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View from the interior atrium of the Frank O. Gehry & Associates/Herbert Lewis Kruse Blunck Architecture Iowa Advanced Technology Building. Photograph by Erich Ansel Koyama.
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The Poetry of Form:
Richard Tuttle Drawings from the Vogel Collection

For almost 30 years, Dorothy and Herbert Vogel have collected the work of Richard Tuttle, known since the 1960s for his eccentric drawings and constructions. From October 2 through November 21, 1993, the Indianapolis Museum of Art will feature an exhibition of more than 80 small, delicate, often playful constructions from this collection. Running concurrently to this exhibition, the museum will present a group of floor drawings representing a different facet of Tuttle's work.

Art at the Edge: Ray Smith

From September 28 through November 28, 1993, the High Museum of Art in Atlanta, Georgia, will present an exhibition of work by American artist Ray Smith. Born in the border town of Brownsville, Texas, Smith's work investigates boundaries between cultures, the physical world, and the psyche. Art at the Edge: Ray Smith will feature a new cycle of paintings focused on issues of cultural metamorphose and interaction.

Lee Friedlander

An installation of almost 100 photographs by renowned American photographer Lee Friedlander will be presented in the lobby concourse between the Walker Art Center and the Guthrie Theater in Minneapolis, October 12, 1993, through January 23, 1994. The photographs represent a selection of images from Friedlander's upcoming book Letters from the People.

Andy Warhol: Print Portfolios

The Des Moines Art Center is presenting an exhibition of eleven complete portfolios by Andy Warhol, November 20, 1993, through February 20, 1994. Andy Warhol: Print Portfolios is comprised of 104 silkscreen prints spanning 20 years of production, from 1967 through 1987. This is the first museum exhibition devoted to this aspect of Warhol's oeuvre. The show is accompanied by an ancillary exhibition of paintings, publications, and video produced by the artist.

Susan Rothenberg: Paintings and Drawings

The first major survey of the work of Susan Rothenberg will be on view at the Museum of Contemporary Art, Chicago, August 21 through October 24, 1993. Featuring approximately 80 paintings and drawings, the exhibition examines the role of the artist's drawings in her development as one of the preeminent painters of her generation. Throughout this exhibition, paintings are viewed with related drawings to show the process that results in Rothenberg's dynamic and often strange imagery.

Max Ernst: Dada and the Dawn of Surrealism

The most comprehensive visual and intellectual exploration ever undertaken into Max Ernst's Dadaist work will be on view at the Chicago Art Institute, September 15 through November 30, 1993. Approximately 150 works are presented, including paintings, collages, relief sculpture and drawings richly augmented by documents related to Ernst and the Dada movement.

Craigie Horsfield

Black-and-white photographs by British artist Craigie Horsfield will be featured in an exhibition at the Walker Art Center, Minneapolis from September 26, 1993, through January 2, 1994. Comprising nearly 14 of his monumentally-scaled photographs, the show will cover a broad range of Horsfield's subject matter, including portraits, landscapes, urban street scenes, and interiors.
Mark Tansey

The Milwaukee Art Museum will be the sole midwest venue for the first major exhibition of paintings by contemporary American artist Mark Tansey. This retrospective features 25 large scale paintings and Wheel (1990), a three-dimensional object built in collaboration with Fritz Breinhorn. Tansey’s paintings reassert the importance of pictorial content as a response to the Abstract Expressionists who dominated the art world after World War II. The work exemplifies a combination of strong technical skills and astute wit, exploring tensions between pictorial representation and reality.

Athletic Facility

RDG Bussard Dikis is completing design development for a new athletic and recreation facility at Franklin and Marshall College in Lancaster, Pennsylvania. Major spaces include a reception room that overlooks a 50-meter pool, a fieldhouse, jogging track, weight training room and meeting rooms. Notions of strength, sponsored by visual lightness of steel and physical heaviness of masonry, served as inspiration for the character of the reception space. Construction is scheduled to begin in the spring of 1994.

Multi-Purpose Facility

Construction is underway for the Intercollegiate Athletic Facility at Northwestern College. Designed by FEH Associates, Inc., the 55,000 square-foot, 4.5 million dollar facility includes a gymnasium, locker rooms, wrestling practice rooms, weight/exercise rooms, faculty offices and related support functions. Completion is scheduled for the fall of 1994.
Young Ice Arena

Thanks to a generous gift from members of the family of Mr. and Mrs. J.A. Young, Thorson Brom Broshar Snyder Architects has worked with the Waterloo Recreation Commission to develop a design for a new ice arena. The building, sited adjacent to the Waterloo Recreation and Arts Center, will have an Olympic-sized ice rink and a variety of multi-purpose functions.

AIA Iowa Office

AIA Iowa is scheduled to move into new offices in the Hotel Fort Des Moines. Designed by Kevin White of Baldwin White Architects, P.C., the offices feature a series of gallery spaces for the display and promotion of architecture. Construction is scheduled for completion by the first of November.
AIA 1993 CONVENTION

DESIGN AND THE ENVIRONMENT

SEPTEMBER 30 - OCTOBER 1, 1993

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Without a doubt, the University of Iowa’s Advanced Technology Laboratory (IATL) by Frank O. Gehry and Associates and Herbert Lewis Kruse Blunk Architecture has drawn the kind of attention and respect the university has long sought. For almost two decades the university has focused on a more contemporary idiom than its brick and limestone image.

