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UNE 1986

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ARCHITECTURAL DESIGN

Editors in charge: Susan Doubilet, Thomas Fisher

73 Rafael Moneo

Spanish architect Rafael Moneo's National Museum of Roman Art, Mérida, is featured. followed by some of his earlier works. A review of the Museum by British journalist Peter Buchanan and a P/A interview with Rafael Moneo are included. Susan Doubilet, Thomas Fisher

86 Campus Complement

The completed Kersten Physics Teaching Center at the University of Chicago has closely followed the design that won a 1984 P/A Citation for architects Holabird & Root, working with campus architect Harold Hellman. Jim Murphy

92 P/A Profile: Harmony and Wholeness

California architect Christopher Alexander's theories are far more widely known than his built work, which is increasing steadily. Two houses, a school in Japan, and a café in Austria are featured, followed by a discussion of Alexander's ideas and his influence on architectural education. Pilar Viladas, Thomas Fisher

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104 Intelligent Computers

Several case studies illustrate efforts to improve the contribution of computers by reducing costs, increasing efficiency, expanding capabilities, or assigning them repetitive or dangerous tasks. Susan Doubilet, Thomas Fisher

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115 A/E/C Systems '86

This section provides comprehensive coverage of meetings, seminars, and exhibits, a list of participants, and some of the many products being introduced at A/E/C Systems '86, June 23-27, in Chicago.





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National Museum of Roman Art, Mérida, Spain (p. 73) by Rafael Moneo. Photo by Lluis Casals.

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Two Invitations for You

Your participation is requested in two programs that can benefit you and the profession: our 34th annual P/A Awards competition (page 13) and a new series of P/A Reader Polls (page 16).

P/A Awards Program

WE at P/A are in favor of awards programs generally, provided they are administered fairly and judged wisely. And we have put a lot of effort into ensuring the value of such programs. Besides administering our own P/A Awards competition, our editors have been involved in dozens of awards juries sponsored by AIA at all levels and by industry groups—serving as advisors and consultants, as well as judges.

For any awards program to confer real distinction upon its winners, certain elements are crucial: clear, equitable rules; a fair, authoritative jury; a good representation of all eligible entries, including some of the finest work (and to get these entries, even the best-known competitions need vigorous solicitations).

With the P/A Awards program, we have had a lot of experience at administering awards juries, and our effectiveness is borne out by the medal that the AIA bestowed upon the program in 1980 as "one of the factors influencing the course of American architecture." But despite the widespread respect for this program and our conscientious efforts to maintain it, there are a few misconceptions that may discourage some potential participants.

One myth is that it takes more than good work to win a P/A Award—that you have to have some kind of connections or belong to some annointed movement. A look at any P/A Awards issue will show, however, that winners are not limited to any group. We pointedly assemble juries with diverse points of view, even at the risk of serious discord (though we do steer clear of crusaders who respect only their own goals). To further assure that the program is not a closed mutual-support system, we make sure that some jurors are *not* previous P/A winners. The openness of these juries to unfamiliar work is amply demonstrated by the annual results; there are always winners whose names (when revealed at the end of the anonymous judging) are unknown to the jury.

And that brings up a second all-too-common misconception: that the P/A competition is primarily a new-talent contest. As proud as we are of the emerging talents uncovered in this program, we know that the stature of these awards depends on the inclusion of work by established firms, as well. (CRS and SOM, for instance, have won dozens of awards, from the 1950s on into the 1980s.)

And then there is the misconception that entries to the P/A Awards competition must be expensive productions. While some firms do spend thousands of dollars on an entry (though I suspect their figures include photos and such that they would obtain anyway), expensive submissions are by no means necessary. Every year there are winning brochures consisting of nonprofessional model shots and drawings reproduced on ordinary copiers. What the submission must have is not lavishness, or even cleverness, but *clarity, completeness,* and *coherence.* The jury will love you for that—and our editors will appreciate it, too.

P/A Reader Polls

To readers of architecture magazines, questionnaires are nothing new. You have probably been asked repeatedly which articles you like best, which materials you have specified, and other questions that help the editors, publishers, and advertisers to improve their performance. But this month, P/A is initiating a series of surveys—which we are calling P/A Reader Polls—to elicit information that we think *you* will want to know. We expect the results of these polls to inform you about the activities and concerns of architectural professionals as a group—then go beyond that to tell you something of what your colleagues are feeling and why.

The first of these Reader Polls takes up the eternal question of compensation: what and how firms and individuals are paid for their work. For a fuller explanation of the P/A Reader Poll program and the reports we hope to produce for you, turn to page 16.

And please take a few minutes to fill out and mail the simple questionnaire facing that page. By gathering responses from the widest variety of readers—including you—we can give you findings that are accurate and insightful.

John Monis Difn



Circle No. 351 on Reader Service Card

Architectural Fabric Structures: An Alternative.



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P/A Awards Program

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announces its 34th annual P/A Awards program. The purpose of this competition is to recognize and encourage outstanding work in Architecture and related environmental design fields before it is executed Submissions are invited in the three general categories of architectural design, urban design and planning, and applied architectural research. Designations of first award, award, and citation may be made by the invited jury, based on overall excellence and advances in the art.

JURY FOR THE 34TH P/A Awards

Architectural Design: Bernardo Fort-Brescia, Principal, Arquitectonica, Coral Gables, Fla.; Thomas Hines, Professor of Architectural History, UCLA; George Hoover, Principal in Charge of Design, Hoover Berg Desmond, Denver, Colo.; Ricardo Legorreta, Legorreta Architects, Mexico City.

Urban Design and Planning: Joe Berridge, Planner and Urban Designer, Berridge Lewinberg Associates, Toronto, Ontario; George Notter, President, Notter Finegold & Alexander Inc., Boston, Mass.

Research: Vivian Loftness, Associate Professor, Department of Architecture, Carnegie-Mellon University, Partner, VLH Associates, Pittsburgh; John Templer, Professor of Architecture, Georgia Institute of Technology. Judging will take place during October 1986. Winners will be notified, confidentially, before October 31. Public announcement of winners will be made at a ceremony in New York on January 23, 1987, and winning entries will be featured in the January 1987 P/A. Clients, as well as professionals responsible, will be recognized. P/A will arrange for coverage of winning entries in national and local media.

Turn page for rules and entry forms.

DEADLINE FOR SUBMISSIONS: SEPTEMBER 8, 1986

P/A Reader Poll Profiling the Profession

The questionnaire facing this page launches an open-ended series of P/A Reader Polls, through which you and your colleagues will learn more about timely professional concerns from analyses of your responses.

If you are pressed for time, skip over these words of explanation for now; just fill out the questionnaire to the right and mail it off. Your answers will be completely anonymous, and they are essential if we are to give you meaningful findings on professional compensation.

This series of polls is unique in the architectural field in that it is being done to produce information of interest to you, the reader—not just to editors, publishers, or product suppliers. And the reports you will get in later issues of P/A will not be just statistics. Answers will be correlated by Morrison & Morrison, research consultants, to generate interpretive findings. Dr. Bruce Morrison, an experimental psychologist, will analyze the responses further to uncover some of the attitudes and emotions likely to underlie them. We are planning to publish the results of each poll in the fourth issue following the questionnaire, to allow time for return and tabulation of the forms, interpretation of results, preparation and printing of a final report.

While the results of this poll are being processed, we will be working up further polls on such subjects as Liability (questionnaire scheduled to appear in the August P/A) and Career Satisfaction (now planned for October). Eventually, we plan to extend these surveys into such areas as design preferences, education, professional organizations, and leisure activities.

A few words on the questions themselves: The primary focus of this first poll (and most subsequent ones) is the architectural profession. But we do not want to discourage responses from readers in such vital related fields as interior design, engineering, and development. In fact, we are depending on them. We just ask that you all read the questions literally: Where it says "architect," for instance, answer the question to the best of your knowledge *as it applies to architects;* where it says "you" or "your," answer for *yourself*, whatever your profession.

And feel free to be totally candid. We have designed this form so that your answers can be completely concealed until it is opened for tabulation, and there will be no way for Morrison & Morrison or P/A to identify you.

So now that you have read the explanation, please be sure to fill out and mail your questionnaire. It should take no longer than five minutes of your time. And it will help P/A to shed more light for you on the profession all of us depend upon for a livelihood. *John Morris Dixon*



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Cranbrook Academy of Art Mr. James Murphy—*Progressive Architecture*



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Gottfried Böhm.



Bensberg City Hall.

Gottfried Böhm, Pritzker Laureate

When Cologne architect Gottfried Böhm was announced as eighth recipient of the Pritzker Architecture Prize, few at the press conference at New York's Museum of Modern Art were familiar with his work. Grandson, son, father, and husband of architects, the 66-year-old Böhm enjoys a quiet following in Europe, the locale of almost all of his buildings, but is little known in America. Despite the originality and power of some of his earlier buildings such as the City Hall at Bensberg and the Pilgrimage Church at Neviges, both dating from 1964, his work has been exhibited only once in this country, and then modestly, at the MoMA "Transformations in Architecture" show of *(continued on p. 25)*



Javits Center Great Hall.

Javits Center Opens

After agonizing construction delays and amid continuing fits of controversy over financial and political games along the way, New York finally has its new convention center. The Jacob K. Javits Convention Center occupies an enormous 18-acre site on Manhattan's West Side, stretching from 34th Street to 39th Street, between 11th and 12th Avenues. Reported to enclose 1.8 million square feet and to provide 900,000 square feet of exhibition space, the center opened with formal ceremonies in April.

James I. Freed is the design partner with I.M. Pei & Partners, architects for the center. Beginning with a 1979 design, the elaborate display of space frame technology ran into a snag in 1983, when flaws were detected in the crucial nodes of the structure. Since all nodes already on the site were suspect, the decision to substitute forged-rather than cast—nodes at all space frame junctions necessitated a revision in the supply chain to cut further delay time to a minimum. Three subcontractors were chosen to perform the task, although Freed feels that one of (continued on p. 25)

Documenting U.S. Architecture

The Society of Architectural Historians has announced plans to produce a 70-volume series entitled The Buildings of the United States. The set will include one volume for each of the 50 states and one each for 20 selected cities. Coeditors-in-chief Adolf K. Placzek and William H. Pierson Jr. expect to release about five volumes a year, commencing with the states of Iowa, North Carolina, Rhode Island, Michigan, and the city Washington, D.C., in 1988. Modeled on the monumental Buildings of England series by Nikolaus Pevsner, the project is supported in part by a grant from the National Endowment for the Humanities and is to be published by the American affiliate of Oxford University Press. Volumes will include not only high-style but also vernacular and industrial architecture.

Davis Brody on Union Square

Two years after demolition of the S. Klein department store on Union Square in New York City, plans for its replacement have been unveiled by a consortium of The Zeckendorf Company, Hirschfeld Realty, and KG Land New York Corporation, an affiliate of Kumagai Gumi Co. The one-million-square-foot mixed-use development takes advantage of a recent rezoning arrangement designed to encourage residential construction in the Union Square neighborhood. A prestigious address in (continued on p. 26)



One Union Square.

P/A NEWS REPORT

Pencil Points

The Los Angeles Library, designed by Bertram Goodhue and completed in 1926, suffered an estimated \$22 million in damage, especially to its interior and contents, in a fire on April 28. Arson is suspected. The façade, though blackened, remained intact, as did the structure; 44 people were injured. The building, listed on the National Register of Historic Places and declared a historic cultural monument by the L.A. Cultural Heritage Board in 1967, has had a long history of fire violations.

Hampton Court, Henry VIII's palace outside London, was badly damaged by fire last month. Staff and firefighters succeeded in saving most of the art treasures housed in Hampton, but the palace's south wing, designed by Sir Christopher Wren in the 1690s, sustained considerable damage. A candle in the apartment of the fire's one victim is blamed for the disaster.

The University of Toronto (P/A, May 1986, p. 30) has set up a Presidential Task Force, to report by July 1, to study the feasibility of retaining the School of Architecture, but as an affiliated college. Informed observers predict a positive decision, based on the sympathetic makeup of the committee and the fact that the University has been proceeding with the admission of new students.

Peter Papademetriou, Professor of Architecture at Rice University and P/A correspondent since 1975, has been awarded a Guggenheim fellowship to complete research on the life and career of architect Eero Saarinen.

The J. Paul Getty Trust has appointed a design advisory committee to review and criticize architect Richard Meier's proposals for the Getty Fine Arts Center in Los Angeles. The committee, selected with Meier's input, is chaired by Bill Lacy, president of Cooper Union, and includes designer Saul Bass, architects Frank Gehry and Ricardo Legorreta, critic Ada Louise Huxtable, and corporate executive J. Irwin Miller. Meier will present his schematic design to the Los Angeles City Planning Commission later this year or early in 1987.

inued on b 34)



Isozaki and Ishioka's Performing space.

Tokyo: Then and Now

Tokyo: Form and Spirit, which opened in April at the Walker Art Center in Minneapolis, is an ambitious, multidisciplinary effort tracing the continuity of Japanese artistic tradition from the Edo period (1603-1868) to the present. Assembled by the Walker in association with the Japan House Gallery, New York, and curated by director Martin Friedman and design curator Mildred Friedman, the exhibition is organized by themes of everyday life (Tokyo Spirit, Walking, Living, Working, Performing, Reflecting, and Playing), and contrasts Edo art and objects with thematic spaces by leading contemporary Japanese architects, designers, and artists (see P/A Preview, April, 1986, pp. 108-113). But the Edo objects, wonderful as they are in their diversity, beauty, and integrity, seem at times tenuously connected to the contemporary spaces, which are predominantly architectural, and almost invariably conceptual.

Fumihiko Maki and Kiyoshi Awazu's six Tokyo Spirit columns are loaded with minutely detailed architectural observations, and Tadanori Yokōo's silkscreen tableaux in the Walking section are vivid overlays of high-art and pop imagery evoking key historical periods, but their architectural frames, designed by Arata Isozaki, seem disconnected. Isozaki appears much more at home in the Performing section, where he and art director Eiko Ishioka created a show-stopping glass-topped stage, which contains 60 video monitors (showing Japanese television commercials) and which also supports live performances-a combination of timeless architecture and hightech wizardry that epitomizes the Japanese genius for integrating the ancient and the up-tothe-minute, a talent also present in Tadao Ando and Shiro Kuramata's elegant Living space, Hiroshi Hara's technically dazzling Working space, and Toyo Ito and Kohei Sugiura's ethereal Reflecting space. While this meticulously designed exhibition often raises more questions than it answers, these very disparities underline the Japanese knack for assimilating impossible amounts of conflicting information into something greater than the sum of its parts.

After closing in Minneapolis on July 20, the exhibition will travel to The Museum of Contemporary Art, Los Angeles (August 30-October 20); the IBM Gallery of Science and Art and the Japan House Gallery, New York (December 7, 1986-February 8, 1987); and the San Francisco Museum of Modern Art (March 15-May 10, 1987). The catalog, copublished by the Walker and Harry N. Abrams, Inc., is a hefty, comprehensive collection of in-depth essays and lavish illustrations. Pilar Viladas



Modern tableau by Yokoo and Isozaki in Walking section

West Week 1986: **Art Meets Science**

Art, Technology and Design was the theme of this year's West Week, which brought a record-breaking 22,000 design professionals to the Pacific Design Center in West Hollywood, Calif., in March. The three-day event featured guest speakers from many disciplines, in an ambitious effort to stress the connection between technology and the arts. In one panel, biologist Paul Ehrlich, Dr. Albert Hibbs of the Jet Propulsion Laboratories, and Nobel laureate physicist Richard Feynman shared the dais with artist June Wayne and moderator Tom Van Sant, a fellow at MIT's Center for Advanced Visual Studies. Van Sant also created a conceptual artwork that combined timelapse photographs of the Earth taken from a number of satellites during West Week's three-day duration.

Design matters were addressed in Cesar Pelli's keynote speech, in which he presented his design for the expansion of the PDC (P/A, Oct. 1976, pp. 78-83). A panel on architecture for art featured Frank Gehry (designer of L.A.'s Temporary Contemporary), Max Gordon (the Saatchi Museum, London), Cesar Pelli (The Museum of Modern Art expansion), and Norman Pfeiffer of Hardy Holzman Pfeiffer Associates (whose L.A. County Museum addition is nearing completion). Thom Mayne, Jill Cole, Rob Quigley, Johannes Van Tilburg, and Joe D'Urso discussed Southern California interiors, while Niels Diffrient, Don Chadwick, Bill Stumpf, Michele De Lucchi, and Warren Snodgrass presented their own chair designs and critiqued each other's. And in one of the biggest hits of the event, artist David Hockney, art director Eiko Ishioka, and architect Zaha Hadid discussed the conceptual process in art, architecture, film, and design. Other seminars addressed productivity, office automation, and facility management, and ongoing exhibitions displayed L.A./AIA Interiors Awards and California Council AIA Honor Awards winners, decorative arts of the early 20th Century and the present, contemporary jewelry created in Formica's Colorcore®, and a 75-year retrospective of German furniture. For those who were still standing after all this, a party at the Temporary Contemporary brought the event to a lively close. Pilar Viladas

Javits (continued from p. 23) them really "bailed out" the others. The resulting construction delays nevertheless cost the city numerous scheduled bookings and the huge loss of revenue from them.

Although originally intended to carry on for two more of the 90-foot bays, the building is already four blocks long. Still, in its organization, the center is a model of clarity, and the dynamic north-south main axis, the concourse, is ample in scale and proportion to handle almost any convention or combination of exhibitions. This axis bisects the Great Hall, the obvious focal point of the whole facility.

Another axis also bisects the hall, perpendicular to the concourse; it is clearly defined as an amenity spine, lined with various shops and terminating in a restaurant at its west end. It is intended that some of these facilities have a life of their own, perhaps separate from pure convention activity.

A system of massive round concrete columns and precast beams at the lower exhibition level carries up to a datum above which the four steel tubes, filled with concrete, form the columns that pick up the loads from the space frame. Elegant girts at the outside window wall carry the wind loading there.

As no applicable code existed for such a high occupancy facility in New York, a special committee set up a criteria framework. Instead of one central HVAC source, for instance, individual rooftop units serve each bay; all are controlled through the central computer.

While the exhibitors' needs have been anticipated (in the form of approximately 50 truck loading locations and outstanding accessibility to exhibit areas), other attendees will probably feel slighted by the almost total lack of parking provisions. The center is intended to be served almost exclusively by shuttle bus runs from the hotels, and no effort was expended to cater to anyone who is unwary enough to drive there.

Even its relatively low profile, especially on 11th Avenue, does not conceal the fact that this is a big center. The gray glass, in 5-foot and slightly more articulated 10-foot grids wraps the building in a uniform, if remarkably unremarkable exterior. Heavily dependent on its higher mass and eroded portal (and clear glass, which helps), the entry-into one of the second highest bays of the great hallaffords almost no procession from the great outdoors to the very big indoors.

Once in, a visitor cannot help but be awed by the scale and structural intricacy of the great space. Its central lantern, reaching a height of approximately 150 feet, is 90 feet square; its four corners are carried on spidery legs down to the inverted pyramid/four-post columns that are typical of the upper level. The sides of the successively lower bays merge with the roof structure to form a continuous fabric. It is a little frustrating to be confronted by a platform dead ahead, which must be surmounted to reach the center of the highest bay. Even so, the space and the vistas north along the concourse and west into the shop/amenity corridor are fascinating in their immensity.

Convention centers are, by nature, boxes to hold exhibits and to move people efficiently and rationally, keeping them as well oriented as possible. Few ever approach the clarity of layout or the lyrical quality of space and structure achieved at the Javits Center. By all appearances, it should function beautifully and inspire its thousands of monthly visitors as well. *Jim Murphy*



The Javits Center.



Züblin headquarters.

Böhm (continued from p. 23) 1979. (This situation is about to be redressed, as an exhibition of Böhm's architectural drawings is scheduled to begin traveling this summer, to the University of Pennsylvania, the Graham Foundation in Chicago, the University of Maryland, the AIA National Headquarters, and MIT.)

Böhm's style has changed markedly over his 40 years of practice. The early buildings, mostly of poured concrete or masonry, seemed almost like eruptions forced out, and made, of the earth's mud, while founded in the tradition of European Expressionism, a tradition which also interested his father, Dominikus, well known for his Catholic churches. The inspiration of Erich Mendelsohn's Einstein Tower can be discerned in the Bensberg City Hall's stair tower, and the Neviges Church is based on the crystalline form common in German Expressionism.

By the 1970s, Böhm's interest had shifted dramatically to lightweight materials, and he adopted a much lighter touch and broader color range. He explained the change as a response to the contemporary world and its economic realities. to new technologies and their possibilities. The glass and steel Citizens' Center in Bergisch Gladbach (P/A, June 1982, pp. 72-75) retains the cozy scale and modular repetitions of some of his earlier masonry work, such as the Children's Village in Bensberg-Refrath of 1965, but something new is introduced: a playful, non-earthy tone, especially noticeable in colorful painted scenes which Böhm himself painted onto surfaces in the interior, and which have a flat, thin, somewhat cute appearance.

The Züblin Corporate headquarters of 1984 has a curious mixture of the lightweight and light-filled with the ponderous. Made up of prefabricated parts, this time not steel but precast concrete, and with an immense glass atrium, the building seems alternately like a fortress and a fairy-tale castle, solemn, sturdy, earnest in its careful detailing and search for original artistic expression—most fascinating in its atrium stairtower, an unmistakable reference to Bensberg City Hall—but yet a little fussy.

While Böhm's shift from earthy expressionism to more literal forms and traditional massing did coincide with the Post-Modern movement, one has the sense that he was marching to his own drummer. Brendan Gill, secretary to the Pritzker jury, suggested that the jury's interest in Böhm was due in part to Böhm's ability, even as he shifted styles, to "avoid the taint of fashion." It seems that the Pritzker jury itself, in selecting the relatively unknown Böhm, avoided the very same taint. Susan Doubilet

Metropolitan's New 20th-Century Wing

The Metropolitan Museum of Art's \$26-million wing for 20th-Century works, to be opened to the public in February 1987, was recently completed and shown to the press. The new addition, designed by Kevin Roche of Kevin Roche John Dinkeloo and Associates, New Haven, Conn., will be named after the late Lila Acheson Wallace, cofounder of Reader's Digest and a major museum benefactor, who contributed \$11 million to the wing's construction.

The new building is the last major stage in the Museum's master plan for expansion, inaugurated in 1970 at the institution's centennial (P/A, July 1975, p. 20; August 1975, pp. 60–3). Located on the southwest corner of the original building, the new wing is similar in profile to the American Wing (1980, also by Roche Dinkeloo) to the northwest, with its tiered, sloping glass roofs and daylighted galleries (P/A, July 1980, p. 42).

The 20th-Century wing is designed to function as a museumwithin-the-museum, with its own staircase, gift shop, and restrooms. Twenty-two gallery spaces, arranged to allow visitors to choose their own course, fill two full floors, with a dramatic skylighted sculpture area occupying a mezzanine.

The restrained richness of the entry spaces, with their paneled walls and polished granite floors, contrasts with the simpler materials used in the galleries—gypsum board walls, oak trim.

In addition to European and American painting and sculpture from 1900 to the present, the new wing will offer a permanent display space for design and architecture, putting the Met's collection of work by 20th-Century masters on view at last. Joanna Wissinger

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P/A NEWS REPORT

Union Square (continued from p. 23) the days of Henry James, the Square had declined over the past two decades. Real estate pressures and a concerted effort by City Hall to attract development, however, have made the area once again desirable.

Davis Brody's four 20-story, masonry-clad residential towers rise from a continuous 7-story base, which will house groundfloor retail space, office space, a residents-only health club, and two floors of apartments. A new facility for the Vineyard Theater and parking are planned below ground.

The seven-story base maintains the Square's established cornice line, while the towers' pyramidal caps are kept below the more spectacular top of the adjacent Con Edison building, a local landmark. Two new subway entrances are to be built within the block. Foundation work is already under way, and the \$200 million complex is to open summer, 1987.

Deficiencies on Times Square

The long saga of the "Portman Hotel" (as it has been generally, and none-too-affectionately, known for years) in New York's Times Square, seems to be working its way to a fittingly controversial conclusion. The colossal convention hotel that architect/ developer John Portman built on the rubble of the historic Helen Hayes and Morosco theaters, and which opened last fall as the Marriott Marquis Hotel, is finally about to unveil its new 1500-seat theater on Broadway, thus delivering the last major amenity required of it by the city, an amenity without which several of its 50 stories and hundreds of its 1877 rooms would presumably not exist.

But even this simple quid pro quo seems to have been too much to have expected of a project that has, from its very inception, been as determinedly antiurban-and indeed, antisocial-as this one has. The new theater, originally proposed as a "stateof-the-art" theater, is now generally regarded by much of the theater community as being seriously deficient. There are no separate loading docks into the theater, for example, so stage sets and costumes must be brought in through hotel loading areas. Likewise, the theater shares an entrance on Broadway with the hotel's new retail spaces. The fly-space, wing-space, and dressing areas are also considered to be woefully small.



The Marriott Marquis.

Citing these and other problems, the Shubert Organization, which was originally to have managed the theater, backed out of the deal over a year ago. Operation has now been given to the Nederlander theater group, which has hired theater designer Roger Morgan to try to salvage something from the interior spaces. In an effort to patch this problem over, the City Planning Commission has released the hotel from the requirements of the special permit under which it was built, in exchange for which the theater is to be made available for one month a year for the use of community groups.

This soft treatment from the city planning commission is just the latest in a long series of concessions, subsidies, and political shoves that this project has received from the start. Reflecting the desperation officials felt over economic conditions at that time, especially in that area of the city, the Marquis was begun with the assistance of the state's Urban Development Corporation, supported by a large federal UDAG grant, handed large tax subsidies, and built over the heated protest of the preservation community, which turned out in strength to resist Portman's destruction of the two theaters. Smoothing over the problems with the complex's new theater simply fits the pattern of its politically charmed life.

Aside from the issue of public assistance, the Marriott Marquis is discouraging architecture, a brooding, ugly fortress that turns its back on Times Square and isolates its occupants from the urban environment. In sealing off its users, it displays an architectural attitude seldom seen, and certainly not desirable, in New York City. *Peter Lemos*

The author is a contributing editor at Metropolis magazine.



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The Gemeentemuseum.

Berlage Revisited

The fiftieth anniversary of H.P. Berlage's Gemeentemuseum in The Hague (1930-35) was celebrated this spring by a series of events in honor of the architect, and by the opening in February of a substantial new addition by Rotterdam architect Wim Quist. The original building, the last work of one of Modern architecture's great pioneers, completed nearly a year after his death, was for the most part ignored by critics of the day, who found it rather out of date in comparison with the white walls and ribbon windows considered standard in advanced circles by 1935. Five decades later, however, the building appears surprisingly contemporary, a remarkable synthesis of the "modern," in its exuberant spatial qualities, and the "traditional," in its stubborn defense of ornament.

Berlage prepared his first scheme for the Gemeentemuseum in 1919; intended as a cultural center more than a mere museum, the project was far too ambitious for post-war realities and was never carried out. In 1927, the community returned to Berlage for a second plan, this time considerably pared down in both size and program. This new version, which Berlage developed in close conjunction with museum director H.E. van Gelder, represented a radical reassessment of the museum as a public institution. No longer a palace of art, the museum had to answer the needs of education and public accessibility. Berlage's design was intended, therefore, to reduce "museum fatigue," by means of a central ring corridor with a courtyard on one side and rooms grouped according to content on the other.

The rational intentions that underscored the program of the museum did not, however, preclude the manipulation of parts toward exclusively architectronic and even expressive ends. The building is approached through a long glass gallery, with ponds to either side—a thoroughly 20th-Century transformation of the grand flight of stairs, and equally dramatic. The gallery spaces themselves are less dramatic, but just as carefully designed, with a high side light that bathes the gallery walls, built-in benches, and unusual showcases built into the outside wall and lighted from above.

The building as a whole was intended to be seen as a museum in a garden; as such, ponds, gardens, a pergola, and restaurant pavilion were brought into the scheme. A small and sensibly sited addition to the museum in 1961 by S. Schamhart, linked to the west end of the original building by a glass gallery and providing temporary exhibition spaces, did not do appreciable damage to this conception, despite the inelegance of its vaguely Miesian architecture.

Unfortunately, the same cannot be said of the new addition by Wim Quist. The new space is not an expansion of the Gemeentemuseum itself, but houses an entirely separate museum, the Education Museum (known as Museon), an institution roughly akin to the Smithsonian in Washington, D.C. The decision to locate the new museum adjacent to the Gemeentemuseum-indeed connected to it by another long glass gallery-was based on the scarcity of suitable land parcels in The Hague, concerns for efficiency, and the desire to heighten the visibility of the Education Museum.

To be fair, Quist—unlike his predecessor Schamhart—has made a serious attempt to respond in a contextual manner to Berlage's building. He obviously appreciates Berlage's organization of the whole from a carefully (continued on p. 30) The Klassik armchair





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Berlage (continued from p. 29)

defined set of pieces (the physical expression of Berlage's "unity in plurality"), and he has even adopted the Gemeentemuseum's 1.1-meter module, using it throughout his addition. The massing of Quist's building, however, though related to Berlage's, seems almost haphazard in comparison, and the detailing, despite the choice of colors and materials similar to those of Berlage's original, is rather harsh. The building is entirely devoid of ornament, in sharp contrast to the sober and subtle ornament that enriches the Gemeentemuseum. The design is much stronger, however, on the interior where Quist, freed perhaps from contextual concerns, has produced spaces both clear and coherent, which should serve the museum well.

Berlage's increased isolation in the 1920s and 1930s was a direct result of his reluctance to accept that which the younger generation of architects saw as a direct conclusion to his own groundbreaking work: a functionalist architecture without ornament. Berlage upheld until the end his belief in a formal organization based upon aesthetics and not merely function, and in the necessity of ornament in architecture. For these convictions Berlage appeared hopelessly out of date in 1935; for the same convictions, the Gemeentemuseum 50 years later remains strong and convincing. It is a sign of the times that the administration of the museum now sees it fit to honor Berlage for his design and his ideas. A second look at the Gemeentemuseum is especially rewarding today, in light of the continuing debate over Modernism; the contrast of the Berlage building to the new addition by Wim Quist brings new force to the arguments that surrounded its design in the early 1930s and that remain compelling today. H. Paul Rovinelli

The author, an architect in Boston, has recently completed a year in the Netherlands researching the late work of H.P. Berlage, under grants from the Fulbright Commission and the National Endowment for the Arts.



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Pencil Points (continued from p. 24) The Design Arts Program of the National Endowment for the Arts has named the design of cities its theme for the 1987 grants program. Contact Design Arts, 1100 Pennsylvania Ave. N.W., Washington, D.C. 20506 for grant guidelines.

The American Academy in Rome has awarded seven fellowships. Four Advanced Design Fellowships for design professionals with at least seven years experience, supported in part by the National Endowment for the Arts, went to planner Norman Krumholz, architect William P. Bruder, urban designer Jeanne Giordano, and graphic designer Julie Riefler. Three Rome Prize **Fellows are Frederick Biehle** and Kathryn A. Dean in architecture, and Elizabeth Hermann in landscape architecture.

The winners of the CertainTeed Award for City Visions have been named. They are Ian Cope, Philadelphia; Stephen Heinz, Yardley, Pa.; Patricia Kucker and Wesley Wei, Philadelphia; Patrice Lynch and Brian Wait, Philadelphia; and Louise Schiller, Cranbury, N.J.

The California College of Arts and Crafts in San Francisco, Northern California's only four-year art and design school, has established a new architecture program, which is to be housed, along with the existing interior design program, in a former cable warehouse renovated by Gensler Associates.

Delta Faucet Company is launching a competition seeking new visions of "the delivery of water." They are offering cash prizes for professionals and students. Jurors are Emilio Ambasz, Bruce Burdick, and Michael McCoy. Paul Rosen of Kohn Pedersen Fox Conway helped develop the concept; Jim Murphy of P/A acted as advisor. Further details: Delta Faucet Company, P.O. Box 40980, Indianapolis, Ind. 46280.

The Statue of Liberty has been selected to receive the AIA's Henry Bacon Medal for Memorial Architecture.

Dr. Robert H. Schuller, senior pastor of the Crystal Cathedral, Garden Grove, Calif., has been named public member of the AIA Board of Directors. His "Hour of Power" is televised weekly from the Cathedral, designed by Johnson/Burgee.



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Charles Moore and RKT&B (top); Davis

Brody & Associates (middle); James Stewart Polshek & Partners (bottom).

Battery Park City Update

Battery Park City, the landfill city at the foot of Manhattan, continues to build at a pace, on a scale, and with the sort of attention to quality and to detail that would amaze even the dreamers of the Governor Rockefeller era. Now, less than a decade after the whole project was saved from default, and just four years since construction there resumed in earnest, the Battery Park City Authority has already managed to bring the first half of the sixmillion-square-foot World Financial Center, designed by Cesar Pelli (P/A, July 1985, pp. 79-87), on line, has begun the occupancy of the 2218 apartments of the Rector Place residential development immediately to the south, has built and planted an impressive series of public parks throughout the site, including a grand 1.2-milelong esplanade along the Hudson, and has now begun to select developers for the next 3500 apartments to be built at the southern end of the site.

In contrast to previous urban renewal, all of this is going to cost the public nothing. When the bonds for Battery Park City are finally paid off in the year 2014, the project will actually have netted a surplus of as much as \$3.5 billion. This April, New York's Governor Cuomo authorized the expenditure of \$400 million of that surplus to be used for the construction and rehabilitation of 24,000 units of "affordable housing" in New York City over the next ten years. There also has been talk of leveraging some of the leftover funds with another bond issue to give this housing effort even more financial clout, but thus far that is just talk.

The effort to funnel some of this money into low-, moderate-, and middle-income housing is both purposeful and ironic, since Battery Park City has become an expensive and elitist enclave. With even the least expensive rentals going for \$1300 a month and condominium units selling for over \$400 per square foot, Battery Park City is accessible only to those citizens of Wall Street who conveniently work quite close by. According to one official there, though, the Authority is "not entirely comfortable" with the elitist character of their endeavors, thus the effort to transfer some of the financial benefits of the project's phenomenal success to those further down the income scale.

Nonetheless, the Authority president, Sandy Frucher, last winter also suggested using some of these surplus funds to revive the now-dead Westway scheme, extending Battery Park City's jurisdiction up the west side waterfront to 34th Street, and developing it with a combination







of landfill and platform construction. Somehow having discovered that such suggestions are not politic in the aftermath of the heated decade-long battle to stop Westway, Frucher has since dropped any talk along those lines.

