer for Christner, Inc., an architecture, planning, and design firm based in St. Louis, Missouri.*

### Perception Communicates and Affects Mission



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### Building Community Through Campus Master Planning

Growth on college campuses during the past two decades has concentrated on classroom and research facilities, on a building-by-building basis. Beginning in the 1990s, campuses have renewed their investment in student-centered facilities. New or renovated residences, which offer apartments, suites, and opportunities for personal choice meet the demands of today's students. Recreation and athletic facilities offering a broad mix of activities proliferate. Vibrant student centers and innovative dining options offer community spaces that encourage student interaction and provide venues for social and cultural life.



Today, planners and administrators realize that the demands of new campus development have often ignored the total environment or given it low priority. High-image projects disconnected from a total plan for development may even have a negative impact. As a result, campus master planning has become the accepted vehicle for change. Most institutions have in place or in process sophisticated master plans that address the physical environment and begin to put the user (not the facility) first in making decisions for renovation and growth.

One area that has been noticeably overlooked in the campus planning movement, however, is master planning for interior spaces. As designers study the issue, it becomes clear that many of the features most directly connected to users' perception of the campus—quality of the learning environment, sense of community and interaction, ease of movement, security, and comfort—are fundamentally functions of the interior architecture. Thus, current thinking based both upon sociological studies and design investigations points to a new and important area of concentration, interior master planning, which goes beyond interior standard programs of the past. A systematic, campus-wide "interior master plan" provides a blueprint for enriching campus life through facility improvements and designates cost-effective methods for doing so.

#### Economic Realities

Changes in the funding climate which affect physical facilities seem to be here to stay. As one industry observer notes, "Higher education is moving into a new era of diminished financial support. Budget problems are not short-term and cyclical but long-term and structural."<sup>2</sup> At the same time, competition among institutions for money, students, and attention is intensifying. "Students and their parents enjoy a buyers market, so campuses must respond to student needs more attentively," states another analyst.<sup>3</sup>

Integrated planning is a cost-effective method of maximizing available funds and developing well thought-out systems for managing and upgrading facilities that will address student needs.

#### Forces Impacting Change

A number of forces are impacting change in campus facilities, many of which have been addressed in recent APPA benchmarking studies. Aging infrastructure must be updated. Fiber optic networks, energy efficient utilities, and modern security measures must be accommodated. New buildings interposed on the existing campus fabric, renovation or historic preservation of older structures, and pervasive issues of deferred maintenance create important opportunities to upgrade building interiors. More stringent regulatory and code requirements addressing such issues as the Americans with Disabilities Act, seismic design, and environmental concerns demand interior retrofit. Finally, the

competitive business climate in which most colleges and universities operate requires a far greater emphasis on recruitment, quality of the teaching and learning environment, student life amenities, and alumni relationships. These interrelated forces create opportunities to not only renovate interiors on a project basis, but to take a comprehensive look at the institutional image as conveyed by the total interior environment.



#### Elements Addressed in an Interior Master Plan

An interior master plan, undertaken as a component of the campus master plan or as an independent study, goes a long way in pulling together disparate facilities projects and assuring that resources are used to create a positive impact on the character and aesthetic of the campus. Look for a design firm that has grouped together a set of interior master plan services, which define interior design guidelines and establish visual continuity throughout the campus. These master planning services typically include the following:

- Analyzing current interior spaces for overall impressions, assets, and liabilities
- Analyzing housekeeping and maintenance guidelines
- Establishing a concept for campus-wide image guidelines
- Developing a set of standards for interior design to coordinate furniture, finishes, and art programs while permitting design flexibility
- Providing sample materials and sketches to illustrate the design concept
- Providing an interiors specification manual, which may include:
  - unit finish specifications by area
  - lighting recommendations by area
  - furniture specifications by area
  - outline specifications for signage
  - general guidelines for art program
  - interior planting recommendations by area
  - cost estimates for materials

Overall, the interior master plan offers facility managers a systematic framework for anticipating and managing change and focusing renovation efforts where they will have the most impact. The plan is useful in budgeting projects,



# ELEMENTS ADDRESSED BY THE INTERIOR MASTER PLAN

Interior Design Elements of Your Project	You Should Keep Constant	You Should Vary
<ul style="list-style-type: none"> <li>• Acoustical Ceilings</li> <li>• Soffits and Fascias</li> <li>• Lighting</li> <li>• Wall Treatment                             <ul style="list-style-type: none"> <li>a. Painting</li> <li>b. Wallcovering</li> <li>c. Ceramic Tile</li> </ul> </li> <li>• Wall Protectors</li> <li>• Wall Base</li> <li>• Doors</li> <li>• Door/Window Frames</li> <li>• Millwork</li> <li>• Window Treatment                             <ul style="list-style-type: none"> <li>a. Blinds</li> <li>b. Drapes</li> </ul> </li> <li>• Flooring                             <ul style="list-style-type: none"> <li>a. Carpet</li> <li>b. Hard Surface Floors</li> </ul> </li> <li>• Furniture                             <ul style="list-style-type: none"> <li>a. Seating/Furniture</li> <li>b. Casework</li> </ul> </li> <li>• Signage</li> <li>• Artwork</li> <li>• Plants</li> </ul>	<ul style="list-style-type: none"> <li>Style, Type, Color</li> <li>Style, Type, Finish</li> <li>Few Prototypes</li> <li>Types</li> <li>Style</li> <li>Style, Color</li> <li>Types, Color</li> <li>Type, Color</li> <li>Style, Type, Finish</li> <li>Style, Type, Finish</li> <li>Style, Type, Finish</li> <li>—</li> <li>Type, Color</li> <li>—</li> <li>Style, Type</li> <li>Type</li> <li>Approved Prototypes</li> <li>Style, Color</li> <li>Style, Type, Color</li> <li>—</li> <li>—</li> </ul>	<ul style="list-style-type: none"> <li>—</li> <li>Color</li> <li>Intensity</li> <li>Color</li> <li>Pattern, Color</li> <li>—</li> <li>—</li> <li>—</li> <li>—</li> <li>—</li> <li>—</li> <li>—</li> <li>—</li> <li>Type &amp; Color</li> <li>Pattern, Color</li> <li>Pattern, Color</li> <li>Pattern, Color</li> <li>Upholstery, Color</li> <li>—</li> <li>—</li> <li>Vary</li> <li>Vary</li> </ul>

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Chart C



communicating design guidelines, simplifying renovation, planning for phased implementation, scheduling periodic cost-effective "face lifts," and realizing economies in furniture and finishes selection. Barbara Epstein, an interior designer, states: "The value of interior master planning comes from the ability to implement renovation over time and avoid 'growth rings,' similar to tree rings, where one collides with earlier styles that contrast sharply with one another."

While the benefits of an interiors master plan speak directly to functional issues, it is worthwhile to consider another dimension of interiors planning—perception management.

### Integrating Perception Management and Facilities Management

A sense of place does not cease to be a concern at the front door of the campus buildings. Certainly, it is inside the buildings where most interaction, learning, socializing, and community building takes place. Understanding how interiors affect both function and perception is therefore not a trivial issue, but an important planning criterion. For example, while decision making about whether or not to choose a particular college or university may incorporate academic reputation, location, and many other factors, perception is part of the equation. When prospective students are asked why they selected a particular school, the response often hinges on image: "I immediately felt at home" or "I knew this is a place where I would fit," are common responses. The interior master plan, used to reinforce a sense of place and establish a positive identity, is an important tool in communicating the campus mission.

### Realizing the Potential of Interior Space

Design elements can be used to meet a variety of diverse objectives: 1) to fulfill fundamental needs associated with learning environments; 2) to enrich personal and social context; and 3) to enrich the physical setting (see Chart D). The following examples illustrate the potential of interior space.

**Express the campus culture.** Campus history and unique traditions need to be understood before design "improvements" are instigated. For example, a large, open cafeteria at Texas Tech University was renovated to create smaller zones similar to restaurant dining. However, student users, (who had not been involved in the design process) preferred the wide open spaces of the old cafeteria, where they enjoyed

people watching from the sidelines. The "improved" design blocked essential sight lines.

**Promote community and social interaction.** In the design of a new Maryville University building, architect Doug Kassabaum notes, "Every campus needs a strong heart, a place that is a focus of campus life and energy. In fact, most campuses have several student centers, libraries, chapels can all serve this function. Campus architecture gives a campus its most potent imagery; the buildings, inside and out, define the setting for our experience."

**Link buildings and interiors with the site (way finding).** In a Christner, Inc. study on way finding, designers studied the

affects of good signage in promoting a sense of continuity throughout the campus and affording people more control over their environment. The study concluded that visitors tend to surmise that the institution's attention to such detail as a well-planned signage system is mirrored in other educational aspects, as well.

**Connect buildings and interiors to nature.** "The perception of nature as beautiful is universal. It is not surprising, then, that the impulse to bring the sights of nature indoors purely to delight the eye is an ancient one," states Barbara Aria in her book, *Outside Inside*.<sup>4</sup> This ideal has become a watchword in good interior planning, which capitalizes on views, daylight, planting, and art programs that reinforce links to nature.



Allene O'Brien

**Definitely homelike, this lounge in a men's residence hall clearly offers a warm, relaxed atmosphere.**

**Provide opportunities for informal communication and brainstorming.** For example, Janet Baum, AIA, principal of HERA, a St. Louis-based laboratory planning firm, states that casual interaction among students is one of the best ways to foster creativity. "Informal brainstorming activity is where some of the best learning takes place. In science and tech buildings, we try to provide modest, informal areas; the kind of places where people can get together for coffee, or stop in the hall away from traffic, and scribble on a white board."

### Planning for Interior Master Planning

While there may be agreement that "college and university planners and administrators will need to take more diagnostic and systematic approaches in dealing with rapidly changing environments and institutions,"<sup>5</sup> getting from here to there may not be as obvious. Effective planning is not a cure for basic institutional ills caused by a lack of con-

*continued on page 17*

## MEETING DIVERSE OBJECTIVES WITH INTERIOR MASTER PLANNING

Objective	Design Element
<b>I. Fundamental</b>	
• Function ability to learn, do research	Ambient qualities, acoustics, lighting, temperature, spatial, ergonomic & accessibility issues
• Comfort for a range of activities & individuals	Ambient qualities, acoustics, lighting, temperature, spatial, ergonomic, & accessibility issues
• Security	Security system, lighting, landscaping, Accessibility, community programs
• Way-finding	Way-finding system with landmarks, use of focal points, lighting, interior landscaping, entries & boundaries, accessibility issues
• Ease of movement/clarity of campus	All of the above and well conceived functional spaces & corridors that connect
<b>II. Enrich Personal &amp; Social Context</b>	
• Promote the individual	All of the above and amenities, coffee kiosks, recreational & residential opportunities, ability to personalize, dining services
• Promote self-esteem	Way-finding, sense of control & ability to perform tasks, opportunity for solitude
• Promote interaction	Spatial arrangements, variety of gathering spaces, comfort, accessibility, & discovery
• Promote community	Opportunities to see and be seen, build in a variety of gathering spaces that promote comfort, accessibility & discovery
<b>III. Enrich Physical Setting</b>	
• Enhance sense of place	Unique image, communicate mission, curb appeal, areas that promote community, learning, self esteem and inspire, spiritual heart of campus
• Connect to nature, time, season	Each window and door is an opportunity for views of the campus and context, window seats
• Connect to history & traditions	Reinforce symbols with special ceremonial, cultural, social aspects
• Reinforce existing architectural style	Create distinctive image with materials, color & lighting, focal points, windows, ceiling
• Reinforce existing landscape elements	Create views of nature, Seasonal focal points, emphasize entries
• Discovery	Ingelnooks, fountains, secret gardens, fireplaces, niches for individual & group
• Demonstrate technology	Integration of computers across settings, well designed library & research facilities
<b>IV. Perception management Demonstrate student centered mission</b>	<b>All of the above contribute</b>

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Chart D



## CHECKLIST FOR PLANNING FOR INTERIOR MASTER PLANNING

<input type="checkbox"/>	1.	Mission statement and description of campus
<input type="checkbox"/>	2.	Describe your interior spaces in terms of where you are now and where you want to be. Use your own terms to describe spaces. List physical characteristics and how one feels or would feel in those environments.
<input type="checkbox"/>	3.	<p>History of planning of interior spaces on campus</p> <ul style="list-style-type: none"> <li>• Chronology of major planning activities</li> <li>• Characteristics of major planning activities                             <ul style="list-style-type: none"> <li>style and content</li> <li>planning structure (e.g. the who, what, when, where, why and how)</li> <li>analytic support</li> </ul> </li> </ul>
<input type="checkbox"/>	4.	<p>Description of current planning activities</p> <ul style="list-style-type: none"> <li>• What are the drivers behind the different types of interior planning? (e.g. strategic, long range, operational)</li> <li>• Issues addressed</li> <li>• Contents/end product</li> <li>• Roles of different planning participants e.g.                             <ul style="list-style-type: none"> <li>identify critical aspects of interiors</li> <li>assist in evaluation of needs</li> <li>coordinate studies</li> <li>assist in evaluation of alternative design options</li> <li>interiors advocate position</li> <li>implementation guidelines</li> </ul> </li> </ul>
<input type="checkbox"/>	5.	What guidelines are used to evaluate planning process & end product?
<input type="checkbox"/>	6.	Describe the top five external challenges facing your institution?
<input type="checkbox"/>	7.	Describe the top five internal challenges facing your institution?
<input type="checkbox"/>	8.	What is the single greatest obstacle to interior master planning?
<input type="checkbox"/>	9.	<p>Fundamental activities would improve current planning</p> <ul style="list-style-type: none"> <li>• strategic planning</li> <li>• operational planning</li> <li>• improve integration between different types of planning</li> <li>• strengthen support for planning</li> <li>• overcome detractors of planning</li> <li>• improve effectiveness of communicating the results &amp; process of planning</li> <li>• implementation guidelines</li> </ul>

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Chart E

continued from page 14

sensus over the institution's central mission or basic character. Just as good lighting illuminates interior spaces, master planning can identify fundamental problems and focus on the need for resolution. Support must come from the top administration down with a commitment to an ongoing process of planning.

Carefully applied and endorsed by all stakeholders, the interior master plan satisfies the needs of students, administrators, faculty, and facility managers. The accompanying checklist (see Chart E) is useful in starting the interior master planning process. More than a methodology or design guideline, the interior master plan becomes a positive force for change.

#### **Selecting a Consultant: Making a Good Match**

The decision of which consultant to hire to lead the interior master plan process is critical. Your consultant will facilitate the process, provide insights gained from working with various user groups, help build consensus, and provide a significant measure of creativity.