Efforts to commission architects of both local and national repute have brought a new life to the campus. Among these, CRS’ Carver/Hawkeye Arena and Gunnar Birkerts’ cylindrical law building are the most notable. Like Gehry’s IATL, each sets an ambitious precedent and dramatically defines a section of the campus. With these buildings, the university has set a course that will be as difficult to maintain as it is to reverse. While not appropriate for every project, buildings of this rank and composition will draw certain praise and criticism, and eventually elevate the campus environment to the high level to which the university aspires.

It is beyond naive to believe that Frank Gehry was chosen to design the IATL because, as some have stated, “they felt he would not impose an alien structure on the campus.” Whether you believe that Gehry’s work is the inspiration of a genius or just flip, unmitigated hubris, what distinguishes his buildings is that they rise above clutter.

Clearly, Gehry’s design is a not-so-subtle statement that lends credibility to a controversial and fledgling laser research program. In that regard, the building is an unqualified success. The degree to which the IATL’s mechanical and electrical components can respond and adapt to rapidly evolving research will ultimately determine the value of this facility to the university and State, and in turn, determine the fate of like-minded programs and buildings into the foreseeable future.

The IATL was originally conceived as a national center for laser research. While this research is still the dominant focus, the scope of the facility has expanded to include “high technology research.” In addition to laser research, this all-encompassing euphemism includes particular disciplines such as the study of acid rain and software development. In order to accommodate such open-ended research, designers had to plan for every conceivable contingency; provide back-up systems, and allow for maximum flexibility in the future.

Because of the ever-changing nature of “high technology research,” specific program requirements for laboratory space in the facility were difficult to identify. In response, the designers created a universal or modular laboratory configuration that is intended to satisfy all eventuality with only minimal modification. An impressive menu of lab amenities has been provided as well as the flexibility to expand capabilities without extensive renovation.

Laboratory space is housed in the building stone block because of the delicate nature of laser research. Laser research requires precise tolerance and is extremely sensitive to vibration, light and variations in air quality. The necessary stability and light requirements were achieved by creating windowless, cast-in-place structure. Lighting systems include surface mounted fluorescent and incandescent track lights on dimmer controls for precise experimentation and variable light volumes.

Distribution of utilities was the determining factor in the configuration of laboratory space. Labs are positioned parallel to a single-loaded utility corridor. This “pipe canyon” distributes all utilities and houses the facility’s elaborate exhaust system. In addition to fume hoods, each lab has a central exhaust, each of which is connected to the system’s massive central exhaust duct. Electrical service to each lab includes three voltage levels 120 V, 120/280 V three-phase, and a 480-V disconnect. The facility also has a closed-loop processed cooling water system to dissipate heat from experiments. In addition, the pipecanon accommodates both data and communication lines.

Suitable air quality is maintained with a series of filters and diffusing fans. Clean air is supplied through ultra-fine 95 percent filters and humidity variations are kept below 5 percent in any 24-hour period through sophisticated vapor barrier. Because Gehry insisted that the building not be air conditioned, all HVAC and lab exhaust is expelled on either end of the pipe canyon.
We know the world we inhabit — our homes, schools, offices, community buildings — by its physical reality, and that reality through its materiality — brick, wood, steel, concrete, glass, and a myriad of other fabrications, literally the “stuff” we build with. Embodied in the Indo-European root “tekth” are today’s concepts of technology: technique, craft weaving and making, and building with artful skill. This issue focuses on the artful exercise of technique and use of technology to bring about architecture.

At the Gerhry/Herbert Lewis Kruse Blunck Iowa Advanced Technology Laboratory at the University of Iowa, the unique demands and configuration of the research equipment drove the form of the building solution. In a wonderful twist of technological necessities, one of today’s most futuristic research enterprises, the Anadrill Calibration Building, is housed in an entirely wooden structure designed by Michael Underhill. Using one of the world’s oldest building materials, it is fabricated without any metal because metal would disrupt the accuracy of the experiments to be conducted.

Linking the choices clients and designers make in their buildings to the global environment, the Bob Berkebile article addresses the issues of technology and sustainability. Using “low tech” materials, automatic energy controls, and building configuration in a site-specific manner, the Center for Energy and Environmental Education by Architects Wells Woodburn O’Neil at the University of Northern Iowa utilizes approximately one-third the energy of similar facilities to maintain comparable comfort levels.

Creative Edge, a Fairfield, Iowa, based company, illustrates the “cutting” edge of design to enhance the work of the architect.

The design techniques and technologies available today support energy-efficient, sustainable architecture. They enable artful fabrication and material connection. Combined, there are rich possibilities for expressive, functional and vital architecture. We trust that you will find the work presented here validates this notion.

Gregory Palermo, FAIA
Iowa Architect Editorial Board
The building’s most intriguing element is its crystalline form. One might expect that some herculean structural elements were necessary to realize Mr. Gehry’s idiosyncratic design. The truth is, the structural design of the building is much the same as it is in a rectangular box: steel forms and curtain wall. Regardless of the technology that went into these forms, a large measure of finesse and creativity was required to make the building a reality. Herbert Lewis Kruse Blunck’s office has been credited with supplying plenty of detailed drawings to keep everything on track.

It is still too early to tell if the University of Iowa Advanced Technology Laboratory will be successful, and by what criteria will measure that success. Certainly, Mr. Gehry’s sculptural statement will in time be embraced as an endearing fixture on the University of Iowa campus. The merit of the IATL, on the other hand, will be weighed only by the quality of research put out in coming decades. Hopefully, the IATL will prove to be a fertile environment for research and open the door for more programs of comparable ambition and buildings of similar stripe.