The basis for the surplus funds is Battery Park City's record for moving its merchandise. This was greatly facilitated early on by the wise choice of Olympia and York as the developer of the massive World Financial Center. They have set the tone for all of the subsequent development with their exceptional ensemble of office buildings arranged around a grand riverfront plaza and glass-enclosed Wintergarden, which is to be planted with

ng distion of refined design sensibilities and business acumen allowed them to start signing up a number of large and attractive tenants, including American ong Express, very quickly, lending

the project a distinctive luster. The luster has also been enhanced by the extensive and innovative use of public art. The plaza facing North Cove in front of the Wintergarden is a fourway collaboration between architect Cesar Pelli, landscape architect M. Paul Friedberg, and artists Siah Armajani and Scott Burton. The waterfront park around South Cove at the southern end of the site, which will include a wooden jetty and a floating, planted island, is a collaboration between artist Mary Miss, landscape architect Susan Child, and architect Stanton Eckstut. In between the two cove projects will be four site-pieces by artists Patsy Norvell, Ned Smyth, Nancy Graves, and Richard Artschwager.

16 palm trees. O&Y's combina-

Battery Park City's quality has especially affected the value of the residential development at Rector Place, which is just now beginning to open up for occupancy and where apartments have been renting and selling faster than the fortunate developers can put them up. For example, when the first 133 condominium units at Rector Place, Hudson Towers, designed by Davis Brody & Associates for the Zeckendorf Company, went on the market last fall, 56 percent of them sold the first day; 88 percent within the first week.

Much of the basis for this salability is a commitment to highquality design, generally encouraged and often imposed by the Authority. Using the 1979 master plan developed by Cooper, Eckstut Associates, which is intended to integrate Battery Park City into the surrounding neighborhoods of lower Manhattan and to ensure a maximum amount of open public space, the Authority has exercised rigorous control throughout the design and construction process (P/A, Feb. 1981, pp. 36, 40; March 1982, p. 36; July 1983, p. 24; December 1983, p. 75).

What the Authority hoped to achieve with this review process, in addition to the normal urban design concerns about bulk, height, shadows, etc., was a level of architectural integrity throughout the project, which would nonetheless encourage the sort of lively mix that one finds in the rest of the City. "We were attempting to do two major things," says Stanton Eckstut,

who with Alex Cooper developed the master plan, and who has assisted Amanda Burden, Vice President for Design and Planning, in the review process for Rector Place. "We wanted the place to be a part of New York. We weren't reproducing it, we were interpreting it. The second thing was that we wanted it to be a pleasurable walking environment with parklike streets. To get that, we needed variety and we needed buildings that related mostly to the public spaces before they could go off and do their own thing. We had to manipulate heights to make sure that views and sunlight were not obstructed. The guidelines were structured to continue the theme of New York, but also to get buildings to relate to each other, to talk to each other."

All of the architects who participated in this process, however, did not find it free of conflicts. "We weren't interested in reproducing an Upper West Side 19th-Century building,' says Todd Schliemann, of James Stewart Polshek & Partners, who designed Liberty House at the river end of Rector Place. "It's just not what we do. It was obvious that the guidelines would be easy to accommodate with cornices and expression lines, but we were trying to reinterpret some of that stuff, so instead of cornices we simply changed brick colors. To get a massing we liked we took some liberties with the guidelines. But, by and large, what they got is what the guidelines asked for.'

Most of the 12 buildings of Rector Place are scheduled for occupancy by this fall, with all of them occupied by early next year. In the meantime, the Authority has proceeded with RFPs for the next phase of 3500 units in the Battery Place residential area immediately south, to include eight full-block building sites. The review process will remain in place and is expected to be even more rigorous than the first phase, with the Authority looking for generally higher quality buildings. A ninth block will contain a Holocaust memorial and Jewish heritage museum now being designed by the Polshek firm.

Success follows success, and the Authority has received 50 proposals from developers for Battery Place, a response which has effectively overloaded their selection process, now running some six months behind schedule. *Peter Lemos*

The author is a contributing editor to Metropolis magazine.



4 ESPLANADE AND GALEWAY PLAZA 5 RECTOR PLACE RESIDENTIAL NEIGHBORHOOI 6 BATTERY PLACE RESIDENTIAL NEIGHBORHOOI 7 SOUTH PARK 8 WORLD TRADE CENTER 9 CHARLES MOORE. RKTAB 9 CHARLES MOORE. RKTAB 10 DAVIS BROUX ASSOCIATES 10 DAVIS BROUX ASSOCIATES 11 JAMES STEWART POLSHEK & PARTNERS 12 CONKLIN ROSSANT. ARCHITECTS 13 MITCHELL GIURGOLA ARCHITECTS 14 RECTOR PARK 15 NORTH COVE 16 SOUTH COVE

Mitchell/Giurgola Architects (top left); Conklin Rossant, Architects (middle left); Battery Place residential area (bottom left).
Project: The Marsh, A Center for Balance and Fitness, Minnetonka MN Architect & Engineer: Hammel Green and Abrahamson, Inc., Minneapolis Lighting Designer: HGA Lighting Design, Minneapolis Electrical Contractor: Hayes Contractors, Inc., Minneapolis

Cove Lighting Reexamined

It's no longer just a subdued accent. Suddenly it's hard working high level illumination.

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Light comes from the two unassuming linear fixtures mounted along either side. They turn the whole ceiling into a single soft overhead light source.

A design plus: the unobtrusive fixture

Designers have always liked cove lighting because it takes the emphasis away from the fixture. But it's usually "mood light," relegated to department stores, restaurants and lobbies. Until now, indirect wallmounted fixtures have been too inefficient for serious lighting tasks.

The fixtures over the pool are 6" x 6" Rounded Very Wide Spread Softshine Indirect by Peerless Lighting. Softshine Indirect fixtures give more good light per watt under ceilings 8'6" or higher than any other fixtures made. Furthermore, they incorporate a strip of visible lens that increases their perceived illumination by 10% to 25%. Both these claims are substantiated by Peerless research data, including independent studies by major universities. All data is available from Peerless on request.

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These fixtures belong in important places: reception areas, corridors, dining facilities, examination rooms, conference rooms.



Nothing else gives the smooth illumination of a good ceiling wash. It's the best of all techniques when a room has reflective surfaces like polished tabletops or glass-covered artwork—or a swimming pool.

They offer cove lighting's chief virtue (they don't impose their personality on the space) and they give good light—enough for visually demanding tasks like research work on a lab bench or picking just the right piece of cake in the cafeteria.



The new cove light: great amounts of even, glare-free light, enhanced by the sparkle of a visible lens.

Research computers at Peerless generated this diagram to show how these Softshine Indirect fixtures work.

The fixture's lensed optics distribute the light facet by facet into precisely the right viewing areas. These remarkable fixtures can wash an entire ceiling when they're mounted only 30" below and as much as

24' apart, as the swimming pool picture proves.

A ceiling like this reflects as a soft, barely noticeable veil, as on the pool's surface. The same holds true for any other surface that reflects, such as the waxed floor in a hospital corridor or a glass-topped sales counter.

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2

In Progress

Two large-scale projects for New Jersey's riverfront, a cultural center, and a rehabilitated bridge are shown in this month's In Progress section, as are a mixed-use facility and one of the theaters it incorporates.





1a



2a

-+ 300%90m ∧N ⊢





60'/18m

2c FLOOR PLAN



1 Newport City Master Plan, Jersey City, N.J. Architect: RTKL Associates, Baltimore. This enormous, 260-acre mixed-use waterfront complex includes housing, offices, commercial and public space, and is sited atop a PATH transit station connecting New Jersey with Lower Manhattan. The northern half of the complex centers around a large park which extends the full depth of the development. A public entertainment pier anchors the waterfront, and to the south, a 90story condominium/hotel projects into the river and dominates the skyline. Three major circulation routes link the waterfront and residential areas to the transit station and downtown Jersey City. Construction began this year; completion of the final phase is expected early in the next century.

2 Exchange Place Centre, Jersey

City, N.J. Architect: The Grad Partnership, Newark, N.J. Built above the Exchange Place station of the PATH transit system, one stop from the World Trade Center across the river, and directly south of Harborfront Terminal and Newport City (see above), this mixed-use tower features a ground-level retail arcade, with parking and office space above, connecting to the PATH station through the arcade. The curtain wall tower sits on a granite base which holds to the property line, while a semicircular bay breaks forward at the building's eastern end, facing Manhattan, and steps up the façade, ending in a spire. Construction is planned to begin this month for 1988 completion.

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3 Milwaukee Theater District, Milwaukee, Wisconsin. Architects: Skidmore, Owings and Merrill, Houston. This one-millionsquare-foot mixed-use facility incorporates theaters (see below), cinemas, restaurants, a hotel, an office building, and underground parking, all connected via a public galleria. A four-story domed central rotunda links the diverse interior spaces and provides access to all major functions. The office tower is sited to the north and west to preserve vistas to existing historic buildings, and to avoid competing with the City Hall tower nearby. Completion is scheduled for the fall of 1987.

4 Milwaukee Repertory Theater, Milwaukee Theater District, Milwaukee, Wisconsin. Architects: Beckley/Myers, Architects, Milwaukee. Constructed within the structural shell of an abandoned power plant, this theater interior is a combination of found space and new construction. The new main stage, a secondary stage, and a cabaret space, with adjacent support areas, are planned within the old building, while the lobby and box office are housed within the envelope of the public galleria, and are set back to form a secondary arcade. Completion, fall of 1987.





3a



4b NORTH-SOUTH SECTION

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NORTH GALLERY



5 Corning Bridge Building,

Corning, N.Y. Architect: Arthur Cotton Moore Associates, Washington, D.C. After a new highway bridge was constructed to route traffic away from the center of town, the old bridge fell into disrepair. Now it is being renovated as a tourist bus route, connecting the town center with the Corning Glass Museum across the river. A linear glass building, with a central dome and portico, will be built atop the bridge to house the Museum's Art in Glass collection. Photochromics glass, a Corning product which darkens in response to light, will be used on the exterior.

6 Hebrew Union College Cultural Center for American Jewish Life, Los Angeles. Architect: Moshe Safdie & Associates, Boston. This 85,000-square-foot complex includes additional gallery space for the Skirball Museum of Judaica, and a conference center, with support facilities, classrooms, meeting rooms, a resource center, and an auditorium. A wing of the museum will be built as an earth dam, protecting an adjacent amphitheater against a potential slide. An observation/meditation pavilion occupies the hill above. The center will be constructed in two phases, beginning early 1987.

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P/A Calendar



Long Building, Kansas City, Mo. The Art of the Tall Building, through June 26.

Exhibits

Through June 15

The Architecture of Richard Morris Hunt. Metropolitan Museum of Art, New York (see P/A, May, p. 28).

Through June 20

Louis Kahn: Unbuilt Work in New York. NYC/AIA, Urban Center, New York.

Through June 21

Exhibition and Benefit Auction for Architects, Designers and Planners for Social Responsibility. Max Protetch, New York.

Through June 26

The Art of the Tall Building. Gallery at the Old Post Office, Dayton, Ohio.

Through June 29

The Architect and the British Country House, 1620–1920. National Academy of Design, New York (P/A, Jan. 1986, p. 25).

Through June 30

Dwellings of West Africa. Lowie Museum of Anthropology, Berkeley, Calif.

Through July 3

Arthur Erickson: Selected Projects, 1971–1985. London Regional Art Gallery, London, Ontario (P/A, May 1985, p. 26).

Through July 5

Oskar Schlemmer. IBM Gallery of Science and Art, New York.

Through July 6

Louis H. Šullivan: Unison with Nature. Octagon Museum, Washington, D.C.

Through July 12

Mies van der Rohe: Architect as Educator. Illinois Institute of Technology, Chicago.

Through July 13

Roma Antiqua: Envois des Architectes Français 1788–1924, Forum, Colisée, Palatin. École national supérieure des Beaux-Arts, Paris.

Through July 16

European Architectural Drawings: 17th to 20th Centuries. Stubbs Books & Prints, New York.

Through July 20

Tokyo: Form and Spirit. Walker Art Center, Minneapolis (P/A, Apr. 1986, p. 108; review, p. 24).

Through July 30

Hugh Ferris: Metropolis. Whitney Museum of American Art at Equitable Center, New York.

Through August 3

Pieces of Places. Lions Gallery, Wadsworth Atheneum, Hartford, Conn.

Through August 10

Mies van der Rohe Centennial Exhibition. Museum of Contemporary Art, Chicago (P/A, Feb. 1986, pp. 21, 23).

Through August 31

Shaker Design. Whitney Museum of American Art, New York.

Through September 1

Frank Lloyd Wright and the Johnson Wax Buildings: Creating a Corporate Cathedral. Renwick Gallery, Washington, D.C. (P/A, April 1986, p. 27).

Through September 30

The Great World's Fairs and Expositions, 1851–1939. Mitchell Wolfson Jr. Collection of Decorative and Propaganda Arts, Miami-Dade Community College, Miami.

June 7–September 7

Warren H. Manning, Landscape Architect, 1860–1938. Glyndor Gallery, Wave Hill, the Bronx, N.Y.

June 18–October 31

Ornamental Architecture Reborn: A New Terra Cotta Vocabulary. National Building Museum, Washington, D.C.

July 1-31

Contemporary Spanish Architects: An Eclectic Panorama. Architectural League, New York.

July 3–August 24

Lawrence Halprin: Changing Places. Museum of Modern Art, San Francisco.

July 3-October 22

Vienna 1900: Art, Architecture and Design. The Museum of Modern Art, New York.

July 7-August 7

The Architecture of Herman Miller. Gallery at the Old Post Office, Dayton, Ohio.

Competitions

June 30

Submission deadline, American Society of Architectural Perspectivists Third Annual Delineators Show. Contact ASAP, % Boston Architectural Center, 320 Newbury St., Boston, Mass. 02115.

June 30

Deadline, Downtown Development Awards. Contact Margaret DeWitt, Downtown Research & Development Center, 1133 Broadway, Suite 1407, New York, N.Y. 10010 (212) 206-7979.

July 7

Application deadline, The Artist Views the City. Contact Marilyn Shannon, Gallery at the Old Post Office, 120 W. Third St., Dayton, Ohio 45402 (513) 223-6500.

July 15

Entry fee deadline, Los Angeles Prize, Visions of Architecture in the Year 2010. Contact Los Angeles Chapter/American Institute of Architects, 8687 Melrose Ave., Suite M-72, Los Angeles, Calif. 90069.

September 8

Postmark deadline, 34th P/A Awards. See page 13 for information and entry form.

Conferences

June 15-19

Advances in Geotectural Design: 2nd International Earth-Sheltered Buildings Conference. University of Minnesota, Minneapolis. Contact Theresa Duty, Dept. of Professional Development, 315 Pillsbury Dr., S.E., University of Minnesota, Minneapolis, Minn. 55455 (612) 373-3188.

June 18-21

Dreams Become Reality: Pacific Coast Builders Conference. Moscone Center, San Francisco. Contact PCBC, 605 Market St., Suite 1010, San Francisco, Calif. 94105.

June 20-22

30th Annual CSI Convention/ Exhibit. Los Angeles Convention Center. Contact Construction Specifications Institute, 601 Madison St., Alexandria, Va. 22314-1791 (703) 684-0300.

June 23-27

A/E/C Systems. McCormick Place, Chicago. Contact Conference Director, A/E/C Systems '86, P.O. Box 11318, Newington, Conn. 06111 (800) 237-3900 (see p. 115).

July 1–3

International Climatic Architecture Congress. Université Catholique de Louvain, Ottignies-Louvain-la-Neuve, Belgium. Contact International Planning Associates, 5010 Sunnyside Ave., Suite 303, Beltsville, Md. 20705 (301) 345-8800.



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P/A PRACTICE

Specifications (continued from p. 57) venting modifications.

Though the American Institute of Architects has been publishing standard general conditions for decades (the fourteenth edition of AIA general conditions A-201 is due out this year), and has offered standard bidding documents as well, improvised conditions still appear with disturbing frequency, and cause problems for the architect, specifier, contractor, and even the owner who creates them.

Not that A-201 was perfect from the start (as recently as 1963 it left a lot to be desired), but it has been improved continuously through a series of revised editions with the help of the AIA's Documents Committee and legal counsel, the Associated General Contractors, and other industry groups. Most important, unlike some of the proposed substitutes, many of its provisions have been tested in court under the stress of litigation and have a well-defined and understood meaning.

Why then doesn't the world accept and emulate A-201 for all its building projects? Why don't the conditions-drafters at least consult the Construction Specifications Institute's *Manual of Practice* for uniform location of subject matter when setting up their own documents? There may be several reasons.

First of all, many of these cus-

tom documents are old and have their own traditions. They may even predate the CSI organization of material and recent A-201 editions. They just haven't been brought up to date because of lack of funding or lack of personnel to do the job. To their credit, several federal agencies now use A-201 with a special compatible supplement containing additional federal requirements. Others stay with the versions they've always used, becoming each year more remote from contemporary construction realities.

Second, many of these documents seem to have been written by lawyers knowledgeable about contract law but not experienced



in construction procedures or contract document problems. As a result, there is often an uneven emphasis on the owner's absolute authority, on public interest protection, often almost an obsession with quoting statutes verbatim, and a corresponding carelessness about how the work will actually be bid and about what the contractor and the architect are really going to do to get the building built. Attempting to be the strongest possible advocate for the public or private owner, lawyers may make the process so difficult for everyone else that the project and the owner eventually suffer. Though they may be skilled in many areas, as construction contract drafters they often appear more like well-intentioned amateurs in this highly specialized field.

Another reason sometimes seems to be an owner's perverseness or excessive need for ego expression: "I know more than the architect and I have the power"; or "We are the client and we call the shots, not the AIA" (thus identifying the architects and their organization as the client's adversary, a sure-fire way of putting the contractor in an advantaged position).

The documents thus produced are frequently unsatisfactory because they try to invent contract conditions to control a well-established industry with its own traditional and habitual procedures, failing to acknowledge that widely known and more effective ways to accomplish this already exist. Experienced architects and specifiers know how the industry works. The standard documents they use embody accumulated knowledge of the process and its pitfalls in a concise and accepted manner. Consequently, it's very seldom that construction contract conditions ever need to be written from scratch, and the motives of the owner or lawyer who insists on it should be suspect from the start.

But what can the average architect or specifier do when confronted with such owner-generated documents on a current project, and how can the situation be improved in the long run? Often, the only answer is to suffer through the present situation using the given conditions and to work around them as much as possible by proposing supplementary or special conditions that bring them more into line with standard practice. Cooperation and goodwill on the job can also help both archi-(continued on page 60)



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Failures (continued from p. 60) 6. How To Avoid

1. Avoid masonry parapet walls.

2. If you insist on building a masonry parapet (or a parapet of any other material for that matter), be ultra-conservative in its design and detailing. Note the following:

a) Allow for movement at all corners and changes in direction. Provide keyed, soft joints.

b) Provide vertical reinforcement so wind forces do not cause horizontal cracking.

c) Fill all cores and joints solid with pourable grout (not mortar).

d) Use metal cap flashing (metal coping) with slip joints to allow for movement. Avoid masonry, precast concrete, or stone copings. If you have to have them, use flashing underneath them, anchor them to the masonry but allow them to move. All horizontal joints should be soft, with backing in the joint and a suitable sealant designed for this exposure.

e) Inspect, inspect, inspect!

3. Do not use glazed brick for an exterior application.

4. Do not put any waterproof coatings on masonry. This is a safe rule to follow unless you

know the product and can verify the research and performance.

5. Put the most experienced detailer in the office on the exterior envelope. Over 75 percent of all building failures have to do with the envelope, so make sure all exterior details are checked by two people before they go out the door. One of the checkers should be the one who seals and signs the drawings.

7. Lessons to Learn

1. Some materials are just not appropriate to use on the outside of a building. Research a product before specifying it. See if it has been used in similar applications, then do your own field inspections to verify manufacturers' or salesmen's claims.

2. Recognize that structures move and need relief elements. Don't let the structure decide where it will crack—try to anticipate it and provide a simple and maintainable soft control joint.

3. Never assume that your detail will be built the way it is shown on the drawings. Get in the field to make sure.

4. Try to visualize all the ways that water could penetrate the building envelope as you have detailed it. Now make sure you have a foolproof system to keep it out. Test the details in your mind; it's a lot cheaper than trying to fix them in the field.

8. Legal Case Reference

The failure cited here did not result in any legal action. After 15 years, the owner expected to incur some maintenance expenses. Not all owners are that understanding.

9. Other References

1. Architectural Graphic Standards. Always a good source for current thinking and practice.

2. Concrete Masonry Handbook. Portland Cement Association, Skokie, Illinois. An excellent reference for practical information on concrete masonry.

3. All of the publications of the National Concrete Masonry Association, Herndon, Va., are extremely valuable. The NCMA-TEK notes are particularly useful.

4. Brick Institute of America, Reston, Va., is an outstanding source for research information on the use of brick masonry. *Raymond A. DiPasquale*

The author is an Associate Professor of Architecture at Syracuse University and heads a firm in Ithaca, N.Y., that specializes in structural consultation and building failures investigation.



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Books

Capability Brown and the Eighteenth-Century English Landscape by Roger Turner. New York, Rizzoli, 1986, 184 pp., \$19.95.

Robert and James Adam: The Men and the Style by Joseph and Anne Rykwert. New York, Rizzoli, 1985, 225 pp., \$25.00. Designs for Castles and Country Villas by Robert & James Adam by Alistair Rowan. New York, Rizzoli, 1985, 160 pp., \$65.00.





DESIGNS FOR CASTLES AND COUNTRY VILLAS BY ROBERT & JAMES ADAM EV ROBERT & JAMES ADAM

Capability Brown & the Brothers Adam

In England, the 18th Century was a time of transition from a lingering medieval culture to an emerging modern society. Architecture and landscape design also embraced new goals and technologies. Lancelot "Capability" Brown and Robert Adam were decisive in this process of cultural self-definition.

Brown (1716-1782, whose nickname stemmed from his customary estimate of a site's "capabilities") was the preeminent landscape designer of his age. In plans for nearly 200 landscapes and numerous houses, he articulated a vision of nature that changed the face of England. He perfected the "natural" landscape garden, completing a movement away from the formal symmetry of the grand Continental gardens epitomized by André Lenôtre's work at Versailles. His motifs were simple and artfully ingenuous: rolling terrain, meadows in turf, hills adorned with clumps of native trees, lakes and streams picturesquely disposed. Visible intervention in the landscapestatuary, horticulture, rigid parterres-was minimized, in favor of an idealized vision of a natural countryside.

In Capability Brown and the Eighteenth-Century English Landscape, the author insists that "there is no question of man's domination of Nature" and that "a Brown landscape is a pure landscape." But this "purity" was highly conventional, derived from an aesthetic tradition (Poussin, Hogarth, Edmund Burke), not a biological one. And it was no laissez-faire operation; Brown's subcontractors moved earth and dammed rivers, developed plant material and maintenance techniques, and even moved entire villages to improve an aristocratic view. Brown didn't liberate nature, he domesticated it. His gardens construct formal meaning from simple "natural" elements.

Turner writes with verve and—on certain disputed bio-

graphical points, for examplewith more conviction than is warranted. He has a gift for the felicitous phrase (Lenôtre's long formal lakes "trapped the sky") and an ability to place Brown's achievements in the wider aesthetic movements of his time. Welcome attention is given to the botanical and technical aspects of the gardens. The gazetteer of Brown's work seems admirably thorough, and would be a good starting point for further research. Capability Brown makes a good introduction to the man and his world-best read in conjunction with other sources.

A complementary view of the times (more academic, but no less opinionated) is offered by Joseph and Anne Rykwert in Robert and James Adam: The Men and The Style. Beginning with William Adam, their father, and his work in Scotland in the 17th Century, the Rykwerts link biography and design. They follow the brothers through their Grand Tours in Rome to their offices in London, and their work from country houses to city squares. Social and political worlds are given special emphasis, as both men were intensely aware of their dependence on aristocratic favor for work and reputation. The creation of the "Adam style" is credited principally to Robert (1728–1794), "the most forceful and talented" of the family.

The scope of his unique vision extended to every detail of construction and furnishing; at Osterly Park, he designed not only doors but knobs and keyhole covers. He imported Italian draftsmen and painters, and specified furniture and even draperies. And underlying the endlessly inventive decoration was a rigorously ordered plan, a "compositional technique . . . of using simple concatenations of constantly varying geometrical shapes." Thus-analogous to the technical and aesthetic advances made by Brown-the Adam style advanced both "the industrialization of the building crafts" and, through "the changeover from Rocaille to the new dry and antiquarian manner," a "method of controlling volume through a linear articulation of surface."

The Rykwerts concentrate particularly on Syon and Kedleston among the country houses, and on the plans of the later town houses, to argue that the Adams's innovations were not only decorative, but more fundamentally concerned social relations and their appropriate spaces. This point is sometimes obscured by difficult analogies and recondite allusions, but their documentation is thorough enough to plot the maze. They offer a valuable analysis of the Adams's accomplishments as city planners, asserting that "alone among British architects of their generation, they had an intense view of city life." Helpful illustrations accompany discussions of the work, including the Adams's own drawings of elevations, plans, and details, and later photographic views.

Brown and Robert Adam worked chiefly at the same time, and often for the same clients. Though it seems the two men never met, their efforts are shared by at least 16 properties, half a dozen of them closely overlapping in time or terrain. Often responsibility cannot be definitively attributed: at Compton Verney, Turner credits the orangery to Brown, the Rykwerts to Adam; scorned Ugbrooke is foisted on Adam by Turner but on Brown by the Rykwerts. Spotty documentation explains some of the ambiguity, and, curiously, each book tends to slight the other's principal. Such overlapping implies that these artists had much in common, despite obvious differences in decorative detail.

The Adam houses were villas, not fortresses, and wanted pleasure grounds for gardens. Brown's landscapes favored buildings with balance, grace, and a certain delicacy uncommon in Elizabethan or Tudor England. Their compatibility can be seen in the four-arched stone bridge Adam built over

(continued on page 69)

(continued from page 66)

the River Cam at Audley End, which Brown had widened and shaped. At Harewood, Brown improved the landscape to suit the new house, for which Adam had substantial responsibility (again Turner and the Rykwerts disagree). A Corinthian central block with balanced pavilions rests on a low, rusticated basement, in close harmony with the smooth empty lawns that make an island of it. To the rear, the ground falls to a Brown-built lake; its irregular banks echo the asymmetrical interior plan, Adam's double-circuit design adapted to the more flexible social circulation of the age.

Medieval building types could no longer serve the emerging modern world; their plans were too rigid, their power too public. **Eighteenth-Century England** wanted authority expressed in the secular languages of history and nature. Brown's simplicity and Adam's grace masked technical control and potent references; their designs linked symbolic programs with functional needs. Turner talks of Brown's propensity to construct a perimeter ride round the estate, belted with trees: "Its chief function was to ensure that all the land visible from the house was the owner's domain, as if the house were in a world of its own," like some feudal castle. And the Rykwerts conclude of the Adams that "the decorative style is merely the decking out of their primary concern, which was the devising of a new way of occupying space. The ceremonious life of the country house was to be controlled and sublimated through antique exemplars."

Many of the Adams's clearest essays in this field can be studied in Designs for Castles & Country Villas by Robert & James Adam. Alastair Rowan, one of the foremost authorities on Adam, has assembled what he believes was meant to be among the volumes of the firms' works published by the brothers (its contents submerged among the 8000 Adam documents preserved in the Soane Collection). Rowan argues that "this last volume of the brothers' work displays a very different sort of architecture to the opulent classicism and profuse interior display that is, for many, synonymous with the name of Robert Adam.'

Rowan asserts that the book was meant to contain designs for at least 32 houses and possibly as many as 50 (of which perhaps 16 were built); he includes 42 different designs in 64 plates reproducing plans and elevations attributed to the Adams. The "villas" are designs for middle-class country houses, modest but compact, and often achieve a certain sculptural power. The more elaborate "castles" echo Norman baronial fortified architecture. (Rowan argues that they "are something radically new": the Rykwerts consider them only "a deliberate answer to the challenge of a certain landscape.") Even the simplest designs show a command of geometry and surprise, fluid plans "whimsical and intriguing, without any waste of space." In all, a vision at once inventive and controlled.

Each plate is accompanied by brief explanations of the building's circumstances, where known, and significance. Rowan's concise prose is an object lesson in reading architectural documents, and an eloquent lexicon of description. He clearly admires the architects, but he's not afraid to criticize the designs. At first the narrative thread may seem lost in the mass of detail, but as the eye becomes accustomed, the quiet procession of these lines on the page becomes fascinating, their themes and variations as complex and satisfying as chamber music. There is a compelling simplicity in plan and elevation which is too often sacrificed to the superficial legibility of perspective photography, though the discipline they require will attract serious students sooner than general readers.

These three essays give partial but provocative views over the world so beautifully constructed by Brown and Adam. Their occasional contradictions contribute a salutary sense of history's persistent obscurity and the limits of our own knowledge. They also show-even in the abstract art presented by Rowan-the ineluctable relation of architectural design and social need. Brown's vision of nature tamed neatly complemented Adam's transformation of Roman palaces into domestic villas. Their Enlightenment faith in such secular orders inspired houses and gardens that combine elegance and rationality. Though many of their projects have been destroyed or modified beyond recognition, their achievement still influences contemporary visions of a balanced world. These books bring that legacy into clearer light. Thomas R. Matthews

The reviewer is a freelance writer on architecture and travel, living in New York, who has contributed to P/A and other architectural journals.



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Progressive Architecture

Rafael Moneo

With this article, P/A introduces to its readers Madrid architect Rafael Moneo, now Chairman of the Architecture Department at Harvard's Graduate School of Design. On the next pages, Moneo's recently completed National Museum of Roman Art in Mérida, Spain, is shown. Following the museum is coverage of two earlier buildings by Moneo. Also included are comments from an interview of Moneo by P/A editors (p. 78).



Rafael Moneo: Museum Mérida, Spain

The Museum is a complex of three wings: the entry/administrative block (facing page, right in large photo), which contains an auditorium and a library on the upper levels; a large gallery block (below and facing page, top left and at left in larger photo); and a small workshop wing for bronze, mosaic, and paper conservation. A bridge (facing page, top right) connects the entry wing and the galleries.

The wings differ markedly from each other in architectural expression. While the gallery block seems decidedly industrial,

AR

the administration wing seems domestic, a self-contained form with shuttered windows and dormers. The paneled entry doors at its south end are surmounted by a niche with an antique statue (previous page). The museum connects to the nearby excavations via a tunnel (see Contents page).



The National Museum of Roman Art in Mérida, Spain, embodies a bridge to antiquity, says reviewer Peter Buchanan. Combining traditional and Modern elements, the building houses Roman antiquities, encloses Roman ruins, and connects to archaeological monuments.



THE Spanish town of Mérida was exactly 2010 years old when the National Museum of Roman Art was completed there last year. Built alongside some of the town's earliest and grandest monuments, the new building, designed by Madrid architect Rafael Moneo, raises mighty arched walls from the ruins buried beneath the town, some of which now lie exposed in the gloom of its basement. The museum is more than just a storehouse for the treasures of the past; it is rooted in the remains of the urban fabric in which these treasures were, and will continue to be, found. These intimate cominglings in space, continuities across millenia, are celebrated in the form and fabric of the building. Instead of being overawed by, and meekly deferring to, context and contents, the museum boldly demands dialogue with both; and history is not applied, but woven into its very fabric. The result is a building of integrity and presence that will be cherished beyond any changes in its functions or in prevailing fashions.

Situated in the hot, dry southwest of Spain, Mérida was founded by the Emperor Augustus in 25 B.C. as Emerita Augusta. Monuments were lavished on the town, which became capital of Lusitania and today boasts the finest Roman remains in Spain. These include a half-mile-long 81-arch bridge still in service across the Guadiana River, portions of two aqueducts, an amphitheater, and a magnificent theater built by Agrippa in 24 B.C. Though embedded within the fabric of the existing town, the museum is also adjacent to the latter two monuments. Connected by tunnel under the intervening small street and parking lot, all three may be visited on the same ticket.

But this physical link between museum and monuments is subordinate to that implied in an architectural dialogue. The museum is built to similar scale and in the same materials and methods as a Roman building, to join the older monuments as almost equal in a triumvirate. Both part of the existing town, yet also a bridge across space and time to an illustrious past, the museum tells a tale of two towns, ancient and modern.

Just as the atrium shaded by an awning (velarium) is inherited from Rome, so too is the pinky-yellow shallow brick still made in Seville. Here the brick is used as the Romans did, as permanent shuttering to massive unreinforced concrete walls with openings spanned by arches. But the brick is left naked with only the thinnest

Rafael Moneo: Museum Mérida, Spain

of joints, achieved by hiding the mortar in specially pressed frogs—a trick that is becoming a trademark with Moneo. The effect is of almost seamless cliffs of glistening clay punctuated only by the radials of the arches. Yet only the walls are Roman: The floors are taut slabs of reinforced concrete whose thin edges are accentuated by spindly railings—a Modernist minimalism against archaic massiveness.

The organization is Modern too, with none of the cross-axial symmetries of Classicism and the Beaux-Arts—though the museum has affinities with the Gothic shipyards that now house Barcelona's Maritime Museum. Around a sunken court are three blocks, each with elevations that reflect their functions. Towards the monuments, the administration block presents a rather domestic face while the main entrance in its short elevation is suitably emphasized. At the rear, workshops for cleaning and restoration are brightly lighted by factory windows. The museum itself has the stern air of a storehouse with only a single window in each of its bays. Some find this dull and overbearing. Yet here is Roman building as it was never intended, but as we all know it, with facings and ornament gone. And though tall and tough, only the north (rear) façade is really unfriendly. Otherwise this exterior seems appropriate to a building that looks forward as far as it looks back.

Inside, the administration block is organized around a well that opens up from entry level to the roof, drawing attention to the lecture theater and library above. On one side, floor slabs step progressively back to acknowledge the open longitudinal axis that is the major unifying element of the interior, and to imply a connection down that axis to the museum. The excavations in the undercroft are attained via ramps and steps. Though under the museum and reached only through it, they are experienced as outside.