The more professional the search, the better the results will be. The traditional, reliable method of selection begins with the request for qualifications (RFQ) followed by a formal interview process. While this is an appropriate way to begin the search, the best results may often be achieved by taking a more active role in getting to know the candidates. Try to learn as much as possible about each prospective consultant on a more informal, personal level. Such issues as personal chemistry, creativity, and the firm's approach to interiors planning are more likely to come out in an on-site visit or interactive workshop than by simply reviewing the marketing package which is presented.

A thoughtful, comprehensive approach will help you make a good match. After all, your consultant will be instrumental in designing the future of your campus.

#### **Notes**

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3. Moore, John. "Can We Reinvent Our Universities?" *Planning for Higher Education*, Vol. 24, Winter 1996, p. 47.
4. Aria, Barbara. *Outside Inside*, New York: Thames & Hudson, 1992, p. 28.
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# THIRD PARTY PROJECT MANAGEMENT:

## A COMING REALITY

### FOR AN INCREASINGLY UNREALISTIC WORLD

by Jeff Griffin

**W**hen WorldCom, the fourth largest telecommunications company in the United States (prior to their pending acquisition of MCI) identified the need for a 1 million-square-foot corporate headquarters and operations facility for WorldCom's growing Internet subsidiary UUNet, the decision to retain a third party development and construction project manager was an easy one. The company needed the space designed, permitted, constructed, and occupied in an astonishingly short period of 22 months, and WorldCom had a real estate department that numbered in the single digits.

WorldCom's decision is illustrative of the emerging role of third party project managers and management firms in the development and facilities delivery process. The growth in the use of this relatively new real estate professional is a logical response to a number of trends in the design, construction, and legal industries, trends that are similarly affecting the facilities development process in the educational, institutional, and collegiate environments.

#### Causal Trends

The use of a project manager is a direct response to the need for better coordination of an increasingly complex, fragmented, and specialized design and construction process. To underscore the extreme level to which this trend has developed, think back to how the design and construction process worked three or four hundred years ago. At that time, if the nobility, government, or clergy wanted a significant building built, they hired "John the Builder." Together with the owner, John the Builder would pick out a suitable site, design the building, budget the project, find building

materials, hire and oversee the workers and craftsman. John the Builder was the ultimate, full-service, design-build firm. Things were a lot simpler back in those days. However, as recently as 30 years ago rarely did the project team, even on large complicated projects, expand beyond an architect, MEP, and structural and civil engineers.

Today's consultant community is as specialized and fragmented as the myriad of regulations and requirements with which they seek to comply. Civil engineering issues have expanded from traditional site development and utility design issues to include environmental, wetlands, traffic, arborists, etc., each often requiring a specialized consultant familiar with the regulatory and industry specific minutia of their chosen field. Collaborating with the base building architect today may be an architect specializing in interiors, furniture systems designers, audio/video specialists, acoustical, lighting, telecommunications, and security consultants. On some projects, legal costs alone exceed the cost to design the building. A typical private project might have a zoning/land planning attorney, separate attorneys representing the borrower and lender, as well as attorneys to prepare complicated acquisition, partnership, and operating documents. The list of players is as endless and as varied as the buildings we require.

#### Changes in the Process

Outside of the growth in the number of players involved, the process itself has become more complicated. It is almost impossible to keep up with the rapid pace of technological advancement in building systems as well as in the teaching and research operating environments. Building codes have become so arcane there are literally firms that specialize in determining compliance with just the Americans with Disabilities Act. Adding to this confusion are building regulations at the local, regional, state, and federal levels

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*Jeff Griffin is president of Griffin/Gosnell Real Estate Services, Alexandria, Virginia.*





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that often conflict with one another, and agency reviewers and inspectors that are often inadequately trained to respond to complex questions and confused about where their agency's jurisdiction ends.

While the process has become more fragmented and complicated, economic pressures have decreased the amount of time available to consultants to solve these complex problems and raised the financial stakes and penalties when the inevitable mistakes are made. Competitive pressure on fees has reduced the dollars available to architects to explore options and to fully document the scope of their improvements.

Money has become such a critical commodity that in the public and private sectors it is never allowed to sit idle. Once funding is obtained or financing secured, the owner wants the building yesterday. Business and teaching environments are changing so rapidly that many companies and institutions have all but given up on long term planning. The cost for this failure to plan materializes when design and construction schedules are compressed to an unreasonable degree to accommodate these schedule and economic demands. Incomplete design documents, disputes and change orders are the result. It is not uncommon on fast track projects for the building's foundations and structure to be underway even before the design has been finalized, permitted and bid out. A significant coordination error on a fast track project can have six- and seven-figure reverberations through the multiple layers of contracts, permits, and design documents.

Some would question at this stage, aren't the issues raised above supposed to be handled by my architect? The answer to this question is both yes and no. The architect is rightfully viewed by the community as the leader of the project's design team. However, competitive pressure on design fees and restrictions placed on these professionals by their liability insurance carriers have collectively and methodically narrowed the scope of services and level of project management provided by most architects. Most insurance carriers prohibit their architect clients from entering into design contracts that require the architect to coordinate the work of the various project consultants. In addition, most owners would be unpleasantly surprised if they knew how little protection was truly afforded them by the architect's review of the contractor's monthly construction requisition.

### Changes in the Architect's Organization

The personnel and structure of most architectural practices have also significantly changed over the years with important impacts on the coordination of projects. Typically, a project team is headed by a project architect or principal of the firm but the majority of the staff hours expended on the project are generated by the lower level architects or designers that produce the construction documents and review the mountains of shop drawings and submittals during the construction phase. These participants are likely to be in their late twenties or early thirties, with less than ten years of professional practice. Although technically competent, they are likely to have more experience with computer-aided drafting and design (CADD) stations than in the field practical experience earned on a construction job site. Formal management training or business experience is rare at this level.

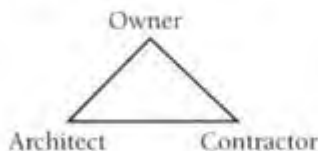
If architects are not being paid sufficiently by the marketplace to assume the broadening responsibility of managing the cafeteria of consultants described above, if architects' insurance carriers are restricting architects from fully assuming the role of project manager and coordinator, and if architectural firms are increasingly unlikely to have management staff adequately



trained to perform the role of the project manager, is the emergence of the third party project manager such a surprising result?

### Role of the Project Manager

The role of the project manager can be as narrow as providing advice on a limited project issue and as broad as providing comprehensive services where the project manager manages the entire site acquisition, design development, and construction process to ensure that the owner's best interests are met at all times. The standard American Institute of Architects Owner/Architect and Owner/Contractor agreements basically establish a three-party relationship as illustrated below.



The owner hires the architect and the architect designs the building. Using these design documents, the owner contracts with a contractor to build the building based on the documents provided by the architect and per the requirements of the owner/contractor agreement. When the contractor has questions about the design intent of the architect, he or she requests clarification from the architect. Periodically the architect observes the work in the field to review if the work is constructed

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*Despite a lot of finger pointing between the architect and the contractor when disputes arise, the one truth is that the owner almost always pays for everything.*

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according to the plans and specifications. This three-party relationship implies an equality or equilibrium that, in reality, does not exist.

There are some construction change orders that occur due to unknown subsurface conditions. Other than these

justifiable claims for additional compensation, most contractor change order claims that are not scope changes initiated by the owner are due to errors or omissions in the drawings by the designers or gaps in the owner/contractor agreement that fail to fully define the obligations of the contractor to the owner. Despite a lot of finger pointing between the architect and the contractor when disputes arise, the one truth to this relationship triangle is that the owner almost always pays. After all, the owner is ultimately paying for everything anyway. The owner is paying for the cost to build the building, and the owner is paying for the design time of the architects and engineers to design the improvements.



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Unfortunately, the owner is the least experienced and educated in the details of the design and construction process and, therefore, is at an inherent disadvantage in protecting himself from being taken advantage of. The project manager levels this playing field by providing experience and technical knowledge solely for the benefit of the owner, free of the conflicts of interest that arise for designers and contractors.

In today's world, it is impossible to expect architects, engineers, and attorneys to draft an error-free set of design documents and contracts. The use of a qualified and experienced project manager, however, can reduce mistakes and effect savings for their owner-client many times the value of the fee charged. The specific responsibilities of the project manager can vary dramatically based on the scope of representation desired by the owner, typical project management services may include:

- Site Alternatives Analysis
- Site Feasibility and Due Diligence
- RFP, RFQ Selection of Consultants
- Manage Design Consultants
- Bid vs. Negotiate Contractor Strategy
- Soft and Hard Cost Draw Requisitions
- Monitor Construction Progress and Quality
- Project Closeout/Owner Turnover
- Land Acquisition and Negotiation
- Finance/Closing Coordination
- Negotiation of Consultant Agreements
- Profit/Loss Budget Responsibility
- Negotiate Contractor/Vendor Agreements
- Permitting Strategy and Acceleration
- Punch List Resolution

#### **Some Drawbacks to Third Party Management**

There are some very real limitations on the services that the project manager can provide. The project manager is not the architect or the engineer and, therefore, cannot and does not design the building and improvements. Architects and engineers are licensed and regulated professionals who carry liability insurance to protect the owner in the event that they fail to perform their services up to the standards of their respective professions. Does this mean that the project manager is not able to point out areas of the project requiring improvement? Clearly not.

The project manager is also not responsible for the means and methods of construction that are the responsibility of the contractor. The project manager, however, can be an important set of eyes on the job site ensuring, to the best of his or her ability and experience, that the contractor's work conforms with the requirements of the project documents.

Although a skilled project manager can make both the contractor and architect better at serving the owner, the responsibilities described above are redundant and overlap the responsibilities of the both the architect and the contractor.

The main benefits of retaining a project manager are the broader perspective and experience they can provide and their ability to see the bigger picture and coordinate issues across project disciplines.

As with most complicated human endeavors, mistakes and lost opportunities occur due to poor communication and coordination. The project manager can identify risks and rewards in the early stages of the project that may affect cost and quality in seemingly unrelated areas months later. They can ensure that decisions being made by one consultant are not being done to the greater detriment of the owner on other project issues.

The project manager's experience, broader perspective, and ability to coordinate are critical resources in managing the risk inherent in the development and construction process and protecting the owner. One key area where these resources are applied to the benefit of the owner is in the drafting and negotiation of owner/architect, owner/contractor, and other agreements. These documents establish the responsibilities and obligations of these parties to the owner, and many cost overruns are the direct result of these documents failing to clearly establish and define these relationships. Owners will typically have an attorney review these agreements, but the attorneys have virtually no practical experience in design and construction when compared to the architects and contractors with which the owner is negotiating.

Attorneys will tend to focus on more purely legal issues while important practical and economic issues will be left unaddressed such as who is responsible for delays and costs due to bad weather, what subsurface conditions can and should be covered under the contractor's price, what happens when the design drawings and specifications disagree, etc. To reference an overused analogy, if the project manager is the orchestra leader, these agreements are his or her instrument of control—the music and baton. It is in the negotiation and drafting of these documents that the project manager can provide the greatest value to the client.

#### **Relevance for Educational Construction Projects**


Although the use of third party project management firms is growing in the private sector and even in some areas of public work, are the benefits described above relevant and as compelling in the educational environment? The changes in the design and consulting professions affect all purchasers of these services equally. The same may not always be said for the public approvals process as many universities and school systems receive limited review by public agencies or are able to bypass these agencies altogether. However, what these institutions may lack in public approvals they often more than compensate for in multiple layers of internal review and approvals by boards, trustees, committees, etc.

There are other factors that argue that the educational community would benefit from professional project management services to an even greater degree than the traditional office, industrial and retail client. Most educational projects are, by their nature, very special purpose. Most office buildings can hardly compare in complexity with a new college of engineering building or performing arts hall. The more special purpose the project the higher a premium is placed on coordination because a number of the consultants and contractors may have limited experience with the building type.

Unless the project is a new school on an undeveloped site, most educational projects are either additions to existing and occupied buildings or new buildings built on increasingly congested college and university campuses. Coordination with these on-site tenants and their operations adds another layer of complexity to the design and construction process for which neither the architect or contractor are typically responsible.

Probably the most compelling reason for the use of a qualified third party project manager is that most educational clients are infrequent purchasers of large scale architectural and construction services. Although most school systems and universities have a steady flow of renovation work and facilities management requirements, construction of large base buildings are comparatively rare. A professional project management firm will generally have

numerous base building projects in various stages of design and construction at any one time. This experience should more than pay for itself on even a modest project budget of \$7 million. If the project manager charged a fee of 3 percent of project costs, a fee of \$210,000 would result. By hiring the project manager, the owner will be able to reduce the level of in-house staffing provided and even though in many companies and school systems the cost for this internal management with allocated overhead will exceed the fee charged by a more efficient third party consultant, to be conservative we will assume that the net additional cost to the client in this example will be \$100,000. At a project cost of \$7 million, the project manager in this example needs only to effect a savings of less than 1.5 percent to pay for the cost of his services. Two well crafted sentences in the soils specifications by the project manager could potentially save the owner more than this amount on a difficult soils job.

As school systems and colleges and universities expand their experiments in emulating the private sector to reduce costs and improve quality, the use of third party project managers in the development and construction of educational facilities is a likely result. Given the unique environment in which these institutions operate and the special purpose nature of many of the buildings they require, the benefits of third party project management may well exceed those already being welcomed by the private sector. 



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Academic Campus, which is geographically contiguous. The weighted average architect and engineering fee, as a percentage of construction, has typically been approximately 13.8 percent. The existing process for retaining and using consultants has been very traditional, cumbersome, and inefficient in providing service to the university customers, who have been asking for more responsiveness from both in-house staff and consultants in the delivery of their projects.

By working with a single consultant, the university expects to lower fees, improve the overall service level, lower overall project cost, reduce operating costs, and add value for improved functionality for university programs. Reduced fees are expected to be derived from eliminating the need for marketing and preparing proposals, establishing standards in every area of the project delivery system, developing a seamless transition of projects from PPM (Planning and Project Management) staff to the single delivery source, and improving scope definition to eliminate redesign once a project has been approved.

The university looked to other institutions and corporations for advice and for their experience with this kind of consulting arrangement. We found no formal examples among peer academic institutions. Some other local hospitals have informal single source consulting agreements that have evolved over a period of time. The university studied the single source agreement operating at Xerox and a similar model, but which used two consultant groups, at Kodak. Both models appear to be working successfully and meeting targeted goals.

The university's senior administrative staff approved initiation of the selection process after reviewing the reengineering recommendations. The partnering represented a significant departure from business as usual. While this change created a certain level of risk and concern, the potential benefit outweighs the concern.