Robert Tibbetts is a frequent writer on art and architecture and a one-time resident of Iowa City currently living in Oakland, California.
(Left) Construction photos reveal that the differentiation between the lab and office blocks is more than skin deep.
STRUCTURE IN ARCHITECTURAL EXPRESSION
Anadrill Calibration Building

In very deep oil wells, the logging of the well consumes a tremendous amount of time and money. Logging normally involves pulling up all of the pipe and drilling bit, and sending equipment down the hole to find if the drilling is drifting sideways and what kind of geological formations the drill is going through. To avoid interrupting drilling, Anadrill (a subsidiary of Schlumberger Limited) has developed a tool that goes down in the well behind the drill bit, and continuously collects data which is transmitted up to the surface by radio. The tool consists of two stainless steel tubes, one inside the other, with delicate electronic equipment housed inside the inner tube, and with the interstitial space for drilling mud pumped down to lubricate the drill bit. The tool is about 8 inches in diameter and about 12 feet long.

The company requires a building for continued research and development, for calibration of finished tools, and for repair and recalibration of tools in service. Tools placed on a brass stand are swung around into various positions and attached to computers that run a series of diagnostic tests. Because the tool senses geological data by electromagnetic waves, the building housing this activity cannot contain any ferrous metals, nor any metal in the form of a circle or ring around the tool stand. Other requirements are simple: plenty of north light for the engineers, and high ceilings for the tools to swing in any direction.

The building is sited several hundred feet from the manufacturing facility and a demonstration offshore drilling platform. It is also kept at least 40 feet from any electrical lines or underground pipes. The site was once a rice field, so the terrain is flat and flooding requires the building to be raised on a berm. A long, gently sloped-ramp is provided to enable the tools to be pushed up on dollies.

The design is to serve as a prototype for other manufacturing facilities. For the sake of economy concrete, concrete block, wood, and glass was used. Inflated fabric, plastics, and plaster all proved to be expensive. The building system is essentially a very straightforward standard system, but with structural gestures accentuated because of the necessary lack of steel reinforcing. When concrete or wood was not strong enough, structural depth rather than reinforcing was added.

The slab has extra-deep-grade beams and the concrete is reinforced with fiberglass cables. The concrete block wall has no steel reinforcing but instead has buttresses built twelve feet on center. The roof structure relies on five wood vierendeel trusses formed by cutting holes out of plywood. The window wall is wood and has similar trusses used as vertical mullions to resist wind loads, since aluminum window walls require steel reinforcing inside aluminum framing members.

Similarly, large overhanging eaves are required to avoid any steps in the wall section that would require flashing, for even if aluminum was used, flashing that forms a ring around the perimeter the roof would interfere with the calibration activity. HVAC equipment and electrical junction boxes are housed in a small structure 30 feet away from the calibration areas. Conditioned air is fed underground in plastic pipe, and all electrical wiring at the junction box is run inside plastic conduit.
(Left) Exploded perspective drawing articulating the components for the Anadrill Calibration Building.

(Left) Plan and section drawing of Calibration Building.
When we abandoned Modernism I was fearful that we “throw out the baby with the bath water.” There are crucial ideas embedded in the Modern Movement that have great sticking power. An important idea is technology and how it contributes to aesthetics. In the most interesting work since Post-Modernism, this issue has resurfaced. However, the reconsideration of technology’s aesthetic appeal sometimes seems as tacked-on as the moldings in Post-Modern projects.

For example, three years ago when I was designing this project, I was very excited about the work of Holt Hinshaw Pfau Jones, especially the Astronauts’ Memorial at Kennedy Space Center (see PA, January 89, pp 68-71). The structural considerations, construction system and workings of the monument were essential to the aesthetic statement. The elegance of the thing is intrinsically connected to the way it is made. However, as more of HHPPJ’s work was published, the essential quality of their tectonics wore thin. The exposed steel formations on the Right Away Ready Mix project (see PA, January 87, pp 101-103) and the Central Chiller Plant for UCLA (see PA, pp 99-101) serve non-essential roles in the buildings, and are reduced to the role of decoration.

In the project for Anadroll an interesting twist occurred. The fact that I was forced to use a lower level of construction technology helped keep the aesthetics of the structure essentially connected. The fact that I couldn’t use steel to reinforce masonry helped to rediscover the essential structural form for masonry. The fact that roof span (all to easy for steel) was too long for joist forced the development of the vierendeel trusses and the role they played in modulating light from the high ribbon of windows. The window wall would have been so easy and in the end mundane with an aluminum frame, turned into a real design problem.

I believe that good design must go beyond “form follows function,” but that designers must not lose the idea that elegance can come from the relationship between design and technology.

Any success in this project is due to my reawakening of Frank Lloyd Wright’s adage to respect “the nature of materials.” Wright argues that “... the material of which a building is built will go far to determine its appropriate mass, its outline and especially proportion.” He further admonish designers to go beyond the simple exposure of structure when discussing “continuity” as an essential quality, “... you may see the appearance of the thing in the surface of your hand as contrasted with the articulation of the bony skeleton itself.”

Michael Underhill was the department head for Architecture Department at Iowa State University prior to his appointment as Dean of Architecture at Arizona State University. Michael practices in Iowa and is member Iowa AIA.
(Left and lower left) Window wall is assembled completely of 2 inch dimensional lumber. Trusses span vertically, and 2X10s and 2X8s span horizontally between the trusses. Individual window frames are 2X4s.
Standing beside the new aviary that he designed for the Kansas City Zoo to house its Australian bird life, Bob Berkebile pointed out one of the least exotic aspects of the project - the waste marble and salvaged lumber used in the building. “The limestone excavated from the construction site went right into the retaining wall,” he said. “Did you realize that construction debris makes up about 30 percent of what’s clogging our landfills nationwide?”