Banishing the ruins, rather than opening through the floor of the museum to include them with the other exhibits, strikes some as perverse. This is further compounded by rows of massive arches marching through the ruins, and only here and there breaking into still larger arches to avoid significant remains. Yet the result is potently suggestive and architecturally consistent, for the design everywhere stresses continuities. Instead of including the ruins as an isolated fragment in the hermetic world of a museum, they are revealed as only a sliver of what continues in all directions under the town.

In contrast to the dark oppressiveness of the basement, the space in the museum reaches expansively to the light that floods in from the monitors above. Here the longitudinal axis has become a broad nave vaulted at regular intervals by arches in crosswalls that define transverse galleries on either side. On the south (front), shallow arches open into progressively shallower periscopelike light shafts. Opposite are tall galleries partially floored on two levels. Openings through the crosswalls create continuous walkways at these levels, which connect to stairs at either end of the museum.

No correct route or sequence is implied through the galleries, each of which, though highly specific in form, is identical. This is the antithesis of most new museums, which provide either a variety of spaces along a set route, or the flexibility to be arranged in this way, with spaces and routes being tailored around the exhibits to which the building remains background. But the Mérida Museum stands aloof from such particulars and is a powerful presence sufficiently generous in character and dimensions to absorb exhibits effortlessly in various arrangements and routes. This architectural presence is not just a product of dramatic form and scale, but also of repetitive rhythms of arches and galleries, and of naked materials and construction with no distracting ductwork, detectors, or disguising panels, all intensified by constantly changing light and chiaroscuro effects. None of this detracts from the exhibits but rather enhances them and paradoxically allows, even encourages, artifacts to be packed together as in a 19th-Century museum. Like such a museum, this one resembles a giant filing cabinet, and instead of processing visitors past each item, lets them choose what to study and in what order. There is a grand aloofness that is strangely humane and dignifying. Peter Buchanan

The author is Deputy Editor of the British Magazine The Architectural Review.









Along the south side of the gallery wing are a series of tall galleries. These become increasingly shallow from east to west, and the largest ones are connected by arched openings (above).

Rafael Moneo: Museum Mérida, Spain

Interview

Rafael Moneo began his career in the office of Spanish architect Saenz de Oiza, before graduating from the School of Architecture in Madrid. In the early 1960s, he traveled in Scandinavia and worked for Jørn Utzon, studied at the Spanish Academy in Rome, then in 1965 returned to Spain, where he received a number of commissions in Madrid and served as assistant professor at Madrid's School of Architecture and, from 1971 to 1980, as professor at Barcelona's School of Architecture. During this time (in 1976-77) he taught at the Institute for Architecture and Urban Studies and at Cooper Union in New York. From 1981, he was professor of architecture in Madrid and extended his practice throughout Spain, serving as well as visiting professor at Princeton University and in Lausanne. In fall 1985 he moved to the United States to chair Harvard's Department of Architecture, while still retaining his practice in Madrid. P/A editors Susan **Doubilet and Thomas Fisher visited** him in Cambridge to discuss his ideas about architecture.

Construction and art

RM: Architecture is an abstract art, but it attains its full expression only when our thoughts about it acquire the real condition that materials can provide. Unfortunately, for many architects today the task is finished at the drawing board. P/A: What do you think has led the architectural profession to this Cartesian split between mind and body, thought and action?

RM: Probably it is related to the evolution of society and the segregation of the labor force. In old times, thought and action moved together. Very often, the architect was directly involved with the construction. Years ago, this relationship was broken. One of the aims of modern architecture was to adjust new aesthetics thoughts—to new techniques, but the split is still there and it is a problem with which we are still struggling.

Industrialization and craft

RM: In Spain, we still retain a give-andtake relationship between architects and builders which allows a quality of craftsmanship fairly close to that in traditional buildings, a relationship that seems to have been lost in the United States, for example. As industrialization increases in Spain, of course, this will inevitably change.

P/A: Does the education of architects in Spain contribute to this deeper understanding of the building process?

RM: As much as this building process and its implications with local authorities are less complex in Spain than in the United States, Spanish architects remain today closer to the building process. In (continued on page 81)











The grand gallery wing, close to 50 feet high, is organized by lateral bearing walls spaced 20 feet on center. These walls, of concrete clad in brick in the old Roman manner of construction, are interrupted by a variety of arched openings. The largest arches form the great longitudinal "nave" of the museum (midground in photo above), on axis with the access bridge. To the north of the central nave are two mezzanine levels (background in photo above). Individual galleries on these mezzanines are separated by the lateral walls, connected horizontally by arched openings (top right) and vertically by openings in the floor, the easternmost one with a mosaic floor restoration on the wall (top left). Stairways between the gallery levels occur at the west (left) and east ends of the wing. The flat, reinforced concrete slabs of the

mezzanine level are deliberately thin, simple, and modern, as are the steel railings, in order to contrast with the ancient look of the 20-inch-thick arched brick-faced walls, which are laid up as if dry, with mortar concealed in deep inner frogs. Natural lighting is introduced in various ways: through skylight monitors between the bays, through high windows in the north and south walls, and through skylights over the main gallery floor, along the north wall where it sets back.







The dramatic main nave of the gallery, as seen along its longitudinal axis (above), has a cathedrallike air. "I love the brick arches," says Peter Eisenman in *The Charlottesville Tapes* (Rizzoli, 1985); "who wouldn'1? It's like motherhood."

Visitors entering the museum can look into the inner courtyard and see, beyond, glimpses of the gallery and of the excavations below. They then descend a ramp to the main gallery level, where they enter the gallery via a bridge. The bridge is shown (top left and right) in views back from the central nave.

The basement (right and following pages) grows out of the excavated ruins of a Paleo-Christian basilica, a Roman house, and tombs.


(continued from page 78)

Spain, graduation automatically certifies architects and therefore many young architects open their own practice right out of school, so they must learn how to build in school. That causes the big difference between Spain and the U.S., because students here know that they will receive much of their practical training once they get out of school, when they are working in established offices.

The Museum: archaeology and architecture

RM: Mérida today is a city that has lost the significance it once had. Yet the Roman splendor is still most palpable in the splendid ruins under and next to the site, and I wanted the museum to allude to this, in several ways. First, I wanted an image of the former grandeur to be reflected in the size, the volume, and the richness of the new spaces. Second, I wanted to use a construction system that would relate to Roman techniques, in order to allow a favorable relationship with the site. And third, I wanted to intertwine the ruins and the new construction in such a way that visitors would have a sense that the ruins have their own life that continues beyond the confines of the building, that the museum has not separated and encased an isolated fragment. The museum manifests the confrontation of two cities: one is the present Mérida, the other the buried Mérida that exists although it isn't evident.

P/A: How did you permit the ruins to retain their own life and individual presence?

RM: First, I have the visitor leave the main body of the museum and reenter the archaeological precinct beneath the building. Even more important, I didn't feel that respect for the ruins required that I follow their orientation. The new building has its own orientation, and the encounter of the two grids retains the individual entity of each fabric without establishing a hierarchy.

P/A: Did you encounter resistance among archaeologists towards making the new architecture so much a part of the ruins?

RM: Not very much, and only at the beginning. For one thing, the ruins under the site are not the most valuable of the remains in Mérida, not as valuable as the amphitheater nearby, for example. But in addition, and most interestingly, the archaeologists realized that our approach was not disrespectful. Quite the contrary: We were using the ruins not just as a foundation, but as a way of underlining the greatness of the old Roman city. After all, this type of superimposition of new building over the remains of older structures recurs time and time again in the history of ancient architecture. Furthermore, the archaeologists were pleased with our flexibility: We were quite willing to adapt our established structure to the conditions, and jump over areas the archaeologists pinpointed. There was a real give and take. (continued on page 85)





Project: Museum de Arte Romano (The National Museum of Roman Art), Mérida, Spain. **Architect:** Rafael Moneo, Madrid. **Client:** Director General of Fine Arts, Ministry of Culture. José A. Saenz de Buruaga, José Maria Alvarez Martinez, museum curators. **Site:** over archaeological remains, including a Roman house and Paleo-Christian basilica remains; adjacent to a theater built by Agrippa (24 B.C.) and an amphitheater.

Program: museum, archaeological precinct, cafeteria, restoration workshops, lecture room, library, offices. Total area: 124,000 square feet. **Structural system:** brick bearing wall with concrete core wall. **Mechanical system:** electric heating.

Major materials: brick, granite flooring on concrete slabs, ceramic tile roofs.

Consultants: Francisco Gonzalez Peiro and Rafael Luque, quantity surveyors; Jesus Jimeniz, Alfonso Garcia Pozuelo, structural engineer. **General contractor:** "Cubiertas y M.Z.O.V." S.A., Juan Manuel Garcia.

Cost: approximately \$3.25 million U.S.

Photos: Lluis Casals except as noted.

The new structure in the underground level (left), 40-inch-thick walls carrying the 20-inch walls of the gallery above, has its own orientation, different from that of the ruins, and its own order of arched openings, which varies only occasionally to accommodate important remains. Moneo, in *The Charlottesville Tapes*, has said "I would like people visiting the museum to have the feeling that not only the crypt but also the new walls were 'found' by excavating, that the walls have been there since the third century after Christ and were uncovered in the process of building another building some centuries later." The Bankinter addition in Madrid and the Town Hall in Logroño are Moneo's most celebrated buildings of the 1970s. Bankinter is noteworthy as an early preservation effort, creating a backdrop for the villa retained on the site. Logroño Town Hall, with its wellloved plaza, represents the optimistic democratic values of the post-Franco era.







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GROUND FLOOR, LOGRONO TOWN HALL

The Bankinter addition (left and left above), designed in collaboration with Ramón Bescós, had to respect the scale of the existing 19th-Century villa as well as avoid blocking the light of the apartment house behind it. These restrictions resulted in the building's dramatic geometry, which is further emphasized by the use of apparently dry joints, as in the Museum at Mérida, and by the windows cut precisely into the wall. To soften the effect of the stark brick wall and to relate it to the decorative nature of the villa, the architects incorporated specially-designed bronze lintels. The eloquent restraint of the taut brick façade is unusual, says Moneo, given the prevalence of technological expressionism in Spanish architecture of the early 1970s.

The Town Hall (above and facing page) of Logroño, the capital of Spain's La Rioja 1 1 2070n

region, was programmed to play an important role in public celebrations. The architect, then, took on the task of creating a major plaza on the site, defined between two triangular wings of the three wings that form the building, a government assembly wing (facing page top), an administrative wing (facing page bottom), and a public meeting hall wing. The variety of architectural themes is unified by a tight grid in which the square, the double square, and the diagonal work together. The golden section was used to establish the dimensions of the plaza. The two major façades (top above) differ one from the other, each representing archetypal Modern elevations, while the use of yellow Salamanca stone gives a sense of permanence and alludes to the timelessness of the ideal political institution.





(continued from page 81) P/A: How does the construction of the Museum relate to Roman construction?

RM: The composition of the bearing walls, with a concrete core and brick on both sides; the series of arches that characterize so strongly the space; the long thin proportions of the bricks, which are made especially for this work: All resemble Roman construction, but far from literally. The fabric, for example: The idea here was to create a wall that was as smooth, continuous, and abstract as possible, in order to form an unimposing background for the archaeological pieces in front of them. That was achieved with bricks which allowed joints that appear mortarless, the mortar being concealed within a deep frog.

Modernity and tradition

RM: At first glance the museum seems quite literal, quite Classical. But if you see it more accurately you will realize that it is based on modern mechanics of composition. It has a certain fluency, a way of dealing with spaces that is undoubtedly Modern. In the Post-Modern/Modern debate, I think that those who argue on the side of Post-Modernism don't realize how deeply we have absorbed Modern principles.

P|A: But you have not taken the Modern approach to contextual relationships: You have not felt that need to provide in your intervention a sharp contrast with the existing environment. Your ability to blend is most satisfying.

RM: I don't think that a work of architecture should be too intrusive. It should always take second place to the total environment. Yet it should always have a certain presence, one based on calm discretion.

Architecture and politics in Spain

RM: Even during the Franco era, there was a movement in architecture away from rather traditional, awkward monumentality towards an image of efficiency and progress, which generally took the form of International Style office buildings. For the Logroño Town Hall, I wanted to create a building which avoided both fake monumentality and dull efficiency, but which respected public democratic values.

P/A: Did Scandinavian Modernism provide a model?

RM: Of course, I am very familiar with the work of Scandinavian architects, and especially Asplund, who I feel provided some of the best public places of the 20th Century. I have been inspired by him, but the overriding goal in Logroño, commissioned during Franco's time but developed and completed later, was to reflect the sense of openness, lightness, and optimism that I felt the Spanish society of the post-Franco era deserved.

Progressive Architecture 6:86 85

P/A Awards Update Kersten Physics Teaching Center University of Chicago

P/A Awards Update Kersten Physics Teaching Center University of Chicago

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ence quadrangle, the building is almost entirely glazed on the façades facing the open space. The plaza at first-floor level and the terrace outside the third-floor laboratory will be used for various demonstrations. The second-floor terrace may be used in conjunction with the student/ faculty lounge. Movable panels (detail, right) can be adjusted for shade or for window enclosure.

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FIRST FLOOR



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P/A Awards Update Kersten Physics Teaching Center University of Chicago





Only the plaza wall, which carries out the consistent slightly rougher texture of the base, and the stair tower massing (below, left) hint that the Ellis Avenue façade (below) is part of the same facility. The quadrangle elevation does not have to be as site-specific as the street elevation, because of the broader separation in the central space. On the interior, the lab spaces for which the building was conceived are handsome and well lighted (bottom, left); the featured space, however, is clearly the spine. At the north end of the spine on the third floor, a small informal lounge (bottom, right) commands a view down the stair, and overlooks the second-floor bridge to the research institutes across the street. In the view north along the spine at second-floor level (facing page), the verticality of the space is heightened by its length and width, and by the prominent steel framing of the curtain wall, with its layers of bracing and grid.







Project: Kersten Physics Teaching Center, University of Chicago, Chicago.

Architects: Holabird & Root, Chicago, with University of Chicago Architect Harold H. Hellman. (Partner in charge, John A. Holabird, Jr.; partner in charge of design, Gerald Horn; project manager, Janis O. Lazda; project designer, James Baird; project architect, Michael Pancost; project team, Kyoko Adachi, Lynne Pertt, and Ernest Wagner. Burton Sobel, structural engineer. Graphic design, Sandra Kuffer. Interior design, Sharon Jasnocha. University project architect, Elio J. Martina.)

Client: The University of Chicago. **Site:** last remaining parcel on a quadrangle surrounded by other science buildings and a library. **Program:** undergraduate physics

teaching facility including 12 teaching laboratories, prep and demonstration rooms, 4 classrooms, 2 lecture rooms, and other office and support areas. Total gross area is 57,200 square feet.

Structural system: poured concrete pan joist decks, reinforced concrete columns on individual spread footings; tubular steel curtain wall structure; steel bridge.

Major materials: wood windows and curtain wall, Indiana limestone, glass, and skylights (see Building Materials, p. 186).

Mechanical system: steam from central university plant. Consultants: mechanical and electrical engineers, Cosentini Associates.

Construction manager: Gilbane Building Company. Costs: \$8.9 million. Photos: Nick Merrick, Hedrich-Blessing except as noted.

P/A Profile Christopher Alexander



Harmony and Wholeness

With a growing body of built work to illustrate the principles set forth in his numerous books, Christopher Alevander is not only proposing radical changes in architectural practice, he is proving that they can work. A discussion of his ideas and influence follows on page 102.

"HOW," wonders Christopher Alexander, "can architects not deal with every aspect of making a thing?" Having become a general contractor himself several years ago (in addition to being one of this country's most controversial theorists and educators), the California architect insists that the only way architects are ever going to produce buildings of beauty and integrity is if they are themselves actively involved in making those buildings. The split between those who design and those who build cannot, by Alexander's definition, produce good architecture. Control over the entire building process is, for him, the means to the ultimate goal: the creation of beautiful, timeless buildings, whose sense of wholeness unites thought and feeling and which are tiny but complete pieces of a larger, universal order.

Alexander's search for the qualities that produce this sense of harmony and order dates back to his undergraduate days, first in mathematics and then in architecture, at Cambridge, and later at Harvard, where he wrote his first book, Community and Privacy (1963), with Serge Chermayeff. That book was followed by Notes on the Synthesis of Form (1964). Alexander, who joined the architecture faculty at the University of California at Berkeley in 1963 (a position he still holds), founded the Center for Environmental Structure in 1967 to pursue his goal even more intensely. (The Center's staff, including Gary Black, Ingrid Fiskdahl-King, Hansjoachim Neis, and Artemis Anninou, "plays an extremely big role" in Alexander's work.) Alexander's theories on form and building have appeared in several books, published by Oxford University Press over the last decade. The best known of these, A Pattern Language (1977), presents a practical guide to Alexander's phenomenological, yet rigorously empirical, approach to making buildings, describing 253 "patterns" that are at once "things in themselves and the processes by which those things are created," and which cover everything from site planning to the shape of a window (see also p. 102). The book is required reading for a thorough understanding of the pattern language concept. While the patterns are understood easily enough, the hard part seems to be interpreting them to produce that wholeness, or what Alexander calls "the quality without a name" that is the subject of The Timeless Way of Building (1979), a volume that expresses Alexander's key ideas in more philosophical terms.

Alexander's recent efforts at giving these theories built form include the café he designed in Linz, Austria (the subject of his 1981 book The Linz Café), and in two houses-one in Albany, California, and the other in nearby Martinez. Each house embodies a different aspect of Alexander's constant technological experimentation: the former a double-shelled structure; and the latter an exercise in lightweight sprayed concrete. (An earlier experiment, involving 30 units of low-cost housing in Mexicali, Mexico, in the 1970s was the subject of his 1985 book, The Production of Houses). Alexander's ideas have been carried out on a larger scale in his master plan for the University of Oregon (the subject of The Oregon Experiment, published in 1975), and more recently in the New Eishin campus (photos, these pages) outside Tokyo, which was, like all his projects, designed, planned, and built with constant user involvement.

Alexander's single-minded adherence to his principles is often interpreted as arrogance, in both architectural and academic circles, and his writings at times have a maddeningly mystical tone, yet what really irks many people about Alexander is his rejection of basic precepts of the architectural and building professions involving the allocation of money, timetables, levels of finish and tolerances, etc., that are now deeply ingrained in the system. While Alexander's buildings are richly ornamented, they have a somewhat "rough and ready" look; something has to give in order to balance the budget, and Alexander chooses richness over slickness. And the notion of an architect getting in there and "messing with production," based on Alexander's belief that it is impossible to visualize any aspect of a building until it is mocked up on-site, is hardly standard practice. (He nonetheless condemns design/build firms for working within the existing system.) Alexander gets impatient when it is suggested that he is proposing social revolution, or even changes in the building/design infrastructure, but his assertion that he wants to "change the underlying reality of buildings" seems to leave him little choice. Still, he insists, his underlying motive is not social reform, but the creation of art: "... The most that I would ever hope ... is [that] by making architecture which is as true as I can manage, people will perhaps see glimpses of other truths . . . I'm very old-fashioned in that sense; I think that all truth is one." In our dualistic, not to mention pluralistic culture, this is doing things the hard way.

But whatever one thinks of Alexander's writings and teachings, his work must stand on its own, and it is compelling work indeed. The buildings share a timeless simplicity and an unpretentious warmth that are so often lacking in today's self-consciously historicist and "vernacular" styles, and their inexpensive materials manage to convey a sense of substance and sensuality that is missing from far more luxurious buildings. And while Alexander's work is seductive in photographs, its real magic must be experienced: if ever any work was not to be copied mindlessly, this is it. But then, Alexander's approach to architecture is self-insuring against theft: form and process are so inextricably united that any shortcuts would tell. That is a small reward for doing things the hard way, but in these expedientminded times, it's also a large one. Pilar Viladas



P/A Profile Christopher Alexander







For the campus of the New Eishin University, a combined high school and college near Tokyo, client Hisae Hosoi asked Alexander for a design that reflected "serious human values." The 20 buildings that have been completed thus far, as well as the next phase of construction (both of which will eventually total 130,000 square feet; see site plan, facing page), were planned and designed with the full participation of the faculty and students, working with the Center for Environmental Structure. (Christopher Alexander, chief architect; Hansjoachim Neis, executive architect; Ingrid Fiksdahl-King, architect; Gary Black, chief engineer; Hisae Hosoi, client.) After interviewing these users for five months, CES developed an 80-page pattern language, organizing the campus into outer and inner precincts (the latter occupies one-fifth of the site and contains most of the buildings),





determining the layout and circulation of the various buildings, and describing their physical character (stone bases, white walls, deeply overhanging roofs, etc.). A gate at the outer boundary leads to an entrance road, which in turn leads to the main gate (preceding page and facing page, upper left), covered in black and white *shikkui*, a traditional Japanese plaster. Across the yard from the main gate is the Great Hall (top left and right), a large ceremonial building that seats 600 (and up to 1200); its three-story central space is indirectly lighted to maintain a mystical feeling, and its massive columns are now painted in various colors.

The main circulation route through the high school sector is the homebase street (above left and bottom right), which is lined with two-story homeroom buildings. On this street side, the buildings have redwood galleries; on the outer



side, they have white-columned arcades. The homebase street ends in the central hall (bottom photos and facing page, bottom right), a gathering spot for students. Its four-foot-thick, shikkui-covered base walls have arched openings, with built-in benches, that double as entrances to the building. The Douglas fir upper structure, with its skylight and tall vertical window, is supported by a truss whose curved members Alexander designed with the help of finite-element analysis on a computer, in order to arrive at a structure that was at once technically sophisticated and formally beautiful. The floor and benches are made of oya-ishi, a common and inexpensive pitted limestone. Off to the side of the homeroom street is the wood and black plaster gymnasium (facing page, middle photos), with its dark red metal roof, and wood hammerbeam truss and cross-braces. A wooden bridge leads from the great hall to the cafeteria (facing page, bottom left). Ornament is integral to many of the buildings, such as the main gate, the Great Hall, the cafeteria, and the music hall (this page, upper right). There was no particular style intended for these buildings, and although they recall certain indigenous Japanese building types, they also evoke memories of European and Scandinavian historical architecture.

The site was planned over a fourmonth period, during which hundreds of white flags were placed and replaced on the site; each new layout was recorded in a drawing, and corrections were made in the flag placement until a satisfactory site plan was achieved, in what Alexander calls "a constant process of checking." Similarly, large-scale mock-ups of the buildings themselves were built, corrected, and remade until they were right, a process also consistent with Alexander's empirical approach to design. Drawings, he argues, are often just images, and may bear little relation to the building that results from them; on-site mockups allow for adjustments in everything from building scale to interior ornament.

While the civil works portion of the project was carried out under the direction of the CES, the construction phase of the \$11 million campus was taken over by a construction company, over Alexander's protests. He concedes, however, that the project's seven-month schedule would have been impossible to meet without the construction company's help, and sees in the experience the potential for architects and large construction firms to collaborate more productively from the outset of a project. Work continues at Eishin once again under **CES** direction.



hotos: Hiroshi Kobayash

P/A Profile Christopher Alexander

The house built in Albany, California, in 1982 for Andre and Anna Sala and their two children (Christopher Alexander and Gary Black, architects; with Bob Smith, David Tuttle, Seth Wachtel, and Andre Sala) occupies a wooded, sloping site (bottom right, view from southwest) on a street appropriately named Hillside. The three-story house incorporates many elements of the pattern language. A parking area at street level leads down wooden stairs and over a bridge (photo and elevation right) to the entrance, which is on the second floor. In accordance with the pattern language, there is seating outside the front door (this page, bottom left) and just inside it (facing page, bottom left). This floor also contains the bath and children's realm (facing page, bottom right), a play area with sleeping alcoves. The parents' realm, with its sleeping and sitting alcoves and separate work rooms (also pattern language elements), is on the third floor. The first floor contains the farmhouse kitchen (another pattern language element), which is also the main living area, with its fireplace, inglenook, and alcove (facing page, top left), and its south- and west-facing sitting area (facing page, top right). Just outside the kitchen are the upper terrace, a walled garden space, and the lower terrace, with its curved parapet/ bench and a spectacular view of San Francisco.





The house has an unusual structural system: the interior post-andbeam structure carries the vertical loads: while the exterior 11/2" concrete shell, carries the shear forces. Sandwiched between the two is a layer of foam insulation; the interior pine-paneled walls are attached to the post-and-beam frame. While the concrete, poured in lifts of alternating colors, proved unexpectedly costly (CES still met the \$103,000 budget, however), the structure has surprised Alexander with its excellent thermal performance. Theoretically, the optimal passive solar structure is one in which the thermal mass is enveloped in a layer of insulation. The thermal mass of the Sala house is on the outside-the "wrong" side-yet the house uses virtually no heat apart from what is generated by the fireplace. Alexander adapted the classic Count Rumford fireplace, which he admires for its simple, efficient design, in inexpensive concrete rather than the traditional and more costly brick, by pouring concrete around a fireproof concrete lining and flue, using simple wooden forms.

The kitchen's terrazzo floors, a mixture of marble dust, marble chips, and cement, were made using Styrofoam forms, an inexpensive method of achieving decorative patterns.















FIRST FLOOR





P/A Profile Christopher Alexander





The Linz Café, built on the bank of the Danube River in Linz, Austria, in 1980, was described by Alexander in his 1981 book of the same name as "one of the first buildings in which I have succeeded in carrying out almost all the intentions expressed in my earlier volumes." Asked to design a building for the architectural exposition "Forum Design," Alexander insisted on creating a functional building. And since the exhibition was temporary, Alexander designed the café to be "portable." In fact, it remains in storage, awaiting relocation.

To take advantage of the river view from his allotted site, Alexander raised the first floor of the building to clear the 10-foot-high embankment. The long side of the narrow building (upper left) faces the west and the river, so that it also catches the afternoon sun. Alexander designed the building by starting with the entrance, a small, enclosed space that opens suddenly into a large coffee bar (facing page, distance). This leads to "a churchlike nave, with a continuous gallery around it, and small alcoves." This main space (facing page) is lined on both sides with alcoves (bottom









left), each with its own window. A wide central stairwell leads down to a terrace nestled into the riverbank below the bay window at the far end of the first floor. A canopied terrace (bottom right) is accessible both from the coffee bar and from the room with the bay window (bottom center). At the entrance end of the building, a narrow stair winds up toward the second floor, where a gallery looks over the main floor, and a second terrace is set back from the one below.

The 2300-square-foot wooden building was completed in ten weeks for about \$35,000. The individual columns and beams were cut to length, while the doors, windows, railings and benches were cut into the framework, and alcoves were fitted in later. Full-scale mockups of everything were made, and shaped by trial and error. Alexander explains, "The drawings record the first imaginings, so one can begin the construction-but it is the small decisions, while the thing is being built, that make it feel just right." The colors were tested in place until the right combinations were found, and Alexander painted the ornament on the walls himself.









1 GUNITE ON POULTRY NETTING 2 GUNITE ON STEEL. MESH OVER WOOD STUDS 3 RIGID URETHANE INSULATION 4 REINFORCING BARS 5 GUNITE ON STEEL MESH 6 GUNITE ON STEEL MESH OVER RIGID POLYSTYRENE INSULATION 7 CRYSTALLINE WATERPROOFING 8 ROOF TRUSS 9 15 LB. BUILDING PAPER 10 BATT INSULATION 11 POLYBUTYLENE RADIANT HEAT TUBING 12 RIGID POLYSTYRENE SLAB INSULATION 13 HIGHWAY MESH 14 POLYETHYLENE VAPOR BARRIER 15 CRUSHED ROCK 15 WATERSTOP 17 WOOD BASEBOARD 18 WOOD CHAIR RAIL



This small house in Martinez, northeast of San Francisco, was completed in 1984 (Christopher Alexander, with Jonathan Fefferman, Gary Black, Hari Tsringas, David Dacus, and Olasheni Agbabiaka), and currently serves as offices for the Center for Environmental Structure. The house is the most recent and most highly developed of Alexander's experiments with lightweight sprayed concrete, or Gunite. Alexander found that poured concrete, although an economical building material, had become too "cold," especially in prefabricated structures, and its formwork was "as rigid as the concrete itself.... You can't see it before you pour it; it's always a mystery." In the Gunite process, a wooden framework supports wire mesh and Styrofoam guidework onto which the concrete is sprayed. This eliminates costly formwork, and consistent with Alexander's ideas about on-site building modification, the technique allows "gradual cutting and shaping of minor elements of the building" without undue delay or extra cost, thus giving the architect much more control over the material and the finished product. The columns and friezes of the house (top) illustrate the versatility of the method. (The friezes also illustrate the pattern language's requirements for "boundaries" around forms and ornament.)

In contrast to the Sala house, the Martinez house was built according to conventional thermal-design wisdom, backed by numerous computer studies and a grant from Pacific Gas & Electric. The walls, with rigid urethane insulation sandwiched between two layers of Gunite, contain radiant heat tubing. However, the building has so far failed to perform as expected; the building mass loses heat much faster than it should. Alexander says that in his next Gunite building, he will reverse the thicknesses of the two walls.

The house is a one-story structure





that includes a vaulted family/dining area with a delicately colored terrazzo floor and concrete fireplace like that of the Sala house, a seating alcove in the living area, and sleeping alcoves in the children's room. Its front porch frames views of the surrounding hills (facing page), as do the various windows inside the house. The wood furniture (bottom photo, made with the assistance of apprentice Kleoniki Tsotropolou) gets its delicacy and depth of color from its finishing process, which Alexander discovered while making dolls for his children. It involves putting a layer of gesso over the wood, coloring it with gouache, and then coating this with varnish.

Also on the Martinez site are earlier experimental Gunite buildings, and a workshop (overleaf), completed in 1985 (Christopher Alexander, with Gary Black, Seth Wachtel, and Lance Dom), which is an experiment in heavy timber construction. This grew out of Alexander's conviction that modern wood buildings had lost the "mass" characteristic of older wood buildings. Alexander plans to use the techniques in a housing project for Canadian Indians. Each house, which is budgeted at \$40,000, will be laid out by its users, framed by Center staff, and then filled in by the users. However, Alexander says that he is "several years" away from achieving the facility with timber that he feels he now has with concrete.

Alexander is currently at work on a house in Seattle that is built with monocoque construction, in which the interior shell and furniture are one. And there are more books in the offing as well: forthcoming volumes on urban design and the Eishin project; and what may be Alexander's magnum opus, *The Nature of Order*, a book already several years in the making and still developing. In it, Alexander attempts "to define fundamental concepts of wholeness and how it can be produced."

P/A Profile Christopher Alexander







Christopher Alexander is better known as a theorist than as an architect, even though his theories are little known and often misunderstood. A discussion of Alexander's ideas, and their influence, follows.

CHRISTOPHER Alexander is, in many ways, an anomaly. He is a trained mathematician and a practicing architect, a well-known theorist and a budding contractor, a prolific writer and an able designer. Anomalous too are his ideas about architecture, for while they constitute a reaction to Modernism, they have almost nothing in common with current Post-Modern theories.

Alexander sees the failings of Modernism and Post-Modernism in the positivist tradition both draw upon. Positivism, which has dominated 20th-Century philosophy, recognizes only those ideas that can be verified through logical, mathematical, or scientific methods. Since values, including those related to aesthetics, resist scientific verification, positivists dismiss them as expressions of personal opinion in which there is no right or wrong.

Modern architecture, with its emphasis on logic and function, has been greatly influenced by positivism—but, according to Alexander, so has Post-Modern architecture. Although Post-Modernists have rejected the positivist faith in logic and the scientific method, most still accept the positivist idea that aesthetic values are subjective and relative: that architectural form is a matter of personal expression, and architectural style a matter of personal preference, with no one approach more right or wrong than another. Seen in this way, Post-Modern pluralism is not a new currency, but the flip side of Modern architecture's positivist coin.

Alexander deals in a currency of very different mint. Following philosopher Martin Heidegger, Alexander believes that the rationalism and pluralism that characterize the modern world have blinded us to what it means to "be" in this world—to feel at one with a community and at home in the environment. The ugliness of the modern environment, he says, testifies to our alienation from it. Most premodern societies possessed a sense of wholeness and of right and wrong—and most produced beautiful, timeless architecture.

While Alexander is certainly not the first theorist to admire traditional vernacular architecture, he differs from others in focusing on *not just its form*, but on the process of its creation. By following that process, he believes we can recapture the beauty of vernacular architecture and regain the feeling of wholeness and connectedness that has been lost in the modern world.

The specifics of that process Alexander calls a "pattern language." The patterns describe archetypal building elements, such as "main gateways" or "garden seats"; building characteristics, such as "positive outdoor space" or "quiet backs"; and human activities, such as "selfgoverning groups" or "communal eating." The evidence for these patterns comes mainly from observations of vernacular architecture ranging from English universities and Italian hilltowns to Greek villages and Oriental temples. That similar patterns recur in the architecture of various societies over long periods of time is offered as proof that they satisfy some very fundamental human needs.

Once again, Alexander is not the only theorist interested in archetypes. But his view differs from that of, say, a rationalist such as Aldo Rossi, in its intention and goal. Archetypes for the rationalists are like ideal Platonic forms deduced from typological analysis of buildings. Alexander's patterns diverge from that position in at least two ways. First, they are not forms derived from analytical abstraction, but representations of human activity and relationships. Second, the pattern language aims not at some Platonic ideal but at the adaptation of archetypal patterns to suit individual needs. Where one seeks in archetypes intellectual clarity, the other seeks emotional fulfillment.

Alexander describes the patterns as a language; like words in a sentence, there is an order and structure to their use. For example, to avoid the random selection and application of patterns in the design of a building, the patterns should be used in order from larger to smaller scale. Alexander's use of the language metaphor differs from that of his contemporaries, once again, in its intention and goal. He seeks a language of archetypal forms and relationships that underlie the timeless architecture of traditional societies. That archetypal language is unlike the language of socially determined imagery that Robert Venturi speaks of or the language of abstract form and deep structures that Peter Eisenman pursues. The test of any language is how well it communicates. Venturi's idea of language is as a vehicle to communicate images relevant to particular social groups; Eisenman's is as a vehicle to investigate the autonomous nature of architectural form. Neither attempts, as Alexander does with the pattern language, to identify purely generic forms and relationships that are common to most societies and easily understood by most people.

Since writing A Pattern Language, Alexander and the other members of his Center for Environmental Structure have extended their pursuit of "the timeless way of building" to encompass both the planning and construction process. Central to this pursuit is the idea that people feel more at home in their environment when they become involved in its shaping, and that designers feel more connected to their work when they become involved in its construction. The goal has been to reestablish the process and not just the forms of vernacular architecture.