Over the fall and winter of 1996-97 the university worked with local consultants and developed a request for proposal. Planning and Project Management staff worked with these consultants individually and in groups through round table discussions to gain input and to understand the sensitivities of the consultants who over the years have served the university well and who would be most affected by this

**T**he University of Rochester in Rochester, New York, has recently completed a thorough review of how it contracts for its architectural and engineering consulting services. During 1996-1997 the university formed "Reengineering Rochester Teams" to review all administrative functions throughout the university. One of these teams focused on existing processes for selecting and retaining consultants of all kinds, and architectural and engineering consulting was included in that evaluation process.

Like most other institutions, the university has historically contracted with multiple A/E firms for design of renovation and construction projects. The team's analyses indicated that there was significant duplication of effort among all consultants and that it was possible to save at least 10 percent in consulting costs by working with only a single local consultant for most of the routine design work.

The University of Rochester comprises nearly eight million square feet on the River Campus, the Medical Center (which includes Strong Memorial Hospital), Eastman School of Music, and off-campus properties in various locations throughout the community. The university's annual construction budget varies between \$20 million and \$25 million annually. About 70 percent of that work takes place at the Medical Center, while the other 30 percent is at the

*Jack Dempsey is deputy director, university facilities, at the University of Rochester, Rochester, New York. Gretchen Wesenberg is senior planner, department of planning and project management, at the University of Rochester.*



agreement. This process took about four months and gave the local consulting community time to form professional alliances in advance of the receipt of the proposal. One of the more difficult aspects of the partnering arrangement is that the agreement will partially limit access to a wide variety of talent within the community.

When the proposal was developed, it was submitted in draft format to senior administration for review and input. In addition, the university's Board of Trustees was advised of the intention to issue this proposal. Advisors given copies of the proposal were asked to comment on the proposal as well as the process.

The request for proposal was developed based on the input of consultants and of facilities managers at other institutions. The proposed contract will include standard architectural and engineering services and interior design, landscaping, civil engineering, hazardous materials, contract administration, construction management/inspection, as well as planning and programming. The proposal included: 1) background information; 2) goals and expectations of the university for this work; 3) criteria that would be used in evaluating the proposals; and 4) the format of the response. However, the university elected not to design the solution in advance. The consultants were expected to develop and propose a contractual relationship that they thought would meet the university goals and criteria. The intention was for them to develop a proposal that would work with their team as well as meet our requirements.

The larger firms in the Rochester area were selected to receive these proposals. In addition, all of the 25 or so firms on the university's preferred vendor list were notified when the proposals were issued. They were given the names of those who received the proposals and were urged to contact them. In addition, all of the firms who received the proposals were given our list of preferred vendors. This was done well in advance of receipt of the proposals in order to give everyone as much advance notice as possible. The university had been well served by this group of preferred vendors and it was important that they had enough time to understand and ask about what we were doing.

The consultants were given about a month to respond. Most had already been hard at work based on the communication already established throughout the consulting community. While the university sent out about 15 proposals, it received only three in return, which made the review less cumbersome. For the proposals, the consultants grouped themselves in a variety of ways and formed consortiums and joint venture alliances. These proposals were distributed for review to senior administration, our university customers, PPM staff, and an external advisor. All were invited to be part of the interview process.

PPM core staff made the initial recommendation for the selection of the consultant. Key criteria for the evaluation

related to an understanding of the project scope, proposed approach, overall experience with single source partnering arrangements, evidence of qualified personnel, proposed performance measures and quality control, overall cost reduction potential, and, above all, the best value to the university. Once the interviews were completed, PPM staff met over a period of a week to select the winner. The proposals were all well done and therefore it was difficult to finally choose one over the other. The recommendation was reviewed and approved by the director of university facilities and by the vice president for budgets and institutional planning. It was then sent to the Board of Trustees' Facilities Committee for review and approval.

University Partners Group, a consortium of three firms—Galson-Lozier Engineers, King and King Architects, and the architectural firm of The DeWolff Partnership—was selected. The University Partners Group solution was different in its commitment to setting up a company where the only client would be the university. The other firm proposed a more traditional consultant relationship. While there were many questions raised by this approach, we felt that there would be tremendous value to be gained from a firm who would be dedicated solely to providing service to the University of Rochester, who had great strength and experience with the university in the medical aspects of our project work, and who we thought had the ability to work on the academic campus as well.

In addition, the University Partners Group understood the importance of the efficiencies to be gained by working on a continuing basis. They were committed to working interactively to create a cohesive working group with the existing university staff. Additionally, the group seemed to have a real understanding of our needs and the challenges that needed to be addressed to create a successful partnering.

In addition to giving us project support, the University Partners Group is able to provide "on-call" field engineering support for our Medical Center and River Campus operating groups. This is important because they will be able to troubleshoot and solve many of our day-to-day maintenance challenges within a much shorter time frame and before some of our repairs grow into larger, more expensive projects requiring full-scale engineering.

Although there have been few bumps in the road, the university's facilities managers believe that the university has already benefited from this arrangement within the first six months of operation. The University of Rochester is beginning to see more cost-effective solutions proposed within a shorter time frame. Users have generally been pleased with the efforts to date. The University Partners are getting involved in projects at an earlier stage during the development of scope and budget. We believe that this will reduce the amount of time required to design a project and will reduce overall cost for design as well. ■

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This fast-growing region is not only home to some of the world's largest high tech firms, it also boasts great weather and lots of nearby entertainment for the whole family. The city of San Jose enjoys 300 days of sunshine a year, with low humidity and an average temperature in the 70s.

Located five minutes from San Jose International Airport, San Jose offers lots of activities all concentrated within a few of the safest city blocks in the country. The city's light rail transit system makes it a breeze to get around to San Jose's museums, restaurants, shops, and other recreational sites.

APPA's meeting will be based at the Fairmont Hotel and the McEnery Convention Center. The Fairmont is adjacent to the McEnery Convention Center, the site of educational sessions and exhibits. It is also just a short stroll from the San Jose Arena, San Jose Museum of Art, and Center for Performing Arts. Within the city of San Jose you can visit the Tech Museum of Innovation's interactive exhibits on science and technology and the Children's Discovery Museum, the largest children's museum in the west. Or explore the mysterious Winchester House, built by Winchester Rifle heiress Sarah Winchester to confuse the spirits of those gunned down by the famous weapon.

San Jose's location half-way between San Francisco and Monterey makes it an ideal spot for exploring northern California. San Jose's South County is California wine country, home to nearly fifty wineries offering tastings and tours, and San Francisco and Monterey are only a short drive away.

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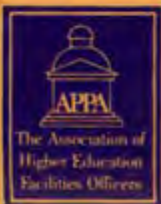
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## 1998 Annual Meeting Exhibitors

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## Educational Programs

As always, we've lined up a full slate of educational sessions to cover the broad spectrum of educational facilities issues along with these special sessions:

### **Special Program—Building Trust: The Key to Higher Performance**

All the new management approaches in the world won't improve your organization if you lack the key element of trust. This day-long intensive workshop, part of the Franklin-Covey Tools for Highly Effective Organizations series, is designed to help individuals and organizations optimize performance by building trust. Building Trust: The Key to High Performance focuses on building trust within an organization. As you participate in this workshop, you will understand that transforming an organization begins at the personal level. Your organization will benefit from high quality products and services, higher customer loyalty, improved employee morale, and a competitive edge in today's turbulent market. Space is limited and advance registration is required, so be sure to register early.

### **Special Program—Meeting Planning Made Easy**

A very different type of program aimed at APPA members who are taking a more active role in their regions! The APPA education department will share tips and strategies for putting together a large meeting. You will learn what to consider as you plan, standard hotel and catering terms and procedures, event planning, travel arrangements, and much more to help your meeting get off the ground.

### **Special Program—Responding to Emerging Industry Trends: New Initiatives from the Construction Specifications Institute.**

Construction Specifications Institute former President Jane Baker and Executive Director Greg Balestrero will present important construction megatrends which are beginning to reshape construction delivery methods. With this revolution have come new demands for creating and sharing construction information. Learn about CSI's new series of initiatives to assist the industry in responding to these trends in this informative, important session by one of APPA's Strategic Partners.



## Events

Education might be the main purpose of the Annual Meeting, but developing strong relationships is also important. That's why APPA is creating a variety of fun activities to let you get to know your colleagues in a relaxed, fun setting. We're still planning, but take a look at what we've lined up so far!

### Welcome Party

This Saturday night event kicks off the conference with food, drinks, music, and the chance to renew acquaintances and make new friends. Bring the whole family!

### 2nd Annual TMA 5K Fun Run

TMA Systems is pleased to sponsor the 5K Fun Run & Walk. This year we'll run through the sites of San Jose in this early morning noncompetitive event that's certain to get your heart pumping.

### Banquet

As always, the banquet provides a relaxing and entertaining finale to the annual meeting. Enjoy a fine dinner and great entertainment and wind down with your colleagues at the final event of the meeting.

### Learning Resource Center/Exhibit Hall

More than a trade show, the Learning Resource Center is an integral part of the conference experience. Visit our corporate vendors to learn about the newest products and services that can help you do your job. The LRC also features on-site demonstrations, educational presentations, games, food, and giveaways. Here's a partial list of who you'll find this year:

## More to Come

We're working steadily to ensure that this year's annual meeting is one you won't forget! Stay up to date with new developments on APPA's web site <http://www.appa.org> and watch your mail for the Preliminary Program and registration materials, coming in May.

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# The VALUE in Value Management: A DIALOGUE

by John Huish & Pieter J. van der Have

**R**ecently, *Facilities Manager* magazine had an opportunity to visit the University of Utah. We took this opportunity to talk John Huish, director of campus design and construction, and Pete van der Have, director of plant operations, both at the "U." The focus of the dialogue was on value management. What follows is a representation of the discussion.

**FM:** What does the term "value management" mean to you?

**PV:** To me, it represents an involved, an intense process where a group of professionals, of diverse disciplines, work together to design a better facility for a given budget. As a goal to be achieved, the initials VM stand for "value management." We don't just go through the process to meet a budget, although sometimes it might be, nor is it purely to improve on the proposed design. To me, and I believe to most of our physical plant staff, it represents a clear opportunity to make a measurable contribution to the design and function of a building over which we'll have responsibility for 50 years after the designers and the contractors leave.

On "our side of the fence," we first started participating in these sessions about nine years ago. Rumor had it they did occur prior to that time—they just didn't invite "those maintenance guys." In other words, we did not get to play back then. Now, we are a full and equal partner in the discussions and the decision making process.

**JH:** I'm a licensed architect, and some of the traditional meanings of VM (or VE for "value engineering," as it was once called) for an architect are negative. Now that I represent a large institutional user group, my own concepts of

VM have transcended these traditional ideas about it. Now VM means several things to me. A few key words immediately come to mind:

- Review
- Critique
- Assert
- Reach consensus

Prior to regularly scheduled value management sessions, our department was charged with scheduling plan reviews on our major capital projects, as was our "parent" agency at the state level, the Division of Facilities Construction and Management, who likewise undertook lengthy reviews of contract documents. (Yes, we are one of the few universities in the country to be "blessed" with a state facilities agency providing oversight on our large projects.) VM replaces the formal plan reviews, which seemed to take forever. We had to insist that each reviewer keep a list of comments that described the notations made on the review sets. A project manager then had to retrieve these lists and combine them into a lengthy list to go over with the architect. Items with which the architect disagreed had to be taken back to the reviewer for discussion, and so on. You can imagine how involved and time consuming this process was. It took so long that much of the review comments were dropped, obviating their purpose. Criticism continued to flow back to us that review comments were ignored, that the consultant was still free to specify whatever, etc. All this time the wall between Plant Operations and CD&C grew. The process was feeding an already maligned network.

The *decision meeting* part of a VM session has now replaced the old, cumbersome review process. Now rather than criticize, we reach consensus through a healthy critique of a project, whereby we assert our individual project requirements. And we do this with the VM process. It's a great vehicle.

---

**John Huish is director of campus design and construction at the University of Utah, Salt Lake City, Utah. Pete van der Have is director of plant operations at the University of Utah; he currently serves as APPA's President.**



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**FM:** From your perspective, what are the benefits of value management?

**PV:** From the physical plant professional's perspective, there are numerous benefits. Most obvious is the increased likelihood of acquiring a building that will be reasonably maintainable. Although we may not always get everything we want, anytime one of our recommendations is incorporated into the design, we're a little bit better off than we would have been otherwise.

Another benefit is that we know well ahead of time what kind of facility we're getting. We even know it quite intimately before the first shovel of dirt is moved. It then becomes easier to prepare for it so that it doesn't become an "additional burden." We know how and when to integrate the new facility into existing processes!

Learning to know the design team working on a project also presents a benefit. Relationships are developed which result in more trust, better cohesion among all the players, and therefore provide opportunity for a more productive exchange of ideas. As facilities professionals, all of us are continually apprised of what works at our institution, and what doesn't. As a result, our published design standards, (available to designers on-line or by disk) are constantly refined. In a sense we are all training each other!

From the maintenance side, we readily admit that much has been gained from participating in the VM process. It has taught us to appreciate the "big picture." We have learned to appreciate the dilemma of the design team. This group of individuals has to jockey back and forth between the primary occupants, the state as the official owner, Plant Operations as the primary operator, and the university's Campus Design & Construction department as our representative during the entire design/construction process. In other words, they often find themselves in a precarious position, doing a constant balancing act.

In these days of shrinking federal and local support, we are increasingly dependent on private donors to fund new construction. These donors feel reassured by this process—just to know they are socking their dollars in a sound investment.

**JH:** What VM means to me is benefit, as in value added. Pete pretty well described that value in his answer. Reduced cost,

however, is certainly not the only benefit to VM. VM was initially established as a measure of surety of costs to a client, but the synergism inherent in the process has brought forth many benefits for an owner or facilities manager.

**FM:** Are there any negative aspects to the value management process?

**PV:** A few of us might say that throwing this many people into a meeting of such length is a waste of time. And during the slower, more tedious times when it appears as if nothing positive is happening, it is sort of like watching baseball. At

other times, everyone seems to be "a-movin' and a-shakin'," full of anticipation for the home run. A few consider this process a partial or total failure if not all of their suggestions were accepted, even if some were. To those people, spending numerous hours jawboning about issues that only partially support their priorities may seem useless.

Also, at times, talk around the table may become briefly heated and adversarial. Let's face it, professional engineers, architects, facilities people, etc., are not always eager to shift positions or change opinions. But frequently, even those uncomfortable exchanges often result in something good for the project.