Rather than describing hallmarks of the building’s style, the fifty-five-year-old architect turned to its new parking lot, proudly noting the trees that he had insisted be retained.

“The building crews were told from the get-go,” Berkebile added, “that they would be called to account for dead trees. Somebody has calculated that we need to breathe about thirty-two pounds of oxygen a day to stay healthy. But our American landscape is so deforested and degraded that it’s producing only sixteen pounds. So the other half we ‘import’ - from oceans, rainforests, wherever we can get it. Yet you do not hear much about our oxygen deficit.”

Shaking his head, Berkebile lamented that the majority of his profession remain so disconnected from the urban fabric, natural environment, or both. While “primitive” builders relied for centuries upon indigenous materials and subtle, simple means of climate control, most modern architectural styles, from Le Corbusier’s 1920s vision of the home as a “machine for living in” to the rise of today’s omnipresent skyscrapers, have seemed intent upon leaving earthly realities far behind. For the first time, however, many architects, designers, and builders are beginning to rethink their trades from the ground up. Their effort is to align their disciplines with the needs of the planet, in ways that would have seemed unimaginable a short time ago.

Over the past several years, Bob Berkebile has been one of the driving forces behind a more environmentally-sound approach from the 56,000-member American Institute of Architects (AIA), whose annual convention theme this summer was devoted to “Architecture at the Crossroads: Designing for a Sustainable Future.” This joint gathering with the World Congress of Architects will culminate with the creation of guidelines called a “Declaration of Interdependence.”

It has taken a while for such an idea to make inroads within the construction industry and affiliated building trades - among architects, designers, developers, landscape designers, and contractors of all kinds. “The building profession is very conservative,” notes Rob Watson, a senior energy resource specialist for NRDC who sits on the AIA’s new Scientific Advisory Group for the Environment (SAGE). But Watson credits Berkebile with “turning the AIA from a bureaucratic organization looking out only for members’ interests to one trying aggressively to initiate and educate them about their broader responsibilities. He added “Within the architectural community, which we previously only concerned with the external lines of a building, people are waking up that buildings are huge resource sink with profound ramifications.”

Architects are in the best position to convey the idea that “we can do more with less, more creatively,” says Kirsten Childs of the Croxte Collaborative, which designed the Natural Resource Defense Council headquarters in the late 1980s. According to Childs, some 54 percent of all energy used in America is related to construction, if not factors in energy used in making building components and shipping them.

While the seventies marked a brief initiative toward solar design and the eighties brought some focus onto energy efficiency and indoor air quality, this decade’s scrutiny is upon the overall impact of building methods, materials, and potential alternatives. In Austin, Texas, Plywood Fiske is using flash - an otherwise useless by-product of combustion - as a substitute for portland cement whose manufacture contributes about 8 percent of the carbon dioxide to atmospheric global warming. In Missoula, Montana, Steve Loken incorporates structural honeycomb floor system that is 93 percent air, rather than using old-growth lumber for the joists. In Lawrence, Kansas, William McDonough persuaded Wal-Mart to experiment with a custom built heating and cooling system that contains ozone layer-depleting chlorofluorocarbons.

The architectural attitude change began to occur at the AIA’s 1989 convention when Berkebile and Kansas City colleague, Kirk Gastinger, introduced a resolution called “Critical Planet Rescue.” They would consider each stage of a building material life cycle: natural resource depletion and ecosystem effects, energy consumption, waste generation, indoor air pollution.

The idea had been percolating in Berkebile’s mind for some years, ever since a tragedy that pains him to discuss. On July 17, 1981, two skyways collapsed into the lobby of Kansas City’s Hy Regency Crown Center hotel, killing 114 people and injuring 185 more. Berkebile had been the
architect for the hotel. Although it was ultimately determined that he was not at fault, the long terrible night that he spent assisting rescue teams at the hotel changed his life.

"Why am I an architect?" he remembers wondering. "And am I making the world better or worse? I began calling architect friends all across the country. Nobody seemed to have an answer for that question."

When it came time to oversee a new building for his architectural firm, Berkebile and his partners went considerable lengths to specify wood veneers from only sustainable tropical forestry operations. Then, at an open house celebrating the opening, Berkebile calls someone raising the likelihood "that the aluminum on this forty-five-story window wall may come from bauxite mines beneath the South American rainforest. I realized we were all so ignorant about whence our materials come. For me, it was a landmark moment."

"The reason we all use so much aluminum is that it is the most energy-conservative material used in the entire building trade? Not only is tropical rainforest being stripped to unearth the bauxite, but most of it is being used to process it to aluminum. After Berkebile started raising such questions publicly, the aluminum industry countered that the deforested areas were afterwards being converted to agricultural use. This has not washed with Berkebile, who believes it is a poor tradeoff.

"The reason we all use so much aluminum is that it is very strong for its weight, durable, and resists corrosion," says Berkebile. "In many ways it's a good material if we'd just use it more intelligently. And the aluminum industry is doing a better job of recycling than almost anyone else. So my attack on the front is against designers and the construction industry, because we only recycle 17 percent of the aluminum used. If I specify recycled instead of new aluminum for a project, I prevent 95 percent of the energy consumption and avoid 96 percent of pollution in the bauxite conversion process."

Architects can now learn about aluminum - as well as the ecological impacts of particle board, wood, concrete, insulation, sealants, vinyl flooring, paint, carpet systems, and more - by subscribing to the AIA's new quarterly Environmental Resource Guide (ERG). The Guide has evolved out of a unique partnership between the AIA and the federal Environmental Protection Agency (EPA).