At the University of Oregon, Alexander and his coworkers established a planning process that encouraged incremental construction, user participation, and regular post-occupancy evaluations. And in the construction of low-income housing in Mexico, they altered the building delivery process so that designers and users could lay out



The barnlike workshop at the Center for Environmental Structure's Martinez studio (facing page) utilizes heavy timber construction that, according to Alexander, is more ecologically sound than other wood framing techniques because of its longevity. The wood detailing is a cross between traditional barn framing and the timberwork in Japanese temples. The tile design (left) was painted by Alexander in 1978. The house (upper right) was designed and partly built by students at Kansas State for the environmental educational center, Meadowcreek. It too contains some ingenious wood detailing. The bus shelter (lower right), built by students at the University of Oregon, has a vaulted roof of lightweight concrete over burlap and lath, a technique Alexander used to construct the Mexicali houses.

their houses on site and become involved in the construction. Alexander also proposed changing the mortgage system to allow for more incremental investment, and the design process to give each architect greater control over a smaller number of buildings.

The deciding factor in any architectural theory is how easily and successfully it can be used by others. Some aspects of the theory, such as the pattern language, seem easily used and adapted by architects, but other aspects, such as the restructuring of the mortgage and building delivery process, seem very hard indeed. The success of the theory in producing what Alexander has always aimed at beauty—is also mixed. It's clear from the preceding pages that, in Alexander's hands, his theory can result in extraordinarily beautiful work. In the hands of other architects, though, the results have been uneven. Whether, as Alexander suggests, that is due to the use of the theory only in part or whether it is simply due to people's uneven design talents is unclear.

The most support for and consistent results from Alexander's theory have been in academia. There too, the pattern language serves as the major focus. Professors Gary Coates and David Seamon at Kansas State use the pattern language as a tool for design education. It enhances "the awareness and perception of student architects," says Coates, and helps them "see the environment in terms of patterns of space, activity, and form." Their students have used the pattern language, most recently, to design and build an environmental educational center in Arkansas called Meadowcreek. "The patterns," says student Daryl Rantis, "were particularly helpful in the programming phase. They were easily understood by the client and allowed a discussion of values as well as needs." Adds Doug Pierce, another student, "The patterns also provided a good way of checking our designs against the client's desires." "It was difficult, though, using the patterns in order," says student Steve Downen. "When designing, you tend to work in various scales simultaneously."

Several Kansas State architecture students helped in the construction of Meadowcreek. While they did not go as far as Alexander in dispensing with drawings and designing the structures at the site, the students did take an unconventional approach. "We worked with models," says student Stan Koehn, "which allowed us to discuss with the construction crews alternative construction methods. By breaking down the gap that separates architect and contractor, we got a better exchange of information and greater craftsmanship."

Another area in which people are extending Alexander's work is in the development of new patterns. Robert Jurmain, a designer/ builder working in Canada's British Columbia, develops an entirely new set of patterns with each client. "When the client produces his own patterns," he says, "there is no question as to their relevancy."



Most research, though, has focused on areas in which the pattern language, as written, seems deficient. For example, the students at Meadowcreek developed new landscape-related patterns—an area that is "a particular weakness," says David Seamon, "in the pattern language." And the Community Design Collaborative in Oakland has worked with low-income tenants in San Francisco to develop patterns for housing design better related to their particular needs.

Most of the work aimed at changing the construction, financing, and regulation of buildings has occurred within Alexander's Center for Environmental Structure. For example, he and his coworkers are currently pursuing ways of relaxing some code requirements, "Particularly in the area of finish tolerances," says Alexander, "which does little good and adds greatly to the cost of building." The center also is continuing its research into new, low-cost construction technologies, expecially in the area of spray-applied concrete. Complementary efforts include the research that Howard Davis of the University of Texas is conducting into the antecedents of our current zoning codes. "I'm looking for new ways of regulating building," says Davis, "that permit a more continuous, whole environment with less coderequired repetition and waste."

The planning process at the University of Oregon has met with the compromises that plague most planning efforts. Students and faculty, says Jerry Finrow, have become more involved in the selection of architects and the design of campus buildings. While a couple of recent projects have not followed the process, "the loopholes that allowed that to happen," he says, "have been plugged. The bottom line is that the buildings that have followed the process are better, with denser, more defined spaces and architectural vocabularies that relate better to the original campus." Others on the campus are less sanguine. In a recent article in *Avenu*, a newspaper published at Oregon's School of Architecture, Mike Shellenbarger argues that, while the university claims to adhere to Alexander's planning ideas, it ignores them when they prove inconvenient.

If Alexander's ideas are hard to carry out, they also are hard to maintain in the face of a well-established building delivery system. Those difficulties, though, don't detract from their value as one of the few real alternatives to the positivist assumptions that infuse much of the current design debate. Alexander's approach is not above criticism. Questions philosophers have raised about the thought of Martin Hiedegger—its dependence upon intuition, its overemphasis on description, its political naïveté—bear upon Alexander's theory. But there's no doubt that, as Stephen Grabow of the University of Kansas says, "Alexander offers, for anyone who wants to come along, the high road of intellectual adventure."

P/A Technics Intelligent Computers

If the computer is to become more useful and cost-effective for architects, it must become more intelligent. The following articles explore various efforts in that direction.

"COMPUTER-AIDED drafting," says Bruce Forbes of the Boston firm Jung/Brannen, "just doesn't pay for itself." Michael Hough, publisher of the influential newsletter, *A/E Systems Report*, supports that position. "In public, most firms with large turnkey CADD systems claim they are paying off in increased productivity. But in private, more than 90 percent admit that the expensive systems are not yet economic, even after a year and sometimes after several years on line." Many firms "struggle to get even a one-to-one payback."

There are two schools of thought about solutions to that problem. One school holds that better management will make computer-aided design and drafting more cost-effective. That computers are not paying for themselves "in 90 percent of the firms," writes Michael Hough, "is, in our opinion, caused not by the equipment but rather by the management of the entire system—equipment, CADD staff, project staff, client, vendor support, et al."

The other school blames the equipment, in particular, the computer software. "Most software," says Bruce Forbes, "only mimics what a draftsperson does manually. Computers will pay for themselves when they become more intelligent, when they not only mimic what we do but do a lot of our work for us."

In the short term, the solution to this problem probably lies with both better management and better software. But, in the long term, there is no doubt that computers must become more intelligent if they are to pay for themselves and if they are to be of use to architects.

The following case studies examine various efforts at making computers more intelligent. One way of doing so involves the integration of graphic and alpha-numeric databases. Some of the early research in this area occurred in England by groups such as Applied Research of Cambridge (ARC, p. 105). Their software has since become the basis for McDonnell Douglas's GDS system, which in the hands of groups such as Center Research of Princeton (p. 108) becomes a powerful tool to analyze disparate information and represent it visually.

Expert systems takes the idea of integrating databases much further. The systems developed and soon to be marketed by Jung/Brannen's Re-

search and Development Corporation (p. 106) not only integrate various databases, but synthesize and analyze the results.

Another way of increasing the computer's intelligence is to link computer-aided design to computer-aided manufacturing, CAD-CAM for short. Skidmore, Owings & Merrill has developed a laser cutting machine (p. 109) to fabricate parts for their architectural models in what may be the first use of CAD-CAM within the architectural profession. Robots offer a more advanced form of CAD-CAM. Several Japanese companies (p. 110) have developed computer-operated robots to perform hazardous, low-skill construction work such as spraying fireproofing or positioning steel.

A third way of increasing the computer's intelligence involves the development of real-time, threedimensional modeling. Yale's School of Architecture uses software written by the French aerospace company Dassault (p. 112) that stores all information in a three-dimensional model, allowing students to generate perspective views automatically or simulate walks through their designs. Animation simulates movement in real-time, making the image on the screen seem much more realistic. As the work of professor Charles Csuri shows (p. 113), animation holds considerable promise as a design and presentation tool.

In every case, as the computer has become more intelligent, it has either reduced costs, enhanced efficiencies, expanded visualization, or eliminated hazardous or repetitive work. Its economic benefits are clear. Less clear are its social benefits. While increasing the intelligence of the computer makes it a better labor saving device, the effect, particularly of robotics and some expert systems, may be the outright elimination of certain jobs. How society deals with the shifts in employment that seem inevitable with some of these systems is, as yet, unclear. But, in dealing with the problem, we must ask: Are the jobs that might be eliminated worth human effort? Should people trained as architects have to spend their days drawing fire stairs and toilet details? Should a construction crew be exposed to the hazards of spraying fireproofing? Such questions show that the real promise of intelligent computers is better utilization of an often wasted resource—our own human intelligence. **Thomas Fisher**



British architects developed an early interest in CAD, especially as related to systems building for public clients. In the last few years, British technology has been developed further, in and for America.





The computer-generated images (above) are of Arata Isozaki's competition entry for the new Tokyo City Hall. Isozaki used McDonnell Douglas's Graphics Design System (GDS) to create these perspective views. While he did not design the building with that system, he did use it to study the building's design and coloration. Applied Research of Cambridge (ARC) developed the GDS software; the distributor Isozaki worked with in Japan is ARC Yamagiwa. From the evidence of the last several several years, it would seem that Britain is a leader in CAD software. McDonnell Douglas turned to Britain and acquired the innovative CAD firm ARC (Applied Research of Cambridge); Prime and Computervision obtained marketing rights to the Medusa CAD system, also developed in Britain; and RUCAPS, a major British CAD vendor, saw a place in the U.S. architectural CAD market for its products.

A discussion with Paul Richens, Director of Product Development at ARC in Cambridge, reveals some of the reasons for Britain's early CAD success. In the late 1960s and early 1970s, British architects developed a special interest in systems buildings. At the same time, the Labour government became an important client, providing commissions in housing and school building. With the interest in systems and the public building boom came a desire to find better ways to automate design and construction. Two men associated with the Cambridge University School of Architecture, Lionel March and Ed Hoskins, decided to establish a commercial firm, Applied Research of Cambridge, to apply computer technology to the disciplines of architecture, engineering, and planning. One of ARC's first customers was the Oxford Regional Health Authority and the Department of Health, and for them ARC developed a system for computer-aided hospital design. The system solved design, not drafting problems: Detail drawings were not the main aim, as computer graphics were still unsophisticated; rather, cost savings, efficient circulation, and ease of maintenance were the goals. The interest in systems building itself died away, poor quality construction and the waning of the Labour party's power doing it in, but the computer software developed for the hospital systems was revised by ARC into a looser, more generalized form, called BDS (Building Design System). ARC soon realized that BDS was still too specific to be of worldwide use, and its principals took another tack. They decided to be less clever, but more useful, solving major data structuring and database tasks, explains Richens, and developed GDS (Graphics Design System), which they have been selling since 1980. They then re-applied themselves to improving BDS.

McDonnell Douglas began distributing ARC products in 1981, and acquired the company in

1985, changing its name to McDonnell Douglas Information Systems, Limited. Meanwhile, two of ARC's software developers began distributorships in other countries: Masanori Nagashima is managing director of ARC Yamagiwa in Japan, and David Archer is technical director of ARC CADcentre in Australia. When Arata Isozaki and Matsuda Hirata Sakamoto were preparing competition drawings for the Tokyo City Hall competition, both went to ARC Yamagiwa to develop submission graphics (Isozaki's submission is shown on this page).

ARC has developed other software packages for architects, including SCS, for solid color shading; ART, a freehand and hard-line coloring program; SITES, for ground modeling; and SPS, for space planning. Under development in the U.K. at the moment is an Early Design Module for preliminary design. The system must have enough built-in information, explains Richens, so that it "understands" buildings-that it expects, first of all, spaces, their relationships to one another, and surfaces; then elements with certain characteristicswalls that are probably vertical, for example, and have thickness, floors, roofs, windows, beams, and columns. And yet it must be flexible and simple enough that it can help prepare, say, a competition submission overnight. Simplicity implies certain limitations of choice, so that the resultant design is likely to be your basic serviceable building, and the designers must step in to enhance it manually if desired. But the preliminary design so produced will eventually be able to interface with the GDS and SCS modules. At some future time, the package may have optional add-on expert systems, for analyses of structure, HVAC, lighting, acoustics, energy efficiency, and so on.

And to return to Britain's place in the architectural CAD world: The British market, quick to leap into the computer age, is saturated for the time being, especially with the British economy tight. While ARC will continue to develop products in Cambridge, in accordance with McDonnell Douglas's reading of the marketplace, talented people such as Richard D'Arcy and Philip Allsopp (p. 108) are turning to America's greener pastures. The route between the United Kingdom and the United States is well traveled these days. *Susan Doubilet*

P/A Technics Expert Systems





These computer images show the fire stair module of Jung/Brannen's expert system in action. The computer has queried the designer for information such as dimensions, floor-to-floor heights, ratings, and construction type. The computer has then designed the stairs without supervision. The images (above) are the result of that process. The yellow lines indicate conflicts, in this case between the fire stair enclosure and the location of beams and columns. A draftsperson would have to resolve the conflict, either moving the stairs or the columns, before the computer prints the drawings and specifications.

What does it mean when we say that a computer is intelligent? And how does its intelligence differ from our own? Such questions have spawned much heated debate among the advocates and critics of artificial intelligence. Those who argue that the computer's intelligence is like our own point to instances where they believe the computer has equaled or even outperformed an intelligent human being, conducting successful psychotherapy sessions, they say, or beating world-class chess champions. Necessary to that argument is the assumption that the human mind works like a computer—that our intelligence can be measured according to its ability to process information, and that our knowledge can be formulated into rules.

The critics of artificial intelligence have attempted to show that assumption to be false. Some have criticized the analogy that the human mind is like a computer. Just because a computer can follow the rules of chess or seem to understand some principles of psychotherapy, they say, does not mean that the computer understands the meaning of its actions. That understanding is what distinguishes human intelligence from that of the computer.

Others have criticized the analogy that all knowledge can be formalized into rules capable of being programmed into a computer. They argue that knowledge is more than just the storing and manipulating of facts according to preprogrammed rules. It also includes intuitive understanding, common sense, and creative insight.

Nothing proves that point more than the thought processes of designers. MIT's Donald Schon shows in his book, *The Reflective Practitioner*, how architects rarely face clear-cut problems capable of quantitative answers and rarely utilize knowledge capable of being explicitly defined. The design process, he writes, largely involves qualitative judgment, intuitive understanding, and creative imagination that are quite foreign to quantitative, logical processes such as those of the computer.

Does that mean that artificial intelligence has no validity or no applicability to architecture? The answer is both yes and no. Artificial intelligence itself seems to shed little light on the process of design. But, the application of artificial intelligence, in what are called expert systems, has considerable relevance to the practice of architecture. Jung/Brannen Research and Development Corporation has written expert systems for architects. Such systems should affect both the availability of expertise and the practice of architecture.

Expert systems are computer programs that contain specialized knowledge that enables a person to solve ill-structured problems. Little use of expert systems has been made in architecture, in part, because their development requires that recognized experts in a field be able to describe their knowledge explicitly enough to be coded into a computer program. Not only is it difficult finding a designer or group of designers whom most architects would consider experts, but it would be nearly impossible for designers to describe their knowledge with sufficient precision to a computer programmer.

Where the potential for expert systems lies is in the nonaesthetic aspects of architectural practice. There, recognized experts in, say, acoustics or management, have knowledge capable of being explicitly described. In those same areas, most architects also have the least expertise and thus the greatest need for outside advice.

The Boston architectural firm Jung/Brannen Associates has recognized the need for expert systems and, over the past four years, undertaken their development. The firm set up a separate research and development corporation, headed by architect Bruce Forbes, to write expert systems for their own in-house use and to market them to the profession. Of the 300 possible expert systems Jung/Brannen has identified, 27 "modules" have been developed and tested for such building elements as fire stairs, elevator cores, toilet rooms, and HVAC systems.

The operation of an expert system seems quite simple. In the fire stair module, for example, the computer begins by querying the architect for necessary information, a process that takes about five minutes. "The computer will tell you what it needs to know," says Forbes. "It will ask for such information as the fire stairs' locations and overall dimensions, the floor-to-floor heights, and the building's structural system."

Here, information retrieval systems become important. Jung/Brannen is developing its own data retrieval system that "would contain all past projects on video disc," says Forbes, "so that you could call up similar buildings to see, for example, what floor-to-floor heights or structural systems you've used before." If you don't know what type of fire stair you want, you can ask the system to proceed, using several types.







Photos: Jung/Bran

The value of expert systems lies not only with the time they save in designing and drawing standard building elements, but in their catching errors, however small. The expert system here notes a problem in the detailing of the stair (middle) that was resolved through the intervention of a draftsperson (bottom). The drawing (top) shows the designation system used by Jung/Brannen in their "Archibus" software. Every finish and substrate receives an alpha-numeric designation on the plans. When using an expert system, the architect could simply draw a plan with single lines; indicate dimensions, construction types, and finishes; and let the computer generate the drawings automatically.

Once the computer has all of the required information, it then does all of the necessary drawings, estimates, and specifications, unattended, in about two hours. If the computer cannot resolve something or finds that some of the information it was given conflicts with some other requirement, it highlights it in yellow. A draftsperson must intervene to resolve those conflicts, a process that might take another hour or two, before the computer prints out the drawings and specifications.

"We did a benchmark study for our fire stair module," says Forbes. "The production of contract documents for the fire stairs in a three-story speculative office building took a draftsperson about 160 hours to complete the documents, by the time the ¹/₈- and ¹/₄-inch plans, sections, and details had been drawn, the specifications written, and the shop drawings checked. The computer produced the same documents in 4¹/₂ hours."

However simple they appear in a demonstration, though, these expert systems require that a person using them already have some familiarity with computers. "An architect who does not have proficiency in computer-aided drafting," says Forbes, "will fail to use expert systems properly. Everyone has to reach a certain plateau before these systems become useful."

To help firms reach that plateau, Jung/Brannen's Research and Development Corporation introduced, in January, a computer software system called Archibus. It provides tutorials in the use of computer-aided design and drafting, word processing, databases, and spread sheets. It also shows architects how they can integrate existing software packages, be they drafting software such as AutoCAD, word processing software such as Multi-Mate, database software such as dBase III, or spread sheet software such as Lotus 1-2-3.

One of the most significant aspects of Archibus is the drawing designation system it uses. The finish and construction of every wall, ceiling, and floor in a building receives an alphanumeric designation that refers to a key. A wall has three alphanumeric designations referring to the materials and finishes on both sides and the type of construction in the middle. Ceilings and floors receive two alphanumeric designations each, indicating the substrate and finish. This designation system is not new; "engineers have used it for some time," says Forbes. Nor is it a radical idea, for it just continues the reference system commonly used for drawing details or room finishes on working drawings. But, this system does greatly increase the amount of information on drawings. It allows drawings to indicate more than just locations and dimensions; they also can begin to convey information about the materials, finishes, and construction of a building without having to resort to time-consuming stippling. When the system is transferred to a computer, "you can indicate the layout of a building with single lines," says Forbes, "give every line a designation, and let the computer complete the drawing."

Archibus' emphasis on basic computer skills, on database integration, and on designation systems reveals its real purpose: getting architects ready to use expert systems. Archibus, says Forbes, "gets people up to the first plateau, where they are using existing software profitably. Once that has been accomplished, they're ready for the next plateau expert systems."

Forbes sees expert systems as essential to the very future of the architectural profession. "If the profession is to survive," he says, "it must become more business-like, more profit-oriented." By reducing errors in contract documents and making the production of those documents more efficient, expert systems can reduce liability and increase productivity and profitability.

Expert systems also may change our idea of what it means to be an expert. Certain types of information, once available in expert systems, may become less valuable. But the expert systems will allow us to build databases for specific buildings, which will become increasingly valuable. "Architects must become information brokers," Forbes says, "controlling where and how information is used. The database developed during the course of designing and constructing a building allows architects to stay involved with the building long after it has been completed."

Jung/Brannen developed its expert systems for its own in-house use. Why then market a tool that is so clearly to the firm's advantage to keep for itself? "The firm feels a certain obligation to the profession," says Forbes. "We're not just looking to make a profit; we're looking for a piece of history." *Thomas Fisher*

P/A Technics Digital Mapping









Center Research used McDonnell Douglas software to generate these two- and three-dimensional images. The large image is a digital map of zip-codes in *Mercer County*, N.J. The small, three-dimensional image (above top) shows the relative size of county populations in New Jersey. The other two small images represent the infrastructure of Mercer County (middle) and the level of urbanization (bottom). The overlaying of such graphic information makes the computer a powerful planning tool.

The three architects who recently formed Center Research Inc., a not-for-profit corporation engaged in fundamental planning and design research, feel that the architectural profession can contribute more to the environment, and in a more meaningful way, than it is currently doing, and can regain the control it has lost over a large segment of the market. The partners share two major areas of interest and expertise which are reflected in their current undertaking: computer-aided design, and health-care planning. Philip Allsopp, who studied in London and at Columbia University, has specialized in management consulting and facilities programming and planning in the health industry for ten years, most recently as a vice-president at Perkins & Will, Chicago. Richard D'Arcy, who also studied in England, had established the firm D'Arcy Race Limited in Oxford, well known for its research and development of CAD technology applications, especially as related to health facilities. William Parker, the only American-born of the three, has written a number of publications dealing with health facilities, was director of Columbia University's Health Facilities Planning and Design program, and served at one time as the Assistant Commissioner of Health for New Jersey.

The principals knew that more could be accomplished with CAD technology than simply drafting. They are applying CAD technology to the identification of problems and potential solutions in the areas of resource mapping and facilities planning and management. "At both a regional and facility level," they point out, "strategic planners need the ability to speculate about the future, in order to evaluate the effectiveness of different resource allocation strategies. CAD technology, specially configured, can provide senior executives with the ability to visualize the potential impacts of different business decisions."

They are, for the moment, concentrating on the health planning sector not only because of their experience but also because it is an area which is changing rapidly—because of competition, alternative networks, and increasing pressures for cost containment—and in which computer use is still rudimentary.

Their area of interest, their use of CAD, and their imaginative approach to the application of information give them a number of benefits. Their Three architects capitalize on the informational aspects of architecture, using computer techniques to broaden the field of practice. Their special expertise is health care facilities, and they are able to build up and manipulate relevant data bases.

range of clients is broad, from private individuals through institutions to governmental bodies, as is their range of potential services, from programming to designing to facilities management and beyond, because their ability to layer information and space allows for a continuity of information. As an example, a post-occupancy evaluation of a facility is used dynamically, its findings forming part of the data base of the facility, and of the prototype. To further the understanding of a building's functioning-for direct application and for future use through a data base-its spaces and staff can be monitored and the findings directly registered on a remote computer. This type of study can test building codes and can lead to codes based on performance rather than prescription. Eventually, the research material can be applied to the development of expert systems for health-care facilities. On a much larger scale, information about health facilities, population, and illnesses can be configured in a multitude of ways, to determine the relationships between needs and services, illnesses and environmental factors, and other useful correlations.

Center Research has secured funding from the New Jersey Health Care Facilities Finance Authority to undertake a number of projects. These include the development of interrelated space and financial data to study the performance basis for capital investments in health facility construction. This study will use computer simulation to study the impact of changes in capital reimbursement on financial performance, and to study alternative staffing and operational approaches to maximize the efficiency of existing facilities. Another study will use digital mapping of utilization data for health planning purposes in New Jersey, layering Diagnostically Related Group data with census, Medicaid, infrastructure, and boundary data. A third study will develop a computerized forecasting model to estimate the future health care needs of the elderly population.

Most of their computer work is based on the McDonnell Douglas system (p. 105), with which D'Arcy and senior research associate Roderick Bond had worked in the United Kingdom, and which they feel is one of the most suitable available systems for manipulating and layering information. *Susan Doubilet*

P/A Technics Lasers



Skidmore, Owings & Merrill, long a leader in the use of computers in architecture, has now pioneered in the use of computer-aided manufacturing. It's one of many intelligent uses of the computer.





The photographs (above) show the laser cutting machine developed by Skidmore, Owings & Merrill for use in fabricating their architectural models. The model of a proposed building in New York (top, middle) has much greater detail for its size than would ever have been possible had it been cut out by hand. The laser produces exact cuts that have perfectly smooth edges. The machine itself (bottom) consists of a fixed arm containing the laser, and a movable table. Computer-aided design and manufacturing (CAD-CAM), while common in the automotive, electronic, and aerospace industries, has barely affected the building industry. There are several reasons for that. The building industry is relatively fragmented, with a fairly low level of automation, making the transfer of information electronically among designers and manufacturers difficult. The industry also has relatively high dimensional tolerances in its buildings, making the precision of computer-aided manufacturing less of a benefit. Still, isolated instances of CAD-CAM use in the design and building process have begun to occur.

One of the first such instances in the architectural profession is the laser cutting machine developed by Skidmore, Owings & Merrill for the fabrication of its architectural models. What led the firm to develop the system was the desire to reduce the cost and drudgery of making models. "Architectural models," says W. Barry Milliken of SOM, "frequently cost \$35,000. That is a higher cost per scaled square foot than the buildings they represent." The laser cutting machine, which is tied into the firm's computer system, cost about \$70,000, "which is cheap for lasers," says Milliken. And it greatly reduces the time required to cut out model components; what used to take hours, now takes minutes to produce.

The machine itself consists of a stationary armature that contains the laser and a movable cutting table operated by perpendicular screwlike shafts. A computer controls the movement of the shafts and table. Because of the toxic fumes given off when the laser vaporizes the plexiglass often used by SOM in its models, the hollow table is connected to a flexible duct and fan that exhaust the fumes outside. The table's upper surface consists of an aluminum grid with replaceable honeycomb cardboard inserts, which allow the exhaust of fumes as the plexiglass is cut. After many cuts, the cardboard surface is simply replaced.

The major components of the machine are not new. Lasers have been used for everything from the cutting of steel to the engraving of wood plaques. Motion tables, too, were used in milling machinery before their adaptation as cutting surfaces for lasers.

What distinguishes this laser equipment is the way in which it is used. The computer controller

provided with the system was "rudimentary," says Milliken. "Most companies use lasers to cut the same simple shapes over and over again. We needed just the opposite: a system that would cut complex shapes only a few times." To overcome the limits of the laser's computer, SOM developed software that linked the machine to the firm's own computer-aided design system, greatly increasing both the intelligence and usefulness of the cutter.

A designer who wants to see a physical model of a proposed building can now pass the necessary design information electronically from the firm's main computers to a computer terminal located in the model making room. There, staff members modify the computer model to make the building of a physical model easier: dividing the building into appropriate sections and altering some dimensions to accommodate the thickness of the model's material. A sheet of plexiglass, cardboard, or paper is then placed on the table and, with a push of a button at the computer controller, the laser either cuts or scores the surface. The precision of the cuts allows the models to contain much more detail than would have been possible had they been cut by hand. And the smoothness of the cuts eliminates the laborious sanding of edges once required. The actual assembly and finish of the models, though, are still done by hand. "Our model makers," says Milliken, "are highly skilled people, expert at the realistic simulation of materials. The laser just relieves them of the job of cutting."

The clear benefit of the laser cutter is the increased speed, improved quality, and reduced cost of making models. "We're able to produce more schematic models," says Milliken, "which makes it easier for designers to study their ideas in three dimensions." The laser cutter also has made the firm's "study models look like display models," he says, "with a much greater level of detail and complexity."

What is equally clear about SOM's laser cutter is its demonstration of CAD-CAM as something relevant to architecture. "Linking the laser cutter to our computer system seemed such an obvious step," adds Milliken. The next step will be much harder: CAD-CAM not of models, but of the buildings themselves. *Thomas Fisher*



Japan has four times the number of robots the United States has, and an even greater lead in construction robots—a technology destined to change the way we build.





The construction robots (above) were developed by the Shimizu Construction Company alone or in conjunction with the Kobe Steel Company. The larger robot sprays fireproofing. As the drawings of it show, the robot consists of a wheeled platform and a "torso" that raises and lowers a rotating arm. At the end of the arm is a position sensor and a spray nozzle that is connected via two flexible hoses to on-site rock wool and cement-milk plants. The smaller robot visible in the photograph is a multipurpose machine that cleans up after the fireproofing robot. It also grinds down any rough areas in the concrete slab.

Ever since the myth of Pygmalion, the idea of bringing the inanimate to life has held particular fascination. But, when the idea becomes reality and the inanimate comes alive, as Galatea did for Pygmalion, the fascination becomes mixed with a certain wariness.

Such has been our response to industrial robots. They have come to symbolize advanced technology and financial success, yet they also have been seen, increasingly, as a threat to employment. Recent studies have predicted that as more industries automate, the number of blue-collar jobs will drop dramatically, leveling off at about half of the current number. We've come to realize that in relieving us of work, robots also can put some people out of work.

Such worries seem remote in the construction industry, where so few robots are used that they provoke more curiosity than concern. The reasons the construction industry has lagged behind have to do with both the nature of robots and the nature of construction.

A robot is any device used to perform a sequence of tasks without direct human intervention. Most in use today are stationary, with a movable arm that is controlled by a computer and that operates much like a human arm, with shoulder, elbow, and wrist joints. Robot effectors (the equivalent of a hand) consist of finger, suction, magnetic, or tube grippers. The type of effector used depends on the task the robot must perform, be it welding, painting, palletizing, drilling, casting, or loading and unloading. The more repetitive, predictable, and precise the task, the more effective—and costeffective—the robot.

Construction work, in contrast, is often nonrepetitive, unpredictable, and imprecise. And, unlike an assembly line, it requires considerable ruggedness and good mobility and sensory ability. Those characteristics do not mean that robots cannot be effective or cost-effective in construction. The high cost of labor and the hazards of some construction jobs alone justifies their development for this work. But, construction requires a sophistication of robot technology that has become possible only recently.

One of the biggest obstacles to the development of construction robots has been their poor sensory abilities. A variety of sensors can convert information about the physical world into electronic signals, including tactile sensors that signal contact with an object; proximity sensors that signal the location and distance of an object; and vision sensors that react to light reflected from an object. The difficulty that construction robots have is not in their use of sensors, but in their understanding of what it is they're sensing. For example, robots have a hard time distinguishing between two overlapping objects and three objects that abut each other. Because of such limitations, many researchers advocate the specialized use of robots so that any one machine need only see and understand objects related to a specific task.

Different, yet no less difficult, are the obstacles confronting robot mobility. Legs, wheels, or treads have been the most common form of locomotion developed for mobile robots, although, of the robots currently available, most would have trouble navigating through a cluttered construction site by themselves. Some form of human guidance is still necessary, whether it involves people physically moving the robot from one part of a site to another or a remote operator controlling its movements with a radio and video camera. An idea that some researchers are pursuing would have the construction robot follow a prepositioned electric guide wire through cleared portions of a site.

The ruggedness of robots, required to withstand the harsh conditions encountered in construction work, has been a problem more easily solved. For robots working outdoors, hard plastic or metal casings have been used to cover their internal mechanism. For indoor work such as welding or spraying, heavy fabric coverings have sufficed to protect the robot. The one factor that must be weighed against the increased ruggedness of a robot is its weight, a factor particularly important if the robot is to work in a building.

Construction Robots in Japan

While much of the research into construction robots has occurred in the United States at places such as the Robotics Institute at Carnegie-Mellon University, the Japanese have been much more active in applying the research to build robots.

There were several factors, according to Seishi Suzuki of the Shimizu Construction Company, that have prompted the Japanese to develop construc-





The Shimizu Construction Company also has developed a steel beam positioning robot called "Mighty Jack." Set in place by crane, the robot grips the end of each steel column with three "fingers" that are at the end of adjustable arms. "Mighty Jack" has a power unit mounted on its back that controls cables that lift the beams and hold them steady while the necessary connections are made. The robot not only allows a faster assembly of a steel frame, since several robots can work simultaneously, but reduces the hazard of connecting beams to columns by positioning and holding the beams with greater precision.

tion robots. The incidence of occupational fatalities among construction workers in Japan is higher than in any other industry; and of occupational disease, twice that of any other industry. Because of these hazards and of better opportunities in other fields, fewer people in Japan are entering the construction industry, resulting in labor shortages and inflated wages. Productivity, too, is lower than in most other industries.

The Japanese have seen a solution to those problems in robotics. Several research and development efforts, notable for the amount of money involved and the degree of cooperation among public and private interests, have looked at construction robots in two ways: how they might fit into current construction methods and how those construction methods might change to better accommodate robots.

Of the construction robots now in use, most aid in the building of concrete or steel structures. The Shimizu Construction Company and the Kobe Steel Company have developed a robot to spray fireproofing; it is self-positioning and self-moving and can equal the performance of the most skilled operator. Two hoses provide a continuous supply of rock wool and cement milk from plants on site.

Shimizu also has developed a robot, called "Mighty Jack," that grips the top of steel columns and hoists beams into place via radio control, and a multipurpose robot, controlled by a gyrocompass, that cleans and grinds concrete slabs. All three eliminate hazardous or repetitive work.

The Kajima Corporation has developed, alone or in conjunction with other companies, an even larger number of robots. Theirs finish concrete slabs, spray concrete, cut concrete with an abrasive jet, place reinforcing bars, weld stud dowels, and detect exfoliated wall tile. The company notes the increased speed of work and the elimination of hazardous working conditions as motives for their use of robots.

Other construction robots currently in use in Japan include a telescopic machine that tests air leakage in clean room filters, a remotely operated crane that places concrete, and a radio-controlled clamp to help in the positioning of steel columns. The Japanese company Ohbayashi-Gumi led in the development of those robots. Another large construction firm, Takenaka Komuten, has developed a robot that distributes concrete with an operator on board.

All of those efforts have had, as their goal, the integration of robots into the construction process as it now exists. The greater long-term significance rests, though, with the effect robots will have on the way we build. Abraham Warszawski of the Technion in Israel and Dwight Sangrey of Carnegie-Mellon discussed those potential effects in a recent paper.

The first step in automating the construction process, they write, involves breaking down all building tasks into ten activities: positioning, connecting, attaching, finishing, coating, concreting, building, inlaying, covering, and jointing. Current robot technology can easily handle such tasks as coating and covering, while activities such as positioning, connecting, and attaching generally lie beyond the capabilities of present technology.

The latter activities may become feasible as robot sensation and mobility improve. But Warszawski and Sangrey also see such construction activities changing to accommodate robots. Those changes include minimizing the number of elements in buildings, in part through the prefabrication of large, complex assemblies; eliminating the need for temporary supports and bracing through the design of elements; adding grips onto building components so that robots can get a better grasp; simplifying connections and finishes; and providing enough room for robots to maneuver within a contruction site. Finally, the authors foresee the possibility of buildings becoming increasingly assembled from large, prefabricated elements made in automated factories-the environment likely to remain most amenable to robots.