This process does not come cheaply. Some say that money is better spent on better components during construction, instead of buying a bunch of overpaid individuals a free lunch. To that, I say "bunk."

**JH:** Boy, I could really get into some credibility trouble here by throwing around a bunch of buzz words—like "paradigm." But those whom you've described, Pete—the negative folks—are still stuck in their own paradigms about construction. They come to a conference like this with all that garbage stacked on top of them and get nothing from the session other than a commitment to themselves that, as soon as they get back to the office, they're going to burn off the mother of all memos to their administration about the time they've all just wasted.

Yes, this is new territory to some. As a matter of fact, it should be new to every one of us at every new VM session we attend. We should come with all that "bunk" left back in the correct depository and say to ourselves, "new-building,

*continued on page 36*





# Goldilocks

"My dorm's too hot.

The showers are too cold.

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new ideas, new critique, new assertions; let's go for it and open our minds up to creative, value-centered, cooperative thoughts and ideas." No, we're not going to throw out our standards. But we're not going to wield them either at the sacrifice of real value.

**FM:** *What kinds of projects are best suited for value management?*

**PV:** You could easily and convincingly argue that the bigger the project, the better the potential for payback. Yet, we hold a modified version of VM for most of our smaller construction and remodeling projects, and even for our significant maintenance projects. We benefit from doing all of them.

**JH:** Again, a sort of "tailoring" results from this process. To predetermine based on project size is missing the point. We have undertaken some great value management on building programs before the onset of design. Especially programs that, because of funding cycles in the legislature, are delayed in processing. Those "aged" programs, which are on the shelf awaiting funding, are absolute candidates for value management because of their needs for reassessment of function, maintenance, and, not the least, budget.

**FM:** *What are some of the specific results which evolved out of the VM process? Are they mandatory?*

**PV:** There are too many positive results from all the sessions we've held thus far on large projects. We simply could not even begin to list them all. At any one session we may end up reviewing a hundred or more recommendations. Perhaps it would be useful to recognize some of the ones that seem to recur most frequently. They address areas such as truss systems, steel vs. concrete decks, size and location of shear walls, roofing systems, chiller sizes, redundancy in, or lack thereof, mechanical systems, cooling towers, building skin, energy efficient/deficient items, fire code compliance, building orientation, service access, location of manholes, utility interface, type of lighting, method of purchase for carpeting, landscaping, constructability, and maintainability, just to name a few.

Results or recommendations are not necessarily mandatory. The design team has the theoretical right to accept, modify, further study, or reject suggestions. Realistically, the people paying the bill can insist on implementation of any idea, even over the designers' protestations. So far, however, this has only rarely ended up controversial or adversarial.

**JH:** We recently canceled a scheduled VM for the schematic design of a \$20 million research building. The two-and-a-half-day session was to begin on a Tuesday morning. On the Friday afternoon before, the architect delivered the plans and outline specs with an estimate that was \$1.1 million over the budget. We sent it back, canceled the VM, and told him to bring it back on budget and then we'd have the VM

session. We weren't going to waste several days trying to take money out of the project to get it on budget. That's the architect's job, not the task of VM participants.

**FM:** *Who pays for the VM? What are the costs?*

**PV:** On large projects, the project budget has to cover the cost of value management. Direct expense items include the cost for bringing in and housing a professional facilitator, rental of a meeting room, fees for the "cold team" (architects and engineers brought in only to critique the design), and then throw in miscellaneous supplies.

We also consider the cost of wages for the in-house people who participate in the process. Even though the project does not directly pay for those costs, they still represent an expense to the institution. We tend to look at that kind of expense as a smart investment in our future.

**JH:** I'm reserving funds in some of my accounts, which are allied to the same purpose, for use in some of the shorter VM sessions we end up having. It's just too critical to not have some reserves at the institution, even the facilities groups for this purpose. But to directly answer the question, the owner pays for VM. That sounds scary, doesn't it? I defer however to the old title block sheets that the Corps of Engineers would give the architectural firm for their work (if you were ever lucky enough to get one of their jobs). In one-inch-high black letters at the top of each sheet outside the ink border was the statement:

### **"VALUE ENGINEERING DOESN'T COST—IT PAYS!"**

**FM:** *Describe the VM process. When does it typically occur and how long does it take?*

**PV:** I can recognize seven phases to the whole process. Giving them labels would cause them to fall out something like this:

1. **Introduction** — takes about 1 hour
2. **Discovery** — may take up to three hours
3. **Exploration**
4. **Brainstorming**
5. **Costing** — Phases C, D, and E may take 10 to 12 hours
6. **Presentation** — takes about one to two hours
7. **Decision making** — probably takes three to four hours

Let me elaborate on these phases. *Introduction* allows the facilitator to explain the process, to highlight the objectives, and perhaps to identify key opportunities that he or she has already identified in an initial review of the plans.

*Discovery* allows the design team to present their project. Presentations are made by the individual disciplines such as architectural, civil, structural, mechanical, and electrical.

*Exploration* encourages all the participants to examine in detail the plans, budgets, specifications, etc.

*Brainstorming* is where new or not-so-new, radical, and other ideas are identified and listed. People who consider themselves specialists in any discipline gather at that discipline's work table and offer ideas. This is where ideas go through their first cleansing. Trust me, there is nothing more honest than a peer review by a bunch of people who don't have a vested interest!

*Evaluation*—this is the work done down in the trenches! Once the ideas that survived the initial cleansing have been summarized, they are analyzed for cost impact. Will their implementation cost the project more, less, or are they neutral? Comments are provided, for the record, evaluating the pluses and the minuses of their implementation. This process is completed through joint efforts by key team members, including engineers, architects, professional cost estimators, and O&M professionals.

*Presentation* places the design team back in the midst of the session, and they for the first time become acquainted with the hundred or so ideas prepared by the VMers. Not much discussion takes place at this stage, except to present the ideas and perhaps provide some clarifications. It certainly can be interesting to watch the body language of the design team as they are introduced to some of the ideas!

*Decision making* happens two days later. The design team has had a chance to review and evaluate the many recommendations. Under the guidance of the facilitator, they provide their reaction to each of the ideas. If they accept a suggestion, end of discussion. Or they can offer to study it further, or accept it with some modifications, etc. They can choose to reject a suggestion, which may lead to some serious negotiations if the rest of the participants feel strongly in the other direction. And so on. Once a suggestion has been accepted by everyone in attendance, the user/owner has every right to expect implementation without substantive change. And that is usually the case.

Looking back at the VM sessions in which we have participated, we could probably claim a 50-50 ratio between accepts and rejects. To me, this means that a helluva lot of suggestions are now in place that otherwise might not even

have seen the light of day! This has to have a positive impact on our way of doing business.

**FM:** *Who do you involve? Who conducts it?*

**PV:** At times, when the nature of the project warrants it, an expert facilitator may be brought in. Other times, an in-house expert facilitator is designated. This person is usually of a strong engineering or architectural orientation, and he or she makes the whole thing happen. The participants, many in proud possession of professional certifications and the requisite egos, require someone who is a strong leader. An expression regarding how difficult it is to herd cats comes to mind. The

*continued on page 39*

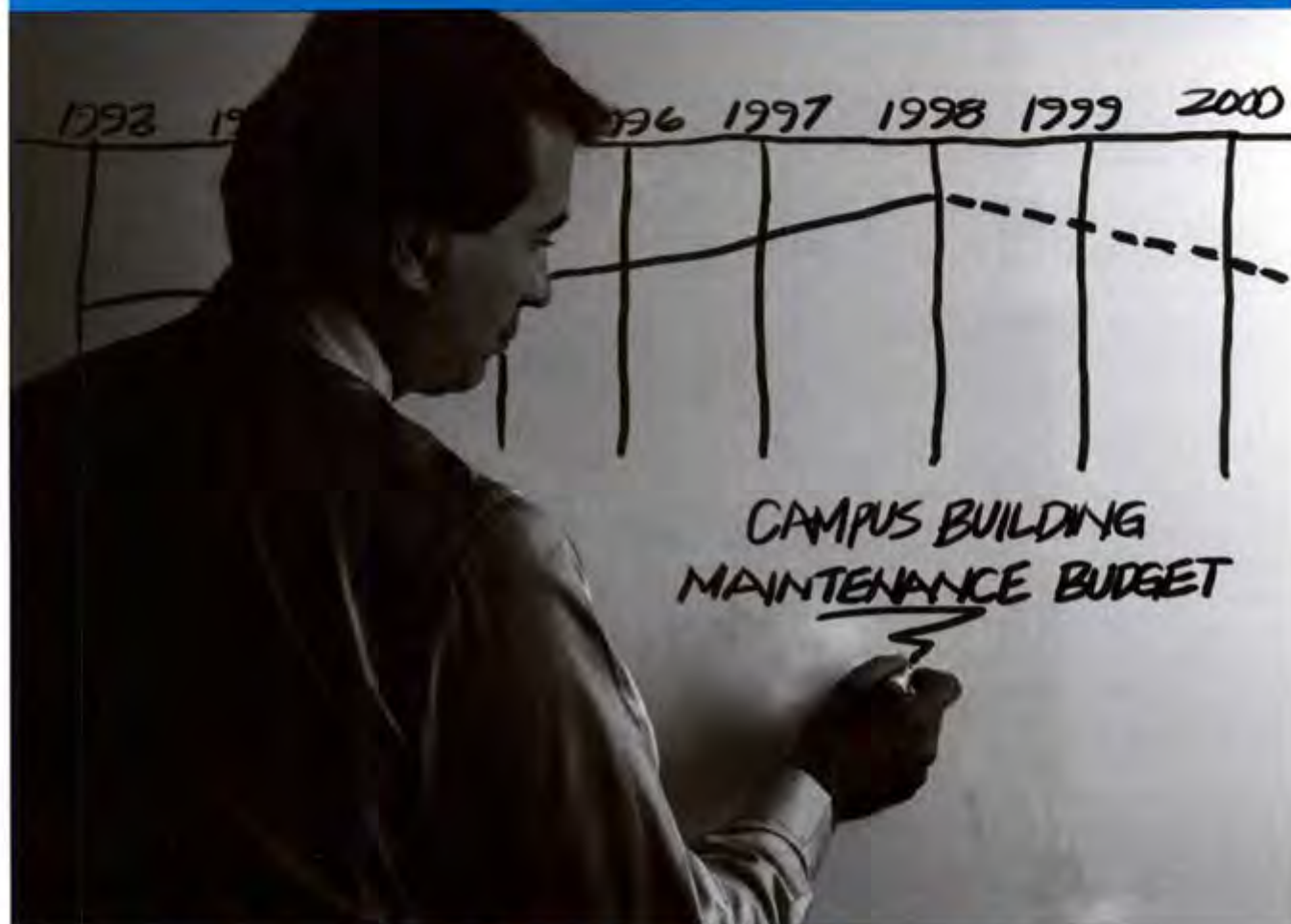


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*continued from page 37*

working group includes architects and engineers not associated with the project in any other way, and representatives of the owner and the user groups. Representing our university, aside from the user groups, are Plant Operations, Campus Design & Construction, Facilities Planning, and Environmental Health & Safety. It seems that all the stakeholders, both short-term and long-term, are well represented.

**JH:** Between my time away from industry and my advancing mental state, I can't remember the precise title for the facilitator, but it is something like Certified Value Engineer or CV Manager. The certification is the result of training at specialized institutions for such. But I'd look more for personality than a pile of credentials. Those can be checked out by references. I'd go for the qualifications which you described—the ability to keep the session steered in the right direction. That takes a particular talent which includes a sense of humor.

**FM:** *Where do you hold your VM sessions?*

**PV:** We have typically used a large meeting room at an off-campus site. We have also used available sites on the campus, thinking that the closer we are to the campus, the higher degree of participation we might see from some of the folks who can't otherwise be there. Of course, parking is always an issue.

The location of the space might not be as critical as its layout. It needs to be small enough so that everyone can hear and participate in the general discussions, yet large enough that the individual disciplines can gather around their own work tables. Lots of natural light seems to enhance creative thinking and positive interaction. A light lunch should be served in a separate space. There should not be any distractions, such as extraneous sounds, from adjoining spaces. The walls should be so that you can tape work sheets up, for everyone to see. And let's not forget restrooms and phones. They have to be convenient. A phone made available in the room itself has proven to be a useful amenity. We also find that refreshments, provided at the back of the room, offer an opportunity for informal interaction. The watering hole factor.

**FM:** *Is there a scaled-down version of value management for smaller projects?*

**PV:** Yes, there is. Every Monday and Thursday we have a two-hour block of time permanently set aside for that same kind of process but pertaining to smaller remodeling, upgrade, and significant maintenance projects. Users, architects and engineers, O&M people, and anyone else interested can show up to participate in the discussions and decision-making process. Though obviously done on a much lower key—for instance, we don't bring in a professional facilitator—the concept of the process is fundamentally the same. The benefits have also definitely been the same. These sessions are held right in our own facility.

**JH:** I have charged my project managers with the responsibilities of facilitating the Monday and Thursday "Project Review" meetings. They handle introductions, challenges to those assembled, and the architect/designers.

**FM:** *Can a VM provide guarantees of O&M costs that are within my budget?*

**PV:** Yeah, right! Are you kidding? No way! Now, having said that, I would also admit that if you have a handle on what type and level of facility your budget can support, you're more likely to be able to approach that, by keeping the design team and the user group under control a little more. We have found that improved maintainability is a frequent benefit from the VM process. For instance, amount and type of glazing often ends up being tweaked in a VM, since I know our budget resource for window washing, like none, and how often we do it, like almost never. Another example is the orientation of entry doors. Besides being concerned about the type of doors and quality, we are extremely sensitive to their orientation, since that can have a major impact on our ability to deal with snow and ice problems, and resulting slip-and-falls. Does that guarantee O&M costs within budget? No, but it helps!

**JH:** There you go, talking O&M. I knew we couldn't escape it. Let me talk about what my stakes are in light of this question. Only I'm going to rephrase it for my discipline as an architect. (I'll get down to earth someday, Pete; be patient.) Can a VM guarantee me a building that still has some "aesthetics" or "design" characteristics left? Or is what I get an emasculated assembly of maintenance marvels? Now there is PARADIGM ONE for you. To be able to answer that question you have to determine for yourself (or your institution if you don't have an architecture school attached to it), what good "design" really constitutes. We still have a world full of design professionals who triumph in form over function. "Form follows function" and such ridiculous statements are twentieth century contrivances for personal justifications. I'd prefer to step a little further back to Vitruvius who coined "Firmness, Commodity, and Delight" as the paradigm for good design. You gotta have all three, folks, you just can't get away from them. I can take care of the "firmness" and "delight." Pete, you handle the commodity, okay? Commodity covers a big gamut in my book. In order to have it I'll listen to the guys who have to clean the toilets, you bet. Get them to the next VM, for sure. VM can be a very educational process for all who attend.