"Architects are in a uniquely positioned discipline to help society move away from the industrial high-tech era into a successful new paradigm," says Bob Simmons, a Colorado-based senior policy advisor in the EPA's pollution prevention division who now works closely with the AIA. The EPA put up an initial $600,000 research grant over a three-year period (now up to $900,000) and turned over its own extensive indoor air quality data for use by the AIA's new permanent Committee on the Environment (COTE).

Today the COTE has established task forces on indoor air quality, building ecology, building materials, waste minimization, alternative energy, and planning and site development. Almost 1,000 AIA members have signed up to participate at regular meetings, and the scientific advisory panel consists of such overseers as Amory Lovins of the Rocky Mountain Institute; Patricia Hynes of MIT; Thomas Lovejoy of the Smithsonian Institution; Denis Hayes of Green Seal; DuPont's "plastic waste solutions" specialist Robert Weis; and NRDC's Watson.

Leading up to the 1993 convention, the AIA sponsored a series of three video conferences on "Livable, Sustainable Communities" at more than 170 locations in the United States and Canada. According to one of the presenters, Texas's Pliny Fisk, whose attending the sessions went from an initial 2,000 to some 6,000 architects by last April. In conjunction with the International Union of Architects, it is also conducting a worldwide design competition on sustainable human habitats. Examples of a more holistic architecture are still a long way from becoming mainstream, but much progress has been made.

Pushing the agenda to a full throttle is Susan Maxman, a Philadelphia architect who last year became the first woman president elected in the AIA's 136-year history. Maxman describes her own...
awakening. While moderating a 1991 panel discussion, a TVA spokesperson discussing ecosystem degradation suddenly "turned to all the architects and said, 'You are responsible for reducing the human footprint on our global ecosystem.' A light went off in my head," she recalls, "that we are the interface between the built and natural environment."

After accompanying Berkebile to last year's Earth Summit in Brazil as AIA representatives, Maxman became his staunchest ally. "This movement will eventually affect the whole aesthetic of architecture," she believes. "You won't see a rubber stamp across the country anymore, like deconstructionism or post-modernism. We'll start asking, 'What is the appropriate design to emerge from a sense of place, what are the indigenous materials, what is the climate telling you?'"

Maxman adds that this used to happen - with wood-frame construction in New England, adobe in the Southwest - before architects intervened in the process. "Then we came along with our fancy stylistism saying 'we can overcome nature.' But why shouldn't architecture respect the cultural value of different regions? Why should every building look the same from Philadelphia to Kansas City? Elegant simplicity will, I hope, be very valued in the future. And how people feel in spaces, the human aspect, how light enters - all those kinds of things you don't need a lot of bells and whistles to do, you just need to be clever."

Montana builder Steve Loken, whose Center for Resourceful Building Technology emphasizes usage of recycled materials, describes the new down-to-earth philosophy by raising basic questions: "How does the house meet the land, and does it heal the land or have to be a blight upon it?"

James Wines, founder of a twenty-two-year-old New York-based collaborative of architects, designers, and environmental artists called SITE (Sculpture in the Environment), is looking to turn that fusion of architecture and ecology into a whole new aesthetic. "The environmental design movement in the 1960s and 1970s failed because solar panels and earth shelters were all so ugly," Wines has said. SITE’s approach is to eliminate the distinctions between landscape and buildings by, for example, allowing indigenous vegetation to pervade an interior space. The notion is basically to plant a building and watch it grow - and SITE’s nature-oriented projects are springing up as a waterfront plaza in Chattanooga and riverfront park in Windsor, Ontario.

Far more esoteric are the earth ships of Michael Reynolds in Taos, New Mexico, one of which was built for actor Dennis Weaver out of rammed earth and old tires. Even The New York Times has described them as "quite lovely," with thick curved walls that echo the bend in the tires, U-shaped rooms that open onto a solar window-laced, bright hallway, and an "interior wetlands" of garden vegetables and flowers extending the full length of the house.

In the vanguard of the new movement is NRDC’s environmental impact as the keynote speaker - an office park in Nimes, France; a day care center in Frankfurt, Germany; the Heinz Family Offices in Pittsburgh; the Wal-Mart eco-prototype Lawrence, Kansas; and a self-sufficient village in South Dakota’s Oglala Sioux tribe.

Paul Bierman-Lytle, a Connecticut-based originator of the AIA’s Environmental Steering Committee, has specialized for a decade in housing for chemically-sensitive individuals. His firm is also building a prototype, solar-powered organic farm in Idaho, and a Southern California home that utilizes a single lightweight concrete material for the entire structure. Recently, he has expanded to open a New York retail outlet called Environmental Construction Outfitters.

But, as Bierman-Lytle sees it, a potential design revolution is scarcely without inherent problems. "Many of us are taking different directions because really we’re all in kindergarten. This is all so taught, and we’re making lots of mistakes, assumptions which will prove to be incorrect another couple years."

One conflict - between energy conservation and indoor air quality - has been solved. Says Berkebile, "Until recently, when we decided to retrofit our buildings up for greater efficiency, we were ignorant that we were inserting more durable, also more toxic new materials. NRDC’s retrofit of Rocky Mountain Institute’s buildings were among the first to successfully conserve energy while recirculating fresh air."