How quickly the building industry automates will depend upon the cooperation among the labor unions, construction management, and the design community. But whether it should automate is quickly becoming a moot question. As Seishi Su. 1ki of the Shimizu Construction Company writes ne low productivity of workers has given "consuruction the image of being too expensive . . . causing a decrease in investment. To deal with this problem, effective means are required to cut labor costs and maximize the use of worker skills. Construction robots are . . . one of the best solutions." **Thomas Fisher**

P/A Technics Three-Dimensional Modeling



Yale architecture students now use computer software developed by French aerospace engineers. While not intended for use by architects, the software has much to offer designers who think three-dimensionally.





The images (above) were made by students of Yale's School of Architecture using Catia—software developed by the French aerospace company Dassault and distributed in the United States by IBM. While not architectural in their subject matter, these images show the software's capabilities to best advantage. Catia constructs a three-dimensional model of an object, letting students not only study a building on the computer as they would an actual physical model, but design a building on the computer as if they were working in clay. They can add or carve shapes then rotate or walk through the results.

We often use computer graphics equipment to draw two-dimensional images. That, however, is not the only or even the best application of it. Some software now lets us use the computer to sculpt as well as to draw, through the construction and manipulation of three-dimensional solid models. Although just bits of data on computer chips, such models look very much like physical models. They have fronts and backs, interiors and exteriors, and can be rotated, walked through, or sliced open.

The architectural applications of such software are many. The construction of three-dimensional solid models lets us design at the computer as we would design with cardboard or clay—adding, subtracting, or manipulating forms—all in a fraction of the time it takes to accomplish those tasks by hand. What is surprising about such software is that automotive and aerospace engineers, not architects, are its major users. A notable exception is Yale's School of Architecture.

Computers at Yale

"We didn't want computers to teach drafting," says Martin Gehner, Associate Dean of Yale's School of Architecture. "We wanted a design tool." When several Yale faculty members began to investigate software that they might use to teach computeraided design, they reviewed and rejected the twodimensional, production-oriented computer software that dominates the architectural market. They came upon three-dimensional solid modeling almost by accident. "We attended one company's demonstration of its two-dimensional architectural software," says Gehner, "but just happened to see a demonstration in the next room of three-dimensional software being presented to representatives from Ford. We realized then that that was the direction we wanted to go."

The school chose a software package called Catia. Distributed in the United States by IBM, Catia was developed by the French aerospace company Dassault for use by its engineers in the design of airplanes. "Two-dimensional software," says William Gillis of Yale, "makes the construction of perspective or isometric views difficult and timeconsuming. Of the three-dimensional packages available, most have the opposite problem of not connecting back easily to two-dimensional graphic information." Catia, in contrast, builds a common three-dimensional solid model that, when rotated or sliced open, immediately produces two-dimensional plans and elevations. "It's as if you were working with an actual model," says Gillis.

Students working with Catia can begin a design, as they would with two-dimensional software, by drawing a plan. The difference with Catia is that those lines define planes; the plan, when rotated, immediately becomes a three-dimensional model. Unlike most other software, students also can design by defining a building in terms of planes or solids, creating spaces within it by adding planes or carving out the solids, and indicating openings in it by intersecting forms and subtracting the area of intersection. While the model is always seen in isometric, perspective views are quickly created by simply defining vanishing points.

Adapting anything for an unintended use is rarely flawless. In the case of Catia, the aerospace software is not fully utilized by architecture students. "There is a kinematics module," says Gillis, "that lets us put objects in motion. It is useful to airplane designers but not to architects. There also is a robotics module that we don't use in which a robot arm, put into motion on the screen, can command an actual robot to perform the same actions."

The software takes some getting used to as well. "When we draw buildings," says Michael Horowitz of Yale, "we often think of a window, say, as lines on paper rather than as deleted sections of the wall plane. Once students get accustomed to thinking in terms of planes and solids, though, they find Catia easy to use."

An architectural module for Catia, soon to be released, should enhance the software's applicability. "Instead of representing walls as a solid material," says Gillis, "the architectural module will allow you to represent them as an assembly."

What's noteworthy about Yale's efforts is its use of software not intended for architects. It shows that the architectural profession does not necessarily have to reinvent the software wheel. It also suggests that there is less of a difference than we might think among airplane designers from Dassault, automotive engineers from Ford, and architecture, sculpture, and drama students from Yale. As Martin Gehner notes, "The bringing together of disciplines may be, in the end, the most important benefit of computerization." **Thomas Fisher**









The large image, called "Gears," by Cranston Csuri Productions won first place in the NCGA competition's experimental category. Of the smaller images, "Simulation Excellence" (top) by Evan and Sutherland won first place in the simulation category; "Quest: A Long Ray's Journey Into Light" (middle) by Apollo Computer won second place in the short films category; and "Ghoti" (bottom) by Anne Seidman won third place among faculty and graduate students.

Computerized animation techniques can help architects visualize a building as it is being designed, permitting them to rotate the building to see it from all sides, and to "move" through its spaces. Charles Csuri, professor of art and computer science at Ohio State University, says that technology is now improving so that it is becoming quicker and more affordable to achieve playback, in real time, of movement through a building whose parameters have been set up in the computer. Csuri points out that processors are now more powerful and less expensive, and that the issues requiring attention no longer revolve primarily around hardware, but around software-how to exploit the capabilities of the hardware efficiently. To play back the representation of an image efficiently in real time, for example, several or even hundreds of small computers can be linked and operated in parallel. So far, it is still too slow and expensive to incorporate complex qualities, such as characteristics of materials, in an animated architectural model. But, says Csuri, this, too, will be attainable in the near future.

Csuri, a founder and still a board member of Cranston Csuri Productions Inc. in Columbus, Ohio (whose project "Gears" has won first prize in the Experimental Category of the 1986 National Computer Graphics Association animation competition), has returned to academia to do basic research. He is interested in the development of expert systems, applying artificial intelligence techniques to understand and organize information so that simple decisions that require tedious work can be handled by the machine. Certain techniques for animation are applicable to architecture: for example, a computerized general theory about color relationships, rules about proportion, or methods for setting up a lighting model. In each case, the computer (like an automatic camera) will work out a first draft solution for a given problem, and then the architect can step in and fine tune it. One must be careful about how far to go with expert systems, says Csuri: they should be used for certain routine things, with their cumulative effect being to allow alternatives to be examined and decisions to be made more quickly. Access to supercomputer power, however, will cause people to rethink the way computers are used in the building industry, he says, approaching the way they are used in the Computer technology will soon allow quicker, less expensive animation, a possible boon to architects for design and presentation. The NCGA recognizes innovative animation projects, and one winner discusses the techniques as they relate to architects.

automotive industry—from design through to fabrication.

In his animation research, Csuri and his colleagues have developed algorithms for the movement of people and animals (incorporating automated "natural" movements, balance, collision detection software, and other parameters), which allow complicated scenes to be developed on computer (not manually, frame by frame) with 20 or 30 creatures interacting. This is a significant advance over Disney, who actually had to film live actors to provide a road map upon which to base intricate cartoons. The efforts of Csuri and his students (funded by the National Science Foundation, among others) in several years time will undoubtedly be used commercially.

NCGA's International Computer Animation Competition

Underlining both the universal appeal and the wide range of applications of animation, the National Computer Graphics Association this year initiated an awards program for innovative computer animation work in ten categories, and they received 150 entries from all over the world. While architects may not identify their professional needs in such categories as Television Commercials or Music Video, they may well find an interest in Sales, Marketing, Public Relations, and Corporate Communication (won by Sogitec of Boulogne, France), Simulation (won by Evans and Sutherland of Salt Lake City; see illustration, left), or the Experimental category (won by Cranston Csuri Productions, discussed above and illustrated at left).

For the award-winning entry Simulation Excellence, Evans and Sutherland used eight database modelers to produce extensive terrain databases. Then, former military pilots employed by Evans and Sutherland flew "authentic missions" through the database using joysticks that are mounted on a "fly box."

For Gears, another winning entry, Cranston Csuri Productions researched spur gear shapes from the 1920s, then used 1986 technology to develop a sophisticated selection of computer-generated gear clusters.

Judges looked for "quality, degree of innovation, uniqueness of presentation, and originality of composition." *Susan Doubilet*



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Seventh International **Computer and Management Show** for the Design and **Construction Industry**

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About A/E/C SYSTEMS '86

Use the free ticket in this Guide to register for admission to the show when you get to Chicago. Registration Hours: 8 AM to 6 PM, June 23 through June 26; 8 AM to 3 PM on June 27. You may also register on site for any of the

conference programs, provided

Highlights

space is available.

- New this year, four "shows within the show": AutoCAD Expo '86, CMC Spring, Intellibuild '86, and Reprographics/86
- A 100-session, 16-track conference program tailored to the needs of the beginning, intermediate and advanced participant
- The active support of over 90 professional associations and trade publications
- The largest and most comprehensive exhibit ever held for design and construction professionals—275 vendors in over 100,000 net square feet
- More than 18,000 design and construction professionals expected to attend—the largest such gathering in the world
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dule At A Glance

stration 8 A 3 8 A bit 10 10 Ference Sessions Jun 6 5 A Scheduled June 23-27 at Chicago's McCormick Place, A/E/C SYSTEMS '86 is the seventh in a series of international computer and management shows for the design and construction industry. Each year, the A/E/C SYSTEMS show gives you a "live action" picture of the current automation/management state of the art . . . and since the picture changes so rapidly, you can't miss attending if you want to be sure you are making the most effective use of the best tools and procedures.

The concurrent conferences, tutorials, special panels and onehour seminars give you invaluable tips direct from the trenches while the huge exhibit—275 vendors in over 100,000 net square feet—lets you experience the latest, most exciting developments in systems and services for yourself.

New features this year offer something for everyone: AUTOCAD EXPO '86, an extensive exhibit and conference for AutoCAD users, application developers, and others involved with this software package . . CMC SPRING, a popular exhibit and conference for construction professionals . . . REPRO-GRAPHICS/86, a special exhibit for reprographics and related facility managers complemented by a two-day conference . . . IN-TELLIBUILD '86, a two-day conference and week-long exhibit focused on intelligent buildings . . . MICROCAD INSTI-TUTE HANDS-ON CENTER, a 75-minute lecture and handson workshop for any participant interested in learning more about microCAD systems ... and much, much more!

Other features of A/E/C SYS-TEMS '86 include the Reprographics Center, a completely self-contained and operational reprographics facility; the Software Center, featuring a display of design, technical and management software; and User Discussion Groups, which bring together users and vendors of specific hardware or software.

ADDED ATTRACTIONS

REPROGRAPHICS/86 June 23–27

Manufacturers and suppliers from virtually every facet of the burgeoning reprographics industry will be on hand as RE-PROGRAPHICS/86 opens in McCormick Place. Designed primarily for in-plant reprographics facility managers, this show-within-the show is also geared to the needs of managers of collateral operations such as retail and commercial printing, blueprint preparation, engineering design, graphic services, and other aspects of graphic arts and reproduction.

The impressive line-up of exhibitors will feature the latest in small and large document copiers, duplicators, presses, typesetting, copy preparation, plate making, photo presses, diazo products, computerized design, and more.

Complementing the exhibit is "Maximizing Internal Systems Productivity," a two-day conference program scheduled Wednesday and Thursday, June 25–26, at the Palmer House. (See page 38AEC for details.)

Intellibuild '86 June 23–27

Sponsored by the International Intelligent Buildings Association (IIBA) The newly formed IIBA's first major exhibit and conference will feature a two-day professional conference and an allweek exhibit by vendors specializing in intelligent buildings.

'Intelligent Buildings: Where in the World Do They Stand?' will be held Monday and Tuesday, June 23-24, at Chicago's Palmer House. Geared to building owners and developers, corporate facility managers, architects, engineers, contractors, and prospective tenants, the program addresses the misconception that electronic capabilities are all that tenants want from intelligent buildings and outlines a new, holistic approach to design and development. (See page 32AEC for details.)

CMC Spring

June 23–27 Sponsored by Contractor Profit News

The June edition of this popular exhibit and conference for construction professionals offers a wealth of timely, practical information for participants. Included is an exhibit of systems and software for estimating, budgeting, project scheduling and control, office management and other applications of interest to contractors. The exhibit called Contractor Systems—is located in the right rear of the exhibit hall (see the exhibit floor plan on page P4).

In addition, CMC Spring features the Construction Management Association of America's third annual construction management forum on computer-assisted construction management on Monday and Tuesday, June 23-24. (See page 29AEC for details.) Also, The Fails Management Institute will conduct two half-day conferences on Wednesday and Thursday, June 25-26, at the Palmer House. These are "Selecting and Using Effective Project Scheduling Systems" and "Automated Estimating Systems to Get More Work." (See pages 37 and 38AEC for details.)

As fall CMC attendees will attest, CMC Spring offers construction professionals a unique opportunity to improve productivity within your organization, to gain information on the latest estimating systems and software, to learn new scheduling and budgeting techniques, and to interface with designers and facility managers.

This Official Guide to A/E/C SYS-TEMS '86 is prepared by Progressive Architecture.

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short-range planning, and how approaches and issues differ among industrial, administrative, and institutional settings.

Joe A. Ouye, Ph.D. President Facility Technics, Inc. Oakland, CA

○ T-17

Fundamental Reprographics: A Systems Drafting Primer McCormick Place—Room 7

This tutorial introduces contemporary reprographic services and helps participants select the most time/quality/cost-effective media according to the results desired.

You'll learn when to use inhouse centers vs. outside services and when to choose photographic, electrostatic, diazo, offset, and presentation media. The leading reprographic services are examined via discussions of color, CAD (photo, electrostatic, pen) plotting and/or design services. Carry-home examples are provided.

Paul M. Fangman

Field Sales Manager Blair Graphics, Inc. Plano, TX

Monday, June 23 2:00-5:00 PM

(Tutorials 20–27)

• T-20

Implementing and Managing an Architectural CADD System McCormick Place—Jane Addams Club

The effective and profitable use of CADD technology depends largely on how well staffing, training, library development, documentation, project management and automation integration issues are handled.

This tutorial shows you how to implement and manage your CADD facility successfully. You'll also discuss financial issues such as how to make money with CADD and how to market and charge for CADD services.

Eric Teicholz

President Graphic Systems, Inc. Cambridge, MA

○ T-21 MicroCADD for A/E's—A Primer

McCormick Place—John Evers Theatre

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Daniel S. Raker

President DESIGN & SYSTEMS RE-SEARCH, Inc. Editor, A/E SYSTEMS REPORT Cambridge, MA

• T-22

Implementing and Managing an Engineering CADD System McCormick Place—Lenox Lohr Theatre

This follow-up to T-12 focuses on what management needs to know and do to bring CADD on board—what to do now, what to do when the system arrives, and what to do later to keep it running.

You'll learn how to: define and establish short- and longterm CADD goals, deal with staffing and training, organize and schedule workloads, and bring a system in house effectively.

Timothy C. O'Connor, PE President

O'Connor Consulting, Inc. Birmingham, MI

⊖ T-23

Applying PC's in the Engineering Office

McCormick Place—David Mayer Theatre

Focusing on PC use in small and large A/E and engineering firms, this tutorial discusses hardware and software applications including micro-based CADD systems. You'll learn how PC's are being used for document and drawing production, marketing, engineering computation, business applications, graphics & CADD.

Learn the real potential for increased production; how to obtain the right software; tips on developing software, evaluating programs, and locating software for specific engineering disciplines.

M. Kevin Parfitt, PE

Principal Parfitt/Ling Consulting Engineers State College, PA

⊖ T-24

Scheduling and Budgeting for Project Managers

McCormick Place—Room 1 Today's business climate is forc-

their pencils" as never before in order to get work, while simultaneously high interest rates are requiring clients to accelerate their project schedules, minimizing the time available for design.

This tutorial offers practical approaches to help project managers deal with these problems, including specific procedures to establish and monitor project schedules and budgets to maintain your firm's profitability and keep your clients happy.

David Burstein

Vice President and Southeast Regional Manager Engineering-Science, Inc. Atlanta, GA

Applying PC's in the Architectural Office

McCormick Place-Room 8

This tutorial answers the A/E's questions about the benefits of and necessary steps in—adding or expanding PC's in your firm.

You'll discover how to apply computers and software (including small CADD systems) in your practice, how to maximize the benefits of each system, and how new technologies can create higher standards, improve service, and offer better methodologies for clients.

C. Page Highfill, AIA

President Highfill-Smith Associates Inc., Architects

Richmond, VA

• T-26

Computer-Aided Facilities Planning

McCormick Place—Room 2 Computer-aided facilities planning offers new opportunities for professional designers and corporate planners alike. In addition to their more traditional uses in design, computers are now used for the on-going planning and control of space and equipment.

In this tutorial, you'll receive an overview of available systems and software plus helpful tips on how to locate and select the right tools for your firm.

Paul Winsberg

Paul Winsberg/Consulting Berkeley, CA

🔵 Т-27

Financial Management and Project Control for A/E's, McCormick Place—Room 7

This financial management tutorial emphasizes practical matters such as hiring a financial manager, pricing techniques, project budgeting, and methods of controlling project and overhead You'll discover the importance of planning, discuss the steps in developing an effective annual business plan, and learn how to select and implement computerized accounting and project control systems.

Lowell V. Getz, CPA Financial Consultant Houston, TX

Tuesday, June 24 1:00-4:00 PM

(Tutorials 30-37)

• T-30 Architectural Computer-Integrated Design McCormick Place—Jane Addams Club

Many architects and engineers limit their use of CADD to production-type drafting, but computer-integrated design concepts are equally valid in the planning, schematics, design development, construction documents, and construction phases of projects.

For over 15 years, The Stewart Design Group has used full-spectrum computer graphic systems with relational data bases, layout optimization, free-hand sketching, drafting, 3-D presentations, specifications, schedules and listings as an integrated matrix for use throughout the design/ construction process. This tutorial allows you to benefit from their comprehensive experience.

Clifford D. Stewart, AIA

President The Stewart Design Group Boston, MA

• T-31

MicroCADD for A/E's: Integrating PC's in the CADD Environment

McCormick Place—John Evers Theatre

Microcomputer-based CADD systems have integration problems ranging from getting different pieces of hardware to talk to one another to getting different human users to cooperate in building and using a micro-CADD database. The effective use and integration of CADD technology depends largely on how completely staffing, training, library development, technical, and administrative issues are addressed.

This tutorial shows you how to implement and manage micro-CADD in an A/E office: how to manage the PC and PC-CADD revolution, options for integration, electronic networks and human cooperation, and preparation for systems proliferation.

Daniel S. Raker

CHECKLIST.

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3-D CADD with a relational DBMS

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Realistic image generation



HVAC layout and design

::structure

Structural analysis and design



Space requirements analysis

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Space inventory analysis

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DESIGN & SYSTEMS RESEARCH, Inc. Editor, A/E SYSTEMS REPORT Cambridge, MA

• T-32 Integrating CADD in the A/E Office

McCormick Place—Lenox Lohr Theatre

CADD systems offer two significant benefits to firms with diverse architectural and engineering groups in house: the coordination of each discipline's work on a single database, and the ability to transfer information from schematics directly into documentation for design development, working drawings, and construction supervision.

Through a case-study presentation, this tutorial highlights CADD benefits and explores the information management and control challenges implicit in CADD usage.

Seymour L. Fish, Partner

Director of Production & CADD Services Haines Lundberg Waehler (HLW) New York, NY

McCormick Place—David Mayer Theatre

This tutorial focuses on the development of CADD standards—what they are, why they are necessary, and how to establish them—for both the A/E office and the involved disciplines.

You'll discuss the value of CADD standards for the autonomous unit and for the unit as part of a larger team, then consider the need for standards within disciplines to facilitate the exchange of data.

G. Anthony DesRosier

Applications Consultant Computer Graphics Applications (CGA) Hopkins, MN

➡ T-34 Automating Specification Production

McCormick Place—Room 1 The pressure to produce specifi-

cations quickly and accurately has never been greater. New techniques allow professionals to produce specs automatically from checklists, link CAD with specs, and merge graphics, database, and text.

This tutorial explains how to improve specification content and coordination, then demonstrates computer methods of joining master detailing systems with specifications and automatically generating specs from both checklists and CAD.

Mark J. Kalin

Director of Information Services Jung/Brannen Associates, Inc. Boston, MA

• T-35

Computer-Aided Engineering through Expert Systems McCormick Place—Room 8

This tutorial introduces the attendee to applications of AI technology in engineering design.

Expert Systems, a major application of AI technology, are used in architecture, civil, structural, chemical process, nuclear and many other industries. You'll receive detailed information not normally available elsewhere.

Bill Beazley

President William G. Beazley and Associates Houston, TX

O T-36

Using Database Management Applications on Your PC McCormick Place—Room 2

This tutorial covers how you can use popular database management software as "tool" software for hundreds of practical applications in your firm—and how to increase greatly the effectiveness of your computer dollars without continually having to buy and train for new software.

Example applications for project management, scheduling, financial management and others are used to help you get the feel of setting up and running your own database management programs.

C. Page Highfill, AIA *President*

Highfill-Smith Associates Inc., Architects Richmond, VA

• T-37

Marrying CADD & Reprographics in A/E Production McCormick Place—Room 7

Whether enhanced or hindered by CADD, the result or output from the design process is of primary importance. What is the interface between CADD and what is not CADD on the same project?

Along with project management-level cost-benefit analysis, this tutorial reviews the maximized use methods for mixing overlay drafting, photo-drafting, CADD repligraphics, postpunching and in-house contact reprographics as well as the use of service firms.

Gary M. Gerlach, AIA

Pin Graphic Advisor

Glastonbury, CT

AUTOCAD EXPO '86

June 24–27

Sponsored by Autodesk, Inc.

Anyone who designs or draws will want to attend AutoCAD EXPO '86, the largest display of AutoCAD® products and services ever assembled. AutoCAD EXPO '86 highlights AutoCADbased applications software for specific disciplines, from architecture and engineering to computer-aided manufacturing and facilities planning. Hardware products currently supported by AutoCAD will also be displayed.

Meet the top applications developers, see the latest in thirdparty applications software, and take advantage of hands-on demonstrations. AutoCAD EXPO '86 is a forum for key AutoCAD-based software developers with one purpose: to provide more sophisticated solutions for the design professional.

Seminar and Panel Sessions

Tuesday, June 24 9–11 AM

Applications Interface

An introduction to AutoLISP[®], the programming language embedded within AutoCAD[®]. Writing of macro programs and functions will be covered.

11 AM-12 PM

AutoLISP[®] Tutorial

An in-depth look at AutoLISP. The use of list and object manipulation, variables, files and expressions will be covered.

1-3 PM

Translators

A panel discussion on exchanging data electronically between AutoCAD and other CAD systems.

3-4 PM

ADI for AutoCAD Peripheral Support

The Autodesk Device Interface (ADI) is an interface specification for use in developing graphics device drivers that work with AutoCAD. Manufacturers, developers, and users will be shown how to write, test, distribute, and support a peripheral driver.

4-6 PM

AutoCAD in the Corporate Environment

Representatives from several major corporations will discuss how they have incorporated AutoCAD into their operations.

Applications Panels

Wednesday, June 25

These special panel sessions are an opportunity to find out about the latest utilizations of Auto-CAD in your field. A round table discussion for participants will meet after each session.

9-10 AM

Mechanical Engineering applications including NC and CNC machine interchange and adapting AutoCAD to the factory floor.

11 AM-12 PM

Civil Engineering applications supporting land development, roadway design, mapping, field data handling, geoprocessing.

1-2 PM

A/*E*/*C* applications in design and drafting.

2:30-3:30 PM

Electrical/Electronic applications in schematic design, layout, control schematics, and related applications.

4–5 PM

Facilities Management discussion with Autodesk staff and software vendors.

Thursday, June 26

9-11 AM

Special Developers Session Current AutoCAD developers will have the opportunity to meet with Autodesk's product management, marketing, technical and applications staff to discuss such topics as scripts, menus, DXF files, and AutoLISP.

12-2 PM

Meet the Management

A presentation of what's new and what's coming with John Walker, President; Richard Handyside, VP of Marketing and Sales; Eric Lyons, Director of Product Management, and others.

3-5 PM

Microcomputer Technology— How It Will Affect the User

Industry spokespersons will give their projections on how microbased technology will progress in the coming five years.

Friday, June 27 9 AM to 12 PM

National User Group Meeting

User Groups from across the nation will have an opportunity to exchange ideas on newsletters, applications software evaluations, information exchange, and forming new groups.

AutoCAD EXPO '86 is a showwithin-a-show. With your registration, you will also be able to attend A/E/C SYSTEMS '86.

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A keen eye for detail and a deft hand for expression provide Joseph Voelker of Springfield, Pa., with a mastery of pen-and-ink rendering of his subjects — particularly architectural subjects. Artist Voelker's pen is the Rapidograph® technical pen with tubular nibs that allow the artist to stroke in virtually any direction on the drawing surface, much the same way a pencil is used. This is the great advantage of the Rapidograph® pen over conventional pens, such as the crow quill and fountain pen which, for the most part, cannot be stroked up —against a paper grain.

This versatility of movement in penand-ink drawing contributes to faster completion of drawings, which might account for artist Voelker's prolific nature: In addition to his commerical and graphic arts output, he has created a series of fine-art drawings of famous and historical landmarks in and around the environs of Philadelphia, of which



these illustrations are only a few.

by Pennsylvania artis

Rapidograph® renderings present your architectural designs in the clearest light possible . . . good ideas translated into exciting visuals. These drawings by Voelker are examples of precision-clear interpretations which can be presented for any project — a restoration, a conversion, a modern highrise, a neoclassic structure, and so on. Such drawings can have a free-hand abandon or be developed with minuscule refinement to hold details in photographic blowups.

The tubular nib is available in 13 line widths. Just the weight of the pen itself and the handhold to keep the pen erect provide a consistent ink laydown. The designer, drafter or artist has only to guide the pen with an easy, non-fatiguing hold. The patented dry, double-seal cap keeps ink throughout the balanced inkflow system ready for instant startup, contributing to optimum drawing time. Refillable ink cartridge also helps keep productivity high. The Rapidograph® pen is designed for use with carbon-black india drawing inks that dry waterproof and smear-proof, allowing the artist to enchance drawings with other media, such as colored drawing ink and watercolor washes, or even pastels and colored pencils.

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oseph L. Voelker

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Seminar Schedule

Our seminar program is designed to stimulate creative production and management problem-solving by exposing you to new ideas and techniques. Between Tuesday, June 24 and Friday, June 27, we offer 57 sessions in 9 time slots on a wide variety of practical topics.

For \$225, you may attend one seminar in each time period, with seats being filled on a first come, first served basis. This fee includes admission to the A/E/C SYSTEMS '86 exhibit.

As you read the seminar abstracts in this section, be sure to check the codes to make certain that basic, intermediate, or advanced sessions are appropriate to your present ability level.

Level of Experience

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Basic	
Intermediate	
Advanced	

Tuesday, June 24 100-Series Seminars 8:30–9:50 AM

S-101 SPECIAL PANEL CAD Wars: Will PC's Slay the CAD Giants? McCormick Place—Jane Ad-

dams Club This, 1986 is your year of judg-

ment. As your workloads increase, which CAD automation bandwagon will you jump on the lumbering old prairie schooners turned into sleek stretch limos or the darting, zippy compacts and subcompacts? This rapid-fire Q&A panel will feature CAD industry senior executives on both sides of the question: Should I buy big or small? Also, is small CAD as good as big in the small office? The big practice? Come early to be sure you get a seat.

Panel Chairman

E. Forrest, PE

Editor A-E-C Automation Newsletter Carlsbad, CA

Invited are senior executives from: AT&T Autodesk Calcomp IBM Intergraph Mitsubishi T&W/Versa CAD

○ S-102 SPECIAL PANEL Computer Liability: Problems and Remedies

McCormick Place—John Evers Theatre

Computers can be a "two-edged sword" for professional liability insurance companies. Most underwriters agree that the net effect will be higher quality assurance and lower professional liability risk—but they are also concerned about an adverse effect on risk caused by automated design. In this session, design professionals are brought up to date on the evolving problems of computerization.

Panel

James V. Atkins, CPCU

Senior Vice President, Marketing Design Professionals Insurance Company Monterey, CA Ernest C. Brown, Esq., PE

Partner Natkin Weisbach & Brown Newport Beach, CA

Paul M. Lurie Lurie Sklar & Simon, Ltd. Chicago, IL

O S-103 SPECIAL PANEL Computers Are for Large Firms—or Are They? McCormick Place—Lenox Lohr Theatre

Large firms are now learning from small firms. Here's the latest on what and why . . . plus new areas and methods of service that PC's are offering. Topics include how to train and still maintain adequate billable hours; the advantages of using spread-sheets in almost every area of the A/E design office. **Panel**

Harold E. Costley

Vice President, Design Services TDFB, Inc. Richmond, VA

C. Page Highfill, AIA

President Highfill-Smith Associates Inc., Architects Richmond, Va

Richard P. Roberts, RLA

Associate and Systems Manager Schmidt Associates Architects, Inc. Indianapolis, IN

S-104 SPECIAL PANEL Reprographics: Interim Step or Long-term Solution?

McCormick Place—David Mayer Theatre

Join us for this open forum discussion by industry leaders on the trends and potential for reprographic systems in a CADD environment. Are the advanced manual drafting techniques to continue enhancing electronic hard copy or merely be a transition step?

Panel Chairman

Gary M. Gerlach, AIA Pin Graphic Advisor Glastonbury, CT

Panel Kenneth W. Gardiner Associate CUH2A Princeton, NJ

Bradley M. Meade Manager of Computer & Reprographics Swanke Hayden Connell Architects New York, NY

Daniel L. Moore, AIA Director of Computer Services— Chicago Office Hansen Lind Meyer, P.C. Chicago, IL

Wednesday, June 25 200-Series Seminars 8:30–9:50 AM

← S-201 SPECIAL PANEL CADD: The Next Five Years McCormick Place—Jane Addams Club

Exciting advances in CADD technology and a fundamental restructuring of the CADD industry promise to change the types of systems you'll be buying-and who you'll be buying them from. As you find yourself investing more of your earnings in CADD and related equipment, it becomes increasingly important that you take into account future directions in computer graphics and applications and assess your vendor's ability to deliver the benefits of coming technologies.

Panel Chairman

Charles M. Foundyller President Daratech, Inc. Cambridge, MA

Panel

James R. Boyce President DFI/Systems Orlando, FL

John Clancy President McDonnell Douglas Manufacturing & Engineering Systems Co. St. Louis, MO

Malcolm Davies Vice President A E C GE CALMA Company Milpitas, CA

Peter Martin President ARCAD Los Angeles, CA

Walter Von Seggern President Sigma Design Inc. Denver, CO

David P. Weisberg Director of Sales Auto-trol Technology Corp. Denver, CO

S-202 SPECIAL PANEL How to Get A Better Return on Your CADD Investment McCormick Place—John Evers Theatre

You can't expect overnight payback from a CADD system in which your business has invested thousands of dollars, let alone a large payoff. There are methods, however, that can speed up the process. Panelists discuss how your firm can witness a more rapid return on investment than most by hiring and training appropriate personnel; making maximum use of the computer from project inception to completion; and insuring complete and thorough input in processing data for every project stage. Panel

Joseph S. Brown

Managing Partner Everett I. Brown Company Indianapolis, IN

Keith J. Garnett, PE President/Chairman of the Board Donohue & Associates, Inc. Sheboygan, WI

Alan D. Hinklin Partner Skidmore, Owings & Merrill Chicago, IL

• S-203 SPECIAL PANEL Can Buildings Really Be Intelligent?

McCormick Place—Lenox Lohr Theatre

Intelligence is in the eye of the beholder-that is, an intelligent building means something different to the architect, engineer, owner/developer, and tenant. The office of the future is arriving faster than the building of today can support it. Open office plans and portable furniture and partitions will not assure flexibility and mobility if the building itself cannot accommodate change. This seminar focuses on why the creation of a truly "intelligent" building must be a collaborative effort among all involved.

Panel Chairman Oliver R. Witte

Management Consultants Chicago, IL

Panel

Gary A. Hall Vice President & Director of Electrical Engineering Hammel, Green & Abrahamson, Inc. Architects & Engineers

Minneapolis, MN **Charles E. Reeder** Chairman The Computer-Aided Design Group™

Marina del Rey, CA

S-204 SPECIAL PANEL Computer Applications in Japan

McCormick Place—David Mayer Theatre

This seminar introduces the current status of computer applications in the architectural design and construction field in Japan, based on questionnaire results. The speakers present examples of computer applications for a variety of systems, from mainframe-based to microbased, then discuss the characteristics and future trends of computer applications in Japan.

Panel Chairman

Tsuyoshi Sasada Associate Professor Osaka University Osaka, Japan

Panel

Masao Mikumo Head of Technological Development Headquarters Shimizu Construction Co., Ltd. Tokyo, Japan

Masanori Nagashima

Managing Director ARC Yamagiwa, Inc. Tokyo, Japan

Fumio Takino President Kozo System, Inc. Tokyo, Japan

Wednesday, June 25 300-Series Seminars NOON-1:00 PM

• S-301

Computer Generated Images for Architectural Design McCormick Place—Jane Addams Club

Computer-generated images can be a valuable tool to the architect in visualizing buildings and environments that do not yet exist. This session discusses the state of the art in computergenerated image making. Current tools available to the architect—and research contributing to future image generation tools—are reviewed.

Kenneth Herold

Director of Marketing, Professional

Design Systems HOK Computer Service Corporation Dallas, TX

Jon H. Pittman

Vice President HOK Computer Service Corporation St. Louis, MO

General Sector Sect

McCormick Place—Johns Evers Theatre

Here's an all-too-familiar statement: "We are a Beta test site for the new turbo software with the latest hardware configuration, which we are under contract to receive after Alpha tests of the previous release, which we never received, are debugged. At least, that's what the salesman promised." Find out why these traps are built, whey we leap into them, and why we should avoid them and stay in business.

Graham Copeland

Division Manager The BSC Group Boston, MA

○ S-303

The Executive's Role in Office Automation

McCormick Place—Lenox Lohr Theatre

Today's business climate demands that executives take an active, hands-on approach to the information technologies that . are shaping the way efficient firms operate. This session shows how senior executives can gain the competitive advantage by learning their CADD and non-CADD systems inside and out, becoming active participants in the development of new automation strategies for themselves and their clients, and assuming the decision-making responsibility for achieving various levels of automation.