**FM:** *Will you realize savings in yearly O&M costs?*

**PV:** I would probably prefer to use the term cost avoidance. As I said in the previous answer, we feel we have been able to control the continental drift between budgets and what we need. The VM process has been one of the tools I'm sure has contributed to our success. Our costs per gross square

*continued on page 41*



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continued from page 39

feet have increased less rapidly than have the CPI, labor rates, etc., while our standards have continually improved. We are confident that better facilities management and creative thoughts are key to this success, and this is what you do in a successful VM. That we have been able to participate in the value engineering process as full and equal partners has definitely been instrumental. This is true even in light of some of the disappointments we might have suffered in individual sessions.

**FM:** You've defined a lengthy process. Can't we learn from doing this once or twice so that the costs and the time can be saved on future projects?

**PV:** I don't believe so. There are too many variables involved which can impact the character of any project. Consider the collective psyche of the user group, the condition of the local construction market, current technologies, code requirements, sources of funding, current campus activity in ongoing construction, priorities of the current administration, moods of surrounding neighbors and other stakeholders, current availability and costs of utilities, general economic conditions, etc. Each and every one of these can affect the personality and makeup of a proposed facility's programming, development, design, and construction. Therefore, a VM is totally justified for every project to help

ensure the proper priority and emphasis is given to each of those variables.

Yet, as said before, VMs do become progressively easier. There are repeat performances by architects and engineers. They learn to anticipate what they can expect from us. The same is true from our side, as well. The exploration and the decision-making phases become easier, and more time is constructively spent in the brainstorming phase. And the results just keep getting better and better.

**JH:** I have to confess, I was worse than a skeptic. There's no place in this dynamic world for static processes. I thought "static" when I first became involved in VM years ago, as a private practitioner. Wasn't all my professional training good enough to assure my client that they were getting the best, most beautiful bang for their buck? Why are all these people assembled to pick my work apart? These were some of my feelings then. I would groan when I heard the pronouncement "VE" (now "VM").

But, the VM process "retrained" me—very positively! We all have responsibilities to each other in the world community. And helping each other learn how to do our jobs better is one of them. Value management is a great medium for that kind of professional development. But the synergy is what's neat. That kind of professional development doesn't occur at someone else's cost. 🏰



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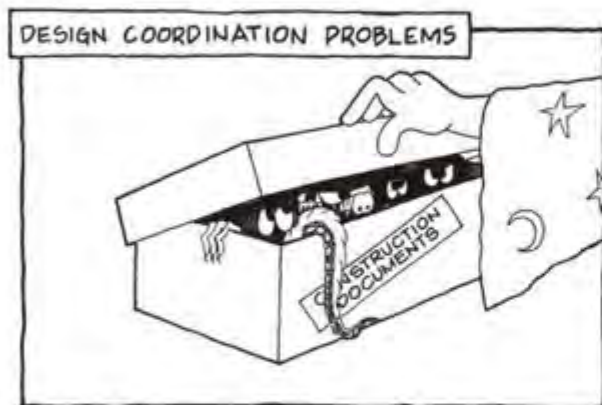
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Who wouldn't want to reduce their construction costs and finish their projects on time? Are you tired of excessive and unnecessary construction change orders? Is too much of your productive time spent resolving design coordination questions? Are you dissatisfied with the quality of design documents?

Construction change orders generally account for between 4 and 8 percent of the cost of construction and can be classified into four major categories:

- **Unforeseen Conditions.** The unexpected and unanticipated changes that are hidden during design. These include unknown conditions that could not reasonably be anticipated.
- **Customer Requested Changes.** The changes made by customers during construction to meet their changed requirements or needs.
- **Technical Errors.** Engineering errors in the technical design.



Dennis Fewell is president of Redi Check International, a construction document review firm based in Norfolk, Virginia.

## Interdisciplinary Coordination Reviews: A Process to Reduce Construction Costs

by Dennis A. Fewell, P.E.

- **Design Coordination Errors and Omissions.** Unnecessary and unproductive changes due to ineffective coordination of the construction documents.

Owners, builders, and designers have limited control over *unforeseen condition changes*; some things simply cannot be reasonably anticipated. There exists a point at which additional site investigation is

economically unjustified. The cost of unforeseen conditions usually is borne by the owner, providing reasonable effort was made to identify site conditions during design.

*Customer requested changes* are the right of the owner to revise the design during construction. With this right comes the responsibility to reimburse the designer and builder to implement the changes.

*Technical errors* compose the smallest portion of change orders. If they occur, the cost to correct the discrepancy is normally borne by the designer who made the error.

Surprisingly, *design coordination errors and omissions* historically account for the greatest portion of change orders. Studies have shown they can account for up to 50 percent of the cost of all change orders. They are unproductive, costly, and most are unavoidable.



What are the economic impacts of unnecessary design coordination errors? Change order rates vary among projects due to several factors: quality of construction documents, quality of builders, type of contracts or contract administration. When you consider that the primary use of this contingency is to address change orders and that design coordination errors account for up to 50 percent of a project's change orders, then the 2 to 4 percent contingency budget is often wasted. To put this in perspective, for a \$10 million project, up to \$400,000 direct cost could be wasted on unnecessary design coordination discrepancies. In addition, there are significant indirect costs associated with coordination discrepancies. Not all coordination issues involve change orders.

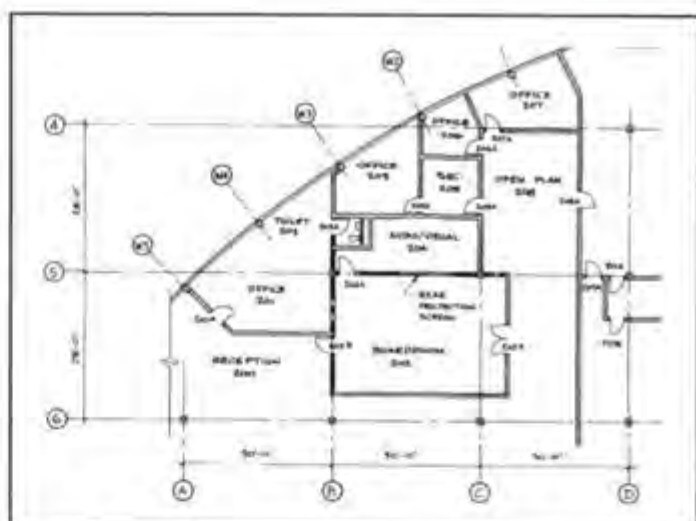
Consider the cost of delays involving design coordination requests for information (RFIs). Besides the time spent discussing a RFI, it can require as many as 12 pieces of correspondence between the parties involved to resolve the issue. The time spent addressing these unproductive issues is a real cost to all the project stakeholders.

Time is money to a contractor, and to us all. Getting off the job site and reducing field overhead often means the difference between profit or loss on a project. Most contractors would prefer a project without change orders, especially unnecessary ones. When asked, contractors will tell you that they never truly recover all their cost for delays associated with resolving these unproductive issues.

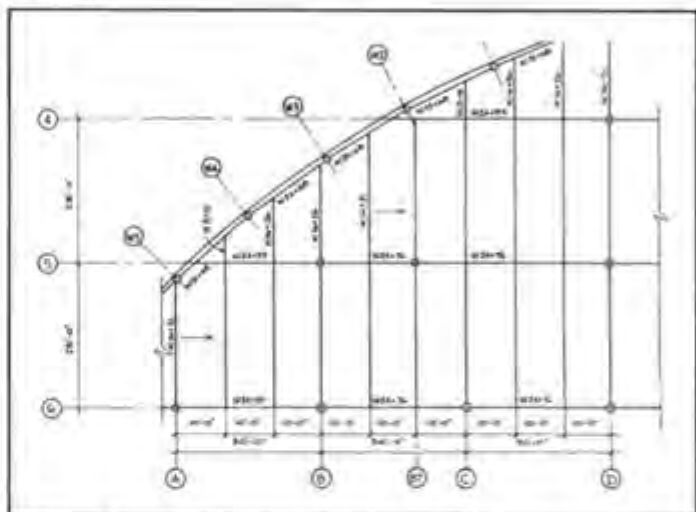
Owners also would like to avoid unnecessary delays spent resolving design coordination errors and omissions. They, too, profit from timely completion of the project. Besides the direct economic benefits of using the facility sooner and reducing loan interest costs, the owner's cost for contract administration and/or inspection is directly affected by the contract duration.

Add all this up and the cost of coordination discrepancies to all the contract parties is significant. More important, it is needless. Let me illustrate how difficult these errors can be to detect. Drawing A is a portion of the architectural floor plan taken from an actual set of drawings for an administrative office building. Drawing B is a partial structural floor plan of the same area. Somewhere on these two drawings there exists a serious design coordination error that would have significant economic consequences if not detected before construction proceeded. Can you spot the problem? There are two practical ways to discover the problem. One way is after the mistake is made during construction. The other way is during a thorough interdisciplinary coordination (IDC) design review. The first way will be expensive to correct the problem, possibly delay the project, and probably create a conflict between the contract parties, especially if repeated coordination problems occur.

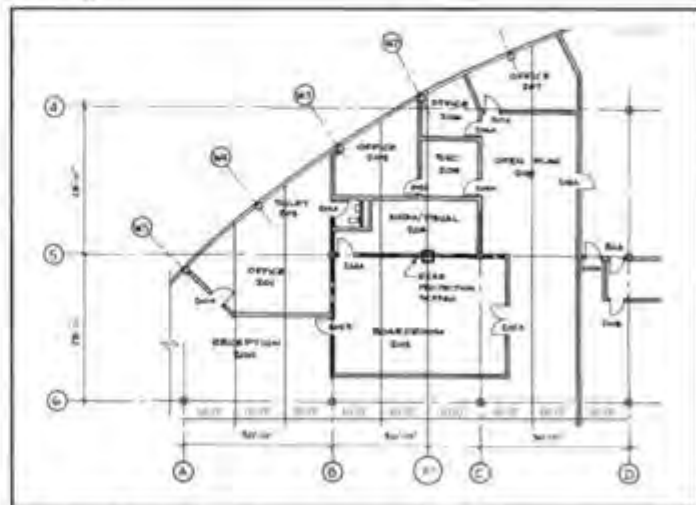
Independently, neither drawing appears to have any discrepancies. However, if the two drawings are overlaid on a



Drawing A.



Drawing B.



Drawing C.

light table and column locations on the two drawings compared (an essential coordination review procedure), the problem is easily seen. Look at Drawing C which illustrates what the two drawings would look like if superimposed.

*continued on page 45*



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The steel column at gridline intersection B7 - 5 is located in the middle of the rear projection screen in Board Room 202. When do you believe this problem would have been discovered? This coordination error would probably be found during construction after the column was in place and when the framing for the screen opening occurred. Built this way the rear projection equipment will not function. Redesign of the Board Room would be required. For this particular project the problem was discovered during an interdisciplinary coordination review prior to the start of construction. The discovery and correction of this coordination discrepancy saved the owner, the designer, and the builder unnecessary conflict, delay, and unproductive costs.

How many coordination errors or omissions do you believe occur in an average set of construction documents? You may be surprised to learn that the design industry is producing documents that have, on average, more than five coordination discrepancies per drawing. For a project with just 100 drawings, that translates to over 500 potential problems, conflicts, change orders, disputes, claims, or requests for information.

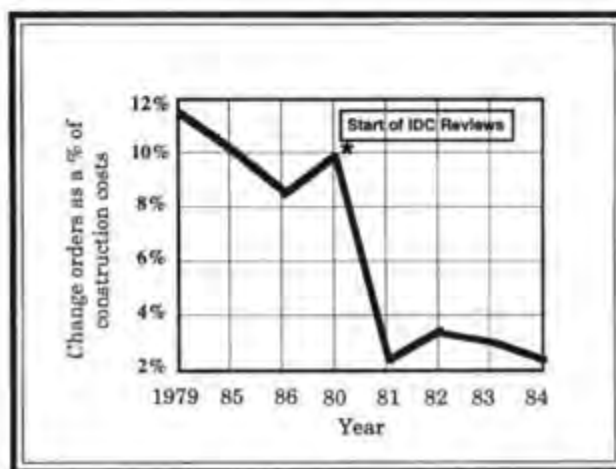
Not all coordination discrepancies on a project will have the cost impact illustrated in this example. Some are just nuisance errors while others require a request for information from the designer to clarify the problem. However, some will be even more serious than this illustration. None of them have to occur.

This overlay procedure is one of many steps of a review process developed by an architect, William T. Nigro, that virtually eliminates these and similar design coordination errors and omissions. As a result of his frustration with the continual conflict and cost associated with design coordination discrepancies, Nigro developed an Interdisciplinary Coordination (IDC) Review System that is recognized by the American Institute of Architects (AIA). The system employs a rigid, structured checklist compiled from years of experience with a method of overlaying drawings from different design disciplines. Independent studies have shown that if properly applied, the process can virtually eliminate most design coordination discrepancies.

One place that monetary savings have been documented is with the U.S. Navy's facilities construction program at the Trident Missile Submarine Base, Kings Bay, Georgia. Starting in 1982, an interdisciplinary coordination review system was used on all major military construction projects for the Kings Bay Trident facilities construction program. The total value of construction for the study was \$670 million, which included numerous separate construction projects over a period of eight years. Most of the projects were competitive sealed bids designed by various A&E firms.

A total of \$250 million of construction was performed before the IDC process was implemented. Between 1982 and 1985, 29 projects with a total value of \$420 million of construction was performed after the IDC process was adopted. No other significant changes in design, construction, or administration of the projects were implemented. Change order rates and change order types were tracked from the beginning.

As illustrated on the graph below, after implementation of the IDC process the project change order rate was reduced dramatically from an average of 10 percent to an average of 3 percent of the total construction value. This reduced the total program cost of \$420 million by approximately 7 percent of the construction value. Approximately one half of the change orders were directly attributed to design errors or omissions. The total cost savings to the Navy were estimated to be in excess of \$15 million.



In 1985 the U.S. Navy's largest engineering field division—Atlantic Division, Naval Facilities Engineering Command, Norfolk, Virginia—conducted an independent study to determine the value added by using the IDC review process. The study included 52 separate projects reviewed over a period of several months. After completing the reviews the design errors and omissions discovered were then reviewed by an estimating team. The Atlantic Division Engineering Command analyzed the discrepancies discovered in the IDC review process, calculated the direct cost it would have taken to correct these discrepancies in the field during construction, and determined that the Navy saved \$1,300 for every hour invested in the review. The U.S. Navy was so impressed with the benefits of the IDC review process that in 1986 the Naval Facilities Engineering Command (NAVFAC) directed its utilization at all major field divisions.