Another often-cited problem is the higher cost of materials such as less-toxic paints or highly-efficient fluorescent lighting. Berkebile, Croxton, and other architects, however, speak of a long-range savings in energy bills, health-care costs, and of cost

(Above) The century-old Audubon Building, recently renovated to create an energy-efficient structure.
The AIA is pushing to bring other federal agencies to the R&D phase. Currently, the Department of Energy is contributing $35,000 annually, but Berkebile anticipates the DOE may ultimately be a bigger partner than the EPA. Other departments—transportation, Housing and Urban Development—are seen as having roles to play. And the AIA’s leadership certainly has a friend in Vice-President Al Gore, who met with Berkebile and Maxman after the 1992 Earth Summit and, says Maxman, “got very excited about what we are doing.”

Berkebile’s hope is that, sometime in the next two years, the building materials industry will start doing own research, drawing upon the AIA’s studies. When I'm designing, I should be able to sit down at my computer and call up any system, particular material, or finish and get a reading on it. I can’t do it yet.”

Another vital step will be filtering a new curriculum into the nation’s architectural schools. Gary Coates, a professor at Kansas State University and specializes in sustainable design, sees the potential for ending “the narcissistic phase of architectural education that predominated in the ’80s.” But, at the moment, as Bierman-Lytle puts it, “the only thing most architectural schools train in are courses in design—which largely has had no concern for materials or energy. The only prescient rules I remember as a student were the understanding of the setting of a building in a community.”

Leaving the Kansas City Zoo, Berkebile has even over to Blue River Industrial District, a cloning area of the city. It is here that his firm hopes to reclaim a blighted landscape for the west Regional Recycling Center, a national prototype with four components envisioned: a central collection and sorting facility for a 200-mile radius, new plants for private waste processors, development sites for manufacturers who reuse or recycle waste materials, and a Recycling Research Institute. “Our funding proposal calls it RIMBY—Recycling in My Backyard,” Berkebile says with a grin, a take-off on the familiar NIMBY (Not in My Backyard) theme.

It has been a typically busy time for the AIA’s ecological spearhead. The largest U.S. architectural firm, Ellerbee Beckett, has enlisted Berkebile’s company to become the sustainable component for a National Park Service project at Harper’s Ferry. Berkebile himself has recently returned from McMurdo Station in Antarctica, where the National Science Foundation called him in to consult with ozone layer-studying scientists about how to improve their earthbound environment. His most popular proposal, he says, was a large hydroponic greenhouse in the town center.

Now, gazing sadly across a hodge-podge of abandoned manufacturing plants and junk yards, Berkebile becomes philosophical. “The overall goal,” he says, “is to create a cultural change for our society. Joseph Campbell pointed out that the focus of the tallest building has changed as society changed—from church steeple to capital dome and currently, the corporate high-rise. Now we need a new paradigm and appropriate symbol.”

Gary Coates, the Kansas architecture professor who is also the author of a book that examines these questions (Resettling America), has a suggestion to offer: “It’s about relationship, a human-scaled settlement powered by sun and wind, integrated into the natural ecology, in which there is a true balance. I’ve referred to this, quoting William Irwin Thompson, as the meta-industrial village. We need a building metaphor that somehow encapsulates the idea of cooperative community, of a responsibility toward the earth and each other that we have abandoned.”
Solar designs of the 1970s paid homage to one god, and if a client asked his or her architect to design a solar building, both had a preconceived understanding of its form. Form did follow "function," and that was the problem: early solar designs looked solar.

The 1990s could be a time when solar architecture reemerges incognito, as part of a polytheistic approach to energy efficient design. The Center for Energy and Environmental Education at the University of Northern Iowa (UNI) combines solar design with aesthetics and environmentally sensitive choices in the use of building materials. The United States Department of Energy recently granted four million dollars to UNI to construct this facility, a place where students, teachers, business people and others may learn about the relationship between energy and the environment. Not only does the building provide a space for the program, but is itself an education tool, a laboratory for the integration of good design, energy efficiency, and sensitivity in use of materials.

Architects Wells Woodburn O'Neil, in conjunction with The Weidt Group, energy and environmental consultants from Minneapolis, have considered many aspects of energy consumption and environmental impact when designing the facility, choosing materials that have the least negative impact on the environment. This involved investigation of many environmental factors, such as the amount of pollution created in the manufacturing of materials. Kevin Nordmeyer of Architects Wells Woodburn O'Neil says, "We based our material selections on their embodied energy; energy spent to produce, transport, assemble and maintain. For example, manufacturing aluminum takes a lot of energy; rather than specifying all aluminum window frames, we chose a vinyl-clad wood window frame with insulated low-E glass."

Other material choices include non-paint-cinder block, brick and metal panels. Nordmeyer says, "We have left the materials unpainted to show people that these materials are beautiful." He says that there are several other reasons not to use paint—lower maintenance cost, reduction of interior toxins and the environmental pollution created by the manufacture of paint.

The architect and consultant established energy and environmental goals to provide for a building...
that would use only one-third the energy of the campus average. Building design strategies utilize daylighting, as much non-mechanical ventilation as possible, and solar heat gain. The solar daylighting and heating strategies are concepts that distinguish this building from a solar design of twenty years ago. Tom McDougall of The Weidt Group says, "We do not think of the building as a power plant; we simply allow the shape of the envelope to take advantage of as much passive solar gain as possible." This in turn does more than lower heating bills; it shifts the peak heating time away from traditional peak times, minimizing additional load on the power plant. Using these goals as grounding, the architects began to fold in ideas of siting and context.

The site is a threshold; it mediates between the developed portion of campus and a forest preserve and it buffers the public parts of campus from the private residence halls. The architects designed a limestone wall that exploits this threshold: the wall slices through the long east-west axis of the building, extending out across a path that links the residence halls to campus. At this intersection is a passageway, a symbolic portal between the public and private and between the developed land and the biological preserve. Using material that makes sense both contextually and environmentally, limestone from a local quarry was used to construct the wall.