Joseph S. Brown

Managing Partner Everett I. Brown Company Indianapolis, IN

• S-304

Computer-Generated Animation for Architecture and Urban Design

McCormick Place—David Mayer Theatre

In this seminar you'll learn about a computer-generated three-dimensional animation system developed for architecture and urban design by professors at Japan's Osaka University. A video presentation illustrates the process by which they have created nearly a dozen animated videos in three years. A short animated video is also featured.

Tsuyoshi Sasada

Associate Professor Osaka University Osaka, Japan

○ S-305 Finding and Keeping Good People

McCormick Place—Room 1

Most managers agree that good people are essential to success. Too much time and money are directed toward efforts to improve or motivate staff. This presentation addresses the far more fundamental "how to" efforts that result in having good people: finding, screening, hiring, and keeping them.

Melville Hensey, PE, CCI

Engineering Management Consultant Hensey Associates Cincinnati, OH

○ S-306

Micros in the Small A/E Office McCormick Place—Room 8

This seminar focuses on the application of personal computers in the small office, including how a computer training plan was implemented, the tax issues involved, and the benefits derived. Other aspects to be covered include employee computer use at home; estimating manpower requirements through the use of electronic spreadsheets; applications in HVAC, structural calculations, budgeting, and general office administration.

Harold E. Costley

Vice President, Design Services Torrence, Dreelin, Farthing & Buford, Inc. Richmond, VA

General Second Seco

McCormick Place—Room 2

This seminar reviews general principles of records management, then discusses the use of computers and other automated equipment to help manage both documents and data. Topics include: guidelines for small and medium firms; deciding whether or not to centralize the files; microfilm applications in the central file and other departments; CAR systems and bar coding.

Patricia N. Gorman

Records Manager Skidmore, Owings & Merrill Chicago, IL

S-308 Integrated Software for Design Professionals McCormick Place—Room 7

Integrated software packages

When will GRAPH/NET's super C.I.D. capabilities be available at Micro prices?"



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can easily be used by the A/E to create templates for performing engineering calculations, cost estimating, project databases, cash flow projections, and other tasks. Mr. Brooks shares his experience combining such software as LOTUS 1-2-3, SYM-PHONY, Borlands' SIDEKICK, Microsoft WINDOWS, and other inexpensive programs into a remarkable PC-based office production tool.

Michael D. Brooks, PE

President ENERCALC Engineering Software Newport Beach, CA

Wednesday, June 25 400-Series Seminars 3:00-4:00 PM

General Sector Sect

McCormick Place—Jane Addams Club

This seminar explores the process of bringing a computer-aided design system into a 12-person design firm. Topics include the establishment of a management philosophy, orienting and acclimating the entire staff to the system, educating users, establishing a forum for user feedback, and developing a system monitor and update process.

Richard P. Roberts, RLA

Associate and Systems Manager Schmidt Associates Architects, Inc. Indianapolis, IN

• S-402 Training Management to Use CADD

McCormick Place—John Evers Theatre

CADD training for A/E managers is entirely different from user training-but even more important. Managers' misdirection (often stemming from misunderstanding or even fear) of CADD efforts results in high employee turnover, low productivity, and failure to achieve ROI. This session addresses the 3 key issues for successful CADD implementation: how CADD differs from manual methods, who should use CADD, and how CADD changes roles and responsibilities.

Kristine K. Fallon, AIA

Vice President, Computer Graphics A. Epstein and Sons International, Inc. Chicago, IL

○ S-403

How to Prepare for a Total Conversion to Systems

McCormick Place—Lenox Lohr Theatre Microcomputers, CADD, and all the other new tools and techniques often fail to meet our expectations. Instead, they seem to be the cause of delays, unexpected expenses, staff resentment, and management embarrassment. Avoid the pitfalls by discovering the problems peculiar to each system, common training mistakes, and a proven approach to choosing and using new systems.

Fred A. Stitt Editor/Publisher Guidelines

Orinda, CA

➡ S-404 CADD in Canada: Innovative Applications for CADD in Canadian A/E Firms McCormick Place—David Mayer

Theatre

Case studies are presented to illustrate innovative applications of off-the-shelf CADD technology in the Canadian A/E/C field. Applications such as urban design, facility management, civil and structural engineering, digital mapping, architecture and architectural modeling and landscape architecture are featured.

Brad Abbott, B.E.S., B. Arch. Client Services Consultant A/E Systems Ontario CAD/CAM Centre Cambridge, Ontario

⊖ S-405

How to Evaluate the Financial Condition of Your Firm McCormick Place—Room 1

Profitability, liquidity, security, stability, capitalization, allocation of resources . . . all words your creditors use in their evaluation of your company. In an entertaining and understandable presentation, Dennis Bersch discusses why management must look just as carefully and critically at their own firms, even though they cannot be as objective as creditors.

Dennis W. Bersch

President Bersch & Company s.c. Milwaukee, WI

Computerized Project Management

McCormick Place—Room 8 Too much paper, out-of-date information, unusable data, uncooperative project managers, and inappropriate software all

and inappropriate software all result in systems failure. This seminar prepares you to take advantage of the opportunities offered by computerization without suffering from a failed installation. Topics include how to determine what you need; questions to ask the software vendor; what to watch out for in hardware; and how to reduce the piles of paper, train project managers, and make project management computer systems profitable.

David A. Rinderer

Practice Management Associates, Ltd.

Newton, MA

Developing a Management Information System for the Design Office

McCormick Place—Room 2 The environment within today's

design office is dynamic, uncertain, and increasingly complex. A Management Information System (MIS) can help keep principals and project managers continually, aware of all aspects of their business operations, projects, and office activities. This session helps the design professional develop an MIS around his or her business.

Bradley E. Wellington

Business Manager Allred, Soffe & Tuttle Murray, UT

○ S-408 The Psychology of Selling A/E Services

McCormick Place—Room 7 When marketers of A and E services combine the basics of psychology with learned selling techniques, they can be even more effective. This seminar focuses on how to size up prospective client decision-makers using a "human grid," discover their needs, and advocate appropriate solutions. You'll acquire another tool with which to gain an edge on your competition.

John Coyne

President Coyne Associates St. Paul, MN

Thursday, June 26 500-Series Seminars 8:30–9:50 AM

○ S-501 SPECIAL PANEL MicroCADD Shootout: Who's (Going to Remain) on First? McCormick Place—Jane Addams Club

As microCADD software systems become commonplace, vendors will play an increasing role in how the AEC community gets work done. Leaders of four top microCADD software companies come together to present their views on where microCADD is going and to field questions from the audience. This session promises to raise sparks and be highly informative as competing vendors share a common forum.

Panel Chairman Daniel S. Raker

President DESIGN & SYSTEMS RESEARCH Inc. Editor A/E SYSTEMS REPORT Cambridge, MA

Panel

Peter Kendall Marketing Manager ROBO Systems Corporation Newtown, PA

Tom Lazear

President T&W Systems, Inc. Huntington Beach, CA

John Walker President Autodesk, Inc. Sausalito, CA

J. Michael Watterson Dir. of Marketing, Systems Div. CalComp Anaheim, CA

← S-502 SPECIAL PANEL A/E CADD Integration: The Nashville Solution

McCormick Place—John Evers Theatre

This seminar describes the unique UNIGRAFS Advanced Systems Drafting Program in use at Gresham, Smith and Partners of Nashville, TN, which integrates CADD with systems drafting techniques, laser plotting and color offset printing. Next, reprographics techniques used at Lellyett and Rogers, the nation's largest and most experienced producer of offset construction documents, are reviewed, including half-size color offset construction documents, laser plotting, input scanning, and the integration of manually drawn overlay and CADD-generated overlay.

Panel

Pat Brumfield

President Lellyett & Rogers Co. Nashville, TN

Darrell James

Director of Computer Applications Barge, Waggoner, Sumner and Cannon Nashville, TN

Edgar Powers, Jr.

Associate/Director of Quality Assurance Gresham, Smith and Partners Nashville, TN

S-503 SPECIAL PANEL What Clients Need to Know about CADD McCormick Place—Lenox Lohr Theatre

Message from the Sponsors of R/E/C SYSTEMS '86

Sure you can design... but can you manage your business? Ne have a service that can help. The principals/sponsors of A/E/C SYSTEMS 86 — George Borkovich, Michael Hough and Frank Stasiowski — together provide the largest and most comprehensive package of management, marketing and systems information available to architects, engineers, contractors and other design and construction professionals.

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Trade Shows

A/E/C SYSTEMS '86 — the world's largest trade show for design and construction professionals being held June 23-27, 1986 at McCormick Place in Chicago

A/E/C SYSTEMS '87 — next year's show will be held June 23-27, 1987 at the Washington, DC Convention Center

Newsletters

A/E SYSTEMS REPORT — the monthly newsletter containing tips on automation and reprographics for professional design firms

Professional Services Management Journal (PSMJ) — the monthly management bible for design firm executives

A/E Marketing Journal — the "how to" marketing newsletter for planning and design firms

Contractor Profit News — the monthly newsletter with practical and profitable management and marketing ideas for contractors

Seminars and Conferences

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Publications

Automation from A to Z and Automation for the Design Firm published by A/E SYS-TEMS REPORT

Financial Statistics Survey, Executive Management Salary Survey and **Fee Survey** published by PSMJ

The A/E Marketing Handbook and the Publicity and Awards Directories published by A/E Marketing Journal

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19 A/E/C

This panel presents case studies

Panel

This panel discussion offers a comprehensive overview of the

G. Anthony DesRosier Applications Consultant

Thursday, June 26 700-Series Seminars 3:00-4:00 PM

⊖ S-701

Linking People and Technology McCormick Place—Jane Addams Club

The key to linking people and technology is full utilization by employees. In this session, you'll learn these proven methods of improving people's success with automation: performing an ergonomics review, using creativity training, and developing a conversion management team. Participants take part in structured exercises designed to provide first hand experience and practical skills.

Thomas F. McDonald, Ph.D. President Transition Associates

La Jolla, CA

Integrating PC's into Production and Management Applications

McCormick Place—Johns Evers Theatre

In this seminar you'll learn how small offices can systematically apply the microcomputer to contract documents, project management, and office management; why standard word processing, spreadsheet, and data base programs make up the basic software package for small architectural offices; and how the microcomputer integrates naturally with reprographics and CADD.

Frank Mascia

Owner/Architect Collaborative Design Group Tucson, AZ

S-703 Implementation of CADD in a

Multidisciplined A/E Firm McCormick Place—Lenox Lohr Theatre

This seminar presents an overview of the stages, problems and rewards of producing drawings. Topics include vendor selection, who should train technicians and how, managing shift work, and the acceptance of CADD as a tool. Also, the problems and experiences of coordinating between architectural, structural, HVAC, piping, electrical, civil and environmental design disciplines are addressed.

R. Darrell James

Director of Computer Applications Barge, Waggoner, Sumner and Cannon Nashville, TN

⊖ S-704

CADD Training: A Case Study McCormick Place—David Mayer Theatre

The emphasis of this seminar is on CADD training as a component of integrating CADD into a design office. Training strategies for the draftsperson to the managing principal are discussed. In addition, training is presented as the vehicle by which to increase the acceptance of CADD into the project process.

William Joseph

Associate

and Anthony Mirante

Senior Associate Gensler and Associates/Architects San Francisco, CA

O S-705

Technology and Office Productivity: A Critical Perspective McCormick Place—Room 1

There is a great deal of confusion on the part of both clients and A/E's about the role technology can and should play in improving office productivity. This seminar critically assesses the relationship between technology and office productivity, drawing upon case studies to help A/E's avoid the many pitfalls along the road to the "office of the future."

Duncan B. Sutherland, Jr. Vice President/Director of Officing CRS Sirrine, Inc. Houston, TX

• S-706

Negotiating Computer Contracts

McCormick Place—Room 8

In this seminar, discussion focuses on contractual issues involved in the procurement of typical CAD terminal and computer hardware printers, "canned" software, custom software, system development, and time share system access. Emphasis is on warranties, liability for design errors, technical and performance specifications, trial periods, maintenance, and special clauses. The speaker was legal counsel to Fluor Corporation's acquisition of over \$50 million in CAD systems.

Ernest C. Brown, Esq., PE Partner

Natkin Weisbach & Brown Newport Beach, CA

Strategic Planning for Design Professionals

McCormick Place—Room 2 "Strategic planning" is a fancy term for figuring out what services, fields and markets you want to be in and how to get there. It is concerned more with opportunities than with problems (which should be addressed during daily management). While most firms benefit from a personalized approach to planning that fits their principals, all such planning should include a few essential steps that are addressed in this seminar.

Melville Hensey, PE, CCI Engineering Management

Consultant Hensey Associates Cincinnati, OH

• S-708

Automated Information Data Bases

McCormick Place-Room 7

Mr. Carroll reviews existing and proposed systems for the automation of specifications, standards, and other design information being used and developed by the private sector. Mr. Rutherford reviews the development and application of a program for the Automated Facilities Engineering Information System and its application to the military construction program of the Navy, Army and Air Force, plus the A/E firms working in this area.

Charles R. Carroll, Jr., FCSI Information Systems Consultant Baltimore, MD

Thomas R. Rutherford, PE Director, Engineering & Design

Criteria Naval Facilities Engineering Command Alexandria, VA

Friday, June 27 800-Series Seminars 8:30–9:50 AM

McCormick Place—Jane Addams Club

The case studies presented show computer design applications by various architects and film designers in the early stages of a design. The decision-making process is illustrated as a basis for decision making in computer applications (to the extent of an "expert system"), regardless of the type of computer hardware used. It is no longer a question of which kind of computer to buy or use, but of who will use it and how.

Panel Chairman Richard J. Rogers

Director of Computer Services Skidmore, Owings & Merrill Chicago, IL

Panel

Allen Broadway Director of Computer Operations Leason Pomeroy Associates Orange, CA

Gail Eadie Fluharty Director of Computer Services Neptune & Thomas Associates Pasadena, CA

S-802 SPECIAL PANEL Selecting Facility Management Software

McCormick Place—John Evers Theatre

The biggest potential for cost benefit of any computer application related to architecture or design can perhaps be found in facility management—but like CAD five years ago, the technology and terminology are new and the potential for expensive mistakes is high. This session lists the steps to take in selecting a facility management system, emphasizing benefit-to-cost analysis, planning for the future, and the avoidance of common errors.

Panel Chairman

Jeffrey M. Hammer President

The Computer-Aided Design Group™ Marina del Rey, CA

Panel

Jim Boyce President DFI Systems

Orlando, FL **Ron Kramer** Principal Business Consulting Resources Lexington, MA

Kerry Smyth Product Specialist CALCOMP Anaheim, CA

Linda Tasker-Tighe, AIA Industry Marketing Manager CADAM, Inc. Burbank, CA

S-803 SPECIAL PANEL Strategies in Evaluating PC Networks vs. Super Micros McCormick Place—Lenox Lohr Theatre

This session contrasts the costs, benefits, and opportunities offered to the A/E/C community by the current generation of single-user microcomputers and multi-user super micro products. Qualitative and quantitative data are presented.

Panel Chairman

Jack L. Thompson, PE President CADD Centre Lynchburg, VA



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Panel

W. Tracey Lenocker, PE Branch Manager CIVILSOFT Orange, CA

Chester A. Shuman Executive Vice President Harper and Shuman, Inc. Cambridge, MA

S-804 SPECIAL PANEL Making CADD Work through Effective Management McCormick Place—David Mayer Theatre

Even though the history of CADD in the AEC office is brief, we can see that the success or failure of a particular system implementation is more likely traceable to the effectiveness of management than to any system features. This session brings together a panel of experienced players in the CADD implementation process to discuss the administrative and technical issues fundamental to success. The panel reviews programmatic solutions for today's problems and explores future impacts on professional practice.

Panel Chairman David A. Jordani, AIA

President David A. Jordani & Associates Minneapolis, MN

Panel

Scott W. Braley

Principal-in-Charge of Operations Heery Architects & Engineers, Inc. Atlanta, GA

Kristine K. Fallon, AIA

Vice President, Computer Graphics A. Epstein and Sons International, Inc.

Chicago, IL

Douglas F. Stoker

Partner Skidmore, Owings & Merrill Chicago, IL

• S-805 <u>SPECIAL PANEL</u> Is There A Robot in Your Future?

McCormick Place-Room 1

This informative panel discussion features experts from the robotics industry along with representatives from companies now using robots in construction. You'll view a new film on how robots are improving productivity, product quality, and cost effectiveness for American manufacturers in a wide range of industries.

Panel Chairman Donald A. Vincent, CAE

Executive Vice President Robotic Industries Association Ann Arbor, MI

Panel

Bruce Kenneth Forbes, AIA President

Jung/Brannen Research and Development Corporation Boston, MA Lester V. Ottinger

President, Marketing Group Advanced Manufacturing Systems, Inc. Norcross, GA

Friday, June 27 900-Series Seminars NOON-1:00 PM

• S-901

Evaluating CAD vs. CADD: Costs vs. Benefits McCormick Place—Jane Addams Club

This session contrasts the costs and benefits of drafting-only computer systems with the current generation of products that offer design functionality as well as drafting.

Jack L. Thompson, PE

President CADD Centre Lynchburg, VA

• S-902

Flexible Integration: Software Concepts for the Future McCormick Place—John Evers Theatre

Mr. Atwood discusses the need for flexibility and full integration in software systems for facility planning, design, and management. Systems of the future will address the problems of sharing information between disciplines, over time, between different machine environments and data formats, and in different geographical locations. You'll learn the problems of incorporating designers' intelligence in software tools-and the need for computer-trained architects to help shape systems for design.

Charles L. Atwood, AIA President

HOK Computer Service Corporation St. Louis, MO

⊖ S-903

Computer Graphics in Interior Design

McCormick Place—Lenox Lohr Theatre

This session is a case study of how computer graphics are effectively used on an interior design project. The discussion includes preliminary design through final construction documents. Special emphasis is placed on the efficiencies of using and reusing the graphical database throughout the course of the project.

William Joseph

Associate and Anthony Mirante Senior Associate Gensler and Associates/Architects San Francisco, CA

S-904 Setting Standards for CADD and Reprographics Production McCormick Place—David Mayer Theatre

Today, a wide range of methodologies is available to A/E firms to produce design and construction documents for various building types, from manual methods to overlay drafting systems to CADD. Each requires rules and standards in order to maximize the use of the system and to increase its efficiency. This seminar shows how HLM made the transition from overlay drafting to CADD systems, how rules and standards are applied to CADD, and how they are used in reprographics.

Daniel L. Moore

Director of Computer Services— Chicago Office Hansen Lind Meyer, P.C. Chicago, IL

S-905

The Negotiable Environment: People, White Collar Work and the Office

McCormick Place—Room 1

Offices should mirror culture as it is now—not as it has been in the past or as some wish it would be in the future. This presentation explores personality types and the need for offices to change to meet changing functions.

Cecil Williams, Ph.D.

Director Facility Management Institute Ann Arbor, MI

• S-906

Data Bases: The Fulfillment of Computer Applications in Design

McCormick Place—Room 8

As sophisticated computer applications grow, data bases play an increasingly significant role. This seminar covers the kinds of data bases that will be available for various disciplines, who will develop them, who will support them financially and technically, and how data bases may radically change the design professions. Electronic Sweet's, a project already under way, is described, including how it will be distributed to design offices.

Harry Mileaf

Vice President, Planning, Electronic Products



McGraw-Hill—Construction Information Group New York, NY

○ S-907 In Search of Microcomputer Software McCormick Place—Room 2

The present deluge of new microcomputer software, which varies greatly in quality, capability, and price, poses problems to the uneducated buyer. This seminar offers timely tips on how to establish reasonable expectations for an inexpensive microcomputer and its software, what to look for in different software arenas, and how to shorten your search process and make intelligent purchasing decisions.

Byron Wilkes

President A/E Software Consultants Inc. Seattle, WA

○ S-908

Planning Profits through Costeffective Data Reporting Systems

McCormick Place—Room 7

In this session, you'll explore effective ways to use data from an integrated project management/accounting system to predict where a firm is going in the future. Revenue forecasting, resource planning, budgeting and data base management for marketing support information are covered in detail. Sample computerized reports of all techniques discussed are available to all attendees.

Nancy L. Watson

President

A/E Management Services, Inc. Plymouth, MI

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Concurrent Conferences

A/E/C SYSTEMS '86 offers a variety of Concurrent Conferences sponsored by professional societies and trade publications serving the design and construction industry. All will be held at the Palmer House. Although these conferences are not connected officially with A/E/C SYS-TEMS '86, show management is cooperating fully with the sponsors to insure a quality learning experience for all participants. For more information, call toll free 800/237-3900.

Free Exhibit Passes

Each Concurrent Conference registrant automatically receives a badge good for admission to the 1000-booth A/E/C SYSTEMS '86 exhibit, and buses are scheduled to transport attendees to the McCormick Place exhibit hall at the close of each conference. Exhibit hours are 10 AM to 6 PM on Tuesday, Wednesday, and Thursday, June 24–26; and 10 AM to 3 PM on Friday, June 27. Be sure to allow sufficient time at the show to view all the exhibits of interest to you.

C-40 CM. FORUM. 86 Third Annual Construction Management Forum on Computer Assisted Construction Management

Sponsored by the Construction Management Association of America (CMAA) and the Illinois Institute of Technology (IIT)

Sunday, June 22 5:00–7:00 PM

Early Registration Ice Breaker Party sponsored by Primavera Systems, Bala Cynwyd, PA

Monday, June 23 8:15 AM-4:15 PM

Tuesday, June 24 8:30 AM-5:00 PM

Palmer House-Grand Ballroom and State Ballroom This program is of interest to professional construction managers, to contractors and architect/engineers, and to construction owners who plan to use computers in managing their projects. It features demonstrations of state-of-the-art software on integrated project management systems that can be used on mainframe, mini and microcomputers. Users of these systems will share their experiences by presenting the benefits obtained and the problems encountered during implementation in various types of construction projects. Classroom style, handson training sessions will introduce participants to some of the more popular software available for personal computers.

Day One Program

Monday, June 23 8:15 AM Registration

8:45 AM Plenary Session: Welcome and Announcements



D. Arditi Conference Chairman Illinois Institute of Technology Chicago, IL

8:55 AM President's Address

F. Muller President CMAA O'Brien-Krietzberg & Associates New York, NY

9:10 AM Historical Development in Computer Technology W.G. O'Neel CH2M Hill Corvallis, OR 10:00 AM Break—Informal Discussion

Concurrent Sessions: Construction Management on the PC

Grand Ballroom 10:20 AM What is a Personal Computer and What Can Be Done with it? D.K. Swanson *IBM Chicago, IL*

11:10 AM Microcomputer Selection for Construction Field Offices M.J. O'Connor U.S. Army Corps of Engineers, Construction Engineering Research Laboratory Champaign, IL

State Ballroom 10:20 AM Primavera in Building Construction J. Libert

Hanscomb Associates Chicago, IL

11:10 AM Construction Management with MacProject

J.L. Halcomb Halcomb Associates Sunnyvale, CA

12:00 NOON Lunch

Sponsored by Metier Management Systems, Houston, Tx

Concurrent Sessions: Construction Management on the PC and the Mini

Grand Ballroom 1:00 PM Microcomputers and Project Management Information Systems

P.C. Nunn Dynamic Design Holland, MI

1:45 PM Management Information System for Time, Expenses and Resources

W.W. Shirley Shirley Software Systems South Pasadena, CA

State Ballroom 1:00 PM Using Project Management Software on Microcomputers

H.A. Levine Project Knowledge Group Clifton Park, NY

1:45 PM Managing Construction Costs During Design Using an IBM PC/36

W.C. Early Management Computer Controls Memphis, TN

2:30 PM Break—Informal Discussion

Concurrent Sessions: Construction Management on the Mini

Grand Ballroom 2:45 PM APECS/8000—Overview of Functional Capabilities R.J. Jurkowski and L.A. Tollefsen ADP Network Services Chicago, IL

3:30 PM Artemis—Overview of Functional Capabilities J. Figel Metier Management Systems

Houston, TX

State Ballroom 2:45 PM Managing R&D with APECS/ 8000 AT&T

Chicago, IL

3:30 PM Managing Industrial Construction with Artemis W.C. Nosseck

Walbridge Aldinger Co. Detroit, MI

4:15 PM Adjournment *NOTE: The CMAA banquet will be held at 7:00 PM this evening*

Day Two Program

Tuesday, June 24

Concurrent Sessions: Construction Management on the Mainframe

Grand Ballroom

8:30 AM Application System—Overview of Functional Capabilities

M. Goldberg *IBM Information Network Chicago, IL*

9:15 AM MSCS—Operational Capabilities and Implementation Procedures W. Webster McDonnell Douglas AEC Systems Co.

St. Louis, MO

State Ballroom

8:30 AM Application System—User Experiences in Renovation

M.D. Loo Carson Pirie Scott & Company Chicago, IL

9:15 AM MSCS—User Experiences in Project Development and Claim Evaluation

M. Wood O'Brien-Krietzberg & Associates New York, NY

10:00 AM Break—Informal Discussion

Plenary Session: Computers in Quantity Takeoff and Estimating

10:15 AM Computerized Quantity Takeoff System

W. Land Pinnacle Technologies Oak Brook, IL

11:15 AM Quantity Takeoff and Estimating with Techsonix

M.V. Racine Techsonix Corporation International-USA San Diego, CA

12:15 PM (Conclusion) Future Development in Computer Technology: Construction Managers' Expectations

J.J. O'Reilly Sargent & Lundy Chicago, IL

1:00 PM Adjournment to Exhibit Hall Bus to McCormick Place

1:15 PM Hands-on Training Sessions (McCormick Place)

Three one-hour hands-on training sessions for interested participants. State-of-the-art PC software (SuperProject, Primavera, and Microsoft Project) will be featured in separate classrooms.

5:00 PM Conclusion of Hands-on Sessions

Registration

The registration fee for this twoday conference is \$345 for non-CMAA members, \$295 for CMAA members, \$245 for additional registrants from CMAA Corporate Members, and \$150 for students and academics. Registration includes the conference, handout materials, handson training sessions, admission to the exhibit hall, the icebreaker party, lunch, and banquet.

Those interested in more information on this program should contact David Arditi, Ph.D., Associate Professor of Civil Engineering, Coordinator of the Construction Engineering and Management Program, Illinois Institute of Technology, Chicago, Illinois 60616, 312/567-3265. Those interested in CMAA membership should contact Karl Borgstrom, Executive Director, CMAA, 1025 Thomas Jefferson Street N.W., East Lobby, Suite 400, Washington, DC 20007, 202/944-3651.

C-41 Excellence in A/E Technology and Practice

Monday, June 23 8:30 AM-4:45 PM Palmer House—Red Lacquer

Room Computerization hasn't lived up to the expectations of many architects and engineers, since advanced technology sometimes brings more problems than it solves. This program explores both the promise and the problems of computerization and demonstrates the best of modern-day practices. You'll discover how A/E's are successfully using technological innovations to enhance the quality of design, construction, and professional life.

This A/E version of "The Search for Excellence" includes high-level management insights as well as the most practical tips to be found anywhere on how to make the technological revolution work the way it should.

Program

8:00 AM Registration

8:30 AM Introduction

8:45 AM Advanced Methods of Design Visualization and Presentation

Case studies and experiments from forward-looking design firms, computer animation specialists, and leading CADDoriented design schools.

9:30 AM Imaginative On-Target Market-

ing

Case studies by Gerald Li of Clark Tribble Harris & Li, Architects, of Charlottesville, NC.

10:15 AM Break—Informal Discussion

10:30 AM

Advanced Management and Working Drawing Systems

A review of the most advanced computer-integrated management and operations for project planning, checklist systems, automated specifications, standard details, standard notation, and jobsite feedback presented by Fred Stitt.

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Gary Peacock Executive Vice President— Operations Lincom Dallas, TX

12:45 PM Adjournment to Exhibit Hall

Registration

The cost for this two-day conference is \$295 on site. IIBA members are entitled to a \$50 discount. Registration includes the conference, handout materials, continental breakfast both days, Monday's luncheon with keynote speaker, and admission to the exhibit hall. For more information on this program or to register, contact Marian Wieghorst at Wieghorst Associates, 40 Overlook Rd., Mountain Lakes, NJ 07046, 201//299-9280.

C-50 The CADD Revolution in Design Education

Sponsored by Fred Stitt, GUIDELINES

Tuesday, June 24 8:30 AM-3:30 PM

Palmer House—Red Lacquer Room

CADD, digitized media, and Artificial Intelligence are upon us, and nothing in our professional lives or professional education is going to be the same. Unfortunately, most schools and offices haven't come to grips with the situation. Students are being graduated who must start their educations on their own all over again. Staff needs are being neglected by offices that fail to provide the new educational resources necessary to maintain professional competence.

Some are doing the job, however. In this conference, you'll learn the best of what's happening in design schools and professional continuing education around the country. Discover what the latest developments can do for the profession, for your staff, and for *you*.

Program

7:45 AM Registration

8:20 AM Introduction and Program Preview

8:30 AM Pratt Institute—CADD for Imagery and Visualization A discussion of a unique, design-

oriented approach to hands-on CADD education.

Hans-Christian Lischewski Dir. of Architectural Computer Applications Pratt Institute School of Architecture Brooklyn, NY

9:00 AM UCLA—Using Computer Programming to Teach Design Principles

An approach in which students start with programming exercises and learn design theory and practice in the process of understanding computer logic.

William J. Mitchell, Ph.D.

Head, Architecture and Urban Design UCLA

Los Angeles, CA

9:40 AM Ohio State University—Design and Design Simulation

A review of Ohio State's unusually extensive Computer-Aided Architectural Design program and special educational features of their Archimodos software.

Chris I. Yessios, Ph.D. Department of Architecture Ohio State University

Columbus, OH

10:10 AM Break—Informal Discussion

10:35 AM Training Professionals through Continuing Education

A presentation dealing with design values and training in the context of a technical school that serves both students and working professionals.

Jerry Rubin, Architect

Milwaukee Area Technical College Milwaukee, WI

11:10 AM

Using Microcomputers for Accelerated Design Studies

How students can use templates of common repeat design and presentation elements and overlays to do quick design studies.

Shigeyuki Yamaguchi Associate Professor

Kyoto Institute of Technology Kyoto, Japan

11:45 AM Computer-Aided Instruction: The Revolution in Design Education

A special report on new resources and tools in design education.

Fred A. Stitt Conference Director

Editor/Publisher

GUIDELINES Orinda, CA

12:00 NOON Lunch

1:10 PM

The CADD/CAM Institute— Educating Architects and Engineers in CADD Technology

A description of current methods and resources for CADD education at the professional level.

Joel N. Orr, Ph.D. Chairman The CADD/CAM Institute Danbury, CT

1:45 PM UC Berkeley—The Personal Computer and AutoCAD

A report on a microcomputer AutoCAD course introduced this spring at the UC Department of Architecture.

Dennis Neeley

Architect, Design Instructor UC Berkeley Berkeley, CA

2:20 PM

The University of Houston— Blending CAD and Design Education with the Real World

A "reality oriented" approach to design education in which much student work is done on real projects in cooperation with architectural offices and public agencies.

Elizabeth Bollinger

Associate Professor University of Houston Houston, TX

2:55 PM Digitized Design and Advanced Image Making

A display of the winners of Guidelines' "CADD in Architectural Design Competition" and a review of varied and experimental professional and school 3-D modeling.

3:30 PM Adjournment to Exhibit Hall

Registration

The cost of this program is \$145 on site. Registration includes the conference, all handout materials, and admission to the A/E/C SYSTEMS '86 exhibit. (Note: Scholarship free admissions are available to students. Contact Genny Yee at GUIDELINES for more information.)

The first national student "CADD in Architectural Design Competition" is being held in conjunction with this conference. The design project is a monument to the Chicago tradition in architecture for a hypothetical site on the Chicago waterfront. A public design critique and awards presentation will be held on Monday, June 23, at the Palmer House in Chicago (the evening before this conference). For more information, contact Genny Yee at GUIDELINES.

For more information on this program contact GUIDELINES, Box 456, Orinda, CA 04563, 415/254-9393 or -0639.

C-51 & 52 Automation and Computerization — Building a Total Surveying System

Sponsored by FORESIGHT Newsletter and P.O.B. Magazine

Tuesday, June 24 8:30 AM–1:00 PM

Wednesday, June 25 8:30 AM-1:00 PM

Palmer House-Monroe Room Fully automating field and office procedures requires the selection, integration and use of the latest in technology: total stations, data collectors, computers, digitizers, plotters, and software. This program will assist the surveyor and civil engineer considering automation of field and/or office equipment and procedures. Whether your firm is ready to install a total surveying system or just wants to automate part of its operation, these halfday sessions on automating field operations and automating office computation, drafting and design operations will help you understand what's involved, what to look for, and what to avoid.

Day One Program (C-51) Automated Field Systems

Tuesday, June 24

8:00 AM Registration

8:30 AM Welcome and Introduction Ed Miller Editor/Publisher P.O.B. Magazine Wayne, MI

8:40 AM Field Measurements: EDMs and Theodolites vs. Total Stations

Jim Reilly President Dudley/Reilly Associates, Inc. Tampa, FL 9:25 AM Field Measurements: Using a Data Collector to Increase Field and Office Productivity

Tom Donahue Editor/Publisher FORESIGHT Newsletter Apple Valley, MN

10:10 AM Break—Informal Discussion

10:30 AM Closure and Adjustment Programs/Error Detection Programs

Jim Reilly President Dudley/Reilly Associates, Inc. Tampa, FL

11:15 AM Automated Stakeout

Tom Donahue Editor/Publisher FORESIGHT Newsletter Apple Valley, MN

12:00 Noon Panel: Questions and Answers

Speakers Donahue, Miller and Reilly answer questions from the audience.

1:00 PM Adjournment to Exhibit Hall

Day Two Program (C-52) The Automated Surveying Office

Wednesday, June 25

8:00 AM Registration

8:30 AM Welcome and Introduction

Ed Miller Editor/Publisher P.O.B. Magazine Wayne, MI

8:40 AM Plotting Direct from Field Data

Tom Donahue Editor/Publisher FORESIGHT Newsletter Apple Valley, MN

9:10 AM Computers: Coordinate Geometry Programs

Panel

Roger L. Cordes

Systems Training Consultant Allen Precision Equipment, Inc. Atlanta, GA

Tom Donahue Editor/Publisher FORESIGHT Newsletter Apple Valley, MN **Ed Miller** Editor/Publisher P.O.B. Magazine Wayne, MI

> 10:00 AM Break—Informal Discussion

10:20 AM Coordinate Geometry Programs (continued)

11:15 AM Plotters

Finished drafting, subdivision maps, plots of survey, cross sections and contouring.