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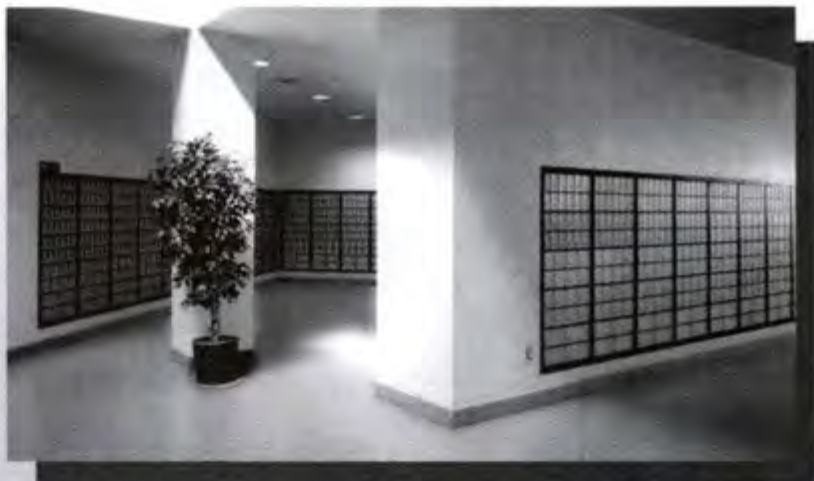
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Even though thousands of architects and engineers have been trained in an IDC process, the design industry is still producing documents that have hundreds of design coordination errors in each set of construction documents. Why do you continue to see construction documents with coordination discrepancies of this magnitude? The problem lies in several areas:

1. **Education.** Construction document coordination review is a learned skill.

Very few, if any, formal courses exist in our higher education system that train designers how to perform an effective construction document review.

2. **Misconceptions.** Ask any designer if they review their design for coordination discrepancies, and they will answer yes. Ask them to describe the specific details of their process, and the answer is probably vague. Most designers believe they perform a coordination review. It is a matter of paradigms. If you have never been taught how to perform a coordination review, if you do not use a system designed specifically for coordination review, then you are seeing the world from your limited scope. Your paradigm says you are performing a coordination review.

3. **Human Nature.** People generally take pride in their work. It's human nature. People also resist criticism, which is also human nature. Add to this the problem of being so close to something that you fail to see flaws in it. A simple analogy is to ask yourself if you proofread your own written documents. If you do not have others proofread your documents, try it sometime. The errors they find will surprise you.

4. **Economics.** Every designer I have discussed the IDC system with agrees that it is a value-added process. However, ask them if they would be willing to buy the services of a third-party review and the response most often is, "Yes, if the client will bear the expense." Now ask the client the same question. They, too, agree that the process is valuable, but often you get the following response: "Isn't that the designer's responsibility? Aren't I already paying them to do it?" Although the three major stakeholders in a project—the owner, designer, and contractor—will benefit from a well-coordinated set of construction documents, sometimes none of them are willing to bear the cost on their own.

What can you do to help improve the quality of your design documents? First, ask your designer if they perform an interdisciplinary coordination review. If the answer is yes, ask a few specific questions about the process.

1. Who performs the review? Is it someone other than the production project manager?
2. Has the reviewer been trained to perform an IDC review?
3. Does the reviewer use a structured review process?
4. Is there a review checklist?
5. How was the checklist developed?
6. Does the review process compare the different design documents to each other: architectural to mechanical, electrical, and structural; structural to mechanical; civil to structural?
7. Does the review process overlay different design discipline drawings?
8. Is there tangible evidence of a thorough review? Does the review produce marked-up drawings or a written report?
9. How long does the review take? A thorough review will take an average of one hour per sheet for most projects.
10. What process is used to confirm that discrepancies have been corrected?

Do a spot check yourself of the documents. Check the following items. If all items are coordinated, there is an excellent chance that the design has been

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properly coordinated. If some of the items contain coordination problems, then the project is in trouble. A complete coordination review is suggested.

#### Civil

- Building location and site improvements match other discipline site plans
- Underground utilities have no coordination interference's between disciplines
- Ground floor slab elevation matches structural

#### Structural

- Vertical control matches architectural
- Grid lines designations and dimensions match architectural

#### Architectural

- Floor plans match all other disciplines
- Column locations and slab depressions match structural
- Fire rated doors on the door schedule match the fire rated walls on the plans

#### Plumbing

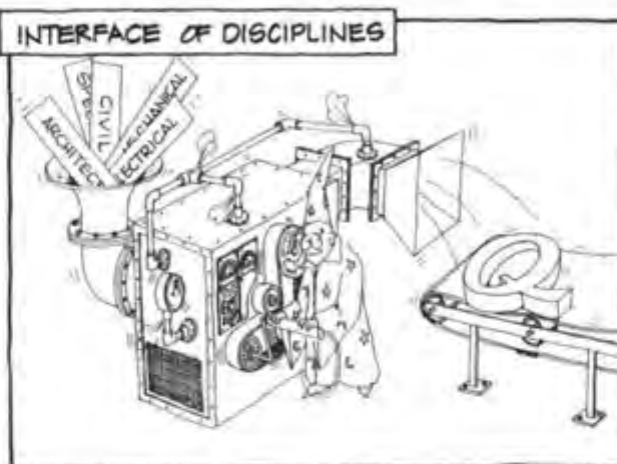
- Utilities leaving building match connection locations and pipe sizes on civil

#### Mechanical

- Grilles and registers on HVAC plans match architectural reflected ceiling plan locations
- Fire dampers on HVAC plans match fire rated wall locations on architectural floor plans

#### Electrical

- Light fixtures on lighting plans match architectural reflected ceiling plan locations



- On power plans, single line diagrams, or motor control center diagrams, the horsepower, voltage, and phase matches mechanical schedules for major pieces of equipment

#### Specifications

- Alternates and/or phasing of construction are coordinated with the drawings and are clear

Finally, consider a third-party review. Find a firm that specializes in interdisciplinary coordination reviews and let them review the documents. Specialized personnel

trained in a good review process and removed from the design can provide an unbiased and critical review. They can "proof-read" the design for you. Remember to ask them the same

questions you would ask the designer concerning the process they will use. Many firms may tell you they can perform an IDC, but be sure that they are able to clearly define their process.

#### Conclusion

There is no such thing as a perfect set of construction documents. However, the IDC system can help you discover coordination errors and omissions before they cost you time, money, and aggravation. The IDC system has proven itself to be effective at cleansing construction documents of interdisciplinary coordination errors, thereby reducing the largest single source of change orders, time extensions, and exposure to liability claims.

The construction process is filled with risks and rewards. It is filled with a great sense of accomplishment, yet sometimes this involves stress and conflict. A well coordinated set of construction documents will greatly enhance your opportunity for success and reduce your stress and conflict on the project. 🏢

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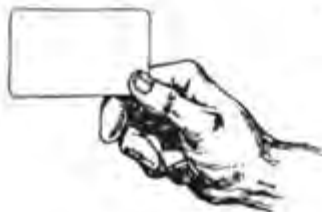
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# THE EVOLUTION

## of Computer-Aided Facility Management

by William D. McLean

In the traditional facility development process, an owner hires an architect to design a building and then bids the drawings out to a contractor who builds it. During construction, changes are made to the drawings to reflect, among other things, field conditions, material substitutions, and value engineering. Savvy owners will request blueprints and as-built CADD drawings when taking possession of the building. These documents are promptly handed to facilities managers, who file them away for future reference.

Within that set of documents, however, is a wealth of information. Imagine the benefits facilities managers could reap by converting the blueprint, CADD information, and as-built drawings into a computer-aided facility management (CAFM) system that could rearrange space, track assets, handle maintenance, and lower A/E redesign fees.

A CAFM system typically is composed of a CADD package and a database. In the best cases, the CADD graphics are linked to the database record, and there is a two-way relationship between the graphics and the data in the database. Once the relationship between the graphics and database has been established, the information in the database can

come from many different places, like other databases, additional data entry, or spreadsheets. This data can be updated as often as necessary without affecting the relationship between graphics and the database.

CAFM links contract drawings drawn in a CADD program to databases that add vital information on types of spaces, occupants, materials, equipment, costs, and other building systems. CAFM's link between graphics and database makes it a powerful tool for time-pressed facilities managers in performing their ever-increasing responsibilities.

### What Facilities Managers Need

Facilities managers manage the information about the operation and maintenance of their buildings. They are responsible for everything from rearranging office areas to finding space for computer hardware. For example, when asked to develop space for a new department, the facilities manager first must find out what space is available and what impact the change will have on available resources.

In general, CAFM saves money and time for facilities managers by integrating four main responsibilities: space management, asset management, maintenance, and technology. Space management requires only a basic floor plan and a database link. With CAFM, a facilities manager can handle space management accurately and efficiently—potentially saving millions in build-out and occupancy costs—by simply knowing what is available in the way of vacant space immediately after the drawing or database is changed.

CAFM also helps facilities managers keep accurate inventories, which reduces costs by enabling companies to maximize use of existing furniture and other assets. It also enables companies to maintain maximum control of standards, allowing facilities managers to see, at a glance, if

*William D. McLean is director of information technology, southeast region, at Heery International, Atlanta, Georgia. He has spent more than 20 years exploring the potential of CADD and standards. Through a cooperative effort between APPA and the Construction Specifications Institute, this article also appears in the March issue of The Construction Specifier. For more information on CSI, contact them at 703-684-0300, toll-free at 800-689-2900, or visit their website at [www.csinet.org](http://www.csinet.org).*



someone has assets in their space that do not match the prescribed inventory in the CAFM database, and develops an effective chargeback system for the space to internal departments.

Facilities managers also are responsible for making sure that cabling and building systems are in place to handle ever-increasing technology requirements. CAFM systems gather data from many databases and display and associate that data with existing assets. The facilities managers can update the CAFM database from other sources at any preset interval.

CAFM also offers savings in cost projections, which allow companies to get accurate quantity take-offs for requests for proposals (RFPs).

#### How CAFM Works

CAFM links graphics, usually in the form of drawings, and databases into an integrated system. Linking the database to the graphics, although time-consuming, is basically a simple process. The best approach involves going from a macro level, such as the site or building, to a micro level, the room with all its contents.

Typically, creating this kind of record involves identifying a visual element in the graphic file and linking it to the appropriate database record. Most systems will allow users to load information directly into the database or through an

interface. Make sure that the system is Open Database Connectivity (ODBC) compliant—an interface standard that is required to move information into or out of databases. ODBC allows one program to communicate with many databases without requiring a special proprietary code for each database.

#### Level and Layering Standards

Applying standards during the development of design and construction documents can make the transition to facilities management easier for owners. A standard is a definition of an exact way of doing something. The more the standard is used, the better it is. A guideline, on the other hand, is a specification for developing a standard.

Having level or layer standards is critical to the success of any CAFM project. Since each element in a drawing is linked to a record in the database, having only one copy of each element in a electronic building is the core issue in CAFM. Duplicate elements could result in duplicate records, invalidating the quantity take-off from the database.

Standards dictate that the elements of a drawing go together so everyone can get what they need from one drawing. For example, an engineer using the architectural floor plan may want to turn off the layer with door numbers, but leave the level with door symbols. Unless everyone uses the same standards of where symbols go and on what levels, the

engineer could end up losing some of the doors and parts of the wall when trying to turn off the door symbols. Only rigid adherence to one standard by everyone—the architect, engineer, owner, and facilities manager—can prevent such incidents.

Many multiservice firms offer integrated drawings, allowing all disciplines to share one set of CADD documents and improving users' chances of getting a set of CADD drawings with a consistent layering standard.

The many CAFM standards and guidelines can cause confusion. A national layering standard could do for the design and construction industry what a single national standard width and gauge of track did for railroads. Efforts by several of the most prominent organizations in the game, including the Construction Specifications Institute (CSI), are underway to create a nationally accepted layer standard that would combine the best of existing standards and guidelines.

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However, until then, it is important to select the standards that are right for a particular project and owner.

Owners who do not have a standard can turn to the American Institute of Architects (AIA), CSI, or U.S. Army Corps of Engineers (Tri-services). The AIA has a CADD layer guideline, rather than a CADD level standard. In effect, it is a specification for developing a standard. Therefore, it is difficult for any two people to develop standards that are alike, much less anything that approaches a national standard. This document has some very good information about CADD, and the AIA has just updated the guideline to take into account reference files.

CSI offers the Uniform Drawing System (UDS). The UDS is, for the most part, a standard; however, it relies on the AIA layer guidelines, which do little to help anyone transferring electronic CADD data from one user to another. CSI has done a good job setting up sheet numbering and naming and was wise to use the ConDoc method of setting up detail and section sheets.

The U.S. Army Corps of Engineers standards are relatively easy to understand. The Corps has used them on many types of projects. The standards are ten years old, which presents both an advantage and a disadvantage. Some parts of the drafting standards are out of date; however, the layering standards have stood the test of time and have gained many users over the years. It is possible to use the level and layer standards without using the drafting standards.

#### **An Integrated CAFM**

The bulk of most facilities managers' documentation exists on paper, not in electronic form, or in some mixture of electronic and paper. Typically, 70 percent of the owner's cost in implementing CAFM involves getting the data into a system. There are several options for transferring information from paper to an electronic format, all of which are time consuming.

Scanning is a simple way to transfer paper documents into an electronic format. Once the document is scanned, the electronic file must be scaled to full size and straightened to correct for warping that takes place when the paper is put through a roller. The result is a full-size raster electronic drawing that is as accurate as the paper documents it came from. However, there are drawbacks to scanning. Scanning does not reflect any alterations performed during construction or since the building was constructed.

Common practice, prior to CADD, was for the graphics of a floor plan to be drawn to a different scale than the dimensions shown on the drawing. Inconsistencies appear in scanned documents. For example, a series of three 12 x 12 rooms might be changed to two 12 x 10 rooms and one 12 x 16 room in the design process; rather than erase the walls, only the dimensions would be changed. The scale of the rooms would not match the dimensions. When this information is scanned, a CADD operator must review and alter the drawings by hand. Editing raster drawings is time consuming and difficult. And programs that automatically

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convert raster scans to vector CADD drawings do not usually work well for facilities management drawings.

Digitizing traces existing scanned drawings or blueprints into a CADD system in one of two ways. Heads-up digitizing uses a scanned file and attaches it as a layer or reference file, allowing the CADD operator to trace over it. With the other method, the CADD operator tapes an existing drawing or blueprint to a digitizing table and traces it with a mouse into a CADD system. Unfortunately, most CAFM programs require more accuracy than is generally available with digitizing.