The wall frames a central interior corridor, spine, which orients the visitor towards the plain and forest preserve; it also orients the visitor to the sun. Generous clerestory windows allow the winter sun to warm the limestone wall. Nordmeyer says, "The spine wall serves as a solar heat sink and a point of environmental orientation; it directs you to the sun and sky, and it links you visually and materially with the earth and prairie ... The corridor's passive solar heating scheme is easily demonstrated to visitors, allowing them to touch and see this strategy firsthand."

The spine also organizes the program spaces, between public and private, but according to sun. The auditorium, seminar rooms and service areas are located on the north side of the corridor and the program space, laboratories and classrooms are on the south side, which face the forest. Carefully sizing south glazing in program rooms prevents direct sunlight from reaching tasks, but borrowing from the light-filled corridor, available daylighting was maximized. Daylighted north-facing rooms also receive light from the interior light well.
The other important design element in the energy center is the program space. It is the most public portion of the building, which is adjacent to the entry, and serves as an information center, a place for exhibits, and a gathering place. Ordmeyer says that its radial shape is symbolic of the sun dial, which denotes the passage of time and star movements. The juxtaposition of this circular program space with the linear spine informs the symmetry of the rest of the building. When the wall intersects the program space, it fractures, not unlike it when it passes through a prism. This breaking of the wall resonates throughout the rest of the building, creating odd angles in some of the rooms, the corridor and in outdoor spaces adjacent to the building.

Low walls extend from the building that terrace the land and serve as visual boundaries for outdoor rooms. These walls essentially mediate between inside and outside; however, they serve another function. In plan, they contain the pieces of the fractured limestone wall. Because these perimeter walls conform to the radial pattern of the program space, there is a visual resolution.

This weaving of program, efficiency, environmentally sensitive choices and context of building to site is what makes this building both compelling and refreshing; it is not a one-liner reminiscent of the 1970s. It addresses many issues, and the form of the building expresses these functions.

John Pulaski Thomas is a graduate student in the department of architecture at Iowa State University.
You can cut through five-inch-thick granite or slice twenty-foot lengths of metal that will not warp. These advances come from the development of abrasive waterjet cutting. This new technology will allow architectural design options to open like wind hitting high sails.

Companies such as the Fairfield-based Creative Edge Corporation are demonstrating the versatile applications of this relatively new technology, which takes materials cutting out of the Stone and Bronze Ages and into the twenty-first century. Five years ago, businessman Jim Bellilove and sculptor Harri Aalto purchased Creative Edge from Creative Glassworks International, a Rock Island, Illinois, firm that manufactures waterjet equipment. Building on years of expertise and technical know-how, Creative Edge’s custom waterjet cutting business has carved itself a unique niche in the industry.

The shop, which Aalto describes as “both a factory and an art studio,” operates 24 hours a day, with three shifts of workers and seven machines. Bellilove says, “This helps drive down the costs of waterjet so that more applications become available.” The technology is decidedly modern: with the combined power of garnet abrasive and water under pressures up to 55,000 psi, abrasive waterjet cutting involves forcing water through the tiny orifice of a sapphire jewel, then blasting it out at 2.5 times the speed of sound.

The specifications of the process are exacting, the results, extremely precise. Using CAD/CAM (computer-assisted design/computer-assisted manufacturing), parameters such as water pressure, feed rate and the size of nozzle, grit and cutting jewel interact with cutting speed and tolerances to determine the actual finished edge on a given material.

Currently Creative Edge strikes a fifty-fifty mix of architectural design work and industrial applications. On the industrial end, use of abrasive waterjet eliminates tool and dye costs, its cold process sidesteps typical problems of slag, burrs, delamination and metal contamination associated with heat-related processes. Milling costs, as well as production time, are also dramatically reduced with this technology.

From a design standpoint, abrasive waterjet technology opens up an exciting degree of design freedom. The vanishing skilled craftsman reappears in the form of this precision cutting technology. A wide palette of materials can be cut: granite, marble, metals and alloys, glass, plastics, acrylics, rubber, and high-pressure laminates, to name a few.

Equally liberating in terms of design is the fact that abrasive waterjet cutting handles intricate shapes with ease. Aalto says, “With this technology anything that can be drawn can be cut. Stone and metal have become graphic media, just like paper and pencil used to be. Now we take stone, for example, and use it almost like paint.”

Aalto’s design background gives the company competitive edge. A client can come in with an idea or sketch; Aalto will then interpret the idea, make suggestions, and produce a blueprint. Once the drawing is approved, a computer programme digitizes the drawing, developing a production ready blueprint that meets the client’s needs and interfaces directly with the cutting machinery.

A world map mosaic for Denver’s new airport was created in this way, illustrating both the technology’s cutting capabilities and the company’s unique design resources. The client had a concept. Aalto suggested the materials, and a stunning piec resulted. Like a giant jigsaw puzzle spanning 7 feet x 25 feet, each of the map’s 4,500 multi-color stone pieces has been individually cut and fitted to create a panoramic view of continents swirling bodies of water.