Tom Donahue Editor/Publisher FORESIGHT Newsletter Apple Valley, MN

12:00 Noon Panel: Questions and Answers Speakers Cordes, Donahue and Miller answer questions from

the audience.

Adjournment to Exhibit Hall

Registration

The cost of each half-day session is \$145; \$245 for both on site. Registration includes the conference, all handout materials, and admission to the exhibit hall. For further information on this program or to register, contact *P.O.B.* P.O. Box 810, Wayne, MI 48184, 313/729-8400.

C-53

Acquiring Computers and Making Them Pay

Sponsored by the Professional Services Management Association (PSMA)

Tuesday, June 24 8:30 AM–2:00 PM Palmer House—Crystal Room

Hear detailed case studies on pricing, financing, billing and recovering the cost of computerization. You'll discover how firms are financing their systems and costing for them, then learn what many public agencies and private concerns are currently allowing as reasonable billings for

computer-assisted services. Plan to attend if you are an experienced user who wants to improve profitability; are planning to purchase your first computer system; need advice on how to finance computer systems; want to make your com-

tems; want to make your computer system pay for itself—and be profitable; want to know how other firms are recovering the cost of CADD and what the Government will allow you to bill for computers; or want to account properly for computer systems and support activities.

Program

8:00 AM Registration

8:30 AM Determining the Cost of Computerization

Case studies on the cost of computerization at small and large design firms; what you should include in your budgets; hidden costs and costs that should be tracked to recover the cost of computerization.

Gregory B. Putnam, AIA President Putnam Management Consultants, Inc. Piedmont, CA

9:30 AM Financing Major Computer Acquisitions

With over 4 years of major automation experience, RTKL shares actual experience versus original plans; what went right and wrong; the approach they took to financing and recovering costs—and how it's working.

Harold Adams, FAIA President RTKL Baltimore, MD

10:15 AM Break—Informal Discussion

10:30 AM Pricing and Billing for Computers

The development of Computer Aided Engineering and Auto-CAD system cost recovery rates and billing for computers used in design, engineering and word processing. This presentation includes procedures consistent with the Federal Acquisition Regulations and most public agency standards.

Steve DeAutremont Central District Administrative Manager CH2M Hill Denver, CO

11:15 AM Getting It All Together for Profit

An interactive panel discussion that reveals for the first time the initial findings of the PSMA Computer Cost/Recovery Study Group on the subject of costing and recovering the cost of computers. The combined experience of panel and audience will test the preliminary assumptions of the study group.

Stephen D. Quiggle

Vice President, Finance EDAW San Francisco, CA (with panel of speakers)

12:00 Noon PSMA Chicago Metro Luncheon

1:00 PM How SOM Does It

Making the initial decision and purchase of a computer system is only the beginning. After acquiring computer systems and using them for many years. SOM shares how they track costs, determine charge-out and billing rates as well as the need for new equipment and modifications of existing computer and management systems.

Brian Jack, AIA

Associate Partner Skidmore, Owings & Merrill Chicago, IL

2:00 PM Adjournment to Exhibit Hall

Registration

The cost of this program is \$195 on site. This includes the conference, handout materials, the PSMA Metro Luncheon, and admission to the exhibit hall. For further information on this program contact Donna Tobin, PSMA, 1213 Prince St., Alexandria, VA 22314, 703/684-3993.

C-60 Selecting and Using Effective Project Scheduling Systems

Sponsored by The Fails Management Institute

Wednesday, June 25 8:30 AM-1:00 PM

Palmer House-State Ballroom

A properly selected and implemented scheduling system will put dollars in your pocket and improve every aspect of your project management. If you already have a scheduling system that is not producing the benefits promised, or if you're planning to buy an automated scheduling package, you need this hard-hitting, informationpacked program to learn how to select and use scheduling software to bring dramatic and substantial improvements to your job management.

This program is designed for general contractors, subcontractors, and specialty contractors of all types and sizes. Design professionals can also benefit, learning the capabilities and limitations of modern project scheduling tools from the contractor's perspective.

Speakers for the day are *Mike Sheppard*, an FMI Senior Consultant and exceptionally skilled in working with contractors during the implementation of computerized systems; and *Paul Mc-Cain*, a former construction vice president who complements Mike's consulting process with a practical insider's experience of construction.

Program

8:00 AM Registration

8:30 AM Scheduling Systems at the Pre-bid Stage

The benefits of starting the process early; who needs to be involved and how to get their commitment; linking schedules to the bid development process; scheduling as a marketing tool.

9:30 AM Pre-job Scheduling Process

Communication and commitment goals; key participants and their roles; creating the pre-job schedule; short interval scheduling.

10:15 AM Using Your Schedule During and After Construction

How to get the maximum benefit from your scheduling system; maintaining support from vendors and field personnel; getting scheduled performance from your subcontractors; using scheduling output reports; post job: the as-built schedule.

11:00 AM Break—Informal Discussion

11:15 AM Selecting an Automated Scheduling System

Using checklists to set objectives; software considerations; adding bells and whistles; how to pick the right hardware; building a complete system; two approaches to implementing a selection process.

12:00 Noon How to Implement an Automated Scheduling System in Your Company

Control issues and how to resolve them; the implementation plan and its fit with current operations; selling the new system in-house; bringing it on-line; why some implementations don't work.

1:00 PM Adjournment to Exhibit Hall

Registration Information

Please see Registration Information for FMI's second program, session C-61, immediately following.

C-61 Automated Estimating Systems to Get More Work

Sponsored by The Fails Management Institute

Thursday, June 26 8:30 AM–1:00 PM Palmer House—State Ballroom

The power of automated estimating systems is here-and one of the most important decisions you'll face is the selection and implementation of the right one for your firm. Packages are readily available from a host of software vendors and are compatible with almost every piece of hardware, which makes your selection/implementation task complex and time consuming. Let FMI's experienced staff help you close the gap between the promise and the reality of automated estimating.

This program is designed for general contractors, subcontractors, and specialty contractors of all types and sizes. Design professionals can also benefit, learning the capabilities and limitations of modern estimating systems from the contractor's perspective.

Speakers for the day are *Mike Sheppard*, an FMI Senior Consultant and exceptionally skilled in working with contractors during the implementation of computerized systems; and *Paul Mc-Cain*, a former construction vice president who complements Mike's consulting process with a practical insider's experience of construction.

Program

8:00 AM Registration

8:30 AM Defining Your Estimating Requirements

Type of work performed and projected; evaluating your estimating history; integration needs with accounting and job costing; output and format required; using the evaluation summary of present and future system needs.

9:30 AM

Comparison of Available Systems

Compatibility wih existing automated systems; technical specifications of packaged software; installation time required; training and support provided; investment ranges for software.

10:30 AM Break—Informal Discussion

10:45 AM Selecting an Automated Estimating System

Using checklists to establish objectives; software and hardware considerations; "need to have" vs. "nice to have" considerations; creating the complete system; approaches for making the right decision.

11:45 AM How to Implement an Automated Estimating System

Selling the new system to your people; control issues and how to deal with them; a programmed procedure for bringing the system on-line; the implementation plan and its fit with current operations.

1:00 PM Adjournment to Exhibit Hall

Registration

The registration cost for each one-day FMI program is \$145 on site. Participants may register on site for both programs for \$245. Rates include the conference(s), handouts, and admission to the exhibit hall. For further information on these programs, contact Ms. Terry Johnson at The Fails Management Institute, P.O. Box 31108, Raleigh, NC 27622, 919/787-8400.

C-62 & 63 Maximizing Internal Systems Productivity

Sponsored by Reprographics/86

Wednesday, June 25 8:30 AM-1:00 PM

Thursday, June 26 8:30 AM–1:00 PM Palmer House— Grand Ballroom

In-plant reprographics operations function as a primary communications link between the design/engineering operations and the manufacturing/fabrication production output divisions. Corporate communications cannot efficiently proceed without coordinated reproduction management. Higher productivity can be achieved by linking inplant functions with external retail reprographics services.

This concurrent conference is geared to the needs of managers of printing departments, duplicating and archival divisions, retail and commercial printing firms, design and graphic services coordinators, and other practitioners of graphic arts and reprographics. In these sessions you will learn about practical techniques for increasing inplant reprographics productivity while integrating the latest CADD technologies and service interests. The intent is to show in-plant repro managers the latest techniques, equipment, materials and management methods to help them turn out more work with better quality.

Day One Program (C-62)

8:00 AM Registration

8:30 AM Maximizing Results with In-Plant Photosystems

Use this technical equipment audit and review of contact- and projection-speed photo products to improve your photo/projection systems and photo-processor systems throughout.

Corky R. Burt

Marketing Manager, Industrial Systems Chestnut Run Laboratory E.I. DuPont Company

Wilmington, DE 9:30 AM

From CADD to Camera

Keep current with the state of the art in CADD hardcopy output by learning the requirements for, and capabilities of, optical laser vector imaging direct to registered small format negatives for filing and blowback to precise full-scale images.

Jack Wally

Systems Consultant Opti-Copy, Inc. Lenexa, KS

10:00 AM Coordinating Reprographics with Outside Vendors

Enjoy this session of specific points to consider when selecting outside vendors, when considering the "make it or buy it" decision, and for assuring that the results pay off.

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Barbara Woodward

Co-manager, Documentation Services Dept. Hughes Aircraft Company Torrance, CA

10:45 AM Break—Informal Discussion

11:00 AM Suggestions for Improved Transmittals and Security

A responsible and effective program for managing access to and limited use distribution of discrete and secure information. An executive management information handling system is reviewed for effective implementation.

David Henney

Chief, Comprehensive Planning Branch U.S. Air Force S.A.C. Offutt AFB, NE

11:45 AM Advanced Micrographics with Improved Archival Retrieval

This session covers the integration of microfilm systems with CADD hardcopy output and the requirements for efficient and secure archival storage and retrieval of contract documents.

Dale Rupp

Market Manager, Commercial Sector 3M Company— Graphic Preparation Systems Div. St. Paul, MN

12:30 PM

Wrap-up and Day Two Preview

1:00 PM Adjournment to Exhibit Hall

Day Two Program (C-63)

8:00 AM Registration

8:30 AM Maximizing Electrostatic Systems

This session covers the proven techniques for increasing productivity and throughput with large- and small-format electrostatic copiers with special emphasis on proper materials used and rescaling functions.

Regis Augusty

National Sales Manager Xerox Corp.—Engineering Graphic Products Division Rochester, NY

9:15 AM

How to Develop In-Plant Rates A presentation of pricing procedures, cost allocation, special service projects and treatment of

cost for overflow work sent out-

side your organization. A proper pricing policy will assist in providing cost-effective reprographic department service. **Dennis Clark**

Jennis Clark

Manager of Information Services, Eastern Div. Stearns Catalytic Corporation Philadelphia, PA

10:00 AM Proper Selection and Application of Drafting & Reproduction Media

An overview is presented of the "Engineering Process," covering the conception of the idea, to the creation of the engineering drawing, to the finalization of the distribution "blueprint." Particular attention is given to drafting methods; manual, vector (pen) and electrographic, and to the specific drafting media used in each. The various methods and distribution of the engineering drawing will be highlighted.

Don Gaffney

Manager of Marketing Operations James River Graphics South Hadley, MA

10:45 AM

Break—Informal Discussion

11:00 AM Maximizing Internal Systems Productivity in an Increasingly CADD Environment

This open forum discussion with panelists from the major industry groups will help provide a consensus concerning the trends and methods for maximizing in-plant reprographics productivity while integrating the latest CADD and electronic imaging technologies and outside service industries.

Panel

Larry Aaron Executive Director In-Plant Printing Management Association New Orleans, LA

Dennis Clark

MIS Director Stearns Catalytic Corporation Philadelphia, PA

Kraig Debus Editor

In-Plant Printer Northbrook, IL

John Deermount, Jr. President

International Reprographic Association New York, NY

1:00 PM

Adjournment to Exhibit Hall

Registration

The cost for the full two-day

program is \$245 on site. For either single day, the cost is \$145 on site. Registration includes the conference, handout materials, and admission to the A/E/C SYS-TEMS '86 exhibit.

For further information on this program, contact Gary M. Gerlach, Program Director, RE-PROGRAPHICS/86, 37 Ledgewood Drive, Glastonbury, CT 06033, 203/659-0857.

C-64 Computer Applications for Facility Management

Sponsored by the International Facility Management Association (IFMA)

Wednesday, June 25 8:30 AM-4:00 PM Palmer House-Red Lacquer Room

If you're a corporate facility manager, space planner, architect, or interior designer and want to learn more about the rapidly changing field of com-

puter-aided facility management, you'll want to attend this nuts-and-bolts educational program.

The management of today's corporate facilities requires the collection, analysis, manipulation, and updating of vast amounts of information. This information is used in the planning, design, and coordination of facility construction and renovation projects; in daily facilities operations and maintenance; and in the forecasting of future facilities needs.

This intensive seminar shows you which computer applications you can apply—and how to apply them—to manage your organization's facilities more efficiently. You'll learn how others have improved their operating effectiveness with the use of computers and will benefit from their experience and insights. So don't reinvent the wheel! Take advantage of what others in your field have found works for them.

Program

8:00 AM Registration

8:30 AM Data Structures for Facility Management

Topics include major FM forces and trends, FM database characteristics, interfaces and integration, data structures and capture procedures, PC vs. CADD vs. mainframe databases, and resources available to the facility manager.

Jeffrey M. Hamer President

The Computer-Aided Design Group Marina del Rey, CA

9:15 AM

Architects'/Engineers' Roles in Developing FM Databases

A discussion of the role architectural firms should play in developing FM systems and the criteria facility managers should use in selecting such a firm.

Tina Rich Walden

Project Director, Computer Applications CRS Sirrine, Inc. Houston, TX

10:00 AM Break—Informal Discussion

10:30 AM Computer Applications: Part I

A presentation covering the following applications: space forecasting and facility programming; maintaining a space inventory; and asset tracking—furniture and equipment.

Michael K. Schley

President Facility Systems Group Houston, TX

11:30 AM Lunch Break

1:00 PM

Computer Applications: Part II

A presentation covering the following applications: computeraided design and FM; implementing CAD; and building the database.

Michael K. Schley

President Facility Systems Group Houston, TX

1:45 PM Case Study: West Virginia Board of Regents

A case study of an FMI project involving the development of a micro-based computer system for the tracking and comparison of the facilities of 16 educational institutions. An explanation of the generic software package developed as a spin-off of this project follows the case study.

Paul H. Lilly Senior Associate

Herman Miller Research Corp. Ann Arbor, MI

2:30 PM Case Study: The Hartford Insurance Group

A case study of how The Hartford Insurance Group uses

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computers to manage space planning projects in 6 million square feet of office space located in 260 facilities nationwide. Also, an evaluation of the pros and cons of producing and updating space drawing vs. alphanumeric data on space usage.

Anthony Zulkeski

Secretary/Manager, Facility Management and Design The Hartford Insurance Group Hartford, CT

3:15 PM

Case Study: McDonnell Douglas Information Systems Group

How McDonnell Douglas has increased productivity of their facility management department through the use of a CAD system for graphics and project management.

Richard L. Curtiss Director of Facilities

McDonnell Douglas Information Systems Group

4:00 PM Wrap-up and Adjournment to Exhibit Hall

Registration

The cost of this program is \$225 on site. Registration includes the conference, all handout materials, and admission to the A/E/C SYSTEMS '86 exhibit. For further information on this program, contact IFMA at 11 Greenway Plaza, Suite 1410, Houston, TX 77046, 713/623-IFMA.

C-65 Computers and Their Use in Marketing Management

Sponsored by the Society for Marketing Professional Services

Wednesday, June 25 8:30 AM-1:00 PM

Palmer House—Adams Room Hear the case studies of four different types of firms—construction management, architectural, engineering, and development—to learn the key factors involved in evaluating present and future needs. The perspective ranges from the single office to the multi-office nationwide firm.

You'll get an overview of the elements necessary to evaluate the acquisition and maintenance of hardware and software; the utilization of existing databases, electronic bulletin boards, mailing lists and tickler files; the anticipated results of budgets and staff requirements; and how to monitor the success of performance and evaluation criteria.

Further, you'll learn how all these firms have successfully applied computer technology to support various marketing functions—and how each firm has integrated the marketing efforts with the existing computer applications.

This conference is of interest to the principals and marketing staff who wish to learn how other design firms have developed computer systems to support marketing; how to motivate and train marketing staff to overcome their fear of using the computer to manage their efforts; and how to market computer capabilities to your clients.

Program

8:00 AM Registration

9:00 AM Welcome and Introductions

9:30 AM

Computers, Marketing and the Large Multi-Office National Practice

Lisbeth Gray

Vice President/Marketing Perkins & Will Washington, DC

Bob Lenzke Senior Designer

Perkins & Will Chicago, IL

10:00 AM

A Modest Perspective on the Small Office: Where Marketing and Operations Mix Frank Bosworth Architect

Clearwater, FL

10:30 AM

Marketing Construction Management Services/Opportunities with Design Professionals

Michael J. D'Amato Vice President W.E. O'Neil Construction Company Hartford, CT

Michael Faron Vice President W.E. O'Neil Construction Company Chicago, IL

11:00 AM

Break—Informal Discussion

11:15 AM For the Client's Eyes, the Impact of Computer Marketing on A/E/P Process

Bill Donohue

Assistant Vice President URBCO Inc. Hartford, CT

11:45 AM

The Next Five Years: Technology's Impact on the Design/ Construction/Development Profession

Panel Discussion

12:15 PM Summary of Panel Remarks Questions and Answers Discussion of Next Year's Topics

1:00 PM Adjourn to Exhibit Hall

Registration

The cost of this half-day program is \$145 on site, which includes the conference, handout materials, and admission to the exhibit hall. For further information on this program, contact Cynthia Buffington at SMPS, 801 N. Fairfax Street, Suite 215, Alexandria, VA 22314, 703/549-6117.

C-70 CAD in Civil Engineering

Sponsored by The Society for Computer Applications in Engineering, Planning and Architecture (CEPA)

Cosponsored by: ACEC APEC, Inc. NSPE/PEPP ASCE/TCCP

Thursday, June 26 8:30 AM–1:00 PM Palmer House— Red Lacquer Room

The speakers for this straightforward conference are practicing engineers who are involved daily with the application of CAD systems to real-world projects under way in their offices. Their presentations detail the problems they have encounteredand overcome-while using a variety of CAD systems in addressing a wide range of technical and management problems. In addition to detailed case studies in Civil Engineering, the speakers address the selection of equipment, the economies of CAD, the impact upon your organization, training of personnel, achievable production ratios, improved quality, and CAD system compatibility. Ample time is allowed for questions.

This conference is especially informative for engineering executives and project managers; for systems analysts who are contemplating the installation of a CAD system or who have recently done so; and for all engineers interested in quality, productivity, and profitability.

Program

8:00 AM Registration

8:30 AM Why CAD?

What justifications exist for introducing CAD into so many areas of engineering, design, and drafting? This session shows how CAD use can be justified or rather, why non-CAD use may be unjustified. A typical CAD installation and growth process is presented, and the future of CAD is discussed in terms of A/E users' expectations and needs.

Robert K. Waddick

Chief Computer Applications Engineer/Computer Services Div. Sargent & Lundy Engineers Chicago, IL

9:20 AM Microcomputer-based CAD for the Civil Engineer

The necessary ingredients for a productive and profitable microcomputer-based CAD system are reviewed via actual examples from civil engineering firms. Topics include payback periods for work stations, minimal hardware and software requirements, drafting-only vs. design-anddrafting software, and interfacing to larger CADD systems.

W. Tracy Lenocker, PE Vice President The Technical Group, Inc. Anaheim, CA

10:10 AM Break—Informal Discussion

10:30 AM Evolution of CADD in a Multi-discipline E/A Firm

A discussion of the evolution of CADD at Sverdrup Corporation, its organization, and how Sverdrup has reached the point where large, multi-discipline projects in the areas of architecture, industrial, transportation, and environmental engineering use CADD productively and efficiently.

Martin Zellin, PE

Project Manager/Architectural Div. The Sverdrup Corporation St. Louis, MO

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11:20 AM Utilizing CAD in Civil Engineering Practice

A case history of one firm's use of CAD's data base manipulation facilities to satisfy clients' increasing demands in the site and subdivision development market.

Russel B. Wilson, PE

Project Engineer KKBNA, Inc. Wheat Ridge, CO

12:10 PM Break—Informal Discussion

12:20 PM CADD—Organizational Impact

The introduction of computers for the preparation of engineering drawings (both design and drafting) is far more complex than were the traditional computer applications of the 1960s and 1970s. This session explores why understanding both the nature and the extent of CADD's impact on office practices is critical to successful implementation.

Richard L. Bland, PE

Director of Computer Services Giffels Associates, Inc. Southfield, MI

1:00 PM Adjournment to Exhibit Hall

Registration

The cost of this program is \$145 on site. This includes the conference, all handout materials, and admission to the exhibit hall. For more information on this program, contact Patricia C. Johnson, CEPA Inc., 15713 Crabbs Branch Way, Rockville, MD 20855, 301/926-7070.

C-71 Intelligent Infrastructure Conference

Sponsored by F-M AUTOMATION NEWSLETTER and A-E-C AUTOMATION NEWSLETTER

Thursday, June 26 8:30 AM-4:00 PM Palmer House-Adams Room

Public utilities and local governments—the primary managers of America's infrastructure—are discovering a productivity improvement tool which promises to change the way they do business. Called by some "AM/FM" (Automated Mapping/Facilities Management), this subset of the information industry is a prime example of the application of computer graphics and database technology to the task of rebuilding and expanding America's infrastructure.

This intensive program is a unique opportunity to discover the state of the science today and the outlook for tomorrow. It will be tremendously valuable to anyone who manages facilities records for utility companies or local government land records systems as well as to vendors of computers and computer graphics hardware/software systems; data conversion service companies, database consultants; specialists in land data systems, engineering, planning, land surveying, and photogrammetry.

Speakers

Jerry Robinson, a recognized expert and consultant in automated mapping and facilities management, is Editor of the F-M AUTOMATION NEWS-LETTER. In the newsletter, Robinson provides timely analysis and reporting on the application of computer graphics and database technology to the management of utility and local government facilities systems.

Ed Forrest, a civil engineer and map maker by profession, has been since 1977 Editor of the A-E-C AUTOMATION NEWS-LETTER, which circulates worldwide. In the newsletter,

Advertisement

ENERCALC Innovative Software Takes Hold Among A/E Firms

One major problem faced by all A/E professionals is the necessity to produce repetitive hand calculations for a typical design project. This type of number crunching can be very time consuming, but properly designed software can be extremely fast and effective for performing this type of tedious work. An innovative west coast software company has developed an excellent tool for performing these everyday calculations.

Michael D. Brooks, structural engineer and founder of ENERCALC Engineering Software, discovered some time ago than an electronic spreadsheet program was an invaluable tool for quickly setting up repetitive calculations for day-to-day type problems. By using the full screen editing abilities of the LOTUS 1-2-3 spreadsheet, he was able to design a series of typical programs which resemble 'fill-in-theblanks' worksheets. After testing the software's value and acceptance in an affiliate consulting firm, Mr. Brooks realized what an invaluable tool his software development had become.

Hence, the idea for marketing this new software was launched. Almost immediately the idea took hold and, after just $2\frac{1}{2}$ years, hundreds of A/E firms are using ENERCALC software. In an effort to teach students the power of modern spreadsheet programs, many universities have even included ENERCALC software in their curriculum.

To design a beam, column, footing, or other item using ENERCALC, you simply enter data in the marked locations on your worksheet and press the "F9" function key, which calculates all the built-in formulas. To recalculate for "what-if" problems, just re-enter only the values which change. By pressing "F9" again, instant results appear for your review. All imput and output can be easily reviewed "on screen" at once, looking just like a typical calculation pad. Making the software even easier to use, each program is provided with a 'HELP' menu offering such features as Auto Entry, Save & Retrieve of Forrest reports and analyzes design office and construction site automation techniques involving all present-day technologies.

Program

8:00 AM Registration

8:30 AM Introduction to Intelligent Infrastructure Management

Learn about this newly emerging field of integrating computer graphics and computer database technology to manage infrastructure facilities, how it differs from comparatively simple business data processing, and why it

data only, Printing, Reset, and others.

Since Mr. Brooks' development, many A/E/C professionals have discovered the benefits of using a spreadsheet program, and designed custom in-house software with excellent results. With 1.5 million copies of ENERCALC's base program in use worldwide, LOTUS 1-2-3 and SYMPHONY have become the defacto standard in spreadsheet programs. And no wonder ENERCALC is of popular, their 'Structural Library' includes 40 powerful programs in five major catagories: STEEL, CONCRETE, TIM-BER, MASONRY, RETAINING WALLS, and STRUCTURAL ANALYSIS, all for \$845. A complete Library also includes a 550 page User's Guide, free support, and periodic updates for under \$100.

To run ENERCALC you must have LOTUS 1-2-3 or SYMPHONY (Supercalc, Excel, and 20/20 versions are due soon). No knowledge of of either is needed, however, because their 'ACCESS' and 'HELP' menus lead you through the necessary commands to use each program. Experienced spreadsheet users will be in familiar territory and can use the programs very quickly. Every program works in the exact same format, so no re-learning or long training is involved. This simple, straight forward approach is great for firms who don't want to spend unproductive time learning so called "user friendly" software.

At the A/E SYSTEMS '86 Conference in Chicago, Mr. Brooks will be conducting SEM-INAR S-308, "Integrated Software for Design Professionals" on Wednesday, June 25 at 12:00. Mr. Brooks will focus on the professional who uses a microcomputer to integrate many functions (i.e. spreadsheet, word processing, desktop accessories, CAD, producing calculations). A very productive environment can be set up using many of the commercially available and inexpensive accessory programs, such as Sidekick, Windows, 1-2-3, Word Perfect, Superkey, and many others.

If you would like to find out more about ENERCALC Engineering Software, you can contact Mr. John Staph at (800) 424-CALC or (714) 720-1865. ENERCALC Engineering Software, 160 Newport Center Drive, Suite 116, Newport Beach, CA 92660. LOTUS 1-2-3 and SYMPHONY are trademarks of Lotus Development Corporation of Cambridge, MA. AutoCAD is a trademark of Autodesk, Inc. of Sausalito, CA. offers great possibilities for rebuilding and expanding America's infrastructure.

8:45 AM The Program Phases in Implementing Intelligent Infrastructure Management

This session explores each major step in implementing Intelligent Infrastructure Management Programs, including the feasibility study, Pilot Project, Hardware/Software Selection, Records Purification, Field Verification, Land Base Map Creation, Facilities Information Conversion, and Applications Enhancements.

9:45 AM Exploiting Automation Drivers and Overcoming Roadblocks

Discover proven methods for gaining support for—and justifying—automation programs, plus how to identify and deal with roadblocks that have delayed many programs.

10:15 AM

Break—Informal Discussion

10:30 AM Impacts of Technology Trends on Intelligent Infrastructure Management

Learn how integrated systems, distributed processing, local area and wide area networking, scan digitizing, optical disks, portable PC field terminals and more are expected to impact intelligent infrastructure Management.

11:30 AM Working Lunch Discussion, Questions & Answers

1:00 PM Intelligent Infrastructure Workshop

This no-holds-barred workshop features the interaction of users and systems vendors. In an unrehearsed format, Session Moderators will ask probing questions of each of the participants. Each participant is allotted equal time for response, and audience participation is encouraged. Instead of sales presentations, you'll hear vendors respond to the real issues in Intelligent Infrastructure Management.

Vendor Participants

Charles D. Howard GFIS Market Support Administrator IBM Corporation

James Hargis

Executive Coordinator, Utility Information Systems Intergraph Corporation

J. Lance Maidlow,

M. Eng. P. Eng Manager, Marketing and Sales Rosal Systems, Ltd.

William L. Folchi Vice President Synercom Technology, Inc.

User Participants

Chris Harlow Vice President San Diego Gas and Electric Company

Frank Castleberry Manager PLRMS Southern Bell Telephone

Wayne J. Delbeke, P. Eng. General Manager Associated Engineering (SASK), Ltd.

Harry Christie Manager, Mapping City of Burnaby Burnaby, BC

4:00 PM Wrap-up and Adjournment to Exhibit Hall

Registration

The cost of this full-day program is \$225 on site, which includes the conference, handout materials, and admission to the exhibit hall. For further information on this program, contact Jerry Robinson at F-M AUTO-MATION NEWSLETTER, 9501 West Devon Avenue, Suite 203, Rosemont, IL 60018, 312/ 823-0555.

C-72 How to Solve Your Liability Problems

Sponsored by PSMJ Seminars

Thursday, June 26 8:30 AM–1:00 PM Palmer House—Monroe Room

With premium rates up over 400% and many firms unable even to get coverage, every A/E/C firm is in a crisis over professional liability. This program tells you what you can do to solve the liability dilemma in your firm. It equips you with specific techniques to implement in order to reduce premiums, indemnify your firm, rewrite contracts, and avoid liability problems.

Program

8:00 AM Registration

8:30 AM Switching Carriers Today: Part I A discussion of how to analyze the benefits of coverage vs. its cost; what is too much insurance and what is too little; and what indemnification terms are negotiable and what won't fly.

John Greenfield Principal Greenfield, Ellis, Bost Atlanta, GA

9:15 AM Switching Carriers Today: Part II

Where to find insurance carriers who will quote you a premium; where to go when insurance is not available through normal channels.

Patrick McLaughlin

Principal Insurance Broker R H S & H Insurance Garland, TX

10:00 AM Discussion/Questions

10:30 AM Break—Informal Discussion

10:45 AM Going Bare: Part I

A discussion of the special risks assumed, how to protect your business and personal assets and how to explain your liability to clients.

Charles Heuer

President Covenants Medford, MA

11:30 AM Going Bare: Part II

A discussion of the work you cannot take on, how to use project insurance and contractual clauses, and how to respond to liability claims.

Cyril "Bud" McRae

President J. H. Kleinfelder & Associates Walnut Creek, CA

12:15 PM Open Discussion

1:00 PM Wrap-up and Adjournment to Exhibit Hall

Registration

The cost of this program is \$145 on site. Registration includes the conference, all handout materials, and admission to the A/E/C SYSTEMS '86 exhibit. For futher information on this program, contact Betsy Miller at PSMJ, Ten Midland Avenue, Newton, MA 02158, 617/965-0055.

Free Directory

As a special bonus, A/E/C SYS-TEMS '86 attendees may pick up a *free copy* of the industry's leading software directory, *Design Compudata '86*, compliments of its publisher, Graphic Systems, Inc. An equal number of copies will be made available each morning, Tuesday through Friday, in the registration area at McCormick Place—but supplies are limited, so be sure to arrive early to obtain your copy.

For more information on this publication, write to Graphic Systems, Inc., 180 Franklin Street, Cambridge, MA 02139.

Foreign Participation

A/E/C SYSTEMS '86 will draw visitors from all over the world. Last year, attendees came from 39 countries, and even more foreign representation is expected this year. Some 500 overseas guests will attend.

Once again, the happenings of Japan, Inc., will be a special feature of this year's education program. Specifically, two seminars sponsored by the Computer Applications Committee of the Architectural Institute of Japan will be presented. See the Seminar Schedule, session S-204 and S-304, for details.

From our neighbors to the north, the Ontario CAD/CAM Centre will showcase Canadian computer innovations. (See session S-404.) Upwards of 1000 Canadian design and construction professionals are expected to be with us in Chicago.

The U.S. Department of Commerce has granted official Trade Fair certification to A/E/C SYS-TEMS '86. As a result, the U.S. Government is helping to promote the show overseas through its embassies and consulates. This year's foreign exhibitors will represent such countries as Japan, India, Canada, Great Britain, and many European distributors.

At A/E/C SYSTEMS '86, there will be an "International Business Center" to facilitate meetings between foreign attendees and the exhibitors. Also, show management will hold a seminar to help exhibitors reach the export market.

A/E/C SYSTEMS is a truly international event. Each year more and more design professionals from countries outside the U.S. find the show a vital element in their education and growth.



Participating Associations and Publications

Show management would like to acknowledge the contribution of the following participating professional organizations and industry publications to the success of A/E/C SYSTEMS '86:

*Has a booth on the floor. Check Exhibitor listing for location.