A more accurate way of getting drawings and blueprints into CADD is to redraw the floor plan from the dimensions. Documenting an existing building by field measuring it and converting field sketches into a CADD drawing is the least efficient and most expensive way of getting an existing building into a CADD system—unless the building has undergone so many revisions that it takes longer to determine how the many versions of the floor plan go together than it does to conduct the field measurements.

If the building plans were developed in CADD and were maintained through construction, putting the building into a CAFM system is relatively inexpensive compared with converting paper drawings and files. From the beginning of the project, an owner should require that designers use CADD and should specify the standards the owner has decided to use.

### Brave New World

CAFM systems are only beginning to deliver on the promises of the electronic and CADD revolutions of 15 years ago. The increase in desktop computer power and integrated systems throughout all levels of an organization are changing the way CAFM systems are used.

The future of facilities management software includes interface programs that will allow desktop managers to

investigate "what-if" scenarios on their own. There are programs that can take the dimensional data about a building, whether it exists in a database, a spreadsheet, or only on paper, and put it into a CADD program where it can then be linked to a CAFM database. This is a very quick and accurate way of getting a CAFM

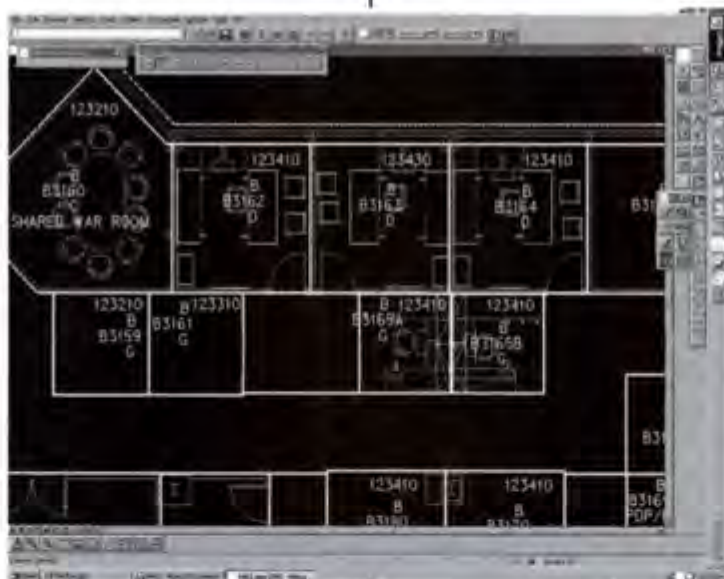
started without preexisting electronic drawings of the building.

Under development are improvements to some off-the-shelf CAFM databases that will allow a database to generate a building from the information in the database to one of several CADD programs and then link the graphics to the CAFM database. So, if an architectural firm puts a building in one CADD system, and the

owner prefers another CADD system, he or she has the option of using that preference. In addition, an owner can maintain a building in a particular CAFM system, yet still allow a wider choice of companies to bid the work since bidding would not be limited to companies who use the same CADD system as the owner.

Loading or reporting on information through the World Wide Web or through the CADD interface, while maintaining the relationship between CADD elements and the database records, is important because the more flexible the system is in allowing the user to input and retrieve data, the more the data will be used. The data will thus be more accurate because it will be maintained. The first step for many facilities managers is to get their

systems converted. Take those papers out of the file drawers and determine what needs to be put into a truly electronic, integrated facilities management system. Be a part of that brave new computer-aided world and start saving money on your facilities. 📌





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by Matthew C. Adams, P.E.

Increasingly, institutional facilities managers are evaluating the option of outsourcing one or more of their service centers. However, "sourcing" of any one department (custodial, grounds, preventive maintenance) is still viewed as a difficult process. Both management and staff have concerns over the impact outsourcing may have on the college. In fact, many institutions evaluate the pros and cons of outsourcing only to defer the decision because of the fear and confusion associated with the employee issues. Additionally, recent press has heightened the greatest fears of any administrator (see "Universities Seek to Cut Costs by Outsourcing More Operations," *Chronicle of Higher Education*, November 21, 1997). However, many of the issues that seem too unsavory to grapple with are continually being explored and delineated by the institutional and corporate community. To put it another way, we can now learn a great deal from the good and bad experiences of others, and concern over employees has been the focus of these experiences. As Doug Christensen (past APPA president) once said at an

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APPA Institute: "Successful facilities management is the effective utilization of material and labor resources." As such, the labor resource of a facilities service department is at least half of the concern in evaluating outsourcing. My experience shows it to be much more. In fact, outsourcing of a service center has taken on three distinct formats in recent years. Each one deals with the labor resource differently. It is often assumed that when a service center is outsourced that all of the employees will change employers. For years this was the default decision. This option is most appropriate for those institutions that want to minimize their involvement in an operation. Often the contractor will provide a single point of contact for the institution's business office thereby reducing management responsibility. Additionally, the college may have an interest in reducing its human resource responsibility. A custodial department is reviewed by the administration and the decision is made to check the "market" for contracted services. After a review of the existing physical inventory and operation, each contractor submits a proposal. Ideally included in this proposal is a cost, a management organization, and a transition plan to take over the service center. Each proposal is compared and contrasted with each other and the current operation and institutional goals. At this point, the process often stops. Even the most polished and professional proposal and associated firm is charged with transitioning the institution's staff onto its corporate roles. Regardless of the contractor, most colleges have a severe case of "buyers remorse" at this point. Nevertheless, the transition of an entire staff continues to occur in

this industry. Ultimately, most are successful. A reputable contractor understands the benefits of acquiring a happy workforce. It is in their best interest to offer a transition plan that creates the least uncertainty and maintains equity for the employees. Keith Reid, vice president of educational services for UNICCO, affirms that "ultimately it is our goal to add value through management. We will make decisions that best make this possible." Some of the considerations in transitioning the entire staff include conversion or transfer of benefit packages, conversion of seniority, continuation of tuition remission, adoption or negotiation of labor contracts, instituting revised human resource policies, and most importantly, accurate dissemination of information. On the other end of the spectrum is the "management assistance contract." Many institutions have determined that it is necessary to acquire outside expertise to manage a service center. Sometimes one or more of the departmental managers retires or otherwise leaves, creating a technical service management need. In other situations, the institution simply can't afford to build the modern management infrastructure for the operation. Small and mid-size institutions see the opportunity to buy rather than recreate a functioning service management system. These days, this decision may not have labor cost as an issue. Productive management of the labor may be the issue. In addition, the "economy of scale" benefits of a large integrated contractor may appeal to a smaller organization. According to Curtis Bragg, executive vice president of ServiceMaster Education Management Services: "In the past, the outsourcing industry was

almost completely dependent on labor savings to reduce costs when in fact there are so many other expense areas." Often ServiceMaster prefers a management assistance contract. Under this arrangement, the institution follows a specification and competitive selection process. The cost associated with each proposal is often much further down the list of selection criteria. The technical competence, managerial experience, available systems and tools, and overall fit take precedence. In effect, the institution seeks to improve the service center with the assistance of the contractor. The college plans to stay in the loop and keep the employees on its roles. Naturally, the fears and concerns associated with outsourcing are far less under this scenario. Typically, the successful firm will both assume and add managers to create an effective team. This team operates just as if they are employees of the institution with one exception. They are responsible to both the college as well as the service company. The service company makes its resources available to the team to leverage their efforts. From training to computer and management reporting systems, the management team operates as an extension of the corporate partner with a focused reporting line to the institution's administration. As more institutions showed hesitation in facing the "fear" of employees during the outsourcing process, the service contracting industry responded. Within the last few years, a new format has taken shape in outsourcing. This format is best described as a hybrid of the previous two options. The goal is simple—offer a way for the college to receive the benefits of outsourcing while still treating the employees fairly without traumatizing them. If the food service industry serves as a precursor to developments in other service centers, then the mixing of institutional and contractor employees is here to stay. Initially, the idea of

having a staff split between two employers seems overly complicated. However, the philosophy really is simple. All vested employees are given the option to stay on as college employees or switch over to the service contractor. All very recently hired and/or new hires are brought onto the contractors roles. All information related to benefits, promotion, labor contracts, etc., are shared in a concise and open forum. As Bill Dillon, vice president for facility services at ARAMARK, put it: "Once the open sharing of information regarding benefits comparisons occurs, the process moves swiftly and painlessly." All issues that require two sets of delineation are completed in tandem. For example, the labor contracts for both employee groups are negotiated at the same time. As such, the work rules are identical or very similar. Grievances, for example are dealt with using the same policies regardless of who an employee might work for. Its

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Bill Dillon's experience that only rarely does an employee management dispute reach a level where the difference between employers has any effect. Overall this format seems to assuage the fears of the workforce. The employees are not forced to accept any major changes to their employment packages. However, the institution must stay involved in the service operation at least from a human resource standpoint. Depending on the average age of the existing workforce, the transition from institutional to contractor staff may take many years. In fact, it may not be worthwhile if the staff is simply too young on average. Nevertheless, the process is very beneficial to some colleges. At the University of Delaware, David Hollowell, executive vice president, acknowledged: "Our success with the outsourcing experience, in particular the positive impact on employees achieved by our transition strategy, has created the comfort level in the University community and with our board of trustees that has allowed us to explore other sourcing opportunities." As illustrated in a report published by Maria Taylor of the Institute for the Study of Organizational Effectiveness at Pennsylvania State, employees at The University of Delaware have transitioned over time:

- University Employees prior to contract = 293
- First year of the contract = 213 University and 93 Contractor
- After five years of the contract = 101 University and 130 Contractor

As the desire of institutions to engage in partnerships with service providers increases, so must the sophistication of the industry. Successful partnerships occur when the various options available are explored and ranked according to the unique situational needs of the institutions and the staff. Now there are three basic formats for outsourcing services, and as institutions express concerns or needs to the industry perhaps more will become available. 🏢



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Do you take photos of job progress or existing site conditions or even ('fess up!) pictures of department picnics and parties? Or perhaps you want to link photos with related to be sure that you keep related records permanently together where they belong. And now, finally, with digital cameras, you will have some protection against misplacing or damaging images like what happens to physical photos. If you still use a film-based camera for these tasks, it's time to consider switching from silver to silicon.

Today's crop of digital cameras promise and deliver advanced, intuitive features that just three years ago would cost \$10,000. Compared to their film cousins, digital cameras provide overwhelming convenience, reduced image acquisition costs, and far more storage and editing options than film-based imaging systems.

Nevertheless, these cameras do produce a lower image quality than traditional cameras, but can digital image quality meet your needs? I say "yes" based on the results of a recent comparative test I performed. Digital cameras from Olympus, Minolta, and Sony produced images with a quality that can easily suffice for routine photo taking tasks in the physical plant.

*Howard Millman operates the Data System Services Group, a problem-solving consultancy group based in Croton, New York that helps universities and university hospitals automate their facility management process. He can be reached at 914-271-6883 or by e-mail at [hmillman@ibm.net](mailto:hmillman@ibm.net).*

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Outwardly, digital cameras look and work like a traditional, single lens, reflex 35mm film camera. Following the trend in traditional cameras, digital camera vendors have automated as many elements of the photo shoot as possible. For example, most digital cameras have automated focus, aperture settings, and shutter speed. This similarity between the traditional and the new is one of digital imaging's greatest attributes—no new photographic techniques to learn!

The biggest differences between the two types of cameras occur internally where, instead of film capturing and storing the image, electronics does the job. Inside a digital camera, a Charge Coupled Device (CCD) chip acquires the image and stores it on a reusable memory module. The CCD must detect nuances of light, dark, and color, a trick done with minuscule RGB filters and complex interpolation

algorithms. The camera's memory will keep your images safe and intact for as long as you want it—even without battery power. You can erase or upload your pictures to a computer for editing, retouching, or for longer term storage.

### **Buying Guidelines**

Your ultimate satisfaction with digital cameras will begin and end with image quality. No matter how many conveniences and features you get, no matter what price, the camera must produce an image that satisfies you, an image that meets your needs and expectations.

At purchase time, look for cameras that include an active matrix LCD view screen, even if the camera has an optical viewfinder. The LCD makes it easier to frame a subject and it significantly increases your chances of capturing the image you set out to. In addition, the LCD allows you to play back and delete your images immediately. Deleting images recovers memory to store the images that you want to keep.





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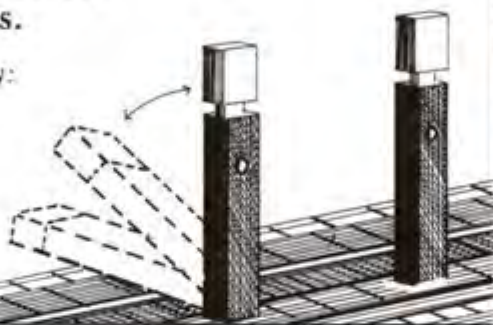
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What features can you expect and what will you have to pay for them? Digital cameras in the \$500 to \$1,000 dollar range will provide a zoom lens, macro mode, auto focusing, and top quality optics. One note of caution, when computing the cost of a digital photo system, remember to add the cost of a dedicated color image printer (such as the Olympus P-300, \$400) to the cost of the camera.

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The three books reviewed in this edition of The Bookshelf cover energy management, energy conservation and indoor air quality. These topics have been haunting facilities managers for quite some time, especially the energy-related ones. As is often the case in life, doing the right thing for one problem only makes the other one worse; simultaneously maintaining an energy conservation program and improving indoor air quality probably cannot be done. However, a better understanding of these issues can only improve our ability to manage them more effectively, and these three books should help us do that. Richard Perhai of Oakland University reviews the latest edition of the *Energy Management Handbook*, and Ralph Palmer of Keene State College discusses *Retrofitting Buildings for Energy Conservation*; both books are products of the Association of Energy Engineers. I review the book *Indoor Air Quality—Solutions and Strategies*; this is a favorite reference of mine, and I feel it is worthy of your attention. —JMC

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*Energy Management Handbook*, third edition, by Wayne C. Turner. Lilburn, Georgia: The Fairmont Press, Inc., 1997, 702 pp, hardcover.

John Casey is manager of the engineering department of the physical plant division at the University of Georgia, Athens, Georgia. If you are interested in reviewing a book for The Bookshelf, contact Casey at [jcasey@uga.cc.uga.edu](mailto:jcasey@uga.cc.uga.edu).