At Chicago O’Hare Airport’s United Airlines terminal, Creative Edge cut glass for a spectacular overhead sculpture of neon and glass designed by architect Murphy Jahn. Another high visible project is the Astronauts’ Memorial Florida’s Kennedy Space Center. The 40 foot x 100 foot memorial has been programmed to generate light rotate, tracking the sun’s movements. Created from five-foot square panels of two-inch thick granite, the memorial’s highly polished surface mirrors clouds and changing sky. The names of United States astronauts who have given their lives in pursuit of space exploration appear in the bluish granite-like stars. Creative Edge cut the names of the granite and filled it in with inlaid crystal, the memorial rotates in the sunlight, light shining through the astronauts’ names, causing them to twinkle like stars in a night sky.

Closer to home, Creative Edge recently worked with Baldwin White Architects, Des Moines, for tower structure for the Forest Avenue Branch of Des Moines Public Library. Conceived as a new icon for the community, the library tower crowns the Mid-City Vision Committee’s years of effort to improve the neighborhood on the north side of Moines.

Children of the community were enlisted to help light the way. Students from Martin Luther King Jr. Elementary School and Moulton Middle School selected appropriate quotations for each of the four book-like panels at the base of the twenty-foot library tower. Now the library is not only the heart of the community but the heart of the library.”
Right) Shooting a stream of light into the neighborhood's night skies, two luminaires installed at the top and bottom of the Forest Avenue Library tower structure create a steady light column that illuminates words of wisdom elected by area school children. Says project coordinator Roger Spears of Baldwin White Architects, "There was always an idea that the tower would be about the importance of education and reading, that it would be about light and learning."

The Baldwin White design team had planned to laser cut on the one-half-inch-thick aluminum panels for the children's quotations, but discovered at laser cutting would not work with this material. The team was unable to find anyone able to do the work until they tracked down Creative Edge. Says Spears, "Here we were searching all over the country and right in our backyard we found someone. ... It's amazing that we have this great source that is virtually unknown in Iowa."

Creative Edge's clients run the gamut from medical implant manufacturers to aircraft parts suppliers, upscale hotels to department stores. Thousands of one-inch-thick stainless steel letters that are fourteen inches high were cut by Creative Edge for signage throughout a Hyatt regency Hotel complex in San Francisco. Solid stainless steel was selected for the project to resist corrosion from the salty air. Creative Edge recently completed a series of stainless steel medallion mosaics for Lord & Taylor using three kinds of marble, brass lettering and ornate brass scrollwork. "Architectural signage is an area that has grown with us," says Aalto. "With waterjet, you can incorporate a new, high-end image ... but that's affordable."

"I think waterjet and our company is actually having an influence on the direction of decorative elements and the kinds of things architects and designers are putting into their designs," says Aalto. "There is a mini-renaissance taking place. Many of the things done painstakingly by hand a hundred years ago, which have since fallen away, can now be done efficiently in a modern way, with a lot of detail. In fact, things can actually be done with more detail."

Innovative technology is driving our world, shaping the way we perceive the world. In terms of architectural design, abrasive waterjetting is creating some breathtaking shapes.

Kristina Ladd Campbell is a freelance writer who lives in Fairfield, Iowa. 
“The laws of logic, economy, optics, physics, prudence, and even good taste, show that this table does not exist: it is an aberration, an illusion,” says designer Philippe Stark.

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ROBERT A. NOVAK, AIA
**Buildings of Iowa**

*Buildings of Iowa* by well-known architectural historian David Gebhard and architectural photographer Gerald Mansheim has been published by Oxford University Press. The book encompasses the full range of Iowa's buildings, from early Native American influences to the present. It takes readers on a fascinating tour of the history and diversity of the state's architecture, from the corncribs and grain elevators to the Prairie-Style bank buildings, Beaux Arts courthouses, Italianate courthouses, Italianate grain elevators to the corncribs and grain elevators, Beaux Arts Prairie-Style bank buildings, and Streamline Moderne houses that can be found in many of Iowa's cities and towns. This comprehensive and lively guide reveals the unity of urban and rural reflected in Iowa's buildings and landscape.

The book offers a treasure trove of architectural discoveries for the scholar, the buff, and the curious. Arranged by the five geographic areas of Iowa and alphabetically by city and town within each region, detailed maps to the properties listed inspire self-guided tours.

Illustrated with more than 400 photographs, line drawings, and maps, *Buildings of Iowa* is the second book in the Society of Architectural Historians monumental series, *Buildings of the United States*. Designed to identify and celebrate American culture as reflected in our architecture, the series will eventually include every state, schools, Art Deco service stations, and Streamline Moderne houses that can be found in many of Iowa's cities and towns.

Recently President of the National Architectural Accrediting Board, Inc. (NAAB) and former Vice-President of the National AIA, Professor Gregory Palermo, FAIA, has a B.Arch. from Carnegie Mellon University and a Master of Architecture and Urban Design from Washington University. In 1990 he chaired the AIA's Architectural Education Task Force and has taught at the School of Architecture, Washington University in St. Louis. Palermo has served as principal, manager and designer for a wide range of projects at several firms, including Mackey Associates and Hellmuth Obata and Kassabaum, both located in St. Louis. Most recently, Palermo has been at Architects Wells Woodburn O'Neill, and is currently on the board of Iowa Architect.

**A Test of Time**

Revered by a generation of architects for its simplicity of form, technological innovation, and brilliant siting, the Deere & Company Administrative Center in Moline, Illinois, designed by Eero Saarinen, was elected by the AIA to receive its 1993 Twenty-Five Year Award. Saarinen's projects have now garnered his award an unprecedented six times, a testament to the power of the Modernist giant's work.

"The Deere & Company Administrative Center looks better today than it did 25 years ago," noted the AIA Honor Awards Jury in making its selection. As the landscape matured, the building is now seen in the way Saarinen envisioned, and the original concept has been validated."
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