*A-E-C Automation Newsletter 7209 Wisteria Way Carlsbad, CA 92008 619/438-1595

*A/E SYSTEMS REPORT P.O. Box 11316 Newington, CT 06111 203/666-9487

*AIDD, Metropolitan Chicago Chapter 6011 N. Winthrop Ave., #414 Chicago, IL 60660

American Association of Cost Engineers 308 Monongahela Building Morgantown, WV 26505 304/296-8444

American Concrete Paving Association 2625 Clearbrook Drive Arlington Heights, IL 60005 312/640-1020

*American Consulting Engineers Council 1015 15th St. NW Washington, DC 20005 202/347-7474

*American Institute of Architects 1735 New York Ave. NW Washington, DC 20006 202/626-7300

*American Institute of Architects—Chicago Chapter 53 West Jackson Chicago, IL 60604 312/663-4111

*American Institute of Steel Construction 400 N. Michigan Avenue Chicago, IL 60601 312/670-5422 *American Society of Civil Engineers 345 East 47 St. New York, NY 10017 212/705-7420

American Society of Landscape Architects 1733 Connecticut Ave. NW Washington, DC 20009 202/466-7730

American Society of Mechanical Engineers—Midwest Region Randhurst, Suite 72 Mount Prospect, IL 60056 312/392-8876

American Subcontractors Association—Chicago 4100 Madison, Suite 7 Hillside, IL 60162 312/544-9060

*APEC, Inc. Miami Valley Tower, Suite 2100 Dayton, OH 45402 513/228-2602

*Architectural & Engineering Systems Magazine 108 Standard St. El Segundo, CA 90245 213/322-5434

Architectural Institute of Japan, Computer Application Committee 26-20 Shiba 5 Chome, Minato-Ku Tokyo, Japan 108 03-456-2051

*Architectural Record 1221 Avenue of the Americas New York, NY 10020 212/512-2793

*Architectural Technology 1735 New York Ave. NW Washington, DC 20006 202/626-7300

*Architecture 1735 New York Ave. NW Washington, DC 20006 202/626-7300

Associated General Contractors—Greater Milwaukee 3289 North Mayfair Milwaukee, WI 53226 414/778-4100 Associated General Contractors of Illinois 3219 Executive Park Drive Springfield, IL 62708

*Association of Energy Engineers 4025 Pleasantdale Road, Suite 340 Atlanta, GA 30340 404/447-5083

Association of Physical Plant Administrators 1446 Duke St. Alexandria, VA 22314

*Association of Records Managers and Administrators, Inc. (ARMA) 4200 Somerset Dr., Suite 215 Prairie Village, KS 66208 913/341-3808

"at" Magazine (Japan)
% Delphi Research Inc.
Owada No. 2 Bldg.
3–6 Sakuragaoka-Machi
Shibuya-Ku, Tokyo
150 JAPAN

*Better Roads P.O. Box 558 Park Ridge, IL 60068 312/693-7710

***Building Economics** 1221 Avenue of the Americas New York, NY 10020 212/512-2793

Building Managers Association of Chicago 135 S. LaSalle St., Room 1025 Chicago, IL 60603 312/236-5237

Building Research Board 2101 Constitution Avenue NW Washington, DC 20418 202/334-3376

*Buildings Design Journal 6255 Barfield Rd. Atlanta, GA 30328 404/256-9800

*CAD/CIM Alert 824 Boylston Street Chestnut Hill, MA 02167

CEC of Illinois P.O. Box 1604 Springfield, IL 62705 217/528-7814 *CEPA, Inc. 15713 Crabbs Branch Way Rockville, MD 20855 301/926-7070

Chicago Building Congress 203 N. Wabash Chicago, IL 60604 312/726-9829

Chicago Regional Chapter, IBD

1155 Merchandise Mart Chicago, IL 60654 312/467-1950

Chicago Post, SAME % U.S. Army Corps of Engineers 219 S. Dearborn Chicago, IL 60604 312/353-6400

*Civil Engineering 345 East 47 St. New York, NY 10017 212/705-7420

Computer Aided Design Report 841 Turquoise St., Suite D San Diego, CA 92109 619/488-0533

*Computer Graphics Today 50 West 23 St. New York, NY 10010 212/645-1000

*Computer Graphics World 119 Russell Street Littleton, MA 01460 617/486-9501

*Construction Engineering Research Laboratory (CERL) P.O. Box 4005 Champaign, IL 61820 217/373-6729

*Construction Information Group/McGraw-Hill Information Systems Co. 1221 Avenue of the Americas New York, NY 10020 212/512-2793

*Construction Industry Press 1105-F Spring St. Silver Spring, MD 20910 301/589-4884 *Construction Management Association of America 1025 Thomas Jefferson St. NW, Suite 400 Washington, DC 20007 202/944-3651

The Construction Specifier 601 Madison St. Alexandria, VA 22314 703/684-0300

*Contractor Profit News Ten Midland Avenue Newton, MA 02158 617/965-0055

Contractors Association of Will and Grundy Counties 252 Ruby Street Joliet, IL 60435 815/726-5476

*Coordinating Council for Computers in Construction % Sweet's Division/ McGraw Hill 1221 Avenue of the Americas New York, NY 10020 212/512-3966

*Corporate Design & Realty 475 Park Avenue South New York, NY 10016 212/576-4162

Daratech, Inc. 16 Myrtle Avenue Cambridge, MA 02138 617/354-2339

Delphi Research (Japan) Owada No. 2 Bldg. 3–6 Sakuragaoka-Machi Shibuya-Ku, Tokyo 150 JAPAN

*Design Compudata 180 Franklin St. Cambridge, MA 02139 617/492-1148

*Design Graphics World 6255 Barfield Road Atlanta, GA 30328 404/256-9800

*Design & Systems Research, Inc. 125 CambridgePark Dr. Cambridge, MA 02140 617/497-5300

Dodge Construction News 230 West Monroe St. Chicago, IL 60606 312/368-6517

*Engineering News-Record 1221 Avenue of the Americas New York, NY 10020 212/512-2372

Fabricators Manufacturers Association 7811 North Alpine Road Rockford, IL 61111 815/654-1902 The Fails Management Institute P.O. Box 31108 Raleigh, NC 27612 919/787-8400

***F-M Automation Newsletter** 9501 W. Devon Ave., Suite 203 Rosemont, IL 60018 312/823-0555

Foresight Newsletter 13772 Glazier Apple Valley, MN 55124 612/432-4545

*The Guidelines Letter P.O. Box 456 Orinda, CA 94563 415/254-0639

Homebuilders Association of Greater Chicago 1010 Jorie Boulevard Oakbrook, IL 60521

Illinois Chapter, ASCE 203 N. Wabash Chicago, IL 60604 312/726-9829

*Illinois Chapter, NCGA % Harper College CAD/CAM Center 1002 East Algonquin Road Schaumburg, IL 60195 312/397-1640

Illinois Institute of Technology Armour College of Engineering IIT Center Chicago, IL 60616 312/567-3265

Illinois Registered Land Surveyors Association 4950 N. Harlem, Suite 102 Harwood Heights, IL 60656

Inland Architect P.O. Box 10394 Chicago, IL 60610 312/321-0583

In-Plant Printing Management Association 2475 Canal Street, Suite 300 New Orleans, LA 70119

Institute of Real Estate Management 430 N. Michigan Avenue Chicago, IL 60611 312/661-1930

*International Facility Management Association Eleven Greenway Plaza, Suite 1410 Houston, TX 77046 713/623-4362

*International Intelligent Buildings Association 1815 H St., N.W., Suite 700 Washington, DC 20006 *International Reprographic Association (IRgA) 9931 Franklin Ave. Franklin Park, IL 60131 312/671-5356

Land Improvement Contractors of America 2800-3 S. 6th St. Springfield, IL 62703 217/525-7000

Mason Contractors Association of America 17W601 14th St. Oakbrook Terrace, IL 60181 312/620-6767

Mechanical Contractors Association of Chicago 1530 Merchandise Mart Chicago, IL 60654 312/670-6740

*Metal Building Review 19 West 21st Street New York, NY 10010 212/741-2095

*MicroCAD Institute 125 CambridgePark Dr. Cambridge, MA 02140 617/497-0001

*National Asphalt Pavement Association 6811 Kenilworth Avenue Riverdale, MD 20840

National Electrical Contractors Association—Illinois 1501 S. MacArthur Blvd. Springfield, IL 62704 217/787-9500

*Ontario CAD/CAM Centre 400 Collier-MacMillian Drive Cambridge, ON, CANADA N1R 7H7 519/622-3100

***Plan and Print** 9931 Franklin Ave. Franklin Park, IL 60131 312/671-5356

P.O.B. P.O. Box 810 Wayne, MI 48184 313/729-8400

Professional Services Management Association (PSMA) 1213 Prince St. Alexandria, VA 22314 703/684-3993

*Professional Services Management Journal (PSMJ) P.O. Box 11316 Newington, CT 06111 203/666-9487

***Progressive Architecture** P.O. Box 1361 Stamford, CT 06904 203/348-7531 Project Management Institute P.O. Box 43 Drexel Hill, PA 19026 215/622-1796

*Roads & Bridges Magazine 380 Northwest Highway Des Plaines, IL 60016 312/298-6622

Robotic Industries Association P.O. Box 3724 Ann Arbor, MI 48106 313/271-7800

SCIP Newsletter 1145 Gaskins Rd. Richmond, VA 23233 804/740-8326

***S. Klein Newsletter on Computer Graphics** P.O. Box 915 Sudbury, MA 01776 617/443-4671

*Society of American Military Engineers (SAME) P.O. Box 180 Alexandria, VA 22313 703/549-3800

Society of American Registered Architects 6633 W. Irving Park Road Chicago, IL 60634 312/726-5880

*Society of Architectural Administrators % The Spector Group 3111 New Hyde Park Road North Hills, NY 11040 516/365-4240

*Society for Computer Aided Engineering 7811 North Alpine Road Rockford, IL 61111 815/654-1902

*Society for Marketing Professional Services (SMPS) 801 N. Fairfax St., Suite 215 Alexandria, VA 22314 703/549-6117

Underground Contractors Association 8550 Bryn Mawr Avenue Chicago, IL 60631 312/693-6930

U.S. Department of Commerce International Trade Administration 14th & Constitution Ave., N.W. Washington, DC 20230 202/377-0872



The Exhibit

A/E/C SYSTEMS '86 features the largest architectural, engineering and construction computer/management exhibit in the world. Housed in 300,000 square feet at the internationally famed McCormick Place, this year's show encompasses over 1000 booths staffed by representatives of more than 275 companies in these key areas:

- Office Automation and Computers . . . AT&T Information Systems, Digital Equipment Corporation, Hewlett-Packard, IBM, Prime, Texas Instruments, Control Data, and Xerox
- Computer Graphics . . . Auto-Trol, Calcomp, Calma, Computervision, Intergraph, McDonnell Douglas, Sigma Design, SKOK, and GMW Computers
- MicroCAD... AutoCAD, Carrier, MegaCADD, Robo Systems, T&W Systems and GTCO Corporation
- Reprographics . . . Dietzgen, DuPont, Fuji Photo, Océ Industries, Teledyne, Opti-Copy, Printfold, Bruning, and Minolta
- A/E Software...ACCI Business Systems, V/L Systems, Alpine Datasystems, BST Consultants, CIVILSOFT, Data Basics, ECOM, Harper and Shuman, and HOK/CSC
- Construction Software...Concord, Digital Systems, Bidtek, MC², Alderfer Project Control, Constructive Computing, and Softrak
- Drafting Equipment and Supplies . . . Hamilton, Keuffel & Esser, Koh-I-Noor, J.S. Staedtler, Ulrich Planfiling, Easifile, Safco, and Vemco
- Computer Peripherals . . . Versatec, Nicolet Computer Graphics, Houston Instruments, Summa Technologies, Benson, and Western Graphtec
- Specialty Products and Services...McGraw-Hill, Haworth, Diginetics, Lietz, Pentax, CEPA, APEC, Van Nostrand, Daratech ... and many, many more!

Highlights

A/E/C SYSTEMS '86 has the largest architectural, engineering and construction computer and management exhibit ever! Housed in 250,000 square feet of exhibit space, it encompasses over 1000 booths by more than 300 companies, including every major vendor serving the automation, reprographics, and management needs of the design and construction professional. Don't miss your chance to see how they can help you practice more effectively. You won't be disappointed!

- More than 100 of the leading vendors of computer graphics (CADD) hardware, software, systems and services—from plotters to turnkey systems, from microCAD to 3-D modeling and animation, including *every* major vendor serving the architect/engineer/contractor market
- Over 50 companies offering reprodrafting services, products and supplies, copier technology and microfilm—plus the state-of-the-art multi-vendor exhibit, *The Reprographic Center*
- Scores of professional societies and trade organizations, publications (magazines, newsletters, books, directories and special reports), and consultants providing computer and management education, training and guidance
- More than three dozen leading suppliers of drafting room and office automation furniture, equipment and cabinetry—from pencils and pens to tables and chairs to ergonomically designed systems and contract furnishings
- Literally hundreds of technical software packages—structural, civil, electrical, energy, plumbing, real estate, project management, bidding, estimating, and much, much more . . . everything to help you manage your business, manage your projects, get new business, and keep your practice at the cutting edge

• Over 100 office automation exhibits of word processing, personal computers, minis and mainframes, peripherals, local area networks, and computer software for every A-E-C application imaginable

The Reprographic Center

Introduced at 1984's show in Baltimore, this extremely popular display has a new twist in 1986-step-by-step instructions on how to do it. The Reprographics Center, located in a 20' x 50' island display in Booth 783, is sponsored by the International Reprographic Association (IRgA). In the heart of the product exposition, this special display features a self-contained and operational "repro center." Through hands-on demonstrations, it depicts how reprographic and computer graphic techniques and products can be married into an effective documentation and production effort.

Developed through A/E SYS-TEMS REPORT research, the idea was nurtured by a special committee of the IRgA in an effort to provide useful information to design professionals in a non-sales setting. The display is staffed by members of the IRgA, and vendor participants from the exhibit floor have generously provided the use of their products.

The Software Center

A/E/C SYSTEMS '86 attendees will have access to more than 80 firms who specialize in providing software for the design and construction industry. Many of these firms are not large enough to staff a booth on the exhibit floor, so we have designated a special "Software Center" where those exhibitors will display information about their products.

Attendees can select from a variety of software products that deal with architectural and engineering design, construction and construction management, project management, graphics, cost estimating, facilities management, financial and accounting, marketing, word processing and numerous other special applications.

Be sure to stop by the Software Center—Booth #400!

Hands-On CADD Center

Get your hands on a PC CADD system!

Every A/E/C SYSTEMS '86 attendee will have an opportunity to take a 75-minute lecture and hands-on workshop on one of three microCAD software packages: AutoCAD, VersaCAD or CADVANCE. Hear an expert lecture, and then sit at your own PC CADD workstation and carry out several exercises prompted by your own workbook and MicroCAD Institute trainers. The Hands-On Center will be open during exhibit hours. Cost: \$50 (or \$35 with a preregistration coupon).

This program is brought to you by The MicroCAD Institute division of Design & Systems Research, Inc. TMI offers classroom and on-site training services on most PC CADD systems. For more information about TMI, The Hands-On Center, or pre-registration booking for your hands-on workshop, call Carolyn Colbert at 617/497-0001, or write The MicroCAD Institute, 125 CambridgePark Drive, Cambridge, MA 02140.

No other show can match the quality and size of the A/E/C SYSTEMS '86 exhibit. In fact, no other show even comes close! A/E/C SYSTEMS has become *the* place where companies serving this market make their new product releases. Be there!

THE SMALL HOUSE

An Artful Guide to Affondable Residential Deson



Duo Dickinson With a Foreword by Turner Brook

1

Progressive Architecture



Each book has been selected for its usefulness to you in your professional practice. **Prices slightly higher in Canada. Foreign orders must be accompanied by payment.** It is not necessary to send payment with the order. Circle appropriate numbers on the Reader Service Cards in the back of this issue, add your name and address and mail. Local sales tax **must** be included with payment. Prices subject to change. **For faster service, send the card in an envelope to:**

Marie DeFelice Progressive Architecture 600 Summer Street PO Box 1361 Stamford, Ct. 06904

P/A Back issues

A limited supply of the following issues of P/A are available at \$7.00 per Copy. **Check MUST accompany order!** Connecticut Residents Add 71/2% Sales Tax.

April	Maki/Treatment Centers/Energy POEs and HVAC
March	Special Issue: Foster's HongkongBank/ British High-Tech
February	Two Churches/Berlin's IBA/London Docklands
	33rd Annual P/A Awards
	Beeby/Taveria/Jahn/Gehry/Entrances Adaptive Reuse/Tax Credits/Substitute
November	Materials



NEW *

1 The Small House, An Artful Guide to Affordable Residential Design

By Duo Dickinson 196pp., illus.... \$34.95

An impressive compilation of superior design, this handsome work features houses that represent every region of the U.S. and includes examples of both primary residences and houses that are used as vacation or second homes. These designs prove that small houses can be built to accommodate a wide variety of sites, budgets, sizes of familiis and aesthetic sensibilities. Circle B601 under Books.

2 Marketing for the Small Design Firm

by Jim Morgan

159pp., illus.... \$27.50 Geared specifically for firms with ten or fewer employees, this is detailed, proven advice for getting more business with the budget you have to work with. Sample charts, forms, checklists, letters, tips for better promotion and more. Circle B602 under Books.

3 Structural Systems

By Henry J. Cowan and Forrest Wilson

256 pp., illus. . . . \$16.95

This is a comprehensive guide to preliminary structural design using a minimum of mathematics and numerous illustrations to describe structural forms and their mathematics. It has a strong emphasis on graphic presentation and is an instant-access reference to structural design. Full consideration is given to the internal and external forces that a building must withstand, and the interaction of structural and environmental design. **Circle B603 under Books.**

4 Practical Manual of Site Development

by B.C. Colley, R.C.E. 220pp., illus. . . . \$37.50 This book is the comprehensive reference source for those involved in the civil engineering design of land development projects. It presents the political, economic and construction considerations as well as physical limitations of any such project. Architects, planners and developers will find it very helpful for understanding the various factors engineers must consider and the problems they must solve. **Circle B604 under Books.**

5 Affordable Houses Designed by Architects

Edited by Jeremy Robinson, 168 pp., illus. . . \$44.50

This lavishly illustrated volume shatters the myth that architect-designed houses are more costly than developer-built houses. The superb photographs, floor plans, drawings, and details of interiors and exteriors present a wealth of ideas on how to construct beautiful and unique houses within limited budgets. **Circle B605 under Books.**

NEW*

6 Designing Buildings That Work

by Fred A. Stitt

244pp., illus.... \$32.50 Designers, architects and others concerned with buildings can improve upon the building plan process by using "high speed design" rather than the hit-or-miss intuitive planning methods of the past. Proven techniques for predesign, programming, planning methodology, planning rules of thumb and systematic problem solving. **Circle B606 under Books.**

7 Design and Planning of Swimming Pools

By John Dawes, 276 pp., illus.....\$52.50

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8 Architectural Rendering: The Techniques of Contemporary Presentation

By Albert O. Halse, 326 pp., illus., 2nd edition, 1972.... \$69.00

This completely up-dated revision of the most widely used guide to architectural rendering covers all working phases from pencil strokes to finished product — and shows how to obtain the desired mood, perspective, light and color effects, select proper equipment and work in different media. **Circle B608 under Books.**

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9 Shopping Malls: Planning & Design

by Barry Martland 183 pp., illus. . . . \$49.95

This book presents a dynamic and rapidly evolving building form, concentrating on two aspects — design and impact. Analyzing over one hundred examples of malls, the author traces the way in which their design has evolved. Amounts to the most comprehensive and up-to-date study available on this subject. **Circle 8609 under Books.**

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AT&T/Omnicad: AT&T Omnidraft is a microcomputerbased design and drafting workstation intended for use by architects, engineers, and facilities planners.

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Apollo: The Domain Series 3000 Personal Workstations bridge the gap between personal computers and technical workstations by offering 32-bit power, desktop ergonomics, and a databus for peripherals. Circle 107 on reader service card



CalComp: Demonstrates its fullrange CAD product continuum including the System 25 600 Series and 300 Series workstations, CADVANCE software and complete line of peripherals. Circle 111 on reader service card



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APEC: New Input Data Managers enable a designer to scroll through a building model and view each input parameter along with a clear English notation explaining the input field. Circle 103 on reader service card



Active English Information Systems, Inc.: System George® is an expert information system. System George is a revolutionary high-tech way to make accurate construction decisions and coordinate your staff's work. Circle 105 on reader service card



AutoCAD: AutoCAD is a fullfeatured computer-aided design program that runs on over 30 microcomputers, bringing mainframe CAD capabilities to lowcost desktop workstations. Circle 108 on reader service card



Chase Systems: ACAD Partner is a unique menu/software system bringing speed, power, and flexibility to AutoCAD[®] Eliminate keyboard commands; user chooses from interchangeable MACRO templates for all A/E/C applications and over 100 symbol templates.

Circle 112 on reader service card

AIA Service Corporation: Masterspec is the most comprehensive specifying system in existence. In loose-leaf notebook or diskettes, it takes a lot of work out of your work. Circle 102 on reader service card

Artecon, Inc.: Will introduce its graphics-based ArteMate COGO package, which will solve various coordinate geometry problems encountered in designs that rely on land surveys. Circle 114 on reader service card



Alpia Incorporated: Worldwide manufacturer of top quality lines of drafting equipment for professionals. Filing systems, drafting tables, drafting machines, reference desks.

Circle 106 on reader service card

Adra Systems: The Adra 1000 is an ultra high performance, lowcost CADD System for design/ drafting applications. It can be used as an enhancement or as a standalone system. Circle 109 on reader service card

American Institute of Architects, Chicago Chapter: Architecturally oriented tours of exhibits, evaluations of demonstrations, and discussions with users: Wednesday-Thursday, 9:00 A.M., Meeting room 6. Panel discussion: Thursday, 1:15 P.M., John Evers Theater.

Circle 110 on reader service card





Data-Basics, Inc.: In use at over 500 installations, AEMAS is an integrated project costing and accounting software package for A/E firms. Multiuser PC's are featured this year. *Circle 117 on reader service card*



GE Calma Company: With GE Calma's integrated approach, an engineer uses the multidisciplined, 3-D DIMENSION III CAE/CADD system to design major construction projects ranging from ships to oil and gas refineries at a large project cost saving.

Circle 120 on reader service card



GeoVision Corporation (formerly Systemhouse Graphics Systems, Inc.): Will be introducing the RAMS/VX automated mapping/geographic information system. RAMS/VX is a price/ performance leader that operates on the Digital MicroVAX II computer system and is used by city/county governments, survey and mapping companies, and utility companies. *Circle 124 on reader service card*



Computervision: The Personal Architect system offers a 3-D modeling approach as opposed to the traditional 2-D drafting approach to architectural design. It is the only PC-based system on the market today that is addressing the entire architectural practice-design, drafting, and the more familiar office functions such as word processing, budgeting, and payroll. *Circle 115 on reader service card*



Dietzgen: Will display "Diplomat" (*DI*gital *PLO*tter *MAT*erials) for most flatbed and drum plotters, and "Electraplot" (Electrographic Plotter Materials) for high-contrast images without staining or smearing. *Circle 118 on reader service card*



GTCO Corporation: The new, inexpensive 2436L and 3648L DIGI-PADs are so light in weight that a variety of mounting configurations are possible. The low-cost tablets are AutoCAD compatible.

Circle 121 on reader service card



Construction Data Control, Inc.: CDCI will demonstrate Profit Builder Plus and Profit IQ, software of integrated estimating, job costing, accounting, and management reporting. *Circle 116 on reader service card*



EIKONIX: The E-Z SCAN[®] Model 4434 large format scanner is an input digitizer for large format media up to 36" x 46" in size. For architectural, engineering, and mapping communities. *Circle 119 on reader service card*

Carrier Corp.: Will exhibit Tool-Kits, designed for VersaCAD 5.0 and a new HVAC Program— Hourly-Analysis—for calculating loads, energy consumption, and operating costs. *Circle 122 on reader service card*

Computer-Aided Design Group: The Facility Management System is an integrated data base designed to respond to every aspect of facility management.

Circle 123 on reader service card

Graphic Co.

Graphic Controls: Offers new pen plotter supplies catalog. The full color catalog shows our wide line of Pen Plotter supplies offered for use on plotters from over 40 different manufacturers. *Circle 125 on reader service card*

Computer Shoppe: The Construction Management Series[®] is a comprehensive and fully integrated software package specifically designed for the construction industry. Provides a total business solution from take off, to bid generation and scheduling, through to job tracking and completion. *Circle 126 on reader service card*

Concord Management Systems: Concord will be exhibiting a wide range of software systems for all sizes of contractors. Our applications include financial management, estimating, scheduling, and productivity tools.



Haworth: Cadvantage[®] is an IBM PC-based office design and space planning package, developed for use by computer novices.

Circle 130 on reader service card



Innovative Analysis: Introducing LARSA, a powerful new integrated structural analysis and design software system performing linear and nonlinear Finite Element Analysis of 2and 3-D models with static and/ or dynamic loadings. LARSA features easy-to-use menus, onscreen prompts, and help screens. Available for PC's and minis.

Circle 133 on reader service card



James River Graphics: Presents a complete line of CAD papers and film for hard copy output from electrostatic and pen plotters and will be highlighting improved V-16 and V-20 vellums with a smoother surface for faster nonskip plotting. *Circle 137 on reader service card*



GrayTech Software, Inc.: CAD 3-D[®] is a high-performance, high-function, low-cost, user-friendly CAD system with both 2-D and true 3-D capabilities designed for Apollo and Hewlett Packard 32-bit workstations. *Circle 128 on reader service card*



Hewlett-Packard: Hewlett-Packard will demonstrate its PC CAD solutions, high-performance plotters, and other peripherals. Software vendors and company representatives will present a variety of A/E solutions for designers.

Circle 131 on reader service card



International Reprographic Association: Reprographic learning center featuring "hands-on" information on advanced drafting techniques, the interface of CADD and reprographics, and A/E design-drafting drawings reproduction equipment and materials. IRA is the publisher of *Plan and Print* magazine.

Circle 134 on reader service card

Control Systems: Will introduce the DESIGNER[®], a graphics engine for the ARTIST 10[®] high resolution controller. The DESIGNER emulates the IBM PGC and accelerates multidimensional vector drawing. The company will also display its graphic controllers for IBM PCs and the CAD/CAE market. *Circle 135 on reader service card*

Digital Equipment Corporation: Automated, networked solutions—from headquarters to construction site, on hardware ranging from desktop to data center systems—will demonstrate applications from Digital and joint-marketing partners. *Circle 136 on reader service card*



Koh-I-Noor: The revolutionary Koh-I-Noor Disposable Plotter Pen[®] features the highest quality output associated with liquid ink and the no mess convenience of the disposable pen.

Circle 138 on reader service card

Diversified Information Services Inc.: AMS Time Machine[®] is a full capability, high-performance project management system, with high quality graphics, designed for use by professional project managers and schedulers.

Circle 139 on reader service card

Elite Software: Will be exhibiting design and estimating software for engineers, architects, and contractors. This software is used in building design calculations such as HVAC loads, energy analysis, fire sprinkler, duct sizing, estimating, lighting and short circuit, and many more. *Circle 140 on reader service card*



HOK/CSC: *DRAW* is a 3-D CADD system with a relational DBMS. Graphics and text are integrated allowing users to generate reports and bills of materials directly from the database. *Circle 129 on reader service card*



Houston Instrument: The A to E size DMP-56 accommodates media 8¹/₂" x 11" to 36" x 48". The DMP-56 features a resolution of .001 inch and a maximum speed of 17" per second. *Circle 132 on reader service card*



The Maedl Group: Aisa Computer Products introduces WorldPort[®] Design Assistant, a CAD/E software that allows the designer to create a true 3-D geometric solid model, which can be developed and manipulated through an integrated series of ports into the models world.

Circle 143 on reader service card



Mutoh America: The F-600/F-900 series professional plotters feature a maximum plotting speed of 1,131 mm/s, acceleration of 5.7G, and minimum positioning resolution of 0.01 mm. *Circle 146 on reader service card*



Numonics: The Numonics Model 5460 is a low-priced, single-pen plotter, with a resolution of 0.001 inch, and an accuracy of 5 percent. See us at Booth #1392.

Circle 150 on reader service card



Lamutt & Associates, Inc.: Put your foot down and solve your engineering problems once and for all. LACES Civil Engineering System is a complete land development system for civil engineers and land surveyors. *Circle 141 on reader service card*



MiCAD: MiCAD is a system integrator of CAD and database functions for AEC and facilities professionals, with over 120 multi-workstation systems placed nationwide. *Circle 144 on reader service card*



New Riders Publishing: New Riders publishes books about technical drafting/design software for microcomputers. New Riders is the leading information source providing how-to guides to the AutoCAD^{TB} software program.

Circle 147 on reader service card



PacSoft Incorporated: PacSoft develops and markets civil engineering, surveying, and mapping software. Integrated COGO/Drafting/Roadway Design System as well as 3-D Modeling, Stormwater Hydrology, and Contour Mapping are available. *Circle 151 on reader service card*



McDonnell Douglas: Graphics Decision Systems for building management. MicroVAX computer center assists decision making from architectural conception through tenant relocation.



Minolta: The RP 509 plain paper, aperture card readerprinter. Features an automatic card feeder and electronic automatic exposure which reduces paper costs and operating time.

Graphic Systems, Inc.: Design Automation: Market 1986 provides how-to information for hardware and software vendors interested in expanding into the architectural market. Circle 148 on reader service card

Graphic Horizons, Inc.: GHI will demonstrate its GRAPH/ NET Computer-Integrated Design System: Drafting, Optimization & Perspectives on the T2 Super-Mini-Computer, and new Expert System enhancements on Sun MicroSystems.

Circle 149 on reader service card

Harper and Shuman, Inc.: For selected microcomputers, MICRO/CFMS is a corporate and project financial management system created specifically for design professionals. *Circle 152 on reader service card*

Hitachi America: CAD GM 1000 software turns an inexpensive IBM PC or compatible into a full-blown CAD system capable of handling a range of AEC applications. *Circle 153 on reader service card*





Printfold Company: Will feature its newest 825 automated high output diazo whiteprint machine. Extremely versatile and reliable, the 825 is designed for the high-volume user and is backed by a nationwide service organization. *Circle 156 on reader service card*



Strategic Software Planning Corp.: PROMIS is a microcomputer project management system that features scheduling, resource management, and cost control. The newest update, version 2.1, includes a timescaled network diagram and a menu-driven direct interface with Lotus 1-2-3 and dBase III. *Circle 159 on reader service card*



Swanson Analysis Systems: Ansys-PC/Linear, a finite element analysis package, is a subset of Ansys[®], the computer system used worldwide for structural, thermal, fluid, electrical, and static electro-magnetic analysis. *Circle 200 on reader service card*



Palette Systems: Palette is a software package consisting of a number of separate but highly integrated modules for use in the fields of computer-aided design and spatial database. *Circle 154 on reader service card*



H. Schreiber Company: Kingfiles store up to 1200 drawings vertically, individually, or in groups via Metal Hangers. They require minimum floor space and provide lowest filing cost per sheet.

Circle 157 on reader service card



Summagraphics: SummaSketch is a professional quality graphics tablet that can be used for tracing, drawing, menu selection, and pointing. The tablet turns the IBM PC or compatible into a real graphics workstation. *Circle 160 on reader service card*



Teledyne Post: The AT&T PC-Based CAD System offers productivity of large-scale system and convenience and productivity of personal workstation. *Circle 201 on reader service card*



Roll Vac Corp.: Roll Vac 4500 is the first fully automated overlay printer. Exposure guesswork is eliminated by automatic sensor. Vacuum contact is achieved in under 7 seconds. *Circle* 155 on reader service card



SKOK Systems Incorporated: Introduces Drawbase running on the IBM PC AT and Hewlett-Packard Vectra PC, the affordable CADD product integrating graphics with data management. *Circle 158 on reader service card*

ICT Computer Drafting

Systems: Featured at A/E/C Systems are high-resolution graphics subsystems, new thermal transfer and laser printer/plotters, and a variety of digitizers. *Circle 161 on reader service card*

Management Computer Controls: Offers cost estimating systems and services to the construction industry. This includes licensing the ICE System[®], and performing estimating services on a contract basis. *Circle 162 on reader service card* **Octal, Incorporated:** Octal's primary business is direct CAD database conversion between dissimilar CAD systems. All Octal products offer completeness, accuracy, ease of use, efficient performance, and modular pricing.

Circle 202 on reader service card





T&W Systems: Versacad Advanced, 5.0 our most powerful CAD system to date; Versacad-Architect, designed by Architects for Architects. Versacad-Facilities Planning/Management Series, five modules dedicated to facilities problem-solving and decision-making.





Texas Instruments: The Pro-CAD 286 specifically configured for computer-aided design, includes the system unit, 640K RAM, 1.2 MB floppy disk, TImode CRT controller, high resolution color display, 80287 numeric coprocessor, mouse, synchronous/asynchronous plotter interface, MS-DOS 3.0, AutoCAD with Advanced Drafting Extensions-3.

Circle 203 on reader service card



Versatec: Versatec Spectrum is the world's first 11-inch format electrostatic color plotter. It can be used as three hard copy devices: printer, plotter, and CRT hard copy device, and offers the user 256 predefined colors plus, an additional 256 user-defined colors.

Circle 206 on reader service card

SPA Consultants Private Ltd.: With aFOOT, footings with direct load and 2-way bendings are designed and drawn to scale on a dot-matrix printer. Circle 208 on reader service card

Systems Unlimited: Will be featuring the best selling AutoShapes text font/shape compiler, the FSIMPLEX fixedspaced font, and AutoESL-the Electronic Symbol Library for AutoCAD!

Circle 209 on reader service card

Sigma Design, Inc.: Will introduce its new PC-based software for AEC CAD. This new software offers 100 percent of the capabilities of Sigma's high-end systems, now available for PCs. Circle 210 on reader service card

Technical Information Systems, Inc.: Multiuser CADD for civil engineers and architects on MicroVAX and VAX. Word processing, financial management, A/E marketing, structural, water resources, land surveying software also available.

Circle 211 on reader service card

Ultraprint: Will feature UL35, a smooth, grit-free Kimberly-Clark film, for CAD plotters using low-cost stainless steel technical pens and wet ink. Circle 212 on reader service card

Wind-2 Research, Inc.: Wind-2 One is a powerful financial management software consisting of five modules: Business Management, Cost Proposal Development, Payroll, Accounts Payable, and General Ledger. Circle 213 on reader service card

Yeakel Electronic Software,

Inc.: Architectural/Engineering project control, billing/accounts receivable system integrated with payroll, accounts payable, general ledger, and manpower utilization using IBM System 36 or PC AT.

Circle 214 on reader service card



Tonias Engineers: Integrated CADD systems for civil engineers. Mapping, roadways, sewers, geometry, structures, drafting, IGES executed under a production environment. le 204 on reader service care



Xerox Corp.: Creation, reproduction and dissemination products for the engineering market will be on display. Circle 207 on reader service card



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P/A in July





Matthews House, Burnet, Texas, by Lawrence Speck & Associates.

Two Houses in the Country

Sensitive but vigorous responses to rural American sites are apparent in two houses: one in the wine country of California, a P/A Awards winner by MACK (formerly Batey & Mack) of San Francisco; the other in the Hill Country of central Texas, by Lawrence Speck & Associates, of Austin, whose completed work has not been published nationally before.

Two Multifamily Projects by Solomon

Architect Daniel Solomon of San Francisco, who has designed several multiunit urban developments there, has now completed two more instructive examples: another moderate-scaled complex in San Francisco and an innovative lower density project in Omaha.

Profile: Cooper, Eckstut Associates

The firm responsible for the planning of New York's Battery Park City—where buildings once again line streets—has expanded its urban design capabilities to other cities and is designing individual buildings with the same kind of urban sensibility.

Technics: Roofing

An update on the ever-challenging problem of flat roofing will concentrate on proper detailing, showing numerous drawings of critical joints designed to avert problems.

Future Issues of P/A

August will be another variegated issue, with features on housing developments by Robert Stern, on the restoration of the New York Public Library by Davis, Brody & Associates, and other design subjects, along with a Technics feature on Interior Lighting. September will bring the annual Interiors issue.

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