When I began the daunting task of reviewing a 700-page reference book to produce a one (that's right, one) page article, there immediately came to mind the need to give the review boundaries. This review seeks to answer the question, "Why offer a third edition to the *Energy Management Handbook*?" The value of previous editions of the *Energy Management Handbook* is well known by energy and facilities managers over the last two decades. I am sure my experience mirrors many others. I cut my teeth as a young facilities engineer on the first edition and dutifully studied through each chapter of the second edition in preparation for the certified energy managers examination. Both editions have been much more than decorations on my office shelf. But why a third edition only four years after the second?

Editor and contributor, Wayne Turner, the good teacher and speaker that he is, anticipated this question in his preface to the third edition and states that the third edition was necessary because "energy management is marching on at an accelerated pace." Both he, in the preface, and Albert Thumann, in the forward, support this reasoning with four energy management areas that have changed recently, or are in the midst of change. They include deregulation of the electric industry; significant technology improvements (e.g., lighting systems); increased usage of newer technologies (e.g., thermal energy storage systems) and; legislative code and standard changes particularly related to indoor air quality and the Energy Policy Act of 1992 (EPACT 92). I agree that the energy manage-

ment field is changing and maturing, and so I anticipated significant updates and enhancements to this edition. My review focuses primarily on the chapters related to the four areas listed above as rationale for this edition.

Arguably, the biggest change in the energy management world is electric retail wheeling, still in its infancy, but becoming a reality throughout the country. In the forward, Thumann, head of the Association of Energy Engineers, refers to the deregulation of the electric utility marketplace as "one of the milestones of the energy roller coaster ride of the 1990s." In this light, I hoped for helpful, up-to-date information to understand this changing marketplace. The chapter on Fleet Management is replaced with a chapter on Electric and Gas Utility Rates, but this is actually a redo of the second edition's Appendix IV by different authors. While the material is helpful as a primer on understanding natural gas and electric rate structures and developing load profiles, it does not go far enough in explaining the changes occurring in the electric industry. Not even a reference section is included—as in most other chapters—to offer the reader other sources on this milestone issue in the energy management industry. While the chapter on Codes, Standards and Legislation does offer several paragraphs describing expected developments—mostly by utility companies—resulting from deregulation in the electric power marketplace, more could have been said on this critical issue facing facilities managers.

Lighting technology has changed significantly over the last few years,



and so has chapter 13 on Lighting. The chapter is more than twice as long and thoroughly covers lighting fundamentals. In addition, the chapter fluidly discusses both the good and bad points of compact fluorescent lamps, electronic ballasts, reflectors, lenses and louvers, capacitive switching HID luminaires, occupancy sensors, and various new exit sign technologies. The EPACT's effect on lamp banning is outlined in detail and environmental impacts from lamp disposal and PCB ballasts are covered. New sections explain common retrofits, illustrate different lamp types, and summarize lighting energy savings opportunities. The references are comprehensive and up-to-date, and are a welcome addition to the handbook.

Thermal energy storage systems (TES) are becoming more commonplace in educational facilities as we seek creative ways to reduce energy

costs. Chapter 19 provides helpful information that any engineer considering TES should read. It includes discussion on partial and full storage, various storage mediums, along with sizing and economic considerations. However, the material, including the area codes for TES suppliers and the cash incentive list, has not been updated from the 1992 edition. Also, there is no mention of linking TES with cold air systems for even further capital savings in new designs.

Indoor air quality (IAQ) and its relationship to energy management has been given greater emphasis in this edition. While IAQ is still addressed in the chapters on Energy Auditing, and Codes, Standards and Legislation, a new chapter devoted to IAQ has been added. The chapter emphasizes IAQ solutions including not only proper ventilation rates (which often increase energy consumption), but also IAQ source control, filtration, proper maintenance, lifelong commis-

sioning, and life cycle costing of system design. These latter approaches often reduce energy costs needed to solve IAQ problems as they focus on removing rather than diluting IAQ sources.

The Energy Policy Act of 1992 (EPACT 92) was just being introduced when the second edition was published in 1992. The third edition begins to integrate EPACT 92 not only in the chapter on Codes, Standards, and Legislation, but also in the chapters on Lighting (lamp efficiency standards), Cogeneration (retail wheeling), Building Envelop (window performance ratings), and Electric and Gas Utility Rates (effects of deregulation on customer rates). A brief summary of other updates include:

1. More examples in the Cogeneration chapter;
2. A revision of the HVAC Systems chapter with better illustrations;
3. A rewrite of the Electric Energy Management chapter with an entire appendix on variable speed drive issues and applications;
4. A new section on fuel cells in the Alternative Energy chapter that describes intriguing new ways of producing electricity;
5. An entirely new chapter on Energy Security and Reliability which shows the interdependence of utility networks, suggests risk analysis methods, offers useful countermeasures, and reflects the maturation of the energy management field;
6. Significant updates on the Natural Gas Purchasing chapter including a listing of marketing companies; and
7. A rewrite of the Control Systems chapter with more emphasis on commercial, non-industrial controls applications.

I recommend that if you already have the second edition, now may not be the time to invest in the third. However, if you're actively involved in energy management at your facilities and don't have a recent copy of the *Energy Management Handbook*, what

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are you waiting for? With 24 chapters, 33 contributors, a 10 page index, and three appendixes, it remains a "must" reference for the facilities and energy management professional.

**Richard J. Perhai, C.E.M.**

Plant Engineer & Energy Manager  
Oakland University  
Rochester, Michigan

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**Retrofitting of Buildings for Energy Conservation**, second edition, edited by Milton Meckler. Lilburn, Georgia: Fairmont Press, Inc., 1994. 489 pp, hardcover.

**M**ilton Meckler, P.E., set an ambitious goal for this book and his efforts have met with mixed success. He states in his foreword that the book "has been compiled as a comprehensive reference text to be used by building owners, managers and operators, investors, architects and design engineers, contractors and plant engineers." While the book is not a retrofit equivalent of the *Energy Management Handbook*, by Wayne Turner, it does contain some interesting and potentially valuable material.

The book is divided into four sections, but it also divides naturally into two sections—strategies and case studies. The strategies discussed fall under utility rates, energy audits, and economic analysis; design and installation strategies; and energy management and lighting strategies. The different chapters, written by different contributors, are obviously written for different audiences and, as a result, the book as a whole feels disjointed. Some chapters are well written—concise, clear, and to the point. Other parts may be too general for energy management professionals but may be ideal as an introduction or guideline for people unfamiliar with the profession.

Some chapters seem out of date. The first edition was published in 1984 and this edition was published

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in 1994. There is no indication of which chapters were written or revised for this edition. The energy conservation field is changing so rapidly that even papers written in 1994 can be out of date. Just the changes in direct digital control, in the purchasing of energy, and financing options since 1994 have been significant. In breadth of subject matter, the chapters run the gamut from a broad-brush discussion of commissioning for retrofit projects to a rather narrowly focused chapter on variable-air-volume airflow rates.

All of the case studies were interesting. One in particular, of a corporate center in Danbury, Connecticut, was especially intriguing to this reader. Another, on institutional rehabilitation, did a good job of walking the reader through some common calculations. Some of the case studies had implications for a wide variety of applications, while others had a very narrow focus. The nature of case studies tends to make them applicable to specific cases. The ability to generalize from them is limited. On the other hand, seeing how particular problems were attacked and solved by a different individual was enlightening. In summation, the book is a mixed bag on a number of levels. Since it is a collection of pieces written by different contributors, there is a lack of cohesiveness of style and subject matter. Some of the information is dated; some is at least far less date-sensitive. While it is not a comprehensive reference text, it is interesting and contains information on energy conservation retrofitting which can be useful and is not easily found elsewhere.

Ralph Palmer  
Coordinator of Energy Services  
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Indoor Air Quality—Solutions and Strategies, Steven M. Hays, Ronald V. Gobbell, and Nicholas R. Ganick. New York: McGraw-Hill, 1995, 418 pp, hardcover.

Someone once remarked that you can tell a lot about people by seeing who their friends and business associates are. If there were any doubt about this truism, the authors of this book dispel them immediately. Here we have three professionals who are partners in a consulting firm which specializes in indoor air quality (IAQ) problems. Their credentials are very impressive, and each brings a different perspective to their collective input to problem solving. The synergy of their expertise is striking, reflecting their background: Hays is both a registered engineer and certified industrial hygienist; Gobbell is a registered architect; and Ganick is a registered HVAC engineer. The melding of these disciplines allows their firm to be engaged in over 6,000 environmental facilities projects. This book, intended as an overview for professionals in the building industry, summarizes their experience and means "... to provide a foundation of IAQ analysis and control, showing relationships among the various disciplines which are fundamental to an understanding of IAQ issues and the practical applications of these disciplines to IAQ."

The book is divided into logical sections, including a brief introduction which is an excellent primer on the IAQ "problem." Three chapters follow, covering the application of industrial hygiene, mechanical engineering, and architecture/construction in indoor air quality investigations. The final chapter synthesizes the three perspectives, and proposes a method for complete IAQ management procedures. The appendices contain checklists, questionnaires, and a complete glossary.

The authors succeed in demonstrating the need for an interdisciplinary approach to IAQ investigations. I admit that I started reading *Solutions & Strategies* through my mechanical engineering eyes, because I was convinced that IAQ issues were only

tangentially related to industrial hygiene and architecture. But pride preceded the fall as I soon discovered how much "they" knew, or how little I knew, about the problem. I am now a firm believer in the formal interdisciplinary methodology that is proposed by the authors, especially as it relates to a proactive maintenance plan for building environmental systems.

*Indoor Air Quality—Solutions and Strategies* is a report to the construction and operation world about a very serious problem. Many campus buildings throughout the world have poor or marginally acceptable indoor air quality, so it is important for all facilities managers to understand how to avoid, or at least minimize, these problems. This book, written by professionals who have "been there, done that" should be in everyone's library.

**Dr. John M. Casey**

Manager, Engineering Department,  
Physical Plant Division  
University of Georgia  
Athens, Georgia



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# Coming Events

## APPA Events

For more information on APPA seminars and programs, contact the APPA Education Department at 703-684-1446, ext. 230 or ext. 231.

**Apr 22-24—1998 Virginia**

**APPA/Virginia Higher Education Facilities Management Group Annual Conference.** James Madison University, Harrisonburg, VA. Contact [vaappa-hefm@jmu.edu](mailto:vaappa-hefm@jmu.edu) for information.

**Aug 2-4, 1998—APPA Educational Conference & 85th Annual Meeting.** San Jose, California.

**Aug 31-Sep 3—AAPPA regional meeting.** Darwin, Northern Territory, Australia.

**Sep 16-19—RMA regional meeting.**

Yavapai College, Prescott, AZ. Contact host Charles Andersen at 520-776-2181.

**Sep 20-25—Institute for Facilities Management.** Portland, OR.

**Oct 2-6—CAPPA regional meeting.** Little Rock, Arkansas. Contact host Jerrel N. Fielder, Sr., University of Central Arkansas, 501-450-3196.

**Oct 4-7—MAPPA regional meeting.** St. Paul, MN. Contact Thomas Dale, University of St. Thomas, 612-962-6530.

**Oct 4-8—PCAPPA regional meeting.** Palm Springs, CA. Contact James Hansen, California State University/San Bernardino, 909-880-7206.

**Oct 16-20—SRAPPA regional meeting.** Birmingham, AL. Contact Brooks Baker, University of Alabama/Birmingham, 205-934-4427.

**Nov 1-4—ERAPPA regional meeting.** Providence, RI. Contact Norman Young, University of Hartford, 860-768-7924.

## Other Events

**May 4-5—CSI Seminar: Construction Contract Administration.** Denver, CO. Contact CSI's Customer Service Center, 800-689-2900.

**May 4-5—Tools for Schools: A Strategic Conference on Removing Environmental Hazards from Our Nation's Schools.** Chicago, IL. Contact IAQ Publications, 800-394-0115.

**May 4-6—Steam Turbines & Auxiliaries.** Houston, TX. Contact the Center for Professional Advancement, 732-613-4535.

**May 6-8—Operation and Maintenance of Pumps.** New Brunswick, NJ. Contact Cook College Office of Continuing Education, 732-932-9271.

**May 18-19—Technology Conference.** San Diego, CA. Contact Pat Apel, Maryville University, 314-529-9304.

**May 18-20—Facility Forum '98.** Orlando, FL. Contact WPC Expositions, 908-788-0343, ext. 135.

**May 18-20—Tools and Techniques for Thinking and Managing Strategically.** New York, NY. Contact the American Management Association, 800-262-9699.

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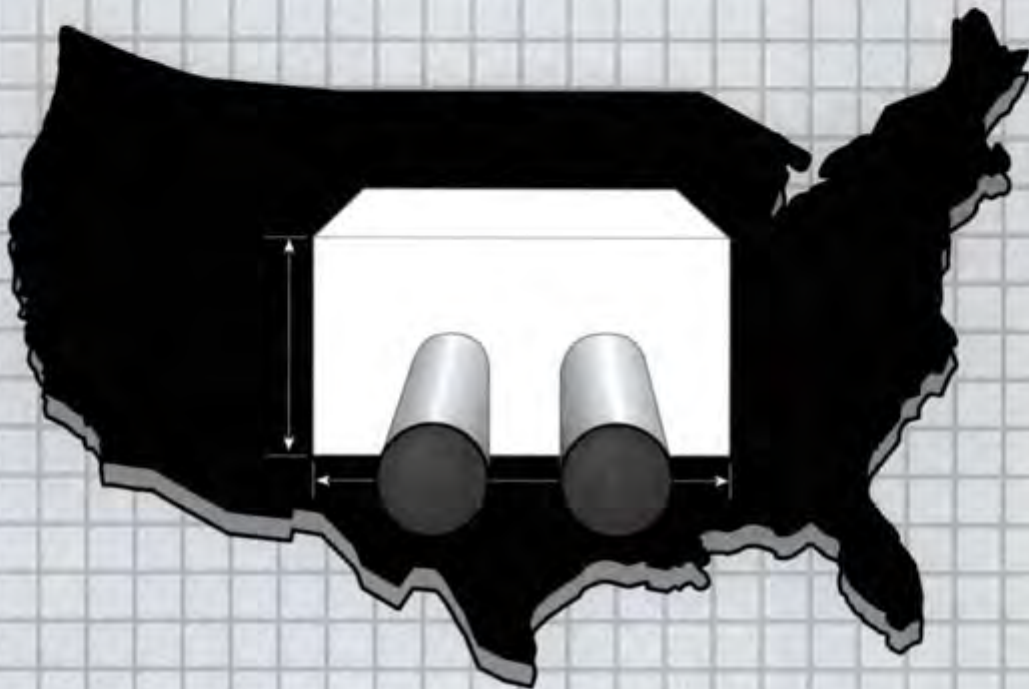
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